Bus Stop Selection and Routing Efficiency

Derek Graham, State Director
North Carolina

Safety vs. Efficiency

- Today's Budget Issues Require More Efficient Transportation or Reduced Transportation Safety Issues

National Highway Traffic Safety Administration

- Assistance from
  - National Association of State Directors of Pupil Transportation Services (NASDPTS)
  - National Association for Pupil Transportation (NAPT)

- WWW.NHTSA.GOV

Selecting School Bus Stop Locations:

A Guide for School Transportation Professionals

July 2010

Pedestrian and Bicycle Information Center

SafeRoutes
National Center for Safe Routes to School

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Prepared by the National Center for Safe Routes to School and the Pedestrian and Bicycle Information Center, both part of the University of North Carolina Highway Safety Research Center, with funding from the National Highway Traffic Safety Administration

Bus Stop Location

- Dictates the routes students travel to the stop
- Dictates the conditions in which the students will be waiting

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School Budget Pressures

- Consolidation of bus stops / bus routes
- Increasing “no transport” zones

- Lead to increased walking distances or shifts to other modes of transportation

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Determining School Bus Stop Locations

- Balancing ideal conditions with the realities of a community's road system, weather and topography.

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Policy

- Formal, written policies

  vs.

- Nothing “set in stone”

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District-level regulations related to school bus stops may address issues such as:

- Use of private roads and/or property
- Special guidelines for kindergarten students such as door-step pick-up
- Placement of stops at corners or mid-block locations
- Placement of stops on main arterials
- Provisions for providing transportation in hazard zones within a “no transport zone”
- Placement of stops in cul-de-sacs and
- Proximity of stops to railroad crossings

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Shared Responsibility

- Which responsibilities the school bears and which responsibilities fall to parents and other caregivers.
- When students are traveling between home and their school bus stops and while waiting for the bus.
  - Most school transportation professionals agree that it is the parents' responsibility to supervise students at these times.
  - However, many also recognize that this may be an unrealistic expectation due to work schedules, disabilities, or other circumstances.
- Regardless of how these situations will be handled, clearly stating and communicating expectations about parents' responsibilities is vital.

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“There is no perfect school bus stop, because it is impossible to eliminate all potential hazards, but guidelines and training are still necessary to ensure that responsible parties are making the safest, most informed decisions when placing stops.”

— State Director of Pupil Transportation

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Street-Side Characteristics

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To provide the safest environment for students to walk between home and the school bus stop and wait at the stop:

- Pick routes on streets with lower traffic volumes and lower speeds.
- Minimize or avoid multi-lane roads where pedestrians are most at risk of injury
- Pick roads with sidewalks or designated pedestrian paths separate from the roadway and traffic.
  - If these are not available, pick roads with sufficient space to walk along the roadway to reach the stop.
- Avoid or limit stops that require the school bus to make a left turn anywhere along the route.
- Avoid stops that require backing up.
  - If backing up is unavoidable, pick up students before backing.
  - During the afternoon return trip, drop off the students only after backing up and being in position to drive forward.
- Avoid railroad crossings along the bus route.
  - If it is impossible to avoid crossings, signage and railroad crossing arm protection should be present.

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Sufficient Visibility for Pedestrians and Drivers

- Enough sight distance so drivers, bus drivers and students waiting at the stop all can see each other.
  - There are no standardized distance measures that provide sufficient visibility nor are there formulas for computing an appropriate sight distance, but the following can impact sight distances:
    - Sunrise/sunset times (Try to avoid placing stops where vehicles will be facing into the sun at pick-up or drop-off times.)
    - Curves and hills
    - Trees and other vegetation
    - On-street parked cars and approaching vehicles
    - Snow drifts from snowplows
- If unavoidable, contact the local transportation authority to post warning signs when needed.
  - The Manual of Uniform Traffic Code Devices4 (MUTCD), used by traffic engineers, describes use of “Bus Stop Ahead” signs based on sight distance

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School Bus Stop Characteristics

- Safest areas for students to wait for or load onto or off of the bus

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School Bus Stop Characteristics

- Choose “near-side” stops whenever possible.
- Minimize the need for students to cross a road from the stop to the bus regardless of the type of roadway.
  - Students **must not** cross multi-lane roads where all traffic is not controlled by the presence of a school bus stop arm and flashing lights.
- Pick locations that offer adequate lighting.
  - If students will be waiting during low light hours, the stop should be positioned near a street light or other light source whenever possible.

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Waiting at the Stop

- Choose locations with sufficient space for students and parents to wait at least 12 feet from the roadway.
  - Distance is recommended based on the “12-foot rule” for students approaching and leaving the bus – 2005 NCST National Specifications and Procedures
  - Some transportation professionals have suggested that the distance needs to reflect the bus class and the differing sight distance afforded by each.
  - Consider the surrounding environment.
    - Commercial businesses and parks offer benefits and drawbacks.
      - Can confer safety because drivers may be more likely to expect pedestrians in these areas, they also can distract children from being ready to load when the bus arrives.

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Provide protection from weather.

- Depending on the geographical region:
  - Establish stops that offer shade without sacrificing visibility.
  - Avoid areas where snow drifts will reduce visibility or access to the bus.

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Stop Placement

- Determine policies for mid-block stops compared to corner stops.
- Whether a stop is located mid-block or on a corner does not have the same impact on safety as other factors described here, but this is a policy decision that must be taken into consideration.

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Stop Placement

- State and local policies vary regarding corner or intersection stops.
- Due to differing interpretations of safety issues and their priority, especially as they relate to visibility, traffic conditions, and control of oncoming traffic.

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Corner stops

- Corner stops are considered preferable because they conform with drivers' expectations to stop at intersections.
- They also provide a wide area to scan for traffic and students, minimize buses backing up and create more efficient routes.

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Corner stops

- Corner stops can be considered less preferable due to the inability to easily control all approaching drivers.
- Some states have noted that if a school bus stop is at an intersection or corner, students should be loaded and unloaded on the far side of the intersection
  - School bus blocks the cross traffic
  - Stop arm controls the other directions.
- avoid locating school bus stops at busy intersections.

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Other bus stop issues

- Consider the number of students who will use a stop.
  - The presence of multiple students confers safety
  - Too many students increases the likelihood of behavioral problems.
- NHTSA guide focuses on the prevention of traffic-related injuries
- Other risks:
  - assault or other crimes.
  - proximity to liquor stores, bars, adult entertainment,
  - Proximity to registered sex offenders

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Student's Route Between Home And School Bus Stop

- Most NAPT and NASDPTS members who provided feedback indicated that their district level policies, guidelines, or recommendations for establishing school bus stops in some manner considered the safety of the route that students travel between their doorstep and the bus stop.
  - The presence of a "safe" path
  - Quality and type of road crossings (more specifically, the number of lanes and the traffic controls present at these crossings)
  - Proximity of railroad crossings
  - Traffic speed limits
  - Walking distance

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Multi-dimensional approach

- Pedestrian safety skills practice
- Integration of pedestrian safety education into bus safety
  - Enforcement
  - Safe Routes to School funds*
- Parent involvement
  - Developmental readiness

Source: UNC Highway Safety Research Center

Developmental readiness: 4 – 6 years of age

- Have a hard time judging when it's safe to cross
- Have difficulty judging speed of traffic
- Have difficulty controlling impulses and concentration
- Have a hard time staying focused on one task (like crossing the street)
- Have difficulty choosing safe crossing sites

Source: UNC Highway Safety Research Center

Developmental readiness: 7 - 9 years of age

- Need supervision as they learn
- Can identify safe crossing sites with help and practice
- Can learn how to identify traffic and stay focused while crossing the street with help and practice

Source: UNC Highway Safety Research Center

Developmental readiness: 10+ years of age

- Need specific instruction and modeling as they learn more complex ped safety skills
- Can identify safe crossing sites with help and practice
- Can learn how to identify traffic and stay focused while crossing the street with help and practice.

Source: UNC Highway Safety Research Center

Parents' role in ensuring the safety of the student while in route to or from the stop and waiting at the stop.

- Maximum distance permitted between a student's home and the school bus stop. The distance between home and the stop:
  - Typically ranges from one to one and one-half miles
  - Sometimes varies with the age of the rider
  - Are increasing in some districts due to economic constraints that are impacting bus service
  - Assumes that parents will ensure the child's safety between the home and school bus stop
  - May be determined from the center of the roadway outside of the residence to the bus stop
  - Is usually approved by the school board and follows state guidelines
  - May be determined by examining safety issues on a case-by-case basis instead of using a certain distance standard

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School bus stops should be located so that students and parents have adequate pathways to walk from home. Desirable pedestrian routes:

- Minimize or avoid street crossings
- Have traffic controls (stop signs or traffic signals) to provide assistance to pedestrians if crossing streets cannot be avoided
- Have sufficient space to walk that is separated from traffic
- Do not require walking on high-volume, high-speed roads
- Are passable in snowy weather

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The “Walkability Checklist” available from the Pedestrian and Bicycle Information Center raises such questions such as:

- Did you have room to walk?
- Potential problems include:
  - Sidewalks or paths started and stopped
  - Sidewalks were broken or cracked
  - Sidewalks were blocked with poles, signs, shrubbery, dumpsters, etc.
  - No sidewalks, paths, or shoulders
  - Was it easy to cross streets? Potential problems include:
    - Road was too wide
    - Traffic signals made us wait too long or did not give us enough time to cross
    - Street needed striped crosswalks or traffic signals
    - Parked cars blocked our view of traffic
    - Trees or plants blocked our view of traffic
    - Sidewalks needed curb ramps or ramps needed repair
    - Can a child:
      - Cross at crosswalks or at a location where the child can see and be seen by drivers
      - Stop and look left, right and then left again before crossing street
      - Walk on sidewalks or shoulders facing traffic where there are no sidewalks
      - Cross with the traffic signal

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Implementation: Documenting a Process

- Standardizing the criteria used in decision-making helps create a transparent, explainable process.
- Easier to explain to school administration, the public and parents
- Does not rely on subjective “common sense” determinations, which can vary widely depending on the transportation director.
- Processes and policies are only useful in improving student safety if they are implemented.

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Engage Available Resources

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Local law enforcement officers

- Law enforcement officers can share data related to crashes and speeding prevalence that may indicate areas to avoid when possible.
- Know the traffic patterns on local roadways
  - Most common types of vehicles
  - Traffic flow irregularities
  - Other dangerous situations that should be avoided.

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Transportation authorities

- Responsible parties
  - Department of Transportation
  - Local traffic engineer
- Relative traffic volume and condition of different roads.
- Responsible for signage that could indicate an upcoming school bus stop and speed limit designation

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Examples

- Sample policies, including Fairfax County

- ….now on to Efficiency

TRANSPORTATION $ SHRINKING ?

Here are some places to Look

Use Optimization to improve Transportation Plan.

Be sure to get reimbursed for PK, Smart Start, etc. that is out of normal route area.

Enforce Idling Policies.

Monitor Drive Time. Minimum Time guarantees paid by local funds

Multi-School Multi-Grade Transportation

Audit Runs to verify proper run paths and stop locations.

Staggered Bell Times

Multi-tier Busing

Reduce # Stops – Increase Stop to Stop Distance

Local Policies

- Bell times, program placement, magnet programs, etc. and how these policies affect the efficient utilization of the transportation fleet.
- If the transportation plans are developed solely from a school-level perspective, opportunities to more efficiently utilize the school bus fleet may be lost.
- TIMS Staff has the experience to advise in these matters.

Idling Policy

"In order to be eligible to receive any mid-year transportation allotment resulting from increased fuel prices, an LEA must have a reduced idling policy in place at the beginning of the school year."

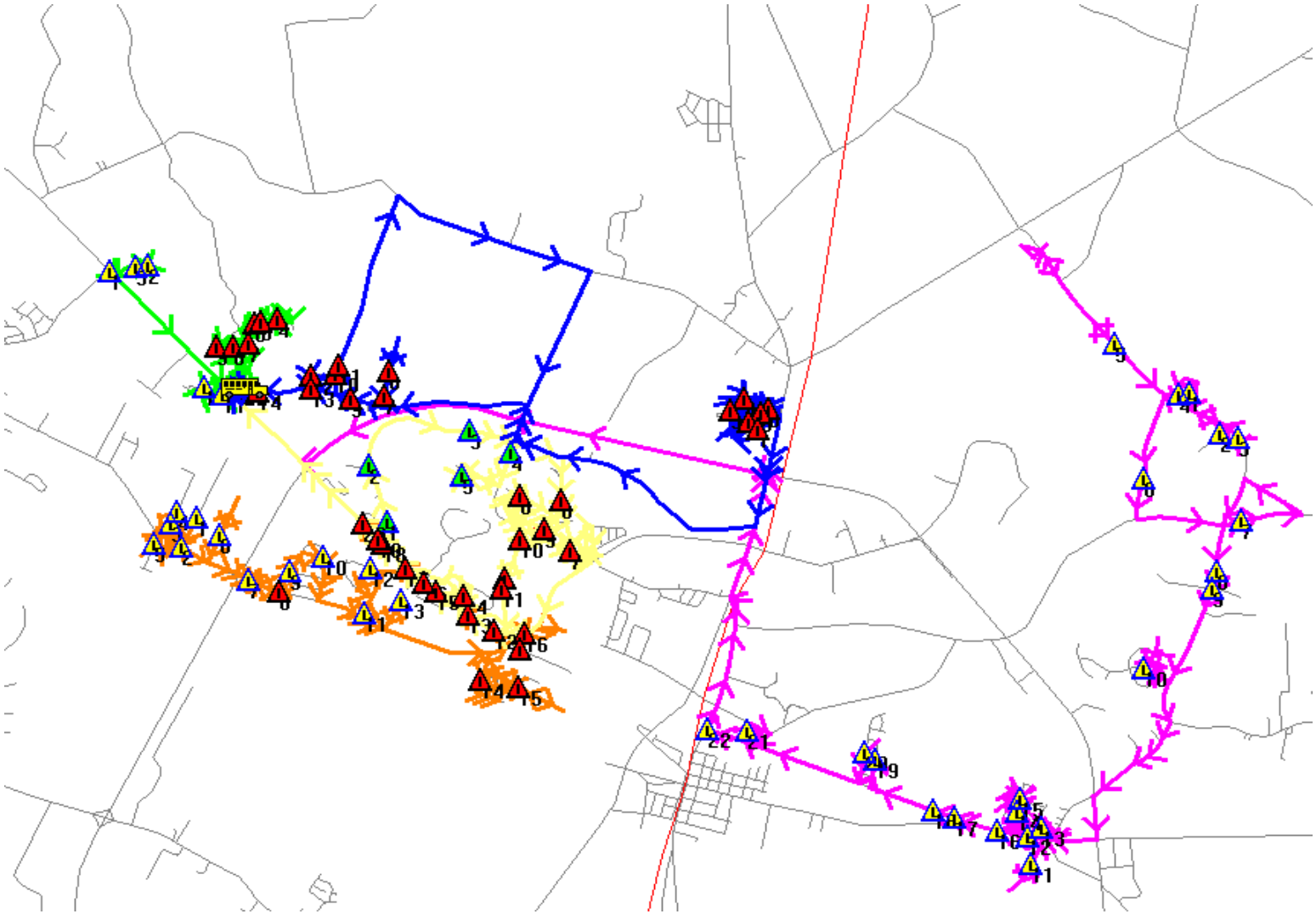
While all districts should have the idling policy in place, is it being enforced within your LEA?

BENEFITS – Reduced Idling results in reduced fuel consumption, therefore, reduced fuel costs. A side benefit is reduced pollution.

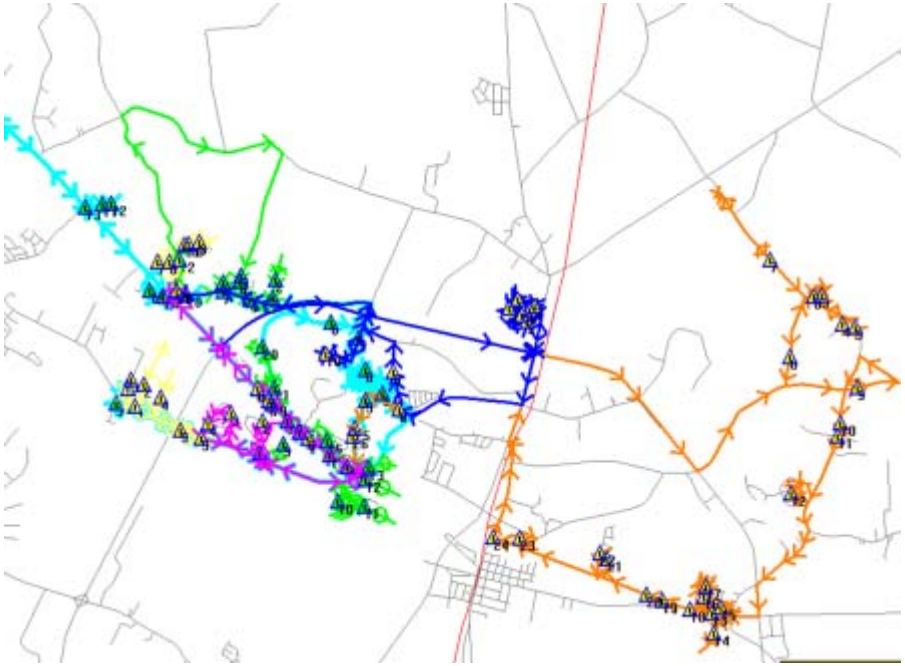
Allotment Policy Manual, Transportation of Pupils - Pgs 66 & 67

- 5 RUNS
- Total students/Beginning run time

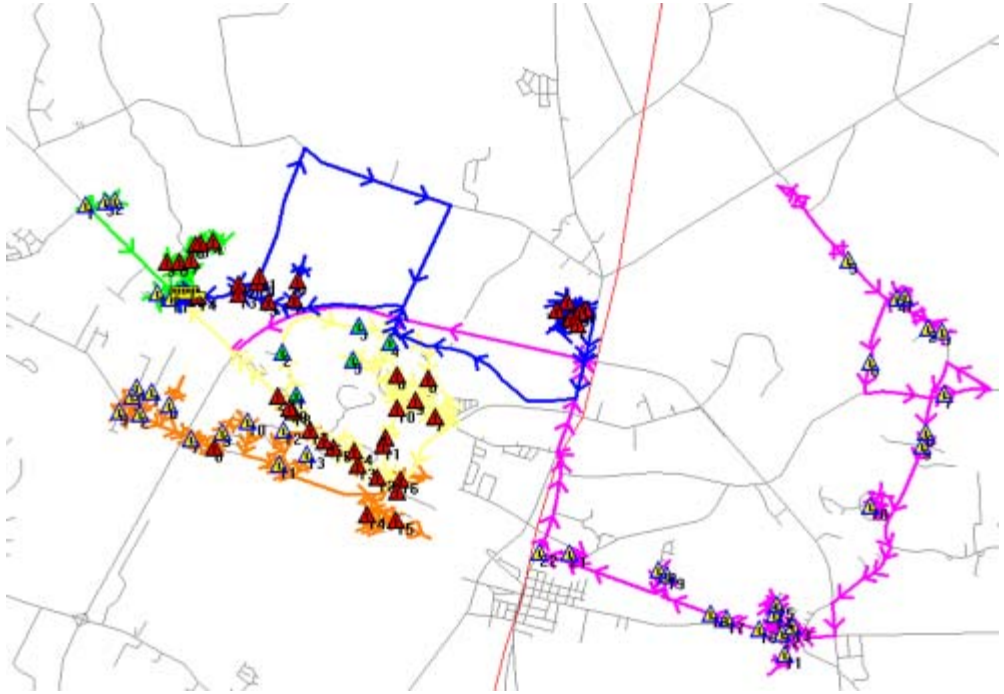
- 27/6:41
- 51/6:50
- 43/6:43
- 53/7:08
- 16/6:47



6 Runs



5 Runs



Who makes your routing decisions?

- How are your routing decisions made?
  - Stop Placements
  - Stop Order
  - Student Assignments
  - # of Runs per School
  - Sharing buses among schools
- Are they made by…
  - School(s)?
  - Transportation Office?
  - Board of Education?

Development of the Transportation Plan

- The transportation plan should be developed and guided by LEA personnel that have the best tools and broadest view of the entire transportation system
- When a plan is developed at the school level, consideration is often given only to a narrow set of circumstances. However, school level supervision and input that is vital to an overall efficiently run transportation plan.
- The LEA Administration, school administrators and the Transportation Department should form a cooperative team that that provides and implements a well-developed transportation plan.

Routing Decisions

How involved is the Transportation Department?

- Who is looking at the big picture?

  – Is transportation considered when placing special needs students, special programs or magnet locations?
  – Is routing reviewed prior to the start of each year?
  – Who sets the bell times for each school?
  – Are these times coordinated to improve efficiency?

Routing Decisions

Improving Efficiency by Reducing Time & Miles

- Many districts have started creating neighborhood ‘community stops*’ within:
  - Housing developments
  - Subdivisions
  - Small neighborhoods
- These reduce the number of miles and driver hours accumulated each day as well as a decrease in student ride times.
- Community Stops should be reviewed to ensure

  student safety will not be comprised

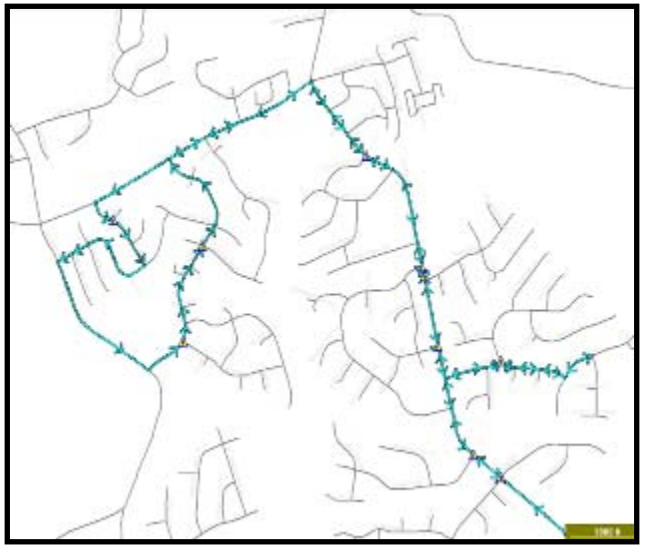
Community Stops

Improving Service by Reducing Time & Miles

Before

Cost: 31 miles one way
62 miles per day
62 x $2.00 = 124.00
$124.00 x 180 days = $22,320

After



Cost: 18 miles one way
36 miles per day
36 x $2.00 = 72.00
$72.00 x 180 days = $12,960

$9,360 savings for 1 bus

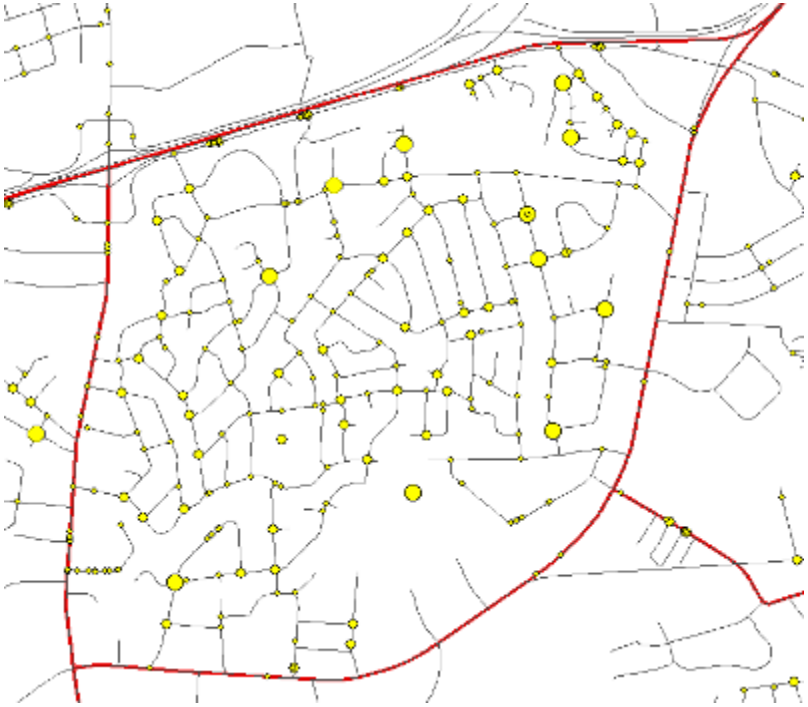
Charlotte-Mecklenburg Schools
August, 2009

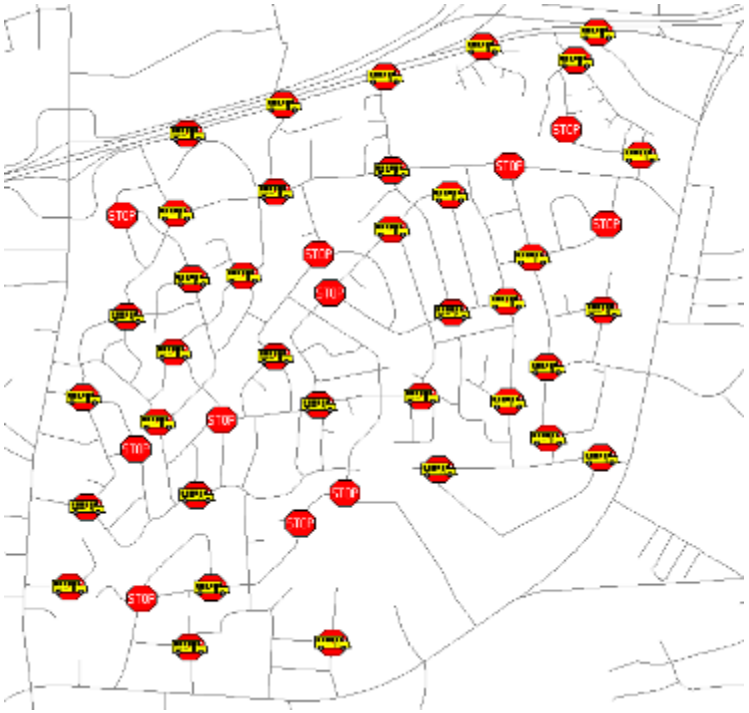
- Review of current neighborhood bus stop placement and develop a template using landmarks in TIMS creating common neighborhood bus stops across the district in an effort to reduce number of stops, buses and miles.

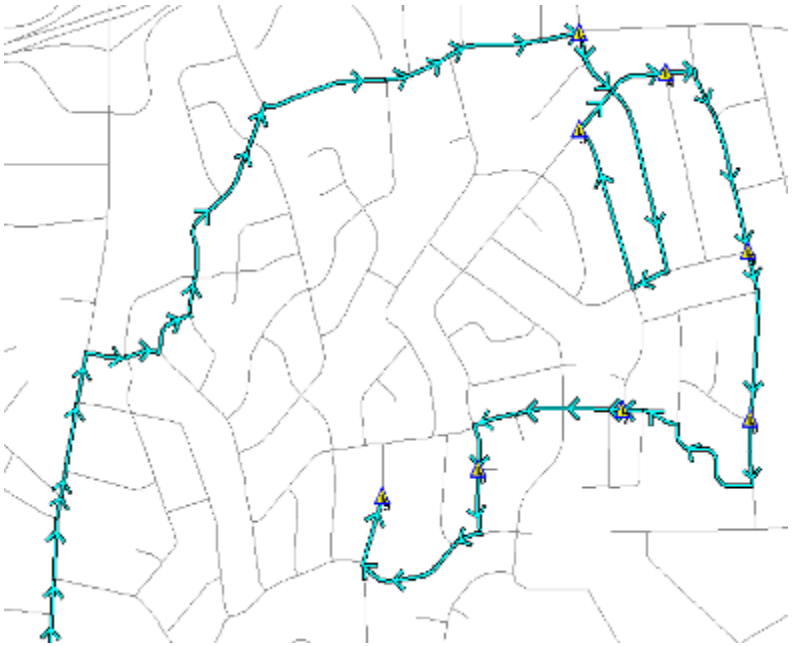
- Staff visited each of the neighborhoods and recorded common bus stop locations. These maps were used by UNCC TIMS staff to create landmarks in TIMS, creating a template of stops to be used by any school serving the neighborhood.

- Two layers of landmark locations were created to address the difference in walking distances for elementary students (.20 and appear as a stop sign) and secondary students (.40 and appear as a school bus).

- Bus stops and runs were created over the summer by CMS transportation staff using the template and route optimization was used to pair the runs together.




STOP



	2008-09	**2009-10***	**Estimated Change**	**NOV 2009 ACTUAL**
# Students Assigned to a Bus	112,000	111,000	(1,000)	114,249
# Total Bus Stops	37,000	26,000	(11,000)	26,932
# Total Bus Runs	5,652	5,292	(360)	5769
# Total Routes or Buses	1,255	1,155	(100)	1150
# Daily Miles	140,000	129,000	(11,000)	123,087
Average Walk Distance to Bus Stop (miles)	0.07	0.12	0.05	0.12.89
*2009-10 Data are projections and subject to change as the year progresses				

Community Stops

Improving Efficiency by Reducing Time & Miles

- Utilizing ‘community stops’ in conjunction with staggered bell times will result in an extremely efficient transportation operation and will produce:
  - Driver Salary Savings
  - Fuel Savings
  - Maintenance & Support Cost Savings
- Simulating using a computer routing program - you can experiment with altering your transportation plan and then examine the potential savings before implementing the changes.

Routing Decisions

Examining the Impact of Community Stops

- Over the summer, Iredell-Statesville Schools discontinued ‘home stops’ for middle and high school students within certain areas and relocated over 500 stops by creating ‘community s

2010-2011 Mileage Reductions: Iredell-Statesville School

School(s)	# of Buses	Miles Reduced	Savings: Bus Miles* (1)	Savings:Driver Wages (2)	State Bus Replacement Expenses (3)	Total Estimated Savings (1+2+3)
LNHS	27	224	$110.82	$73.28	$109.23	$293.33
NIHS/NIMS	30	477	$235.73	$44.49	$232.34	$512.55
SIHS/TMS	23	313	$154.77	$52.63	$152.54	$359.94
WIHS/WIMS	25	225	$110.98	$6.14	$109.39	$226.50
SHS	10	72	$35.36	$16.52	$34.85	$86.73
EIMS	13	138	$68.05	$15.58	$67.07	$150.69
LMS	12	150	$74.03	$49.44	$72.96	$196.43
BMS	20	289	$142.96	$74.10	$140.91	$357.98
Daily Total	160	1888	$932.69	$152.57	$919.29	$2,004.55
Annual Total	160	339,777	$167,883.82	$27,463.32	$165,471.40	$360,818.53

Ridership and Safety

- Caution – If plans are so different that students and parents choose NOT to ride the bus…..
  - Lower Student Count
  - Fewer students riding the bus means that overall safety is reduced

Data Analysis

Auditing Student Ridership

Examining Annual Changes at the School Level

School	2007-2008 Riders	2007-2008 Students	2008-2009 Riders	2008-2009 Students	Rider Difference	Student Difference	% Change in Riders	% Change in Students
312	223	440	273	559	50	119	22%	27%
320	161	429	170	454	9	25	6%	6%
372	156	264	152	247	-4	-17	-3%	-6%
351	92	529	160	537	68	8	74%	2%
358	72	661	127	637	55	-24	76%	-4%

- The accuracy of TIMS can be explored by examining the annual changes at the school level between student population and student ridership
- These two numbers should show echo one another each year but could be impacted by changes to
  - School Grade Composition
  - School Boundaries
  - Enforcement of Walk Zones

*We are looking into conducting a School-Level Analysis of changes in Population and Ridership for each LEA as part of the TDTIMS Annual Audit

Auditing Bus Routes

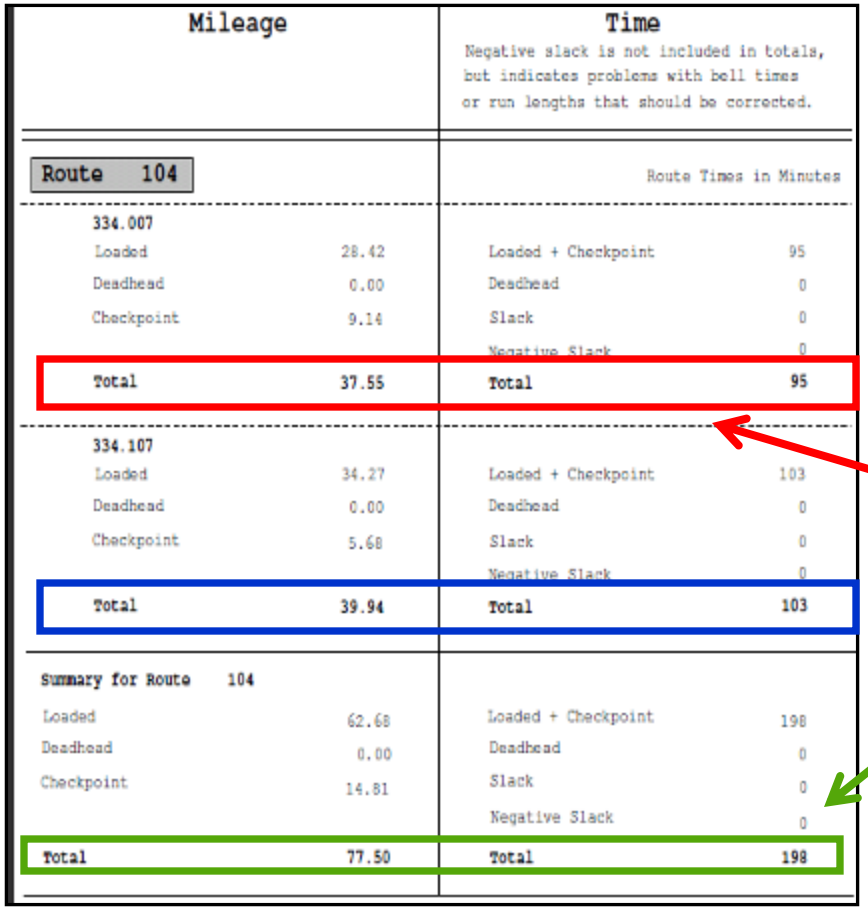
Assessing Driver Compliance

- If your routing data is an accurate representation of your daily transportation operations, then assessing driver compliance is quite simple as routing Data can be compared to
  - Driver Hours & Payroll
  - Odometer Mileage from your Fleet System

- Both of these comparisons are irrelevant if your routing Data is inaccurate.

Auditing Bus Routes

Assessing Driver Compliance



Mileage		Time	
		Negative slack is not included in totals, but indicates problems with bell times or run lengths that should be corrected.	
Route 104			Route Times in Minutes
334.007			
Loaded	28.42	Loaded + Checkpoint	95
Deadhead	0.00	Deadhead	0
Checkpoint	9.14	Slack	0
		Negative Slack	0
Total	**37.55**	**Total**	**95**
334.107			
Loaded	34.27	Loaded + Checkpoint	103
Deadhead	0.00	Deadhead	0
Checkpoint	5.68	Slack	0
		Negative Slack	0
Total	**39.94**	**Total**	**103**
Summary for Route 104			
Loaded	62.68	Loaded + Checkpoint	198
Deadhead	0.00	Deadhead	0
Checkpoint	14.81	Slack	0
		Negative Slack	0
Total	**77.50**	**Total**	**198**

- TIMS features a number of reports that can assist in assessing driver compliance.
- The RTE Time & Miles Summary displays the exact number of miles and minutes needed for each Bus.
  - AM Runs
  - PM Runs
  - Daily Total

Auditing Bus Routes

Assessing Driver Compliance

RTE ID	RUN ID	Begin Time	End Time	Total Miles	# of Minutes
1	310.003	6:47 AM	7:25 AM	15.382	38
1	310.103	2:02 PM	2:56 PM	15.8136	54
100	322.002	5:39 AM	7:34 AM	37.7627	115
100	322.102	2:10 PM	4:15 PM	37.8896	125
101	320.004	6:38 AM	7:45 AM	23.7038	67
101	320.104	2:55 PM	4:16 PM	23.8583	81
102	322.001	6:38 AM	7:34 AM	18.8776	56
102	322.101	2:10 PM	3:05 PM	13.8136	55
103	320.002	6:49 AM	7:45 AM	19.7479	56
103	320.102	2:55 PM	4:09 PM	21.485	74
104	334.007	6:15 AM	7:50 AM	37.5534	95
104	334.107	3:10 PM	4:53 PM	39.9424	103

- TIMS Data Managers are able to examine the number of miles and minutes for each AM or PM run and the daily totals for a single driver, bus or school.
- This data can then be compared to driver payroll and BSIP to assess compliance.
- Some LEAs use TIMS to establish driver hours for the upcoming year, while others continue to rely on “estimates” from school personnel.

Auditing Bus Routes

Examining TIMS Data

RTE ID	RUN ID	Begin Time	End Time	Total Miles	# of Minutes
1	310.003	6:47 AM	7:25 AM	15.382	38
1	310.103	2:02 PM	2:56 PM	15.8136	54
100	322.002	5:39 AM	7:34 AM	37.7627	115
100	322.102	2:10 PM	4:15 PM	37.8896	125

- Bus 100 shows a total of 240 minutes of driving time (4 hours) is needed each day to complete the route as designed in TIMS. This figure does not typically include pre/post inspection time.
- TIMS allows the inclusion of extra time before and after the established run to account for this or LEAs may add this additional time on their own.
- Route Time & Miles reports are highly dependent upon an accurate representation of your LEA in TIMS
  - School Bell Times: Early/Late Windows
  - Stop Placement & Stop Order
  - Map Calibration (Road Speed, Turnarounds ,Checkpoints, etc)

Verifying the Transportation Plan and Drivers Time

- When is the last time someone from transportation rode a bus with the copy of the run directions to audit directions, stop times, and travel speeds?
- When doing this to monitor driver performance, auditing the data can be done at the same time

INSPECT what you EXPECT!

- **BENEFITS** – More accurate information in the routing database will result in a more realistic and efficient transportation plan.
  - Riding the bus may also result in better communications between the drivers and the transportation planners.
  - Improved communications should mean that the drivers will understand the importance of sharing issues that affect their runs.
  - The net result is an improved transportation plan that means less cost.

School Bus Route Hazards

Fox River Grove, IL

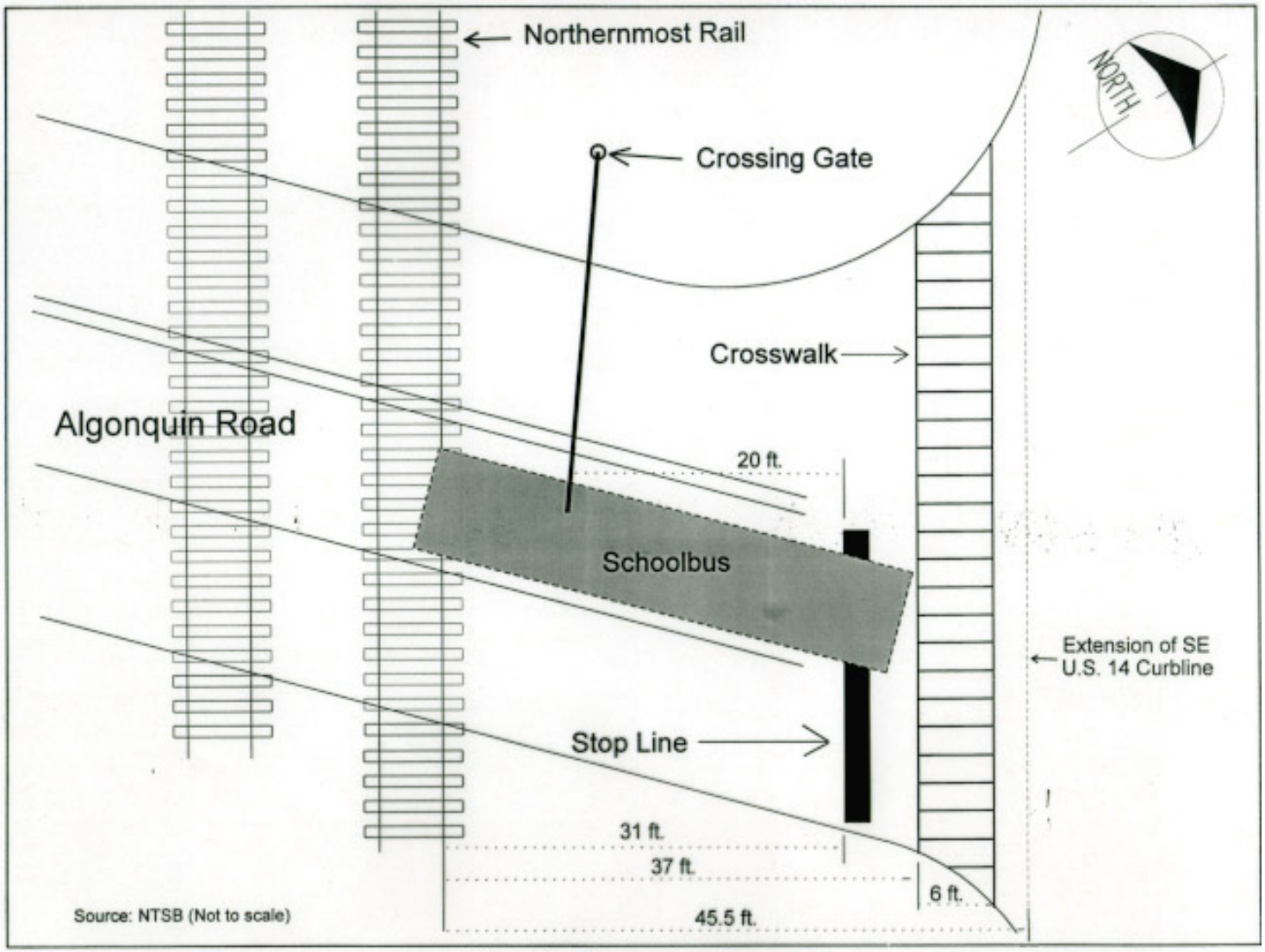


Figure 5 — Diagram of queuing area

Recommendations

- Advise drivers of the circumstances of this accident and provide guidance about vehicle positioning, especially at railroad/highway grade crossings
- Develop guidelines for the appropriate placement of radio speakers; disable speakers adjacent to the driver’s head.

Recommendations

- Implement a program for identification of school bus route hazards and routinely monitor and evaluate all regular and substitute school bus drivers.
- Consider railroad/highway grade crossing crash histories or characteristics when establishing bus routes.

NASDPTS Study

- **First Issue:**

  - **Define “School Bus Route Hazard”**

    - **Driving ?**
    - **Loading Zone ?**
    - **Fixed ?**
    - **Without Warning ?**

NASDPTS Study

- **Types of Hazards Included**
  - **Driving -- Everything but Loading Zone**
  - **Fixed -- None that occur without warning**
  - **Not an “All-Inclusive” list**

Fixed Route Hazard
Dangerous Intersections & Roadways

- High Crash Locations
- Visibility Obstructions
- Peculiar Roadway Features

Blind Curve and Railroad Crossing

Fixed Route Hazard
Bridges, Tunnels, Underpasses & Overpasses

- Weight Capacity
- Clearance
- Lane Width

Fixed Route Hazard
Pedestrian Areas

- Difficult Visibility
- Narrow Streets with Parked Vehicles
- Heavy Pedestrian Congestion

Fixed Route Hazard
Queuing/Storage Areas

- Acceleration/Deceleration Areas
- Median Area
- Turning Lane

Fixed Route Hazard

Railroad Grade Crossing

- Signs & Controls
- Visibility
- Storage Space
- Roadway Design Features

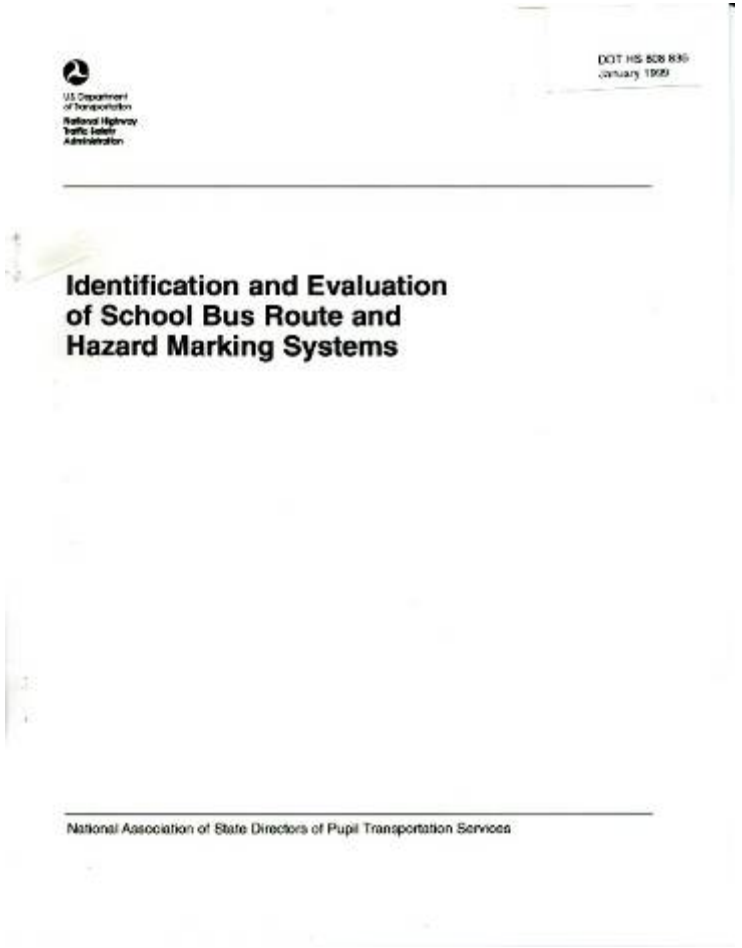
This regular length bus cannot clear the tracks when stopped in the queing area before the white line.

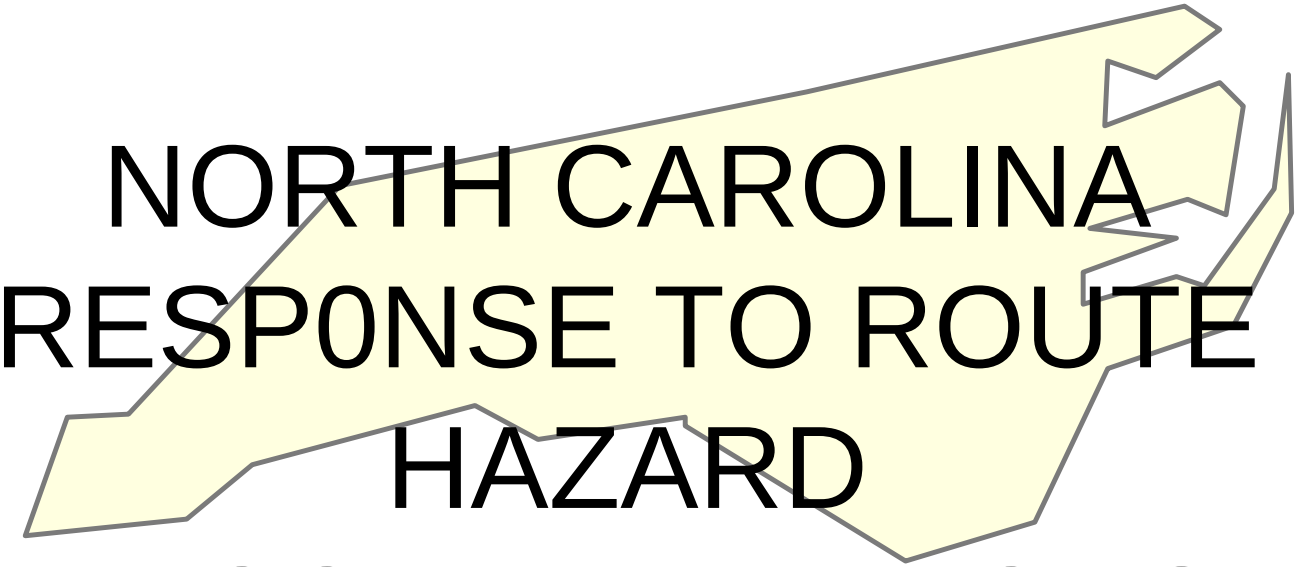
Fixed Route Hazard Identification System

- **Identification**
  - **Established, systematic process**
- **Information**
  - **Disseminate to all personnel**
- **Training & Common Sense**
  - **Essential to success**

NASDPTS REPORT

- **Route Hazards Report**
- **January 1999**
  - **# DOT HS 808 836**
- **WWW.NASDPTS.ORG**
  - **Operations / Routing**





NORTH CAROLINA RESP0NSE TO ROUTE HAZARD RECOMMENDATONS

Transportation Information Management System (TIMS)

Statewide program of Computer-Assisted School Bus Routing and Scheduling

Uses software from Education Logistics

The TIMS Customized Route Hazard Program

Initiated as a result of Fox River Grove Recommendations

Written warning statement that is available to all drivers. Examples:

- Railroad Crossings -
  - single and multi-tracks,
  - insufficient queing areas,
- Narrow bridges
- Blind curves.

How does this program benefit School Transportation ?

The number one benefit is to the school bus driver. They can easily see the hazard warning statements printed on their bus route before they proceed on their route.

The customized warning feature allows for an unlimited use and opens the door for public relations with the community.

The warning statement can be modified by the TIMS Data Manager

```
 REPORT CODE: BUSRUN- 5     USER:              DATE: 06-FEB-98
TIME: 08:56 am       INFO:
 PAGE:    5

 Run: 340001  Route: 184  Description:
 Bus: 184     Route Description:  MS LANIER

 Description                                                Time Stpld
Runld   Stop

 OWEN TAYLOR LN & S US 117 HWY                               7:04     2
4  340002
      Turn Right on S US 117 HWY                 486   2993
      Turn Left on  PERRY RIVEN RD               426   2330

 ********* WARNING RRX NO GATE  *********

Turn Left on  BEASLEY TOR RD              425   2994
      Turn Left on  BEASLEY S M RD                710   2616
```

REPORT CODE: BUSRUN- 5 USER: DATE: 06-FEB-98 TIME: 08:56 am
PAGE: 1

Run: 324005 Route: 122 Description: MS BRYANT
Bus: 122 Route Description: MS BRYANT

Description	Time	Stpld	Runld	Stop	
School: WALLACE RO Check Point Record	7:14	0	CHK PT		
Turn Right on HIGH SCHOOL RD				2535	1024
Turn Left on S US 117 HWY				1018	3628
Turn Right on E HALL ST				937	936

********* **WARNING RRX - CURVE** - *********

Turn Left on S WEST RAILRO ST WA 2216 2207
730 S WEST RAILRO ST WA 7:23 1

This report can provide warnings of other hazards.

REPORT CODE: BUSRUN- 5 USER: DATE: 06-FEB-98 TIME: 08:56 am
PAGE: 9

Run: 336001 Route: 187 Description: MS KEA
Bus: 187 Route Description: MS KEA

Description	Time	Stpld	Runld	Stop
School: WARSAW EL Check Point Record	6:55	0		CHK PT
Turn Right on LANEFIELD RD	2444 761			
Turn Right on E BEST ST	761 2537			
Turn Left on S PINE ST WR	1255 1256			
S US 117 HWY & B L TRAILER LN	7:01	7	7	336084
2051 S US 117 HWY	7:06	1	18	336078
Turn Right on WILLIS CARR RD	1837 2328			

****** ALERT -BLIND CURVE AHEAD ******

Turn Right on ISHAM FREDE RD	1839 709			
688 ISHAM FREDE RD	7:11	2	20	336075
Turn Right on BEASLEY TOR RD	710 2996			
Turn Left on PERRY RIVEN RD	425 424			

What's the Answer?

Education

Education!

EDUCATION!!

Bus Stop Selection and Routing Efficiency

Derek Graham, State Director
North Carolina