

NORTH CAROLINA Department of Transportation



Moving Toward Better Air Quality with Better Traffic Control Devices Dean Ledbetter, PE

Division Twelve Corridor Development Engineer

What are Traffic Control Devices?

Traffic control devices notify road users of regulations and provide warning and guidance needed for the uniform and efficient operation of all elements of the traffic stream in a manner intended to minimize the occurrences of crashes.

What Are Good Traffic Control Devices?

To be effective, a traffic control device should meet five basic requirements:

A. Fulfill a need;

B. Command attention;

C. Convey a clear, simple meaning;

D. Command respect from road users; and

E. Give adequate time for proper response.

What Are Better Traffic Control Devices?

My Definitions of Better:

- 1. Most Appropriate for the Location for Current Demand
- Deliberately Chosen
- Reviewed Periodically
- 2. Provides Flexibility
- Changed by Time/Day/Season or Traffic-Responsive
 - Scheduled
 - Manual
 - Automated

Stop Signs

Do we always need them?



Can drivers identify the intersection without a sign? Are they familiar enough with the location? Do they have enough sight distance? Is there really enough traffic to warrant one?

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Stop Signs

Do all movements need to stop? Can right turns run safely without stopping?



For some atypical intersections, right turns don't really need to stop.

All-Way Stops

Does an all-way stop make more sense?

Should not be used for speed control.

Intersection of two neighborhood collector streets? Would alternating traffic flow better?

Is visibility limited for stopped drivers? High vehicle-pedestrian conflicts?

ALL WAY



A Tale of Two Neighborhoods





Neighborhood in Western State



- 49 Internal Intersections
- 1 Yield Sign

Neighborhood in NC Piedmont

- 44 Internal Intersections
- 40 Stop Signs
- 1 All-Way Stop
- 3 Yield Signs



Stop and Yield Signs

It is better to keep vehicles moving unless there is a good reason to stop them.

- Better for Air Quality
- Drivers Prefer to Keep Moving



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Traffic Signals

Design—Intersection Layout

• If we plan for worst-case future development, we can create problems in the near-term.



Traffic Signal Phasing



Traffic Signal Phasing



Traffic Signal Phasing



Traffic Signal Detection

Pretimed signals may work well in downtown areas with consistent traffic patterns and pedestrian activity.

Actuated signals rely on vehicle and pedestrian detectors to allow them to operate in a range of timings. If detectors fail, signals become very inefficient.

Detection is often the weakest link in the traffic signal system.

Traffic Signal Detection

Most signals rely on inductive loop detectors embedded within the pavement to detect vehicles, including bicycles.

Out-of-street detection can include: microwave video imaging radar infrared

Traffic Signal Detection



How Can We Be Better?

Rest In Red

- All approaches have red displays until a vehicle or pedestrian is detected
 - Faster response times for off-peak hours.
 - Faster response for pedestrians.

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Traffic Signal Coordination

Favors major streets

Two-way coordination is challenging

- Time-of-day vs. Traffic-responsive
- Special event timing plans

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Challenges with Coordination



Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) monitor traffic flow and provide information to drivers



Intelligent Transportation Systems

Monitoring

- Cameras
- Detectors
 - Volume
 - Speed
- Vehicle Probe Data

Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) monitor traffic flow and provide information to drivers

- Timely
- Easy to understand
- Up-to-date

How Can We Be Better?

Use air quality forecasts to:

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• Alter parking and transit costs

Use real-time air quality information to:

- Provide alternate route information to drivers
- Determine optimal signal system timings

How Can We Be Better?



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