TECHNICAL MEMORANDUM

DATE: December 9, 2025
TO: Nicole Morse, T&B Planning, Inc.
FROM: Alex So, Urban Crossroads, Inc.
JOB NO: 16408-01 VMT

SUBJECT: APPLE VALLEY 84 VEHICLE MILES TRAVELED (VMT) ANALYSIS

Urban Crossroads, Inc. has completed the following Vehicle Miles Traveled (VMT) Analysis for the Apple Valley 84 development (Project), which is located north of Stoddard Wells Road and south of Johnson Road in the Town of Apple Valley.

PROJECT OVERVIEW

The Project consists of the development of an industrial warehouse and distribution building totaling 1,381,412 square feet. A site plan for the proposed Project is shown in Attachment A.

BACKGROUND

The California Environmental Quality Act (CEQA) requires all lead agencies to adopt VMT as the measure for identifying transportation impacts for land use projects. To comply with CEQA, the Town of Apple Valley adopted Resolution No. 2021-08 A Resolution of the City Council of the Town of Apple Valley, California, Adopting Thresholds of Significance for Vehicle Miles Traveled (VMT) Under the California Environmental Quality Act (CEQA) (May 11, 2021) (1) (**Town Guidelines**), which documents the Town's adopted VMT methodology and impact thresholds based on guidance as provide by the San Bernardino County Transportation Authority's (SBCTA) Recommended Traffic Impact Analysis Guidelines for Vehicle Miles Traveled and Level of Service Assessment (February 2020) (2). This VMT analysis has been prepared based on the adopted Town Guidelines.

TRAFFIC MODELING METHODOLOGY

The Town Guidelines identifies the San Bernardino Transportation Analysis Model (SBTAM) as the appropriate tool for conducting VMT forecasting and analysis for land use projects in Town of Apple Valley as it considers interaction between different land uses based on socio-economic data (SED), such as population, households, and employment. The current version of SBTAM (version 3.2 also referred to as SBTAM+) was last released in June 2024 and represents the most current sub-regional transportation model for San Bernardino County. The calculation of VMT for land use projects is generally based on the number of trips generated and the average trip length of each vehicle type.

VMT ANALYSIS METHODOLOGY

Consistent with Town Guidelines, VMT has been estimated using the Origin/Destination method and Boundary method. For both methods, VMT is presented as total VMT and VMT per Service Population. Total VMT is an estimate of total vehicle travel and considers all vehicle trips and trip

purposes; whereas VMT per service population is an efficiency metric that represents VMT generated on a typical weekday per person who lives and/or works in the Town of Apple Valley or in the case of the Project, per person who works within the Project. Total VMT provides an estimate of the total vehicle travel, while VMT per service population measures the efficiency of travel. Consistent with Town Guidelines, the efficiency metric VMT per service population (SP) has been adopted by the Town of Apple Valley for VMT impact analysis.

Origin/Destination VMT

The Origin/Destination (OD) method for calculating VMT sums all weekday VMT generated by trips with at least one trip end in the study area (i.e., Project boundary) and tracks those trips to their estimated origins/destinations. Origins are all vehicle trips that start in a specific traffic analysis zone (TAZ) and destinations are all trips that end in a specific TAZ.

Boundary VMT

Town Guidelines identifies that any VMT analysis should also contain an evaluation of a project's effect on VMT, which can be performed using the boundary method of calculating VMT. The boundary method is the sum of all weekday VMT on the roadway network within a designated boundary (i.e., Town boundary). The boundary method estimates VMT by multiplying vehicle trips on each roadway segment within the boundary by that segment's length. This approach consists of all trips, including those trips that do not begin or end in the designated boundary. Consistent with Town Guidelines, the Town of Apple Valley was used as the boundary for this assessment.

VMT METRIC AND SIGNIFICANCE THRESHOLD

As stated in the Town Guidelines, the appropriate VMT metric is VMT per service population. A project would result in a significant project-generated VMT impact if either of the following conditions are satisfied:

1. The baseline project generated VMT per SP exceeds the Town of Apple Valley General Plan Buildout VMT per SP, or
2. The cumulative project generated VMT per SP exceeds the Town of Apple Valley General Plan Buildout VMT per SP.

The project's effect on VMT would be considered significant if it results in either of the following conditions to be satisfied:

1. The baseline link-level boundary Town-wide VMT per SP increases under the plus project condition compared to the no project condition, or
2. The cumulative link-level boundary Town-wide VMT per SP increases under the plus project condition compared to the no project condition.

The Town of Apple Valley's VMT per capita was calculated utilizing the SBTAM's horizon year (2050) traffic model. All TAZs located within Town of Apple Valley were selected and the Total VMT was calculated from SBTAM. For ease of comparison, the VMT for the Town was then divided by the Town's service population. Resulting in the Town of Apple Valley's General Plan Buildout average of 33.2 VMT per service population, as presented in Table 1.

TABLE 1: TOWN OF APPLE VALLEY GENERAL PLAN BUILDOUT (GPBO) VMT PER SP

	Town GPBO
Service Population	123,280
VMT	4,406,862
VMT per Service Population (Threshold)	35.7

PROJECT VMT ESTIMATES

To estimate project generated VMT, standard land use information such as building square footage and dwelling units must first be converted into a SBTAM compatible dataset. The SBTAM Model utilizes socio-economic data (SED) (e.g., households and employment) as key inputs for the purposes of vehicle trip estimation. Table 2 summarizes the SED inputs used to represent the Project. This SED information was then added to the Project's TAZ to obtain project generated VMT.

TABLE 2: PROJECT'S EMPLOYMENT ESTIMATES

Land Use	Quantity (in SF)	Employment Density Factor[1]	Estimated Employees
Industrial	1,381,412	1,195 SF per Employee	1,156

[1] Employment conversion factors are derived from the SCAG Employment Density Report (2001).

Project generated VMT and a comparison to the Town's impact thresholds are presented in Table 3. SBTAM output data can be found in Attachment B. The Project is estimated to generate VMT per service population exceeding the Town of Apple Valley's VMT impact threshold.

TABLE 3: PROJECT'S VMT PER SERVICE POPULATION

	Baseline	Cumulative
Town Threshold	35.7	35.7
Project Employees	1,156	1,156
Project VMT	43,638	48,120
Project VMT per Service Population	37.8	41.6
Exceeds VMT Threshold?	Yes	Yes

VMT REDUCTION STRATEGIES

Table 4 illustrates the percentage in which the Project exceeds the Town's impact threshold for cumulative conditions and the resulting reduction in total VMT needed to bring the Project below the threshold.

TABLE 4: PROJECT'S REQUIRED VMT REDUCTION

	Project
% Total VMT Reduction Required	14.2%
Total VMT above Threshold	6,850

The California Air Pollution Control Officers Association (**CAPCOA**) Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and

Equity (October 2024) (**Handbook**) (2) has been utilized to determine trip reduction measures that would be applicable to the Project. The Handbook describes methods to quantify reductions in greenhouse gas emissions and, in the case of Transportation measures (i.e., trip reduction strategies), the associated reductions to VMT. This evaluation will focus on a review of the Handbook's Transportation measures that are determined to be applicable to the Project.

SELECTING MEASURES

To determine which Transportation measures should be considered from the Handbook, land use type, scale, and locational context are each identified as key factors for determining an individual measure's applicability to a development project. The Handbook contains a fact sheet for each measure that describes the measure, locational context, scale of application, implementation requirements, and other considerations that should be reviewed to determine a measure's applicability.

Project Type

Project type is an important consideration when determining which measures are applicable for consideration. For example, measures associated with neighborhood design are not applicable to an office project, whereas trip reduction programs intended to reduce employee commute VMT would not be applicable to an apartment project.

Scale

The Handbook identifies that measures can be applied at different scales or geographic levels, however, "some measures may only be applicable at the project-level, whereas others may be more appropriate within a broader planning context such as for a general plan or climate action plan." The geographic levels considered in the Handbook include Project/Site and Plan/Community. Project/Site applies to measures that can reduce VMT at the scale of an individual development project or employer. Plan/Community refers to measures that reduce VMT at the scale of a specific plan, general plan, or climate action plan. Transportation measures can be quantified at either the Project/Site scale or the Plan/Community scale, but never both.[1]

Locational Context

The Handbook describes locational context as "used to identify trip reduction measures within the transportation sector that are appropriate in certain types of neighborhoods differentiated by transportation characteristics and level of development (e.g., rural, suburban, and urban)." More specifically, rural, suburban, and urban are defined as follows.

Rural: An area characterized by little development. Compared to urban and suburban areas, rural areas have a lower density of residences, higher numbers of single-family residences, and higher numbers of vehicle dependent land use patterns. Where applicable, the Handbook provides three land use distinctions within the rural locational context category—R_a, R_b, and R_c. R_a refers to rural areas within a master-planned community. These rural areas often include a broad offering of amenities and services, which may be accessed by walking or other alternative forms of transportation. R_b refers to rural areas adjacent to a commuter rail station with convenient rail

[1] Handbook, Page 37

service to a major employment center. As the name implies, these rural areas have greater access to commuter rail as an alternative mode of transportation. R_C refers to rural areas with transit service and that are near jobs/services.

Suburban: An area characterized by dispersed, low-density, single-use, automobile dependent land use patterns, usually outside of the central Town. Also known as a suburb.

Urban: An area located within the central Town with higher density land uses than in the suburbs. Often characterized by multi-family housing, tall office buildings, and dense retail.

The Project's locational context is determined to be suburban.

Transportation Measures

As noted in the Handbook, the Transportation section measures "promote transit and alternative transportation, support use of alternatively fueled vehicles, or encourage land use planning practices that reduce vehicle trips and vehicle miles traveled (VMT). Measures within the transportation sector are separated into six subsectors: Land Use, Neighborhood Design, Parking or Road Pricing Management, Transit, Trip Reduction Programs, and Clean Vehicles and Fuels."[2] For the purposes of this evaluation, the measures listed within the Trip Reduction Programs subsector that are focused on reducing employee commute VMT would be most applicable to the Project's employment generating land uses.

Trip Reduction Programs Subsector

Each fact sheet within the Trip Reduction Programs subsector was reviewed to determine each measure's applicability to the Project.

The following explores all applicable mitigation measures for an employment project located in a suburban area. The quantification below assumes that potential future tenants implement the identified measures using default values supplied by the Handbook's calculation fact sheet. Generally, trip reduction programs are more appropriate for the occupant/tenant (i.e., employer) to implement and monitor rather than the building owner or developer. As such, any VMT reductions are estimates only, as the Project does not have known tenants.

The City's VMT threshold is based on total VMT per service population, which includes all trip types, not just commute trips. However, the following VMT mitigation measures are designed to reduce home-based work (HBW) VMT only.

For industrial projects, where non-work trips (e.g., truck, visitor, and delivery trips) make up a significant portion of total VMT, these HBW focused measures may have limited effectiveness. As a result, even with mitigation, it can be challenging for an industrial project to reduce total VMT enough to meet the City's threshold.

T-7 Implement Commute Trip Reduction (CTR) Marketing

Future project employers shall implement a marketing strategy to promote a CTR program. Information sharing and marketing promote and educate employees about their travel choices to the employment location beyond single occupancy driving such as carpooling, taking transit,

[2] Handbook, Page 30

walking, and biking, thereby reducing VMT. The following features (or similar alternatives) of the marketing strategy are essential for effectiveness.

- On-site or online commuter information services.
- Employee transportation coordinators.
- On-site or online transit pass sales.
- Guaranteed ride home service.

TABLE 5: T-7 VMT CALCULATION VARIABLES

ID	Variable	Value	Unit	Source
Output				
A	Percent reduction in GHG emissions from project/site employee commute VMT	0-4.0	%	calculated
User Inputs				
B	Percent of employees eligible for program	0-100	%	user input
Constants, Assumptions, and Available Defaults				
C	Percent reduction in employee commute vehicle trips	-4	%	TRB 2010
D	Adjustment from vehicle trips to VMT	1	unitless	assumed

$$A = B \times C \times D$$

Project employers will provide their employees with materials and online resources as a means to promote the commute trip reduction program. As calculated for the Project, with proper implementation and 90%[3] of the Project's employees eligible, this design feature is expected to reduce home-based work (HBW) attraction VMT by 3.6%.

T-8 Provide Ridesharing Program

The Project will provide a ridesharing program and establish a permanent transportation management association with funding requirements for employers. Ridesharing encourages carpooled vehicle trips in place of single-occupied vehicle trips, thereby reducing the number of trips and VMT. Ridesharing must be promoted through a multifaceted approach. Examples include the following.

- Designating a certain percentage of desirable parking spaces for ridesharing vehicles.
- Designating adequate passenger loading and unloading and waiting areas for ridesharing vehicles.
- Providing an app or website for coordinating rides.

TABLE 6: T-8 VMT CALCULATION VARIABLES

ID	Variable	Value	Unit	Source

[3] Employees who might not be able to participate could include those who work nighttime hours when transit and rideshare services are not available or employees who are required to drive to work as part of their job duties. As the Project is estimated to operate during typical business hours, it is expected that 90% of the employees will be operating during hours in which services associated with reduction measures are available.

Output				
A	Percent reduction in GHG emissions from project/site employee commute VMT	0-8.0	%	calculated
User Inputs				
B	Percent of employees eligible for program	0-100	%	user input
Constants, Assumptions, and Available Defaults				
C	Percent reduction in employee commute VMT	-4	%	SANDAG 2019

$$A = B \times C$$

As calculated for the Project, with proper implementation and generally 90%[3] of the Project's employees eligible, the Project is expected to reduce VMT by 3.6%.

T-10 Provide End-of-Trip Bicycle Facilities

This measure is listed in the Handbook as available to projects in a suburban setting. As described in the Handbook, "the measure will install and maintain end-of-trip facilities for employee use. End-of-trip facilities include bike parking, bike lockers, showers, and personal lockers. The provision and maintenance of secure bike parking and related facilities encourages commuting by bicycle, thereby reducing VMT and GHG emissions."[4] The fact sheet for this measure was utilized to calculate the Project's potential VMT reduction.

TABLE 7: T-10 VMT CALCULATION VARIABLES

ID	Variable	Value	Unit	Source
Output				
A	Percent reduction in GHG emissions from project/site employee commute VMT	0.1-4.4	%	calculated
User Inputs				
	None			
Constants, Assumptions, and Available Defaults				
B	Bike mode adjustment factor	1.78 or 4.86[1]	unitless	Buehler 2012
C	Existing bicycle trip length for all trips in region	2.2	miles	FHWA 2017a
D	Existing vehicle trip length for all trips in region	11.7	miles	FHWA 2017a
E	Existing bicycle mode share for work trips in region	0.4	%	FHWA 2017b
F	Existing vehicle mode share for work trips in region	95.3	%	FHWA 2017b

[1]The bike mode adjustment factor should be provided by the user based on type of bike facility. A study found that commuters with showers, lockers, and bike parking at work are associated with 4.86 times greater likelihood to commute by bicycle when compared to individuals without any bicycle facilities at work. Individuals with bike parking, but no showers and lockers at the workplace, are associated with 1.78 times greater likelihood to cycle to work than those without trip-end facilities.

$$A = \frac{C \times \left(E - (B \times E)\right)}{D \times F}$$

This will promote an alternative mode of commuting for employees. As calculated, the Project will reduce VMT by 0.1%.

[4] Handbook, Page 100

Total VMT Reductions

The Handbook states that effectiveness levels for multiple measures within a subsector may be multiplied to determine a combined effectiveness level. Because the combination of measures and independence of measures are complicated, the Handbook recommends that measure reductions within a subsector be multiplied unless the user can provide substantial evidence indicating that emission reductions are independent of one another and that they should therefore be added. Each subsector has a maximum allowable reduction. These were derived by combining the maximum allowable reduction of each individual non-mutually-exclusive measure within the subsector. As all the Project Design Features above fall under the Subsector of "Trip Reduction Programs," the Handbook states that the "Trip Reduction Subsector" has a maximum reduction of 45%. Therefore, a project cannot exceed the maximum allowable reduction. The Handbook provides the following equation for combining Subsector reductions:

$$Reduction_{Subsector} = 1 - [(1 - A) \times (1 - B) \times (1 - C) \dots]$$

Project's VMT reduction are as follows:

$$-7.2\% = 1 - [(1 - 3.6\%) \times (1 - 3.6\%) \times (1 - 0.1\%)]$$

As outlined in the VMT reduction calculations, the Project includes a mitigation measure estimated to reduce its HBW VMT (commute-related VMT) by 7.2%. However, the Town of Apple Valley assesses VMT significance using the OD method, which considers all trip types and does not isolate trip purposes like HBW. Therefore, the 7.2% reduction applies only to a portion of the Project's total VMT and is not sufficient to fully mitigate the overall impact. As the Project is required to reduce its VMT by 14.2%, even with the VMT reduction achieved by implementing the measures discussed previously, the Project would continue to exceed the City's VMT threshold.

Project's Cumulative Effect On VMT

The Project's cumulative effect on VMT has been calculated using the boundary method. Land use information representing the proposed land use changes contemplated by the Project were coded into the Project TAZ to represent the "With Project" condition. Table 8 summarizes the boundary VMT under the No Project and With Project scenarios for both baseline and cumulative conditions and any increase to VMT per service population would be considered to have a significant cumulative VMT impact.

Table 8: Cumulative Boundary VMT

	Service Population	Boundary VMT	VMT per Service Population	Exceeds Threshold?
Town-wide Baseline No Project	101,801	1,468,489	14.4	-
Town-wide Baseline With Project	102,957	1,475,488	14.3	No
Town-wide Cumulative No Project	123,280	1,886,726	15.3	-
Town-wide Cumulative With Project	124,436	1,895,638	15.2	No

Boundary VMT increases under the With Project scenario for both baseline and cumulative conditions, which is expected as additional development is introduced into the model. However, to evaluate the efficiency of a land use project or plan, boundary VMT is divided by the service population to establish a per service population efficiency metric. Using this approach, the resulting

VMT per service population is reduced in the With Project scenario under both baseline and cumulative conditions.

CONCLUSION

Based on the results of this analysis, the following findings are made:

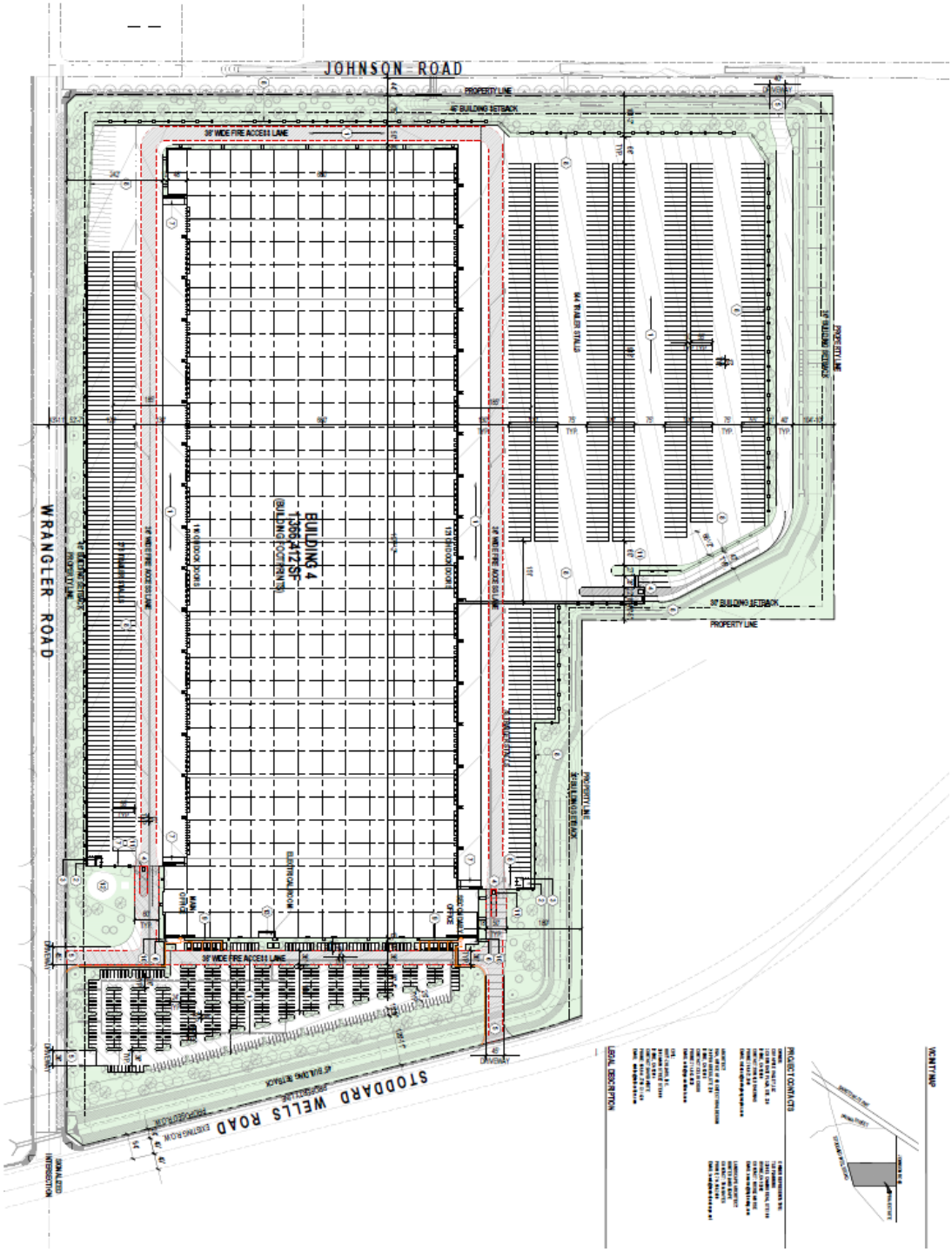
- The Project was evaluated using methodology and thresholds as outlined in the Town Guidelines.
- Project generated VMT estimates were calculated from the SBTAM Model and compared to the Town of Apple Valley's impact thresholds.
- Project generated VMT per service population was found to exceed Town's adopted VMT impact thresholds.
- Even with the inclusion of feasible VMT mitigation measures, the project generated VMT would continue to exceed the Town's impact threshold
- The Project's cumulative effect on VMT per service population was found to decrease in the With Project scenario compared to the No Project scenario, under both baseline and cumulative conditions, which is below the Town's cumulative impact threshold.

If you have any questions, please contact me directly at aso@urbanxroads.com.

REFERENCES

1. **Town of Apple Valley.** *Resolution of the City Council of the Town of Apple Valley, California, Adopting Thresholds of Significance for Vehicle Miles Traveled (VMT) Under the California Environmental Quality Act.* May 2021.
2. **SBCTA.** *Recommended Traffic Impact Analysis Guidelines for Vehicle Miles Traveled and Level of Service Assessment.* Febuary 2020.
3. **CAPCOA.** *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity.* October 2024.

ATTACHMENT A:
PROJECT SITE PLAN



ATTACHMENT B:
SBTAM OUTPUT DATA

	2019	2050
Auto VMT From	53945301	53945301
Auto VMT To	12990.66016	15585.72363
Auto VMT Intra	12260.78418	14416.29004
Auto VT From	120.624886	106.325569
Auto VT To	864.401367	997.530945
Auto VT Intra	828.323181	962.025269
Auto TripLen From	51.532818	45.423939
Auto TripLen To	15.028505	15.624301
Auto TripLen Intra	14.801933	14.985355
Auto TripLen All	2.340739	2.340739
Truck VMT From	15.312543	15.618402
Truck VMT To	8710.548828	9079.041992
Truck VMT Intra	8600.478516	9038.637695
Truck VT From	572.50415	426.769531
Truck VT To	438.873413	454.249023
Truck VT Intra	438.873413	454.249023
Truck TripLen From	244.582672	182.322556
Truck TripLen To	19.84752	19.986927
Truck TripLen Intra	19.596718	19.897979
Truck TripLen All	2.340739	2.340739
All VMT From	26.436309	24.361756
All VMT To	21701.20898	24664.76563
All VMT Intra	20861.26367	23454.92773
All VT From	693.129028	533.095093
All VT To	1303.27478	1451.780029
All VT Intra	1267.196533	1416.274292
All TripLen From	296.115479	227.74649
All TripLen To	16.651292	16.989327
All TripLen Intra	16.462532	16.561006
All TripLen All	2.340739	2.340739
Auto VMT From	18.40932	18.023125