APPLICATION 2019-698 STAFF REPORT
ELIZABETH LANE ELEMENTARY
MOBILE CLASSROOM SUNSET REQUEST

Pre Public Hearing Staff Analysis · July 2019

Town of Matthews™ North Carolina

SUMMARY

Location

121 Elizabeth Lane

Ownership/Applicant

Charlotte Mecklenburg Schools

Zoning

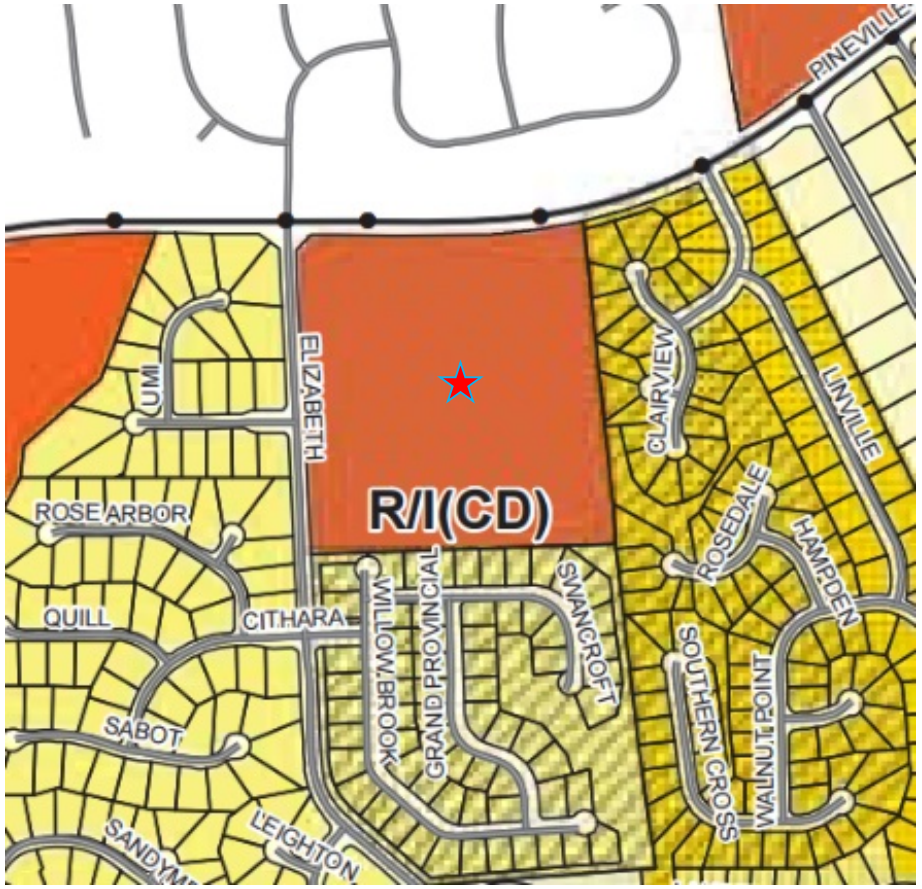
R/I (CD)

Use

Elementary School

Request Summary

Charlotte Mecklenburg Schools request a two year extension to the mobile classroom sunset provision for 8 classrooms located outside of the original 1995 boundary.



SITE INFORMATION AND BACKGROUND

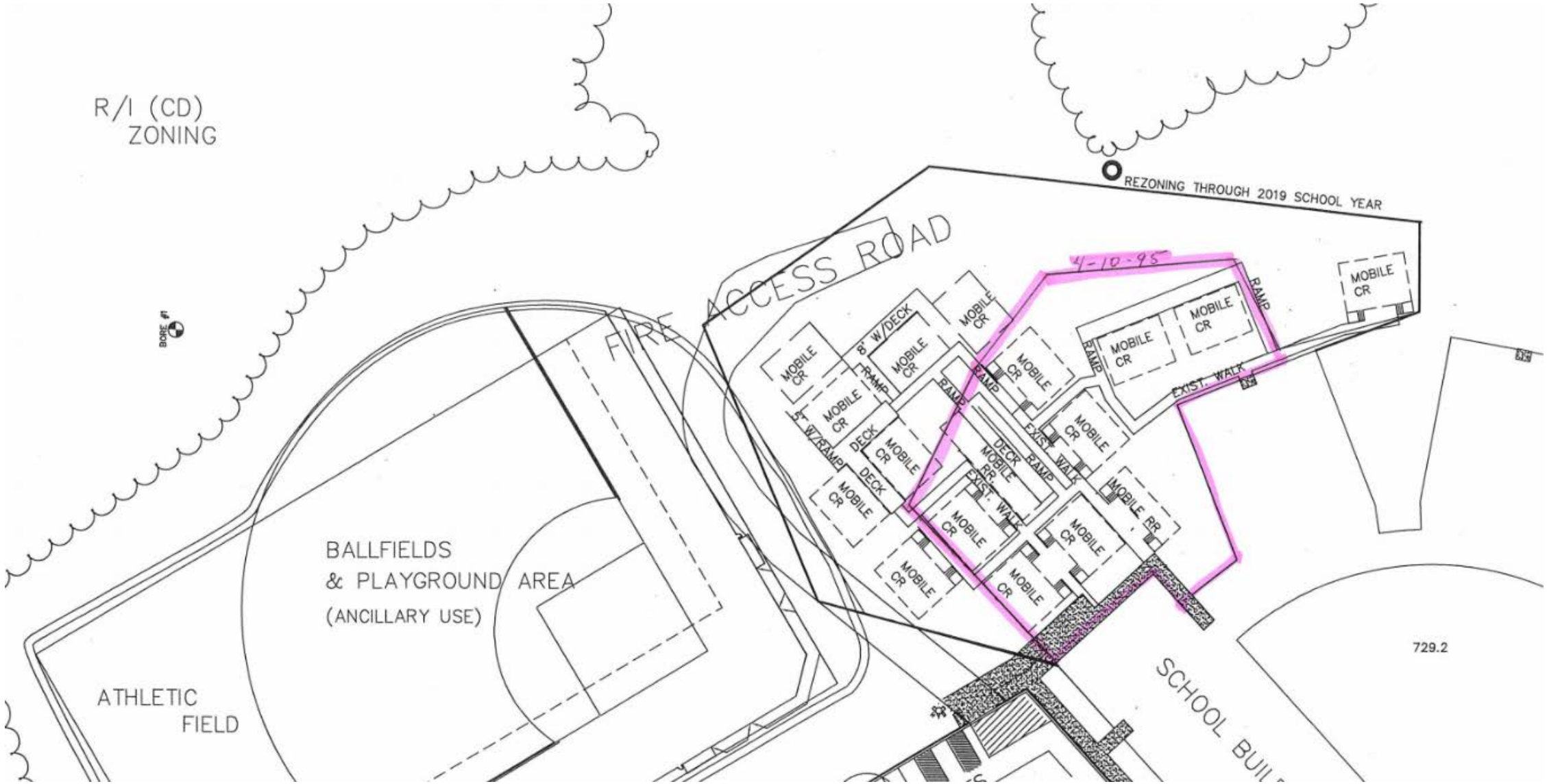
Site Summary

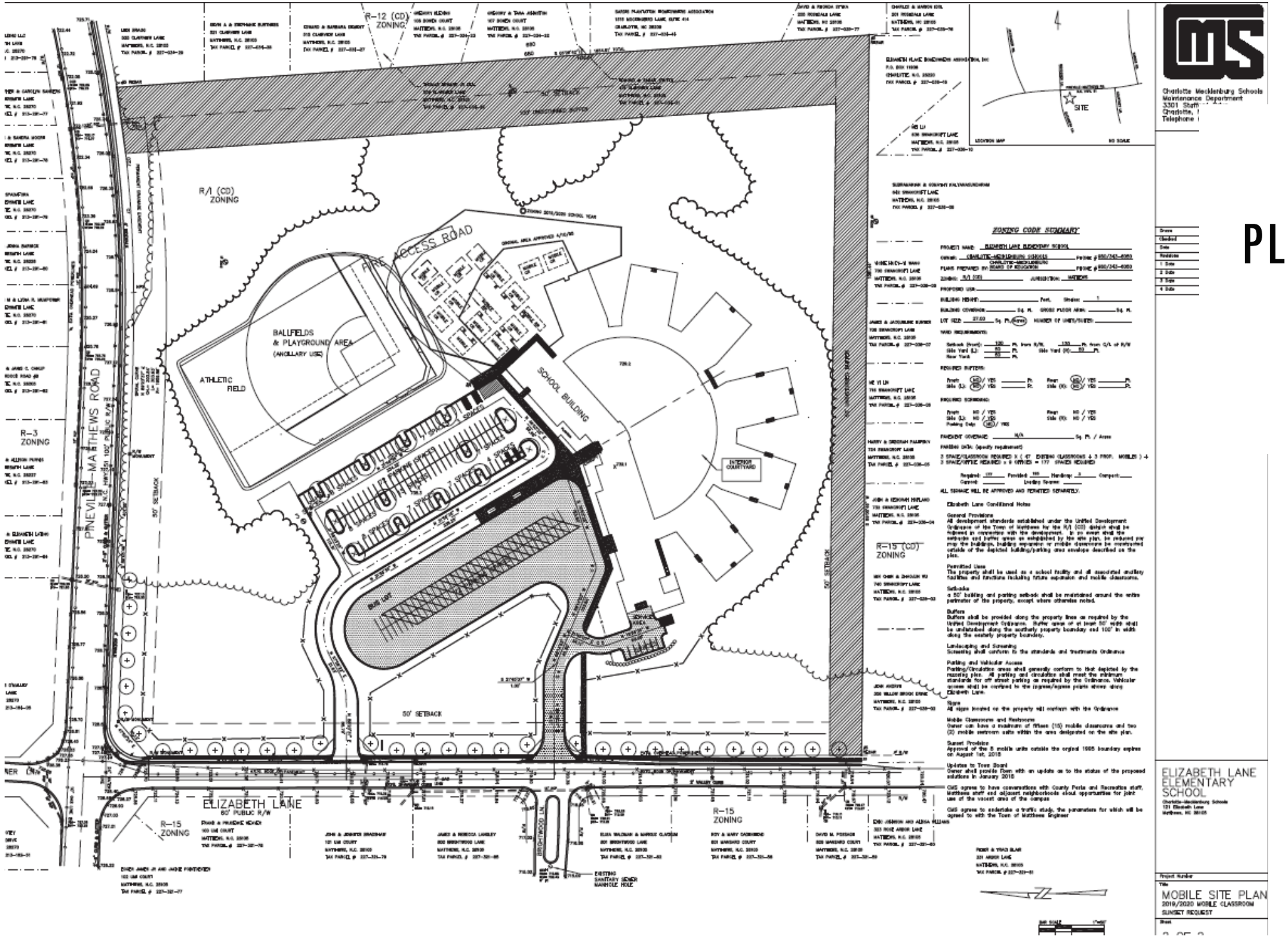
The 1995 original rezoning for Elizabeth Lane Elementary included a dedicated area for mobile classrooms to the east of the main school building. In 2001, CMS requested a change of conditions to enlarge the mobile classroom area to allow for 3 new units and to bring two existing units within the mobile classroom envelope for a total of up to 17. The approved 2001 change of conditions contained a sunset provision that required the new units to be removed by July 1, 2002. In 2016, the sunset provision was renewed for one year to allow the additional units outside of the original boundary.

In 2017 and 2018, requests to renew the sunset provision for one year were approved.

The 2018 conditions included CMS providing a queueing study and commitment to work with Town and County on potential joint use of vacant portions of the campus. Queueing study was completed in May 2018.

SITE PLAN – 1995 BOUNDARY FOR CLASSROOMS





PROPOSED SITE PLAN —2019-2021 BOUNDARY FOR CLASSROOMS

EXISTING SITE – 2019 BOUNDARY FOR CLASSROOMS

SUMMARY OF PROPOSED CONDITIONS

Conditions

1. The 9 mobile buildings outside of the 1995 boundary may remain until August 1, 2019.
2. 100' undisturbed buffer along eastern property line remains.
3. Commitment to work with Town and County on potential joint use of vacant portions of campus.
4. Queueing study was completed in May 2018 by Design Resource Group.

1. Increase the Sunset Clause for 2 years until the August 1, 2021 to allow 9 mobile buildings outside of 1995 boundary limits.
2. Address vehicle queueing issues by implementing the proposed recommendation from Design Resource Group to provided queuing of vehicles in the afternoon as currently used for morning peak time. (See attached memo from Transportation Planner Dana Stoogenke)

Town of Matthews Public Works

1600 Tank Town Road
Matthews, NC 28105
704.847.3640
fax 704.845.2488

Zoning Recommendations for Elizabeth Lane Elementary School

DATE: July 2, 2019
TO: Jay Camp, Interim Planning Director
FROM: Dana Stoogenke, AICP – Transportation Planner

Background:

Elizabeth Lane Elementary School currently does not allow vehicles to stack on-site until 2:33pm for afternoon dismissal. This cause significant congestion on Elizabeth Lane and illegal u-turn movements. The School has approximately 72 vehicles (1,797 feet) queueing during afternoon dismissal but, only 650 feet of on-site single stacking, according to the Queueing Study and Access Evaluation Memorandum (Queueing Memo). The Queueing Memo was commissioned by Charlotte-Mecklenburg Schools (CMS) and is dated May 24, 2018. The lead on the Queueing Memo was Randy E. Goddard, P.E. with Design Resource Group.

Recommendation:

Option 1: Implement the Queueing Memo recommendations for vehicle queueing for afternoon dismissal (Queueing Memo, pg. 6). "…Once the queue in Lot B (Staff Park) reaches Elizabeth Lane parents enter Lot A (Bus Lot) to begin stacking as they currently do in the morning peak. Once dismissal begins, the vehicle queued in Lot A can begin moving to lot B for student pick-up. This will allow Elizabeth Lane to operate better with less school related traffic. This change will provide 1,850 of on-site stacking." This recommendation is a low cost, easily implementable solution and staff highly recommends it.

Option 2: Improve the infrastructure on and adjacent to Elizabeth Lane Elementary School. These recommendations are needed, if Option 1 is not implemented.

1. Widen choke point on the internal driveway for Lot B (Staff Parking) to allow vehicles to double stack, creating about 500 additional feet of stacking.

2. Widen pavement on Elizabeth Lane between Lot B (Staff Parking) and Lot A (Bus Lot) to reduce the amount of illegal yellow line crossing during drop off and pick up.

3. Build a roundabout at the intersection of Cithara Road and Elizabeth Lane to facilitate u-turn movements and maintain speed control on Elizabeth Lane.

Attachment: Queueing Study and Access Evaluation Memorandum

5/29/2018
2018-684

DESIGN RESOURCE GROUP

QUEUEING STUDY & ACCESS EVALUATION MEMORANDUM

Date: May 24, 2018

To: Tom Odell
Charlotte-Mecklenburg Schools
3301 Stafford Drive
Charlotte, NC 28208

From: Randy E. Goddard, P.E.
Managing Principal
Design Resource Group, PA (C-2165)

NORTH CAROLINA PROFESSIONAL SEAL 16315 ENGINEER RANDY E. GODDARD

May 24, 2018

Subject: **Elizabeth Lane (K-5) Elementary School** (157-021)

Background:

Per the request of Town of Matthews Planning and Development, a queueing study and traffic evaluation is required by Charlotte-Mecklenburg Schools (CMS) to ensure compliance with conditions of approval of application #2017-662 (Elizabeth Lane Mobile Classroom Sunset Revision) with Matthews.

The queueing study/traffic evaluation will include observation of existing traffic patterns and queues during both the AM and PM school peak periods and the calculation of minimum stacking per the Municipal School Transportation Assistance (MSTA) calculator using current 2017-2018 enrollment data.

Location and School Information:

Elizabeth Lane Elementary School is located at 121 Elizabeth Lane (south of Pineville Matthews Road [NC 51]) in the Town of Matthews, NC. Per CMS personnel, the following is the latest information regarding the school:

- School begins at 7:45 AM and dismisses at 2:45 PM
- Approximately 1,088 students
- Approximately 9 buses during both the morning arrival period and 14 buses in the afternoon dismissal period
- Approximately 53 faculty/staff

The existing campus has two access locations on Elizabeth Lane on the west side of the school each going to a separate parking lot. Lot A is the southern most lot and is mainly used by buses (unloading and loading of students on the buses). Lot B is the northern most lot on Elizabeth Lane and is used for staff parking and is the primary drop-off/pickup area for students arriving in cars.

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Charlotte, NC 28208
704.343.0608
www.drgrp.com

Trip Generation:

Based on an elementary school with an enrollment of 1,088 students (13 buses, and 53 staff/faculty), the school is expected to potentially generate 875 trips in the AM peak hour. The PM dismissal peak hour for the school does not typically coincide with the normal traffic PM peak "rush" hour and is, therefore, not considered to be a significant factor. It should be noted that there were significantly fewer trips witnessed during the campus field visit than what the Municipal School Transportation Assistance (MSTA) trip generation calculates.

Table 1: Trip Generation

School Type	Number of Students	Daily Trips	AM Arrival Peak			PM Dismissal Peak*		
			Enter	Exit	Total	Enter	Exit	Total
Elementary School	1,088	1,310	464	411	875	191	191	382

Reference: MSTA School Traffic Calculator, NCDOT 2015

* School PM Peak Occurs Prior to Typical Peak Hour, for Informational Purposes Only

Existing Morning Arrival Plan for Elizabeth Lane Elementary School (7:45 AM):

Elizabeth Lane Elementary staff have recently implemented a new traffic pattern for the morning drop off period (see Figure 1 for current AM traffic patterns) which typically operates in three waves.

Wave 1 (Students Arriving before 7:15 AM)

Students arriving before 7:15 AM are required to travel to Lot A to insure vehicles do not stack into Lot B and block any arriving staff members. This also helps to eliminate vehicles queueing onto Elizabeth lane and blocking any through traffic heading to Pineville-Matthews Road (NC 51). A member of staff directs traffic at Lot B's entrance to allow staff to enter and restrict student traffic before 7:15 AM.

Wave 2 (Students Arriving After 7:15 AM)

At 7:13 AM, school staff release the vehicles waiting in Lot A to progress to Lot B for student drop-off. The staff member directing traffic at Lot B restricts left turn movements into the site until all the queued vehicles in Lot A have cleared.

Once the vehicles in Lot A have cleared, the buses begin to unload students in Lot A and traffic from both directions (right and left turns) are allowed into the Lot B. All students must enter for drop-off at Lot B while the buses are unloading in Lot A. It should be noted that the staff member in charge of directing traffic at Lot B's access returns to the school to assist with the drop-off process after Lot A has cleared (i.e. traffic is no longer directed by a staff member).

Wave 3 (Students Arriving After Buses Have Unloaded)

After the buses have unloaded all students, Lot A also opens for student drop-off (both lots open to vehicle traffic drop-off at this time).

It should be noted, there is a crossing guard at the crosswalk on Elizabeth Lane at Lot A/Brightwood Lane intersection that directs buses and assists any students walking to school and using the crosswalk, but there are not staff or officers directing vehicle traffic at either of the lot accesses.

Existing Afternoon Dismissal Pattern for Elizabeth Lane Elementary School (2:45 PM):

During the afternoon dismissal period, Lot A (bus lot) is closed to all student pick-up traffic to allow for safe and timely movement and loading of buses. The current operation has parents stacking on-site in Lot B (see Figure 2 for current PM traffic pattern). Once the dismissal queue in Lot B reaches Elizabeth Lane the dismissal traffic begins to queue along Elizabeth lane, with vehicles performing U-turns on Elizabeth Lane in order enter the vehicle queue.

Student dismissal begins around 2:40 PM for “car riders” and moves efficiently due to a student call out system employed by staff. Vehicles have student identifier tags with staff announcing arrival for each student. Per staff comments, the dismissal period is typically completed within ten to fifteen minutes once pick-up begins.

The same crossing guard also provides her assistance to students and buses in the afternoon dismissal period as well, but there are not staff or officers directing vehicle traffic at either of the lot accesses.

Existing Maximum Vehicle Queues

Field observations were performed during the morning arrival and afternoon dismissal peaks for the school (documenting approximately every five minutes during arrival/dismissal peaks) to determine the maximum vehicle queue lengths for pertinent traffic movements for Elizabeth Lane Elementary. These movements included:

- Northbound left and right turn movements on Elizabeth Lane at Pineville-Matthews Road (NC 51)
- Southbound left turn movements on Elizabeth Lane at Elizabeth Lane Elementary School’s Lot A and Lot B accesses
- Eastbound right turn movements on Pineville-Matthews Road (NC 51) at Elizabeth lane
- Westbound left turn movements on Pineville-Matthews Road (NC 51) at Elizabeth Lane

The maximum and average queues observed are as follows (see Figures 3 & 4):

Morning Arrival Observations for Elizabeth Lane Elementary School (6:45 – 7:50 AM):

Elizabeth Lane facing south at Pineville-Matthews Road

Pineville-Matthews Road facing west at Elizabeth Lane

- Northbound left and right turn movements Elizabeth Lane at Pineville-Matthews Road (NC 51):
  - The maximum queue witnessed during the morning arrival period was 50 vehicles (1,250 feet – a combination of left, through and right turn movements) and occurred on multiple occasions. The average northbound queue for this period was approximately 34 vehicles (850 feet).
  - The combined through-right lane did not typically experience a queue as the vehicles queueing in the northbound left turn lane spilled into the through-right lane and did not allow passage for vehicles to make these movements.

- Southbound left turn movements on Elizabeth Lane at Lot A's access
  - The maximum queue witnessed during the morning arrival period was 9 vehicles (225 feet) and occurred on multiple occasions. The average southbound queue for this period was approximately 4 vehicles (100 feet).

- Southbound left turn movements on Elizabeth Lane at Lot B's access
  - The maximum queue witnessed during the morning arrival period was 29 vehicles (725 feet – queue extended to eastbound Pineville-Matthews Road (NC 51) and occurred on multiple occasions. The average southbound queue for this period was approximately 11 vehicles (275 feet).

- Eastbound right turn movements on Pineville-Matthews Road (NC 51) at Elizabeth Lane
  - The maximum queue witnessed during the morning arrival period was 15 vehicles (375 feet – within the queue caused by the southbound left turn movement queue to Lot B on Elizabeth Lane) and occurred on multiple occasions. The maximum queue on NC 51 was a direct result of the southbound queue from Elizabeth Lane. The average operation of the traffic signal saw no queue as a result of the Elizabeth Lane Elementary traffic.

- Westbound left turn movements on Pineville-Matthews Road (NC 51) at Elizabeth Lane
  - The maximum queue witnessed during the morning arrival period was 9 vehicles (225 feet) and occurred on couple of occasions. The average westbound left turn lane queue for this period was approximately 3 vehicles (75 feet).

<u>Afternoon Dismissal Observations for Elizabeth Lane Elementary School (2:00 – 3:00 PM):</u>

Elizabeth Lane facing south at Lot B's Access

Elizabeth Lane facing north at Lot B's Access

- Northbound left and right turn movements Elizabeth Lane at Pineville-Matthews Road (NC 51):
  - The maximum queue witnessed during the afternoon dismissal period was 55 vehicles (1,400 feet) and occurred on one occasion. The average northbound queue for this period was approximately 29 vehicles (725 feet).
  - The combined through-right lane did not typically experience a queue as the vehicles queueing in the northbound left turn lane spilled into the through-right lane and did not allow passage for vehicles to make these movements.

- Southbound left turn movements on Elizabeth Lane at Lot A's access
  - The maximum queue witnessed during the afternoon dismissal period was 4 buses (150 feet – only buses entering the bus lot) and occurred on multiple occasions. The average southbound queue for this period was approximately 2 buses (75 feet).

- Southbound left turn movements on Elizabeth Lane at Lot B's access
  - The maximum queue witnessed during the afternoon dismissal period was 6 vehicles (150 feet) and occurred on a couple of occasions. The average southbound queue for this period was approximately 4 vehicles (100 feet).

- Eastbound right turn movements on Pineville-Matthews Road (NC 51) at Elizabeth Lane
  - No queue was witnessed as a direct result of the Elizabeth Lane Elementary School for the eastbound right turn movements.

- Westbound left turn movements on Pineville-Matthews Road (NC 51) at Elizabeth Lane
  - The maximum and average queue witnessed during the afternoon dismissal period was 3 vehicles (75 feet) and occurred on multiple occasions.

Elizabeth Lane Elementary Campus Comments/ Recommendations:

We provide the following recommendations related to future circulation/access:

- The MSTA School Traffic Calculator, from the Traffic Engineering and Safety Systems Branch, Division of Highways, NCDOT 2017 is a useful worksheet for calculating the recommended minimum on-site stacking (queue) length for vehicles dropping-off and picking-up students during the morning arrival and afternoon dismissal times. This worksheet derives/calculates information from variables such as whether the school is a private or public school, the number of students, the number of faculty, and the number of buses. Calculations for the school buildings are as follows (a copy of the MSTA School Traffic Calculator is attached to this document).

  - Elizabeth Lane Elementary (1,088 elementary school students) the estimated number of queued vehicles at any one time during the PM peak dismissal time is approximately 72 vehicles (1,797 feet). With all vehicular access via Elizabeth Lane, there is approximately 650 feet of on-site single stacking under the currently required afternoon dismissal traffic pattern. Single stacking of vehicles is recommended due to safety concerns.

- The morning arrival period traffic management plan recently implemented at the elementary school is sufficient in our opinion, especially considering the school peak queue on Elizabeth Lane typically begins and clears in a 30-minute period (7:15 - 7:45 AM). Therefore, our only recommendation for the morning arrival period is the following:

  - An off-duty officer directing traffic at each of the lot access locations, for the minimum 30-minute period as noted above, which will help with the overall circulation and flow of vehicles entering and exiting the school.

- In order to better meet the stacking requirements set forth by the MSTA calculator in the afternoon dismissal period, which typically begins and clears in a 30-minute period (2:25 – 2:55 PM), we suggest the following (see Figure 5):

  - Implement a traffic management plan similar to the current morning arrival plan, so once the queue in Lot B reaches Elizabeth Lane parents enter Lot A (bus lot) to begin stacking as they currently do in the morning peak. Once dismissal begins, the vehicles queued in Lot A can begin moving to Lot B for student pick-up. This will allow Elizabeth Lane to operate better with less school related traffic. This change will provide 1,850 feet of on-site stacking (slightly higher than the 1,797 feet recommended by MSTA).
  - An off-duty officer directing traffic at each of the lot access locations, for the minimum 30-minute period as noted above, which will help with the overall circulation and flow of vehicles entering and exiting the school.
  - Although, the proposed afternoon traffic plan mixes bus and vehicle traffic (not typically recommended), it could be a reasonable solution if all vehicles in the queue are allowed to clear Lot A before bus loading begins (typically a 10 to 15 minute process); therefore, eliminating any conflicts between students and vehicle traffic.

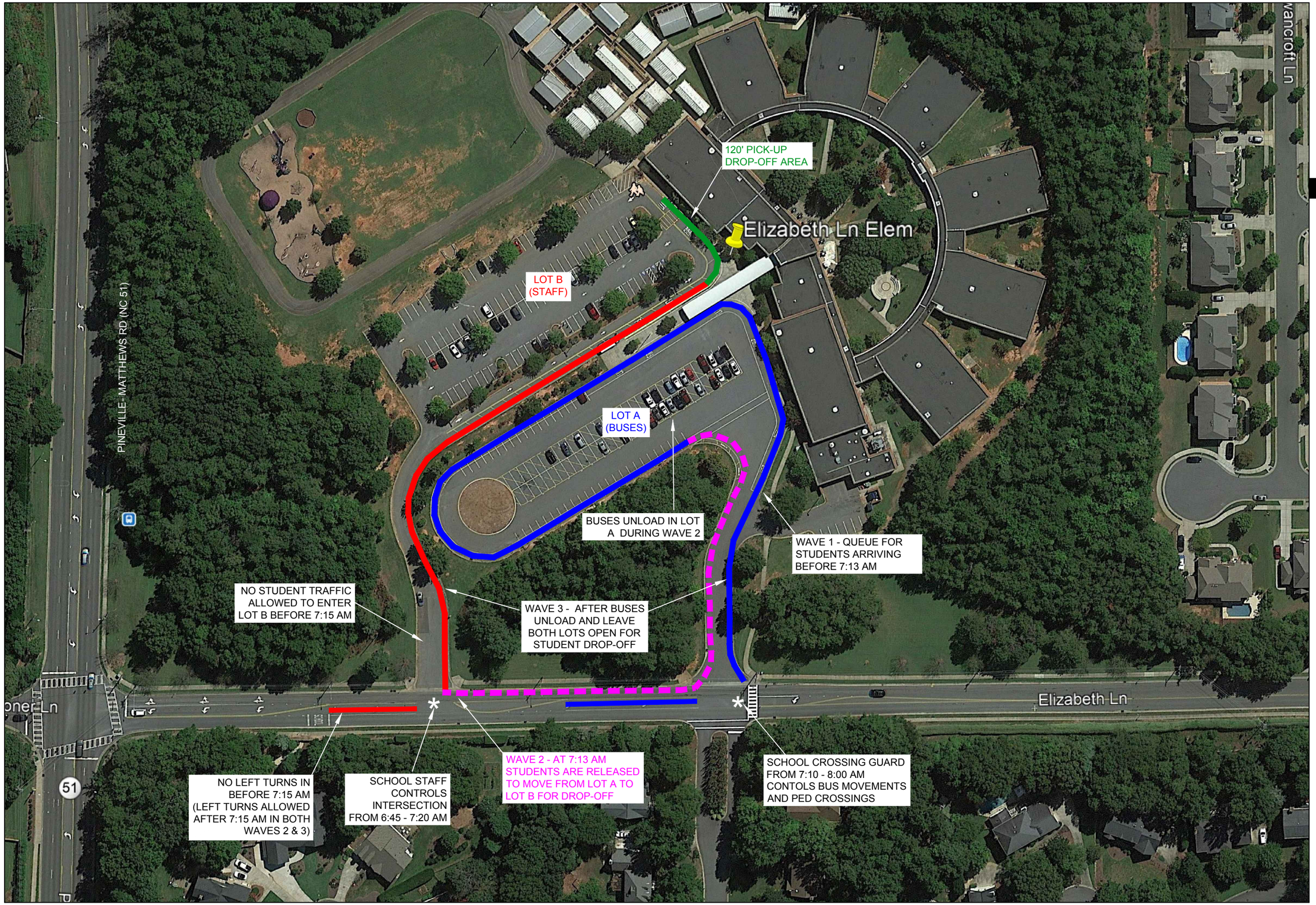
In our professional opinion and based on our morning and afternoon school observations, the suggested changes to the morning and afternoon traffic management plans could prove beneficial and will allow for better circulation and flow in and around Elizabeth Lane Elementary School and will also provide the minimum recommended MSTA on-site stacking. Although current patterns see queueing along Elizabeth Lane and Pineville-Matthews Road (NC 51), all school related traffic typically disperses in no more than a 30-minute window which we feel could be further reduced by implementing these recommendations.

Should you have any questions concerning our evaluation and recommendations, please call.

Attachments: Figure 1 – Existing Morning Arrival Operation Plan
Figure 2 – Existing Afternoon Dismissal Operation Plan
Figure 3 – Morning Arrival Period Maximum & Average Queue Lengths
Figure 4 – Afternoon Dismissal Period Maximum & Average Queue Lengths
Figure 5 – Suggested Afternoon Dismissal Operation Plan
MSTA Calculator

cc: Susan Habina-Woolard P.E. Town of Matthews
File

5/29/2018
2018-684



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CMS - ELIZABETH LANE ELEM. QUEUEING STUDY TTM

MATTHEWS, NC

CHARLOTTE-MECKLINBURG SCHOOLS
3301 STAFFORD DRIVE
CHARLOTTE, NC 28208

EXISTING MORNING ARRIVAL OPERATION PLAN

0 50 100
SCALE: 1" = 100'

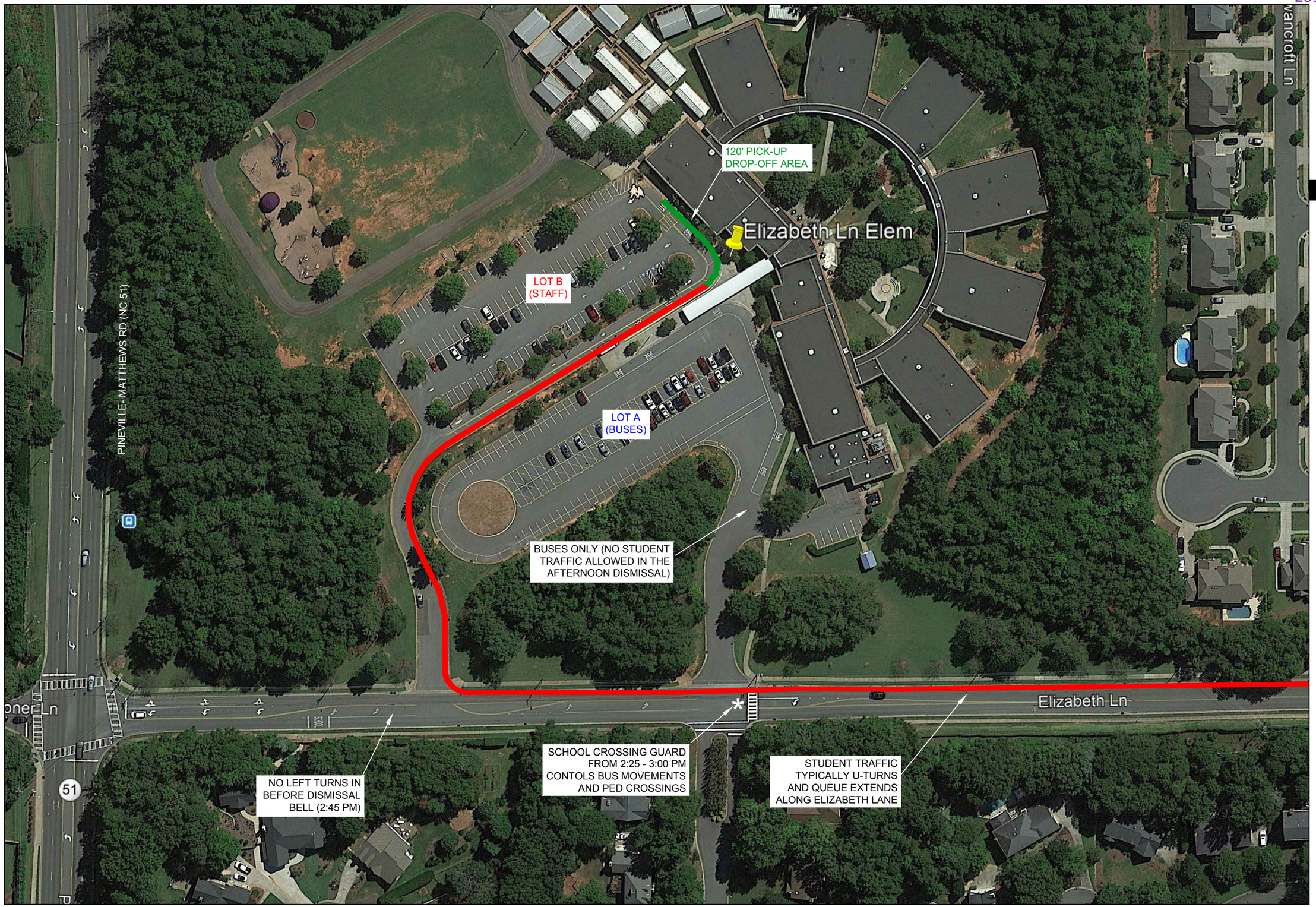
PROJECT #: 157-021
DRAWN BY: MWW
CHECKED BY: REG

MAY 2018

REVISIONS:

Figure 1

5/29/2018
2018-684



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CHARLOTTE, NC 28208

EXISTING AFTERNOON DISMISSAL OPERATION PLAN

0 50 100
SCALE: 1" = 100'

PROJECT #: 157-021
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Figure 2

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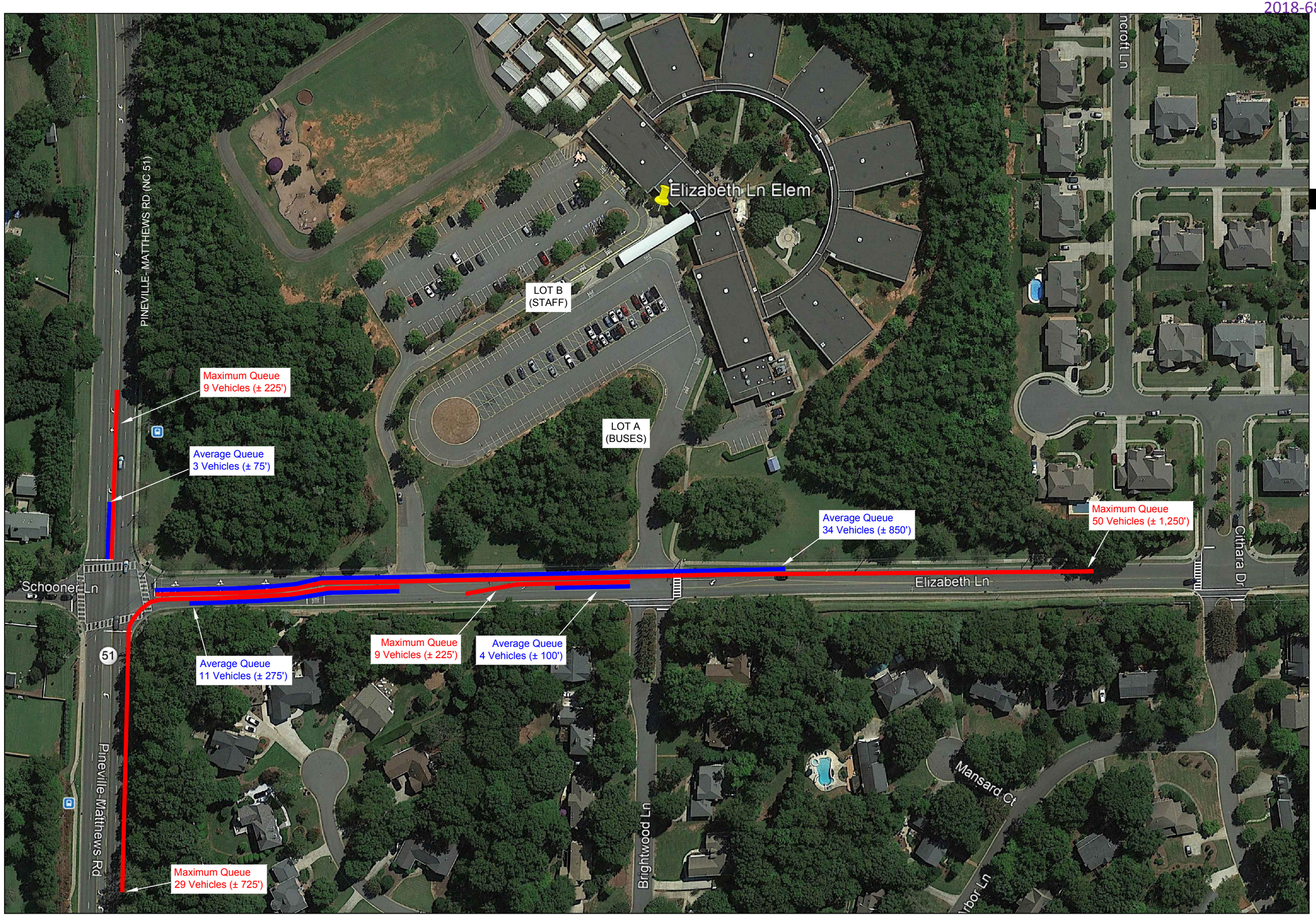
2018-684



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MORNING ARRIVAL PERIOD MAX & AVERAGE QUEUE LENGTHS

0 60 120
SCALE: 1" = 120'

PROJECT #: 157-021
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Figure 3

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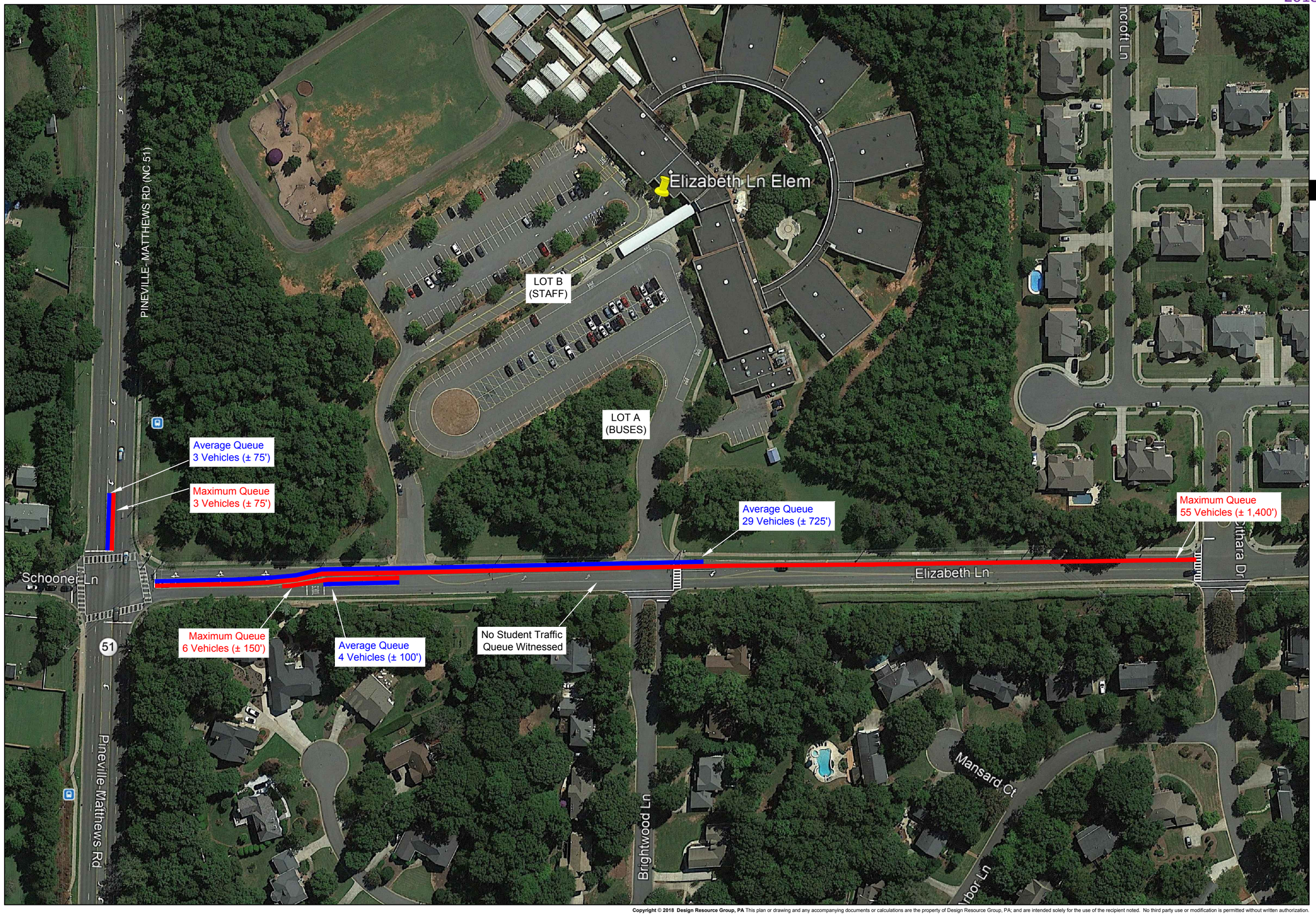

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AFTERNOON DISMISSAL PERIOD MAX & AVERAGE QUEUE LENGTHS

0 60 120
SCALE: 1" = 120'

PROJECT #: 157-021
DRAWN BY: MWW
CHECKED BY: REG

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Figure 4

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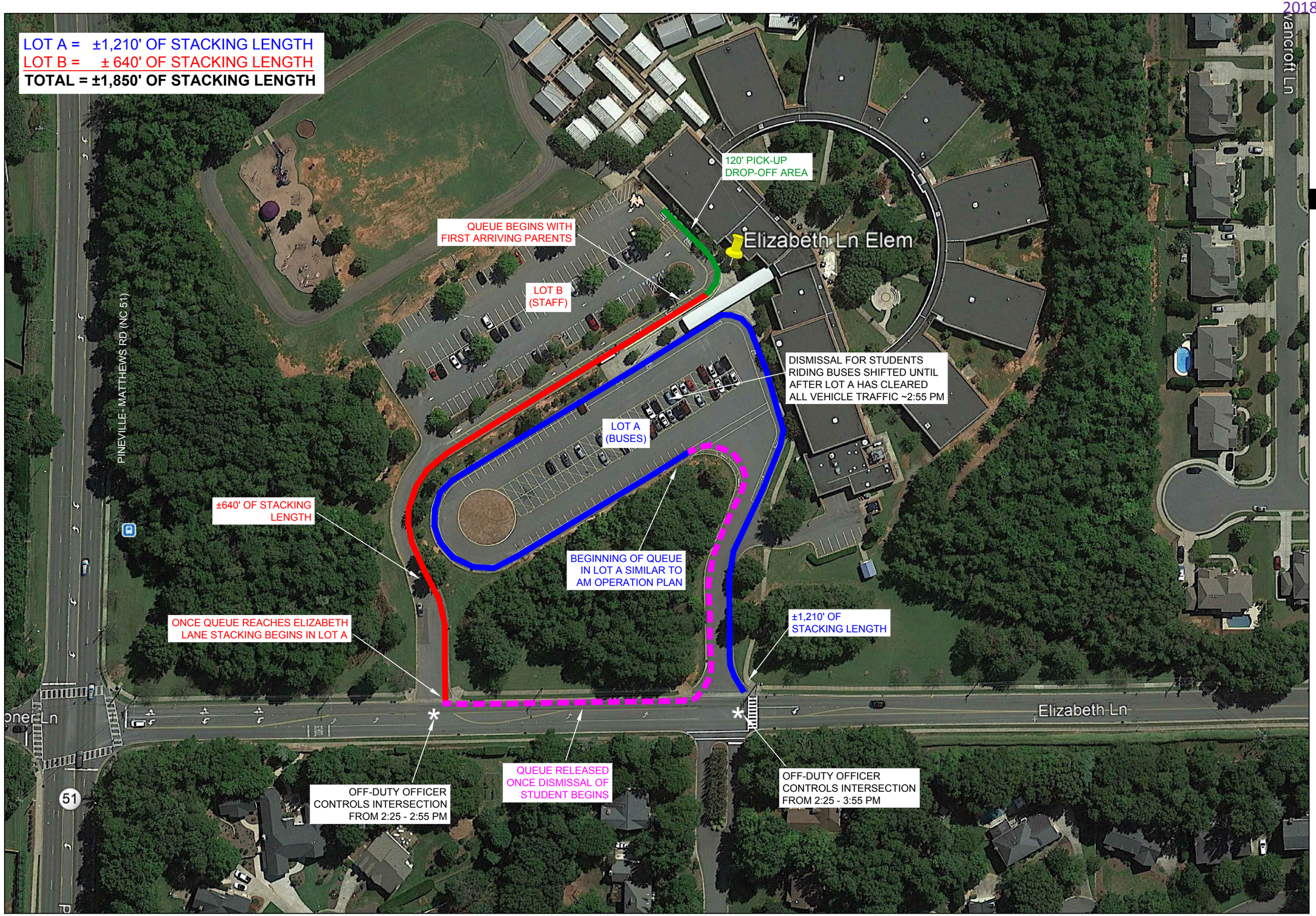

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CHARLOTTE, NC 28208

SUGGESTED AFTERNOON DISMISSAL OPERATION PLAN

0 50 100
SCALE: 1" = 100'

PROJECT #: 157-021
DRAWN BY: MWW
CHECKED BY: REG

MAY 2018

REVISIONS:

Figure 5

5/29/2018
2018-684

MSTA School Traffic Calculations

AM and PM Peak Traffic Estimates

(These numbers do not reflect peak hour traffic volumes)

AM Cars / Student	PM Cars / Student	Avg. Car Length	PM At one Time
36.56%	16.31%	22.19	45.50%
34.58%	14.10%	22.70	51.90%
9.20%	4.30%	24.42	55.71%

NOTES

- **Average Queue Length does not** include an alternative traffic pattern required for high traffic demand days which is usually 30% additional length.
- **Average Queue Length does not** include the Student Loading Zone.
- Peak traffic volumes at schools normally occur within a 30-minute time period. (justifying a PHF of 0.5)

School Name: Elizabeth Ln. Elementary

Type: **Typical Public with buses**

Version: 102816

MSTA School Queue Input					Calculations					
Type School	**Student Population**	**Number of Buses**	**Staff Members**	**Student Drivers**	**PM Total Vehicles**	**PM Peak Vehicles**	**Average Queue Length**	**Total AM Trips**	**Total PM Trips**	**High Demand Length**
Elementary	1088	13	53		178	81	**1797**	875	382	**1797**
		15	128							
Middle										
High										
							1797	875	382	1797
										0

Elementary School Data

Direction	AM Trips Generated Parents	Buses	Staff	Trips	PM Trips Generated Parents	Buses	Staff	Trips
IN	398	13	53	464	178	13		191
OUT	398	13		411	178	13		191
		AM Elementary Trips		**875**		PM Elementary Trips		**382**

Direction	AM Trips Generated Parents	Buses	Staff	Trips	PM Trips Generated Parents	Buses	Staff	Trips
IN								
OUT								
		AM Middle Trips				PM Middle Trips		

Direction	AM Trips Generated Parents	Buses	Staff		Trips	PM Trips Generated Parents	Buses	Staff		Trips
IN										
OUT										
			AM High Trips					PM High Trips		

All AM TRIPS	In	464
	Out	411
	Total	875

All PM TRIPS	In	191
	Out	191
	Total	382

ADT
1310
1310

Calculated 5/4/2018 By:_____