Route 7 Corridor Assessment and Implementation Plan

City of Norwalk and Town of Wilton, CT



Corridor Assessment and Concept Development Report

Prepared for: South Western Regional Planning Agency



South Western Regional Planning Agency

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In Association with Fitzgerald and Halliday, Inc.

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Executive Summary

US Route 7 is an essential travel corridor that serves both local and regional travelers as well as many community needs. It provides connectivity among several urbanized areas as well as suburban communities and beyond.

The segment of US Route 7 between Norwalk and Danbury has been studied for decades, with a variety of project planned to increase highway capacity and to improve commuter rail operations and mobility. Recently, two of those high profile projects (the completion of the Merritt Parkway/Route 7 Interchange and a widening project of Route 7 between Route 33 and Grist Mill Road) were put on an indefinite hold. As a result, many multimodal operational and safety needs in this corridor will go unaddressed and a need to examine alternative options was identified.

The first phase of this study consisted of documenting the existing conditions and issues within the study area from both a corridor-wide perspective as well as individual locations. Additionally, as part of the first phase, concepts (both short and longer-term) were developed to address the identified existing needs. The study identified 14 focus areas in the corridor and developed multiple short-term and long-term concepts for each location focused on addressing historical/stakeholder identified issues, traffic operations, safety, bicycle and pedestrian, and land use.

The top five short-term recommended projects for the entire corridor based on their anticipated benefits are as follows:

- Modify the signing and striping in the westbound direction on Route 7 between SR 719 (Main Avenue)/DMV and Grist Mill Road to allow for better utilization of the dual left-turn lanes from US Route 7 (Grist Mill Road) to southbound US Route 7 Expressway. Simulation results show southbound travel times between Foxboro Drive to US Route 7 Expressway are reduced by approximately 40-50%.
- Extend the northbound left-turn pocket on the US Route 7 Expressway at US Route 7 (Grist Mill Road) and create a more conventional striping setup for the left-turn pocket. Simulation results show a 20-40% reduction in northbound average delay, and approximately 20% reduction in northbound travel time between US Route 7 Expressway and the West Rocks Road intersection as the extended left-turn pockets mitigates the blocking of thru traffic by left-turning traffic.
- Modify the striping between the northern Gateway Shopping Center driveway and the Kent Road intersection such that the current exclusive left-turn lane northbound is split between an exclusive left-turn lane northbound onto Kent Road and an exclusive leftturn lane southbound into the Gateway Shopping Center driveway.
- Modify the striping on the eastbound approach at the Route 33 (Westport Road) and Route 7 (Danbury Road) intersection such that there are two lanes eastbound. This will create a reduced queue in the eastbound direction, and allow for signal timing to be reallocated from the eastbound direction to the heavier northbound approach; therefore, reducing the queue and delay on the northbound Route 7 (Danbury Road) approach. Simulation results show approximately 50% reduction in overall intersection delay during the PM peak hour.





 Evaluate modifications to the signal timing and phasing at Grumman Hill Road to improve traffic flow and reduce delay and congestion. Specifically, a southbound lead phase in the PM peak should be evaluated and considered in the same manner as the existing northbound lead phase in the AM peak. This will aid the heavy southbound left turn in the PM peak period destined the residential area along Grumman Hill Road.

Subsequent phases of the study will investigate in more detail some of focus area concepts and longerterm options that have the potential to better address the major factors of the congestion and safety issues in the corridor. The overall goal of the study is to develop near, mid-term, and future long-term improvement opportunities along with phasing criteria and priorities and funding options to implement the various recommendations.





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Introduction

A. Project History

US Route 7 is an essential travel corridor that serves both local and regional travelers as well as many community needs. It provides connectivity among several urbanized areas as well as suburban communities and beyond.

The segment of US Route 7 between Norwalk and Danbury has been studied for decades, with a variety of efforts to add highway capacity and to improve commuter rail operations and mobility. US Route 7 has experienced significant traffic growth through the years and significant development along its entire length, with the most concentrated development evidenced within the parameters outline by this study: the southern end of the corridor in southern Wilton and northern Norwalk. A Route 7 Expressway, known locally as "Super 7", was considered and dismissed years ago by the Connecticut Department of Transportation. In addition, shorter by-pass roads were contemplated from the end of the limited-access portion of the US Route 7 Expressway that currently terminates at US Route 7 (Grist Mill Road) to various "landing points' in the vicinity of Kent Road and Route 33 (Westport Road) in Wilton. These proposals were all dismissed due to potential environmental and community impacts and strong public opposition. Consequently, a series of more localized roadway widening and intersection improvements has been implemented, are currently just completing construction, or are planned for the roadway. Two of these high-priority roadway projects have been indefinitely put on hold as a result of funding

Two of these high-priority roadway projects have been indefinitely put on hold as a result of funding constraints. These include:

- *State Project # 102-269* for the US Route 7 and Route 15 (Merritt Parkway) interchange The purpose of this project was to construct a full-directional interchange between US Route 7 and Route 15 (Merritt Parkway), while maintaining access for SR 719 (Main Avenue) to and from Route 15 (Merritt Parkway).
- *State Project # 102-305* for the segment of US Route 7 between Route 33 (Westport Road) and US Route 7 (Grist Mill Road) The purpose of this project was to improve traffic flow from the Route 7 Expressway terminus to the intersection of US Route 7 (Danbury Road) and Route 33 (Westport Road) without building a short bypass of this section. Overall, the project would have widened the existing roadway to provide two lanes of traffic in each direction with an additional operational lane at major intersections.

As a result of the cancellation of these two projects, many multimodal operational and safety needs in this corridor will go unaddressed. This study is intended to develop near, mid-term, and long-term improvement opportunities to address these issues, and will also identify order-of-magnitude cost estimates, phasing criteria and priorities, as well as funding opportunities to implement the various recommendations of the study.

The first phase of the study consists of documenting the existing conditions and issues within the study area from both a corridor-wide perspective as well as individual locations. Additionally, as part of the first phase, concepts (both short and longer-term) were developed to address the identified existing needs. Subsequent phases of the study will investigate in more detail some of focus area concepts and longer-term options that have the potential to better address the major factors of the congestion and safety issues in the corridor.





Corridor Characteristics

The project area (south to north) begins at Route 123 (New Canaan Ave) between the US Route 7 Expressway and SR 719 (Main Avenue) in Norwalk, CT. The primary routes of analysis include US Route 7 and SR 719 (Main Avenue) which run parallel to each other until meeting at the US Route 7 Expressway/Grist Mill Road/SR 719 (Main Avenue) intersection. Glover Avenue also runs parallel to these two routes and provides access to the Merritt 7 Corporate Park. US Route 7 (Danbury Road) crosses the Norwalk and Wilton municipal boundary just north of Foxboro Drive and continues north to a "T" intersection with Route 33 (Westport Road). The project area terminates at the US Route 7 (Danbury Road)/Route 33 intersection with Route 106 (Wolfpit Road). A map of the study corridor is provided in *Figure 1*.

The US Route 7 expressway section of the corridor is a 55-mph two-lane roadway classified as urban principal expressway until the expressway terminates at US Route 7 (Grist Mill Road). SR 719 (Main Avenue) is a two-lane, urban minor arterial that begins at Route 123 (New Canaan Ave) and continues until US Route 7 (Grist Mill Road). Moving south to north, most intersections on SR 719 (Main Avenue) are lacking left-turn pockets until the Merrittview/Stop & Shop intersection just south of the Route 15 (Merritt Parkway) interchange. From the Merrittview/Stop & Shop intersection until US Route 7 (Grist Mill Road), most intersections have left-turn pockets on SR 719 (Main Avenue), including multiple intersections providing access to the Merritt 7 Corporate Park.

Moving north from the US Route 7 Expressway/Grist Mill Road/SR 719 (Main Avenue)/DMV intersection to Route 33 (Westport Road), US Route 7 continues as a two-lane, urban principal arterial with a mix of intersections with and without left-turn pockets. On the southbound side, beginning just south of the US Route 7 (Danbury Road) and the Route 33 (Westport Road) "T" intersection, US Route 7 (Danbury Road) becomes a single-lane until just north of Grumman Hill Road. US Route 7 (Danbury Road) and Route 33 (Westport Road) move northwest as a combined roadway through Wolfpit Road, the northerly project terminus.





Figure 1: Map of the Project Area

C. Project Approach

The project approach for conducting the first phase (existing conditions corridor assessment and concept development) included the following steps: Data Synthesis, Corridor Evaluation, Evaluation Matrix, Focus Areas, Corridor-Wide Concepts and Recommendations and Next Steps.

Data Synthesis: The first step in the evaluation of existing conditions started with a review of previous work to determine the availability and suitability of existing data and to identify missing data to be collected. This step also included traffic counts, field observations, and travel time studies.

Corridor Evaluation: The second step in the evaluation of existing conditions included an evaluation of the following corridor aspects: Historical/Locally Identified Issues, Traffic Operations, Safety, Access, Pedestrian and Bicycle, Transit, Land Use and Planned Developments, and Environment.

Evaluation Matrix: The third step was to create a matrix to evaluate and rank key locations in the corridor based on issues that can be grouped and evaluated together including Historical/Locally Identified Issues, Traffic Operations, Safety, Access, Pedestrian and Land Use/Planned Development. The result of the matrix is a ranking of the intersections and key mid-block sections to be evaluated as focus areas.

Focus Areas Analysis and Concept Development: The fourth step was to analyze in detail the top focus areas identified in evaluation matrix. Each focus area is discussed in detail with respect to existing conditions and potential concepts. Additionally, the short-term concepts are evaluated with respect to their benefits and impacts.

Corridor-Wide Concepts: This section presents needs and recommendations from a corridor-wide perspective. Typically, these types of recommendations include larger-scale and area roadway improvements, bicycle and pedestrian accommodations beyond intersection specific improvements, broad transit recommendations for service and facilities within the corridor, and access management policies beyond specific curb-cut improvements.

Recommendations and Next Steps: This last chapter identifies the top short-term projects recommended for the corridor based on their anticipated benefits and discusses the next phases of the project.





II. Data Synthesis

A. Data Review

As a part of the Existing Conditions task, available information from local, state, and regional transportation projects and plans in the corridor, including transportation, land use, environmental data, and forecasts, were reviewed and synthesized. **Table 1** contains the list of available studies reviewed and intersection-specific data for the entire project area. The Division of Traffic Engineering for CTDOT provided the most recent signal plans available and the closed loop (coordinated) system timings for the entire project area.

The 2009 counts conducted as part of the Route 7 Transportation and Land Use Study provided a significant amount of recent turning movement count data for the project area north of US Route 7 (Grist Mill Road) on US Route 7. Conversely, south of US Route 7 (Grist Mill Road) there was little turning movement count data available. CTDOT average daily traffic (ADT) data is available for most of the corridor with 2012 supplemental data in the Merritt 7 Corporate Park area. **Table 1** also has Level of Service (LOS), average delay per vehicle, and volume to capacity (v/c) ratio results that were noted during the data review process.

The data review also included crash analysis using CTDOT historical crash data resources such as Traffic Crash Viewing System (TAVS), Traffic Crash Surveillance Report (TASR), and the Suggested List of Surveillance Study Sites (SLOSSS), as well as local input from municipal officials. A compilation of available data allowed "hot spots" to be determined and then investigated further to identify issues that may be negatively impacting safety.

B. Data Collection

The data collection focus areas were based on a combination of missing data and problem locations determined during the data review. The data collection effort took part during the week of April 9, 2012 and included the following tasks:

- Turning Movement Counts
- Travel Time Data
- General Data/Observations
 - o Intersection Sketches
 - o Field Signal Timings
 - o Intersection Video



Data Collection

							Volumo Chango				
				Signal Plan		2012	from Previous to		Available Synchr	Analysis Results	Historical Issues
Main Pd	Intersecting Street	Signal #	МР	(Voar)	Provious Count	Lirban Count	2012 Count			Worst Ann (AM/PM)	Townshin Input
		100 201		(Teal)	Flevious Coulit				Overall LOS (AM/FIM)		Township input
RT 123	US 7 SB Ramps	102-301		2002				CTDOT 2010			
	US 7 NB Ramps	102-202	0.00	2001	0005 Masterart N	Full	05.00/	CTDOT 2010			
	RT 123	102-222	0.00	2010	2005 - Westport - N	Full	- 25.3%	CTD012008	PM - LOS D - V/C=1.19	-	*
		102-294	0.10	2002	0005 Masterart N	ANA Orth					
	Ward St	102-223	0.22	2002	2005 - Westport - N	Aivi Oniy		CTDOT 2008	PM - LOS E - V/C=1.15	-	
	Broad St	102-281	0.30	2006	2005 - Westport - N			CTD012008	PIM - LOS A - VC=0.78	-	v
	Perry Ave	102-225	0.62	2007	2005 - Westport - N				PM - LOS D - V/C=1.12	-	√
	Linden St	102-282	0.71	2003							✓
Main Ave	Merritnew	102-280	0.98	2003		Full					
	Glover Ave/Creeping Hemlock Dr	102-227	1.18	2003	2007 Ramp Data	Full		CIDOT 2010			✓
	Xerox Driveway	102-311	1.28	2002		Full		CTDOT 2010			
	Merritt 601	102-310	1.36	2002		Turns Only		Merritt 7 ATR 2012			
	Merritt 401/501	102-286	1.50	2003				Merritt 7 ATR 2012			
	Merritt 201/301 & Valley View Rd	102-270	1.61	2002				Merritt 7 ATR 2012			
	Merritt 101	102-303	1.70	2002				Merritt 7 ATR 2012			
	US 7	102-284	2.02/4.10	2010	11/4/2009 - FHI	Full	- 11.4%	CTDOT 2010	F/F (248/261)	EB-493 / EB 462	\checkmark
RT 7	Glover Ave	102-304	4.01	2003	6/24/03 - Widening	Turns Only		CTDOT 2010			✓
	Grist Mill Rd	102-285	3.96	2003	6/24/03 - Widening	Full	+ 3.4%	CTDOT 2010			✓
	West Rock Rd	102-228	4.38	2012	3/31/2011 - Tighe	AM Turns Only	- 4.9%	CTDOT 2010	C/F	WB-49 / WBL-423	✓
	Foxboro Dr	102-314	4.52	2005	11/4/2009 - FHI			CTDOT 2010	A/A	-	
	Gateway Shopping Center	161-204	4.61	2008				CTDOT 2008			✓
	Kent Rd	161-209	4.76	2008	11/4/2009 - FHI				A/B	-	
(Main Ave)	Kensett Ave	161-212	4.85	2008	11/4/2009 - FHI			CTDOT 2008	B/B	-	✓
	Wilton Corp Park Main	161-205	5.12	2007	11/4/2009 - FHI				A/A	-	\checkmark
	Grumman Hill Rd	161-206	5.25	2008	11/4/2009 - FHI			CTDOT 2010	C/B	WBT-151 / EBT-37	√
	RT 33	161-202	6.03	2011	11/4/2009 - FHI			CTDOT 2010	E/E	WBL-206 / EBT-179	✓
KI 33/KI 7	Wolfpit Rd	161-215	6.29	2011	11/4/2009 - FHI			CTDOT 2010	Not in Results	-	

= Missing Recent Turning Movement Count Data

Available Studies Reviewed

Source	Report	Data Period	Report Notes/Comments/Summary			
FHI 2009	Crash Summary, Norwalk Town Line to Northern Project Limits	2005-2008	General Tally of all crash categories, no segments			
TAVS	Crash Reports (Brief), US 7, SR 123 and SR 719 corridors	2005-2008	No side-street or detailed info			
FHI 2009	Travel Time Analysis, Both directions, From Grist Mill Rd to Northern Project Limits	2009	Time, Speed, Speed Limits for all segments			
FHI 2009	Pedestrian Facility Inventory, Grist Mill Rd to Northern Project Limits	2009	Brief description of ped facilities at each intersection			
CTDOT 200	High Definition photos along entire US 7, SR 123 and SR 719 corridors	2008	Taken from Digital Hiw ay Photo/Video Log			
SWRPA 20	Regional Plan 2006-2015	Varies	Population grow th to date, general area description, density maps, transportation plans, etc.			
Vollmer As	Central Norwalk Transportation Management Plan	2006	South of study area, various recommendations to improve LOS of intersections and ped safety			
2Plus, Inc.	Merritt 7 Report	2007	Study of business ow ners/employees and transportation needs within study area			
JZTI	Norwalk Circulator Study	2009	South of study area, various traffic analyses and recommendations			
City of Norv	Norwalk Connectivity Master Plan 2012	2012	South of study area, explanation of existing and future transportation trends and plans for improvement			
FHI	Norwalk Ped & Bike Transportation Plan 2012	Varies	Pedestrian and Bicycle recommendations for the area, including crossw alk, paths, signs, etc.			
City of Norv	Mid-Harbor Planning Study	2005	Southeast of study area, plan to bolster mid-harbor area via transportation, land use, ped accomodations.			
FHI	Norwalk Ped & Bike Corridor Priority	2011	List of ped and bike recommendations for area			
FHI	Norwalk River Valley Trail Routing Study	2012	North of study area, ped connectivity plan along Norw alk River			
City of Norv	Norwalk Wall Street Area Planning	?	South of study area, various transportation and land use recommendations			
Vollmer As	Westport North Main Corridor Study 2006	2005	Overlapping intersections in study area along SR 719, crash analysis and TMC's, land use recommendations			
CTDOT?	Proposed Interchange 7/15 schematic	N/A	Route 7/Route 15 Interchange concept for completing missing moves			
VHB	Route 7 Corridor Travel Options Implementation	2000	Recommendations for Bus and Rail improvements, east of study area			
SWRPA 20	Wilton Access Management Study	2010	Drivew ay and curb cut recommendations from Norw alk-Wilton Tow n Line to northern project limits			
Wilton PZC	Wilton Plan of Conservation and Development 2010	Varies	Land use, population change through 2007, density map, Super 7 issues, transportation plan			
Tighe & Bo	iPark STC Application	2011	AM and PM turning movement count volumes at RT 7 and West Rocks Rd			
Tighe & Bo	Traffic Count Summary - Merritt 7	2012	ATR data at nine access points for Merritt 7 Corporate Park			
CTDOT	Meeting Summary - Pedestrian Amenities on S.R. 719 (near Merritt 7 Corporate Park)	2012	Meeting summary (CTDOT, Norw alk DPW, and Merritt 7 Manager) on increased pedestrian accommodations			
CTDOT	Route 7-15 TFD (RT 15 Ramp Volumes)	2006	AM and PM Ramp volumes at RT 15, RT 7, Creeping Hemlock Rd, Glover Ave for 2007, 2010, 2030 No Build			
	Table 1: Previous Studies and Available Data					

Route 7 Corridor Assessment and Implementation Plan



South Western Regional Planning Agency



Turning Movement Counts

Development of a simulation model for the project area requires turning movement counts, as well as other information. Based on the data review, the southern part of the corridor was missing the most data. With limited time and resources for the data collection effort, the following locations were targeted for turning movement counts:

- RT 123 & SB RT 7 Expy Ramps
- RT 123 & NB RT 7 Expy Ramps/Grand Street
- RT 123 & SR 719
- SR 719 & Ward Street (AM only)
- SR 719 & Merrittview/Stop & Shop Driveway
- SR 719 & Glover Ave
- SR 719 & 801 The Towers Driveway

- SR 719 & Merritt 601
- US RT 7 (Grist Mill Rd) & Main Avenue/DMV
- US RT 7 (Grist Mill Rd) & Glover Ave
- US RT 7 (Grist Mill Rd) & US RT 7 Expy
- US RT 7 (Main Ave) & West Rocks Rd (AM only)

For these locations, turning movement count data was collected during the AM peak period (7:00-9:00 AM) and PM peak period (3:30-6:30 PM). System peak hours were determined for the network and found to be 7:45-8:45 AM and 5:00-6:00 PM. *Appendix A* contains the turning movement count data and peak hour volumes figures for the AM and PM peak hours.

Travel Time Data

To assist in creating a calibrated existing conditions model, travel time and delay studies were performed during the time periods of the intersection turning movement counts. Travel time data was collected utilizing a GPS unit and a laptop enabled with Tru-Traffic software, the output looking like Figure 2. Location and speed data is recorded every second and travel time data is then compared to simulated travel times in the existing conditions model to assist in the calibration process. Video was recorded for each travel time run to supplement the GPS data and provide further insight during the model calibration process. Travel time runs included various sections and attempted to capture key movements. The sections generally began at Route 123 (New Canaan Avenue), at the southern end of the corridor, and ended at Wolfpit Road, at the northern end of the corridor.



Figure 2: Travel Time Data

In addition to overall travel times through the corridor, GPS-based travel times provided other useful information such as free flow speeds, mid-block congestion, visual queuing understanding, and interruptions of the corridor green band. The field collected travel time and delay study data, along with a travel time summary table, are included in *Appendix A*.





General Data/Observations

During the data collection effort, general data throughout the study area was collected, including pictures, intersection videos, intersection sketches, field signal timings, queuing data, and field observations. Relevant general data is included in *Appendix B*.





III. Corridor Evaluation

A. Historical/Locally Identified Issues

The data review of available project area studies and meetings with local officials identified key areas with operational, safety, pedestrian, or pedestrian/bicycle concerns. **Table 2** lists the locations in the City of Norwalk at which concerns were identified and the main concern at each. **Table 3** lists the locations in the Town of Wilton at which concerns were identified and the main concern at each.

Int ID	Name	Main Concern
10	RT 123 & SR 719	Dunkin Donuts entrance
40	SR 719 & Broad Street	Mid-block at Walgreens entrance
50	SR 719 & Perry Ave	CVS entrance
60	SR 719 & Linden Street	McDonalds entrance
80	SR 719 & Glover Ave	RT 15 (Merritt Pkwy) interchange and pedestrian accommodations
140-142	US RT 7 (Grist Mill Rd) & US RT 7 Expy to Main Ave	Congestion
150	US RT 7 (Main Ave) & West Rocks Rd	Congestion

Table 2: City of Norwalk

Norwalk officials also indicated the need for the completion of sidewalks at the following locations: East side of Main Avenue between Homestead Hotel and Merritt 601, to/from Merritt 7 Rail Station, and Grist Mill Road to Norwalk River Valley Trail.

Table 3: Town of Wilton

Int ID	Name	Main Concern
170	US RT 7 (Danbury Rd) & Gateway Shopping Center	SB Lefts near Fawn Ridge Ln
190	US RT 7 (Danbury Rd) & Kennsett Ave	Dunkin Donuts entrance
200	US RT 7 (Danbury Rd) & Wilton Corp Park	Unsignalized entrances
210	US RT 7 (Danbury Rd) & Grumman Hill Rd	Needs left turn pockets
220	US RT 7 (Danbury Rd) Mid-block Grumman Hill Rd to RT 33 (Westport Rd)	Turns to/from business on RT 7
220	US RT 7 (Danbury Rd) & RT 33 (Westport Rd)	SB merge and lane-drop
230	US RT 7 (Danbury Rd)/RT 33 Mid-block RT 33 to Wolfpit Rd	Orem's Diner access

Wilton officials commented that the emergency vehicle preemption systems (EVPS) receptors on signals are misaligned and not functioning. *Appendix C* contains the meeting summaries





from the municipal meetings with Norwalk and Wilton representatives that took place on April 27, 2012 and April 30, 2012, respectively.

B. Traffic Analysis

Field Observations:

Starting at the southern end of the corridor, Route 123 (New Canaan Avenue) provides full access to/from the US Route 7 Expressway. Due to missing movements north at the Route 15 (Merritt Parkway)/US Route 7 Expressway partial interchange, Route 123 (New Canaan Avenue) carries additional traffic volume for motorists going the round-about way to perform the movements. The Danbury Branch Rail Line that runs through Route 123 (New Canaan Avenue) causes extended queuing along eastbound Route 123 (New Canaan Avenue) and southbound SR 719 (Main Avenue). Moving north on SR 719 (Main Avenue), the cross-section is a two-lane roadway without left-turn pockets at the intersections and is abundant with curb cuts and access points for businesses on SR 719 (Main Avenue). This causes weaving and lane change issues due to drivers "sliding" around left-turning vehicles waiting for a suitable gap.

SR 719 (Main Avenue) operates fairly well at the Route 15 (Merritt Parkway) interchange, but there is some queuing on Glover Avenue during the PM Peak. A police officer is connected into the controller during the PM peak from approximately 4:00 to 6:30 PM. Traffic flows very well along SR 719 (Main Avenue) in the Merritt 7 Corporate Park area until hitting congestion at the US Route 7 Expressway/Grist Mill Road/SR 719 (Main Avenue) intersection.



Figure 3: US Route 7 (Grist Mill Road) from the US Route 7 Expressway to SR 719 (Main Avenue)

Significant congestion, particularly in the northbound direction, occurs at the intersection of the US Route 7 Expressway and US Route 7 (Grist Mill Road), shown in *Figure 3*. There is significant left-turn volume towards Belden Hill Road, causing queues beyond the approximately 500-foot storage lane. This causes northbound right-turning drivers to slow down and thus increase their delay. In the southbound direction on SR 719 (Main Avenue) approaching the US Route 7 (Grist Mill Road) intersection, queuing extends well past West Rocks Road. This queue



appears to mostly be due to the westbound lane configuration towards US Route 7 (Grist Mill Road) and the Belden Hill Rd area. The westbound lane configuration on US Route 7 (Grist Mill Road) causes all vehicles wanting to proceed on the Route 7 expressway southbound to stay in the left/through lane between SR 719 (Main Avenue) and Glover Avenue. The right/through lane in this area is empty even through southbound queuing extends through West Rocks Road and further north. The gas station and Starbucks shopping center located north and west of the US Route 7 Expressway/Grist Mill Road/SR 719 (Main Avenue) intersection also contribute to the overall congestion in this area.

Moving north, there are left-turn pockets at signalized intersections, but there is some minor congestion approaching the Gateway Shopping Center. This congestion appears to be more related to geometry and sight distance as opposed to sidestreet volume. Traffic flows well until the Grumman Hill Road intersection, which appears to be due to congestion caused by the lack of left-turn pockets at the intersection.

Between Grumman Hill Road and Route 33 (Westport Road) there is only one (1) southbound travel lane and minimal shoulder width, so any left-turning vehicles in this direction hold up traffic because there is no area for vehicles to "slide" around. The northbound approach from US Route 7 (Danbury Road) to Route 33 (Westport Road) usually had a large queue, but generally cleared every cycle. The eastbound approach to the US Route 7 (Danbury Road)/Route 33 (Westport Road) approach to the US Route 7 (Danbury Road)/Route 33 (Westport Road) and Sharp Hill Road. The northbound lead-left phase at US Route 7 (Danbury Road)/Route 33 (Westport Road) and Wolfpit Road did not gap out when vehicles were not present.

The detailed field observations document is included in *Appendix B*.

Synchro 7/SimTraffic Model:

The operational analysis was performed utilizing Synchro 7 and its simulation component, SimTraffic. The base Synchro model for each peak period is setup with input data including geometric information, signal phasing and timing, volume information, truck percentage, and peak hour factors. The data is then run in SimTraffic for multiple, separate one-hour simulations to account for the variability in traffic that occurs on a daily basis.

Calibration is an iterative process where differences between field and model data are identified and resolved based on further investigation of the field data. Specific model parameters, including lane alignment through an intersection, turning speeds, lane change distances, headway factors, and entering blocked intersections, have an impact on the simulation and can generate a more realistic driver behavior. Adjustment of these parameters helps bridge the gap between field and model data to enable model calibration.

The two key measures of effectiveness (MOEs) in determining a calibrated simulation model are (1) visual queuing generally corresponding to field observations, and (2) simulated travel times within 20% of field travel times. Queuing notes are taken in the field during the travel time runs and supplemented by video footage taken during every travel time run. During the calibration process, an approximate average and maximum queue is determined for key, generally congested, locations throughout the project area. Several random seeds are viewed and engineering judgment is used to determine if queuing is within an acceptable range





corresponding to field conditions. This is the qualitative part of the calibration process. The quantitative part is comparing field travel time runs to simulation travel time results. Field travel time runs were completed along the Route 7 Expressway, US Route 7 (Grist Mill Road), US Route 7 (Danbury Road), SR 719 (Main Avenue), and Route 123 (New Canaan

Ave). *Figure 4* shows the travel time sections used for the travel time calibration.



The first travel time section began at the US Route 7 Expressway ramps from Route 123 (New Canaan Avenue) through US Route 7 (Grist Mill Road), terminating at Sharp Hill Road just north of Wolfpit Road. This section was mainly used for the calibration of the US Route 7 (Grist Mill Road) area and the Route 33 (Westport Road) and Wolfpit Road area.

The second travel time section was along Route 123 (New Canaan Avenue) beginning at Riverside Avenue and ending at Ward Street. This section was used for calibration of Route 123 (New Canaan Avenue). The third section was SR 719 (Main Avenue) between Linden Street and the Merritt 601 building driveway, and was used to calibrate the Glover Ave/Route 15 (Merritt Parkway) Ramps area.

The comparison of field travel times to calibrated SimTraffic travel times are located in *Tables 4 and 5* for the AM and PM peak hours, respectively. The SimTraffic results are an average of five random simulations.

	vel Time (ime (min)		
Section	Direction	Model	Field	Delta
1	NB	8.7	8.0	8%
1	SB	11.7	12.1	-3%
2	NB	2.6	2.7	-3%
2	SB	2.4	2.1	16%
2	NB	2.1	2.4	-16%
3	SB	1.1	1.1	5%

Table 4: AM Travel Time Comparison

		Travel Time (min)						
Section	Direction	Model	Field	Delta				
1	NB	9.8	8.1	17%				
Ι	SB	13.6	15.3	-13%				
2	NB	3.6	3.2	11%				
Z	SB	2.2	1.8	17%				
2	NB	2.0	1.7	13%				
3	SB	1.7	1.8	-5%				

Table 5: PM Travel Time Comparison

The travel time results comparison show the model within 20% of field travel time runs. Since visual queuing was also within acceptable ranges, the model could proceed to the final step of calibration, processing LOS and delay results and checking to make sure results approximately match field conditions.



Figure 4: Travel Time Run Locations





Tables 6 and **7** show the calibrated SimTraffic LOS and delay results for the AM and PM peak hour models, respectively, at key locations in the corridor. **Appendix D** contains the full SimTraffic results for all intersections in the Synchro 7/SimTraffic model.

Table 6: AM Peak Hour Existing Calibrated SimTraffic Results									
ID #	Intersection	EB	WB	NB	SB	Overall			
230	US RT 7 (Danbury Rd)/RT 33 & Wolfpit Rd	C (21)	B (12)	C (24)	-	B (18)			
220	US RT 7 (Danbury Rd) & RT 33 (Westport Rd)	E (76)	C (21)	D (52)	-	D (53)			
150	US RT 7 (Main Ave) & West Rocks Rd	C (20)	D (43)	B (18)	D (38)	C (28)			
140	US RT 7 (Grist Mill Rd) & SR 719 (Main Ave)/DMV	C (32)	D (54)	C (30)	F (134)	E (71)			
141	US RT 7 (Grist Mill Rd) & Glover Ave	B (17)	C (22)	C (33)	-	B (19)			
142	US RT 7 (Grist Mill Rd) & US RT 7 Expy	C (30)	C (22)	F (115)	-	E (72)			
90	SR 719 (Main Ave) & Xerox (Towers 801)	B (16)	-	A (3)	A (3)	A (3)			
80	SR 719 (Main Ave) & Glover Ave/RT 15 Ramps	D (43)	D (37)	D (40)	C (23)	D (37)			
70	SR 719 (Main Ave) & Merrittview/Stop & Shop	B (19)	B (19)	A (7)	A (5)	A (7)			
10	RT 123 (New Canaan Ave) & SR 719 (Main Ave)	A (2)	-	C (24)	C (22)	B (17)			
11	RT 123 (New Canaan Ave) & RR Crossing	D (41)	-	-	-	D (41)			
12	RT 123 (New Canaan Ave) & US RT 7 Expry NB Ramps	B (11)	D (41)	D (37)	C (28)	C (32)			
13	RT 123 (New Canaan Ave) & US RT 7 Expy SB Ramps	C (29)	B (11)	-	C (31)	B (17)			

Table 6 shows the AM LOS results and shows long eastbound delay at the US Route 7 (Danbury Road) and Route 33 (Westport Road) intersection; which corresponds with field observations. The results also show there is significant delay of around two minutes approaching US Route 7 (Grist Mill Road) in the northbound and southbound directions, which corresponds with field observations and historically identified issues. The southbound delay at SR 719 (Main Avenue) and Route 123 (New Canaan Avenue) was expected to be higher in the SimTraffic model, but the additional queuing in the field at this approach appeared to occur during rail crossing events which are not modeled in the Synchro 7/SimTraffic model.



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Table 7: PM Peak Hour Existing Calibrated SimTraffic Results									
ID #	Intersection	EB	WB	NB	SB	Overall			
230	US RT 7 (Danbury Rd)/RT 33 & Wolfpit Rd	C (34)	B (14)	D (37)	-	C (26)			
220	US RT 7 (Danbury Rd) & RT 33 (Westport Rd)	F (83)	E (72)	D (42)	-	E (65)			
150	US RT 7 (Main Ave) & West Rocks Rd	F (102)	F (446)	B (19)	E (63)	F (83)			
140	US RT 7 (Grist Mill Rd) & SR 719 (Main Ave)/DMV	E (76)	D (43)	E (60)	F (131)	F (92)			
141	US RT 7 (Grist Mill Rd) & Glover Ave	D (38)	C (23)	E (60)	-	C (35)			
142	US RT 7 (Grist Mill Rd) & US RT 7 Expy	C (22)	B (18)	F (224)	-	F (111)			
90	SR 719 (Main Ave) & Xerox (Towers 801)	C (22)	-	A (4)	A (7)	A (8)			
80	SR 719 (Main Ave) & Glover Ave/RT 15 Ramps	F (140)	D (48)	B (16)	D (41)	D (53)			
70	SR 719 (Main Ave) & Merrittview/Stop & Shop	D (46)	C (25)	B (11)	B (11)	B (17)			
10	RT 123 (New Canaan Ave) & SR 719 (Main Ave)	A (3)	-	B (16)	B (15)	B (11)			
11	RT 123 (New Canaan Ave) & RR Crossing	E (69)	-	-	-	E (69)			
12	RT 123 (New Canaan Ave) & US RT 7 Expy NB Ramps	E (58)	C (25)	D (37)	C (29)	C (34)			

Table 7 shows the PM LOS results. The results indicate eastbound issues at US Route 7 (Danbury Road) and Route 33 (Westport Road) that occasionally gueue back to Wolfpit Road also occur in the PM peak. During the PM peak the area surrounding US Route 7 (Grist Mill Road) has significant delays up to four to seven minutes on select approaches. Delay in the southbound direction extended well past West Rocks Road, and northbound queuing extended to approximately the horizontal curve point of tangent approaching the US Route 7 (Grist Mill Road) and US Route 7 Expressway intersection.

B (17)

B (10)

RT 123 (New Canaan Ave) &

US RT 7 Expy SB Ramps

13

Table 7 shows a LOS F for the eastbound Glover Ave approach at SR 719 (Main Avenue) and Glover Avenue/Route 15 (Merritt Parkway) Ramps during the PM peak. The model included field signal timings when the police officer was "plugged" into the controller, and field observed queuing crossing over the Danbury rail crossing coincided with the SimTraffic model. Lastly, LOS E results in the eastbound direction on Route 123 (New Canaan Avenue) between US Route 7 Expressway NB Ramps and SR 719 (Main Avenue), corresponding with field



B (14)

C (28)



observations in this area of constant queuing between the Danbury rail crossing and US Route 7 Expressway NB Ramps.

Key Problem Areas:

Based on the field observations and operations analysis, the following are key problem areas from a traffic operations standpoint listed in order of impact/significance:

- 1. US Route 7 (Danbury Road) southbound approaching US Route 7 (Grist Mill Road)
- 2. US Route 7 Expressway northbound approaching US Route 7 (Grist Mill Road)
- 3. US Route 7 (Danbury Road)/Route 33 southbound approaching US Route 7 (Danbury Road)/Route 33 (Westport Road)
- 4. SR 719 (Main Avenue) southbound approaching Route 123 (New Canaan Avenue)
- 5. Route 123 (New Canaan Avenue) eastbound approaching SR 719 (Main Avenue)
- 6. Grumman Hill Road intersection





C. Safety

A crash analysis was performed for Route 7 and Route 719 (Main Avenue) in the project area in an effort to identify issues that may be negatively impacting safety. Due to the large number of signalized intersections (27) and mid-block locations in the project area, safety "hot spot" locations would have to be identified for more detailed investigation including crash diagrams and qualitative analysis. To accomplish this, a three-pronged strategy comparing CTDOT Traffic Crash Viewing System (TAVS), CTDOT Suggested List of Surveillance Study Sites (SLOSSS), and local input from township officials was used to help identify the safety "hot spots".

The TAVS program allows the user to display and print various information about traffic crashes that occur on state-maintained roadways. Post-processing spreadsheets were used on the raw TAVS data to produce an excel graph showing the number of crashes at each intersection and mid-block locations. An intersection was generally defined as +/- 0.02 miles from the milepost the signal is located on, and mid-block locations were broken down into multiples of 0.10 miles between signals (e.g., Grumman Hill Road to RT 33 is 0.78 miles which turned into seven, 0.11 mile mid-block sections). If a mid-block location was less than 0.05 miles in length then it would be considered part of the neighboring signals (e.g., between US Route 7 (Grist Mill Road)/US Route 7 Expressway and US Route 7 (Grist Mill Road)/Glover Avenue).

The SLOSSS Report is a list of Traffic Crash Surveillance Report (TASR) locations that experienced abnormally high crash rates for the corresponding 3-year period. The SLOSSS objective is to determine locations whose actual crash rate is greater than its critical crash rate; therefore, having the greatest potential for crash reduction with safety improvements. In addition to these two quantitative measures, local officials from Norwalk and Wilton were asked for their input on locations they felt were high priority in regards to safety (*Appendix C* contains meeting summaries).

Figures 5 and 6 show the following eleven (11) selected safety "hot spot" locations based on the TAVS data, SLOSSS Report, and local input:

- 1. SR 719 (Main Avenue) & Route 123 (New Canaan Avenue)
- 2. SR 719 (Main Avenue) & Ward Street
- 3. SR 719 (Main Avenue) & Perry Avenue
- 4. SR 719 (Main Avenue) & Glover Avenue
- 5. US Route 7 (Grist Mill Road) & US Route 7 Expressway
- 6. US Route 7 (Grist Mill Road) & Glover Avenue
- 7. US Route 7 (Grist Mill Road) & SR 719 (Main Avenue)/DMV
- 8. Between US Route 7 (Grist Mill Road) (MP 4.13) & West Rocks Road (MP 4.35)
- 9. US Route 7 (Main Avenue) & West Rocks Road
- 10. US Route 7 (Danbury Road) & Gateway Shopping Center
- 11. US Route 7 (Danbury Road) & Kennsett Avenue
- 12. US Route 7 (Danbury Road) & Grumman Hill Road
- 13. Between Grumman Hill Road (MP 5.28) and Route 33 (Westport Road) (MP 6.00)
- 14. US Route 7 (Danbury Road) & Route 33 (Westport Road)





TAVS Crash Records by Milepost for 2006-2008 Main Avenue (BT 719)









D. Access

Access patterns, in particular the location and spacing of driveways, have a strong influence on traffic flow and safety. As vehicles turn onto and off of a roadway to access businesses, offices, and residences, they create conflict points, or locations where vehicles can cross paths. The frequency and spacing of driveways and the related number of conflict points in turn creates locations where vehicles slow down to make turns or avoid other vehicles. This can result in congestion and safety issues. Access management is the process of overseeing access to land development while simultaneously preserving the flow of traffic on the surrounding roadway system in terms of safety and capacity. Its focus is on safety of travel and minimizing conflict points which also helps to maintain the smooth flow of traffic. Access issues were identified with field observations, discussions with municipal staff, and a review of available traffic and transportation reports. In addition, the findings of two access management studies for the study area were reviewed.

Norwalk

In Norwalk, development along Main Avenue (Route 719 & US Route 7) is a dense urban environment where few vacant properties remain. There is a plethora of driveways; at least one serving each property. While there are some retail plazas or complexes within which multiple businesses are served by one or two driveways, there are also a limited number of locations where there are interconnections among developments. The following are locations that have access issues that are discussed in further detail in **Section VI: Overall Corridor Concepts**:

- SR 719 (Main Avenue) from Route 123 (New Canaan Avenue) to Delaware Avenue
- SR 719 (Main Avenue) north of Linden Street
- US Route 7 from Main Avenue/DMV to West Rocks Road
- US Route 7 (Main Avenue) at the i.park facility on West Rocks Road

A 1996 access management plan for US Route 7 included a curb-cut plan and recommendations for changes to the local land use regulations to promote better access design during site development. The curb-cut plan shows recommendations for improvements to the design of individual driveways in the study corridor. The plan also made a general recommendation for a driveway spacing standard of 150 to 200 feet apart, based on the development patterns at the time, the lack of undeveloped land, and the assumption that the standard would most commonly be applied to redevelopment of an existing parcel.

Wilton

US Route 7 (Danbury Road) in the study area is a densely developed suburban environment with numerous businesses, offices, and other development. In Wilton, US Route 7 (Danbury Road) from the junction with Route 33 (Westport Road) to the Town line has a plethora of curbcuts but also some stretches of undeveloped land with no current access points onto the roadway.

Similar to the Norwalk access management plan, the 2010 Wilton plan included recommendations for changes to the local land use regulations to promote better access design during site development and a curb-cut plan. The curb-cut plan for Wilton most frequently made recommendations for individual driveway closures, realignments, driveway consolidation, right-in/right-out only redesign, landscaping, narrowing driveways, shared driveways, and internal



connections. The following are locations that have access issues that will be discussed in further detail in **Section VI: Overall Corridor Concepts**:

- 116 Danbury Road (US Route 7) Avalon Wilton Apartments
- 129 Danbury Road (US Route 7) Ring's End Lumber
- 10 Westport Avenue (Route 33) Commercial Park

E. Pedestrian/Bicycle

Bicycling: The Connecticut 2009 Bicycle Map classifies state highways in terms of suitability for bicycling. The suitability is based on the shoulder width as well as the traffic volumes of various segments of the roadway. Route 7 in the project area has a classification of "less suitable for bicycling" on the 2009 map. Less suitable locations are those where the shoulder width is three feet or less and the traffic volumes are above 5,000 vehicles per day. The US Route 7 corridor in the study area also has stretches of congestion and dense development. This higher density results in numerous driveways that create potential conflicts between bicyclists and vehicles. Vehicle turning movements across the bicycle travel lanes are dangerous for bicyclists as well as pedestrians, who motorists often don't observe. In summary, the study corridor is not conducive to bicycle travel.

A bicycle and pedestrian plan was completed for the US Route 7 corridor in Wilton in January, 2012 (Norwalk Pedestrian & Bikeway Transportation Plan, January, 2012, Fitzgerald & Halliday, Inc.). The plan identified priorities for bicycle and pedestrian facilities in the study corridor (along with all of central Norwalk). The plan classified travel corridors in tiers in terms of need for improvements. The Main Avenue corridor in Norwalk from Route 123 (New Canaan Avenue) to the City line is classified as a Tier 1 corridor, or a corridor that meets one or more of the following factors:

- Multiple pedestrian crashes,
- Multiple bicycle crashes, and
- No sidewalk on either side of the roadway within 1/4 mile of a school or transit center.

The plan noted that Main Avenue (SR 719 & US Route 7), due to four lanes of traffic and shoulders that are less than three feet wide in most locations, would not accommodate a bicycle lane. Traffic volumes and speed on this segment of the corridor also prohibit shared use bicycle lanes or sharrows (shared lane roadways that are marked by bicycle pavement markings and signed with "Share the Road" signage). As such, neither was recommended for Main Avenue (SR 719 & US Route 7) from Route 123 (New Canaan Avenue) to the City line. Nonetheless, sharrows were noted as the most feasible of any option for bicyclists in the study area.

Sidewalks and Crosswalks: In general, there are sidewalks on both sides of US Route 7 in the southern portion of the study corridor, diminishing to an absence of sidewalks in the northern end of the study corridor. Sidewalks are present from Route 123 (New Canaan Avenue) to Foxboro Drive in Norwalk. They are mostly absent from Foxboro Road north to Route 33 (Westport Road) in Wilton. Those that exist in Norwalk vary in condition, surface materials and continuity. They are frequently interrupted by driveways of varied width.



Crosswalks occur in a limited number of locations and in no instance are there crosswalks to serve every leg of an intersection. There are no crosswalks at some key intersections or near some pedestrian destinations where they can be expected to want to cross Main Avenue (SR 719 & US Route 7). Local officials in Norwalk expressed a strong desire for completion of sidewalk connectivity and eliminating gaps in the system.

The pedestrian and bike transportation plan noted above made numerous recommendations to improve the walking environment on Main Avenue (*Figure 7*). It classified US Route 7 as a high priority area for improvements due in large part to pedestrian activity and the presence of the Merritt 7 rail station.

Greenways and Trails: A portion of the Norwalk River Valley Trail is under development in the study corridor. One segment of existing trail occurs between Route 123 (New Canaan Avenue) and Broad Street. This is the only greenway or off-road trail in the study corridor. The Norwalk Pedestrian & Bikeway Transportation Plan included improvement concepts for eight segments of the Norwalk River Valley Trail, including one segment from Broad Street to US Route 7 (Grist Mill Road). The proposed trail along this segment would connect the existing trail at Broad Street to US Route 7 (Grist Mill Road), a nearly two-mile long segment. This 8-10 foot wide trail would be located on the west side of the US Route 7 Expressway and, for the most part, would follow an existing utility corridor. This trail would cross below Route 15 (Merritt Parkway) adjacent to Perry Lane and would require a tunnel to be constructed through one of the Parkway bridges. The features and amenities that have been planned for the trail include an asphalt surface, timber guardrails, chain link fence, boardwalk structures, and bridges.



Figure 7: Pedestrian and Bicycle Transportation Plan



F. Transit

There are a number of transit providers and routes that serve the US Route 7 corridor. These include the Norwalk Transit District lines, employer shuttles, paratransit service, and the Danbury Branch Rail Line. The Norwalk Transit District offers the following service in the study area:

- The 7-Link regional bus service which travels from Norwalk to Danbury (with shared operating responsibility with the Housatonic Area Regional Transit (HART),
- The local fixed-route bus service Wheels Route 3 travels from downtown Norwalk as far north as the Department of Motor Vehicles on SR 719 (Main Avenue) and also travels into/through the Merritt 7 rail station site,
- The local bus service on evenings and Sundays runs from Burnell Avenue to the Wal-Mart on US Route 7 (Main Avenue), and
- The commuter shuttle travels on SR 719 (Main Avenue) to the Merritt 7 Station and also along Glover Avenue.



Figure 8: NTD Wheels bus at new pulse point

Monthly ridership on the Route 7 Link service has risen by 12% between July of 2011 and April of 2012. Average daily ridership has risen from 227 to 255 passengers in this time period. Monthly ridership on the commuter shuttle to Merritt 7 has risen 7% between July 2011 and April 2012, with a 52,257 total passengers of between January and the end of April, 2012.

Private employer shuttles also serve north-south trips along the US Route 7 connector and Main Avenue while paratransit buses provide service to the individual locations requested by the users.

The Danbury Branch of the New Haven Metro-North Rail Line parallels the US Route 7 corridor. It provides service from Danbury to Downtown Norwalk (South Norwalk Station). In total, there are 11 round trips between Danbury and South Norwalk on weekdays and six round trips on weekends. In general, the Danbury Branch Line schedule provides four peak hour direction trains (southbound in the morning and northbound in the evening) with headways of about 30-45 minutes. Off peak trains are less frequent with headways ranging from 1 ½ hours to almost 4 hours. As a result, this service is primarily designed to serve peak hour commuters in the peak direction.





G. Existing Land Use and Development Potential

As noted elsewhere, the US Route 7 corridor in southern Wilton and northern Norwalk is a densely developed area. Development is somewhat more suburban in character in Wilton and more urban and intense in Norwalk. A wide variety of land uses are found along the corridor with offices and retail uses most common. Notable clusters of uses from north to south include:

Wilton

- Undeveloped land owned by the State of Connecticut at the junction of US Route 7 (Danbury Road) and Route 33 (Westport Road),
- Residentially zoned and/or occupied land on the east side of US Route 7 (Danbury Road) south of Route 33 (Westport Road), and
- Undeveloped land in the vicinity of Arrowhead Road, some of which is preserved open space.

Norwalk

- Big-box, strip commercial, and hotel development near West Rocks Road,
- Residential subdivisions (most without direct access to the US Route 7 Expressway) east of the US Route 7 expressway between Route 15 (Merritt Parkway) and Route 123 (New Canaan Road),
- Office complexes on the west side of the US Route 7 Expressway near the Merritt 7 rail station, and
- Large cemetery surrounded by an older residential neighborhood at Broad Street.

Given the current density of development in the study corridor, the primary opportunities for new development are in the Wilton portion of the study area. In Norwalk, land use changes can be expected to result primarily from infill and redevelopment of existing sites. As new development occurs, there are opportunities to address issues of access management, connectivity, and multi-modal access during the development application and approval process.

The proximity of the Norwalk River and associated floodplains will constrain some development. An additional consideration will be not only the proximity of actual development to the river, but the amount of impervious surfaces being proposed and potential impacts of stormwater flows to the river, its floodplains, and nearby wetlands.

A list of the planned and programmed development or redevelopment projects in the study corridor was compiled based on discussions with the planning offices in Wilton and Norwalk and review of STC permits in the works or recently granted. Planned and programmed developments are those which have a reasonable expectation of being built in the next 5 years. In addition, the future land use plans for Wilton and Norwalk were reviewed to gain some insight into each community's goals for future development patterns in the study area. Such developments in each community include:





Norwalk

- i.park, seen in *Figure 9*, with office high-tech workspace leasing at 761 Main Avenue (US Route 7), was recently approved for a 12,000 square foot addition.
- An office building of 82,700 square feet has been proposed on Glover Avenue at the northwest corner of the interchange between the Route 7 Expressway and Route 15 (Merritt Parkway).
- 345 Main Avenue (SR 719): this former medical office building will be redeveloped.



Figure 9: i.park site on Wilton-Norwalk town line

- Two new hotels are expected to be built; one across the street (379 Main Avenue) from the Stop N Shop complex at 380 Main street, and the second off of SR 719 (Main Avenue) and slightly north of Perry Avenue at Linden Street.
- Redevelopment of the former Elin Company site at 268 Main Avenue (SR 719) for non-residential mixed-use.

The City of Norwalk Plan of Conservation and Development (2008, Chan Krieger Sieniewicz) indicates that the US Route 7 corridor should remain in its current character and mix of uses in the future. The area is envisioned as predominantly commercial with a mix of retail and office uses. It also recommends implementation of the Norwalk Valley River trail through the study area.

Wilton

- Redevelopment/new occupant for 10-20 Westport Avenue (Route 33) is leasing 230,000 square feet of office space.
- Avalon multi-family rental housing development recently completed at 116 Danbury Road (US Route 7); 100 units of which 30 are affordable units.
- The existing storage company opposite and just south of the new Avalon homes at 116 Danbury Road (US Route 7) is expected to remain and potentially be upgraded in the near-term with longer-term redevelopment for corporate office or research use.
- A new hotel is a possibility adjacent to the i.park development at the Town line with Norwalk.

The Wilton 2010 Plan of Conservation and Development (Planimetrics) indicates that this area of Wilton should retain its current character and serve as a transition zone between the town core and village center to the north and the urban character of Norwalk to the south. The area is shown on the 2010 Future land use map as retail on the east side of US Route 7 and medium density residential on the west side of US Route 7.





These proposed developments in Norwalk and Wilton could have significant impacts to the traffic volumes along the US Route 7 corridor and will only add to the existing congestion and safety issues documented here.

H. Environmental

Given the urban and suburban environment, there are few environmental resources of concern in the study corridor. The most notable resource is the Norwalk River which virtually parallels most of the corridor length just to the east of US Route 7 (Danbury Road) and then SR 719 (Main Avenue) further south. At Linden Street the river moves further west and is situated on the west side of the US Route 7 Expressway. There are areas of floodway as well as 100-year and 500-year floodplains associated with the Norwalk River along its length. All lie adjacent to existing development in numerous locales. There are pockets of wetlands, also mostly associated with the Norwalk River, adjacent to US Route 7 (Danbury Road) from its junction with Route 33 (Westport Road) south to Grumman Hill Road. There are no other wetlands of note in the corridor. There are no other notable environmental resources in the study area. The ELINCO building mid-way between Broad Street and Perry Avenue on the east side of SR 719 (Main Avenue) is a brownfield site.





IV. Evaluation Matrix

In order to assess the corridor from a qualitative standpoint and prioritize focus areas for further study, each intersection was examined and ranked on the following criteria as described below:

- Historical Issues: Locations were ranked on a scale from 1 to 10. Locations that were identified as being problematic by multiple local stakeholders and previous studies were assigned a score of 10 and were a high priority, while those with few identifications or studies were assigned a score of 1 and were a low priority. Locations without identified issues scored a zero. To help better distinguish between problem locations, no more than 3 locations were assigned the same score, unless it was a zero.
- Traffic Operations: Locations were ranked on a scale from 1 to 10. The most congested locations along the corridor were assigned a score of 10 and locations with a low delay were assigned a score of 1. Locations with free flowing traffic scored a zero. To help better distinguish between problem locations, no more than 3 locations were assigned the same score, unless it was a zero.
- Safety and Access: Locations were ranked on a scale from 1 to 10. Locations identified by the crash data base systems as high crash incident sites were assigned a score of 10 while those identified as low crash incident sites were assigned a score of 1. Locations without crashes were given a score of zero. To help better distinguish between problem locations, no more than 3 locations were assigned the same score, unless it was a zero.
- Pedestrian and Bicycle Facilities: Locations were ranked on a scale from 1 to 5. Locations with full pedestrian facilities, including actuated pedestrian signals, crosswalks and sidewalks were scored as a 1. Those intersections without any pedestrian facilities scored a 5. Any location that had a pedestrian/bicyclist injury was automatically assigned a score of 7 and if a location had a pedestrian/bicyclist fatality it was automatically assigned a score of 10.
- Land use: Locations were ranked on a scale from 1 to 5. Locations with planned new developments were scored based on their potential impact on the adjacent intersections. Those locations with developments expected to have a high impact were given a score of 5 while those with a low anticipated impact were given a score of 1. Locations with no adjacent development planned were given a score of zero.

The results of this assessment are summarized by location in *Figure 10: Corridor Assessment Matrix by Location*. The results of the assessment listed by the location's ranking from highest to lowest are in *Figure 11: Corridor Assessment Matrix by Rank*.



Legend/Scoring Criteria
Historical/Local Issues
ocations are ranked on a scale of 1-10
10 indictates High priority, 1 indicates low priority
No more than 3 locations can have the same score
ocations without identified issues score a zero

Traffic Operations							
Locations are ranked on a scale of 1-10							
10 indictates the most congested locations, 1 indicates low delay							
No more than 3 locations can have the same score							
Locations with free flowing traffic score a zero							
Safety/Access							

City of Norwalk

Town of Wilton

Locations are ranked on a scale of 1-10 10 indictates High crash location, 1 indicates low number crashes No more than 3 locations can have the same score Locations with free flowing traffic score a zero

Pedestrian/Bicycle	
Locations are ranked on a scale of 1-10	
Locations with fatality score a 10, injury score 7	

5 indicates no pedestrian facilities, 1 indicates good facilities

No more than 3 locations can have the same score

Land Use
Locations are ranked on a scale of 1-5
5 indicates planned development with anticipated traffic impact
0 indicates no adjacent development planned
No more than 3 locations can have the same score

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	Rt 123	9		9		10	2			0		
	Delaware Ave	0		1		5	2			0		
	Ward St	8		6		8	7	'		0		
	Broad St	8		6		6	3			0		
	Perry Ave	7		7		9	1			0		
≤a	Linden St	7		7		6	1			1		
in A	Merritview	0		1		4	2			1		
ven	RT 15 EB Ramps	0		2		1	5			0		
ue e	Glover Ave/Creeping Hemlock Dr	6		7		7	3			5		
	Xerox/801 The Towers	0		1		3	5			0		
	Merritt 601	0		0		2	3			0		
	Merritt 401/501	0		0		3	2			0		
	Merritt 201/301 & Valley View Rd	0		0		4	2			0		
	Merritt 101	0		0		3	2			0		
	Grist Mill Rd	10		10		10	5			0		
	Glover Ave	10		10		7	5			0		
	Main Avenue/DMV	10		10		9	7			0		
	from Grist Mill Rd to West Rocks Rd	6		9		10	7			0		
	West Rocks Rd	6		9		8	1			2		
c	Foxboro Dr	0		3		4	3			0		
SRC	Gateway Shopping Center	9		8		7	3			0		
ute	Kent Rd	0	I	2		2	3			2		
7	Kennsett Ave	8		5		9	3			0		
	Wilton Corp Park Main	0	I	1		2	1			0		
	Grumman Hill Rd	9		8		8	5			0		
	Grumman Hill Rd to Rt 33	8		6		5	5			2		
	Rt 33	7		8		5	5			2		
	Wolfpit Rd	0	Ī	4		6	1			0		



Figure 10: Corridor Assessment Matrix by Location

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Legend/Scoring Criteria
Historical/Local Issues
Locations are ranked on a scale of 1-10
10 indictates High priority, 1 indicates low priority
No more than 3 locations can have the same score
Locations without identified issues score a zero

Traffic Operations	
Locations are ranked on a scale of 1-10	
	_

10 indictates the most congested locations, 1 indicates low delay No more than 3 locations can have the same score Locations with free flowing traffic score a zero

Pedestrian/Bicycle
Locations are ranked on a scale of 1-10
Locations with fatality score a 10, injury score 7
5 indicates no pedestrian facilities, 1 indicates good facilities
No more than 3 locations can have the same score

Land Use
Locations are ranked on a scale of 1-5
5 indicates planned development with anticipated traffic impact
0 indicates no adjacent development planned
No more than 3 locations can have the same score

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Grist Mill Rd	10	10		10	5		0	
Glover Ave	10	10		7	5		0	
from Grist Mill Rd to West Bocks Rd	6	9		10	7		0	-
Rt 123	G	9		10	2		0	
Grumman Hill Pd	9	0		2	5		0	
Ward St	9	6	╋	0 0	7		0	
	6	7	+	0 7	2		5	
Gateway Shapping Contor	0	0		7	2			
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RL SS	6	0		5 0	1		2	
Crumman Hill Bd to Bt 22	0	6		0 E	-		2	
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	0 7	5	+	9	3		0	<u> </u>
Perry Ave	/		+	9	2		0	
Broad St	8	6	-	6	3		0	
Linden St	/		+	6	1		1	
	0	4	+	6	1		0	
	0	3		4	3		0	
Xerox/801 The Towers	0	1		3	5		0	
Kent Rd	0	2	+	2	3		2	
Delaware Ave	0	1	+	5	2		0	
Merritview	0	1		4	2		1	
RT 15 EB Ramps	0	2		1	5	L	0	
Merritt 201/301 & Valley View Rd	0	0		4	2		0	
Merritt 601	0	0		2	3		0	
Merritt 401/501	0	0		3	2		0	
Merritt 101	0	0		3	2		0	
Wilton Corp Park Main	0	1		2	1		0	



5

4

Figure 11: Corridor Assessment Matrix by Rank

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V. Focus Areas

In Section IV, *Existing Conditions Evaluation*, there were fourteen Focus Area locations that scored 25 or higher in the Existing Conditions Evaluation Matrix. These locations (intersections or sections of the roadway) were identified as the most critical problem areas based on historical/stakeholder identified issues, traffic operations, safety, pedestrian and bicycle facilities, and land use. The Focus Areas selected are listed by their location along the corridor from south to north:

- 1. SR 719 (Main Avenue) & Route 123 (New Canaan Avenue)
- 2. SR 719 (Main Avenue) & Ward Street
- 3. SR 719 (Main Avenue) & Perry Avenue
- 4. SR 719 (Main Avenue) & Glover Avenue
- 5. US Route 7 (Grist Mill Road) & US Route 7Expressway
- 6. US Route 7 (Grist Mill Road) & Glover Avenue
- 7. US Route 7 (Grist Mill Road) & SR 719 (Main Avenue)/DMV
- 8. US Route 7 (Main Avenue) between US Route 7 (Grist Mill Road) (MP 4.13) and West Rocks Road (MP 4.35)
- 9. US Route 7 (Main Avenue) & West Rocks Road
- 10. US Route 7 (Danbury Road) & Gateway Shopping Center
- 11. U.S. Route 7 (Danbury Road) & Kennsett Avenue
- 12. U.S. Route 7 (Danbury Road) & Grumman Hill Road
- 13. US Route 7 (Danbury Road) between Grumman Hill Road (MP 5.28) and Route 33 (Westport Road) (MP 6.00)
- 14. US Route 7 (Danbury Road) & Route 33 (Westport Road)

In the following sections, each focus area is discussed in detail with respect to Existing Conditions, Concept Development and Concept Evaluation.

Existing Conditions: Each Focus area is examined in detail to fully understand the reasons for concerns, safety issues and operations problems. The evaluation includes crash diagrams for the most recent three (3) years of available information, traffic operations simulation analysis as well as field observations.

Concept Development: Based on the existing conditions evaluation, previously identified improvements and in coordination with the project stakeholders, a series of potential concepts were developed to address these problem areas. Short term concepts, ranging from small signal timing changes to changes in lane assignments and intersection configurations, are presented. These concepts were examined for feasibility using an aerial base map, and where possible, evaluated for potential traffic operations benefits. Longer term concepts are also presented as potential ideas for future study. These concepts typically would include roadway widening, impact to adjacent properties and changes in roadway alignment.

Concept Evaluation: A summary table is provided for each Focus Area that summarizes the concepts and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. The following page explains how the concepts were evaluated with respect to scale, benefits, and impacts.



None	The criteria is not applicable, or there is no anticipated impact or
	benefit from the proposed alternative on the specific criteria.

- Low Anticipated benefits and/or impacts are relatively small. The concept would likely not directly impact the specific criteria.
- Medium Anticipated benefits and/or impacts are in the medium range, where some improvement is expected, but not large changes. The concept would likely have a direct impact on the specific criteria.
- **High** Large benefits and/or impacts are anticipated. The intent of the concept would likely have been to directly address the criteria (Traffic Operations, Safety, etc).

Benefits

- Traffic Operations Anticipated benefits (quantitative and/or qualitative) to traffic operations
- SafetyAnticipated impact to safety based on the proposed changes and
the existing type and number of crashes.
- Ped/BikeAnticipated benefits to bicycle and pedestrian accommodations

Impacts

- **Environment** Potential impacts to environmental features including cultural/historical resources, stormwater, wetlands, etc. It is not expected that any short term concepts would have environmental impacts.
- Access Potential impacts to access including relocation and/or removal of business and residential access points.
- **ROW** Potential impact to properties.
- Utilities Expected impacts to utilities including utility poles, drainage, and lighting; and any signal modification including foundation relocation, signal head modifications, and mast arm adjustments.





Focus Area 1: SR 719 (Main Avenue) & Route 123 (New Canaan Avenue)





Figure 12: Intersection of SR 719 (Main Ave) and SR 123 (New Canaan Ave)



Figure 13: SR 123 (New Canaan Ave) between US Route 7 and Main Avenue





Focus Area 1: Existing Conditions

Figure 12 shows the signalized intersection of SR 719 (Main Avenue) and Route 123 (New Canaan Ave). The northbound Route 123 (Main Street) approach is skewed with a dedicated left-turn lane and a dedicated thru lane. The southbound SR 719 (Main Avenue) approach has a dedicated right-turn lane and a dedicated thru lane. The eastbound Route 123 (New Canaan Avenue) approach has a dedicated left-turn lane and a shared right- or left-turn lane, and also has a positive approach grade where traffic is metered by a railroad crossing signal, approximately 200 feet to the west of the intersection.

On the northwest corner of the intersection is a Dunkin' Donuts with driveways within 100 feet of the intersection on both Route 123 and SR 719. The close proximity of the Dunkin' Donuts access points to the intersection contributes to congestion, driver confusion, visibility and blind spot issues, left-turn weaving, left-turn queuing, and potentially unsafe roadway entrances for motorists, as well as for pedestrians. On the east side of the intersection is a vacant lot (previously a diner restaurant) with angled parking spaces. The southwest corner of the intersection contains a car dealership with low volume driveways approximately 150 feet from the intersection on both legs.

The traffic operations, as viewed in the field, showed general congestion increased by the Danbury Rail Line at-grade crossing, access to the Dunkin Donuts on the southbound approach, and a heavy westbound left-turn movement onto the US Route 7 Expressway SB ramps (0.3 miles to west). On the eastbound approach traffic generally moves slowly across the rail tracks, and the internal clearance time between the tracks and the SR 123 (New Canaan Avenue)/SR 719 (Main Avenue) intersection limits the amount of green time eastbound drivers receive at the rail signal. The eastbound SR 123 (New Canaan Avenue) traffic is also held up by a significant amount of vehicles accessing the Dunkin Donuts, which results in queuing in the northbound left lane on SR 719 (Main Avenue).

In the westbound direction on SR 123 (New Canaan Avenue) there is a large left-turn volume onto the SR 7 Expressway southbound. Based on field observations, this left-turning traffic appears to over-utilize the inside lane on SR 123 which causes queuing to extend through the intersection with SR 719 (Main Avenue) to approximately Delaware Avenue. This queuing is exacerbated during the frequent rail crossings when traffic movements are shut down. This westbound queuing is more pronounced during the AM peak period than during the PM Peak.

In the PM Peak hour, the Synchro 7/SimTraffic analysis results indicated eastbound queuing and delay of LOS E for the eastbound approaches at the SR 123 (New Canaan Avenue)/Rail Line signal and the SR 123 (New Canaan Avenue)/SR 7 Expressway NB Ramps

From a pedestrian perspective, the sidewalks are complete on all sides of the intersections, and crosswalks are located on the northbound and eastbound approaches. The southbound leg does not have a crosswalk, and this is most likely due to the dual left-turn lanes on the eastbound approach. Pedestrian push buttons are present on the northwest and southwest corners of the intersection, but is missing from the southeast side.

Over the three-year period from 2006-2008, there were a total of eighty-eight (88) crashes recorded at or near this intersection, as shown in *Figure 15*. Thirty-seven (37) of the crashes were angle collisions, twenty-five (25) were rear-end collisions, twenty-two (22) were sideswipe





collisions, three (3) were backing collisions, and one (1) was a vehicle hitting a fixed object. The high occurrence of angle (42%) and rear-end crashes (29%) can likely be attributed to the congestion at the intersection and the close proximity of the Dunkin' Donuts driveway on the north leg of the intersection. The significant presence of sideswipes (25%) is likely a result of drivers trying to "get around" stopped or turning traffic. The intersection geometry may also be a contributing factor to the sideswipes. Most of the reported crashes (85%) occurred during daylight and 80% occurred when the roadway surface was dry. Based on the crash data, the lighting and pavement conditions are not a significant contributing cause of crashes at this location.

Figure 14 is an excerpt from *Figure 10*, the Corridor Assessment Matrix. This location was ranked 6th in the existing conditions evaluation matrix, scoring a 10 in safety and a 9 in both historical/local issues and traffic operations. Based on this evaluation, concepts were developed to address the identified issues. These concepts are presented in the following section.



Figure 14: Evaluation Matrix Excerpt for the Intersection of SR 123 (New Canaan Avenue) and SR 719 (Main Avenue)



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Figure 15: Crashes at Intersection of SR 719 (Main Avenue) and Route 123 (New Canaan Avenue)



Focus Area 1: Concept Development

Concept 1A: Signal Timing Changes

Evaluate modifying the signal timing and coordination for the signals along SR 123 (New Canaan Avenue) between SR 719 (Main Avenue) and the SR 7 Expressway ramps to improve traffic flow between the intersection, thereby reducing congestion and delay. Signal timing changes would account for the railroad signal and the impact that signal has on east-west traffic flow. This concept would be part of a system-wide signal retiming.

Concept 1B: Restriping

Modify and maintain the striping through the intersection by adding "puppy tracks", as seen in *Figure 16.* Some striping exists, but has faded over time. This striping allows motorists to be more aware of and stay in the travel lanes through the intersection, reducing the likelihood for sideswipes within the intersection. There were 10 sideswipes on the eastbound leg of the intersection, 3 on the northbound leg, and 4 on the southbound leg. The striping could also be coupled with "Stay in Lane" signing.



Figure 16: Concept 1B - Restriping at intersection of SR 719 (Main Avenue) and SR 123 (New Canaan Avenue)





Limit left-turns to the Dunkin' Donuts parking lot to certain off-peak hours in order to decrease the chance for conflicts, as seen on the right of *Figure 17*. Limiting the times at which motorists can make left-turn movements will reduce conflict opportunities at a location where angle collisions from left-turning driveway movements are the highest. The angle collisions at this location are approximately 31% of the total crashes at/near this intersection.

Concept 1D: Eliminate/Consolidate Driveways

This concept takes Concept 1C further by completely eliminating the driveway from Dunkin' Donuts that is closest to the intersection and which has a high number of crashes. This includes striping that directs traffic to a driveway further from the intersection, as seen on the left of *Figure 17*. By consolidating the number of access points, the number of conflict points would be reduced, therefore improving safety.



Figure 17: Concept 1C & 1D - Restricted Left Turns Signing & Consolidate Dunkin' Donuts Driveways





Concept 1E: Reconfigure Intersection

Reconfigure the intersection by moving the stop bars closer to the center of the intersection, as shown in *Figure 18*. By shortening the intersection, the clearance times could be reduced, and the smaller intersection should result in fewer eastbound sideswipes, as the vehicle paths would be more intuitive to the driver. This alternative would also require placement of far-side traffic signal mast arms.



Figure 18: Concept 1E - Reconfigure Intersection

The various concepts shown here represent a variety of improvement ideas that could be combined for an overall intersection improvement plan. For instance, modifying the signal timing (Concept 1A), adding improved striping in the form of "puppy tracks" (Concept 1B), and tightening up the intersection (Concept 1E) together would provide multiple benefits and improvements for traffic flow and safety.



Concepts for Future Consideration:

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

- i. Modify the intersection of SR 123 (New Canaan Avenue) and the Southbound US Route 7 Expressway entrance/exit ramps to improve traffic flow on SR 123 and indirectly improve traffic operations at SR 123 and SR 719
 - Restripe to change the thru lane to a thru/left turn lane onto the US Route 7 Expressway southbound ramp.
 - Add an additional SR 123 (New Canaan Avenue) westbound left-turn lane to the SR 7 Expressway southbound ramp.
 - Add an additional SR 123 (New Canaan Avenue) westbound lane near the SR 7 Expressway interchange, using the current two lanes as exclusive left-turn lanes.
- ii. Construct on-and off- ramps to account for the missing movements further north at the SR 719 (Main Avenue) and Route 15 (Merritt Parkway) interchange and US Route 7 Expressway and Route 15 (Merritt Parkway) interchange. Providing motorists with ways to get to the US Route 7 Expressway from Route 15 (Merritt Parkway) eastbound and from the US Route 7 Expressway to Route 15 (Merritt Parkway) eastbound could significantly reduce traffic utilizing Route 123 (New Canaan Avenue) to access these routes. This could permit a cross-section reduction of SR 719 (Main Avenue) to add a center left-turn lane, also known as a road diet as seen in *Figure 19.* By adding a center left-turn lane, left-turning motorists are removed from the thru-lanes, reducing rear-end collisions, sideswipes, and even queuing. The chances for conflict between motorists turning left from driveways is also reduced since they would no longer have to cross two lanes of traffic to get to the direction in which they desire to go



Figure 19: SR 719 (Main Avenue) "Road Diet"



Concept Evaluation Summary: *Table 8* summarizes the short term concepts discussed above and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety, and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. Based on the preliminary evaluation, these concepts appear to be feasible, but will need to be evaluated in more detail and compared to other areas and improvements to determine prioritization.

C	Description	Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)			
Concept	Description	Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities
1A	Signal Timing Changes	Low-Med	-	Low	None	None	None	None
1B	Restriping	Low	Low	None	None	Low	None	None
1C	Limit Left-Turns to Dunkin' Donuts	Low-Med	Medium	None	None	Medium	None	None
1D	Eliminate/ Consolidate Driveways	Low-Med	Medium	Low	None	High	Medium	Low
1E	Reconfigure Intersection	Low-Med	Low-Med	Medium	None	Low	Low	Medium

Table 8: Anticipated Benefit/Potential Impacts of Concepts for Focus Area 1



Focus Area 2: SR 719 (Main Avenue) & Ward Street





Figure 20: Intersection of SR 719 (Main Avenue) and Ward Street

Focus Area 2: Existing Conditions

Figure 20 shows the intersection of SR 719 (Main Avenue) and Ward Street, which is a signalized T-intersection where Ward Street is the sidestreet leg. The northbound and southbound SR 719 (Main Avenue) approaches have two thru-lanes in each direction and narrow (less than 1-foot wide) shoulders. The westbound Ward Street approach has been re-striped as two (2) approximately 11.5-foot lanes with dedicated left- and right-turn lanes. In the northbound direction, vehicles are permitted to turn right on red.

The western side of the intersection has a number of stores including a Chinese food restaurant and beauty salon, whose patron's park directly off SR 719 (Main Avenue), as well as a shopping center with an entrance approximately 200 feet north of the intersection. With



the shops having parking directly off the street, there is potential for conflicts with entrances/exits for motorists and unsafe conditions for pedestrians, specifically when motorists back out of the parking areas. On the southeast corner of the intersection is a Bank of America with driveways within 100 to 200 feet of the intersection. On the northeast corner of the intersection is a florist and drapery company that both have driveways within 100 feet of the intersection.

The traffic operations as viewed in the field showed minimal to no congestion on the northbound and westbound approaches and sporadic congestion on the southbound approach depending on the number of left-turning vehicles onto Ward Street.

Congestion was consistently noticed at the mid-block Walgreens entrance just to the north. This is a full access point with the exception of a left turn restriction exiting the Walgreens. The significant amount of vehicles entering this access point causes congestion in both the northbound and southbound directions with vehicles weaving around other vehicles waiting to enter the Walgreens access point.

Traffic volumes were collected only during the AM peak, therefore the Synchro 7/SimTraffic analysis was not conducted for the PM peak. The AM results showed minimal delay on all approaches, and since the mid-block locations were not included in the model the additional delay and queuing caused by the Walgreens entrance was not reflected in the model. **Tables 6** and **7** in Section 3B contain overall LOS and delay results for the AM and PM peak hour Synchro 7/SimTraffic models, while the detailed results are provided in **Appendix D**.

From a pedestrian perspective, the sidewalks are complete on the east side of SR 719 (Main Avenue), and on the west side there is a fragmented asphalt sidewalk that extends from the Walgreens south to where the street-front parking begins across from Ward Street. The southbound and westbound legs of the intersection have painted crosswalks, although the crosswalk on the southbound approach is placed essentially in the middle of the intersection. Pedestrian push buttons are located on both sides of SR 719 (Main Avenue) to cross the southbound crosswalk.

Over the three-year period from 2006-2008, there were a total of forty-two (42) crashes recorded at or near this intersection, as is shown in *Figure 22*. Sixteen (16) of the crashes were rear-end collisions, fifteen (15) were angle collisions, seven (7) were sideswipe collisions, two (2) were backing collisions, and two (2) involved a pedestrian. The high amount of rear-end collisions (38%), specifically on the southbound approach is likely due to the lack of a dedicated left-turn lane onto Ward Street. Most of all reported crashes (69%) occurred during daylight and 74% occurred when the roadway surface was dry. Based on the crash data, the lighting and pavement conditions are not a significant contributing cause of crashes at this location. It should be noted that 45% of crashes involved an injury; which is a relatively high percentage.

Figure 21 is an excerpt from the Corridor Assessment Matrix. This location was ranked 8th in the existing conditions evaluation matrix, scoring an 8 in safety and historical issues, and a 7 in pedestrian/bicycle safety. Based on this evaluation, concepts were developed and evaluated to improve conditions at this intersection. These short-term concepts are presented below.





Figure 21: Evaluation Matrix Excerpt for the Intersection of SR 719 (Main Avenue) and Ward Street





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Figure 22: Crashes at Intersection of SR 719 (Main Avenue) and Ward Street





Focus Area 2: Concept Development

Concept 2A: Signal Timing Changes

Evaluate the signal timing and offsets as part of corridor retiming to improve traffic flow and reduce delay and congestion.

Concept 2B: Pedestrian Signal Heads, Push Buttons, and Signage

Install pedestrian signal heads and push buttons where not already included and modify timing for existing push buttons. There were two crashes involving pedestrians at this location. Adding countdown signal heads, push buttons, and ADA ramps creates a safer environment for pedestrians. These measures could also be combined with increased signage such as "Yield to Pedestrians in Crosswalk" signs. With proper signs, motorists become more aware of the possibility of the presence of pedestrians. This helps to make the environment more pedestrian-friendly.

Concept 2C: Relocate Crosswalk

Relocate the crosswalk away from the middle of the intersection and perpendicular to the southbound approach of the intersection, as shown in *Figure 23*. This relocation reduces the distance pedestrians have to travel in order to cross the street. This enables the pedestrian to be out of the way of traffic sooner and avoid unnecessary time within the intersection. Moving the crosswalk out of the middle of the intersection also avoids unnecessary potential conflicts between westbound traffic and pedestrians. This concept would involve the addition of new pedestrian signal poles and the changes proposed in Concept 2B.



Figure 23: Concept 2C – Relocate Pedestrian Crosswalk





Install "No Left Turn" signs at the main Walgreens driveway for northbound motorists. Leftturning vehicles should then be directed to make a left and enter the Walgreens lot at the Broad Street driveway. Eliminating left turns into the main Walgreens driveway would remove the movement that causes the majority of crashes at the Walgreens driveway. The crash analysis results showed that almost 40% of the crashes at the Walgreen Driveway occurred between the hours of 4-6PM. Therefore, a variation of this concept could be to restrict left turns during peak hours only.

Concepts for Future Consideration:

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

i. Create a driveway with access to Walgreens across from Ward Street, as seen in *Figure* **24**. This would allow for access into and out of the parking lot and would most effectively be combined with the elimination of left turns (right-in/right-out only) into or out of the existing Walgreens main driveway to improve utilization of the signal. The signal operations for this concept would need to be studied in detail as the potential benefit of aligning the driveway with Ward Street may be negated by the need to provide split phasing at the intersection.



Figure 24: Four - Way Intersection at Ward Street



ii. Reduce the cross-section of SR 719 (Main Avenue) to add a center left-turn lane, as seen in *Figure 25*. By adding a left-turn lane, left-turning motorists are removed from the thru-lanes, reducing rear-end collisions, sideswipes, and even queuing. The chances for conflict between motorists turning left from driveways is also reduced since they would no longer have to cross two lanes of traffic to get to the direction in which they desire to go. This concept would be expected to improve safety and slow speeding, but it would also reduce the through capacity of the roadway and may result in increased travel time for through traffic. This alternative may be most practical if other physical changes are made to the overall roadway network (completion of the Route 15 and Route 7 Expressway interchange), resulting in a reduced number of vehicles using this section of roadway.



Figure 25: SR 719 (Main Avenue) Center Left-Turn Only Lane at Ward Street





Concept Evaluation Summary: *Table 9* summarizes the short term concepts discussed above and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety, and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. Based on the preliminary evaluation, these concepts appear to be feasible, but will need to be evaluated in more detail and compared to other areas and improvements to determine prioritization.

		Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)			
Concept	Description	Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities
2A	Signal Timing Changes	Medium	Low	Low	None	None	None	None
2B	Pedestrian Signal Heads, Push Buttons and Signage	None	Medium	High	None	None	None	None
2C	Relocate Crosswalk	None	Medium	High	None	None	None	Low
2D	Turn Restrictions at Walgreens Driveway	Medium	Medium	None	None	Medium	None	None

 Table 9: Anticipated Benefit/Potential Impacts of Concepts for Focus Area 2









Figure 26: Intersection of SR 719 (Main Avenue) and Perry Avenue

Focus Area 3: Existing Conditions

Figure 26 shows the signalized T-intersection of SR 719 (Main Ave) and Perry Avenue. The eastbound approach to the intersection has a positive grade approaching the intersection with an at-grade railroad crossing approximately 250 feet from the intersection. There are no dedicated turn lanes on SR 719 (Main Avenue) at this intersection. All turns are shared with thru lanes and there are no shoulders. The southbound right turns are permitted to turn right on red.

On the northwest corner of the intersection is a CVS pharmacy with driveways approximately 200 feet from the intersection on both legs. This potentially creates unsafe roadway entrances for motorists along SR 719 (Main Avenue). The close proximity of the Linden Street intersection to the north (350 feet) and mid-block entrance to the CVS contributes to slower travel speeds, SR 719 (Main Avenue) turning vehicle queuing, and weaving to avoid the turning vehicle queues. On the east side of the intersection is Perry Plaza which includes shops such as a UPS store with an exit-only driveway at the





The traffic operations during the AM peak period generally operated well with minimal queuing and delay. During the PM peak period the traffic was slow moving, congestion occurred between Perry Avenue and Linden Street, and weaving occurred to avoid left-turn queuing on SR 719 (Main Avenue). This appeared to be due to the closely spaced Linden Street and Perry Avenue with the mid-block access to CVS. The signal timing and coordination between Linden Street and Perry Avenue did not seem to be optimal as during the travel time runs there were constant stops at both Perry Avenue and Linden Avenue during the same travel time run. With no traffic volume available for this intersection, Synchro 7/SimTraffic analysis was not completed.

From a pedestrian perspective, the sidewalks are complete on all sides of the intersection with the exception of the south side of Perry Avenue between the intersection and the Rail Line crossing. The only crosswalk is on the southbound leg which includes pedestrian push buttons and pedestrian signal heads. It appears the curb on the northwest corner has been modified and it should be noted that the "piano key" crosswalk markings are missing in this area.

Over the three-year period from 2006-2008, there were a total of forty-four (44) crashes recorded at this intersection as seen in *Figure 28*. Seventeen (17) of the crashes were rear-end collisions, fifteen (15) were angle crashes, nine (9) were sideswipe collisions, two (2) involved a vehicle hitting a fixed object, and one (1) was a head-on collision. The most common collision at the CVS entrance is an angle collision between eastbound motorists and southbound motorists. The most common collision at Perry Avenue and the southern strip mall entrance is a rear-end collision. Most of all reported crashes (77%) occurred during daylight and 80% occurred when the roadway was dry. Based on the crash data, the lighting and pavement conditions are not a significant contributing cause of crashes at this location.

Figure 27 is an excerpt from the Corridor Assessment Matrix. This location was ranked 14th in the existing conditions evaluation matrix, scoring a 9 in safety and a 7 in both historical issues and traffic operations. Based on this evaluation, concepts were developed and evaluated to improve conditions at this intersection. These concepts are presented in the following section.



Figure 27: Evaluation Matrix Excerpt for the Intersection of SR 719 (Main Avenue) and Perry Avenue









Focus Area 3: Concept Development

It should be noted that the City of Norwalk has plans to change the Perry Avenue approach to SR 719 which would add a lane to the intersection. This change would be expected to help operations and safety at this location. It may also be possible to construct Future Concept (i), as outlined below while the intersection is under construction.

Concept 3A: Signal Timing Changes

Evaluate modifying the signal timing and offsets as part of corridor retiming to improve traffic flow and reduce delay and congestion.

Concept 3B: Turn Restrictions at CVS Driveway

Restrict exiting traffic from the CVS driveway to right-turn only. This restriction would eliminate the left-turn movements that are the highest crashes at the CVS driveway. Motorists desiring to go northbound on SR 719 (Main Avenue) can access this movement by proceeding to Perry Avenue. Improvements at Perry Avenue would account for this extra volume and the signal timing would compensate appropriately to allow for safer turning conditions.

Concepts for Future Consideration:



Figure 29: Perry Plaza Driveway Modifications

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

i. Eliminate the existing driveway to Perry Plaza on SR 719 (Main Avenue) north of Perry Avenue and make the Perry Plaza driveway south of Perry Avenue a right-in/right-out only, as shown in Figure 29. The existing driveway at Perry Avenue would be expanded to include entrance and exit movements for Perry Plaza. By reducing the number driveways. the amount of of uncontrolled turning movements is reduced and potential conflicts with opposing traffic is eliminated. The signal at Perry Avenue would need to be redesigned to accommodate for the southbound and westbound traffic volume from Perry Plaza.





Reduce the cross-section of SR ii. 719 (Main Avenue) to add a center left-turn lane, as shown in Figure 30. By adding a left-turn lane, leftturning motorists are removed from the thru-lanes, reducing rear-end collisions, sideswipes, and even queuing. The chances for conflict between motorists turning left from driveways is also reduced since they would no longer have to cross two lanes of traffic to get to the direction in which they desire to go. This concept would likely be part of a larger road-diet concept for the section of SR 719 between SR 123 and the Merritt Parkway.





Concept Evaluation Summary: *Table 10* summarizes the short term concepts discussed above and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety, and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. Based on the preliminary evaluation, these concepts appear to be feasible, but will need to be evaluated in more detail and compared to other areas and improvements to determine prioritization.

		Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)			
Concept	Description	Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities
3A	Signal Timing Changes	Low-Med	Low	Low	None	None	None	None
3B	Turn Restrictions at CVS Driveway	Low-Med	Medium	None	None	Medium	None	None

Table 10: Anticipated Benefit/Potential Impacts of Concepts for Focus Area 3









Figure 31: Intersection of SR 719 (Main Avenue) and Glover Avenue

Focus Area 4: Existing Conditions

Figure 31 shows the signalized intersection of SR 719 (Main Avenue) and Glover Avenue. The signal at this intersection also controls movements on Creeping Hemlock Drive, which doubles as an off-ramp from Route 15 (Merritt Parkway) southbound to SR 719 (Main Avenue) northbound. Within the signal control area is an additional Route 15 (Merritt Parkway) southbound off-ramp for those heading southbound on SR 719 (Main Avenue) and two Route 15 (Merritt Parkway) southbound on-ramps. The intersection does not have a regular 4-way intersection geometry. The atypical geometry, coupled with the multiple on- and off-ramps at this intersection, can prove very confusing and increases chances for conflict. The eastbound approach consists of a dedicated right-turn lane and a The southbound approach consists of a free-movement lane. thru/right-turn lane, a dedicated thru lane, and a dedicated right-turns lane which allows motorists to turn onto Glover Avenue or the Route 15 (Merritt Parkway) southbound on-ramp. The westbound approach consists of a dedicated right-turn lane, a thru/right lane and a dedicated left-turn lane. The northbound approach is signed for a dedicated right-turn lane, a thru lane, and a thru/left-turn lane, though



the pavement markings show only a dedicated right-turn lane. The eastbound and northbound approaches enter the intersection at an upgrade while the southbound and westbound approaches enter the intersection at a downgrade.

On the northwest corner of the intersection is a Shell gas station with driveways within approximately 30 feet from the intersection on both legs. This potentially creates unsafe roadway entrances for motorists along SR 719 (Main Avenue) and Glover Avenue. Glover Avenue provides a connection for those to/from Merritt 7 Corporate Park to Route 15 (Merritt Parkway), and potentially the US Route 7 Expressway via Route 15 (Merritt Parkway). A business entrance exists directly across from Glover Avenue, just north of Creeping Hemlock Drive. This entrance can create potential conflict due to the lack of signals informing traffic from the business of when it is safe to proceed through the intersection. Unfamiliar motorists heading northbound from Creeping Hemlock Drive may not be aware of this driveway and could cause conflicts with motorists exiting the driveway. Further from the intersection on the northeast side is a Homestead Suites Hotel with a driveway approximately 100 feet north of the intersection. The proximity of this driveway to the multiple-entrance intersection could cause conflicts if drivers are not paying attention. The proximity of all of the driveways to the intersection can cause slower traffic speeds, turning-vehicle queuing due to lack of dedicated turning lanes, and weaving of motorists to avoid turning vehicles.

The traffic operations during the AM peak period generally operated well with occasional queuing in the northbound direction when left turning vehicles would have to wait for a suitable gap to make the turn onto Glover Avenue. Creeping Hemlock Drive had a good amount of volume during the AM peak, but generally cleared every cycle, and Glover Avenue had minimal queuing and delay. During the PM peak period a police officer was "plugged" into the controller beginning at approximately 4:30 PM until the end of the turning movement count at 6:30 PM. The officer appeared to be giving more time to SR 719 (Main Avenue) and Glover Avenue as traffic volumes required it. Glover Avenue had increased volumes around 5:00 PM causing queuing to extend over the Rail Line towards the Merritt 7 Rail Station. Southbound SR 719 (Main Avenue) queuing occasionally backed up to the upstream signalized intersection.

The SimTraffic analysis results show the eastbound approach has a very poor LOS F during the PM peak hour, with an average delay of approximately 2 minutes. Generally the intersection is rated with a LOS D during both the AM and PM peak hours, with a higher average delay during the PM peak hour. **Tables 6** and **7** in Section 3B contain overall LOS and delay results for the AM and PM peak hour Synchro 7/SimTraffic models, while the detailed results are provided in **Appendix D**.

From a pedestrian perspective, the sidewalks are complete on the westbound side of Glover Avenue, ending at the Shell gas station and on the southbound side of SR 719 (Main Avenue) northbound approach. For pedestrians to continue north on SR 719 (Main Avenue), they must cross through the Shell gas station lot in order to reach more sidewalk, which can put them in the path of motorists entering the lot. There are no pedestrian crosswalk markings across any approach to this intersection.





Figure 32 is an excerpt from the Corridor Assessment Matrix. This location was ranked 8th in the existing conditions evaluation matrix, scoring a 7 in safety and traffic operations, and a 6 in historical/local issues. Based on this evaluation, concepts were developed and evaluated to improve conditions at this intersection. These short-term concepts are presented below.



Figure 32: Evaluation Matrix Excerpt for the Intersection of SR 719 (Main Avenue) and Glover Avenue



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Figure 33: Crashes at Intersection of SR 719 (Main Avenue) and Glover Avenue





Focus Area 4: Concept Development

Concept 4A: Signal Timing Changes

Evaluate modifications to the signal timing at Glover Avenue to improve traffic flow and reduce delay and congestion. Existing signal timings and traffic volumes yielded an average LOS D in both the AM and PM peak for the intersection using SimTraffic analysis. The eastbound approach has the highest delay during both peaks, with just over a two minute delay in the PM peak. By modifying the signal timing/phasing and offsets as part of corridor retiming, improved traffic flow and a reduction in delay and congestion would be expected.

Concepts for Future Consideration:

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

i. Modify the driveways to the gas station at the northwest corner of the intersection, as shown in *Figure 34*. The driveway on Glover Avenue and the furthest driveway from the intersection on SR 719 (Main Avenue) would remain with full access. The driveway closest to the intersection on SR 719 (Main Avenue) would be limited to right-in right-out only. Further safety improvements could be achieved with signs restricting left-turns during peak hours. These modifications would eliminate conflicts between motorists trying to cross two to three lanes of congested traffic.



Figure 34: Glover Avenue Gas Station Driveway Modifications



- 7
- ii. A larger project to reconstruct the access ramps to and from SR 15, or the addition of ramps from SR 15 to the SR 7 expressway would help alleviate traffic and safety concerns at this location.

Concept Evaluation Summary: *Table 11* summarizes the short term concepts discussed above and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety, and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. Based on the preliminary evaluation, these concepts appear to be feasible, but will need to be evaluated in more detail and compared to other areas and improvements to determine prioritization.

Table 11: Antici	pated Benefit/Potential	Impacts of Conce	pts for Focus Area 4
	patoa Bonontri otontia		

Concept	Description	Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)			
		Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities
4A	Signal Timing Changes	Low-Med	Low	Low	None	None	None	None





Focus Areas 5, 6 and 7: Grist Mill Road

Focus Areas 5, 6 and 7 are located along Grist Mill Road, and are closely spaced, with traffic from one intersection impacting the adjacent intersection. Each intersection is discussed individually for traffic operations; however, due to the interaction between the intersections, concepts were developed together for all three.





Figure 35: Intersection of US Route 7 (Grist Mill Road) and US Route 7 Expressway

Focus Area 5: Existing Conditions

Figure 35 shows the intersection of US Route 7 (Grist Mill Road) and the US Route 7 Expressway, where the US Route 7 Expressway terminates and US Route 7 (Grist Mill Road) continues eastbound towards SR 719 (Main Avenue) and the Norwalk Motor Vehicle Department (DMV). The limited-access freeway is two lanes in each direction with wide shoulders and a wide grass median. At the intersection, the northbound approach has one left-turn lane and dual right-turn lanes. The westbound approach has dual left-turn lanes and one thru lane, while the eastbound approach has a thru lane and a right-turn lane. Once US Route 7 (Grist Mill Road) makes the easterly turn towards the DMV there is little to no shoulder and no median. Major queuing occurs on the northbound and westbound approaches during peak periods. There are no driveways within the immediate area





of this intersection.

The traffic operations during both peak periods included heavy queuing on the northbound US Route 7 Expressway approach which is a combination of a heavy left-turn move towards Belden Hill Road and a very heavy right-turn movement onto US Route 7 (Grist Mill Road) for all vehicles destined to continue on US Route 7 northbound. The northbound right movement can be affected by the queuing that spills back from the US Route 7 (Grist Mill Road) and SR 719 (Main Avenue)/DMV intersection.

The SimTraffic analysis results show the northbound approach has a very poor LOS F with an average delay of approximately two minutes and four minutes in the AM and PM peak hours, respectively. **Tables 6** and **7** in Section 3B contain overall LOS and delay results for the AM and PM peak hour Synchro 7/SimTraffic models, while the detailed results are provided in **Appendix D**.

From a pedestrian perspective, there are no sidewalks, no crosswalks, and no pedestrian signal heads. A bicycle and pedestrian plan was completed for the US Route 7 corridor in Norwalk in January, 2012 (*Norwalk Pedestrian & Bikeway Transportation Plan, page 22, January, 2012, Fitzgerald & Halliday, Inc.*), where a multiuse path was recommended for a segment of Grist Mill Road at Route 7.

Over the three-year period from 2006-2008, there were a total of seventy-three (73) crashes recorded at this intersection, as shown on *Figure 41*. Forty-three (43) of the crashes were rearend collisions, ten (10) involved vehicles hitting fixed objects, eight (8) were sideswipe collisions, seven (7) were angle collisions, two (2) were backing collisions, one (1) was an overturn due to loss of control, one (1) was a moving object collision, and one (1) was an unclassified collision. The long queues in the northbound and westbound directions likely contribute to the high number of rear-end crashes. Since fixed object collisions were the second most frequent type of crash at this intersection, the geometry of the intersection might also be a contributing factor. Most of all reported crashes (77%) occurred during daylight and 73% occurred when the roadway surface was dry. Based on the crash data, the lighting and pavement conditions are not a significant contributing cause of crashes at this location.

Figure 36 is an excerpt from the Corridor Assessment Matrix. This location was ranked 2nd in the existing conditions evaluation matrix scoring a 10 for safety, historical issues, and traffic operation problems. Based on this evaluation, concepts were developed and evaluated to improve conditions at this intersection. These short-term concepts are presented below.



Figure 36: Evaluation Matrix Excerpt for the Intersection of US Route 7 (Grist Mill Road) and the US Route 7 Expressway







Road) approaches.



Figure 37: Intersection of US Route 7 (Grist Mill Rd) and Glover Avenue

Focus Area 6: Existing Conditions

Figure 37 shows that US Route 7 (Grist Mill Road) and Glover Avenue meet at a signalized T-intersection. This signalized intersection is less than 250 feet east of the US Route 7 Expressway and US Route 7 (Grist Mill Road) intersection and less than 450 feet west of the US Route 7 (Grist Mill Road) and SR 719 (Main Avenue)/DMV intersection. The proximity of this intersection to the other two intersections contributes to congestion in this section of US The eastbound approach has two thru lanes and one Route 7. dedicated right-turn lane. The westbound approach has two thru lanes and one dedicated left-turn lane. The northbound approach has one dedicated left-turn lane and one shared left/right/turn lane. There is significant queuing that occurs in the eastbound and westbound directions on US Route 7 (Grist Mill Road) that stems from the neighboring intersections and frequently extends into this intersection.

The traffic operations during both peak periods included heavy queuing on the eastbound and westbound US Route 7 (Grist Mill The northbound Glover Avenue approach was generally clear during the



AM peak with minor queuing during the PM peak. Vehicles were consistently noted using the dedicated turn lanes on US Route 7 (Grist Mill Road) to Glover Avenue in both directions as through lanes to avoid the extensive queuing. It was also noted in the westbound direction that almost all vehicles destined for the US Route 7 Expressway southbound would occupy the left, through lane at the US Route 7 (Grist Mill Road)/Glover Avenue intersection. The right, through lane at this intersection would generally remain empty with the exception of the few vehicles destined for Belden Hill Road or vehicles attempting to avoid the westbound queue and "slide" over into the left-turn lane at the US Route 7 (Grist Mill Road)/US Route 7 Expressway intersection.

Due to the short distances between the two neighboring signals, the SimTraffic analysis results show minimal delay for the eastbound and westbound approaches on US Route 7 (Grist Mill Road). Glover Avenue is a LOS E in the PM peak which appears accurate when compared to the field conditions. *Tables 6* and 7 in Section 3B contain overall LOS and delay results for the AM and PM peak hour Synchro 7/SimTraffic models, while the detailed results are provided in *Appendix D*.

From a pedestrian perspective, the only sidewalks are located on the east side of Glover Avenue and terminate where Glover Avenue meets US Route 7 (Grist Mill Road). There are no crosswalks and no pedestrian signal heads at this intersection.

Over the three-year period from 2006-2008, there were a total of thirty-six (36) crashes recorded at this intersection as shown in *Figure 41*. Nineteen (19) of the crashes were rear-end collisions, seven (7) were sideswipe collisions, seven (7) were angle collisions, and three (3) were unclassified collisions. The long queues and stop-and-go conditions in the eastbound and westbound directions are likely a contributing factor to the high number of rear-end crashes. Most of all reported crashes (78%) occurred during daylight and 89% occurred when the roadway surface was dry. Based on the crash data, the lighting and pavement conditions are not a significant contributing cause of crashes at this location.

Figure 38 is an excerpt from the Corridor Assessment Matrix. This location was ranked 3rd in the existing conditions evaluation matrix scoring a 10 for historical issues and traffic operation problems, and a 7 for safety. Based on this evaluation, concepts were developed and evaluated to improve conditions at this intersection. These short-term concepts are presented below.



Figure 38: Evaluation Matrix Excerpt for the Intersection of US Route 7 (Grist Mill Road) and Glover Avenue


Focus Area 7: US Route 7 (Grist Mill Road) & SR 719 (Main Avenue)/DMV





Figure 39: Intersection of US Route 7 (Grist Mill Road) and SR 719 (Main Avenue)/DMV

Focus Area 7: Existing Conditions

Figure 39 shows the intersection of US Route 7 (Grist Mill Road) and SR 719 (Main Avenue)/DMV. This intersection is probably the busiest intersection in the corridor, as it serves traffic for both US Route 7 and SR 719 (Main Avenue). The eastbound approach has one left-turn lane, one shared left/thru lane and a right-turn lane. The southbound approach has a left-turn, thru and right-turn lane, while the northbound approach has a left-turn lane and a thru/right lane. The westbound approach from the DMV has a shared thru/left turn lane and a shared thru/right turn lane. Major queuing occurs at the southbound and eastbound approaches during peak periods. There is a driveway to a Shell gas station and Starbucks restaurant within 100 feet north of the intersection. The proximity of these driveways to the intersection and the queuing that frequently exists in the southbound lanes contributes to difficulties for vehicles entering and exiting, particularly from/to northbound US Route 7 (Main Avenue). The southbound, eastbound and westbound approaches come into the intersection at a downgrade.





In the southbound direction, the right lane has queuing that extends well past the upstream intersection of West Rocks Road. A key contributing cause of this southbound right lane queuing is that almost all vehicles destined for the US Route 7 Expressway southbound use the left, westbound through lane approaching the Glover Ave intersection. This appears to be partially based on the change in striping and lane configuration on US Route 7 (Grist Mill Road) between Glover Ave and Grist Mill Road, where the through lane becomes a dedicated left-turn lane just past the Glover Avenue intersection, and onto the US Route 7 Expressway southbound.

The SimTraffic analysis results show the southbound approach has a very poor LOS F with an average delay of approximately two minutes in the AM and PM peak hours between West Rocks Road and SR 719 (Main Avenue)/DMV. *Tables 6* and 7 in Section 3B contain overall LOS and delay results for the AM and PM peak hour Synchro 7/SimTraffic models, while the detailed results are provided in *Appendix D*.

From a pedestrian perspective, sidewalks are complete on the east side of the intersection in front of the DMV, but no crosswalks are present on any legs of the intersection. Pedestrian push buttons are provided to cross the southbound US Route 7 (Main Avenue) approach, but no pedestrian signals heads are present. There were very few pedestrians counted crossing Main Avenue at this location, with only one crossing Main Ave, 12 crossed the driveway to the DMV, and 3 crossed Grist Mill Road.

Over the three-year period from 2006-2008, there were a total of forty-nine (49) crashes recorded at this intersection, as shown in *Figure 41*. Twenty-five (25) of the crashes were rearend collisions, sixteen (16) were sideswipes, four (4) were angle collisions, two (2) involved vehicles hitting a fixed object, one (1) was an overturn due to loss of control, and one (1) collision involved a bicyclist. The long queues in the southbound and eastbound directions likely contribute to the high number of rear-end crashes, similar to the intersection of US Route 7 and Grist Mill Road. The queue spillback from that intersection adds to the safety issues at this intersection since it is the cause of congestion in the southbound approach. Congestion and impatience of motorists wanting to "get-around" stopped/turning traffic likely contributes to both sideswipes and rear-end crashes. Most of all reported crashes (74%) occurred during daylight and 67% occurred when the roadway surface was dry. Based on the crash data, the lighting and pavement conditions are not a significant contributing cause of crashes at this location.

Figure 40 is an excerpt from the Corridor Assessment Matrix. This location was ranked 1st in the existing conditions evaluation matrix scoring a 10 for historical issues and traffic operation problems, a 9 for safety, and a 7 for pedestrian/bicycle safety. Based on this evaluation,





concepts were developed and evaluated to improve conditions at this intersection. These short-term concepts are presented below.



Figure 40: Evaluation Matrix Excerpt for the Intersection of US Route 7 (Grist Mill Road) and SR 719 (Main Avenue)/DMV





Figure 41: Crashes on US Route 7 (Grist Mill Road) from the US Route 7 Expressway to SR 719 (Main Avenue)

Sumbo	Accidents	Amount	S. of Tota				
aymbo	Type	Anount	76 01 1018				
	Angle	20	12				
* *	Rear-end	92	55				
¥	Sideswipe - same direction	31	19				
*/	Sideswipe · opposite direction	1	1				
	Fixed object	12	7				
~	Moving object	1	1				
~*	Overturn	2	1				
— × —	Head-on	0	0				
`	Backing	2	1				
в 🗧	Bicyc st	1	1				
P <	Pedestrian	0	0				
	Other/Unknown	4	2				
	TOTAL	166	100				
	Severity						
	Injury	29	17				
*	Fatality	1	1				
	Light Conditions						
Daylight		125	75				
Dark - Not Lit		3	2				
Dark Lit		35	21				
Dawn		0	0				
Dusk		2	1				
Unknown		1	1				
	Road Conditions						
Dry		122	74				
Wet		37	22				
Snow/Slush		2	1				
CB		3	2				
Sand/Mud/Dirt	101	0	0				
Other		0	0				
Unknown		2	1				
	Legend						
 Number 	r of Accidents	Signalized in	tersection				







Concept A: Signal Timing Changes

Evaluate modifications to the signal timing to better accommodate existing traffic volumes. SimTraffic analysis indicated congestion and delay, with intersection operating at LOS E and F during the peak periods with delays of up to 4 minutes in the PM peak. By modifying the signal timing/phasing for the three signals, operations potentially would be improved. Combining signal timing changes with other proposed changes would be expected to further improve traffic movement through the area.

Concept B: Extend NB Left Pocket on Expressway

Extend the northbound left-turn pocket on the US Route 7 Expressway, as seen in *Figure 42*, and create a more conventional striping setup for the left turn pocket. The extension of this left-turn lane separates the left-turning motorists from the right turns further in advance of the intersection. *Table 12* provides the simulation results for Concept B which shows northbound travel times from US Route 7 Expressway to West Rocks Road are reduced by 17 to 22 percent. Simulation results also show Level of Service (LOS) improvements for the northbound approach at US Route 7 Expressway and Grist Mill Road from LOS F with nearly two minutes of average delay to LOS E and less than 70 seconds of average delay after the improvements during the AM peak hour. Complete results for Concept B including all approaches are located in **Appendix D**.

		AM Peak		PM Peak			
Intersection (Approach)	LOS (Delay)			LOS (Delay)			
	Existing	Proposed	Percent Improvement	Existing	Proposed	Percent Improvement	
US 7 and Grist Mill Road (NB)	F (115)	E (69)	40%	F (224)	F (175)	22%	
US 7 and Glover Ave (EB)	B (17)	B (15)	12%	D (38)	C (30)	21%	
US 7 and Main Ave/DMV (EB)	C (32)	C (25)	22%	E (76)	E (61)	20%	
Travel Time (sec) – NB US 7 Expressway to West Rocks Road	226	187	17%	334	261	22%	

Table 12: SimTraffic Simulation Results for Concept B



Figure 42: Concept B - Extended Left Turn Only Lane



Modify the corridor signing and striping (see *Figure 43*):

- I. Addition of roadside or, if necessary, overhead lane signing on westbound Grist Mill Road approaching SR 7 Expressway
- II. Modify the striping of the right turn only lane on eastbound US Route 7 (Grist Mill Road) at Glover Avenue to be a right-thru lane. This would also require removal of the overlap right turn phase at this location. This allows for better traffic flow through the intersection and allows for motorists heading southbound on SR 719 (Main Avenue) to clear through the Glover Avenue intersection and not wait in the queue until after the Glover Avenue intersection.
- III. Modify the signing and striping on the westbound approach to Glover Avenue. This new signing and striping allows for better utilization of the dual left-turn lanes from US Route 7 (Grist Mill Road) to southbound US Route 7 Expressway. Advanced signing of this intersection improves traffic movement by reducing motorist confusion and allows lane utilization as intended. Better traffic flow through to the US Route 7 Expressway reduces the queue through US Route 7 (Grist Mill Road). It should be noted that the striped gore area across from Glover Avenue shown in Figure 43 is one option for guiding traffic to the appropriate lanes, and this striping maybe optional.

Table 13 has the simulation results for Concept C which shows southbound travel times from Foxboro Drive to US Route 7 Expressway are reduced by 38 to 48 percent. Simulation results also show Level of Service (LOS) improvements for the southbound approach at US Route 7 (Main Avenue) and SR 719/DMV from LOS F with over two minutes of average delay to LOS C and less than 25 seconds of average delay after the improvements. Complete results for Concept C including all approaches are located in **Appendix D**.

		AM Peak		PM Peak			
Intersection (Approach)	LOS (Delay)			LOS (D)elay)		
	Existing	Proposed	Percent Improvement	Existing	Proposed	Percent Improvement	
US 7 and Foxboro Drive (SB)	A (5)	A (4)	20%	C (32)	A (5)	84%	
US 7 and West Rocks Road (SB)	D (38)	B (12)	68%	E (63)	B (13)	79%	
US 7 and Main Ave/DMV (SB)	F (134)	C (22)	84%	F (131)	C (22)	83%	
Travel Time (sec) – SB Foxboro Drive to US 7 Expressway	292	180	38%	330	172	48%	

Table 13: SimTraffic Simulation Results for Concept C





Figure 43: Proposed Solution Signing and Striping for US Route 7 (Grist Mill Road) from US Route 7 Expressway to SR 719 (Main Avenue)

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Concept D: Add Second NB Left-Turn Lane on Expressway

Add a second northbound US Route 7 Expressway left-turn lane, striping accordingly, as seen in *Figure 43.* The addition of the second left-turn lane does not necessitate widening of the existing roadway, although changes would likely be needed to the existing median, and pavement. A larger volume of vehicles can be contained in the two dedicated lanes, thus eliminating blockage of the thru traffic on Route 7. Analysis of existing conditions indicated the existing signal operates at a LOS F on the northbound approach.

Table 14 has the simulation results for Concept B which shows northbound travel times from US Route 7 Expressway to West Rocks Road are reduced by 5 to 26 percent. Simulation results also show Level of Service (LOS) improvements for the northbound approach at US Route 7 Expressway and Grist Mill Road of 14 and 46 percent in the AM and PM peak hours, respectively. Complete results for Concept B including all approaches are located in **Appendix D**.

		AM Peak		PM Peak			
Intersection (Approach)	LOS (Delay)			LOS (D	elay)		
	Existing	Proposed	Percent Improvement	Existing	Proposed	Percent Improvement	
US 7 and Grist Mill Road (NB)	F (115)	F (99)	14%	F (224)	F (121)	46%	
US 7 and Glover Ave (EB)	B (17)	B (16)	6%	D (38)	C (31)	18%	
US 7 and Main Ave/DMV (EB)	C (32)	C (27)	16%	E (76)	E (63)	17%	
Travel Time (sec) – NB US 7 Expressway to West Rocks Road	226	215	5%	334	246	26%	

Table 14: SimTraffic Simulation Results for Concept D

Concept E: Channelize Movements at Main Avenue

Add channelizing right turn islands at the intersection of Main Street and Grist Mill Road *Figure* 44. This would simplify operations, allow continuous flow of vehicles turning right from Grist Mill Road to Main Avenue Southbound, and Main Avenue Southbound to Grist Mill Road. Concept E improvements were included in the operations analysis for Concepts B, C and D.



Figure 44: Concept E, Channelized Right Turns at Grist Mill Road and Main Avenue

Concepts for Future Consideration:

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

- i. Roundabout. Roundabouts have been proven to improve safety by reducing conflicts between vehicles, specifically angle, and head-on collisions. The introduction of a roundabout at the intersection of the SR 7 Expressway Terminus at Grist Mill Road would force motorists entering to reduce their speed due to the need to yield to motorists in the roundabout. The continual flow of traffic can improve operations, and reduce queues. Further study and analysis would be required to assess the impacts. This alternative would likely result in a high level of geometric changes to the roadway.
- ii. A combined Roundabout that connects the intersections of Grist Mill Road and the SR 7 Expressway, and Grist Mill Road and Glover Avenue would require significant geometric changes, and further study to determine feasibility, impacts and costs, but may be a suitable long term solution at this location.
- iii. A connector roadway, or slip ramp between the SR 7 Expressway and Glover Avenue that would remove vehicles turning onto Glover from using Grist Mill Road.

Concept Evaluation Summary: *Table 15* summarizes the short term concepts discussed above and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety, and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. Based on the preliminary evaluation, these concepts appear to be feasible, but will need to be evaluated in more detail and compared to other areas and improvements to determine prioritization.

Concept		Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)			
	Description	Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities
А	Signal Timing Changes	Low	Low	Low	None	None	None	None
В	Extend NB Left-Turn Pocket on Expressway	Medium	Low	None	Low	None	None	None
С	Modify Signing and Striping	High	Medium	None	None	None	None	None
D	Add Second NB Left- Turn Lane on Expressway	Medium	Medium	None	Low	None	None	None
E	Channelize Movements at Main Avenue	Low/Med	Medium	None	Low	Low	None	None

Table 15: Anticipated Benefit/Potential Impacts of Concepts for Focus Areas 5, 6, and 7



Focus Area 8:

US Route 7 (Main Avenue) between US Route 7 (Grist Mill Road) (MP 4.13) and West Rocks Road (MP 4.35)





Figure 45: US Route 7 (Main Avenue) between US Route 7 (Grist Mill Road) and West Rocks Road

Focus Area 8: Existing Conditions

The mid-block segment between the signalized intersections of US Route 7 (Grist Mill Road) and West Rocks Road has a four-lane cross-section with no shoulders. It contains strip malls, restaurants, and a gas station as shown in *Figure 45*. The gas station driveways are between 100 and 200 feet north of the US Route 7 (Grist Mill Road) intersection on the west side of US Route 7 (Main Avenue). During peak periods, traffic is queued in the southbound direction along the entire mid-block segment, mostly in the right lane. Northbound vehicles attempting to turn left into the gas station remain stopped in a thru lane until a gap is created by drivers in the southbound lanes, which does not occur often. As noted in the





The traffic operations during both peak periods included heavy southbound delay stemming from the US Route 7 (Grist Mill Road) intersection that extends through West Rocks Road. The combination of this extensive queuing in the southbound right lane and multiple, frequent curb cuts for businesses creates a situation where northbound left-turning vehicles have an extremely difficult time making turns into business driveways. During site visits, it appeared most of the drivers familiar with the area would avoid the northbound left through lane in an attempt to avoid the potential left-turn queuing. During the PM peak, left-turn queuing results in northbound queuing extending from the West Rocks Road intersection nearly back to the DMV. This northbound queuing creates a situation similar to the southbound direction where vehicles have a difficult time making a left turn into the businesses on the east side of US Route 7 (Main Avenue).

The Synchro 7/SimTraffic model did not include mid-block access points due to the limitation of the program; therefore, there are no simulation results to report for this mid-block section.

From a pedestrian perspective, sidewalks are only complete on the east side of US Route 7 (Main Avenue) from the DMV to the Hilton Hotel approximately 600 feet to the north. Frequent curb cuts, very heavy traffic volume, and minimal to no shoulder create an unfriendly environment for pedestrians.

As can be seen in *Figure 47*, there were a total of 114 crashes reported between 2006 and 2008, which translates to an average of 43.8 crashes per 1/10th of a mile. Of the 114 crashes, there were sixty (60) angle collisions, thirty-three (33) rear-end collisions, fourteen (14) sideswipes, three (3) involving vehicles hitting a fixed object, two (2) pedestrian crashes, one (1) was a backing collision, and one (1) was an unclassified collision. These statistics are consistent with the roadway conditions and safety concerns mentioned above. The high number of rear-end crashes are also indicative of the high volumes on the roadway and the significant volumes of people stopping or slowing to enter driveways. Sideswipes may also indicate that there are high numbers of motorists attempting to avoid others who are slowing or stopping to enter driveways. Most of all reported crashes occurred during daylight conditions (89%) and dry roadway conditions (66%), indicating that roadway lighting and pavement conditions are not a primary factor.

Figure 46 is an excerpt from the Corridor Assessment Matrix. This location was ranked 4th in the existing conditions evaluation matrix scoring a 10 for safety, 9 for traffic operation problems, and 7 for pedestrian/bicycle safety. Based on this evaluation, concepts were developed and evaluated to improve conditions at this intersection. These concepts are presented in the following section.





Figure 46: Evaluation Matrix Excerpt for mid-block US Route 7 (Main Avenue) between US Route 7 (Grist Mill Road) and West Rocks Road





Figure 47: Crashes Along US Route 7 (Main Avenue) from US Route 7 (Grist Mill Road) to West Rocks Road

% of Tota
52
29
12
0
3
0
0
0
1
0
2
1
100
22
0
89
0
10
0
1
0
66
31
1
0
0
0
Z





Focus Area 8: Concept Development

Concept 8A: Eliminate/Consolidate Driveways

Restrict left-turn access to/from properties during peak hours and/or modify access points to permit RI/RO access, particularly those near intersections and with significant numbers of angle collisions (Shell, Starbucks exit, Center 7 shopping center, etc.). By restricting or reducing property accesses, the number of left-turning vehicles and potential conflicts is reduced. With more than 80% of crashes being angle and rear-end collisions, reducing driveways and the type of access allowed at each could help to avoid these types of crashes.

Concepts for Future Consideration:

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

- i. Depending on other physical changes in the surrounding area, if traffic volumes were reduced, it may be possible to reduce the cross-section of US Route 7 (Main Avenue) to add a two-way left turn lane (TWLTL), as shown in *Figure 48*. By adding a TWLTL, left-turning motorists are removed from the thru-lanes, reducing rear-end collisions, sideswipes, and even queuing. The chances for conflict between motorists turning left from driveways is also reduced since they would no longer have to cross two lanes of traffic to get to the direction in which they desire to go. This alternative would require additional investigation and study, and would be part of a corridor approach, rather than as an individual section
- ii. Increase the cross section to add a TWLTL as seen in *Figure 49*. Similar to the previous concept discussed, by adding a TWLTL for motorists and removing the left turns from the thru-lanes, thru-traffic is able to better avoid conflicts that may normally result, specifically rear-end and sideswipe collisions, which together account for over 40% of the crashes in this corridor. This alternative would likely impact right-of-way, utilities and access points.

Concept Evaluation Summary: *Table 16* summarizes the short term concepts discussed above and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety, and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. Based on the preliminary evaluation, these concepts appear to be feasible, but will need to be evaluated in more detail and compared to other areas and improvements to determine prioritization.

Concept	Description	Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)			
	Description	Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities
8A	Eliminate/Consolidate Driveways	Medium	Medium	Low	None	High	Medium	Low

Table 16: Anticipated Benefit/Potential Impacts of Concepts for Focus Area 8





7

Figure 48: Decrease Cross-Section and Add Center Left-Turn Only Lane



Figure 49: Increase Cross-Section to Add Center Left-Turn Only Lane



Focus Area 9: US Route 7 (Main Avenue) & West Rocks Road





Figure 50: Intersection of US Route 7 (Main Avenue) and West Rocks Road

Focus Area 9: Existing Conditions

As shown in Figure 50, the intersection of US Route 7 (Main Avenue) and West Rocks Road, US Route 7 (Main Avenue) approaches the intersection from the south at an upgrade and both US Route 7 (Main Avenue) from the north and West Rocks Road from the east approach the intersection at a downgrade. Motorists entering the intersection from westbound West Rocks Road also enter the intersection from a tree-lined horizontal curve, potentially making visibility an issue. Both northbound and southbound approaches on US Route 7 (Main Avenue) have two thru-lanes and one dedicated left-turn lane. The northbound US Route 7 (Main Avenue) approach currently has a short, 75-foot dedicated right-turn lane. The westbound approach of West Rocks Road has been restriped as a dedicated left lane and shared thru/right lane which is permitted to turn right on red. The eastbound approach of West Rocks Road is a driveway to the i.park facility.

queuing on the northbound and southbound US Route 7 (Main Avenue) approaches. The



southbound queuing is related to the capacity issues downstream at US Route 7 (Grist Mill Road). The northbound queuing, more so in the PM peak, appears to be related to capacity issues and the access points to Shell gas station and Walmart just north of the intersection. The westbound West Rocks Road approach had significant volume, but generally cleared every cycle.

The SimTraffic analysis results show the southbound US Route 7 (Main Avenue) approach has some spillback queuing and delay from the downstream intersection during the PM peak. The PM peak results also show significant delays of greater than two minutes for the West Rocks Road approaches. This is due to the difficulty of modeling an extremely congested area in SimTraffic as the sidestreet vehicles find it difficult to "push" their way into the southbound US Route 7 (Main Avenue) queue. The southbound US Route 7 (Main Avenue) queue in this part of the network extended well past West Rocks Road and back to Gateway Shopping center in the SimTraffic model (consistent with field observations). *Tables 6* and 7 in Section 3B contain overall LOS and delay results for the AM and PM peak hour Synchro 7/SimTraffic models, while the detailed results are provided in *Appendix D*.

From a pedestrian perspective, sidewalks are complete on the northeast corner of the intersection at the Shell gas station, and on the bridge structure crossing the Norwalk River on the eastbound West Rocks Road approach. Crosswalks are provided on the southbound and eastbound approaches, but pedestrian push buttons and pedestrian signal heads are only provided crossing the southbound US Route 7 (Main Avenue) approach.

A bicycle and pedestrian plan was completed for the US Route 7 corridor in Norwalk in January, 2012 (*Norwalk Pedestrian & Bikeway Transportation Plan, January, 2012, Fitzgerald & Halliday, Inc.*), where a shared-lane marking, or sharrow, was recommended for West Rocks Road near its junction with US Route 7 (Main Avenue) to help guide bicyclist and inform motorist to expect to see bicyclist on the street.

On the southeast corner of the intersection is a carpet store with a driveway on West Rocks Road approximately 50 feet east of the intersection. On the northeast corner of the intersection is a Shell gas station with driveways within 50 feet of both legs of the intersection. These driveways along with others up to 150 feet from the intersection offer access to Wal-Mart, which is set back further from the roadway. The proximity of these driveways to the intersection create numerous opportunities for turning and conflicting traffic and are likely a factor in the high number of crashes occurring at the intersection.

Over the three-year period from 2006-2008, there were a total of thirty-eight (38) crashes recorded at this intersection as shown in *Figure 52*. Nineteen (19) of the crashes were rear-end collisions, nine (9) were angle collisions, six (6) were sideswipes, one (1) was an overturn due to equipment failure, one (1) involved a vehicle hitting a fixed object, one (1) was a backing collision, and one (1) involved a vehicle hitting a moving object. Most of all reported crashes (66%) occurred during daylight and 63% occurred when the roadway surface was dry. Based on the crash data, the lighting and pavement conditions are not a significant contributing cause of crashes at this location, but may need to be investigated further.





the existing conditions evaluation matrix scoring a 9 for traffic operation problems, 8 for safety, and 6 for historical issues. Based on this evaluation, concepts were developed and evaluated to improve conditions at this intersection. These concepts are presented in the following section.

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	All october assessments creation and the construction of the const
	the costs of the Cost of the set
West Rocks Rd	6 9 8 1 2 26

Figure 51: Evaluation Matrix Excerpt for the Intersection of US Route 7 (Main Avenue) and West Rocks Road





Figure 52: Crashes at the Intersection of US Route 7 (Main Avenue) and West Rocks Road



Focus Area 9: Concept Development

Concept 9A: Signal Timing Changes

Although the operations at the signal are reported as failing under existing conditions, the cause of the failure is related to the congestion and failure downstream at Grist Mill Road with the queues extending beyond West Rocks Road causing the delay. Modifications to the signal timing may improve traffic flow and reduce delay and congestion when combined with other corridor improvements. These improvements would need to be assessed further as a network assessment comparing travel times before and after the implementation of other concepts.

Concept 9B: Eliminate/Consolidate Driveway

Reconfigure/consolidate the driveway access point south of the intersection as shown in *Figure* **53**. By reducing access points near intersections, and/or converting to right in-right out only, the number of left-turning vehicles and potential conflicts is reduced. Another secondary driveway concept would be to restrict left-turns during peak hours. Reducing driveways and the types of access allowed at each can help to avoid angle, rear-end, and sideswipe collisions as well as queuing.



Figure 53: Concept 9B - Reconfigure Driveway Access





Concepts for Future Consideration:

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

i. Widen Kent Road to provide an alternate access to/from i.park, as shown in *Figure 54*. With roadway improvements providing additional capacity, Kent Road could become a useful alternative access point for i.park. With an alternate access, the volumes at the West Rocks Road could be significantly reduced and improve movement through the intersection, reducing queuing and delays.



Figure 54: Widen Kent Road

ii. Extend Foxboro Drive into i.park, as seen in *Figure 55.* By adding another access to the i.park area, volumes through the West Rocks Road intersection can be reduced. This could allow for longer green times in the northbound and southbound directions of US Route 7 (Main Avenue) which would then reduce delays and queuing.





Figure 55: Extend Foxboro Drive into i.park.

Concept Evaluation Summary: *Table 17* summarizes the short term concepts discussed above and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety, and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. Based on the preliminary evaluation, these concepts appear to be feasible, but will need to be evaluated in more detail and compared to other areas and improvements to determine prioritization.

Concept		Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)			
	Description	Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities
9A	Signal Timing Changes	Medium	Low	Low	None	None	None	None
9B	Eliminate/Consolidate Driveway	Medium	Medium	Low	None	Medium	None	None

Table 17: Anticipated Benefit/Potential Impacts of Concepts for Focus Area 9



Focus Area 10: US Route 7 (Danbury Road) & Gateway Shopping Center





Figure 56: Intersection of US Route 7 (Danbury Road) and Gateway Shopping Center





Focus Area 10: Existing Conditions

Figure 56 shows the intersection of US Route 7 (Danbury Road) and the main Gateway Shopping Center exit, where US Route 7 (Danbury Road) approaches the intersection from the south at an upgrade whereas both US Route 7 (Danbury Road) from the north and the shopping center drive from the east approach the intersection at a downgrade. Both northbound and southbound approaches on US Route 7 (Danbury Road) have two shared thru/turn lanes, and left turns are prohibited in the southbound direction. The westbound approach of the shopping center has two shared exit turning lanes where right turns on red are allowed. The eastbound approach driveway to the strip mall has no signing or striping on the intersection approach.

On the east side of the intersection is the Gateway Shopping Center and on the west side is a strip mall including mostly smaller stores. In addition to the exit from the Gateway Shopping Center at the signal, two other exits exist: One located at the northern end of the shopping center and one located approximately 100 feet south of the signal, which appears to be primarily used for deliveries and employees. The only entrance to the shopping center for southbound motorists is 300 feet north of the signal at an unsignalized location with an approximately 8-foot wide striped area to move out of the southbound US Route 7 (Danbury Road) through lanes. Missing this entrance could cause potential issues if the motorist is unfamiliar with the area.

The southbound traffic operations during the AM peak period generally operated well with minimal queuing and delay. During the PM peak in the southbound direction queuing sporadically extended back to the Gateway Shopping Center. The northbound direction during the AM and PM peak periods had slow moving traffic approaching the signal which could be due to the horizontal curve that begins south of Foxboro Road. During the travel time runs for both peaks, the run stopped at a red light at this intersection, so signal coordination may be an issue as well.

With no traffic volumes available for this intersection, a Synchro 7/SimTraffic analysis was not conducted.

From a pedestrian perspective, sidewalks are complete on the east side of US Route 7 (Danbury Road) along the Gateway Shopping Center, but missing on the west side along the strip mall. There is a pedestrian push button on the northeast corner, but no painted crosswalks.

Over the three-year period from 2006-2008, there were a total of thirty-four (34) crashes recorded at this intersection as seen in *Figure 58*. Sixteen (16) of the crashes were rear-end collisions, ten (10) were sideswipe collisions, seven (6) were angle collisions, and one (1) was an overturn due to loss of control. The high percentage of sideswipe and rear-end crashes is indicative of the numerous access points and lack of lanes to separate turning traffic. Most of all reported crashes (76%) occurred during daylight and (59%) occurred when the roadway surface was dry. This indicates that lighting and pavement conditions do not appear to be the primary cause of crashes, although both percentages are slightly lower than other locations throughout the corridor so both the lighting and pavement conditions may need to be investigated further.





the existing conditions evaluation matrix scoring a 9 for historical/local issues, 8 for traffic operation problems, and a 7 for safety. Based on this evaluation, concepts were developed and evaluated to improve conditions at this intersection. These concepts are presented in the following section.



Figure 57: Evaluation Matrix Excerpt for the Intersection of US Route 7 (Danbury Road) and the Gateway Shopping Center





Figure 58: Crashes at the Intersection of US Route 7 (Danbury Road) and Gateway Shopping Center



Focus Area 10: Concept Development

Concept 10A: Signal Timing Changes

Evaluate modifying the signal timing and coordination for the traffic signals along US Route 7 (Danbury Road), to improve traffic flow between intersections thereby reducing congestion and delay. This concept would be part of a system-wide signal retiming.

Concept 10B: Modify Kent Left-Turn Lane

Modify the striping between the northern Gateway Shopping Center driveway and the Kent Road intersection such that the current exclusive left-turn lane northbound is split between an exclusive left-turn lane northbound onto Kent Road and an exclusive left-turn lane southbound into the Gateway Shopping Center driveway, as seen in *Figure 59*. This entrance is the only way southbound motorists can access the Gateway Shopping Center. By removing them from the thru-travel lanes, potential conflicts are avoided and a reduction in the number of crashes and queuing issues would likely result. This may require a change to the adjacent driveway to make it right-in right-out only.



Figure 59: Concept 10B - Divide Kent Road Left-Turn Only Lane

Concept 10C: Striping from Strip Mall

Provide striping at the westbound entrance for the right and left turns, as seen in *Figure 60*. By designating where motorists should be for certain movements reduces confusion and the potential for conflicts. Currently motorists entering the shopping area could face conflicts with motorists attempting right- and left-turn movements without the proper lane designation. Waiting for the turning motorists to move could cause conflict with the southbound traffic so providing designated space for all possible movements at this entrance is very beneficial. This concept may require changes to the signal head locations.



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Figure 60: Concept 10C - Add Striping to Eastbound Approach

Concepts for Future Consideration:

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

i. Widen US Route 7 (Danbury Road) in front of the Gateway Shopping Center to continue the 5-lane cross-section throughout the corridor and eliminate the "pinch point" of approximately 700 feet of 4-lane cross-section. This would be coupled with widening and shifting the Gateway Shopping Center driveway such that southbound left turns could be made into the driveway, as seen in *Figure 61*. Additional signals might need to be added and the signal timing would need to be adjusted to properly account for the new movement.





Figure 61: Widen US Route 7 and Gateway Shopping Center Driveway

ii. In combination with other alternatives, some accesses to the strip mall on the southbound side of US Route 7 (Danbury Road) could be eliminated. Reducing the number of access points along the roadway would reduce the number of conflict points between motorists.

Concept Evaluation Summary: *Table 18* summarizes the short term concepts discussed above and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety, and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. Based on the preliminary evaluation, these concepts appear to be feasible, but will need to be evaluated in more detail and compared to other areas and improvements to determine prioritization.

Concept	Description	Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)			
	Description	Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities
10A	Signal Timing Changes	Low/Med	-	None	None	None	None	None
10B	Modify Kent Left-Turn Lane	Low	Low	None	None	Low	None	None
10C	Striping from Strip Mall	Low	None	None	None	Low	None	None

 Table 18: Anticipated Benefit/Potential Impacts of Concepts for Focus Area 10









Figure 62: Intersection of US Route 7 (Danbury Road) and Kennsett Ave

Focus Area 11: Existing Conditions

Figure 62 shows the signalized T-intersection of US Route 7 (Danbury Road) and Kennsett Avenue. This intersection is part of an 800 foot long pinch point where no exclusive left-turn lanes are provided. North and south of the intersection, exclusive left-turn lanes are provided creating a zone in which left-turning motorists must make turning movements from thru-lanes. US Route 7 (Danbury Road) approaches the intersection from the south at an upgrade and approaches the intersection from the north at a downgrade. Both northbound and southbound approaches on US

Route 7 (Danbury Road) have two shared thru/turn lanes. The westbound approach of Kensett



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Avenue has two lanes with worn striping and no signs indicating lane usage. The westbound approach includes two driveways, one an entrance only to a bank and the other an entrance/exit to a small shopping center. Less than 100 feet in any direction is another driveway to more shops or banks. To the north, a bank driveway is exit only and can be difficult for those attempting to go southbound.

On the west side of the intersection are multiple small shopping centers, a bank, and a Dunkin' Donuts which creates access issues due to increased activity this business creates and the proximity of the access to the intersection. On the northeast corner is Chase Bank with driveways less than 100 feet from both legs of the intersection. On the southwest corner is HSBC Bank, also with driveways less than 100 feet from both legs of the intersection.

The traffic operations at this intersection generally operated well for both peaks. Depending on the arrival rate of southbound left-turning vehicles, occasionally a southbound queue in the left lane would be present. The Dunkin' Donuts entrance 100 feet to the north caused northbound drivers to queue in the left lane causing other drivers to weave around them. It was also noted that drivers had difficulty exiting this access point heading north on US Route 7 (Danbury Road).

The SimTraffic analysis showed LOS A on US Route 7 (Danbury Road) and LOS C or LOS D on Kennsett Avenue. **Tables 6** and **7** in Section 3B contain overall LOS and delay results for the AM and PM peak hour Synchro 7/SimTraffic models, while the detailed results are provided in **Appendix D**.

From a pedestrian perspective, sidewalks are complete on the east side of US Route 7 (Danbury Road), but missing on the west side. Pedestrian push buttons are located on the southeast corner, and the island on the west side of US Route 7 (Danbury Road) directly across Kennsett Ave, but no marked crosswalks are present.

Over the three-year period from 2006-2008, there were a total of fifty-four (54) crashes recorded at this intersection as seen in *Figure 64*. Thirty (30) of the crashes were rear-end collisions, nineteen (19) of the crashes were angle collisions, and five (5) were sideswipes. With the simulation results and field observations indicating that traffic flows relatively well at this location, the high number of rear end crashes is indicative of unexpected turns or stops. Three of the sideswipes and eleven rear-ends occurred in the northbound direction at the entrance to Dunkin Donuts. Most of all reported crashes (87%) occurred during daylight and 65% occurred when the roadway surface was dry. Based on the crash data, the lighting and pavement conditions are not a significant contributing cause of crashes at this location.

Figure 63 is an excerpt from the Corridor Assessment Matrix. This location was ranked 14th in the existing conditions evaluation matrix scoring a 9 for safety, an 8 for historical issues, and a 5 for traffic operation problems. Based on this evaluation, concepts were developed and evaluated to improve conditions at this intersection. These concepts are presented in the following section.





Figure 63: Evaluation Matrix Excerpt for the Intersection of US Route 7 (Danbury Road) and Kennsett Avenue





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Figure 64: Crashes at the Intersection of US Route 7 (Danbury Road) and Kennsett Avenue



Focus Area 11: Concept Development

Concept 11A: Signal Timing Changes

Evaluate modifying the signal timing and coordination for the traffic signals along US Route 7 (Danbury Road), to improve traffic flow between the intersection thereby reducing congestion and delay. This concept would be part of a system-wide signal retiming.

Concept 11B: Advanced Signing

Add advanced signing stating that motorists should "Be Prepared to Stop" along the northbound approach to the intersection. Adding these signs would help to provide advance warning to motorists approaching the signal from the south, and could help reduce the number of rear-end collisions at the northbound approach.

Concept 11C: Left-Turn Restrictions

Consider left-turn restrictions into businesses along the west side of US Route 7 (Danbury Road). This would be combined with retiming of the signal to assist in allowing left-turning motorists adequate time to execute their left-turn movement at the signal. This would also assist in reducing conflicts between northbound and southbound motorists at the unsignalized driveways just north of the intersection.

Concepts for Future Consideration:

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

i. Reduce the cross-section of US Route 7 (Danbury Road) such that there is a center left-turn only lane, as seen in *Figure 65*. This would create room for exclusive left-turn lanes at the intersection as well as north of the intersection at the entrance for Dunkin' Donuts. The Dunkin' Donuts driveway in particular has a high number of rear-end (11) and angle (8) collisions. The addition of a center-turn lane would allow left-turning motorists to be removed from the through lanes and potentially lower the number of rear-end collisions occurring at this location. With a center left-turn only lane the motorists would have to cross fewer lanes of traffic, which could help reduce the number of angle collisions. This concept would need to be part of a larger road-diet concept which would depend on other physical changes to area roadways that could reduce the traffic volumes on this section of road.





Figure 65: Center Left-Turn Only Lane at Kennsett Avenue

ii. Create exclusive left-turn lanes at Kennsett Avenue. Coupled with the proper signal timing, the addition of the turning lane would attract motorists that typically wait considerable amounts of time to execute left-turn movements both at the signal and north of the signal. This would then reduce the potential conflicts between left-turning and southbound motorists. An exclusive left-turn lane or even back-to-back exclusive left-turn lanes between this driveway and the intersection, as seen in *Figure 66*, would also reduce rear-end collisions, the most common collision at this intersection, between northbound motorists and left-turning motorists. The addition of a signal for eastbound motorists would also draw motorists making eastbound movements outside of the signalized intersection. The resulting widening of the roadway at Kennsett Avenue should continue north and south of the intersection to match up with the existing 5-lane configuration at the next intersection in both directions. This would relieve the "pinch


point" feeling at Kennsett Avenue due to the current reduction from 5 lanes to 4 lanes in each direction.



Figure 66: Exclusive Back-to-Back Left-Turn Lanes





		Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)				
Concept	Description	Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities	
11A	Signal Timing Changes	Low/Med	-	None	None	None	None	None	
11B	Advanced Signing	None	Low	None	None	None	None	None	
11C	Left-Turn Restrictions	Low	Low	None	None	None	None	None	

Table 19: Anticipated Benefit/Potential Impacts of Concepts for Focus Area 11



Focus Area 12: U.S. Route 7 (Danbury Road) & Grumman Hill Road





Figure 67: Intersection of US Route 7 (Danbury Road) and Grumman Hill Road

Focus Area 12: Existing Conditions

Figure 67 shows the signalized intersection of US Route 7 (Danbury Road) and Grumman Hill Road. US Route 7 (Danbury Road) has a shared thru/left and shared thru/right lane in each direction, and right turn on red is allowed in both directions. The westbound approach of Grumman Hill Road has one lane, and the eastbound approach has a shared left/thru lane and a short right-turn lane.

On the west side of the intersection is ASML, a large production company. On the northeast corner of the intersection is a sporting goods store with a driveway 100 feet north of the intersection. On the southeast corner of the intersection is a building with a driveway on Grumman Hill Road about 100 feet to the east which does not seem to impact the intersection.



The traffic operations at this intersection were focused around the left-turning traffic occupying the left lane on US Route 7 (Danbury Road). The lack of left-turn lanes at this intersection causes drivers to over-utilize the right/through lane, and drivers that get caught behind left-turning traffic weave around vehicles causing an unsafe situation where sideswipes and rearend crashes could occur.

The SimTraffic analysis showed LOS C and LOS D for average overall intersection delay, but the bigger concern at this intersection is the safety issues associated with no left-turn lanes.

From a pedestrian perspective, there are no sidewalks in the area or crosswalks on any approaches, but pedestrian push buttons are included on the northwest and northeast corners of the intersection.

Over the three-year period from 2006-2008, there were a total of forty-three (43) crashes recorded at this intersection as seen in *Figure 69*. Twenty-one (21) of the crashes were rearend collisions, fourteen (14) were angle collisions, five (5) were sideswipes, and three (3) involved a vehicle hitting a fixed object. The types of crashes are indicative of the conditions (lack of turn lanes) that exist at the intersection. Most of all reported crashes (82%) occurred during daylight and 56% occurred when the roadway surface was wet. This indicates that lighting conditions are not the significant contributing factor in the crashes at this location but pavement conditions might need to be investigated further as the percentage of wet surface crashes is relatively high compared to the rest of the corridor.

Figure 68 is an excerpt from the Corridor Assessment Matrix. This location was ranked 7th in the existing conditions evaluation matrix scoring a 9 for historical issues and an 8 for safety and traffic operation problems. Based on this evaluation, concepts were developed and evaluated to improve conditions at this intersection. These concepts are presented in the following section.



Figure 68: Evaluation Matrix Excerpt for the Intersection of US Route 7 (Danbury Road) and Grumman Hill Road





Figure 69: Crashes at the Intersection of US Route 7 (Danbury Road) and Grumman Hill Road



Focus Area 12: Concept Development

Concept 12A: Signal Timing Changes

Evaluate modifications to the signal timing to improve traffic flow and reduce delay and congestion. Specifically, a southbound lead phase in the PM peak should be evaluated and considered in the same manner as the existing northbound lead phase in the AM peak. During the AM peak the northbound left is heavier due to residents heading to work at the ASML manufacturing building, and during the PM peak the southbound left is heavier due to residents heading back to their homes along Grumman Hill Road. It should be noted that traffic counts for Grumman Hill Road were based on 2009 counts and not collected as part of Phase I. Updated turning movement counts need to be collected for a proper evaluation.

Concept 12B: Advanced Signing

Add advanced signing warning motorists of the upcoming signal and potential for stopped traffic. The signing would increase motorist awareness of the signal and better prepare them for potential conflicts. This could reduce rear-end collisions as well as angle collisions due to motorists unintentionally running red lights.

Concepts for Future Consideration:

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

- i. Add exclusive left-turn lanes on US Route 7 (Danbury Road) at the signal. Coupled with modifying the signal timing, this would allow a safe amount of time for left-turning motorists to exit the intersection safely and potentially avoid conflicts with thru-motorists. With turning motorists allotted the proper timing, there would be a reduced amount of "last-minute" turning in order to make the light, which also creates conflicts with the northbound and southbound motorists. Also, by removing the left-turning motorists from the thru-lanes, rear-end and sideswipe collisions would be reduced along with queues and delays. This would likely have ROW impacts and potentially access and utility impacts.
- ii. When compared to other similar locations along the corridor, there is a higher percentage of crashes reported occurring on wet-surface (56%). Future redesigns of the intersection should evaluate if drainage/roadway surface is an issue.





Concept Evaluation Summary: *Table 20* summarizes the short term concepts discussed above and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety, and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. Based on the preliminary evaluation, these concepts appear to be feasible, but will need to be evaluated in more detail and compared to other areas and improvements to determine prioritization.

	Description	Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)				
Concept	Description	Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities	
12A	Signal Timing Changes	Low- Medium	-	Low	None	None	None	None	
12B	Advanced Signing	Low	None	None	None	None	None	None	

Table 20: Anticipated Benefit/Potential Impacts of Concepts for Focus Area 12



Focus Area 13: US Route 7 (Danbury Road) between Grumman Hill Road (MP 5.28) and Route 33 (Westport Road) (MP 6.00)





Figure 70: US Route 7(Danbury Road) between Grumman Hill Road and Route 33 (Westport Road)





Focus Area 13: Existing Conditions

Figure 70 shows the mid-block segment between the signalized intersections of Grumman Hill Road and Route 33 (Westport Road). It is difficult to see in the figure, but this section is generally a three-lane section with shoulders varying from 0 to 6 feet. The section tapers to and from a four-lane roadway with the southbound direction varying from one lane in the corridor to two lanes within 0.10 miles of Grumman Hill Road and Route 33 (Westport Road). This section is more rural than other sections of US Route 7 with a few businesses and two residential neighborhoods entering/exiting onto US Route 7 (Danbury Road).

The traffic operations during both peak periods included vehicles over-utilizing the right northbound through lane to avoid possible queued left-turning vehicles. In the southbound direction vehicles generally slowed down at the lane reduction from two to one. Between 8:45 and 9:00 AM on April 11, 2012 the queue from the southbound lane drop extended back through Wolfpit Road to Sharp Hill Road. Also, in the southbound direction there are locations within the one-lane section where there is almost no shoulder, and if there is a left-turning vehicle waiting to turn this causes extensive queuing as there is no room to "slide" around the queued vehicle.

The Synchro 7/SimTraffic model did not include mid-block access points; therefore, there are no simulation results to report for this mid-block section.

From a pedestrian perspective, there is one complete sidewalk on the east side of US Route 7 (Danbury Road) for approximately 0.15 miles in front of the Wilton Hill Condos property. The driveway for the condos is also equipped with pedestrian crosswalks.

As can be seen in *Figure 72*, there were a total of 51 crashes reported between 2006 and 2008, which translates to an average of 7.6 crashes per 1/10th of a mile. Of the 51 crashes, there were twenty-four (24) rear-end collisions, thirteen (13) sideswipes, seven (7) angle collisions, four (4) involving vehicles hitting a fixed object, two (2) involving vehicles hitting a moving object, and one (1) backing collision. The high number of rear-end collisions indicate there are high volumes on the roadway, with a significant amount of people stopping/slowing for business and residential driveways. The high number of rear-end collisions specifically nearing the intersection with Route 33 (Westport Rd) signifies the impact the traffic signal has on the traffic northbound on US Route 7. A sideswipe being the second most common collision in this section indicates that many motorists may be swerving to avoid other motorists stopped in the roadway to turn into driveways. Something to note is the repetition of sideswipes occurring due to drivers making illegal passing maneuvers southbound. Most of all reported crashes occurred during daylight conditions (86%) and dry roadway conditions (51%), indicating that roadway lighting and pavement conditions are not a concern, though with 39% of collisions occurring when the roadway was wet it may be something to look into further.

Figure 71 is an excerpt from the Corridor Assessment Matrix. This location was ranked 13th in the existing conditions evaluation matrix scoring an 8 for historical issues, 6 for traffic operations and 5 for both safety and pedestrian/bicycle safety issues. Based on this evaluation, concepts were developed and evaluated to improve conditions at this intersection. These concepts are presented in the following section.





Figure 71: Evaluation Matrix Excerpt for midblock US Route 7 (Danbury Road) from Grumman Hill Road to Route 33 (Westport Road)





Figure 72: Crashes along US Route 7 (Danbury Road) between Grumman Hill Road and Route 33 (Westport Road)



111

Accidents									
Symbo	Туре	Amount	% of Tota						
	Angle	7	14						
	Rear-end	24	47						
~	Sideswipe - same direction	11	21						
*	Sideswipe - opposite direction	2	4						
	Fixed object	4	8						
~	Moving object	2	4						
<	Overturn	0	0						
``	Head-on	0	0						
	Backing	1	2						
в	Bicyc st	0	0						
P <	Pedestrian	0	0						
÷	Other/Unknown	0	0						
	TOTAL	51	100						
	Severity								
	Injury	16	31						
*	Fatality	0	0						
	Light Conditions								
Daylight		44	86						
Dark - Not Lit		3	6						
Dark - Lit		3	6						
Dawn		0	0						
Dusk		1	2						
Unknown		0	U						
D-1	Road Conditions								
Ury		26	51						
Wet Count? Link		20	39						
anowratuan		2	*						
Cond/Mud/Okt	01		2						
Other		0	2 0						
Unknown		1	2						
• Numbe	r of Accidents	Signalized in	ntersection						
	URBAN ENGINEERS, INC. HARTFORD SQUARE WEST SUITE 2:203 75 CHARTER OWA AVENUE HARTFORD, CT 06106								
	AND IMPLEMENTATION PLAN NORWALK AND WILTON, CONNECTICUT								
	STUDY AREA CRASHES BY TYPE JANUARY 2006 - DECEMBER 2008 SHEET 10 OF 11								



Focus Area 13: Concept Development

Concept 13A: Driveway Signage

Install signs warning motorists of "driveways" and/or destination signs. The most common collision in this corridor is a rear-end collision, typically at/near driveways. Sideswipes are the second most common collision. It seems that drivers may be stopping unexpectedly along the corridor such that other motorists either swerve around or rear-end them. By providing advanced warning/signing motorists can be better prepared for the slowing and stopping vehicles in their path.

Concepts for Future Consideration:

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

i. Reduce the cross-section of US Route 7 (Danbury Road) to add a center left-turn lane as seen in *Figure 73*. By adding a left-turn lane, left-turning motorists are removed from the thru-lanes, reducing rear-end collisions, sideswipes, and even queuing. This center lane also provides a middle point for motorists turning onto US Route 7 (Danbury Road) to wait for open spots between northbound and southbound directions. The chances for conflict between motorists turning left from driveways is also reduced since they would no longer have to cross two lanes of traffic to get to the direction in which they desire to go. This alternative would require additional investigation and study, and would be part of a corridor approach, rather than as an individual section. It would also depend on other physical changes to area roadways that could reduce the traffic volumes on this section of road.









ii. Widen US Route 7 (Danbury Road) such that there are two lanes in each direction, as seen in *Figure 74*. This will help to maintain continuity between the Route 33 (Westport Road) and Grumman Hill Road intersections. This section is currently a pinch point for the southbound motorists. Opening southbound US Route 7 up to two lanes will help to reduce queues encroaching and proceeding through the Route 33 (Westport Road) intersection. Yet another option with widening US Route 7 is to have two lanes in each direction and a center left-turn only lane, as shown in *Figure 75*. This would remove left-turning motorists from the through lanes, reducing angle, rear-end, and sideswipe collisions as well as queues.



* Width Varies

Figure 74: Widening Cross-Section, 4-Lane Roadway





Figure 75: Widening Cross-Section, 5-Lane Roadway with Center Left-Turn Only Lane

Concept Evaluation Summary: *Table 21* summarizes the short term concepts discussed above and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety, and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. Based on the preliminary evaluation, these concepts appear to be feasible, but will need to be evaluated in more detail and compared to other areas and improvements to determine prioritization..

Concept	Description	Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)			
		Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities
13A	Driveway Signage	None	Low	None	None	None	None	None







Figure 76: Intersection of US Route 7 (Danbury Road) and Route 33 (Westport Road)

Focus Area 14: Existing Conditions

Figure 76 shows the signalized T - intersection of US Route 7 (Danbury Road) and Route 33 (Westport Rd). One leg of the US Route 7 approach is slightly askew coming into the intersection with a slight geometric correction which causes there to be a horizontal curve just before the signal. The US Route 7 northbound approach has two lanes, one an exclusive left-turn lane and the other a shared left/right turn lane. No signing exists that prohibits motorists from turning right on red. The US Route 7 southbound approach is two lanes up to 0.10 miles north of the intersection where it splits such that one lane is exclusively for US Route 7 southbound traffic and the



other goes through the signalized intersection to head eastbound on Route 33. The lane heading southbound does not have to yield to traffic from Route 33. The westbound approach of Route 33 has one exclusive left-turn lane and two through lanes. There are no pedestrian crossings at any approach to this intersection.

On the southwest side of the intersection is a storage shed with a driveway approximately 300 feet south of the intersection. On the southeast side of the intersection are a few small buildings with a driveway approximately 300 feet south of the intersection as well. These driveways do not seem to negatively affect motorists at or approaching the intersection.

Traffic operations during the AM peak period included queuing in the northbound direction past the driveway south of the intersection, but this queue generally cleared every cycle. In the eastbound direction volume was heavy and slow moving through the Wolfpit Road intersection back to Sharp Hill Road. This eastbound queuing at Wolfpit Road appeared to be caused by over-utilization of the right lane for traffic turning onto Wolfpit Road combined with traffic continuing through onto US Route 7 (Danbury Road) southbound. Traffic volume was also heavy in the eastbound through lane at the US Route 7 (Danbury Road) and Route 33 (Westport Rd) intersection. It should be noted the westbound lead-left phase on Route 7 (Danbury Road) at Wolfpit Road appeared to be set to max recall as the phase did not gap out even when no vehicles were present.

Traffic operations during the PM peak period included queuing in the northbound direction generally similar to AM with sporadic queuing back to the "Melissa & Doug" store, where it would take two cycles for the queuing to clear. Traffic volume was heavy in the eastbound through lane at the US Route 7 (Danbury Road) and Route 33 (Westport Rd) intersection, but the eastbound right movement to US Route 7 southbound was lighter in the PM peak period compared to AM.

The SimTraffic analysis results show the eastbound US Route 7 (Danbury Road) approach has a delay over a minute during the AM peak. During the PM peak the eastbound US Route 7 (Danbury Road) approach has a more significant delay of almost a minute and a half. **Tables 6** and **7** in Section 3B contain overall LOS and delay results for the AM and PM peak hour Synchro 7/SimTraffic models, while the detailed results are provided in **Appendix D**.

From a pedestrian perspective, there are no sidewalks in the area or crosswalks on any approach.

Over the three-year period from 2006-2008, there were a total of twenty-two (22) crashes recorded at this intersection as seen in *Figure 78*. Twelve (12) of the crashes were rear-end collisions, five (5) were sideswipes, three (3) were angle collisions, and two (2) involved a vehicle hitting a fixed object. The high number of rear-end crashes at the intersection may be indicative of the high volumes and increased impatience of motorists, which a re-timed traffic signal could help prevent. Also, since the highest number of rear-end collisions occur at the northbound approach of US Route 7 (Danbury Road), the geometry or visibility here might be an issue. Most of all reported crashes (73%) occurred during daylight and 64% occurred when the roadway surface was dry. Based on the crash data, the lighting and pavement conditions are







not a significant contributing cause of crashes at this location. Since 27% of crashes involved personal injury and none involved a fatality, it seems that vehicles are not traveling at high speeds when crashes occur.

Figure 77 is an excerpt from the Corridor Assessment Matrix. This location was ranked 11th in the existing conditions evaluation matrix scoring an 8 for traffic operation problems, a 7 for historical issues, and a 5 for both safety and pedestrian/bicycle safety issues. Based on this evaluation, concepts were developed to address the identified issues. These concepts are presented in the following section.



Figure 77: Evaluation Matrix Excerpt for the Intersection of US Route 7 (Danbury Road) and Route 33 (Westport Road)





Figure 78: Crashes at the Intersection of US Route 7 (Danbury Road) and Route 33 (Westport Road)







Focus Area 14: Concept Development

Concept 14A: Advanced Signing

Add "Signal Ahead" signs on the Route 33 (Westport Road) approach to warn motorists of the upcoming signal. Advance warning better prepares motorists for future conditions along the roadway and can make the intersection safer. Advanced warning can reduce rear-end collisions as well as angle collisions.

Concept 14B: Restriping for 2 Exclusive Thru EB Lanes

Modify the striping on the eastbound approach such that there are two lanes eastbound, as shown on *Figure 79*. The addition of this lane using a bump-out will reduce the queue on this approach and also create a better flow of traffic since Route 33 (Westport Road) is already two lanes in the eastbound direction.

Table 22 has the simulation results for Concept 14B which shows Level of Service (LOS), average vehicle delay, and percent improvement comparing existing and proposed conditions. The AM peak hour results show minimal benefits, but the PM peak hour shows an overall intersection delay reduction of 50 percent.

		AM Peak		PM Peak			
Route 7 and Route 33	LOS (Delay)			LOS (D	elay)		
Intersection	Existing	Proposed	Percent Improvement	Existing	Proposed	Percent Improvement	
Northbound Approach (RT 7)	D (48)	D (42)	13%	E (75)	D (39)	48%	
Eastbound (RT 7/RT 33)	D (38)	D (37)	3%	E (62)	C (27)	56%	
Westbound (RT 33)	C (22)	C (24)	-9%	D (45)	C (27)	40%	
Overall Intersection	D (36)	D (35)	3%	E (64)	C (32)	50%	

Table 22: SimTraffic Simulation Results for Concept 14B



Figure 79: Concept 14B – Restriping Bump-Out for 2 Lanes in Eastbound Direction





Concept 14C: Restriping for Exclusive Thru and Shared Thru-Right EB Lanes

Modify the striping on the eastbound approach such that two lanes are maintained eastbound, as shown on *Figure 80*. The maintenance of this lane and having continuation onto US Route 7 (Danbury Road) as a shared lane will reduce the queue at this approach and also create a better flow of traffic since Route 33 (Westport Road) is already two lanes in the eastbound direction. The benefit of this concept versus Concept 14B is that motorists heading to Gaylord Drive S from the eastbound lanes can still be removed from the through lanes to make a left-turn movement. This would help to maintain the lack of rear-ends and sideswipes occurring at this location.

Table 23 has the simulation results for Concept 14C which shows Level of Service (LOS), average vehicle delay, and percent improvement comparing existing and proposed conditions. Similar to Concept 14B results for the AM peak hour results show minimal benefit, but the PM peak hour shows a significant overall intersection delay reduction of 41 percent.

		AM Peak		PM Peak			
Route 7 and Route 33	LOS (Delay)			LOS (Delay)			
Intersection	Existing	Proposed	Percent Improvement	Existing	Proposed	Percent Improvement	
Northbound Approach (RT 7)	D (48)	D (40)	17%	E (75)	D (41)	45%	
Eastbound (RT 7/RT 33)	D (38)	C (30)	21%	E (62)	C (32)	48%	
Westbound (RT 33)	C (22)	C (21)	5%	D (45)	D (42)	7%	
Overall Intersection	D (36)	C (30)	17%	E (64)	D (38)	41%	

Table 23: SimTraffic Simulation Results for Concept 14C



Figure 80: Concept 14C – Restriping for Continuing 2 Lanes in Eastbound Direction





Concepts 14B and 14C include modifying the striping on the eastbound approach such that two lanes are maintained eastbound. To provide adequate length of eastbound auxiliary through lane east of the Route 7 and Route 33 intersection, striping modifications and minor widening would need to occur between Route 7 and Dudley Road on Route 33. *Figure 81* shows a conceptual plan that would enable adequate length of auxiliary lane beyond the intersection and taper length.



Figure 81: Modification to Route 33 Continuing 2 Lanes in Eastbound Direction







Concepts for Future Consideration:

Additional concepts that represent long term improvements due to their potential cost and impact are presented below.

i. Realign Route 33 (Westport Road) such that it approaches US Route 7 (Danbury Road) to form a T-intersection, as seen in *Figure 82*. Improvement of the geometric alignment can help to avoid motorist confusion as to whether or not they can just continue from Route 33 (Westport Road) onto US Route 7 (Danbury Road)/Route 33. Advanced signing for the intersection with lane assignments would be necessary.



Figure 82: Realignment of Route 33

ii. Create a hybrid 2-lane roundabout at this intersection. Roundabouts would encourage a better, continuous flow of traffic through the intersection. Roundabouts can reduce opportunities for conflict between vehicles. The introduction of a roundabout would force motorists entering to reduce their speed due to the need to yield to motorists in the roundabout.

Concept Evaluation Summary: *Table 24* summarizes the short term concepts discussed above and identifies the anticipated benefit (High/Medium/Low) for each concept based on Traffic Operations, Safety, and Bicycle/Pedestrian facilities. Potential Impacts are also provided with respect to Access, Right-of-Way, Utilities, and the Environment. Based on the preliminary evaluation, these concepts appear to be feasible, but will need to be evaluated in more detail and compared to other areas and improvements to determine prioritization.







Table 24: Anticipated Benefit/Potential Impacts of Concepts for Focus Area 14

Concept	2	Anticipated Benefit (High/Medium/Low)			Potential Impacts (High/Medium/Low)				
	Description	Traffic Operations	Safety/ Access	Ped/ Bike	Environ.	Access	ROW	Utilities	
14A	Advanced Signing	None	Low	None	None	None	None	None	
14B	Restriping for 2 Exclusive Thru EB Lanes	Med	Low	None	None	Low	None	None	
14C	Restriping for Exclusive Thru and Shared Thru- Right EB Lanes	Med	Low	None	None	Low	None	None	





VI. Corridor-Wide Concepts

The previous chapters discussed focus area recommendations. This chapter presents needs and recommendations from a corridor-wide perspective. Typically, these types of recommendations include larger-scale and area roadway improvements, bicycle and pedestrian accommodations beyond intersection specific improvements, broad transit recommendations for service and facilities within the corridor, and access management policies beyond specific curbcut improvements.

A. Bicycle and Pedestrian Facilities

Route 7 has been classified as a high priority area for pedestrian and bicycle improvements by the City of Norwalk due in large part to demand for pedestrian access and the presence of the Merritt 7 rail station.

Pedestrian Facilities

There are several areas in the study area that would benefit from pedestrian improvements. Many have already been presented in the focus area improvement plans. Others include:

- Filling in gaps in sidewalk continuity or improvements to sidewalk conditions in locations where pedestrian activity is present or expected:
 - SR 719 (Main Avenue):
 - Broad Street to Delaware Ave
 - Glover Ave to Merritt 601 Driveway
 - To/From Merritt 7 railroad station
 - o US Route 7:
 - o US Route 7 (Grist Mill Road) to West Rocks Road
 - o Gateway Shopping Center to Kennsett Ave
 - o North of Wilton Corporate Park Main Entrance
- Additional crosswalks at numerous intersections throughout the corridor as well as upgrades to intersections that are not fully ADA compliant. Intersections include:
 - SR 719 (Main Avenue) & Delaware Ave
 - SR 719 (Main Avenue) & Broad Street
 - SR 719 (Main Avenue) & Perry Avenue (planned additional crosswalk as part of Perry Avenue improvements)
 - o SR 719 (Main Avenue) & Linden Street
 - SR 719 (Main Avenue) & Glover Ave/Creeping Hemlock Drive
 - SR 719 (Main Avenue) & Xerox Driveway (801 The Towers Driveway)
 - SR 719 (Main Avenue) & Four Merritt 7 Corporate Driveways
 - Merritt 7 railroad station
 - SR 719 (Main Avenue) & Valleyview Road
 - US Route 7 (Main Avenue) & US Route 7 (Grist Mill Road)
 - US Route 7 (Main Avenue) & West Rocks Road
 - US Route 7 (Danbury Road) & Gateway Shopping Center
 - US Route 7 (Danbury Road) & Kent Road
 - US Route 7 (Danbury Road) & Kennsett Avenue



- US Route 7 (Danbury Road) & Grumman Hill Road
- US Route 7 (Danbury Road) & Route 33 (Westport Road)
- Pedestrian connection from Merritt 7 train station (on west side of tracks) to the Merritt 7 complex and other destination on the east side of the tracks. This is currently being investigated by the CTDOT as part of overall improvements to the Merritt 7 Train Station.

Bicycle Facilities

Despite carrying a high volume of traffic and having limited facilities for bicyclists, Route 7 is the primary connector for many locations and communities within the Norwalk River Valley. Route 7 is used by bicyclists due to relatively flat grades and no other significant north/south alternatives in the valley. However, in this specific study area, because there are four lanes of traffic and shoulders that are less than three feet wide in most locations, a bike lane could not easily be accommodated. However, the following bicycle recommendations from a corridor-wide perspective are put forward:

- Extend the Norwalk River Valley Trail north of Broad Street,
- Provide bike racks at the Merritt 7 Train Station and other major destinations along the corridor, and
- Install bicycle warning signage alerting drivers that bicycles may be present within the roadway.

B. Access

Within the study area, the City of Norwalk and the Town of Wilton have access management and curb cut plans intended to improve flow and safety along the corridor and to promote improved access design for new land uses as they go through the site plan approval process. The plan for Wilton is relatively recent and was completed in July, 2011. The plan for Norwalk, is a bit older, and was completed in 1996. Specific curb-cut recommendations from both plans have been reviewed and incorporated, as appropriate, into the specific focus area improvement plans. However, from a corridor-wide perspective, we believe it is important to highlight some of the access management policies and best practices that promote safe and efficient corridor traffic flow and access to abutting properties. These include:

- Minimize conflict points or opportunities for vehicles to cross paths, minimize the number of driveways serving a property while still adequately addressing traffic access/egress demand, and align opposing access points/driveways,
- Interconnect abutting parcels through parking lot connections or rear service roads,
- Provide safe, adequate spacing between driveways, between intersections, and between driveways and intersections, and
- Maintain good sight-lines for all drivers.

It is further recommended that both the City of Norwalk and Town of Wilton actively utilize the access management and curb cut plans whenever possible during site plan review or when reviewing any roadway and access modification.





C. Operations

The following corridor-wide operational issues are occurring in the project area:

- Fire and EMS reported that emergency vehicle preemption systems (EVPS) receptors on signals are misaligned and not functioning properly.
- Previous studies have indicated that future volumes will require a second through lane in the southbound direction between Route 33 (Westport Road) and Grumman Hill Road. This is also necessary to provide lane continuity and improve safety.
- The Norwalk Valley River Trail is planned to connect south of Route 15 (Merritt Parkway) to Route 33 (Westport Road), and this requires a connection under Route 15 (Merritt Parkway) and movement across the over-capacity US Route 7 (Grist Mill Road), both of which pose design and operational issues for key locations in the project area.

In addition to the above, the following operational and infrastructure changes are concepts that are either corridor-wide concepts or concepts that have a wide area or corridor impact.

- Corridor signal retiming/optimization
- Adaptive Signal Systems
- •
- Completion of missing movements at the Route 15/Route 7 interchange and safety improvements to the Route 15/Main Avenue interchange
- •
- Shared center left-turn lanes in sections of the corridor with multiple access points, and high numbers of crashes. Shared center left-turn lanes are also shown in the Focus Area section of this report.
- •

D. Transit

The demand for bus service in all forms appears to be growing steadily in the study corridor. Improvements to the roadway network will need to accommodate both transit vehicles in increasing frequency and/or numbers as well as automobiles. The Merritt 7 Station on Glover Avenue is a heavily used commuter rail stop in the center of the study corridor. Currently, improved service on the branch line is being programmed and is expected to increase demand for commuter rail in the corridor and subsequently result in higher parking demand at all the stations along the corridor from Norwalk to Danbury, including Merritt 7. Improvements to the station are currently being evaluated and a potential new parking lot for commuters could be located on the east side of SR 719 (Main Avenue) across the street from the Merritt 7 office complex. Still, there will be a need to accommodate the parking demand in a number of strategic ways, including reducing demand with enhanced transit access to the station via the commuter bus system and system of employer shuttles.



Improvement to transit service and facilities within and serving the study area has the potential to reduce travel demand thereby improving roadway operations and safety. Improved transit also gives travelers a choice of mode to complete their trip. A number of previous and ongoing studies have investigated and recommended transit enhancements in this corridor. These are summarized here and continue to be a relevant part of the overall approach to improved travel conditions in the study area. These transit improvements, along with a brief description, are discussed below.

1. Enhancements to the Route 7 Link Bus Service

Discussions with the Norwalk Transit District and Housatonic Area Regional Transit indicate that an evaluation of the existing 7 Link bus service that operates along the corridor should be undertaken. In addition to growth in demand from Norwalk to Wilton, these agencies have recognized the need to explore adding frequency to bus service in parts of the corridor as well as offering all-day service. Currently, there is not enough data available to determine if such enhancements are warranted; therefore, it is recommended that a study be commissioned to evaluate the existing service characteristics of the Route 7 Link service along the corridor. This existing service connects Danbury to Norwalk, along Route 7, and currently runs during peak and shoulder-peak periods (6 AM to 11:50 AM and 3 PM to 8:45 PM), with approximately 60 minute headways during these timeframes. A future study might include the following components:

- Evaluate the existing ridership: It is critical to know what the existing ridership numbers are, and which, if any, vehicles are at or over capacity, as well as where the riders are coming from. Ridership origin and destination could be achieved via an on-board ridership survey.
- Establish the ridership demand: Based on any existing transit ridership projections in the region and information from the ridership survey, estimate what the ridership demand along the corridor is both now and into the future.
- Develop a proposed schedule and service frequency sufficient to meet the estimated ridership demand. This schedule should be detailed in nature and fit into the existing schedule with modifications as needed. It should assign specific bus numbers to each route and identify station stop times along the corridor.
- Determine the total vehicle fleet size necessary to meet the estimated ridership demand. Estimate the number of additional buses needed to serve the corridor. Additional buses would be estimated to accommodate overflow on the existing service, as well as capture additional riders from the increased service.
- Determine whether the existing bus storage facility is sufficient to accommodate the new fleet vehicles or if additional storage is needed.
- Determine if the existing maintenance facility or service is sufficient to meet the needs of the new total fleet size or if additional maintenance facilities are needed.
- Estimate the total capital costs for these service improvements, which would include new buses, possible new storage space, and possible new maintenance facilities. Based on the ridership estimate, it is also necessary to determine if any station improvements, such as shelters, benches, or fare collection equipment, are needed to accommodate the increase in riders.



- Estimate the total operating and maintenance (O&M) costs for the increase in service. This includes all of the costs to run the service, such as driver/operator pay, fuel, vehicle maintenance, and other obligations of NTD and HART.
- Coordination with the local jurisdiction(s) will be critical to ensure that the additional vehicles do not result in adverse traffic impacts along the corridor. If impacts occur, mitigation measures may be needed.
- Engage the public and transit stakeholders to achieve maximum input from those most affected by changes to transit service.
- Explore new technologies developed to enhance the transit experience and maximize the efficiency and effectiveness of the service.
- Explore the relationship between the train stations at both ends of the corridor (Norwalk and Danbury) and the bus hubs. Improving intermodal transfers should be a priority.

The Route 7 Link Study should be a near-term priority, as current demand may warrant more immediate modifications to the transit service.

2. *Merritt 7 Train Station Enhancements*

The Department of Transportation is moving forward with the conceptual design for improvements to the Merritt 7 Train Station which is located in this study area. These improvements are likely to include:

- A new 500-foot (6 car) high-level platform with canopy and waiting shelter,
- A new pedestrian bridge with access stairs, ramps, and elevators, and
- Expansion of parking to include a 200-space surface parking lot

3. Danbury Branch Line Service Improvements

Improved service to the Danbury Branch Line is currently under study by CTDOT. A variety of alternatives are under consideration including infrastructure and equipment improvements as well as extension of service north of Danbury to New Milford, Connecticut. It is recommended that improvements to the commuter rail service move forward based on these studies and that the most appropriate alternative be advanced. Improved commuter rail service is expected to result in mode shift and reduce vehicular travel demand in the entire overall corridor as well as in this study area.

VII. Recommendations and Next Steps

A. Recommendations

Each of the 14 focus areas had multiple short-term and long-term concepts developed that focused on addressing historical/stakeholder identified issues, traffic operations, safety, bicycle and pedestrian, and land use. Concepts ranged from small-scale improvements, such as restriping and signage changes, to larger-scale infrastructure changes, such as lane additions, intersection/interchange reconfigurations, and road diets. The top five short-term recommended projects for the entire corridor based on their anticipated benefits are as follows:





1.

Focus Area 5,6,7 (Concept C – See Figure 43 on page 71):

Modify the signing and striping in the westbound direction on Route 7 (Grist Mill Road) between SR 719 (Main Avenue)/DMV and Grist Mill Road to allow for better utilization of the dual left-turn lanes from US Route 7 (Grist Mill Road) to southbound US Route 7 Expressway. Improvements costs of re-striping and signage are minimal and simulation results show southbound travel times between Foxboro Drive to US Route 7 Expressway are reduced by approximately 40-50%. Simulation results also show Level of Service (LOS) improvements for the southbound approach at US Route 7 (Main Avenue) and SR 719/DMV from LOS F with over two minutes of average delay to LOS C and less than 25 seconds of average delay after the improvements.

Modify the striping of the right-turn only lane on eastbound US Route 7 (Grist Mill Road) at Glover Avenue to be a right/thru lane. This would also require removal of the overlap right-turn phase at this location. This allows for better traffic flow through the intersection and allows for motorists heading southbound on SR 719 (Main Avenue) to clear through the Glover Avenue intersection and not wait in the queue until after the Glover Avenue intersection. Improvement costs of re-striping and signal equipment changes are minimal and removing the southbound SR 719 destined traffic from the two eastbound through lanes approaching Glover Avenue should help improve congestion on eastbound Route 7 (Grist Mill Road).

2. Focus Area 5,6,7 (Concept B – See Figure 42 on page 69):

Extend the northbound left-turn pocket on the US Route 7 Expressway at US Route 7 (Grist Mill Road) and create a more conventional striping setup for the left-turn pocket. The extension of this left-turn lane separates the left-turning motorists from the right turns further in advance of the intersection. Improvements costs would be higher than restriping improvements and include costs of extending the left-turn pocket, but the grass median is wide and no impacts would occur to southbound US Route 7 Expressway. Simulation results show a 20-40% reduction in northbound average delay, and approximately 20% reduction in northbound travel time between US Route 7 Expressway and the West Rocks Road intersection as the extended left-turn pockets mitigates the blocking of thru traffic by left-turning traffic. In addition to this infrastructure improvement, Concept C for this focus area includes an additional northbound left-turn lane to create dual left-turning lanes that could be considered as a long-term improvement.

3. Focus Area 10 (Concept 10B – See Figure 59 on page 92):

Modify the striping between the northern Gateway Shopping Center driveway and the Kent Road intersection such that the current exclusive left-turn lane northbound is split between an exclusive left-turn lane northbound onto Kent Road and an exclusive left-turn lane southbound into the Gateway Shopping Center driveway. This entrance is the only way southbound motorists can access the Gateway Shopping Center. By removing them from the thru-travel lanes, potential conflicts are avoided and a reduction in the queue would likely result. Improvements costs of re-striping are minimal, and the safety benefits of removing the southbound left vehicles destined for Gateway Shopping Center from the two through lanes should be significant.





4. Focus Area 12 (Concept 12):

Evaluate modifications to the signal timing at Grumman Hill Road to improve traffic flow and reduce delay and congestion. Specifically, a southbound lead phase in the PM peak should be evaluated and considered in the same manner as the existing northbound lead phase in the AM peak. This will aid the heavy southbound left turn in the PM peak period destined the residential area along Grumman Hill Road. It should be noted that traffic counts for Grumman Hill Road were not collected as part of Phase I due to time and budget constraints, and updated turning movement counts should be collected prior to implementation of this concept. Improvement costs should be minimal and include a new signal head facing southbound Route 7 (Danbury Road).

5. Focus Area 14 – Concept 14B – See Figure 79 on page 119):

Modify the striping on the eastbound approach at the Route 33 (Westport Road) and Route 7 (Danbury Road) intersection such that there are two lanes eastbound. This will create a reduced queue in the eastbound direction, and allow for signal timing to be reallocated from the eastbound direction to the heavier northbound approach; therefore, reducing the queue and delay on the northbound Route 7 (Danbury Road) approach. Improvement costs for the eastbound approach will be minimal and include restriping, but incorporated with this improvement is necessary changes on Route 33 (Westport Road) east of the intersection to Dudley Road. These additional improvements include minor roadway widening, re-striping, and grass median modifications. Simulation results show approximately 50% reduction in overall intersection delay during the PM peak hour.

B. Next Steps

Phase I of this study focused on very short-term and relatively low-cost improvement options to the US Route 7 and Main Avenue corridor. Subsequent phases will investigate in more detail some of focus area concepts and longer-term options that have the potential to better address the major factors of the congestion and safety issues that have been documented in this report. Based on this investigation, it appears that the major factors of the congestion and safety issues include:

- An incomplete limited-access expressway network with the truncating of the US Route 7 Expressway at Grist Mill Road and the incomplete interchange between the US Route 7 Expressway and Route 15 (Merritt Parkway).
- A roadway network that is constrained by the Norwalk River and the Danbury Branch Commuter Rail Line and to some degree the US Route 7 Expressway – resulting in a less than comprehensive roadway network that limits travel route choices and connectivity and concentrates traffic at key "pinch points" such as the Grist Mill Road area at the terminus of the US Route 7 Expressway, the Route 123 (New Canaan Avenue) interchange area and SR 719 (Main Avenue) at the southern end of the study corridor.
- Excessive and sometimes poorly designed access to properties along SR 719 (Main Avenue) and Route 7 with limited turn lanes.



- 7
 - High speeds and poor transitions between facility types such as at the Route 15 (Merritt Parkway) ramps with SR 719 (Main Avenue) and at the terminus of the US Route 7 Expressway at Grist Mill Road.

Future improvement options should attempt to address these root causes and should consider a revised philosophy from simply building larger, high-speed, limited-access facilities that are focused primarily on moving cars. Future improvement options that will be investigated will be based on the following principles:

- Complete, to the degree possible, a comprehensive transportation network both in terms of inter-connectivity and mode choice.
- Incorporate more redundancy in the transportation network with more interconnection of the system to better distribute demand. This principle manages and distributes demand and has the potential to create a more complete roadway network giving travelers more choices.
- Redesign existing facilities to provide safer and less abrupt transitions from high speed facilities to more local roads.
- Approach the roadway design with a complete streets mentality that is more context sensitive to the environmental context and surrounding land uses.

These principles allow for investigation and consideration of the following modifications:

- Assuming that the long-ago proposed US Route 7 Expressway will never be constructed, lower the design speed of the incomplete US Route 7 Expressway beginning around and possibly south of Route 123 (Exit 2) and extending north. The design of this facility could then be downgraded to a boulevard-like facility allowing access from additional east/west roadways and helping to create a more complete roadway network that does not concentrate demands at limited locations. Potential improvements as a result of this design change could include:
 - Redesign and complete the US Route 7 and Route 15 (Merritt Parkway) interchange from a clover leaf design for the interchange of two limited-access highways to a smaller footprint "diamond" interchange between the limited-access Route 15 (Merritt Parkway) and a more boulevard-like US Route 7. A simpler and smaller design here will be much less expensive, likely have fewer impacts, and therefore may facilitate the completion of this interchange for all movements.
 - The redesigned interchange could lead to a redesign of SR 719 (Main Avenue) between Route 15 (Merritt Parkway) and Route 123 as a result in the reduction in traffic volumes that currently use this section of SR 719 (Main Avenue) to move between the Route 15 (Merritt Parkway) and the US Route 7 Expressway. Potentially, SR 719 could be a three lane crosssection with a center turn lane that would help reduce the number of



crashes in the corridor which in turn leads to a significant cost savings. This change could also lead to other changes including bike lanes or new/expanded sidewalks to create a more complete street.

- Explore the possibility of connecting Glover Avenue and North Seir Hill and Seir Hill Roads with the US Route 7 Boulevard. This has the potential to provide more efficient access from the west to the Merritt 7 Complex and the Merritt 7 train station; two significant traffic generators on the Main Avenue corridor.
- Extend the newly-defined US Route 7 Boulevard north from US Route 7 (Grist Mill Road), paralleling the Danbury Branch rail road tracks, to Kent Road in Wilton. This is expected to have a significant benefit on reducing congestion and improving safety in the US Route 7 (Grist Mill Road) area by giving through traffic the opportunity to avoid the heavily developed section of US Route 7 (Main Avenue) north of US Route 7 (Grist Mill Road), as well as providing direct access to i.park. This also has the potential to reduce cut-through traffic currently known to use Belden Hill Road.
- Revisit the design of the Route 123 (Exit 2) interchange to possibly provide a simpler interface with Route 123 to improve operations and safety in that area. It could be possible, with a redesigned scale of the US Route 7 Boulevard to convert this interchange into a more traditional intersection system rather than high-speed ramp system. Given the constrained operations of Route 123 in this area, as well as the nearby at-grade rail road crossing, a redesign of this interchange could have significant operations and safety benefits on Route 123 and SR 719 (Main Avenue).

Figure 83 summarizes these possible modifications to the transportation network. These modifications may preclude the need for more extensive capacity improvements along the Main Avenue Corridor and could address the long-standing congested "pinch points" in the corridor by better distributing the demand amongst a more comprehensive, slower speed, network. Subsequent phases of this study effort will explore these options in more detail including looking at operational benefits, alternatives, feasibility, and order-of-magnitude costs.





Figure 83: Corridor Vision

