Appendix D

Traffic Study

Traffic Study

BUTTERFIELD REDEVELOPMENT PROJECT

VILLAGE OF COLD SPRING
PUTNAM COUNTY, NEW YORK

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January 17, 2013
Revised November 15, 2013

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1.0 INTRODUCTION

The Applicant is proposing a mixed use development consisting of 55 senior condominium units, an existing Medical Services Building (11,456 square feet), 15,000 (gross) square feet of municipal offices, and 7,000 square feet of retail, and 10,500 square feet of general office on the former Butterfield Hospital site NYS Route 9D, Cold Spring, New York. The existing of medical office building, known as the (Carolyn) Lahey Pavilion, is fully rented.

A Highway Work Permit will be required from the New York State Department of Transportation (NYS DOT) for any improvements at the three driveways on NYS Route 9D and any other work within the State right-of-way. These three driveways would provide access to the bulk of the project. The number of and location of driveways is subject to NYS DOT approval. Parking, bumpouts into the road, proximity of municipal offices to the State right-of-way, and utility changes are just some of the work elements subject to NYS DOT approval. These driveways onto NYS Route 9D would be considered minor commercial driveways. Even if all site traffic was consolidated into one driveway the projected one-way total volume would be under 100 vehicles per hour.

Three single family driveways are proposed on Paulding Avenue (a village street).

This report examines the current and future traffic operations in the vicinity of the subject site.

The description of the network's current operating conditions, based on the existing transportation network and traffic, are referred to herein as the Existing Conditions. Future transportation operations are examined for the No Build Conditions (without the new Butterfield redevelopment) and Build Conditions (with the Butterfield redevelopment). The future conditions (No Build and Build) analyze traffic operations in 2016. The No Build Condition is the future baseline upon which project traffic is assessed. The Build Condition represents the combination of the No Build Condition plus the new traffic that would result from development and operation of the Butterfield Redevelopment Project.

2.0 EXECUTIVE SUMMARY

The project site, the location of the former Butterfield Hospital, is located off of NYS Route 9D and Paulding Avenue (a Village street) in the Village of Cold Spring, New York.

The Applicant is proposing a mixed use development consisting of 55 senior condominium units, an existing Medical Services Building, 15,000 (gross) square feet of municipal offices, and 7,000 square feet of retail, and 10,500 square feet of general office on the former Butterfield Hospital site on NYS Route 9D, Cold Spring, New York Attachment A Figure 8 shows the proposed site plan.

Four driveways exist and the three on NYS Route 9D are proposed at the same or similar locations. Three single family residential driveways will connect to Paulding Avenue.

The project's mixed use would put seniors near medical services, retail uses, and government services. In addition this location has sidewalks on NYS Route 9D and is in close proximity to other Village businesses and walking trails. Open space is being provided on site.

The Butterfield Redevelopment Project is projected to generate 76 a.m. peak hour external trips, 103 p.m. peak hour trips, and 61 Saturday peak hour trips.

No reduction was taken for the mixed use of the site. The following intersections were studied. They will operate under existing and future conditions at a level of service, D or better.

NYS Route 9D and NYS Route 301 (Main Street)
NYS Route 9D and Benedict Road
NYS Route 9D and Bank Street
NYS Route 9D, Paulding Avenue, and Chestnut Street
NYS Route 9D, Paulding Avenue, and Wall Street

Total site generation is relatively low (less than traffic on Benedict Road for example) and thus site accesses would operate acceptably.

The project will require a highway work permit from the New York State Department of Transportation.

No off-site mitigations measures are needed or proposed. On-site pedestrian and bicycle accommodations could reduce internal and external vehicular trips.

3.0 EXISTING TRAFFIC CONDITIONS

3.1 The Regional Network

The subject site is located in the Village of Cold Spring, Putnam County, New York as shown in Attachment A, Figure 1.

Major state roads in the immediate area are:

- US Route 9,
- NYS Route 9D, and
- NYS Route 301.

All of these roads are primary two lane roads in Putnam County although US Route 9 has some three lanes sections to permit passing. NYS Route 9 is removed from the site area. US Route 9 carries traffic north-south through the western part of Putnam County. US Route 9 parallels NYS Route 9D and thus relieves NYS Route 9D from much of the regional traffic.

NYS Route 9D is a main north-south route however it is generally oriented east-west in much of this section of the Village of Cold Spring. NYS Route 9D known as Chestnut Street through most of the Village until NYS Route 9D diverges becoming the Bear Mountain Beacon State Highway. This occurs just west of the western site access. Regardless of the road name, NYS Route 9D is referred herein by this state designation only. Most commercial activity is located on either NYS Route 9D, or Main Street.

NYS Route 301 (Main Street) is an east-west road bisecting the Village and half of Putnam County. In this area NYS Route 301 travels as much north-south as east-west and is denoted herein as northeast and southwest approaches. NYS Route 301 ends at NYS Route 9D and Main Street continues toward the Hudson River. The current Village offices are on Main Street.

3.2 The Local Road Network

Attachment A, Figure 1 shows the road network in the vicinity of the subject site. The local roadways in the vicinity of the site include the following:

- Bank Street
- Chestnut Street
- Benedict Road
- Paulding Avenue
- Wall Street
- Main Street

All the above roads are two lane Village streets. These roads are further described in the following paragraphs.

Bank Street

Bank Street goes from NYS Route 9D to Peekskill Road, Peekskill Road connects NYS Route 9D and NYS Route 301 and avoids the center of the Village. Bank Street follows a stream corridor to the south and has local street connections on the west side only.

Chestnut Street

NYS Route 9D is known as Chestnut Street through most of the Village from Route 301 east past Benedict Road where it diverges from NYS Route 9D. Chestnut Street continues straight east and loops back north to NYS Route 9D at Paulding Avenue. To avoid confusion, Chestnut Street will be referred to herein as the portion excluding NYS Route 9D. This portion of Chestnut Street is primarily residential and has a trail access into the pedestrian trails that follow the stream corridor adjacent to Bank Street.

Benedict Road

Benedict Road is a short street with access to the Foodtown plaza, other businesses, and some residential homes.

Paulding Avenue

Paulding Avenue intersects with NYS Route 9D twice, opposite Wall Street and near Bank Street and the eastern terminus of Chestnut Street.

Wall Street

Wall Street is a narrow residential street. Wall Street terminates at NYS Route 9D opposite Paulding Avenue.

Main Street

Main Street is a major mixed use street. The railroad bisects Main Street leaving one block separated adjacent to the Hudson River. Main Street continues from the railroad to NYS Route 9D where it continues as NYS Route 301.

The following Cold Spring Village intersections were investigated in this traffic study and their locations are shown in Attachment A, Figure 1. All of the intersection figures depicting traffic volumes simplify the intersection layouts for clarity and analysis. Descriptions of the study intersections are provided below.

NYS Route 9D and NYS Route 301 (Main Street)

NYS Route 9D and NYS Route 301 (Main Street) is the most important intersection in the Village of Cold Spring and the only signalized one.

NYS Route 9D and Benedict Road

Benedict Road is a STOP-controlled "T" intersection with NYS Route 9D. To the west of the intersection is an entrance to the Foodtown Plaza.

NYS Route 9D, Paulding Avenue, and Wall Street

Paulding Avenue and Wall Street are both STOP-controlled at NYS Route 9D. The intersection of NYS Route 9D, Paulding Avenue, and Wall Street should not be confused with the more

eastern intersection of NYS Route 9D, Chestnut Street, and Paulding Avenue where Chestnut Street is not NYS Route 9D as discussed below.

NYS Route 9D, Paulding Avenue, and Chestnut Street

Chestnut Street is STOP-controlled at both intersections with NYS Route 9D. Paulding Avenue is also STOP-controlled at this intersection with NYS Route 9D. Chestnut Street intersects NYS Route 9D between Paulding Avenue and Bank Street and could be treated as a five-way intersection or as a four-way with either Paulding Avenue or Bank Street. As the new Synchro, traffic assessment model does not handle five-way intersections and Paulding Avenue will get a portion of the site traffic, the traffic analysis considered Chestnut Street as a fourth leg to the eastern Paulding Avenue and NYS Route 9D intersection. See Attachment E Figure E-1.

NYS Route 9D and Bank Street

This intersection is analyzed as a standard "T" intersection. Bank Street is STOP-controlled at NYS Route 9D. See the above description of Paulding Avenue, Chestnut Street, and NYS Route 9D.

Sight Lines

NYS Route 9D rises from Main Street to a long flat stretch before beginning a curving slight incline along the site frontage. This geometry results in no dips or rises in the roadway to hinder sight lines. Sight lines are dependent on horizontal geometry and limited by grading and vegetation on the inside of the curve. Attachment F contains photos illustrating sight lines. The western access could have longer sight lines if a tree outside their property had its low branches trimmed (Attachment F Attachment Figure F-1). The opposite direction sight lines are partially impeded by trees (Attachment F Figure F-2). The Center access has a slight rise on the west side (Attachment F Figure F-3) and is clear to the left Attachment F Figure F-4. The eastern access has a sign and vegetation around it. The overgrown vegetation obstructs current sight lines (Attachment F Figure F-5) with clear lines in the opposite direction (Attachment F Figure F-6).

Bicycles and Pedestrians

Attachment G Figure G-1 shows the pedestrian facilities located near the project site. Opposite the site is some medium density housing. The housing faces away from the site and as shown in Attachment G Figure G-2, a hedge discourages crossing NYS Route 9D mid-block to the project site. The nearest crosswalk is at the site's western driveway. It ends at the corner memorial where there is a bench. Sidewalks head west from the site to the NYS Route 9D commercial center and further west to Main Street with mixed commercial and residential uses. Main Street has benches facing away from the road.

Pedestrian traffic in the area is light (under 15 per hour) and consists of a combination of users including joggers, baby strollers, dog walkers, and shoppers. The project site area does not typically have the large increases in tourist pedestrian flow which occur along Main Street during the summer.

The Foundry has recently added a bus dropoff/pickup area with sidewalk and benches near their new event access on Chestnut Street.

There are no bicycle parking facilities in the area. Bike Route 9 runs south down US Route 9 to NYS Route 301 and south again along NYS Route 9D to the Bear Mountain Bridge[1].

Safety

Except for traffic of the Lahey Pavillon (western driveway) and seasonal uses at the other access, there is no other use accessing NYS Route 9D along the site frontage. A hedge along the opposite side of NYS Route 9D discourages pedestrian traffic. Historically there are no vehicles parking on the street to add to potential conflicts along the frontage. Therefore conflict can be considered low in this area.

NYS Route 9D to the north from the site to NYS Route 301 has on-street parking, and thus there more conflicts, however it is also flatter and straighter. Data[2] from 2009 to 2011 indicates there were only three personal injury (including fatal) collisions per year in the entire Village or about half the rate (personal injury collisions per mile) of the entire Putnam County. Based on this information no further safety analysis is warranted except for contacting the Village police.

A preliminary survey was done using unofficial 2007 to early 2011 data[3]. The data included property damage only and injury collisions for 1/8 mile sections. The NYS Route 9D section 1660-1790 which would include the Lahey Pavillon indicated no collisions. Ten collisions were noted by One Chestnut Street (NYS Route 9D by Main Street), four by 19 to 27 Chestnut Street (NYS Route 9D), and eight by 33-57 Chestnut Street (NYS Route 9D Foodtown and Post Office area). Generally less than three collisions per year in any one section.

3.3 Traffic Counts

New York State Department of Transportation machine counts were used to establish peak hours for traffic counts at the study intersections.

The Existing Conditions evaluation is based on 2012 traffic counts. Attachment A, Figure 1 shows the count locations.

Manual counts for the weekday (a.m. and p.m.) peak hour were collected on Wednesday, January 25, 2012, and weekend on Saturday January 28, 2012 at all study intersections. Generally, weekday peak traffic occurred between 8 a.m. and 9 a.m. and between 4 p.m. and 5 p.m. The Saturday peak traffic varies more, falling between 1:15 p.m. and 3:15 p.m. Weekday counts were taken at the Lahey Pavilion driveway on Tuesday afternoon, October 22, 2013 and Wednesday morning October 23, 2013. Driveway volumes were added to Attachment A Figures.

Existing traffic volumes are shown in Attachment A Figures 2, 3, and 4.

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[1] https://www.dot.ny.gov/portal/pls/portal/MEXIS_APP.DYN_BIKE_TRAIL_GOOGLE_MAPIT.show?p_arg_names=p_trail_id&p_arg_values=145, as viewed November 12, 2013.
[2] Institute for Traffic Safety Management and Research, "Putnam County Traffic Safety Data", Albany, NY, February 2013.
[3] http://data.lohud.com/dist_web/accidents_fullsize.php as viewed November 13, 2013.

4.0 FUTURE NETWORK WITHOUT THE PROJECT

4.1 No Build Traffic

Typically, a project's traffic impact is determined by comparing projected future traffic conditions without the project's traffic to the projected traffic conditions with project-generated traffic in the Build Year. In this case, the build-out year for the Butterfield site is anticipated as 2016. If the project is completed earlier, the resulting future traffic would be lower as background traffic would also be lower.

The No-Build Condition is a scenario that establishes a future baseline condition projected from existing counts. No-Build Conditions are ascertained based on a number of predictable factors: (1) improvements in the local road network that are planned or underway; (2) traffic from general population growth in the area; and (3) traffic from identified development projects in the project site vicinity.

4.2 Infrastructure Projects

The NYS DOT Transportation Improvement Program (TIP) identifies and tracks transportation projects over a five year program period. The TIP is updated regularly and all aspects are subject to change. Within the context of this traffic study, any TIP project would be considered if it had the potential to affect any studied intersection within the time frame of this analysis.

The New York Metropolitan Transportation Council Transportation Improvement Plan 2011 to 2015 (June 2011) indicates only a sidewalk and lighting project (Project Identification Number 875953) for Main Street in Cold Spring which would not alter traffic in the study area.

4.3 Background Growth

To evaluate the overall impact of the proposed project, traffic projections were prepared for a planned build-out year of 2016. This project is planned to be fully built and occupied by 2016. Traffic in the study area is partially insulated from regional north-south through traffic by US Route 9. Cold Spring is the terminus of NYS Route 301 and therefore has little through east-west traffic.

The traffic growth rate used in this traffic study is one percent per year. Attachment H contains additional information regarding background traffic growth.

The background growth traffic and traffic generated by three identified developments in the vicinity of the subject project are used to estimate the No-Build traffic volumes. The No-Build traffic volumes represent future traffic operating conditions without the development of the subject project and are a benchmark against which potential project-related traffic impacts can be measured. Below is the discussion of traffic anticipated to be generated by other area projects.

4.4 Other Area Projects

Planned, pending, or approved site development projects in the area that might add a significant volume of traffic to any of the intersections in the study area were identified through consultation with officials and review of available planning documents. The development projects considered in this traffic analysis are those under construction, development projects approved and not yet

under construction, and those currently under review (pending) in the Village of Cold Spring as of the original traffic counts.

Besides the TIP, the West Point Foundry Preserve and Serroukas (Foodtown Plaza) projects would both alter the traffic flows. The Foodtown Project had proposed to close an entrance on NYS Route 9D and reroute the traffic through Benedict Road. This rerouting is based on the February 2, 2012 letter to LMV Architects from John Collins Engineers, P.C. regarding p.m. peak hour rerouting. Reducing close access points is generally done to increase safety. As indicated in the Barton & Loguidice letter of October 17, 2013 this access to Foodtown Plaza is not being removed or closed. Thus, the analysis herein is overly conservative in dealing with future conflicting movements and projected volume, however the proximity of these access points would function slightly worse than if treated as two isolated locations. The more conservative analysis combining the volumes is retained in the study.

The West Point Foundry proposes to have weekend access from Haul Road off of southern Chestnut Street for special events. This adjustment for future traffic has been added to the Saturday volumes based on the Traffic Impact & Impact Analysis West Point Foundry Preserve Cold Spring, New York (Frederick P. Clark, Associates, Inc., Rye, N. Y., March 2008). These No Build projects are listed in Table 1. Trip generation rates and estimated trips are shown in Attachment B, Tables 1 and 2. This access along with a bus turn out and accessories has been constructed.

The Elemesco project was approved by the Town in 2012. Pass-by and internal trips at this site do not reach study intersections. Gasoline trips are already on the network as part of the existing condition. No reduction was made for elimination of the service repair traffic.

Table 1
Pending or Approved Projects in Site Vicinity

Project	Size and Type	Network Changes
Serroukas (Foodtown), NYS Route 9D west of Benedict Road	Existing 7,200 square foot supermarket and 2200 post Office are proposed to be expanded. Existing additional 5,600 square feet of other commercial space to remain unchanged.	Closing NYS Route 9D direct entrance traffic will use Benedict Road. Trip generation is being based on Supermarket trip rate increase from 7,200 square feet to 10,100 square feet
West Point Foundry Preserve	New access	Haul Road off of Chestnut Street to be new weekend special event access. This work has been completed with a bus stop pull out, sidewalk, and benches
Elemesco	Existing Gasoline station with repair service replacing repair service with Convenience store and donut shop with drive through window	Bicycle parking is proposed at this location

[1] John Collins Engineers P.C. letter to Mike McCormack, February 2, 2012.
[2]."Traffic Impact and Impact Analysis West Point Foundry Preserve, Cold Spring, New York", Frederick P. Clark Associates, Inc., Rye, NY March 2008.

The No Build projects' traffic volumes are added to the 2016 background traffic volumes, resulting in the No-Build volumes, which are presented graphically in Attachment A, Figures 5, 6, and 7.

5.0 FUTURE TRAFFIC WITH THE PROJECT

5.1 Site Generated Traffic

Description of Primary Site Accesses

Three commercial and three privately owned residential driveways will provide access to the Butterfield Site (see Attachment A Figure 8). A Highway Work permit will be required from the New York State Department of Transportation for improvements at the NYS Route 9D site accesses and any other work in the State right-of-way. Because this entire site will generate less than 100 one-way trips in the peak hour, its three accesses to NYS Route 9D would be considered minor commercial driveways.

The Paulding Avenue site driveways will provide access to the individual single family residential homes.

Three NYS Route 9D driveways will provide access to an internal circulation and parking to municipal offices, senior residential condominium, retail shopping, general office space, and the existing medical offices. The site plan provides no internal road connection between Paulding Avenue and NYS Route 9D.

Trip Generation

The Butterfield Redevelopment Project is proposing a mixed use development consisting of 3 single family homes, 55 senior condominium residences, an existing Medical Services Building, 15,000 (gross) square feet of municipal offices, 10,500 square feet of general office space, and 7,000 square feet of retail on the former Butterfield Hospital site NYS Route 9D, Cold Spring, New York. Trip generation data published by the Institute of Transportation Engineers (ITE) is used for this analysis. Attachment I contains a description of the Maximum Retail Alternative and comparison with the Proposed Action.

Traffic from the existing medical services building is already on the network as part of the existing traffic and thus is not considered new trip generation. The retail use is based on average trip generation given the relatively small building size. The gross square footage is being used to approximate the gross leasable square footage.

Trip generation data for municipal offices is not available for Saturday. Since only emergency services functions are likely to be open during the weekend, ten percent of the p.m. weekday peak hour trip generation was used to estimate Saturday use of the municipal offices.

As ITE published only one data survey for the a.m. peak hour and that rate would generate too much traffic in relation to existing NYS Route 301 where such services are currently maintained and in relation to the p.m. peak hour rate, the p.m. weekday trip generation was used with a reverse directional distribution for the a.m. peak hour.

Table 2 provides trip generation rates for site use. Attachment J provides additional background regarding the type of trip rates used in Table 2. Table 3 shows the anticipated trips generated from the site. For the purpose of this analysis no reduction was made internal trips based on the mixed uses.

Table 2
Butterfield Trip Rate Summary for New Uses

Land Uses {ITE Code}	Peak Hour Trip Rates [3]					
	Weekday A.M.		Weekday P.M.		Saturday	
	IN (Trips/ Unit**)	OUT (Trips/ Unit**)	IN (Trips/ Unit**)	OUT (Trips/ Unit**)	IN (Trips/ Unit**)	OUT (Trips/ Unit**)
Single Family housing 3 residential dwelling units {210}	0.188*	0.563*	0.630*	0.370*	0.502*	0.428*
Senior adult housing attached 55 dwelling units [252***}	0.092	0.178	0.232	0.198	0.181	0.137
General office space 10,500 square feet[1]	2.643	0.360	0.506	2.474	0.232*	0.198*
Retail 7,000 square feet {820}	0.595*	0.365*	1.781*	1.929*	2.506*	2.314*
Municipal offices 15,000 square feet[2] {730}	0.835	0.375	0.375*	0.835*	0.038	0.084

* Average rates.

** Units are dwelling units, or 1000 square feet gross floor area for municipal offices, general offices, and retail. Trip Generation, Institute of Transportation Engineers, 9th edition, Washington, DC, 2012.

*** Weekday data is based on the maximum rates which are about twice the average rates. Directional distribution is presumed evenly distributed on Saturday.

[1] Weekday p.m. rates doubled from average to approximate a.m. peak hour rates.

[2] Weekday p.m. rates reverse of a.m. rates and Saturday 10% of p.m. rates.

[3] See Attachment J.

Table 3
Butterfield New Trip Generation

Land Uses	Peak Hour Trips*					
	Weekday A.M.		Weekday P.M.		Saturday	
	IN (Trips)	OUT (Trips)	IN (Trips)	OUT (Trips)	IN (Trips)	OUT (Trips)
Single Family housing 3 residential dwelling units	1	2	2	1	2	1
Senior adult housing attached 55 dwelling units	5	10	13	11	10	8
General office space 10,500 square feet	28	4	5	26	2	2
Retail 7,000 square feet	4	3	12	14	18	16
Municipal offices 15,000 square feet	13	6	6	13	1	1
Total	**51**	**25**	**38**	**65**	**33**	**28**

Trip Generation, Institute of Transportation Engineers, 9th edition, Washington, DC, 2012.

* No reduction taken for mixed use.

The Proposed Action is projected to generate 76 a.m. peak hour external trips, 103 p.m. peak hour trips, and 61 Saturday peak hour trips. The maximum new one-way peak hour number of trips is 65.

Trip Distribution

The distribution of site generated trips is shown in Attachment A, Figures 9, 10, and 11. These site generated trips in Attachment A, Figures 9, 10, and 11 are added to the No Build traffic (Attachment A, Figures 5, 6, and 7) to obtain Build Condition trips (Attachment A, Figures 12, 13, and 14) for use in the Build Condition level of service analysis.

6.0 LEVEL OF SERVICE

6.1 Measure of Effectiveness Criteria

'Level of service' is used as the measure of effectiveness for traffic flow conditions. Peak hour average vehicle delays were calculated to establish the quality of operation (level of service). Level of service is identified on a scale of level of service “A” representing the most efficient conditions to level of service “F” representing the least efficient conditions. Detailed information concerning measures of effectiveness criteria (delay and level of service) can be found in Attachment C.

For signalized intersections a level of service D for all lane groups is the minimum acceptable although due to the cost or constraints of improvements, levels of service E and F may be tolerated.

No level of service analysis is needed at site access points as the Benedict Road three-way intersection has substantially more traffic accessing NYS Route 9D than the entire new projected site traffic that is split between three access points. Level of service at these access points should be better than at Benedict Road and NYS Route 9D. The Paulding Avenue accesses should be level of service A as total intersection volumes are less than 100 vehicles in each peak hour.

6.2 Existing Level of Service

The results of the Existing Condition level of service analyses for the study intersections are summarized in Table 4 with all levels of service at C or better. The capacity analysis calculations are provided in Attachment D.

6.3 No Build Level of Service

The results of the No Build Condition level of service analyses for the study intersections are also summarized in Table 4. All levels of service remain at C or better with one exception. The elimination of the Foodtown Plaza NYS Route 9D driveway will contribute to the Benedict Road approach to NYS Route 9D operating at level of service D in both the No-Build and the Build conditions.

The capacity analysis calculations are provided in Attachment D.

6.4 Build Condition Level of Service

The results of the Build Condition level of service analyses for the study intersections are also summarized in Table 4. All levels of service remain at C or better except the Benedict Avenue approach to NYS Route 9D that will remain level of service D. The capacity analysis calculations are provided in Attachment D.

Minimal increases in delay (less than one second per vehicle) will be result in three locations having acceptable but declining future operational level of service as a result of the proposed Butterfield project. Attachment I contains a comparison with the Maximum Retail Alternative use.

Table 4
Level of Service Summary All Conditions
NYS Route 9D Intersections

Intersection Road	Lane Group Approach Direction - Movement	Levels of Service (Delay in seconds per vehicle) Volume to Capacity Ratio								
		A.M. Weekday Peak Hour			P.M. Weekday Peak Hour			Saturday Peak Hour		
		Existing	No Build	Build	Existing	No Build	Build	Existing	No Build	Build
NYS Route 301 and NYS Route 9D (signalized)										
NYS Route 9D	SEB - L, T, R	A (9.7) 0.52	B (10.7) 0.56	B (11.3) 0.59	A (6.2) 0.28	A (6.9) 0.31	A (7.1) 0.33	A (6.1) 0.26	A (9.9) 0.32	B (10.1) 0.33
NYS Route 9D	NWB - L, T, R	A (7.2) 0.29	A (8.0) 0.34	A (8.2) 0.36	A (8.2) 0.48	A (9.5) 0.54	B (10.4) 0.59	A (6.7) 0.33	B (11.3) 0.44	B (11.6) 0.46
NYS Route 301	NEB - L, T, R	B (16.5) 0.26	B (16.6) 0.30	B (16.6) 0.31	B (18.1) 0.42	B (18.0) 0.44	B (18.0) 0.44	B (18.2) 0.44	B (17.8) 0.54	B (17.9) 0.55
NYS Route 301	SWB - L, T, R	b (19.9) 0.63	C (20.3) 0.66	C (20.6) 0.67	B (19.0) 0.53	B (19.3) 0.57	B (19.4) 0.57	B (19.1) 0.54	C (25.4) 0.73	C (26.7) 0.75
	Overall	B (12.4)	B (13.1)	B (13.5)	B (11.5)	B (12.3)	B (12.7)	B (11.8)	B (16.4)	B (16.8)
Bank Street and NYS Route 9D (unsignalized)										
NYS Route 9D*	EB - L, T	A (7.6) 0.01	A (7.7) 0.01	A (7.7) 0.01	A (8.3) 0.03	A (8.4) 0.03	A (8.5) 0.03	A (7.8) 0.01	A (7.9) 0.02	A (7.9) 0.02
Bank Street	SB - L, R	B (10.4) 0.06	B (10.6) 0.07	B (10.8) 0.07	B (11.7) 0.05	B (12.1) 0.05	B (12.4) 0.06	B (10.7) 0.02	B (11.0) 0.03	B (11.2) 0.03
Paulding Avenue, Chestnut Street, and NYS Route 9D (unsignalized)										
NYS Route 9D*	EB - L, T, R	A (7.7) 0.01	A (7.8) 0.01	A (7.8) 0.01	A (8.3) 0.02	A (8.4) 0.02	A (8.5) 0.02	A (7.8) 0.01	A (7.8) 0.01	A (7.8) 0.01
NYS Route 9D*	WB - L, T, R	A (8.0) 0.00	A (8.1) 0.00	A (8.2) 0.00	A (7.8) 0.01	A (7.9) 0.01	A (8.0) 0.01	A (7.8) 0.00	A (8.0) 0.02	A (8.0) 0.02
Chestnut Street	NB - L, T, R	B (11.8) 0.01	B (12.3) 0.01	B (12.6) 0.01	B (14.9) 0.01	C (15.9) 0.01	C (16.8) 0.02	A (9.8) 0.00	B (10.1) 0.00	B (10.2) 0.00
Paulding Avenue	SB - L, T, R	B (12.1) 0.03	B (12.8) 0.03	B (13.4) 0.04	C (16.2) 0.04	C (17.2) 0.05	C (18.3) 0.06	B (12.5) 0.02	B (13.6) 0.03	B (13.8) 0.03
Benedict Road and NYS Route 9D (unsignalized)										
NYS Route 9D*	NWB - L, T, R	A (8.0) 0.01	A (8.2) 0.02	A (8.3) 0.02	A (7.7) 0.01	A (8.2) 0.08	A (8.3) 0.08	A (7.8) 0.01	A (8.3) 0.04	A (8.3) 0.04
Benedict Road	NEB - L, T, R	B (12.7) 0.16	B (13.8) 0.19	B (13.9) 0.19	C (16.3) 0.33	D (25.3) 0.52	D (28.4) 0.56	B (12.1) 0.18	C (15.9) 0.29	C (16.5) 0.30
Paulding Avenue, Chestnut Street, and NYS Route 9D (unsignalized)										
Wall Street	EB - L, T, R	B (13.7) 0.04	B (14.7) 0.04	C (15.5) 0.04	B (14.1) 0.02	C (15.2) 0.02	C (16.1) 0.02	B (11.4) 0.02	B (13.0) 0.02	B (13.0) 0.02
Paulding Avenue	WB - L, T, R	B (14.3) 0.05	C (15.6) 0.06	C (16.2) 0.06	B (14.8) 0.05	C (16.0) 0.05	C (16.8) 0.06	B (11.7) 0.03	B (13.0) 0.03	B (13.1) 0.03
NYS Route 9D*	NWB - L, T, R	A (8.2) 0.00	A (8.3) 0.00	A (8.4) 0.00	A (7.9) 0.01	A (8.0) 0.02	A (8.0) 0.02	A (7.9) 0.00	A (8.2) 0.00	A (8.3) 0.00
NYS Route 9D*	SEB - L, T, R	A (7.7) 0.01	A (7.8) 0.01	A (7.8) 0.01	A (8.5) 0.01	A (8.6) 0.01	A (8.9) 0.01	A (7.9) 0.00	A (8.0) 0.00	A (8.0) 0.00

NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound. L = left, R= right, T = through, (e.g. WB-L = Westbound left).

*Unsignalized intersection NYS Route 9D delay shown for left turn movement only, approach delays under one second.

7.0 MITIGATION

External mitigation measures are not necessary for existing traffic or future network traffic as a result of the project and therefore no off-site improvements are identified.

External trips to the site can be reduced by providing adequate bicycle parking and pedestrian connections. Internal vehicle trips can be discouraged by providing adequate internal pedestrian connections. Figure G-3 in Attachment G shows pedestrian walkways internal to the site. Proposed bicycle parking areas are anticipated at all nonresidential buildings and at the Gateway Park.

Interior trees along the frontage should be trimmed to facilitate lawn mowing and sight lines. The bush in the sign base at the eastern driveway will be cut back on the street side if the sign remains.

Close attention should be paid sight lines on the center access. Additional grading maybe required.

Parking Mitigation

The Applicant has proposed new zoning which permits up to 20 percent shared parking among uses. The reduction in parking reduces stormwater runoff by reducing impermeable surfaces, encourages alternative transportation, and reduces costs. The plan further reduces permeable surfaces by providing parking under buildings. These parking initiatives are important to limiting the development footprint to the existing disturbed areas, thus allowing the preservation of open space which is to be used in the creation of “Gateway Park”.

Figure K-1 in Attachment K of the Traffic Study illustrates the concept of shared parking where a certain number of spaces are considered as “designated” parking, allocated to each specific building, and how the remainder is available as shared parking.

Table 5 illustrates how the designated parking plus the shared parking provides an increase in the total effective parking available for each use exceeding the parking stipulated in the Village’s Code before the twenty percent reduction.

In general this concepts illustrated in Figure K-1 gives priority to designated spaces for the Lahey Pavilon around its building, senior parking underneath their buildings, retail and municipal/office parking adjacent to and branching out from their buildings. Additional space underneath the senior building could be designated for Municipal office use.

Table 5
Butterfield Parking Concept

Land Uses*	100 % of Parking per Use Table	80 % Required by Zoning	Provided Under a 50:50 Concept****		
			Designated	Shared	Total Effective Parking Available
Building 1 Municipal office/retail 15,000 square feet	70	53**	42	42	84
Building 2 Office/Retail space 10,500 square feet	82	62**	43	42	85
Lahey Pavillion 11,500 square feet	35	35	35	42	77
Building 3	25	25	25	42	67
Buildings 4, 5, and 6	30	30	30	42	72
Total	**242**	**205**	**175**	**42**	**217 *****

* single family lots not shown

** Prorated based on 80% of 187 spaces in nonresidential buildings with Lahey Building fixed.

*** Total of designated and shared parking totals, not a column total.

**** The 50:50 concept is not proposed rather it illustrates a concept with a high degree of designated parking as opposed to an all shared parking concept with Building 1 and/or 2 having all shared parking. Attachment K Figure K-1.

ATTACHMENT A

Traffic Volume and Network Figures

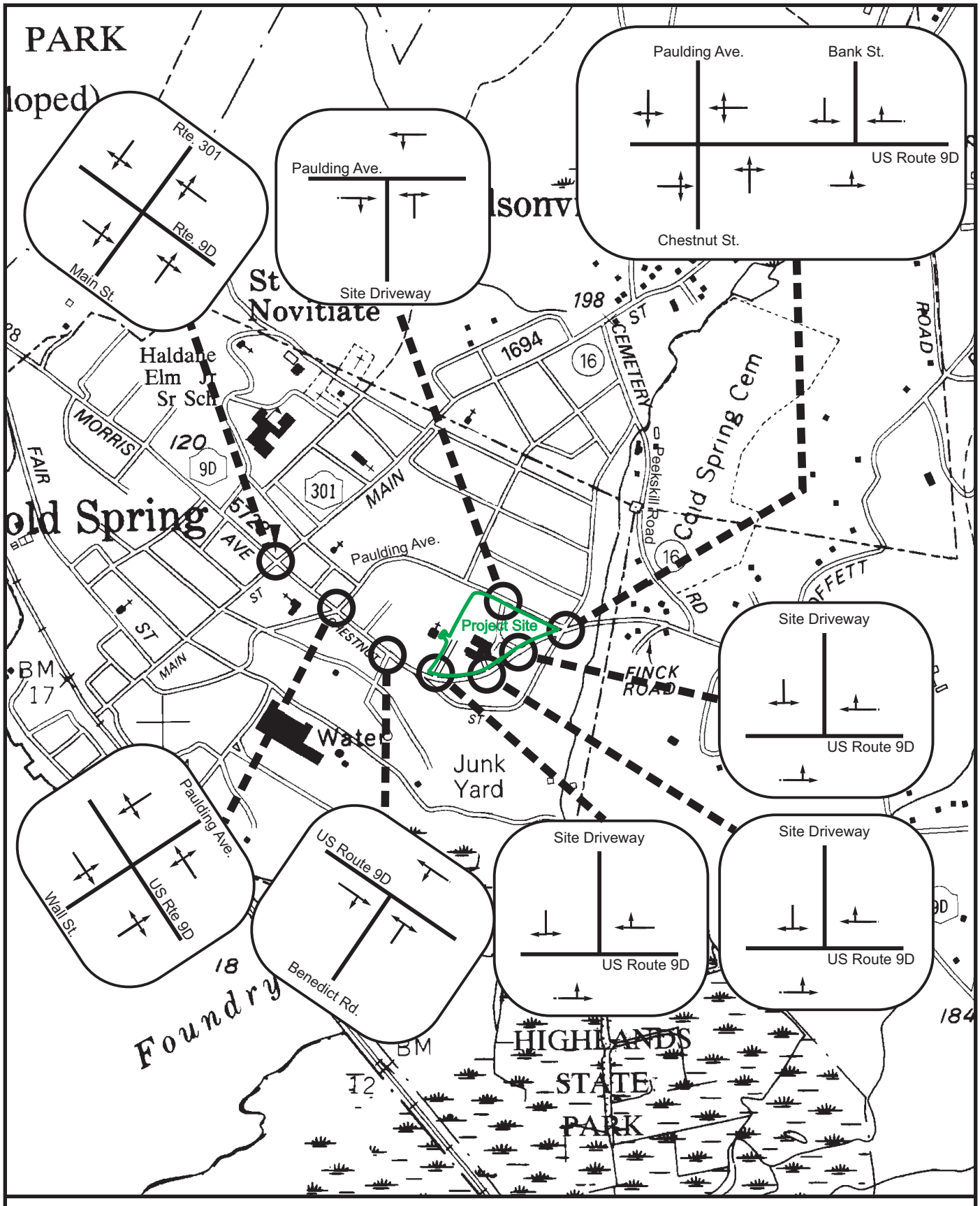

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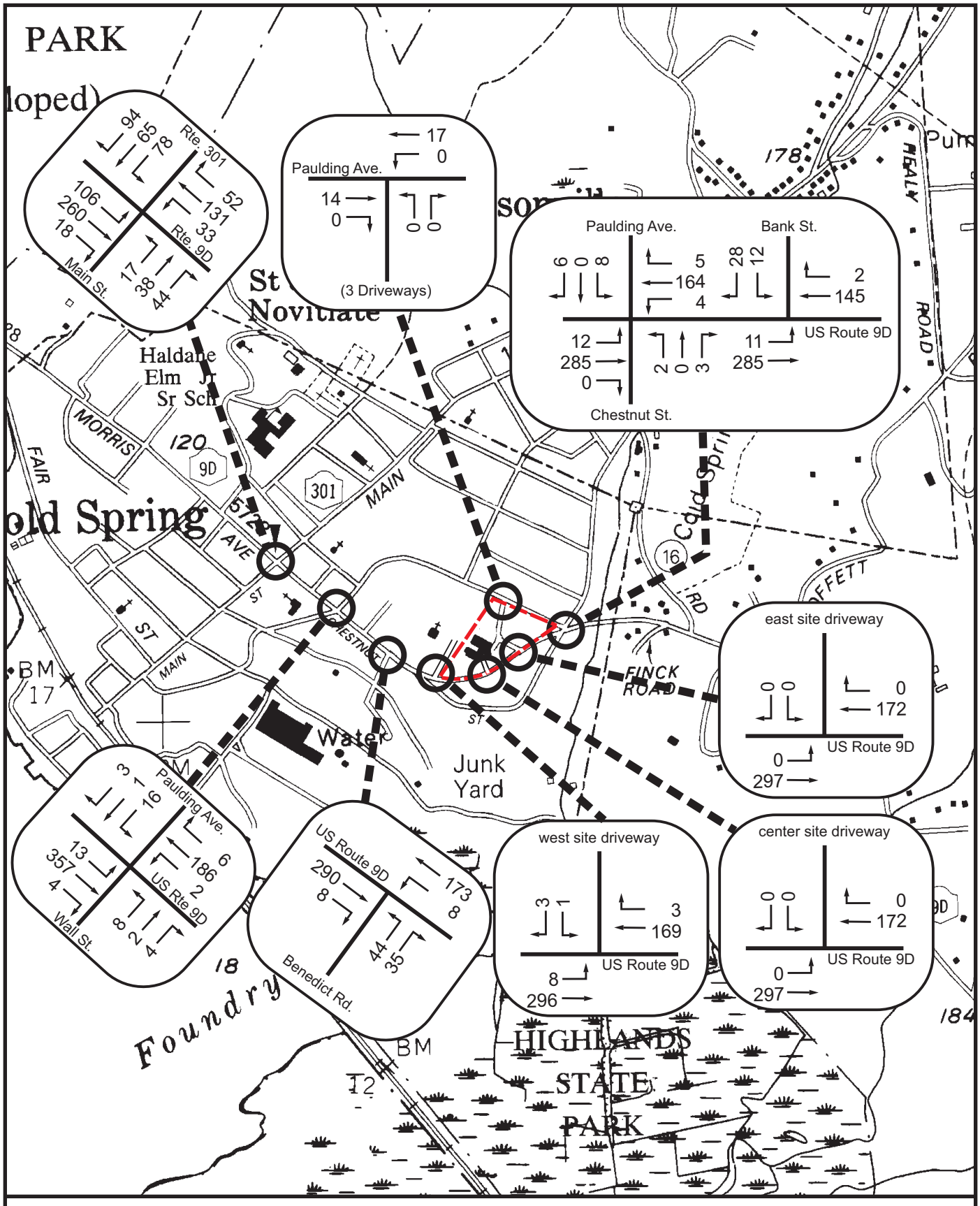
Figure 1: Local Network Lane Approach Configuration
Butterfield
Village of Cold Spring, Putnam County, NY
Base Map: NYS DOT Planimetric Map, West Point Quad
Scale: 1" = 1,000'

File 12007 01/24/12
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418



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Site Property Boundary

Intersections Studied

Figure 2: Existing AM Peak Hour Traffic

Butterfield

Village of Cold Spring, Putnam County, NY

Base Map: NYS DOT Planimetric Map, West Point Quad

Scale: 1" = 1,000'

File 12007 11/07/13
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

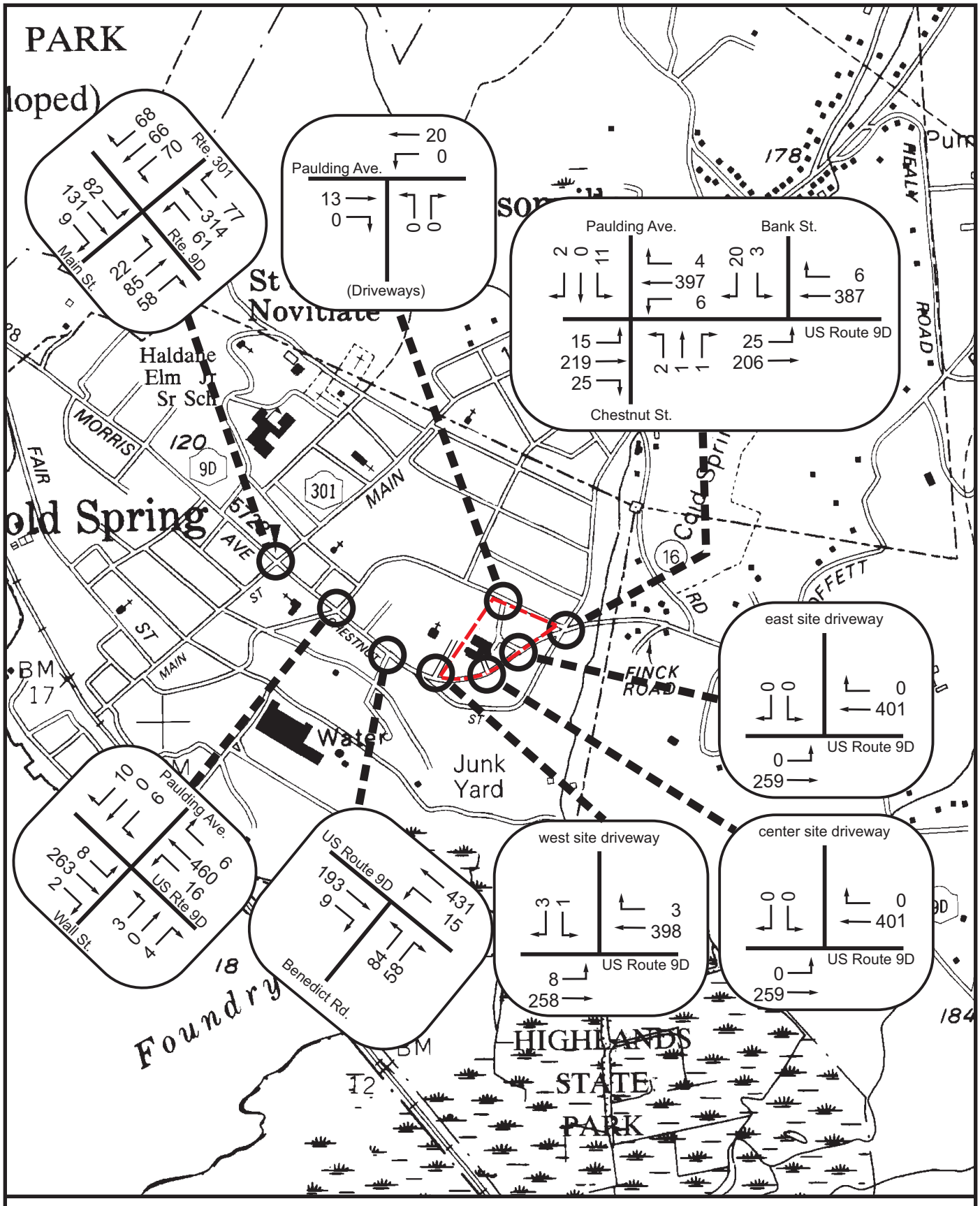
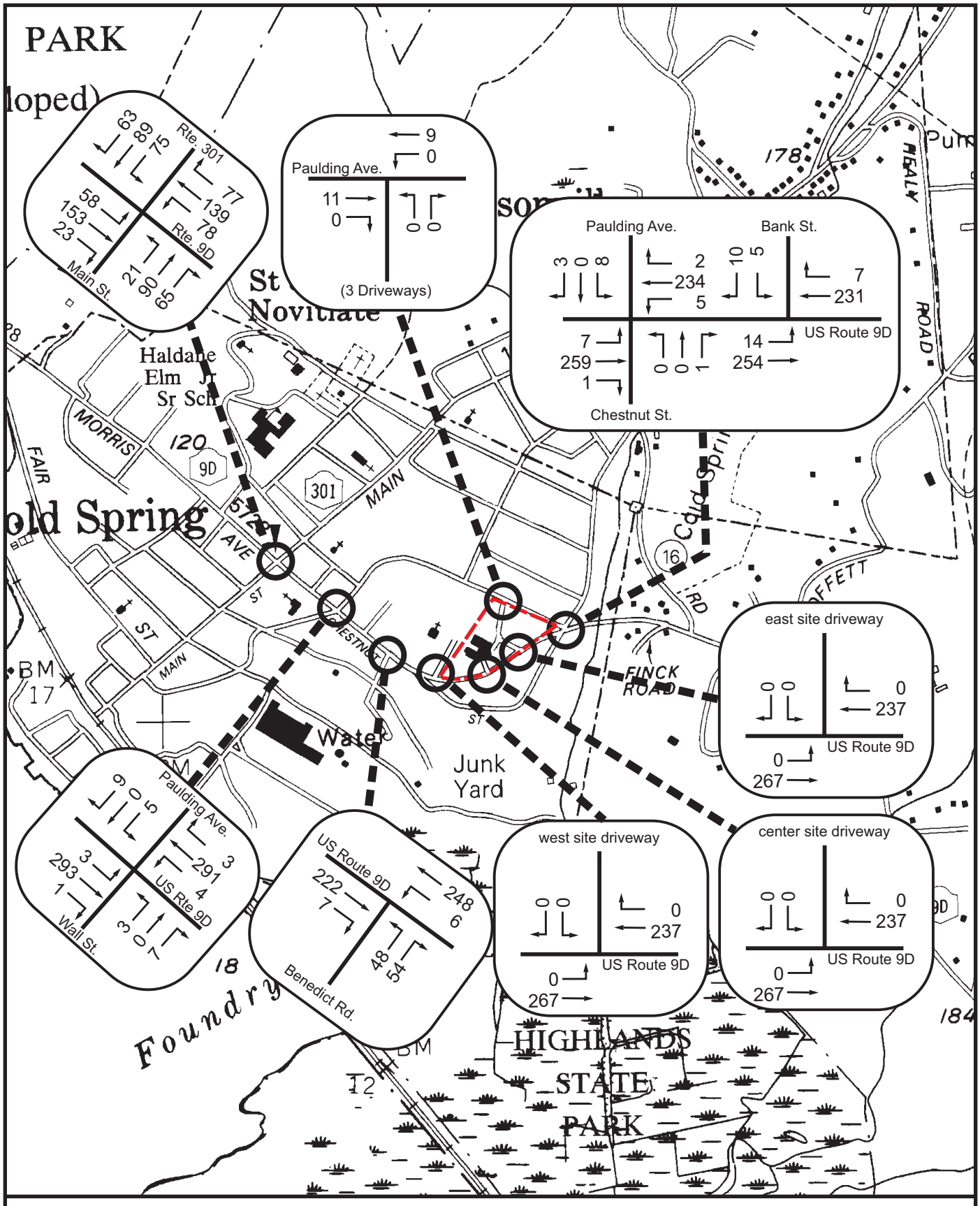


Figure 3: Existing PM Peak Hour Traffic
Butterfield
Village of Cold Spring, Putnam County, NY
Base Map: NYS DOT Planimetric Map, West Point Quad
Scale: 1" = 1,000'

File 12007 11/07/13
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418



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Site Property Boundary

Intersections Studied

Figure 4: Existing Saturday Peak Hour Traffic
Butterfield
Village of Cold Spring, Putnam County, NY
Base Map: NYS DOT Planimetric Map, West Point Quad
Scale: 1" = 1,000'

File 12007 11/07/13
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

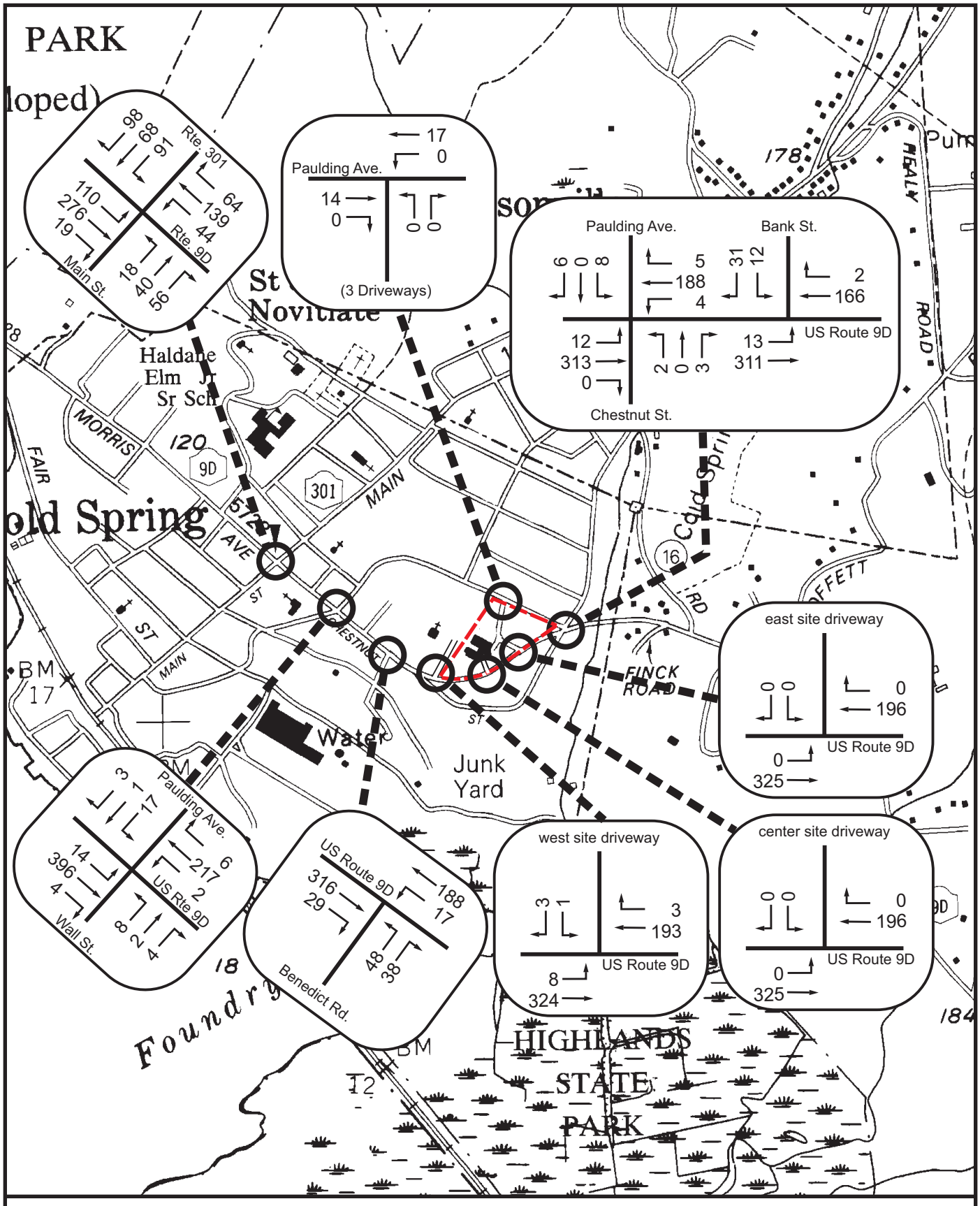


Figure 5: No Build AM Peak Hour Traffic
Butterfield
Village of Cold Spring, Putnam County, NY
Base Map: NYS DOT Planimetric Map, West Point Quad
Scale: 1" = 1,000'

File 12007 11/07/13
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

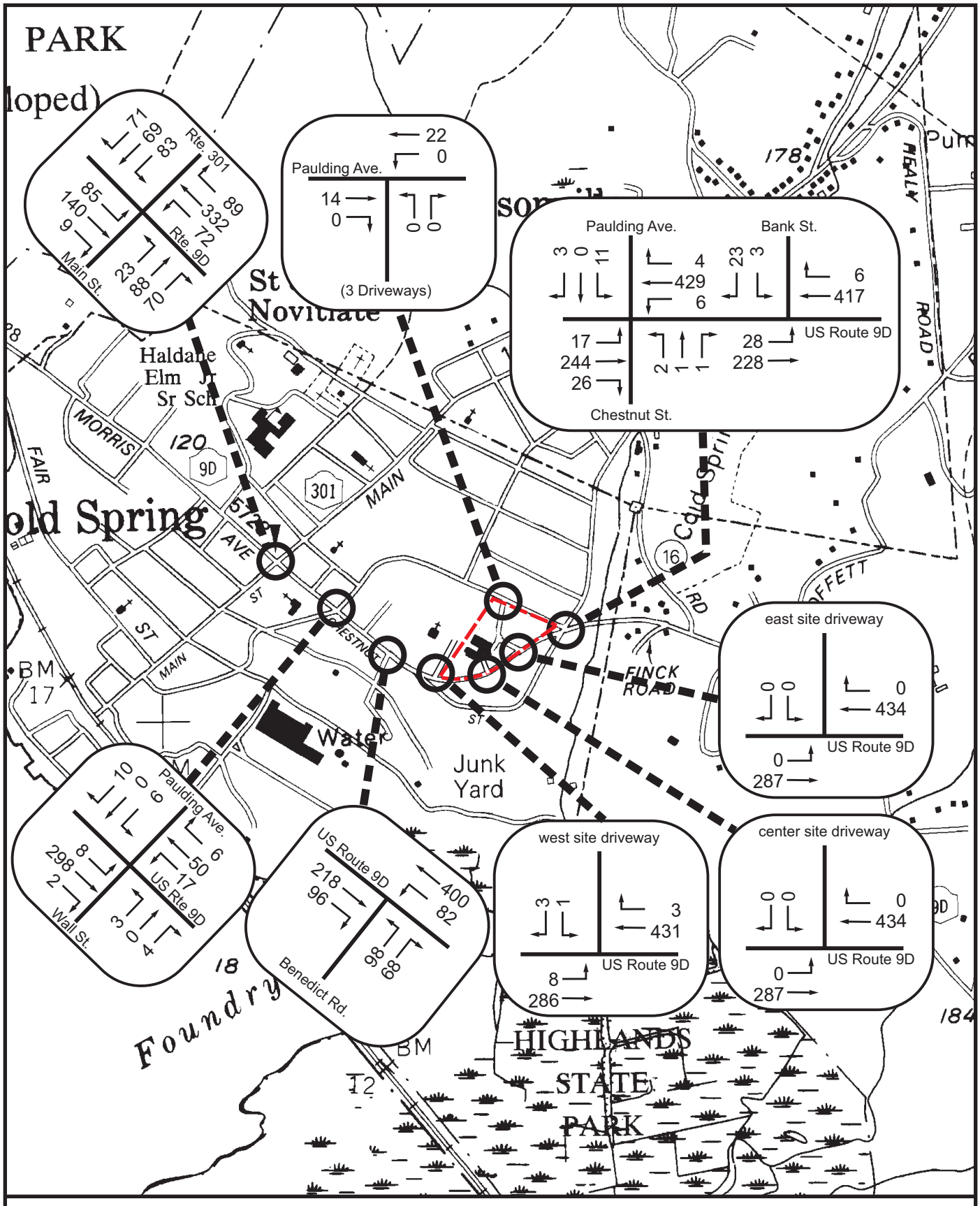


Figure 6: No Build PM Peak Hour Traffic
Butterfield
Village of Cold Spring, Putnam County, NY
Base Map: NYS DOT Planimetric Map, West Point Quad
Scale: 1" = 1,000'

File 12007 11/07/13
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

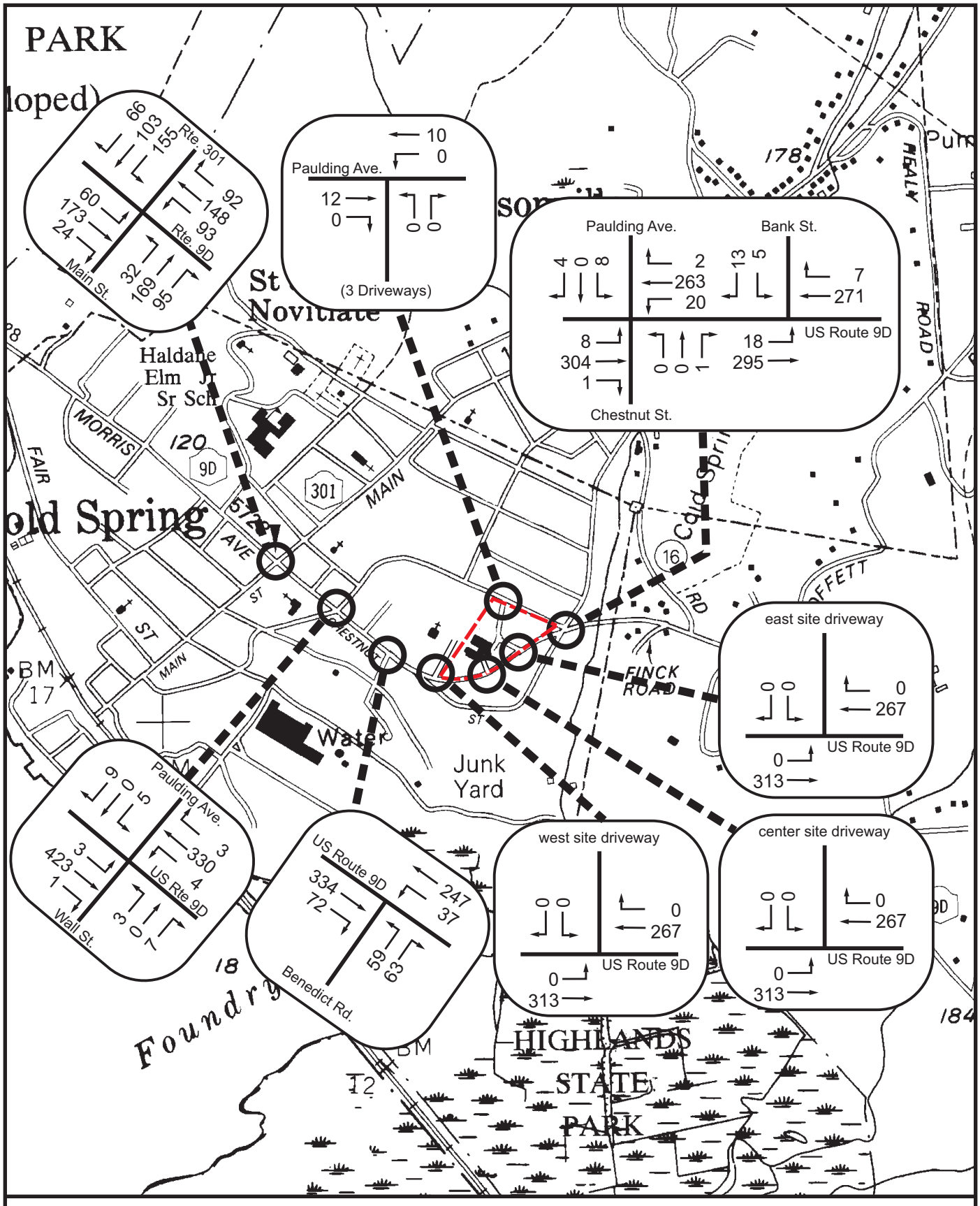


Figure 7: No Build Saturday Peak Hour Traffic

Butterfield

Village of Cold Spring, Putnam County, NY

Base Map: NYS DOT Planimetric Map, West Point Quad

Scale: 1" = 1,000'

File 12007 11/07/13
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

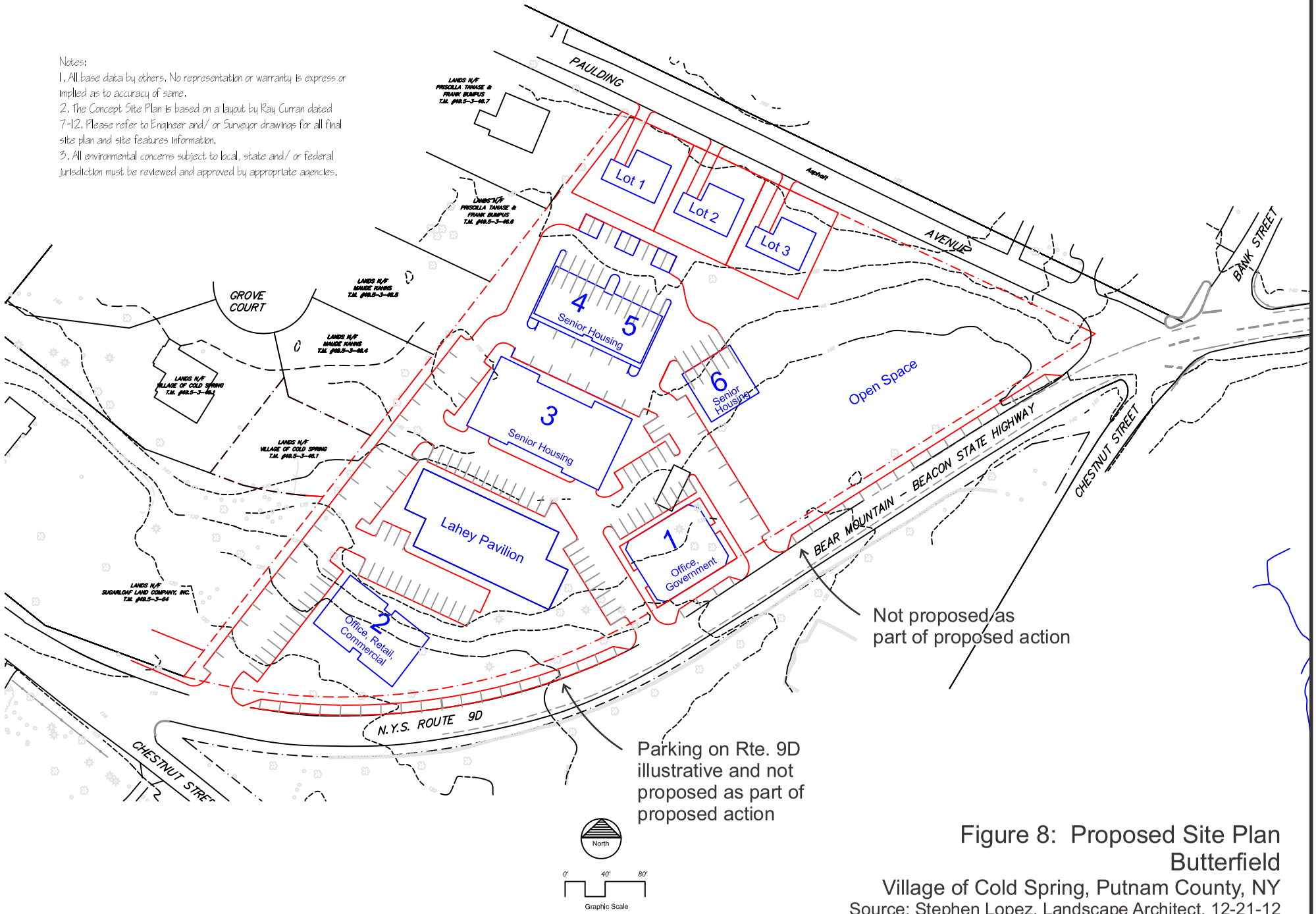


Figure 8: Proposed Site Plan
Butterfield

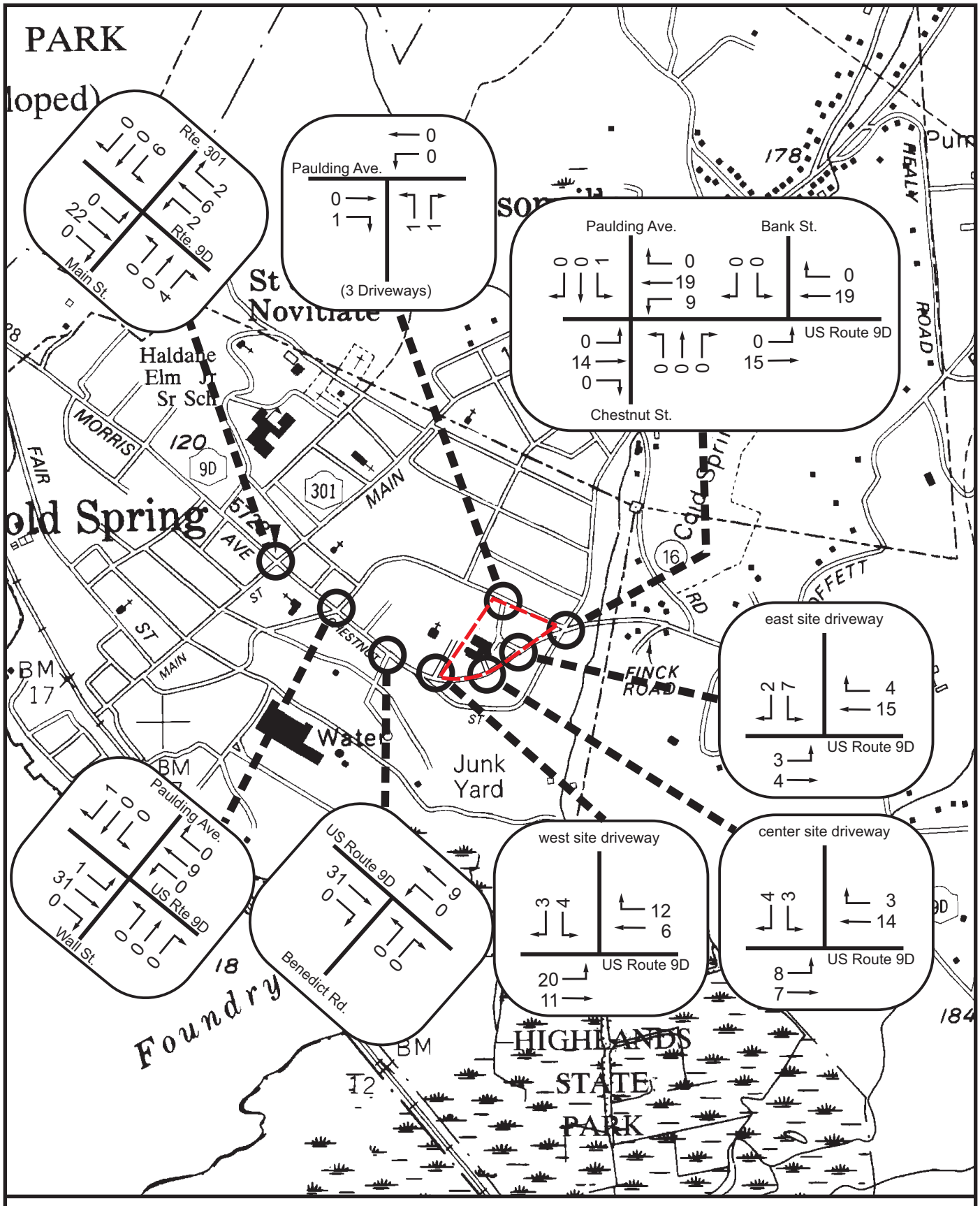
Village of Cold Spring, Putnam County, NY

Source: Stephen Lopez, Landscape Architect, 12-21-12

Scale: Graphic scale as shown

File 12008 01/17/13
JS/12008

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418



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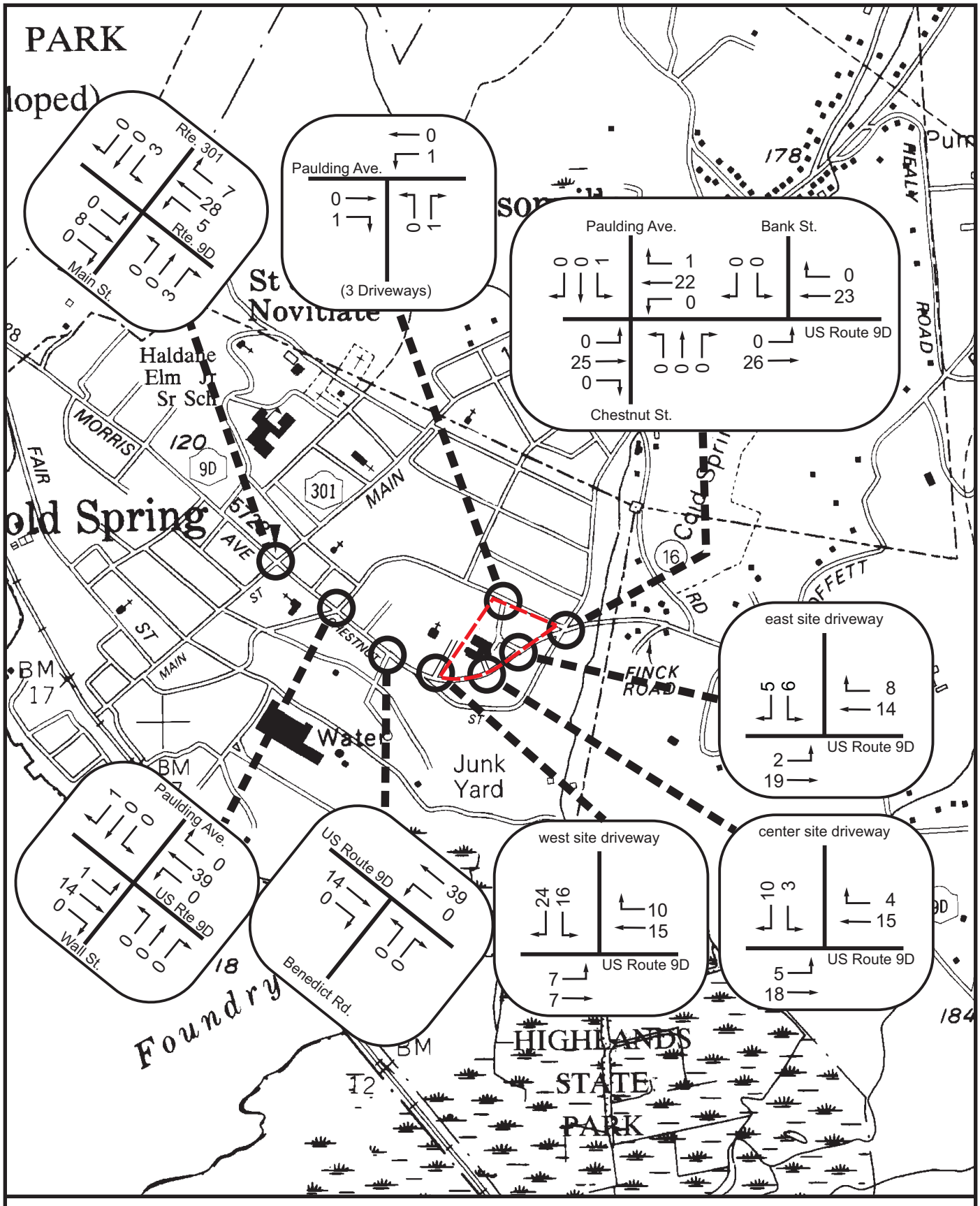
Site Property Boundary
Intersections Studied

Figure 9: AM Weekday New Site Generated Peak Hour Trips

Butterfield
Village of Cold Spring, Putnam County, NY
Base Map: NYS DOT Planimetric Map, West Point Quad
Scale: 1" = 1,000'

File 12007 11/07/13
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418



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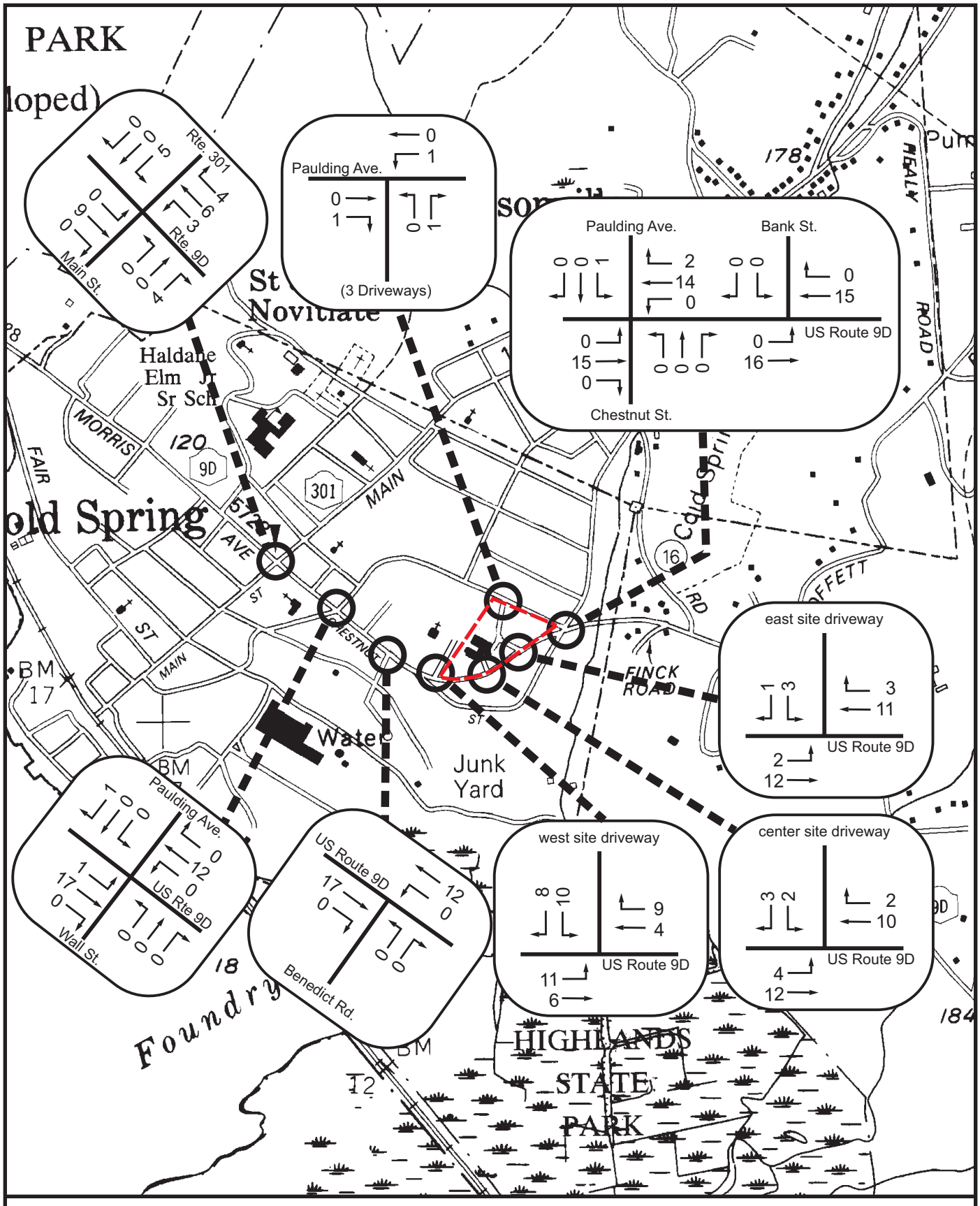
Site Property Boundary
Intersections Studied

Figure 10: PM Weekday New Site Generated Peak Hour Trips

Butterfield
Village of Cold Spring, Putnam County, NY
Base Map: NYS DOT Planimetric Map, West Point Quad
Scale: 1" = 1,000'

File 12007 11/07/13
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418



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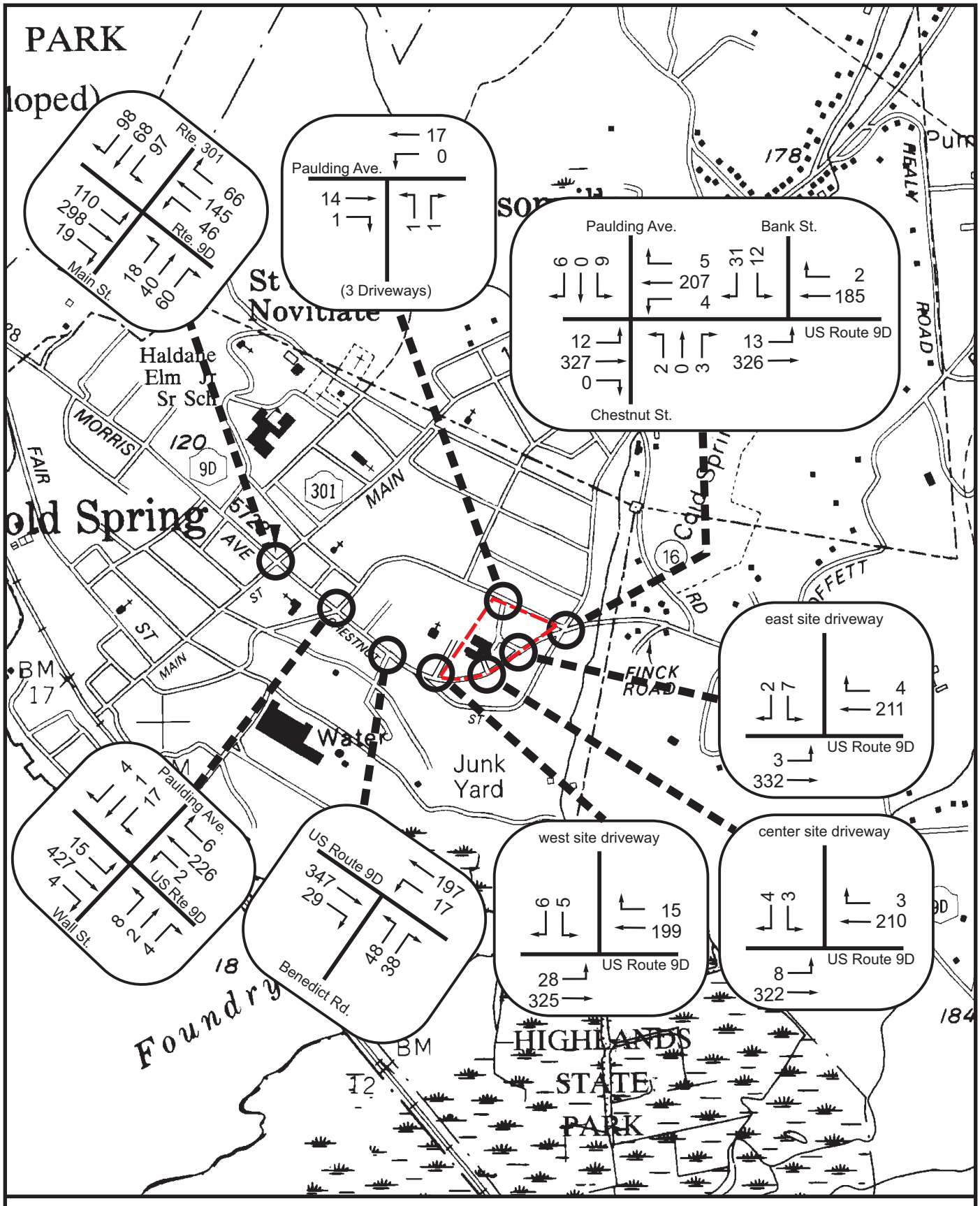
Site Property Boundary
Intersections Studied

Figure 11: Saturday New Site Generated Peak Hour Trips
Butterfield
Village of Cold Spring, Putnam County, NY
Base Map: NYS DOT Planimetric Map, West Point Quad
Scale: 1" = 1,000'

File 12007 11/07/13
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418



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Site Property Boundary
Intersections Studied

Figure 12: Build AM Peak Hour Traffic
Butterfield
Village of Cold Spring, Putnam County, NY
Base Map: NYS DOT Planimetric Map, West Point Quad
Scale: 1" = 1,000'

File 12007 11/07/13
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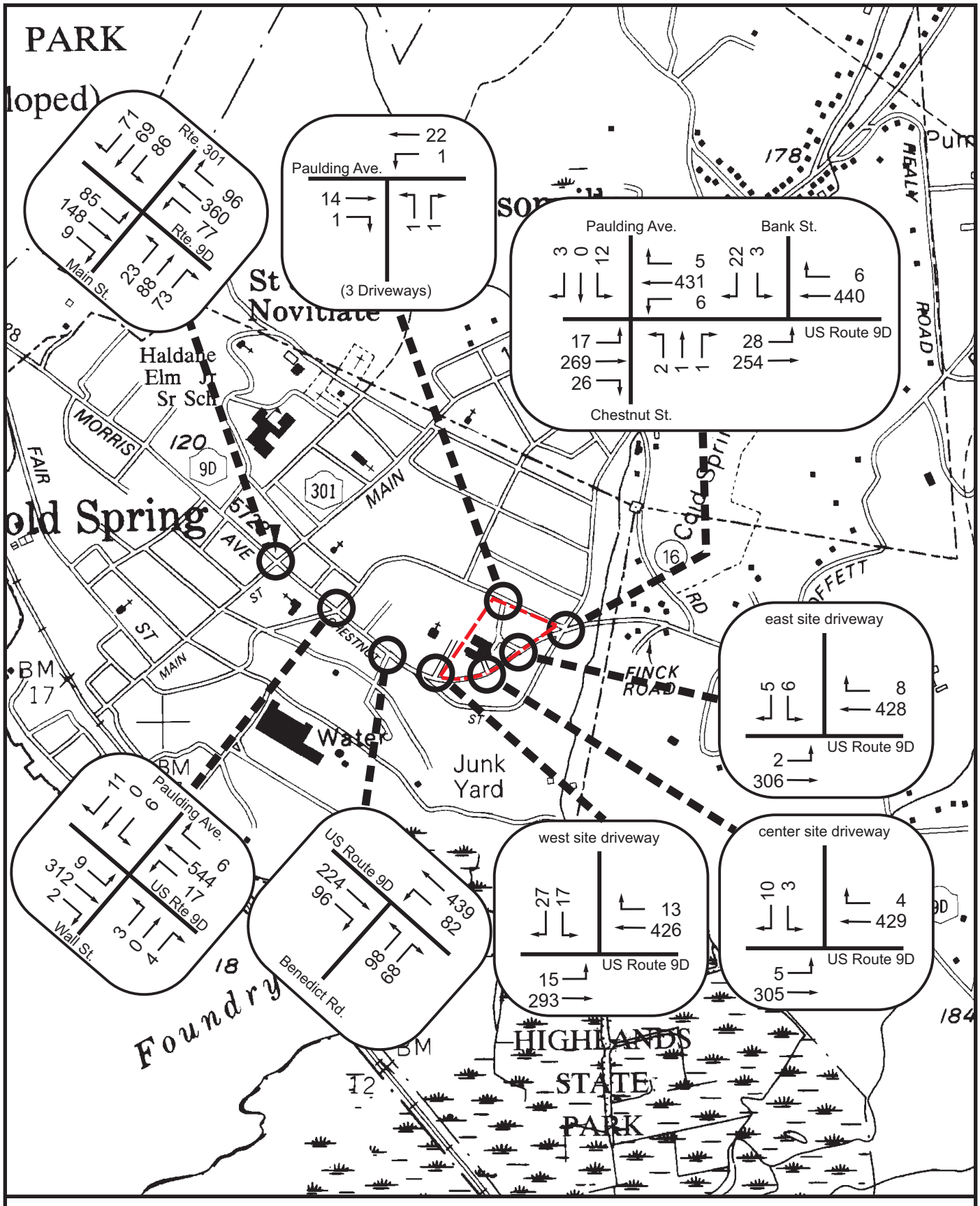
Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418



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Site Property Boundary

Intersections Studied

Figure 13: Build PM Peak Hour Traffic

Butterfield

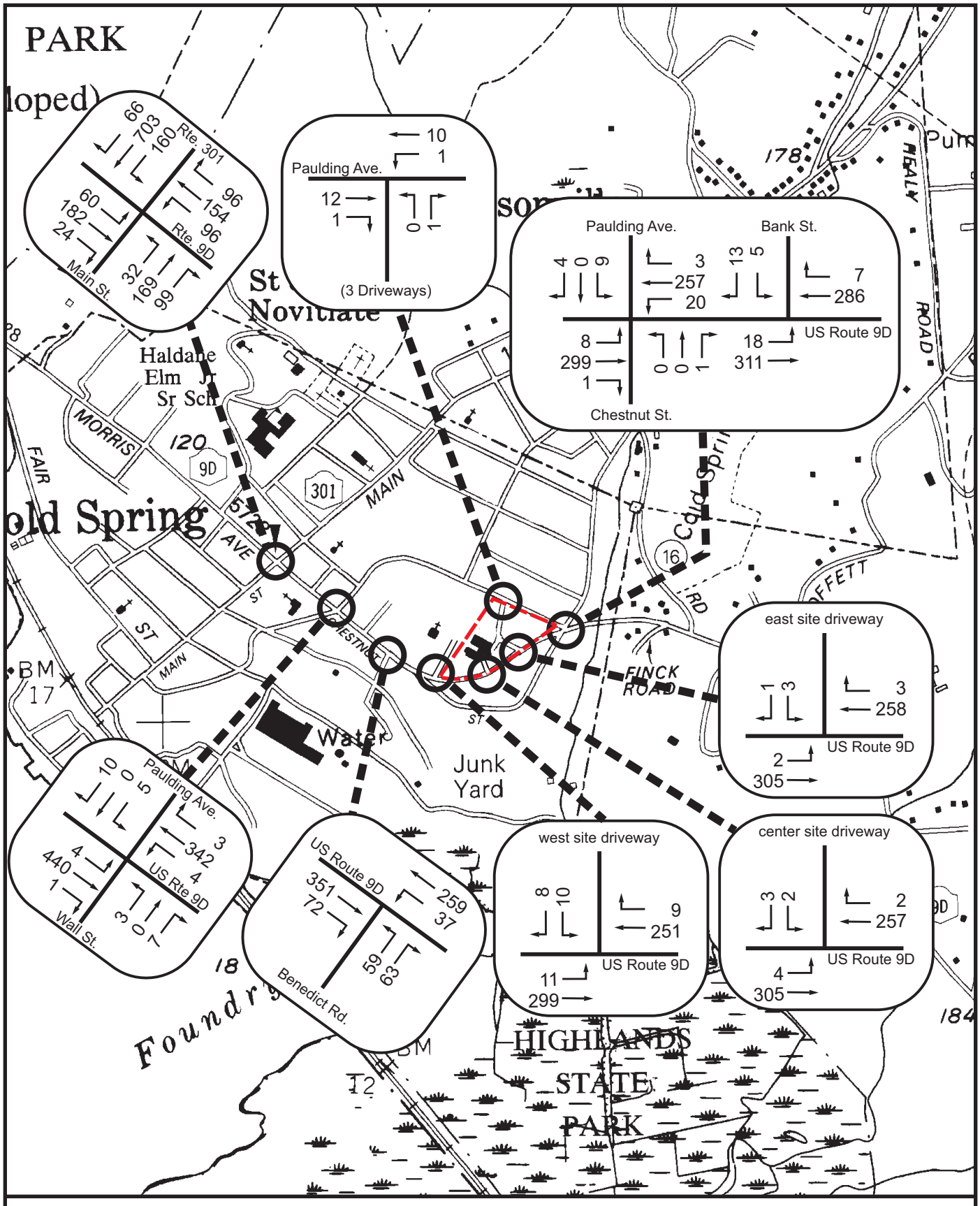
Village of Cold Spring, Putnam County, NY

Base Map: NYS DOT Planimetric Map, West Point Quad

Scale: 1" = 1,000'

File 12007 11/07/13
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418



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Site Property Boundary
Intersections Studied

Figure 14: Build Saturday Peak Hour Traffic
Butterfield
Village of Cold Spring, Putnam County, NY
Base Map: NYS DOT Planimetric Map, West Point Quad
Scale: 1" = 1,000'

File 12007 11/07/13
JS/12007

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

ATTACHMENT B

Other Projects

ATTACHMENT B
OTHER PROJECTS

Table B-1
Butterfield Trip Rate Summary for New Uses

Land Uses[1] {ITE Code}	Peak Hour Trip Rates					
	Weekday A.M.		Weekday P.M.		Saturday	
	IN (Trips/ Unit*)	OUT (Trips/ Unit*)	IN (Trips/ Unit*)	OUT (Trips/ Unit*)	IN (Trips/ Unit*)	OUT (Trips/ Unit*)
Serroukas (Foodtown)						
10,100 square feet supermarket proposed {850}	2.190	1.400	10.749	10.327	5.534	5.317
7,200 square feet supermarket existing {850}	2.190	1.400	12.265	11.784	5.534	5.317
Elemesco						
Convenience Store (Open 16 hours) 1101 square feet {852**}	15.510	15.510	16.939	17.631	17.804	17.106
Coffee/donut Shop with drive through 675 square feet {937}	56.483	54.268	21.465	21.465	42.260	42.260

[1] Trip Generation, Institute of Transportation Engineers, 8th edition, Washington, DC, 2008.

* Units are dwelling units, or 1000 square feet gross floor area for Municipal offices or retail as noted.

** No Saturday rates. Based on estimate from Convenience Market with Gasoline Pumps {853} at 76 percent reflecting ratio between uses of {852 and 853} in the a.m. peak hour.

Table B-2
Butterfield New Trip Generation

Land Uses	Peak Hour Trips					
	Weekday A.M.		Weekday P.M.		Saturday	
	IN (Trips)	OUT (Trips)	IN (Trips)	OUT (Trips)	IN (Trips)	OUT (Trips)
Serroukas (Foodtown)						
proposed	22	14	109	104	56	54
existing	16	10	88	85	40	38
change	**6**	**4**	**21**	**19**	**16**	**16**
West Point Foundry Preserve[1]						
	**	**	**	**	**100**	**100**
Elemesco						
External non-pass-by trips *	**36**	**35**	**20**	**21**	**32**	**31**

* Excludes 25 percent pass-by and 10 percent internal trips.

** Special Event traffic added to Saturday only.

[1]."Traffic Impact and Impact Analysis West Point Foundry Preserve, Cold Spring, New York", Frederick P. Clark Associates, Inc., Rye, NY March 2008.

ATTACHMENT C

Level of Service Criteria

Traffic: Performance Measures

Introduction

The HCM 2010 Highway Capacity Manual[1] and the *Synchro 8 Software*[2] procedures document the methodology used for modeling levels of service, average vehicle delay, and volume -to-capacity ratios at both signalized and unsignalized intersections. Level of service is a measure of the operational quality of an intersection; level of service A is the highest, most efficient level, and level of service F is the lowest level. The operational quality of an intersection for the automobile mode is based on the average amount of time a vehicle is delayed. Levels of service are examined by 'lane group', the set of lanes allowing common movement(s) on an approach. Approaches to intersections are assigned primary directions for clarity as depicted on the traffic volume figures.

The *Synchro 8 Software* modeled results are applied to peak hour periods only. During off peak periods, which is the majority of the time, drivers typically will find operations better than the modeled peak hour results. During peak periods the experience of individual drivers can vary, because the model calculates average delay.

Level of Service Criteria Signalized Intersections

When analyzing activity at signalized intersections, an understanding of the definition of level of service for the Automobile mode is essential:

Automobile Mode

Level of service can be characterized for the entire intersection, each intersection approach, and each lane group. Control delay alone is used to characterize level of service for the entire intersection or an approach. Control delay and volume-to-capacity ratio are used to characterize level of service for a lane group. Delay quantifies the increase in travel time due to traffic signal control. It is also a surrogate measure to driver discomfort and fuel consumption. The volume-to-capacity ratio quantifies the degree to which a phase's capacity is utilized by a lane group. The following paragraphs describe each level of service.

Level of service A describes operations with a control delay of 10 seconds per vehicle or less and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If it is due to favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.

Level of service B describes operations with control delay between 10 and 20 seconds per vehicle and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with Level of service A.

Level of service C describes operations with control delay between 20 and 35 seconds per vehicle and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when progression is favorable or the cycle length is moderate. Individual cycle failures (i.e., one or more queued vehicles are not able to depart as a result of depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of

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[1] Transportation Research Board of the National Academies, HCM 2010 Highway Capacity Manual, Washington D.C., 2010.

[2] Synchro 8, Computer software, Trafficware, Sugar Land, Texas, 2011, revised 2012.

vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.

Level of service D describes operations with control delay between 35 and 55 seconds per vehicle and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is higher and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

Level of service E describes operations with control delay between 55 and 80 seconds per vehicle and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

Level of service F describes operations with control delay exceeding 80 seconds per vehicle or a volume-to-capacity ratio greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

A lane group can incur a delay less than 80 seconds per vehicle when the volume-to-capacity ratio exceeds 1.0. This condition typically occurs when the cycle length is short, the signal progression is favorable, or both. As a result, both the delay and volume-to-capacity ratio are considered when lane group level of service is established. A ratio of 1.0 or more indicates that cycle capacity is fully utilized and represents failure from a capacity perspective (just as delay in excess of 80 seconds per vehicle represents failure from a delay perspective).

Exhibit 18-4 lists the level of service thresholds established for the automobile mode at a signalized intersection.[3]

Signalized Intersections Level of Service Criteria Automobile Mode For Lane Groups		
Average Control Delay (Seconds Per Vehicle)	Volume-to-capacity Ratio less than or equal to one **Level of Service**	Volume-to-capacity Ratio greater than one **Level of Service**
less than or equal to 10	A	F
greater than 10 and less than or equal to 20	B	F
greater than 20 and less than or equal to 35	C	F
greater than 35 and less than or equal to 55	D	F
greater than 55 and less than or equal to 80	E	F
greater than 80	F	F

[1] From Transportation Research Board of the National Academies, HCM 2010 Highway Capacity Manual, Washington D.C., Volume 3 page 18-6, Exhibit 18-4, 2010. Abbreviations and mathematical symbols have been replaced for reader clarity. Table limited to lane groups (lane or group of lanes sharing a common movement)

The New York State Department of Transportation (NYS DOT) generally seeks in urban areas for a level of service D or better (delay of 55 seconds or less for a signalized intersection) for all lane groups however:

[3] From Transportation Research Board of the National Academies, HCM 2010 Highway Capacity Manual, Washington D.C., Volume 3 page 18-6, 2010. Abbreviations and mathematical symbols replaced for reader clarity.

In some cases, it may be necessary to accept level of service E or F on individual lane groups due to unreasonable costs or impacts associated with improving the level of service.[4]

Level of Service Criteria for Two-way STOP-Controlled intersections

The Highway Capacity Manual[5] describes the level of service criteria as:

Level of service for two way stop controlled intersections is determined by the computed or measure control delay. For motor vehicles, level of service is determined for each minor-street movement (or shared movement) as well as major-street left turns by using criteria given in Exhibit 19-1 . Level of service is not defined for the intersection as a whole or for the major street-street approaches for three primary reasons: (a) major-street through vehicles are assumed to experience zero delay; (b) the disproportionate number of major-street through vehicles at a typical two way stopped controlled intersection skews the weighted average of all movements, resulting in a very low overall average delay for all vehicles; and (c) the resulting low delay can mask important level of service deficiencies for minor movements. As Exhibit 19-1 notes, level of service is assigned to the movements if the volume-to-capacity ratio for the movement exceeds 1.0, regardless of the control delay.

The level of service criteria for two-way stop-controlled intersections are somewhat different from the criteria used in Chapter 18 for signalized intersections, primarily because user perceptions differ among transportation facility types. the expectation is that a signalized intersection is designed to carry higher traffic volumes and will present greater delay than unsignalized intersection. Unsignalized intersections are also associated with more uncertainty for users, as delays are less predictable than they are at signals, which can reduce user's delay tolerance.

The Highway Capacity Manual[6] includes the following concerning level of service F at two-way stop-controlled intersection lane groups:

Level of service F occurs when there are not enough gaps of suitable size to allow minor street vehicles to enter or cross through traffic on the major-street, resulting in long average control delays (greater than 50 seconds per vehicle). Depending on the demand on the approach, long queues on the minor approaches may result....

Level of service F may also appear in the form of drivers on the minor street selecting smaller-than-usual gaps...

Even with a level of service F estimate, most low-volume minor-street approaches would not meet any of the Manual on Uniform Traffic Control Devices volume or delay warrants for signalization...

---

[4] From NYS DOT, Highway Design Manual, Revision 62, April 13, 2011, (page 5-103) with abbreviations replaced for reader clarity.

[5] From Transportation Research Board of the National Academies, HCM 2010 Highway Capacity Manual, Washington D.C., Volume 3 page 19-1 and 19-2, 2010. Abbreviations and mathematical symbols have been replaced for reader clarity.

[6] From Transportation Research Board of the National Academies, HCM 2010 Highway Capacity Manual, Washington D.C., Volume 3 page 19-40, 2010. Abbreviations and mathematical symbols have been replaced for reader clarity.

In some cases, the delay equations predict delays greater than 50 seconds for minor -street movements under very low volumes conditions on the minor street (fewer than 25 vehicles per hour). On the basis of the first term of the delay equation, the level of service F threshold is reached with a movement capacity of approximately 85 vehicles per hour or less, regardless of the minor-street movement volume.

Two-Way Stop Controlled (Unsignalized) Intersections Level of Service Criteria Automobile Mode For Lane Groups		
Average Control Delay (Seconds Per Vehicle)	Volume-to-capacity Ratio less than or equal to one **Level of Service**	Volume-to-capacity Ratio greater than one **Level of Service**
less than or equal to 10	A	F
greater than 10 and less than or equal to 15	B	F
greater than 15 and less than or equal to 25	C	F
greater than 25 and less than or equal to 35	D	F
greater than 35 and less than or equal to 50	E	F
greater than 50	F	F
Modified from Transportation Research Board of the National Academies, HCM 2010 Highway Capacity Manual, Washington D.C., Volume 3 page 19-2, Exhibit 19-1, 2010. Abbreviations and mathematical symbols have been replaced for reader clarity. Level of service is not calculated for major street approaches or for the intersection as a whole. Major Street through vehicles are assumed to experience no delay.		

ATTACHMENT D

Level of Service Calculations

HCM 2010 Signalized Intersection Summary
14: Route 301 & Route 9D

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	106	260	15	33	131	52	17	36	44	78	65	94
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.99		0.95	0.98		0.93	0.96		0.93
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	161.3	161.3	161.3	161.3	161.3	161.3	156.5	156.5	156.5	166.2	166.2	166.2
Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Cap, veh/h	260	574	31	155	525	190	109	162	162	179	122	140
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	314	1032	56	140	944	342	119	628	626	348	473	543
Grp Volume(v), veh/h	449	0	0	254	0	0	114	0	0	279	0	0
Grp Sat Flow(s),veh/h/ln	1403	0	0	1426	0	0	1373	0	0	1364	0	0
Q Serve(g_s), s	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	0.0
Cycle Q Clear(g_c), s	10.4	0.0	0.0	4.8	0.0	0.0	3.6	0.0	0.0	10.1	0.0	0.0
Prop In Lane	0.28		0.04	0.15		0.24	0.18		0.46	0.33		0.40
Lane Grp Cap(c), veh/h	865	0	0	870	0	0	433	0	0	442	0	0
V/C Ratio(X)	0.52	0.00	0.00	0.29	0.00	0.00	0.26	0.00	0.00	0.63	0.00	0.00
Avail Cap(c_a), veh/h	865	0	0	870	0	0	576	0	0	588	0	0
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	7.5	0.0	0.0	6.4	0.0	0.0	16.2	0.0	0.0	18.4	0.0	0.0
Incr Delay (d2), s/veh	2.2	0.0	0.0	0.9	0.0	0.0	0.3	0.0	0.0	1.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	3.4	0.0	0.0	1.6	0.0	0.0	1.1	0.0	0.0	3.4	0.0	0.0
Lane Grp Delay (d), s/veh	9.7	0.0	0.0	7.2	0.0	0.0	16.5	0.0	0.0	19.9	0.0	0.0
Lane Grp LOS	A			A			B			B		
Approach Vol, veh/h		449			254			114			279	
Approach Delay, s/veh		9.7			7.2			16.5			19.9	
Approach LOS		A			A			B			B	

Timer												
Assigned Phs		6			2			4			8	
Phs Duration (G+Y+Rc), s		35.0			35.0			18.9			18.9	
Change Period (Y+Rc), s		5.0			5.0			5.0			5.0	
Max Green Setting (Gmax), s		30.0			30.0			20.0			20.0	
Max Q Clear Time (g_c+I1), s		12.4			6.8			5.6			12.1	
Green Ext Time (p_c), s		2.4			2.5			1.3			0.9	

Intersection Summary												
HCM 2010 Ctrl Delay			12.4									
HCM 2010 LOS			B									

Notes

Intersection	
Intersection Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	11	285	145	2	12	28
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	12	310	158	2	13	30
Number of Lanes	0	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	165	0	-	0	498	169
Stage 1	-	-	-	-	164	-
Stage 2	-	-	-	-	334	-
Follow-up Headway	2.254	-	-	-	3.554	3.354
Pot Capacity-1 Maneuver	1389	-	-	-	525	865
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	717	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1383	-	-	-	515	858
Mov Capacity-2 Maneuver	-	-	-	-	515	-
Stage 1	-	-	-	-	852	-
Stage 2	-	-	-	-	707	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	10.4
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1383	-	-	-	715
HCM Control Delay, s	7.626	0	-	-	10.4
HCM Lane V/C Ratio	0.01	-	-	-	0.06
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.0	-	-	-	0.2

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	12	285	0	4	164	5	2	0	3	8	0	6
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	14	335	0	5	193	6	2	0	4	9	0	7
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	204	0	0	340	0	0	583	582	345	580	579	206
Stage 1	-	-	-	-	-	-	369	369	-	210	210	-
Stage 2	-	-	-	-	-	-	214	213	-	370	369	-
Follow-up Headway	2.254	-	-	2.254	-	-	3.554	4.054	3.354	3.554	4.054	3.354
Pot Capacity-1 Maneuver	1344	-	-	1197	-	-	418	419	689	420	421	824
Stage 1	-	-	-	-	-	-	643	614	-	783	721	-
Stage 2	-	-	-	-	-	-	779	719	-	642	614	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1338	-	-	1192	-	-	405	408	683	409	410	817
Mov Capacity-2 Maneuver	-	-	-	-	-	-	405	408	-	409	410	-
Stage 1	-	-	-	-	-	-	632	603	-	770	714	-
Stage 2	-	-	-	-	-	-	765	712	-	628	603	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.2	11.8	12.1
HCM LOS	-	-	B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	536	1338	-	-	1192	-	-	520
HCM Control Delay, s	11.8	7.719	0	-	8.032	0	-	12.1
HCM Lane V/C Ratio	0.01	0.01	-	-	0.00	-	-	0.03
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th-tile Q, veh	0.0	0.0	-	-	0.0	-	-	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.9

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	290	8	8	173	44	35
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	326	9	9	194	49	39
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow All	0	0	340	0	547	340
Stage 1	-	-	-	-	335	-
Stage 2	-	-	-	-	212	-
Follow-up Headway	-	-	2.254	-	3.554	3.354
Pot Capacity-1 Maneuver	-	-	1197	-	491	693
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	814	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1192	-	483	687
Mov Capacity-2 Maneuver	-	-	-	-	483	-
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	804	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0.4	12.7
HCM LOS	-	-	B

Minor Lane / Major Mvmt	NELn1	NWL	NWT	SET	SER
Cap, veh/h	556	1192	-	-	-
HCM Control Delay, s	12.7	8.043	0	-	-
HCM Lane V/C Ratio	0.16	0.01	-	-	-
HCM Lane LOS	B	A	A	-	-
HCM 95th-tile Q, veh	0.6	0.0	-	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	8	2	4	16	1	3	13	357	4	2	186	6
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	9	2	4	17	1	3	14	384	4	2	200	6
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Minor 1			Minor 2			Major 1			Major 2		
Conflicting Flow All	634	635	396	635	634	213	211	0	0	393	0	0
Stage 1	419	419	-	213	213	-	-	-	-	-	-	-
Stage 2	215	216	-	422	421	-	-	-	-	-	-	-
Follow-up Headway	3.554	4.054	3.354	3.554	4.054	3.354	2.254	-	-	2.254	-	-
Pot Capacity-1 Maneuver	386	391	645	386	391	817	1336	-	-	1144	-	-
Stage 1	604	583	-	780	719	-	-	-	-	-	-	-
Stage 2	778	717	-	602	582	-	-	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	0	0	0	0	-	-	0	-	-
Mov Capacity-1 Maneuver	376	382	640	374	382	810	1330	-	-	1139	-	-
Mov Capacity-2 Maneuver	376	382	-	374	382	-	-	-	-	-	-	-
Stage 1	594	573	-	767	715	-	-	-	-	-	-	-
Stage 2	769	713	-	586	572	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	13.7	14.3	0.3	0.1
HCM LOS	B	B	-	-

Minor Lane / Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	SEL	SET	SER
Cap, veh/h	1139	-	-	427	407	1330	-	-
HCM Control Delay, s	8.167	0	-	13.7	14.3	7.736	0	-
HCM Lane V/C Ratio	0.00	-	-	0.04	0.05	0.01	-	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th-tile Q, veh	0.0	-	-	0.1	0.2	0.0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	82	131	9	61	314	77	22	85	58	70	66	68
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.96	0.98		0.96	0.97		0.92	0.97		0.92
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	169.3	169.3	169.3	169.3	169.3	169.3	164.2	164.2	164.2	174.4	174.4	174.4
Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Cap, veh/h	325	475	28	153	677	154	101	194	118	187	131	106
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	397	821	49	128	1169	266	100	852	518	404	573	466
Grp Volume(v), veh/h	233	0	0	476	0	0	173	0	0	223	0	0
Grp Sat Flow(s),veh/h/ln	1268	0	0	1563	0	0	1470	0	0	1443	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0
Cycle Q Clear(g_c), s	3.6	0.0	0.0	9.0	0.0	0.0	5.2	0.0	0.0	6.9	0.0	0.0
Prop In Lane	0.37		0.04	0.13		0.17	0.13		0.35	0.37		0.32
Lane Grp Cap(c), veh/h	829	0	0	984	0	0	414	0	0	424	0	0
V/C Ratio(X)	0.28	0.00	0.00	0.48	0.00	0.00	0.42	0.00	0.00	0.53	0.00	0.00
Avail Cap(c_a), veh/h	829	0	0	984	0	0	635	0	0	636	0	0
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.3	0.0	0.0	6.5	0.0	0.0	17.5	0.0	0.0	18.0	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	1.7	0.0	0.0	0.7	0.0	0.0	1.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	1.3	0.0	0.0	3.2	0.0	0.0	1.9	0.0	0.0	2.5	0.0	0.0
Lane Grp Delay (d), s/veh	6.2	0.0	0.0	8.2	0.0	0.0	18.1	0.0	0.0	19.0	0.0	0.0
Lane Grp LOS	A			A			B			B		
Approach Vol, veh/h		233			476			173			223	
Approach Delay, s/veh		6.2			8.2			18.1			19.0	
Approach LOS		A			A			B			B	

Timer												
Assigned Phs		6			2			4			8	
Phs Duration (G+Y+Rc), s		35.0			35.0			16.8			16.8	
Change Period (Y+Rc), s		5.0			5.0			5.0			5.0	
Max Green Setting (Gmax), s		30.0			30.0			20.0			20.0	
Max Q Clear Time (g_c+I1), s		5.6			11.0			7.2			8.9	
Green Ext Time (p_c), s		2.5			2.4			1.2			1.1	

Intersection Summary												
HCM 2010 Ctrl Delay			11.5									
HCM 2010 LOS			B									

Notes

Intersection	
Intersection Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	25	206	387	6	3	20
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	28	231	435	7	3	22
Number of Lanes	0	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	447	0	-	0	731	448
Stage 1	-	-	-	-	443	-
Stage 2	-	-	-	-	288	-
Follow-up Headway	2.209	-	-	-	3.509	3.309
Pot Capacity-1 Maneuver	1119	-	-	-	390	613
Stage 1	-	-	-	-	649	-
Stage 2	-	-	-	-	763	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1114	-	-	-	376	608
Mov Capacity-2 Maneuver	-	-	-	-	376	-
Stage 1	-	-	-	-	646	-
Stage 2	-	-	-	-	738	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	11.7
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1114	-	-	-	563
HCM Control Delay, s	8.315	0	-	-	11.7
HCM Lane V/C Ratio	0.03	-	-	-	0.05
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.1	-	-	-	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	15	219	25	6	397	4	2	1	1	11	0	2
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	17	246	28	7	446	4	2	1	1	12	0	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	456	0	0	279	0	0	767	768	270	767	780	458
Stage 1	-	-	-	-	-	-	299	299	-	467	467	-
Stage 2	-	-	-	-	-	-	468	469	-	300	313	-
Follow-up Headway	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Capacity-1 Maneuver	1110	-	-	1289	-	-	320	333	771	320	328	605
Stage 1	-	-	-	-	-	-	712	668	-	578	563	-
Stage 2	-	-	-	-	-	-	577	562	-	711	659	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1105	-	-	1284	-	-	310	322	765	310	317	600
Mov Capacity-2 Maneuver	-	-	-	-	-	-	310	322	-	310	317	-
Stage 1	-	-	-	-	-	-	696	653	-	565	557	-
Stage 2	-	-	-	-	-	-	568	556	-	693	644	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	14.9	16.2
HCM LOS	-	-	B	C

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	368	1105	-	-	1284	-	-	335
HCM Control Delay, s	14.9	8.308	0	-	7.819	0	-	16.2
HCM Lane V/C Ratio	0.01	0.02	-	-	0.01	-	-	0.04
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th-tile Q, veh	0.0	0.0	-	-	0.0	-	-	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	3.1

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	193	9	15	431	84	58
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	217	10	17	484	94	65
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow All	0	0	232	0	745	232
Stage 1	-	-	-	-	227	-
Stage 2	-	-	-	-	518	-
Follow-up Headway	-	-	2.209	-	3.509	3.309
Pot Capacity-1 Maneuver	-	-	1342	-	383	810
Stage 1	-	-	-	-	813	-
Stage 2	-	-	-	-	600	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1336	-	373	803
Mov Capacity-2 Maneuver	-	-	-	-	373	-
Stage 1	-	-	-	-	810	-
Stage 2	-	-	-	-	587	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0.3	16.3
HCM LOS	-	-	C

Minor Lane / Major Mvmt	NELn1	NWL	NWT	SET	SER
Cap, veh/h	477	1336	-	-	-
HCM Control Delay, s	16.3	7.729	0	-	-
HCM Lane V/C Ratio	0.33	0.01	-	-	-
HCM Lane LOS	C	A	A	-	-
HCM 95th-tile Q, veh	1.5	0.0	-	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	3	0	4	6	0	10	8	263	2	16	460	6
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	3	0	4	7	0	11	9	296	2	18	517	7
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Minor 1			Minor 2			Major 1			Major 2		
Conflicting Flow All	887	885	307	883	882	530	529	0	0	303	0	0
Stage 1	320	320	-	561	561	-	-	-	-	-	-	-
Stage 2	567	565	-	322	321	-	-	-	-	-	-	-
Follow-up Headway	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Capacity-1 Maneuver	266	285	735	267	286	551	1043	-	-	1264	-	-
Stage 1	694	654	-	514	512	-	-	-	-	-	-	-
Stage 2	510	510	-	692	653	-	-	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	0	0	0	0	-	-	0	-	-
Mov Capacity-1 Maneuver	252	274	729	257	275	546	1039	-	-	1259	-	-
Mov Capacity-2 Maneuver	252	274	-	257	275	-	-	-	-	-	-	-
Stage 1	684	645	-	507	500	-	-	-	-	-	-	-
Stage 2	487	498	-	678	644	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	14.1	14.8	0.2	0.3
HCM LOS	B	B	-	-

Minor Lane / Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	SEL	SET	SER
Cap, veh/h	1259	-	-	402	384	1039	-	-
HCM Control Delay, s	7.901	0	-	14.1	14.8	8.495	0	-
HCM Lane V/C Ratio	0.01	-	-	0.02	0.05	0.01	-	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th-tile Q, veh	0.0	-	-	0.1	0.1	0.0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	58	153	23	78	139	77	21	90	65	75	89	63
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.96	0.98		0.96	0.97		0.92	0.97		0.92
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	169.3	169.3	169.3	169.3	169.3	169.3	164.2	164.2	164.2	174.4	174.4	174.4
Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Cap, veh/h	250	603	84	261	435	216	98	195	125	175	163	95
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	285	1047	147	302	755	374	89	839	541	360	702	408
Grp Volume(v), veh/h	242	0	0	302	0	0	182	0	0	234	0	0
Grp Sat Flow(s),veh/h/ln	1478	0	0	1431	0	0	1469	0	0	1471	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0
Cycle Q Clear(g_c), s	3.8	0.0	0.0	5.1	0.0	0.0	5.6	0.0	0.0	7.2	0.0	0.0
Prop In Lane	0.25		0.10	0.26		0.26	0.12		0.37	0.33		0.28
Lane Grp Cap(c), veh/h	938	0	0	912	0	0	418	0	0	433	0	0
V/C Ratio(X)	0.26	0.00	0.00	0.33	0.00	0.00	0.44	0.00	0.00	0.54	0.00	0.00
Avail Cap(c_a), veh/h	938	0	0	912	0	0	631	0	0	642	0	0
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.5	0.0	0.0	5.8	0.0	0.0	17.5	0.0	0.0	18.0	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.0	1.0	0.0	0.0	0.7	0.0	0.0	1.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	1.4	0.0	0.0	1.8	0.0	0.0	2.0	0.0	0.0	2.6	0.0	0.0
Lane Grp Delay (d), s/veh	6.1	0.0	0.0	6.7	0.0	0.0	18.2	0.0	0.0	19.1	0.0	0.0
Lane Grp LOS	A			A			B			B		
Approach Vol, veh/h		242			302			182			234	
Approach Delay, s/veh		6.1			6.7			18.2			19.1	
Approach LOS		A			A			B			B	

Timer												
Assigned Phs		6			2			4			8	
Phs Duration (G+Y+Rc), s		35.0			35.0			17.1			17.1	
Change Period (Y+Rc), s		5.0			5.0			5.0			5.0	
Max Green Setting (Gmax), s		30.0			30.0			20.0			20.0	
Max Q Clear Time (g_c+I1), s		5.8			7.1			7.6			9.2	
Green Ext Time (p_c), s		1.9			1.9			1.2			1.2	

Intersection Summary												
HCM 2010 Ctrl Delay			11.8									
HCM 2010 LOS			B									

Notes

Intersection	
Intersection Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	14	254	231	7	5	10
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	15	265	241	7	5	10
Number of Lanes	0	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	253	0	-	0	543	254
Stage 1	-	-	-	-	249	-
Stage 2	-	-	-	-	294	-
Follow-up Headway	2.209	-	-	-	3.509	3.309
Pot Capacity-1 Maneuver	1318	-	-	-	502	787
Stage 1	-	-	-	-	795	-
Stage 2	-	-	-	-	759	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1313	-	-	-	491	780
Mov Capacity-2 Maneuver	-	-	-	-	491	-
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	746	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	10.7
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1313	-	-	-	652
HCM Control Delay, s	7.773	0	-	-	10.7
HCM Lane V/C Ratio	0.01	-	-	-	0.02
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.0	-	-	-	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	7	259	1	5	234	2	0	0	1	8	0	3
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	7	276	1	5	249	2	0	0	1	9	0	3
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	256	0	0	282	0	0	563	563	286	562	562	260
Stage 1	-	-	-	-	-	-	296	296	-	266	266	-
Stage 2	-	-	-	-	-	-	267	267	-	296	296	-
Follow-up Headway	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Capacity-1 Maneuver	1315	-	-	1286	-	-	438	437	755	439	437	781
Stage 1	-	-	-	-	-	-	715	670	-	742	691	-
Stage 2	-	-	-	-	-	-	741	690	-	715	670	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1310	-	-	1281	-	-	429	429	749	431	429	775
Mov Capacity-2 Maneuver	-	-	-	-	-	-	429	429	-	431	429	-
Stage 1	-	-	-	-	-	-	708	663	-	734	685	-
Stage 2	-	-	-	-	-	-	731	684	-	707	663	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.2	9.8	12.5
HCM LOS	-	-	A	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	749	1310	-	-	1281	-	-	490
HCM Control Delay, s	9.8	7.764	0	-	7.822	0	-	12.5
HCM Lane V/C Ratio	0.00	0.01	-	-	0.00	-	-	0.02
HCM Lane LOS	A	A	A	-	A	A	-	B
HCM 95th-tile Q, veh	0.0	0.0	-	-	0.0	-	-	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.2

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	222	7	6	248	48	54
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	241	8	7	270	52	59
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow All	0	0	254	0	533	255
Stage 1	-	-	-	-	250	-
Stage 2	-	-	-	-	283	-
Follow-up Headway	-	-	2.209	-	3.509	3.309
Pot Capacity-1 Maneuver	-	-	1317	-	509	786
Stage 1	-	-	-	-	794	-
Stage 2	-	-	-	-	767	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1312	-	502	779
Mov Capacity-2 Maneuver	-	-	-	-	502	-
Stage 1	-	-	-	-	791	-
Stage 2	-	-	-	-	759	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0.2	12.1
HCM LOS	-	-	B

Minor Lane / Major Mvmt	NELn1	NWL	NWT	SET	SER
Cap, veh/h	618	1312	-	-	-
HCM Control Delay, s	12.1	7.758	0	-	-
HCM Lane V/C Ratio	0.18	0.01	-	-	-
HCM Lane LOS	B	A	A	-	-
HCM 95th-tile Q, veh	0.6	0.0	-	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	3	0	7	5	0	9	3	293	1	4	291	3
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	3	0	7	5	0	9	3	302	1	4	300	3
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Minor 1			Minor 2			Major 1			Major 2		
Conflicting Flow All	633	630	313	632	629	312	308	0	0	308	0	0
Stage 1	314	314	-	315	315	-	-	-	-	-	-	-
Stage 2	319	316	-	317	314	-	-	-	-	-	-	-
Follow-up Headway	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Capacity-1 Maneuver	394	400	730	394	400	731	1258	-	-	1258	-	-
Stage 1	699	658	-	698	657	-	-	-	-	-	-	-
Stage 2	695	657	-	696	658	-	-	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	0	0	0	0	-	-	0	-	-
Mov Capacity-1 Maneuver	384	394	724	385	394	725	1253	-	-	1253	-	-
Mov Capacity-2 Maneuver	384	394	-	385	394	-	-	-	-	-	-	-
Stage 1	694	653	-	693	652	-	-	-	-	-	-	-
Stage 2	681	652	-	684	653	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	11.4	11.7	0.1	0.1
HCM LOS	B	B	-	-

Minor Lane / Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	SEL	SET	SER
Cap, veh/h	1253	-	-	572	551	1253	-	-
HCM Control Delay, s	7.883	0	-	11.4	11.7	7.88	0	-
HCM Lane V/C Ratio	0.00	-	-	0.02	0.03	0.00	-	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th-tile Q, veh	0.0	-	-	0.1	0.1	0.0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	110	276	19	44	139	64	18	40	56	91	68	98
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.95	0.99		0.95	0.98		0.93	0.97		0.93
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	161.3	161.3	161.3	161.3	161.3	161.3	156.5	156.5	156.5	166.2	166.2	166.2
Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Cap, veh/h	250	568	36	172	478	199	104	159	181	195	122	140
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	303	1034	65	172	871	362	102	594	675	393	457	523
Grp Volume(v), veh/h	476	0	0	291	0	0	134	0	0	302	0	0
Grp Sat Flow(s),veh/h/ln	1402	0	0	1406	0	0	1371	0	0	1373	0	0
Q Serve(g_s), s	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0
Cycle Q Clear(g_c), s	11.7	0.0	0.0	5.8	0.0	0.0	4.3	0.0	0.0	11.0	0.0	0.0
Prop In Lane	0.27		0.05	0.18		0.26	0.16		0.49	0.35		0.38
Lane Grp Cap(c), veh/h	854	0	0	850	0	0	444	0	0	457	0	0
V/C Ratio(X)	0.56	0.00	0.00	0.34	0.00	0.00	0.30	0.00	0.00	0.66	0.00	0.00
Avail Cap(c_a), veh/h	854	0	0	850	0	0	569	0	0	584	0	0
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.0	0.0	0.0	6.9	0.0	0.0	16.2	0.0	0.0	18.5	0.0	0.0
Incr Delay (d2), s/veh	2.6	0.0	0.0	1.1	0.0	0.0	0.4	0.0	0.0	1.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	4.1	0.0	0.0	2.0	0.0	0.0	1.4	0.0	0.0	3.7	0.0	0.0
Lane Grp Delay (d), s/veh	10.7	0.0	0.0	8.0	0.0	0.0	16.6	0.0	0.0	20.3	0.0	0.0
Lane Grp LOS	B			A			B			C		
Approach Vol, veh/h		476			291			134			302	
Approach Delay, s/veh		10.7			8.0			16.6			20.3	
Approach LOS		B			A			B			C	

Timer												
Assigned Phs		6			2			4			8	
Phs Duration (G+Y+Rc), s		35.0			35.0			19.6			19.6	
Change Period (Y+Rc), s		5.0			5.0			5.0			5.0	
Max Green Setting (Gmax), s		30.0			30.0			20.0			20.0	
Max Q Clear Time (g_c+I1), s		13.7			7.8			6.3			13.0	
Green Ext Time (p_c), s		2.6			2.8			1.4			1.0	

Intersection Summary	
HCM 2010 Ctrl Delay	13.1
HCM 2010 LOS	B

Notes

Intersection	
Intersection Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	13	311	166	2	12	31
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	14	338	180	2	13	34
Number of Lanes	0	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	188	0	-	0	553	192
Stage 1	-	-	-	-	187	-
Stage 2	-	-	-	-	366	-
Follow-up Headway	2.254	-	-	-	3.554	3.354
Pot Capacity-1 Maneuver	1362	-	-	-	487	839
Stage 1	-	-	-	-	835	-
Stage 2	-	-	-	-	693	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1356	-	-	-	477	832
Mov Capacity-2 Maneuver	-	-	-	-	477	-
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	681	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	10.6
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1356	-	-	-	689
HCM Control Delay, s	7.683	0	-	-	10.6
HCM Lane V/C Ratio	0.01	-	-	-	0.07
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.0	-	-	-	0.2

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	12	313	0	4	188	5	2	0	3	8	0	6
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	14	368	0	5	221	6	2	0	4	9	0	7
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	232	0	0	373	0	0	643	642	378	642	640	234
Stage 1	-	-	-	-	-	-	401	401	-	239	239	-
Stage 2	-	-	-	-	-	-	242	241	-	403	401	-
Follow-up Headway	2.254	-	-	2.254	-	-	3.554	4.054	3.354	3.554	4.054	3.354
Pot Capacity-1 Maneuver	1312	-	-	1164	-	-	381	387	660	381	388	795
Stage 1	-	-	-	-	-	-	618	594	-	755	700	-
Stage 2	-	-	-	-	-	-	753	699	-	616	594	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1307	-	-	1159	-	-	369	377	655	371	378	788
Mov Capacity-2 Maneuver	-	-	-	-	-	-	369	377	-	371	378	-
Stage 1	-	-	-	-	-	-	607	584	-	742	694	-
Stage 2	-	-	-	-	-	-	739	693	-	602	584	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.2	12.3	12.8
HCM LOS	-	-	B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	500	1307	-	-	1159	-	-	480
HCM Control Delay, s	12.3	7.784	0	-	8.119	0	-	12.8
HCM Lane V/C Ratio	0.01	0.01	-	-	0.00	-	-	0.03
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th-tile Q, veh	0.0	0.0	-	-	0.0	-	-	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.1

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	316	29	17	188	48	38
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	355	33	19	211	54	43
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow All	0	0	393	0	625	381
Stage 1	-	-	-	-	376	-
Stage 2	-	-	-	-	249	-
Follow-up Headway	-	-	2.254	-	3.554	3.354
Pot Capacity-1 Maneuver	-	-	1144	-	442	657
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	783	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1139	-	430	652
Mov Capacity-2 Maneuver	-	-	-	-	430	-
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	765	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0.7	13.8
HCM LOS	-	-	B

Minor Lane / Major Mvmt	NELn1	NWL	NWT	SET	SER
Cap, veh/h	506	1139	-	-	-
HCM Control Delay, s	13.8	8.215	0	-	-
HCM Lane V/C Ratio	0.19	0.02	-	-	-
HCM Lane LOS	B	A	A	-	-
HCM 95th-tile Q, veh	0.7	0.1	-	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	8	2	4	17	1	3	14	396	4	2	217	6
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	9	2	4	18	1	3	15	426	4	2	233	6
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Minor 1			Minor 2			Major 1			Major 2		
Conflicting Flow All	711	712	438	712	711	247	245	0	0	435	0	0
Stage 1	463	463	-	246	246	-	-	-	-	-	-	-
Stage 2	248	249	-	466	465	-	-	-	-	-	-	-
Follow-up Headway	3.554	4.054	3.354	3.554	4.054	3.354	2.254	-	-	2.254	-	-
Pot Capacity-1 Maneuver	343	353	610	342	353	782	1298	-	-	1104	-	-
Stage 1	571	557	-	749	695	-	-	-	-	-	-	-
Stage 2	747	693	-	569	556	-	-	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	0	0	0	0	-	-	0	-	-
Mov Capacity-1 Maneuver	334	344	605	331	344	775	1293	-	-	1099	-	-
Mov Capacity-2 Maneuver	334	344	-	331	344	-	-	-	-	-	-	-
Stage 1	560	546	-	735	691	-	-	-	-	-	-	-
Stage 2	738	689	-	552	545	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	14.7	15.6	0.3	0.1
HCM LOS	B	C	-	-

Minor Lane / Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	SEL	SET	SER
Cap, veh/h	1099	-	-	385	361	1293	-	-
HCM Control Delay, s	8.282	0	-	14.7	15.6	7.817	0	-
HCM Lane V/C Ratio	0.00	-	-	0.04	0.06	0.01	-	-
HCM Lane LOS	A	A	-	B	C	A	A	-
HCM 95th-tile Q, veh	0.0	-	-	0.1	0.2	0.0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	85	140	9	72	332	89	23	88	70	83	69	71
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.96	0.98		0.96	0.97		0.92	0.97		0.92
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	169.3	169.3	169.3	169.3	169.3	169.3	164.2	164.2	164.2	174.4	174.4	174.4
Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Cap, veh/h	304	456	25	162	634	159	100	198	140	201	129	103
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	373	805	45	148	1119	280	95	810	572	433	529	422
Grp Volume(v), veh/h	245	0	0	519	0	0	191	0	0	246	0	0
Grp Sat Flow(s),veh/h/ln	1222	0	0	1548	0	0	1477	0	0	1384	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0
Cycle Q Clear(g_c), s	4.3	0.0	0.0	10.9	0.0	0.0	5.9	0.0	0.0	8.4	0.0	0.0
Prop In Lane	0.36		0.04	0.15		0.18	0.13		0.39	0.40		0.30
Lane Grp Cap(c), veh/h	785	0	0	955	0	0	438	0	0	433	0	0
V/C Ratio(X)	0.31	0.00	0.00	0.54	0.00	0.00	0.44	0.00	0.00	0.57	0.00	0.00
Avail Cap(c_a), veh/h	785	0	0	955	0	0	624	0	0	610	0	0
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.8	0.0	0.0	7.3	0.0	0.0	17.3	0.0	0.0	18.1	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	2.2	0.0	0.0	0.7	0.0	0.0	1.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	1.5	0.0	0.0	3.9	0.0	0.0	2.0	0.0	0.0	2.8	0.0	0.0
Lane Grp Delay (d), s/veh	6.9	0.0	0.0	9.5	0.0	0.0	18.0	0.0	0.0	19.3	0.0	0.0
Lane Grp LOS	A			A			B			B		
Approach Vol, veh/h		245			519			191			246	
Approach Delay, s/veh		6.9			9.5			18.0			19.3	
Approach LOS		A			A			B			B	
Timer												
Assigned Phs		6			2			4			8	
Phs Duration (G+Y+Rc), s		35.0			35.0			17.9			17.9	
Change Period (Y+Rc), s		5.0			5.0			5.0			5.0	
Max Green Setting (Gmax), s		30.0			30.0			20.0			20.0	
Max Q Clear Time (g_c+I1), s		6.3			12.9			7.9			10.4	
Green Ext Time (p_c), s		2.8			2.6			1.3			1.2	
Intersection Summary												
HCM 2010 Ctrl Delay			12.3									
HCM 2010 LOS			B									
Notes												

Intersection	
Intersection Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	28	228	417	6	3	23
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	31	256	469	7	3	26
Number of Lanes	0	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	480	0	-	0	796	482
Stage 1	-	-	-	-	477	-
Stage 2	-	-	-	-	319	-
Follow-up Headway	2.209	-	-	-	3.509	3.309
Pot Capacity-1 Maneuver	1088	-	-	-	357	586
Stage 1	-	-	-	-	626	-
Stage 2	-	-	-	-	739	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1083	-	-	-	342	581
Mov Capacity-2 Maneuver	-	-	-	-	342	-
Stage 1	-	-	-	-	623	-
Stage 2	-	-	-	-	712	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	12.1
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1083	-	-	-	538
HCM Control Delay, s	8.424	0	-	-	12.1
HCM Lane V/C Ratio	0.03	-	-	-	0.05
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.1	-	-	-	0.2

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	17	244	26	6	429	4	2	1	1	11	0	3
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	19	274	29	7	482	4	2	1	1	12	0	3
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	492	0	0	308	0	0	836	837	299	836	850	494
Stage 1	-	-	-	-	-	-	332	332	-	503	503	-
Stage 2	-	-	-	-	-	-	504	505	-	333	347	-
Follow-up Headway	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Capacity-1 Maneuver	1077	-	-	1258	-	-	288	304	743	288	299	577
Stage 1	-	-	-	-	-	-	684	646	-	553	543	-
Stage 2	-	-	-	-	-	-	552	542	-	683	637	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1073	-	-	1253	-	-	278	293	737	278	288	572
Mov Capacity-2 Maneuver	-	-	-	-	-	-	278	293	-	278	288	-
Stage 1	-	-	-	-	-	-	667	630	-	539	536	-
Stage 2	-	-	-	-	-	-	542	535	-	664	621	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	15.9	17.2
HCM LOS	-	-	C	C

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	334	1073	-	-	1253	-	-	312
HCM Control Delay, s	15.9	8.416	0	-	7.889	0	-	17.2
HCM Lane V/C Ratio	0.01	0.02	-	-	0.01	-	-	0.05
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th-tile Q, veh	0.0	0.1	-	-	0.0	-	-	0.2

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.1

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	210	96	82	400	98	68
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	236	108	92	449	110	76
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow All	0	0	349	0	929	300
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	634	-
Follow-up Headway	-	-	2.209	-	3.509	3.309
Pot Capacity-1 Maneuver	-	-	1215	-	298	742
Stage 1	-	-	-	-	758	-
Stage 2	-	-	-	-	530	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1210	-	266	736
Mov Capacity-2 Maneuver	-	-	-	-	266	-
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	474	-

Approach	SE	NW	NE
HCM Control Delay, s	0	1.4	25.3
HCM LOS	-	-	D

Minor Lane / Major Mvmt	NELn1	NWL	NWT	SET	SER
Cap, veh/h	360	1210	-	-	-
HCM Control Delay, s	25.3	8.22	0	-	-
HCM Lane V/C Ratio	0.52	0.08	-	-	-
HCM Lane LOS	D	A	A	-	-
HCM 95th-tile Q, veh	2.9	0.2	-	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	3	0	4	6	0	10	8	298	2	17	502	6
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	3	0	4	7	0	11	9	335	2	19	564	7
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Minor 1			Minor 2			Major 1			Major 2		
Conflicting Flow All	975	973	346	972	971	577	576	0	0	342	0	0
Stage 1	359	359	-	611	611	-	-	-	-	-	-	-
Stage 2	616	614	-	361	360	-	-	-	-	-	-	-
Follow-up Headway	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Capacity-1 Maneuver	232	253	699	233	254	518	1002	-	-	1223	-	-
Stage 1	661	629	-	483	486	-	-	-	-	-	-	-
Stage 2	480	484	-	659	628	-	-	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	0	0	0	0	-	-	0	-	-
Mov Capacity-1 Maneuver	219	242	693	224	243	514	998	-	-	1218	-	-
Mov Capacity-2 Maneuver	219	242	-	224	243	-	-	-	-	-	-	-
Stage 1	651	619	-	476	473	-	-	-	-	-	-	-
Stage 2	457	471	-	645	619	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	15.2	16	0.2	0.3
HCM LOS	C	C	-	-

Minor Lane / Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	SEL	SET	SER
Cap, veh/h	1218	-	-	360	346	998	-	-
HCM Control Delay, s	8.003	0	-	15.2	16	8.64	0	-
HCM Lane V/C Ratio	0.02	-	-	0.02	0.05	0.01	-	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th-tile Q, veh	0.0	-	-	0.1	0.2	0.0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	60	173	24	93	148	92	32	169	95	155	103	66
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.95	0.98		0.94	0.98		0.94
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	169.3	169.3	169.3	169.3	169.3	169.3	164.2	164.2	164.2	174.4	174.4	174.4
Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Cap, veh/h	208	546	71	237	353	196	96	307	159	237	143	75
Arrive On Green	0.50	0.50	0.50	0.50	0.50	0.50	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	267	1089	141	318	704	390	87	927	480	448	433	225
Grp Volume(v), veh/h	265	0	0	344	0	0	305	0	0	334	0	0
Grp Sat Flow(s),veh/h/ln	1497	0	0	1413	0	0	1494	0	0	1106	0	0
Q Serve(g_s), s	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	7.6	0.0	0.0
Cycle Q Clear(g_c), s	5.7	0.0	0.0	8.7	0.0	0.0	10.1	0.0	0.0	17.7	0.0	0.0
Prop In Lane	0.23		0.09	0.28		0.28	0.11		0.32	0.48		0.20
Lane Grp Cap(c), veh/h	826	0	0	786	0	0	561	0	0	455	0	0
V/C Ratio(X)	0.32	0.00	0.00	0.44	0.00	0.00	0.54	0.00	0.00	0.73	0.00	0.00
Avail Cap(c_a), veh/h	826	0	0	786	0	0	566	0	0	460	0	0
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.8	0.0	0.0	9.5	0.0	0.0	16.7	0.0	0.0	19.5	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	1.8	0.0	0.0	1.1	0.0	0.0	5.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	2.2	0.0	0.0	3.2	0.0	0.0	3.6	0.0	0.0	5.1	0.0	0.0
Lane Grp Delay (d), s/veh	9.9	0.0	0.0	11.3	0.0	0.0	17.8	0.0	0.0	25.4	0.0	0.0
Lane Grp LOS	A			B			B			C		
Approach Vol, veh/h		265			344			305			334	
Approach Delay, s/veh		9.9			11.3			17.8			25.4	
Approach LOS		A			B			B			C	

Timer												
Assigned Phs		6			2			4			8	
Phs Duration (G+Y+Rc), s		35.0			35.0			24.8			24.8	
Change Period (Y+Rc), s		5.0			5.0			5.0			5.0	
Max Green Setting (Gmax), s		30.0			30.0			20.0			20.0	
Max Q Clear Time (g_c+I1), s		7.7			10.7			12.1			19.7	
Green Ext Time (p_c), s		2.1			2.1			1.6			0.1	

Intersection Summary												
HCM 2010 Ctrl Delay			16.4									
HCM 2010 LOS			B									

Notes

Intersection	
Intersection Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	18	295	271	7	5	13
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	19	307	282	7	5	14
Number of Lanes	0	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	295	0	-	0	636	296
Stage 1	-	-	-	-	291	-
Stage 2	-	-	-	-	345	-
Follow-up Headway	2.209	-	-	-	3.509	3.309
Pot Capacity-1 Maneuver	1272	-	-	-	444	746
Stage 1	-	-	-	-	761	-
Stage 2	-	-	-	-	719	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1267	-	-	-	432	740
Mov Capacity-2 Maneuver	-	-	-	-	432	-
Stage 1	-	-	-	-	758	-
Stage 2	-	-	-	-	703	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	11
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1267	-	-	-	618
HCM Control Delay, s	7.884	0	-	-	11
HCM Lane V/C Ratio	0.02	-	-	-	0.03
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.0	-	-	-	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	8	304	1	20	263	2	0	0	1	8	0	4
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	9	323	1	21	280	2	0	0	1	9	0	4
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	287	0	0	329	0	0	677	675	334	674	674	291
Stage 1	-	-	-	-	-	-	346	346	-	328	328	-
Stage 2	-	-	-	-	-	-	331	329	-	346	346	-
Follow-up Headway	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Capacity-1 Maneuver	1281	-	-	1236	-	-	368	377	710	370	377	751
Stage 1	-	-	-	-	-	-	672	637	-	687	649	-
Stage 2	-	-	-	-	-	-	684	648	-	672	637	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1276	-	-	1231	-	-	355	363	704	358	363	745
Mov Capacity-2 Maneuver	-	-	-	-	-	-	355	363	-	358	363	-
Stage 1	-	-	-	-	-	-	663	629	-	678	633	-
Stage 2	-	-	-	-	-	-	664	632	-	662	629	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.6	10.1	13.6
HCM LOS	-	-	B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	704	1276	-	-	1231	-	-	433
HCM Control Delay, s	10.1	7.84	0	-	7.976	0	-	13.6
HCM Lane V/C Ratio	0.00	0.01	-	-	0.02	-	-	0.03
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th-tile Q, veh	0.0	0.0	-	-	0.1	-	-	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.8

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	334	72	37	247	59	63
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	363	78	40	268	64	68
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow All	0	0	446	0	756	412
Stage 1	-	-	-	-	407	-
Stage 2	-	-	-	-	349	-
Follow-up Headway	-	-	2.209	-	3.509	3.309
Pot Capacity-1 Maneuver	-	-	1120	-	377	642
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	716	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1115	-	358	637
Mov Capacity-2 Maneuver	-	-	-	-	358	-
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	683	-

Approach	SE	NW	NE
HCM Control Delay, s	0	1.1	15.9
HCM LOS	-	-	C

Minor Lane / Major Mvmt	NELn1	NWL	NWT	SET	SER
Cap, veh/h	463	1115	-	-	-
HCM Control Delay, s	15.9	8.349	0	-	-
HCM Lane V/C Ratio	0.29	0.04	-	-	-
HCM Lane LOS	C	A	A	-	-
HCM 95th-tile Q, veh	1.2	0.1	-	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	3	0	7	5	0	9	3	423	1	4	330	3
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	3	0	7	5	0	9	3	436	1	4	340	3
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Minor 1			Minor 2			Major 1			Major 2		
Conflicting Flow All	808	805	447	806	803	352	348	0	0	442	0	0
Stage 1	448	448	-	355	355	-	-	-	-	-	-	-
Stage 2	360	357	-	451	448	-	-	-	-	-	-	-
Follow-up Headway	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Capacity-1 Maneuver	301	317	614	301	318	694	1216	-	-	1123	-	-
Stage 1	592	575	-	664	631	-	-	-	-	-	-	-
Stage 2	660	630	-	590	575	-	-	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	0	0	0	0	-	-	0	-	-
Mov Capacity-1 Maneuver	293	312	609	293	313	688	1211	-	-	1118	-	-
Mov Capacity-2 Maneuver	293	312	-	293	313	-	-	-	-	-	-	-
Stage 1	588	571	-	659	626	-	-	-	-	-	-	-
Stage 2	646	625	-	579	571	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	13	13	0.1	0.1
HCM LOS	B	B	-	-

Minor Lane / Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	SEL	SET	SER
Cap, veh/h	1118	-	-	460	464	1211	-	-
HCM Control Delay, s	8.232	0	-	13	13	7.98	0	-
HCM Lane V/C Ratio	0.00	-	-	0.02	0.03	0.00	-	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th-tile Q, veh	0.0	-	-	0.1	0.1	0.0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	110	298	19	46	145	66	18	40	60	97	68	98
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.95	0.99		0.95	0.98		0.93	0.97		0.93
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	161.3	161.3	161.3	161.3	161.3	161.3	156.5	156.5	156.5	166.2	166.2	166.2
Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Cap, veh/h	238	582	34	170	474	196	102	155	190	202	121	138
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	284	1064	62	170	867	359	98	571	699	415	445	510
Grp Volume(v), veh/h	502	0	0	303	0	0	139	0	0	309	0	0
Grp Sat Flow(s),veh/h/ln	1411	0	0	1396	0	0	1368	0	0	1370	0	0
Q Serve(g_s), s	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	0.0	0.0
Cycle Q Clear(g_c), s	12.8	0.0	0.0	6.2	0.0	0.0	4.5	0.0	0.0	11.4	0.0	0.0
Prop In Lane	0.26		0.04	0.18		0.26	0.15		0.51	0.37		0.37
Lane Grp Cap(c), veh/h	853	0	0	840	0	0	447	0	0	461	0	0
V/C Ratio(X)	0.59	0.00	0.00	0.36	0.00	0.00	0.31	0.00	0.00	0.67	0.00	0.00
Avail Cap(c_a), veh/h	853	0	0	840	0	0	565	0	0	581	0	0
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.4	0.0	0.0	7.0	0.0	0.0	16.2	0.0	0.0	18.5	0.0	0.0
Incr Delay (d2), s/veh	3.0	0.0	0.0	1.2	0.0	0.0	0.4	0.0	0.0	2.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	4.3	0.0	0.0	2.1	0.0	0.0	1.4	0.0	0.0	3.9	0.0	0.0
Lane Grp Delay (d), s/veh	11.3	0.0	0.0	8.2	0.0	0.0	16.6	0.0	0.0	20.6	0.0	0.0
Lane Grp LOS	B			A			B			C		
Approach Vol, veh/h		502			303			139			309	
Approach Delay, s/veh		11.3			8.2			16.6			20.6	
Approach LOS		B			A			B			C	

Timer												
Assigned Phs		6			2			4			8	
Phs Duration (G+Y+Rc), s		35.0			35.0			19.9			19.9	
Change Period (Y+Rc), s		5.0			5.0			5.0			5.0	
Max Green Setting (Gmax), s		30.0			30.0			20.0			20.0	
Max Q Clear Time (g_c+I1), s		14.8			8.2			6.5			13.4	
Green Ext Time (p_c), s		2.7			2.9			1.4			1.0	

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Notes

Intersection	
Intersection Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	13	326	185	2	12	31
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	14	354	201	2	13	34
Number of Lanes	0	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	208	0	-	0	590	212
Stage 1	-	-	-	-	207	-
Stage 2	-	-	-	-	383	-
Follow-up Headway	2.254	-	-	-	3.554	3.354
Pot Capacity-1 Maneuver	1339	-	-	-	464	818
Stage 1	-	-	-	-	818	-
Stage 2	-	-	-	-	681	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1333	-	-	-	454	811
Mov Capacity-2 Maneuver	-	-	-	-	454	-
Stage 1	-	-	-	-	815	-
Stage 2	-	-	-	-	669	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	10.8
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1333	-	-	-	665
HCM Control Delay, s	7.73	0	-	-	10.8
HCM Lane V/C Ratio	0.01	-	-	-	0.07
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.0	-	-	-	0.2

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	12	327	0	4	207	5	2	0	3	9	0	6
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	14	385	0	5	244	6	2	0	4	11	0	7
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	254	0	0	390	0	0	682	682	395	681	679	256
Stage 1	-	-	-	-	-	-	418	418	-	261	261	-
Stage 2	-	-	-	-	-	-	264	264	-	420	418	-
Follow-up Headway	2.254	-	-	2.254	-	-	3.554	4.054	3.354	3.554	4.054	3.354
Pot Capacity-1 Maneuver	1288	-	-	1147	-	-	359	367	646	359	369	773
Stage 1	-	-	-	-	-	-	605	584	-	735	685	-
Stage 2	-	-	-	-	-	-	732	683	-	603	584	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1283	-	-	1142	-	-	348	357	641	349	359	767
Mov Capacity-2 Maneuver	-	-	-	-	-	-	348	357	-	349	359	-
Stage 1	-	-	-	-	-	-	594	573	-	722	679	-
Stage 2	-	-	-	-	-	-	719	677	-	589	573	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.2	12.6	13.4
HCM LOS	-	-	B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	480	1283	-	-	1142	-	-	446
HCM Control Delay, s	12.6	7.837	0	-	8.165	0	-	13.4
HCM Lane V/C Ratio	0.01	0.01	-	-	0.00	-	-	0.04
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th-tile Q, veh	0.0	0.0	-	-	0.0	-	-	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.1

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	347	29	17	147	48	38
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	390	33	19	165	54	43
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow All	0	0	427	0	614	416
Stage 1	-	-	-	-	411	-
Stage 2	-	-	-	-	203	-
Follow-up Headway	-	-	2.254	-	3.554	3.354
Pot Capacity-1 Maneuver	-	-	1111	-	449	628
Stage 1	-	-	-	-	661	-
Stage 2	-	-	-	-	822	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1106	-	437	623
Mov Capacity-2 Maneuver	-	-	-	-	437	-
Stage 1	-	-	-	-	658	-
Stage 2	-	-	-	-	803	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0.9	13.9
HCM LOS	-	-	B

Minor Lane / Major Mvmt	NELn1	NWL	NWT	SET	SER
Cap, veh/h	503	1106	-	-	-
HCM Control Delay, s	13.9	8.312	0	-	-
HCM Lane V/C Ratio	0.19	0.02	-	-	-
HCM Lane LOS	B	A	A	-	-
HCM 95th-tile Q, veh	0.7	0.1	-	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	8	2	4	17	1	4	15	427	4	2	226	6
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	9	2	4	18	1	4	16	459	4	2	243	6
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Minor 1			Minor 2			Major 1			Major 2		
Conflicting Flow All	757	758	471	758	757	256	254	0	0	468	0	0
Stage 1	499	499	-	256	256	-	-	-	-	-	-	-
Stage 2	258	259	-	502	501	-	-	-	-	-	-	-
Follow-up Headway	3.554	4.054	3.354	3.554	4.054	3.354	2.254	-	-	2.254	-	-
Pot Capacity-1 Maneuver	319	332	585	319	332	773	1288	-	-	1073	-	-
Stage 1	546	537	-	740	688	-	-	-	-	-	-	-
Stage 2	738	686	-	544	536	-	-	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	0	0	0	0	-	-	0	-	-
Mov Capacity-1 Maneuver	309	323	580	308	323	767	1283	-	-	1069	-	-
Mov Capacity-2 Maneuver	309	323	-	308	323	-	-	-	-	-	-	-
Stage 1	534	526	-	724	684	-	-	-	-	-	-	-
Stage 2	728	682	-	526	525	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	15.5	16.2	0.3	0.1
HCM LOS	C	C	-	-

Minor Lane / Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	SEL	SET	SER
Cap, veh/h	1069	-	-	359	346	1283	-	-
HCM Control Delay, s	8.374	0	-	15.5	16.2	7.842	0	-
HCM Lane V/C Ratio	0.00	-	-	0.04	0.07	0.01	-	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th-tile Q, veh	0.0	-	-	0.1	0.2	0.0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	85	148	9	77	360	96	23	88	73	86	69	71
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.96	0.98		0.96	0.97		0.92	0.97		0.92
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	169.3	169.3	169.3	169.3	169.3	169.3	164.2	164.2	164.2	174.4	174.4	174.4
Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Cap, veh/h	286	453	24	162	631	157	99	197	145	204	128	102
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	344	802	42	149	1118	278	93	796	586	439	519	413
Grp Volume(v), veh/h	254	0	0	561	0	0	194	0	0	249	0	0
Grp Sat Flow(s),veh/h/ln	1188	0	0	1545	0	0	1475	0	0	1371	0	0
Q Serve(g_s), s	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0
Cycle Q Clear(g_c), s	4.6	0.0	0.0	12.5	0.0	0.0	6.0	0.0	0.0	8.7	0.0	0.0
Prop In Lane	0.35		0.04	0.14		0.18	0.12		0.40	0.41		0.30
Lane Grp Cap(c), veh/h	762	0	0	950	0	0	441	0	0	434	0	0
V/C Ratio(X)	0.33	0.00	0.00	0.59	0.00	0.00	0.44	0.00	0.00	0.57	0.00	0.00
Avail Cap(c_a), veh/h	762	0	0	950	0	0	621	0	0	605	0	0
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.9	0.0	0.0	7.7	0.0	0.0	17.3	0.0	0.0	18.2	0.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	0.0	2.7	0.0	0.0	0.7	0.0	0.0	1.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	1.7	0.0	0.0	4.6	0.0	0.0	2.1	0.0	0.0	2.8	0.0	0.0
Lane Grp Delay (d), s/veh	7.1	0.0	0.0	10.4	0.0	0.0	18.0	0.0	0.0	19.4	0.0	0.0
Lane Grp LOS	A			B			B			B		
Approach Vol, veh/h		254			561			194			249	
Approach Delay, s/veh		7.1			10.4			18.0			19.4	
Approach LOS		A			B			B			B	

Timer												
Assigned Phs		6			2			4			8	
Phs Duration (G+Y+Rc), s		35.0			35.0			18.1			18.1	
Change Period (Y+Rc), s		5.0			5.0			5.0			5.0	
Max Green Setting (Gmax), s		30.0			30.0			20.0			20.0	
Max Q Clear Time (g_c+I1), s		6.6			14.5			8.0			10.7	
Green Ext Time (p_c), s		3.0			2.8			1.3			1.2	

Intersection Summary												
HCM 2010 Ctrl Delay			12.7									
HCM 2010 LOS			B									

Notes

Intersection	
Intersection Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	28	254	440	6	3	23
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	31	285	494	7	3	26
Number of Lanes	0	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	506	0	-	0	851	508
Stage 1	-	-	-	-	503	-
Stage 2	-	-	-	-	348	-
Follow-up Headway	2.209	-	-	-	3.509	3.309
Pot Capacity-1 Maneuver	1064	-	-	-	332	567
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	717	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1060	-	-	-	318	562
Mov Capacity-2 Maneuver	-	-	-	-	318	-
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	689	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	12.4
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1060	-	-	-	516
HCM Control Delay, s	8.5	0	-	-	12.4
HCM Lane V/C Ratio	0.03	-	-	-	0.06
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.1	-	-	-	0.2

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	17	269	26	6	451	5	2	1	1	12	0	3
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	19	302	29	7	507	6	2	1	1	13	0	3
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	517	0	0	336	0	0	890	891	327	889	903	520
Stage 1	-	-	-	-	-	-	360	360	-	528	528	-
Stage 2	-	-	-	-	-	-	530	531	-	361	375	-
Follow-up Headway	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Capacity-1 Maneuver	1054	-	-	1229	-	-	265	283	717	265	278	558
Stage 1	-	-	-	-	-	-	660	628	-	536	529	-
Stage 2	-	-	-	-	-	-	534	528	-	659	619	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1050	-	-	1224	-	-	255	272	711	256	267	553
Mov Capacity-2 Maneuver	-	-	-	-	-	-	255	272	-	256	267	-
Stage 1	-	-	-	-	-	-	643	612	-	522	523	-
Stage 2	-	-	-	-	-	-	524	522	-	640	603	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	16.8	18.3
HCM LOS	-	-	C	C

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	309	1050	-	-	1224	-	-	287
HCM Control Delay, s	16.8	8.492	0	-	7.957	0	-	18.3
HCM Lane V/C Ratio	0.02	0.02	-	-	0.01	-	-	0.06
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th-tile Q, veh	0.0	0.1	-	-	0.0	-	-	0.2

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.4

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	224	96	82	439	98	68
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	252	108	92	493	110	76
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow All	0	0	365	0	989	316
Stage 1	-	-	-	-	311	-
Stage 2	-	-	-	-	678	-
Follow-up Headway	-	-	2.209	-	3.509	3.309
Pot Capacity-1 Maneuver	-	-	1199	-	275	727
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	506	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1194	-	244	721
Mov Capacity-2 Maneuver	-	-	-	-	244	-
Stage 1	-	-	-	-	742	-
Stage 2	-	-	-	-	450	-

Approach	SE	NW	NE
HCM Control Delay, s	0	1.3	28.4
HCM LOS	-	-	D

Minor Lane / Major Mvmt	NELn1	NWL	NWT	SET	SER
Cap, veh/h	335	1194	-	-	-
HCM Control Delay, s	28.4	8.267	0	-	-
HCM Lane V/C Ratio	0.56	0.08	-	-	-
HCM Lane LOS	D	A	A	-	-
HCM 95th-tile Q, veh	3.2	0.3	-	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	3	0	4	6	0	11	9	312	2	17	541	6
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	3	0	4	7	0	12	10	351	2	19	608	7
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Minor 1			Minor 2			Major 1			Major 2		
Conflicting Flow All	1038	1035	362	1033	1032	621	620	0	0	358	0	0
Stage 1	377	377	-	654	654	-	-	-	-	-	-	-
Stage 2	661	658	-	379	378	-	-	-	-	-	-	-
Follow-up Headway	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Capacity-1 Maneuver	210	233	685	212	234	489	965	-	-	1206	-	-
Stage 1	647	618	-	457	465	-	-	-	-	-	-	-
Stage 2	453	463	-	645	617	-	-	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	0	0	0	0	-	-	0	-	-
Mov Capacity-1 Maneuver	197	223	679	203	224	485	961	-	-	1201	-	-
Mov Capacity-2 Maneuver	197	223	-	203	224	-	-	-	-	-	-	-
Stage 1	636	607	-	449	452	-	-	-	-	-	-	-
Stage 2	429	450	-	630	606	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	16.1	16.8	0.2	0.2
HCM LOS	C	C	-	-

Minor Lane / Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	SEL	SET	SER
Cap, veh/h	1201	-	-	331	325	961	-	-
HCM Control Delay, s	8.046	0	-	16.1	16.8	8.786	0	-
HCM Lane V/C Ratio	0.02	-	-	0.02	0.06	0.01	-	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th-tile Q, veh	0.0	-	-	0.1	0.2	0.0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	60	182	24	96	154	96	32	169	99	160	103	66
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.95	0.98		0.95	0.98		0.94	0.98		0.94
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	169.3	169.3	169.3	169.3	169.3	169.3	164.2	164.2	164.2	174.4	174.4	174.4
Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Cap, veh/h	201	555	68	235	353	196	95	305	164	239	139	73
Arrive On Green	0.50	0.50	0.50	0.50	0.50	0.50	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	255	1110	137	316	705	392	86	915	493	450	418	218
Grp Volume(v), veh/h	275	0	0	357	0	0	309	0	0	339	0	0
Grp Sat Flow(s),veh/h/ln	1502	0	0	1413	0	0	1494	0	0	1086	0	0
Q Serve(g_s), s	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	8.2	0.0	0.0
Cycle Q Clear(g_c), s	6.0	0.0	0.0	9.2	0.0	0.0	10.3	0.0	0.0	18.5	0.0	0.0
Prop In Lane	0.23		0.09	0.28		0.28	0.11		0.33	0.49		0.20
Lane Grp Cap(c), veh/h	824	0	0	783	0	0	565	0	0	451	0	0
V/C Ratio(X)	0.33	0.00	0.00	0.46	0.00	0.00	0.55	0.00	0.00	0.75	0.00	0.00
Avail Cap(c_a), veh/h	824	0	0	783	0	0	565	0	0	451	0	0
HCM Platoon Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.0	0.0	0.0	9.7	0.0	0.0	16.8	0.0	0.0	19.8	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	1.9	0.0	0.0	1.1	0.0	0.0	6.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	2.3	0.0	0.0	3.3	0.0	0.0	3.7	0.0	0.0	5.5	0.0	0.0
Lane Grp Delay (d), s/veh	10.1	0.0	0.0	11.6	0.0	0.0	17.9	0.0	0.0	26.7	0.0	0.0
Lane Grp LOS	B			B			B			C		
Approach Vol, veh/h		275			357			309			339	
Approach Delay, s/veh		10.1			11.6			17.9			26.7	
Approach LOS		B			B			B			C	

Timer												
Assigned Phs		6			2			4			8	
Phs Duration (G+Y+Rc), s		35.0			35.0			25.0			25.0	
Change Period (Y+Rc), s		5.0			5.0			5.0			5.0	
Max Green Setting (Gmax), s		30.0			30.0			20.0			20.0	
Max Q Clear Time (g_c+I1), s		8.0			11.2			12.3			20.5	
Green Ext Time (p_c), s		2.2			2.1			1.6			0.0	

Intersection Summary												
HCM 2010 Ctrl Delay			16.8									
HCM 2010 LOS			B									

Notes

Intersection	
Intersection Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	18	311	286	7	5	13
Conflicting Peds, #/hr	5	0	0	5	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	19	324	298	7	5	14
Number of Lanes	0	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	310	0	-	0	668	312
Stage 1	-	-	-	-	307	-
Stage 2	-	-	-	-	361	-
Follow-up Headway	2.209	-	-	-	3.509	3.309
Pot Capacity-1 Maneuver	1256	-	-	-	425	731
Stage 1	-	-	-	-	748	-
Stage 2	-	-	-	-	707	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1251	-	-	-	413	725
Mov Capacity-2 Maneuver	-	-	-	-	413	-
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	691	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	11.2
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1251	-	-	-	599
HCM Control Delay, s	7.921	0	-	-	11.2
HCM Lane V/C Ratio	0.02	-	-	-	0.03
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.0	-	-	-	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	8	319	1	20	257	3	0	0	1	9	0	4
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	9	339	1	21	273	3	0	0	1	10	0	4
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	282	0	0	345	0	0	687	686	350	685	685	285
Stage 1	-	-	-	-	-	-	362	362	-	323	323	-
Stage 2	-	-	-	-	-	-	325	324	-	362	362	-
Follow-up Headway	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Capacity-1 Maneuver	1286	-	-	1220	-	-	362	371	696	364	372	756
Stage 1	-	-	-	-	-	-	659	627	-	691	652	-
Stage 2	-	-	-	-	-	-	690	651	-	659	627	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1281	-	-	1215	-	-	349	357	690	352	358	750
Mov Capacity-2 Maneuver	-	-	-	-	-	-	349	357	-	352	358	-
Stage 1	-	-	-	-	-	-	650	619	-	682	636	-
Stage 2	-	-	-	-	-	-	670	635	-	649	619	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.6	10.2	13.8
HCM LOS	-	-	B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	690	1281	-	-	1215	-	-	421
HCM Control Delay, s	10.2	7.829	0	-	8.016	0	-	13.8
HCM Lane V/C Ratio	0.00	0.01	-	-	0.02	-	-	0.03
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th-tile Q, veh	0.0	0.0	-	-	0.1	-	-	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.8

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	351	72	37	259	59	63
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	382	78	40	282	64	68
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow All	0	0	465	0	788	431
Stage 1	-	-	-	-	426	-
Stage 2	-	-	-	-	362	-
Follow-up Headway	-	-	2.209	-	3.509	3.309
Pot Capacity-1 Maneuver	-	-	1102	-	361	626
Stage 1	-	-	-	-	661	-
Stage 2	-	-	-	-	707	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1097	-	343	621
Mov Capacity-2 Maneuver	-	-	-	-	343	-
Stage 1	-	-	-	-	658	-
Stage 2	-	-	-	-	674	-

Approach	SE	NW	NE
HCM Control Delay, s	0	1.1	16.5
HCM LOS	-	-	C

Minor Lane / Major Mvmt	NELn1	NWL	NWT	SET	SER
Cap, veh/h	446	1097	-	-	-
HCM Control Delay, s	16.5	8.407	0	-	-
HCM Lane V/C Ratio	0.30	0.04	-	-	-
HCM Lane LOS	C	A	A	-	-
HCM 95th-tile Q, veh	1.2	0.1	-	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	3	0	7	5	0	10	4	440	1	4	342	3
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	3	0	7	5	0	10	4	454	1	4	353	3
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Minor 1			Minor 2			Major 1			Major 2		
Conflicting Flow All	840	836	464	838	835	364	361	0	0	460	0	0
Stage 1	467	467	-	367	367	-	-	-	-	-	-	-
Stage 2	373	369	-	471	468	-	-	-	-	-	-	-
Follow-up Headway	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Capacity-1 Maneuver	286	304	600	287	305	683	1203	-	-	1106	-	-
Stage 1	578	563	-	655	624	-	-	-	-	-	-	-
Stage 2	650	623	-	575	563	-	-	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	0	0	0	0	-	-	0	-	-
Mov Capacity-1 Maneuver	277	299	595	279	300	677	1198	-	-	1101	-	-
Mov Capacity-2 Maneuver	277	299	-	279	300	-	-	-	-	-	-	-
Stage 1	573	558	-	650	618	-	-	-	-	-	-	-
Stage 2	634	617	-	563	558	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	13.3	13.1	0.1	0.1
HCM LOS	B	B	-	-

Minor Lane / Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	SEL	SET	SER
Cap, veh/h	1101	-	-	443	459	1198	-	-
HCM Control Delay, s	8.282	0	-	13.3	13.1	8.015	0	-
HCM Lane V/C Ratio	0.00	-	-	0.02	0.03	0.00	-	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th-tile Q, veh	0.0	-	-	0.1	0.1	0.0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

ATTACHMENT E

Photo of
NYS Route 9, Paulding Avenue, and
Bank Street

Figure E-1: Paulding Avnue and Bank Street from NYS Route 9D
Butterfield
Village of Cold Spring, Putnam County, NY
Source: Tim Miller Associates, Inc.

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

ATTACHMENT F

Sight Lines

Attachment F
Existing Sight Distance

Stopping sight distance is the distance a vehicle would require to be able to stop on wet pavement to avoid a collision with a vehicle entering or in the traffic stream. Intersection sight distance provides an additional margin of safety above stopping sight distance when vehicles are entering the traffic stream. Passing sight distance is not an issue for this project as passing is prohibited in this section of NYS Route 9D.

Intersection sight distance is defined as the sight distance that is necessary for a vehicle to safely enter the traffic stream requiring only minor speed adjustments by vehicles in the traffic stream. The posted speed limit on NYS Route 9D in the vicinity of the Butterfield site area is 30 miles per hour.

The required sight distances vary as a function of vehicle traveling speed. Table F-1 shows the Stopping and Intersection Sight Distances recommended by the American Association of State Highway and Transportation Officials (AASHTO) for 30, 35, and 40 miles per hour.

Table F-1
Sight Distance Criteria

Speed (in miles/hour)	Stopping Sight Distance	Intersection Sight Distance for Turns	
		Left from Major Street*	(right/left) to Major Street*
30 (Posted)	200 feet	245 feet	290 feet/ 335 Feet
35	250 feet	285 feet	335 feet/ 390 Feet
40	350 feet	325 feet	385 feet/ 445 Feet

A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 6th ed., 2011.

* Major street is NYS Route 9D.

The sight distance measurements for each of the three Butterfield existing access locations on NYS Route 9D is shown in Table F-2. The existing accesses are at future access locations.

Sight distances are based on manual field measurements using 3.5 foot eye height of car driver and a 3.5 foot object height. Based on the NYS Route 9D westward down slope, object height is not a contributing factor to sight line limitations. Eye positioning from the minor street was based on 14.5 feet from the travel way. These heights and locations are consistent with AASHTO recommendations[1]. To accommodate truck driver eye heights of 7.6 feet trimming of lower branches on internal property trees should be reviewed during site design. It is recommended that some trimming be conducted prior to construction vehicles using access points.

[1] A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 6th ed., Chapter 9, 2011.

Table F-2 Sight Distances		
Location	**Estimated Sight Distance**	
	Unimproved	**Improved**
Eastern Driveway		
Looking east (left)	+600*	
Looking West (right)***	180	450
Center Driveway		
Looking east (left)	+700*	
Looking West (right)***	350	500
Western Driveway Lahey Pavilion		
Looking east (left)**	490	
Looking West (right)***	+600	
Based on November 25, 2013 manual field review.		
* Sight lines between eastbound and westbound NYS Route 9D vehicles reduce by 100 feet due to off-site vegetation.		
** Also applies to sight lines between eastbound and westbound NYS Route 9D vehicles.		
*** Eastbound trailing vehicle sight distance equal to or greater than improved value.		

The sight distances for vehicles trailing left turning vehicles from the major road are not constrained by interior vegetation and grading and are therefore greater than sight distances to the right including improvements in Table 2.

Sight lines between the left turning vehicles on NYS Route 9D and advancing vehicles is constrained by vegetation past Bank Street. This constraint applies to the center and eastern access and results in a decrease of sight lines by about 100 feet.

Recommended intersection sight distance can be achieved for all movements with interior site tree trimming, regrading of the knoll by the center access, and trimming vegetation at the eastern site access.

Figure F-1: Western Drive Looking West
Butterfield
Village of Cold Spring, Putnam County, NY
Source: Tim Miller Associates, Inc.

File 12008 Fig 1 11/17/13

Figure F-2: Eastern Driveway Looking East
Butterfield
Village of Cold Spring, Putnam County, NY
Source: Tim Miller Associates, Inc.

File 12008 Fig 1 11/17/13

Figure F-3: Center Driveway Looking West
Butterfield
Village of Cold Spring, Putnam County, NY
Source: Tim Miller Associates, Inc.

File 12008 Fig 1 11/17/13

Figure F-4: Center Driveway Looking East
Butterfield
Village of Cold Spring, Putnam County, NY
Source: Tim Miller Associates, Inc.

File 12008 Fig 1 11/17/13

Figure F-5: Eastern Driveway Looking West
Butterfield
Village of Cold Spring, Putnam County, NY
Source: Tim Miller Associates, Inc.

File 12008 Fig 1 11/17/13

Figure F-6: Eastern Driveway Looking East
Butterfield
Village of Cold Spring, Putnam County, NY
Source: Tim Miller Associates, Inc.

File 12008 Fig 1 11/17/13

ATTACHMENT G

Pedestrian and Bicycle Facilities Concept

N
W E
S

Medium Density Residential
Commercial
Mixed Use
Sidewalks
Crosswalks

Hedge
(blocks pedestrians)

Figure G-1: Pedestrian Facilities

Butterfield
Village of Cold Spring, Putnam County, NY
Scale: 1" = 250'
Base Map: NYS GIS Clearinghouse Orthoimagery, 2009

File 12008 03/06/12
JS/12008

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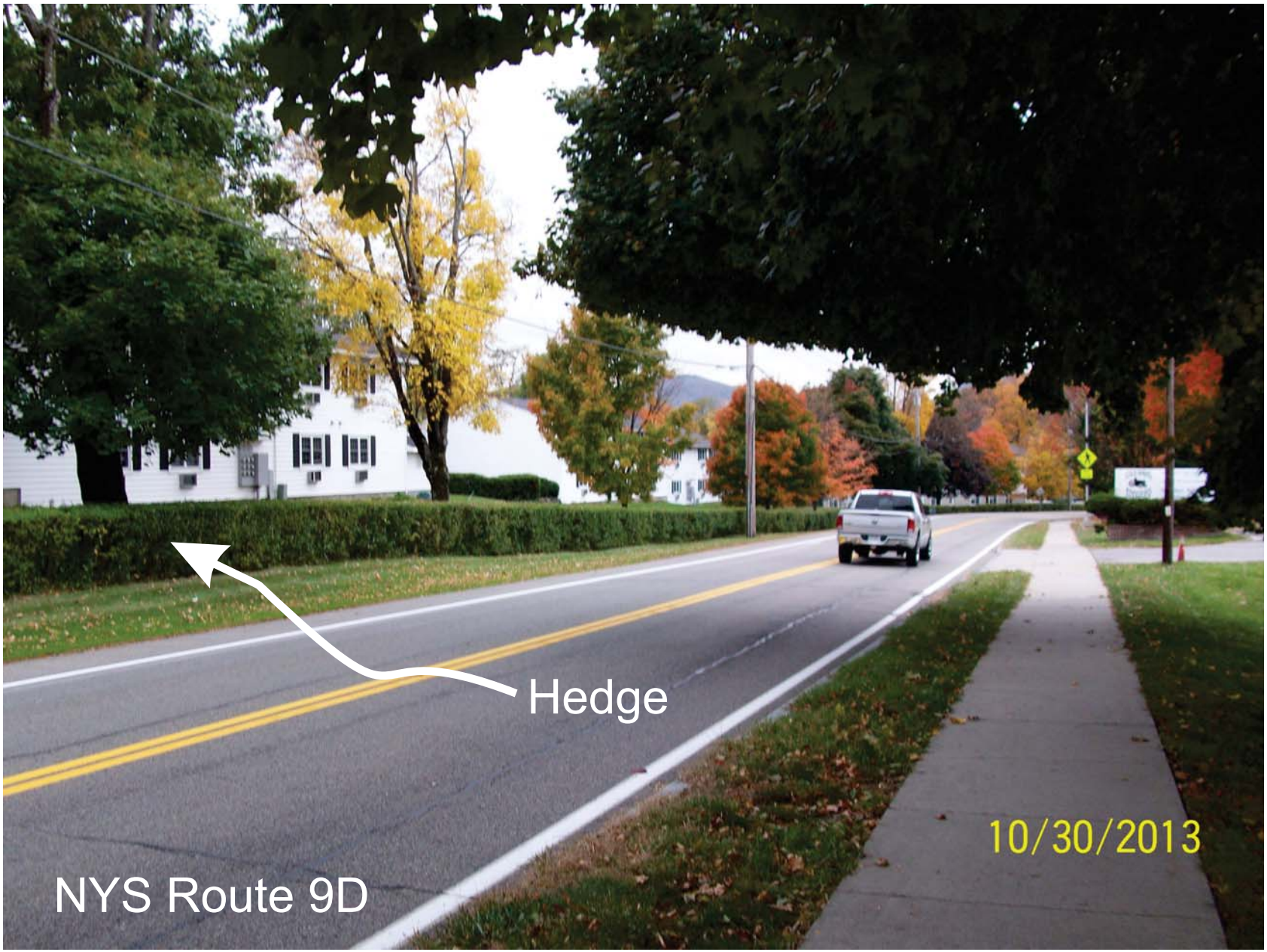
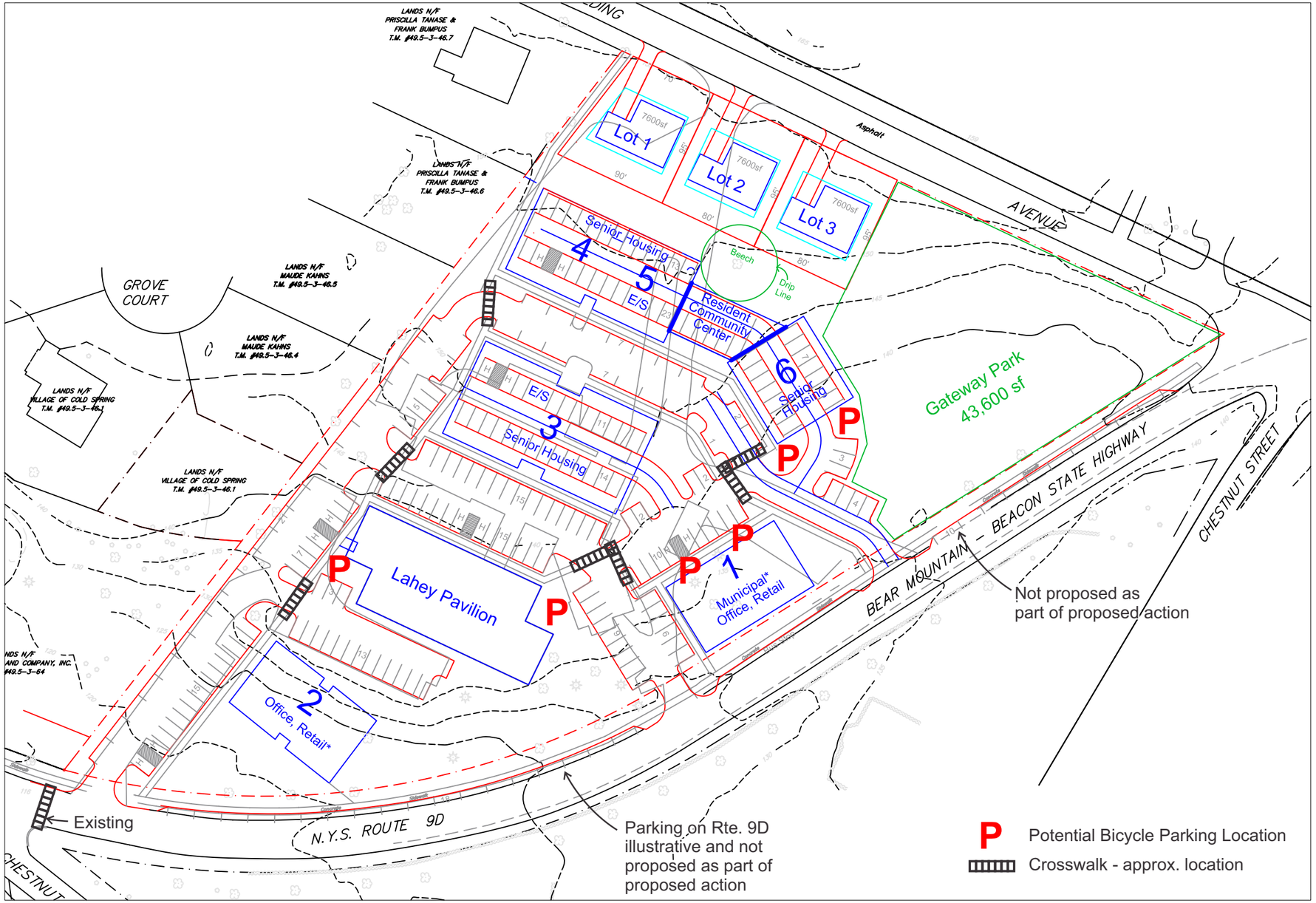


Project Site

Figure G-2: NYS Route 9D Hedge
Butterfield
Village of Cold Spring, Putnam County, NY
Source: Tim Miller Associates, Inc.

File 12008 Fig 1 11/17/13



Zoning Analysis

One Family	Required	Lot 1	Lot 2	Lot 3
Lot Area	7500 sf	7600 sf	7600 sf	7600sf
Lot Width	75 ft.	80 ft.	80 ft.	80 ft.
Lot Depth	75 ft.	95 ft.	95 ft.	95 ft.
Front Yard	20 ft.	20+ ft.	20+ ft.	20+ ft.
Side Yard	10 ft.	10+ ft.	10+ft.	10+ ft.
Rear Yard	20 ft.	20+ ft.	20+ ft.	20+ ft.
Coverage	30%	26.6%	26.6%	26.6%

Mixed Use	Required	Provided	
Lot Area	120,000 sf	225,434 +- sf	
Lot Width	200 ft.	590 +- ft.	
Lot Depth	200 ft.	355 +- ft.	
Front Yard*	0 ft.	0 ft.	
Side Yard	10 ft.	10 ft.2 Sides 25 ft.	152 ft.
Rear Yard	10 ft.	29 ft.	
Open Space	15%	47%	
Building Cover	25%	23.4%	

*For frontage on a NYS Highway

NOTES TO BUTTERFIELD CONCEPTUAL SITE PLAN

1. Building No. 1shall be approximately 15,000 sq. feet with dimensions of approximately 60' x 100'. It shall house one or more of the following uses: municipal, post office, first floor retail store space and/or first floor bank and/or first floor personal service shop not to exceed 6,000 sq. feet, and first or upper floor business and professional offices.
2. Building No. 2 shall be approximately 65' x 110'. It shall house one or more of the following uses: first floor retail store space and/or first floor bank and/or first floor personal service shop not to exceed 7000 sq. feet, and first or upper floor business and professional offices.
3. Building No. 3 shall be approximately 80' x 160'. It shall be senior citizen housing.
4. Building No. 4-5 shall be approximately 75' x 150'. It shall be senior citizen housing.
5. Building No. 6 shall be approximately 75' x 75'. It shall be senior citizen housing.
6. The existing building designated "Lahey Pavilion" shall continue to house a medical services use.
7. There shall be no more than three single family homes on the property as depicted.
8. The southeast corner of the property designated as "Gateway Park" shall remain a grassed area.
9. The large Copper Beech tree identified near the proposed three single family homes shall be preserved.
10. On site parking and internal circulation is an approximation based on the proposed location of the buildings and is subject to change.

* Retail space may include banks and personal service shops.

Notes:
1. All base data by others. No representation or warranty is express or implied as to accuracy of same.
2. The Concept Site Plan is based on a layout by Ray Curran dated 7-12. Please refer to Engineer and/ or Surveyor drawings for all final site plan and site features information.
3. This drawing is not for construction purposes.

Project Summary

Building 1. Municipal Office Building. 6,000 sf footprint, 15,000 sf total
(First Floor Retail not to exceed 6,000 sf)
Building 2. Retail/Office Building. 7,000 sf footprint, 17,500 sf total
(First Floor Retail not to exceed 7,000 sf)
Buildings 3-6 Senior Condominiums, 55 Units
Lots 1, 2, 3. Three (3) Single Family Homes

North

0' 40' 80'

Graphic Scale

Figure G-3: Pedestrian & Bicycle Facilities
Butterfield
Village of Cold Spring, Putnam County, NY
Source: Stephen Lopez, Landscape Architect, rev. 05-06-13
Scale: Graphic scale as shown

File 12008 11/05/13
JS/12008

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ATTACHMENT H

Background Growth

ATTACHMENT H
BACKGROUND GROWTH

This attachment documents the basis for the background growth of one percent per year used in Section 4.3.

The Village of Cold Spring is already densely populated reducing the prospects of large local growth. US Route 9 and the Taconic State Parkway insulate NYS Route 9D from regional traffic growth. There are train stations in Beacon and Garrison that insulate the area from regional growth in commuter rail traffic. The Beacon Railroad station was also recently provided with additional parking.

Historically the Cold Spring Planning Board has already accepted one percent background growth before and after this study.

The February 2, 2012 Sarroukas (FoodTown Plaza) letter report (Page 2) from John Collins Engineers, P.C. notes:

> "The Existing Traffic Volumes were projected to a 2013 design year utilizing a background growth factor. Based on Historical data, this growth factor was found to be in the order of 1%."

The May 15, 2012 traffic study for 33 Chestnut Street (page 3) notes:

> "Traffic in the study area is insulated from regional north-south traffic by US Route 9. Cold spring is the terminus of NYS Route 301 and therefore has little through east-west traffic. Given these considerations and the general regional growth in the recent past, the traffic growth rate used in this study is one percent per year."

The future regional growth has been studied in detail. The New York Metropolitan Transportation Council's (the area's Metropolitan Planning Organization) regional transportation plan (Plan 2040, adopted September 4, 2013) projects from 2014 to 2040 a ten percent growth (less than a half a percent per year) in daily auto trips and in the lower Hudson a 23.2 percent increase in vehicle miles traveled (slightly less than one percent per year).

This level of growth has been documented at the nearest toll bridge crossings over the Hudson River. The Bear Mountain Bridge and Newburgh-Beacon Bridge traffic provides insight into regional transportation and these locations are continuously counted. Over a four year period the Newburgh-Beacon Bridge traffic declined slightly and effectively 0.0 percent compounded annually and Bear Mountain Bridge has increase 5.7 percent (approximately 1.4 percent compounded annually) as shown in Table H-1. This lack of grow is not inconsistent with relative lack of growth at the Bridge Authority locations statewide as shown in Table H-2.

Table H-1 Local Bridge Traffic					
Locations (percent growth 2008-2012)	**Trips ***				
	2008	2009	2010	**2011**	**2012**
Newburgh-Beacon Bridge (0.0%)	24,734,276	24,633,486	25,111,916	24,728,728	24,682,092
Bear Mountain Bridge (5.7%)	6,506,630	6,510,442	6,578,902	6,606,168	6,875,130
From the New York State Bridge Authority downloaded October 23, 2013 from http://www.nysba.ny.gov/Index%20Page/General%20Info%20Files/Historical%20Traffic%20Classifications%20%282-12-13%29.pdf					
* Volumes are counted eastbound and doubled.					

Table H-2 All NYS Bridge Authority Bridge Traffic					
Locations	**Trip Growth ***				
	2008	2009	2010	**2011**	**2012**
All NYS Authority Bridges	-2.00%	0.42%	1.34%	-1.30	0.55%
From the New York State Bridge Authority downloaded October 23, 2013 from http://www.nysba.ny.gov/Index%20Page/General%20Info%20Files/Historical%20Traffic%20Classifications%20%282-12-13%29.pdf					
* Volumes are counted eastbound and doubled.					

ATTACHMENT I

Maximum Retail Alternative

ATTACHMENT I
MAXIMUM RETAIL ALTERNATIVE

The initial Traffic Analysis studied the conservative scenario of 7,000 square foot of retail space, 15,000 square foot of municipal office space, 10,500 square foot of general office space and 11,500 square foot of existing medical office space, in addition to 55 senior residential units and three single family houses.

The initial Traffic Analysis assumed that Building 2 would include 7,000 square feet of retail space on it's ground floor. However, The proposed zoning law allows for up to 13,000 square feet of retail space on site with a maximum of 7,000 square feet in any one building. This represents an increase of 6,000 square feet of retail space in Building 1, and a commensurate decrease in the amount of Municipal Office space to 9,000 square feet. The tables below evaluates the impact of the Maximum Retail Alternative Scenario and compares the trip generation of the Alternative to the previously proposed plan.

Table I-1 shows the rates of trip generation for the Maximum Retail Alternative of up to 13,000 square foot of retail are unchanged from the Proposed Action.

Table I-1
Maximum Retail Alternative
Butterfield Trip Rate Summary for New Uses

Land Uses {ITE Code}	Peak Hour Trip Rates					
	Weekday A.M.		Weekday P.M.		Saturday	
	IN (Trips/ Unit**)	OUT (Trips/ Unit**)	IN (Trips/ Unit**)	OUT (Trips/ Unit**)	IN (Trips/ Unit**)	OUT (Trips/ Unit**)
Single Family housing 3 residential dwelling units {210**}	0.188*	0.563*	0.630*	0.370*	0.502*	0.428*
Senior adult housing attached 55 dwelling units [252***}	0.092	0.178	0.232	0.198	0.181	0.137
General office space 10,500 square feet {710}[1]***	2.643	0.360	0.506	2.474	0.232*	0.198*
Retail 13,000 square feet {820}	0.595*	0.365*	1.781*	1.929*	2.506*	2.314*
Municipal offices 9,000**** square feet [2] {730}	0.835	0.375	0.375	0.835	0.038	0.084

* Average Rates.

** Units are dwelling units, or 1000 square feet gross floor area for municipal offices, general offices, and retail. Trip Generation, Institute of Transportation Engineers, 9th edition, Washington, DC, 2012.

*** Weekday data is based on the maximum rates which are about twice the average rates. Directional distribution is presumed evenly distributed on Saturday.

[1] Weekday p.m. rates doubled from average to approximate a.m. peak hour rates.

[2] Weekday p.m. rates reverse of a.m. rates and Saturday 10% of p.m. rates.

The Maximum Retail Alternative shift of 6,000 square feet from municipal office to retail is projected to generate 74 a.m. peak hour external trips, 117 p.m. peak hour trips, and 89 Saturday peak hour trips as shown in Table I-2. The maximum new one-way peak hour number of trips is 71, which occurs during the p.m. Peak hour.

Table I-2 Maximum Retail Alternative Butterfield New Trip Generation						
Land Uses	Peak Hour Trips*					
	Weekday A.M.		Weekday P.M.		Saturday	
	IN (Trips)	OUT (Trips)	IN (Trips)	OUT (Trips)	IN (Trips)	OUT (Trips)
Single Family housing 3 residential dwelling units	1	2	2	1	2	1
Senior adult housing attached 55 dwelling units	5	10	13	11	10	8
General office space 10,500 square feet	28	4	5	26	2	2
Retail 13,000 square feet	8	5	23	25	33	30
Municipal offices 9,000 square feet	8	3	3	8	0	1
Total by direction	**50**	**24**	**46**	**71**	**47**	**42**
TOTAL	**74**		**117**		**89**	
Trip Generation, Institute of Transportation Engineers, 9th edition, Washington, DC, 2012.						
* No reduction taken for mixed use.						

Table I-3 indicates the difference between the Proposed Action and the Maximum Retail Alternative trips. The largest increase is on Saturday as municipal offices are generally closed and retail demand peaks thus resulting in a 28 vehicle increase. Although delay is not linear to volume increases, the change in volumes and delay from the No Build to the Build Condition for the Maximum Retail Alternative is anticipated as less than one second per vehicle as shown in Table I-3. This minimal increase in delay is not expected to have any significant impact on traffic operating levels of service.

Table I-3 Proposed and Alternative Butterfield New Trip Generation						
Land Uses	Peak Hour Trips*					
	Weekday A.M.		Weekday P.M.		Saturday	
	IN (Trips)	OUT (Trips)	IN (Trips)	OUT (Trips)	IN (Trips)	OUT (Trips)
Proposed Total	51	25	38	65	33	28
Alternative Total	50	24	46	71	47	42
Change in Trips	**-1**	**-1**	**+8**	**+6**	**+14**	**+14**
Percent Change in Site Generated Trips	-3%		+14%		+46%	
Order of magnitude of expected change in delay for the approach most changed from No Build to Build Condition.	reduction less than 0.1 seconds of delay per vehicle		increase of 0.4 seconds of delay per vehicle		increase of 0.6 seconds of delay per vehicle	
Trip Generation, Institute of Transportation Engineers, 9th edition, Washington, DC, 2012.						

ATTACHMENT J

Trip Rates Background

ATTACHMENT J
TRIP GENERATION RATES

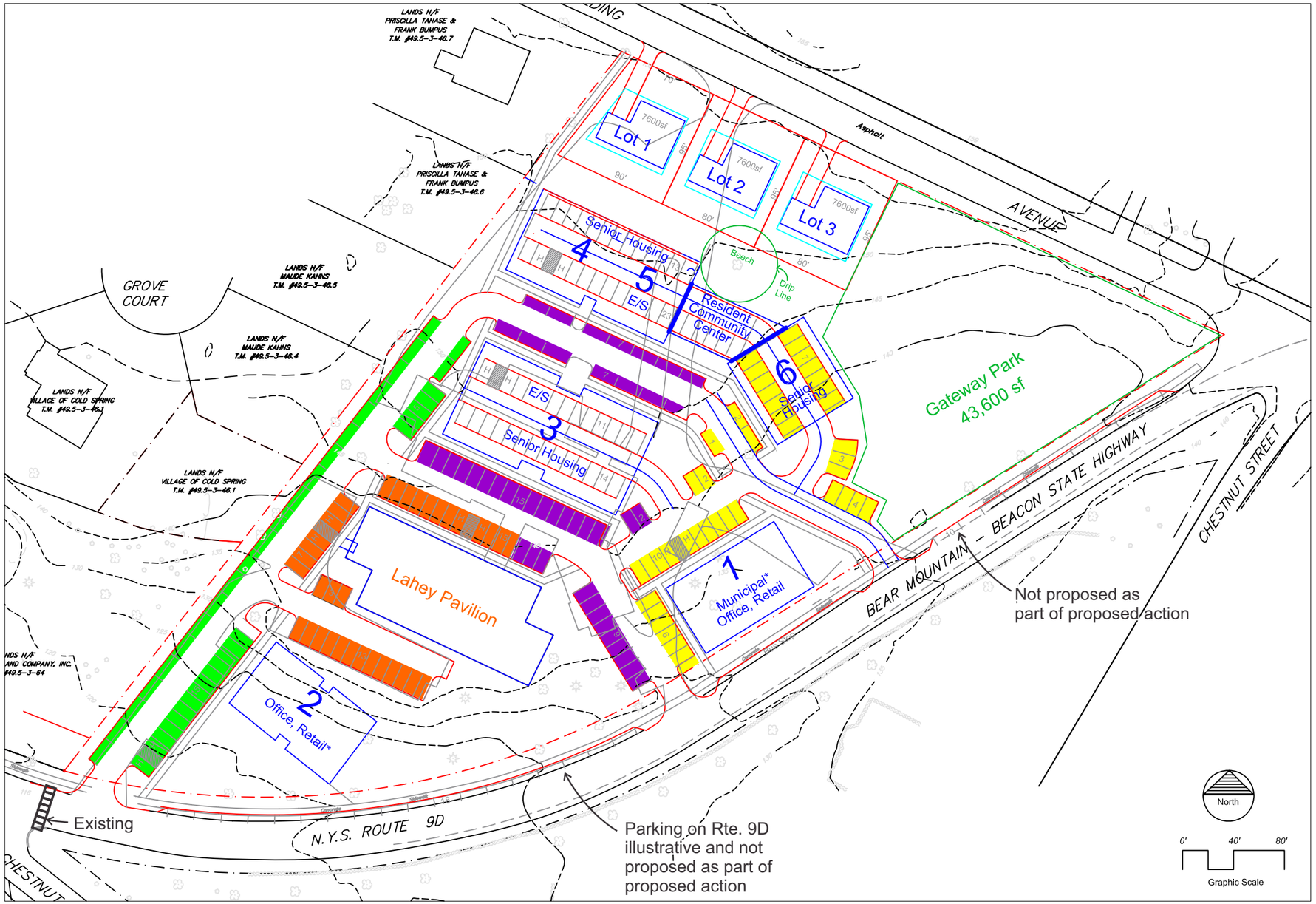
Formula rates based on survey data are typically used for determining trip rates however in some cases there is insufficient data, or insufficient data in the size the facility in question to use the formula rate. In other cases the formula rate produces a result outside observed surveys or are suspect, then formula rate was not use.

Table J-1
Trip Generation Rates Used

Use	Weekday AM Peak Hour	Weekday PM Peak Hour	Saturday Peak Hour
Single Family Housing 3 dwelling units	formula rates break down when the independent variable (Dwelling Units) is too small as the formula rate exceeds the maximum rate in a.m. peak hour and Saturday peak hour.		
	Average rate used	Average rate used	Average rate used
Senior Housing Attached	Average rates are higher than formula rates for 55 units.		formula rate used
	Maximum rates used as average rates tend to be low		
General Office	formula rate used	formula rates break down when the independent variable (1000 gross square feet) is too small. PM rate exceeds maximum rate.	No formula rate
		Average Rate doubled to approximate a.m. rate	Average Rate
Retail	formula rates break down when the independent variable (1000 gross square feet) is too small. Saturday rate exceeds maximum observed rate. Average Rates used.		
	Average Rates Used. The types of retail uses maybe partially limited by the parking allocation.		
Government Offices	Only one data point	No Formula rate	No data available
	Used PM peak hour rate reversed for direction	Used average rate	Used 10% of p.m. rate as offices typically closed.
Trip Rates are shown in text Table 2.			

ATTACHMENT K

Shared Parking Concept



Zoning Analysis

One Family	Required	Lot 1	Lot 2	Lot 3
Lot Area	7500 sf	7600 sf	7600 sf	7600sf
Lot Width	75 ft.	80 ft.	80 ft.	80 ft.
Lot Depth	75 ft.	95 ft.	95 ft.	95 ft.
Front Yard	20 ft.	20+ ft.	20+ ft.	20+ ft.
Side Yard	10 ft.	10+ ft.	10+ft.	10+ ft.
Rear Yard	20 ft.	20+ ft.	20+ ft.	20+ ft.
Coverage	30%	26.6%	26.6%	26.6%

Mixed Use	Required	Provided	
Lot Area	120,000 sf	225,434 +- sf	
Lot Width	200 ft.	590 +- ft.	
Lot Depth	200 ft.	355 +- ft.	
Front Yard*	0 ft.	0 ft.	
Side Yard	10 ft.	10 ft.2 Sides 25 ft.	152 ft.
Rear Yard	10 ft.	29 ft.	
Open Space	15%	47%	
Building Cover	25%	23.4%	

*For frontage on a NYS Highway

NOTES TO BUTTERFIELD CONCEPTUAL SITE PLAN

1. Building No. 1shall be approximately 15,000 sq. feet with dimensions of approximately 60' x 100'. It shall house one or more of the following uses: municipal, post office, first floor retail store space and/or first floor bank and/or first floor personal service shop not to exceed 6,000 sq. feet, and first or upper floor business and professional offices.
2. Building No. 2 shall be approximately 65' x 110'. It shall house one or more of the following uses: first floor retail store space and/or first floor bank and/or first floor personal service shop not to exceed 7000 sq. feet, and first or upper floor business and professional offices.
3. Building No. 3 shall be approximately 80' x 160'. It shall be senior citizen housing.
4. Building No. 4-5 shall be approximately 75' x 150'. It shall be senior citizen housing.
5. Building No. 6 shall be approximately 75' x 75'. It shall be senior citizen housing.
6. The existing building designated "Lahey Pavilion" shall continue to house a medical services use.
7. There shall be no more than three single family homes on the property as depicted.
8. The southeast corner of the property designated as "Gateway Park" shall remain a grassed area.
9. The large Copper Beech tree identified near the proposed three single family homes shall be preserved.
10. On site parking and internal circulation is an approximation based on the proposed location of the buildings and is subject to change.

* Retail space may include banks and personal service shops.

Notes:
1. All base data by others. No representation or warranty is express or implied as to accuracy of same.
2. The Concept Site Plan is based on a layout by Ray Curran dated 7-12. Please refer to Engineer and/ or Surveyor drawings for all final site plan and site features information.
3. This drawing is not for construction purposes.

Project Summary

Building 1. Municipal Office Building. 6,000 sf footprint, 15,000 sf total (First Floor Retail not to exceed 6,000 sf)
Building 2. Retail/Office Building. 7,000 sf footprint, 17,500 sf total (First Floor Retail not to exceed 7,000 sf)
Buildings 3-6 Senior Condominiums, 55 Units
Lots 1, 2, 3. Three (3) Single Family Homes

Legend
- Building #1 Municipal Office Bldg.
- Building #2 Office, Retail
- Lahey Pavilion
- Shared Parking
- Senior Housing

Figure K-1: Shared Parking Plan
Butterfield
Village of Cold Spring, Putnam County, NY
Source: Stephen Lopez, Landscape Architect, rev. 05-06-13
Scale: Graphic scale as shown

File 12008 11/05/13
JS/12008