NORTH CAROLINA
Department of Transportation











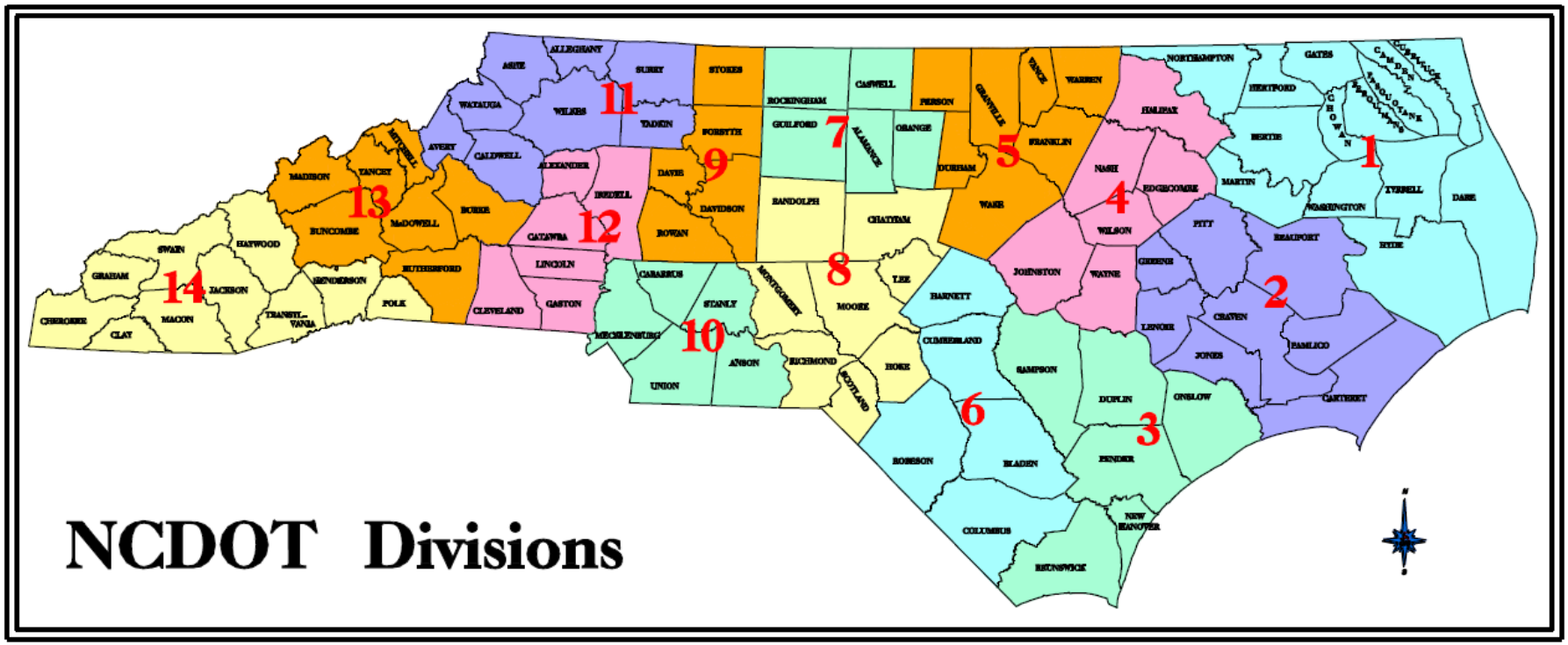
MSTA Calculator and School study

Tammy A. Germiller

September 29, 2020

(MSTA) Definition and Purpose

- **Definition:** MSTA is a section in the Traffic Management Unit of the Transportation Mobility and Safety Division
- **Partners:** Municipalities, School Districts, Schools, Law Enforcement, Parent Teacher Associations, Developers and NCDOT
- **Purpose:** Continue to provide North Carolina with safe roads to safe schools through congestion mitigation around educational facilities.
- **Work Products:** By statute new, expanding or relocating schools. Prior to COVID, also included existing schools experiencing a problem.


NCDOT Divisions
1
2
3
4
5
6
7
8
9
10
11
12
13
14
ALLEGHANY
ASHE
SURRY
STOKES
ROCKINGHAM
CASWELL
PERSON
GRANVILLE
VANCE
WARREN
NORTHAMPTON
GATES
HERTFORD
CAMDEN
CURRITUCK
PASQUOTANK
CHOWAN
PERQUIMANS
WATAUGA
WILKES
YADKIN
GUILFORD
ALAMANCE
ORANGE
DURHAM
FRANKLIN
HALIFAX
BERTIE
AVERY
CALDWELL
ALEXANDER
FORSYTH
DAVIE
RANDOLPH
CHATHAM
WAKE
NASH
EDGECOMBE
MARTIN
TYRRELL
DARE
MITCHELL
YANCEY
MADISON
BUNCOMBE
McDOWELL
BURKE
IREDELL
DAVIDSON
ROWAN
WILSON
WASHINGTON
HYDE
CATAWBA
LINCOLN
CABARRUS
MONTGOMERY
LEE
JOHNSTON
WAYNE
PITT
GREENE
BEAUFORT
SWAIN
HAYWOOD
GRAHAM
JACKSON
HENDERSON
RUTHERFORD
POLK
CLEVELAND
GASTON
MECKLENBURG
STANLY
MOORE
HARNETT
LENOIR
CRAVEN
CHEROKEE
CLAY
MACON
TRANSYLVANIA
UNION
ANSON
RICHMOND
SCOTLAND
HOKE
CUMBERLAND
SAMPSON
JONES
PAMLICO
DUPLIN
ONSLOW
CARTERET
ROBESON
BLADEN
PENDER
NEW HANOVER
COLUMBUS
BRUNSWICK

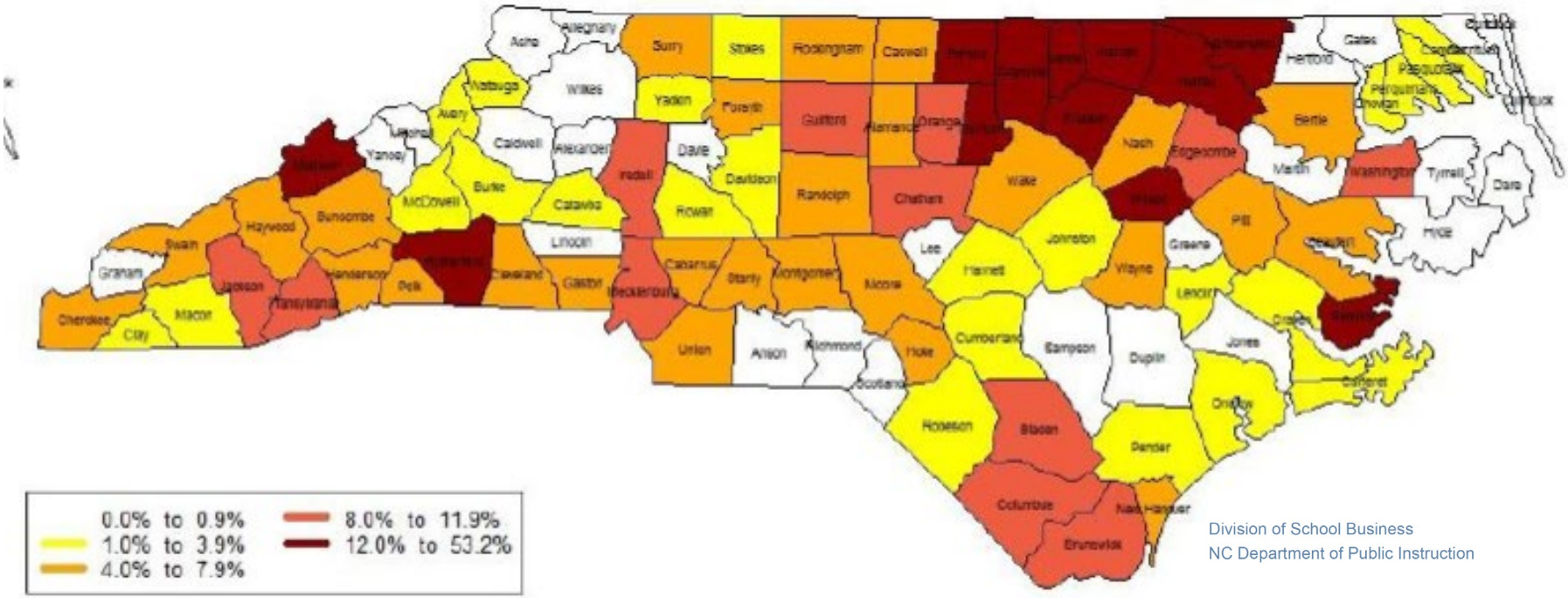
Some statistic

2019

Preschools	8,097	Public district schools	2,517
Elementary schools	2,313	Public charter schools	177
Middle schools	1,370	Private schools	7,694
High schools	1,122	All schools	10,388

Great! SCHOOLS.org

2017 - 2018



Division of School Business
NC Department of Public Instruction

THE Law

Legislation, GS 136-18 (29a) requires all school planners to provide NCDOT recommendations and evaluations of their traffic operations and safety impacts to the state highway system prior to construction.

Chapter 136.
Roads and Highways.
Article 1.
Organization of Department of Transportation.

§ 136-18. Powers of Department of Transportation.
The said Department of Transportation shall be vested with the following powers:

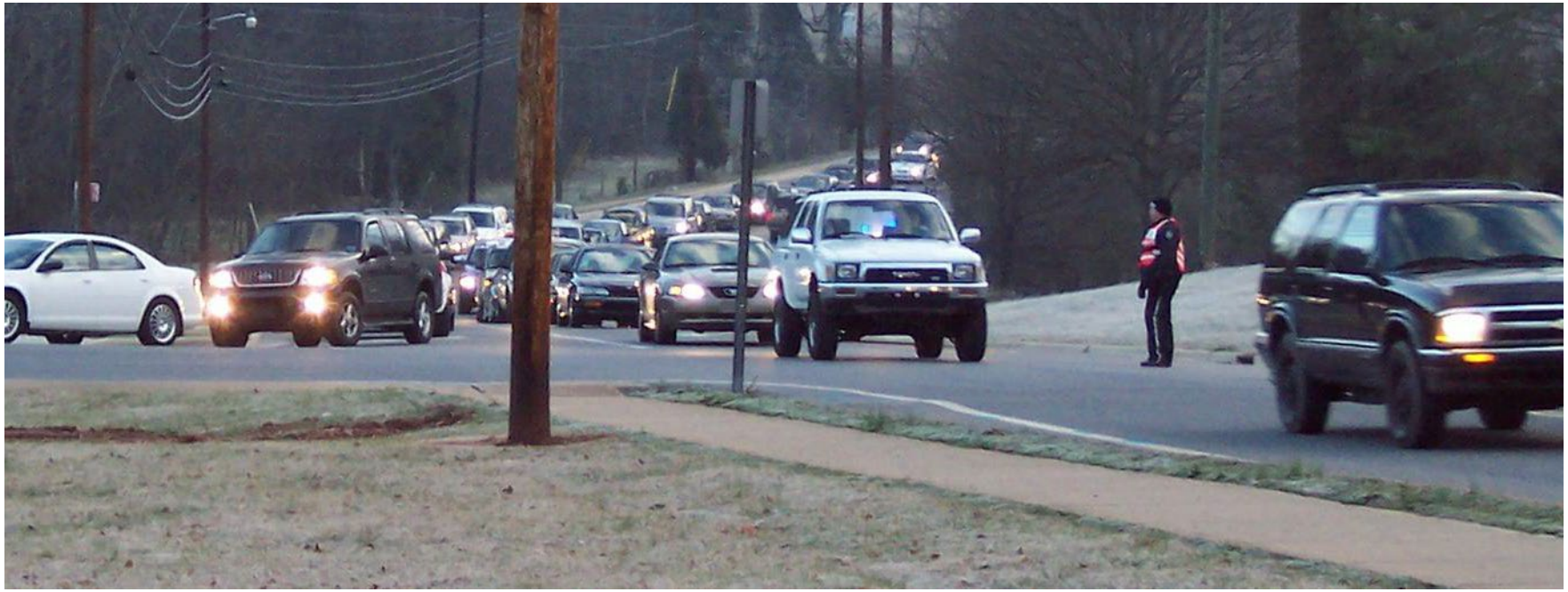
(29a) To coordinate with all public and private entities planning schools to provide written recommendations and evaluations of driveway access and traffic operational and safety impacts on the State Highway system resulting from the development of the proposed sites. All public and private entities shall, upon acquiring land for a new school or prior to beginning construction of a new school, relocating a school, or expanding an existing school, request from the Department a written evaluation and written recommendations to ensure that all proposed access points comply with the criteria in the current North Carolina Department of Transportation 'Policy on Street and Driveway Access'. The Department shall provide the written evaluation and recommendations within a reasonable time, which shall not exceed 60 days. This subdivision shall not be construed to require the public or private entities planning schools to meet the recommendations made by the Department, except those highway improvements that are required for safe ingress and egress to the State highway system.

Link
GS_136-18.pdf

A typical example of an existing school that has outgrown its functionality.



Chaos





Chaos

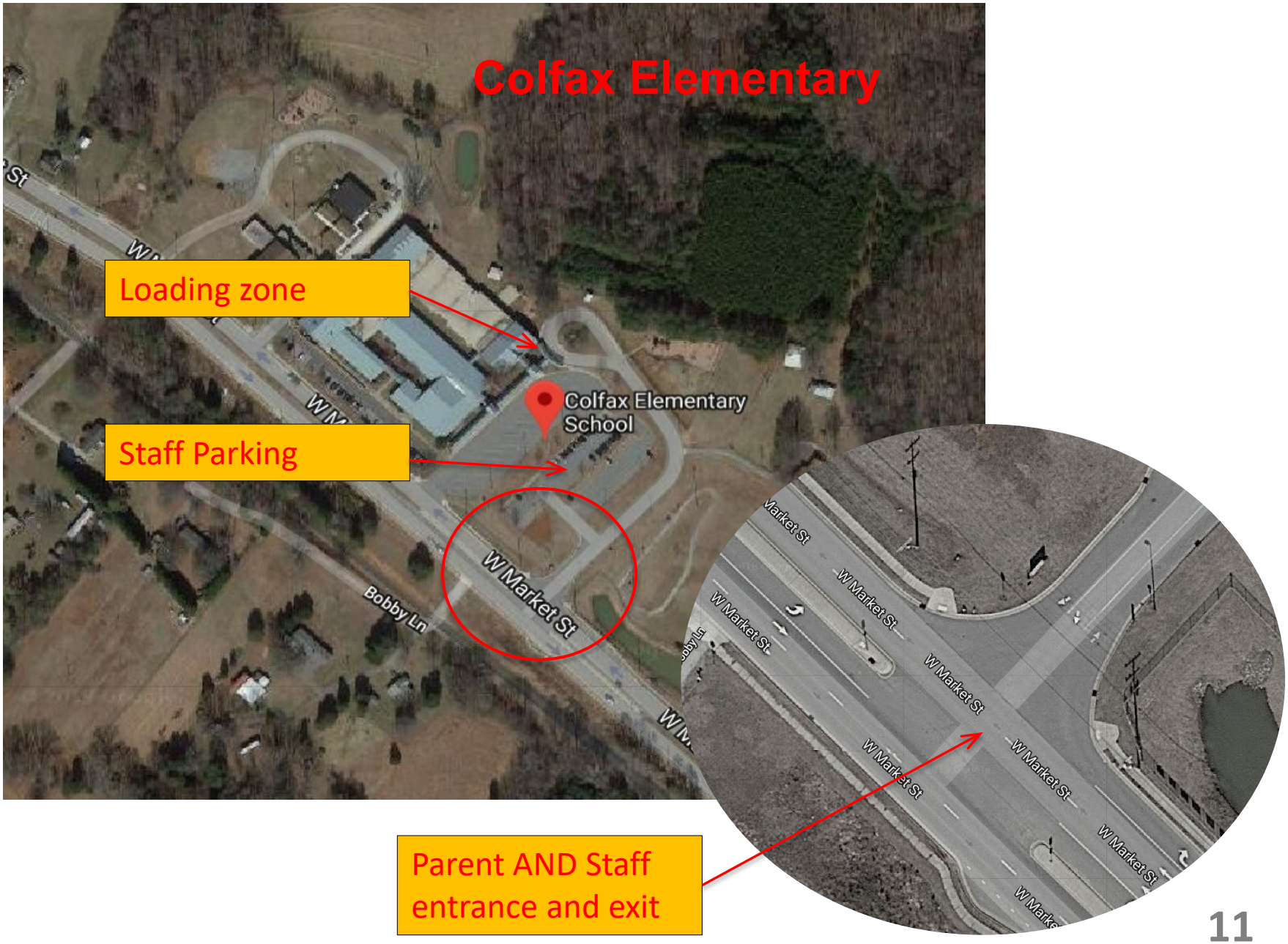






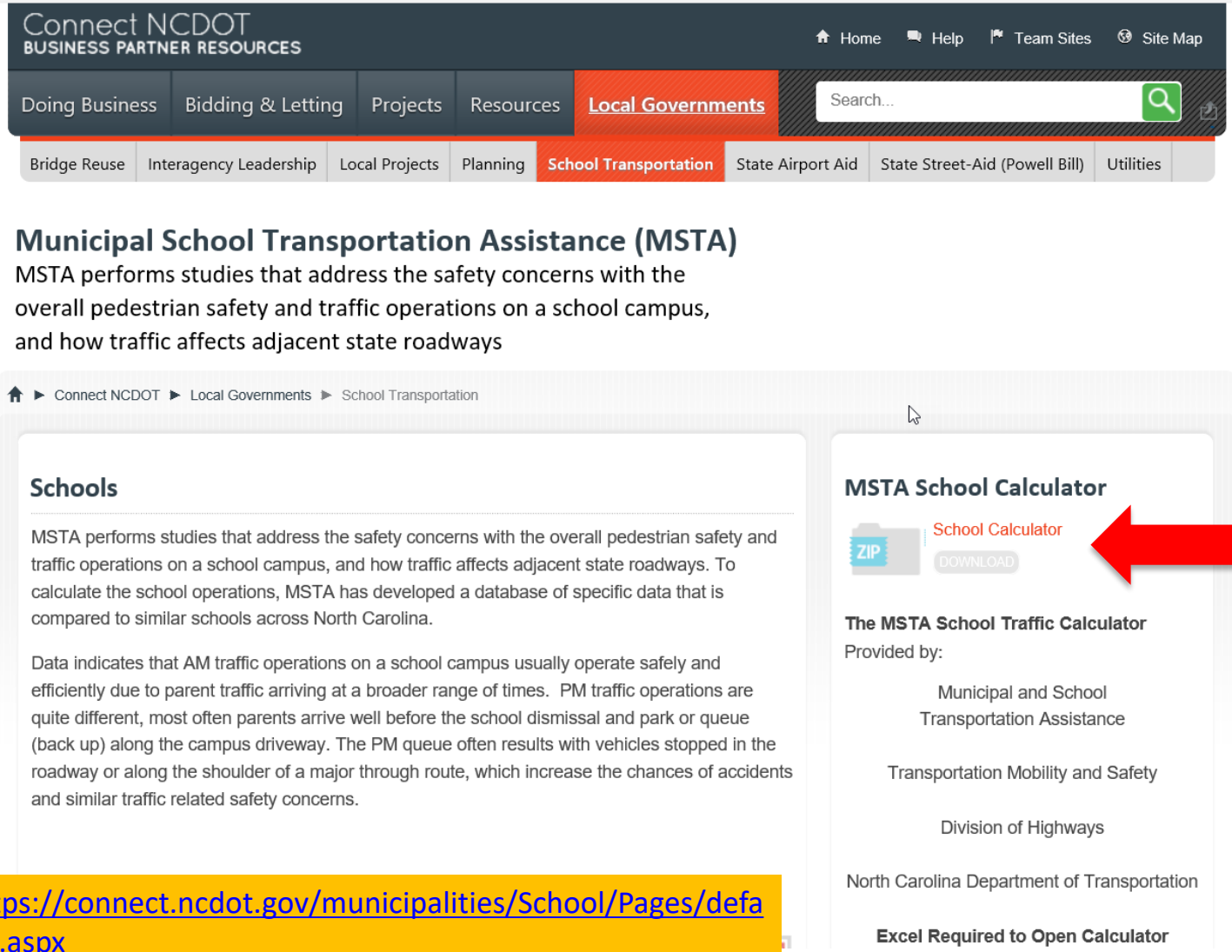
Drone footage – Three school complex




Colfax Elementary
Loading zone
Staff Parking
Colfax Elementary School
W Market St
Bobby Ln
Parent AND Staff entrance and exit


2019-09-19 7:00:01 AM

Tools of the trade
MSTA Calculator



https://connect.ncdot.gov/municipalities/School/Pages/default.aspx

Loading Zone

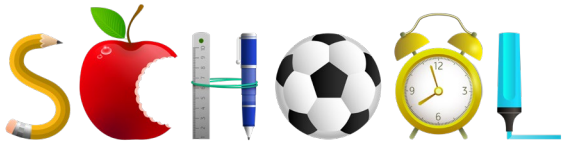




School study - overview



Where to begin?



study - overview

This Photo by Unknown Author is licensed under CC BY-NC

- **Get MSTA involved as early in the process as possible**

- **Have a co-ordination meeting(s) with all stakeholders to scope**
- **study**
  - District Engineer
  - RTE
  - DTE
  - MSTA and Congestion Management
  - School officials
  - Town if applicable
  - NCDOT Bike/Ped if applicable

- **MSTA Checklist**
  - Have the school fill it out and make sure its signed. Checklist for School Requesting Study.pdf

- **Get counts** as applicable – THINK MINIMAL locations

- **The Site plan** should show MSTA required items (think calculator tab)

School study – overview continued

- **Calculate needed queue with the calculator or use Local data.**
  - Use queue length from the calculator or use local measured queue plus 30% for High Demand. If increasing number of students, set up a proportion.
  - Make sure you are using the correct tab.
  - Note that urban public schools have been shallowing. *Interim guidance coming.*
  - Staggering the bell schedules can have a 25% overlap
  - First step in design is to make sure queue can be maintained on campus.

- **Conduct a Field visit** to the school to observe AM & PM loading ops.

- **Set up Synchro/SimTraffic files** as per MSTA standards (think calculator tab)

- **Put together the report**. Make sure the recommended improvements are reasonable.
  - Schools have different rules. They are allowed to have an acceptable level of delay. Do not have to adhere to Driveway manual specifications completely.



This Photo by Unknown Author licensed under CC BY-SAis

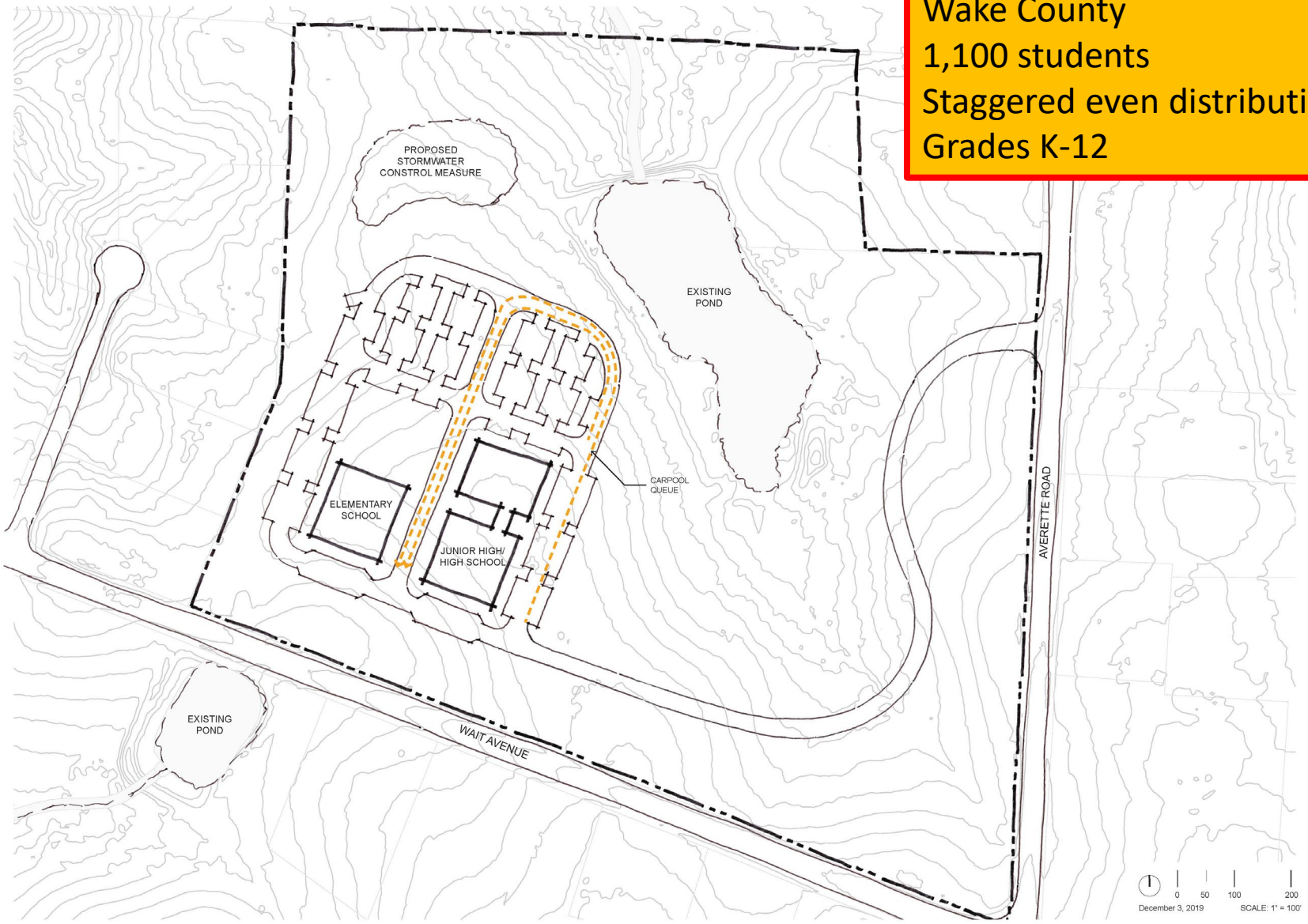
School study – overview continued



This Photo by Unknown Author is licensed under CC BY-ND

- **Follow MSTA's principles of SOAR** with the design
  - SEPARATE modes of traffic
  - ORGANIZE student loading process
  - ASSIGN short term visitor parking
  - RESTRICT driver options
- MSTA preference is for **one ingress with a separate egress**.
  - Reasons?
- Is a **Traffic Management Plan (TMP**) needed?
  - Not a plan per se, but a list of instructions to give parents.
- **Submittals** (TIA's and Traffic Operations)
  - Should go through the District Engineer
  - Will need to be reviewed by MSTA and Congestion Management.

Wake County
1,100 students
Staggered even distribution
Grades K-12



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
55.94%	39.15%	22.19	48.67%
52.91%	47.50%	22.19	46.12%
50.08%	47.58%	22.83	55.71%

School Name:

Type: **Urban Charter**

Version: 102816

MSTA School Queue Input

Calculations

Grade Level	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
										30%
K - 10	623		43		244	119	2641	740	531	3433
		9								
11th	31		5		15	7	155	38	35	202
		1		10						
12th	24		6		12	7	160	30	30	208
		0		20						
Sum >>	678		54		271	133	2956	808	596	3843
										887

Grade K-10

Direction	AM Trips Generated Parents	Buses	Staff	Trips	PM Trips Generated Parents	Buses	Staff	Trips
IN	349		43	392	244			244
OUT	349			349	244		43	287
		AM K-10 Trips		740		PM K-10 Trips		531

Grade 11

Direction	AM Trips Generated Parents	Buses	Staff		Trips	PM Trips Generated Parents	Buses	Staff		Trips
IN	16		5		21	15				15
OUT	16				16	15		5		20
			AM 11th Trips		38			PM 11th Trips		35

Grade 12

Direction	AM Trips Generated Parents	Buses	Staff		Trips	PM Trips Generated Parents	Buses	Staff		Trips
IN	12		6		18	12				12
OUT	12				12	12		6		18
			AM 12th Trips		30			PM 12th Trips		30

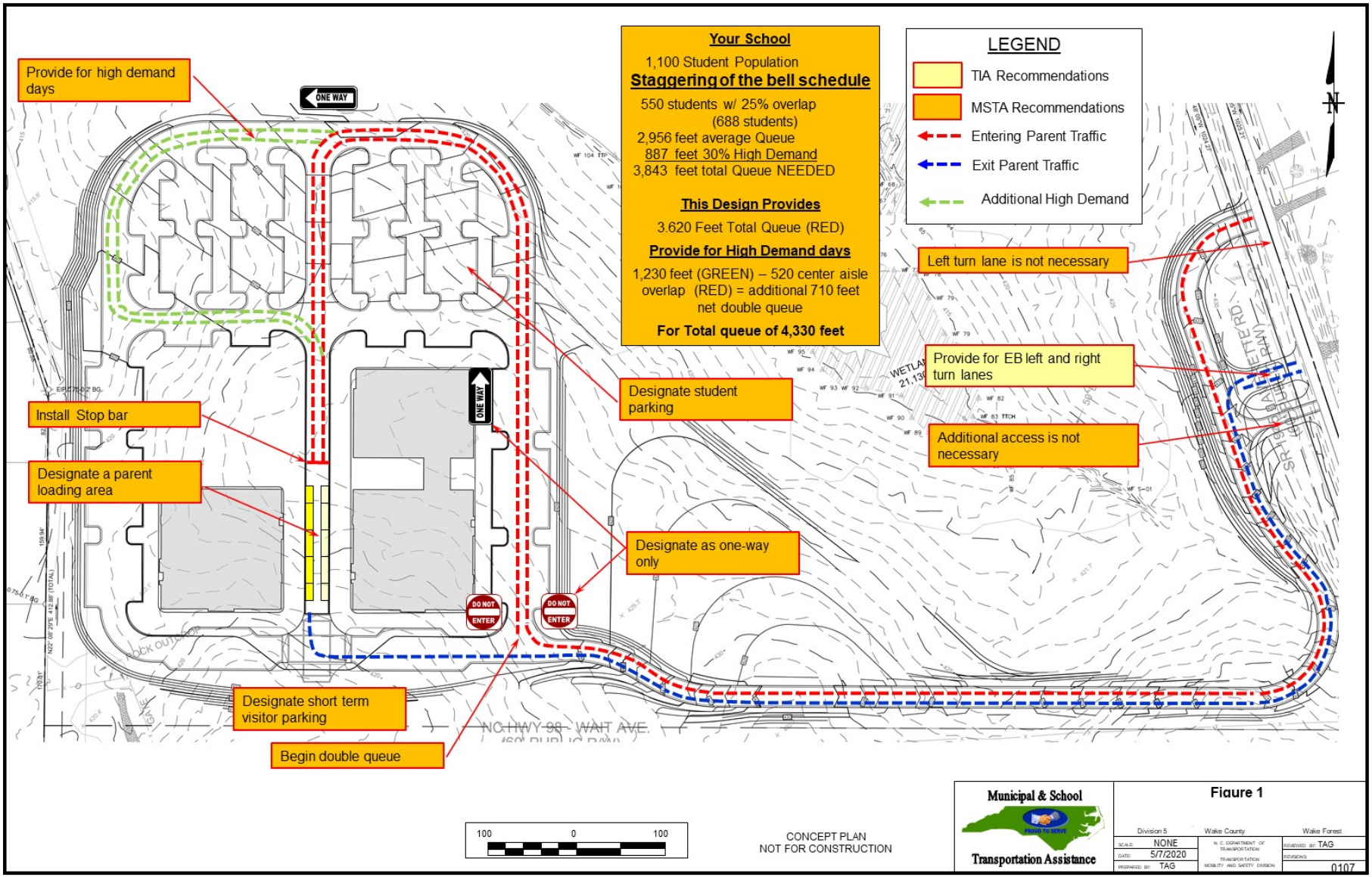
All AM TRIPS		
	In	431
	Out	377
	Total	808

All PM TRIPS		
	In	271
	Out	325
	Total	596

ADT
1271
73
60
1404

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)


Provide for high demand days
ONE WAY
Your School
1,100 Student Population
Staggering of the bell schedule
550 students w/ 25% overlap (688 students)
2,956 feet average Queue
887 feet 30% High Demand
3,843 feet total Queue NEEDED
This Design Provides
3.620 Feet Total Queue (RED)
Provide for High Demand days
1,230 feet (GREEN) – 520 center aisle overlap (RED) = additional 710 feet net double queue
For Total queue of 4,330 feet
LEGEND
TIA Recommendations
MSTA Recommendations
Entering Parent Traffic
Exit Parent Traffic
Additional High Demand
Left turn lane is not necessary
Provide for EB left and right turn lanes
Additional access is not necessary
Designate student parking
Install Stop bar
Designate a parent loading area
Designate as one-way only
DO NOT ENTER
Designate short term visitor parking
Begin double queue
NC HWY 98 - WAIT AVE.
100 0 100
CONCEPT PLAN
NOT FOR CONSTRUCTION
Municipal & School
Transportation Assistance
Figure 1
Division 5
Wake County
Wake Forest
SCALE: NONE
DATE: 5/7/2020
PREPARED BY: TAG
N. C. DEPARTMENT OF TRANSPORTATION
TRANSPORTATION MOBILITY AND SAFETY DIVISION
REVISED BY: TAG
REVISIONS
0107


Averette Road
NC 98 (Wait Avenue)
365
1
365
1
365
86
365
451
451
128
23
128
428
112
522
14
23
94
120
852
89
151


Averette Road
NC 98 (Wait Avenue)

Questions?



This Photo by Unknown Author is licensed under CC BY-SA-NC