# Strategies for the Greening of Student Pick-Up During School Dismissal


texite

Winter Conference
January 30th, 2010
Frisco, TX

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TRAFFIC ENGINEERS, INC.
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# Today's Discussion

Improve Safety & Roadway Operations

Safer, "Greener" Student Pick-up

Improve Emissions & Air Quality

- The topic of design and operation of parent pick-up zones at schools has not received considerable attention until recently
- Parent pick-up zones are often overlooked in school site design

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## Safety / Roadway Operations Issues

Pedestrian / vehicular / bus conflicts


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## Safety / Roadway Operations Issues

Students staging outside school


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# Safety / Roadway Operations Issues

Vehicles queue in through lanes


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# Improve Safety / Roadway Operations

## Reduce conflict points

- Hold back walkers and bicycle riders until all private vehicle pick-ups are complete (ensures no conflicts)
- Hold back private vehicle pick-up students until all walkers and bicycle riders are off-site (encourages walking and biking)
- Segregate buses, private vehicles and walkers/bikers



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# Improve Safety / Roadway Operations

## Eliminate off-site vehicle queue

- Retrofit on-site queue lane for existing schools
- Case Study: C.E. Landolt Elementary School, Clear Creek ISD, Harris County, TX
  - Enrollment: 1,200 students
  - On-site storage for 8 vehicles in queue
  - Maximum observed queue of 82 vehicles
  - Through lanes of El Dorado Blvd (an adjacent major arterial) were blocked repeatedly


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# Improve Safety / Roadway Operations


**C.E. Landolt ES**
**"Before"**
**02/23/2007**

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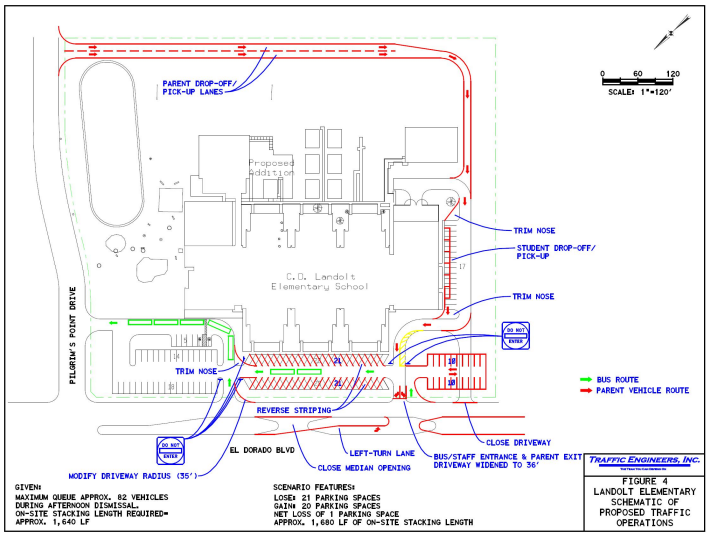


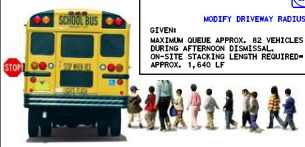


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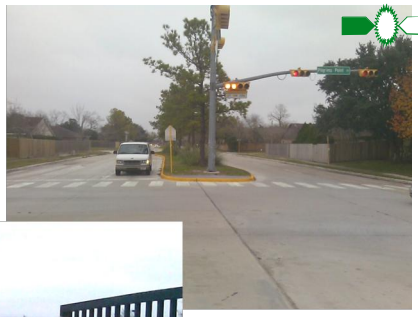
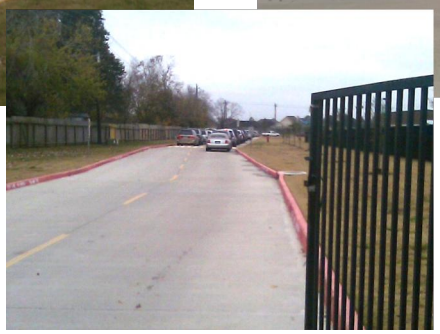
# Improve Safety / Roadway Operations





**C.E. Landolt ES**
**"After"**
**12/12/2009**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# Improve Safety / Roadway Operations

Design sufficient on-site vehicle queue lane for new schools

- Traffic Engineers, Inc., has collected data from 55 elementary schools around Harris County, Texas
- Linear-regression model developed to predict maximum queue length
- Data collected from each school includes:
  - Enrollment
  - Total number of private pick-up vehicles
  - Maximum queue length, in vehicles
  - Stacking and loading techniques


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# Improve Safety / Roadway Operations

Data collected from 55 Elementary Schools in/around Harris County, Texas

| | Observation Date | Total Enrollment | Total Parent Vehicles (Actual) | Percentage of School for Total | Maximum Queue (Actual) | Percentage of School for Maximum Queue | Queue as Percentage of Total | Double Stacking Observed |
|---|---|---|---|---|---|---|---|---|
| **Cy-Fair ISD** | | | | | | | | |
| Andre Elementary | 12/7/2006 | 1,553 | 103 | 6.6% | 85 | 5.5% | 82.5% | No |
| Duryea Elementary | 12/7/2006 | 1,150 | 59 | 5.1% | 58 | 5.0% | 98.3% | No |
| Sheridan Elementary | 12/7/2006 | 1,321 | 118 | 8.9% | 75 | 5.7% | 63.6% | No |
| Walker Elementary | 12/7/2006 | 1,324 | 75 | 5.7% | 69 | 5.2% | 92.0% | No |
| Keith Elementary | 12/4/2007 | 1,036 | 95 | 9.2% | 61 | 5.9% | 64.2% | No |
| Ault Elementary | 12/6/2007 | 1,100 | 86 | 7.8% | 68 | 6.2% | 79.1% | No |
| Postma Elementary | 3/5/2009 | 1,057 | 87 | 8.2% | 77 | 7.3% | 88.5% | No |
| Birkes Elementary | 3/6/2009 | 1,335 | 108 | 8.1% | 71 | 5.3% | 65.7% | No |
| | | | | | | | | |
| **Spring ISD** | | | | | | | | |
| Winship Elementary | 12/12/2006 | 845 | 67 | 7.9% | 43 | 5.1% | 64.2% | Yes |
| Salyers Elementary | 12/12/2006 | 715 | 75 | 10.5% | 53 | 7.4% | 70.7% | No |


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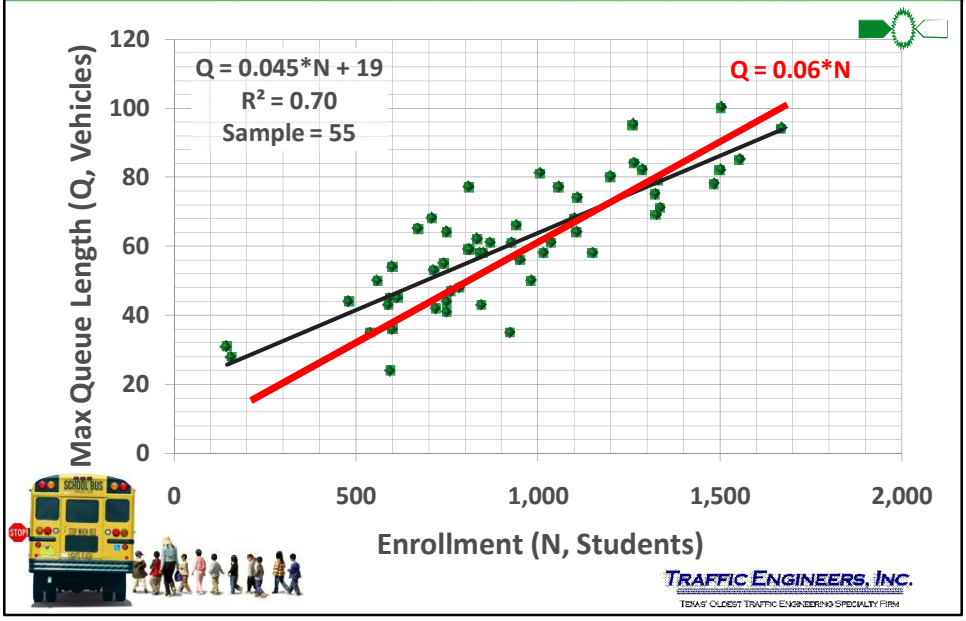
# Improve Safety / Roadway Operations







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# Improve Safety / Roadway Operations

## "Rule of Thumb" Design Value

- On-site queue length (in terms of vehicles) is approximately **6%** of the total planned ultimate enrollment of the school
- Assume typical vehicle length of 23 feet[1]
- Thus, a planned 1,000 student elementary school should have (1,000)(.06)(23)=1,380 linear feet of queue length on-site


[1]Source: Harris County, TX, School Traffic Study Guidelines

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# Improve Safety / Roadway Operations

**Table 11. Recommended Parent Drop-off/Pick-up Zone On-Site Stacking Length for Texas.**

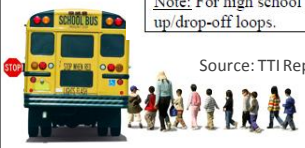
| School Type | Student Population | Loop Drive Stacking Length (linear feet) (m) |
|---|---|---|
| Elementary | Less than 500 | 400 – 750 (122 – 229) |
| | 500 or more | 750 – 1500 (229 – 458) |
| Middle | Less than 600 | 500 – 800 (153 – 244) |
| | 600 or more | 800 – 1600 (244 – 488) |
| High (*31*) | 400 – 800 | 800 – 1200 (244 – 366) |
| | 800 – 2500 | 1200 – 1500 (366 – 458) |
| Note: For high school populations greater than 2500 students, consider two separate student pick-up/drop-off loops. | | |

1,125

**Table 10. South Carolina DOT Recommendations for On-Site Stacking Length (*31*).**

| School Type | Student Population | Loop Drive Stacking Length (linear feet) (m) |
|---|---|---|
| Elementary | 200 – 600 | 900 – 1200 (274.5 – 366) |
| | 600 – 1400 | 1200 – 1500 (366 – 457.5) |
| Middle | 200 – 600 | 900 – 1200 (274.5 – 366) |
| | 600 – 1200 | 1200 – 1500 (366 – 457.5) |
| High | 400 – 800 | 800 – 1200 (244 – 366) |
| | 800 – 2500 | 1200 – 1500 (366 – 457.5) |
| Note: For high school populations greater than 2500 students, consider two separate student pick-up/drop-off loops. | | |

1,350




Source: TTI Report 4286-2: "Traffic Operations and Safety at Schools: Recommended Guidelines"

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# Today's Discussion

Improve Safety & Roadway Operations

Safer, "Greener" Student Pick-up

Improve Emissions & Air Quality


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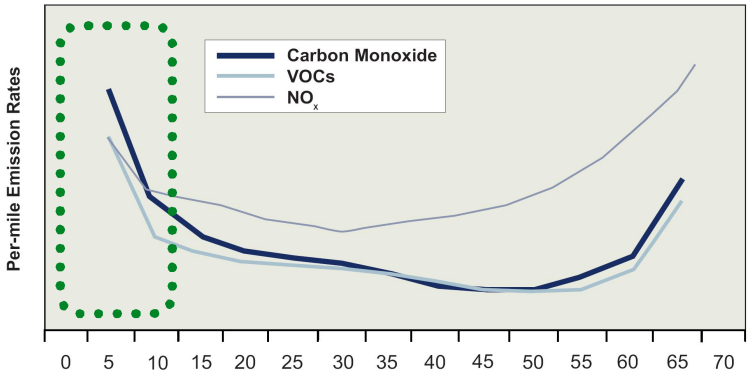
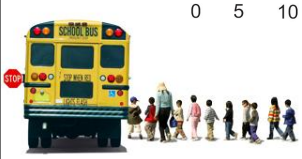
# Emissions / Air Quality Issues

**Higher rates of emissions exist during low speeds/ idling[1]**




[1] Source: EPA MOBILE5a Emissions Model

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# Emissions / Air Quality Issues

## Emissions while idling

- Vehicles idling at 5,050 Texas elementary schools produce ~15-25K[1] metric tons of $CO_2$ annually (~3-4K[1] metric tons in Harris County)
- Houston region has historically not met EPA air quality standards; expected to meet for first time for 2009
- EPA has recently proposed more stringent requirements


[1] Source: Traffic Engineers, Inc., data collection averages

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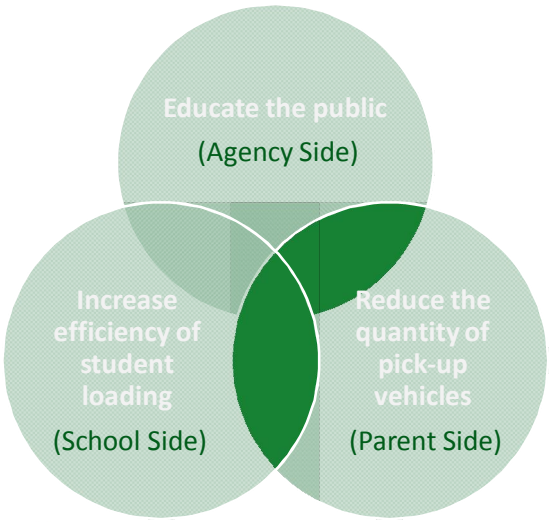
# Improve Emissions / Air Quality





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# Improve Emissions / Air Quality

## Educate the public

- Instill green thinking into community
- Promote walking and biking to school through printed materials and TV airwaves
- Encourage motorists to turn off engine when idling
- The 5 E's:
  - Education
  - Encouragement
  - Enforcement
  - Engineering
  - Evaluation


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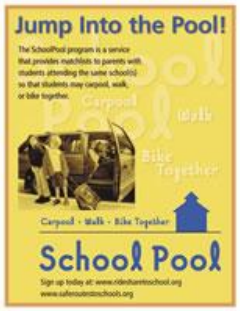
# Improve Emissions / Air Quality

## Educate the public – Case Study

- Marin County, California: "Greenways to School"
- $175K grant to promote green ways for students to get to and from school
- Utilizes "SchoolPool" website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# Improve Emissions / Air Quality

## Reduce the quantity of pick-up vehicles

- Ride Share (Multi-family carpools)
  - Rotate weeks between families
  - May utilize "express lanes" for carpool pick-up


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# Improve Emissions / Air Quality

## Increase the efficiency of student loading

- Stagger dismissal by grade
- Two stage process with loading stations
  - Hang-tags or placards in car to identify student early
  - Walkie-talkies or bullhorns call to stations
  - Load up to six vehicles simultaneously based on assigned station number


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# Improve Emissions / Air Quality

## Increase the efficiency of student loading Case Study: Emerging Technologies

- Brookshire Elementary School, Orange County Public School, Winter Park, Florida
  - Pilot program which uses bar-code reader at driveway entrance to scan pick-up vehicle
  - TVs mounted inside building display which student to place in pick-up line based on successful bar-code read
  - Students staged inside school (away from vehicle emissions)
  - Multiple bar-codes available for family with more than one vehicle that picks up students


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# Improve Emissions / Air Quality

Results[1]:

Maximum Queue Length
**Decreased**
**50%**

Pick-up Duration Time
**Decreased**
**10 min**


[1]Source: Brookshire Elementary School Principal Jeremy Moore

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# Improve Emissions / Air Quality

Goal: Reduce emissions by 50%

- Could potentially save 10-12K metric tons/year of $CO_2$ in Texas (for elementary schools alone)


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## Summary

- Improving the student pick-up process has significant safety and environmental benefits for the school and for the community
- Planning in the school site design phase is best, but there are retrofit options
- Statistical models can be developed to design on-site queue storage required for elementary schools
- Improving operations requires collaborative effort between governmental agencies, architects, engineers, school districts, students and parents


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## Resources

- Texas Transportation Institute Report 4286-2
  - **http://tti.tamu.edu/documents/4286-2.pdf**
- National Center for Safe Routes to School
  - **http://www.saferoutesinfo.org/**
- Texas Center for Safe Routes to School
  - **http://www.txdot.gov/safety/safe_routes/default.htm**
- International Walk-to-School in the USA
  - **http://www.walktoschool-usa.org/**
- Traffic Engineers, Inc.
  - **Dustin Qualls, PE, PTOE; dustin@trafficengineers.com**


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