WORKZONE SAFETY INITIATIVES
WORK ZONE “PRESENCE LIGHTING”

STEVE KITE, PE  STATE WORK ZONE ENGINEER
PRESENCE LIGHT OBJECTIVES

• INCREASE MOTORIST AWARENESS OF APPROACHING WORK ZONE
• DECREASE SPEEDS IN WORK ZONES
• IMPROVE WORKER & MOTORIST SAFETY
• IMPROVE MOTORIST VISIBILITY THROUGH WZ
• REDUCE WZ REAR END COLLISIONS
WORK ZONE SAFETY INNOVATION
PRESENCE LIGHT OBJECTIVES

• Improve WZ “conspicuity” throughout full length of lane closure

• Create “uniform” speeds throughout full length of lane closure

• Motorist Speed Confirmatory

• Improve Worker Visibility

• Give drivers the idea of an “active” work zone
WORK ZONE APPLICATIONS

• ANY NIGHTTIME APPLICATIONS WHERE A LANE IS TAKEN INTERMITTINGLY FOR CONSTRUCTION

• MULTI LANE HIGHWAY AND INTERSTATE

• RURAL AREAS WITH NO ADDITIONAL HIGHWAY LIGHTING

• NIGHTTIME ASPHALT PAVING & BRIDGE CLOSURES
WORK ZONE SAFETY INNOVATION
PRESENCE LIGHTING

UTILIZES “BALLOON/ANTI-GLARE” LIGHTING SYSTEMS THAT SUPPLEMENT TASK/TOWER LIGHTING...NOT REPLACEMENTS

INSTALLED EITHER IN ADVANCE OR THROUGHOUT THE LANE CLOSURE OR BOTH
TYPICAL RESURFACING LIGHTING
IS THIS AN "ACTIVE" WORK ZONE?
FIND THE WORKER

Work Zone Safety Innovation- "Presence Lighting"
NC FIRST TEST OF WORK ZONE PRESENCE LIGHTS, U.S. 17

WENT 1 MILE “DOWNSTREAM” FROM ACTIVE WORK ZONE AND COLLECT SPEED DATA WITHOUT LIGHTS

THEN INSTALLED LIGHTS AND COLLECTED SPEED DATA....NO WORK EQUIPMENT OR LIGHTING IN THE AREA OTHER THAN THE PRESENCE LIGHTS
PRESENCE LIGHT
U.S. 17 NC

AVERAGE SPEEDS “BEFORE” PRESENCE LIGHTS WERE ACTIVATED = 57.7 MPH

AVERAGE SPEEDS “AFTER” PRESENCE LIGHTS WERE ACTIVATED = 51.94 MPH

A 5.76 MPH AVERAGE SPEED REDUCTION WAS ACHIEVED WITH THE “PRESENCE” LIGHTING
PRESENCE LIGHT DEMO HIGHLIGHTS

ONE NIGHT WITH NO PRESENCE LIGHTS

ONE NIGHT WITH PRESENCE LIGHTS

SPEED TRAILERS SET FOR BOTH NIGHTS

SPEED MONITORED FOR DURATION OF BOTH NIGHTS
PRESENCE LIGHT
U.S. 23 TAWES, MI

1678 TOTAL VEHICLES PAST THROUGH WORK ZONE DURING TEST PERIOD

PERIOD SPEED MONITORED WITHOUT PRESENCE LIGHTS: AVERAGE SPEED: 56.92 MPH

PERIOD SPEED MONITORED WITH PRESENCE LIGHTS: AVERAGE SPEED: 51.27 MPH

AVERAGE REDUCTION OF SPEED: 5.65 MPH
PRESENCE LIGHT
I-94 WESTBOUND JACKSON

7192 TOTAL VEHICLES PAST THROUGH WORK ZONE DURING TEST PERIOD

PERIOD SPEED MONITORED WITHOUT PRESENCE LIGHTS: AVERAGE SPEED: 67.78 MPH

PERIOD SPEED MONITORED WITH PRESENCE LIGHTS: AVERAGE SPEED: 62.82 MPH

AVERAGE REDUCTION OF SPEED: 4.96 MPH
PRESENCE LIGHT
I-94 JACKSON (2ND DEMO)

22145 TOTAL VEHICLES PAST THROUGH WORK ZONE DURING TEST PERIOD

PERIOD SPEED MONITORED WITHOUT PRESENCE LIGHTS: AVERAGE SPEED: 68.48 MPH

PERIOD SPEED MONITORED WITH PRESENCE LIGHTS: AVERAGE SPEED: 62.82 MPH

AVERAGE REDUCTION OF SPEED: 6.95 MPH
PRESENCE LIGHT
I-94 EB KALAMAZOO

11,191 TOTAL VEHICLES PAST THROUGH WORK ZONE DURING TEST PERIOD

PERIOD SPEED MONITORED WITHOUT PRESENCE LIGHTS: AVERAGE SPEED: 65.19 MPH

PERIOD SPEED MONITORED WITH PRESENCE LIGHTS: AVERAGE SPEED: 57.94 MPH

AVERAGE REDUCTION OF SPEED: 7.25 MPH
PRESENCE LIGHT
TN I-40E, HAYWOOD

TOTAL OF 7865 VEHICLES SPEEDS RECORDED IN WORK ZONE DURING TEST PERIOD

PERIOD SPEED MONITORED WITHOUT PRESENCE LIGHTS: AVERAGE SPEED: 68.76 MPH

PERIOD SPEED MONITORED WITH PRESENCE LIGHTS: AVERAGE SPEED: 63.82 MPH

AVERAGE REDUCTION OF SPEED: 4.94 MPH
TOTAL OF 12,248 VEHICLES SPEEDS RECORDED IN WORK ZONE DURING TEST PERIOD

PERIOD SPEED MONITORED WITHOUT PRESENCE LIGHTS: AVERAGE SPEED: 74.76 MPH

PERIOD SPEED MONITORED WITH PRESENCE LIGHTS: AVERAGE SPEED: 68.89 MPH

AVERAGE REDUCTION OF SPEED: 5.87 MPH
PRESENCE LIGHT TYPICAL LAYOUT – BEFORE WZ

WORK ZONE PRESENCE LIGHT APPLICATION

WORK ZONE
WORKERS PRESENT • WORKERS PRESENT

5250 ft (approx. 1 mile) before Work Zone (WZ)
7 PRESENCE LIGHTS
PRESENCE LIGHT TYPICAL LAYOUT

WORK ZONE PRESENCE LIGHT APPLICATION

- 5250 ft (approx. 1 mile) before Work Zone (WZ)
  - 7 PRESENCE LIGHTS
- 2250 ft (approx. 1/2 mile) into WZ
  - 4 PRESENCE LIGHTS
- 6750 ft (approx. 1.3 miles) into WZ
  - 10 OPTIONAL PRESENCE LIGHTS
- 1500 ft (approx. 3 miles) into WZ
  - 3 PRESENCE LIGHTS

WORK ZONE
WORKERS PRESENT • WORKERS PRESENT

OPTIONAL VSL
± 3375 ft before de taper
± 1875 ft into the WZ
**SPACING RECOMMENDATIONS BASED ON SUBSEQUENT TEST**

Recommend the following spacing based on light outputs and lighted surface area of each light unit.

<table>
<thead>
<tr>
<th>Light Output (Lumens)</th>
<th>Fixture Surface Area (Square Feet)</th>
<th>Max Spacing (Feet)</th>
<th>No. Units (Per Mile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14,000 Min</td>
<td>4</td>
<td>750’</td>
<td>7</td>
</tr>
<tr>
<td>14,000-60,000</td>
<td>5</td>
<td>1,000’</td>
<td>5</td>
</tr>
<tr>
<td>60,000 and Up</td>
<td>6 or Greater</td>
<td>1,320’</td>
<td>4</td>
</tr>
</tbody>
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KEY BENEFITS

• MOTORIST SEE THE PRESENCE OF LIGHTING AND SLOW DOWN

• LIGHTING GUIDES MOTORIST THROUGH MERGE/TRANSITION IMPROVING SAFETY

• SMOOTHER TRANSITION TO REDUCE SPEED DIFFERENTIAL – LESS SHOCK WAVES AND WORK ZONE INTRUSIONS

• GREATER VISIBILITY AND SLOWER SPEEDS IMPROVES MOTORIST AND WORKER SAFETY
FURTHER RESEARCH

NCSU is contracted to evaluate up to 8 Interstate Resurfacing Projects this Summer and Fall

The projects will be evaluated using “before” and “after” WZ Presence Light installations

The projects will collect 5 nights of “before” data and 5 nights of “after” data
PRESENCE LIGHT VIDEO

HTTPS://YOUTU.BE/VWWJPK2FU1C
ADDITIONAL WORK ZONE SAFETY INITIATIVES
VARIABLE SPEED LIMIT OBJECTIVES

• INCREASE MOTORIST AWARENESS OF AN ACTIVE WORK ZONE

• DECREASE SPEEDS IN WORK ZONES

• IMPROVE WORKER & MOTORIST SAFETY

• IMPROVE MOTORIST SPEED COMPLIANCE

• REDUCE WZ REAR END COLLISIONS
VARIABLE SPEED LIMIT APPLICATIONS

- CONSTRUCTION WORK ZONES THAT REDUCE CAPACITY
- MULTI LANE HIGHWAY AND INTERSTATE
- RURAL AREAS
- ASPHALT PAVING & BRIDGE CLOSURES
WORK ZONE VARIABLE SPEED LIMIT

VER-MAC WORK ZONE – VSL

• VER-MAC LED DESIGN AND 1ST APPROVED IN OHIO & NC

• REDUCES SPEED IN WORK ZONES WHEN WORKERS ARE PRESENT

• CAN CONTROL AT SIGN OR REMOTELY VIA JAMLOGIC

• HISTORICAL RECORD WITH DATE & TIME OF CHANGES

• REDUCING WZ SPEEDS IS KEY GOAL FOR DOT’S THROUGHOUT U.S.
NOW, **NCDOT** IS UTILIZING DIGITAL SPEED LIMIT SIGNS IN ADDITION TO THE WORK ZONE “PRESENCE” LIGHTS.

WE ARE **REDUCTING THE SPEEDS** DURING LANE CLOSURES AND RETURNING AT THE END OF EACH NIGHTS OPERATION TO THE **EXISTING SPEED LIMIT**
Now, NCDOT is utilizing Variable Speed Limit Signs in addition to the Work Zone “Presence” Lights.

These are used in advance of the lane closure/s and every mile and half throughout the WZ.
Questions?

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MANAGING TRAFFIC, MOVING PEOPLE.