

Future Conditions Report

Route 44 Corridor Study, Canton, CT

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Future Conditions

This section of the Route 44 Corridor Study summarizes the tasks associated with the assessment of future conditions within the study area. The future conditions were based upon post-COVID pandemic traffic volumes, base year 2023.

The assessment of future conditions includes a review of future development potential, traffic growth forecasts, the potential for increased demand for bicycle and pedestrian trips, and information on the safety benefits of potential improvements to be reviewed in the alternatives analysis.

3.1 Methodology

A key component of this study involved forecasting travel demands and land use changes. This allows the studied alternatives and recommended transportation infrastructure investments to anticipate future needs and provide long-term benefits for the Town of Canton. To estimate future conditions along the Route 44 corridor, a 25-year planning horizon was studied incorporating all potential transportation and development activity that may be realized by the year 2050. Based upon these projections, the future conditions were reviewed to understand the 2050 baseline growth (programmed transportation projects and regional traffic growth factor) and the 2050 potential growth (same as baseline but with anticipated land development included as well). The 2050 No-Build Condition incorporates all the programmed projects, traffic growth, and expected developments and those currently in the pipeline for approval, as well as the Town of Canton's long-term planning and vision for how growth will develop in the study area. Vacant and developable parcels in the study area that the Town expects to be developed are included in the 25-year study horizon. Proposed transportation improvement alternatives are not included in the 2050 No-Build

Condition. The resulting comparison of Existing Conditions to the 2050 No-Build Condition is a measure of the ability of the existing transportation system to handle future travel demands.

The 2050 Build Condition, reviewed in the next Task of this Study, includes the future transportation and development characteristics described in the No-Build Condition as well as the transportation improvement alternatives recommended in this corridor study. The transportation improvement alternatives provide conceptual solutions at locations along the corridor with existing safety or operational deficiencies as noted by the Town of Canton, CRCOG, the public, and the traffic operations analyses herein. Subsequent sections of this corridor study describe the transportation improvement alternatives in detail. The resulting comparison of the future conditions is a measure of the effectiveness of transportation improvements if implemented.

3.2 2050 No-Build Condition

The No-Build Condition was developed using information provided by CTDOT and the Town of Canton. Ultimately, this information was used to estimate traffic operations along the corridor in 2050 without any transportation improvement alternatives to be proposed for this study.

3.2.1 2050 Traffic Volumes

Traffic volumes along a corridor change over time according to driving demand, which is influenced by anticipated land development, economic activity, broader regional driving trends, and land use characteristics. New developments typically attract new driving trips, particularly in locations with existing land use characteristics like the Route 44 corridor. However, it should be noted that the Town of Canton is working to orient new development towards providing better accommodation for a mixture of different travel modes, including bicycling, walking, and public transportation. The Bicycle, Pedestrian, and Transit Potential section (3.3) discusses these efforts in more detail to support access and demand for non-car transportation modes.

Future traffic volumes are typically estimated by growing existing traffic volume data by a percentage reflecting historical, area-specific traffic trends compounded over the length of the planning horizon. The Connecticut Department of Transportation (CTDOT) calculated and provided 2050 peak hour traffic volumes along the corridor by growing the 2023 traffic volumes previously described. The 2050 traffic volumes reflect an approximately 23.5% percent increase from 2023 volumes, or an increase of about 1% per year, representing a highly conservative estimate of future traffic volumes. In other words, this percentage is the largest amount of traffic growth that should be expected based on current information on regional trends and background growth. Predicting this level of traffic growth will help CRCOG and the Town of Canton make appropriate decisions to address likely deficiencies in the transportation network before they arise. The 2050 peak hour traffic volume networks provided by CTDOT are included in Figures 1, 2, and 3.

This is the baseline traffic growth that the analysis begins from before including the potential of additional traffic growth and trips that would result from various development projects in the study area.

Figure 1 2050 AM Peak Traffic Volumes

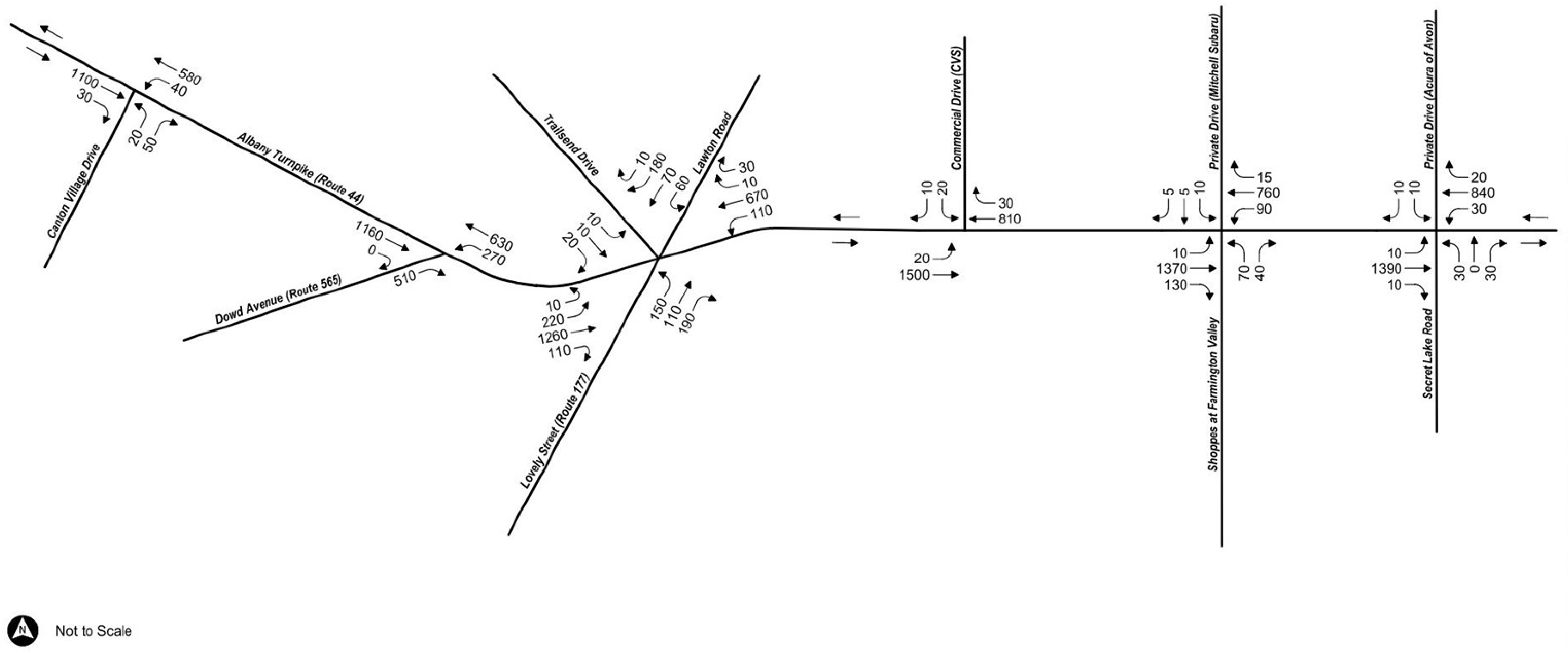


Figure 2 2050 PM Peak Traffic Volumes

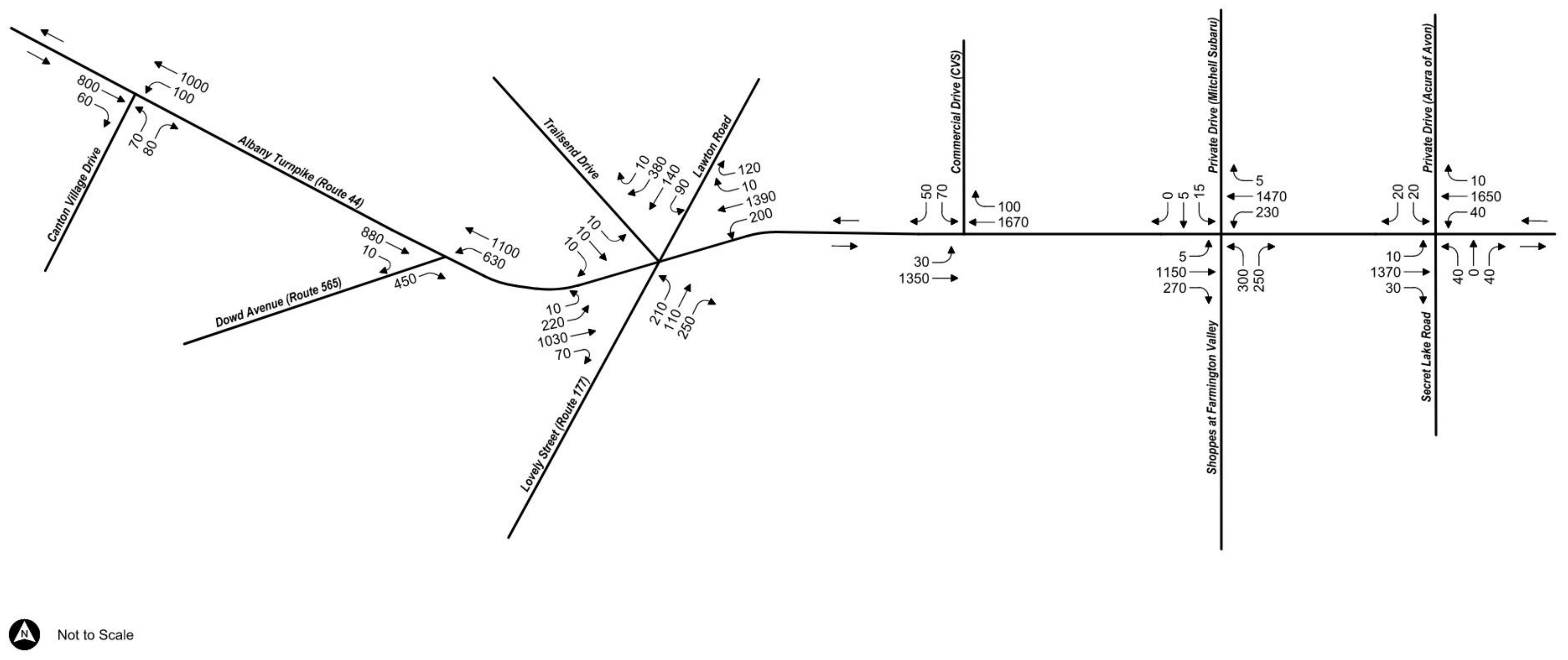
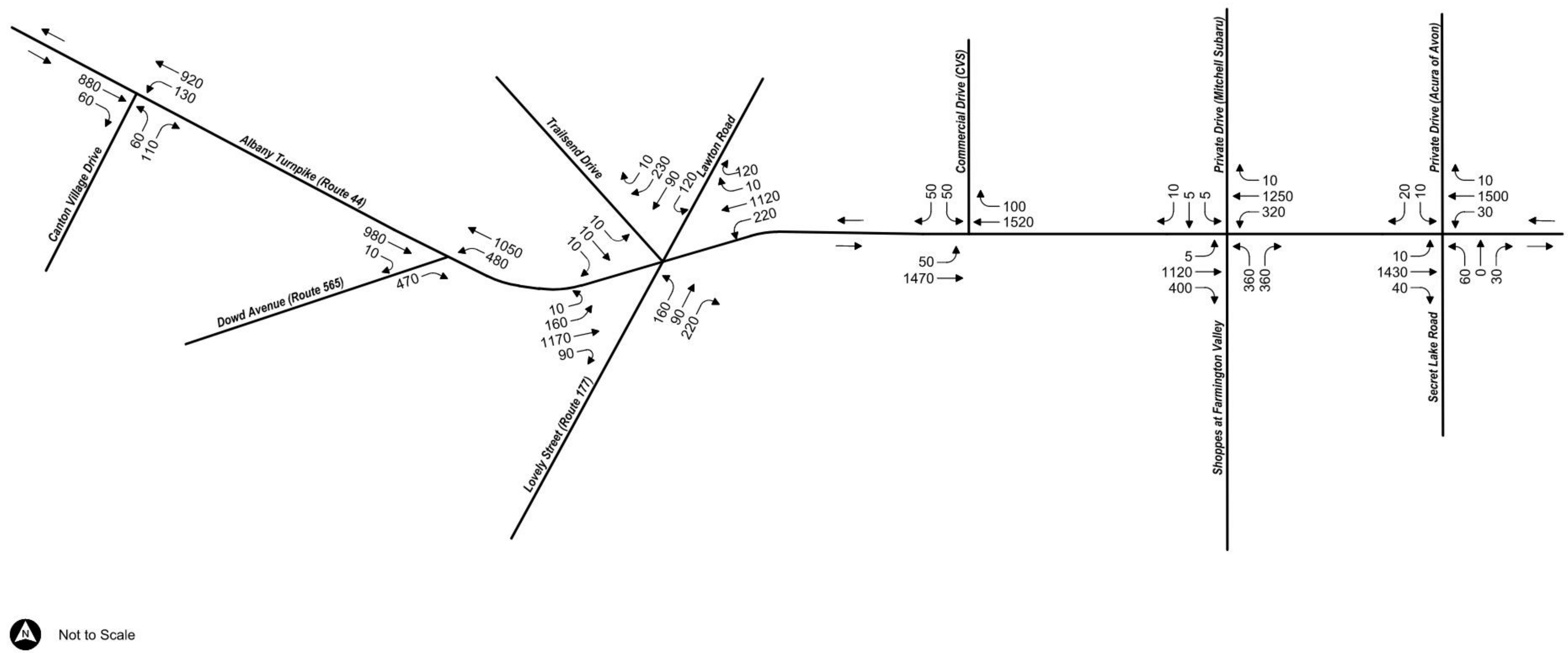


Figure 3 2050 Saturday Midday Peak Traffic Volumes



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3.2.2 Future Development Projects

Many parcels along the Route 44 corridor frontage and nearby to the corridor are undergoing redevelopment, or have recently redeveloped, particularly in the eastern part of the corridor between Lawton Road/Route 177 (Lovely Street) and the Simsbury town line. As noted in the Existing Conditions Report, there has been new development across from the Shops at Farmington Valley to construct an Aldi Grocery Store and build out the Mitchell Subaru in the last few years. The CVS and UCONN Health facility near the corner of Route 44 and Lawton Road were constructed in approximately 2012. The Applegate Village development of homes, just to the north of Route 44 at the corner of Lawton Road and Washburn Road, is currently under construction. Additional vacant developable parcels exist along and near the corridor, and the Town of Canton is actively reviewing proposals for many of these, such as multifamily housing behind the CVS and UCONN Health at 115 Albany Turnpike. Development further west on Route 44, out of the study area, along Dowd Avenue, and alongside streets off Dowd Avenue and Route 44 have been recently constructed or are expected to be developed in coming years. In the consideration of future traffic volumes, it was important to study these parcels and consult with the Town of Canton to discuss the traffic impacts that are expected to result from these and any other parcels they identified for future development.

VHB met with CRCOG and the Town of Canton to identify key future development parcels along the Route 44 and Dowd Avenue corridors. Many different parcels with development potential were discussed, not just along the two main roads but also including Commerce Drive, Old Canton Road, Lawton Road, and Secret Lake Road. These areas are discussed in more detail in the following sections.

3.2.2.1 Route 44

Route 44 has the most development along it and continues to have the most potential for significant redevelopment in the future. There are also properties just off Route 44 on cross streets that are prime for redevelopment due to the easy access to the main roadway. Discussion focused on a number of properties along the road, from the east side of the corridor by the Simsbury Town Line to the west end of the study area near the Canton Village Shops. A few properties by the Simsbury Town Line, on the east end of the study area, have been proposed for development in recent years but the process of development has stalled on these properties for various reasons. An exception is the redevelopment of La Trattoria restaurant on Brass Lantern Road into a new restaurant, Mizu 21. In the center of the study area, near the Lawton Road/Lovely Street intersection, a significant amount of development has recently occurred, with additional development expected in the future. Properties with development proposed or expected include 115 Albany Turnpike, 12 Lawton Road, 3 Trailsend Drive, and additional development on the property occupied by the Shops at Farmington Valley (110 Albany Turnpike). In the western end of the study area there is some potential for redevelopment, but no firm proposals for large-scale redevelopment are currently proposed. However, there is a desire from the Town to redevelop the Canton Village Shops area into a higher-density village center with retail and housing.

3.2.2.2 Dowd Avenue

Along Dowd Avenue within the west section of the study area, there is some smaller-scale housing development that is proposed for the properties across the street from the Canton Village Shops, which are constrained by environmental limitations on the properties. At the far west end of the study area (which extends to Canton Hollow) are two properties that have been approved to be merged and converted to multifamily housing with a small amount of retail. The Canton Village Shops also extends to Dowd Avenue and the Town has interest in further developing this area as noted in the previous section. There were otherwise no other potential developments discussed along Dowd Avenue. The Town and the public have shared concerns about traffic safety and heavy truck traffic along Dowd Avenue in connection with these new developments.

3.2.2.3 Lawton Road

A significant amount of development has focused on Lawton Road and may impact the intersection of Lawton Road/Lovely Street with Route 44. These properties, some of which were noted in the Route 44 section (3.2.2.1), include 115 Albany Turnpike, which is proposed for development and has frontage along Lawton Road; 12 Lawton Road, which is also proposed for development; 3 Trailsend Drive, which may be combined with 12 Lawton Road for a larger development; and the Applegate Village development at the corner of Lawton Road and Washburn Road which is under construction. These are or would be new housing developments, with 12 Lawton Road and 115 Albany Turnpike being medium density multifamily housing in mid-rise buildings. Further north on Lawton Road it was also noted that a town-owned parcel (55 Lawton Road) may become an area for public recreation in the future.

3.2.2.4 Secret Lake Road, Commerce Drive, and Old Canton Road

Additional properties were discussed on these cross streets that intersect with Route 44 or Dowd Avenue. As part of the Shops at Farmington Valley, it is possible there could be an expansion of the mall that includes developing the property at 10 Secret Lake Road, which is across the road from the main mall area, as well as an expansion within the 110 Albany Turnpike property. Commerce Drive, which connects to Dowd Avenue, has seen some new housing developments constructed in the last several years as vacant industrial properties have turned over into housing. There are additional vacant properties along the road that could be developed, but there are no proposals for developing them at this time. Finally, Old Canton Road was discussed as another side street off Route 44 where there could be additional development. At this time, a multifamily housing development has been approved at 75 Old Canton Road but is not under construction yet.

3.2.3 Modeled Future Development and Additional Vehicle Trips

The future development parcels discussed in the previous sections were reviewed to determine which ones would be most likely to produce new vehicle trips that may not be included in the regional background traffic growth and would have some impact on the traffic operations along Route 44. Parcels towards the center of the study area with significant new housing or retail, known or assumed, were included in the analysis. Parcels on the east end of the study area by the Simsbury Town Line were not modeled due to the uncertainly about future development on these parcels but also because traffic would most likely be traveling east on Route 44, away from the study area, as opposed to through the study area. Additionally, some parcels discussed would produce negligible new traffic into the system and so would have no significant effect on traffic operations. Finally, parcels with little information about potential future development or where there were too many unknowns were not included in the modeled trip generation. This includes potential expansion of the Shops at Farmington Valley at 110 Albany Turnpike, where additional traffic is expected to be accounted for in the CTDOT forecast of future trip generation. The exception to this is the Canton Village Shops, where the Town has expressed an interest in creating a more dense village center in this area inclusive of housing. Although uncertain, this is significant enough to warrant the inclusion of additional vehicle trips to this development.

Table 1 shows the parcels with approved or potential uses that were modeled for their new vehicle trips for the future conditions. Figure 4 shows a map of these parcels in relation to the study area. The expected traffic of these parcels was modeled to determine if the new vehicle trips generated from them would significantly impact the transportation network and traffic operations.

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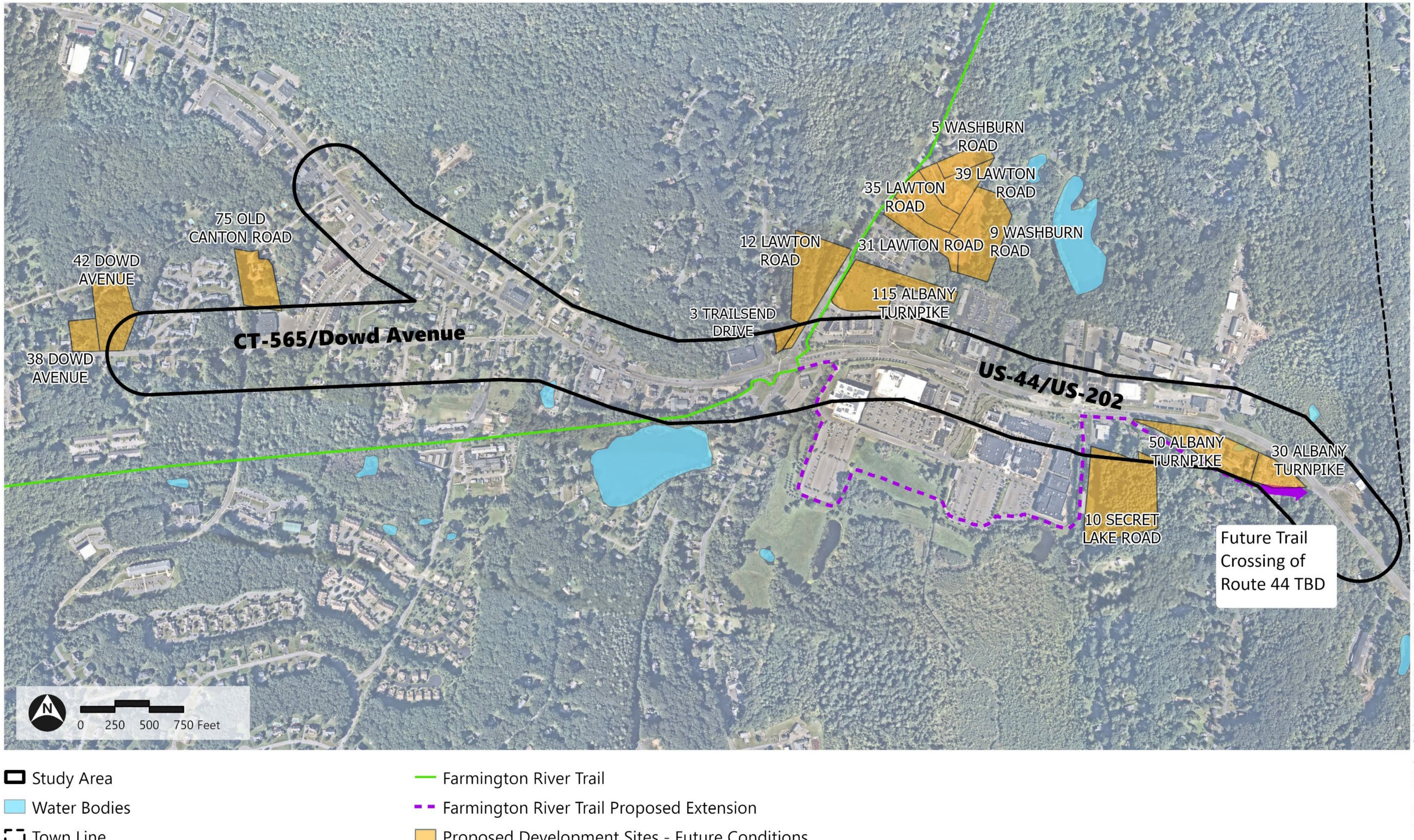
Table 1 List of Development Sites Modeled for New Vehicle Trips

Address	Size (Acres)	Zoning	Development Status	Development Type	# of Housing Units/Commercial Area
50 Albany Turnpike	2.88	East Gateway Design Village District (EGDVD)	Under Discussion; Not Yet Proposed	Potential Multifamily Housing	60 units
10 Secret Lake Road	6.68	EGDVD	Not Yet Proposed	Potential New Commercial	50,000 square feet
31 Lawton Road	2.02	Applegate Design Village District (AGDVD)	Approved, Under Construction	Single-family home development (Applegate Village)	34 units
35 Lawton Road	2				
39 Lawton Road	2.32				
5 Washburn Road	1.16				
9 Washburn Road	4.24				
115 Albany Turnpike	4.35	EGDVD	Submitted to P&Z for Approval	Multifamily Housing	102 units
12 Lawton Road	4	EGDVD	Not Yet Proposed	Multifamily Housing	70 units

Address	Size (Acres)	Zoning	Development Status	Development Type	# of Housing Units/Commercial Area
3 Trailsend Drive	0.5				
38 Dowd Avenue	1.1	Canton Village Design Village District (CVDVD)	Approved	Multifamily housing and retail commercial (properties to be merged)	54 units; 6,000 square feet
42 Dowd Avenue	2				
75 Old Canton Road	2.1	CVDVD	Approved	Multifamily Housing	60 units
220 Albany Turnpike (Canton Village Shops)	11.5	CVDVD	Not Yet Proposed	Potential for new housing or commercial development	Undefined

Figure 4 Map of Development Sites Modeled for New Vehicle Trips



Source: Town of Canton, VHB

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As shown in Table 1, all the parcels modeled are in the Town's Design Village Districts, which encourage denser housing development with a more walkable character and closer to the street, to create a building street frontage. Proposed and approved housing developments are usually multi-family with up to 25 units per acre, with a prime example being the 115 Albany Turnpike development project. However, limited access to utilities, along with topography and environmental conditions – particularly wetlands – can significantly restrict development on certain parcels. As a result, most parcels will not be built-out on the entire parcel footprint but will need to work around site constraints to be viable. Developments are also encouraged in the Design Village Districts to be mixed-use, typically with a residential and commercial/retail component, such as 38 & 42 Dowd Avenue which has been approved to have 54 units of housing and 6,000 square feet of ground floor retail. The goal is to develop properties that create a more neighborhood-like impression along the street, particularly Dowd Avenue, to improve the overall walkability of the street and create the effect of traveling down a residential/neighborhood street instead of a rural highway.

Almost all the properties modeled already have proposed housing or commercial development usage that was provided by the Town. The properties that did not have previous information were 10 Secret Lake Road and the Canton Village Shops (220 Albany Turnpike). For 10 Secret Lake Road, this property was modeled as a retail development similar to the developments in main Shops at Farmington Valley complex, which would be a more intensive use than housing, and thus a more conservative approach to the number of possible new trips (more vehicle trips would be created from retail than housing). The Canton Village Shops has a more uncertain future in terms of development, so the intersection of Route 44 and the Canton Village Shops was assumed to have double the amount of traffic originating from the Shops than the existing data show, which would add 150 more vehicle trips to this intersection. This was done to account for the possibility of new commercial and housing space within Canton Village, to again be conservative and model a reasonable amount of increased traffic to this location.

3.2.3.1 Trip Generation Modeling Results

With the proposed numbers of housing units and commercial space, vehicle trips that could be generated for these developments were approximated using the *Institute of Transportation Engineers Trip Generation Manual, 11th Edition*. This widely used reference manual provides vehicle trip generation rates for various land uses based on traffic count data collected at similar sites. Land Use Codes used to model the proposed development traffic include 221, Mid-Rise Multifamily Housing Not Close to Rail Transit; 821, Shopping Plaza (40-150K square feet) – Supermarket; 215, Single-Family Attached Housing; and 822, Strip Retail Plaza (<40K square feet).

Although the intent of the development in the Design Village Districts is to reduce vehicle traffic and encourage walking, biking, and transit trips, it was conservatively assumed that the transportation mode share for all trips to and from the site would be by private automobile. As noted in the Existing Conditions Report, the CT Transit bus service that utilizes Route 44 is not oriented towards everyday trips but for commuting to Hartford and back. In addition, the pedestrian and bicycle network is still being built out and may not immediately diminish the amount of vehicle trips in the study area. Therefore, a credit was not taken into account for alternative travel modes to the sites such as pedestrians or transit to provide a more conservative analysis of the anticipated traffic generation.

Using the development information in the previous section and the trip generation guide above, vehicle trips were modeled from the developments. Trips were modeled to see the impact of them on the nearby signalized intersections and through the rest of the corridor. They would be spread out in the Route 44 corridor area and would not impact just one intersection.

Trips from the potential future housing developments identified would generate a small number of trips per peak hour, relative to existing and projected through volumes along the Route 44 corridor. However, trips from a potential new commercial development at 10 Secret Lake Road could have substantial impact on the traffic signal operations at Route 44 and Secret Lake Road. This commercial development was modeled as a supermarket to be conservative in the modeling and assume higher traffic.

For the purposes of this study, these trips were added on to the 25-year traffic growth calculated by CTDOT. Therefore, the traffic volumes used in the 2050 No-Build Condition are the volumes provided by CTDOT in addition to those produced by the modeled developments.

3.2.4 Future Roadway Projects

Based on discussions with CTDOT, CRCOG, and the Town of Canton, there are no significant transportation improvements currently planned along the corridor in the near future. Recent changes – to revise the traffic signal at the Shops at Farmington Valley to accommodate the Mitchell Subaru development – have been completed and are already incorporated into the known traffic conditions of the study area. Aside from expected maintenance of pavement conditions with typical milling and overlay of the Route 44 roadway, no other major projects are known at this time that would affect the No-Build Conditions. In addition, it can be expected that CTDOT may replace traffic control signal equipment at various locations during the No-Build period, however those improvements are considered to be typical maintenance type improvements. Therefore, the 2050 No-Build condition was assumed to maintain existing roadway conditions.

3.2.5 2050 No-Build Traffic Operations

Capacity analyses were performed to evaluate traffic operations at the study intersections during the weekday morning, weekday evening, and Saturday midday peak traffic periods under the 2050 No-Build scenario. These analyses were performed by inputting the 2050 peak hour traffic volumes provided by CTDOT into the existing conditions Synchro model discussed in the Existing Conditions Report to forecast future traffic operating conditions in 2050 if no transportation improvements or signal timing modifications are implemented.

The trips generated by the new developments as discussed in Section 3.2.3 were added to the CTDOT forecasted volumes to finalize the No-Build scenario for this study.

The capacity analysis documented in the Existing Conditions identified one intersection within the study area that operates with an overall LOS D or E during the peak periods under existing conditions: Route 44 at Route 177 (Lovely Street)/Lawton Road/Trailsend Drive. This intersection operates at LOS E during weekday afternoon and Saturday midday peak hours and at LOS D in the morning peak hour.

The approximately 23.5% traffic growth forecast under the 2050 No-Build condition as well as additional traffic from new developments is expected to further exacerbate existing capacity issues at certain intersections along the corridor. Delays and vehicle queues are not expected to change significantly at most study intersections, but the intersection of Route 44 at Route 177 (Lovely Street)/Lawton Road/Trailsend Drive will remain congested and continue to deteriorate. Under the 2050 No-Build condition, this intersection will experience worsening conditions for traffic, with the LOS for all peak hours degrading to F conditions.

The LOS at the intersection of Route 44 at Secret Lake Road is expected to degrade substantially, to LOS C in the morning peak hour, and to LOS F from LOS B in the evening and Saturday midday peak hours. This is due to the potential for significant traffic to a new commercial development at 10 Secret Lake Road. Note that this is considered a worst-case scenario for this intersection if a very high-intensity commercial development (such as a supermarket) is developed here, and if no changes are made to the geometry of the intersection.

Minor changes are expected at some of the other intersections. The morning and Saturday midday peak hours at Route 44 and Dowd Avenue are expected to fall to LOS C from LOS B, while the evening peak hour will fall to LOS D from LOS B; the evening and Saturday midday peak hours at Route 44 and the CVS Drive are expected to fall to LOS B from LOS A; and the Saturday midday peak hour at Route 44 and Canton Village is expected to drop to LOS B from LOS A.

Table 2 shows the results of the 2050 No-Build Capacity Analysis compared to the Existing Conditions and the CTDOT conditions before including the proposed and potential development projects. Significant changes in LOS for the No-Build Condition are highlighted in yellow.

Figures 5, 6, and 7 show the intersection volumes of the No-Build Conditions for AM, PM, and Saturday midday peaks, respectively.

Table 2 Signalized Intersection Capacity Analysis Summary – Existing, CTDOT Forecast and 2050 Conditions Comparison

Location	Peak Hour	Mov't	Existing Conditions					CTDOT Forecast Conditions					No-Build Conditions				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
Route 44 at Canton Village	AM	EB T/R	0.42	6	A	115	160	0.52	7	A	160	223	0.56	9	A	183	267
		WB L	0.10	2	A	3	6	0.12	2	A	2	m4	0.15	2	A	2	m3
		WB T	0.18	2	A	22	27	0.22	1	A	25	26	0.29	1	A	26	27
		NB L	0.20	40	D	13	33	0.20	40	D	13	33	0.20	40	D	13	33
		NB R	0.04	39	D	0	28	0.04	39	D	0	28	0.04	39	D	0	28
		Overall	**0.41**	**7**	**A**			**0.49**	**7**	**A**			**0.53**	**7**	**A**		
	PM	EB T/R	0.41	12	B	92	265	0.51	14	B	122	#374	0.52	14	B	127	#392
		WB L	0.23	6	A	8	m41	0.27	7	A	8	m34	0.35	8	A	17	m36
		WB T	0.36	5	A	44	185	0.45	6	A	59	232	0.58	7	A	114	m243
		NB L	0.45	39	D	48	81	0.45	39	D	48	81	0.45	39	D	48	81
		NB R	0.06	37	D	0	33	0.06	37	D	0	33	0.06	37	D	0	33
		Overall	**0.39**	**11**	**B**			**0.47**	**12**	**B**			**0.56**	**12**	**B**		
	SAT	EB T/R	0.40	8	A	105	169	0.52	11	B	152	252	0.59	14	B	190	296
		WB L	0.28	3	A	11	m21	0.31	6	A	13	m29	0.34	8	A	23	m28
		WB T	0.30	2	A	38	64	0.38	4	A	61	m133	0.45	5	A	134	m133
		NB L	0.42	35	D	33	66	0.42	35	D	33	66	0.42	35	D	33	66
		NB R	0.08	34	C	0	42	0.08	34	C	0	42	0.08	34	C	0	42
		Overall	**0.42**	**8**	**A**			**0.52**	**9**	**A**			**0.58**	**11**	**B**		
Route 44 at Dowd Ave	AM	EB T/R	0.59	11	B	210	280	0.74	14	B	284	372	0.77	13	B	303	395
		WB L/T	0.37	1	A	0	1	0.46	1	A	1	1	0.58	2	A	1	1
		NB R	0.89	43	D	263	#376	1.04	77	E	~387	#506	1.11	97	F	~431	#550
		Overall	**0.71**	**15**	**B**			**0.87**	**23**	**C**			**0.91**	**26**	**C**		
	PM	EB T/R	0.56	15	B	196	32	0.72	18	B	263	33	0.73	18	B	269	31
		WB L/T	0.69	4	A	1	3	0.85	7	A	117	227	1.09	57	E	~575	#692
		NB R	0.67	27	C	179	280	0.79	32	C	234	#394	0.92	46	D	294	#498
		Overall	**0.69**	**10**	**B**			**0.85**	**14**	**B**			**1.09**	**46**	**D**		
	SAT	EB T/R	0.53	14	B	194	246	0.66	15	B	260	325	0.67	13	B	270	124
		WB L/T	0.64	2	A	1	2	0.80	4	A	3	146	0.97	16	B	~262	#433
		NB R	0.77	27	C	198	266	0.93	44	D	271	#394	1.05	74	E	~361	#471
		Overall	**0.70**	**10**	**B**			**0.86**	**14**	**B**			**1.00**	**25**	**C**		
Route 44 at Route 177 (Lovely St)/Lawton Rd/Trailsend Dr	AM	EB L	0.96	106	F	166	#344	>1.20	>120	F	~250	#433	>1.20	>120	F	~293	#478
		EB T	0.85	43	D	456	#632	1.03	75	E	~636	#810	1.13	112	F	~763	#924
		EB R	0.06	0	A	0	0	0.07	0	A	0	0	0.07	0	A	0	0
		WB L	0.65	63	E	84	145	0.71	68	E	107	173	0.72	68	E	117	186
		WB T	0.56	34	C	229	286	0.67	38	D	299	358	0.74	40	D	347	412
		WB R 2	0.02	0	A	0	0	0.02	0	A	0	0	0.03	0	A	0	0

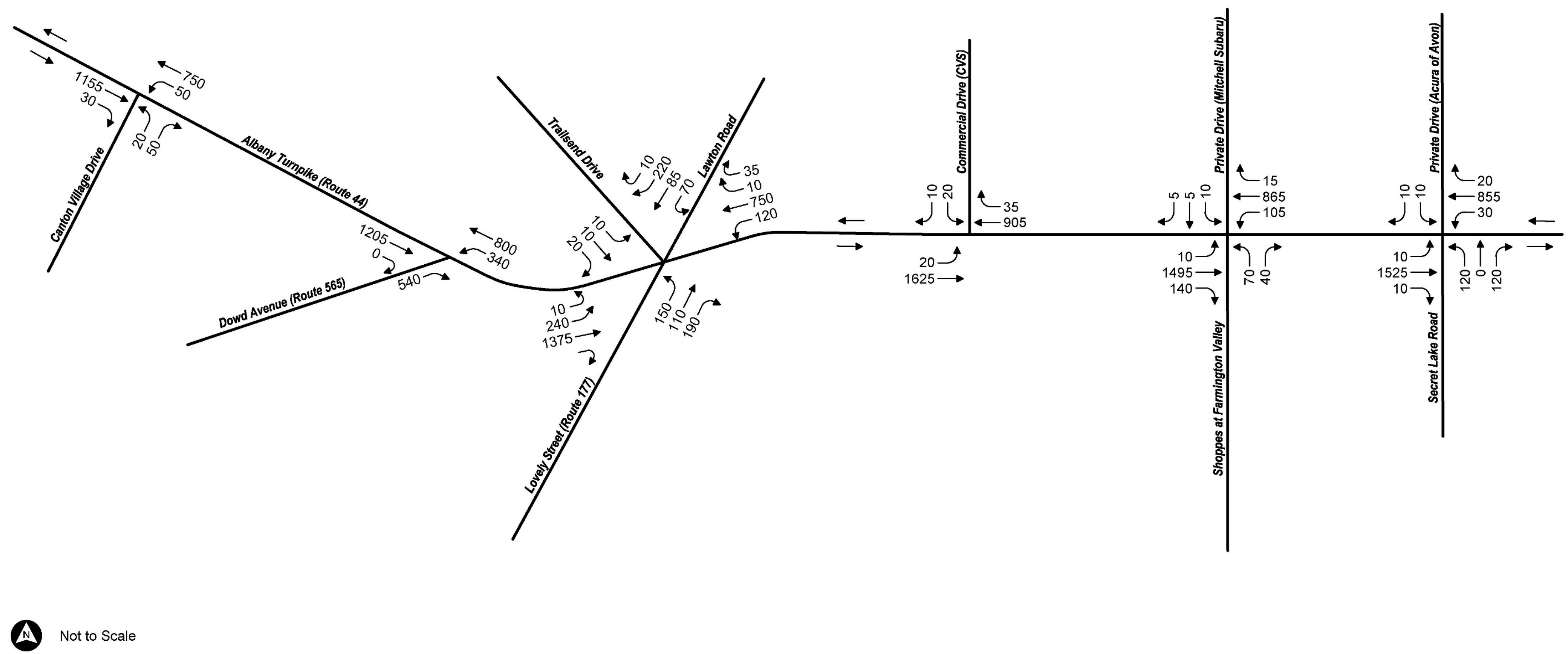
Location	Peak Hour	Mov't	Existing Conditions v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	CTDOT Forecast Conditions v/c	Del	LOS	Q50	Q95	No-Build Conditions v/c	Del	LOS	Q50	Q95
		NB L	0.71	63	E	119	199	0.74	67	E	144	#248	0.75	68	E	146	#248
		NB T	0.42	53	D	80	142	0.47	54	D	101	169	0.48	55	D	103	169
		NB R	0.21	41	D	20	62	0.29	41	D	39	90	0.29	41	D	39	90
		SB L/T	0.69	64	E	109	#179	0.81	79	E	135	#232	0.98	118	F	167	#293
		SB R	0.67	59	E	89	131	0.78	69	E	112	#162	0.95	99	F	140	#216
		SE L	0.63	68	E	48	75	0.65	73	E	50	76	0.66	75	E	50	76
		Overall	**0.87**	**48**	**D**			**1.00**	**68**	**E**			**1.08**	**89**	**F**		
	PM	EB L	>1.20	>120	F	241	#405	>1.20	>120	F	~320	#494	>1.20	>120	F	~350	#528
		EB T	0.73	41	D	377	486	0.95	63	E	515	#671	1.05	90	F	~606	#744
		EB R	0.04	0	A	0	0	0.04	0	A	0	0	0.05	0	A	0	0
		WB L	0.77	72	E	151	226	0.79	69	E	187	#301	0.83	72	E	214	#356
		WB T	0.93	52	D	586	#737	1.09	94	F	~809	#950	>1.20	>120	F	1005	#1144
		WB R 2	0.07	0	A	0	0	0.09	0	A	0	0	0.10	0	A	0	0
		NB L	1.04	>120	F	196	#330	>1.20	>120	F	~287	#427	>1.20	>120	F	~287	#427
		NB T	0.47	59	E	92	147	0.58	61	E	114	173	0.58	61	E	114	173
		NB R	0.27	43	D	30	65	0.38	41	D	55	101	0.37	40	D	55	101
		SB L/T	0.77	69	E	169	#289	0.98	110	F	223	#403	1.11	>120	F	~287	#471
		SB R	0.89	80	E	173	#273	1.09	>120	F	~241	#360	>1.20	>120	F	~303	#428
		SE L	0.70	86	F	46	58	0.70	86	F	46	58	0.70	86	F	46	58
		Overall	**1.01**	**68**	**E**			**1.20**	**104**	**F**			**>1.20**	**>120**	**F**		
	SAT	EB L	0.84	94	F	129	#332	1.04	>120	F	164	#421	1.10	>120	F	~176	#450
		EB T	0.90	59	E	434	#818	1.11	115	F	~603	#1083	1.19	>120	F	~706	#1194
		EB R	0.04	0	A	0	0	0.06	0	A	0	0	0.06	0	A	0	0
		WB L	0.87	93	F	162	#402	1.09	>120	F	208	#511	>1.20	>120	F	~269	#594
		WB T	0.88	54	D	432	#815	1.09	106	F	601	#1100	>1.20	>120	F	~809	#1331
		WB R 2	0.07	0	A	0	0	0.08	0	A	0	0	0.11	0	A	0	0
		NB L	0.79	87	F	119	#262	0.84	91	F	149	#352	0.84	91	F	149	#352
		NB T	0.37	64	E	61	138	0.41	64	E	80	171	0.41	64	E	80	171
		NB R	0.12	47	D	0	56	0.23	47	D	21	100	0.23	47	D	21	100
		SB L/T	1.07	>120	F	163	#433	>1.20	>120	F	~250	#546	>1.20	>120	F	~339	#674
		SB R	0.81	83	F	105	#242	1.00	>120	F	132	#305	1.19	>120	F	~175	#378
		SE L	0.65	84	F	47	71	0.67	87	F	48	71	0.67	87	F	48	71
		Overall	**0.82**	**66**	**E**			**0.99**	**112**	**F**			**1.13**	**>120**	**F**		
Route 44 at CVS Drive	AM	EB L	0.05	3	A	1	15	0.06	3	A	1	15	0.06	3	A	1	15
		EB T	0.49	5	A	79	363	0.60	6	A	112	512	0.65	6	A	131	#603
		WB T	0.31	7	A	30	319	0.38	8	A	90	391	0.42	8	A	114	432
		WB R	0.02	5	A	0	12	0.02	4	A	0	10	0.03	4	A	0	10
		SB L	0.24	47	D	9	18	0.24	47	D	9	18	0.24	47	D	9	18
		Overall	**0.47**	**6**	**A**			**0.57**	**7**	**A**			**0.62**	**8**	**A**		
	PM	EB L	0.18	7	A	2	22	0.28	12	B	2	22	0.28	18	B	2	22
		EB T	0.47	6	A	70	344	0.58	7	A	98	480	0.61	7	A	108	529
		WB T	0.65	8	A	172	#652	0.79	12	B	228	#885	0.90	14	B	246	#1064
		WB R	0.09	3	A	1	m27	0.09	3	A	1	m23	0.11	3	A	1	m22

Location	Peak Hour	Mov't	Existing Conditions v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	CTDOT Forecast Conditions v/c	Del	LOS	Q50	Q95	No-Build Conditions v/c	Del	LOS	Q50	Q95
		SB L	0.34	44	D	26	50	0.34	44	D	26	50	0.34	44	D	26	50
		Overall	**0.58**	**9**	**A**			**0.70**	**11**	**B**			**0.80**	**12**	**B**		
	SAT	EB L	0.22	6	A	3	32	0.32	9	A	3	32	0.37	14	B	3	38
		EB T	0.51	6	A	75	365	0.62	8	A	105	#533	0.67	8	A	120	#635
		WB T	0.58	9	A	121	#520	0.71	8	A	124	#707	0.84	10	B	123	#876
		WB R	0.08	4	A	0	m16	0.08	3	A	0	m11	0.10	2	A	0	m9
		SB L	0.27	39	D	19	34	0.27	39	D	19	34	0.27	39	D	19	34
		Overall	**0.51**	**9**	**A**			**0.62**	**9**	**A**			**0.72**	**10**	**B**		
Route 44 at Shops at Farmington Valley/Private Driveway	AM	EB L	0.50	54	D	6	m12	0.50	55	E	6	m11	0.50	56	E	6	m10
		EB T	0.58	19	B	332	490	0.70	19	B	361	586	0.78	21	C	418	#660
		EB R	0.09	31	C	6	85	0.09	18	B	0	59	0.10	18	B	0	66
		WB L	0.45	49	D	29	62	0.45	52	D	36	62	0.49	46	D	39	m62
		WB T/R	0.34	5	A	32	83	0.41	5	A	52	97	0.47	6	A	83	m139
		NB L	0.48	46	D	34	51	0.48	46	D	34	51	0.48	46	D	34	51
		NB T	0.49	46	D	35	52	0.49	46	D	35	52	0.49	46	D	35	52
		NB R	0.04	37	D	0	3	0.04	37	D	0	3	0.04	37	D	0	3
		SB L	0.21	47	D	10	22	0.21	47	D	10	22	0.21	47	D	10	22
		SB T	0.11	46	D	5	17	0.11	46	D	5	17	0.11	46	D	5	17
		Overall	**0.54**	**19**	**B**			**0.64**	**18**	**B**			**0.70**	**18**	**B**		
	PM	EB L	0.29	60	E	3	m7	0.29	59	E	3	m7	0.29	59	E	3	m6
		EB T	0.57	15	B	246	105	0.73	20	B	351	#413	0.79	23	C	386	#561
		EB R	0.19	10	A	14	14	0.23	12	B	37	62	0.25	13	B	41	74
		WB L	0.65	57	E	82	127	0.65	56	E	87	m110	0.69	50	D	101	m105
		WB T/R	0.61	8	A	56	179	0.77	11	B	117	#316	0.89	14	B	215	m#488
		NB L	0.74	53	D	106	#191	0.74	53	D	106	#191	0.74	53	D	106	#191
		NB T	0.75	53	D	107	#193	0.75	53	D	107	#193	0.75	53	D	107	#193
		NB R	0.34	31	C	34	80	0.36	32	C	38	84	0.35	31	C	37	81
		SB L	0.32	47	D	15	27	0.32	47	D	15	27	0.32	47	D	15	27
		SB T	0.10	46	D	5	13	0.10	46	D	5	13	0.10	46	D	5	13
		Overall	**0.65**	**20**	**C**			**0.77**	**22**	**C**			**0.87**	**23**	**C**		
	SAT	EB L	0.29	45	D	3	m9	0.29	44	D	3	m8	0.29	43	D	3	m8
		EB T	0.68	25	C	251	263	0.89	33	C	~386	#531	0.99	48	D	~481	#585
		EB R	0.29	38	D	28	139	0.34	29	C	19	162	0.39	28	C	30	178
		WB L	0.74	53	D	111	156	0.74	49	D	112	156	0.81	41	D	135	m156
		WB T/R	0.58	12	B	74	225	0.74	16	B	140	#326	0.90	18	B	255	m#530
		NB L	0.80	52	D	118	#212	0.80	52	D	118	#212	0.80	52	D	118	#212
		NB T	0.80	52	D	118	#212	0.80	52	D	118	#212	0.80	52	D	118	#212
		NB R	0.51	27	C	53	103	0.52	27	C	58	108	0.51	26	C	56	109
		SB L	0.12	41	D	5	12	0.12	41	D	5	12	0.12	41	D	5	12
		SB T	0.14	41	D	5	13	0.14	41	D	5	13	0.14	41	D	5	13
		Overall	**0.68**	**29**	**C**			**0.82**	**30**	**C**			**0.90**	**33**	**C**		
	AM	EB L	0.03	2	A	1	m1	0.03	6	A	1	m2	0.04	8	A	1	m2

Location	Peak Hour	Mov't	Existing Conditions					CTDOT Forecast Conditions					No-Build Conditions				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
Route 44 at Secret Lake Road/Acura of Avon		EB T	0.58	5	A	49	51	0.72	9	A	134	151	0.91	17	B	131	#675
		WB L	0.09	7	A	2	12	0.18	9	A	3	15	0.25	17	B	3	16
		WB T	0.35	8	A	57	179	0.43	9	A	76	232	0.50	14	B	86	249
		NB T	0.03	43	D	0	0	0.05	43	D	0	0	0.85	62	E	~181	#154
		SB L	0.29	49	D	8	23	0.29	49	D	8	23	0.29	49	D	8	23
		SB R	0.01	47	D	0	0	0.01	47	D	0	0	0.01	47	D	0	0
		Overall	**0.50**	**8**	**A**			**0.62**	**10**	**B**			**0.84**	**22**	**C**		
	PM	EB L	0.07	9	A	2	m5	0.12	17	B	1	m4	0.12	20	C	2	m4
		EB T	0.58	9	A	144	217	0.73	14	B	151	292	0.79	17	B	201	340
		WB L	0.13	7	A	6	16	0.27	10	B	8	20	0.31	13	B	9	21
		WB T	0.69	13	B	291	485	0.87	21	C	430	#775	0.91	24	C	471	#817
		NB T	0.05	43	D	0	0	0.06	42	D	0	0	>1.20	>120	F	~935	#723
		SB L	0.36	48	D	17	35	0.36	48	D	17	35	0.36	48	D	17	35
		SB R	0.02	46	D	0	0	0.02	46	D	0	0	0.02	46	D	0	0
		Overall	**0.61**	**13**	**B**			**0.74**	**19**	**B**			**>1.20**	**>120**	**F**		
	SAT	EB L	0.06	8	A	2	m3	0.10	11	B	2	m2	0.11	13	B	2	m2
		EB T	0.63	11	B	190	212	0.81	16	B	198	#317	0.89	20	B	255	m#560
		WB L	0.10	8	A	4	12	0.23	12	B	6	15	0.23	14	B	6	16
		WB T	0.62	13	B	218	368	0.78	18	B	306	#540	0.82	20	C	336	#608
		NB T	0.05	38	D	0	0	0.07	37	D	0	0	>1.20	>120	F	~589	#544
		SB L	0.17	42	D	8	20	0.17	42	D	8	20	0.17	42	D	8	20
		SB R	0.02	41	D	0	0	0.02	41	D	0	0	0.02	41	D	0	0
		Overall	**0.52**	**13**	**B**			**0.65**	**18**	**B**			**1.08**	**>120**	**F**		

Source: VHB, Inc. using Synchro 11 software
1 volume-to-capacity ratio
2 delay, in seconds
3 level of service
4 50th percentile queue length, in feet
5 95th percentile queue length, in feet
EB = Eastbound; WB = Westbound; NB = Northbound; SB = Southbound; R = right; T = through, L= left
# 95th% volume exceeds capacity, queue may be longer
~ Volume exceeds capacity, queue is theoretically infinite
m Volume for 95th percentile queue is metered by upstream signal

Figure 5 2050 No-Build AM Peak Traffic Volumes



\\vhb.com\gbl\proj\Wethersfield\43281.00 Route 44 Corridor Study\Graphics\FIGURES\Network Diagrams - Build.dwg

Figure 6 2050 No-Build PM Peak Traffic Volumes

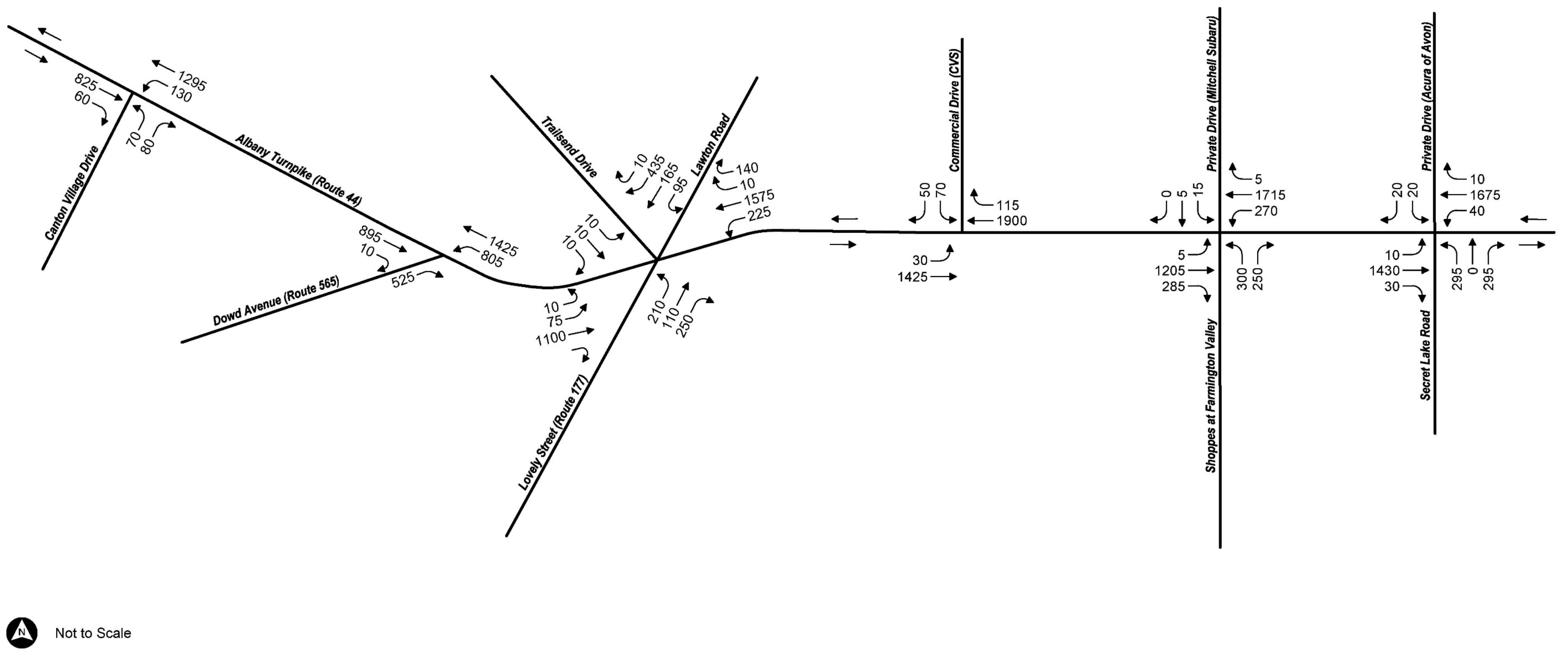
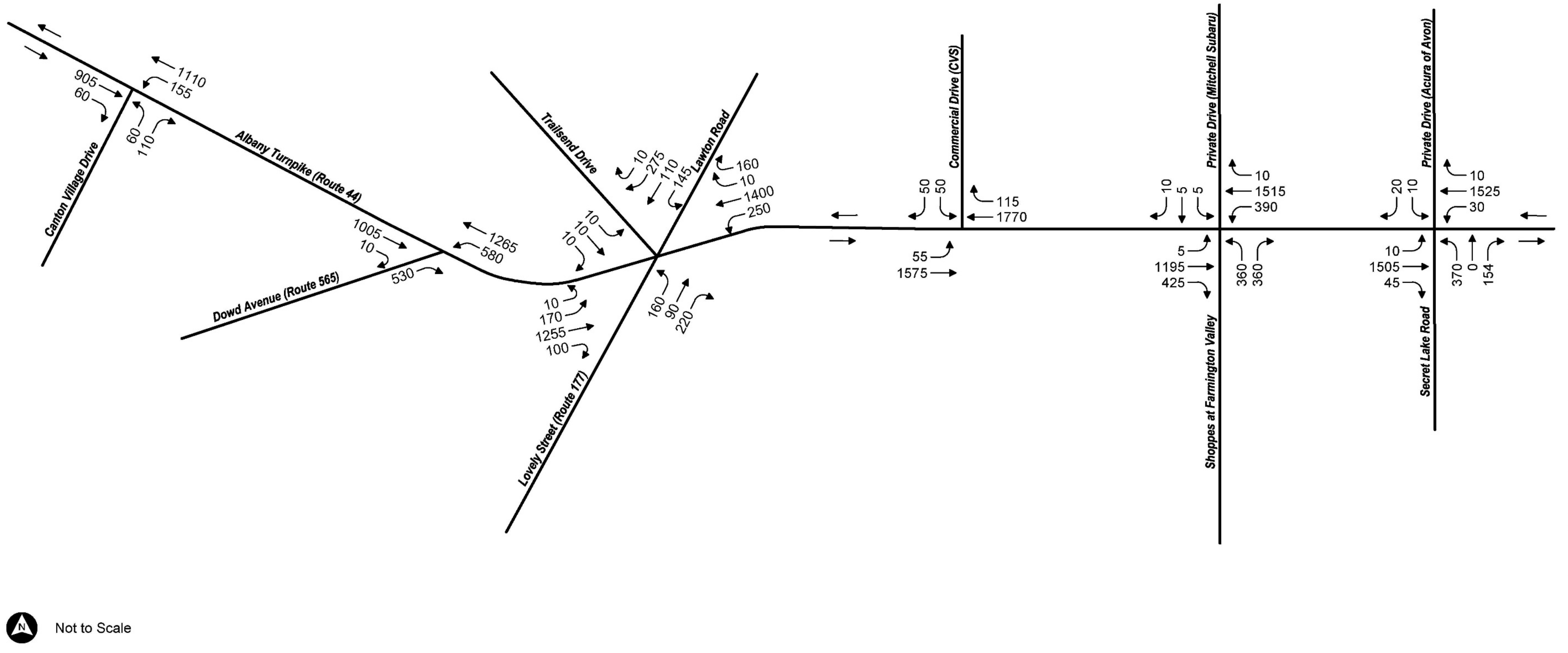


Figure 7 2050 No-Build Saturday Midday Peak Traffic Volumes



3.3 Bicycle, Pedestrian, and Transit Potential

Canton was originally developed primarily as a farming community comprising of large tracts of open spaces, with the exception of Collinsville which was developed as a compact, walkable village center mainly to serve the workers of the Collins Company. The most significant growth in Canton came after 1950 as access to automobiles and highways allowed for people to live farther away from economic centers and their place of work. This has resulted in a development pattern and urban form of dispersed development and low density that is oriented to automobile travel. As noted in the Canton POCD, much of the land in Canton is zoned for residential development on one- to two-acre lots, requiring people to travel long distances to get from one place to another and limiting the attraction and efficiency of traveling by walking, biking, and public transportation. In addition, Route 44 is a long-distance route for through traffic (it was considered for conversion to a freeway in the 1960s and 1970s) that was built mainly to carry high volumes of automobiles. As a result, the majority of trips made through the study area are via car or truck, even with the presence of the Farmington River Trail being mostly parallel to Route 44 and Dowd Avenue through the study area.

The Town of Canton is actively working to promote and encourage non-automobile trips, through zoning changes, policy, and programs such as Safe Routes to School. This is especially true within the study area as it continues to grow and develop – the intent is to grow while minimizing the increase and impact of new vehicle trips from commercial and residential development. This increases the potential for non-automobile trips, but it remains to be seen how many car trips can be shifted to non-car trips given the existing geography of the area as discussed in the previous paragraph. The increase in population from new housing may change the demographics of the town and bring in residents who expect and demand better accommodations for biking and walking, at least for short trips and connections to major shopping areas. It is still critical to focus on safety and access for people who are not traveling by car to support the vision of the Town and build on their efforts to shape new development in the study area.

To tap into the potential for more bicycling, walking, and transit trips, these modes must be made attractive, with a special focus on safety, comfort, and ease of use. The Farmington River Trail is the only bicycle facility in the study area, except for bicycle racks that are located in several locations as noted in the Existing Conditions Report. Pedestrians can have difficult conditions for getting around, due to the lack of sidewalks in many places on Route 44, narrow sidewalks with limited buffer from the road, damaged or heaved sidewalks, limited streetscape amenities and little shade along Route 44, and the long and infrequent crosswalks along the road. Transit is limited to express services that do not provide general everyday trips in Canton. These issues must be addressed to improve the viability of these travel modes.

For this section, potential future opportunities for bicycle, pedestrian, trail, and transit improvements will be discussed in a general nature. Specific recommendations for each area will be included in the Alternatives Analysis memorandum.

3.3.1 Pedestrian

The development of a walkable and pedestrian-friendly Route 44 and Dowd Avenue is a critical part of the vision of the Town of Canton to create village center areas where people can walk around comfortably and residents can safely make trips for errands, work, school, entertainment, etc. Safe walking areas are also a key part of making public transportation more accessible and viable, as most transit trips start as walking trips.

Deficiencies in pedestrian facilities were noted above – lack of sidewalks, narrow or unbuffered sidewalks in some areas, long or difficult crossings, and lack of streetscape amenities such as street trees. New sidewalks will make it easier and safer for people to walk between developments and improve accessibility of transit. To address crossing issues, crossings much be made shorter to reduce pedestrian exposure to car traffic in the road, which can be accomplished through curb extensions and intersections redesigns that reduce crossing times and address curb ramps so that pedestrians with mobility impairments can also be served well. Although crossings of Route 44 are not frequent, they must be paired with traffic signals that provide the safest crossing opportunities given Route 44's high volume and high speeds. Dowd Avenue can have more crossing opportunities because the volumes and speeds are lower, but public input has indicated that volumes and speeds are still perceived as too high for the road and should be addressed, such as through traffic calming measures.

Narrow and uncomfortable sidewalks – particularly along Route 44 – lack shade trees to protect pedestrians from sun and weather and are either built to an outdated standard or are too narrow to allow pedestrians to comfortably pass each other. There may also be a lack of a buffer between the sidewalk and the road, which carries fast-moving traffic, or the buffer is small and unattractive. Widening sidewalks or installing street trees may require removing road space or parking areas or would need to be included as part of a property redevelopment. These changes will make it much easier for pedestrians to get around and support multimodal access to the study area.

3.3.2 Bicycling

Bicycling is a healthy and economical mode of transportation that also allows for longer trips than by walking and can help extend trips made on public transportation. People riding bicycles are still vulnerable users however and are exposed to traffic more often than people walking. High speed and high-volume traffic is challenging for bicyclists, especially those that are less experienced and have less tolerance for uncomfortable situations.

Much of the existing bicycle traffic occurs on the Farmington River Trail. Being fully separated from the road, riders do not have conflict with motor vehicles except at the locations where the trail must cross the road or where a separated path is not provided. Route 44 has high volumes and speeds, with limited paved shoulder, which discourage riders who are not already experienced and skilled at sharing roadways with car traffic. Although Dowd Avenue has less traffic, it is still significant enough to discourage most users, who would prefer to use the Farmington River Trail since it parallels Dowd Avenue for a long way. Providing wider paved shoulders or even bicycle lanes on Route 44 and Dowd Avenue would be ideal, but there are significant challenges with this due to the lack of right-of-way and need to provide adequate traffic capacity on Route 44 through the study area.

Other improvements to create bicycle facilities and lower car traffic speeds would also be beneficial to encouraging bicycle travel. If dedicated bicycle facilities cannot be developed, shared bicycle and pedestrian facilities such as trails or sidepaths along the road, in addition to the Farmington River Trail, would assist with filling gaps and providing a comfortable place off the roadway for bicyclists to travel.

3.3.3 Trails

The Farmington River Trail is a comfortable, attractive multiuse path that is set apart considerably from Route 44 and Dowd Avenue as it runs west through the study area from the intersection of Route 44 and Lawton Road/Lovely Street. North of this intersection, there is a short off-road section on Lawton Road before it drops back to an on-street route, although the Town of Canton intends to have additional sections of the route constructed as off-road sidepaths with the new developments at 115 Albany Turnpike and the Applegate Village development. This trail is an important part of the bicycle and pedestrian network, as it connects to neighborhoods west and north of the study area including Collinsville.

One of the challenges to the utility of the trail is that it has limited connections to the commercial development it passes near on Route 44. There are topographic and environmental constraints to making these connections, such as steep grade changes and crossing low, wet areas. However, with the planned extension of the trail through the Shops at Farmington Valley, it will provide access to a significant commercial area for residents and visitors alike, increasing the potential for non-car trips to this regional draw.

The trail is intended to continue eastward towards Simsbury and Avon and will need to cross Route 44 at some point along the route. A potential location of a crossing will be further reviewed in the Alternatives Analysis that will come after this report.

3.3.4 Public Transportation

CT Transit provides express service to Hartford through the study area along Route 44. This is a critical service for those who need to make this commute and helps to remove vehicle trips from the transportation system. However, the number of people that use this service is low, and there are less than ten trips for the express routes throughout an average day. Users must plan ahead for their trips and be sure they do not need to return for several hours. If they miss a bus, they may not be able to get on the next bus for an hour or may not be able to make their trip at all, requiring them to get a taxi or rideshare to get to their destination or use a private automobile. This low frequency makes it challenging for people to use the service who have more convenient options to available, or if they already have access to a private vehicle.

Besides issues of frequency, comfort and user experience are important to make the service easy to use and understand. At least one bus stop lacks sidewalks to the stop on the same side of the road, and signage indicating the bus stop can be small and hard to see if someone is not already familiar with where the bus stop is. Access to the bus stops from side streets can be difficult due to lack of sidewalk connections that make this trip safe as well. Lack of bus information signage means that to ride the bus you need to know which side of the road to be on and what the bus schedule is. These create additional hurdles for someone to choose to ride the bus when they must have already ridden the bus or must research bus information well in advance.

Overall, there are improvements that can be made to improve safety and access to the bus service that exists currently. However, there are needed improvements to frequency and the ability to make everyday trips that will be beyond the confines of this corridor study.

3.4 Safety Benefit Estimation

Based on the crash history and the operational issues found during the existing conditions scan, different improvements suggested by the FHWA Proven Safety Countermeasures were reviewed as having potential for addressing transportation issues. They include, but are not limited to:

- Modern Roundabouts
- Speed Management
- Bicycle facilities
- Pedestrian Crosswalk Enhancements
- Dedicated Turn lanes
- Corridor Access Management
- Sidewalks/Walkways
- Roadway Reconfiguration
- Wider Shoulders

Potential safety benefits vary between countermeasures and depend on application but are broadly set out in the countermeasures fact sheets provided by FHWA. They are provided in the next several sections and figures to illustrate the potential safety benefits.

3.4.1 Modern Roundabouts

The safety benefits of converting a two-way stop-controlled intersection to a roundabout are up to an 82% reduction in fatal and injury crashes. For converting a signalized intersection to a roundabout, this can be up to a 78% reduction.

Figure 8 FHWA Roundabouts Countermeasure Fact Sheet

U.S. Department of Transportation
Federal Highway Administration

OFFICE OF SAFETY
Proven Safety Countermeasures

Roundabouts

The modern roundabout is an intersection with a circular configuration that safely and efficiently moves traffic. Roundabouts feature channelized, curved approaches that reduce vehicle speed, entry yield control that gives right-of-way to circulating traffic, and counterclockwise flow around a central island that minimizes conflict points. The net result of lower speeds and reduced conflicts at roundabouts is an environment where crashes that cause injury or fatality are substantially reduced.

Roundabouts are not only a safer type of intersection; they are also efficient in terms of keeping people moving. Even while calming traffic, they can reduce delay and queuing when compared to other intersection alternatives. Furthermore, the lower vehicular speeds and reduced conflict environment can create a more suitable environment for walking and bicycling.

Roundabouts can be implemented in both urban and rural areas under a wide range of traffic conditions. They can replace signals, two-way stop controls, and all-way stop controls. Roundabouts are an effective option for managing speed and transitioning traffic from high-speed to low-speed environments, such as freeway interchange ramp terminals, and rural intersections along high-speed roads.

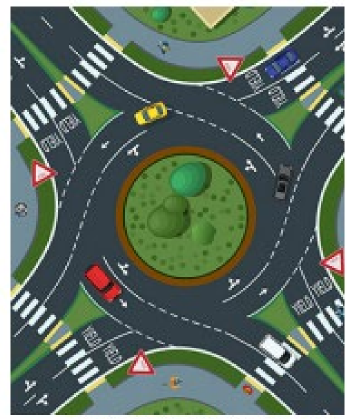
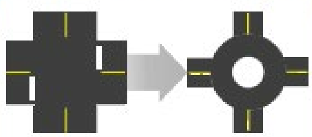


Illustration of a multilane roundabout. Source: FHWA

Example of a single-lane roundabout. Source: FHWA

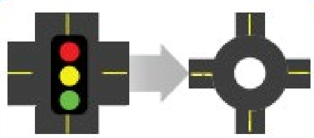
Safety Benefits:

Two-Way Stop-Controlled Intersection to a Roundabout



82% reduction in fatal and injury crashes.[1]

Signalized Intersection to a Roundabout



78% reduction in fatal and injury crashes.[1]

For more information on this and other FHWA Proven Safety Countermeasures, please visit https://highways.dot.gov/safety/proven-safety-countermeasures and https://highways.dot.gov/safety/intersection-safety/intersection-types/roundabouts.

FHWA-SA-21-042

1 (CMF ID: 211,226) AASHTO. The Highway Safety Manual, American Association of State Highway Transportation Professionals, Washington, D.C., (2010).

ZERO IS OUR GOAL
A SAFE SYSTEM IS HOW WE GET THERE

Source: FHWA

3.4.2 Speed Management

Reducing speeds is one of the most important methods for reducing fatalities and serious injuries. Achieving desired speeds requires implementing speed management strategies along with setting speed limits, such as self-enforcing roadways, traffic calming, and speed safety cameras.

To address serious speeding issues on a roadway, it is often necessary to implement different traffic calming measures along a roadway to change the experience of drivers on the road. "Traffic calming" refers to various design measures – mainly physical measures – that are used to reduce the negative effects of motor vehicle use, alter driver behavior, support the livability and vitality of residential and commercial areas, and improve conditions for people bicycling and walking. This is accomplished by slowing down or reducing traffic volumes along a single street or street network. These measures can include horizontal and vertical features such as speed humps, raised crosswalks, road narrowing, chicanes, curb extensions, and other physical and psychological interventions in the road layout. Other key goals of traffic calming include reducing collision frequency and severity, reducing the need for police enforcement, and reducing cut-through motor vehicle traffic.[1] While traffic calming measures have not historically been used on state highways, measures such as raised crosswalks are currently being tested on state roads. Certain features, particularly vertical features, would not be appropriate for Route 44, but could be used on Dowd Avenue.

Speed cameras have recently been approved for use in Connecticut and CTDOT released guidance at the beginning of 2024 on how municipalities can utilize the technology. Public Act 23-116 required CTDOT to develop guidance for municipalities that wish to use automated traffic enforcement safety devices, such as red light and speed safety cameras, in their communities.[2] The Automated Traffic Enforcement Safety Device (ATESD) Program is meant to improve public safety, change driver behavior, and save lives. CTDOT guidelines on automated speed enforcement zones outlines where they can be applied, the process for approvals, and annual reporting. To participate in the program, municipalities are required to prepare a plan, create an ordinance, hold a public hearing, and submit the final plan to CTDOT for approval prior to the use an automated traffic enforcement safety device. It is up to the individual municipality/LTA to go through the process and define the locations where speeding issues should be addressed. FHWA notes that fixed units (stationary cameras) can reduce crashes on urban principal arterials up 54% for all crashes and 47% for injury crashes.

[1] See https://www.ite.org/technical-resources/traffic-calming/ and https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer/module-2-traffic-calming-basics#2.1

[2] https://portal.ct.gov/dot/automated-traffic-enforcement-safety-device-program/automated-traffic-enforcement-safety-device-program-overview

Figure 9 FHWA Speed Safety Cameras Countermeasure Fact Sheet

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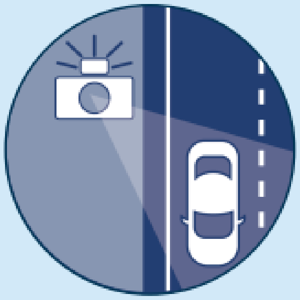
Speed Safety Cameras

Safe Speeds is a core principle of the Safe System Approach since humans are less likely to survive high-speed crashes. Enforcing safe speeds has been challenging; however, with more information and tools communities can make progress in reducing speeds. Agencies can use speed safety cameras (SSCs) as an effective and reliable technology to supplement more traditional methods of enforcement, engineering measures, and education to alter the social norms of speeding. SSCs use speed measurement devices to detect speeding and capture photographic or video evidence of vehicles that are violating a set speed threshold.



Safety Benefits:

Fixed units can reduce crashes on urban principal arterials up to:

54% for all crashes.[4]

48% for injury crashes.[4]

P2P units can reduce crashes on urban expressways, freeways, and principal arterials up to:

37% for fatal and injury crashes.[2]

Mobile units can reduce crashes on urban principal arterials up to:

20% for fatal and injury crashes.[5]

In New York City, fixed units reduced speeding in school zones up to 63% during school hours.[6]

For more information on this and other FHWA Proven Safety Countermeasures, please reference the: Speed Safety Camera Program Planning and Operations Guide.

FHWA-SA-21-070

Applications

Agencies should conduct a network analysis of speeding-related crashes to identify locations to implement SSCs. The analysis can include scope (e.g., widespread, localized), location types (e.g., urban/suburban/rural, work zones, residential, school zones), roadway types (e.g., expressways, arterials, local streets), times of day, and road users most affected by speed-related crashes (e.g., pedestrians, bicyclists).

SSCs can be deployed as:

- **Fixed units**—a single, stationary camera targeting one location.
- **Point-to-Point (P2P) units**—multiple cameras to capture average speed over a certain distance.
- **Mobile units**—a portable camera, generally in a vehicle or trailer.

The table below describes suitable circumstances for SSC deployment.[1]

Considerations

- SSCs can produce a crash reduction upstream and downstream, thus generating a spillover effect.[2]
- Public trust is essential for any type of enforcement. With proper controls in place, SSCs can offer fair and equitable enforcement of speeding, regardless of driver age, race, gender, or socio-economic status. SSCs should be planned with community input and equity impacts in mind.
- Using both overt (i.e., highly visible) and covert (i.e., hidden) enforcement may encourage drivers to comply with limits everywhere, not only at sites they are aware are enforced.
- Agencies should conduct evaluations regularly to determine if SSCs are accomplishing safety goals and whether changes in strategy, scheduling, communications, or public engagement are necessary.
- Agencies should conduct a legal and policy review to determine if SSCs are authorized within a jurisdiction and how the authorization and other traffic laws will affect a SSC program.
- Agencies should develop an SSC program plan with consideration of the USDOT SSC guidelines for planning, public involvement, stakeholder coordination, implementation, maintenance, evaluation, etc.[3]

Considerations for Selection	Fixed	P2P	Mobile
Problems are long-term and site-specific.	X	X	—
Problems are network-wide, and shift based on enforcement efforts.	—	—	X
Speeds at enforcement site vary largely from downstream sites.	—	X	X
Overt enforcement is legally required.	X	X	X
Sight distance for the enforcement unit is limited.	X	X	—
Enforcement sites are multilane facilities.	X	X	—

1 Speed Safety Camera Program Planning and Operations Guide. FHWA. (2023).
2 (CMF ID: 7718) Montella et al. "Effects on speed and safety of point-to-point speed enforcement systems". Accident Analysis and Prevention, Vol. 75, (2015). Note that this is an international study.
3 Speed Enforcement Camera Systems Operational Guidelines. NHTSA. (2008).
4 (CMF ID: 2915,2921) Shin et al. "Evaluation of the Scottsdale Loop 101 automated speed enforcement demonstration program." Accident Analysis and Prevention, Vol. 41, (2009).
5 (CMF ID: 7582) Li et al. "A Before-and-After Empirical Bayes Evaluation of Automated Mobile Speed Enforcement on Urban Arterial Roads." Presented at the 94th Annual Meeting of the Transportation Research Board, Paper No. 15-1563, Washington, D.C., (2015). Note that this is an international study.
6 Automated Speed Enforcement Program Report 2014-2017. New York City DOT, (2018).

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Source: FHWA

3.4.3 Bicycle Facilities

Bicycle facilities can be used to encourage more people to bicycle and provide separate space for them so they do not need to share traffic lanes with automobile drivers. FHWA notes that most fatal and serious injury crashes occur at non-intersection locations, and nearly one-third of these crashes occur when motorists are overtaking bicyclists, because the speed and size differential between vehicles and bicycles can lead to severe injury.[3] Different contexts require different approaches to the bicycle facility design, with higher speed and higher volume roadways needing more separation from traffic.

[3] https://highways.dot.gov/safety/proven-safety-countermeasures/bicycle-lanes

Figure 10 FHWA Bicycle Lanes Countermeasure Fact Sheet

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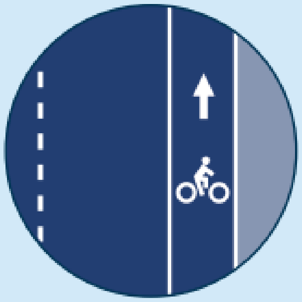
Proven Safety Countermeasures



Safety Benefits:
Converting traditional or flush buffered bicycle lanes to a separated bicycle lane with flexible delineator posts can reduce crashes up to:

53%

for bicycle/vehicle crashes.[3]

Bicycle Lane Additions can reduce crashes up to:

49%

for total crashes on urban 4-lane undivided collectors and local roads.[7]

30%

for total crashes on urban 2-lane undivided collectors and local roads.[7]

Bicycle lane in Washington, DC.
Source: Alex Baca, Washington Area Bicyclist Association.

For more information on this and other FHWA Proven Safety Countermeasures, please visit https://highways.dot.gov/safety/proven-safety-countermeasures and https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-07/fhwasa18077.pdf.

FHWA-SA-21-051

Bicycle Lanes

Most fatal and serious injury bicyclist crashes occur at non-intersection locations. Nearly one-third of these crashes occur when motorists are overtaking bicyclists[1] because the speed and size differential between vehicles and bicycles can lead to severe injury. Many people are not comfortable riding a bicycle because of their fear that this type of crash may occur. To make bicycling safer and more comfortable for most types of bicyclists, State and local agencies should consider installing bicycle lanes. Providing bicycle facilities can mitigate or prevent interactions, conflicts, and crashes between bicyclists and motor vehicles, and create a network of safer roadways for bicycling. Bicycle Lanes align with the Safe System Approach principle of recognizing human vulnerability—where separating users in space can enhance safety for all road users.

Applications

The FHWA's *Bikeway Selection Guide* and *Incorporating On-Road Bicycle Networks into Resurfacing Projects* assist agencies in determining which facilities provide the most benefit in various contexts. Bicycle lanes can be included on new roadways or created on existing roads by reallocating space in the right-of-way through *Road Diets*. Separated bicycle lanes, which use vertical elements—such as flexible delineator posts, curbs, or vegetation—between the bicycle lane and motorized traffic lanes provide additional safety benefits.[2,3] For a marked bike lane without vertical elements, a lateral offset with marked buffer can help to further separate bicyclists from vehicle traffic.

Considerations

- In order to maximize a roadway's suitability for riders of all ages and abilities, bicycle lane design should vary according to roadway characteristics (number of lanes, motor vehicle and truck volumes, speed, presence of transit), user needs (current and forecasted ridership, types of bicycles and micromobility devices in use within the community, role within the bicycling network), and land-use context (adjacent land uses, types and intensity of conflicting uses, demands from other users for curbside access). Separated bicycle lanes are recommended on roadways with higher vehicle volumes and speeds, such as arterials.
- City and State policies may require minimum bicycle lane widths, although desirable bicycle lane widths can differ by agency and functional classification of the road, current and forecasted bicycle volumes, and contextual attributes such as topography.
- Studies have found that roadways did not experience an increase in crashes or congestion when travel lane widths were decreased to add a bicycle lane.[4]
- Studies and experience in U.S. cities show that bicycle lanes increase ridership and may help jurisdictions better manage roadway capacity.
- In rural areas, rumble strips can negatively impact bicyclists' ability to ride if not properly installed. Agencies should consider the dimensions, placement, and offset of rumble strips when adding a bicycle lane.[5]
- Bicycle lanes should be considered on roadways where adjacent land use suggests that trips could be served by varied modes, particularly to meet the safety and travel needs of low-income populations likely to use bicycles to reach essential destinations.[6]

1 Thomas et al. Bicyclist Crash Types on National, State, and Local Levels: A New Look. Transportation Research Record 673(6), 664-676, (2019).
2 Separated Bike Lane Planning and Design Guide. FHWA-HEP-15-025, (2015).
3 (CMF ID: 11296) Developing CMFs for Separated Bicycle Lanes. FHWA-HRT-23-025, (2023).
4 Park and Abdel-Aty. Evaluation of safety effectiveness of multiple cross sectional features on urban arterials. Accident Analysis and Prevention, Vol. 92, pp. 245-255, (2016).
5 FHWA Tech Advisory Shoulder and Edge Line Rumble Strips. (2011).
6 Sandt et al. Pursuing Equity in Pedestrian and Bicycle Planning. FHWA, (2016).
7 (CMF ID: 10738, 10742) Development of Crash Modification Factors for Bicycle Lane Additions While Reducing Lane and Shoulder Widths. FHWA-HRT-21-012, (2021).

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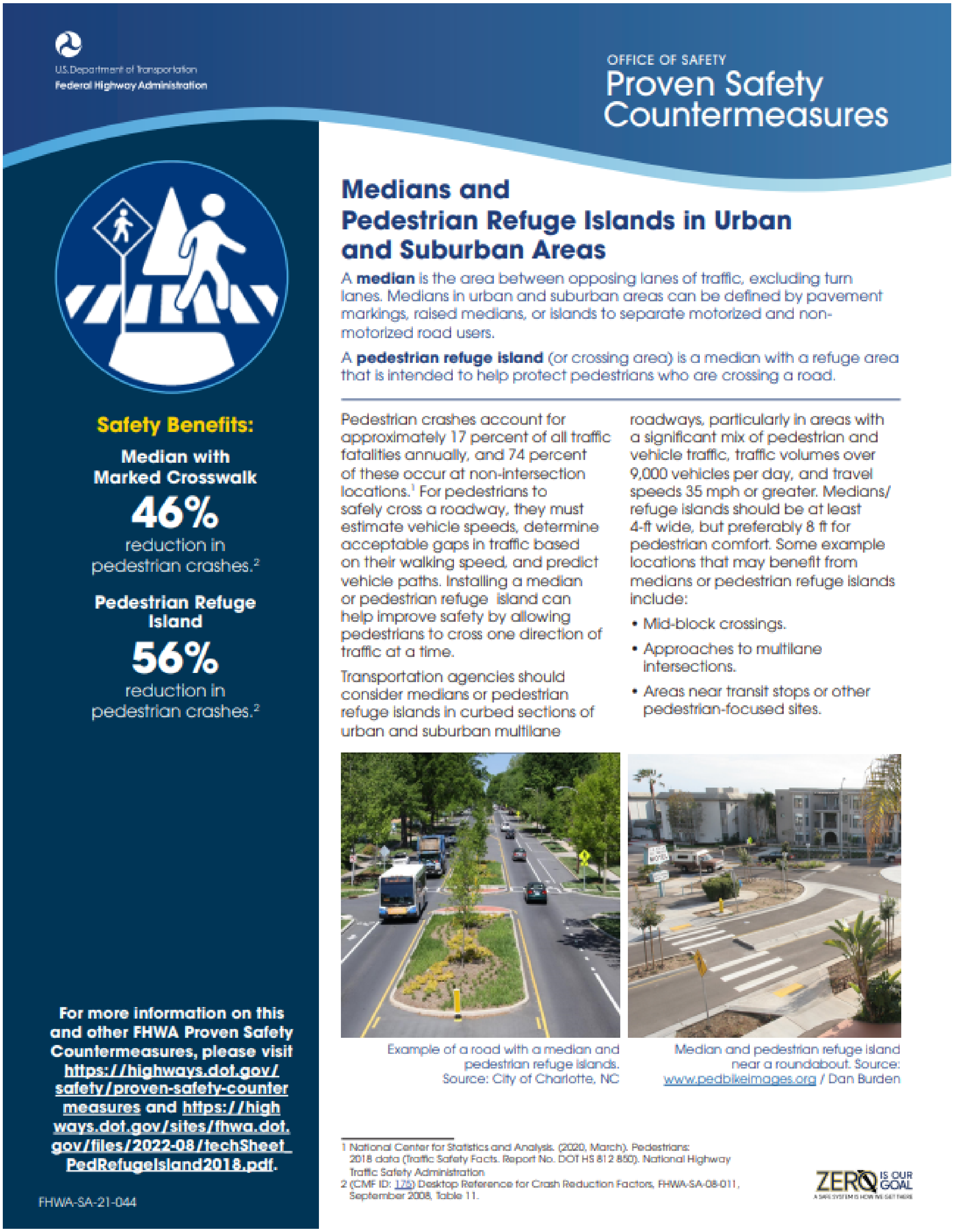
Source: FHWA

3.4.4 Pedestrian Crosswalk Enhancements

Improvements to crosswalks can include curb extensions (to shorten the crosswalk length), better street lighting, medians/pedestrian refuge islands to help protect pedestrians who are crossing the road, and high-visibility crosswalks. Warning lights such as Rectangular Rapid Flashing Beacons (RRFBs), which are already in use on Dowd Avenue, can be especially useful on lower-volume roads for visibility and alerting drivers to when a pedestrian is crossing or wishes to cross the street. Median islands may be useful to assist pedestrians crossing Route 44, where right-of-way and street space allow, to make for more comfortable crossings. FHWA notes that a median with a marked crosswalk can result in a 46% reduction in pedestrian crashes, while a pedestrian refuge island can result in a 56% reduction in pedestrian crashes.

Figure 11 FHWA Median Islands Countermeasure Fact Sheet



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Medians and Pedestrian Refuge Islands in Urban and Suburban Areas

A **median** is the area between opposing lanes of traffic, excluding turn lanes. Medians in urban and suburban areas can be defined by pavement markings, raised medians, or islands to separate motorized and non-motorized road users.

A **pedestrian refuge island** (or crossing area) is a median with a refuge area that is intended to help protect pedestrians who are crossing a road.

Safety Benefits:

Median with Marked Crosswalk

46%

reduction in pedestrian crashes.[2]

Pedestrian Refuge Island

56%

reduction in pedestrian crashes.[2]

Pedestrian crashes account for approximately 17 percent of all traffic fatalities annually, and 74 percent of these occur at non-intersection locations.[1] For pedestrians to safely cross a roadway, they must estimate vehicle speeds, determine acceptable gaps in traffic based on their walking speed, and predict vehicle paths. Installing a median or pedestrian refuge island can help improve safety by allowing pedestrians to cross one direction of traffic at a time.

Transportation agencies should consider medians or pedestrian refuge islands in curbed sections of urban and suburban multilane roadways, particularly in areas with a significant mix of pedestrian and vehicle traffic, traffic volumes over 9,000 vehicles per day, and travel speeds 35 mph or greater. Medians/refuge islands should be at least 4-ft wide, but preferably 8 ft for pedestrian comfort. Some example locations that may benefit from medians or pedestrian refuge islands include:

- Mid-block crossings.
- Approaches to multilane intersections.
- Areas near transit stops or other pedestrian-focused sites.

Example of a road with a median and pedestrian refuge islands. Source: City of Charlotte, NC

Median and pedestrian refuge island near a roundabout. Source: www.pedbikeimages.org / Dan Burden

For more information on this and other FHWA Proven Safety Countermeasures, please visit https://highways.dot.gov/safety/proven-safety-countermeasures and https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-08/techSheet_PedRefugeIsland2018.pdf.

FHWA-SA-21-044

1 National Center for Statistics and Analysis. (2020, March). Pedestrians: 2018 data (Traffic Safety Facts. Report No. DOT HS 812 850). National Highway Traffic Safety Administration

2 (CMF ID: 175) Desktop Reference for Crash Reduction Factors, FHWA-SA-08-011, September 2008, Table 11.

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Source: FHWA

3.4.5 Dedicated Turn Lanes

Left or right turn lanes provide physical separation between turning traffic that is slowing or stopped and adjacent through traffic at approaches to intersections[4] as well as turns into businesses and other properties. Left turn lanes can provide a 28-48% reduction in total crashes. As noted in the public outreach during the existing conditions for this study, there were many concerns about left turns into businesses along Route 44, especially between Lawton Road/Lovely Street and Dowd Avenue, and from Route 44 onto Dowd Avenue.

[4] https://highways.dot.gov/safety/proven-safety-countermeasures/dedicated-left-and-right-turn-lanes-intersections

Figure 12 FHWA Turn Lanes Countermeasure Fact Sheet

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Safety Benefits:

Left-Turn Lanes

28-48%

reduction in total crashes.[1]

Positive Offset Left-Turn Lanes

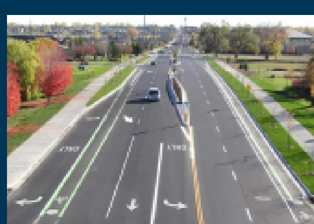
36%

reduction in fatal and injury crashes.[2]

Right-Turn Lanes

14-26%

reduction in total crashes.[1]



Left- and right-turn lanes at a two-way stop-controlled intersection. Source: City of Greeley, CO

For more information on this and other FHWA Proven Safety Countermeasures, please visit https://highways.dot.gov/safety/proven-safety-countermeasures and https://www.fhwa.dot.gov/publications/research/safety/02103/02103techbrief.pdf.

FHWA-SA-21-041

Dedicated Left- and Right-Turn Lanes at Intersections

Auxiliary turn lanes—either for left turns or right turns—provide physical separation between turning traffic that is slowing or stopped and adjacent through traffic at approaches to intersections. Turn lanes can be designed to provide for deceleration prior to a turn, as well as for storage of vehicles that are stopped and waiting for the opportunity to complete a turn.

While turn lanes provide measurable safety and operational benefits at many types of intersections, they are particularly helpful at two-way stop-controlled intersections. Crashes occurring at these intersections are often related to turning maneuvers. Since the major route traffic is free flowing and typically travels at higher speeds, crashes that do occur are often severe. The main crash types include collisions of vehicles turning left across opposing through traffic and rear-end collisions of vehicles turning left or right with other vehicles following closely behind. Turn lanes reduce the potential for these types of crashes.

Installing left-turn lanes and/or right-turn lanes should be considered for the major road approaches for improving safety at both three- and four-leg intersections with stop control on the minor road, where significant turning volumes exist, or where there is a history of turn-related crashes. Pedestrian and bicyclist safety and convenience should also be considered when adding turn lanes at an intersection. Specifically, offset left- and right-turn lanes will lengthen crossing distances for pedestrians.

Offset Turn Lanes

Providing offset of left- and right-turn lanes to increase visibility can provide added safety benefits, and is preferable in many situations, particularly at locations with higher speeds, or where free-flow or permissive movements are possible.

At turn lanes with zero or negative offset, turning vehicles can block sightlines. For left-turn lanes, this usually involves opposing left-turning vehicles occupying the turn lanes at the same time. For right-turn lanes, this typically involves right-turning vehicles from the major road and vehicles entering the intersection from the minor road. In both scenarios, adding positive offset to turn lanes enhances the sight distance to approaching vehicles that conflict with the turning movement. Offset turn lanes should be considered when there is a high frequency of these types of conflicts in order to reduce the likelihood of a severe crash.

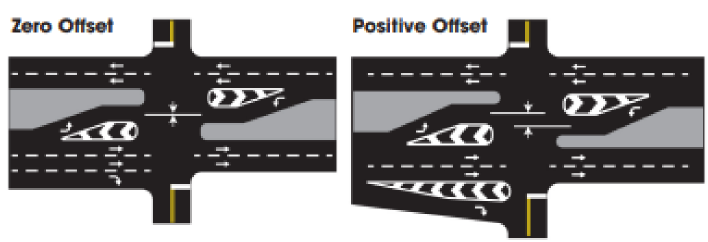


Illustration comparing zero offset to positive offset of left- and right-turn lanes. Source: FHWA

1 (CMF ID: 260, 268, 285, 289) Harwood et al. Safety Effectiveness of Intersection Left- and Right-Turn Lanes. FHWA-HRD-02-089, (2002).
2 (CMF ID: 6096) Persaud et al. Safety Evaluation of Offset Improvements for Left-Turn Lanes. FHWA-HRT-09-035, (2009).

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Source: FHWA

3.4.6 Corridor Access Management

Access management refers to the design, application, and control of entry and exit points along a roadway. This includes intersections with other roads and driveways that serve adjacent properties.[5] Access management was suggested as part of the original Route 44 Corridor Study from 2000 and has been partially implemented in the Route 44 corridor since that study. Additional access management may be considered for other parts of the corridor to provide safer driving conditions and enhance safety for all modes. According to FHWA, reducing driveway density can provide a 25-31% reduction in fatal and injury crashes along urban/suburban arterial streets.

[5] https://highways.dot.gov/safety/proven-safety-countermeasures/corridor-access-management

Figure 13 FHWA Access Management Countermeasure Fact Sheet

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Proven Safety Countermeasures

Safety Benefits:

Reducing driveway density

5-23%
reduction in total crashes along 2-lane rural roads.[3]

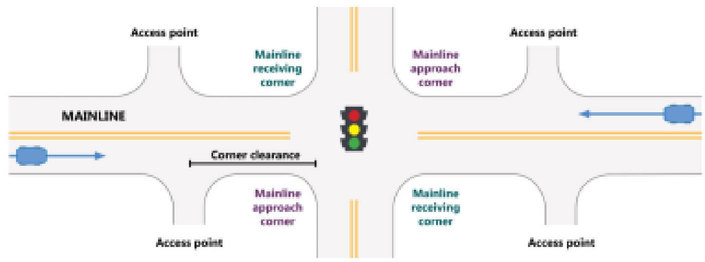
25-31%
reduction in fatal and injury crashes along urban/suburban arterials.[4]

For more information on this and other FHWA Proven Safety Countermeasures, please visit https://highways.dot.gov/safety/proven-safety-countermeasures and https://highways.dot.gov/safety/intersection-safety/cam.

FHWA-SA-21-040

Corridor Access Management

Access management refers to the design, application, and control of entry and exit points along a roadway. This includes intersections with other roads and driveways that serve adjacent properties. Thoughtful access management along a corridor can simultaneously enhance safety for all modes, facilitate walking and biking, and reduce trip delay and congestion.



Schematic of an intersection and adjacent access points. Source: FHWA

Every intersection, from a signalized intersection to an unpaved driveway, has the potential for conflicts between vehicles, pedestrians, and bicyclists. The number and types of conflict points—locations where the travel paths of two users intersect—influence the safety performance of the intersection or driveway. FHWA developed corridor-level crash prediction models to estimate and analyze the safety effects of selected access management techniques for different area types, land uses, roadway variables, and traffic volumes.[1]

The following access management strategies can be used individually or in combination with one another:

- Reduce density through driveway closure, consolidation, or relocation.
- Manage spacing of intersection and access points.
- Limit allowable movements at driveways (such as right-in/right-out only).
- Place driveways on an intersection approach corner rather than a receiving corner, which is expected to have fewer total crashes.[2]
- Implement raised medians that preclude across-roadway movements.
- Utilize designs such as roundabouts or reduced left-turn conflicts (such as restricted crossing U-turn, median U-turns, etc.).
- Provide turn lanes (i.e., left-only, right-only, or interior two-way left).
- Use lower speed one-way or two-way off-arterial circulation roads.

Successful corridor access management involves balancing overall safety and mobility for all users along with the needs of adjacent land uses.

Tandem roundabouts with a continuous raised median eliminates left-turn and across-roadway conflicts. Source: FHWA

1 Gross et al. Safety Evaluation of Access Management Policies and Techniques. FHWA-HRT-14-057, (2018).
2 Le et al. Safety Evaluation of Corner Clearance at Signalized Intersections. FHWA-HRT-17-084, (2018).
3 Harwood et al. Prediction of the Expected Safety Performance of Rural Two-Lane Highways. FHWA-RD-99-207, (2000).
4 (CMF ID: 179,178) Elvik, R. and Vaa, T., Handbook of Road Safety Measures. Oxford, United Kingdom, Elsevier, (2004).

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Source: FHWA

3.4.7 Sidewalks/Walkways

As discussed earlier in this report, sidewalks are critical for pedestrians to be able to walk safely along roadways and reduce crashes between pedestrians and drivers. During the existing conditions review, pedestrians were seen walking along Route 44 between Simsbury/Avon and Canton, in the narrow shoulder of the road while high speed traffic went around them. Public comment and information from the Town noted that employees from the Shops at Farmington Valley would walk to the restaurants across the Simsbury/Avon town line. A lack of sidewalks puts them in greater danger and does not allow for access by people with mobility impairments. FHWA notes that sidewalks can provide a 65-89% reduction in crashes involving pedestrians walking along roadways.

Figure 14 FHWA Walkways Countermeasure Fact Sheet

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Safety Benefits:

Sidewalks

65-89%

reduction in crashes involving pedestrians walking along roadways.[3]

Paved Shoulders

71%

reduction in crashes involving pedestrians walking along roadways.[3]

For more information on this and other FHWA Proven Safety Countermeasures, please visit https://highways.dot.gov/safety/proven-safety-countermeasures and http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=1.

FHWA-SA-21-047

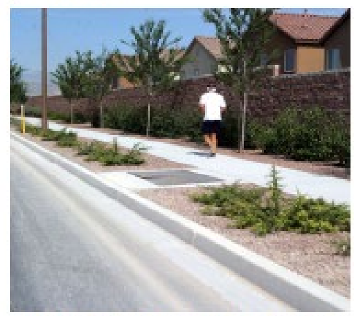
Walkways

A walkway is any type of defined space or pathway for use by a person traveling by foot or using a wheelchair. These may be pedestrian walkways, shared use paths, sidewalks, or roadway shoulders.

With more than 6,200 pedestrian fatalities and 75,000 pedestrian injuries occurring in roadway crashes annually,[1] it is important for transportation agencies to improve conditions and safety for pedestrians and to integrate walkways more fully into the transportation system. Research shows people living in low-income communities are less likely to encounter walkways and other pedestrian-friendly features.[2]

Well-designed pedestrian walkways, shared use paths, and sidewalks improve the safety and mobility of pedestrians. Pedestrians should have direct and connected network of walking routes to desired destinations without gaps or abrupt changes. In some rural or suburban areas, where these types of walkways are not feasible, roadway shoulders provide an area for pedestrians to walk next to the roadway, although these are not preferable.

Transportation agencies should work towards incorporating pedestrian facilities into all roadway projects unless exceptional circumstances exist. It is important to provide and maintain accessible walkways along both sides of the road in urban areas, particularly near school zones and transit locations, and where there is a large amount of pedestrian activity. Walkable shoulders should also be considered along both sides of rural highways when routinely used by pedestrians.



Example of a sidewalk in a residential area. Source: pedbikeimages.org / Burden

Paved shoulder used as a walkway. Source: pedbikeimages.org / Burden

1 National Center for Statistics and Analysis. (2020, March). Pedestrians: 2018 data (Traffic Safety Facts. Report No. DOT HS 812 850). National Highway Traffic Safety Administration.
2 Gibbs, et all. Income Disparities in Street Features that Encourage Walking. Bridging the Gap. (2012, March).
3 Gan et al. Update of Florida Crash Reduction Factors and Countermeasures to Improve the Development of District Safety Improvement Projects. Florida DOT, (2005).

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Source: FHWA

3.4.8 Roadway Reconfiguration

Roadway Reconfigurations (often known as Road Diets) can improve safety, calm traffic, provide better mobility and access for all road users, and enhance overall quality of life. Although this is a potential strategy to address safety concerns on Route 44, it may not be viable for completing a roadway reconfiguration on Route 44 given the existing volumes along the roadway and need to accommodate regional through traffic and traffic to the large commercial areas (such as the Shops at Farmington Valley). Reconfigurations need to be carefully considered and analyzed for applicability when there is limited traffic capacity available on the roadway being reviewed as a candidate for the reconfiguration.

Figure 15 FHWA Roadway Reconfigurations Countermeasure Fact Sheet

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Safety Benefits:

4-Lane to 3-Lane Road Diet Conversions

19-47%

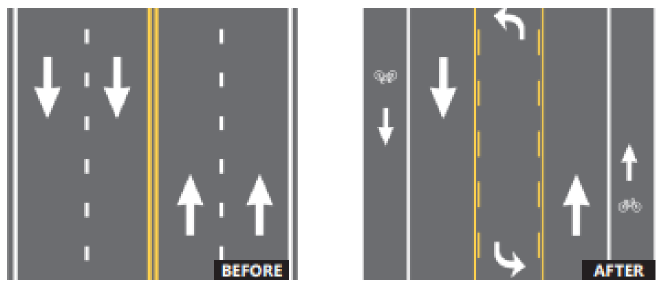
reduction in total crashes.[1]

For more information on this and other FHWA Proven Safety Countermeasures, please visit https://highways.dot.gov/safety/proven-safety-countermeasures and https://highways.dot.gov/safety/other/road-diets.

FHWA-SA-21-046

Road Diets (Roadway Reconfiguration)

A Road Diet, or roadway reconfiguration, can improve safety, calm traffic, provide better mobility and access for all road users, and enhance overall quality of life. A Road Diet typically involves converting an existing four-lane undivided roadway to a three-lane roadway consisting of two through lanes and a center two-way left-turn lane (TWLTL).



Before and after example of a Road Diet. Source: FHWA

Benefits of Road Diet installations may include:

- Reduction of rear-end and left-turn crashes due to the dedicated left-turn lane.
- Reduced right-angle crashes as side street motorists cross three versus four travel lanes.
- Fewer lanes for pedestrians to cross.
- Opportunity to install pedestrian refuge islands, bicycle lanes, on-street parking, or transit stops.
- Traffic calming and more consistent speeds.
- A more community-focused, Complete Streets environment that better accommodates the needs of all road users.

A Road Diet can be a low-cost safety solution when planned in conjunction with a simple pavement overlay, and the reconfiguration can be accomplished at no additional cost. Typically, a Road Diet is implemented on a roadway with a current and future average daily traffic of 25,000 or less.

Road Diet project in Honolulu, Hawaii. Source: Leidos

1 (CMF ID: 5554,2841) *Evaluation of Lane Reduction "Road Diet" Measures on Crashes*, FHWA-HRT-10-053, (2010).

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A SAFE SYSTEM IS HOW WE GET THERE

Source: FHWA

3.4.9 Wide Shoulders

Although not directly addressed as a specific countermeasure by FHWA, wider paved shoulders can provide space for people to bicycle or walk along a roadway to keep them out of the travel lane where there would be conflicts with drivers. Wider shoulders can be created by narrowing travel lanes, where possible, or widening that roadway. These could be considered on Route 44 or Dowd Avenue, depending on the ability to narrow existing lanes to add shoulder space that is currently limited.