TRAFFIC STUDY

PROPOSED AMBULANCE UNIT
70 CUMBERLAND AVENUE
LAKE SUCCESS

PREPARED FOR THE
MANHASSET-LAKEVILLE WATER AND FIRE DISTRICT

PREPARED BY

CAMERON ENGINEERING
an IMEG company

AUGUST 2023

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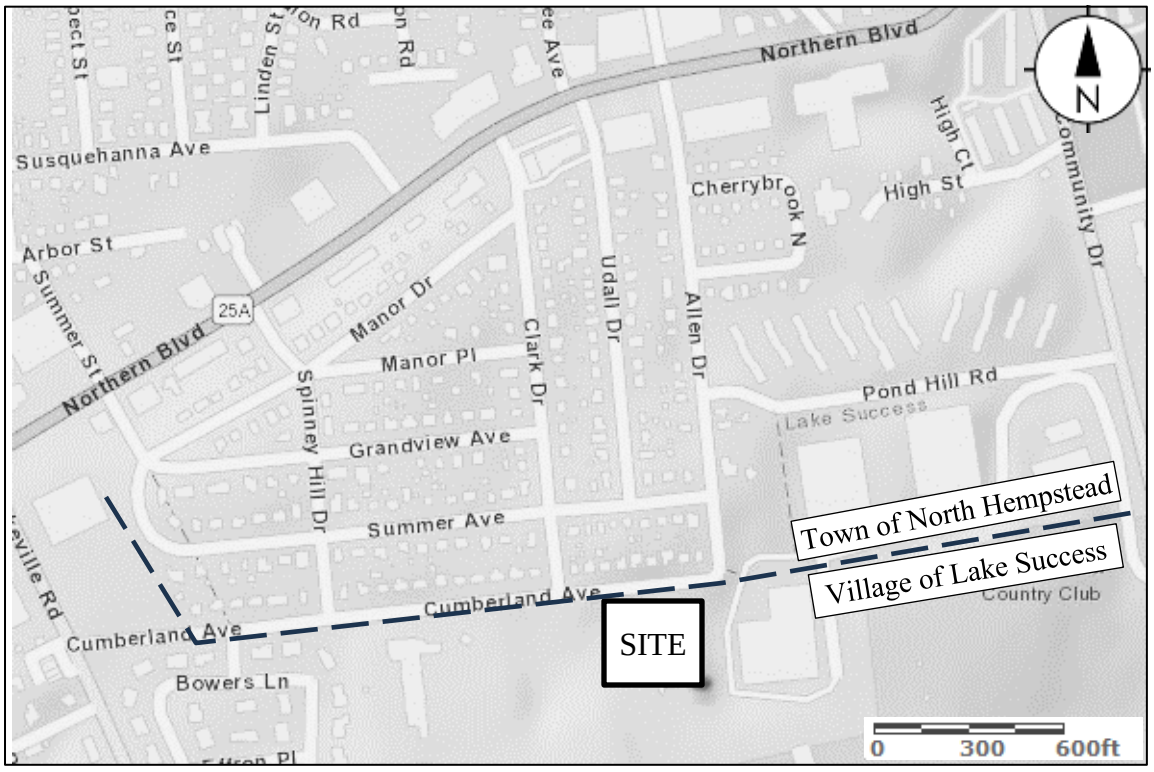
1. Background and Existing Site Conditions

1.1 Purpose of Report

The Manhasset-Lakeville Water and Fire District ("the District") is proposing a ±10,044 s.f. ambulance unit at 70 Cumberland Avenue in the Village of Lake Success. The site and the adjacent roadway network are shown in Figure 1 below. At a recent public meeting on this proposal, members of the public raised concerns about traffic at and away from the property. In response to the public's concerns, the District requested that Cameron Engineering, an IMEG Company, perform a detailed traffic study. This study is in two parts:

1) A traffic engineering analysis of the application: assess the number/types of vehicles the ambulance unit would generate, and at what times of the week, relative to the existing traffic on Cumberland Avenue; parking demand; site configuration; driveway sight lines.
2) A traffic engineering assessment of existing concerns ***unrelated to the application***: research available accident data for the area; conduct multiple site visits to assess existing traffic- and safety-related conditions such as street lighting, roadside vegetation, sidewalks, intersection sight lines, and general conditions for pedestrians/bicyclists. Where appropriate, provide rationale for off-site improvements that the Town could implement to address pre-existing traffic- or safety-related concerns.

Figure 1: Project Location Map



1.2 Site Context

The District's property is situated within the Village of Lake Success. The Lake Success-Town of North Hempstead boundary runs along Cumberland Avenue. Therefore, while the site is in the Village of Lake Success and subject to Village requirements, it is the Town of North Hempstead that has jurisdiction on the surrounding residential streets.

1.3 Study Methodology

A. Review the Existing Conditions at the site and the immediate vicinity

- Research Average Annual Daily Traffic [AADT] volumes near the site using New York State Department of Transportation [NYSDOT] 24-hour data.
- Perform traffic counts at the key intersection during weekday AM (6:00-9:00 am) and PM (3:00-6:00 pm) peak traffic periods to establish the existing peak hour volumes at the times this facility would be its most active.
- Discuss with the Water and Fire District, the public comments which were raised at a recent public hearing associated with the proposed ambulance unit. Classify those concerns into categories:
  1) Those which pertain to the proposed project
  2) Those which pertain to previously existing conditions on Cumberland Avenue, for the section that runs along the limits of the District's property
  3) Those which are higher-level in nature (no specific location given) or those which are associated with off-site locations and intersections, well beyond the limits of the property that is owned and controlled by the District

  For the first two types of concerns, the District has the ability to tailor its plan so that potential concerns do not materialize, and to address pre-existing issues that may exist along its site frontage.

  For the third type of concerns, our goal is to verify concerns in a realistically proximate area around the property, acknowledge those concerns which our engineering team is able to verify, and present potential improvement measures that the Town could implement to address these concerns. This category of concerns are beyond the purview of the District and unrelated to this application, but are presented in this report in the interest of improving safety as a matter of course.
- Visit the site and the surrounding streets on multiple occasions, including peak "rush hour" periods, midday periods, and at night. Observe and document traffic conditions and physical features related to traffic flow, speeds, visibility, walking, and safety.

The primary focus of this study is the immediate vicinity: Cumberland Avenue east of Clark Drive, and Allen Drive north to Summer Avenue.

A secondary focus of this study comprises the higher-level concerns raised by the public: the connection route to Community Drive and "More Than A Gym" (a special needs facility), and the adult education facility to the west.

- Request the latest available 2-3 years of accident data for Cumberland Avenue from the Lake Success Police Department and Nassau County Police Department. If the data are available, review the data for specific patterns and high-incident locations.

B. Determine the "Build" Scenario: Future Conditions with the project in place

- Examine the site plan documents and obtain the planned operational information about the ambulance unit.
- Discuss the site plan yield and layout, and daily/hourly schedules and operation.
- Discuss access to the site, and sight distance considerations.
- Determine the number of code-required parking spaces and determine if parking needs on the site will be met.
- Calculate the volumes typically generated by the site's proposed use during peak hours, based on anticipated activity at the property.
- Use *Synchro* to calculate the future levels of service with the ambulance unit in place.
- Determine the traffic impact (if any) of the proposed project, by gauging genuine differences between the levels of service with vs. without the ambulance unit. If there are genuine differences, traffic mitigation and/or site plan revision is warranted.

C. Qualitatively Address Off-Site Pre-existing Concerns (unrelated to the project)

- For identified issues that our engineering team was able to verify in the field or through data research, provide suggested traffic and safety improvements that the Town of North Hempstead might implement, matching the improvement with the underlying rationale.

  These off-site improvement recommendations are not related to the ambulance unit. This study is simply a mechanism for a transportation engineering study to verify reported concerns and suggest ways to address these pre-existing concerns.

2. Existing Local Conditions and Traffic Volumes

The property where the ambulance unit is proposed is owned by the Manhasset-Lakeville Water District ("the District") and zoned "Economic Development A" (ED-A).

Village Code §105-95.B.6 is the Village's performance standard pertaining to traffic:

B. The purposes of these performance standards are, consistent with the promotion of the public health, safety, morals, and general welfare of the Village, to secure safety from fire, panic, and other dangers, to provide adequate light and air, to prevent the overcrowding of land, to lessen traffic congestion and to facilitate development of areas in accordance with the development policy of the Village, and in furtherance thereof:

(6) To regulate and control the flow of vehicular traffic on any street, road, or highway within the Village so as to prevent overcrowding of streets during established traffic peak periods and to maintain a reasonable and steady flow of traffic in the vicinity of the ED-A District.

Figure 2: Village Zoning Map Excerpt (not to scale)

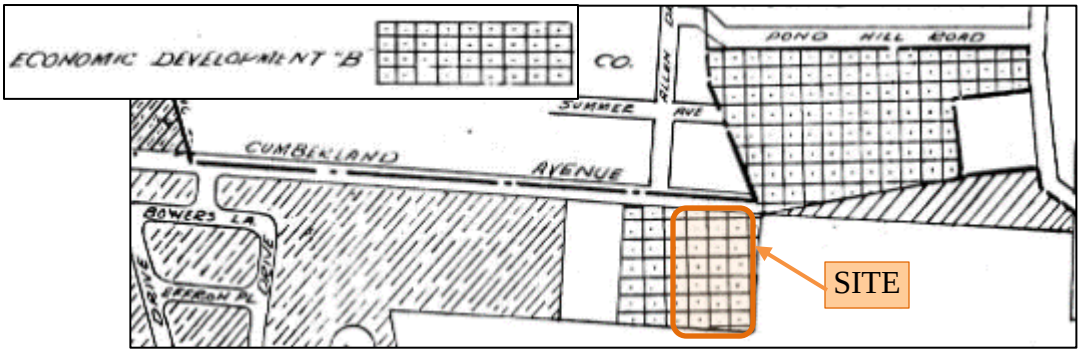


Figure 3 follows on the next page to depict the site plan overlaid on an aerial photograph.

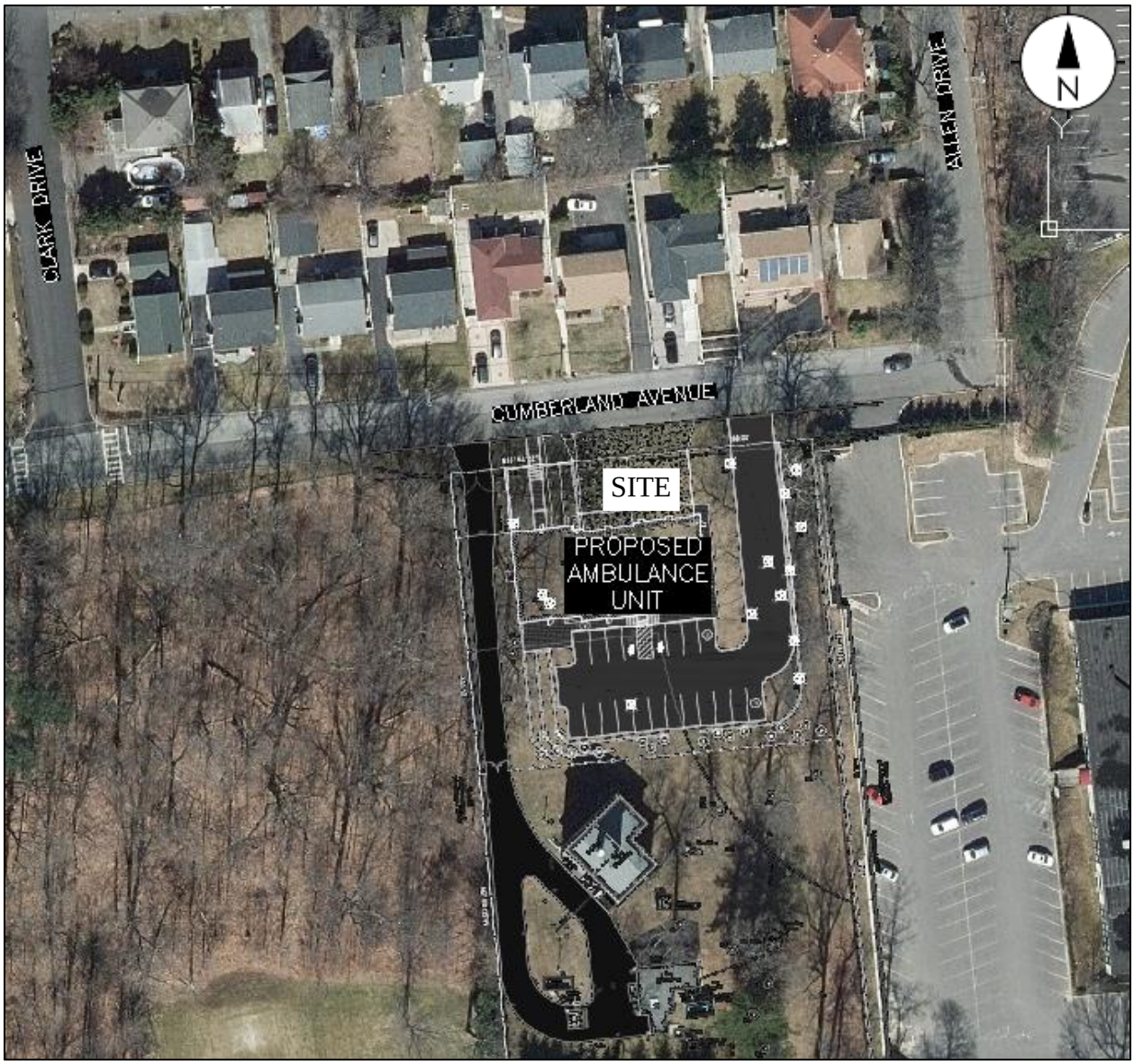
The proposed ambulance unit location comprises the north section of property the District already owns. The new building, if constructed, would be situated between Cumberland Avenue and existing water treatment buildings.

2.1 Roadway Descriptions

All streets in the immediate area are two-lane local roads with a 30 mph speed limit. This includes Cumberland Avenue, Clark Drive, Allen Drive, and Summer Avenue.

Cumberland Avenue is a two-lane Village roadway with a 30 speed limit and an Average Annual Daily Traffic (AADT) volume of 1,215 vehicles per day to the west of Clark Drive (where data is available). The District property is on the south side of Cumberland Avenue, just west of Allen Drive.

Figure 3: Site Aerial Photograph

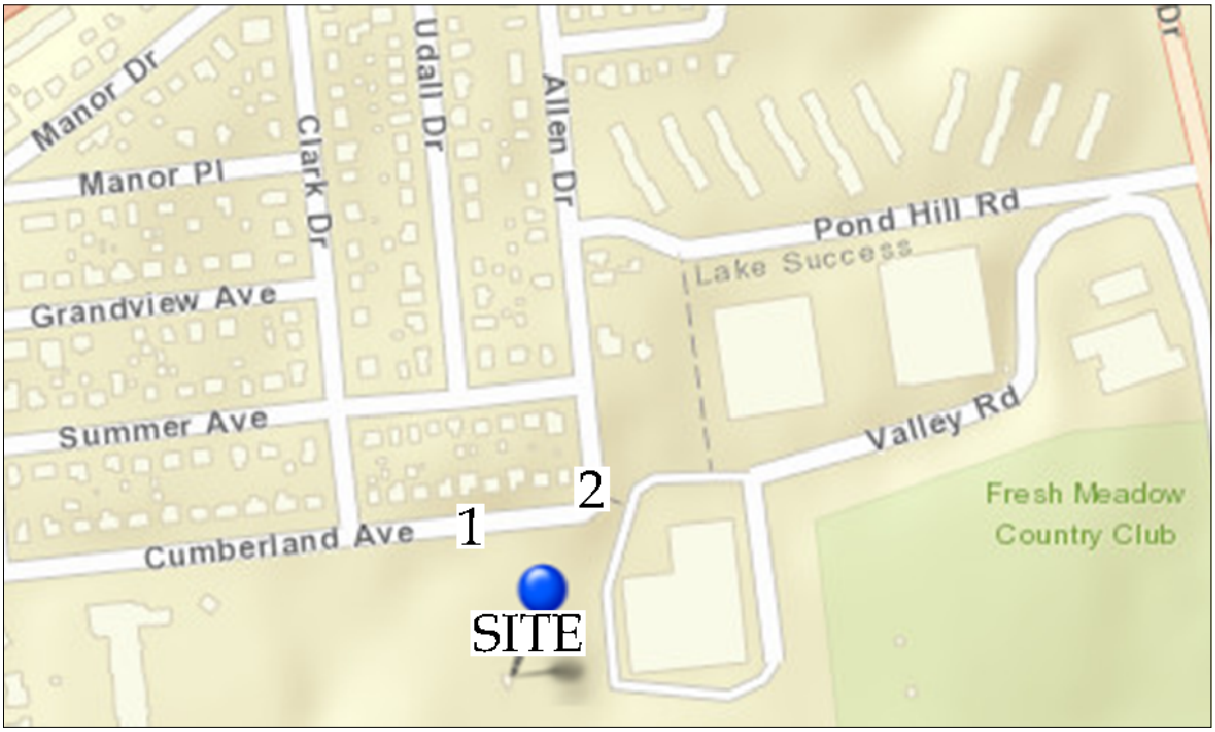


2.2 Existing Traffic Volumes

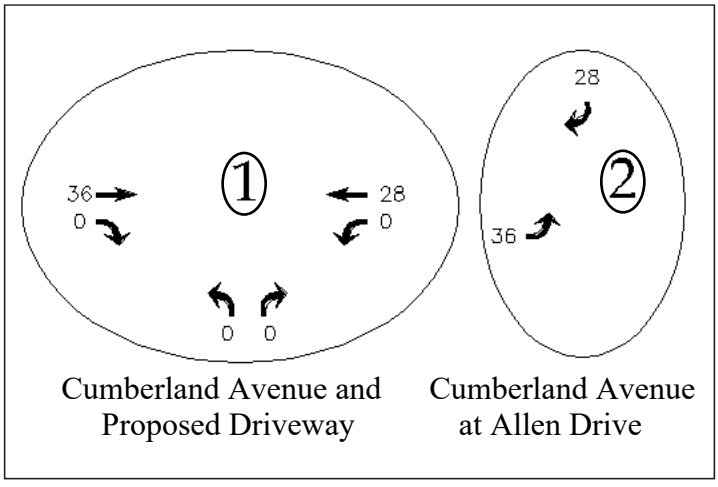
The key intersection for analysis will be the future driveways on Cumberland Avenue. Traffic, pedestrian, and bicycle volumes were counted at the existing water district driveway location on Tuesday, June 13, 2023 for extended peak hour periods of 6:00-9:00 a.m. and 3:00-6:00 p.m. All traffic, and most or all pedestrians, counted at this location on Cumberland Avenue either originated from or was headed to the nearby intersection of Cumberland Avenue/Allen Drive.

The counted traffic and pedestrian volumes are shown in Figure 4 on the next page.

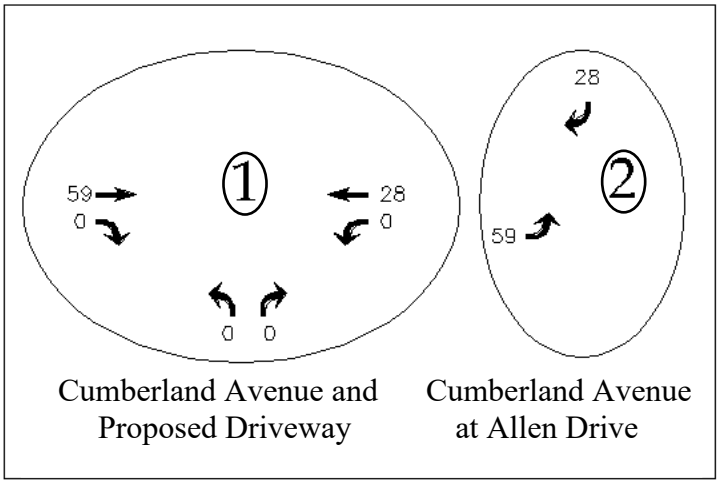
Figure 4: Existing Traffic Volumes



AM Peak Hour



PM Peak Hour



No bicycles or pedestrians were observed during peak hours

3. Proposed Ambulance Unit

3.1 Proposed Operations and Trip Generation

Today, the ambulance unit is housed with Company #3 of the Manhasset-Lakeville Fire Department, which is located at 25 Prospect Street in Great Neck. If the ambulance unit relocates to the Cumberland Avenue site, the ambulance unit would operate the same way as it currently operates, summarized below.

The ambulance unit has 40 members: certified Emergency Medical Technicians/EMTs, Advanced Emergency Medical Technicians/A-EMTs, Advanced Emergency Medical Technicians-Critical Care/EMT-CCs, and Paramedics. There are four emergency vehicles: 3 ambulances and a "fly car" SUV that is not used to transport patients. There are typically four to six volunteer responders in the building at any time.

As volunteers arrive for a shift or leave after a shift, there are up to 4 to 6 trips in or out of the building over the course of an hour (2 to 3 people who leave at a time, replaced by 2 to 3 other volunteers). This is not enough traffic to have a noticeable impact on traffic flow on any local street, or on safety conditions, regardless of where the new building is located.

- The statewide environmental assessment standards in the NYS Department of Environmental Conservation *Short EAF Workbook* classify "fewer than 100 trips per hour" as a non-substantial increase in traffic above present levels. This building will have 6 or fewer trips an hour, on a regular basis.
- The national standard to scope and perform traffic studies is the Institute of Transportation Engineers (ITE) recommended practice as described in *Transportation Impact Analyses for Site Development.* The ITE defers to the local standard (which in New York is 100 trips per hour), but notes that 50-100 hourly trips is the predominant threshold range, and if a site generates fewer trips than 50-100 trips per hour, a traffic impact study is not warranted because no impacts are expected to occur.

Similarly, ambulance calls will not impact overall traffic flow or safety in the area. In the Manhasset-Lakeville Water and Fire District, the ambulance unit responds to working fire and rescue incidents and to calls made to 911, plus the unit provides coverage during community events. In 2022, the ambulance unit responded to 1,230 calls, an average of 3 to 4 calls per day; this would remain the average rate if the unit was to relocate. Emergency calls can occur at any time, with "generated traffic per call" of 1-2 ambulances at a time. The District follows all national and state protocols, addressing each call depending on the information from dispatch. In any case, the number of vehicles entering or leaving is too small to have a material impact on local traffic flow and safety.

Specific to this proposed ambulance unit, the Supervisor has offered to the local residents on Cumberland Drive to not utilize sirens when ambulances leave for an overnight call, unless there is traffic immediately near the driveway. The goal is to minimize noise impacts to the homes nearby. Ambulances would utilize flashing lights for any response call.

On 359 out of 365 days a year, there is little to no traffic in or out of the unit unless there is an emergency call or a shift change in progress. Six times a year (every other month), the facility would host training for up to 30 local volunteers in the Multipurpose Room. Trainings would be at 7:00 p.m. on weeknights, or on weekends. This report calculates trip generation with 30 trainees and no carpooling, to be conservative. As shown below, the corresponding traffic (32 trips in an hour, during off hours) is below the threshold where a full traffic impact study is warranted. This level of traffic will not have any impact on local streets, particularly since trainings only occur a few times a year and do not factor into day-to-day conditions.

Vehicular trip generation is summarized in Table 1 below.

Table 1: Site-Generated Peak Hour Trips

Daily Operations

Volunteer Arrivals/Departures

AM Peak Hour		PM Peak Hour		***During Emergency Calls***			
Enter:	3 trips/hour	Enter:	3 trips/hour	Enter:	0 trips/hour	OR	2 trips/hour
Exit:	3 trips/hour	Exit:	3 trips/hour	Exit:	2 trips/hour		0 trips/hour
Total:	6 trips/hour	Total:	6 trips/hour	Total:	2 trips/hour		2 trips/hour

Periodic Training, every other month

Consider 30 trainees, 2 instructors, 0% carpooling
Arrivals and Departures are outside the peak hours on local streets

AM Arrivals		PM Departures	
Enter:	32 trips/hour	Enter:	0 trips/hour
Exit:	0 trips/hour	Exit:	32 trips/hour
Total:	32 trips/hour	Total:	32 trips/hour

3.2 Levels of Service, Traffic Impacts

Level of Service (LOS) describes the quality of traffic flow in terms of vehicle delays at an intersection. LOS "A" (relatively congestion-free) is the best possible LOS grade; higher delays correspond to LOS B, C, D, E, or F. Detailed LOS descriptions are in Appendix A.

For a new or expanded building to have an impact on traffic requires a significant change in delay, or a future LOS that changes from LOS A, B, or C to LOS E or F. As explained in

Section 3.1, the ambulance unit will not have enough traffic to impact local traffic flow, a conclusion based on longstanding State and national traffic engineering standard thresholds. Nonetheless, given the purview of this report to address concerns raised by the public, this study includes an engineering assessment of Existing peak hour conditions vs. Peak Training Day peak hour conditions. The "Peak Training Day" represents the busiest 6 days of the year with 32 new trips in or out of the site at various hours. The projected traffic is shown below in Table 2.

Table 2: Traffic Volumes on Peak Training Days

Table 4-3: Trip Distribution & Assignment

Growth Factor: 1.1% for 2 years, to 2025

2-year growth: 1.022

Existing volumes x 1.022 for 2 years of growth + other project trips

	Training Day	
	AM	PM
Enter:	32	0
Exit:	0	32
Total:	32 tph	32 tph

			Existing 2023 Volumes		% Heavy Vehicles		2025 Total No Build Volumes		Distribution		Generated Trips		2025 Build Traffic Volumes	
Approach	AM	PM	AM	PM	AM	PM	AM	PM	%Enter	%Exit	AM	PM	AM	PM
INTERSECTION: Site Driveway and Cumberland Avenue														
NB Left	Peak hours:		0	0			0	0		40%	0	13	0	13
Right	800	1530	0	0			0	0		60%	0	19	0	19
EB Through			36	59	3%	3%	37	60			---	---	37	60
Right			0	0			0	0	40%		13	0	13	0
WB Left			0	0			0	0	60%		19	0	19	0
Through	Peak Hour		28	28	7%	0%	29	29			---	---	29	29
Right	Factors are:		0	0			0	0			---	---	0	0
Intersection	*0.76*	*0.66*	*64*	*87*			*65*	*89*			*32*	*32*	*97*	*121*
INTERSECTION: Allen Drive and Cumberland Avenue														
NB Left			0	0			0	0			---	---	0	0
Through			0	0			0	0			---	---	0	0
SB Through			0	0			0	0			---	---	0	0
Right			28	28			29	29	60%		19	0	48	29
EB Left			36	59			37	60		60%	0	19	37	80
Intersection	*0.76*	*0.66*	*64*	*87*			*65*	*89*			*19*	*19*	*85*	*108*

(Continues on the next page)

			Existing 2023 Volumes		% Heavy Vehicles		2025 Total No Build Volumes		Distribution		Generated Trips		2025 Build Traffic Volumes	
Approach	AM	PM	AM	PM	AM	PM	AM	PM	%Enter	%Exit	AM	PM	AM	PM
INTERSECTION: Site Driveway and Cumberland Avenue														
NB Left	Peak hours:		0	0			0	0		40%	0	12	0	12
Right	800	1530	0	0			0	0		60%	0	18	0	18
EB Through			36	59	3%	3%	37	60			---	---	37	60
Right			0	0			0	0	40%		12	0	12	0
WB Left			0	0			0	0	60%		18	0	18	0
Through	Peak Hour		28	28	7%	0%	29	29			---	---	29	29
Right	Factors are:		0	0			0	0			---	---	0	0
Intersection	*0.76*	*0.66*	*64*	*87*			*65*	*89*			*30*	*30*	*95*	*119*
INTERSECTION: Allen Drive and Cumberland Avenue														
NB Left			0	0			0	0			---	---	0	0
Through			0	0			0	0			---	---	0	0
SB Through			0	0			0	0			---	---	0	0
Right			28	28			29	29	60%		18	0	47	29
EB Left			36	59			37	60		60%	0	18	37	78
Intersection	*0.76*	*0.66*	*64*	*87*			*65*	*89*			*18*	*18*	*83*	*107*

LOS analyses were performed using Synchro 11, a software package that complies with the *Highway Capacity Manual Sixth Edition* (*HCM 6*). Synchro software incorporates:

- Counted cars, trucks, buses, and pedestrians in 15-minute intervals
- The number of lanes in each direction
- Turn lane storage (where applicable)
- Whether an intersection has a signal or stop sign
- The relative locations of adjacent intersections

As summarized in Table 3 below, eastbound and westbound Cumberland Avenue will continue to operate at LOS A, the best level of service grade, even on the busiest days of the year. The driveway will also operate at LOS A. This confirms the earlier statements concerning traffic impacts: there will be no traffic impact with an ambulance unit at this site. Analysis worksheets are in Appendix B.

Table 3: Levels of Service

Existing Conditions (Gate Closed) at Cumberland Avenue Site Driveway

	AM Peak Hour			PM Peak Hour		
Movement	**Delay**	**v/c Ratio**	**LOS**	**Delay**	**v/c Ratio**	**LOS**
Eastbound Through-Right	0.0	0.00	A	0.0	0.00	A
Westbound Left-Through	0.0	0.00	A	0.0	0.00	A
Northbound Left-Right	0.0	0.00	A	0.0	0.00	A
INTERSECTION	*0.0*		*A*	*0.0*		*A*

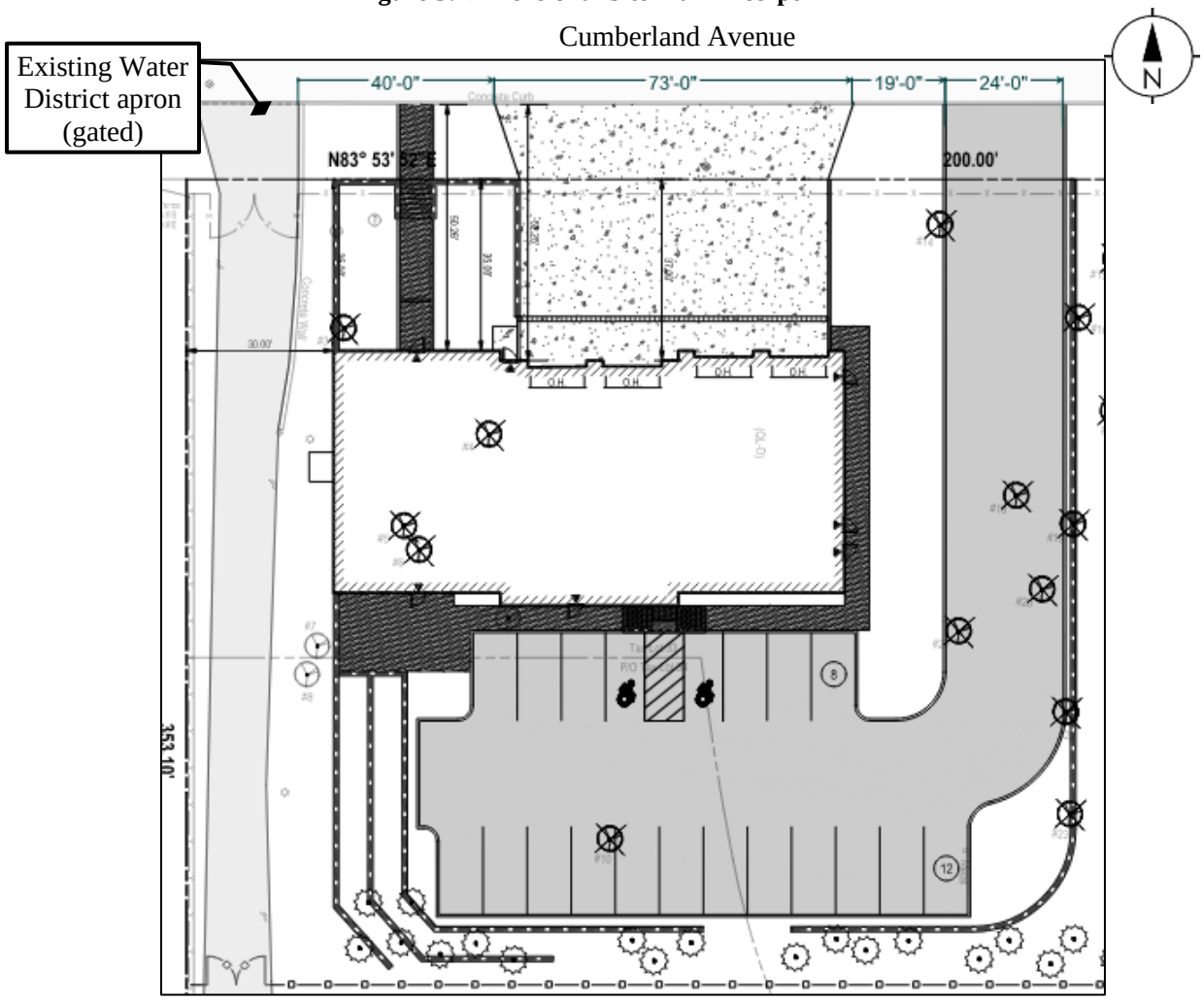
Build Conditions (Training Days) at Cumberland Avenue Site Driveway

	AM Peak Hour			PM Peak Hour		
Movement	**Delay**	**v/c Ratio**	**LOS**	**Delay**	**v/c Ratio**	**LOS**
Eastbound Through-Right	0.0	0.00	A	0.0	0.00	A
Westbound Left-Through	7.4	0.02	A	0.0	0.00	A
Northbound Left-Right	0.0	0.00	A	9.1	0.05	A
INTERSECTION	*1.4*		*A*	*2.4*		*A*

3.3 Site Access

As shown on the H2M Dimensional Site Plan prepared in January 2023, the proposed building will have a new ±73' wide apron for ambulance entry/exit, and a separate 24' wide driveway for the new parking lot. The new driveways will be east of the existing water district driveway on Cumberland Avenue, as shown on the plan excerpt in Figure 5 below.

Figure 5: Dimensional Site Plan Excerpt



Village Code §105-209 (Parking facilities for new buildings, alterations, and conversions) requires the new two-way driveways to be a minimum of 20 feet wide. The 73' ambulance apron and the 24' parking lot apron both satisfy the Village code for width.

The driveway aprons will be unsignalized. Apart from emergency responses, exiting traffic will yield to traffic on Cumberland Avenue, just like every other driveway on this street.

3.4 Parking

Village code §105-116 requires 1 parking space per 150 s.f. of floor area regardless of the building use. The 10,044 s.f. building will have 2,375 s.f. ambulance bays and ±1,540 s.f. of combined hallway, stairwell, and elevator space, leaving ±6,129 s.f. of floor area as defined by the code. At 1 space per 150 s.f., this equals 41 required parking spaces.

There will be 20 exterior spaces provided, including 2 handicapped parking spots, plus the 4 interior emergency vehicle bays. The total on-site vehicle storage, without use of the aprons in front of the ambulance bays, is 24 vehicles.

The Americans with Disabilities Act (ADA) requires 1 handicapped accessible space for parking lots with up to 25 spaces, so there is a surplus above the ADA requirement.

As explained in Section 3.1 (Proposed Operations and Trip Generation) there will typically be 4 to 6 people in the building. Having room for 24 vehicles will be a sizeable surplus more than 3 times the genuine demand, even during shift changes.

On the 6 days a year with additional personnel in the building for training, the District would need to accommodate 32 vehicles in addition to the emergency response vehicles in their own bays. The District can implement a "Training Session Parking Management Plan" that accommodates this extra demand. The parking plan would be shared with trainees in advance, and on-site personnel can help direct them upon arrival if necessary.

Figure 6 depicts three possible Training Session Parking Management Plans. Of note, none of these options has parking in front of the ambulance bays. A vital goal of this project is to stop parking ambulances in tandem, which the existing Great Neck location requires but which can slow emergency response times. This is discussed in Section 4 below.

Every alternative accommodates the peak parking, using paved areas within the confines of District property. The District may opt for a hybrid or modified version of one of the alternatives. The figures are intended to show that there are multiple viable options that contain parking demand on-site.

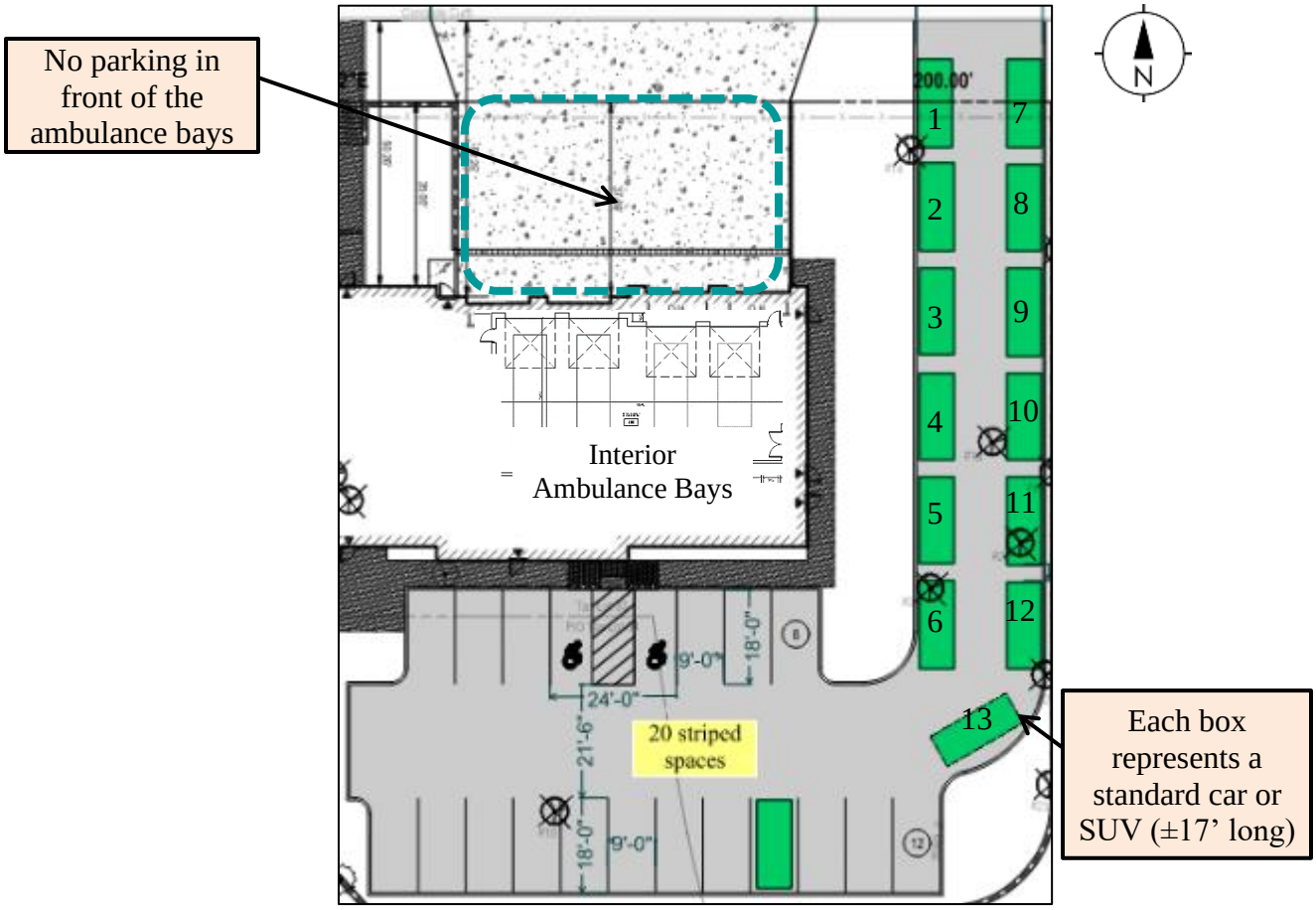
There will be no parking on Cumberland Avenue or on any grass areas along the street.

Figure 6: Sample Training Session Parking Management Plans

(Not to scale)

This first sketch depicts **Alternate 1**, which adds 13 vehicles using both sides of the new ambulance unit driveway. Combined with the 20 striped spaces behind the building, this layout accommodates 33 vehicles (not counting the ambulance bays), which is a 1-space surplus above the peak training-related demand.

Alternate 1: 20 striped spaces + room for 13 vehicles in ambulance driveway = 33



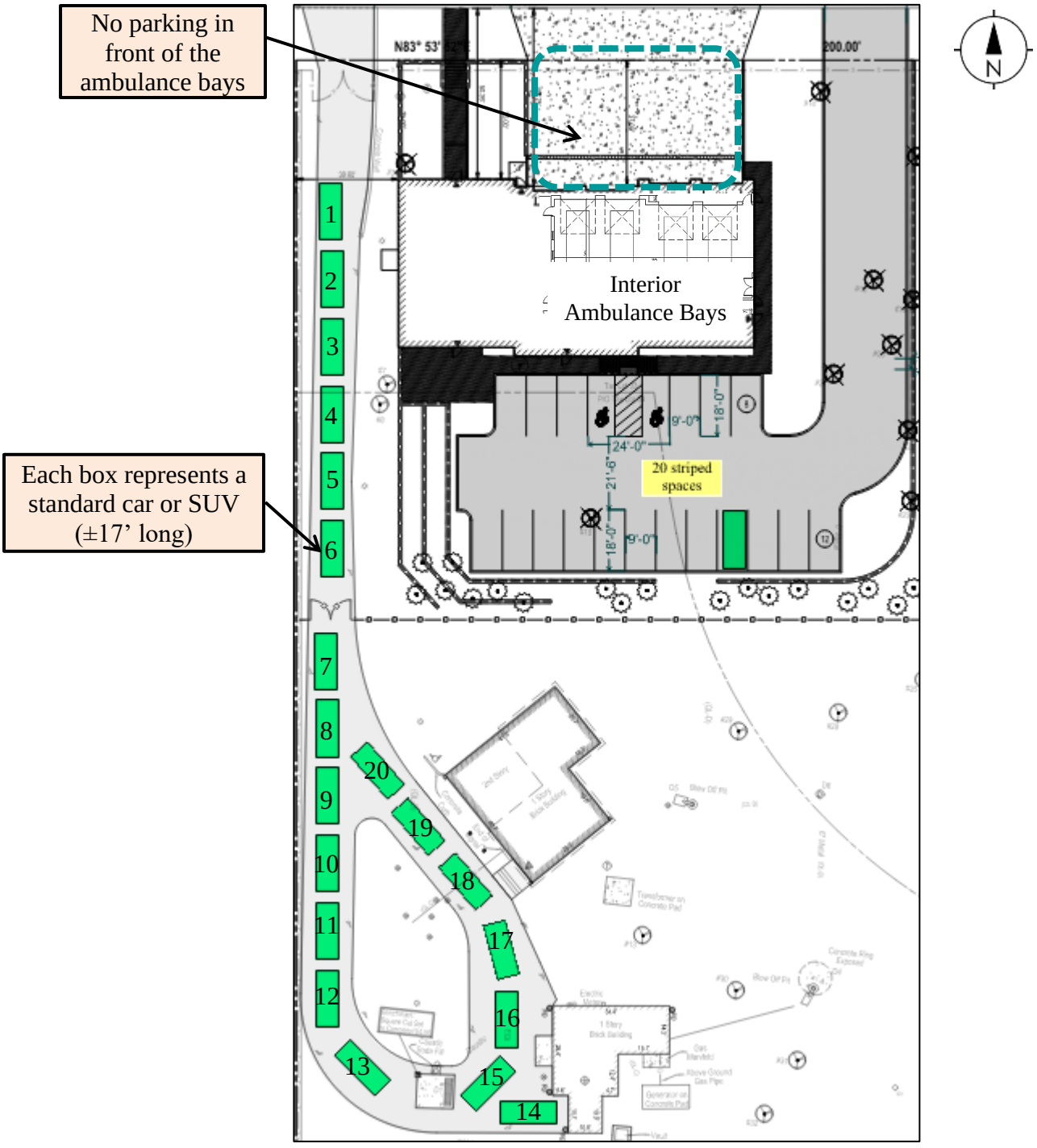
The second sketch, shown on the next page, depicts **Alternate 2**, which adds 20 vehicles in single-file on the existing water treatment building driveway. With this configuration, there is room (but not a need) to also park a vehicle in the ambulance unit driveway, which would accommodate a total of 41 vehicles, the number of spaces required under Village code.

This configuration represents a 9-space surplus above the peak training-related demand.

Of note, using the area next to the water treatment buildings is feasible because training sessions will be held in the evenings and/or on weekends, when the water buildings are not staffed and do not require parking on their own.

Figure 6 (continued):

Alternate 2: 20 striped spaces + room for 20 vehicles in water treatment driveway = 40

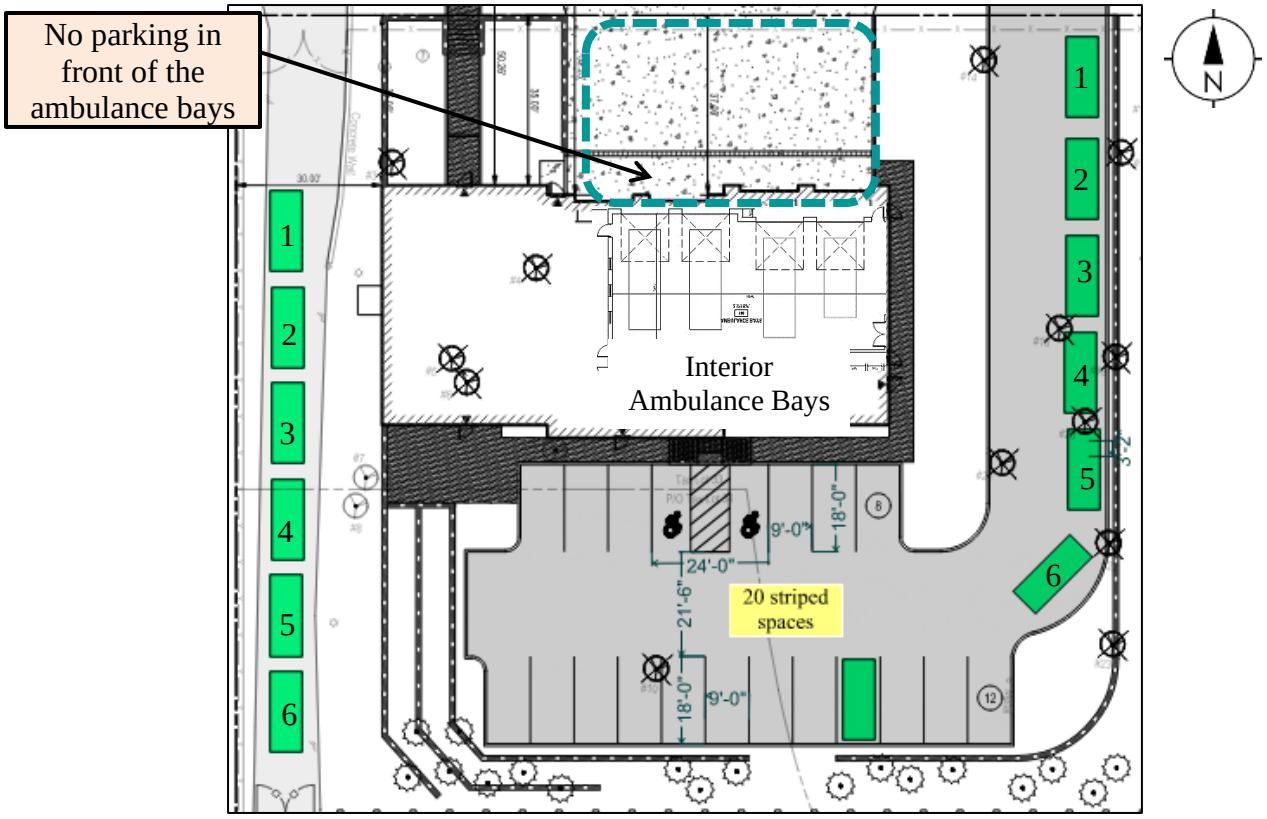


The third sketch below depicts **Alternate 3**, a hybrid of the first two options. This alternative shows 6 single-file vehicles on the water treatment building driveway (in front of the interior gate) and 6 single-file vehicles on the ambulance unit driveway to accommodate 32 vehicles on District property. This is exactly the peak anticipated demand during a training session.

Of note, there is room on the ambulance unit driveway to double-stack and fit 6 vehicles behind the front yard setback, if required.

Figure 6 (continued):

Alternate 3: 20 striped spaces + 6 in water treatment driveway + 6 in ambulance driveway = 32



3.5 Driveway Sight Distance

People exiting a site need to see oncoming vehicles, pedestrians, and bicycles on Cumberland Avenue and vice versa. The required sight distance (meaning, the farthest away someone can be from a driveway location and still be seen) depends on the main road's 85th percentile speed (the speed below which 85% of motorists are traveling). Based on the posted speed limit (30 mph) and our counts and observations, the prevailing speed on Cumberland Avenue near the site driveway is considered as 25 mph. All traffic passing the driveway is either proceeding east from a stop sign at Clark Drive, or west from a slow position on Allen Drive while they approach the stop sign at Clark Drive. Drivers lack the physical room to significantly increase speed past the proposed driveway.

Sight line requirements are listed in the AASHTO (American Association of State Highway and Transportation Officials) text, *A Policy on Geometric Design of Highways and Streets*. The requirements for various driveway maneuvers are as follows for 25 mph speeds:

- Exiting right turns: 240 feet to the left (west)
- Exiting left turns: 280 feet in both directions
- Stopping sight distance for oncoming eastbound/westbound drivers: 155 feet

Cameron Engineering measured the sight distances from the proposed driveway. Looking to the right from the proposed driveway, the view extends to where Cumberland Avenue ends at Allen Drive, roughly 130 feet away. Looking to the left (west), the view extends approximately 390' which is just past the top of the hill by Clark Drive (see Photos 1 and 2 below).

Driveway sight lines satisfy AASHTO requirements. As will be explained in Section 5 of this report, nearby intersections have challenging sight distance, unrelated to this application.

Photo 1: Looking left (west) from the proposed driveway

Photo 2: Looking right (east) from the proposed driveway

3.6 Sidewalks

Today, the space along the District's property on the south side of Cumberland Avenue is vegetated with grass and is has a noticeable side-slope away from the street (as shown in Photo 1 and Photo 2 above). During our office's site visits, there were no visible wear patterns in the grass, which would likely have been evident if pedestrians routinely walked on the grass.

The proposed renderings depict new sidewalk along the District's property close to the street. As shown in Figure 7 below, the sidewalk will connect to the proposed concrete driveway apron for the garage doors.

The proposed ambulance unit will therefore provide a pedestrian-oriented space out of the flow of traffic, along the section of Cumberland Avenue that the District controls.

Figure 7: Excerpt of Proposed Front Façade Rendering

3.7 Accident History

The latest available accident data for Cumberland Avenue was requested from the Lake Success Police Department and from the Nassau County Police Department, since the Village-Town of North Hempstead line runs along Cumberland Avenue.

The Nassau County Police Department responded that "No responsive record(s) located following a diligent search" and referred to the Lake Success Police Department.

The Village of Lake Success response and follow-up were completed in August 2023, noting zero reportable vehicle accidents for 2021 and 2022, and two reportable vehicle accidents in 2023 to date. While any incident is undesirable, the reported accident frequency on Cumberland Avenue is too low to indicate specific concerns, and this street is not considered a high-accident location (which would require at least 5 reported accidents per year).

4. Comparison of Existing and Proposed Ambulance Unit Sites

The next step of this study is to qualitatively compare the existing and proposed ambulance unit sites from the perspectives of traffic safety, circulation, and parking. This is to address two types of public comments that were raised at the ambulance unit meeting:

1) Asking to keep the ambulance unit at its current location (25 Prospect Street in Thomaston)
2) Concerns that the proposed location is inadequate to handle traffic, without corresponding concerns about the existing location

The two properties are situated roughly ½ mile apart, as shown in the map below.

Figure 8: Map of Existing Fire Company #3 and Proposed Site

4.1 Street Views of Prospect Street and Cumberland Avenue

As shown in the photos below, the character of the two streets is nearly identical:

- Predominantly residential, with closely-spaced driveways on one or both sides
- Similar width, though Cumberland Avenue is slightly wider at 30 feet vs. 28'6" for Prospect Street
- Similar in vertical grade changes
- No sidewalk on either side of the street, at either location
- Both streets have a 30 mph speed limit

Photo 3: Looking along the street past the Existing Site/Fire Company #3

Photo 4: Looking along the street past the Proposed Site

4.2 Additional Traffic Character Comparisons

Prospect Street is quite short, just under 900 feet long, with all-way stop controlled intersections at each end of the street.

Cumberland Avenue is not much longer, roughly 1,000 feet long, and the adjacent intersection to west of the District property (at Clark Drive) is all-way stop controlled. Today, the intersection to the east (at Allen Drive) is not all-way stop controlled, but Section 5.2.1 below makes the recommendation to install all-way stop signs. If the Town agrees, both sites will be bounded by all-way stop controlled intersections in each direction.

Another point of similarity is the proximity to community facilities. The Prospect Street building is roughly 600 feet from Thomaston Park, and the Cumberland Avenue site is about 400 feet from Manor Park.

4.3 Parking and Emergency Vehicle Storage

As shown in Figure 9 below, the existing building fire company/ambulance unit site has 17 on-site parking spaces in addition to indoor vehicle bays. Parking at the current site is a challenge, and relocating the ambulance unit will free up at least 4 outdoor parking spaces at the fire company building. This includes the ambulance unit's "fly car" that cannot be accommodated indoors, so it must be parked outside. The proposed site would accommodate all response vehicles indoors.

Figure 9: Existing Fire Company #3 / Ambulance Unit

More importantly, today the ambulance unit must park its ambulances in tandem in the same parking bay; the ambulance in front prevents the ambulance behind from exiting. This is far from ideal, and can increase response times. The proposed building will accommodate side-by-side parking for all 4 response vehicles, a vast improvement for safety that streamlines emergency responses.

4.4 Comparison Summary

In many ways, the Fire Company #3 site is nearly indistinguishable from Cumberland Avenue in terms of roadway character, sidewalks, driveways, etc. Reported concerns about Cumberland Avenue sidewalk, width, and density of driveways conceivably pertain to the existing Fire Company #3 location, but the District is not aware of residents having ever raised these concerns at the existing location. More importantly, these concerns have not materialized at Fire Company #3. Therefore, we do not believe there is factual justification to expect concerns about road width, sidewalk, or nearby driveways to materialize at the Cumberland Avenue site. Further, the Cumberland Avenue plan adds sidewalk along its frontage, and the proposed site will address many District capacity and safety issues.

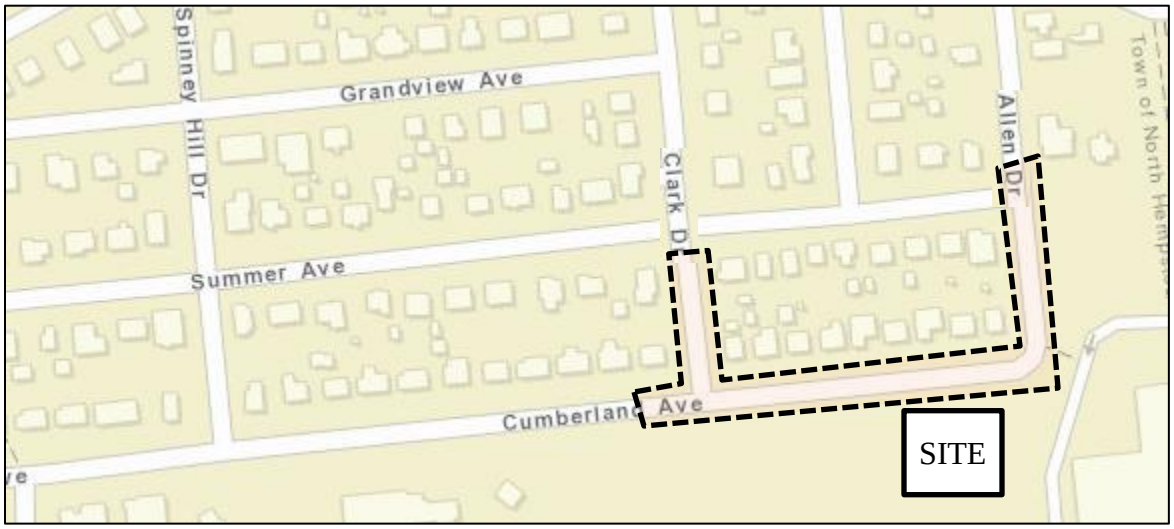
Table 4: Site Location Comparisons

Feature	Existing Company #3: Prospect Street	Proposed Site: Cumberland Avenue	Difference (if any)
Roadway Character and Conditions			
Roadway Length	±875 feet	±1,000 feet	Not significant
Road Character	Primarily Residential; Thomaston Park a 3-minute walk away	Primarily Residential; Manor Park a 2-minute walk away	--
Road Speed Limit	30 mph	30 mph	--
Road Width	28.5 feet	30 feet	Cumberland Ave. is wider
Road Classification	2-lane local street (class 19)	2-lane minor collector street (class 17)	Cumberland Avenue is a slightly higher-order roadway
Adjacent Intersections	Nearby intersections are all-way stop controlled	Nearby intersections are, or are recommended to be, all-way stop controlled (see Section 5.2.1)	No difference with recommended all-way stop signs at Cumberland Ave/Allen Drive
Roadside and Access Conditions			
Sidewalks	None	None, but the plan proposes sidewalk	Cumberland site will have sidewalk along its frontage
Traffic Control	Unsignalized driveway	Unsignalized driveways	--
Parking Conditions			
Provided Parking	17 spaces, no interior room for 4th response car	20 spaces, interior room for all 4 response vehicles	Cumberland Avenue site accommodates demand
Interior Parking	Tandem Ambulances	Side by side Ambulances	Reduced response time from Cumberland Avenue

5. Assessing Existing Concerns (Unrelated to the Ambulance Unit)

This report section documents our investigation of existing concerns in the site's immediate vicinity, with potential improvements the Town could do. The immediate vicinity comprises Cumberland Avenue near Clark Drive, and Clark Drive/Allen Drive south of Summer Avenue; see Figure 10. It is acknowledged that members of the public raised issues at the ambulance unit meeting that pertain to locations further away, or roads that are under control of the County (Lakeville Road) or State (Northern Boulevard). These concerns are not relevant to the ambulance unit relocation, and County/State road concerns need to be made to the Nassau County Department of Public Works or State Department of Transportation.

Figure 10: Area Study Map (not to scale)



5.1 General Recommendations – Entire Study Area

Traffic Control Sign Visibility

Traffic control sign visibility (stop signs, speed limit signs, pedestrian crossing signs, etc.) is a general issue, particularly in low light conditions. This can be addressed by replacing existing signs in kind, but with higher "retroreflectivity" sign panels, with fluorescent yellow signs replacing yellow-orange signs, and with added reflector panels on sign posts.

Newer signs will inherently reflect more light back to oncoming drivers, which will make the signs easier to see and read from further away. One particularly faded sign our team observed is the "All Way" plaque on facing southbound Allen Drive at Summer Avenue (Photo 5 at right).

Photo 5: Faded plaque

Yellow-orange pedestrian-related "W series" signs can be upgraded with fluorescent yellow signs which have higher contrast and are likewise easier to see and read from further away.

Photo 6: Pedestrian Warning signs on Cumberland Avenue

Existing sign on westbound Cumberland Avenue is yellow-orange:

Proposed fluorescent yellow sign replacement (in-kind with the same sign):

Photo 7: Reflector Sign Panel Example

Sign without a reflector panel on the post:

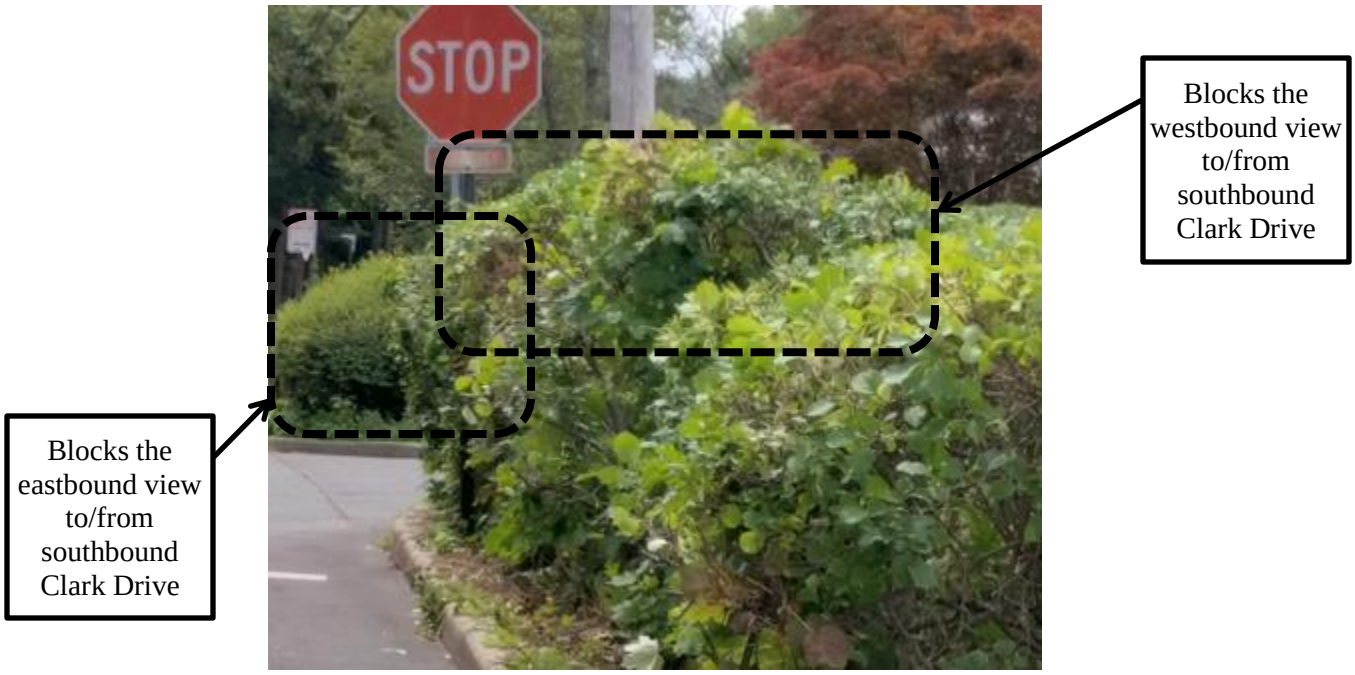
Sign with a reflector panel on the post:

<u>Vegetation Trimming and Clearing</u>

There are several places where vegetation encroached into the space required for visibility for intersections or traffic control signs. A driver's eye height is 3.5' to 7' above the ground, depending on whether he is in a car, SUV, bus, or truck. The area 3' to 8' above the ground needs to be clear of obstructions, including tall shrubbery on the ground and lower-lying tree canopies. Vegetation from 3'-to-8' above-grade should be cleared within 10' of an intersection and within 3' of a traffic or parking sign panel.

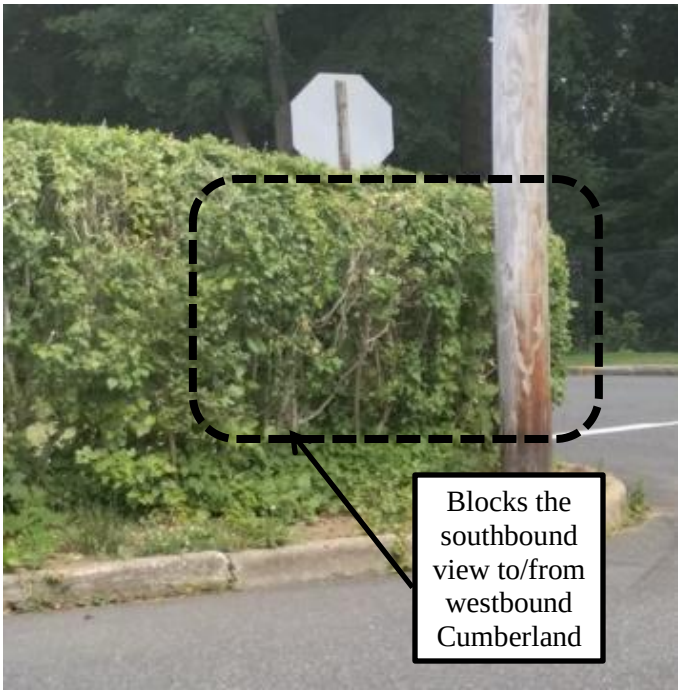
Photo 8: Vegetation for Clearing and Trimming

Looking west on Cumberland Avenue approaching Clark Drive



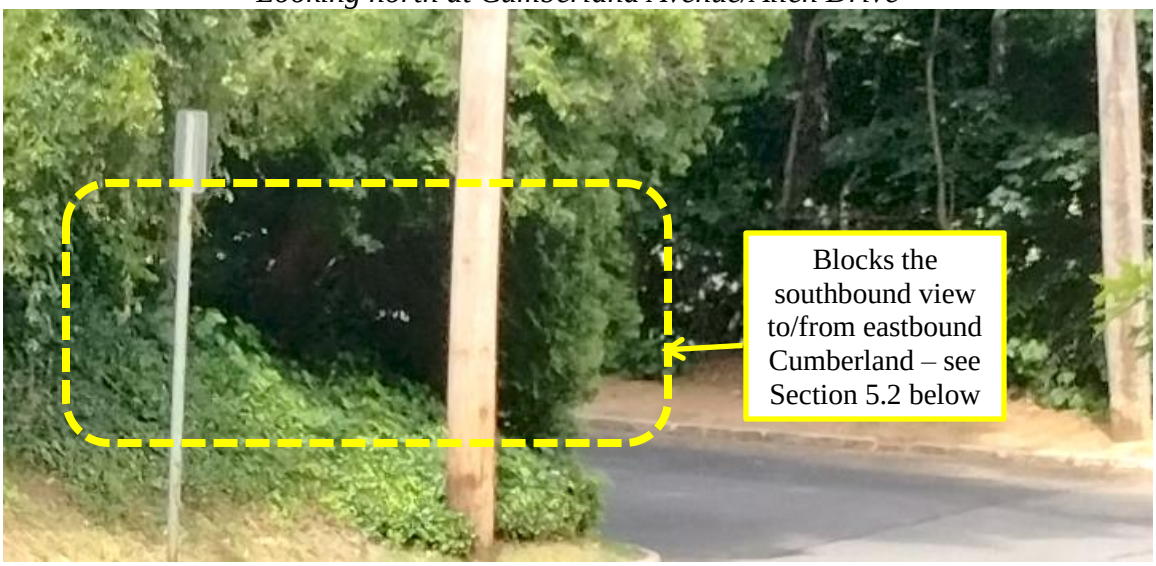
Looking south on Clark Drive approaching Cumberland Avenue

Looking left (east)



Looking right (west)

Photo 8 (continued)
Looking north at Cumberland Avenue/Allen Drive



School Bus Stops

Our engineer team did not observe any school buses stopping along Cumberland Avenue in front of the District's property. Of note, the proposed site plan includes sidewalk in front of the ambulance unit, which could serve a school bus stop if one is assigned in the future.

The closest observed school bus stop is at the intersection of Clark Drive and Summer Avenue. Our office also verified that this is the nearest public school bus stop, using the Great Neck School District Office of Transportation Infofinder[1] site. Multiple school routes utilize this intersection; our engineers observed two buses (one northbound, one southbound) dropping off children at the end of the school day. We did not observe any apparent safety issues with oncoming traffic; the streets are narrow and prevent errant drivers from passing stopped school buses, and stopped buses are visible from all directions.

Photo 9: Stopped School Buses at Clark Drive/Summer Avenue

[1] Accessed at https://www.infofinderi.com/ifi/?cid=GNU05631037999

5.2 Improvements at Individual Intersections

The two intersections on either side of the property warrant specific measures in addition to the overarching recommendations above.

5.2.1 Cumberland Avenue at Allen Drive

Guiderail and Sign Replacement:

The existing guiderail marking the east end of Cumberland Avenue appears to have been struck by a vehicle at some point; the guiderail and arrow plaque are misaligned. See Photo 10. We would recommend these features be replaced with a new guiderail and arrow plaque.

Additionally, the new guiderail should have white reflective delineators installed to enhance nighttime visibility. Photo 11 and Photo 12 depict un-retouched photos taken at approximately 10:00 p.m. to show limited nighttime views looking south and east at the existing rail. Photo 13 shows two examples of delineators that reflect headlights to help drivers see the rail at night.

Photo 10: Misalignment of Existing Guiderail and Arrow Plaque

Photo 11: Nighttime Guiderail View, Looking South

Photo 12: Nighttime Guiderail View, Looking East along Cumberland Avenue

Photo 13: Sample Guiderail Delineators

All-Way Stop Signs:

The sight distance at this corner is extremely limited, such that a driver in either direction cannot see traffic approaching from the intersecting street without being immediately at the intersection.

There is no right-of-way conflict per se, because the only movements are southbound right turns and eastbound left turns that should not cross if they occur at the same time. However, with limited sight lines and a small radius (field measurements indicate a 10' southbound right turn curb radius) it can encourage sweeping right turns that can conflict with an eastbound driver who cannot see approaching vehicles on Allen Drive.

It would therefore be safer to implement all-way stop signs, because with all-way stop signs, each driver only needs to see the vehicle stopped at the stop line.

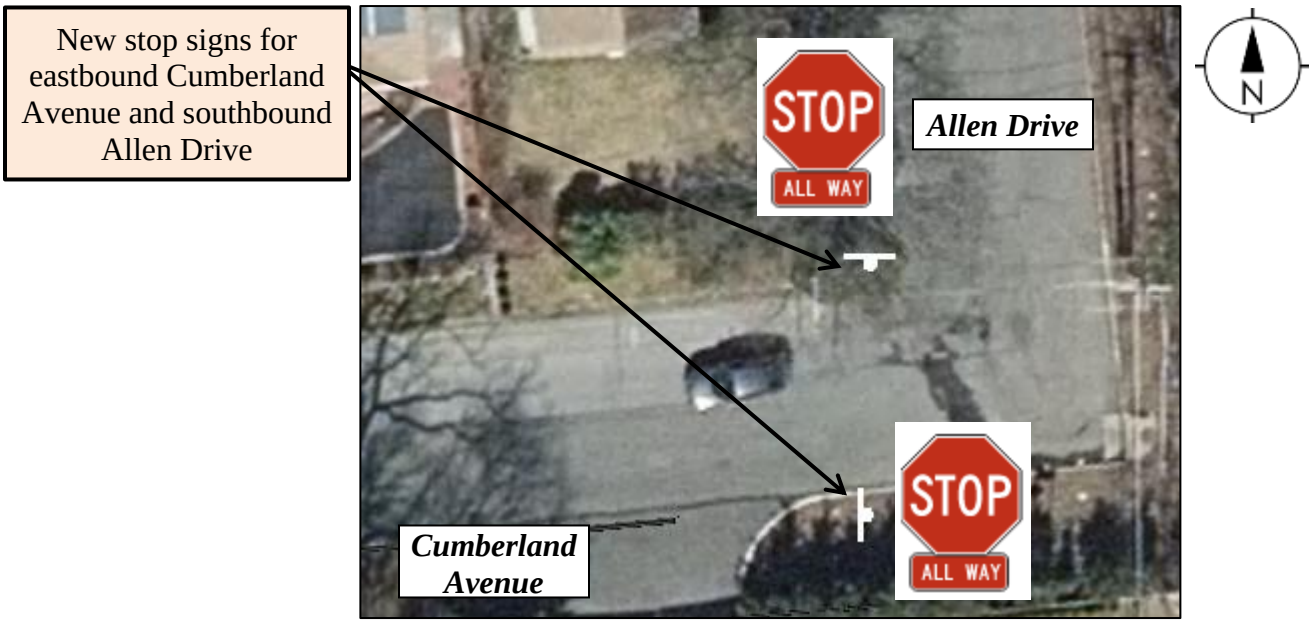
The National *Manual on Uniform Traffic Control Devices* ("MUTCD") does not have set criteria that automatically require all-way stop signs. Rather, there are features which should be considered in an engineering study for potential new all-way stop signs.

The required minimum traffic volumes are not satisfied (200-300 vehicles per hour for 8 or more hours a day). However, two criteria are satisfied, and in our engineering judgment it would be safer to implement the all-way stop signs:

- The volume of traffic on the intersecting roads is approximately equal
- A road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop

In practice, the proposed stop signs would be placed as depicted below:

Figure 11: All-way Stop Signs at Cumberland Avenue/Allen Drive



As an additional safety measure, since this would be a new traffic control setup, we recommend "Stop Ahead" signs posted ±100 feet north and west of the new stop signs.

Table 5 shows the resulting Level of Service conditions if the intersection was controlled by stop signs in all directions. Each direction will operate at LOS A, which indicates acceptable operation, and we believe a safer condition that what currently exists.

Table 5: Level of Service with All Way Stop Signs at Cumberland Avenue-Allen Drive

	AM Peak Hour			PM Peak Hour		
Movement	**Delay**	**v/c Ratio**	**LOS**	**Delay**	**v/c Ratio**	**LOS**
Eastbound Left Turn	7.5	0.06	A	7.9	0.14	A
Northbound Left-Right	7.1	0.00	A	7.2	0.00	A
Southbound Right Turn	6.7	0.06	A	6.8	0.04	A
INTERSECTION	*7.0*		*A*	*7.6*		*A*

Northwest Corner:

Our engineers measured a 10-foot corner radius, which is conducive to all-way stop signs and to slow turning speeds. We do not recommend increasing the radius at this corner. However, this corner warrants vegetative clearing because the overgrowth is obstructing drivers' line of sight (explained in Section 5.1).

Photo 14: Cumberland Avenue/Allen Drive Northwest Corner

5.2.2 Cumberland Avenue at Clark Drive

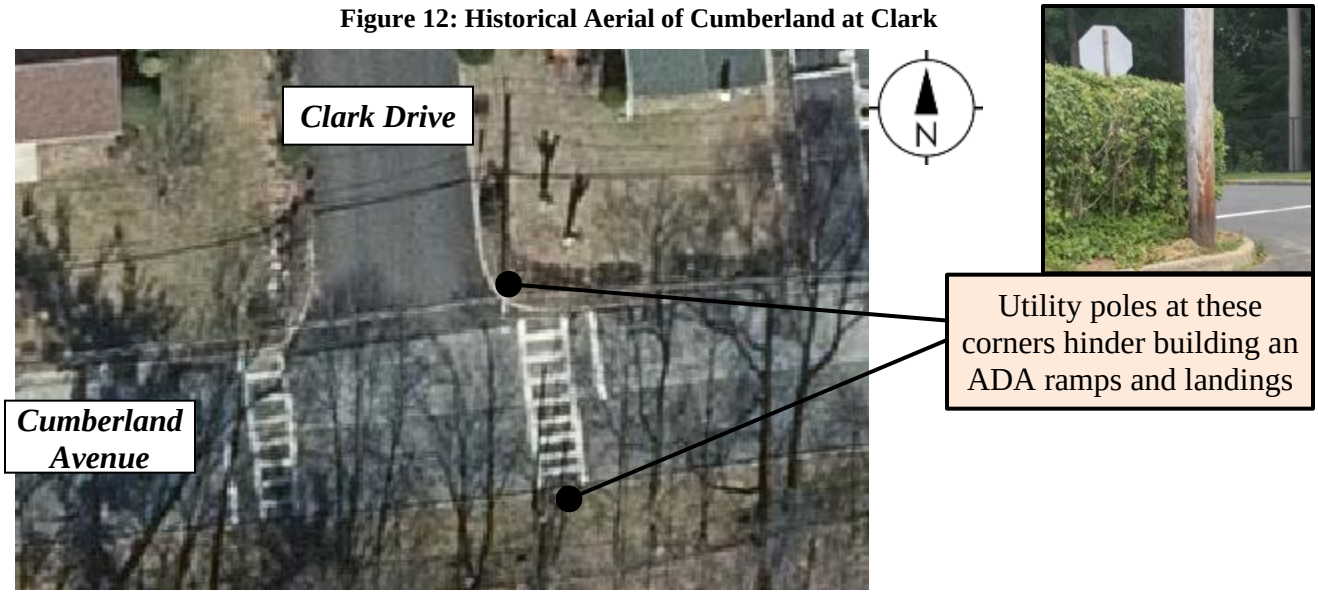
North-South Crosswalks

Historical aerial photos taken between 2010 and 2020 show north-south crosswalks used to exist at this intersection, but they have been removed as of June 2023. Below is an aerial photo from April 2020, showing the previous crosswalk striping.

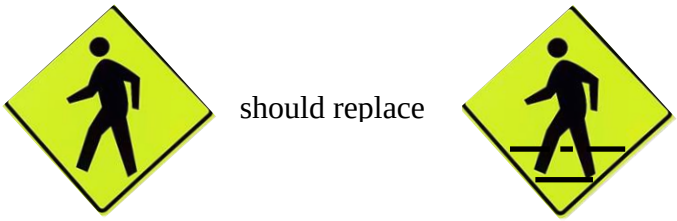
We do not recommend re-striping either crosswalk without also providing ADA-compliant curb ramps and landings at each end.

There are existing utility poles less than 2 feet from the face of the curb on the northeast and southeast corners of the intersection. This presents a challenge in building ADA-compliant curb ramps and landings in the shortest north-south path. While the northeast and northwest corners both have tall, dense shrubbery, there is more opportunity to replace the northwest-southwest crosswalk in the future because there are fewer above-grade obstructions.

Figure 12: Historical Aerial of Cumberland at Clark



With no striped crosswalk, new Pedestrian Crossing signs should indicate an unmarked crossing:



Pole-Mounted Convex Mirrors

Where sight distance is strained, one way to expand a side street driver's field of view is to install a convex mirror facing the side street. Typically, these mirrors are mounted on a utility pole and are set 7' above grade.

We recommend installing a convex mirror facing southbound Clark Drive, in addition to the vegetation clearing described above.

Sample convex mirror placement and field of view

5.2.3 Southeast Corner of Cumberland Avenue/Allen Drive

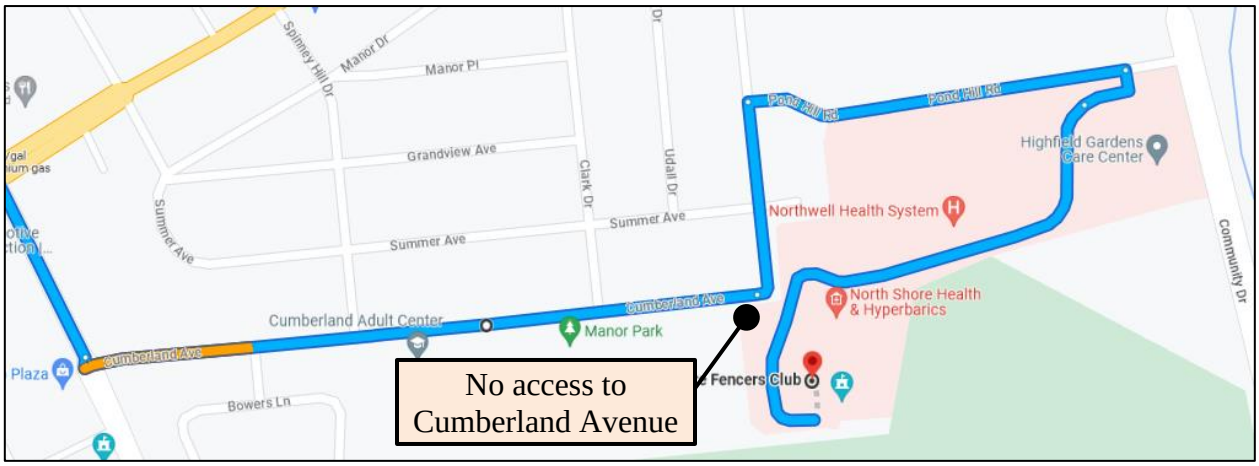
The building situated physically to the east of the District property houses a number of recreational, commercial, and community uses. However, the building has no access to Cumberland Avenue because its driveway appears to be for emergency egress only. The opening is fenced and gated, observed closed each time our engineers visited the area.

Figure 13: Aerial Photo of Next Door Building

Photo 15: Locked Gate for Adjacent Building

Furthermore, the building tenant addresses are on Community Drive, and GPS directions to the property route drivers past this fenced opening on Cumberland Avenue, not through the locked gate. Below is an example routing from just west of the property:

Figure 14: Routing to/from the Adjacent Building (no Cumberland Avenue access)



The proposed ambulance unit will not change the access configuration for this building, and will not create a cut-through route or safety concerns.

5.2.4 Allen Drive at Summer Avenue

This intersection is already all-way stop sign controlled. The only recommendation pertains to replacing the existing signs, which appear to be beyond their useful service life. The southbound "All Way" plaque at this intersection was shown in Photo 5 on page 5-1.

On the next page is a summary figure depicting all recommended improvements.

Figure 15:
Recommended Area Improvements

All improvements are Town of North Hempstead jurisdiction unless otherwise noted

Summer Avenue

Green dashed lines indicate replacing all existing traffic and parking signs and using reflective posts

Allen Drive

Clark Drive

Trim vegetation that is blocking the line of sight

Trim vegetation that is blocking the line of sight

Install "Stop Ahead" sign

Replace guiderail and add reflecting delineators

Cumberland Avenue

Install "Stop Ahead" sign

Proposed Ambulance Unit

Existing gate to remain

Install All-Way Stop Signs

Do not replace this crosswalk without also building ADA-compliant ramps and landings

Install Convex Mirror

Ambulance Unit includes proposed sidewalk along its section of Cumberland Avenue

CAMERON ENGINEERING
an AKRF company
177 Crossways Park Drive, Woodbury, NY 11797 T: (516) 827-4900
1411 Broadway, Suite 610, New York, NY 10018 T: (212) 324-4000
303 Tarrytown Road, 1st Floor, White Plains, NY 10603 T: (914) 721-8300
Corporate Seal Initiated 1996 State of New York
www.cameronengineering.com, www.timegcorp.com

MANHASSET–LAKEVILLE WATER & FIRE DISTRICT PROPOSED AMBULANCE UNIT
PROJECT LOCATION:
70 CUMBERLAND AVENUE
LAKE SUCCESS, NY
SCALE: 1"=50'

6. Summary and Conclusions

1. The Manhasset-Lakeville Water and Fire District is proposing to relocate its existing ambulance unit from the Fire Company #3 building at 25 Prospect Street in Great Neck, to the existing water facility site at 70 Cumberland Avenue in the Village of Lake Success.

2. Cameron Engineering prepared this study to assess a number of traffic safety concerns raised by members of the public, and to assess the potential traffic safety impacts of the proposed site plan. This study includes existing traffic and pedestrian volumes counted in June 2023 during weekday 6:00-9:00 a.m. and 3:00-6:00 p.m. peak periods and multiple site visits.

3. The ambulance unit will have an unsignalized apron in front of 4 side-by-side interior ambulance bays, for direct ingress and egress. This is a vast safety improvement over the tandem ambulance parking at the current building.

4. The ambulance unit will have an a separate 24-foot wide unsignalized driveway to a dedicated 20-space parking lot. This represents about three times the day-to-day demand, and is an increase over the existing site's 17 parking spaces for the ambulance unit and fire company combined.

   Periodically, on weekends or evenings with a training session, the District has multiple options for parking management plans that can utilize the water treatment building area and the new parking lot driveway to accommodate the additional visitors (32 spaces needed).

   There will be no ambulance unit parking on Cumberland Avenue or other local streets.

5. The proposed driveways will have adequate sight lines.

6. Cumberland Avenue is very similar in character (speed, width, length, closely-spaced residential driveways) to the existing ambulance unit location on Prospect Street in the Village of Thomaston. Resident concerns raised for the Cumberland Avenue site have not, to the District's knowledge, been made about the Prospect Street location, and these concerns have not materialized at Prospect Street. Therefore, we see no factual evidence to justify concerns about Cumberland Avenue's width, roadside character, lack of sidewalks, etc.

7. Day to day, the relocated ambulance unit may generate 2 to 6 trips over an hour, during response calls or shift changes. The District averages 3 to 4 calls a day, which can occur at any time. On weekends or evenings with a training session, there may be 32 trips in an hour. These numbers are far too low to require a traffic impact study according to state and national standards.

   However, this study includes a traffic impact "level of service" assessment, and confirms the lack of impacts to local traffic if the ambulance unit relocates to Cumberland Avenue.

8. The proposed ambulance unit will have sidewalk along its frontage, which could accommodate local pedestrians, and a school bus stop if one is assigned here in the future. Our team did not observe safety concerns associated with buses stopping at the nearby corner of Clark Drive/Summer Avenue (the closest public school bus to the site).
9. Reported accident data from the Lake Success Police Department and Nassau County Police Department does not indicate specific concerns or a high accident location on Cumberland Avenue.
10. There is no further warranted change to the ambulance unit site plan based on safety.
11. This study explains a number of improvements that the Town of North Hempstead might undertake to address other reported existing issues that are unrelated to this project, and which apply to the general area around the property. These improvements include all-way stop signs, vegetation clearing, guiderail replacement and enhancement, convex mirrors, and new signs with reflective posts.
12. Based on the analyses and the conclusions herein, it is our professional opinion that the ambulance unit relocating to this site will not create off-site traffic, parking, or safety concerns. This location is better suited for allowing indoor, side-by-side response vehicle parking, which cannot be accommodated at the existing Fire Company #3 building.

    While we acknowledge a number of supplemental concerns that were raised, regarding existing conditions well beyond the immediate area of the District property, these concerns are unrelated to the ambulance unit and are best addressed as separate requests to the Town, the Nassau County Department of Public Works, or the State Department of Transportation.

7. Appendices

- Appendix A: Level of Service Descriptions
- Appendix B: Existing Level of Service Worksheets
- Appendix C: Build Level of Service Worksheets

APPENDIX A:
LEVEL OF SERVICE DESCRIPTIONS

Level of service is a measure of traffic flow quality, which denotes the average delays that motorists face as they travel through an intersection. A motorist's delay is caused by several factors, including the presence of a traffic control (i.e., a signal or stop sign), geometry, other vehicles on the road, and incidents.

Total delay is the difference between the actual travel time, and the ideal travel time that would happen if there weren't any traffic controls, geometric delays, incidents, or other vehicles on the road. The HCS program only quantifies the "control delay," the portion of total delay attributed to the signal or stop sign. Control delay includes delays due to initial deceleration, stopped time, queue move-up time, and final acceleration.

The level of service (LOS) at **signalized** intersections is defined in terms of delay, which is a measure of driver discomfort, frustration, fuel consumption, and lost travel time.

The LOS at **two-way stop controlled** (**TWSC**) intersections depends on the capacity of each minor movement, not for the intersection as a whole. The capacity of a controlled leg is based on the distribution of gaps in the major street traffic flow, driver judgment in selecting a gap through which to move, and the follow-up time required by each driver in a queue.

The LOS at **All-Way stop controlled** (**AWSC**) intersections is also defined for each minor movement, and depends on the capacity, departure headway, and service time. A movement's delay is a function of the volume-to-capacity (v/c) ratio, service time, and departure headway.

The right of way at an AWSC intersection is controlled by stop signs on every leg of an intersection. Though the driver on the right generally has right of way, actual traffic flow at AWSC intersections generally follows one of two patterns:

1. Vehicles from opposite legs (i.e., northbound and southbound, or eastbound and westbound) arrive close to the same time; this is considered "2-phase" operation.
2. Vehicles from all four legs arrive separately. This is considered "4-phase" operation.

Service time is the time it takes an average vehicle to enter the intersection after stopping, and it depends on the probability that someone is on an opposing leg when a vehicle reaches the stop line. When the opposing legs are empty, a motorist can enter the intersection right after stopping. But if there are one or more vehicles on the opposing legs, the driver must wait for consensus from the other drivers before entering the intersection. The more opposing vehicles there are, the longer the service time will be, although subsequent delay increases get smaller with each additional vehicle. This probability depends on several factors, including the geometry of the intersection, lane configuration, and vehicular volumes.

Levels of service range between LOS A (relatively congestion-free) and LOS F (congested):

Level of Service A indicates very low control delays. This occurs when progression is extremely favorable; most vehicles arrive during the green phase and do not stop at all. Short traffic signal cycles may contribute to low delay.

Level of Service B generally occurs with good progression and/or short signal cycle lengths at signalized intersections. More vehicles stop than for LOS A, causing higher average delays.

APPENDIX A (continued):
LEVEL OF SERVICE DESCRIPTIONS

Level of Service C has higher delays than LOS B. This may result from fair progression and/or longer cycle lengths. Individual cycle failures, where motorists wait through an entire signal cycle, may begin to appear. The number of vehicles stopping is significant, though many still pass through without stopping.

Level of Service D has the influence of congestion becoming more noticeable. This may result from some combination of unfavorable progression, long cycle lengths, and high volume-to-capacity (v/c) ratios. The proportion of stopping vehicles increases, and individual cycle failures are noticeable.

Level of Service E is considered the limit of acceptable delay. This LOS generally indicates poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures occur often.

Level of Service F is considered unacceptable to most drivers. The condition occurs with oversaturation (when arrival flow exceeds the intersection's capacity, denoted by the v/c ratio*) but it may also occur at v/c ratios below 1.0 with many individual cycle failures.

The following conditions are used to determine **Signalized** levels of service:

Average Control Delay (seconds per vehicle)	Level of Service (v/c Ratio)	
	v/c ≤ 1.0	v/c > 1.0
≤ 10.0	Level of Service A	Level of Service F
> 10.0 and ≤ 20.0	Level of Service B	Level of Service F
> 20.0 and ≤ 35.0	Level of Service C	Level of Service F
> 35.0 and ≤ 55.0	Level of Service D	Level of Service F
> 55.0 and ≤ 80.0	Level of Service E	Level of Service F
> 80.0	Level of Service F	Level of Service F

The expectation is that TWSC and AWSC intersections are designed to carry smaller traffic volumes than signalized intersections. Therefore, the delay threshold times are lower for the same LOS grades. The following delays are used to determine **Unsignalized** levels of service:

Average Control Delay (seconds per vehicle)	Level of Service (v/c Ratio)	
	v/c ≤ 1.0	v/c > 1.0
≤ 10.0	Level of Service A	Level of Service F
> 10.0 and ≤ 15.0	Level of Service B	Level of Service F
> 15.0 and ≤ 25.0	Level of Service C	Level of Service F
> 25.0 and ≤ 35.0	Level of Service D	Level of Service F
> 35.0 and ≤ 50.0	Level of Service E	Level of Service F
> 50.0	Level of Service F	Level of Service F

** For individual lane groups (not overall approaches or intersections), HCM 6 automatically defines the signalized level of service as LOS F if the v/c ratio is above 1.0.*

APPENDIX B:
EXISTING LEVEL OF SERVICE/CAPACITY WORKSHEETS

1. Cumberland Avenue Site Driveway

There is no analysis for Cumberland Avenue and Allen Drive under existing conditions because neither direction has a stop sign.

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	36	0	0	28	0	0
Future Vol, veh/h	36	0	0	28	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	76	76	76	76	76	76
Heavy Vehicles, %	3	3	7	7	0	0
Mvmt Flow	47	0	0	37	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	47	0	84	47
Stage 1	-	-	-	-	47	-
Stage 2	-	-	-	-	37	-
Critical Hdwy	-	-	4.17	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.263	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1529	-	923	1028
Stage 1	-	-	-	-	981	-
Stage 2	-	-	-	-	991	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1529	-	923	1028
Mov Cap-2 Maneuver	-	-	-	-	923	-
Stage 1	-	-	-	-	981	-
Stage 2	-	-	-	-	991	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1529	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	59	0	0	28	0	0
Future Vol, veh/h	59	0	0	28	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	3	3	0	0	0	0
Mvmt Flow	89	0	0	42	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	89	0	131	89
Stage 1	-	-	-	-	89	-
Stage 2	-	-	-	-	42	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1519	-	868	975
Stage 1	-	-	-	-	940	-
Stage 2	-	-	-	-	986	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1519	-	868	975
Mov Cap-2 Maneuver	-	-	-	-	868	-
Stage 1	-	-	-	-	940	-
Stage 2	-	-	-	-	986	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1519	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

APPENDIX C:
BUILD LEVEL OF SERVICE/CAPACITY WORKSHEETS

1. Cumberland Avenue Site Driveway
2. Cumberland Avenue and Allen Drive

Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	37	12	19	29	0	0
Future Vol, veh/h	37	12	19	29	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	76	76	76	76	76	76
Heavy Vehicles, %	3	3	7	7	0	0
Mvmt Flow	49	16	25	38	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	65	0	145	57
Stage 1	-	-	-	-	57	-
Stage 2	-	-	-	-	88	-
Critical Hdwy	-	-	4.17	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.263	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1506	-	852	1015
Stage 1	-	-	-	-	971	-
Stage 2	-	-	-	-	940	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1506	-	838	1015
Mov Cap-2 Maneuver	-	-	-	-	838	-
Stage 1	-	-	-	-	971	-
Stage 2	-	-	-	-	924	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.9	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1506	-
HCM Lane V/C Ratio	-	-	-	0.017	-
HCM Control Delay (s)	0	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	60	0	0	29	13	19
Future Vol, veh/h	60	0	0	29	13	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	3	3	0	0	0	0
Mvmt Flow	91	0	0	44	20	29

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	91	0	135	91
Stage 1	-	-	-	-	91	-
Stage 2	-	-	-	-	44	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1517	-	863	972
Stage 1	-	-	-	-	938	-
Stage 2	-	-	-	-	984	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1517	-	863	972
Mov Cap-2 Maneuver	-	-	-	-	863	-
Stage 1	-	-	-	-	938	-
Stage 2	-	-	-	-	984	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	925	-	-	1517	-
HCM Lane V/C Ratio	0.052	-	-	-	-
HCM Control Delay (s)	9.1	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Intersection Delay, s/veh	7
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	37	0	0	0	0	48
Future Vol, veh/h	37	0	0	0	0	48
Peak Hour Factor	0.76	0.76	0.92	0.92	0.76	0.76
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	0	0	0	0	63
Number of Lanes	1	0	0	1	0	1

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.5	0	6.7
HCM LOS	A	-	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	100%	0%
Vol Thru, %	100%	0%	0%
Vol Right, %	0%	0%	100%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	0	37	48
LT Vol	0	37	0
Through Vol	0	0	0
RT Vol	0	0	48
Lane Flow Rate	0	49	63
Geometry Grp	1	1	1
Degree of Util (X)	0	0.057	0.06
Departure Headway (Hd)	4.066	4.244	3.418
Convergence, Y/N	Yes	Yes	Yes
Cap	0	848	1046
Service Time	2.098	2.252	1.445
HCM Lane V/C Ratio	0	0.058	0.06
HCM Control Delay	7.1	7.5	6.7
HCM Lane LOS	N	A	A
HCM 95th-tile Q	0	0.2	0.2

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	79	0	0	0	0	29
Future Vol, veh/h	79	0	0	0	0	29
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	120	0	0	0	0	44
Number of Lanes	1	0	0	1	0	1

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.9	0	6.8
HCM LOS	A	-	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	100%	0%
Vol Thru, %	100%	0%	0%
Vol Right, %	0%	0%	100%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	0	79	29
LT Vol	0	79	0
Through Vol	0	0	0
RT Vol	0	0	29
Lane Flow Rate	0	120	44
Geometry Grp	1	1	1
Degree of Util (X)	0	0.14	0.043
Departure Headway (Hd)	4.177	4.211	3.541
Convergence, Y/N	Yes	Yes	Yes
Cap	0	855	998
Service Time	2.249	2.219	1.608
HCM Lane V/C Ratio	0	0.14	0.044
HCM Control Delay	7.2	7.9	6.8
HCM Lane LOS	N	A	A
HCM 95th-tile Q	0	0.5	0.1