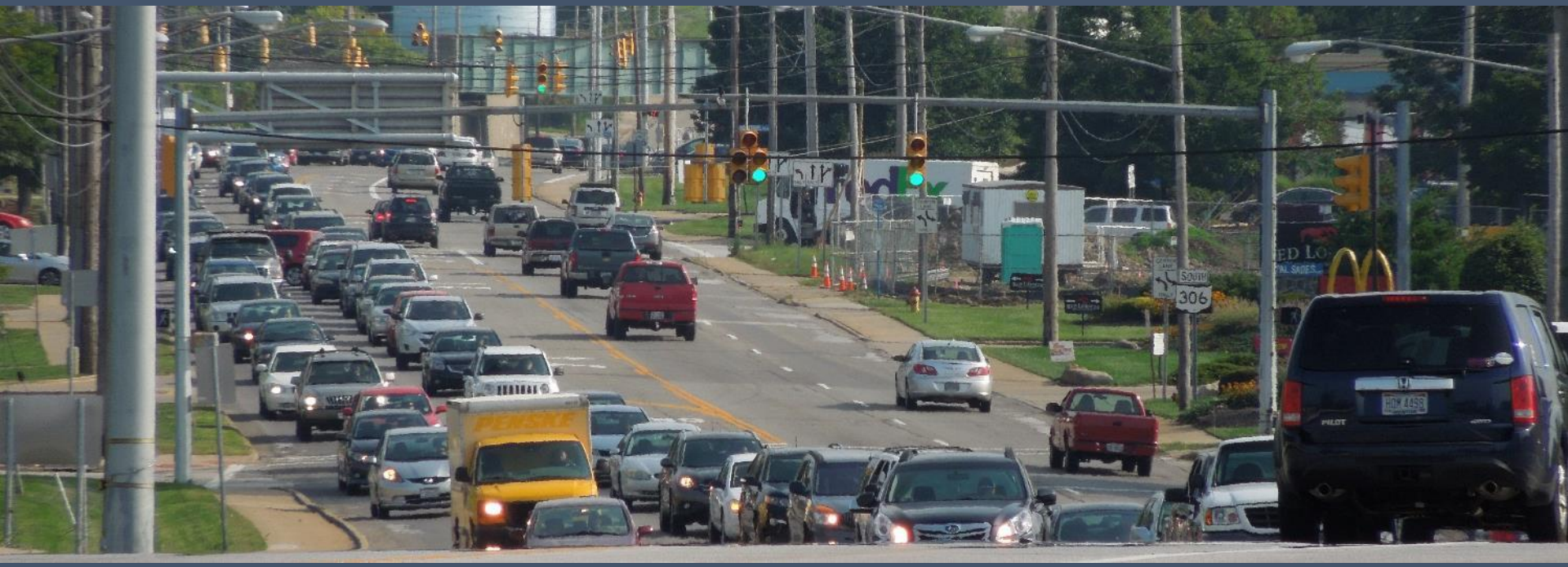
Re-Timing Congested Corridors… Cutting Out The Chaos



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Signal Timing Updates

How often do you update your signal timing?

- Every 3 years or less?
- Every 3 to 5 years?
- Every 5 to 10 years?
- More than 10 years?

Signal Timing Updates

Average Retiming Interval	Percent of Respondents
More Frequently than Every 3 Years	42
Around 5 Years	18
Around 10 Years	5
More than 10 Years	35

Source: Tarnoff and Ordonez (2004)

Benefits of Signal Retiming

The Institute of Transportation Engineers has determined that Signal Retiming reduces:

- Motorist delay by 15% to 37% and
- Overall travel time by 7 to 13%

Benefits of Signal Retiming

The Institute of Transportation Engineers has determined that Signal Retiming reduces:

- Fuel consumption by 6 to 9% and
- Vehicle emissions

Benefits of Signal Retiming

The Institute of Transportation Engineers has determined that Signal Retiming reduces:

- The number of collisions and driver aggression, and
- Results in a 40:1 Return on Investment

Signal Timing Update Examples

- Big Problems Come In Small Packages
- Right-Sizing a Signal System
- VooDoo Engineering

Big Problems / Small Packages

Big Problems / Small Packages

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Big Problems / Small Packages

- The TOD Screen showed no Events
- The Coordination Screen showed no coordination Plans
- The Controller Clock did not reflect the accurate time

Big Problems / Small Packages

Plus the controller was of a different make than the other 3 units

Big Problems / Small Packages

How could this have been prevented?

- Appropriate Project Scope
- Detail in Design
- Thorough Plan Reviews
- On-Site Construction Knowledge
- Complaint Investigation

“Right-Sizing” A System

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“Right-Sizing” A System

The information presented is not intended to advocate or discourage the purchase of any signal system or components, nor to endorse or denounce any vendor or product.

“Right-Sizing” A System

“Right-Sizing” A System

Existing Timing Plans

- Level 1 – Free
- Level 2 – Low Volume
- Level 3 – Moderate Volume
  - Direction 1 – Favors southbound movements
  - Direction 2 – Favors northbound movements
  - Average – Balanced flow
- Level 4 – High Volume
  - High Volume Plan is identical to Level 3 Direction 1

“Right-Sizing” A System

Review of System Logs

- Monday through Thursday
  - Generally runs Free or Moderate Volume Balanced Plan
  - PM Peak/High Volume Plan runs 5 periods scattered throughout the day, ranging from 7 minutes to 17 minutes each
  - During the PM Peak period, the PM Peak/High Volume Plan runs for an average total of 28 minutes
  - AM Peak Plan runs for an average of 17 minutes per day during the early afternoon
- Fridays and Weekends
  - Generally Runs PM Peak/High Volume Plan from 7 am to 6 pm

“Right-Sizing” A System

System Problems and Parameters

- Saturated Volumes/Occupancies > Scale Factor
- Inappropriate Service of Directional Imbalances > Detector Groupings
- Bouncing Plan to Plan > Threshold Values

“Right-Sizing” A System

System Considerations

- What functionality do you “Need”?
- What functionality do you “Want”?
- What are the respective Capital Costs?
- Do you have budget and personnel adequate to maintain the system equipment and retain its operational integrity?
- Do you have budget and personnel adequate to perform routine system updates and re-timing?

Voodoo Engineering

- Start with problem or set of problems
- May collect data and crunch some numbers
- Utilize logic and experience to improve conditions and resolve problem

Voodoo Engineering

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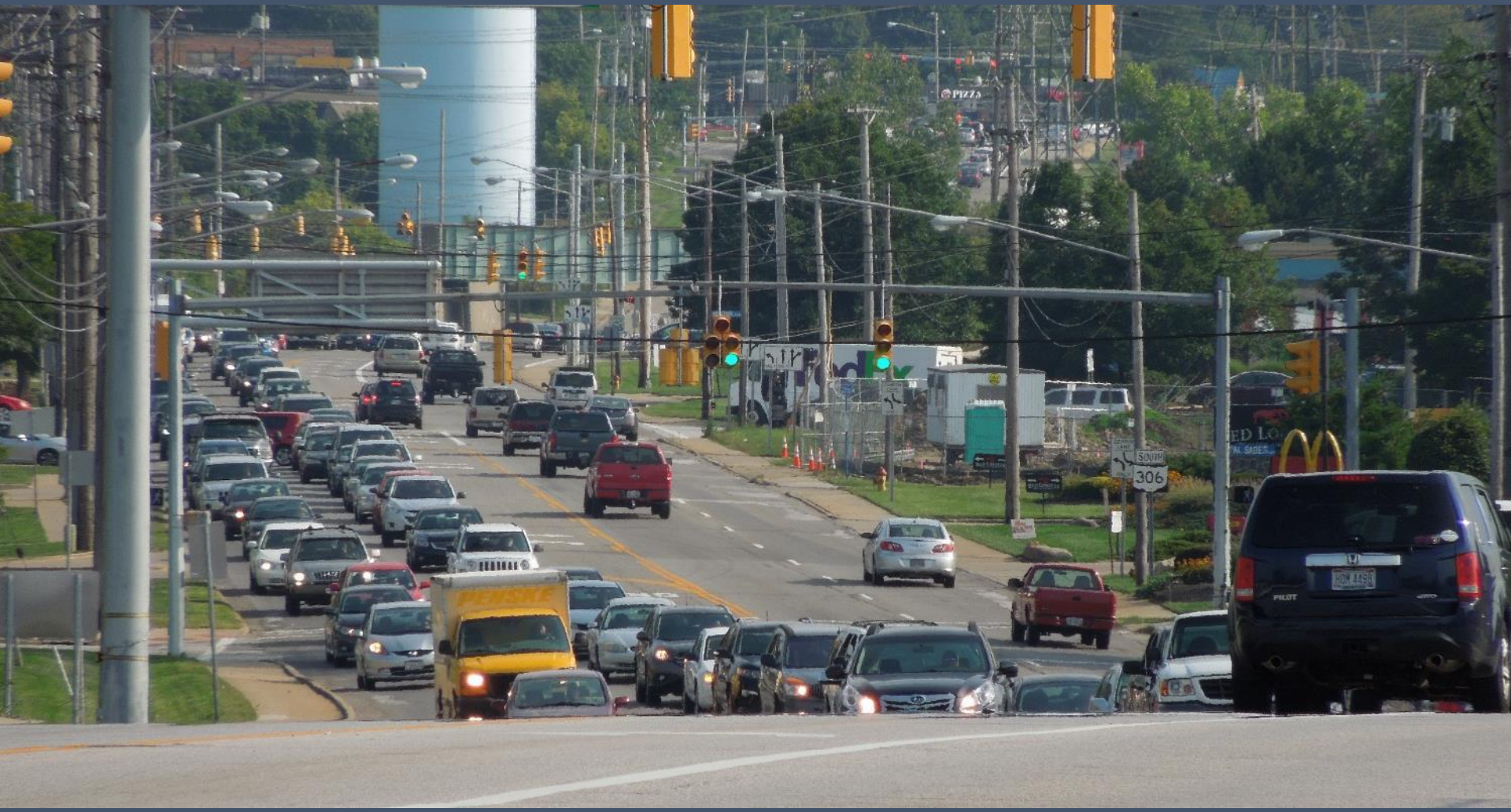
Voodoo Engineering



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Voodoo Engineering

Voodoo Engineering

- Travel Speed Approaches Posted Speed
- Far Less Travel Time
- Far Fewer Stops

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Voodoo Engineering

Estimated Signal Retiming Benefits

Delay Savings
147,607 Hours
$2,886,105

Crash Reductions
11 Crashes
$185,279

Emissions Savings
2.3 kg
$4,544

Fuel Savings
15,782 Gallons
$29,985

Benefit Cost Ratio
71:1

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Results

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Results

Big Problems Come In Small Packages

- Small Corridors can have problems that are an annoyance, lead to delay and create accident potential
- Often, the solution to such problems is very basic
- Problem solved by input of proper data and installation of GPS clock

Results

Right-Sizing a Signal System

- Make sure you have the personnel and financial abilities to address the maintenance aspects of both hardware and software
- GIGO
- Know what variables affect system decisions

Results

Voodoo Engineering

- Important to review all aspects of corridor operation, including basic timing parameters
- Don’t underestimate the improvement potential
- Review your work
- Tweak as necessary
- Signal Timing Improvements benefit many aspects