

PROJECT SPECIAL PROVISIONS
Traffic

WORK ZONE SIGNING:

09-16-03

1- DESCRIPTION.

Install and maintain signing in accordance with Divisions 11 and 12 of the North Carolina Department of Transportation January 2002 Standard Specifications for Roads and Structures, the North Carolina Department of Transportation January 2002 Highway Design Branch Roadway Standard Drawings and the following provisions:

Furnish, install, maintain, and remove advance warning work zone signs and any required lane closure signing.

Furnish, install, and maintain general work zone warning signs for resurfacing and/or milling such as "Rough Road" (W8-8 at 48" X 48") (for milling only), "Uneven Pavement" (W8-15 at 48" X 48"), "Low Shoulder" (W8-9 at 48" X 48"), "Low / Soft Shoulder" (W8-9B at 48" X 48"), "Unmarked Pavement Ahead" (W16-10 at 48" X 48"), and "Do Not Pass"(R4-1 at 24" X 30". When construction is completed in any given area of the project, relocate signs to the next work site, as directed by the Engineer. Remove these signs at the completion of the project.

All work zone signs may be portable.

2- CONSTRUCTION METHODS.**(A) General:**

Install all warning work zone signs before beginning work on a particular map. If signs are installed three days prior to the beginning of work on a particular map, cover the signs until the work begins. Install each work zone warning sign separately and not on the same post(s) with any other sign except where an advisory speed plate or directional arrow is used.

(B) Advance warning work zone signs:

Install advance warning work zone signs (see attached Detail(s) and North Carolina Department of Transportation January 2002 Highway Design Branch Roadway Standard Drawings Nos. 1101.02 and 1110.01) prior to beginning of work and remove upon final completion of the project. If there is a period of construction inactivity longer than two weeks, remove or cover advance warning work zone signs. Uncover advance warning work zone signs no more than 3 days before work resumes. All other operations could be suspended upon failure to comply with the above requirements. Such suspended operations would not be resumed until the above requirements are fulfilled.

(C) Lane closure work zone signs:

Install any required lane closure signing needed during the life of the project (see North Carolina Department of Transportation January 2002 Highway Design Branch Roadway Standard Drawings Nos. 1101.02, 1101.11 and 1110.02).

(D) General work zone warning signs:

Install general work zone warning signs for resurfacing and/or milling such as "Rough Road" (W8-8 at 48" X 48") (for milling only), "Uneven Pavement" (W8-15 at 48" X 48"), "Low Shoulder" (W8-9 at 48" X 48") and "Low / Soft Shoulder" (W8-9B at 48" X 48") at 1 mile intervals starting at a minimum of 500 feet in advance of the condition for both directions of travel (undivided roadways only) and at any other points determined by the Engineer.

Install the "Low Shoulder" (W8-9 at 48" X 48") or "Low / Soft Shoulder" (W8-9B at 48" X 48") signs prior to any resurfacing in an area where shoulder construction will be performed. Install general work zone warning signs such as "Unmarked Pavement Ahead" (W16-10 at 48" X 48") and "Do Not Pass" (R4-1 at 24" X 30") alternately at 1/2 mile intervals starting at a minimum of 500 feet in advance of the condition for both directions of travel (undivided roadways only) and at any other points determined by the Engineer. Install signs prior to the obliteration of any pavement markings. Remove these signs at the completion of the project.

3- BASIS OF PAYMENT.

No direct payment will be made for Work Zone Signing as such work will be considered incidental to the various other bid items in the Contract.

R-3

TRAFFIC CONTROL**01-18-05**

Revise the *2002 Standard Specifications* as follows:

Article 1089-1 WORK ZONE SIGNS is deleted. Substitute the following:

(A) General:

Rigid sign retroreflective sheeting requirements for Types VII, VIII and IX (prismatic) fluorescent are described in Tables 1089-A, 1089-B and 1089-C. Cover the entire sign face of the sign substrate with NCDOT approved Type VII, VIII or IX (prismatic) fluorescent orange reflective sheeting. Apply the reflective sheeting in a workmanlike manner so that there are no bubbles or wrinkles in the material.

Roll-up sign retroreflective requirements are described in Table 1089-D.

1. Work Zones Signs (Stationary)

Use Type VII, VIII or IX (prismatic) fluorescent orange retroreflective sheeting that meets the following reflective requirements in Tables 1089-A, 1089-B or 1089-C respectively. Use approved composite or aluminum for sign backing. Signs and sign supports must meet or exceed NCHRP 350 requirements for Breakaway Devices.

Table 1089-A		
Minimum Coefficient of Retroreflection R_A for TYPE VII Fluorescent Orange Sheeting (Candelas per lux per square meter)		
Observation Angle	Entrance Angle	
	-4°	30°
0.1°	300	170
0.2°	230	130
0.5°	72	41

Table 1089-B		
Minimum Coefficient of Retroreflection R_A for TYPE VIII Fluorescent Orange Sheeting (Candelas per lux per square meter)		
Observation Angle	Entrance Angle	
	-4°	30°
0.1°	300	135
0.2°	210	95
0.5°	75	35

Table 1089-C		
Minimum Coefficient of Retroreflection R_A for TYPE IX Fluorescent Orange Sheeting (Candelas per lux per square meter)		
Observation Angle	Entrance Angle	
	-4°	30°
0.1°	200	110
0.2°	115	65
0.5°	72	41
1.0°	24	14

2. Work Zones Signs (Barricade Mounted)

Use approved composite or roll-up signs for barricade mounted sign substrates. Approved composite barricade mounted warning signs (black on orange) must be Type VII, VIII or IX sheeting which meet the retroreflective requirements of Table 1089-A, 1089-B or 1089-C. Roll-up mounted barricade warning signs (black on orange) must meet the retroreflective requirements in Table 1089-D. Sign and barricade assembly must meet or exceed the requirements of NCHRP 350 for Work Zone Category II Devices.

3. Work Zones Signs (Portable)

Use approved composite or roll-up sign substrates on portable sign stands.

Composite - Use Type VII, VIII or IX (prismatic) fluorescent orange retroreflective sheeting that meets the following reflective requirements in Tables 1089-A, 1089-B or 1089-C. Signs and sign supports must meet or exceed NCHRP 350 requirements for Breakaway Devices.

Roll-up Signs - Use fluorescent orange retroreflective roll-up signs that meet the following reflective requirements:

Table 1089-D		
Minimum Coefficient of Retroreflection R_A for Fluorescent Orange Roll-Up Signs (Candelas per lux per square meter)		
Observation Angle	Entrance Angle	
	-4°	30°
0.1°	300	120
0.2°	200	80
0.5°	90	34

Use roll up signs that have a minimum 3/16” x 1 1/4” horizontal rib and 38” x 1 1/4” vertical rib and has been crash test to meet NCHRP 350 requirements and Traffic Control qualified by the Work Zone Traffic Control Unit.

Add the following after 1089-1(C):

(D) Warranty

Warranty requirements for rigid sign retroreflective sheeting Types VII, VIII and IX are described in Section 1093-9 (F) and Tables 1089 A, B and C.

Roll-up fluorescent orange retroreflective signs will maintain 80% of its retroreflectivity (Table 1089-D) for years 1 – 2 and 50% for year 3.

Rigid and Rollup Fluorescent orange signs will maintain a Fluorescence Luminance Factor (Y_F)* of 13% for three (3) years.

*Fluorescence Testing Method is described in ASTM E2301 Test Methods for Fluorescent Retro reflective Sheeting.

Rigid and Roll up fluorescent orange signs shall maintain a total Luminance Factor (Y) of 25 for three (3) years and conform to the requirements of Table 1089-E when measured in accordance with ASTM D4956.

Table 1089-E								
Fluorescent Orange colorimetric requirements								
Color	1		2		3		4	
	x	y	x	y	x	y	x	y
Fluorescent Orange	0.583	0.416	0.535	0.400	0.595	0.351	0.645	0.355

BARRICADES

Article 1089-3(A) General, delete both paragraphs and substitute the following:

Type III Barricades shall be constructed of perforated square steel tubing and/or angle iron. Provide Type III barricades that use a cross member or stabilization bar and meet the requirements of NCHRP 350 for Work Zone Category II Devices with composite and roll-up signs attached.

Use approved composite or plastic barricade rails that have a smooth face and have alternating orange and white retroreflective stripes that slope at an angle of 45 degrees.

Article 1089-3(C) Reflective Sheeting, delete the first paragraph only and substitute the following:

Use Type VII, VIII or IX (prismatic) retroreflective fluorescent orange sheeting on both sides of the barricade rails. The rail sheeting retroreflectivity values shall meet the retroreflectivity requirements in Table 1089-A, 1089-B or 1089-C and shall be listed on the Department’s approved product list or accepted as traffic qualified by the Traffic Control Unit.

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WORK ZONE SIGNS

01-18-05R

Revise the *Standard Specifications* as follows:

DESCRIPTION

Page 11-5, **Article 1110-1 Description**

Replace the second paragraph with the following:

Furnish, install, maintain and relocate portable work zone signs and portable work zone sign stands in accordance with the plans and specifications. When portable work zone signs and portable work zone sign stands are not in use for periods longer than 30 minutes, collapse sign stand and reinstall once work begins.

Replace the last sentence in the third paragraph with the following:

Use work zone signs (portable) only with portable work zone sign stands specifically designed for one another. Work Zone Signs (portable) may be roll up or approved composite.

MATERIALS

Page 11-5, **Article 1110-2 Part (A) General:**

Add the following:

Barricade Mounted Signs.....Article 1089-3

MATERIAL QUALIFICATIONS

Page 11-5, **Article 1110-2 (B) Material Qualifications.**

Delete the first sentence in the first paragraph and replace with the following:

Provide portable work zone sign stands, portable signs and sign sheeting which are listed on the North Carolina Department of Transportation’s approved product list or accepted as traffic qualified by the Traffic Control Unit.

Page 11-6, **Article 1110-2 (B) Material Qualifications**

Delete “Traffic Control Section” in the second sentence of the first paragraph and insert “Traffic Control Unit”.

CONSTRUCTION METHODS

Page 11-6, Replace **Article 1110-3 Construction Methods**

Replace **Article 1110-3 (B) Work Zone Signs (Barricade Mounted)** with the following:

Mount approved composite or roll-up signs to barricade rails so that the signs do not cover more than 50 percent of the top two rails or 33 percent of the total area of the three rails. Signs are to be mounted a minimum of 1’ from the ground to the bottom of the sign.

Replace **Article 1110-3 (C) 2. Work Zone Signs (Portable)** with the following:

Install portable work zone signs to carry roll-up or approved composite at a minimum height of 1’ from the bottom of the sign to the ground on two lane-two way roadways.

Install portable work zone signs to carry roll-up or approved composite at a minimum height of 5’ from the bottom of the sign to the ground on multi-lane roadways.

MEASUREMENT AND PAYMENT

No direct payment will be made for Work Zone Signs as such work will be considered incidental to other bid items in the contract.

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BARRICADES

01-18-05_R

Revise the *2002 Standard Specifications* as follows:

Page 11- 12, **Article 1145-2 Materials**, delete the contents and substitute the following:

(A) General

Refer to Division 10:

Barricades..... Article 1089-3

(B) Material Qualifications

Provide Type III barricades and barricade rails that are listed on the North Carolina Department of Transportation’s approved product list or accepted as traffic qualified by the Traffic Control Unit. For more information on the Traffic Qualification process, contact the Traffic Control Unit at Century Center Building B, 1020 Birch Ridge Drive, Raleigh, NC 27610; (919) 250-4159, or see the approved product list on the NCDOT web site at: www.doh.dot.state.nc.us/construction/tc/Apv_Prod/apv_prod.htm

(C) Historical Performance:

Historical performance of Type III barricades and barricade rails will be used in determining future use of the material by the NCDOT, even if the Type III Barricade is traffic-qualified. Poor past or poor current performance of Type III Barricades at any site, whether or not related to a specific contract may be grounds for non-acceptance of a product on any project under contract.

MEASUREMENT AND PAYMENT

No direct payment will be made for Barricades as such work will be considered incidental to other bid items.

R9

WBS#: 8CR.10631.3, 8CR.20631.3, 8CR.30639.3
Date: 12-07-2004
Revised:

Moore County

USE IN CONJUNCTION WITH 2002 STANDARD SPECIFICATIONS

THE FOLLOWING ROADWAY STANDARDS DRAWINGS AS THEY APPEAR IN THE "HIGHWAY DESIGN BRANCH ROADWAY STANDARD DRAWINGS" - ROADWAY DESIGN UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY, 2002 AND THE LATEST REVISIONS THERETO ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STANDARD PAVEMENT MARKINGS

ROADWAY STANDARD DRAWINGS: 1205.01, 1205.02, 1205.03, 1205.04, 1205.05,
1205.06, 1205.07, 1205.08, 1205.09, 1205.10,
1205.11, 1205.12

SNOWPLOWABLE PAVEMENT MARKERS

ROADWAY STANDARD DRAWINGS: 1250.01, 1253.01

WBS#: 8CR.10631.3, 8CR.20631.3, 8CR.30639.3

Moore County

Date: 12/09/2004

Revised:

LARGE BEADS IN PAINT PAVEMENT MARKING

This work shall be in accordance with *Section 1205 Pavement Marking General Requirements* of the *2002 Standard Specifications* except as follows:

Glass Beads:

(A) Composition

The silica content of the glass beads must be at least 60 percent.

Manufacture the **Large** beads from a composition designed to be highly resistant to traffic wear and to the effects of weathering.

Manufacture the **Premixed** beads from 100% recycled non-pigmented glass from a composition designed to be highly resistant to traffic wear and to the effects of weathering.

The appropriate glass bead coatings such as Moisture-proof and Adherence shall be applied by the bead manufacturer for proper bead embedment depth. All gradation tests shall be performed after the coatings have been applied.

This requirement will not apply for tape.

(B) Physical Characteristics

The glass beads must be colorless, transparent and free from milkiness, excessive air bubbles, skins and foreign objects.

The glass beads must have a minimum refractive index of 1.50 when tested by liquid immersion method (See ASTM D-1214) at 77°F (25°C), be spherical in shape, be essentially free of sharp angular particles, and particles showing surface scarring and scratching.

(C) Gradation

Use glass beads in all pavement marking material with a minimum of 80% true spheres when tested according to ASTM D-1155. Test large beads for Aspect Ratio, which shall be 1.2:1 or less.

Use Large Drop-On Glass Beads in Paint which meet the following gradation requirements:

<u>U.S. STANDARD SIEVE SIZE</u>	<u>% PASSING</u>	<u>% RETAINED</u>
SIEVE #8	100	0
SIEVE #10	95-100	0-5
SIEVE #12	80-95	5-20
SIEVE #14	10-40	40-80
SIEVE #16	0-5	10-40
SIEVE #18	0-2	0-5
PAN	0	0-2

The large glass beads shall be capable of flowing freely through dispensing equipment in any weather suitable for marking the pavement.

All Glass Beads Premixed in Thermoplastic, Heated-In-Place Thermoplastic, Cold Applied Plastic and Removable Tape must meet AASHTO M-247 type I.

(D) Glass Bead Application:

Drop-On: Method where glass beads are dispensed by a pressurized mechanical feed or high pressure means onto the pavement marking as it is applied to the pavement. Drop-On bead dispensing for symbols and characters may be accomplished by gravitational methods such as hand scattering.

Drop on glass beads in a double drop system with the large gradation first and the regular gradation second in the same pass of the equipment. Apply in equal amounts by weight.

(E) Paint Application:

Apply paint with drop-on beads at the rate necessary to produce a minimum wet film thickness of 15 mils (0.38 mm)

(F) Method of Measurement and Basis of Payment:

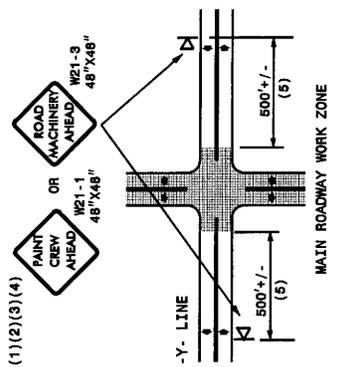
Method of Measurement and Basis of Payment will be in accordance with *Section 1205 Pavement Marking General Requirements* of the *2002 Standard Specifications*.

GENERAL NOTES

- (1) THE FOLLOWING OPTIONS MAY BE USED FOR ADVANCE WARNING SIGNS:
 - A. TRUCK MOUNTED CHANGEABLE MESSAGE SIGN (CMS)
 - B. TRUCK MOUNTED ADVANCE WARNING SIGNS (MUST CIRCLE TO PICK UP SIGNS)
 - C. GROUND MOUNTED CHANGEABLE MESSAGE SIGN (CMS) (MUST USE CIRCLE TO PICK UP SIGNS)
 - D. GROUND MOUNTED ADVANCE WARNING SIGNS (MUST BE 48" X 48" WITH PROPER SPACING, 1.5 FT. OR 1.8 FT. SHEET PILING, IF SPACE LIMITED, THE SIGN SHOULD BE APPROVED FROM ENGINEER. A SMALLER SIGN CAN BE USED WITH APPROVAL FROM ENGINEER.
- (2) SIGNS ON VEHICLES SHOULD BE MOUNTED AT A MINIMUM OF ONE (1) FOOT FROM THE GROUND AND SHOULD NOT BLOCK THE MOTORIST'S SIGHT OF THE FLASHING ARROW PANEL AND/OR LIGHTBAR.
- (3) GROUND MOUNTED ADVANCED WARNING SIGNS SHOULD BE MOUNTED A MINIMUM OF ONE (1) FOOT FROM THE GROUND TO BOTTOM OF SIGN.
- (4) SIGN SPACING SHOULD BE ADJUSTED FOR HORIZONTAL AND VERTICAL CURVES, ETC. TO IMPROVE SIGHT DISTANCES.
- (5) ADDITIONAL VEHICLES SHOULD BE USED IN WORK CARAVAN TO FACILITATE DRYING OF PAVEMENT DURING MAINTENANCE OPERATIONS (TMA'S ARE OPTIONAL ON THESE ADDITIONAL VEHICLES). HOWEVER, THE FIRST VEHICLE MOTORISTS SEE IN THE TRAVEL LANE SHALL HAVE A TMLA.

- LEGEND**
- PORTABLE SIGN. SIGNS MUST BE NCHRP-350 AND MCDOT APPROVED.
 - DIRECTION OF TRAFFIC FLOW
 - APPLICATION VEHICLE WITH LIGHT BAR
 - PROTECTION VEHICLE WITH TRUCK MOUNTED IMPACT ATTENUATOR (TMIA) AND LIGHT BAR (SEE ROADWAY STANDARD NO. 1185.01). TMIA MUST BE STANDARD NO. 1185.01. TMIA MUST APPROVED.
 - FLASHING ARROW PANEL, TYPE "B" (60"x30" MIN.), CAUTION MODE

- (7) ADJUST DISTANCE AS NEEDED TO PREVENT MOTORISTS FROM ENTERING SPACE BETWEEN THE APPLICATION AND PROTECTION VEHICLE. DISTANCE CAN BE LENGTHENED TO ACCOMMODATE SIGHT DISTANCE NEEDS.
- (8) ROUND UP MILEAGE TO NEXT WHOLE MILE. WORK ZONE SHOULD NOT EXCEED FIVE (5) MILES IN LENGTH.
- (9) RADIO COMMUNICATION BETWEEN VEHICLES IS REQUIRED.
- (10) USE OF A LIGHT BAR ON ALL VEHICLES IS PREFERRED, BUT A ROTATING BEACON MAY BE USED INSTEAD.
- (11) IF WORK IS PERFORMED AT NIGHT, THE WORK AREA MUST BE ILLUMINATED WITH MACHINE AND/OR TOWER LIGHTS AS APPROVED BY THE ENGINEER.
- (12) ALL TRAFFIC CONTROL DEVICES WILL BE CONSIDERED INCIDENTAL TO THE PAY ITEMS FOR PAVEMENT MARKING AND MARKERS.
- (13) INFORMATIONAL SIGNS SHOULD BE ACTIVITY SPECIFIC, I.E. "WET PAINT AHEAD" SIGNS MAY BE RECTANGULAR OR DIAMOND SHAPE. SIGN SIZE SHOULD BE BASED ON THE ABOVE POSTED SPEED LIMIT. SIGN WHEN TRAVELLING FIVE (5) MILES ABOVE POSTED SPEED LIMIT.
- (14) IF A LEAD VEHICLE IS ADDED TO OPERATION, IT SHOULD HAVE THE SAME ADVANCE WARNING SIGNS AS THE APPLICATION VEHICLE SHOWN BELOW.



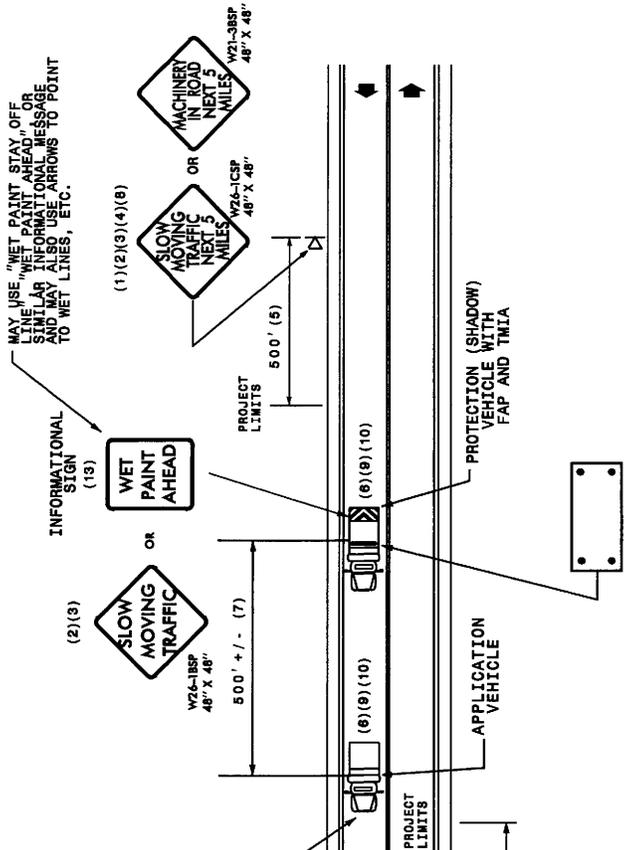
SIGN SHOULD BE ATTACHED TO THE FRONT OF THE APPLICATION VEHICLE

W21-3SP 48" X 48"

W26-1BSP 48" X 48"

W21-3SP 48" X 48"

W26-1BSP 48" X 48"



MOVING OPERATION CARAVAN
 (OPERATIONS TRAVELING 3 MPH OR FASTER)
 PLACING PAVEMENT MARKING OR MARKERS
 ON TWO-LANE TWO-WAY ROADWAYS

DRAWING NUMBER 6
 IMPLEMENTATION DATE: 07/01/97
 REVISED: 11/03/04