Traffic Impact Study

Proposed Retail-to-Office Redevelopment
850 Hartford Turnpike
Waterford, Connecticut

Prepared for:

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EXECUTIVE SUMMARY

DESCRIPTION OF PROJECT

Vanasse & Associates, Inc. (VAI) has prepared this Traffic Impact Study (TIS) to identify traffic impacts associated with a proposed retail-to-office redevelopment located at 850 Hartford Turnpike in Waterford, Connecticut (the "Project"). The purpose of this TIS is to review existing and future traffic conditions in the vicinity of the site, determine the traffic impact of the proposed Project at key intersections expected to experience increased traffic levels from the Project, and review the need for improvements to mitigate the Project's traffic impact.

PROPOSED PROJECT

The Project site is bounded by Hartford Turnpike to the north, Target to the east, Home Depot to the west, and areas of open and wooded spaces to the south. Currently, the Project site contains the approximately 980,000 square foot (sf) Crystal Mall, which is mostly vacant with no active anchor stores. The Project site has three access points onto Hartford Turnpike, with two signalized intersections and one unsignalized intersection. The Project will redevelop the existing building to contain a mixture of office, research and development, and workforce development facilities with an anticipated occupancy of 4,500 employees.

EXISTING CONDITIONS

A comprehensive field inventory was conducted to collect existing roadway geometrics, traffic volumes, operating characteristics, speed limits, and sight distances, as well as land use information. Traffic volumes were collected in October 2025 at the intersections expected to receive the traffic impact from the Project. The study area locations are listed below:

- Hartford Turnpike (Route 85) at Cross Road
- Route 85 at Waterford Commons and Target driveway
- Route 85 at Crystal Mall north driveway
- Route 85 at Crystal Mall middle driveway
- Route 85 at Dayton Place
- Route 85 at Crystal Mall south driveway
- Route 85 at I-95 southbound ramps
- Route 85 at I-95 northbound ramps

PROJECT-GENERATED TRAFFIC

The Crystal Mall is generally vacant. Trip generation within the study compared the proposed office development to the Crystal Mall under full occupancy. When comparing the two scenarios, the proposed site generated trips result in a significant reduction to weekday daily and Saturday trips (>15,000 trips per day). Peak hour trip generation in the morning will provide 1,225 net new vehicle trips while the evening and Saturday midday peak hours will result in 873 and 2,726 net fewer vehicle trips respectively.

Project-related traffic-volume increases in the study area relative to 2027 Background conditions are anticipated to range from 87 to 715 vehicles or 4.9 to 44.7 percent, during peak periods. The larger increases occur during the weekday morning peak hour before stores within the Crystal Mall would be open.

TRAFFIC OPERATIONS ANALYSIS

Under future conditions, operations are impacted with increases in delays and vehicle queue lengths on the various approaches. Some intersections were shown to operate near or at capacity. When comparing the proposed office use to the potential full occupancy of the mall, the same intersections are impacted with similar or larger levels of delay. Mitigation has been identified to improve operations at these locations and would be required if either of these conditions were to occur.

RECOMMENDATIONS

Recommendations include promoting Transportation Demand Management (TDM) measures and off-site mitigation. It should be noted there is a CTDOT improvement project scheduled to begin by November 2026 that will upgrade and replace the traffic signal equipment along Route 85 adjacent to the Crystal Mall. It is recommended that the Route 85 coordinated signal system be optimized to the changes in traffic volumes from the Project. To reduce travel times through the corridor and minimize delays, two separate lane reconfigurations will be required. The southern exit driveway from the Crystal Mall will require a second right-turn lane to offset weekday evening exiting volumes. At the I-95 off-ramps, a lane reconfiguration is being proposed to allow for a dual left turn onto I-95 northbound. Widening of the on-ramp is proposed, and lane designations of Route 85 northbound and I-95 eastbound off-ramp will be modified. Additionally, pedestrian accommodations will be upgraded at the Route 85 at I-95 southbound off-ramps to provide safer crossing conditions while allowing for more traffic to flow off the interstate.

CONCLUSIONS

As documented in this study, Project-related traffic increases will result in increases in traffic volumes or traffic delays at the intersections within the study area. When comparing this to the full occupancy of the Crystal Mall, similar movements are shown to be nearing or at-capacity, and both scenarios would require some off-site mitigation. With the implementation of mitigation measures, the majority of increases in overall intersection delays will be less than 20 seconds with all intersections operating at an overall level of service D or better. Based on these analyses, it is expected that Project-related traffic will be adequately accommodated within the existing and future infrastructure with manageable impacts on the traffic operations within the study area.

INTRODUCTION

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Study (TIS) in order to identify the traffic impacts associated with the proposed retail-to-office redevelopment of the Crystal Mall located at 850 Hartford Turnpike in Waterford, Connecticut. This report identifies and analyzes existing and future traffic conditions both with and without the Project and reviews access requirements, potential off-site improvements, and safety considerations.

STUDY METHODOLOGY

This study was prepared in accordance with the State guidelines for TISs and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area, including an inventory of roadway geometry, observations of traffic flow, and collection of peak-period traffic counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed, along with future traffic demand due to expected traffic growth independent of the Project. A two-year time horizon was selected for these analyses, consistent with State guidelines for the preparation of TISs. The traffic analysis conducted in stage two identifies projected future roadway capacity, traffic safety, and site access issues.

The third stage of the study presents and evaluates measures to address traffic and safety issues, if necessary, based on the results from stage two.

EXISTING CONDITIONS

A comprehensive field inventory of existing conditions within the study area was conducted in October 2025. The field investigation consisted of an inventory of existing roadway geometrics, traffic volumes, and operating characteristics, as well as posted speed limits, sight distance, and land use information within the study area. The study area for the Project includes the major roadway that provides access to the Project, as well as the intersections, which are expected to accommodate the majority of Project-related traffic. The study area is listed below and graphically depicted on Figure 1.

- Hartford Turnpike (Route 85) at Cross Road
- Route 85 at Waterford Commons and Target driveway
- Route 85 at Crystal Mall north driveway
- Route 85 at Crystal Mall middle driveway
- Route 85 at Dayton Place
- Route 85 at Crystal Mall south driveway
- Route 85 at I-95 southbound ramps
- Route 85 at I-95 northbound ramps

GEOMETRY

Roadway

Hartford Turnpike (Route 85)

Route 85 is a four-lane principal arterial roadway under Connecticut Department of Transportation (CTDOT) jurisdiction. The road has a general northwest-southeast alignment throughout the study area and consists of two 11-foot-wide through lanes in each direction separated by a variable 6- to 15-foot-wide curbed median. Additional turning lanes are provided at major intersections. The posted speed limit within the study area is 35 miles per hour (mph). Land use along Route 85 within the study area consists of commercial developments.

Intersections

Figure 2 summarizes existing traffic control, lane use, travel lane widths, and pedestrian and bicycle accommodations at the study area intersections as observed in October 2025.

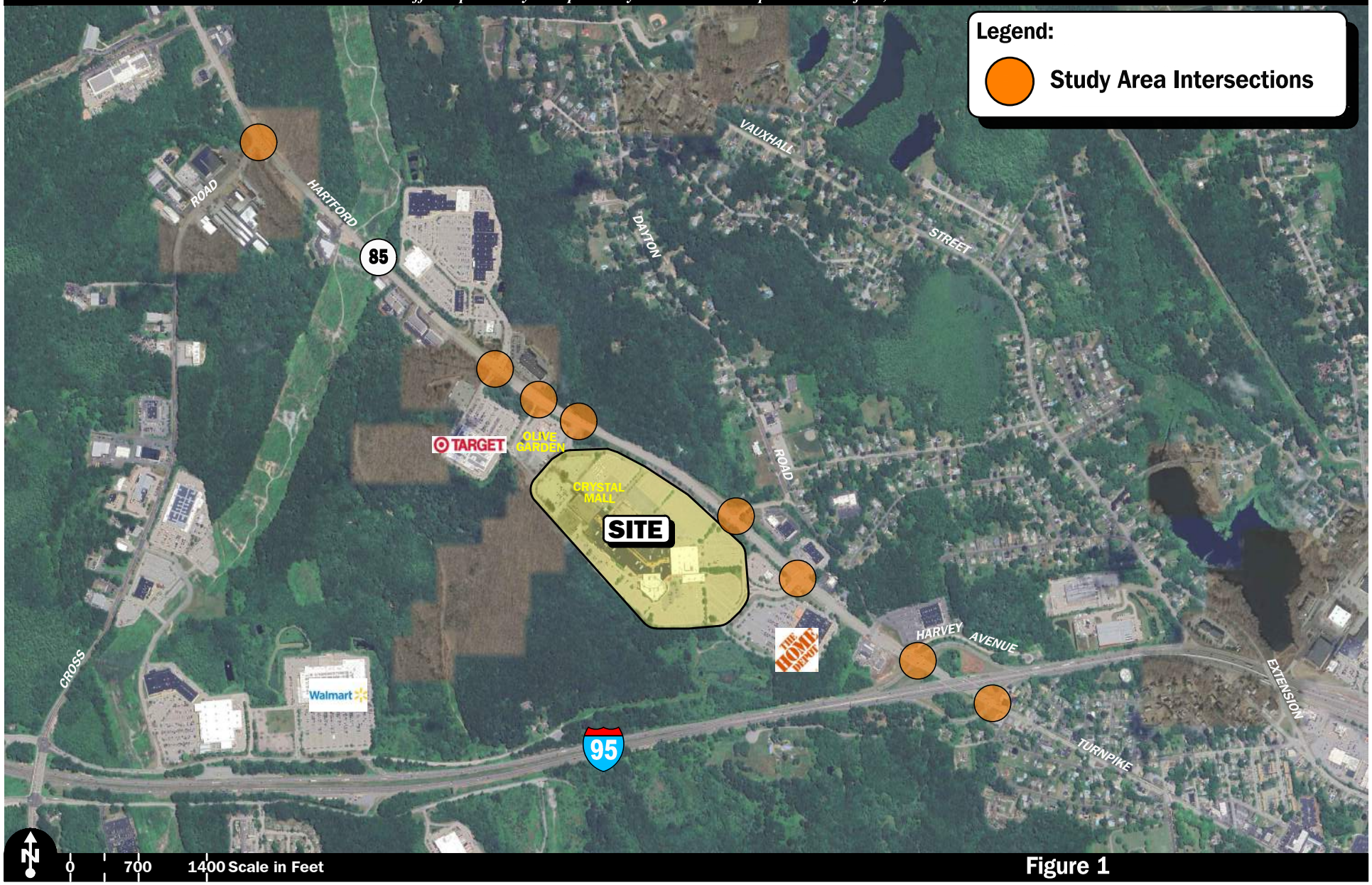

Figure 1

Study Area and Site Location Map

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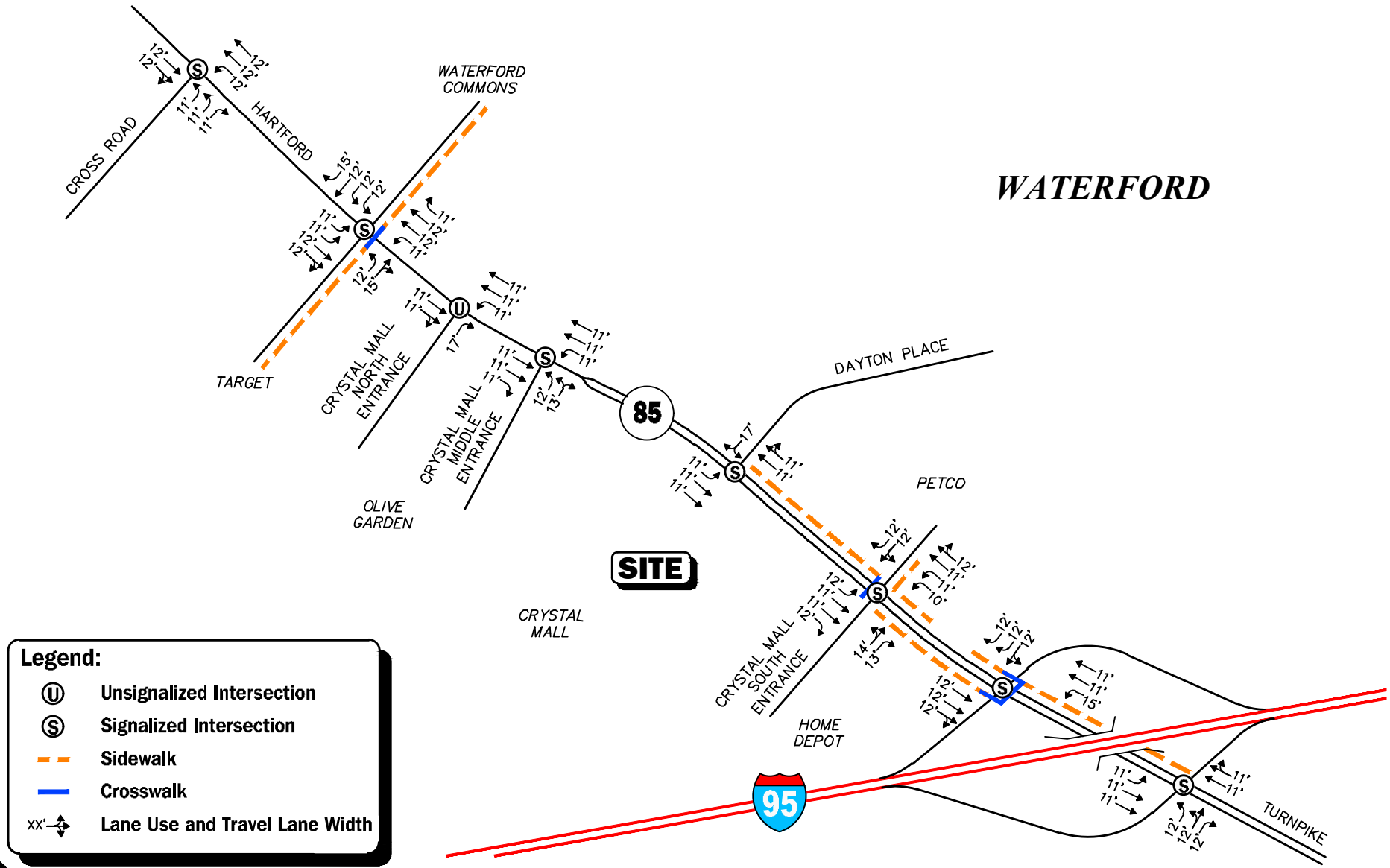

Figure 2

Existing Intersection Lane Use, Travel Lane Width, and Pedestrian Facilities

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EXISTING TRAFFIC VOLUMES

In order to establish base traffic-volume demands and flow patterns within the study area, manual turning movement counts (TMCs) were conducted in October 2025. TMCs were conducted on Friday, October 24, 2025, during the weekday morning (7:00 to 9:00 AM) and weekday evening (4:00 to 6:00 PM) peak periods.

Additionally, an automatic traffic recorder (ATR) was used to identify traffic flow patterns on Route 85 in October 2025. The ATR was conducted for a 48-hour period from Thursday, October 23, to Friday, October 24, 2025. Speed and volume measurements were collected in 15-minute increments.

Traffic-Volume Adjustments

In order to develop 2025 Existing traffic-volume conditions, the data collected was assessed to determine if adjustments to account for seasonal fluctuations in traffic were necessary. To achieve this, the 2024 *Expansion Factors*[1] from the CTDOT Bureau of Policy and Planning was used. Specifically, *Group 4 – Urban Factors* was reviewed. Based on this review, it was determined that traffic volumes on Fridays in October are 14 percent above average-month conditions, and therefore, the traffic volumes were left unadjusted in order to provide a conservative analysis condition. A summary of the 2025 Existing daily and peak-hour traffic volumes is provided in Table 1. The 2025 Existing peak-hour traffic volumes are shown graphically in Figures 3 and 4 for the respective weekday morning and weekday evening peak-hour periods.

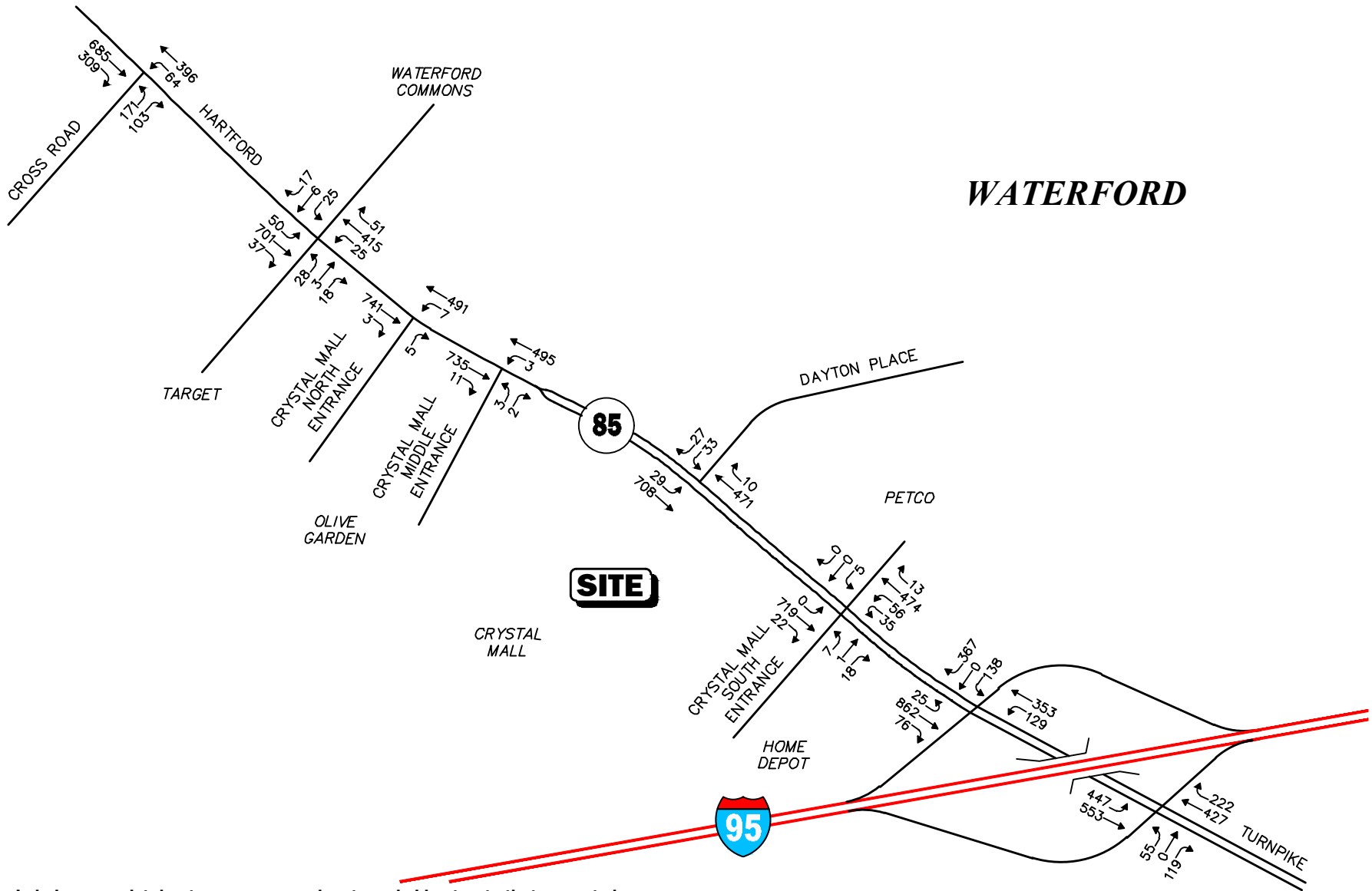
As shown in Table 1, Route 85 carried approximately 23,580 vehicles per day (vpd) on an average weekday, with 1,235 vehicles per hour (vph) during the weekday morning peak hour and 2,209 vph during the weekday evening peak hour. During the weekday morning peak hour, 60 percent of the traffic travels southbound, and during the weekday evening peak hour, 56 percent of the traffic travels northbound.

Table 1
2025 EXISTING ROADWAY TRAFFIC-VOLUME SUMMARY

Location/Peak Hour	Daily Volume (vpd)[a]	Volume (vph)[b]	K Factor[c]	Directional Distribution[d]
Route 85, north of Dayton Place:				
Weekday Daily	23,580	--	--	--
Weekday Morning	--	1,235	5.2	60% SB
Weekday Evening	--	2,209	9.4	56% NB

Source: ATRs conducted by VAI in October 2025.
[a]Two-way daily traffic expressed in vehicles per day, based on ATR conducted by VAI in October 2025.
[b]Two-way peak-hour volume expressed in vehicles per hour.
[c]The percentage of daily traffic that occurs during the peak hour.
[d]Percent traveling in peak direction.

[1]*Expansion Factors 2024*; CTDOT Bureau of Policy and Planning; 2025.



Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to Scale

Figure 3

2025 Existing
Weekday Morning
Peak-Hour Traffic Volumes

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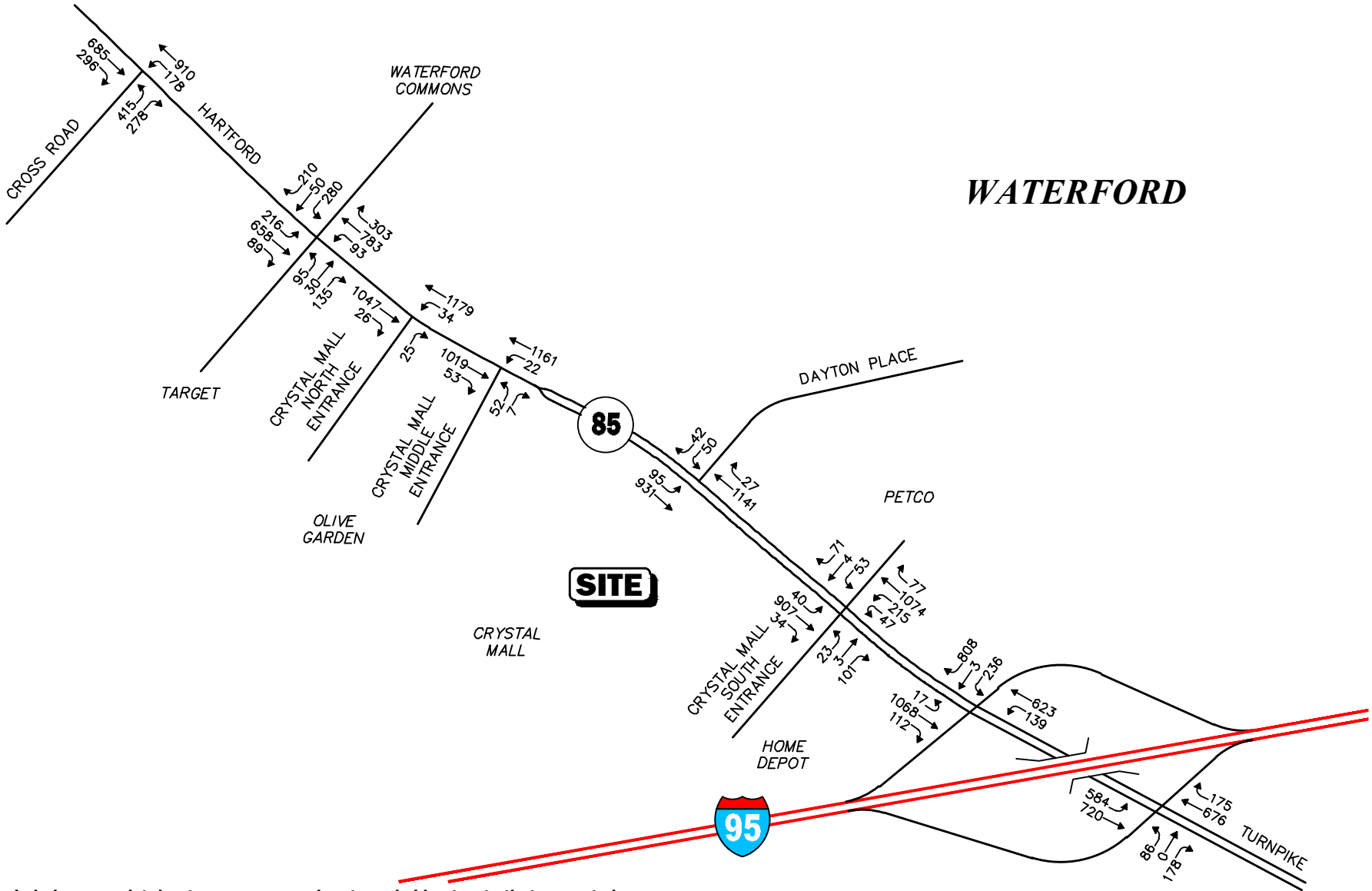

Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to Scale

Figure 4

2025 Existing
Weekday Evening
Peak-Hour Traffic Volumes

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PEDESTRIAN AND BICYCLE FACILITIES

An inventory of pedestrian and bicycle facilities within the study area was undertaken in October 2025. There are no sidewalks or bicycle facilities located within the majority of the study area. The majority of the sidewalks within the corridor are located between the two signalized intersections of the Crystal Mall south entrance driveway and the I-95 northbound ramps. West of the south driveway entrance, a sidewalk is only present on the north side of Route 85 up to the Dayton Place intersection. Pedestrian crosswalks are present at only four of the eight signalized intersections. The full field inventory of the study area is shown on Figure 2.

PUBLIC TRANSPORTATION

Public transportation services are provided within the Town of Waterford by the Southeast Area Transit District (SEAT). The closest SEAT bus service to the Project site is provided at the Crystal Mall building entrance, accessed from the south entrance driveway. Within the study area, the SEAT operates the bus services shown in Table 2.

Table 2
PUBLIC TRANSPORTATION SERVICES

Service	Stop Closest to Site	Distance from Site	Weekday		Saturday[a]	
			Hours of Operation	Headway (minutes)	Hours of Operation	Headway (minutes)
Route 12: New London to Crystal Mall and New London Shopping Center	Crystal Mall	Internal	6:25 AM – 7:25 PM	60	7:25 AM – 6:55 PM	60
Route 14: New London to New London Mall, Waterford Commons, Crystal Mall, and New London Shopping Center	Crystal Mall	Internal	6:35 AM – 7:55 PM	60	7:00 AM – 6:55 PM	60
Route 15: New London to Mitchell College, Waterford Commons, and Crystal Mall	Crystal Mall	Internal	8:00 PM – 10:55 PM	60	7:00 PM – 10:55 PM	60

[a]No Sunday service is provided.

VEHICLE SPEED MEASUREMENTS

Existing vehicle speeds along Route 85 in the vicinity of the Project site were recorded in conjunction with the ATR to determine the average and 85th percentile vehicle speeds. The speed limit on this section of Route 85 is posted at 35 mph. The results of the speed measurements are shown in Table 3.

Table 3
VEHICLE TRAVEL SPEED MEASUREMENTS

	Route 85	
	Northbound	Southbound
Average Travel Speed (mph)	41	44
85th Percentile Speed (mph)	47	50
Speed Limit (mph)	35	35

Source: Speed data conducted by VAI in October 2025 at Route 85 north of Dayton Place.
mph = miles per hour.

As can be seen in Table 3, the mean vehicle travel speed along Route 85 in the vicinity of the Project site was 41 and 44 mph in the northbound and southbound directions, respectively. The measured 85th percentile vehicle travel speed, or the speed at which 85 percent of the observed vehicles traveled at or below, was found to be 47 and 50 mph in the northbound and southbound directions. This is greater than 10 mph above the posted speed limit in both directions of 35 mph.

MOTOR VEHICLE CRASH DATA

Motor vehicle crash data were obtained from the Connecticut Crash Data Repository for the calendar years 2022 to 2024 to identify crash trends and/or safety deficiencies in the study area. Motor vehicle crash data for the study location was researched to determine the type of incident, weather conditions, lighting conditions, roadway conditions, and severity of each incident. A summary of the data is provided in Table 4.

As can be seen in Table 4, five of the study intersections have 10 or less crashes per year, while three of the study intersections range from 10.33 to 15.67 crashes per year. A majority of the crashes observed throughout the study intersections occurred under clear weather conditions, during daylight, and involved rear-end type crashes that resulted in property damage only. No fatalities, pedestrian-related, or bicycle-related injuries were reported at any of the analyzed intersections within the last three years. Detailed crash exports from the Connecticut Crash Data Repository are provided in the Appendix.

Table 4
MOTOR VEHICLE CRASH DATA SUMMARY

Scenario	Route 85 at Cross Road	Route 85 at Waterford Commons and Target Driveway	Route 85 at Crystal Mall North Driveway	Route 85 at Crystal Mall Middle Driveway	Route 85 at Dayton Place	Route 85 at Crystal Mall South Driveway	Route 85 at I-95 Southbound Ramps	Route 85 at I-95 Northbound Ramps
Year:								
2022	16	9	0	0	4	5	21	12
2023	11	10	1	1	6	4	13	11
2024	9	10	1	0	3	5	13	8
Total	36	29	2	1	13	14	47	31
Average[a]	12.00	9.67	0.67	0.33	4.33	4.67	15.67	10.33
Type:								
Angle	10	7	1	0	4	8	12	7
Rear-End	15	21	0	1	7	5	24	17
Head-On	0	0	0	0	0	0	1	0
Sideswipe	7	1	1	0	1	1	6	5
Pedestrian/Bike	0	0	0	0	0	0	0	0
Single Vehicle	4	0	0	0	1	0	4	2
Unknown/Other	0	0	0	0	0	0	0	0
Total	36	29	2	1	13	14	47	31
Weather Conditions:								
Clear	26	25	2	1	9	11	34	23
Cloudy/Rain	7	4	0	0	2	3	13	8
Snow/Ice	3	0	0	0	1	0	0	0
Fog	0	0	0	0	1	0	0	0
Unknown/Other	0	0	0	0	0	0	0	0
Total	36	29	2	1	13	14	47	31
Lighting Conditions:								
Daylight	24	20	1	1	10	8	37	25
Dawn/Dusk	1	2	0	0	0	1	2	0
Dark (lit)	8	7	1	0	2	5	8	5
Dark (unlit)	3	0	0	0	1	0	0	1
Unknown/Other	0	0	0	0	0	0	0	0
Total	36	29	2	1	13	14	47	31
Pavement Conditions :								
Dry	25	25	2	1	8	9	38	23
Wet	8	4	0	0	4	5	9	8
Snow/Ice	3	0	0	0	1	0	0	0
Unknown/Other	0	0	0	0	0	0	0	0
Total	36	29	2	1	13	14	47	31
Severity:								
Property Damage Only	25	23	1	1	6	7	33	24
Personal Injury	11	16	1	0	7	7	14	7
Fatality	0	0	0	0	0	0	0	0
Unknown/Other	0	0	0	0	0	0	0	0
Total	36	29	2	1	13	14	47	31

Source: UCONN Connecticut Crash Data Repository, 2022 through 2024
[a]Average number of crashes over the three-year period.

FUTURE CONDITIONS

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, existing traffic volumes in the study area were projected to the year 2027. Traffic volumes on the roadway network at that time, in the absence of the Project (that is, the Background condition), would include existing traffic, new traffic due to general background traffic growth, and traffic related to specific development by others expected to be completed by 2027. Inclusion of these factors resulted in the development of 2027 Background traffic volumes. Anticipated site-generated traffic volumes were then superimposed upon these Background traffic-flow networks to develop the 2027 Combined traffic-volume conditions.

FUTURE TRAFFIC GROWTH

Traffic growth on area roadways is a function of the expected land development impacting the study area. Several methods are used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all existing traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

In addition, we identified the location and type of planned development affecting the study area, estimated the traffic to be generated by that development, and assigned it to the area roadway network. This produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

To provide a conservative analysis framework, both procedures were used in this TIS.

General Background Growth

To determine traffic growth in the study area, historic traffic count data provided by the CTDOT Bureau of Policy and Planning were reviewed. This data within the Waterford/New London area indicates that traffic volume fluctuates, with an average increase of 0.05 percent. To be conservative, a 1.0 percent per year compounded annual background traffic growth rate was used to account for future traffic growth, including presently unforeseen development within the study area.

Specific Development by Others

The Town of Waterford was contacted in order to determine if there are any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. Based on these discussions, no developments were identified at this time that are expected to result in an increase in traffic within the study area beyond the general background traffic growth rate of 1.0 percent.

Planned Roadway Improvements

Since the study area roadway is under State jurisdiction, CTDOT was contacted in order to determine if there were any planned future roadway improvement projects within the study area. Based on these discussions, the following project was identified:

Computerized Traffic Signal System (CTSS) Replacement, Waterford. This project entails the reconstruction of aging traffic signal infrastructure of ten signals along the Route 85 corridor, ranging from the Jefferson Avenue intersection, south of the Project site, to the I-395 southbound off-ramp. The reconstruction of the existing signals will allow for enhanced video capabilities for vehicle detection, optimized coordination between signals, and additional pedestrian accommodation at certain intersections. Construction is scheduled to begin by November 2026.

Based on the project goals and draft plans received by CTDOT, the following assumptions were implemented into the background and combined conditions:

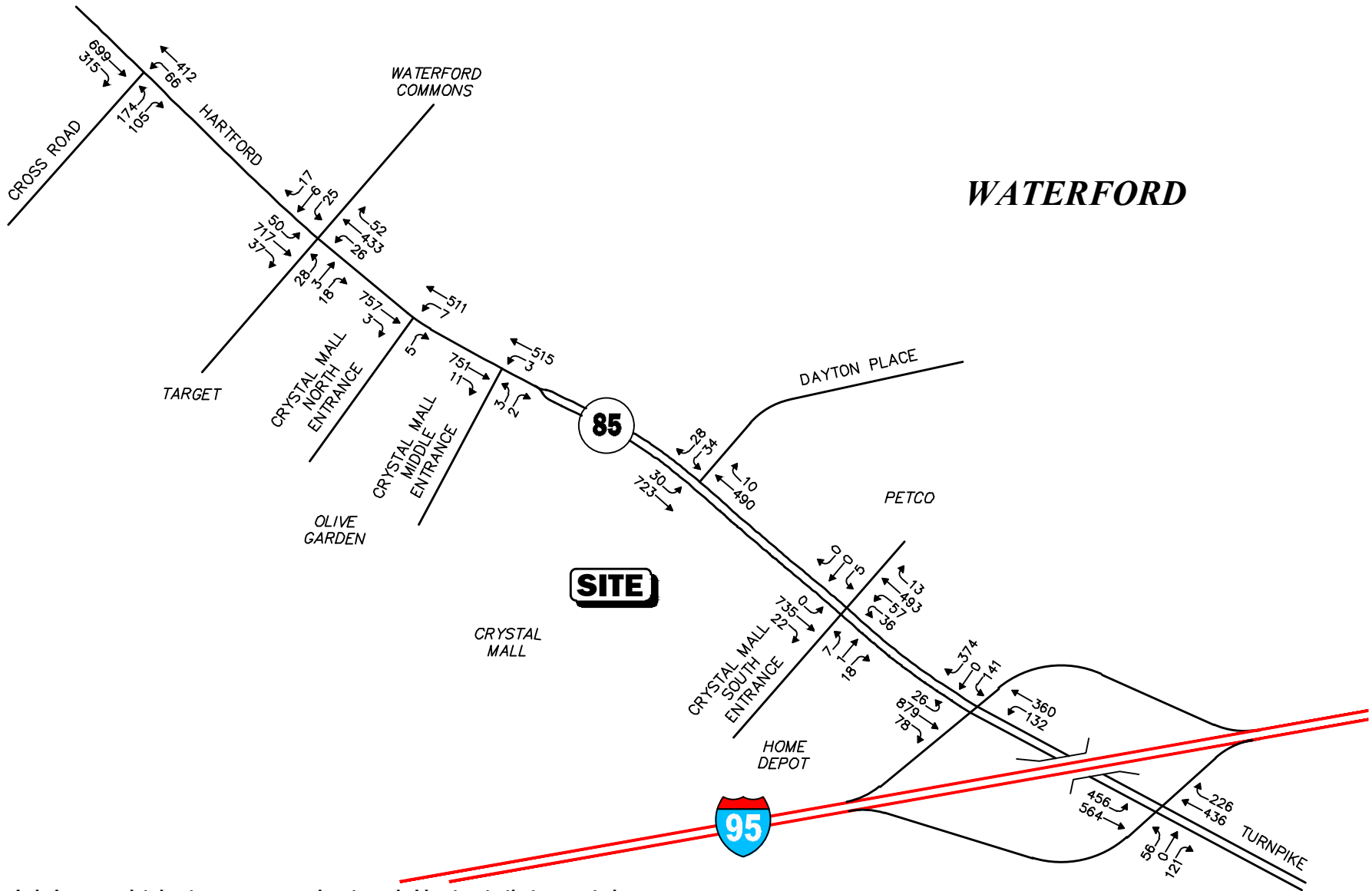
- Pedestrian crossings would be implemented at all intersections. Pedestrian phasing was included at any intersections where pedestrian volume was recorded.

- "NO RIGHT TURN ON RED" signs would be installed at all intersections with such a movement. This was incorporated within the capacity analysis of the Background and Combined conditions.

- Since the corridor is being reconstructed, it is assumed that the coordinated signal system will be re-timed according to recent traffic volumes. As such, the coordinated signals were optimized to all be on the same cycle length, with revised splits and updated clearance timings according to the draft plans that were obtained from CTDOT.

Background Traffic Volumes

The 2027 Background peak-hour traffic-volume networks were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2025 Existing peak-hour traffic volumes for a two-year period. The resulting 2027 Background weekday morning and evening peak-hour traffic-volume networks are shown on Figures 5 and 6, respectively.



Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to Scale

Figure 5

2027 Background
Weekday Morning
Peak-Hour Traffic Volumes

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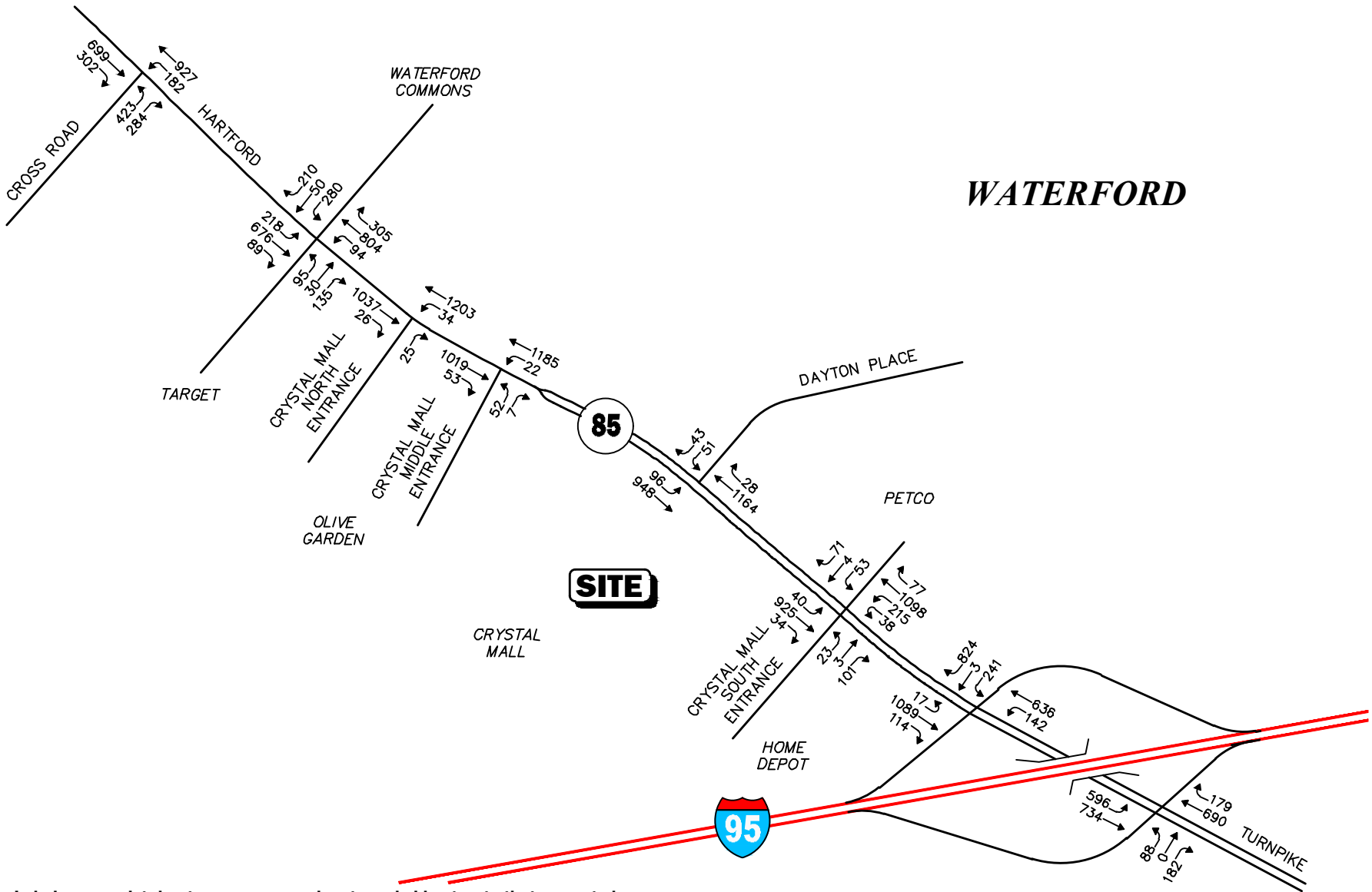

Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

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Figure 6

2027 Background
Weekday Evening
Peak-Hour Traffic Volumes

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PROJECT-GENERATED TRAFFIC

Project Site Existing Trips

At present, the Crystal Mall site is zoned for commercial use. The Project involves the redevelopment of the entire parcel to provide office and research and development spaces. A comparison of the building's trip generation for both the former retail use and the proposed use was developed as a first step to identify the impacts of the Project. The building area from a prior OSTA certificate[2] for the Crystal Mall was reviewed for this analysis.

To determine traffic characteristics of the existing use, trip-generation statistics published by the Institute of Transportation Engineers (ITE)[3] were reviewed. Trip rates from ITE Land Use Code (LUC) 820, *Shopping Center* were used. Trips were developed for a typical weekday and Saturday daily, as well as the weekday morning and weekday evening peak hours. The vehicle trips assuming a re-occupied Crystal Mall are summarized in Table 5.

Table 5
CRYSTAL MALL RE-OCCUPIED
TRIP-GENERATION SUMMARY

Time Period/Direction	Site Existing Total Trips[a]
Weekday Daily	29,226
Weekday Morning Peak Hour:	
Entering	438
Exiting	279
Total	707
Weekday Evening Peak Hour:	
Entering	1,293
Exiting	1,335
Total	2,618
Saturday Daily	31,988
Saturday Midday Peak Hour:	
Entering	1,439
Exiting	1,383
Total	2,822

[a]Based on ITE LUC 820, *Shopping Center* (803.12 /1,000 sf).

As can be seen in Table 5, the existing site as a re-occupied shopping center would be expected to generate 29,226 vehicle trips on an average weekday and 31,988 vehicle trips on an average Saturday (two-way, 24-hour volume), with 707 vehicle trips (438 entering and 279 exiting) during the weekday morning peak hour, 2,618 vehicle trips (1,293 entering and 1,335 exiting) during the

[2]*Certificate 280-A*, Crystal Mall/ Olive Garden; CT, 2003.

[3]*Trip Generation,* 12th Edition; Institute of Transportation Engineers; Washington, DC; 2025.

weekday evening peak hour, and 2,822 vehicle trips (1,439 entering and 1,383 exiting) during the Saturday midday peak hour. This is roughly in line with the Project's original Office of the State Traffic Administration (OSTA) application, which identified the Crystal Mall to generate approximately 32,000 vehicles per day, with a peak-hour generation of 6,000 vehicles (3,600 entering and 2,400 exiting).

Project Future Trip Generation

The proposed Project entails the redevelopment of the existing approximately 980,000 sf building into a combination of office and research and development uses. To develop the traffic characteristics of the proposed Project, trip-generation statistics published by the ITE[4] for similar land uses as those proposed were used. The distribution of building area between uses was developed based on a percentage of each use by square footage, and those percentages were then assigned to 4,500 anticipated employees for daily trip generations and 3,900 for peak hour trip generation. This reduction of 600 employees for peak hour trips is included since 300 workers will be working 2nd shift (2:30 PM to 10:30 PM) and 3rd shift (10:30 PM to 6:30 AM) respectively and will be traveling during off-peak hours. Saturday daily and Saturday midday peak hour trips were estimated based on the assumption that approximately five percent of employees would report to work on a given Saturday.

[4]Ibid 3.

Table 6
PROPOSED SITE TRIP-GENERATION SUMMARY

Time Period/ Directional Distribution	Proposed Office Trips	Proposed Research and Development Trips	Total Proposed Trips
Weekday Daily	8,826[a]	4,242[b]	13,068
Weekday Morning Peak Hour:			
Entering	1,211[c]	377[d]	1,588
Exiting	197[c]	147[d]	344
Total	1,408	524	1,932
Weekday Evening Peak Hour:			
Entering	233[c]	154[d]	387
Exiting	1,060[c]	298[d]	1,358
Total	1,293	452	1,745
Saturday Daily	442	212	654
Saturday Midday Peak Hour:			
Entering	35	13	48
Exiting	35	13	48
Total	70	26	96

[a]Based on ITE LUC 710, *General Office Building* (3,315 employees).
[b]Based on ITE LUC 760, *Research and Development Center* (1,185 employees).
[c]Based on ITE LUC 710, *General Office Building* (2,873 employees).
[d]Based on ITE LUC 760, *Research and Development Center* (1,027 employees).

As can be seen in Table 6, the proposed site is expected to generate 13,068 vehicle trips on an average weekday (two-way, 24-hour volume) and 654 vehicles trips on an average Saturday, with 1,932 vehicle trips (1,588 entering and 344 exiting) during the weekday morning peak hour, 1,745 vehicle trips (387 entering and 1,358 exiting) during the weekday evening peak hour and 96 vehicle trips (48 entering and 48 exiting) during the Saturday midday peak hour.

Per OSTA standards, the Project compares the existing and proposed land use to identify net new Project-generated traffic. As such, Table 7 provides a comparison of trips between the land uses and the anticipated change in trips from the new office development.

Table 7
NET NEW TRIP-GENERATION SUMMARY

Time Period/ Directional Distribution	Existing Trips[a] (A)	Proposed Trips[b] (B)	Net New Trips (C=B-A)
Weekday Daily	29,226	13,068	-16,158
Weekday Morning Peak Hour:			
Entering	438	1,588	+1,150
Exiting	269	344	+75
Total	707	1,932	+1,225
Weekday Evening Peak Hour:			
Entering	1,283	387	-896
Exiting	1,335	1,358	+23
Total	2,618	1,745	-873
Saturday Daily	31,988	654	-31,334
Saturday Midday Peak Hour:			
Entering	1,439	48	-1,391
Exiting	1,383	48	-1,335
Total	2,822	96	-2,726

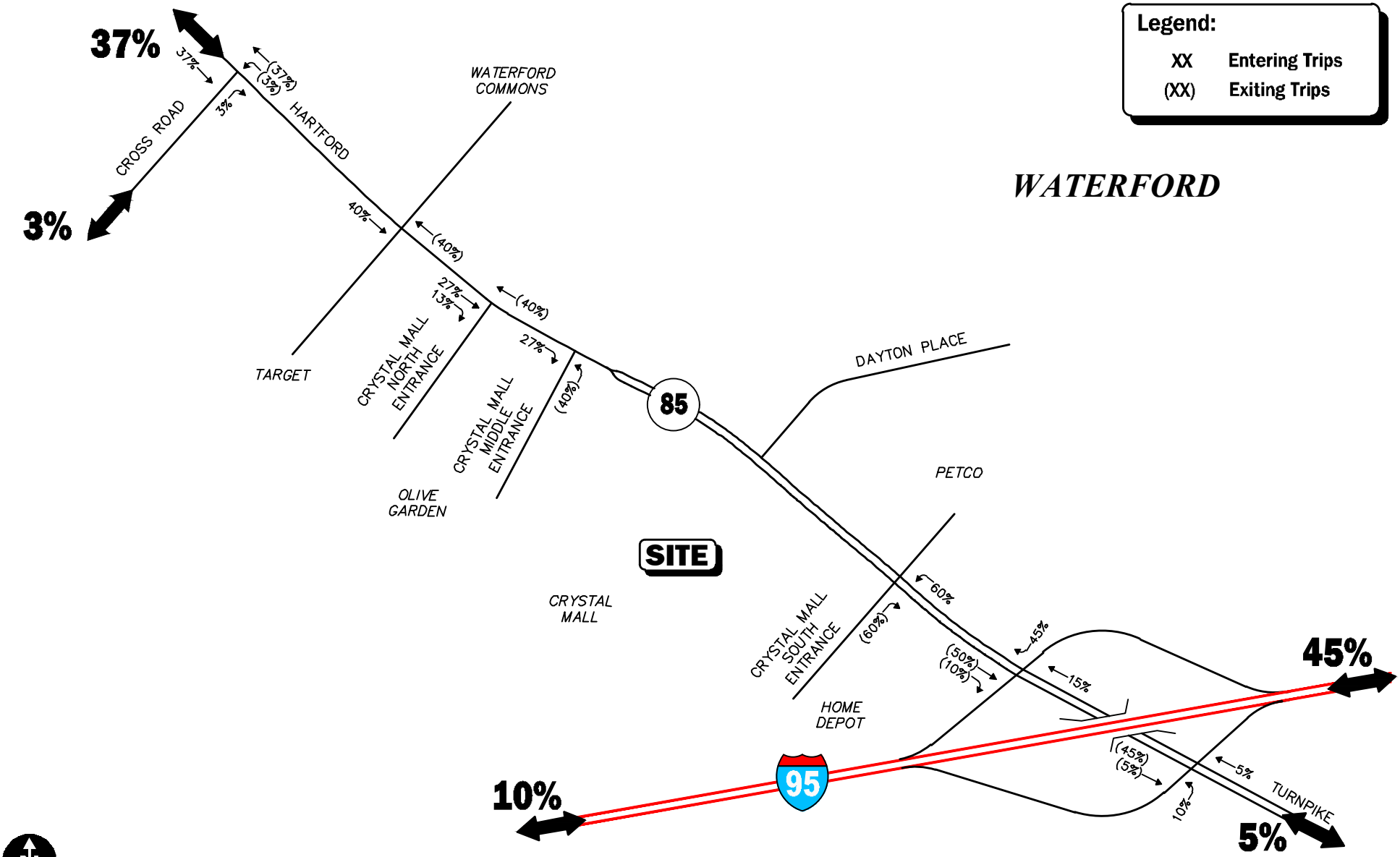
[a]Total Existing Trips in Table 5.
[b]Total Proposed Trips in Table 6.

As can be seen in Table 7, the proposed office building is expected to generate 16,158 net fewer vehicle trips on an average weekday (two-way, 24-hour volume) and 31,334 net fewer vehicle trips on a typical Saturday, with 1,225 net new vehicle trips (+1,150 entering and +75 exiting) during the weekday morning peak hour, 865 net-fewer vehicle trips (-896 entering and +23 exiting) during the weekday evening peak hour and 2,726 net-fewer trips (-1,391 entering and -1,335 exiting) during the Saturday midday peak hour.

TRIP DISTRIBUTION AND ASSIGNMENT

The Project trip distribution was based on a review of existing travel patterns at the study area intersections and Journey-to-Work data from the General Dynamics Electric Boat's Census Tract (7025) with destinations broken out by city/town, counties, and states. Table 8 shows the Project trip assignment based on these data. Figure 7 shows the graphical representation of trip distribution on the roadway network. Figures 8 and 9 show the respective weekday morning and weekday evening peak-hour site generated trips through the network.

In addition to this, analysis was conducted assuming the full occupancy of the Crystal Mall based on the existing trips identified in Table 5. Assuming that five percent of the Mall is currently occupied, the remaining 95 percent of existing trips were assigned and distributed based on a review of existing travel patterns within the network. Figure 10 shows the graphical representation of the retail trip distribution on the roadway network. Figures 11 and 12 show the respective weekday morning and weekday evening peak-hour full occupancy trips through the network.



Not to Scale

Figure 7

Project-Generated Traffic Trip Distribution Map

Vanasse & Associates inc

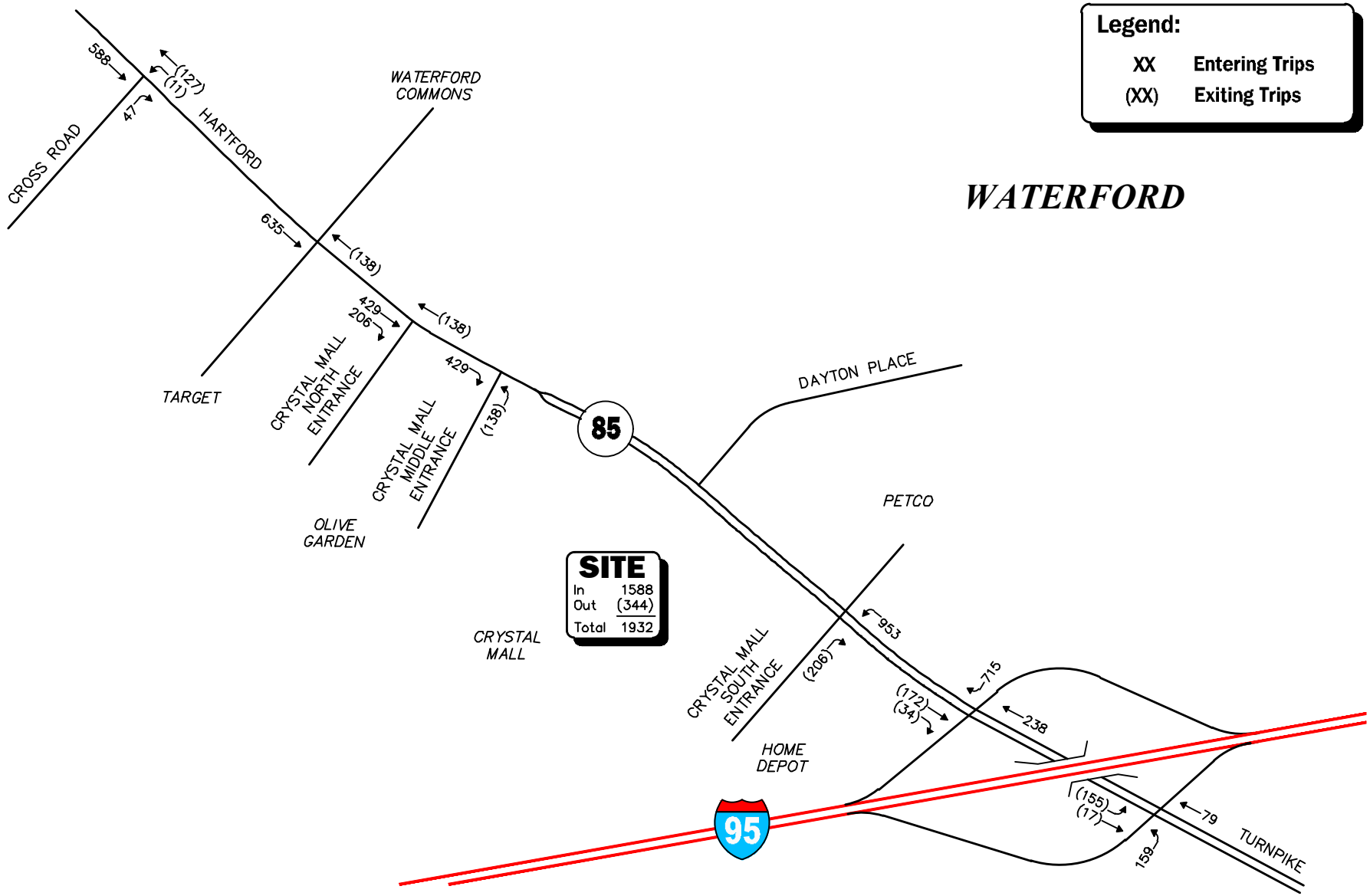


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Figure 8

Project-Generated Traffic
Weekday Morning
Peak-Hour Traffic Volumes

Vanasse & Associates inc

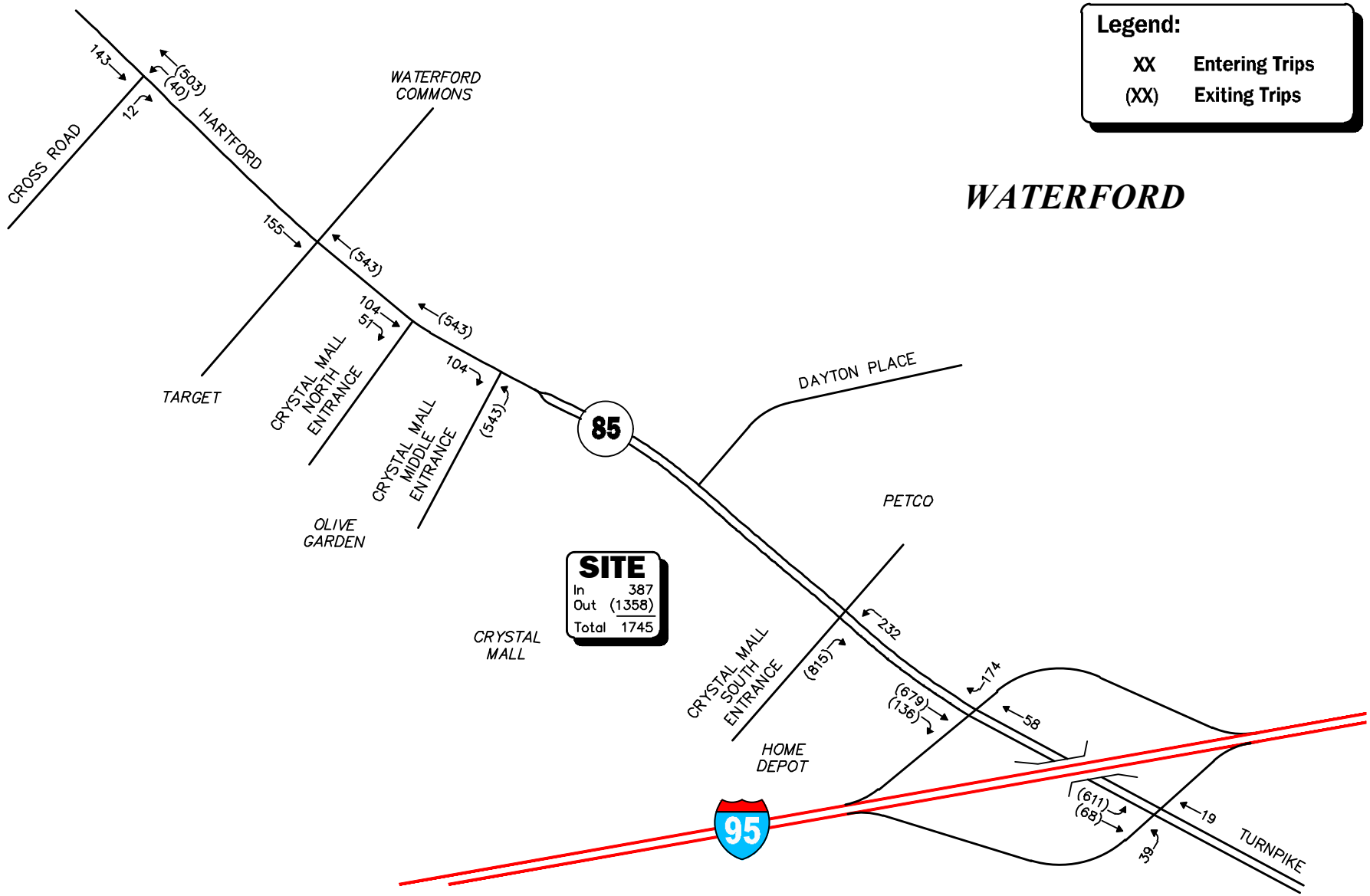

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Figure 9

Project-Generated Traffic
Weekday Evening
Peak-Hour Traffic Volumes

Vanasse & Associates inc

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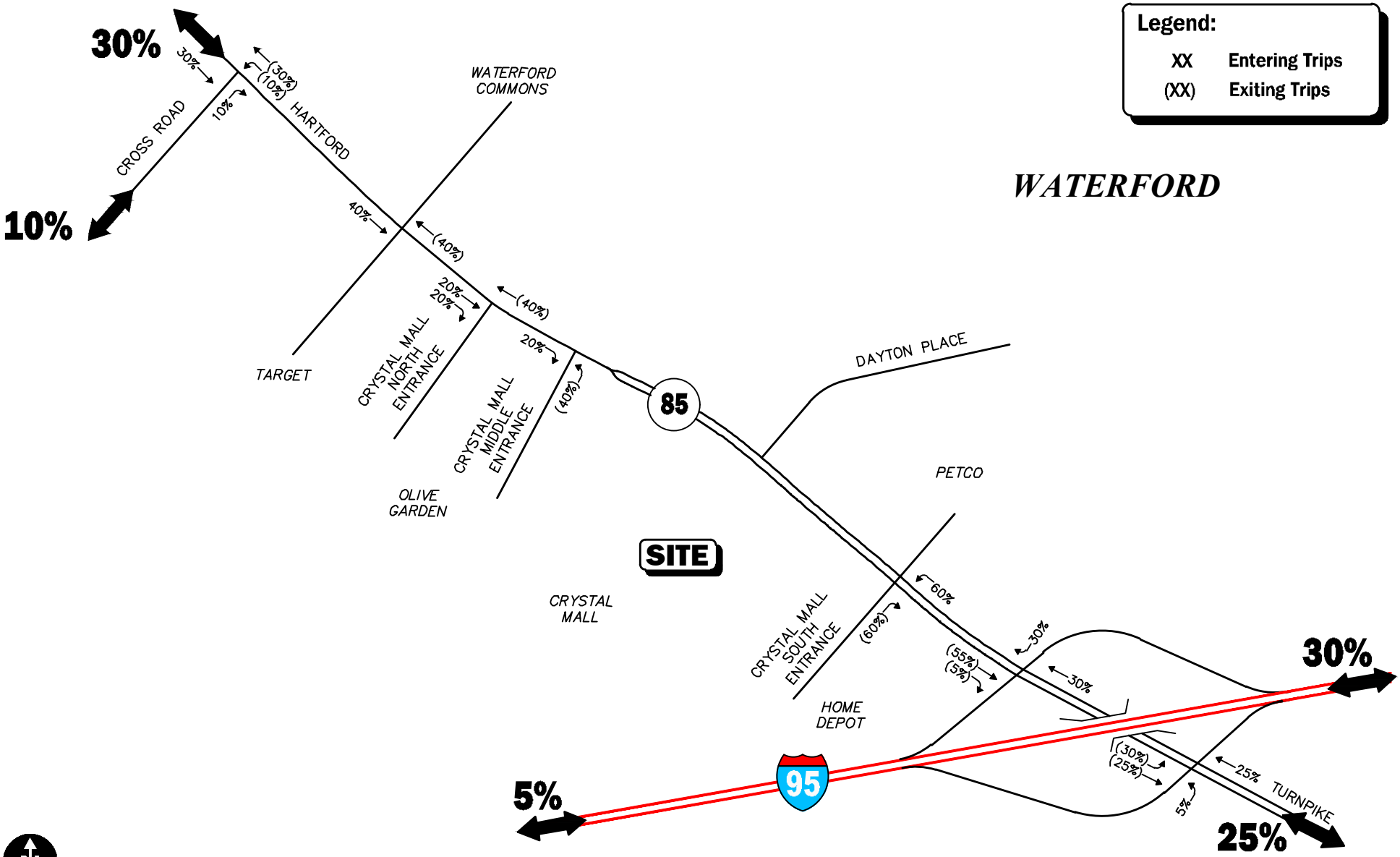
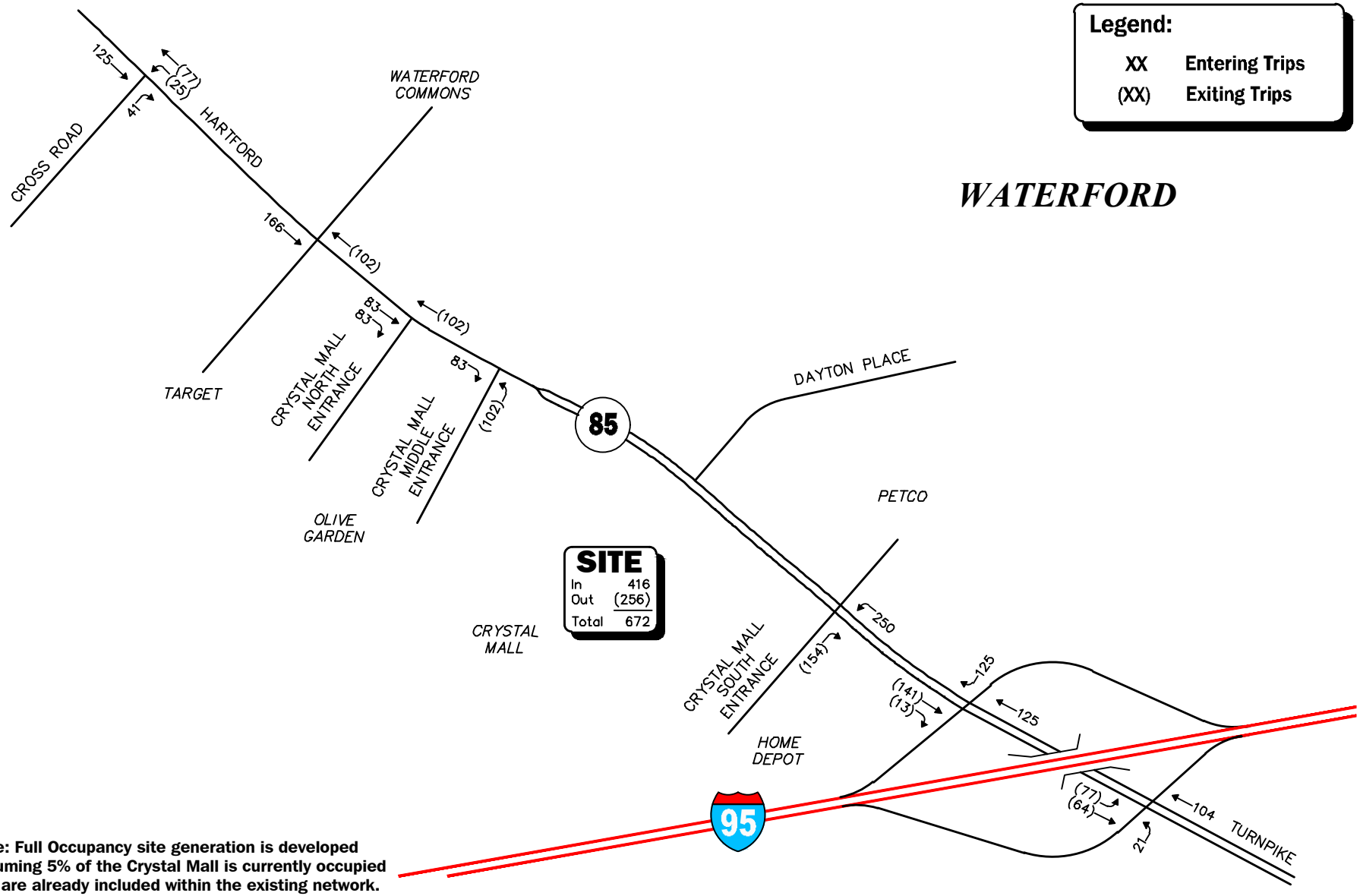


Figure 10

Full Mall Occupancy
Trip Distribution Map

Vanasse & Associates inc



Note: Full Occupancy site generation is developed assuming 5% of the Crystal Mall is currently occupied and are already included within the existing network.

Not to Scale

Figure 11

Full Mall Occupancy
Weekday Morning
Peak-Hour Traffic Volumes

Vanasse & Associates inc

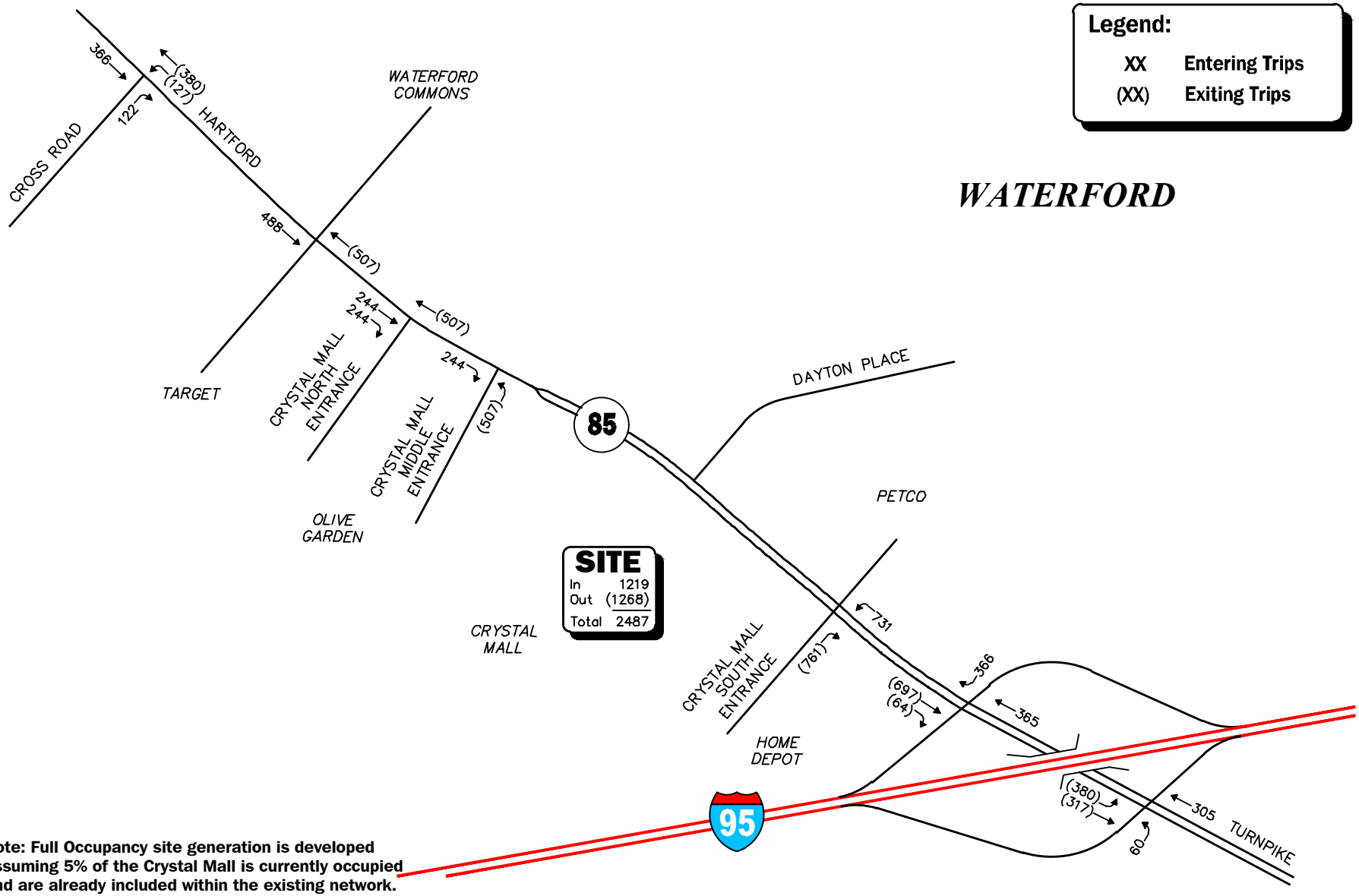


Figure 12

Full Mall Occupancy
Weekday Evening
Peak-Hour Traffic Volumes

Vanasse & Associates inc

Table 8
TRIP-DISTRIBUTION SUMMARY

		Proposed Office Use Trip Distribution	Full Mall Occupancy Distribution
Roadway	Direction (To/From)	Percent (To/From)	Percent (To/From)
Route 85	North	37	30
Route 85	South	5	25
Interstate 95	East	45	30
Interstate 95	West	10	5
Cross Road	West	3	10
TOTAL		100	100

FUTURE TRAFFIC VOLUMES – BUILD CONDITION

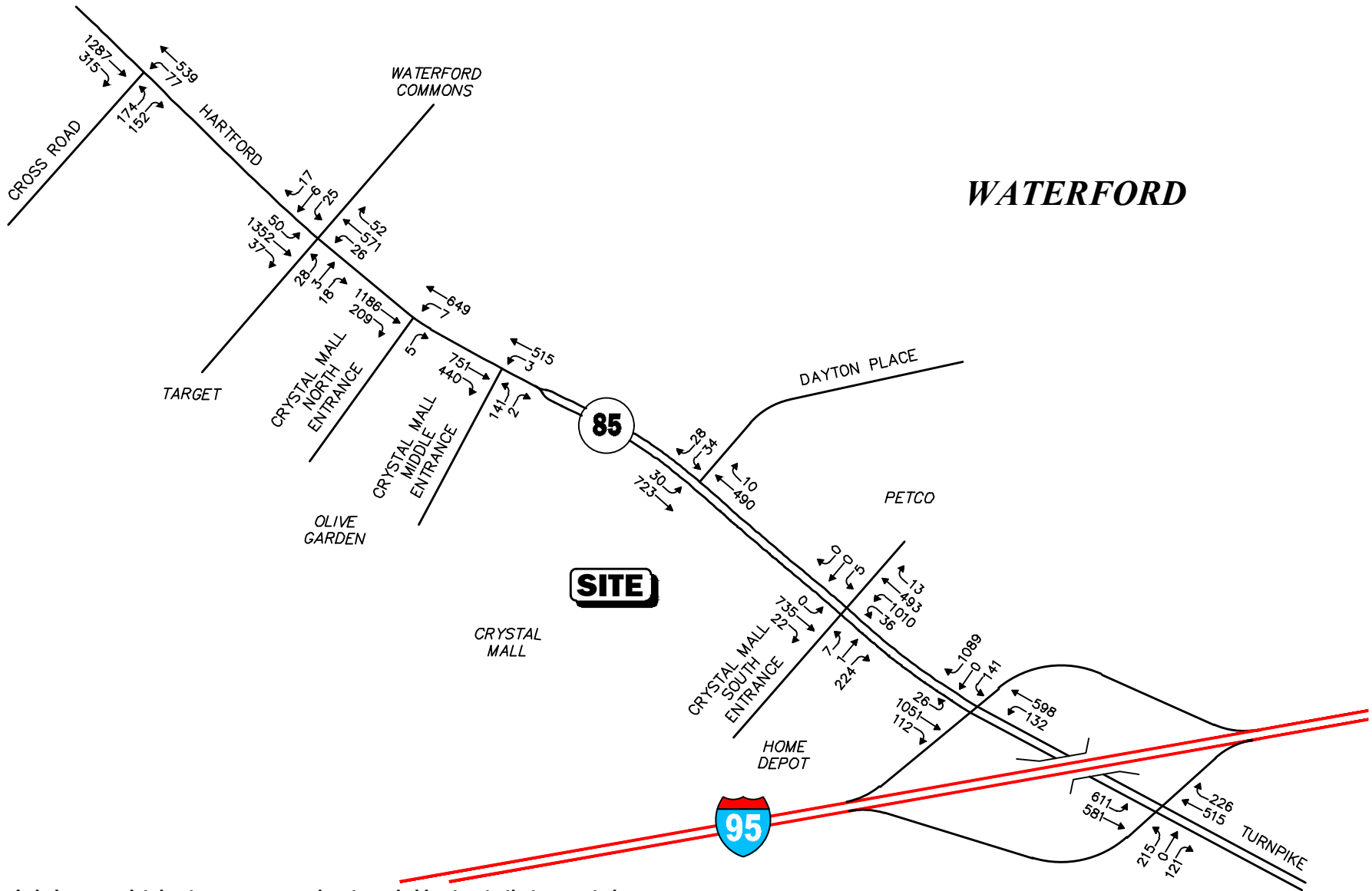
The 2027 Combined condition networks consist of the 2027 Background traffic volumes with the existing site-generated traffic throughout the Crystal Mall, and the anticipated Project-generated traffic added to them. Existing trips were retained in the analysis to provide a conservative estimation of traffic impacts. The 2027 Combined weekday morning and weekday evening peak-hour traffic-volume networks are graphically depicted on Figures 13 and 14 while the 2027 Full Mall Occupancy peak hour traffic-volume networks are depicted on Figures 15 and 16 respectively. A summary of peak-hour projected traffic-volume increases external to the study area that is the subject of this assessment is shown in Table 9. These volumes are based on the expected increases from the Project.

Table 9
PEAK-HOUR TRAFFIC-VOLUME INCREASES

Location/Peak Hour	2027 Background	2027 Combined	Traffic-Volume Increase Over Background	Percent Increase Over Background
Route 85, north of Cross Road:				
Weekday Morning	1,600	2,315	715	44.7
Weekday Evening	2,351	2,997	646	27.5
Route 85, south of I-95:				
Weekday Morning	1,347	1,443	96	7.1
Weekday Evening	1,785	1,872	87	4.9

[a]Two-way volume during peak hours listed.

As shown in Table 9, Project-related traffic-volume increases external to the study area relative to 2027 Background conditions are anticipated to range from 87 to 715 vehicles or 4.9 to 44.7 percent during the peak periods.



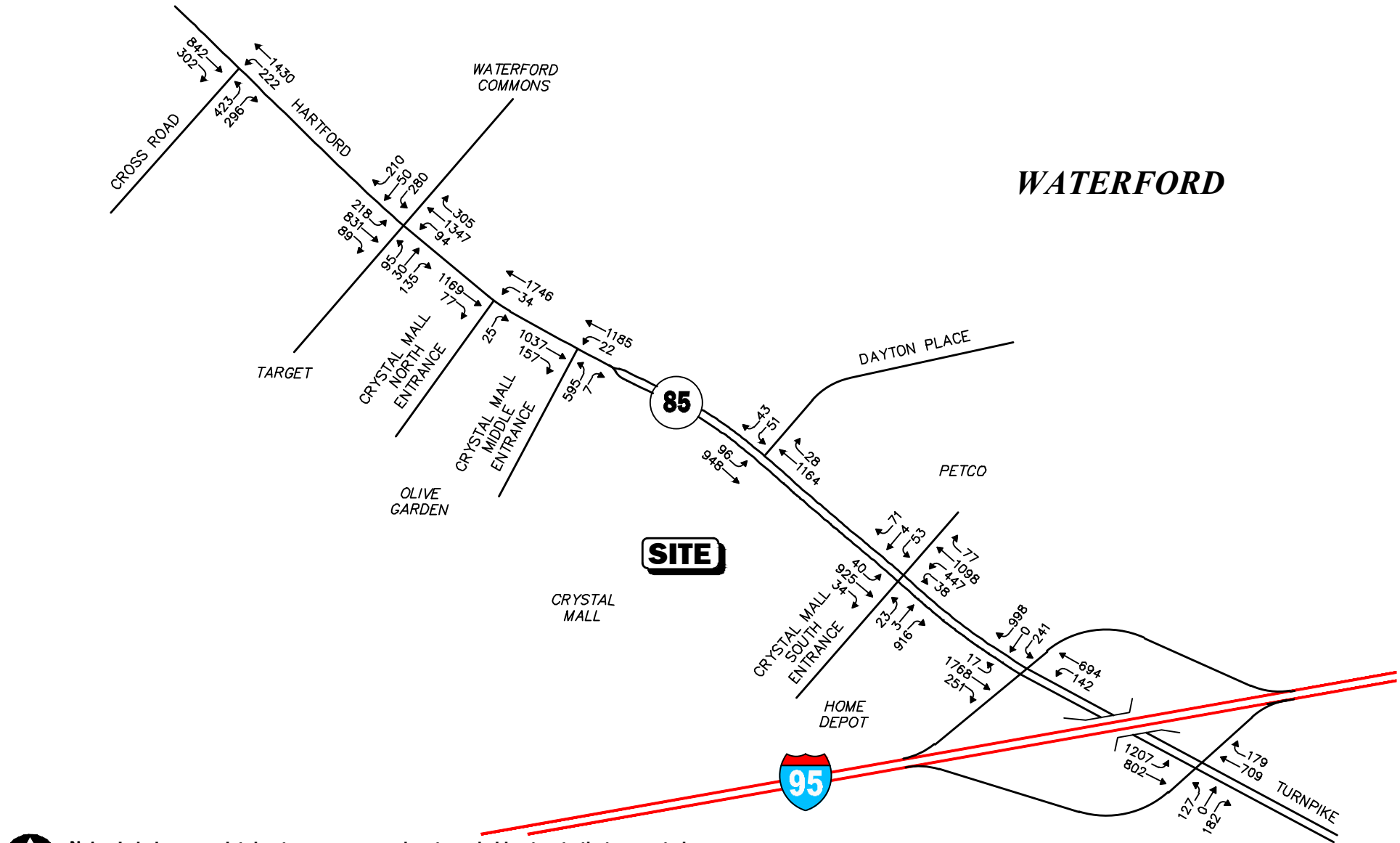
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to Scale

Figure 13

2027 Combined Weekday Morning Peak-Hour Traffic Volumes

Vanasse & Associates inc



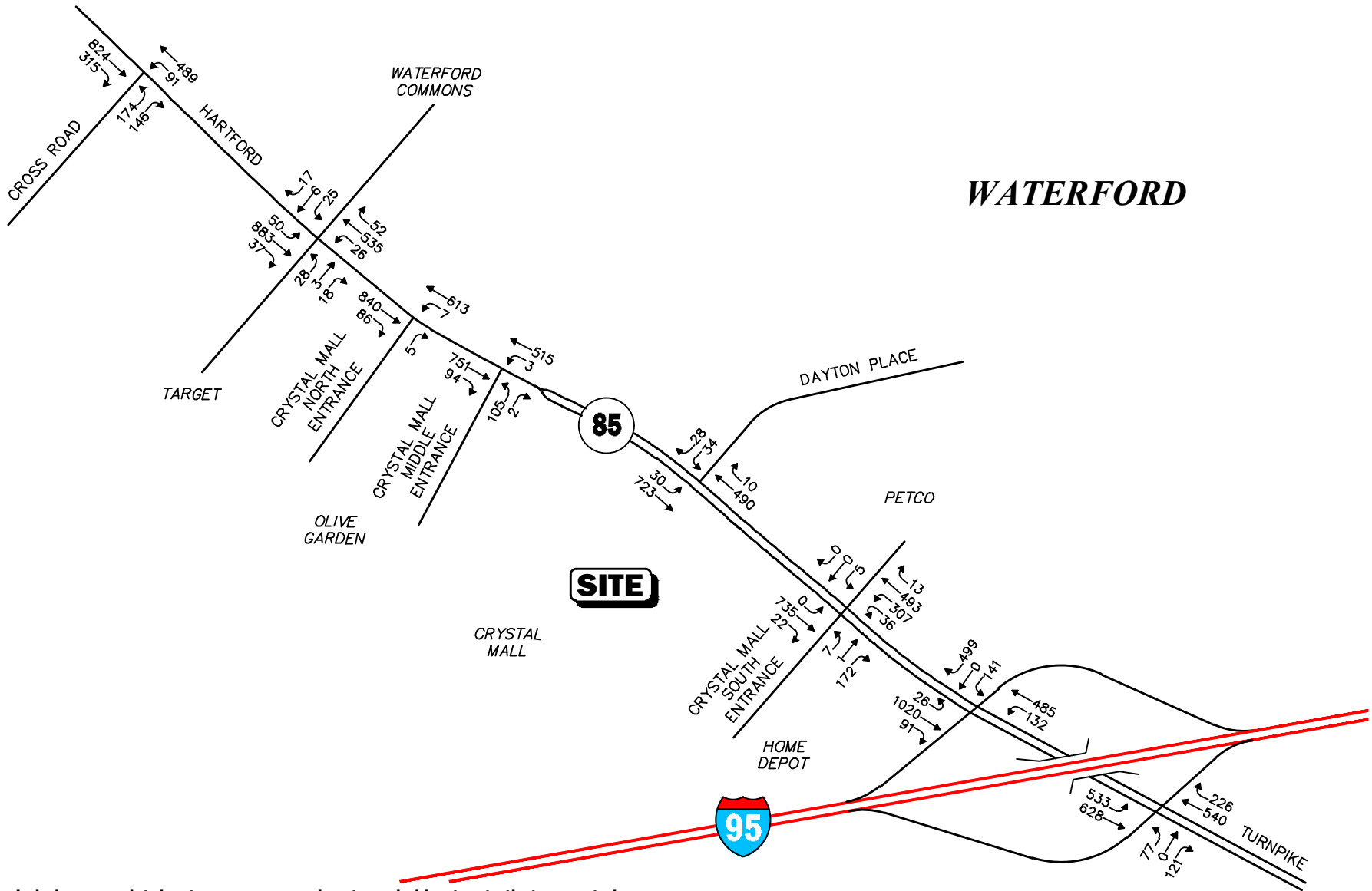
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to Scale

Figure 14

2027 Combined Weekday Evening Peak-Hour Traffic Volumes

Vanasse & Associates inc



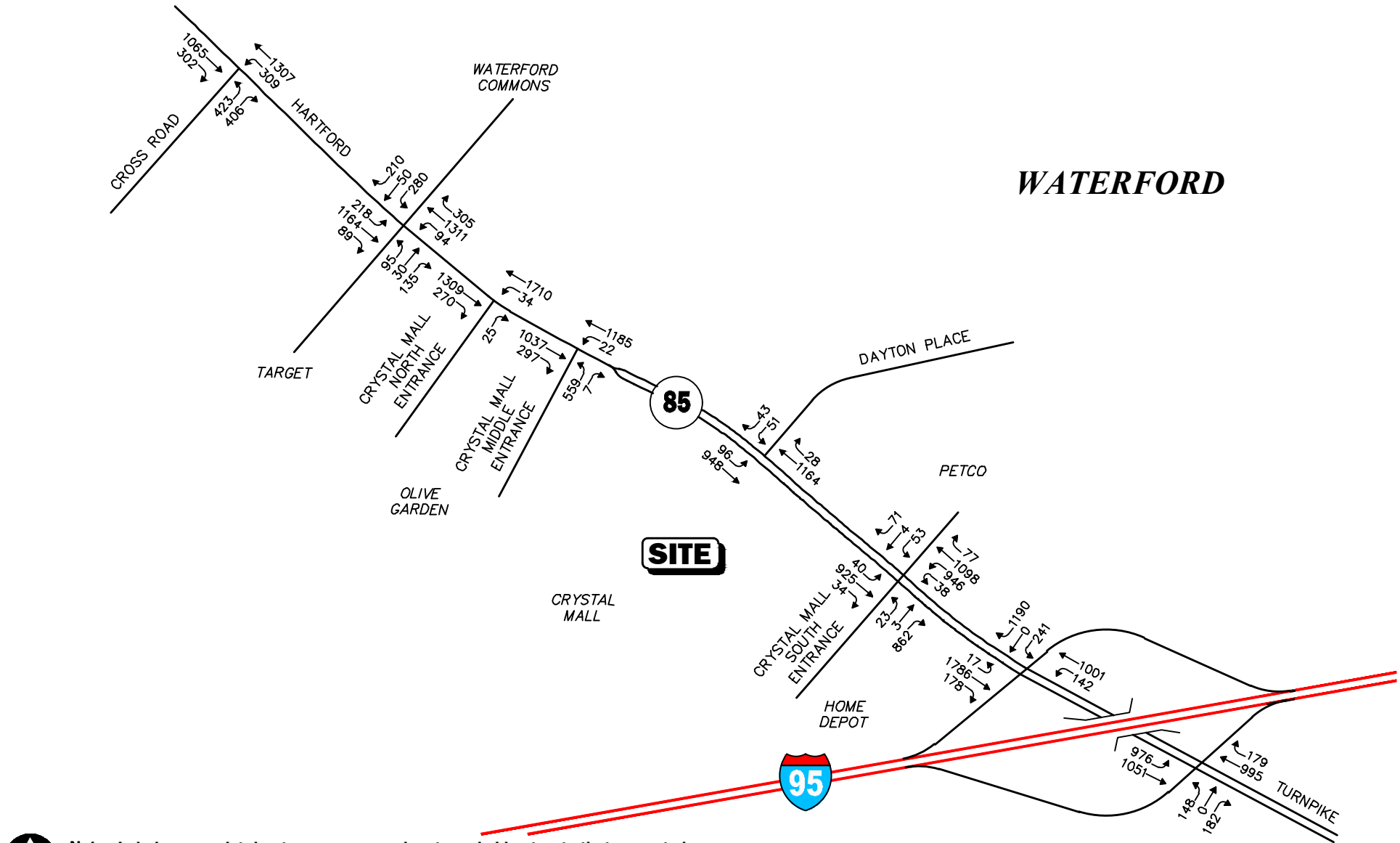
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to Scale

Figure 15

2027 Full Mall Occupancy
Weekday Morning
Peak-Hour Traffic Volumes

Vanasse & Associates inc



Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to Scale

Figure 16

2027 Full Mall Occupancy
Weekday Evening
Peak-Hour Traffic Volumes

Vanasse & Associates inc

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TRAFFIC OPERATIONS ANALYSIS

Measuring existing and future traffic volumes quantify traffic flow within the study area. To assess quality of flow, roadway capacity, and vehicle queue analyses were conducted under Existing, Background, and Build traffic-volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

METHODOLOGY

Levels of Service

A primary result of capacity analysis is the assignment of level of service to traffic facilities under various traffic-flow conditions.[5] The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best-operating conditions and LOS F representing congested or constrained operating conditions.

Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

Signalized Intersections

The six levels of service for signalized intersections may be described as follows:

[5]The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual 6th Edition;* Transportation Research Board; Washington, DC; 2016.

- *LOS A* describes operations with very low control delay; most vehicles do not stop at all.
- *LOS B* describes operations with relatively low control delay. However, more vehicles stop than LOS A.
- *LOS C* describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- *LOS D* describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop, and individual cycle failures are noticeable.
- *LOS E* describes operations with high control delay values. Individual cycle failures are frequent occurrences.
- *LOS F* describes operations with high control delay values that often occur with oversaturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Levels of service for signalized intersections were calculated using the Percentile Delay Method implemented as a part of the Synchro™ 12 software. The Percentile Delay Method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on "percentile" delay. Level-of-service designations are based on the criterion of percentile delay per vehicle and are a measure of: i) driver discomfort; ii) motorist frustration; and iii) fuel consumption; and include a uniform delay based on percentile volumes using a Poisson arrival pattern, an initial queue move-up time, and a queue interaction delay that accounts for delays resulting from queues extending from adjacent intersections. Table 10 summarizes the relationship between level-of-service and percentile delay and uses the same numerical delay thresholds as the *Highway Capacity Manual* method. The tabulated percentile delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches, or to entire intersections.

Table 10
LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS[a]

Level of Service	Percentile Delay Per Vehicle (Seconds)
A	≤10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	>80.0

[a]Source: Highway Capacity Manual; Transportation Research Board; Washington, DC; 2000; page 16-2.

Unsignalized Intersections

The six levels of service for unsignalized intersections may be described as follows:

- *LOS A* represents a condition with little or no control delay to minor street traffic.
- *LOS B* represents a condition with short control delays to minor street traffic.
- *LOS C* represents a condition with average control delays to minor street traffic.
- *LOS D* represents a condition with long control delays to minor street traffic.
- *LOS E* represents operating conditions at or near capacity level, with very long control delays to minor street traffic.
- *LOS F* represents a condition where minor street demand volume exceeds capacity of an approach lane, with control delays resulting.

The levels of service of unsignalized intersections are determined by application of a procedure described in the *Highway Capacity Manual 7th Edition.* Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study, and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the *Highway Capacity Manual 7th Edition*. Table 11 summarizes the relationship between level of service and average control delay.

Table 11
LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS[a]

Level-of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
v/c ≤ 1.0	v/c > 1.0	v/c ≤ 1.0
A	F	A
B	F	B
C	F	C
D	F	D
E	F	E
F	F	F

[a]Source: *Highway Capacity Manual 7th Edition*; Transportation Research Board; Washington, DC; 2022; page 20-6.

ANALYSIS RESULTS

Level-of-service analyses were conducted for 2025 Existing, 2027 Background, 2027 Combined with the Project, and 2027 Combined Full Mall Occupancy conditions for the study area intersections. The results of the intersection capacity analysis within the study area are described below, with a tabular summary provided in Tables 12 and 13.

Signalized Intersections

Route 85 at Cross Road

Under Existing and Background conditions, this intersection operates at an overall LOS A during the existing weekday morning peak hour and LOS B during all other analysis periods. Under the Combined conditions, only the weekday morning peak hour experiences a level of service change from LOS B to D. Overall delay increases by 31.1 seconds in the morning peak hour, while the evening peak hour is expected to increase by only 3.8 seconds. Vehicle queuing on the Route 85 approaches is anticipated to increase by no more than 15 vehicles in either analysis period. In comparison to the full occupancy of the Crystal Mall, the office use does not create a failing southbound through movement in the weekday evening peak hour. The overall delay in the weekday evening peak hour would increase by 38.4 seconds and decrease by 28.3 seconds when strictly comparing the proposed office and full occupancy retail uses. Mitigation is proposed to address this condition.

Route 85 at Target Driveway and Waterford Commons

Under Existing conditions, this intersection operates at an overall LOS A during the weekday morning and LOS C during the evening peak hours. Under the Background conditions, the level of service is expected to change from LOS A to B during the weekday morning peak hour, while the weekday evening peak hour will remain at LOS C. Under the Combined conditions, the weekday morning peak hour will retain its LOS B while the weekday evening peak hour will change from LOS C to F. The LOS F is due to an at-capacity northbound through movement that results in a delay greater than 2 minutes. The increases in overall delay due to Project-generated traffic are no more than 2.0 seconds in the weekday morning peak hour and greater than 2 minutes in the weekday evening peak hour. Vehicle queuing on the Route 85 approaches is anticipated to increase by no more than 2 vehicles during the weekday morning peak hour and 10 vehicles during the weekday evening peak hour. In comparison to the full occupancy of the Crystal Mall, the retail use results in at-capacity movements for the northbound and southbound through movements during the weekday evening peak hour. During this time period, the overall delay is also greater than 2 minutes with vehicle queueing in the southbound direction increasing by an additional 21 vehicles. Mitigation is proposed to address this condition.

Route 85 at Crystal Mall Middle Entrance Driveway

Under Existing and Background conditions, this intersection operates at an overall LOS A during all analysis periods. Under the Combined conditions, the weekday evening peak hour changes from LOS A to D due to the Project-generated traffic. The overall increase in delay due to Project-generated traffic during the weekday evening peak hour is 31.7 seconds, caused by at-capacity driveway movement. Vehicle queuing of the Crystal Mall exit driveway is anticipated to increase by no more than 8 vehicles during the weekday evening peak hour. In comparison to the full occupancy of the Crystal Mall, the retail use results in similar delays and queues for the driveway movement. Mitigation is proposed to address this condition.

Route 85 at Dayton Place

Under Existing conditions, this intersection operates at an overall LOS A during the weekday morning peak hour and LOS B during the weekday evening peak hour. Under the Background conditions, the level of service changes from LOS B to A due to the CTDOT signal reconstruction project. Under the Combined conditions, there is no change in level of service as none of the Project-generated traffic is expected to pass through the intersection.

Route 85 at Crystal Mall Southern Entrance Driveway

Under Existing conditions, this intersection operates at an overall LOS A during the weekday morning peak hour and LOS B during the weekday evening peak hour. Under the Background conditions, the weekday evening peak hour's level of service changes from LOS B to A due to the CTDOT signal reconstruction project. Under the Combined conditions, the weekday morning peak hour's level of service changes from LOS A to B, while the evening peak hour changes from LOS A to F. The LOS F is due to an at-capacity eastbound right-turn movement resulting in a volume-to-capacity ratio greater than 1. The increases in overall delay due to Project-generated traffic are no more than 7.4 seconds in the weekday morning peak hour and greater than 70.4 seconds in the weekday evening peak hour. Vehicle queueing of the Route 85 through movements is expected to increase by no more than 7 vehicles under either analysis period. The largest vehicle queueing impact is observed to be at Route 85 northbound left-turn movement, which increases its queue by 8 vehicles in the weekday morning peak hour. This increase in queue can be maintained within the existing turn lanes located on Route 85. In comparison to the full occupancy of the Crystal Mall, the retail use results in similar delays and queues for the driveway movement. Mitigation is proposed to address this condition, including widening the South Entrance driveway approach.

Route 85 at I-95 Southbound Ramps

Under Existing conditions, this intersection operates at an overall LOS A during the weekday morning and LOS C during the evening peak hours. Under the Background conditions, the level of service is unchanged during the weekday morning peak hour, while the weekday evening peak hour changes from LOS C to B due to the CTDOT signal reconstruction project. Under the Combined conditions, both peak hours change their respective LOS to E. The weekday morning peak hour has one at-capacity movement from the I-95 off-ramp, while the weekday evening peak hour contains two at-capacity movements. The increases in overall delay due to Project-generated traffic are 61.4 seconds during the weekday morning peak hour and 55.3 seconds in the weekday evening peak hour. Vehicle queuing on the Route 85 approaches is anticipated to increase by 23 vehicles during the weekday evening peak hour and is not anticipated to increase in the weekday morning peak hour. Vehicle queueing on the I-95 southbound off ramp is anticipated to increase by up to 14 vehicles, which would still be fully maintained on the off-ramp without queueing onto I-95. In comparison to the full occupancy of the Crystal Mall, the retail use would produce a larger impact to the intersection, resulting in an LOS F during the weekday evening peak hour. Mitigation is proposed to address this condition.

Route 85 at I-95 Northbound Ramps

Under Existing conditions, this intersection operates at an overall LOS A during the weekday morning and LOS B during the evening peak hours. Under the Background conditions, the level of service is expected to change from LOS A to B during the weekday morning peak hour and remain at LOS B during the weekday evening peak hour. Under the Combined conditions, the weekday

morning peak hour will change LOS from B to C, while the weekday evening peak hour will change from LOS B to F. The LOS F is due to an at-capacity movement of the southbound left movement onto the Interstate 95 on-ramp. The increases in overall delay due to Project-generated traffic are no more than 9.5 seconds in the weekday morning peak hour and greater than 2 minutes during the weekday evening peak hour. Vehicle queuing on the Route 85 southbound left movement is anticipated to increase by 13 vehicles during the weekday morning peak hour, while the weekday evening peak hour anticipated to increase by 37 vehicles, which would exceed the existing capacity of the turn lane and spill back into the prior intersection. Likewise, the Route 85 through movements would increase by no more than 2 vehicles under either analysis period. Queues on the I-95 northbound off-ramp will have an increase of 2 vehicles, which will be contained on the off-ramp. In comparison to the full occupancy of the Crystal Mall, the retail use would produce a similar impact to the intersection, resulting in an LOS F during the weekday evening peak hour. Mitigation is proposed to address this condition, including the reconfiguration of the Route 85 southbound approach to provide a second left-turn lane to I-95 northbound.

Table 12
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2025 Existing				2027 Background				2027 Combined				2027 Full Mall Occupancy			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg/95th	V/C	Delay	LOS	Queue Avg/95th	V/C	Delay	LOS	Queue Avg/95th	V/C	Delay	LOS	Queue Avg/95th
Route 85 at Cross Road																
Weekday Morning:																
Cross Road EB LT	0.43	23.4	C	36/54	0.40	22.6	C	36/51	0.33	20.7	C	34/47	0.33	21.0	C	35/47
Cross Road EB RT	0.09	22.1	C	0/29	0.54	24.2	C	44/73	0.64	25.7	C	63/93	0.63	25.3	C	60/91
Route 85 NB LT	0.27	4.7	A	13/26	0.29	6.4	A	6/30	0.36	13.9	B	9/45	0.41	9.7	A	13/56
Route 85 NB TH	0.19	2.6	A	43/86	0.21	4.4	A	19/120	0.28	5.7	A	43/163	0.26	5.3	A	34/146
Route 85 SB TH/RT	0.57	8.8	A	110/178	0.60	9.7	A	120/211	1.07	59.2	E	414/575	0.75	14.3	B	172/337
Overall	--	**9.6**	**A**	--	--	**10.6**	**B**	--	--	**41.7**	**D**	--	--	**13.4**	**B**	--
Weekday Evening:																
Cross Road EB LT	0.61	22.3	C	78/108	0.53	19.6	B	73/105	0.52	19.3	B	72/105	0.45	17.0	B	68/105
Cross Road EB RT	0.21	19.4	B	3/52	0.78	29.0	C	104/173	0.79	30.0	C	107/184	0.93	44.2	D	154/312
Route 85 NB LT	0.60	20.4	C	93/186	0.63	6.0	A	2/27	0.73	7.8	A	9/21	1.04	39.5	D	69/138
Route 85 NB TH	0.43	7.4	A	214/428	0.47	4.9	A	23/192	0.72	8.4	A	300/600	0.71	9.9	A	274/548
Route 85 SB TH/RT	0.67	14.4	B	141/210	0.74	17.3	B	167/231	0.92	27.5	C	252/363	1.20	116.3	F	380/467
Overall	--	**14.2**	**B**	--	--	**14.1**	**B**	--	--	**17.9**	**B**	--	--	**56.3**	**E**	--
Route 85 at Target Driveway and Waterford Commons																
Weekday Morning:																
Target Driveway EB LT	0.54	32.7	C	13/29	0.44	28.9	C	13/30	0.44	28.9	C	13/30	0.44	28.9	C	13/30
Target Driveway EB TH/RT	0.06	27.1	C	1/16	0.20	25.5	C	10/24	0.20	25.5	C	10/24	0.20	25.5	C	10/24
Waterford Commons Driveway WB LT	0.13	26.4	C	4/14	0.23	28.4	C	4/14	0.23	28.4	C	5/14	0.23	28.4	C	5/14
Waterford Commons Driveway WB TH	0.05	25.6	C	2/12	0.05	25.7	C	2/12	0.05	25.7	C	2/12	0.05	25.7	C	2/12
Waterford Commons Driveway WB RT	0.01	25.5	C	0/0	0.18	26.2	C	6/22	0.18	26.2	C	6/22	0.18	26.2	C	6/22
Route 85 NB LT	0.44	18.9	B	11/22	0.31	17.7	B	10/17	0.31	24.1	C	11/20	0.31	23.2	C	10/21
Route 85 NB TH	0.28	9.8	A	2/136	0.29	9.2	A	65/118	0.38	8.0	A	62/160	0.35	8.1	A	58/148
Route 85 NB RT	0.04	7.3	A	0/18	0.08	7.5	A	5/46	0.08	5.6	A	3/34	0.08	5.9	A	3/36
Route 85 SB LT	0.16	33.7	C	9/21	0.19	27.6	C	9/19	0.19	24.2	C	7/12	0.19	24.9	C	9/15
Route 85 SB TH/RT	0.43	4.0	A	0/53	0.46	7.5	A	0/128	0.84	12.7	B	0/338	0.56	9.8	A	0/175
Overall	--	**9.1**	**A**	--	--	**10.4**	**B**	--	--	**12.4**	**B**	--	--	**10.9**	**B**	--
Weekday Evening:																
Target Driveway EB LT	0.68	61.5	E	84/132	0.73	41.5	D	39/93	0.73	41.5	D	39/93	0.73	41.5	D	39/93
Target Driveway EB TH/RT	0.36	53.1	D	26/87	0.51	20.6	C	61/103	0.51	20.6	C	61/103	0.51	20.6	C	61/103
Waterford Commons Driveway WB LT	0.66	52.1	D	117/158	0.87	45.8	D	57/119	0.87	45.8	D	57/119	0.87	45.8	D	57/119
Waterford Commons Driveway WB TH	0.24	48.0	D	39/75	0.12	17.6	C	16/38	0.12	17.6	B	16/38	0.12	17.6	B	16/38
Waterford Commons Driveway WB RT	0.14	47.4	D	0/70	0.58	21.2	C	75/130	0.58	21.2	C	75/130	0.58	21.2	C	75/130
Route 85 NB LT	0.67	69.1	E	86/114	0.64	27.8	C	33/94	0.64	33.4	C	36/64	0.64	33.3	C	36/65
Route 85 NB TH	0.49	16.9	B	172/327	0.96	37.9	D	162/260	1.61	>120	F	444/469	1.57	>120	F	424/465
Route 85 NB RT	0.22	23.2	C	0/104	0.81	30.8	C	104/222	0.81	25.7	C	117/159	0.81	26.4	C	114/164
Route 85 SB LT	0.55	48.1	D	98/139	0.57	29.0	C	54/79	0.57	29.2	C	54/65	0.57	26.9	C	52/104
Route 85 SB TH/RT	0.44	14.4	B	192/258	0.84	24.4	C	117/245	1.00	41.6	D	240/292	1.36	>120	F	404/808
Overall	--	**30.1**	**C**	--	--	**31.1**	**C**	--	--	**>120**	**F**	--	--	**>120**	**F**	--
Route 85 at Crystall Mall Middle Entrance Driveway																
Weekday Morning:																
Crystal Mall Middle Entrance Driveway EB LT/RT	0.07	28.7	C	1/4	0.09	28.4	C	1/4	0.53	23.7	C	38/45	0.50	24.7	C	29/35
Route 85 NB LT	0.06	27.7	C	1/3	0.13	28.2	C	1/6	0.13	33.2	C	1/6	0.13	33.5	C	1/6
Route 85 NB TH	0.20	2.7	A	0/35	0.21	0.5	A	0/9	0.25	1.8	A	13/17	0.24	1.1	A	7/11
Route 85 SB TH	0.32	7.4	A	0/222	0.33	0.7	A	0/15	0.39	3.2	A	72/144	0.38	2.0	A	38/76
Route 85 SB RT	0.01	5.4	A	0/10	0.01	0.4	A	0/1	0.48	4.9	A	86/172	0.10	1.4	A	9/18
Overall	--	**5.6**	**A**	--	--	**0.8**	**A**	--	--	**5.5**	**A**	--	--	**4.0**	**A**	--
Weekday Evening:																
Crystal Mall Middle Entrance Driveway EB LT/RT	0.28	26.6	C	11/23	0.29	26.3	C	13/25	1.23	>120	F	183/223	1.15	110.3	F	164/208
Route 85 NB LT	0.32	24.6	C	7/9	0.59	34.6	C	9/15	0.59	37.2	D	9/15	0.59	37.3	D	9/15
Route 85 NB TH	0.43	6.7	A	367/734	0.44	3.7	A	65/152	0.51	5.7	A	75/158	0.51	5.7	A	78/158
Route 85 SB TH	0.48	7.9	A	117/333	0.48	3.9	A	63/114	0.57	6.6	A	77/96	0.57	5.8	A	55/61
Route 85 SB RT	0.04	6.2	A	2/15	0.05	2.8	A	6/12	0.19	4.8	A	17/29	0.36	3.8	A	27/34
Overall	--	**8.0**	**A**	--	--	**4.7**	**A**	--	--	**36.4**	**D**	--	--	**27.3**	**C**	--

See notes at end of table.

Table 12 (Continued)
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2025 Existing				2027 Background				2027 Combined				2027 Full Mall Occupancy			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg/95th	V/C	Delay	LOS	Queue Avg/95th	V/C	Delay	LOS	Queue Avg/95th	V/C	Delay	LOS	Queue Avg/95th
Route 85 at Dayton Place																
Weekday Morning:																
Dayton Place WB LT/RT	0.30	26.5	C	14/35	0.47	28.0	C	27/49	0.47	28.0	C	27/49	0.47	28.0	C	27/49
Route 85 NB TH/ RT	0.24	2.6	A	11/37	0.24	7.1	A	50/112	0.24	7.1	A	65/122	0.24	6.4	A	52/112
Route 85 SB LT	0.07	3.4	A	1/17	0.08	0.9	A	2/3	0.08	1.5	A	7/14	0.08	1.4	A	5/10
Route 85 SB TH	0.36	3.1	A	15/117	0.36	1.4	A	24/48	0.36	2.2	A	92/184	0.36	2.0	A	67/134
Overall	--	**4.2**	**A**	--	--	**4.8**	**A**	--	--	**5.2**	**A**	--	--	**4.9**	**A**	--
Weekday Evening:																
Dayton Place WB LT/RT	0.40	24.8	C	30/36	0.64	30.4	C	52/64	0.64	30.4	C	52/64	0.64	30.4	C	52/64
Route 85 NB TH/ RT	0.63	17.0	B	330/514	0.63	8.3	A	93/110	0.63	8.4	A	93/114	0.63	7.8	A	88/107
Route 85 SB LT	0.38	13.7	B	6/69	0.39	11.6	B	11/21	0.39	12.1	B	14/19	0.39	12.0	B	11/19
Route 85 SB TH	0.41	6.2	A	38/274	0.40	3.1	A	50/107	0.40	3.9	A	74/76	0.40	3.4	A	58/76
Overall	--	**13.0**	**B**	--	--	**7.7**	**A**	--	--	**8.1**	**A**	--	--	**7.6**	**A**	--
Route 85 at Crystall Mall South Entrance Driveway and 825 Hartford Turnpike Entrance Driveway																
Weekday Morning:																
Crystal Mall South Entrance Driveway EB LT/TH	0.16	23.7	C	4/13	0.20	28.8	C	4/13	0.20	28.8	C	4/13	0.20	28.8	C	4/13
Crystal Mall South Entrance Driveway EB RT	0.02	21.7	C	0/0	0.13	23.0	C	8/16	0.48	11.1	B	71/95	0.65	22.5	C	78/78
825 Hartford Turnpike Driveway WB LT/TH	0.15	28.3	C	3/9	0.18	28.9	C	3/9	0.18	28.9	C	3/9	0.18	28.9	C	3/9
825 Hartford Turnpike Driveway WB RT	0.00	0.0	A	0/0	0.00	0.0	A	0/0	0.00	0.0	A	0/0	0.00	0.0	A	0/0
Route 85 NB UT/LT	0.25	22.1	C	13/35	0.28	22.1	C	18/31	0.79	15.2	B	198/236	0.47	15.3	B	60/80
Route 85 NB TH/RT	0.32	12.7	B	67/87	0.20	0.8	B	0/17	0.20	1.7	A	0/34	0.20	1.3	A	0/32
Route 85 SB LT	0.00	0.0	A	0/0	0.00	0.0	A	0/0	0.00	0.0	A	0/0	0.00	0.0	A	0/0
Route 85 SB TH	0.38	5.8	A	42/100	0.38	1.9	A	38/76	0.77	10.8	B	16/18	0.47	2.5	A	13/18
Route 85 SB RT	0.02	4.0	A	0/0	0.03	0.9	A	2/4	0.06	2.4	A	1/3	0.03	1.0	A	1/3
Overall	--	**9.8**	**A**	--	--	**3.5**	**A**	--	--	**10.9**	**B**	--	--	**7.1**	**A**	--
Weekday Evening:																
Crystal Mall South Entrance Driveway EB LT/TH	0.26	51.0	D	23/48	0.25	25.6	C	11/29	0.25	25.6	C	11/29	0.25	25.6	C	11/29
Crystal Mall South Entrance Driveway EB RT	0.24	38.5	D	42/72	0.31	18.1	B	31/53	1.52	>120	F	561/665	1.43	>120	F	509/614
825 Hartford Turnpike Driveway WB LT/ TH	0.51	53.3	D	48/90	0.50	26.9	C	22/54	0.50	26.9	C	22/54	0.50	26.9	C	22/54
825 Hartford Turnpike Driveway WB RT	0.05	49.7	D	0/1	0.53	27.4	C	27/63	0.53	27.4	C	27/63	0.53	27.4	C	27/63
Route 85 NB UT/LT	0.61	42.0	D	111/131	0.46	16.6	B	39/49	0.39	11.3	B	71/80	0.79	13.5	B	181/362
Route 85 NB TH/RT	0.56	14.2	B	249/316	0.57	9.6	A	179/212	0.57	9.4	A	175/177	0.57	8.3	A	182/364
Route 85 SB LT	0.14	49.9	D	33/76	0.34	30.2	C	16/47	0.34	32.6	C	0/47	0.34	32.2	C	0/47
Route 85 SB TH	0.44	11.2	B	182/318	0.57	3.9	A	48/96	0.95	22.1	C	20/265	0.95	21.7	C	20/265
Route 85 SB RT	0.02	0.2	A	0/1	0.05	1.5	A	0/2	0.08	2.1	A	0/4	0.08	2.2	A	0/4
Overall	--	**19.5**	**B**	--	--	**9.8**	**A**	--	--	**80.2**	**F**	--	--	**60.9**	**E**	--
Route 85 at I-95 Southbound Ramps																
Weekday Morning:																
I-95 Southbound Off-Ramp WB LT/TH	0.46	21.5	C	84/227	0.38	18.8	C	47/81	0.28	14.8	B	41/81	0.33	16.9	B	43/81
I-95 Southbound Off-Ramp WB RT	0.15	19.9	B	0/29	0.62	21.3	C	75/105	1.35	>120	F	337/460	0.72	21.8	C	98/144
Route 85 NB LT	0.41	5.1	A	15/43	0.46	4.5	A	0/19	0.56	9.5	A	0/9	0.55	9.6	A	3/20
Route 85 NB TH	0.17	3.9	A	22/49	0.19	0.8	A	0/0	0.36	0.9	A	0/0	0.27	1.1	A	0/0
Route 85 SB LT	0.06	7.3	A	2/14	0.07	5.1	A	6/10	0.10	9.1	A	4/8	0.08	7.7	A	5/11
Route 85 SB TH/RT	0.41	7.4	A	32/96	0.47	7.2	A	78/156	0.69	12.1	B	71/99	0.60	11.0	B	76/100
Overall	--	**10.0**	**A**	--	--	**9.4**	**A**	--	--	**70.8**	**E**	--	--	**11.6**	**B**	--
Weekday Evening:																
I-95 Southbound Off-Ramp WB LT/ TH	0.45	31.5	C	163/203	0.44	15.1	B	75/129	0.44	15.1	B	75/129	0.44	15.1	B	75/129
I-95 Southbound Off-Ramp WB RT	0.78	40.0	D	262/292	0.96	38.7	D	183/300	1.16	104.3	F	285/392	1.39	>120	F	382/492
Route 85 NB LT	0.61	17.1	B	52/108	0.62	9.7	A	3/11	0.62	10.6	B	3/8	0.62	8.7	A	5/10
Route 85 NB TH	0.33	12.5	B	139/210	0.40	2.3	A	2/3	0.43	1.5	A	2/3	0.62	2.5	A	3/3
Route 85 SB LT	0.05	15.4	B	10/18	0.07	8.5	A	2/5	0.07	11.4	B	4/4	0.11	11.3	B	4/4
Route 85 SB TH/RT	0.51	23.4	C	343/403	0.70	12.4	B	87/174	1.18	95.2	F	369/738	1.14	78.7	E	351/702
Overall	--	**25.9**	**C**	--	--	**17.5**	**B**	--	--	**72.8**	**E**	--	--	**87.7**	**F**	--

See notes at end of table.

Table 12 (Continued)
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2025 Existing				2027 Background				2027 Combined				2027 Full Mall Occupancy			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg/95th	V/C	Delay	LOS	Queue Avg/95th	V/C	Delay	LOS	Queue Avg/95th	V/C	Delay	LOS	Queue Avg/95th
Route 85 at I-95 Northbound Ramps																
Weekday Morning:																
I-95 Northbound Off-Ramp EB LT	0.17	27.1	C	11/38	0.17	24.2	C	10/31	0.55	25.8	C	44/88	0.23	24.4	C	14/40
I-95 Northbound Off-Ramp EB TH	0.17	27.1	C	12/40	0.17	24.2	C	10/31	0.55	26.0	C	44/89	0.24	24.5	C	15/40
I-95 Northbound Off-Ramp EB RT	0.19	26.7	C	0/44	0.79	44.6	D	48/110	0.67	30.8	C	48/110	0.79	44.6	D	48/110
Route 85 NB TH/RT	0.41	11.7	B	75/168	0.50	13.0	B	103/274	0.73	21.4	C	138/201	0.65	16.9	B	144/218
Route 85 SB LT	0.75	9.7	A	46/158	0.78	7.8	A	0/14	0.98	32.6	C	37/335	0.91	19.7	B	17/259
Route 85 SB TH/RT	0.23	2.2	A	26/51	0.24	0.6	A	0/2	0.25	0.5	A	1/2	0.26	0.3	A	1/2
Overall	--	**9.9**	**A**	--	--	**10.6**	**B**	--	--	**20.1**	**C**	--	--	**14.8**	**B**	--
Weekday Evening:																
I-95 Northbound Off-Ramp EB LT	0.22	31.2	C	21/51	0.19	22.5	C	15/43	0.26	22.8	C	23/55	0.31	23.0	C	27/63
I-95 Northbound Off-Ramp EB TH	0.22	31.3	C	22/52	0.19	22.5	C	15/43	0.27	22.9	C	23/56	0.31	23.1	C	27/63
I-95 Northbound Off-Ramp EB RT	0.12	30.8	C	0/55	0.84	46.2	D	69/169	0.84	46.2	D	69/169	0.84	46.2	D	69/169
Route 85 NB TH/RT	0.66	21.5	C	179/268	0.80	22.8	C	172/280	0.91	32.5	C	177/288	1.19	117.0	F	310/426
Route 85 SB LT	0.89	30.7	C	195/432	0.96	26.5	C	19/301	1.75	>120	F	605/1210	1.42	>120	F	422/844
Route 85 SB TH/RT	0.27	2.5	A	36/71	0.30	0.8	A	3/4	0.33	0.4	A	2/2	0.43	0.4	A	3/3
Overall	--	**19.2**	**B**	--	--	**19.0**	**B**	--	--	**>120**	**F**	--	--	**96.9**	**F**	--

[a]Volume-to-capacity ratio.
[b]Control (signal) delay per vehicle in seconds.
[c]Level of service.
[d]Queue length in feet.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound; UT = U-turn movements; LT = left-turning movements; TH = through movements; RT = right-turning movements.

Unsignalized Intersection

Route 85 at Crystal Mall North Driveway

Under Existing and Background conditions, the minor street approach at this intersection operates at LOS B under all analysis conditions, while the Route 85 northbound left movement operates at LOS A or B. Under the Build conditions, the level of service for the minor street approach changes from LOS B to C. Queues are expected to be minimal, with increases of less than 1 vehicle.

Table 13
UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Unsignalized Intersection/Peak Hour/Movement	2025 Existing				2027 Background				2027 Combined				2027 Full Mall Occupancy			
	Demand[a]	Delay[b]	LOS[c]	Queue[d] 95th	Demand	Delay	LOS	Queue 95th	Demand	Delay	LOS	Queue 95th	Demand	Delay	LOS	Queue 95th
Route 85 and Crystal Mall North Driveway																
Weekday Morning:																
Route 85 NB LT	7	9.5	A	0	7	9.5	A	0	7	13.5	B	3	7	10.3	B	0
Crystal Mall North Driveway EB LT/RT	5	11.8	B	3	5	11.9	B	3	5	17.3	C	3	5	13.0	B	3
Weekday Evening:																
Route 85 NB LT	34	12.1	B	5	34	12.3	B	5	34	13.6	B	5	34	17.7	C	10
Crystal Mall North Driveway EB LT/RT	25	14.4	B	8	25	14.6	B	8	25	16.2	C	8	25	20.7	C	13

[a]Demand in vehicles per hour.
[b]Delay in seconds per vehicle.
[c]Level of service.
[d]95th percentile queue length in feet.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

RECOMMENDATIONS AND CONCLUSIONS

VAI has prepared this TIS to identify traffic impacts associated with the retail-to-office redevelopment proposed for the Crystal Mall located at 850 Hartford Turnpike in Waterford, Connecticut. This study was prepared in accordance with OSTA Guidelines for traffic studies and was conducted in accordance with the standards of the traffic engineering and transportation planning professions for the preparation of such reports. Based on the results of this study, the following can be concluded:

- Three of the study intersections had more than 10 crashes per year. The crashes were observed to mainly be rear-end collisions under clear weather, during daylight, and resulting in property damage only. These crashes are typical for signalized intersections and do not point to any other deficiencies.

- When compared to a re-occupancy of the existing Crystal Mall, the Project is expected to generate 16,158 net fewer vehicle trips on an average weekday and 31,334 net fewer vehicle trips on an average Saturday (two-way, 24-hour volume), with 1,225 net new vehicle trips (+1,150 entering and +75 exiting) during the weekday morning peak hour, 873 net fewer vehicle trips (-896 entering and +23 exiting) during the weekday evening peak hour and 2,726 net fewer trips during the Saturday midday peak hour.

- Project-related traffic increases are projected to range between 87 and 715 vehicles during peak hours, with traffic percentage increases ranging from 4.9 to 44.6 percent.

- The Project will have an impact (increase) on motorist delays or vehicle queuing at all of the signalized intersections compared to anticipated future conditions without the Project (Background conditions). As part of the Project, mitigation will be required, with the goal of reducing travel times through the Route 85 corridor and minimizing overall delay at signalized intersections.

RECOMMENDATIONS

The following recommendations have been developed as a part of this evaluation and, where applicable, will be completed in conjunction with the Project subject to receipt of all necessary rights, permits, and approvals.

Project Access

Access to the Project site will be provided via three existing access points. Two existing access points are fully accessible signalized intersections that will act as the main northern and southern entrance points. The third access point is limited access with right- and left-turn-in and right-turn-out of the site. It is anticipated that a portion of the trips from the north will utilize this access point.

- All unsignalized driveways within the Project site should be placed under STOP-sign control, with a painted STOP-bar included.
- All signs and other pavement markings to be installed within the Project site shall conform to the applicable standards of the current *Manual on Uniform Traffic Control Devices* (MUTCD).[6]
- Signs and landscaping to be installed as a part of the Project within the intersection sight triangle areas should be designed and maintained so as not to restrict lines of sight.
- Snow accumulations (windrows) within sight triangle areas should be promptly removed where such accumulations would impede sightlines.

Transportation Demand Management (TDM) Plan

In an effort to encourage the use of alternative modes of transportation to single-occupant vehicles, the following TDM measures will be implemented as a part of the Project:

- A "welcome packet" should be provided to employees that details available public transportation services, walking alternatives, and commuter options.
- Information regarding park-and-rides and shuttle options will be posted in a central location and/or otherwise made available to employees of the Project.
- To encourage the use of public transportation, the property management team will make public transportation schedules available, posting them in a centralized location for employees.
- The property management team will provide information on available pedestrian facilities in the vicinity of the Project site. This information will be posted in a centralized location.

Off-Site Improvements

Route 85 Corridor Improvements

The addition of Project-related traffic to the signalized intersections along Route 85 within the study area was shown to result in an increase in motorist delays and vehicle queuing over Background conditions. In order to enhance safety and to offset the predicted impact of the Project,

[6] *Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, D.C.; 2009.

the Project proponent will work with CTDOT to design and implement an optimal traffic signal timing, phasing, and coordination plan (where applicable).

The initial traffic signal timing improvements will be completed prior to the issuance of any Certificate of Occupancy for the Project, subject to receipt of all necessary rights, permits, and approvals, and will include a review of the "yellow" and "all-red" clearance intervals and the pedestrian phase timings. Operating conditions at the subject intersections will be reviewed thereafter as a part of the annual traffic Monitoring and Reporting Program (discussion follows), and the traffic signal timing, phasing, and coordination will be further adjusted based on the results of the monitoring program, again, subject to receipt of all necessary rights, permits, and approvals.

Additional analysis was conducted to model these proposed off-site Improvements. As can be seen in Table 14, with the traffic signal timing improvements, operating conditions are predicted to generally improve over the Combined conditions, with a majority of intersections operating at LOS D or better.

Table 14
MITIGATED SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2027 Background V/C[a]	2027 Background Delay[b]	2027 Background LOS[c]	2027 Background Queue[d] Avg/95th	2027 Combined V/C	2027 Combined Delay	2027 Combined LOS	2027 Combined Queue Avg/95th	2027 Mitigated V/C	2027 Mitigated Delay	2027 Mitigated LOS	2027 Mitigated Queue Avg/95th
Route 85 at Cross Road												
Weekday Morning:												
Cross Road EB LT	0.40	22.6	C	36/51	0.33	20.7	C	34/47	0.40	37.7	D	63/84
Cross Road EB RT	0.54	24.2	C	44/73	0.64	25.7	C	63/93	0.79	54.4	D	115/164
Route 85 NB LT	0.29	6.4	A	6/30	0.36	13.9	B	9/45	0.54	23.9	C	18/51
Route 85 NB TH	0.21	4.4	A	19/120	0.28	5.7	A	43/163	0.25	1.4	A	18/36
Route 85 SB TH/RT	0.60	9.7	A	120/211	1.07	59.2	E	414/575	0.85	17.7	B	459/578
Overall	--	**10.6**	**B**	--	--	**41.7**	**D**	--	--	**18.2**	**B**	--
Weekday Evening:												
Cross Road EB LT	0.53	19.6	B	73/105	0.52	19.3	B	72/105	0.57	37.6	D	149/192
Cross Road EB RT	0.78	29.0	C	104/173	0.79	30.0	C	107/184	0.87	58.2	E	221/318
Route 85 NB LT	0.63	6.0	A	2/27	0.73	7.8	A	9/21	0.77	50.2	D	101/139
Route 85 NB TH	0.47	4.9	A	23/192	0.72	8.4	A	300/600	0.64	2.0	A	51/77
Route 85 SB TH/RT	0.74	17.3	B	167/231	0.92	27.5	C	252/363	0.72	21.5	C	363/453
Overall	--	**14.1**	**B**	**--**	--	**17.9**	**B**	--	--	**20.5**	**C**	--
Route 85 at Target Driveway and Waterford Commons												
Weekday Morning:												
Target Driveway EB LT	0.44	28.9	C	13/30	0.44	28.9	C	13/30	0.42	46.9	D	24/44
Target Driveway EB TH/RT	0.20	25.5	C	10/24	0.20	25.5	C	10/24	0.31	45.6	D	18/36
Waterford Commons Driveway WB LT	0.23	28.4	C	4/14	0.23	28.4	C	5/14	0.19	46.4	D	8/22
Waterford Commons Driveway WB TH	0.05	25.7	C	2/12	0.05	25.7	C	2/12	0.07	45.4	D	4/17
Waterford Commons Driveway WB RT	0.18	26.2	C	6/22	0.18	26.2	C	6/22	0.28	46.6	D	12/34
Route 85 NB LT	0.31	17.7	B	10/17	0.31	24.1	C	11/20	0.37	50.5	D	0/48
Route 85 NB TH	0.29	9.2	A	65/118	0.38	8.0	A	62/160	0.29	6.7	A	89/182
Route 85 NB RT	0.08	7.5	A	5/46	0.08	5.6	A	3/34	0.06	5.0	A	15/35
Route 85 SB LT	0.19	27.6	C	9/19	0.19	24.2	C	7/12	0.23	52.0	D	18/19
Route 85 SB TH/RT	0.46	7.5	A	0/128	0.84	12.7	B	0/338	0.67	3.3	A	79/229
Overall	--	**10.4**	**B**	--	--	**12.4**	**B**	--	--	**8.1**	**A**	--
Weekday Evening:												
Target Driveway EB LT	0.73	41.5	D	39/93	0.73	41.5	D	39/93	0.71	61.3	E	76/144
Target Driveway EB TH/RT	0.51	20.6	C	61/103	0.51	20.6	C	61/103	0.77	57.8	E	130/196
Waterford Commons Driveway WB LT	0.87	45.8	D	57/119	0.87	45.8	D	57/119	0.81	59.9	E	109/186
Waterford Commons Driveway WB TH	0.12	17.6	C	16/38	0.12	17.6	B	16/38	0.17	39.0	D	32/69
Waterford Commons Driveway WB RT	0.58	21.2	C	75/130	0.58	21.2	C	75/130	0.83	61.2	E	155/274
Route 85 NB LT	0.64	27.8	C	33/94	0.64	33.4	C	36/64	0.47	41.6	D	78/126
Route 85 NB TH	0.96	37.9	D	162/260	1.61	>120	F	444/469	0.88	21.6	C	488/976
Route 85 NB RT	0.81	30.8	C	104/222	0.81	25.7	C	117/159	0.44	11.9	B	122/175
Route 85 SB LT	0.57	29.0	C	54/79	0.57	29.2	C	54/65	0.77	51.7	D	93/155
Route 85 SB TH/RT	0.84	24.4	C	117/245	1.00	41.6	D	240/292	0.66	17.7	B	311/622
Overall	--	**31.1**	**C**	--	--	**>120**	**F**	--	--	**29.8**	**C**	--
Route 85 at Crystall Mall Middle Entrance Driveway												
Weekday Morning:												
Crystal Mall Middle Entrance Driveway EB LT/RT	0.09	28.4	C	1/4	0.53	23.7	C	38/45	0.62	43.0	D	71/142
Route 85 NB LT	0.13	28.2	C	1/6	0.13	33.2	C	1/6	0.14	39.7	D	2/6
Route 85 NB TH	0.21	0.5	A	0/9	0.25	1.8	A	13/17	0.22	2.4	A	22/24
Route 85 SB TH	0.33	0.7	A	0/15	0.39	3.2	A	72/144	0.34	1.3	A	5/14
Route 85 SB RT	0.01	0.4	A	0/1	0.48	4.9	A	86/172	0.41	1.8	A	7/17
Overall	--	**0.8**	**A**	--	--	**5.5**	**A**	--	--	**6.2**	**A**	--
Weekday Evening:												
Crystal Mall Middle Entrance Driveway EB LT/RT	0.29	26.3	C	13/25	1.23	>120	F	183/223	0.82	43.2	D	256/263
Route 85 NB LT	0.59	34.6	C	9/15	0.59	37.2	D	9/15	0.49	54.7	D	13/26
Route 85 NB TH	0.44	3.7	A	65/152	0.51	5.7	A	75/158	0.53	9.3	A	271/441
Route 85 SB TH	0.48	3.9	A	63/114	0.57	6.6	A	77/96	0.57	5.7	A	55/257
Route 85 SB RT	0.05	2.8	A	6/12	0.19	4.8	A	17/29	0.19	3.4	A	15/63
Overall	--	**4.7**	**A**	**--**	--	**36.4**	**D**	--	--	**15.7**	**B**	--

See notes at the end of the table.

Table 14 (Continued)
MITIGATED SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2027 Background V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg/95th	2027 Combined V/C	Delay	LOS	Queue Avg/95th	2027 Mitigated V/C	Delay	LOS	Queue Avg/95th
Route 85 at Dayton Place												
Weekday Morning:												
Dayton Place WB LT/RT	0.47	28.0	C	27/49	0.47	28.0	C	27/49	0.52	25.1	C	22/43
Route 85 NB TH/ RT	0.24	7.1	A	50/112	0.24	7.1	A	65/122	0.26	5.7	A	50/61
Route 85 SB LT	0.08	0.9	A	2/3	0.08	1.5	A	7/14	0.08	2.1	A	4/10
Route 85 SB TH	0.36	1.4	A	24/48	0.36	2.2	A	92/184	0.37	2.8	A	78/110
Overall	**--**	**4.8**	**A**	**--**	--	**5.2**	**A**	--	--	**4.9**	**A**	--
Weekday Evening:												
Dayton Place WB LT/RT	0.64	30.4	C	52/64	0.64	30.4	C	52/64	0.61	48.6	D	103/106
Route 85 NB TH/ RT	0.63	8.3	A	93/110	0.63	8.4	A	93/114	0.53	2.4	A	60/68
Route 85 SB LT	0.39	11.6	B	11/21	0.39	12.1	B	14/19	0.36	8.1	A	26/52
Route 85 SB TH	0.40	3.1	A	50/107	0.40	3.9	A	74/76	0.38	7.2	A	221/442
Overall	--	**7.7**	**A**	--	--	**8.1**	**A**	--	--	**7.4**	**A**	--
Route 85 at Crystall Mall South Entrance Driveway and 825 Hartford Turnpike Entrance Driveway												
Weekday Morning:												
Crystal Mall South Entrance Driveway EB LT/TH	0.20	28.8	C	4/13	0.20	28.8	C	4/13	0.33	50.5	D	7/20
Crystal Mall South Entrance Driveway EB RT	0.13	23.0	C	8/16	0.48	11.1	B	71/95	0.29	18.6	B	72/144
825 Hartford Turnpike Driveway WB LT/TH	0.18	28.9	C	3/9	0.18	28.9	C	3/9	0.30	50.5	D	5/14
825 Hartford Turnpike Driveway WB RT	0.00	0.0	A	0/0	0.00	0.0	A	0/0	0.00	0.0	A	0/0
Route 85 NB UT/LT	0.28	22.1	C	18/31	0.79	15.2	B	198/236	0.84	21.5	C	256/420
Route 85 NB TH/RT	0.20	0.8	B	0/17	0.20	1.7	A	0/34	0.18	0.9	A	0/36
Route 85 SB LT	0.00	0.0	A	0/0	0.00	0.0	A	0/0	0.00	0.0	A	0/0
Route 85 SB TH	0.38	1.9	A	38/76	0.77	10.8	B	16/18	0.56	11.1	B	161/322
Route 85 SB RT	0.03	0.9	A	2/4	0.06	2.4	A	1/3	0.04	6.4	A	6/18
Overall	--	**3.5**	**A**	--	--	**10.9**	**B**	--	--	**14.3**	**B**	--
Weekday Evening:												
Crystal Mall South Entrance Driveway EB LT/TH	0.25	25.6	C	11/29	0.25	25.6	C	11/29	0.31	48.6	D	22/48
Crystal Mall South Entrance Driveway EB RT	0.31	18.1	B	31/53	1.52	>120	F	561/665	0.85	30.0	C	342/346
825 Hartford Turnpike Driveway WB LT/ TH	0.50	26.9	C	22/54	0.50	26.9	C	22/54	0.61	55.8	E	44/101
825 Hartford Turnpike Driveway WB RT	0.53	27.4	C	27/63	0.53	27.4	C	27/63	0.65	58.3	E	56/119
Route 85 NB UT/LT	0.46	16.6	B	39/49	0.39	11.3	B	71/80	0.37	20.0	C	92/102
Route 85 NB TH/RT	0.57	9.6	A	179/212	0.57	9.4	A	175/177	0.47	5.2	A	197/211
Route 85 SB LT	0.34	30.2	C	16/47	0.34	32.6	C	0/47	0.51	73.4	E	33/71
Route 85 SB TH	0.57	3.9	A	48/96	0.95	22.1	C	20/265	0.75	37.1	D	426/478
Route 85 SB RT	0.05	1.5	A	0/2	0.08	2.1	A	0/4	0.06	17.8	B	27/49
Overall	--	**9.8**	**A**	--	--	**80.2**	**F**	--	--	**24.6**	**C**	--
Route 85 at I-95 Southbound Ramps												
Weekday Morning:												
I-95 Southbound Off-Ramp WB LT/TH	0.38	18.8	C	47/81	0.28	14.8	B	41/81	0.21	17.5	B	58/99
I-95 Southbound Off-Ramp WB RT	0.62	21.3	C	75/105	1.35	>120	F	337/460	0.90	35.1	D	309/440
Route 85 NB LT	0.46	4.5	A	0/19	0.56	9.5	A	0/9	0.64	30.1	C	63/84
Route 85 NB TH	0.19	0.8	A	0/0	0.36	0.9	A	0/0	0.40	12.5	B	147/294
Route 85 SB LT	0.07	5.1	A	6/10	0.10	9.1	A	4/8	0.14	15.5	B	12/23
Route 85 SB TH/RT	0.47	7.2	A	78/156	0.69	12.1	B	71/99	0.75	24.3	C	263/321
Overall	--	**9.4**	**A**	--	--	**70.8**	**E**	--	--	**25.7**	**C**	--
Weekday Evening:												
I-95 Southbound Off-Ramp WB LT/ TH	0.44	15.1	B	75/129	0.44	15.1	B	75/129	0.43	26.8	C	145/215
I-95 Southbound Off-Ramp WB RT	0.96	38.7	D	183/300	1.16	104.3	F	285/392	0.95	51.2	D	350/490
Route 85 NB LT	0.62	9.7	A	3/11	0.62	10.6	B	3/8	0.88	38.9	D	68/71
Route 85 NB TH	0.40	2.3	A	2/3	0.43	1.5	A	2/3	0.39	16.9	B	262/265
Route 85 SB LT	0.07	8.5	A	2/5	0.07	11.4	B	4/4	0.06	19.4	B	8/11
Route 85 SB TH/RT	0.70	12.4	B	87/174	1.18	95.2	F	369/738	0.93	39.7	D	336/506
Overall	--	**17.5**	**B**	--	--	**72.8**	**E**	--	--	**37.7**	**D**	--

See notes at the end of the table.

Table 14 (Continued)
MITIGATED SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/Peak Hour/Movement	2027 Background				2027 Combined				2027 Mitigated			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg/95[th]	V/C	Delay	LOS	Queue Avg/95[th]	V/C	Delay	LOS	Queue Avg/95[th]
Route 85 at I-95 Northbound Ramps												
Weekday Morning:												
I-95 Northbound Off-Ramp EB LT	0.17	24.2	C	10/31	0.55	25.8	C	44/88	0.81	53.4	D	150/224
I-95 Northbound Off-Ramp EB TH	0.17	24.2	C	10/31	0.55	26.0	C	44/89	0.27	36.1	D	40/78
I-95 Northbound Off-Ramp EB RT	0.79	44.6	D	48/110	0.67	30.8	C	48/110	0.27	36.1	D	40/77
Route 85 NB TH/RT*	0.50	13.0	B	103/274	0.73	21.4	C	138/201	0.67	24.4	C	287/436
Route 85 NB RT	--	--	--	--	--	--	--	--	0.34	18.5	B	105/174
Route 85 SB LT	0.78	7.8	A	0/14	0.98	32.6	C	37/335	0.87	28.4	C	198/290
Route 85 SB TH/RT	0.24	0.6	A	0/2	0.25	0.5	A	1/2	0.25	1.7	A	17/25
Overall	--	**10.6**	**B**	--	--	**20.1**	**C**	--	--	**22.7**	**C**	--
Weekday Evening:												
I-95 Northbound Off-Ramp EB LT	0.19	22.5	C	15/43	0.26	22.8	C	23/55	0.84	79.6	E	95/203
I-95 Northbound Off-Ramp EB TH	0.19	22.5	C	15/43	0.27	22.9	C	23/56	0.07	46.0	D	0/0
I-95 Northbound Off-Ramp EB RT	0.84	46.2	D	69/169	0.84	46.2	D	69/169	0.07	46.0	D	0/0
Route 85 NB TH/RT*	0.80	22.8	C	172/280	0.91	32.5	C	177/288	1.03	72.9	E	599/834
Route 85 NB RT	--	--	--	--	--	--	--	--	0.17	22.1	C	21/70
Route 85 SB LT	0.96	26.5	C	19/301	1.75	>120	F	605/1210	0.94	31.9	C	208/379
Route 85 SB TH/RT	0.30	0.8	A	3/4	0.33	0.4	A	2/2	0.28	3.7	A	96/120
Overall	--	**19.0**	**B**	--	--	**>120**	**F**	--	--	**36.6**	**D**	--

[a]Volume to capacity ratio.
[b]Delay in seconds per vehicle.
[c]Level of service.
[d]Average/95[th] percentile queue length in feet.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound; UT = U-turning movements; LT = left-turning movements; TH = through movements; RT = right-turning movements.
*The shared through/right-turn movement would not exist in the mitigated condition; only the through movement would be contained in this lane.

Crystal Mall Southern Exit Lane Widening

To offset the increase in motorist delays and vehicle queueing at the Project's south entrance driveway, the Project will work with Home Depot to design and construct an additional right-turn lane exiting the site. This lane widening would be accommodated by constructing a retaining wall along the Home Depot parking lot and modifying the existing traffic signal to operate with two right-turn lanes. Conceptual improvements for the lane widening are shown graphically on Figure 17.

Route 85 at I-95 Southbound Ramps

The addition of Project-related traffic to the signalized intersection of Route 85 at the I-95 southbound ramps was shown to create a failing scenario where the queues would exceed the capacity and back up into the prior intersection. In order to enhance safety and to offset the predicted impact of the Project, the Project proponent will work with CTDOT to design and implement updated pedestrian accommodations that include leading pedestrian interval (LPI) and LED blankout signs, which would be used to replace the proposed "NO TURN ON RED" signage that will be a part of the new CTDOT improvement project. The introduction of LPI and LED blankout signage will allow for right turns on red for vehicles exiting and entering I-95, while pedestrians can still be protected during concurrent pedestrian phases.

Route 85 at Interstate 95 Northbound Ramps

The addition of Project-related traffic to the signalized intersection at Route 85 at the I-95 northbound ramp was shown to create a failing scenario where the queues of the southbound left would exceed the capacity and back up into the prior intersection. In order to enhance safety and to offset the predicted impact of the Project, the Project proponent will work with CTDOT to design and implement a new cross-section along Route 85, which would include dual-left-turn lanes onto the I-95 off-ramp and one through lane heading south on Route 85. Modifications to the existing corridor are shown graphically on Figure 18.

Traffic Monitoring Program

The Project Proponent will conduct a post-development traffic monitoring program to evaluate the success of the proposed mitigation, refine the elements of the TDM program, and validate the trip projections for the Project. The monitoring program will include:

i) Obtaining traffic-volume information over a continuous seven-day, weeklong period on the driveways serving the Project;

ii) Performing manual turning movement and vehicle classification counts at the following intersections (the "Monitored Intersections") during the weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak periods;

iii) Updating traffic operations and LOS calculations at the site driveway intersections with Route 85; and,

iv) Evaluating motor vehicle crash data at the Monitored Intersections.

The monitoring program will commence six months after issuance of the first Certificate of Occupancy for the Project and will continue on an annual basis thereafter for a period not to exceed five years after completion of the Project. The results of the monitoring program will be

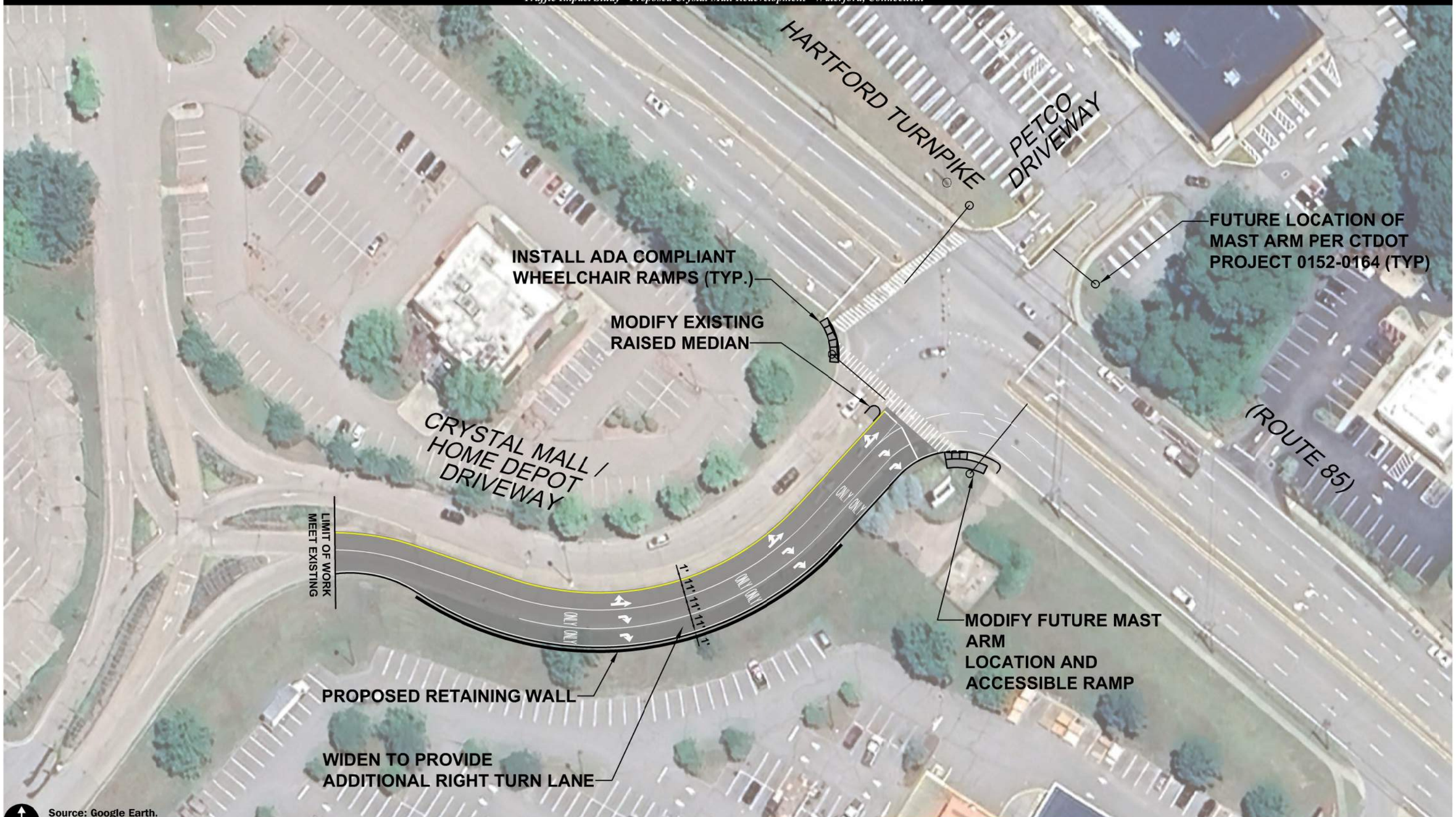

Figure 17

Conceptual Improvement Plan
Hartford Turnpike (Route 85) at Crystal Mall / Home Depot Driveway

Vanasse & Associates inc

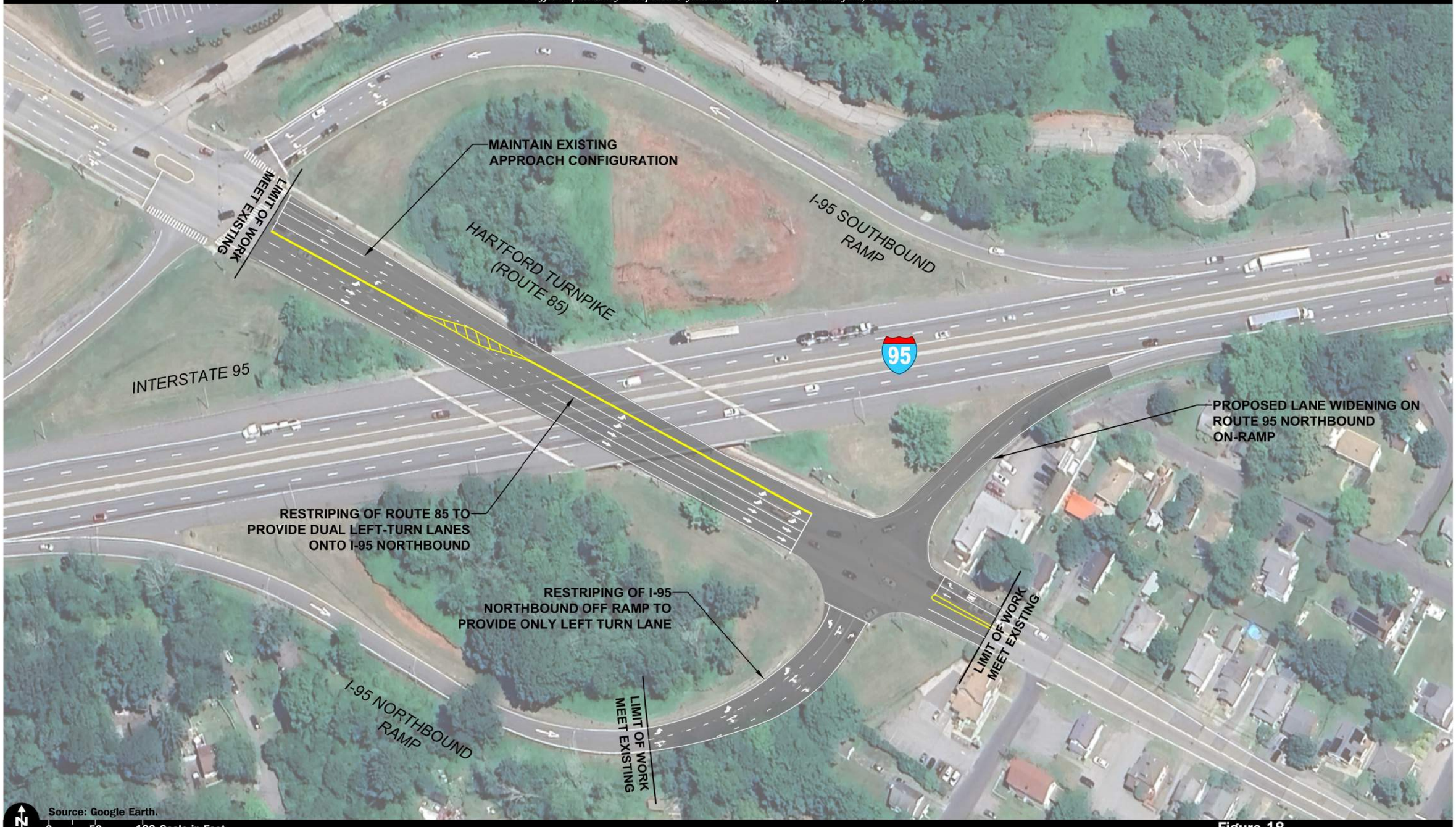

Figure 18

Conceptual Improvement Plan
Hartford Turnpike (Route 85) at
I-95 Northbound Ramp

Vanasse & Associates inc

summarized in a report (the "Traffic Monitoring Report") to be provided to CTDOT, the Southeastern Connecticut Council of Governments (SECTCOG) and the Town of Waterford within two months after the completion of the data collection effort. The Traffic Monitoring Report will document: i) traffic volumes associated with the Project; ii) motorist delays, vehicle queuing, crash severity, and calculated crash rates at the Monitored Intersections; and iii) the elements of the TDM program that have been implemented and the use of alternative modes of transportation to SOVs by employees.

If and to the extent any of the following occur: i) the volume of traffic attributable to the Project as measured at the Project site driveway exceeds the projected traffic volumes on a daily or peak-hour basis by more than 10 percent; ii) there is an increase in the frequency of occurrence of motor vehicle crashes at the Monitored Intersections that can be attributed to the Project; or iii) traffic operations at the Monitored Intersections are materially degraded as a result of the addition of Project-related traffic; the Project proponent will coordinate with the appropriate approving authorities to implement one or more of the following measures subject to receipt of all necessary rights, permits and approvals:

- Traffic signal timing, phasing, and coordination improvements
- Sign and pavement marking installation
- Expansion or refinement of the elements of the TDM program

The specific improvement measure(s) will be summarized in the Traffic Monitoring Report, and their status and effectiveness will be evaluated in the subsequent Traffic Monitoring Report.

CONCLUSIONS

As documented in this study, Project-related traffic increases will result in increases in traffic volumes or delays at intersections within the study area. However, these increases in overall intersection delay can be mitigated, reducing them to less than 20 seconds at most intersections. Signal optimization for the corridor is recommended based on the addition of Project-generated traffic. Additional mitigation measures are recommended at the intersections with Route 85 and I-95 on- and off-ramps. Based on these analyses, it is expected that Project-related traffic will be adequately accommodated within the existing and future infrastructure with manageable impacts on the traffic operations within the study area.