

December 10, 2010

Village of Cayuga Heights
836 Hanshaw Road
Ithaca, New York 14850

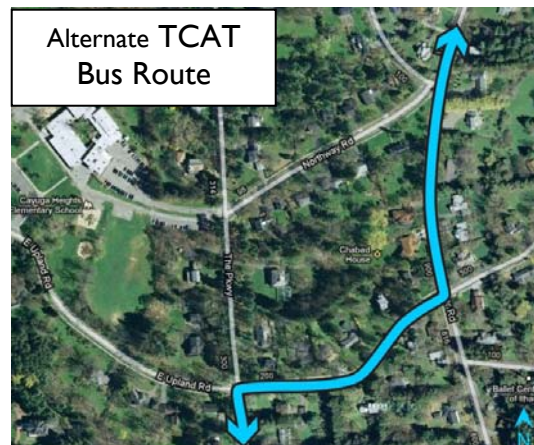
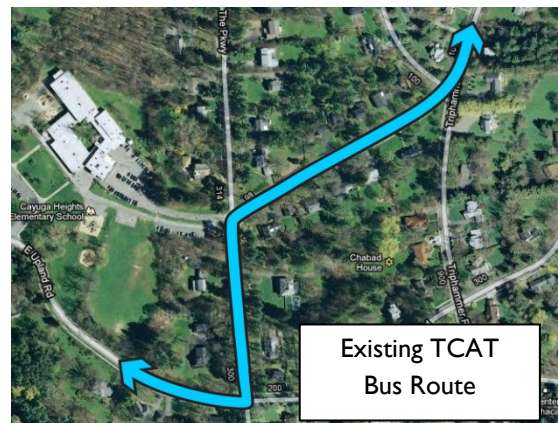
Attn: Mr. Brent Cross

RE: The Parkway-Northway Road- E Upland Road
Village of Cayuga Heights
Transportation Operations and TCAT Bus Route Evaluation

Dear Mr. Cross:

We have completed an evaluation of transportation operations and conditions in the immediate area surrounding Cayuga Heights Elementary school in the Village of Cayuga Heights, New York.

The purpose of this detailed engineering study is to document the existing characteristics and operations of the roadway network and intersections surrounding the school, and provide recommendations regarding any safety or operational issues pertaining to vehicular and pedestrian traffic and TCAT bus travel on these roadways. The existing route of the TCAT buses is depicted in the graphic to the right. Below that is an alternative route that the TCAT buses used previously. Our findings are summarized in the letter below.



Existing Peak Hour Conditions

In an effort to establish existing traffic conditions around the school, turning movement counts were collected at the following study area intersections.

- The Parkway/Northway Road/School driveway
- Triphammer Road/Northway Road/Midway Road
- Triphammer Road/E. Upland Road
- The Parkway/E. Upland Road

The counts were performed on November 5th 2010 from 7:15-8:15 AM and 1:45-3:45 PM. The intersection of The Parkway/Northway Road/school driveway was counted from 1:45-5:30 PM to

account for driveway traffic associated with the afterschool program. The afternoon peak hour occurred between 2:45-3:45 PM. Pedestrians and TCAT buses were also counted at the study intersections. The peak hour turning movement counts are depicted in **Figure 1**. TCAT bus peak hour volumes are illustrated in **Figure 2** and the pedestrian volumes are shown in **Figure 3**.

24-Hour Traffic Data Collection

Radar-based traffic data collection devices were installed at the following four locations:

- The Parkway north of Northway Road
- The Parkway south of Northway Road
- Northway Road north of The Parkway, and
- E. Upland Road between Triphammer Road and The Parkway

Twenty-four hour traffic data was collected October 19th through October 20th, 2010. The device recorded volume and speed data for a twenty-four hour period. Graphical illustrations of the data derived from the turning movement counts and twenty-four hour counts are available in the attachment to this letter. The twenty-four hour count data is depicted in **Figure 1**.

Speed Study

The speed data gathered by the radar devices has been analyzed to determine the 85th percentile speeds on the The Parkway, Northway Road, and E. Upland Road. The 85th percentile speed is defined as the speed at which 85% of vehicles are traveling at or under, while only 15% are exceeding that particular speed. This methodology is commonly used for design and safety monitoring purposes in the traffic engineering industry. The table below summarizes the 85th percentile speeds at each of the four study locations. The results indicate that travel speeds on all roadways are under the posted 30 MPH limit.

**TABLE I
SPEED STUDY RESULTS**

Location	85 th Percentile Speed (MPH)			
	Eastbound	Westbound	Northbound	Southbound
Parkway N. of Northway	NA	NA	26	26
Parkway S. of Northway	NA	NA	24	24
Northway Road	24	24	NA	NA
E. Upland Road	28	28	NA	NA

Capacity Analysis

Capacity analysis has been performed to assess the operation of each of the four study intersections. Capacity analysis is a technique used for determining a measure of effectiveness for a section of roadway and/or intersection based on the number of vehicles during a specific time period. The measure of effectiveness used for the capacity analysis is referred to as a Level of Service (LOS). Levels of Service are calculated to provide an indication of the amount of delay that a motorist experiences while traveling along a roadway or through an intersection. Since the most amount of delay to motorists

usually occurs at intersections, capacity analysis typically focuses on intersections, as opposed to highway segments.

Six Levels of Service are defined for analysis purposes. They are assigned letter designations, from "A" to "F", with LOS "A" representing the best conditions and LOS "F" the worst. Suggested ranges of service capacity and an explanation of Levels of Service are included in the Appendix.

The standard procedure for capacity analysis of signalized and unsignalized intersections is outlined in the Highway Capacity Manual (HCM 2000) published by the Transportation Research Board. Traffic analysis software, Synchro 7, which is based on procedures and methodologies contained in the HCM 2000, was used to analyze operating conditions at study area intersections. The procedure yields a Level of Service (LOS) based on the HCM 2000 as an indicator of how well intersections operate. The intersection of Triphammer Road/Northway Road/Midway Road was evaluated with SimTraffic software because Synchro is unable to analyze atypical intersection configurations. Both analysis methodologies are recognized and approved by NYSDOT, and use widely across the country.

Capacity results for existing conditions are listed in Table II. The discussion following the table summarizes capacity conditions. All capacity analysis calculations are included in the Appendix.

**TABLE II
CAPACITY ANALYSIS RESULTS**

INTERSECTION	EXISTING CONDITIONS	
	AM	PM
The Parkway/E. Upland Rd		
Eastbound	A	A
Westbound	A	A
Northbound	A	A
Southbound	A	A
E. Upland Rd/Triphammer Rd		
Eastbound	B	B
Westbound	B	B
Northbound	A	A
Southbound	A	A
Triphammer Rd/Northway Rd/Midway Rd		
Eastbound	A*	A*
Westbound	A*	A*
Northbound	A*	A*
Southbound	A*	A*
The Parkway/Northway Rd/School driveway		
Eastbound	B	A
Westbound	B	A
Northbound	A	A
Southbound	A	A

* Results derived from SimTraffic simulation due to atypical roadway geometry

The results indicate that all intersections operate at Level of Service (LOS) “B” or better on all approaches during the AM and PM peak hours. There are no capacity or delay issues at any of the study intersections.

Accident Analysis

The three (3) most recent years of accident data were requested from the Cayuga Heights Police Department. The police department furnished MV-104 forms detailing every accident that occurred at each of the four study intersections. Each accident report was studied to determine whether any discernable accident patterns exist at any of the intersections studied.

A total of seven (7) accidents were analyzed. Two of those seven accidents were collisions with deer. Most notably, there were two (2) right-angle collisions at the intersection of Triphammer Road/E. Upland Road. These two accidents, dating to 2007 and 2010, were both caused by drivers running the stop sign at the eastbound approach on E. Upland Road due to driver inattention. One other notable accident occurred when a large truck attempted to make the eastbound left from E. Upland Road onto The Parkway. The large vehicle struck a car parked on the northbound side of The Parkway immediately north of the intersection.

Aside from the three accidents mentioned in the preceding paragraph, no other significant accidents were identified. No discernable accident patterns can be observed at any of the study intersections.

Based on our review and analysis of accidents on the roadways surrounding Cayuga Heights Elementary School, there are no substantive safety deficiencies identified along either bus route.

School Zone Considerations

A field investigation of the roadways adjacent to the school revealed that no school zone pavement markings exist on the northbound and southbound approaches of The Parkway adjacent to the school driveway. It appeared that The Parkway was in the process of being re-sealed or repaved. It is unknown whether the markings existed in the past and have been recently paved over. It is recommended that school zone pavement markings be installed on both the northbound and southbound approaches to the intersection of The Parkway/Northway Road/school driveway.

The speed study results indicate that the 85th percentile speed of traffic on The Parkway, south of Northway Road, is 23-24 MPH during the afternoon school peak hour which exceeds the posted school speed limit of 15 MPH.

Bus Routing Factors and Considerations

The suitability of the appropriate bus route must take into account the information presented above, as well as the operational and context components as noted below.

- I. There are no substantive safety deficiencies along either route. No egregious safety deficiencies exist at any of the study intersections. However, there may be significant actual or perceived benefits to relocating the bus route to avoid the intersection of The Parkway/Northway Road/school driveway.

Guiding principles for the national Safe Routes to School Program calls for reducing the amount of traffic around schools, particularly large vehicle traffic. Another design principle limits vehicular-pedestrian conflicts at primary pedestrian crossing locations. Relocation of the TCAT bus route away from The Parkway/Northway/school driveway intersection would minimize the conflicts between school pedestrians and buses which are considered large vehicles.

Our experience with vehicular and pedestrian circulation and operational plans at many school facilities, and the “Safe Routes To School” initiative, have proven that separation of bus and pedestrian traffic provides significant benefits to school-age pedestrians and motorists. Ideally, the mixing of pedestrians and large vehicles like buses should be minimized to the extent practicable. This effectively reduces the potential for bus-pedestrian collisions dramatically.

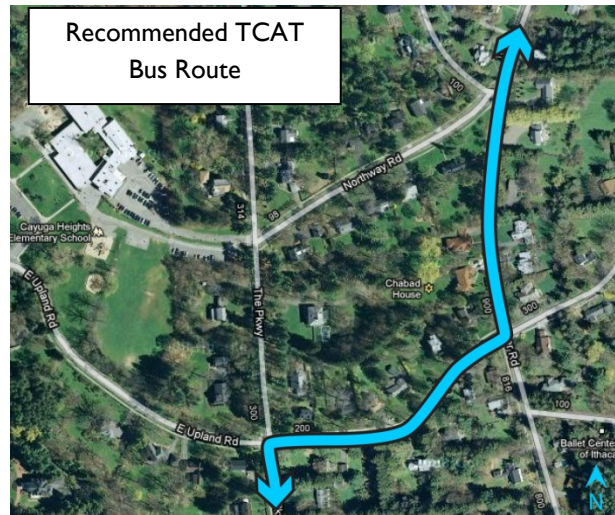
The designated school crossings at the intersection of The Parkway/Northway Road/school driveway indicate that those particular crossing locations are considered the safest places for one to cross the road. In addition, pedestrian crossings and potential vehicle/pedestrian conflicts are the greatest at the intersection of The Parkway/Northway Road/school driveway and on the north leg of The Parkway at Upland Road based upon the pedestrian crossing volumes shown in Figure 3. An effort should be made to maintain a high degree of safety; both real and perceived, at this location. A higher perception of safety by students and parents will increase the likelihood that children will walk to school and reap the health and environmental benefits from doing so.

2. The intersection of Triphammer Road/Northway Road/Midway Road is a skewed configuration. This less than desirable intersection geometry makes it difficult for motorists making the eastbound-left from Northway to Triphammer to easily and comfortably view the approaching northbound traffic on Triphammer Road. Large vehicles, in particular, have greater difficulty, and need more time to make a turning movement, and thus TCAT buses are more vulnerable to the conditions of cumbersome sight lines at this intersection.
3. The existing intersection geometry, largely the corner radius at Triphammer Road/E. Upland Road intersection may make it cumbersome for TCAT buses to make the southbound-right turning movement. The southbound-right movement may require that cars waiting on the eastbound approach avoid pulling all the way to the stop bar in order to let the bus make its turn.
4. TCAT buses currently must slow their travel speeds on The Parkway within the school zone to accommodate the existing 15 MPH speed limit during school times.

Recommendations

Based on our review of the physical and operational conditions of the study area roadways, it is recommended that the TCAT bus route be shifted to avoid the intersection of The Parkway/Northway Road/school driveway. The bus route relocation should prove mutually beneficial to TCAT and Cayuga Heights Elementary School. The buses should utilize E. Upland Road instead of Northway Road to travel between The Parkway and Triphammer Road. The proposed TCAT bus route is depicted in the graphic to the right.

The over-riding reason for bus route relocation is the reduction in traffic and potential conflict between bus traffic and school pedestrians at The Parkway/Northway Road/school driveway intersection to minimize risk of accidents.



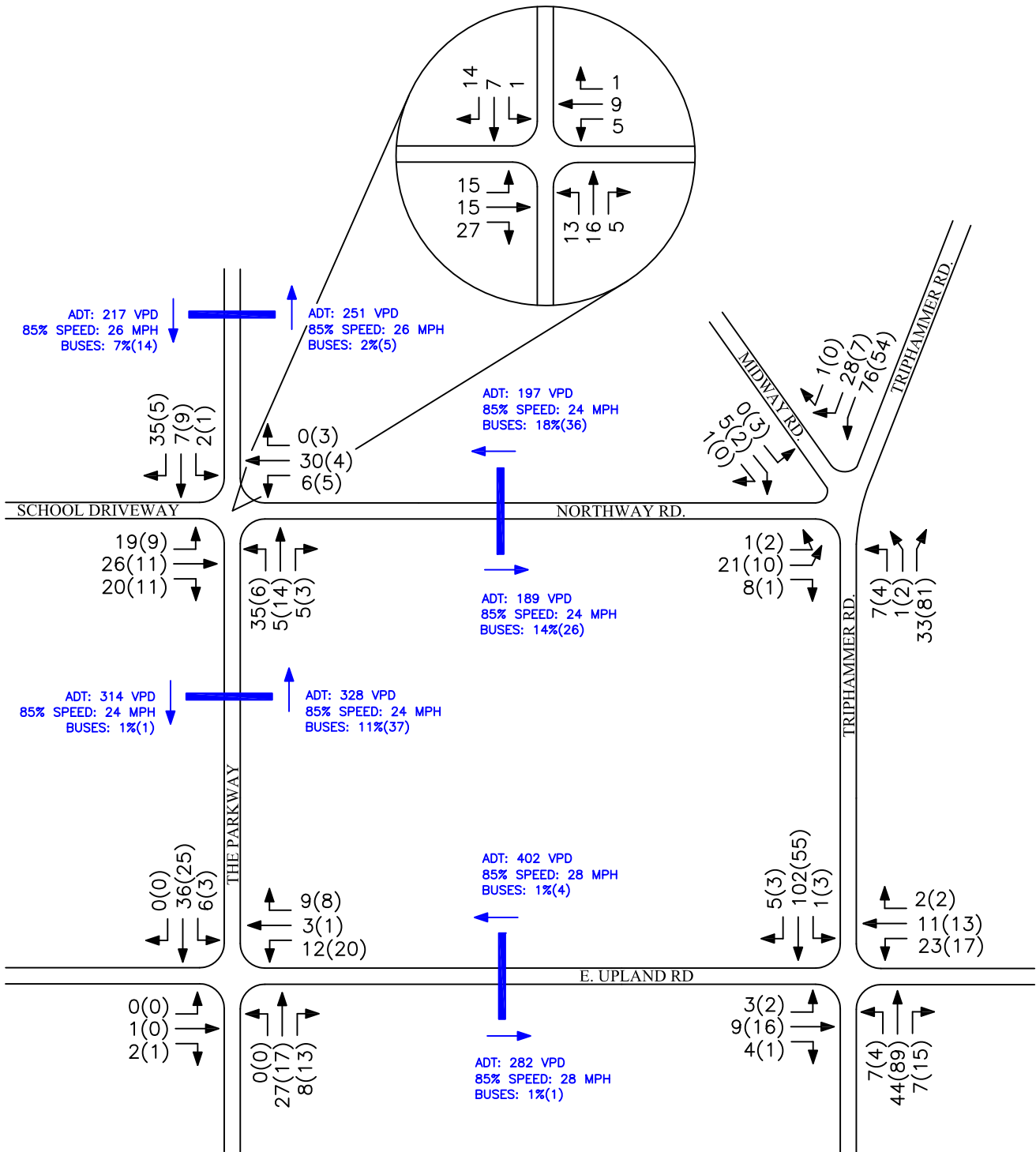
If you have any questions or are in need of additional information, please do not hesitate to contact our office.

Respectively Submitted,
SRF & Associates

Amy C. Dake, PE, PTOE
Senior Traffic Engineer

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SCHOOL PM PEAK HOUR (1:45)



PEAK HOURS = 7:15 AM(2:45 PM)
 VPD = VEHICLES PER DAY
 85% SPEED IN MILES PER HOUR
 XX(X) = PERCENTAGE OF BUSES(# OF BUSES PER DAY)



XX(X) = AM(PM)

FIGURE 1
 PEAK HOUR & 24
 HOUR VOLUMES, 85TH % SPEEDS

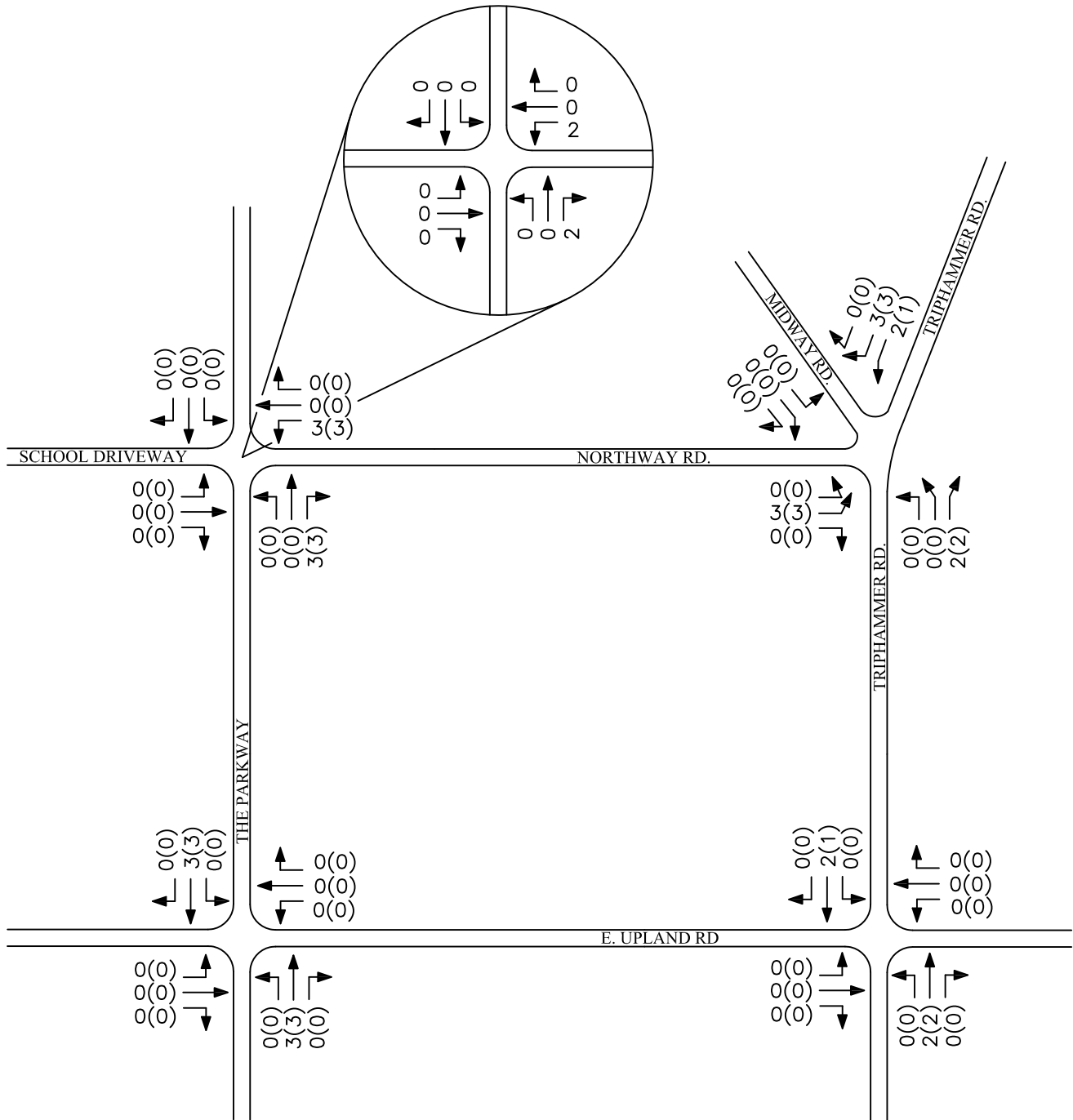
VILLAGE OF CAYUGA HEIGHTS
 TOMPKINS COUNTY, NEW YORK



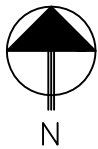
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SCHOOL PM PEAK HOUR (1:45)



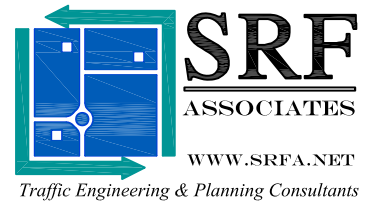
PEAK HOURS = 7:15 AM(2:45 PM)



XX(XX) = AM(PM)

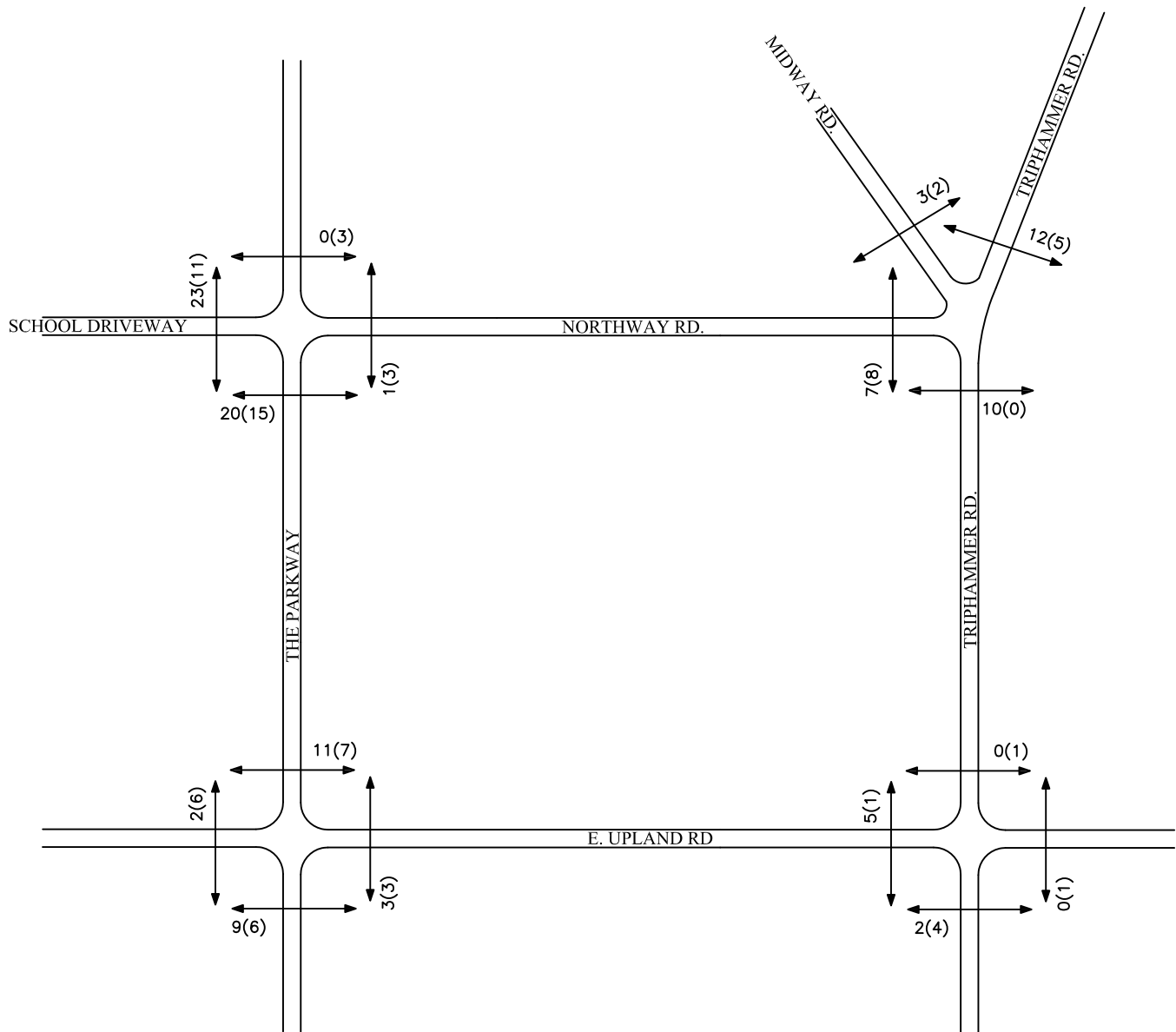
FIGURE 2
TCAT BUS
PEAK HOUR VOLUMES

VILLAGE OF CAYUGA HEIGHTS
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SCHOOL PEAK HOURS = 7:15 AM(1:45 PM)



XX(XX) = AM(PM)

FIGURE 3
PEDESTRIAN VOLUMES

VILLAGE OF CAYUGA HEIGHTS
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