CRAIGHEAD COUNTY

INVITATION TO BID-Not an Order

Craighead County Judge's Office
511 Union St. Suite 119
Jonesboro, Arkansas 72401

PURCHASING OFFICE

BID NO. 2023-10

DATE March 22, 2023

Sealed bids, subject to the conditions on the attached hereof, and as may be attached hereto, will be received at this office until 2:00 PM April 6, 2023 and then publicly opened, for furnishing the supplies, materials, and/or services as described below.

Bids will be opened April 6, 2023.
2:00 P.M. Local Time

FOB Craighead County, Arkansas

BY: Al Haines
Purchasing Director

Item #	DESCRIPTION
1	The intent of the attached specifications is to describe asphalt chip sealing, scrub sealing, traffic control, and type of materials to use for preserving various County Roads in Craighead County.
2	The successful bidder will furnish Craighead County a signed copy of all delivery receipts for each road or job, and will invoice the County for each job individually.
3	Does bidder meet all specifications? Yes_____ No_____ If no, please attach sheets explaining differences.
4	Successful bidder shall maintain bid price throughout the 2023 asphalt seal season.
5	Bidder should specify approximate start date if awarded bid. Days_____
6	Bidder shall quote price per gallon of asphalt sealer and mineral aggregate laid on roads and each job should be bid separately and should include traffic control and mobilization.
7	Bid must be signed by an authorized representative or bid will be rejected.
8	Bidder should return all pages of this bid package.
9	Bid # 2023-10 must be noted on the outside of bidders envelope.
10	Total cost per job should be shown on **Bid Sheet Form**

EXECUTION OF BID

Date_____

We, the undersigned, have read all the requirements set forth in this bid proposal including specifications, conditions, and pertinent information regarding the articles being bid on, and we agree to furnish articles at the prices instructions, stated.

Arkansas use Tax Register No._____

Bidder_____ Address_____

By_____ City_____

(Person Authorized to Sign Bids) Title

UNSIGNED BIDS WILL BE REJECTED

BIDS ARE SUBJECT TO REJECTION UNLESS SUBMITTED ON THIS FORM

NOTICE TO BIDDERS, SEE REVERSE SIDE OR ATTACHMENTS FOR INSTRUCTIONS AND CONDITIONS.

CRAIGHEAD COUNTY
JONESBORO, ARKANSAS

CONDITIONS OF BIDDING

Compliance with the following conditions is necessary for consideration of this bid.

1. Signature-This bid must be signed with the firm name and by an authorized officer, employee or agent.
2. Sales Tax-Is to be shown in the bid price, but is to be listed as separate line item. The County is not exempt from Arkansas State Sales Tax. Contractors are to include all costs into the bid price, including applicable taxes.
3. Freight and other delivery charges-to destination at designated County job site in the County must be included in bid. Charges may not be added after the bid is opened.
4. Discounts-Show rate, total amount, and latest day any discounts will be allowed after receipt of article and invoice, otherwise County will deduct allowed discount when payment is made.
5. Firm Price-All prices quoted will remain firm for at least 30 days from date of bid, unless otherwise specified by the County or bidder
6. Identical Bids-In the event of two or more identical low bids, the contract may be awarded arbitrarily or for any reason to any of such bidders, or split in any proportion between the said two or more bidders at discretion of the County.
7. Clean up-Complete cleanup and proper disposal of any and all job related items is considered to be a part of any contract let by Craighead County.
8. Ambiguity in bid-Any ambiguity in any bid as the result of omission, error, lack of clarity or non-compliance specifications, instructions, and all conditions of bidding shall be construed in the light most favorable to the County
9. Construction
   A. When requested, the Contractor is to supply the County with evidence of having and maintaining proper and specifically Workman's Compensation Insurance in accordance with the laws of the State of Arkansas, Public Liability, and Property Damage. All premiums and cost shall be paid by Contractor. In no way will the County be responsible in case of accident.
   B. A Performance Bond equaling the total amount of any bid exceeding $50,000 must be provided for erection of any public building, public structure, or public improvement(Pursuant to Arkansas Code 18-44-503.)
10. The County reserves the right to reject any and all bids, accept in whole or in part, to waive informalities in bids received, to accept bids on materials or equipment with variations from specifications in those cases where efficiency of operation will not be impaired, and unless otherwise specified by bidder, to accept any item in the bid. If unit prices and extensions thereof do not coincide, the County may accept the bid for the lesser amount whether reflected by extension or by the correct multiple of the unit price.

INSTRUCTIONS TO BIDDERS

(Please read carefully)

1. Submit bid on bid form attached.
2. Address all bids to: Purchasing Director, Craighead County Judge's Office, 511 Union St.; Suite 119, Jonesboro, Arkansas 72401and make certain to indicate identifying bid number on the outside of bid envelope.
3. DO NOT include Federal Excise Tax in bid. County will furnish exemption certificate.
4. Bids received after stated time will not be considered.
5. Be sure and read all conditions and verify amounts before submitting bids. No changes or additions will be allowed after submission.
6. Guarantees and warranties should be attached as a part of the bid, as they may be a consideration in awarding contract.
7. Delivery or contract completion time is to be shown, as this date may, where time is of the essence, determine the contract award.
8. Additional information may be obtained from the Purchasing Department.
9. Bid Bond of 5% is required with this bid.
10. **Point of contact will be Marvin Day at 243-6453**

COUNTY RESERVES THE RIGHT TO ACCEPT PART OR ALL OF ANY SPECIFIC BID OR BIDS AND TO ACCEPT BID WITH OR WITHOUT TRADE-IN, AND REJECT ANY AND ALL BIDS.

SPECIFICATIONS

1. Scope: As part of the ongoing asphalt preservation on various county roads, We are requesting bids for sealing various county roads according to the attached specifications.
   The work will be done in accordance with the current ARDOT specifications for sealing asphalt roads.
2. Each job listed below must be bid separately.
3. See attached specifications indicating road numbers, locations, and job numbers for sealing, traffic control, and fog sealing various roads in Craighead County.
4. Craighead County stipulates that the successful bidder will do other sealing jobs at the bid price should other monies become available to Craighead County.
5. Craighead County reserves the right to accept, reject, in whole or in part, to waive informalities in bids received, or accept bids with variations.
6. Traffic control shall be responsibility of contractor. Any damages to property, vehicles, persons, or any other incidents or accidents shall be the liability of the contractor.
7. Mobilization costs should be listed as a separate item.
8. All applications of product of sealing, traffic control, and related jobs in this bid package shall be according to attached specifications.
9. Signage shall be placed at all road intersections according to the Manual on Uniform Traffic Control Devices.
10. Job must be completed according to ARDOT Specification.
11. Liquidated damages will be $500 per day after September 30,2023.

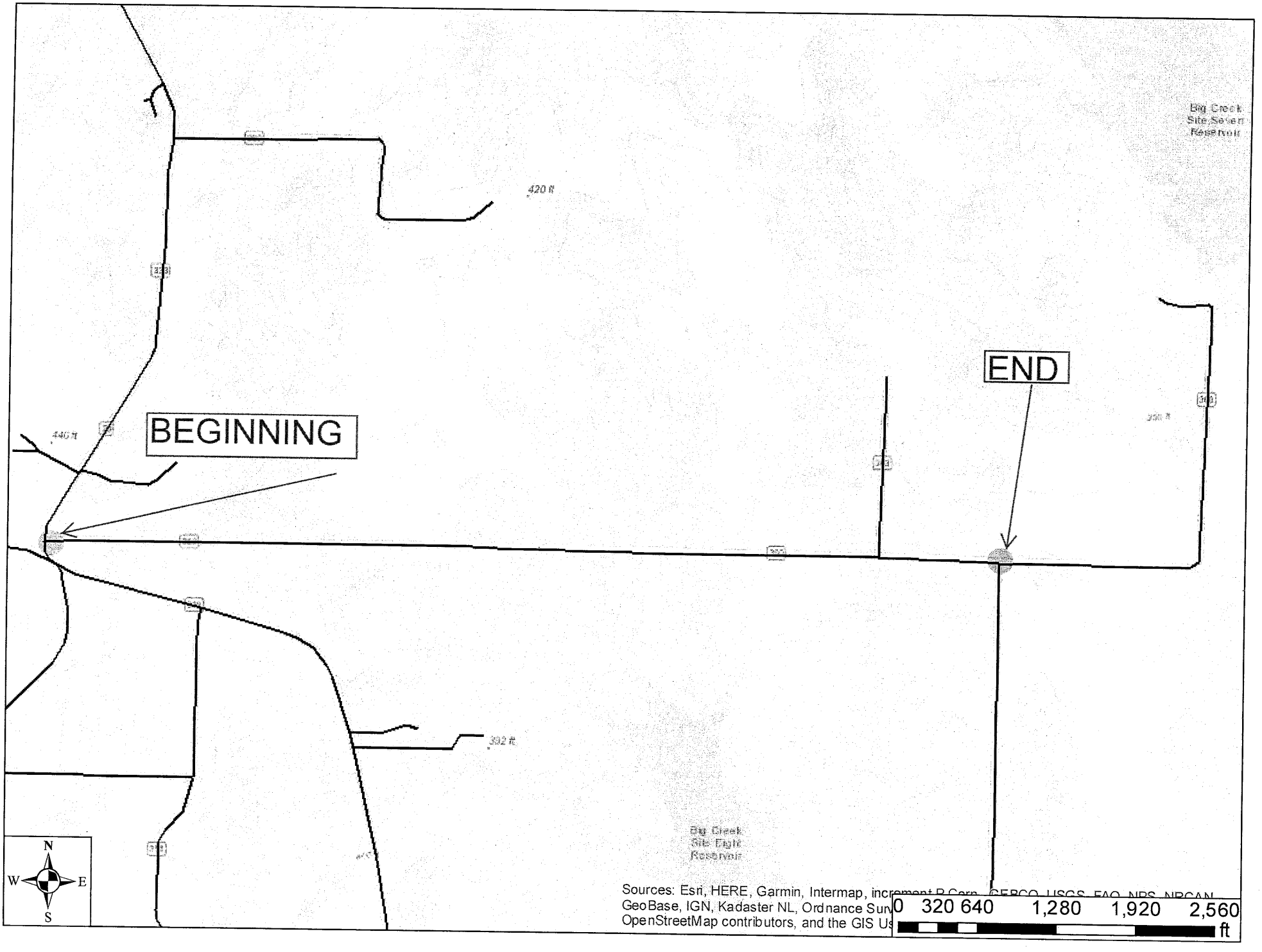
Bid Sheet Form

Bid 2023-10 **Job number of County Roads to be chip sealed and scrub sealed**

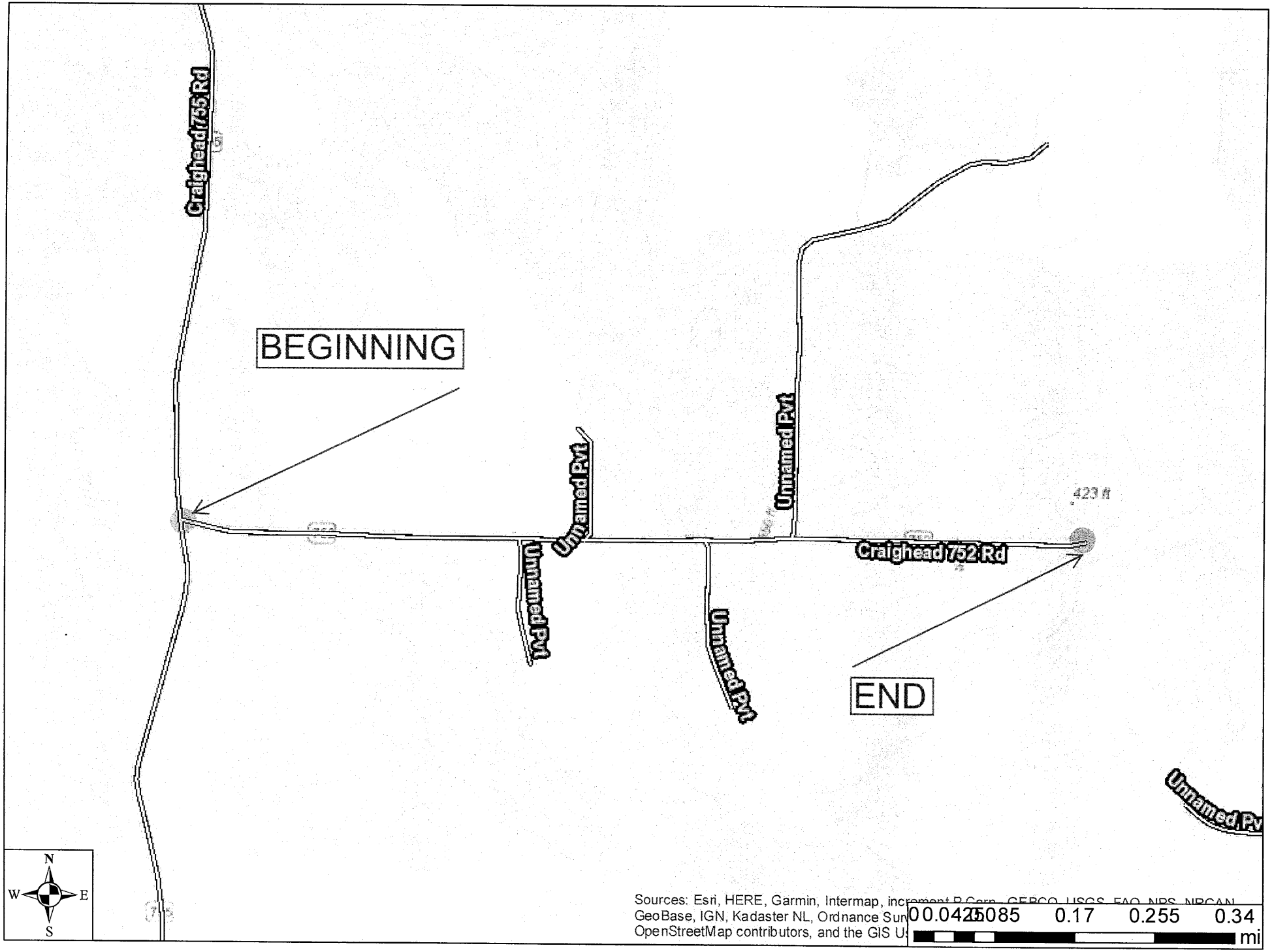
Asphalt Preservation on various Craighead County Roads

	County Road	Estimated Sq Yards	Est miles	Item	Quantity	Unit Price	Extension
Job 1	CR 360	15,180	1.18	Mineral Aggregate (Class 2)(25 lbs/sy)	189.8 tons		
				CRS-2P (.35gal/sy)	5,313 gallons		
Job 2	CR 752	8,489	0.72	Mineral Aggregate (Class 2)(25 lbs/sy)	106.1 tons		
				CRS-2P (.35gal/sy)	2,971.2 gallons		
Job 3	CR 712	19,396.7	1.50	Mineral Aggregate (Class 2)(25 lbs/sy)	242.5 tons		
				CRS-2P (.35gal/sy)	6,788.9 gallons		
Job 4	CR 620	14,747.3	1.14	Mineral Aggregate (Class 4)(25 lbs/sy)	184.3 tons		
				CMS-1PC (.3gal/sy)	4,424.2 gallons		
				Fog Seal Type 2 (.1gal/sy)	1,475 gallons		
Job 5	CR 846	14,764	1.14	Mineral Aggregate (Class 4)(25 lbs/sy)	184.6 tons		
				CMS-1PC (.3gal/sy)	4,429.2 gallons		
				Fog Seal Type 2 (.1gal/sy)	1,476.4 gallons		
	Traffic Control/Temporary Signage			Follow MUTCD Regulations	1 Each		
	Mobilization Cost(not to exceed 5%)				1 Each		
				Bid according to Specifications:		**Total Bid**	$_____
				Surfacing Quantities			
				Traffic Control Devices			

CR 360


BEGINNING
END
420 ft
440 ft
392 ft
Big Creek Site Seven Reservoir
Big Creek Site Eight Reservoir
N
W
E
S
0 320 640 1,280 1,920 2,560
ft

CR 752


Craighead755 Rd
BEGINNING
Unnamed Pvt
Unnamed Pvt
Unnamed Pvt
423 ft
Craighead 752 Rd
Unnamed Pvt
END
N
W
E
S
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN,
GeoBase, IGN, Kadaster NL, Ordnance Sur
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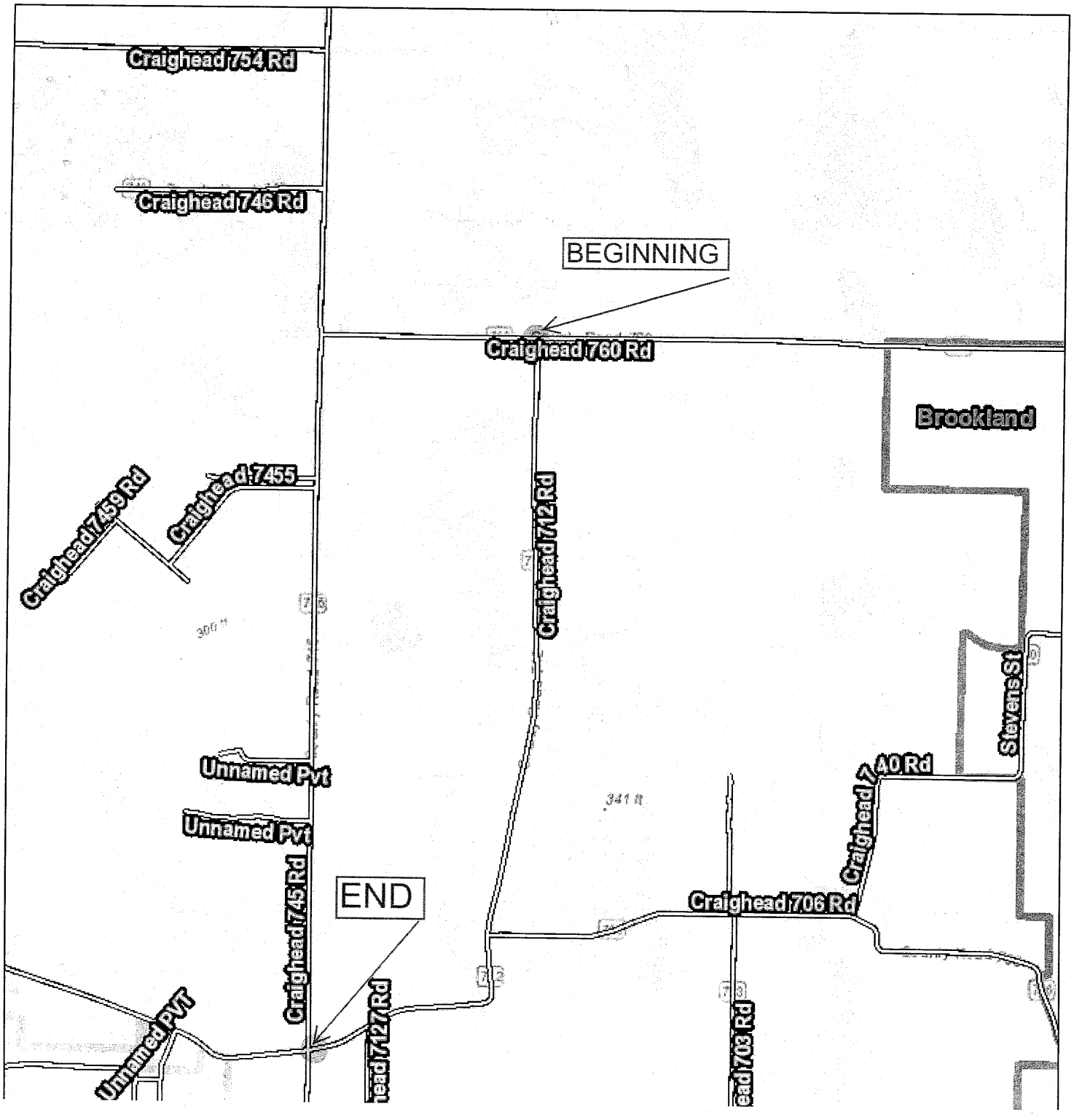
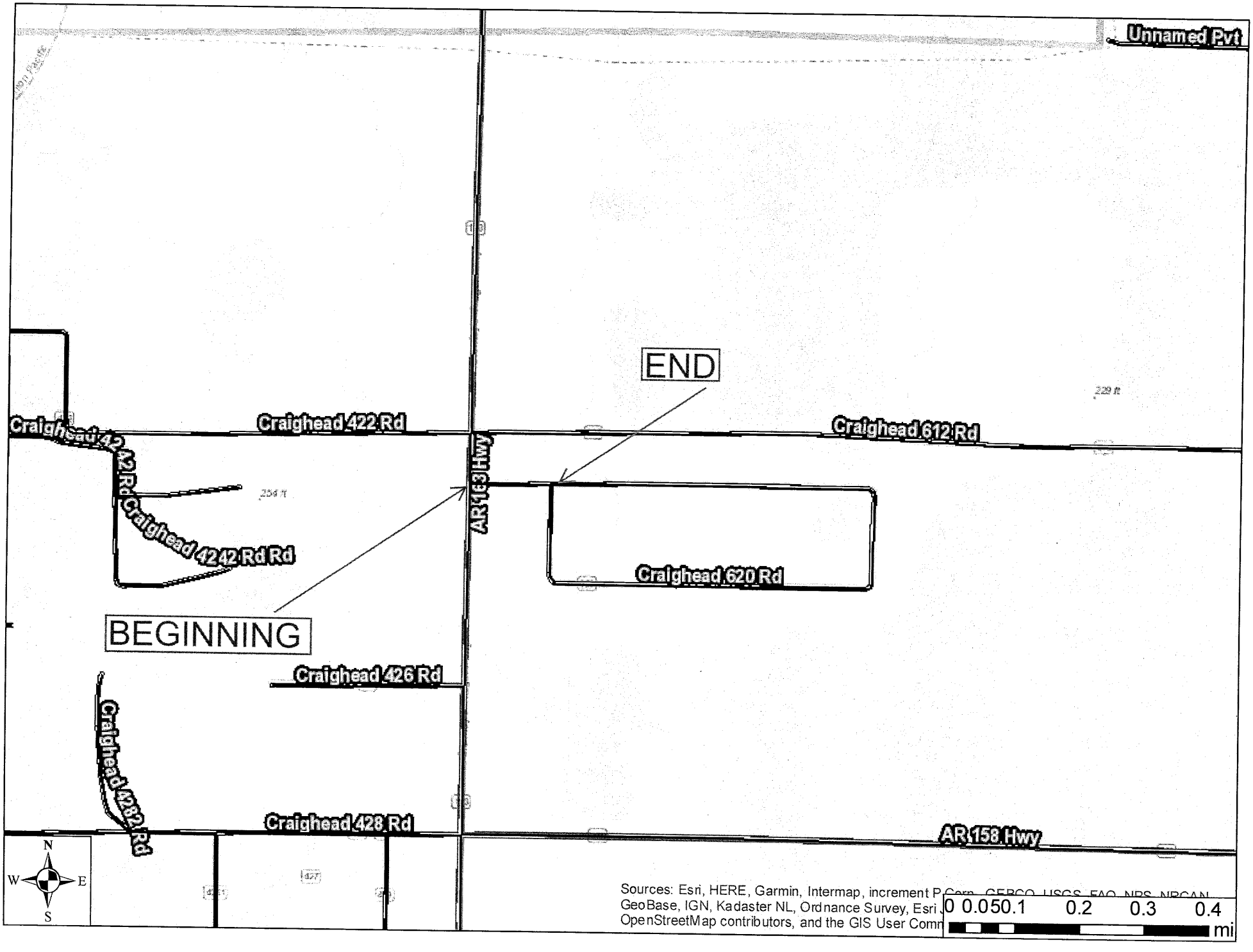
mi

CR 712


Craighead 754 Rd
Craighead 746 Rd
BEGINNING
Craighead 760 Rd
Brookland
Craighead 759 Rd
Craighead 7455
Craighead 712 Rd
Stevens St
Unnamed Pvt
Unnamed Pvt
Craighead 740 Rd
END
Craighead 745 Rd
Craighead 706 Rd
Unnamed Pvt
Craighead 703 Rd

CR 620


Unnamed Pvt
END
Craighead 422 Rd
Craighead 612 Rd
Craighead 4242 Rd
Craighead 4242 Rd Rd
AR 163 Hwy
Craighead 620 Rd
BEGINNING
Craighead 426 Rd
Craighead 4282 Rd
Craighead 428 Rd
AR 158 Hwy
N
W
E
S
Sources: Esri, HERE, Garmin, Intermap, increment P Corp, GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri J OpenStreetMap contributors, and the GIS User Comm
0 0.050.1 0.2 0.3 0.4
mi

CR 846


Craighead 836 Rd
Craighead 834 Rd
Craighead 847 Rd
Craighead 853 Rd
AR 139 Hwy S
BEGINNING
Craighead 840 Rd
Craighead 846 Rd
Ditch Number 4
Craighead 842 Rd
AR 135 Hwy S
END
Craighead 865 Rd
N New York Ave
Craighead 849 Rd
Craighead 862 Rd
Craighead 850 Rd
Craighead 859 Rd
N
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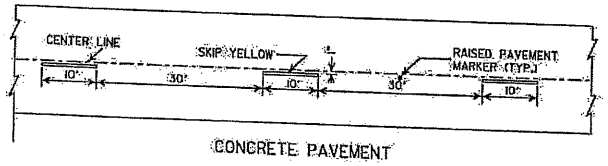
Sources: Esri, HERE, Garmin, Intermap, increment
GeoBase, IGN, Kadaster NL, Ordnance Survey, Esr
OpenStreetMap contributors, and the GIS User Con
0 0.125 0.25 0.5 0.75 1
mi

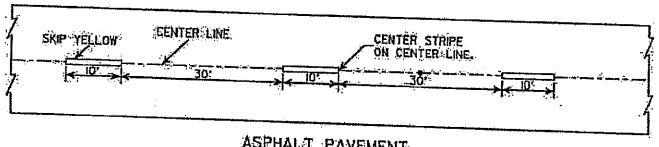
GOVERNING SPECIFICATIONS

ARKANSAS STATE HIGHWAY COMMISSION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, EDITION OF 2014, AND THE FOLLOWING SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.

NUMBER	TITLE
ERRATA	ERRATA FOR THE BOOK OF STANDARD SPECIFICATIONS
100-3	CONTRACTOR'S LICENSE
100-4	DEPARTMENT NAME CHANGE
102-2	ISSUANCE OF PROPOSALS
108-1	LIQUIDATED DAMAGES
108-2	WORK ALLOWED PRIOR TO ISSUANCE OF WORK ORDER
306-1	QUALITY CONTROL AND ACCEPTANCE
400-2	ASPHALT SURFACE TREATMENT
604-1	RETROREFLECTIVE SHEETING FOR TRAFFIC CONTROL DEVICES IN CONSTRUCTION ZONES
604-3	TRAFFIC CONTROL DEVICES IN CONSTRUCTION ZONES (MASH)
723-1	GENERAL REQUIREMENTS FOR SIGNS
729-1	CHANNEL POST SIGN SUPPORT
JOB SA1664	BIDDING REQUIREMENTS AND CONDITIONS
JOB SA1664	FOG SEAL
JOB SA1664	MANDATORY ELECTRONIC CONTRACT
JOB SA1664	MANDATORY ELECTRONIC DOCUMENT SUBMITTAL
JOB SA1664	REJUVENATING MASS CRACK TREATMENT

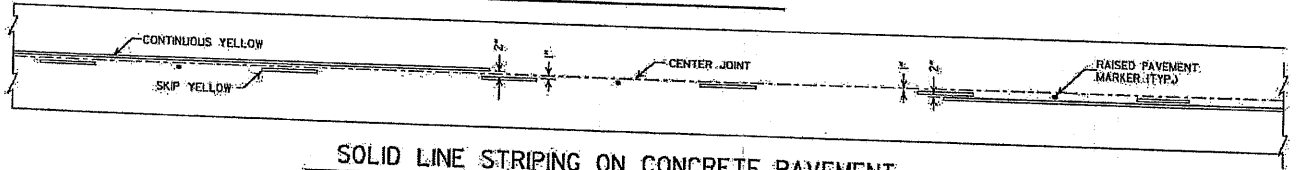


CONCRETE PAVEMENT

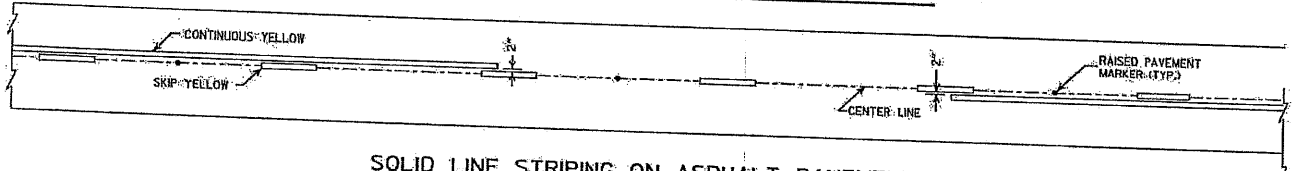


ASPHALT PAVEMENT

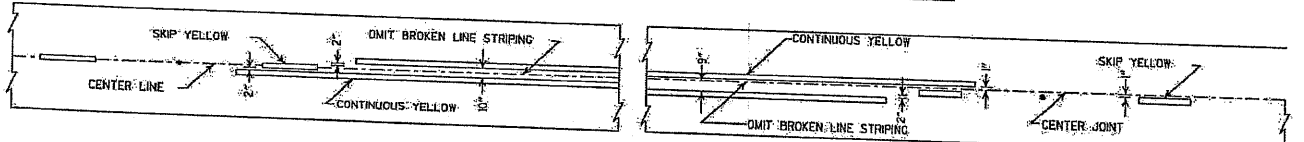
BROKEN LINE STRIPING



SOLID LINE STRIPING ON CONCRETE PAVEMENT



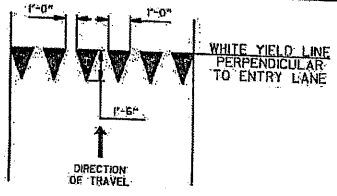
SOLID LINE STRIPING ON ASPHALT PAVEMENT



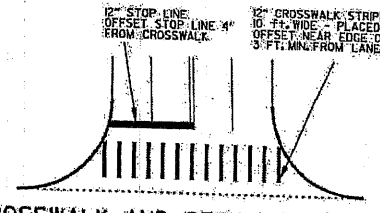
ASPHALT PAVEMENT

CONCRETE PAVEMENT

STRIPING AT ADJACENT NO PASSING LANES

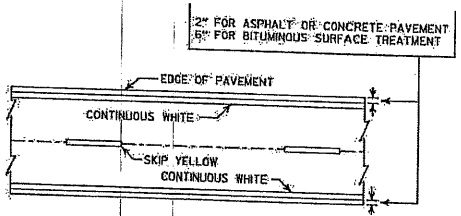


YIELD LINE DETAIL



CROSSWALK AND STOP LINE DETAILS

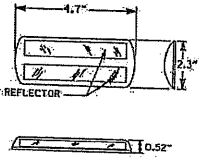
NOTES:
1. REFER TO THE STRIPING DETAILS FOR PAVEMENT MARKING LINE WIDTHS.
2. THIS DRAWING SHALL BE USED IN CONJUNCTION WITH THE LATEST REVISED ADDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
3. RAISED PAVEMENT MARKERS SHALL BE PLACED ON AN 80 FEET SPACING UNLESS OTHERWISE SHOWN IN THE PLANS.



PAVEMENT EDGE LINE MARKING

NOTE:
THE RED LENS OF THE TYPE II R.P.M. SHALL FACE THE INCORRECT TRAFFIC MOVEMENT.

NOTE:
DIMENSIONS SHOWN FOR RAISED PAVEMENT MARKERS ARE TYPICAL. THE CONTRACTOR MAY SUBSTITUTE SIMILAR MARKERS WITH THE APPROVAL OF THE ENGINEER. REQUESTING APPROVAL FOR SIMILAR MARKERS, MAY BE MADE BY REFERRING TO THE ARDOT QUALIFIED PRODUCTS LIST.

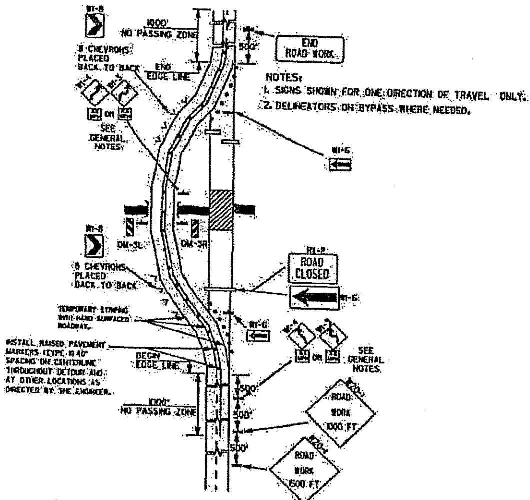


DETAIL OF STANDARD RAISED PAVEMENT MARKERS

DATE	REVISION	
2-27-20	REVISED STOP LINE DETAILS	
6-1-17	ADDED YIELD LINE DETAIL	
5-12-16	REVISED LINE WIDTHS, SPACING, & NOTES	
9-12-13	REVISED DETAIL OF STANDARD RAISED PAVEMENT MARKERS	
11-17-10	REVISED GENERAL NOTES & REMOVED PLIABLE PVMT MRKRS	
11-18-04	REVISED NOTE 2 & GENERAL NOTES	
8-22-02	ADDED CROSSWALK & STOPBAR DTLS.	
7-02-98	ADDED DETAILS OF STD. RAISED PAV'T. MARKERS	
4-26-95	REV. NOTES 3&4; ADDED R.P.M.	
9-30-80	DRAWN	
DATE		1-9-30-80 FILMED

PAVEMENT MARKING DETAILS

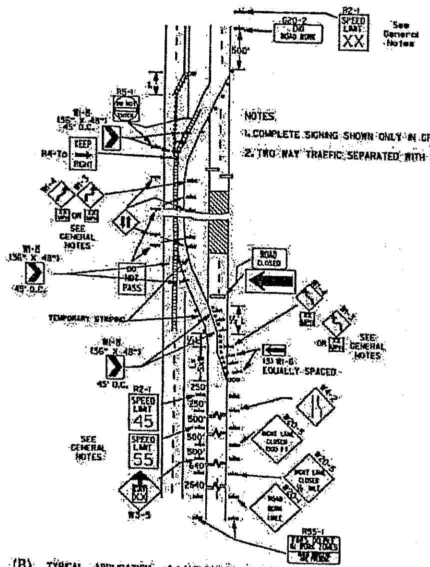
STANDARD DRAWING PM-1



NOTES:

1. SIGNS SHOWN FOR ONE DIRECTION OF TRAVEL ONLY.
2. DELINEATORS ON BYPASS WHERE NEEDED.

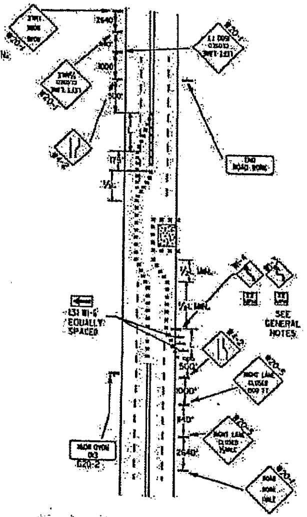
(A) TYPICAL APPLICATION OF TRAFFIC CONTROL DEVICES ON A 2-LANE HIGHWAY WHERE THE ENTIRE ROADWAY IS CLOSED AND A BYPASS DETOUR IS PROVIDED.



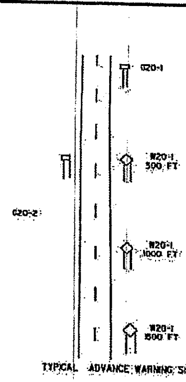
NOTES

1. COMPLETE SIGNING SHOWN ONLY IN CROSSOVER DIRECTION.
2. TWO WAY TRAFFIC SEPARATED WITH POSITIVE BARRIER.

(B) TYPICAL APPLICATION - 4-LANE DIVIDED ROADWAY WHERE ONE ROADWAY IS CLOSED.



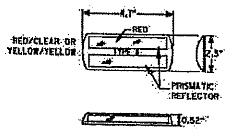
(C) TYPICAL APPLICATION - 4-LANE UNDIVIDED ROADWAY WHERE HALF OF THE ROADWAY IS CLOSED.



TYPICAL ADVANCE WARNING SIGN PLACEMENT

KEY:

- FLAGGER
- POSITIVE BARRIER
- ARROW PANEL (IF REQUIRED)
- TYPE III BARRICADE
- CHANNELIZING DEVICE
- TRAFFIC DRUM
- RAISED PAVEMENT MARKER



DETAIL OF RAISED PAVEMENT MARKERS

TAPER FORMULAE:

$L = S \times W$ FOR SPEEDS OF 45MPH OR MORE.

$L = \frac{WS^2}{60}$ FOR SPEEDS OF 40MPH OR LESS.

WHERE:

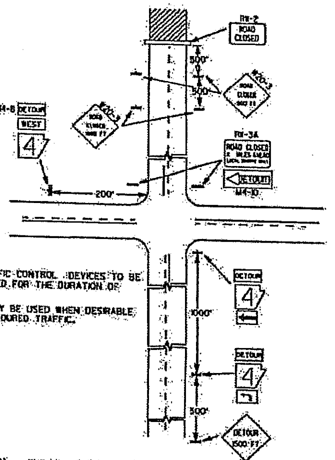
L= MINIMUM LENGTH OF TAPER.

S= NUMERICAL VALUE OF POSTED SPEED LIMIT PRIOR TO WORK OR 85TH PERCENTILE SPEED.

W= WIDTH OF OFFSET.

GENERAL NOTES:

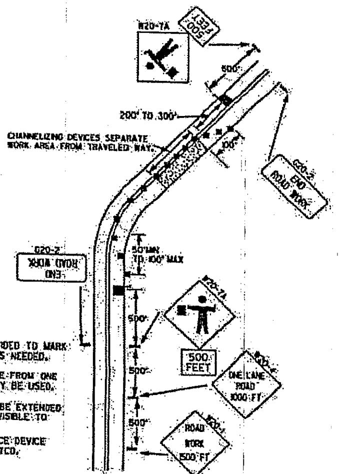
1. THE MAINTENANCE DIVISION SHALL CONDUCT A BALL BANK STUDY TO DETERMINE THE ADVISORY SPEED LIMIT PRIOR TO OPENING TO TRAFFIC. THE ADVISORY SPEED WILL BE POSTED ON W1-3 OR W1-4 CURVE WARNING SIGNS. USE W1-4 WHEN SPEED IS GREATER THAN 30MPH AND W1-3 WHEN 30MPH OR LESS
2. WHEN THE EXISTING SPEED LIMIT IS 55MPH AND THE PLANS REQUIRE A SPEED LIMIT OF 45MPH, THE R2-1(55) SHALL BE OMITTED AND THE W3-5 SHALL BE INSTALLED AT THAT LOCATION. ADDITIONAL R2-1 45MPH SPEED LIMIT SIGNS SHALL BE INSTALLED AT A MAXIMUM OF 1MILE INTERVALS. AT THE END OF THE WORK AREA A R2-1(XX) SHALL BE INSTALLED TO MATCH ORIGINAL SPEED LIMIT.
3. WHEN THE EXISTING SPEED LIMIT IS 65MPH AND THE PLANS REQUIRE A SPEED LIMIT OF 55MPH, THE R2-1(45) SHALL BE OMITTED. ADDITIONAL R2-1 55MPH SPEED LIMIT SIGNS SHALL BE INSTALLED AT A MAXIMUM OF 1MILE INTERVALS. AT THE END OF THE WORK AREA A R2-1(XX) SHALL BE INSTALLED TO MATCH ORIGINAL SPEED LIMIT.
4. THE MAXIMUM SPACING BETWEEN CHANNELIZING DEVICES IN A TAPER SHOULD BE APPROXIMATELY EQUAL IN FEET TO THE SPEED LIMIT. BEYOND THE TAPER, MAXIMUM SPACING SHALL BE TWO TIMES THE SPEED LIMIT, OR AS DIRECTED BY THE ENGINEER.
5. WARNING LIGHTS AND/OR FLAGS MAY BE MOUNTED TO SIGNS OR CHANNELIZING DEVICES AT NIGHT AS NEEDED.
6. PAVEMENT MARKINGS NO LONGER APPLICABLE WHICH MIGHT CREATE CONFUSION IN THE MINDS OF VEHICLE OPERATORS SHALL BE REMOVED OR OBLITERATED AS SOON AS PRACTICABLE.
7. TRAILER MOUNTED DEVICES SUCH AS ARROW PANELS AND PORTABLE CHANGEABLE MESSAGE SIGNS SHALL BE DELINEATED BY AFFIXING CONSPICUITY MATERIAL IN A CONTINUOUS LINE ON THE FACE OF THE TRAILER. WHEN PLACED ON OR ADJACENT TO THE SHOULDER AND NOT BEHIND A POSITIVE BARRIER, THESE DEVICES SHALL BE DELINEATED BY PLACING FIVE (5) TRAFFIC DRUMS, EQUALLY SPACED ALONG THE TRAFFIC SIDE OF THE DEVICE.
8. DIMENSIONS SHOWN FOR RAISED PAVEMENT MARKERS ARE TYPICAL. THE CONTRACTOR MAY SUBSTITUTE SIMILAR MARKERS WITH THE APPROVAL OF THE ENGINEER. REQUESTING APPROVAL FOR SIMILAR MARKERS MAY BE MADE BY REFERRING TO THE ARDOT QUALIFIED PRODUCTS LIST.
9. ALL TRAILER MOUNTED DEVICES SUCH AS ARROW PANELS AND PORTABLE CHANGEABLE MESSAGE SIGNS SHALL MEET THE REQUIREMENTS OF THE MANUAL FOR ASSESSING SAFETY HARDWARE (MASH).



NOTES:

1. REGULATORY TRAFFIC CONTROL DEVICES TO BE MODIFIED AS NEEDED FOR THE DURATION OF THE DETOUR.
2. STREET NAMES MAY BE USED WHEN DESIRABLE FOR DIRECTING DETOURED TRAFFIC.

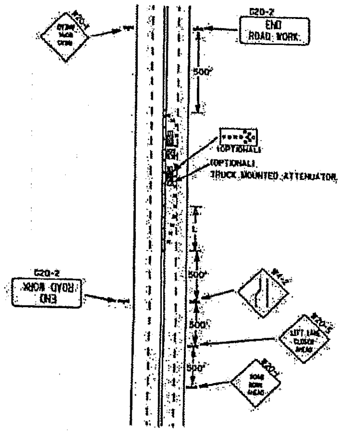
(D) TYPICAL APPLICATION - ROADWAY CLOSED BEYOND DETOUR POINT.



NOTES:

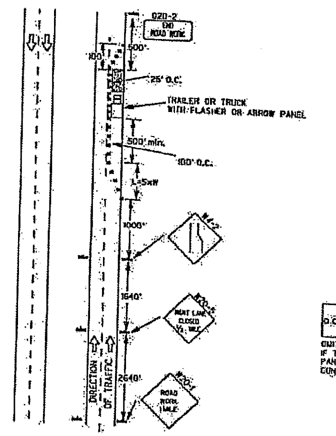
1. FLOOD LIGHTS SHOULD BE PROVIDED TO MARK FLAGGER STATIONS AT NIGHT AS NEEDED.
2. IF ENTIRE WORK AREA IS VISIBLE FROM ONE STATION, A SINGLE FLAGGER MAY BE USED.
3. CHANNELIZING DEVICES ARE TO BE EXTENDED TO A POINT WHERE THEY ARE VISIBLE TO APPROACHING TRAFFIC.
4. AUTOMATED FLAGGER ASSISTANCE DEVICE (AFAD) OPTIONAL. REFER TO MUTCD.

(E) TYPICAL APPLICATION OF TRAFFIC CONTROL DEVICES ON 2-LANE HIGHWAY WHERE ONE LANE IS CLOSED AND FLAGGING IS PROVIDED.

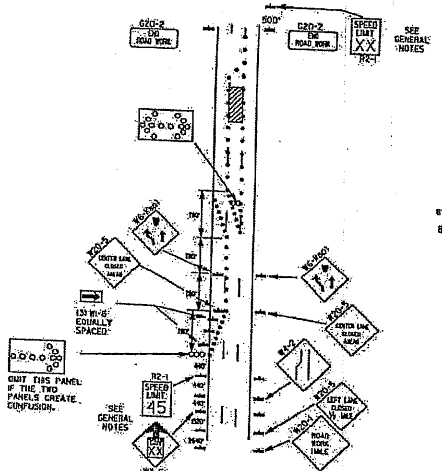


(F) TYPICAL APPLICATION - 4-LANE UNDIVIDED ROADWAY WITH INSIDE LANE CLOSED.

8-07-19	REVISED NOTE 1, ADDED NOTE 9	
9-2-15	REVISED NOTE 2, ADDED NOTE 8, REVISED DRAWING (A) & REPLACED R2-5A WITH W3-5	
9-12-13	REVISED DETAIL OF RAISED PAVEMENT MARKERS	
3-1-10	ADDED (AFAD)	
8-20-08	REVISED SIGN DESIGNATIONS	
4-18-04	ADDED GENERAL NOTE	
10-18-96	ADDED R55-1	
4-26-96	CORRECTED (o) BEHIND G20-2	
6-8-95	CORRECTED SIGN IDENT. ON W1-4A	6-8-95
2-2-95	REVISED PER PART VI, MUTCD, SEPT. 3, 1993	
8-15-91	DRAWN AND PLACED IN USE	
DATE	REVISION	FILMED



(A) TYPICAL APPLICATION - DAYTIME MAINTENANCE OPERATIONS OF SHORT DURATION ON A 4-LANE DIVIDED ROADWAY WHERE HALF OF THE ROADWAY IS CLOSED.



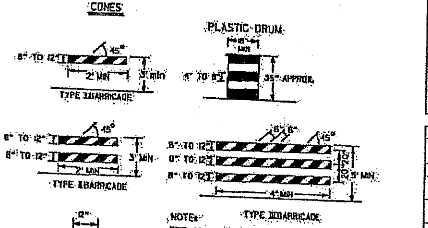
(B) TYPICAL APPLICATION - 3-LANE ONEWAY ROADWAY WHERE CENTER LANE IS CLOSED.

CHANNELIZING DEVICES:

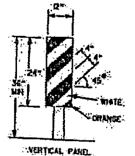
* WHEN CONES ARE USED ON FREEWAYS AND MULTI-LANE HIGHWAYS, THEY SHALL BE 28" MIN. DURING HOURS OF DARKNESS, 28" CONES SHALL BE USED ON ALL ROADWAYS, AND SHALL BE REFLECTORIZED IN ACCORDANCE WITH THE M.U.T.C.D.

CONES

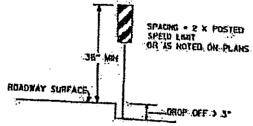
PLASTIC DRUM



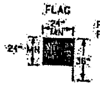
NOTE:
FOR ALL ROAD CLOSURES, THE TYPE III BARRICADES SHALL BE OF SUFFICIENT LENGTH TO EXTEND ACROSS ENTIRE ROADWAY.



VERTICAL PANEL PLACEMENT



FLAG



FLAG SHALL BE OF GOOD GRADE RED MATERIAL.

TRAFFIC CONTROL DEVICES

NON-INTERSTATE

VERTICAL DIFFERENTIAL	LOCATION	TRAFFIC CONTROL	
		≤ 45 MPH	> 45 MPH
≤ 2"	CENTERLINE	W8-11 AND LANE STRIPING	W8-11 AND LANE STRIPING
> 2"	CENTERLINE	STANDARD LANE CLOSURE	STANDARD LANE CLOSURE
≤ 3"	EDGE OF TRAVELED LANE OR EDGE OF SHOULDER	W8-9, EDGE LINE STRIPING, AND VERTICAL PANELS	W8-9, EDGE LINE STRIPING, AND VERTICAL PANELS
> 3" ≤ 6"	EDGE OF TRAVELED LANE OR EDGE OF SHOULDER	W8-17, EDGE LINE STRIPING, AND VERTICAL PANELS	W8-17, EDGE LINE STRIPING, AND VERTICAL PANELS
> 6" ≤ 18"	EDGE OF TRAVELED LANE OR EDGE OF SHOULDER	W8-17, EDGE LINE STRIPING, AND TRAFFIC DRUMS(1)	W8-17, EDGE LINE STRIPING, AND TRAFFIC DRUMS(1)
> 18" ≤ 24"	EDGE OF TRAVELED LANE OR EDGE OF SHOULDER	W8-17, EDGE LINE STRIPING, AND TRAFFIC DRUMS(1)	A STABILIZED WEDGE, W8-17, EDGE LINE STRIPING AND TRAFFIC DRUMS(2)
> 24"	EDGE OF TRAVELED LANE OR EDGE OF SHOULDER	PRECAST CONCRETE BARRIER(3) & EDGE LINES	PRECAST CONCRETE BARRIER(3) & EDGE LINES

INTERSTATE

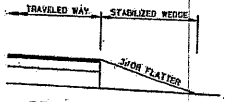
VERTICAL DIFFERENTIAL	LOCATION	TRAFFIC CONTROL
≤ 2"	CENTERLINE	W8-11 AND LANE STRIPING
≤ 2"	EDGE OF TRAVELED LANE OR EDGE OF SHOULDER	W8-9 EDGE LINE STRIPING, AND TRAFFIC DRUMS(1)
> 2" ≤ 6"	EDGE OF TRAVELED LANE OR EDGE OF SHOULDER	W8-17, EDGE LINE STRIPING, AND TRAFFIC DRUMS(2)
> 6"	EDGE OF TRAVELED LANE OR EDGE OF SHOULDER	PRECAST CONCRETE BARRIER & EDGE LINES

INTERSTATE AND NON-INTERSTATE

FORESLOPE	HEIGHT	TRAFFIC CONTROL
1:1	≥ 2 FT	PRECAST CONCRETE BARRIER
2:1	≤ 6 FT	TRAFFIC DRUMS
2:1	> 6 FT	PRECAST CONCRETE BARRIER
Flatter than 2:1	N/A	TRAFFIC DRUMS

GENERAL NOTES:

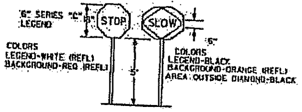
1. WHEN THE SHOULDER AREA IS USED AS PART OF THE TRAVELED LANE AND THERE IS INSUFFICIENT WIDTH TO PLACE TRAFFIC DRUMS ON THE REMAINING SHOULDER WIDTH THEN VERTICAL PANELS SHALL BE USED.
2. WHEN THERE IS INSUFFICIENT WIDTH TO PLACE TRAFFIC DRUMS ON THE REMAINING SHOULDER WIDTH, A STABILIZED WEDGE SHALL BE USED.
3. PRECAST CONCRETE BARRIER WALL CAN BE USED IN LIEU OF A STABILIZED WEDGE, W8-17 SIGN, EDGE LINE STRIPING, AND TRAFFIC DRUMS, IF AND WHERE DIRECTED BY THE ENGINEER.
4. A STABILIZED WEDGE, W8-17 SIGN, EDGE LINE STRIPING, AND TRAFFIC DRUMS CAN BE USED IN LIEU OF PRECAST CONCRETE BARRIER WALL, IF AND WHERE DIRECTED BY THE ENGINEER.
5. W21-5, W21-5a, AND/OR W21-5b SIGNS SHALL BE USED WHERE THE ROADWAY IS UNOBSTRUCTED IF AND WHERE DIRECTED BY THE ENGINEER.



STABILIZED WEDGE

NOTE:
MATERIALS FOR THE STABILIZED WEDGE SHALL MEET THE REQUIREMENTS PROVIDED IN SECTION 603.02 OF THE STANDARD SPECIFICATIONS.

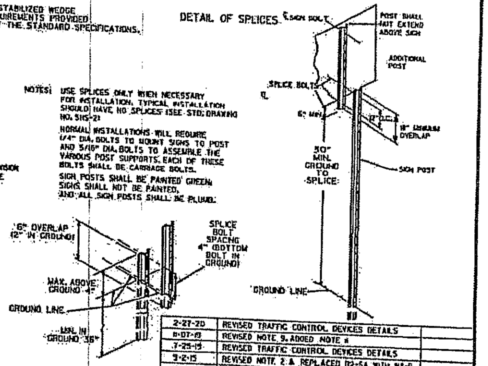
STOP SLOW PADDLE



COLORS
LEGEND-WHITE (REFL)
BACKGROUND-RED (REFL)

COLORS
LEGEND-BLACK
BACKGROUND-ORANGE (REFL)
AREA OUTSIDE DIAMOND-BLACK

DETAIL OF SPLICES



NOTES: USE SPLICES ONLY WHEN NECESSARY FOR INSTALLATION. TYPICAL INSTALLATION SHOULD HAVE NO SPLICES (SEE STD. DRAWING NO. SHS-2)

NORMAL INSTALLATIONS WILL REQUIRE 1/4" DIA. BOLTS TO MOUNT SIGNS TO POST AND 5/16" DIA. BOLTS TO ASSEMBLE THE VARIOUS POST SUPPORTS. EACH OF THESE BOLTS SHALL BE CARRIAGE BOLTS.

SIGN POSTS SHALL BE PAINTED GREEN. SIGNS SHALL NOT BE PAINTED, AND ALL SIGN POSTS SHALL BE PLUMB.

KEY:

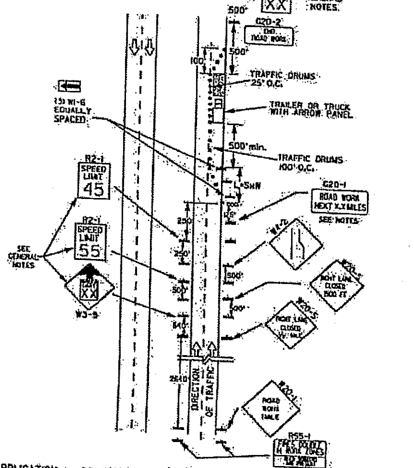
OOO ARROW PANEL (IF REQUIRED)

▪ CHANNELIZING DEVICE

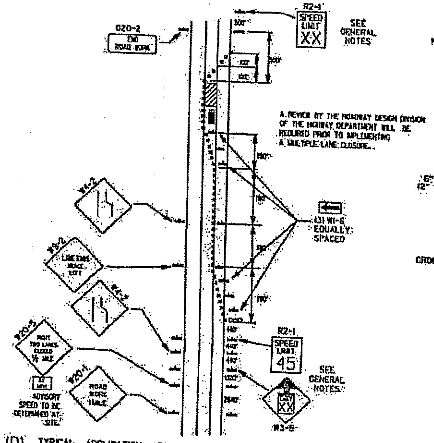
● TRAFFIC DRUM

GENERAL NOTES:

1. A SPEED LIMIT REDUCTION MAY BE IMPLEMENTED ONLY WHEN DESIGNATED IN THE PLAN OR WHEN RECOMMENDED BY THE ROADWAY DESIGN DIVISION.
2. WHEN THE EXISTING SPEED LIMIT IS 55MPH AND THE PLANS REQUIRE A SPEED LIMIT OF 45MPH, THE R2-1(55) SHALL BE OMITTED AND THE W3-5 SHALL BE INSTALLED AT THAT LOCATION. ADDITIONAL R2-1 45MPH SPEED LIMIT SIGNS SHALL BE INSTALLED AT A MAXIMUM OF 1MILE INTERVALS. AT THE END OF THE WORK AREA A R2-1(XX) SHALL BE INSTALLED TO MATCH ORIGINAL SPEED LIMIT.
3. WHEN THE EXISTING SPEED LIMIT IS 65MPH AND THE PLANS REQUIRE A SPEED LIMIT OF 55MPH, THE R2-1(45) SHALL BE OMITTED. ADDITIONAL R2-1 55MPH SPEED LIMIT SIGNS SHALL BE INSTALLED AT A MAXIMUM OF 1MILE INTERVALS. AT THE END OF THE WORK AREA A R2-1(XX) SHALL BE INSTALLED TO MATCH ORIGINAL SPEED LIMIT.
4. THE MAXIMUM SPACING BETWEEN CHANNELIZING DEVICES IN A TAPER SHOULD BE APPROXIMATELY EQUAL IN FEET TO THE SPEED LIMIT. BEYOND THE TAPER, MAXIMUM SPACING SHALL BE TWO TIMES THE SPEED LIMIT OR AS DIRECTED BY THE ENGINEER.
5. WARNING LIGHTS AND/OR FLAGS MAY BE MOUNTED TO SIGNS OR CHANNELIZING DEVICES AT NIGHT AS NEEDED.
6. PAVEMENT MARKINGS NO LONGER APPLICABLE WHICH MIGHT CREATE CONFUSION IN THE MINDS OF VEHICLE OPERATORS SHALL BE REMOVED OR OBLITERATED AS SOON AS PRACTICABLE.
7. THE G20-1 SIGN WILL BE REQUIRED ON JOBS OF OVER TWO MILES IN LENGTH. WHEN THE LANE CLOSURE IS NOT AT THE BEGINNING OF THE PROJECT, THE G20-1 SIGN SHALL BE ERECTED 125' IN ADVANCE OF THE JOB LIMIT. ADDITIONAL W20-1 (1 MILE) SIGNS ARE NOT REQUIRED IN ADVANCE OF LANE CLOSURES THAT BEGIN INSIDE THE PROJECT LIMITS.
8. FLAGGERS SHALL USE STOP/SLOW PADDLES FOR CONTROLLING TRAFFIC THROUGH WORK ZONES. FLAGS MAY BE USED ONLY FOR EMERGENCY SITUATIONS.
9. ALL PLASTIC DRUMS AND CONES SHALL MEET THE REQUIREMENTS OF MANUAL FOR ASSESSING SAFETY HARDWARE (MASH).
10. TRAILER MOUNTED DEVICES SUCH AS ARROW PANELS AND PORTABLE CHANGEABLE MESSAGE SIGNS SHALL BE DELINEATED BY AFFIXING CONSPICUITY MATERIAL IN A CONTINUOUS LINE ON THE FACE OF THE TRAILER. WHEN PLACED ON OR ADJACENT TO THE SHOULDER AND NOT BEHIND A POSITIVE BARRIER, THESE DEVICES SHALL BE DELINEATED BY PLACING FIVE (5) TRAFFIC DRUMS, EQUALLY SPACED ALONG THE TRAFFIC SIDE OF THE DEVICE.
11. ALL TRAILER MOUNTED DEVICES SUCH AS ARROW PANELS AND PORTABLE CHANGEABLE MESSAGE SIGNS SHALL MEET THE REQUIREMENTS OF THE MANUAL FOR ASSESSING SAFETY HARDWARE (MASH).

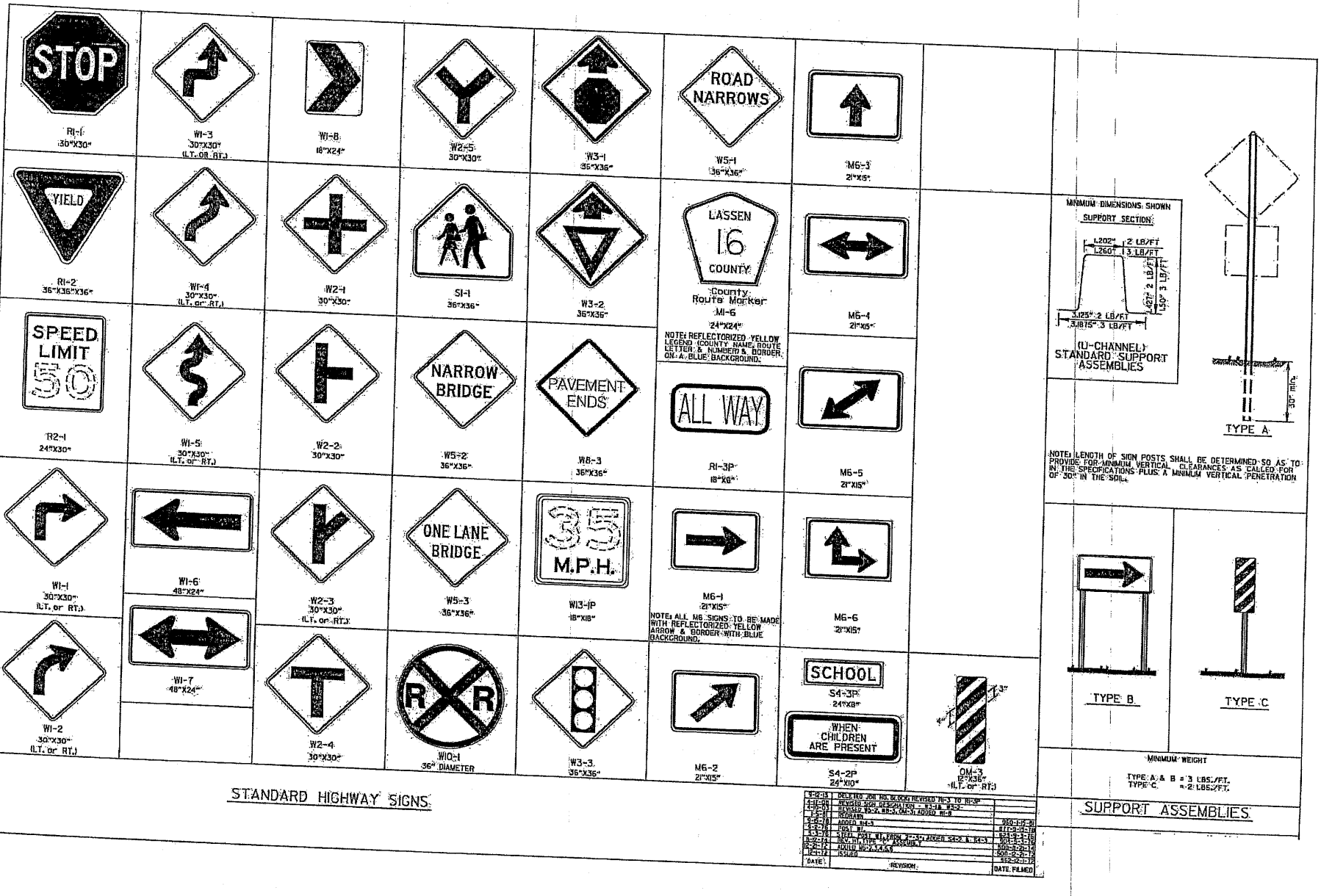


(C) TYPICAL APPLICATION - CONSTRUCTION OPERATIONS OF INTERMEDIATE TO LONG TERM DURATION ON A 4-LANE DIVIDED ROADWAY WHERE HALF OF THE ROADWAY IS CLOSED.



(D) TYPICAL APPLICATION - CLOSING MULTIPLE LANES OF A MULTILANE HIGHWAY.

2-27-20	REVISED TRAFFIC CONTROL DEVICES DETAILS	
6-07-19	REVISED NOTE 9, ADDED NOTE 11	
7-25-19	REVISED TRAFFIC CONTROL DEVICES DETAILS	
9-2-15	REVISED NOTE 2 & REPLACED R2-5A WITH W3-5	
10-19-09	ADDED REFERENCE TO MASH	
11-20-08	REVISED SIGN DESIGNATIONS	
8-10-04	ADDED NOTE	
10-1-98	ADDED NOTE	
4-03-97	ADDED (SP) TO W6-1A, REVISED TRAFFIC CONTROL DEVICES NOTE	
10-18-96	ADDED R55-1	
10-12-95	MOVED UPPER SPLICE	
6-8-95	REVISED SPLICE DETAIL, TEXT	
2-2-95	REVISED PER PART VI, MUTCD, SEPT. 3, 1993	6-8-95
8-15-91	DRAWN AND PLACED IN USE	
DATE	REVISION	DLMCD


STOP
R1-1
30"X30"
W1-3
30"X30"
(LT. OR RT.)
W1-8
18"X24"
W2-5
30"X30"
W3-1
36"X36"
ROAD NARROWS
W5-1
36"X36"
M6-3
21"X15"
YIELD
R1-2
36"X36"X36"
W1-4
30"X30"
(LT. OR RT.)
W2-1
30"X30"
S1-1
36"X36"
W3-2
36"X36"
LASSEN
16
COUNTY
County Route Marker
M1-6
24"X24"
NOTE: REFLECTORIZED YELLOW LEGEND (COUNTY NAME, ROUTE LETTER, & NUMBER) & BORDER ON A BLUE BACKGROUND.
M6-4
21"X15"
SPEED LIMIT
50
R2-1
24"X30"
W1-5
30"X30"
(LT. OR RT.)
W2-2
30"X30"
W5-2
36"X36"
PAVEMENT ENDS
W8-3
36"X36"
ALL WAY
R1-3P
18"X6"
M6-5
21"X15"
W1-1
30"X30"
(LT. or RT.)
W1-6
48"X24"
W2-3
30"X30"
(LT. or RT.)
ONE LANE BRIDGE
W5-3
36"X36"
35
M.P.H.
W13-1P
18"X18"
M6-1
21"X15"
NOTE: ALL M6 SIGNS TO BE MADE WITH REFLECTORIZED YELLOW ARROW & BORDER WITH BLUE BACKGROUND.
M6-6
21"X15"
W1-7
48"X24"
W1-2
30"X30"
(LT. or RT.)
W2-4
30"X30"
R
R
W10-1
36" DIAMETER
W3-3
36"X36"
M6-2
21"X15"
SCHOOL
S4-3P
24"X18"
WHEN CHILDREN ARE PRESENT
S4-2P
24"X10"
3"
4"
OM-3
12"X36"
(LT. or RT.)
MINIMUM DIMENSIONS SHOWN
SUPPORT SECTION
1.202" 2 LB/FT
1.260" 3 LB/FT
2 LB/FT
3 LB/FT
3.125" 2 LB/FT
3.1875" 3 LB/FT
(U-CHANNEL) STANDARD SUPPORT ASSEMBLIES
TYPE A
30" min.
NOTE: LENGTH OF SIGN POSTS SHALL BE DETERMINED SO AS TO PROVIDE FOR MINIMUM VERTICAL CLEARANCES AS CALLED FOR IN THE SPECIFICATIONS PLUS A MINIMUM VERTICAL PENETRATION OF 30" IN THE SOIL.
TYPE B
TYPE C
MINIMUM WEIGHT
TYPE A & B = 3 LBS./FT.
TYPE C = 2 LBS./FT.
SUPPORT ASSEMBLIES
STANDARD HIGHWAY SIGNS
9-9-13 DELETED JOB NO. BLOCK REVISED R1-1 TO R1-2P
4-11-05 REVISED SIGN DESIGNATION = R2-1A, W5-2
1-5-01 REVISED, W3-2, W8-3, OM-3; ADDED W1-8
1-5-01 REDRAWN
5-6-98 ADDED W4-3 DSG-1-15-91
4-5-78 POST BY BTC-9-1-78
4-1-76 STEEL POST WT. FROM 2"x3" ADDED S4-2 & R4-3 SPA-4-1-76
8-27-74 SIGN DETAILS "C" ASSIGN'D DSG-8-1-74
12-2-74 ADDED W1-2, 3 & 4 SPA-12-2-74
12-1-72 ISSUED SDD-12-1-72
DATE: REVISION: DATE FILMED

R1-1

STANDARD 30"X30"
EXPRESSWAY 36"X36"
SPECIAL 48"X48"

R1-2

STD. 36"X36"X36"
EXPWY. 48"X48"X48"
FWY. 60"X60"X60"

R2-1

STD. 24"X30"
EXPWY. 36"X48"
FWY. 48"X60"

W3-5

STD. 36"X36"
EXPWY. 48"X48"
FWY. 48"X48"

W3-5a

STD. 36"X36"
EXPWY. 48"X48"
FWY. 48"X48"

R4-1

STD. 24"X30"
EXPWY. 36"X48"
FWY. 48"X60"

R4-2

STD. 24"X30"
EXPWY. 36"X48"
FWY. 48"X60"

ADVANCE DISTANCES
(XXXX)

500 FT ½ MILE
1000 FT ¾ MILE
1500 FT 1 MILE
AHEAD

GENERAL NOTES:

1. ALL TRAFFIC CONTROL DEVICES USED ON ROAD CONSTRUCTION SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION, AND TO THE STANDARD HIGHWAY SIGNS, LATEST EDITION, OR AS APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION.

2. TRAFFIC CONTROL DEVICES SHALL BE SET UP JUST BEFORE THE START OF CONSTRUCTION OPERATIONS AND SHALL BE PROPERLY MAINTAINED DURING THE TIME SUCH CONDITIONS EXIST. THEY SHALL REMAIN IN PLACE ONLY AS LONG AS NEEDED AND REMOVED THEREAFTER.

3. EXISTING SIGNS AND CONSTRUCTION SIGNS SHALL BE KEPT IN PROPER POSITION, AND BE CLEAN AND LEGIBLE AT ALL TIMES. SIGNS THAT DO NOT APPLY TO EXISTING CONDITIONS SHALL BE REMOVED. SIGNS THAT ARE DAMAGED, DEFACED, OR THAT ACCUMULATE DIRT DURING CONSTRUCTION SHALL BE CLEANED, REPAIRED, OR REPLACED.

* 4. SIGNS ARE USUALLY MOUNTED ON A SINGLE POST, ALTHOUGH THOSE WIDER THAN 36" OR LARGER THAN 10 SQ. FT. SHALL BE MOUNTED ON TWO POSTS OR ABOVE A TYPE III BARRICADE.

* 5. SIGN POSTS DIRECT BURIED IN SOIL SHALL BE 2 LB. MINIMUM CHANNEL POST OR 4"X4" WOOD POSTS. CHANNEL POSTS SHALL BE PAINTED GREEN. WOOD POSTS SHALL BE PAINTED WHITE. ALL POSTS SHALL BE NEATLY CONSTRUCTED, AND SHALL BE REPLUMBED, CLEANED, OR REPAIRED AS NEEDED FOR THE DURATION OF THE JOB. THERE SHALL NOT BE MORE THAN 2 POSTS IN A 7' PATH FOR WOOD OR CHANNEL POSTS. ANY CHANNEL POST SPLICE SHALL BE IN ACCORDANCE WITH STANDARD DRAWING TC-3.

6. POST MOUNTED SIGNS IN RURAL AREAS SHALL BE CONSTRUCTED WITH THE NEAR EDGE OF THE SIGN FROM 6 TO 12 FEET FROM THE PAVEMENT EDGE. SIGNS IN URBAN AREAS AND BARRICADE MOUNTED SIGNS SHALL BE MOUNTED A MINIMUM OF 2 FEET FROM THE PAVEMENT EDGE.

7. ALL POST AND BARRICADE MOUNTED SIGNS MOUNTED IN URBAN AREAS SHALL BE MOUNTED A MINIMUM DISTANCE OF 7' FROM THE BOTTOM OF THE SIGN TO THE ROADWAY SURFACE. ALL POST AND BARRICADE MOUNTED SIGNS MOUNTED IN RURAL AREAS SHALL BE MOUNTED A MINIMUM DISTANCE OF 7' FROM THE BOTTOM OF THE SIGN TO THE ROADWAY SURFACE, EXCEPT A MINIMUM OF 6' SHALL BE USED WHEN MOUNTING AN ADVISORY SIGN BELOW A WARNING SIGN. TEMPORARY SIGNS MAY BE MOUNTED ON PORTABLE SUPPORTS FOR INTERMEDIATE TERM STATIONARY WORK CONDITIONS. THE SIGNS MINIMUM MOUNTING HEIGHT SHALL BE 5'. RETROREFLECTIVE DEVICES SHALL BE USED. TEMPORARY SIGNS MAY BE MOUNTED ON PORTABLE SUPPORTS FOR SHORT-TERM, SHORT DURATION, AND MOBILE CONDITIONS, THEY SHALL BE NO LESS THAN ONE FOOT ABOVE THE TRAVELED WAY. LONG-TERM STATIONARY SIGNS SHALL BE DIRECT BURIED IN SOIL, UNLESS CONDITIONS NECESSITATE THE USE OF PORTABLE SIGNS, OR AS APPROVED BY THE ENGINEER. CONCRETE PADS, CONCRETE OR ROCK BALLAST, OR OTHER SOLID MATERIALS SHALL NOT BE UTILIZED WITH PORTABLE SIGN SUPPORTS.

8. FLAGGERS SHALL USE REFLECTORIZED STOP-SLOW PADDLES. FLAGS MAY BE USED ONLY FOR EMERGENCY SITUATIONS.

9. MOST OF THE SIGNS SHOWN ARE ORIENTED TO THE RIGHT, HOWEVER, THIS DOES NOT PRECLUDE THE USE OF MIRROR IMAGES OF THESE SIGNS WHERE THE REVERSE ORIENTATION MIGHT BETTER CONVEY TO MOTORISTS THE PROPER DIRECTION OF MOVEMENT.

10. R55-1 SIGNS SHALL BE PLACED AT LEAST 1500' BUT NOT MORE THAN 1 MILE IN ADVANCE OF THE WORK ZONE, IF A SPEED LIMIT REDUCTION IS IN EFFECT, THE SIGN SHALL BE PLACED A MINIMUM OF 500' IN ADVANCE OF THE "REDUCED SPEED AHEAD" SIGN.

* NOTE: SUPPORTS FOR SIGNS, BARRICADES, AND VERTICAL PANELS THAT ARE DIFFERENT FROM THE REQUIREMENTS SHOWN IN NOTES 4 & 5, BUT MEET THE REQUIREMENTS OF MANUAL FOR ASSESSING SAFETY HARDWARE (MASH), WILL BE ACCEPTED. COMPLIANCE WITH THE REQUIREMENTS OF MANUAL FOR ASSESSING SAFETY HARDWARE (MASH) IS REQUIRED FOR ALL PROJECTS.

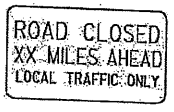
R5-1

STD. 30"X30"
EXPWY. 36"X36"
SPECIAL 48"X48"

R11-2

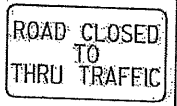
48"X30"

R11-3A



60"X30"

R11-4



60"X30"

W21-5a

STD. 36"X36"
FWY. 48"X48"

W1-1

STD. 36"X36"
FWY. 48"X48"

W1-2

STD. 36"X36"
FWY. 48"X48"

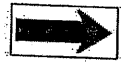
W1-3

STD. 48"X48"

W1-4

STD. 48"X48"

W1-6



STD. 48"X24"
SPECIAL 60"X30"

W1-8

STD. 18"X24"
SPECIAL 24"X30"
EXPWY. 30"X36"
FWY. 36"X48"

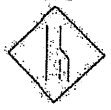
W3-1

STD. 36"X36"
SPECIAL 48"X48"

W3-2

STD. 36"X36"
SPECIAL 48"X48"

W4-2



STD. 36"X36"
FWY. 48"X48"

W5-1

STD. 36"X36"
SPECIAL 48"X48"

W6-3

EXPWY. 36"X36"
SPECIAL 48"X48"

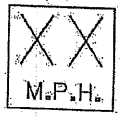
W8-7

EXPWY. 36"X36"
FWY. 48"X48"

W9-2

STD. 36"X36"
FWY. 48"X48"

W13-1

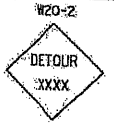


STD. 24"X24"

W20-1

STD. 48"X48"

W20-2



STD. 48"X48"

W20-3

STD. 48"X48"

W20-4

STD. 48"X48"

W20-5

STD. 48"X48"

W20-7a

STD. 36"X36"
FWY. 48"X48"

W21-2

STD. 30"X30"
SPECIAL 36"X36"

W21-5

STD. 30"X30"
SPECIAL 36"X36"

W24-1

STD. 36"X36"

W1-4b

STD. 48"X48"

R56-1

STD. 18"X18"

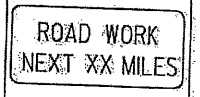
W8-11

STD. 36"X36"
FWY. 48"X48"

W8-9

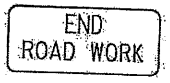
STD. 36"X36"
FWY. 48"X48"

G20-1



60"X24"

G20-2



48"X24"

OM-3L OM-3R

12"X36"

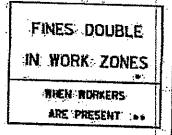
M4-9

STD. 30"X24"
SPECIAL 48"X36"
SPECIAL 60"X48"

M4-10

48"X18"

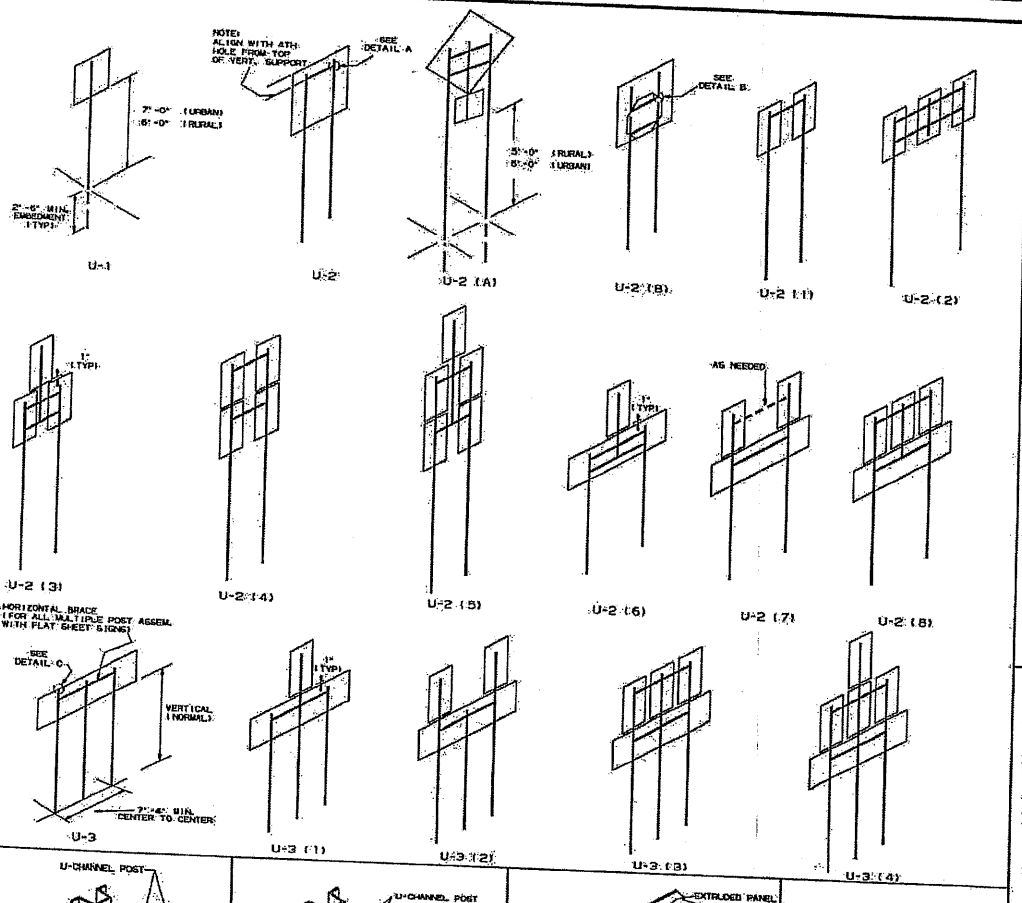
R55-1

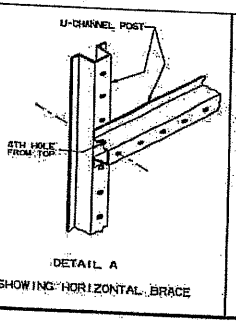


36"X60"

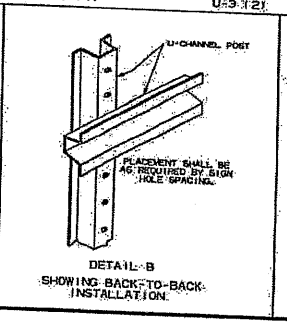
* USE 6" 'C' LETTERS
** USE 4" 'D' LETTERS

DATE	REVISION	FILMED
8-07-18	REVISED FOR MASH	
4-15-17	DELETED R5P-1 & ADDED W21-5a	
9-2-15	REVISED REDUCED SPEED LMT. AHEAD SIGNS REVISED ROAD WORK NEXT XX MILES	
12-8-14	REVISED W24-1	
1-17-13	DELETED R11-9a & ADDED W8-11	
10-15-09	ADDED REFERENCE TO MASH & ADDED SIGN W24-1	
4-17-08	REVISED SIGN DESIGNATIONS	
1-18-04	REVISED NOTES	
10-5-03	REVISED NOTE 1	
1-6-01	REVISED NOTE 7	
9-28-00	REVISED NOTE	
1-18-98	ADDED NOTE	
6-26-97	REVISED NOTE 5	
4-03-97	REVISED NOTE 5	
10-8-96	ADDED CONTROLLED ACCESS HWY. SIGN & TO NOTE 7	
10-12-95	ADDED R55-1	
6-8-95	REVISED TO CORRECT SIGN ILLUSTRATIONS	6-8-95
2-2-95	REVISED PER PART VI, MUTCD SEPT. 3, 1993	
8-15-91	DRAWN AND PLACED IN USE	

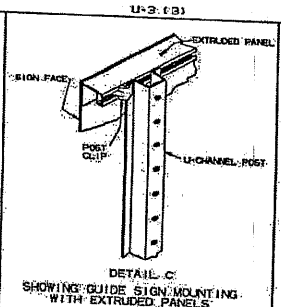




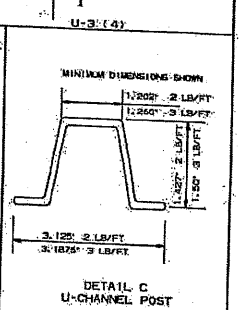
DETAIL A
SHOWING HORIZONTAL BRACE



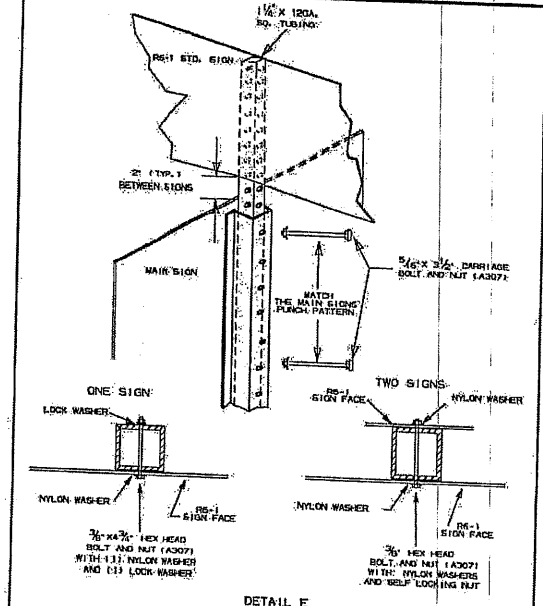
DETAIL B
SHOWING BACK-TO-BACK INSTALLATION



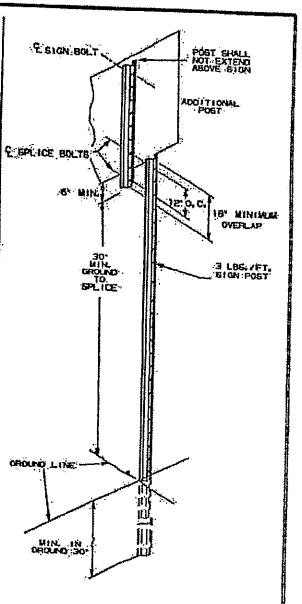
DETAIL C
SHOWING GUIDE SIGN MOUNTING WITH EXTRUDED PANELS



DETAIL C
U-CHANNEL POST



DETAIL E
R6-1 EXTENSION FOR U-CHANNEL POST



DETAIL F
DETAIL OF SPLICES

NOTES:

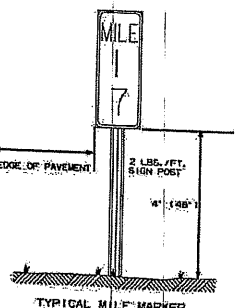
SIGNS AT LEAST 8' IN LENGTH MAY BE INSTALLED ON THREE 3 LB. POSTS. IN NO CASE SHALL THERE BE MORE THAN TWO 3 LB. POSTS WITHIN A 7' PATH.

SPLICES NECESSARY TO ATTAIN PROPER MOUNTING HEIGHT SHALL BE AS SHOWN IN DETAIL (F).

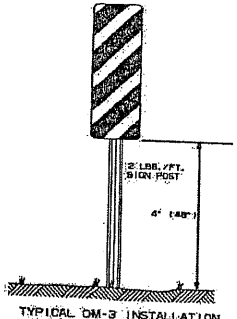
NORMAL INSTALLATIONS WILL REQUIRE 5/16" DIA. CARRIAGE BOLTS TO MOUNT SIGNS TO POST AND TO ASSEMBLE THE VARIOUS POST SUPPORTS.

ALL SIGN POSTS SHALL BE PLUMB.

THE POST FOR "TYPE U" SUPPORTS SHALL BE HOT DIP GALVANIZED.



TYPICAL MILE MARKER INSTALLATION



TYPICAL OM-3 INSTALLATION AT EDGE OF OBSTRUCTION

DATE	REVISION	FILMED
7-25-18	REVISED CARRIAGE BOLT WITH MATERIAL REQUIREMENT	
2-27-18	REVISED NOTES	
9-2-13	REVISED U-213, U-216, U-311, DETAIL D ADDED DETAILS E & F ADDED TYPICAL MARKERS	
10-9-03	REMOVED ROUND POST & REVISED SPACING	
10-12-95	MOVED UPPER SPLICE	
6-8-95	REVISED SPLICE DETAIL	6-8-95
2-2-95	REDRAWN	2-2-95

04-08-2014
03-09-2016 Rev.
11-16-2017 Rev.
10-25-2018 Rev.
12-06-2018 Rev.
01-09-2020 Rev.
09-17-2020 Rev.

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO.

FOG SEAL

Description: This work shall consist of the uniform application of an asphalt emulsion to an existing paved surface by means of a bituminous distributor meeting the requirements of Section 403 of Standard Specifications for Highway Construction, 2014 Edition, and/or as directed by the Engineer.

Materials: The Fog Seal emulsified asphalt shall meet the properties in the table below. Type 1 is a commodity slow setting, low residue emulsion. Type 2 an emulsion designed for quick traffic return. Type 3 is a polymer modified emulsion for general use. Type 4 is a polymer modified emulsion designed for the rejuvenation of oxidized Hot Mix Asphalt.

TEST ON EMULSION	TEST METHOD	Type 1 (MIN)	(MAX)	Type 2 (MIN)	(MAX)	Type 3 (MIN)	(MAX)	Type 4 (MIN)	(MAX)
Viscosity, Saybolt-Furol, @ 77°F, SFS	AASHTO T 59	-	100		100		100	10	100
Particle Charge	AASHTO T 59	(+) or (-)		(+) or (-)		(+) or (-)		(+) or (-)	
Sieve Test, %	AASHTO T 59	-	-		0.3		0.3	-	0.3
Storage, 24 hour, %	AASHTO T 59	-	-	-	-	-	-	-	1
Oil Distillate, %	AASHTO T 59	-	-	-	-	-	-	-	0.5
Residue properties from Distillation[1]									
Residue, %	AASHTO T 59	30	-	30	-	30	-	30	-
MSCR @ 64°C, J_{nr} @ 3.2/kPa	AASHTO T 350	-	-		2.0	-	-	-	-
Penetration, 77°F, 100g, 5 sec	AASHTO T 49	90	250	-	-	40	90	-	-
Elastic Recovery, 25°C, %		-	-	-	-	40		-	-
Penetration, 4°C, 200g, 60 sec		-	-	-	-	-	-	30	-
Residue properties from Low Temp Evaporation	AASHTO R 78 Procedure B								
MSCR @ 52°C, J_{nr} @ 3.2/kPa	AASHTO TP70	-	-	-	-	-	-	-	2.0
Polymer Properties[2]									
Tests on Modifier Mass Change, %	ASTM D471 (modified)	-	-	-	-	-	-	-	50%
Test on Rejuvenating Agent									
Flash Point, COC, °F	AASHTO T 48	-		-	-	-	-	380	-
Viscosity, 140 °F, CST	AASHTO T 201	-		-	-	-	-	50	175
Saturate, % by wt	ASTM D2007	-		-	-	-	-	-	30
Asphaltenes	ASTM D2007	-		-	-	-	-	-	1.0
Test on Rejuvenating Residue		-							
Weight change, %w	ASTM D2872	-		-	-	-	-	-	6.5
Viscosity Ratio (RTFO/Orig.)	ASTM D2170	-		-	-	-	-	-	3

See next page for footnotes.

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO.

FOG SEAL

Footnotes

1. Exception to AASHTO T 59: Bring the temperature on the lower thermometer slowly to 350°F plus or minus 10°F. Maintain this temperature for 20 minutes. Complete the total distillation in 60 plus or minus 5 minutes.
2. For modifications for Polymer Properties testing, refer to Appendix A Test Modifications.
3. Modify ASTM D471 as follows:
   a. Place 0.8g of modifier into an 18-mm silicone rubber DSR mold
   b. If necessary, dry at ambient lab conditions for 72 hr.
   c. Remove the modifier from the mold and place the sample into a forced draft oven on release paper for 48 hr at 40°C.
   d. After 48 hr, cool and weigh the sample to the nearest 0.0001 g. Record the weight.
   e. Pour 30 g of rejuvenating agent in a 90-ml metal container.
   f. Place modifier sample in the container and add another 30 g of rejuvenating agent. Ensure the modifier sample is completely covered; add more rejuvenating agent if necessary.
   g. Cover the container with a metal lid and place it into a 40°C oven for 48 hr.
   h. Remove the sample from the container. Use a paper towel to blot the surface of the sample to remove excess rejuvenator. Allow sample to cool to room temperature and weigh to the nearest 0.0001 g.
   i. Calculate the mass change, expressed in Equation 1. Mass change will be positive.

$$Mass\ Change\ (\%) - \frac{M_2 - M_1}{M_1} x100$$

Where:
M_1 = Mass of modifier sample before being conditioned in the rejuvenating agent (g); and
M_2 = Mass of modifier sample after conditioning in the rejuvenating agent (g).

Equipment

Asphalt Distributor: The mechanical pressure distributor shall meet the requirements of Subsection 403.06. The spray nozzles shall be rated and of the size recommended for a uniform application rate.

Rotary Broom: The Rotary Broom shall be capable of removing dust, debris, and loose mineral aggregate from the surface as needed and based on the specifications herein.

Equipment Calibration: The asphalt distributor shall be calibrated by applying asphalt emulsion for a continuous section of minimum 500 ft. The amount of material distributed shall be within 5% of the intended application rate and shall be verified by use of a strapping stick as supplied by the equipment manufacturer. Neither a visual gauge indicating volume nor the computer readout shall be used as a calibration method. The application rate is measured in gal/square yard.

Test Strip: Prior to the beginning of the project, the contractor may be required to perform a test strip in a suitable area such as a parking lot or staging area to assure the materials, contractor personnel, and equipment are suitable to produce a satisfactory Fog Seal. The location for the test strip shall be approved by the Engineer. The test strip may be conducted as part of the calibration procedure or may be conducted as part of the project.

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO.

FOG SEAL

Surface Preparation

General: Immediately prior to applying the Fog Seal, the pavement surface shall be cleared of all loose material, silt spots, vegetation, and other objectionable material. If water is used, cracks shall be allowed to dry thoroughly before applying the asphalt emulsion. Manholes, valve boxes, drop inlets, and other service entrances shall be protected from the rejuvenating Fog Seal by a suitable method. Thermoplastic and other striping should be removed or protected prior to application of the asphalt emulsion. The Engineer shall approve the surface preparation prior to application of the Fog Seal.

Material Storage and Handling

Asphalt Emulsion: It is expected that the contractor follows the manufacturer guidelines for storage and handling of the specified Fog Seal emulsion.

Aggregate: Aggregate intended for use on the project shall be maintained in such manner as to protect it from contamination by debris and excess moisture. Large or oversized particles shall be removed from the aggregate by screening or other acceptable method prior to use on the project.

Seasonal Limitations: The Fog Seal shall be placed between April 1 - September 30 for travel lanes and April 1 - October 30 for shoulders.

Construction Requirements: The pavement surface shall be swept and cleaned in accordance with Subsection 402.03(b). Fog Seal shall not be applied when the air or pavement temperature is below 50°F, nor shall it be applied to a surface exhibiting moisture, nor when general weather conditions, in the opinion of the Engineer, are not suitable. Road surface must be dry. Do not apply during foggy weather or when rain is likely to occur the same or following day. In order to allow enough time for the Fog Seal to completely cure, Fog Seal shall not be applied after 3:00 pm in order to allow for complete curing before opening the lane to traffic, unless otherwise approved by the Engineer prior to application (based on weather and traffic conditions). The distributor shall be so adjusted and operated as to distribute evenly the material being applied at a rate between 0.05-0.15 gallons/square yard as indicated on the plans. The application rate shall vary according to the demands of the pavement and shall be determined by the Engineer.

Traffic Control: Traffic control shall be maintained until the product has sufficiently cured to withstand traffic without damage. The Fog Seal shall be completely broken before traffic is permitted to drive on it.

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO.

FOG SEAL

Aggregate: Aggregate is used only as a blotting agent in areas of excess emulsion application or as a means to protect a freshly placed seal in high traffic areas or to facilitate early return to traffic. The aggregate shall be any suitable manufactured or natural sand with top-sized material of less than 0.25 inch. Furnish and uniformly distribute clean, fine sand on the surface to blot excess when an excessive quantity of asphalt is applied. If sand is required, the application rate should be 1.0-2.0 lbs/square yard. Deposits of asphalt material upon the road surface in excess of the quantity specified, caused by stopping or starting the distributor, overflow, leakage, or otherwise, shall be removed at no cost to the Department.

Method of Measurement: Fog Seal shall be measured by the gallon.

Basis of Payment: Work completed and measured as provided above will be paid for at the contract unit price bid per gallon for Fog Seal. The bid price shall be full compensation for surface preparation, furnishing, preparing, hauling, application of the Fog Seal, and removing of Aggregate used for blotting; and for all equipment, tools, labor, and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Fog Seal (Type ___)	Gallon

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO.

REJUVENATING MASS CRACK TREATMENT

Description:

This item shall consist of the application of a polymer modified asphalt rejuvenating mass crack treatment, as specified, according to these specifications, and in reasonably close conformity with the plans or as directed.

The treatment consists of furnishing properly distributed rejuvenating asphalt emulsion scrubbed into the cracks and voids followed by a uniform application of aggregate for building a riding surface, improving the surface friction of a roadway, sealing cracks in the roadway, reducing the rate of oxidation of a surface mixture, or as an interlayer to delay or reduce the occurrence of reflective cracking.

Materials:

(a) **Asphalt Emulsion**. The asphalt emulsion for rejuvenating mass crack treatment shall meet the requirements of the following table and shall be composed of a polymer modifier, a petroleum based rejuvenating agent, and asphalt. The emulsion supplier shall receive quarterly certificates of analysis (COA) for both the polymer and rejuvenating agency manufacturers. The COAs shall be provided to the Department upon request.

Property	Test Procedure (AASHTO)	Specification (min)	(max)
Emulsion Properties			
Viscosity, Saybolt-Furol, @ 77°F, SFS	T59	50	350
Storage, 24 hour, %	T59	-	1
Oil Distillate, %	T59	-	0.5
Sieve Test, %	T59	-	0.1
Residue by Distillation (1) @ 350°F, %	T59	60	-
Residue Properties From Distillation	T59		
Penetration @ 4°C , 200g weight, 60 sec	T49	30	-
Residue Properties From Low Temp Evaporation	R78, Procedure B		
MSCR @ 52°C, J_{nr} @ 3.2/kPa	ASTM D7405	-	4.0
Polymer Properties(2)			
Tests on Modifier Mass Change, %	ASTM D471 (modified)		50%
Test on Rejuvenating Agent			
Flash Point, COC, °F	ASTM D92	380	-
Viscosity, 140°F, cSt	ASTM D2170	50	175
Saturate, % by wt	ASTM D2007	-	30
Asphaltenes	ASTM D2007	-	1.0
Test on Residue from RTFO			
Weight change, %	ASTM D2872	-	6.5
Viscosity Ratio	ASTM D2170	-	3

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO.

REJUVENATING MASS CRACK TREATMENT

1. Exception to AASHTO T59: Bring the temperature on the lower thermometer slowly to 350°F plus or minus 10°F. Maintain this temperature for 20 minutes. Complete the total distillation in 60 plus or minus 5 minutes.
2. Modify ASTM D471 as follows:
   a. Place 0.8g of modifier into an 18-mm silicone rubber DSR mold.
   b. If necessary, dry at ambient lab conditions for 72 hr.
   c. Remove the modifier from the mold and place the sample into a forced draft oven on release paper for 48 hr at 40°C.
   d. After 48 hr, cool and weigh the sample to the nearest 0.0001 g. Record the weight.
   e. Pour 30 g of rejuvenating agent in a 90-ml metal container.
   f. Place modifier sample in the container and add another 30 g of rejuvenating agent. Ensure the modifier sample is completely covered; add more rejuvenating agent if necessary.
   g. Cover the container with a metal lid and place it into a 40°C oven for 48 hr.
   h. Remove the sample from the container. Use a paper towel to blot the surface of the sample to remove excess rejuvenator. Allow sample to cool to room temperature and weigh to the nearest 0.0001 g.
   i. Calculate the mass change, expressed in Equation 1. Mass change will be positive.
      i. $Mass\ Change\ (\%) - \frac{M_2 - M_1}{M_1} x100$
      ii. Where:
      iii. M_1 = Mass of modifier sample before being conditioned in the rejuvenating agent (g); and
      iv. M_2 = Mass of modifier sample after conditioning in the rejuvenating agent (g).

(b) Rejuvenating Agent. The manufacturer of the rejuvenating agent, through the emulsion supplier and the contractor, shall submit to the Department test results certifying that the material meets the specification shown in the table above. The Department shall not accept test results dated more than 120 calendar days from the date of the project start. At any time during the project, the Department may obtain, and have tested at Department expense, samples of the rejuvenating agent being used in manufacturing of emulsion delivered to the project.

(c) Latex Polymer. The manufacturer of the latex polymer, through the emulsion supplier and the contractor, shall submit to the Department test results certifying that the material meets the specification shown in the table above. The Department shall not accept test results dated more than 120 calendar days from the date of the project start. At any time during the project, the Department may obtain, and have tested at Department expense, samples of the latex polymer being used in manufacturing of emulsion delivered to the project.

(d) Aggregate. Unless otherwise noted, the aggregate material shall be crushed stone listed in and meeting the requirements of Subsection 403.01 and having a gradation of Class 4 Mineral Aggregate as indicated in Subsection 403.02. When a Rejuvenating Mass Crack Treatment is to be used as an interlayer a Class 1 Mineral Aggregate as indicated in Subsection 403.02 may be used. It shall be stated in the plans if the Class 1 Mineral aggregate is required.

Equipment:

(a) Pressure Distributor. An approved mechanical pressure distributor shall meet the requirements of Section 403.

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO.

REJUVENATING MASS CRACK TREATMENT

(b) Broom Sled. A broom sled as described herein shall be used to force the emulsion into cracks and voids after application of the emulsion from a pressurized distributor and before the application of aggregate.

The broom sled frame shall be constructed of metal and equipped with means to be attached to and pulled by the distributor truck.

The broom sled must be equipped with a means of raising and lowering the broom sled when desired. It shall be towable in the elevated position. The height of the broom sled assembly shall be adjustable related to the amount of emulsion carried by the broom heads themselves such that, regardless of application rate, the broom sled carries an excess of emulsion in front of the broom heads across the width of the area to be treated while containing the emulsion inside of the broom sled frame and not outside of the intended width of the treatment.

The main body of the broom sled shall have an overall frame size similar to the one shown in the drawing below. The nearest and furthest members, paralleling the back of the distributor truck, and diagonal members shall be equipped with street brooms. The leading member and the trailing member shall have broom heads angled at approximately 10 to 15 degrees off the centerline of the supporting member. The diagonal members shall have broom heads attached in line with the centerline of the supporting member. Each individual street broom attached to the broom sled assembly shall have a density of bristles to sufficiently push the emulsion evenly within the desired area of application. The stiffness of the bristles shall not bend excessively during application and spreading of the emulsion.

The broom sled shall be equipped with hinged wing assemblies attached to the main body not to exceed 4.5 feet per side, with diagonals and equipped with the identical street brooms as described herein.

The purpose of the maximum rigid frame width and the hinged wing extensions is not only for maximum width of 16 feet but to maintain the scrubbing process evenly as contours and cross-sections change across the existing road surface. A means or method of controlling the broom sled, causing it to track evenly behind the distributor in curves and on cross slopes, is required.

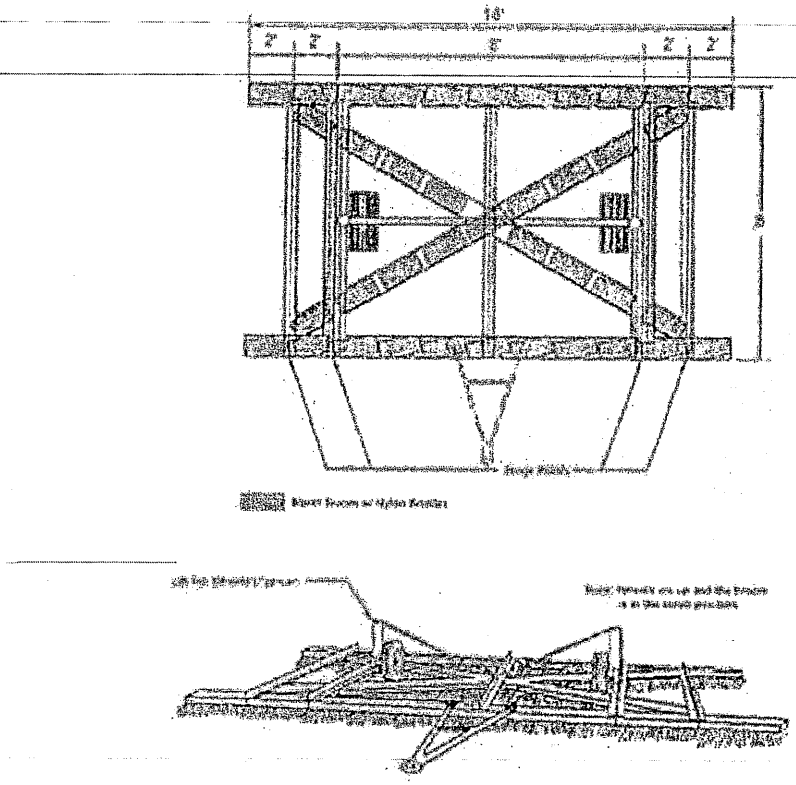
All broom sled designs shall be submitted to the Department for approval. Demonstration that the broom sled design is capable of filling the cracks with emulsion shall be performed prior to the Engineer approving the broom sled design. Demonstration of the broom sled may be performed on the test strip. An example broom sled design diagram is included in this document.

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO.

REJUVENATING MASS CRACK TREATMENT



Scrub Broom

(c) Aggregate Spreader. The mechanical aggregate spreader shall meet the requirements of Subsection 403.07.

(d) Rollers. Rollers shall meet the requirements of Subsection 403.08.

(e) Rotary Broom. The Rotary Broom shall be a capable of removing debris and loose mineral aggregate from the surface as needed and based on the specifications herein.

Test Strip:

Prior to the beginning of the project, the contractor shall be required to perform a test strip with a minimum length of 100 feet to assure the materials, contractor personnel and equipment are suitable to produce a satisfactory Rejuvenating Mass Crack Treatment. The test strip may be conducted as part of the calibration procedure. The test strip may be in a suitable area such as a parking lot or staging area. The contractor may also elect to use the project site for the test strip. If the test strip is placed within the project limits the contractor shall correct any deficiencies before opening to traffic as directed by the Engineer at no additional cost to the Department. The location for the test strip shall be approved by the Engineer prior to placement of the test strip.

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO.

REJUVENATING MASS CRACK TREATMENT

Construction Requirements:

(a) General. The methods employed in performing the work, and all equipment, tools, and machinery used in handling material and executing any part of the work shall be subject to the approval of the Engineer before the work is started and whenever found unsatisfactory shall be changed or improved as required. Equipment, tools, and machinery used must be maintained in a satisfactory condition, and must conform to the requirements provided in Section 403.

The surfaces of all structures shall be protected by some satisfactory method to prevent their being disfigured by the application of asphalt material. Objectionable asphalt discoloration, caused by the Contractor's operations, shall be removed from all roadway and bridge structures at no cost to the Department.

Asphalt material shall not be applied on a surface having excess moisture or when weather conditions are unsuitable. The Contractor shall monitor local weather conditions to avoid placing material on the road ahead of adverse weather that could subsequently damage the material. In the event materials are damaged by adverse weather, they shall be replaced or repaired at no additional cost to the Department.

Special precautions shall be taken to ensure that the equipment is operated in a manner that distributes the asphalt and aggregate evenly and uniformly. Deposits of asphalt and aggregate material upon the road surface in excess of the quantity specified, caused by stopping or starting the distributing machine, overflow, leakage, or other mechanical or human errors, shall be removed.

Prior to performing the actual work, all equipment shall be adjusted and calibrated according to Section 403 and applicable manufacturer's requirements.

The surface section shall be constructed in half widths for each application.

(b) Preparation of Existing Surface. Potholes and surface depressions will be repaired by the Department prior to the Rejuvenating Mass Crack Treatment work unless shown otherwise on the plans. Immediately prior to application of the asphalt material, clean and de-grass existing pavements over the full width to be treated and all raised pavement markers shall be removed.

Manholes, valve boxes, drop inlets and other service entrances shall be protected from the asphalt emulsion by a suitable method.

(c) Sweeping and Cleaning. Before the asphalt material is applied, the surface shall be thoroughly cleaned and swept with a rotary power broom to remove all dust, dirt, mud, and loose or foreign material. A blower may be used to assist in the cleaning operation. The sweeping and cleaning operations shall be carried only far enough in advance of the application of the asphalt material to ensure that the surface is maintained in the proper condition at the time of application. Clean areas not reached by the power broom or blower by hand brooming or blowing.

(d) Application of Asphalt Material. After the surface to be treated has been prepared as specified above, the asphalt material for the surface treatment shall be sprayed uniformly over the surface by means of an approved mechanical pressure distributor,

meeting the requirements of Section 403, shown on the plans and at the designated rate of application as shown on the plans.

The optimum application rate of asphalt material is dependent on the mineral aggregate gradation as well as the condition of the pavement in which the Rejuvenating Mass Crack Treatment is to be applied. The application rate of the asphalt material may be adjusted by the Engineer based on field conditions at the time of construction.

The asphalt material shall be applied at the temperature between 140 - 180°F. The Contractor shall ensure uniformity of distribution at junctions of distributor loads by use of building paper or other approved methods.

After asphalt material is applied and broomed to force material into cracks and voids, no equipment or traffic will be permitted on the surface until the aggregate is applied and rolled.

(e) Application of Mineral Aggregate. The mineral aggregate shall not contain excessive free moisture and shall be spread immediately following the application of the asphalt material. Operations shall not proceed or continue when the asphalt material is allowed to chill, set up, dry, or otherwise impair retention of the mineral aggregate. The mineral aggregate shall be spread with a mechanical spreader meeting the requirements of Section 403. The mineral aggregate shall be distributed over the asphalt material and at the rate of application shown in the plans. The use of an approved chip box to distribute the mineral aggregate will be permitted on detour construction and other areas approved by the Engineer where the use of a mechanical spreader is impractical. Spreading shall be accomplished in such manner that the tires of the trucks or aggregate spreader at no time contact the uncovered and freshly applied asphalt material. Portions of the surface not covered by mechanical spreaders shall be hand spotted so that the entire surface will be uniformly covered. Light hand brooming may be necessary to distribute excess aggregate.

(f) Rolling and Brooming. A minimum of two pneumatic rollers, along with one rotary power broom shall be used with each aggregate spreader being used. A steel wheel roller will be allowed as a finish roller with approval by the Engineer.

Rolling shall begin immediately behind the spreader. Each surface treatment shall be completely rolled a minimum of three times.

After the final set of asphalt has occurred and no more than 48 hours after application, the surface shall be lightly broomed to remove excess aggregate. Generally, the brooming shall be confined to the cooler hours of the day and shall be conducted so as not to displace embedded material.

(g) Second and Successive Applications. If the work involves two or more applications of asphalt material and mineral aggregate, the rates of application for this material will be those specified on the plans or as designated by the Engineer. The method of construction will be the same as for an asphalt surface treatment meeting the requirements of Section 402. If a second seal is to be constructed, the emulsion shall conform to Subsection 403.03(d) or Subsection 403.03(e). Each application shall be placed only after the preceding application has been satisfactorily completed and cured. Further, the asphalt

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO.

REJUVENATING MASS CRACK TREATMENT

material shall be firmly set and the aggregate firmly embedded so as not to be displaced by brooming. Before application, the surface shall be thoroughly swept with a rotary power broom so that no dust or loose aggregate is left that might cause a plane of cleavage.

Traffic Control:

During the application of the asphalt material and aggregate, and during the rolling operation, traffic will not be allowed on the new surface. When traffic must use the lane adjacent to the lane under construction, the Contractor shall regulate the flow of vehicles past the surfacing operation at a speed not to exceed 25 miles per hour (40 km/h). The Engineer may require the use of a pilot vehicle.

Until the asphalt has set and the cover aggregate is firmly embedded, traffic shall not exceed 25 miles per hour (40 km/h). The vehicle speeds shall be controlled by the use of one or a combination of barricades, flaggers, signs, or pilot vehicles that will minimize the loss of cover aggregate. The method used for speed control shall be approved by the Engineer and will be subject to change or modification should the selected method of control prove unsatisfactory.

The Contractor shall route the aggregate haul trucks to and from the work area so that they will not have to turn on the freshly placed surface treatment.

Temperature and Seasonal Limitations:

Asphalt material shall not be applied when the ambient and surface temperature including shaded areas is below 60°F (15°C). In addition, asphalt surface treatments shall not be applied outside the following seasonal limitations:

Traveled Lanes	April 15 to September 30
Shoulders	April 1 to October 31

No deviation from the above limitations will be allowed except by written permission from the Engineer.

Method of Measurement:

(a) Mineral aggregate in surface treatments will be measured either by the cubic yard (cubic meter) or by the ton (metric ton).

(b) Rejuvenating Mass Crack will be measured by the gallon (liter).

Basis of Payment:

Work completed and accepted and measured as provided above will be paid for as follows:

(a) Mineral aggregate will be paid for at the contract unit price bid per ton (metric ton) or per cubic yard (cubic meter) for Mineral Aggregate in Asphalt Surface Treatment.

In cases where the combined specific gravity of the material used for Mineral Aggregate in Rejuvenating Mass Crack Treatment exceeds 2.80 and the method of measurement is by the ton (metric ton), the quantity of material will be adjusted for payment by multiplying the quantity of the material used by the specific gravity of 2.80 and dividing by the higher specific gravity.

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO.

REJUVENATING MASS CRACK TREATMENT

(b) Asphalt material will be paid for at the contract unit price bid per gallon (liter) for Rejuvenating Emulsified Asphalt (CMS-1PC).

The above contract unit price shall be full compensation for surface preparation including the removal of the raised pavement; furnishing, loading, heating, hauling, placing, and applying materials; for cleaning, sweeping, brooming, rolling; and for all labor, equipment, tools, and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	**Pay Unit**
Mineral Aggregate in Asphalt Surface Treatment (Class ___)	Cubic Yard (Cubic Meter) or Ton (Metric Ton)
Rejuvenating Emulsified Asphalt (CMS-1PC)	Gallon (Liter)