
TRAFFIC IMPACT STUDY GUIDELINES

Traffic Impact Study Scope

1. A scope request must be submitted to the city for all new projects and updates regardless of the trip generation volumes. Generally, one intersection shall be analyzed for every 100 peak hour trips. If a study has less than 100 peak hour trips, one intersection will be required to be analyzed. For scoping purposes, the peak hour trips shall be calculated without any pass-by adjustments. The city may require additional intersections due to the location and nature of the development. Please email all scope requests to pwtrafscope@cityofhenderson.com.
2. The scope request must include trip generation volumes, vicinity map and a site plan. The site plan must include at a minimum north arrow, any existing and proposed driveways, adjacent and opposing driveways, medians, drive aisles, building footprints with square footage labeled, closest adjacent streets labeled and the parcels APNs. A preliminary trip distribution is optional unless otherwise specified within the scope. The city highly encourages early review of the distribution for any site to minimize review time of the study and to reduce the number of reviews.

Trip Generation Analysis (TGA)

A TGA is typically required on projects generating up to 100 peak hour trips for the entire proposed development. TGA can consist of but not limited to a trip generation, School walking paths (for residential projects), pedestrian analysis (for commercial projects), response times, and cost participation.

Traffic Impact Study

A TIS is typically required on projects generating 100 peak hour trips or more for the entire proposed development. The City of Henderson (City) may require traffic studies, regardless of the number of trips generated by the development, as the City deems necessary due to the type of development proposed and the location. Updates will be required as different phases are built, regardless of the number of trips.

1. **Trip Generation:** Trip Generation should be calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, latest edition (See www.ite.org). In addition, Section 3.4 of the ITE Trip Generation Handbook titled Recommended Procedure for Estimating Trip Generation should be used.
2. **Pass-By Trip Reductions:** Pass-by trip reductions should be calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, latest edition (see www.ite.org). Pass-By Trip Reductions shall not be applied to driveway volumes. Reductions for diverted link trips are not permitted. For projects that qualify for a pass-by reduction, a pass-by figure and a primary trip figure shall be submitted/approved before the study can be formally submitted. These figures shall illustrate the distribution and assignment for both pass-by and primary trips. Internal capture is generally not allowed to be combined with pass-by trip reductions unless mutually agreed upon by the City and the consultant engineer.
3. **Mixed Use Projects:** For mixed use projects of regional significance, internal capture rates shall be approved by the City Traffic Engineer or designee before the study is formally submitted.

4. **RTC Transit Routes:** Provide a bus turnout on the far side of all Major Collector/Major Collector intersections and greater as a minimum. A combination bus turnout/right-turn lane may be required based upon review of the site plan. Other bus turnout locations will be reviewed on a case-by-case basis.
5. **Level-of-Service Analysis:**
 - Level-of-service calculations shall be based upon the latest edition of the Highway Capacity Manual.
 - If an unsignalized intersection operates at a level-of-service below C (D or less), please provide and analyze three mitigation measures including, but not limited to: signalization, channelized medians, turning lanes, increase in storage lanes, restricted turns, or additional lanes. Discuss the pros and cons of each mitigation measure provided. If an intersection operates at level-of-service D or poorer with mitigation measures, the analysis still needs to be provided in the traffic study. Based upon the results of the analysis, the City will determine if any of the mitigation measures will be implemented. This information is needed to evaluate the impact on the overall roadway system in the area and adjacent neighborhoods.
 - If a signalized intersection operates at a level-of-service below D (E or less), please provide and analyze three mitigation measures. Discuss the pros and cons of each mitigation measure provided. If an intersection operates at level-of-service E or poorer with mitigation measures, the analysis still needs to be provided in the traffic study. Based upon the results of the analysis, the City will determine if any of the mitigation measures will be implemented. This information is needed to evaluate the impact on the overall roadway system in the area and adjacent neighborhoods.
6. **Warrant Analysis:** Signal warrant analysis shall be based upon the latest issue of the Manual on Uniform Traffic Control Devices (MUTCD). In general, the peak hour warrant shall not be used to warrant new traffic signals for typical commercial and residential land uses. The City may allow the use of projected volumes for warrant analysis provided the analysis shows projected 8 hour traffic signal warrants being satisfied. In addition to the Traffic Signal Warrant Analysis, provide progression analysis if a new or future signal is needed or recommended. If a new signal is proposed on a roadway being coordinated by the Freeway and Arterial System of Transportation (FAST), the proposed signal location will need to be submitted to FAST for their concurrence.
7. **Progression Analysis:** If a new signal is proposed on a roadway with existing or proposed traffic signal coordination performed by FAST, the proposed signal location and progression analysis shall be submitted to FAST for their concurrence. Unless otherwise approved by the City, the arterial green band shall be a minimum of 40 percent of the cycle length.
8. **Queuing Analysis:**
 - Provide a queuing analysis for all project driveways in a residential gated community.
 - A 30 second service time per vehicle with one storage lane shall be used in the analysis. A separate visitor lane and turn-around area will need to be provided per RTC Standard Drawing No. 222.1, "Commercial and Multi-Family Driveway and Security Gate Geometrics".
 - A left turn lane and/or right turn lane at the project entrance shall not be included as part of the storage distance.

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- The available queuing distance shall be a minimum of 50 feet measured from the back of curb to the visitor call box or the distance per the queuing analysis, whichever is larger on Collector Roadways and 100 feet measured from the back of curb to the visitor call box or the distance per the queuing analysis, whichever is larger on Arterial roadways.
 - A special queuing analysis will be required for all drive-thru locations and industrial/warehousing sites. Coordinate with COH Traffic Staff regarding queuing analysis requirements.
 - Methodology from the ITE Transportation and Land Development publication shall be used (See www.ite.org).
 - Typical passenger vehicle queue length is 25 feet. Typical truck vehicle queue length is 75 feet.
9. **Truck Parking:** All Industrial/warehousing projects must include a detailed discussion on truck parking. The discussion must include the following:
- The weekday truck trips based on the ITE Trip Gen Code 150 and the truck parking generation rate (2.24% for warehouse and 4.33% for transportation and logistics) in the California Statewide Truck Parking Study (Feb 2022) must be used to calculate the demand for truck parking for any industrial/warehousing project. The parking study document is available on the Caltrans website at
 - <https://dot.ca.gov/-/media/dot-media/programs/transportationplanning/documents/freight-planning/plan-accordion/catrkpkgstdy-finalreport-all.pdf>. The calculated truck parking demand must be provided outside of any gated area within all industrial/warehousing projects and illustrated on the site plan submitted with the TIS.
 - Coordinate with COH Traffic Staff regarding truck parking requirement.
10. **Left/Right Turn Storage Analysis:**
- Left-turn and right-turn storage bay analyses must be performed at all study intersections and project driveways identified in the traffic impact study scope.
 - Left turn storage at signalized intersections is to be calculated using the FAST timing. If the timing sheet is not available, the Poisson method, a 95 percent confidence and a 3-minute wait.

$$Desirable\ Storage = \{N + (z * [sqrt\ N])\} * X \frac{feet}{vehicle}$$

C = Cycle Length (Sec)

N = (veh/interval)

N = [(V) x (C/3600)]

V= vehicles per hour

Z = 1.645 for 95% confidence level

- Storage at unsignalized intersections is to be calculated assuming a uniform arrival rate with a 2-minute wait.

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$$\text{Desirable Storage} = \left[\left(\frac{\text{number of vehicles}}{60\text{min}} \right) * 2 \text{ minutes} \right] * X \frac{\text{feet}}{\text{vehicle}}$$

- HCM modules for left turn storage from alternative programs such as Vistro are acceptable but must be accompanied by a side comparison with an acceptable module such as Syncho HCM module and or HCS.
- If the left turn storage exceeds the available pocket, the developer must extend the storage bay to meet the required storage and/or the Traffic Impact Study must include cost participation. If the left turn storage cannot be extended, coordination with COH Traffic Staff is required to find alternative mitigation measures such as but not limited to reducing the square footage of the building to decrease the anticipated trips.
- The minimum storage length for right turn lanes is required to be 150-ft and a taper that complies with RTC Standard Drawings.
- Typical passenger vehicle length is 25 feet.
- For projects that generate truck traffic, a separate left turn storage calculation must be provided specifying the percent of truck traffic generated and the average length (75-feet) of a truck or the largest vehicle utilizing the site, whichever is larger. The passenger car equivalent (PCE) shall not be used.

11. Intersections of Major Collector and Minor Arterial: Additional rights of way for dual left turn lanes and right turn lanes are required for all intersections of major collector roadways and greater per RTC Standard Drawing 201.1, Additional Right-of-Way at Major Intersections. (See www.rtcnv.com). Right of way for intersection flaring may also be required at any intersection as determined by the Public Works Director or designee. Additional rights of way for roundabouts are required per NCHRP Research Report 1043 Guide to Roundabouts.

12. Driveways:

- Common driveways shall be required between developing parcels with similar uses proposed. Exceptions to this requirement must be approved by the Director of Public Works and/or the Community Development Director. (See Henderson Development Code Section 19.12).
- No more than two driveways shall be allowed along the property frontage of any street. If the driveway spacing cannot be met, then only one drive will be allowed. Additional driveways shall require approval from the Director of Public Works. (See Henderson Development Code Section 19.12).
- Residential development with 100 units and larger or at COH discretion shall have 2 full access points.
- Except for the DCC zoning district, driveways into commercial, business park, office complex and warehouse developments that generate more than 500 vehicle trips per day shall be spaced 200 feet centerline to centerline for driveways accessing Major Collector roadways and 300 feet centerline to centerline for driveways accessing Minor Arterial roadways and greater. Driveways in the DCC zoning district shall be approved by design review. (See Henderson Development Code Section 19.12).
- Driveways will not be permitted within right turn lanes.

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13. Cost Participation Analysis / Critical Lane Analysis:

- Use 66.6% (2/3) for 2 lanes and 50% (1/2) for 3 or more lanes in calculating the critical lane for multilane facilities. Use 55.5% for dual left turn lanes or dual right turn lanes.
- Use 1200 vehicles per hour as the critical lane volume at intersections and 1,140 per hour at T intersections. The current cost of a signal is approximately \$275,000 for intersections of City roadways and \$300,000 on state roadways. The cost is subject to change by the City based upon actual bid prices.
- If left turn volumes exceed 300 vehicles per hour, dual lefts may be required. Participation for dual lefts is computed using a 300 vehicle per hour capacity. The current cost for dual-left turns is approximately \$150,000.
- For Major Collector roadways or greater, right-turn lanes may be required for driveways that are projected to have 50 to 99 entering passenger vehicles during the peak hour and right turn lanes will be required for all driveways that are projected to have 100 entering passenger vehicles or more during the development's peak hour.
- For Major Collector roadways or greater, right turn lanes may be required for industrial/warehousing projects at driveways that are utilized for truck traffic. This will be determined on a case-by-case basis. Coordination with COH Traffic Staff is required.
- If right-turn volumes exceed 100 vehicles per hour at an intersection, a right turn lane may be required. Right turn lanes may also be required as determined by the Director of Public Works. Right turn lanes shall not be required for driveways in the DCC zoning district.
- The current cost for right turn lanes is approximately \$150,000. A capacity of 150 vehicles per hour should be used for participation calculations for intersections.
- Use existing lane configurations in the analysis and what is committed to be built by the developer.
- When projects are built in phases, the study will address the improvements to be constructed with each phase and the associated participation for each phase.

14. Traffic Crash Analysis: The intersections and mid-block locations to be analyzed shall be specified in the TIS scope. Crash data is to be supplied by the City of Henderson police. In general, a crash analysis shall include the number of crashes and a crash rate. Crash rates shall be calculated per million vehicle miles for segments and per million entering vehicles for intersections. Traffic and pedestrian Crash data including a minimum period of 3 years shall be evaluated at intersections, median openings and mid-block as required in the scope.

15. Figures to be included in the Traffic Impact Study:

- Vicinity Map.
- Site Plan Map.
- Directional Distribution
- Existing traffic Volumes
- Peak Hour Site Only Volumes
- Future Background Traffic Volumes
- Future Background with Site Traffic Volumes.

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- Existing Geometrics and Control.
- Recommended Geometrics and Control.
- School Walking Routes for Residential Developments.
- Site Plan or Project Boundary Superimposed on Aerial Photograph.
- Time-Space Diagrams for traffic signal progression, if applicable.

16. Additional Items to be Included in the Traffic Impact Study:

- Traffic Impact Study Scoping Checklist.
- Planning Commission and City Council Conditions.
- Site plans showing, at a minimum, building with square footages, drive aisles, street names (public and private), medians, right-of-way, opposing/adjacent driveways, and gated entries.
- Completed Traffic Impact Study Submittal Form.
- Statement of Conformance to NDOT's Access Management System and Standards, if applicable. See (<https://www.dot.nv.gov/doing-business/documents-and-publications>).
- Any addition exhibits and figures required within the scope of work or comment letter.

17. Submittal Fees: Submittal Fees will need to be paid at the time of initial submittal. Fees are included in the City of Henderson Public works Permits, Study & Review Fees labeled "Table J Public Works Permits, Study and Review fees"

(<https://www.cityofhenderson.com/government/departments/development-services-center/fees-schedules>).

18. Traffic Impact Study Update: Traffic Impact Study Updates will be required as different phases of a project are built regardless of the number of trips. The update will need to address cost participations and improvements that will be constructed. Generally, an update will be required if more than 2-years has passed since the latest update or acceptance, and/or traffic patterns within the study area have changed.

19. Master Transportation Plan Amendments and Vacation Studies:

- Master Transportation Plan amendments shall be classified as legislative, quasi-judicial or minor adjustment.
- Legislative amendments are those changes that involve the creation, broad scale implementation or revision of public policy, including large scale map changes where a significant number of property owners are directly affected. Legislative amendments shall require a vacation study.
- Quasi-Judicial amendments are those that affect only the subject property or other properties in the immediate vicinity. Quasi-judicial amendments should require a vacation study.
- Minor adjustment amendments involve only a single property and may not require a vacation study. A typical minor adjustment would be a minor adjustment to a street or highway alignment that would not affect the functionality of the roadway.
- The Director or Public Works or designee shall determine if a proposed amendment is legislative, quasi-judicial or minor adjustment.

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- The vacation study analysis for a Master Transportation Plan Amendment shall address the following:
 - The traffic impact Study area shall be generally determined by the properties adjacent to the proposed roadway to the nearest adjacent Major Arterial roadway in each direction including all minor collector roadways and greater. A roadway is required every quarter mile. The traffic impact Study area may be expanded by the Director of Public Works, Director of Community Development, or designee.
 - Traffic conditions shall be evaluated for existing conditions, 5-year, 10-year and 20-year projections with and without the proposed amendment.
 - The applicant shall identify the responsible party and propose mitigation and improvements for the 5-year, 10-year and 20-year scenarios.
 - Master Transportation Plan amendments that involve establishing new alignments shall demonstrate the new alignment is consistent with the following elements:
 - The new alignment maintains the intent and purpose of the proposed alignment originally shown on the plan maps.
 - The new alignment will not adversely affect the carrying capacity, safety, or integrity of the transportation system.
 - The new alignment is necessary to preserve a significant natural feature, minimize engineering or construction constraints or would result in a significant enhancement of the development potential of affected properties.
 - The new alignment will not significantly increase the cost or complexity of any off-site improvements.
 - The new alignment does not have significant adverse effects on nearby property.

20. Miscellaneous:

- The Traffic Impact Study will need to be approved before any improvement plans are submitted for review and approval. A copy of the traffic impact Study approval letter shall accompany the improvement plans at the time of submittal.
- Any incomplete information provided with the Traffic Impact Study will result in the entire submittal being rejected.
- Civil Improvement mylars will not be signed and released until the applicable traffic participation fees have been paid.

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