

Final Technical Memorandum
Boght Road GEIS – Route 9 Update

Town of Colonie, NY

CME Project No. 06-213d

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Introduction and Project Description

This report provides traffic engineering evaluations for the Route 9 sub area of the *DGEIS Land Use and Transportation Update, Boght Road – Colombia Street (2005 Study)* located in the Town of Colonie, Albany County, New York. The *2005 Study* is included under Attachment A. This study was funded by the Town of Colonie and was initiated primarily for two reasons – 1) Several recent development proposals are larger than expected in the *2005 Study*, and 2) the Town of Colonie, the Capital District Transportation Committee (CDTC), the Capital District Transit Authority (CDTA), and the New York State Department of Transportation (NYSDOT) need to identify the desired improvements in the Route 9 corridor. Involving CDTA, NYSDOT, and CDTC is necessary because Route 9 is an important regional arterial. Future improvements should be made with consideration of the CDTC New Visions Plan, NYSDOT's operations planning, and CDTA's regional transit planning.

The *2005 Study* showed the need for major widening on Route 9 including additional through lanes in each direction to mitigate long term PM peak hour operational deficiencies in the corridor. The study also documented the need for a future traffic signal at the Route 9/Latham Auto Park Drive/Old Loudon Road intersection. While these improvements theoretically satisfied future travel demand and site access needs, they were not supported by CDTC and the NYSDOT. The involved agencies have agreed that adding two general purpose travel lanes on Route 9 is not cost effective and is not consistent with New Visions, and that installing a traffic signal at the Route 9/Latham Auto Park Drive/Old Loudon Road intersection would increase delays on Route 9, however, the installation of this signal in conjunction with other off-site improvements appears to be the preferred alternative.

In letters dated December 13, 1996, February 28, 2007, and February 4, 2008 (Included as Attachment B), the NYSDOT is on record documenting concerns about a potential traffic signal at the Route 9/Latham Auto Park Drive/Old Loudon Road intersection, and how it could compromise the ability of Route 9 to serve as an alternate route for I-87 incident management.

Identifying reasonable improvements and minimizing costs of new transportation infrastructure is fundamental to a successful public/private cost-sharing program and implementation of the overall GEIS plan. The Town and the NYSDOT approved Latham Auto Park Drive as an unsignalized intersection at a time when the build-out of the area was expected to be lower intensity land uses generating fewer vehicle trips. The lower intensity build out would have enabled the intersection to operate adequately under stop sign control while providing reasonable site access and preserving the mobility function of Route 9. The current higher density retail and office proposals will create greater impacts to Route 9 and the local transportation system (above and beyond the levels anticipated in the *2005 Study* update) necessitating this additional study.

The purpose of this work is to identify short-term geometric and system operations improvements for the section of Route 9 from Route 9R to Dunsbach Ferry Road, while maintaining a five-lane cross-section on Route 9. The need for these improvements is associated with the construction of several specific development projects located within the corridor. The results of this evaluation can be incorporated into the *2005 Study*.

This study also presents an assessment of the long term traffic operations and recommends further study of the long term needs within the Boght Road area. There have been significant changes in land use, travel patterns, and other infrastructure within the area, and it has been over 20 years since the original comprehensive Boght Road GEIS was completed in 1989.

Methodology

This *Boght Road GEIS Route 9 Update* consists of various traffic engineering evaluations throughout the Route 9 corridor between Route 9R and Dunsbach Ferry Road, including an existing conditions analysis, a travel speed and delay study, alternative conditions analyses, and traffic simulation modeling. The evaluations were conducted to observe existing traffic flow patterns and operations throughout the corridor and to quantify traffic operational benefits of proposed improvements. The study area for this analysis includes the following intersections.

- Route 9 / Route 9R / I-87 Access
- Route 9 / Latham Auto Park Drive / Old Loudon Road
- Route 9 / Century Hill Drive
- Route 9 / Dunsbach Ferry Road
- Route 9R / Old Loudon Road
- Route 9R/ Johnson Road

The following diagram shows the study area location.

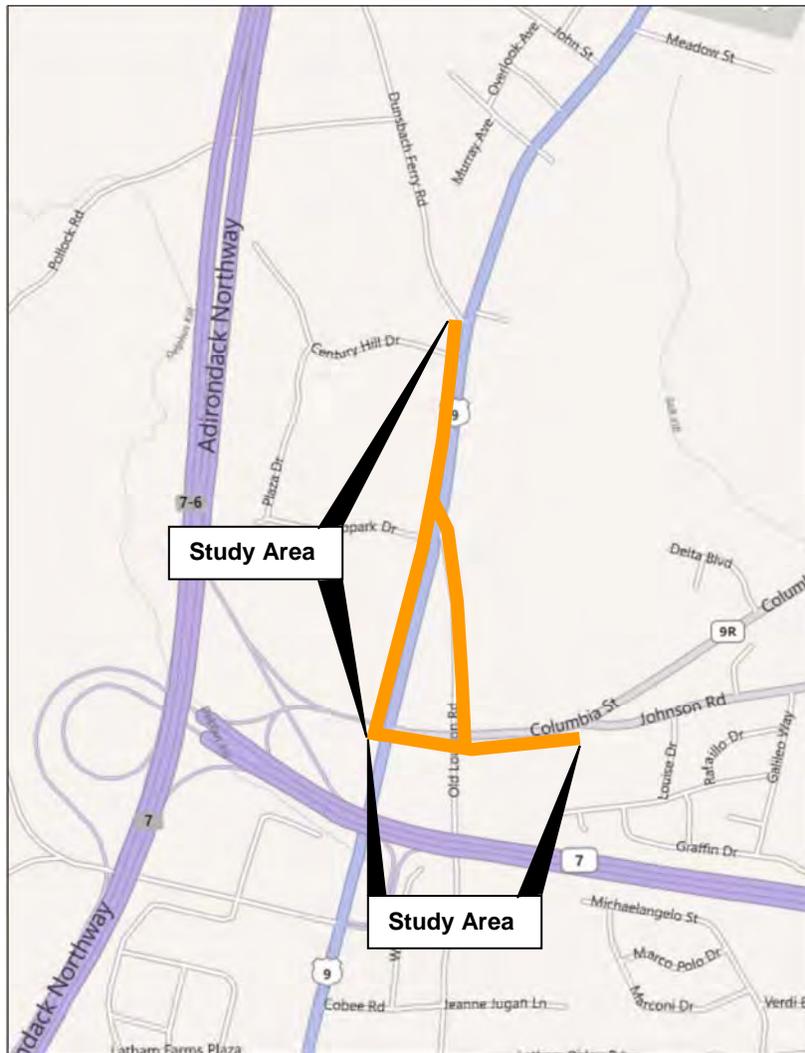


Figure 1 – Study Area

The original long-term improvement plan of constructing two additional through lanes on US Route 9 found in the *2005 Study* is no longer the preferred alternative based on input provided by the NYSDOT and CDTC. Maintaining a five lane section on US Route 9 will also affect the proposed future geometric improvements recommended at the US Route 9/Boght Road intersection located north of the Boght Road GEIS study area which is not included in this evaluation. A technical memorandum dated June 21, 2010 found under Attachment C includes a revised analysis that amends the recommended geometry at the US Route 9/Boght Road intersection for long-term growth conditions.

Existing Conditions

a. Existing Traffic Data

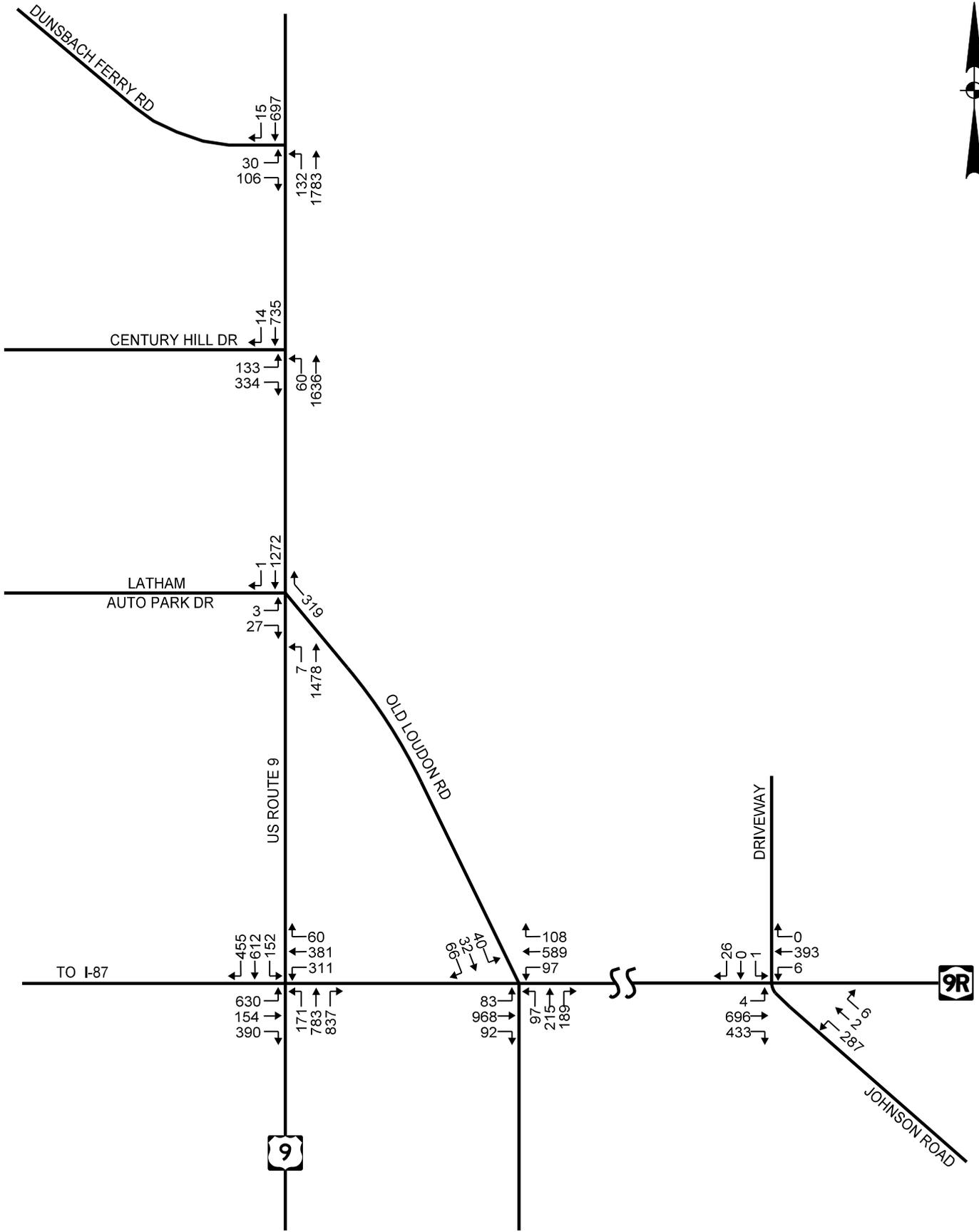
An evaluation of the weekday morning and afternoon and weekend Saturday peak hour counts conducted for the *2005 Study Land Use and Transportation Update* and more recent counts conducted for the proposed *Retail Development* located off of Latham Auto Park Drive, indicates that the PM

peak hour of adjacent street traffic represents a worst-case time period for traffic volumes through the project corridor. A review of NYSDOT annual average daily traffic count information on US Route 9 indicates that the afternoon peak commuter period is 25 percent higher than the morning peak commuter period. Therefore, manual intersection turning movement counts were conducted by Creighton Manning Engineering, LLP on Tuesday May 13, 2008, Wednesday, May 14, 2008, Thursday, May 22, 2008, and Wednesday, January 6, 2010 during the afternoon peak period from 4:30 to 6:00 p.m. at the following signalized intersections:

- Route 9 / Route 9R / I-87 Access
- Route 9 / Latham Auto Park Drive / Old Loudon Road
- Route 9 / Century Hill Drive
- Route 9R / Old Loudon Road
- Route 9R/ Johnson Road

A review of historical traffic counts in the project vicinity indicates that traffic growth has been relatively stable over the last several years. Therefore, the 2008 traffic volumes are reflective of existing 2010 traffic conditions. The turning movement counts conducted in June 2004 for the *2005 Study* at the unsignalized intersection of Route 9 and Dunsbach Ferry Road were factored and balanced to represent 2010 conditions based on the updated counts conducted at the adjacent signalized intersections. The raw turning movement count data is included in Attachment D. The resulting PM peak hour traffic volumes for 2010 Existing conditions are shown on Figure 2.

Existing geometric conditions were verified and signal timing data was obtained in the field as well as from NYSDOT. The data was used to create a traffic simulation model of the roadway network that reflects current conditions within the project area.



2010 EXISTING PM PEAK HOUR TRAFFIC VOLUMES

BOGHT ROAD GEIS US ROUTE 9 UPDATE
TOWN OF COLONIE, NEW YORK



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b. Speed & Delay Study

A speed and delay study was conducted along Route 9 between the intersections of Sparrowbush Road and Boght Road on Monday, May 12, 2008. Travel time information was collected during the PM peak period from 4:00 to 6:00 p.m. The objective of the survey was to identify the existing average travel speed and average delay experienced by northbound and southbound drivers passing through the Route 9 corridor during the PM peak commuter period.

The methodology for the speed and delay study involved a driver and a data collector equipped with a stop watch who drove the length of the corridor several times during the PM peak period using the average car (floating car) technique. During each run, the data collector documented three conditions:

- The time that the vehicle stopped at the back of a queue, if it stopped.
- The time that the vehicle started rolling again.
- The time that the vehicle crossed the stop line at the traffic signal.

Resulting travel times were converted to total operating speed (including stopped delay).

For this study, the recorder documented the time on Route 9 at four locations: the Sparrowbush Road stop line, the Route 9R/I-87 Access stop line, the Century Hill Drive stop line, and the Boght Road stop line. A total of 14 trial runs were completed (7 in each direction) during the PM peak period.

It is noted that the existing speed limit along Route 9 varies. South of the Route 9R/I-87 Access intersection, Route 9 is posted at 40 miles per hour (mph) for travel in both directions. Approximately halfway between the Route 9R/I-87 Access and Latham Auto Park Drive intersections, the speed limit on Route 9 changes to 45 mph and remains at 45 mph until changing to 55 mph just north of Dunsbach Ferry Road.

Figure 3 shows the average operating speed along Route 9 (including stopped delay) for the roadway segments between the major signalized intersections.

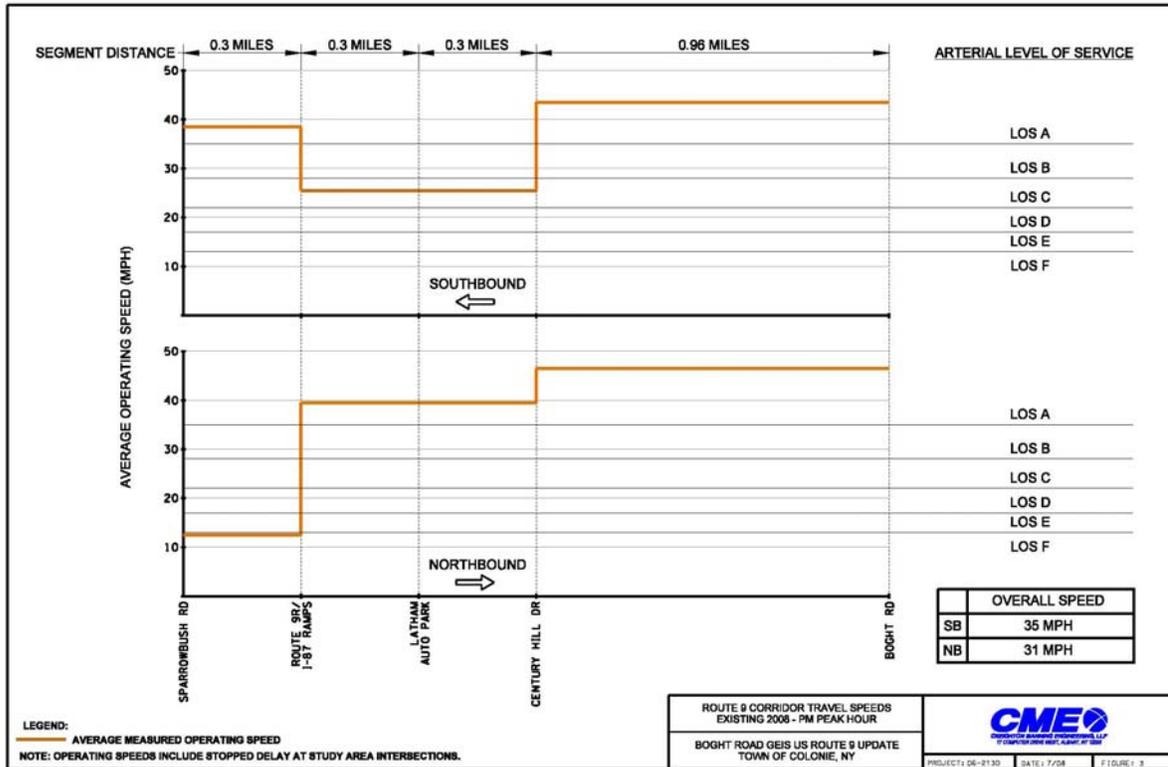


Figure 3 – Route 9 Overall Operating Speeds

This analysis shows that traffic generally moves well in the southbound direction with an overall operating speed of 35 mph and all segments operating at an arterial level of service (LOS) of C or better (*2000 Highway Capacity Manual*). In the northbound direction, traffic moves well between the intersections of Route 9R/I-87 Access and Boght Road at an arterial LOS A. However, between Sparrowbush Road and Route 9R/I-87 Access, northbound traffic moves much slower and experiences longer delays (arterial LOS F). Overall, the operating speed of northbound traffic was measured to be 31 mph while the total average travel time is approximately 3 minutes and 35 seconds.

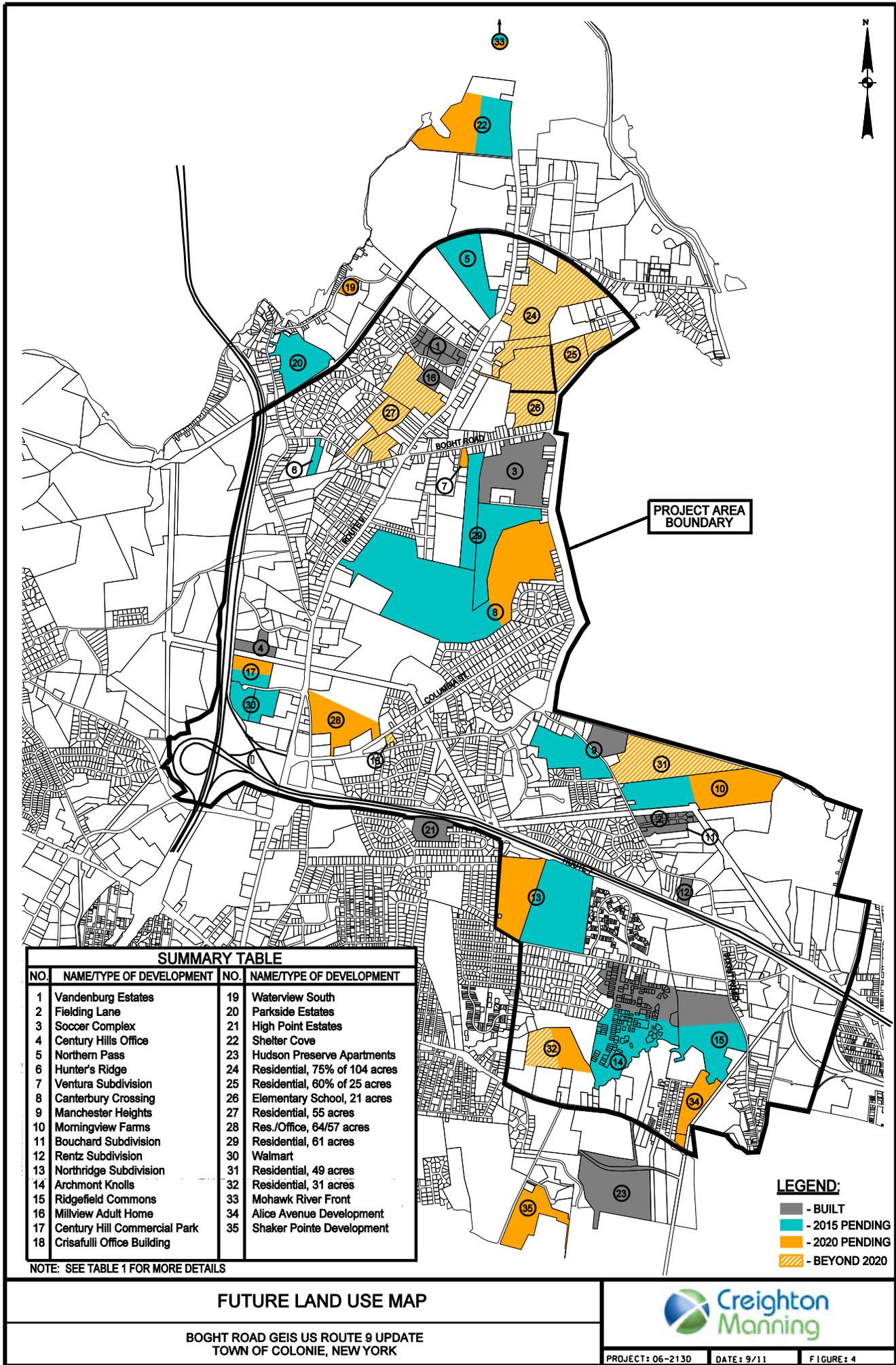
Land Use Evaluation and Traffic Forecasts

a. Land Use Revisions

Meetings were held with the Town on May 6, 2008 and January 7, 2010 and with the Boght Road Technical Committee on January 26, 2010 and January 28, 2011 to document and confirm the latest land use information in the *2005 Study* area. Table 1 and Figure 4 provide a summary of the current anticipated development in the Town as compared to the *2005 Study*.

Table 1 – Revised Development Plan

No.	Name/Type of Development	2005 Study Size	2011 Study Size	Built by 2008	Include in 2015	Include in 2020	Beyond 2020
1	Vandenburg Estates	20 du	Same	100%	--	--	--
2	Fielding Lane	13 du	Same	100%	--	--	--
3	Soccer Complex	6-8 fields	Same	100%	--	--	--
4	Century Hills Office	50 KSF	38 KSF, 45 KSF	100%	--	--	--
5	Northern Pass	100 du	68 Town Homes, 11 Apartments, 14.175 KSF Office	--	100%	--	--
6	Hunter's Ridge	13 du	Same	--	100%	--	--
7	Ventura Subdivision	3 du	Same	--	--	100%	--
8	Canterbury Crossing	373 du, 6 KSF	77 Single Family, 42 Carriage, 152 Condos, 58 Senior Housing, 6 KSF Retail and a Firehouse	--	50%	50%	--
9	Manchester Heights	77 du	Same	33%	67%	--	--
10	Morningview Farms	45 du	Same	--	67%	33%	--
11	Bouchard Subdivision	3 du	Same	100%			--
12	Rentz Subdivision	1 du	Same	100%			--
13	Northridge Subdivision	161 du	140 du (50% Single Family, 50% Carriage)	--	50%	50%	--
14	Archmont Knolls	82 du	Phase 4 – 52 du Phase 5 – 32 du	Phase 4 – 50%	Phase 4 – 50% Phase 5 – 100%	--	--
15	Ridgefield Commons	54 du	Phase 1 – 33 du Phase 2 – 21 du	Phase 1 – 75%	Phase 1 – 25% Phase 2 – 50%	Phase 2 – 50%	--
16	Millview Adult Home	10 beds, 3 KSF	Same	100%	--	--	--
17	Century Hill Commercial Business Park	150 KSF	Phase 1 – 54 KSF Office, 80 KSF Office Phase 2 – 151 KSF Office, 100 Room Hotel, 8.4 KSF Retail	--	Phase 1 – 100%	Phase 2 – 100%	--
18	Crisafulli Office Building	10.5 KSF	Same	--	--	--	✓
19	Waterview South	7 du	4 du	--	--	100%	--
20	Parkside Estates	39 du	Same	--	100%	--	--
21	High Point Estates	10 du	Same	100%	--	--	--
22	Shelter Cove	311 du, 8 KSF	111 Single Family, 200 Multi-Family, 8 KSF Office	--	50%	50%	--
23	Hudson Preserve Apartment	348 du	Same	100%	--	--	--
24	Residential, 75% of 104 acres	156 du	Same	--	--	--	✓
25	Residential, 60% of 25 acres	30 du	Same	--	--	--	✓
26	Elementary School, 21 acres			--	--	--	✓
27	Residential, 55 acres	110 du	Same	--	--	--	✓
28	Res/Office, 64/57 acres	128 du, 912 KSF	400KSF Office and 50KSF Mixed Use Commercial	--	--	100%	--
29	Residential, 61 acres	122 du	47 du	--	100%	--	--
30	Retail Development	100 KSF	196 KSF Retail	--	100%	--	--
31	Residential, 49 acres	98 du	Same	--	--	--	✓
32	Swatling Acres PDD	62 du	128 apartments 6 KSF office	--	--	50%	✓
33	Mohawk River Front	None	10 KSF Retail, 30 Apartments, 92 Condos	--	25%	75%	--
34	Alice Avenue Development	None	90 Assisted Living Center, 170 Senior Housing units	--	--	100%	--
35	Shaker Pointe Development	None	198 mix apartments and cottage homes, 38 KSF Commercial	--	--	100%	--



SUMMARY TABLE			
NO.	NAME/TYPE OF DEVELOPMENT	NO.	NAME/TYPE OF DEVELOPMENT
1	Vandenburg Estates	19	Waterview South
2	Fielding Lane	20	Parkside Estates
3	Soccer Complex	21	High Point Estates
4	Century Hills Office	22	Shelter Cove
5	Northern Pass	23	Hudson Preserve Apartments
6	Hunter's Ridge	24	Residential, 75% of 104 acres
7	Ventura Subdivision	25	Residential, 60% of 25 acres
8	Canterbury Crossing	26	Elementary School, 21 acres
9	Manchester Heights	27	Residential, 55 acres
10	Morningview Farms	28	Res./Office, 64/57 acres
11	Bouchard Subdivision	29	Residential, 61 acres
12	Rentz Subdivision	30	Walmart
13	Northridge Subdivision	31	Residential, 49 acres
14	Archmont Knolls	32	Residential, 31 acres
15	Ridgefield Commons	33	Mohawk River Front
16	Millview Adult Home	34	Alice Avenue Development
17	Century Hill Commercial Park	35	Shaker Pointe Development
18	Crisafulli Office Building		

NOTE: SEE TABLE 1 FOR MORE DETAILS

LEGEND:
 - BUILT
 - 2015 PENDING
 - 2020 PENDING
 - BEYOND 2020

FUTURE LAND USE MAP

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b. Traffic Forecasts

Design years were selected in consultation with the Town Planning Department and with the Technical Committee as Short-Term 2015 and a Long-Term 2020. Table 1 provides a summary of the anticipated development schedule for each land use to determine impacts associated with the applicable design year. Traffic forecasts were prepared for the Short-Term 2015 design year and Long-Term 2020 design year based on these assumptions.

The 2020 design year includes traffic from the Short-Term 2015 evaluation as well as most of the remaining known and anticipated developments documented in the *2005 Study*. It is noted that access to Property No. 28 identified in the *2005 Study* was modified based on a review of existing physical constraints (wetlands) and conversations with Town planners. Specifically, primary access to Parcel No. 28 is no longer expected to intersect Route 9 opposite Dunsbach Ferry Road. Access to this site is expected via Old Loudon Road and Route 9R (under the Null Alternative).

With the exception of the proposed *Retail Development* (Parcel No. 30), trip generation associated with the Short-Term 2015 and Long-Term 2020 development scenarios was estimated based on the Institute of Transportation Engineers (ITE) *Trip Generation*, 7th edition, which provides trip generation data for various land uses based on studies of similar existing developments located across the country. Trip generation data was collected by CME at the *Wal-Mart Super Center* located in the Town of Halfmoon on Monday, June 23, 2008. Based on the site specific data, the Halfmoon *Wal-Mart Super Center* is generating 4.61 trips/KSF during the PM peak hour. This rate is 17% higher than the ITE published trip rate for a Free – Standing Discount Super Store. Therefore, the trip generation for the proposed *Retail Development* was estimated based on this data.

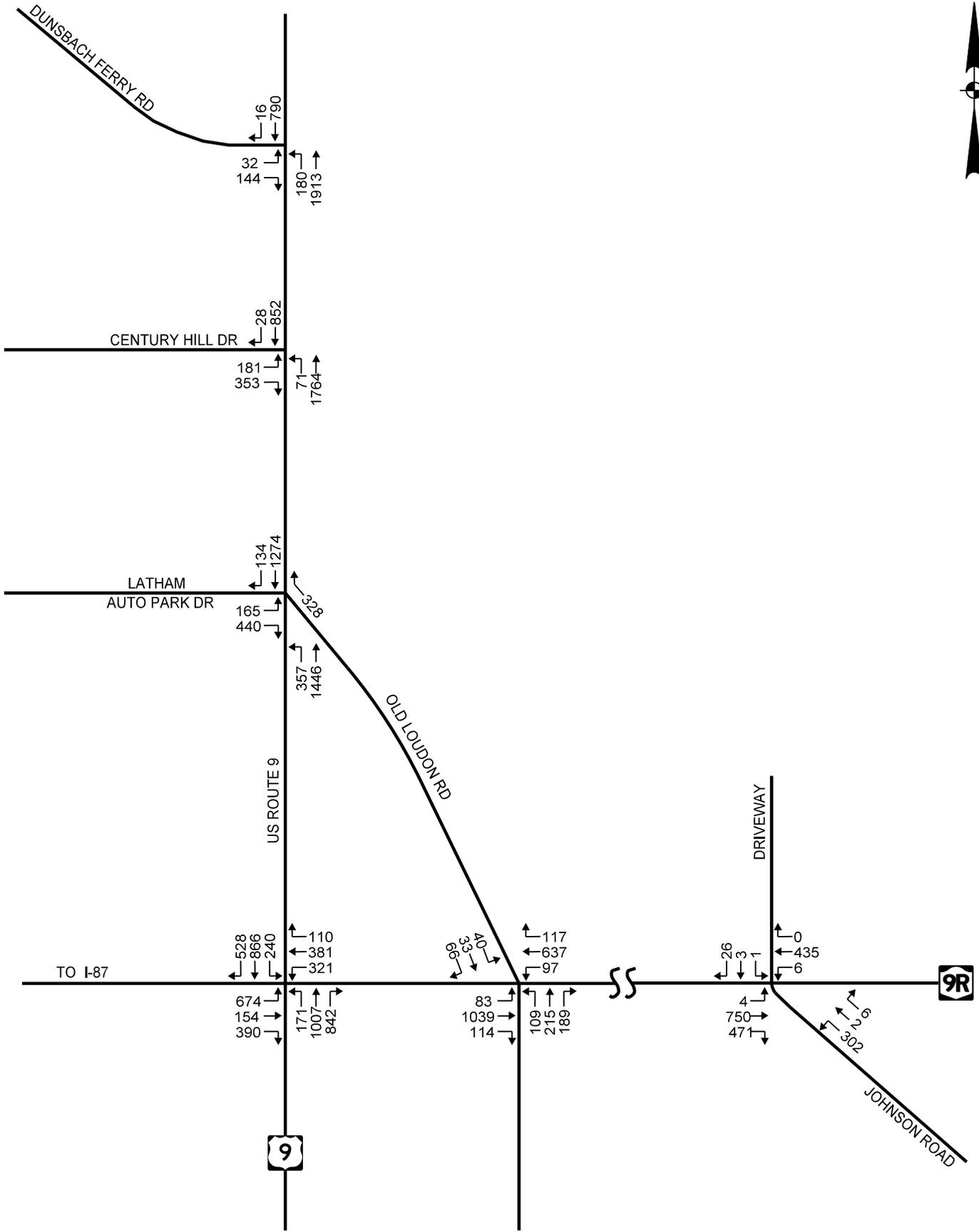
Traffic generated by several developments were distributed and assigned to the study area intersections based on existing travel patterns, available traffic studies, information provided by CDTC's Regional Travel Demand Forecasting Modeling, the locations of the proposed developments, and the locations of population centers and major travel routes in the region. It is assumed that an access connector from Latham Auto Park Drive to Century Hill Drive will be included in the Short-Term 2015 design year (per the current plans for the *Century Hill Commercial Business Park*). It is noted that this connection can be a private road and not be deeded over to the Town, but that rights of access should be provided to the traveling public. Traffic generated by the remaining developments documented in the *2005 Study* for the Short-Term 2015 and Long-Term 2020 design years were distributed and assigned using a TMODEL transportation sub-area model. Table 2 provides a trip generation comparison for the *Retail Development* and *Century Hill Commercial Business Park* parcels as compared to the *2005 Study*. The table shows that these two parcels are expected to generate approximately 400 more PM peak hour trips than predicted in 2005. A summary of the trip generation for the Short-Term and Long-Term developments is included under Attachment E.

**Table 2 – Trip Generation Comparison
2005 Study Estimate versus 2010 Proposed**

Land Use		Current 2010 Proposed			2005 Study Estimate		
		PM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Parcel No. 17	Latham Auto Park – 150,000 SF	--	--	--	154	242	396
	Century Hill Commercial Business Park – Phase 1+2						
	Office – 285,000 SF	68	330	398	--	--	--
	Hotel – 100 Rooms (86,500 SF)	26	27	53	--	--	--
	Retail – 8,400 SF	18	24	42	--	--	--
Parcel No. 30	Retail – 100,000 SF	--	--	--	180	195	375
	Retail Development – 196,000 SF						
	Total Trips	443	461	904	--	--	--
	25% Pass-by Trips	-113	-113	-226	--	--	--
	New Trips	330	348	678	--	--	--
Total New Trips		442	729	1171	334	437	771

c. Alternatives

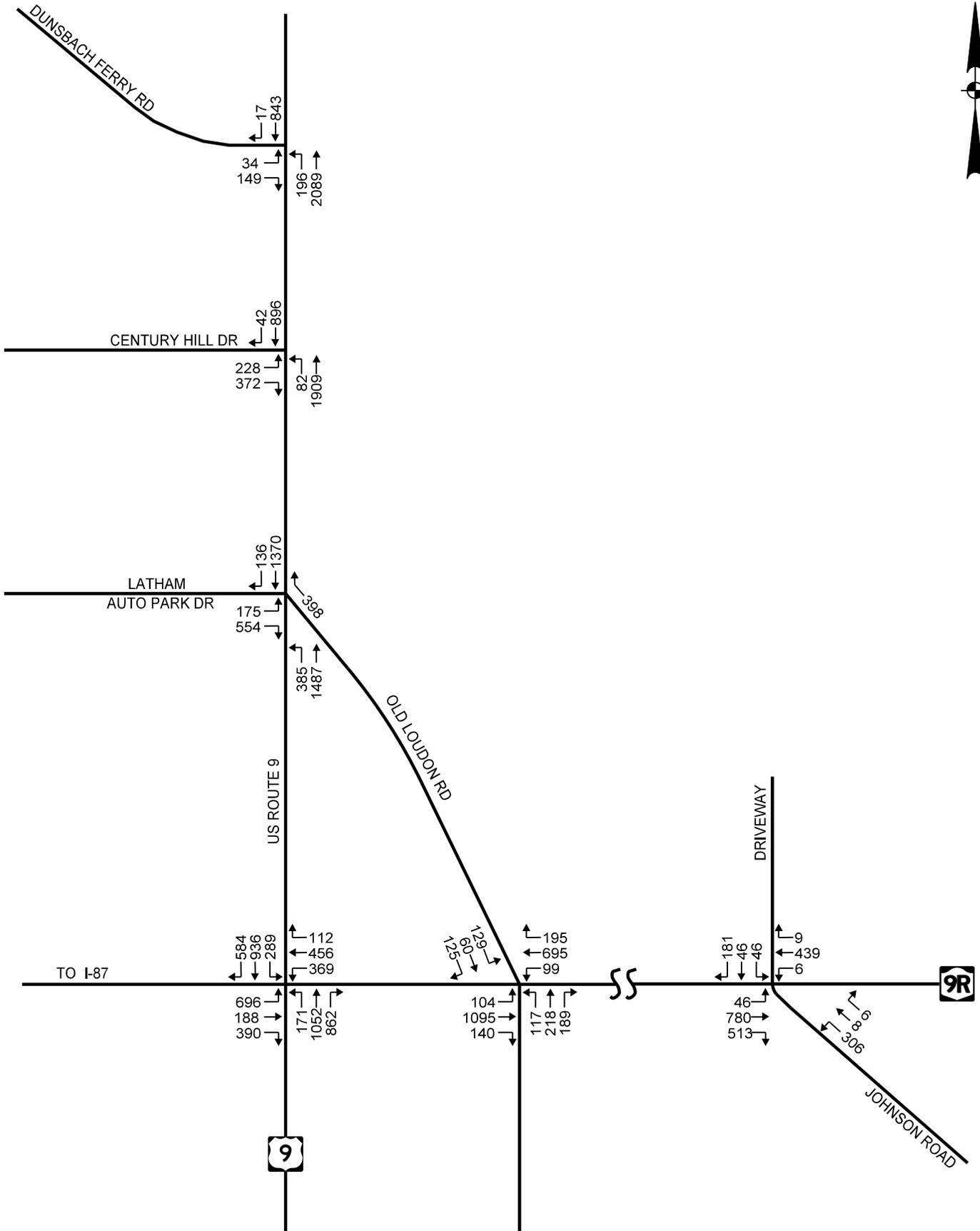
Working meetings were held with the Town on April 21, May 6, June 18, July 22, August 5, August 22, September 25, December 10, December 19, 2008, and on January 4, January 7, January 23, March 4, March 23, 2010, January 28, 2011, March 11, 2011, March 28, 2011, and July 5, 2011. Several of the meetings included attendance by representatives of the NYSDOT, CDTC, and CDTA. During the course of these meetings, NYSDOT indicated that the installation of a traffic signal at the Route 9/Latham Auto Park Drive/Old Loudon Road intersection would only be considered if it presented an overall benefit to network operations in the study area and not recommended for the exclusive improvement of access to commercial and office land uses on Latham Auto Park Drive. Therefore, based on discussions at the working meetings, it was agreed that this memorandum would focus on a preferred improvement scenario with and without a new connector road that extends southeast from the US Route 9/Old Loudon Road/Latham Auto Park Drive intersection through Parcel No. 28 to the NY Route 9R/Johnson Road intersection which would provide a network wide benefit to traffic operations in the area. Other alternatives such as converting Old Loudon Road to two-way traffic, and establishing roadway connections between Century Hill Drive and Pollock Road, and Century Hill Drive and Dunsbach Ferry Road were explored and rejected by the Town. Turning movements for localized traffic at study area intersections were reassigned to use the new connector road in addition to a redistribution of regional traffic volumes from Route 9 to Route 9R based on information provided by CDTC. Figures 5 and 6 show the 2015 and 2020 traffic volumes without the connector road while Figures 7 and 8 show the re-distributed 2015 and 2020 traffic volumes with the connector road.



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2015 PM PEAK HOUR
 TRAFFIC VOLUMES
 WITHOUT CONNECTOR ROAD
 BOGHT ROAD GEIS US ROUTE 9 UPDATE
 TOWN OF COLONIE, NEW YORK

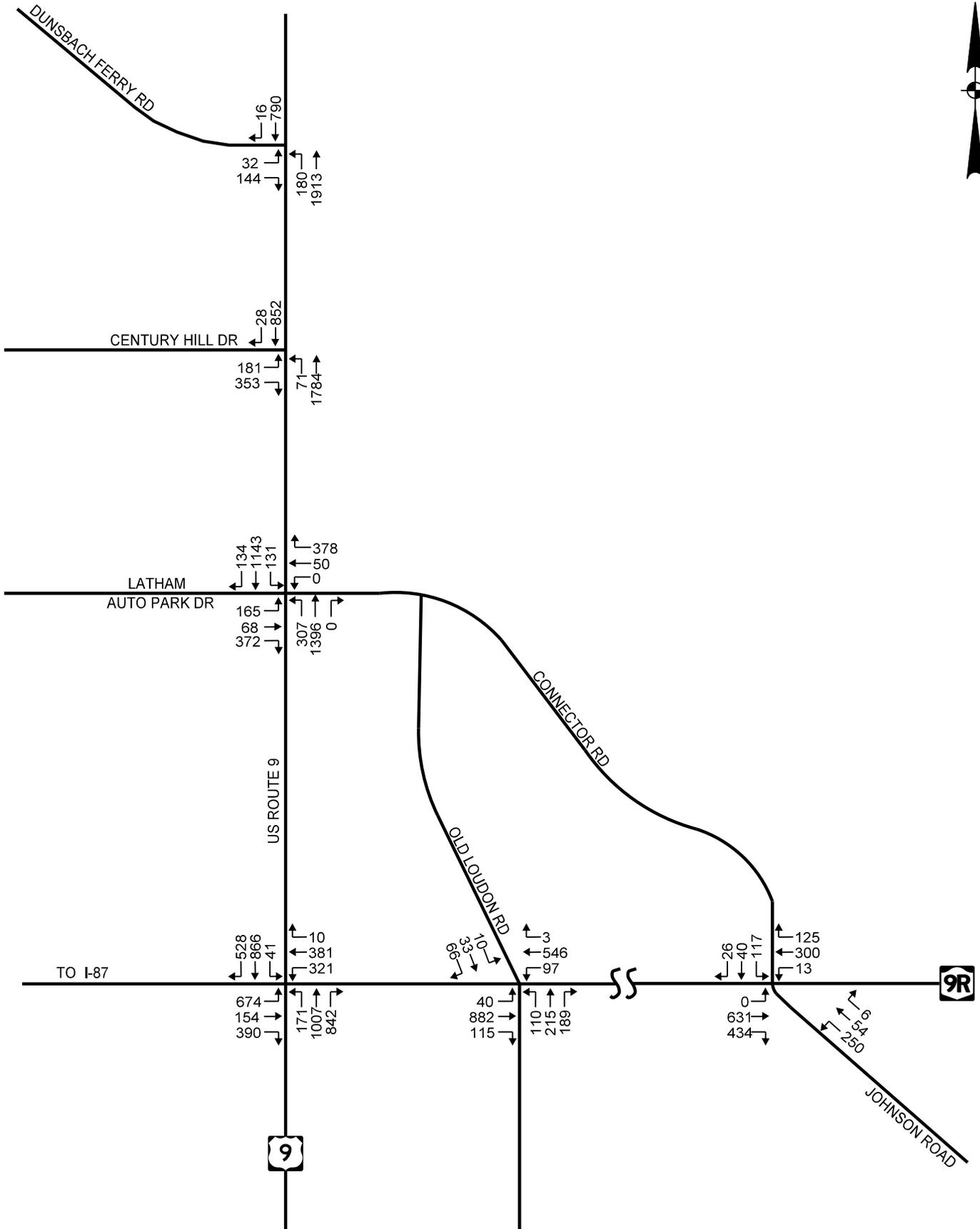




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2020 PM PEAK HOUR
 TRAFFIC VOLUMES
 WITHOUT CONNECTOR ROAD
 BOGHT ROAD GEIS US ROUTE 9 UPDATE
 TOWN OF COLONIE, NEW YORK

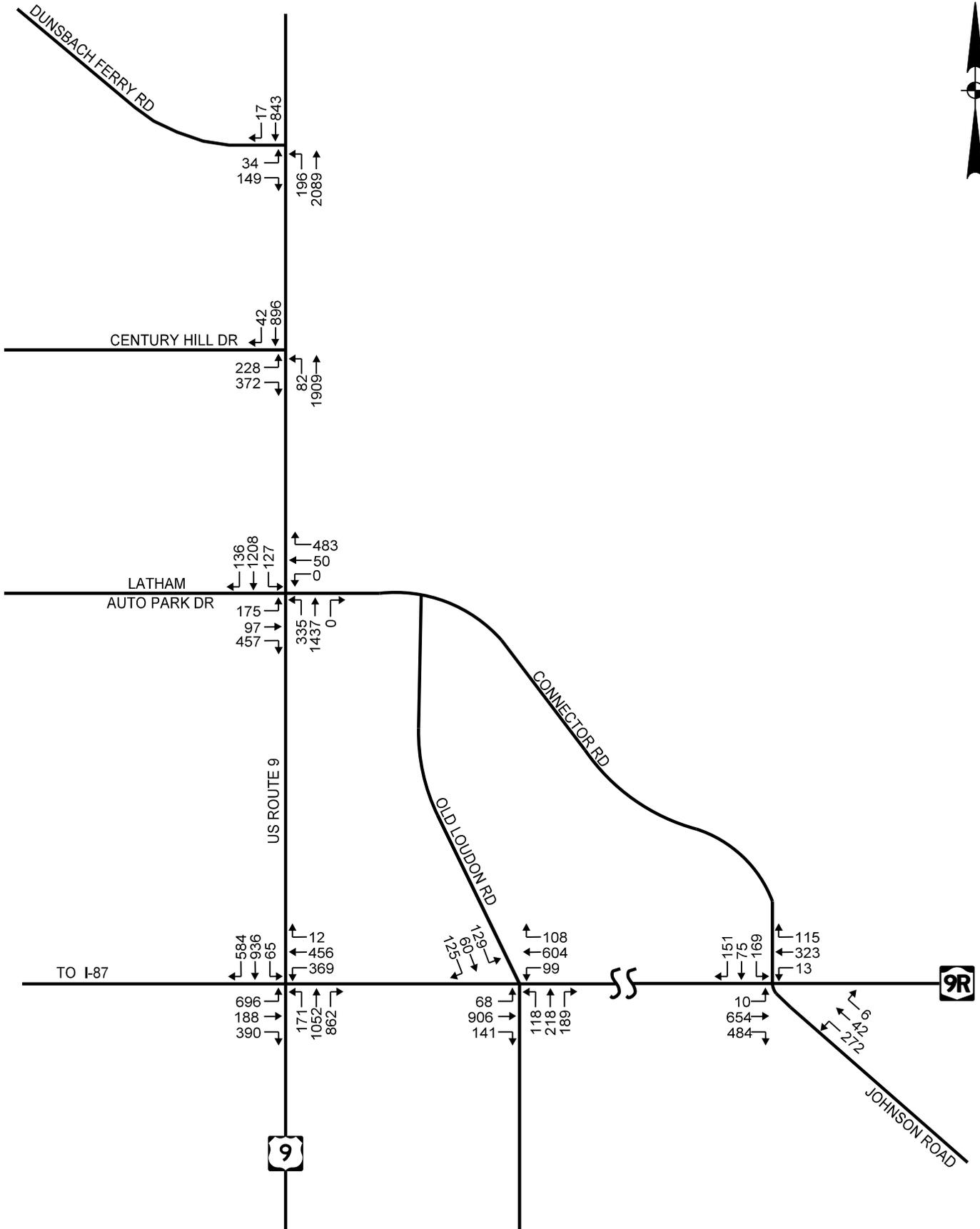




2015 EXISTING PM PEAK HOUR
TRAFFIC VOLUMES
WITH CONNECTOR ROAD

BOGHT ROAD GEIS US ROUTE 9 UPDATE
TOWN OF COLONIE, NEW YORK





2020 PM PEAK HOUR
TRAFFIC VOLUMES
WITH CONNECTOR ROAD

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Traffic Analysis

a. Traffic Simulation Models

Traffic simulation models were developed using the *Synchro-6 / Simtraffic* software which automates the procedures contained in the *2000 Highway Capacity Manual* (HCM). Models were developed for the following conditions:

- 2010 Existing Condition –
 - Represents existing geometry and signal timings.
- 2015 and 2020 Null Conditions –
 - Represents existing geometry and signal timings except at the US Route 9/Old Loudon Road/Latham Auto Park Drive intersection which requires the installation of a traffic signal to provide access to the proposed *Retail Development* (Parcel No. 30) and Century Hill Commercial Business Park developments. Also includes an eastbound left-turn lane at the NY Route 9R/Johnson Road intersection to provide access to Parcel No. 28.
- 2015 and 2020 Alternative 1 Condition –
 - Intersection Improvements and signal timing coordination *without* the construction of the Connector Road.
- 2015 and 2020 Alternative 2 Condition –
 - Intersection Improvements and signal timing coordination *with* the construction of the Connector Road (Preferred Alternative).

b. Levels of Service

Intersection Level of Service (LOS) and capacity analysis relate traffic volumes to the physical characteristics of an intersection. The *Synchro-6 / Simtraffic* software was used to evaluate levels of service and coordinated signal timing plans to optimize progression along Route 9. Intersection LOS ranges from LOS A (little delay) to LOS F (excessive delay) and is a measure of the quality of traffic flow. Attachment F contains detailed descriptions of LOS criteria for unsignalized and signalized intersections as well as the detailed level of service reports.

The relative impact of Short-Term and Long-Term anticipated development can be determined by comparing the level of service for the 2015 and 2020 Null conditions with the 2015 and 2020 design years for the Alternative 1 and 2 conditions. The preferred alternative (constructing a connector road from Route 9 to Route 9R) shows improved intersection levels of service. Table 3 shows the results of the Level of Service calculations.

Table 3 – Level of Service Summary

Intersection Approach		Control	PM Peak Hour							
			2010 Existing	Short-Term 2015			Long-Term 2020			
				Null	Alt. 1 (without Connector)	Alt. 2 (with Connector)	Null	Alt. 1 (without Connector)	Alt. 2 (with Connector)	
Route 9/Route 9R/I-87 Access		S								
I-87 Access EB	L,L	S	F (135.4)	F (216.5)	F (82.1)	D (49.2)	F (234.6)	F (111.8)	E (55.1)	
	T		D (36.9)	D (41.1)	D (35.7)	C (31.5)	D (43.4)	D (37.0)	C (33.8)	
Route 9R WB	R,R	S	C (23.4)	C (27.1)	C (25.3)	C (21.9)	C (28.3)	C (24.5)	C (23.8)	
	L,L		E (59.6)	E (64.5)	D (35.2)	C (33.9)	E (65.7)	E (65.5)	C (32.3)	
Route 9 NB	TR	S	E (69.6)	F (98.1)	--	--	F (151.5)	--	--	
	T,TR		--	--	E (73.8)	D (43.8)	--	F (150.8)	D (53.0)	
Route 9 SB	L,L	S	E (60.8)	E (66.1)	D (54.0)	D (52.6)	E (66.1)	D (48.5)	E (63.7)	
	T,T		D (53.2)	F (84.6)	D (54.5)	C (33.3)	F (98.8)	E (76.2)	D (35.8)	
Route 9 SB	R	S	A (1.6)	A (1.6)	A (1.5)	A (1.5)	A (1.7)	A (1.5)	A (1.5)	
	L		E (72.1)	F (179.3)	E (79.9)	D (37.3)	F (275.9)	F (103.9)	E (68.8)	
Route 9 SB	T,T	S	D (45.1)	E (58.6)	B (19.9)	C (24.8)	F (71.8)	C (28.5)	C (30.9)	
	R		C (26.9)	C (31.5)	A (7.8)	A (8.7)	D (37.2)	B (15.7)	B (11.0)	
Overall			D (51.5)	E (77.7)	D (39.2)	C (27.0)	F (95.0)	E (58.2)	C (31.1)	
Route 9/Latham Auto Park Dr/Old Loudon Rd		U								
Latham Auto Park EB	L	U	F (*)	--	--	--	--	--	--	
	R		F (*)	--	--	--	--	--	--	
Old Loudon Rd WB	R	U	F (211.6)	--	--	--	--	--	--	
	L		B (13.5)	--	--	--	--	--	--	
Latham Auto Park EB		S								
Latham Auto Park EB	L	S	--	D (38.8)	D (46.4)	D (36.0)	D (43.6)	D (47.2)	C (33.9)	
	T		--	--	C (30.4)	--	--	--	C (29.3)	
Old Loudon Rd WB	R	S	--	C (22.5)	C (23.3)	B (17.0)	C (31.1)	C (31.9)	B (18.6)	
	LT		--	--	C (29.7)	--	--	--	C (28.0)	
Route 9 NB	R	S	--	C (34.8)	D (39.4)	C (33.6)	D (50.9)	D (41.6)	D (52.6)	
	L		--	D (38.9)	B (12.1)	C (20.7)	D (51.2)	C (28.5)	C (29.6)	
Route 9 SB	T,TR	S	--	B (15.6)	A (1.4)	A (8.9)	B (16.8)	B (12.3)	B (12.0)	
	L		--	--	--	C (33.1)	--	--	D (51.8)	
Route 9 SB	T,T	S	--	C (26.0)	C (24.0)	C (29.3)	D (30.8)	C (25.0)	D (35.0)	
	R		--	A (5.7)	A (8.4)	B (10.2)	A (5.9)	A (7.6)	A (10.0)	
Overall			--	C (24.0)	B (17.5)	C (21.6)	C (30.0)	C (24.3)	C (28.1)	
Route 9/Century Hill Dr		S								
Century Hill Dr EB	L	S	C (28.5)	C (28.4)	D (46.6)	D (46.6)	C (34.7)	D (51.5)	D (51.5)	
	R		C (22.0)	C (23.4)	C (29.1)	C (28.7)	C (27.9)	C (29.4)	C (30.1)	
Route 9 NB	L	S	A (4.4)	A (7.0)	A (4.5)	A (4.6)	A (8.7)	A (5.6)	A (6.2)	
	T,T		A (7.5)	B (13.1)	A (8.3)	A (9.2)	C (20.9)	B (15.3)	B (13.3)	
Route 9 SB	T, TR	S	B (12.7)	B (16.3)	C (21.6)	C (21.8)	B (18.1)	--	--	
	T,T		--	--	--	--	--	C (22.9)	C (22.5)	
Route 9 SB	R	S	--	--	--	--	--	B (15.5)	B (15.2)	
	R		--	--	--	--	--	--	--	
Overall			B (12.3)	B (16.5)	B (17.6)	B (17.9)	C (22.1)	C (22.1)	C (21.1)	
Route 9/Dunsbach Ferry Rd		U								
Route 9 NB	L	U	B (10.3)	B (11.4)	B (11.4)	B (11.4)	B (12.1)	B (12.1)	B (12.1)	
	LR		C (19.9)	D (29.6)	D (30.3)	D (30.3)	E (43.4)	E (45.3)	E (45.3)	
Dunsbach Ferry EB	L	U	--	--	B (11.4)	B (11.4)	--	B (12.1)	B (12.1)	
	L		--	--	E (41.7)	E (41.6)	--	F (58.9)	F (58.9)	
Dunsbach Ferry EB	R	U	--	--	B (14.7)	B (14.7)	--	C (15.6)	C (15.6)	
	App.		--	--	C (19.6)	C (19.6)	--	C (23.7)	C (23.7)	
Route 9 NB	L	U	--	--	B (11.4)	B (11.4)	--	B (12.1)	B (12.1)	
	R		--	--	B (14.7)	B (14.7)	--	C (15.6)	C (15.6)	
Overall			--	--	B (11.4)	B (11.4)	--	B (12.1)	B (12.1)	
Route 9R/Old Loudon Rd		S								
Route 9R EB	L	S	B (10.0)	B (10.8)	B (13.2)	B (11.6)	B (13.4)	C (29.6)	C (21.7)	
	T,TR		C (22.1)	C (25.5)	B (19.3)	C (20.1)	C (33.0)	E (65.5)	D (41.8)	
Route 9R WB	L	S	B (13.8)	B (15.9)	C (25.7)	B (17.8)	B (19.4)	E (59.7)	D (42.9)	
	T,TR		B (15.4)	B (16.3)	B (11.7)	B (10.3)	B (19.8)	D (36.9)	C (23.7)	
Old Loudon Rd NB	LT	S	C (33.1)	D (38.2)	D (53.3)	D (54.0)	E (56.9)	C (26.6)	C (24.6)	
	R		B (19.9)	C (21.1)	B (19.2)	C (27.3)	C (22.5)	B (13.1)	B (16.8)	
Old Loudon Rd SB	LTR	S	C (22.7)	C (24.2)	C (30.2)	C (26.7)	F (339.9)	E (70.8)	D (54.7)	
			C (20.8)	C (23.4)	C (21.9)	C (23.2)	E (67.2)	D (50.3)	D (35.1)	

Key: NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound intersection approaches
L,T,R = Left-turn, through, and/or right-turn movements
S, U = Signalized or unsignalized intersection control
X (Y.Y) = Level of Service (Delay, seconds per vehicle)
--- = Not Applicable

Table 3 – Level of Service Summary (Cont'd)

Intersection Approach		Control	PM Peak Hour						
			2010 Existing	Short-Term 2015			Long-Term 2020		
				Null	Alt. 1 (without Connector)	Alt. 2 (with Connector)	Null	Alt. 1 (without Connector)	Alt. 2 (with Connector)
Route 9R/Johnson Rd/Connector Rd		S							
Route 9R EB	LT		C (20.1)	--	--	--	--	--	--
	L		--	B (11.6)	A (5.3)	A (0.0)	C (22.4)	A (6.4)	A (5.2)
Route 9R WB	T		--	C (24.0)	B (10.1)	A (4.5)	E (58.0)	B (11.3)	B (12.7)
	R		A (1.9)	A (1.9)	A (3.6)	A (2.1)	A (6.1)	A (1.4)	B (16.0)
Johnson Rd NB	L		B (11.0)	B (12.0)	A (8.7)	A (6.3)	C (23.3)	B (14.5)	A (7.3)
	TR		B (14.4)	B (16.1)	B (12.4)	A (9.0)	C (28.7)	B (18.5)	B (10.7)
Bypass Rd SB	LTR		D (43.6)	D (43.1)	D (40.0)	--	D (53.4)	E (65.5)	--
	L		--	--	--	D (44.8)	--	--	C (31.1)
Overall	TR		--	--	--	C (28.1)	--	--	B (11.2)
	LTR		D (47.4)	D (48.9)	C (23.2)	--	E (64.3)	C (21.0)	--
Overall	L		--	--	--	C (26.2)	--	--	B (12.0)
	TR		--	--	--	C (20.1)	--	--	B (10.6)
Overall			B (19.3)	C (21.0)	B (14.2)	B (12.8)	D (40.8)	B (19.0)	B (14.8)

Key: NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound intersection approaches
L,T,R = Left-turn, through, and/or right-turn movements
S, U = Signalized or unsignalized intersection control
X (Y.Y) = Level of Service (Delay, seconds per vehicle)
--- = Not Applicable

The following observations are evident from the level of service analysis:

- Route 9/Route 9R/I-87 Access** – The level of service summary indicates that this intersection currently operates at an overall LOS D during the PM peak hour with several movements operating at LOS E and the eastbound left-turn movement operating at a LOS F. During the 2015 and 2020 Null condition, this intersection will degrade to an overall LOS E/F with multiple movements operating at a LOS E/F.

Short-Term Alternatives – For Alternative 1 and 2 conditions, it is recommended that an additional westbound through lane be constructed on Route 9R and that the traffic signal be coordinated with the proposed signal at the Route 9/ Old Loudon Road/Latham Auto Park Drive intersection and the existing signal at the Route 9/Century Hill Drive intersection located to the north. This geometric improvement was included in the *2005 Study*. However, the Short-Term Alternative 1 level of service analysis indicates that with this improvement, this intersection will continue to operate at similar overall operations as existing conditions with the eastbound and southbound left-turn movements and the westbound shared through/right-turn movement operating at a LOS E/F. The Short-Term Alternative 2 level of service analysis indicates that this intersection will operate at an overall LOS C during the PM peak hour with all movements operating at a LOS D or better.

Long-Term Alternatives – The Long-Term Alternative 1 level of service analysis indicates that this intersection will operate at an overall LOS E with multiple movements operating at a LOS E/F without the connector road during the PM peak hour. However, this intersection will operate at an overall LOS C with all movements operating at a LOS E or better under Alternative 2.

Although some lane groups will operate below LOS D, the overall intersection operations will be better than 2010 Existing conditions.

- Route 9/Old Loudon Road/Latham Auto Park Drive – The level of service summary indicates that the side street traffic at this stop sign controlled intersection currently operates at a LOS F while the northbound Route 9 left-turn lane operates at a LOS B during the PM peak hour.

The Null condition and Alternative 1 Short-Term and Long-Term conditions will require the installation of a traffic signal at this intersection and separate left and right turn lanes on the eastbound approach in order to provide adequate access to the proposed *Retail Development* (Parcel No. 30) and Century Hill Commercial Business Park developments located on Latham Auto Park Drive. The level of service analysis indicates that this intersection will operate at an overall LOS B/C with all movements operating at a LOS D or better during the PM peak hour.

Alternative 2 includes installation of a coordinated traffic signal, and constructing a road that connects US Route 9 opposite Latham Auto Park Drive to NY Route 9R opposite Johnson Road. Old Loudon Road will be re-aligned to intersect the new connector road to the east but will still provide one-way northbound access. The eastbound Latham Auto Park Drive approach should include separate left, through, and right turn lanes, while the westbound Connector Road approach should provide a shared left-turn/through lane and a separate right-turn lane. It is also recommended that the southbound Route 9 approach be re-stripped to provide an exclusive left-turn lane. The Short-Term and Long-Term level of service summary for Alternative 2 indicates that this signalized intersection will operate at an overall LOS C with all travel movements operating at a LOS D or better during the PM peak hour.

- Route 9/Century Hill Drive – The level of service summary indicates that this intersection currently operates at an overall LOS B during the PM peak hour with all movements operating at a LOS C or better. During the 2015 and 2020 Null condition, this intersection will operate at an overall LOS B/C with all movements operating at a LOS C or better during the PM peak hour.

Short-Term Alternatives – The Short-Term level of service summary indicates that this intersection will operate at an overall LOS B for Alternative 1 and 2 with all movements operating at a LOS D or better during the PM peak hour. This existing traffic signal will be coordinated with the proposed signal at the Latham Auto Park Drive/Old Loudon Road intersection and the Route 9R/I-87 Access intersection on Route 9.

Long-Term Alternatives – The Long-Term level of service analysis for the Alternative 1 and 2 conditions indicates that this intersection will operate at an overall LOS C during the PM peak hour. It is noted that the construction of a separate southbound right-turn lane on Route 9 is recommended as part of the *2005 Study*. No additional improvements are necessary.

- Route 9/Dunsbach Ferry Road – The level of service summary indicates that the eastbound Dunsbach Ferry Road approach currently operates at a LOS C. A review of the level of service summary for the Null, Alternative 1, and Alternative 2 design conditions indicates that they are almost identical except for slight variations due to platooning of vehicles associated with the proposed coordinated signal system located to the south. Therefore, the level of service analysis and recommendations provided for the 2015 Short-Term and 2020 Long-Term design years are the same for each design condition.

The analysis indicates that the eastbound movement will degrade to a LOS D during the 2015 Short-Term design year. During the 2020 Long-Term design year, the eastbound Dunsbach Ferry Road approach will operate at a LOS E with approximately 45 seconds of delay if a single lane is provided for shared left and right turn movements. However, a review of the eastbound volume to capacity (v/c) ratio indicates that while this approach may experience delays over one minute during the PM peak hour, it still provides adequate capacity. The delay experienced during the PM peak hour is mainly reflective of the high though volumes on US Route 9 and is generally considered an acceptable operating condition during the peak hours. Due to the proximity of the Century Hill Drive intersection, installing a new traffic signal at Dunsbach Ferry Road will not be allowed by the NYSDOT. Providing a roadway connection between Dunsbach Ferry Road and Century Hill Drive, or Pollock Road and Century Hill Drive was considered and rejected by the Town. The intersection should be monitored in the future for safety and traffic operations, in conjunction with the Century Hill Drive traffic signal to identify a preferred long term solution that provides adequate side street access, and preserves the mobility function of Route 9. This will not include new roadway connections to Dunsbach Ferry Road, or Pollock Road, but could include turn prohibitions at the Dunsbach Ferry Road/Route 9 intersection.

Therefore, two separate geometric alternatives were evaluated for the Short-Term and Long-Term design years. Option 1 assumes that a separate left and right turn lane will be provided on the eastbound Dunsbach Ferry Road approach while Option 2 assumes that eastbound left-turns exiting this intersection will be restricted. The analysis for Option 1 indicates that the overall approach will operate at LOS C with approximately 20 seconds of delay during the 2015 design year and with approximately 24 seconds of delay during the 2020 design year. The level of service analysis for Option 2 indicates that the eastbound right-turn only approach will operate at a LOS B/C during the 2015 and 2020 design years.

It is also recommended that the intersection be realigned to the north as per the concept plan if the property in the northwest quadrant redevelops for either alternative.

The northbound Route 9 left-turn lane currently operates at a LOS B and will continue to operate at the same levels of service during the 2015 and 2020 design years under any proposed geometric alternative.

- Route 9R/Old Loudon Road – The level of service summary indicates that this intersection currently operates at an overall LOS C during the PM peak hour. During the Short-Term 2015 and Long-Term 2020 Null condition, this intersection will operate at an overall LOS C/E during the PM peak hour with the southbound approach operating at a LOS F during the 2020 design year.

The level of service summary indicates that this intersection will operate at an overall LOS C with all movements operating at a LOS D or better for Alternative 1 and Alternative 2 during the 2015 Short-Term design year. This intersection will operate at an overall LOS D during the Long-Term design years with all movements operating at a LOS E or better for Alternative 1 while all movements will operate at a LOS D or better for Alternative 2 with improved signal timing and coordination.

- Route 9R/Johnson Road – The level of service summary indicates that this intersection operates at an overall LOS B with all movements operating at a LOS D or better.

The Null condition and Alternative 1 and 2 conditions will require re-striping the eastbound approach to provide an exclusive left-turn lane for access into Parcel No. 28 and/or the proposed connector road. The level of service analysis for the Short-Term and Long-Term Null conditions indicates that this intersection will operate at an overall LOS C/D with all movements operating at a LOS E or better during the PM peak hour. The Short-Term and Long-Term Alternative 1 level of service analysis indicates that this intersection will provide adequate access into Parcel No. 28 and will operate at a overall LOS B with improved signal timing and coordination.

Alternative 2 includes installation of a new coordinated traffic signal, and constructing a road that connects US Route 9 opposite Latham Auto Park Drive to NY Route 9R opposite Johnson Road. The northbound Johnson Road approach and the southbound Connector Road approach should provide an exclusive left-turn lane and a shared through/right-turn lane. The Short-Term and Long-Term level of service summary for Alternative 2 indicates that this signalized intersection will operate at an overall LOS B with all travel movements operating at a LOS D or better during the PM peak hour.

A summary of the intersection improvement changes from the *2005 Study* and the current recommended improvements is included under Attachment G.

c. Cost Estimate

A cost estimate summary included on Table 4 was prepared for the proposed improvements recommended in the GEIS study area.

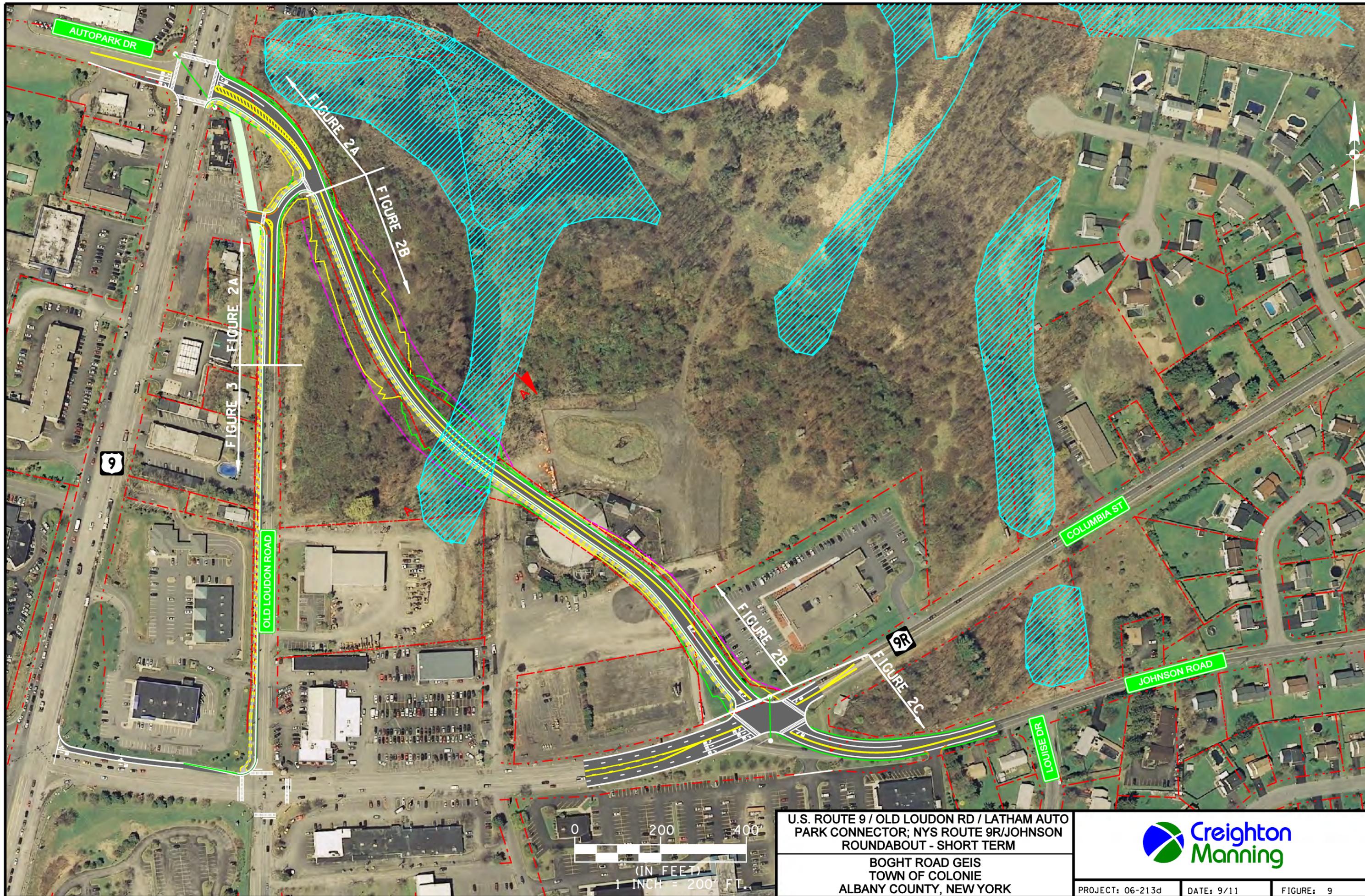
Table 4 – Cost Estimate Summary

Intersection		Improvement	Cost	
			Short Term	Long Term
1	US Rt 9/Century Hill Dr	Construct SB right-turn lane	-	\$228,000
1A	US Rt 9/Dunsbach Ferry Rd	Construct separate EB left and right turn lanes	\$171,000	-
2A	US Rt 9/Old Loudon Rd/Latham Auto Park	Install traffic signal with access to Connector Rd and additional geometry	\$1,412,000	-
2B	Connector Road	Construct Connector Rd from US Route 9 to Route 9R	\$3,027,000	-
2C	NY Route 9R/Johnson Signal	Provide access to Connector Rd and additional intersection geometry	\$1,399,000	-
3	NY Rt 9R/Old Loudon Rd	Pedestrian Accommodations, Signal Timing, Coordination	\$220,000	-
4	NY Rt 9R/Baker Ave/Boght Rd	Install roundabout	-	\$937,000
5	NY Rt 9R/Columbia St/Baker Ave	Install Roundabout	-	\$1,473,000
6	Haswell Rd/Swatling Rd	Construct separate NB left and right turn lanes	-	\$143,000
7	Old Loudon Rd/Cobee Rd/Jeanne Jugan La	Install traffic signal	\$306,000	-
8	Old Loudon Rd/Latham Ridge Rd	Install traffic signal and construct SB left-turn lane	-	\$ 867,000
9	US Rt 9/NY Rt 9R	Construct WB thru lane	\$510,000	-
10	US Rt 9/Boght Rd/NY Rt 9R	Construct EB/WB left-turn lanes and WB right-turn lane	\$1,367,000	-
11	US Rt 9/Boght Rd/NY Rt 9R	Construct NB right-turn lane	-	\$337,000
12	Boght Road/Johnson Rd/St. Agnes HWY <i>(Previously Constructed)</i>	Install Roundabout (Existing)	\$927,000	-
13	Boght Rd/Haswell Rd/Elm Street	Install traffic signal	-	\$317,000
14	Johnson Rd/Miller Rd	Install traffic signal	-	\$306,000
15	Baker Ave/Vliet Blvd	Install traffic signal	-	\$ 357,000
16	Transit Accommodations (as per Town Engineer)	Transit Accommodations	\$250,000	-
TOTAL:			\$9,589,000	\$4,965,000
PROJECT TOTAL (SHORT TERM +LONG TERM) =			\$14,554,000	

The detailed cost estimates for all of the intersection improvements is located under Attachment H. The proposed Connector Road is shown on Figure 9. A review of the proposed roadway alignment indicates that the Connector Road and adjacent signal improvements will impact approximately 3.75 acres of right-of-way. An approximate summary for the acquisition of the necessary right-of-way to construct the Connector Road and other improvements was included in the cost estimate.

d. Parcel No. 28 Sensitivity Analysis

A sensitivity analysis was conducted to determine if the study area intersections will operate adequately if Parcel No. 28 (400,000 SF of Office and 50,000 SF of mixed commercial/retail development) develops more aggressively than anticipated with approximately 500,000 SF of mixed use retail development. Attachment I contains the detailed Level of Service reports. Table 5 shows the results of the Level of Service calculations.



FILE NAME : F:\Projects\2006\06-213d\cadd\dm\figures\concept_pln_2.dgn
 DATE / USER : 9/21/2011 / Koberick

U.S. ROUTE 9 / OLD LOUDON RD / LATHAM AUTO
 PARK CONNECTOR; NYS ROUTE 9R/JOHNSON
 ROUNDABOUT - SHORT TERM
 BOGHT ROAD GEIS
 TOWN OF COLONIE
 ALBANY COUNTY, NEW YORK

	
PROJECT: 06-213d	DATE: 9/11
FIGURE: 9	

**Table 5 – Sensitivity Analysis Level of Service Summary
(500 KSF Parcel No. 28)**

Intersection Approach		Control	PM Peak Hour		
			Long-Term 2020		
			Null	Alt. 1	Alt. 2
Route 9/Route 9R/I-87 Access		S			
I-87 Access EB	L,L T		F (322.0) D (44.3)	F (207.4) D (42.6)	E (66.3) C (3.4)
Route 9R WB	R,R L,L TR		C (28.4) E (65.9) F (180.0)	C (26.8) D (45.3) --	C (23.1) D (41.2) --
Route 9 NB	T,TR L,L T,T		-- E (66.1) F (144.4)	F (136.1) D (53.7) F (120.6)	E (78.0) E (63.5) E (57.9)
Route 9 SB	R L T,T R		A (1.8) F (460.1) F (84.0) D (42.4)	A (1.6) F (200.4) C (21.7) A (9.9)	A (1.6) E (55.4) D (46.7) B (12.9)
Overall			F (133.4)	F (81.1)	D (41.9)
Route 9/Latham Auto Park Dr/ Old Loudon Rd		S			
Latham Auto Park EB	L T R		D (45.5) -- C (33.0)	D (46.3) -- D (38.5)	C (32.6) C (28.7) B (19.2)
Old Loudon Rd WB	LT R		-- F (98.5)	-- D (39.0)	C (24.5) D (46.4)
Route 9 NB	L T,TR		D (54.7) C (21.0)	C (25.4) A (3.5)	C (30.2) D (49.8)
Route 9 SB	L T,T R		-- D (44.4) A (5.9)	-- C (26.8) A (6.0)	D (54.1) D (37.7) A (9.4)
Overall			D (41.6)	C (22.0)	D (40.1)
Route 9/Century Hill Dr		S			
Century Hill Dr EB	L R		D (35.6) C (28.4)	D (54.7) C (31.2)	D (54.7) C (30.7)
Route 9 NB	L T,T		A (10.9) D (51.4)	A (7.3) C (21.0)	A (9.8) B (13.4)
Route 9 SB	T, TR T,T R		C (21.4) -- --	-- C (25.2) B (15.1)	-- C (25.5) B (15.3)
Overall			D (38.4)	C (25.8)	C (22.0)
Route 9/Dunsbach Ferry Rd		U			
Route 9 NB	L		B (14.2)	B (14.2)	B (14.2)
Dunsbach Ferry EB	LR		F (113.6)	F (108.0)	F (108.0)
Route 9R/Old Loudon Rd		S			
Route 9R EB	L T,TR		D (36.7) C (32.2)	C (29.4) C (26.3)	B (11.9) B (17.0)
Route 9R WB	L T,TR		C (20.3) C (27.3)	C (22.0) C (28.9)	C (23.8) B (14.9)
Old Loudon Rd NB	LT L T		D (53.9) -- --	-- C (33.5) D (52.3)	-- D (42.0) C (30.3)
Old Loudon Rd SB	R LTR L TR		C (23.2) F (835.7) -- --	C (28.2) -- D (52.6) C (32.2)	C (26.0) -- D (53.9) D (45.5)
Overall			F (152.6)	C (31.4)	C (23.2)

Key: NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound intersection approaches
L,T,R = Left-turn, through, and/or right-turn movements
S, U = Signalized or unsignalized intersection control
X (Y.Y) = Level of Service (Delay, seconds per vehicle)
--- = Not Applicable

**Table 5 – Sensitivity Analysis Level of Service Summary (Cont'd)
(500 KSF Parcel No. 28)**

Intersection Approach		Control	Long-Term 2020		
			Null	Alt. 1	Alt. 2
Route 9R/Johnson Rd/Connector Rd		S			
Route 9R EB	L		F (382.8)	D (38.2)	B (13.9)
	T		F (97.5)	B (15.4)	B (11.6)
	R		A (8.6)	A (2.3)	A (2.1)
Route 9R WB	L		C (30.6)	C (23.2)	C (24.0)
	TR		D (42.2)	D (44.9)	--
	LTR		E (59.4)	--	C (30.7)
Johnson Rd NB	L		--	D (36.2)	B (16.4)
	TR		--	B (18.3)	--
	LTR		F (107.4)	--	D (41.5)
Bypass Rd SB	L		--	D (37.0)	C (26.6)
	TR		--	D (52.9)	--
Overall			F (94.2)	C (28.4)	B (19.6)

Key: NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound intersection approaches
L,T,R = Left-turn, through, and/or right-turn movements
S, U = Signalized or unsignalized intersection control
X (Y.Y) = Level of Service (Delay, seconds per vehicle)
--- = Not Applicable

The sensitivity level of service analysis indicates that the US Route 9/NY Route 9R/I-87 Access intersection will degrade to an overall LOS F during Long-Term Alternative 1 conditions if Parcel No. 28 is developed more intensely than anticipated. However, the analysis also indicates that this intersection will continue to operate at an overall LOS D with all movements operating at a LOS E or better during Long-Term Alternative 2 conditions. The other study area intersections will continue to operate adequately for both alternatives with the exception of the NY Route 9R/Old Loudon Road intersection. The analysis indicates that exclusive northbound and southbound left-turn lanes should be constructed on Old Loudon Road for both alternatives to accommodate increased traffic associated with Parcel No. 28. However, it is noted that improvements to this intersection would be contingent on a new access provided to Parcel No. 28. For example, these additional lanes on Old Loudon Road may not be necessary if access to Parcel No. 28 is only permitted from the Connector Road and prohibited from Old Loudon Road. The sensitivity analysis indicates that Alternative 2 (preferred alternative identified previously) provides the best overall intersection operations through the Boght Road study area.

e. Roundabout Sensitivity Analysis

An intersection control sensitivity analysis was conducted at the Route 9/Latham Auto Park Drive/Connector Road intersection and at the Route 9R/Johnson Road/Connector Road intersection to determine if roundabouts could improve intersection delay for the Short-Term and Long-Term development conditions. Intersection evaluations were made using the *SIDRA* Software which automates the procedures contained in the *2000 Highway Capacity Manual*. Attachment J contains detailed descriptions of LOS criteria for roundabout intersections and the detailed Level of Service reports. The results of the level of service sensitivity analysis at the Route 9/Latham Auto Park Drive/Connector Road intersection and at the Route 9R/Johnson Road/Connector Road intersection during the PM peak hour are shown in Table 6.

Table 6 – Roundabout Level of Service Sensitivity Analysis

Intersection Approach	Control	PM Peak Hour			
		2015		2020	
		Alt. 1	Alt. 2	Alt. 1	Alt. 2
Route 9/Latham Auto Park Dr/Connector Rd					
Route 9 NB	LT-T	A (9.9)	--	A (9.9)	--
	LT-TR	--	C (20.6)	--	C (27.1)
Connector Rd WB	RR	C (30.5)	--	E (69.8)	--
	LTR-R	--	F (98.5)	--	F (247.6)
Route 9 SB	T-TR	B (15.2)	--	C (23.1)	--
	LT-TR	--	B (16.6)	--	C (21.1)
Latham Auto Park EB	LR-R	C (23.3)	--	F (93.6)	--
	LTR-R	--	C (23.2)	--	E (78.0)
	Overall	B (15.7)	C (29.4)	C (34.0)	E (64.8)
Route 9R/Johnson Rd/Connector Rd					
Johnson Rd NB	LTR	--	C (21.7)	--	C (25.2)
Route 9R WB	LTR	--	A (8.8)	--	A (9.3)
Connector Rd SB	LTR	--	B (12.0)	--	B (15.2)
Route 9R EB	LTR	--	C (24.5)	--	--
	LT-R	--	--	--	A (6.2)
	Overall	--	B (19.4)	--	B (11.0)

Key: NB, SB, EB, WB = Northbound, Southbound, Eastbound, Westbound intersection approaches
 L,T,R = Left-turn, through, and/or right-turn movements
 S, U, R = Signalized, unsignalized, or roundabout intersection control
 X (Y.Y) = Level of Service (Delay, seconds per vehicle)

The proposed geometry for a two-lane roundabout at the Route 9/Latham Auto Park Drive/Connector Road intersection with and without a connection from US Route 9 to NY Route 9R at the Johnson Road intersection is shown on Figures 10 and 11. The Short-Term level of service summary indicates that a two-lane roundabout will operate at an overall LOS B/C during the PM peak hour for Alternative 1 and Alternative 2 conditions, respectively. The two-lane roundabout Long-Term analysis indicates that this intersection will operate at an overall LOS C/E during the PM peak hour for Alternative 1 and Alternative 2 conditions, respectively, with multiple approaches operating at a LOS E/F during the PM peak hour. Therefore, construction of a two-lane roundabout is not recommended at this intersection since it will not operate adequately for Short-Term and Long-Term development scenarios.

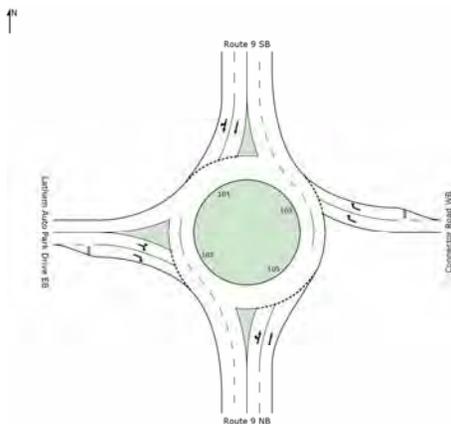


Figure 10 – Alternative 1 Geometry

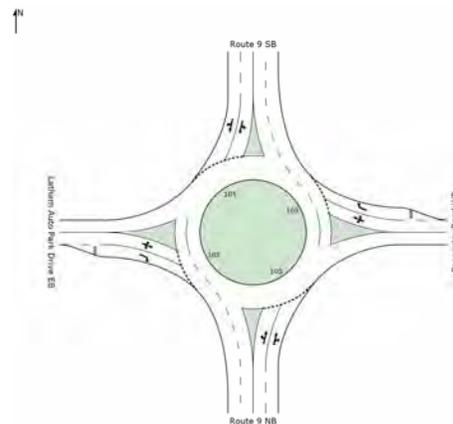


Figure 11 – Alternative 2 Geometry

The proposed geometry for a single-lane roundabout at the Route 9/Johnson Road/Connector Road intersection with a connection from NY Route 9R to US Route 9 at the Latham Auto Park Drive intersection is shown on Figures 12 and 13. The level of service summary indicates that a single-lane roundabout for the 2015 Short-Term Alternative 2 condition will operate at an overall LOS B during the PM peak hour. The roundabout sensitivity analysis for the Long-Term 2020 Alternative 2 condition indicates that this intersection will operate at an overall LOS B with all movements operating at a LOS C or better if an eastbound slip right-turn lane is constructed. Therefore, construction of a single-lane roundabout would provide adequate access to the connector road for the Short-Term and Long-Term Alternative 2 design years. However, a review of the right-of-way (ROW) around the intersection and the skew angle of the Route 9R/Johnson Road intersection indicates that a roundabout would have greater impacts to adjacent land uses than a traffic signal. Since the signal Alternative functions at acceptable levels of service and has fewer physical impacts, it is the recommended alternative at this intersection.

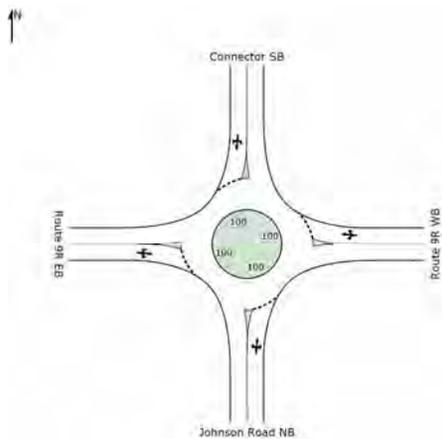


Figure 12 – Short-Term Alternative 2 Geometry

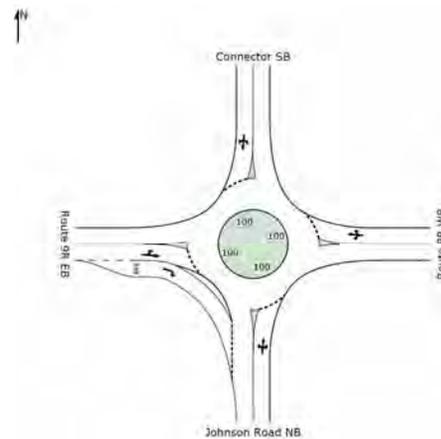


Figure 13 – Long-Term Alternative 2 Geometry

f. Performance Measures

Measures of effectiveness (MOEs) serve as other performance measures for evaluating the Route 9 Corridor. The MOEs can include delays, travel times, fuel consumption, average speed, emissions, and the “performance index” (PI) from the traffic simulation model. The PI represents a combination of the delays, stops, and queuing penalty. A lower PI indicates better overall operations. Table 7 summarizes the MOEs for Route 9.

Table 7 – Measures of Effectiveness on Route 9

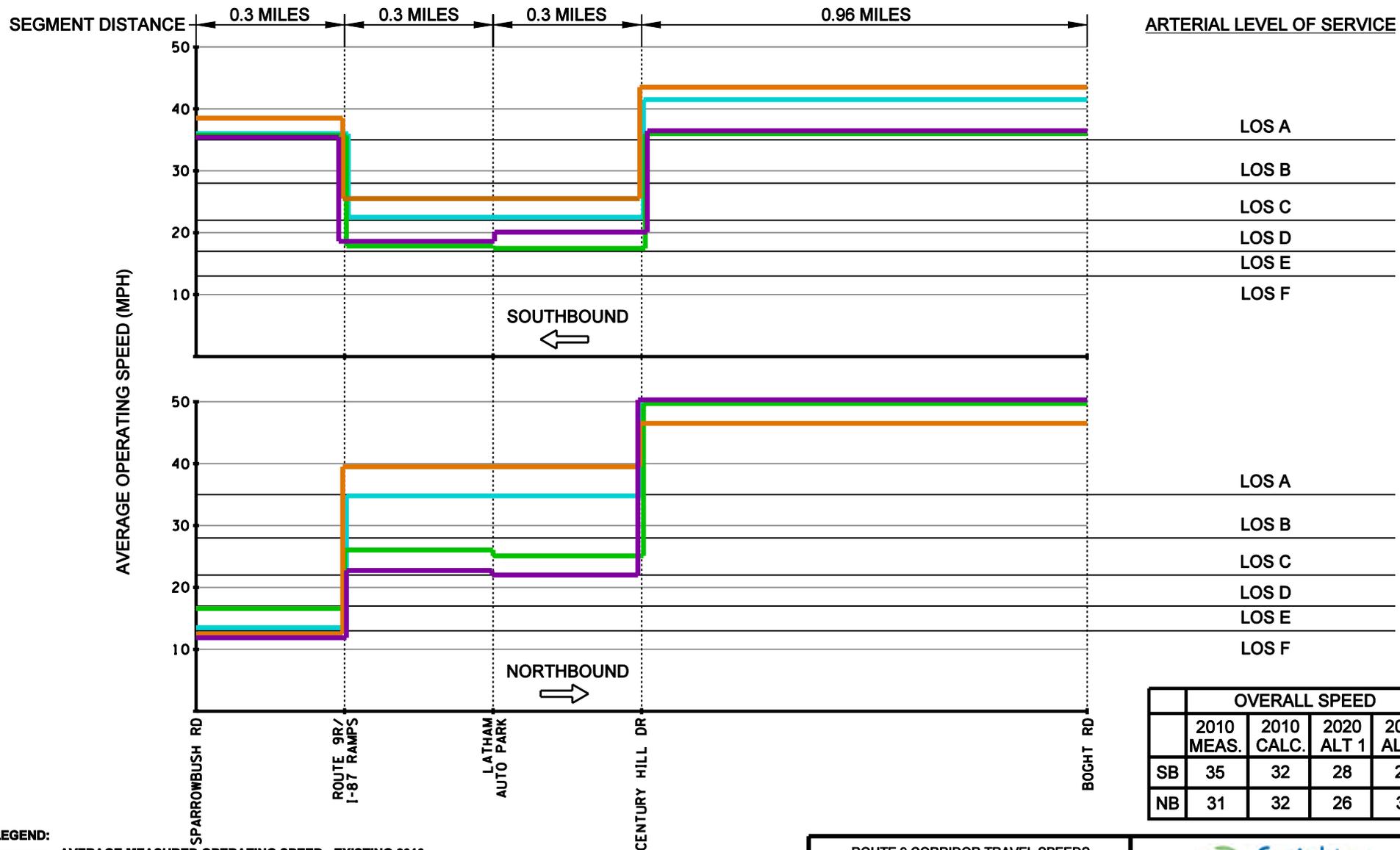
Measure of Effectiveness	PM Peak Hour						
	2010 Existing	2015			2020		
		Null	Alt. 1	Alt. 2	Null	Alt. 1	Alt. 2
Total Delay (Hours)	38	91	54	48	121	78	61
Travel Time (Seconds)	222	282	231	217	304	272	227
Performance Index	47.7	110.6	69.7	65.0	142.1	100.5	80.2
CO Emissions (kg)	17.5	24.4	21.6	21.4	27.6	25.7	23.7
Fuel Consumed (gal)	250	349	309	306	395	367	339
Overall Speed (mph)							
NB	32	25	30	32	23	26	31
SB	32	26	30	29	24	28	27

Overall, Table 6 shows that the MOEs along Route 9 will degrade through 2015 and 2020 conditions with and without improvements. However, the Alternative 2 condition with the connector road for the Short-Term and Long-Term design years result in less diminishing impacts.

Figure 14 shows the average operating speeds along Route 9 under 2010 and 2020 conditions. The average *measured* operating speed represents Existing 2010 conditions obtained from the Speed & Delay Study (also shown on Figure 3), while the average *calculated* speeds for 2010 and 2020 conditions are results from the Synchro 6 Software. Overall, the 2010 measured and calculated speeds on Route 9 are comparable in the northbound and southbound directions indicating that the model reasonably replicates existing conditions. For example, the average northbound travel time measured from the Speed & Delay Study was 3 minutes and 35 seconds while the average northbound travel time generated by the Synchro model was 3 minutes and 42 seconds. These existing speeds correspond to an existing arterial level of service of C or better in the northbound and southbound directions from the Route 9R/I-87 Access intersection to Boght Road. However, the segment of Route 9 from Sparrowbush Road to Route 9R/I-87 Access (northbound) operates at a LOS F under existing conditions.

Overall with the additional Long-Term development and without roadway improvements, average travel speeds along Route 9 will be reduced by approximately eight (8) to nine (9) miles per hour with the average calculated travel time in the northbound direction increasing to 5 minutes and 4 seconds. With the recommended improvements for Alternative 1, speed reductions will be less (ranging from four to six miles per hour depending on the direction) and will result in average calculated travel times of 4 minutes and 31 seconds in the northbound direction. With the recommended improvements for Alternative 2 (preferred alternative), speed reductions will be even less (ranging from one to five miles per hour depending on the direction) and will result in average calculated travel times of 3 minutes and 47 seconds in the northbound direction. The benefit of the improved traffic operations at the Route 9/Route 9R

intersection will be off-set by the installation of a new traffic signal at the Route 9/Latham Auto Park Drive/Old Loudon Road intersection. Even after coordinating the traffic signals on Route 9, it will not be possible to provide traffic progression for all major traffic flows in both directions. For example, the north-south green phase at the new traffic signal can be coordinated with the left turn movement from the I-87 ramp, or the northbound through movement from Route 9, but not both. The impact of the new traffic signal on segment operating speeds is illustrated on Figure 14.



	OVERALL SPEED			
	2010 MEAS.	2010 CALC.	2020 ALT 1	2020 ALT 2
SB	35	32	28	27
NB	31	32	26	31

- LEGEND:**
- AVERAGE MEASURED OPERATING SPEED - EXISTING 2010
 - AVERAGE CALCULATED OPERATING SPEED - EXISTING 2010
 - AVERAGE CALCULATED OPERATING SPEED - 2020 ALTERNATIVE 1
 - AVERAGE CALCULATED OPERATING SPEED - 2020 ALTERNATIVE 2

NOTE: OPERATING SPEEDS INCLUDE STOPPED DELAY AT STUDY AREA INTERSECTIONS.

ROUTE 9 CORRIDOR TRAVEL SPEEDS
PM PEAK HOUR

BOGHT ROAD GEIS US ROUTE 9 UPDATE
TOWN OF COLONIE, NY



FILE NAME : F:\Projects\0606106-213D\cadd\fig\travelsp_speed.dwg
 DATE/TIME : 9/22/2011 10:51:00 AM

Transit

A working meeting was held with the Town, NYSDOT, and The Capital District Transportation Authority (CDTA) on August 22, 2008 to discuss existing transit service in the study area and to determine what transit improvements should be considered along the Route 9 corridor. Input was also obtained from CDTA during project briefs in 2010 and 2011. The CDTA currently provides one existing bus route along Route 9 in the study area (Route #29). This line currently provides weekday service from Albany to Cohoes via Old Loudon Road to Route 9R with three selected trips in each direction operating via Route 9 to Boght Road. It is not anticipated that the existing or new transit routes will be modified to provide direct access into any of the proposed land uses on Latham Auto Park Drive or Century Hill Drive. The CDTA has indicated that they would use mainline bus stops on Route 9 at the Century Hill Drive and Latham Auto Park Drive/Connector Road intersections if adequate pedestrian and transit waiting accommodations are provided. This is consistent with CDTA's policy to minimize route deviations and maximize transit efficiency along trunk routes served by improved pedestrian and feeder systems.

In the short-term, it is recommended that crosswalks and safe waiting areas and/or bus shelters be provided along Route 9 at these intersections. It is also recommended that pedestrian accommodations be provided along Latham Auto Park Drive, Century Hill Drive, and the connection between Latham Auto Park Drive and Century Hill Drive so that transit riders can access land uses on the west side of Route 9. In the long-term, it is recommended that pedestrian accommodations be provided along the Connector Road from Route 9 to the Route 9R intersection into Latham. CDTA's plans for future bus service operating along Route 9 would be adequate to serve the existing and future offices in the Century Hill Drive/Latham Auto Park Drive area.

However, including a major retail facility and office development in the corridor will increase the demand for transit service for both customers and workers. Locating these developments at the end of Latham Auto Park Drive, more than 400 yards away from CDTA's US Route 9 service will make it very difficult for CDTA to efficiently expand service to the development without substantially increasing costs, both in terms of time and money. The retail proposal should be required to subsidize direct transit service to the site with a bus stop on-site with a dedicated, ongoing funding stream. The service should be reasonable in terms of routes and frequency to serve employees and customers, and be in operation for a sufficient time period to establish the transit market potential (usually twelve to eighteen months). For CDTA to incorporate a pilot service into CDTA service, a minimum threshold of performance of 15 passengers per hour of service must be achieved. Service performing below this threshold requires dedicated operating subsidy to continue beyond a pilot period. The Town has determined that the Boght mitigation shall include \$250,000 toward physical transit improvements such as but not limited to shelters, and pedestrian improvements near shelters.

Pedestrian Safety

The proposed retail project will increase pedestrian activity in the area, particularly between the *Retail Development* on Parcel No. 30 and local offices, and to Route 9 and beyond. There is the potential for patrons carrying bags or pushing carts to need to cross Route 9 where the speed limit is 45 miles per hour and the total roadway width is approximately 80 feet including shoulders. Traffic signal improvements should include

state-of-the-practice pedestrian actuated crossings with count down times and ADA compliant accommodation to provide safe crossings for all pedestrians. A speed limit reduction should also be considered in the area. Pedestrian improvements are also needed along several roadway segments as described in the Transit section above including accommodations along Latham Auto Park Drive, Century Hill Drive, and the private north/south connector road, and the Connector Road from Route 9 to Route 9R. Altogether, these improvements will provide a safe pedestrian system in the area.

Fair Share Contribution Evaluation and Methodology

The methodology for determining a fair share contribution from public agencies and private developments that will be used to fund the necessary improvements was developed through several meetings with CDTC and the Town and was subsequently based on accepted approaches for determining a fair share contribution. This methodology assigns the cost of highway improvements to those who create the need for the improvement and is based on the capacity used. Table 4 indicates that the proposed improvements identified in the study area will cost approximately \$14.554M. It was determined that the resulting private share associated with traffic contributing to the need for study area improvements is \$10.575M or approximately 73 percent. The remaining cost funded through public funds is \$3.979M or approximately 27 percent of the total improvement cost.

Conclusions

This memo provides technical documentation for the Town of Colonie, CDTC, CDTA, and NYSDOT as they consider potential development throughout the Route 9 area of the Boght Road GEIS study area. Existing conditions showed most intersections operate at good levels of service with acceptable delays and a few approaches operating at LOS E/F conditions with the arterial speed on the northbound approach of Route 9 at Route 9R operating at a LOS F.

With the anticipated development, capacity improvements are necessary at the Route 9/Latham Auto Park Drive/Old Loudon Road intersection, the Route 9/Route 9R/I-87 Access intersection, and the Route 9R/Jonhnsn Road intersection. Installing a traffic signal on Route 9 at the Latham Auto Park Drive/Old Loudon Road intersection and constructing a new connector road that extends southeast from the US Route 9/Old Loudon Road/Latham Auto Park Drive intersection through Parcel No. 28 to the NY Route 9R/Johnson Road intersection mitigates overall failing levels of service at the intersections on Route 9 for both Short-Term and Long-Term conditions, however some approaches will continue to experience long delays during the 2020 design year.

Given the changes in development, and recognizing that it has been over 20 years since the completion of the original Boght Road GEIS, a comprehensive GEIS update is recommended to verify other infrastructure needs. The Town should consider the impact of retail, alternative land uses, and build-out densities in the study area. The Town may consider rezoning or zoning modifications to ameliorate transportation and other infrastructure impacts.

Table 8 provides a summary of the Short-Term and Long-Term transportation improvements recommended at the study area intersections as well as proposed linkages between parcels. The primary linkage is a new roadway extending between

Latham Auto Park Drive and Century Hill Drive and should be constructed as part of the next development project in the area. Additional connections have been identified that will benefit overall circulation and traffic operations in the corridor as growth occurs. These connections should be completed with development of specific sites in the future. Several letters are included as Attachment K that show support by landowners for the traffic signal on Route 9 at the Latham Auto Park Drive/Old Loudon Road intersection and interconnections between parcels to access the new signal.

Short-Term and Long-Term transit related improvements were also identified which include providing crosswalks and safe waiting areas and/or bus shelters along existing and new transit routes. In addition, pedestrian accommodations should also be provided along study area roadways to ensure that adequate access and connectivity is available to existing and future land uses from the proposed bus stops. These improvements are shown graphically on the large scale map attached to this memo.

The overall cost of the improvements in the area is estimated at \$14.554M. The methodology for determining a fair share contribution from public agencies and private developments was developed to assign the cost of highway improvements to those who use the roadway capacity. Based on this assessment, the public/private split was determined to be \$3.979M/\$10.575M. The resulting private share is incorporated into the Boght mitigation formula.

Table 8 – Short-Term and Long-Term Improvements

Short-Term 2015 Improvements	
Intersection Improvements	
<i>Route 9R/Old Loudon Road</i>	
	Install pedestrian accommodations.
	Coordinate traffic signal with Route 9 and Johnson Road intersections
<i>Route 9/Route 9R/I-87 Access</i>	
	Construct additional westbound through lane on Route 9R.
	Coordinate traffic signal with Latham Auto Park Drive/Old Loudon Road and Century Hill Drive intersections.
<i>Route 9/Latham Auto Park Drive/Old Loudon Road/Connector Road</i>	
	Install a traffic signal and coordinate with adjacent signals.
	Provide exclusive left, through and right turn lanes eastbound on Latham Auto Park Drive. Provide shared left/through lane and exclusive right-turn lane westbound on new Connector Road. Re-strip Route 9 to provide an exclusive southbound left-turn lane.
	Reconfigure Old Loudon Road to intersect the new Connector Road to the east of Route 9. Maintain one-way operation on the northern end of Old Loudon Road.
	Consider turn prohibitions at driveways within the intersection influence area adjacent to the Route 9/Latham Auto Park Drive/Connector Road intersection.
	Install pedestrian accommodations.
<i>Route 9/Century Hill Drive</i>	
	Coordinate traffic signal with Latham Auto Park Drive/Old Loudon Road and Route 9R/I-87 Access intersections.
	Install pedestrian accommodations.
<i>Route 9R/Johnson Road</i>	
	Re-stripe the eastbound approach to provide an exclusive left-turn lane.
	Provide exclusive northbound and southbound left-turn lanes on Johnson Road and the Connector Road.
	Install pedestrian accommodations.
	Coordinate traffic signal with Route 9 and Old Loudon Road intersections
<i>Route 9/Lawrence Street</i>	
	Install pedestrian accommodations.
Transit Improvements	
	Provide pedestrian stops with a safe place to wait and pedestrian linkages to signal crossings.
Linkage Improvements	
	Construct a Connector Road from the Route 9/Latham Auto Park Drive intersection to Route 9R opposite the Johnson Road intersection.
	1) Provide two-way access between Century Hill Drive and Latham Auto Park Drive.
	2) Provide two-way access between Tri-City Fitness and Nemith parcels.
	3) Provide north-south two-way access between Tri-City Fitness parcel and Latham Auto Park Drive, with east/west access to Holiday Inn parcel.
	4) Provide two-way access between Nemith Parcel and Holiday Inn, with easement to motel site.
	5) Provide two-way access between Tri-City Fitness and Retail Development.
	6) Provide two-way access between Retail Development and Nemith Parcel.
	Provide pedestrian accommodations along Latham Auto Park Drive, Century Hill Drive, the connection between Century Hill Drive and Latham Auto Park Drive, and the Connector Road between Route 9 and Route 9R.
Future Planning	
	Update the Boght Area GEIS and consider the impact of retail and future land use build-out alternatives.
Long-Term 2020 Improvements	
Intersection Improvements	
<i>Route 9R/Old Loudon Road</i>	
	Monitor this intersection for the construction of northbound and southbound left-turn lanes on Old Loudon Road if Parcel No. 28 develops more aggressively than anticipated (500 KSF Sensitivity Analysis).
<i>Route 9/Century Hill Drive</i>	
	Construct southbound right-turn lane on Route 9.
<i>Route 9/Dunsbach Ferry Road</i>	
	1) Construct a separate eastbound right-turn lane.
	2) Restrict left-turns exiting Dunsbach Ferry Road.
	3) Evaluate Re-aligning Dunsbach Ferry Road and create a four-way intersection with Belmar Parkway South.
	4) Monitor safety, traffic operations and the interaction between the Dunsbach Ferry Road intersection and the Century Hill Drive intersection.

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CONCEPTUAL IMPROVEMENT PLAN ROUTE 9 AREA OF BOGHT RD. GEIS



OTHER - NON GEIS
PROVIDE TWO-WAY ACCESS BETWEEN TRI-CITY FITNESS AND WALMART PARCELS

OTHER - NON GEIS
PROVIDE NORTH/SOUTH ACCESS BETWEEN TRI-CITY AND LATHAM AUTO PARK

OTHER - NON GEIS
PROVIDE TWO-WAY ACCESS BETWEEN WALMART AND NEMITH PARCELS

OTHER - NON GEIS
PROVIDE NORTH/SOUTH ACCESS BETWEEN NEMITH AND TRI-CITY FITNESS

SHORT-TERM
- PROVIDE ADDITIONAL WESTBOUND THROUGH LANE ON ROUTE 9R AT ROUTE 9
- COORDINATE TRAFFIC SIGNAL WITH TWO ADJACENT SIGNALS TO THE NORTH AND EAST

SHORT-TERM
- COORDINATE TRAFFIC SIGNAL WITH TWO ADJACENT SIGNALS
- INSTALL PEDESTRIAN ACCOMMODATIONS. SEE NOTE 4 (TYP.)

OTHER - NON GEIS
MONITOR INTERSECTION FOR CONSTRUCTION OF EXCLUSIVE LEFT TURN LANES NORTHBOUND AND SOUTHBOUND

SHORT-TERM
PROVIDE SIDEWALK ON ONE SIDE

SHORT-TERM
- PROVIDE EXCLUSIVE EASTBOUND LEFT TURN LANE
- PROVIDE EXCLUSIVE NORTHBOUND AND SOUTHBOUND LEFT-TURN LANES
- INSTALL PEDESTRIAN ACCOMMODATIONS SEE NOTE 4 (TYP.)
- COORDINATE TRAFFIC SIGNAL WITH TWO SIGNALIZED INTERSECTIONS TO THE WEST.

- VEHICULAR CONNECTION
- VEHICULAR CONNECTION REJECTED BY TOWN
- PEDESTRIAN CONNECTION
- SHORT-TERM IMPROVEMENT FUNDED THROUGH GEIS MITIGATION
- LONG-TERM IMPROVEMENT FUNDED THROUGH GEIS MITIGATION
- IMPROVEMENT REJECTED
- IMPROVEMENT NOT FUNDED THROUGH GEIS MITIGATION

OTHER - NON GEIS
TURN PROHIBITIONS WITHIN INTERSECTION INFLUENCE AREAS (TYP.)

OTHER - NON GEIS
FUTURE EASTWEST CONNECTION.

OTHER - NON GEIS
RECONSTRUCT INTERSECTION

OTHER - NON GEIS
PROVIDE TWO-WAY PUBLIC ACCESS BETWEEN CENTURY HILL DRIVE AND AUTO PARK DRIVE

OTHER - NON GEIS
PROVIDE PEDESTRIAN ACCOMMODATIONS ALONG LATHAM AUTO PARK, PLAZA DRIVE AND CENTURY HILL DRIVE

SHORT-TERM
PROVIDE TRANSIT STOPS WITH SAFE PLACE TO WAIT AND PEDESTRIAN LINKAGE TO SIGNAL CROSSING (TYP.)

REJECTED
FUTURE ROADWAY CONNECTIONS WERE CONSIDERED AND REJECTED BY THE TOWN



SHORT-TERM
RECONFIGURE OLD LOUDON ROAD TO INTERSECT THE CONNECTOR ROAD

SHORT-TERM
CONSTRUCT A CONNECTOR ROAD WITH PEDESTRIAN ACCOMMODATION FROM ROUTE 9 TO ROUTE 9R

SHORT-TERM
- INSTALL TRAFFIC SIGNAL & COORDINATE WITH ADJACENT SIGNALS

SHORT-TERM
- PROVIDE SHARED LEFT TURN/THROUGH LANE WESTBOUND; AND SEPARATE LEFT THROUGH AND RIGHT TURN LANES EASTBOUND

SHORT-TERM
- INSTALL PEDESTRIAN ACCOMMODATIONS SEE NOTE 4 (TYP.)

SHORT-TERM
- COORDINATE TRAFFIC SIGNAL WITH TWO SIGNALS TO THE SOUTH

SHORT-TERM
- INSTALL PEDESTRIAN ACCOMMODATIONS SEE NOTE 4 (TYP.)

LONG-TERM
CONSTRUCT SOUTHBOUND RIGHT TURN LANE

SHORT-TERM
PROVIDE SEPARATE EASTBOUND LEFT AND RIGHT TURN LANES

OTHER - NON GEIS
MONITOR CLOSELY-SPACED INTERSECTIONS TO PROVIDE ADEQUATE SAFETY AND TRAFFIC OPERATIONS

OTHER - NON GEIS
INSTALL PEDESTRIAN ACCOMMODATIONS SEE NOTE 4 (TYP.)

- 1 PROPOSED FUTURE INGRESS/EGRESS EASEMENT TO LOT 944 WHEN PROPOSED LOT 4 (WAL-MART) IS DEVELOPED. AS PER DWG. S-2, SHEET 2 OF 2, PROPOSED COMMERCIAL SUBDIVISION OF 950, 952, 958, 964 & 970 LOUDON ROAD, DATED DECEMBER 1996.
- 2 DEVELOPMENT PLANS FOR 4 AUTOPARK DRIVE SHALL PROVIDE AN INTERCONNECTING DRIVEWAY TO ALLOW ACCESS FROM BOTH 944 AND 950 LOUDON ROAD THROUGH 4 AUTOPARK DRIVE TO THE PROPOSED SIGNAL AT LOUDON ROAD AND AUTOPARK DRIVE. AS PER SHEET 1 OF 1, AMENDMENT OF SUBDIVISION OF 950, 952, 958, 964 & 970 LOUDON ROAD, DATED 9/1/05.
- 3 PROPOSED INGRESS/EGRESS EASEMENT TO BE GRANTED TO O'HEARN (EASEMENT #3) AS PER DWG. S-1, SHEET 1 OF 2, PROPOSED COMMERCIAL SUBDIVISION OF 950, 952, 958, 964 & 970 LOUDON ROAD, DATED DECEMBER 1996.
- 4 PROVIDE ADA COMPLIANT PEDESTRIAN CROSSING ACCOMMODATIONS INCLUDING CROSSWALKS, RAMPS WITH DETECTABLE WARNING, PED PUSH BUTTONS AND COUNT-DOWN TIMERS (TYP.)