January 13, 2022

Mr. William H. McMinn
Director of Facilities
Town of Madison/Madison Public Schools
284 Green Hill Road
Madison, CT 06443

RE: Traffic Evaluation
Proposed New Elementary School
Mungertown Road, Madison, Connecticut
SLR #141.15339.00006

Dear Mr. McMinn:

At your request, we have undertaken this study to evaluate traffic aspects associated with the proposed elementary school in Madison, Connecticut. The current elementary school, J. Milton Jeffrey Elementary, is located at 331 Copse Road and has 350 students in kindergarten to third grade. The proposed project will include constructing a new elementary school on vacant property on Mungertown Road at Map-Block 56-1; the enrollment is projected to increase to 625 students in pre-kindergarten to fifth grade.

The work comprising the study consisted of several tasks including field reconnaissance, data collection, review of roadway and traffic conditions, estimation of existing and new school-generated traffic volumes, and assessment of future traffic operations at key intersections. **Figure 1** shows the site location and surrounding roadway network.

EXISTING J. MILTON JEFFREY ELEMENTARY SCHOOL

J. Milton Jeffrey Elementary School (Jeffrey School) is located at 331 Copse Road. The site is currently occupied by the existing school building, bus loop, and school parking lots and is adjacent to Walter C. Polson Middle School and Daniel Hand High School. Jeffrey School is occupied by approximately 85 staff members and 350 students in kindergarten through third grade for the 2021-2022 school year. The school hours are 8:50 a.m. to 3:05 p.m. The school has an after-care program that houses up to 50 students.

It is our understanding that during the 2021-2022 school year, approximately 40 percent of students are dropped off and picked up, 60 percent are bussed, and a negligible percentage walk or bike to and from school. The school is currently serviced by 16 full-size buses.

Site access is available via several driveways at Copse Road. The school parking lot is accessible via separate entrance and exit driveways. Student drop-off takes place in the main parking lot, where vehicles queue in a loop through the parking lot. During pick-up, parents park in the lot and walk in to get their students.

The school has a bus loop with a separate access driveway at Copse Road. A handful of visitor and staff parking spaces are located off the bus loop.

Arrival and dismissal operations and parking at Jeffrey School were observed on Wednesday, November 17, 2021. During arrival and dismissal, parent vehicles enter at the driveway adjacent to the main parking lot and circulate through the parking lot. Buses use the bus loop driveway and drop students at the front of the school.

MUNGERTOWN ROAD SITE ENVIRONS

The new site is located on Mungertown Road south of Green Hills Road. Our study area included Mungertown Road from the Interstate 95 (I-95) southbound (SB) off-ramp to Green Hills Road and Green Hills Road from Nortontown Road to Copse Road. All intersections within our study area are unsignalized.

Green Hill Road is classified by the Connecticut Department of Transportation (CTDOT) as an urban collector and runs approximately east/west in the vicinity of the site with one lane in each direction. The posted speed limit is 30 miles per hour (mph), with a 25 mph school zone between the Daniel Hand High School driveway and Copse Road. Sidewalks are present on along the high school frontage of Green Hill Road. Both Daniel Hand High School and Walter C. Polson Middle School have access via Green Hill Road. At the intersection of Green Hill Road with Warpas Road, the southbound and eastbound approaches are stop controlled, while the westbound approach has no stop control.

A discussion should take place with the police department to understand why all-way stop was not implemented at the intersection of Warpas Road at Green Hills Road. Although traffic operations are generally good, having stop signs present on one of the two arterial approaches to an intersection does not meet driver expectations; all-way stop control should be considered here.

While not in our immediate study area, we found a similar situation exists at the four-way intersection of Green Hill Road at Ridge Road. Here, all approaches except the eastbound approach are stop controlled. This location should also be discussed with the police department.

Mungertown Road is an urban collector that runs approximately north/south with one lane in each direction. The posted speed limit is 30 mph. There are no sidewalks present along either side of Mungertown Road in the vicinity of the site. South of the study area, Mungertown Road provides access to I-95 north via Fort Path Road.

Crash Data Summary

Data on traffic crashes near the proposed site for the recent 3-year period of January 1, 2019, to January 10, 2022, was obtained via the Connecticut Crash Data Repository. This data is summarized in Table 1 by location, crash severity, and collision type.

TABLE 1
Crash Data Summary

LOCATION:	CRASH SEVERITY					TYPE OF COLLISION							
	SERIOUS INJURY	SUSPECTED MINOR INJURY	POSSIBLE INJURY	PROPERTY DAMAGE ONLY	TOTAL	ANGLE	BACKING	FIXED-OBJECT	HIT-OBJECT	REAR-END	SIDESWIPE, SAME DIRECTION	TREE	TOTAL
Mungertown Road at I-95 SB off-ramp/Nortontown Road			1	2	**3**	1	1		1				**3**
Mungertown Road between Green Hill Road and I-95 SB off-ramp				1	**1**							1	**1**
Mungertown Road at Green Hill Road		1	1		**2**	1				1			**2**
Green Hill Road between Warpas Road and Copse Road				1	**1**					1			**1**
Green Hill Road at high school driveway			1	2	**3**	1		1			1		**3**
Green Hill Road at Copse Road		2	2	8	**12**	10	1			1			**12**
TOTAL	**0**	**3**	**5**	**14**	**22**	**13**	**2**	**1**	**1**	**3**	**1**	**1**	**22**

Source: Connecticut Crash Data Repository from January 1, 2019 to January 6, 2022

A total of 22 crashes were reported within the study area during this period. Approximately 64 percent of the crashes resulted in property damage only. None of the reported crashes resulted in fatality or serious injury. The most common collision type was the angle collision, comprising 59 percent of reported crashes, followed by rear-end collisions at 14 percent. There was one collision that occurred near the proposed site frontage, which involved a motorist colliding with a tree just north of the driveway of 194 Mungertown Road. It is noted that approximately 55 percent of the reported collisions occurred at the intersection of Copse Road at Green Hill Road. Given the volume of traffic at this intersection, this collision rate seems high for the area. Ten of the twelve collisions at this intersection were angle-type collisions; over half of the angle-type collisions involved southbound vehicles colliding with eastbound vehicles, which may be indicative of poor sight lines for southbound vehicles looking to the right.

Existing Traffic Volumes

Traffic counts were conducted at the study intersections on Thursday, November 18, 2021, from 7:30 a.m. to 9:30 a.m. and 2:30 p.m. to 6:00 p.m. The school peak hours were extracted from the collected data and

found to be 8:00 a.m. to 9:00 a.m. and 3:00 p.m. to 4:00 p.m. **Figure 2** shows the existing peak-hour traffic volumes. The study intersections include:

1. Mungertown Road at Nortontown Road/I-95 southbound off-ramp
2. Green Hill Road at Nortontown Road
3. Green Hill Road at Mungertown Road
4. Green Hill Road at Warpas Road
5. Green Hill Road at Copse Road
6. Copse Road at existing Jeffrey School parking lot
7. Copse Road at existing Jeffrey School bus loop

The existing Jeffrey School driveway volumes were also extracted from the traffic counts. It was found that 244 vehicles entered or exited the site during the arrival peak hour and 237 exited or entered at dismissal. We estimate that there were 82 vehicles that dropped students off in the morning during the peak hour and 75 that picked up students during the dismissal peak hour. In Table 2, the breakdown by peak hour for parents, staff, and buses is provided.

TABLE 2
Site-Generated Traffic Estimates
2021-2022 School Year

TRIP TYPE	WEEKDAY MORNING PEAK HOUR			WEEKDAY AFTERNOON PEAK HOUR		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Parent Cars	82	82	164	75	75	150
Staff Cars	48	0	48	0	55	55
Buses	16	16	32	16	16	32
TOTAL	**146**	**98**	**244**	**91**	**146**	**237**

Based on the traffic counts, it is estimated that approximately 50 parent vehicles were waiting on site during the peak of pick-up operations. Given that there are 325 students in attendance at Jeffrey School, this indicates that the number of cars that may be waiting during pick-up would equal approximately 15 percent of the student population.

Parking observations were also made on the day of the counts. In total, there were 80 vehicles parked on site after 9:30 a.m. (once drop-off had ended and school had begun) and 79 vehicles parked on site before 2:30 p.m. (before dismissal). This equates to a parking demand of approximately 1 parked vehicle per staff member.

PROPOSED NEW SCHOOL

The new elementary school is proposed to be constructed on Mungertown Road at Map-Block 56-1, which is currently vacant. The school enrollment is projected to increase from 350 students and 85 staff members in kindergarten through third grade to approximately 625 students and 125 staff members in pre-kindergarten through fifth grade by 2025. The number of school buses will increase from 16 to 25.

Based on extrapolation of the Jeffrey School demographics, trip characteristics, and parking demand, we recommend the site have 125 parking spaces available for staff and visitors, meeting the parking demand of 1 space per staff member.

Based on the anticipated increase in student enrollment from 350 students to 625 students at the proposed school, the future site should accommodate 100 waiting parent vehicles, either in a pick-up lane, additional parking lot, or some combination of the two. Drop-off operations need to be scrutinized as well to ensure that the pick-up accommodations work for future drop-off operations as well. Additionally, the parent pick-up and drop-off operations should ideally be separated from both the normal staff/visitor operations and the bus area. The bus lane at the proposed school should accommodate all 25 future buses on site.

Site access will be provided via Mungertown Road. **Sight distances** were evaluated along the proposed site frontage on Mungertown Road. Based on the CTDOT guidelines, a sight distance of 335 feet would be required for the posted speed limit of 30 mph looking in either direction. It was determined that this distance should be easily achievable at most locations along the site frontage. Going forward, however, when determining the final driveway location, current speed data on Mungertown Road should be collected via Automatic Traffic Recorder (ATR) to determine the 85th percentile speed. Sight distances should be achieved for this speed. Some clearing along Mungertown Road and perhaps rebuilding some sections of an existing stone wall may be required. Additionally, a school zone should be considered when approaching the proposed school driveway along the site frontage to best control travel speeds.

SITE-GENERATED TRAFFIC

New peak-hour trips that are expected to be generated by the proposed school were estimated by expanding the existing school-related traffic based on the anticipated enrollment of the new elementary school (enrollment will increase by a factor of 1.79 and staff will increase by a factor of 1.47). The parent vehicle volumes were multiplied by a factor of 1.8 and the teacher vehicle volumes were multiplied by a factor of 1.5 to estimate the new traffic that will be added because of the proposed school. Additionally, the number of buses was increased to 25 buses. Table 3 summarizes the estimated site-generated traffic for 2025 during the study peak hours.

TABLE 3
Proposed Site-Generated Traffic Estimates

TRIP TYPE	WEEKDAY MORNING PEAK HOUR			WEEKDAY AFTERNOON PEAK HOUR		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Parent Cars	150	150	300	135	135	270
Staff Cars	70	0	70	0	85	85
Buses	25	25	50	25	25	50
TOTAL	**245**	**175**	**420**	**160**	**245**	**405**

The geographic distribution of the site-generated traffic was estimated based on review of the existing roadway traffic patterns at the study intersections. **Figure 3** shows the estimated future site traffic distribution through the study intersections for parent and staff vehicles. **Figure 4** shows the estimated future site-generated traffic based on this route distribution for parent and staff vehicles during the weekday morning and afternoon peak hours. **Figure 5** shows the future site-generated bus trips for the weekday morning and afternoon peak hours.

FUTURE TRAFFIC VOLUMES

Future roadway traffic volumes were estimated both with and without the proposed school in place in order to determine possible traffic impacts. This proposed school is anticipated to open at full expanded enrollment in August 2025.

The **background traffic** scenario is reflective of future conditions before the new school is built and was estimated by expanding the baseline (2021 existing) traffic volumes to the estimated opening year of 2025 using an annual growth rate of 0.75 percent, per input from CTDOT. Correspondence with the Town of Madison and CTDOT finds that there are no nearby upcoming developments that are anticipated to add traffic through the study area. The resultant 2025 estimated traffic volumes reflect conditions without the proposed school and can be seen in **Figure 6** as the background traffic volumes.

The **combined traffic** scenario is reflective of future conditions after the proposed new school is built and opened. The combined traffic scenario was estimated by removing the existing school traffic and adding the new site traffic generated by the proposed school to the background traffic. The resultant estimated 2025 future combined traffic volumes are also shown on **Figure 7.** It is noted that the future combined traffic scenario results in a reduction of approximately 60 trips at the intersection of Copse Road at Green Hill Road during each study peak hour after the Jeffrey School traffic is removed and the new school traffic is added.

Intersection Capacity Analysis

The future background and combined traffic scenarios were evaluated by means of capacity analysis techniques. These analyses were used to determine the quality of operations at the study intersections, and a comparison of background versus combined traffic operations allows for a determination of possible traffic impacts from the proposed development. The quality of operations is measured and expressed as a level of service (LOS); LOS is defined as a measure of inconvenience that motorists experience. The levels are expressed with letter designations of A through F. In most communities, LOS D or better during peak hours is considered acceptable.

Table 4 summarizes the results of the capacity analysis. A more detailed explanation of LOS and the analysis worksheets are provided in the Appendix. As can be seen, traffic conditions are expected to remain good at peak-hour LOS C or better for almost all movements during both peak hours.

One exception is the intersection of Mungertown Road and the I-95 SB off-ramp. Due to the location of

the new school, Mungertown Road is expected to have an increase in trips during both peak hours, resulting in a decrease in LOS from LOS C to LOS E for the off-ramp at the intersections near the proposed site.

TABLE 4
Capacity Analysis Summary

MOVEMENTS	WEEKDAY MORNING PEAK HOUR		WEEKDAY AFTERNOON PEAK HOUR	
	BACKGROUND	COMBINED	BACKGROUND	COMBINED
Unsignalized				
Mungertown Road at Nortontown Road/I-95 southbound off-ramp				
Northbound Left/Through	A	A	A	A
Eastbound Left/Right	A	B	A	B
Westbound Left/Through/Right	C	E	B	C
Green Hill Road at Nortontown Road				
Northbound Left/Through/Right	A	A	A	A
Eastbound Left/Through/Right	A	A	A	A
Westbound Left/Through/Right	A	A	A	A
Southbound Left/Through/Right	A	A	A	A
Green Hill Road at Mungertown Road				
Northbound Left/Through/Right	A	B	B	B
Eastbound Left	A	A	A	A
Westbound Left	A	A	A	A
Southbound Left/Through/Right	B	B	B	B
Green Hill Road at Warpas Road				
Eastbound Through/Left	A	A	A	A
Southbound Left/Right	A	A	A	A
Green Hill Road at Copse Road				
Northbound Left/Through/Right	B	B	B	B
Eastbound Left	A	A	A	A
Westbound Left	A	A	A	A
Southbound Left/Through/Right	B	B	B	B
Copse Road at existing school parking lot				
Northbound Left/Right	B	--	B	--
Westbound Left	A	--	A	--
Copse Road at existing school bus loop				
Northbound Left/Right	B	--	A	--
Westbound Left	A	--	A	--
Mungertown Road at proposed school driveway				
Westbound Left/Right	--	C	--	C
Southbound Left	--	A	--	A

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ACTIVE TRANSPORTATION EVALUATION

Relocating and expanding the J. Milton Jeffrey Elementary School in Madison to a new site on Mungertown Road near the Green Hill Road intersection provides an opportunity to rethink Safe Routes to School (SRTS) in Madison–in conformity with the Town's recent Complete Streets Policy and Federal SRTS guidelines. The following indicates that sidewalks are desirable, especially in the vicinity of schools.

- Madison's Complete Streets Policy, adopted in 2018, "...shall direct the design, construction, use, and maintenance of town roadways, pathways, and sidewalks creating a comprehensive, integrated transportation network that is safe, accessible, comfortable, accommodating, and welcoming to all users." This policy mentions the importance of sidewalks and crosswalks around schools six times and one of its primary performance indicators is the number of linear feet of sidewalks and other pedestrian accommodations built or improved within 0.5 miles of schools.

- Madison's Bicycle & Pedestrian Advisory Committee oversees the compliance and reporting of the Town's Complete Streets policy. Since the Complete Streets policy's adoption, no sidewalks or other pedestrian accommodations have been built or improved within the 0.5 mile radius of schools.

- The U.S. Department of Transportation provides guidance on implementing SRTS programs; these can improve safety for children and create a culture of walking and bicycling for transportation. They provide opportunities for people to become more physically active and to rely less on their cars. SRTS programs also can result in reduced traffic congestion and motor vehicle emissions.

It is frequently the case that students do not walk or bike to school because no adequate sidewalk exists for the entirety of their route. If built, however, walking and biking are naturally encouraged. In fact, studies have shown that providing sidewalks is one of the most effective engineering measures in encouraging children to walk to school.

Our observations at Jeffrey Elementary School indicated that few, if any, students currently walk or bike to school, and 60 percent of students arrive by bus. Additionally, most staff come in personal cars, and some 40 percent of students get dropped off by parents. At your direction, we evaluated the potential of building sidewalks in the vicinity of the new school site, and more specifically, connecting to existing sidewalks along the Daniel Hand High School frontage on Green Hill Road. To do this, we assembled available mapping and superimposed a 5-foot sidewalk from the proposed site to the high school. We then evaluated the route in terms of available right-of-way (ROW) as well as physical constraints along the path. In **Figure 8** the path is shown along with considerations annotated from this evaluation.

The key findings are:

1. A sidewalk along the new school frontage appears to be easily accommodated. Some tree clearing and perhaps re-building some sections of the existing stone wall may be required. This

depends on whether a grass strip is desired between the sidewalk and the road, which is recommended and included in the high school sidewalk that was recently built.

2. To the south of the proposed site, a sidewalk appears to be easily constructable to at least Derenthal Drive where walking access to several homes would materialize. Beyond here, there are grade challenges highlighted by existing guiderail in the vicinity of Nortontown Road/the I-95 southbound off-ramp.

3. Between the site frontage and Green Hills Road, there appears to be room for a sidewalk with minimal clearing, assuming no grass strip buffer. A significant stand of trees could be affected should the grass strip be included.

4. At the intersection of Mungertown Road and Green Hills Road there appears to be ample ROW and open area to install sidewalk. There is also room on the opposite corners of the intersection to install accessible infrastructure should a crosswalk be desired here.

5. Sidewalk along Green Hill Road is fraught with challenges. These include a very large mature tree, several other large trees, grading challenges, private property, a wooden fence, and most notably, the bridge abutment and guiderail approaches to a crossing of Neck River.

Based on our review of the physical environment, and the desire to begin providing accommodations for pedestrians, we suggest that sidewalks be included along the site frontage of the proposed new school to begin creating this amenity. In conjunction with neighbor input, the sidewalk could be extended to Green Hills Road to the north and as far south as Derenthal Drive. Strategically placed crosswalks could also be considered. This would begin to create the walking environment that local and federal guidance would suggest as desirable.

CONCLUSION AND RECOMMENDATIONS

This study was conducted to assess the traffic implications of a proposed new school on Mungertown Road in Madison. To determine a profile of existing conditions, detailed field reconnaissance and data assembly efforts were undertaken. The new traffic that will be generated by the proposed school was estimated based on travel patterns at the existing Jeffrey School that we understand will be closed. Intersection capacity analyses were performed comparing existing and future conditions at the study intersections near the proposed site. The recommendations regarding the proposed new school are as follows:

- Sidewalk should be included along the site frontage of the proposed new school to begin creating a walking environment for students. The sidewalk could be extended along Mungertown Road to Green Hills Road to the north and as far south as Derenthal Drive. Strategically placed crosswalks could also be considered.

- A discussion should take place with the police department to understand why an all-way stop was not implemented at the intersection of Green Hill Road at Warpas Road, since intersections with

two out of three stops are somewhat unusual traffic control and generally not consistent with driver expectations.

- The intersection of Green Hill Road at Ridge Road should also be reviewed since it similarly only has stop signs on three of the four approaches, although this intersection is out of the study area.

- Once the final site driveway location is determined, sight lines should be provided for drivers egressing the site onto Mungertown Road; the sight lines should extend at least 335 feet in either direction to meet CTDOT guidelines for the posted speed limit. However, speeds on Mungertown Road should be collected via ATR to determine 85th percentile speeds past the site and the goal should be to have sight distances that meet the 85th percentile criteria.

- Any brush or overhanging branches within the ROW that obscure drivers' line of sight should be cleared and maintained as such. Some rebuilding of sections of an existing stone wall may be required as well, depending on the final driveway locations.

- A school zone should be considered on Mungertown Road approaching the proposed site driveway.

- The site design should include provisions for accommodating all 25 buses in their own separate area. The goal should be to separate buses from parent pick-up/drop-off and other traffic to the extent possible.

- For 650 students, parking for 125 cars should be programmed for staff and visitors.

- Depending on how pick-up and drop-off are managed, there should be room on site for at least 100 parent vehicles waiting to pick up.

- Drop-off operations are typically not a problem if managed correctly. However, if the operation is different than pick-up, attention should be paid to accommodating both operations.

We hope this report is useful to you and the Town of Madison. If you have any questions or need anything further, please do not hesitate to contact the undersigned.

Sincerely,

SLR International Corporation

David G. Sullivan, PE
U.S. Manager of Traffic & Transportation Planning

Enclosures

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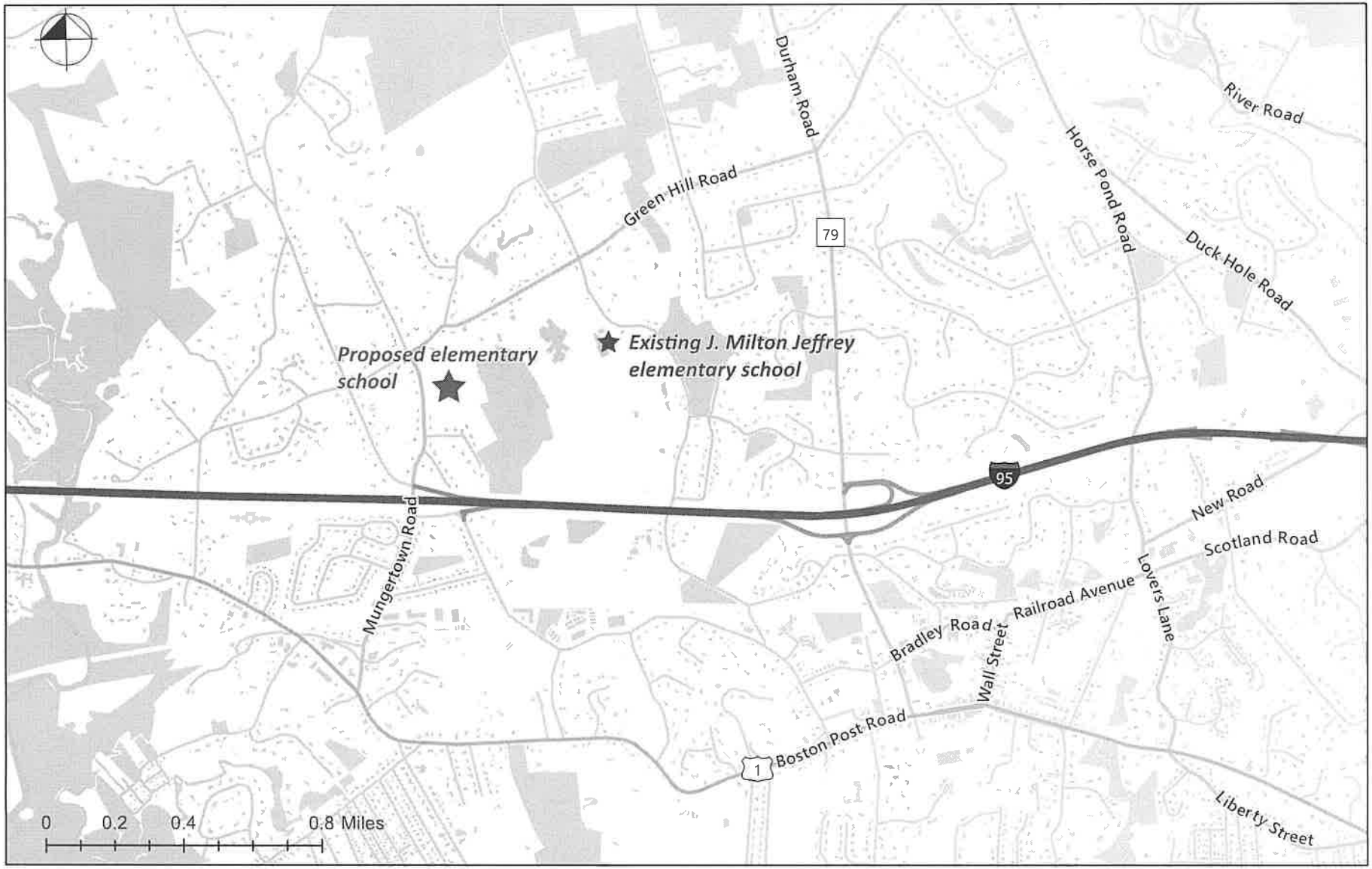

FIGURE 1
SITE LOCATION AND SURROUNDING ROADWAY AREA

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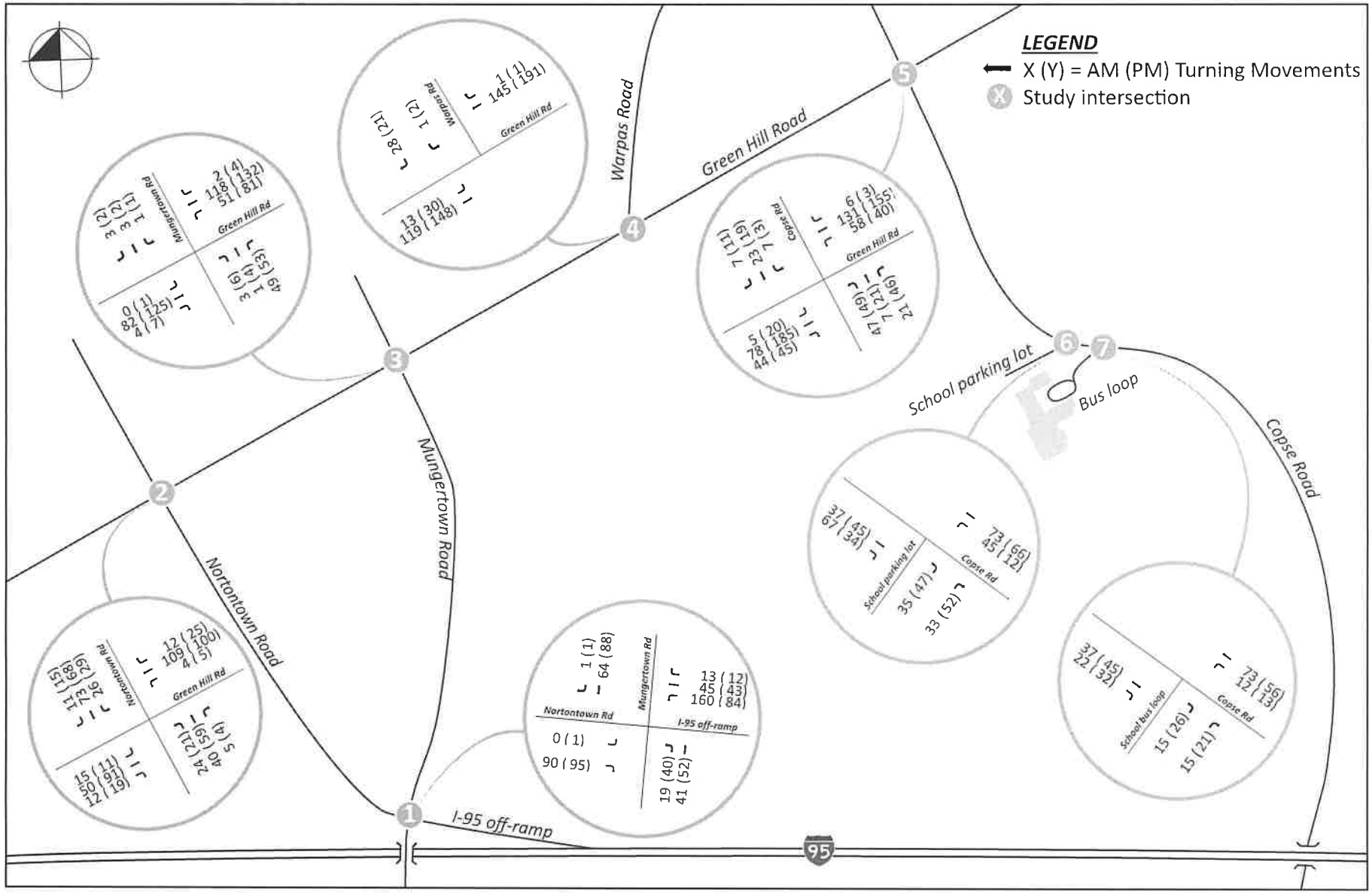

WEEKDAY MORNING PEAK HOUR (8:00 A.M. TO 9:00 A.M.)
WEEKDAY AFTERNOON PEAK HOUR (3:00 P.M. TO 4:00 P.M.

FIGURE 2
2021 BASELINE TRAFFIC VOLUMES

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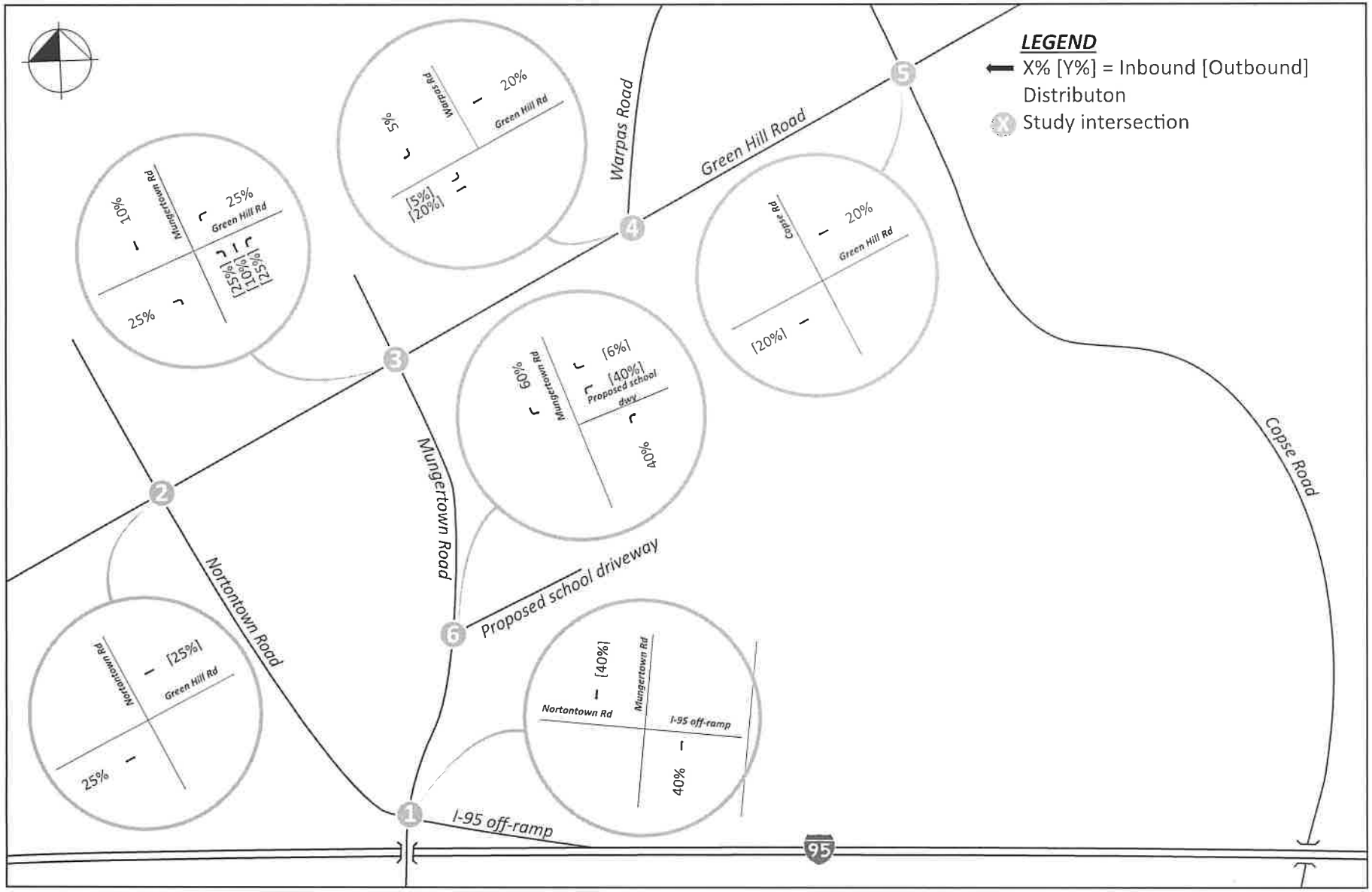

FIGURE 3
PROPOSED SITE TRAFFIC DISTRIBUTION - PARENT AND STAFF VEHICLES

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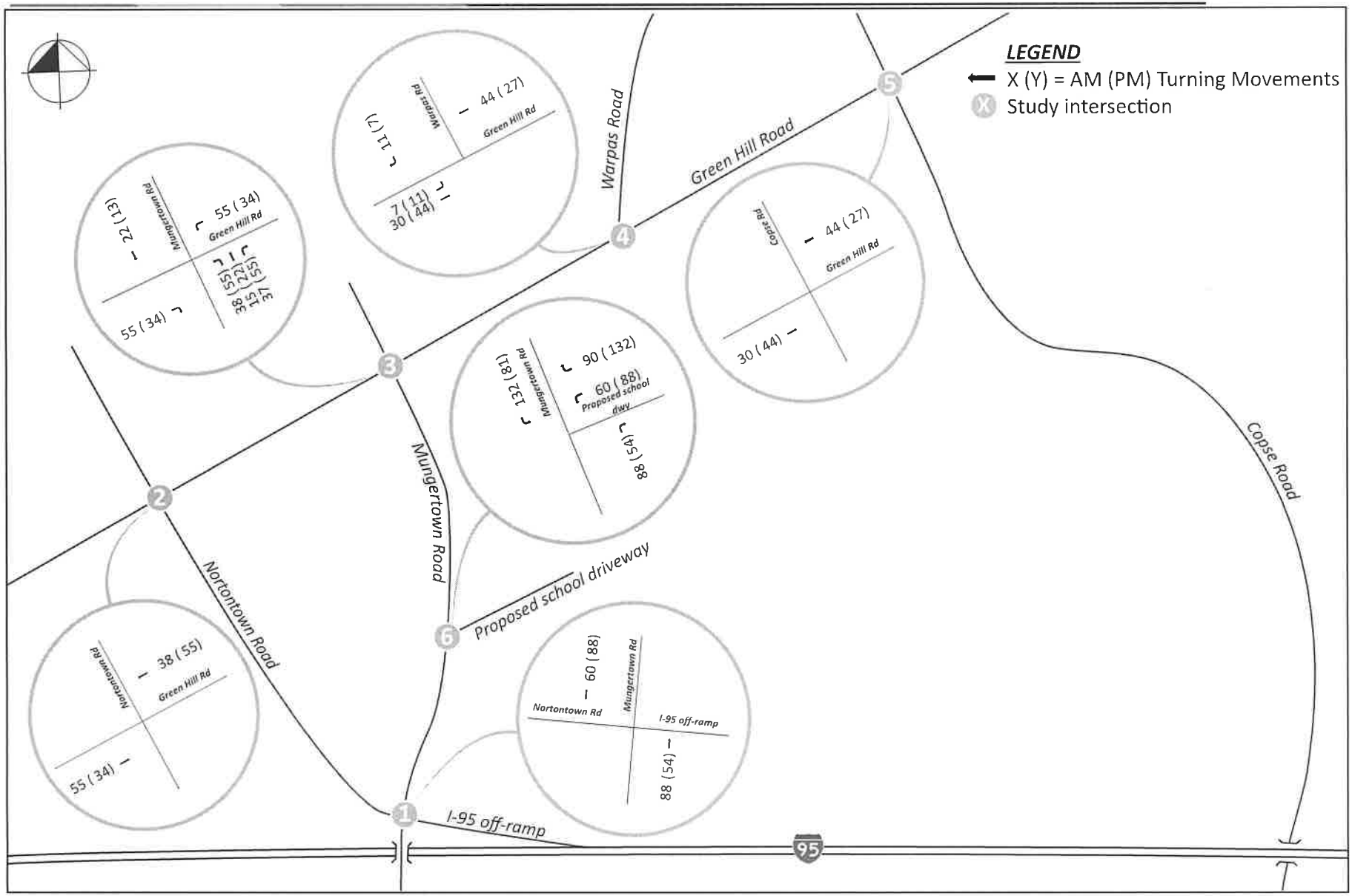

WEEKDAY MORNING PEAK HOUR (8:00 A.M. TO 9:00 A.M.)
WEEKDAY AFTERNOON PEAK HOUR (3:00 P.M. TO 4:00 P.M.

FIGURE 4
SITE-GENERATED TRAFFIC VOLUMES - PARENT AND STAFF VEHICLES

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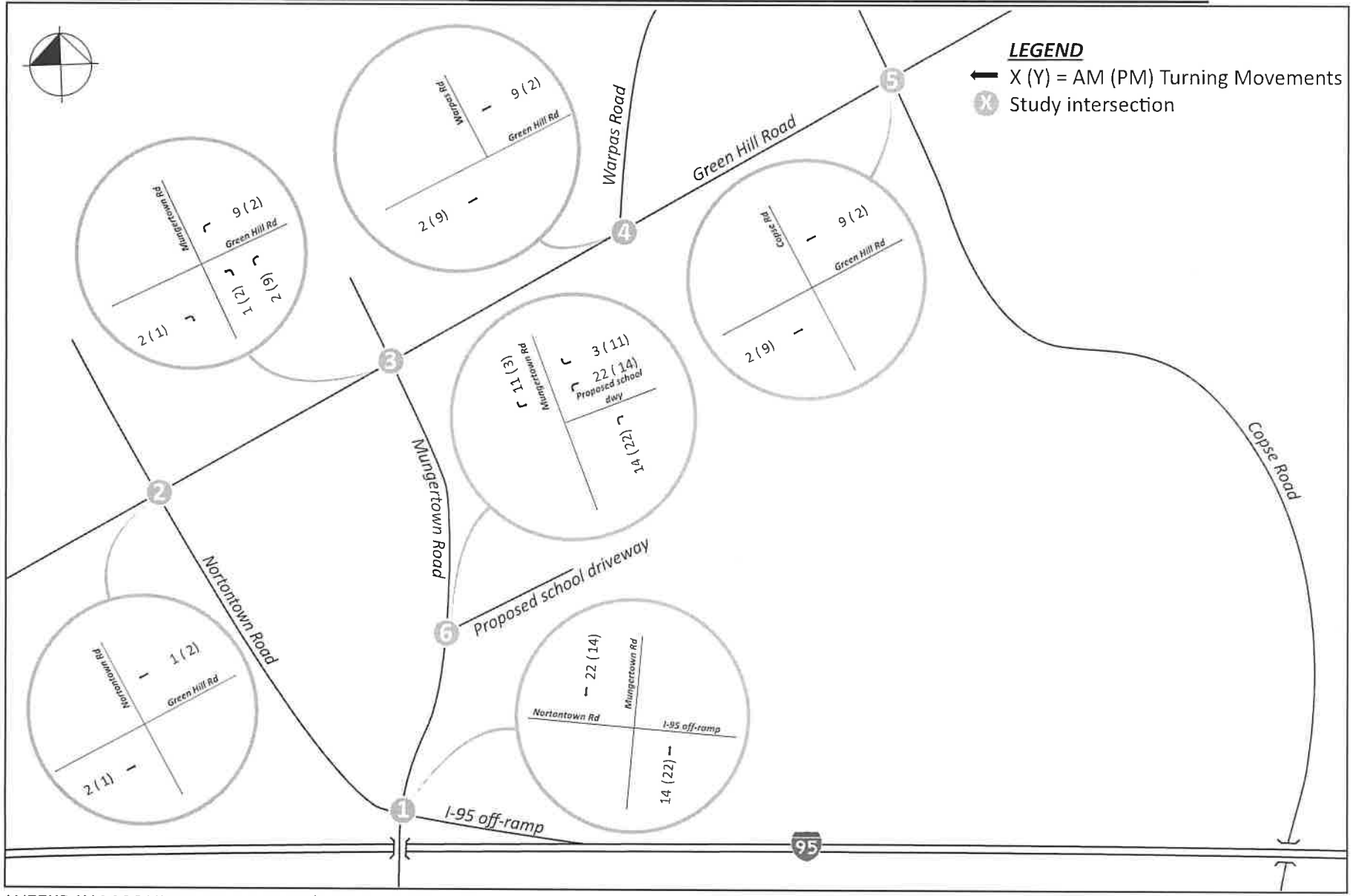

WEEKDAY MORNING PEAK HOUR (8:00 A.M. TO 9:00 A.M.)
WEEKDAY AFTERNOON PEAK HOUR (3:00 P.M. TO 4:00 P.M.

FIGURE 5
SITE-GENERATED TRAFFIC VOLUMES - BUS TRIPS

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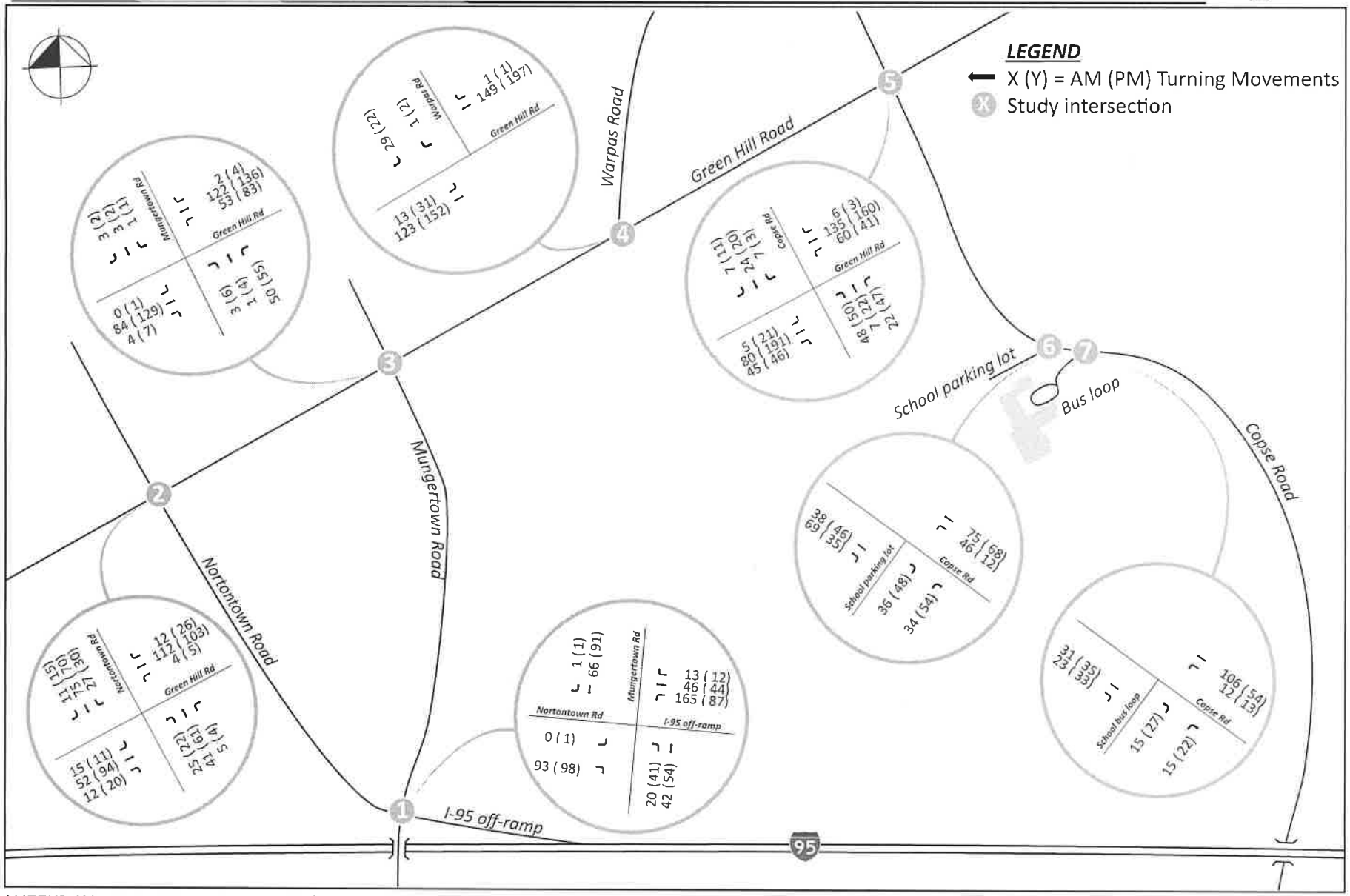

WEEKDAY MORNING PEAK HOUR (8:00 A.M. TO 9:00 A.M.)
WEEKDAY AFTERNOON PEAK HOUR (3:00 P.M. TO 4:00 P.M.

FIGURE 6
2025 BACKGROUND TRAFFIC VOLUMES

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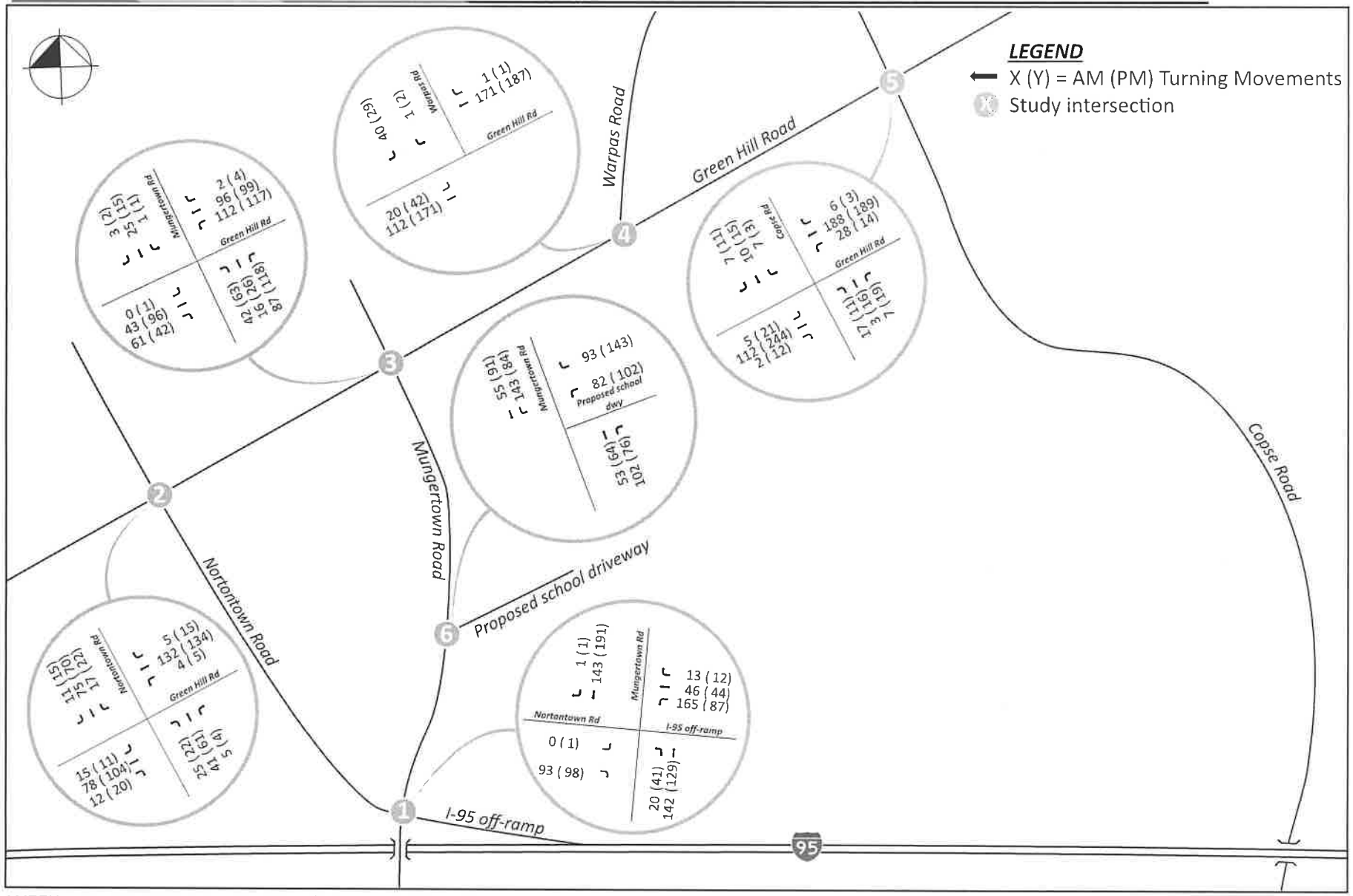
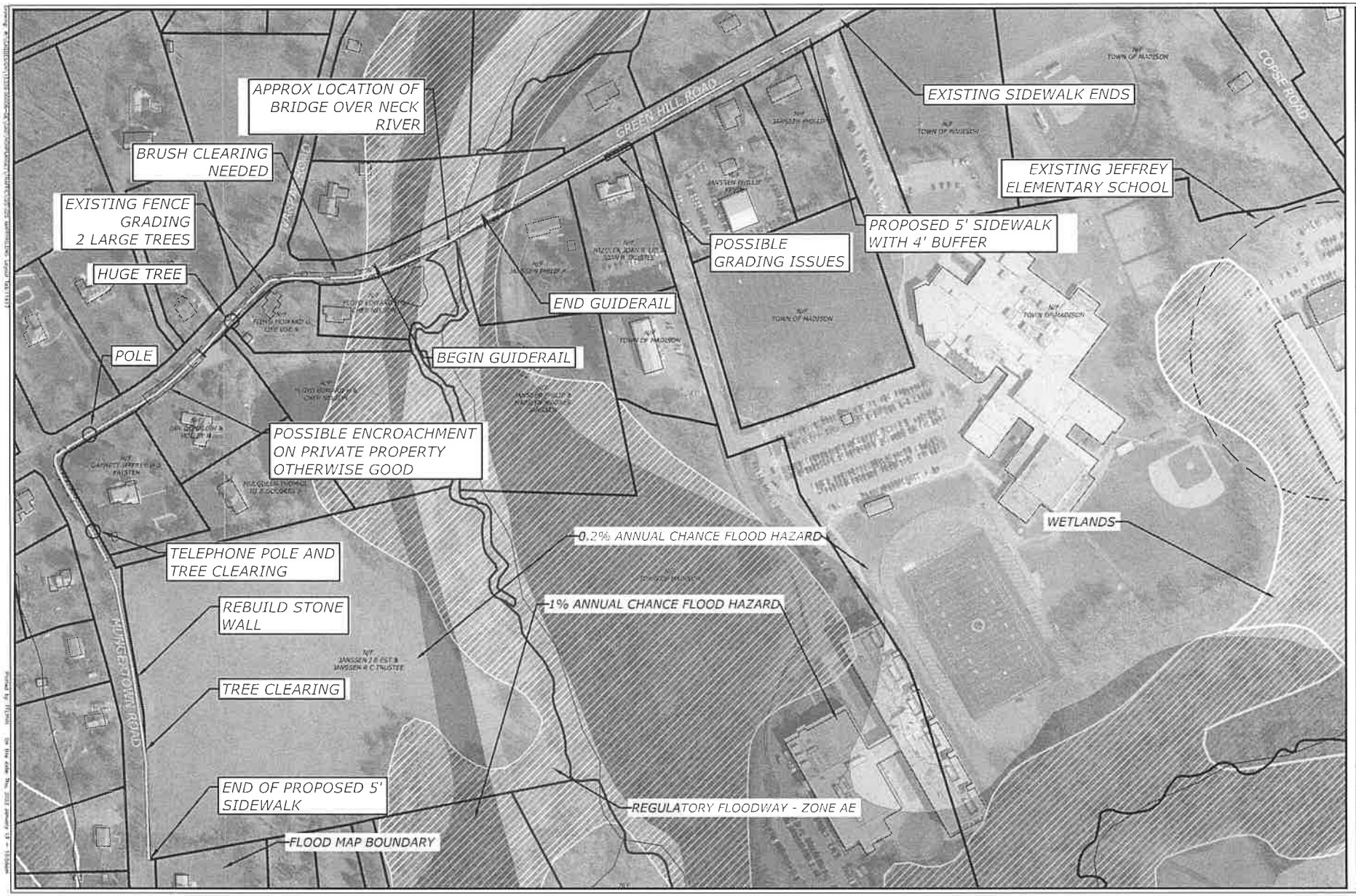


WEEKDAY MORNING PEAK HOUR (8:00 A.M. TO 9:00 A.M.)
WEEKDAY AFTERNOON PEAK HOUR (3:00 P.M. TO 4:00 P.M.

FIGURE 7
2025 COMBINED TRAFFIC VOLUMES



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REVISIONS

PROPOSED SIDEWALK EVALUATION

MADISON ELEMENTARY SCHOOL

HUNGERTOWN ROAD
MADISON, CONNECTICUT

-	FMF	DGS

1"=200'

JANUARY 13, 2022

141.15339.00006

FIG 8