



Connecticut Statewide Freight Plan Update

Appendix C – Truck Volumes Analysis

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August 2022



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I. TRUCK ANALYSIS DATA AND METHODOLOGY

This technical memorandum documents the 2015-2019 truck volume trends analysis. The trends information, including growth and change in truck traffic relative to all traffic, are reported at state, county, and route levels. Based on the period of available data, the trends information do not report impacts of the COVID-19 pandemic.

I.1 DATA

The following data were used in this analysis:

- **Connecticut Department of Transportation's (CTDOT's) Highway Performance Monitoring System (HPMS) 2015-2019 Data:** The HPMS data is annually reported by CTDOT to the Federal Highway Administration (FHWA). It contains tabulated average annual daily traffic (AADT) estimates for trucks (classified into single unit truck¹ and combination truck²) and total for all vehicle types by highway segment. This data supports truck and total traffic comparisons and trends analysis. The volume information is available only as bi-directional totals.
- **CTDOT's 2019 AADT Geographic Information System (GIS) Data:** This is a geospatial database developed by CTDOT that identifies AADT estimate and year of the count data by highway segment. This data enables visualization of segment level attributes both on a single direction and bi-directional basis. This analysis only uses the bi-directional segment features.
- **United States (U.S.) Census 2018 TIGER U.S. County Boundary Line GIS Data:** This is a geospatial dataset developed by the U.S. Census that identifies the boundaries of U.S. counties, including those in Connecticut.
- **Connecticut Department of Motor Vehicles' (DMV's) Bi-annual Weigh Station Reports:** These reports are prepared for the five weigh stations in the State located on interstate highways in Danbury, Greenwich, Middletown, Union and Waterford. The reports contain information on the total number of vehicles weighed, total number and type of vehicle inspections, total number and type of citations issued, and total potential fines for the weigh stations.

I.2 METHODOLOGY

The HPMS data and GIS data do not have a common segment identifier or route labeling system. The two types of data differ in the segment extents, that is, the beginning and ending postmiles. There are also extent differences within the different years of HPMS data. The HPMS data included all state routes and some local routes, while the GIS data includes all routes. The local routes that are missing in the

¹ A single unit truck is a single unit vehicle capable of carrying cargo.

² A combination truck is a combination vehicle made by articulating a truck tractor unit with one or more trailers containing cargo.

HPMS data are those where classification counts are not required. As a result, the analysis and visualization of the HPMS data using the GIS data required large data processing to identify matching routes and locations and repeating the processing steps for the different years of HPMS data.

HPMS and GIS data were matched via database queries (for state and local routes separately) in Microsoft (MS) Access software followed by post-processing in MS Excel to select the best match, and a small percentage of manual matching based adjustments. The result was many-to-many relationships between the HPMS and GIS data. For multiple HPMS data segments matched to the same GIS data segment, a distance weighted average was used to compute the average truck volume. For a single HPMS data segment matched to multiple GIS data segments, the truck volume data was kept the same. The visualization of truck volumes was done using the GIS data segments. There are GIS data segments with no HPMS data.

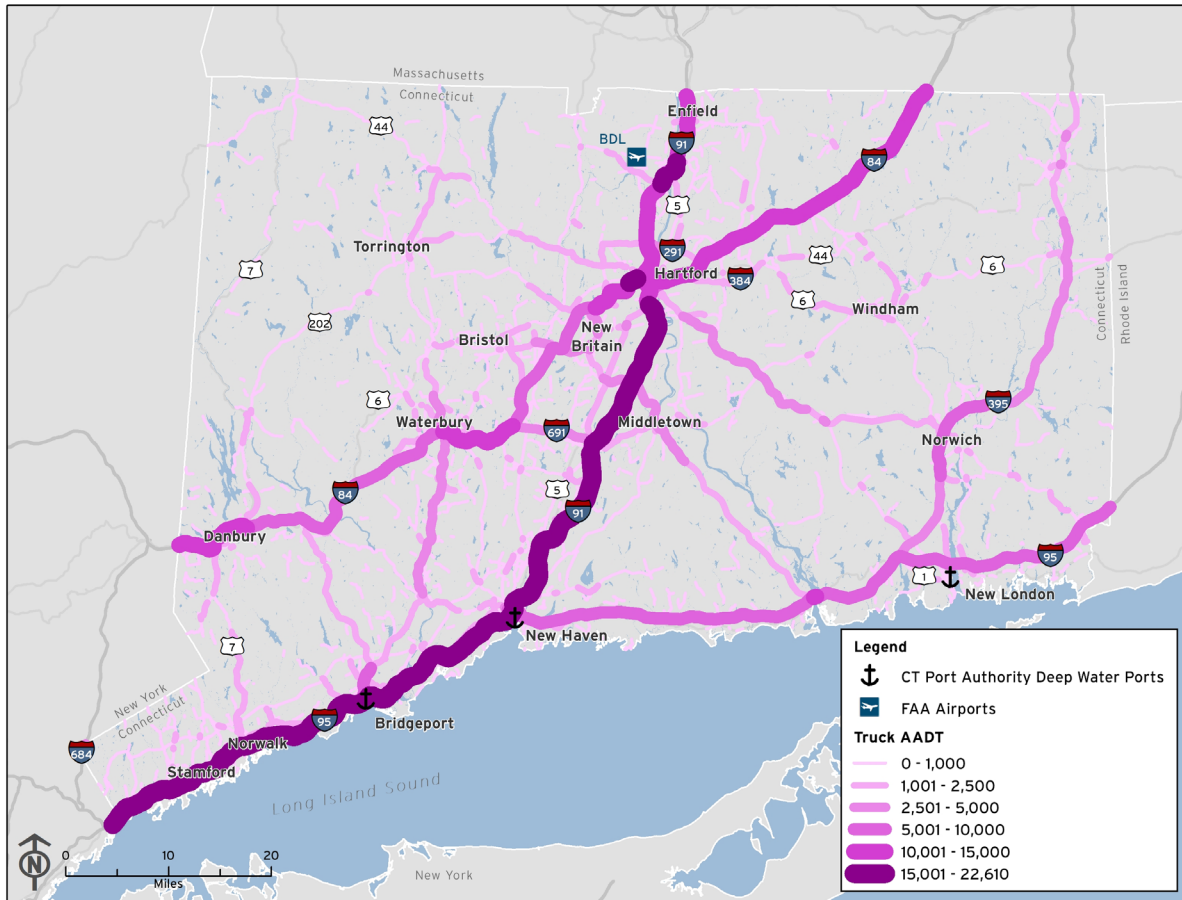
For the trends analysis, the Federal Information Processing Standard (FIPS) code and name for the county in which the GIS data segments are located were identified. Based on the established match between the HPMS data and GIS data, the county FIPS code and name were assigned to all HPMS data segments. The HPMS data for 2015-2019 was then summarized at route and county level, and trend charts and tables were developed.

2. STATEWIDE TRUCK VOLUMES AND TRENDS

2.1 2019 TRUCK VOLUMES

Figure 2.1 shows the 2019 average annual daily truck volumes across the State. Truck-based freight in the State is carried over Interstates 95, 84, 91, 291, 395 and 691; US routes including 1, 5, 6, 7, 44 and 202; and State Routes 2, 8, 9, 25, 66, 72 and 85.

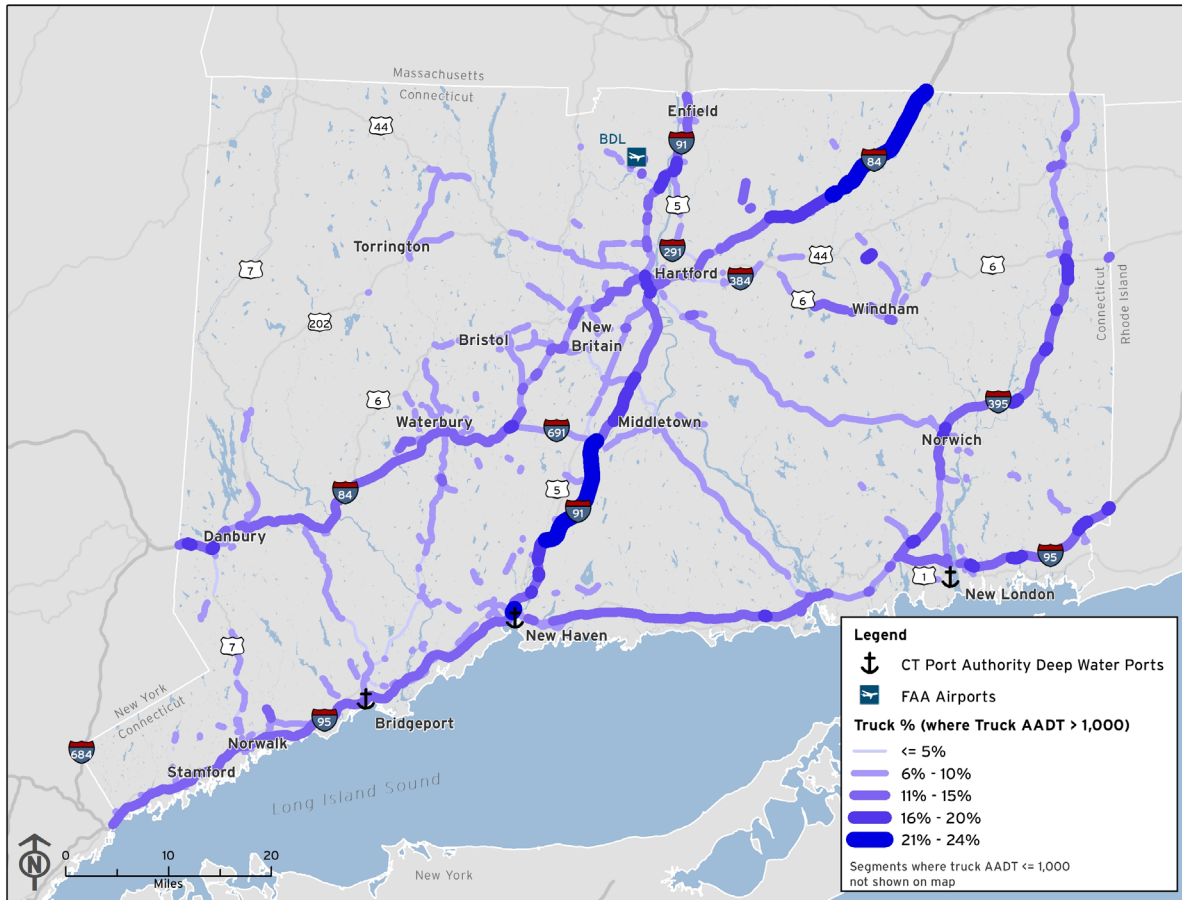
I-95 from the New York/Connecticut border to New Haven and I-91 between New Haven and Hartford carry the heaviest truck volumes, generally over 15,000 trucks per day and up to 22,000 trucks per day (near Bridgeport). North of Hartford, the truck traffic splits into I-91 and I-84 corridors and averages over 10,000 trucks per day up to the Connecticut/Massachusetts border. The urban limits of Danbury and Waterbury and the Raymond E Baldwin Bridge across the Connecticut River also experience over 10,000 trucks per day. Rural parts of I-84 from the New York state line to Hartford and I-95 from New Haven to the Connecticut/Rhode Island border carry between 5,000 and 10,000 trucks per day. Other state routes carry under 5,000 trucks per day and provide critical cross-corridor connectivity.

Figure 2.1: 2019 Statewide Annual Average Daily Truck Volumes

Sources: CTDOT 2015-2019 Truck AADT Data for FHWA HPMS Reporting; CTDOT 2019 Total AADT GIS Data; CDM Smith's GIS Analysis

2.2 2019 TRUCK PERCENTAGES

Figure 2.2 shows the 2019 annual average daily truck percentage across the State. The map excludes information on state routes with less than 1,000 trucks per day. On corridors with truck traffic larger than 5,000 trucks per day, the truck percentage is generally between 10 and 15 percent, and reaches just over 20 percent on portions of I-84 near the Massachusetts line and portions of I-91 between New Haven and Hartford.

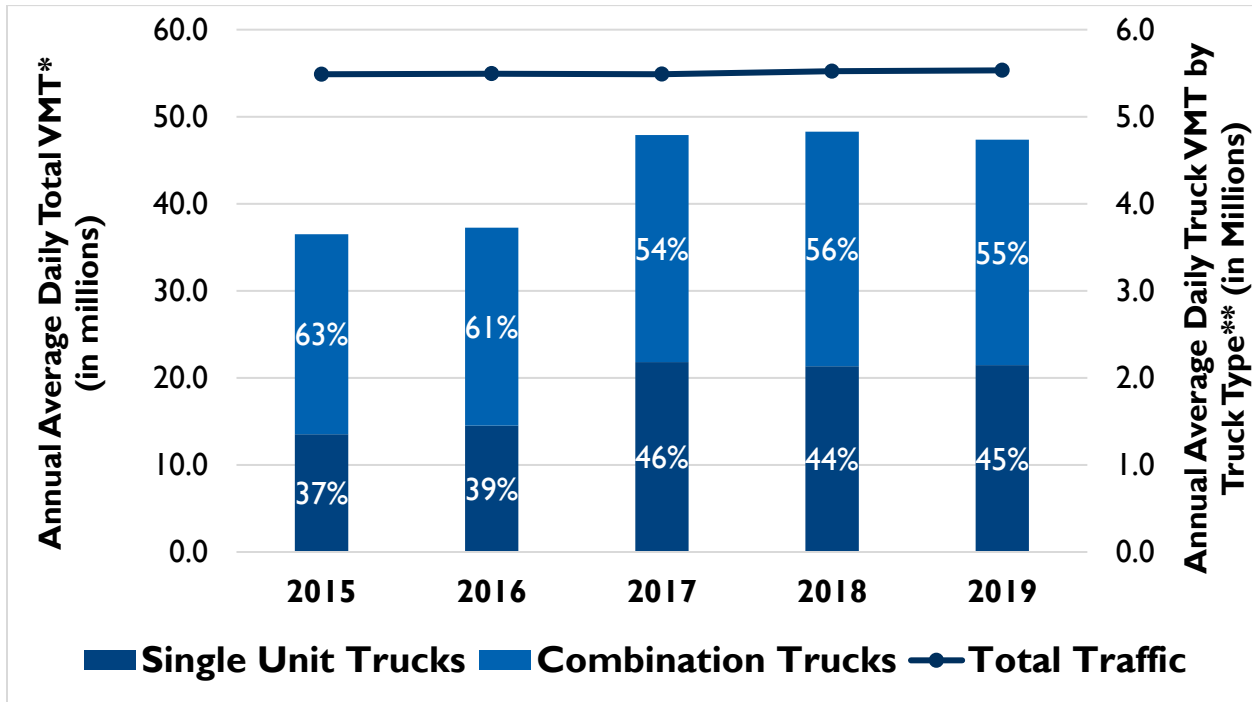
Figure 2.2: 2019 Statewide Annual Average Daily Truck Percentage

Sources: CTDOT 2015-2019 Truck AADT Data for FHWA HPMS Reporting; CTDOT 2019 Total AADT GIS Data; CDM Smith's GIS Analysis

2.3 2015-2019 TRUCK VMT TRENDS

In 2019, the Statewide annual average daily truck vehicle-miles traveled (VMT) was 4.74 million, which was 8.6 percent of the Statewide annual average daily total traffic VMT. The historical annual average daily VMT data as shown in **Figure 2.3** reveals that the average year-to-year change in truck VMT over 2015-2019 is 7.4 percent compared to 0.2 percent for total traffic VMT. So, truck traffic has clearly grown faster than total traffic during this time. Between 2015 and 2017, there was a growth trend in truck VMT in the State. This has slowed down after 2017. Single unit trucks were 37 percent of total truck VMT in 2015 but grew to 45 percent of the total truck VMT in 2019. There is no particular trend in the total traffic VMT, it remained relatively flat.

Figure 2.3: 2015-2019 Statewide Annual Average Daily Truck VMT Trends



*All Traffic Annual Average Daily Total Traffic VMT is shown as Line with Markers

**All Traffic Annual Average Daily Truck VMT by Truck Type is shown as Stacked Column Chart

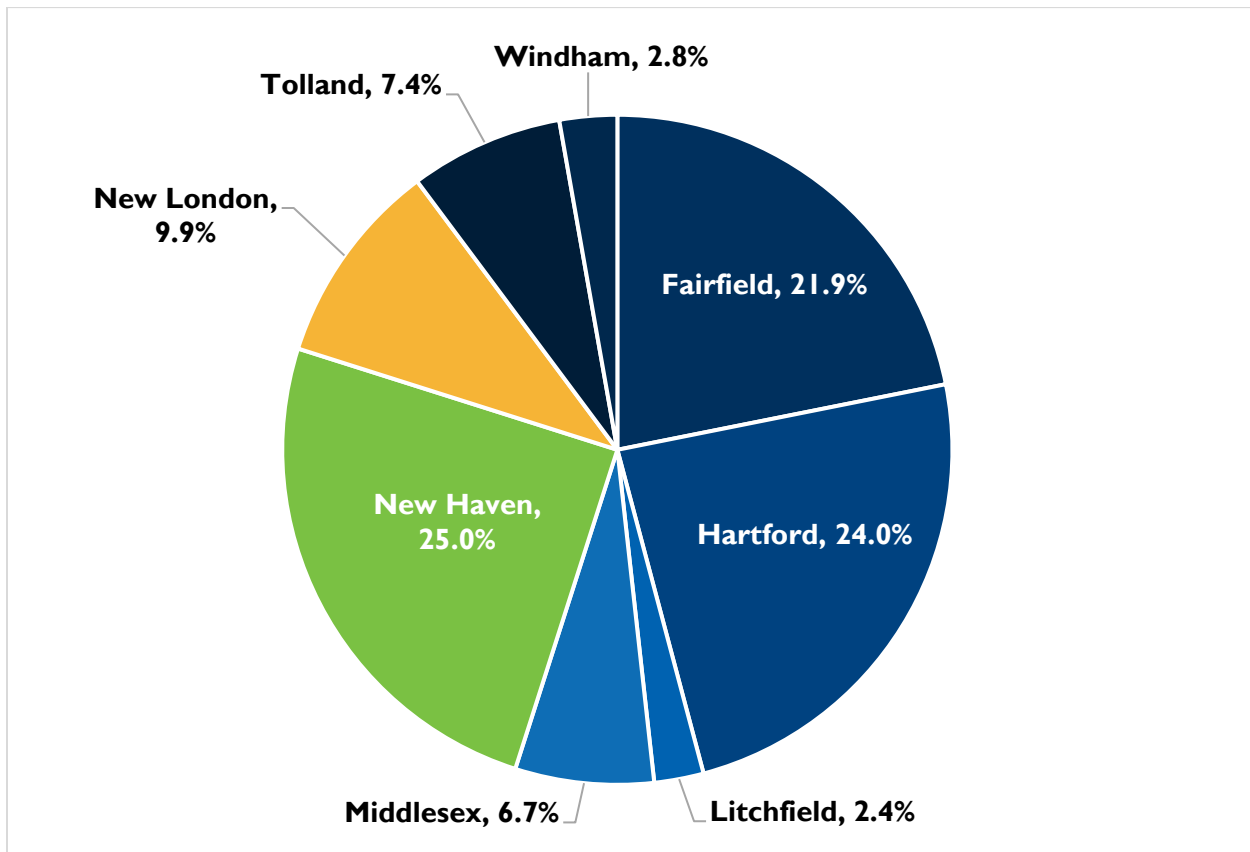
Source: CTDOT 2015-2019 Truck AADT Data for FHWA HPMS Reporting; CDM Smith

3. COUNTY LEVEL TRUCK VOLUME SHARES AND TRENDS

The county level truck volumes and trends analysis results are discussed in this section.

3.1 2019 TRUCK VMT SHARES OF STATE

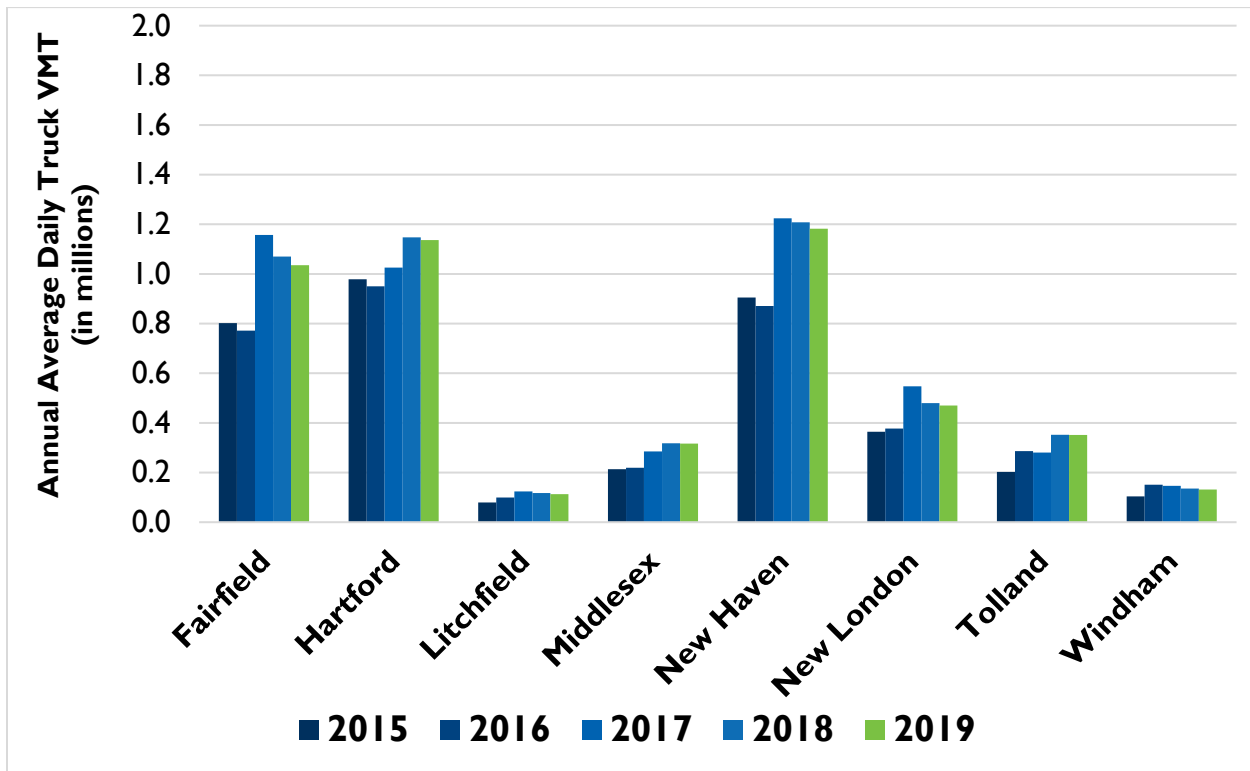
As shown in **Figure 3.1**, in 2019, New Haven, Hartford and Fairfield counties jointly contributed 70.8 percent of the statewide annual average daily truck vehicle-miles traveled (VMT); the rest comes from the remaining five counties (Litchfield, Middlesex, New London, Tolland, and Windham).

Figure 3.1: 2019 County Level Annual Average Daily Truck VMT Shares

Sources: CTDOT 2015-2019 Truck AADT Data for FHWA HPMS Reporting; CDM Smith

3.2 2015-2019 TRUCK VMT TRENDS

Figure 3.2 shows that the year-to-year percentage changes in truck VMT varied by county. The percentage increase in truck VMT was the highest in 2015-2016 for Litchfield, Tolland, and Windham counties, in 2016-2017 for Fairfield, Middlesex, New Haven, and New London counties; and in 2017-2018 for Hartford county. For all counties, the average year-to-year change over 2015-2019 ranged between 4.0 percent and 16.1 percent (i.e., truck traffic increased in all counties).

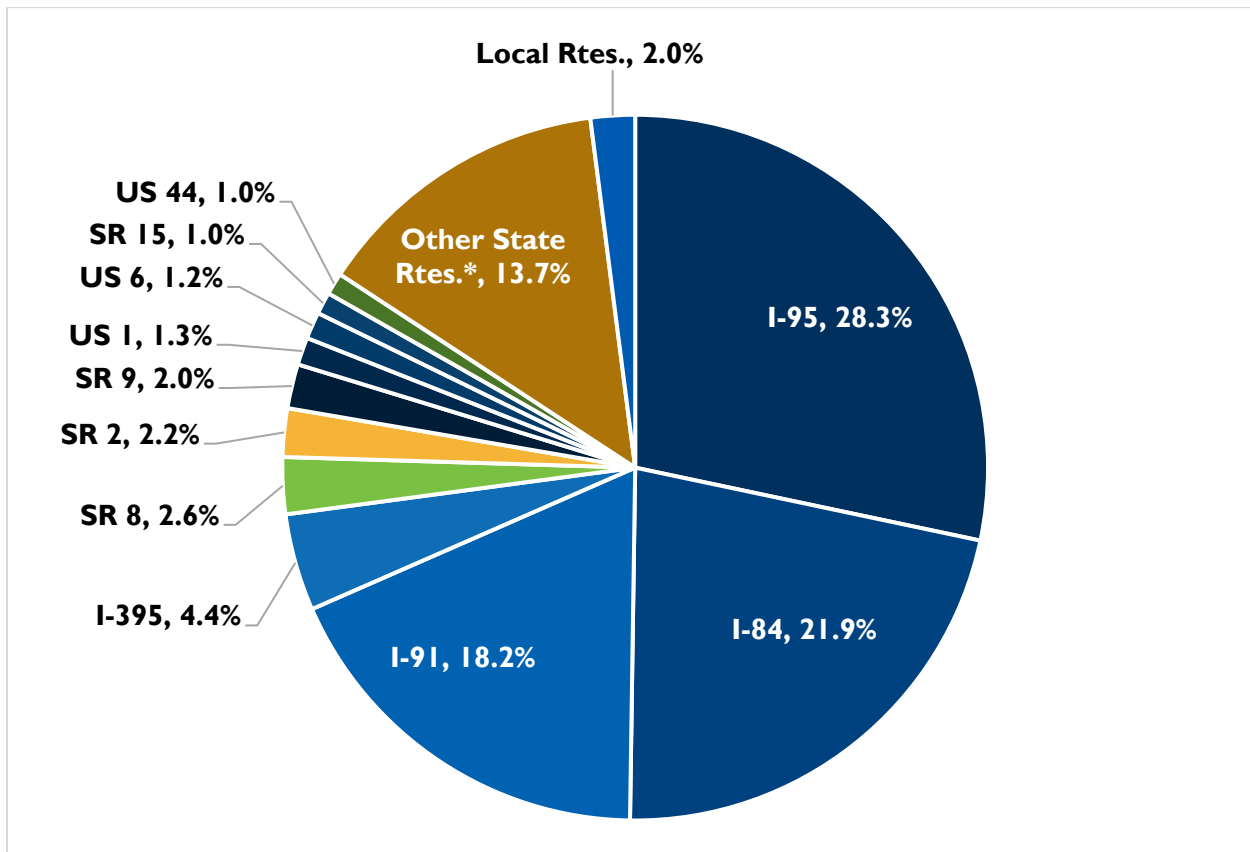
Figure 3.2: 2015-2019 County Level Annual Average Daily Truck VMT Trends

Sources: CTDOT 2015-2019 Truck AADT Data for FHWA HPMS Reporting; CDM Smith

4. ROUTE LEVEL TRUCK VOLUMES AND TRENDS

4.1 2019 TRUCK VMT SHARES OF STATE

As shown in **Figure 4.1**, in 2019, I-95, I-84 and I-91 jointly contributed 68.4 percent of the statewide annual average daily truck vehicle-miles traveled (VMT), with the remaining 31.6 percent coming from the remaining state and local routes in Connecticut. Most truck traffic is clearly traveling on Connecticut's state highway network, and more specifically on its Interstates.

Figure 4.1: 2019 Route Level Annual Average Daily Truck VMT Shares

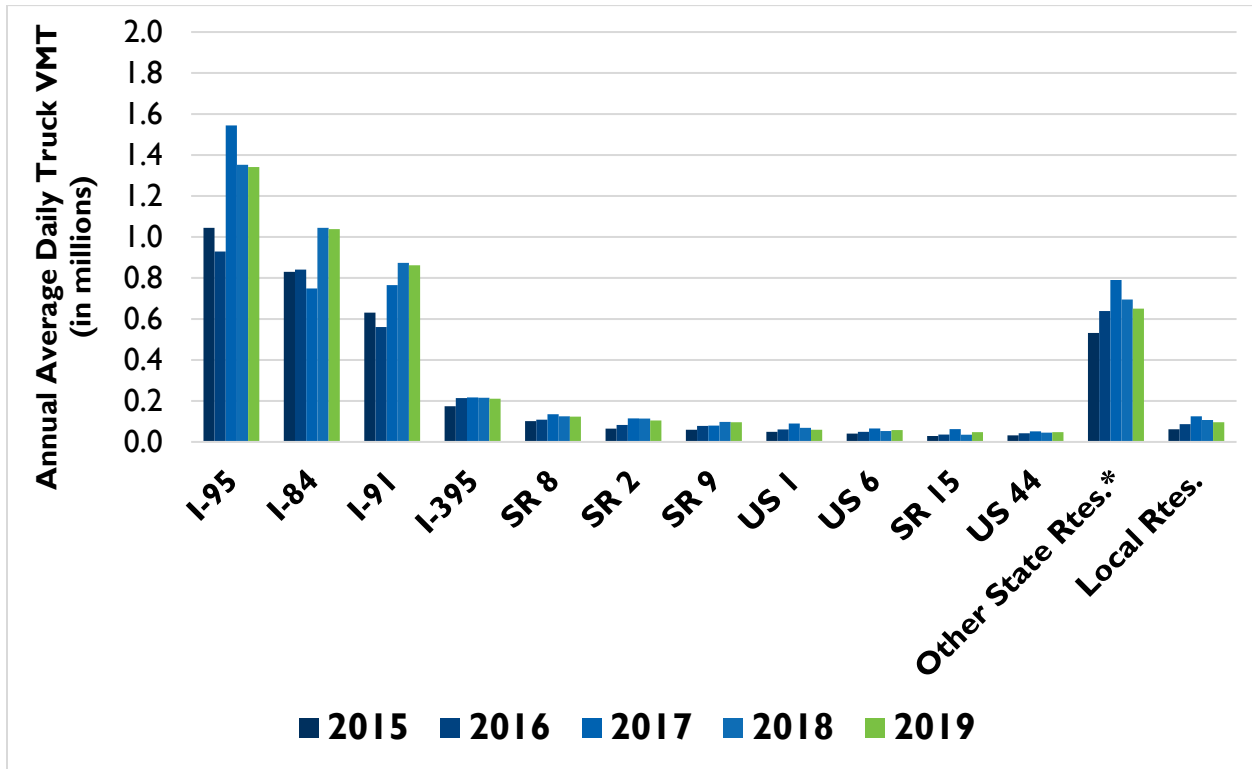
*Other state routes are estimated to carry less than 1 percent of Statewide total daily truck vehicle-miles in 2019.

Sources: CTDOT 2015-2019 Truck AADT Data for FHWA HPMS Reporting; CDM Smith

4.2 2015-2019 TRUCK VMT TRENDS

Figure 4.2 shows that the year-to-year percentage changes in truck VMT varied by route. The percentage increase in truck VMT was the highest in 2015-2016 for I-395, SR 9, and US 44; in 2016-2017 for I-95, I-91, SR 8, SR 2, US 1, US 6 and SR 15; and in 2017-2018 for I-84. For all counties, the average year-to-year change over 2015-2019 ranged between 5.4 percent and 22.1 percent (i.e., an increase on all routes).

Figure 4.2: 2015-2019 Route Level Annual Average Daily Truck VMT Trends



*Other state routes are estimated to carry less than 1 percent of Statewide total daily truck vehicle-miles in 2019.

Sources: CTDOT 2015-2019 Truck AADT Data for FHWA HPMS Reporting; CDM Smith

5. WEIGH STATION TRENDS

As mentioned earlier, there are five weigh stations in Connecticut located on the interstate highways in Danbury, Greenwich, Middletown, Union, and Waterford. Their locations are shown in **Figure 5.1**.

Figure 5.1: Weigh Station Locations Map



Source: All Stays Pro Account – Truck Dashboard; CDM Smith’s GIS Analysis

Table 5.1 summarizes the 2015-2019 trends in the data for weigh stations. In September 2018, a vehicle crashed into the Waterford weigh station on I-95 southbound and demolished the building.³ This weigh station has since closed and CTDOT is converting it to a Virtual Weigh Station, which was a recommendation from the 2017 Connecticut Freight Plan. Overall in the state, there is a declining trend in number of vehicles weighed and number of inspections although truck VMT is increasing. As a result, the number of citations are also declining. Partly, this trend may be attributed to bypasses or pre-clearances enabled by Intelligent Transportation Systems (ITS) for commercial vehicle operations (CVO).

³ <https://www.wtnh.com/news/connecticut/new-london/suv-crashes-into-waterford-weigh-station-on-interstate-95/> (last accessed on November 22, 2021)

Table 5.1: 2015-2019 Weigh Station Data Trends

Weigh Station	Metric	2015	2016	2017	2018	2019
Danbury	# of Veh. Weighed	91,124	87,718	60,659	44,136	60,375
	# of Veh. Inspections	1,755	1,366	1,054	663	664
	Total # of Citations	3,814	2,214	1,610	1,005	744
	# of Citations relating to Overweight Violations	1,008	648	606	340	155
	# of Citations relating to Oversize Violations	596	400	155	69	30
Greenwich	# of Veh. Weighed	144,600	190,949	199,121	119,296	105,941
	# of Veh. Inspections	1,687	2,478	2,028	1,795	1,400
	Total # of Citations	3,374	4,499	3,652	3,873	2,870
	# of Citations relating to Overweight Violations	1,109	1,882	1,403	1,336	927
	# of Citations relating to Oversize Violations	378	221	164	104	57
Middletown	# of Veh. Weighed	75,468	63,463	48,878	76,759	54,559
	# of Veh. Inspections	1,781	1,536	1,186	1,334	976
	Total # of Citations	1,868	2,007	1,360	946	1,493
	# of Citations relating to Overweight Violations	797	781	551	294	355
	# of Citations relating to Oversize Violations	69	76	44	38	37
Union	# of Veh. Weighed	203,884	152,244	195,668	205,878	199,998
	# of Veh. Inspections	1,381	1,448	1,422	1,386	1,209
	Total # of Citations	402	641	743	1,489	2,625
	# of Citations relating to Overweight Violations	38	189	271	553	887
	# of Citations relating to Oversize Violations	31	32	30	82	257
Waterford N/B	# of Veh. Weighed	34,660	50,143	49,421	33,226	40,920
	# of Veh. Inspections	622	652	715	468	677
	Total # of Citations	962	976	880	510	868
	# of Citations relating to Overweight Violations	191	239	372	174	301
	# of Citations relating to Oversize Violations	18	22	21	8	16
Waterford S/B*	# of Veh. Weighed	20,339	5,945	3,647	223	0
	# of Veh. Inspections	431	190	153	185	0
	Total # of Citations	1,304	875	666	575	0
	# of Citations relating to Overweight Violations	222	194	207	187	0
	# of Citations relating to Oversize Violations	20	9	8	6	0
State Total	# of Veh. Weighed	570,075	550,462	557,394	479,518	461,793

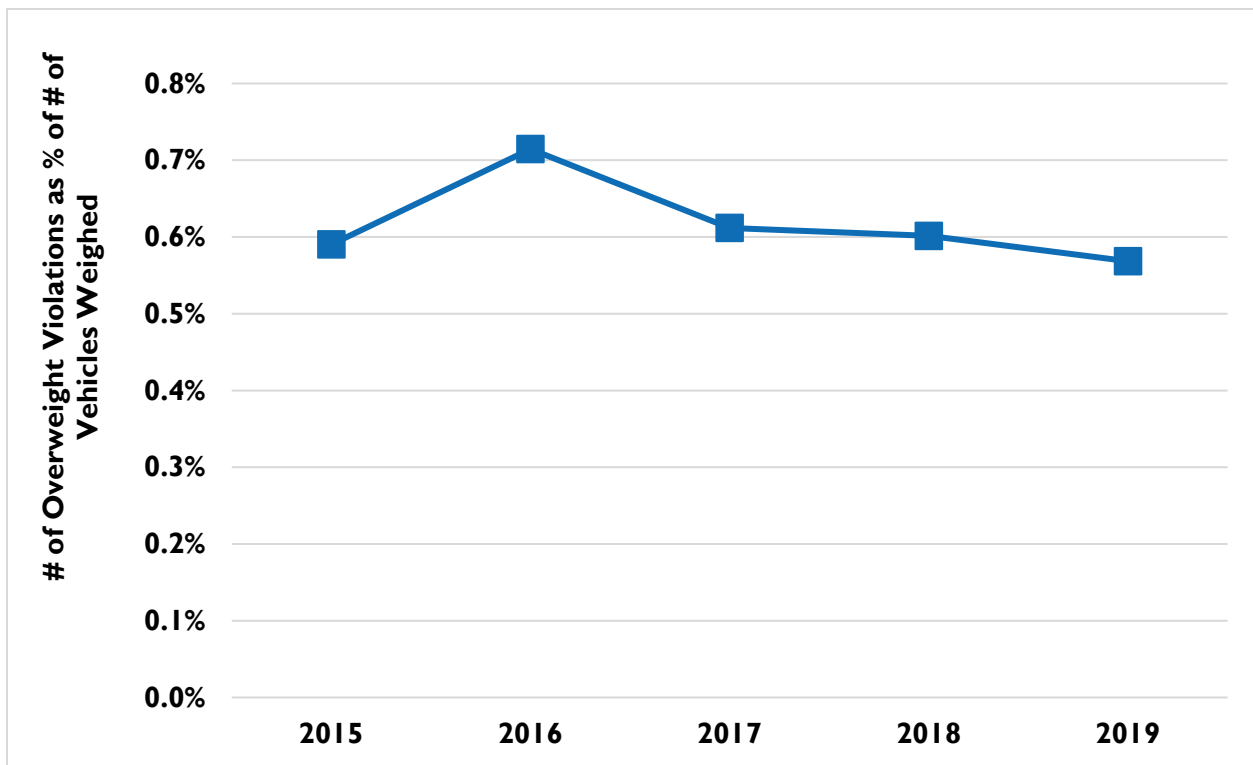
Weigh Station	Metric	2015	2016	2017	2018	2019
	# of Veh. Inspections	7,657	7,670	6,558	5,831	4,926
	Total # of Citations	11,724	11,212	8,911	8,398	8,600
	# of Citations relating to Overweight Violations	3,365	3,933	3,410	2,884	2,625
	# of Citations relating to Oversize Violations	1,112	760	422	307	397

Source: Connecticut DMV – Weigh Station Reports, Available at: <https://portal.ct.gov/DMV/Commercial-Vehicle-Safety/Weigh-Station-Reports/Weigh-Station-Reports> (last accessed on November 22, 2021)

*Not operational since September 2018, this affects numerical values for Waterford S/B and State Total metrics.

Figure 5.2 shows the overweight violations trends normalized using number of vehicles weighed. The share of overweight violations seems to be fairly flat at around 0.6 percent.

Figure 5.2: 2015-2019 Statewide Normalized Overweight Violations Trends



Source: Connecticut DMV – Weigh Station Reports, Available at: <https://portal.ct.gov/DMV/Commercial-Vehicle-Safety/Weigh-Station-Reports/Weigh-Station-Reports> (last accessed on November 22, 2021)