CUY-90-14.90

PID 77332/85531

APPENDIX EX-69

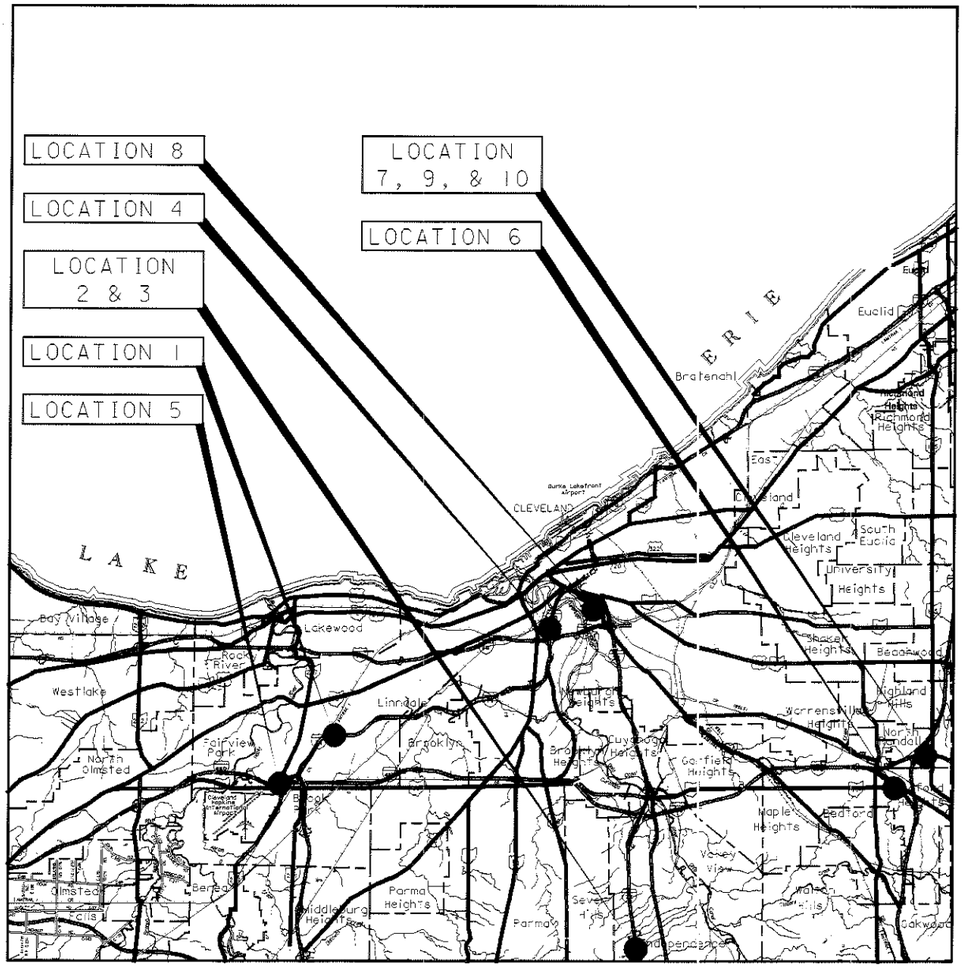
CUY-071-1174 PID 22737
(Reference Document)

State of Ohio
Department of Transportation
Jolene M. Molitoris, Director

Innerbelt Bridge
Construction Contract Group 1 (CCG1)

Revision Date: 2002

OHIO DEPARTMENT OF TRANSPORTATION



LATITUDE: N41°26'20" LONGITUDE: W81°48'10"

LOCATION	BRIDGE NO.	STRUCTURAL FILE NO.	CITY,VILLAGE, OR TOWNSHIP
1	CUY-71-1174E	1804863	CLEVELAND
2	CUY-77-0523R	1806033	BROADVIEW HTS.
3	CUY-77-0570R	1806092	INDEPENDENCE
4	CUY-90-1506	1807684	CLEVELAND
5	CUY-480-0727	1814184	CLEVELAND
6	CUY-480-2503	1813935	BEDFORD HTS.
7	CUY-480N-0129R	1811088	WARRENSVILLE HTS.
8	CUY-14-0184	1801546	CLEVELAND
9	CUY-422-1390NE	1814745	WARRENSVILLE HTS.
10	CUY-422-1390R	1814753	WARRENSVILLE HTS.

INDEX OF SHEETS:

PROJECT DESCRIPTION

Wearing surface replacements.

1997 SPECIFICATIONS

The standard specificatons of the State of Ohio, Department of Transportation, including changes and supplemental specifications listed in the proposal shall govern this improvement.

I hereby approve these plans and declare that the making of this improvement will not require the closing to traffic of the highway and that provisions for the maintenance and safety will be as set forth on plans and estimates.

Approved _____ Date _____ District Deputy Director of Transportation

Approved _____ Date 4-1-02 Director, Department of Transportation

CUY - IR 71 - 11.74/Various
020252 PID - 22737
Dist 12 6/5/2002

UNDERGROUND UTILITIES
TWO WORKING DAYS
BEFORE YOU DIG
CALL 1-800-362-2764 (TOLL FREE)
OHIO UTILITIES PROTECTION SERVICE
NON-MEMBERS
MUST BE CALLED DIRECTLY

PLAN PREPARED BY:

ODOT - DISTRICT TWELVE
PRODUCTION DEPARTMENT
5500 TRANSPORTATION BLVD.
GARFIELD HEIGHTS, OHIO 44125

STANDARD CONSTRUCTION DRAWINGS				SUPPLEMENTAL SPECIFICATIONS	
MT-35.10	4/20/01	MT-99.10M	1/30/95	828	12/14/00
MT-95.30M	4/25/94	MT-105.10M	4/25/94	848	6/30/98
MT-95.31M	4/25/94	MT-105.11M	4/25/94	954	9/9/97
MT-95.32M	4/25/94	TC-41.10	1/19/01		
MT-98.12M	6/24/93	TC-41.20	1/19/01		
MT-98.13M	6/24/93	TC-52.10	4/20/01		
MT-98.14M	6/24/93	TC-52.20	4/20/01	SPECIAL PROVISIONS	
MT-98.15M	6/24/93	TC-65.10	10/19/01		
MT-98.16M	6/24/93	TC-65.11	10/19/01		
MT-98.19M	3/01/96	TC-65.12	10/19/01		

P.E. STAMP

STATE OF OHIO
JAMES R. CALANNI
E-64579
REGISTERED
PROFESSIONAL ENGINEER

FEDERAL PROJECT NO. TE21-G020 (352)
PID NO. 22737
CONSTRUCTION PROJECT NO.
RAILROAD INVOLVEMENT NONE
CUY-71-11.74/VAR.
1/13

LOCATION MAPS

CUY-71-11.74/ VAR.

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LOCATION MAPS

CUY-71-11.74/ VAR.

REFERENCE SHALL BE MADE TO STANDARD DRAWINGS:

LISTED ON THE TITLE SHEET.

AND TO SUPPLEMENTAL SPECIFICATIONS:

LISTED ON THE TITLE SHEET.

AND TO PROPOSAL NOTES:

SEE PROPOSAL

CONVERSION OF METRIC STANDARD DRAWINGS:

THE METRIC STANDARD DRAWINGS REFERENCED IN THIS PLAN SHALL BE CONVERTED TO ENGLISH UNITS USING THE SI (METRIC) TO ENGLISH CONVERSION FACTORS PROVIDED IN SECTION 109.01 OF THE CMS. THE APPENDIX OF ASTM E 380 SHALL BE UTILIZED FOR ANY ADDITIONAL CONVERSION FACTORS REQUIRED. CONVERSIONS SHALL BE APPROXIMATELY PRECISE AND SHALL REFLECT STANDARD INDUSTRY ENGLISH VALUES WHERE SUITABLE.

EXISTING STRUCTURE VERIFICATION:

DETAILS AND DIMENSIONS SHOWN ON THESE PLANS PERTAINING TO THE EXISTING STRUCTURE HAVE BEEN OBTAINED FROM PLANS OF THE EXISTING STRUCTURE AND FROM FIELD OBSERVATIONS AND MEASUREMENTS. CONSEQUENTLY, THEY ARE INDICATIVE OF THE EXISTING STRUCTURE AND THE PROPOSED WORK BUT THEY SHALL BE CONSIDERED TENTATIVE AND APPROXIMATE. THE CONTRACTOR IS REFERRED TO C.M.S. SECTIONS 102.05 AND 105.02. THE ORIGINAL CONSTRUCTION PLANS OF THE EXISTING BRIDGE ARE AVAILABLE UPON REQUEST AT THE DISTRICT 12 OFFICE OF THE OHIO DEPARTMENT OF TRANSPORTATION, GARFIELD HEIGHTS, OHIO.

CONTRACT BID PRICES SHALL BE BASED UPON A RECOGNITION OF THE UNCERTAINTIES DESCRIBED ABOVE AND UPON A PRE-BID EXAMINATION OF THE EXISTING STRUCTURE BY THE CONTRACTOR. HOWEVER, ALL PROJECT WORK SHALL BE BASED ON ACTUAL DETAILS AND DIMENSIONS WHICH HAVE BEEN VERIFIED BY THE CONTRACTOR IN THE FIELD.

UTILITIES:

THERE ARE NO UTILITIES SHOWN ON THIS PLAN. THE NATURE OF THE WORK REQUIRED BY THIS PROJECT WILL NOT AFFECT ANY KNOWN UTILITIES IN THE WORK AREA.

CONTIGENCY QUANTITIES:

THE CONTRACTOR SHALL NOT ORDER MATERIALS OR PERFORM WORK FOR ITEMS DESIGNATED BY PLAN NOTE TO BE USED "AS DIRECTED BY THE ENGINEER" UNLESS AUTHORIZED BY THE ENGINEER. THE ACTUAL WORK LOCATIONS AND QUANTITIES USED FOR SUCH ITEMS SHALL BE INCORPORATED INTO THE FINAL CHANGE ORDER GOVERNING COMPLETION OF THIS PROJECT.

COOPERATION BETWEEN CONTRACTORS:

THE CONTRACTOR SHALL COOPERATE AND COORDINATE HIS OPERATIONS WITH THE CONTRACTORS ON OTHER PROJECTS THAT MAY BE IN FORCE DURING THE LIFE OF THE CONTRACT. NO WAIVER OF ANY PROVISIONS OF 105.07 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS IS INTENDED.

LIMITATIONS OF OPERATIONS:

THE CONTRACTOR'S ACTIVITIES AND WORK SCHEDULE SHALL BE CONSTRAINED BY THE FOLLOWING SPECIAL LIMITATIONS:

1. MAINTENANCE OF TRAFFIC RESTRICTIONS (REFER TO THE MAINTENANCE OF TRAFFIC SHEETS IN THIS PLAN).
2. ALL WORK SHALL BE COMPLETED BY JULY 31, 2003.

ITEM 202 - RAISED PAVEMENT MARKERS REMOVED FOR STORAGE, AS PER PLAN:

RAISED PAVEMENT MARKERS SHALL BE REMOVED FROM THE ROADWAY IN SUCH A MANNER THAT PREVENTS DAMAGE TO THE CASTINGS. REMOVED MARKERS SHALL BE COLLECTED, STORED IN 55 GALLON DRUMS (WITH THE AMOUNT CLEARLY MARKED) AND THEN DELIVERED TO THE ODOT WARRENSVILLE YARD, 25609 EMERY ROAD, WARRENSVILLE HEIGHTS, OHIO 44128 (SR 175 AT THE INTERSECTION OF I-271 AND EMERY RD), BY THE CONTRACTOR, AS DIRECTED BY THE ENGINEER. THE PROJECT ENGINEER SHALL GIVE THE WARRENSVILLE TRAFFIC DEPARTMENT (292-5801) FORTY-EIGHT (48) HOUR NOTICE PRIOR TO ANY DELIVERIES. THE PROJECT ENGINEER SHALL BE RESPONSIBLE FOR FURNISHING ALL TRANSFER/RECEIVING DOCUMENTATION TO THE YARD. ALL COSTS ASSOCIATED WITH THE REMOVAL, STORAGE, AND DELIVERY OF THESE MARKERS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR ITEM 202 - RAISED PAVEMENT MARKERS REMOVED FOR STORAGE, AS PER PLAN.

THE FOLLOWING ESTIMATED QUANTITY HAS BEEN INCLUDED IN THE GENERAL SUMMARY TO BE USED THROUGHOUT THIS PROJECT.

ITEM 202 - RAISED PAVEMENT MARKERS REMOVED FOR STORAGE, AS PER PLAN	69 EA

ITEM 828, AS PER PLAN:

PRIOR TO ANY WEARING SURFACE REPLACEMENT, THE CONTRACTOR SHALL FIELD SURVEY THE LOCATIONS OF THE EXISTING PAVEMENT MARKINGS WITHIN THE PROJECT LIMITS. THIS SURVEY SHALL BE USED TO PLACE THE TEMPORARY AND PROPOSED FINAL PAVEMENT MARKINGS IN THE LOCATIONS OF THE ORIGINAL PAVEMENT MARKINGS.

ALL COSTS ASSOCIATED WITH THIS SURVERY SHALL BE INCLUDED IN THE UNIT BID PRICE FOR THE APPROPRIATE ITEM 828, AS PER PLAN. (i.e., COST ASSOCIATED WITH THE SURVEY OF LANE LINES SHALL BE INCLUDED IN THE UNIT BID PRICE FOR ITEM 828 - LANE LINE, AS PER PLAN.)

ITEM 621 - RAISED PAVEMENT MARKER, INSTALLATION ONLY:

MATERIALS SUPPLIED BY THE DEPARTMENT:

CASTINGS SHALL BE SUPPLIED WITH REFLECTORS.

ALL MATERIALS ARE TO BE CONTRACTOR FURNISHED, EXCEPT THAT THE DEPARTMENT SHALL SUPPLY RPM MATERIALS IN THE QUANTITIES SHOWN HEREIN TO THE CONTRACTOR. PAY ITEMS FOR THE DEPARTMENT SUPPLIED MATERIALS SHALL BE INDICATED AS "INSTALLATION ONLY". THE TYPE OF DEPARTMENT SUPPLIED MATERIAL SHALL BE RAISED PAVEMENT MARKER CASTINGS WITH PRISMATIC RETROREFLECTORS.

THE CONTRACTOR SHALL PICK UP THE DEPARTMENT SUPPLIED RPM MATERIALS AT THE WARRENSVILLE MAINTENANCE YARD.

THE CONTRACTOR SHALL PICK UP AND LOAD DEPARTMENT SUPPLIED RPM MATERIALS AT THE SPECIFIED LOCATION(S) FOR TRANSPORT TO THE WORK SITE OR TO THE CONTRACTOR'S STORAGE FACILITY.

THE ABOVE WORK INCLUDING ALL LABOR, EQUIPMENT AND MATERIAL NEEDED TO PERFORM THE WORK SHALL BE CONSIDERED INCIDENTAL TO THE RESPECTIVE PAY ITEM.

THE FOLLOWING ESTIMATED QUANTITY HAS BEEN INCLUDED IN THE GENERAL SUMMARY TO SUPPLY THE CONTRACTOR WITH RECYCLED RAISED PAVEMENT MARKER WITH PRISMATIC REFLECTORS.

ITEM 621 - RAISED PAVEMENT MARKER INSTALLATION ONLY	41 EA

CALCULATED JRC CHECKED NRC

GENERAL NOTES

CUY-71-11.74/VAR

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ITEM 848 - SUPERPLASTICIZED DENSE CONCRETE OVERLAY USING HYDRODEMOLITION, AS PER PLAN (----- THICK):
ITEM 848 - SURFACE PREPARATION USING HYDRODEMOLITION, AS PER PLAN:
ITEM 848 - SUPERPLASTICIZED DENSE CONCRETE OVERLAY (VARIABLE THICKNESS), MATERIAL ONLY, AS PER PLAN:
ITEM 848 - WEARING COURSE REMOVED, ASPHALT AS PER PLAN:
ITEM 848 - EXISTING CONCRETE OVERLAY REMOVED, AS PER PLAN (----- THICK):

THESE ITEMS SHALL BE PERFORMED PER SUPPLEMENTAL SPECIFICATION "BRIDGE DECK REPAIR AND OVERLAY WITH CONCRETE USING HYDRO-DEMOLITION" WITH THE FOLLOWING REVISIONS:

THESE ITEMS SHALL ALSO BE APPLIED TO THE APPROACH SLABS OF THE FOLLOWING STRUCTURES:

CUY-71-1174E	CUY-480N-0129R
CUY-90-1506 (EB ONLY)	CUY-14-0184
CUY-480-0727	CUY-422-1390NE
CUY-480-2503	CUY-422-1390R

THE THICKNESS OF THE CONCRETE OVERLAY REMOVED, ASPHALT WEARING COURSE REMOVED, PROPOSED OVERLAY, AND THE DEPTH OF HYDRODEMOLITION SHALL BE AS SPECIFIED IN THE PLANS.

CONSTRUCTION JOINTS WILL NOT BE PERMITTED IN THE WHEEL LINE.

AT ALL INTERSTATE LOCATIONS, THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 6' (3' AT LOCATIONS 7 AND 9) BETWEEN THE EDGE OF THE WORKZONE AND THE BIDWELL MACHINE DURING WEARING SURFACE PLACEMENT OPERATIONS.

ALL OTHER REQUIREMENTS OF THE SUPPLEMENTAL SPECIFICATION SHALL REMAIN IN EFFECT.

IN ADDITION TO THE ABOVE REQUIREMENTS, FOR STRUCTURES CUY-71-1174E, CUY-77-0523R, CUY-77-0570R, CUY-90-1506 (EB ONLY), CUY-480-2503, CUY-480N-0129R, CUY-422-1390NE, AND CUY-422-1390R THE FOLLOWING REVISIONS SHALL APPLY:

(SEE 848.18) THE REMOVAL OPERATIONS SHALL NOT BEGIN IF SUSTAINED RAINS (5 HOURS OR MORE WITH BREAKS BETWEEN SHOWERS LESS THAN 1½HOURS) ARE PREDICTED WITHIN 48 HOURS OF COMMENCEMENT.

(SEE 848.21) THE FINAL DECK SOUNDING MAY TAKE PLACE WITHIN 24 HOURS OF A RAIN, AND THE DECK DOES NOT HAVE TO BE COMPLETELY DRY.

(SEE 848.23) FULL DEPTH REPAIR IS NOT REQUIRED IF LESS THAN ONE HALF OF THE DECK ORIGINAL CONCRETE THICKNESS IS SOUND.

(SEE 848.29) THE WET CURE TIME IS REDUCED FROM 72 HOURS TO 24 HOURS OR UNTIL A BEAM BREAK OF 600 PSI IS ACHIEVED, WHICHEVER IS GREATER. AFTER THE 24 HOUR WET CURE, THE FINISHED OVERLAY SURFACE SHALL BE CURED BY SPRAYING A UNIFORM APPLICATION OF CURING MATERIAL OF 705.07, TYPE I OR ID, AS PER CMS 511.14 METHOD (B) MEMBRANE CURING. IF THE CURING COMPOUND CAN NOT BE PLACED WITHIN THE SAME SHORT TERM CLOSURE PERIOD AS THE OVERLAY, THE CONTRACTOR MAY ALLOW TRAFFIC ONTO THE OVERLAY, AND SHALL, AT THE NEXT AVAILABLE SHORT TERM CLOSURE PERIOD, APPLY THE MEMBRANE CURING COMPOUND.

(SEE 848.29) TRAFFIC WILL NOT BE PERMITTED ON THE FINISHED OVERLAY SURFACE UNTIL AFTER THE COMPLETION OF THE 24 HOUR WET CURE, AND AFTER TWO TEST BEAMS HAVE ATTAINED AN AVERAGE MODULUS OF RUPTURE OF 600 PST (4.2 MPa).

(SEE 848.30) THE OVERLAY SURFACE EVAPORATION RATE REQUIREMENTS ARE IN EFFECT FROM 9:30 AM TO 11:00 PM. THEY ARE NOT IN EFFECT FROM 11:00 PM TO 9:30 AM.

(SEE 848.31) FOR EACH PHASE, THE CONTRACTOR SHALL PROVIDE ENOUGH MATERIAL FOR TWO BEAM BREAKS EACH AT 12 HOURS, 24 HOURS, 36 HOURS, AND 48 HOURS. THE DEPARTMENT WILL PERFORM THE BEAM BREAK TESTS AND DOCUMENT THE TIME OF THE POUR. THE TIME OF THE BEAM BREAK TESTS, AND THE MODULUS OF RUPTURE FOR EACH BEAM UNTIL THE MODULUS OF RUPTURE OF THE TWO TESTS IS NOT LESS THAN 650 PSI (4.5 MPa). TRAFFIC IS ALLOWED ON THE OVERLAY AT 600 PSI (4.5 MPa).

IF THE CONTRACTOR CAN NOT COMMENCE THE CONCRETE POUR BY 3a.m. SUNDAY, THE CONTRACTOR SHALL FOLLOW ITEM SPECIAL - STRUCTURE, MISC.: EMERGENCY ASPHALT PAVING OPERATION ON STANDBY.

ALL OTHER REQUIREMENTS OF THE SUPPLEMENTAL SPECIFICATION SHALL REMAIN IN EFFECT.

ITEM SPECIAL - STRUCTURE, MISC.: EMERGENCY ASPHALT PAVING OPERATION ON STANDBY:

THIS ITEM SHALL APPLY TO THE FOLLOWING STRUCTURES:

CUY-77-0523R	CUY-480-2503
CUY-77-0570R	CUY-480N-0129R
CUY-90-1506 (EB ONLY)	CUY-422-1390NE
	CUY-422-1390R

THE CONTRACTOR SHALL MAKE ARRANGEMENTS TO HAVE AN ASPHALT CONCRETE SUPPLIER AND ASPHALT PAVING COMPANY ON CALL ON SUNDAYS THAT THE BRIDGE DECK OVERLAY IS SCHEDULED. IF THE CONTRACTOR HAS NOT STARTED TO POUR THE CONCRETE OVERLAY BY 3a.m. SUNDAY, THE PROJECT ENGINEER WILL DIRECT THE CONTRACTOR TO STOP OPERATIONS AND PAVE THE BRIDGE WITH ASPHALT. THE ASPHALT CONTRACTOR WILL HAVE THE ABILITY TO MOBILIZE OPERATIONS WITHIN 12 HOURS. THIS INCLUDES PROVIDING 404 ASPHALT AND A PAVING CREW WITH COMPACTION EQUIPMENT.

THE PAVING AND ALL EXISTING TRAFFIC CONTROL MUST BE IN PLACE BY 5a.m. MONDAY.

THE FOLLOWING ITEMS SHALL BE USED IN THIS OPERATION:

ITEM	UNIT	DESCRIPTION
614	CU. YD.	BITUMINOUS CONCRETE FOR MAINTAINING TRAFFIC
848	SQ. YD.	WEARING COURSE REMOVED, ASPHALT, AS PER PLAN

AND SHALL BE PAID FOR UNDER THIS ITEM SPECIAL - STRUCTURE, MISC.: EMERGENCY ASPHALT PAVING OPERATION ON STANDBY.

THE STATE WILL PAY FOR ALL COSTS ASSOCIATED WITH PLACING AND REMOVING THE ASPHALT IF THE CONTRACTOR WAS NOT RESPONSIBLE FOR THE DELAY. IF THE CONTRACTOR WAS RESPONSIBLE FOR THE DELAY, HE WILL HAVE TO PAY ALL THE COST ASSOCIATED WITH THE PLACEMENT AND REMOVAL OF THE ASPHALT.

PAYMENT FOR ALL OF THE ABOVE SHALL BE AT THE UNIT PRICE BID PER EACH FOR ITEM SPECIAL - STRUCTURE, MISC.: EMERGENCY ASPHALT PAVING OPERATION ON STANDBY WHICH SHALL INCLUDE ALL LABOR, EQUIPMENT, MATERIALS, AND INCIDENTALS NECESSARY TO COMPLETE THE ABOVE WORK.

CALCULATED JRC CHECKED NRC

GENERAL NOTES

CUY-71-11.74/ VAR

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NOTES:

✳ - THIS QUANTITY SHALL BE USED AS DIRECTED BY THE ENGINEER. ALL OR A PORTION OF THIS QUANTITY IS SUBJECT TO NON-PERFORMANCE WITHOUT PENALTY TO THE STATE OF OHIO.

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL	UNIT	LOCATION 1 CUY-71-1174E	2 CUY-77-0523R	3 CUY-77-0570R	4 CUY-90-1506 (E.B. ONLY)	5 CUY-480-0727	6 CUY-480-2503	7 CUY-480N-0129R	8 CUY-14-0184	9 CUY-422-1390NE	10 CUY-422-1390R			GENERAL
		TRAFFIC CONTROL															
202	54101	RAISED PAVEMENT MARKER REMOVED FOR STORAGE, ✳ AS PER PLAN	69	EACH													69
614	20100	TEMPORARY LANE LINE, CLASS I, 642 PAINT ✳	0.74	MILE													0.74
614	21100	TEMPORARY CENTER LINE, CLASS I, 642 PAINT ✳	0.04	MILE													0.04
614	23200	TEMPORARY CHANNELIZING LINE, CLASS I, 642 PAINT ✳	300	LIN FT													300
614	25200	TEMPORARY TRANSVERSE LINE, CLASS I, 642 PAINT ✳	150	LIN FT													150
621	00200	RAISED PAVEMENT MARKER, INSTALLATION ONLY ✳	41	EACH													41
828	10001	EDGE LINE, AS PER PLAN	0.92	MILE													0.92
828	10101	LANE LINE, AS PER PLAN	0.74	MILE													0.74
828	10201	CENTER LINE, AS PER PLAN	0.04	MILE													0.04
828	10301	CHANNELIZING LINE, AS PER PLAN	300	LIN FT													300
828	10601	TRANSVERSE LINE, AS PER PLAN	150	LIN FT													150
		STRUCTURE															
516	01301	ELASTOMERIC STRIP SEAL WITHOUT STEEL EXTRUSIONS, AS PER PLAN	247	LIN FT							247						
848	10201	SUPERPLASTICIZED DENSE CONCRETE OVERLAY USING HYDRODEMOLITION, AS PER PLAN (2" THICK)	1467	SQ YD						1467							
848	10201	SUPERPLASTICIZED DENSE CONCRETE OVERLAY USING HYDRODEMOLITION, AS PER PLAN (2¼" THICK)	6813	SQ YD	318	647	536				4278		419	615			
848	10201	SUPERPLASTICIZED DENSE CONCRETE OVERLAY USING HYDRODEMOLITION, AS PER PLAN (2½" THICK)	311	SQ YD					311								
848	10201	SUPERPLASTICIZED DENSE CONCRETE OVERLAY USING HYDRODEMOLITION, AS PER PLAN (2¾" THICK)	1907	SQ YD				1198			487		89	133			

GENERAL SUMMARY

CUY-71-11.74/ VAR

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NOTES:

✳ - THIS QUANTITY SHALL BE USED AS DIRECTED BY THE ENGINEER. ALL OR A PORTION OF THIS QUANTITY IS SUBJECT TO NON-PERFORMANCE WITHOUT PENALTY TO THE STATE OF OHIO.

▲ - REMOVAL DEPTH MAY VARY BETWEEN STRUCTURES. SEE BRIDGE DATA SHEET TO DETERMINE PROPOSED REMOVAL DEPTH FOR EACH STRUCTURE.

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL	UNIT	LOCATION 1 CUY-71-11.74E	2 CUY-77-05.23R	3 CUY-77-05.70R	4 CUY-90-15.06 (E.B. ONLY)	5 CUY-480-07.27	6 CUY-480-25.03	7 CUY-480N-01.29R	8 CUY-14-01.84	9 CUY-422-13.90NE	10 CUY-422-13.90R			GENERAL
		STRUCTURE (CONT.)															
848	10201	SUPERPLASTICIZED DENSE CONCRETE OVERLAY USING HYDRODEMOLITION, AS PER PLAN (3" THICK)	360	SQ YD				360									
848	10201	SUPERPLASTICIZED DENSE CONCRETE OVERLAY USING HYDRODEMOLITION, AS PER PLAN (3½" THICK)	3351	SQ YD					2335			1016					
848	10201	SUPERPLASTICIZED DENSE CONCRETE OVERLAY USING HYDRODEMOLITION, AS PER PLAN (3¾" THICK)	89	SQ YD	89												
848	10201	SUPERPLASTICIZED DENSE CONCRETE OVERLAY USING HYDRODEMOLITION, AS PER PLAN (4" THICK)	267	SQ YD						267							
848	20001	SURFACE PREPARATION USING HYDRODEMOLITION, AS PER PLAN	14565	SQ YD	407	647	536	1558	2646	1734	4765	1016	508	748			
848	30201	SUPERPLASTICIZED DENSE CONCRETE OVERLAY (VARIABLE THICKNESS), MATERIAL ONLY, AS PER PLAN	84	CU YD	2	4	3	9	15	10	27	7	3	4			
848	50000	HAND CHIPPING	144	SQ YD	4	6	5	16	26	17	48	10	5	7			
848	50100	TEST SLAB	LUMP		LUMP	LUMP	LUMP	LUMP	LUMP	LUMP	LUMP	LUMP	LUMP	LUMP			
848	50200	FULL-DEPTH REPAIR ✳	2	CU YD					1		1						
848	50301	WEARING COURSE REMOVED, ASPHALT, AS PER PLAN ▲	4776	SQ YD	89			360	2335	267	487	1016	89	133			
848	50321	EXISTING CONCRETE OVERLAY REMOVED, AS PER PLAN ▲	9789	SQ YD	318	647	536	1198	311	1467	4278		419	615			
848	50340	REMOVAL OF DEBONDED OR DETERIORATED EXISTING VARIABLE THICKNESS CONCRETE OVERLAY	1927	SQ YD	52	73	60	222	448	200	548	178	59	87			
		MAINTENANCE OF TRAFFIC															
SPECIAL	53000200	STRUCTURE, MISC.: EMERGENCY ASPHALT PAVING OPERATION ON STANDBY	LUMP			LUMP	LUMP	LUMP		LUMP	LUMP		LUMP	LUMP			
614	11100	LAW ENFORCEMENT OFFICER WITH PATROL CAR ✳	350	HOUR													350
614	11000	MAINTAINING TRAFFIC	LUMP														LUMP
624	10000	MOBILIZATION	LUMP														LUMP

NOTE: FINAL OVERLAYS SHALL MATCH TO EXISTING ELEVATIONS.

LOCATION	BRIDGE NO. STRUCTURE FILE NO. FEATURE INTERSECTED	BRIDGE LIMITS (FT)	ROADWAY WIDTH (FT)	SKEW	APPROACH SLAB LENGTH	APPROACH SLAB WIDTH	NUMBER OF LANES ON	STRUCTURE					APPROACH SLAB				
								EXISTING WEARING SURFACE TYPE	NOMINAL THICKNESS OF ITEM 848-EXISTING CONCRETE OVERLAY REMOVED, AS PER PLAN	DEPTH OF ITEM 848-SURFACE PREPARATION USING HYDRODEMOLITION, AS PER PLAN	NOMINAL THICKNESS OF ITEM 848-WEARING COURSE REMOVED, ASPHALT, AS PER PLAN	THICKNESS OF ITEM 848-SUPERPLASTICIZED DENSE CONCRETE OVERLAY USING HYDRODEMOLITION, AS PER PLAN	EXISTING WEARING SURFACE TYPE	NOMINAL THICKNESS OF ITEM 848-EXISTING CONCRETE OVERLAY REMOVED, AS PER PLAN	DEPTH OF ITEM 848-SURFACE PREPARATION USING HYDRODEMOLITION, AS PER PLAN	NOMINAL THICKNESS OF ITEM 848-WEARING COURSE REMOVED, ASPHALT, AS PER PLAN	THICKNESS OF ITEM 848-SUPERPLASTICIZED DENSE CONCRETE OVERLAY USING HYDRODEMOLITION, AS PER PLAN
1	CUY-71-1174E 1804863 I-77 N.B. RAMP TO W. 150TH OVER W. 154TH	110.20	26.0	17°	25'	16'	1 RAMP	LATEX MODIFIED CONCRETE	1¼"	1"	NA	2¼"	ASPHALT CONCRETE	VARIES ¾" TO 0"	½"	VARIES 2½" TO 3¼"	3¾"
2	CUY-77-0523R 1806033 I-77NB OVER SPRAGUE ROAD	155.76	38.0	2°	25'	24'	2 N.B.	LATEX MODIFIED CONCRETE	1¼"	1"	NA	2¼"	NO WORK				
3	CUY-77-0570R 1806092 I-77NB OVER BROOKSIDE ROAD	129.50	38.0	5°	25'	24'	2 N.B.	LATEX MODIFIED CONCRETE	1¼"	1"	NA	2¼"	NO WORK				
4	CUY-90-1506 (E.B. ONLY) 1807684 I-90EB OVER KENILWORTH AVE.	169.11	VARIES 63.1 TO 66.4	VARIES 12° NOMINAL	25'	64.7' (AVERAGE)	4 E.B.	DENSE CONCRETE	1¾"	1"	NA	2¾"	ASPHALT CONCRETE	VARIES ½" TO 0"	1"	VARIES 1½" TO 2"	3"
5	CUY-480-0727 1814184 GRAYTON ROAD OVER I-480	378.48	28.0 N.B. 28.0 S.B.	33° WITH REF. CHORD	25'	56'	2 N.B. 2 S.B.	ASPHALT CONCRETE	NA	1"	2½"	3½"	INTEGRAL CONCRETE	1½"	1"	NA	2½"
6	CUY-480-2503 1813935 I-480 OVER LIBBY ROAD	165.50	40.5 E.B. 40.5 W.B.	NONE	25'	48''	2 E.B. 2 W.B.	LATEX MODIFIED CONCRETE	1¾"	¼"	NA	2"	ASPHALT CONCRETE	VARIES 1½" TO 0"	1"	VARIES 1½" TO 3"	4"
7	CUY-480N-0129R 1811088 I-480N OVER I-271	697.63	VARIES 51.0 TO 65.4	UNIT 1: 2° UNIT 2: 3°	WEST 25' EAST 25'	WEST 36' EAST 40'	3 E.B.	LATEX MODIFIED CONCRETE	1¼"	1"	NA	2¼"	ASPHALT CONCRETE	VARIES ½" TO 0"	1"	VARIES 1¼" TO 1¾"	2¾"
8	CUY-14-0184 1801546 S.R. 14 OVER NORFOLK SOUTHERN	160.85	42.0	NONE	SOUTH 25' NORTH 35'	SOUTH 44.5' (AVERAGE) NORTH 42'	2 E.B. 2 W.B.	ASPHALT CONCRETE	NA	1"	2½"	3½"	ASPHALT CONCRETE	NA	1"	2½"	3½"
9	CUY-422-1390NE 1814745 I-271 S.B. TO U.S 422 E.B. OVER RICHMOND ROAD	144.97	26.0	14°	25'	16'	1 E.B.	LATEX MODIFIED CONCRETE	1¼"	1"	NA	2¼"	ASPHALT CONCRETE	VARIES ½" TO 0"	1"	VARIES 1¼" TO 1¾"	2¾"
10	CUY-422-1390R 1814753 I-271 N.B. TO U.S 422 E.B. OVER RICHMOND ROAD	141.93	39.0	8°	25'	24'	2 E.B	LATEX MODIFIED CONCRETE	1¼"	1"	NA	2¼"	ASPHALT CONCRETE	VARIES ½" TO 0"	1"	VARIES 1¼" TO 1¾"	2¾"

DESIGNED JRC | DRAWN JRC | CHECKED NRC | REVISED | REVIEWED MJM | DATE 3/02 | STRUCTURE FILE NUMBER

DESIGN AGENCY
DISTRICT TWELVE
PRODUCTION DEPARTMENT

BRIDGE DATA

CUY-71-11.74/VAR.

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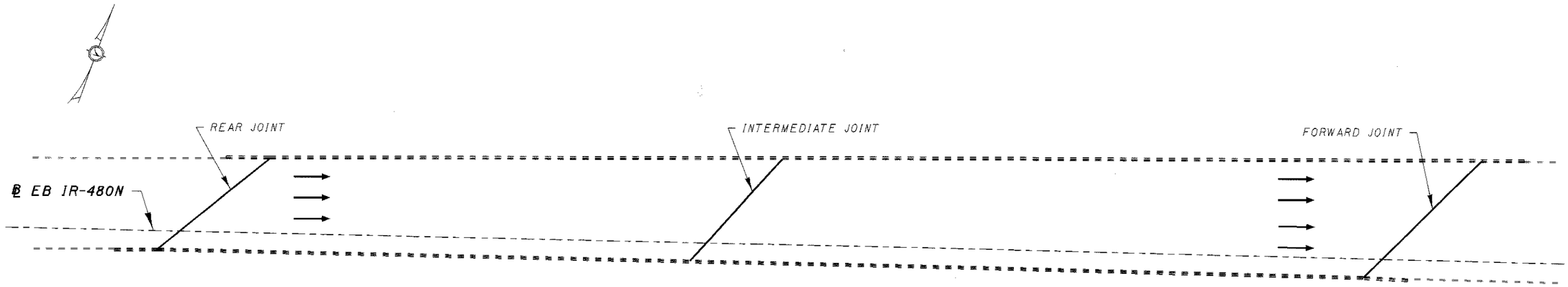
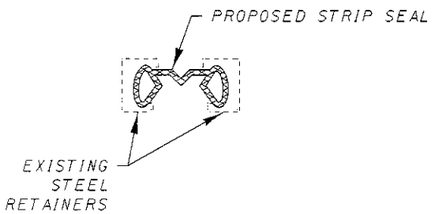


PLAN VIEW

CUY-480N-0129R (SFN: 1811088)
WORK REQUIRED: REPLACE ALL EXPANSION JOINT SEALS AND REPLACE THE WEARING SURFACE ON THE DECK AND THE APPROACH SLABS.
(WEARING SURFACE REPLACEMENT NOT SHOWN)



EXPANSION JOINT SECTION

(ACTUAL CROSS-SECTION OF STRIP SEAL MAY BE DIFFERENT)

JOINT LOCATION	SKEW	JOINT LENGTH	SEAL SIZE
REAR	51°26′	82′	4″
INTERMEDIATE	42°27′	72′	5″
FORWARD	45°33′	93′	5″

ITEM 516-ELASTOMERIC STRIP SEAL WITHOUT STEEL EXTRUSIONS, AS PER PLAN

THE CONTRACTOR SHALL REPLACE ALL THE EXISTING STRIP SEALS WITH AN INDENTICAL STRIP SEAL AS PER THE MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS. BID PRICES SHALL BE BASE ON THE FOLLOWING STRIP SEALS:

SEAL MOVEMENT RATING	D.S. BROWN COMPANY
4″	SS400*
5″	SS500*

*** - PRIOR TO ORDERING ANY MATERIAL, THE CONTRACTOR WILL FIELD VERIFY THE TYPE OF STRIP SEAL BY REMOVING A FULL-WIDTH PORTION OF THE EXISTING STRIP SEAL AND CONSULTING WITH THE D.S. BROWN COMPANY AT THE FOLLOWING LOCATION:**

D.S. BROWN COMPANY
300 EAST CHERRY STREET
NORTH BALTIMORE, OH 45872
TELEPHONE: 419.257.3561
FAX: 419.257.2200

ALL LABOR, EQUIPMENT, AND MATERIALS, NECESSARY TO COMPLETE THE ABOVE WORK SHALL BE INCLUDED IN THE UNIT BID PRICE FOR ITEM 516-ELASTOMERIC STRIP SEAL WITHOUT STEEL EXTRUSIONS, AS PER PLAN.

THE FOLLOWING ESTIMATED QUANTITY HAS BEEN CARRIED TO THE GENERAL SUMMARY:

ITEM 516-ELASTOMERIC STRIP SEAL WITHOUT STEEL EXTRUSIONS, AS PER PLAN — 247 LF

DESIGN AGENCY: DISTRICT TWELVE PRODUCTION DEPARTMENT
DESIGNED: JRC | DRAWN: JRC | REVIEWED: MJM | DATE: 3/02
CHECKED: NRC | REVISED: | STRUCTURE FILE NUMBER:

STRIP SEAL REPLACEMENT

CUY-71-11.74/VAR.

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ITEM 614 - MAINTAINING TRAFFIC:

GENERAL

GENERALLY THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS AS TO MAKE THE PROPOSED REPAIR WITH A MINIMUM OF HAZARD, DELAY AND INCONVENIENCE TO THE MOTORISTS USING THE HIGHWAY. FURTHERMORE, IN ADDITION TO THE CONSTRUCTION AND MATERIAL SPECIFICATIONS, THE FOLLOWING SPECIFIC PROVISIONS ARE MANDATORY.

NOTIFICATION

SINCE FUNCTIONAL TRAFFIC CONTROL IS A MAJOR CONCERN ON THIS PROJECT, IT IS ESSENTIAL THAT THE MOTORING PUBLIC BE ADEQUATELY FOREWARNED OF FUTURE LANE CLOSURES AND TRAFFIC CONSTRICTIONS. THEREFORE, THE CONTRACTOR SHALL SUBMIT A SCHEDULE TO THE OHIO DEPARTMENT OF TRANSPORTATION INDICATING THE LOCATIONS AND DATES OF THE LANE CLOSURES AT LEAST THREE (3) DAYS PRIOR TO THE IMPLEMENTATION OF ANY SUCH CLOSURES. THE CONTRACTOR SHALL ALSO NOTIFY THE LOCAL LAW ENFORCEMENT AGENCIES OF LANE CLOSURES AT LEAST THREE (3) DAYS PRIOR TO IMPLEMENTATION.

RESTRICTIONS

LANE CLOSURES MAY ONLY BE IMPLEMENTED AT THE TIMES PERMITTED BY THE "DISTRICT 12, PERMITTED LANE CLOSURE TIMES" LIST, WHICH IS LOCATED ON THE ODOT WEB SITE:

www.dot.state.oh.us/dist12/workzone/lanesclo.htm

THE LATEST REVISION, AT 14 DAYS PRIOR TO THE BID DATE, SHALL BE IN EFFECT FOR THIS PROJECT.

WITH THE FOLLOWING EXCEPTIONS:

LOCATION 1, CUY-71-11.74E
- ON ONE OCCASION, THE CONTRACTOR IS PERMITTED TO CLOSE THE RAMP FROM 8 P.M. FRIDAY TO 5 A.M. MONDAY. ONCE THE WEARING SURFACE REMOVAL BEGINS, NO TRAFFIC WILL BE ALLOWED ON ANY PORTION OF THE STRUCTURE UNTIL THE ENTIRE PROPOSED WEARING SURFACE HAS COMPLETELY CURED PER THESE PLANS. IF THE RAMP IS CLOSED OUTSIDE OF THE SPECIFIED TIMES, LIQUIDATED DAMAGES IN THE FOLLOWING AMOUNTS WILL BE ACCESSED THE CONTRACTOR FOR EACH MINUTE THE RAMP REMAINS CLOSED:

TIMES	LIQUIDATED DAMAGES
5 A.M. TO 9 A.M. MONDAY THRU FRIDAY	$15 PER MINUTE
ALL OTHER TIMES	$5 PER MINUTE

ASPHALT WEARING SURFACE WILL NOT BE PERMITTED TO TEMPORARILY OPEN THE RAMP

LOCATION 2, CUY-77-0523R
- ON TWO OCCASIONS, THE CONTRACTOR IS PERMITTED TO CLOSE ONE LANE FROM 8 P.M. FRIDAY TO 6 A.M. MONDAY.

LOCATION 3, CUY-77-0570R
- ON TWO OCCASIONS, THE CONTRACTOR IS PERMITTED TO CLOSE ONE LANE FROM 8 P.M. FRIDAY TO 6 A.M. MONDAY.

LOCATION 4, CUY-90-1506 (EAST BOUND ONLY)
- ON TWO OCCASIONS, THE CONTRACTOR IS PERMITTED TO CLOSE I-90 E.B. FROM 10 P.M. FRIDAY TO 5 A.M. MONDAY (PROVIDED A PROPER DETOUR IS IMPLEMENTED) AND ONE LANE ON I-71 N.E. FROM 9 P.M. SATURDAY TO 9 A.M. SUNDAY.

LOCATION 6, CUY-480-2503
- ON FOUR OCCASIONS, THE CONTRACTOR IS PERMITTED TO CLOSE ONE LANE FROM 9 P.M. FRIDAY TO 6 A.M. MONDAY.

LOCATION 7, CUY-480N-0129R
- ON SIX OCCASIONS, THE CONTRACTOR IS PERMITTED TO CLOSE ONE LANE FROM 8 P.M. FRIDAY TO 6 A.M. MONDAY.

LOCATION 9, CUY-422-1390NE
- ON TWO OCCASIONS, THE CONTRACTOR IS PERMITTED TO REDUCE THE RAMP TO 10' FROM 8 P.M. FRIDAY TO 6 A.M. MONDAY.

LOCATION 10, CUY-422-1390R
- ON TWO OCCASIONS, THE CONTRACTOR IS PERMITTED TO CLOSE ONE LANE FROM 8 P.M. FRIDAY TO 6 A.M. MONDAY.

NO OTHER 3 LANE CLOSURES ARE PERMITTED.

ANY ROADWAY NOT LISTED IN THE "DISTRICT 12 PERMITTED LANE CLOSURE TIMES" SHALL NOT HAVE ANY CLOSURES WEEKDAYS FROM 7am-9am AND 3pm-6pm.

NO LANE OR SHOULDER CLOSURES SHALL BE IN PLACE WHEN NO WORK IS BEING PERFORMED.

AT LEAST ONE 11 FOOT WIDE LANE IN EACH DIRECTION SHALL BE OPEN AT ALL TIMES.

EXIT AND ENTRANCE RAMPS LANES SHALL REMAIN OPEN AT ALL TIMES AND EXHIBIT A MINIMUM WIDTH OF TEN (10) FEET, UNLESS OTHERWISE SPECIFIED.

MAINTENANCE OF TRAFFIC SCHEME (AT ALL LOCATIONS)

THE CONTRACTOR SHALL DEVISE A SIMPLE MAINTENANCE OF TRAFFIC SCHEME, WHICH SHALL BE STAMPED BY A PROFESSIONAL ENGINEER (SCHEME MAY BE A HAND SKETCH) AND PRESENTED TO THE DISTRICT WORKZONE TRAFFIC CONTROL ENGINEER AND PROJECT ENGINEER FOR APPROVAL AT LEAST TWO WEEKS PRIOR TO IMPLEMENTATION.

THE MAINTENANCE OF TRAFFIC SCHEME SHALL PRESENT, IN GENERAL, THE METHODS FOR MAINTAINING TRAFFIC THAT THE CONTRACTOR PROPOSES TO USE FOR CONDUCTING THE REQUIRED WORK IN A SAFE AND EFFICIENT MANNER. THE MAINTENANCE OF TRAFFIC SCHEME SHALL BE IN CONFORMANCE WITH THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (OMUTCD), LATEST REVISION, THE REFERENCED STANDARD CONSTRUCTION DRAWINGS, THE ATTACHED MAINTENANCE OF TRAFFIC SHEETS, AND THE SPECIFICATIONS. THE CONTRACTOR SHALL NOT COMMENCE WORK UNTIL THE MAINTENANCE OF TRAFFIC SCHEME HAS BEEN APPROVED.

THE ENGINEER SHALL PRESENT A TRAFFIC MANAGEMENT PLAN FOR EACH LOCATION. THE TRAFFIC MANAGEMENT PLAN WILL SHOW DETOURS ROUTES AND SIGNING, PLACEMENT OF PORTABLE CHANGEABLE MESSAGE SIGNS, ALTERNATE ROUTES THAT CAN BE USED BY TRAFFIC, ADVANCE WARNING TO TRAFFIC OF UP COMING CLOSURES AND RESTRICTIONS, MESSAGES THAT CAN BE BROAD CAST ON ODOT'S HIGHWAY ADVISORY RADIO STATION, AND ALL OTHER DETAILS THAT WOULD INVOLVE MANAGING TRAFFIC AROUND OR THROUGH THE WORK AREA. THIS PLAN CAN BE HAND SKETCHED AND PRESENTED TO THE DISTRICT WORK ZONE TRAFFIC ENGINEER AND PROJECT ENGINEER FOR APPROVAL. IT MUST BE STAMPED BY A PROFESSIONAL ENGINEER.
ALL WORK SHALL BE CONDUCTED FROM WITHIN A ONE, TWO, OR THREE LANE CLOSURE USING DRUMS ACCORDING TO THE RESTRICTIONS AND THE CONCEPTS PRESENTED IN MT-95.30M AND ASSOCIATED STANDARD CONSTRUCTION DRAWINGS MT-98.12M THRU MT-98.16M (SEE TITLE SHEET), AND THESE PLANS.

IF DURING THE PROJECT, THE ENGINEER DETERMINES THAT THE APPROVED MAINTENANCE OF TRAFFIC PLAN IS NOT PERFORMING AS DESIRED, THE WORK SHALL BE SUSPENDED UNTIL THE PROBLEM IS RESOLVED TO THE SATISFACTION OF THE ENGINEER AND THE MAINTENANCE OF TRAFFIC PLAN IS REVISED ACCORDINGLY. ANY COSTS OR DELAYS INCURRED AS A RESULT OF THE FAILURE OF THE SATISFACTION OF THE ENGINEER SHALL BE THE FULL RESPONSIBILITY OF THE CONTRACTOR.

DURING NON-WORKING HOURS, ALL LANES SHALL BE IN FULL OPERATION WITH ALL TRAFFIC CONTROL SIGNS, EXCEPT OW-124 (ROAD CONSTRUCTION AHEAD) SIGNS, REMOVED OR COVERED AND ALL CHANNELIZING DEVICES REMOVED FROM THE PAVEMENT SURFACES. CHANNELIZING DEVICES MAY BE STORED OR DEPLOYED TEMPORARILY ADJACENT TO THE SHOULDER TO MINIMIZE THE NIGHTLY TRAFFIC CONTROL SET-UP TIME.

CONSTRUCTION EQUIPMENT, PRIVATE VEHICLES AND MATERIALS SHALL NOT BE PARKED OR STORED ON THE ROADWAY ADJACENT TO THE ROADWAY WITHIN THE 30 FOOT CLEAR ZONE OF THE TRAVELED LANES.

NOTWITHSTANDING THE ABOVE, NO LANE OR SHOULDER CLOSURES SHALL OCCUR DURING THE PERIOD BEGINNING AT 12:00 NOON ON THE DAY PRECEDING AND CONTINUING UNTIL NOON ON THE DAY FOLLOWING LEGAL HOLIDAYS AND HOLIDAY WEEKENDS SUCH AS MEMORIAL DAY, FOURTH OF JULY, AND LABOR DAY.

FURTHERMORE, NO LANE CLOSURES SHALL BE IMPLEMENTED OR IN PLACE DURING INCREASED TRAFFIC VOLUMES CAUSED BY SPECIAL EVENTS WITH A SEATING CAPACITY OVER 40,000 (IN LIEU OF NOTE 1 IN THE "DISTRICT 12, PERMITTED LANE CLOSURE TIMES" LIST), OR WHEN THE ENGINEER DEEMS THE CLIMATOLOGICAL CONDITIONS TOO HAZARDOUS.

PAYMENT FOR ALL THE ITEMS REQUIRED TO MAINTAIN TRAFFIC IN ACCORDANCE WITH THESE REQUIREMENTS SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 614 - MAINTAINING TRAFFIC.

MAINTENANCE OF TRAFFIC SYSTEMS

A. WHEN REQUIRED

WHENEVER ANY PART OF THE TRAVELED SURFACE IS BEING WORKED UPON OR IS OTHERWISE NOT SUITABLE FOR SAFE AND CONVENIENT USE BY VEHICLES, TRAFFIC CONTROL DEVICES SUFFICIENT TO PROTECT SUCH AREAS TO ASSURE THE SAFE AND CONVENIENT PASSAGE OF VEHICULAR TRAFFIC SHALL BE INSTALLED AND MAINTAINED. SUCH TRAFFIC CONTROL DEVICES AND THE MANNER IN WHICH THEY ARE USED SHALL BE CONSISTENT WITH THESE PLANS AND THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS (HEREINAFTER REFERRED TO AS THE "MANUAL"). THE TRAFFIC CONTROL DEVICE SYSTEM SHALL CONSTITUTE THE MINIMUM PROVISIONS FOR TRAFFIC CONTROL FOR EACH PARTICULAR SITUATION. WHENEVER THE ENGINEER DEEMS IT NECESSARY ESPECIALLY WHERE A GRADE, CURVE, OR MERGE CONDITIONS EXIST, HE MAY DIRECT THAT ADDITIONAL OR ALTERNATIVE DEVICES BE USED.

B. CONDITIONS

DURING ALL PARTS OF THIS PROJECT, SIGNING, BARRICADES, FLASHING AROWS, ETC. SHALL BE LOCATED AS INDICATED IN THE MANUAL OR AS SHOWN ON THE MAINTENANCE OF TRAFFIC SHEETS.

C. ADVANCE WARNING SIGNS

ALL ADVANCE WARNING SIGNS FOR ANY CONDITION WHICH RESTRICTS TRAFFIC SHALL BE ERECTED BEFORE ANY SUCH RESTRICTION IS PUT INTO EFFECT. ALL SUCH SIGNS SHALL BE COVERED OR REMOVED FROM THE VIEW OF TRAFFIC WHENEVER THEY ARE NOT APPLICABLE.

D. FLASHING ARROW REQUIREMENT

FLASHING ARROWS SHALL BE FURNISHED AS SHOWN ON THE MAINTENANCE OF TRAFFIC PLANS.

E. PROTECTION OF PUBLIC

WHENEVER ANY WORK IS BEING DONE OVER A TRAVELED LANE OR SHOULDER, THE CONTRACTOR SHALL SUPPLY SUFFICIENT SAFETY EQUIPMENT AS APPROVED BY THE DIRECTOR TO PROTECT THE TRAVELING PUBLIC FROM ANY CONSTRUCTION DEBRIS. IF TRAVELED LANES UNDER STRUCTURES ARE TO BE CLOSED FOR REASONS OF SAFETY, METHOD AND TIME OF CLOSURE MUST BE APPROVED PRIOR TO IMPLEMENTATION. PERSONAL CARS SHALL NOT BE PARKED WITHIN THE L/A.

MAINTENANCE OF TRAFFIC NOTES

CUY-71-11.74/ VAR

F. LAW ENFORCEMENT OFFICER WITH PATROL CAR

THE CONTRACTOR SHALL PROVIDE AND PAY ALL COST FOR THE SERVICES OF LAW ENFORCEMENT OFFICER WITH PATROL CAR FOR THE EXCLUSIVE PURPOSE OF CONTROLLING TRAFFIC AS DETERMINED BY THE ENGINEER. THE NUMBER OF OFFICERS AND CARS REQUIRED FOR THIS PURPOSE SHALL BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. THE OFFICERS SHALL MOVE THEIR PATROL CARS AS NECESSARY TO INSURE THEIR CONSTANT PRESENCE AT THE POINT(S) OF SLOWDOWN, STOPPAGE OR BACK-UP. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE ARRANGEMENTS FOR SCHEDULING AND PAYMENT OF LAW ENFORCEMENT OFFICER WITH PATROL CAR.

PAYMENT FOR ALL OF THE ABOVE SHALL BE INCLUDED IN THE MAN HOUR PRICE BID FOR ITEM 614 - LAW ENFORCEMENT OFFICER WITH PATROL CAR.

G. WORKSITE TRAFFIC SUPERVISOR (AT ALL LOCATIONS)

THE CONTRACTOR SHALL EMPLOY (OTHER THAN THE SUPERINTENDENT) AND SUBJECT TO THE APPROVAL OF THE ENGINEER, A CERTIFIED WORKSITE TRAFFIC SUPERVISOR (WTS). THE WTS MAY BE CERTIFIED FROM ONE OF THE FOLLOWING ORGANIZATIONS:

1) AMERICAN TRAFFIC SAFETY SERVICE ASSOCIATION A.T.S.S.A. PHONE NUMBER 1-800-272-8772) CERTIFIED WORKSITE TRAFFIC SUPERVISOR (WTS)

2) THE NATIONAL SAFETY COUNCIL, TRAFFIC CONTROL ZONES SUPERVISORS COURSE, PHONE NO. 1-800-441-5103

3) NATIONAL HIGHWAY INSTITUTE, DESIGN AND OPERATION OF WORK ZONE TRAFFIC CONTROL, PHONE NO. 1-703-235-0528

THE WTS POSITION IS ESTABLISHED FOR THE PURPOSE OF MONITORING AND CORRECTING ANY TRAFFIC CONTROL DEFICIENCIES IN THE WORK ZONE. THE WTS SHALL OVERSEE ALL OPERATIONS THAT AFFECT THE MOVEMENT OF VEHICULAR AND PEDESTRIAN TRAFFIC THROUGH THE WORK ZONE.

THE WTS SHALL BE PRESENT WHEN THE CONTRACTOR OR SUBCONTRACTOR INSTALLS A TRAFFIC RESTRICTION, LANE CLOSURE, ETC. IN LIEU OF THE WTS BEING PRESENT WHEN A SUBCONTRACTOR HAS A WORKZONE IN PLACE, THE CONTRACTOR MAY USE HIS OWN PERSONNEL THAT IS A CERTIFIED WTS. THE CONTRACTOR OR SUBCONTRACTOR MUST PRESENT A COPY OF HIS WTS CERTIFICATE TO THE PROJECT ENGINEER. A WTS MUST BE PRESENT WHEN THE WORK ZONE IS BEING SET UP. HE MUST APPROVE THE WORK ZONE BEFORE HE LEAVES OR PERFORMS OTHER DUTIES.

THE RESTRICTIONS ARE SHORT TERM. THE WTS SHALL MONITOR THE ZONE FOR COMPLIANCE. DURING THE LANE CLOSURE HE SHALL MAKE SURE ALL TRAFFIC CONTROL ITEMS ARE FUNCTIONING PROPERLY. TRAFFIC CONTROL WILL BE THE WTS' MAIN DUTY DURING IMPLEMENTATION OF ZONES OR SHORT TERM ZONES. THE WTS SHALL HAVE THE AUTHORITY TO HAVE DEFICIENCIES CORRECTED AS SOON AS POSSIBLE. THE WTS SHALL PROVIDE THE DISTRICT WORK ZONE TRAFFIC CONTROL ENGINEER A SKETCH OF THE TRAFFIC CONTROL PLAN (TCP) EVERYDAY THERE IS TO BE A SHORT TERM TRAFFIC RESTRICTION, LANE CLOSURE, ETC. THIS TCP SHALL SHOW HOW THE WORK ZONES ARE TO BE IMPLEMENTED.

THE WTS SHALL BE AVAILABLE ON A 24-HOUR BASIS TO REPAIR AND/OR REPLACE DAMAGED OR MISSING TRAFFIC CONTROL DEVICES. A 24-HOUR PHONE NUMBER SHALL BE MADE AVAILABLE TO THE PROJECT ENGINEER IN ORDER TO CONTACT THE WTS. THE WTS SHALL HAVE A PAGER AND THE PHONE NUMBER PROVIDED TO THE PROJECT ENGINEER.

FAILURE OF THE CONTRACTOR TO COMPLY WITH ANY OF THE ABOVE, SHALL CONSTITUTE CAUSE FOR THE PROJECT ENGINEER TO DEDUCT $500.00 PER DAY FROM MONEY DUE TO THE CONTRACTOR NOT AS A PENALTY, BUT AS A LIQUIDATED DAMAGE.

PAYMENT FOR THE WTS SHALL BE INCLUDED UNDER THE LUMP SUM ITEM 614 - MAINTAINING TRAFFIC.

H. FAILURE TO COMPLY

IF THERE IS ANY FAILURE TO COMPLY WITH PROVISION FOR TRAFFIC CONTROL SET OUT IN THESE PLANS AND NOTES, OR WITH THE PROVISIONS OF THE "MANUAL", THE HIGHWAY IN THE VICINITY OF THE WORK AREA SHALL NOT BE CONSIDERED IN A CONDITION FOR THE SAFE AND CONVENIENT USE BY THE TRAVELING PUBLIC. ANY FAILURE TO KEEP THE HIGHWAY, IN THE VICINITY OF THE WORK AREA, IN A CONDITION FOR THE SAFE AND CONVENIENT USE BY THE TRAVELING PUBLIC SHALL BE CONSIDERED A BREACH OF THIS CONTRACT. WORK SHALL BE SUSPENDED UNTIL THE CONTRACTOR COMPLIES WITH THE PROVISION OF THE AFOREMENTIONED ITEMS.

MAINTENANCE OF TRAFFIC CONTROL MATERIAL

A. SIGNS

SIGN DIMENSIONS AND SPECIFICATIONS, INCLUDING LETTER SIZES SHALL BE AS PROVIDED IN THE "MANUAL", OR IN DESIGN DRAWINGS PROVIDED BY THE DEPARTMENT OF TRANSPORTATION. THE SIGNS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER PRIOR TO THE START OF THIS PROJECT.

WORK ZONE MARKING SIGNS

WORK ZONE MARKING SIGNS SHALL BE ERECTED PER STANDARD DRAWING MT-99.10M AND ITEM 614 OF THE CMS.

B. SIGN SUPPORTS

SIGN SUPPORTS SHALL BE AS SHOWN ON STANDARD DRAWINGS MT-105.10M AND MT-105.11M.

C. FLASHING ARROWS

THE ELECTRIC FLASHING ARROW SHALL BE AS SHOWN ON STANDARD CONSTRUCTION DRAWING MT-35.10.

D. CONES

CONES SHALL BE LOCATED AS SHOWN IN THE "MANUAL" AND THE TRAFFIC CONTROL PLANS.

E. DRUMS

DRUMS SHALL BE LOCATED AS SHOWN ON THE TRAFFIC CONTROL PLANS AND ARE REQUIRED FOR NIGHTTIME CLOSURES.

F. FLOODLIGHTING

FLOODLIGHTING OF THE WORK SITE FOR OPERATIONS CONDUCTED DURING NIGHT TIME PERIODS SHALL BE ACCOMPLISHED SO THAT THE LIGHTS DO NOT CAUSE GLARE TO THE DRIVERS ON THE ROADWAY. TO ENSURE ADEQUACY OF THE FLOODLIGHT PLACEMENT, THE CONTRACTOR AND ENGINEER SHALL DRIVE THROUGH THE WORK SITE EACH NIGHT WHEN THE LIGHTING IS IN PLACE AND OPERATIVE PRIOR TO COMMENCING ANY WORK. IF GLARE IS DETECTED THE LIGHT PLACEMENT AND SHIELDING SHALL BE ADJUSTED TO THE SATISFACTION OF THE ENGINEER BEFORE WORK PROCEEDS.

PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS SHALL BE INCLUDED IN THE LUMP SUM CONTRACT PRICE FOR MAINTAINING TRAFFIC.

G. PORTABLE CHANGEABLE MESSAGE SIGN, AS PER PLAN

THE CONTRACTOR SHALL FURNISH, INSTALL, MAINTAIN, AND REMOVE WHEN NO LONGER NEEDED, UP TO FOUR (4) PORTABLE CHANGEABLE MESSAGE SIGN(S) AT EACH CLOSURE. THE PCMS SHALL BE OF THE TYPE SHOWN ON THE LIST OF APPROVED PCMS MAINTAINED BY THE DIRECTOR. THE PCMS SHALL BE A CLASS I OR II TYPE UNIT.

THE PORTABLE CHANGEABLE MESSAGE SIGN SHALL BE MOUNTED ON A TRAILER. NO FLIP DISC SIGNS ARE PERMITTED. THE LOCATION OF THE PCMS SHALL BE AS DIRECTED BY THE ENGINEER. THE ENGINEER SHALL BE PROVIDED ACCESS TO EACH SIGN UNIT AND SHALL BE PROVIDED WITH APPROPRIATE TRAINING AND OPERATION INSTRUCTIONS.

THE PCMS SHALL CONTAIN A CELLULAR TELEPHONE LINK WHICH WILL ALLOW REMOTE SIGN ACTIVATION, DEACTIVATION, MESSAGE CHANGES, MESSAGE ADDITIONS AND REVISIONS TO TIME OF DAY PROGRAMS. THE SYSTEM SHALL ALSO PERMIT VERIFICATION OF CURRENT AND PROGRAMMED MESSAGES.

THE CONTRACTOR SHALL PROVIDE TO THE ENGINEER THE SOFTWARE NECESSARY TO CONTROL THE PCMS REMOTELY.

THE PCMS SHALL BE EQUIPPED WITH A MYRIAD SAFETY BEAM OR AN APPROVED EQUAL AS DETERMINED BY THE ENGINEER. THE MYRIAD SAFETY BEAM SENDS OUT A SIGNAL THAT ACTIVATES RADAR DETECTORS. THE BEAM IS APPROVED BY THE F.C.C. THE MYRIAD SAFETY BEAM SHALL USE THE SAME POWER SUPPLY AS THE PCMS. THE MYRIAD SAFETY BEAM SHALL BE ABLE TO BE ACTIVATED WITH THE PCMS RUNNING OR NOT. THE MYRIAD SAFETY BEAM IS DISTRIBUTED BY THE TRIPLEX GROUP, INC., P.O. BOX 428, NEW HOPE, PA 18938, PHONE (215) 862-5077.

AT THE DIRECTION OF THE ENGINEER THE PCMS MAY BE REMOVED FOR PERIODS OR TIMES WHEN NOT IN USE. NO PAYMENT WILL BE MADE FOR THESE TIMES (EX. WINTER MONTHS).

THERE SHALL BE AT LEAST ONE CLASS I OR II CHANGEABLE MESSAGE SIGNS AT EACH WEARING SURFACE REPLACEMENT OPERATION.

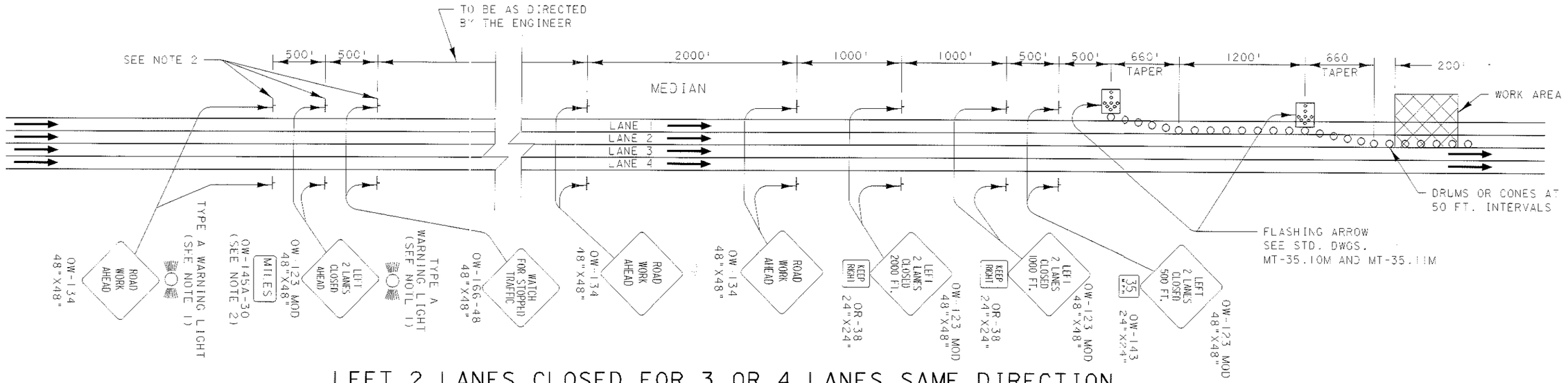
PAYMENT FOR THE PORTABLE CHANGEABLE MESSAGE SIGNS SHALL BE AT THE LUMP SUM UNIT PRICE BID FOR ITEM 614 - MAINTAINING TRAFFIC.

G. WORK VEHICLES

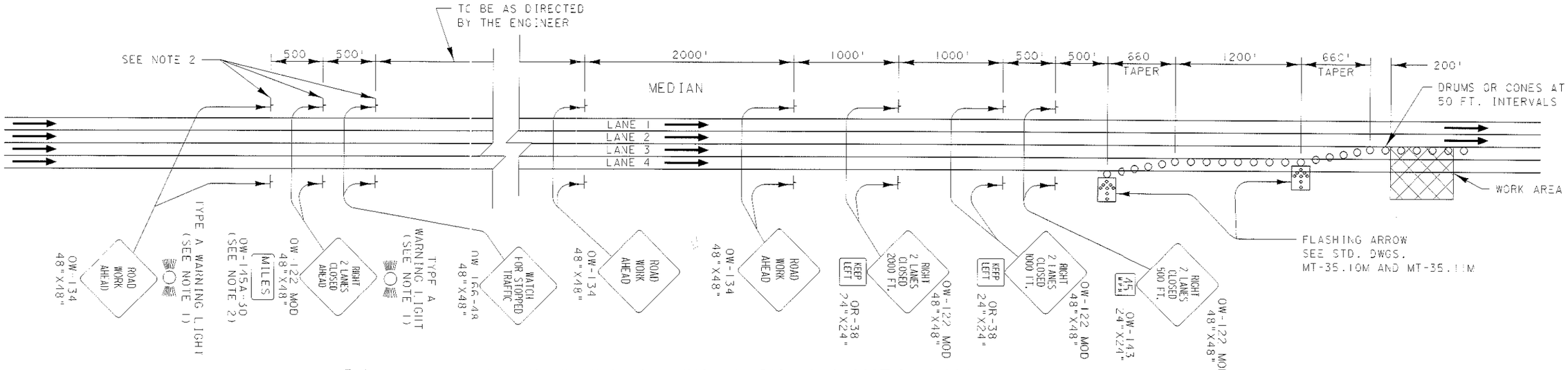
ALL WORK VEHICLES LICENSED TO OPERATE ON THE HIGHWAY, INCLUDING TRUCKS, SHALL BE EQUIPPED WITH A FLASHING, ROTATING OR OSCILLATING AMBER LIGHT VISIBLE TO ALL DIRECTIONS OF TRAFFIC FOR A MINIMUM OF ONE-HALF KILOMETER IN BRIGHT SUNLIGHT AND SHALL BE OPERATED WITH LIGHTED HEAD AND TAIL LAMPS. THE AMBER LIGHT SHALL BE IN OPERATION AT ALL TIMES WITHIN THE WORK ZONE AND WHILE TRAVELING TO AND FROM THE WORK ZONE WHENEVER THE VEHICLE SPEED IS BELOW 55 MPH. VEHICLE HAZARD LAMPS DO NOT SATISFY THIS REQUIREMENT. ALL OTHER EQUIPMENT SHALL BE EQUIPPED WITH A FLASHING, ROTATING OR OSCILLATING AMBER LIGHT VISIBLE IN ALL DIRECTIONS OF TRAFFIC FOR A MINIMUM OF ONE-HALF KILOMETER IN BRIGHT SUNLIGHT. THE AMBER LIGHT SHALL BE IN OPERATION WHILE THE EQUIPMENT IS WITHIN THE WORK ZONE.

PAYMENT

PAYMENT FOR PROVIDING, ERECTING, MAINTAINING AND REMOVING TEMPORARY MAINTENANCE OF TRAFFIC CONTROL DEVICES, INCLUDING WORK ZONE MARKING SIGNS, SHALL BE MADE UNDER THE LUMP SUM PRICE BID FOR ITEM 614 - MAINTAINING TRAFFIC UNLESS SEPARATELY ITEMIZED.



LEFT 2 LANES CLOSED FOR 3 OR 4 LANES SAME DIRECTION



RIGHT 2 LANES CLOSED FOR 3 OR 4 LANES SAME DIRECTION

GENERAL NOTES:

1. TYPE A FLASHING WARNING LIGHTS SHOWN ON THE "ROAD WORK AHEAD" AND "RIGHT(OR LEFT) 2 LANES CLOSED AHEAD" SIGNS ARE REQUIRED WHENEVER A NIGHT LANE CLOSURE IS NECESSARY.
2. EXTRA ADVANCE WARNING SIGN GROUPS CONSISTING OF OW-128, OW-122 MOD, OR OW 123 MOD AND OW-166 SIGNS PLUS DISTANCE PLATES MAY BE SPECIFIED IN THE PLANS OR REQUIRED TO BE ERECTED AT THE DIRECTION OF THE ENGINEER.

MAINTENANCE OF TRAFFIC NOTES

CUY-71-11.74/VAR

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STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 828
EPOXY PAVEMENT MARKING

December 14, 2000

828.01 Description. This work shall consist of furnishing and applying epoxy pavement markings in accordance with 641, 740 and the additional requirements described herein.

The epoxy material and installation shall be in compliance with all the applicable EPA and local environmental regulations.

In general, the marking material shall consist of four components: Part A (White or Yellow), Part B, Size I Glass Beads, and Size II Glass Beads, as described below.

828.02 Epoxy Pavement Marking Material. Epoxy pavement markings shall be prequalified in accordance with Supplement 1047. Material supplied shall be a two-part epoxy system capable of being applied at ambient temperature down to 10°C (50°F). The material shall be capable of retaining reflective glass beads of the drop-on type or spray-on type.

Epoxy shall comply with the following requirements:

a. Formulation: The epoxy shall be formulated as a Long Life Pavement Marking System, capable of providing a minimum of 4 years of performance, free of any peroxides. The epoxy should be designed to provide simple volumetric mixing ratio of its components (such as 2:1) .

b. Epoxide Number: The epoxide number of the epoxy resin shall be manufacturer target value ± 0.05 as determined by ASTM D 1652 for both white and yellow Part A on a pigment free basis.

c. Amine Number: The amine number of the curing agent (Part B) shall be manufacturer target

value ± 50 as per ASTM D 2074 on a pigment free basis.

d. Toxicity: Upon heating to application temperature, the material shall not exude fumes which are toxic or injurious to persons or property. After curing the materials should be completely inert with all components fully reacted and environmentally safe.

e. Drying Time (Laboratory): The pavement marking material, when mixed in the proper ratio and applied at the properly prescribed wet film thickness at 24°C ±0.5°C (75°F ±2°F) and with the proper saturation of glass beads, shall exhibit a no tracking time of no greater than 40-45 minutes when tested according to ASTM D 711.

f. Drying Time (field): The pavement marking material shall have a setting time to a no-tracking condition of not more than 35 minutes. The line must be protected from tracking during the setting period by coning off or as specified in the plans.

g. Curing: The epoxy pavement marking material shall be capable of fully curing at a constant surface temperature of 7°C (45°F) or above.

h. Adhesion to Pavement(Portland Cement Concrete and Asphalt): The cured pavement marking materials, when tested according to ACI Method 503, shall have such a high degree of adhesion to the specified Portland cement concrete [compressive strength, 27,000 kPa (4,000 PSI) minimum] or asphalt surface such that there shall be a 100 percent substrate failure in the performance of this test. The prepared specimens shall be conditioned at room temperature 24°C ±0.5°C (75°F ±2°F) for a minimum of 24 hours and a maximum of 72 hours prior to the performance of the indicated test

i. Hardness: The epoxy pavement marking materials, when tested according to ASTM D 224, shall have a Shore D Hardness of between 70 and 90. Samples shall be allowed to cure at room temperature 24°C ±0 .5°C (75°F ±2°F) for a minimum of 24 hours and a maximum of 72 hours prior to performing the indicated test.

j. Tensile Strength: When tested in accordance with ASTM D 638, the epoxy pavement marking materials shall have a tensile strength of not less than 34,000 kPa (5,000 psi). The Type IV specimens shall be cast in a suitable mold and pulled at a rate of 6 mm (1/4 inch) per minute, by a suitable dynamic testing machine. The samples shall be allowed to cure at room temperature 24°C ± 0.5°C (75°F ±2°F) for a minimum of 24 hours and a maximum of 72 hours prior to performing the indicated test.

k. Compressive Resistance: When tested according to ASTM D 695, a catalyzed epoxy pavement marking materials shall have a compressive strength of not less than 83,000 kPa (12,000 psi). The cast sample shall be conditioned at room temperature 24°C ±0.5°C (75°F ±2°F) for a minimum of 72 hours before performing the indicated test. The rate of compression for these samples shall be no more than 6 mm (1/4 inch) per minute.

l. Abrasion Resistance: The abrasion resistance shall be evaluated on a Taber Abrader with a 1.0

kg (2.2 pounds) load and CS-17 wheels. The duration of the test shall be 1,000 cycles. The wear index shall be calculated based on ASTM C 501 and the wear index for a catalyzed material shall not be more than 100 mg (0.02 pounds). The test shall be run on cured samples of materials which have been applied at a film thickness of 0.5 mm (20 mil) to code S-16 stainless steel plates. The samples shall be allowed to cure at 24°C ±0.5°C (75°F ±2°F) for a minimum of 24 hours and a maximum of 72 hours prior to performing the indicated test.

m. Impact Strength:

(1) Sample preparation: Properly mixed material shall be applied on a minimum of 28 days old clean concrete and shall be allowed to cure for 72 hours at 24°C ±0.5°C (75°F ±2°F). Film thickness of the material shall be at the appropriately prescribed thickness.

(2) Testing: At a temperature of 24°C ±0.5°C (75°F ±2°F) , a 0.9 kg (2 pound) round steel ball shall be dropped from a height of 1,200 mm (48 inches) on the cured sample. No cracking or chipping of the material shall take place .

n. Color: The mixed epoxy compound, both white and yellow, shall be applied to 2 sets of 76 mm x 152 mm (3 inches x 6 inches) aluminum panels at 0.5 mm (20 ± 1 mil) in thickness, one set with no glass beads and one set with glass beads (must ensure 50/50 distribution of Size I and Size II beads for this will impact the results of the test). Expose the prepared samples in a Q.U.V. Environmental Testing Chamber, as described in ASTM G 53, and they shall conform to the following requirements in alternating cycles:

The test shall be conducted for 75 hours at 50°C (122°F), 4 hours humidity and 4 hours U.V., in alternating cycles. The prepared panels shall be cured at 25°C (77°F) for 72 hours prior to exposure.

The color of the white epoxy material shall not be darker than the Federal Standard No. 595A-17855. The color of the yellow epoxy polymer material shall be same as Federal Standard No. 595A-13415.

o. Certificate of compliance: The material manufacturer shall furnish a notarized certification that the material complies with the provisions of this specification. It shall not be inferred that the provisions of a certification of compliance waives state inspection, sampling, or testing.

p. Laboratory samples: Promptly after execution of the contract, the Contractor shall notify the Engineer of the sources of material he expects to use. The material manufacturer shall furnish samples of the epoxy materials as may be required by the Engineer, a minimum of ten days before the date of intended use of these materials.

q. Infrared spectra: A copy of the infrared spectra of each component on each lot number shall be supplied by the manufacturer along with the certification papers. This infrared spectra will be on record with the Department to serve as a quality control measure for the future supply of this system to the State.

r. Manufacturer Qualifications : The manufacturer must have expertise and performance history

including: Must have completed and passed the service test in accordance with Supplement 1047; verifiable installations; ample production capacity; proper facility; compliance with EPA regulations ; verifiable quality control program; in Ohio must have passed a minimum of 4 years of performance (durability and retroreflectivity) on concrete or asphalt surface.

s. Qualifying contractor: The Contractor shall demonstrate an ability to satisfactorily apply the material in the presence of the Engineer at a mutually agreed upon location, before commencement of the work. A previous statement of demonstrated ability to apply this material issued by any ODOT district will suffice as evidence of qualification.

828.03 Glass Beads. In addition to the requirements of 740.10, the following shall apply:

Glass bead packaging shall clearly indicate EPOXY - SIZE I or EPOXY SIZE II.

Inspection shall be done at the project site. Random samples shall be obtained from material delivered to the project site, or at other locations designated by the Laboratory.

The glass beads shall have the following gradation when tested in accordance with ASTM D 1214.

SIZE I Sieve Size	Percent Retained	SIZE II Sieve Size	Percent Retained
2.00 mm (No. 10)	0	850 µm (No. 20)	0-5
1.70 mm (No. 12)	0-5	600 µm (No. 30)	5-20
1.40 mm (No. 14)	5-20	300 µm (No. 50)	30-75
1.18 mm (No. 16)	40-80	180 µm (No. 80)	9-32
1.00 mm (No. 18)	10-40	150 µm (No. 100)	0-5
850 µm (No. 20)	0-5	pan	0-2
pan	0-2		

Reflective Media: The glass beads shall be smooth, clear, free from any air inclusions and scratches that might affect their functions as a retro-reflective media, and shall have the characteristics listed below.

Roundness (Percent by Weight): Not more than 20 percent of the glass beads shall be irregular or fused spheroids, and at least 80 percent of the beads shall be true beads.

Index of Refraction: The refractive index of the beads shall be a minimum of 1.50 as determined by the liquid immersion method at 25° C (77° F). The silica content of glass beads shall not be less than 60 percent.

Coating: The glass beads, Size I, shall be coated with a silane-type adherence coating to enhance its embedment in, and adherence to the applied binder film. The coated beads shall emit a yellow-green fluorescence when tested by the Dansyl Chloride test procedure. The Size II glass beads shall be treated with a moisture-proof coating. Both types of glass beads shall show no tendency to absorb moisture in storage and shall remain free of clusters and lumps. They shall flow freely from dispensing equipment at any time when surface and atmosphere conditions are satisfactory for marking operations.

The moisture-resistance of the glass beads shall be determined on the basis of the following test:

Place 1 kg (2.2 pounds) of beads in a washed cotton bag, having a thread count of 8 per square centimeter (50 per square inch) (warp and woof) and immerse the bag in a container of water for 30 seconds. Remove the bag and force the excess water from the sample by squeezing the bag. Suspend and allow to drain for two hours at room temperature (21°-22°C) (70°-72°F). After draining mix the sample in the bag by shaking thoroughly. Transfer a sample slowly to a clean, dry glass funnel having a stem 100 mm (4 inches) in length, with a 10 mm (3/8 inches) inside diameter stem entrance opening and a minimum exit opening of 6 mm (1/4 inches). The entire sample shall flow freely through the funnel without stoppage. When first introduced to the funnel, if the beads clog, it is permissible to tap the funnel to initiate flow.

828.04 Equipment. Equipment for applying the epoxy pavement marking shall be capable of mixing the components in proportions recommended by the manufacturer and applying glass beads at the time of the line placement. The equipment used shall be capable of applying epoxy material at the specified thickness, width and pattern. The Contractor shall provide a calibrated measuring device acceptable to the Engineer to measure the epoxy resin in the striper tanks.

The application equipment shall be a mobile, truck mounted and self contained pavement marking machine, specifically designed to spray the epoxy binder and reflective glass beads in continuous and skip line patterns. The application equipment shall be maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. In addition, the truck mounted unit shall be provided with accessories to allow for the marking of legends, symbols, crosswalks, and other special patterns.

The Engineer and the Material Manufacturer together may approve the use of a portable applicator in lieu of truck mounted accessories for use in applying special marking only, provided such equipment can demonstrate satisfactory application of reflectorized markings in accordance with these specifications.

The mobile applicator shall include the following features:

1. Individual material reservoirs, or space, for the storage of Part A and Part B of the epoxy binder.

2. Heating equipment of sufficient capacity to maintain the individual binder components at the manufacturer's recommended temperature and produce the required amount of heat at the mixing head & gun tip and maintain those temperatures with the tolerances recommended by the binder manufacturer for the spray application.

3. Adequate individual tanks for the storage and dispensing of Size I and Size II glass beads.

4. Individual dispensers for the simultaneous application of Size I and Size II glass beads respectively. Each dispenser shall be capable of applying beads at a rate up to 2.4 kg per liter (20 pounds per gallon).

5. Individual metering devices on the proportioning pumps (one indicator per pump) as well as stroke counters to monitor liter usage. All such devices shall be clearly visible.

6. All the necessary spray equipment mixers, compressors and other appurtenances to allow for the placement of reflectorized pavement marking systems in a simultaneous sequence of operations.

7. A minimum 600 mm (24 inches) long static mixer unit or an equivalent system that produces properly mixed material.

8. A completely enclosed flush and purge system to clean the lines and the guns without expelling any of the solution into the environment.

828.05 Cleaning and Surface Preparation. The contractor shall clean the surface to remove all debris, laitance oil and any other contaminants that may hinder the adhesion of the system to the surface. Whenever grinding, scarifying, sandblasting, shot blasting or other operations are performed, the debris generated shall be contained through vacuum type equipment or equivalent and the work shall be conducted in such a manner that the finished pavement surface is not damaged or unnecessarily scarred or left in a pattern that will mislead or misdirect the motorist. When these operations are completed, the pavement surface shall first be power broomed and then blown off with compressed air to remove residue and debris resulting from the cleaning work. All such debris shall be contained, and disposed of in the appropriate manner.

Cleaning and surface preparation work shall be conducted in such a manner as to control and minimize airborne dust, and similar debris.

Epoxy pavement markings shall not be placed on any new asphalt concrete pavement containing SBS, SBR latex, or SMA latex polymer modifiers until the pavement has been in place for 48 hours. On all other new asphalt pavements, no surface preparation is required.

For any other type of modified asphalt or for open graded friction course asphalts, the Contractor shall contact the manufacturer for surface preparation recommendations.

In all cases the manufacturer's recommendations for surface preparation shall be followed.

The cost of any surface preparation shall be included in the unit bid cost for each line or pavement marking.

Care shall be taken when performing the surface preparation and cleaning work to prevent damage to transverse and longitudinal joint sealers.

Limits of work: Surface preparation shall be confined to the surface area specified for the application of pavement marking materials on the plans or as directed by the Engineer.

Surface preparation work includes cleaning for lines or cleaning for letters and symbols. Lines will be meant to include: Solid lines; Broken lines; Dotted lines; Channelizing lines; Stop lines and Crosswalk lines.

The area of preparation will be the width of the new pavement marking, or existing line, plus 25 mm (1 inch) on each side and the length of broken lines plus 300 mm (12 inches) on each end. When letters and symbols are cleaned the area of preparation will be sufficiently large to accommodate the new marking, or to remove the existing marking. No new markings, lines, crossbars or symbols shall be applied on any pavement that has not been properly prepared as per this specification.

On new Portland cement concrete pavements, cleaning operations shall not begin until a minimum of 30 days after the placement of concrete. The extent of the cleaning work shall be to prepare the concrete surface such that: (a) There is no visible evidence of curing compound on the concrete surface. (b) There are no heavy puddled deposits of curing compound in the valleys of the textured concrete surface. (c) All remaining curing compound is intact; all loose and flaking material is removed. (d)The peaks of the textured pavement surface are rounded in profile and free of sharp edges and irregularities. (e) The extent of the cleaning should be as such to insure the laitance is removed on both old as well as new concrete.

In the event that epoxy pavement marking is to be placed over existing pavement markings, the existing pavement marking shall be removed.

Pavement markings shall be removed to the extent that 95 to 100 percent of the existing marking is removed. Removal operations shall be conducted in such a manner that no more than moderate color and/or surface texture change results on the surrounding pavement surface.

828.06 Application. Epoxy marking material shall be applied only when the surface is clean and dry and when the pavement and air temperature are above 10°C (50°F). The Contractor shall transfer the entire contents of each material container to the striper tanks. The material shall be thoroughly mixed at all times during application.

Epoxy marking material shall be applied uniformly to the surface to be marked at the following rate in liters per kilometer (gallons per mile) of line. To achieve this rate the thickness of binder must be 20 mils ± 1 mil.

Liters per kilometer of line	**Width of line (mm)**				
	100	**150**	**200**	**300**	**600**
Solid line	52	78	103	155	310
Dashed line	13	20	26	40	80
Dotted line	17	26	35	52	103
Symbols, words	0.5 l/sq. meter				

Gallons per mile of line	**Width of line (Inches)**

	4	6	8	12	24
Solid Line	22	33	44	66	132
Dashed line	5.5	8.3	11	17	33
Dotted Line	7.3	11	14.7	22	44
Symbols, Words	1.0 Gallon per 80 Square feet				

On open graded asphalts the above rate shall be increased by 25 percent to achieve the required thickness of 25 mils ± 1 mil.

Thinning is not permitted.

Glass beads shall be applied to the uncured epoxy material in sufficient quantity so that the beads completely fill the epoxy film from the film-pavement interface to the top surface of the film to the extent that there are loose beads on the surface of the uncured line. The rate of application shall not be less than 3 kg (25 pounds) of glass beads per liter (gallon) of epoxy material applied. Glass beads shall be dropped on in a double-drop system with the large gradation (Size I) first and the regular gradation (Size II) second in the same pass of the equipment. The beads shall be applied in equal amount by weight.

If the epoxy marking does not dry to a no-tracking condition consistently and shows a cyclical soft spot, the Contractor shall cease marking application until the problem is corrected.

828.07 Method of Measurement. In addition to the requirements of 641.12, the following shall apply:

1. The Contractor must submit certified documents from the manufacturer listing of the amount of epoxy (in liters) and glass beads (in kilograms) shipped for the particular project.

2. In the field the Contractor shall furnish a calibrated device to measure the quantity of materials used such as stroke counters mounted on the dispensing pumps. Stroke counter readings must be taken at the beginning and end of each day by the Engineer. Caution must be taken while re-circulating the material to turn off the stroke counter on the pump. Using the "dipping the tank" method is not sufficient.

3. The rate of application of materials shall be verified by comparing the amount of materials used with the computed amount needed for each section. Where short sections are involved and it is not practical or feasible to determine the quantities used on each and every short section, such sections may, by agreement between the Engineer and Contractor, be grouped together to verify the quantities used.

4. Removal of pavement markings must be indicated on the plans, and will be paid for in the units indicated in 828.09.

828.08 Final Acceptance: Pavement markings which are unacceptable, or become unacceptable

prior to final acceptance, as determined by the Engineer, for causes such as, but not limited to, improper application, loss of adhesion to the pavement, non-uniform retroreflectivity, or non-retroreflectivity, shall be replaced by the Contractor with markings conforming to these specifications and requirements at his expense without delay, or the Contractor may request that the work be considered non-performed. The Contractor will receive no payment for unacceptable work which is considered non-performed.

828.09 Basis of Payment. Payment for accepted quantities complete in place will be made at the contract prices, or prices adjusted in accordance with 641.11 for:

Item	Unit	Description
828	Kilometer (mile)	Edge line
828	Kilometer (mile)	Lane line
828	Kilometer (mile)	Center line
828	Meter (linear foot)	Channelizing line
828	Meter (linear foot)	Stop line
828	Meter (linear foot)	Crosswalk line
828	Meter (linear foot)	Transverse line
828	Meter (linear foot)	Curb marking
828	Square meter (square foot)	Island marking
828	Each	Handicap symbol marking
828	Each	Railroad symbol marking
828	Each	School symbol marking, ___mm (in.)
828	Meter (linear foot)	Parking lot stall marking
828	Each	Lane arrow
828	Each	Word on pavement, ___mm (in.)
828	Meter (linear foot)	Dotted line
828	Each, meter(linear foot), square meter (square foot)	Removal of pavement marking
828	Lump sum	Two-way radio equipment

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 848

BRIDGE DECK REPAIR AND OVERLAY WITH CONCRETE USING HYDRO-DEMOLITION

June 30, 1998

848.01 Description. This work shall consist of furnishing the necessary labor, materials and equipment to repair and overlay concrete bridge decks in accordance with these specifications and in reasonably close conformity with the grades, thickness, and cross sections shown on the plans or as directed by the Engineer. This work shall include the removal of patches other than sound portland cement concrete and all loose and unsound concrete by hydro-demolition; preparation of the sound existing concrete surface; removal, forming and concrete for full-depth repairs; blast cleaning or high pressure water cleaning; furnishing, placing, finishing, texturing and curing of a micro silica modified concrete (MSC) overlay, a latex modified concrete (LMC) overlay, or a superplasticized dense concrete (SDC) overlay, as specified; and all other operations necessary to complete this work according to these specifications and to the satisfaction of the Engineer.

Removal of flexible (asphalt) concrete overlays and rigid concrete overlays are included as part of this work if the following bid items are part of the project plans:

Item 848, Wearing Course Removed, Asphalt,
Item 848, Existing Concrete Overlay Removed ____ Nominal Thickness
Item 848, Removal Debonded, Deteriorated Existing Variable Thickness Concrete Overlay

848.02 Bridge Decks with No Existing Rigid Concrete Overlay. The overlay surface shall be finished to a dimension "T" above the surface of the existing portland cement concrete deck. The existing deck shall be removed to a uniform depth of "D" across its entire surface. The uniform removal depth will be exceeded where unsound concrete is encountered. Unless the plans state otherwise, "D" shall be 25 mm (1 inch).

848.03 Bridge Decks with an Existing Rigid Concrete Overlay. When a rigid concrete overlay exists on a deck, the thickness of concrete "D" to be removed and the thickness of the new overlay "T" replaced is a function of the existing concrete overlay thickness and shall be as called out in the plans. The cost of removing the rigid concrete overlay shall be included in the price bid for Item 848, Existing Concrete Overlay Removed ___ Nominal Thickness and an additional item 848, Removal Debonded, Deteriorated Existing Variable Thickness Concrete Overlay. The second bid item is intended for the removal of unsound variable thickness overlay concrete not removed in the 848, Existing Concrete Overlay Removed, ____ Nominal Thickness.

Spalled or delaminated tops of backwalls shall be repaired with the specified overlay material for the bridge deck (variable thickness).

848.04 Micro-silica Modified Concrete Materials. The materials shall conform to the following requirements:

Fine aggregate (natural sand)	703.02*
Coarse aggregate (No.8)	703.02*

Portland cement, Type I or IA	701.04** or 701.01
Water	499.02
Chemical admixture	705.12, ASTM C 494, Type A or D
Air-entraining admixture	705.10
Superplasticizing admixture (High Range Water Reducer)	705.12, ASTM C 494, Type F
Curing materials	705.05 or 705.06, White opaque
Micro-silica admixture	ASTM C 1240***

* Deleterious material shall not exceed one-half the requirement for superstructure aggregate. Sodium sulfate soundness loss shall not exceed that specified for superstructure concrete in 703.02.

** Only one brand of cement shall be used for each bridge deck overlay unless otherwise permitted by the Engineer.

*** Micro-silica admixture shall meet ASTM C 1240 and be from a source approved by the Office of Materials Management, 1600 W. Broad St., Columbus, Ohio. The use of micro-silica admixtures in dissolvable bags shall not be allowed.

The Contractor will obtain a written statement from the manufacturers of the chemical admixtures verifying the compatibility of the combination of materials and the sequence in which they are combined. The manufacturers will further designate a technical representative from their company or the ready-mix supplier to be in charge of the dispensing of the admixture products. The technical representatives shall act in an advisory capacity and will report to the Contractor and the Engineer any operations and procedures which are considered by the representative as being detrimental to the integrity of the placement. The manufacturer's technical representative will be present during concrete placement unless his presence is waived by the Engineer.

848.05 Latex Modified Concrete Materials. The materials shall conform to the following requirements:

Fine aggregate (natural sand)	703.02*
Coarse aggregate (No. 8)	703.02*
Portland cement, Type I	701.04**
Water	499.02
Latex emulsion	SS No. 953***
Curing materials	705.05 or 705.06, white opaque

* Deleterious material shall not exceed one half the requirement for superstructure aggregate, and the sodium sulfate soundness loss shall not exceed that specified for superstructure concrete in 703.02.

**705.10 admixture shall not be used.

***The latex emulsion shall be protected from freezing and prolonged exposure to temperatures in excess of 29°C (85°F). Emulsions in storage facilities shall be re-circulated in accordance with the manufacturer's recommendations.

848.06 Superplasticized Dense Concrete Materials. The materials shall conform to the following requirements:

Fine aggregate (natural sand)	703.02*
Coarse aggregate (No. 8)	703.02*
Portland cement, Type I or IA**	701.04 or 701.01
Water	499.02
Chemical admixture	705.12, ASTM C 494, Type A or D
Air-entraining admixture	705.10
Superplasticizing admixture (High Range Water Reducer)	705.12, ASTM C 494, Type F
Curing materials	705.05 or 705.06, white opaque

* Deleterious material shall not exceed one half the requirement for superstructure aggregate, and the sodium sulfate soundness loss shall not exceed that specified for superstructure concrete in 703.02.

** Only one brand of cement shall be used for each bridge deck overlay unless otherwise permitted by the Engineer.

Note: The Contractor shall obtain a written statement from the manufacturer of the superplasticizing admixture that he is satisfied with the compatibility of the combination of materials and the sequence in which they are combined. The manufacturer shall further designate a technical representative from the ready-mix supplier or his company to be in charge of dispensing the admixture products. Operations and procedures which are considered by the designated representative as being detrimental to the integrity of the overlay will not be permitted.

848.07 Mixers - Micro-silica Modified or Superplasticized Dense Concrete. Concrete shall be mixed in a central mixing plant or by a ready-mixed concrete truck capable of discharging concrete having a maximum water-cementitious ratio of 0.36. Mixing equipment shall meet the requirements of 499.04(b). Admixtures shall be introduced into the concrete in such a manner that will disperse them throughout the entire load. Batch plants shall meet the requirements of 499.04(a) and shall be located such that the maximum time required from start of mixing to completion of discharge of the concrete at the site of work shall not exceed 90 minutes.

848.08 Mixers - Continuous Mobile for Latex Modified Concrete. Requirements for

continuous mobile mixers for latex modified concrete are as follows. The proportioning and mixing equipment shall be an integral mobile unit having the capacity and continuous mixing capability to permit the finishing operations to proceed at a constant rate so that final finishing can be completed prior to the formation of a plastic film on the LMC surface. It shall consistently produce a uniformly blended mixture within the specified air content and slump limits. The mixer shall also:

(1) Be capable of producing not less than 4.6 m^3 (6 cubic yards) of LMC without recharging.

(2) Be equipped with a recording meter with a ticket printout device to record an indication of the cement quantity being introduced into the mix. The metering device shall be accurate within a tolerance of -1 to +3 percent.

(3) Be equipped with a latex metering device to indicate volume dispensed. The metering device shall be accurate within a tolerance of -1 to +2 percent. In addition the latex tank shall have a stand pipe marked in liters (gallons).

(4) Be equipped with a water flow indicator, and have a water flow control that is readily adjustable to provide for minor variations in aggregate moisture content. The flow indicator shall be accurate within a tolerance of $\pm$ 1 percent in the range of expected use.

(5) Be equipped with a control to regulate the quantity of each of the LMC components to permit production of a mix having the specified composition. To ensure that the mixer can accurately proportion and blend all components of the LMC on a continuous or intermittent basis, the mixer shall be calibrated prior to the start of the overlay placement.

The Engineer may require re-calibration of the cement, latex, and water metering devices as he deems necessary.

(6) Be capable of discharging mixed LMC through a conventional chute directly in front of the finishing machine.

(7) Be kept clean, free of partially dried or hardened materials, and properly operating at all times.

848.09 Finishing Machine. An approved self-propelled finishing machine shall be used with supports outside the prepared deck surface to be overlaid, except where hand finishing equipment is authorized. The finishing machine shall be equipped with forward and reverse drive mechanisms that enable precise velocity control of the machine while it is moving in either direction. It shall be equipped with one or more rotating rollers. It shall be equipped with augers and either a vibrating pan or vibrating rollers. Vibrating frequency for pans and rollers shall be variable from 1500 to 5000 pulses per minute. The

Contractor shall furnish the necessary verification of these vibration frequencies. Screeds shall have provisions for raising above the finished concrete surface.

The placing and finishing equipment shall be designed so that the elapsed time between depositing concrete and final finishing shall not exceed 10 minutes.

848.10 Finishing Machine Rail and Supports. Finishing machines shall be supported by rail and supports made of steel. Rail shall be furnished in sections not less than 3 m (10 feet) in length and be of sufficient cross-section so that the weight of the finishing machine causes zero vertical deflection while in motion. Rail shall be straight with no sections exceeding a tolerance of 3 mm in 3.0 m (1/8-inch in 10 feet) in any direction. Rail supports shall be screw-type adjustable saddles and shall be of sufficient number under the rail so that zero vertical deflection occurs under the weight of the finishing machine.

848.11 Hydro-demolition Equipment. The hydro-demolition equipment shall be a self-propelled machine that utilizes a high pressure water jet stream capable of removing concrete to the depth specified herein and/or as shown on the plans and be capable of removing rust and concrete particles from reinforcing steel. Hand held high pressure [690 bar (10000 psi) minimum] wands or 16 kg (35 lb.) maximum jackhammers operated at no more than a 45 degree angle from horizontal shall be used in areas that are inaccessible to the self-propelled machine or in patching areas that require work to remove the remaining unsound concrete.

848.12 Proportioning and Mixing of Micro-silica Modified Concrete. All required characteristics of the mix, i.e. air entrainment and slump, shall be adjusted off the deck before placement of the overlay begins. The components of the micro silica modified concrete shall be combined into a workable mixture of uniform composition and consistency. They shall be proportioned as follows:

QUANTITIES OF MATERIAL PER CUBIC METER(CUBIC YARD) (DRY WEIGHTS)*

Type of Coarse Aggregate	Coarse Aggregate kg (lbs)	Fine Aggregate kg (lbs)	Cement kg (lbs)	Micro Silica kg (lbs)	Max. Water Cementitious Ratio ^^
Gravel	805(1355)	805(1355)	415(700)	30(50)	0.36
Limestone	815(1350)	805(1355)	415(700)	30(50)	0.36
Slag	705(1190)	805(1355)	415(700)	30(50)	0.36

* The specific gravities used for determining the above weights are: natural sand 2.62, gravel 2.62, limestone 2.65, slag 2.30 and micro silica 2.20.

^^ The water cementitious ratio shall be calculated based upon the total cementitious material. Cementitious material shall include Portland cement and microsilica (solids).

The proportions of coarse and fine aggregate shall be adjusted to provide the maximum amount of course aggregate possible and still provide a workable and finishable mix. The Contractor may modify the mixes shown by adjusting the coarse and fine aggregates up to 50 kgs (100 lbs) each, unless otherwise approved by the Engineer.

The batch weights previously described shall be corrected to compensate for the moisture contained in the aggregate at the time of use. A chemical admixture (705.12, Type A or D) shall be used. The transit mixer charge shall be limited to 3/4 of its rated capacity or 4.6 cubic meters (6 cubic yards), whichever is the smaller, unless a larger size is approved by the Engineer.

The specified cementitious content shall be maintained and a maximum water-cementitious material ratio of 0.36 shall not be exceeded. Any admixture added at the job site shall be mixed a minimum of 5 minutes at mixing speed. After all components have been added, the slump range shall be 150 mm (6 inches) plus or minus 50 mm (2 inches). The air content of plastic concrete at the time of placement shall be 8 plus or minus 2 percent.

The use of Micro-silica admixture in dissolvable bags shall not be allowed.

If a slump loss occurs after mixing and before placement, the charge may be retempered with the admixture to restore plasticity. The slump range and air content shall be rechecked to ensure conformance to the allowable values. The load shall still be placed within the 90 minute limitation as per 848.07. If the consistency of the charge after retempering is such as to cause segregation of the components, this will be cause for rejection of the load.

848.13 Proportioning and Mixing of Latex Modified Concrete. Prior to each day's placement, each mixer shall be checked to assure that specified air content, slump and yield have been attained. Trial concrete shall not be incorporated into the work. Additional testing will be done in accordance with 848.31.

The LMC shall be a workable mixture having a uniform composition and consistency with the following proportions, properties or limits:

QUANTITIES OF MATERIALS PER CUBIC METER (CUBIC YARD)(DRY WEIGHT)*

Type of Coarse Aggregate	Fine Aggregate kg (lbs)**	Coarse Aggregate kg (lbs)	Cement kg(lbs)	Latex Emulsion L (gal)	Maximum Net Water L gal)
Gravel	974 (1645)	769 (1300)	389 (658)	121 (24.5)	86 (17.5)
Limestone	974 (1645)	778 (1315)	389 (658)	121 (24.5)	86 (17.5)
Slag	974 (1645)	675 (1140)	389 (658)	121 (24.5)	86 (17.5)

Slump*** 100 to 150 mm (4 to 6 inches)

Air content of plastic mix shall not exceed 7 percent.

*The specific gravities used for determining the above weights are: natural sand 2.62, gravel 2.62, limestone 2.65 and slag 2.30.

** The dry weights are approximate. This proportion should produce good workability, but due to gradation variability, the fine aggregate content may be increased, with approval by the Engineer, as much as 8 percent by weight if the coarse aggregate is reduced an equal volume.

*** The slump shall not be measured until after the concrete has been discharged from the mixer and left undisturbed for 4 to 5 minutes. The water content may be adjusted to control the slump within the prescribed limits.

848.14 Proportioning and Mixing of Superplasticized Dense Concrete. The SDC mix shall be proportioned and mixed in accordance with 499 of the CMS except as modified herein.

All required characteristics of the mix, i.e. air entrainment and slump, shall be adjusted off the deck before placement of the overlay begins. The components for superplasticized dense concrete shall be combined into a workable mixture of uniform composition and consistency. They shall be proportioned as follows:

QUANTITIES OF MATERIAL PER CUBIC METER (CUBIC YARD), DRY WEIGHTS*

Type of Coarse Aggregate	Coarse Aggregate kg (lbs)	Fine Aggregate kg (lbs)	Cement kg (lbs)	Maximum Water-Cement Ratio
Gravel	769 (1300)	769 (1300)	489 (825)	0.36
Limestone	778 (1315)	769 (1300)	489 (825)	0.36
Slag	675 (1140)	769 (1300)	489 (825)	0.36

* The specific gravities used for determining the above weights are: natural sand 2.62, gravel 2.62, limestone 2.65 and slag 2.30.

The batch weights previously described shall be corrected to compensate for the moisture contained in the aggregate at the time of use. A chemical admixture (705.12, Type A or D) shall be used. The transit mixer charge shall be limited to 3/4 of its rated capacity or 4.6 m^3 (6 cubic yards), whichever is the smaller, unless a larger size is approved by the Engineer.

The specified cement content shall be maintained and a maximum water-cement ratio of 0.36 shall not be exceeded. If superplasticizing admixture is added at the job site, the load shall be mixed a minimum of 5 minutes at mixing speed. After all of the superplasticizer has been added, the slump range shall be 150 ± 50 mm (6 ± 2 inches). The air content of fresh unvibrated SDC at the time of placement shall be 8 ± 2 percent. Two compressive cylinders shall be made for every other ready-mix truck load of SDC incorporated into the work.

If a slump loss occurs after addition and mixing of the superplasticizing admixture and before placement of the SDC overlay, the charge may be "re-tempered" with the admixture to restore plasticity. The slump range and air content shall be rechecked to ensure conformance to the allowable values. If the consistency of the charge after "re-tempering" is such as to cause segregation of the components, this will be cause for rejection of the load.

848.15 Test Slab. At the option of the Engineer, the Contractor shall make one or more trial batches of overlay material of the size to be hauled at least 4 days before the overlay is to be placed. He shall cast one or more small test slabs demonstrating the ability to finish and texture the concrete in accordance with 848.26. These slabs shall be 2.4 m (8 feet) long, a width which is wide enough to accommodate the tinning equipment and 32 mm (1 1/4 inch) thick.

848.16 Preparation of Existing Deck. No operations without reasonably available engineering controls that limit fugitive dust will be acceptable.

The Contractor shall be aware that there are state, regional, and local government agencies throughout the State that have requirements regarding control of dust generated by the blasting operation.

The Contractor is responsible for protecting traffic under the bridge while removing deck concrete.

848.17 Removal of Existing Asphaltic Concrete Overlays. If an item "848, Wearing Course Removed, Asphalt" is specified in the plans, the Contractor shall remove the existing asphaltic concrete course to the original concrete deck and any waterproofing material that was part of the deck. Removal shall comply with the requirements of CMS 202 and be completed before hydro-demolition is performed. This item shall be a separate operation from 848.18.

848.18 Removal of Existing Concrete Overlays. If an item "848, Existing Concrete Overlay Removed ____ Nominal Thickness" is specified in the plans, the Contractor shall remove the existing concrete overlay to the nominal specified thickness. Removal shall comply with the requirements of CMS 202 and as amended below:

Nominal thickness is defined as the specified thickness +/- 6 mm (1/4 inch).

If the Engineer determines during the nominal thickness removal that not enough existing concrete overlay is removed to expose only variable thickness existing concrete overlay islands, the Engineer will require the Contractor to adjust the removal depth, as required, until only variable thickness islands of concrete overlay are visible.

848.19 Removal of Existing Concrete Overlay, Variable Thickness. If an item "Item 848, Removal Debonded, Deteriorated Existing Variable Thickness Concrete Overlay" is specified in the plans the Contractor shall perform the following:

After removing the existing uniform concrete overlay, the Contractor shall clean the deck to allow sounding. With Contractor supplied aerosol paint, the Engineer shall sound and mark the areas of unbonded variable thickness existing concrete overlay for removal. The Contractor shall remove by chipping all obviously loose, debonded and/or deteriorated concrete overlay (variable thickness). Chipping hammers shall not be heavier than the nominal 16 kg (35 lb) class and shall be operated at an angle of less than 45 degrees from the deck surface. Concrete shall be removed in a manner that prevents cutting, elongating or damaging reinforcing steel. Any reinforcing steel damaged shall be replaced at the Contractor's expense. Additionally, any "islands" of existing overlay that will not allow the minimum uniform thickness of new concrete overlay to be obtained shall be removed. Upon the Engineer's approval of the marked removal areas, Concrete Removal by Hydro-demolition 848.20 may be performed.

848.20 Concrete Removal by Hydro-demolition. The intent of this specification is to remove all unsound concrete, both uniform and variable depth, by using hydro-demolition, not scarification or jacking.

The entire top surface of the concrete bridge deck shall be completely removed to a depth "D" of 25 mm (1 inch) or as specified in the plans. The measurement shall be nominal and shall be taken from the Portland cement concrete surface to the mortar line.

The Contractor may choose to use conventional scarifying equipment to make an initial pass across the deck to remove a portion of the total depth, "D", required. In all cases the final 25 mm (1 inch) will be removed using hydro-demolition equipment. If the Contractor's choice of using mechanical scarifying equipment results in exposing or snagging the top mat of reinforcing steel, the scarifying equipment shall be immediately stopped and any remaining removal will be by hand chipping, if necessary, and hydro-demolition.

Damaged or dislodged reinforcing steel shall be repaired or replaced at the Contractor's expense. Replacement shall include the removal of any additional concrete required to position the new reinforcing steel at the correct height and to provide the required lap splice lengths as defined in 509.

Prior to the commencement of the removal operation with hydro-demolition, the equipment

shall be calibrated on an area of sound concrete as designated by the Engineer. In case of an existing overlay, calibration shall be performed on original deck concrete that is sound and not on any remaining concrete overlay material. After calibration, the equipment shall moved to an known unsound area to verify that all unsound concrete is removed by the established recorded settings.

The Engineer shall verify the following settings:
1. Water pressure gauge
2. Machine staging control (step)
3. Nozzle size
4. Nozzle speed (travel)

During the calibration, any or all of the above settings may be modified in order to achieve removal of all unsound concrete. The settings may be changed by the Contractor to achieve total removal of unsound concrete, but the Engineer must be notified of all changes. The Engineer may change any or all of the settings in order to achieve the goal of removing unsound concrete with hydro-demolition. The removal shall be verified, as necessary, and at least every 10 m (30 feet) along the cutting path. The readings shall be documented and, if necessary, the equipment re-calibrated to insure the goal of removing all unsound concrete with hydro-demolition is achieved.

Calibration shall be required on each structure, each time hydro-demolition is performed and as required to achieve the results specified by the plan. The depth of removal shall be verified as necessary, and at least every 10 m (30 feet) along the cutting path. The readings shall be documented and, if necessary, the equipment re-calibrated to insure the specified depth of removal.

The Contractor shall block all drains on the deck and install aggregate dams every 50 meters (150 feet) 150 mm (6 inches) high by 300 mm (1 foot) wide minimum, to strain run-off. The deck shall be used as a settlement basin within itself. A settlement basin outside or at the end of the structure is required if further straining is necessary to produce visibly clear water.

The Contractor shall provide shielding, as necessary, to insure containment of all dislodged concrete within the removal area in order to protect the traveling public from flying debris both on and under work site.

848.21 Resounding. After the hydro-demolition operation has completed the removal, and the deck is allowed to dry, the deck shall be resounded to assure that all unsound material has been removed. The final sounding of the deck shall be done by the Engineer and shall not be performed within 24 hours after a rain. In no case shall the final sounding be made unless the deck is dry. Final sounding shall consist of as many successive resoundings as required to ensure that all deteriorated and fractured concrete has been removed. Additional removal shall be performed with the hand held wand [690 bar (10000 psi) min] or 16 kg (35 lb.) maximum weight jackhammer operated at an angle of no more

than 45 degrees from horizontal. If jackhammering results in the exposure of ½ of the reinforcing steel, the adjacent concrete shall be removed to a depth that will provide a minimum 19 mm (3/4 inch) clearance around the reinforcing steel except where other reinforcing steel makes this impractical.

Aerosol spray paint for outlining shall be provided by the Contractor.

848.22 Cleaning. Cleaning shall be performed with a vacuum system capable of removing wet debris and water all in the same pass. Cleaning shall be done in a timely manner, before debris and water is allowed to dry on the deck surface. All exposed reinforcing steel which is left unsupported by the hydro-demolition process shall be adequately supported and protected from bending from all construction traffic.

All reinforcing steel damaged or dislodged by these operations shall be replaced with bars of the same size and coating at no additional cost to the State. Replacement shall include the removal of any additional concrete required to position the new reinforcing steel at the correct height and to supply the required lap splice lengths as defined in 509.

848.23 Full Depth Repair. Where the deck is sound for less than one half of its original depth, the concrete shall be removed full depth except for limited areas as may be designated by the Engineer. Forms shall be provided to support concrete placed in full-depth repair areas. The forms for areas of up to 0.4 square meter (4 square feet) may be suspended from wires from the reinforcing steel. For areas greater than 0.4 square meter (4 square feet), the forms shall be supported from the primary members of the superstructure or by shoring from below. Areas of full-depth repair shall have the concrete faces and reinforcing steel cleaned as described in 848.24

848.24 Preparation Prior to Overlay Placement.. Not more than 24 hours prior to placing the overlay, all surfaces to which the overlay is to bond, including exposed reinforcing and structural steel, the work face of a previously placed overlay, and the faces of curbs and barriers up to a height of at least 25 mm (1 inch) above the proposed overlay surface shall be blast cleaned. Exposed reinforcing and structural steel shall be cleaned to remove all loose and built-up rust, asphalt residue, and all other contaminants detrimental to achieving an adequate bond. Pockets of rust (corrosion cells) on exposed reinforcing steel shall be cleaned of all corrosion products. Areas of steel where the original hydroblasting was applied should normally be adequately cleaned but steel shall be inspected to assure cleanliness requirements are met. Suitable blast methods may include high pressure water blasting [690 bar (10000 psi) min], water blasting [less than 690 bar (10000 psi)] with abrasives in the water, abrasive blasting with containment, or vacuum abrasive blasting. Listed concrete surfaces shall be made free of spalls, latence, and all contaminants detrimental to achieving an adequate bond.

Bridge scuppers shall be cleaned of all foreign matter and plugged prior to placement of the overlay. Scuppers shall be unplugged to permit free drainage of water from the deck

surface following overlay placement.

Vehicles other than approved construction equipment will not be permitted on those sections of the deck where hydro-demolition has begun. Contamination of the deck by construction equipment or from any other source shall be prevented.

848.25 Finishing Machine Dry Run. After the screed rails have been set to proper profile and prior to placing the overlay, the Contractor shall check the finishing machine clearance to assure the Engineer that the specified nominal thickness of overlay will be attained over the entire deck.

848.26 Placing, Consolidating and Finishing. The deck surface which will contact the overlay shall be cleaned with compressed air, wetted, and kept wet for at least one hour immediately prior to placing the overlay. Any standing water shall be removed prior to placement of the overlay. The newly exposed surfaces in full-depth repair areas shall be similarly cleaned and prepared immediately prior to placing concrete.

Overlays shall be placed, consolidated and finished to the plan surface. Hand vibrators shall be used for full-depth repair, variable depth areas, at all edges and adjacent to joint bulkheads.

Concrete for full-depth repairs shall be the overlay concrete placed either simultaneously with the overlay or, if preplaced separately from the overlay operation, the concrete may be either the overlay concrete or 511 Class S Concrete. If the full-depth repair is preplaced separately, it shall be placed up to the plan lower boundary of the overlay, given a broom finish, and cured as specified in 511.14. [on a LMC or SDC overlay project, the faces of existing sound concrete shall be similarly wetted and coated with bonding grout prior to placing concrete.]

Contamination of the wetted deck by construction equipment or from any other source shall be prevented by placement of a clean 100 μm (4-mil) polyethylene sheet (or any other covering as approved by the Engineer) on the surface of the prepared deck.

Where reinforcing steel is exposed, the Contractor shall provide adequate supports for the concrete mixer so that reinforcing steel and its bond with the concrete will not be damaged by the weight and movement of the concrete mixer, or shall provide means to convey concrete from the mixer to the finishing machine.

After the overlay material has been consolidated and finished, it shall be textured transversely to provide a random pattern of grooves spaced at 10 mm to 45 mm (3/8 inch to 1 3/4 inch) centers with 50 percent of the spacings being less than 25 mm (1 inch). Grooves shall be approximately 4 mm (0.15 inches) deep and 2.5 mm (0.10 inches) wide. A strip of surface 225 to 300 mm (9 to 12 inches) wide adjacent to curbs and barriers shall

not be textured.

At the Contractor's option an evaporation retardant may be used after finishing, or after texturing, or both. This material shall not be finished into the plastic concrete at any time. Only products specifically marketed for such usage shall be utilized. The evaporation retardant shall be applied as per the manufacturer's written recommendations and shall consist of a fine mist using a suitable sprayer. Application in a stream shall not be allowed. The wet burlap cure, 848.28 or 848.29, shall follow this operation as closely as possible.

The Contractor shall stencil the date of construction (month and year) and the letters MS, LM or SD into the overlay before it takes its final set. The date shall be located in the right-hand corner of the deck at the forward abutment. It shall be placed parallel to the edge of the overlay and centered at 300 mm (1 2 inches) in from both the edge of the overlay and end finish. The numerals shall be 75 to 100 mm (3 to 4 inches) in height, 6 mm (1/4 inch) in depth and face the centerline of the roadway.

Longitudinal joints are permitted, but only to the extent necessary to accommodate the width of the finishing machine, to facilitate changes in roadway crown, and to permit maintenance of vehicular traffic, except as approved by the Engineer. Longitudinal joints shall not be used in close proximity to faces of curbs or barriers or at edges of decks. All joints in the overlay shall be formed.

Any ponding problem which is noted prior to final acceptance of the overlay shall be corrected by the Contractor at no cost to the State.

A 3 meter (10-foot) straightedge shall be used to check the overlay directly behind the finishing machine. It shall also be used to check transversely along the edges of the overlay where hand finishing is done. Any irregularities exceeding 3 mm in 3 m (1 /8 inch in 10 feet) shall be corrected immediately.

848.27 Curing. If a full-depth repair is placed separately, it shall be water-cured as described below for the applicable overlay concrete and shall have attained a modulus of rupture of 2.8 MPa (400 psi).

A cure day shall be defined as a 24-consecutive hour period of time. The temperature of the overlay surface shall be maintained above 2°C (35° F) until the curing period is completed. Any day during which the air temperature at the overlay surface fails below 7° C (45° F) shall not be counted as a cure day.

When curing is completed, all joints and abutting surfaces in the overlay shall be sealed with an approved high molecular weight methacrylate sealer meeting Supplemental Specification 954. The sealer shall be prepared and applied in accordance with the manufacturer's recommendations. Joints to be sealed shall include transverse joints in the overlay concrete, joints between overlay concrete and steel enddams, longitudinal joints between overlay concrete placements, and longitudinal joints between overlay concrete

and safety curb, barriers, parapets, bulb angles, etc. In the edges of decks without curbs, the interface between the overlay and the existing deck shall be sealed in a similar manner. Any cracking which occurs prior to opening to traffic shall be sealed as above or repaired or corrected in another manner as directed by the Engineer at no cost to the State. The deck shall be sounded and any delaminated area shall be removed and replaced at the Contractor's expense.

Any improperly cured overlay may be ordered to be removed and replaced at no cost to the State. Regardless of what type of overlay, curing shall start after the concrete has been tined and the surface will not be damaged by the cure.

848.28 Curing Application LMC Overlays. As soon as the tining operation is completed, the finished overlay surface shall be covered with a single layer of clean wet burlap. The burlap shall be kept wet by a continuous flow of water through soaker hoses and covered with a 100 μm (4-mil) white opaque polyethylene film or a wet burlap - white opaque polyethylene sheet for 48 hours. After this initial wet curing period, the covering shall be removed and the surface dry-air cured for an additional 2 days before subjecting the new surface to vehicular traffic.

Traffic will not be permitted on the finished overlay surface until after completion of the 4-day cure.

848.29 Curing Application MSC and SDC Overlays. As soon as the tinning operation is completed, the finished overlay surface shall be covered with a single layer of clean wet burlap. The fresh overlay surface shall receive a wet burlap cure for 3 days. For the entire curing period of 72 hours the burlap shall be kept wet by the continuous application of water through soaker hoses. Either a 100 μm (4-mil) white opaque polyethylene film or a wet burlap-white opaque polyethylene sheet shall be used to cover the wet burlap for the entire 72 hour period.

Traffic will not be permitted on the finished overlay surface until after completion of the 3 day wet cure.

848.30 Limitation on Placing Operations. Prior to overlay placement, the Engineer shall establish the Contractor's ability to place the overlay on a continuous basis and to consolidate, finish, texture, prior to the formation of plastic surface film, and commence curing.

When directed by the Engineer, a representative of the either the latex manufacturer or the micro-silica supplier shall be present during the proportioning, mixing, placing and finishing of the overlay. Operations and procedures which are considered by this representative to be detrimental to the integrity and durability of the repaired and overlaid bridge deck will not be permitted.

Once the finishing machine has made the first pass, workers shall not be allowed to walk in the freshly placed overlay.

No overlay concrete shall be placed when it is raining, when the ambient air temperature is below 7°C (45° F) or when it is predicted to fall below 7°C (45°F) for the duration of the curing period

Overlays shall be placed only when the overlay surface evaporation rate, as affected by ambient air temperature, concrete temperature, deck temperature, relative humidity and wind velocity, is 0.5 kg/m^2 (0.1 pound per square foot) per hour or less. The Contractor shall determine and document the atmospheric conditions, subject to verification by the Engineer. No overlay concrete shall be placed if the ambient air temperature is 29°C (85° F) or greater or predicted to go above 29 °C (85 °F) during the overlay placement regardless of the surface evaporation rate.

Figure 1 in ACI 308 (see 511.08) shall be used to determine graphically the loss of surface moisture for the overlay. In no case shall the temperature of the overlay concrete exceed 29°C (85°F) during placement. The measurement of weather parameters shall be made within 3 m (10 feet) of the placement area. No overlays shall be placed after October 15 except by specific permission of the Director.

If placement of the overlay is to be made at night, the Contractor shall submit a plan which provides adequate lighting for the work area. The plan shall be submitted at least 15 calendar days in advance and be approved by the Engineer before concrete is placed. The lights shall be so directed that they do not affect or distract approaching traffic.

During delays in the overlay concrete's placement operations of more than 10 minutes and/or when a plastic surface film develops on a LMC overlay, the work face of the overlay shall be temporarily covered with wet burlap. If an excessive delay is anticipated, a bulkhead shall be installed at the work face and the overlay placement operation terminated.

Unless otherwise authorized by the Engineer, an overlay shall not be placed adjacent to a previous overlay which has cured for less than 36 hours.

Adequate precautions shall be taken to protect the freshly placed overlay from rain.

Vehicles other than approved construction equipment will not be permitted on those sections of the deck where concrete removal operations have begun. Contamination by construction equipment or from any other source shall not be permitted.

Prior to the end of the full curing period for any section, no power driven tools heavier than a 7 kg (15 lb.) chipping hammer shall be used adjacent to the new overlay.

848.31 Sampling and Testing. After each charging of the concrete mixing unit (LMC)

or transit mixer (MSC or SDC), the following testing shall be performed by the Department: Testing shall be performed at the point of discharge onto the deck.

a. Slump
   100 mm to 150 mm [4 to 6 inches](LMC)
   150 mm +/- 50 mm [6 +/- 2 inches](MSC or SDC)
b. Unit weight
c. Air
   7% max. (LMC)
   8% +/- 2% (MSC or SDC)

d. Compressive strength cylinders shall be made for every 40 cubic meters(50 cubic yards)

The Contractor shall furnish the required materials and samples without charge to the State as per 106.03.

For LMC, with all controls set for the desired mix, activate the mixer and discharge the mixed material into a 0.25 m^3 (one-quarter cubic yard) container 1 x 1 x 0.25 m (36 x 36 x 9 inches). When the cement recording meter indicates a discharge of 97 kg (1 3/4 bags) of cement or 0.25 m^3 (1/4 cubic yard), the container should be filled flush with consolidated LMC. This test will be accepted as evidence of satisfactory performance for each truck.

848.32 Method of Measurement. Wearing Course Removed, Asphalt shall be measured as the actual square meters (square yards) of existing asphalt wearing course and waterproofing material removed and shall include all labor, materials, equipment required to complete the work.

Existing Concrete Overlay Removed ____ Nominal Thickness shall be measured as the actual square meters (square yards) of existing concrete overlay removed and shall include all labor, materials, and equipment required to complete the work.

Removal Debonded, Deteriorated Existing Variable Thickness Concrete Overlay shall be measured as the actual square meters (square yards) of marked removal areas defined in 848.19, and shall include all labor, materials, equipment, paint, to remove unsound variable thickness concrete overlays before hydro-demolition.

For measurement of quantities, the overlay is divided by a horizontal plane into two items, consisting of an upper part of uniform thickness "_____ Concrete Overlay Using Hydro-demolition (____mm (inches) thick)" and a lower part of variable thickness "_____ Concrete Overlay (Variable Thickness) - Material Only". "Full-Depth Repair with _____ Concrete" is measured as an additional separate pay item.

_____ Concrete Overlay using Hydro-demolition (____mm (inches) thick)

shall be measured as the actual deck area in square meters (square yards) overlaid. The thickness shall be as determined in 848.02 and 848.03. The bid price for this item includes the cost of furnishing, placing, finishing, texturing and curing the specified thickness overlay. Placement shall also include all labor and equipment to place the variable thickness overlay (since the variable thickness and the constant thickness overlay are placed in one operation).

Surface Preparation Using Hydro-demolition shall be measured as the actual deck area in square meters (square yards) overlaid and shall include the cost of surface preparation, hydro-demolition, milling, removal of the surface preparation debris, cleaning, and all other materials, materials, labor and equipment required to complete this work, but not specifically included in the other items for payment.

Full-Depth Repair shall be measured as the volume in cubic meters (cubic yards) based on the measured area of full-depth openings in the deck and the existing slab thickness, minus D as defined in 848.02. The bid price for this item includes the cost of removing sound concrete where the depth of sound concrete is less than half of the original thickness of the deck furnishing and installing forms and supports, furnishing and placing the overlay concrete and if the full-depth repair is preplaced, the finishing and curing required.

_____ Concrete Overlay (variable thickness) Material Only shall be the volume in cubic meters (cubic yards) measured as the difference between the total volume (as indicated by the batch quantity tickets for the ready-mix trucks) of overlay placed and accepted, less the calculated volume of the overlay concrete (plan specified thickness), less the volume of overlay concrete used for full-depth repair, and less any wasted overlay concrete. The volume of overlay concrete remaining in the drum of the last ready-mix truck shall be weighed or measured by the Engineer. The bid price for this item includes the cost of material only, furnished to the job site. No separate payment shall be made for the placement of the concrete or for any tools, labor, equipment or incidentals necessary for such placement complete and in conformance with these notes. The intent of this item is to pay material costs only for all materials, other than uniform thickness overlay material, regardless of the depth of removal incurred and including any material required for grade correction.

Concrete for the test slabs required under 848.15 shall be paid for on a lump sum basis. All other concrete for testing purposes shall be furnished without charge to the department per 106.03.

Hand chipping shall be based on the square meters (square yards) of material removed regardless of depth. Included shall be all labor and equipment required to remove unsound concrete by jackhammer or hand held wand in accordance with 848.16 and to clean the surface and remove debris accumulated as part of this operation. Further, this item is intended for unsound areas remaining after hydro-demolition and shall not include hand chipping of concrete which is inaccessible by hydro-demolition equipment.

848.33 Basis of Payment. Payment for completed and accepted quantities as measured above will be made at the contract price bid for:

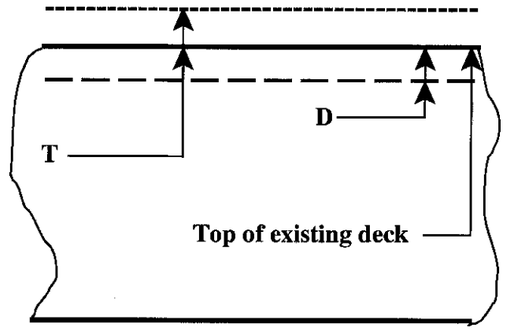
Item	Unit	Description
848	Square meter (square yard)	_____ Concrete overlay using hydro-demolition [____mm (____inch)] thick
848	Square meter (square yard)	Surface preparation using hydro-demolition
848	Cubic meter (cubic yard)	_____ Concrete overlay (variable thickness), material only
848	Square meter (square yard)	Hand chipping
848	Lump sum	Test slab
848	Cubic meter (cubic yard)	Full-depth repair
848	Square meter (square yard)	Wearing course removed, asphalt
848	Square meter (square yard)	Existing concrete overlay removed _____ nominal thickness
848	Square meter (square yard)	Removal debonded or deteriorated existing variable thickness concrete overlay

Designer's Note for Supplemental Specification 848:

For Bridge Decks with No existing Rigid overlay

1. Plan detailed finished height "T" (see section 848.02) specifying the final elevation of the MSC, SDC or LMC concrete overlay above the existing Portland cement concrete deck.

2. Plans shall specify a uniform removal depth "D" (see section 848.02) of the existing Portland cement concrete deck. Exception if "D" is to be 25 mm (1 inch) removal of existing deck.



BID ITEMS REQUIRED

1. If an asphaltic overlay is on the concrete bridge deck a bid item is required
   848 Square meter — Wearing course removed, asphalt

2. Specify the overlay. Include type (LMC, SDC or MSC), thickness( ) and quantity in square meter (square yard). The thickness is the total of "T" and "D"
   848 Square meter (square yard) — _____ Concrete overlay using hydro-demolition [____mm (____inch)] thick

3. Specify the removal quantities in square meter
   848 Square meter (square yard) — Surface preparation using hydro-demolition

4. Specify the variable thickness quantity required. Quantity shall be based on required bridge deck survey and evaluation required in section 400 of the Bridge Design Manual. Additionally type of overlay concrete (LMC, SDC or MSC) shall be specified.
   848 Cubic meter (cubic yard) — _____ Concrete overlay (variable thickness), material only

5. A nominal quantity of hand chipping shall be specified. Recommend 10% of the estimated variable thickness area of the deck (If 30% of deck is considered to require variable thickness repair the 30 x .10 = 3% of deck square yardage would be specified for hand chipping. Other methods for quantities that have been developed are acceptable.

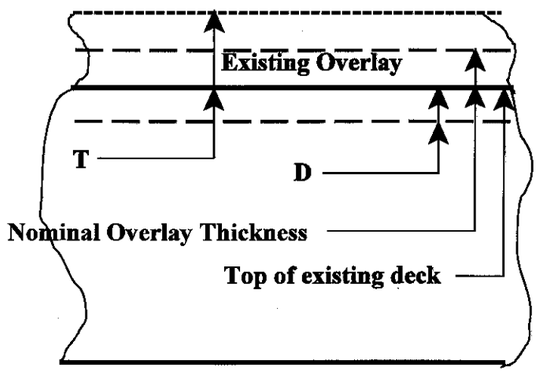
848 Square meter (square yard) Hand chipping

6. Test Slab bid item shall be included for all projects
   848 Lump sum Test slab

7. Quantities shall be specified for full depth repair based on required bridge deck evaluation. Required quantities shall be based on the definition for pay item in section 848.32.
   848 Cubic meter (cubic yard) Full-depth repair

Bridge Decks with <u>an existing Rigid overlay</u>

1. Plan detailed finished height "T" (see section 848.03) specifying the thickness of either the MSC, SDC or LMC concrete overlay. For bridge decks with an existing rigid overlay this thickness "T" is a function of the designer required finished grade and the "nominal depth" of the existing rigid concrete overlay.



2. Plans shall specify a uniform removal depth "D" (see section 848.03) of the existing Portland cement concrete deck.

3. The item "Removal of variable thickness rigid overlay" is intended to remove unsound variable thickness before the uniform hydro-demolition removal is performed.

BID ITEMS REQUIRED

1. If an asphaltic overlay is on the concrete bridge deck a bid item is required
   848 Square meter Wearing course removed, asphalt

2. A nominal depth of existing concrete overlay shall be specified in addition to the square meter(square yard) quantity. The nominal depth should be based on existing plan specified verified by actual field measured depths of the existing concrete overlay based on either cores taken during the bridge deck survey and/or additional cores or drilling performed in the field to evaluate the actual thickness of the existing concrete overlay. Contact with the original overlay project's project engineer, or other original project personnel, may be beneficial in establishing the nominal depth.
   848 Square meter (square yard) Existing concrete overlay removed _____ nominal thickness

3. A item removal of Debonded or Deteriorated Existing Variable Thickness Concrete Overlay, is intended for removal, by hand chipping, any debonded, unsound, variable thickness existing rigid concrete overlay <u>before hydro-demolition</u> is performed. The square meter (square yard) should be based on three (3) items:
   A. Original overlay project's bridge deck survey.
   B. New project's bridge deck survey depth measurement
   C. Contact with the original overlay project's project engineer and other project personnel.
   The final number will be a guess. Comparison of expected variable thickness area for the new project as compared to original project may help establish a quantity.
   848 Square meter (square yard) Removal debonded or deteriorated existing variable thickness concrete overlay

4. Specify the overlay. Include type (LMC, SDC or MSC), thickness() and quantity in square meter (square yard). The thickness is the total of T and D.
   848 Square meter (square yard) Concrete overlay using hydro-demolition [____mm (____inch)] thick

5. Specify the removal quantities in square meter
   848 Square meter (square yard) Surface preparation using hydro-demolition

6. Specify the variable thickness quantity required. Quantity shall be based on required bridge deck survey and evaluation required in section 400 of the Bridge Design Manual. Additionally type of overlay concrete (LMC, SDC or MSC) shall be specified.
   848 Cubic meter (cubic yard) _____ Concrete overlay (variable thickness), material only

7. A nominal quantity of hand chipping shall be specified. Recommend 10% of the estimated variable thickness area of the deck (If 30% of deck is considered to require variable thickness repair the 30 x .10 = 3% of deck square yardage would be specified for hand chipping. Other methods for quantities that have been developed are acceptable.
   848 Square meter (square yard) Hand chipping

8. Test Slab bid item shall be included for all projects
   848 Lump sum Test slab

9. Quantities shall be specified for full depth repair based on required bridge deck evaluation. Required

quantities shall be based on the definition for pay item in section 848.32.

848	Cubic meter (cubic yard)	Full-depth repair

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 954
HIGH MOLECULAR WEIGHT METHACRYLATE (HMWM) RESIN

September 9, 1997

The high molecular weight methacrylate (HMWM) resin shall be low viscosity, non-fuming, conforming to the following:

Viscosity	Less than 25 cps (brookfield viscometer, Model RVT with UL adaptor or Model LVF, # spindle and UL adaptor C@ 25 ºC (77 ºF) (ASTM D 2849)
Density	Greater than 8.4 lbs/gal Ca 25 ºC (77 ºF) (ASTM D 2849)
Flash Point	Greater than 93 ºC (200 ºF) (PenskyMartens CC) (ASTM D 93)
Vapor Pressure	Less than 1.0 mm Hg C@ 25 ºC (77 ºF) (ASTM D 323)
TG (DSC)	Greater than 58 ºC (135 º F) (ASTM D3418)
Shelf Life	Must be 1 year minimum at manufacturers recommended environmental considerations.
Gel Time	Greater than 40 min - 100 g mass (ASTM D 2471) (thin film)
Percent Solids	Greater than 90% by weight
Bond Strength	Greater than 10.5MPa (1500 psi) (ASTM C 882)

The resin shall be from the approved list in the Office of Materials Management.

TEMPORARY SIGN SUPPORT REQUIREMENTS

A. PLACEMENT OF SIGNS WHICH WILL REMAIN MORE THAN ONE DAY:

1) LATERAL PLACEMENT TO NEAREST EDGE OF SIGNS SHALL BE AS FOLLOWS:

   a) ON THE RIGHT SIDE OF THE ROAD FOR APPROACHING TRAFFIC (EXCEPT FOR DUAL MOUNTED SIGNS AND SIGNS DESIGNATED IN THE PLANS FOR LEFT SIDE MOUNTING).

   b) CURBED ROADWAY - MINIMUM 0.6 m BEHIND FACE OF CURB.

   c) UNCURBED ROADWAY- 3.7 m FROM EDGE OF TRAFFIC LANE OR 1.8 m FROM EDGE OF PAVED OR USEABLE SHOULDER, WHICHEVER IS GREATER.

   d) BEHIND GUARDRAIL OR BARRIER - PREFERABLY 0.6 m BEHIND FACE OF GUARDRAIL (MINIMUM 0.3 m) FOR SIGNS ON CLASS A SUPPORTS: 1.2 m FOR CLASS B OR C SUPPORTS: 0.3 m BEHIND FACE OF CONCRETE BARRIER UNLESS BARRIER TOP MOUNTING IS REQUIRED BY THE PLAN.

2) VERTICAL CLEARANCE OF SIGNS, MEASURED ABOVE ROADWAY ELEVATION: SHALL BE AS FOLLOWS:

   a) RURAL - 1.5 m WHEN PARKED CARS, CONSTRUCTION EQUIPMENT, ETC WILL NOT OBSCURE SIGN VISIBILITY.

   b) RURAL AREAS WITH PARKED CARS OR CONSTRUCTION EQUIPMENT - 2.1 m

   c) URBAN - 2.1 m

   d) CARE SHALL BE TAKEN TO ASSURE THAT SIGNS WILL NOT BE OBSCURED BY CONSTRUCTION EQUIPMENT, TREES, WEEDS OR OTHER OBSTACLES. BRUSH, WEEDS OR GRASS WITHIN THE RIGHT OF WAY SHALL BE TRIMMED AS NECESSARY. SIGNS SHALL NORMALLY BE VISIBLE TO TRAFFIC 122 m TO 183 m IN ADVANCE OF THE SIGN.

3) SUPPORTS FOR SIGNS WHICH WILL REMAIN IN PLACE MORE THAN ONE DAY SHALL BE FIXED RATHER THAN PORTABLE EXCEPT IN SITUATIONS WHERE THE SIGN MUST REST ON PERMANENT PAVEMENT OR OTHER SURFACE WHICH WOULD BE DAMAGED BY INSERTION OF POST TYPE SUPPORTS.

B. PLACEMENT OF SIGNS WHICH WILL REMAIN FOR ONE DAY OR LESS:

1) SAME AS A-1 ABOVE EXCEPT THAT SIGNS MAY BE PLACED ON THE ROADWAY ONLY IF THEY DO NOT INTRUDE INTO A TRAFFIC LANE IN USE.

2) MINIMUM OF 0.3 m ABOVE ROADWAY

C. CLASSES OF SUPPORTS:

ALL TEMPORARY SIGN SUPPORTS SHALL BE OF THE FOLLOWING TYPES:

1) CLASS A:

SUPPORTS SHALL BE USED FOR EXPOSED LOCATIONS ON HIGHWAYS WHERE TRAFFIC APPROACH SPEEDS OF 40 MPH AND HIGHER ARE ENCOUNTERED. THEY ARE ALSO SUITABLE FOR USE IN ALL OTHER LOCATIONS.

2) CLASS B:

SUPPORTS SHALL BE USED FOR EXPOSED LOCATIONS ON HIGHWAYS WHERE TRAFFIC APPROACH SPEEDS OF LESS THAN 40 MPH ARE ENCOUNTERED. THEY ARE ALSO SUITABLE FOR USE IN ALL APPLICATIONS DEFINED FOR CLASS C SUPPORTS.

3) CLASS C:

SUPPORTS MAY ONLY BE USED WHERE FULLY PROTECTED BY GUARDRAIL, CONCRETE BARRIER AND IN LOCATIONS POSITIVELY PROTECTED FROM TRAFFIC SUCH AS ON RETAINING WALLS OR WHERE TRAFFIC APPROACH SPEEDS ARE LESS THAN 25 MPH.

D. TRAFFIC APPROACH SPEEDS:

TRAFFIC APPROACH SPEEDS SHALL BE THE LOCALLY POSTED SPEED (NOT ADVISORY SPEED SIGNS) OR THE MEASURED ACTUAL (85TH PERCENTILE) SPEED (IF AVAILABLE) OF APPROACHING TRAFFIC, WHICHEVER IS HIGHER, ADJACENT TO THE SIGN LOCATION.

TABLE

APPROACH SPEED (MPH)	COMPLETELY PROTECTED BY GUARDRAIL OR BARRIER	PARTLY PROTECTED BY GUARDRAIL OR BARRIER *	GREATER THAN 9 m FROM EDGE OF PAVEMENT	WITHIN 9 m FROM EDGE OF PAVEMENT
40 AND HIGHER	A, B OR C	A OR B	A OR B **	A ONLY
26 TO 39	A, B OR C	A OR B	A OR B	A OR B
0 TO 25	A, B OR C	A, B OR C	A, B OR C	A, B OR C

* IF SUPPORTS ARE BEHIND GUARDRAIL BUT NOT FULLY 1.7 m BEHIND FACE OF RAIL OR IF SIGN IS NOT 0.3 m BEHIND FACE OF CONCRETE BARRIER.

** 9 m CRITERION IS BASED UPON STRAIGHT ROADWAY AND A SLOPE OF 6 to 1 OR FLATTER. SUPPORTS ON THE OUTSIDE OF CURVES OR LOCATED DOWN A SLOPE (STEEPER THAN 6 : 1) WILL REQUIRE USE OF CLASS A SUPPORTS.

E. BALLASTING

BALLASTING OF PORTABLE SUPPORTS SHALL BE WITH SANDBAGS PLACED WITHIN 0.3 m OF THE GROUND. IN NO CASE SHALL HARD OBJECTS BE USED FOR BALLAST.

F. STRENGTH OF SIGN SUPPORTS

THE CONTRACTOR SHALL CHOOSE SIGN SUPPORTS OF ADEQUATE STRENGTH AND WITH ADEQUATE FOUNDATIONS AND ANCHORAGE TO SUPPORT THE SIGN SIZES ERECTED. PROPRIETARY DEVICES SHALL NOT BE LOADED BEYOND THE LIMITS RECOMMENDED BY THE MANUFACTURER. SLIP-BASE TYPE BREAKAWAY BEAM CONNECTIONS SHALL BE AT LEAST PARTIALLY EMBEDDED IN CONCRETE CONSISTING OF A 0.3 m DEEP BY 0.3 m DIAMETER COLLAR. SIGN SUPPORTS WHICH FAIL UNDER TYPICAL WIND LOAD CONDITIONS SHALL BE IMMEDIATELY MODIFIED OR REPLACED WITH A SUPPORT OF ADEQUATE STRENGTH.

G. PROHIBITED SUPPORTS

THE FOLLOWING SUPPORT TYPES SHALL NOT BE PERMITTED ON PROJECTS:

1) SUPPORTS FABRICATED FROM AUTOMOTIVE AXLE DIFFERENTIAL ASSEMBLIES AND SIMILARLY HEAVY ASSEMBLIES WHICH CANNOT BE CONSIDERED BREAKAWAY TYPE.

2) SUPPORTS CONSISTING OF VERTICAL POSTS WITH ANGLED BRACES MADE FROM DRIVEPOST OR OTHER RIGID ELEMENTS.

CLASS A SUPPORTS

FIXED SUPPORTS

1) ALL #2 AND #3 POST WHEN INSTALLED SINGLY OR IN PAIRS (SIDE BY SIDE) ACCORDING TO THE DETAILS OF TC-41.20M. THE NUMBER OF SUPPORTS SHALL BE AS SHOWN ON TC-52.10M AND TC-52.20M.

2) THE FOLLOWING POST TYPES, WHEN INSTALLED SINGLY, BY IMBEDMENT OR DRIVING INTO EARTH TO A DEPTH OF ABOUT 1.1 m.

   a) - UP TO 102 X 102 mm WOOD.

   b) - UP TO 51 mm DIAMETER SCHEDULE 40 STEEL PIPE.

   c) - UP TO 76 mm DIAMETER SCHEDULE 40 ALUMINUM PIPE.

   d) - UP TO 56.4 mm SQUARE, 12 GAUGE WALL, PUNCHED STEEL POST.

   e) - UP TO 152 X 203 mm WOOD WITH BREAKAWAY HOLES SHOWN BELOW.

3) THE FOLLOWING POST TYPES WHEN INSTALLED IN PAIRS (SIDE BY SIDE) WITH LESS THAN 2 m BETWEEN POSTS, BY IMBEDMENT OR DRIVING INTO EARTH TO A DEPTH OF ABOUT 1.1 m :

   a) - UP TO 102 X 102 mm WOOD.

   b) - UP TO 51mm DIAMETER SCHEDULE 40 STEEL PIPE.

   c) - UP TO 76 mm DIAMETER SCHEDULE 40 ALUMINUM PIPE.

   d) - UP TO 51 mm SQUARE, 14 GAUGE WALL, PUNCHED STEEL POST.

4) FIXED TYPE III BARRICADES:

5) ALL BREAKAWAY CONNECTION BEAM SUPPORTS, WHEN INSTALLED ACCORDING TO THE PROPER DETAILS SHOWN ON TC-41.10M WITH A MINIMUM CLEAR DISTANCE BETWEEN SUPPORTS OF 2.1 m FOR SUPPORTS LARGER THAN W6 X 9.

6) ANY BREAKAWAY POST OR POST AND CONNECTION WHICH HAS BEEN CRASH TESTED AND APPROVED BY THE FHWA AS SATISFYING THE BREAKAWAY CRITERIA DESCRIBED IN 630.06.

(CONTINUED ON MT-105.11M)

METRIC

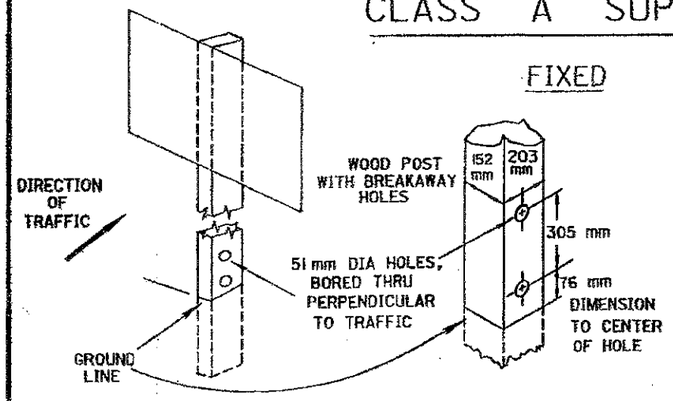
BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

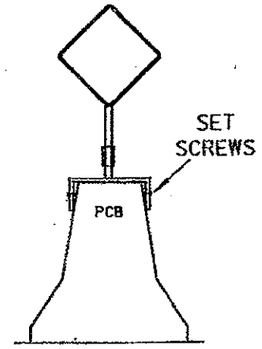
MAINTENANCE OF TRAFFIC	DATE 04/25/94
TEMPORARY SIGN SUPPORT	
STANDARD CONSTRUCTION DRAWING MT-105.10M	
APPROVED Jay Braga ENGR. OF DESIGN SERVICES	

WCC

CLASS A SUPPORTS

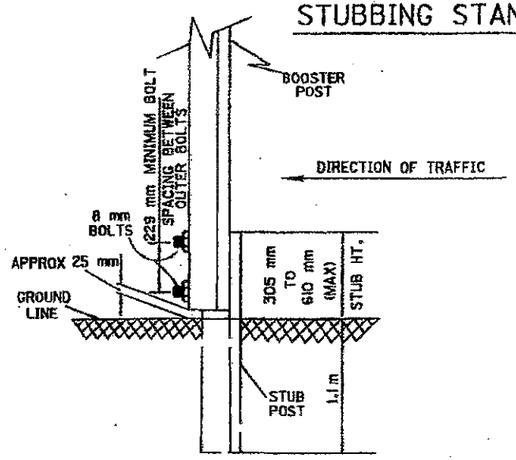
FIXED





CLASS A SUPPORTS

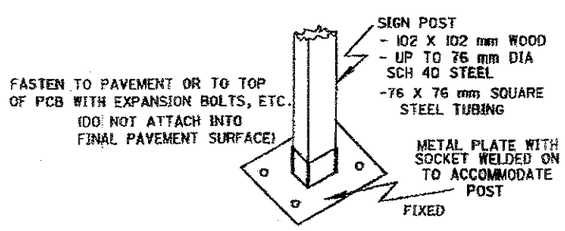
STUBBING STANDARD

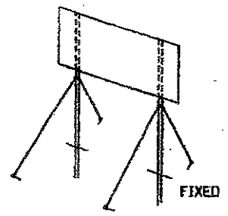


NOTES

1. FOR USE WITH #3 POST OR SMALLER ONLY
2. BOLTS SHALL BE STEEL OR ALUMINUM
3. A MINIMUM OF TWO FASTENERS SHALL BE USED PER ASSEMBLY
4. BOOSTER POST SHALL BE MOUNTED BEHIND STUB POST
5. BOOSTER POST SHALL BE THE SAME OR 1.5 kg/m LESS THAN STUB POST

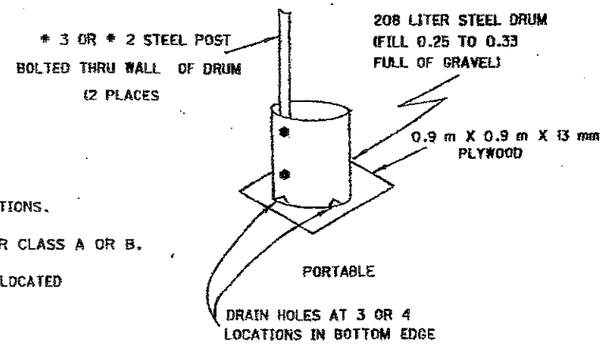
CLASS B SUPPORTS





ANY CLASS A SIGN POST WITH GUY WIRES ADDED TO INCREASE SIGN CARRYING ABILITY. (GUY WIRES SHALL NOT BE HEAVIER THAN 3.2 mm DIA. BRAIDED CABLE. GUY ANCHORS SHALL NOT EXTEND MORE THAN 152 mm ABOVE GROUND SURFACE).

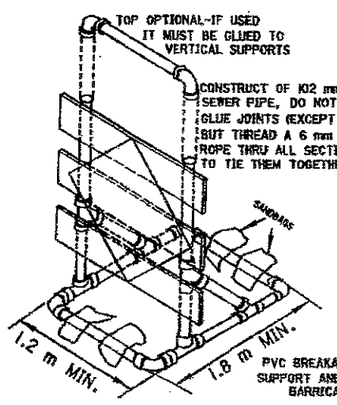
CLASS C SUPPORTS

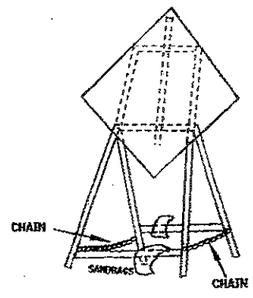


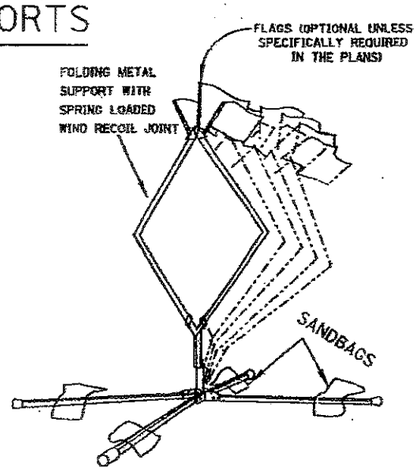
1. ALL BEAM TYPE SUPPORTS WITHOUT BREAKAWAY CONNECTIONS.
2. SUPPORTS SIMILAR TO BUT LARGER THAN PERMITTED FOR CLASS A OR B.
3. THE STEEL DRUM(S) SHOWN BELOW MAY BE USED ONLY WHEN LOCATED BEHIND GUARDRAIL OR BARRIER.

CLASS A SUPPORTS

PORTABLE







NOTES

RAIL MATERIALS:

25 X 203 mm OR 51 X 203 mm COMMON LUMBER
203 mm X (16 mm TO 25 mm) THICK EXTERIOR PLYWOOD
EXTRUDED PLASTIC OR FORMED SHEET METAL WITH A 203 mm WIDE SURFACE AND OF SUFFICENT STIFFNESS TO RESIST TYPICAL WIND LOADS OF UP TO 147 kg/m², BUT HAVING A WEIGHT OF NOT MORE THAN 7.5 kg/m.

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF THE OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

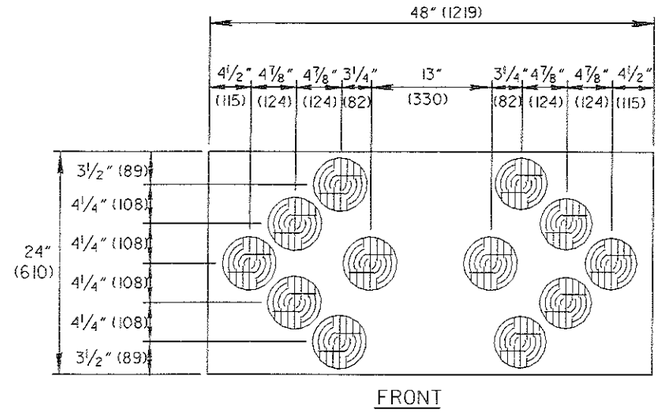
DATE 04/25/94

TEMPORARY SIGN SUPPORT

STANDARD CONSTRUCTION DRAWING MT-105.11M

APPROVED _____ ENGR. OF DESIGN SERVICES

WCC



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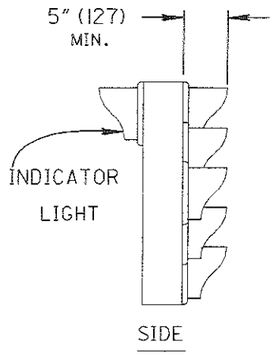
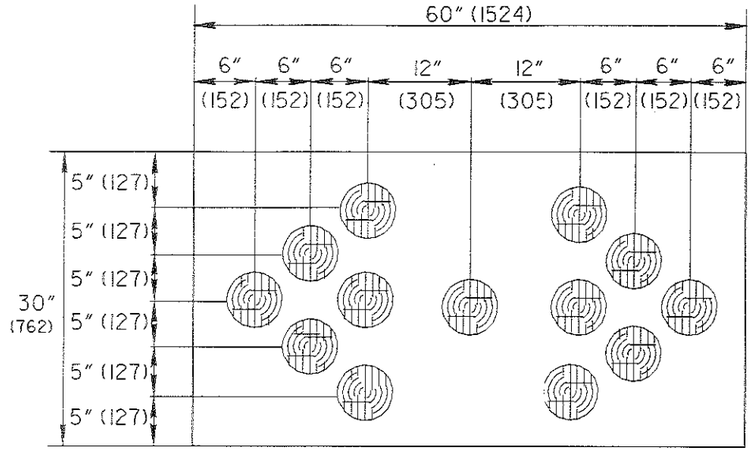


SIDE

TYPE A PANEL



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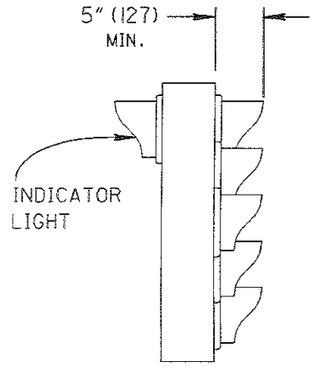
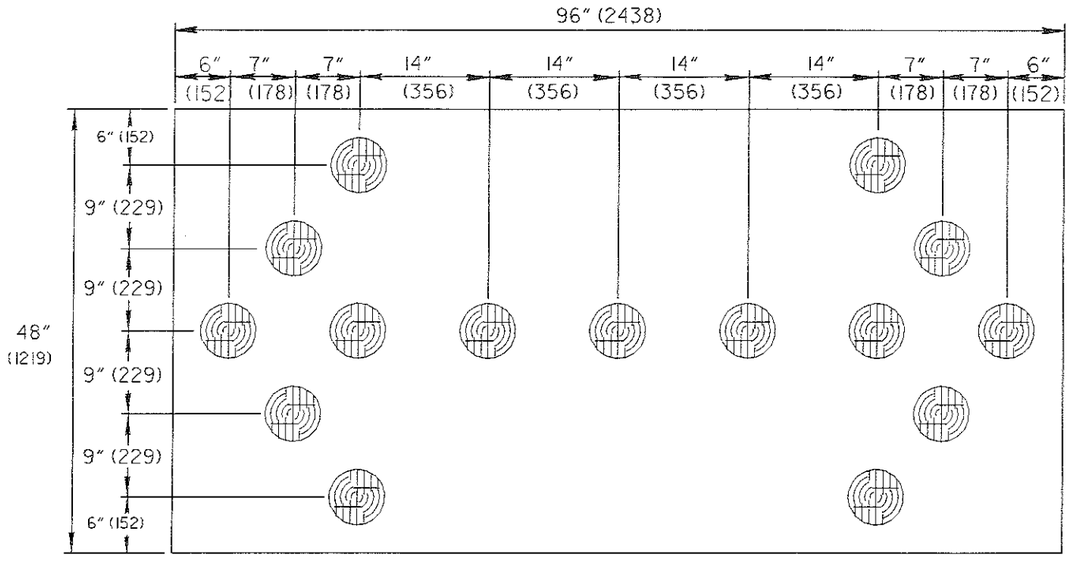


SIDE

TYPE B PANEL



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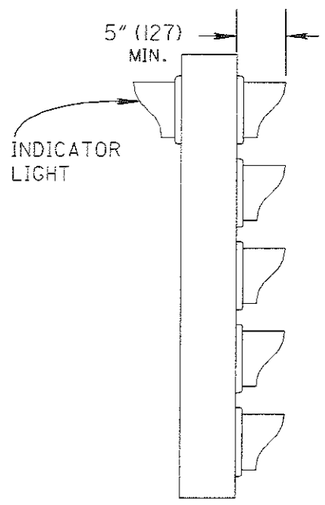


SIDE

TYPE C PANEL

ALL DIMENSIONS IN PARENTHESES ARE IN MILLIMETERS, UNLESS NOTED OTHERWISE.

4-20-01

FLASHING ARROW PANEL

OFFICE OF TRAFFIC ENGINEERING

MT-35.10

FLASHING ARROW PANEL

The flashing arrow panel shall consist of the following components:

A. flasher panel

B. lamps

C. controls

D. power supply

E. mounting

A. Flasher panel

The flasher panel shall be of exterior type plywood or corrosion resistant metal construction of adequate design and strength. The panel finish shall be flat black.

A flasher panel shall be one of three sizes. The type A panel shall be a nominal 24" (610 mm) high by 48" (1219 mm) wide. Type B shall be a nominal 30" (762 mm) high by 60" (1524 mm) wide. Type C shall be a nominal 48" (1219 mm) high by 96" (2438 mm) wide.

Flashing arrow panels shall normally utilize high output (4412A and 4415A) lamps powered by an engine driven generator when permitted by the plans. The contractor may also furnish units powered by a solar array and batteries or only batteries. However, these units shall not be used where the approaching traffic would be on a horizontal curve in excess of 3 degrees. These units shall not be used if the approaching traffic, closer tha 1 mile (1.6 km) [1/2 mile (.8 km) where speed limits are less than 40 MPH], is more than 5½ degrees horizontally or 2 degrees vertically from the central axis of the lens units.

B. Lamps

For engine powered generator units, lamps shall be ANSI Number 4412a (PAR 46) for type B and C and 4415a (PAR 36) for type A. The lamp shall be fitted with an upper hood of not less than 180° at least 5 " (127 mm) long. Arrow panels may use a lower power (wattage) lamp than the standard arrow panels. The lamps shall be approximately 5" (127 mm) diameter with a parabolic reflector. The lamp shall provide improved light distribution control by means of high quality reflectors and refractors. The light output from each lamp of the arrow shall not be less than shown in figure 1 when operating at full daytime brightness.

The lamps shall be securely mounted and positioned in the panel perpendicular to the panel face and oriented so that the lamp location lug (on back of the lamp) is on the horizontal center line through the lens. The lug will be on the right side of the lamp as viewed from the front.

The lamps shall be wired in circuits that can be switched to display any one of the folowing messages: left arrow, right arrow, left and right, and caution bar. A minimum of three indicator lights shall be placed on the back of the panel to indicate which message mode is in operation.

Each panel shall contain the following number of lamps as a minimum: type A-12 lamps, type B-13 lamps, type C-15 lamps.

CANDLE POWER CHART

				100					4°
		100	150	200	150	100			2°
100	150	200	250	350	250	200	150	100	0° HORIZONTAL
		100	150	200	150	100			- 2°
				100					- 4°
10°	7.5°	5°	2.5°	0°	2.5°	5°	7.5°	10°	
LEFT				CENTER				RIGHT	

(1) Measurements expressed in candela.
(2) Color of output light shall be yellow to light yellow.

Figure 1

C. Controls

Each flashing arrow panel shall contain a flasher control and a dimmer control unit housed in a cabinet which can be locked.

1. Flasher control

The flash rate for the sign panel shall be 25 to 40 flashes per minute. The flasher shall not cause electromagnetic interference. The lamps shall have a minimum "on time" of 50% and a maximum of 66%.

2. Dimmer control

Lamp intensity shall be variable by means of a photoelectrically controlled circuit which shall reduce lamp output during low ambient light conditions. Lamp intensity shall be at the nighttime level whenever the ambient illumination is in or below the range 2 foot-candle (21 lux) to 5 foot-candle (54 lux) and shall be at daytime level when ambient illumination is in or above the range 5 foot-candle (54 lux) to 10 foot-candle 108 (lux). If controls provide for continuous adjustment of lamp intensity with respect to ambient illumination, then lamp intensity shall increase linearly from nightime intensity at 5 foot-candle (54 lux) to daytime intensity at 3250 foot-candle (35,000 lux). A time delay shall be built into the control to prevent false operation due to light flashes. The photoelectric control shall contain a switch which shall override the photoelectric control.

D. Power supply

The flashing arrow panel shall operate from power sources capable of continuously furnishing the proper voltage to the lamps a minimum of 24 hours without attendance.

D. Cont.

Motor generators, if used shall be of modern design to provide low emission of pollutants and shall be properly muffled. The motor generator shall be enclosed in a mesh enclosure which can be locked. The fuel tank shall have a cap which can be locked. Motor generators supplying power to a flashing arrow sign shall not be used to supply power to other equipment. Gasoline fueled engines shall not be used.

Battery and solar/battery units shall have a no-charge-life of not less than 15 days. No-charge-life is the number of consecutive days that the system can continue to function (double arrow mode, normal dimming during 12 hour night, full output during 12 hour day) starting with a full battery charge and with no additional charge being provided by the solar cells. The no-charge-life may be based upon calculations providing that manufacturer's ratings and efficiency calculations are furnished for each major component.

E. Mounting

The flashing arrow panel may be trailer or vehicle mounted or mounted on a rigid supporting device suitable for maintaining it in the designated position. Each of the mounting methods shall be suitably stable such as to prevent movement due to high winds or passage of large vehicles.

When a trailer is used, construction shall be such as to transport the flashing arrow panel and appurtances adequately and legally as well as support them properly during operation. The trailer shall be equipped with devices which shall provide leveling and stability during operation.

Minimum arrow panel mounting height shall be 7 feet (2.1 m) above the pavement surface (measured to the bottom of the panel).

Use and operation

The flashing arrow panel shall be located as shown in the maintainence of traffic drawings or as directed by the Engineer and operated continuously during traffic maintained periods. The Contractor shall supply all fuel, lubricants and parts necessary to obtain continuous operation and shall provide all service. The Contractor shall inspect the operation of the unit daily, including weekends and holidays. The Contractor shall arrange with the Engineer, an acceptable method of obtaining service for a malfunctioning panel within 30 minutes of a reported malfunction. Lamp intensity shall be adjusted to provide minimum legibility distances of ½ mile (.8 km) type A, ¾ mile (1.21 km) type B and 1 mile (1.6 km) type C.

Type C panels shall be used for stationary operations on high speed 55 MPH or greater, high volume roadways. Type B shall be used for stationary operations on intermediate speed 40-50 MPH facilities, and type A on low speed 20-35 MPH facilities.

In addition, type B panels shall be used for moving operations on freeways and expressways and type A for moving operations on other facilities.

Battery and solar/battery units shall be fully charged when first set up. They shall have gauges to indicate approximate battery charge remaining. The Contractor shall verify daily that the unit is operating satisfactorily and the remaining battery charge is sufficient for at least 2 more days.

Flashing arrow panels are not to be used on two lane-two way roadways.

When left unattended the control cabinet, motor generator enclosure and fuel tank shall be locked.

Type A and type B panels used in moving operations may be powered by the vehicle's electrical system but shall not be left unattended when so powered.

When not in use, the flashing arrow panel shall be stored at a location which will not be hazardous to traffic or pedestrians.

The panels shall be designed for operation in 100% humidity and temperatures from -20 to + 130 degrees Fahrenheit (-29 to + 54 degrees Celsius).

JAM

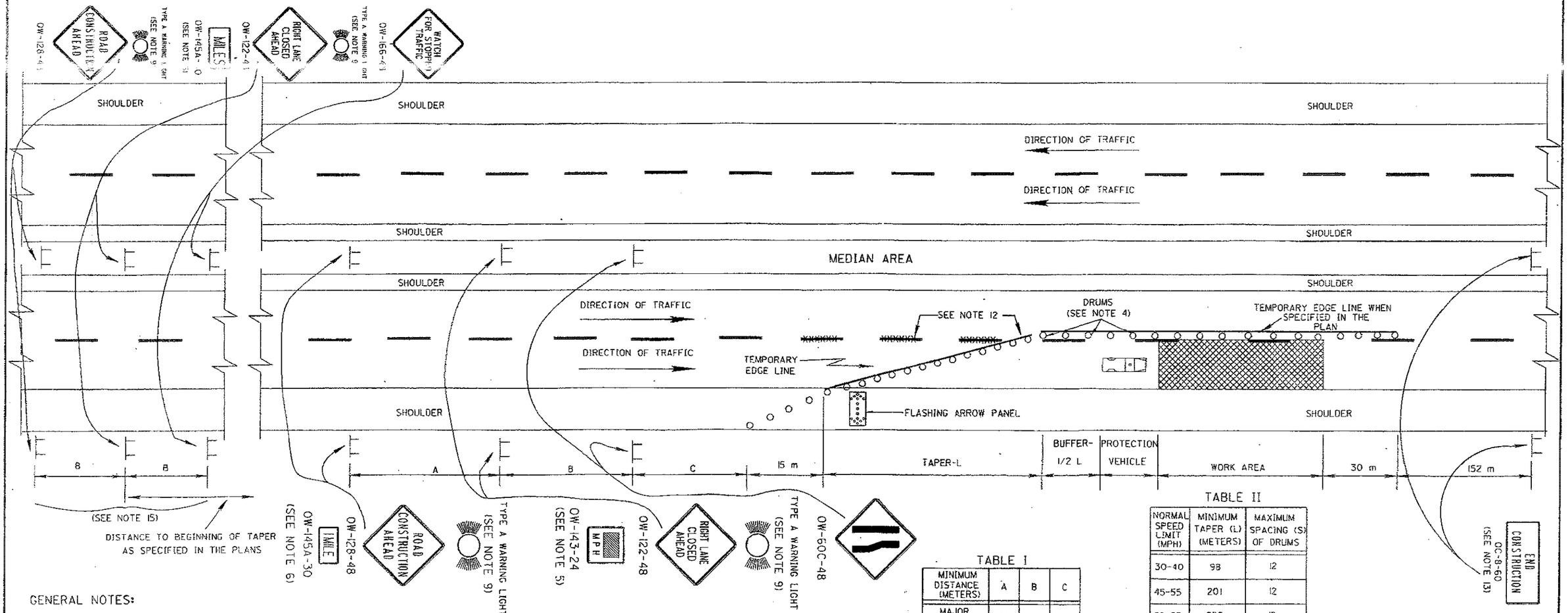


TABLE I

MINIMUM DISTANCE (METERS)	A	B	C
MAJOR STANDARD	152	152	152
URBAN FREEWAY & EXPRESSWAY	152 TO 305	152 TO 305	152 TO 305
RURAL FREEWAY & EXPRESSWAY	792	488	305

TABLE II

NORMAL SPEED LIMIT (MPH)	MINIMUM TAPER (L) (METERS)	MAXIMUM SPACING (S) OF DRUMS
30-40	98	12
45-55	201	12
60-65	238	18

GENERAL NOTES:

1. THE LOCATION OF THE MERGING TAPER AND THE ADVANCE WARNING SIGNS SHOULD BE ADJUSTED TO PROVIDE FOR ADEQUATE SIGHT DISTANCE FOR THE EXISTING VERTICAL AND HORIZONTAL ROADWAY ALIGNMENT.

2. THE SPACING BETWEEN PROPOSED SIGNS SHOULD BE ADJUSTED TO NOT CONFLICT WITH AND TO PROVIDE A MINIMUM OF 61m CLEARANCE TO EXISTING SIGNS.

3. THE TAPER LENGTH (L) AND SPACING (S) OF DRUMS SHALL CONFORM TO TABLE II. DRUM SPACING (S) SHALL BE USED FOR THE MERGING TAPER, THE BUFFER AREA AND FOR THE FIRST 305 m OF THE WORK AREA AND AT OTHER HAZARDOUS LOCATIONS AS DIRECTED BY THE ENGINEER. THE MAXIMUM DRUM SPACING FOR THE BALANCE OF THE WORK AREA IS TO BE TWO TIMES THE SPACING (S) IN TABLE II. A MINIMUM OF 5 DRUMS SHALL BE USED TO CLOSE THE SHOULDER.

4. CONES HAVING A MINIMUM HEIGHT OF 0.7 m MAY BE SUBSTITUTED FOR DRUMS FOR DAYTIME LANE CLOSURES. PROVISIONS SHALL BE MADE TO SAFELY STABILIZE THE CONES TO PREVENT THEM FROM BLOWING OVER. IF THIS CANNOT BE ACHIEVED, DRUMS SHALL BE USED.

5. THE ADVISORY SPEED SIGN OW-143 SHALL BE USED WHEN SPECIFIED IN THE PLAN.

6. THE DISTANCE PLATE OW-145A SHALL INDICATE THE DISTANCE TO THE BEGINNING OF THE MERGING TAPER (L). DISTANCES LESS THAN ONE MILE MAY BE EXPRESSED IN FEET. THE PLAQUE MAY BE OMITTED IF EXTRA ADVANCE SIGN GROUPS ARE NOT USED.

7. THE PROTECTION VEHICLE, LOCATED CLOSE TO THE WORK, SHALL BE IN PLACE AND UNOCCUPIED WHENEVER WORKERS ARE IN THE WORK AREA. THIS VEHICLE SHALL BE REMOVED FROM THE PAVEMENT WHENEVER WORKERS ARE NOT IN THE WORK AREA. THE VEHICLE SHALL BE EQUIPPED WITH A 360 DEGREE ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE A MINIMUM OF 402 m. OTHER PROTECTIVE DEVICES MAY BE USED IN LIEU OF THE PROTECTION VEHICLE SHOWN WHEN APPROVED BY THE ENGINEER.

8. THE FLASHING ARROW PANEL SHALL MEET REQUIREMENTS OF STANDARD CONSTRUCTION DRAWING TC-35.10M.

9. TYPE A FLASHING WARNING LIGHTS SHOWN ON THE OW-128 AND OW-122 - (123) SIGNS ARE REQUIRED WHENEVER A NIGHT LANE CLOSURE IS NECESSARY

10. WHEN WORK IS BEING PERFORMED IN THE LANE ADJACENT TO THE MEDIAN ON A DIVIDED HIGHWAY, OW-123 SIGNS SHALL BE SUBSTITUTED FOR THE OW-122 SIGNS AND OW-60D SIGNS SHALL BE SUBSTITUTED FOR THE OW-60C SIGNS.

11. 36 INCH WARNING SIGN SIZES MAY BE USED ON DIVIDED ROADWAYS THAT ARE NOT CLASSIFIED AS FREEWAYS OR EXPRESSWAYS.

12. IF THE CONSTRUCTION OPERATION REQUIRES THE LANE CLOSURE FOR MORE THAN ONE DAY THEN THE EXISTING CONFLICTING PAVEMENT MARKINGS AND REFLECTORS FROM THE RAISED PAVEMENT MARKERS (RPMS) SHALL BE REMOVED AND THE APPROPRIATE COLOR TEMPORARY EDGE LINES SHALL BE APPLIED ALONG THE TAPER. TEMPORARY EDGE LINES WHICH WOULD CONFLICT WITH FINAL TRAFFIC LANES SHALL BE REMOVABLE (740.05 TYPE C) TAPE UNLESS

12. CONT. THE AREA WILL BE RESURFACED IN THE NEXT WORK PHASE. AFTER COMPLETION OF THE WORK, PAVEMENT MARKINGS OTHER THAN 740.05 TYPE C SHALL BE REMOVED IN ACCORDANCE WITH 641.10. THE ORIGINAL MARKINGS AND PAVEMENT MARKER REFLECTORS SHALL BE RESTORED AT NO ADDITIONAL COST.

13. THE OC-8 SIGNS ARE ONLY REQUIRED FOR LANE CLOSURES OF MORE THAN ONE DAY AND MAY BE OMITTED IF THEY FALL WITHIN THE LIMITS OF A CONSTRUCTION PROJECT.

14. OW-128 SIGNS SHALL BE PROVIDED ON ENTRANCE RAMPS AND/OR SIDE ROADS LOCATED WITHIN THE WORK LIMITS OR THE ADVANCE WARNING SIGN GROUP. WITHIN THE LENGTH OF CLOSURE, PROVISION SHALL BE MADE TO CONTROL TRAFFIC ENTERING FROM INTERSECTING STREETS AND DRIVEWAYS. THREE DRUMS SHALL BE PLACED ON EACH SIDE ACROSS THE CLOSED LANE AT EACH INTERSECTION AND DRIVEWAY.

15. EXTRA ADVANCE WARNING SIGN GROUPS CONSISTING OF OW-128, OW-122 AND OW-166 SIGNS PLUS DISTANCE PLATES MAY BE SPECIFIED IN THE PLANS OR REQUIRED TO BE ERECTED AT THE DIRECTION OF THE ENGINEER.

16. ALL MATERIAL AND EQUIPMENT SHALL BE REMOVED FROM THE CLOSURE AND THE WORK AREA WHEN NO WORK IS BEING DONE.

METRIC

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

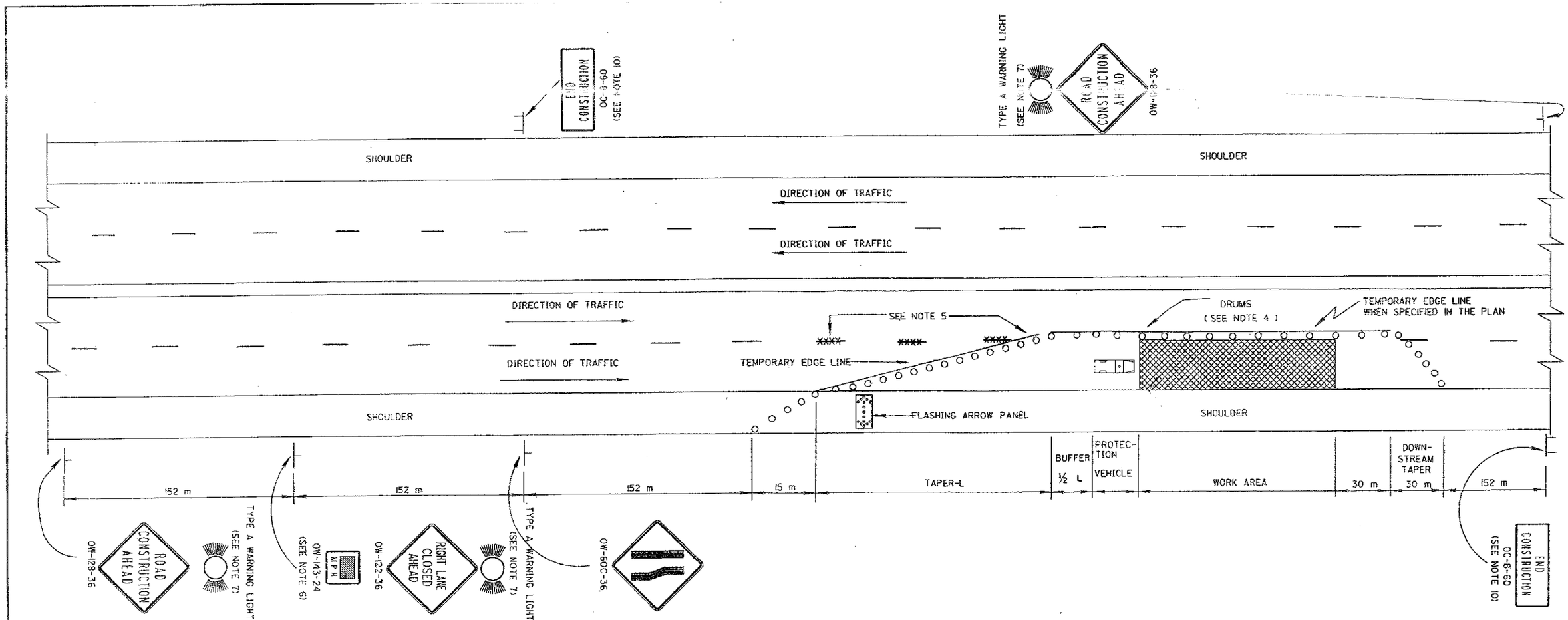
DATE 04/25/94

CLOSING RIGHT OR LEFT LANE OF A MULTI-LANE DIVIDED HIGHWAY WITH DRUMS

STANDARD CONSTRUCTION DRAWING MT-95.30M

APPROVED _____ ENGR. OF DESIGN SERVICES

WCC



GENERAL NOTES:

1. THE LOCATION OF THE MERGING TAPER AND THE ADVANCE WARNING SIGNS SHOULD BE ADJUSTED TO PROVIDE FOR ADEQUATE SIGHT DISTANCE FOR THE EXISTING VERTICAL AND HORIZONTAL ROADWAY ALIGNMENT.

2. THE SPACING BETWEEN PROPOSED SIGNS SHOULD BE ADJUSTED TO NOT CONFLICT WITH AND TO PROVIDE A MINIMUM OF 61 m CLEARANCE TO EXISTING SIGNS.

3. THIS TAPER LENGTH (L) AND SPACING (S) OF DRUMS SHALL CONFORM TO TABLE I. DRUM SPACING (S) SHALL BE USED FOR THE MERGING TAPER, THE BUFFER AREA AND FOR THE FIRST 305 m OF THE WORK AREA AND AT OTHER HAZARDOUS LOCATIONS AS DIRECTED BY THE ENGINEER. THE MAXIMUM DRUM SPACING FOR THE BALANCE OF THE WORK AREA IS TO BE TWO TIMES THE SPACING (S) IN TABLE I. A MINIMUM OF 5 DRUMS SHALL BE USED TO CLOSE THE SHOULDER AND THE DOWNSTREAM TAPER.

4. CONES HAVING A MINIMUM HEIGHT OF 0.7 m MAY BE SUBSTITUTED FOR DRUMS FOR DAYTIME LANE CLOSURES. PROVISIONS SHALL BE MADE TO SAFELY STABILIZE THE CONES TO PREVENT THEM FROM BLOWING OVER. IF THIS CANNOT BE ACHIEVED, DRUMS SHALL BE USED.

5. IF THE CONSTRUCTION OPERATION REQUIRES THE LANE CLOSURE FOR MORE THAN ONE DAY THEN THE EXISTING CONFLICTING PAVEMENT MARKINGS AND REFLECTORS FROM THE RAISED PAVEMENT MARKERS (RPMS) SHALL BE REMOVED AND THE APPROPRIATE COLOR TEMPORARY EDGE LINES SHALL BE APPLIED ALONG THE TAPER. TEMPORARY EDGE LINES WHICH WOULD CONFLICT WITH FINAL TRAFFIC LANES SHALL BE REMOVABLE (740.05 TYPE C) TAPE UNLESS THE

5. CONT. AREA WILL BE RESURFACED IN THE NEXT WORK PHASE. AFTER COMPLETION OF THE WORK, PAVEMENT MARKINGS OTHER THAN 740.05 TYPE C SHALL BE REMOVED IN ACCORDANCE WITH 641.10. THE ORIGINAL MARKINGS AND PAVEMENT MARKER REFLECTORS SHALL BE RESTORED AT NO ADDITIONAL COST.

6. THE ADVISORY SPEED SIGN OW-143 SHALL BE USED WHEN SPECIFIED IN THE PLAN.

7. TYPE A FLASHING WARNING LIGHTS SHOWN ON THE OW-128 AND OW-122 SIGNS ARE REQUIRED WHENEVER A NIGHT LANE CLOSURE IS NECESSARY.

8. THE FLASHING ARROW PANEL SHALL MEET REQUIREMENTS OF STANDARD CONSTRUCTION DRAWING TC-35.10M.

9. THE PROTECTION VEHICLE SHOWN AT THE BEGINNING OF THE WORK AREA SHALL BE IN PLACE AND UNOCCUPIED WHENEVER WORKERS ARE IN THE WORK AREA. THIS VEHICLE SHALL BE REMOVED FROM THE PAVEMENT WHENEVER WORKERS ARE NOT IN THE WORK AREA. THE VEHICLE SHALL BE EQUIPPED WITH A 360 DEGREE ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE A MINIMUM OF 402 m. OTHER PROTECTIVE DEVICES MAY BE USED IN LIEU OF THE PROTECTION VEHICLE SHOWN WHEN APPROVED BY THE ENGINEER.

10. THE OC-8 SIGNS ARE ONLY REQUIRED FOR LANE CLOSURES OF MORE THAN ONE DAY AND MAY BE OMITTED IF THEY FALL WITHIN THE LIMITS OF A CONSTRUCTION PROJECT.

11. OW-128 SIGNS SHALL BE PROVIDED ON ENTRANCE RAMPS AND/OR SIDE ROADS LOCATED WITHIN THE WORK LIMITS OR THE ADVANCE WARNING SIGN GROUP. WITHIN THE LENGTH OF CLOSURE, PROVISION SHALL BE MADE TO CONTROL TRAFFIC ENTERING FROM INTERSECTING STREETS AND DRIVEWAYS. THREE DRUMS SHALL BE PLACED ON EACH SIDE ACROSS THE CLOSED LANE AT EACH INTERSECTION AND DRIVEWAY.

12. ALL MATERIAL AND EQUIPMENT SHALL BE REMOVED FROM THE CLOSURE AND THE WORK AREA WHEN NO WORK IS BEING DONE.

TABLE I

SPEED LIMIT (MPH)	MINIMUM TAPER (L) (METERS)	MAXIMUM SPACING (S) OF DRUMS
20-25	38	6
30-40	98	12
45-55	201	12

METRIC

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

DATE 04/25/94

CLOSING RIGHT LANE OF A MULTI-LANE UNDIVIDED HIGHWAY WITH DRUMS

STANDARD CONSTRUCTION DRAWING MT-95.31M

APPROVED _____ ENGR. OF DESIGN SERVICES

WCC

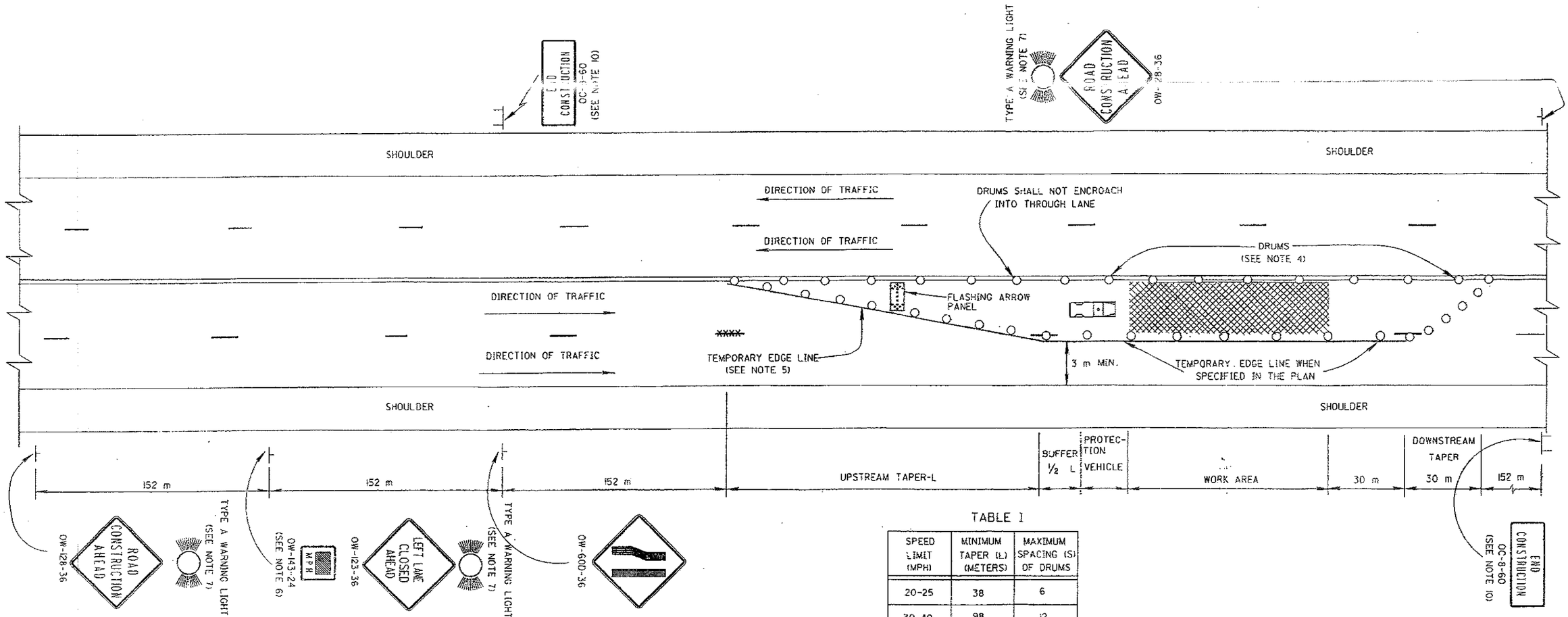


TABLE I

SPEED LIMIT (MPH)	MINIMUM TAPER (L) (METERS)	MAXIMUM SPACING (S) OF DRUMS
20-25	38	6
30-40	98	12
45-55	201	12

GENERAL NOTES:

1. THE LOCATION OF THE MERGING TAPER AND THE ADVANCE WARNING SIGNS SHOULD BE ADJUSTED TO PROVIDE FOR ADEQUATE SIGHT DISTANCE FOR THE EXISTING VERTICAL AND HORIZONTAL ROADWAY ALIGNMENT.

2. THE SPACING BETWEEN PROPOSED SIGNS SHOULD BE ADJUSTED NOT TO CONFLICT WITH AND TO PROVIDE A MINIMUM OF 61 m CLEARANCE TO EXISTING SIGNS.

3. THE TAPER LENGTH (L) AND SPACING (S) OF DRUMS FOR THE MERGING TAPER SHALL CONFORM TO TABLE I. DRUMS PLACED ALONG THE CENTERLINE SHALL BE SPACED AT (S). DRUM SPACING (S) SHALL ALSO BE USED FOR THE BUFFER AREA AND FOR THE FIRST 305 m OF THE WORK AREA AND AT OTHER LOCATIONS AS DIRECTED BY THE ENGINEER. THE MAXIMUM DRUM SPACING FOR THE BALANCE OF THE WORK AREA EXCEPT ALONG THE CENTERLINE IS TO BE TWO TIMES THE SPACING (S) IN TABLE I. A MINIMUM OF 5 DRUMS SHALL BE USED IN THE DOWNSTREAM TAPER.

4. CONES HAVING A MINIMUM HEIGHT OF 0.7 m MAY BE SUBSTITUTED FOR DRUMS FOR DAYTIME LANE CLOSURES. PROVISIONS SHALL BE MADE TO SAFELY STABILIZE THE CONES TO PREVENT THEM FROM BLOWING OVER. IF THIS CANNOT BE ACHIEVED, DRUMS SHALL BE USED.

5. IF THE CONSTRUCTION OPERATION REQUIRES THE LANE CLOSURE FOR MORE THAN ONE DAY THEN THE EXISTING CONFLICTING PAVEMENT MARKINGS AND REFLECTORS FROM THE RAISED PAVEMENT MARKERS (RPMS) SHALL BE REMOVED AND THE APPROPRIATE COLOR TEMPORARY EDGE LINES SHALL BE APPLIED ALONG THE TAPER. TEMPORARY EDGE LINES WHICH WOULD CONFLICT WITH FINAL TRAFFIC LANES SHALL BE REMOVABLE (740.05 TYPE C) TAPE UNLESS THE AREA WILL BE RESURFACED IN THE NEXT WORK PHASE. AFTER COMPLETION OF THE WORK, PAVEMENT MARKINGS OTHER THAN 740.05 TYPE C SHALL BE REMOVED IN ACCORDANCE WITH 641.10. THE ORIGINAL MARKINGS AND PAVEMENT MARKER REFLECTORS SHALL BE RESTORED AT NO ADDITIONAL COST.

6. THE ADVISORY SPEED SIGN OW-143 SHALL BE USED WHEN SPECIFIED IN THE PLAN.

7. TYPE A FLASHING WARNING LIGHTS SHOWN ON THE OW-128 AND OW-123 SIGNS ARE REQUIRED WHENEVER A NIGHT LANE CLOSURE IS NECESSARY.

8. THE FLASHING ARROW PANEL SHALL MEET REQUIREMENTS OF STANDARD CONSTRUCTION DRAWING TC-35.10M.

9. THE PROTECTION VEHICLE SHOWN AT THE BEGINNING OF THE WORK AREA SHALL BE IN PLACE AND UNOCCUPIED WHENEVER WORKERS ARE IN THE WORK AREA. THIS VEHICLE SHALL BE REMOVED FROM THE PAVEMENT WHENEVER WORKERS ARE NOT IN THE WORK AREA. THE VEHICLE SHALL BE EQUIPPED WITH A 360 DEGREE ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE A MINIMUM OF 402 m. OTHER PROTECTIVE DEVICES MAY BE USED IN LIEU OF THE PROTECTION VEHICLE SHOWN WHEN APPROVED BY THE ENGINEER.

10. THE OC-8 SIGNS ARE ONLY REQUIRED FOR LANE CLOSURES OF MORE THAN ONE DAY AND MAY BE OMITTED IF THEY FALL WITHIN THE LIMITS OF A CONSTRUCTION PROJECT.

11. OW-128 SIGNS SHALL BE PROVIDED ON ENTRANCE RAMPS AND/OR SIDE ROADS LOCATED WITHIN THE WORK LIMITS OR THE ADVANCE WARNING SIGN GROUP. WITHIN THE LENGTH OF CLOSURE, PROVISION SHALL BE MADE TO CONTROL TRAFFIC ENTERING FROM INTERSECTNG STREETS AND DRIVEWAYS. THREE DRUMS SHALL BE PLACED ON EACH SIDE ACROSS THE CLOSED LANE AT EACH INTERSECTION AND DRIVEWAY.

12. ALL MATERIAL AND EQUIPMENT SHALL BE REMOVED FROM THE CLOSURE AND THE WORK AREA WHEN NO WORK IS BEING DONE.

METRIC

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

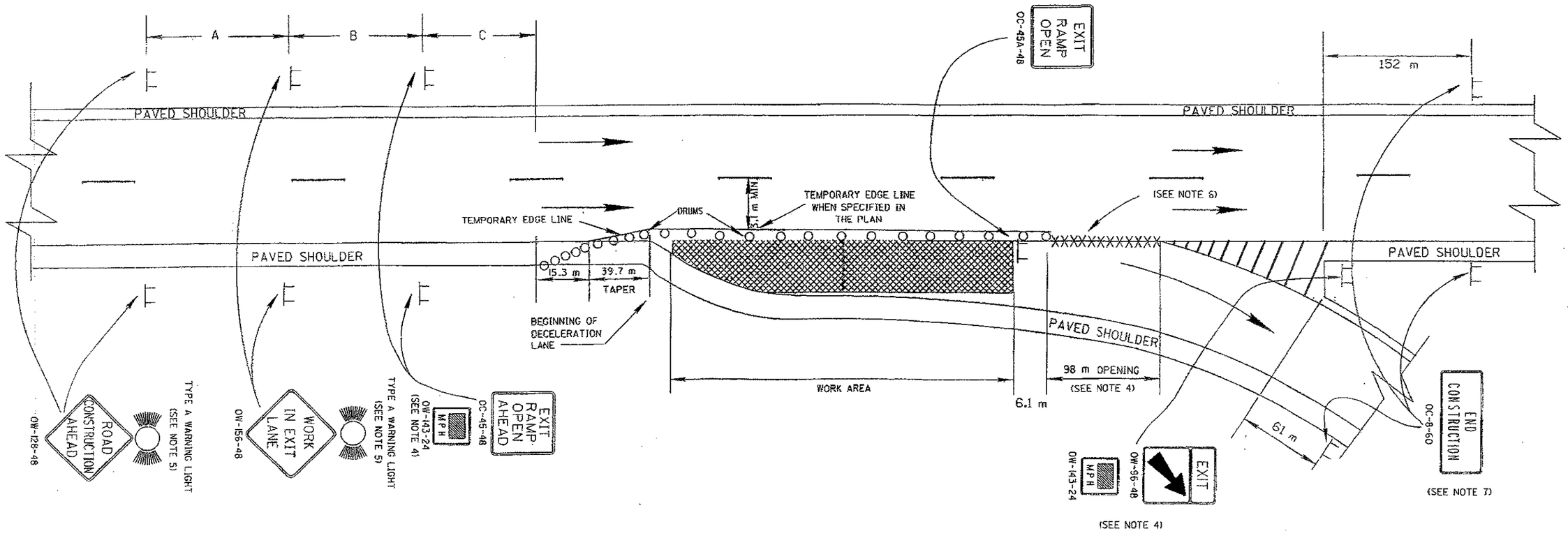
DATE 04/25/94

CLOSING LEFT LANE OF A MULTILANE UNDIVIDED HIGHWAY WITH DRUMS

STANDARD CONSTRUCTION DRAWING MT-95.32M

APPROVED _____ ENGR. OF DESIGN SERVICES

WCC



GENERAL NOTES:

1. THE LOCATION OF THE ADVANCE WARNING SIGNS SHOULD BE ADJUSTED TO PROVIDE FOR ADEQUATE SIGHT DISTANCE FOR THE EXISTING VERTICAL AND HORIZONTAL ROADWAY ALIGNMENT.

2. THE SPACING BETWEEN PROPOSED SIGNS SHOULD BE ADJUSTED TO NOT CONFLICT WITH AND TO PROVIDE A MINIMUM OF 61 m CLEARANCE TO EXISTING SIGNS, EXCEPT THE OW-96-48 SIGN WHICH MAY BE ADJACENT TO THE GF SIGN IN THE GORE.

3. ALONG THE CLOSURE DRUMS SHALL BE SPACED AT 6.1 m CENTER TO CENTER. A MINIMUM OF 5 DRUMS SHALL BE USED TO CLOSE THE SHOULDER. CONES HAVING A MINIMUM HEIGHT OF 0.7 m MAY BE SUBSTITUTED FOR DRUMS FOR DAYTIME LANE CLOSURES. PROVISIONS SHALL BE MADE TO SAFELY STABILIZE THE CONES TO PREVENT THEM FROM BLOWING OVER. IF THIS CANNOT BE ACHIEVED, DRUMS SHALL BE USED.

4. THE OPENING TO THE RAMP SHALL BE 98 m OR MORE, WHENEVER POSSIBLE. A LESSER OPENING MAY BE PROVIDED IF NO OTHER ALTERNATIVE IS AVAILABLE. WHEN A LESSER OPENING IS PROVIDED, ADVISORY SPEED PLAQUES (OW-143) SHALL BE ADDED TO THE OW-96 AND OC-45 SIGNS AS FOLLOWS:

OPENING	ADVISORY SPEED
88 m	80 km/h - 50 MPH
79 m	72 km/h - 45 MPH
70 m	64 km/h - 40 MPH
35 m	56 km/h - 35 MPH

IF A 61 m OPENING CANNOT BE PROVIDED, THE RAMP SHOULD BE CLOSED.

4. CONT. THE ADVISORY SPEED DISPLAYED SHALL NOT BE GREATER THAN WOULD OTHERWISE BE REQUIRED TO ACCOMMODATE THE PERMANENT RAMP GEOMETRY NEAR THE EXIT.

ADVISORY SPEEDS WITHIN 16 km/h OF THE LEGAL SPEED LIMIT NEED NOT BE DISPLAYED.

5. TYPE A FLASHING WARNING LIGHTS SHOWN ON THE "ROAD CONSTRUCTION AHEAD" AND "WORK IN EXIT LANE" SIGNS ARE REQUIRED WHENEVER A NIGHT LANE CLOSURE IS NECESSARY.

6. IF THE CONSTRUCTION OPERATION REQUIRES THE LANE CLOSURE FOR MORE THAN ONE DAY THEN THE EXISTING CONFLICTING PAVEMENT MARKINGS AND REFLECTORS FROM THE RAISED PAVEMENT MARKERS (RPMS) SHALL BE REMOVED AND THE APPROPRIATE COLOR TEMPORARY EDGE LINES SHALL BE APPLIED ALONG THE TAPER. TEMPORARY EDGE LINES WHICH WOULD CONFLICT WITH FINAL TRAFFIC LANES SHALL BE REMOVABLE (740.05 TYPE C) TAPE UNLESS THE AREA WILL BE RESURFACED IN THE NEXT WORK PHASE. AFTER COMPLETION OF THE WORK, PAVEMENT MARKINGS OTHER THAN 740.05 TYPE C SHALL BE REMOVED IN ACCORDANCE WITH 641.10. THE ORIGINAL MARKINGS AND PAVEMENT MARKER REFLECTORS SHALL BE RESTORED AT NO ADDITIONAL COST.

7. THE OC-8 SIGNS ARE ONLY REQUIRED FOR LANE CLOSURES OF MORE THAN ONE DAY AND MAY BE OMITTED IF THEY FALL WITHIN THE LIMITS OF A CONSTRUCTION PROJECT.

8. ALL MATERIAL AND EQUIPMENT SHALL BE REMOVED FROM THE CLOSURE AND THE WORK AREA WHEN NO WORK IS BEING DONE.

TABLE I

MINIMUM DISTANCE (METERS)	A	B	C
URBAN FREEWAY & EXPRESSWAY	152 TO 305	152 TO 305	152 TO 305
RURAL FREEWAY & EXPRESSWAY	792	488	305

METRIC

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

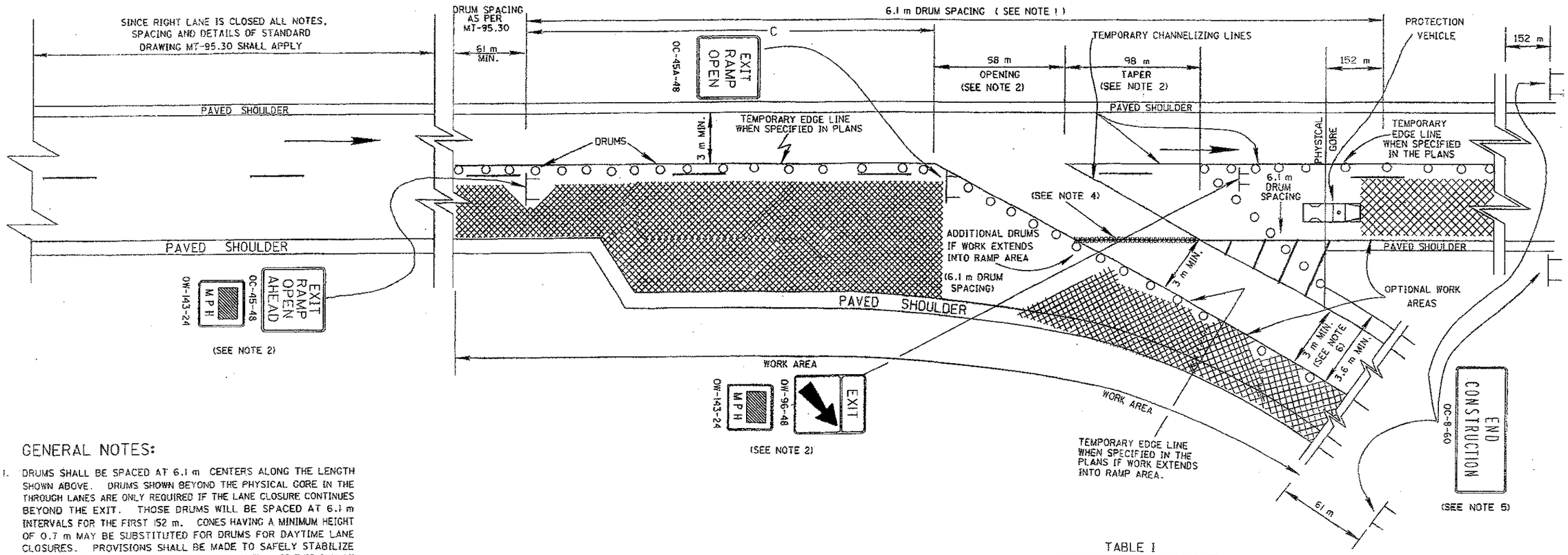
LANE CLOSURE IN DECELERATION LANE

DATE 06/24/93

STANDARD CONSTRUCTION DRAWING MT-98.12M

APPROVED Doyle Cooper ENGR. OF DESIGN SERVICES

WCC



GENERAL NOTES:

1. DRUMS SHALL BE SPACED AT 6.1 m CENTERS ALONG THE LENGTH SHOWN ABOVE. DRUMS SHOWN BEYOND THE PHYSICAL GORE IN THE THROUGH LANES ARE ONLY REQUIRED IF THE LANE CLOSURE CONTINUES BEYOND THE EXIT. THOSE DRUMS WILL BE SPACED AT 6.1 m INTERVALS FOR THE FIRST 152 m. CONES HAVING A MINIMUM HEIGHT OF 0.7 m MAY BE SUBSTITUTED FOR DRUMS FOR DAYTIME LANE CLOSURES. PROVISIONS SHALL BE MADE TO SAFELY STABILIZE THE CONES TO PREVENT THEM FROM BLOWING OVER. IF THIS CANNOT BE ACHIEVED, DRUMS SHALL BE USED.

2. THE OPENING TO THE RAMP AND THE TAPER ACROSS THE CLOSED LANE SHOULD EACH BE 98 m OR MORE WHENEVER POSSIBLE. A LESSER OPENING AND/OR TAPER MAY BE PROVIDED IF NO OTHER ALTERNATIVE IS AVAILABLE. THE OPENING SHALL NEVER BE LESS THAN THE TAPER, BUT MAY BE MORE. WHEN LESSER OPENING AND/OR TAPER LENGTHS ARE PROVIDED, ADVISORY SPEED PLAQUES (OW-143) SHALL BE ADDED TO THE OW-96 AND OC-45 SIGNS AS FOLLOWS:

OPENING/TAPER	ADVISORY SPEED
88 m	80 km/h - 50 MPH
79 m	72 km/h - 45 MPH
70 m	64 km/h - 40 MPH
61 m	56 km/h - 35 MPH

IF 61 m MINIMUM DIMENSIONS CANNOT BE PROVIDED, THE RAMP SHOULD BE CLOSED.

THE ADVISORY SPEED DISPLAYED SHALL NOT BE GREATER THAN WOULD OTHERWISE BE REQUIRED TO ACCOMMODATE THE PERMANENT RAMP GEOMETRY NEAR THE EXIT.

ADVISORY SPEEDS WITHIN 16.1 km/h OF THE LEGAL SPEED LIMIT NEED NOT BE DISPLAYED.

3. THE PROTECTION VEHICLE LOCATED CLOSE TO THE WORK SHALL BE IN PLACE AND UNOCCUPIED WHENEVER WORKERS ARE IN THE WORK AREA. THIS VEHICLE SHALL BE REMOVED FROM THE PAVEMENT WHENEVER WORKERS ARE NOT IN THE WORK AREA. THE VEHICLE SHALL BE EQUIPPED WITH A 360 DEGREE ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE A MINIMUM OF 402 m. OTHER PROTECTIVE DEVICES MAY BE USED IN LIEU OF THE PROTECTION VEHICLE SHOWN WHEN APPROVED BY THE ENGINEER.

4. IF THE CONSTRUCTION OPERATION REQUIRES THE LANE CLOSURE FOR MORE THAN ONE DAY THEN THE EXISTING CONFLICTING PAVEMENT MARKINGS AND REFLECTORS FROM THE RAISED PAVEMENT MARKERS (RPMS) SHALL BE REMOVED AND a) TEMPORARY CHANNELIZING LINES SHALL BE APPLIED AND b) THE APPROPRIATE COLOR TEMPORARY EDGE LINES SHALL BE APPLIED WHEN SPECIFIED IN THE PLANS. TEMPORARY CHANNELIZING LINES AND EDGE LINES WHICH WOULD CONFLICT WITH FINAL TRAFFIC LANES SHALL BE REMOVABLE (740.05 TYPE C) TAPE UNLESS THE AREA WILL BE RESURFACED IN THE NEXT WORK PHASE. AFTER COMPLETION OF THE WORK, PAVEMENT MARKINGS OTHER THAN 740.05 TYPE C SHALL BE REMOVED IN ACCORDANCE WITH 641.10. THE ORIGINAL MARKINGS AND PAVEMENT MARKER REFLECTORS SHALL BE RESTORED AT NO ADDITIONAL COST.

5. THE OC-8 SIGNS ARE ONLY REQUIRED FOR LANE CLOSURES OF MORE THAN ONE DAY AND MAY BE OMITTED IF THEY FALL WITHIN THE LIMITS OF A CONSTRUCTION PROJECT.

6. NORMALLY A 3 m MINIMUM RAMP WIDTH SHALL BE MAINTAINED ON EXISTING RAMP PAVEMENT. WHERE THIS IS NOT POSSIBLE, A MINIMUM WIDTH OF 3.6 m INCLUDING THE PAVED SHOULDER MAY BE USED ONLY: (1) IF THE TRAFFIC WILL BE ON THE SHOULDER LESS THAN ONE DAY AND THE SHOULDER IS IN GOOD CONDITION, OR (2) IF THE SHOULDER PAVEMENT IS STRENGTHENED TO HOLD THE ANTICIPATED LOAD.

7. ALL MATERIAL AND EQUIPMENT SHALL BE REMOVED FROM THE CLOSURE AND THE WORK AREA WHEN NO WORK IS BEING DONE.

TABLE I

MINIMUM DISTANCE (METERS)	
	C
URBAN FREEWAY & EXPRESSWAY	152 TO 305
RURAL FREEWAY & EXPRESSWAY	305

METRIC

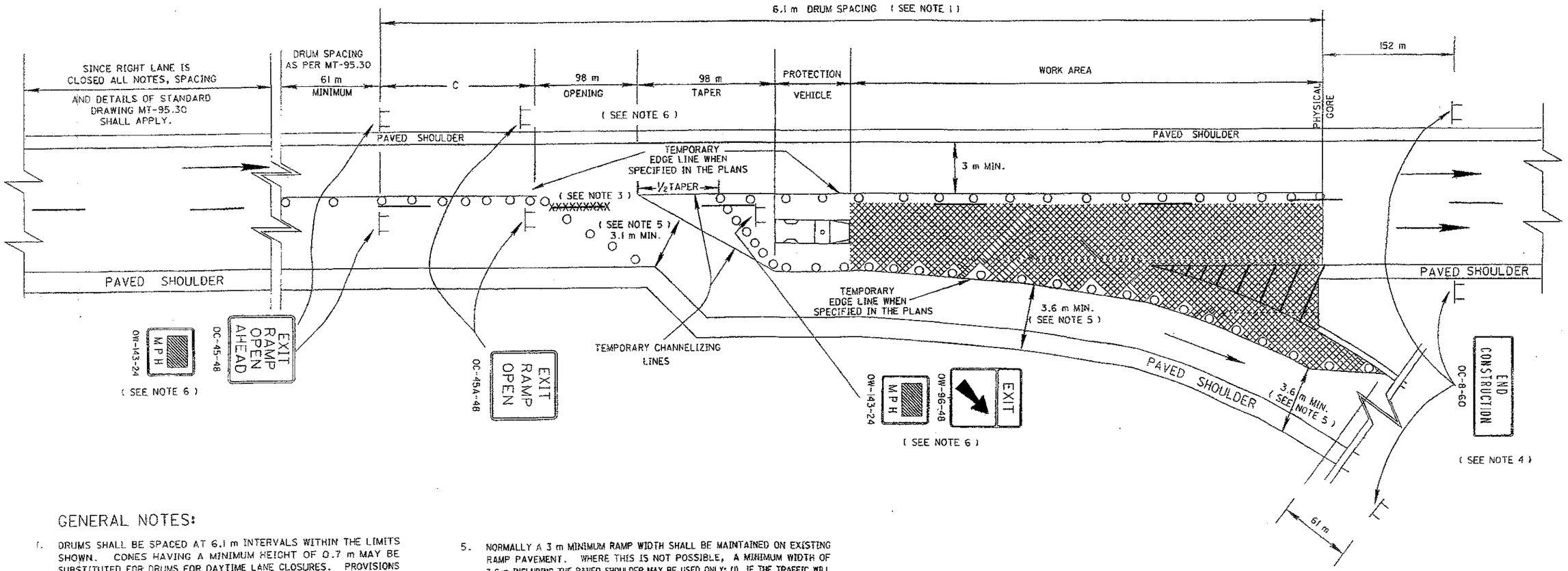
ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC	DATE
LANE CLOSURE BEFORE EXIT GORE	06/24/93
STANDARD CONSTRUCTION DRAWING MT-98.13M	

APPROVED: Larry D. Cooper ENGR. OF DESIGN SERVICES

WCC



GENERAL NOTES:

1. DRUMS SHALL BE SPACED AT 6.1 m INTERVALS WITHIN THE LIMITS SHOWN. CONES HAVING A MINIMUM HEIGHT OF 0.7 m MAY BE SUBSTITUTED FOR DRUMS FOR DAYTIME LANE CLOSURES. PROVISIONS SHALL BE MADE TO SAFELY STABILIZE THE CONES TO PREVENT THEM FROM BLOWING OVER. IF THIS CANNOT BE ACHIEVED, DRUMS SHALL BE USED.

2. THE PROTECTION VEHICLE LOCATED CLOSE TO THE WORK SHALL BE IN PLACE AND UNOCCUPIED WHENEVER WORKERS ARE IN THE WORK AREA. THIS VEHICLE SHALL BE REMOVED FROM THE PAVEMENT WHENEVER WORKERS ARE NOT IN THE WORK AREA. THE VEHICLE SHALL BE EQUIPPED WITH A 360 DEGREE ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE A MINIMUM OF 402 m. OTHER PROTECTIVE DEVICES MAY BE USED IN LIEU OF THE PROTECTION VEHICLE SHOWN WHEN APPROVED BY THE ENGINEER.

3. IF THE CONSTRUCTION OPERATION REQUIRES THE LANE CLOSURE FOR MORE THAN ONE DAY THEN THE EXISTING CONFLICTING PAVEMENT MARKINGS AND REFLECTORS FROM THE RAISED PAVEMENT MARKERS (RPMS) SHALL BE REMOVED AND a) TEMPORARY CHANNELIZING LINES SHALL BE APPLIED AND b) THE APPROPRIATE COLOR TEMPORARY EDGE LINES SHALL BE APPLIED WHEN SPECIFIED IN THE PLANS. TEMPORARY CHANNELIZING LINES AND EDGE LINES WHICH WOULD CONFLICT WITH FINAL TRAFFIC LANES SHALL BE REMOVABLE (740.05 TYPE C) TAPE UNLESS THE AREA WILL BE RESURFACED IN THE NEXT WORK PHASE. AFTER COMPLETION OF THE WORK, PAVEMENT MARKINGS OTHER THAN 740.05 TYPE C SHALL BE REMOVED IN ACCORDANCE WITH 641.10. THE ORIGINAL MARKINGS AND PAVEMENT MARKER REFLECTORS SHALL BE RESTORED AT NO ADDITIONAL COST.

4. THE OC-8 SIGNS ARE ONLY REQUIRED FOR LANE CLOSURES OF MORE THAN ONE DAY AND MAY BE OMITTED IF THEY FALL WITHIN THE LIMITS OF A CONSTRUCTION PROJECT.

5. NORMALLY A 3 m MINIMUM RAMP WIDTH SHALL BE MAINTAINED ON EXISTING RAMP PAVEMENT. WHERE THIS IS NOT POSSIBLE, A MINIMUM WIDTH OF 3.6 m INCLUDING THE PAVED SHOULDER MAY BE USED ONLY: (1) IF THE TRAFFIC WILL BE ON THE SHOULDER LESS THAN ONE DAY AND THE SHOULDER IS IN GOOD CONDITION, OR (2) IF THE SHOULDER PAVEMENT IS STRENGTHENED TO HOLD THE ANTICIPATED LOAD.

6. THE OPENING TO THE RAMP AND THE TAPER IN ADVANCE OF THE CLOSED LANE SHOULD EACH BE 98 m OR MORE WHENEVER POSSIBLE. A LESSER OPENING AND/OR TAPER LENGTH MAY BE PROVIDED IF NO OTHER ALTERNATIVE IS AVAILABLE. THE OPENING SHALL NEVER BE LESS THAN THE TAPER, BUT MAY BE MORE. WHEN LESSER OPENING AND/OR TAPER LENGTHS ARE PROVIDED, ADVISORY SPEED PLAQUES (OW-143) SHALL BE ADDED TO THE OW-96 AND OC-45 SIGNS AS FOLLOWS:

OPENING/TAPER	ADVISORY SPEED
88 m	80 km/h - 50 MPH
79 m	72 km/h - 45 MPH
70 m	64 km/h - 40 MPH
61 m	56 km/h - 35 MPH

IF 61 m MINIMUM DIMENSION CANNOT BE PROVIDED, THE RAMP SHOULD BE CLOSED.

THE ADVISORY SPEED DISPLAYED SHALL NOT BE GREATER THAN WOULD OTHERWISE BE REQUIRED TO ACCOMMODATE THE PERMANENT RAMP GEOMETRY NEAR THE EXIT.

ADVISORY SPEEDS WITHIN 16.1 km/h OF THE LEGAL SPEED LIMIT NEED NOT BE DISPLAYED.

7. ALL MATERIAL AND EQUIPMENT SHALL BE REMOVED FROM THE CLOSURE AND THE WORK AREA WHEN NO WORK IS BEING DONE.

TABLE I

MINIMUM DISTANCE (METERS)	
	C
URBAN FREEWAY & EXPRESSWAY	152 TO 305
RURAL FREEWAY & EXPRESSWAY	305

METRIC

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

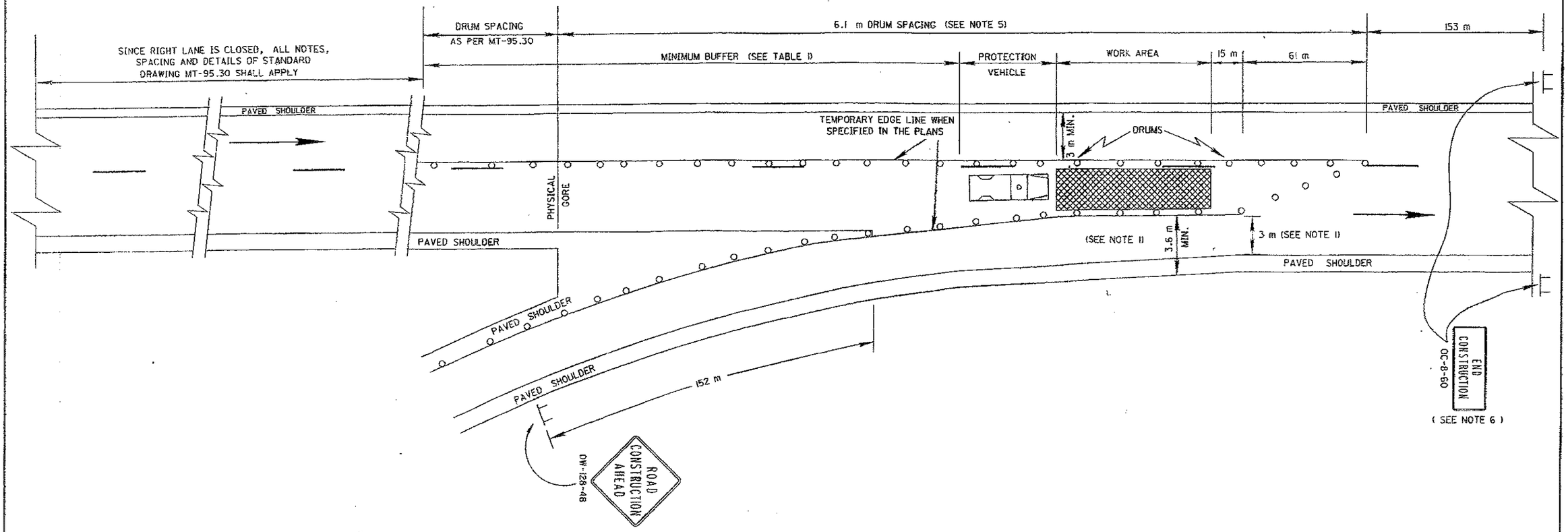
LANE CLOSURE
AT EXIT GORE

DATE 06/24/93

STANDARD CONSTRUCTION DRAWING MT-98.14M

APPROVED Daryl Creyer ENGR. OF DESIGN SERVICES

WCC



GENERAL NOTES:

1. THIS WORK AREA TRAFFIC CONTROL APPLICATION SHALL BE EMPLOYED ONLY WHEN THE LATERAL CLEARANCE BETWEEN THE CHANNELIZING DEVICES AT THE RIGHT EDGE OF THE WORK AREA AND THE EDGE OF THE RAMP PAVEMENT IS 3 m OR MORE. NORMALLY A 3 m MINIMUM RAMP WIDTH SHALL BE MAINTAINED ON EXISTING RAMP PAVEMENT. WHERE THIS IS NOT POSSIBLE, A MINIMUM WIDTH OF 3.6 m INCLUDING THE PAVED SHOULDER MAY BE USED ONLY: (1) IF THE TRAFFIC WILL BE ON THE SHOULDER LESS THAN ONE DAY AND THE SHOULDER IS IN GOOD CONDITION, OR (2) IF THE SHOULDER PAVEMENT IS STRENGTHENED TO HOLD THE ANTICIPATED LOAD. WHEN THE RAMP IS CLOSED APPROPRIATE DETOUR SIGNS SHALL BE PROVIDED.

2. WHEN THE RAMP IS NOT LONG ENOUGH TO ALLOW SIGN PLACEMENT AS SPECIFIED ABOVE, THEY MAY BE SPACED PROPORTIONATELY WITHIN THE SPACE AVAILABLE AS DETERMINED BY THE ENGINEER (A 61 m MINIMUM SPACING MUST BE MAINTAINED).

3. THE PROTECTION VEHICLE LOCATED CLOSE TO THE WORK AREA SHALL BE IN PLACE AND UNOCCUPIED WHENEVER WORKERS ARE IN THE WORK AREA. THIS VEHICLE SHALL BE REMOVED FROM THE PAVEMENT WHENEVER WORKERS ARE NOT IN THE WORK AREA. THE VEHICLE SHALL BE EQUIPPED WITH A 360 DEGREE ROTATING OR FLASHING AMBER BEACON VISIBLE A MINIMUM OF 402 m. OTHER PROTECTIVE DEVICES MAY BE USED IN LIEU OF THE PROTECTION VEHICLE SHOWN WHEN APPROVED BY THE ENGINEER.

4. IF THE CONSTRUCTION OPERATION REQUIRES THE LANE CLOSURE FOR MORE THAN ONE DAY THEN THE EXISTING CONFLICTING PAVEMENT MARKINGS AND REFLECTORS FROM THE RAISED PAVEMENT MARKERS (RPMS) SHALL BE REMOVED AND THE APPROPRIATE COLOR TEMPORARY EDGE LINES SHALL BE APPLIED WHEN SPECIFIED IN THE PLANS. TEMPORARY EDGE LINES WHICH WOULD CONFLICT WITH FINAL TRAFFIC LANES SHALL BE REMOVABLE (740.05 TYPE C) TAPE UNLESS THE AREA WILL BE RESURFACED IN THE NEXT WORK PHASE. AFTER COMPLETION OF THE WORK, PAVEMENT MARKINGS OTHER THAN 740.05 TYPE C SHALL BE REMOVED IN ACCORDANCE WITH 641.10. THE ORIGINAL MARKINGS AND PAVEMENT MARKER REFLECTORS SHALL BE RESTORED AT NO ADDITIONAL COST.

5. DRUMS SHALL BE SPACED AT 6.1 m INTERVALS ON BOTH SIDES OF THE WORK AREA WITHIN THE LIMITS SHOWN. CONES HAVING A MINIMUM HEIGHT OF 0.7 m MAY BE SUBSTITUTED FOR DRUMS FOR DAYTIME LANE CLOSURES. PROVISIONS SHALL BE MADE TO SAFELY STABILIZE THE CONES TO PREVENT THEM FROM BLOWING OVER. IF THIS CANNOT BE ACHIEVED, DRUMS SHALL BE USED.

6. THE OC-8 SIGNS ARE ONLY REQUIRED FOR LANE CLOSURES OF MORE THAN ONE DAY AND MAY BE OMITTED IF THEY FALL WITHIN THE LIMITS OF A CONSTRUCTION PROJECT.

7. ALL MATERIAL AND EQUIPMENT SHALL BE REMOVED FROM THE CLOSURE AND THE WORK AREA WHEN NO WORK IS BEING DONE.

TABLE I

NORMAL SPEED LIMIT		MINIMUM BUFFER
(MPH)	(km/h)	(METERS)
45 - 50	72 - 88	101
60 - 65	96 - 104	119

METRIC

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

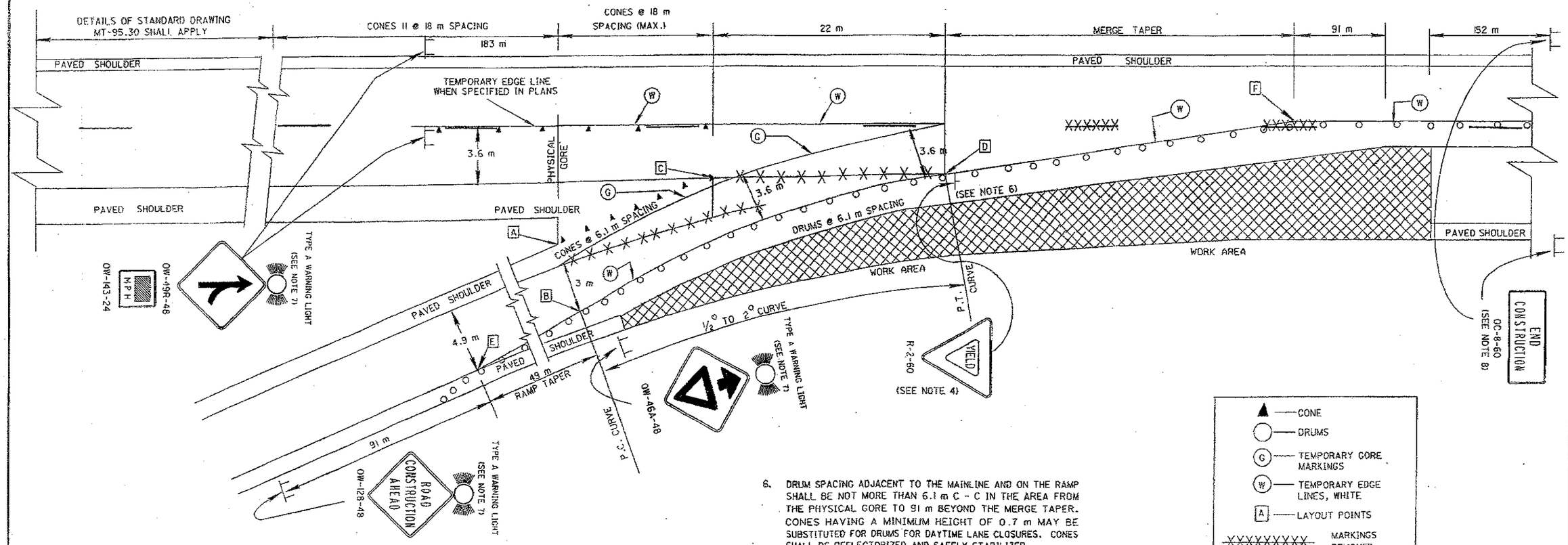
LANE CLOSURE AT
ENTRANCE RAMP: PLAN A

DATE 06/24/93

STANDARD CONSTRUCTION DRAWING MT-98.15M

APPROVED Roy Krueger ENGR. OF DESIGN SERVICES

WCC



GENERAL NOTES :

1. THIS WORK AREA TRAFFIC CONTROL APPLICATION SHALL BE EMPLOYED WHEN: (1) THE LATERAL CLEARANCE BETWEEN CHANNELIZING DEVICES AT THE RIGHT EDGE OF THE WORK AREA AND THE EDGE OF PAVEMENT IS LESS THAN 3 m (3.6 m IF THE SHOULDER PAVEMENT IS USED) AS SHOWN ON DRAWING MT-98.15, AND (2) THE REQUIRED RAMP TAPERS AND CURVES CAN BE PROVIDED AS SHOWN EXCEPT AS DESCRIBED IN NOTE 4. IN THE EVENT THE WORK ZONE CONDITION WOULD PERMIT THE USE OF EITHER MT-98.15 OR MT-98.16, MT-98.15 SHALL BE USED. THIS TRAFFIC CONTROL MEASURE SHALL NOT BE PLACED IN EFFECT UNTIL IMMEDIATELY BEFORE THE CONTRACTOR IS FULLY PREPARED TO PERFORM THE WORK ON THE RAMP OR LANE ADJACENT TO IT. ONCE THIS MEASURE IS PLACED INTO EFFECT, THE CONTRACTOR SHALL EXPEDITIOUSLY PURSUE THE WORK (WORKING CONTINUOUSLY WITH FULL CREW IN THE RAMP AREA ON ALL NORMAL WORKING DAYS) UNTIL IT IS COMPLETED AND SHALL IMMEDIATELY OPEN THE AREA TO NORMAL TRAFFIC OR, AS A MINIMUM, REVERT TO THE METHODS SHOWN ON MT-98.15. IT IS THE INTENT THAT THE LONGEST MERGING TAPER LENGTH POSSIBLE SHALL BE CHOSEN, COMMENSURATE WITH THE REQUIREMENTS OF CONSTRUCTION.

2. THE RAMP TAPER SHALL DESIRABLY BE LOCATED TO PROVIDE A 3 m MINIMUM PATH BETWEEN DRUMS AND THE PAVED SHOULDER IN THE GORE. THE RAMP TRAFFIC MAY BE PLACED ON THE PAVED GORE AS SHOWN ABOVE ONLY IF: (1) THE TRAFFIC WILL USE THE PAVED SHOULDER PAVEMENT LESS THAN ONE DAY AND THE SHOULDER PAVEMENT IS IN GOOD CONDITION AND IS LEVEL AND SMOOTH OR (2) IF THE SHOULDER PAVEMENT IS ADEQUATELY STRENGTHENED, LEVELED AND SMOOTHED TO CARRY THE ANTICIPATED LOAD. A MINIMUM OF 3 DRUMS SHALL BE USED TO CLOSE THE RAMP SHOULDER.

3. WHEN THE RAMP IS NOT LONG ENOUGH TO ALLOW SIGN PLACEMENT AS SPECIFIED ABOVE, THEY MAY BE SPACED PROPORTIONATELY WITHIN THE SPACE AVAILABLE AS DETERMINED BY THE ENGINEER (A 61 m MINIMUM SPACING MUST BE MAINTAINED).

4. IT WILL BE NECESSARY TO MOVE THE LOCATION OF ANY EXISTING YIELD SIGN. IN THESE CASES, THE PERMANENT R-2 SIGN INSTALLATION SHALL BE REMOVED (AND SUBSEQUENTLY RESTORED) AND THE TEMPORARY INSTALLATION SHALL BE MOUNTED APPROPRIATELY. IF THE REQUIRED DISTANCES (RAMP TAPER, CURVE AND MERGE TAPER) CANNOT BE OBTAINED, THE ENGINEER MAY APPROVE SLIGHTLY LOWER VALUES FOR A SHORT TIME, IN WHICH CASE THE YIELD SIGN SHALL BE REMOVED AND A 1.2 m STOP SIGN PLACED APPROPRIATELY TO BE VISIBLE TO RAMP TRAFFIC BUT NOT BE OBTRUSIVE TO MAINLINE TRAFFIC.

5. IF THE CONSTRUCTION OPERATION REQUIRES THE LANE CLOSURE FOR MORE THAN ONE DAY THEN THE EXISTING CONFLICTING PAVEMENT MARKINGS AND REFLECTORS FROM THE RAISED PAVEMENT MARKERS (RPMS) SHALL BE REMOVED AT NO ADDITIONAL COST. THE APPROPRIATE COLOR TEMPORARY EDGE LINES SHALL BE APPLIED ALONG THE TAPER. TEMPORARY PAVEMENT MARKINGS WHICH WOULD CONFLICT WITH FINAL TRAFFIC LANES SHALL BE REMOVABLE (740.05 TYPE C TAPE UNLESS THE AREA WILL BE RESURFACED IN THE NEXT WORK PHASE. AFTER COMPLETION OF THE WORK, TEMPORARY PAVEMENT MARKINGS SHALL BE REMOVED IN ACCORDANCE WITH 641.10 AND THE ORIGINAL MARKINGS AND RAISED PAVEMENT MARKER REFLECTORS SHALL BE RESTORED AT NO ADDITIONAL COST.

6. DRUM SPACING ADJACENT TO THE MAINLINE AND ON THE RAMP SHALL BE NOT MORE THAN 6.1 m C - C IN THE AREA FROM THE PHYSICAL GORE TO 91 m BEYOND THE MERGE TAPER. CONES HAVING A MINIMUM HEIGHT OF 0.7 m MAY BE SUBSTITUTED FOR DRUMS FOR DAYTIME LANE CLOSURES. CONES SHALL BE REFLECTORIZED AND SAFELY STABILIZED.

7. TYPE A FLASHING WARNING LIGHTS ARE REQUIRED ON THE ROAD CONSTRUCTION AHEAD (OW-128-48), MERGE (OW-49R-48) AND THE YIELD AHEAD (OW-46-48) SIGNS WHENEVER A NIGHT LANE CLOSURE IS NECESSARY.

8. THE OC-8 SIGNS ARE ONLY REQUIRED FOR LANE CLOSURES OF MORE THAN ONE DAY AND MAY BE OMITTED IF THEY FALL WITHIN THE LIMITS OF A CONSTRUCTION PROJECT.

9. FROM THE END OF THE GORE AREA GRADED SHOULDER (POINT A), LOCATE THE PC OF THE CURVE BY MEASURING PERPENDICULAR TO THE RAMP CENTERLINE 3 m OF RAMP PAVEMENT, NOT INCLUDING PAVED SHOULDER WIDTH (POINT B). FROM THE END OF THE GORE AREA PAVED SHOULDER (POINT C), LOCATE THE PT OF THE CURVE BY MEASURING 22 m FROM POINT C ALONG THE EDGE OF PAVEMENT EXTENDED (POINT D).

10. PLACEMENT OF DRUMS SHALL BEGIN AT (POINT E) 49 m UPSTREAM FROM THE PREVIOUSLY LOCATED PC (POINT B) AND AT THE RIGHT EDGE OF RAMP PAVEMENT. FROM THIS POINT A DRUM TAPER SHALL BE PLACED TO THE PC (POINT B) AND THEN ALONG A CURVE AS SHOWN TO THE PT (POINT D) WHERE A 48 m (MIN.) MERGE TAPER SHALL MEET MAINLINE TRAFFIC CONTROL (POINT F).

11. ALL MATERIAL AND EQUIPMENT SHALL BE REMOVED FROM THE CLOSURE AND THE WORK AREA WHEN NO WORK IS BEING DONE.

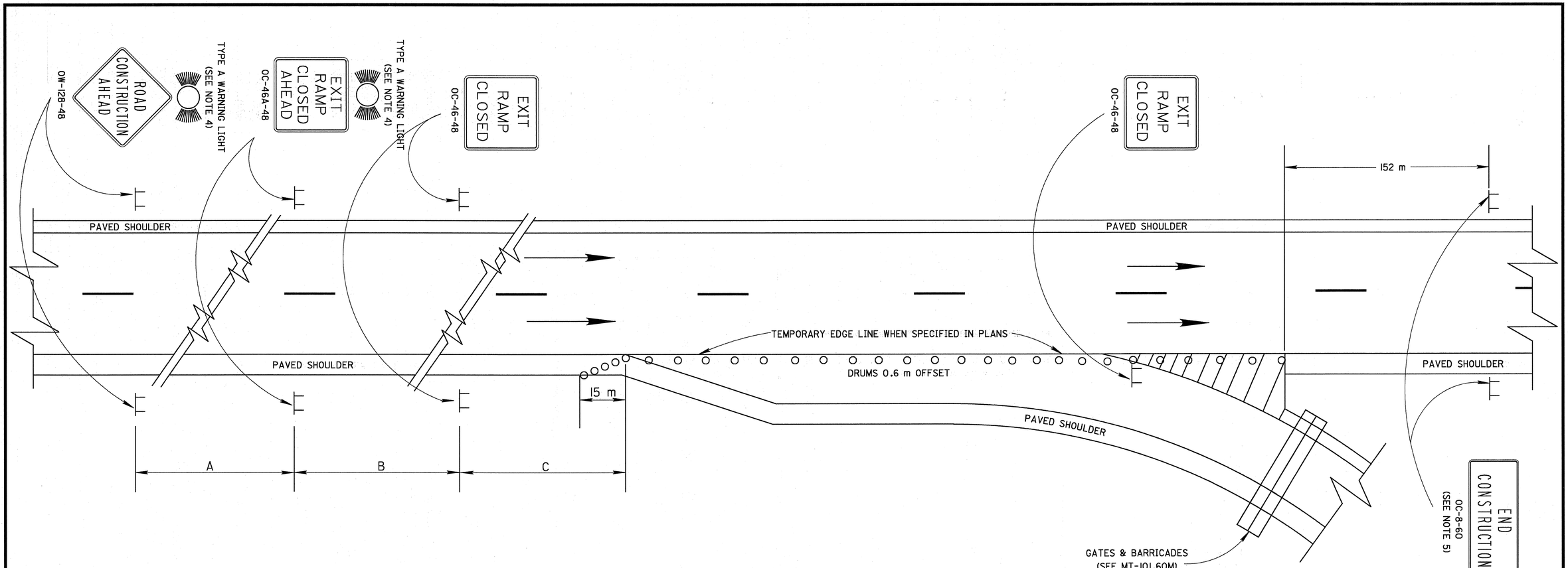
METRIC

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF THE OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC	DATE 06/24/93
LANE CLOSURE AT ENTRANCE RAMP: PLAN B	
STANDARD CONSTRUCTION DRAWING MT-98.16M	
APPROVED Tony L Craig ENGR. OF DESIGN SERVICES	

WCC



GENERAL NOTES:

1. THE LOCATION OF THE ADVANCE WARNING SIGNS SHOULD BE ADJUSTED TO PROVIDE FOR ADEQUATE SIGHT DISTANCE FOR THE EXISTING VERTICAL AND HORIZONTAL ROADWAY ALIGNMENT.

2. THE SPACING BETWEEN PROPOSED SIGNS SHOULD BE ADJUSTED TO NOT CONFLICT WITH AND TO PROVIDE A MINIMUM OF 61 m CLEARANCE TO EXISTING SIGNS.

3. ALONG THE CLOSURE, DRUMS SHALL BE SPACED AT 6.1 m CENTER TO CENTER. A MINIMUM OF 5 DRUMS SHALL BE USED TO CLOSE THE SHOULDER. CONES HAVING A MINIMUM HEIGHT OF 0.7 m MAY BE SUBSTITUTED FOR DRUMS FOR DAYTIME LANE CLOSURES. PROVISIONS SHALL BE MADE TO SAFELY STABILIZE THE CONES TO PREVENT THEM FROM BLOWING OVER. IF THIS CANNOT BE ACHIEVED, DRUMS SHALL BE USED.

4. TYPE A FLASHING WARNING LIGHTS SHOWN ON THE OW-128 AND OC-46A SIGNS ARE REQUIRED WHENEVER A NIGHT CLOSURE IS NECESSARY.

5. THE OC-8 SIGNS ARE ONLY REQUIRED FOR RAMP CLOSURES OF MORE THAN ONE DAY AND MAY BE OMITTED IF THEY FALL WITHIN THE LIMITS OF A CONSTRUCTION PROJECT.

TABLE I

MINIMUM DISTANCE (METERS)			
	A	B	C
URBAN FREEWAY & EXPRESSWAY	152 TO 305	152 TO 305	152 TO 305
RURAL FREEWAY & EXPRESSWAY	792	488	305

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF THE OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

OFFICE OF TRAFFIC ENGINEERING
DIVISION OF ENGINEERING POLICY
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

EXIT RAMP CLOSURE

DATE 03/01/96

STANDARD CONSTRUCTION DRAWING MT-98.19M

APPROVED _____ ADMINISTRATOR

metric units

WCC

614 WORK ZONE PAVEMENT MARKINGS

GENERAL

THE CONTRACTOR SHALL FURNISH, INSTALL, MAINTAIN AND WHEN NECESSARY, REMOVE WORK ZONE RETROREFLECTIVE PAVEMENT MARKINGS ON EXISTING, RECONSTRUCTED, RESURFACED OR TEMPORARY ROADS WITHIN THE WORK LIMITS, IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS.

THE MARKINGS SHALL BE EVALUATED BY THE ENGINEER IN ACCORDANCE WITH THE THREE PERFORMANCE PARAMETERS CONTAINED IN SUPPLEMENT 1047. THE MARKINGS SHALL BE REPAIRED OR REPLACED WHEN THE NUMERICAL RATING OF A PARAMETER IS (a) SIX OR LOWER FOR DURABILITY, (b) FOUR OR LOWER FOR VISUAL EFFECTIVENESS AND (c) FOUR OR LOWER FOR NIGHT VISIBILITY. THE CONTRACTOR SHALL REPAIR OR REPLACE UNSATISFACTORY MARKINGS IMMEDIATELY AND AT NO ADDITIONAL COST TO THE STATE.

TEMPORARY PAVEMENT MARKING MATERIALS

UNLESS OTHERWISE INDICATED ON THE PLANS, TEMPORARY PAVEMENT MARKINGS MAY BE EITHER 641.02 PAINT OR 740.05 TYPE B OR TYPE C PREFORMED MATERIAL.

PAINT

PAINTED MARKINGS SHALL BE IN ACCORDANCE WITH 642 EXCEPT THAT (a) PARAGRAPH 641.11 SHALL NOT APPLY, (b) WHERE THE MARKINGS ARE NOT LIABLE TO BE TRACKED, EITHER CONVENTIONAL OR FAST DRY PAINT MAY BE USED FOR 641.02 AND (c) WHEN APPLYIED TO NEW ASPHALT PAVEMENT SURFACES PLACED BY THIS PROJECT, THE SPECIFIED APPLICATION RATE SHALL BE AS FOLLOWS:

LITERS PER KILOMETER OF LINE	WIDTH OF LINE (MILLIMETERS) 100	200	300		
SOLID LINE	56.6	113.3	169.9	-	-
3.0 m DASHED LINE	14.2	-	-	-	-
1.2 m DASHED LINE	5.7	-	-	-	-
DOTTED LINE	19.0	-	-	-	-

(d) WHEN APPLIED TO PLANED ASPHALT PAVEMENT SURFACES, THE SPECIFIED APPLICATION RATE SHALL BE AS FOLLOWS:

LITERS PER KILOMETER OF LINE	WIDTH OF LINE (MILLIMETERS) 100	200	300		
SOLID LINE	67.9	135.9	203.8	-	-
3.0 m DASHED LINE	17.0	-	-	-	-
1.2 m DASHED LINE	6.8	-	-	-	-
DOTTED LINE	22.7	-	-	-	-

TYPE B AND TYPE C PREFORMED MATERIAL

PREFORMED MATERIAL SHALL COMPLY WITH 740.05 EXCEPT THAT NO PREFORMED MATERIAL CONTAINING METAL SHALL BE PLACED ON ANY SURFACE UNLESS IT WILL BE REMOVED LATER BY THE CONTRACTOR. TEMPORARY PAVEMENT MARKINGS OF 740.05 PREFORMED MATERIAL SHALL BE REMOVED PRIOR TO PLACEMENT OF 642 OR 644 SURFACE COURSE MARKINGS AT THAT LOCATION. PREFORMED MATERIAL SHALL BE IN ACCORDANCE WITH 644 EXCEPT AS MODIFIED HEREIN.

PLACEMENT

TEMPORARY MARKINGS SHALL BE COMPLETE AND IN PLACE ON ALL PAVEMENT, INCLUDING RAMPS, PRIOR TO EXPOSING IT TO TRAFFIC. WHEN TEMPORARY MARKINGS CONFLICT WITH THE TRAFFIC PATTERN, THEY SHALL BE REMOVED BY THE CONTRACTOR IN ACCORDANCE WITH 641.10.

LINE PLACEMENT TOLERANCE FOR FINAL SURFACES SHALL BE IN ACCORDANCE WITH 641.07. ON SURFACES OTHER THAN THE FINAL, THE TOLERANCE PERMITTED SHALL BE TWICE THAT IN 641.07. LAYOUT AND PREMARKING SHALL BE IN ACCORDANCE WITH 641.06.

TEMPORARY MARKING CLASSES

CLASS I MARKINGS

CLASS I MARKINGS SHALL BE APPLIED TO THE STANDARD DIMENSIONS AS DEFINED IN 642 WITH THE FOLLOWING EXCEPTION:

1. TRANSVERSE LINES SHALL BE 200 mm IN WIDTH.
2. STOP LINES SHALL BE 300 mm IN WIDTH.
3. CROSSWALK LINES SHALL BE 200 mm IN WIDTH.

CLASS II MARKINGS

CLASS II MARKINGS (ABBREVIATED) SHALL BE DEFINED AS FOLLOWS:

CENTER LINES SHALL CONSIST OF SINGLE, YELLOW 100 mm WIDE BY A MINIMUM OF 1.2 m LONG DASHES SPACED AT A MAXIMUM OF 12.0 m INTERVALS.

LANE LINES SHALL CONSIST OF WHITE 100 mm WIDE BY A MINIMUM OF 1.2 m LONG DASHES SPACED AT A MAXIMUM OF 12.0 m INTERVALS.

GORE MARKINGS SHALL BE CONTINUOUS, WHITE 100 mm LINES PLACED AT THE THEORETICAL GORE OF AN EXIT RAMP OR DIVERGING ROADWAYS.

CONFLICTING EXISTING MARKINGS

THE CONTRACTOR SHALL, PRIOR TO PLACING TEMPORARY MARKINGS, REMOVE ALL CONFLICTING EXISTING MARKINGS VISIBLE TO THE TRAVELING PUBLIC DURING DAYLIGHT OR NIGHTTIME HOURS IN ACCORDANCE WITH 641.10. THE COST FOR REMOVAL OF CONFLICTING MARKINGS SHALL BE INCLUDED IN 614 MAINTAINING TRAFFIC UNLESS SPECIFICALLY ITEMIZED.

THE CONTRACTOR SHALL ALSO REMOVE THE PRISMATIC RETRO-REFLECTOR WITHIN ANY RAISED PAVEMENT MARKER (RPM) WHICH IS IN CONFLICT WITH THE TEMPORARY PAVEMENT MARKINGS. WHEN THE TEMPORARY PAVEMENT MARKINGS ARE REMOVED AND THE RPM IS NO LONGER IN CONFLICT, THE CONTRACTOR SHALL THOROUGHLY CLEAN THE RECESSED REFLECTOR ATTACHMENT AREA OF THE CASTING AND INSTALL A NEW PRISMATIC RETRO-REFLECTOR OF THE SAME KIND AND COLOR. THE COST FOR THIS WORK SHALL BE INCIDENTAL TO THE VARIOUS PAY ITEMS.

ALLOWABLE DURATION OF CLASS II CENTER LINES

EXCEPT AS NOTED BELOW, ANYTIME EXISTING PERMANENT NO PASSING ZONE MARKINGS HAVE BEEN REMOVED OR OBLITERATED AS THE RESULT OF A CONSTRUCTION OPERATION (PAVEMENT GRINDING, ASPHALT PAVEMENT OVERLAYS, ETC.) AND THE SECTION OF PAVEMENT CONTINUES TO BE USED BY THE TRAVELING PUBLIC, THE CONTRACTOR MUST WITHIN 3 CALENDAR DAYS PLACE FINAL CENTER LINE MARKINGS AS SPECIFIED BY THE PLAN. EQUIVALENT 614 CLASS I CENTER LINE MARKINGS MAY BE USED IN LIEU OF FINAL MARKINGS. IN THIS EVENT, THE CONTRACTOR SHALL FURNISH ALL LABOR, EQUIPMENT, AND MATERIAL NECESSARY TO PLACE AND MAINTAIN 614 CLASS I MARKINGS AS PART OF THE LUMP SUM BID FOR MAINTAINING TRAFFIC.

IF AFTER THE ORIGINAL MARKINGS ARE REMOVED OR OBLITERATED, THE CONTRACTOR RETURNS TO THE SUBJECT NO PASSING ZONE AND PLACES A PLAN SPECIFIED PAVEMENT COURSE WITHIN THE 3 CALENDAR DAY LIMIT, OR PERFORMS WORK IN PREPARATION FOR A SUBSEQUENT PAVEMENT COURSE, THE CONTRACTOR WILL HAVE TEMPORARILY SATISFIED THE CONDITIONS OF THE PREVIOUS PARAGRAPH. IN THIS EVENT THE 3 CALENDAR DAY LIMIT WILL BEGIN AGAIN.

SECTIONS OF PAVEMENT WHERE PASSING IS PERMITTED IN BOTH DIRECTIONS SHALL BE GOVERNED BY THE 21 DAY LIMIT DESCRIBED BELOW IN THE PARAGRAPH ENTITLED "ALLOWABLE DURATION OF CLASS II LANE LINES, GORE MARKINGS AND ABSENCE OF EDGE LINES."

FOR EACH CALENDAR DAY BEYOND 3 DAYS THAT THIS WORK SHALL REMAIN UNCOMPLETED, THE SUM OF $200 PER CALENDAR DAY WILL BE DEDUCTED FROM ANY MONEY DUE THE CONTRACTOR, NOT AS A PENALTY BUT AS LIQUIDATED DAMAGES.

ALLOWABLE DURATION OF CLASS II LANE LINES AND GORE MARKINGS AND ABSENCE OF EDGE LINES

ANYTIME EXISTING PERMANENT LANE LINES, GORE MARKINGS OR EDGE LINES HAVE BEEN REMOVED OR OBLITERATED AS THE RESULT OF A CONSTRUCTION OPERATION (PAVEMENT GRINDING, ASPHALT PAVEMENT OVERLAYS, PAVEMENT WIDENING, ETC.) AND THE SECTION OF PAVEMENT CONTINUES TO BE USED BY THE TRAVELING PUBLIC, THE CONTRACTOR MUST WITHIN 21 CALENDAR DAYS PLACE FINAL PAVEMENT MARKINGS AS SPECIFIED BY THE PLAN. EQUIVALENT 614 CLASS I MARKINGS MAY BE USED IN LIEU OF FINAL MARKINGS. IN THIS EVENT, THE CONTRACTOR SHALL FURNISH ALL LABOR, EQUIPMENT, AND MATERIAL NECESSARY TO PLACE AND MAINTAIN 614 CLASS I MARKINGS AS PART OF THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC.

IF, AFTER THE ORIGINAL MARKINGS ARE REMOVED OR OBLITERATED, THE CONTRACTOR RETURNS TO THE SUBJECT SECTION OF PAVEMENT AND PLACES A PLAN SPECIFIED PAVEMENT COURSE WITHIN THE 21 CALENDAR DAY LIMIT, OR PERFORMS SPECIFIED WORK WHICH REQUIRES A LANE CLOSURE, EXCEPT ROUTINE MAINTENANCE REQUIRED BY 614.02, THE CONTRACTOR WILL HAVE TEMPORARILY SATISFIED THE CONDITIONS OF THE PREVIOUS PARAGRAPH. IN THIS EVENT, THE 21 CALENDAR DAY LIMIT WILL BEGIN AGAIN.

FOR EACH CALENDAR DAY BEYOND 21 DAYS THAT THIS WORK SHALL REMAIN UNCOMPLETED, THE SUM OF $200 PER CALENDAR DAY WILL BE DEDUCTED FROM ANY MONEY DUE THE CONTRACTOR, NOT AS A PENALTY BUT AS LIQUIDATED DAMAGES.

IF A SECTION OF PAVEMENT IS IN A CONTINUOUS PART OF THE PROJECT THEN A NEW 21 DAY LIMIT FOR RENEWED WORK ON A SECTION SHALL APPLY TO ALL SECTIONS IN THAT PART. IF THE PROJECT IS IN PARTS AND THE TRAVELING PUBLIC WOULD NOT DISCERN THE PARTS AS ONE CONTINUOUS PROJECT, THEN A NEW 21 DAY LIMIT IN ONE PART WILL NOT APPLY TO THE OTHER PARTS. THE TWO DIRECTIONAL SIDES OF A FREEWAY SHALL BE TREATED AS SEPARATE PARTS. WORK ON ONE SIDE OF A FREEWAY SHALL NOT CREATE A NEW 21 DAY LIMIT FOR THE OTHER SIDE.

METHOD OF MEASUREMENT

TEMPORARY PAVEMENT MARKINGS WILL BE MEASURED COMPLETE IN PLACE, BY CLASS AND MATERIAL, IN THE UNITS DESIGNATED. LINE QUANTITIES WILL BE THE LENGTH OF THE COMPLETED STRIPE, INCLUDING GAPS, INTERSECTIONS, AND OTHER SECTIONS OF PAVEMENT NOT NORMALLY MARKED.

TEMPORARY PAVEMENT MARKINGS WILL INCLUDE THE LAYOUT, APPLICATION AND REMOVAL OF THE MARKINGS, WHEN REQUIRED.

BASIS OF PAYMENT

PAYMENT FOR ACCEPTED QUANTITIES COMPLETE IN PLACE WILL BE MADE AT THE CONTRACT UNIT PRICE. PAYMENT SHALL BE FULL COMPENSATION FOR ALL MATERIALS, LABOR, INCIDENTALS AND EQUIPMENT FOR PLACEMENT, MAINTENANCE AND NECESSARY REMOVAL OF MARKINGS.

ITEM	UNIT	DESCRIPTION
614	KILOMETER	TEMPORARY LANE LINES, CLASS____, ___*
614	KILOMETER	TEMPORARY CENTER LINES, CLASS____, ___*
614	METER	TEMPORARY CHANNELIZING LINES, CLASS I, ___*
614	KILOMETER	TEMPORARY EDGE LINES, CLASS I, ___*
614	METER	TEMPORARY GORE MARKINGS, CLASS II, ___*
614	METER	TEMPORARY STOP LINES, CLASS I, ___*
614	METER	TEMPORARY CROSSWALK LINES, CLASS I, ___*
614	METER	TEMPORARY DOTTED LINES, CLASS I, ___*

* TYPE MATERIAL (642 PAINT, 740.05 TYPE B OR 740.05 TYPE C OR LEFT BLANK TO PERMIT ANY OF THE THREE)

614 WORK ZONE MARKING SIGNS

GENERAL

THE CONTRACTOR SHALL FURNISH, INSTALL, MAINTAIN AND SUBSEQUENTLY REMOVE WORK ZONE MARKING SIGNS (OW-1-67, R-33 AND R-34) AND THEIR SUPPORTS WITHIN THE WORK LIMITS IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS.

THE CONTRACTOR SHALL, IN ADVANCE OF ANY SECTION OF ROADWAY LACKING OMUTCD STANDARD EDGE LINE MARKINGS, ERECT A "NO EDGE LINES" (OW-1-67-36) SIGN. ON FREEWAYS AND EXPRESSWAYS AN OW-1-67-48 SIGN SHALL BE USED. THESE SIGNS SHALL BE IN PLACE PRIOR TO EXPOSING THE ROADWAY TO TRAFFIC. THESE SIGNS SHALL ALSO BE ERECTED ON EACH ENTRANCE RAMP, AT INTERSECTIONS OF THROUGH ROADS TO WARN ENTERING OR TURNING TRAFFIC OF THE CONDITIONS AND AT LEAST ONCE EVERY 3.2 km ALONG THE ROADWAY. THESE SIGNS SHALL BE REMOVED WHEN THEY DO NOT APPLY.

THE CONTRACTOR SHALL AT THE BEGINNING OF EACH NO-PASSING ZONE LACKING OMUTCD STANDARD CENTER LINE MARKINGS, ERECT A "DO NOT PASS" (R-33-30) SIGN AND AT THE END OF EACH NO-PASSING ZONE, ERECT A "PASS WITH CARE" (R-34-30) SIGN.

MATERIALS

THE CONTRACTOR MAY USE SIGNS AND SUPPORTS IN USED BUT GOOD CONDITION. SIGN FACES SHALL BE REFLECTORIZED WITH TYPE G SHEETING COMPLYING WITH THE REQUIREMENTS OF 730.19. WORK ZONE MARKING SIGNS SHALL BE PROVIDED WITH SUITABLE YIELDING SUPPORTS OF SUFFICIENT STRENGTH AND STABILITY.

METHOD OF MEASUREMENT

WORK ZONE MARKING SIGNS WILL BE MEASURED AS THE NUMBER OF SIGN INSTALLATIONS, INCLUDING THE SIGN, NECESSARY SUPPORTS AND ALL ATTACHMENT HARDWARE. ALL OTHER WORK ZONE SIGNS SHALL BE INCLUDED IN 614 MAINTAINING TRAFFIC UNLESS SEPARATELY ITEMIZED.

BASIS OF PAYMENT

PAYMENT FOR ACCEPTED QUANTITIES, COMPLETE, IN PLACE WILL BE MADE AT THE CONTRACT UNIT PRICE. PAYMENT SHALL BE FULL COMPENSATION FOR ALL MATERIALS, LABOR, INCIDENTALS AND EQUIPMENT FOR PLACEMENT, MAINTENANCE AND REMOVAL OF THE SIGNS.

ITEM	UNIT	DESCRIPTION
614	EACH	WORK ZONE MARKING SIGNS

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

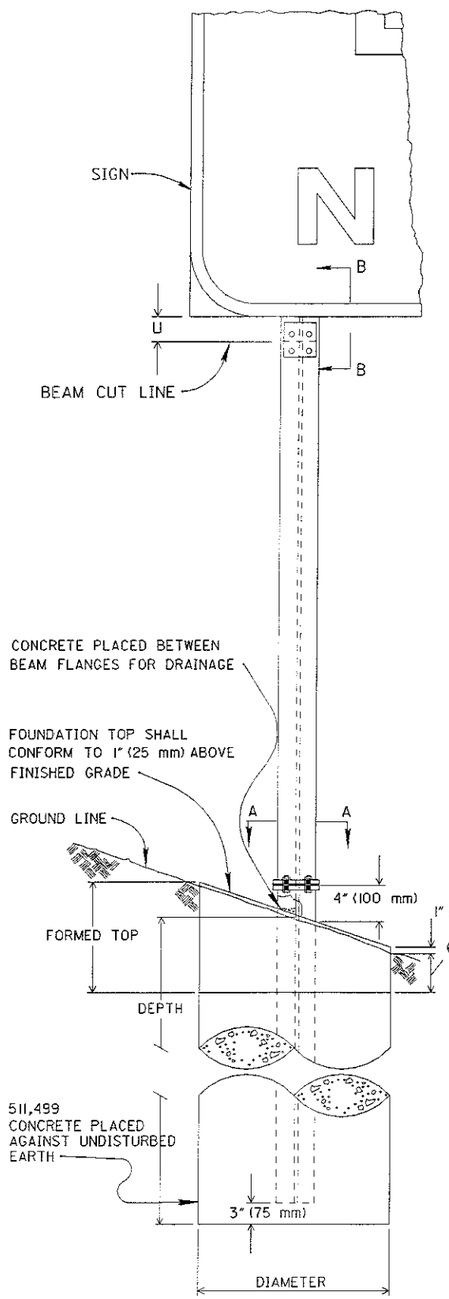
MAINTENANCE OF TRAFFIC

WORK ZONE PAVEMENT MARKINGS AND SIGNS

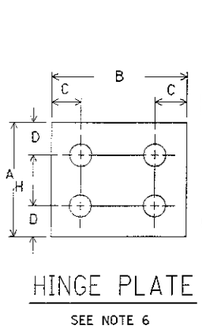
DATE 01/30/95

STANDARD CONSTRUCTION DRAWING MT-99.10M

APPROVED _____ ENGR. OF DESIGN SERVICES

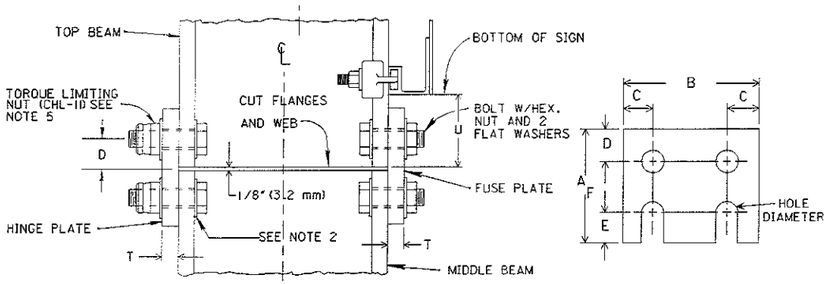


SLIP BASE DESIGN



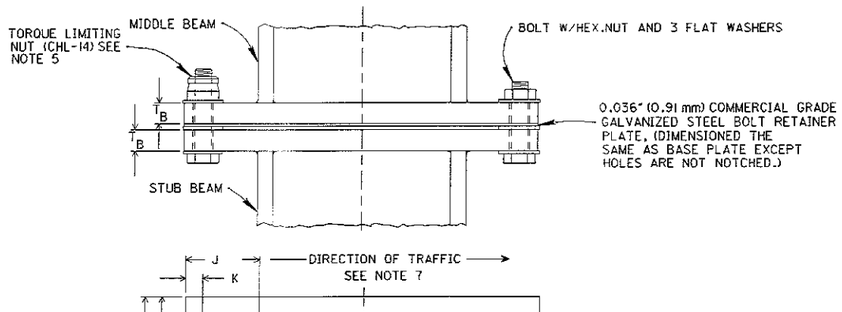
HINGE PLATE

SEE NOTE 6



SECTION B - B

FUSE PLATE



SECTION A - A

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED

BEAM		HINGE AND FUSE PLATE DIMENSIONS											FOUNDATIONS			BASE PLATE DIMENSIONS								
																DIMENSIONS						HOLE	BOLT	MAX. TORQUE
TYPE	SIZE	A_H	A_F	B	C	D	E	T	U	HOLE DIA.	BOLT SIZE	MIN. PRELOAD (lb)	DIA. (feet)	DEPTH (feet)	CONCRETE cu yd/ea	G	H	J	K	L	T_B	DIA.	SIZE	in./lbs.
S4 X 7.7	4 x 2-5/8	4-1/8	3-5/8	2-5/8	9/16	1	1/2	3/16	2-1/2	9/16	1/2	10,000	1.5	4	0.27	4	8	2	1/2	1	3/4	9/16	1/2	200
W6 X 9	5-7/8 x 4	4-1/8	3-5/8	4	7/8	1	1/2	3/16	2-1/2	9/16	1/2	10,000	1.5	5	0.33	5-1/2	10	2-1/16	1/2	1	3/4	9/16	1/2	200
W10 X 12	9-7/8 x 4	6-1/8	5-3/8	4	7/8	1-1/2	3/4	3/16	3-1/2	13/16	3/4	25,000	2.5	6	1.10	8	14-1/2	2-5/16	3/4	1-1/2	3/4	13/16	3/4	750
W8 X 18	8-1/8 x 5-1/4	7-1/8	6-1/4	5-1/4	1-1/4	1-3/4	7/8	1/4	4	15/16	7/8	35,000	2.5	6	1.10	8	14-1/2	3-1/4	3/4	1-1/2	1	13/16	3/4	750
W10 X 22	10-1/8x5-3/4	8-1/8	7-1/8	5-3/4	1-1/2	2	1	5/16	4-1/2	1-1/16	1	46,000	2.5	6.75	1.23	8	14-1/2	2-5/16	15/16	2	1	1-1/16	1	1325
W12 X 30	12-3/8x6-1/2	8-1/8	7-1/8	6-1/2	1-1/2	2	1	5/16	4-1/2	1-1/16	1	46,000	2.5	8.25	1.50	10	17	2-7/16	15/16	2	1-1/4	1-1/16	1	1325

ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

BEAM		HINGE AND FUSE PLATE DIMENSIONS											FOUNDATIONS			BASE PLATE DIMENSIONS								
																DIMENSIONS						HOLE	BOLT	MAX. TORQUE
TYPE	SIZE	A_H	A_F	B	C	D	E	T	U	HOLE DIA.	BOLT SIZE	MIN. PRELOAD (kg)	DIA. (METER)	DEPTH (METER)	CONCRETE m^3 / EA	G	H	J	K	L	T_B	DIA.	SIZE	N·m
S100x11.5	102 x 67	105	92	67	14	25	13	4.8	64	14	13	4535	0.5	1.2	0.24	102	203	51	13	25	19	14	13	22.6
W150x13.5	149 x 102	105	92	102	22	25	13	4.8	64	14	13	4535	0.5	1.5	0.30	140	254	52	13	25	19	14	13	22.6
W250x17.9	244 x 102	156	137	102	22	38	19	4.8	90	21	19	11339	0.8	1.8	0.91	203	368	59	19	38	19	21	19	85
W200x26.6	206 x 133	181	159	133	32	45	22	6.4	102	24	22	15875	0.8	1.8	0.91	203	368	83	19	38	25	21	19	85
W250x32.7	257 x 146	206	181	146	38	51	25	8	114	27	25	20865	0.8	2.1	1.06	203	368	59	24	51	25	27	25	150
W310x44.5	314 x 165	206	181	165	38	51	25	8	114	27	25	20865	0.8	2.5	1.26	254	432	62	24	51	32	27	25	150

NOTES

1. Base plate weld size shall be equal to the beam flange and web thickness respectively, but no less than 1/4" (6.4 mm) in either instance.
2. With the S4X7.7 (S100x11.5) beam, use malleable iron beveled washers conforming with ASTM A47 grade 35018.
3. Tighten fuse and hinge plate connections in the shop following a method approved by the Engineer to produce the minimum bolt preload specified.
4. Use the following procedure in assembling the breakaway base plate:

   After all bolts, washers, standard nuts and bolt retainer plates are in place. Tighten all standard nuts snugly with a 12" (305 mm) wrench. Loosen each bolt in turn and retighten in a systematic manner to the specified maximum torque. Calibrate wrenches at least once each working day for each bolt diameter being torqued. Burr threads at junction with nut using a center punch.

5. In lieu of the standard nuts and procedures outlined in 3 and 4 above, the supports may be assembled using torque limiting nuts. Tighten each nut with sufficient torque applied until the upper wrenching surface has sheared away from the structural body of the nut. Shop assemble fuse and hinge plates following this procedure. Use nuts as manufactured by HI-Shear Corp. Torrance, California; VOI SHAN Industries - Culvert City, California; Standard Pressed Steel - Jenkintown, Pennsylvania or approved equal. Use the torque limiting nut part number CHL-14 for the base plate, and CHL-11 for the fuse and hinge plates.
6. For beams subject to impact from opposite directions (such as in freeway medians) provide fuse plates on both sides.
7. Notches shown for installation to the right of traffic. For installations to the left of traffic, fabricate with skewed edge of notches reversed from that shown.
8. Dimensions shown for alternate designs are approximate. Specified dimensions for alternate designs require prequalification. An approved list of suppliers can be provided by O.D.O.T. Payment for alternate designs will be based on the plan quantities for embedded beams.

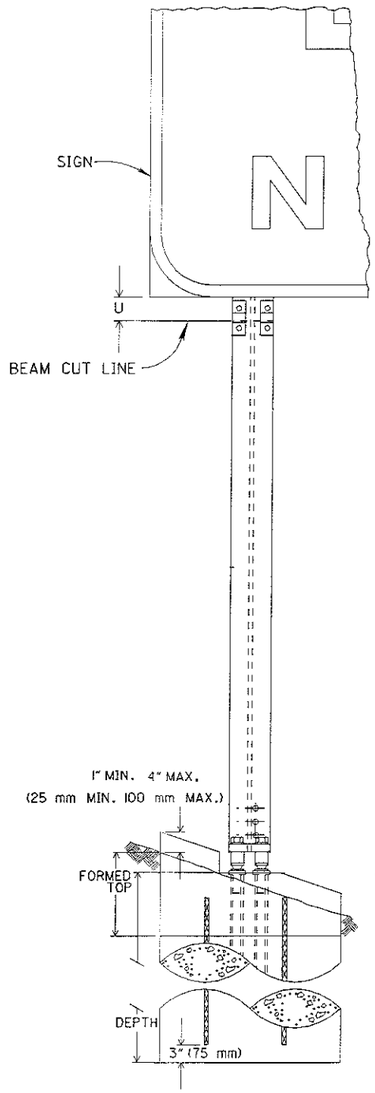
STRUCTURAL BEAM SIGN SUPPORTS

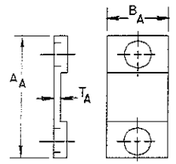
01-19-01

OFFICE OF TRAFFIC ENGINEERING

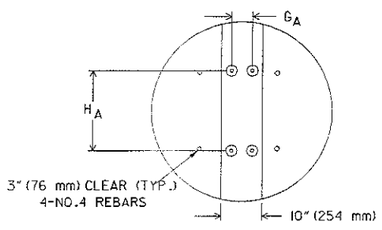
TC-41.10

LAM





ALTERNATE HINGE AND FUSE PLATES
(4 PER BEAM)



ALTERNATE DESIGN

ALTERNATE DESIGN
(SEE NOTE 8)
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED

BEAM		HINGE AND FUSE PLATE				FOUNDATIONS			BASE PLATE DIMENSIONS		
TYPE	SIZE	A_A	B_A	BOLT SIZE	T_A	DIA. (FEET)	DEPTH (FEET)	CONCRETE YD^3/ EA.	G_A	H_A	BOLT SIZE
S4 X 7.7	4 x 2-5/8	3-3/4	1	1/2	0.071	1.5	4	0.27	4-1/4	7-11/16	1/2
W6 X 9	5-7/8 x 4	3-3/4	1	1/2	0.071	1.5	5	0.33	4-1/4	9-9/16	1/2
W10 X 12	9-7/8 x 4	3-3/4	1	1/2	0.071	2.5	6	1.10	4-1/4	13-5/8	1/2
W8 X 18	8-1/8x5-1/4	4-3/4	1-1/2	3/4	0.113	2.5	6	1.10	3	16-1/4	1/2
W10 X 22	10-1/8x5-3/4	4-3/4	1-1/2	3/4	0.113	2.5	6.75	1.23	4	18-5/16	5/8
W12 X 30	12-3/8x6-1/2	4-3/4	1-1/2	3/4	0.113	2.5	8.25	1.50	4	20-7/16	5/8

ALTERNATE DESIGN
(SEE NOTE 8)
ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

BEAM		HINGE AND FUSE PLATE				FOUNDATIONS			BASE PLATE DIMENSIONS		
TYPE	SIZE	A_A	B_A	BOLT SIZE	T_A	DIA. (METER)	DEPTH (METER)	CONCRETE m^3/ EA	G_A	H_A	BOLT SIZE
S100 X 11.5	102 x 67	95	25	13	1.80	0.5	1.2	0.24	108	195	13
W150 X 13.5	149 x 102	95	25	13	1.80	0.5	1.5	0.30	108	243	13
W250 X 17.9	244 x 102	95	25	13	1.80	0.8	1.8	0.91	108	346	13
W200 X 26.6	206 x 133	121	38	19	2.87	0.8	1.8	0.91	76	413	13
W250 X 32.7	257 x 146	121	38	19	2.87	0.8	2.1	1.06	102	465	16
W310 X 44.5	314 x 165	121	38	19	2.87	0.8	2.5	1.26	102	519	16

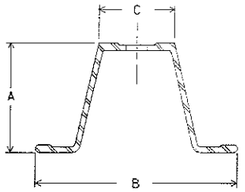
STRUCTURAL BEAM SIGN SUPPORTS | 01-19-01

STRUCTURAL

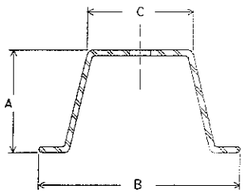
OFFICE OF TRAFFIC ENGINEERING

TC-41.10

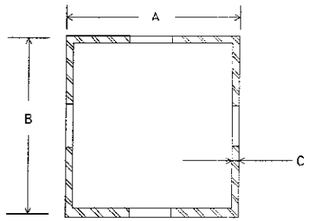
LAM



TYPE P



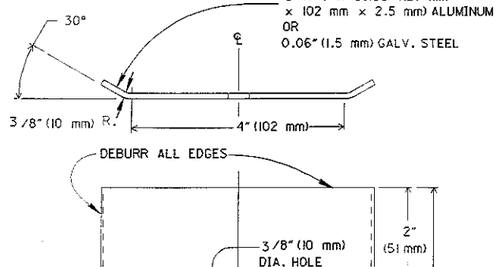
TYPE F



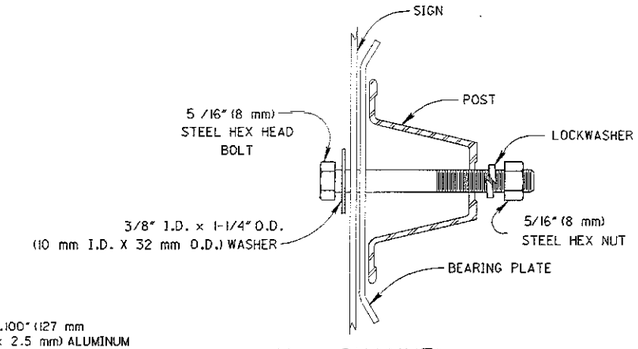
TYPE S

POST NO.	TYPE	LB/FT	POST DIMENSIONS (INCHES) A	B	C	ANCHOR DIMENSIONS A	B	C	NUMBER OF POSTS PERMITTED IN SEVEN FOOT PATH IN EXPOSED LOCATIONS
1	F	1.12	0.875	2.063	0.813				
2	P	2.00	1.469	3.063	1.281				2
	F	2.00	1.516	3.125	1.250				2
	S		1.750	1.750	0.083	2.000	2.000	0.105	2
3	P	3.00	1.875	3.500	1.313				2
	F	3.00	1.750	3.500	1.625				2
	S		2.00	2.00	0.083	2.250	2.250	0.105	2
4	P	4.00	TWO NO.2 POST						0
	F	4.00	TWO NO.2 POST						0
	S		2.500	2.500	0.105	3.000	3.000	0.188	1
6	P	6.00	TWO NO.3 POST						0
	F	6.00	TWO NO.3 POST						0

POST NO.	TYPE	Kg/m	POST DIMENSIONS (mm) A	B	C	ANCHOR DIMENSIONS A	B	C	NUMBER OF POSTS PERMITTED IN 2.1m PATH IN EXPOSED LOCATIONS
1	F	1.7	22	52	21				
2	P	3.0	37	78	33				2
	F	3.0	39	79	32				2
	S		44	44	2.1	51	51	2.7	2
3	P	4.5	48	89	33				2
	F	4.5	44	89	41				2
	S		51	51	2.1	57	57	2.7	2
4	P	6.0	TWO NO.2 POST						0
	F	6.0	TWO NO.2 POST						0
	S		63	63	2.7	76	76	4.8	1
6	P	9.0	TWO NO.3 POST						0
	F	9.0	TWO NO.3 POST						0



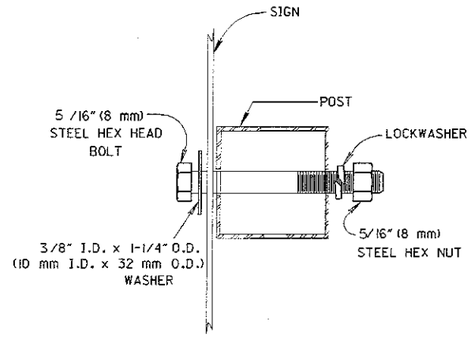
BEARING PLATE



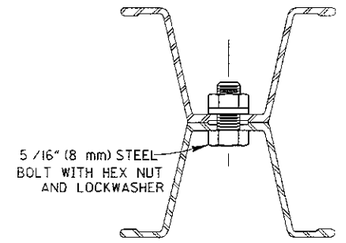
U - CHANNEL
SIGN ATTACHMENT DETAIL

NOTES

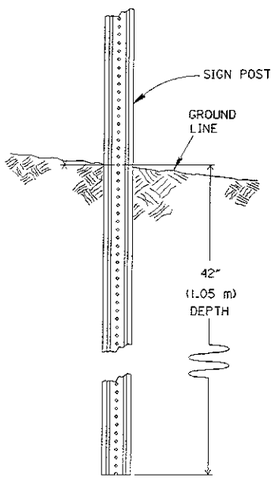
1. Install number 4 type P and F posts, and number 6 type P and F posts, only in protected locations (e.g. behind guardrail). Install two post installations of number 4 type S posts within 7 foot (2.1m) path only in protected locations.
2. Use of anchor base with No. 2 and No. 3 square post is optional. Use of anchor base with No. 4 square post is required.
3. Square post may have die-cut knockouts or open holes.



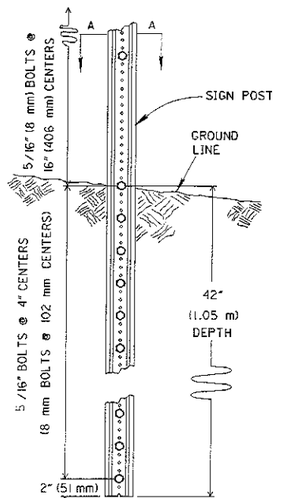
SQUARE POST
SIGN ATTACHMENT DETAIL



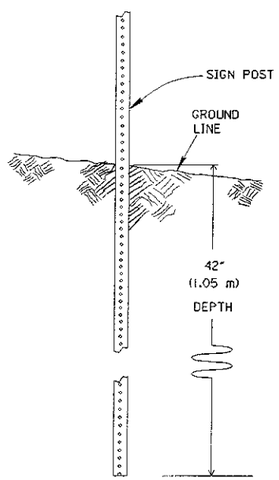
SECTION A - A



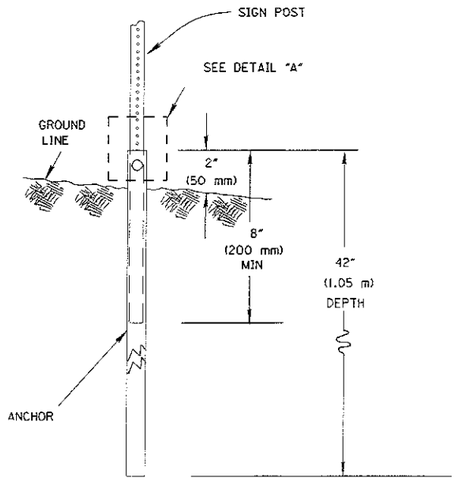
TYPICAL NO. 1, NO. 2 AND NO. 3 U - CHANNEL DRIVEN INSTALLATION



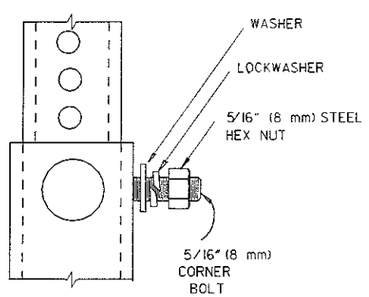
TYPICAL NO. 4 AND NO. 6 U - CHANNEL DRIVEN INSTALLATION



TYPICAL SQUARE POST DRIVEN INSTALLATION



TYPICAL SQUARE POST ANCHOR BASE INSTALLATION



DETAIL "A"

01-19-01

YIELDING POST

OFFICE OF TRAFFIC ENGINEERING

TC-41.20

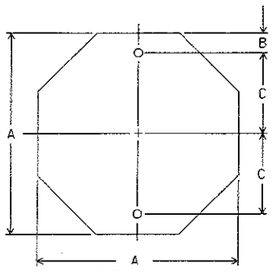
1 / 1

LAM

NOTES

1. For each detail shown, the top table is in inches and the lower table is in millimeters unless otherwise noted.
2. All bolt holes shall be 3/8" (10 mm) in diameter, and may be drilled or punched to finished size.
3. Dimensions between bolt holes shall be to tolerance of ± 1/32" (± 0.8 mm).
4. All route shields shall be 0.063" (1.6 mm) thick and attached to extrusheet signs with aluminum blind rivets.

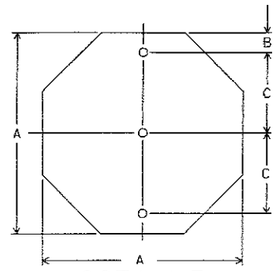
SHAPE — OCTA-2-6 — NO. BOLTS REQUIRED
NO. SUPPORTS REQUIRED



OCTA-1-2

A	B	C	GAUGE	SQ. FT.
18	3	6	0.063	2.25
24	3	9	0.063	4.00

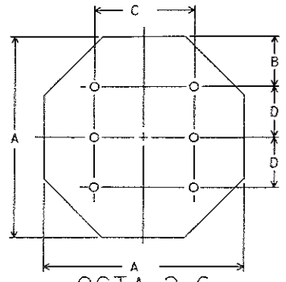
A	B	C	THICKNESS	m^2
450	75	150	1.6	0.20
600	75	225	1.6	0.36



OCTA-1-3

A	B	C	GAUGE	SQ. FT.
30	3	12	0.080	6.25
36	6	12	0.080	9.00

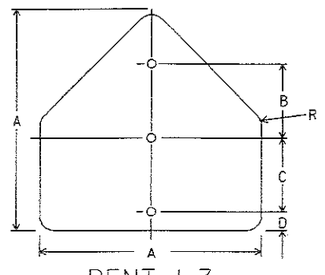
A	B	C	THICKNESS	m^2
750	75	300	2.0	0.56
900	150	300	2.0	0.81



OCTA-2-6

A	B	C	D	GAUGE	SQ. FT.
48	12	24	12	0.100	16.00

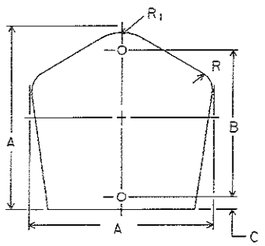
A	B	C	D	THICKNESS	m^2
1200	300	600	300	2.5	1.44



PENT-1-3

A	B	C	D	R	GAUGE	SQ. FT.
30	10	11	3	1.88	0.080	6.25
36	12	12	3	2.25	0.080	9.00
42	14	13	4	2.50	0.100	12.25

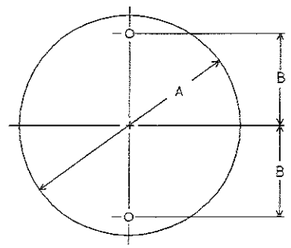
A	B	C	D	R	THICKNESS	m^2
750	250	275	75	48	2.0	0.56
900	300	300	75	57	2.0	0.81
1050	350	325	100	64	2.5	1.10



CO-1-2

A	B	C	R_1	R	GAUGE	SQ. FT.
18	15	1	5	2	0.063	2.25
24	18	2	5.31	2.69	0.063	4.00
30	24	2	6.63	3.38	0.080	6.25

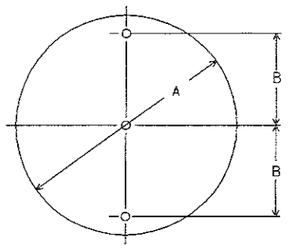
A	B	C	R_1	R	THICKNESS	m^2
450	375	25	125	50	1.6	0.20
600	450	50	135	68	1.6	0.36
750	600	50	168	86	2.0	0.56



CIR-1-2

A	B	GAUGE	SQ. FT.
18	6	0.063	2.25
24	9	0.063	4.00

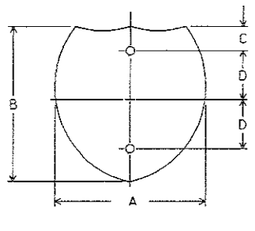
A	B	THICKNESS	m^2
450	150	1.6	0.20
600	225	2.0	0.36



CIR-1-3

A	B	GAUGE	SQ. FT.
30	12	0.080	6.25
36	15	0.080	9.00

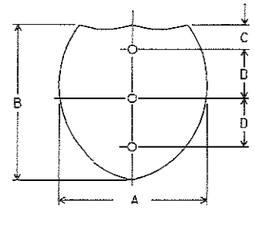
A	B	THICKNESS	m^2
750	300	2.0	0.56
900	375	2.0	0.81



I.S.-1-2

A	B	C	D	GAUGE	SQ. FT.
24	24	3	9	0.063	4.00
30	24	3	9	0.080	5.00
30	30	3	12	0.080	6.25
40	30	3	12	0.080	8.33

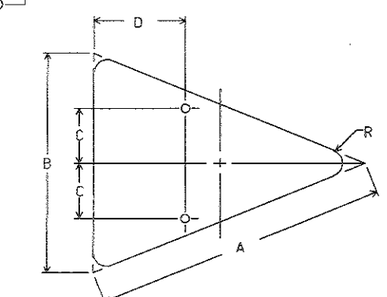
A	B	C	D	THICKNESS	m^2
600	600	75	225	1.6	0.36
750	600	75	225	2.0	0.45
750	750	75	300	2.0	0.56
1000	750	75	300	2.0	0.75



I.S.-1-3

A	B	C	D	GAUGE	SQ. FT.
36	36	6	12	0.080	9.00
48	36	6	12	0.100	12.00

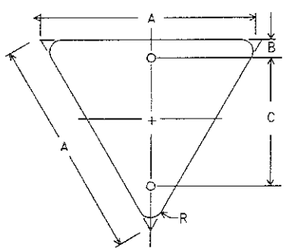
A	B	C	D	THICKNESS	m^2
900	900	150	300	2.0	0.81
1200	900	150	300	2.5	1.08



ISOS-1-2

A	B	C	D	R	GAUGE	SQ. FT.
40	30	7.50	12	1.88	0.080	3.86
48	36	9	15	2.25	0.100	5.56

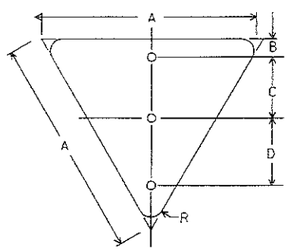
A	B	C	D	R	THICKNESS	m^2
1000	750	187	300	48	2.0	0.35
1200	900	225	375	57	2.5	0.50



TRI-1-2

A	B	C	R	GAUGE	SQ. FT.
24	2	14	1.50	0.080	1.73

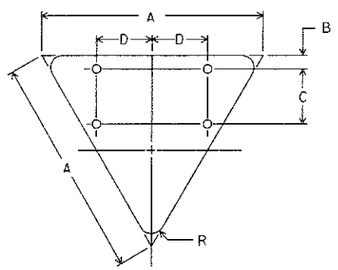
A	B	C	R	THICKNESS	m^2
600	50	350	38	2.0	0.16



TRI-1-3

A	B	C	D	R	GAUGE	SQ. FT.
36	3	10	11	2.00	0.100	3.90

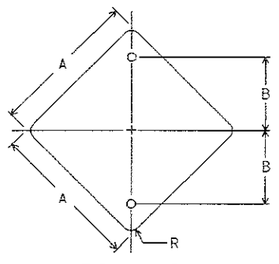
A	B	C	D	R	THICKNESS	m^2
900	75	250	275	50	2.5	0.35



TRI-2-4

A	B	C	D	R	GAUGE	SQ. FT.
48	3	12	12	3	0.100	6.93
60	3	18	15	4	0.100	10.83

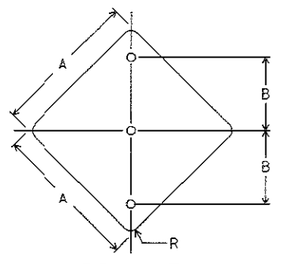
A	B	C	D	R	THICKNESS	m^2
1200	75	300	300	75	2.5	0.62
1500	75	450	375	100	2.5	0.97



DIA-1-2

A	B	R	GAUGE	SQ. FT.
18	9	1.50	0.063	2.25

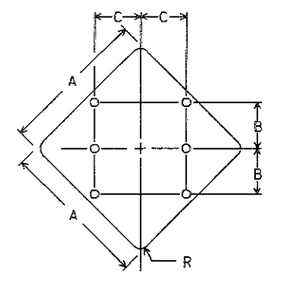
A	B	R	THICKNESS	m^2
450	225	38	1.6	0.20



DIA-1-3

A	B	R	GAUGE	SQ. FT.
24	12	1.50	0.063	4.00
30	15	1.88	0.080	6.25
36	18	2.25	0.080	9.00

A	B	R	THICKNESS	m^2
600	300	38	1.6	0.36
750	375	48	2.0	0.56
900	450	57	2.0	0.81



DIA-2-6

A	B	C	R	GAUGE	SQ. FT.
48	15	15	3	0.100	16.00
60	18	18	3.75	0.100	25.00

A	B	C	R	THICKNESS	m^2
1200	375	375	75	2.5	1.44
1500	450	450	95	2.5	2.25

4-20-01

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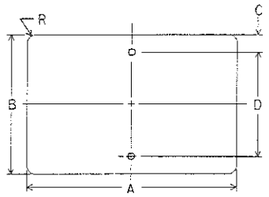
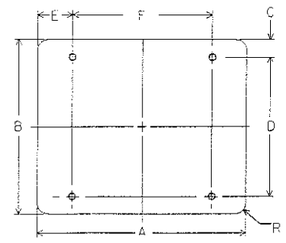


H-REC-1-2

A	B	C	D	R	GAUGE	SQ.FT.
12	4	1.00	2	1.50	0.063	0.34
12	6	1.50	3	1.50	0.063	0.50
12	9	1.50	6	1.50	0.063	0.75
18	6	1.50	3	1.50	0.063	0.75
18	12	1.50	9	1.50	0.063	1.50
21	15	1.50	12	1.50	0.063	2.19
21	18	3	12	1.50	0.063	2.63
24	6	1.50	3	1.50	0.063	1.00
24	8	1.50	5	1.50	0.063	1.33
24	10	1.50	7	1.50	0.063	1.67
24	12	1.50	9	1.50	0.063	2.00
24	18	3	12	1.50	0.063	3.00
30	8	1.50	5	1.50	0.063	1.67
30	10	1.50	7	1.50	0.063	2.08
30	12	1.50	9	1.50	0.080	2.50
30	15	1.50	12	1.50	0.080	3.13
30	16	1.50	13	1.50	0.080	3.33
30	18	3	12	1.50	0.080	3.75
30	24	3	18	1.50	0.080	5.00
36	6	1.50	3	1.50	0.080	1.50
36	12	1.50	9	1.50	0.080	3.00
36	15	1.50	12	1.50	0.080	3.75
36	18	3	12	1.50	0.080	4.50
36	24	3	18	1.50	0.080	6.00
37.5	30	3	24	1.50	0.080	7.81
42	15	1.50	12	1.50	0.080	4.38
48	20	3	14	1.50	0.080	6.67

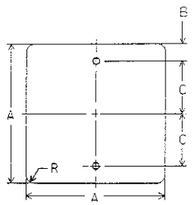
A	B	C	D	R	THICKNESS	m^2
300	100	25	50	38	1.6	0.03
300	150	37.5	75	38	1.6	0.05
300	225	37.5	150	38	1.6	0.07
450	150	37.5	75	38	1.6	0.07
450	300	37.5	225	38	1.6	0.14
525	375	37.5	300	38	1.6	0.20
525	450	75	300	38	1.6	0.24
600	150	37.5	75	38	1.6	0.09
600	200	37.5	125	38	1.6	0.12
600	250	37.5	175	38	1.6	0.15
600	300	37.5	225	38	1.6	0.18
600	450	75	300	38	1.6	0.27
750	200	37.5	125	38	1.6	0.15
750	250	37.5	175	38	1.6	0.19
750	300	37.5	225	38	2.0	0.23
750	375	37.5	300	38	2.0	0.28
750	400	37.5	325	38	2.0	0.30
750	450	75	300	38	2.0	0.34
750	600	75	450	38	2.0	0.45
900	150	37.5	75	38	2.0	0.14
900	300	37.5	225	38	2.0	0.27
900	375	37.5	300	38	2.0	0.34
900	450	75	300	38	2.0	0.41
900	600	75	450	38	2.0	0.54
937	750	75	600	38	2.0	0.70
1050	375	37.5	300	38	2.0	0.39
1200	500	75	350	38	2.0	0.60



H-REC-2-4

A	B	C	D	E	F	R	GAUGE	SQ.FT.
36	24	3	18	6	24	1.50	0.080	6.00
36	30	3	24	6	24	1.88	0.080	7.50
40	20	3	14	6	28	1.50	0.080	5.56
42	36	6	24	9	24	2.25	0.100	10.50
45	36	6	24	9	27	2.25	0.100	11.25
48	8	1.50	5	9	30	1.50	0.080	2.67
48	8.50	1.50	5.50	9	30	1.50	0.080	2.83
48	14	1.50	11	9	30	1.50	0.080	4.67
48	16	1.50	13	9	30	1.50	0.080	5.33
48	18	3	12	9	30	1.50	0.080	6.00
48	24	3	18	9	30	1.88	0.100	8.00
48	30	3	24	9	30	1.88	0.100	10.00
48	36	6	24	9	30	2.25	0.100	12.00
48	42	6	30	9	30	2.25	0.100	14.00
56	8	1.50	5	12	32	1.50	0.100	3.11
60	12	1.50	9	12	36	1.50	0.080	5.00
60	24	3	18	12	36	1.50	0.100	10.00
60	30	3	24	12	36	1.88	0.100	12.50
60	36	6	24	12	36	2.25	0.100	15.00
60	40	6	28	12	36	2.25	0.100	16.67
64	8	1.50	5	12	40	1.50	0.100	3.56
66	24	3	18	12	42	1.50	0.100	11.00
66	36	6	24	12	42	2.25	0.100	16.50
72	12	1.50	9	12	48	1.50	0.100	6.00
72	18	3	12	12	48	1.50	0.100	9.00
72	24	3	18	12	48	1.50	0.100	12.00
72	36	6	24	12	48	1.50	0.100	18.00

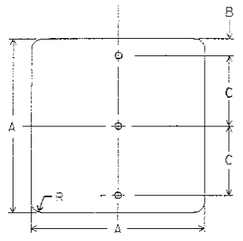
A	B	C	D	E	F	R	THICKNESS	m^2
900	600	75	450	150	600	38	2.0	0.54
900	750	75	600	150	600	48	2.0	0.68
1000	500	75	350	150	700	38	2.0	0.50
1050	900	150	600	225	600	57	2.5	0.95
1125	900	150	600	225	675	57	2.5	1.01
1200	200	37.5	125	225	750	38	2.0	0.24
1200	212	37.5	137	225	750	38	2.0	0.25
1200	350	37.5	275	225	750	38	2.0	0.42
1200	400	37.5	325	225	750	38	2.0	0.48
1200	450	75	300	225	750	38	2.0	0.54
1200	600	75	450	225	750	48	2.5	0.72
1200	750	75	600	225	750	48	2.5	0.90
1200	900	150	600	225	750	57	2.5	1.08
1200	1050	150	750	225	750	57	2.5	1.26
1400	200	37.5	125	300	800	38	2.5	0.28
1500	300	37.5	225	300	900	38	2.0	0.45
1500	600	75	450	300	900	38	2.5	0.90
1500	750	75	600	300	900	48	2.5	1.13
1500	900	150	600	300	900	57	2.5	1.35
1500	1000	150	700	300	900	57	2.5	1.50
1600	200	37.5	125	300	1000	38	2.5	0.32
1650	600	75	450	300	1050	38	2.5	0.99
1650	900	150	600	300	1050	57	2.5	1.49
1800	300	37.5	225	300	1200	38	2.5	0.54
1800	450	75	300	300	1200	38	2.5	0.81
1800	600	75	450	300	1200	38	2.5	1.08
1800	900	150	600	300	1200	38	2.5	1.62



SQ-1-2

A	B	C	R	GAUGE	SQ.FT.
15	3	4.5	1.50	0.063	1.56
18	3	6	1.50	0.063	2.25
24	3	9	1.50	0.063	4.00

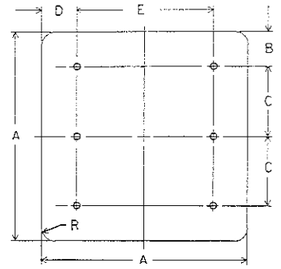
A	B	C	R	THICKNESS	m^2
375	75	112.5	38	1.6	0.14
450	75	150	38	1.6	0.20
600	75	225	38	1.6	0.36



SQ-1-3

A	B	C	R	GAUGE	SQ.FT.
30	3	12	1.88	0.080	6.25
36	6	12	2.25	0.080	9.00

A	B	C	R	THICKNESS	m^2
750	75	300	48	2.0	0.56
900	150	300	57	2.0	0.81



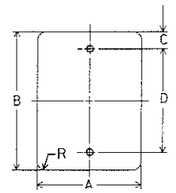
SQ-2-6

	A	B	C	D	E	R	GAUGE	SQ.FT.
*	36	6	12	6	24	2.25	0.080	9.00
	48	6	18	9	30	3.00	0.100	16.00

* "DO NOT ENTER" SIGN

	A	B	C	D	E	R	THICKNESS	m^2
*	900	150	300	150	600	57	2.0	0.81
	1200	150	450	225	750	75	2.5	1.44

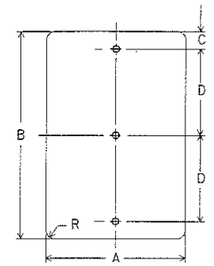
* "DO NOT ENTER" SIGN



V-REC-1-2

A	B	C	D	R	GAUGE	SQ.FT.
8	26	5	16	1.50	0.063	1.44
9	12	1.50	9	1.50	0.063	0.75
12	18	1.50	15	1.50	0.063	1.50
12	24	3	18	1.50	0.063	2.00
18	24	3	18	1.50	0.063	3.00

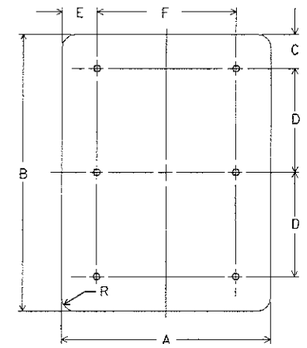
A	B	C	D	R	THICKNESS	m^2
200	650	125	400	38	1.6	0.13
225	300	37.5	225	38	1.6	0.07
300	450	37.5	375	38	1.6	0.14
300	600	75	450	38	1.6	0.18
450	600	75	450	38	1.6	0.27



V-REC-1-3

A	B	C	D	R	GAUGE	SQ.FT.
6	54	9	18	1.50	0.080	2.25
12	36	3	15	1.50	0.063	3.00
12	48	6	18	1.50	0.080	4.00
24	30	3	12	1.50	0.080	5.00
24	36	3	15	1.50	0.080	6.00
24	48	9	15	1.50	0.100	8.00
30	36	3	15	1.88	0.080	7.50
30	38	3	16	1.50	0.080	7.92
30	42	9	12	1.50	0.080	8.75
36	42	9	12	2.25	0.100	10.50

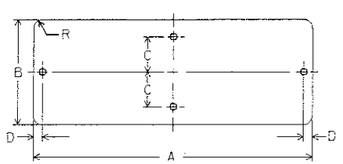
A	B	C	D	R	THICKNESS	m^2
150	1350	225	450	38	2.0	0.20
300	900	75	375	38	1.6	0.27
300	1200	150	450	38	2.0	0.36
600	750	75	300	38	2.0	0.45
600	900	75	375	38	2.0	0.54
600	1200	225	375	38	2.5	0.72
750	900	75	375	48	2.0	0.68
750	950	75	400	38	2.0	0.68
750	1050	225	300	38	2.0	0.79
900	1050	225	300	57	2.5	0.95



V-REC-2-6

A	B	C	D	E	F	R	GAUGE	SQ.FT.
36	48	6	18	6	24	2.25	0.080	12.00
36	54	6	21	6	24	2.25	0.100	13.50
36	60	6	24	6	24	2.25	0.100	15.00
36	72	9	27	6	24	2.25	0.100	18.00
48	54	6	21	9	30	3	0.100	18.00
48	60	6	24	9	30	3	0.100	20.00
48	96	12	36	9	30	3	0.100	32.00

A	B	C	D	E	F	R	THICKNESS	m^2
900	1200	150	450	150	600	57	2.0	1.08
900	1350	150	525	150	600	57	2.5	1.22
900	1500	150	600	150	600	57	2.5	1.35
900	1800	225	675	150	600	57	2.5	1.62
1200	1350	150	525	225	750	75	2.5	1.62
1200	1500	150	600	225	750	75	2.5	1.80
1200	2400	300	900	225	750	75	2.5	2.88



H-REC-1-4 (ONE WAY)

A	B	C	D	R	GAUGE	SQ.FT.
36	12	4	1	1.50	0.080	3.00
48	18	6	1.50	1.50	0.080	6.00

A	B	C	D	R	THICKNESS	m^2
900	300	100	25	38	2.0	0.27
1200	450	150	38	38	2.5	0.54

SHAPE — H-REC-2-4 — NO. BOLTS REQUIRED

NO. SUPPORTS REQUIRED

NOTES

1. For each detail shown, the top table is in inches and the lower table is in millimeters unless otherwise noted.
2. All bolt holes shall be 3/8" (10 mm) in diameter, and may be drilled or punched to finished size.
3. Dimensions beween bolt holes shall be to tolerance of ± 1/32" (± 0.8 mm).

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SIGN BLANK DETAILS II

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TC-52.20

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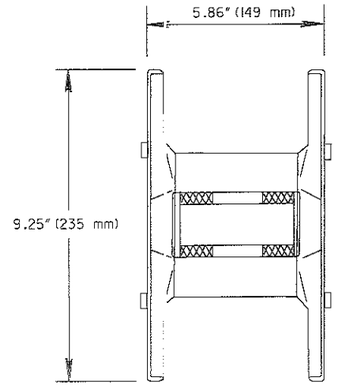
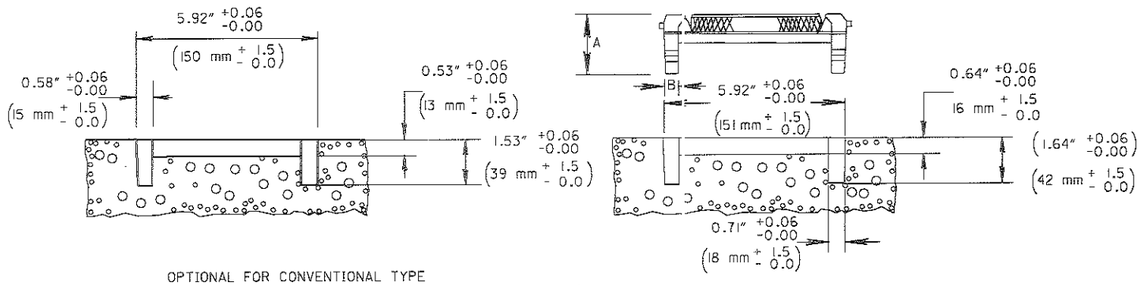
LAM

	CONVENTIONAL TYPE	LOW PROFILE TYPE
A	1.74"	1.69"
B	.46"	.59"

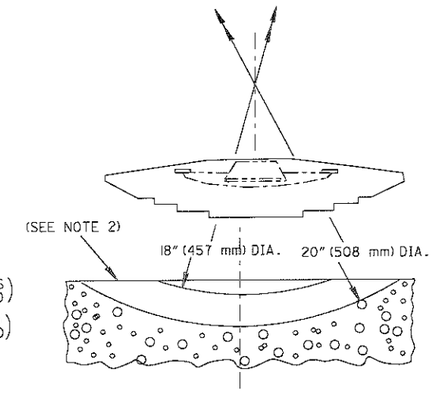
(METRIC)

	CONVENTIONAL TYPE	LOW PROFILE TYPE
A	44 mm	43 mm
B	12 mm	15 mm

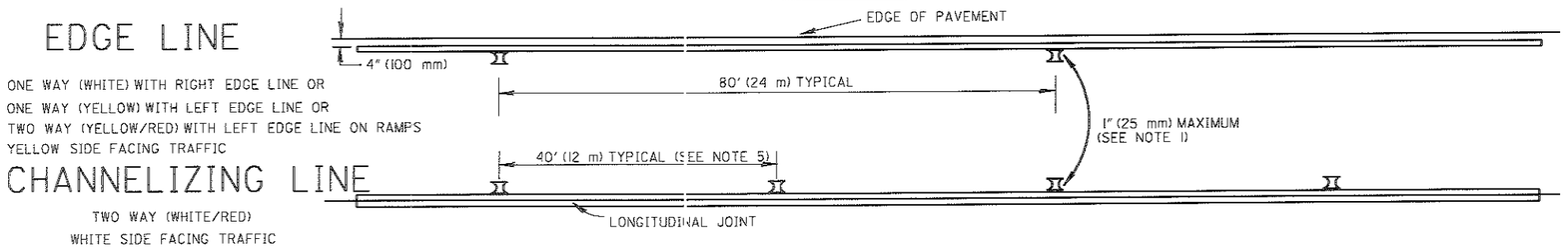


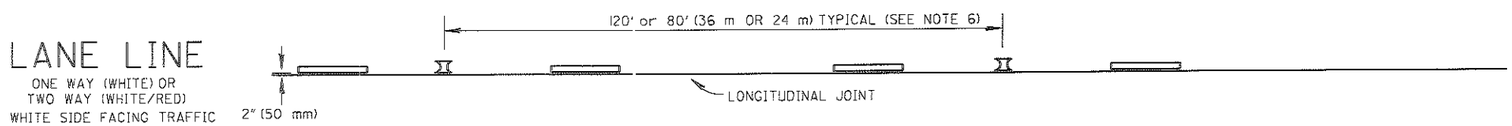


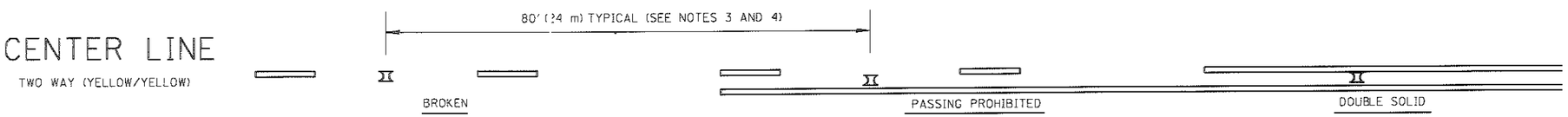
OPTIONAL FOR CONVENTIONAL TYPE



CASTING AND SAW CUT DETAILS







TYPICAL RAISED PAVEMENT MARKER PLACEMENT WITH LONGITUDINAL PAVEMENT MARKINGS

NOTES

1. Center line markers shall be placed between the two lines. Markers installed along an edge line or channelizing line shall be placed so that the casting is no more than 1" (25 mm) from the near edge of the line. Markers installed along a lane line or dashed yellow center line shall be placed between and in line with the dashes. Markers shall not be placed over the lines except where the lines deviate visibly from their correct alignment, and then only with the approval of the engineer.
2. To facilitate the cutting of the two parallel slots and intervening concaved surface simultaneously, it is recommended that an arbor and saw blade assembly be used. For additional details and tolerances of the casting and arbor-saw assembly contact the casting manufacture.
3. For horizontal curves of 5° or greater (radius of 380 m or less), the spacing of the center line markers shall be reduced to 40' (12 m) between P.C. or T.S. and P.T. or S.T.
4. For horizontal curves of 10° or greater (radius of 250 m or less) the spacing of the center line markers may be reduced to 20' (6 m) between P.C. or T.S. and P.T. or S.T. When using 20' (6 m) spacing, 12 raised pavement markers at 40' (12 m) spacing shall be installed on each end of the 20' (6 m) spacing.
5. When a channelizing line is less than 80' (24 m) in length, one raised pavement marker shall be placed at each end of the line, and one shall be placed in the center of the line.
6. Raised pavement markers on lane lines on freeways shall be one way white spaced at 120' (36 m). All other raised pavement makers on lane line on multilane or divided roadways shall be two way red/white spaced at 80' (24 m).

RAISED PAVEMENT MARKER INSTALLATION DETAILS

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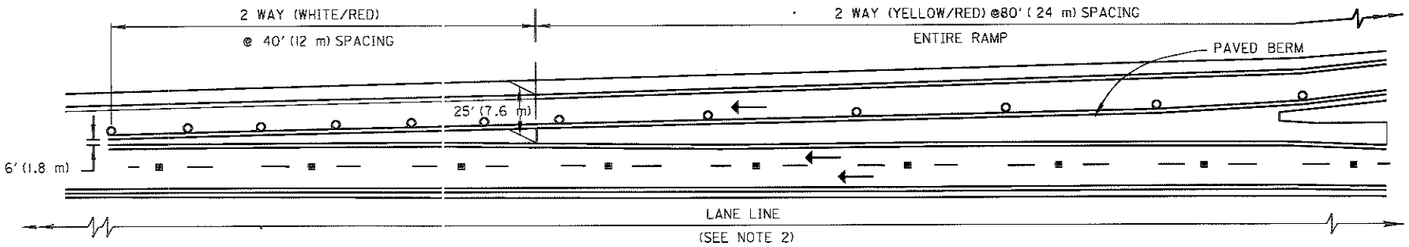
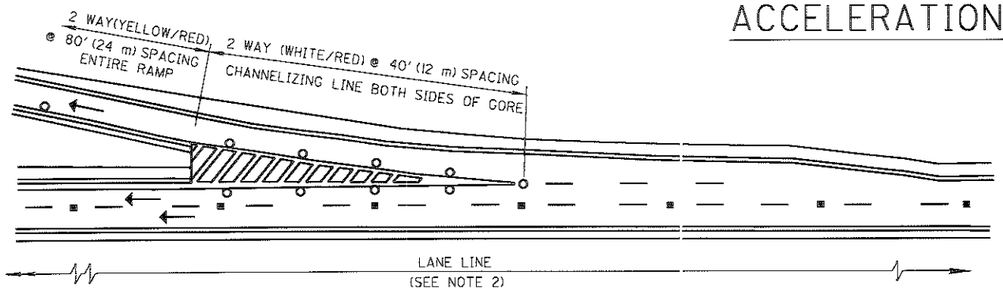
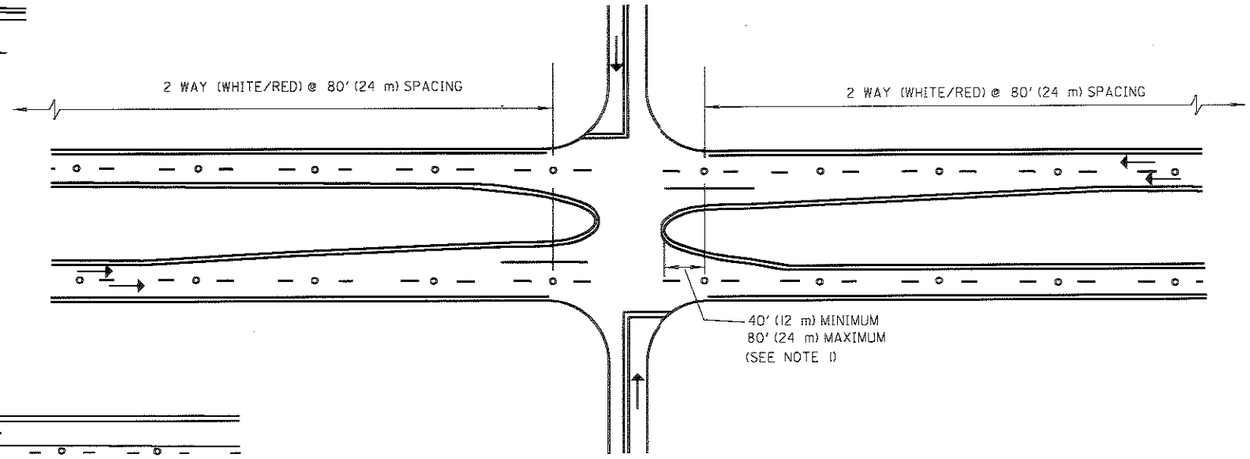


ACCELERATION LANE

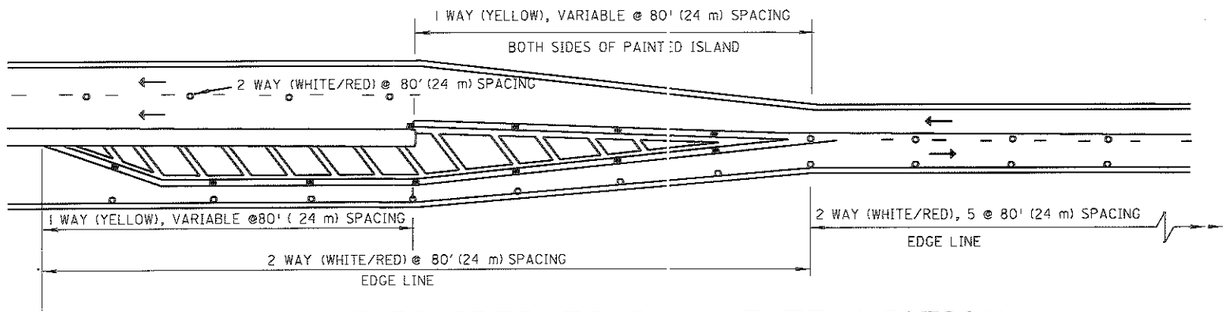


DECELERATION LANE

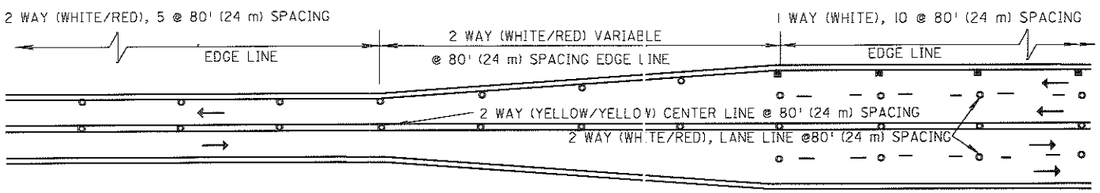


MULTILANE DIVIDED-CONTROLLED ACCESS

(SEE NOTE 2)



4 LANE DIVIDED TO 2 LANE TRANSITION



4 LANE UNDIVIDED TO 2 LANE TRANSITION

NOTES

1. Raised pavement markers shall not be placed in the directional roadways within the intersection area.
2. Raised pavement markers on lane lines on freeways shall be one way white spaced at 120' (36 m). All other raised pavement markers on lane lines on multilane or divided roadways shall be two way red/white spaced at 80' (24 m).

LEGEND

- ■ 1 WAY REFLECTORS
- ○ 2 WAY REFLECTORS

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RAISED PAVEMENT MARKER DETAILS I

OFFICE OF TRAFFIC ENGINEERING

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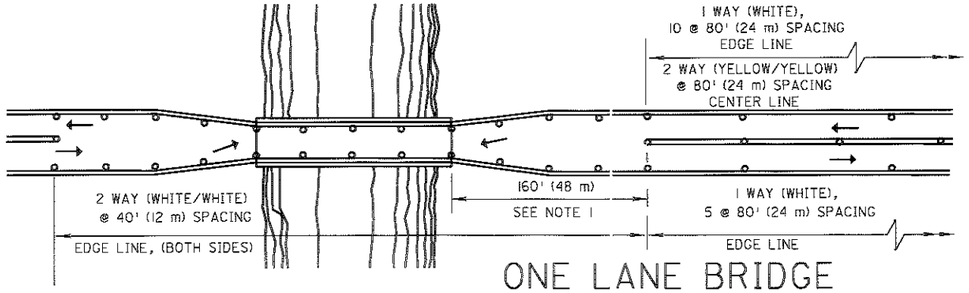
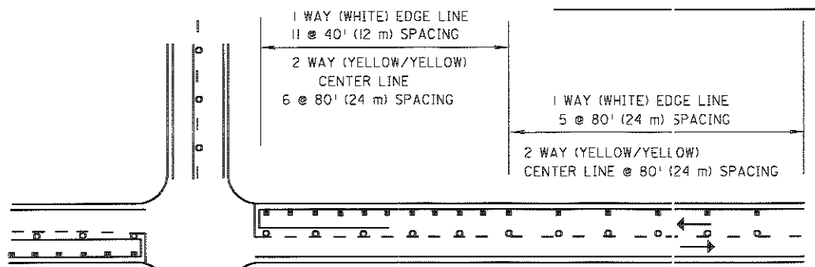
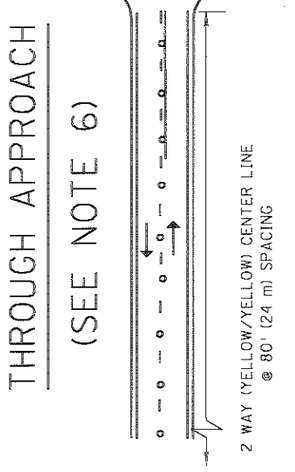
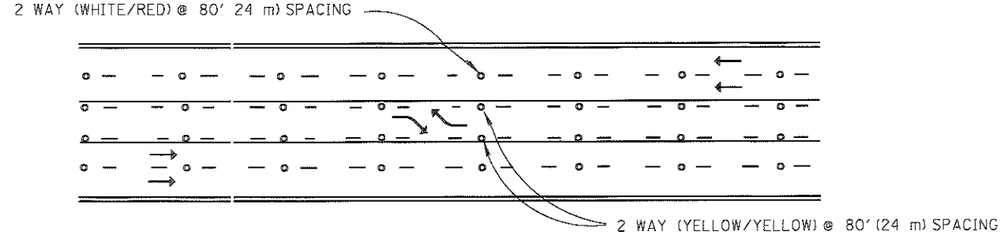


ONE LANE BRIDGE

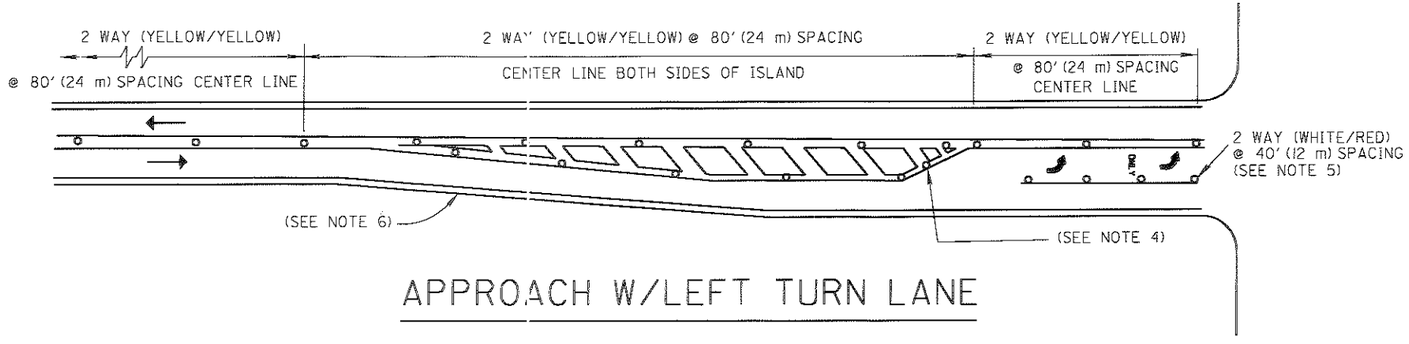


STOP APPROACH
(SEE NOTE 7)





TWO WAY LEFT TURN LANE



APPROACH W/LEFT TURN LANE

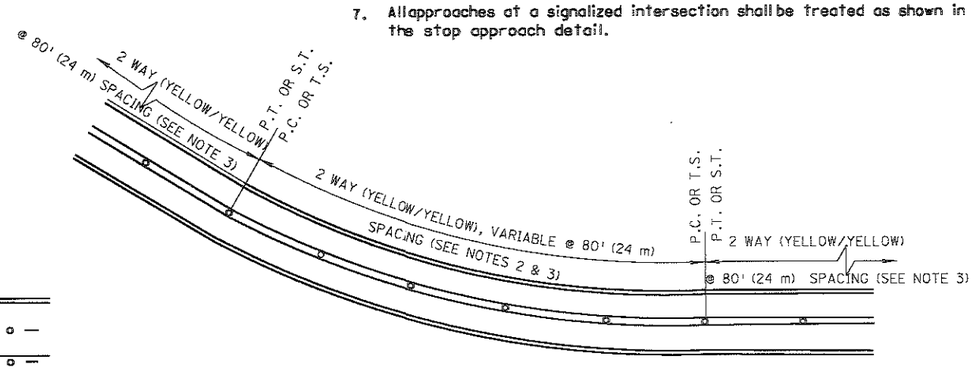
LEGEND

■ 1 WAY REFLECTORS

○ 2 WAY REFLECTORS

NOTES

1. For one lane bridges, painted center line and center line markers shall be omitted 160' (48 m) on each side and across the bridge.
2. For horizontal curves of 5°or greater (radius of 380 m or less), the spacing of the center line markers shall be reduced to 40' (12 m) between P.C. or T.S. and P.T. or S.T.
3. For horizontal curves of 10°or greater (radius of 250 m or less), the spacing of the center line markers may be reduced to 20' (6 m) between P.C. and T.S. and P.T. or S.T. When using 20' (6 m) spacing, 12 raised pavement markers at 40' (12 m) spacing shall be installed on each end of the 20' (6 m) spacing.
4. A minimum of 3 equally spaced raised pavement markers shall be installed on the back taper.
5. When a channelizing line is less than 80' (24 m) long, one raised pavement marker shall be placed at each end of the line, and one shall be placed in the center of the line.
6. Raised pavement markers shall not be placed on edge lines on a through approach.
7. All approaches at a signalized intersection shall be treated as shown in the stop approach detail.



HORIZONTAL CURVE

10-19-01

RAISED PAVEMENT MARKER DETAILS II

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TC-65.12

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