METROCOG
Connecticut Metropolitan Council of Governments

TOWN OF STRATFORD CONNECTICUT SETTLED 1639 SEAL

Tighe&Bond

Route 110 Engineering Planning Study
Stratford, CT

Final Study Report

Prepared For:

Connecticut Metropolitan Council of Governments
and
Town of Stratford

Stratford, CT

April 3, 2017

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Executive Summary

Introduction

The Route 110 Engineering Planning Study (Study) was conducted on behalf of the Town of Stratford (Town) by the Connecticut Metropolitan Council of Governments (METROCOG). The project was funded by the Federal Highway Administration (FHWA) through the Connecticut Department of Transportation (CTDOT) and METROCOG with matching funding by the Town of Stratford. METROCOG serves the Town of Stratford, a member Town of the Greater Bridgeport and Valley Metropolitan Planning Organization (GBVMPO).

The purpose of the Study was to develop a comprehensive transportation improvement plan for the Route 110 corridor in the study area and provide a planning document for the Town, METROCOG, and State to guide the implementation of transportation system improvements to meet local and regional transportation needs and deficiencies while accommodating future land use and economic development goals.

The goals and objectives of the Study were identified by the Route 110 Technical Advisory Committee (TAC) and Route 110 Community Advisory Committee (CAC). The TAC was comprised of Town of Stratford, METROCOG, Greater Bridgeport Transit, and CTDOT staff. The CAC was comprised of major corridor stakeholders along with representation from Town staff and METROCOG. The Study goals and objectives were identified at the onset of the Study and included the following:

Goals and Objectives

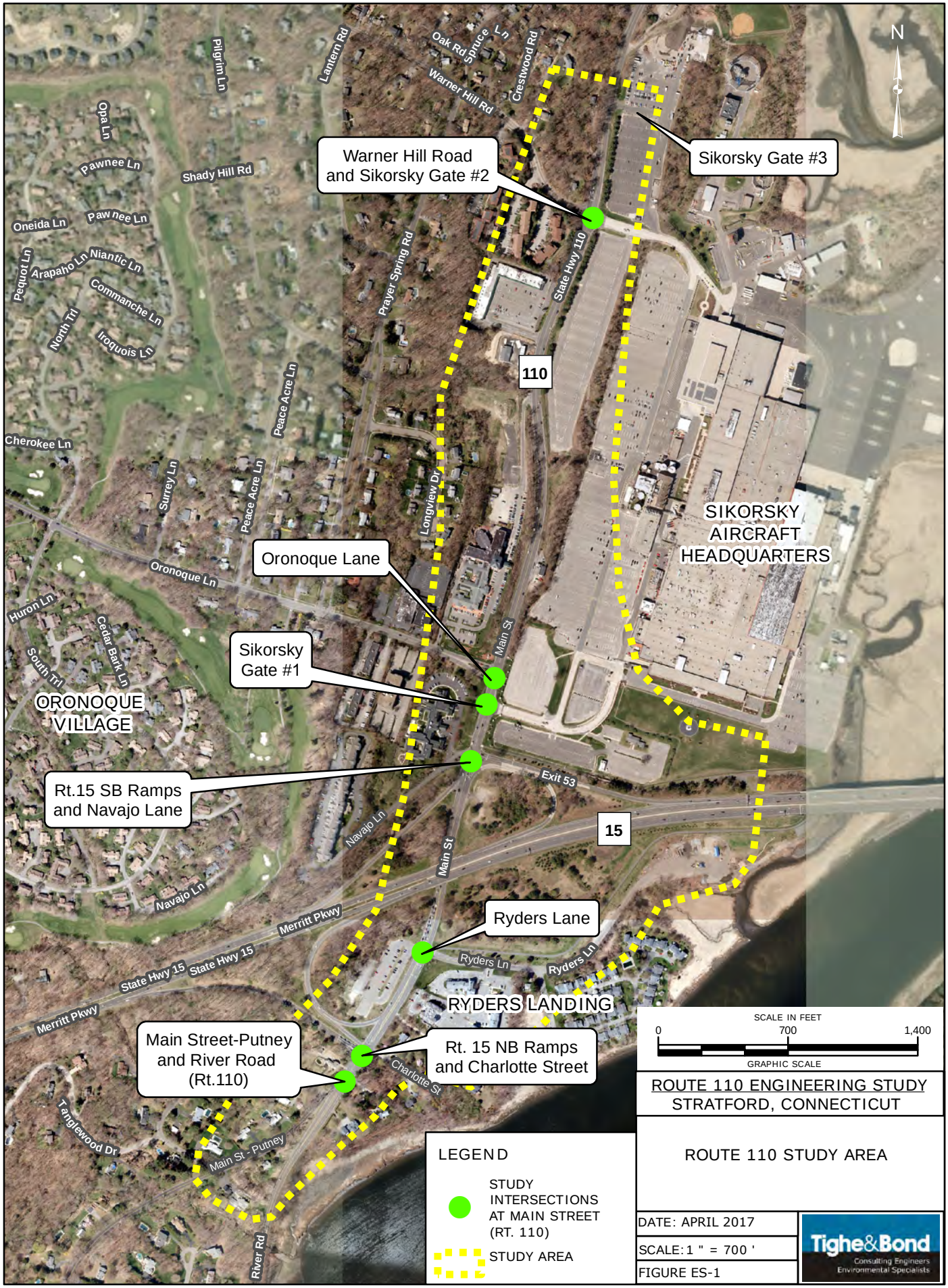
- Develop cost effective transportation system solutions that improve operations to mitigate poor capacity and congestion while accommodating future land use expansion along Main Street and in the region.

- Improve transportation system opportunities and mobility for alternative travel modes including sidewalk and bicycle infrastructure, exclusive pedestrian signalization at intersections, and improved transit amenities to provide a complete transportation system.

- Develop a comprehensive transportation improvement plan that facilitates the prioritization and implementation time frames to enable the programming of improvements to meet both current and future corridor needs.

Study Area

The study area included the segment of Route 110 in the Town of Stratford directly adjacent to Route 15 (Merritt Parkway/Wilbur Cross Parkway) and Sikorsky Aircraft. The study area begins just south of the intersection of River Road (Route 110) with Main Street - Putney and extends north for approximately one mile to 500 feet north of the intersection of Main Street (Route 110) at Warner Hill Road. The study area included segments of the side streets and commercial driveways approaching the corridor. The study area included several intersections along Route 110 that were analyzed. These locations are shown in Figure ES-1.



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11/5/2014

Public Involvement

Throughout the Study, a comprehensive Public Involvement Program was conducted by the Study Team in cooperation with the State and Local agencies. The goals of the outreach program were:

- Obtain input from the Public on study area issues, concerns, and help identify and frame the study goals and objectives
- Advise the Public of the study findings
- Educate the Study Team with local knowledge
- Involve stakeholders and the public in the development and refinement of recommendations that fit the vision and character of the Town
- Facilitate reviews by Town Council, Boards and Commissions, Businesses, and Residents, leading to a Final Improvement Plan that can be endorsed by the Town and Region to help guide future transportation system improvements and enhancements

Project Committees

Technical Advisory Committee (TAC) and Community Advisory Committee (CAC)

This committee provided consistent input and oversight throughout the study process. The committee was comprised of Town Staff, METROCOG Staff, Greater Bridgeport Transit (GBT) Staff and CTDOT Staff. The Community Advisory Committee (CAC) is comprised of project stakeholders directly impacted by operations in the study area. The CAC includes members from Sikorsky Aircraft, area businesses, and other key stakeholders that live and/or operate a business in the study area.

Summary of Outreach Activities

The Public Outreach initiatives were conducted throughout the Study through the TAC and CAC as well as with key stakeholders and the public. The following meetings took place during the progression of the Study:

Project Kickoff Meeting:	August 14, 2014
TAC Kickoff Meeting:	November 12, 2014
CAC Kickoff Meeting:	November 19, 2014
Stakeholder Interview with Sikorsky Aircraft:	January 28, 2015
Stakeholder Interview with Ryders Landing:	January 12, 2015
TAC Existing/Future Conditions and Alternatives Meeting:	October 15, 2015
CAC Existing/Future Conditions and Alternatives Meeting:	November 18, 2015
TAC Final Report Review Meeting:	November 30, 2016
CAC Final Report Review Meeting:	November 30, 2016
Public Information Meeting:	December 8, 2016

Assessment of Existing Conditions

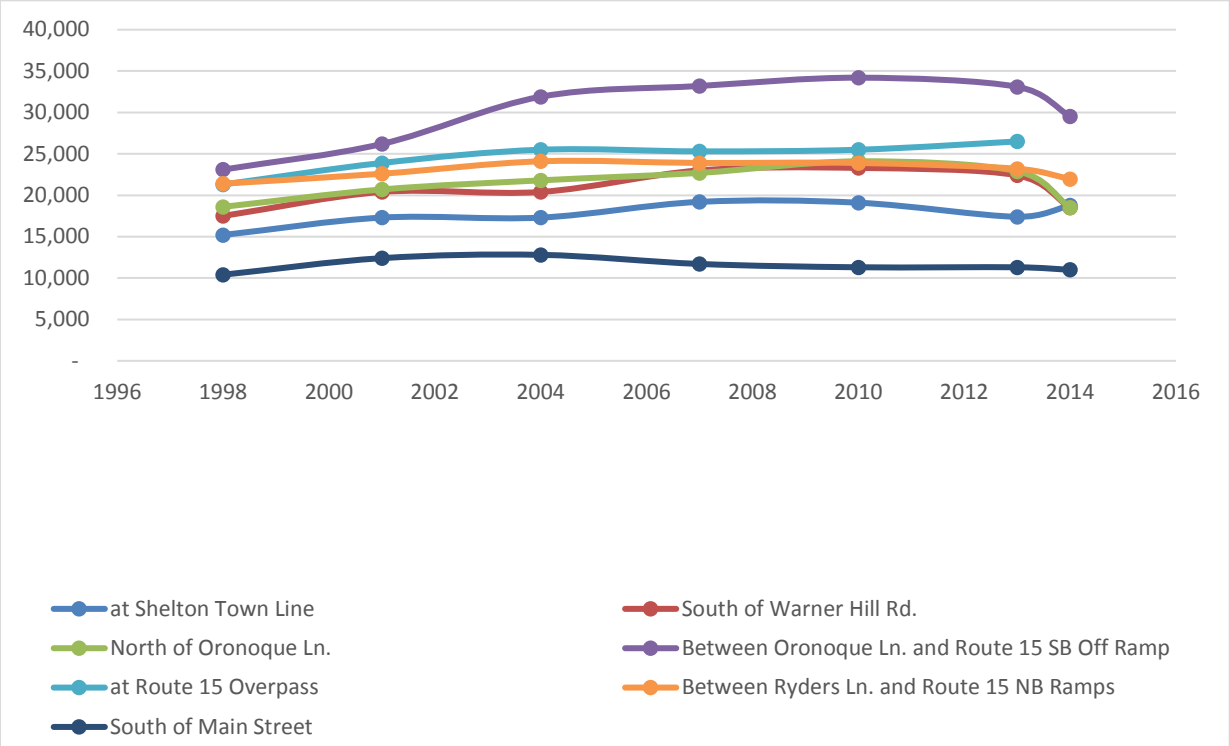
The assessment of existing conditions included an extensive data collection process to establish the current condition of the transportation system in the study area. The purpose of the existing condition assessment was to identify existing needs and deficiencies and begin the process of identifying opportunities for improvements to the transportation system in the study area. This section describes the assessment of the study area transportation system as it exists in 2014.

Traffic Volumes

Available historical traffic volume data was obtained from the CTDOT during the Data Collection task. In addition, several traffic counts were conducted, supplementing the available data. A review of the historic average daily traffic volume data published by CTDOT indicates daily traffic volumes along Route 110 peaked in the mid-2000's, and have slightly declined since, coincident with the economic recession during the latter half of the decade. Figure ES-2 shows the change in average daily traffic at multiple locations along Route 110 in the study area.

FIGURE ES-2

Route 110 Historical Average Daily Traffic



Travel Speeds

Travel speed data was collected along Route 110 in conjunction with the Automatic Traffic Recorder (ATR) traffic counts. Speed data was collected in September 2014. Table ES-1 summarizes the results of the speed observations along the corridors. In general, travel speeds along Route 110 were within 5 to 10 miles per hour of the posted speed limit. The northern end of the study area experienced slightly higher operating speeds as there is less congestion and less curb cuts.

TABLE ES-1

Travel Speed Observations (MPH)

Location	Posted Limit	Average Speed		85th Percentile Speed	
		NB/EB	SB/WB	NB/EB	SB/WB
Route 110 (Main Street)					
South of Shelton Town Line	40	41	46	46	51
North of Warner Hill Road	40	46	42	52	47
North of Oronoque Lane	40	40	32	46	43
North of Merritt Pky NB Ramps	40	31	22	36	26
South of Main Street	45	27	40	37	45
Warner Hill Road					
West of Route 110	25	28	27	33	31
Oronoque Lane					
West of Route 110	30	21	23	25	26
Ryders Lane					
East of Route 110	NP	16	17	20	21
Main Street					
West of Route 110	30	18	33	26	38

NP: No Posted Speed Limit

Traffic Operations

Traffic operations were evaluated for the seven signalized intersections along the Route 110 corridor during the morning, afternoon Sikorsky Shift Change, and afternoon peak hours. The analyses were conducted using Trafficware's *Synchro plus SimTraffic 8 – Traffic Signal Coordination Software,* based on the *2010 Highway Capacity Manual (HCM)* methodology.

Average Control Delay (Seconds per Vehicle)	Level of Service[a]	
	v/c Ratio ≤1.00	v/c Ratio >1.00
≤10	A	F
>10 to 20	B	F
>20 to 35	C	F
>35 to 55	D	F
>55 to 80	E	F
>80	F	F

Note: [a]For approach-based and intersectionwide assessments, LOS is defined solely by control delay.

Source: *HCM2010: Highway Capacity Manual.* Washington, D.C.: Transportation Research Board, 2010. Exhibit 18-4, Pg. 18-6.

In general intersections that exhibit a LOS A or B are considered to have excellent to good operating conditions with little congestion or delay. LOS C indicates an intersection with acceptable operations. LOS D indicates an intersection that has tolerable operations with average delays approaching one minute. Intersections with LOS E and F are operating with poor or failing conditions and typically warrant a more thorough review and possible improvement to mitigate the capacity issues. Improvements can include geometric, lane use, timing modifications, or different form of traffic control to mitigate the operational issues and reduce average delay. In the context of this planning process, during the analysis of both existing and future conditions, intersections exhibiting LOS E and F were identified for further analysis and potential improvements to mitigate poor or failing operations. Table ES-2 summarize the intersection operations in terms of average delay per vehicle and LOS along Route 110 for the 2014 Existing Conditions.

TABLE ES-2

Route 110 Intersection Operational Summary – 2014 Existing Conditions

	Morning Peak Hour		Sikorsky Shift Change Peak Hour		Afternoon Peak Hour	
Study Intersection	**LOS**	**Avg. Delay (s/veh)**	**LOS**	**Avg. Delay (s/veh)**	**LOS**	**Avg. Delay (s/veh)**
Warner Hill Road and Sikorsky Gate #2	D	45.0	C	32.9	D	35.9
Oronoque Lane	D	45.6	C	33.0	D	50.1
Sikorsky Gate #1	D	35.4	E	73.1	D	42.8
Merritt Parkway SB Ramps and Navajo Lane	D	46.8	C	27.6	F	81.2
Ryders Lane and Commuter Parking Lot Drive	A	3.5	B	11.6	B	12.1
Merritt Parkway NB Ramps and Charlotte Street	C	33.6	F	96.6	F	178.3
Main Street – Putney	C	20.4	B	14.1	C	21.9

Traffic Safety

Motor vehicle collision history data were collected from CTDOT and the Town for the latest six-year period of available data, between January 1, 2007 and December 31, 2012. Table ES-3 summarizes the number of collisions recorded along the Route 110 corridor within the study area from 2007 through 2012. During the six-year period, 479 collisions were reported. Rear-end type collisions were the most common type accounting for almost half of the total with 234 crashes (49%) recorded; the second most common type of collision was Turning - Intersecting Paths with 62 crashes (13%), followed by Turning – Opposite Directions with 60 crashes (13%), and Sideswipe – Same Direction with 59 crashes (12%). The remaining types of collisions were each less than 4% of the total number of crashes. No fatalities were recorded in any of the collisions along the Route 110 corridor. A total of 27 crashes reported significant injuries with the remaining 452 collisions categorized as Property Damage Only.

TABLE ES-3

Route 110 Collisions – Study Area Summary

	Number of Collisions							% of Total
Intersection/Location	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Total**	**Collisions**
Oronoque Lane*	16	25	23	17	13	23	**117**	**25%**
Warner Hill Road/Sikorsky Gate #2*	15	12	23	15	22	20	**107**	**22%**
Merritt Parkway NB Ramps/Charlotte Street*	3	11	7	6	11	11	**49**	**10%**
Merritt Parkway SB Exit/Navajo Lane*	13	5	6	4	10	3	**41**	**9%**
Sikorsky Gate #1*	2	6	7	5	12	3	**35**	**7%**
Oronoque Shopping Plaza Driveway	8	8	5	2	5	5	**33**	**7%**
Ryders Lane/Commuter Lot Drive*	4	6	8	5	3	0	**26**	**5%**
Sunoco Gas Station Drives	3	4	3	1	4	1	**16**	**3%**
Merritt Parkway SB On-Ramp from Route 110 SB	3	5	3	0	1	0	**12**	**3%**
Main Street – Putney*	3	2	3	1	2	0	**11**	**2%**
Near Merritt Parkway Underpass	1	3	2	2	2	1	**11**	**2%**
Sikorsky Gate #3	3	1	1	0	3	1	**9**	**2%**
Mobil Gas Station Drives	2	0	3	0	0	0	**5**	**1%**
7003 Main Street Driveway	0	1	1	0	0	1	**3**	**1%**
Pine Tree Trail	1	0	0	1	1	0	**3**	**1%**
7579 Main Street Driveway	0	0	0	1	0	0	**1**	**<1%**
Total	**77**	**89**	**95**	**60**	**89**	**69**	**479**	**100%**

* Study Area Intersection

Transportation System Conditions

The Study Team conducted observations of the existing roadway network to identify deficiencies or areas of concern that warrant a more detailed assessment for mitigation. The following observations were recorded:

- Vehicles approaching the Main Street - Putney intersection from the south along River Road use the painted median as a left turn lane to Main Street - Putney
- The northbound left turn movement from River Road to Main Street - Putney is very difficult for larger vehicles due to the sharp turn and acute angle of the intersection
- The intersection alignment of Main Street - Putney with Route 110 restricts the ability for vehicles to turn right onto Route 110 southbound
- The cluster operation of the Main Street - Putney and Merritt Parkway Northbound Ramps causes long clearance times and interrupts progression through this section of the Route 110 corridor
- Statewide collision data indicates that the Route 110 intersections with Oronoque Lane and Warner Hill Road/Sikorsky Gate #2 should be evaluated to improve safety
- Warner Hill Road and Oronoque Lane have significant steep downgrades of 12% and 15%, respectively, as they approach Route 110 from the west
- Vehicular travel speeds along the Route 110 corridor are 5 - 10 miles per hour higher than the posted speed limit (See Section 2.5 – Travel Speeds and Figure 2-12 for more information)
- The closely spaced signalized intersection at Oronoque Lane, Sikorsky Gate #1, and Merritt Parkway Southbound Ramps/Navajo Lane disrupt coordination along the Route 110 corridor with vehicles commonly blocking the intersections reducing the capacity of Route 110 and causes significant queuing on Oronoque Lane, Sikorsky Gate #1 and the Merritt Parkway Southbound Off-Ramp during the peak hours
- The significant amount of traffic destined for the Merritt Parkway results in poor lane utilization through most of the study area with vehicles remaining in right and left lanes to avoid getting stuck in the wrong lane at the desired turn. This causes significant queuing southbound in the afternoon peak hours extending north from Ryders Lane well past the intersection of Oronoque Lane
- The corridor lacks pedestrian facilities along the entire length with very limited sidewalks and includes signage to prevent pedestrian crossing at the Merritt Parkway Interchange Northbound Ramp. Only the Ryders Lane/Commuter Parking Lot Driveway intersection provides an exclusive pedestrian crossing phase
- Limited shoulders of 1 to 1.5 feet are present along the entire corridor significantly limiting the ability of bicyclists to share the roadway with vehicles
- GBT bus stops are marked with signage at the Merritt Parkway Southbound Ramp/Navajo Lane and Ryders Lane/Commuter Lot Driveway intersection, but lack any other accommodations with riders standing in grassed areas and within drainage swales

Assessment of Future Conditions

The assessment of future conditions conducts an analysis of the Route 110 study area under existing geometric and operational conditions utilizing 2034 Background and 2034 Future Traffic volumes. This process identified deterioration of operational efficiency from existing conditions helping to determine areas of concern that develop in the future.

The future conditions analysis included traffic projections based on the methodology described below to expand the 2014 Existing Traffic volumes to the 2034 Background Traffic volumes. The Route 110 study area intersections were analyzed under two scenarios, a background condition and optimization scenario. The 2034 Background analysis utilized existing geometry and existing traffic signal settings to facilitate a direct correlation between existing and future conditions. The 2034 Background Optimized analysis utilized existing geometry, but modified intersection signal operations to provide the most efficient signalized intersection operations based on future traffic, including adjustments to traffic signal timings and settings.

Background Traffic Growth

Utilizing historical traffic volume trends exhibited by the corridor between 1998 and 2013, the 2014 collected ADT data, and the 2014 Existing Traffic Volumes, 2034 Background Traffic Volumes were developed for the study area. The methodology utilized to develop the background volumes was based on historical volume trends and recognition of the regional influence on traffic volumes along Route 110. The historical trends indicate very limited growth over the surveyed time-period, with an average of 1.2% annual growth over the 15 year period from 1998 through 2013. Based on a review of the historical trends for Route 110, the 2014 Existing Traffic Volumes have been expanded at a rate of 0.25% per year, compounded annually. This growth rate results in a total growth of just over 5% in traffic volumes from 2014 to 2034.

Future Traffic Forecast

Based on the expected types of land use and development, future development generated traffic volumes for the three potential development sites were estimated. The trip generation estimate was based on data published in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition, 2012. The Development Generated Traffic during the Sikorsky mid-afternoon peak period for each development was conservatively estimated at 20% of the peak generation, in recognition of the lower overall traffic volumes on the roadway system during the Sikorsky shift change mid-afternoon time period. The Development Generated Traffic for each development site are summarized in Table ES-4. In total, the potential sites result in approximately 336 additional trips in the morning peak hour, 140 trips in the Sikorsky Shift Change peak and 702 trips in the afternoon peak hour.

TABLE ES-4

Development Generated Traffic for Potential Development Parcels in Route 110 Study Area

Area	Estimated Development	Morning			Sikorsky Shift Change			Afternoon		
		In	Out	Total	In	Out	Total	In	Out	Total
1	20,000 sf Commercial PAD	49	41	90	22	21	43	109	108	217
2	175,000 sf Mixed Use	69	72	141	33	31	64	163	157	320
3	175,000 sf Medical/Hospitality	68	37	105	15	18	33	73	92	165
	Totals	**186**	**150**	**336**	**70**	**70**	**140**	**345**	**357**	**702**

Future Traffic Operations

Traffic operations for the 2034 Future Traffic Volumes were evaluated using Trafficware's Synchro plus SimTraffic 8 – Traffic Signal Coordination Software, based on the 2010 Highway Capacity Manual methodology. Existing condition geometry was utilized with the exception of the addition of the new driveway opposite Main Street – Putney. The new driveway was set to operate during the same phase as Main Street – Putney.

Signal operations were optimized along the corridor, as would be the case when the additional development comes online. Table ES-5 summarizes the expected traffic operations of the Route 110 corridor under 2034 Future conditions in each of the peak periods.

TABLE ES-5

Route 110 Intersection Operational Summary – 2034 Future Conditions

Study Intersection	Morning Peak Hour		Sikorsky Shift Change Peak Hour		Afternoon Peak Hour	
	LOS	Avg. Delay (s/veh)	LOS	Avg. Delay (s/veh)	LOS	Avg. Delay (s/veh)
Warner Hill Road and Sikorsky Gate #2	D	36.0	C	30.8	D	45.0
Oronoque Lane	D	47.7	D	44.9	D	48.7
Sikorsky Gate #1	A	7.3	D	38.2	D	41.5
Merritt Parkway SB Ramps and Navajo Lane	C	33.2	C	29.3	E	67.9
Ryders Lane and Commuter Parking Lot Drive	A	3.2	A	6.1	A	7.2
Merritt Parkway NB Ramps and Charlotte Street	E	67.2	F	103.2	F	176.4
Main Street – Putney	C	24.7	B	17.1	D	50.4

The full report provides a detailed description of the future areas of concern related to the traffic operations results and other observed needs and deficiencies.

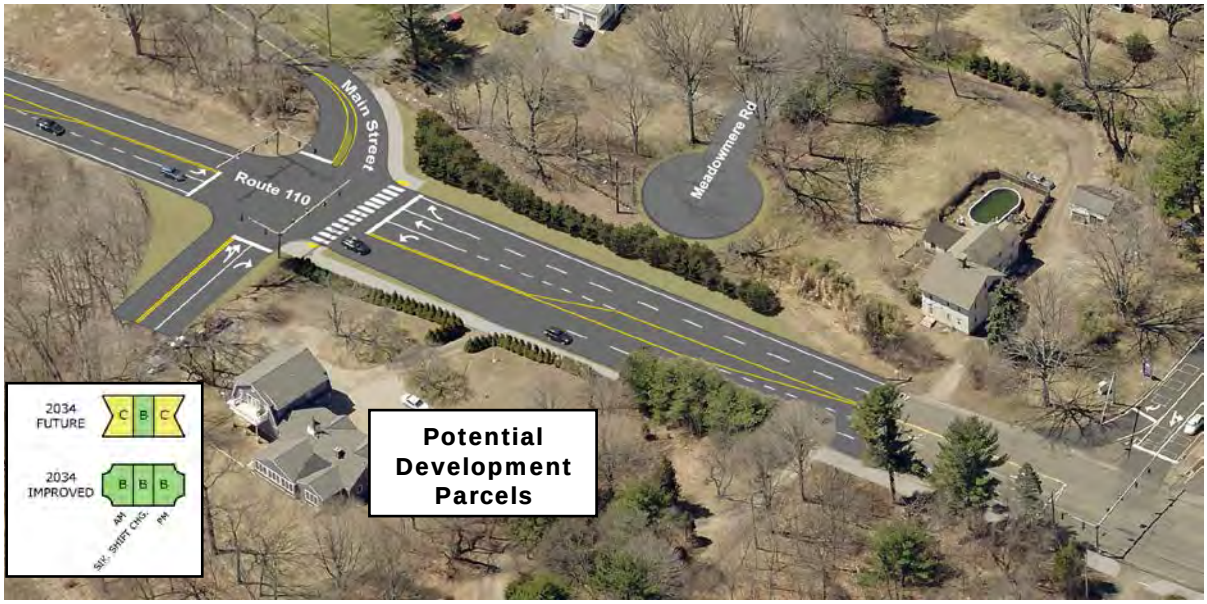
Recommendations

The recommendations address both existing needs and deficiencies and those resulting from the forecasted travel demand and potential development growth that is expected to occur in the Town of Stratford and the region by the year 2034. The recommendations were developed cooperatively with the Technical and Community Advisory Committees, CTDOT and METROCOG and were refined through a public input process, to address the goals and objectives outlined in the Study Mission Statement.

The proposed improvements are generally spot improvements meant to mitigate current and future conditions for the areas of concern. In some areas, more extensive physical improvements are necessary to address existing deficiencies along with the future transportation needs. The recommendations are presented by location, from the south to the north along the Route 110 corridor. The spot improvements to the transportation system will address future traffic growth, improve safety, increase accessibility, and promote alternative modes of travel. Although many of the recommendations address transportation issues related to motor vehicles, a series of alternative mode enhancement recommendations were developed to address pedestrian, transit, cyclist, and recreational usage of the transportation system.

Concept A: Main Street – Putney Intersection

Concept A improves traffic operations, intersection geometry, safety, and alternative travel mode mobility at the intersection of Route 110 (River Road / Main Street) with Main Street – Putney. The existing Main Street – Putney alignment intersects Route 110 at a skewed angle approximately 215 feet south of the Merritt Parkway northbound ramps. The skewed geometry results in difficult turning movement and/or high speeds maneuvers to and from Route 110.



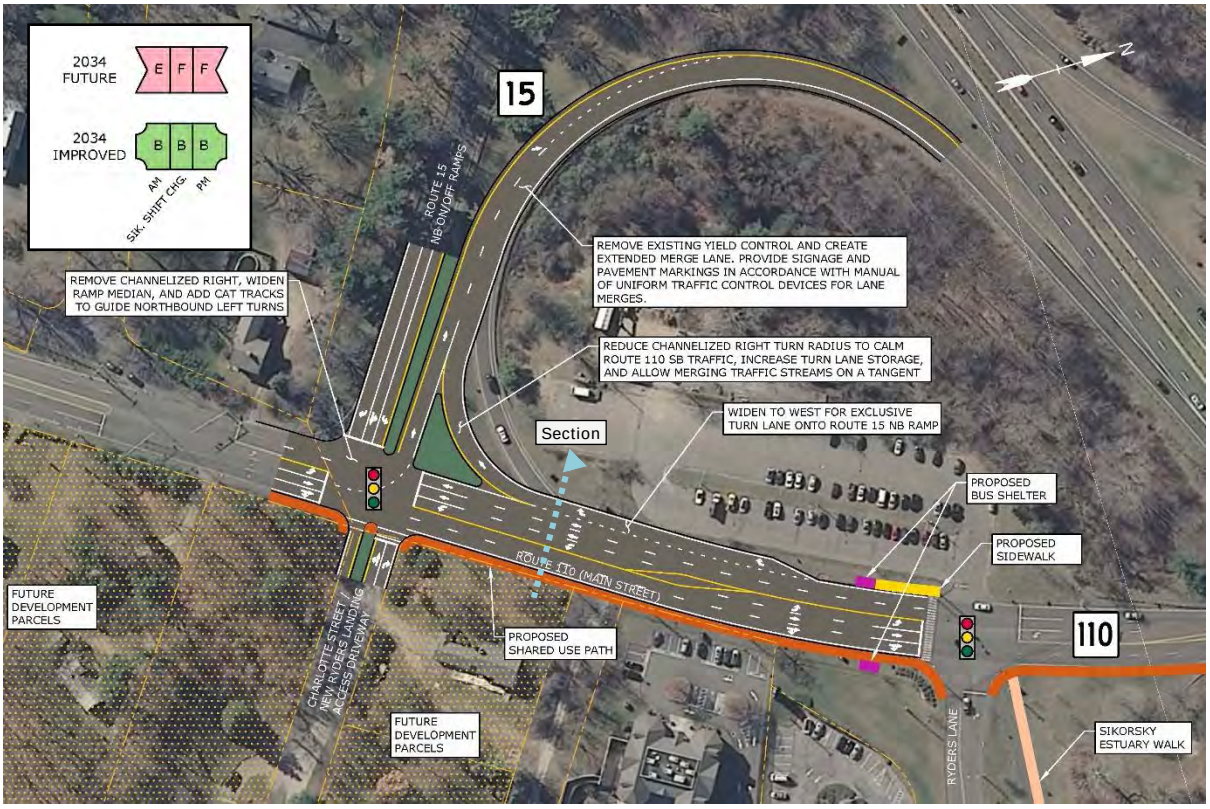
Concept A proposes the following primary physical improvements:

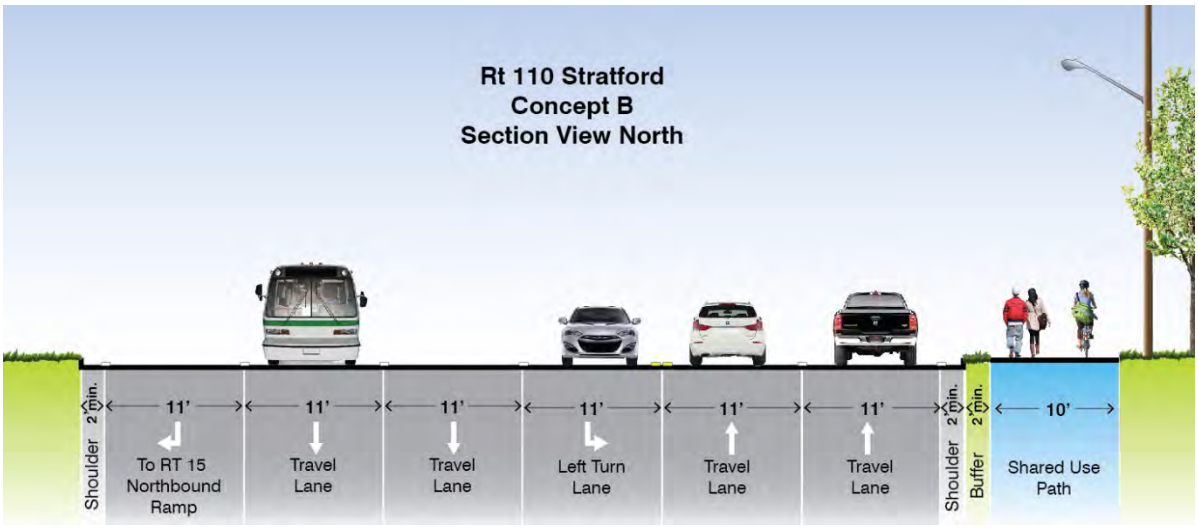
- Realign Main Street – Putney to the south at a perpendicular intersection with Route 110, approximately 500 feet south of the Merritt Parkway northbound ramps.
- Facilitate future development on the east side of Route 110 by defining a preferred driveway location opposite the realigned Main Street – Putney approach.
- Utilize existing roadway width to provide a northbound exclusive left turn lane to remove left turning vehicles from Route 110 northbound traffic stream.
- Convert the north access of Meadowmere Road to a cul-de-sac.
- Provide a shared use path along the east side of Route 110, south of the Merritt Parkway northbound ramps crossing to the west side of Route 110 at the realigned Main Street – Putney intersection.
- The concept includes a minor taking of private property to facilitate the realignment of Main Street – Putney to the south of the current intersection.

Concept B: Route 15 Northbound Ramps Intersection

Concept B improves traffic operations as well as alternative travel mode access and mobility at the intersection of Route 110 with the Merritt Parkway northbound ramps and Charlotte Street. The concept also accommodates potential future development parcels identified opposite the Merritt Parkway ramps on the east side of Route 110. The preferred concept proposes the following primary physical improvements:

- Widen the Merritt Parkway northbound entrance ramp to provide an extended merge area on the ramp to eliminate the existing yield condition for Route 110 southbound traffic and allow additional time for Route 110 traffic to merge on the ramp into a single lane before merging with Merritt Parkway northbound traffic.
- Widen Route 110 to the west and install a southbound exclusive right turn.
- Eliminate the small, right turn channelizing island on the Merritt Parkway northbound exit ramp
- Provide a shared use path along the east side of Route 110 to improve bicycle/pedestrian accessibility. See Concept G for more information on the alternative travel mode opportunities.
- Improve bus stops with shelter amenities on both sides of Route 110 and connect to shared use path with additional in-fill sidewalk.


2034 FUTURE
E F F
2034 IMPROVED
B B B
AM
SIK. SHIFT CHG.
PM
15
ROUTE 15 NB ON/OFF RAMPS
REMOVE CHANNELIZED RIGHT, WIDEN RAMP MEDIAN, AND ADD CAT TRACKS TO GUIDE NORTHBOUND LEFT TURNS
REMOVE EXISTING YIELD CONTROL AND CREATE EXTENDED MERGE LANE. PROVIDE SIGNAGE AND PAVEMENT MARKINGS IN ACCORDANCE WITH MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR LANE MERGES.
REDUCE CHANNELIZED RIGHT TURN RADIUS TO CALM ROUTE 110 SB TRAFFIC, INCREASE TURN LANE STORAGE, AND ALLOW MERGING TRAFFIC STREAMS ON A TANGENT
WIDEN TO WEST FOR EXCLUSIVE TURN LANE ONTO ROUTE 15 NB RAMP
Section
PROPOSED BUS SHELTER
PROPOSED SIDEWALK
ROUTE 110 (MAIN STREET)
FUTURE DEVELOPMENT PARCELS
CHARLOTTE STREET NEW RYDERS LANDING ACCESS DRIVEWAY
PROPOSED SHARED USE PATH
FUTURE DEVELOPMENT PARCELS
110
RYDERS LANE
SIKORSKY ESTUARY WALK
N


Rt 110 Stratford
Concept B
Section View North
Shoulder 2' min.
11'
To RT 15 Northbound Ramp
11'
Travel Lane
11'
Travel Lane
11'
Left Turn Lane
11'
Travel Lane
11'
Travel Lane
Shoulder 2' min.
Buffer 2' min.
10'
Shared Use Path

Concept C: Sikorsky Gate #1 Area – Realignment

Concept C mitigates the existing poor traffic operations, improves safety, facilitates better access to transit and provides mobility for bicyclists and pedestrians in the Sikorsky Gate #1 area. This concept also includes the intersections with Route 110 at the Merritt Parkway southbound ramps / Navajo Lane, and Oronoque Lane. The three closely spaced intersections cause congestion throughout the weekday peak hours resulting in the most congested portion of the corridor. Concept C proposes the following physical improvements to improve traffic operations, safety and mobility:

- Relocate the Sikorsky Gate #1 driveway opposite Oronoque Lane and develop a new site driveway for Sikorsky Aircraft while maintaining the no left turn restriction for southbound Route 110 and prohibiting access from Oronoque Lane.

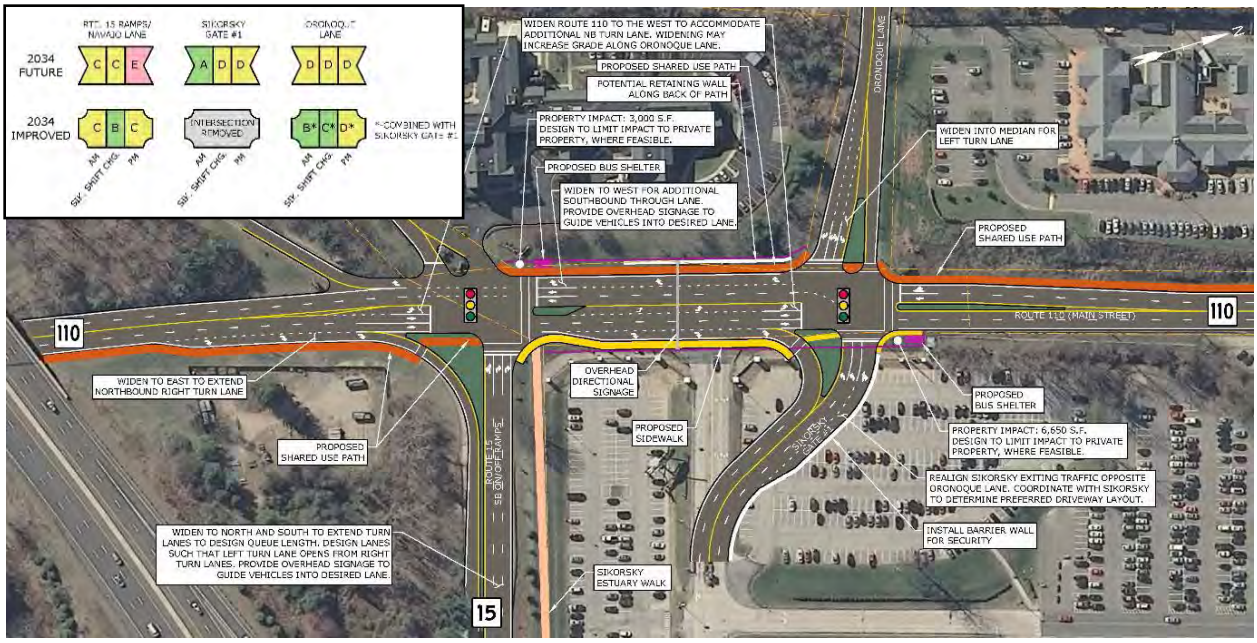
- Widen Route 110 to the west to install a northbound left turn lane between Navajo Lane and Oronoque Lane and a southbound through-right turn lane starting just south of Oronoque Lane and ending in an exclusive right turn lane onto the Merritt Parkway southbound entrance ramp.

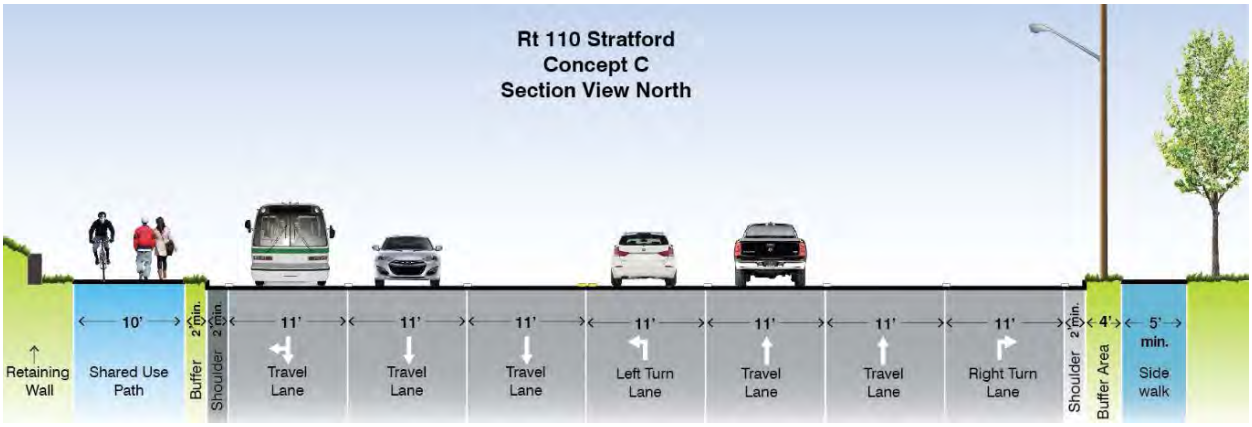
- Increase storage for turn lanes on Merritt Parkway southbound off ramp and on Route 110 northbound on ramp to Merritt Parkway southbound to design queue lengths.

- Provide a shared use path along the east side of Route 110, south of the Merritt Parkway southbound ramp and along the west side of Route 110 north of the ramp to improve bicycle/pedestrian accessibility.

- Provide new bus stops with shelter amenities on both sides of Route 110 and connect to a shared use path with additional sidewalk.

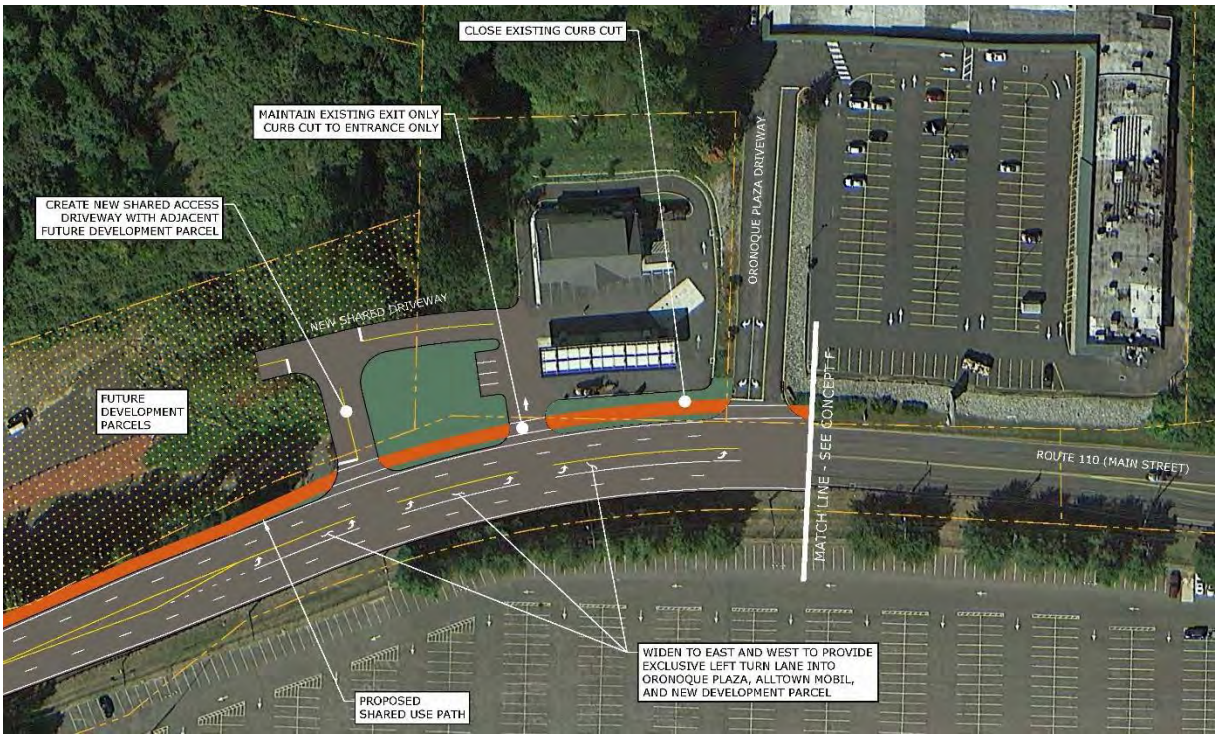
As shown in the illustration below, the concept results in acceptable LOS B through LOS D operation during the peak hours analyzed with the 2034 future traffic volumes. The Concept C cross section shows the new Route 110 lane configuration with the additional northbound left turn lane and southbound through lane between the intersections.





Concept E: Alltown-Mobil / Oronoque Plaza Area

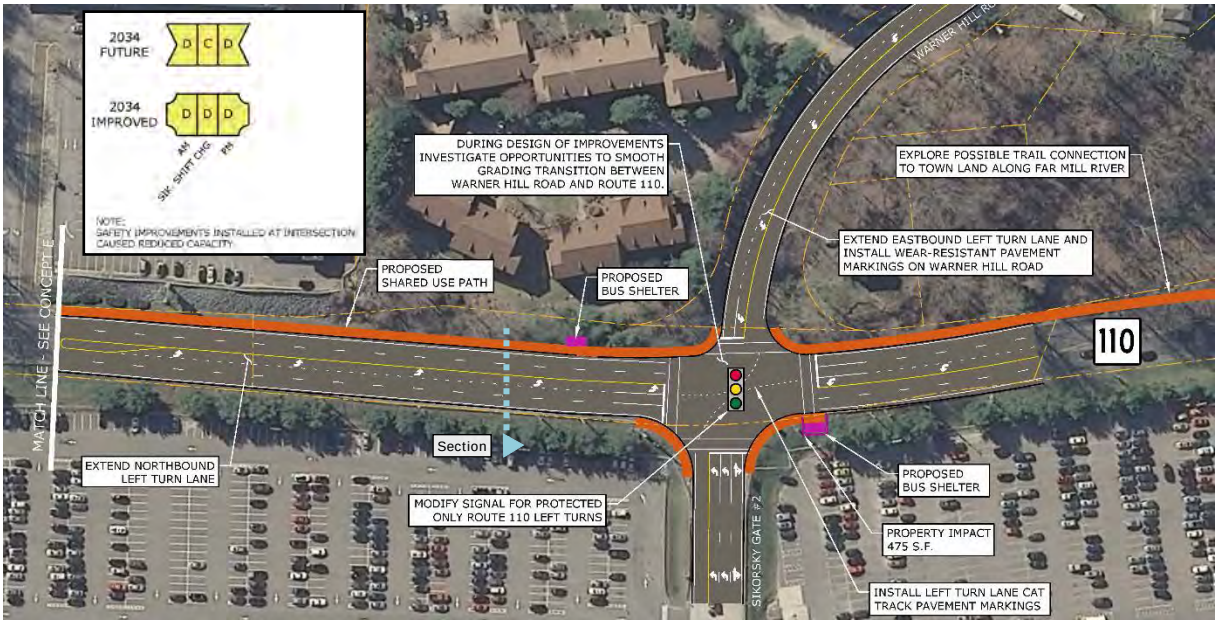
Concept E focuses on perceived safety concerns in the Alltown-Mobil and Oronoque Plaza area. Concept E recommends adjusting access to the Alltown-Mobil site if future development was to occur in this area and adding a left turn lane into both the gas station and Oronoque Plaza to remove left turning vehicles from the through traffic stream.

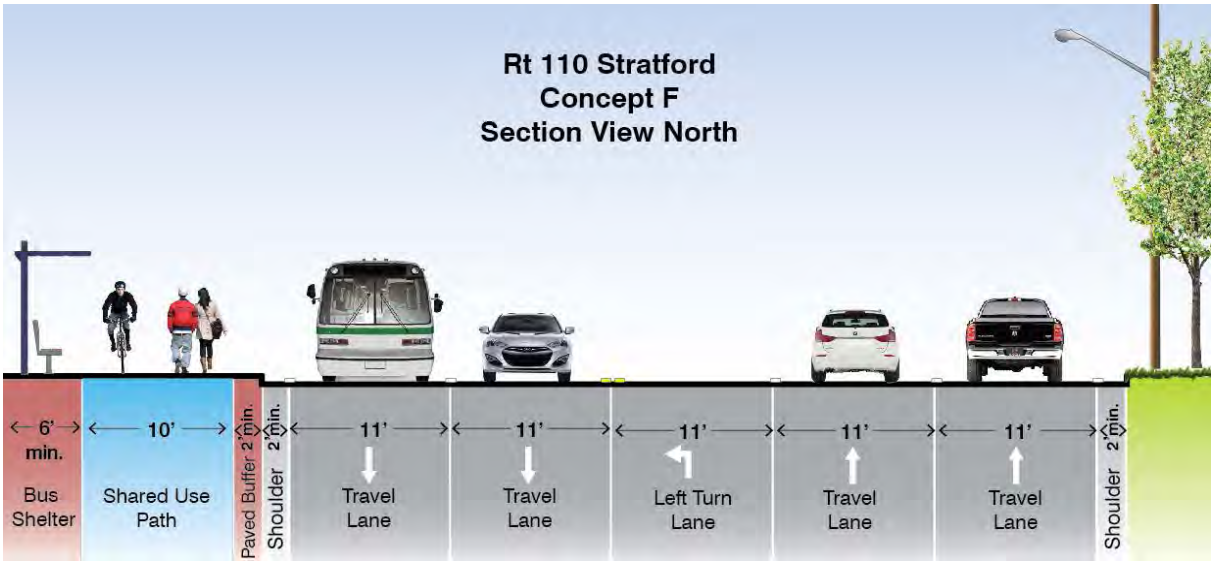


Concept F: Warner Hill Road & Sikorsky Gate #2 Intersection

Concept F proposes operational modifications to the Route 110 intersection with Warner Hill Road and Sikorsky Gate #2 to mitigate safety issues at this intersection. A review of the traffic accident data revealed a significant accident history, particularly for vehicles making permitted left turns from Route 110 onto Warner Hill Road and into Sikorsky Gate #2. Concept F proposes to eliminate the permitted left turns from Route 110 to Sikorsky Gate #2 driveway and Warner Hill Road, replacing them with a protected only left turn signal phase.

The proposed shared use path extends through this intersection from the south along the west side of Route 110. The path includes the provision of new transit shelters on either side of Route 110 to improve access to bus service for Sikorsky Aircraft. The Town of Stratford owns land to the north of the study area along the Far Mill River and the shared use path should connect to this public recreational area.

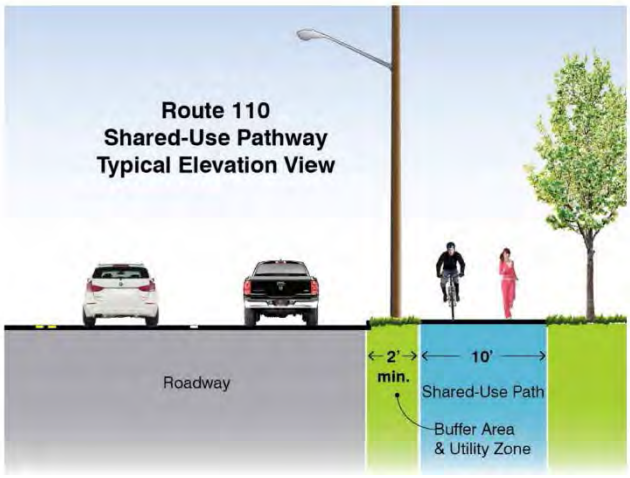

2034 FUTURE
D C D
2034 IMPROVED
D D D
AM SHIFT CHG PM
NOTE:
SAFETY IMPROVEMENTS INSTALLED AT INTERSECTION CAUSED REDUCED CAPACITY
MATCH LINE - SEE CONCEPT E
DURING DESIGN OF IMPROVEMENTS INVESTIGATE OPPORTUNITIES TO SMOOTH GRADING TRANSITION BETWEEN WARNER HILL ROAD AND ROUTE 110.
EXPLORE POSSIBLE TRAIL CONNECTION TO TOWN LAND ALONG FAR MILL RIVER
EXTEND EASTBOUND LEFT TURN LANE AND INSTALL WEAR-RESISTANT PAVEMENT MARKINGS ON WARNER HILL ROAD
PROPOSED SHARED USE PATH
PROPOSED BUS SHELTER
110
Section
EXTEND NORTHBOUND LEFT TURN LANE
MODIFY SIGNAL FOR PROTECTED ONLY ROUTE 110 LEFT TURNS
SIKORSKY GATE #2
PROPOSED BUS SHELTER
PROPERTY IMPACT 475 S.F.
INSTALL LEFT TURN LANE CAT TRACK PAVEMENT MARKINGS


Rt 110 Stratford
Concept F
Section View North
6' min.
Bus Shelter
10'
Shared Use Path
Paved Buffer 2' min.
Shoulder 2' min.
11'
Travel Lane
11'
Travel Lane
11'
Left Turn Lane
11'
Travel Lane
11'
Travel Lane
Shoulder 2' min.

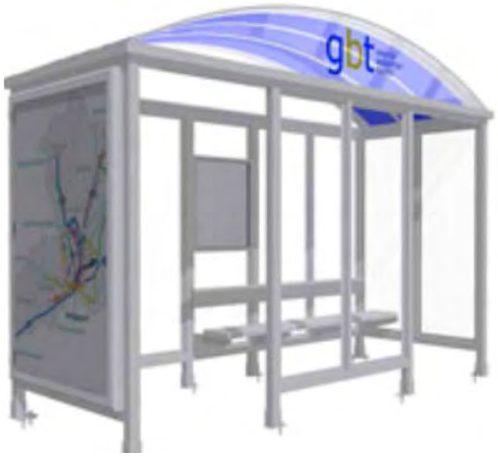
Concept G: Pedestrian, Bicyclist and Transit Accommodations

Concept G defines the pedestrian, bicycle and transit facility improvements along the Route 110 corridor. The existing conditions assessment identified a lack of non-motorized and alternative travel mode facilities and amenities. Furthermore, public input from the Technical and Community Advisory Committees meetings affirmed that improving alternative travel mode facilities and amenities were an important objective. The corridor users want better non-motorized access, mobility and safety. The Town of Stratford is focused on improving these facilities, increasing transit usage, and providing more extensive and interconnected bicycle and pedestrian facilities.

Based on the corridor review, the advisory committee input, and discussions with Greater Bridgeport Transit, it is recommended that a shared use path along the entire corridor be constructed from the Main Street – Putney intersection through the Warner Hill Road/Sikorsky Gate #2 intersection. The off-road path would be 10 feet wide to accommodate two-way bicycle and pedestrian traffic. The path would connect to the existing Sikorsky Estuary walk, which travels in a 0.80 mile u-shaped loop under the Sikorsky Memorial Bridge to the east between Ryders Lane and the Merritt Parkway southbound exit ramp. To facilitate more efficient access along the Route 110 corridor, it is recommended that a tunnel (rendering below) be installed carrying the shared use path under the Merritt Parkway along the east side of Route 110 through the existing bridge abutment of the bridge carrying the Merritt Parkway over Route 110.



For transit amenities, sidewalks are proposed to connect portions of the shared use path with new transit shelters at the three existing GBT transit stops at Ryders Lane, the Sikorsky Gate #1 area and the Sikorsky Gate #2 and Warner Hill intersection. GBT provided guidance that bus stop locations should be located immediately adjacent to through travel lanes and downstream of intersections whenever possible. The rendering of the new transit shelters being installed by Greater Bridgeport Transit is shown.



Courtesy of Susan Rubinsky Marketing

Implementation Plan

The implementation plan identifies and prioritizes recommended improvements that can be planned, programmed, and built within the 20 year study horizon. The implementation plan includes the overall project costs, complexity, and benefit. This section of the report seeks to provide the Town of Stratford, CTDOT, and METROCOG a menu of projects with guidance for implementation over time, based on a series of qualitative and quantitative metrics.

The Transportation Improvement Program includes 9 improvement projects that address the roadway network, transit system, and pedestrian and bicycle needs in the study area. Specifically, the Study recommends physical roadway improvements at 6 locations along the corridor and identifies numerous improvements to enhance transit, pedestrian and bicycle access to the roadway system through construction of new and improved facilities for alternative mode travelers. For summary purposes, these alternative transportation mode recommendations are grouped as one combined project for each mode, however the Study recognizes that implementation of the improvements will likely occur as the result of many separate projects as funding from various sources becomes available.

The priority for each of the recommended improvement projects has been established based on two primary criteria: project need and local interest to implement the recommended improvements. Project need is based on the urgency to mitigate an existing deficiency within the overall transportation system. Projects are deemed to have a higher priority when they address an identified safety deficiency, address accessibility, or mitigate a current mobility or operational issue. The project priority categories are defined at Short-Term, Mid-Term, and Long-Term based on the criteria described in Table ES-6.

TABLE ES-6

Summary of Project Need Priority Metrics

Project Priority	Project Characteristics
Long-Term	• Project does not address an identified safety concern • Project addresses future travel demand and traffic operations • Project may have mobility, accessibility, or multi-modal benefits
Mid-Term	• Project scope provides operational and mobility benefits that are currently an issue, but traffic operations are not poor or failing • Local stakeholders have expressed interest in implementing improvement to enhance transportation system.
Short-Term	• Project addresses an urgent safety issue • Project intended to address existing operational deficiency • Project addressed a deficiency in accessibility that has been identified as a local concern

Table ES-7 summarizes the implementation plan recommendations on a project-level basis. A review of the implementation plan indicates that there are 5 projects that have been identified as Short-Term priorities, 2 projects that that have been identified as Mid-Term priorities, and 2 projects that have been identified as Long-Term priorities.

Table ES-7

Summary of Projects in Implementation Plan

	Project Description	Project Priority	Project Complexity	Project Cost
C	Sikorsky Gate #1 Intersection Realignment Improvements	Short-Term	High	$6,000,000
F	Route 110 (Main Street) at Sikorsky Gate #2 and Warner Hill Road Intersection Improvements	Short-Term	Low	$400,000
B	Route 110 (Main Street) at Route 15 Northbound Ramps Intersection Improvements	Short-Term	Moderate	$1,475,000
G3	Transit Accommodation Improvements	Short-Term	Low	None
G1	Pedestrian and Bike Accommodations Improvements (Shared Use Path)	Mid-Term	Moderate	$1,470,000
A	Route 110 (Main Street / River Road) at Main Street – Putney Intersection Improvements	Mid-Term	Moderate	$1,425,000
G2	Pedestrian and Bike Accommodations Improvements (Merritt Parkway Overpass Tunnel)	Long-Term	High	$3,250,000
E	Alltown Mobil / Oronoque Plaza Area Improvements	Long-Term	Low	$415,000

Section 1
Introduction

The Route 110 Engineering Planning Study (Study) is being conducted on behalf of the Town of Stratford (Town) by the Connecticut Metropolitan Council of Governments (METROCOG). The project is funded by the Federal Highway Administration (FHWA) and the Town of Stratford through Connecticut Department of Transportation (CTDOT) and METROCOG. METROCOG serves the Town of Stratford as a member Town of the Greater Bridgeport and Valley Metropolitan Planning Organization (GBVMPO). The purpose of the Study is to develop a comprehensive transportation improvement plan for the Route 110 corridor study area and provide a planning document for the Town, Region, and State to guide the implementation of transportation system improvements to meet local and regional transportation needs while accommodating future land and economic development goals.

The goals and objectives of the Study were identified by the Route 110 Technical Advisory Committee (TAC) and Route 110 Community Advisory Committee (CAC). The TAC was comprised of Town of Stratford, METROCOG, Greater Bridgeport Transit, and CTDOT staff, while the CAC was comprised of major corridor stakeholders along with representation from Town staff and METROCOG. The Study goals and objectives were identified at the onset of the Study and included the following:

- Develop cost effective transportation system solutions that improve operations to mitigate poor capacity and congestion while accommodating future land use expansion along Main Street and in the region.

- Improve transportation system opportunities and mobility for alternative travel modes including sidewalk and bicycle infrastructure, exclusive pedestrian signalization at intersections, and improved transit amenities to provide a complete transportation system.

- Develop a comprehensive transportation improvement plan that facilitates the prioritization and implementation time frames to enable the programming of improvements to meet both current and future corridor needs.

The study process includes five primary work tasks that were included in the overall scope of the project.

Task 1 - Data Collection

Task 2 - Analysis of Existing Conditions

Task 3 - Analysis of Future Conditions

Task 4 - Identification and Analysis of Improvement Alternatives

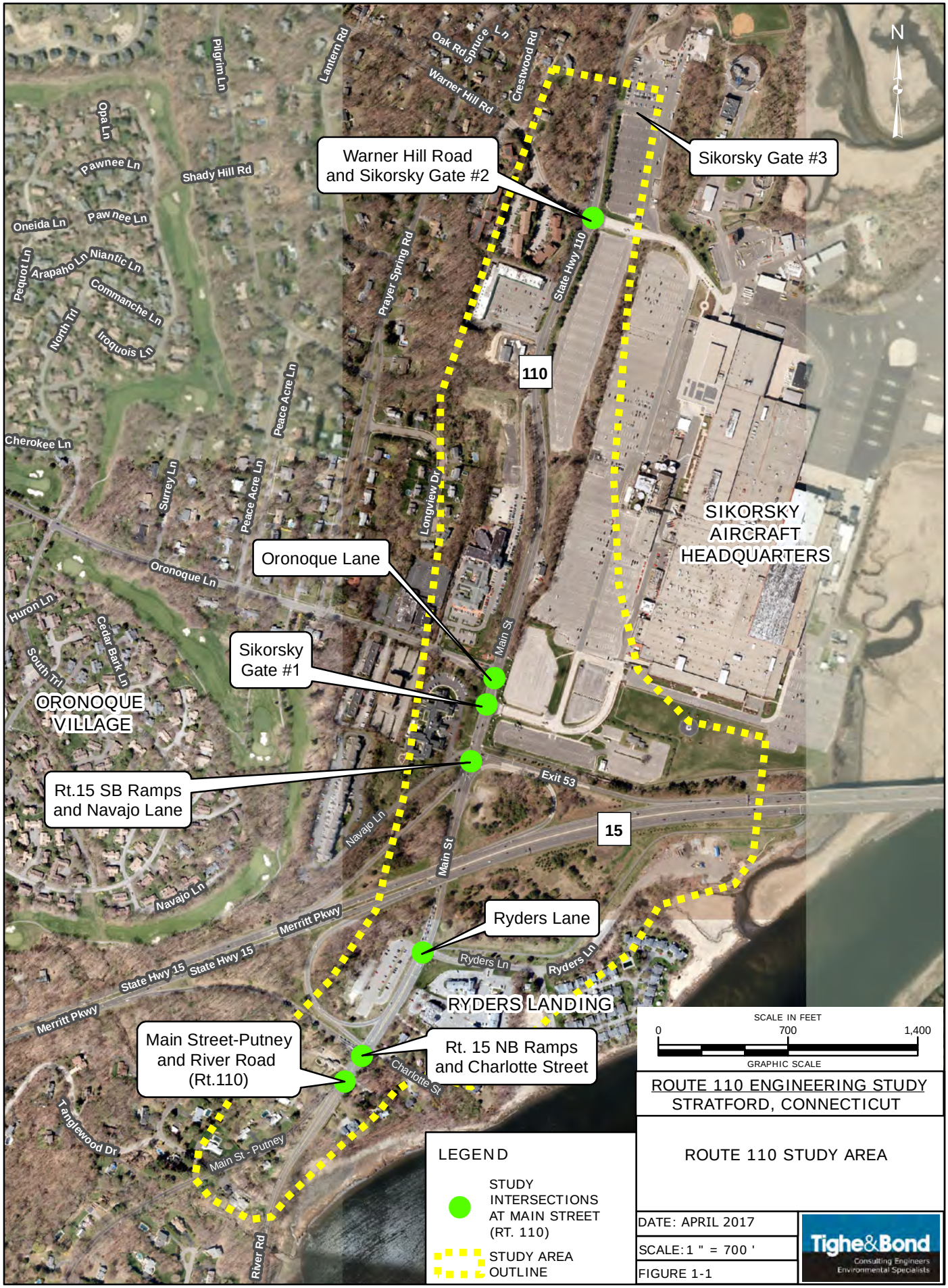
Task 5 - Final Improvement Plan

In addition to these work tasks a comprehensive Public Outreach program was conducted throughout the study process to involve and obtain input from the public. The efforts included one public information meeting in addition to the TAC and CAC meetings as well as the dissemination of information through the project website. The Public Outreach program is described in more detail, along with a summary of activities in Section 1.4.

1.1 Study Area

The study area includes a segment of Route 110 in the Town of Stratford directly adjacent to Route 15 (Merritt Parkway/Wilbur Cross Parkway) and Sikorsky Aircraft. The study area begins just south of the intersection of River Road (Route 110) with Main Street - Putney and extends north for approximately one mile to 500 feet north of the intersection of Main Street (Route 110) at Warner Hill Road. The study area includes segments of the side streets and commercial driveways approaching the corridor. The study area includes several intersections along Route 110 that were analyzed. These locations are shown in Figure 1-1.

In addition to reviewing the transportation system, the Study also conducted an analysis of existing and future land use. Overall, the study area includes a diverse mix of land uses, currently developed and/or zoned for development. Current land uses include residential, retail, commercial, office parks, and light industrial. The assessment of current land use and forecasted development growth trends are provided in subsequent sections of this report.



Tighe & Bond, Inc. J:\G\G0648 GBRC-Route 110 Study\Drawing\GIS\GBRCR110_FIGURE1-1_20141104.mxd

11/5/2014

1.2 Study Team

The Study Team includes representatives from the Town of Stratford, METROCOG, and CTDOT, in addition to the consultant team. The consulting team included Tighe & Bond, the prime consultant, and Fitzgerald & Halliday, a subconsultant.

Tighe & Bond provided overall project management, traffic and transportation engineering and led the public involvement process. Fitzgerald & Halliday was responsible for assessing the existing natural resources and reviewing current transportation infrastructure relative to accommodations for bicycles and pedestrians and providing recommendations for future enhancements to better accommodate all modes of travel in the study area.

The Town of Stratford is represented by staff from:

- Engineering Department
- Conservation Department
- Economic Development Department
- Planning Department

CTDOT staff from the Bureau of Policy and Planning are actively involved in the Study through their participation on the Technical Advisory Committees, in addition to their oversight role for the study findings through other technical divisions within the Department.

METROCOG is the Council of Governments and Metropolitan Planning Organization for the Town of Stratford and served as overall project manager for the Study. METROCOG staff actively participated in the public outreach initiatives in cooperation with the Town. METROCOG staff were members on the Technical and Community Advisory Committees. Additionally, METROCOG hosted the project website. In the future, METROCOG will assist the Town and State with identifying and securing funding for projects based on the recommendations in this Study.

In total the Study is represented by parties at the Local, Regional, and State levels to ensure that the planning activities fit within the overall planning goals at all levels of government and correlate with the local vision for the study area in the future.

1.3 Study Process

The Study followed a process developed by METROCOG and the Consultant Team based upon experiences with similar engineering planning studies. The key elements of the Study include:

- Conduct technical analyses and observations of the study corridor to assess existing conditions and identify needs and deficiencies
- Forecast future travel demand, analyzing future traffic conditions, and identifying potential future areas of concern within the 20 year study horizon
- Identify potential economic development opportunities in the corridor and assess their effect on the transportation system
- Identify feasible infrastructure improvement alternatives that mitigate the effects of future traffic on the corridor while providing opportunities to enhance the overall transportation system to better accommodate all modes of travel
- Conduct stakeholder meetings to obtain input on the study findings and to help guide the development of improvement alternatives
- Conduct a comprehensive public outreach process involving meetings and a project website to obtain public input on the study process and recommendations that can be supported in the long range transportation plan

This Final Study Report summarizes the comprehensive analysis of existing conditions, future conditions, and describes the transportation system improvement recommendations needed to mitigate the forecasted growth in traffic and development in the region and Town.

The Study included both an assessment of existing conditions detailing the current study area needs, deficiencies, and opportunities as well as a future condition analysis conducted to assess the impact of local and regional growth on the Route 110 corridor during the 20 year study horizon. An Existing and Future Conditions Technical Memorandum was prepared that provided a detailed summary of the following tasks:

- Assessing the existing transportation system and identifying needs and deficiencies
- Observing traffic volumes, vehicle classifications, and travel speeds within the study area and developing 2014 Existing Traffic volumes
- Analyzing traffic safety
- Analyzing traffic operations during the morning, mid-afternoon Sikorsky shift-change and afternoon peak periods
- Reviewing current multi-modal transportation services and facilities
- Screening the natural and environmental resources to identify existing resources

- Forecasting 2034 background traffic volumes that include both regional travel demand growth plus potential local development

- Review potential development/redevelopment within the 20 year study horizon along the corridor and assessing the impacts of the development on the existing transportation infrastructure

- Conducting an analysis of traffic conditions under the 2034 traffic conditions

- Identifying future areas of concern, which formed the basis for the development of physical improvements to mitigate the deficiencies

The assessment of existing and future conditions provided the basis for the development of a series of improvement alternatives for the study area transportation system. The improvements were developed to provide acceptable intersection operations, mitigate the effects of projected traffic growth, address identified safety concerns and issues, and increase multi-modal access in the study area. The recommended improvement plans are presented in Section 4 of this report with the complete engineering concept plans presented in Appendix B. Finally, Section 5 of the report presents an implementation plan prioritizing recommended improvements by need and complexity to help guide future decision making.

1.4 Public Involvement and Outreach Initiatives

Throughout the Study, a comprehensive Public Outreach Program was conducted by the Study Team in cooperation with the State and Local agencies. The goals of the outreach program were:

- Obtain input from the Public on study area issues, concerns, and help identify and frame the study goals and objectives
- Advise the Public of the study findings
- Educate the Study Team with local knowledge
- Involve stakeholders and the public in the development and refinement of recommendations that fit the vision and character of the Town
- Facilitate reviews by Town Council, Boards and Commissions, Businesses, and Residents, leading to a Final Improvement Plan that can be endorsed by the Town and Region to help guide future transportation system improvements and enhancements

In order to meet these Public Involvement and Outreach goals, the following project committees were formed.

1.4.1 Project Committees

The Study was guided through oversight provided by the Town of Stratford, METROCOG, and CTDOT. The public outreach initiatives were facilitated through a Technical Advisory Committee and a Community Advisory Committee. The following section describes each of the groups, their roles, and responsibility to provide oversight and guidance throughout the development of the Study.

1.4.1.1 Technical Advisory Committee (TAC)

This committee provided consistent input and oversight throughout the study process. The committee was comprised of:

- **Town Representatives**: Staff from the planning, engineering, and economic development departments are included on the Committee
- **METROCOG Representatives:** Staff from METROCOG participated in the TAC to ensure that the planning activities taking place along the Study corridor also meet regional goals and objectives
- **GBT Representatives:** Staff from Greater Bridgeport Transit (GBT) served on the TAC to provide planning direction relative to the regional bus transit system that they operate and provide input on transit related improvements and amenities in the corridor
- **CTDOT Representatives:** CTDOT Staff from the Division of Policy and Planning represented the Department on this project and served as a liaison between the Study and other Department units

Technical Advisory Committee meetings were conducted at key milestones of the study process to provide an update on the study process and obtain guidance on the results, findings, and recommendations of the Study.

1.4.1.2 Community Advisory Committee

The Community Advisory Committee (CAC) is comprised of project stakeholders directly impacted by operations in the study area. The CAC includes members from Sikorsky Aircraft, area businesses, and other key stakeholders that live and/or operate a business in the study area. In addition, the CAC includes select members of the Technical Advisory Committee from the Town of Stratford and METROCOG to provide a cohesive public outreach process. The CAC meetings provided a forum for the CAC members to provide their perspectives on the study goals and objectives and help vet study findings and recommendations.

1.4.2 Summary of Outreach Activities

The Public Outreach initiatives have been on-going since the initiation of the Study through the TAC and CAC as well as with key stakeholders and the public. The following meetings have taken place during the progression of the Study:

Project Kickoff Meeting:	August 14, 2014
TAC Kickoff Meeting:	November 12, 2014
CAC Kickoff Meeting:	November 19, 2014
Stakeholder Interview with Sikorsky Aircraft:	January 28, 2015
Stakeholder Interview with Ryders Landing:	January 12, 2015
TAC Existing/Future Conditions and Alternatives Meeting:	October 15, 2015
CAC Existing/Future Conditions and Alternatives Meeting:	November 18, 2015
TAC Final Report Review Meeting:	November 30, 2016
CAC Final Report Review Meeting:	November 30, 2016
Public Information Meeting:	December 8, 2016

These meetings were a key component of acquiring information and feedback on the various work tasks conducted throughout the project.

1.4.3 Project Website

The METROCOG hosts a project website that includes access to study information and publications:

http://www.ctmetro.org/projects/transportation/roads-highways/route-110-faqs/

The website also provides a forum for the public to submit questions and comments through an online form.

Section 2
Assessment of Existing Conditions

The assessment of existing conditions includes an extensive data collection process to establish the current condition of the transportation system in the study area. The purpose of the existing condition assessment is to identify existing needs and deficiencies and begin the process of identifying opportunities for improvements to the transportation system in the study area. This section describes the assessment of the study area transportation system as it exists in 2014.

2.1 Roadway Network

The main roadways in the study area (shown on Figure 1-1) were reviewed in the field to observe the condition of the roadway network and identify any deficiencies. These roadways are classified as either Urban Principal/Minor Arterials, Urban Collectors or Urban Local Roadways by the Connecticut Department of Transportation (CTDOT) in its functional classification system. Based on the classifications of the study area roadways, a review of roadway characteristics was conducted to determine if deficiencies exist. The following sections summarize the results of the observations.

2.1.1 State Route 110 (Main Street/River Road)

Main Street/River Road is classified as an Urban Principal/Minor Arterial by the CTDOT, and is designated as Connecticut State Route 110. Route 110 runs north-south in the east half of the Town of Stratford, beginning in Stratford at the intersection with U.S. Route 1 to the south and running north through the City of Shelton before ending at the intersection with the Monroe Turnpike (Route 111) in the Town of Monroe. The roadway is designated as River Road south of the intersection with Main Street - Putney and then transitions to Main Street through the balance of the study area and north to the Shelton City line. The northern portion of Route 110 in the study area is designated as a minor arterial from the Shelton City line to the intersection of the Route 15 (Merritt Parkway) Exit 53 Interchange Ramps where the classification changes to Principal Arterial continuing south through the remainder of the study area.

Route 110 provides regional access, in addition to local access within the study area. The roadway intersects with Warner Hill Road, in the northern portion of the study area. Warner Hill Road, which transitions to Old Stratford Road to the northwest, provides a full interchange with Route 8, as well as providing access to State Route 714 (Bridgeport Avenue), which serves as a commercial corridor in the City of Shelton. As mentioned, Route 110 intersects with the Merritt Parkway (Route 15) in the southern portion of the study area. The Merritt Parkway provides travelers regional access, including access to Interstate 95 and the City of Milford to the east and Route 8 and the City of Bridgeport to the west of the study area. This Merritt Parkway interchange provides a significant destination for regional travelers that utilize Route 110 for regional access.

Route 110, within the study area, is approximately 1.2 miles long. The roadway cross section varies from two lanes wide at either end of the study area, to four/five lanes wide at the intersections with Warner Hill Road, Oronoque Lane, Sikorsky Aircraft Gates #1 and 2, and the Merritt Parkway Interchange, which has two through lanes in each direction and exclusive left and right turn lanes depending on the intersection.

North of Warner Hill Road, Route 110 is approximately 46± feet wide with four 11-foot travel lanes, two in each direction, with a 1 foot shoulder on either side, before tapering to a single lane in each direction north of Sikorsky Aircraft Gate #3. Two, 11-foot wide exclusive left turn lanes are provided on the Route 110 northbound and southbound approaches to the Warner Hill Road intersection. South of Warner Hill Road and approaching the intersection with Oronoque Lane, Route 110 is approximately 50 feet wide with four, 12-foot travel lanes and 1 foot shoulders on either side.

Between the intersections with Oronoque Lane and the Merritt Parkway Interchange southbound ramps, Route 110 has four 11-foot travel lanes, two in each direction with 1 foot shoulders. The Route 110 northbound approach to the Merritt Parkway interchange southbound ramps provides an uncontrolled channelized right turn to merge onto Merritt Parkway southbound. The Route 110 northbound approach to Sikorsky Gate #1 has an exclusive right turn lane into the Gate.

Route 110 at Merritt Parkway Southbound Ramps – Looking North

South of the Merritt Parkway Interchange southbound ramps and approaching the intersection with Ryders Lane and the Commuter Parking Lot Driveway, Route 110 passes under the Merritt Parkway. In this area, Route 110 is approximately 50 feet wide with four, 12-foot travel lanes and 1 foot shoulders. Northbound and southbound exclusive left turn lanes, each 11 feet wide, are provided at the Ryders Lane and Commuter Parking Lot Drive intersection.

Between the intersections with Ryders Lane/Commuter Parking Lot Driveway and the Merritt Parkway Interchange northbound ramps, Route 110 is approximately 62± feet wide, with four, 12-foot wide travel lanes, two in each direction, an 11 foot wide painted median and 1.5 foot shoulders. In this section, Route 110 southbound provides a yield controlled channelized right turn lane to merge onto the Merritt Parkway northbound ramp.

At the intersection with the Merritt Parkway Interchange northbound ramps, Route 110 has two, 12-foot travel lanes in each direction, with 1.5 foot shoulders and an 11 foot wide exclusive left turn lane in each direction. Similar lane widths are carried through the intersection with Main Street – Putney, before tapering into a single lane in each

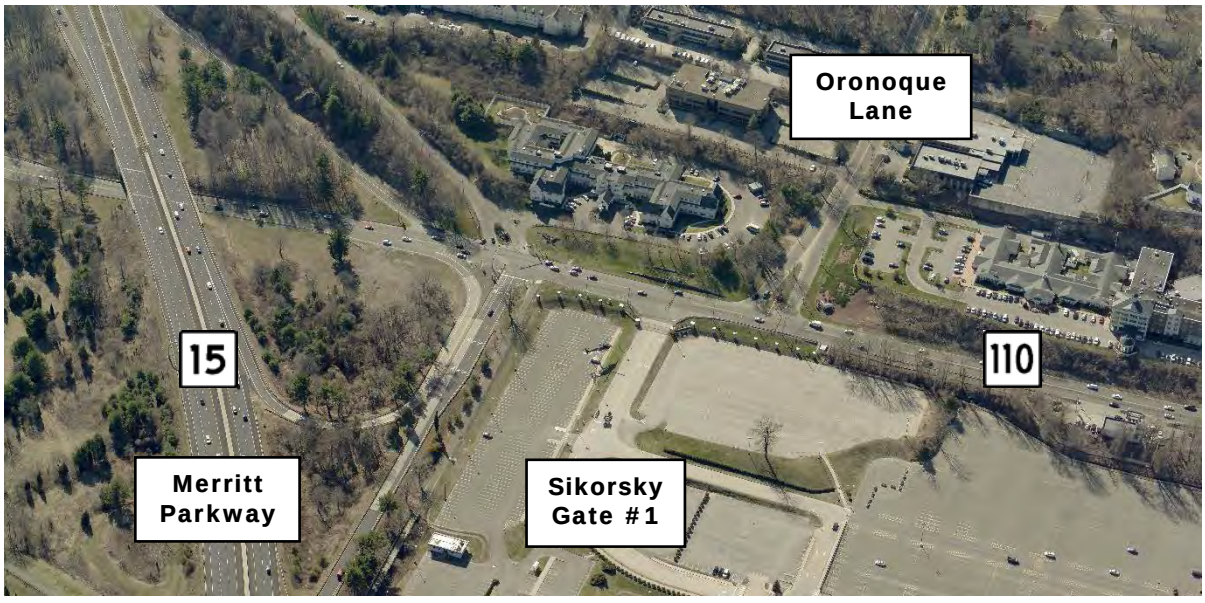
direction at the end of the study area approximately 325 feet south of Main Street – Putney. The Route 110 northbound approach to Main Street – Putney includes an 11 foot wide painted median that tapers to the two-lane cross-section to the south.

The posted speed limit on Route 110 in the study area is 40 miles per hour from the north limit of the study area to the intersection with Charlotte Street to the south. South of Charlotte Street, the speed limit is 45 miles per hour. More information about the posted speed limits and existing travel speeds is provided in Section 2.5.

The character of Route 110 within the study area is largely a commuter route servicing commercial properties on either side of the roadway. The corridor is bordered by the Housatonic River to the east and residential properties to the west beyond the commercial properties fronting the roadway. The primary traffic generator in the corridor is the Sikorsky Aircraft Corporation headquarters facility spanning approximately 0.75 miles on the east side of Route 110. Other commercial properties, including two assisted living facilities, a hotel, two gas stations and two shopping plazas are the other traffic generators within the study area. At the south end of the study area, 8 residential properties are serviced by Leslie Street, Charlotte Street and private driveways which intersect Route 110.

2.1.2 State Route 15 (Merritt Parkway)

Merritt Parkway (Route 15), is classified by CTDOT as an Urban Principal Arterial Expressway. Merritt Parkway crosses the center of the Route 110 study corridor creating the full service interchange 53. The roadway provides regional access to the Route 110 corridor with the Sikorsky Bridge accessing the City of Milford, Interstate 95, U.S. Route 1 and other New Haven County towns/cities to the east and the Town of Trumbull and other Fairfield County towns/cities to the west. Approaching Interchange 53 and the Route 110 corridor, Merritt Parkway has two lanes in each direction with a Southbound exit-only auxiliary lane. The Merritt Parkway Northbound access from Route 110 merges onto Merritt Parkway in the exit-only auxiliary lane for the Milford Parkway connector to Interstate 95 and U.S. Route 1. Merritt Parkway has a posted speed limit of 55 miles per hour.



Route 110 from Merritt Parkway to Oronoque Lane – Looking West

2.1.3 Main Street - Putney

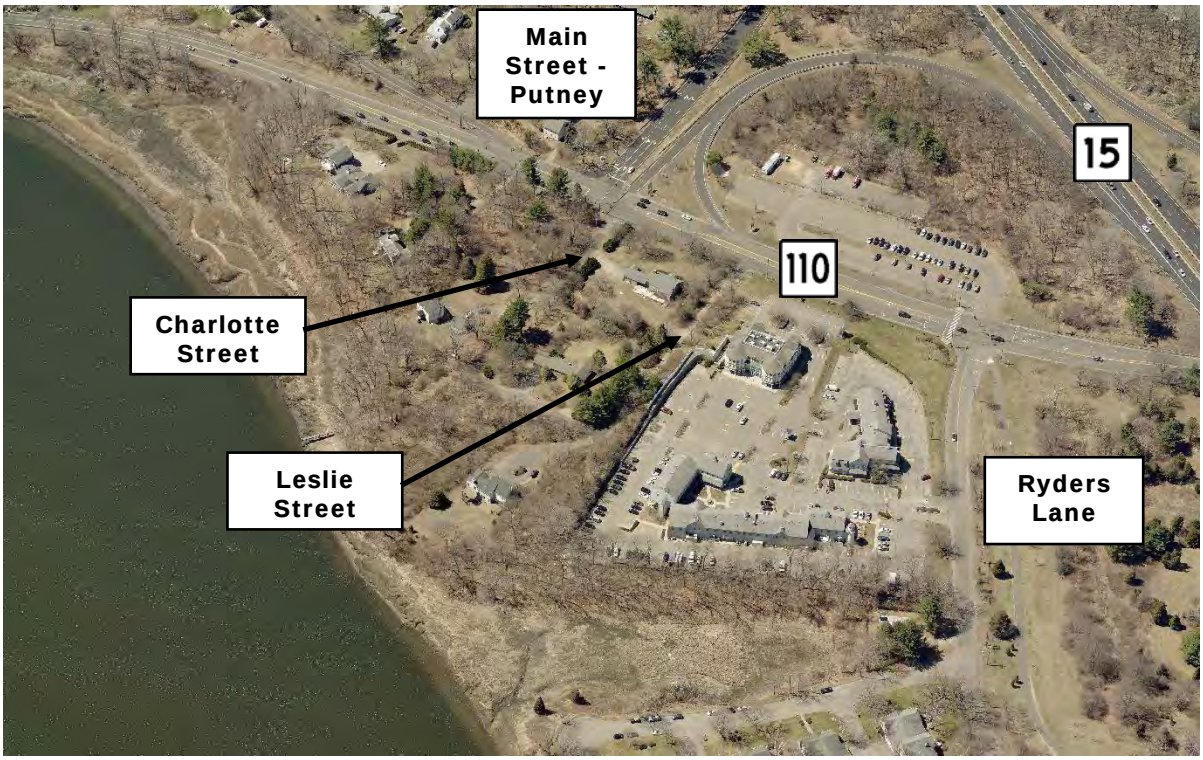
Main Street - Putney is classified by CTDOT as a collector roadway directly east of the Route 110 corridor. The roadway is a single lane in each direction servicing mainly residential properties and the Harry B. Flood Middle School via Chapel Street. Main Street - Putney bypasses approximately 1.15 miles of Route 110 before intersecting with Route 110 again to the south.

2.1.4 Charlotte Street and Leslie Street

Charlotte Street and Leslie Street are classified by CTDOT as local roadways. The roadways intersect Route 110 from the east with Charlotte Street opposite the Merritt Parkway Interchange northbound ramps and Leslie Street located approximately 235 feet to the north of the intersection. The roadways are unpaved and narrow with two-way traffic, servicing four residential properties between Route 110 and the Housatonic River.

2.1.5 Ryders Lane

Ryders Lane, classified by CTDOT as a local roadway, intersects Route 110 approximately 450 feet south of the Merritt Parkway underpass at a signalized intersection. Ryders Lane has a single lane in each direction providing access to Ryders Landing Shopping Plaza and the Ryders Landing Condominiums to the east of Route 110. Ryders Lane dead ends to the east in a property along the Housatonic River, which is currently being used as a staging area for CTDOT maintenance crews.



Route 110 from Main Street – Putney to Merritt Parkway – Looking West

2.1.6 Navajo Lane

Navajo Lane is a private driveway that intersects Route 110 at the signalized intersection opposite the Merritt Parkway southbound ramps. The driveway is a single lane in each direction with a median separating entering and existing traffic. The driveway provides access to Homewood Suites and the Atria Senior Living Facility.

2.1.7 Sikorsky Aircraft Site Access Driveways (Gates 1 through 3)

The Sikorsky Aircraft Corporation World Headquarters fronts Route 110 on the east side of the roadway next to the Housatonic River. The facility has three driveways on Route 110, Gates #1 through #3. Gate #3 is located just north of the study area and is controlled by a traffic signal. The driveway is a single lane in each direction and all visitors to the Sikorsky facility must enter through this gate. Gate #2 intersects Route 110 opposite Warner Hill Road and is signal controlled. The driveway has one lane entering and three lanes exiting, two exclusive left turn lanes and a shared-through right lane. The Gate provides access to the main campus parking area and serves employees, private contractors and deliveries. Gate #1 intersects Route 110 between the intersections with Oronoque Lane and the Merritt Parkway Interchange 53 southbound ramps. The gate has two entering lanes and two exiting lanes, an exclusive left turn and shared left-right turn lane. Gate #1 services mainly Sikorsky employee traffic.

Sikorsky Gate #1 from Route 110 – Looking South

Sikorsky Gate #2 from Warner Hill Road – Looking East

2.1.8 Oronoque Lane

Oronoque Lane is classified by CTDOT as an Urban Local Roadway. The roadway runs east to west and is approximately 40± feet wide with a single lane in each direction. The posted speed limit is 30 miles per hour. Approaching Route 110, Oronoque Lane has a steep, approximate 12% downgrade towards Route 110. At the intersection of Route 110, Oronoque Lane widens, providing a short landscaped median and two lanes eastbound to provide an exclusive right turn and a left-right turn lane onto Route 110. Oronoque Lane provides access to Lord Chamberlain Assisted Living Facility and two office buildings directly west of Route 110 and residential properties including Oronoque Village further to the west. Oronoque Lane also provides access to Bridgeport Avenue (State Route 714) to the west via James Farm Road and Armstrong Road, which serve as a bypass alternative to access Route 110 and the Merritt Parkway from the west.

Oronoque Lane – Looking West from Route 110

2.1.9 Warner Hill Road

Warner Hill Road, classified by CTDOT as an Urban Collector roadway, runs east to west terminating at the intersection with Route 110. The roadway is a single lane in each direction and widens to two lanes eastbound at Route 110 with an exclusive left turn lane for turns onto Route 110. Similar to Oronoque Lane, Warner Hill Road has a steep downgrade of approximately 15% entering the intersection with Route 110. As previously mentioned, Warner Hill Road provides access to the Route 8 expressway and Bridgeport Avenue (State Route 714) to the west via Old Stratford Road. The posted speed limit on Warner Hill Road is 30 miles per hour.

Warner Hill Road – Looking West towards Route 110 and Sikorsky Gate #2

2.2 Intersection Traffic Control

Within the study area, Route 110 intersection traffic control is generally signalized at public street intersections and the Sikorsky Entrance Gates, and unsignalized at private/commercial driveway intersections. The study corridor features seven signalized intersections at the major intersections as listed in Table 2-1. Several unsignalized intersections with stop control on the minor approaches are provided within the study area accessing two gas stations, Oronoque Shopping Plaza and residential properties.

The traffic control signals along Route 110 operate within a closed loop traffic control signal system owned and operated by CTDOT. The system's function is to provide coordination between several intersections to promote efficient traffic operations. The

closed loop signal system includes the 7 study area intersections. Closed loop signal system settings related to cycle lengths, time of day signal patterns, and traffic control signal phasing information was obtained from CTDOT. The settings were utilized in the traffic model to analyze traffic control signal operations. The results of the analysis are summarized in Section 2.6 – Existing Traffic Operations.

The Route 110 intersections with Oronoque Lane and Sikorsky Gate #1 operate with one traffic signal controller in a cluster intersection configuration. These closely spaced intersections are coordinated with the adjacent signals, particularly the adjacent intersection with the Merritt Parkway Southbound Ramps. Although the coordination aims to promote efficient traffic operations, the three signalized intersections within 500 feet causes significant congestion and delays during the peak hours. A main goal of this Study was to develop and analyze concepts to mitigate the operational issues observed at the signalized intersections along the corridor.

The Route 110 intersections with the Merritt Parkway northbound ramps and Main Street – Putney also operate under one traffic signal controller in a cluster intersection configuration. These intersections were observed to operate efficiently during the peak hours as the southbound Route 110 traffic flow onto Merritt Parkway Northbound is not signalized as part of the intersection.

Currently, only the Route 110 intersection with Ryders Lane/Commuter Parking Lot Driveway provides a pedestrian push-button actuated exclusive pedestrian crossing phase. All other signals in the study area, with the exception of Main Street - Putney, are equipped with pedestrian push buttons to actuate the minor street (side street) pedestrian clearance time to allow pedestrians to cross concurrently with vehicular traffic. Opportunities to improve access and accommodations for pedestrians along the corridor were identified as part of this Study. Further detail on the existing pedestrian accommodations within the study area is provided in Section 2.8 – Alternative Travel Modes.

TABLE 2-1

Route 110 Intersections Traffic Control Devices

Intersection	Traffic Control	
Main Street - Putney	Closed Loop Traffic Signal	Clustered Operation
Route 15 Northbound Ramps and Charlotte Street	Closed Loop Traffic Signal	
Ryders Lane and Commuter Lot Drive	Closed Loop Traffic Signal	
Route 15 Southbound Off-Ramp and Navajo Lane	Closed Loop Traffic Signal	Clustered Operation
Sikorsky Gate #1	Closed Loop Traffic Signal	
Oronoque Lane	Closed Loop Traffic Signal	
Warner Hill Road and Sikorsky Gate #2	Closed Loop Traffic Signal	

2.3 Traffic Volumes

2.3.1 Historical and 2014 Traffic Volumes

Available historical traffic volume data was obtained from the CTDOT during the Data Collection task. In addition, several traffic counts were conducted, supplementing the available data. Data sources include:

- CTDOT triennial 24-hour continuous automatic traffic recorder (ATR) data between 1997 and 2013. The most recent count year for the Town was 2013 and the Merritt Parkway Ramps was 2012.
- Manual turning movement counts at the 7 signalized study area intersections in September 2014 as part of the study data collection effort.
- ATR counts at 7 locations along Route 110 and 4 locations on the side streets in September 2014 as part of the study data collection effort.

A review of the historic average daily traffic volume data published by CTDOT indicates daily traffic volumes along Route 110 peaked in the mid-2000's, and have slightly declined since, coincident with the economic recession during the latter half of the decade. Figures 2-1 through 2-3 show the change in average daily traffic at multiple locations in the study area. Figure 2-4 in Appendix A summarizes the 2012 through 2014 Average Daily Traffic Volumes at count locations throughout the study area.

FIGURE 2-1

Route 110 Historical Average Daily Traffic

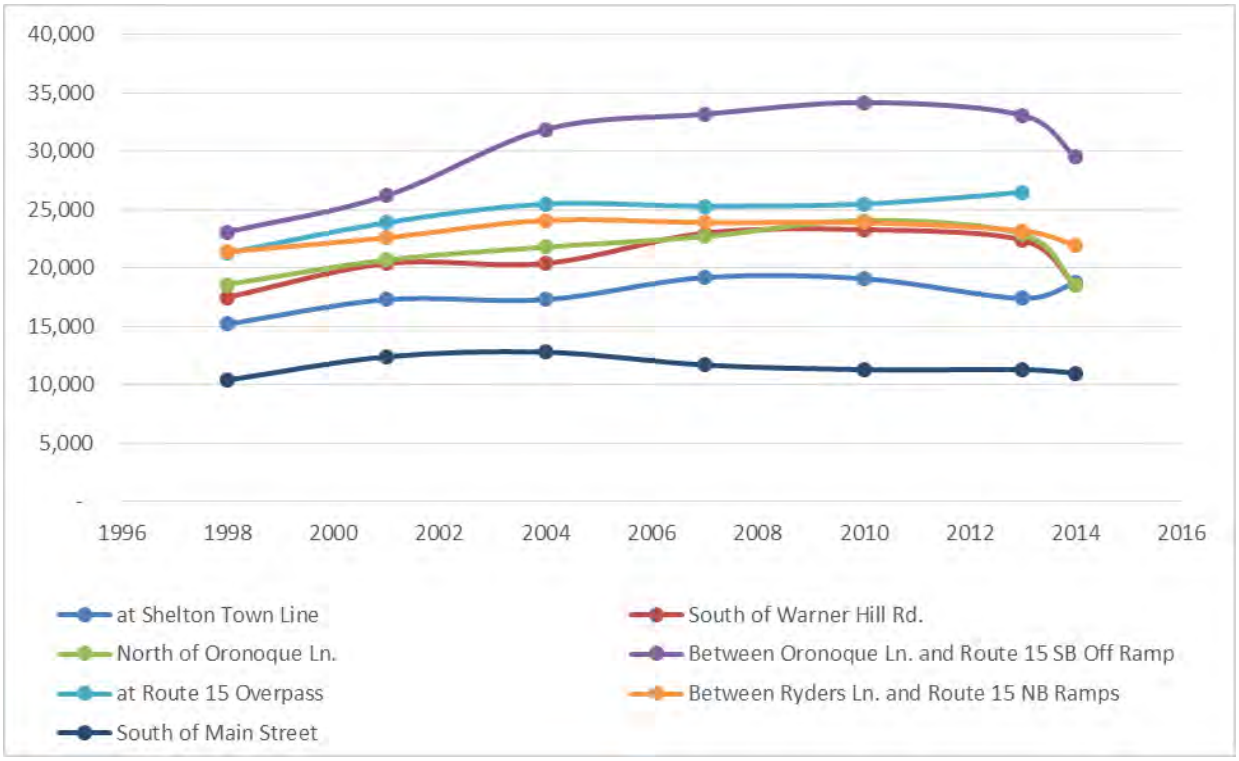


FIGURE 2-2

Merritt Parkway (Route 15) Ramps Historical Average Daily Traffic

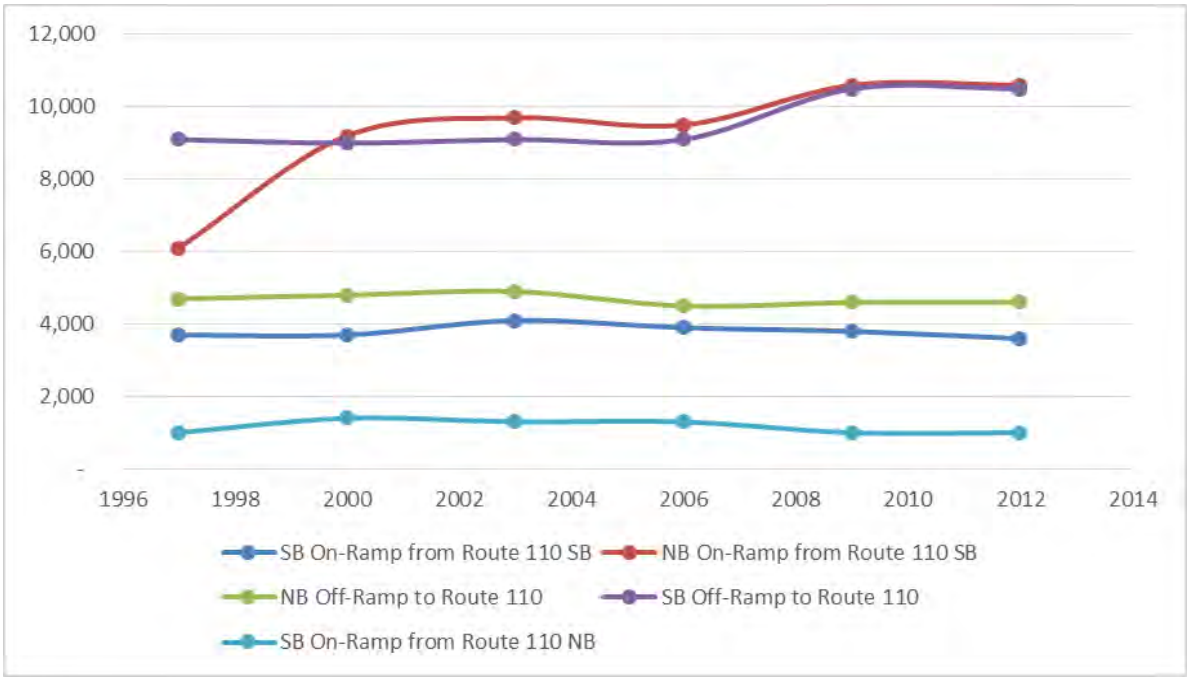


FIGURE 2-3

Intersecting Side Streets Historical Average Daily Traffic

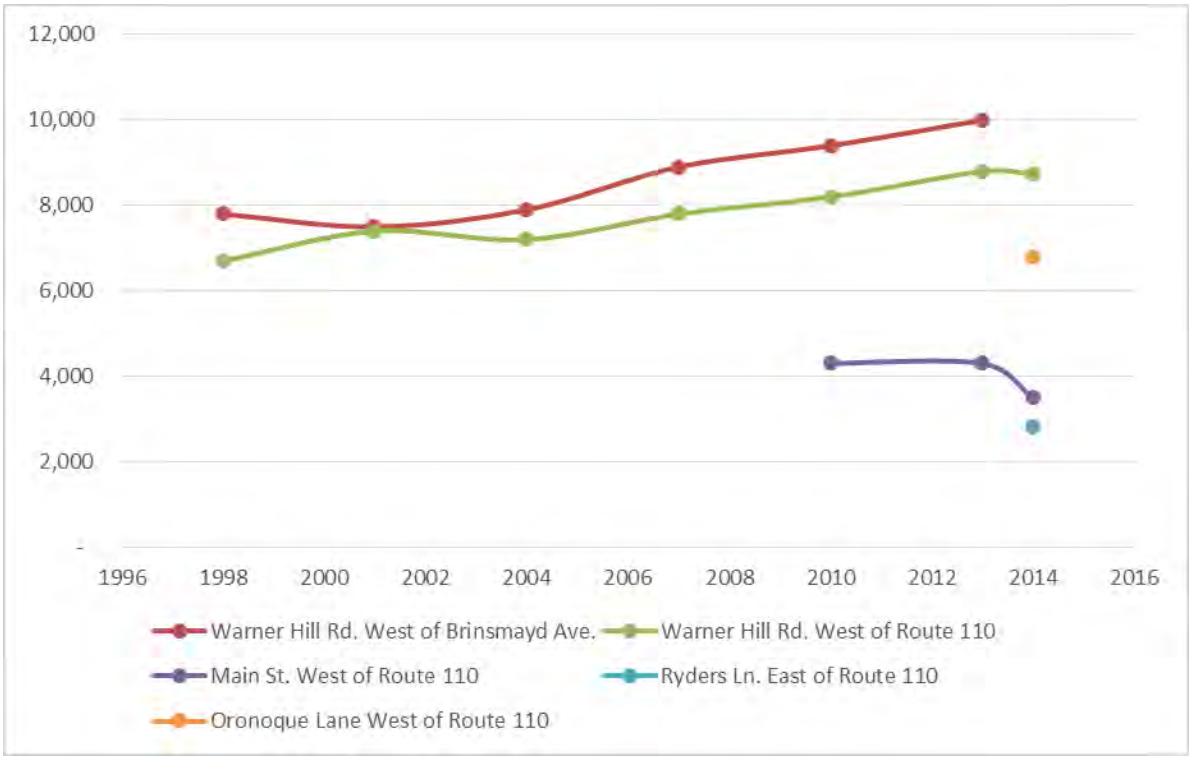


Table 2-2 summarizes the various average daily traffic data at select locations along the Route 110 corridor, and the previously presented Figure 2-4 in Appendix A depicts the ADT data on a diagram of the overall study area. The table provides the Average Daily Traffic, Morning, Sikorsky Afternoon Shift Change, and Afternoon Peak Hour Traffic (including a directional distribution of the volume during the peak hour when available) and the peak hour "K" factor. The "K" factor is calculated by determining the percentage of the total ADT that occurs during the peak hour period, indicating the relative intensity of the peak hour volume relative to the balance of the average daily traffic.

A review of Table 2-2 exhibits the highest volumes in the study area are centered around the Sikorsky Gate #1 Driveway. Comparing the volumes in the core of the study corridor with areas to the north and south shows that 7,000-10,000 less vehicles per day travel Route 110 north of the study area and 15,000-20,000 less vehicles per day travel Route 110 south of the study area. Also, a review of the "K" factors indicate that about 1-4% more of the total daily traffic occurs during the afternoon peak hour when compared to the morning and Sikorsky Shift Change peaks. These observations indicate the significant traffic volume in the interchange area during the afternoon peak hour.

TABLE 2-2

Existing Average Daily Traffic Summary (2012 – 2014)

		Morning Peak Hour			Sikorsky Shift Change Peak Hour		
Location	ADT	Vehicles Per Hour	Dist.	"K" Factor	Vehicles Per Hour	Dist.	"K" Factor
Route 110							
Shelton Town Line	18,770	1,319	68% SB	7.0%	1,515	64% NB	8.1%
North of Warner Hill Road	18,685	1,386	62% SB	7.4%	1,553	63% NB	8.3%
North of Oronoque Lane	18,500	2,140	55% NB	11.4%	1,729	51% NB	9.2%
South of Oronoque Lane	31,155	2,779	55% NB	14.8%	2,278	51% SB	12.1%
South of Sikorsky Gate #1	29,525	3,163	60% NB	16.9%	2,936	63%SB	15.6%
Merritt Parkway Overpass	26,500	1,807	57% NB	9.6%	2,300	63% SB	12.3%
South of Ryders Lane	21,960	1,860	60% SB	9.9%	2,257	68%SB	12.0%
South of Main Street-Putney	10,995	923	60% NB	4.9%	988	51%SB	5.3%
Merritt Parkway Exit 53 Ramps							
SB On from 110 SB	3,600	322		1.7%	386		2.1%
NB On from 110	10,600	992		5.3%	1,149		6.1%
NB Off to 110	4,600	358		1.9%	369		2.0%
SB Off to 110	10,500	1,415		7.5%	761		4.1%
SB On from 110 NB	1,000	94		0.5%	96		0.5%
Side Streets							
Warner Hill Road	8,740	811	53% EB	4.3%	643	51% WB	3.4%
Oronoque Lane	6,805	723	52% WB	3.9%	775	56% EB	4.1%
Ryders Lane	2,830	103	71% EB	0.6%	266	53% WB	1.4%
Main Street-Putney	3,495	318	65% EB	1.7%	285	51% WB	1.5%

Note: Dist. = Directional Distribution

TABLE 2-2 (Continued)

Existing Average Daily Traffic Summary (2012 – 2014)

Location	ADT	Afternoon Peak Hour		
		Vehicles Per Hour	Dist.	"K" Factor
Route 110				
Shelton Town Line	18,770	1,616	65% NB	8.6%
North of Warner Hill Road	18,685	1,818	65% NB	9.7%
North of Oronoque Lane	18,500	2,398	50% SB	12.8%
South of Oronoque Lane	31,155	3,006	53% SB	16.0%
South of Sikorsky Gate #1	29,525	3,288	57% SB	17.5%
Merritt Parkway Overpass	26,500	2,490	69% SB	13.3%
South of Ryders Lane	21,960	2,530	71% SB	13.5%
South of Main Street	10,995	1,073	52% NB	5.7%
Merritt Parkway Exit 53 Ramps				
SB On from 110 SB	3,600	478		2.6%
NB On from 110	10,600	1,437		7.7%
NB Off to 110	4,600	307		1.6%
SB Off to 110	10,500	1,102		5.9%
SB On from 110 NB	1,000	78		0.4%
Side Streets				
Warner Hill Road	8,740	805	50% WB	4.3%
Oronoque Lane	6,805	818	59% EB	4.3%
Ryders Lane	2,830	269	56% WB	1.4%
Main Street-Putney	3,495	413	55% EB	2.2%

Note: Dist. = Directional Distribution

2.3.2 2014 Existing Traffic Volumes

In order to establish the 2014 Existing Traffic Volumes, the intersection turning movement data was analyzed and balanced between the study area intersections utilizing the ATR data for each of the three peak periods. The balanced peak hour traffic volumes are illustrated on Figures 2-5 through 2-7 in Appendix A for the weekday morning, Sikorsky shift-change, and afternoon peak periods, respectively.

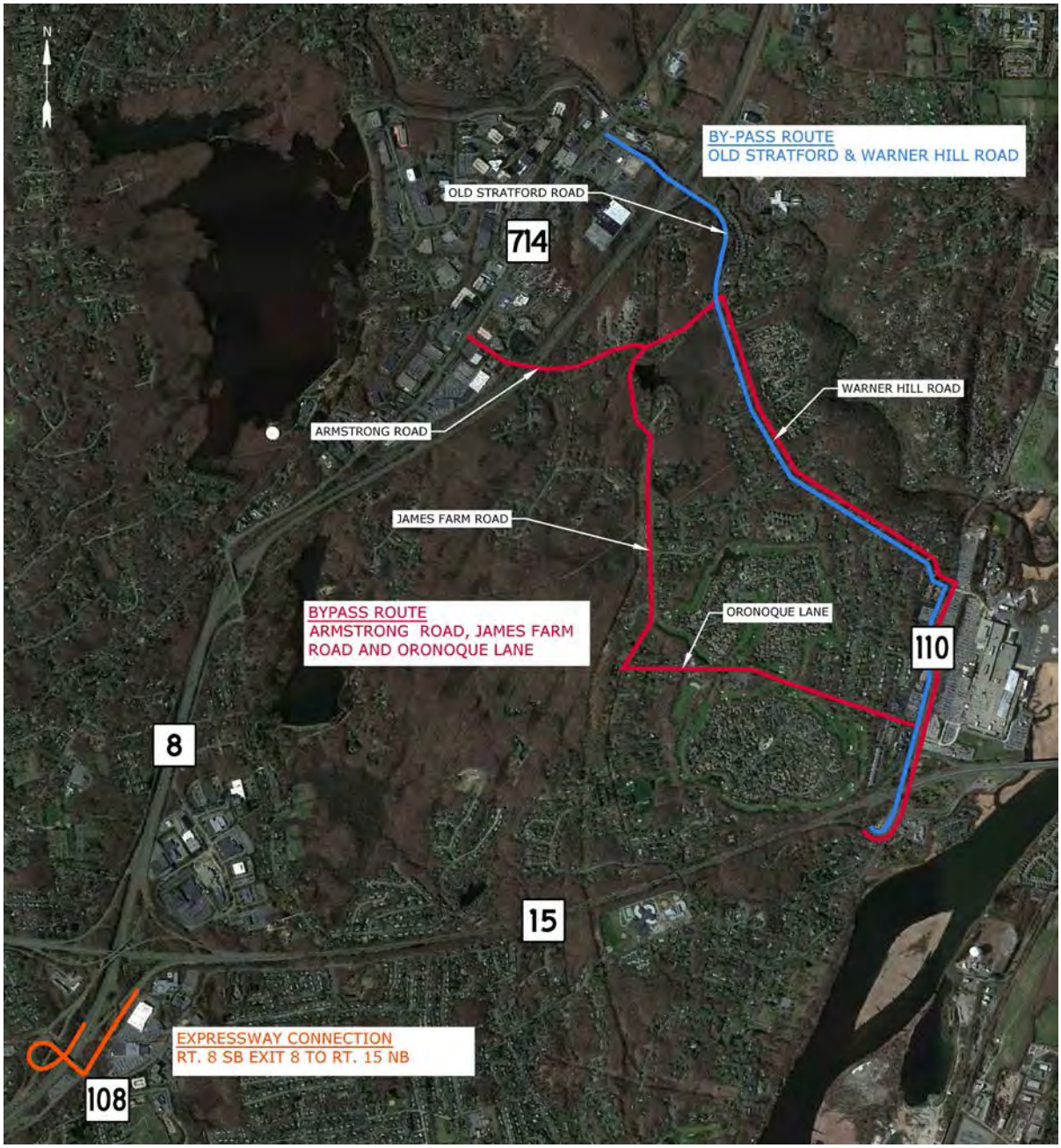
As shown in the Figures, traffic along the Route 110 corridor builds throughout the day with the lowest peak hour volumes in the morning peak hour and higher volumes in the Sikorsky Shift Change peak hour and higher still in the afternoon peak hour. As expected, the morning peak hour has a significant amount of traffic entering the Sikorsky facility. During the afternoon Sikorsky Shift Change peak-hour, significant volume enters and exits the facility. Finally, the afternoon peak hour had significant volume exiting Sikorsky Aircraft combined with the heaviest volumes on the adjacent roadway network associated with the regional commuting traffic. Combining the Sikorsky traffic with the regional traffic passing through the Route 110 corridor, significant traffic congestion occurs along the corridor, particularly during the peak hour. Further detail of the traffic operations can be found in Section 2.6 – Existing Traffic Operations.

2.3.3 Regional Traffic Patterns

A detailed review of the existing travel patterns along the Route 110 corridor provided in the previous sections reveal that in addition to the heavy traffic flow from the major access points along the corridor, including the Merritt Parkway and Sikorsky Aircraft, Route 110 also receives significant traffic volume from the intersecting roadways accessing points to the west. Oronoque Lane and Warner Hill Road, which provide east/west access between Route 110 and Bridgeport Avenue (Route 714) in Shelton via Old Stratford Road and Armstrong Road, exhibit significant cut-through traffic volume utilizing the two roadways during the commuter peak hours.

A review of the regional roadway network suggests that the lack of a direct freeway ramp connection between Route 8 southbound, which has several interchanges along Bridgeport Avenue, and Merritt Parkway northbound, causes traffic orientated to Merritt Parkway northbound to use local roadways as an alternate cut through route in lieu of the Route 8 expressway. Currently, Route 8 southbound traffic orientated to Merritt Parkway northbound must exit the highway onto Route 108 via Exit 8, travel over the Route 108 overpass of Route 8, and then make a left turn onto the Merritt Parkway northbound entrance ramp at a signalized intersection. This expressway to expressway connection path is shown in orange in the map on the following page. The unintended use of Oronoque Lane and Warner Hill Road as an alternative to Route 8 from Bridgeport Avenue presents potential issues not only for the residents along these local roadways, but more importantly increases the flow of traffic using the Route 110 corridor to access Merritt Parkway northbound. These by-pass routes are shown in red and blue in the map on the following page.

In order to quantify the volume of cut-through traffic using Warner Hill Road and Oronoque Lane, an origin and destination (O&D) survey was conducted. The O&D survey recorded vehicle license plates and tracked them to and from Route 110 and Bridgeport Avenue at key points to determine the volume of cut-through traffic using these streets. The O&D survey was conducted during the morning peak from 7:00 to 9:00 AM and the afternoon peak from 3:00 PM to 6:00 PM. Figures 2-8 and 2-9 in Appendix A highlight the key cut-through traffic paths and volumes observed in the O&D study.



Route 8 / Merritt Parkway and By-Pass Routes via Route 110

As shown in Figure 2-8 and 2-9, a significant amount of traffic travels between Bridgeport Avenue and Route 110 during the peak periods. On Old Stratford Road, 19-26% of the southbound traffic travelling past the Route 8 interchange, and 63-75% of the traffic exiting the Route 8 interchange was observed traveling to Route 110 via Oronoque Lane and Warner Hill Road. Approximately 40% of the left turning vehicles exiting the Route 8 southbound ramp to Old Stratford Road in the morning and afternoon peaks are destined for Route 110. Similarly, on Armstrong Road, approximately 44-49% of southbound traffic traveling from Bridgeport Avenue, accessed Route 110 via Oronoque Lane and Warner Hill Road during the peaks.

Further review of the O&D data reveals that a significant portion of the total cut-through traffic are utilizing Route 110 to access Merritt Parkway northbound. Approximately 15% of the traffic on Old Stratford Road north of the Route 8 interchange, approximately 33% of the traffic on Armstrong Road just south of Bridgeport Avenue, and 15-19% of the Route 8 South Exit 12 left turning traffic access Merritt Parkway northbound via the cut-through routes and Route 110 during the peak hours. In total, these three cut-through streams account for 330 vehicles in the morning peak and 945 vehicles in the afternoon peak accessing the Merritt Parkway northbound ramp.

Comparatively, the O&D survey observations recorded 1,191 vehicles accessing the Merritt Parkway northbound loop ramp from Route 110 southbound in the morning peak and 3,428 vehicles in the afternoon peak. Therefore, the cut-through traffic accounts for approximately 27.5% of the morning and afternoon peak traffic accessing the Merritt Parkway northbound ramp. Conversely, approximately 100 vehicles and 345 vehicles access Merritt Parkway from Route 8 southbound Exit 8 via Route 108 during the morning and afternoon peaks, respectively, significantly lower than the traffic flow from the cut-through routes of 330 vehicles and 945 vehicles, respectively. This further highlights that commuters have determined that the local roadway network between Bridgeport Avenue and Route 110 is preferred over using the limited access highway. Furthermore, the survey showed that motorists are exiting the Route 8 expressway at Old Stratford Road rather than at Route 108, favoring the shorter overall travel path to access Merritt Parkway northbound from Route 110.

Similar to the southbound direction, significant traffic flows are present northbound between Route 110 and Bridgeport Avenue during both peak periods. The northbound flows are slightly less than those realized in the southbound direction, as Merritt Parkway southbound has a direct connection to Route 8 northbound. On Warner Hill Road, 51% and 58% of the traffic accesses Bridgeport Avenue during the morning and afternoon peak periods, respectively. On Oronoque Lane northbound, 46% of traffic and 30% of the traffic on the roadway is destined for Bridgeport Avenue during the morning and afternoon peaks, respectively.

2.4 Travel Time Study

In October 2014, a vehicle travel time study was conducted along Route 110 to measure average travel time to traverse the study corridor during the weekday morning peak hour (7:30 - 8:30 AM), weekday midday peak hour (12:00 – 1:00 PM), weekday Sikorsky Afternoon Shift Change peak hour (3:00 – 4:00 PM), weekday afternoon peak hour (4:45 - 5:45 PM), and Saturday midday peak hour (11:30 AM – 12:30 PM). Travel time data was recorded three times per travel direction during each of the three peak hours. The average travel time between intersections, traffic signal related delay at each intersection, and average travel speed per segment are presented graphically in Figures 2-10 and 2-11.

Signal delay equates to the total time observed following the study vehicle coming to a complete stop due to a red light at the traffic signal and the additional time required to pass through the intersection due to the traffic signal.

The travel time study revealed that traveling the Route 110 corridor takes significantly longer during the afternoon peak hour than the other peaks. Travelling in the northbound direction the observed travel time was about 4 minutes 58 seconds during the afternoon peak hour, with an average travel speed of under 18 miles per hour. Travelling in the southbound direction the average total trip time was 7 minutes during

the afternoon peak hour with an average travel speed of less than 13 miles per hour. In the other peak periods, the travel time in both directions was recorded between slightly longer than 3 minutes to slightly longer than 4 minutes with average travel speeds of 20 to 28 miles per hour.

A review of the chart of the travel time data indicates good progression along the corridor, both south and north of the Merritt Parkway Interchange and Sikorsky Gate #1, Oronoque Lane area. Progression is illustrated by the plotted line having a steep vertical orientation. The delay caused by the three closely spaced signals accounts for a significant portion of the stopped time/delay during the peak periods. This is due to the significant amount of traffic entering Route 110 from the east and west and the impact of those volumes on the through traffic progression.

FIGURE 2-10

Route 110 Travel Time Study – Northbound Direction

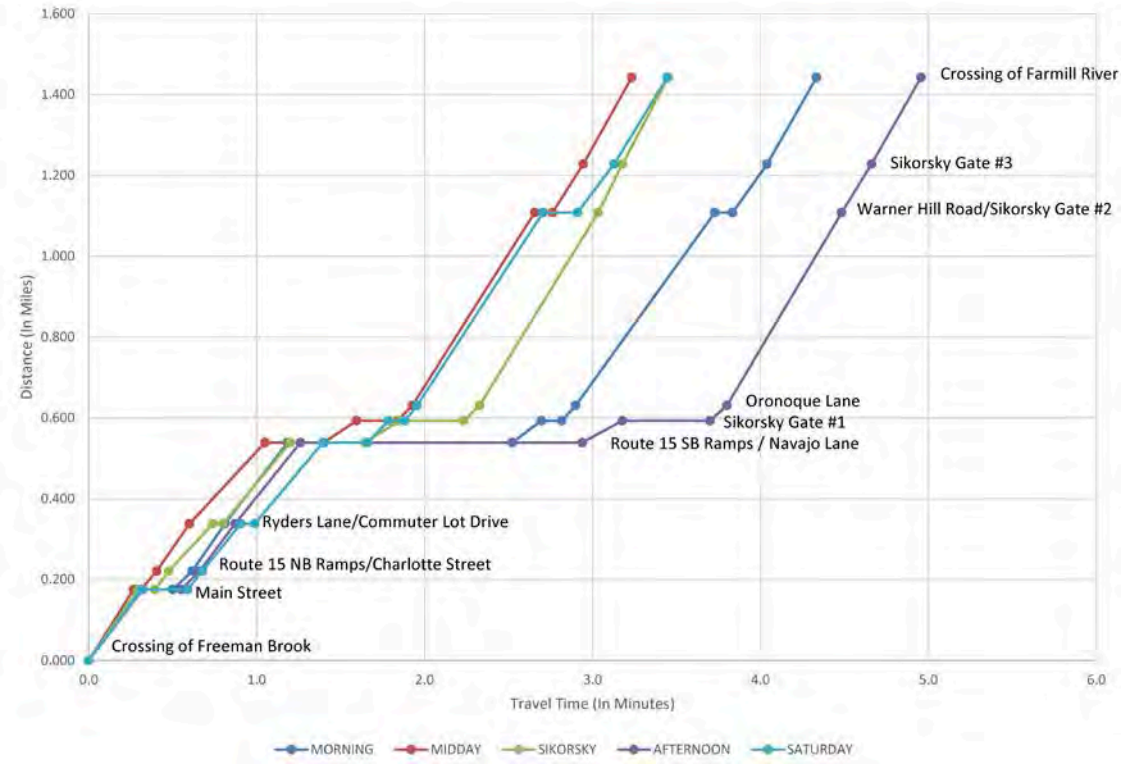
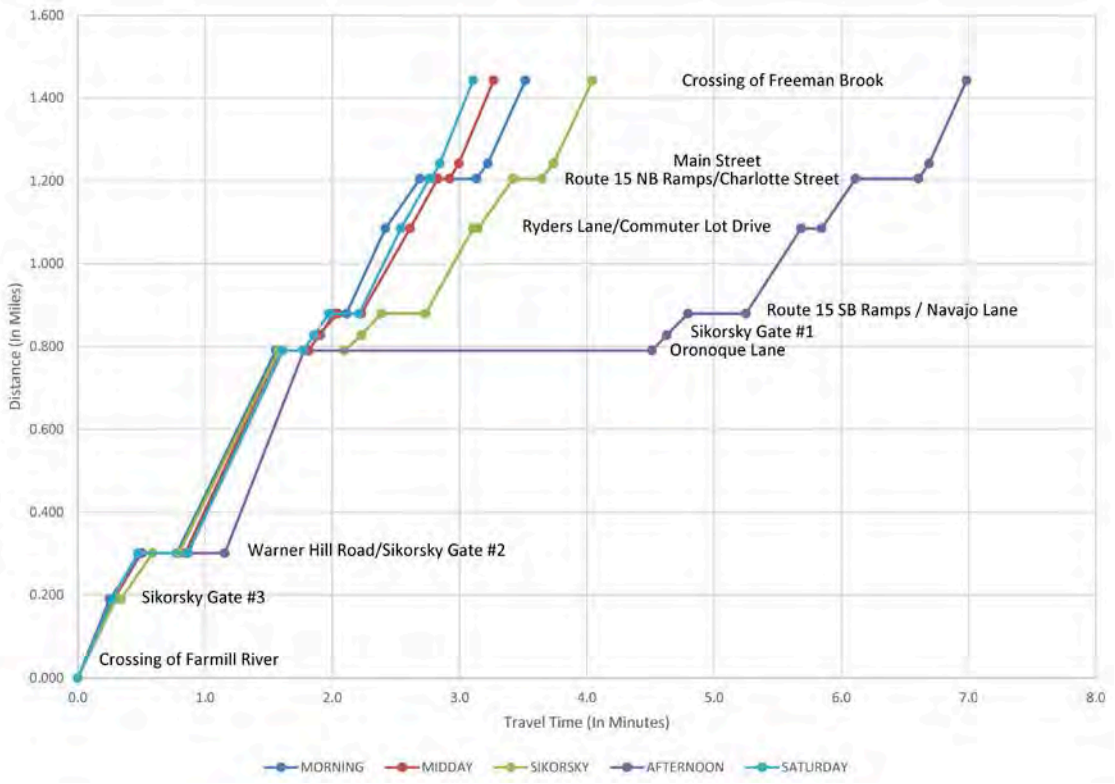


FIGURE 2-11

Route 110 Travel Time Study – Southbound Direction



2.5 Travel Speed

Travel speed data was collected along Route 110 during the traffic data collection activities in conjunction with the Automatic Traffic Recorder (ATR) traffic counts. Speed data was collected in September 2014. Table 2-3 on the following page and Figure 2-12 in Appendix A summarizes the results of the speed observations along the corridors.

In general, travel speeds along Route 110 were within 5 to 10 miles per hour of the posted speed limit. The 85th percentile speed, also known as the operating speed and the speed at which 85% of all traffic is travelling at or below, is lower in the area of Oronoque Lane and the Merritt Parkway Interchange due to the traffic congestion and close spacing of intersection roadways. The northern end of the study area experienced slightly higher operating speeds as there is less congestion and less curb cuts. Speeds adjacent to Route 110 along Warner Hill Road, Oronoque Lane, Ryders Lane, and Main Street were within 8 miles per hour of the posted speed limit with several operating speeds less than the posted speed limit. However, these observations are not indicative of traveling conditions along these roadways outside the study area.

TABLE 2-3
Travel Speed Observations (MPH)

Location	Posted Limit	Average Speed		85th Percentile Speed	
		NB/EB	SB/WB	NB/EB	SB/WB
Route 110 (Main Street)					
South of Shelton Town Line	40	41	46	46	51
North of Warner Hill Road	40	46	42	52	47
North of Oronoque Lane	40	40	32	46	43
North of Merritt Pky NB Ramps	40	31	22	36	26
South of Main Street	45	27	40	37	45
Warner Hill Road					
West of Route 110	25	28	27	33	31
Oronoque Lane					
West of Route 110	30	21	23	25	26
Ryders Lane					
East of Route 110	NP	16	17	20	21
Main Street					
West of Route 110	30	18	33	26	38

NP: No Posted Speed Limit

2.6 Existing Traffic Operations

Traffic operations were evaluated for the seven signalized intersections along the Route 110 corridor during the morning, afternoon Sikorsky Shift Change, and afternoon peak hours. The analyses were conducted using Trafficware's *Synchro plus SimTraffic 8 – Traffic Signal Coordination Software,* based on the *2010 Highway Capacity Manual (HCM)* methodology.

The qualitative operational condition of an intersection is described by the HCM in terms of average control delay per vehicle. Average delay is measured in seconds that occurs at an intersection, per vehicle, due to traffic control. The average control delay is used to assign a Level of Service (LOS) to a particular intersection or intersection approach. LOS is defined by HCM, using average control delay, to assign letter grades A through F to indicate the efficiency of the traffic control at an intersection. The definitions of the letter grades in terms of average control delay are provided in the table below.

Average Control Delay (Seconds per Vehicle)	Level of Service[a]	
	v/c Ratio ≤1.00	v/c Ratio >1.00
≤10	A	F
>10 to 20	B	F
>20 to 35	C	F
>35 to 55	D	F
>55 to 80	E	F
>80	F	F

Note: [a]For approach-based and intersectionwide assessments, LOS is defined solely by control delay.

Source: *HCM2010: Highway Capacity Manual.* Washington, D.C.: Transportation Research Board, 2010. Exhibit 18-4, Pg. 18-6.

In general intersections that exhibit a LOS A or B are considered to have excellent to good operating conditions with little congestion or delay. LOS C indicates an intersection with acceptable operations. LOS D indicates an intersection that has tolerable operations with average delays approaching one minute. Intersections with LOS E and F are operating with poor or failing conditions and typically warrant a more thorough review and possible improvement to mitigate the capacity issues. Improvements can include geometric, lane use, timing modifications, or different form of traffic control to mitigate the operational issues and reduce average delay. In the context of this planning process, during the analysis of both existing and future conditions, intersections exhibiting LOS E and F were identified for further analysis and potential improvements to mitigate poor or failing operations. Table 2-4 summarize the intersection operations in terms of average delay per vehicle and LOS along Route 110 for the 2014 Existing Conditions. A detailed description of the analysis results is available separately in the Existing and Future Conditions Assessment Technical Memorandum.

TABLE 2-4

Route 110 Intersection Operational Summary – 2014 Existing Conditions

	Morning Peak Hour		Sikorsky Shift Change Peak Hour		Afternoon Peak Hour	
Study Intersection	**LOS**	**Avg. Delay (s/veh)**	**LOS**	**Avg. Delay (s/veh)**	**LOS**	**Avg. Delay (s/veh)**
Warner Hill Road and Sikorsky Gate #2	D	45.0	C	32.9	D	35.9
Oronoque Lane	D	45.6	C	33.0	D	50.1
Sikorsky Gate #1	D	35.4	E	73.1	D	42.8
Merritt Parkway SB Ramps and Navajo Lane	D	46.8	C	27.6	F	81.2
Ryders Lane and Commuter Parking Lot Drive	A	3.5	B	11.6	B	12.1
Merritt Parkway NB Ramps and Charlotte Street	C	33.6	F	96.6	F	178.3
Main Street – Putney	C	20.4	B	14.1	C	21.9

2.6.1 2014 Morning Peak Hour Operations

During the morning peak hour, the study area intersections along Route 110 operate at overall LOS D north of the Merritt Parkway underpass and LOS A/B to the south of the Merritt Parkway. As observed in the field, long delays are present on the side street and commercial driveway approaches to Route 110 from the east and west, with vehicles delayed waiting to enter the Route 110 corridor. Once traveling on the Route 110 corridor vehicles experience moderate delays caused by vehicles queued to turn into the side streets from Route 110.

2.6.2 2014 Sikorsky Shift-Change Peak Hour Operations

During the Sikorsky Shift-Change peak (2:00 P.M.-3:00 P.M.), the vast majority of the traffic along the Route 110 corridor are vehicles entering the corridor destined for and leaving the Sikorsky main employee Gates #1 and #2. The corridor experiences moderate to significant delays focused at these portal locations and the entrance and exit ramps to the Merritt Parkway.

2.6.3 2014 Afternoon Peak Hour Operations

During the weekday afternoon peak hour, study area intersections along Route 110 experience the longest delays. Southbound Route 110 has the heaviest traffic volume through the corridor, with the majority destined for the Merritt Parkway northbound entrance ramp. As observed in the field, significant southbound queuing and blocking of intersections cause delays entering the corridor from the side streets to the east and west, particularly the Merritt Parkway southbound exit ramp, Oronoque Lane and Warner Hill Road. These poor operating conditions are reflected in the capacity analysis results with approaches operating close to over-capacity with significant queuing.

In the peak periods, the overall LOS computed by the analysis software is slightly better than the actual field-observed conditions, as delays from the over-capacity intersections to the south propagate through the network. The turbulence created by the traffic streams entering from the side streets, blocking Route 110 through movements result in additional actual delay, higher than that reported by the capacity analysis. Traffic microsimulation results show even more significant delays and queues at along the corridor.

2.7 Traffic Safety

Motor vehicle collision history data for the Route 110 corridor were collected from CTDOT and from data provided by the Town for the latest six-year period of available data, between January 1, 2007 and December 31, 2012. Summaries of the entire corridor and select intersections with high collision rates are provided in the following sections.

2.7.1 Crash History

Table 2-5 summarizes the number and type of collisions recorded along the Route 110 corridor within the study area from 2007 through 2012. During the six-year period, 479 collisions were reported. Rear-end type collisions were the most common type accounting for almost half of the total with 234 crashes (49%) recorded; the second most common type of collision was Turning - Intersecting Paths with 62 crashes (13%), followed by Turning – Opposite Directions with 60 crashes (13%), and Sideswipe – Same Direction with 59 crashes (12%). The remaining types of collisions were each less than 4% of the total number of crashes.

The most common contributing factor to collisions was drivers Following Too Closely with 219 crashes (46%) recorded over the six-year period. The second most common contributing factor was drivers Failed to Grant Right-Of-Way (ROW) with 97 crashes (20%). The remaining contributing factors were each less than 9% of the total collisions. Table 2-6 summarizes the contributing factors.

No fatalities were recorded in any of the collisions along the Route 110 corridor. A total of 27 crashes reported significant injuries with the remaining 452 collisions categorized as Property Damage Only. Table 2-7 summarizes the resulting injuries and/or property damage from the crashes.

Table 2-8 summarizes the Route 110 collisions by intersection. As shown, the intersections of Oronoque Lane and Warner Hill Road/Sikorsky Gate #2 experience the most collisions with 117 crashes (20 per year) and 107 crashes (18 per year), respectively. Crashes occurring at these two intersections were depicted graphically on collision diagrams shown in Figure 2-13 and 2-14 of Appendix A. The collision diagrams facilitate the identification of collision patterns.

As shown in Figure 2-13, the Oronoque Lane intersection experiences a significant amount of rear-end collisions on each approach with 73 rear-end collisions in the six years of data accounting for 62% of all collisions. High rear-end collision rates are common at signalized intersections with significant traffic congestion such as the Oronoque Lane intersection. Sideswipe collisions were the second most common crashes at the intersection, focused on the Route 110 northbound and southbound approaches, with 21 crashes (18%) at the intersection. These sideswipes are likely caused by vehicles changing lanes to avoid vehicles turning into Oronoque Lane. Turning movement collisions including intersecting paths, same direction turns and opposite direction turns accounted for 16 crashes (14%). Although there was a significant number of crashes, only 3 resulted in injury and the remainder were Property Damage Only.

The Warner Hill Road/Sikorsky Gate #2 intersection also experiences a high rate of rear-end collisions with 41 of the 107 collisions (38%) at the intersection being that type as shown in Figure 2-14. The second most common type of collision was Turning-Opposite Direction with 29 crashes or 27% of the total crashes at the intersection. The third most

common type of collision was Sideswipe-Same Direction with 11 collisions, 10% of the total number of crashes. Overall, the intersection experienced a high number of turning movement and angle collisions with 49 collisions accounting for 46% of all crashes at the intersection. The collision diagram shows that a majority of these collisions occurred between northbound and southbound left turning traffic and opposing through movements due to the alignment of the northbound and southbound approaches being offset. Again as with the Oronoque Lane intersection, although there was a significant amount of crashes, 12 of the 107 accidents resulted in significant injury.

In summary, a review of collision data indicates that the Route 110 intersections with Oronoque Road and Warner Hill Road/Sikorsky Gate #2 should be evaluated with respect to opportunities to improve safety at those two locations.

Alignment of Route 110 at Warner Hill Road/Sikorsky Gate #2 – Looking North

Although not identified in the collision history review, members of the TAC and CAC sited safety concerns due to the proximity of the Alltown Mobil entrance and Oronoque Plaza full access driveways. According to members, there is a perceived safety issue with adjacent driveway turning maneuvers crossing paths and causing driver confusion with respect to entering and exiting movements from the two sites. The Alltown Mobil site was recently reconstructed and the northern entrance only driveway was installed adjacent to the Oronoque Plaza full access driveway. Due to the recent change in traffic patterns there was insufficient data to determine if this a significant collision pattern was present.

Route 110 at Oronoque Plaza and Alltown Mobil Driveways – Looking West

TABLE 2-5

Route 110 Collisions by Type

Collision Type	Number of Collisions							% of Total Collisions
	2007	2008	2009	2010	2011	2012	Total	
Rear-End	32	45	55	28	43	31	**234**	**49%**
Turning – Intersecting Paths	8	13	9	10	10	12	**62**	**13%**
Turning – Opposite Direction	10	9	14	11	10	6	**60**	**13%**
Sideswipe – Same Direction	16	9	10	5	10	9	**59**	**12%**
Turning – Same Direction	5	2	2	3	3	2	**17**	**4%**
Moving Object	0	5	2	1	2	1	**11**	**2%**
Angle	1	2	1	1	1	4	**10**	**2%**
Fixed Object	3	0	0	0	4	2	**9**	**2%**
Sideswipe – Opposite Direction	1	3	1	0	3	1	**9**	**2%**
Backing	1	0	0	1	2	1	**5**	**1%**
Head-on	0	0	0	0	1	0	**1**	**<1%**
Jackknife	0	0	0	0	0	0	**1**	**<1%**
Parking	0	1	1	0	0	0	**1**	**<1%**
Total	**77**	**89**	**95**	**60**	**89**	**69**	**479**	**100%**

TABLE 2-6

Route 110 Collisions by Contributing Factors

Contributing Factor	Number of Collisions							% of Total Collisions
	2007	2008	2009	2010	2011	2012	Total	
Following Too Closely	30	44	52	25	39	29	**219**	**46%**
Failed to Grant ROW	15	18	20	17	14	13	**97**	**20%**
Improper Lane Change	11	6	9	4	7	7	**44**	**9%**
Violated Traffic Control	3	5	4	4	7	6	**29**	**6%**
Driver Lost Control	4	4	1	2	6	3	**20**	**4%**
Improper Turning Maneuver	5	1	2	3	2	2	**15**	**3%**
Speed Too Fast For Conditions	2	2	2	1	2	2	**11**	**2%**
Animal/Foreign Object in Road	0	5	2	1	1	1	**10**	**1%**
Improper Passing Maneuver	1	0	1	1	3	1	**7**	**1%**
Under the Influence	1	0	0	0	4	1	**6**	**1%**
Unknown	2	2	1	0	0	1	**6**	**1%**
Unsafe Backing	1	0	0	1	2	1	**5**	**1%**
Defective Equipment	1	0	0	0	1	2	**4**	**1%**
Slippery Surface	1	1	1	0	1	0	**4**	**1%**
Unsafe Right Turn on Red	0	1	0	1	0	0	**2**	**<1%**
Total	**77**	**89**	**95**	**60**	**89**	**69**	**479**	**100%**

TABLE 2-7

Route 110 Collisions - Severity

Injury/ Damage	Number of Collisions							% of Total Collisions
	2007	2008	2009	2010	2011	2012	Total	
Fatal	0	0	0	0	0	0	**0**	**0%**
Injury	3	5	6	2	4	7	**27**	**6%**
Property Damage Only (PDO)	74	84	89	58	85	62	**452**	**94%**
Total	**77**	**89**	**95**	**60**	**89**	**69**	**479**	**100%**

TABLE 2-8

Route 110 Collisions – Study Area Summary

Intersection/Location	Number of Collisions							% of Total
	2007	2008	2009	2010	2011	2012	Total	Collisions
Oronoque Lane*	16	25	23	17	13	23	**117**	**25%**
Warner Hill Road/Sikorsky Gate #2*	15	12	23	15	22	20	**107**	**22%**
Merritt Parkway NB Ramps/Charlotte Street*	3	11	7	6	11	11	**49**	**10%**
Merritt Parkway SB Exit/Navajo Lane*	13	5	6	4	10	3	**41**	**9%**
Sikorsky Gate #1*	2	6	7	5	12	3	**35**	**7%**
Oronoque Shopping Plaza Driveway	8	8	5	2	5	5	**33**	**7%**
Ryders Lane/Commuter Lot Drive*	4	6	8	5	3	0	**26**	**5%**
Sunoco Gas Station Drives	3	4	3	1	4	1	**16**	**3%**
Merritt Parkway SB On-Ramp from Route 110 SB	3	5	3	0	1	0	**12**	**3%**
Main Street – Putney*	3	2	3	1	2	0	**11**	**2%**
Near Merritt Parkway Underpass	1	3	2	2	2	1	**11**	**2%**
Sikorsky Gate #3	3	1	1	0	3	1	**9**	**2%**
Mobil Gas Station Drives	2	0	3	0	0	0	**5**	**1%**
7003 Main Street Driveway	0	1	1	0	0	1	**3**	**1%**
Pine Tree Trail	1	0	0	1	1	0	**3**	**1%**
7579 Main Street Driveway	0	0	0	1	0	0	**1**	**<1%**
Total	**77**	**89**	**95**	**60**	**89**	**69**	**479**	**100%**

* Study Area Intersection

2.7.2 Bicycle and Pedestrian Crash History

The crash data received from the study area was reviewed for crashes involving bicyclists and/or pedestrians. The data, summarized in Table 2-9, revealed one pedestrian related crash in proximity to the study area and three bicycle related crashes, two within the study area and one immediately south of the study area.

TABLE 2-9

Pedestrian and Bicyclists Collisions Summary

Date	Type	Location	Contributing Factor	Injury
9/17/08	Bicyclist	Route 110 at Warner Hill Road/Sikorsky Gate #2	Unsafe right turn on red by the vehicle	Non-incapacitating injury
5/30/10	Pedestrian	2 tenths mile south of Main Street & Putney Chapel Way intersection	Unsafe use of highway by pedestrian	Non-incapacitating injury
8/13/11	Bicyclist	100 meter south of Main Street & Putney Chapel Way intersection	Bicyclist failed to grant right-of-way	Non-incapacitating injury
8/15/12	Bicyclist	Route 110 at Oronoque Lane	Improper turning maneuver by bicyclist	Non-incapacitating injury

Due to the limited number of incidents, no pattern is discernible that would suggest a particular safety deficiency at a location within the study area. The unsafe use of the highway by a pedestrian could be a result of the lack of a sidewalk at the crash location.

2.8 Alternative Travel Modes

The study area is typical of a low to mid density suburban setting: sidewalks are lacking with pedestrians walking in the shoulder of the roadway or on lawns. Cyclists ride on the shoulder of the roadway as on-street bicycle facilities are not available for their use.

The lack of bicycle and pedestrian facilities within the study area acts to discourage, rather than encourage non-motorized travel. Additionally, the Route 110 corridor is generally hostile to pedestrians whether walking along, or attempting to cross, the corridor.

The only notable bicycle or pedestrian facility is the Sikorsky Estuary Walk, which is a 0.8 mile long shared-use pathway that provides access to the Housatonic River area and provides an alternative route around, and below the intersection of Merritt Parkway and Route 110. The path also connects to and crosses over the Housatonic River on the Sikorsky Memorial Bridge, however the trail doesn't connect to any facilities on the east side of the river, essentially acting as a dead end.

A review of the regional transportation plan shows a planned greenway connection between Farmill Park (north of the study area) and the Sikorsky Estuary Walk along Route 110. There is also a planned route extending from the southern portion of the Sikorsky Estuary Walk, along River Road to Boothe Park.

2.8.1 Transit Facilities

Greater Bridgeport Transit's Route 23 serves the study area via a route that travels north and south on Route 110. Bus service is provided on weekdays only. Eleven northbound trips and nine southbound trips occur in the study area between 5:50 am and 7:43 pm. Bus stops are designated (by sign post) at two locations within the study area:

- Route 110 at Ryders Lane: Northbound and southbound bus stops are located on the south side of the intersection. No bus turnout area is provided, which is GBT's preferred loading method so buses remain in the travel lane, nor are any passenger facilities provided at the bus stop to encourage the use of the service.

- Route 110 at Merritt Parkway Southbound Ramps / Navajo Lane: Southbound stop located at the northwest corner and northbound stop located on the southeast corner. No bus turnout area is provided nor are any passenger facilities provided at the bus stop to encourage the use of the service.

Ryders Lane Looking North

Merritt Parkway SB Ramps Looking South

Greater Bridgeport Transit Stops

2.8.2 Pedestrian Facilities

Given the suburban setting, and low to mid density land uses, few pedestrians were observed in the study area during site visits. A contributing factor to these observations is the lack of sidewalks along the study area's roadways. Existing pedestrian facilities are shown in Figure 2-15 of Appendix A.

There are no public sidewalks within the study area. The only pedestrian travel facility is the previously noted Sikorsky Estuary Walk.

Pedestrian crossing facilities were noted at the following intersections on Route 110 (from north to south):

- Route 110 at Ryders Lane: A marked crosswalk is located at the south side of the intersection. Curb ramps and exclusive pedestrian phase push buttons are located at the southeast and southwest corners of the intersection. This pedestrian actuated signal facility provides access to the GBT stop and the park and ride lot located on the west side of Route 110.

Route 110 at Ryders Lane Crosswalk – Looking South

- Route 110 at Merritt Parkway Southbound Ramps and Navajo Lane: Pedestrian push button for green light is located at the southwest corner of intersection and within the splitter island at the southeast corner of the intersection. Curb ramps are present on the east side of the intersection, at the splitter island and northeast corner. There are no crosswalk pavement markings at this location.

Route 110 at Merritt Parkway SB Ramps/Navajo Lane Pushbutton

- Route 110 at Sikorsky Gate #1 Entrance: Pedestrian push buttons for green light are located at the southwest and northeast corners of the intersection. No curb ramps or marked crosswalks are present at this location.

- Route 110 at Oronoque Lane: Pedestrian push button for green light is located on northwest corner of intersection. A push button pole base is located on the northeast corner no push button is present. No curb ramps or marked crosswalks are present at this location.

- Route 110 at Warner Hill Road/ Sikorsky Gate# 2: Pedestrian push buttons for green light are located on the northwest and northeast corners of the intersection. The push button on the northeast corner is located several feet behind the guardrail with no access provided to the pushbutton. No curb ramps or marked crosswalks are present at this location.

2.8.3 Bicycle Facilities

There are no on-street bicycle facilities within the study area. The Sikorsky Estuary Walk, a shared-use pathway, is the only bicycle facility within the study area. As previously noted, there is a planned greenway connection between Farmill Park (north of the study area) and the Sikorsky Estuary Walk. While there are no details regarding the planned facility, it is anticipated that it would be a pathway adjacent to Route 110. There is also a planned greenway route extending from the southern loop of the Sikorsky Estuary Walk to Boothe Park via River Road. The existing bicycle facilities in the study area are shown graphically in Figure 2-15 in Appendix A.

North Entrance along Ryders Lane Looking East

North Entrance at Sikorsky Looking East

Sikorsky Estuary Walk Entrances on Route 110

2.9 Transportation System Condition

The Study Team conducted observations of the existing roadway network to identify deficiencies or areas of concern that warrant a more detailed assessment for mitigation. The observations are described below and graphically represented on Figures 2-16 through 2-21 in Appendix A.

- Vehicles approaching the Main Street - Putney intersection from the south along River Road use the painted median as a left turn lane to Main Street - Putney

- The northbound left turn movement from River Road to Main Street - Putney is very difficult for larger vehicles due to the sharp turn and acute angle of the intersection

- The intersection alignment of Main Street - Putney with Route 110 restricts the ability for vehicles to turn right onto Route 110 southbound

- The cluster operation of the Main Street - Putney and Merritt Parkway Northbound Ramps causes long clearance times and interrupts progression through this section of the Route 110 corridor

- Statewide collision data indicates that the Route 110 intersections with Oronoque Lane and Warner Hill Road/Sikorsky Gate #2 should be evaluated to improve safety

- Warner Hill Road and Oronoque Lane have significant steep downgrades of 12% and 15%, respectively, as they approach Route 110 from the west

- Vehicular travel speeds along the Route 110 corridor are 5 - 10 miles per hour higher than the posted speed limit (See Section 2.5 – Travel Speeds and Figure 2-12 for more information)

- The closely spaced signalized intersection at Oronoque Lane, Sikorsky Gate #1, and Merritt Parkway Southbound Ramps/Navajo Lane disrupt coordination along the Route 110 corridor with vehicles commonly blocking the intersections reducing the capacity of Route 110 and causes significant queuing on Oronoque Lane, Sikorsky Gate #1 and the Merritt Parkway Southbound Off-Ramp during the peak hours

- The significant amount of traffic destined for the Merritt Parkway results in poor lane utilization through most of the study area with vehicles remaining in right and left lanes to avoid getting stuck in the wrong lane at the desired turn. This causes significant queuing southbound in the afternoon peak hours extending north from Ryders Lane well past the intersection of Oronoque Lane

- The corridor lacks pedestrian facilities along the entire length with very limited sidewalks and includes signage to prevent pedestrian crossing at the Merritt Parkway Interchange Northbound Ramp. Only the Ryders Lane/Commuter Parking Lot Driveway intersection provides an exclusive pedestrian crossing phase

- Limited shoulders of 1 to 1.5 feet are present along the entire corridor significantly limiting the ability of bicyclists to share the roadway with vehicles

- GBT bus stops are marked with signage at the Merritt Parkway Southbound Ramp/Navajo Lane and Ryders Lane/Commuter Lot Driveway intersection, but lack any other accommodations with riders standing in grassed areas and within drainage swales

2.10 Environmental and Natural Resources

The study area was screened for the following natural and cultural resources and physical environment features:

- Surface Water Resources
- Ground Water Resources
- Floodplains
- Wetlands
- Threatened and Endangered Species and Critical Habitats
- Historic Register Properties
- Section 4(f) and 6(f) Properties
- Sensitive Noise Receivers
- Hazardous Risk Sites

In addition to reviewing aerial images of the study area, current Geographic Information Systems (GIS) data from the Connecticut Department of Energy and Environmental Protection (CTDEEP), the METROCOG and the Town of Stratford were obtained and reviewed during this screening analysis.

2.10.1 Surface Water Resources

There are no surface waters within the study area, although the Housatonic River is immediately to the east of the study area and the Farmill River is to the north. The study area lies within the Housatonic River watershed.

The water quality of the Housatonic River is classified as SB; the Farmill River is classified as B. Class B waters are designated for use for fish and wildlife habitat; agricultural and industrial supply and other legitimate uses including navigation. Class SB waters are designated for marine fish, shellfish and wildlife habitat, shellfish harvesting for transfer to approved areas for purification prior to human consumption, recreation, industrial and other legitimate uses including navigation.

2.10.2 Groundwater Resources

Most of the groundwater in the study area is classified by the CTDEEP as Class GB. Class GB designated uses include industrial process water and cooling waters; baseflow for hydraulically connected surface water bodies; presumed not suitable for human consumption without treatment. Discharges are limited to: treated domestic sewage, certain agricultural wastes, and certain water treatment wastewaters.

2.10.3 Wetlands

According to the U.S. Army Corps of Engineers (ACOE) 1987 Wetlands Delineation Manual, federal wetlands can generally be defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically

adapted for life in saturated soil conditions. The State of Connecticut defines wetlands as land, including submerged land, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the Natural Resources Conservation Services (NRCS).

Based on a review of CTDEEP GIS mapping, intertidal marshes are located immediately east of the study area, but no intertidal marshes or inland wetlands are located within the study area.

2.10.4 Floodplains and Stream Channel Encroachment Lines

Floodplains are low-lying areas adjacent to rivers or streams that are inundated periodically by floodwaters. A 100-year floodplain is an area that has a one percent chance of being inundated by floodwaters in a given year, whereas a 500-year floodplain is an area that has a 0.2% chance of being inundated by floodwaters in a given year. Floodways are located within floodplains and consist of the river or stream channel plus any portion of the 100-year floodplain which carries stream flows during flood events. Floodplains and floodways are important for storing floodwaters so that adjacent properties and downstream areas are not damaged during flood events. In Connecticut, stream channel encroachment lines (SCELs) are jurisdictional boundaries established by the CTDEEP that generally outline riverine floodplain areas and may also include portions of 100-year floodplains and floodways. The flood zones surrounding the study area is shown in Figure 2-22 of Appendix A

There are 100-year floodplains and 500-year floodplains within the study area associated with the Housatonic River. A four hundred foot segment of Route 110 is located within both of these floodplain areas immediately south of the Oronoque Shopping Plaza at 7365 Main Street. Zone A is at the southern end of the study area, extending from the Housatonic River across River Road and Main Street. Zone A areas have a 1% chance of flooding on an annual basis and is considered a high risk area.

There are no Stream Channel Encroachment Lines within the study area.

2.10.5 Threatened and Endangered Species and Critical Habitats

Rare, threatened, and endangered species are protected by federal and state legislation. Information on species designated (listed) as threatened and endangered at the state and federal levels is compiled and made available through the CTDEEP's Natural Diversity Data Base (NDDB).

The CTDEEP NDDB GIS data layer was consulted to determine if there were any records in the study area. Due to the sensitivity of the information, the GIS data layer only depicts approximate locations of protected species, their habitats, and/or significant natural communities. The GIS data review revealed a NDDB listed "Significant Natural Community Area" on the north, south, and east boundaries of the study area. The boundaries of these areas are shown in Figure 2-23 of Appendix A.

Intertidal brackish and freshwater marshes are also present immediately east of the study area.

2.10.6 Historic Register Properties

There are no properties listed on the 2008 National Register of Historic Places within the project study area.

There are no 4(f) properties, which are generally public park lands and recreation areas, within the study area. The closest such properties include the Far Mill River Park, which is several hundred feet north of the study area, and Boothe Memorial Park, which is several hundred feet south of the study area.

2.10.7 Sensitive Noise Receivers

The Federal Highway Administration's Noise Abatement Criteria (NAC) documented in 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise is based on Land Use Activity Categories. Land uses considered most sensitive to highway/roadway noise are designated as either Land Use Activity Category A or B. Land Use Activity Category A includes lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such uses include outdoor amphitheaters, outdoor concert pavilions, and National Historic Landmarks with significant outdoor use. There are no Category A land uses in the project study area.

Land Use Activity Category B includes picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals. For this planning study, Category B land uses were identified using existing land use maps and GIS data. Noise sensitive land uses, such as schools, churches, hotels, and hospital facilities, are listed below.

- Homewood Suites, 6905 Main Street
- Lord Chamberlain Nursing and Rehabilitation Center, 7003 Main Street

In addition, the existing neighborhoods off of Ryders Lane and the Tudor Ridge apartment/condo complex at the intersection of Warner Hill Road and Main Street are sensitive noise receptors. They should be considered when evaluating roadway improvements and development proposals, especially for noise impacts during construction.

2.10.8 Hazardous Risk Sites

Data sources that were reviewed to identify potential hazardous materials and environmental risk sites within the study area include the Environmental Protection Agency's (EPA) Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) GIS database, CT DEEP's List of Contaminated or Potentially Contaminated Sites, CT DEEP's Brownfields Inventory, and CT DEEP's Landfill Leachate and Wastewater Discharges GIS data.

CT DEEP's Landfill Leachate and Wastewater Discharges data locates surface and groundwater discharges that (1) have received a waste water discharge permit from the state, or (2) are historic and now defunct waste sites, or (3) are locations of accidental spills, leaks, or discharges of a variety of liquid or solid wastes. There are three locations within, or in close proximity to, the study areas. These include:

- An industrial pit located on the Sikorsky site
- A cooling/industrial discharge along an inlet to the Housatonic River east of the Sikorsky site
- A salt storage area at the end of Ryders Lane

CT DEEP's List of Contaminated or Potentially Contaminated Sites (Dated 2/10/14) identified two sites within the study area. These sites include:

- Don's Auto Service, 7050 Main Street: Leaking underground storage tanks (Remediation had been started, no start or completion dates have been documented)
- Oronoque Service Station, 7290 Main Street: Leaking underground storage tanks (listed as pending, this station was rebuilt in 2013)

The EPA CERCLIS database revealed no sites within, or in close proximity to, the study area. Likewise, CT DEEP's Brownfields Inventory did not identify any sites within, or in close proximity to, the study area.

2.11 Land Use and Economic Development

In addition to the anticipated regional traffic growth, land use changes and future development potential in the study area were evaluated. Developing an understanding of existing land use and economic conditions in the study area facilitated an understanding of how future development may occur along Route 110. This section documents current land use in the study area and identifies the potential for land use and economic growth.

2.11.1 Demographics

Basic demographic data including population, age, median household income, median home price, and household size is shown in Table 2-10 for Stratford, Fairfield County, and the State of Connecticut. Data is presented for both the 2010 Census and current estimates from 2013 or 2014.

The data shows that Stratford is growing at a rate just below Fairfield County and in-line with State trends. In 2014, the population of Stratford was estimated at 51,694, a 0.6% increase since 2010. Stratford residents are, on average, older than those in the County and State with an average age of 42.9 years, compared to 39.7, and 40.2, respectively.

Stratford residents are less affluent than the County with similar median household incomes to the State levels. The 2013 estimated median income in Stratford was $66,361, 1.7% lower than in 2010. Median household income in the County and State grew by 1.2% and 2.5%, respectively between 2010 and 2013.

The median housing price in Stratford declined, as did house values in the County and State. The median price of a house in Stratford is $262,000, a 12.6% decrease since 2010. The median home price in the County dropped by 9.5% and the State declined by 5.9%.

Median household size in Stratford is currently 2.61, lower than both the County and the State. Household size in Stratford has declined by approximately 2 percent in the past 3-4 years, while household size has increased slightly in the County and State.

TABLE 2-10

Demographic Profile, Stratford, Fairfield County, and State of Connecticut

	Town of Stratford			Fairfield County			State of Connecticut		
	2010	Current	% Change	2010	Current	% Change	2010	Current	% Change
Residents	51,384	51,694	0.6%	916,829	926,233	1.0%	3,574,097	3,596,677	0.6%
Age	42.2	42.9	1.7%	39.1	39.7	1.5%	40.0	40.2	0.5%
Median Household Income	$67,530	$ 66,361	-1.7%	$81,268	$82,283	1.2%	$67,740	$69,461	2.5%
Median Housing Price*	$299,600	$262,000	-12.6%	$477,700	$432,100	-9.5%	$296,500	$278,900	-5.9%
HH Size*	2.66	2.61	-1.9%	2.78	2.82	1.4%	2.65	2.68	1.1%

***** *Owner-occupied units*

Source: US Census Bureau; American Factfinder – Current Estimates are 2013 or 2014

2.11.2 Plans of Conservation and Development

The Plan of Conservation and Development (POCD) for most towns and regions within Connecticut outline goals and objectives for future land use and development. The Town of Stratford POCD and the METROCOG POCD were reviewed with a focus on development goals affecting the Route 110 Corridor. The plans recognize that the growth in the region requires goals and policies aimed at sustaining and managing development over the next 20 years. Key goals and policies from both of the plans, specifically related to the objectives of this Study, are summarized in this section.

The Stratford PCOD, adopted in January 2014, provides several goals and policies with regard to the study area in terms of land use and development. These are bulleted below and presented in the Stratford Vision Plan (Figure 2-24 – Appendix A) and Future Land Use Figure (Figure 2-25 – Appendix A):

- Ensure that existing and future transportation infrastructure is adequate to handle current use as well as projected growth. This Study is a key component for the planning of required infrastructure improvements along the Route 110 Corridor to support economic growth in Stratford.

- Continue to support the further development of a greenway network as defined in the Vision Plan. Improve greenway and streetscapes designated in the Vision Plan to transform them into multi-modal greenway linkages, incorporating bicycle lanes, improved pedestrian accommodations, and enhanced landscaping. Route 110 is designated as a potential greenway streetscape corridor and this Study explored the potential to provide pedestrian and bicycle accommodations to support alternative travel modes.

- Revise land use plans to locate commercial properties in areas where good transportation capacity can be provided. A review of the Future Land Use shows expansion of commercial development along Route 110 in the study area. This

Study focuses on the existing and future capacity of the Route 110 to identify and facilitate additional, commercial and industrial development.

- Enhance the gateway experience between communities by land and water. The Route 110 serves as a gateway to Stratford from Shelton to the north and west and Milford to the east via Merritt Parkway. The results of this Study will guide infrastructure improvements to the corridor which enhance the gateway experience.

- Encourage appropriate waterfront commercial development. As shown in the Stratford Vision Plan, a potential waterfront commercial node has been identified just south of Merritt Parkway and adjacent to Ryders Landing. This Study considers this potential development and provides recommendations that the Town can use to help guide access to the development, including potential offsite improvements to the transportation system.

In addition to the local POCD, METROCOG recently completed their Regional Plan of Conservation and Development (RPOCD). The results of this Study informed the new RPOCD for the future development and growth along the Route 110 Corridor. The previous RPOCD, adopted in January 2008, presented three growth management alternatives from the year 2000 to the year 2020 to provide METROCOG with growth alternative visions of the future as they relate to the growth of the region and the impact to travel patterns and land development. A brief description of each alternative is provided below with the expected impact to the Route 110 corridor.

The Current Trends Alternative is defined as the "business as usual" alternative with low-density segregated land use development. The following bullets highlight the impact to Stratford and the Route 110 Corridor:

- 15-28% growth in traffic volumes from 2000 to 2020 on ADT basis. As detailed in Section 2.3, this magnitude of ADT growth has not been realized along the Route 110 corridor, nor the region.

- Improvement, reconstruction, and widening of the main arterials are crucial to accommodate expected development. However, Route 110 is not specifically mentioned as a corridor needing specific improvements.

- Local bus ridership is not expected to grow significantly with the investment in transportation infrastructure.

The Regional Growth Center alternative is characterized by compact growth aimed towards areas with sufficient infrastructure to support development. This alternative suggests the following about Stratford and the Route 110 Corridor:

- Regional growth centers in population and employment will concentrate in regional centers such as Bridgeport, Fairfield, and Stratford.

- The Regional growth center alternative suggests approximately 20% traffic growth from 2000 to 2020, with private vehicles remaining the main mode of travel to connect employees and regional centers.

- Similar to the Current Trends Alternative, Route 110 is not specifically identified as an area in need of significant infrastructure improvement.

The final alternative presented in the RPOCD is the Transit/Light Rail Centers alternative. This alternative projects growth surrounding medium to high density mixed use centers along transit network corridors. For Stratford and Route 110 the following impacts are expected:

- Focus on Transit Oriented Development (TOD) to target development at medium to high-density centers along transit corridors. Expectation is for 5-10% mode shift between private vehicles and public transportation. This plan focuses on southern Stratford where there are denser, transit focused areas.

- Light rail line proposed along the Merritt Parkway Corridor connecting the Route 110 area through Fairfield County to Stamford. Although the development of the line could impact travel patterns along and surrounding Route 110, the plan for this line has not yet progressed past the concept level.

- Similar to the other alternatives, Route 110 is not specifically identified as an area in need of significant infrastructure improvement under this growth scenario.

2.11.3 Zoning Regulations and Land Use

Town zoning regulations dictate where specific land uses can occur and how developments are built. These regulations are generally developed with the focus of achieving the goals and objectives of the POCD. The zoning regulations for Stratford were reviewed to identify the types of development that can occur within the study area. The regulations inform future growth forecasts in subsequent study phases and helps to identify the potential build-out in the corridor that will occur within the next 20 years.

Figures 2-26 and 2-27 in Appendix A display the current zoning and land uses for Stratford. Seven specific zones including six categories of land uses encompass the study area. Table 2-11 summarizes the specific zoning designations and the current land uses within each zone. Also included in Table 2-11 are the major employers and/or commercial developments located within each zone.

The One-Family Residential Zone (RS-1) is located at the northern and southern ends of the study area. Land uses in this zone include mainly low density residential with single family homes and a medium density residential area in Ryders Landing. The remainder of the zone includes a small parcel along the Merritt Parkway owned by the State of Connecticut used for maintenance as well as a few park/open space/recreation parcels. There are also a few scattered vacant lots where meaningful development would be difficult without combining with other adjacent properties.

The One-Family Residential Zone (RS-2) includes only a small portion of the study area behind the Limited Commercial (LBB) zone. The zone features low density residential within the study area.

The Limited Commercial (LBB) zone is located along the central western portion of the corridor. The zone includes much of the commercial and community service land uses within the corridor including Homewood Suites, Atria Senior Living, Lord Chamberlain Nursing and Rehabilitation Center, Alltown Mobil and Oronoque Shopping Plaza. The remainder of the zone includes low and medium density residential, including Tutor Ridge Apartments located west of Route 110 and immediately south of Warner Hill Road.

The Retail Commercial zones (CF and CNC) are located in the southern end of the study area on the east side of Route 110. The zone includes the Ryders Landing commercial plaza.

The final two zones, Light Industrial (MA) and Resource Conservation (RCD) are located on the eastern side of the Route 110 corridor. The zones include the Sikorsky Aircraft World Headquarters, the largest employer in Fairfield County. The remainder of the zone is comprised of undevelopable intertidal marshes as discussed in Section 2.10.3 and shown in Figure 2-23.

TABLE 2-11

Allowable Uses - Zoning Districts in Route 110 Study Area

Zone	Land Uses within Zone	Major Employers/ Commercial Developments
One-Family Residential (RS-1)	Residential – Low & Medium Density Community Service Park/Open Space/Recreation Vacant	Ryders Landing Residential
One-Family Residential (RS-2)	Residential – Low Density	N/A
Limited Commercial (LBB)	Residential – Low & Medium Density Commercial Community Service	Homewood Suites, Atria Senior Living, Lord Chamberlain Nursing and Rehabilitation Center, Alltown Mobil, Oronoque Shopping Plaza, Tudor Ridge Apartments
Retail Commercial (CF)	Commercial	Ryders Landing Commercial
Retail Commercial (CNC)	Commercial	Ryders Landing Commercial
Light Industrial (MA)	Industrial	Sikorsky Aircraft
Resource Conservation (RCD)	Intertidal Marsh Industrial	Sikorsky Aircraft

Source: Stratford Zoning Regulations, POCD and Tax Assessor Database

2.11.4 Potential Development Parcels

In order to assess the development potential within the study area, the study team conducted an analysis of vacant and underutilized parcels for potential development and land use changes. This review analyzed parcels within the study area based upon existing adjacent land uses, the Stratford POCD (See Section 2.11.1), and the Stratford Zoning Regulations (See Section 2.11.2), to identify parcels likely for potential future development and/or redevelopment. Discussions with Town staff also informed the parcel review to determine which parcels have previously been or are currently being reviewed for potential development.

Based on the review of the POCD, Zoning regulations, and discussions with Town staff, three potential groups of parcels (labeled Area 1, 2, and 3) were identified that are likely to be developed/redeveloped within the 20 year study horizon. The areas are shown in Figure 2-28 of Appendix A and summarized in Table 2-12 on the following page.

The first development area is located in the southern portion of the study area between Route 110 and the Housatonic River. The area consists of two parcels currently zoned for one-family residences (RS-1) and contains low density residential land uses. The second development area is a group of one-family residential (RS-1) parcels located just north of area 1 and south of the Ryders Landing commercial plaza. The area consists of five parcels with low density residential land uses or vacant parcels. The final group consists of two parcels located in the central portion of the study area on the west side of Route 110. These parcels are currently zoned for Limited Commercial (LBB) and are bordered by commercial land use to the north, residential land use to the west and community service land use to the south.

A review of the adjacent land uses for each of these development areas was conducted to determine the most likely type of development that would occur. In addition, the Town provided input relative to the Town's zoning and development goals. Based on this information, approximate development potential was estimated at 20,000 square feet of commercial planned area development in Area 1, 175,000 square feet of mixed use commercial development in Area 2, and 175,000 square feet of medical/hospitality type land uses in Area 3. The traffic generation associated with this potential development and the potential impact to the transportation system in the future are reviewed in Section 3.

TABLE 2-12

Potential Development Parcels in Route 110 Study Area

Area	Parcels (Map/Block/Lot)	Current Zone	Adjacent Land Uses	Estimated Potential Development
1	70/18/3/9 70/18/3/14	One-Family Residence (RS-1)	Residential – Low Density Vacant	20,000 sf Commercial PAD
2	70/18/3/6 70/18/3/7 70/18/3/8 70/18/4/1 70/18/4/2	One-Family Residence (RS-1)	Residential – Low Density Commercial Vacant	175,000 sf Mixed Use Commercial
3	70/25/5/25 70/25/5/26	Limited Commercial (LBB)	Residential – Low Density Commercial Community Service	175,000 sf medical/hospitality

Section 3
Assessment of Future Conditions

The assessment of future conditions conducts an analysis of the Route 110 study area under existing geometric and operational conditions utilizing 2034 Background and 2034 Future Traffic volumes. This process identifies deterioration of operational efficiency from existing conditions helping to determine areas of concern that develop in the future.

The future conditions analysis includes traffic projections based on the methodology described below to expand the 2014 Existing Traffic volumes to the 2034 Background Traffic volumes. The Route 110 study area intersections were analyzed under two scenarios, a background condition and optimization scenario. The 2034 Background analysis utilizes existing geometry and existing traffic signal settings to facilitate a direct correlation between existing and future conditions. The 2034 Background Optimized analysis utilizes existing geometry, but modifies intersection signal operations to provide the most efficient signalized intersection operations based on future traffic, including adjustments to traffic signal timings and settings.

In addition to the background traffic growth, this section expands upon the review of the potential development and redevelopment along the corridor described in Section 2. This section identifies the projected travel demand generated by the potential future development into the traffic volume projections. This additional travel demand was added to the 2034 Background Traffic Volumes to estimate 2034 Future Traffic Volumes, which were analyzed under the existing geometric and operational conditions.

This section concludes with future areas of concern based upon the results of the traffic analyses. These areas are the focus of improvements to accommodate projected future travel demand on the Route 110 corridor.

3.1 Background Traffic Growth

Utilizing historical traffic volume trends exhibited by the corridor between 1998 and 2013, the 2014 collected ADT data, and the 2014 Existing Traffic Volumes, 2034 Background Traffic Volumes were developed for the study area. The methodology utilized to develop the background volumes is based on historical volume trends and recognition of the regional influence on traffic volumes along Route 110. The historical trends indicate very limited growth over the surveyed time-period, with an average of 1.2% annual growth over the 15 year period from 1998 through 2013. These growth trends correlate with statewide volume data collected over the past decade, which indicates a period of growth during the first half of the 2000's decade, followed by a period of traffic volume contraction from 2007 through 2013, closely correlated with the economic contraction and muted growth over the past 5-7 years.

Based on a review of the historical trends for Route 110, the 2014 Existing Traffic Volumes have been expanded at a rate of 0.25% per year, compounded annually. This growth rate results in a total growth of just over 5% in traffic volumes from 2014 to 2034. The 2034 Background Traffic Volumes are summarized in Figures 3-1 through 3-3 in Appendix A for each of the weekday morning peak, weekday Sikorsky Shift Change peak, and weekday afternoon peak periods, respectively. The CTDOT Office of Trip Analysis has approved these 2034 Background Traffic volumes.

3.2 Future Traffic Forecast

As detailed in Section 2.11.4, to assess the potential changes in study area traffic volumes over the 20 year study period, the Study Team conducted an analysis of potential development and redevelopment within the study area. The traffic generated by this potential development (Development Generated Traffic), along with the background traffic growth forecast presented in Section 3.1, estimates the expected future traffic demand on the corridor.

Based on the expected types of land use and development, future development generated traffic volumes for the three potential development sites have been estimated. The trip generation estimate is based on data published in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition, 2012. The manual is an industry standard publication for calculating trip generation. Based on data in the manual, traffic volumes have been developed for each potential development area for the morning and afternoon peak hours. The Development Generated Traffic during the Sikorsky mid-afternoon peak period for each development was conservatively estimated at 20% of the peak generation, in recognition of the lower overall traffic volumes on the roadway system during the Sikorsky shift change mid-afternoon time period. The Development Generated Traffic for each development site are summarized in Table 3-1. In total, the potential sites result in approximately 336 additional trips in the morning peak hour, 140 trips in the Sikorsky Shift Change peak and 702 trips in the afternoon peak hour.

TABLE 3-1

Development Generated Traffic for Potential Development Parcels in Route 110 Study Area

Area	Estimated Development	Morning			Sikorsky Shift Change			Afternoon		
		In	Out	Total	In	Out	Total	In	Out	Total
1	20,000 sf Commercial PAD	49	41	90	22	21	43	109	108	217
2	175,000 sf Mixed Use	69	72	141	33	31	64	163	157	320
3	175,000 sf Medical/Hospitality	68	37	105	15	18	33	73	92	165
	Totals	**186**	**150**	**336**	**70**	**70**	**140**	**345**	**357**	**702**

The site generated traffic volumes were assigned to the roadway system at the likely point of connection and distributed to the roadway network based on the following regional traffic distribution derived from the existing traffic patterns along the corridor:

- 40% to/from Merritt Parkway to the north
- 20% to/from Route 110 to the north
- 15% to/from Merritt Parkway to the south
- 10% to/from Warner Hill Road
- 10% to/from Oronoque Lane
- 5% to/from Route 110 to the south

The resulting Development Generated traffic volumes for each development for the morning, Sikorsky Shift Change, and afternoon peak hours are illustrated on Figures 3-4 to 3-6 in Appendix A.

Finally, the 2034 Future Traffic Volumes have been estimated based on the combination of the 2034 Background Traffic volumes plus the addition of the traffic associated with the three potential developments. Figures 3-7 to 3-9 in Appendix A present the 2034 Future Traffic Volumes, for each of the peak hours, respectively. The Development Generated Volumes and 2034 Future volumes have been approved by the CTDOT Office of Trip Analysis. Based on this forecast of development and redevelopment plus the background traffic growth, the study estimates that total traffic volume growth in the corridor will be approximately 10-18% (0.5%-0.8% per year), depending on the peak hour, over the 20-year study horizon.

3.3 2034 Future Traffic Operations

Traffic operations for the 2034 Future Traffic Volumes were evaluated using Trafficware's Synchro plus SimTraffic 8 – Traffic Signal Coordination Software, based on the 2010 Highway Capacity Manual methodology. Existing condition geometry was utilized with the exception of the addition of the new driveway opposite Main Street – Putney. The new driveway was set to operate during the same phase as Main Street – Putney. Signal operations were optimized along the corridor, as would be the case when the additional development comes online. Table 3-2 summarizes the expected traffic operations of the Route 110 corridor under 2034 Future conditions in each of the peak periods. A detailed description of the analysis results is available separately in the Existing and Future Conditions Technical Memorandum.

Under the 2034 Future conditions, intersection operations deteriorate due to the projected regional and local development-based traffic growth. Several of the signalized intersections operate at overall LOS D, approaching failing operations, while others operate at failing LOS E or F during the peak hours, with significant delays on the critical approaches. The queue lengths at the critical movements will also be lengthened, extending into adjacent intersections over subsequent cycles of the signals and causing further delays not necessarily captured by the capacity analysis results.

As mentioned in the existing conditions section, the overall LOS computed by the analysis software tends to underestimate the delay of vehicles along the congested areas of the Route 110 corridor. Vehicles that enter from the side streets block Route 110 through movements and propagate additional delays through the network. Traffic microsimulation results show even more significant delays and queuing along Route 110 in the 2034 Future conditions. Specific areas of concern borne by the capacity analyses and microsimulation review are further detailed in the following section.

TABLE 3-2
Route 110 Intersection Operational Summary – 2034 Future Conditions

	Morning Peak Hour		Sikorsky Shift Change Peak Hour		Afternoon Peak Hour	
Study Intersection	**LOS**	**Avg. Delay (s/veh)**	**LOS**	**Avg. Delay (s/veh)**	**LOS**	**Avg. Delay (s/veh)**
Warner Hill Road and Sikorsky Gate #2	D	36.0	C	30.8	D	45.0
Oronoque Lane	D	47.7	D	44.9	D	48.7
Sikorsky Gate #1	A	7.3	D	38.2	D	41.5
Merritt Parkway SB Ramps and Navajo Lane	C	33.2	C	29.3	E	67.9
Ryders Lane and Commuter Parking Lot Drive	A	3.2	A	6.1	A	7.2
Merritt Parkway NB Ramps and Charlotte Street	E	67.2	F	103.2	F	176.4
Main Street – Putney	C	24.7	B	17.1	D	50.4

3.4 Future Areas of Concern

The following section details future areas of concern along the Route 110 corridor that warrant review for mitigation. These areas were identified through the observation of existing concerns and the traffic analysis conducted with intersections expected to operate at deteriorated levels under the 2034 Future projected traffic volumes. Refer to Figure 1-1 in Section 1.1 for a map of these areas.

- **Route 110 at Main Street – Putney**
  - Main Street – Putney approach experiences failing operations at LOS E/F during all three peak hours.
  - LOS E operation on the Route 110 SB approach during the afternoon peak hour.
  - The Main Street – Putney intersection traffic control signal operates with the adjacent Route 15 NB Ramps and Charlotte Drive signal in a cluster configuration reducing the flexibility for the signal to balance demand on all approaches.
  - Angled geometry of the intersection restricts the ability of right turns from Main Street – Putney to Route 110 SB and turns into Main Street – Putney from Route 110 NB with vehicles using the painted median as well as facilitating high speed turning movements into Main Street – Putney from Route 110 SB.

- **Route 110 at Merritt Parkway NB Ramps/Charlotte Drive**

  - Overall intersection LOS E operation in the morning peak hour and LOS F during the Sikorsky shift change and afternoon peak hour with delays of over 100 seconds per vehicle.

  - LOS E operation during the morning and Sikorsky shift change peak and LOS F operation during the afternoon peak of the Merritt Parkway NB Off-Ramp left and through-left movements.

  - Route 110 NB left turns operate at LOS F during the morning and afternoon peak periods.

  - LOS F operation of the Route 110 SB through movement in all three peak periods with queues extending into and past the adjacent Ryders Lane and Commuter Lot driveway signal.

  - As mentioned, this intersection operates in a cluster with the adjacent Main Street – Putney intersection causing lost time for internal intersection clearance phases and limiting flexibility to tailor timing and phasing to intersection demand.

- **Route 110 at Ryders Lane/Commuter Lot Drive**

  - LOS E operation of the Ryders Lane shared through-left lane during the morning peak hour.

  - Route 110 NB and SB queues extend past the available left turn lane storage during the peak morning and afternoon peak hours.

  - Due to the proximity of the Merritt Parkway NB On-Ramp, there is poor lane utilization on the Route 110 SB approach to the Ryders Lane intersection with a majority of the vehicles in the shared through-right lane and vehicles weaving into the right lane within and immediately downstream of the intersection. Queues from the Merritt Parkway NB On-Ramp intersection regularly extend into and past the Ryders Lane intersection.

- **Route 110 at Merritt Parkway SB Ramps/Navajo Lane**

  - Overall intersection operation of LOS E during the afternoon peak hour.

  - LOS F operation with significant delays and queueing on the Merritt Parkway SB Off-Ramp shared through-left movement in all peak hours. In the morning peak hour, LOS F operation is expected on the Merritt Parkway SB Off-Ramp right movement as well.

  - LOS E operation on the Navajo Lane approach during the morning peak and LOS F operation on the Route 110 SB approach during the afternoon peak hour.

  - The proximity of the Sikorsky Gate #1 and Oronoque Lane intersections continue to cause additional delays and congested operations with queues between the intersections extending into and beyond adjacent intersections and preventing vehicles from entering and exiting Route 110.

- **Route 110 at Sikorsky Gate #1**

  - LOS F operation continues on the Sikorsky Gate #1 approach during the afternoon peak hour.

  - LOS E operation continues on the Route 110 NB approach in the Sikorsky Shift Change and afternoon peak hours.

  - The Sikorsky Gate #1 intersection operates as a cluster with the Oronoque Lane intersection limiting the flexibility of the signal to adjust to peak demands on approaches and resulting in lost capacity due to intersection clearance phases. In addition, due to the proximity of the Route 110 intersection with the Merritt Parkway SB ramps, the Route 110 main line and Sikorsky Gate #1 queues continue to extend beyond the available storage between the intersections blocking vehicles from entering and exiting Route 110.

- **Route 110 at Oronoque Lane**

  - LOS E/F operation on the Oronoque Lane left turn and Route 110 NB shared through-left movements during the three peak hours.

  - Likely continuation of high frequency of intersection collisions including significant turning movement and sideswipe collisions due to the volume of turning traffic and lack of a Route 110 NB left turn lane.

  - As mentioned for Sikorsky Gate #1, the Oronoque Lane signal operates on the same controller as the Sikorsky Gate #1 signal restricting the ability to adjust signal timing and phasing to peak demands. Route 110 through movement and side street queues from both signals continue to block traffic streams from entering and exiting Route 110.

- **Route 110 at Alltown Mobil and Oronoque Plaza Driveways**

  - The perceived safety concerns identified in the existing condition analysis should be monitored to determine if unsafe operations exist at this location. If an increase in accidents are reported through a review of accident data, mitigation should be considered to address patterns in the data.

- **Route 110 at Warner Hill Road/Sikorsky Gate #2**

  - High number of vehicle collisions involving Route 110 NB and SB left turning vehicles exhibited in the data are likely to be exacerbated with additional traffic along the corridor.

  - LOS E operation on the Warner Hill shared through-right movement in all peak hours with delays approaching LOS F operation in the morning and afternoon peaks.

  - LOS D/E operation of Sikorsky Gate #2 approach in the morning and afternoon peak hours.

  - Queues on intersection through movements extend past available storage for left turning vehicles in various peak periods.

Section 4
Recommendations

This section details the recommendations for transportation system improvements and enhancements. The recommendations address both existing issues and those resulting from the forecasted travel demand and potential development growth that is expected to occur in the Town of Stratford and the region by the year 2034. The recommendations were developed cooperatively with the Technical and Community Advisory Committees, CTDOT and METROCOG and were refined through a public input process, to address the goals and objectives outlined in the Study Mission Statement.

The proposed improvements are generally spot improvements meant to mitigate current and future conditions for the areas of concern identified in Section 3. In some areas, more extensive physical improvements are necessary to address existing deficiencies along with the future transportation needs. The recommendations are presented by location, from the south to the north along the Route 110 corridor. The spot improvements to the transportation system will address future traffic growth, improve safety, increase accessibility, and promote alternative modes of travel. Although many of the recommendations address transportation issues related to motor vehicles, a series of alternative mode enhancement recommendations were developed to address pedestrian, transit, cyclist, and recreational usage of the transportation system.

The development and refinement of the preferred improvements was guided by the Town of Stratford's and METROCOG's desire to identify implementable solutions that adequately meet study goals by addressing both the existing deficiencies and potential future operational issues identified and described in the previous sections of this report.

Alternative concepts for the areas of concern are presented in the last subsection, and Appendix C. However, these alternatives were screened out from further consideration due to constructability issues, failure to meet engineering standards and design criteria, safety concerns, traffic operations concerns and/or low benefit to cost ratios. They have been included to provide a comprehensive understanding of the Study process.

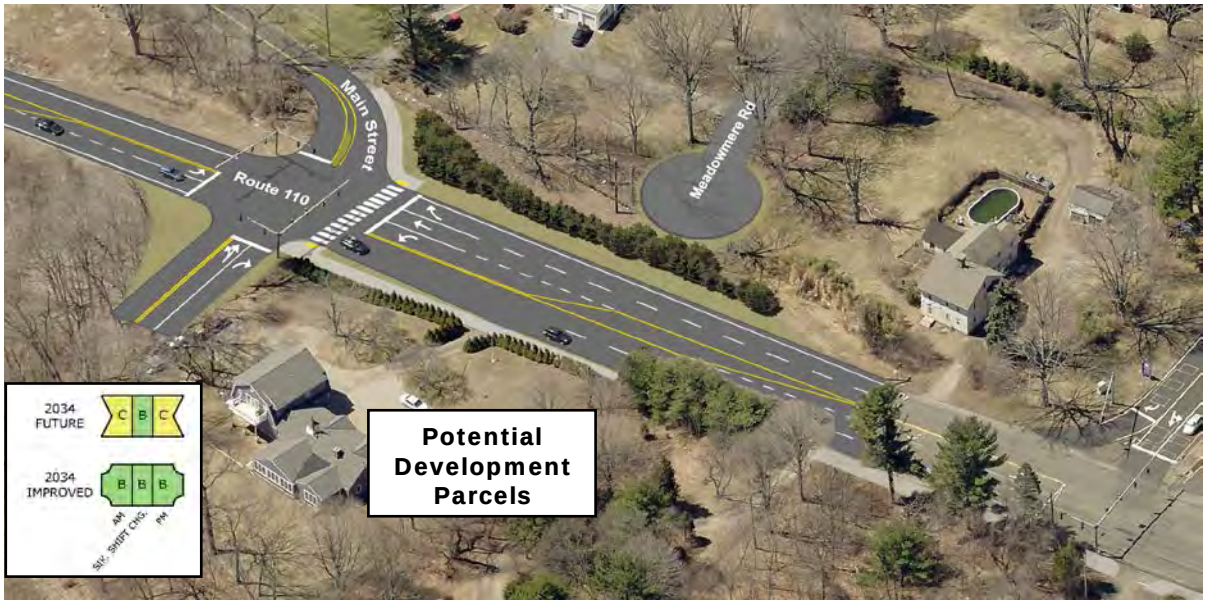
4.1 Summary of Recommendations

The following sections present the recommended spot improvements for the areas of concern. The sections include a description of the improvement and snapshots of the concepts, renderings and cross-sections, as well as a summary of the traffic operations expected following implementation of the improvements when compared to the no-build future condition. Tables 4-1 and 4-2 in Appendix A provide a full summary of the traffic operations by approach for the scenarios analyzed. The full concept plans for each of the recommendations and associated traffic operations are included in Appendix B.

Finally, the additional concepts discussed in the last subsection and presented in Appendix C are included to provide State and local planners with complete documentation of the ideas that were vetted during the development of the preferred concepts. The drawings identify the basis of why each of the concepts were screened from further consideration.

4.1.1 Concept A: Main Street – Putney Intersection

Concept A improves traffic operations, intersection geometry, safety, and alternative travel mode mobility at the intersection of Route 110 (River Road / Main Street) with Main Street – Putney. The existing Main Street – Putney alignment intersects Route 110 at a skewed angle approximately 215 feet south of the Merritt Parkway northbound ramps. The skewed geometry results in difficult turning movement and/or high speeds maneuvers to and from Route 110.



Due to the proximity of the adjacent Merritt Parkway ramp intersection to the north, the two intersections operate on one controller. This limits flexibility for phasing and timing of the signal and reduces the capacity of both intersections. Finally, potential development parcels were identified opposite Main Street – Putney on the east side of Route 110. Accommodating this future development potential, while providing a comprehensive plan for improving traffic operations along Route 110 were the primary objectives of the intersection improvement plan.

The preferred concept proposes the following primary physical improvements:

- Realign Main Street – Putney to the south at a perpendicular intersection with Route 110, approximately 500 feet south of the Merritt Parkway northbound ramps. The perpendicular realignment facilitates standard intersection movements and the increased separation from the Merritt Parkway northbound ramp intersection will allow for coordinated intersection operations on a separate controller, increasing capacity, progression, and improving traffic operations.

- Facilitate future development on the east side of Route 110 by defining a preferred driveway location opposite the realigned Main Street – Putney approach.

- Utilize existing roadway width to provide a northbound exclusive left turn lane to remove left turning vehicles from Route 110 northbound traffic stream.

- Convert the north access of Meadowmere Road to a cul-de-sac to remove vehicle turning conflict points and increase safety. Residents will be able to utilize the south intersection with Main Street – Putney immediately to the south of the study area.

- Provide a shared use path along the east side of Route 110, south of the Merritt Parkway northbound ramps crossing to the west side of Route 110 at the realigned Main Street – Putney intersection to improve bicycle/pedestrian accessibility. See Concept G for more information on the alternative mode improvements.

It is important to note that this concept plan includes a minor taking of private property to facilitate the realignment of Main Street – Putney to the south of the current intersection. The property owners were contacted during the Study process, attended the Public Information Meeting and conveyed their concerns with the impacts this improvement will have on their property. If this improvement progresses to implementation, the design should limit the impact to private property, where feasible, and further discussions with the property owner should be conducted early in the project development process.

Concept A results in efficient LOS B operation during the peak hours at the improved intersection under the 2034 traffic volumes. The engineering concept plan included in Appendix B.

4.1.2 Concept B: Route 15 Northbound Ramps Intersection

Concept B improves traffic operations as well as alternative travel mode access and mobility at the intersection of Route 110 with the Merritt Parkway northbound ramps and Charlotte Street. The intersection experiences significant congestion, particularly in the afternoon peak hour with Route 110 southbound vehicles accessing the Merritt Parkway northbound ramp. Congestion is also present on the Merritt Parkway northbound exit ramp during the peak hours. In addition, the signal at this intersection operates in a cluster on the same controller as the adjacent Main Street – Putney intersection, limiting flexibility for phasing and timing patterns while reducing the capacity of both intersections. Finally, potential future development parcels were identified opposite the Merritt Parkway ramps on the east side of Route 110. This potential future development is accommodated under the recommended improvements. The preferred concept proposes the following primary physical improvements:

- Widen the Merritt Parkway northbound entrance ramp to provide an extended merge area on the ramp to eliminate the existing yield condition for Route 110 southbound traffic and allow additional time for Route 110 traffic to merge on the ramp into a single lane before merging with Merritt Parkway northbound traffic. Appropriate location and lane merge signage are critical for optimal merging maneuvers. The radius on the entrance ramp has been reduced to increase turn lane storage, calm traffic speeds from Route 110 southbound, and facilitate the merge with Route 110 northbound left turning traffic on the tangent of the ramp. Install merge signs in accordance with the Federal Highway Administration publication, Manual on Uniform Traffic Control Devices.

- Widen Route 110 to the west and install a southbound exclusive right turn lane facilitating improved traffic operations for turning traffic and removing this traffic stream from the Route 110 through lanes.

- Eliminate the small, right turn channelizing island on the Merritt Parkway northbound exit ramp

- Add ‘cat tracks’ to guide northbound left turning vehicles to the Merritt Parkway northbound on-ramp.

- Add ‘cat tracks’ to guide Route 110 northbound left turning vehicles to the Merritt Parkway northbound on-ramp

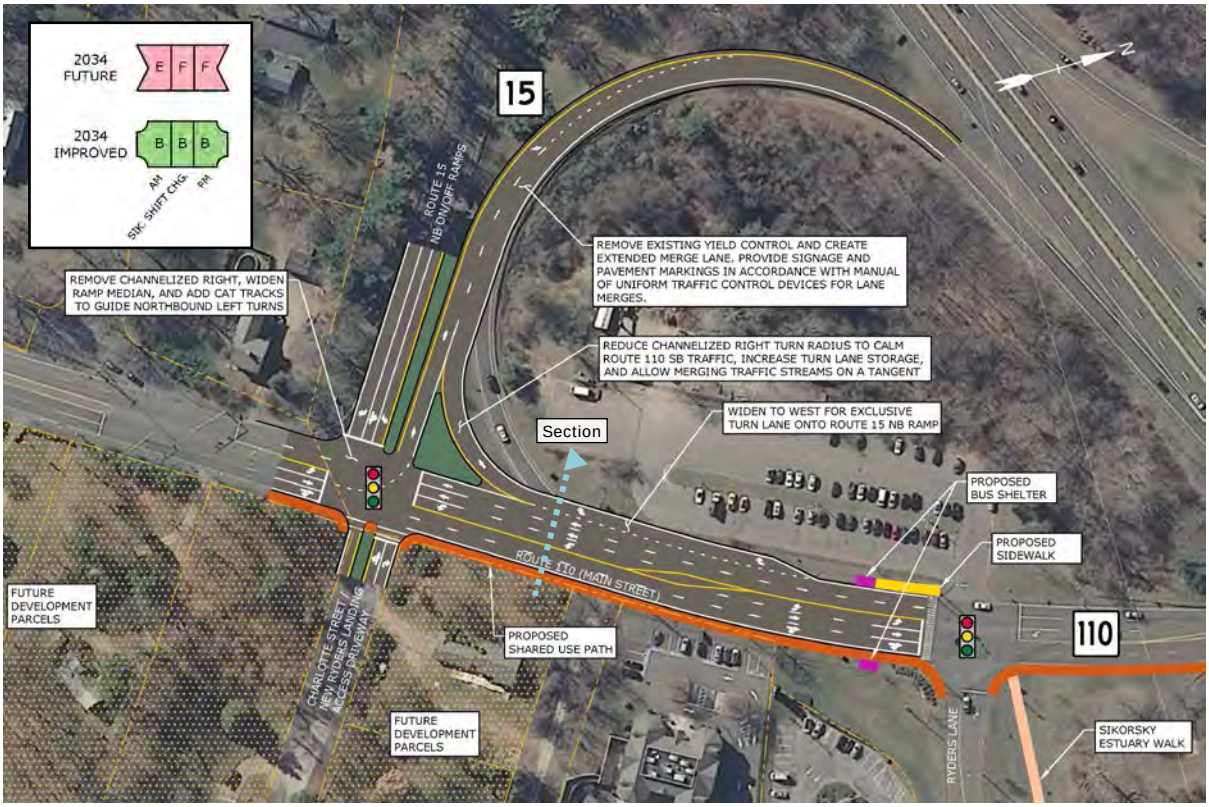
- For the potential development parcels, a widened driveway is shown on the existing footprint of Charlotte Street to accommodate a new multi-lane site driveway at the existing traffic control signal. Modify the traffic control signal operations accordingly to incorporate this new traffic stream as necessary.

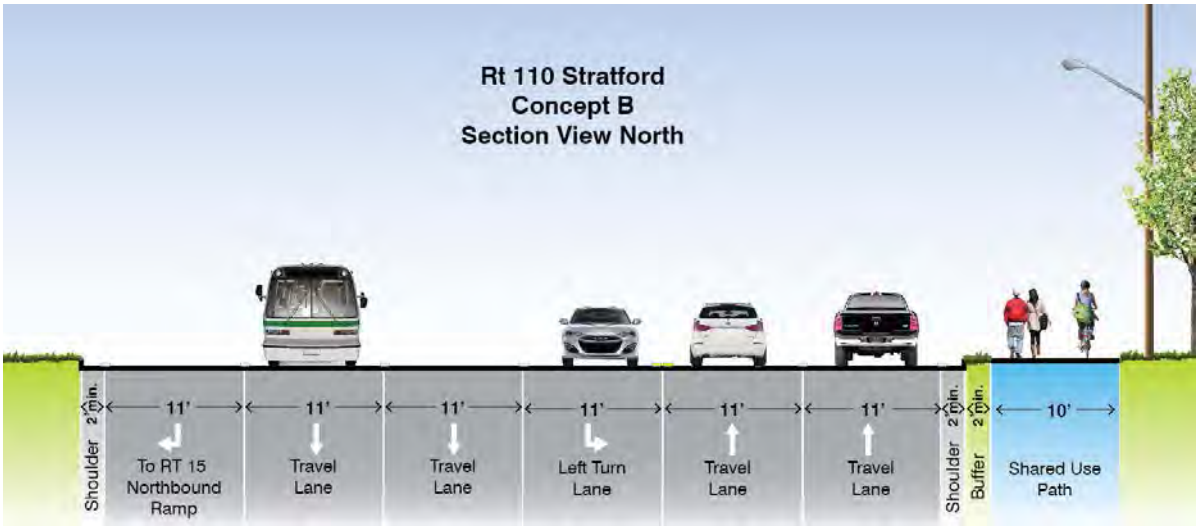
- Provide a shared use path along the east side of Route 110 to improve bicycle/pedestrian accessibility. See Concept G for more information on the alternative travel mode opportunities.

- Improve bus stops with shelter amenities on both sides of Route 110 and connect to shared use path with additional in-fill sidewalk.

The modifications to the intersection result in LOS B operation during the peak hours analyzed with the 2034 future traffic volumes, significantly improved from the future

conditions with no improvements. The cross section provided shows the proposed roadway cross-section with the right turn lane as well as the shared use path on the east side of Route 110. The full Concept B plan is included in Appendix B.





4.1.3 Concept C: Sikorsky Gate #1 Area – Realignment

Concept C mitigates the existing poor traffic operations, improves safety, facilitates better access to transit and provides mobility for bicyclists and pedestrians in the Sikorsky Gate #1 area. This concept also includes the intersections with Route 110 at the Merritt Parkway southbound ramps / Navajo Lane, and Oronoque Lane. The three closely spaced intersections cause congestion throughout the weekday peak hours resulting in the most congested portion of the corridor. Heavy traffic volumes along Route 110 combined with turning movements from Route 110 and the side streets consistently block Route 110 through movements in both travel directions. The lack of exclusive turn lanes within this segment, particularly a northbound left turn lane onto Oronoque Lane, causes safety issues and reduces capacity as queuing vehicles block through movements. Also, similar to the traffic signal at the Merritt Parkway northbound ramps, the Merritt Parkway southbound ramps operate under the same traffic signal controller as Sikorsky Gate #1 and Oronoque Lane, limiting flexibility and efficiency for traffic signal phasing and timing.

Concept C proposes the following physical improvements to improve traffic operations, safety and mobility:

- Relocate the Sikorsky Gate #1 driveway opposite Oronoque Lane and develop a new site driveway for Sikorsky Aircraft while maintaining the no left turn restriction for southbound Route 110 and prohibiting access from Oronoque Lane.

- Eliminate the cluster operation with the Merritt Parkway southbound ramp.

- Widen Route 110 to the west to install a northbound left turn lane between Navajo Lane and Oronoque Lane and a southbound through-right turn lane starting just south of Oronoque Lane and ending in an exclusive right turn lane onto the Merritt Parkway southbound entrance ramp.

- Increase storage for turn lanes on Merritt Parkway southbound off ramp and on Route 110 northbound on ramp to Merritt Parkway southbound to design queue lengths.

- Provide overhead advanced directional signage on the Route 110 southbound and Merritt Parkway southbound off-ramp to guide vehicles into the desired lane.

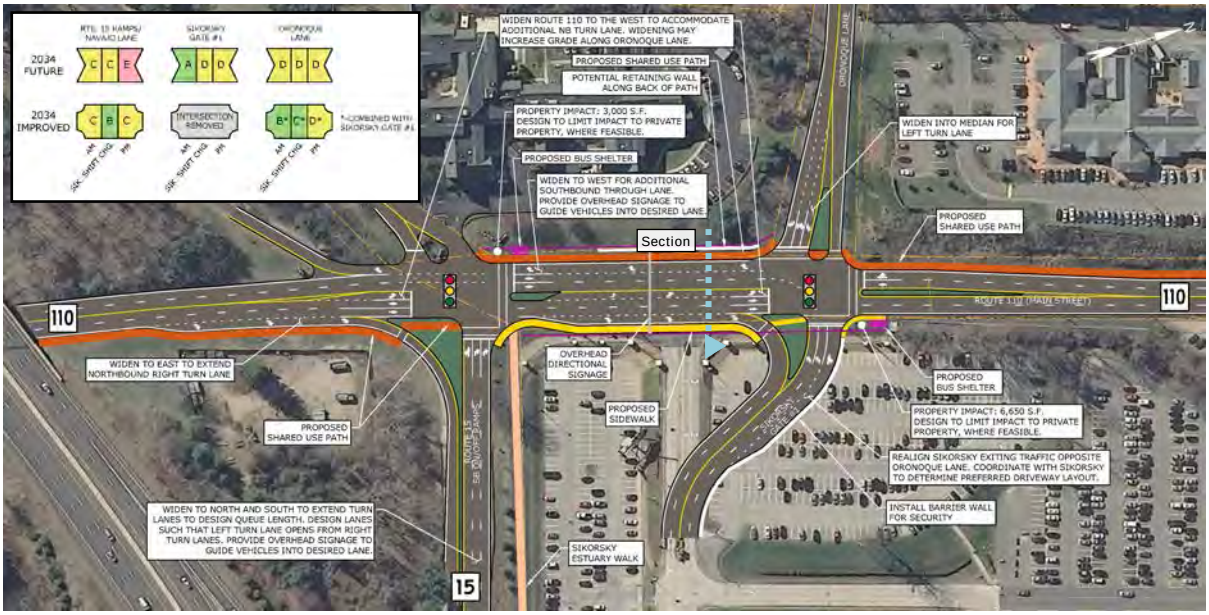
- Provide a shared use path along the east side of Route 110, south of the Merritt Parkway southbound ramp and along the west side of Route 110 north of the ramp to improve bicycle/pedestrian accessibility. See Concept G for more information on the alternative travel mode opportunities.

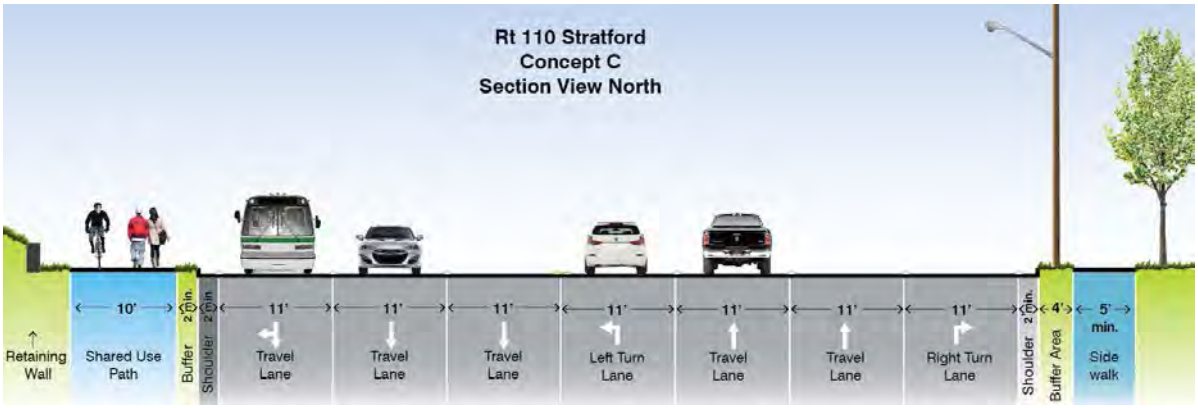
- Provide new bus stops with shelter amenities on both sides of Route 110 and connect to a shared use path with additional sidewalk.

It is important to note that the concept does not analyze, in detail, the potentially significant modifications that would be required within the Sikorsky site to realign the driveway. Further review of the impacts and alternatives during the detailed design phase will be required to select the preferred realignment and determine the full scope and impact. As such, Concept C focuses on the modifications within the Route 110 right-of-way. The on-site costs, outside of the driveway relocation, will be a significant addition to the costs associated with the improvement to Route 110.

Overall, Concept C reduces conflict points and consolidates access to Route 110 by creating a four-way intersection with Sikorsky Gate #1 and Oronoque Lane. Eliminating one of the three closely spaced intersections addresses the existing safety and congestion concerns. The additional turn lanes remove turning vehicles from the Route 110 through lanes, increasing capacity and improving traffic operations. However, the concept requires significant and costly changes to the Sikorsky Gate #1 driveway and results in impacts to parking and circulation within the Sikorsky Aircraft site, which add significant costs to the physical improvements along Route 110.

As shown in the illustration below, the concept results in acceptable LOS B through LOS D operation during the peak hours analyzed with the 2034 future traffic volumes. As mentioned, the improvement includes the consolidation of the clustered Sikorsky Gate #1 and Oronoque Lane operation into a single intersection allowing for additional storage space between the intersections and eliminating additional delay associated with travel through another signalized intersection. The Concept C cross section shows the new Route 110 lane configuration with the additional northbound left turn lane and southbound through lane between the intersections. The additional lanes reduce the weaving observed in the existing conditions such that vehicles can select a dedicated turn or through lane or lanes that become dedicated to turning movements. The full Concept C plan is included in Appendix B.





4.1.4 Concept E: Alltown-Mobil / Oronoque Plaza Area

Concept E focuses on perceived safety concerns in the Alltown-Mobil and Oronoque Plaza area. Concept E recommends adjusting access to the Alltown-Mobil site if future development was to occur in this area and adding a left turn lane into both the gas station and Oronoque Plaza to remove left turning vehicles from the through traffic stream. The concept reflects feedback received from the Community Advisory Committee, noting that the closely spaced driveways of the adjacent developments are causing safety concerns related to driver expectancy for vehicles entering and exiting the two properties.

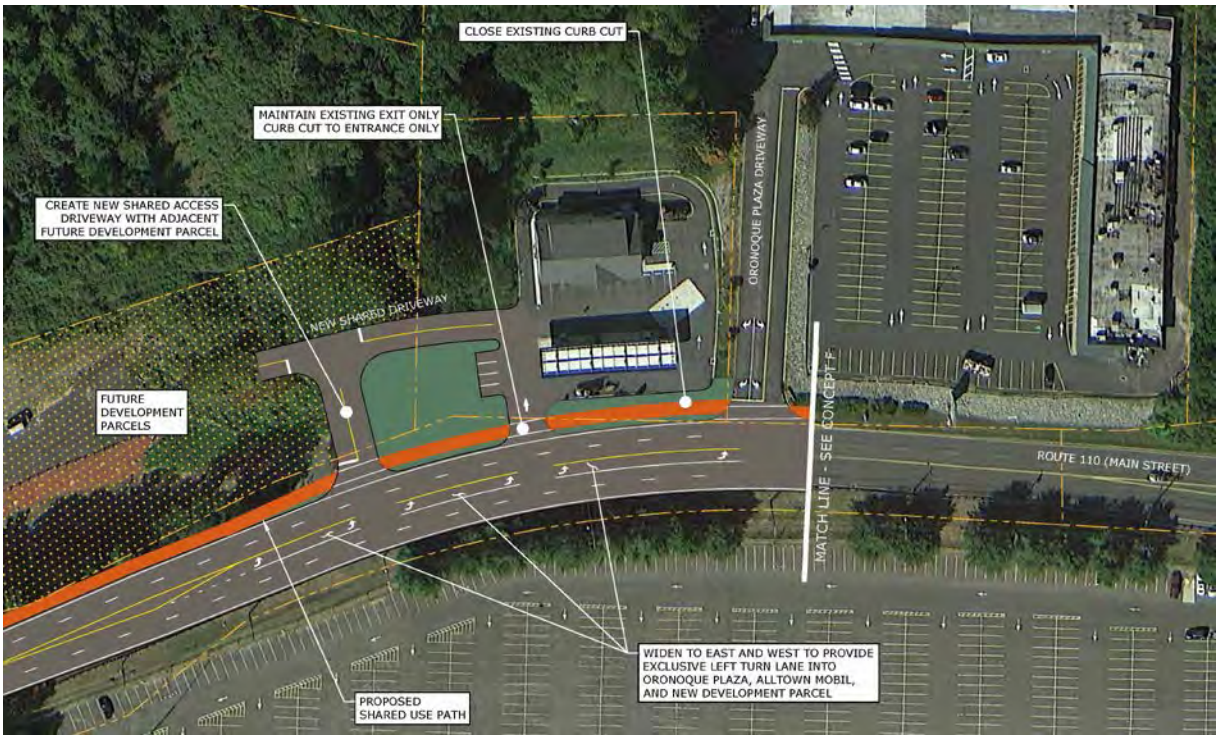
The Alltown-Mobil property, recently redeveloped and completed in 2013, provides an entrance-only driveway, directly adjacent to the Oronoque Plaza driveway, and an exit only driveway approximately 130 feet to the south of the entrance. A review of traffic accident data provided by the Town of Stratford did not reveal any discernable patterns associated with traffic operations at the driveways. However, the data is limited given that the Alltown-Mobil site was only recently completed. Further review of future traffic accident data will be needed to determine if a safety issue exists that would necessitate

improvements and modifications to the driveway access and operations to mitigate unsafe conditions.

In addition to the safety concerns, a future development parcel was identified south of the Alltown-Mobil property. The future development of this parcel may provide an opportunity to reconfigure site access to mitigate the perceived safety issues that arise.

To address the safety concerns with the Alltown-Mobil driveways and accommodate the future potential development on the adjacent property, Concept E proposes to consolidate the driveways with a shared full access drive to the two properties to the south of the existing Alltown-Mobil exit-only driveway and eliminate the existing Alltown-Mobil entrance only driveway adjacent to Oronoque Plaza. A northbound exclusive left turn lane into the new driveway locations and the Oronoque Plaza driveway is also included to remove left turning vehicles from through lanes. This concept will require the support of the property owners to approve a shared access point.

The shared use path continues along the western side of Route 110 through this segment of the corridor in the available level area located adjacent to the roadway shoulder. A snapshot of the concept is shown on the following page with the full concept plan included in Appendix B.



4.1.5 Concept F: Warner Hill Road & Sikorsky Gate #2 Intersection

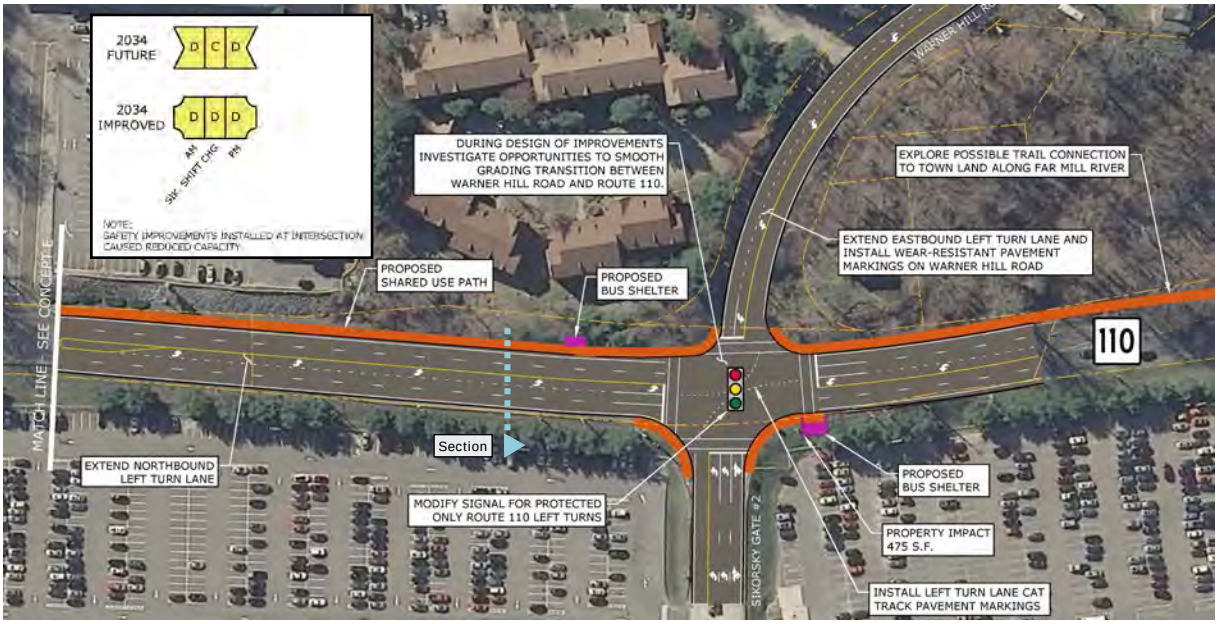
Concept F proposed operational modifications to the Route 110 intersection with Warner Hill Road and Sikorsky Gate #2 to mitigate safety issues at this intersection. A review of the traffic accident data revealed a significant accident history, particularly for vehicles making permitted left turns from Route 110 onto Warner Hill Road and into Sikorsky Gate #2. In addition, the intersection experiences moderate traffic congestion, particularly during the Sikorsky peak exiting periods, as well as on the northbound left turn movement from Route 110, as vehicles travel west along Warner Hill Road towards Shelton and the Route 8 Expressway.

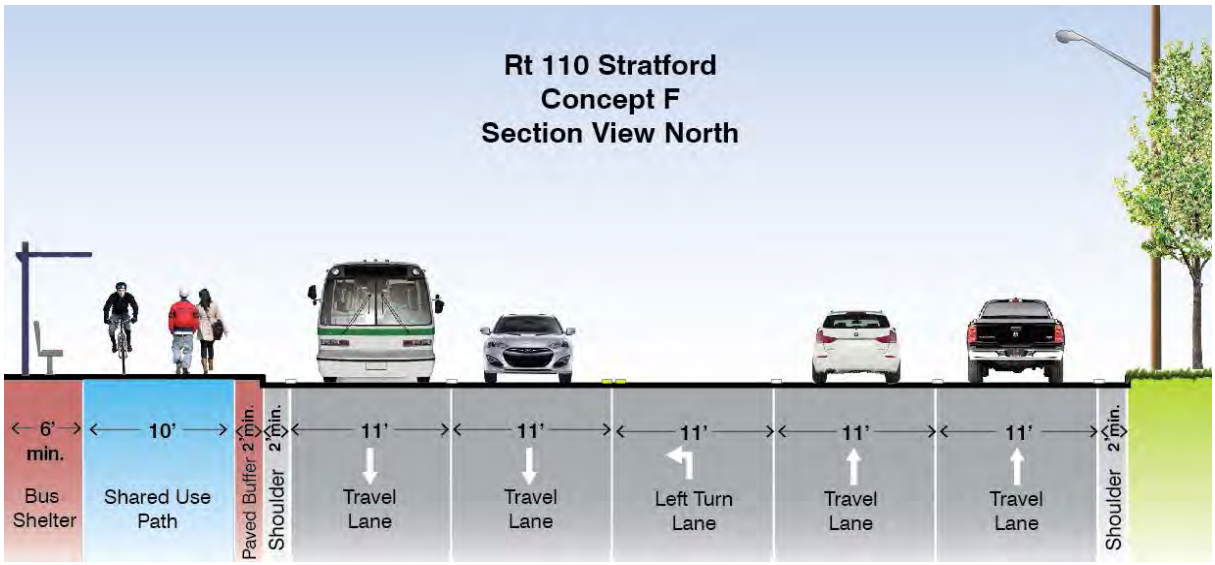
Concept F proposes to eliminate the permitted left turns from Route 110 to Sikorsky Gate #2 driveway and Warner Hill Road, replacing them with a protected only left turn signal phase. Additionally, pavement markings ('cat tracks') were shown through the intersection to improve tracking for left turning vehicles. Elimination of the permitted left turns will reduce intersection capacity and result in slightly more congested traffic operations. However, these improvements are expected to dramatically increase intersection and corridor safety. In order to address the capacity changes, the concept proposes to extend the Route 110 northbound left turn storage length to provide the additional vehicle storage needed to store cars waiting to turn left onto Warner Hill Road.

The proposed shared use path extends through this intersection from the south along the west side of Route 110. The path includes the provision of new transit shelters on either side of Route 110 to improve access to bus service for Sikorsky Aircraft. The Town of Stratford owns land to the north of the study area along the Far Mill River and the shared use path should connect to this public recreational area.

Finally, Concept F proposes the extension of the eastbound left turn lane and the installation and maintenance of wear-resistant pavement markings on Warner Hill Road to increase capacity and help guide vehicles down the steep slope of the roadway, mitigating safety concerns with crashes occurring off the side of the roadway. In addition, during the design of the improvements, investigate opportunities to smooth the grading transition between Warner Hill Road and Route 110 to eliminate existing issues with vehicles scraping on the pavement within the transition. During a recent repaving project, some regrading was implemented, which improved this condition over the pre-existing intersection grading transition.

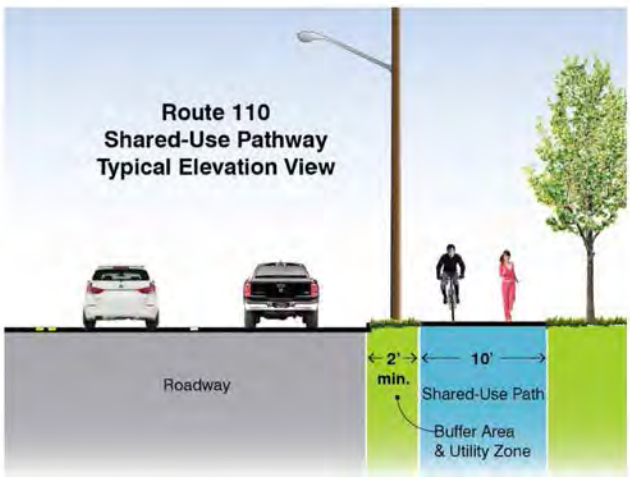
As mentioned and illustrated below, the improvements result in slightly decreased intersection LOS but remains at an acceptable LOS D during the peak hours analyzed with the 2034 traffic volumes. The cross section shows the addition of the shared use path and bus shelters proposed to accommodate bicycle/pedestrian traffic with the potential goal of extending the shared use path to Town of Stratford owned land along the Far Mill River approximately 0.3 miles to the north of the intersection.


2034 FUTURE
D C D
2034 IMPROVED
D D D
AM SHIFT CHG PM
SIX SHIFT CHG
NOTE:
SAFETY IMPROVEMENTS INSTALLED AT INTERSECTION CAUSED REDUCED CAPACITY
DURING DESIGN OF IMPROVEMENTS INVESTIGATE OPPORTUNITIES TO SMOOTH GRADING TRANSITION BETWEEN WARNER HILL ROAD AND ROUTE 110.
EXPLORE POSSIBLE TRAIL CONNECTION TO TOWN LAND ALONG FAR MILL RIVER
EXTEND EASTBOUND LEFT TURN LANE AND INSTALL WEAR-RESISTANT PAVEMENT MARKINGS ON WARNER HILL ROAD
PROPOSED SHARED USE PATH
PROPOSED BUS SHELTER
MATCH LINE - SEE CONCEPT E
110
Section
EXTEND NORTHBOUND LEFT TURN LANE
MODIFY SIGNAL FOR PROTECTED ONLY ROUTE 110 LEFT TURNS
SIKORSKY GATE #2
PROPOSED BUS SHELTER
PROPERTY IMPACT 475 S.F.
INSTALL LEFT TURN LANE CAT TRACK PAVEMENT MARKINGS


Rt 110 Stratford
Concept F
Section View North
6' min.
Bus Shelter
10'
Shared Use Path
Paved Buffer 2' min.
Shoulder 2' min.
11'
Travel Lane
11'
Travel Lane
11'
Left Turn Lane
11'
Travel Lane
11'
Travel Lane
Shoulder 2' min.

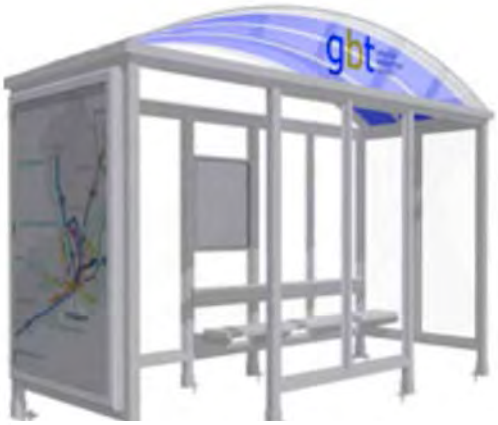
4.1.6 Concept G: Pedestrian, Bicyclist and Transit Accommodations

Concept G defines the pedestrian, bicycle and transit facility improvements along the Route 110 corridor. The existing conditions assessment identified a lack of non-motorized and alternative travel mode facilities and amenities. Furthermore, public input from the Technical and Community Advisory Committees meetings affirmed that improving alternative travel mode facilities and amenities were an important objective. The corridor users want better non-motorized access, mobility and safety. The Town of Stratford is focused on improving these facilities, increasing transit usage, and providing more extensive and interconnected bicycle and pedestrian facilities.



Based on the corridor review, the advisory committee input, and discussions with Greater Bridgeport Transit, it is recommended that a shared use path along the entire corridor be constructed from the Main Street – Putney intersection through the Warner Hill Road/Sikorsky Gate #2 intersection. The off-road path would be 10 feet wide to accommodate two-way bicycle and pedestrian traffic. The path would connect to the existing Sikorsky Estuary walk, which travels in a 0.80 mile u-shaped loop under the Sikorsky Memorial Bridge to the east between Ryders Lane and the Merritt Parkway southbound exit ramp. To facilitate more efficient access along the Route 110 corridor, it is recommended that a tunnel (rendering below) be installed carrying the shared use path under the Merritt Parkway along the east side of Route 110 through the existing bridge abutment of the bridge carrying the Merritt Parkway over Route 110.

For transit amenities, sidewalks are proposed to connect portions of the shared use path with new transit shelters at the three existing GBT transit stops at Ryders Lane, the Sikorsky Gate #1 area and the Sikorsky Gate #2 and Warner Hill intersection. GBT provided guidance that bus stop locations should be located immediately adjacent to through travel lanes and downstream of intersections whenever possible. The rendering of the new transit shelters being installed by Greater Bridgeport Transit is shown.



Courtesy of Susan Rubinsky Marketing Consulting (www.rubinsky.com)

The full version of Concept G is provided in Appendix B. The layout of the shared use path and sidewalk and the location of the transit shelters are shown on the individual concept plans A through F. In addition to the path and new sidewalks, striped crosswalks and protected pedestrian crossing phases at the corridor's reconstructed intersections should be considered to delineate appropriate crossing locations and provide safer crossing of Route 110 to access the alternative mode facilities.

Typical bar style crosswalk markings.

4.1.7 Screened Alternatives

During the development and review of the alternatives developed for this project, several concepts were identified but screened out from further consideration due to constructability issues, failure to meet engineering standards and design criteria, safety concerns, traffic operations concerns and/or low benefit to cost ratios. These alternatives are included as attachments to this memo to provide State and local planners with complete documentation of all concepts that were vetted through this process. The concepts, included in Appendix C and summarized in Table 4-3 of Appendix A, identify the basis of why each of the ideas was screened from further consideration. Further information related to the screening process is provided in the Analysis of Alternatives Technical Memorandum prepared during this Study.

Section 5
Implementation Plan

The implementation plan identifies and prioritizes recommended improvements that can be planned, programmed, and built within the 20 year study horizon. The implementation plan includes the overall project costs, complexity, and benefit. This section of the report seeks to provide the Town of Stratford, CTDOT, and METROCOG a menu of projects with guidance for implementation over time, based on a series of qualitative and quantitative metrics.

5.1 Transportation Improvement Program

The Transportation Improvement Program includes 9 improvement projects that address the roadway network, transit system, and pedestrian and bicycle needs in the study area. Specifically, the Study recommends physical roadway improvements at 6 locations along the corridor and identifies numerous improvements to enhance transit, pedestrian and bicycle access to the roadway system through construction of new and improved facilities for alternative mode travelers. For summary purposes, these alternative transportation mode recommendations are grouped as one combined project for each mode, however the Study recognizes that implementation of the improvements will likely occur as the result of many separate projects as funding from various sources becomes available.

The Transportation Improvement Program classifies projects as small, medium, and large based on project size, complexity, and project cost. The projects are also prioritized as short-term, mid-term, and long-term representing when implementation of the project is anticipated to be necessary. A short-term project prioritization indicates an immediate need for the project to address an existing deficiency or operational concern. Conversely, a project prioritized as long-term indicates a project intended to address an anticipated future issue or need such as operational issues that are expected to occur due to future traffic growth.

5.1.1 Project Categorization

Project types are categorized into small projects, medium projects, and large projects, based on the metrics described in Table 5-1.

TABLE 5-1

Project Type Characteristics

Project Type	Implementation Time	Complexity	Approximate Project Cost
Small	Less than 3 years	Low	Less than $1 million
Medium	Between 3-6 years	Moderate	$1 million - $2 million
Large	More than 6 years	High	More than $2 million

Implementation time refers to the time frame required to initiate a project, conduct the remaining planning and engineering design work required to prepare the project for construction and to initiate constructing the improvement, assuming that funding for all phases of the project is available. A subsequent section of the report identifies possible funding sources that may be available to support the implementation of each project.

Implementation time is not intended to indicate the priority or relative time frame with respect to the completion of this Study, but rather intended to provide planners and decision makers with a measurement of the potential total time to implement the improvement from initiation due to several factors.

The complexity of each project has been established based on the overall effort to plan, design, and construct the improvement. Several metrics were considered in the establishment of each project's relative complexity. Projects are categorized into Low, Moderate, and High complexity based on the qualitative metrics described in Table 5-2.

TABLE 5-2

Summary of Project Complexity Characteristics

Complexity Level	Project Characteristics
Low Complexity	• Little to no additional planning needed, concept planning sufficient to proceed into design • Design effort is limited and typical. • None to minor right of way action • Environmental impacts and permitting requirements are very low • Utility impacts are considered minor or not anticipated
Moderate Complexity	• Additional Planning required to define project • Detailed design effort needed to define construction and impacts • Some right of way impacts anticipated • Environmental impacts and permitting are expected. • Potential for utility impacts and relocations
High Complexity	• Significant planning still required to define project • Detailed design effort following planning is required • Significant right of way actions needed. Private ownership coordination • Major environmental impacts, significant permitting process and agency involvement at all levels of government • Major utility relocations and design efforts to coordinate

Project costs have been estimated following the guidelines published by the Connecticut Department of Transportation and are presented in 2016 dollars. Costs may need to be expanded to account for inflationary pressures on construction costs looking out into the future. The "Preliminary Cost Estimating Guidelines" provide unit costs and percentage based lump sum costs to facilitate the estimation of project costs at the Preliminary Engineering level of project development. The approximate project costs presented in this Study are limited to the construction item costs and exclude costs related to rights of way actions, utility relocations, environmental remediation, and engineering. The estimates include contingency (25%) and incidentals (25%) in the total opinion of probable costs for each project.

5.1.2 Project Prioritization

The priority for each of the recommended improvement projects has been established based on two primary criteria: project need and local interest to implement the recommended improvements. Project need is based on the urgency to mitigate an existing deficiency within the overall transportation system. Projects are deemed to have a higher priority when they address an identified safety deficiency, address accessibility, or mitigate a current mobility or operational issue. The project priority categories are defined at Short-Term, Mid-Term, and Long-Term based on the criteria described in Table 5-3.

TABLE 5-3

Summary of Project Need Priority Metrics

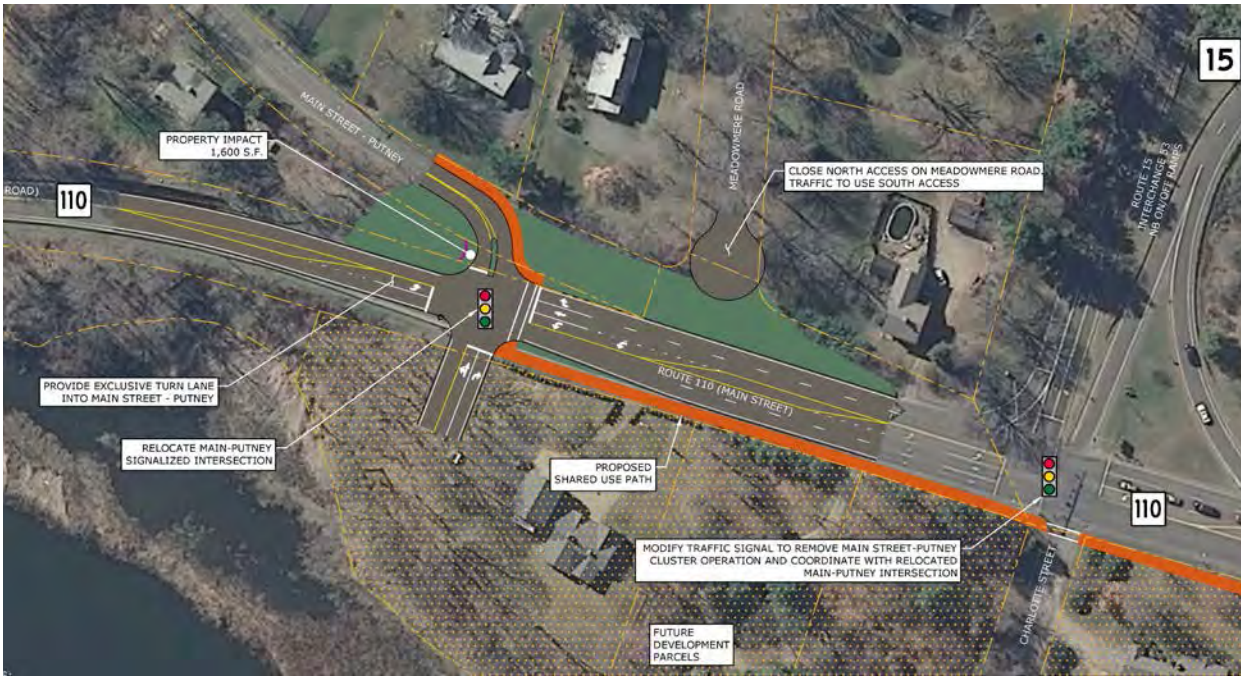
Project Priority	Project Characteristics
Long-Term	• Project does not address an identified safety concern • Project addresses future travel demand and traffic operations • Project may have mobility, accessibility, or multi-modal benefits
Mid-Term	• Project scope provides operational and mobility benefits that are currently an issue, but traffic operations are not poor or failing • Local stakeholders have expressed interest in implementing improvement to enhance transportation system.
Short-Term	• Project addresses an urgent safety issue • Project intended to address existing operational deficiency • Project addressed a deficiency in accessibility that has been identified as a local concern

In addition to the priority assigned to the project based on project need, input from the Town of Stratford and METROCOG was obtained for each of the projects to determine the relative importance of each project from a local and regional planning and policy perspective. The overall priority presented for each of the projects is predominately based on transportation need, however, in cases where the Town or METROCOG has indicated that a project is a higher priority to address local interests, adjustments have been made to factor local input into the prioritization process.

5.1.3 Recommended Projects Summary

The following section outlines each of the proposed improvements recommended by the Study, describing the projects in terms of the scope of the improvements, project type, project priority, estimated project cost, and permits. It should be noted that some priorities described in this report are subjective and founded in the policies and goals of the Town of Stratford and METROCOG and project stakeholders at the time of development. The local and regional priorities should continue to be reviewed and evaluated to determine if changes to the priorities for the improvement plans are needed to remain current with local and state trends, policies, priorities, and conditions with the study area.

A: Route 110 (Main Street / River Road) at Main Street – Putney Intersection Improvements			
Project Goals:	Improve capacity by removing clustered operation with adjacent Merritt Parkway NB Ramp intersection, mitigate safety issues related to existing intersection geometry and accommodate future development along River Road	**Project Type:**	Medium
		Project Complexity:	Moderate
		Project Priority:	Mid-Term
		Project Cost:	$1,425,000
Major Project Elements:	• Realign Main Street – Putney perpendicular with Route 110, 500 feet south of the Merritt Parkway northbound ramps and remove cluster signal operation with Merritt Parkway northbound ramps • Close north access to Meadowmere Road with cul-de-sac • Install northbound left turn lane • Facilitate future development and accommodate a new driveway for parcels along the east side of Route 110 opposite realigned Main Street – Putney • Optimize signal timings throughout Route 110 corridor • Create shared use bicycle/pedestrian path from Main Street - Putney north along the east side of Route 110 to provide connectivity to transit facilities and mobility for bicycle/pedestrian travelers		
Permits:	• Encroachment Permit for development driveway construction • Traffic Control Signal Permit for signal operation revisions • Potential for OSTA approval depending on size of development and property ownership • Municipal Coastal Consistency Review • Negotiation with private property owner on potential partial taking		



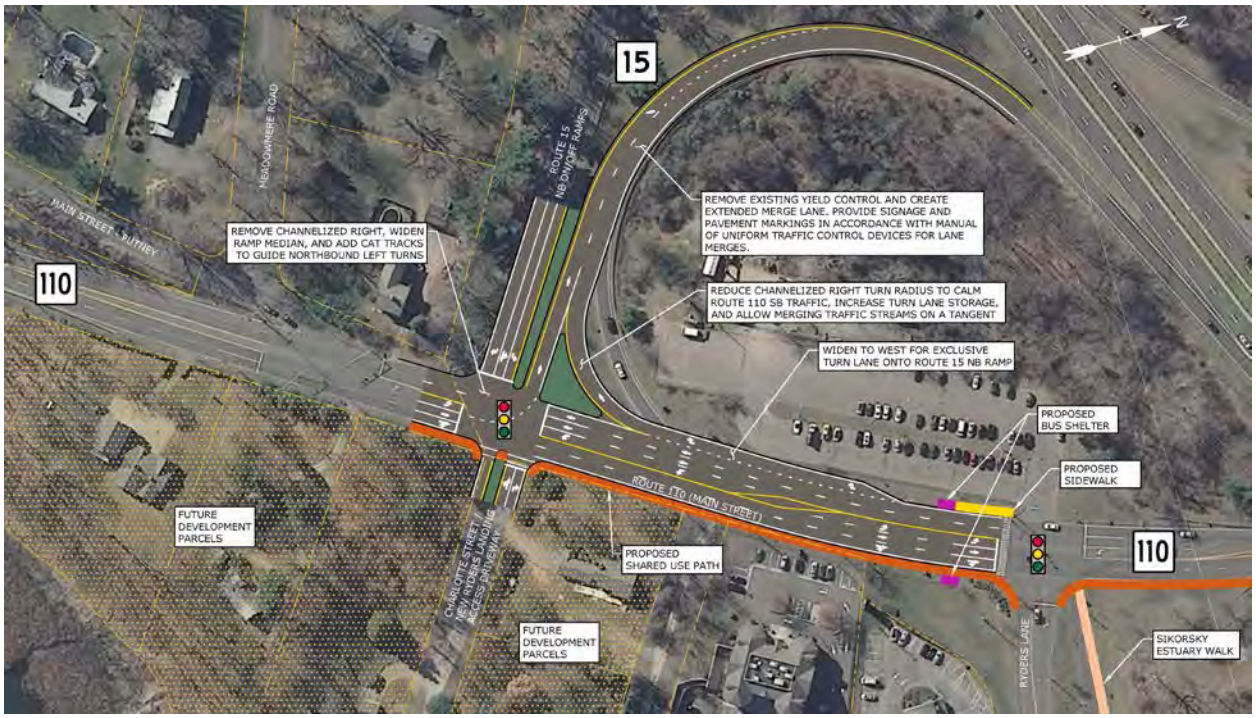
B: Route 110 (Main Street) at Route 15 Northbound Ramps Intersection Improvements			
Project Goals:	Improve traffic operations by adding additional capacity on Route 15 ramp from Route 110 and accommodate future development	**Project Type:**	Medium
		Project Complexity:	Moderate
		Project Priority:	Short-Term
		Project Cost:	$1,475,000

Major Project Elements:

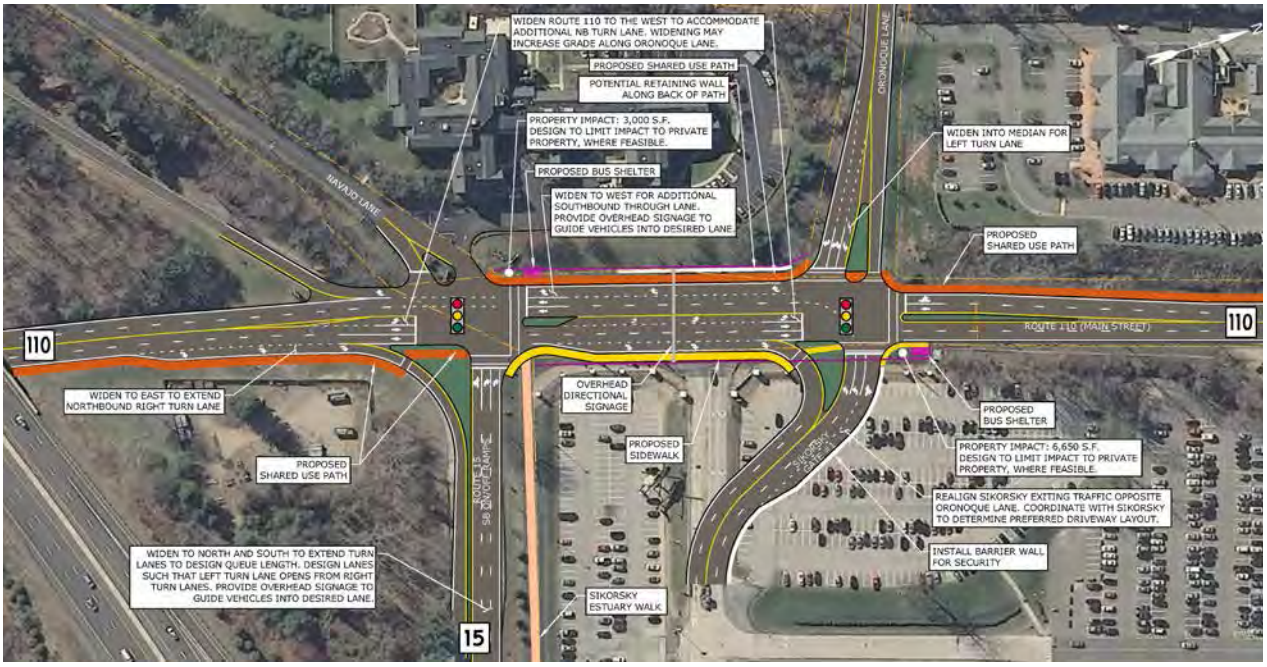
- Remove yield control on Merritt Parkway ramp and create extended merge on ramp
- Reduce radius on Route 110 southbound Merritt Parkway ramp approach to increase storage, calm traffic speed, and facilitate merging on the tangent portion of the ramp
- Widen to west for an exclusive southbound right turn lane onto Merritt Parkway northbound ramp
- Incorporate future development with new driveway for parcels east of Route 110 opposite Merritt Parkway northbound exit ramp
- Remove channelizing island for Merritt Parkway exit and install 'cat tracks' to guide northbound left turns onto Merritt Parkway On-Ramp
- Create shared use bicycle/pedestrian path and sidewalks to provide connectivity to transit facilities and mobility for bicycle/pedestrian travelers

Permits:

- Encroachment Permit for development driveway construction
- New OSTA Certificate or modification for Ryders Landing Certificate (OSTA No. 138-8004-03) depending on development size, configuration, and property ownership
- Municipal Coastal Consistency Review

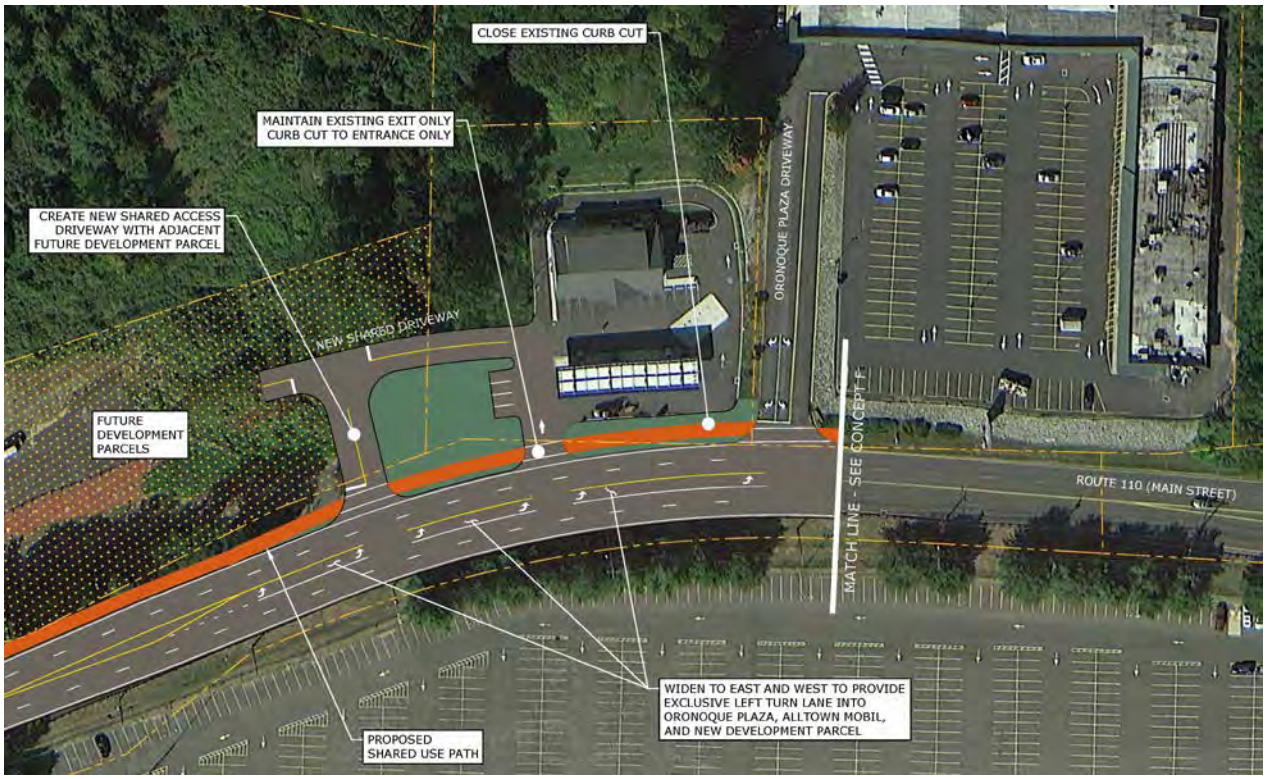


C: Sikorsky Gate #1 Intersection Realignment Improvements			
Project Goals:	Improve traffic operations by realigning Sikorsky Gate #1 across from Oronoque Lane, eliminate one of the three existing, closely spaced intersections, and widen Route 110 for additional travel lanes in both directions along Route 110	**Project Type:**	Large
		Project Complexity:	High
		Project Priority:	Short-Term
		Project Cost:	$6,000,000[1]
Major Project Elements:	• Relocate Sikorsky Gate #1 opposite Oronoque Lane and remove clustered signal operation • Widen Route 110 to west for additional northbound left turn lane and southbound right turn lane south of Oronoque Lane • Install additional left turn lane on Oronoque Lane • Extend the Merritt Parkway southbound exit ramp lane storage lengths to accommodate the design queuing • Create shared use bicycle/pedestrian path and sidewalks to provide connectivity to transit facilities and mobility for bicycle/pedestrian travelers		
Permits:	• Encroachment Permit for Sikorsky Driveway relocation • Modification of OSTA Certificate for Sikorsky Aircraft (OSTA No. 138-8503-01) for Modified Access and Parking Layout		



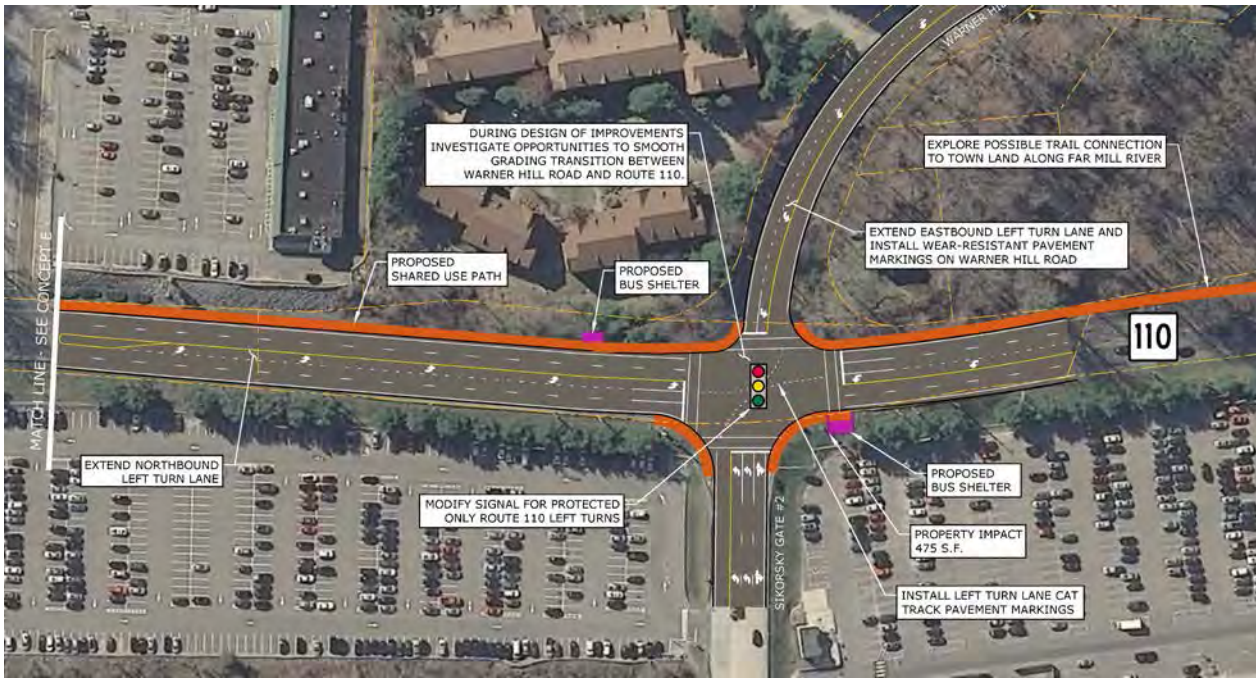
1. Project cost includes cost of improvements within Route 110 right of way and construction of realigned Sikorsky Gate #1 driveway. Cost for additional, potentially significant internal modifications to the Sikorsky site to facilitate realignment of the driveway. Further review of impacts and alternatives during the detailed design phase are required to determine accurate price.

E: Alltown Mobil / Oronoque Plaza Area Improvements			
Project Goals:	Address perceived safety issue with proximity of existing driveway locations while accommodating future development on adjacent parcel	**Project Type:**	Small
		Project Complexity:	Low
		Project Priority:	Long-Term
		Project Cost:	$415,000[1]
Major Project Elements:	• Close existing northern entrance only driveway to Alltown Mobil due to proximity to Oronoque Plaza driveway • Install new shared driveway with adjacent future development parcel further south on Route 110 • Create shared use bicycle/pedestrian path		
Permits:	• Encroachment Permit for Development Driveway Construction • New OSTA Certificate or modified Lord Chamberlain Certificate (OSTA No. 138-9806-01) depending on development size and property ownership		



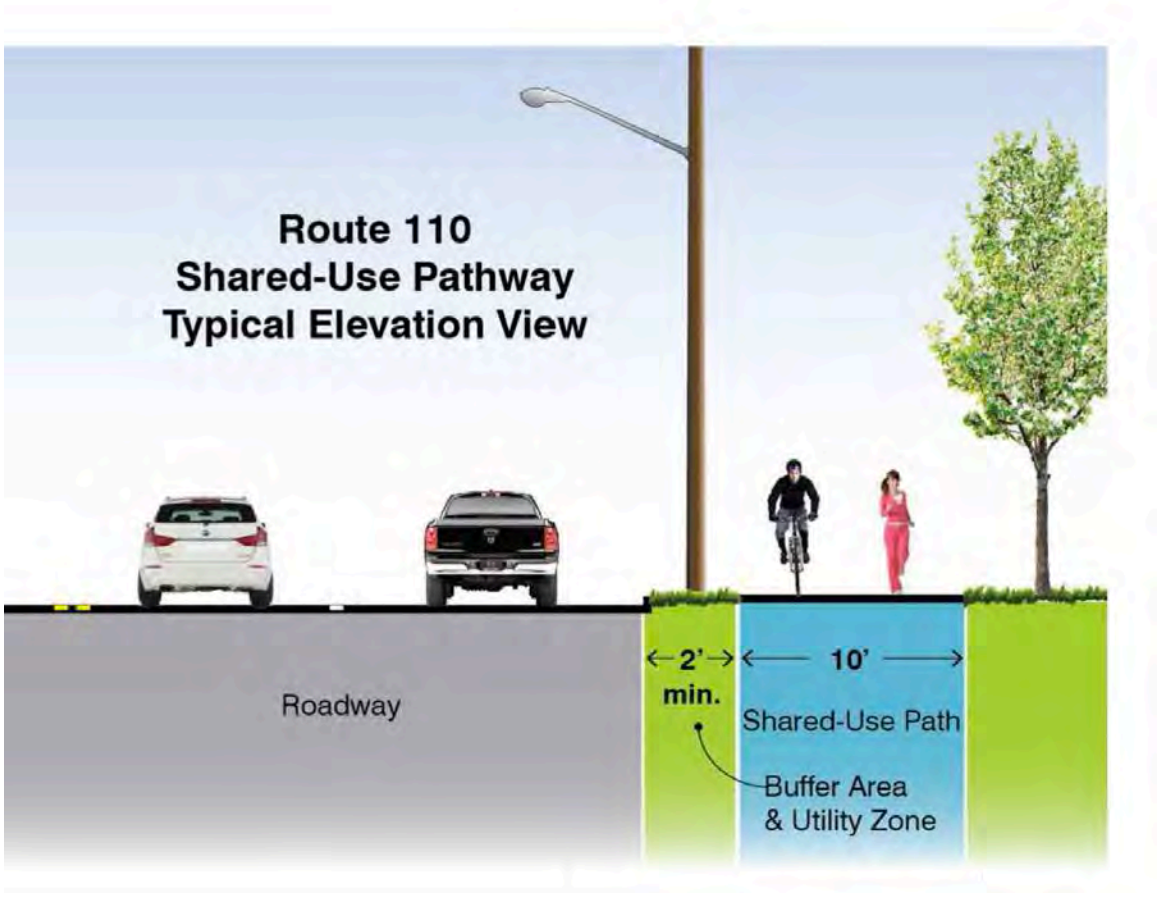
1. Project cost includes cost of widening for the northbound left turn lane installation. Depending on need for improvements and confirmation of safety issue, additional lane cost may be funded by State, Municipal, and/or private resources. Cost for revisions to / installation of development driveways is expected to be funded privately during development of sites and therefore not included in project cost.

F: Route 110 (Main Street) at Sikorsky Gate #2 and Warner Hill Road Intersection Improvements			
Project Goals:	Address existing collision issues for left turning traffic and traffic traveling down steep grade on Warner Hill Road	**Project Type:**	Small
		Project Complexity:	Low
		Project Priority:	Short-Term
		Project Cost:	$400,000[1]
Major Project Elements:	• Modify signal phasing to allow protected northbound and southbound left turns only • Install 'cat track' pavement markings for northbound and southbound left turn movements to help define travel paths through the intersection • Lengthen northbound left turn lane to accommodate additional vehicle storage • Install wear resistant pavement markings on Warner Hill Road • Create multi-use bicycle/pedestrian path along corridor with sidewalks connecting to new bus shelters		
Permits:	• Encroachment Permits would be required for work in the CTDOT Right-of Way • Municipal Coastal Consistency Review • Negotiation with private property owner on potential taking		



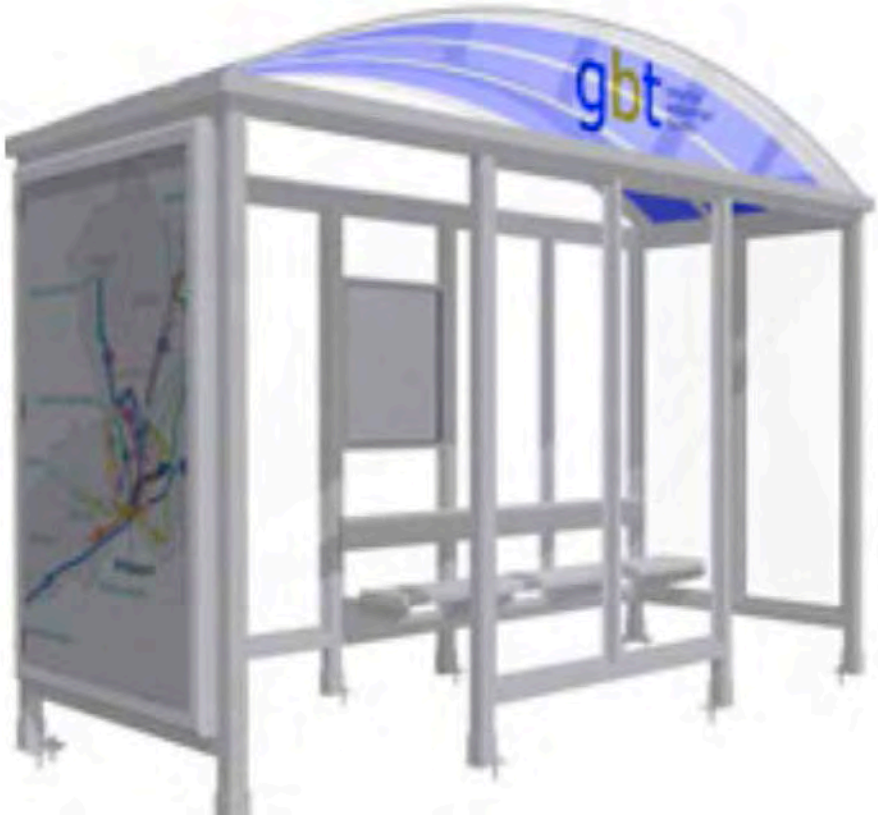
1. Project cost relates to widening for left turn lane extension. Revisions to the signal phasing and pavement marking installation can be completed during regular signal/roadway maintenance.

G1: Pedestrian and Bike Accommodation Improvements (Shared Use Path)			
Project Goals:	Improve accommodations for pedestrians and bicyclists along Route 110 corridor	**Project Type:**	Medium
		Project Complexity:	Moderate
		Project Priority:	Mid-Term
		Project Cost (Path):	$1,470,000
Major Project Elements:	• Install a Shared Use Path along Route 110 for Pedestrian and Bicyclist Access • Install sidewalks in select areas of the corridor to provide connectivity between the shared path and transit facilities • Provide actuated pedestrian crossing facilities at signalized intersections		
Permits:	• Encroachment Permits would be required for work in the CTDOT Right-of Way • Floodplain Management Certification Program for Municipal Projects permit for areas of the path that encroach on the 100 year floodplain		



G2: Pedestrian and Bike Accommodation Improvements (Tunnel)			
Project Goals:	Improve accommodations for pedestrians and bicyclists between Sikorsky area and Ryders Landing area	**Project Type:**	Large
		Project Complexity:	High
		Project Priority:	Long-Term
		Project Cost:	$3,250,000
Major Project Elements:	• Install tunnel on the east abutment of the Merritt Parkway overpass to accommodate new shared path adjacent to Route 110 and provide a shorter pedestrian and bicycle route between Sikorsky area and Ryders Landing area		
Permits:	• Merritt Parkway Commission would have oversight related to alterations to the bridge structure.		

G3: Transit Accommodation Improvements			
Project Goals:	Improve accommodations transit riders along Route 110 corridor	**Project Type:**	Small
		Project Complexity:	Low
		Project Priority:	Short-Term
		Project Cost:	None[1]
Major Project Elements:	• Install Greater Bridgeport Transit Shelters at Ryders Lane, Sikorsky Gate #1 and Warner Hill Road/Sikorsky Gate #2 to provide defined stops		
Permits:	Encroachment Permit for installation		



1. Funding for transit shelters available from Greater Bridgeport Transit.

5.1.4 Implementation Plan Summary

Table 5-4 summarizes the implementation plan recommendations on a project-level basis. A review of the implementation plan indicates that there are 5 projects that have been identified as Short-Term priorities, 2 projects that that have been identified as Mid-Term priorities, and 2 projects that have been identified as Long-Term priorities. The projects prioritized as Short-Term indicate that funding sources could be sought in the Short-Term to address the existing concerns.

Table 5-4

Summary of Projects in Implementation Plan

	Project Description	Project Priority	Project Complexity	Project Cost
C	Sikorsky Gate #1 Intersection Realignment Improvements	Short-Term[1]	High	$6,000,000
F	Route 110 (Main Street) at Sikorsky Gate #2 and Warner Hill Road Intersection Improvements	Short-Term	Low	$400,000[2]
B	Route 110 (Main Street) at Route 15 Northbound Ramps Intersection Improvements	Short-Term	Moderate	$1,475,000
G3	Transit Accommodation Improvements	Short-Term	Low	None[3]
G1	Pedestrian and Bike Accommodations Improvements (Shared Use Path)	Mid-Term[4]	Moderate	$1,470,000
A	Route 110 (Main Street / River Road) at Main Street – Putney Intersection Improvements	Mid-Term	Moderate	$1,425,000
G2	Pedestrian and Bike Accommodations Improvements (Merritt Parkway Overpass Tunnel)	Long-Term	High	$3,250,000
E	Alltown Mobil / Oronoque Plaza Area Improvements	Long-Term	Low	$415,000[5]

1. Feasibility of completing realigned Sikorsky Driveway concurrent with Route 110 widening should be considered; otherwise realignment should follow widening project in the mid to long term time frame.
2. Project cost includes widening for left turn lane extension. Revisions to the signal phasing and pavement marking installation can be completed during regular signal/roadway maintenance.
3. Funding for transit shelters available from Greater Bridgeport Transit.
4. Priority set at mid-term for completing corridor-wide shared use path; Portions of path shown within limits of projects with short-term priority should be completed during the project and have been included in each project costs.
5. Project cost includes widening for the northbound left turn lane installation. Depending on need for improvements and confirmation of safety issue, additional lane cost may be funded by State, Municipal, and/or private resources. Cost for revisions to / installation of development driveways is expected to be funded privately during development of sites and therefore not included in project cost.

As noted in Table 5-4, the feasibility of realigning Sikorsky Gate #1 (Concept C) should be considered concurrently with the construction of widening along Route 110 shown in both Concepts C and D. Performing construction concurrently will allow for lower overall construction costs and maximize the benefits of the improvement to overall corridor traffic operations.

The proposed shared use path should be considered for construction during the intersection spot improvements for all short-term projects with the ultimate goal of completing the shared use path along the corridor, with the exception of the tunnel, in a mid-term time frame as multi-modal transportation improvement funding becomes available. The improvements north of Sikorsky Gate #1 area do not require significant public investment or significant physical improvements and the installation of the shared use path along this segment should be considered as part of one enhancement project. The tunnel solution is a complex project with high costs and impacts to the existing Merritt Parkway bridge and is considered a long-term improvement.

Two of the projects identified can be completed in a short time frame and with minimal cost. The modification to the signal operations and the installation of the pavement markings at the Route 110 and Sikorsky Gate #2 and Warner Hill Road intersection can be designed and installed by State/Municipal forces as part of routine traffic signal and pavement marking maintenance. Given the potential safety improvements associated with this project, funding should be identified to implement this low-cost low-complexity solution. The second easily implementable project is the installation of bus shelters at key transit stops along the corridor. Per meetings with Greater Bridgeport Transit, funding is available for these new shelters and should be considered as soon as feasible. The design and location of these shelters should coordinate with the proposed shared use path and sidewalk installations such that they will not have to be relocated during the intersection spot improvement projects.

5.2 Project Implementation

The transition from project planning to implementation is the critical step forward in the project development process. Utilizing the ideas and plans developed under this Study, and with the help from METROCOG and support from CTDOT, the Town of Stratford's responsibility lies in the identification of projects for implementation to address the needs and future concerns in the study area. Once a project has been identified by the Town, the actual implementation will follow a well-defined process. The most critical hurdle for the projects is identification of a funding source to support the engineering, rights of way acquisition, utility modifications, and ultimately construction of the improvements. The Town, working independently or with METROCOG and/or CTDOT will determine the purpose and need of a project and develop a scope for the work. Utilizing the concept plans and costs defined in this Study, funding through an appropriate funding vehicle can be sought.

5.2.1 Project Initiation and Funding

Generally speaking, it is expected that the majority of the recommendations and improvements identified in this Study will be publically funded through State and/or Federal Transportation Funding Programs as provided for in the Federal Transportation Legislation, through State funding made available in the State of Connecticut transportation budget, or through the State Bond Commission. However, there are other improvements that could be constructed by private entities as mitigation for proposed development in the study area. The Town should rely on the recommendations of this

Study to ensure that local regulatory approvals consider the recommendations of this Study when determining the appropriate level of mitigation to be included as a condition of approval of new development.

There are many current funding vehicles that are available to the Town, Region, and State to support the recommendations presented in the Study. Current funding programs include:

- Congestion Mitigation and Air Quality Improvement Program (CMAQ)
- Local Capital Improvement Program (LoCIP)
- Local Transportation Capital Improvement Program (LoTCIP)
- National Highway Performance Program (NHPP)
- National Safety Improvement Program (HSIP)
- Recreational Trails Program
- Special Tax Obligation Bonds
- Surface Transportation Program (STP)
- Transportation Alternatives Program (TAP)

It is worth noting that with any program reliant on public funding, either by the Federal Government or State of Connecticut, that priorities may change in the future along with available funding vehicles for transportation system improvements. In addition, there are several large construction projects currently underway in the State of Connecticut that have constrained transportation spending looking forward as available funds are channeled to complete these project. The State of Connecticut Department of Transportation published the Transportation Infrastructure Capital Plan: 2015 – 2019 describing the state of available funds and programmed spend over the next four years. However, the current fiscal constraints should not limit the identification and pursuit of projects and funding for the priority projects identified by the Study, so that as funding becomes available, projects are ready.

5.2.2 Design, Permitting and Construction

5.2.2.1 Engineering Design

Following the initiation of a project and identification of a funding source, the remaining steps to implement an improvement will involve design and construction. Based on the complexity of a project, an initial Preliminary Engineering phase may be required to conduct a more detailed engineering study and refine the concept plans and project scope. A preliminary engineering study can help establish the potential impacts to environmental and natural resources, identify potential property and utility impacts, and help refine the expected costs in current dollars, rather than forecasting based on estimates reported in this Study, which are provided in current 2016 dollars.

Once Preliminary Engineering is complete and the decision is made to move forward with the project, Final Design will take place to add detail to the plan, conduct a right of way acquisition process, address utility conflicts and possible relocations, and develop construction documentation to facilitate bidding and construction of the improvements. Generally, projects that are identified as having a low level of complexity can be

designed within 12-18 months from initiation of the project by the Town. As complexity grows, so does the timeframe required to design improvements, with design phases potentially lasting three years or more.

5.2.2.2 Low Impact Design Options

This section provides an overview of landscaping and Low Impact Development (LID) techniques that can be considered for incorporation into the design of the proposed Route 110 concepts. Integrating LIDs will reduce the strain on the existing drainage system with the increased impervious surface area associated with the improvements. The LID options presented include the use of pervious pavements and bioswales. Sample landscaping options are also provided for use within the medians.

Bioswales

Bioswales are vegetated channels that provide treatment and retention as they move stormwater from one place to another. Vegetated swales slow, infiltrate, and filter stormwater flows. Bioswales are typically used as parking lot islands, in medians, as roadside swales, or as landscape buffers. Bioswales can offer the following benefits:

- Treat stormwater using vegetation, soil, and microbes
- Reduce the total volume of stormwater runoff
- Slow the velocity of runoff and reduce the peak discharge
- Increase infiltration and groundwater recharge
- Can be an aesthetic part of the landscape and increase biodiversity

Bioswales should be considered in areas with well drained soils. Areas with poorly drained sites will require an underdrain to remove overflow stormwater. Compacted soils, short runoff contact time, large storm events, and steep slopes reduce the effectiveness of bioswales.

Bioswales are inexpensive relative to traditional curb and gutter treatment or underground stormwater systems. Maintenance (seasonal trimming and removal of debris) is required more often, but is much less expensive than that of traditional curb and gutter system maintenance. Installation cost per square foot varies depending on drainage requirements and density of planting. Typical costs range from $5 to $10 per square foot.

Bioswales should be planted with a mix of close growing vegetation that is water and salt tolerant. Plants should be selected for their nutrient uptake ability and appropriateness for the site. The use of native plants is recommended. Figures 5-1 and 5-2 in Appendix A contain typical bioswale plant schedules, cross-sections and construction details.

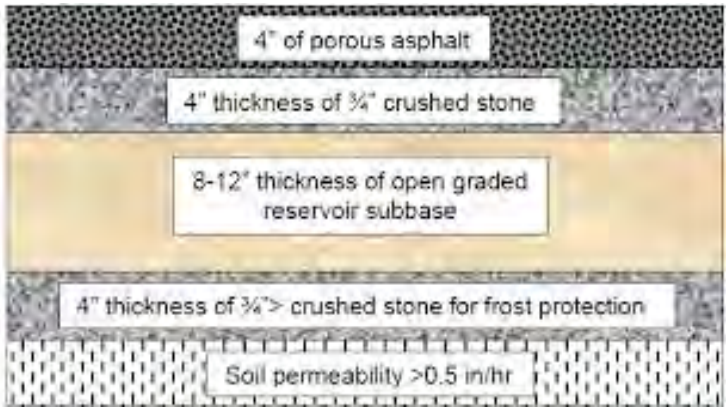
Samples of Bioswales

Pervious Asphalt

Pervious (or porous) asphalt is a mix that is designed to allow for onsite stormwater infiltration. It has been shown to reduce slipping hazards by absorbing water from the surface in cold climates. It can be installed with the same equipment as traditional asphalt and is designed to have an equal lifespan. Installation involves less labor than is required with pervious concrete. Typical uses of this treatment include; parking lots, driveways, walkways.

Plowing and poor drainage can lessen the life span. Tight parking lots which cause many turning movements can cause spalling. This product is also prone to clogging, leaves and sand reduce the infiltration rates.

Pervious asphalt has been used in multiple locations at the University of Connecticut Storrs Campus. The product has held up well in these locations and the university is in the process of purchasing a maintenance vacuum.



Typical Pervious Pavement Section (Source: Tompkins County Soil and Water Conservation Stormwater Program)

Installation costs approximately $5 a square foot. Required maintenance includes twice yearly truck vacuuming and special snowplow blades designed to not damage the surface. The implementation of this type of LID measure may be appropriate for the shared use path, but is not considered a feasible solution for roadway pavement.

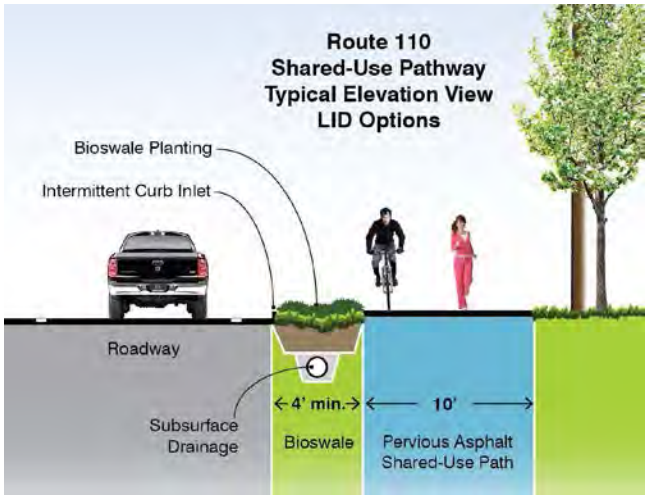
Landscaped Median

Landscaped medians can be comprised of a combination of plantings, sod, and hardscape elements. Given sight line and visibility concerns, small shrubs, perennials, grasses, and bulbs are recommended. Landscaped areas cost approximately $10 per square foot, sodded areas cost approximately $2 per square foot and hardscaped areas cost approximately $10 to $15 per square foot.

Plants used in landscaped medians should be drought resistant, low maintenance, and salt tolerant species. The use of native plants whenever possible is recommended. Figure 5-3 in Appendix A includes typical planting schemes of landscaped medians with a list of suitable species.

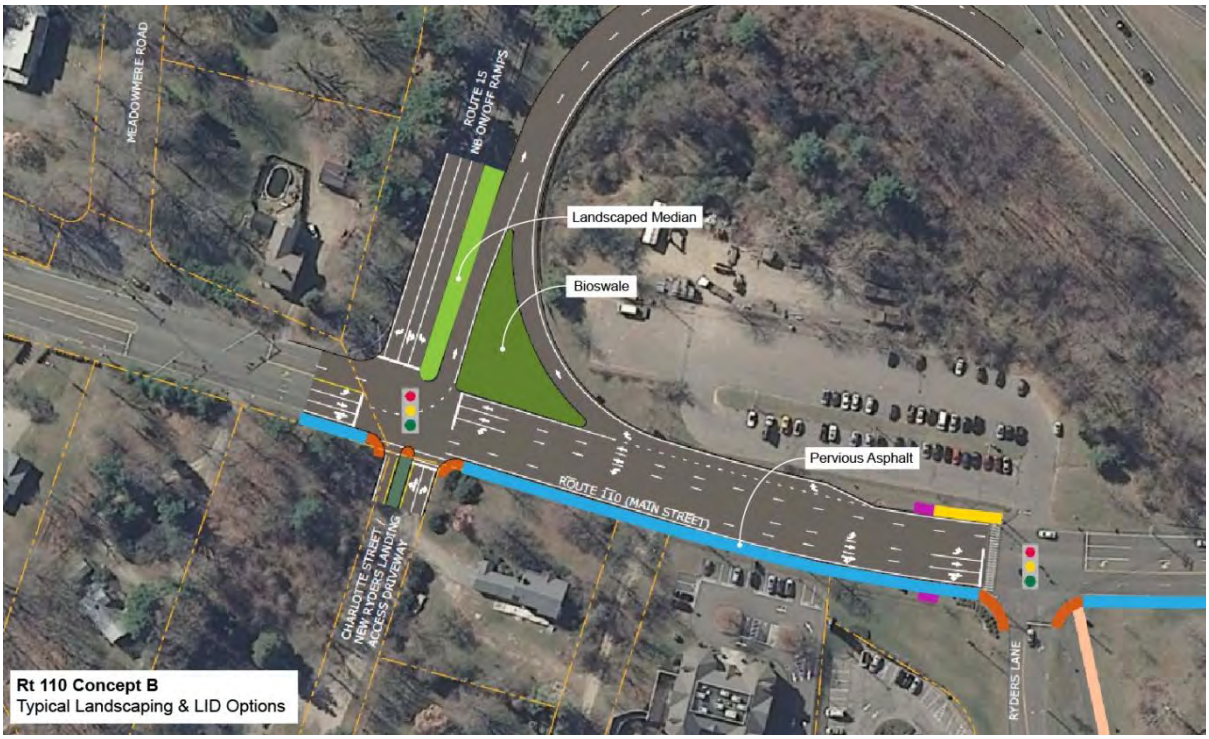
Application to Route 110

Potential LID measures should be considered and incorporated into the improvement designs to reduce the strain of the additional impervious area on the existing stormwater system. Applying the LID options to the proposed Route 110 improvements, the location of a bioswale between the shared use pathway and roadway would assist with capturing stormwater runoff as well as providing separation between pathway users and vehicles. Concept plans demonstrating opportunities for LID treatments are presented on the following pages.

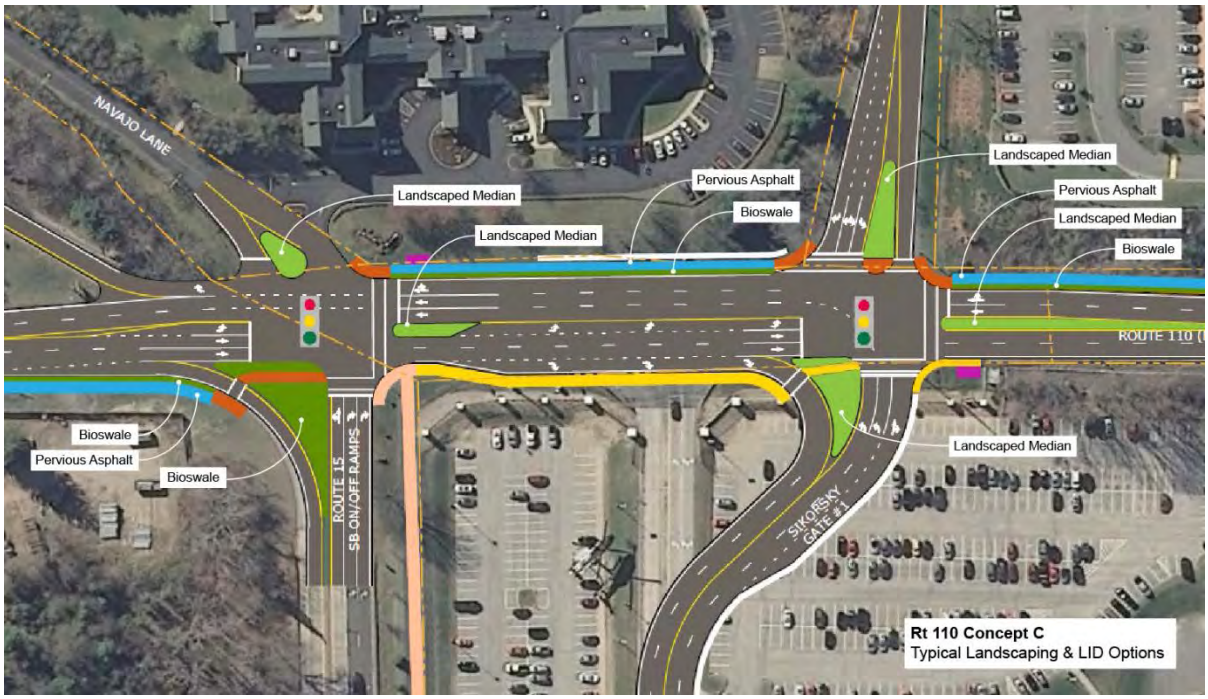


Concept A: Pervious asphalt could be used for the pathway in this area. (Curb ramps would be constructed of conventional concrete)

Concept B: The large median island at the Rt. 15 northbound on ramp could be designed as a bioswale and the splitter island between on and off ramps could accommodate landscaping. The pathway in this area could be constructed of pervious asphalt.

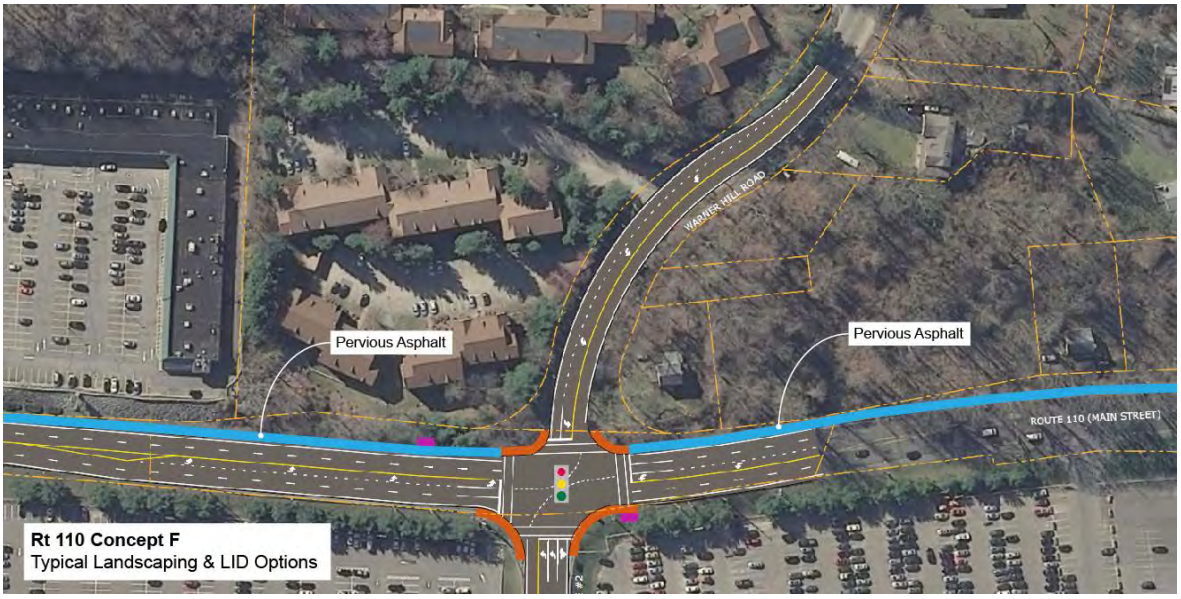


Concept C: A combination of LID measures such as pervious asphalt, bioswales, and landscaped median islands could be used in this area.



Concept E: LID opportunities are limited to the use of pervious asphalt for the pathway in this area.

Concept F: Similar to Concept E, LID opportunities are limited to the use of pervious asphalt for the pathway in this area. Curb ramps and segment of sidewalk and pathway at the intersection would be constructed of conventional concrete.



5.2.2.3 Permitting

As noted in Section 2.10 of this report, there are few regulated natural resources within the project area. Those of note consists of 1) the Connecticut Coastal Boundary, and 2) the 100-year floodplain south of Warner Hill Road.

Coastal Consistency Review

The Connecticut Coastal Boundary, associated with the tidally-influenced Housatonic River, overlays the following study intersections:

- Route 110 & Main Street- Putney and River Road (Concept A)
- Merritt Parkway NB Ramps and Charlotte Street (Concept B)
- Ryders Lane (Concept B)
- Warner Hill Road and Sikorsky Gate #2 (Concept F)

Because the project is located within the Connecticut Coastal Boundary, it triggers the need for a coastal consistency review through the Town of Stratford (Application for Review of Coastal Site Plans). The municipal Planning & Zoning Commissions are responsible for approvals.

Floodplain

None of the roadway study intersections are within the 100-year floodplain. However, the proposed shared use path along the west side of Route 110 from Warner Hill Road, running southerly towards Oronoque Lane, does encroach on the 100-year floodplain. The floodplain is depicted on the "Flood Zones" map in Appendix A. The Town of Stratford would be required to obtain a permit through the Flood Management

Certification Program for Municipal Projects Funded by the Connecticut Department of Transportation.

Stormwater

The total land area of disturbance for this project (including soil disturbance, clearing, grading, and excavation) is approximately 3.0 acres. If the projects are bid as a whole, or in any combination of concepts that equals or exceeds 1.0 acre of impact, a CTDEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities will be required. If the total project impact bid at one time is less than 1.0 acres, an Application for Review of Erosion and Sedimentation Control Plan must be filed with the Town of Stratford, but a CTDEEP permit would not be required.

Inland Wetland & Watercourse Permit

Although initial natural resource screening uncovered no inland wetlands within the project area, it is important to note that the site has not been field investigated for wetlands. As the project advances into design, the site will need to be visited by a qualified wetlands/soils scientist to confirm this preliminary assessment.

CTDOT Improvement Construction & Development Permitting

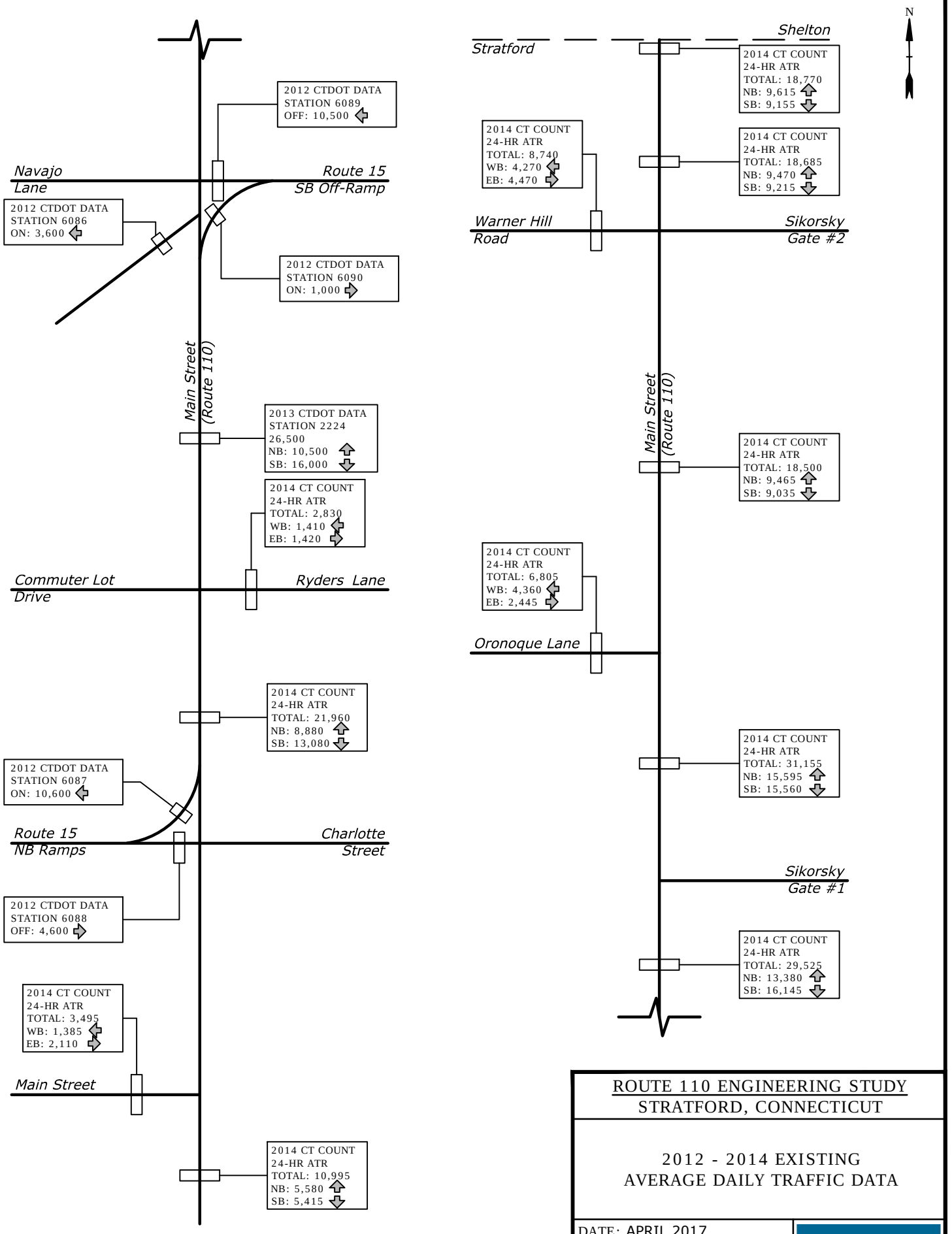
In addition to the permitting for natural resources, CTDOT will require permits for developments and construction of improvements within the State Right of Way for Municipal roadway improvements and driveways to developments. The permits include encroachment permits and signal revision permits for the Municipal roadway and development driveway improvements and Office of State Traffic Administration (OSTA) permits for large developments that exceed the OSTA size limits. The permits required for the recommended improvement plan are summarized in the improvement matrices in Section 5.1.3. Depending on the scope of the work and the entity, the Municipality or a private developer, performing the design, funding for the permits may come from public and/or private resources.

5.2.2.4 Construction

Following the completion of the design phase, the project will begin the construction phase. The steps involved in a publically funded project include advertisement for bids to contractors, collecting bids on the work and awarding the contract, and finally conducting the construction to build the improvement. Utility relocations typically take place during construction, but in some instances a utility company may relocate facilities in advance of a project taking place once a utility agreement is in place. Generally, smaller projects are completed within one construction season, March through November. Larger projects can span several construction seasons depending on the complexity of the work, the construction staging and phasing needed to facilitate the maintenance and protection of traffic operations during construction, and possibly the availability of funding. Projects identified as having Moderate Complexity can be expected to take up to two construction seasons, and highly complex projects could take more than two construction seasons to build.

Tighe&Bond

APPENDIX A



DATA SOURCES:
1. 2014 CT COUNT DATA
2. 2012/2014 CTDOT COUNT DATA

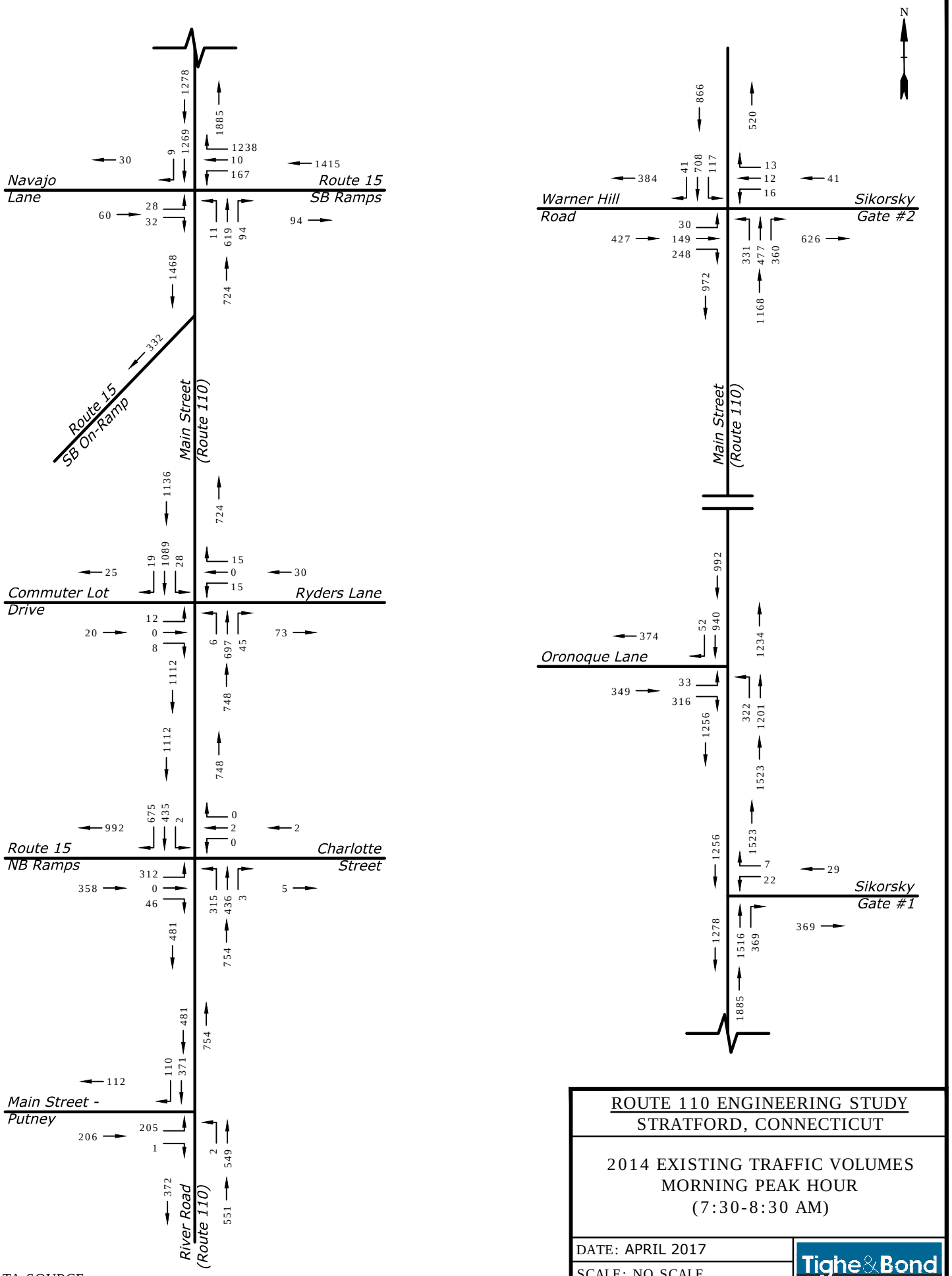
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

2012 - 2014 EXISTING
AVERAGE DAILY TRAFFIC DATA

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 2-4

Tighe&Bond

07/21/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

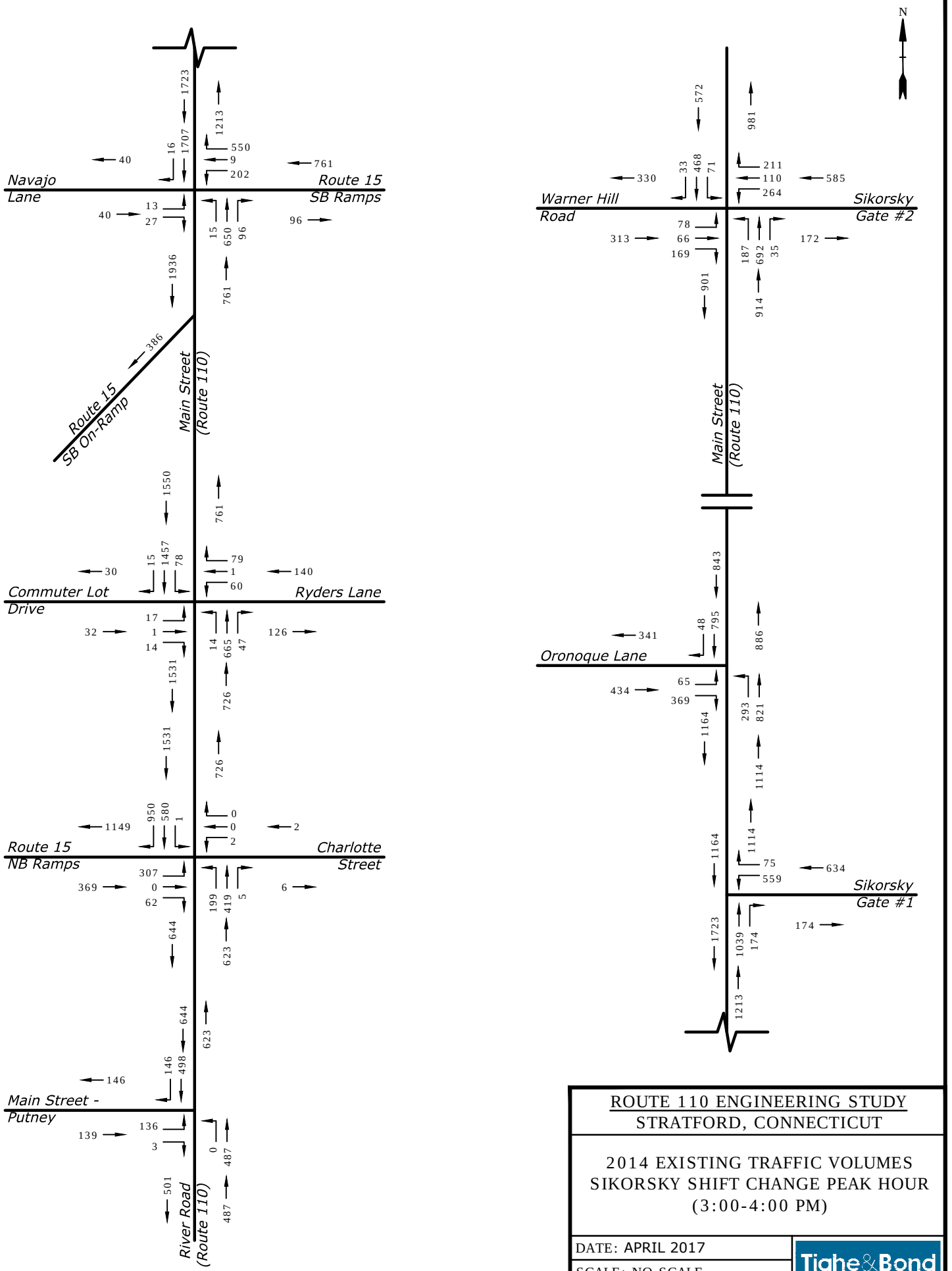
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

2014 EXISTING TRAFFIC VOLUMES
MORNING PEAK HOUR
(7:30-8:30 AM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 2-5

Tighe&Bond

07/21/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

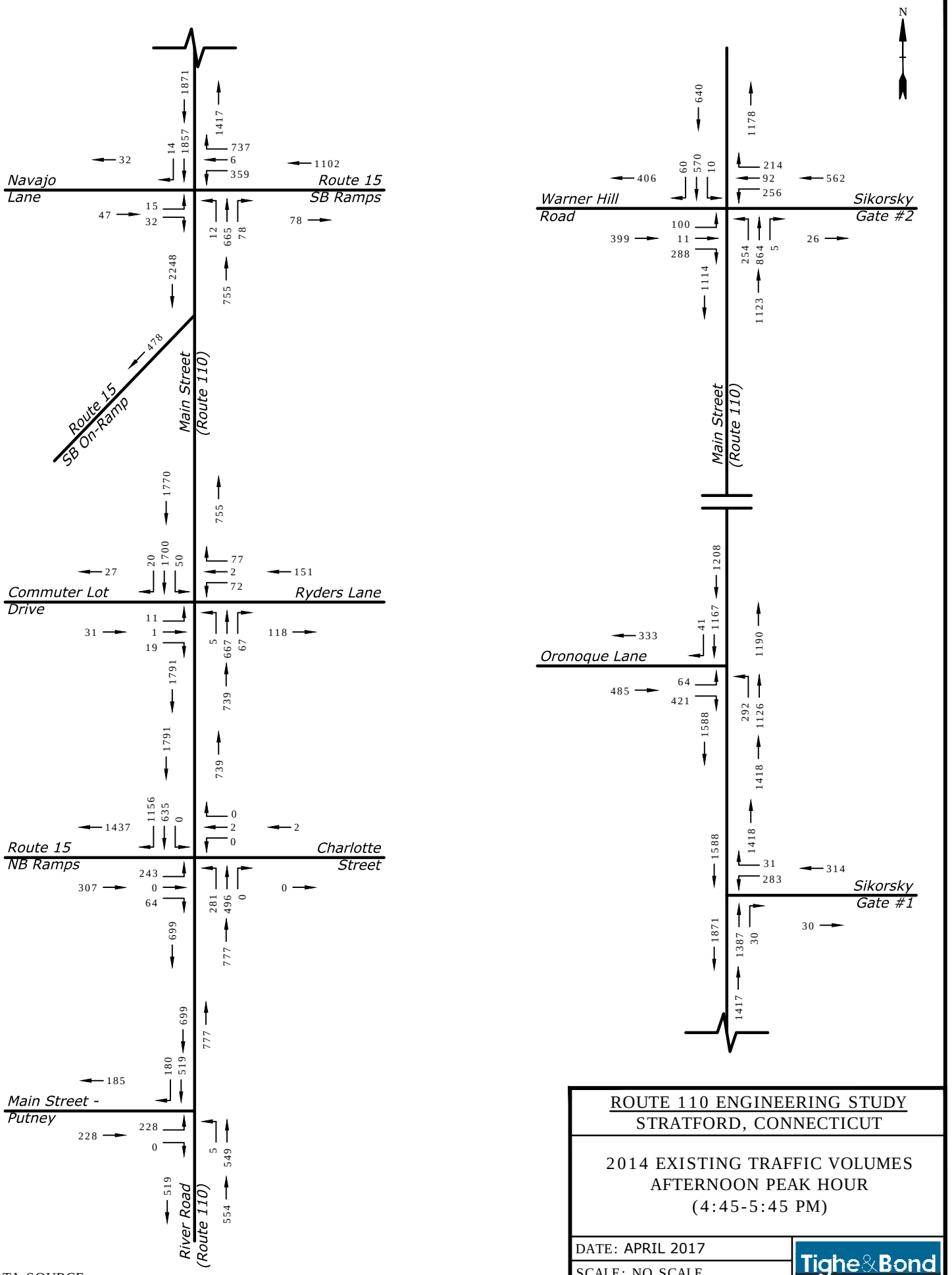
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

2014 EXISTING TRAFFIC VOLUMES
SIKORSKY SHIFT CHANGE PEAK HOUR
(3:00-4:00 PM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 2-6

Tighe&Bond

07/21/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

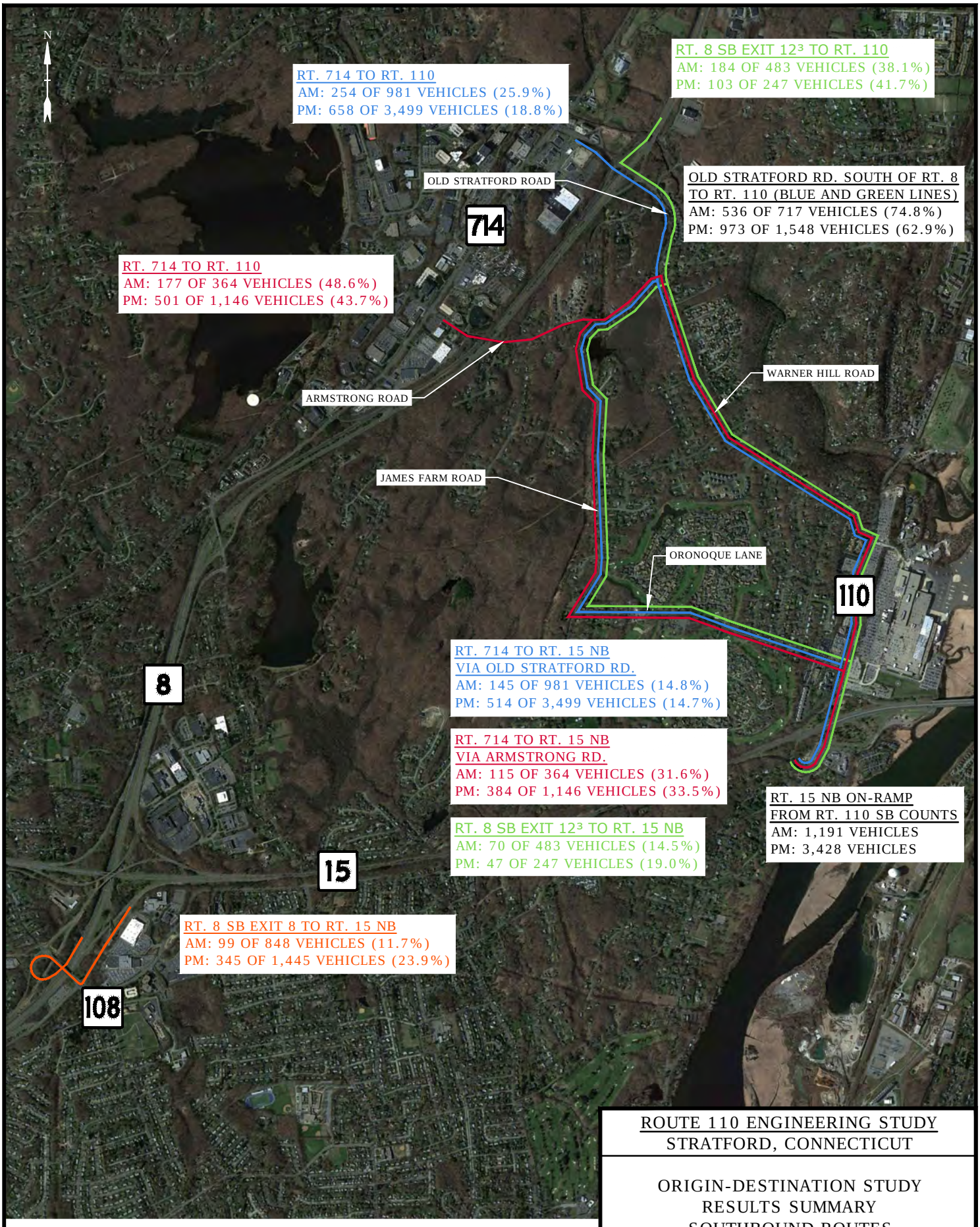
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

2014 EXISTING TRAFFIC VOLUMES
AFTERNOON PEAK HOUR
(4:45-5:45 PM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 2-7

Tighe&Bond

07/21/2015



NOTES:
1. MORNING PEAK PERIOD COUNTED BETWEEN 7:00 AND 9:00 AM.
2. AFTERNOON PEAK PERIOD COUNTED BETWEEN 3:00 AND 6:00 PM.
3. OBSERVATIONS AT ROUTE 8 SOUTHBOUND EXIT 12 INCLUDES LEFT TURNING TRAFFIC ONLY.

ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

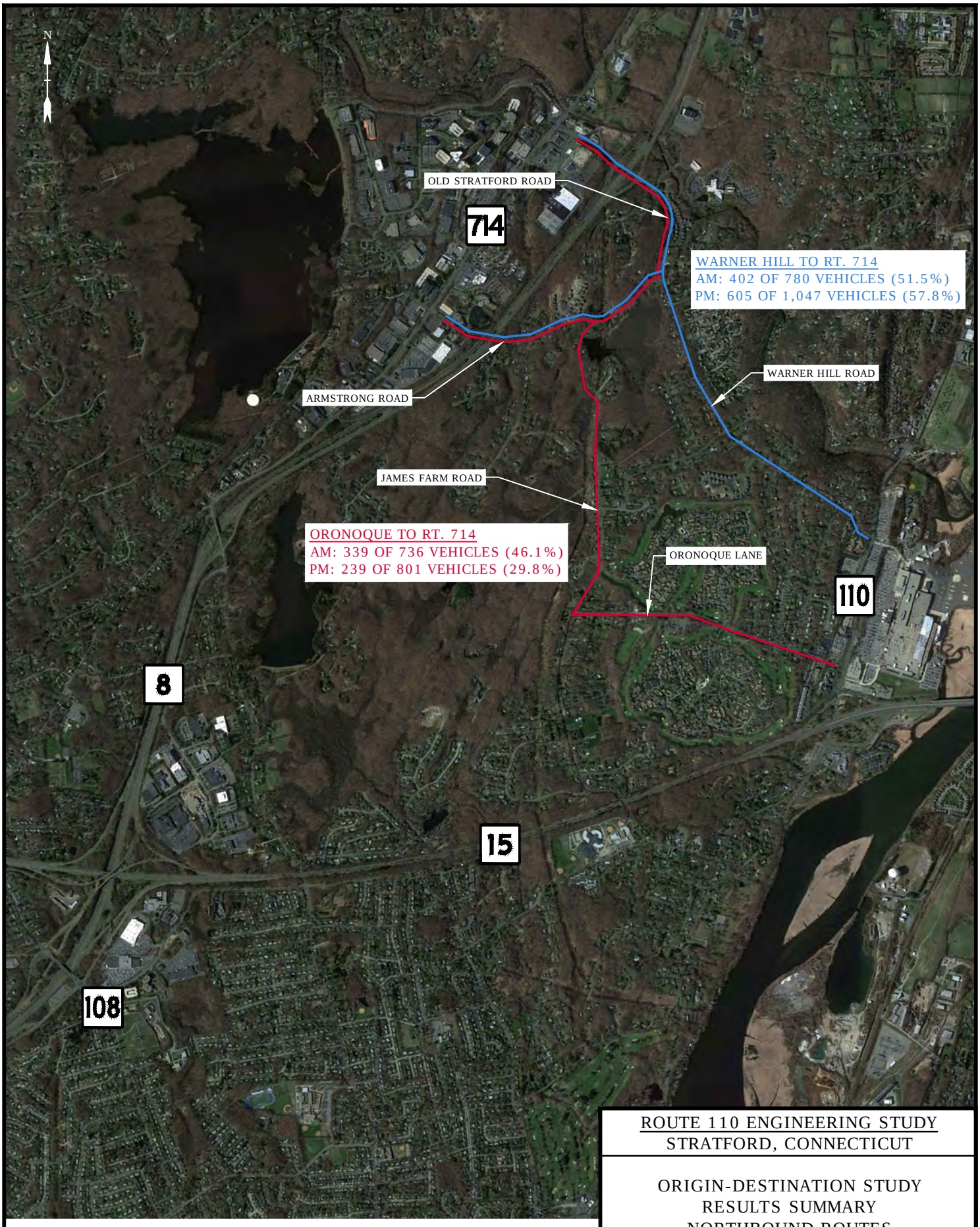
ORIGIN-DESTINATION STUDY RESULTS SUMMARY SOUTHBOUND ROUTES

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 2-8

Tighe&Bond

12/15/2016

Tighe & Bond, Inc. \\SRV\Projects\G\G0648 GBRC-Route 110 Study\Drawing\Sheet\OD-G0648-01.dwg



NOTES:
1. MORNING PEAK PERIOD COUNTED BETWEEN 7:00 AND 9:00 AM.
2. AFTERNOON PEAK PERIOD COUNTED BETWEEN 3:00 AND 6:00 PM.

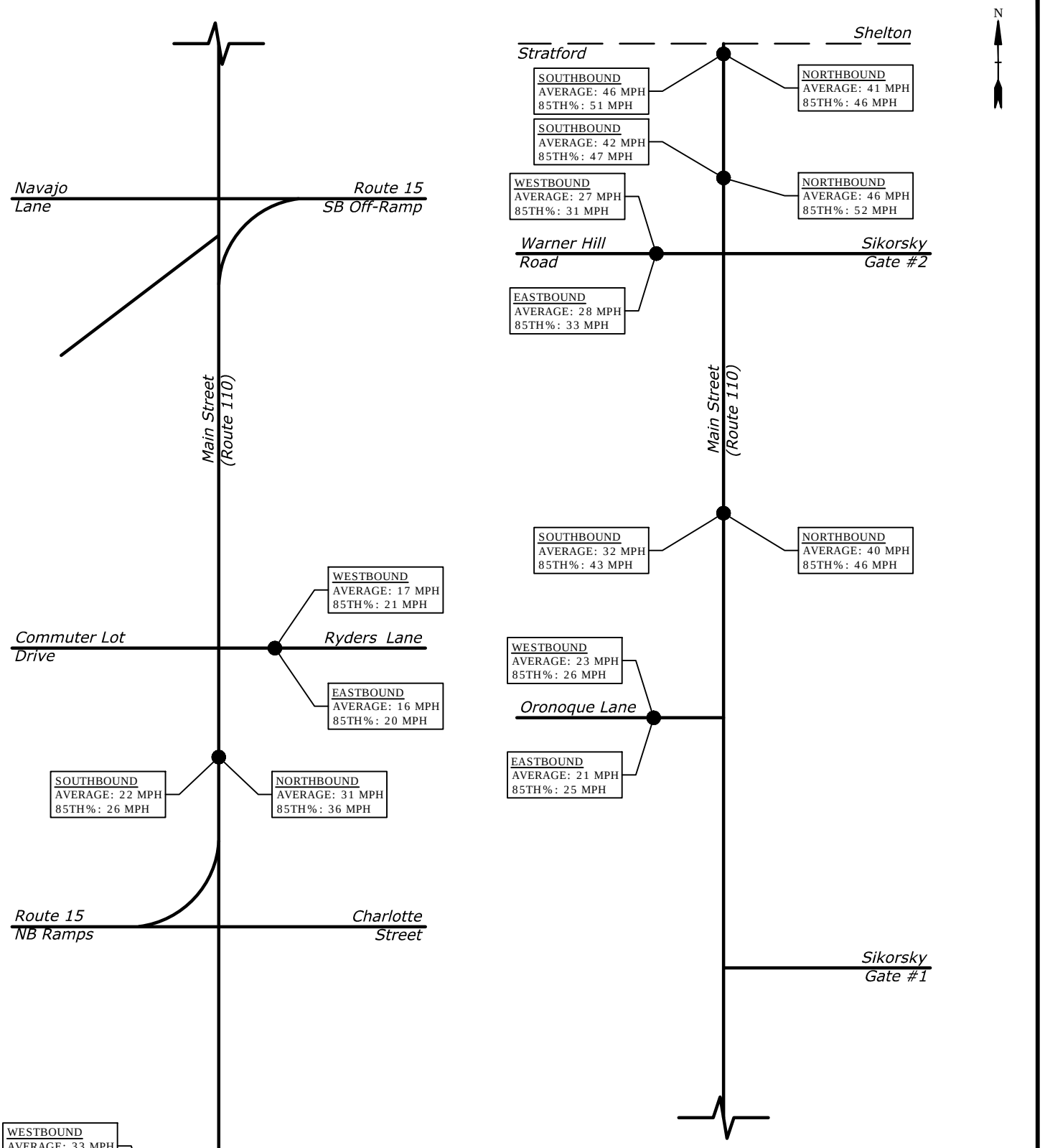
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

ORIGIN-DESTINATION STUDY
RESULTS SUMMARY
NORTHBOUND ROUTES

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 2-9

Tighe&Bond

12/15/2016



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

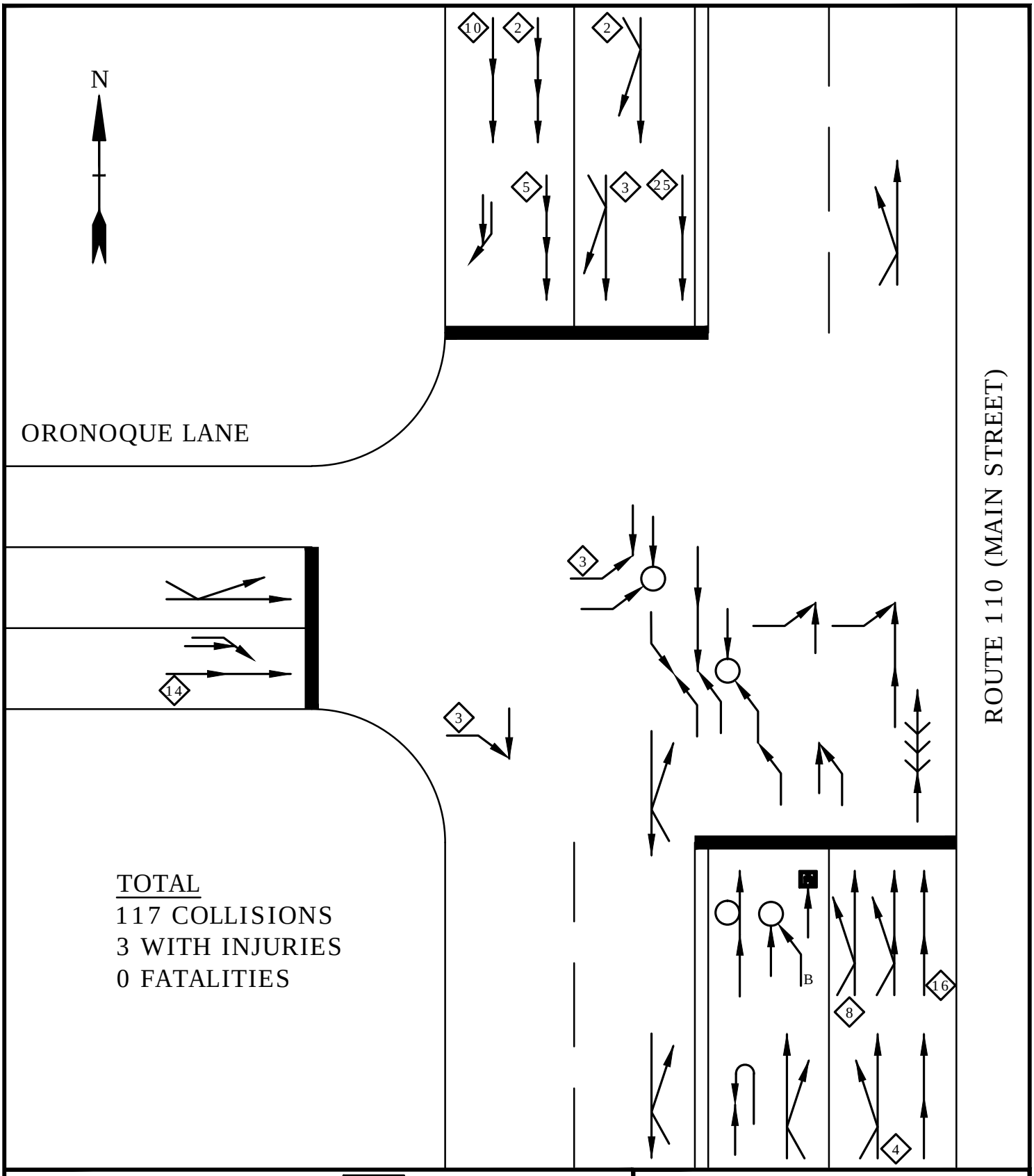
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

TRAVEL SPEED OBSERVATIONS

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 2-12

Tighe&Bond

07/21/2015



Legend:

- FATAL ACCIDENT
- PERSONAL INJURY
- PROPERTY DAMAGE ONLY
- REAR END COLLISION
- SIDESWIPE COLLISION
- VEHICLE BACKING
- PARKED VEHICLE
- OUT OF CONTROL
- FIXED/MOVING OBJECT COLLISION
- OVERTURN/JACKKNIFE
- PEDESTRIAN
- MOTOR VEHICLE
- B BICYCLE
- # NUMBER OF COLLISIONS

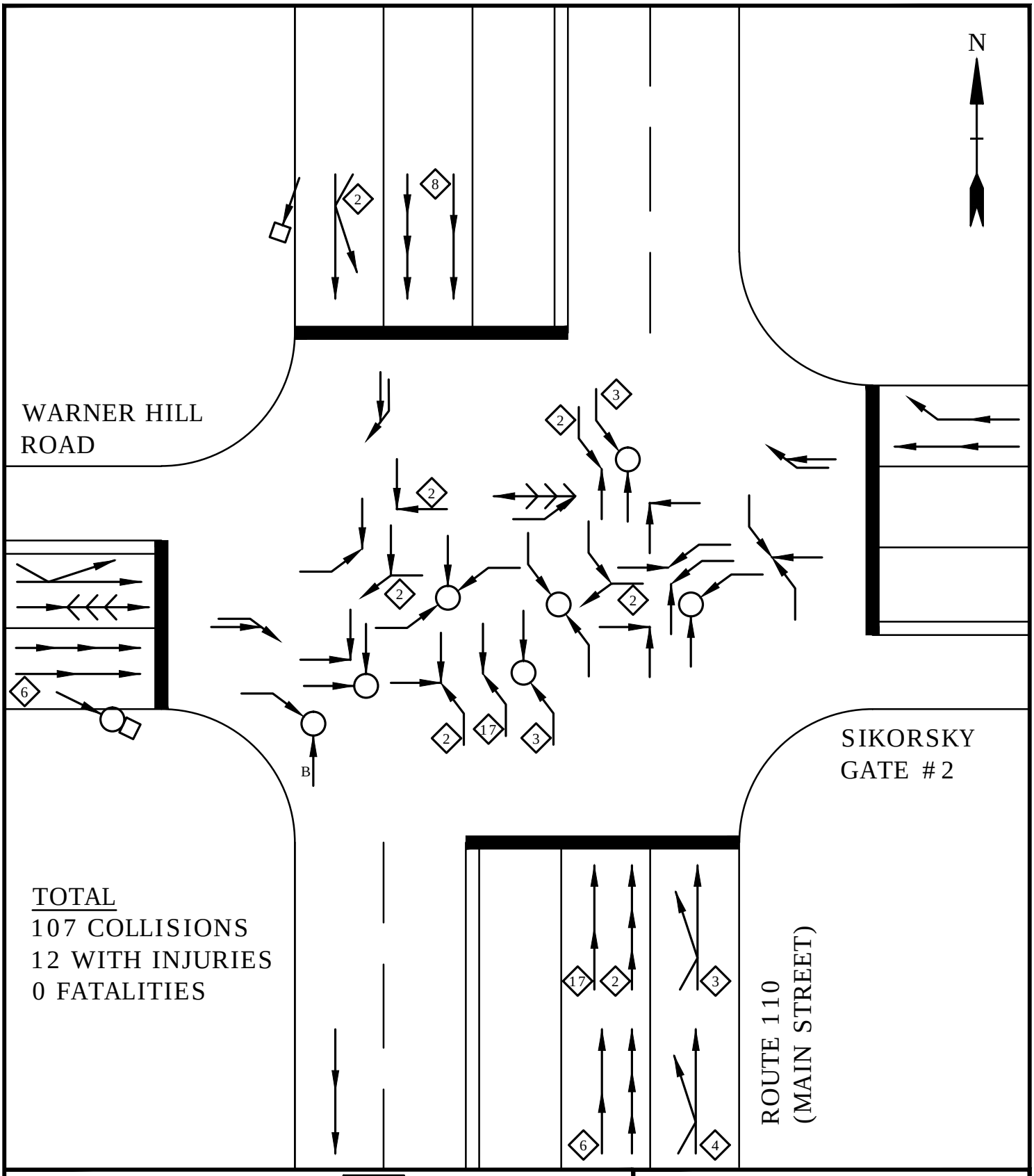
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

COLLISION DIAGRAM:
ROUTE 110 AT
ORONOQUE LANE
JANUARY 2007 TO DECEMBER 2012

DATE: APRIL 2017
SCALE: N.T.S
FIGURE 2-13

Tighe&Bond

07/21/2015



ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

COLLISION DIAGRAM:
ROUTE 110 AT WARNER HILL ROAD &
SIKORSKY GATE #2
JANUARY 2007 TO DECEMBER 2012

DATE: APRIL 2017
SCALE: N.T.S
FIGURE 2-14

Tighe&Bond

07/21/2015

ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

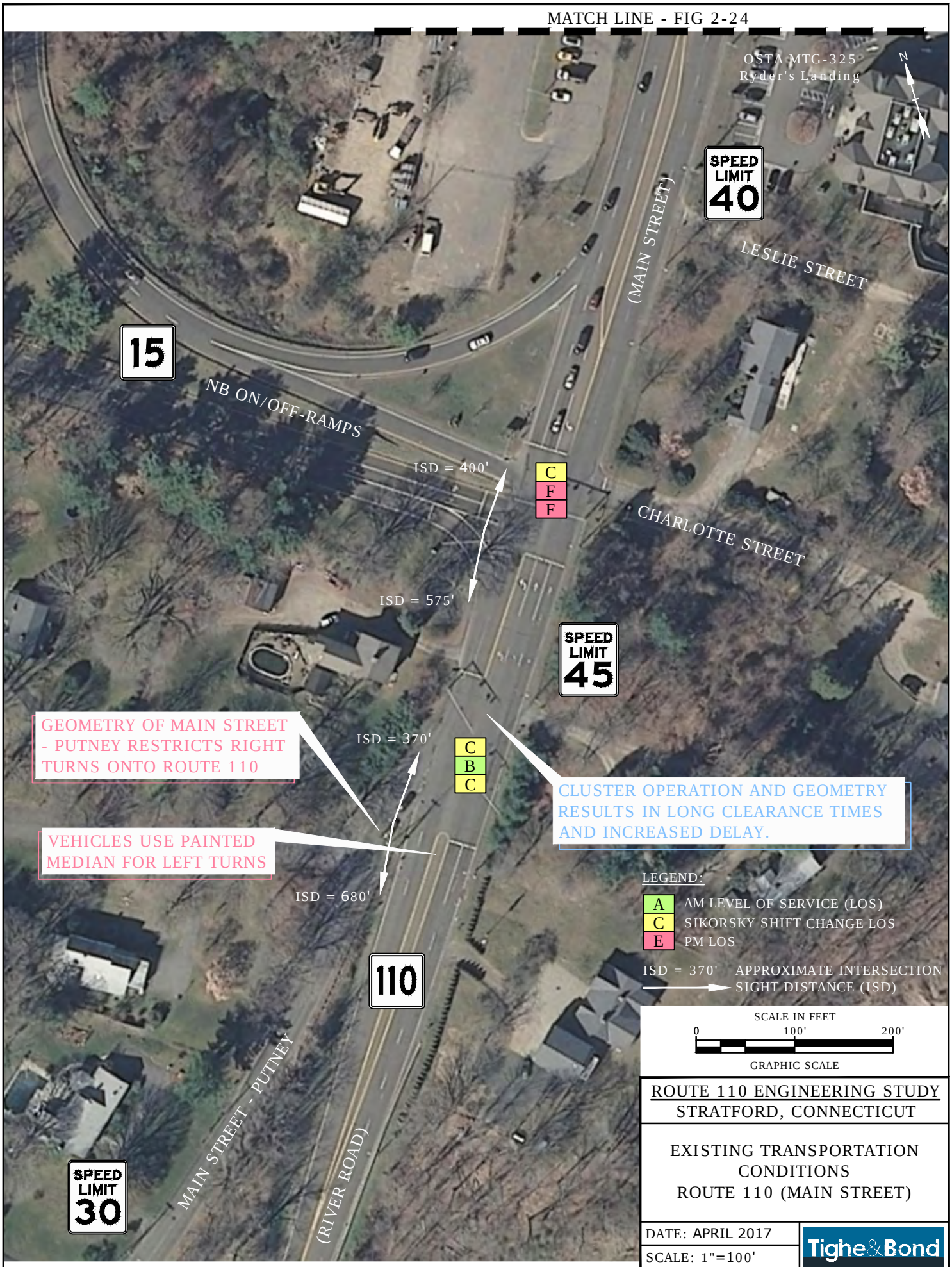
Bicycle, Pedestrian & Transit Facilities

DATE: APRIL 2017
SCALE:1 " = 833 '
FIGURE 2-15

Tighe&Bond
Consulting Engineers
Environmental Specialists

11/5/2014

Tighe & Bond, Inc. C:\Users\fgomes\Documents\FHWP\1249-Rt110\Route 110 Project Data\Maps.mxd



ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

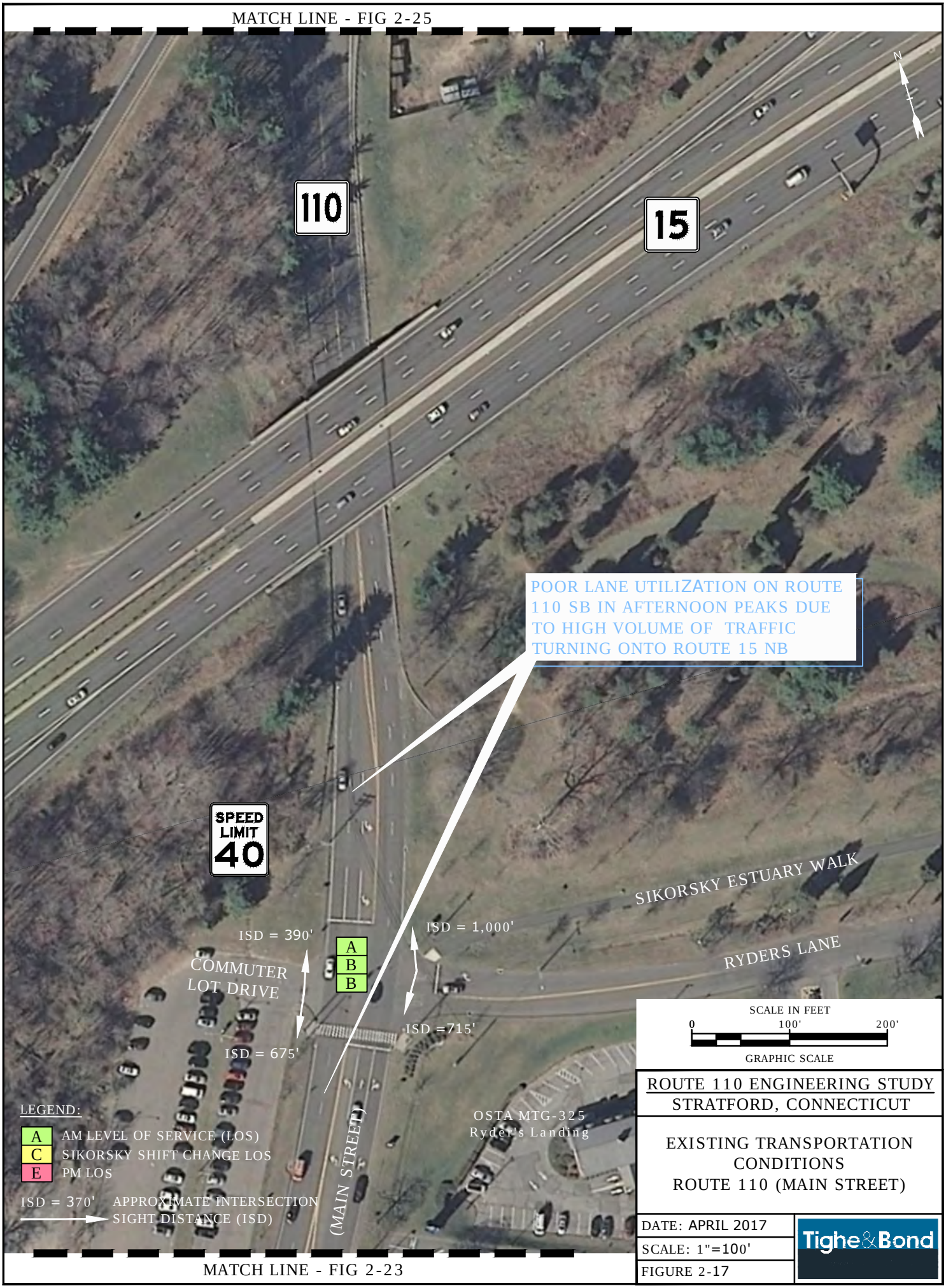
EXISTING TRANSPORTATION CONDITIONS
ROUTE 110 (MAIN STREET)

DATE: APRIL 2017
SCALE: 1"=100'
FIGURE 2-16

Tighe & Bond

Tighe & Bond, Inc. J:\G\G0648 GBRC-Route 110 Study\Drawing\Sketch\AE-G0648-02.dwg

08/19/2015



SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

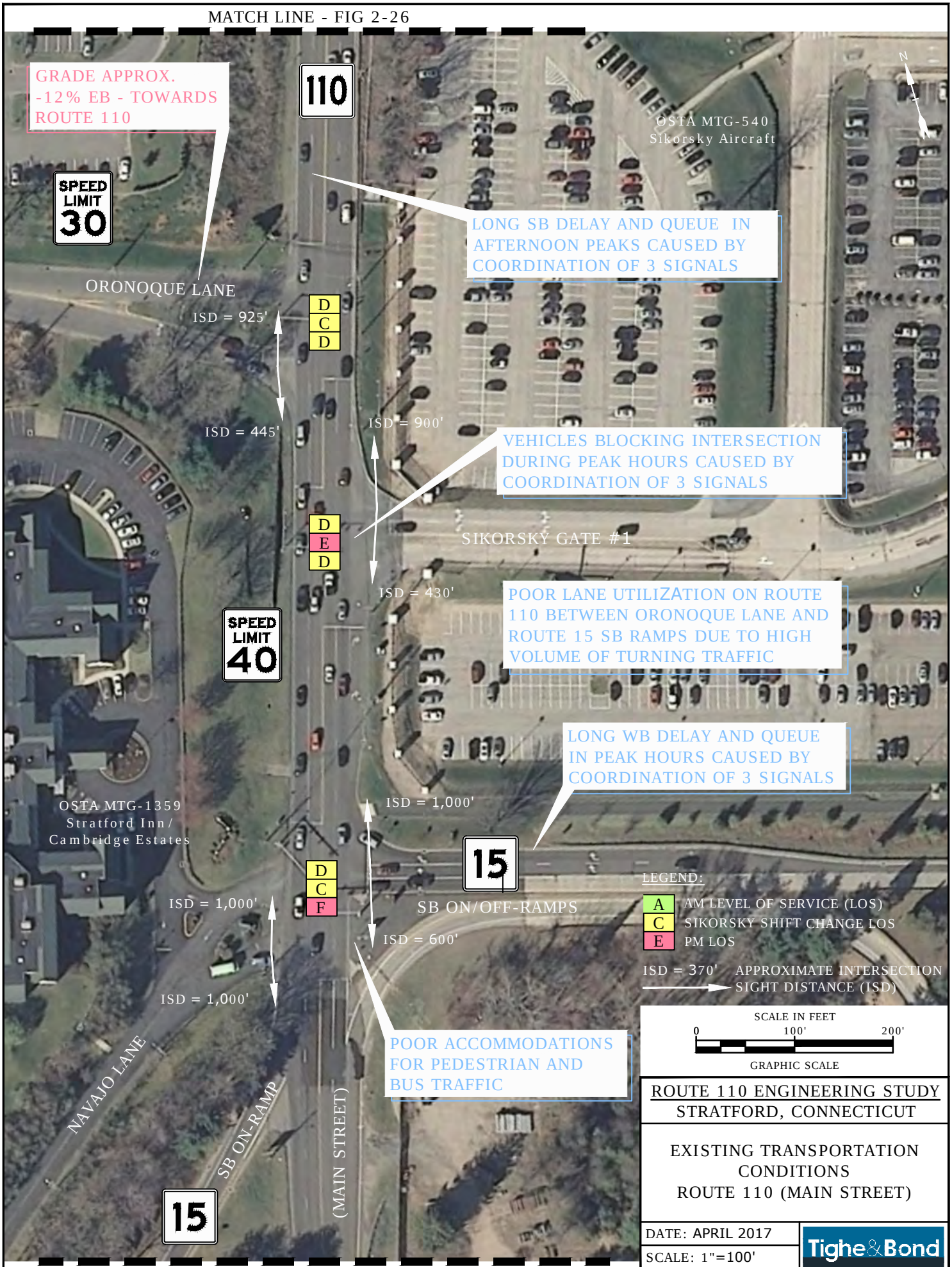
EXISTING TRANSPORTATION CONDITIONS
ROUTE 110 (MAIN STREET)

DATE: APRIL 2017
SCALE: 1"=100'
FIGURE 2-17

Tighe&Bond

Tighe & Bond, Inc. J:\G\G0648 GBRC-Route 110 Study\Drawing\Sketch\AE-G0648-02.dwg

08/19/2015



ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

EXISTING TRANSPORTATION CONDITIONS
ROUTE 110 (MAIN STREET)

DATE: APRIL 2017
SCALE: 1"=100'
FIGURE 2-18

Tighe&Bond

08/19/2015

Tighe & Bond, Inc. J:\G\G0648 GBRC-Route 110 Study\Drawing\Sketch\AE-G0648-02.dwg

MATCH LINE - FIG 2-27

LEGEND:

A - AM LEVEL OF SERVICE (LOS)

C - SIKORSKY SHIFT CHANGE LOS

E - PM LOS

ISD = 370' - APPROXIMATE INTERSECTION SIGHT DISTANCE (ISD)

SCALE IN FEET

0 100' 200'

GRAPHIC SCALE

ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

EXISTING TRANSPORTATION CONDITIONS
ROUTE 110 (MAIN STREET)

DATE: APRIL 2017

SCALE: 1"=100'

FIGURE 2-19

Tighe&Bond

MATCH LINE - FIG 2-25

Tighe & Bond, Inc. J:\G\G0648 GBRC-Route 110 Study\Drawing\Sketch\AE-G0648-02.dwg

08/19/2015

MATCH LINE - FIG 2-28

LEGEND:

A - AM LEVEL OF SERVICE (LOS)
C - SIKORSKY SHIFT CHANGE LOS
E - PM LOS

ISD = 370' APPROXIMATE INTERSECTION SIGHT DISTANCE (ISD)

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

EXISTING TRANSPORTATION CONDITIONS
ROUTE 110 (MAIN STREET)

DATE: APRIL 2017
SCALE: 1"=100'
FIGURE 2-20

Tighe&Bond

MATCH LINE - FIG 2-26

Tighe & Bond, Inc. J:\G\G0648 GBRC-Route 110 Study\Drawing\Sketch\AE-G0648-02.dwg

08/19/2015

MATCH LINE - FIG 2-27

ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

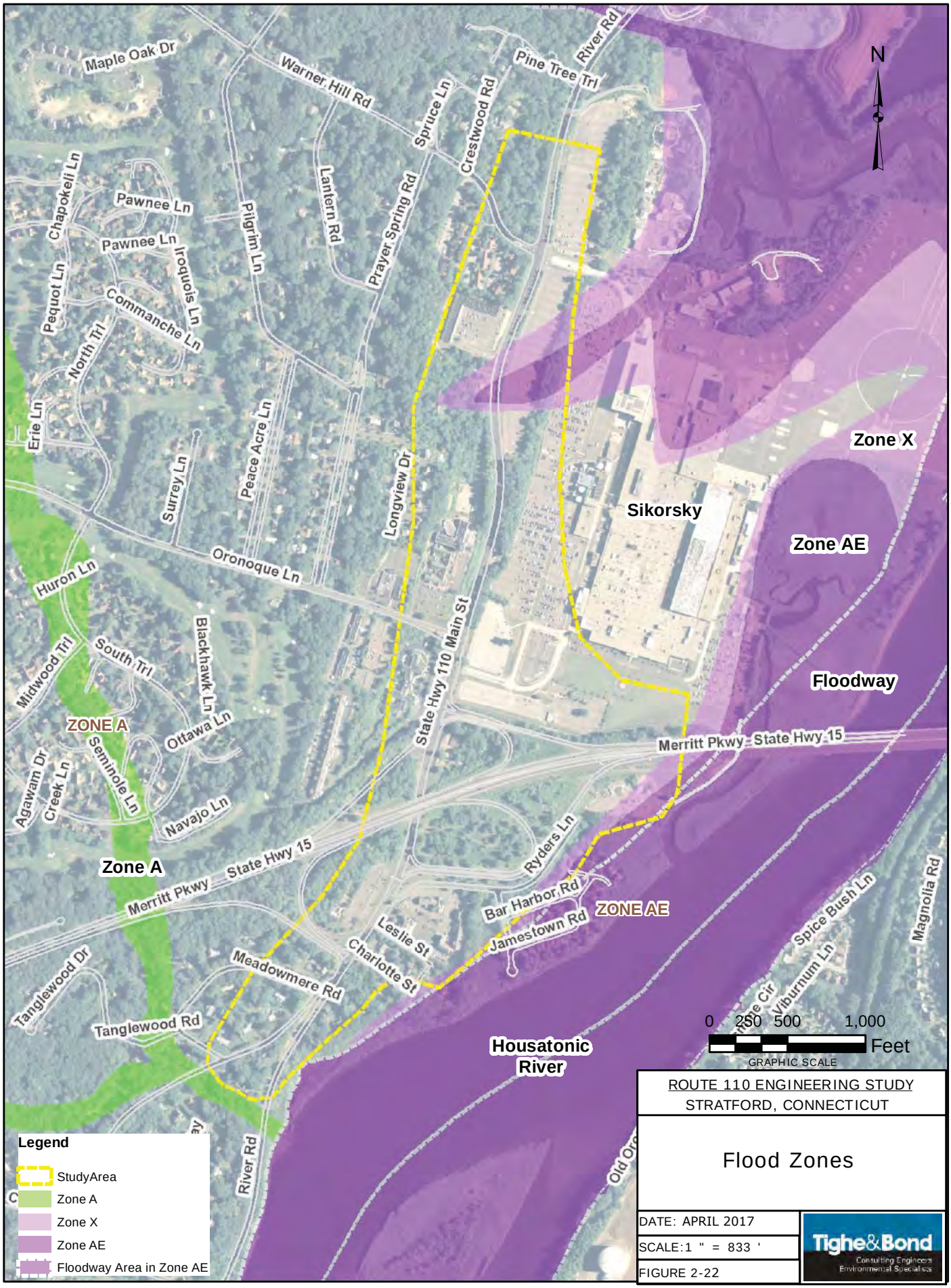
EXISTING TRANSPORTATION CONDITIONS
ROUTE 110 (MAIN STREET)

DATE: APRIL 2017
SCALE: 1"=100'
FIGURE 2-21

Tighe&Bond

Tighe & Bond, Inc. J:\G\G0648 GBRC-Route 110 Study\Drawing\Sketch\AE-G0648-02.dwg

08/19/2015



ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

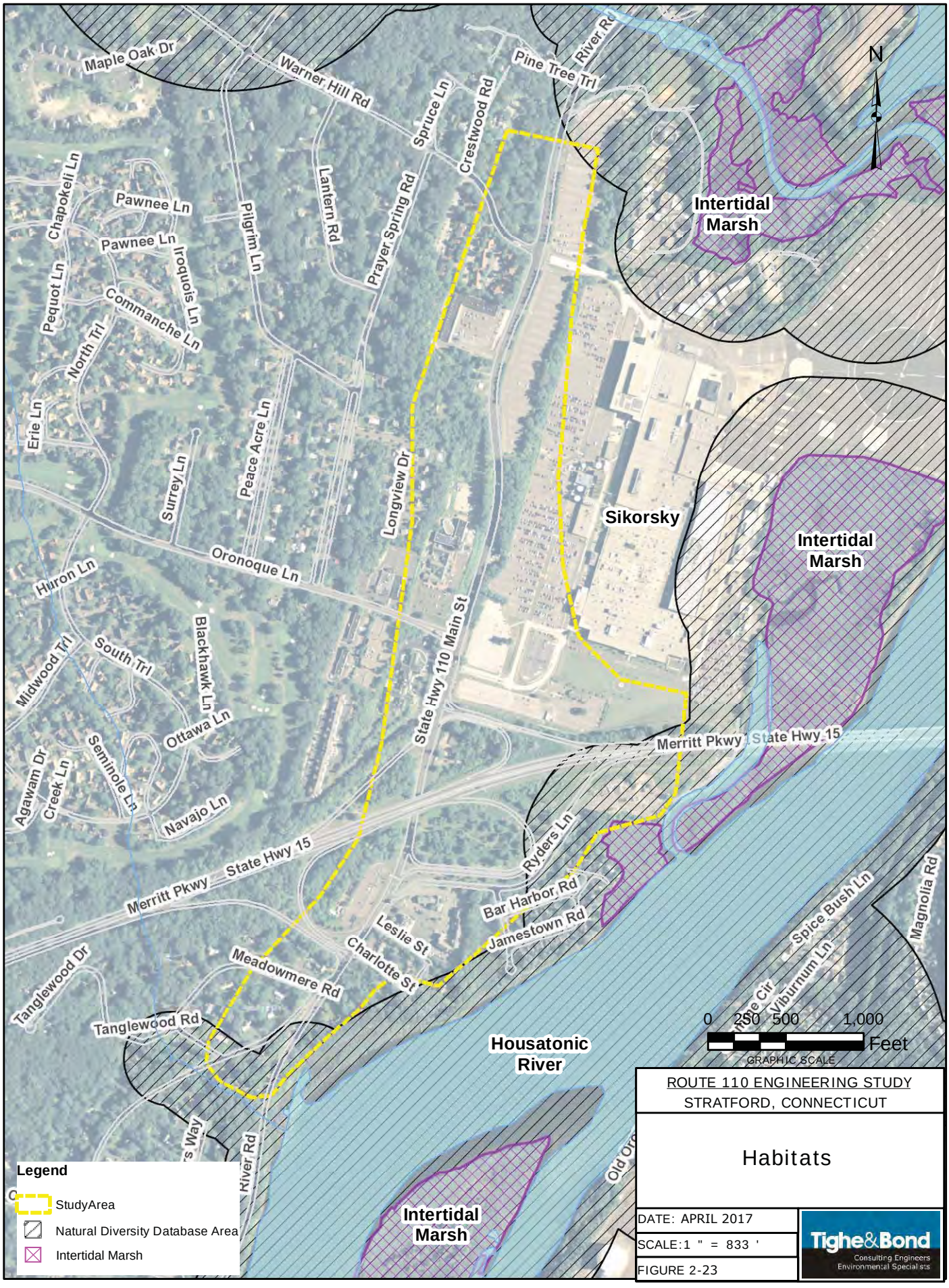
Flood Zones

DATE: APRIL 2017
SCALE:1 " = 833 '
FIGURE 2-22

Tighe&Bond
Consulting Engineers
Environmental Specialists

11/5/2014

Tighe & Bond, Inc. C:\Users\fgomes\Documents\FHIP1249-Rt110\Route 110 Project Data\Maps.mxd



ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

Habitats

DATE: APRIL 2017
SCALE:1 " = 833 '
FIGURE 2-23

Tighe&Bond
Consulting Engineers
Environmental Specialists

11/5/2014

Tighe & Bond, Inc. C:\Users\fgomes\Documents\FHIP1249-Rt110\Route 110 Project Data\Maps.mxd

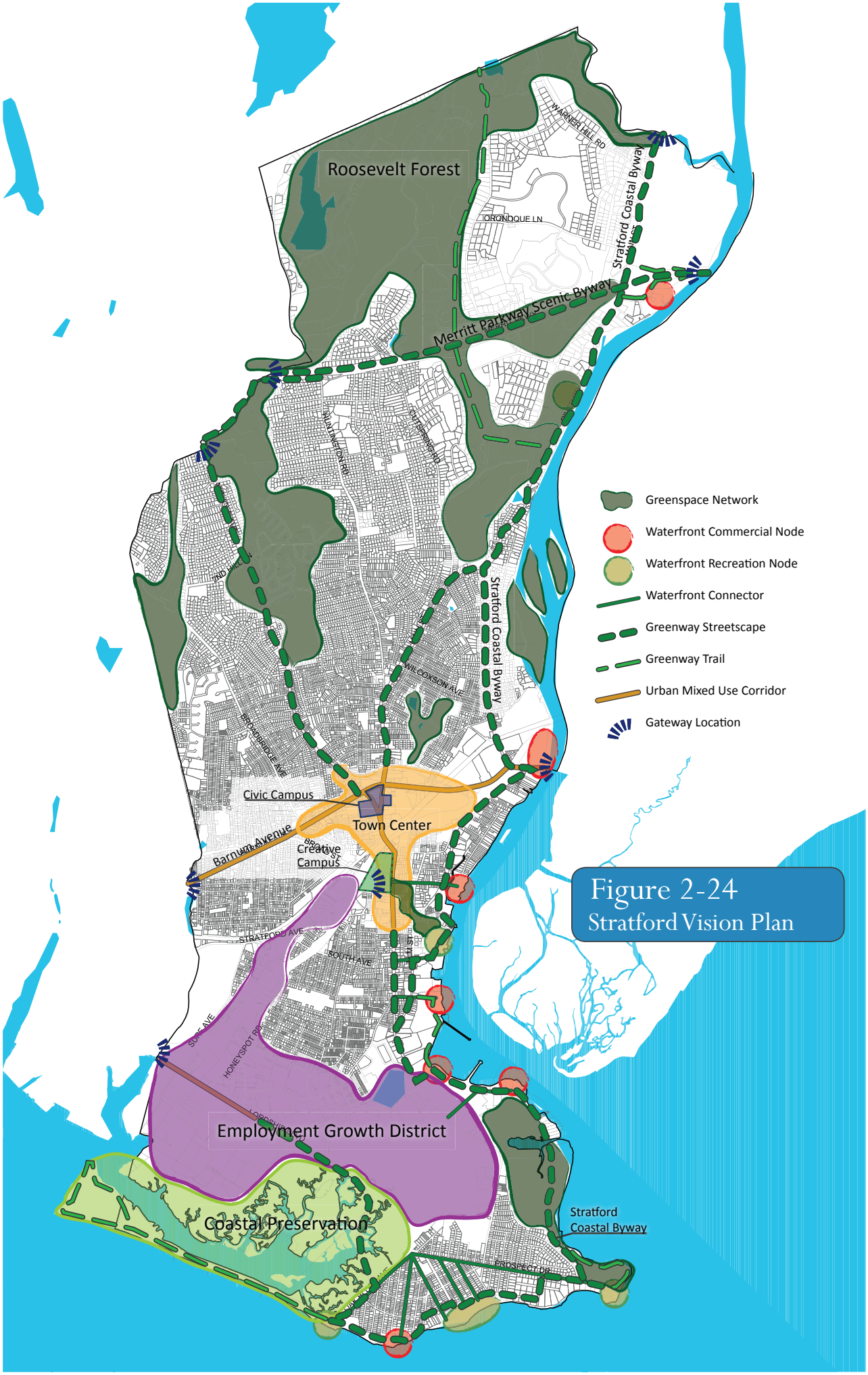
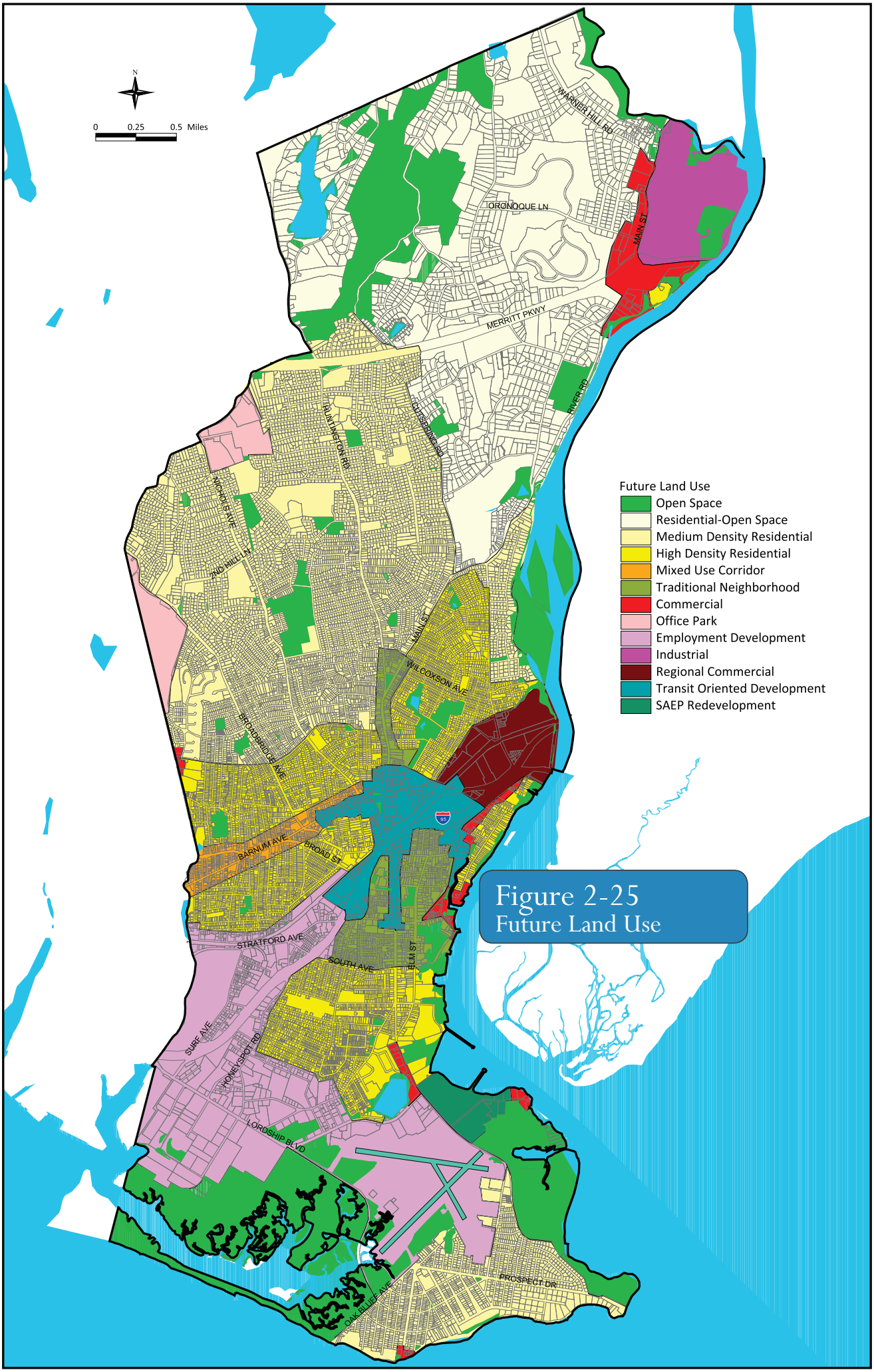


Figure 2-24
Stratford Vision Plan


N
0 0.25 0.5 Miles
MARNER HILL RD
TORONOQUE LN
MAIN ST
MERRITT PKWY
RIVER RD
HUNTINGTON RD
CUTTSPRINGS RD
NICHOLS AVE
2ND HILL LN
MAIN ST
WILCOXSON AVE
BROADBRIDGE AVE
BARNUM AVE
BROAD ST
STRATFORD AVE
SOUTH AVE
BLUM ST
SURF AVE
HONEYSPOT RD
LORDSHIP BLVD
OAK BLUFF AVE
PROSPECT DR
Future Land Use
Open Space
Residential-Open Space
Medium Density Residential
High Density Residential
Mixed Use Corridor
Traditional Neighborhood
Commercial
Office Park
Employment Development
Industrial
Regional Commercial
Transit Oriented Development
SAEP Redevelopment
Figure 2-25
Future Land Use

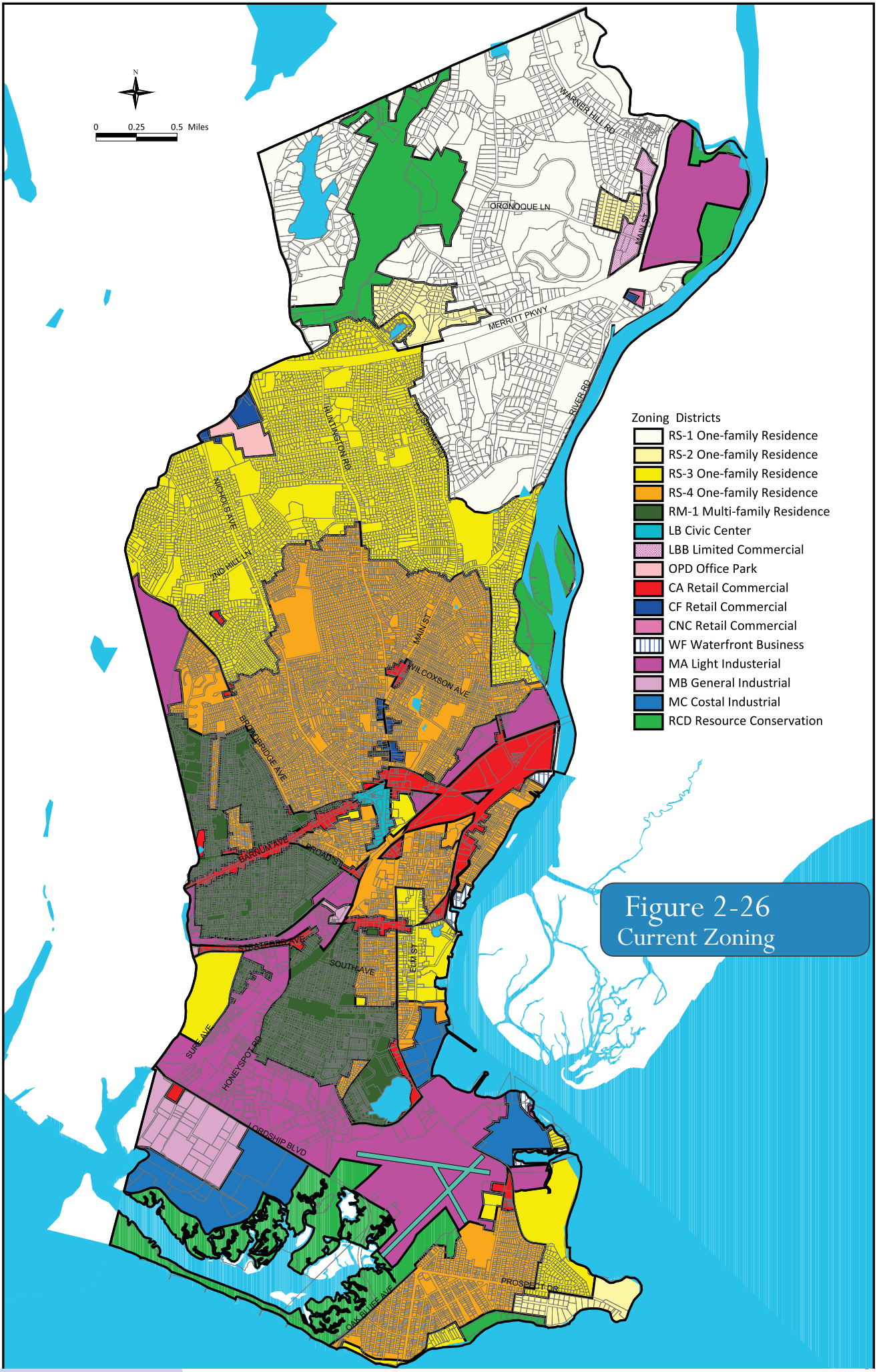
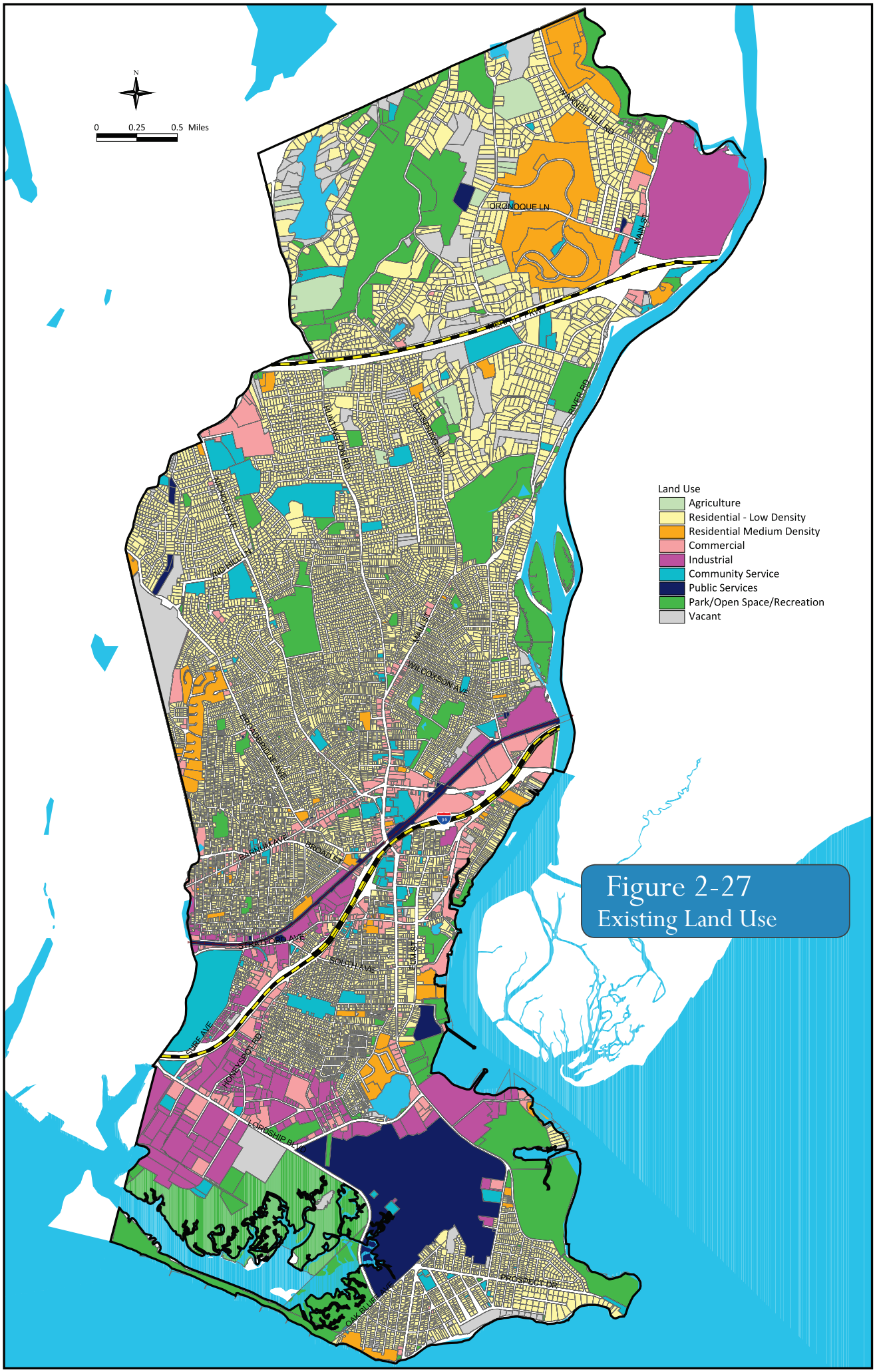
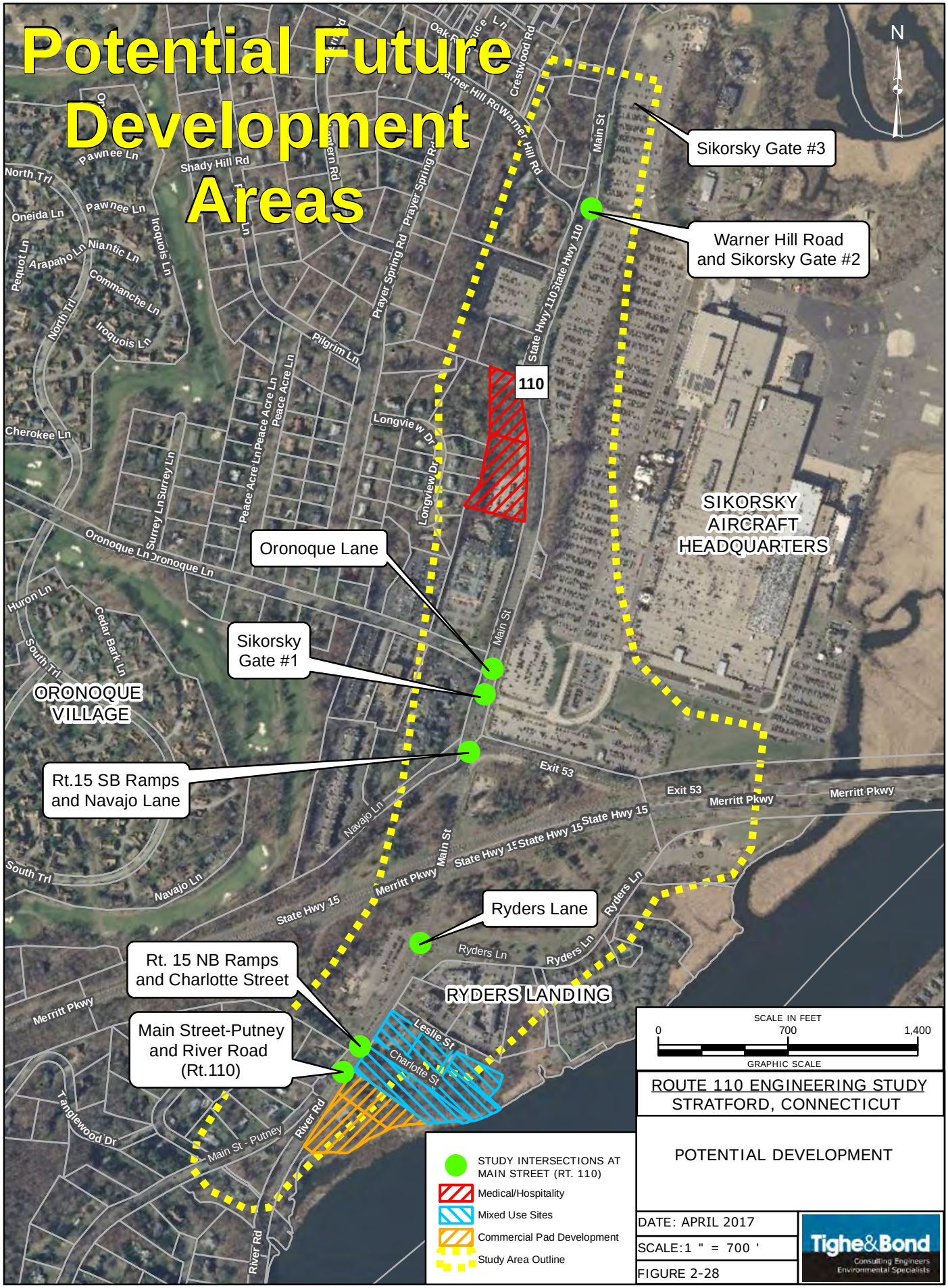


Figure 2-26
Current Zoning


N
0 0.25 0.5 Miles
Land Use
Agriculture
Residential - Low Density
Residential Medium Density
Commercial
Industrial
Community Service
Public Services
Park/Open Space/Recreation
Vacant
Figure 2-27
Existing Land Use



ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

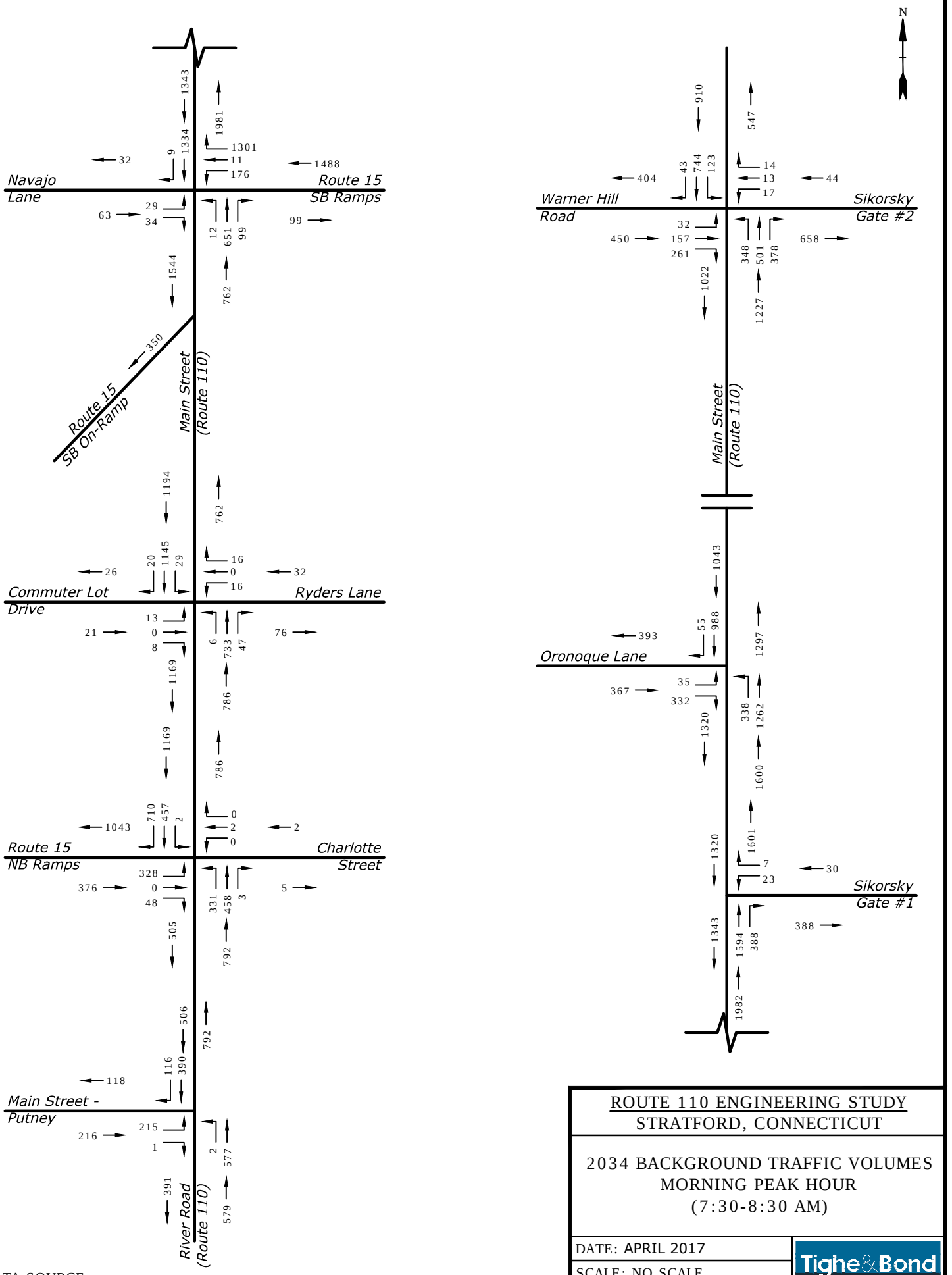
POTENTIAL DEVELOPMENT

DATE: APRIL 2017
SCALE: 1 " = 700 '
FIGURE 2-28

Tighe&Bond
Consulting Engineers
Environmental Specialists

Tighe & Bond, Inc. J:\G\G0648 GBRC-Route 110 Study\Drawing\GIS\PotentialDevelopmentAreas_20150213.mxd

2/27/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

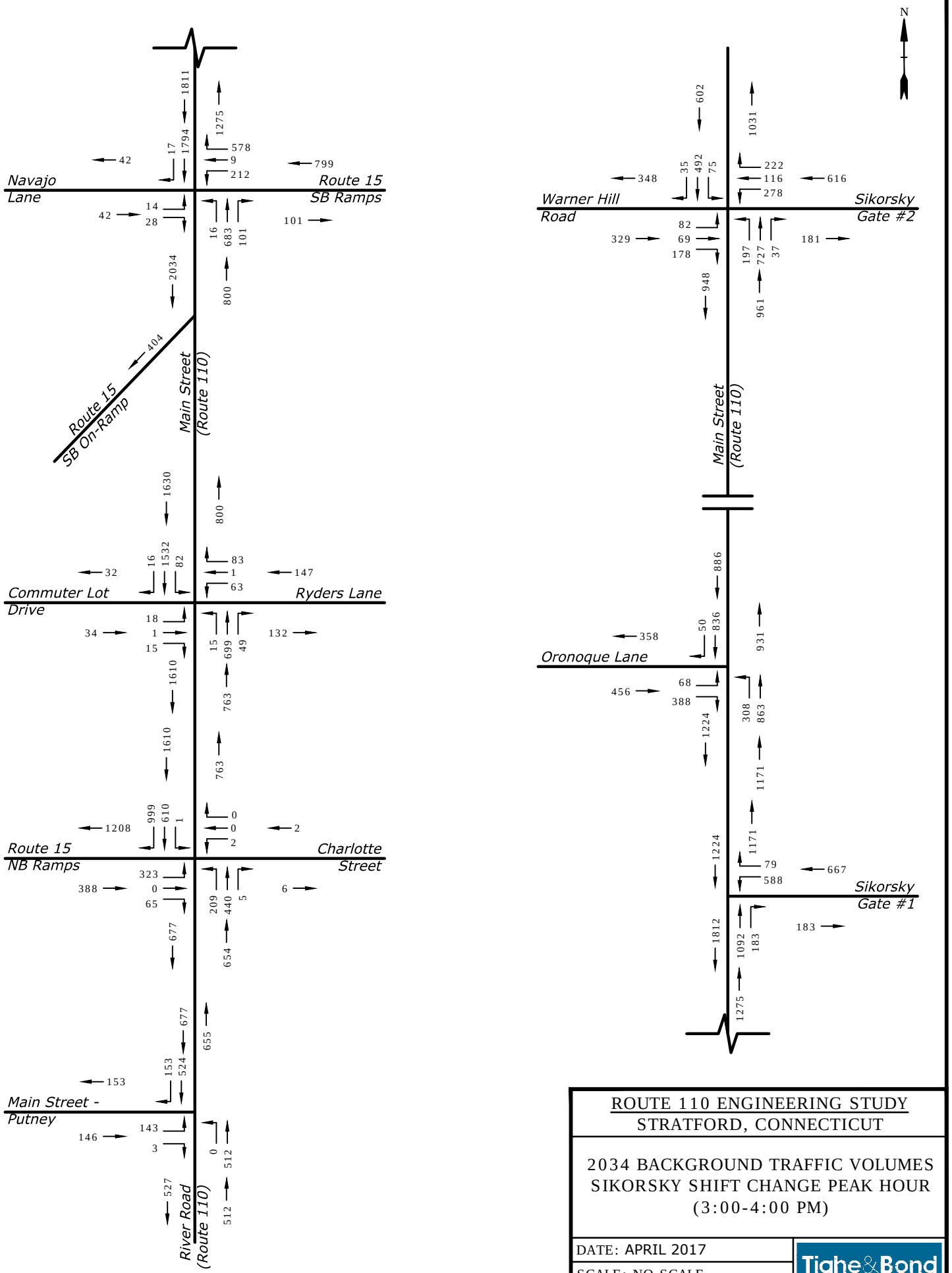
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

2034 BACKGROUND TRAFFIC VOLUMES
MORNING PEAK HOUR
(7:30-8:30 AM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 3-1

Tighe&Bond

10/14/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

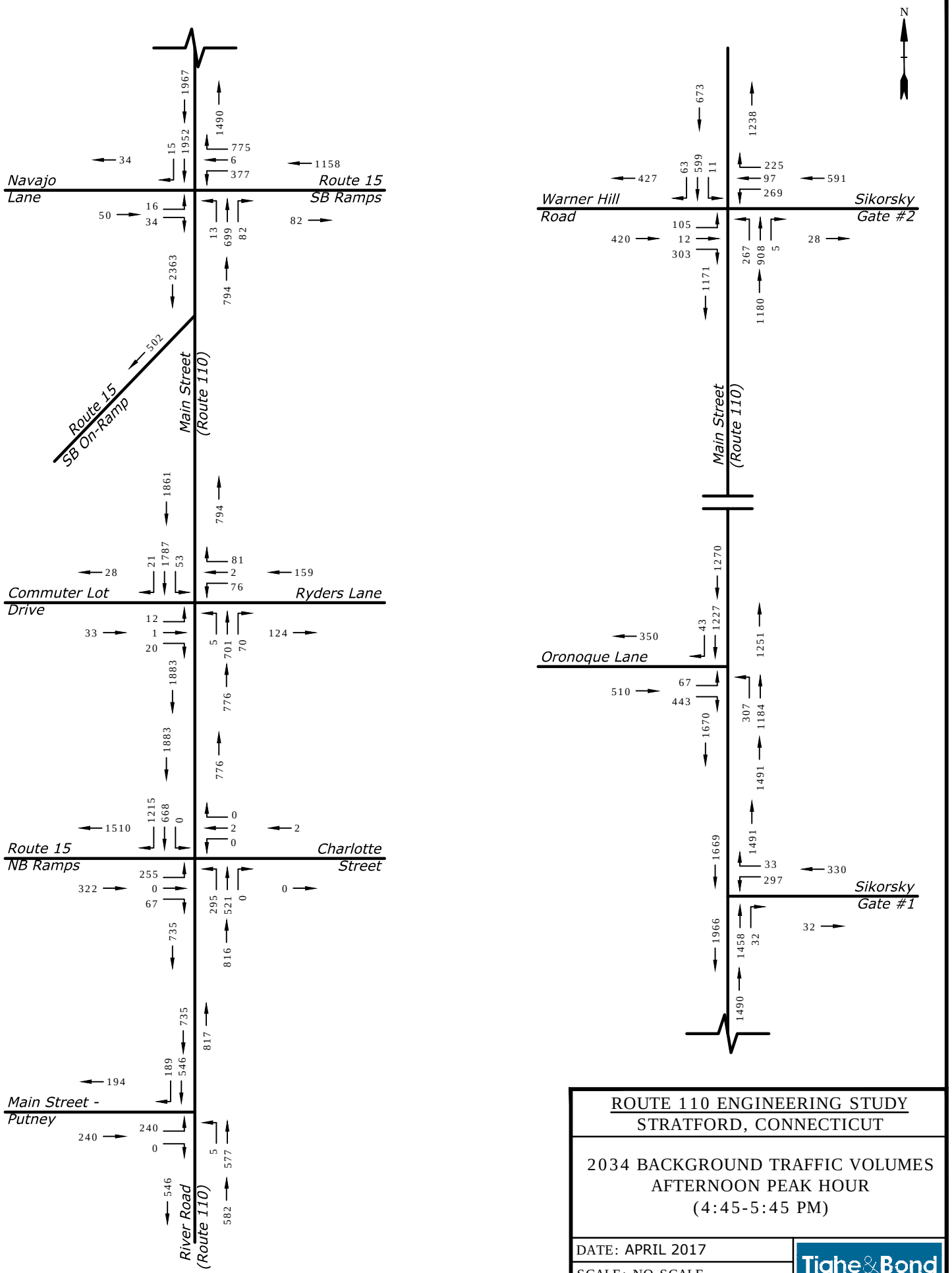
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

2034 BACKGROUND TRAFFIC VOLUMES
SIKORSKY SHIFT CHANGE PEAK HOUR
(3:00-4:00 PM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 3-2

Tighe&Bond

10/14/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

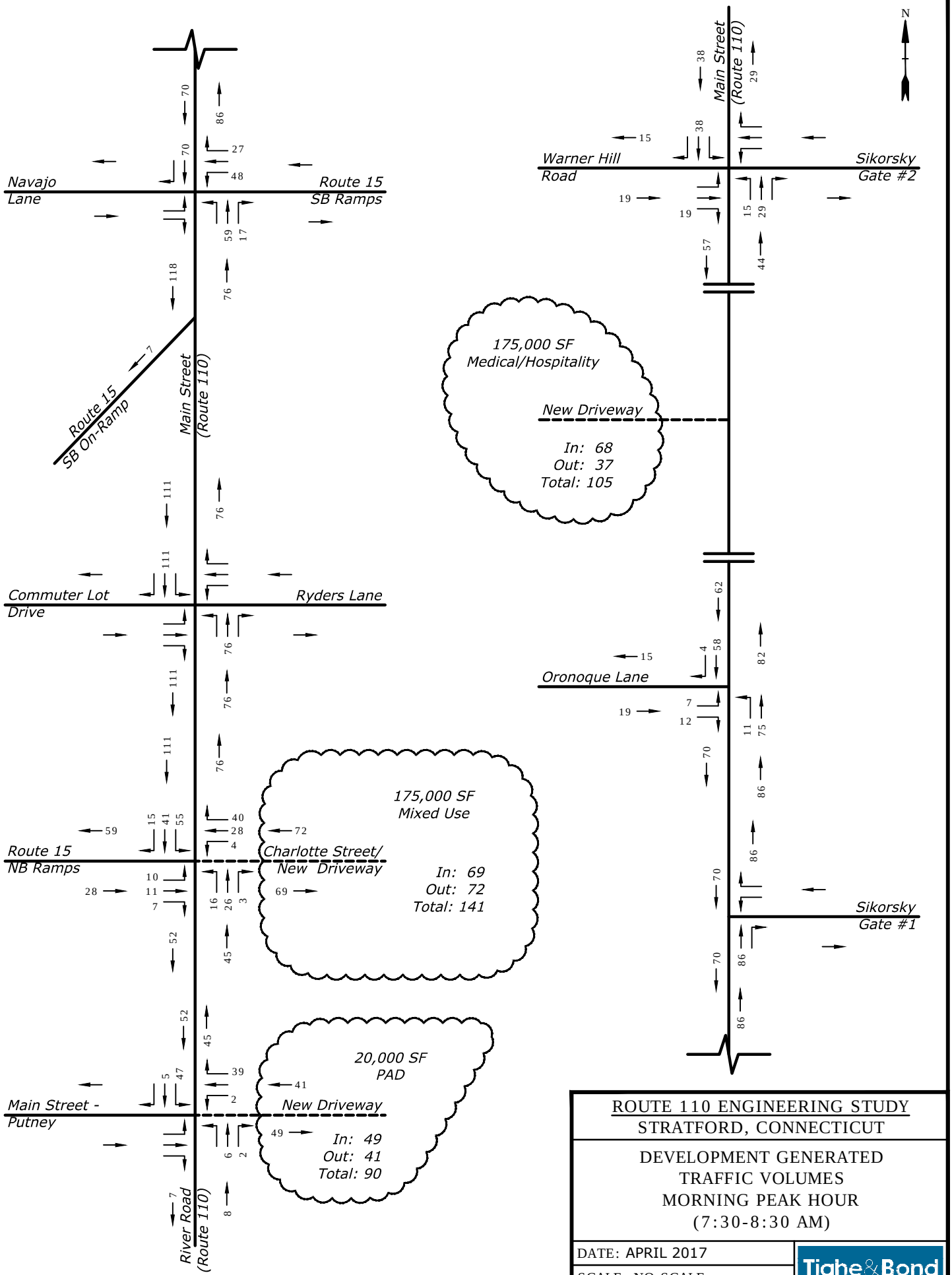
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

2034 BACKGROUND TRAFFIC VOLUMES
AFTERNOON PEAK HOUR
(4:45-5:45 PM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 3-3

Tighe&Bond

10/14/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

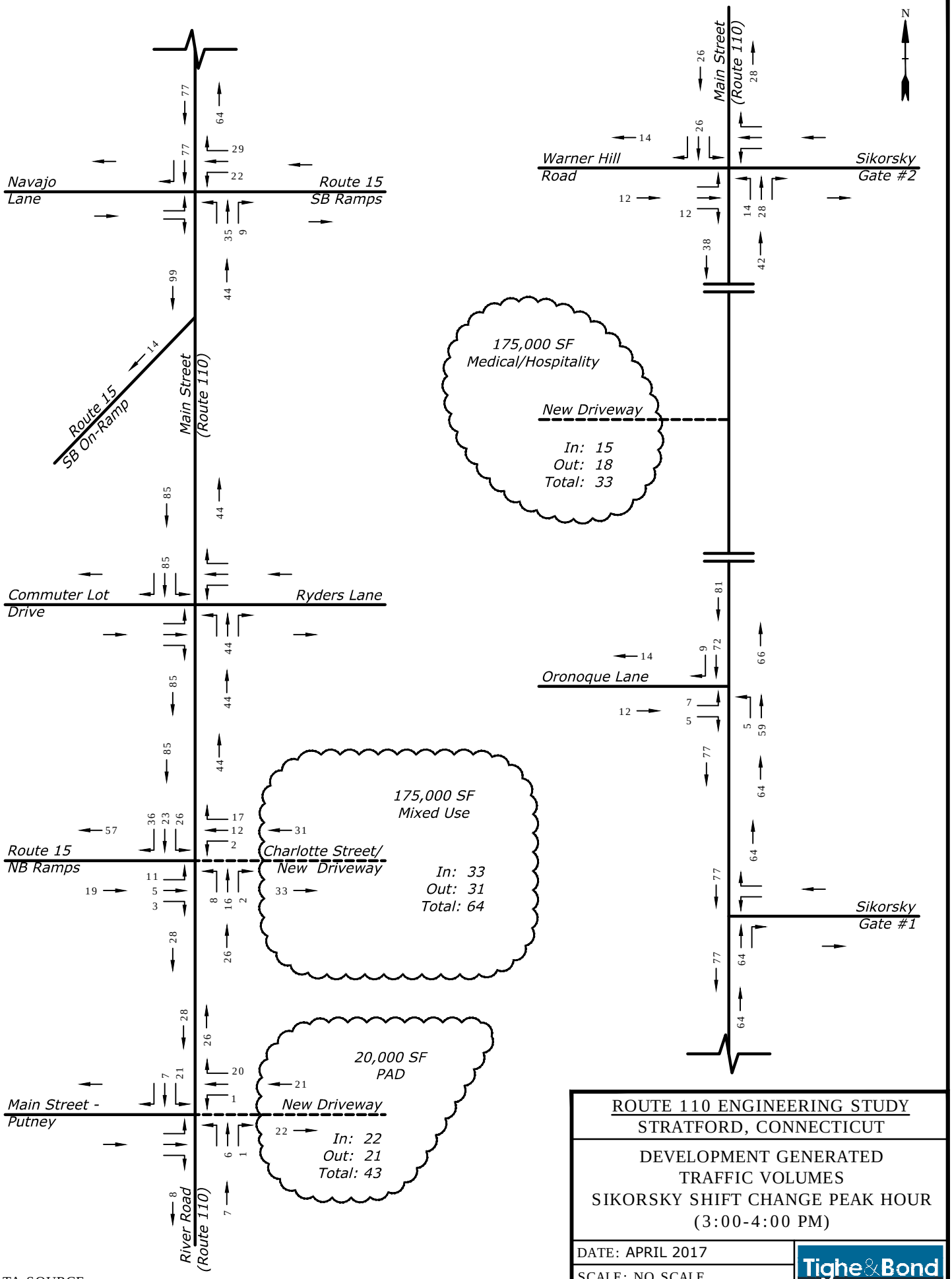
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

DEVELOPMENT GENERATED
TRAFFIC VOLUMES
MORNING PEAK HOUR
(7:30-8:30 AM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 3-4

Tighe&Bond

08/17/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

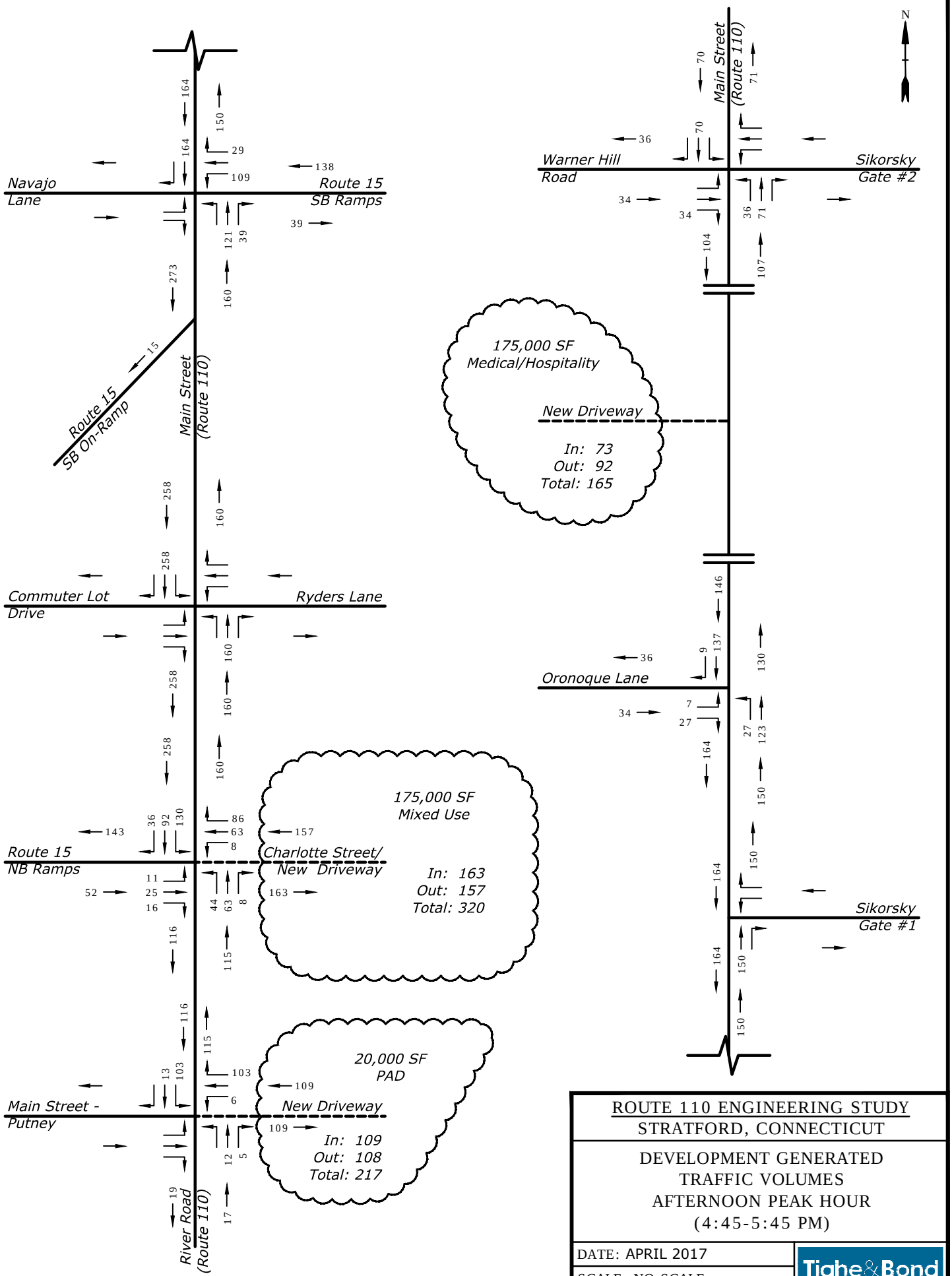
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

DEVELOPMENT GENERATED
TRAFFIC VOLUMES
SIKORSKY SHIFT CHANGE PEAK HOUR
(3:00-4:00 PM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 3-5

Tighe & Bond

08/17/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

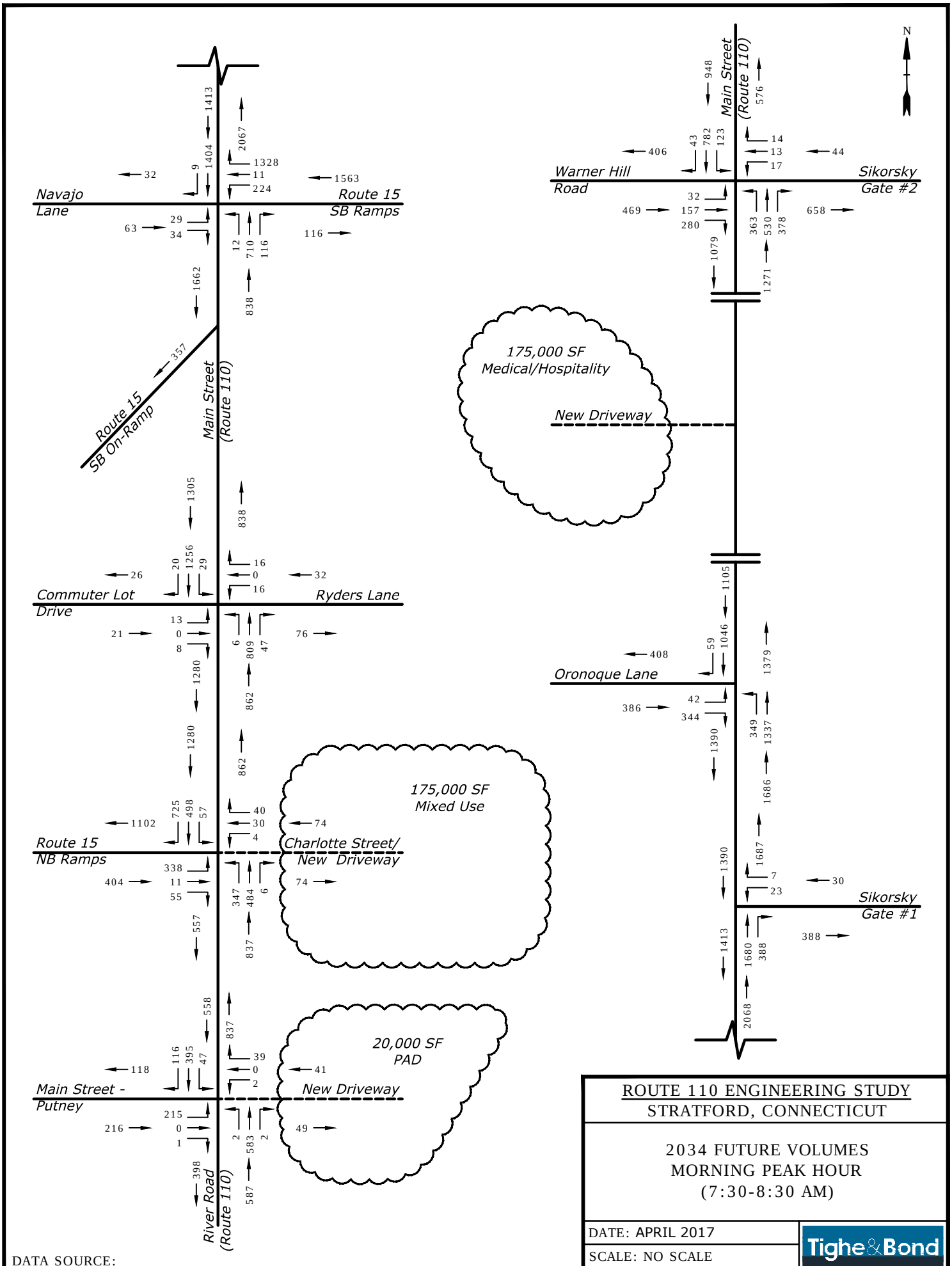
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

DEVELOPMENT GENERATED
TRAFFIC VOLUMES
AFTERNOON PEAK HOUR
(4:45-5:45 PM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 3-6

Tighe&Bond

08/17/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

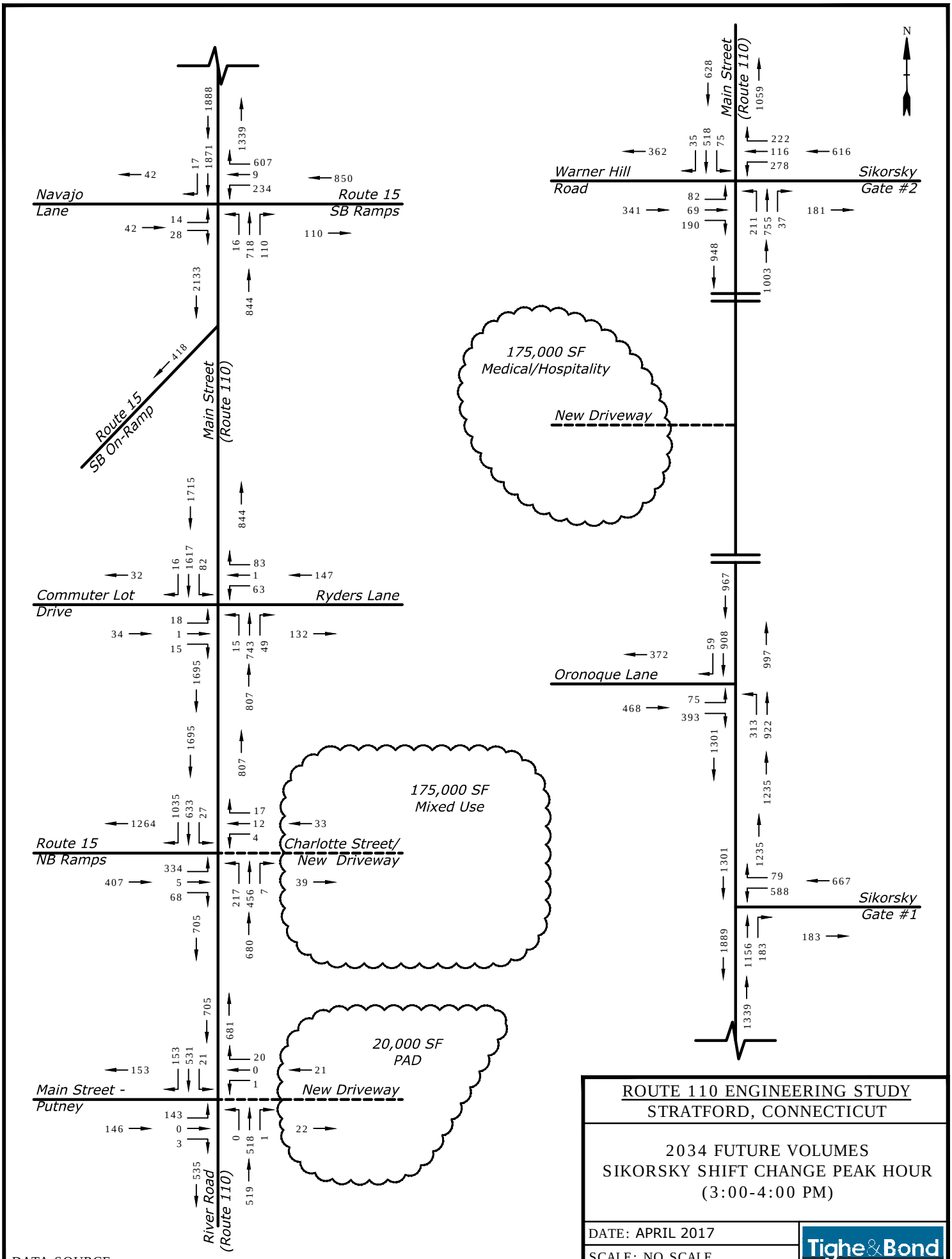
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

2034 FUTURE VOLUMES
MORNING PEAK HOUR
(7:30-8:30 AM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 3-7

Tighe&Bond

08/17/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

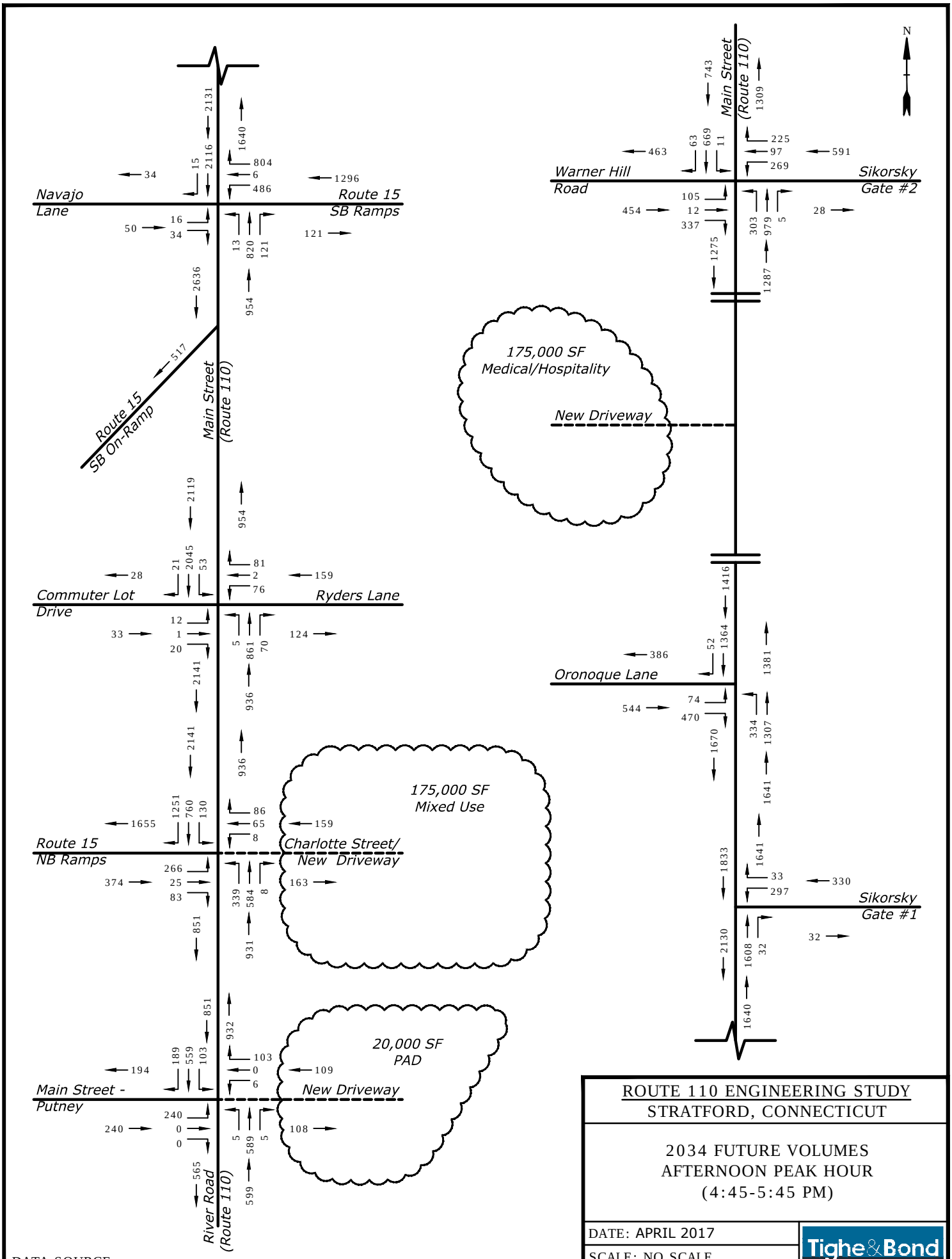
2034 FUTURE VOLUMES
SIKORSKY SHIFT CHANGE PEAK HOUR
(3:00-4:00 PM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 3-8

Tighe&Bond

Tighe & Bond, Inc. J:\G\G0648 GBRC-Route 110 Study\Drawing\Sketch\TV-G0648-01.dwg

08/17/2015



DATA SOURCE:
2014 CT COUNT DATA, SEPTEMBER 2014

ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

2034 FUTURE VOLUMES
AFTERNOON PEAK HOUR
(4:45-5:45 PM)

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 3-9

Tighe&Bond

08/17/2015

TABLE 4-1
Intersection Operation Summary - Vehicular Levels of Service / Average Delay (sec/veh)

		Weekday Morning Peak Hour			Weekday Sikorsky Shift Change Peak Hour			Weekday Afternoon Peak Hour		
	Lane Use	2014 Existing	2034 Background	2034 Optimized	2014 Existing	2034 Background	2034 Optimized	2014 Existing	2034 Background	2034 Optimized
Traffic Signal - Route 110 (Main Street) at Warner Hill Road / Sikorsky Gate #2										
Overall		**D / 45.0**	**D / 53.6**	**D / 35.4**	**C / 32.9**	**C / 34.5**	**C / 27.3**	**D / 35.9**	**D / 40.1**	**D / 35.1**
Warner Hill Road	EBL	C / 23.7	C / 23.9	C / 25.4	C / 32.3	C / 32.9	C / 27.5	C / 31.4	C / 32.5	C / 28.7
	EBT>	F / 128.3	F / 155.2	D / 53.0	E / 62.1	E / 69.5	E / 55.9	E / 64.6	F / 92.8	E / 68.6
Sikorsky Gate #2	WBL	C / 27.7	C / 27.9	D / 38.9	C / 30.5	C / 30.5	C / 27.8	C / 32.5	C / 32.5	C / 34.1
	WBT>	C / 20.8	C / 20.8	C / 28.3	D / 42.7	D / 45.6	D / 43.9	D / 41.7	D / 45.8	D / 53.9
Route 110 (Main Street)	NBL	F / 81.8	F / 110.6	D / 44.9	C / 22.2	C / 23.7	B / 16.8	D / 50.2	E / 59.7	C / 33.6
	NBT>	B / 16.3	B / 17.1	B / 18.8	C / 30.1	C / 31.2	B / 15.0	C / 26.9	C / 26.2	B / 16.5
Route 110 (Main Street)	SBL	B / 12.4	B / 12.8	C / 21.0	B / 14.8	B / 15.2	B / 18.9	B / 11.4	B / 11.2	B / 13.8
	SBT>	C / 23.7	C / 24.3	D / 43.4	C / 24.7	C / 25.3	C / 26.0	C / 28.7	C / 28.3	D / 37.9
Traffic Signal - Route 110 (Main Street) at Oronoque Lane										
Overall		**D / 45.6**	**D / 44.2**	**D / 42.3**	**C / 33.0**	**D / 38.5**	**D / 40.1**	**D / 50.1**	**E / 59.2**	**D / 42.6**
Oronoque Lane	EBL	B / 11.9	B / 11.9	C / 25.7	C / 20.9	C / 22.0	D / 42.0	C / 20.1	C / 21.8	E / 76.4
	EBR	A / 8.5	A / 8.5	B / 17.4	A / 8.7	A / 8.8	B / 14.1	A / 8.7	A / 8.9	B / 16.6
Route 110 (Main Street)	<NBT	E / 64.8	E / 60.6	E / 66.1	D / 48.7	E / 60.2	E / 55.9	E / 63.3	E / 63.7	E / 63.4
Route 110 (Main Street)	SBT>	C / 28.5	C / 31.1	B / 13.0	C / 21.5	C / 21.8	C / 25.4	D / 49.0	E / 71.4	B / 16.4
Traffic Signal - Route 110 (Main Street) at Sikorsky Gate #1										
Overall		**D / 35.4**	**D / 35.3**	**B / 14.3**	**E / 73.1**	**F / 82.6**	**D / 39.1**	**D / 42.8**	**D / 44.4**	**D / 36.3**
Sikorsky Gate #1	WB	F / 243.4	F / 259.1	C / 32.9	F / 252.2	F / 281.2	F / 106.0	F / 139.7	F / 140.2	F / 120.6
Route 110 (Main Street)	NBT	E / 66.3	E / 65.6	C / 27.8	E / 55.1	E / 64.6	D / 45.0	E / 65.7	E / 66.4	E / 57.2
	NBR	A / 6.9	A / 7.3	A / 2.7	A / 6.5	A / 6.8	A / 4.8	A / 5.3	A / 4.8	A / 3.0
	SB	A / 1.6	A / 1.8	A / 0.9	A / 1.5	A / 1.7	A / 2.6	A / 4.4	A / 7.1	A / 2.0
Traffic Signal - Route 110 (Main Street) at Route 15 SB Ramps / Navajo Lane										
Overall		**D / 46.8**	**D / 49.5**	**D / 37.5**	**C / 27.6**	**C / 31.5**	**C / 25.6**	**F / 81.2**	**F / 90.8**	**D / 48.2**
Navajo Lane	EBL	D / 36.7	D / 36.9	D / 43.5	D / 35.1	D / 35.2	C / 29.9	D / 35.3	D / 35.5	D / 35.5
	EBR	A / 0.8	A / 0.9	A / 1.2	A / 0.7	A / 0.7	A / 0.6	A / 0.9	A / 0.9	A / 0.9
Route 15 SB Ramps	<WBT	D / 48.4	D / 51.3	F / 84.0	F / 139.5	F / 156.0	F / 108.3	F / 471.8	F / 514.5	F / 158.2
	WBR	F / 82.2	F / 83.6	E / 69.8	D / 38.0	D / 47.4	C / 31.9	F / 98.5	F / 96.1	D / 42.0
Route 110 (Main Street)	<NBT	D / 41.9	D / 50.8	C / 29.4	A / 7.2	A / 8.9	B / 10.9	A / 6.2	A / 9.7	B / 19.0
	NBR	A / 0.1	A / 0.1	A / 0.1	A / 0.1	A / 0.1	A / 0.1	A / 0.1	A / 0.0	A / 0.0
Route 110 (Main Street)	SBT>	B / 19.6	C / 20.6	A / 7.4	C / 20.1	C / 22.1	C / 20.8	C / 29.8	D / 41.2	D / 42.7
Traffic Signal - Route 110 (Main Street) at Ryders Lane / Commuter Lot Drive										
Overall		**A / 3.5**	**A / 3.5**	**A / 3.1**	**B / 11.6**	**B / 11.9**	**A / 6.1**	**B / 12.1**	**B / 12.8**	**A / 9.4**
Commuter Lot Drive	EB	A / 0.9	A / 1.0	A / 1.3	C / 23.1	C / 23.0	C / 20.3	B / 18.8	B / 18.4	B / 18.3
Ryders Lane	<WBT	D / 35.5	D / 35.7	D / 41.3	D / 41.9	D / 42.1	D / 35.7	D / 42.7	D / 42.7	D / 39.5
	WBR	A / 0.3	A / 0.4	A / 1.0	A / 6.3	A / 6.1	A / 5.3	A / 6.1	A / 5.9	A / 5.9
Route 110 (Main Street)	NBL	A / 1.0	A / 1.0	A / 1.3	A / 2.2	A / 2.4	A / 2.5	A / 2.4	A / 2.8	A / 4.6
	NBT>	A / 4.2	A / 4.3	A / 4.6	A / 7.0	A / 7.2	A / 6.1	A / 5.9	A / 6.3	A / 8.8
Route 110 (Main Street)	SBL	A / 1.8	A / 1.8	A / 1.1	A / 4.8	A / 4.8	A / 0.7	A / 4.5	A / 4.6	A / 3.6
	SBT>	A / 2.8	A / 2.8	A / 1.6	B / 13.0	B / 13.5	A / 4.9	B / 13.8	B / 14.8	A / 8.5
Traffic Signal - Route 110 (Main Street) at Route 15 NB Ramps / Charlotte Drive										
Overall		**C / 33.6**	**D / 43.4**	**D / 49.5**	**F / 96.6**	**F / 118.4**	**F / 105.6**	**F / 178.3**	**F / 194.1**	**F / 184.2**
Route 15 NB Ramps	EBL	D / 40.0	D / 40.6	D / 53.8	D / 39.4	D / 39.8	D / 42.7	D / 37.4	D / 50.0	D / 50.0
	<EBT	D / 42.4	D / 43.2	E / 59.3	D / 41.5	D / 42.2	D / 46.9	D / 38.8	D / 54.5	D / 54.5
	EBR	A / 0.5	A / 0.5	A / 0.7	A / 0.7	A / 0.8	A / 0.7	A / 0.8	A / 1.1	A / 1.1
Charlotte Street	WB	C / 31.5	C / 31.5	C / 30.5	C / 31.5	C / 31.5	C / 27.0	C / 31.0	C / 26.5	C / 27.5
Route 110 (Main Street)	NBL	C / 25.1	C / 28.4	C / 24.5	B / 10.1	B / 10.7	B / 12.5	B / 18.3	C / 20.2	C / 20.5
	NBT>	B / 13.3	B / 13.5	B / 17.6	B / 11.3	B / 11.6	A / 9.4	B / 14.8	B / 15.8	B / 15.6
Route 110 (Main Street)	SBL	C / 21.5	C / 23.0	C / 31.5	B / 18.0	B / 18.0	B / 15.0	0 / 0.0	0 / 0.0	0 / 0.0
	SBT>	D / 43.3	E / 61.8	E / 69.3	F / 146.8	F / 182.3	F / 160.8	F / 274.2	F / 296.9	F / 281.1
Traffic Signal - Route 110 (Main Street) at Main Street - Putney										
Overall		**C / 20.4**	**C / 22.5**	**B / 19.6**	**B / 14.1**	**B / 15.0**	**B / 15.2**	**C / 21.9**	**D / 36.8**	**D / 37.7**
Main Street	EB	E / 67.2	E / 78.1	E / 60.1	E / 56.3	E / 59.0	D / 50.3	E / 70.5	E / 57.0	E / 63.0
Route 110 (Main Street)	<NBT	B / 17.8	B / 18.2	B / 17.4	B / 15.4	B / 15.7	B / 14.6	B / 18.0	B / 17.2	B / 16.6
Route 110 (Main Street)	SBT>	A / 3.4	A / 3.7	A / 4.8	A / 4.0	A / 5.0	A / 8.0	A / 9.1	D / 45.8	D / 46.1

TABLE 4-1 (Continued)
Intersection Operation Summary - Vehicular Levels of Service / Average Delay (sec/veh)

	Lane Use	Weekday Morning Peak Hour 2034 Future	Weekday Morning Peak Hour 2034 Improved Concept C	Weekday Morning Peak Hour 2034 Improved Concept D	Weekday Sikorsky Shift Change Peak Hour 2034 Future	Weekday Sikorsky Shift Change Peak Hour 2034 Improved Concept C	Weekday Sikorsky Shift Change Peak Hour 2034 Improved Concept D	Weekday Afternoon Peak Hour 2034 Future	Weekday Afternoon Peak Hour 2034 Improved Concept C	Weekday Afternoon Peak Hour 2034 Improved Concept D
Traffic Signal - Route 110 (Main Street) at Warner Hill Road / Sikorsky Gate #2										
Overall		**D / 36.0**	**D / 46.6**	**D / 45.1**	**C / 30.8**	**D / 38.4**	**D / 41.1**	**D / 45.0**	**D / 52.8**	**D / 52.7**
Warner Hill Road	EBL	C / 33.8	C / 32.5	C / 29.9	C / 29.2	C / 32.7	C / 32.7	C / 33.5	C / 33.5	C / 33.5
	EBT>	E / 73.5	E / 72.9	E / 68.8	E / 55.4	E / 60.1	E / 60.1	E / 76.4	E / 76.9	E / 76.9
Sikorsky Gate #2	WBL	E / 59.8	D / 54.6	D / 49.4	C / 30.5	C / 34.0	C / 34.0	D / 41.1	D / 44.3	D / 44.3
	WBT>	D / 42.7	D / 38.9	D / 35.4	D / 47.4	D / 53.6	D / 53.6	E / 68.3	F / 93.4	F / 93.4
Route 110 (Main Street)	NBL	C / 33.8	E / 68.1	E / 66.8	B / 17.4	E / 61.6	E / 77.4	C / 34.9	E / 79.1	F / 82.9
	NBT>	B / 14.8	C / 20.1	B / 13.4	B / 19.3	B / 19.0	C / 23.7	C / 27.0	B / 17.1	B / 15.6
Route 110 (Main Street)	SBL	C / 20.7	E / 76.4	F / 80.3	C / 21.0	E / 61.7	E / 61.7	B / 17.2	E / 57.5	E / 57.5
	SBT>	D / 42.2	D / 48.7	D / 53.4	C / 32.6	D / 37.7	D / 37.7	D / 51.4	E / 66.2	E / 66.2
Traffic Signal - Route 110 (Main Street) at Oronoque Lane										
Overall		**D / 47.7**	**B / 13.4**	**B / 15.6**	**D / 44.9**	**C / 28.0**	**B / 19.1**	**D / 48.7**	**D / 43.6**	**B / 19.4**
	EBL	F / 124.4	E / 57.4	B / 13.1	E / 64.3	E / 55.0	B / 16.0	F / 139.8	E / 58.2	B / 16.3
Oronoque Lane	<EBT>	-- / --	B / 19.7	-- / --	-- / --	B / 19.8	-- / --	-- / --	C / 21.4	-- / --
	EBR	C / 24.6	B / 18.2	B / 12.5	B / 14.1	B / 17.8	B / 14.3	C / 29.3	B / 19.2	B / 15.5
Sikorsky Gate #1	WBL	-- / --	E / 55.2	-- / --	-- / --	E / 57.8	-- / --	-- / --	E / 77.6	-- / --
(Improved Only)	WBT>	-- / --	A / 0.3	-- / --	-- / --	A / 2.2	-- / --	-- / --	A / 1.0	-- / --
	NBL	-- / --	C / 30.1	E / 77.4	-- / --	D / 46.2	E / 79.0	-- / --	E / 64.6	F / 90.6
Route 110 (Main Street)	<NBT	F / 68.7	A / 8.2	A / 1.0	E / 59.4	B / 17.4	A / 0.8	F / 68.8	B / 10.8	A / 1.2
	NBR	-- / --	A / 0.2	-- / --	-- / --	A / 0.1	-- / --	-- / --	A / 0.0	-- / --
Route 110 (Main Street)	SBT>	A / 5.9	B / 15.1	B / 14.8	C / 29.1	C / 22.6	B / 19.1	B / 11.3	E / 70.1	C / 20.6
Traffic Signal - Route 110 (Main Street) at Sikorsky Gate #1										
Overall		**A / 7.3**		**A / 5.2**	**D / 38.2**		**B / 16.0**	**D / 41.5**		**B / 13.0**
Sikorsky Gate #1	WB	D / 50.1	INT. REMOVED	D / 41.5	D / 49.9	INT. REMOVED	D / 49.6	F / 198.1	INT. REMOVED	E / 67.6
	NBT	B / 12.9		A / 8.6	E / 70.5		B / 13.6	E / 55.6		B / 13.0
Route 110 (Main Street)	NBR	A / 3.3		A / 2.6	B / 10.2		A / 2.5	A / 1.9		A / 4.1
	SB	A / 0.7		A / 1.1	A / 7.5		A / 2.8	A / 1.7		A / 3.3
Traffic Signal - Route 110 (Main Street) at Route 15 SB Ramps / Navajo Lane										
Overall		**C / 33.2**	**C / 26.2**	**C / 27.2**	**C / 29.3**	**B / 17.6**	**B / 18.3**	**E / 67.9**	**C / 27.2**	**D / 39.9**
Navajo Lane	EBL	E / 69.2	E / 62.5	E / 56.0	D / 35.6	D / 40.6	D / 40.6	D / 46.4	D / 46.4	D / 46.4
	EBR	A / 2.6	A / 2.2	A / 1.8	A / 0.7	A / 0.9	A / 0.9	A / 1.5	A / 1.5	A / 1.5
Route 15 SB Ramps	<WBT	F / 90.0	E / 74.4	E / 74.0	F / 117.3	D / 53.7	D / 53.7	F / 204.0	E / 67.4	E / 67.4
	WBR	F / 60.3	D / 36.2	D / 38.9	D / 41.0	C / 24.7	C / 24.7	D / 50.4	C / 26.9	C / 26.9
	NBL	-- / --	D / 45.6	D / 44.6	-- / --	D / 38.8	D / 38.8	-- / --	D / 35.4	C / 34.6
Route 110 (Main Street)	<NBT	C / 25.2	D / 39.8	D / 39.3	B / 19.0	C / 27.1	C / 27.1	B / 19.4	C / 30.5	C / 30.0
	NBR	A / 0.1	A / 0.1	A / 0.1	A / 0.1	A / 0.1	A / 0.1	A / 0.1	A / 0.1	A / 0.1
Route 110 (Main Street)	SBT>	A / 5.2	A / 3.7	A / 4.3	C / 20.4	A / 7.9	A / 9.3	F / 67.0	B / 18.5	D / 45.2
Traffic Signal - Route 110 (Main Street) at Ryders Lane / Commuter Lot Drive										
Overall		**A / 3.2**	**A / 1.9**	**A / 2.7**	**A / 6.1**	**A / 5.6**	**A / 5.6**	**A / 7.2**	**A / 8.8**	**A / 8.7**
Commuter Lot Drive	EB	A / 2.5	A / 2.2	A / 1.9	C / 23.1	C / 25.2	C / 25.2	C / 22.2	C / 22.2	C / 22.2
Ryders Lane	<WBT	E / 64.2	E / 58.2	D / 52.5	D / 41.6	D / 45.0	D / 45.0	D / 47.9	D / 47.9	D / 47.9
	WBR	A / 6.2	A / 5.1	A / 3.3	A / 6.3	A / 6.8	A / 6.8	A / 7.3	A / 7.3	A / 7.3
Route 110 (Main Street)	NBL	A / 1.7	A / 1.0	A / 1.0	A / 4.5	A / 2.3	A / 2.3	A / 3.6	A / 2.6	A / 2.4
	NBT>	A / 4.1	A / 1.6	A / 1.7	A / 6.5	A / 4.0	A / 4.0	A / 6.7	A / 4.7	A / 4.8
Route 110 (Main Street)	SBL	A / 1.2	A / 0.9	A / 1.6	A / 2.7	A / 1.8	A / 1.9	A / 2.0	A / 2.2	A / 2.2
	SBT>	A / 1.9	A / 1.4	A / 2.8	A / 4.4	A / 4.6	A / 4.6	A / 5.8	A / 9.1	A / 9.1
Traffic Signal - Route 110 (Main Street) at Route 15 NB Ramps / Charlotte Drive										
Overall		**E / 67.2**	**B / 16.5**	**B / 16.6**	**F / 103.2**	**B / 13.6**	**B / 13.4**	**F / 176.4**	**B / 17.9**	**B / 18.3**
	EBL	E / 74.3	E / 63.7	E / 58.0	E / 61.0	D / 45.7	D / 45.7	F / 98.4	D / 53.3	D / 53.3
Route 15 NB Ramps	<EBT	E / 78.7	E / 67.0	E / 60.9	E / 67.3	D / 48.1	D / 48.1	F / 116.9	E / 57.1	E / 57.1
	EBR	A / 1.1	A / 1.0	A / 0.9	A / 1.0	A / 0.9	A / 0.9	A / 2.3	A / 1.6	A / 1.6
Charlotte Street /	<WBT	C / 23.1	E / 60.4	D / 54.4	B / 19.0	D / 40.8	D / 40.8	C / 25.3	E / 55.6	E / 55.6
New Driveway	WBR	-- / --	A / 1.8	A / 1.5	-- / --	A / 0.4	A / 0.4	-- / --	A / 3.3	A / 3.3
Route 110 (Main Street)	NBL	F / 82.8	B / 12.6	B / 12.7	B / 19.6	B / 12.6	B / 12.6	F / 121.4	C / 25.8	C / 25.7
	NBT>	C / 25.8	B / 11.6	B / 12.0	B / 10.3	B / 13.9	B / 13.9	B / 17.2	B / 15.7	B / 15.7
	SBL	D / 36.8	A / 6.7	A / 8.8	B / 15.1	A / 4.0	A / 3.4	D / 36.9	A / 7.1	A / 7.0
Route 110 (Main Street)	SBT	F / 83.7	B / 12.9	B / 17.4	F / 155.1	A / 9.0	A / 7.7	F / 270.7	B / 15.9	B / 16.1
	SBR	-- / --	A / 1.2	A / 1.3	-- / --	A / 6.5	A / 6.6	-- / --	B / 10.4	B / 11.3
Traffic Signal - Route 110 (Main Street) at Main Street - Putney										
Overall		**C / 24.7**	**B / 18.3**	**B / 18.0**	**B / 17.1**	**B / 10.5**	**B / 10.4**	**D / 50.4**	**B / 15.8**	**B / 15.8**
Main Street - Putney	EB	F / 85.2	E / 67.6	E / 62.4	E / 58.2	D / 51.9	D / 51.9	F / 129.8	E / 56.7	E / 56.7
New Driveway	<WBT	A / 0.6	C / 32.5	C / 29.5	A / 0.2	C / 28.0	C / 28.0	A / 2.9	C / 26.3	C / 26.3
	WBR	-- / --	A / 5.4	A / 4.1	-- / --	A / 0.4	A / 0.4	-- / --	A / 6.7	A / 6.7
Route 110 (Main Street)	NBT	C / 21.6	B / 15.9	B / 16.1	B / 15.4	A / 9.7	A / 9.7	B / 19.4	B / 18.6	B / 18.6
	SBL	-- / --	A / 1.9	A / 2.6	-- / --	A / 0.6	A / 0.6	-- / --	A / 2.0	A / 1.9
Route 110 (Main Street)	SBT>	A / 6.4	A / 3.3	A / 4.9	B / 10.5	A / 3.7	A / 3.4	E / 55.9	A / 4.4	A / 4.5
	SBR	-- / --	A / 0.2	A / 0.2	-- / --	A / 0.2	A / 0.2	-- / --	A / 0.3	A / 0.3

TABLE 4-2

Intersection Operation Summary - Vehicular 50th / 95th Percentile Queue (In Feet)

		Weekday Morning Peak Hour			Weekday Sikorsky Shift Change Peak Hour			Weekday Afternoon Peak Hour		
	Lane Use	2014 Existing	2034 Background	2034 Optimized	2014 Existing	2034 Background	2034 Optimized	2014 Existing	2034 Background	2034 Optimized
Traffic Signal - Route 110 (Main Street) at Warner Hill Road/Sikorsky Gate #2										
Warner Hill Road	EBL	11 / 34	12 / 35	15 / 39	38 / 79	40 / 83	34 / 72	48 / 97	52 / 101	48 / 93
	EBT>	231 / 403	262 / 426	257 / 451	129 / 270	136 / 285	114 / 240	188 / 363	226 / 383	169 / 326
Sikorsky Gate #2	WBL	3 / 11	3 / 12	5 / 15	61 / 104	66 / 109	58 / 94	61 / 102	64 / 106	69 / 108
	WBT>	5 / 26	5 / 27	8 / 34	113 / 283	126 / 305	101 / 246	95 / 243	104 / 263	114 / 275
Route 110 (Main Street)	NBL	125 / 279	150 / 307	152 / 331	65 / 95	69 / 98	26 / 77	102 / 112	106 / 108	90 / 106
	NBT>	128 / 194	141 / 211	175 / 246	162 / 222	174 / 240	113 / 164	192 / 245	201 / 247	157 / 274
Route 110 (Main Street)	SBL	26 / 51	27 / 54	38 / 70	22 / 41	23 / 43	20 / 44	3 / 10	3 / 11	3 / 12
	SBT>	153 / 214	164 / 228	242 / 347	119 / 154	124 / 162	113 / 163	156 / 197	163 / 208	175 / 260
Traffic Signal - Route 110 (Main Street) at Oronoque Lane										
Oronoque Lane	EBL	15 / 71	16 / 73	21 / 111	49 / 120	54 / 128	48 / 168	50 / 126	56 / 137	71 / 228
	EBR	0 / 55	0 / 57	0 / 74	0 / 61	0 / 63	0 / 80	0 / 64	0 / 66	0 / 97
Route 110 (Main Street)	<NBT	296 / 320	328 / 315	232 / 343	172 / 194	176 / 210	76 / 208	251 / 323	274 / 320	209 / 328
Route 110 (Main Street)	SBT>	248 / 328	267 / 368	193 / 250	129 / 166	137 / 173	199 / 194	363 / 490	409 / 498	295 / 341
Traffic Signal - Route 110 (Main Street) at Sikorsky Gate #1										
Sikorsky Gate #1	WB	5 / 17	5 / 17	7 / 21	236 / 343	256 / 364	159 / 273	80 / 124	86 / 132	100 / 185
Route 110 (Main Street)	NBT	321 / 430	382 / 441	98 / 122	177 / 212	186 / 236	172 / 243	207 / 269	243 / 333	192 / 218
	NBR	50 / 60	55 / 58	14 / 15	17 / 47	22 / 47	31 / 41	3 / 5	2 / 3	1 / 1
Route 110 (Main Street)	SBT	19 / 13	20 / 14	13 / 10	20 / 14	21 / 15	25 / 21	23 / 15	26 / 15	17 / 15
Traffic Signal - Route 110 (Main Street) at Route 15 SB Ramps/Navajo Lane										
Navajo Lane	EBL	14 / 39	15 / 41	17 / 46	7 / 24	7 / 25	6 / 23	8 / 26	8 / 27	8 / 27
	EBR	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
Route 15 SB Ramps	<WBT	93 / 185	99 / 199	116 / 245	135 / 269	146 / 283	115 / 245	312 / 479	333 / 503	261 / 431
	WBR	353 / 530	405 / 572	509 / 653	155 / 221	165 / 254	140 / 226	236 / 367	271 / 393	226 / 350
Route 110 (Main Street)	<NBT	203 / 323	235 / 358	111 / 308	101 / 135	109 / 144	96 / 124	84 / 114	92 / 133	126 / 194
	NBR	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
Route 110 (Main Street)	SBT>	241 / 315	259 / 362	123 / 128	474 / 469	505 / 500	374 / 563	526 / 663	565 / 724	656 / 772
Traffic Signal - Route 110 (Main Street) at Ryders Lane/Commuter Lot Drive										
Commuter Lot Drive	EB	0 / 0	0 / 0	0 / 0	9 / 32	10 / 35	8 / 32	6 / 29	6 / 30	6 / 31
Ryders Lane	<WBT	8 / 26	8 / 26	9 / 29	31 / 66	33 / 69	28 / 62	38 / 76	40 / 79	40 / 81
	WBR	0 / 0	0 / 0	0 / 3	0 / 30	0 / 30	0 / 27	0 / 29	0 / 29	0 / 30
Route 110 (Main Street)	NBL	0 / 1	0 / 0	0 / 1	0 / 3	0 / 3	1 / 1	1 / 1	1 / 1	1 / 1
	NBT>	104 / 130	109 / 136	37 / 144	102 / 127	106 / 133	103 / 136	82 / 103	87 / 108	112 / 181
Route 110 (Main Street)	SBL	2 / 3	2 / 3	2 / 2	13 / 19	13 / 19	1 / 0	7 / 10	8 / 11	6 / 6
	SBT>	74 / 100	74 / 102	60 / 57	347 / 497	411 / 518	6 / 422	430 / 536	452 / 544	210 / 199
Traffic Signal - Route 110 (Main Street) at Route 15 NB Ramps/Charlotte Drive										
Route 15 NB Ramps	EBL	84 / 142	88 / 149	102 / 187	82 / 141	86 / 147	75 / 157	65 / 114	70 / 150	70 / 150
	<EBT	85 / 145	89 / 151	103 / 198	83 / 143	87 / 149	76 / 167	65 / 115	71 / 157	71 / 157
	EBR	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
Charlotte Street	WB	1 / 7	1 / 7	1 / 7	1 / 7	1 / 7	1 / 7	1 / 7	1 / 7	1 / 7
Route 110 (Main Street)	NBL	52 / 115	54 / 131	61 / 92	26 / 37	27 / 40	23 / 46	50 / 68	52 / 80	53 / 80
	NBT>	105 / 115	107 / 115	137 / 189	104 / 148	110 / 155	86 / 117	127 / 144	135 / 184	134 / 176
Route 110 (Main Street)	SBL	0 / 1	0 / 1	1 / 2	0 / 0	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0
	SBT>	99 / 355	135 / 393	350 / 508	490 / 604	538 / 460	411 / 539	664 / 825	668 / 884	567 / 894
Traffic Signal - Route 110 (Main Street) at Main Street - Putney										
Main Street	EB	110 / 264	117 / 279	128 / 236	72 / 167	76 / 177	66 / 148	123 / 296	126 / 242	128 / 254
Route 110 (Main Street)	<NBT	105 / 146	112 / 155	124 / 168	91 / 128	96 / 135	83 / 120	106 / 147	110 / 153	107 / 149
Route 110 (Main Street)	SBT>	15 / 14	16 / 14	25 / 25	25 / 17	22 / 17	18 / 16	29 / 13	32 / 21	36 / 20

TABLE 4-2 (Continued)

Intersection Operation Summary - Vehicular 50th / 95th Percentile Queue (In Feet)

		Weekday Morning Peak Hour			Weekday Sikorsky Shift Change Peak Hour			Weekday Afternoon Peak Hour		
	Lane Use	2034 Future	2034 Improved Concept C	2034 Improved Concept D	2034 Future	2034 Improved Concept C	2034 Improved Concept D	2034 Future	2034 Improved Concept C	2034 Improved Concept D
Traffic Signal - Route 110 (Main Street) at Warner Hill Road/Sikorsky Gate #2										
Warner Hill Road	EBL	21 / 48	20 / 46	18 / 44	38 / 77	43 / 84	43 / 84	60 / 108	60 / 108	60 / 108
	EBT>	383 / 584	362 / 572	331 / 538	135 / 255	154 / 278	154 / 278	240 / 423	240 / 423	240 / 423
Sikorsky Gate #2	WBL	7 / 21	6 / 19	6 / 18	67 / 104	76 / 115	76 / 115	88 / 130	90 / 133	90 / 133
	WBT>	12 / 44	11 / 42	10 / 40	125 / 270	151 / 305	151 / 305	163 / 343	186 / 366	186 / 366
Route 110 (Main Street)	NBL	249 / 243	287 / 497	272 / 477	57 / 95	67 / 224	142 / 250	154 / 145	222 / 394	179 / 376
	NBT>	228 / 227	290 / 354	199 / 302	241 / 307	267 / 346	136 / 166	281 / 302	237 / 328	105 / 317
Route 110 (Main Street)	SBL	54 / 88	101 / 179	94 / 192	24 / 52	46 / 107	46 / 107	4 / 14	8 / 27	8 / 27
	SBT>	378 / 470	358 / 492	332 / 475	148 / 226	173 / 261	173 / 261	256 / 367	264 / 393	264 / 393
Traffic Signal - Route 110 (Main Street) at Oronoque Lane										
	EBL	114 / 279	32 / 69	14 / 51	75 / 220	43 / 97	22 / 61	162 / 331	47 / 95	24 / 67
Oronoque Lane	<EBT>	-- / --	4 / 82	-- / --	-- / --	4 / 101	-- / --	-- / --	5 / 116	-- / --
	EBR	0 / 106	0 / 73	0 / 72	0 / 72	0 / 87	0 / 72	32 / 171	0 / 101	0 / 84
Sikorsky Gate #1	WBL	-- / --	9 / 24	-- / --	-- / --	185 / 288	-- / --	-- / --	107 / 191	-- / --
(Improved Only)	WBT>	-- / --	0 / 0	-- / --	-- / --	0 / 9	-- / --	-- / --	0 / 0	-- / --
	NBL	-- / --	200 / 249	190 / 305	-- / --	139 / 290	109 / 231	-- / --	208 / 368	174 / 288
Route 110 (Main Street)	<NBT	264 / 391	251 / 304	13 / 9	184 / 246	246 / 296	3 / 1	292 / 429	245 / 280	12 / 9
	NBR	-- / --	0 / 0	-- / --	-- / --	0 / 0	-- / --	-- / --	0 / 0	-- / --
Route 110 (Main Street)	SBT>	133 / 152	445 / 511	129 / 142	235 / 292	253 / 318	78 / 113	165 / 182	449 / 483	175 / 431
Traffic Signal - Route 110 (Main Street) at Sikorsky Gate #1										
Sikorsky Gate #1	WB	10 / 28		8 / 24	178 / 282		201 / 303	139 / 231		114 / 196
Route 110 (Main Street)	NBT	214 / 162	**INT.**	163 / 188	271 / 322	**INT.**	150 / 137	223 / 257	**INT.**	171 / 202
	NBR	7 / 8	**REMOVED**	18 / 18	36 / 54	**REMOVED**	0 / 13	1 / 1	**REMOVED**	2 / 5
Route 110 (Main Street)	SBT	12 / 11		14 / 10	29 / 24		38 / 28	16 / 15		28 / 21
Traffic Signal - Route 110 (Main Street) at Route 15 SB Ramps/Navajo Lane										
Navajo Lane	EBL	26 / 62	24 / 58	22 / 54	7 / 25	8 / 28	8 / 28	10 / 32	10 / 32	10 / 32
	EBR	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
Route 15 SB Ramps	<WBT	214 / 375	192 / 323	177 / 319	150 / 292	144 / 219	144 / 219	448 / 651	332 / 542	332 / 542
	WBR	705 / 880	544 / 707	521 / 718	177 / 279	167 / 211	167 / 211	303 / 439	249 / 327	249 / 327
	NBL	-- / --	5 / 27	5 / 27	-- / --	6 / 29	6 / 29	-- / --	6 / 19	6 / 19
Route 110 (Main Street)	<NBT	126 / 248	207 / 308	192 / 308	115 / 212	138 / 291	138 / 291	184 / 249	202 / 308	214 / 312
	NBR	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
Route 110 (Main Street)	SBT>	67 / 71	49 / 83	51 / 79	602 / 736	285 / 307	205 / 253	931 / 1024	323 / 622	499 / 650
Traffic Signal - Route 110 (Main Street) at Ryders Lane/Commuter Lot Drive										
Commuter Lot Drive	EB	0 / 0	0 / 0	0 / 0	9 / 35	11 / 38	11 / 38	8 / 36	8 / 36	8 / 36
Ryders Lane	<WBT	14 / 39	13 / 37	12 / 34	32 / 70	37 / 76	37 / 76	51 / 98	51 / 98	51 / 98
	WBR	0 / 10	0 / 9	0 / 6	0 / 31	0 / 34	0 / 34	0 / 36	0 / 36	0 / 36
Route 110 (Main Street)	NBL	1 / 1	0 / 2	0 / 2	1 / 4	1 / 2	1 / 2	0 / 1	0 / 1	0 / 1
	NBT>	115 / 158	32 / 48	32 / 47	27 / 71	24 / 35	24 / 35	42 / 220	42 / 93	49 / 90
Route 110 (Main Street)	SBL	3 / 3	2 / 3	4 / 3	7 / 9	6 / 6	6 / 6	5 / 5	4 / 5	4 / 5
	SBT>	93 / 102	65 / 95	173 / 98	136 / 152	108 / 87	116 / 86	154 / 137	150 / 926	145 / 921
Traffic Signal - Route 110 (Main Street) at Route 15 NB Ramps/Charlotte Drive										
	EBL	163 / 250	150 / 222	136 / 204	95 / 205	105 / 165	105 / 165	106 / 233	101 / 165	101 / 165
Route 15 NB Ramps	<EBT	161 / 250	149 / 221	134 / 203	95 / 208	105 / 166	105 / 166	109 / 247	104 / 171	104 / 171
	EBR	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1	0 / 1
Charlotte Street /	<WBT	26 / 69	28 / 63	25 / 59	7 / 31	9 / 30	9 / 30	63 / 126	50 / 97	50 / 97
New Driveway	WBR	-- / --	0 / 0	0 / 0	-- / --	0 / 0	0 / 0	-- / --	0 / 3	0 / 3
Route 110 (Main Street)	NBL	95 / 376	98 / 193	79 / 174	29 / 89	38 / 143	38 / 143	142 / 286	137 / 269	139 / 268
	NBT>	211 / 272	76 / 123	78 / 107	108 / 142	44 / 177	44 / 177	180 / 204	99 / 204	101 / 207
	SBL	46 / 95	11 / 24	16 / 24	7 / 11	4 / 2	3 / 2	67 / 88	15 / 30	13 / 30
Route 110 (Main Street)	SBT	651 / 778	67 / 146	97 / 158	553 / 651	73 / 157	57 / 157	930 / 1173	142 / 313	142 / 319
	SBR	-- / --	0 / 7	21 / 7	-- / --	98 / 709	338 / 709	-- / --	184 / 343	185 / 343
Traffic Signal - Route 110 (Main Street) at Main Street - Putney										
Main Street - Putney	EBT	191 / 296	175 / 247	159 / 228	75 / 160	86 / 140	86 / 140	165 / 321	158 / 229	158 / 229
New Driveway	<WBT	0 / 0	1 / 8	1 / 7	0 / 0	1 / 4	1 / 4	0 / 16	3 / 14	3 / 14
	WBR	-- / --	0 / 18	0 / 15	-- / --	0 / 0	0 / 0	-- / --	0 / 38	0 / 38
Route 110 (Main Street)	NBT	173 / 235	266 / 451	254 / 437	96 / 135	95 / 295	95 / 295	137 / 182	257 / 443	257 / 443
	SBL	-- / --	3 / 3	5 / 3	-- / --	0 / 1	0 / 1	-- / --	2 / 5	2 / 5
Route 110 (Main Street)	SBT>	36 / 36	27 / 68	42 / 100	28 / 16	23 / 136	8 / 136	46 / 28	43 / 113	43 / 115
	SBR	-- / --	0 / 0	0 / 0	-- / --	0 / 0	0 / 0	-- / --	0 / 0	0 / 0

TABLE 4-3 (Locations A through C)

Route 110 Screened Improvement Alternatives Summary

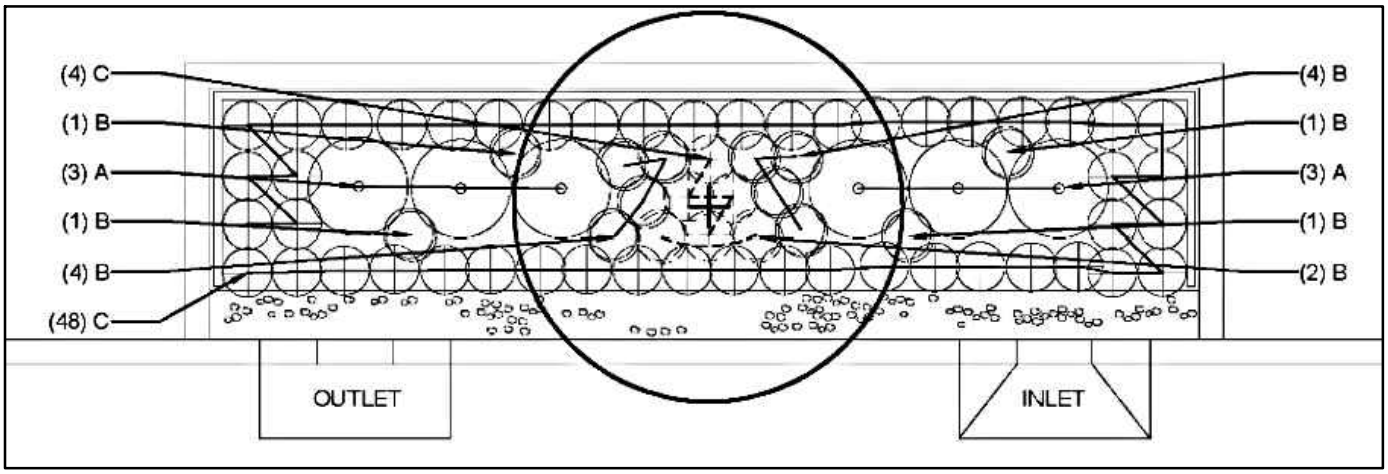
Concept	Project Scope	Reason for Screening
A1	Relocates Main Street – Putney intersection to south similar to preferred Concept A and proposes unsignalized operation of the intersection	• Insufficient operation with LOS F on side streets • Safety concerns with vehicles exiting Main Street – Putney crossing 3 southbound lanes on Route 110
B1	Scope similar to preferred Concept B without the proposed southbound right turn lane onto the Route 15 ramp	• Southbound dedicated right turn lane on Route 110 provided in preferred Concept B provides improved traffic operations • Right of way exists to include additional southbound right turn lane
B2	Increases widening on Route 110 to include two, southbound right turn lanes onto Route 15 ramp with multiple merges within the loop ramp	• Safety concerns with multiple on-ramp merges and weaving of vehicles • Low cost to benefit ratio
C1	Scope similar to preferred Concept C without the proposed channelizing right turn island into Sikorsky Gate #1 from Route 110 northbound and allowing through movements from Oronoque Lane	• Channelizing island for Route 110 northbound right turns (Concept C) results in improved operations • Channelizing island provides protection from through Oronoque Lane through vehicles crossing into Sikorsky Gate #1
C2	Realignment of intersection by shifting both Oronoque Lane and Sikorsky Gate #1	• Grading issues for the relocated Oronoque Lane alignment
C3	Realignment of intersection includes splitting the inbound and outbound Sikorsky Gate #1 traffic streams with inbound in existing location and outbound opposite Oronoque Lane	• More significant impact to parking with Sikorsky site than preferred Concept C • Grading issues for the widened Oronoque Lane alignment
D1	Scope similar to preferred Concept D without the additional southbound through lane south of Sikorsky Gate #1	• Preferred Concept D with the additional southbound right turn lane south of Sikorsky Gate #1 intersection for Route 15 Southbound traffic results in increased capacity and improved traffic operations
D2	Scope similar to preferred Concept D without the additional northbound lane from the Route 15 southbound ramps to Oronoque Lane	• Preferred Concept D with the additional northbound left turn lane to Oronoque Lane results in increased capacity and improve traffic operations
D3	Scope similar to preferred Concept D without the additional northbound lane and with the additional southbound through lane extended through the Oronoque Lane intersection	• Preferred Concept D with the additional northbound left turn lane to Oronoque Lane results in increased capacity and improve traffic operations • Additional southbound lane at Oronoque Lane promotes vehicle by-pass and weaving downstream

TABLE 4-3 (Continued – Locations D & E)

Route 110 Screened Improvement Alternatives Summary

Concept	Project Scope	Reason for Screening
D4	Scope similar to preferred Concept D without the additional northbound lane and with the additional southbound lane extended through the Route 15 southbound ramps / Navajo Lane intersection and merging before the Route 15 overpass	• Insufficient southbound merge taper distance south of the Route 15 southbound ramp / Navajo Lane intersection to provide two lanes under the Merritt Parkway Bridge • Preferred Concept D with the additional northbound left turn lane to Oronoque Lane results in increased capacity and improve traffic operations
D5	Scope similar to preferred Concept D without the additional northbound lane, the additional southbound from just north of the Oronoque Lane intersection and through the Route 15 southbound ramps / Navajo Lane intersection and merging before the Route 15 overpass	• Insufficient southbound merge taper distance south of the Route 15 southbound ramp / Navajo Lane intersection to provide two lanes under the Merritt Parkway Bridge • Preferred Concept D with the additional northbound left turn lane to Oronoque Lane results in increased capacity and improve traffic operations • Additional southbound lane at Oronoque Lane promotes vehicle by-pass and weaving downstream
D6	Scope similar to preferred Concept D with the additional southbound through lane extended through the Oronoque Lane intersection	• Additional southbound lane at Oronoque Lane promotes vehicle by-pass and weaving downstream
D7	Scope similar to preferred Concept D with the additional southbound through lane extended through the Route 15 southbound ramps / Navajo Lane intersection and merging before the Route 15 overpass	• Insufficient southbound merge taper distance south of the Route 15 southbound ramp / Navajo Lane intersection to provide two lanes under the Merritt Parkway Bridge
D8	Scope similar to preferred Concept D with southbound lane extending through both the Oronoque Lane and the Route 15 southbound ramps / Navajo Lane intersections	• Insufficient southbound merge taper distance south of the Route 15 southbound ramp / Navajo Lane intersection to provide two lanes under the Merritt Parkway Bridge • Additional southbound lane at Oronoque Lane promotes vehicle by-pass and weaving downstream
E1	Consolidates access to Alltown-Mobil to the southern driveway location and closing the northern driveway adjacent to Oronoque Plaza driveway	• Site access concerns from property owner • Insufficient evidence of safety concerns due to recent reconstruction of the Alltown-Mobil site

URBAN PLAN 1 PLANT SCHEDULE							
QUAN	KEY	PLAN VERSION	TYPE	BOTANICAL NAME	COMMON NAME	SIZE	SPACING
6	A	A	SHRUB	ILEX GLABRA 'SHAMROCK'	INKBERRY	#5 CONT. OR B&B	2' O.C.
		B	ROSE	ROSA PALUSTRIS	SWAMP ROSE	#2/#3 CONT.	
12	B	A	PERENNIAL	HIBISCUS MOSCHEUTOS 'LUNA PINK'	HARDY HIBISCUS	#2 CONT.	12" O.C.
		B	PERENNIAL	RUDBECKIA SUBTOMENTOSA 'HENRY EILERS'	SWEET CONEFLOWER	#2 CONT.	
48	C	A	GRASSES	PENNISETUM ALOPECUROIDES 'LITTLE BUNNY'	FOUNTAIN GRASS	#2 CONT.	12" O.C.
		B	GRASSES	CAREX 'ICE DANCE'	SEDGE	#2 CONT.	
ONLY PLANTED IN R.O.W. RAIN GARDEN OR R.O.W. BIOSWALE WITH NO TREE							
2	B	A	PERENNIAL	HIBISCUS MOSCHEUTOS 'LUNA PINK'	HARDY HIBISCUS	#2 CONT.	12" O.C.
		B	PERENNIAL	RUDBECKIA SUBTOMENTOSA 'HENRY EILERS'	SWEET CONEFLOWER	#2 CONT.	
4	C	A	GRASSES	PENNISETUM ALOPECUROIDES 'LITTLE BUNNY'	FOUNTAIN GRASS	#2 CONT.	12" O.C.
		B	GRASSES	CAREX 'ICE DANCE'	SEDGE	#2 CONT.	



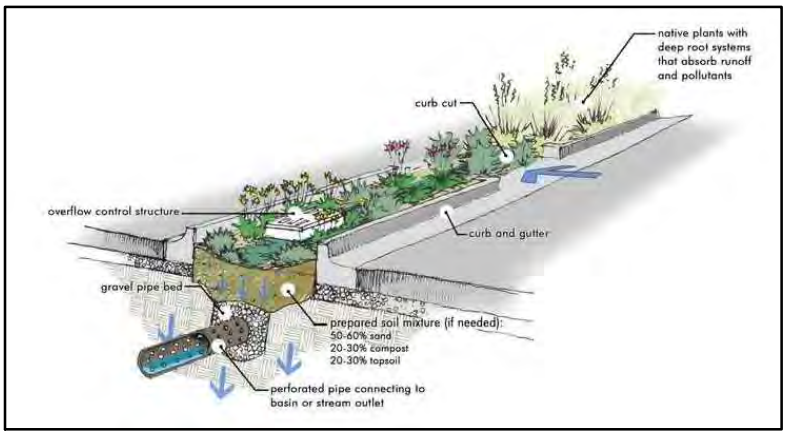
SOURCE: PLANT SCHEDULE FOR URBAN BIOSWALES AS SPECIFIED IN CITY OF NEW YORK'S OFFICE OF ENVIRONMENTAL PROTECTION'S STANDARDS FOR GREEN INFRASTRUCTURE GUIDEBOOK, SOURCE; CITY OF NEW YORK OFFICE OF GREEN INFRASTRUCTURE

ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

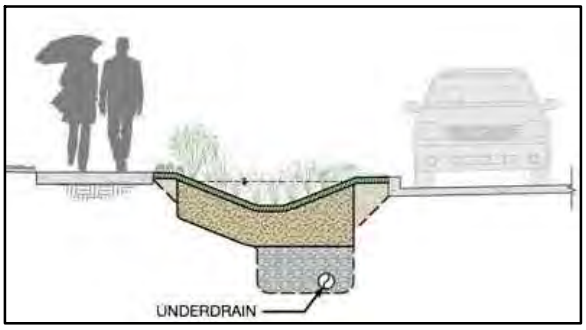
BIOSWALE PLANTING DETAILS

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 5-1

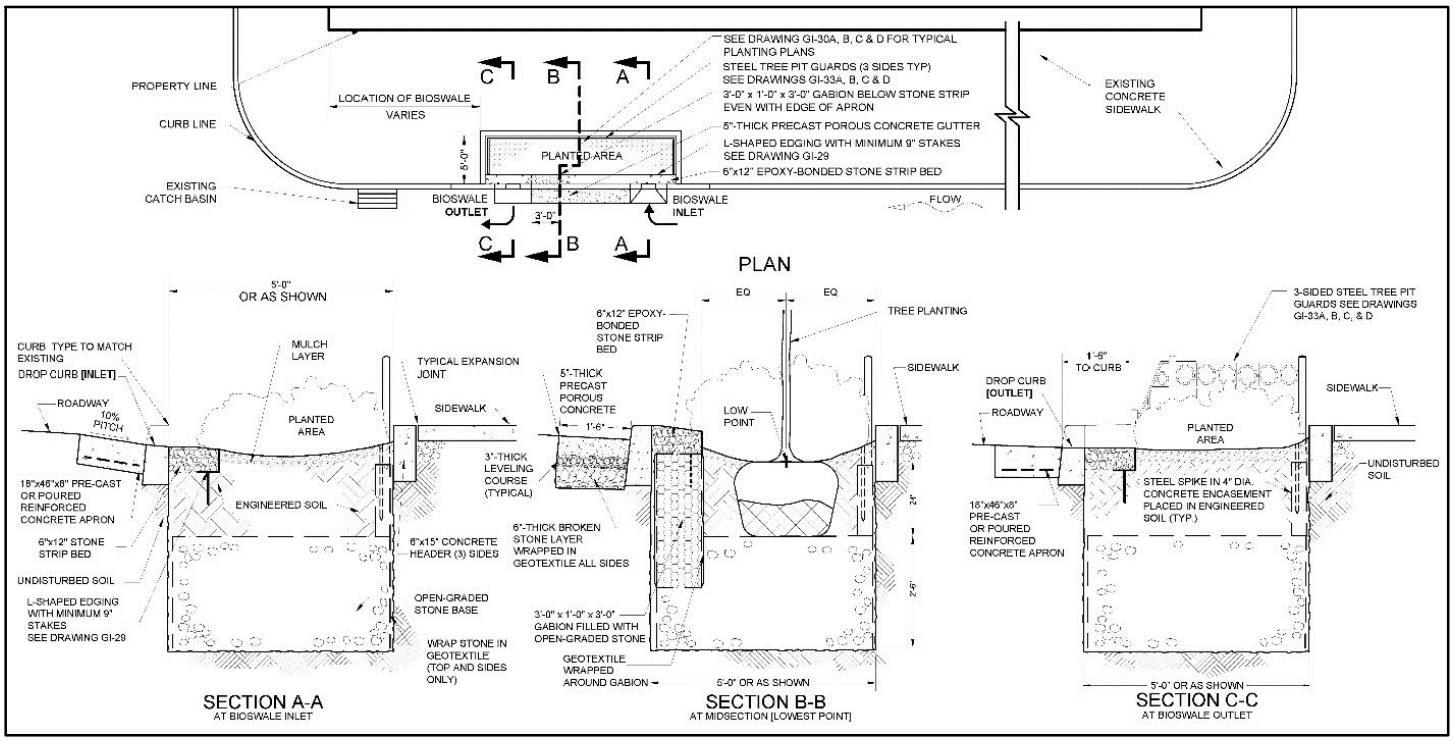
Tighe&Bond



TYPICAL BIOSWALE DETAIL



TYPICAL ROADSIDE BIOSWALE WITH UNDERDRAIN



TYPICAL BIOSWALE CONSTRUCTION DETAIL

SOURCE: CONSTRUCTION DETAILS FOR URBAN BIOSWALES AS SPECIFIED IN CITY OF NEW YORK'S OFFICE OF ENVIRONMENTAL PROTECTION'S "STANDARDS FOR GREEN INFRASTRUCTURE GUIDEBOOK."

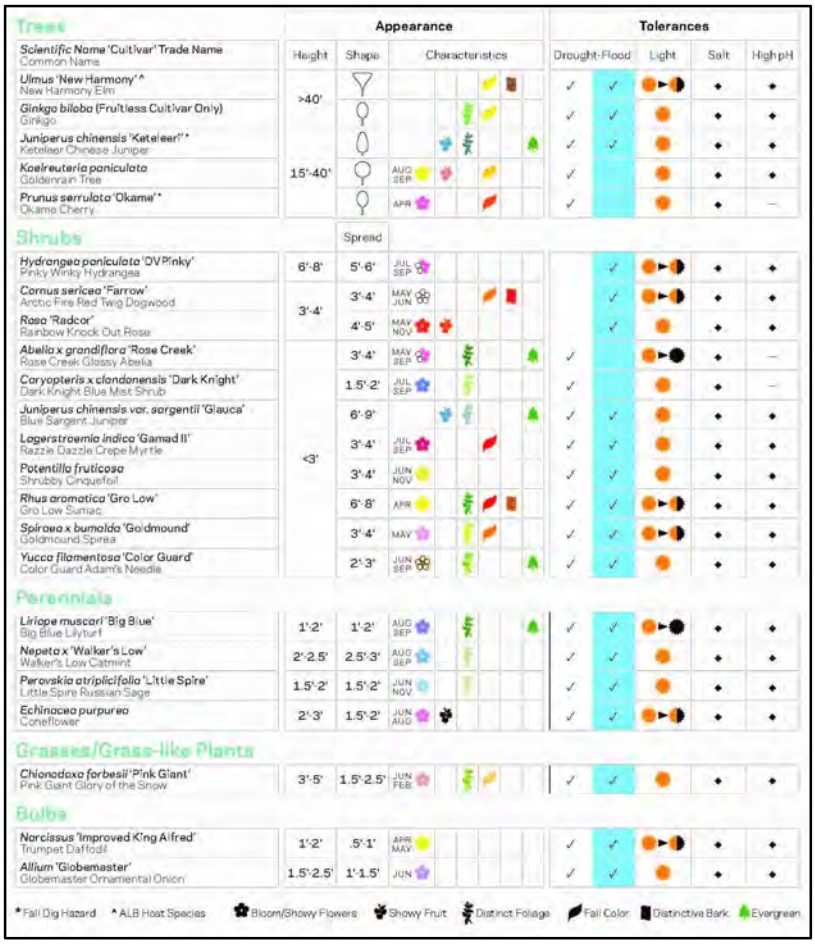
ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

BIOSWALE SECTIONS AND CONSTRUCTION DETAILS

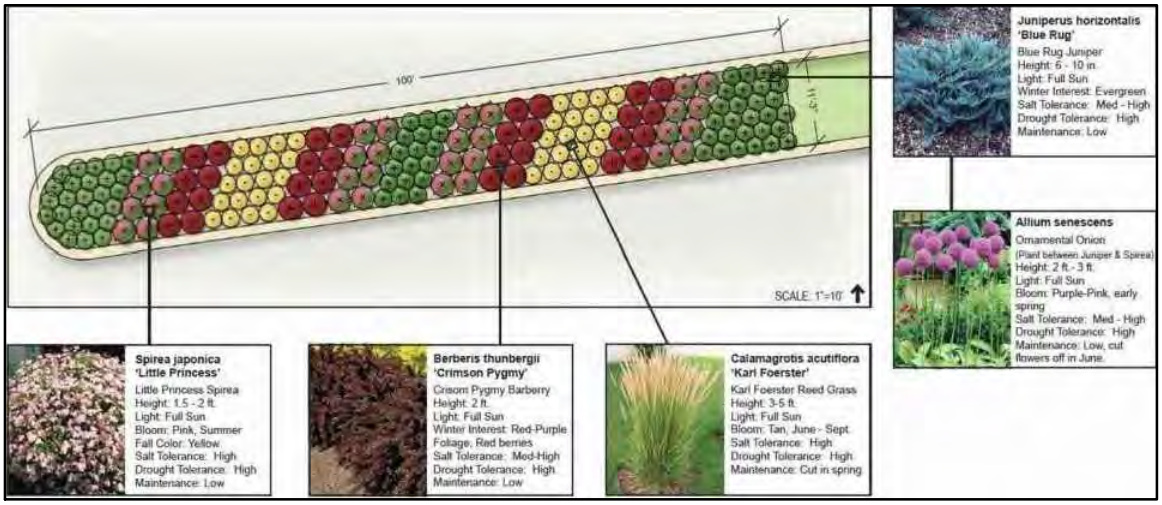
DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 5-2

Tighe&Bond

02/17/2016



TYPICAL PLATING SCHEMATIC FOR LANDSCAPED MEDIANS
(SOURCE: NY DOT STREET DESIGN MANUAL)



TYPICAL PLANTING SCHEMATIC OF LANDSCAPED MEDIAN
(SOURCE: PENNSYLVANIA DEPARTMENT OF TRANSPORTATION)

ROUTE 110 ENGINEERING STUDY
STRATFORD, CONNECTICUT

MEDIAN PLANTING DETAILS

DATE: APRIL 2017
SCALE: NO SCALE
FIGURE 5-3

Tighe&Bond

02/17/2016

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APPENDIX B

CAPACITY ANALYSIS RESULTS:

2034 FUTURE: C | B | C

2034 IMPROVED: B | B | B

- PM LOS
- SIKORSKY SHIFT CHANGE LOS
- AM LEVEL OF SERVICE (LOS)

ROUTE 110 (RIVER ROAD)

110

MAIN STREET - PUTNEY

MEADOWMERE ROAD

CLOSE NORTH ACCESS ON MEADOWMERE ROAD. TRAFFIC TO USE SOUTH ACCESS

15

ROUTE 15 INTERCHANGE 53 NB ON/OFF RAMPS

PROVIDE EXCLUSIVE TURN LANE INTO MAIN STREET - PUTNEY

PROPERTY IMPACT: 1,600 S.F. DESIGN TO LIMIT IMPACT TO PRIVATE PROPERTY, WHERE FEASIBLE.

RELOCATE MAIN-PUTNEY SIGNALIZED INTERSECTION

ROUTE 110 (MAIN STREET)

PROPOSED SHARED USE PATH

MODIFY TRAFFIC SIGNAL TO REMOVE MAIN STREET-PUTNEY CLUSTER OPERATION AND COORDINATE WITH RELOCATED MAIN-PUTNEY INTERSECTION

110

CHARLOTTE STREET

FUTURE DEVELOPMENT PARCELS

CONCEPT BENEFITS:

- MITIGATES CAPACITY ISSUES BY SEPARATING OPERATION FROM MERRITT PARKWAY NB RAMPS
- REALIGNMENT ALLOW FOR SAFER TURNING MOVEMENTS IN AND OUT OF MAIN STREET - PUTNEY
- IMPROVED BICYCLE & PEDESTRIAN ACCESS
- ACCOMMODATES FUTURE LAND DEVELOPMENT

SCALE IN FEET

0 80' 160'

GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT A

DATE: APRIL 2017

SCALE: 1"=80'

FIGURE A

Tighe&Bond

12/20/2016

Dec 20, 2016-2:21pm Plotted By: CDY
Tighe & Bond, Inc. J:\G\G0648 GBRC-Route 110 Study\Drawing\Sheet\CON-G0648-A.dwg

CAPACITY ANALYSIS RESULTS:

2034 FUTURE: E | F | F

2034 IMPROVED: B | B | B

- PM LOS
- SIKORSKY SHIFT CHANGE LOS
- AM LEVEL OF SERVICE (LOS)

MAIN STREET - PUTNEY

MEADOWMERE ROAD

ROUTE 15 NB ON/OFF RAMPS

15

110

REMOVE CHANNELIZED RIGHT, WIDEN RAMP MEDIAN, AND ADD CAT TRACKS TO GUIDE NORTHBOUND LEFT TURNS

REMOVE EXISTING YIELD CONTROL AND CREATE EXTENDED MERGE LANE. PROVIDE SIGNAGE AND PAVEMENT MARKINGS IN ACCORDANCE WITH MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR LANE MERGES.

REDUCE CHANNELIZED RIGHT TURN RADIUS TO CALM ROUTE 110 SB TRAFFIC, INCREASE TURN LANE STORAGE, AND ALLOW MERGING TRAFFIC STREAMS ON A TANGENT

WIDEN TO WEST FOR EXCLUSIVE TURN LANE ONTO ROUTE 15 NB RAMP

PROPOSED BUS SHELTER

PROPOSED SIDEWALK

ROUTE 110 (MAIN STREET)

PROPOSED SHARED USE PATH

FUTURE DEVELOPMENT PARCELS

CHARLOTTE STREET / NEW RYDERS LANDING ACCESS DRIVEWAY

FUTURE DEVELOPMENT PARCELS

110

RYDERS LANE

SIKORSKY ESTUARY WALK

N

CONCEPT BENEFITS:

- IMPROVED RAMP OPERATIONS FOR ROUTE 110 SB TRAFFIC
- MITIGATES CAPACITY ISSUES BY SEPARATING OPERATION FROM MAIN STREET - PUTNEY
- SAFER TURNING MOVEMENTS FOR ROUTE 110 NB LEFT TURNS
- IMPROVED PEDESTRIAN, BICYCLE AND TRANSIT ACCESS
- ACCOMMODATES FUTURE LAND DEVELOPMENT

SCALE IN FEET

0 100' 200'

GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT B

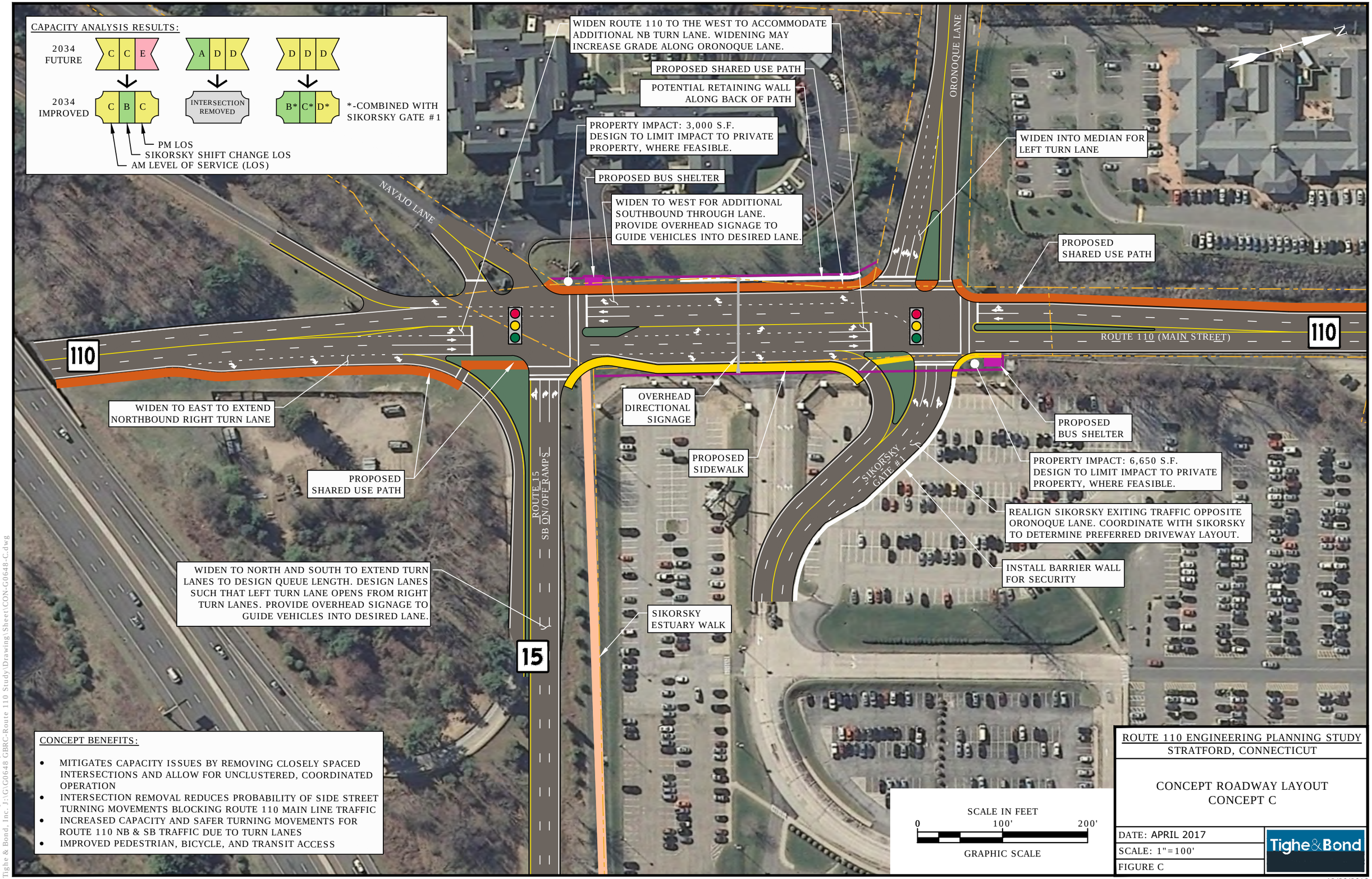
DATE: APRIL 2017

SCALE: 1"=100'

FIGURE B

Tighe&Bond

12/20/2016



CONCEPT BENEFITS:

- MITIGATES CAPACITY ISSUES BY REMOVING CLOSELY SPACED INTERSECTIONS AND ALLOW FOR UNCLUSTERED, COORDINATED OPERATION
- INTERSECTION REMOVAL REDUCES PROBABILITY OF SIDE STREET TURNING MOVEMENTS BLOCKING ROUTE 110 MAIN LINE TRAFFIC
- INCREASED CAPACITY AND SAFER TURNING MOVEMENTS FOR ROUTE 110 NB & SB TRAFFIC DUE TO TURN LANES
- IMPROVED PEDESTRIAN, BICYCLE, AND TRANSIT ACCESS

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT C

DATE: APRIL 2017
SCALE: 1"=100'
FIGURE C

Tighe&Bond

12/20/2016

CLOSE EXISTING CURB CUT

MAINTAIN EXISTING EXIT ONLY
CURB CUT TO ENTRANCE ONLY

CREATE NEW SHARED ACCESS
DRIVEWAY WITH ADJACENT
FUTURE DEVELOPMENT PARCEL

NEW SHARED DRIVEWAY

ORONOQUE PLAZA DRIVEWAY

FUTURE
DEVELOPMENT
PARCELS

MATCH LINE - SEE CONCEPT F

ROUTE 110 (MAIN STREET)

110

PROPOSED
SHARED USE PATH

WIDEN TO EAST AND WEST TO PROVIDE
EXCLUSIVE LEFT TURN LANE INTO
ORONOQUE PLAZA, ALLTOWN MOBIL,
AND NEW DEVELOPMENT PARCEL

CONCEPT BENEFITS:

- ADDRESSES PERCEIVED SAFETY CONCERN WITH ALLTOWN-MOBIL & ORONOQUE PLAZA DRIVEWAYS
- INCREAESED CAPACITY & SAFER TURNING MOVEMENTS FOR ROUTE 110 NB LEFT TURNING TRAFFIC
- IMPROVED BICYCLE & PEDESTRIAN ACCESS
- ACCOMMODATES FUTURE LAND DEVELOPMENT

SCALE IN FEET
0 80' 160'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT E

DATE: APRIL 2017
SCALE: 1"=80'
FIGURE E

Tighe&Bond

12/20/2016

CAPACITY ANALYSIS RESULTS:

2034 FUTURE: D | C | D

2034 IMPROVED: D | D | D

PM LOS
SIKORSKY SHIFT CHANGE LOS
AM LEVEL OF SERVICE (LOS)

NOTE:
SAFETY IMPROVEMENTS INSTALLED AT INTERSECTION CAUSED REDUCED CAPACITY.

N

WARNER HILL ROAD

DURING DESIGN OF IMPROVEMENTS INVESTIGATE OPPORTUNITIES TO SMOOTH GRADING TRANSITION BETWEEN WARNER HILL ROAD AND ROUTE 110.

EXPLORE POSSIBLE TRAIL CONNECTION TO TOWN LAND ALONG FAR MILL RIVER

EXTEND EASTBOUND LEFT TURN LANE AND INSTALL WEAR-RESISTANT PAVEMENT MARKINGS ON WARNER HILL ROAD

PROPOSED SHARED USE PATH

PROPOSED BUS SHELTER

MATCH LINE - SEE CONCEPT E

ROUTE 110 (MAIN STREET)

110

EXTEND NORTHBOUND LEFT TURN LANE

MODIFY SIGNAL FOR PROTECTED ONLY ROUTE 110 LEFT TURNS

SIKORSKY GATE #2

PROPOSED BUS SHELTER

PROPERTY IMPACT 475 S.F.

INSTALL LEFT TURN LANE CAT TRACK PAVEMENT MARKINGS

CONCEPT BENEFITS:

- REVISED PROTECTED-ONLY PHASING AND PAVEMENT MARKINGS INCREASE SAFETY FOR ROUTE 110 NB LEFT TURNING TRAFFIC
- IMPROVED PEDESTRIAN, BICYCLE, & TRANSIT ACCESS

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT F

DATE: APRIL 2017
SCALE: 1"=100'
FIGURE F

Tighe&Bond

12/20/2016

Dec 20, 2016-2:21pm Plotted By: CDY
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NOTE:
SEE INDIVIDUAL CONCEPT PLANS FOR DETAIL OF PROPOSED PEDESTRIAN CROSSINGS AT INTERSECTIONS.

SCALE IN FEET
0 400' 800'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT G
PEDESTRIAN, BIKE AND TRANSIT ACCOMMODATIONS

DATE: APRIL 2017
SCALE: 1"=400'
FIGURE G - SHEET 1

Tighe&Bond

12/20/2016

Dec 20, 2016-2:22pm Plotted By: CDY
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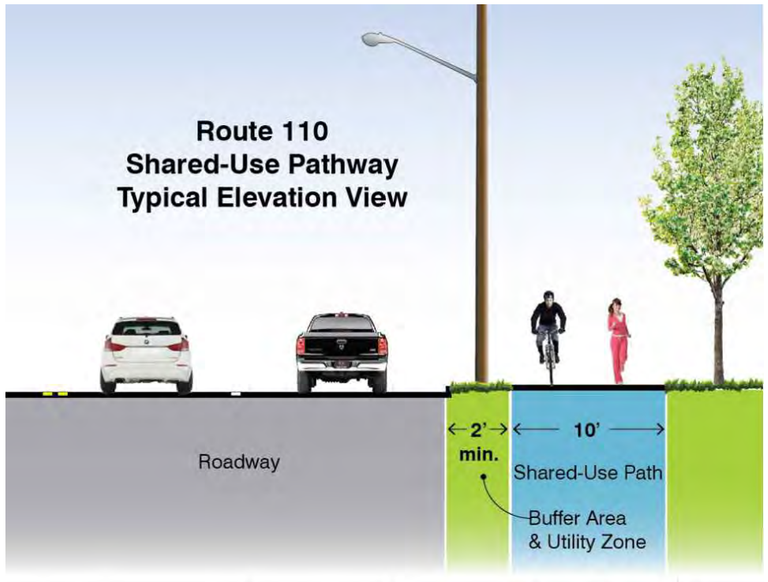
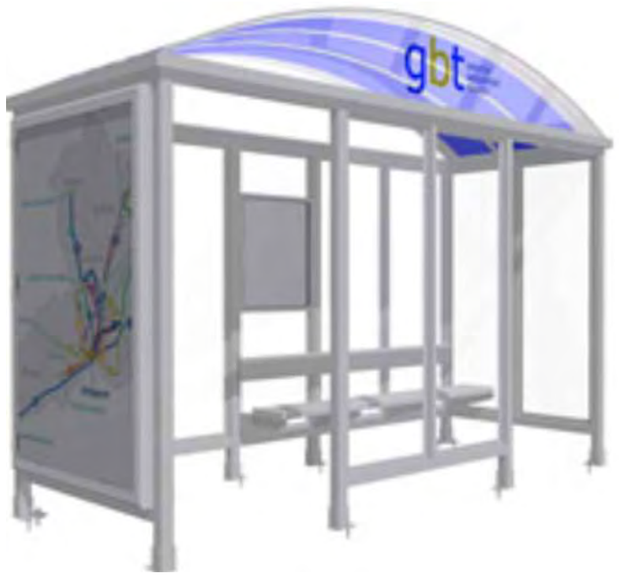


G1: TYPICAL SHARED USE PATH CROSS SECTION

NO SCALE

G2: SHARED USE PATH TUNNEL

NO SCALE



Courtesy of: Susan Rubinsky Marketing Consulting (rubinsky.com)

G3: TYPICAL GREATER BRIDGEPORT TRANSIT SHELTER

NO SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT G
PEDESTRIAN, BIKE AND TRANSIT
ACCOMMODATIONS

DATE: APRIL 2017
SCALE: NOT TO SCALE
FIGURE G - SHEET 2

Tighe&Bond

12/20/2016

Tighe&Bond

APPENDIX C

Concept D: Sikorsky Gate #1 Area – Existing Alignment

Concept D recommends improvements in the same vicinity as Concept C, but avoids relocating the Sikorsky Gate #1 intersection. To a lesser extent than Concept C, Concept D mitigates the existing poor traffic operations, improves safety, facilitates better access to transit and provides mobility for bicyclist and pedestrians in the vicinity of Sikorsky Gate #1. The adjacent intersections with the Merritt Parkway southbound ramps / Navajo Lane, and Oronoque Lane are also included in this concept.

Concept D maintains the existing location of Sikorsky Gate #1 while providing the following physical improvements along Route 110:

- Widen Route 110 to the west to install a northbound left turn lane between Navajo Lane and Oronoque Lane and a southbound through-right turn lane starting just south of the Sikorsky Aircraft driveway intersection and ending in an exclusive right turn lane onto the Merritt Parkway southbound entrance ramp, similar to the Concept C.

- Increase storage for turn lanes on Merritt Parkway southbound off ramp to design queue lengths.

- Provide overhead advanced directional signage on the Route 110 southbound and Merritt Parkway southbound off-ramp to guide vehicles into desired lane.

- Provide a shared use path along the east side of Route 110, south of the Merritt Parkway southbound ramp and along the west side of Route 110 north of the ramp to improve bicycle and pedestrian accessibility.

- Provide new bus stops with shelter amenities on both sides of Route 110 and connect to shared use path with additional sidewalk. See Concept G for more information on the alternative travel mode opportunities.

Although the concept increases roadway capacity and improves traffic operations the three existing closely spaced intersections are expected to continue to disrupt the flow of traffic along Route 110 and the adjacent side streets. The improvements result in acceptable LOS B through LOS D operation during the peak hours analyzed with the 2034 future traffic volumes. Concept D could provide a near-term improvement to traffic operations and improve overall safety and mobility along Route 110 while working towards accomplishing the intersection consolidation shown in Concept C as part of a long range solution for the corridor.

After review by the Study Team this concept was screened out as it does not fully mitigate the congestion issues caused by the closely spaced intersections. As mentioned, the relocation of the Sikorsky Gate #1 driveway (Concept C) is critical to improve progression and facilitate vehicles entering and exiting Route 110 in the area. In other words, Concept D does not provide a significant benefit for the cost of reconstructing Route 110. However, should significant issues arise with the relocation of the Sikorsky Gate #1 driveway, this improvement could be considered as an interim solution while negotiations with Sikorsky are on-going.

Concept H: Route 110 Southbound Three Lane Cross Section

In addition to reviewing potential intersection realignment and widening concepts in the Sikorsky Gate #1 area, a concept was developed to review the benefits and impacts of widening Route 110 southbound to three lanes from just north of Oronoque Lane to the Merritt Parkway northbound ramps. As previously mentioned, the amount of Route 110 southbound traffic, particularly in the afternoon peak hour, causes congestion under existing geometric conditions due to the heavy volume of traffic accessing the Merritt Parkway northbound. Concept H illustrates widening Route 110 to three lanes southbound from just north of Oronoque Lane, under the Merritt Parkway overpass to the Merritt Parkway northbound ramp intersection. This concept requires major widening along the Route 110 corridor including the complete replacement of the existing Merritt Parkway overpass to expand the opening beneath the overpass to carry the additional through lane plus additional width for sidewalk/ shared use path accommodations.

After review by the Study Team this concept was screened out due to the high cost required to reconstruct the Merritt Parkway Bridge. Furthermore, the Merritt Parkway overpass was reconstructed in 1997 and found to be in satisfactory condition under a 2011 bridge inspection. As such, replacement of the bridge is not expected during the 20 year study horizon. However, should future traffic conditions warrant or reconstruction be programmed for the bridge, further review of the three lane southbound concept should be investigated to determine the benefits and provide significant improvements along Route 110 for all travel modes.

CONCEPT SCREENED

- INSUFFICIENT OPERATION OF UNSIGNALIZED INTERSECTION - LOS F ON SIDE STREETS
- SAFETY CONCERNS WITH UNSIGNALIZED CROSSING OF 3 SOUTHBOUND LANES

PROPERTY IMPACTS

MAIN STREET - PUTNEY

MEADOWMERE ROAD

ROUTE 110 (RIVER ROAD)

110

STOP

CLOSE NORTH ACCESS ON MEADOWMERE ROAD. TRAFFIC TO USE SOUTH ACCESS

15

ROUTE 15 INTERCHANGE 53 NB ON/OFF RAMPS

PROPOSED SHARED USE PATH

RELOCATE MAIN STREET - PUTNEY UNSIGNALIZED INTERSECTION

STOP

ROUTE 110 (MAIN STREET)

MODIFY TRAFFIC SIGNAL TO REMOVE MAIN-PUTNEY CLUSTER OPERATION

110

CHARLOTTE STREET

PROPOSED SHARED USE PATH

FUTURE DEVELOPMENT PARCELS

SCALE IN FEET

0 80' 160'

GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT A1

DATE: JULY 29, 2016
SCALE: 1"=80'
FIGURE A1

Tighe&Bond

07/18/2016

Jul 18, 2016-11:42am Plotted By: CDY
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CONCEPT SCREENED

- SOUTHBOUND RIGHT TURN LANE ONTO ROUTE 15 (CONCEPT B) RESULTS IN IMPROVED OPERATIONS
- RIGHT OF WAY EXISTS TO INCLUDE ADDITIONAL SOUTHBOUND RIGHT TURN LANE

MAIN STREET - PUTNEY

MEADOWMERE ROAD

ROUTE 15 NB ON/OFF RAMPS

15

110

REMOVE CHANNELIZED RIGHT, WIDEN RAMP MEDIAN, AND ADD CAT TRACKS TO GUIDE NORTHBOUND LEFT TURNS

REMOVE EXISTING YIELD CONTROL AND WIDEN TO WEST FOR EXTENDED MERGE LANE

PROPOSED BUS SHELTER

PROPOSED SIDEWALK

ROUTE 110 (MAIN STREET)

PROPOSED SHARED USE PATH

FUTURE DEVELOPMENT PARCELS

CHARLOTTE STREET / NEW RYDERS LANDING ACCESS DRIVEWAY

FUTURE DEVELOPMENT PARCELS

110

RYDERS LANE

SIKORSKY ESTUARY WALK

N

SCALE IN FEET

0 100' 200'

GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT B1

DATE: JULY 29, 2016

SCALE: 1"=100'

FIGURE B1

Tighe&Bond

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CONCEPT SCREENED

- SAFETY CONCERNS WITH MULTIPLE ON-RAMP MERGES AND WEAVING VEHICLES
- LOW COST-BENEFIT RATIO

MAIN STREET - PUTNEY

MEADOWMERE ROAD

ROUTE 15 NB ON/OFF RAMPS

15

110

REMOVE CHANNELIZED RIGHT, WIDEN RAMP MEDIAN, AND ADD CAT TRACKS TO GUIDE NORTHBOUND LEFT TURNS

WIDEN TO WEST FOR ADDITIONAL LANE FROM ROUTE 110 ONTO ROUTE 15 NB RAMP

PROPOSED BUS SHELTER

PROPOSED SIDEWALK

ROUTE 110 (MAIN STREET)

PROPOSED SHARED USE PATH

FUTURE DEVELOPMENT PARCELS

CHARLOTTE STREET / NEW RYDERS LANDING ACCESS DRIVEWAY

FUTURE DEVELOPMENT PARCELS

RYDERS LANE

SIKORSKY ESTUARY WALK

N

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT B2

DATE: JULY 29, 2016
SCALE: 1"=100'
FIGURE B2

Tighe&Bond

07/18/2016

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CONCEPT SCREENED

- CHANNELIZING ISLAND FOR ROUTE 110 NORTHBOUND RIGHT TURNS (CONCEPT C) RESULTS IN IMPROVED OPERATIONS
- CHANNELIZING ISLAND PROVIDES PROTECTION FROM ORONOQUE LANE THROUGH VEHICLES INTO SIKORSKY GATE #1.

WIDEN ROUTE 110 TO THE WEST TO ACCOMMODATE ADDITIONAL NB TURN LANE. WIDENING MAY INCREASE GRADE ALONG ORONOQUE LANE.

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF PATH

PROPOSED BUS SHELTER

WIDEN TO WEST FOR ADDITIONAL SOUTHBOUND THROUGH LANE

WIDEN INTO MEDIAN FOR LEFT TURN LANE

PROPOSED SHARED USE PATH

PROPOSED SHARED USE PATH

PROPOSED SIDEWALK

PROPOSED BUS SHELTER

REALIGN SIKORSKY GATE #1 OPPOSITE ORONOQUE LANE

INSTALL BARRIER WALL FOR SECURITY

SIKORSKY ESTUARY WALK

NAVAJO LANE

ORONOQUE LANE

ROUTE 110 (MAIN STREET)

ROUTE 15 SB ON/OFF RAMPS

SIKORSKY GATE #1

110

15

N

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT C1

DATE: JULY 29, 2016
SCALE: 1"=100'
FIGURE C1

Tighe&Bond

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CONCEPT SCREENED

- GRADING ISSUES TO THE SOUTHWEST OF INTERSECTION FOR RELOCATED ORONOQUE LANE ALIGNMENT

WIDEN ROUTE 110 TO THE WEST TO ACCOMMODATE ADDITIONAL NB TURN LANE. WIDENING MAY INCREASE GRADE ALONG ORONOQUE LANE.

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF SIDEWALK

PROPOSED BUS SHELTER

PROPOSED SHARED USE PATH

PROPOSED SHARED USE PATH

PROPOSED SIDEWALK

PROPOSED BUS SHELTER

INSTALL BARRIER WALL FOR SECURITY

SIKORSKY ESTUARY WALK

REALIGN SIKORSKY GATE 3 OPPOSITE ORONOQUE LANE

ORONOQUE LANE

ROUTE 110 (MAIN STREET)

110

110

ROUTE 15 SB ON/OFF RAMPS

15

SIKORSKY GATE #1

N

SCALE IN FEET

0 100' 200'

GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT C2

DATE: JULY 29, 2016

SCALE: 1"=100'

FIGURE C2

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CONCEPT SCREENED

- MORE SIGNIFICANT IMPACT TO PARKING WITHIN SIKORSKY SITE THAN PREFERRED CONCEPT C
- GRADING ISSUES TO THE SOUTHWEST OF INTERSECTION FOR THE REALIGNED ORONOQUE LANE ALIGNMENT

WIDEN ROUTE 110 TO THE WEST TO ACCOMMODATE ADDITIONAL NB TURN LANE. WIDENING MAY INCREASE GRADE ALONG ORONOQUE LANE.

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF PATH

PROPOSED BUS SHELTER

PROPOSED SHARED USE PATH

PROPOSED SIDEWALK

PROPOSED BUS SHELTER

PROPOSED SHARED USE PATH

REALIGN SIKORSKY EXITING TRAFFIC OPPOSITE ORONOQUE LANE

INSTALL BARRIER WALL FOR SECURITY

SIKORSKY ESTUARY WALK

NAVAJO LANE

ORONOQUE LANE

ROUTE 110 (MAIN STREET)

110

ROUTE 15 SB ON/OFF RAMPS

15

SIKORSKY GATE #1

N

SCALE IN FEET

0 100' 200'

GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT C3

DATE: JULY 29, 2016
SCALE: 1"=100'
FIGURE C3

Tighe&Bond

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CONCEPT SCREENED

- DOES NOT FULLY MITIGATE CONGESTION ISSUES CAUSED BY CLOSELY SPACE INTERSECTIONS
- LOW COST-BENEFIT RATIO WHEN COMPARED TO REALIGNMENT CONCEPT (CONCEPT C)

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF PATH

PROPERTY IMPACT: 1,200 S.F. DESIGN TO LIMIT IMPACT TO PRIVATE PROPERTY, WHERE FEASIBLE.

PROPOSED BUS SHELTER

NAVAJO LANE

ORONOQUE LANE

WIDEN INTO MEDIAN FOR LEFT TURN LANE

END SOUTHBOUND LANE IN EXCLUSIVE RIGHT TURN LANE

WIDEN TO WEST FOR ADDITIONAL SOUTHBOUND THROUGH LANE. PROVIDE OVERHEAD SIGNAGE TO GUIDE VEHICLES INTO DESIRED LANE.

PROPOSED SHARED USE PATH

110

ROUTE 110 (MAIN STREET)

110

WIDEN TO EAST TO EXTEND NORTHBOUND RIGHT TURN LANE

PROPOSED SIDEWALK

PROPOSED SIDEWALK

PROPOSED BUS SHELTER

WIDEN TO WEST FOR NORTHBOUND LEFT TURN LANE INTO NAVAJO

WIDEN TO WEST FOR NORTHBOUND LEFT TURN LANE INTO ORONOQUE

PROPOSED SHARED USE PATH

ROUTE 15 SB ON/OFF RAMPS

SIKORSKY GATE #1

PROPERTY IMPACT: 4,500 S.F. DESIGN TO LIMIT IMPACT TO PRIVATE PROPERTY, WHERE FEASIBLE.

SIKORSKY ESTUARY WALK

WIDEN TO NORTH AND SOUTH TO EXTEND TURN LANES TO DESIGN QUEUE LENGTH. DESIGN LANES SUCH THAT LEFT TURN LANE OPENS FROM RIGHT TURN LANES. PROVIDE OVERHEAD SIGNAGE TO GUIDE VEHICLES INTO DESIRED LANE.

15

CAPACITY ANALYSIS RESULTS:

2034 FUTURE	C	C	E	A	D	D	D	D	D
2034 IMPROVED	C	B	D	A	B	B	B	B	B

PM LOS
SIKORSKY SHIFT CHANGE LOS
AM LEVEL OF SERVICE (LOS)

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

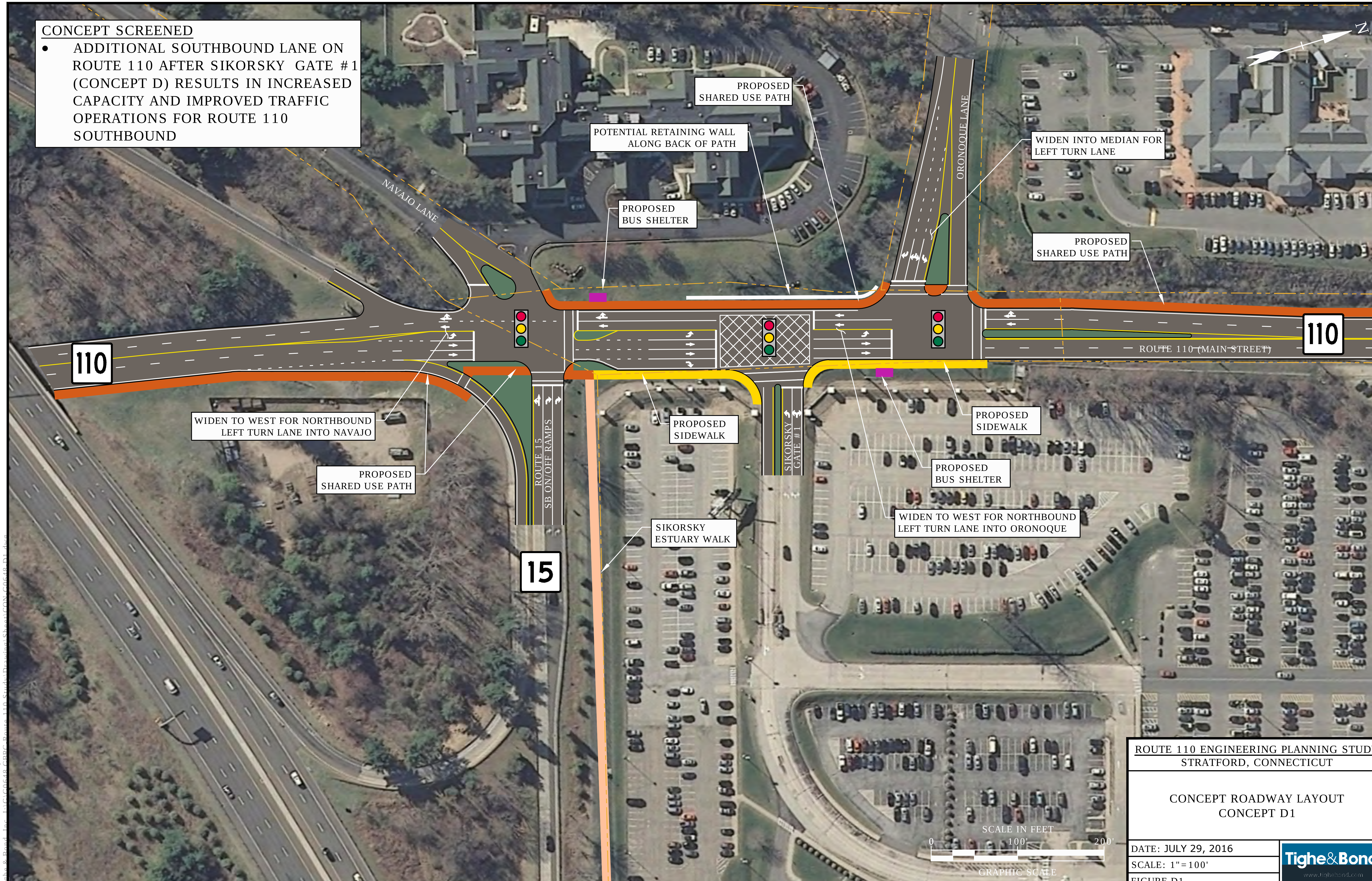
ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT D

DATE: DECEMBER 2016
SCALE: 1"=100'
FIGURE D

Tighe&Bond

12/20/2016


CONCEPT SCREENED
• ADDITIONAL SOUTHBOUND LANE ON ROUTE 110 AFTER SIKORSKY GATE #1 (CONCEPT D) RESULTS IN INCREASED CAPACITY AND IMPROVED TRAFFIC OPERATIONS FOR ROUTE 110 SOUTHBOUND
PROPOSED SHARED USE PATH
POTENTIAL RETAINING WALL ALONG BACK OF PATH
PROPOSED BUS SHELTER
NAVAJO LANE
ORONOQUE LANE
WIDEN INTO MEDIAN FOR LEFT TURN LANE
PROPOSED SHARED USE PATH
110
110
ROUTE 110 (MAIN STREET)
WIDEN TO WEST FOR NORTHBOUND LEFT TURN LANE INTO NAVAJO
PROPOSED SHARED USE PATH
ROUTE 15 SB ON/OFF RAMPS
PROPOSED SIDEWALK
SIKORSKY GATE #1
PROPOSED SIDEWALK
PROPOSED BUS SHELTER
WIDEN TO WEST FOR NORTHBOUND LEFT TURN LANE INTO ORONOQUE
SIKORSKY ESTUARY WALK
15
SCALE IN FEET
0
100'
200'
GRAPHIC SCALE
ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT
CONCEPT ROADWAY LAYOUT
CONCEPT D1
DATE: JULY 29, 2016
SCALE: 1"=100'
FIGURE D1
Tighe&Bond

07/18/2016

CONCEPT SCREENED

- ADDITIONAL NORTHBOUND LEFT TURN LANE (CONCEPT D) RESULTS IN INCREASED CAPACITY AND IMPROVED OPERATIONS ON ROUTE 110 NORTHBOUND

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF PATH

ORONOQUE LANE

NAVAJO LANE

PROPOSED BUS SHELTER

END SOUTHBOUND LANE IN EXCLUSIVE RIGHT TURN LANE

WIDEN TO WEST FOR ADDITIONAL SOUTHBOUND THROUGH LANE

PROPOSED SHARED USE PATH

110

ROUTE 110 (MAIN STREET)

110

PROPOSED BUS SHELTER

PROPOSED SIDEWALK

PROPOSED SIDEWALK

PROPOSED SHARED USE PATH

ROUTE 15 SB ON/OFF RAMPS

SIKORSKY GATE #1

SIKORSKY ESTUARY WALK

15

SCALE IN FEET

0 100' 200'

GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT D2

DATE: JULY 29, 2016

SCALE: 1"=100'

FIGURE D2

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CONCEPT SCREENED

- ADDITIONAL NORTHBOUND LEFT TURN LANE (CONCEPT D) RESULTS IN INCREASED CAPACITY AND IMPROVED OPERATIONS ON ROUTE 110 NORTHBOUND
- ADDITIONAL SOUTHBOUND LANE AT ORONOQUE PROMOTES VEHICLE BY-PASS AND WEAVING DOWNSTREAM

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF PATH

ORONOQUE LANE

NAVAJO LANE

PROPOSED BUS SHELTER

END SOUTHBOUND LANE IN EXCLUSIVE RIGHT TURN LANE

WIDEN TO WEST FOR ADDITIONAL SOUTHBOUND THROUGH LANE

PROPOSED SHARED USE PATH

110

ROUTE 110 (MAIN STREET)

110

PROPOSED SHARED USE PATH

ROUTE 15 SB ON/OFF RAMPS

PROPOSED SIDEWALK

SIKORSKY GATE #1

PROPOSED BUS SHELTER

PROPOSED SIDEWALK

SIKORSKY ESTUARY WALK

15

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT D3

DATE: JULY 29, 2016
SCALE: 1"=100'
FIGURE D3

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CONCEPT SCREENED

- INSUFFICIENT SOUTHBOUND MERGE TAPER DISTANCE SOUTH OF THE ROUTE 15 SOUTHBOUND RAMP/NAVAJO LANE INTERSECTION
- ADDITIONAL NORTHBOUND LEFT TURN LANE (CONCEPT D) RESULTS IN INCREASED CAPACITY AND IMPROVED OPERATIONS ON ROUTE 110 NORTHBOUND

N

NAVAJO LANE

260' TAPER
(CTDOT REQUIRED 495')

200'

110

MERGE SOUTHBOUND LANE BEFORE BRIDGE

PROPOSED SHARED USE PATH

ROUTE 15 SB ON/OFF RAMPS

15

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF PATH

PROPOSED BUS SHELTER

WIDEN TO WEST FOR ADDITIONAL SOUTHBOUND THROUGH LANE

ORONOQUE LANE

PROPOSED SHARED USE PATH

ROUTE 110 (MAIN STREET)

110

PROPOSED BUS SHELTER

PROPOSED SIDEWALK

PROPOSED SIDEWALK

SIKORSKY GATE #1

SIKORSKY ESTUARY WALK

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT D4

DATE: JULY 29, 2016
SCALE: 1"=100'
FIGURE D4

Tighe&Bond

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CONCEPT SCREENED

- INSUFFICIENT SOUTHBOUND MERGE TAPER DISTANCE SOUTH OF THE ROUTE 15 SOUTHBOUND RAMP/NAVAJO LANE INTERSECTION
- ADDITIONAL NORTHBOUND LEFT TURN LANE (CONCEPT D) RESULTS IN INCREASED CAPACITY AND IMPROVED OPERATIONS ON ROUTE 110 NORTHBOUND
- ADDITIONAL SOUTHBOUND LANE AT ORONOQUE PROMOTES VEHICLE BY-PASS AND WEAVING DOWNSTREAM

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF PATH

ORONOQUE LANE

PROPOSED BUS SHELTER

NAVAJO LANE

PROPOSED SHARED USE PATH

260' TAPER (CTDOT REQUIRED 495')

200'

WIDEN TO WEST FOR ADDITIONAL SOUTHBOUND THROUGH LANE

110

ROUTE 110 (MAIN STREET)

110

MERGE SOUTHBOUND LANE BEFORE BRIDGE

PROPOSED SHARED USE PATH

ROUTE 15 SB ON/OFF RAMPS

PROPOSED SIDEWALK

SIKORSKY GATE #1

PROPOSED BUS SHELTER

PROPOSED SIDEWALK

SIKORSKY ESTUARY WALK

15

SCALE IN FEET

0 100' 200'

GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT D5

DATE: JULY 29, 2016

SCALE: 1"=100'

FIGURE D5

Tighe&Bond

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CONCEPT SCREENED
ADDITIONAL SOUTHBOUND LANE AT ORONOQUE PROMOTES VEHICLE BY-PASS AND WEAVING DOWNSTREAM

N

NAVAJO LANE

ORONOQUE LANE

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF PATH

PROPOSED BUS SHELTER

END SOUTHBOUND LANE IN EXCLUSIVE RIGHT TURN LANE

WIDEN TO WEST FOR ADDITIONAL SOUTHBOUND THROUGH LANE

PROPOSED SHARED USE PATH

110

ROUTE 110 (MAIN STREET)

110

PROPOSED SIDEWALK

PROPOSED SIDEWALK

PROPOSED BUS SHELTER

PROPOSED SHARED USE PATH

ROUTE 15 SB ON/OFF RAMPS

SIKORSKY GATE #1

SIKORSKY ESTUARY WALK

WIDEN TO WEST FOR NORTHBOUND LEFT TURN LANE INTO ORONOQUE

15

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT D6

DATE: JULY 29, 2016
SCALE: 1"=100'
FIGURE D6

Tighe&Bond

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CONCEPT SCREENED
INSUFFICIENT SOUTHBOUND MERGE TAPER DISTANCE SOUTH OF THE ROUTE 15 SOUTHBOUND RAMP/NAVAJO LANE INTERSECTION

N

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF PATH

ORONOQUE LANE

NAVAJO LANE

PROPOSED BUS SHELTER

PROPOSED SHARED USE PATH

WIDEN TO WEST FOR ADDITIONAL SOUTHBOUND THROUGH LANE

260' TAPER
(CTDOT REQUIRED 495')

200'

110

ROUTE 110 (MAIN STREET)

110

PROPOSED SIDEWALK

MERGE SOUTHBOUND LANE BEFORE BRIDGE

PROPOSED SHARED USE PATH

ROUTE 15 SB ON/OFF RAMPS

PROPOSED SIDEWALK

SIKORSKY GATE #1

PROPOSED BUS SHELTER

SIKORSKY ESTUARY WALK

WIDEN TO WEST FOR NORTHBOUND LEFT TURN LANE INTO ORONOQUE

15

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT D7

DATE: JULY 29, 2016
SCALE: 1"=100'
FIGURE D7

Tighe&Bond

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CONCEPT SCREENED

- INSUFFICIENT SOUTHBOUND MERGE TAPER DISTANCE SOUTH OF THE ROUTE 15 SOUTHBOUND RAMP/NAVAJO LANE INTERSECTION
- ADDITIONAL SOUTHBOUND LANE AT ORONOQUE PROMOTES VEHICLE BY-PASS AND WEAVING DOWNSTREAM

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF PATH

ORONOQUE LANE

NAVAJO LANE

PROPOSED BUS SHELTER

PROPOSED SHARED USE PATH

WIDEN TO WEST FOR ADDITIONAL SOUTHBOUND THROUGH LANE

260' TAPER
(CTDOT REQUIRED 495')

200'

110

110

ROUTE T10 (MAIN STREET)

PROPOSED SIDEWALK

MERGE SOUTHBOUND LANE BEFORE BRIDGE

PROPOSED SHARED USE PATH

ROUTE 15 SB ON/OFF RAMPS

PROPOSED SIDEWALK

SIKORSKY GATE #1

PROPOSED BUS SHELTER

SIKORSKY ESTUARY WALK

WIDEN TO WEST FOR NORTHBOUND LEFT TURN LANE INTO ORONOQUE

15

N

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT D8

DATE: JULY 29, 2016
SCALE: 1"=100'
FIGURE D8

Tighe&Bond

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CONCEPT SCREENED

- SITE ACCESS CONCERNS FROM PROPERTY OWNER
- INSUFFICIENT EVIDENCE OF SAFETY CONCERNS DUE TO RECENT RECONSTRUCTION OF ALLTOWN/MOBIL SITE

ORONOQUE PLAZA DRIVEWAY

PROPOSED SHARED USE PATH

FUTURE DEVELOPMENT PARCELS

ROUTE 110 (MAIN STREET)

110

CLOSE EXISTING CURB CUT

CHANGE EXISTING EXIT ONLY CURB CUT TO ENTRY/EXIT. WIDEN DRIVEWAY

SCALE IN FEET
0 80' 160'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT E1

DATE: JULY 29, 2016
SCALE: 1"=80'
FIGURE E1

Tighe&Bond

07/29/2016

CONCEPT SCREENED

- BRIDGE RECONSTRUCTED IN 1997 AND INSPECTED TO BE IN SATISFACTORY CONDITION IN 2011; 50 YEAR LIFE EXPECTANCY DOES NOT FALL WITHIN STUDY HORIZON
- POTENTIAL TO INDUCE MORE CUT THROUGH TRAFFIC FROM SHELTON
- LOW COST-BENEFIT RATIO

N

15

ROUTE 15 NB ON/OFF RAMPS

REMOVE EXISTING YIELD CONTROL AND CREATE EXTENDED MERGE LANE

WIDEN TO WEST FOR EXCLUSIVE TURN LANE ONTO ROUTE 15 NB RAMP

110

PROPOSED BUS SHELTER

PROPOSED SIDEWALK

WIDEN BRIDGE TO ACCOMMODATE ADDITIONAL SOUTHBOUND LANE AND SHARED USE PATH

MERRITT PARKWAY

ROUTE 110 (MAIN STREET)

110

PROPOSED SHARED USE PATH

CHARLOTTE STREET / NEW RYDERS LANDING ACCESS DRIVEWAY

FUTURE DEVELOPMENT PARCELS

RYDERS LANE

SIKORSKY ESTUARY WALK

SCALE IN FEET

0 100' 200'

GRAPHIC SCALE

MATCH LINE SHEET H1 - SHEET 2 OF 2

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT H
SHEET 1 OF 2

DATE: JULY 29, 2016
SCALE: 1"=100'
FIGURE H - SHEET 1

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MATCH LINE SHEET HI - SHEET 1 OF 2

WIDEN ROUTE 110 TO THE WEST TO ACCOMMODATE ADDITIONAL NB LANE. WIDENING MAY INCREASE GRADE ALONG ORONOQUE LANE.

PROPOSED SHARED USE PATH

POTENTIAL RETAINING WALL ALONG BACK OF PATH

PROPOSED BUS SHELTER

NAVAJO LANE

ORONOQUE LANE

PROPOSED SHARED USE PATH

ROUTE 110 (MAIN STREET)

110

PROPOSED SIDEWALK

ROUTE 15 SB ON/OFF RAMPS

SIKORSKY GATE #1

PROPOSED BUS SHELTER

PROPOSED SHARED USE PATH

15

SIKORSKY ESTUARY WALK

CONCEPT SCREENED

- BRIDGE RECONSTRUCTED IN 1997 AND INSPECTED TO BE IN SATISFACTORY CONDITION IN 2011; 50 YEAR LIFE EXPECTANCY DOES NOT FALL WITHIN STUDY HORIZON
- POTENTIAL TO INDUCE MORE CUT THROUGH TRAFFIC FROM SHELTON
- LOW COST-BENEFIT RATIO

SCALE IN FEET
0 100' 200'
GRAPHIC SCALE

ROUTE 110 ENGINEERING PLANNING STUDY
STRATFORD, CONNECTICUT

CONCEPT ROADWAY LAYOUT
CONCEPT H
SHEET 2 OF 2

DATE: JULY 29, 2016
SCALE: 1"=100'
FIGURE H - SHEET 2

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