

**PROJECT SPECIAL PROVISIONS**

Traffic

**TRAFFIC CONTROL**

**01-18-05**

Rev. 06/21/05

Revise the *2002 Standard Specifications* as follows:

**WORK ZONE SIGNS**

Article 1089-1(A) General 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.

<b>Table 1089-A</b>		
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 Subarticle 1093-2(F). Such sheeting shall maintain 80% (Table 1093-10) of its retroreflectivity as shown in Tables 1089 A, B, and C.

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

Rigid and Rollup Fluorescent orange signs shall 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**

**01-18-05<sub>R</sub>**

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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Robeson County

**WORK ZONE TRAFFIC CONTROL:**

**SKINNY DRUMS**

**DESCRIPTION.**

Furnish, install, maintain, relocate, and remove Skinny Drums with ballast in accordance with the contract.

**MATERIALS.**

Provide Skinny Drums that have been evaluated by NTPEP and are traffic-qualified by the Work Zone Traffic Control Unit.

**(A) General:**

Provide skinny-drums composed of a body, reflective stripes, and ballast.

**(B) Body:**

Provide a skinny-drum made of orange, impact resistant, ultraviolet plastic material capable of maintaining its integrity upon impact throughout a temperature range of -20°F to 125°F. When struck, the skinny-drum shall not permanently distort to a degree that would prevent reuse, nor roll excessively after impact. Design the skinny-drum to prevent water from accumulating and freezing in the top or bottom.

Provide a skinny-drum that is cylindrical in shape with the following dimensions; a minimum height of 42 inches, a minimum top outer diameter of 4 inches and a bottom outer diameter of 7.5 inches. The top outer diameter shall not exceed the bottom outside diameter. Provide closed tops on drums to prevent accumulation of debris.

**(C) Retroreflective Stripes:**

Provide a minimum of two orange and two white alternating circumferential stripes for each skinny-drum. Use a minimum six inch wide band of Type III high intensity (encapsulated lens) reflective sheeting or better that meets the requirements of Section 1093 for each band. Do not exceed two inches for any non-reflective spaces between orange and white stripes. Do not place stripes over any protruding corrugation areas. No damage to the reflective sheeting should result from stacking and unstacking the skinny drums, or vehicle impact.

**(D) Ballast:**

Ballast skinny-drums using a preformed base specifically designed for the model skinny-drum. Each base shall be a minimum of 15 pounds and be circular or equilaterally polygonal in shape. When properly ballasted, the skinny drums shall be wind resistant to the extent of withstanding wind created by traffic under normal roadway conditions including high speed truck traffic in close proximity to the skinny drums. Do not place ballast on top of the drum. Upon impact, the main body of the drum shall deform and become detached from the base allowing vehicles to easily pass over the remaining base.

**(E) Material Certification:**

Furnish a Type 3 Certification in accordance with Article 106-3 for all new skinny drums and a Type 7 Material Certification for all used skinny drums prior to use.

**(F) Approval:**

All materials are subject to the approval of the Engineer.

**CONSTRUCTION METHODS.**

Use the same type of reflective sheeting (minimum of Type III) on all Skinny Drums installed at any one time during the life of the project.

Use ballasting methods in accordance with manufacturer's specification.

Use Skinny Drums as follows:

- Skinny Drums may be used in lieu of cones.
- Space Skinny Drums equal in feet to the posted speed limit, not to exceed 50 foot spacing, in the tangent sections on multilane roadways.

Do not use Skinny Drums as follows:

- Do not use Skinny Drums for tapers on multilane roadways.
- Do not substitute Skinny Drums for normal drums or intermix with drums unless directed by the Engineer or the Traffic Control Plans.
- Do not use Skinny Drums to separate two directions of travel that have been shifted on a multilane roadway.
- Do not use Skinny Drums for lane closures on multilane roadways for longer than three (3) consecutive days.

**MAINTENANCE.**

At no cost to the Department, immediately replace any Skinny Drum, ballast, or reflective sheeting that are torn, crushed, discolored, or otherwise damaged.



**MEASUREMENT AND PAYMENT.**

*Skinny Drums* will be measured and paid for as the actual number of Skinny Drums satisfactorily placed, accepted by the Engineer and in use at any one time during the life of the project.

Relocation of Skinny Drums is considered incidental to the measurement of the quantity of Skinny Drums and no separate payment will be made.

Payment will be made under:

<b>Pay Item.....</b>	<b>Pay Unit</b>
Skinny Drum.....	Each