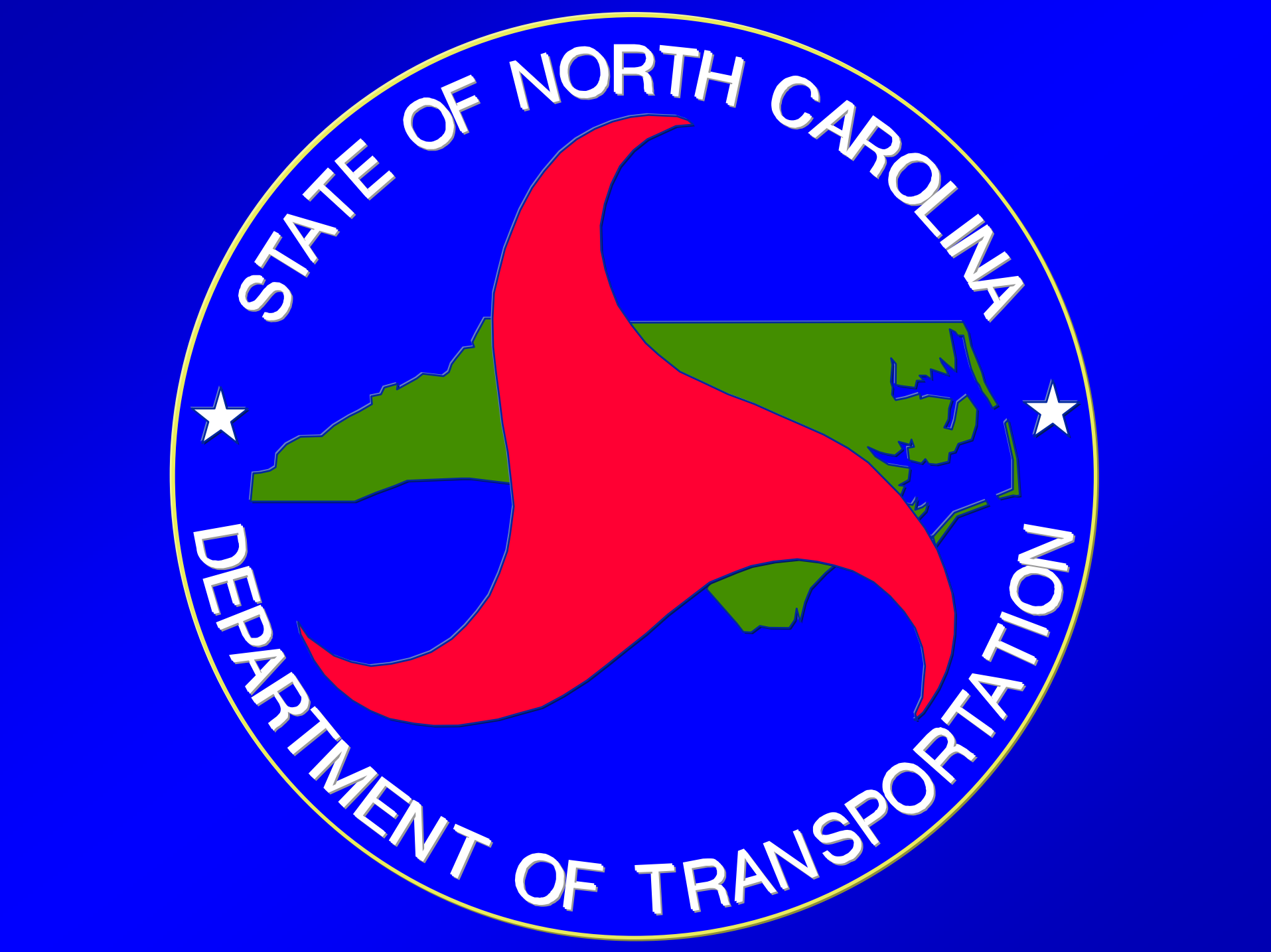
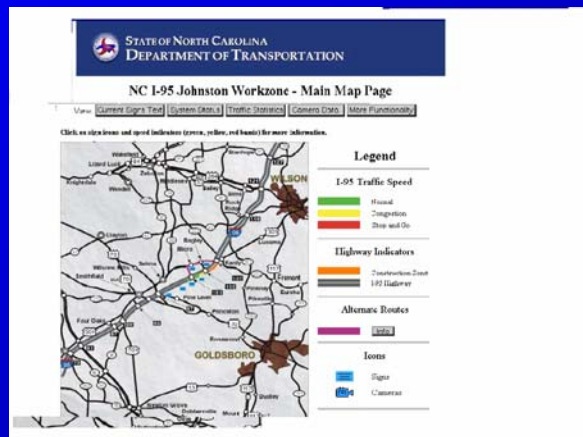

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

AASHTO (TIG) Workshop
St. Louis, MO
September 12-13

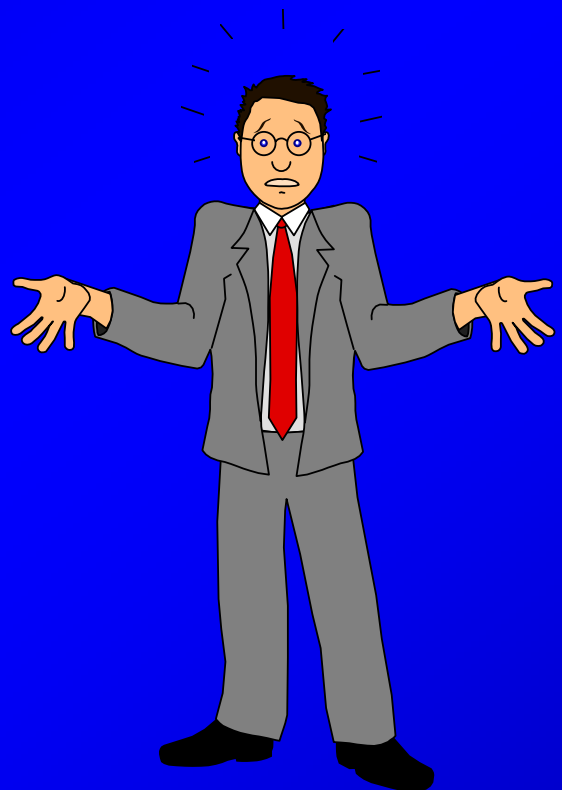
The Essential Elements of a SMARTZONE Contract



Steve Kite, PE
NCDOT
Work Zone Traffic Control
Project Engineer

How do I start?

http://tiq.transportation.org



http://tig.transportation.org

> Focus Technologies

>ITS in Work Zones

> 7 Categories

1) Congestion Mitigation
2) Traveler Information
3) Incident Management
4) Queue Management
5) Weather/Road Condition
6) Speed Mgmt/Enforcement
7) Construction Management

4 Steps to Success

1) Identify Your Problem(s)

2) Determine the Proper Type of ITS Strategy to Solve the Problem(s)

3) Develop Specifications and Drawings

4) Establish the Contract

- "Lease" vs Purchase
- "Lump Sum" vs Individual Pay Items
- If Leased, "Daily vs Weekly vs Monthly" Pay items
- What to Pay for?
    - Monthly rental
    - Mobilization
    - Relocations
    - Remobilizations
    - On site Technician Assistance


YOUR
SPEED
IS


Atlas
7. 16. 2002

422A


YOUR
SPEED
IS
25


SPEED
LIMIT
55


SPEED
LIMIT
45


SPEED
LIMIT
55


STOP
HERE
ON
RED
TO
ACTIVATE
SIGNAL

Step 1) Identify Your Problem

1) Is Congestion Mitigation the main Goal?

Suggestion: Consider in Areas where Alternate Routes are available

2) Is Traveler Information the main Goal?

Suggestion: Consider in areas with Recurring Congestion

3) Is Incident Management the main Goal?

Suggestion: Consider in areas where High Potential Exists for Extreme Impacts

4) Is Queue Management the main Goal?

Suggestion: Consider Dynamic Lane Merging

5) Are Weather/Road Conditions the main Goals?

Suggestion: Consider Hydroplaning, Fog and/or Snow detection

6) Is Speed Management/Enforcement the main Goal?

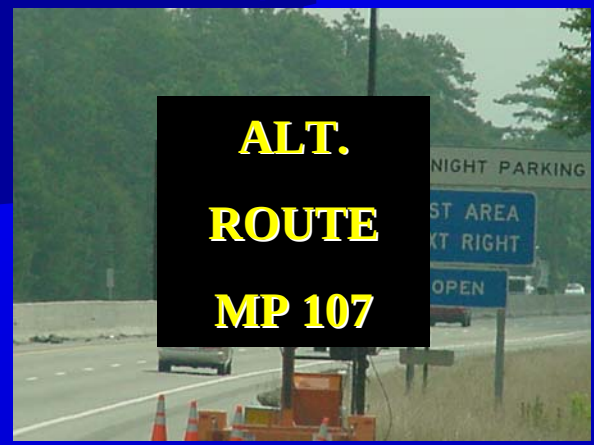
Suggestion: Consider Variable Speed Limit and/or Automated Speed Enforcement

AUTOMATED
SPEED ENFORCEMENT

VARIABLE

SPEED LIMIT

Step 2) Determine the Proper ITS Strategy

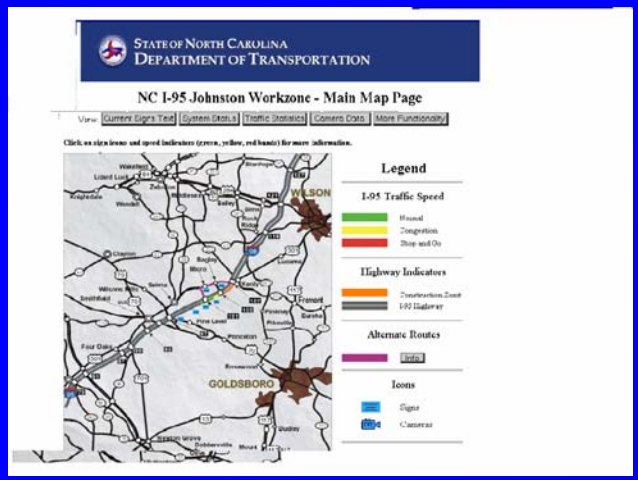


TRAVELER INFORMATION

Determine the Proper Type ITS Strategy to Solve the Problem

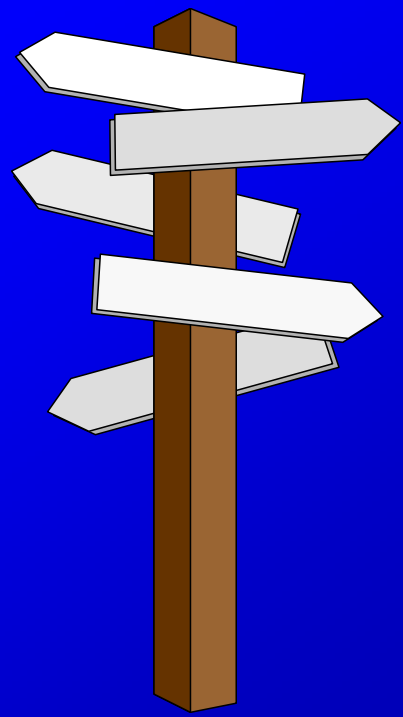
Traveler Information w/o Alternate Routes

Travel Information thru Project Website



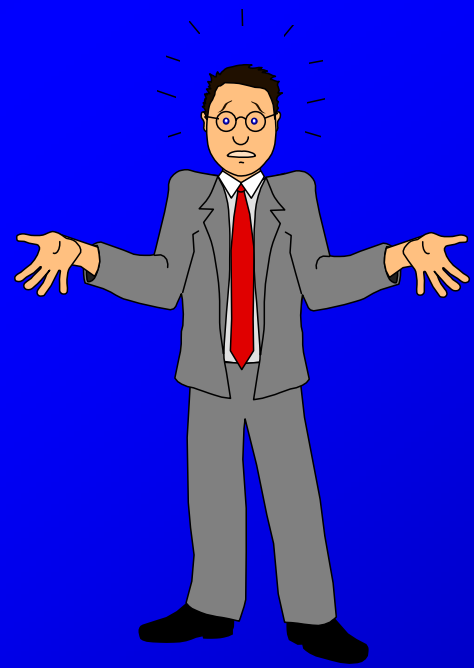
Incident Management w/ Camera Surveillance

Step 3) Develop Specifications and Technical Drawings



Step 3) Develop Spec's and Drawings

COMMONLY ASKED QUESTIONS



How do I begin to write a Specification?

Where do I find Specifications?

Do I need technical drawings?

How do I know what to spec?

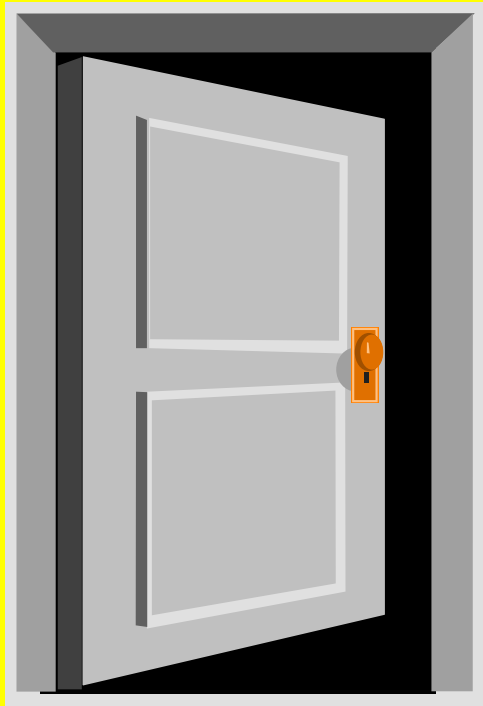
Where do I find information to write a Spec?

A Performance Spec or Technical Spec?

Should there be penalties for system malfunctioning and/or poor performance and/or failure to provide reliable, accurate data?

THE SOURCE FOR KNOWLEDGE

http://tig.transportation.org



Step 3) Specifications

ESSENTIAL ELEMENTS

1) Essential Function Of System

2) Duration Of Deployment

3) Date to Be Fully Operational

4) Approximate Number Of Devices

5) System Performance Criteria

What Constitutes Performance?
Penalties for Non-Performance

6) Payment Schedule and Type [Lease (Day or Month), Lump Sum Payment, etc.]

Step 3) Continued

Technical Drawings

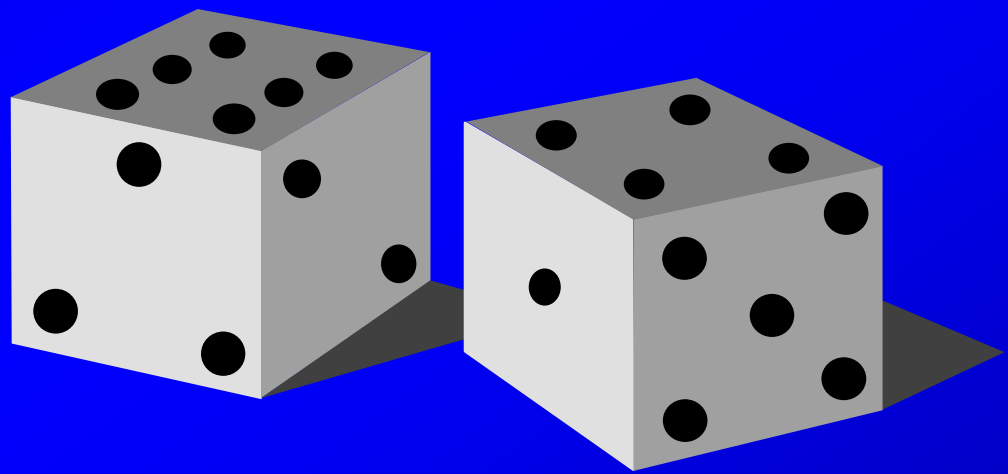
1) Approximate location of devices

2) Message Bank for CMS's

- Freeflow vs onset of Congestion
- Moderate Congestion
- Gridlock

3) Alternate Route designation (if used)

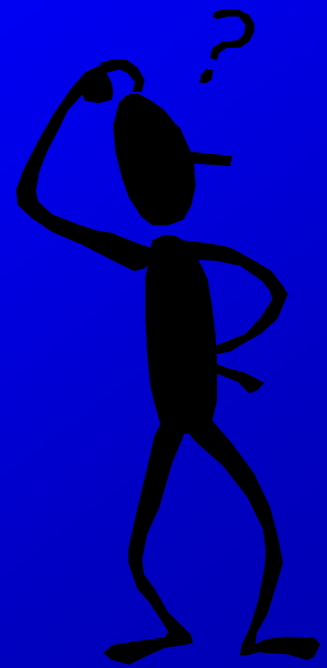
Step 4) Establish the Contract



Step 4) Establish the Contract

COMMONLY ASKED QUESTIONS

- **Should We Purchase or Lease?**
- **Should We include as a Traffic Control Line Item in the TIP contract?**
- **Should We Let as a Separate Purchase Order Contract?**
- **Do We need a List of Approved Vendors?**
- **If so, Does this Apply for Each Type of Technology?**
- **Should We use “Best Value” vs “Low Bid”?**



Step 4) Establish the Contract

Things to Consider when establishing the Contract

- "Lease" vs Purchase
- "Lump Sum" vs Individual Pay Items
- If Leased, "Daily vs Weekly vs Monthly" Pay items
- What to Pay for?
  - Monthly rental
  - Mobilization
  - Relocations
  - Remobilizations
  - On site Technician Assistance
- "Best Value" Contracting

THE SOURCE FOR KNOWLEDGE

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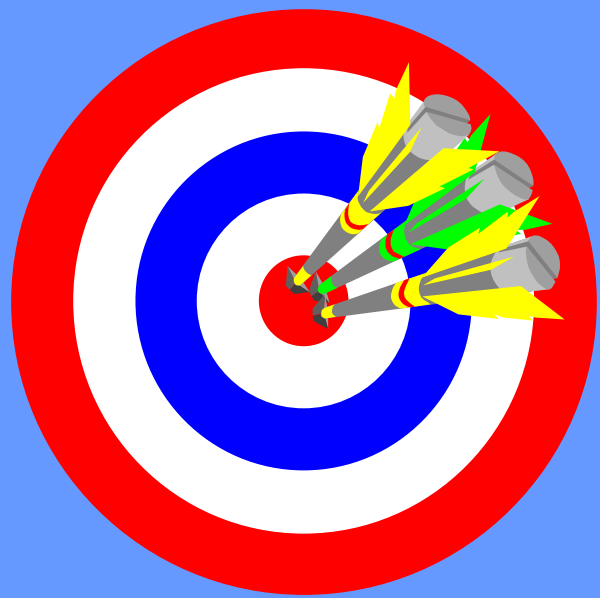


What we've done in NC

1) Types of Work Zone ITS Systems

2) Types of Contracts

3) Project Costs

Work Zone ITS Systems

I. Types of Systems

- 6 -Type I systems (Congestion Mitigation w/ Alternate Routing. All done on Interstate Rehabilitation projects.
- 2 - Type II systems (Traveler Information). These done on Freeway reconstruction in urban environment. Heavy commuter traffic.
- 1 - Type V system (Hydroplaning). This system was installed on an 8 lane on-site detour.

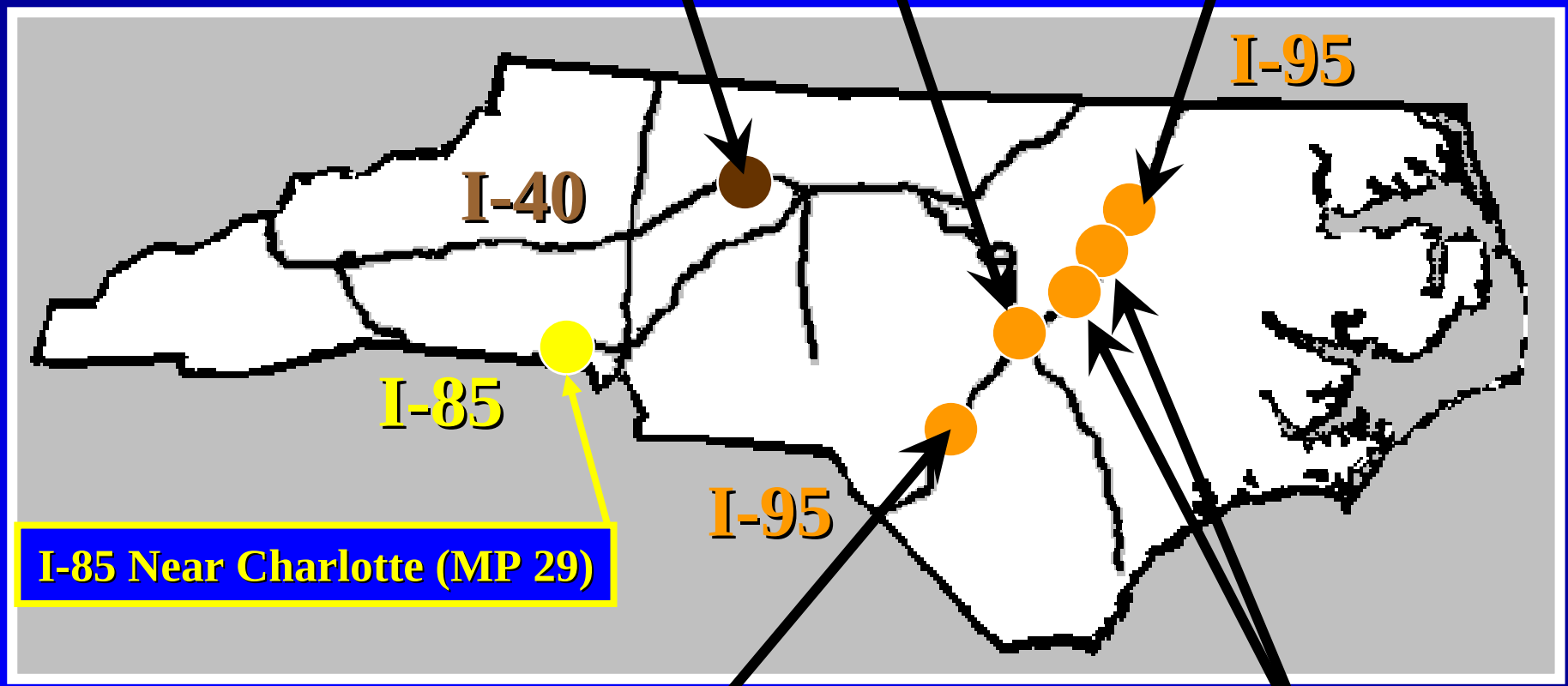
9 Total Deployments

SMARTZONE Deployments

I-95 Near Four Oaks (MP 87)

I-95 Near Rocky Mt. (MP 145)

I-40 Near Winston-Salem (MP 87)

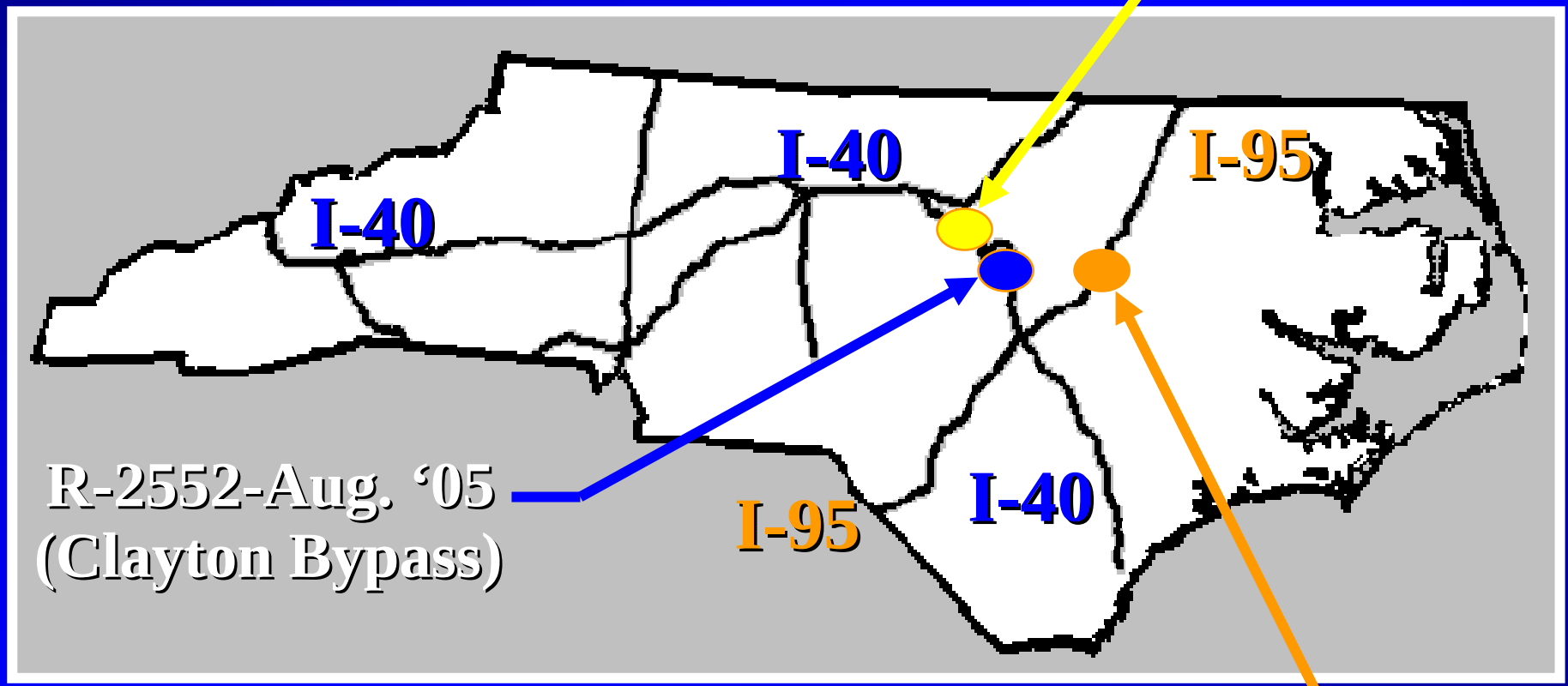


I-85 Near Charlotte (MP 29)

I-95 Near Fayetteville (MP 58)

I-95 Near Kenly (MP 107)

Current Deployments



Types of Contracts

I. Types of Contracts

A. We've had 5 Purchase Order Contracts with the Department and the Vendor. Contract awarded to "Low Bidder"

B. We've had 3 "Supplemental Agreements" where the Contractor was allowed to select the vendor based on an approved list. One of these was a "Lump Sum" pay item

C. We've had 1 project that is Design/Build, where the Contractor was allowed to select the vendor based on an approved list. This was a "Lump Sum" pay item.

THE SOURCE FOR KNOWLEDGE

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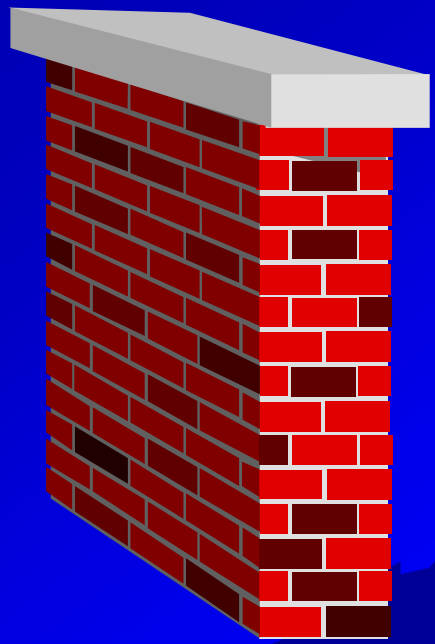
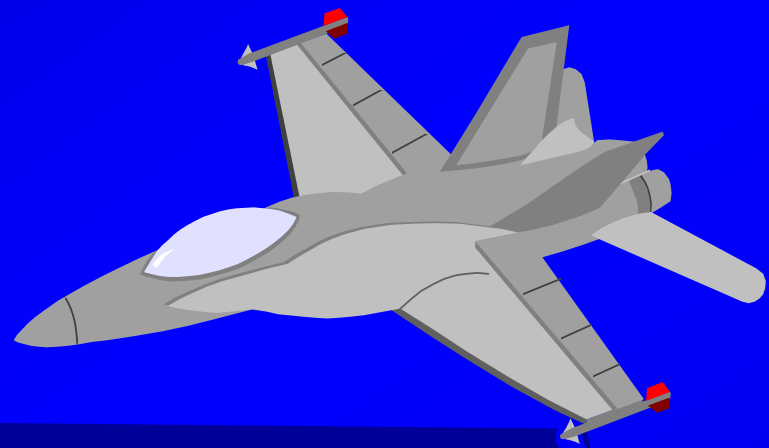
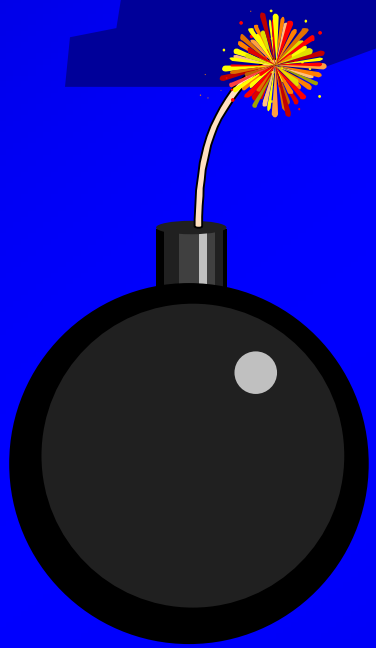
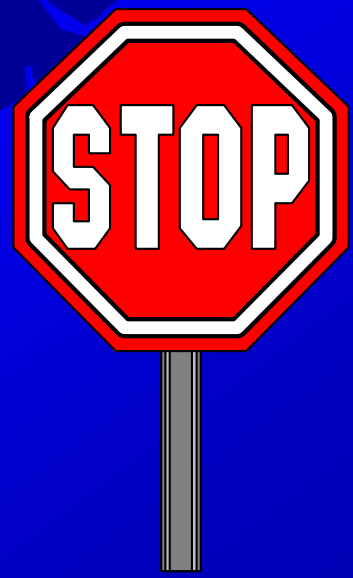




Project Costs





Project Costs

What are the influencing factors that drive cost?

Ans: There are multiple factors, but mainly project duration (months versus years), project length, amount of necessary equipment and whether bi-directional monitoring is required

How do you fund the deployments?

Ans: Very carefully…..we've primarily used 'cost overruns' to the contract. Looking at programming these costs for future construction and maintenance projects

How do you justify the expense?

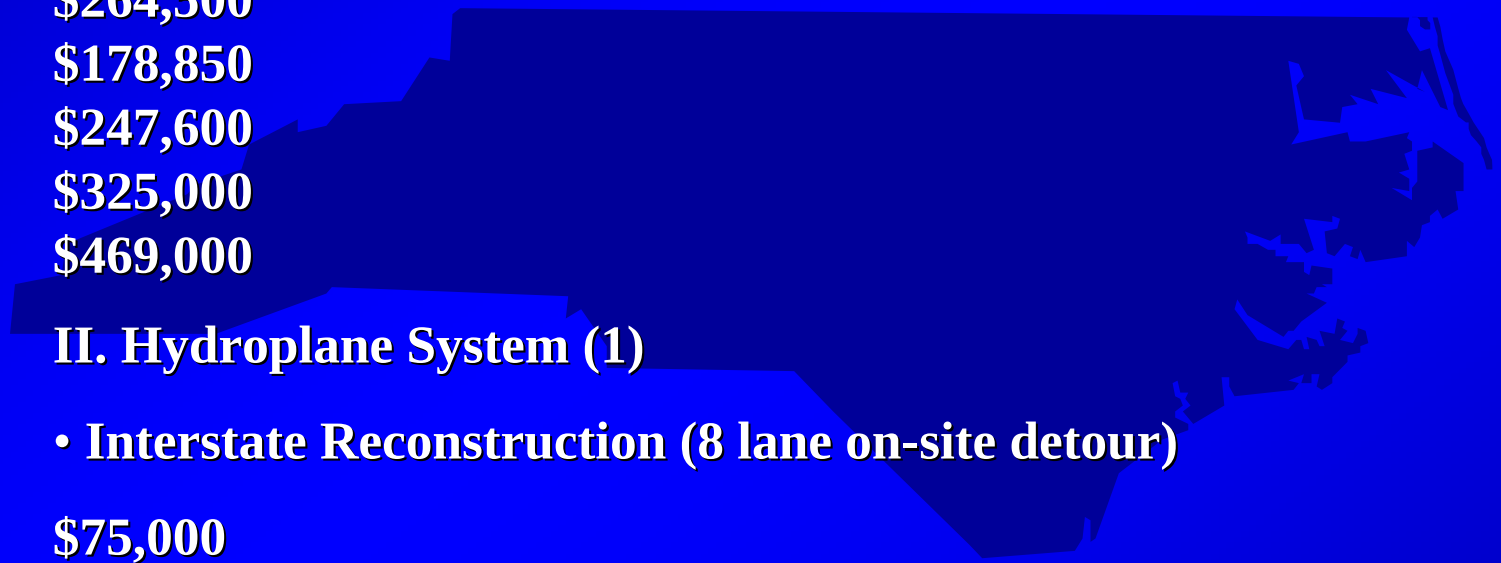
Ans: Justification is a combination of previous experience and a culture of safety for problem work zones. However, it's important that performance results are documented and that benefit to cost comparisons are completed.

Costs of NC deployments

I. Congestion Mitigation Systems with Alternate Routing

• Interstate Rehabilitation Projects (6)

$235,000
$264,500
$178,850
$247,600
$325,000
$469,000



II. Hydroplane System (1)

• Interstate Reconstruction (8 lane on-site detour)

$75,000

III. Travel Time Systems without Alternate Routing

•Freeway Reconstruction (2)

$900,000 +/-
TBD

Common Questions

What works best?

Did the results meet your expectations?

Is there a better method of contracting?

Is there a preferred method of contract administration?

Are the systems effective?

Are the systems cost effective?

Is there any data to measure their effectiveness?

Partial Answers

What works best?….

Depends on vendor, the accuracy of the Specification and pay item type.

Did the results meet your expectations?…..

Most of the time…. communication reliability still remains an unsolved variable

Is there a better method of contracting? ……

We are still learning, but for now our answer is the purchase order contract with vendor. We DO NOT recommend LUMP SUM contract pay items and Design/Build teams initiating the Specifications

Partial Answers (Cont)

Is there a preferred method of contract administration?…..

Not necessarily, Keep the performance requirements simple so it's easier for field inspectors to monitor and administer

Are the systems effective?…

Yes, but they need continuous monitoring and tweaking

Is there any data to measure their effectiveness?….

Yes, there is limited data. Soon we will be implementing our "measures of effectiveness" policy requiring measurement to be made on each deployment.

Are the systems cost effective?….

Hard to determine, but we are convinced they are……and soon will be able to measure and document this data

Results

SMARTZONE Results

Project construction staff have reported much better traffic flow and fewer crashes. No fatalities attributed to queueing have been recorded.

2 reports have been completed to date. The first on the I-95 projects and 1 on the I-85 Hydroplaning system.

A) I-95 Report indicated motorists understood the system and realized it was providing 'realtime' travel information

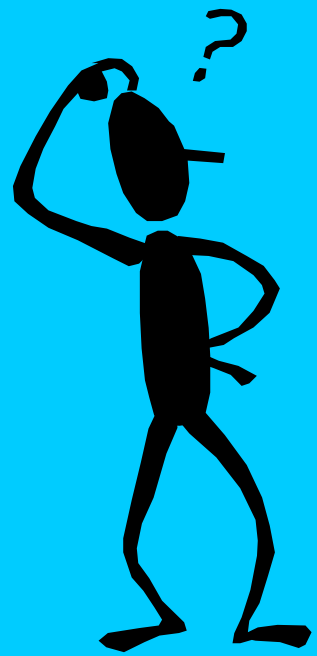
B) I-85 Report indicated crashes during wet pavement conditions were reduced by 58% after deployment of the system.

Positive responses from the public, media and professional agencies

Lessons Learned

- To date, the purchase order contracts with vendors have been much more cost efficient
- The Congestion Mitigation Systems have been well received and have yielded 0 fatalities due to queueing
- The Travel Time system has mixed comments, but generally positive
- Our Specifications need tweaking in multiple areas
- The CMS messaging is the key to any system
- Need to be clear that our technical drawings serve as a “guide” and not the absolute solution for determining numbers of devices.

Questions/Comments?



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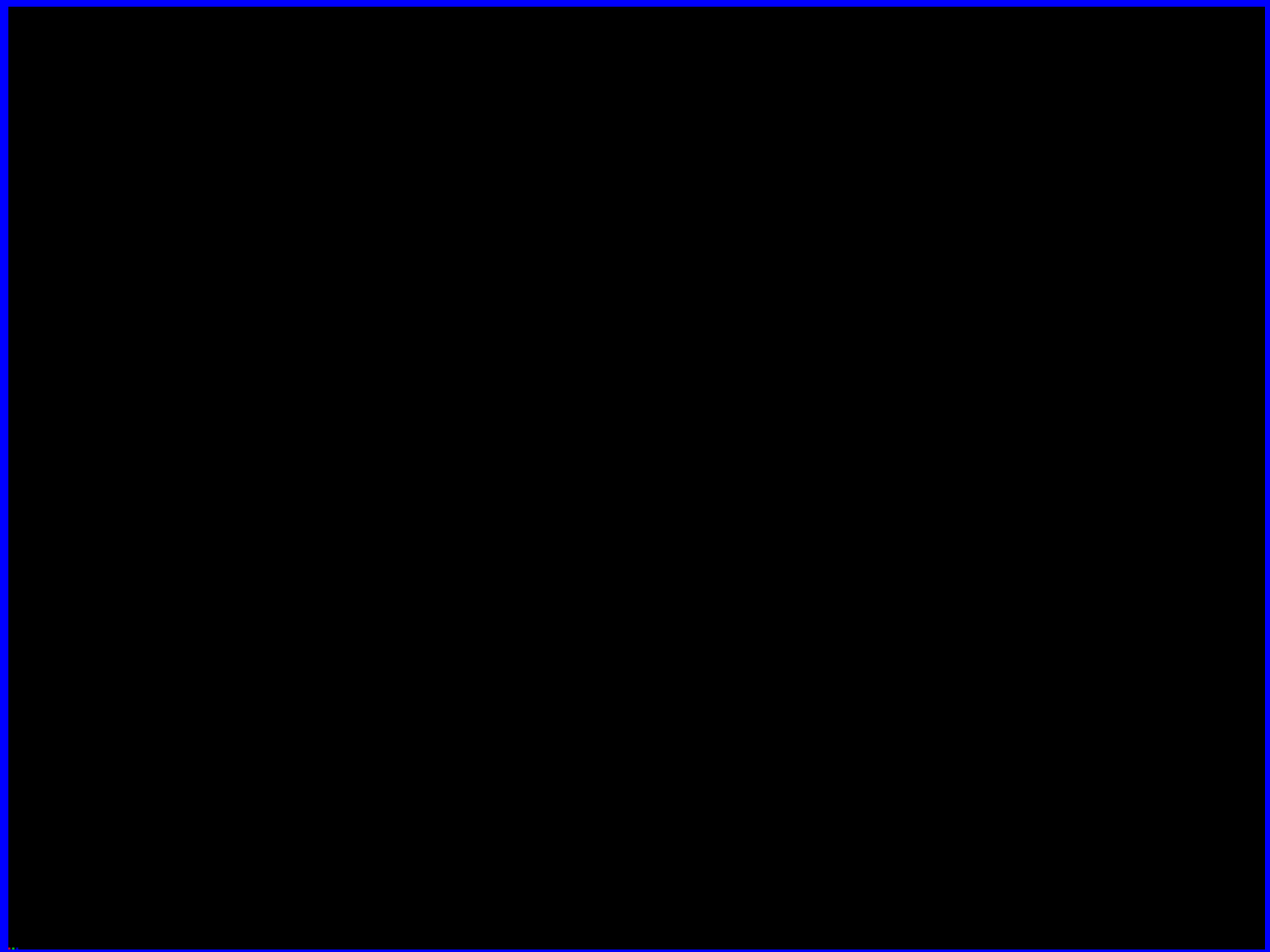
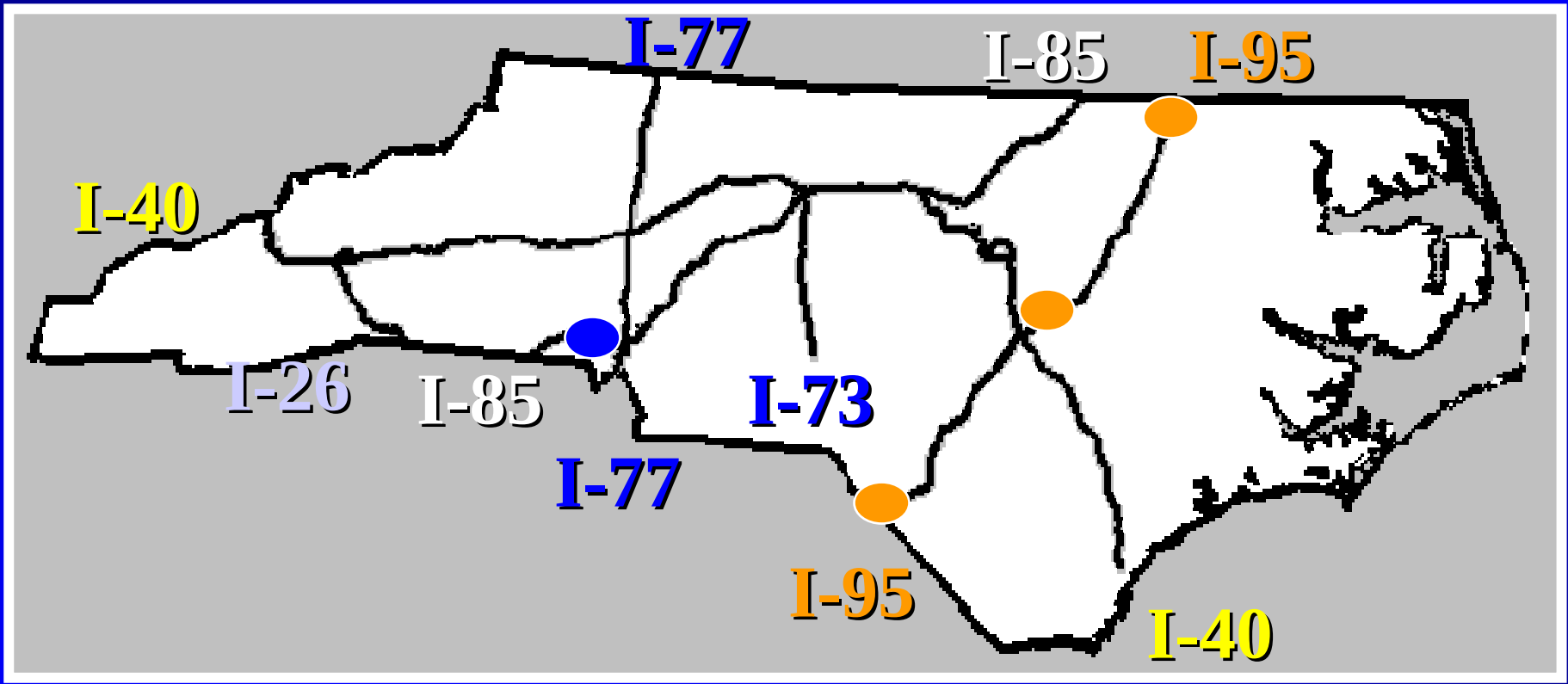
Why Should DOT's Get Involved?



Interstate Network in North Carolina



Nearly 80,000 miles of state maintained roads- 2nd largest in the Nation

Over 1000 miles of interstate highway

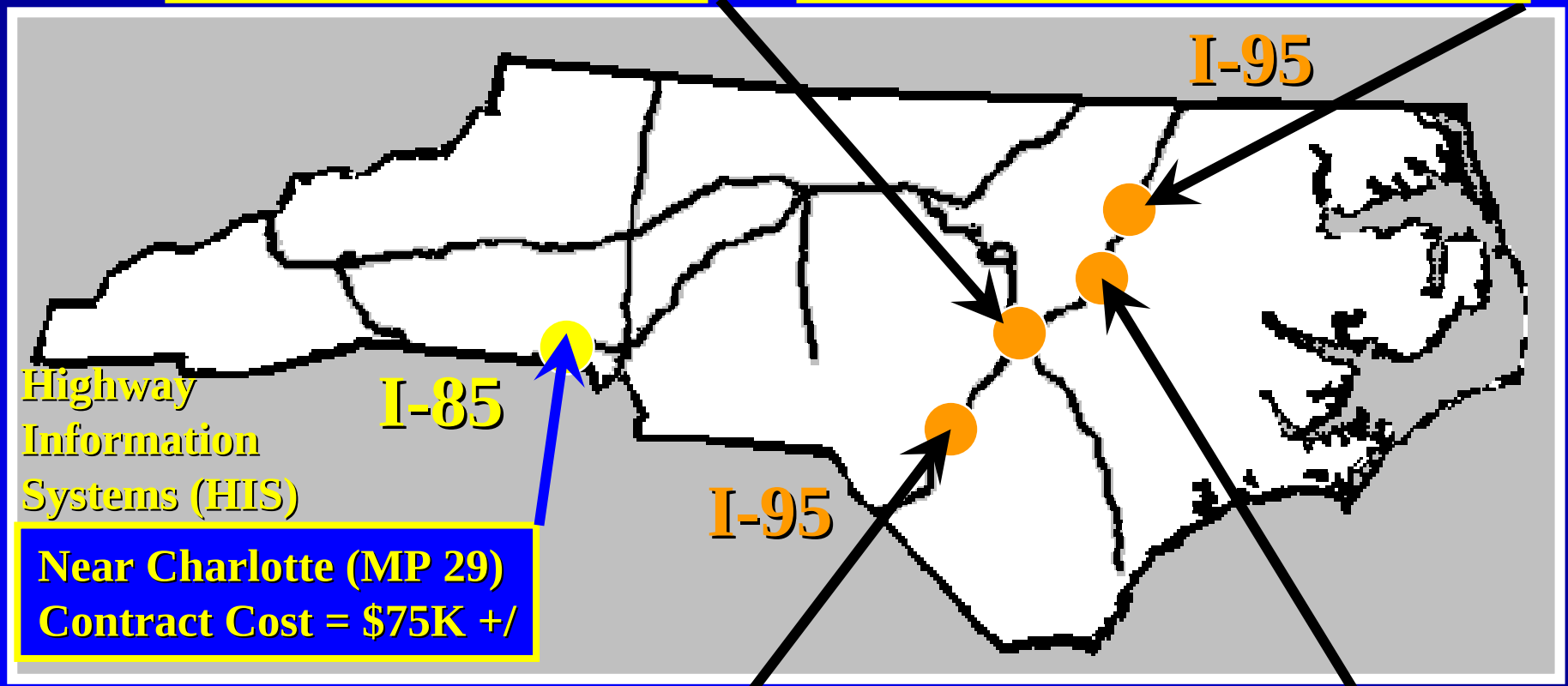
SMARTZONE Deployments

PDP Associates

Near Four Oaks (MP 87)
Contract Cost = $247,600

International Road Dynamics (IRD)

Near Rocky Mt. (MP 145)
Contract Cost = $264,500



Highway Information Systems (HIS)

Near Charlotte (MP 29)
Contract Cost = $75K +/

Scientex Corp.

Near Fayetteville (MP 58)
Contract Cost = $235,000

International Road Dynamics (IRD)

Near Kenly (MP 107)
Contract Cost = $178,850

I-85 Hydroplane System just outside of Charlotte

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