Zack Stewart
Northern District Commissioner

Wayne O. Burkes
ıtral District Commissioner

Ronnie Shows
Southern District Commissioner

Dr. Robert L. Robinson
Executive Director

Kenneth I. Warren
Deputy Executive Director/
Chief Engineer

Mississippi Department of Transportation / P.O. Box 1850 / Jackson, Mississippi 39215-1850 / FAX (601) 359-7110

Inter-Departmental Memorandum

Date: November 11, 1997

To: Asst. Chief Engineer - PreConstruction (R. Young)
Asst. Chief Engineer - Operations (J. Kopf)
Roadway Design Division Engineer (W. Ruff)
Construction Division
Traffic Engineering Division
FHWA

From: Assistant Roadway Design Div. Engineer
John B. Pickering

Subject: Difference in Elevation For Travel Lanes and Pavement Edge Drop-Off

Attached are memorandums dated August 15 and August 25 documenting two (2) formal meetings regarding the above subject. Also attached is a summary of the two (2) meetings and what this writer believes to be the MDOT's implementation plan titled, **"Proposed Policy for Difference in Elevation for Travel Lanes and Pavement Edge Drop-Off."**

Roadway Design Division tried to verbalize the use of positive barrier protection for punch-out sites incompleted at sunset; however, the ramifications of adopting this change in policy would undoubtedly be controversial and result in higher cost of repair projects. Because of so many issues involved, the use of a positive barrier for punch-out projects was not included in the attached policy.

If there are any questions or if additional information is needed, please advise.

Attachments

pc: File

C:\MSOFFICE\PROJECTS\MISCELAN\PAVDROP\PAVDCOV2.DOC

November 11, 1997

PROPOSED POLICY FOR DIFFERENCE IN ELEVATION FOR TRAVEL LANES AND PAVEMENT EDGE DROP-OFF

DIFFERENCE IN ELEVATION FOR TRAVEL LANES --

The MDOT specifications will be revised to reflect the following:

- The maximum difference in elevation for travel lanes can not exceed 2.25 inches or 55 millimeters where traffic is expected to cross a temporary longitudinal construction joint.

- Current specifications say, *"Single lane placement of leveling, binder and surface courses shall be limited to the distance covered in one and one-half days in advance of that placed in the adjacent lane."* This will remain in the specifications; however, add to the specifications requiring adjacent lanes to be matched within 48 hours unless an emergency arises.

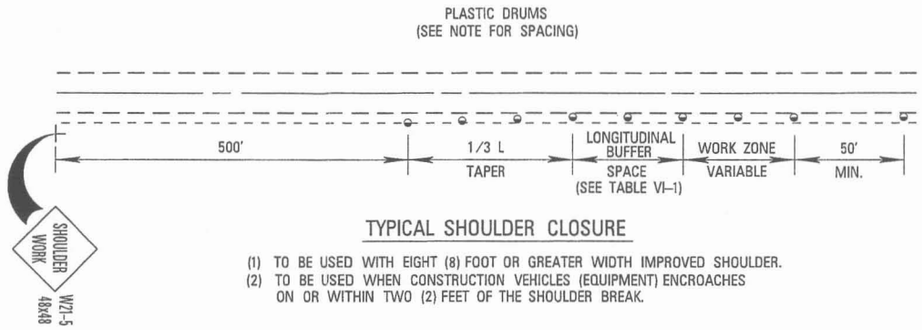
- Uneven lane signs will be required on all projects when there is any difference in elevation for travel lanes where traffic is expected to cross a temporary longitudinal construction joint. The uneven lane signs will be spaced at 1/4 mile (400 meters) intervals. Additional information regarding these signs will be provided by Roadway Design Division and Traffic Engineering Division for insertion in the specifications.

PAVEMENT EDGE DROP-OFFS --

The attached drawing titled, *"Traffic Control Details - Drum placement and Shoulder Closure,"* (Working Number TCP-6) is applicable to all projects with pavement edge drop-offs.

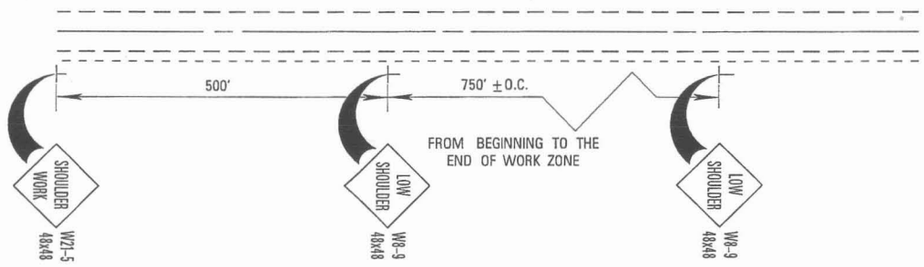
END ~~

ST.	PROJECT NO.
MISS.	



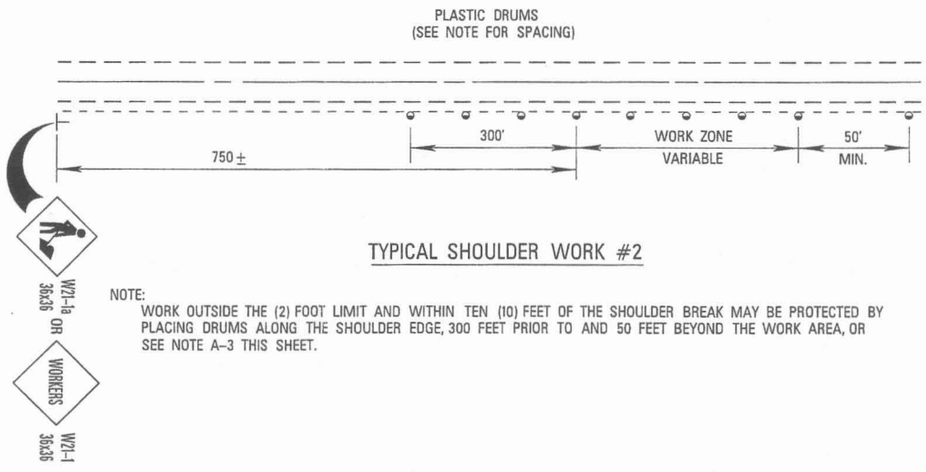
TYPICAL SHOULDER CLOSURE

(1) TO BE USED WITH EIGHT (8) FOOT OR GREATER WIDTH IMPROVED SHOULDER.
(2) TO BE USED WHEN CONSTRUCTION VEHICLES (EQUIPMENT) ENCROACHES ON OR WITHIN TWO (2) FEET OF THE SHOULDER BREAK.



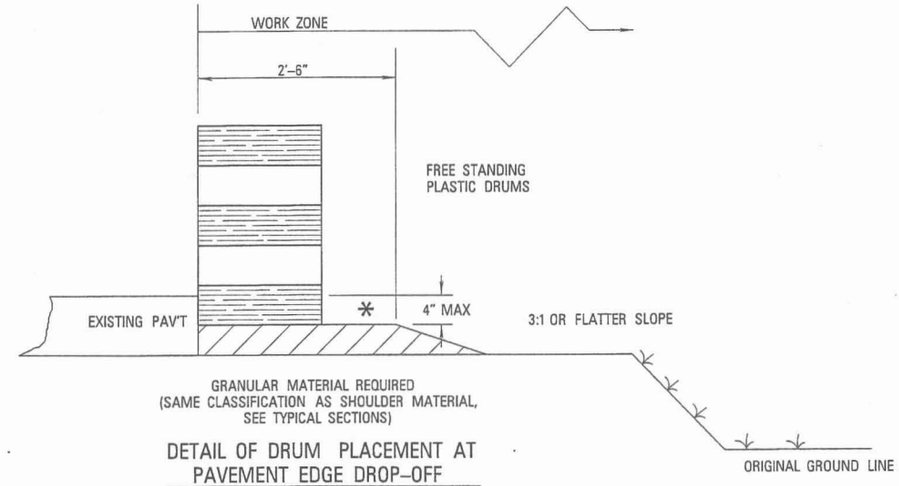
TYPICAL SHOULDER WORK #1

(SEE NOTE A-1 THIS SHEET)



TYPICAL SHOULDER WORK #2

NOTE:
WORK OUTSIDE THE (2) FOOT LIMIT AND WITHIN TEN (10) FEET OF THE SHOULDER BREAK MAY BE PROTECTED BY PLACING DRUMS ALONG THE SHOULDER EDGE, 300 FEET PRIOR TO AND 50 FEET BEYOND THE WORK AREA, OR SEE NOTE A-3 THIS SHEET.



DETAIL OF DRUM PLACEMENT AT PAVEMENT EDGE DROP-OFF

NOTES

* A. PAVEMENT EDGE DROP-OFF

1. IF LESS THAN TWO (2) INCHES–NO PROTECTION REQUIRED. PLACE A SHOULDER WORK SIGN (W21–5) 500 FEET IN ADVANCE OF WORK ZONE SHOULDER AND A LOW SHOULDER SIGN (W8–9) AT THE BEGINNING AND THROUGHOUT THE WORK ZONE @ (750' ± O.C.).
2. TWO TO FOUR INCHES–PLACE DRUMS, VERTICAL PANELS OR BARRICADES EVERY 100 FEET ON TANGENT SECTIONS FOR SPEEDS OF 50 MILES PER HOUR OR GREATER. CONES MAY BE USED IN PLACE OF DRUMS, PANELS, AND BARRICADES DURING DAYLIGHT HOURS. FOR TANGENT SECTIONS WITH SPEEDS LESS THAN 50 MILES PER HOUR AND FOR CURVES, DEVICES SHOULD BE PLACED EVERY 50 FEET. SPACING FOR TAPERS SHOULD BE IN ACCORDANCE WITH THE M.U.T.C.D. (1/3 L, WHERE L IS THE TAPER LENGTH IN FEET.)
3. GREATER THAN FOUR (4) INCHES–POSITIVE SEPARATION OR WEDGE WITH 3:1 OR FLATTER SLOPE NEEDED. IF THERE IS EIGHT (8) FEET OR MORE DISTANCE BETWEEN THE EDGE OF TRAVEL LANE AND DROP–OFF, THEN DRUMS, PANELS OR BARRICADES MAY BE USED. IF CONCRETE BARRIERS ARE USED, SPECIAL REFLECTIVE DEVICES OR STEADY BURN LIGHTS SHOULD BE USED FOR OVERNIGHT INSTALLATIONS.
4. FOR TEMPORARY CONDITIONS, DROP–OFFS GREATER THAN FOUR (4) INCHES MAY BE PROTECTED WITH DRUMS, VERTICAL PANELS OR BARRICADES FOR SHORT DISTANCES DURING DAYLIGHT HOURS WHILE WORK IS BEING DONE IN THE DROP–OFF AREA.
5. LESSER TREATMENTS THAN THOSE DESCRIBED ABOVE MAY BE CONSIDERED FOR LOW–VOLUME LOCAL STREETS.

B. DRUM SPACING

1. TANGENTS = 2 X S
2. TAPERS = L/3
   WHERE L = S X W
   L = TAPER LENGTH IN FEET
   S = SPEED IN MPH (POSTED OR 85 PERCENTILE)
   W = WIDTH OF OFFSET IN FEET

C. ALL TRAFFIC CONTROL ITEMS SHOWN ON THIS SHEET SHALL BE PAID FOR UNDER MAINTENANCE OF TRAFFIC.

TABLE VI-1. GUIDELINES FOR LENGTH OF LONGITUDINAL BUFFER SPACE

SPEED* (MPH)	LENGTH (FEET)
20	35
25	55
30	85
35	120
40	170
45	220
50	280
55	335
60	415
65	485

* POSTED SPEED, OFF–PEAK 85 PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH.

DATE	REVISION	BY

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL DETAILS
DRUM PLACEMENT
AND
SHOULDER CLOSURE

PROJECT NO.:
COUNTY:

WORKING NUMBER
TCP–6
SHEET NUMBER

FILENAME: specproj/plas-drum.dgn
DESIGN TEAM BOB WARDELL CHECKED P. HUNT DATE 8-19-97

COUNTY: PROJECT NO.:

Zack Stewart
Northern District Commissioner

ne O. Burkes
.ıtral District Commissioner

Ronnie Shows
Southern District Commissioner

MDOT

Dr. Robert L. Robinson
Executive Director

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Deputy Executive Director/
Chief Engineer

Mississippi Department of Transportation / P.O. Box 1850 / Jackson, Mississippi 39215-1850 / FAX (601) 359-7110

Inter-Office Memorandum

Date: August 25, 1997

To: Roadway Design Division Engineer
Wendel Ruff

From: Acting Asst. Roadway Design Div. Engineer
John Pickering J.P.

Subject: Difference in Elevation for Travel Lanes

There was a meeting today to discuss my report concerning the difference in elevation for travel lanes dated August 18, 1997. Those in attendance were as follows:

Jim Kopf	Asst. Chief Engineer - Operations
Steve McMahen	Construction Engineer
Buddy Russell	Asst. Construction Engineer
Doug Funchess	Specifications Engineer - Construction Div.
John Pickering	Acting Asst. Roadway Design Div. Engineer

The current specifications say, *"Single lane placement of leveling, binder and surface courses shall be limited to the distance covered in one and one-half days in advance of that placed in the adjacent lane."* This will remain in the specifications; however, add to the specifications requiring adjacent lanes to be matched within 48 hours unless an emergency arises.

Uneven lane signs will be required on all projects when there is <u>any</u> difference in elevation for travel lanes where traffic is expected to cross. The uneven lane signs will be spaced at 1/4 mile (400 meters) intervals.

Special drawings for the uneven lane signs will be developed by Roadway Design Division if required.

- Subsequent to this meeting, the staff of Roadway Design believes the drawing would be too elementary when the specifications could reflect the intent as follows:

- ◊ Uneven lane signs will be required on all projects when there is any difference in elevation for travel lanes where traffic is expected to cross and will be spaced at 1/4 mile (400 meters) intervals.

- ◊ Two (2) signs will be required facing traffic on 4-lane divided highways and four (4) signs (2 back to back) will be required on 2-lane highways. The signs will be moved or covered within a certain time period or distance whenever there is not any difference in elevation for travel lanes.

- ◊ There will be no additional compensation for these uneven lane signs.

The above summarizes the comments from the meeting and also adds additional recommendations from Roadway Design Division.

pc: File

Zack Stewart
Northern District Commissioner

[illegible]yne O. Burkes
[illegible]tral District Commissioner

Ronnie Shows
Southern District Commissioner

Dr. Robert L. Robinson
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Deputy Executive Director/
Chief Engineer

Mississippi Department of Transportation / P.O. Box 1850 / Jackson, Mississippi 39215-1850 / FAX (601) 359-7110

Inter-Departmental Memorandum

DATE: August 15, 1997

TO: Roadway Design Division Engineer
Mr. Wendel T. Ruff

FROM: Acting Asst. Roadway Design Div. Engineer
John Pickering J.P.

RE: Difference in Elevation For Travel Lanes and Pavement Edge Drop-Off

Due to the new superpave specifications within the MDOT, there was a meeting on July 31, 1997, regarding the difference in elevation for travel lanes. Also discussed was pavement edge drop-offs. The following were in attendance:

Larry Kastner . . . . . FHWA
Richard Young . . . . . Asst. Chief Engineer - PreConstruction
Jim Kopf . . . . . Asst. Chief Engineer - Operations
Buddy Russell . . . . . Asst. Construction Engineer
Doug Funchess . . . . . Specifications Engineer
Wendel Ruff . . . . . Roadway Design Division Engineer
John Pickering . . . . . Acting Asst. Roadway Design Div. Engineer
Keith Purvis . . . . . Roadway Design Division - Pavement Specialist

Difference in Elevation For Travel Lanes --

Current MDOT specifications require the maximum difference in elevation for travel lanes to be 1.5 inches (40 millimeters); therefore, in order to comply with this specification, surface courses never exceed this thickness on projects where traffic moves longitudinally across the difference in elevation. The MDOT will begin to implement superpave specifications on all hot mix asphalt beginning with the August, 1997 letting. These new specifications will require all courses to generally increase, and will set the minimum thickness for 12.5 mm mixture (surface course) to be 1.5 inches (40 millimeters). In order to have greater flexibility in the thickness design, it would be advantageous to increase the maximum allowable difference in elevation for longitudinal joint construction.

Since the MDOT desires to increase the pavement laying thickness with the new superpave specifications, the discussion focused on whether to increase it or not. The following was presented during the meeting:

- The AASHTO 1996 Roadside Design Guide says, *"Desirably, no vertical differential greater than 50 mm should occur between adjacent lanes."*

- The FHWA presented some guidelines *for "Difference in Elevation For Travel Lanes" and "Longitudinal Joint Construction and Edge Drop-Offs".* This information was presented as guidelines and is not a policy of the FHWA (copy attached).

  One state referred to during the discussion was Arkansas, where their policy says, ***"The State of Arkansas allows a maximum drop-off of 3 inches on the centerline pavement edge*** *and 4 inches maximum at the edge of the shoulder.* ***When resurfacing lifts are less than 1 inch no treatment is necessary. Between 1 and 3 inches, at the centerline, an uneven lane sign (WSP-1) is required.*** *At the shoulder edge, a drop-off of between 1 and 4 inches requires that a drop-off sign (WSP-2) be used.* ***Adjacent lanes must be matched within 24 hours unless an emergency arises."***

On 2-lane roadways where the temporary longitudinal construction joint is greater than the MDOT's specifications, no-passing signs would be required and/or a double yellow stripe could be used.

From the discussion, it was resolved to **change the MDOT Specifications to read the maximum difference in elevation for travel lanes can not exceed 2.25 inches or 55 millimeters where traffic is expected to cross a temporary longitudinal construction joint. On projects where traffic is expected to cross a temporary longitudinal construction joint between 1.5 inches (40 mm) and 2.25 inches (55 mm), an uneven lane sign will be required.** With the superpave specifications, this will allow the use of the 19.0-mm mixture (binder course) on projects where traffic is expected to cross the joint. **Roadway Design Division will develop a special design sheet (possibly a standard) that will show when and where to place the uneven lane sign within the appropriate projects.**

There was additional discussion regarding whether or not to require adjacent lanes to be matched within 24 hours unless an emergency arises, but no final decision was reached.

Pavement Edge Drop-Offs --

Pavement edge drop-offs was also discussed during the meeting. Roadway Design Division's current special design sheet for *"Drum Placement and Shoulder Closure"* follows the FHWA's guidelines as shown on the attachments.

The discussion centered on normal projects versus punch-out projects as follows:

- Roadway Design Plans use drums for punch-out projects except at bridge ends when replacing bridge end pavement. When replacing bridge end pavement, the plans include precast concrete barrier.

- Roadway Design plans for projects requiring shoulder work include the attached drawing (Working Sheet No. TCP-6) for pavement edge drop-offs. One item to mention concerning the drawing is when the vertical shoulder work is greater than 4 inches (100 mm), the contractor is to use a positive barrier or a 2.5 feet (750 mm) wedge with a 1:3 or flatter slope built up to within 4 inches (100 mm) of the pavement edge (see detail on drawing in the upper right hand corner and Note No. A.3). This applies when the shoulder is left overnight and traffic is running adjacent to the drop-off.

Other items brought up during the discussion include the following:

- The MDOT's present policy of using drums with punch-out projects needs to be addressed. Use of a positive barrier, either concrete or something like the "Triton Barrier", should be investigated.

    - ◊ One major problem with the use of a positive barrier is that projects without paved shoulders and projects without the necessary width or depth, would require additional pavement work on the shoulders to support the temporary traffic. This could increase the cost of the project drastically.

For pavement edge drop-offs, no changes to our policy were noted. Further investigation regarding our policy with punch-out projects will be forthcoming; however, Roadway Design Division is not expected to do anything at this time.

If there are any questions or if additional information is needed, please advise.

Attachments

pc: Asst. Chief Engineer - PreConstruction (R. Young)
Asst. Chief Engineer - Operations (J. Kopf)
FHWA
Construction Division
Traffic Engineering Division
File

GUIDELINES FOR PAVEMENT EDGE DROP-OFFS

Difference in Elevation For Travel Lanes

A pavement edge that traffic is expected to cross in a lane change situation should not have an elevation difference greater than one and one-half inches. This may be increased to two inches for low speed situations. Warning signs should be placed in advance and throughout the drop-off area.

Pavement drop-off.

Pavement edges that traffic is not expected to cross, except accidentally, should be treated as follows:

Less than two inches - No protection required. Warning signs should be placed in advance and throughout the drop-off area.

Two to four inches - Place drums, vertical panels, or barricades every 100 feet on tangent sections for speeds of 50 miles per hour or greater. Cones may be used in place of drums, panels, and barricades during daylight hours. For tangent sections with speeds less than 50 miles per hour and for curves devices should be placed every 50 feet. Spacing for tapers should be in accordance with MUTCD.

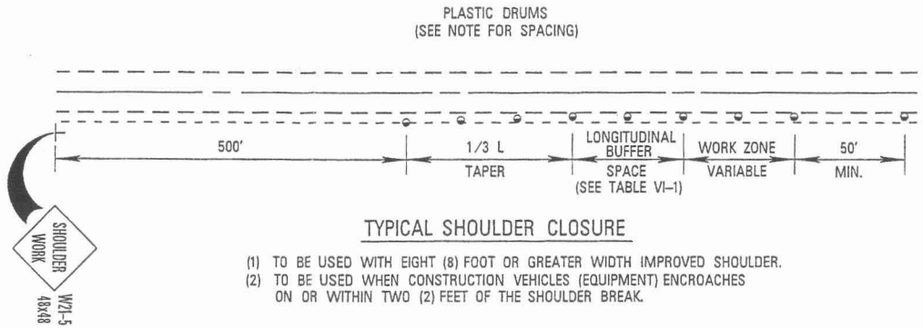
Greater than four inches - Positive separation or wedge with 3:1 or flatter slope needed. If there is eight feet or more distance between the edge of pavement and drop-off drums, panels or barricades may be used. If concrete barriers are used special reflective devices or steady burn lights should be used for overnight installations.

For temporary conditions drop-offs greater than four inches may be protected with drums, vertical panels, or barricades for short distances during daylight hours while work is being done in the drop-off area.

Lesser treatments then those described above may be considered for low-volume local streets.

FROM FHWA - JULY 31, 1997

STATE MISS.	PROJECT NO.



TYPICAL SHOULDER CLOSURE

(1) TO BE USED WITH EIGHT (8) FOOT OR GREATER WIDTH IMPROVED SHOULDER.
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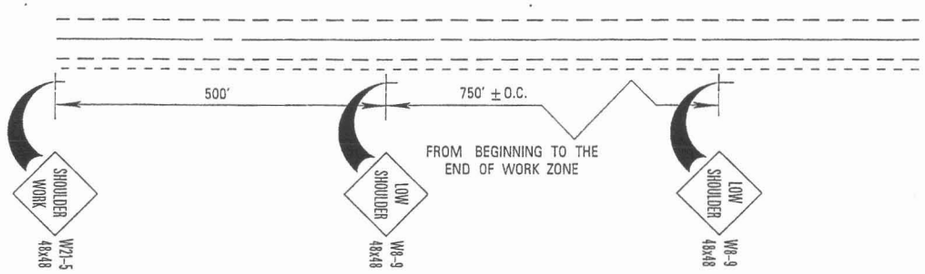
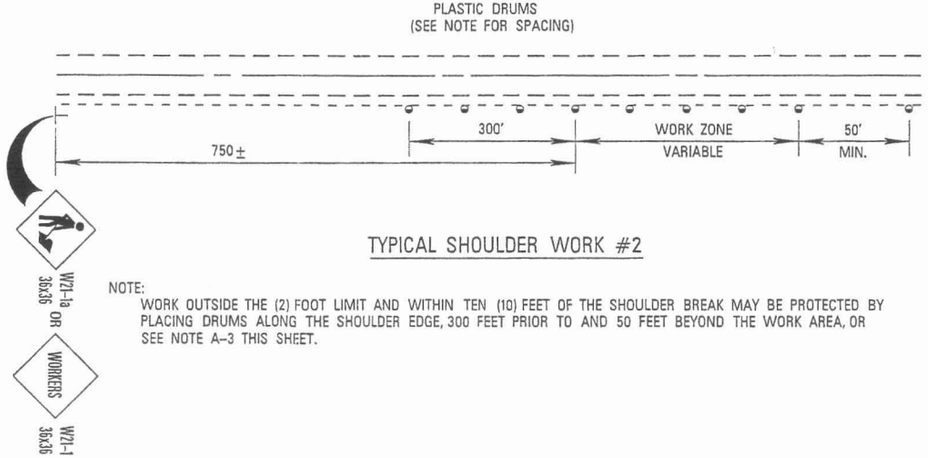


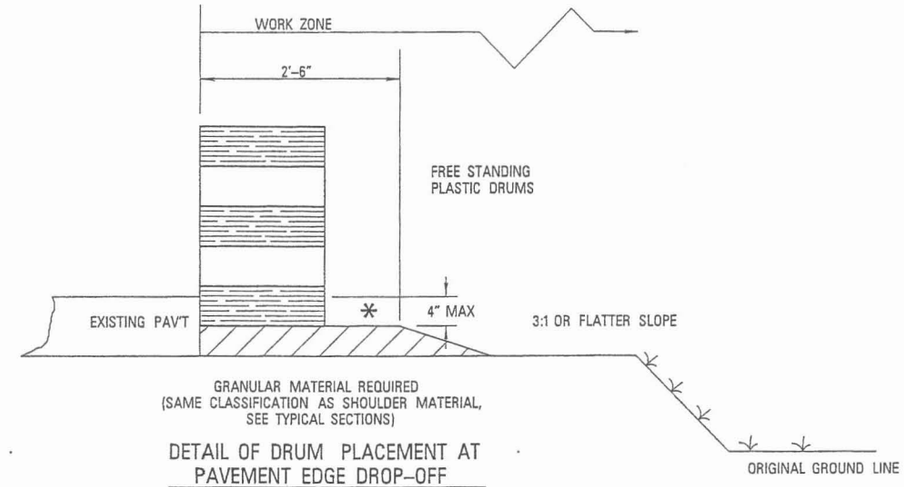
TYPICAL SHOULDER WORK #1

(SEE NOTE A-1 THIS SHEET)



TYPICAL SHOULDER WORK #2

NOTE:
WORK OUTSIDE THE (2) FOOT LIMIT AND WITHIN TEN (10) FEET OF THE SHOULDER BREAK MAY BE PROTECTED BY PLACING DRUMS ALONG THE SHOULDER EDGE, 300 FEET PRIOR TO AND 50 FEET BEYOND THE WORK AREA, OR SEE NOTE A-3 THIS SHEET.



DETAIL OF DRUM PLACEMENT AT PAVEMENT EDGE DROP-OFF

NOTES

* A. PAVEMENT EDGE DROP-OFF

1. IF LESS THAN TWO (2) INCHES–NO PROTECTION REQUIRED. PLACE A SHOULDER WORK SIGN (W21–5) 500 FEET IN ADVANCE OF WORK ZONE SHOULDER AND A LOW SHOULDER SIGN (W8–9) AT THE BEGINNING AND THROUGHOUT THE WORK ZONE @ (750' ± O.C.).
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65	485

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DATE	REVISION	BY

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL DETAILS
DRUM PLACEMENT
AND
SHOULDER CLOSURE

PROJECT NO.:
COUNTY:
FILENAME: specproj/plas-drum.dgn
DESIGN TEAM BOB WARDELL CHECKED P. HUNT DATE 8-19-97

WORKING NUMBER
TCP–6
SHEET NUMBER

COUNTY:
DESIGN TEAM:
PROJECT NO.:
FILENAME: