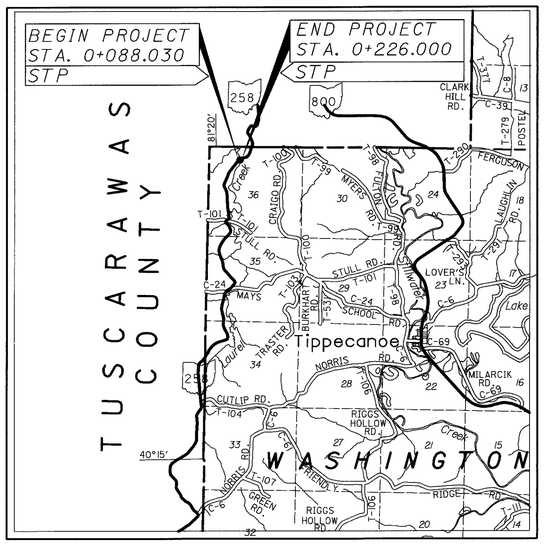
STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

HAS-258-4.410

WASHINGTON TOWNSHIP
HARRISON COUNTY

metric units



LOCATION MAP

LATITUDE: N 40°18'10" LONGITUDE: W 80°26'25"

PORTION TO BE IMPROVED
INTERSTATE & DIVIDED HIGHWAY
UNDIVIDED STATE & FEDERAL ROUTES
OTHER ROADS

DESIGN DESIGNATION

CURRENT ADT (1999)	250
DESIGN YEAR ADT (2019)	320
DESIGN HOURLY VOLUME (2019)	38
DIRECTIONAL DISTRIBUTION	55%
TRUCKS (24 HOUR B&C)	5%
DESIGN SPEED	90 Km/h
LEGAL SPEED	55 MPH (89 Km/h)

DESIGN FUNCTIONAL CLASSIFICATION -
RURAL COLLECTOR

DESIGN EXCEPTIONS

DESIGN FEATURES	APPROVAL DATES	SHEET NOS.
STOPPING SIGHT DIST.	1/6/00	9-11
BRIDGE WIDTH	1/6/00	20
HORIZONTAL ALIGN.	1/6/00	9-11
LANE WIDTH	1/6/00	9-11
SUPERELEVATION	1/6/00	8
VERTICAL CURVE LENGTH	1/6/00	9-11
VERTICAL STOPPING SIGHT DISTANCE	1/6/00	9-11

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:
BURGESS & NIPLE, LTD.
100 WEST ERIE STREET
PAINESVILLE, OH 44077

ENGINEERS SEAL:

STATE OF OHIO
RICHARD C. BECKERT
036062
REGISTERED
PROFESSIONAL ENGINEER

Richard C Beckert
RICHARD C. BECKERT
PE-036062

INDEX OF SHEETS:

PROJECT DESCRIPTION

IMPROVEMENT OF 0.08 KILOMETERS OF STATE ROUTE 258 BY REPLACEMENT OF EXISTING STRUCTURE OVER LAUREL CREEK, INCLUDING NEW APPROACH SLABS, AND ASSOCIATED ROADWAY WORK.

1997 SPECIFICATIONS

THE STANDARD SPECIFICATIONS 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 REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY AND THAT DETOURS WILL BE PROVIDED AS INDICATED ON SHEET 5.

APPROVED _____ DISTRICT DEPUTY DIRECTOR
DATE 12/10/00

APPROVED _____ DIRECTOR, DEPARTMENT OF TRANSPORTATION
DATE 3-1-00

STANDARD CONSTRUCTION DRAWINGS

BP-3.1M	10-28-94			MT-101.6M	4-25-94		AS-1-81M	10-25-94
		DM4.3	6-30-95				CPA-5-94M	10-25-94
							CPP-2-94M	12-19-94
		DM4.4	6-30-95				CS-1-93M	6-30-95
GR-2.1M	4-14-98						DBR-2-73	8-18-95
GR-3.4M	10-21-97						DS-1-94M	12-15-94
GR-4.1M	11-30-94			TC-65.10	11-1-95		PCB-91M	7-2-99
GR-4.2M	10-21-97							
GR-5.1M	4-21-95			TC-65.12	11-1-95			

SUPPLEMENTAL SPECIFICATIONS

806	9-09-97
814	6-02-98
842	1-06-99
844	1-06-99
877	4-13-99
893	10-12-99
899	10-21-98
905	4-01-98
907	10-21-98

SPECIAL PROVISIONS

WATERWAY PERMIT
NWP#3 2-8-99
NWP#14 2-8-99

FEDERAL PROJECT NO. TE21-6000 (316)
PID NO. 13044
CONSTRUCTION PROJECT NO.
RAILROAD INVOLVEMENT NONE
HAS-258-4.410
1 / 33

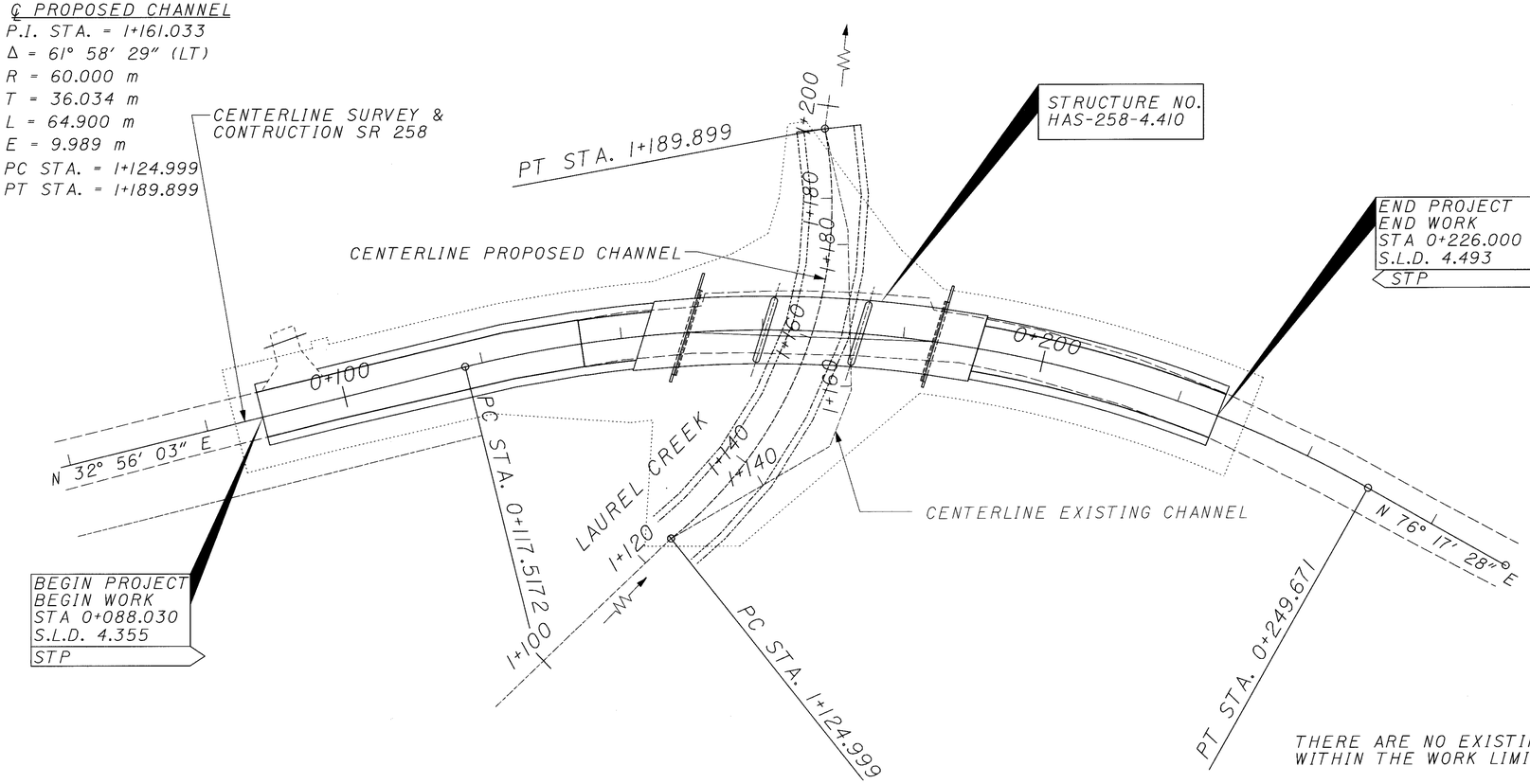
HAS-258-4.410
000377
PID# 13044
07/19/00
DIST. 11

13044DT.DGN

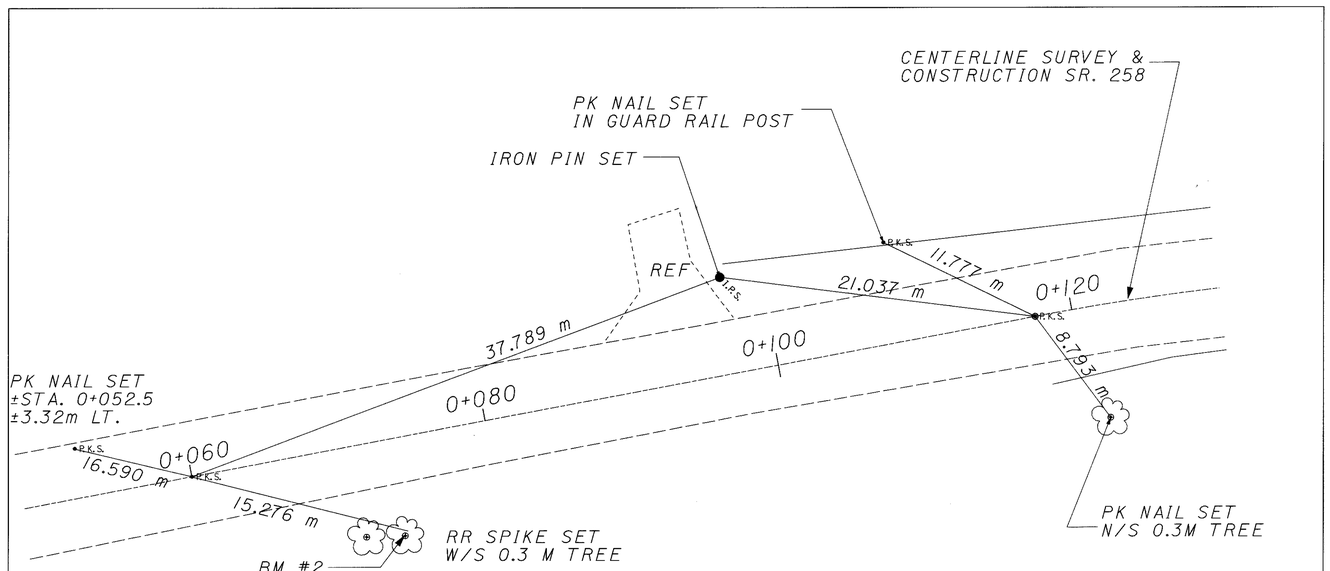
℄ SURVEY & CONSTRUCTION
CURVE I
P.I. STA. = 0+186.939
Δ = 43° 21′ 25″ (RT)
R = 174.640 m
T = 69.422 m
L = 132.154 m
E = 13.292 m
PC STA. = 0+117.5172
PT STA. = 0+249.671

℄ PROPOSED CHANNEL
P.I. STA. = 1+161.033
Δ = 61° 58′ 29″ (LT)
R = 60.000 m
T = 36.034 m
L = 64.900 m
E = 9.989 m
PC STA. = 1+124.999
PT STA. = 1+189.899

metric units

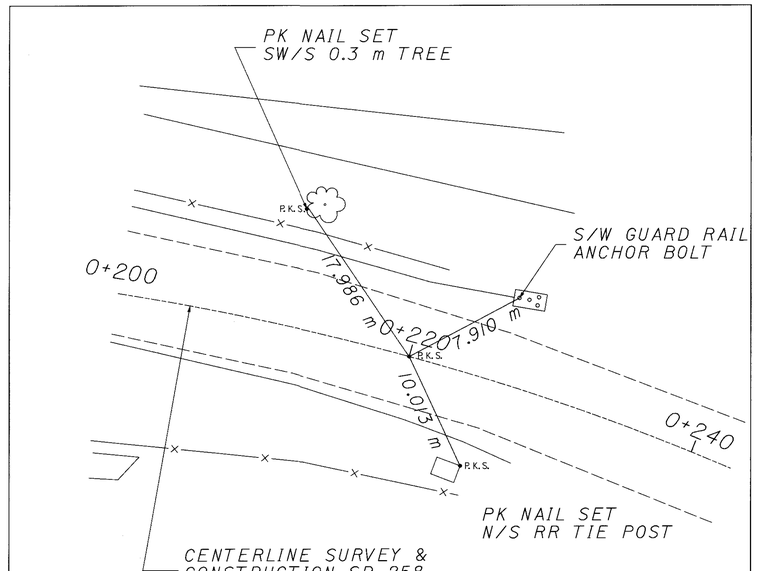


THERE ARE NO EXISTING LANDSCAPED AREAS WITHIN THE WORK LIMITS.



PK NAIL SET
STA. 0+060, S.R. 258

PK NAIL SET
P.C. STA. 0+117.5172, SR 258

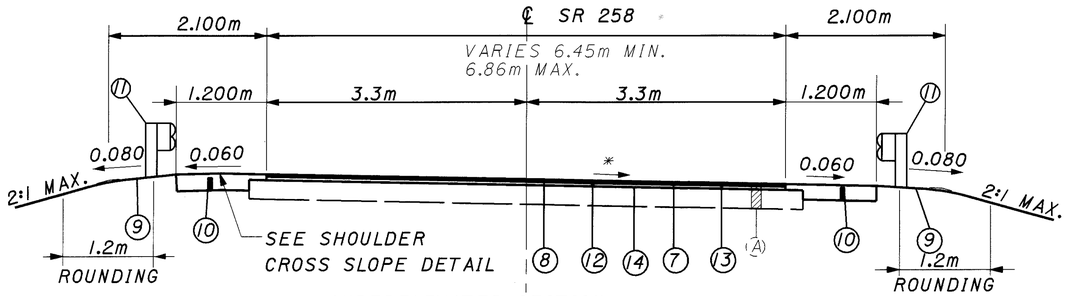


PK NAIL SET
STA. 0+220, SR 258

HORIZONTAL SCALE IN METERS
0 8 16

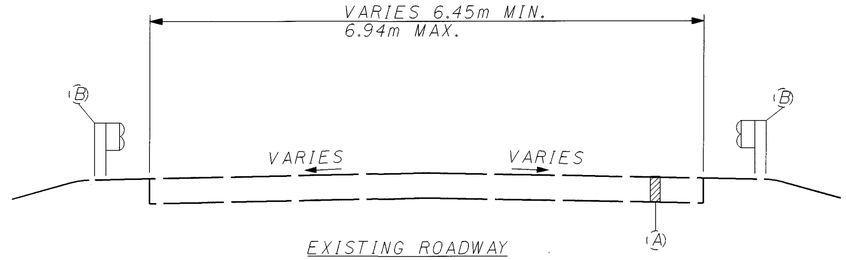
SCHEMATIC PLAN

HAS-258-4.410



SUPERELEVATED SECTION

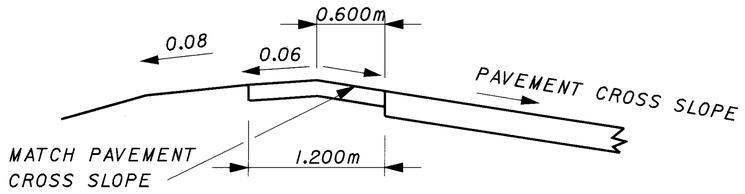
STA. 0+088.030 TO 0+134.072 = 46.042m



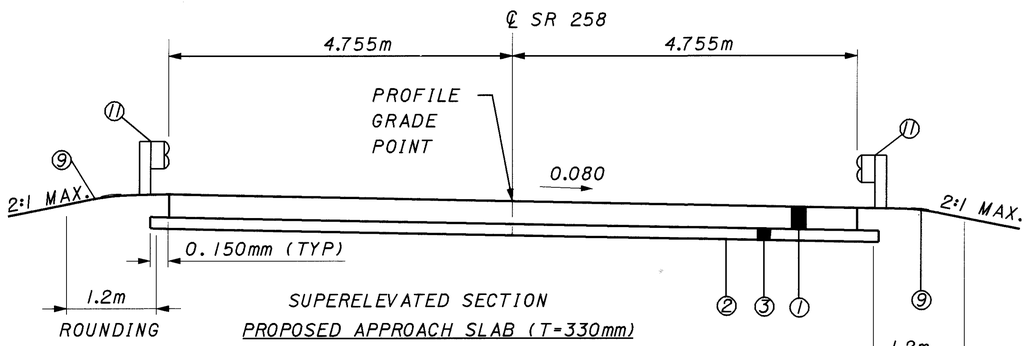
EXISTING ROADWAY

STA. 0+088.030 TO 0+149.272

STA 0+184.540 TO 0+226.000



SHOULDER CROSS SLOPE DETAIL



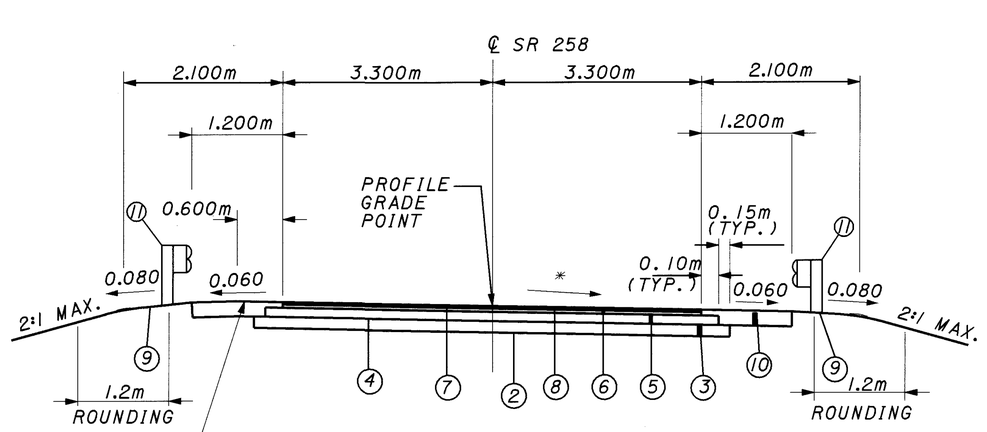
SUPERELEVATED SECTION

PROPOSED APPROACH SLAB (T=330mm)

STA. 0+143.159 TO 0+149.259 = 6.100m

STA. 0+184.542 TO 0+190.642 = 6.100m

TOTAL = 12.200m



SEE SHOULDER
CROSS SLOPE DETAIL

SUPERELEVATED SECTION

STA. 0+134.072 TO 0+143.159 = 9.087m

STA 0+190.642 TO 0+226.000 = 35.358m

TOTAL = 44.445m

PROPOSED LEGEND

(1) ITEM 611 - APPROACH SLAB (T=330mm)
(2) ITEM 203 - SUBGRADE COMPACTION
(3) ITEM 304 - 150mm AGGREGATE BASE
(4) ITEM 408 - BITUMINOUS PRIME COAT
(5) ITEM 301 - 125mm BITUMINOUS AGGREGATE BASE, PG64-22
(6) ITEM 448 - 45mm ASPHALT CONCRETE INTERMEDIATE COURSE , TYPE 2, PG64-22
(7) ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE
(8) ITEM 448 - 32mm ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64-22, AS PER PLAN
(9) ITEM 659 - SEEDING AND MULCHING
(10) ITEM 304 - 200mm AGGREGATE BASE
(11) ITEM 606 - GUARDRAIL, TYPE 5
(12) ITEM 448 - VARIABLE DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE , TYPE 2, PG64-22
(13) ITEM 202 - WEARING COURSE REMOVED
(14) ITEM 407- TACK COAT

EXISTING LEGEND

(A) EXISTING ASPHALT PAVEMENT
(B) EXISTING GUARDRAIL

* SEE SUPERELEVATION TABLE SHEET 8

TYPICAL SECTIONS

HAS-258-4.410

CALCULATED AEP
CHECKED DAS

GENERAL NOTES

ITEM 870 - SEEDING AND MULCHING

SEEDING AND MULCHING SHALL BE APPLIED TO ALL AREAS OF EXPOSED SOIL BETWEEN THE RIGHT-OF-WAY LINES, AND WITHIN THE CONSTRUCTION LIMITS FOR AREAS OUTSIDE THE RIGHT-OF-WAY LINES COVERED BY WORK AGREEMENT OR SLOPE EASEMENT. QUANTITY CALCULATIONS FOR ITEM 659 SEEDING AND MULCHING, ARE BASED ON THESE LIMITS.

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

870, SEEDING AND MULCHING	1100 SQ. METER
870, COMMERCIAL FERTILIZER	55 KILOGRAM
870, AGRICULTURAL LIMING	281.6 KILOGRAM

WATERING PERMANENT SEEDED AREAS

THE FOLLOWING ESTIMATED QUANTITIES ARE TO BE USED AS DIRECTED BY THE ENGINEER TO PROMOTE GROWTH AND TO CARE FOR PERMANENT SEEDED AREAS PER 659.09:

870, WATER	11	CU. METER

TEMPORARY SOIL EROSION AND SEDIMENT CONTROL

THE FOLLOWING ESTIMATED QUANTITIES ARE TO BE PLACED BY THE CONTRACTOR WITH THE ENGINEER'S CONCURRENCE FOR TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES:

877, TEMPORARY PERIMETER, DITCH CHECK, OR INLET PROTECTION FILTER FABRIC FENCE	60	METER
877, TEMPORARY SEDIMENT BASINS AND DAMS	60	CU. METER
877, SEDIMENT REMOVAL	60	CU. METER,
601, ROCK CHANNEL PROTECTION, TYPE C, WITHOUT FILTER	12	CU. METER

UTILITIES

LISTED BELOW ARE ALL UTILITIES LOCATED WITHIN THE PROJECT.

AEP OHIO POWER COMPANY
301 CLEVELAND AVE. S.W.
P.O. BOX 24630
CANTON, OHIO 44701-4630
PH. 330-438-7723

GTE NORTH INCORPORATED
1168 KENNEL ROAD
MINERVA, OHIO 44657
PH. 330-868-4154

WORK LIMITS

THE WORK LIMITS SHOWN ON THESE PLANS ARE FOR PHYSICAL CONSTRUCTION ONLY. THE INSTALLATION AND OPERATION OF ALL TEMPORARY TRAFFIC CONTROL AND TEMPORARY TRAFFIC CONTROL DEVICES REQUIRED BY THESE PLANS SHALL BE PROVIDED BY THE CONTRACTOR WHETHER INSIDE OR OUTSIDE THESE WORK LIMITS.

ITEM 407 - TACK COAT AND TACK COAT FOR INTERMEDIATE COURSE

THE RATE OF APPLICATION OF THE 407 TACK COAT SHALL BE SUBJECT TO ADJUSTMENT AS DIRECTED BY THE ENGINEER. FOR ESTIMATING PURPOSES ONLY, THE PLAN QUANTITIES INDICATE AN AVERAGE APPLICATION RATE OF:

407, TACK COAT FOR INTERMEDIATE COURSE	0.34	LITER PER SQ. METER
407, TACK COAT	0.18	LITER PER SQ. METER

CLEARING AND GRUBBING

ALL TREES AND STUMPS SPECIFICALLY MARKED FOR REMOVAL WITHIN THE CONSTRUCTION LIMITS SHALL BE REMOVED UNDER THE LUMP SUM BID FOR ITEM 201, CLEARING AND GRUBBING. THE FOLLOWING IS AN APPROXIMATE ESTIMATE OF THE NUMBER OF TREES AND STUMPS TO BE REMOVED.

SIZES	NO. TREES	NO. STUMPS	TOTAL
0.5m	4	-	4
0.8m	2	-	2
1.2m	-	-	-
1.5m	-	-	-

DEMOLITION DEBRIS

THE CONTRACTOR SHALL TAKE PRECAUTIONS TO AVOID AND/OR LIMIT DEMOLITION DEBRIS FROM ENTERING THE STREAM. ANY MATERIAL THAT DOES FALL INTO THE STREAM SHALL BE REMOVED AS SOON AS POSSIBLE.

INSTREAM WORK

INSTREAM WORK WILL BE LIMITED WHERE PRACTICABLE AND ONLY CLEAN NON-ERODIBLE MATERIAL WILL BE USED FOR FORDS OR COFFERDAMS. THIS TEMPORARY PLACED MATERIAL WILL BE REMOVED AND THE STREAM BOTTOM RESTORED TO NEAR NATURAL CONDITIONS WHEN THE WORK IS COMPLETED.

ELEVATION DATUM

ALL ELEVATIONS ARE BASED ON U.S.G.S. DATUM.

UNSUITABLE SUBGRADE EXCAVATION, INCLUDING EMBANKMENT CONSTRUCTION

IF UNSUITABLE FOUNDATION SOILS ARE ENCOUNTERED IN THE AREAS OF THE PROPOSED ROADBED, THEY SHALL BE REMOVED AND REPLACED WITH SUITABLE MATERIAL MEETING THE REQUIREMENTS OF 203.08. THE LOCATIONS AND DIMENSIONS WILL BE AS DETERMINED BY THE ENGINEER.

THE FOLLOWING CONTINGENCY QUANTITIES HAVE BEEN INCLUDED IN THE GENERAL SUMMARY TO BE USED AS DIRECTED BY THE ENGINEER:

ITEM 203	20	CU. METERS EMBANKMENT
ITEM 203	20	CU. METERS EXCAVATION NOT INCLUDING EMBANKMENT CONSTRUCTION

STREAM CHANNEL EXCAVATION

THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PREVENT ANY ACCIDENTAL DISCHARGES ASSOCIATED WITH THE EXCAVATION AND HAULING OF MATERIAL FROM THE STREAM CHANNEL. THIS PERTAINS TO ANY EXCAVATION OPERATIONS SUCH AS, FOUNDATIONS ABUTMENT EXCAVATION, CHANNEL CLEANOUT, EXCAVATION FOR ROCK CHANNEL PROTECTION AND REMOVAL OF ANY TEMPORARY FILL ASSOCIATED WITH CONSTRUCTION OPERATIONS.

ITEM 448 -ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64-22, AS PER PLAN

MATERIALS FURNISHED FOR FINE AND COARSE AGGREGATE USED IN THIS ITEM SHALL EXCLUDE ALL STONE AND CRUSHED CARBONATE STONE.

ROUNDING

THE ROUNDING AT SLOPE BREAKPOINTS SHOWN ON THE TYPICAL SECTIONS APPLY TO ALL CROSS-SECTIONS EVEN THOUGH OTHERWISE SHOWN.

EROSION CONTROL

ITEMS 601 ARE PROVIDED IN THE PLANS FOR EROSION CONTROL. ROCK OF A STABLE NATURE SHALL NOT BE REMOVED IN ORDER TO PLACE ANY OF THESE ITEMS. THE ENGINEER SHALL CHECK AND NON-PERFORM QUANTITIES OR ADJUST LOCATIONS AND QUANTITIES OF THESE ITEMS WHERE INDICATED BY FIELD CONDITIONS DURING CONSTRUCTION. IN ADDITION, THESE ITEMS SHALL MEET THE REQUIREMENT OF 108.04.

CONTINGENCY 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.

CHANNEL EMBANKMENTS

PORTIONS OF THE EXISTING CHANNEL SHALL BE FILLED AND SLOPED TO DRAIN AS SHOWN IN THESE PLANS. IN CHANNEL EMBANKMENT AREAS WHICH WILL NOT SUPPORT ANY PORTION OF THE NEW ROAD BED OR STRUCTURAL EMBANKMENTS, THE CONTRACTOR MAY UTILIZE EMBANKMENT METHODS MEETING THE FOLLOWING REQUIREMENTS.

BENCHING AND SUITABLE MATERIALS SHALL BE WAIVED. IN LIEU OF THE REQUIREMENTS OF ITEM 203, THE DEPTH OF LAYERS IN WHICH THE EMBANKMENTS ARE TO BE PLACED, AND THEIR COMPACTION, SHALL CONFORM WITH ACCEPTABLE CONSTRUCTION PRACTICES AS DETERMINED BY THE ENGINEER.

PAYMENT FOR ALL OF THE ABOVE SHALL BE INCLUDED IN THE CONTRACT PRICE FOR ITEM 203, EMBANKMENT.

ITEM 614, MAINTAINING TRAFFIC

ODOT SHALL PROVIDE, ERECT, MAINTAIN, AND REMOVE ALL DETOUR SIGNS.

NOTICE OF CLOSURE SIGNS, AS DETAILED IN THESE PLANS, SHALL BE ERECTED BY THE CONTRACTOR AT LEAST ONE WEEK IN ADVANCE OF THE SCHEDULED CLOSURE. THE SIGNS SHALL BE ERECTED AS PER STANDARD CONSTRUCTION DRAWINGS AND THE OMUTCD. THEY SHALL BE PLACED SO AS NOT TO INTERFERE WITH THE VISIBILITY OF ANY OTHER TRAFFIC CONTROL SIGNS. THEY SHALL BE ERECTED AT THE POINT OF CLOSURE.

THE FOLLOWING ESTIMATED QUANTITIES HAVE BEEN INCLUDED IN THE GENERAL SUMMARY FOR USE AS DIRECTED BY THE ENGINEER FOR THE MAINTENANCE OF TRAFFIC.

ITEM 614, BITUMINOUS CONCRETE FOR MAINTAINING TRAFFIC	3 CU. METER

THE CONTRACTOR SHALL PROVIDE, ERECT AND MAINTAIN STANDARD "ROAD CLOSED" SIGNS, SIGN SUPPORTS, BARRICADES, GATES, AND LIGHTS, AS DETAILED IN STANDARD CONSTRUCTION DRAWINGS MT-101.60M.

CONTRACTOR SHALL MAINTAIN ACCESS TO THE FIELD DRIVE AT APPROXIMATE STATION 0+90.00 LT. FOR THE DURATION OF CONSTRUCTION.

THE CONTRACTOR SHALL HAVE ALL WORK COMPLETED AND THE ROADWAY OPENED TO TRAFFIC NO LATER THAN NOVEMBER 15, 2000. FAILURE TO COMPLY WITH THIS REQUIREMENT SHALL RESULT IN LIQUIDATED DAMAGES BEING ASSESSED TO THE CONTRACTOR IN ACCORDANCE WITH ITEM 108.07.

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE SPECIFICATIONS, AS WELL AS THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS SHALL BE INCLUDED IN THE LUMP SUM CONTRACT PRICE FOR 614, MAINTAINING TRAFFIC UNLESS SEPARATELY ITEMIZED IN THE PLAN.

NOTIFICATION OF WORK ZONE LANE RESTRICTIONS

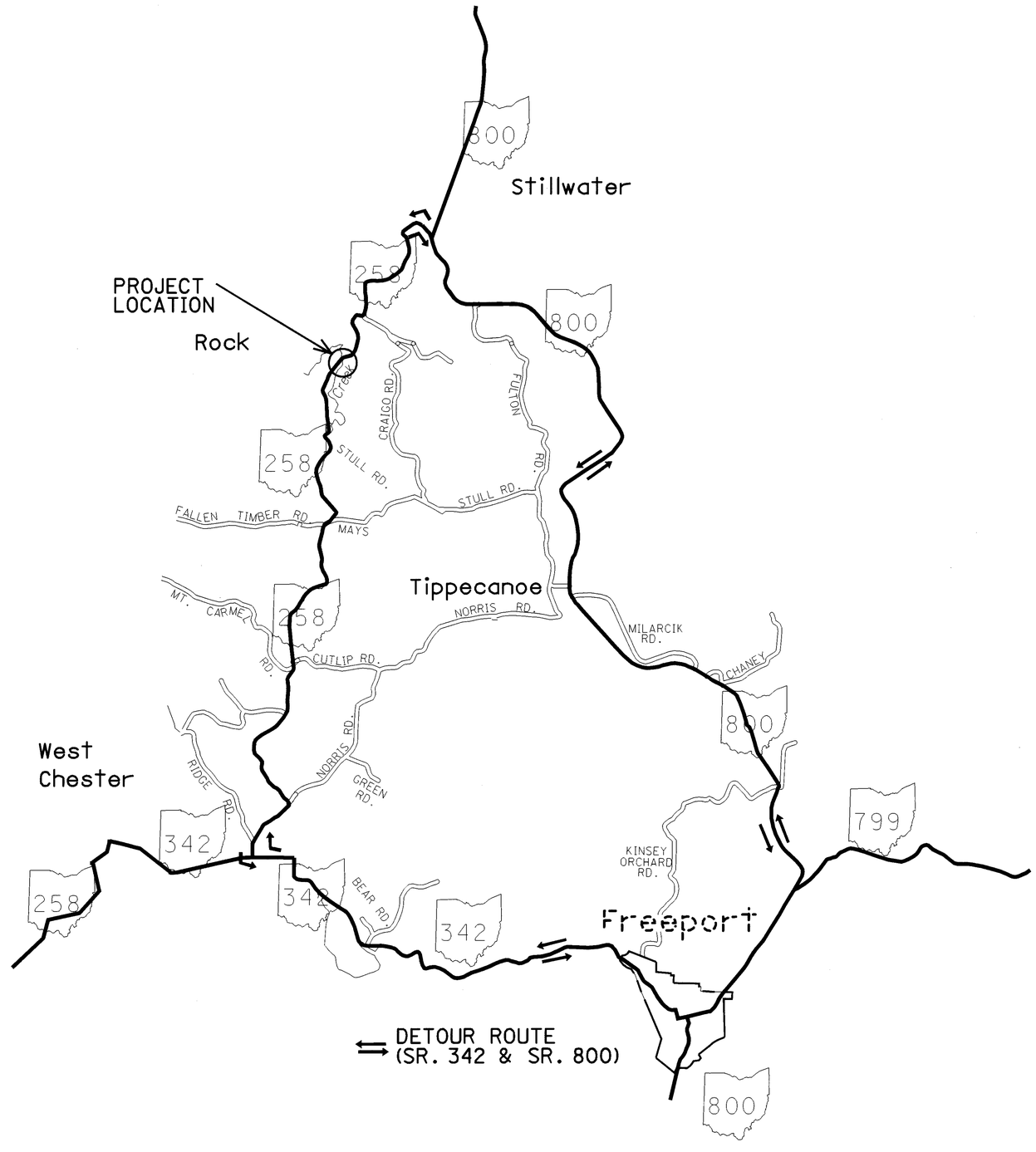
THE CONTRACTOR SHALL NOTIFY THE ENGINEER AT LEAST EIGHTEEN (18) DAYS PRIOR TO IMPLEMENTING ANY WORK ZONE RESTRICTIONS THAT WILL REDUCE THE WIDTH OR VERTICAL CLEARANCE OF ANY LANE ON WHICH THE TRAFFIC WILL BE MAINTAINED DURING CONSTRUCTION.

THE ENGINEER SHALL IMMEDIATELY NOTIFY THE DISTRICT ROADWAY SERVICES MANAGER TO ADVISE THE OFFICE OF HIGHWAY MANAGEMENT OF THE RESTRICTIONS.

DUST CONTROL

THE CONTRACTOR SHALL FURNISH AND APPLY WATER AND CALCIUM CHLORIDE FOR DUST CONTROL AS DIRECTED BY THE ENGINEER. THE FOLLOWING CONTINGENCY QUANTITIES HAVE BEEN INCLUDED FOR DUST CONTROL PURPOSES:

ITEM 616, WATER	3 CU. METER
ITEM 616, CALCIUM CHLORIDE	1 METRIC TON



CALCULATED AEP
CHECKED DAS

MAINTENANCE OF TRAFFIC GENERAL NOTES

HAS-258-4.410

P:\PR22057A\CADD\MN1.DGN

SHEET NUMBER											ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE SHEET NO.
4	5	8	9	10	11	12	13	14	18	19						
															ROADWAY	
											201	11000	LUMP		CLEARING AND GRUBBING	
		305									202	23500	305	SQ METER	WEARING COURSE REMOVED	
			88		88						202	38000	176	METER	GUARDRAIL REMOVED	
20						7	85	91	242	344	203	12000	789	CU METER	EXCAVATION NOT INCLUDING EMBANKMENT CONSTRUCTION	
20						5	80	57	132	147	203	20000	441	CU METER	EMBANKMENT	
		438									203	50000	438	SQ METER	SUBGRADE COMPACTION	
			80.01		68.58						606	13000	148.59	METER	GUARDRAIL, TYPE 5	
			1		2						606	25000	3	EACH	ANCHOR ASSEMBLY, TYPE A	
			1								606	26500	1	EACH	ANCHOR ASSEMBLY, TYPE T	
			2								606	35140	4	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 4	
															EROSION CONTROL	
				376							601	32200	376	CU METER	ROCK CHANNEL PROTECTION, TYPE C, WITH FILTER	
12											601	34200	12	CU METER	ROCK CHANNEL PROTECTION, TYPE C, WITHOUT FILTER	
1100											870	10000	1100	SQ METER	SEEDING AND MULCHING	
55											870	20000	55	KILOGRAM	COMMERCIAL FERTILIZER	
281.6											870	30000	281.6	KILOGRAM	AGRICULTURAL LIMING	
11											870	35000	11	CU METER	WATER	
60											877	30000	60	METER	TEMPORARY PERIMETER, DITCH CHECK, OR INLET	
															PROTECTION FILTER FABRIC FENCE	
60											877	50000	60	CU METER	TEMPORARY SEDIMENT BASINS AND DAMS	
60											877	60000	60	CU METER	SEDIMENT REMOVAL	
															PAVEMENT	
		38									301	46000	38	CU METER	BITUMINOUS AGGREGATE BASE, PG64-22	
		110	5								304	20000	115	CU METER	AGGREGATE BASE	
		104									407	10000	104	LITER	TACK COAT	
		108									407	14000	108	LITER	TACK COAT FOR INTERMEDIATE COURSE	
		529									408	10000	529	LITER	BITUMINOUS PRIME COAT	
		28									448	46050	28	CU METER	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG64-22	
		20									448	47021	20	CU METER	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64-22, AS PER PLAN	4
		117									611	15000	117	SQ METER	REINFORCED CONCRETE APPROACH SLAB (T= 330mm)	
															TRAFFIC CONTROL	
		7									621	00100	7	EACH	RAISED PAVEMENT MARKER	
			11	10							626	00300	21	EACH	BARRIER REFLECTOR, TYPE A2	
		0.28									642	00100	0.28	KILOMETER	EDGE LINE, TYPE 1	
		0.14									642	00300	0.14	KILOMETER	CENTER LINE, TYPE 1	

CALCULATED AEP
CHECKED DAS

GENERAL SUMMARY

HAS-258-4.410

SHEET NUMBER											ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE SHEET NO.
4	5	8	9	10	11	12	13	14	18	19						
															FOR STRUCTURE QUANTITIES	22
															MAINTENANCE OF TRAFFIC	
	3										614	13000	3	CU METER	BITUMINOUS CONCRETE FOR MAINTAINING TRAFFIC	
	3										616	10000	3	CU METER	WATER	
	1										616	20000	1	MTON	CALCIUM CHLORIDE	
											623	10000	LUMP		CONSTRUCTION LAYOUT STAKES	
											614	11000	LUMP		MAINTAINING TRAFFIC	
											624	10000	LUMP		MOBILIZATION	
											806	16010	6	MONTH	FIELD OFFICE, TYPE B	

CALCULATED AEP
CHECKED DAS

GENERAL SUMMARY

HAS-258-4.410

metric units

CALCULATED AEP CHECKED DAS

SUPERELEVATION TABLE

LEFT SIDE					CENTERLINE CONTROL		RIGHT SIDE					
EDGE ELEVATION	TRANSITION RATE	ELEVATION CORRECTION	CROSS SLOPE	WIDTH	STATION	PROFILE GRADE	WIDTH	CROSS SLOPE	ELEVATION CORRECTION	TRANSITION RATE	EDGE ELEVATION	REMARKS
					0+088.03	261.400						*
					0+090.00	261.459						*
261.65	↑	0.00	0.000	3	0+095.92	261.649	3	-0.0451	-0.1353	↑	261.51	H.F.
261.81		0.0243	0.0081	3	0+100.00	261.790	3	-0.0451	-0.1353		261.66	
261.97		0.0468	0.0156	3	0+103.80	261.929	3	-0.0451	-0.1353		261.79	F.C.
262.25		0.0807	0.0269	3	0+110.00	262.173	3	-0.0451	-0.1353		262.04	
262.67		0.1353	0.0451	3	0+120.00	262.537	3	-0.0451	-0.1353		262.40	
262.99		0.1902	0.0634	3	0+130.00	262.797	3	-0.0634	-0.1902		262.61	
263.17	180.00:1	0.24	0.0800	3	0+139.12	262.934	3	-0.0800	-0.24	180.00:1	262.69	F.S.
263.18		0.24	0.0800	3	0+140.00	262.942	3	-0.0800	-0.24		262.70	
263.23		0.24	0.0800	3	0+150.00	262.988	3	-0.0800	-0.24		262.75	
263.24		0.24	0.0800	3	0+160.00	262.996	3	-0.0800	-0.24		262.76	
263.21		0.24	0.0800	3	0+170.00	262.97	3	-0.0800	-0.24		262.73	
263.15		0.24	0.0800	3	0+180.00	262.912	3	-0.0800	-0.24		262.67	
263.06		0.24	0.0800	3	0+190.00	262.822	3	-0.0800	-0.24		262.58	
262.85		0.24	0.0800	3	0+200.00	262.606	3	-0.0800	-0.24		262.37	
262.69		0.24	0.0800	3	0+204.00	262.45	3	-0.0800	-0.24		262.21	F.S.
262.41		.02073	0.0691	3	0+210.00	262.21	3	-0.0691	-0.2073		262.00	
261.99		0.1527	0.0509	3	0+220.00	261.84	3	-0.0509	-0.1527		261.68	
261.80	↓	0.12	0.0400	3	0+226.00	261.68	3	-0.0400	-0.12	↓	261.56	M.E.

* MATCH EXISTING PAVEMENT ELEVATIONS AT STA. 0+088.03.
TRANSITION PAVEMENT FROM STA 0+095.92 TO STA 0+088.03.

ITEM 642 CENTER LINE, TYPE I
STA. 0+088.030 TO STA. 0+226.000
137.970/1000 = 0.138 KILOMETERS

ITEM 642 EDGE LINE
STA. 0+088.030 TO STA. 0+226.000
137.970/1000 X 2 = 0.276 KILOMETERS

ITEM 621 RAISED PAVEMENT MARKER
STA. 0+088.030 TO STA. 0+226.000
137.970/24 + 1 = 7

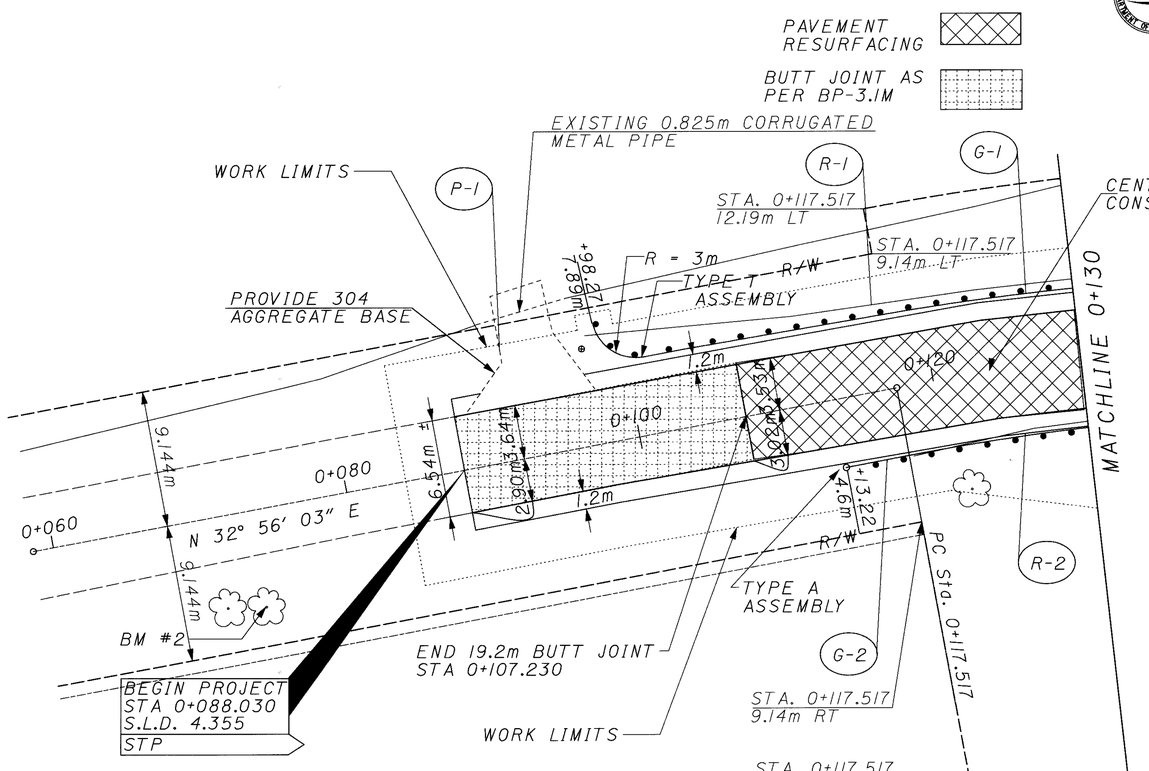
PAVEMENT CALCULATIONS		DISTANCE D	PAVEMENT WIDTH W	SHOULDER WIDTH S	AREA (*COMPUTER MEASURED) A=DxW	ITEM 202 WEARING COURSE REMOVED A	ITEM 203 SUBGRADE COMPACTION Dx(W+0.5)	ITEM 301 BITUMINOUS AGGREGATE BASE 125 mm 0.125xDx(W+0.2)	ITEM 304 AGGREGATE BASE 150mm 0.150xDx(W+0.5)	ITEM 407 TACK COAT FOR INTERMEDIATE COURSE 0.18xA	ITEM 407 TACK COAT 0.34xA	ITEM 408 BITUMINOUS PRIME COAT 1.8xA	ITEM 448 ASPHALT INTERMEDIATE COURSE 45mm 45 xA / 1000	ITEM 448 ASPHALT SURFACE COURSE 32mm A.P.P. 32 xA / 1000	ITEM 448 VARIABLE DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE	ITEM 304 200mm AGGREGATE BASE 2xDxSx0.20	ITEM 611 REINFORCED CONCRETE APPROACH SLAB (T=330mm)		
		METER	METER	METER	SQ. M.	SQ. M.	SQ. M.	CU. M.	CU. M.	LITER	LITER	LITER	CU. M.	CU. M.	CU. M.	CU. M.	SQ. M.	
STATION	TO STATION																	
0+088.030	0+134.072	46.042	VARIES	1.200	*304.032	304.032	-	-	-	54.726	103.370	-	-	9.729	13.681	22.100	-	
0+134.072	0+143.159	9.087	6.600	1.200	59.974		64.518	7.724	9.678	10.795	-	107.953	2.700	1.919	-	4.362	-	
0+143.159	0+149.259	6.100	9.510		58.011		61.061	-	9.159	-	-	-	-	-	-	-	58.011	
0+184.542	0+190.642	6.100	9.510		58.011		61.061	-	9.159	-	-	-	-	-	-	-	58.011	
0+190.642	0+226.000	35.358	6.600	1.200	233.363		251.042	30.054	37.656	42.005	-	420.053	10.501	7.468	-	16.972	-	
SUB-SUMMARY						304.032	437.682	37.778	65.652	107.526	103.370	528.006	13.201	19.116	13.681	43.434	116.022	
CARRIED TO GENERAL SUMMARY						305	438	38	66	108	104	529	14	20	14	44	117	

CALCULATIONS & SUPERELEVATION TABLE

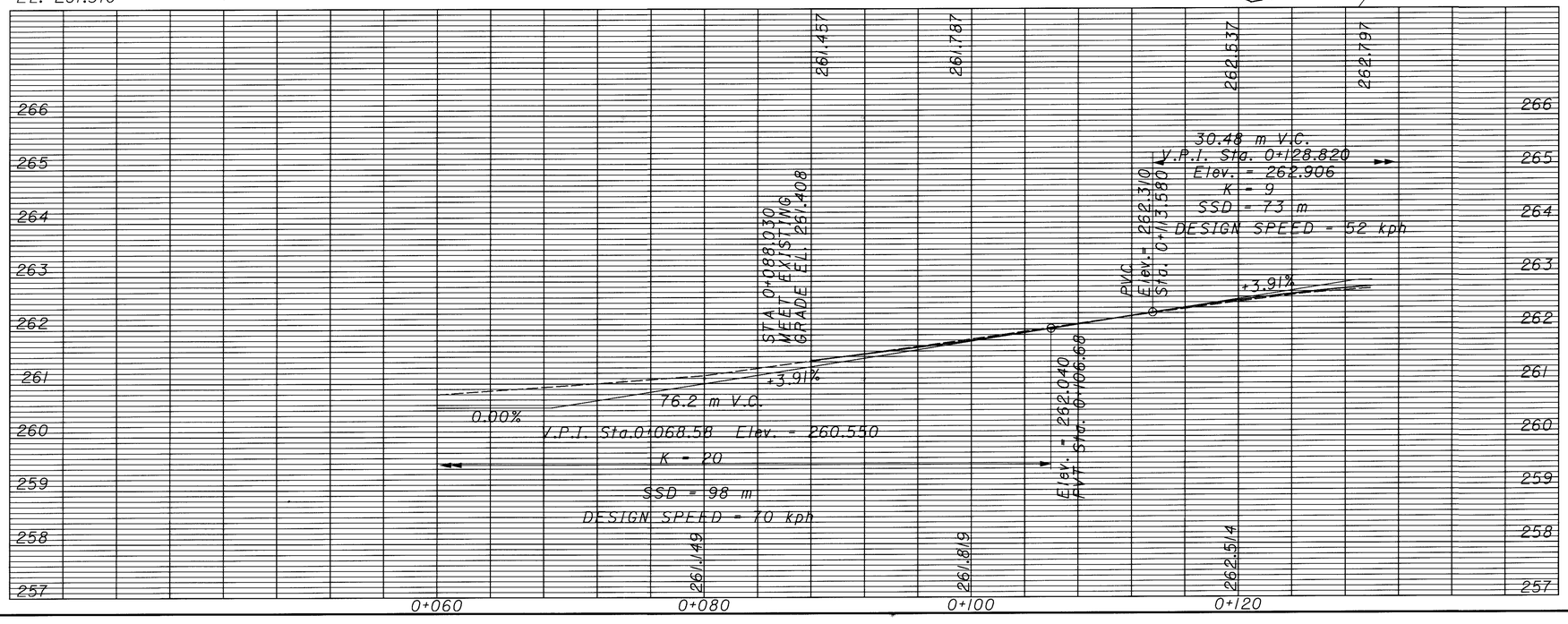
HAS-258-4.410

P:\PR22057A\CADD\MISCDET.DGN

metric units



BM #2
RR SPIKE SET IN
WEST SIDE OF 0.3 M TREE
STA. 0+073.30 6.60m± RT.
EL. 261.310



REF NO.	STATION FROM	STATION TO	SIDE	606 BRIDGE TERMINAL ASSEMBLY, TYPE 4 EACH	202 GUARDRAIL REMOVED METER	304 AGGREGATE BASE (*COMPUTER MEASURED) CU METER	626 BARRIER REFLECTOR TYPE A EACH	606 GUARDRAIL, TYPE 5 METER	606 ANCHOR ASSEMBLY, TYPE T EACH	606 ANCHOR ASSEMBLY, TYPE A EACH
G-1	0+098.27	0+149.78	LT	1	54.91	*4.24	6	53.34	1	1
G-2	0+113.22	0+148.32	RT	1	32.72		5	34.29		1
R-1	0+097.60	0+149.27	LT							
R-2	0+117.84	0+149.27	RT							
P-1	0+088.96	0+097.61	LT							
TOTALS CARRIED TO GENERAL SUMMARY				2	88	5	11	87.63	1	1

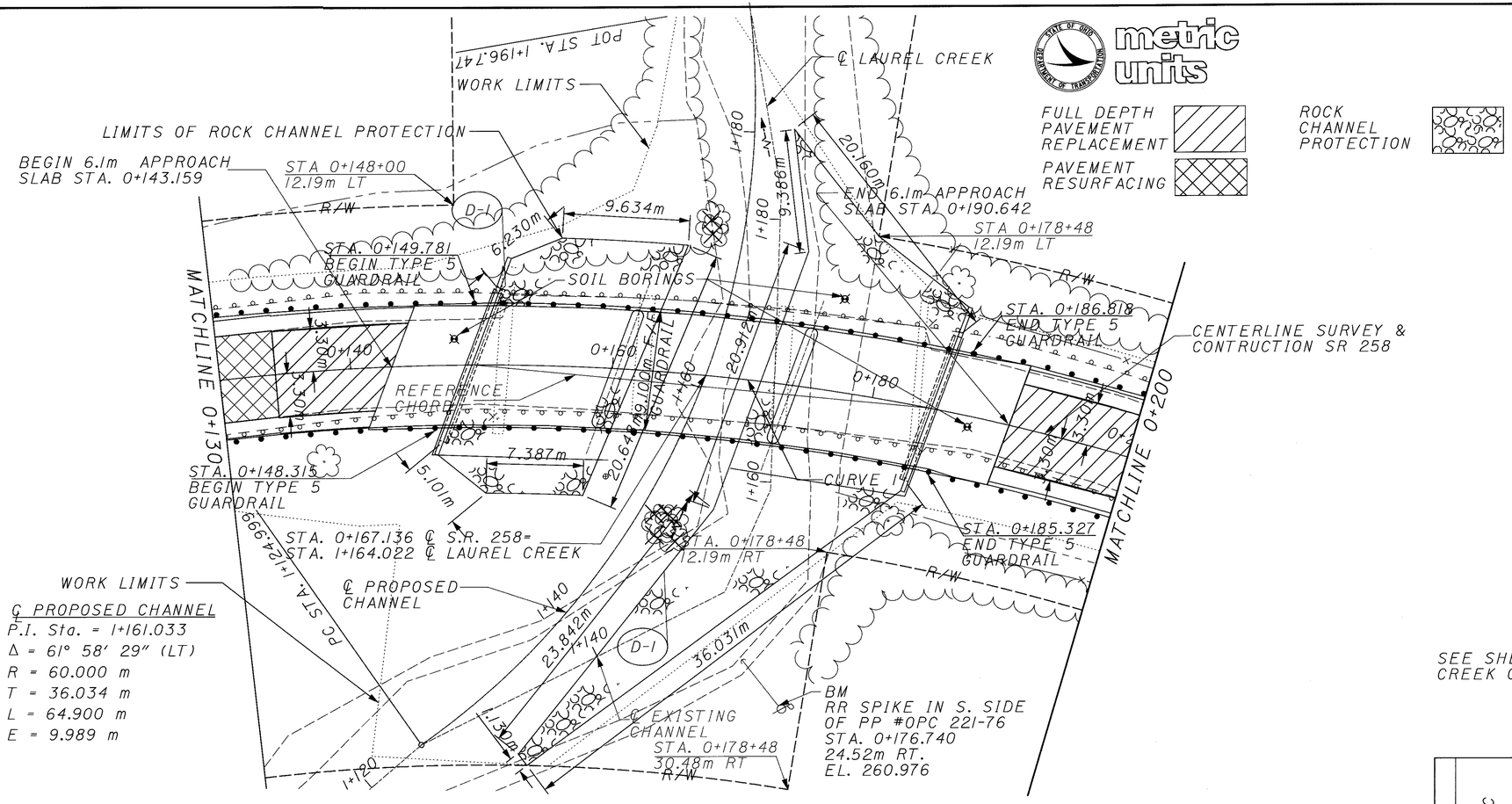
CALCULATED SM
CHECKED DAS

0 2 4 8
HORIZONTAL SCALE IN METERS

PLAN AND PROFILE
STA. 0+060 TO STA. 0+130

HAS-258-4.410

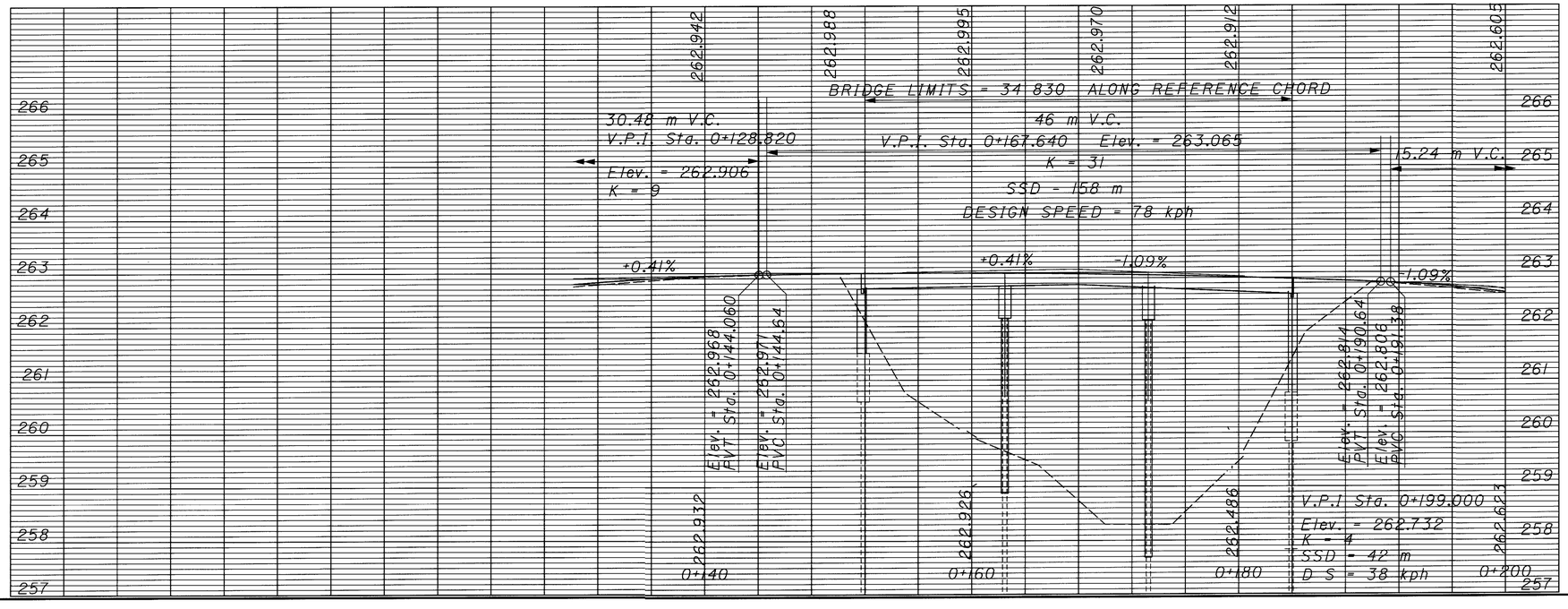
9
33



SEE SHEET 15 FOR CREEK CLEANOUT PLAN

℄ SURVEY & CONSTRUCTION
CURVE 1
P.I. Sta. = 0+186.939
Δ = 43° 21′ 25″ (RT)
R = 174.640 m
T = 69.422 m
L = 132.154 m
E = 13.292 m

℄ PROPOSED CHANNEL
P.I. Sta. = 1+161.033
Δ = 61° 58′ 29″ (LT)
R = 60.000 m
T = 36.034 m
L = 64.900 m
E = 9.989 m



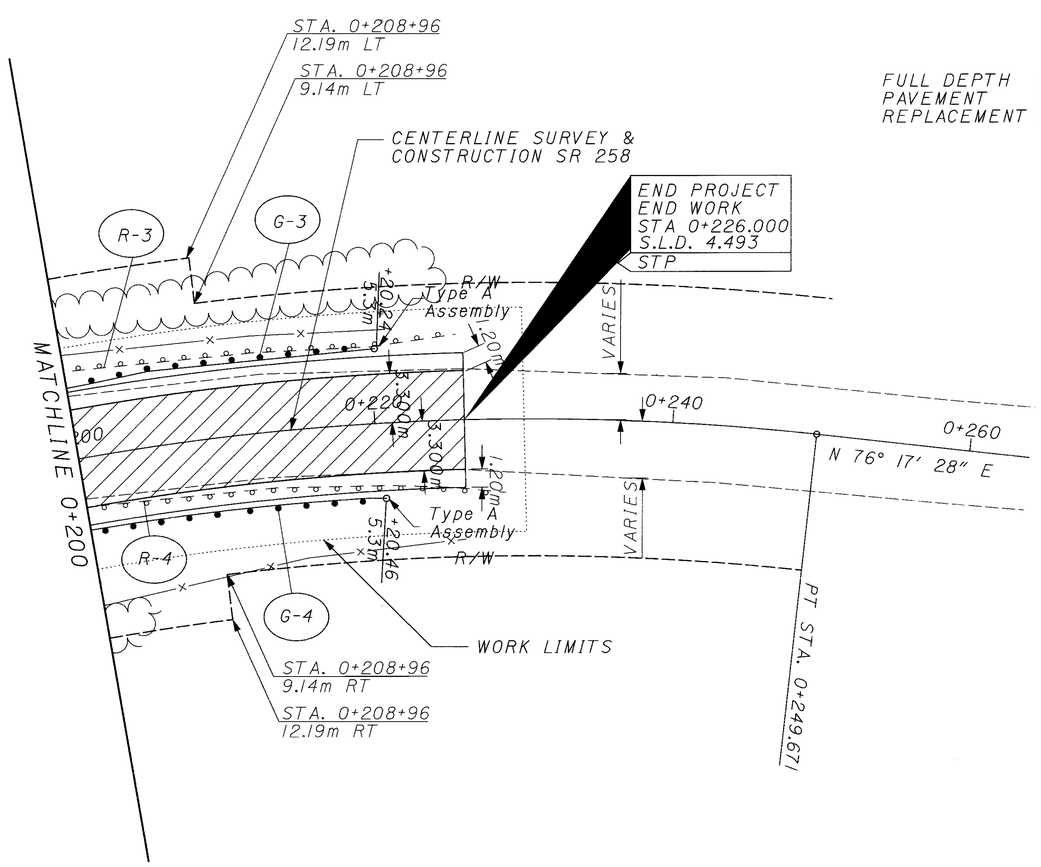
REF NO.	STATION FROM	STATION TO	SIDE	
D-1				601 ROCK CHANNEL, PROTECTION, TYPE C WITH FILTER (*COMPUTER MEASURED) CU METER *375.44
TOTALS CARRIED TO GENERAL SUMMARY				376

CALCULATED SM
CHECKED DAS

PLAN AND PROFILE STA. 0+130 TO 0+200

HAS-258-4.410

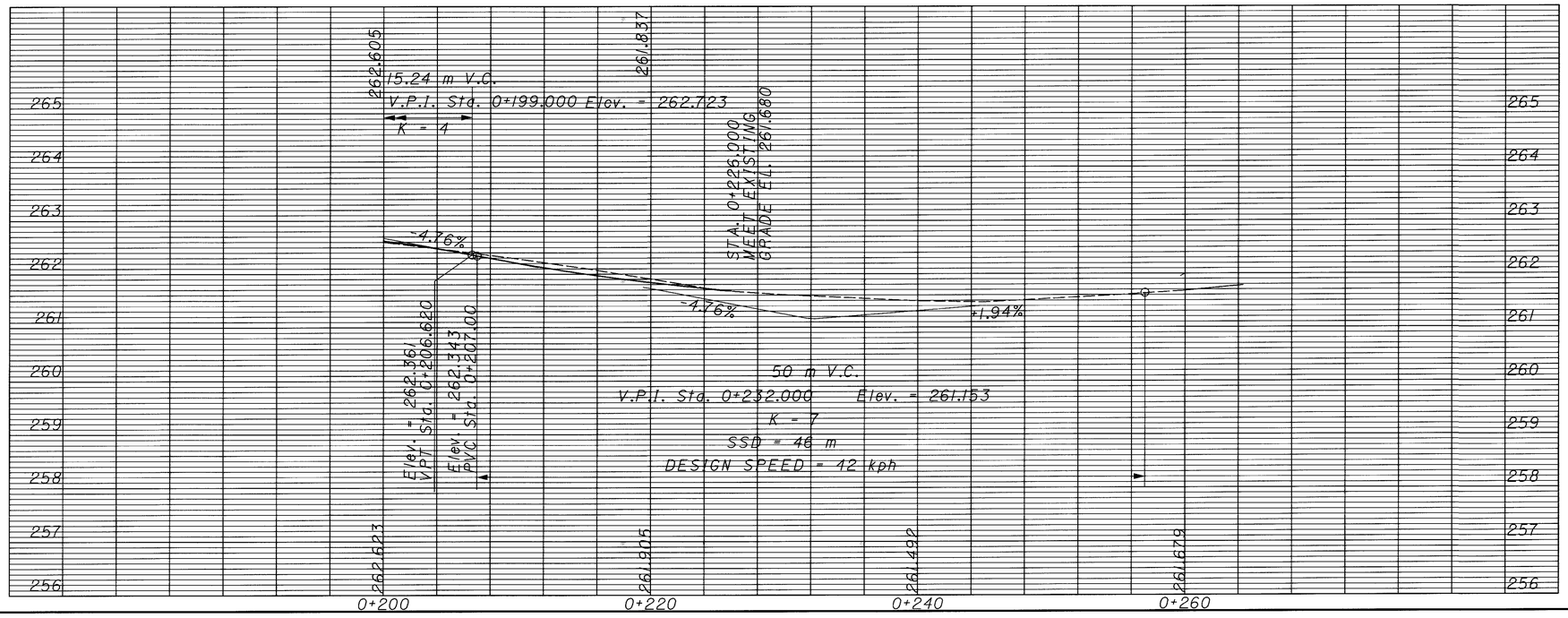
10
33



FULL DEPTH PAVEMENT REPLACEMENT

metric units

BM#1
RR SPIKE SET IN
EAST SIDE OF 0.6M
TREE ± STA. 0+200
13.50m LT.
EL. 261.326



REF NO.	STATION FROM	STATION TO	SIDE	606 GUARDRAIL, TYPE 5 METER	606 ANCHOR ASSEMBLY, TYPE A EACH	606 BRIDGE TERMINAL ASSEMBLY, TYPE 4 EACH	202 GUARDRAIL REMOVED METER	626 BARRIER REFLECTOR TYPE A EACH
G-3	0+186.82	0+220.24	LT	34.29	1	1		5
G-4	0+185.33	0+220.46	RT	34.29	1	1		5
R-3	0+184.54	0+225.54	LT				43.94	
R-4	0+184.54	0+228.73	RT				43.82	
TOTALS CARRIED TO GENERAL SUMMARY				68.58	2	2	88	10

CALCULATED SM
CHECKED DAS

HORIZONTAL SCALE IN METERS
0 4 8

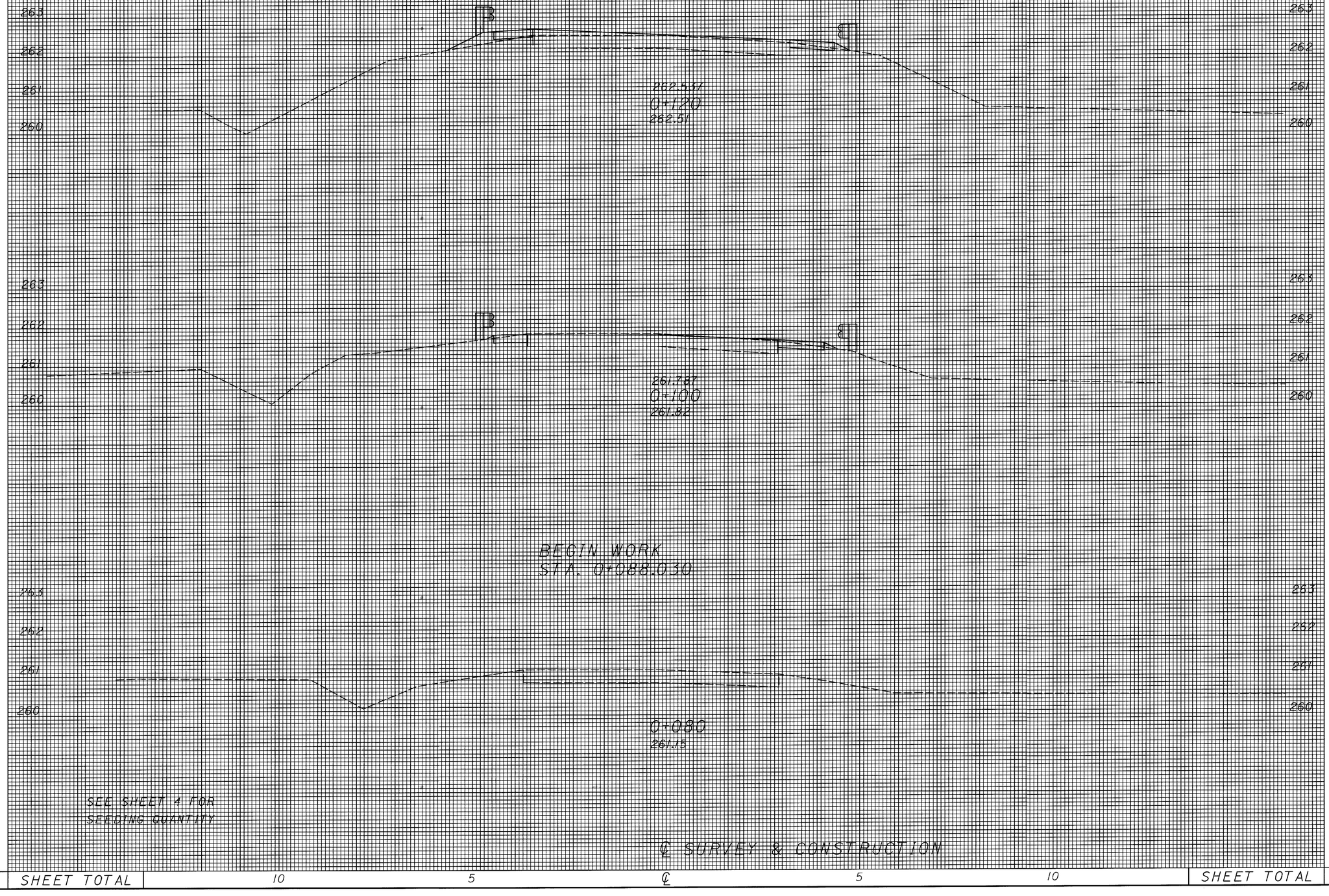
PLAN AND PROFILE
STA. 0+200 TO 0+260

HAS-258-4.410

33

SEEDING	
END WIDTH	SQ. METERS

℄ SURVEY & CONSTRUCTION



SEE SHEET 4 FOR SEEDING QUANTITY

℄ SURVEY & CONSTRUCTION

	END AREA		VOLUME	
	CUT	FILL	CUT	FILL
	0.2	0.3		
			5	4
	0.3	0.1		
			2	1
	0.3	0.1	AH	
SHEET TOTAL			7	5

10	5	℄	5	10

CALCULATED MH
CHECKED DAS

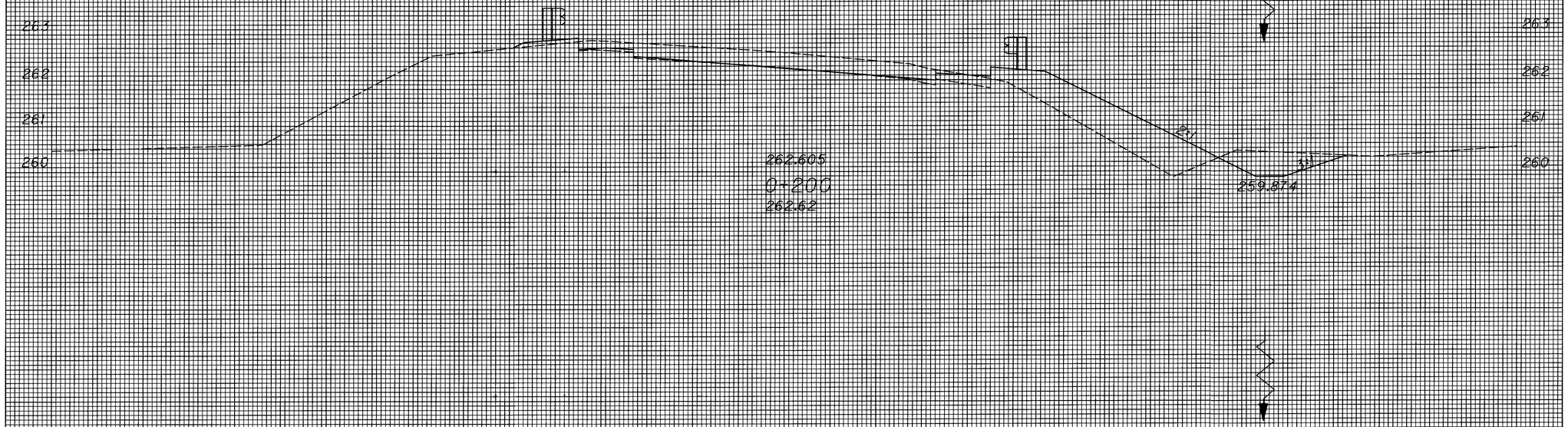
CROSS SECTIONS
STA. 0+080 TO STA. 0+120

HAS-258-4.410

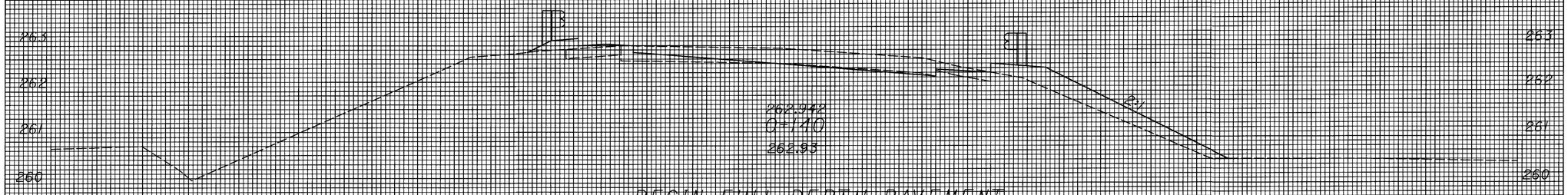
12
33

SEEDING	
END WIDTH	SQ. METERS

℄ SURVEY & CONSTRUCTION



STRUCTURE LIMITS STA. 0+149.259
TO STA. 0+184.542



BEGIN FULL DEPTH PAVEMENT
REPLACEMENT STA. 0+134.072

SEE SHEET 4 FOR
SEEDING QUANTITY

℄ SURVEY & CONSTRUCTION

END AREA		VOLUME		
CUT	FILL	CUT	FILL	
3.1	3.4			
		48	53	
3.1	3.4			AH
2.4	2.2			BK
		23	21	
2.4	2.2			
		14	6	
SHEET TOTAL		80	85	

CALCULATED MH
CHECKED DAS

CROSS SECTIONS
STA. 0+140 TO STA. 0+200

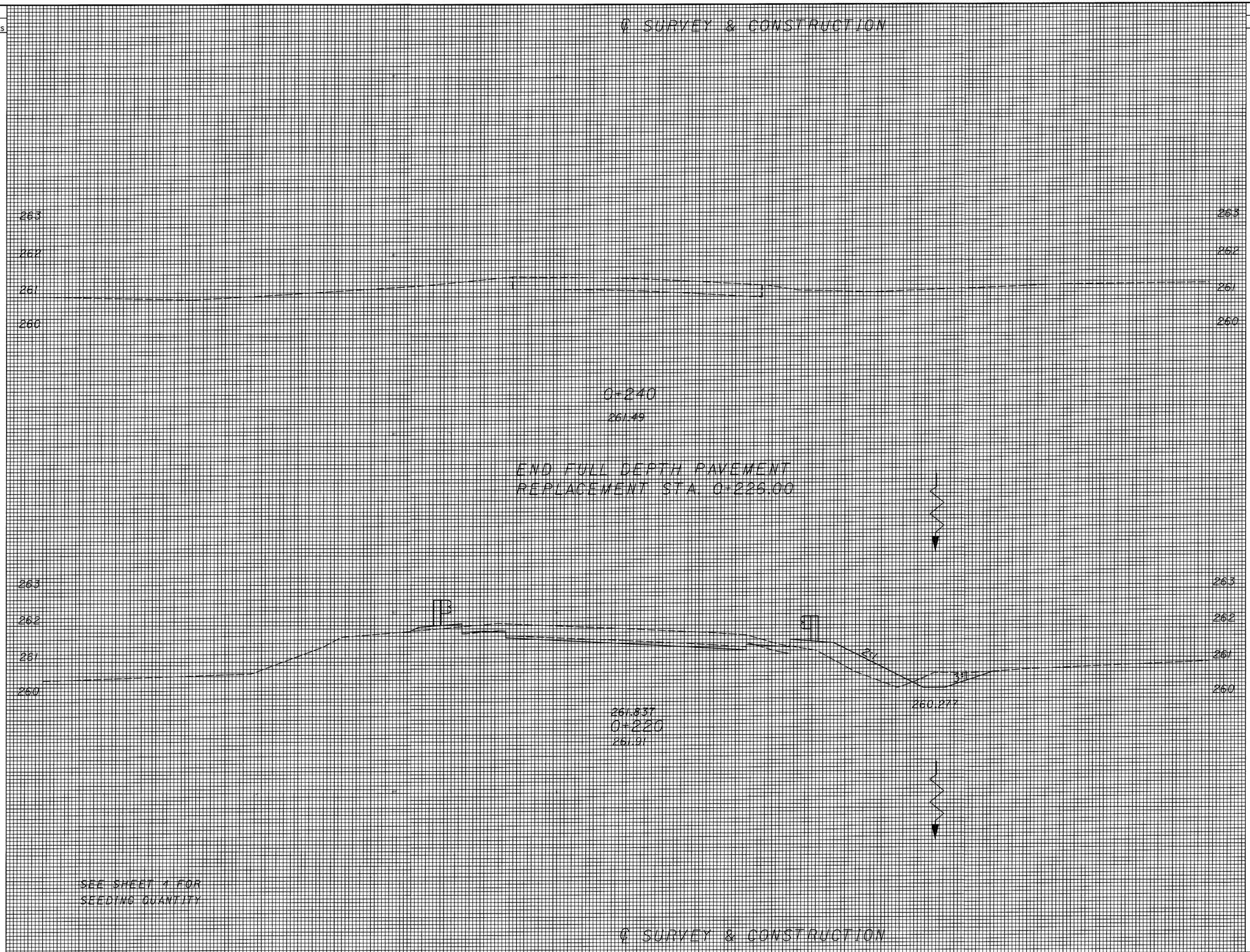
HAS-258-4.410

13
33

SHEET TOTAL 10 5 ℄ 5 10

SEEDING	
END WIDTH	SQ. METERS

℄ SURVEY & CONSTRUCTION



END AREA		VOLUME	
CUT	FILL	CUT	FILL
3.8	1.2	AH	
		22	9
3.8	1.2		
		69	48
		91	57

CALCULATED MH

CHECKED DAS

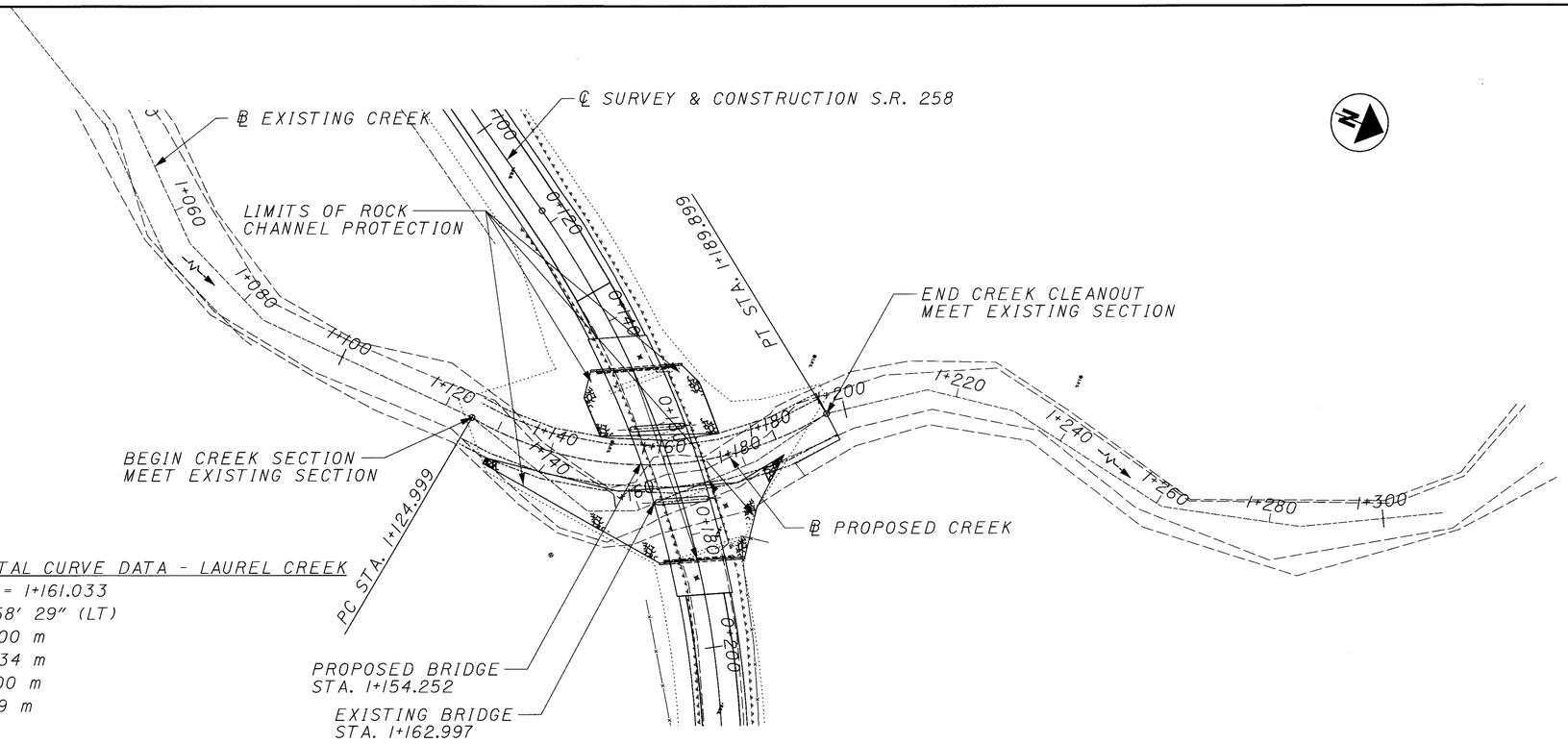
CROSS SECTIONS
STA. 0+220 TO STA. 0+240

HAS-258-4.410

14
33

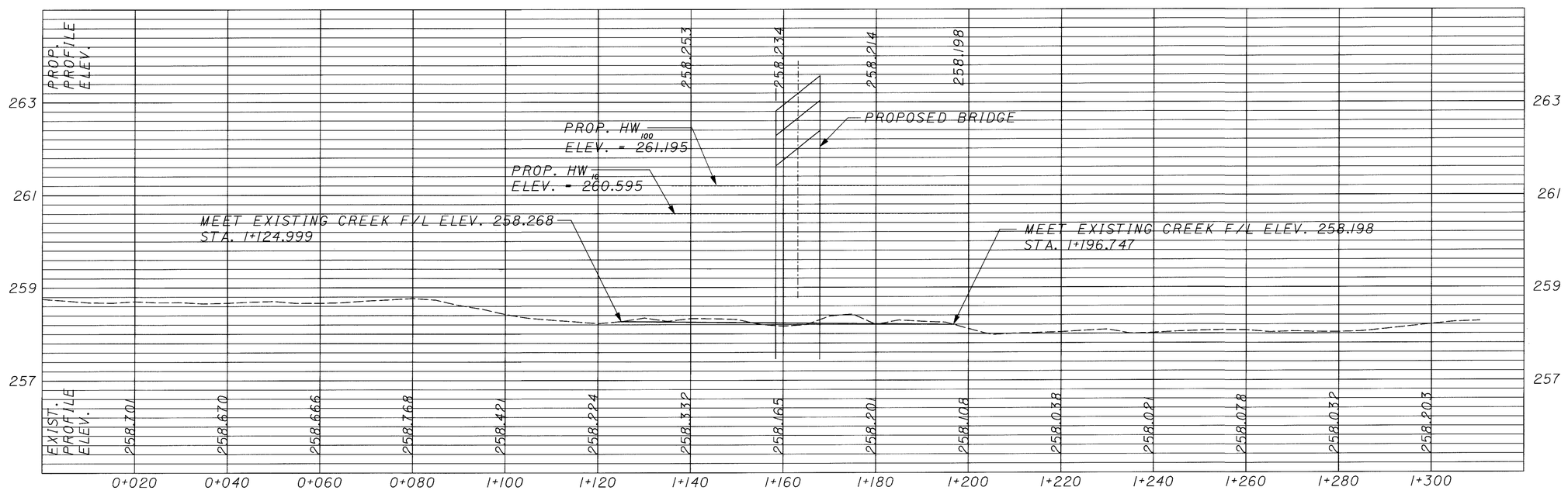
SHEET TOTAL | 10 | 5 | ℄ | 5 | 10 | SHEET TOTAL

metric units



HORIZONTAL CURVE DATA - LAUREL CREEK
P.I. Sta. = 1+161.033
Δ = 61° 58′ 29″ (LT)
R = 60.000 m
T = 36.034 m
L = 64.900 m
E = 9.989 m

PLAN



PROFILE

HARRISON COUNTY
STA. 0+149.272
STA. 0+184.540

DESIGNED KK
DRAWN KK
CHECKED SCT
REVISED MPS
REVIEWED RCB DATE 01-21-00
STRUCTURE FILE NUMBER 3402746

BURGESS & NIPLE ENGINEERS ARCHITECTS

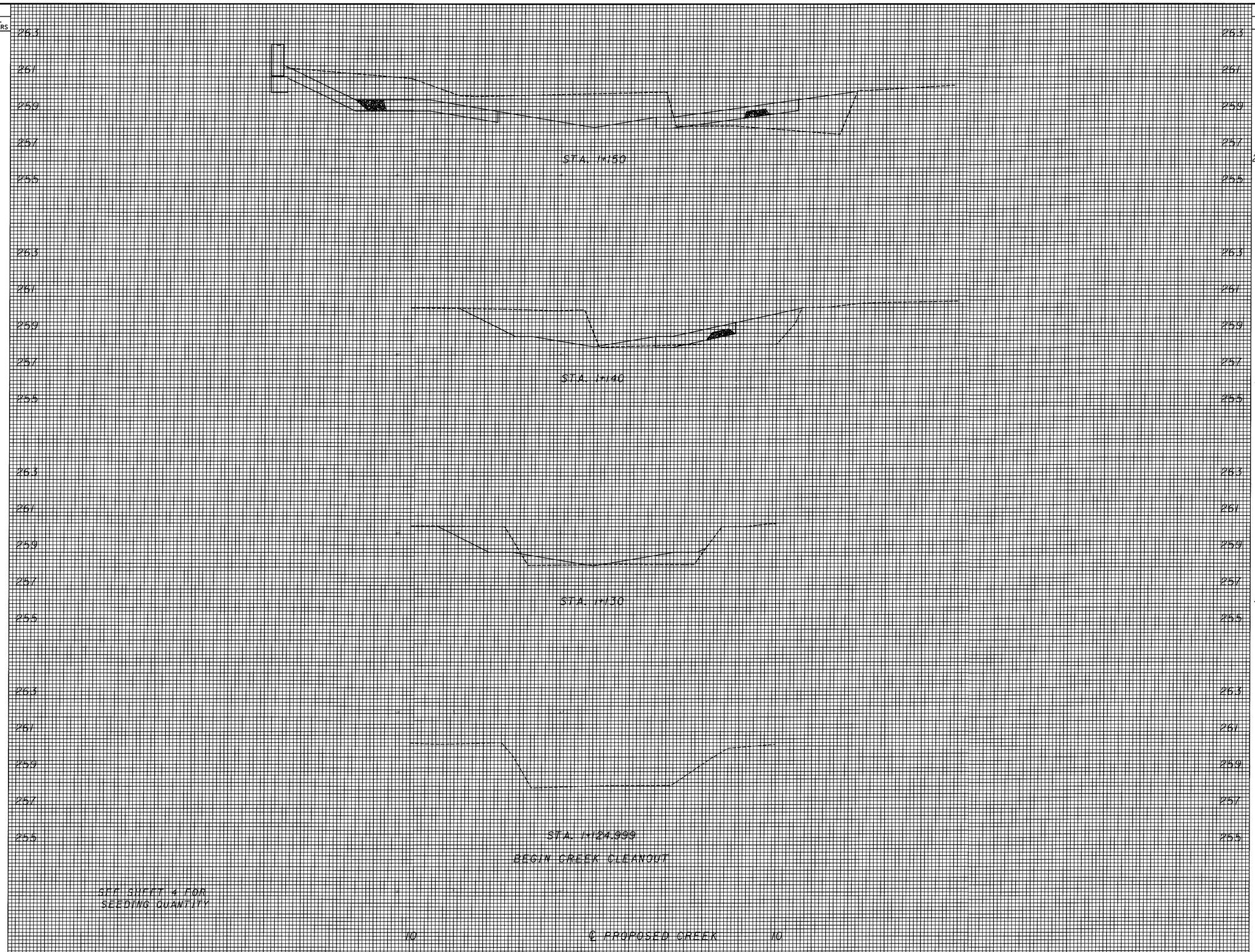
CREEK CLEANOUT PLAN
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410

15
33

P:\PR22057A\CADD\SUPPSITE.DGN

SEEDING		END AREA		VOLUME	
END WIDTH	SQ. METERS	CUT	FILL	CUT	FILL
		23.6	8.7		
				165	75
		9.4	6.3		
				67	48
		3.9	3.3		
				10	9
		0	0		
SHEET TOTAL				242	132



BURGESS & NIPLE ENGINEERS ARCHITECTS

DESIGNED	DRAWN	REVIEWED	DATE
JAA	JAA	RCB	01-21-00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
CWP		3402746	

CREEK CLEANOUT CROSS SECTIONS

BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410

16
33

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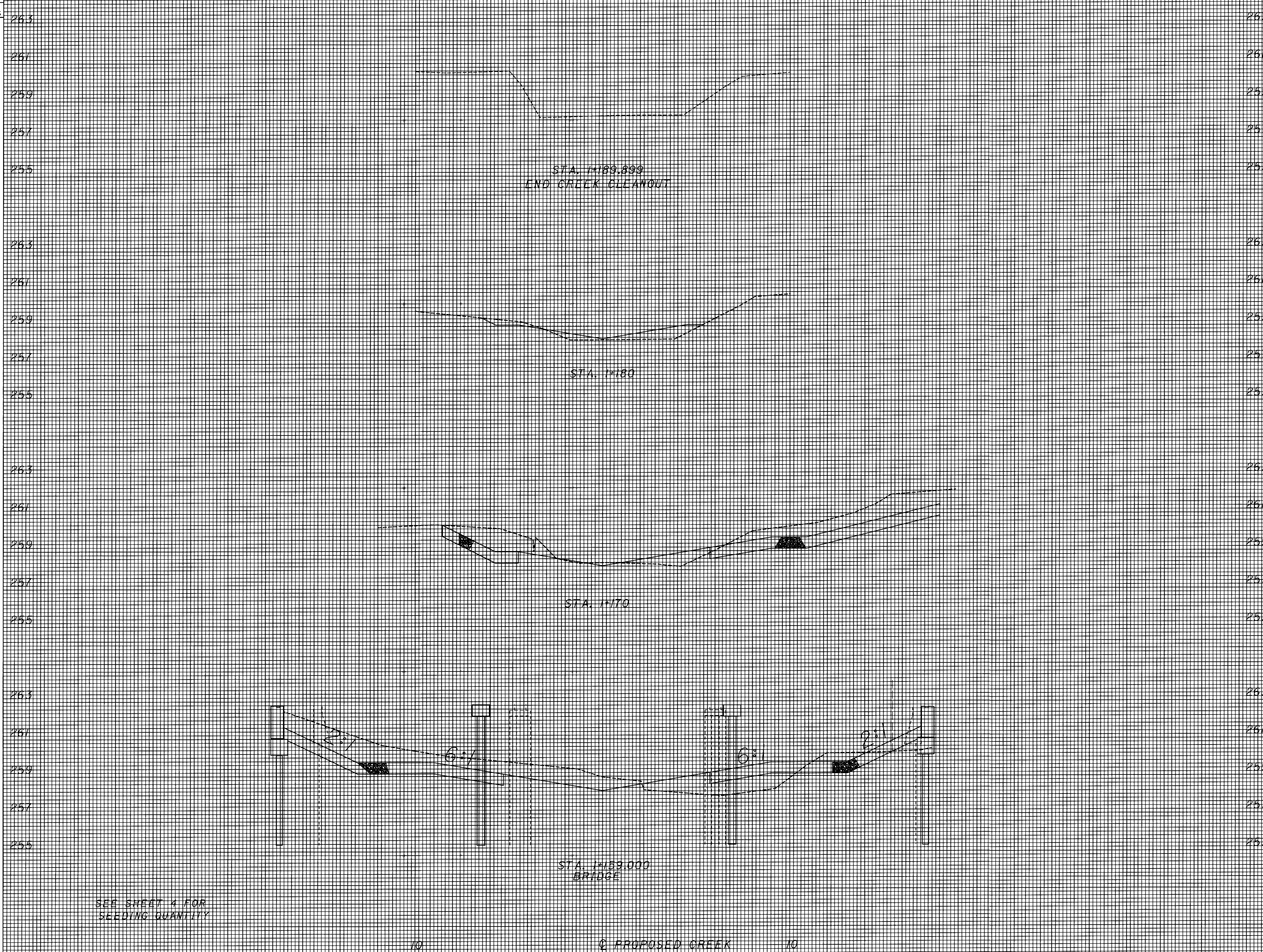
SEEDING	
END WIDTH	SQ. METERS



SEE SHEET 4 FOR SEEDING QUANTITY

Station	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
STA. 1+189.899	0	0		
			2	7
STA. 1+180	0.6	2.5		
			36	23
STA. 1+170	6.6	2.0		
			127	48
STA. 1+159.000	16.1	6.6		
			179	69
SHEET TOTAL			344	147

SHEET TOTAL

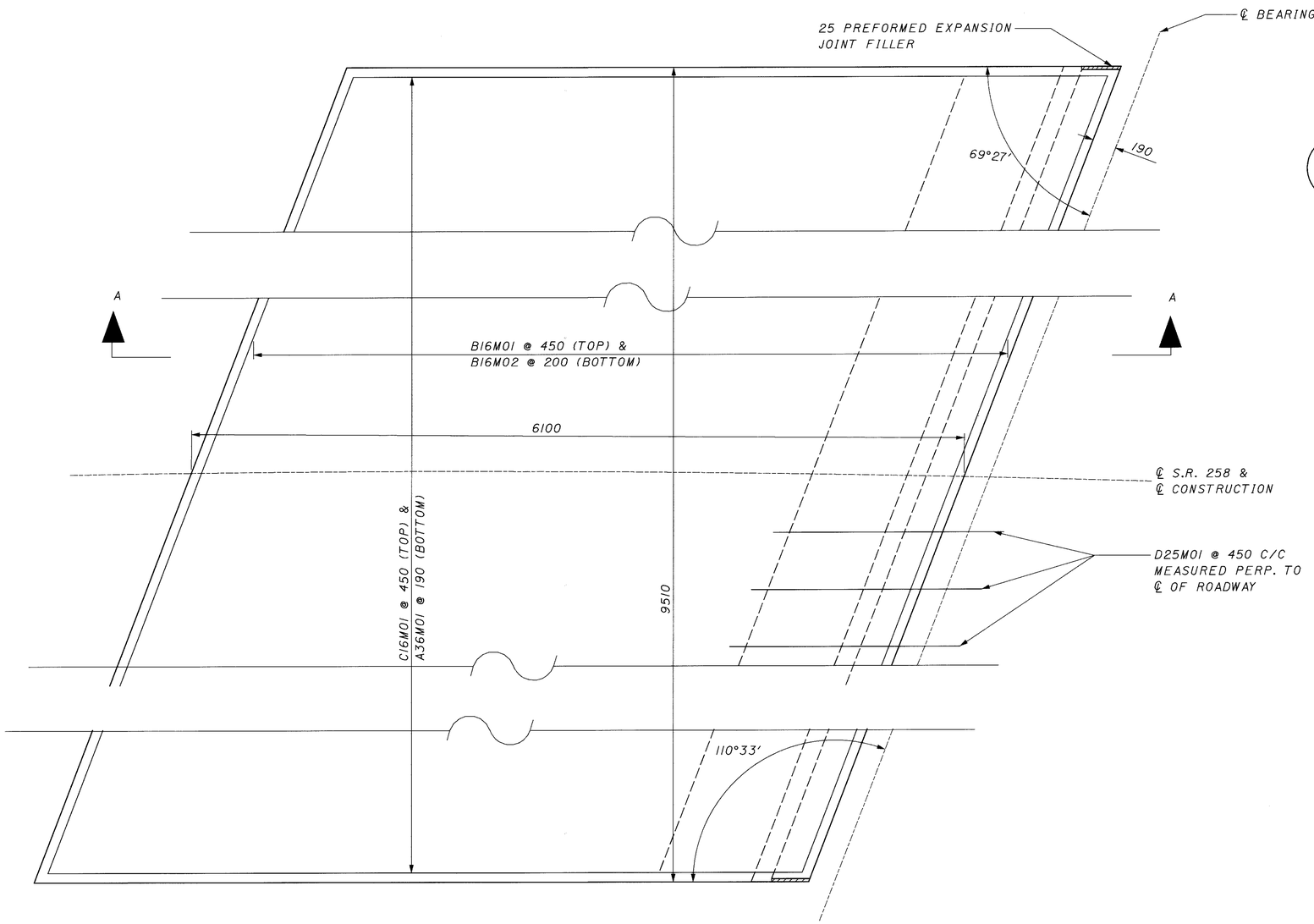
ENGINEERS ARCHITECTS

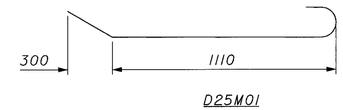
DESIGNED JAA	CHECKED CWP
DRAWN JAA	REVISED
REVIEWED RCB DATE 01-21-00	STRUCTURE FILE NUMBER 3402746

CREEK CLEANOUT CROSS SECTIONS

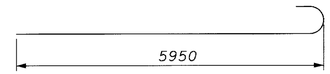
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410





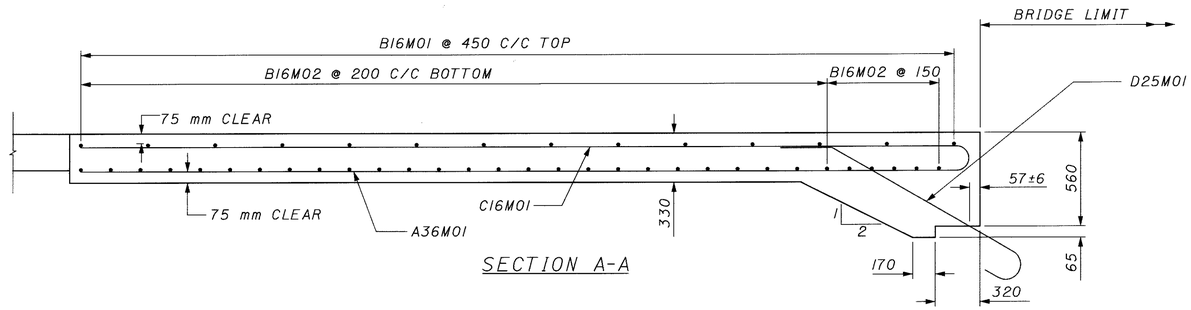
D25M01



A36M01

REINFORCING STEEL LIST *			
MARK	LENGTH (EA)	SHAPE	NO.
B16M01	10000	S	14
B16M02	10000	S	31
A36M01	6380	B	50
C16M01	5950	S	22
D25M01	1815	B	22

REAR APPROACH SLAB PLAN



SECTION A-A

NOTES:
1. ALL BARS SHALL BE EPOXY COATED
2. ALL LONGITUDINAL BARS SHALL BE PLACED PARALLEL TO ℄ OF ROADWAY
3. ALL TRANSVERSE BARS SHALL BE PLACED PARALLEL TO ℄ OF ABUTMENT
4. FOR ADDITIONAL APPROACH SLAB DETAILS SEE STANDARD DRAWING AS-1-81M
5. APPROACH SLAB SIDES SHALL BE STRAIGHT.

* REAR APPROACH ONLY

LEGEND:
C/C = CENTER TO CENTER
C.J. = CONSTRUCTION JOINT
TYP. = TYPICAL
PERP. = PERPENDICULAR
L.F. = LEFT FORWARD
S=STRAIGHT
B=BENT

metric units

CALCULATED CDC
CHECKED SCT

APPROACH SLAB DETAILS 1

HAS-258-4.410

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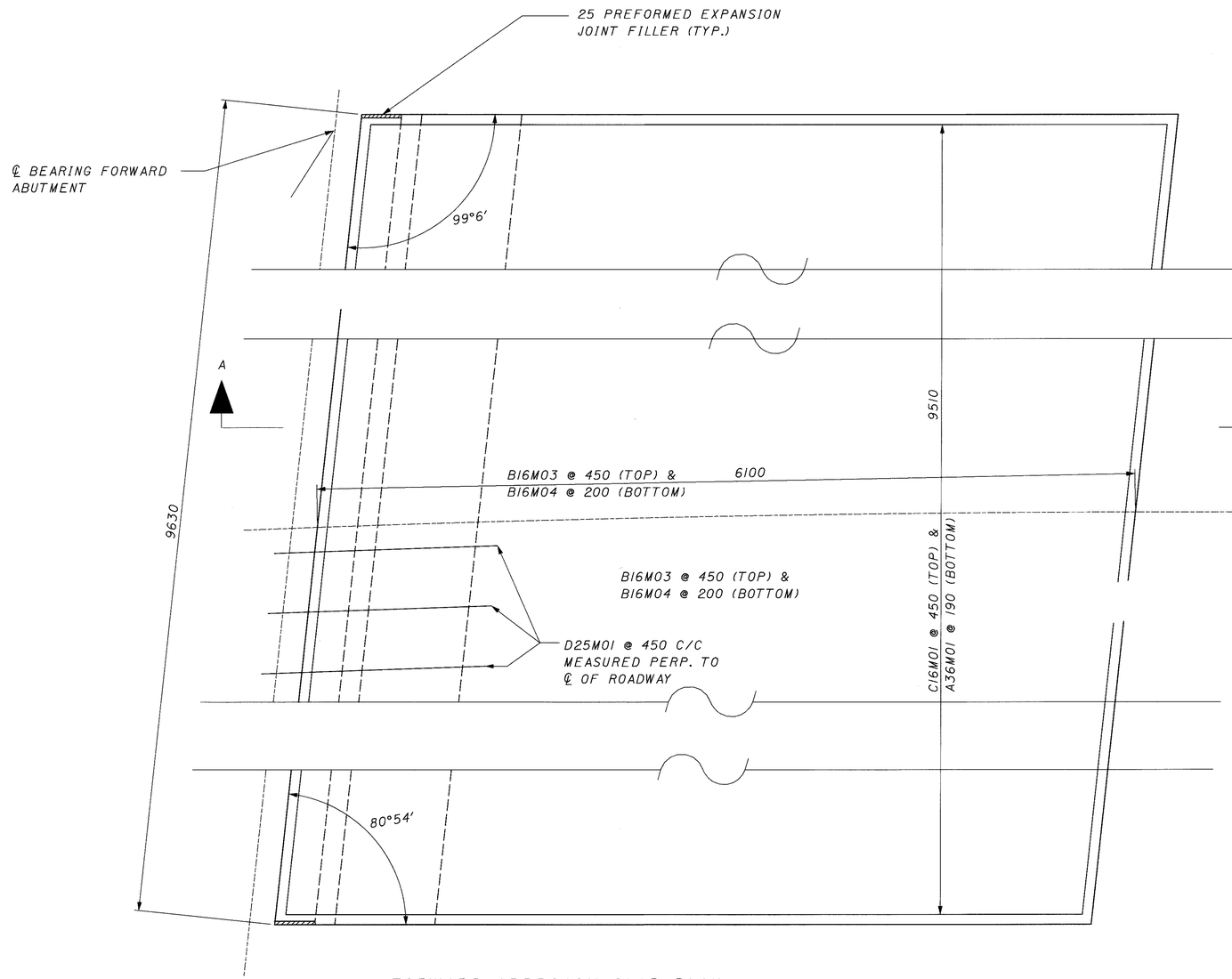
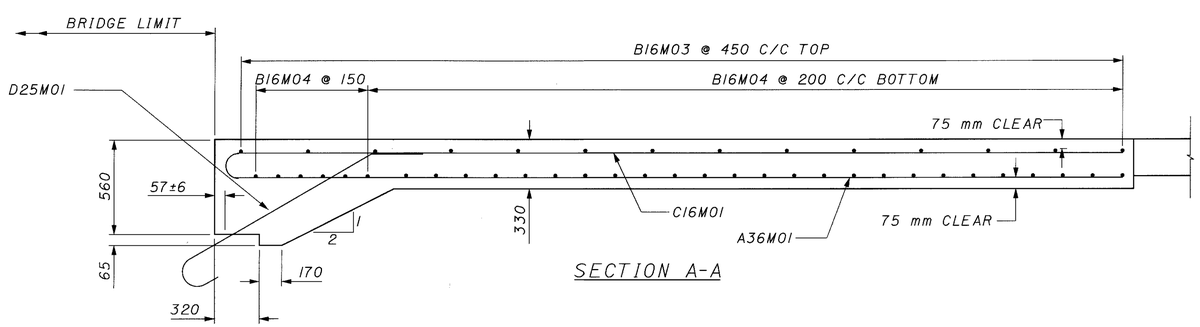
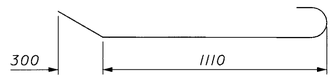


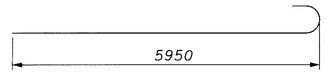
FORWARD APPROACH SLAB PLAN



SECTION A-A



D25M01



A36M01

REINFORCING STEEL LIST *			
MARK	LENGTH (EA)	SHAPE	NO.
B16M03	9480	S	14
B16M04	9480	S	31
A36M01	6380	B	50
C16M01	5950	S	22
D25M01	1815	B	22

NOTES:
1. ALL BARS SHALL BE EPOXY COATED
2. ALL LONGITUDINAL BARS SHALL BE PLACED PARALLEL TO ℄ OF ROADWAY
3. ALL TRANSVERSE BARS SHALL BE PLACED PARALLEL TO ℄ OF ABUTMENT
4. FOR ADDITIONAL APPROACH SLAB DETAILS SEE STANDARD DRAWING AS-1-81M
5. APPROACH SLAB SIDES SHALL BE STRAIGHT

* FORWARD APPROACH ONLY

LEGEND:
C/C - CENTER TO CENTER
C.J. - CONSTRUCTION JOINT
TYP. - TYPICAL
PERP. - PERPENDICULAR
S-STRAIGHT
B-BENT

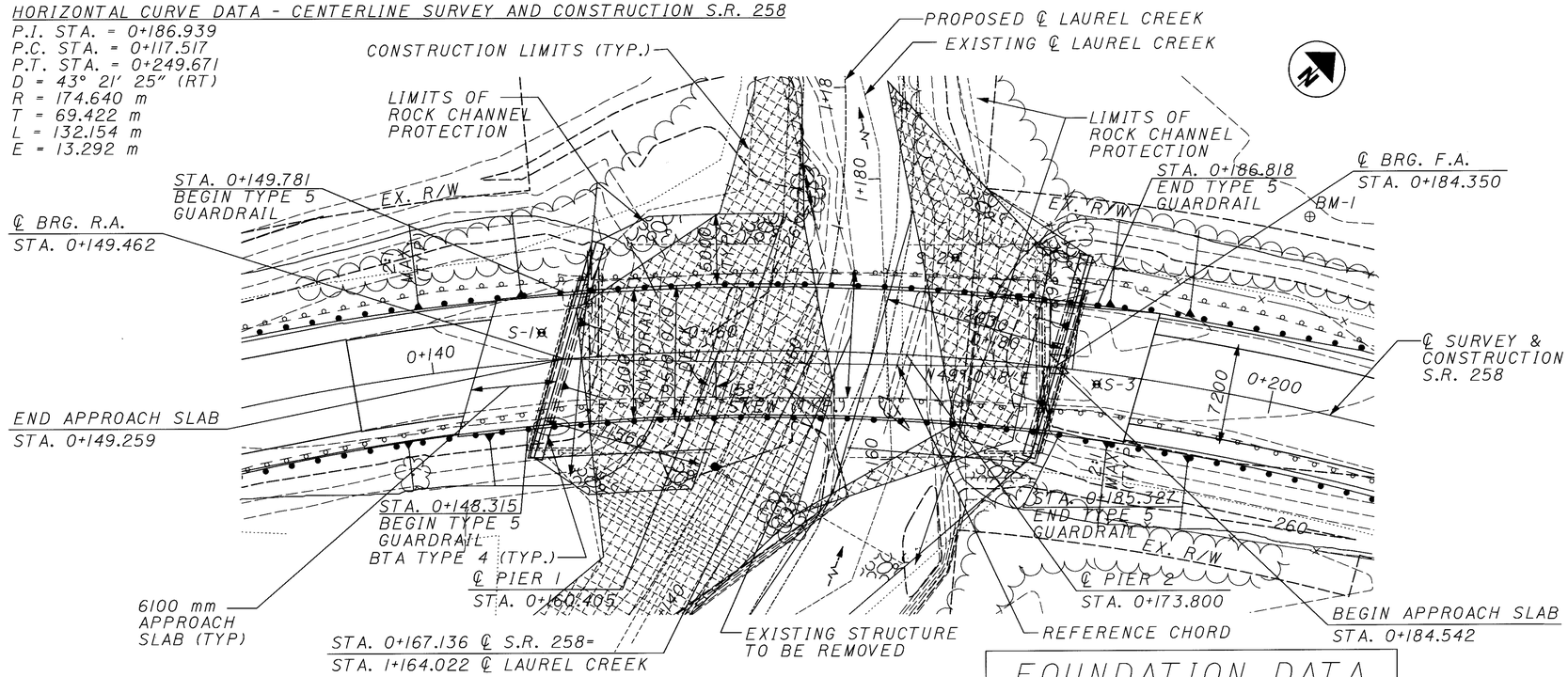
metric units

CALCULATED CDC
CHECKED SCT

APPROACH SLAB DETAILS II

HAS-258-4.410

HORIZONTAL CURVE DATA - CENTERLINE SURVEY AND CONSTRUCTION S.R. 258
P.I. STA. = 0+186.939
P.C. STA. = 0+117.517
P.T. STA. = 0+249.671
D = 43° 21′ 25″ (RT)
R = 174.640 m
T = 69.422 m
L = 132.154 m
E = 13.292 m



PLAN

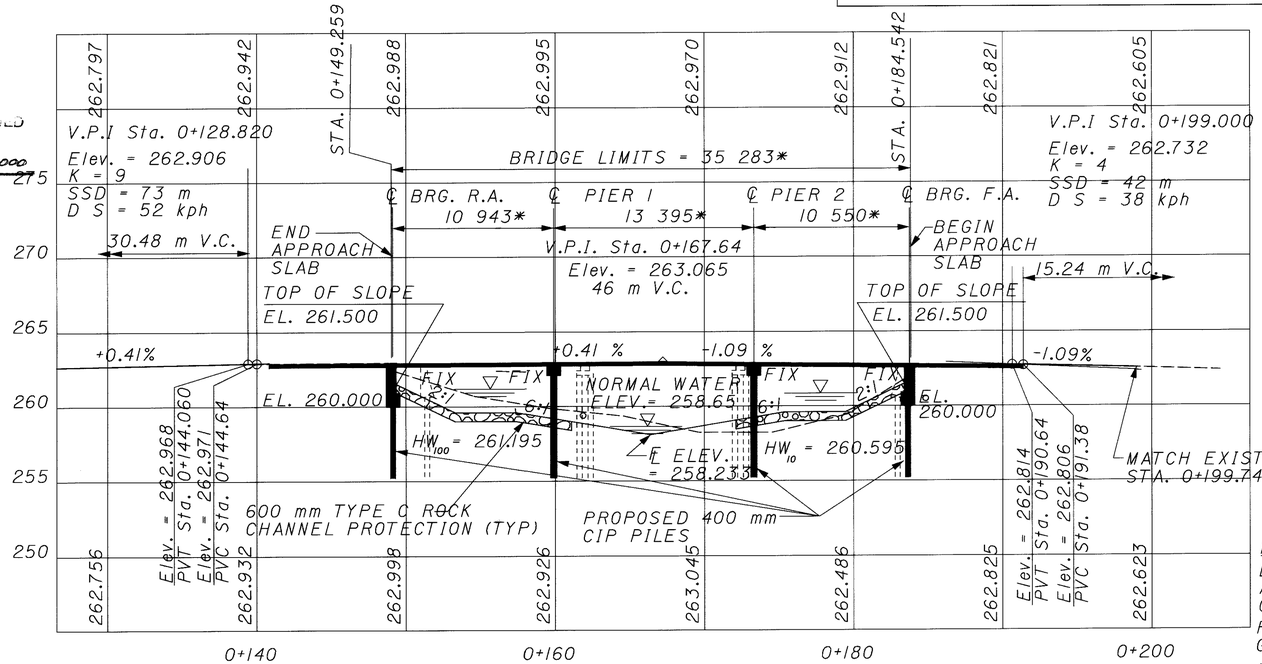
⊕ BM-1
RR SPIKE SET IN EAST SIDE OF 0.6 m TREE STA. 0+200±, 13.50 m LT.
EL. 261.326

⊕ BM-2
RR SPIKE SET IN WEST SIDE OF 0.3 m TREE STA. 0+073.30±, 6.60 m RT.
EL. 261.310

FOUNDATION DATA

ESTIMATED PILE PAY LENGTH

ABUTMENTS: 18 METERS
PIERS: 24 METERS



PROFILE ALONG ℄ SURVEY & ℄ OF CONSTRUCTION

STRUCTURE PLANS REVIEWED BY URS CONSULTANTS,
DAK/BKL DATE 2-14-2000

TRAFFIC DATA

CURRENT ADT (1999).....250
DESIGN YEAR ADT (2019).....320
DESIGN YEAR ADTT (2019).....40

EXISTING STRUCTURE

TYPE: CREOSOTED TIMBER BRIDGE WITH STEEL STRINGERS, STRUCTURAL STEEL PIERS AND REINFORCED CONCRETE ABUTMENTS

SPANS: 10 670±, 10 670±, 10 670± C/C OF BRGS.

ROADWAY: 8840± F/F GUARDRAIL

LOADING: CF 400(57)

WEARING SURFACE: 25 mm ASPHALT CONCRETE

ALIGNMENT: 174.640 m R CURVE RIGHT

APPROACH SLABS: NONE

SKEW: VARIES YEAR BUILT: 1931

STRUCTURE FILE NUMBER: 3402738

PROPOSED STRUCTURE

TYPE: CONTINUOUS REINFORCED CONCRETE SLAB. CAPPED PILE SUBSTRUCTURE.

SPANS: 10 715, 13 400, 10 715 C/C OF BRGS. ALONG REF. CHORD

ROADWAY: 9100 F/F GUARDRAIL

LOADING: MS-18-44 AND ALTERNATE MILITARY LOADING

WEARING SURFACE: 25 mm MONOLITHIC CONCRETE

ALIGNMENT: 174.640 m R CURVE RIGHT

APPROACH SLABS: 6100 LONG

SKEW: 15° LEFT FORWARD

SUPERELEVATION: 0.08

LONGITUDE: N 81°26′27″ LATITUDE: W 40°18′11″

HYDRAULIC DATA

DRAINAGE AREA ..... 75.50 SQ. Km
DESIGN YEAR FREQUENCY ..... 10 YEARS

Q_{10} ..... 49.19 CMS
HW_{10} 260.595
V_{10} ..... 1.313 MPS

PROPOSED BRIDGE CLEARS DESIGN YEAR WATER SURFACE ELEVATION BY 1.348 m.

Q_{100} ..... 76.77 CMS
HW_{100} 261.195
V_{100} ..... 1.408 MPS

NOTES:
EARTHWORK LIMITS ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
FOR LOCATION OF REFERENCE CHORD AND GEOMETRIC LAYOUT, SEE SHEET 2 OF 14
* MEASURED ALONG ℄ SURVEY & CONSTRUCTION
⊠ SOIL BORING LOCATION

LEGEND
MAX. = MAXIMUM
BRG. = BEARING
F.A. = FORWARD ABUTMENT
R.A. = REAR ABUTMENT
TYP = TYPICAL
L.F. = LEFT FORWARD
▨ = LIMITS CHANNEL EXCAVATION
C/C = CENTERLINE TO CENTERLINE

metric units

DESIGNED KK DRAWN KK CHECKED SCT REVIEWED RCB DATE 02-08-00 REVISED
STRUCTURE FILE NUMBER 3402746

HARRISON COUNTY
STA. 0+149.259
STA. 0+184.542

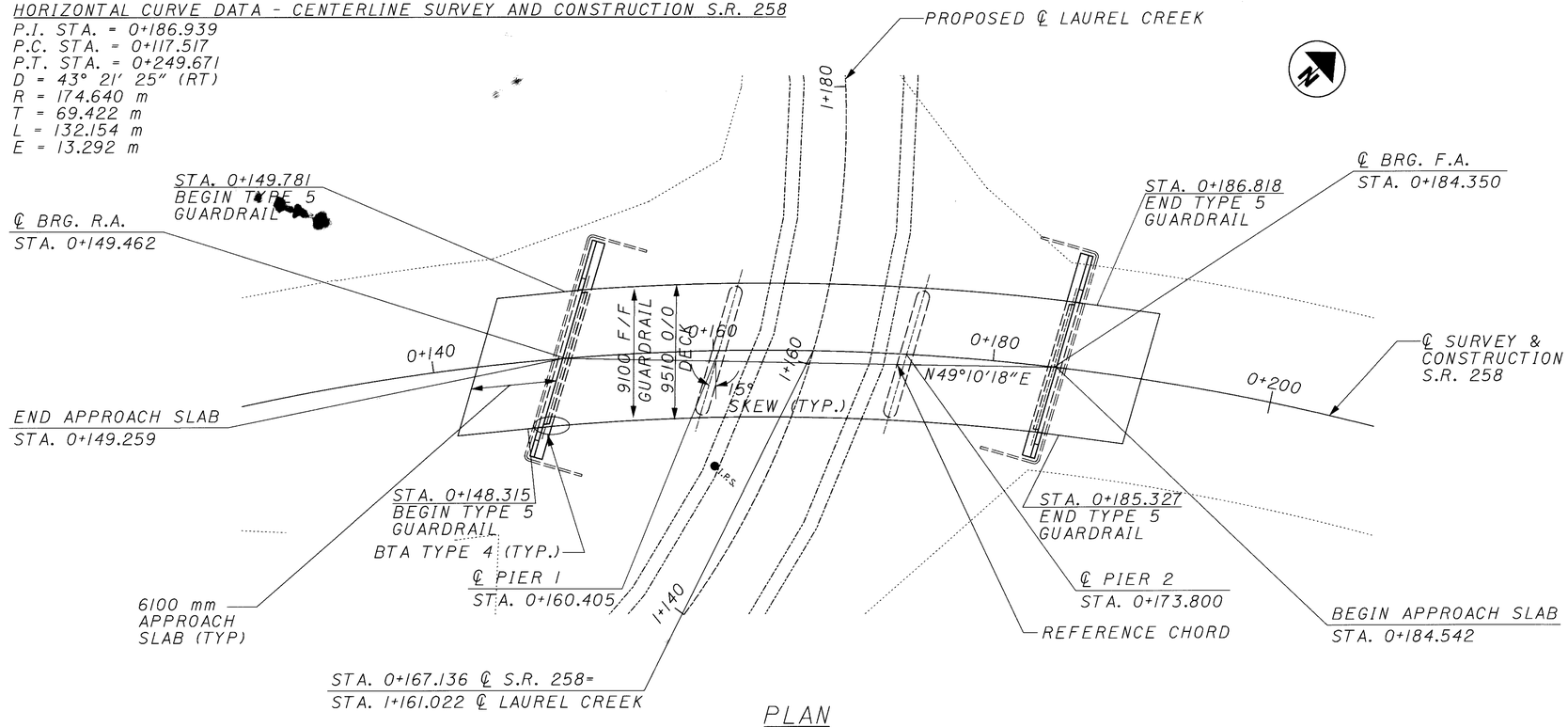
SITE PLAN
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410

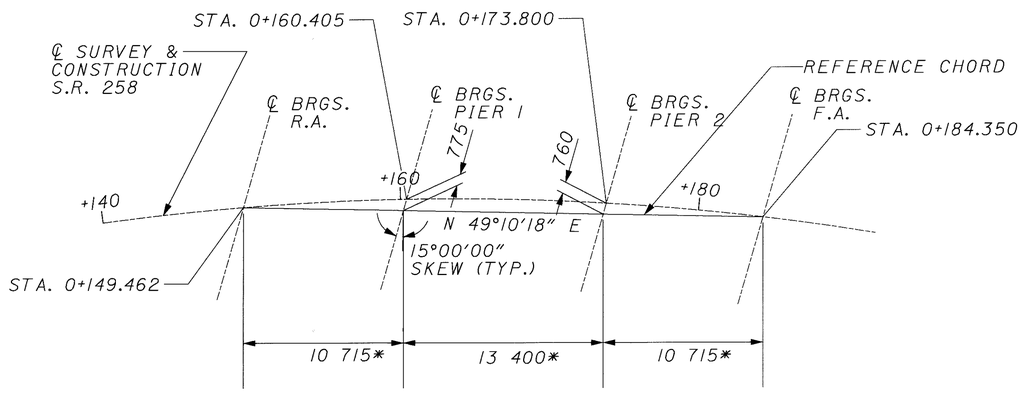
1/14
20/33

P:\PR22057A\CADD\SITEPLAN.DGN

HORIZONTAL CURVE DATA - CENTERLINE SURVEY AND CONSTRUCTION S.R. 258
P.I. STA. = 0+186.939
P.C. STA. = 0+117.517
P.T. STA. = 0+249.671
D = 43° 21′ 25″ (RT)
R = 174.640 m
T = 69.422 m
L = 132.154 m
E = 13.292 m



PLAN



GEOMETRIC LAYOUT

* MEASURED ALONG REFERENCE CHORD

metric units

INDEX OF SHEETS

LEGEND
BRGS. = BEARING
F.A. = FORWARD ABUTMENT
R.A. = REAR ABUTMENT
TYP. = TYPICAL
L.F. = LEFT FORWARD
STA. = STATION
EL. = ELEVATION
O/O = OUT TO OUT
F/F = FACE TO FACE
BTA = BRIDGE TERMINAL ASSEMBLY

BURGESS & NIPLE ENGINEERS ARCHITECTS

DESIGNED KK | DRAWN KK | CHECKED SCT | REVIEWED RCB | DATE 02-08-00 | REVISED | STRUCTURE FILE NUMBER 3402746

GENERAL PLAN
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410

2 / 14

21 / 33

P:\PR22057A\CADD\SITEPLAN.DGN

metric units

DESIGN SPECIFICATIONS:

THIS STRUCTURE CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO), 1996, INCLUDING THE 1997 & 1998 INTERIM SPECIFICATIONS, AND THE ODOT BRIDGE DESIGN MANUAL.

STANDARD DRAWINGS:

REFERENCE SHALL BE MADE TO THE FOLLOWING STANDARD DRAWINGS:

AS-1-81M DATED 10-25-94
CPA-5-94M DATED 10-25-94
CPP-2-94M DATED 12-19-94
CS-1-93M DATED 6-30-95
DS-1-94M DATED 12-15-94
DBR-2-73M DATED 8-18-95

AND SUPPLEMENTAL SPECIFICATIONS

814, DATED 6-2-98. 954, DATED 09-09-97
842, DATED 1-6-99.
844, DATED 1-6-99.
899, DATED 10-21-98.
905, DATED 4-1-98.
907, DATED 10-21-98

DESIGN DATA:

DESIGN LOADING: MS-18-44, AND ALTERNATE MILITARY LOADING.
FUTURE WEARING SURFACE (FWS) 2.87 KPA
HIGH PERFORMANCE CONCRETE - COMPRESSIVE STRENGTH = 31.0 MPa (SUPERSTRUCTURE)
HIGH PERFORMANCE CONCRETE - COMPRESSIVE STRENGTH = 27.5 MPa (SUBSTRUCTURE)
REINFORCING STEEL: ASTM A615M, A616M, OR A617M, GRADE 420 MINIMUM YIELD STRENGTH 420 MPa
SPIRAL REINFORCEMENT MAY BE PLAIN BARS ASTM A82M OR A615M

DECK PROTECTION METHOD: EPOXY COATED REINFORCING STEEL, STEEL DRIP STRIP, 65 mm CONCRETE COVER AND SEALING OF CONCRETE SURFACES.
MONOLITHIC WEARING SURFACE: WEARING SURFACE IS ASSUMED, FOR DESIGN PURPOSES, TO BE 25 mm THICK.

PILE DESIGN LOADS (ULTIMATE BEARING VALUES)
THE ULTIMATE BEARING VALUE IS 822 KN PER PILE FOR THE 14 ABUTMENT PILES. THE ULTIMATE BEARING VALUE IS 1206 KN PER PILE FOR THE 10 PIER PILES.

ABUTMENT PILES:
14 PILES 18 METERS LONG, ESTIMATED LENGTH
14 PILES OF ORDER LENGTH 18 METERS LONG
14 PILES OF ORDER LENGTH 1.5 METERS LONG
7 SPLICES

PIER PILES:
10 PILES 24 METERS LONG, ESTIMATED LENGTH
10 PILES OF ORDER LENGTH 18 METERS
10 PILES OF ORDER LENGTH 7.5 METERS
10 SPLICES

ITEM 507 400mm PILES, AS PER PLAN
PILE WALL THICKNESS: THE RESPONSIBILITY OF CHOOSING AND PROVIDING A SATISFACTORY PILE WALL THICKNESS FOR THIS PROJECT SHALL BE BORNE BY THE CONTRACTOR EXCEPT THAT THE PILE WALL THICKNESS SHALL NOT BE LESS THAN 6mm. IF A PILE WALL THICKNESS GREATER THAN 6mm IS NECESSARY TO RESIST THE PILE WALL DRIVING STRESS, THE CONTRACTOR SHALL MAKE THIS DETERMINATION AND SHALL FURNISH A PILE WITH AN ACCEPTABLE WALL THICKNESS. IF MONOTUBE PILES ARE USED, THE MINIMUM WALL THICKNESS SHALL BE 4.5 mm.

PILE HAMMER: THE PILE HAMMER USED TO INSTALL THE 400mm PILES SHALL HAVE A STATES ENERGY RATING OF NOT LESS THAN 25000 JOULES. THIS REQUIREMENT DOES NOT RELIEVE THE CONTRACTOR FROM 108.05 WHICH STATES THAT THE CONTRACTOR IS TO PROVIDE SUFFICIENT EQUIPMENT FOR PROSECUTING THE REQUIRED WORK. REFER TO "ODOT'S MANUAL OF PROCEDURES FOR STRUCTURES" TO OBTAIN THE STATES ENERGY RATING.

EXISTING STRUCTURE PLANS:

THE ORIGINAL DESIGN PLANS MAY BE EXAMINED BY PROSPECTIVE BIDDERS AT THE DEPARTMENT OF TRANSPORTATION, DISTRICT 11 OFFICE, 2201 REISER AVENUE S.E. NEW PHILADELPHIA, OH 44663. THE CONTRACTOR SHALL BE FAMILIAR WITH THE DRAWINGS.

WORK LIMITS:

THE WORK LIMITS SHOWN ON THESE PLANS ARE FOR PHYSICAL CONSTRUCTION ONLY. THE INSTALLATION AND OPERATION OF ALL TEMPORARY TRAFFIC CONTROL AND TEMPORARY TRAFFIC CONTROL DEVICES REQUIRED BY THESE PLANS SHALL BE PROVIDED BY THE CONTRACTOR WHETHER INSIDE OR OUTSIDE THE WORK LIMITS.

STREAM CHANNEL EXCAVATION:

THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PREVENT ANY INCIDENTAL DISCHARGES ASSOCIATED WITH THE EXCAVATION AND HAULING OF MATERIAL FROM THE STREAM CHANNEL. THIS PERTAINS TO ANY EXCAVATION OPERATIONS SUCH AS, FOUNDATION PIER OR ABUTMENT EXCAVATION, CHANNEL CLEANOUT, EXCAVATION FOR ROCK CHANNEL PROTECTION AND REMOVAL OF ANY TEMPORARY FILL ASSOCIATED WITH CONSTRUCTION OPERATIONS.

PROPOSED WORK:

IN GENERAL, THE PROPOSED WORK CONSISTS OF REMOVAL OF THE EXISTING BRIDGE SUPERSTRUCTURE, PIERS, ABUTMENTS AND WINGWALLS, APPROACH SLABS AND ABUTMENT DRAINAGE. CONSTRUCTION SHALL INCLUDE THE INSTALLATION OF A NEW SUPERSTRUCTURE, NEW ABUTMENTS AND WINGWALLS, PIERS, ROCK CHANNEL SLOPE PROTECTION AND APPROACH SLABS. IN ADDITION, SEAL THE NEW CONCRETE DECK EDGE WITH EPOXY, INSTALL NEW ROCK CHANNEL PROTECTION AND COMPLETE INCIDENTAL ITEMS OF WORK. ALL WORK MUST BE COORDINATED WITHIN MAINTENANCE OF TRAFFIC PLANS AND SAFETY REQUIREMENTS.

STRUCTURE REMOVED, OVER 6 METER SPAN

REMOVAL OF EXISTING STRUCTURE: WHEN NO LONGER NEEDED TO MAINTAIN TRAFFIC THE EXISTING STRUCTURE SHALL BE REMOVED UPON RECIEVING PERMISSION FROM THE ENGINEER.

REINFORCING BAR SPLICE LENGTHS:

REINFORCING BAR SPLICE LENGTHS SHALL CONFORM TO THE MINIMUM LENGTHS SPECIFIED BY 509.08 OF THE CMS UNLESS OTHERWISE NOTED ON THE PLANS.

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BURGESS & NIPLE ENGINEERS ARCHITECTS

DESIGNED DCF/JAA
DRAWN DCF/JAA
CHECKED SCT
REVISED
REVIEWED RCB DATE 02-08-00
STRUCTURE FILE NUMBER 3402746

GENERAL NOTES
BRIDGE NO. HAS-258-4410
SR 258 OVER LAUREL CREEK

HAS-258-4.41/0

3 / 14

22 / 33

metric units

ESTIMATED QUANTITIES

ITEM	ITEM EXT.	TOTAL	UNIT	DESCRIPTION	SUPER.	SUBSTR. PIERS	SUBSTR. ABUTS.	GENERAL	AS PER PLAN REFERENCE SHEET
202	11002	LUMP		STRUCTURE REMOVED, OVER 6 METER SPAN				LUMP	
202	38500	68	METER	BRIDGE RAILING REMOVED				68	
503	11100	LUMP		COFFERDAMS CRIBS AND SHEETING				LUMP	
503	21300	LUMP		UNCLASSIFIED EXCAVATION				LUMP	
505	11100	LUMP		PILE DRIVING EQUIPMENT MOBILIZATION				LUMP	
507	00701	528	METER	400 mm CAST-IN-PLACE REINFORCED CONCRETE PILES, DRIVEN, AS PER PLAN		255	273		22 OF 33
507	00751	528	METER	400 mm CAST-IN-PLACE REINFORCED CONCRETE PILES, FURNISHED,AS PER PLAN		255	273		22 OF 33
507	50500	17	EACH	STEEL PILE SPLICE		10	7		
SPECIAL	51267510	156	SQ. METER	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE) *	65	56	35		
516	13600	1	SQ. METER	25 mm PREFORMED EXPANSION JOINT FILLER			1		
517	72510	74	METER	RAILING (DEEP BEAM RAIL WITH 3 STEEL TUBULAR BACKUPS AND STEEL POSTS)*				74	
518	21230	LUMP		POROUS BACKFILL WITH FILTER FABRIC			LUMP		
SPECIAL	51822300	83	METER	STEEL DRIP STRIP	83				
518	40000	31	METER	150 MM PERFORATED CORRUGATED PLASTIC PIPE			31		
518	40010	18	METER	150 MM NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS			18		
844	48000	189	CU. METER	HIGH PERFORMANCE CONCRETE, SUPERSTRUCTURE (DECK)	189				
844	48040	70	CU. METER	HIGH PERFORMANCE CONCRETE, SUBSTRUCTURE		17	53		
844	49000	LUMP		HIGH PERFORMANCE CONCRETE, TRIAL MIX				LUMP	
844	49010	LUMP		HIGH PERFORMANCE CONCRETE, TESTING				LUMP	

(* SEE PROPOSAL NOTE)

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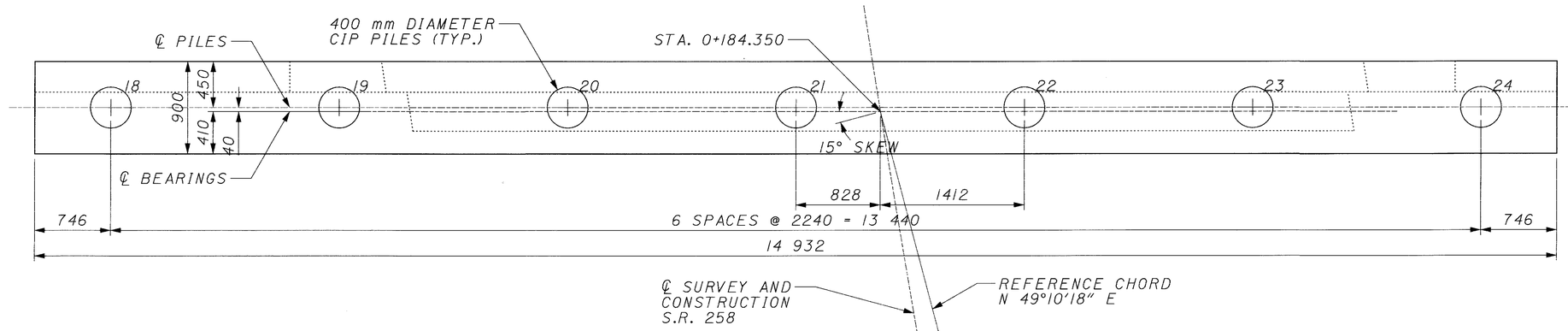
BUCKEYE ENGINEERS & ENGINEERS ARCHITECTS

DESIGNED RAR | DRAWN JAA | CHECKED SCT | REVISED | REVIEWED RCB 02-08-00 | DATE | STRUCTURE FILE NUMBER 3402746

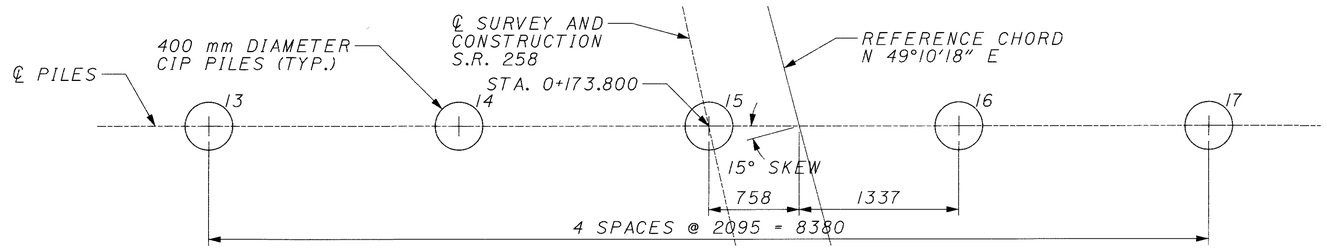
ESTIMATED QUANTITIES
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410



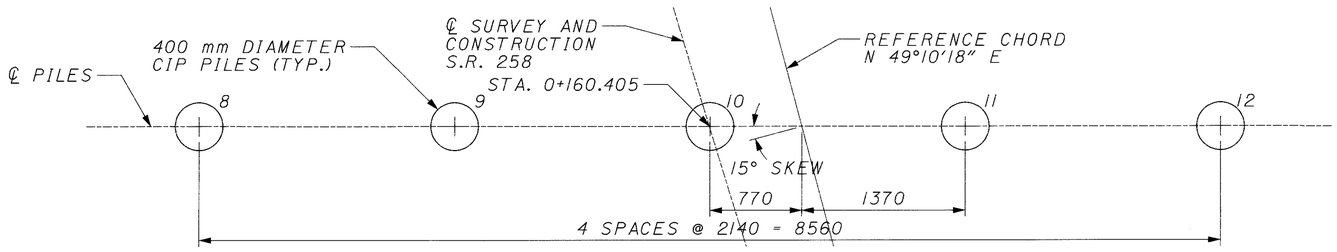
ABUTMENT FOUNDATION PLAN

FORWARD ABUTMENT



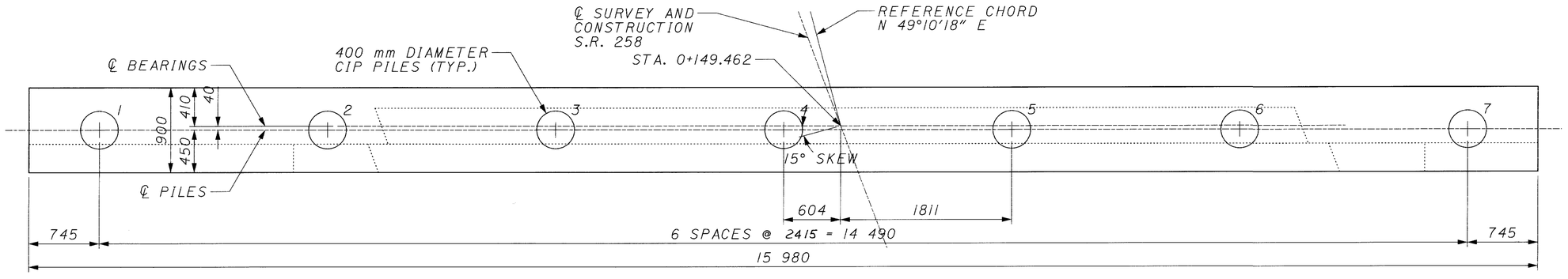
PIER FOUNDATION PLAN

PIER 2



PIER FOUNDATION PLAN

PIER 1



ABUTMENT FOUNDATION PLAN

REAR ABUTMENT

metric units

HUGHES BROTHERS ENGINEERS ARCHITECTS

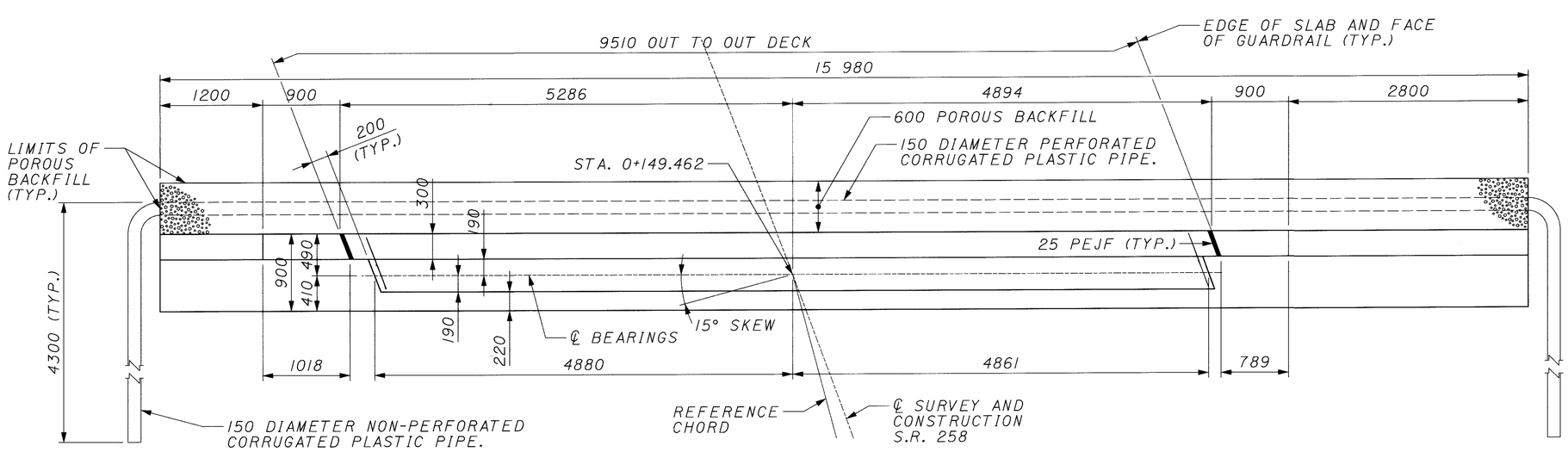
DESIGNED MAR
DRAWN MAR
CHECKED CDC
REVISED
REVIEWED RCB 02-08-00
DATE
STRUCTURE FILE NUMBER 3402746

FOUNDATION PLAN
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

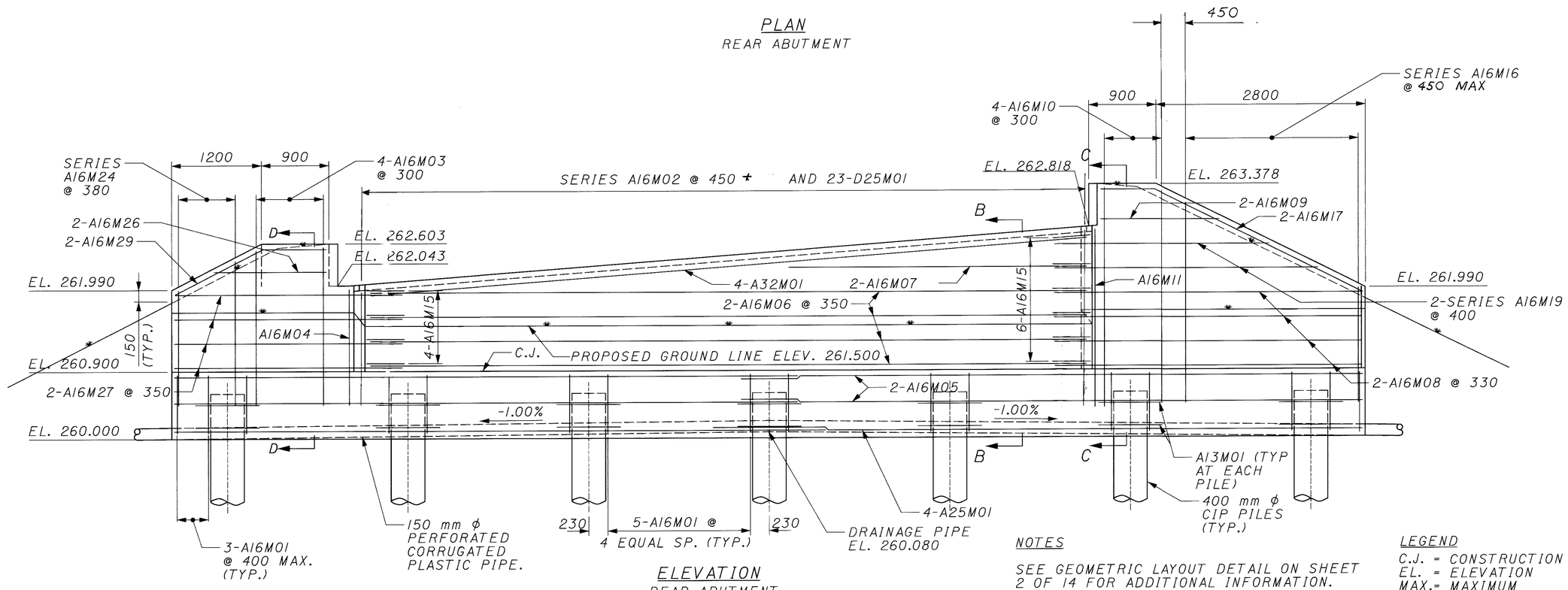
HAS-258-4.410

5 / 14

24 / 33



PLAN
REAR ABUTMENT



ELEVATION
REAR ABUTMENT

NOTES

SEE GEOMETRIC LAYOUT DETAIL ON SHEET 2 OF 14 FOR ADDITIONAL INFORMATION.

FOR DETAILS NOT SHOWN SEE STANDARD DRAWING CPA-5-94M.

FOR SUBDRAIN OUTLET PIPE EROSION CONTROL PAD AND ANIMAL GUARD SEE STANDARD DRAWING DM1.1M. PAYMENT IS INCLUDED IN ITEM 518 - 150 mm NON-PERFORATED CORRUGATED PLASTIC PIPE.

LEGEND

C.J. = CONSTRUCTION JOINT
EL. = ELEVATION
MAX.= MAXIMUM
TYP.= TYPICAL

metric units

DESIGNED JAA
DRAWN JAA
CHECKED SCT
REVIEWED RCB 02-08-00
DATE
REVISED
STRUCTURE FILE NUMBER 3402746

REAR ABUTMENT PLAN & ELEVATION
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410

6 / 14

25 / 33

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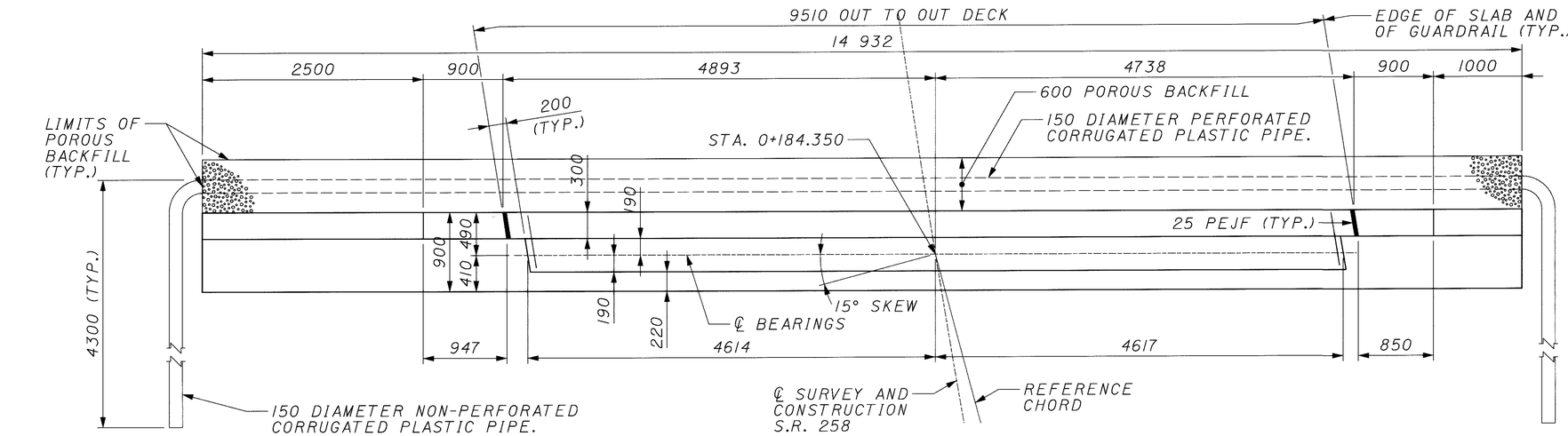
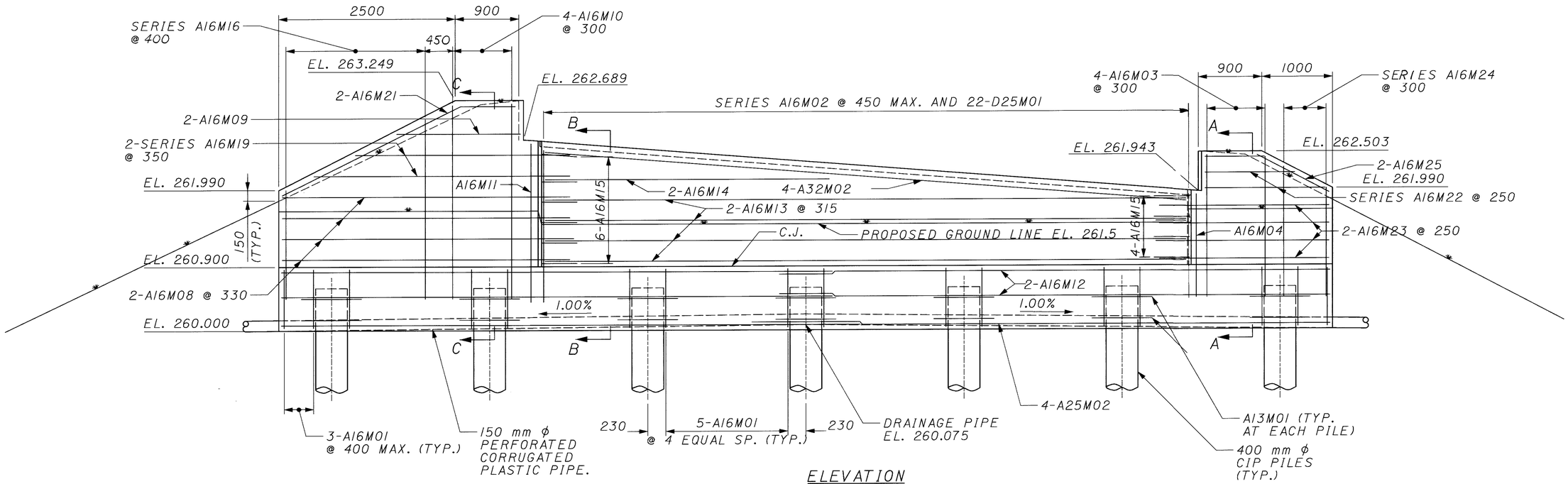


PLAN
FORWARD ABUTMENT



ELEVATION
FORWARD ABUTMENT

NOTES

SEE GEOMETRIC LAYOUT DETAIL ON SHEET 2 OF 14 FOR ADDITIONAL INFORMATION.

FOR DETAILS NOT SHOWN SEE STANDARD DRAWING CPA-5-94M.

FOR SUBDRAIN OUTLET PIPE EROSION CONTROL PAD AND ANIMAL GUARD SEE STANDARD DRAWING DM1.1M. PAYMENT IS INCLUDED IN ITEM 518 - 150 mm NON-PERFORATED CORRUGATED PLASTIC PIPE.

LEGEND

C.J. = CONSTRUCTION JOINT
EL. = ELEVATION
MAX.= MAXIMUM
TYP.= TYPICAL

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
metric units

BURGESS & NIPPLE ENGINEERS ARCHITECTS

DESIGNED	DRAWN	REVIEWED	DATE
JAA	JAA	RCB	02-08-00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
SCT		3402746	

FORWARD ABUTMENT PLAN & ELEVATION
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410

7 / 14

26 / 33

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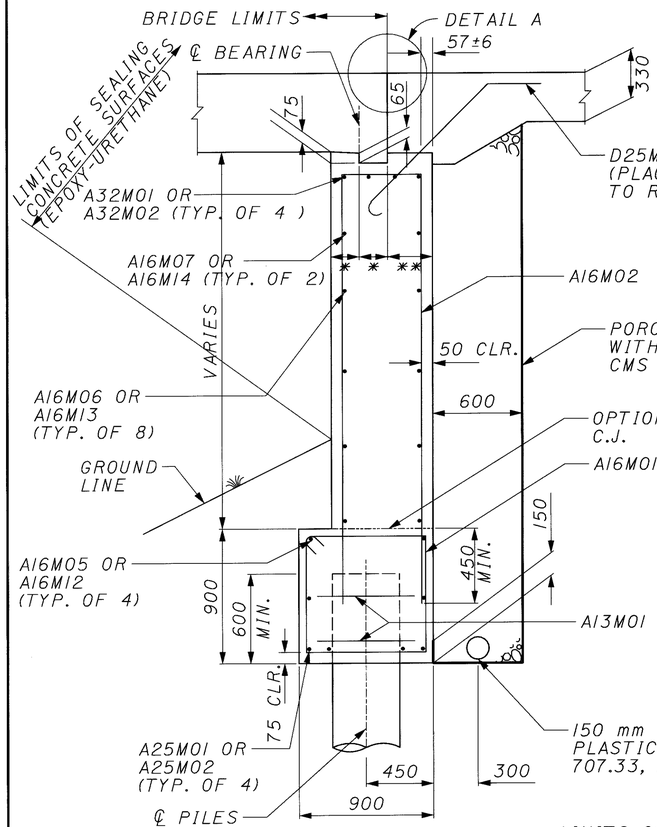
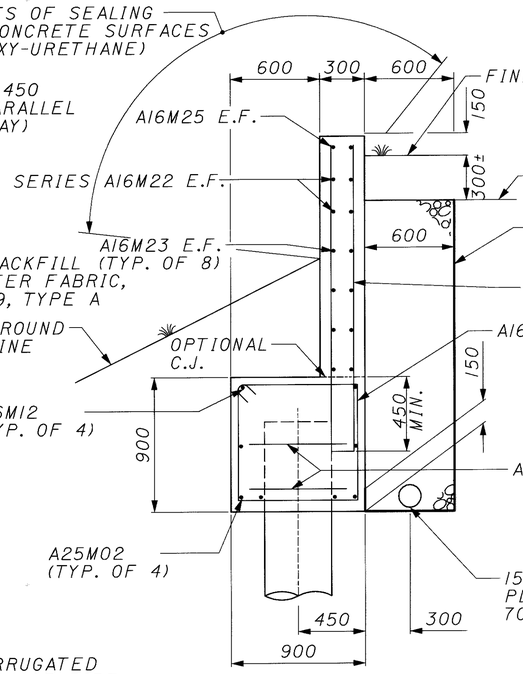
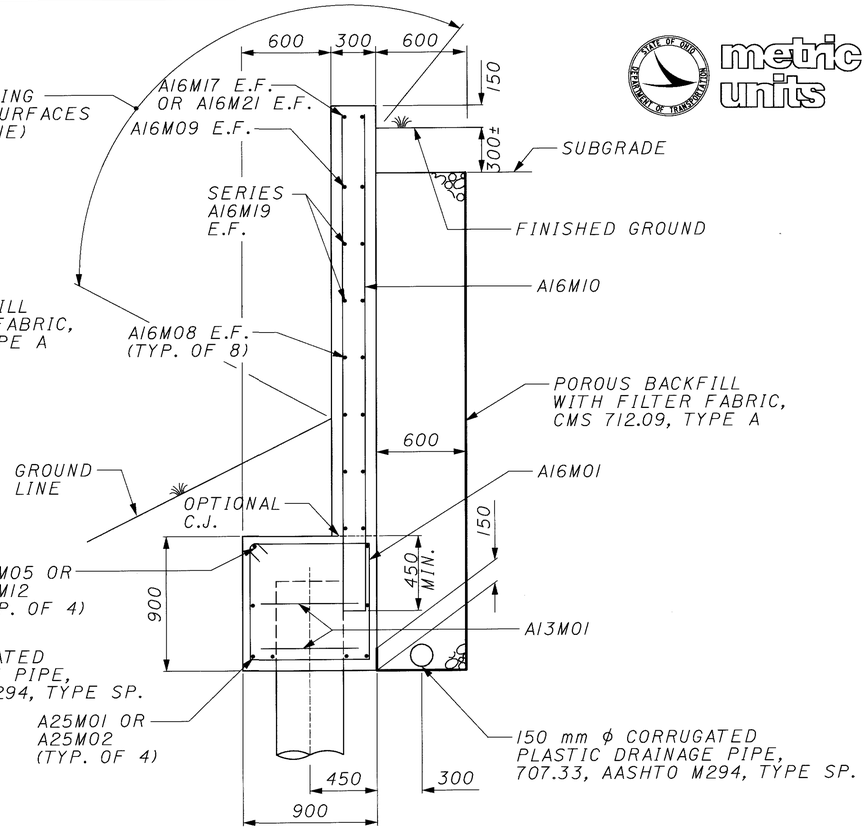


SECTION B-B

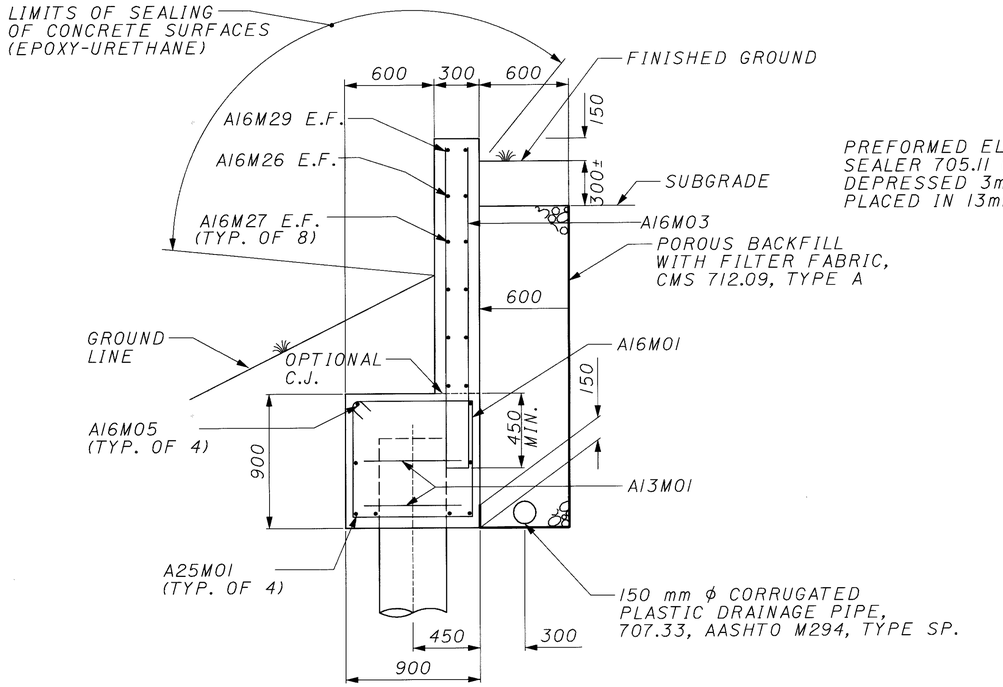
* - 190
** - 300



SECTION A-A (F.A.)

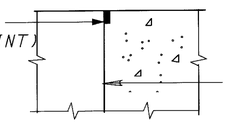


SECTION C-C



SECTION D-D (R.A.)

PREFORMED ELASTOMERIC JOINT SEALER 705.11 (32mm FOR 13mm JOINT) DEPRESSED 3mm BELOW ROADWAY, PLACED IN 13mm x 55mm GROOVE.



TYPE "A" WATERPROOFING PAYMENT TO BE INCLUDED WITH ITEM 611, REINFORCED CONCRETE APPROACH SLAB

DETAIL A

LEGEND

TYP. = TYPICAL
C.J. = CONSTRUCTION JOINT
MIN. = MINIMUM
R.A. = REAR ABUTMENT
F.A. = FORWARD ABUTMENT
E.F. = EACH FACE

NOTES

FOR ADDITIONAL ABUTMENT DETAILS SEE STANDARD DRAWING CPA-5-94M.

metric units

DESIGNED JAA
DRAWN JAA
CHECKED SCT
REVISED
REVIEWED RCB 02-08-00
STRUCTURE FILE NUMBER 3402746

ABUTMENT DETAILS
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

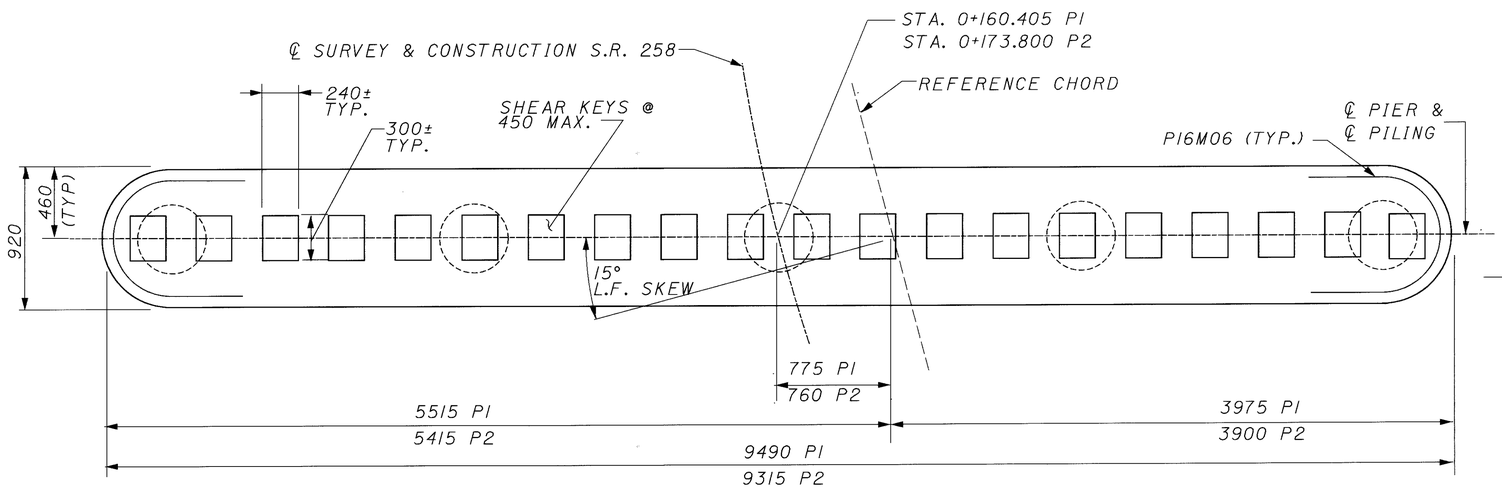
HAS-258-4.410

8 / 14

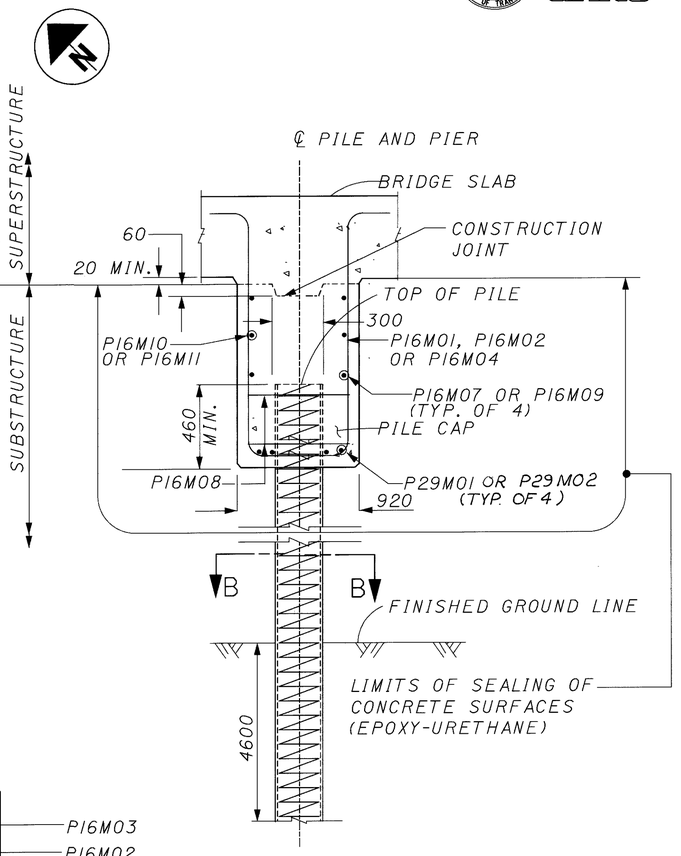
27 / 33

P:\PR22057A\CADD\SUB_DET1.DGN

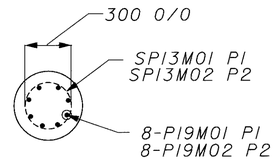
metric units



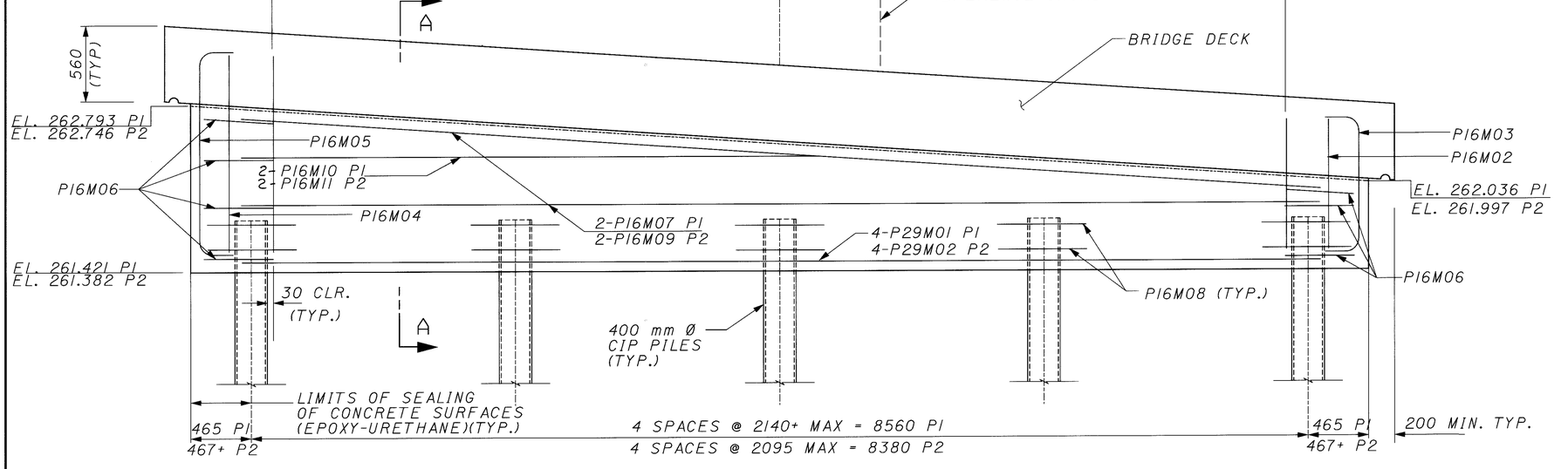
PIER PLAN



SECTION A-A



SECTION B-B



PIER ELEVATION

NOTES

FOR ADDITIONAL PIER DETAILS SEE STANDARD DRAWING CPP-2-94M.

BOTTOM OF PIER CAP SHALL BE HORIZONTAL.

SEE GENERAL LAYOUT DETAIL ON SHEET 2 OF 14 FOR ADDITIONAL DETAILS.

LEGEND

TYP = TYPICAL
F/F = FACE TO FACE
O/O = OUT TO OUT
PI = PIER 1
P2 = PIER 2
MAX. = MAXIMUM
MIN. = MINIMUN
EQ. = EQUAL
SP. = SPACES
L.F. = LEFT FORWARD

BURGESS & NIPPLE ENGINEERS ARCHITECTS

DESIGNED SCT
DRAWN SCT
CHECKED JAA
REVISED
REVIEWED RCB 02-08-00
DATE
STRUCTURE FILE NUMBER 3402746

PIER DETAILS
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

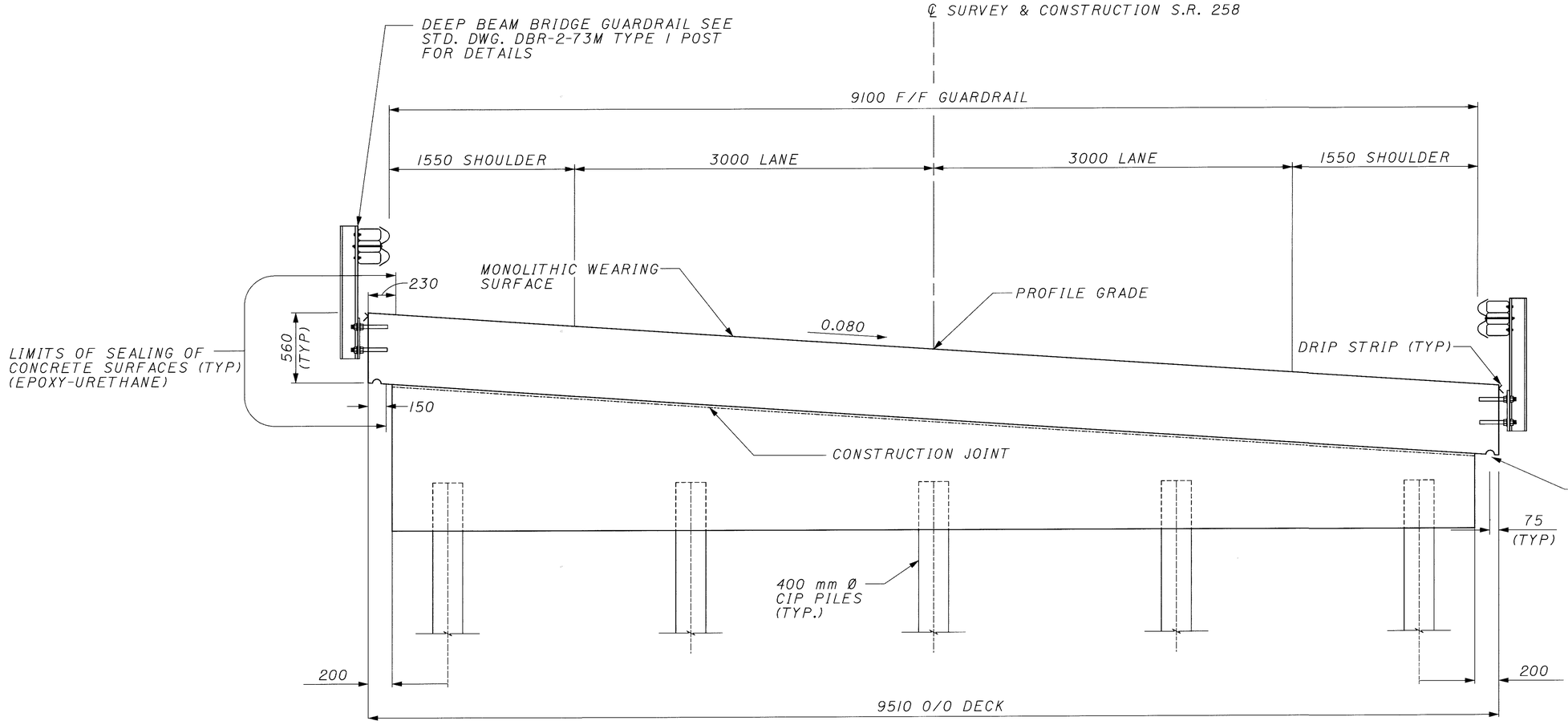
HAS-258-4.410

9 / 14

28 / 33

P:\PR22057A\CADD\PIER.DGN

metric units



TRANSVERSE SECTION

LEGEND

TYP = TYPICAL
F/F = FACE TO FACE
O/O = OUT TO OUT

FOR ADDITIONAL SUPERSTRUCTURE DETAILS SEE STANDARD DRAWING CS-1-93M AND DS-1-94M.

P:\PR22057A\CADD\BRGTYP.DGN

DESIGNED JAA	REVIEWED RCB 02-08-00
DRAWN JAA	REVISED
CHECKED SCT	STRUCTURE FILE NUMBER 3402746

BURGESS & NIPLE ENGINEERS ARCHITECTS

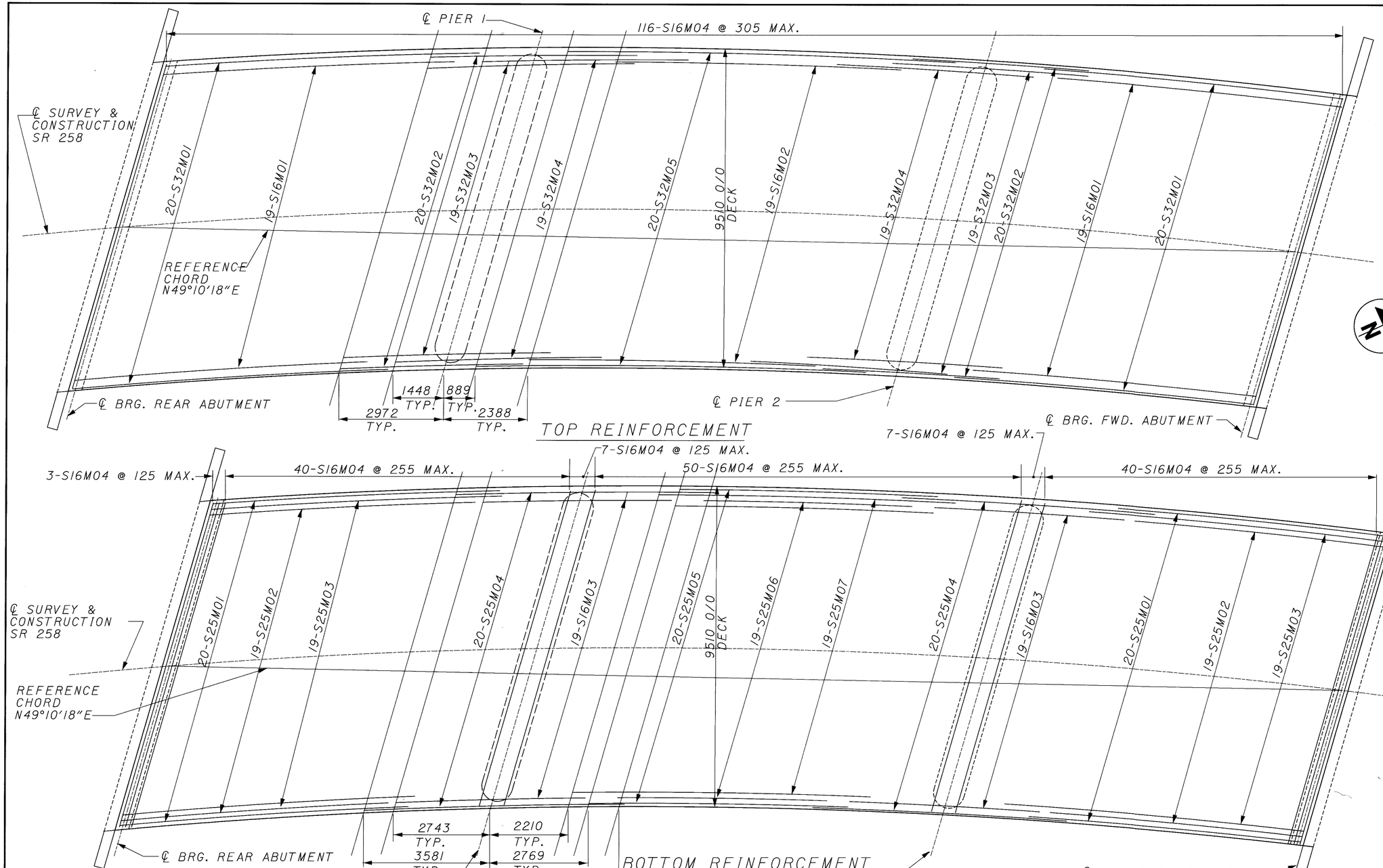
TRANSVERSE SECTION
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410

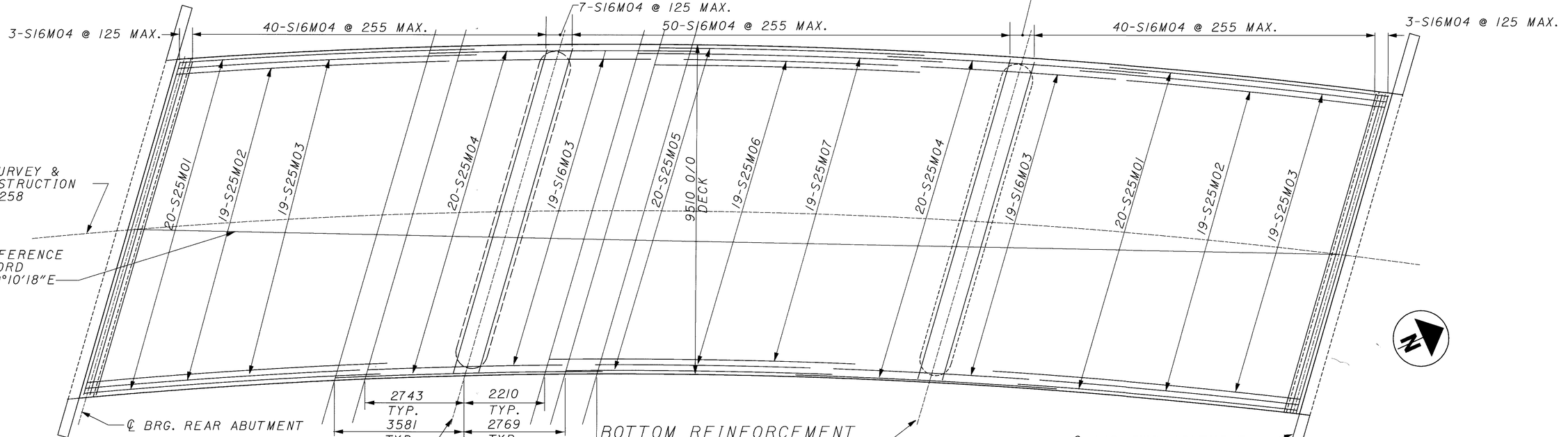
10 / 14

29 / 33

metric units



TOP REINFORCEMENT



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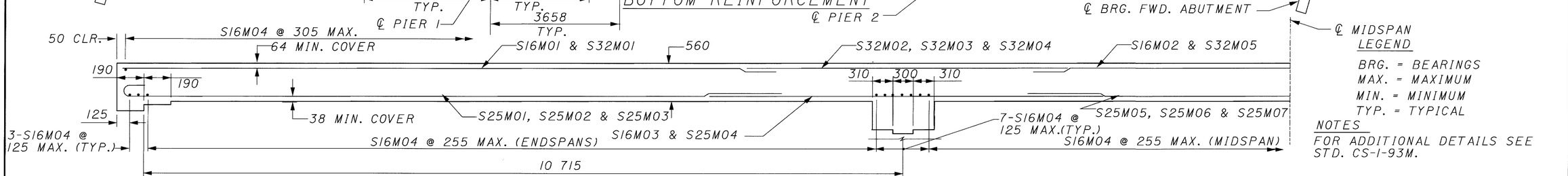


LONGITUDINAL SECTION

LEGEND

BRG. = BEARINGS
MAX. = MAXIMUM
MIN. = MINIMUM
TYP. = TYPICAL

NOTES

FOR ADDITIONAL DETAILS SEE STD. CS-1-93M.

BUNGE & NIELSEN ENGINEERS ARCHITECTS

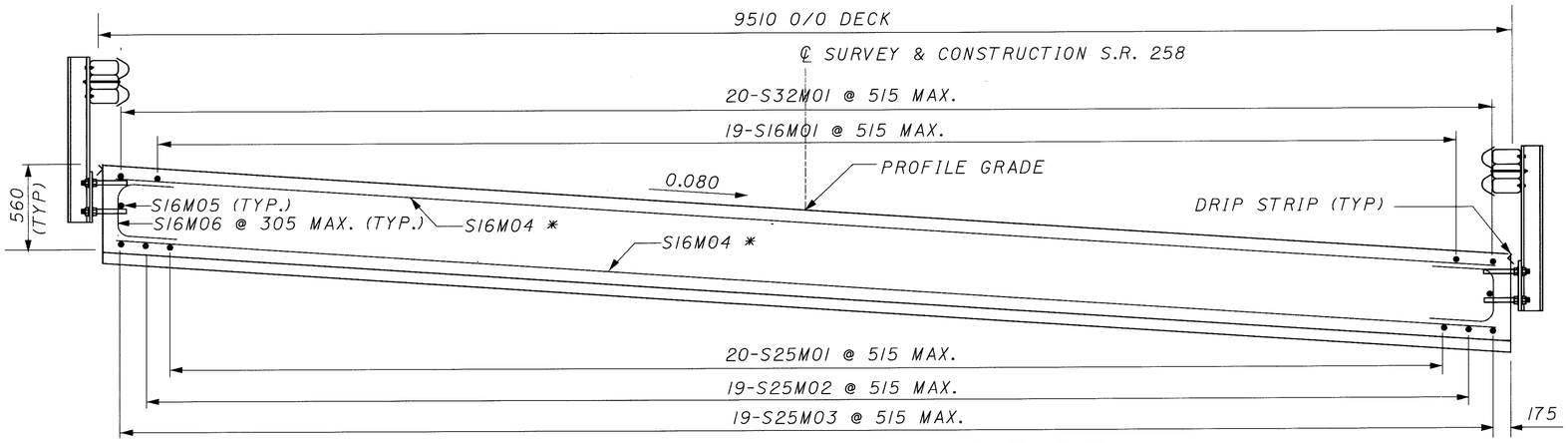
DESIGNED	DRAWN	REVIEWED	DATE
SCT	SCT	RCB	02-08-00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
CDC		3402746	

DECK PLAN
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

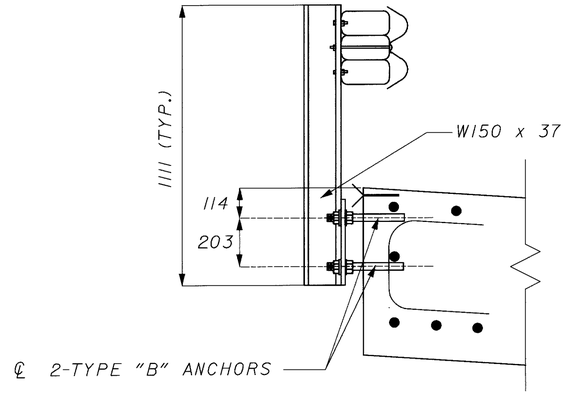
HAS-258-4.410

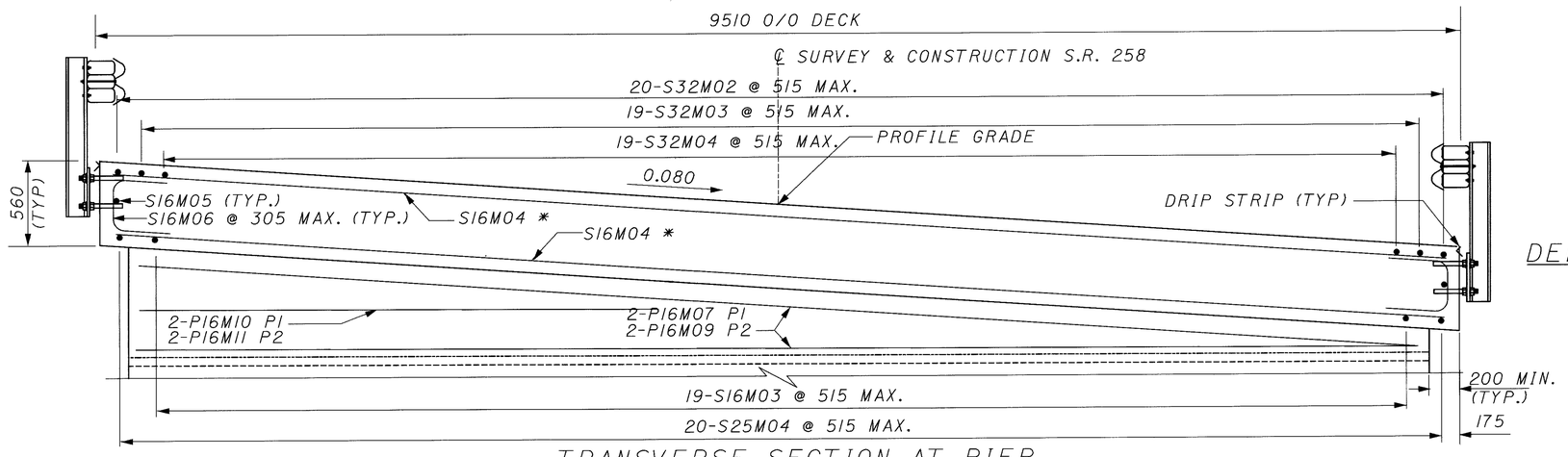
11 / 14

30 / 33



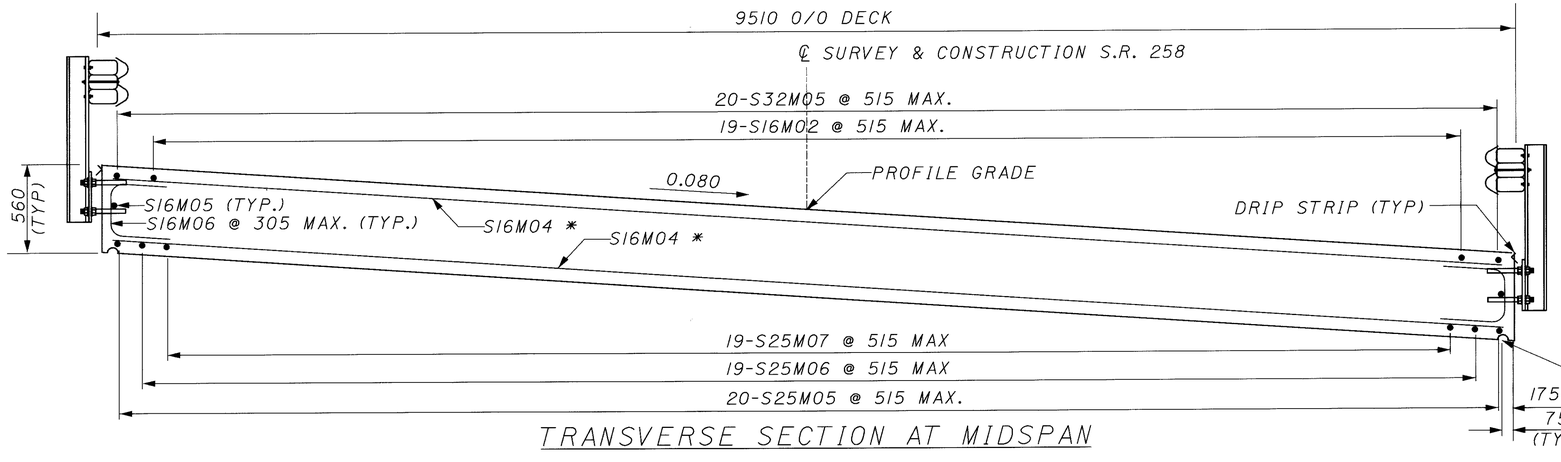
TRANSVERSE SECTION AT ABUTMENT





TRANSVERSE SECTION AT PIER

DEEP BEAM BRIDGE GUARDRAIL DETAIL



TRANSVERSE SECTION AT MIDSPAN

FOR ADDITIONAL SUPERSTRUCTURE DETAILS SEE STANDARD DRAWING CS-1-93M

* SPACE BARS AS SHOWN IN DECK PLAN

FOR ADDITIONAL BRIDGE GUARDRAIL DETAILS SEE STANDARD DRAWING DBR-2-73M

LEGEND

TYP = TYPICAL
F/F = FACE TO FACE
O/O = OUT TO OUT
MAX. = MAXIMUM

metric units

BURGESS & NIPLE ENGINEERS ARCHITECTS

DESIGNED SCT | DRAWN SCT | REVIEWED RCB 02-08-00 | DATE
CHECKED CDC | REVISED | STRUCTURE FILE NUMBER 3402746

DECK SECTIONS
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410

12 / 14

31 / 33

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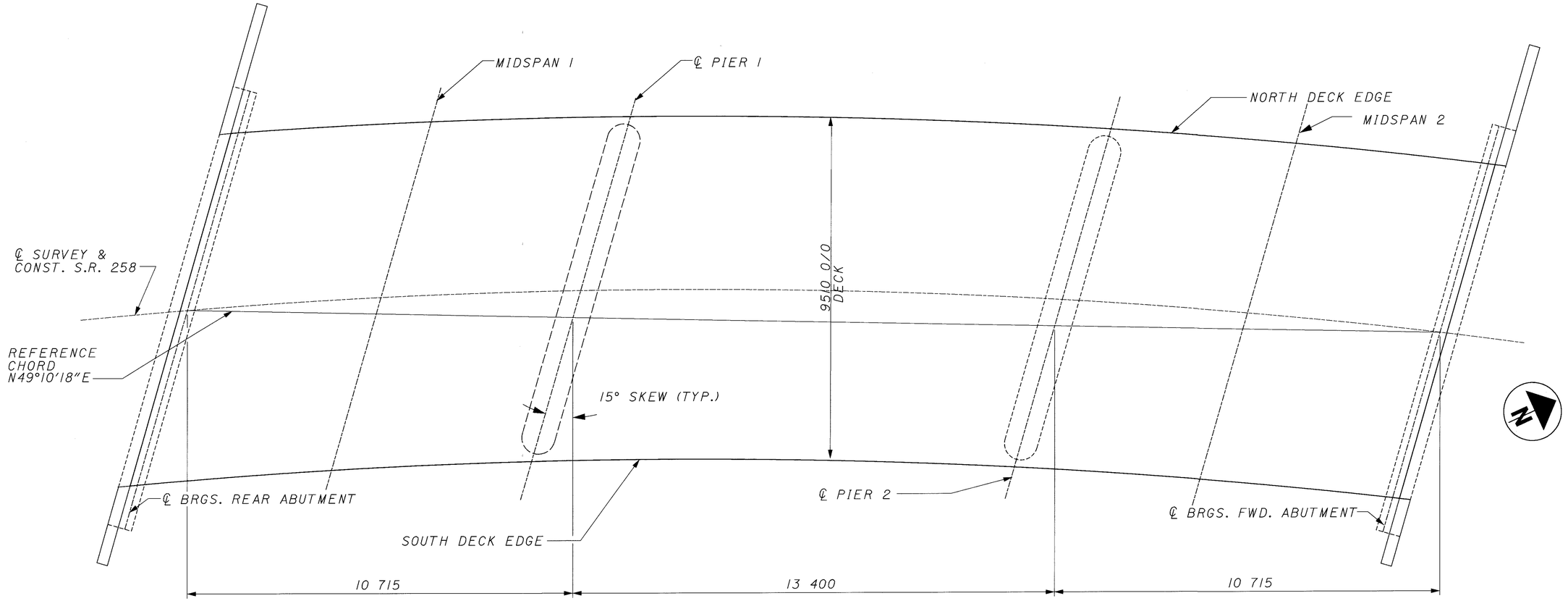


SCREED ELEVATION PLAN

SCREED ELEVATION TABLE

SCREED LINE	℄ BRG. R.A.		MID SPAN 1		℄ PIER 1		MID SPAN 2		℄ PIER 2		MID SPAN 3		℄ BRGS. F.A.	
	STATION	ELEVATION	STATION	ELEVATION	STATION	ELEVATION	STATION	ELEVATION	STATION	ELEVATION	STATION	ELEVATION	STATION	ELEVATION
NORTH DECK EDGE	0+151.258	263.371	0+156.720	263.389	0+161.869	263.373	0+168.602	263.374	0+174.874	263.326	0+180.086	263.304	0+185.126	263.249
℄ S.R. 258	0+149.462	262.987	0+154.934	263.009	0+160.405	262.995	0+167.103	263.000	0+173.800	262.952	0+179.075	262.932	0+184.350	262.876
SOUTH DECK EDGE	0+147.659	262.602	0+153.459	262.627	0+158.937	262.616	0+166.066	262.623	0+172.724	262.577	0+178.237	262.557	0+183.580	262.503

SCREED ELEVATIONS SHOWN ARE FOR THE DECK SLAB SURFACE PRIOR TO CONCRETE PLACEMENT. ALLOWANCE HAS BEEN MADE FOR ANTICIPATED CALCULATED DEAD LOAD DEFLECTIONS.

LEGEND

BRGS. = BEARINGS
CONST. = CONSTRUCTION
FWD. = FORWARD
R.A. = REAR ABUTMENT
F.A. = FORWARD ABUTMENT

BURGESS & NIPLE ENGINEERS ARCHITECTS

DESIGNED MAR | CHECKED CDC
DRAWN MAR | REVISED
REVIEWED RCB 02-08-00 | DATE
STRUCTURE FILE NUMBER 3402746

SCREED ELEVATIONS
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410

13 / 14

32 / 33

ALL BARS SHALL BE EPOXY COATED, GRADE 420

MARK	FORWARD	REAR	TOTAL NO.	LENGTH	TYPE	DIM. A	DIM. B	DIM. C	INCR.	MASS* KG.
ABUTMENTS										
A13M01	14	14	28	2800	2	600	730			78
A16M01	36	36	72	3315	2	770	770			371
A16M02	1 SER	1 SER	45	3815	3	1650	580		35	321
	0F	0F		T0		T0				
	22	23		5355		2420	580			
A16M03	4	4	8	4570	3	2250	180			72
A16M04	1	1	2	3300	3	1600	180			11
A16M05		8	8	8385	STR					104
A16M06		8	8	9600	STR					121
A16M07		2	2	4770	STR					15
A16M08	8	8	16	4340	STR					108
A16M09	2	2	4	1500	STR					10
A16M10	4	4	8	5975	3	2930	180			75
A16M11	1	1	2	4900	3	2400	180			16
A16M12	8		8	7860	STR					98
A16M13	8		8	9090	STR					114
A16M14	2		2	4515	STR					14
A16M15	10	10	20	1515	3	500	580			48
A16M16	1 SER	1 SER	2 SER	3195	3	1540	180		280	87
	0F	0F	0F	T0		T0				
	6	6	6	5995		2940				
A16M17		2	2	3665	9	700	3005			12
A16M19	2 SER	2 SER	4 SER	2930	STR				635	40
	0F	0F	0F	T0						
	2	2	2	3565						
A16M21	2		2	3340	9	700	2680			11
A16M22	2 SER		2 SER	1200	STR				500	9
	0F		0F	T0						
	2		2	1700						
A16M23	8		8	2550	STR					32
A16M24	1 SER	1 SER	2 SER	3195	3	1540	180		190	34
	0F	0F	0F	T0		T0				
	3	3	3	3955		1920				
A16M25	2		2	1770	9	700	1070			5
A16M26		2	2	1900	STR					6
A16M27		8	8	3000	STR					38
A16M29		2	2	1990	9	700	1290			6
A25M01		8	8	8750	STR					279
A25M02	8		8	8225	STR					262
A32M01		4	4	9580	STR					249
A32M02	4		4	9070	STR					236
D25M01	SEE APPROACH SLAB SHEETS, 18 AND 19 OF 33									
TOTAL FOR ABUTMENTS										2882

THE BAR SIZE NUMBER IS SPECIFIED IN THE BAR MARK COLUMN. THE FIRST TWO DIGITS INDICATE THE BAR SIZE NUMBER. FOR EXAMPLE, AN A16M01 IS A #16M BAR. BAR DIMENSIONS SHOWN ARE OUT TO OUT UNLESS OTHERWISE INDICATED.

* MASS OF REINFORCING STEEL IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY.

ALL BARS SHALL BE EPOXY COATED, GRADE 420

MARK	FORWARD	REAR	TOTAL NO.	LENGTH	TYPE	DIM. A	DIM. B	DIM. C	INCR.	MASS* KG.
PIERS	PIER 2	PIER 1								PIERS
P16M01	1 SER	1 SER	2 SER	3160	4	1000	810	255	38	244
	0F	0F	0F	T0		T0				
	20	20	20	4600		1720	810	255		
P16M02	1	1	2	3090	4	990	760	255		8
P16M03	1	1	2	1420	5	990	255			5
P16M04	1	1	2	4560	4	1725	760	255		15
P16M05	1	1	2	2155	5	1725	255			7
P16M06	7	7	14	3130	6	970	750			69
P16M07		4	4	8500	STR					54
P16M08	10	10	20	2915	2	770	610			92
P16M09	4		4	8230	STR					52
P16M10		2	2	4250	STR					14
P16M11	2		2	4115	STR					13
P19M01		40	40	6720	STR					601
P19M02	40		40	8270	STR					740
P29M01		4	4	8700	STR					176
P29M02	4		4	8420	STR					170
SP13M01		5	5	6720	8	300	300			34
SP13M02	5		5	8270	8	300	300			42
TOTAL FOR PIERS										2336

ALL BARS SHALL BE EPOXY COATED, GRADE 420

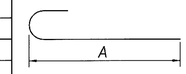
MARK	TOP	BOTTOM	TOTAL NO.	LENGTH	TYPE	DIM. A	MASS* KG.
SUPERSTRUCTURE							
S16M01	38		38	8710	STR		514
S16M02	19		19	8940	STR		264
S16M03		38	38	5485	STR		324
S16M04	116	150	266	9480	STR		3914
S16M05	6		6	12 190	STR		114
S16M06	232		232	1960	7		706
S25M01		40	40	7900	1	7545	1256
S25M02		38	38	8915	STR		1346
S25M03		38	38	8435	STR		1274
S25M04		40	40	7240	STR		1151
S25M05		20	20	8180	STR		650
S25M06		19	19	7850	STR		593
S25M07		19	19	7850	STR		593
S32M01	40		40	10 200	STR		2613
S32M02	40		40	5945	STR		1523
S32M03	38		38	6655	STR		1620
S32M04	38		38	6655	STR		1620
S32M05	20		20	11 940	STR		1530
TOTAL FOR SUPERSTRUCTURE							21 605

SPIRAL BAR CAGE

CONCRETE SPACERS OR OTHER APPROVED NONCORROSIVE SPACING DEVICES SHALL BE USED AT SUFFICIENT INTERVALS (NEAR THE BOTTOM AND AT INTERVALS NOT EXCEEDING 3050 mm) TO INSURE CONCENTRIC SPACING FOR THE ENTIRE CAGE LENGTH. SPACERS SHALL BE CONSTRUCTED OF APPROVED MATERIAL EQUAL IN QUALITY AND DURABILITY TO THE CONCRETE SPECIFIED FOR THE SHAFT. THE SPACERS SHALL HAVE ADEQUATE DIMENSIONS TO INSURE A MINIMUM 75 mm CLEAR SPACE BETWEEN THE OUTSIDE OF THE REINFORCING CAGE AND THE DESIGN DIMENSION OF THE CAST-IN-PLACE PILE.

ALL BARS SHALL BE EPOXY COATED.

metric units



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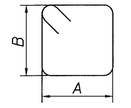

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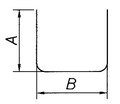

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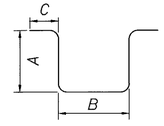

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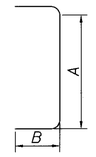

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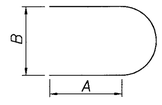

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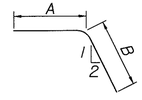

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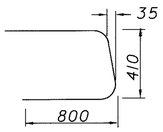

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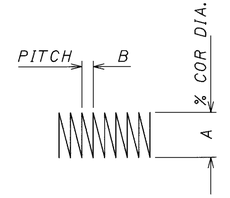


TYPE 8

LEGEND:

DIM. = DIMENSION
INCR. = INCREMENT
NO. = NUMBER
STR = STRAIGHT BAR

BUREAU OF BRIDGES & STRUCTURES ENGINEERS ARCHITECTS

REVIEWED RCB 02-08-00 DATE
STRUCTURE FILE NUMBER 3402746
DRAWN JAA REVISED
DESIGNED DCF CHECKED SCT

REINFORCING SCHEDULE
BRIDGE NO. HAS-258-4410
S.R. 258 OVER LAUREL CREEK

HAS-258-4.410

14 / 14

33 / 33

P:\PR22057A\CADD\REBAR.DGN

SPECIAL PROVISIONS

WATERWAY PERMITS
FOR

CRS: HAS-258-4.410 PID 13044

U.S. ARMY CORPS OF ENGINEERS
PERMIT NUMBER: NWP #3 & 14

OHIO EPA
PERMIT NUMBER: NA

DATE: 2/8/99

NATIONWIDE PERMIT

3. Maintenance. The repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area including those due to changes in materials, construction techniques, or current construction codes or safety standards which are necessary to make repair, rehabilitation, or replacement, are permitted provided the environmental effects resulting from such repair, rehabilitation, or replacement are minimal. Currently serviceable means useable as is or with some maintenance but not so degraded as to essentially require reconstruction. This NWP authorizes the repair, rehabilitation, or replacement of those structures destroyed by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced or under contract to commence within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the District Engineer, provided the permittee can demonstrate funding, contract, or other similar delays. Maintenance dredging and beach restoration are not authorized by this NWP. (Sections 10 and 404)

For activities involving a discharge, the Ohio State Certification General Conditions apply to this nationwide permit.

NATIONWIDE PERMIT

14. Road Crossings. Fills for roads crossing waters of the United States (including wetlands and other special aquatic sites) provided the activity meets all of the following criteria:

a. The width of the fill is limited to the minimum necessary for the actual crossing;

b. The fill placed in waters of the United States is limited to a filled area of no more than 1/3 acre. Furthermore, no more than a total of 200 linear feet of the fill for the roadway can occur in special aquatic sites, including wetlands;

c. The crossing is culverted, bridged or otherwise designed to prevent the restriction of, and to withstand, expected high flows and tidal flows, and to prevent the restriction of low flows and the movement of aquatic organisms;

d. The crossing, including all attendant features, both temporary and permanent, is part of a single and complete project for crossing of a water of the United States; and,

e. For fills in special aquatic sites, including wetlands, the permittee notifies the District Engineer in accordance with the "Notification" general condition. The notification must also include a delineation of affected special aquatic sites, including wetlands.

This NWP may not be combined with NWP 18 or NWP 26 for the purpose of increasing the footprint of the road crossing. Some road fills may be eligible for an exemption from the need for a Section 404 permit altogether (see 33 CFR 323.4). Also, where local circumstances indicate the need, District Engineers will define the term "expected high flows" for the purpose of establishing applicability of this NWP. (Sections 10 and 404)

The Ohio State Certification General Conditions apply to this nationwide permit.

OHIO STATE CERTIFICATION GENERAL CONDITIONS FOR NATIONWIDE PERMITS.

The following general conditions apply to Nationwide Permits 3, 4, 5, 6, 7, 12, 13, 14, 15, 16, 18, 19, 20, 22, 23, 25, 26, 27, 29, 30, 31, 32, 33, 34, 36, 37, 38, and 40.

Steps shall be taken, upon completion of the projects, to ensure bank stability. This may include, but is not limited to, the placement of riprap or bank seeding.

Any damages to the immediate environment of the project by equipment needed for construction or hauling will be repaired immediately.

Care must be employed throughout the course of this project to avoid the creation of unnecessary turbidity which may degrade water quality or adversely affect aquatic life outside the project areas.

For Nationwide Permits 14, 21, 26 (1-3 acres), 29, 33, 37, and 38, that require Agency coordination, in accordance with the Nationwide Permit General Condition entitled "Notification", Number 13(e)(i), the Corps shall submit a pre-construction notification to Ohio EPA for review and comment.

NATIONWIDE PERMIT CONDITIONS

GENERAL CONDITIONS:

The following general conditions must be followed in order for any authorization by a NWP to be valid:

1. Navigation. No activity may cause more than a minimal adverse effect on navigation.

2. Proper maintenance. Any structure or fill authorized shall be properly maintained, including maintenance to ensure public safety.

3. Erosion and siltation controls. Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date.

4. Aquatic life movements. No activity may substantially disrupt the movement of those species of aquatic life indigenous to the waterbody, including those species which normally migrate through the area, unless the activity @ s primary purpose is to impound water.

5. Equipment. Heavy equipment working in wetlands must be placed on mats, or other measures must be taken to minimize soil disturbance.

6. Regional and case-by-case conditions. The activity must comply with any regional conditions which may have been added by the Division Engineer (see 33 CFR 330.4(e) and with any case specific conditions added by the Corps or by the State or tribe in its section 401 water quality certification.

7. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System; or in a river officially designated by Congress as a "study river" for possible inclusion in the system, while the river is in an official study status, unless the appropriate Federal agency, with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely effect the Wild and Scenic River designation, or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service.)

8. Tribal rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

9. Water quality certification. In certain states, an individual Section 401 water quality certification must be obtained or waived (see 33 CFR 330.4(c).

10. Coastal zone management. In certain states, an individual State coastal zone management consistency concurrence must be obtained or waived (see Section 330.4(d)

11. Endangered Species.

(a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act, or which is likely to destroy or adversely modify the critical habitat of such species. Non-federal permittees shall notify the District Engineer if any listed species or critical habitat might be affected or is in the vicinity of the project, and shall not begin work on the activity until notified by the District Engineer that the requirements of the Endangered Species Act have been satisfied and that the activity is authorized.

(b) Authorization of an activity by a nationwide permit does not authorize the "take" of a threatened or endangered species as defined under the Federal Endangered Species Act. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, both lethal and non-lethal "takes" of protected species are in violation of the Endangered Species Act. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. Fish and Wildlife Service and National Marine Fisheries Service or their world wide web pages at http://www.fws.gov/~r9endspp/endspp.html and http://kingfish.spp.mnfs.gov/tmcintyr/prot_res.html#ES and Recovery, respectively.

12. Historic properties. No activity which may affect historic properties listed, or eligible for listing, in the National Register of Historic Places is authorized, until the DE has complied with the provisions of 33 CFR Part 325, Appendix C. The prospective permittee must notify the District Engineer if the authorized activity may affect any historic properties listed, determined to be eligible, or which the prospective permittee has reason to believe may be eligible for listing on the National Register of Historic Places, and shall not begin the activity until notified by the District Engineer that the requirements of the National Historic Preservation Act have been satisfied and that the activity is authorized. Information on the location and existence of historic resources can be obtained from the State Historic Preservation Office and the National Register of Historic Places (see 33 CFR 330.4(g).

13. Notification.

(a) Timing: Where required by the terms of the NWP, the prospective permittee must notify the District Engineer with a Pre-Construction Notification (PCN) as early as possible and shall not begin the activity: (1) Until notified by the District Engineer that the activity may proceed under the NWP with any special conditions imposed by the District or Division

Engineer; or (2) If notified by the District or Division Engineer that an individual permit is required; or (3) Unless 30 days (or 45 days for NWP 26 only) have passed from the District Engineer's receipt of the notification and the prospective permittee has not received notice from the District or Division Engineer Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Notification: The notification must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;

(3) Brief description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s) or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity; and

(4) For NWPs S 18, 21, 26, 29, 34, and 38, the PCN must also include a delineation of affected special aquatic sites, including wetlands (see paragraph 13(f);

(5) For NWP 21 - Surface Coal Mining Activities, the PCN must include an OSM or State approved mitigation plan.

(6) For NWP 29-Single-Family Housing, the PCN must also include:

(i) Any past use of this NWP by the individual permittee and/or the permittee's spouse;

(ii) A statement that the single-family housing activity is for a personal residence of the permittee;

(iii) A description cf the entire parcel, including its size, and a delineation of wetlands. For the purpose of this NWP, parcels of land measuring 0.5 acre or less will not require a formal on-site delineation. However, the applicant shall provide an indication of where the wetlands are and the amount of wetlands that exists on the property. For parcels greater than 0.5 acre in size, a formal wetland delineation must be prepared in accordance with the current method required by the Corps. (See paragraph 13(f);

(iv) A written description of all land (including, if available, legal descriptions) owned by the prospective permittee and/or the prospective permittee t s spouse, within a one mile radius of the parcel, in any form of ownership (including any land owned as a partner, corporation, joint tenant, co-tenant, or as a tenant-by-the-entirety) and any land on which a purchase and sale agreement or other contract for sale or purchase has been executed;

(7) For NWP 31 Maintenance of Existing Flood Control Projects, the prospective permittee must either notify the District Engineer with a Pre-Construction Notification (PCN) prior to each maintenance activity or submit a five year (or less) maintenance plan. In addition, the PCN must include all of the following:

(I) Sufficient baseline information so as to identify the approved channel depths and configurations and existing facilities. Minor deviations are authorized, provided that the approved flood control protection or drainage is not increased;

(ii) A delineation of any affected special aquatic sites, including wetlands; and,

(iii) Location of the dredged material disposal site.

(8) For NWP 33-Temporary Construction, Access, and Deterring, the PCN must also include a restoration plan of reasonable measures to avoid and minimize adverse effects to aquatic sources.

(c) Form of Notification: The standard individual permit application form (Form ENG 4345) may be used as the notification but must clearly indicate that it is a PCN and must include all of the information required in (b) (1)-(7) of General Condition 13. A letter may also be used.

(d) District Engineer's Decision: In reviewing the pre-construction notification for the proposed activity, the District Engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative-adverse environmental effects or may be contrary to the public interest. The prospective permittee may, optionally, submit a proposed mitigation plan with the pre-construction notification to expedite the process and the District Engineer will consider any optional mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed work are minimal. If the District Engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects are minimal, the District Engineer will notify the permittee and include any conditions the DE deems necessary.

Any mitigation proposal must be approved by the District Engineer prior to commencing work. If the prospective permittee elects to submit a mitigation plan, the District Engineer will expeditiously review the proposed mitigation plan, but will not commence a second 30-day (or 45-day for NWP 26) notification procedure. If the net adverse effects of the project (with the mitigation proposal) are determined by the District Engineer to be minimal, the District Engineer will provide a timely written response to the applicant stating that the project can proceed under the terms and conditions of the nationwide permit

If the District Engineer determines that the adverse effects of the proposed work are more than minimal, then he will notify the applicant either: (1) that the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (2) that the project is authorized under the NWP subject to the applicant's submitting a mitigation proposal that would reduce the adverse effects to the minimal level; or (3) that the project is authorized under the NWP with specific modifications or conditions.

(e) Agency Coordination: The District Engineer will consider any comments from Federal and State agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(i) For NWP 14, 21, 26 (between l and 3 acres of impact), 29, 33, 37, and 38. The District Engineer will, upon receipt of a notification, provide immediately, e.g., facsimile transmission, overnight mail or other expeditious manner, a copy to the appropriate offices of the Fish and Wildlife Service, State natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO), and, if appropriate, the National Marine Fisheries Service. With the exception of NWP 37, these agencies will then have S calendar days from the date the material is transmitted to telephone or fax the District Engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the District Engineer will wait an additional 10 calendar days (16 calendar days for NWP 26 PCNs) before making a decision on ,the notification. The District Engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency. The District Engineer will indicate in the administrative record associated with each notification that the resource agencies' concerns were considered. Applicants are encouraged to provide the Corps multiple copies of notifications to expedite agency notification.
(ii) Optional Agency Coordination For NWPs 5, 7, 12, 13, 17, 18, 27, 31, and 34, where a Regional Administrator of EPA, a Regional Director of USFWS, or Regional Director of NMFS has formally requested general notification from the District Engineer for the activities covered by any of these NWPs, the Corps will provide the requesting agency with notification on the particular NWPs. However, where the agencies have a record of not generally submitting substantive comments on activities covered by any of these NWPs, the Corps district may discontinue providing notification to those regional agency offices The District Engineer will coordinate with the resources agencies to identify which activities involving a PCN that the agencies will provide substantive comments to the Corps The District Engineer may also request comments from the agencies on a case by case basis when the District Engineer determines that such comments would assist the Corps in reaching a decision whether effects are more than minimal either individually or cumulatively.
(iii) Optional Agency Coordination, 401 Denial. For NWP 26 only, where the State has denied its 401 water quality certification for activities with less than I acre of wetland impact, the EPA regional administrator may request agency coordination of PCNs between 1/3 and I acre. The request may only include acreage limitations within the 1/3 to 1 acre range for which the state has denied water quality certification. In cases where the EPA has requested coordination of projects as described here, the Corps will forward the PCN to EPA only. The PCN will then be forwarded to the Fish and Wildlife Service and the National Marine Fisheries Service by EPA under agreements among those agencies. Any agency receiving the PCN will be bound by the time frames for providing comments to the Corps.

(f) Wetlands Delineations: Wetland delineations must be prepared in accordance with the current method required by the Corps. For NWP 29 see paragraph (b)(6)(iii) for parcels less than 0.5 acres in size. The permittee may ask the Corps to delineate the special aquatic site. There may be some delay if the Corps does the delineation. Furthermore, the 30-day period (45 days for NWP 26) will not start until the wetland delineation has been completed and submitted to the Corps, where appropriate.

(g) Mitigation: Factors that the District Engineer will consider when determining the acceptability of appropriate and practicable mitigation include, but are not limited to:
(I) To be practicable, the mitigation must be available and capable of being done considering costs, existing technology, and logistics in light of the overall project purposes;
(ii) To the extent appropriate, permittees should consider mitigation banking and other forms of mitigation including contributions to wetland trust funds, "in lieu fees~ to organizations such as The Nature Conservancy, state or county natural resource management agencies, where such fees contribute to the restoration, creation, replacement, enhancement, or preservation of wetlands. Furthermore, examples of mitigation that may be appropriate and practicable include but are not limited to: reducing the size of the project; establishing wetland or upland buffer zones to protect aquatic resource values; and replacing the loss of aquatic resource values by creating, restoring, and enhancing similar functions and values. In addition, mitigation must address wetland impacts, such as functions and values, and cannot be simply used to offset the acreage of wetland losses that would occur in order to meet the acreage limits of some of the NWPs (e.g., for NWP 26, 5 acres of wetlands cannot be created to change a 6-acre loss of wetlands to a I acre loss; however, 2 created acres can be used to reduce the impacts of a 3-acre loss.).

14. Compliance certification. Every permittee who has received a Nationwide permit verification from the Corps will submit a signed certification regarding the completed work and any required mitigation. The certification will be forwarded by the Corps with the authorization letter and will include:

a. A statement that the authorized work was done in accordance with the Corps authorization, including any general or specific conditions;
b. A statement that any required mitigation was completed in accordance with the permit conditions;
c. The signature of the permittee certifying the completion of the work and mitigation .

15. Multiple use of Nationwide permits. In any case where any NWP number 12 through 40 is combined with any other NWP number 12 through 40, as part of a single and complete project, the permittee must notify the District Engineer in accordance with paragraphs a, b, and c on the "Notification General Condition number 13. Any NWP number 1 through 11 may be combined with any other NWP without notification to the Corps, unless notification is otherwise required by the terms of the NWPs. As provided at 33 CFR 330.6(c) two or more different NWPs can be combined to authorize a single and complete project. However, the same NWP cannot be used more than once for a single and complete project.

SECTION 404 ONLY CONDITIONS:

In addition to the General Conditions, the following conditions apply only to activities that involve the discharge of dredged or fill material into waters of the U.S., and must be followed in order for authorization by the NWPs to be valid:

1. Water supply intakes. No discharge of dredged or fill material may occur in the proximity of a public water supply intake except where the discharge is for repair of the public water supply intake structures or adjacent bank stabilization.

2. Shellfish production. No discharge of dredged or fill material may occur in areas of concentrated shellfish production, unless the discharge is directly related to a shellfish harvesting activity authorized by NWP 4.

3. Suitable material. No discharge of dredged or fill material may consist of unsuitable material (e.g. trash, debris, car bodies, asphalt, etc.) and material discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

4. Mitigation. Discharges of dredged or fill material into waters of the United States must be minimized or avoided to the maximum extent practicable at the project site (i.e. on-site), unless the District Engineer approves a compensation plan that the District Engineer determines is more beneficial to the environment than on-site minimization or avoidance measures.

5. Spawning areas. Discharges in spawning areas during spawning seasons must be avoided to the maximum extent practicable.

6. Obstruction of high flows. To the maximum extent practicable, discharges must not permanently restrict or impede the passage of normal or expected high flows or cause the relocation of the water (unless the primary purpose of the fill is to impound waters).

7. Adverse effects from impoundments. If the discharge creates an impoundment of water, adverse effects on the aquatic system caused by the accelerated passage of water and/or the restriction of its flow shall be minimized to the maximum extent practicable.

8. Waterfowl breeding areas. Discharges into breeding areas for migratory waterfowl must be avoided to the maximum extent practicable.

9. Removal of temporary Fills. Any temporary fills must be removed in their entirety and the affected areas returned to their preexisting elevation.

GEOLOGY OF THE SITE

THE PROJECT SITE LIES ON THE HIGHLY DISSECTED ALLEGHENY PLATEAU, AT AN APPROXIMATE ELEVATION 262 METERS. THE AREA WAS FAR OUT IN THE UNGLACIATED PART OF OHIO. TOP OF BEDROCK IN THE VICINITY OF THIS SITE ANTICIPATED TO BE AT AN APPROXIMATE ELEVATION OF 220.0 METERS OR DEEPER. AT THIS ELEVATION, BEDROCK IS EXPECTED TO CONSISTS OF MIDDLE KITTANNING COAL AND UNDERLYING SANDSTONES ARE THE LOWER FREEPORT AND CLARION.

EXPLORATION

THE SUBSURFACE PROGRAM FOR THIS PROJECT INCLUDED ADVANCING A TOTAL OF THREE (3) STRUCTURAL DRIVE SAMPLE EXPLORATORY BORINGS BY A TRUCK MOUNTED AND A ALL TERRAIN DRILLING RIGS, USING CONVENTIONAL 3.25 I.D. HOLLOW-STEM AUGERS, PERFORMED ON OCTOBER, 1998.

INVESTIGATIONAL FINDINGS

TEST BORING S-1 WAS ADVANCED BEHIND THE SOUTH ABUTMENT AND TEST BORING S-3 WAS ADVANCED BEHIND THE NORTH ABUTMENT OF THE EXISTING BRIDGE. BOTH WERE ADVANCED THROUGH THE ASPHALT PAVEMENT WITHIN THE ROADWAY AREA. THE THICKNESS OF THE ASPHALT PAVEMENT AT THE BORING LOCATIONS S-1 AND S-3 WERE FOUND TO BE 200 MM, 250 MM RESPECTIVELY. TEST BORING S-2 WAS ADVANCED THROUGH MAN MADE BERM TO THE WEST OF THE NORTH PIER.

THE SUBSURFACE SOILS ENCOUNTERED IN TEST BORINGS S-1 AND S-3 CONSISTED OF SILT AND CLAY (A-6A), SANDY SILT (A-4A), CINDER FRAGMENTS WITH SAND, SILT, AND CLAY (A-2-6), AND SILT (A-4B) ABOVE ELEVATION 258.33 AND 258.22 RESPECTIVELY. IT APPEARED THAT THESE SOILS ARE PART OF EMBANKMENT FILL FOR THE ROADWAY. BETWEEN ELEVATION 258.33 AND 255.79 (M), GRAVEL AND STONE FRAGMENTS WITH SAND (A-1-B), SANDY SILT (A-4A), COARSE AND FINE SAND (A-3A) SOILS, AND TRACE WOODS WERE ENCOUNTERED. THESE SOILS APPEARED TO BE PART OF THE OLD CREEK BOTTOM DEPOSITS. ALTERNATE LAYERS OF SILT (A-4B) AND SILT AND CLAY (A-6A) WERE ENCOUNTERED BELOW ELEVATIONS 256.44, 256.13, AND 255.79 (M) IN TEST BORINGS S-1, S-2, AND S-3 RESPECTIVELY.

THE CONSISTENCY OF THE COHESIVE SOILS WAS FOUND TO RANGE FROM "SOFT" TO "HARD", BUT WAS PREDOMINANTLY "STIFF TO VERY STIFF." THE RELATIVE DENSITY OF THE COHESIONLESS SOILS WAS FOUND TO RANGE FROM "VERY LOOSE" TO "MEDIUM DENSE", BUT WAS PREDOMINANTLY "LOOSE."

BEDROCK WAS NOT ENCOUNTERED AT THE TEST BORING LOCATIONS WITHIN THE EXPLORED DEPTHS.

LEGEND

- ⊕ AUGER BORING LOCATION-PLAN VIEW.
- ⊕ PRESS AND/OR DRIVE SAMPLE AND/OR CORE BORING LOCATION-PLAN VIEW.
- TR TOP OF ROCK
- W—— INDICATES FREE WATER ELEVATION
- ▼—— INDICATES STATIC WATER ELEVATION
- ⊢⊣ HORIZONTAL BAR ON BORING LOG INDICATES THE DEPTH THE SAMPLE WAS TAKEN – PROFILE VIEW
- X/Y/Z FIGURES BESIDE THE BORING LOG IN PROFILE INDICATE THE NUMBER OF BLOWS FOR STANDARD PENETRATION TEST.
  - X = NO. OF BLOWS FOR FIRST 150mm
  - Y = NO. OF BLOWS FOR SECOND 150mm
  - Z = NO. OF BLOWS FOR THIRD 150mm

SYMBOLS OF ROCK TYPES

- COAL
- FIRE CLAY OR UNDERCLAY
- WEATHERED MUDSTONE
- MUDSTONE
- WEATHERED SHALE
- SHALE
- WEATHERED CLAY-SHALE
- CLAY-SHALE
- BOULDERS or COBBLES
- WEATHERED SILTSTONE
- SILTSTONE
- WEATHERED SILTSTONE
- SANDSTONE
- LEACHED DOLOMITE
- DOLOMITE
- LEACHED LIMESTONE
- LIMESTONE

PARTICLE SIZE DEFINITIONS

300 mm	75 mm	2.0 mm	0.42 mm	0.074 mm	0.005 mm
Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
			No. 10 SIEVE	No. 40 SIEVE	No. 200 SIEVE	

NOTES

ALL AVAILABLE SOIL AND BEDROCK INFORMATION WHICH CAN BE CONVENIENTLY SHOWN ON THE STRUCTURE FOUNDATION INVESTIGATION SHEETS HAS BEEN SO REPORTED. ADDITIONAL SUBSURFACE INVESTIGATION MAY HAVE BEEN MADE TO STUDY SOME SPECIAL ASPECT OF THE PROJECT. COPIES OF THIS DATA, IF ANY, MAY BE INSPECTED IN THE DISTRICT DEPUTY DIRECTOR'S OFFICE, THE OFFICE OF MATERIALS MANAGEMENT AT 1600 WEST BROAD STREET, THE OFFICE OF ROADWAY ENGINEERING OR THE OFFICE OF STRUCTURAL ENGINEERING AT 25 SOUTH FRONT STREET, COLUMBUS, OHIO 43215.

GENERAL INFORMATION

DRIVE SAMPLES

DRIVE SAMPLE BORINGS ARE MADE BY MEANS OF A MECHANICALLY-POWERED, ROTARY-TYPE DRILL RIG EMPLOYING A 50.80 mm O.D., 34.93 mm I.D., SPLIT-SPOON SAMPLER, AT CONTINUOUS, 0.75 m AND/OR 1.50 m DEPTH INTERVALS, DRIVEN BY MEANS OF A 63.5 kg HAMMER WITH A FREE FALL OF 0.76 m. THE NUMBER OF BLOWS REQUIRED TO DRIVE THE SAMPLER THREE 0.15 m INCREMENTS IS CONSIDERED THE STANDARD PENETRATION TEST.

PRESS SAMPLES

PRESS SAMPLES ARE TAKEN BY MEANS OF MECHANICALLY-POWERED, ROTARY-TYPE DRILL RIG, EMPLOYING A 76 mm O.D. THIN WALL PRESS SAMPLING TUBE. THE PRESS SAMPLING TUBE IS ADVANCED BY CONTINUOUS UNIFORM PRESSURE APPLIED BY THE DRILL RIG.

CORE BORINGS

CORE BORINGS ARE MADE BY MEANS OF A MECHANICALLY-POWERED, ROTARY-TYPE DRILL RIG, EMPLOYING AN NW-PAM CORE BARREL WITH AN INDUSTRIAL DIAMOND CUTTING HEAD.

SAMPLING AND TESTING

THE BORING LOG SHEETS SHOW A GRAPHIC PLOT OF THE INFORMATION OBTAINED, INCLUDING DEPTH AND ELEVATION OF THE SAMPLE, TYPE OF SAMPLE, NUMBER OF BLOWS FOR THE STANDARD PENETRATION TEST IN THREE 0.15 m INCREMENTS, AND A SAMPLE DESCRIPTION BASED ON LABORATORY TEST RESULTS, UTILIZING THE ODOT CLASSIFICATION SYSTEM. RESULTS OF STRENGTH AND CONSOLIDATION TESTING, IF PERFORMED ON UNDISTURBED SAMPLES, APPEAR GRAPHICALLY ON SEPARATE ENCLOSURES. ROCK SAMPLES ARE DISPLAYED ON THE LOG SHEETS, INCLUDING DEPTH AND ELEVATION OF THE SAMPLE, AMOUNT OF RECOVERY, AND A VISUAL CLASSIFICATION BASED ON TYPE, COLOR, DEGREE OF HARDNESS, GRAIN SIZE, DETERIORATION, BEDDING, ACID REACTION, AND OTHER QUALIFYING FACTORS.

AT DEPTHS WHERE MATERIALS ARE BOULDERY OR GRAVELLY TO THE EXTENT THAT A SAMPLER CANNOT BE UTILIZED, A WASH SAMPLE IS PROCURED AND VISUALLY CLASSIFIED, IN ORDER TO DETERMINE THE GENERAL CHARACTERISTICS OF THE MATERIAL. THESE SAMPLES ARE NOT CONSIDERED SUFFICIENTLY REPRESENTATIVE TO WARRANT LABORATORY TESTING.

PRIME ENGINEERING & ARCHITECTURE, INC.
COLUMBUS: (614) 457-2100
AKRON: (330) 666-5432

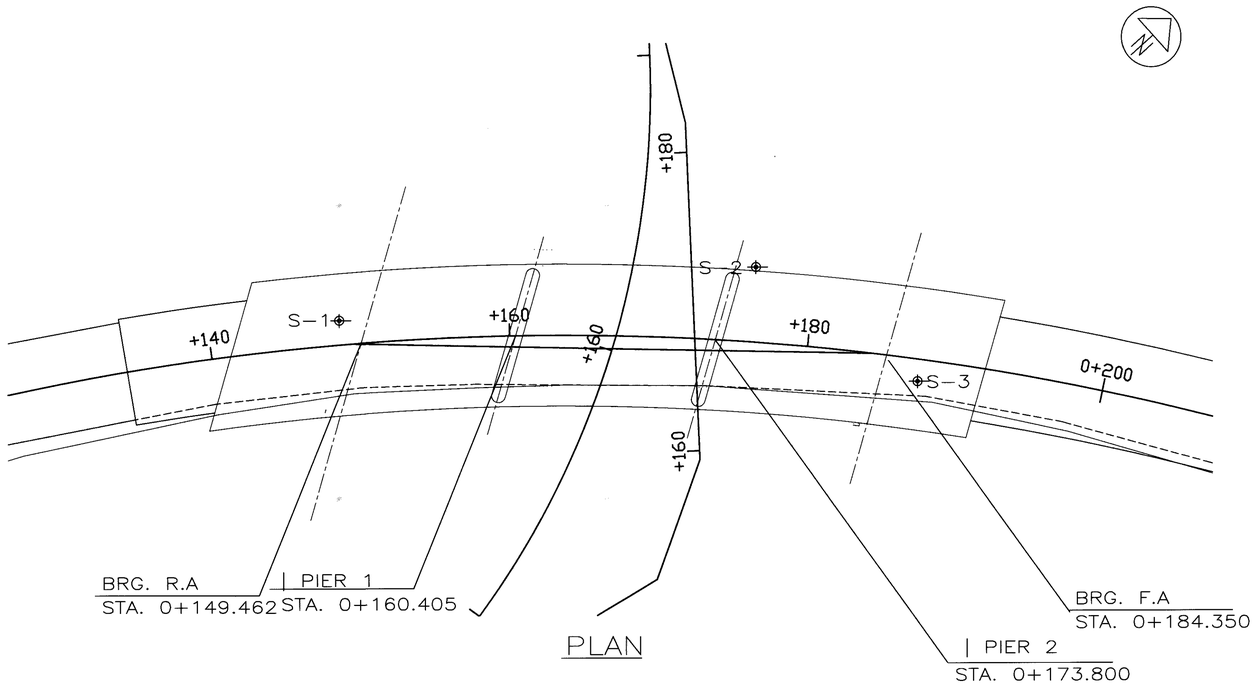
DRAWN M.B | REVISED S.S | DATE 04/21/99 | CALCULATED W.J.N | CHECKED S.S.S

STRUCTURE FOUNDATION INVESTIGATION
HAS-258-0274

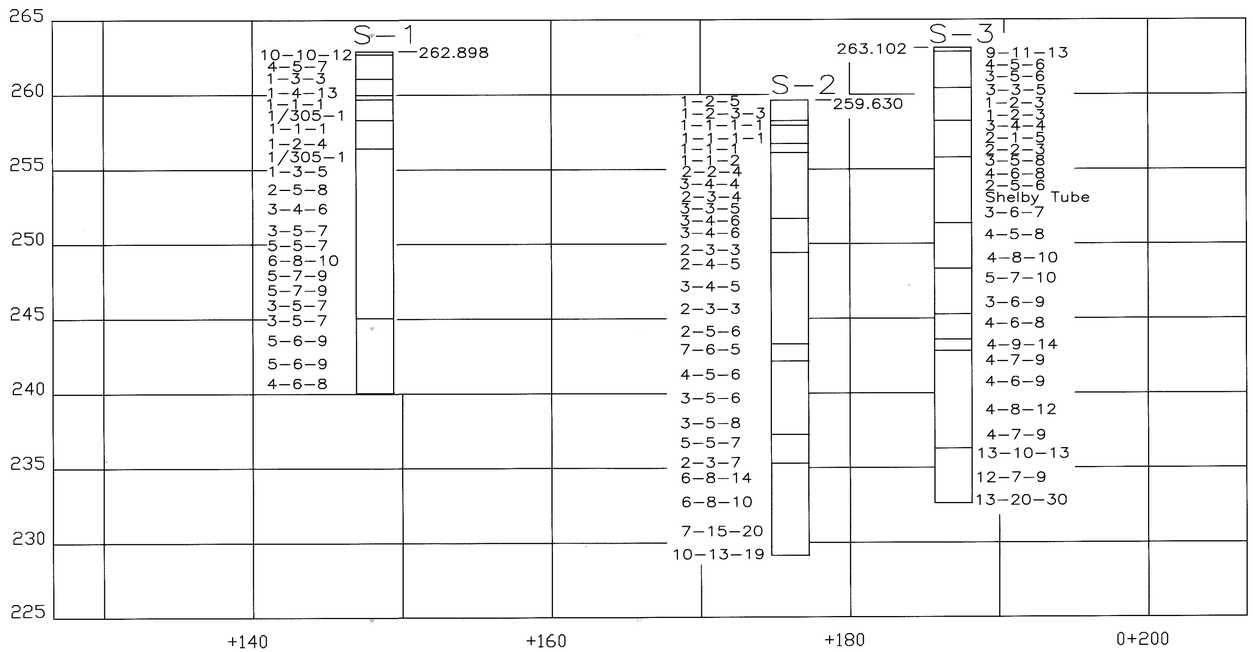
HAS-258-0.274

1/5

metric units



PLAN



PROFILE

Prime Engineering & Architecture, Inc.	
Columbus: (614) 457-2100 Akron: (330) 666-5432	
CALCULATED W.I.N	CHECKED S.S.S
DATE 04/21/99	
REVIEWED S.S	
DRAWN M.B	

STRUCTURE FOUNDATION INVESTIGATION
HAS-258-0274

HAS-258-0.274

2/5

LOG OF BORING

Date Started 10-22-98 Sampler Type SS Dia. 50.8 mm Water Elev. ± m

Date Completed 10-22-98 Casing: length Dia. 82,6mm

Boring No. S-1 Station & Offset STA 0+148.13, 1.67 m Lt. Surface Elev. 262.898 m

Elev. (m)	Depth (m)	Std. Pen./ RQD	Rec. (m)	Loss (m)	Description	Sample No.	Sample Type	Physical Characteristics (%) Agg.	C.S.	F.S.	Silt	Clay	L.L.	P.L.	P.I.	27 W.C. %	ODOT Class
262.898	0																
262.70	0.20	10-10-12			ASPHALT PAVEMENT Very stiff to stiff, brown and gray SILT AND CLAY, little sand, trace gravel, damp to moist (fill).	1	SS	3	4	7	--	86 *	32	20	12	32	A-6a
		4-5-7				2	SS	--	--	--	--	--	--	--	--	21	VISUAL
261.07	1.83	1-3-3			Medium stiff, brown to gray SANDY SILT, little clay, trace gravel, moist. (fill).	3	SS	--	--	--	--	--	--	--	--	19	VISUAL
		1-4-13				4A	SS	--	--	--	--	--	--	--	--	31	VISUAL
260.00	2.90					4B	SS									14	
259.70	3.20	1-1-1			Medium dense, gray CYINDERS FRAGMENTS WITH SAND, SILT AND CLAY, moist (fill).	5	SS	--	--	--	--	--	--	--	--	25	VISUAL
		1/305-1			Very soft, brown SILT, little clay, trace sand, moist (possible fill).	6	SS	--	--	--	--	--	--	--	--	25	VISUAL
258.33	4.57	1-1-1			Very loose to loose, brown and gray COARSE AND FINE SAND, little silt, trace clay with woood pieces, wet.	7	SS	--	--	--	--	--	--	--	--	43	VISUAL
		1-2-4			Note:- Wood encountered between 5.94 to 6.10 meters.	8	SS	--	--	--	--	--	--	--	--	36	VISUAL
256.44	6.46	1/305-1			Stiff to very stiff, gray SILT, some clay, trace sand, moist.	9	SS	--	--	--	--	--	--	--	--	34	VISUAL
		1-3-5				10	SS	--	--	--	--	--	--	--	--	28	VISUAL
		2-5-8				11	SS	0	0	1	--	99 *	32	22	10	25	A-4b
		3-4-6				12	SS	--	--	--	--	--	--	--	--	28	VISUAL
		3-5-7				13	SS	0	0	0	--	100 *	29	22	7	29	A-4b
		5-5-7				14	SS	--	--	--	--	--	--	--	--	26	VISUAL
		6-8-10				15	SS	--	--	--	--	--	--	--	--	26	VISUAL
		5-7-9				16	SS	0	0	2	62	36	29	21	8	25	A-4b
		5-7-9				17	SS	--	--	--	--	--	--	--	--	25	VISUAL
		3-5-7				18	SS	--	--	--	--	--	--	--	--	28	VISUAL
245.07	17.83	3-5-7			Stiff, gray SILT AND CLAY, trace sand.	19	SS	--	--	--	--	--	--	--	--	27	VISUAL
		5-6-9				20	SS	--	--	--	--	--	--	--	--	23	VISUAL
		5-6-9				21	SS	0	0	3	--	97 *	36	23	13	26	A-6a
		4-6-8				22	SS	--	--	--	--	--	--	--	--	28	VISUAL
240.04	22.86				TERMINATION DEPTH = 22.86 METERS												

*SILT AND CLAY COMBINED

LOG OF BORING

Date Started 10-30-98 Sampler Type SS Dia. 50.8 mm Water Elev. 257.59 ± m

Date Completed 10-30-98 Casing: length Dia. 82,6mm

Boring No. S-2 Station & Offset STA 0+176.02. 5.03 m Lt. Surface Elev. 259.63 ±m

Elev. (m)	Depth (m)	Std. Pen./ RQD	Rec. (m)	Loss (m)	Description	Sample No.	Sample Type	Physical Characteristics (%) Agg.	C.S.	F.S.	Silt	Clay	L.L.	P.L.	P.I.	27 W.C. %	ODOT Class
259.63	0																
		1-2-5			Brown SILTY CLAY, little sand, trace gravel (fill).	1	SS	--	--	--	--	--	--	--	--	25	VISUAL
		1-2-3-3				2A	SS	--	--	--	--	--	--	--	--	30	VISUAL
258.26	1.37				Loose, brown GRAVEL AND ROCK FRAGMENTS WITH SAND, trace wood pieces, wet.	2B	SS	53	5	28	--	14 *	--	--	--	16	A-1-b
257.95	1.68	1-1-1-1				3	SS	1	5	57	--	37 *	--	--	--	32	A-4a
		1-1-1-1			Very soft, brown SANDY SILT, little clay, trace gravel, wet.	4	SS	4	7	38	31	20	--	--	--	41	A-4a
256.73	2.90	1-1-1			Very loose, brown COARSE AND FINE SAND, little silt, trace clay, trace gravel, trace wood pieces, wet.	5	SS	10	18	52	--	20 *	--	--	--	32	A-3a
256.13	3.50	1-1-2				6A	SS	--	--	--	--	--	--	--	--	30	VISUAL
					Medium stiff to stiff, gray SILT, some clay, trace sand, moist.	6B	SS	--	--	--	--	--	--	--	--	28	VISUAL
		2-2-4				7	SS	0	0	0	61	39	32	22	10	26	A-4b
		3-4-4				8	SS	--	--	--	--	--	--	--	--	25	VISUAL
		2-3-4				9	SS	--	--	--	--	--	--	--	--	27	VISUAL
		3-3-5				10	SS	--	--	--	--	--	--	--	--	26	VISUAL
		3-4-6				11	SS	--	--	--	--	--	--	--	--	26	VISUAL
251.71	7,92	3-4-6			Stiff to medium stiff, gray SILT AND CLAY, trace sand, moist.	12	SS	--	--	--	--	--	--	--	--	17	VISUAL
		2-3-3				13	SS	--	--	--	--	--	--	--	--	34	VISUAL
249.42	10.21	2-4-5			Stiff to medium stiff, gray SILT, some clay, trace sand, moist.	14	SS	--	--	--	--	--	--	--	--	27	VISUAL
		3-4-5				15	SS	--	--	--	--	--	--	--	--	27	VISUAL
		2-3-3				16	SS	--	--	--	--	--	--	--	--	27	VISUAL
		2-5-6				17	SS	--	--	--	--	--	--	--	--	27	VISUAL
243.32	16.31	7-6-5			Loose, gray COARSE AND FINE SAND, little silt, wet.	18A	SS	--	--	--	--	--	--	--	--	20	VISUAL
243.02	16.61				Stiff, gray SILT AND CLAY, trace sand, moist.	18B	SS	--	--	--	--	--	--	--	--	24	VISUAL
		4-5-6				19	SS	0	0	2	--	98 *	34	23	11	26	A-6a
		3-5-6				20	SS	--	--	--	--	--	--	--	--	28	VISUAL
		3-5-8				21	SS	--	--	--	--	--	--	--	--	26	VISUAL
237.23	22.40	5-5-7			Stiff, gray SILT, some clay, trace sand, moist.	22	SS	--	--	--	--	--	--	--	--	27	VISUAL
		2-3-7				23	SS	--	--	--	--	--	--	--	--	29	VISUAL
235.31	24.32				Very stiff to hard, gray SILT AND CLAY, little sand, trace sandstone and coal fragments, moist.												
		6-8-14				24	SS	--	--	--	--	--	--	--	--	22	VISUAL
		6-8-10				25	SS	--	--	--	--	--	--	--	--	19	VISUAL
		7-15-20				26	SS	--	--	--	--	--	--	--	--	15	VISUAL
		10-13-19				27	SS	--	--	--	--	--	--	--	--	16	VISUAL
229.15	30.48				TERMINATION DEPTH = 30.48 METERS												

* SILT AND CLAY COMBINED

LOG OF BORING

Date Started 10-23-98 | Sampler Type SS | Dia. 50.8 mm | Water Elev. 259.442 m

Date Completed 10-23-98 | Casing: length | Dia. 82,6mm

Boring No. S-3 | Station & Offset STA 0+186.84, 1.47m Rt. | Surface Elev. 263.102 m

Elev. (m)	Depth (m)	Std. Pen./ RQD	Rec. (m)	Loss (m)	Description	Sample No.	Sample Type	Physical Characteristics (%) Agg.	C.S.	F.S.	Silt	Clay	L.L.	P.L.	P.I.	W.C. %	ODOT Class
263.102	0																
262.85	0.25	9-11-13			ASPHALT PAVEMENT	1	SS	--	--	--	--	--	--	--	--	16	VISUAL
					Very stiff to stiff, brown and gray Silt AND CLAY, little sand, trace gravel, damp to moist, (fill).												
		4-5-6				2	SS	--	--	--	--	--	--	--	--	22	VISUAL
		3-5-6				3	SS	--	--	--	--	--	--	--	--	69	VISUAL
260.42	2.68	3-3-5			Medium stiff, brown SANDY SILT, little clay, trace gravel, trace roots, (possible fill).	4	SS	--	--	--	--	--	--	--	--	24	VISUAL
		1-2-3				5	SS	--	--	--	--	--	--	--	--	33	VISUAL
		1-2-3				6	SS	--	--	--	--	--	--	--	--	32	VISUAL
258.22	4.88	3-4-4			Loose, brown and gray COARSE AND FINE SAND, little silt, trace clay, trace wood pieces, wet.	7	SS	--	--	--	--	--	--	--	--	24	VISUAL
		2-1-5				8	SS	--	--	--	--	--	--	--	--	24	VISUAL
		2-2-3				9	SS	--	--	--	--	--	--	--	--	32	VISUAL
255.79	7.31	3-5-8			Stiff, gray SILT, some clay, trace sand, moist.	10	SS	--	--	--	--	--	--	--	--	28	VISUAL
		4-6-8				11	SS	0	0	1	--	99 *	31	22	9	26	A-4b
		2-5-6				12	SS	--	--	--	--	--	--	--	--	27	VISUAL
		Shelby tube				13		--	--	--	--	--	--	--	--	27	VISUAL
		3-6-7				14	SS	--	--	--	--	--	--	--	--	25	VISUAL
251.37	11.73	4-5-8			Stiff to very stiff, gray SILT AND CLAY, trace sand, moist.	15	SS	0	0	10	--	90 *	33	22	11	24	A-6a
		4-8-10				16	SS	--	--	--	--	--	--	--	--	27	VISUAL
248.32	14.78	5-7-10			Very stiff, gray SILT, some clay, trace sand, moist.	17	SS	0	0	2	57	41	30	20	10	26	A-4b
		3-6-9				18	SS	--	--	--	--	--	--	--	--	26	VISUAL
245.27	17.83	4-6-8			Stiff to very stiff, gray SILT AND CLAY, trace sand, moist.	19	SS	--	--	--	--	--	--	--	--	25	VISUAL
243.59	19.51	4-9-14				20A	SS	--	--	--	--	--	--	--	--	22	VISUAL
					Medium dense, gray COARSE AND FINE SAND, wet.	20B	SS		--	--	--	--	--	--	--	23	VISUAL
242.83	20.27				Very stiff, gray SILT, some clay, trace sand, moist.												
		4-7-9				21	SS	--	--	--	--	--	--	--	--	26	VISUAL
		4-6-9				22	SS	--	--	--	--	--	--	--	--	28	VISUAL
		4-8-12				23	SS	0	0	1	--	99 *	31	22	9	26	A-4b
		4-7-9				24	SS	--	--	--	--	--	--	--	--	26	VISUAL
236.28	26.82	13-10-13			Very stiff to hard, gray SILT AND CLAY, little sand, trace sandstone and coal fragments, moist.	25	SS	--	--	--	--	--	--	--	--	23	VISUAL
		12-7-9				26	SS	--	--	--	--	--	--	--	--	35	VISUAL
		13-20-30				27	SS	--	--	--	--	--	--	--	--	16	VISUAL
232.62	30.48				TERMINATION DEPTH = 30.48 METERS												

* SILT AND CLAY COMBINED

DRAWN	REVIEWED	DATE	CALCULATED	CHECKED
M.B	S.S	04/21/99	W.I.N	S.S.S

PRIME ENGINEERING & ARCHITECTURE, INC.
COLUMBUS: (614) 457-2100 AKRON: (330) 666-5432

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 806

FIELD OFFICE
September 9, 1997

806.01 Description. This item shall consist of providing, maintaining and subsequently removing a field office for the exclusive use of the Department for the duration of the contract at a location approved by the Engineer. The field office will be designated as Type A, B or C.

806.02 General. The field office shall be available and completely functional at a time directed by the Engineer. The office shall have a minimum ceiling height of 2.1 m (7 feet) and have provisions for maintaining room temperature between 20 and 27 C (68 and 80 F). The Type C field office shall have a separate enclosed room for the Engineer. The Contractor shall provide and maintain telephone and electric service. One phone shall be connected to a recorded answering device. One speaker phone shall be required for Type B or Type C facilities. All field office types shall have one copying machine ;the copier shall be provided with all necessary maintenance and paper supplies, and be capable of producing multiple copies of documents up to 216 by 356 mm (8 1/2 by 14-inch) in size. The Type B and Type C field offices shall have a facsimile machine.

The office shall be provided with potable hot and cold water. The office shall also have neat, sanitary, enclosed toilet accommodations; associated lavatory and sanitary supplies shall be furnished. Portable facilities may be provided with the approval of the Engineer.

On all projects requiring moisture and density control of construction materials, the field office shall contain a storage box for a nuclear density gauge in accordance with drawings on file with the Director.

Additional requirements for field office and office equipment are as specified in the following table:

FIELD OFFICE

Item	Type A	Type B	Type C
Floor Space, m^2 (sq. ft.).....	14 (150)	46 (500)	93 (1000)
Telephone	2	4	4
Base Radio & 4-Hand Held Units[1]	--	--	1
10 Column Electronic Calculator with Tape	1	2	3
Desk and Chair Set	1	3	5
Work Tables, 750 by 1800 mm (30 by 72-inch)	1	2	3
4 Drawer, Legal Size, Lockable Metal File Cabinet	--	1	2
2 Drawer, Metal File Cabinet ...	1	2	2
Portable Fire Extinguishers - Type 2A10BC-5#	1	1	2
All Weather Parking Spaces ...	4	8	10
Plan Rack[2]	1	1	2

1. Units shall be capable of transmitting and receiving voice communication between office and any area on the project site.
2. Capable of handling the breakdown of 559x864 mm (22x34 inch) sized plans in to 10 sections.

The preceding requirements for the field office may be modified only upon written approval of the Engineer.

806.03 Computer Equipment for Field Office. Where required, the Contractor shall furnish, install, and maintain the following computer hardware and software in the field office required by this item for the life of the contract. All computer hardware and software furnished shall be for the exclusive use of the Engineer and staff and shall be operable at the same time as the field office.

This system shall not experience down time exceeding 48 hours from notification by the Engineer. The Contractor shall replace stolen, vandalized, or units otherwise inoperable within 48 hours after notification by the Engineer. Upon completion of the contract, the hardware and software furnished by the Contractor shall remain the property of the Contractor.

Computer Hardware

(1) One IBM PC compatible computer with an Intel Pentium processor (or equal) operating at a minimum 200 MHz. The computer shall be provided with the following **minimum** requirements:

a. 2.1 Gigabyte hard disk
b. 32 Megabytes RAM

c. one 3.5 inch., 1.44 MB floppy drive
d. one 8x CD-ROM drive
e. 101 key keyboard
f. 15 inch Hi-Res Super VGA Color Monitor 1024 X 768 resolution with .28 dot pitch and Hi-Res Super VGA Card with 2 Megabytes of Video RAM.
g. 2 Button Microsoft compatible mouse with appropriate software, compatible with required software.
h. At least 1 parallel port and 1 serial interface port and 1 mouse port.
I. one 56K firmware upgradeable 3Com compatible modem

(2) Hewlett Packard LaserJet compatible (PCL3 emulation) 6 page per minute printer or approved equal and parallel printer cable.

(3) Surge Protector. 15 amp six outlet with circuit breaker control, phone line circuit surge protection and a surge indicator light.

Computer Software

The Contractor shall furnish, load, and maintain the following software on the computers provided in the field offices: Microsoft Windows 95 (with games removed) and the Corel Professional Edition Office Suite Version 8.

All computer hardware and software shall be maintained by the Contractor during the life of the contract. Information for proposed "equal" equipment shall be submitted to the Engineer and be approved prior to use.

Along with the furniture under 806.02, the Contractor shall also provide the necessary stands, tables, etc. to accommodate the computer system.

806.04 Basis of Payment. The field office will be paid for at the contract price bid, which price shall be full compensation for furnishing, maintaining and subsequently removing the field office and all incidentals necessary to complete this item. The field office and any required computer equipment shall be paid on a monthly basis. The contract bid price shall be full compensation for furnishing, setting up, maintaining, and subsequently removing the specified computer hardware and software from the field office.

Item	Unit	Description
806	Month	Field office, Type_____
806	Month	Computer equipment for field office

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 814

EMBANKMENT CONSTRUCTION USING PETROLEUM CONTAMINATED SOIL

June 2, 1998

814.01 Description: This work shall consist of using Petroleum Contaminated Soil (PCS) material, and/or constructing a mixture of PCS material and embankment material in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or established by the Engineer; mixed, spread, compacted, shaped and finished.

The Contractor may elect to use PCS material as embankment material or may excavate PCS material detailed in the contract or found in the work. It is not a requirement of this specification to use the PCS material in the embankment. The use of PCS material may be allowed as per this specification.

Item 203, Roadway Excavation and Embankment shall apply: deviations from these are as follows.

814.02 Restrictions of Usage. The Contractor shall certify to the Engineer that the PCS material does not exceed the petroleum constituent concentrations stated in OAC 1301: 7-9-16(I)(1)(c)(ii)(b). These values are provided below:

Benzene	35 parts per million
Toluene	109 parts per million
Ethylbenzene	32 parts per million
Total Xylenes	165 parts per million

This certification shall include test results from an independent environmental consultant approved by the Department. The consultant shall perform BTEX testing by using United States Environmental Protection Agency (USEPA) test method SW 846 method 8020 or equivalent method. These tests shall be performed on every 90 metric tons (100 tons) of PCS used on the project.

The Contractor shall submit this certification and information in a suitable format to the Engineer 10 working days prior to the intended usage.

PCS shall not be allowed within the top 1.0 m (3 feet) of the final subgrade elevation or within 1.5 m (5 feet) from any exposed surface.

The final PCS material shall produce a stable embankment. The source, materials, construction and compaction techniques shall be approved by the Engineer.

814.03 Materials. The PCS material shall meet the requirements of Item 203 and the following additional requirements:

The PCS material shall be classified by an independent soils consultant approved by the Department as per Section 4.3 of the Department's "Specifications for Subsurface Investigation Manual". The soils consultant shall determine the suitability of the material under Item 203 Embankment Materials.

The soils consultant shall make a moisture density curve in accordance with AASHTO T 99 for every 225 metric tons (250 tons) of PCS material.

The soils consultant shall submit the above information in a suitable format to the Engineer at least 7 working days prior to the proposed work. This report shall be written and sealed by a Registered Professional Engineer.

814.04 Construction Requirements. The outer soil cover shall be raised uniformly with the PCS material. At no time shall the PCS material be dumped or spread on soft areas, in jurisdictional wetland, or in standing water.

The layers of PCS material shall be alternated with other Department approved soil layers (other than PCS material) .

PCS material shall be spread on the embankment or subgrade in 200 mm (8 inch) loose lifts.

Compaction shall be performed with a sheeps foot roller, self propelled roller or other approved equipment. The compaction operation shall be coordinated with the spreading operation to minimize the amount of PCS material spread out on the embankment. In no case shall the PCS material be left spread out and uncompacted overnight.

The PCS material shall be compacted at a moisture content to obtain the required density and embankment stability. The PCS mixture shall be compacted to a density required under 203.12 or to a density determined by 203.09(b). Any water needed to bring the material to the specified moisture shall be uniformly mixed throughout the lift.

814.05 Method of Measurement. The PCS material shall be paid as per the 203 Items in the contract documents.

814.06 Basis of Payment. The contract unit price per cubic meter(cubic yard) for the 203 Items in the contract documents shall include full compensation for furnishing all testing and certification documentation, labor, materials and incidentals for doing all work involved with the PCS material.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 842

CONCRETE FOR STRUCTURES

January 6, 1999

842.01 Description. This item shall consist of furnishing and placing portland cement concrete including reinforcing steel in accordance with these specifications and in reasonably close conformity with the lines, grades and dimensions shown on the plans. This item shall also include all costs associated with saw cutting grooves into the surface of superstructure concrete after the concrete has cured. Falsework and forms shall be in accordance with 508.

For prestressed concrete, see Supplemental Specification 865.

Concrete for structures shall met the requirements of Supplemental Specification 899 (Concrete - General), except as modified herein.

842.02 Materials. Materials shall conform to 899.02 except as follows:

Aggregate; all concrete above the ground line in a given substructure unit or all concrete for any given superstructure shall be made of aggregates of the same kind and colors, except upon permission of the Engineer.

Reinforcing materials; 509.02.

Curing materials; 705.05, 705.06 (white opaque), 705.07 Type 1 or 1D.

Joint filler;1/4 inch (6 mm) gray sponge 711.28, or preformed filler 705.03.

Seals; preformed elastomeric compression joint seals, 705.11.

842.03 Proportions. Concrete for structures shall be proportioned according to 899.03, using Class C or Class S as specified.

842.04 Concrete Test Specimens. On structures over 20 foot (6.1 m) span, two test cylinders will be made from each 200 cubic yards (150 m^3), or fraction thereof, of concrete that is incorporated each day in the work. On structures of 20 foot (6.1 m) span or less, not less than two cylinders will be made for each 50 cubic yards (35 m^3) of concrete.

When necessary to permit early removal of falsework or to permit backfilling, concrete test beams shall be made and tested according to standard methods on file in the office of the Director.

842.05 High-Early-Strength Concrete. The use of high-early-strength concrete shall be in accordance with 899.03. Curing and loading shall be in accordance with 842.14.

842.06 Mixing of Concrete. Mixing shall be according to 899.09.

When mixed, all concrete shall have a temperature of not more than 90 ºF (32 ºC), and the concrete shall be maintained under this temperature until deposited in the work.

When an air temperature of 60 ºF (16 ºC) or higher prevails at the time of placing concrete in a bridge superstructure over 20 foot (6.1 m) span, the Contractor shall add an approved chemical admixture (705.12, Type B or D) to the concrete.

842.07 Slump. Concrete shall have a slump such that it will be workable in the required position. It shall be of such a consistency that it will flow around reinforcing steel, but individual particles of coarse aggregate, when isolated, shall show a coating of mortar containing its proportionate amount of sand.

The slump of concrete placed by the vibration method shall be in accordance with 899.03, the slump being determined according to ASTM C 143.

842.08 Placing Concrete. The Contractor shall submit according to 501.06, a description of the procedures he proposes to use and notify the Engineer at least 24 hours in advance of placing concrete.

Superstructure concrete shall be placed only when the surface evaporation rate determined by using Figure 1 in ACI 308 is equal to or less than 0.2 lb./sq. ft./hour(1.0 kg/m^2/hour). The Contractor shall determine and document the ambient air temperature, concrete temperature, deck surface temperature, relative humidity, and wind velocity, subject to verification by the Engineer. No superstructure concrete shall be placed if the ambient air temperature is 85 ºF(30 ºC) or higher or predicted to go above 85 ºF(30 ºC)

during the concrete placement regardless of the surface evaporation rate.

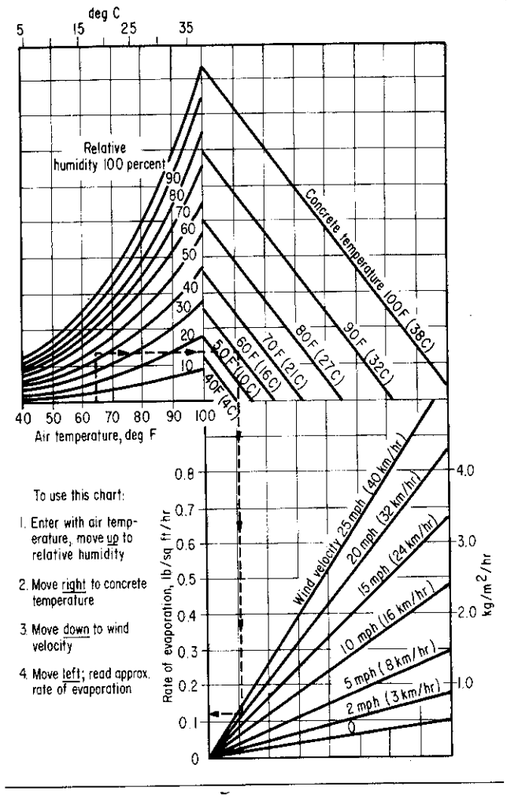
When a concrete deck is to be placed on continuous steel beams or girders, the placing of the concrete deck in any span shall not be started until all of the main beam or girder splices have been completed at least two piers beyond the pier or piers supporting the span in question.

Concrete for backwalls with steel expansion joints shall not be placed until the abutments have been backfilled to within 1 foot (0.3 m) of the bridge seat elevation and all structural steel or prestressed concrete beams have been erected, unless a different procedure is approved by the Director. The steel expansion joint shall serve as a template for the top of the backwall. If temporary bolts are used to support the backwall portion of an expansion device during the placing of the backwall concrete, these bolts shall be removed after the concrete has taken its initial set and before a change in temperature causes superstructure movement sufficient to damage the backwall.

In order that the concrete will be finished during daylight hours, the time of starting the concreting operations shall be subject to the approval of the Engineer.

The Contractor shall furnish assurance to the Engineer of an adequate and uniform source of supply of concrete to permit proper placing and finishing, and of the availability of coverings for protection in case of rain, before work will be permitted to start.

Figure1 ACI 308-81



Before placing the concrete, all forms and structural steel which will be in contact with the concrete shall be thoroughly cleaned and the space to be occupied by the concrete shall be free from all laitance, silt, dirt, shavings, sawdust, loose and built-up rust and other debris. The methods of depositing shall be such as to insure that all reinforcing steel is completely enveloped in concrete mortar and such that this condition can be verified by inspection. The method or device used for conveying the concrete from the mixer to its place in the work shall be such as to insure against separation of the coarse aggregate from the mortar. When concrete is being deposited in shallow members, such as slabs, it shall be placed with as short a vertical drop as practicable. The concrete shall be deposited so as to maintain a surface practically horizontal over the section being placed.

When a chute is used, its slope shall be such as to allow concrete of the proper consistency to flow readily without segregation. Concrete shall be deposited as near as possible to its final position.

Concrete shall not be dropped into the forms a distance of more than 5 feet (1.5 m). Drop chutes shall be used to limit free fall to 5 feet (1.5 m) and the delivery ends shall be as nearly vertical as practicable.

The use of mortar topping for concrete railing caps and other similar surfaces shall not be permitted.

The use of the vibration method of placing all concrete, in structures is required. The Contractor shall furnish and have in use sufficient vibration equipment of an approved type and size to properly compact each batch immediately after it is placed in the forms.

The vibrators shall generally be of a type that is applied directly to the concrete and have a frequency of at least 4500 impulses per minute, but where inaccessibility precludes this method of vibration, the vibrators shall be applied externally to the forms.

The concrete shall be deposited as near its final position as possible and shall not be caused to flow long distances by vibrators. Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. Vibrators shall be inserted into and withdrawn from the concrete slowly. The vibration shall be of sufficient duration and intensity to thoroughly compact the concrete, but not continued so as to cause segregation. Care must be used not to disturb partially hardened concrete.

Such spading as is necessary to insure smooth surfaces and dense concrete shall be done along form surfaces and in corners and locations impossible to reach with the vibrators, The Engineer shall with the collaboration of the Contractor closely observe the results obtained on the first concrete placed and such alterations shall be made in the mix, as permitted by these specifications, as are necessary to secure the best results.

The surface of the finished concrete shall be covered immediately with wet burlap.

842.081 Slipform Construction of Bridge Railing. Unless the plans eliminate the use of slipforming for this project, the Contractor is permitted the option of slipforming the bridge parapets and medians If the Contractor elects to slipform, the finished concrete shall meet the following tolerances from plan dimensions:

Reinforcing steel cover	-½ inch (-13mm) + ½ inch (+ 13 inch)
Top width dimension	-0 + 1/4 inch (+ 6 mm)
Bottom width dimension	-0 + ½ inch (+ 13mm)
Surface flatness	1/4 inch in 10 feet (6 mm in 3 meters)
Vertical alignment (Deviation from a line parallel to the grade line)	½ inch in 20 feet (13 mm in 6 meters)

All reinforcing steel joints and/or splices in the bridge railing steel shall be tied. A dry run to check for reinforcing clearance and rigidity of the reinforcing cages shall be required before any concrete is placed. The Contractor shall verify reinforcing clearances and make any adjustments to the cage to establish the required clearances during the dry run. Reinforcing steel cages are to be rigid (defined as no movement during the slipforming dry run). If the Engineer determines the cages are not rigid, the Contractor must stabilize the cages before any slipforming is performed. The Contractor may add any additional diagonal reinforcing steel between the front and rear vertical reinforcing faces to establish the required rigidity. Any additional reinforcing steel required to adequately stabilize the cages shall be the Contractor's expense.

Honeycombing, cracking, tearing and other defects shall be repaired or patched immediately upon exit from the slipform equipment. Defects shall be completely filled with concrete. The use of water to smooth or close the surface is not acceptable

Control Joints shall be constructed by sawing 1 1/4 inches (32 mm) deep into the perimeter of the parapet, after the concrete has taken its initial set but before any shrinkage cracks develop. Generally initial set is within 6 hours of batching of the concrete. All joints shall be sawed within 24 hours of placement. Joints shall be sawed by using an edge guide, fence or jig to insure that the joint is straight, true and aligned on all faces of the parapet. The joint width shall be the width of the saw blade, a nominal 1/4 inch (6 mm). The control joints shall be caulked with a polyurethane or polymeric material meeting Federal Specification TT-S-00227E

Slip formed concrete will require different slumps than those listed in 899 or other plan specified concrete. The consistency of the concrete should be such that the concrete exiting the slipform does not pull but is stiff enough to prevent waviness and sags in the finished surfaces. Method A, Water Curing, 842.14 is required. As slipformed concrete has a low water/cement ratio, timely application of the water cure is critical in helping control shrinkage cracks.

No water shall be added or applied to the concrete after it has left the truck.

The Contractor shall furnish all necessary platforms to protect against falling debris during the slipforming operation, to allow access for completing the finishing operation and to allow the inspector access.

The Engineer will inspect the slipformed surface for horizontal cracking no earlier than 21 days after completion of the slipforming operation. All horizontal cracks shall be repaired by epoxy injection. If a concrete sealer has been applied, any damage to the sealer shall be repaired after the epoxy injection has been completed. The aforementioned repairs shall be made at no additional cost to the State

842.09 Construction Joints. When construction joints are shown on the plans, all concrete between consecutive joints shall be placed in a continuous operation. Concrete shall not be placed against the side of any joint for at least 12 hours, or as required by 842.14.

Approval of the Director must be obtained for placing any construction joint not shown on the plans or permitted by 842.08 and 842.16.

The plans on which a day's work is to terminate shall be predetermined before depositing of concrete begins. They shall in general be perpendicular to the lines of principal stress and in regions of small shear. Horizontal joints will not be permitted in concrete girders and beams. Slabs acting with concrete beams or girders shall be deposited continuously with them unless composite construction is specified.

All construction joints shall be made with bulkheads provided with keys which clear all exposed surfaces approximately one-third the thickness of the joint.

Horizontal joints in piers, abutments and retaining walls generally shall be avoided and, when they are used, shall not be located within 2 feet (0.6 m) of the normal water level.

Construction joints not shown on the plans and above ordinary low water, in abutments, and in retaining walls that retain earth fills shall be waterproofed on the back with a 36 inch (1 m) strip of Type B waterproofing according to 512 at the Contractor's expense.

Joints in cantilevered members shall be avoided.

Horizontal construction joints shall have the surface of the concrete below the joint dampened immediately prior to placing adjoining concrete.

Horizontal construction joints between bridge slabs and superimposed curbs, parapets, sidewalks and median strips, shall be placed and protected the same as the remainder of the slab. They shall be cured in accordance with 842.14.

Care shall be exercised to avoid disturbing the bond of curb reinforcing steel protruding from the concrete. If the curb areas are used by workers when placing the deck concrete, the reinforcing steel shall be tied and/or braced to prevent its movement.

Where walls or columns support slabs or beams, the concrete in the vertical member shall be deposited up to the bottom of the supported member and a period of at least 2 hours shall elapse for settlement before placing concrete in the horizontal member.

842.10 Emergency. When the work is unexpectedly interrupted by break-downs, storms or other causes and the concrete as placed would produce an improper construction joint, the Contractor shall rearrange the freshly deposited concrete to provide a suitable construction joint. When such a joint occurs at a section on which there is shearing stress, he shall provide an adequate mechanical bond across the joint by forming a key, inserting reinforcing steel or by some other means satisfactory to the Engineer, which will prevent a plane of weakness.

842.11 Depositing Concrete Under Water. No concrete except for cofferdam seals shall be deposited under water, unless by special permission of the Director. If such permission is granted, care shall be exercised to prevent the formation of laitance.

Concrete shall not be deposited until any laitance, which may have formed on concrete previously placed, has been removed. Pumping shall be discontinued while depositing foundation concrete if it results in a flow of water inside of forms. If concrete other than cofferdam seals is deposited under water, the proportion of cement used shall be increased at least 10 percent at no extra expense to the State, to compensate for losses due to water. Concrete deposited under water shall be carefully placed in a compact mass in its final position by means of a tremie, a closed bottom dump bucket or other approved method and shall not be disturbed after being deposited.

842.12 Depositing and Curing Concrete During Cold Weather. When an atmospheric temperature of 32 ºF (0 ºC) or less exists at the time concrete is placed, or is predicted by weather forecasts to occur during the curing period, the following procedures shall apply:

The water or aggregate or both shall be heated as necessary to make the temperature of the concrete not less than 50 ºF (10 ºC) nor more than 70 ºF (21 ºC) when placed.

Concrete shall not be placed in contact with materials having a temperature of less than 32 ºF (0 ºC). If necessary, the forms, reinforcing steel and foundation materials shall be heated before the concrete is placed.

The concrete shall be protected from freezing and specified temperatures for curing shall be maintained by a heated enclosure, insulated forms or by either of these used in combination with flooding, except that insulation alone may not be used to protect and cure deck slabs less than 10 inches (250 mm) thick.

The heated enclosure shall surround the top, sides and bottom of the concrete to be placed during cold weather except that concrete surfaces which have been flooded need not be enclosed.

The concrete shall be cured by maintaining the surface temperature between 50 ºF and 100 ºF (10 ºC and 38 ºC) for a period of not less than five days except as modified below for concrete flooded with water. At the end of this curing period, the temperature shall be reduced at a rate not to exceed 20 ºF (11 ºC) in 24 hours until it is within 20 ºF (11 ºC) of atmospheric temperature.

Sufficient high-low thermometers shall be furnished and installed by the Contractor in such a manner that the surface temperature of the concrete may be readily determined. For deck slabs, the surface temperature shall include deck bottoms, deck facia and deck top surfaces.

Removal of falsework and opening to traffic shall be not earlier than specified by 842.14.

(a) When a heated enclosure is used. The enclosure and heating devices shall be as nearly complete before any concrete is placed as the placing will permit. Throughout the entire concreting operation, the completion of enclosures and the application of heat shall follow the placing of concrete as closely as possible.

Heat may be supplied by any method which will maintain the required temperature continuously with a reasonable degree of uniformity in all parts of the enclosure without discoloring the concrete.

Combustion-type heating units shall be vented from the enclosure.

If dry heat, other than free steam, is used with method (a) curing, all exposed concrete shall be covered with two thicknesses of burlap as soon after placing the concrete as it can be done without marring the surface. The burlap shall be wetted and kept continuously wet and shall not be removed during the heating period, except as required for rubbing. Wood forms without liners, left in place more than two days after the placing of concrete, shall be thoroughly wet at least once each day for the remainder of the heating period. If forms are removed during the heating period, the concrete shall be thoroughly drenched with water and covered with burlap as noted above for the remainder of the heating period.

Enclosures shall be strong and wind proof, and provide adequate space to allow free circulation of air around the forms and deposited concrete.

(b) When insulation is used. Sufficient thermometers shall be furnished and installed by the Contractor in such a manner that the surface temperature of the concrete may be readily determined. Whenever the surface temperature, as indicated by the thermometer readings, approaches 100 ºF (38 ºC), the forms or insulation shall be loosened or otherwise vented to keep the surface temperature within the specified limits. If the thermometer readings indicate that the minimum required temperature is not maintained, the structure shall be promptly enclosed and heated as provided above or flooded as specified below.

The insulating material shall be wind and water resistant. Precautions shall be taken at edges and corners to insure that such points of extreme exposure are adequately protected. The top surface of the concrete shall be protected by a tarpaulin, or other approved waterproof cover, placed over the insulation.

(c) When the concrete is to be flooded with water. The concrete may be flooded as soon as it can be done without damaging it. Flooding water shall be heated to a temperature of not less than 50 ºF (10 ºC) nor more than 100 ºF (38 ºC). The heated flood water may be discontinued after 48 hours if the concrete remains flooded to a depth of 1 foot (0.3 m) above its highest elevation for at least the subsequent 120-hour period.

842.13 Removal of Forms. In order to facilitate finishing, forms on vertical surfaces which are to receive a rubbed surface finish shall be removed as soon as the concrete has hardened sufficiently that it will not be damaged.

842.14 Curing and Loading. Concrete for structures shall have the falsework removed and be opened to traffic in not less time than is specified by the following table:

		Age of Concrete in Days	
	Span (a)	**No Beam Test**	**Beam Test (b)**
Removing Falsework	Over 10' (3.0 m)	14	5
	10' (3.0 m) or less and all pier caps	7	3
Traffic	Any	14	7

(a) Span in this circumstance is defined as the horizontal distance between faces of the supporting elements when measured parallel to the primary reinforcement.

(b) Applicable only when the average modulus of rupture for two tests is not less than 650 psi (4.5 MPa).

When the temperature of the air surrounding the concrete is above and maintained above 32 ºF (0 ºC) and below 50 ºF (10 ºC) and the provisions of 842.12 are not in force, the duration of the cure shall be based on a beam test, except that the curing time shall not be less than tabulated above.

When a beam test is not performed, the time specified above for removing falsework and opening to traffic shall be extended one day for each day the temperature of the air surrounding the concrete is below 50 ºF (10 ºC).

All superstructure concrete, all concrete which is to have a sealer applied, and all construction joints shall be cured in accordance with Method (a) Water Curing. All other concrete shall be cured either by Method (a) Water Curing or Method (b) Membrane Curing. However, if Method (b) is used on areas to be waterproofed, the membrane shall be removed.

Compression rings are not to be installed on pier columns or similar items of construction for the purpose of supporting falsework or subsequent construction until after a 72-hour curing period.

No load shall be applied or other work conducted that will damage new concrete or interfere with its curing. Where work is necessary on new concrete to complete a structure, such as building forms on a footing, workers and materials shall be kept off such concrete until such time as it will not be damaged by the work in progress, but in no case shall the elapsed time between placing the concrete and working on same be less than 36 hours. No work that will interfere with the curing shall be done on concrete placed during cold weather unless insulating material to retain the heat in the mix is placed during periods in the day when the presence of workers will not interfere with the normal curing procedure. When this is done, the normal protection shall be resumed immediately after work is suspended. Proper curing shall have preference and, if necessary, workers shall be kept off so that the concrete may be thoroughly wetted and kept wet until the curing is completed.

Method (a) Water Curing. All surfaces not covered by forms shall be protected immediately after brooming or final finishing with two thicknesses of wet burlap and kept wet by the continuous application of water for a period of not less than 7 days. Formed surfaces shall, after the removal of forms, be cured in like manner for the remainder of the curing period with the entire surface of the concrete being thoroughly drenched with water and covered immediately after forms are removed.

In lieu of continuous sprinkling, wet burlap covered with white polyethylene sheeting or plastic coated burlap blankets 705.06 may be used. They shall be placed wet with the burlap side against the concrete. Adjoining plastic coated blankets or polyethylene sheets used to cover wet burlap shall be lapped sufficiently and held securely in place at laps and edges so that positive moisture seal is provided. White polyethylene sheeting or plastic coated blankets containing holes or tears shall be covered with an additional covering of sheeting or blankets as directed.

Method (b) Membrane Curing. Immediately after the free water has disappeared on

surfaces not protected by forms and immediately after the removal of forms, if such are removed before the end of the 7-day curing period, the concrete shall be sealed by spraying as a fine mist a uniform application of the curing material 705.07, Type 1 or 1D, in such manner as to provide continuous, uniform, water impermeable film without marring the surface of the concrete.

The membrane curing shall be applied in one or more separate coats at the rate of at least 1 gallon per 200 square feet (1 L/5m^2) of surface. To assure that the proper amount of the curing material is applied, the number of gallons (liters) of curing material in the spray container shall be noted, and the correct area for that volume laid off so that the area of concrete surface to be covered will be such that the approved application rate will be secured. Curing material shall be thoroughly agitated immediately previous to use. If the film is broken or damaged at any time during the specified curing period, the area or areas affected shall be given a complete duplicate treatment of the curing material applied at the same rate as the first treatment.

Unless adequate precautions are taken to protect the surface of the membrane, workers, materials and equipment shall be kept off the membrane for the duration of the curing period.

842.15 Surface Finish. Immediately after the removal of forms, all cavities produced by form ties and all other holes, honeycomb spots, broken corners or edges and other defects shall be cleaned, dampened and completely filled, pointed or trued with a mortar of the same proportions as used in the concrete being finished. Exposed surfaces which are not satisfactory to the Engineer because of excessive patching and/or other corrective work, shall be grout cleaned or rubbed as required by the Engineer. Other contiguous exposed surfaces on the structure shall be finished in a similar manner to the extent required to produce a uniform appearance.

On all exposed surfaces, all fins and irregular projections shall be removed with a stone or power grinder, care being taken to avoid contrasting surface textures. Sufficient white cement shall be substituted for the regular cement in the filling of holes and other corrective work to produce finished patches of the same color as the surrounding concrete.

Grout Cleaning. Where grout cleaning is called for on the plans or is necessary for corrective work, the surface, after wetting, shall be uniformly covered with a grout consisting of one part cement to 1 1/2 parts fine sand, 703.03 and sufficient water to produce a consistency of thick paint. White portland cement shall be used for all or part of the cement in the grout, as directed by the Engineer, to give the color required to match the concrete. The grout shall be uniformly applied with brushes or a spray gun, and all air bubbles and holes shall be completely filled. Immediately after the application of the grout, the surface shall be vigorously scoured with a cork or other suitable float. While the grout is still plastic the surface shall be finished with a sponge rubber or other suitable float removing all excess grout. The finishing shall be done at the time when grout will not be pulled from the holes or depressions. After being allowed to thoroughly dry, the surface shall be vigorously rubbed with a dry burlap to completely remove any dried grout. There shall be no visible film of grout remaining on the surface after this rubbing and the entire cleaning operations of any area must be completed on the day it is started. If any dark spots or streaks remain after this operation, they shall be removed with a fine grained

silicon carbide stone, but the rubbing shall not be sufficient to change the texture of the surface. Unless otherwise directed by the Engineer, grout cleaning shall be delayed until the final clean up of the project.

Rubbed Finish. Forms shall be removed, if possible, within two days after concrete is placed. Corrections shall be made as outlined above. Rubbing of concrete shall be started as soon as the conditions will permit. Immediately before starting this work, the concrete shall be kept thoroughly saturated with water for a minimum period of two hours. Sufficient time shall have elapsed before wetting down to allow the mortar used in pointing insert holes and defects to be thoroughly set. Surfaces to be finished shall be rubbed with a medium coarse silicon carbide stone until all form marks, projections and irregularities have been removed, all voids filled and a uniform surface has been attained. The paste produced by rubbing shall be left in place at this time. No additional material other than water shall be applied to the surface. After all concrete above the surface being finished has been placed, the final finish shall be obtained by rubbing with a fine silicon carbide stone and water. This rubbing shall be continued until the entire surface is of a smooth texture and uniform in color. Any surfaces which have been given a rubbed finish, shall be protected from subsequent construction operations. Any surfaces which are not protected shall be cleaned and again rubbed, if necessary, to secure a uniform and satisfactory surface.

No extra payment will be made for any type of surface finish, the cost being considered as included in the price bid for concrete.

842.16 Roadway Finish. Concrete deck slabs shall be finished in accordance with the requirements of 451.12 except that construction joints shall not be edged, and a strip of surface 9 to 12 inches (220 to 300 mm) wide adjacent to curbs and barriers shall not be grooved. The use of a broom drag on concrete deck slabs may be in the longitudinal or transverse direction. The requirement for use of a finishing machine may be waived by the Engineer for small bridges where their use is impractical.

The finishing machine shall be approved by the Engineer. It shall be self-propelled and equipped with forward and reverse drive mechanisms that enable precision velocity control of the machine while moving in either direction. It shall be equipped with one or more rotating rollers, leveling augers and either a vibrating pan or vibrating rollers. Vibrating frequency for pans or rollers shall be variable from 1500 to 5000 pulses per minute. The Contractor shall furnish the necessary verification of these frequencies. The finishing machine shall be capable of finishing transversely while traveling in either direction across the deck. Screeds shall have provisions for raising them above the concrete surface. The finishing machine shall be of sufficient size to finish the full width of the decks between curbs or parapet walls. The wheels of the finishing machine shall run on temporary riding rails adequately supported on structural steel or falsework. The rail and rail supports shall be made of steel and shall be arranged so that the weight of the finishing machine and the operator cause zero vertical deflection while traveling across the deck. Rail shall be straight with no sections exceeding a tolerance of 1/8 inch in 10 feet (3 mm in 3.0 m) in any direction. All support rails shall be elevated a sufficient distance above the slab to permit the simultaneous finishing by hand of any portions not finished by the machine. Any rail supports shall be fabricated and installed in such manner

as to permit their removal to at least 2 inches (50 mm) below the top of the slab. Holes formed by the removal of such supports shall be filled during the final finishing of the slab. The concrete shall be delivered and distributed at a uniform and adequate rate ahead of the finishing machine by suitable mechanical equipment. Concrete shall be placed no more than 10 feet (3m) directly in front of the finishing machine.

Bridge decks that are to be waterproofed with a membrane shall be given a burlap drag finish.

842.161 Bridge Deck Grooving. After the concrete has cured, transverse grooves shall be sawed into the deck. The grooving shall conform to the following requirements:

Grooving shall be done utilizing diamond blades, mounted on a multi blade arbor on a self-propelled machine which has been built for grooving of concrete surfaces. The groove machine shall have a depth control device which will detect variations in the pavement surface and adjust the cutting head height to maintain the depth of the groove specified. The grooving machine will be provided with devices to control alignment. Flailing or impact type grooving equipment will not be permitted.

Grooves shall begin and end approximately one foot from any curb, parapet toe or deck edge and shall be perpendicular to the bridge center line.

The Contractor shall provide an experienced technician to supervise the location, alignment, layout, dimension, and grooving of the surface.

Grooves shall run in a continuous pattern across the surface. The grooving shall be terminated a minimum of 1 foot (300mm) from any device in place in a bridge deck, such as scuppers or expansion joints. The grooves shall be a random pattern spaced at 3/8 to 1 3/4 inch (10 to 45 mm), with 50 percent of spacings being less than 1 inch (25 mm). The grooves shall be approximately 0.15 inches (4 mm) deep and 0.10 inches (3 mm) wide.

At the beginning of each work shift, all grooving machines shall be equipped with a full complement of grooving blades that are capable of cutting grooves of the specified width, depth and spacing.

If during the course of work, a single grooving blade on any individual grooving machine becomes incapable of cutting a groove, work will be permitted to continue for the remainder of the work shift and the Contractor will not be required to otherwise cut the groove omitted because of the failed blade. Should two or more grooving blades on any individual grooving machine become incapable of cutting grooves, the Contractor shall cease operating such equipment until it is repaired.

The removal of all slurry and any remaining residue resulting from the grooving operation shall be continuous. The bridge deck surface shall be left in clean condition, free of all slurry and residue. Residue from grooving operations shall not be permitted to flow across shoulders or lanes occupied by public traffic or flow into gutters or other drainage facilities. Solid residue, resulting from grooving operations, shall be removed from the surface before such residue is blown by the action of traffic or wind.

The Contractor shall be responsible for providing water as necessary to perform the specified grooving in accordance with the specifications.

842.17 Sidewalk Finish. The concrete shall be struck off after placing with a template and finished with a float to produce a sandy texture.

842.18 Method of Measurement. The volume shall be the number of cubic yards (cubic meters) determined by calculations from plan dimensions, in place, completed and accepted.

Reinforcing steel, supports, mechanical connectors, and tie wires shall be incidental in the price bid for structural concrete.

No deduction will be made for the volume of the reinforcing steel, conduits or structural steel other than beam flanges embedded in deck slabs. No deduction will be made for the volume of any embedded timber or concrete piles.

Superstructure concrete includes the concrete in deflective parapets not having a metallic railing.

Deck concrete may be measured by either volume or area. The area of concrete shall be based on plan dimensions.

842.19 Basis of Payment. Payment will be made at contract prices for:

Item	Unit	Description
842	Cubic yard (cubic meter)	Class ___ concrete, _____
842	Cubic yard (Cubic meter), Square yard (square meter)	Class ___ concrete, bridge deck

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 844

HIGH PERFORMANCE CONCRETE FOR STRUCTURES

January 6, 1999

844.01 DESCRIPTION. This item consists of supplying, placing, curing, broom texturing, sealing joints and cracks and diamond grinding a high performance concrete that is workable, finishable, and when necessary, pumpable.

The probability of higher than normal dosage rates of Type F or G admixtures is likely. The need for chemical admixtures or aggregates or both, different from the Contractor's normal sources is a distinct possibility.

All provisions of Supplemental Specification 899 (Concrete - General) and Supplemental Specification 842 (Concrete for Structures) shall apply, except as modified herein.

844.02 MATERIAL. The maximum sodium sulfate soundness loss for coarse aggregate will be 10 percent.

Fly ash will meet 705.13 Class C.

Ground granulated blast furnace (GGBF) slag will meet ASTM C 989, grade 100 minimum (manufacturer's certification is required). The one day cube strength results of ASTM C 1073 may be used in lieu of the 7 and 28 day cube strengths required by ASTM C 989.

Only one source of fly ash or GGBF slag will be used in any one structure, unless otherwise authorized by the Engineer. Bulk fly ash or GGBF slag will be stored in waterproof bins.

Micro-silica admixture will meet ASTM C 1240 and be from a source approved by the Office of Materials Management, 1600 W. Broad Street, Columbus, Ohio.

Cement will be Type 1 only (701.04); only one brand, grade or kind shall be used in any given superstructure except upon permission of the Engineer.

High molecular weight methacrylate resin sealer shall meet the requirements of Supplemental Specification 954.

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 its company or the ready-mix supplier to be in charge of the dispensing of the admixture products. The technical representatives will 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.

844.03 PROPORTIONING. The proportioning options of 899.04 will not be permitted.

At least 3 days prior to placing the test slab, the Contractor will submit in writing the specific mix design and batching sequence for the project. This design is for the Engineer's information and review and only subject to approval for meeting the specification proportions.

If any proportioning or batching sequence modifications are needed, the Contractor will submit a revised mix design or batching sequence to the Engineer and perform another test slab at no additional cost to the State. A successful test slab pour, as determined by the Engineer, must be completed before any concrete is placed.

844.031 PROPORTIONING, SLIPFORMING. The Contractor is allowed the option of slipforming bridge parapets. A mix will be developed and a 20 foot (6m) section of parapet will be slipformed as a test section. Up to two thirds of the No. 8 Size coarse aggregate may be replaced with No. 57 Size coarse aggregate. The Engineer will approve the test section before any additional parapet concrete is allowed to be slipformed. The approved slipform concrete mix design will be submitted to The Office of Materials Management for record purposes.

Dimensional Tolerances and Acceptance Criteria.

Dimensions will not be in excess of the construction tolerances listed below:

Reinforcing steel cover	- ½ inch (- 13 mm) + ½ inch (+ 13 mm)
Top width dimension	-0 + 1/4 inch (+ 6 mm)
Bottom width dimension	-0 + ½ inch (+ 13 mm)
Surface flatness	1/4 inch in 10 feet(6 mm in 3 meters)
Vertical alignment	½ inch in 20 feet
(Deviation from a line parallel	(13 mm in 6 meters)
to the grade line)	

All reinforcing steel joints and/or splices in the bridge railing steel shall be tied. A dry run to check for reinforcing clearance and rigidity of the reinforcing cages shall be required before any concrete is placed. The Contractor shall verify reinforcing clearances and make any adjustments to the cage to establish the required clearances during the dry run. Reinforcing steel cages are to be rigid (defined as no movement during the slipforming dry run). If the Engineer determines the cages are not rigid, the Contractor must stabilize the cages before any slipforming is performed. The Contractor may add any additional diagonal reinforcing steel between the front and rear vertical reinforcing faces to establish the required rigidity. Any additional reinforcing steel required to adequately stabilize the cages shall be the Contractor's expense.

Honeycombing, cracking, tearing and other defects shall be repaired or patched immediately upon exit from the slipform equipment. Defects shall be completely filled with concrete.

Control joints shall be constructed by sawing 1 1/4 inches (32 mm) deep the perimeter of the parapet, after the concrete has taken its initial set but before any shrinkage cracks develop. Generally initial set is within 6 hours of batching of the concrete. All joints shall be sawed within 24 hours of placement. Joints shall be sawed by using an edge guide, fence or jig to insure that the joint is straight, true and aligned on all faces of the parapet. The joint width shall be the width of the saw blade, a nominal 1/4 inch (6 mm).

Slip formed concrete will require different slumps than those listed in 899 or other plan specified concrete. The consistency of the concrete should be such that the concrete exiting the slipform does not pull but is stiff enough to prevent waviness and sags in the finished surfaces. Method A, Water Curing, 842.14 is required. As slipformed concrete has a low water-cement ratio, timely application of the water cure is critical in helping control shrinkage cracks.

No water shall be added or applied to the concrete after it has left the truck.

The Contractor shall furnish all necessary platforms to protect against falling debris during the slipforming operation, to allow access for completing the finishing operation and to allow the inspector access.

Concrete control joints will be sawed 1½ inch (35mm) into the concrete by use of an edge guide, fence or jig to assure the cut joint is straight, true and aligned on all faces of the parapet. the Joint will be a saw blade wide, (nominal ¼ inch (6mm)). The perimeter of the control joint will be caulked with a polyurethane or polymeric material meeting Federal Specification TT-S-00227E.

The Engineer will inspect the slipformed surface for horizontal cracking no earlier than 21 days after completion of the slipforming operation. All horizontal cracks shall be repaired by epoxy injection. If a concrete sealer has been applied, any damage to the sealer shall be repaired after the epoxy injection has been completed. The aforementioned repairs shall be made at no additional cost to the State.

844.04 MIX OPTIONS. Unless specific concrete mixes are specified in the pay item descriptions, the following provisions will apply:

All superstructure concrete except for parapet concrete will consist of mix 3 or mix 4. If mix 3 is used for the deck, then all other concrete will be mix 1 or mix 3 concrete. If mix 4 is used for the deck, then all other concrete will be mix 2 or mix 4 concrete.

Any 899 calendar time restrictions regarding the use of fly ash will be waived for this concrete.

The following proportions will used as a starting mix design.

CONCRETE TABLE
Quantities Per Cubic Yard
Aggregates (SSD)

Mix 1 (Fly Ash)

Aggregate Type	Fine Aggregate (lb)	#8 Coarse Aggregate (lb)	Total (lb)	Cement Content (lb)	Fly Ash (lb)	Water to Cementitious Ratio Max	Air Content +/-2%
Gravel	1320	1480	2800	530	170	0.38	7
Limestone	1320	1495	2815	530	170	0.38	7
Slag	1320	1300	2620	530	170	0.38	7

Mix 2 (GGBF Slag)

Aggregate Type	Fine Aggregate (lb)	#8 Coarse Aggregate (lb)	Total (lb)	Cement Content (lb)	GGBF Slag (lb)	Water to Cementitious Ratio Max	Air Content +/-2%
Gravel	1335	1480	2815	490	210	0.38	7
Limestone	1335	1495	2830	490	210	0.38	7
Slag	1335	1295	2630	490	210	0.38	7

Mix 3 (Fly Ash + Microsilica)

Aggregate Type	Fine Aggregate (lb)	#8 Coarse Aggregate (lb)	Total (lb)	Cement Content (lb)	Fly Ash (lb)	Micro-Silica (lb)	Water to Cementitious Ratio Max	Air Content +/-2%
Gravel	1355	1475	2830	480	150	30	0.40	7
Limestone	1355	1490	2845	480	150	30	0.40	7
Slag	1355	1295	2650	480	150	30	0.40	7

Mix 4 (GGBF Slag + Microsilica)

Aggregate Type	Fine Aggregate (lb)	#8 Coarse Aggregate (lb)	Total (lb)	Cement Content (lb)	GGBF Slag (lb)	Micro-Silica (lb)	Water to Cementitious Ratio Max	Air Content +/-2%
Gravel	1370	1475	2845	440	190	30	0.40	7
Limestone	1370	1490	2860	440	190	30	0.40	7
Slag	1370	1295	2665	440	190	30	0.40	7

8 inch maximum slump at placement for all mixes.

CONCRETE TABLE
Quantities Per Cubic Meter
Aggregates (SSD)

Mix 1 (Fly Ash)

Aggregate Type	Fine Aggregate (kg)	#8 Coarse Aggregate (kg)	Total (kg)	Cement Content (kg)	Fly Ash (kg)	Water to Cementitious Ratio Max	Air Content +/-2%
Gravel	783	878	1661	314	101	0.38	7
Limestone	783	887	1670	314	101	0.38	7
Slag	783	771	1554	314	101	0.38	7

Mix 2 (GGBF Slag)

Aggregate Type	Fine Aggregate (kg)	#8 Coarse Aggregate (kg)	Total (kg)	Cement Content (kg)	GGBF Slag (kg)	Water to Cementitious Ratio Max	Air Content +/-2%
Gravel	792	878	1670	291	125	0.38	7
Limestone	792	887	1679	291	125	0.38	7
Slag	792	768	1560	291	125	0.38	7

Mix 3 (Fly Ash + Microsilica)

Aggregate Type	Fine Aggregate (kg)	#8 Coarse Aggregate (kg)	Total (kg)	Cement Content (kg)	Fly Ash (kg)	Micro-Silica (kg)	Water to Cementitious Ratio Max	Air Content +/-2%
Gravel	804	875	1679	285	89	18	0.40	7
Limestone	804	884	1688	285	89	18	0.40	7
Slag	804	768	1572	285	89	18	0.40	7

Mix 4 (GGBF Slag + Microsilica)

Aggregate Type	Fine Aggregate (kg)	#8 Coarse Aggregate (kg)	Total (kg)	Cement Content (kg)	GGBF Slag (kg)	Micro-Silica (kg)	Water to Cementitious Ratio Max	Air Content +/-2%
Gravel	813	875	1688	261	113	18	0.40	7
Limestone	813	884	1697	261	113	18	0.40	7
Slag	813	768	1581	261	113	18	0.40	7

200mm maximum slump at placement for all mixes.

The weights specified in the concrete table were calculated for materials of the following bulk specific gravities (SSD): natural sand and gravel 2.62, limestone sand 2.68, limestone 2.65, slag 2.30, fly ash 2.65, GGBF slag 2.90, Microsilica solids 2.20, and Portland cement 3.15. For aggregates of specific gravities differing more than plus or minus 0.02 from these, the weights in the table will be corrected.

If, during the progress of work, the specific gravity of one or both of the aggregates changes, the batch weight will be adjusted to conform to the new specific gravity.

The water cement ratio will be calculated based upon the total cementitious material. Cementitious material will include Portland cement, fly ash, GGBF slag and Microsilica (solids).

The proportions of coarse and fine aggregate will be adjusted to provide the maximum amount of coarse 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 100 pounds (50 kg) each, unless otherwise approved by the Engineer.

844.05 PROVISIONS. An approved high range water reducer (Type F or G) will be used to achieve the desired workability level at the specified water cementitious ratio. These chemical admixtures will conform to 705.12 (ASTM C 494) Type F or G and be approved by the Office of Materials Management. The majority of these admixtures will be added at the plant.

Type A or D chemical admixture conforming to 705.12 (ASTM C494) will be added to the concrete at the plant. The addition of these admixtures will supersede the concrete temperature requirements under items 899.03 and 842.06. The trial batch, as specified below, will be repeated until the mix exhibits the necessary finishability characteristics.

The moisture content of the coarse aggregate will be above the saturated surface dry (SSD) condition immediately prior to being incorporated into the mix.

The cementitious content will be maintained and the maximum water cementitious ratio will not be exceeded. The Type F or G admixture will be added and mixed in accordance with the manufacturer's recommendations. The Contractor will furnish a volumetric dispenser for the Type F or G or have a gage on each truck-mounted Type F or G dispensing tank. After discharging concrete and prior to reloading, all wash water will be removed, by reversing each truck drum at the plant.

If Type F or G admixture is added at the job site, the load will be mixed a minimum of 5 minutes at mixing speed.

If during discharge any mechanical balling or microsilica balling whatsoever is observed, the load shall be rejected and the mixing process revised to prevent further balling.

If slump loss occurs before placement of the concrete, the concrete may be "replasticized" with the admixture to restore plasticity. The slump range and air content will be rechecked to ensure conformance to the specifications. If the consistency of the load after "replasticizing" is such as to cause segregation of the components, this will be cause for rejection of the load. Discharge will be complete within 90 minutes after the combining of the water and the cementitious material.

The Contractor will perform sufficient advance testing to ensure conformance with these specifications prior to placement of the concrete.

Sampling and testing for entrained air content and slump will be measured at the point of placement. For deck pours, this will be at the point of placement on the deck.

The Contractor will make one or more trial batches of concrete meeting these specifications, of the size to be hauled, at least four days before the deck concrete is to be placed. The Contractor will cast one or more test slabs, 8 feet (2.4m) x 4 feet (1.2m) x 4 inches (0.1m), finished and textured in accordance with these requirements. The

Contractor will not be required to saw the texture unless the deck texture is required to be sawn. If the workability of the trial batch is not acceptable, the Contractor will modify the mix design or batching sequence and retest as per 844.03. Payment for the trial batch or batches and test slabs will be at the lump sum price bid for High Performance Concrete Trial Mix.

844.06 PLACEMENT LIMITATION. Concrete deck pours will begin only when favorable atmospheric conditions exist and are predicted to stay favorable for the duration of the pour.

Favorable atmospheric conditions exist when the surface evaporation rate, as affected by the ambient air temperature, concrete temperature, relative humidity, and wind velocity is 0.1 pounds per square foot per hour (0.49 kg per square meter per hour) or less. Figure 1 ACI 308 (see Item 842.08) will be used to determine graphically the surface evaporation rate.

To meet favorable atmospheric conditions, the Contractor may be required to place concrete at night. Actual measurement of data required in Figure 1 will be within 10 feet (3 m) of the area where the concrete is to be placed. For piers, abutments, and poured parapets, Figure 1 will not apply. Figure 1 will apply for slip formed parapets.

If placement is to be made at night, the Contractor will submit a plan which provides adequate lighting for the work area at least 15 calendar days in advance, and receive written approval from the Engineer before placing the concrete. The lights will be so directed that they do not affect or distract approaching traffic.

The Contractor will ensure that concrete pumping lines do not displace reinforcing steel during placement.

844.07 EQUIPMENT FOR BRIDGE DECKS. Concrete will be mixed in a central mixing plant or by a ready-mixed truck capable of discharging concrete having a maximum water cementitious ratio of 0.38. Mixing equipment will meet the requirements of 899.06(b). Admixtures will be introduced into the concrete in such a manner as to facilitate dispersion throughout entire load. Batch plants will meet the requirements of 899.06(a) and will be located such that the maximum time required from start of mixing to completion of discharge of the concrete at the site will not exceed 90 minutes.

An approved self-propelled finishing machine will be used. The finishing machine will be equipped with forward and reverse drive mechanisms that enable precise velocity control of the machine while it is moving in either direction. It will be equipped with two or more rotating rollers. It will be equipped with augers and either a vibrating pan or vibrating rollers. Vibrating frequency for pan or rollers will vary from 1500 to 5000 pulses per minute. The Contractor will furnish the necessary verification of these vibration frequencies. Screeds will have provisions for raising above the finished concrete surface. Roller tampers attached to finishing machines which have fins protruding more then 1/4 inch (6mm) from the roller are not allowed.

Concrete shall be placed no more then 10 feet (3.1 m) directly in front of the finishing machine.

Standard hand vibration equipment shall be used. Because high performance concretes are more cohesive, more vibration is required for proper consolidation than for

Class C and S mixes. Vibration, often between each rebar, will be required to adequately consolidate a bridge deck even though the surface appears well consolidated.

Finishing machines will be supported by rail and supports made of steel. Rail will be furnished in sections not less that 10 feet (3.1 m) in length and be sufficient cross-section so that the weight of the finishing machine causes zero vertical deflection while in motion. Rail will be straight with no sections exceeding a tolerance of 1/8 inch in 10 feet (3 mm in 3.1 m) in any direction. Rail supports will be screw-type adjustable saddles and will be of sufficient number under the rail so that zero vertical deflection occurs under the weight of the finishing machine.

A flexible blue steel blade with rounded edges is recommended for finishing.

844.08 SUPERSTRUCTURE DECK CURING AND TEXTURING. After the concrete is placed, finished and bullfloated if necessary, the surface of the concrete shall immediately receive a broom finish. Immediately after the completed brooming, the finished surface will be covered with a single layer of clean wet burlap. The burlap will be kept wet by a continuous flow of water through soaker hoses and covered with a 4 mils (100 μm) white opaque polyethylene film or a wet burlap - white opaque polyethylene sheet for 7 days. At the end of 7 days, the deck will be allowed to surface dry. After the deck has air dried but within 12 hours, the surface shall be membrane cured as per 842.14 method(b).

When pouring under provision of 842.12, the deck will be kept continuously wet with hoses and the curing will be 7 days with the surface being maintained between 50 ºF (10 ºC) and 100 ºF (38 ºC) as specified. At the end of 7 days, the deck will be allowed to surface dry. After the deck has air dried but within 12 hours, the surface shall be membrane cured as per 842.14 method(b).

After the water curing is completed, and prior to the application of the curing compound, the Contractor shall saw transverse grooves into the deck. In lieu of sawing the grooves into the deck prior to the application of the curing compound, the Contractor may elect to saw the grooves into the deck some period after the curing compound is placed. However, in every case it will be necessary to saw the deck prior to opening the bridge to traffic. If the Contractor does elect to saw the deck after the curing compound has been applied, it will be necessary, at no additional costs, to reapply the curing compound immediately after the surface of the deck has air dried but within 12 hours after the sawing operation.

The grooving shall conform to the following requirements: Grooving shall be done utilizing diamond blades, mounted on a multi blade arbor on a self-propelled machine which has been built for grooving of concrete surfaces. The groove machine shall have a depth control device which will detect variations in the pavement surface and adjust the cutting head height to maintain the depth of the groove specified. The grooving machine will be provided with devices to control alignment. Flailing or impact type grooving equipment will not be permitted.

Grooves shall begin and end approximately one foot from any curb, parapet toe or deck edge and shall be perpendicular to the bridge center line.

The Contractor shall provide an experienced technician to supervise the location, alignment, layout, dimension, and grooving of the surface.

Grooves shall run in a continuous pattern across the surface. The grooving shall be terminated a minimum of 1 foot (0.3 m) from any device in place in a bridge deck, such as scuppers or expansion joints. The grooves shall be a random pattern spaced at 3/8 to 1 3/4 inch (10 to 45 mm), with 50 percent of spacings being less than 1 inch (25 mm). The grooves shall be approximately 0.15 inches (4 mm) deep and 0.10 inches (3 mm) wide.

At the beginning of each work shift, all grooving machines shall be equipped with a full complement of grooving blades that are capable of cutting grooves of the specified width, depth and spacing.

If during the course of work, a single grooving blade on any individual grooving machine becomes incapable of cutting a groove, work will be permitted to continue for the remainder of the work shift and the Contractor will not be required to otherwise cut the groove omitted because of the failed blade. Should two or more grooving blades on any individual grooving machine become incapable of cutting grooves, the Contractor shall cease operating such equipment until it is repaired.

The removal of all slurry and any remaining residue resulting from the grooving operation shall be continuous. The bridge deck surface shall be left in clean condition, free of all slurry and residue. Residue from grooving operations shall not be permitted to flow across shoulders or lanes occupied by public traffic or flow into gutters or other drainage facilities. Solid residue, resulting from grooving operations, shall be removed from the surface before such residue is blown by the action of traffic or wind.

The Contractor shall be responsible for providing water as necessary to perform the specified grooving in accordance with the specifications.

844.09 CURING AND LOADING. Curing and loading will be per 842.14, except that the deck will not be opened to traffic until the 7 day water cure is completed and the membrane curing compound has been applied and allowed to dry for the minimum time recommended by the manufacturer. Superstructure deck concrete placed between October 15 and March 15 will not be opened to traffic for a minimum of 30 days after placement.

844.10 SEALING JOINTS AND CRACKS. After the application of the membrane cure, and the deck has thoroughly dried, the following areas will be sealed with a high molecular weight methacrylate (HMWM) sealer meeting Supplemental Specification 954 prior to opening the deck to traffic: transverse joints in the deck; joints between the concrete deck and steel end dams; longitudinal joints in the deck; longitudinal joints between the deck and safety curb, barriers, and parapets, etc.; and, cracks which are discovered in the deck which will be checked on the top and bottom surface before opening the deck to traffic.

All costs for sealing in accordance with above, will be included with the appropriate concrete item. No separate payment for sealing will be made.

844.11 CHLORIDE RESISTANCE, DRYING SHRINKAGE, AND HEAT OF HYDRATION TESTING. When included as a separate pay item, the Contractor will perform rapid chloride permeability tests (AASHTO T 227) for every bridge deck placed

using this concrete. A minimum of 3 tests will be made for decks containing less than 100 cubic yards (75 cubic meters) of superstructure concrete. For all other decks, 6 tests will be required. These tests will be made on the deck superstructure concrete samples obtained from the actual concrete used. The same number of drying shrinkage tests will be performed as per ASTM C 157.

Results of rapid chloride permeability tests will be shown at 28, 56 and 90 days. Results of drying shrinkage tests will be shown at 4, 7, 14, 28, 56 and 90 days.

Concrete heat of hydration testing will be performed to determine the potential for length change due to thermal expansion and contraction. Starting immediately after the placement of the deck, concrete temperatures will be taken and tabulated. A location will be chosen on the deck which is accessible for hourly readings and representative of the overall deck pour. The temperatures will be taken by installing three thermometers into the fresh concrete. The bulb of the thermometers will be located at 1 inch (25mm) below the surface of the concrete, at approximately mid-slab and at 1 inch (25mm) above the bottom deck form. The thermometers will be left in place throughout the testing time. Thermometers may be lubricated and placed in a thin plastic sheath to facilitate eventual removal. After removal, the holes remaining will be drilled out and filled as approved by the Engineer.

The following temperature intervals will be used:

Test Intervals	**Time**
2 hour	first 12 hours
3 hours	second 12 hours
4 hours	second day
8 hours	third thru fifth day

Ambient air temperatures will also be noted when each concrete temperature is taken. All testing will be performed by a testing laboratory regularly inspected by the "Cement and Concrete Reference Laboratories" (CCRL). A copy of the last CCRL inspection report will be furnished to the Engineer prior to the test slab pour.

If the Contractor uses Mix 1 or Mix 2 concrete for the parapets or substructures, the Contractor will make an additional 3 chloride permeability and drying shrinkage tests for that concrete. If used for the parapets, the Contractor will also test for heat of hydration as described above with one thermometer located at 1 inch (25mm) below the top of the parapet and second thermometer located 19 inches (500mm) below the top of the parapet, approximately midway between the front and back faces of the parapet. For units constructed with the same concrete mix option as the deck, no additional testing will be required.

The results of all tests shall be tabulated on the attached form and forwarded to the following address no later than 10 days following the completion of the tests:

The Office of Structural Engineering
Ohio Department of Transportation, 3rd Floor
1980 W. Broad Street
Columbus, Ohio 43223

All costs of testing as outlined above will be paid for under the lump sum bid price for High Performance Concrete Testing.

844.12 METHOD OF MEASUREMENT. The volume will be measured as per 842.18. The area of high performance concrete will be based on plan dimensions. The above items will include all labor, material, equipment and incidentals necessary to complete these items of work. The above items will also include all costs associated with sealing joints and cracks and sawing grooves into the deck.

Payment for high performance concrete testing will not be made until the Office of Structural Engineering has received the results of all tests.

844.13 BASIS OF PAYMENT. Payment for the above completed and accepted quantities will be made at the contract bid price for:

Item	Units	Description
844	Cubic yard (cubic meter)	High performance concrete superstructure (deck)
844	Square yard (square meter)	High performance concrete superstructure (deck)
844	Cubic yard (cubic meter)	High performance concrete superstructure (parapet)
844	Cubic yard (cubic meter)	High performance concrete substructure
844	Lump sum	High performance concrete trial mix
844	Lump sum	High performance concrete testing

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 877
TEMPORARY SEDIMENT AND EROSION CONTROL

April 13, 1999

877.01 Description. This work shall consist of temporary control measures as detailed in the plans and/or general notes during the life of the contract to control sediment and erosion through the use of straw or hay bales, dikes, slope protection, sediment pits, basins and dams, slope drains, coarse aggregate, mulches, grasses, filter fabrics, ditch lining, inlet protection and other erosion control devices or methods.

The permanent control provisions contained in the contract shall be coordinated with the temporary erosion control features to the extent practical to assure economical, effective and continuous erosion control throughout the construction and post-construction period.

Temporary controls are required for construction work outside the right-of-way in areas such as borrow pit operations, haul roads, equipment and material storage sites, waste areas, and temporary plant sites. This work will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor, with costs included in the contract prices bid for the items to which they apply.

877.02 Materials. Commercial fertilizer shall be (10-20-10) and shall conform to Item 659.

Temporary seeding and mulching shall consist of annual ryegrass (*Lolium multifolium*). Seed and mulching materials shall be applied in accordance with Item 659.

Temporary filter fabric ditch checks shall consist of 30 inch [0.8m] wide filter fabric with sound wood supports with maximum spacing of 10 feet [3.0m] on centers. Temporary inlet filter barriers shall consist of 18 inch [0.5m] wide filter fabric fence with a securely nailed 2 x 4 wood frame.

Temporary bale filter dikes and perimeter filter fabric fence shall consist of straw or hay bales, or 30 inch [0.8m] wide filter fabric fence with sound wood supports with a maximum

spacing of 10 feet [3.0m] on centers. All the above filter fabric fence shall meet the requirements of 712.09, Type C.

Temporary dikes shall consist of suitable 203 material.

Temporary slope drains shall consist of pipe, pipe caps, coarse aggregate, riprap, rock channel protection, or other materials. Sediment pits are not paid for separately but are included as part of slope drain construction.

Pipe caps shall be included in the unit bid price for the pipe. Pipe caps shall have a minimum diameter of 1/4 inch (6.4mm) holes and be specifically designed to connect to the pipe. There will be a minimum of one hole per square inch (645 mm^2) of the cross sectional end area of the pipe cap.

Temporary sediment basins and dams shall be constructed by methods described in Item 203 Excavation and Embankment and Item 601 Rock Channel Protection, Type C or D with filter.

Temporary rock check dams shall be constructed of Item 601 Rock Channel Protection, Type C or D without filter.

Temporary ditch and slope protection shall meet the requirements of Item 670.

877.03 Construction Requirements. The Storm Water Pollution Prevention Plan (SWPPP) details the placement, location and description of the temporary and permanent erosion control items. The following descriptions shall be used to supplement the plan. The Contractor shall rearrange and modify the plan quantities to meet the field conditions and the National Pollutant Discharge Elimination System (NPDES) Permit.

When the plan does not have a SWPPP, the Contractor shall submit a plan detailing control feature locations and quantities at the pre-construction meeting.

In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal or State or local agencies, the more restrictive laws, rules, or regulations shall apply.

(A) Clearing and Grubbing. The Contractor shall limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, and borrow and fill operations as determined by the project conditions. The Contractor shall preserve existing vegetation where attainable and temporarily seed and mulch disturbed idle areas as stated.

Inactive cleared and grubbed areas that are scheduled to remain idle for more than 45 days shall be stabilized with vegetation (i.e. temporary seed and mulch) within 7 days following the clearing and grubbing operations. If an area is within 50 feet [15 m] of any water body (i.e. stream, river, pond, etc.), then it shall be vegetated within 2 days following

the clearing and grubbing operations.

(B) Installation of Control Features. Temporary erosion and sediment control items shall be installed as detailed and are to remain functional until the upper slope drainage areas are fully stabilized.

Temporary perimeter, ditch check or inlet filter fabric fence shall be constructed in accordance with Standard Drawing DM-4.4.

1. Temporary Perimeter Controls: Temporary perimeter filter fabric fence shall protect the following from sheet flow runoff: off right of way locations; off construction limit locations; around water bodies, wet lands or around other significant items designated on the plan.

Dikes shall be used to prevent flow from coming on to the project and to barren areas on the project.

The Contractor shall install perimeter filter fabric fence and dikes concurrent with the clearing and grubbing operations.

2. Inlet Protection: The Contractor shall use an 18 inch [0.5m] wide filter fabric fence supported around a storm drain inlet or manhole with securely nailed 2 x 4 inch (50 X 100 mm) lumber. The Contractor shall excavate a six inch (150 mm) trench around the inlet, and drive the posts six inches (150 mm) below the excavated trench bottom. The fabric shall be stretched around the frame, placing six inches of fabric in the trench and secure tightly. The fabric shall overlap on one side of the inlet so that the fabric ends are not attached to the same post. Backfill the excavated soil onto the fabric and compact tightly.

The Contractor shall construct the inlet protection as soon as the inlet is completed.

3. Temporary and Permanent Seeding: Use seed and mulch liberally during and after construction and before or during winter shut down. Temporary seeding areas shall be fertilized at one-half the specified rate of application in Item 659. Temporary seeding shall be annual ryegrass sown at 2 pounds per 1000 square feet [1 kg/100 m^2] and mulched in accordance with Item 659. When project conditions prevent the incorporation of fertilizer into the soil and preparation of the seed bed cannot be performed in accordance with Item 659, these requirements may be waived. Temporary seed shall not be placed on frozen ground.

The Contractor shall place the permanent seed on all barren areas within 7 days of obtaining final grade. The Contractor shall place the temporary seed and mulch as stated under clearing and grubbing.

4. Slopes: Dikes, slope drains and ditches shall be installed to divert water from bare soil and to protect cut and fill slopes. The Contractor shall place dikes at the top of fill slopes to protect the sides slopes from erosion.

The Contractor shall install dikes and slope drains when no filling activity occurs for three or more weeks and when slope height is greater than 8 feet [2.5m].

The Contractor shall construct a ditch at the top of cut slopes prior to the cutting of the slope to reduce runoff potential.

5. Ditch Checks: Filter fabric fence or rock checks are placed to protect ditches from erosion and to filter sediment from flowing water. The checks are placed across the width of the ditch.

Filter fabric fences are installed for 2 acres (8,000 m^2) or less of drainage area. Rock ditch checks are installed for 2 to 5 acres (8,000 to 20,000 m^2) of drainage area. When no rock quantities are denoted for rock checks, use the calculated rock quantities from basins for the rock checks.

Ditch checks shall be installed in conjunction with sediment basins and dams when the above drainage areas are not exceeded.

The Contractor shall place the ditch checks as soon as the ditch is cut.

6. Bale Filter Dikes: Bale filter dikes shall be installed a few feet (meters) from the toe of a slope to filter and/or divert sediment to an appropriate control before it enters a water body on or off the project limits.

It is used to collect sediment for a maximum of:

a) less than 1/4 acre [1,000 m^2] without an outlet
b) slope length of less than 100 feet [30 m] at a maximum slope of 2:1.
c) use outlet or pit every 100 feet [30 m] for a 2:1 slope. Use a greater spacing for flatter slopes.

Bale filter dikes shall be constructed in accordance with Standard Drawing DM- 4.3. When filter fabric is used for the bale filter dike, the location is accordance with Standard Drawing DM-4.3 and the construction details shown in Standard Drawing DM-4.4 are used.

The Contractor shall construct the bale filter dikes concurrent with the grubbing operations.

7. Sediment Dams or Basins: Basins and dams are placed and used at concentrated and critical flow locations to settle sediment out before leaving the project. Use basins at the bottom of a ravine, at a culvert inlet or outlet, along or at the end of the ditch and at any concentrated sediment exit point of the project. Use a basin quantity of 67 cubic yards for every acre of drainage area (125 m^3 per 10,000 m^2).

The Contractor shall construct sediment dams and basins at the first step of grading and within 7 days of commencing grubbing operations.

8. River, Stream and Water Body Protection: Protect all streams or water bodies passing through or on the project. Use filter fabric or bale filter dikes to line the water edges. Divert project sediment flow by using dike and slope protection. A combination of the above or other control features can be used.

The Contractor shall construct the above features concurrent with the grubbing operations.

a) Stream Relocation: Fully stabilize the new stream channel prior to diverting flow into the new channel.

b) Stream and River Crossing: Provide a means for construction equipment to cross water courses without causing erosion of streambanks or deposits in the channel. Plan and locate crossings well in advance of needing them. Disturbance to water bodies shall be kept to a minimum. Crossings shall be kept to a minimum and as narrow as practical. Crossings shall be made in shallow areas rather than deep pools where possible. Clearing, grubbing and excavation of streambanks, bed and approach sections shall be kept to a minimum.

The provisions for conveyance shall anticipate high flows and shall not impede the movement of aquatic life.

If culverts are used, the following minimums shall apply: Place culverts on the existing stream bed to avoid a drop in waterfall at the downstream end of the pipe. Culvert diameter shall be at least three times the depth of normal stream flow at the point of the crossing. The minimum size culvert to be used shall be 18 inches [0.5m]. There shall be sufficient number of culverts to completely cross the channel from stream bank to stream bank with no more than 12 inches [0.3m] between each culvert.

All fill and surface material placed in the channel, around the culverts or on the surface of the crossing shall be clean non toxic dump rock fill Type B, C, or D. Extend placed rock up slope from original stream bank to catch and remove erodible material from equipment.

Aggregate used does not need to be removed. Care should be taken to avoid any impoundment or restriction to fish passage. All pipes must be removed upon project completion.

The stream crossing work will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor, with costs included in the contract bid prices for the items to which they apply.

When the normal water elevation is shown on the plan, the Contractor shall construct crossings to accommodate a water elevation at least one foot (0.3m) above the stated normal water elevation. Fording in accordance with 107.21 is not allowed.

877.04 Maintenance. Temporary erosion control features shall be properly maintained.

The Contractor shall maintain these items with the concurrence of the Engineer. When the Contractor properly places the erosion control items in the contract in accordance with the contract documents, then the Department will pay for the additional cost to maintain or replace these items of work by the unit bid prices, agreed unit prices or by 109.04. Silt removed from erosion control features shall be disposed of in accordance with 203.05.

The Engineer or appointed inspector will check the temporary and permanent erosion control features every 7 days or within 24 hours of any rainfall of more than ½-inch (10 mm).

(A) Temporary Perimeter, Ditch Checks, Inlet Protection Filter Fabric Fence, Dikes and Bale Filter Dikes. Trapped sediment shall be removed and cleaned when it reaches half the height of the lowest section. The Contractor shall make the appropriate corrections when the above fail or become non functional. The Contractor shall maintain the items until the up slope permanent grass coverage is 70 percent or better. The Contractor shall remove the items when the up slope permanent grass coverage is 70 percent or better.

(B) Temporary and Permanent Seed: The seed bed shall be thoroughly watered in accordance with the requirements of Item 659. The quantity of water will be measured and paid for as Item 659 water. Seeded areas shall be maintained until 70 percent or better cover is established. Temporary seeded areas shall be mowed and paid for in accordance with Item 659.

(C) Sediment Dams and Basins: Deposited sediment shall be removed when the initial volume has been reduced one-half. The Contractor shall make the appropriate corrections when these items fail or non functional. The Contractor shall remove the dams and basins when the permanent seed and mulch is placed on the entire project.

877.05 Performance. The Contractor shall install additional erosion control features, make adjustments to meet the field conditions, anticipated future work or corrections based on the weekly storm water inspections with the concurrence of the Engineer. The type and quantity will be paid by the unit bid prices, agreed unit prices or by 109.04.

In the event that the Contractor or its agents refuse or fail to adhere to the requirements of the 404 Permit, the 401 Water Quality Certification and/or the NPDES Storm Water Permit and as a result an assessment or fine is made or levied against the Ohio Department of Transportation, the Contractor shall reimburse the Department within ten (10) calendar days of the assessment or fine or the Department may withhold the amount of the fine from the Contractor's next pay estimate and deliver that sum to the permitting agencies issuing the assessment or fine.

These fines are not to be construed as a penalty but are liquidated damages to recover costs assessed against the Department due to the Contractor's refusal or failure to comply with the permit requirements.

If proper sediment and erosion controls are not being provided by the Contractor, progress estimates shall be withheld until proper controls are placed.

All temporary erosion control items shall be removed before the project is accepted. Removed materials shall become the property of the Contractor and shall be disposed of in accordance with Item 203.

877.06 Method of Measurement. Temporary erosion and sediment control work, completed and accepted, will be measured as follows:

(A) All fertilized areas will be measured and paid for as Item 659 Commercial Fertilizer.

(B) Temporary seeding and mulching will be measured by the square yard (square meter) of seeded and mulched area completed in accordance with these specifications.

(C) Temporary slope drains will be measured by the linear foot (meter) complete in place.

(D) Temporary Perimeter, Inlet Protection, Ditch Check, Filter Fabric Fence will be measured per linear foot (meter) in place. Bale filter dike will be paid under temporary perimeter fabric fence.

(E) Rock required will be paid for under Item 601 Rock Channel Protection, Type C or D with or without filter.

(F) Temporary sediment dams, and basins will be measured by the cubic yard (cubic meter) of excavation and embankment complete in place.

(G) Temporary dikes will be measured by the cubic yard(cubic meter), of excavation and embankment complete in place.

(H) Temporary slope or ditch protection will be measured by the square yard (square meter), complete in place.

(I) Sediment Removal will be measured in cubic yards(cubic meters) completed in place. The sediment removed from dams, basins, inlet protection, ditch checks, perimeter filter fabric, bale filter dikes and all other types of filter fabrics, straw or hay bales or any other temporary sediment control items will be paid under this item.

In the event that temporary erosion and sediment control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled, such temporary work shall be performed by the Contractor at his expense.

877.07 Basis of Payment: Accepted quantities of temporary sediment and erosion control

work placed and measured as provided above, will be paid for under:

Item	Unit	Description
877	Square yard (square meter)	Temporary seeding and mulching
877	Linear foot (meter)	Temporary slope drains
877	Cubic yard (cubic meter)	Temporary sediment basins and dams
877	Linear foot (meter)	Temporary perimeter, ditch check or inlet protection filter fabric fence
877	Linear foot (meter)	Temporary perimeter filter fabric fence
877	Linear foot (meter)	Temporary ditch check filter fabric fence
877	Linear foot (meter)	Temporary inlet protection filter fabric fence
877	Cubic yard (cubic meter)	Temporary dikes
877	Square yard (square meter)	Temporary ditch protection
877	Square yard (square meter)	Temporary slope protection
877	Cubic yard (cubic meter)	Sediment removal

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 893

CLASS S CONCRETE FOR NEW BRIDGE DECKS WITH WARRANTY

October 12, 1999

893.01 Description. This item shall consist of furnishing and placing Class S concrete for new bridge decks in conformance with SS 842 except as modified herein. This work shall also consist of warranting the structural bridge deck concrete for items listed in 893.03 and Appendix A for a period of Seven (7) years.

893.02 Maintenance Bond. When the successful Bidder provides the Department with the performance and payment bonds specified in 103.05, the successful Bidder shall also furnish a maintenance bond for the period of years specified herein in the amount of 50 percent of the total price bid for the item 893 Class S Concrete For Bridge Deck With Warranty.

The Surety that underwrites the maintenance bond is required to have an A.M. Best rating of "A -" or better. The cost of the maintenance bond shall be included in the pay item for the premium for the contract performance bond and the payment bond.

The effective date of the maintenance bond is the date the Department's Form C-85 is issued for the structure. The issuance of Form C-85 for the structure shall occur within 30 days after all of the pavement items, including all markings, are completed and the bridge deck is open to traffic in its permanent pattern. After Form C-85 is issued, the Department will notify the Surety and will establish all final quantities for the project and the project will be finalized using standard procedures. The maintenance bond expires after the period of years specified in the pay item from the issuance of Form C-85.

The Contractor shall maintain the liability insurance specified in 107.14, insuring against Contractor or Contractor authorized operations negligently performed during the warranty period. This insurance shall be in effect throughout the warranty period. A copy of the Certificate of Insurance shall be sent to the District each year.

893.03 Warranty Items and Remedial Actions. Warranty items and Remedial Actions are listed in Appendix A. The warranty applies to the entire bridge deck

Meeting the minimum requirements and guidelines of the applicable specification are not to be construed as a warranty, expressed or implied, as to the materials properties and workmanship efforts required to meet the performance criteria.

The intent of this contract is for the Contractor to provide a maintenance free bridge deck. The Contractor may perform routine maintenance during the warranty period.

All materials used for Remedial Action work shall be approved by the Engineer.

Any pavement markings or raised pavement markers (RPM) removed or damaged while performing a Remedial Action shall be replaced with pavement markings or RPMs equal to or better than the original products at the Contractor's cost.

All Remedial Actions shall be performed on or before November 15 or the time limits within the remedial action requirements. Prior to performing any Remedial Action, the Contractor shall submit a Remedial Action plan to the Engineer for approval. This plan shall state when and how the Remedial Action will be done and what material will be used. Remedial Action work performed by the Contractor shall be warrantied for the remainder of the warranty period.

Emergency work, repairing deck distresses hazardous to the traveling public, may be performed by the Department. The cost of the remedial work required to correct the distress, including traffic control, and any emergency work, no matter who does the emergency work, will be paid by the Contractor. The Contractor is not responsible for bridge deck damage beyond the Contractor's control (i.e., car fire, etc.).

893.04 Warranty Evaluation Review. At least three reviews are required under this warranty specification. The project will be reviewed by a District Review Team (DRT).

1. At 1 year a review for alligator or map cracking is to be performed.

2. At 2 years a review for scaling and spalling.

3. Final review, one month before the end of the warranty period. The review shall only be for scaling and spalling.

The project will be reviewed by a District Review Team (DRT) with equipment provided by the Contractor. Traffic control for inspection will be provided by the Department. The Contractor or any other interested party may attend the review, for observation only. The DRT will determine if thresholds are exceeded as defined in section Appendix A and define those areas. Within 15 days after the completion of the review, the results will be issued in writing to the Contractor.

893.05 Traffic Control. The contractor shall provide traffic control for any corrective work. The Contractor's traffic control plan for performing any work required by this specification during the warranty period shall be in accordance with current Department policy, the Ohio Manual of Uniform Traffic Control Devices for Streets and Highways. His traffic control plan shall be submitted to the District Construction Engineer (DCE) for approval before any work is performed. Any major change in the Department's construction traffic control policy or the Manual of Uniform Traffic Control Devices for Streets and Highways from that which was in affect at the time the project was bid will be considered a changed condition

893.06 Appeal Process The Contractor may appeal the findings of the DRT. Any appeal shall be submitted to the DCE, in writing, within fifteen (15) days after the Engineer has given the written results to the Contractor.

The DCE will evaluate the Contractor's appeal. Within forty-five (45) days after receiving the Contractor's appeal, the DCE will inform the contractor, in writing, of his determination.

If the Contractor disagrees with the DCE's determination, the Contractor may appeal this determination to a Central Office resolution team. This team will be made up of a representative from the Office of Structural Engineering, Highway Management, and Materials Management. If the Contractor elects to appeal the determination of the DCE, the Contractor shall submit written notice to the DCE of his intention within fifteen (15) days after receipt of the DCE determination. The DCE will then forward the Contractor's appeal along with all pertinent information to the Central Office resolution team. A determination will be made within forty-five (45) days after the Central Office resolution team has received the Contractor's appeal from the DCE.

893.07 Method of Measurement. Deck concrete may be measured by either volume or area. The volume shall be the number of cubic yards (cubic meters) determined by calculations from plan dimensions, in place, completed and accepted. The area of concrete shall also be determined by calculations from plan dimensions, in place, completed and accepted.

Reinforcing steel, supports, mechanical connectors, and tie wires shall be incidental in the price bid for structural concrete.

No deduction will be made for the volume of the reinforcing steel, conduits or structural steel other than beam flanges embedded in deck slabs.

Superstructure concrete includes the concrete in deflective parapets not having a metallic railing.

893.08 Basis of Payment. Payment will be made at contract prices for:

Item	Unit	Description
893	Cubic yard (cubic meter), square yard (square meter)	Class S concrete, for bridge deck with warranty

Appendix A

Distress Type	**Threshold Level** (per Segment)	**Remedial Action**
Deck Scaling (Minor)	Less than 1/4" but greater then 1/8" in first two years of warranty (1) (2) "and" No more than 20% of the individual bridge deck surface area	Grind defective area; saw cut transverse grooves; seal surface with a non-epoxy sealer as per PN 516
Deck Scaling (Intermediate)	Greater than 1/4" in first two years of warranty (1) (2)	Diamond saw the perimeter 1 inch deep then use hydro demolition to 1" deep remove scaled area greater than 1/4" and patch with a nominal 1" inlay with either latex modified concrete or micro silica modified concrete as per SS 848 . Edges of the patches shall be sealed with High Molecular Weight Methacrylate Resin as per SS 846.
Deck Scaling (Major)	Total Scaling is more than 20% of the individual bridge deck surface area	Hydro demolition total deck 1" deep and place nominal 1" inlay with either latex modified concrete or micro silica modified concrete as per SS 848 .
Spalling (Minor)	One area less than 32 square yards of deck surface area (1) (2)	Diamond saw the perimeter 1 inch deep, then patch with either latex modified concrete or micro silica modified concrete as per SS 848 . Edges of the patches shall be sealed with High Molecular Weight Methacrylate Resin as per SS 846.
Spalling (Major)	More then one area or one area greater than 32 square yards of deck surface area (1) (2)	Hydro demolition total deck 1" deep and place nominal 1" inlay with either latex modified concrete or micro silica modified concrete as per SS 848 .
Cracking (Minor) (Alligator or Map cracking)	0% to 20% of deck surface 1 year from initiation of warranty period	Application of High Molecular Weight Methacrylate Resin as per SS 846 to the crack areas
Cracking (Major) (Alligator or Map cracking)	Greater than 20% of deck surface in 1 year from initiation of warranty period.	Hydro demolition total deck 1" deep and place nominal 1" inlay with either latex modified concrete or micro silica modified concrete as per SS 848 .
(1) If conditions are found earlier than two years the Contractor will be required to perform remedial actions or if conditions are found after the two year inspection but before the completion of the warranty.(2) Threshold level is also enforce for the total warranty period of 7 years.		

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 899

CONCRETE - GENERAL

October 21, 1998

899.01 Description. This work shall consist of proportioning and mixing portland cement concrete.

899.02 Materials. Materials shall be:

Fine aggregate*	703.02
Fly ash	705.13
Coarse aggregate	703.02, 703.13***
Portland cement	701.01, 701.02, 701.03
	701.04, 701.05****
Ground granulated blast furnace slag	ASTM C 989, grade 100 or 120
Air entraining admixture.	705.10
Chemical admixture for concrete.	705.12**

*703.02 natural sand is required in 255, 451, 452, 453, 611, and 511 deck slabs.

**Admixtures shall contain no more than 50 parts per million chloride ions by weight of cement.

*** Applies only to 451, 452 and 453.

**** Use of Slag-Modified Portland Cement meeting ASTM C 595M, Type I(SM) is permitted; acceptance shall be in accordance with 701 and Supplement 1028. Type I(SM) may be used only between April 1 to October 1, and when 705.10 Air-Entraining Admixture is added at the mixer. Type I(SM) may not be used with Options 1 and 3.

Water used in concrete shall be free from sewage, oil, acid, strong alkalies or vegetable matter, and also shall be free from clay and loam. Water which is potable is satisfactory for use in concrete.

899.03 Proportioning. Proportioning shall be based on pre-determined cement content. Except as otherwise provided herein, each cubic yard (cubic meter) of concrete shall contain the specified weight of cement as determined by the yield calculation. The yield shall be within ± 1 percent of the theoretical yield of 27.00 cubic feet (1 m^3). The water-cement ratio shall not exceed the maximum specified. Below this limit, the quantity of water shall be adjusted to meet the slump requirements.

Concrete shall contain 6 ± 2 percent of total air, except as noted herein.

Slump shall be maintained within the range shown as nominal slump in the following table. No concrete shall be used in the work that has a slump greater than that shown as maximum in the table. When the slump is found to exceed the limit of nominal slump but is within the maximum limit, occasional loads of concrete may be used, provided an immediate adjustment is made in the mixture to reduce the slump of succeeding loads to within the nominal range shown.

Type of Work	Nom. Slump inch (mm)*	Max. Slump inch (mm)**
Concrete pavement (305, 451, 452, 453, 611, 615)	1-3 (25-75)	4 (100)
Structural Concrete (511, 610, 622)	1-4 (25-100)	5 (125)
Superstructure concrete (511)	2-4 (50-100)	4 (100)
Non-reinforced concrete (601, 602 603, 604, 608, 609, 612, 622)	1-4 (25-100)	5 (125)

*This slump may be increased to 6 inches (150 mm) provided the increase is achieved by the addition of a chemical admixture meeting the requirements of 705.12, Type F or G.

**This slump may be increased to 7 inches (180 mm) provided the increase is achieved by the addition of a chemical admixture meeting the requirements of 705.12, Type F or G.

Tests on the plastic concrete for pavement shall be made at the paving site or at a location designated by the Engineer. Tests for structure concrete shall be made at the site of the work at the point of placement.

The weights of fine and coarse aggregate shall be determined by the Engineer from the weights given in the Concrete Table. If high early strength concrete is specified, the Contractor may use high-early strength cement, additional cement, approved chemical admixtures, or a combination of these materials to achieve a modulus of rupture of 600 psi (4.2 MPa) in three days or less. If high-early-strength concrete is not specified, but is desirable to expedite the work, the Contractor may use these same materials at no additional cost to the state.

The weights specified in the Concrete Table were calculated for aggregates of the following bulk specific gravities: natural sand and gravel 2.62, limestone sand 2.68, limestone 2.65, and slag 2.30. The assumed specific gravities of fly ash and ground granulated blast furnace slag are 2.30 and 2.90, respectively. For aggregates of specific gravities differing more than plus or minus 0.02 from these, the weights in the table shall be corrected as indicated in paragraph (c).

CONCRETE TABLE

Quantities Per Cubic Yard (Meter)

Type of Coarse Aggregate	Dry Aggregates: Fine Aggregate lb (kg)	Dry Aggregates: Coarse Aggregate lb (kg)	Dry Aggregates: Total lb (kg)	Cement Content lb (kg)	Water-Cement Ratio Maximum
CLASS C (Using No. 57 or No. 67 Size)					
Gravel	1160 (688)	1735(1029)	2895(1717)	600 (356)	0.5
Limestone	1285(762)	1630(967)	2915(1729)	600(356)	0.5
Slag	1350(801)	1360(807)	2710(1608)	600(356)	0.5
CLASS F (Using No. 57 or No. 67 Size)					
Gravel	1270(753)	1810(1074)	3080(1827)	470(288)	0.55
Limestone	1345(798)	1730(1026)	3075(1824)	470(288)	0.55
Slag	1380(819)	1470(872)	2850(1691)	470(288)	0.55
CLASS S (Using No. 57 or No. 67 Size)					
Gravel	1125(667)	1735(1029)	2860(1697)	715(424)	0.44
Limestone	1260(747)	1530(908)	2790(1655)	715(424)	0.44
Slag	1280(759)	1370(813)	2650(1572)	715(424)	0.44

On projects specifying 451, 452, or 453, the following requirements shall apply. If No. 57 or 67 Size is approved, the quantities per cubic yard (cubic meter) will be in accordance with the above concrete table. If sizes No. 7, 78, or 8 are approved, the concrete shall contain 8 plus or minus 2 percent air, and the quantities will be in accordance with the following table:

Quantities Per Cubic Yard (Meter)

Type of Coarse Aggregate	Dry Aggregates: Fine Aggregate lb (kg)	Dry Aggregates: Coarse Aggregate lb (kg)	Dry Aggregates: Total lb (kg)	Cement Content lb (kg)	Water-Cement Ratio Maximum
CLASS C (Using No. 7, 78, or No. 8 Size)					
Gravel	1320(783)	1460(866)	2780(1649)	600(356)	0.5
Limestone	1380(819)	1410(837)	2790(1656)	600(356)	0.5

At any time during the construction period, the relative weights of fine and coarse aggregate as determined from the above table may be varied by the Engineer in order to insure a workable mix within the slump range and to control the yield. However, the total weight of aggregate per cubic yard (cubic meter) shall not be changed except as provided in the preceding paragraph as for the following conditions or both.

(a) For batch weights, the weights determined as described above shall be corrected to compensate for moisture contained in the aggregates at the time of use.

(b) If it is found impossible to prepare concrete of the proper consistency without exceeding the maximum water/cement ratio specified, a water reducing admixture conforming to requirements of 705.12 shall be used or the cement content shall be increased. However, the Contractor shall not be compensated for the admixture or additional cement which may be required by reason of such adjustment.

(c) If, during the progress of the work, the specific gravity of one or both of the aggregates changes, the batch weight shall be adjusted to conform to the new specific gravity.

(d) Unit weight determinations shall be made and the yield shall be calculated and maintained in accordance with ASTM C 138. Based on these determinations, the batch weights will be adjusted when necessary. However, the specified cement content shall be maintained within a tolerance of ± 1 percent and the maximum water-cement ratio shall not be exceeded.

(e) The amount of mixing water shall be adjusted for the moisture contained in the aggregate and for the moisture which they will absorb, in order to determine the amount of water to be added at the mixer.

(f) An approved set retarding admixture meeting the requirements of 705.12, Type B or Type D shall be required for concrete when the concrete temperature exceeds a nominal temperature of 75° F (24° C).

899.04 Proportioning Options. The Contractor may substitute one of the following options for all concrete items: The dry weights specified in these tables were calculated using the same specific gravities used in 899.03. The specific gravity used for ground granulated blast furnace (GGBF) slag is 2.90. Adjustments shall be made to the mix design due to specific gravities differing by more than 0.02. Other adjustments may be made as allowed in 899.03 and approved by the Engineer.

The requirements for Proportioning Option 1 are as follows. The cement content may be reduced as much as 15 per cent by weight with the substitution of an equivalent weight of fly ash meeting the requirements of 705.13. The water/cement ratio shall be based on the combined weight of cement and fly ash. Proportioning Option 1 shall meet the following Mix Design Concrete Table:

Quantities Per Cubic Yard (Cubic Meter).

Type of Coarse Aggregate	Dry Aggregates: Fine Aggregate lb (kg)	Dry Aggregates: Coarse Aggregate lb (kg)	Dry Aggregates: Total lb (kg)	Cement Content lb (kg)	Fly Ash lb (kg)	Water-CM Ratio Maximum
CLASS C Option 1 (Using No. 57 or No. 67 Size)						
Gravel	1140(676)	1700(1009)	2840(1685)	510(303)	90(53)	0.50
Limestone	1260(748)	1595(946)	2855(1694)	510(303)	90(53)	0.50
Slag	1320(783)	1330(789)	2650(1572)	510(303)	90(53)	0.50
CLASS F Option 1(Using No. 57 or No. 67 Size)						
Gravel	1260(748)	1800(1068)	3060(1815)	400(237)	70(42)	0.55
Limestone	1350(801)	1730(1026)	3080(1827)	400(237)	70(42)	0.55
Slag	1380(819)	1475(875)	2855(1694)	400(237)	70(42)	0.55
CLASS S Option 1 (Using No. 57 or No. 67 Size)						
Gravel	1060(629)	1640(973)	2700(1602)	608(361)	107(63)	0.44
Limestone	1230(730)	1490(884)	2720(1614)	608(361)	107(63)	0.44
Slag	1220(724)	1300(771)	2520(1495)	608(361)	107(63)	0.44
CLASS C Option 1 (Using No. 7, 78 or 8 Size)						
Gravel	1310(777)	1440(854)	2750(1631)	510(303)	90(53)	0.50
Limestone	1350(801)	1410(837)	2760(1638)	510(303)	90(53)	0.50

The requirements for Proportioning Option 2 are as follows. The cement content may be reduced as much as 50 pounds per cubic yard(30 kg/ m3), with the substitution of an equivalent volume of aggregate, provided the Contractor uses an approved water reducing admixture meeting the requirements of 705.12; Type A or Type D. Proportioning Option 2 shall meet the following Mix Design Concrete Table:

Quantities Per Cubic Yard (Cubic Meter).

Type of Coarse Aggregate	Dry Aggregates: Fine Aggregate lb (kg)	Dry Aggregates: Coarse Aggregate lb (kg)	Dry Aggregates: Total lb (kg)	Cement Content lb (kg)	Water-Cement Ratio Maximum
CLASS C Option 2 (Using No. 57 or No. 67 Size)					
Gravel	1190(706)	1785(1059)	2975(1765)	550(326)	0.50
Limestone	1320(783)	1675(994)	2995(1777)	550(326)	0.50
Slag	1385(822)	1395(828)	2780(1649)	550(326)	0.50
CLASS F Option 2 (Using No. 57 or No. 67 Size)					
Gravel	1315(780)	1880(1115)	3195(1896)	420(249)	0.55
Limestone	1410(837)	1810(1074)	3220(1910)	420(249)	0.55
Slag	1445(857)	1540(914)	2985(1771)	420(249)	0.55
CLASS S Option 2 (Using No. 57 or No. 67 Size)					
Gravel	1120(664)	1710(1015)	2830(1679)	665(395)	0.44
Limestone	1290(765)	1560(926)	2850(1691)	665(395)	0.44
Slag	1270(753)	1370(813)	2640(1566)	655(395)	0.44
CLASS C Option 2 (Using No. 7, 78 or No. 8 Size)					
Gravel	1370(813)	1510(896)	2880(1709)	550(326)	0.50
Limestone	1420(842)	1480(878)	2900(1720)	550(326)	0.50

The requirements for Proportioning Option 3 are as follows. The Portland cement content may be reduced as much as 50 pounds per cubic yard(30 kg/m3) with the substitution of an equivalent volume of aggregate, provided the Contractor uses an approved water-reducing admixture meeting the requirements of 705.12, Type A or D. The cementitious materials content shall consist of a combination, by weight, of a minimum of 70 percent Type I or Type IA Portland cement (701.04 or 701.01), and a maximum of 30 percent ground granulated blast furnace slag, ASTM C 989, grade 100 or 120. Proportioning Option 3 shall meet the following Mix Design Concrete Table:

Quantities Per Cubic Yard (Cubic Meter).

Type of Coarse Aggregate	Dry Aggregates: Fine Aggregate lb (kg)	Dry Aggregates: Coarse Aggregate lb (kg)	Dry Aggregates: Total lb (kg)	Cement Content lb (kg)	GGBF Slag lb (kg)	Water-CM Ratio Maximum
CLASS C Option 3 (Using No. 57 or No. 67 Size)						
Gravel	1185(703)	1775(1053)	2960(1756)	385(228)	165(98)	0.50
Limestone	1310(777)	1670(991)	2980(1768)	385(228)	165(98)	0.50
Slag	1385(822)	1385(822)	2770(1644)	385(228)	165(98)	0.50
CLASS F Option 3(Using No. 57 or No. 67 Size)						
Gravel	1320(783)	1870(1109)	3190(1892)	294(174)	126(75)	0.55
Limestone	1400(831)	1810(1074)	3210(1905)	294(174)	126(75)	0.55
Slag	1440(854)	1535(911)	2975(1765)	294(174)	126(75)	0.55

CLASS S Option 3 (Using No. 57 or No. 67 Size)

Gravel	1105(656)	1715(1017)	2820(1673)	465(276)	200(119)	0.44
Limestone	1280(759)	1555(923)	2835(1682)	465(276)	200(119)	0.44
Slag	1270(753)	1360(807)	2630(1560)	465(276)	200(119)	0.44

CLASS C Option 3 (Using No. 7, 78 or No. 8 Size)

Gravel	1370(813)	1500(890)	2870(1703)	385(228)	165(98)	0.50
Limestone	1410(837)	1480(878)	2890(1715)	385(228)	165(98)	0.50

GGBF = ground granulated blast furnace slag; CM = cementitious material.

The use of coarse aggregate in Portland cement concrete pavements is restricted by 703.13, as modified by the proposal.

Approval of Optional Mix Designs. A request to use any option design must be submitted to the Engineer for approval.

All admixtures used in the concrete mixture must be compatible and shall be dispensed in accordance with the manufacturer's recommendations.

If Portland cement with fly ash as an additive is used as described under Option 1 or ground granulated blast furnace slag is used under Option 3, the mix design shall be used only between April 1 and October 15, unless otherwise authorized by the Director. If Option 1 is used, an approved set retarding admixture meeting the requirements of 705.12, Type B or Type D shall be used if the concrete temperature exceeds a nominal temperature of 75° F (24° C) . If Option 2 or 3 is used, an approved water reducing set retarding admixture meeting the requirements of 705.12, Type D shall be used if the concrete temperature exceeds a nominal temperature of 75° F (24° C).

The proportioning adjustments under Options 1, 2 or 3 shall be the responsibility of the Contractor, and shall be in accordance with the ACI Standard "Recommended Practice for Selecting Proportions for Normal Weight Concrete" (ACI 211.1). The proportioning shall be based on developing an average compressive strength at 28 days of 4000 psi (28.0 MPa) for Class C, 3000 psi (21.0 Mpa) for Class F or 4500 psi (31.0 MPa) for Class S.

Optional mixes are not permitted with concrete bridge deck overlays using microsilica. For mixes used in latex modified and superplasticized dense concrete bridge deck overlays (Supplemental Specifications 847 and 848), and using Option 1 and 2, certified test data shall be provided for all requirements in accordance with Supplement 1045. Option 3 may not be used with concrete bridge deck overlays (Supplemental Specifications 847 and 848). The testing for Absorption, Scaling Resistance, and Volume Change will not be required for mixes used in dense concrete bridge deck overlays.

Only one source of fly ash shall be used in any one structure unless otherwise authorized by the Director. Bulk fly ash shall be stored in waterproof bins.

No option mixes shall be permitted in concrete mixes designed or intended to obtain high early strength.

899.05 Additional Classes of Concrete for Rigid Replacement.

Class FS. This mixture is a fast-setting Portland cement concrete for accelerated setting and strength development. The minimum cement content shall be 900 pounds per cubic yard (534 kg/m^3) and the maximum water -- cement ratio shall be 0.40. The rigid replacement may be opened to traffic after four hours provided test beams have attained a modulus of rupture of 400 psi (2.8 MPa).

The concrete shall be kept plastic by means of a Type B or D admixture until the surface has been textured. The Type B or D admixture shall be used in accordance with the manufacturer's recommendations.

Calcium chloride shall be added and mixed with each batch of concrete just prior to placement. If calcium chloride with 94-97 percent purity is used, the addition rate shall be 1.6 percent by weight of the cement. If calcium chloride with 70-80 percent purity is used, the addition rate shall be 2.0 percent by weight of the cement. When calcium chloride in a water solution is used, the water used shall be considered as part of the concrete mixing water and appropriate adjustments shall be made for its inclusion in the total concrete mixture.

Any other approved accelerating admixture may be used at the rate recommended by the manufacturer, provided it will produce the required strength in the allotted time.

Immediately after the curing compound has been applied, the replacements shall be covered with polyethylene sheeting and further covered with building board as specified in ASTM C 208. The building board shall be wrapped in a black polyethylene sheeting and placed tight against the surrounding concrete and weighted down to protect the fresh concrete from the weather.

Class MS. This mixture is a moderate-setting portland cement concrete for accelerated strength development. The rigid replacement may be opened to traffic after 24 hours provided test beams have attained a modulus of rupture of 400 psi (2.8 MPa). The minimum cement content shall be 800 pounds per cubic yard (475 kg/m3) and the maximum water-cement ratio shall be 0.43.

The proportioning of the concrete materials to meet the requirements of each class of rigid replacement concrete specified shall be the responsibility of the Contractor. The coarse aggregate may be any one of the following sizes: No. 57, No. 6, No. 67, or No. 8. When No. 8 size is used, the entrained air content shall be 8 ±2 percent. Otherwise, the entrained air content shall be 6 ±2 percent.

The Engineer's approval of the concrete mix design will be based on the Contractor's submitted proportions and the foregoing information.

899.06 Equipment. Equipment shall be as follows:

(a) Batching Plants. Each plant shall be constructed and operated so that no intermingling of materials occurs prior to batching. The plant shall have weighing mechanisms which provide either a visible means of checking weights or a printed record. Dispensing mechanisms for water and admixtures shall have a visible means of checking quantities or shall produce a printed record.

Weighing mechanisms used for cement and aggregates shall weigh to an accuracy such that the weight indicated on the scale or printed ticket is within ± 0.5 percent of the correct weight. Devices for weighing or metering water shall measure to an accuracy of ± 1.0 percent throughout the range used.

All weighing and metering devices shall have been checked and their accuracy attested to within the 12-month period immediately prior to their use. This service may be performed by the Sealer of Weights and Measures or a scale servicing company. In lieu of the preceeding requirements, the concrete batch facilities may be approved if a Certificate of Performance has been issued by the National Ready Mixed Concrete Association.

To reach a capacity of 500 pounds (227 kg), ten standard test weights or the services of a scale servicing company shall be readily available for testing the weighing devices at the batch plant. All weights used in testing the weighing devices shall be sealed every 3 years by the Ohio Department of Agriculture.

Weighing and dispensing devices shall be tested as often as the Engineer may deem necessary to assure their continued accuracy.

(b) Mixers. Mixers and agitators shall conform to paragraphs 10, 11.2, 11.5 and 11.6 of AASHTO M 157, except that mechanical counters are permitted.

When a truck mixer is used for complete mixing, each batch of concrete shall be mixed for not less than 70 revolutions of the drum or blades at the rate of rotation designated on the metal plate on the mixer as mixing speed.

Bodies of nonagitating hauling equipment for concrete shall be smooth, mortartight, metal containers and shall be capable of discharging the concrete at a satisfactory controlled rate without segregation. Covers shall be provided when required by the Engineer. Trucks having dump bodies with rounded corners and no internal ribs or projections will be permitted for nonagitating hauling.

899.07 Handling, Measuring and Batching Materials. Aggregates from different sources and of different gradings shall not be stockpiled together. Aggregates that have become segregated, or mixed with earth or foreign material, shall be reworked or cleaned as directed by the Engineer, or rejected. Coarse aggregate shall be maintained with a uniform moisture content.

The fine aggregate and coarse aggregate shall be separately weighed in the respective amounts set by the Engineer as outlined in 899.03. Separate weighing devices shall be used for weighing the cement.

Batching shall be so conducted as to result in the weights of each material required within a tolerance of ± 1.0 percent for cement and ± 2.0 percent for aggregates. Water shall be measured by weight or volume to within a tolerance of ± 1.0 percent. Admixtures shall be dispensed to within ± 3.0 percent of the desired amount.

Methods and equipment for adding air-entraining agent or other admixture into the batch, when required, shall be approved by the Engineer.

899.08 Concrete Batch Plant Tickets. The Contractor shall furnish the Engineer a concrete batch

plant ticket for each load of concrete delivered for use on the project. Batch tickets may be computer-generated, handwritten, or a combination. The ticket shall include, at a minimum, the information listed in Table I:

TABLE I - EVERY BATCH TICKET	
Name of ready-mix batch plant	
Batch Plant No	
Batch Plant Location	
Serial number of ticket	
Date	
Truck Number	
Class of Concrete	
JMF#	
Time the load was batched	
Size of Batch [cu yd (cu m)]	
Actual weights of cementitious material:	
Cement [lbs(kg)]	
Fly ash [lbs(kg)]	
Ground granulated blast furnace slag [lbs(kg)]	
Micro-silica [lbs(kg)]	
Other	
Actual weights of aggregates:	
Coarse [lbs(kg)]	
Fine [lbs(kg)]	
Other	
Actual weight of water [lbs(kg)]	
Actual volume of admixtures:	
Air entrainer [fl. oz. (mL)]	
Superplasticizer [fl. oz. (mL)]	
Water reducer [fl. oz.(mL)]	
Retarder [fl. oz. (mL)]	
Other	
Aggregate moisture contents (%):	
Coarse Aggregate	
Fine Aggregate	
Water Cement Ratio, leaving the plant	

Batch tickets for each day's first load of concrete, for each JMF, shall also include the information in Table II below. The Table II information may be either included on the batch ticket or furnished on a separate form. The separate form may be computer-generated or handwritten, but the form must be physically attached to the batch ticket.

If during the concrete manufacturing process any of the information listed in Table II changes, the information in Table II shall be resubmitted with the first concrete batch ticket supplied with the changed concrete.

TABLE II - FIRST TICKET EACH DAY, EACH JMF	
Cementitious Sources and Grade or Type:	
Cement	
Micro - Silica	
Ground granulated Blast Furnace slag	
Fly Ash	
Other	
Admixtures - Brand and Type:	
Air entrainer	
Retarder	
Water reducer	
Superplasticizer	
Other	

Concrete batch ticket information conforms to ASTM C 94, section 13.
Supporting data may be required by the Engineer to validate the basis for the furnished aggregate moisture contents.
Cost for generating and supplying the information and the concrete batch tickets shall be included in the individual concrete items.

899.09 Mixing Concrete. The concrete may be mixed in a central mix plant or in truck mixers. The mixer shall be of an approved type.

When mixed in central mixers, the mixing time shall not be less than 60 seconds. Mixing time begins when all materials are in the drum and ends when the discharge begins. Transfer time in multiple drum mixers is included in mixing time. The contents of an individual mixer drum shall be removed before a succeeding batch is emptied therein.

Ready-mixed concrete shall be mixed and delivered in accordance with 899.04(b). Mixed concrete from the central mixers shall be transported in truck mixers, truck agitators, or trucks having nonagitating bodies. The concrete shall be delivered to the site of the work and discharge shall be completed within one hour after the combining of the water and the cement. If an approved set-retarding (705.12, Type B) or a water-reducing and set-retarding (705.12, Type D or G) admixture is used at the Contractor's expense, discharge shall be completed within 90 minutes after the combining of the water and the cement.

When concrete is delivered in transit mixers or agitators, additional water within the limits specified may be added and sufficient mixing performed to adjust the slump and to regenerate the specified air content throughout the batch, provided all these operations are performed prior to discharging any of the batch and within the above time limitations. When making these adjustments, the concrete shall be mixed a minimum of 30 revolutions at mixing speed.

Retempering after the start of discharge is permitted by the use of approved admixtures (705.12, Type F or G) when approved by the Engineer.

Admixtures containing more than 50 parts per million chloride by weight of cement will be permitted only when provided for in the contract, or upon written permission of the Director.

The procedure for making and testing of concrete beams shall be in accordance with the requirements of Supplement 1023 on file in the Office of the Director.

When mixed, all concrete shall have a temperature of not more than 90° F (32° C), and the concrete shall be maintained under this temperature until deposited in the work.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 905
OPEN HEARTH AND BASIC OXYGEN FURNACE STEEL SLAG AGGREGATE USED FOR ITEMS 203, 304, 306, 307, 410, 411, 617, 503 OR 603

April 1, 1998

Open Hearth (OH) or Basic Oxygen Furnace (BOF) slag shall not be used for Aggregate or Soil for Item 603 Bedding or Backfill , for Items 306 Cement Treated Free Draining Base or 307 Non-Stabilized Drainage Base, Item 503.10 Backfill; or under, around or within 15 meters (50 feet) of any structure.

OH and BOF slag may be used in Item 203 Embankment, as defined in 203.02, if the OH or BOF slag is blended in a 3:1 mixture (3 parts natural soil and 1 part OH or BOF slag). The 3:1 mixture shall be placed at least 0.3m (1.0 ft) below the flow line of the underdrains or other drainage items susceptible to runoff as per 203.08. Aging and stock piling requirements of this specification are required.

OH and BOF slag may be used for surface course applications in Items 617, 410 and 411, if the OH and BOF slag meets the above specifications, and meets the aging and stock piling, deleterious substances, and crushing requirements of this specification.

BOF slag shall not be allowed for non-surface course applications in Items 304, 410, 411 or 617.

Recycled OH or BOF slag from Department or non-Department projects may be used in Item 203, or surface course applications in Items 617, 410 or 411, if the material meets the requirements of this specification.

OH slag may be used for Item 304 and for a non-surface course application in Items 617, 410 and 411, if the OH slag meets the above specifications and all the additions and deletions listed below;

Recycled OH or BOF slag from Department or non-Department projects shall not be allowed.

Deleterious substances (soft pieces) shall include soft lime, lime oxide or magnesia agglomerations or any foreign materials prone to rapid disintegration under construction processing and weathering conditions.

Deleterious substances(soft pieces) in accordance with Supplement 1029 (hand crushing of soft pieces) shall be less than 3 percent by weight.

Material passing the 75 μm(200 sieve) shall be less than 10 percent by weight.

No crushing of OH or BOF slag shall be allowed.

Identification of OH Slag. Clear, definitive and undisputable identification of the OH slag is required for OH slag used for Item 304 or for a non-surface course application in Items 617, 410 or 411.

The producer shall show the Department evidence that the material supplied is open hearth slag. This information shall consist of but not be limited to the following:

Steel producer, production dates, production rates, stockpiling dates, type of steel produced, and all known Department and non-Department projects where the material was previously used.

This identification of OH slag may be supplemented by other information approved by the Department or by using 10 years of good performance data. The producer shall submit to the Department projects where the OH slag has been used without expansion or tufa problems. The Department will review the above projects as part of the identification approval process.

All OH slag not identified as open hearth slag shall be considered basic oxygen furnace slag unless identified otherwise.

Tufa Performance Verified. Tufa is a precipitate form of calcium carbonate that can clog up the underdrain systems. Some OH slag sources clog up underdrain systems and some do not. Tufa performance verification will be based on field performance and Department's inspection of the underdrain systems.

Tufa performance verification is required for OH slag used for Item 304, or when OH slag is used for a non-surface course applications in Items 617, 410 or 411.

The producer shall submit to the Department past projects that are at least 10 years old that used the proposed OH slag source. The producer shall supply the Department with construction plans with the underdrains and underdrain outlets marked on the plans, or other suitable method, approved by the Department, showing the underdrain system. The producer shall mark the underdrain outlets in the field for inspection. The Department will inspect the underdrain systems for tufa deposits. If tufa deposits are found in the outlets or in the underdrain system, the OH slag source shall be rejected.

The following sources have previously been evaluated for tufa performance: Standard-Lafarge's Cuyahoga Heights and McDonald plants. Tufa performance verification is not required for these sources.

Aging and Stockpiling Requirements. All OH and BOF slag shall be stockpiled and aged as follows:

The material shall be graded and stockpiled into maximum size piles of 23,000 Metric ton (25,000 ton). Prior to and during the stock piling operation, these materials shall have water added to provide a uniform moisture content not less than their absorbed moisture. The stockpile shall be maintained in a moist condition during the required stock piling period.

The producer shall mix the stockpile when the outside surface of the pile has crusted over. The Department will inspect the stock pile every 2 months to ensure no crusting occurs. Frozen stockpile material shall not be mixed. The aging period shall be suspended when the stockpile is frozen for more than one month.

This aging period shall be at least 6 months in duration and shall start over if any new material is added to the pile during the aging period.

Expansion Testing. After the aging and stock piling requirements have been met, expansion testing is required for OH slag used for Item 304 or when OH slag is used for a non surface course applications in Item 617, Item 410 or Item 411.

Expansion Testing shall be performed in accordance with Pennsylvania Department of Transportation PTM No. 130, the ODOT equivalent to this test or expansion testing acceptable to ODOT.

The producer shall hire an independent AASHTO accredited and ODOT approved laboratory to perform at least half of the expansion testing. At the producer's option, up to half of the required expansion testing may be performed by the producer's lab. The Office of Materials Management shall observe the expansion testing and approve each independent and producer laboratory.

The expansion testing shall be performed for every 2300 metric tons (2500 tons) or fraction thereof of the material supplied.

The maximum allowable total expansion for each test shall be less than 0.50 percent. If any one test fails in the stockpile, the entire stockpile shall be rejected.

When sampling for expansion, the producer shall notify the Department at least 48 hours prior to the sampling. The Department will verify that the sample came from the correct stock pile and take independent spit samples , if required.

The expansion test data and a suitably presented summary of the expansion test data shall be submitted to the Department for approval. The Department reserves the right to perform independent testing to verify the laboratory results at any time.

The Department expansion test data shall take precedence over the producer or independent laboratory expansion testing results in the event of a conflict. The Department shall make the final determination on all conflicting data.

If the material fails the expansion testing, the material shall be stock piled for a minimum of 2 additional months from the date of last sampling and retested for expansion. No materials shall be approved for use until the material passes the expansion test.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 907

Sulphur Leachate Test for Air Cooled Blast Furnace Slag for Acceptance of Items 203, 304, 306, 307, 503, 603 and S.S.855 (Asphalt Treated Free Draining Base)

October 21, 1998

907.01 Description. Air cooled blast furnace slag used in Items 203, 304, 306, 307, 503, 603, and S.S.855 (Asphalt Treated Free Draining Base) must meet the requirements of this specification. This specification contains the required sampling procedure; sulphur leachate test procedure; and, the criteria that must be met for the material to be incorporated into the work.

907.02 Sampling Procedure. The following sampling method for obtaining samples of air cooled blast furnace slag for leachate tests shall be used:

1. Sampling: The material to be used should be sampled as the stockpile is being built.

2. When obtaining the sample after the stockpile is built: The sample may be taken by shovel or hand. The sample shall be selected randomly from both the exterior and interior of the stockpile. The producer shall use a heavy equipment for the excavation of the interior material.

3. Sampling Frequency: Each sample is to be taken in random increments over each 5200 tons (4720 metric tons) stockpiled.

4. Sample size and sample reduction: The field sample should be 80 to 100 pounds (35 to 45 kg). From this field sample, a test sample of 20 to 25 pounds (9 to 11 kg) shall be quartered out.

5. Documentation : Stockpile location and test results shall be maintained at the plant and shall be available upon request.

6. The Producer shall certify that this test has been performed prior to acceptance.

907.03 Sulphur Leachate Test Procedure and Criteria. The test procedure involves soaking the slag material in water for a specified period of time and then observing the color of the water. A greenish-yellow coloration indicates a problem. The smell of hydrogen sulfide(rotten eggs) usually accompanies the observation of colored water.

1. Equipment Needed:

A. A five-gallon (19-liter) bucket for soaking the sample.
B. Filter paper for filtering the water.
C. A funnel through which to filter the water.
D. A glass container for observing the water.
E. A rock color chart. This chart is used for color comparisons and is distributed by the Geological Society of America
F. Water shall be distilled or tap water let set in a bucket for a minimum of 12 hours.

2. Test Procedures.

A. Prepare a test sample of approximately 20 to 25 pounds (9 to 11 kg) from a field sample of approximately 100 pounds (45 kg).

B. For Item 306, Type 3 granular material in Item 603, and S.S.855(Asphalt Treated Free Draining Base), the test sample should then be rinsed over a No. 4 (4.75mm) sieve to remove any fines that may be clinging to the larger particles.

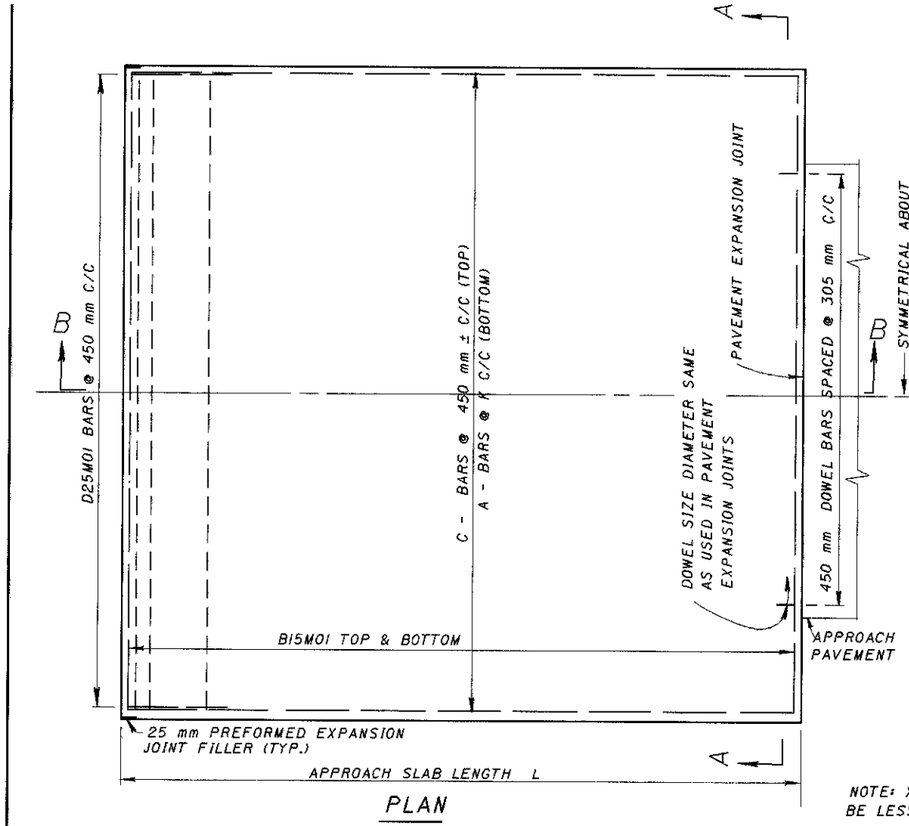
C. Place the test sample in bucket and fill with water until the sample is covered by at least ½ inch (13 mm) of water. Allow the sample to soak for 24 hours.

D. After soaking for 24 hours, throughly mix the water and collect a water sample of approximately 3.4 fl. oz. (100 mL).

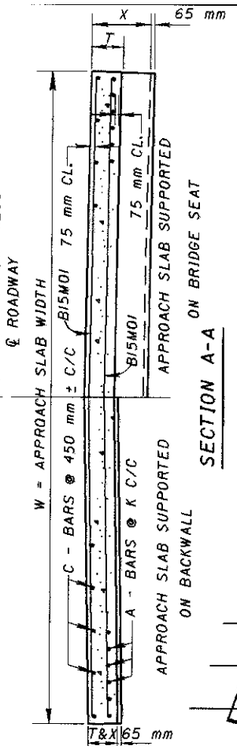
E. Filter the water sample to remove the suspended solids which may interfere with the color observation.

F. If the color of the filtered water is equal to or darker than the moderate greenish- yellow color from the rock chart (hue 10Y), the material fails. If the water appears clear or lighter than the moderate greenish-yellow color from the rock chart (hue 10Y), then allow the sample to soak for another 24 hours and repeat steps "D" through "F".

G. If, after 48 hours, the water appears clear or less than the moderate greenish-yellow color from the rock chart (hue 10Y), then the material is acceptable.

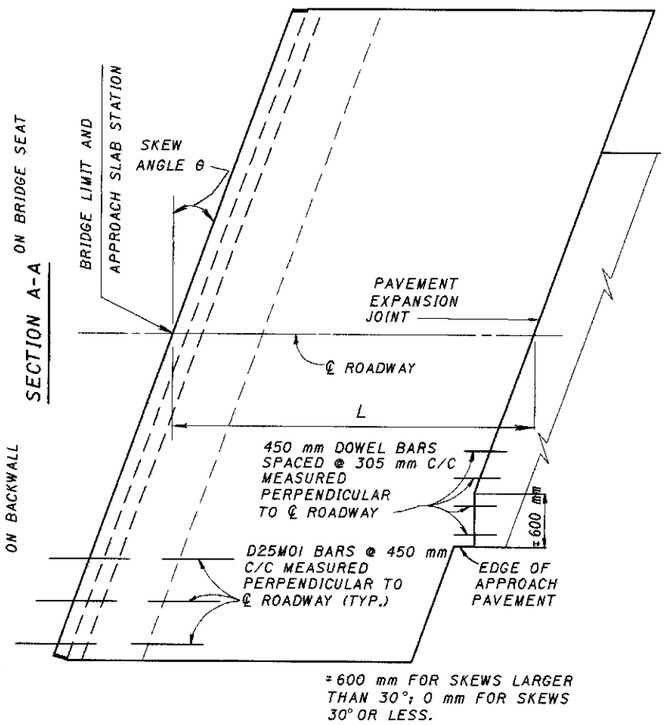


PLAN

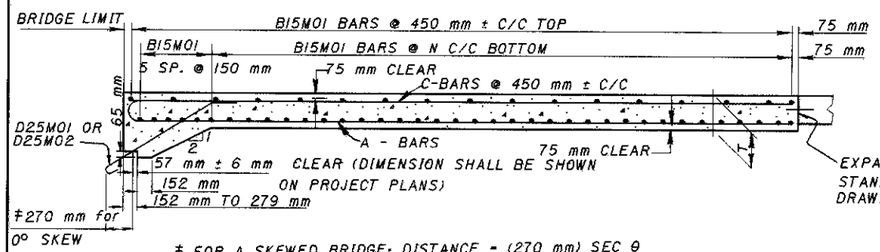


SECTION A-A

NOTE: X SHALL NEVER BE LESS THAN T



‡600 mm FOR SKEWS LARGER THAN 30°; 0 mm FOR SKEWS 30° OR LESS.



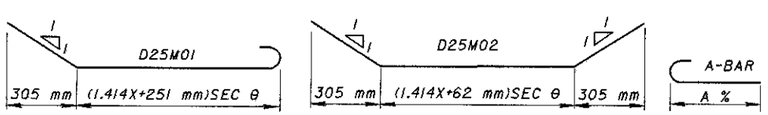
‡ FOR A SKEWED BRIDGE: DISTANCE = (270 mm) SEC θ

SECTION B-B

REINFORCING STEEL (FOR ONE APPROACH SLAB)

LENGTH L mm	THICKNESS T mm	A-BARS SP'C'G K	A-BARS MARK	A-BARS LENGTH mm	A-BARS DIMENSION A mm	A-BARS NO. REQ'D.	B15M01 (BOTTOM) * LENGTH	B15M01 (BOTTOM) SP'C'G N	B15M01 (BOTTOM) NO. REQ'D.	B15M01 (TOP) * LENGTH	B15M01 (TOP) NO. REQ'D.	C-BARS MARK	C-BARS LENGTH mm	C-BARS NO. REQ'D.	D25M01 OR D25M02 NO. REQ'D.
4600	305	255	A35M01	4880	4450	W-150/K + 1	θ (W-150)sec	230	22	θ (W-150)sec	11	C15M01	4425	W-150/450 + 1	W-150/450 + 1
6100	330	190	A35M02	6380	5950			200	31		14	C15M02	5950		
7600	380	180	A35M03	7880	7450			200	39		18	C15M03	7450		
9150	430	165	A35M04	9430	9000			215	44		21	C15M04	9000		

W = APPROACH SLAB WIDTH, OUT TO OUT, IN mm
θ = ANGLE OF SKEW
K = A-BAR SPACING IN mm
N = B-BAR SPACING IN mm
X = APPROACH SLAB THICKNESS AT ABUTMENT END IN mm
% = OUT TO OUT



APPROACH SLAB FOR SKEWED STRUCTURE

GENERAL: THIS DRAWING PROVIDES DESIGN AND GENERAL CONSTRUCTION DETAILS. THE PROJECT PLANS WILL SHOW LENGTH, SKEW, CURBS (IF ANY), ESTIMATED QUANTITY (SQUARE METER), AND SPECIAL NOTES AND DETAILS WHERE NECESSARY. FOR CONDITIONS OTHER THAN THOSE INDICATED HEREON, THE APPROACH SLAB SHALL BE ADAPTED TO FIT THE ENDS OF THE BRIDGE AND THE APPROACH PAVEMENT.

ANCHOR BARS D25M01 OR D25M02 SHALL BE DETAILED FOR A SPECIFIC BRIDGE AND SHALL BE INCLUDED WITH ITEM 509 UNDER ABUTMENTS OR SUPERSTRUCTURE FOR PAYMENT. D25M01 BARS CANNOT BE USED AS SHOWN WHERE APPROACH SLABS ARE SUPPORTED ON BACKWALLS LESS THAN 350 mm THICK. D25M02 BARS SHALL BE USED ON PRESTRESSED CONCRETE BOX BEAM BRIDGES WHERE THE APPROACH SLAB IS SUPPORTED ON AN 280 mm THICK BACKWALL.

BAR SIZE IS INDICATED IN THE BAR MARK. THE FIRST LETTER IDENTIFIES THE BAR LOCATION, NEXT TWO DIGITS AND LETTER INDICATES THE METRIC BAR SIZE DESIGNATION, AND THE REMAINING DIGITS ITS SEQUENCE NUMBER.

EXAMPLE : A35M01
1) A = LOCATION OF THE BAR IN THE STRUCTURE
2) 35M = METRIC BAR SIZE DESIGNATION
3) 01 = SEQUENCE NUMBER

* AT THE OPTION OF THE CONTRACTOR, B15M01 BARS MAY BE LAPPED 500 mm MINIMUM AT THE CENTERLINE OF ROADWAY, OR WHERE REQUIRED FOR LONGITUDINAL CONSTRUCTION JOINTS.

DESIGN SPECIFICATIONS: THIS STANDARD DRAWING CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1977, INCLUDING THE 1978, 1979, 1980 AND 1981 INTERIM SPECIFICATIONS AND THE OHIO "SUPPLEMENT" TO THESE SPECIFICATIONS.

DESIGN DATA

DESIGN LOADING: MS18 AND THE ALTERNATE MILITARY LOADING.

CONCRETE CLASS C : COMPRESSIVE STRENGTH 28 MPa

REINFORCING STEEL: ASTM A615M, A616M OR A617M-GRADE 400; MINIMUM YIELD STRENGTH OF 400 MPa AND SHALL BE EPOXY COATED.

REINFORCING STEEL: FOR SKEWED BRIDGES THE A AND C BARS SHALL BE PLACED PARALLEL TO THE CENTER LINE OF ROADWAY AND THE B BARS SHALL BE PLACED PARALLEL TO THE ABUTMENTS.

PREFORMED EXPANSION JOINT FILLER, TYPE "A" WATER PROOFING, AND SEALER AT THE CORNERS AND SIDES OF THE APPROACH SLAB SHALL BE INCLUDED IN THE PRICE BID PER SQUARE METER FOR THE APPROACH SLAB.

PREFORMED ELASTOMERIC JOINT SEALER SHOWN AT THE BRIDGE LIMIT END OF THE APPROACH SLAB SHALL BE INCLUDED IN THE PRICE BID PER SQUARE METER FOR THE APPROACH SLAB.

LONGITUDINAL CONSTRUCTION JOINTS REQUIRED FOR STAGE CONSTRUCTION SHALL BE AS PER 511.09.

CURBS, BRIDGES WITH SIDEWALKS : FOR BRIDGES CONSTRUCTED WITH RAISED SIDEWALKS, DEFLECTOR PARAPETS OR OTHER TYPES OF CONSTRUCTION WHICH RETAIN ROADWAY SURFACE DRAINAGE, THE APPROACH SLABS SHALL EITHER INCLUDE INTEGRAL CURBS OR BE CONSTRUCTED IN CONJUNCTION WITH BRIDGE CURBS. CURB HEIGHT SHALL BE TRANSITIONED UNIFORMILY BETWEEN BRIDGE CURB HEIGHT AND APPROACH CURB HEIGHT IN A LENGTH AS FOLLOWS: WHERE WINGWALL EXTENDS BEYOND END OF APPROACH SLAB, USE A MINIMUM LENGTH OF 3000 mm BEYOND END OF WINGWALL. WHERE THE APPROACH SLAB EXTENDS BEYOND THE END OF WINGWALL, TRANSITION IN THIS LENGTH. HOWEVER, THE TRANSITION LENGTH SHALL NOT BE LESS THAN 3000 mm AND THE TRANSITION SHALL EXTEND BEYOND THE END OF APPROACH SLAB IF NECESSARY.

APPROACH SLAB WIDTH (W): APPROACH SLABS SHALL BE THE SAME WIDTH AS THE BRIDGE ROADWAY.

THE LENGTH OF APPROACH SLABS SHOULD BE BASED ON FACTORS SUCH AS THE SIZE AND AMOUNT OF EXCAVATION BEHIND THE ABUTMENTS, NEW OR EXISTING EMBANKMENTS AND SKEW OF THE BRIDGE.

CROWN SHALL CONFORM TO THAT OF THE APPROACH PAVEMENT AND BRIDGE DECK. IF THE RATE OF CROWN OF THE BRIDGE DECK DIFFERS FROM THAT OF THE APPROACH PAVEMENT, A SMOOTH TRANSITION SHALL BE PROVIDED WITHIN THE LIMITS OF THE APPROACH SLAB.

WEARING SURFACE: GENERALLY APPROACH SLABS SHALL HAVE AN ASPHALT CONCRETE WEARING SURFACE ONLY WHEN BOTH THE APPROACH PAVEMENT SURFACE AND THE BRIDGE WEARING SURFACE ARE ASPHALT CONCRETE.

EXPANSION JOINT DETAILS AT THE APPROACH PAVEMENT END OF THE APPROACH SLAB ARE USED ONLY IN CONJUNCTION WITH CONCRETE PAVEMENT OR CONCRETE BASE COURSE. PAYMENT FOR THE EXPANSION JOINT, INCLUDING DOWEL BARS, PREFORMED EXPANSION JOINT FILLER AND JOINT SEALER, IS INCLUDED IN THE PRICE BID PER SQ. METER FOR THE APPROACH SLAB.

DESIGN AGENCY: BUREAU OF BRIDGES AND STRUCTURAL DESIGN

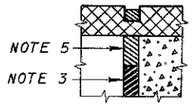
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES — DATE: 10-25-94

REVISIONS

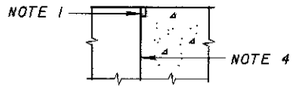
DESIGNED JFF | DRAWN JFF | CHECKED JAM | REVIEWED LMW

AS-1-81M

STANDARD
REINFORCED CONCRETE
APPROACH SLAB - METRIC



DETAIL A



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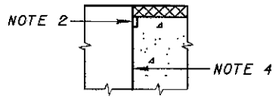

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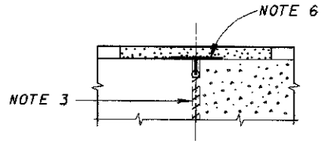

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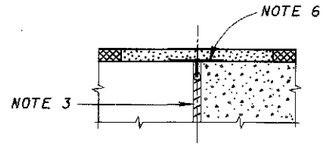
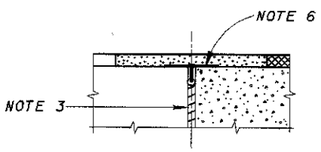


DETAIL E

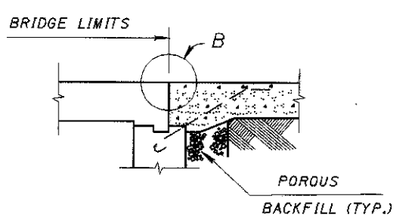


DETAIL F

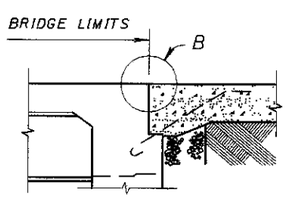
CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB

CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB

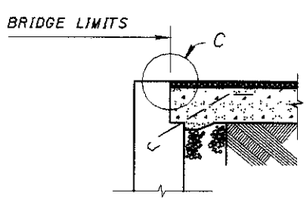
CONCRETE WEARING SURFACE ON BRIDGE DECK ONLY



ON SLAB BRIDGES

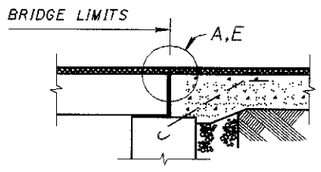


ON BRIDGES WITH INTEGRAL CONSTRUCTION

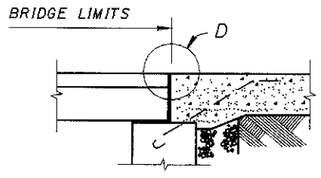


APPROACH SLAB SUPPORTED ON ABUTMENT BACKWALL

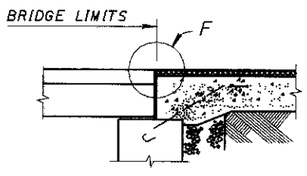
ASPHALT CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB



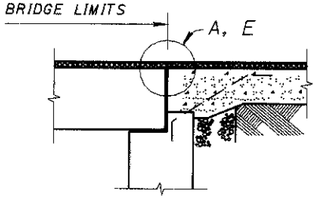
ON PRESTRESSED CONCRETE BOX BEAM BRIDGES



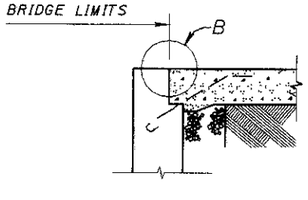
ON PRESTRESSED CONCRETE BOX BEAM BRIDGES



ON PRESTRESSED CONCRETE BOX BEAM BRIDGES



APPROACH SLAB SUPPORTED ON ABUTMENT BACKWALL



APPROACH SLAB SUPPORTED ON ABUTMENT BACKWALL

NOTE : APPROACH SLAB SEAT ON PRESTRESSED CONCRETE BOX BEAM BRIDGES IS SHOWN AT SAME ELEVATION AS BEAM SEAT. HOWEVER, IT MAY ACTUALLY BE HIGHER OR LOWER THAN THE BEAM SEAT DEPENDING ON BOX BEAM DEPTH.

NOTE 1 : PREFORMED ELASTOMERIC JOINT SEALER 705.11 (32 mm FOR 13 mm JOINT) DEPRESSED 3 mm BELOW ROADWAY. PLACED IN 13 mm x 55 mm GROOVE.

NOTE 2 : PREFORMED ELASTOMERIC JOINT SEALER 705.11 (32 mm FOR 13 mm JOINT) PLACED IN 13 mm x 55 mm GROOVE.

NOTE 3 : 25 mm PREFORMED EXPANSION JOINT FILLER 705.03

NOTE 4 : TYPE "A" WATERPROOFING.

NOTE 5 : SEE PLAN INSERT SHEET, ABUTMENT JOINTS IN BITUMINOUS CONCRETE BOX BEAM BRIDGES.

NOTE 6 : SEE PLAN INSERT SHEET, POLYMER MODIFIED ASPHALT EXPANSION JOINT SYSTEM.

TYPE "A" WATERPROOFING SHALL NOT EXTEND ABOVE THE BOTTOM OF THE GROOVE INTO WHICH THE PREFORMED ELASTOMERIC JOINT SEALER IS TO BE PLACED. IT SHALL BE APPLIED TO THE ENTIRE AREA OF THE ABUTMENT OR SUPERSTRUCTURE WHICH COMES INTO CONTACT WITH THE APPROACH SLAB.

FOR PRESTRESSED CONCRETE BOX BEAM BRIDGES WITH ASPHALT CONCRETE ON BOTH BRIDGE DECK AND APPROACH SLAB, THE TOP OF APPROACH SLAB AT THE BRIDGE END SHALL BE CONSTRUCTED TO THE LEVEL OF THE TOP OF THE BEAMS TO FACILITATE WATERPROOFING OF THE JOINT. THE THICKNESS OF ASPHALT CONCRETE AT THE APPROACH END SHALL BE THE THICKNESS OF ASPHALT CONCRETE USED ON THE ROADWAY PAVEMENT. THE THICKNESS OF ASPHALT CONCRETE SHALL VARY UNIFORMLY, IF NECESSARY, IN THE LENGTH OF THE APPROACH SLAB. THE BASE SHALL BE GRADED TO PERMIT THE BOTTOM OF THE APPROACH SLAB TO BE PARALLEL TO THE TOP.

FOR STRUCTURES HAVING ASPHALT CONCRETE WEARING SURFACE ON BOTH BRIDGE DECK AND APPROACH SLABS AND WHERE NO DECK EXPANSION DEVICES ARE PROVIDED, THE DECK MEMBRANE WATERPROOFING SHALL EXTEND BEYOND THE BRIDGE LIMITS A DISTANCE OF 600 mm.

DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

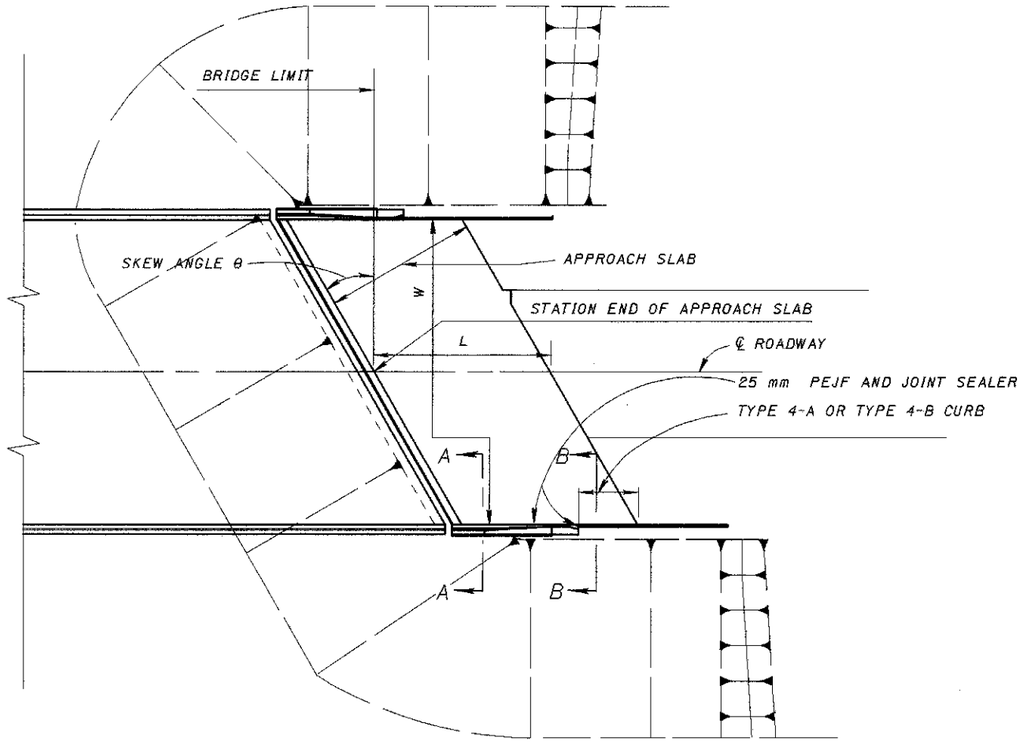
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
10-25-94
DATE
ENGINEER OF BRIDGES

REVISIONS

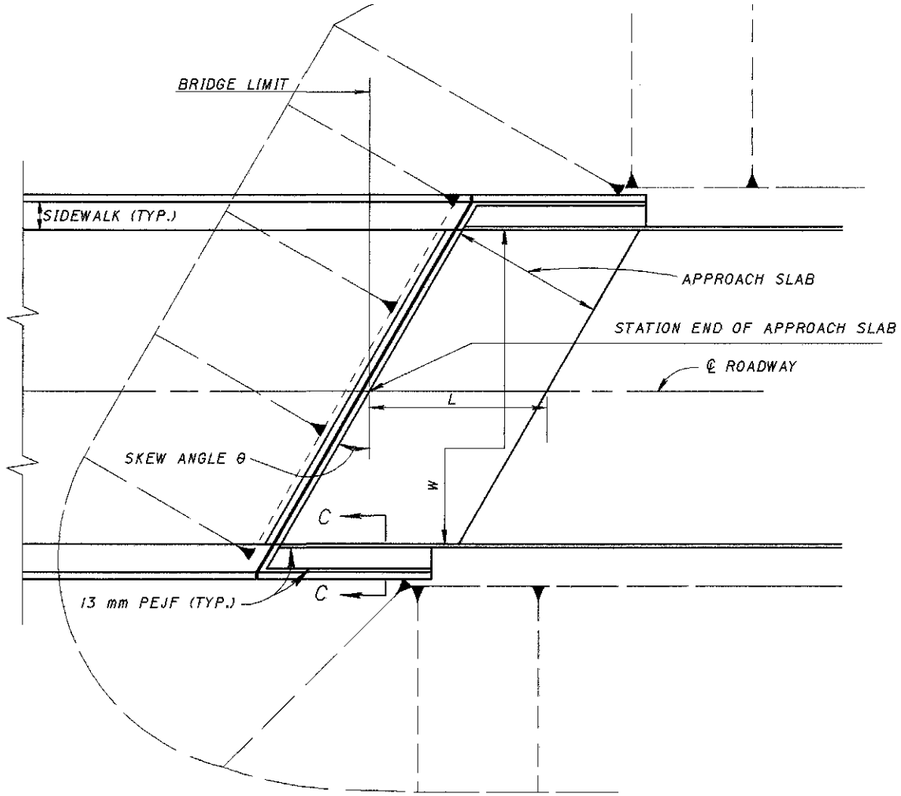
DESIGNED JFF
DRAWN JFF
CHECKED JAM
REVISED LMW

AS-1-81M

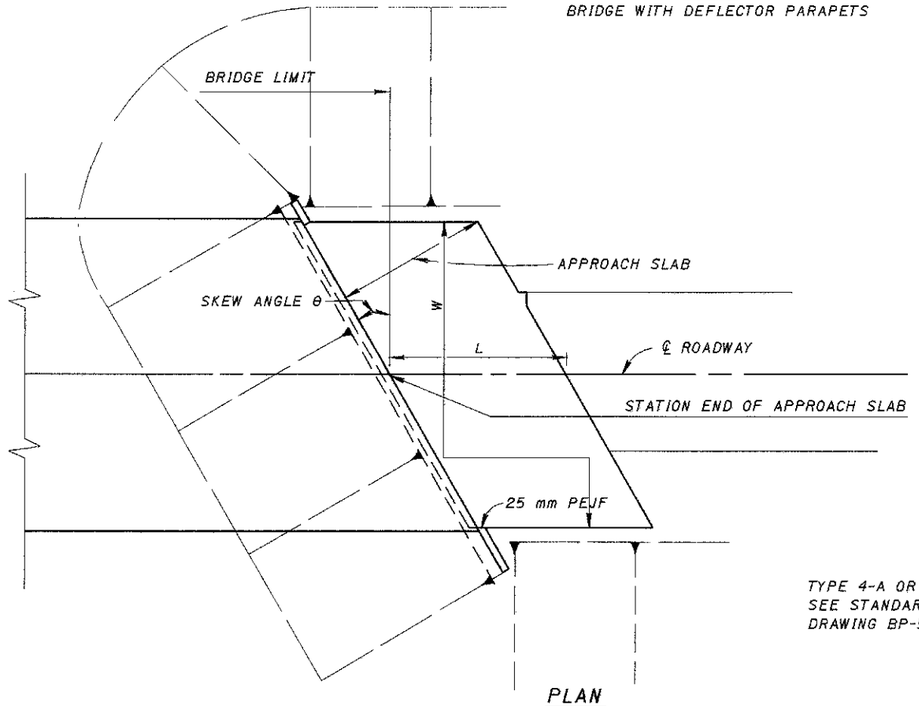
STANDARD
REINFORCED CONCRETE APPROACH SLAB - METRIC



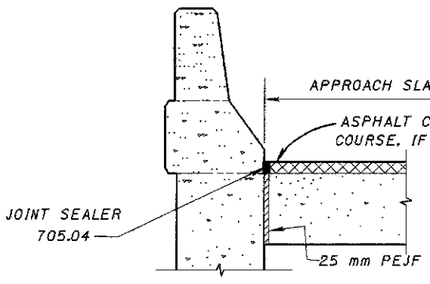
PLAN
BRIDGE WITH DEFLECTOR PARAPETS



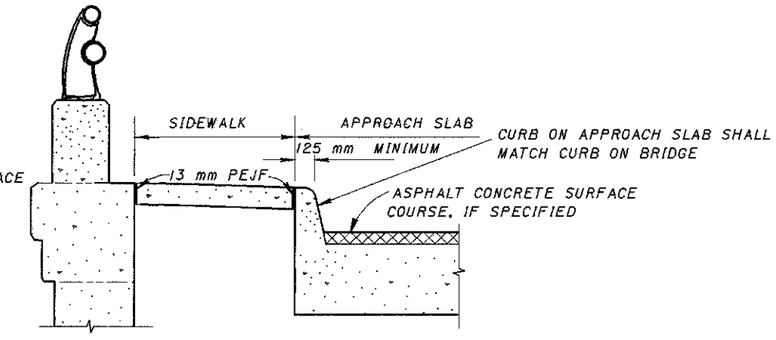
PLAN
BRIDGE WITH SIDEWALKS



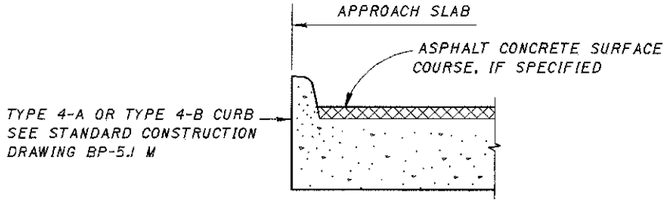
PLAN
BRIDGE WITHOUT CURBS



SECTION A-A



SECTION C-C



SECTION B-B

DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

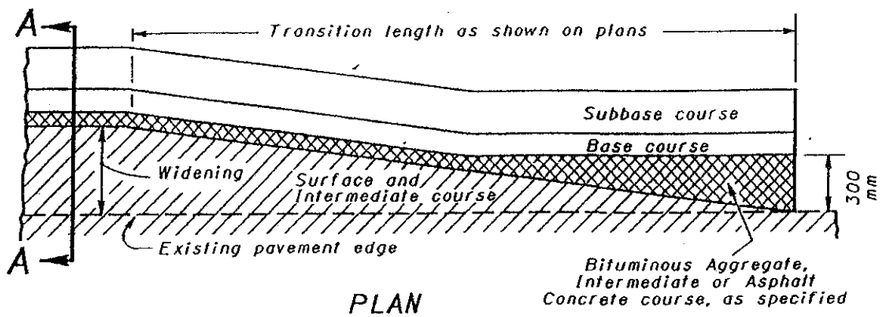
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES
10-25-94
DATE

REVISED LMW
CHECKED JAM
DESIGNED JFF
DRAWN JFF
REVISIONS

AS-1-81M

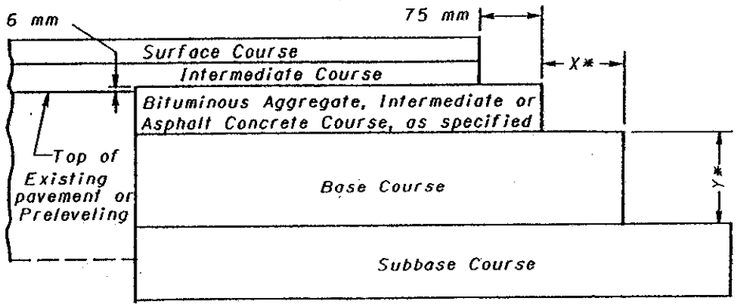
STANDARD
REINFORCED CONCRETE APPROACH SLAB - METRIC

3 / 3



PLAN

MERGING EDGE OF PAVEMENT WIDENING WITH EDGE OF EXISTING PAVEMENT

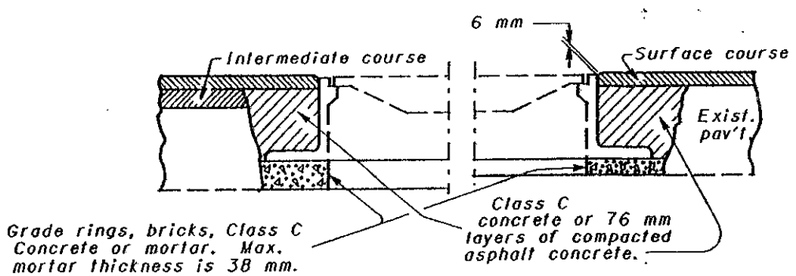


The Bituminous Aggregate in the upper part of the base widening shall finish approximately 6 mm above the edge of the existing pavement where no preleveling is used. Where a preleveling (using intermediate course material) is specified it shall be placed prior to excavation of the widening trench and the upper course of the base widening shall finish approximately 6 mm above the preleveling.

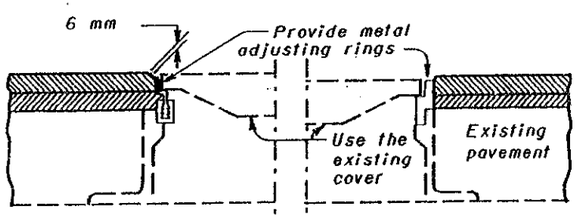
*The extended width (X) of a base or subbase course shall be equal to the depth (Y) of that particular course. unless otherwise specified in the plans.

SECTION A-A

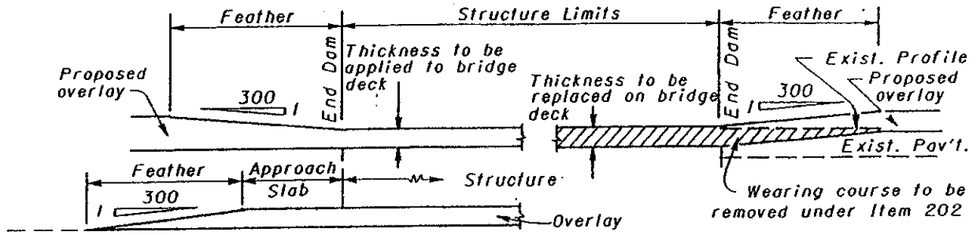
COURSE DETAIL FOR WIDENING



USING CONCRETE OR MORTAR

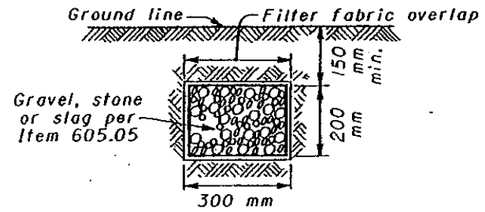


USING METAL ADJUSTING RINGS



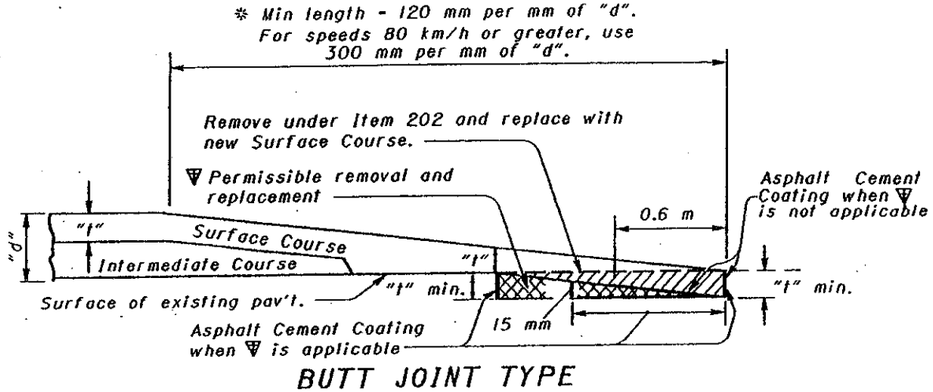
Details assume non-settled approach slabs. Smoothing of the profile for settlement is required per plan grades or as directed by the Engineer.

FEATHERING AT STRUCTURES

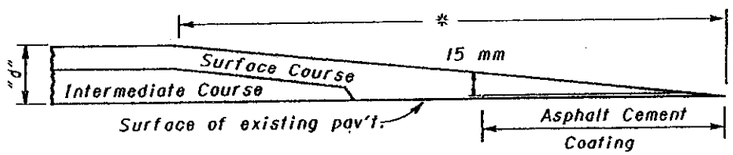


Aggregate drains to be placed where and as directed by Engineer. Provide filter fabric when specified as a separate pay item.

AGGREGATE DRAIN



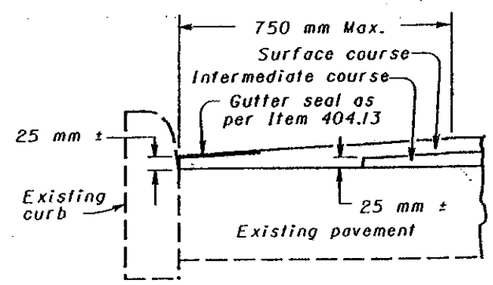
BUTT JOINT TYPE



TAPER EDGE TYPE

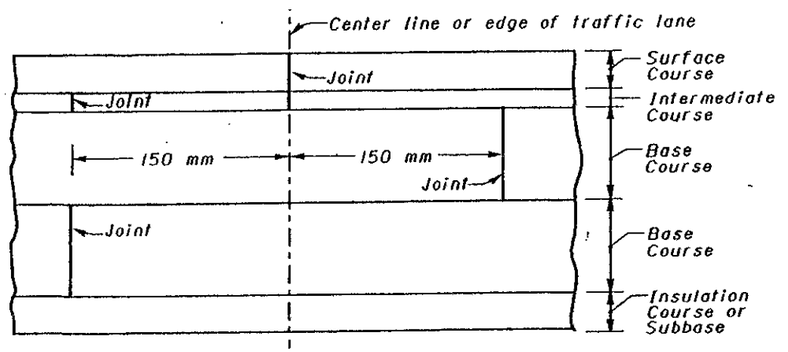
NOTE: Either butt or taper type may be used unless type is specified by the plan.

PLACING FEATHERED AREAS



Special care shall be taken during construction to obtain maximum compaction of bituminous concrete in gutters.

GUTTER FINISH



LAPPING LONGITUDINAL JOINTS

Metal adjusting rings shall: (a) attach securely to the existing frame by welding or mechanical devices; (b) consist either of cast metal having an integral rim and seat, or be fabricated metal with a sturdy connection between the seat and rim; and (c) provide an even seat for the manhole cover. In addition, the adjusting ring type shall be a design acceptable to the local governmental agency responsible for street and sewer maintenance. Any installation unacceptable to the Engineer shall be replaced by the Contractor at his expense.

MANHOLES ADJUSTED TO GRADE

metric units

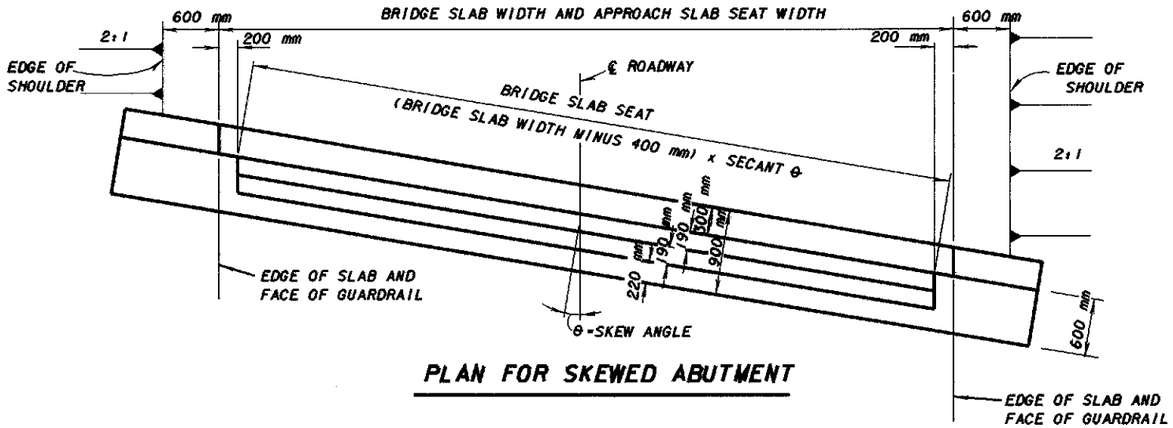
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

RESURFACING

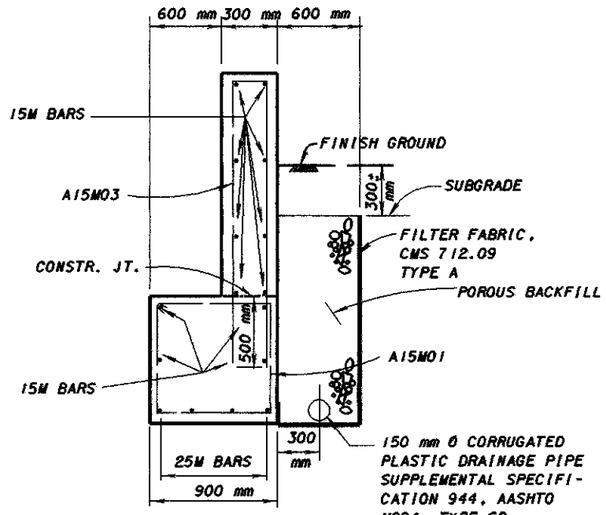
DATE 10-28-94

STANDARD CONSTRUCTION DRAWING **BP-3.1M**

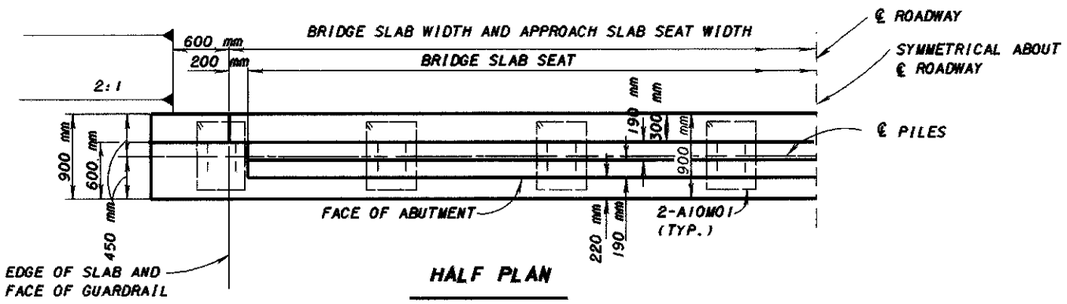
APPROVED W. K. Hukman
ENGR., L & D



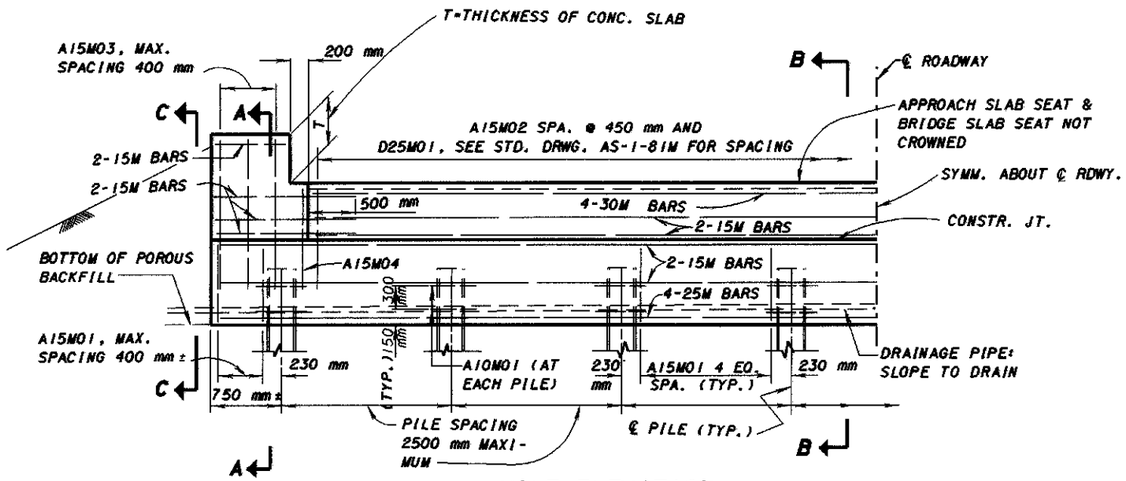
PLAN FOR SKEWED ABUTMENT



SECTION A-A

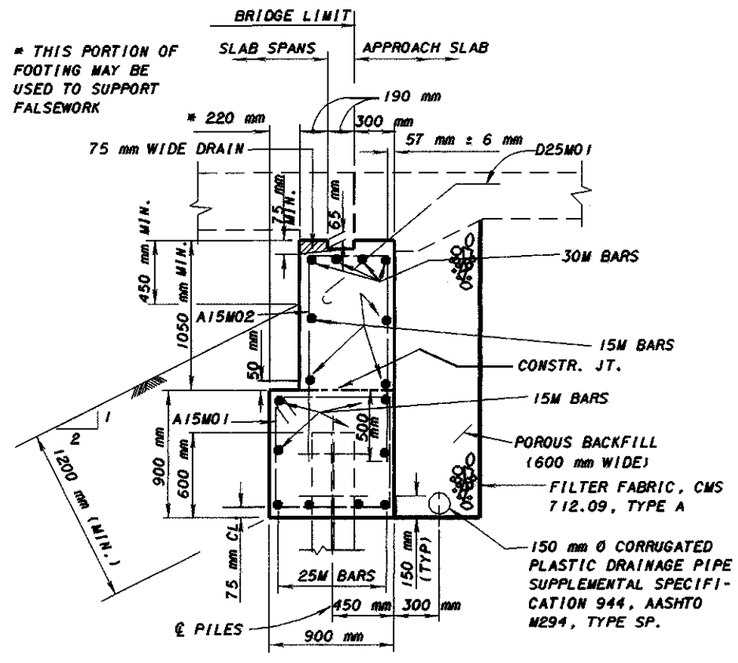


HALF PLAN



HALF ELEVATION

SEE SHEET 2/2 FOR SECTION C-C



SECTION B-B

SEE SHEET 2/2 FOR DRAIN DETAILS

DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Ed Abrahamson
ENGINEER OF BRIDGES
10-25-94
DATE

REVISIONS	DESIGNED	CHECKED	REVIEWED
	JAM	SAM	LAW
	phase	CPA-5-94M	
	BDB		

STANDARD
CAPPED PILE ABUTMENT - METRIC

1 / 2

GENERAL NOTES

DESIGN SPECIFICATIONS: THIS STANDARD DRAWING CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1992, INCLUDING THE 1993 INTERIM SPECIFICATIONS AND THE ODOT BRIDGE DESIGN MANUAL.

DESIGN LOADING: MS18 AND THE ALTERNATE MILITARY LOADING

DESIGN DATA: CONCRETE CLASS C - COMPRESSIVE STRENGTH 28 MPa (SUBSTRUCTURE)
REINFORCING STEEL - ASTM A615M, A616M OR A617M, GRADE 400 WITH A MINIMUM YIELD STRENGTH OF 400 MPa AND SHALL BE EPOXY COATED.

POROUS BACKFILL : POROUS BACKFILL 600 mm THICK WITH FILTER FABRIC SHALL EXTEND UPWARD TO THE PLANE OF THE SUBGRADE, TO 300 mm BELOW THE EMBANKMENT SURFACE, AND LATERALLY TO THE SURFACE OF THE EMBANKMENT SLOPES. GEOTEXTILE FABRIC SHALL CONFORM WITH 712.09, TYPE A. THE BOTTOM OF THE POROUS BACKFILL SHALL BE SLOPED (1:12 MINIMUM) LATERALLY TO DRAIN. GEOTEXTILE FABRIC IS INCLUDED WITH POROUS BACKFILL FOR PAYMENT.

ANIMAL GUARD : ANIMAL GUARD SHALL BE PROVIDED AT THE OUTLET END OF THE DRAINAGE PIPE. SEE STANDARD CONSTRUCTION DRAWING MC-4.1M FOR DETAILS. PAYMENT FOR THE ANIMAL GUARD SHALL BE INCLUDED WITH THE DRAINAGE PIPE BID ITEM.

DESIGN INSTRUCTIONS

GENERAL : THIS DRAWING PROVIDES DESIGN AND GENERAL CONSTRUCTION DETAILS. THE PROJECT PLANS FOR EACH STRUCTURE SHALL SHOW STATIONS, SPAN LENGTHS, ROADWAY WIDTH, SKEW, CURVE AND SUPERELEVATION DATA (IF ANY), ELEVATIONS, SUPERSTRUCTURE DETAILS, ESTIMATED QUANTITIES, REINFORCING STEEL LIST, AREAS OF SEALING, TYPE OF SEALER AND OTHER NECESSARY DETAILS AND SPECIAL NOTES.

PILE TYPE, SIZE AND ESTIMATED PAY LENGTHS SHALL BE SHOWN ON THE PROJECT PLANS (USUALLY AS 310 mm OR 360 mm DIAMETER CAST-IN-PLACE REINFORCED CONCRETE, OR AS 250 mm OR 310 mm STEEL "H" PILES). SPACING SHALL NOT EXCEED 2500 mm. THE PILE DESIGN LOADS SHALL BE GIVEN IN THE STRUCTURE GENERAL NOTES.

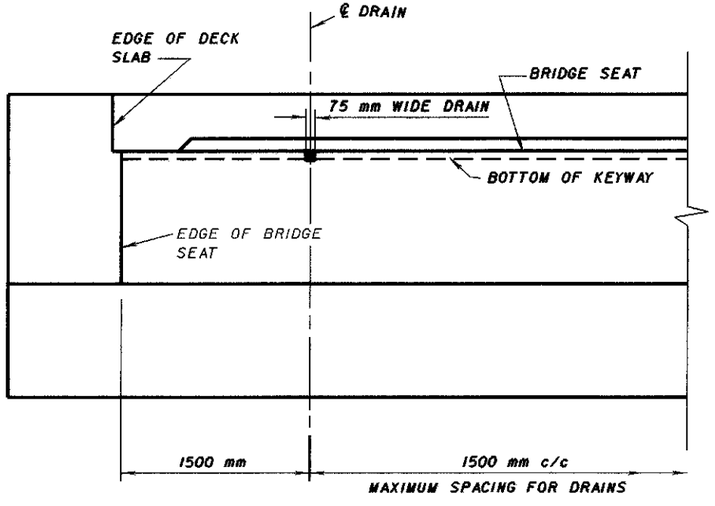
REINFORCING STEEL: THE LONGITUDINAL 30M, 25M AND 15M BARS AT THE OPTION OF THE CONTRACTOR, MAY BE FURNISHED EITHER IN ONE LENGTH AS SHOWN HEREON, OR SPLICED. IF THE SPLICE OPTION IS CHOSEN, THE 30M BAR SHALL BE LAPPED 2800 mm, THE 25M BAR SHALL BE LAPPED 1800 mm AND THE 15M BAR SHALL BE LAPPED 900 mm. A STAGGERED LAP SPLICE ARRANGEMENT SHALL BE USED. QUANTITY TO INCLUDE BAR WEIGHTS FURNISHED TO PROVIDE LAP SPLICES.

BAR SIZE IS INDICATED IN THE BAR MARK. THE FIRST LETTER IDENTIFIES THE BAR LOCATION; NEXT TWO DIGITS AND LETTER INDICATES THE METRIC BAR SIZE DESIGNATION; AND THE REMAINING DIGITS IT'S SEQUENCE NUMBER.

EXAMPLE: A15M01
- a) A = LOCATION OF THE BAR IN THE STRUCTURE
- b) 15M = METRIC BAR SIZE DESIGNATION
- c) 01 = SEQUENCE NUMBER

LEGEND

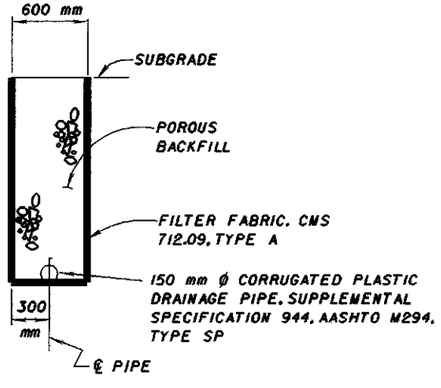
% = OUT TO OUT



PART ELEVATION

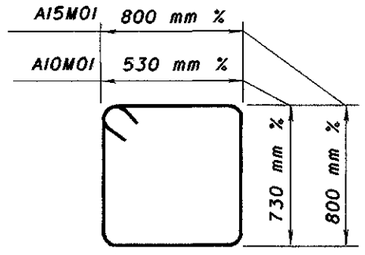
SHOWING DRAIN DETAILS

(SEE SECTION B-B, SHEET 1/2 FOR ADDITIONAL DETAILS)

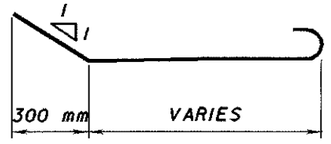


SECTION C-C

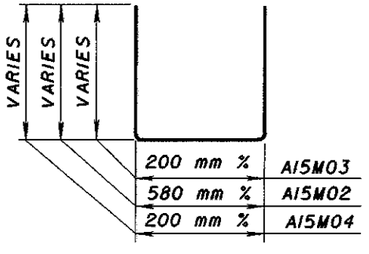
SEE SHEET 1/2 FOR LOCATION OF SECTION C-C



A15M01 LENGTH = 3375mm
A10M01 LENGTH = 2645mm



D25M01



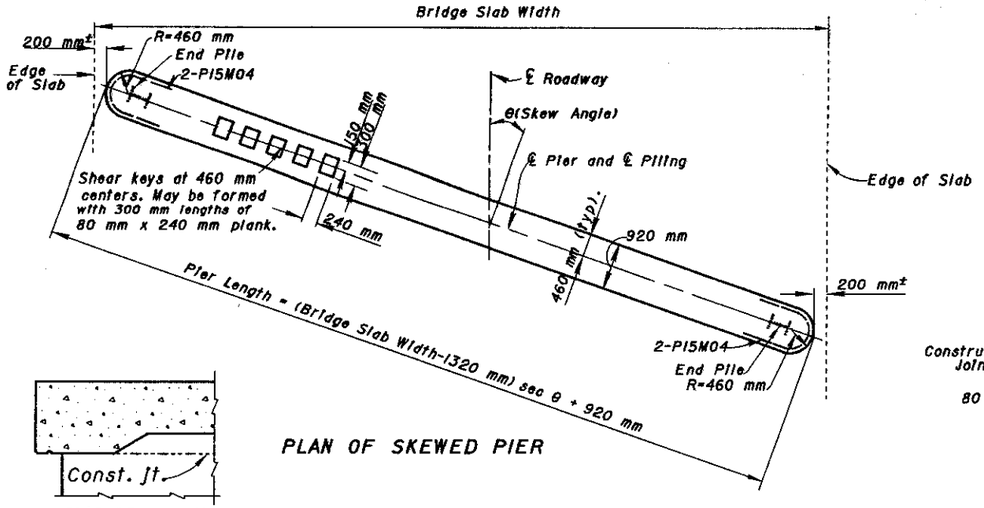
DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES
10-25-94
DATE

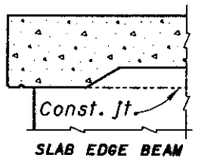
REVISIONS	DESIGNED JAM	CHECKED SAM	REVISED LAW
	DRAWN BDB		CPA-5-94M

STANDARD
CAPPED PILE ABUTMENT - METRIC

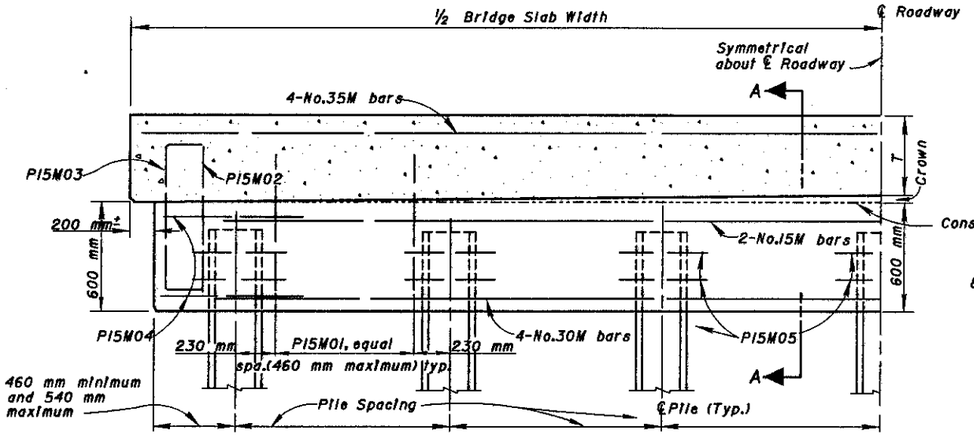
2/2



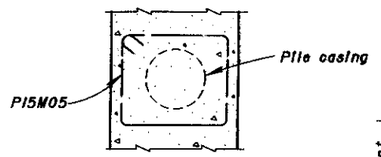
PLAN OF SKEWED PIER



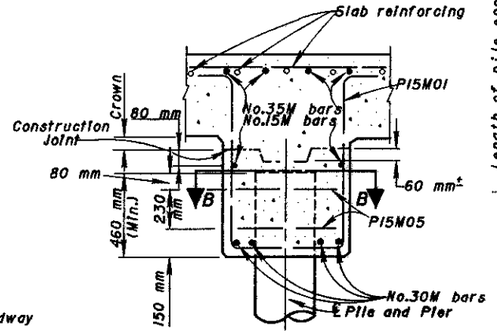
SLAB EDGE BEAM



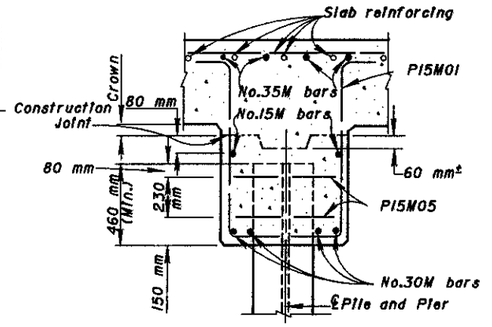
HALF ELEVATION



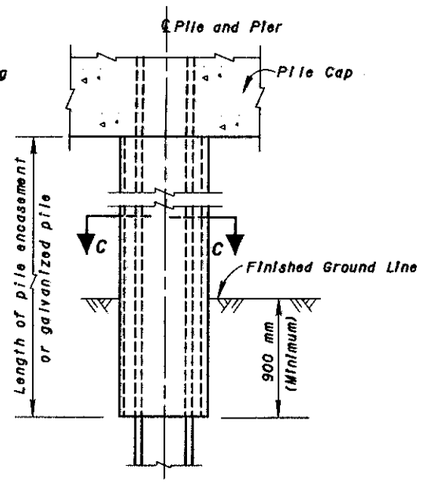
SECTION B-B



SECTION A-A
SHOWING 400 mm CAST-IN-PLACE CONCRETE PILE

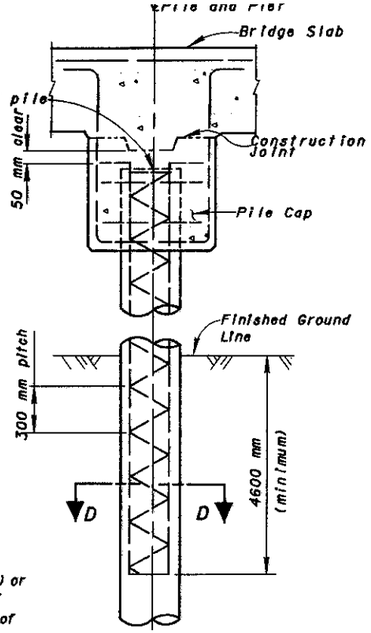


SECTION A-A
SHOWING STEEL PILE, HP 310 x 79

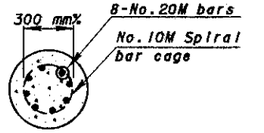


PILE ENCASEMENT

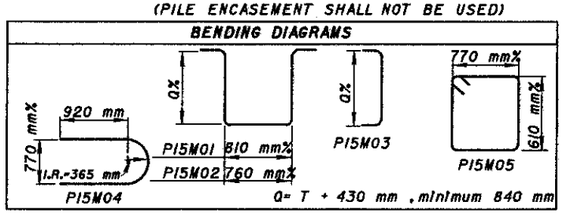
SECTION C-C
SHOWING STEEL PILE, HP 310 x 79



CONCRETE PILE REINFORCMENT



SECTION D-D
SHOWING 400 mm CAST-IN-PLACE REINFORCED CONCRETE PILE (PILE ENCASEMENT SHALL NOT BE USED)



GENERAL NOTES

DESIGN SPECIFICATION:
This Standard Drawing conforms to "Standard Specifications for Highway Bridges" adopted by the American Association of State Highway and Transportation Officials, 1992, including the 1993 interim specifications and the ODOT Bridge Design Manual.

DESIGN LOADING: MS18 and the Alternate Military Loading.

DESIGN DATA:

CONCRETE CLASS "S" - Compressive Strength 31 MPa

REINFORCING STEEL- ASTM A615M, A616M, or A617M Grade 400, with a minimum yield strength of 400 MPa and shall be epoxy coated.

SPIRIAL REINFORCMENT may be plain bars, ASTM A82M or A615M and shall be epoxy coated.

ITEM SPECIAL- PILE ENCASEMENT: All steel H piles shall be encased or galvanized as shown.

The encasement option shall consist of a pipe filled with either class C or class S concrete as per 507.06.

The galvanizing option shall be as per 711.02. The galvanizing coating minimum thickness shall be100 micrometers. Gouges, scrapes,

GENERAL NOTES (CONTINUED)

scratches or other surface imperfections caused by handling or driving of the H pile shall be repaired to the satisfaction of the Engineer. Additional galvanizing length beyond plan dimensions shall be at the contractor's expense.

The length of pile encasement shall be measured in meters along the length of the pile. This item shall include all work and materials necessary to furnish the required encasement.

Payment for pile encasement or galvanizing will be made at the the contract unit price per linear meter as item Special, Pile Encasement.

FALSEWORK SUPPORT: Attachment of the falsework support members to pier piles will be permitted if the attachment is made to the portion of pile encased in the pier cap. There shall be no eccentric loads produced in the piles by attached falsework support members.

DESIGN INSTRUCTIONS

GENERAL: This drawing provides general construction details. The project plans for each structure shall show Stations, Span Lengths, Roadway Width, Skew, Curve and Superelevation (if any) Elevations, Superstructure Details, Estimated Quantities, Reinforcing Steel List, Pile Encasement and other necessary details and special notes.

REINFORCING STEEL: The longitudinal No.35M, No.30M and No.15M bars, at the option of the Contractor, may be furnished either

DESIGN INSTRUCTIONS

in one length as shown hereon, or spliced. If the splice option is chosen, the No.35M bar shall be lapped 2800 mm, the No.30M bar shall bar shall be lapped 2450 mm and the No.15M bar shall be lapped 900 mm. A staggered lap splice arrangement should be used.

Payment for reinforcing shall be the plan quantity. Do not adjust the plan to include bar weights furnished to provide lap splices.

PILE TYPE AND SIZE: The pile type and size shall be specified on the project plans. For example a 400 mm diameter cast-in-place reinforced concrete pile as shown in section D-D or a HP 310 x 79 pile.

PILE DESIGN LOADS: The pile design loads and estimated pay lengths shall be given in the Structure General Notes. Pile spacing shall not exceed 2300 mm.

SLAB THICKNESS: See Slab Standard Drawing for value of "T".

LIMITS OF DESIGN: This Standard Drawing should not be used for any bridge in which the following limits are exceeded.
(a) Skew angle equals 35°.
(b) Exposed pile height equals 6000 mm (consider scour depths and soil density)
(c) To support a continuous span arrangement greater than 17 000 mm.
(d) Slope embankment, debris or ice flow loads which would cause appreciable horizontal force against the pile bent.
(e) Rock or other firm material would prevent driving piles at least 3000 mm below finished ground line.

Bar Size is indicated in the bar mark. The first letter indentifies the bar location; next two digits and letter indicates the metric bar size designation; and the remaining digits its sequence number.

Example: PI5M01
a) P= Location of the bar in the structure
b) 15M = Metric bar size designation
c) 01 = Sequence

Legend:

I.R. = Inside Radius
℄ = Out to Out
R = Radius
T = Slab Thickness

DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

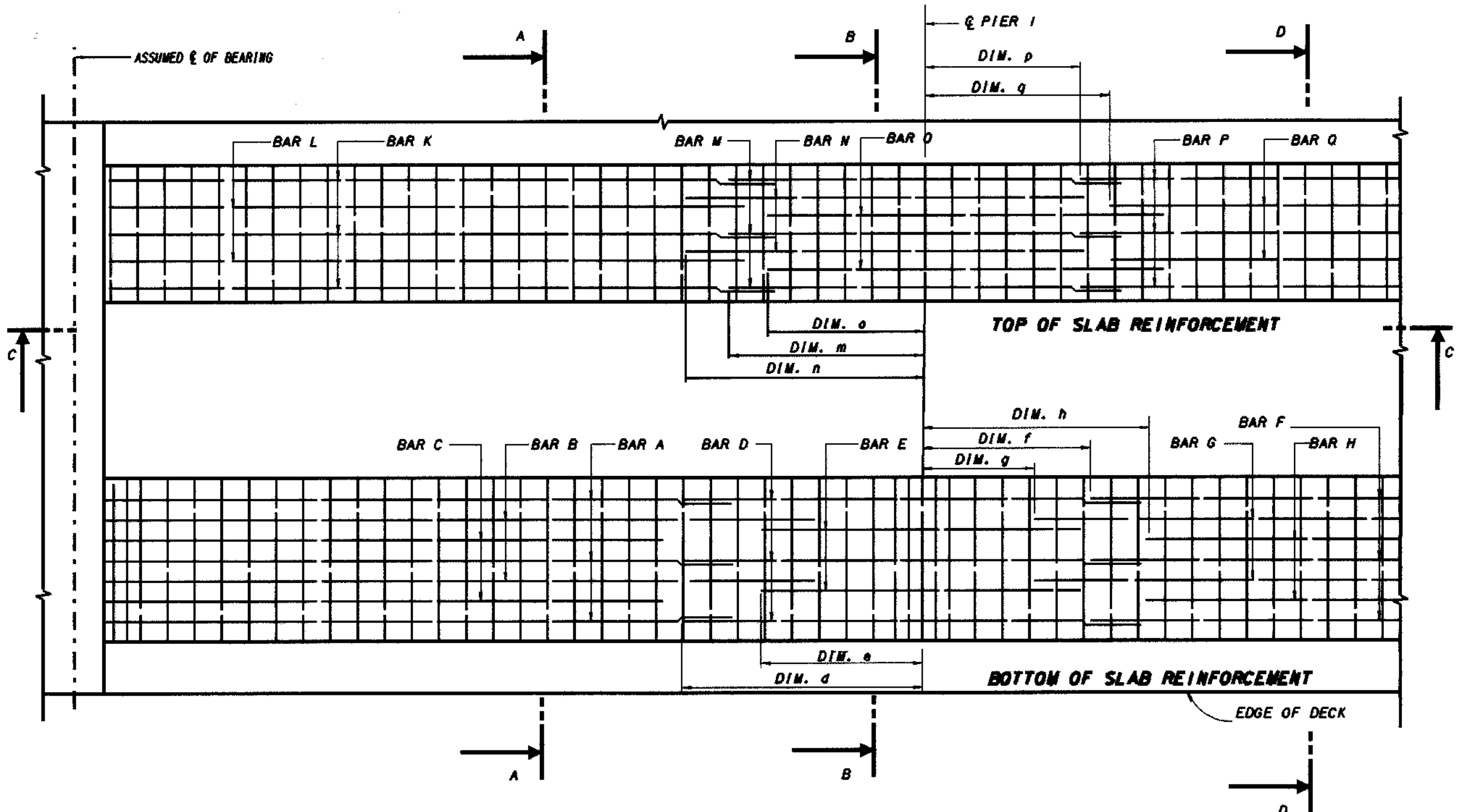
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES
12-16-94
DATE

REVIEWED LMW
CHECKED SAM
PREPARED JAM
DRAWN GFJ
CPP-2-94M

REVISIONS

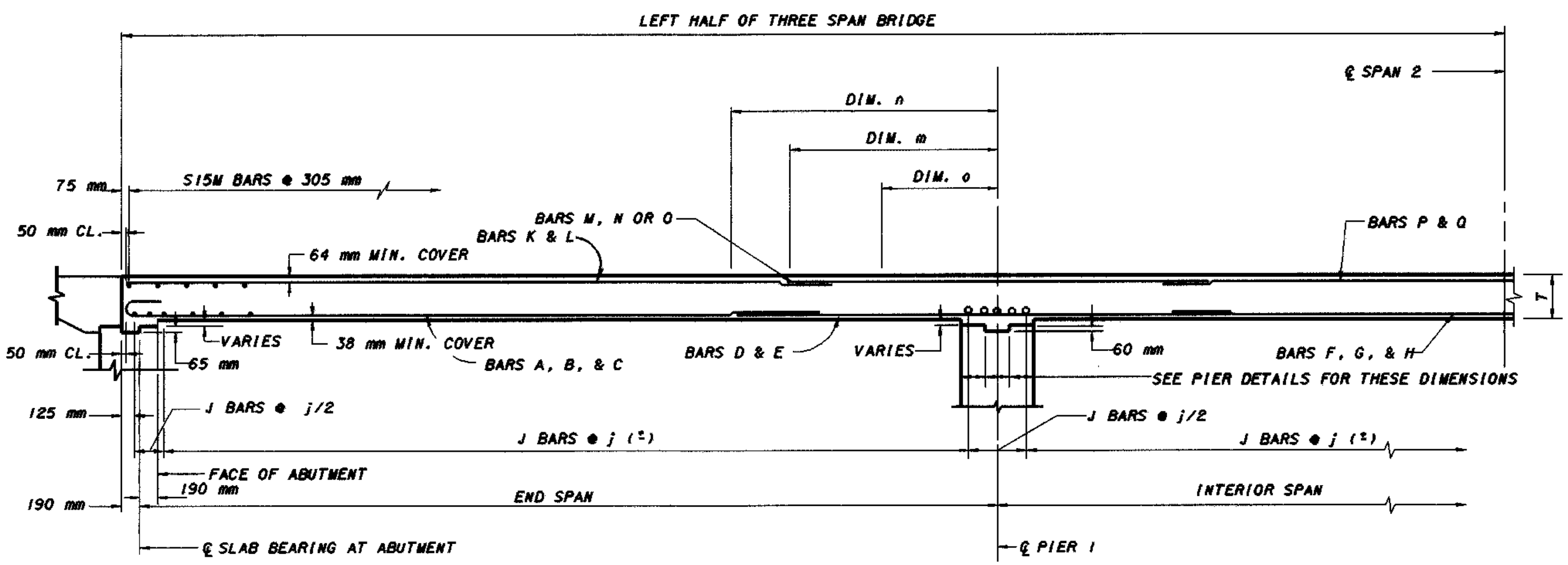
STANDARD
CAPPED PILE PIER
FOR CONTINUOUS SLAB BRIDGES-METRIC

1/1



SEE SHEET NO. 2/3 FOR SECTIONS A - A, B - B AND D - D

PARTIAL PLAN VIEW



SECTION C - C

GENERAL NOTES

GENERAL: THIS STANDARD DRAWING PROVIDES DESIGN AND GENERAL CONSTRUCTION DETAILS FOR THREE SPAN SLAB BRIDGES. THE PROJECT PLANS FOR EACH STRUCTURE WILL SHOW SPAN LENGTHS, ROADWAY WIDTHS, SKEW, CURVE, AND SUPERELEVATION (IF ANY), ELEVATIONS, SLAB REINFORCEMENT DETAILS IN PLAN AND CROSS SECTIONS, SUBSTRUCTURE DETAILS, ESTIMATED QUANTITIES, REINFORCING STEEL LIST AND OTHER NECESSARY DETAILS AND SPECIAL NOTES.

ADDITIONAL INTERIOR SPANS OF THE SAME LENGTH AS THE MIDDLE SPAN OF THE THREE SPAN SLAB BRIDGE DESIGN WITH AN 0.8 END SPAN RATIO MAY BE INCORPORATED INTO THE STRUCTURE WITHOUT CHANGE IN SLAB THICKNESS OR REINFORCEMENT. ADDITIONAL INTERIOR SPANS OF THE SAME LENGTH AS THE MIDDLE SPAN OF THE THREE SPAN SLAB BRIDGE WITH 0.7 END SPAN RATIOS REQUIRE A 25% INCREASE IN THE NEGATIVE REINFORCEMENT (TOP DECK STEEL) AT THE PIERS CLOSEST TO THE ABUTMENTS.

DESIGN SPECIFICATIONS: THIS STANDARD DRAWING CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1992, AND THE OHIO BRIDGE DESIGN MANUAL.

DESIGN METHOD: LOAD FACTOR DESIGN
DESIGN LOADING: MS18 AND THE ALTERNATE MILITARY LOADING
SUPERIMPOSED DEAD LOADS: 366.93 kg/m²
DESIGN STRESSES:
CONCRETE CLASS S - COMPRESSIVE STRENGTH 31MPa
REINFORCING STEEL - ASTM A615M, A616M, A617M GRADE 400 MINIMUM YIELD STRENGTH 400MPa
WEARING SURFACE: MONOLITHIC CONCRETE - 25 mm
DECK PROTECTION METHOD - EPOXY COATED REINFORCING STEEL, TOP AND BOTTOM MATS

SKEW: FOR BRIDGES WITH SKEW, LONGITUDINAL BARS SHALL BE PLACED PARALLEL TO CENTERLINE OF THE ROADWAY AND TRANSVERSE BARS PARALLEL TO PIERS AND ABUTMENTS. THIS STANDARD SHALL NOT BE USED FOR SKEWS GREATER THAN 30°.

BAR SIZE IS INDICATED IN THE BAR MARK. THE FIRST LETTER IDENTIFIES THE BAR LOCATION; THE NEXT TWO DIGITS AND LETTER INDICATE THE METRIC BAR SIZE DESIGNATION; AND THE REMAINING DIGITS ITS SEQUENCE NUMBER.

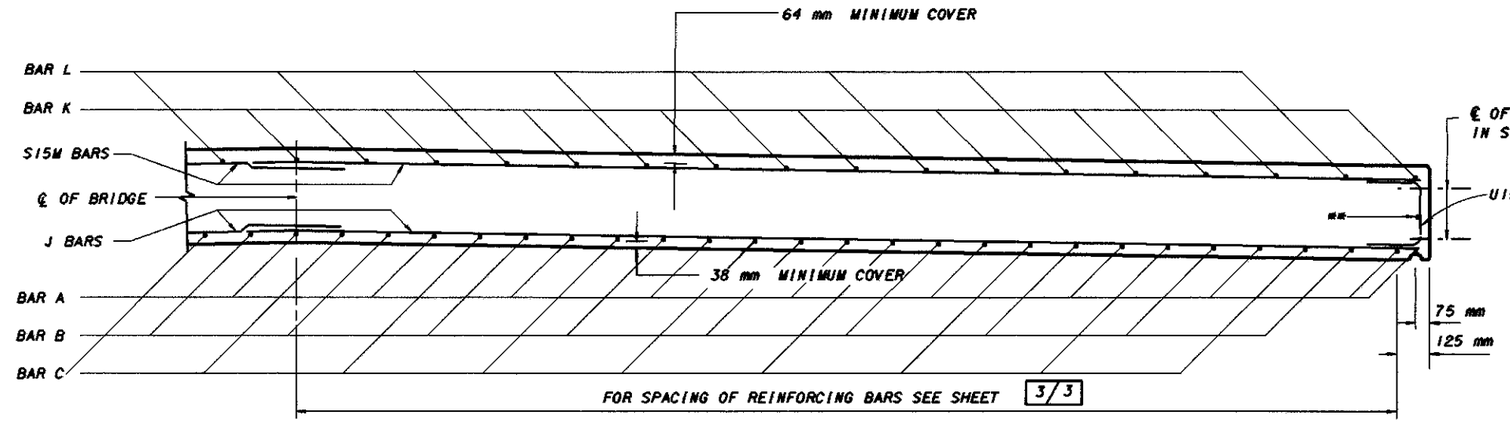
EXAMPLE: U15M01
1. U = LOCATION OF THE BAR IN THE STRUCTURE
2. 15M = METRIC BAR SIZE DESIGNATION
3. 01 = SEQUENCE NUMBER

DESIGN AGENCY: OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
10-25-94 DATE
ADMINISTRATOR

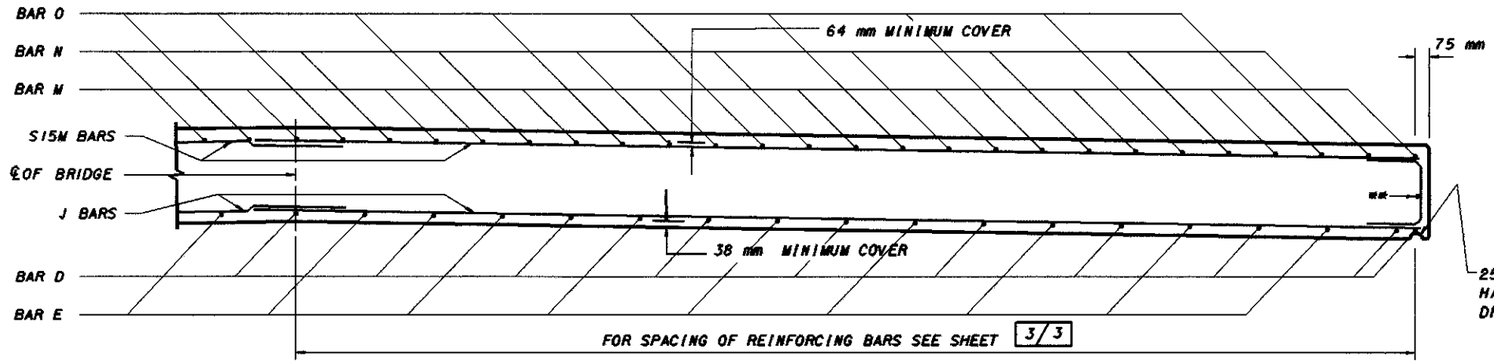
REVIEWED LMW | CHECKED JFF | DESIGNED MGP | DRAWN BDB | REVISIONS 6-30-95 | CS-1-93M

STANDARD
CONTINUOUS SLAB BRIDGE METRIC

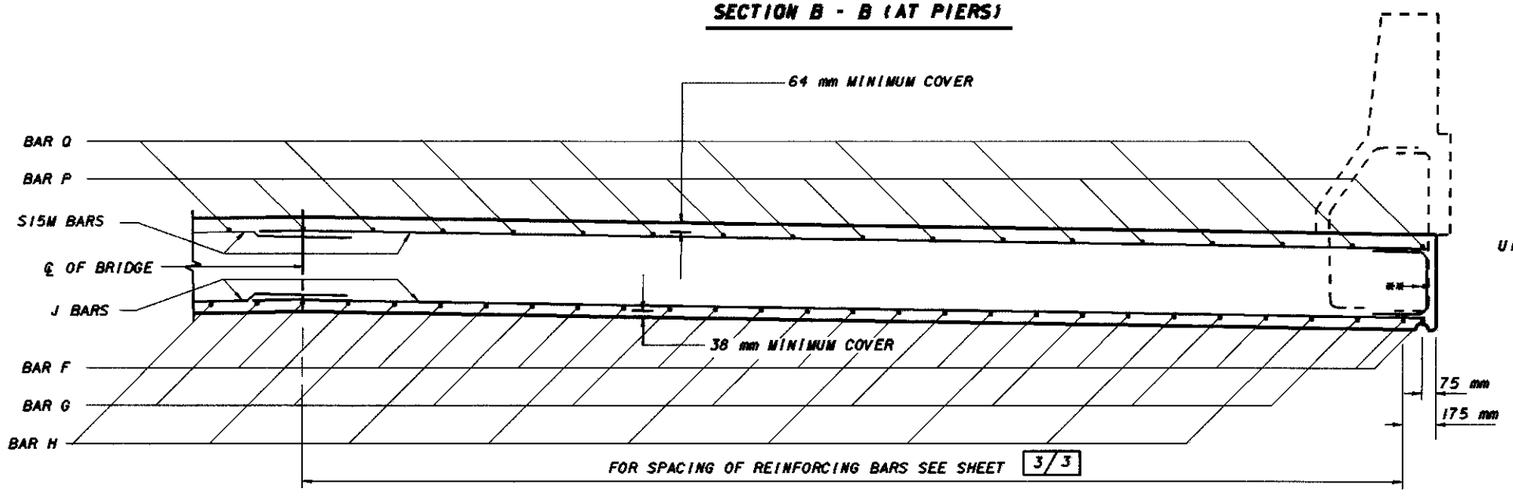


SECTION A - A (END SPAN)

** USE T15M01 BAR ONLY WITH T GREATER THAN 533mm



SECTION B - B (AT PIERS)



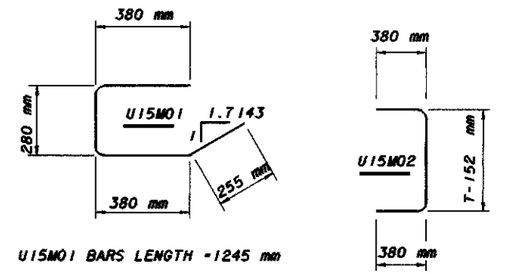
SECTION D - D (INTERIOR SPAN(S))

CONSTRUCTION JOINTS:
PLACEMENT OF THE CONCRETE DECK SLAB SHALL BE CONTINUOUS. CONSTRUCTION JOINTS SHALL BE PROVIDED ONLY IF A DECK POUR CANNOT BE COMPLETED DUE TO INCLEMENT CONDITIONS. THE CONSTRUCTION JOINT SHALL CONFORM TO THE REQUIREMENTS OF 511 OF THE CMS.

CAMBER:
CAMBER AS SHOWN IN THE SLAB AND REINFORCING TABLES SHALL BE PROVIDED TO COMPENSATE FOR THE DEAD LOAD DEFLECTIONS IN ADDITION TO ANY CAMBER REQUIRED FOR CONFORMANCE WITH THE PROFILE OF THE HIGHWAY.
ALLOWANCE SHALL BE MADE FOR THE DEFLECTION OF ANY FALSEWORK MEMBERS SUPPORTING THE ACTUAL CONCRETE DURING PLACEMENT.

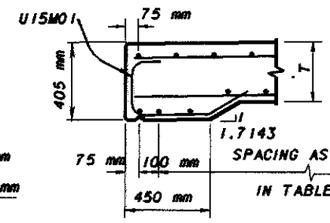
EDGE BEAM OPTION:
IN LIEU OF FORMING AN EDGE BEAM, THE CONTRACTOR MAY FURNISH A 405 mm SLAB OR A SLAB VARYING IN THICKNESS FROM 405 mm AT THE EDGE TO "T" AT THE CENTER OF THE ROADWAY AT NO ADDITIONAL COST TO THE OWNER.

EXPANSION:
PROVISIONS SHALL BE MADE FOR EXPANSION WHEN THE BRIDGE LENGTH EXCEEDS 76 200 mm OR WHEN A RIGID SUBSTRUCTURE (OTHER THAN A SINGLE LINE OF PILES) IS EMPLOYED.

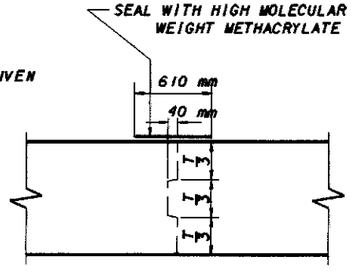


U15M01 BARS LENGTH =1245 mm

U15M02 BARS LENGTH =T+559 mm



EDGE BEAM DETAIL
FOR T < 406 mm



CONSTRUCTION JOINT

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Ed Sanchez
ADMINISTRATOR
10-25-94
DATE

REVISED LMW	CS-1-93M
CHECKED JFF	
DESIGNED MGP	DRAWN BDB
REVISIONS 6-30-95	

STANDARD
CONTINUOUS SLAB BRIDGE METRIC

2/3

THREE SPAN SLAB DATA

SPANS (mm) (SPAN RATIOS 0.7-1-0.7)	T (mm)	BAR SIZES (NUMBER) BARS A,B C,D F,G,H	BAR SIZES BARS K,M N,O P	BAR SIZES BARS E,L Q	BAR SIZES BAR J	BAR SPACINGS (mm) BARS A,B C,D,E F,G,H	BAR SPACINGS BARS K,L M,N,O P,Q	BAR SPACINGS BAR J	BAR A LENGTH	BAR B LENGTH	BAR C LENGTH	BAR C DIM. c	BAR D LENGTH	BAR D DIM. d	BAR E LENGTH	BAR E DIM. e	BAR F LENGTH	BAR F DIM. f	BARS G AND H LENGTH	BARS G AND H DIM. g	BARS G AND H DIM. h	BAR K LENGTH	BAR L LENGTH	BAR M LENGTH	BAR M DIM. m	BARS N AND O LENGTH	BARS N AND O DIM. n	BARS N AND O DIM. o	BAR P LENGTH	BAR P DIM. p	BAR Q LENGTH	BAR Q DIM. q	REQ'D. DEAD LOAD CAMBER AT MIDSPAN SPANS 1 & 3 (mm)	REQ'D. DEAD LOAD CAMBER AT MIDSPAN SPAN 2 (mm)	NUMBER OF J BARS	NUMBER OF S15M BARS	NUMBER OF T15M BARS	LENGTH OF T15M BARS (mm)	NUMBER OF U15M01 OR U15M02 BARS
4260-6090-4260	305	25M	20M	15M	15M	475	455	190	3962	3734	3581	3277	2819	1143	2591	1219	4115	990	3581	838	1676	2896	2616	4877	2362	5105	2362	1753	2819	1638	2261	1917	0	6	85	50			170
4790-6850-4790	330	25M	25M	15M	15M	455	515	190	4191	3962	3810	3505	3200	1295	2896	1372	4420	1219	3962	990	1905	3429	2997	4877	2362	5156	2362	2362	3835	1511	2997	1930	0	6	93	55			186
5334-7620-5334	355	25M	25M	15M	15M	440	495	190	4572	4420	4191	3886	3734	1600	3200	1600	4724	1448	4420	1067	2134	4039	3607	4877	2438	5182	2438	1753	4750	1435	3912	1854	0	6	98	62			196
5860-8380-5860	380	25M	25M	15M	15M	440	455	200	4877	4801	4496	4191	4039	1829	3505	1753	5334	1524	4953	1219	2210	4648	4216	4724	2362	5055	2362	1676	5664	1359	4826	1778	0	6	107	68			214
6390-9140 -6390	405	25M	25M	15M	15M	530	535	200	5613	5334	5080	4724	4420	1829	3658	1753	5740	1702	5182	1372	2591	5334	4597	4877	2515	5283	2515	1600	7036	1054	5563	1791	0	13	116	74			232
6930-9900-6930	430	25M	25M	15M	15M	550	535	215	5918	5639	5385	5029	4648	2057	3962	1981	6502	1702	5867	1448	2591	5944	5207	4724	2438	5131	2438	1524	7950	978	6477	1715	0	13	118	80			236
7460-10660-7460	460	25M	25M	15M	15M	550	455	230	6223	6020	5690	5334	5029	2286	4191	2134	6960	1854	6401	1524	2743	6553	5817	4572	2362	5004	2362	1448	8865	902	7391	1638	0	13	120	86			240
8000-11430-8000	480	25M	25M	15M	15M	530	455	230	6528	6378	5994	5639	5486	2515	4572	2362	7264	2083	6782	1676	2972	7315	6579	4572	2134	5029	2134	1219	9169	1130	7696	1867	0	19	128	92			256
8533-12190-8533	510	25M	30M	15M	15M	530	515	230	6833	6706	6299	5944	5791	2743	4877	2515	7874	2159	7315	1829	3048	7798	6731	5182	2515	5715	2515	1295	10185	1003	8052	2070	0	19	136	98			272
9060-12950-9060	535	25M	30M	15M	15M	530	475	240	7214	7087	6680	6325	6096	2896	5105	2667	8331	2311	7849	1905	3200	8255	7188	5334	2591	5893	2591	1372	10795	1080	8661	2146	6	25	137	104			274
9600-13710-9600	560	25M	35M	15M	15M	515	550	240	7518	7468	6985	6629	6553	3124	5410	2819	8636	2540	8230	2057	3429	8839	7341	5944	2972	6655	2972	1448	11938	889	8941	2388	6	25	144	110	4	16967	288
10130-14470-10130	585	25M	35M	15M	15M	515	515	240	7823	7849	7290	6934	6934	3353	5715	2972	9093	2692	8687	2210	3581	9296	7798	6096	3048	6807	3048	1524	12548	965	9550	2464	6	32	152	116	4	17882	304
10660-15240-10660	610	25M	35M	15M	15M	495	475	240	8128	8153	7595	7391	7391	3581	6096	3200	9398	2921	9068	2362	3810	9754	8255	6248	3124	6985	3124	1600	13157	1041	10160	2692	6	32	160	122	6	12649	320
11200-16000-11200	635	25M	35M	15M	15M	475	515	240	8433	8458	7899	7544	7772	3810	6477	3429	9855	3073	9525	2515	3962	10287	8331	7163	3581	8052	3581	1676	13970	1016	10033	2985	6	38	167	128	6	13259	334
11690-16700-11690	660	25M	35M	15M	15M	455	515	230	8814	8839	8280	7925	8153	3962	6782	3581	10160	3302	9906	2667	4191	10744	8788	7315	3658	8230	3658	1753	14580	1092	10643	3054	6	38	184	134	6	13868	368

THREE SPAN SLAB DATA

SPANS (mm) SPAN RATIOS (0.8-1-0.8)	T (mm)	BAR SIZES (NUMBER) BARS A,B C,D F,G,H	BAR SIZES BARS K,M N,O P	BAR SIZES BARS E,L Q	BAR SIZES BAR J	BAR SPACINGS (mm) BARS A,B C,D,E F,G,H	BAR SPACINGS BARS K,L M,N,O P,Q	BAR SPACINGS BAR J	BAR A LENGTH	BAR B LENGTH	BAR C LENGTH	BAR C DIM. c	BAR D LENGTH	BAR D DIM. d	BAR E LENGTH	BAR E DIM. e	BAR F LENGTH	BAR F DIM. f	BARS G AND H LENGTH	BARS G AND H DIM. g	BARS G AND H DIM. h	BAR K LENGTH	BAR L LENGTH	BAR M LENGTH	BAR M DIM. m	BARS N AND O LENGTH	BARS N AND O DIM. n	BARS N AND O DIM. o	BAR P LENGTH	BAR P DIM. p	BAR Q LENGTH	BAR Q DIM. q	REQ'D. DEAD LOAD CAMBER AT MIDSPAN SPANS 1 & 3 (mm)	REQ'D. DEAD LOAD CAMBER AT MIDSPAN SPAN 2 (mm)	NUMBER OF J BARS	NUMBER OF S15M BARS	NUMBER OF T15M BARS	LENGTH OF T15M BARS (mm)	NUMBER OF U15M01 OR U15M02 BARS
4260-5334-4260	280	25M	20M	15M	15M	475	455	290	3962	3734	3581	3277	2743	1143	2515	1219	3505	914	2972	762	1600	2819	2540	5029	2438	5258	2438	1829	1905	1715	1346	1994	0	0	55	48			110
4870-6090-4870	305	25M	20M	15M	15M	440	440	290	4267	4191	3886	3581	3277	1448	2819	1372	3810	1143	3353	914	1829	3505	3226	4877	2362	5105	2362	1753	2819	1638	2261	1892	0	6	62	54			124
5480-6850-5480	330	25M	25M	15M	15M	440	495	200	4648	4648	4267	3962	3658	1676	3048	1524	4267	1295	3886	991	1981	4115	3683	5029	2515	5309	2515	1829	3835	1511	2997	1930	0	6	96	61			192
6090-7620-6090	355	25M	25M	15M	15M	530	455	190	5385	5182	4851	4496	4039	1753	3277	1600	4826	1397	4191	1143	2286	4801	4369	4877	2438	5182	2438	1753	4750	1435	3912	1854	6	6	112	67			224
6700-8380-6700	380	25M	25M	15M	15M	550	535	215	5766	5715	5232	4877	4343	1981	3429	1676	5436	1473	4801	1219	2362	5563	4826	5182	2591	5563	2591	1676	5817	1283	4343	2019	6	6	109	74			218
7310-9140-7310	405	25M	25M	15M	15M	530	535	215	6147	6096	5613	5258	4877	2210	3810	1905	5588	1778	5105	1372	2667	5944	5207	5334	2819	5740	2819	1905	6731	1206	5258	1943	6	6	118	80			236
7920-9900-7920	430	25M	25M	15M	15M	530	475	230	6528	6553	5994	5639	5258	2438	4115	2057	6045	1930	5563	1524	2819	6629	5893	5334	2743	5740	2743	1829	7341	1283	5867	2019	6	6	121	87			242
8520-10660-8520	460	25M	25M	15M	15M	530	455	230	6833	7010	6299	5944	5715	2743	4343	2210	6502	2083	6096	1600	2972	7315	6579	5486	2667	5766	2667	1753	7950	1359	6477	2096	6	13	129	93			258
9140-11430-9140	485	25M	30M	15M	15M	515	495	230	7214	7468	6680	6325	6172	2972	4724	2362	6807	2311	6401	1829	3200	8026	6960	5639	2972	6147	4420	1676	9271	1080	7137	2146	6	13	138	100			276
9750-12190-9750	510	25M	30M	15M	15M	515	455	240	7595	7925	7061	6706	6553	3200	4953	2515	7264	2464	6934	1905	3353	8712	7645	5639	2819	6172	2819	1600	9881	1156	7747	2223	13	13	139	106			278
10360-12950-10360	535	25M	35M	15M	15M	515	550	240	7976	8382	7442	7087	6934	3429	5258	2667	7722	2616	7391	2057	3505	9525	8026	6096	3048	6782	3048	1524	11024	965	8026	2464	13	19	148	113			296
10960-13710-10960	560	25M	35M	15M	15M	515	515	255	8433	8915	7899	7544	7239	3581	5486	2743	8179	2769	7849	2210	3658	10211	8712	5944	2972	6655	2972	1448	11938	889	8941	2388	13	19	148	119	4	18288	296
11570-14470-11570	585	25M	35M	15M	15M	495	475	255	8738	9296	8204	7849	7772	3810	5867	2972	8484	2921	8230	2362	3886	10744	9246	6096	3048	6807	3048	1524	12548	965	9550	2464	19	25	156	126	6	13005	312
12190-15240-12190	610	25M	35M	15M	15M	495	515	255	9195	9754	8661	8306	8077	4039	6172	3124	8941	3150	8687	2515	4039	11354	9398	7010	3505	7823	3505	1600	13360	940	9423	2908	19	25	164	132	6	13665	328
12800-16000-12800	635	25M	35M	15M	15M	495	475	265	9728	10287	9195	8839	8230	4115	6401	3175	9550	3226	9220	2667	4115	11887	9931	7163	3581	8052	3581	1676	13970	1016	10033	2985	19	25	164	139	6	14326	328
13360-16700-13360	660	25M	35M	15M	15M	475	475	280	10109	10668	9576	9220	8687	4343	6706	3353	9855	3454	9601	2819	4343	12421	10439	7315	3658	8230	3658	1753	14580	1092	14249	3061	19	32	180	145	6	14986	360

BAR C

DESIGN AGENCY: OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

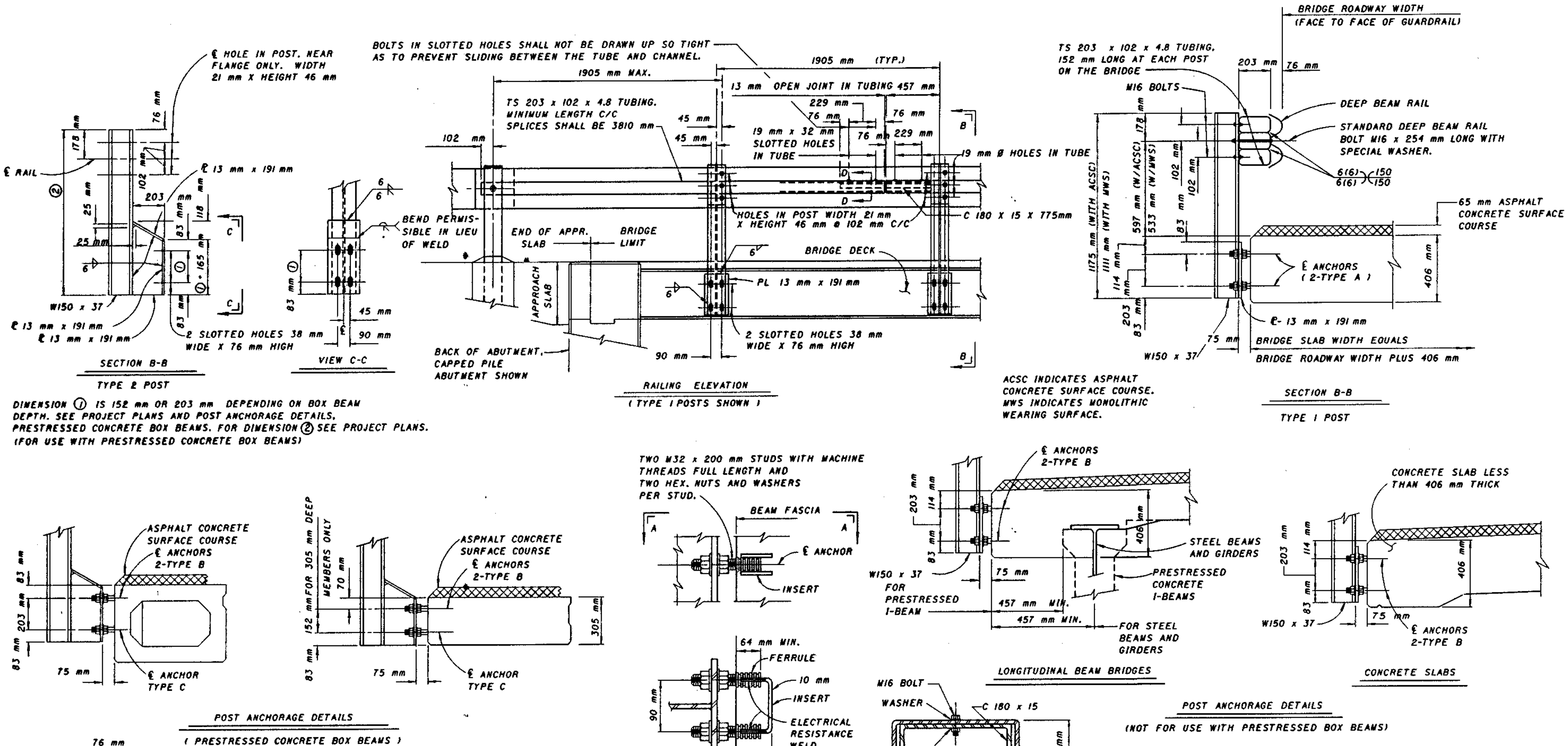
ADMINISTRATOR — DATE 10-25-94

REVISIONS 6-30-95 | DESIGNED MGP | DRAWN BDB | CHECKED JFF | REVIEWED LWM

CS-1-93M

STANDARD CONTINUOUS SLAB BRIDGE METRIC

3/3



SECTION B-B — TYPE 2 POST

VIEW C-C

RAILING ELEVATION (TYPE 1 POSTS SHOWN)

SECTION B-B — TYPE 1 POST

DIMENSION ① IS 152 mm OR 203 mm DEPENDING ON BOX BEAM DEPTH. SEE PROJECT PLANS AND POST ANCHORAGE DETAILS, PRESTRESSED CONCRETE BOX BEAMS. FOR DIMENSION ② SEE PROJECT PLANS. (FOR USE WITH PRESTRESSED CONCRETE BOX BEAMS)

POST ANCHORAGE DETAILS (PRESTRESSED CONCRETE BOX BEAMS)

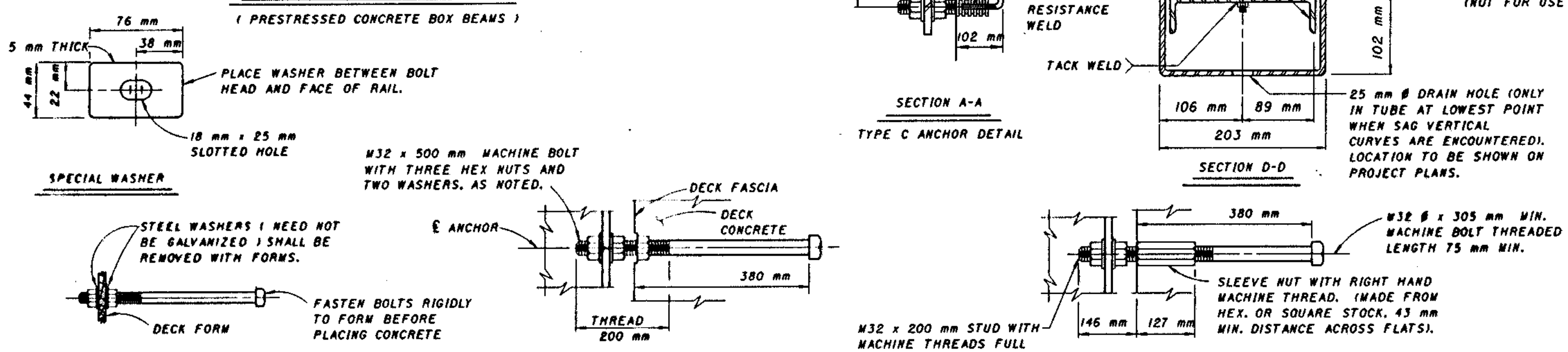
SECTION A-A — TYPE C ANCHOR DETAIL

LONGITUDINAL BEAM BRIDGES

CONCRETE SLABS

POST ANCHORAGE DETAILS (NOT FOR USE WITH PRESTRESSED BOX BEAMS)

SECTION D-D



SPECIAL WASHER

TYPE A ANCHORS SUPPORTED BY FORMS

TYPE A ANCHOR DETAIL

TYPE B ANCHOR DETAIL

TYPE A ANCHORS SHOULD ONLY BE USED ON PROJECTS WHERE THE ORIGINAL ANCHORS WERE TYPE A AND ALL ANCHORS ON ANY SINGLE STRUCTURE ARE NOT BEING REMOVED OR REPLACED

MATERIAL : ALL NUTS SHALL CONFORM TO THE PHYSICAL PROPERTIES OF ASTM-A325M. THE CHEMICAL PROPERTIES ARE WAIVED FOR ALL BOLTS, ANCHOR BOLTS, NUTS AND STUDS.

M16 BOLTS SHALL BE ASTM-A325M.

M32 ANCHOR BOLTS AND STUDS SHALL CONFORM TO THE FOLLOWING PHYSICAL PROPERTIES:

A) ELONGATION SHALL BE 10%
B) THREAD PITCH IS 3.6mm
C) STRESS AREA IS 643mm^2
D) PROOF LOAD LENGTH MEASUREMENT METHOD IS 386kN
E) PROOF LOAD YIELD STRENGTH METHOD IS 424kN
F) MINIMUM TENSILE STRENGTH IS 534kN
G) PRODUCT HARDNESS IS ROCKWELL C23 MINIMUM AND C34 MAXIMUM.

STEEL TUBING SHALL BE AS PER ITEM 707.10. ALL GUARDRAIL POSTS SHALL BE ASTM A36M.

GALVANIZING : ALL GUARDRAIL POSTS, TUBES, HARDWARE AND ACCESSORIES SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123 OR ASTM A153, EXCEPT AS OTHERWISE NOTED.

TYPE C ANCHOR INSERTS OF A DIFFERENT TYPE MAY BE PROVIDED IF APPROVED BY THE DIRECTOR.

DESIGN AGENCY: BUREAU OF BRIDGES AND STRUCTURAL DESIGN

STATE OF OHIO DEPARTMENT OF TRANSPORTATION — ENGINEER OF BRIDGES — 10-25-94 DATE

REVISIONS 8-18-95 | DESIGNED JFF | DRAWN REF | CHECKED JAM | REVIEWED LMW | DBR-2-73M

STANDARD DEEP BEAM BRIDGE GUARDRAIL - METRIC

1/1

STRAW OR HAY BALES

BALE PLACEMENT: Bales shall be tightly placed adjacently and entrenched 2" [50] to 3" [75] before staking; or a small amount of loose soil shall be lightly compacted along the upstream edge of the bales.

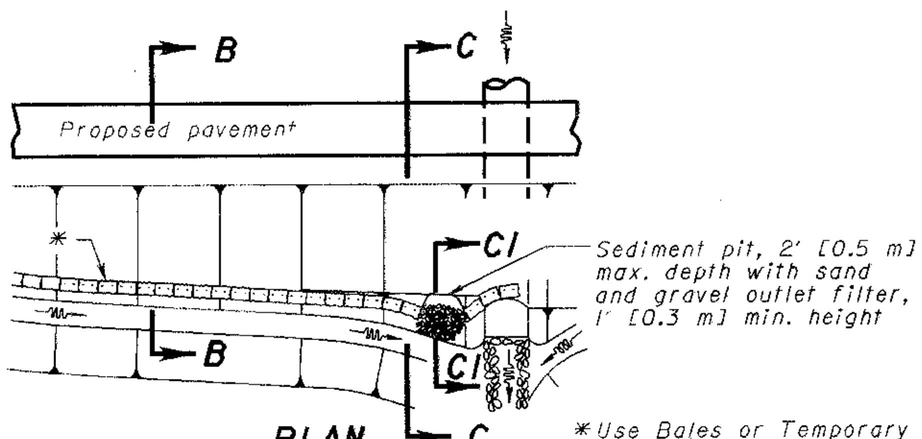
Each bale shall be firmly staked with a minimum of two stakes at least 3' [1 m] in length. Stakes shall be wooden 2"x2" [50x50], reinforcing bars or fence posts.

Loose straw or hay shall be wedged between and under staked bales.

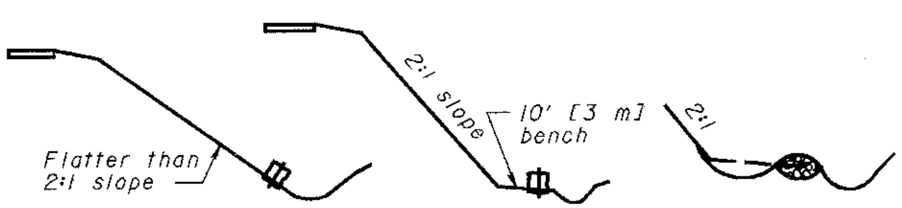
PITS: Sediment pits shall be provided and their cost included in the unit price bid for the adjacent SS 877 items.

MAINTENANCE: The maintenance or replacement will be paid for by the Department under unit bid prices, agreed unit price, or under 109.04.

BASIS OF PAYMENT: Straw or hay bale installation shall be paid for under **Item 877 - Temporary Perimeter Filter Fabric Fence.** Cost will include placing, staking and removing.



*Use Bales or Temporary Perimeter Filter Fabric Fence constructed per **SCD DM-4.4**



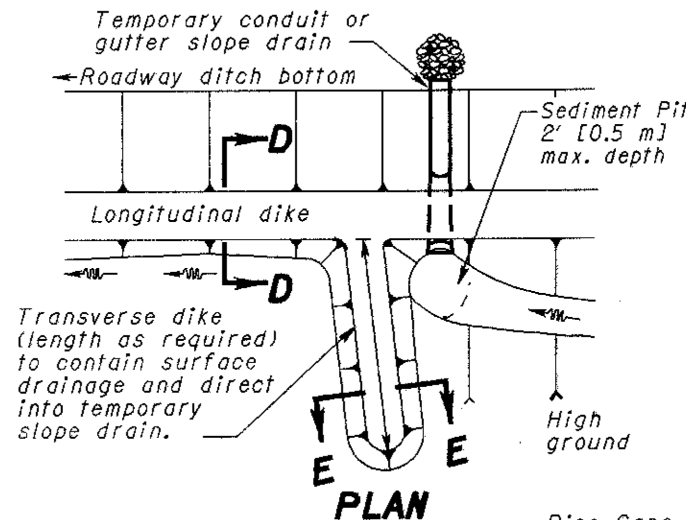
SECTION B-B

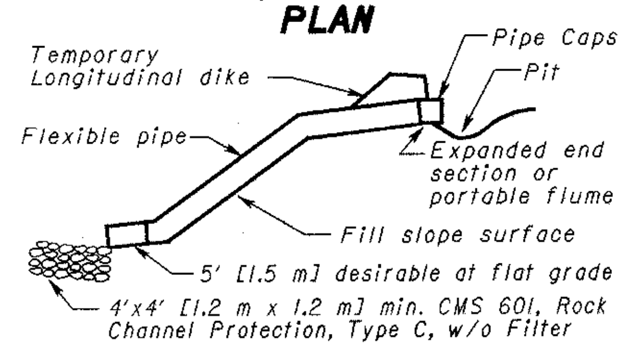
SECTION C-C

SECTION C1-C1

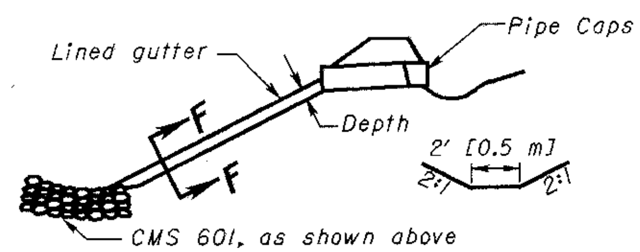
BALE FILTER DIKE

DIKES AND SLOPE PROTECTION

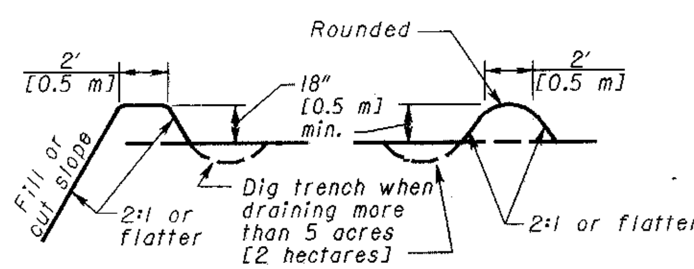




CONDUIT SLOPE DRAIN



SECTION F-F
GUTTER SLOPE DRAIN



SECTION D-D   SECTION E-E

TEMPORARY SLOPE DRAINS RECOMMENDED SIZES				
Area in acres [hectares]	**Pipe Sizes**			**Gutter depth**
	Smooth	**Corrugated**	**Half-round**	
0-4 [0-1.6]	6" [150]	6" [150]	18" [450]	8" [200]
4-8 [1.6-3.2]	8" [200]	12" [300]	18" [450]	8" [200]
8-12 [3.2-4.9]	10" [250]	15" [375]	21" [525]	12" [300]

GENERAL: Dikes & drains shown shall be used when earthwork operations on slopes are higher than 8' [2.5 m] and fill operations are suspended for three weeks or more. Smaller dikes used at the end of a day's operation shall be considered as part of the earthwork. Temporary slope drains shall be suitably positioned and anchored to prevent movement or undermining.

LONGITUDINAL DIKES: Longitudinal dikes shall be constructed of suitable material as per CMS 203 and compacted to 85% of maximum density.

CONDUITS: Conduits for slope drains shall be corrugated steel pipe, corrugated or smooth plastic pipe, rubber conduit, or an approved equal.

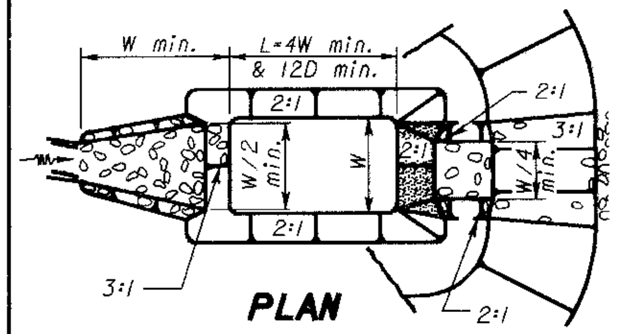
GUTTERS: Gutters for slope drains shall be lined with Type C rock channel protection, crushed aggregate slope protection, portland cement concrete, bituminous concrete, plastic sheeting (on slopes 4:1 max.), partial pipe sections or approved equal.

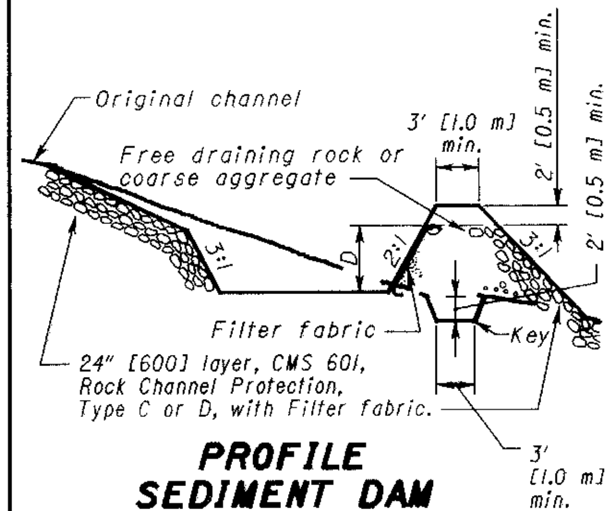
PITS: Sediment pits shall be provided and their cost included in the unit price bid for the adjacent items.

MAINTENANCE: Dikes and slope protection shall be acceptably maintained. The maintenance or replacement cost will be paid for by the Department under unit bid prices, agreed unit prices, or CMS 109.04.

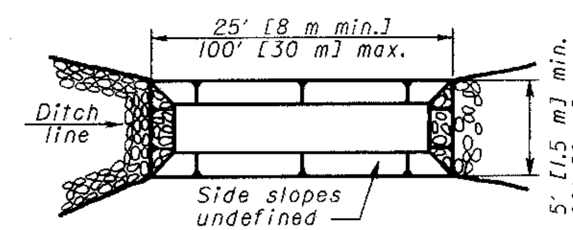
BASIS OF PAYMENT: Temporary dikes shall be paid for under **Item 877-Temporary Dikes.** Temporary slope drains shall be paid for under **Item 877-Temporary Slope Drains.** Rock required shall be paid for under **Item 601, Rock Channel Protection, Type C, w/o Filter.**

SEDIMENT BASINS & DAMS

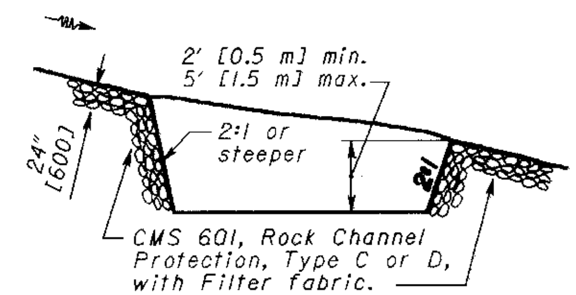




PROFILE
SEDIMENT DAM



PLAN



PROFILE
SEDIMENT BASIN

EMBANKMENT: Sediment basin embankment construction shall be as per CMS 203.

FILTERS: Filter fabric shall be per CMS 601.02 and installed per CMS 601.08 or as detailed here. Such fabrics may be cleaned in lieu of replacement. The cost of all filter fabric required to construct the sediment basin or dam shall be included in the cost of the Item 601, Rock Channel Protection, with Filter Fabric.

SIZE: The volume shown on the plans is the total storage volume required for the sediment basin or dam (67 cubic yards per acre [127 cubic meters per hectare]). A series of smaller basins or dams may be substituted for a larger basin or dam.

MAINTENANCE: Sediment pits, dams and basins shall be acceptably maintained. The maintenance or replacement cost will be paid for by the Department under unit bid prices, agreed unit prices, or CMS 109.04.

BASIS OF PAYMENT: Sediment Dams and Basins shall be paid for under **Item 877-Sediment Basin and Dams.** The pay quantity shall be the actual number of cubic yards [cubic meters] of excavation and embankment required to construct the basin or dam. Rock required shall be paid for under **Item 601, Rock Channel Protection, Type C or D, with Filter.**

THIS DRAWING REPLACES DM-4.3M DATED 6-30-95.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
4-29-99
DATE

REVISIONS

STDS. ENGR. M. EVANS
DRAWN D. FOCKE

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

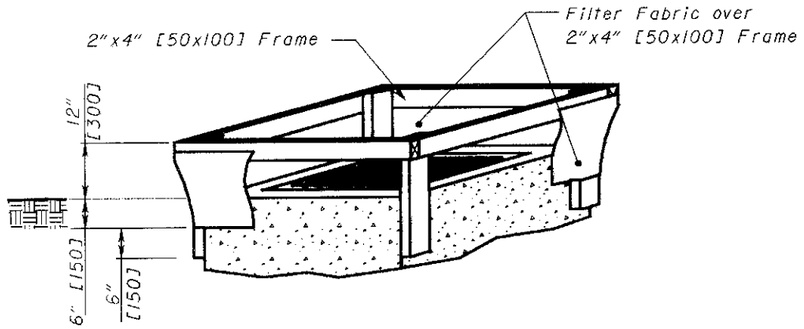
DESIGN AGENCY: OFFICE OF PLANNING

STANDARD ROADWAY CONSTRUCTION DRAWING
TEMPORARY EROSION CONTROL

NUMBER **DM-4.3**

1/1

TEMPORARY INLET PROTECTION FILTER FABRIC FENCE



MATERIALS: Filter Fabric shall meet the requirements of CMS 712.09, Type C. The framing wood shall be construction grade 2"x4" [50x100] lumber.

CONSTRUCTION: Excavate a 6" [150] deep trench around the inlet, then drive the 2"x4" [50x100] posts 6" [150] below the excavated trench. Construct the wooden frame using the overlap joint detail shown above. The filter fabric shall be stretched around the wooden frame and securely fastened. The filter fabric shall overlap across one side of the inlet such that the ends of the filter fabric are not attached to the same post. Backfill and compact the excavated soil. Other devices may be used with the approval of the Director.

MAINTENANCE: The filter fabric shall be maintained to be functional, This shall include removal of trapped sediment and required cleaning, repair, and/or replacement of the filter fabric. The maintenance or replacement cost will be paid for by the Department under unit bid prices, agreed unit prices, or under CMS 109.04.

PAYMENT: The cost of all materials, construction and removal shall be paid for under **Item 877 - Temporary Inlet Protection Filter Fabric Fence, Linear Foot [Meter].**

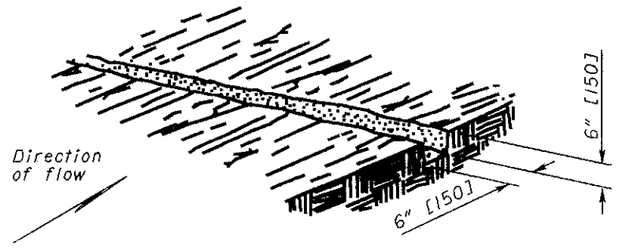
NOTES

MATERIALS: Filter fabric shall meet the requirements of CMS 712.09, Type C. Support stakes shall be a minimum of 1.5"x1.5" [38x38], nominal, and shall be hardwood of sound quality. The stakes shall be driven a minimum of 6" [150] below the bottom of the filter fabric. The maximum spacing between support stakes shall be 10' [3 m].

CONSTRUCTION: The bottom of the fabric shall be buried 6" [150] below the ground. The ends of adjacent sections of fence shall be overlapped with the end stake of each section wrapped together prior to installation. The ground elevation of the fence shall be held constant except that the end elevations shall be raised upslope to prevent flow around the end of the fence.

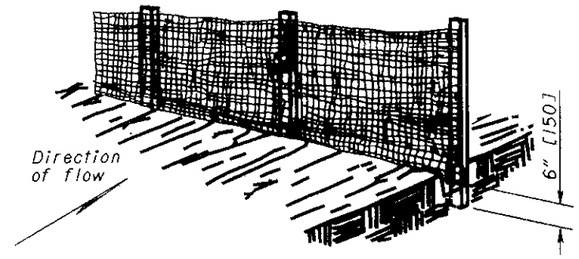
MAINTENANCE: The filter fabric fence shall be maintained to be functional. This shall include removal of trapped sediment and required cleaning, repair, and replacement of the filter fabric. The maintenance or replacement cost will be paid for by the Department under unit bid prices, agreed unit prices, or CMS 109.04.

PAYMENT: The cost of all materials, construction and removal shall be paid for under **Item 877 - Temporary Perimeter Filter Fabric Fence or Temporary Ditch Check Filter Fabric Fence, Linear Foot [Meter].**



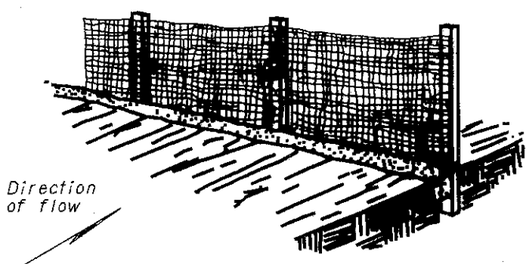
Excavate a 6"x6" [150x150] trench along the proposed fence line.

STEP 1



Place fabric and support stakes and extend fabric into the trench.

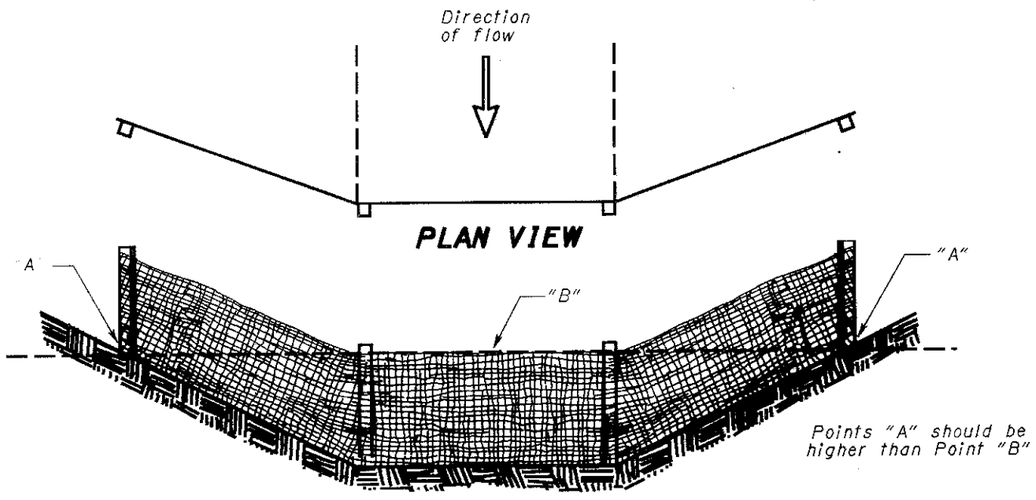
STEP 2



Backfill and compact the excavated soil.

STEP 3

PLACEMENT AND CONSTRUCTION OF PERIMETER FILTER FABRIC FENCE



PLACEMENT AND CONSTRUCTION OF DITCH CHECK FILTER FABRIC FENCE

THIS DRAWING REPLACES DM-4.4M DATED 6-30-95.

OHIO DEPARTMENT OF TRANSPORTATION — DATE 4-29-99
ROADWAY DESIGN ENGINEER

REVISIONS

STDS. ENGR. W. EVANS
DRAWN D. FOCKE

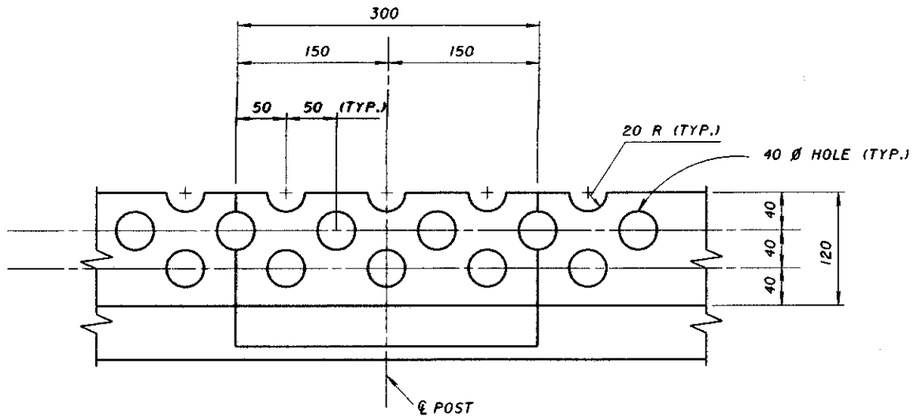
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

DESIGN AGENCY
OFFICE OF PLANNING

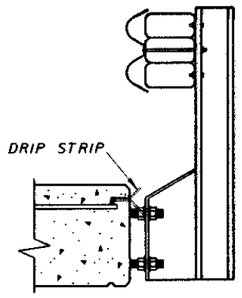
STANDARD ROADWAY CONSTRUCTION DRAWING
TEMPORARY EROSION CONTROL

NUMBER DM-4.4

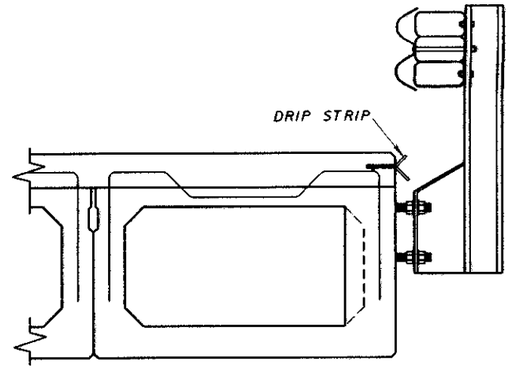
1 / 1



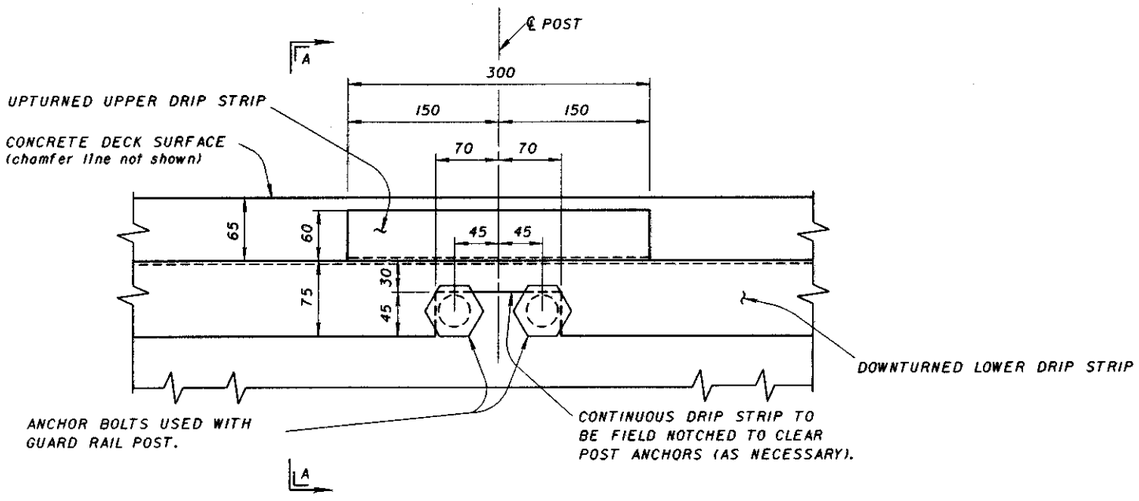
PARTIAL PLAN



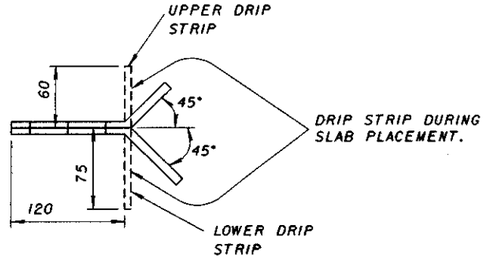
SECTION AT EDGE OF CONCRETE DECK SLAB



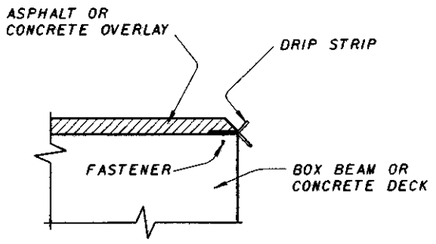
SECTION AT EDGE OF COMPOSITE PRESTRESSED BOX BEAM DECK



ELEVATION



SECTION A-A



✡ SECTION AT EDGE OF ASPHALT OR CONCRETE OVERLAY

✡ PRIOR TO PLACING AN ASPHALT OR CONCRETE OVERLAY, THE BENT DRIP STRIPS SHALL BE INSTALLED ALONG THE EDGE OF THE SLAB OR PRESTRESSED BOX BEAM AS SHOWN. THE DRIP STRIPS SHALL BE FASTENED WITH (32 mm length , 3 mm shank diameter) BUTTON HEAD SPIKES WITH DEFORMED SHANKS OR EXPANSION ANCHORS AT 450 mm C/C MAX. ALL INSTALLATION DEVICES SHALL EITHER BE GALANIZED OR STAINLESS STEEL.

OTHER SIMILAR DEVICES WHICH WILL NOT DAMAGE THE CONCRETE MAY BE USED SUBJECT TO THE APPROVAL OF THE ENGINEER.

DRIP STRIP NOTES:

LOWER STAINLESS STEEL DRIP STRIP, AS DETAILED, SHALL BE INSTALLED ALONG THE FULL LENGTH OF EACH SIDE OF THE BRIDGE. IF SPLICES ARE REQUIRED IN THE LOWER DRIP STRIP, THE INDIVIDUAL PIECES SHALL BE BUTTED TIGHTLY TOGETHER, NOT LAPPED. A 300 mm LONG UPPER DRIP STRIP SHALL BE INSTALLED AT EACH RAILING POST. STRIPS SHALL BE BENT UP AT 90° AGAINST THE INSIDE FACE OF THE FORMS BEFORE CONCRETE IS PLACED. AFTER THE FORMS ARE REMOVED, THE DRIP STRIPS SHALL BE BENT TO A FINAL POSITION OF 45° AS SHOWN IN SECTION A-A.

STAINLESS STEEL SHALL BE A MINIMUM OF 0.8 mm ASTM A167, TYPE 304, MILL FINISH.

CARE SHALL BE USED WHEN STRIPPING FORMWORK SO AS NOT TO DAMAGE OR WRINKLE THE STAINLESS STEEL DRIP STRIP. TO FURTHER ENSURE THAT WRINKLING OF THE STRIPS DOES NOT OCCUR, AN ADEQUATE LENGTH BACKUP BAR SHALL BE USED DURING THE BENDING OUT OPERATION.

TOTAL QUANTITY FOR BID ITEM SHALL INCLUDE LINEAR FOOTAGE OF BOTH LOWER AND UPPER DRIP STRIPS.

PAYMENT SHALL BE AT THE CONTRACT PRICE BID FOR ITEM SPECIAL, LIN. FT. STEEL DRIP STRIP AND SHALL INCLUDE ALL MATERIALS, LABOR, TOOLS AND INCIDENTALS NECESSARY TO COMPLETE THIS ITEM.

DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

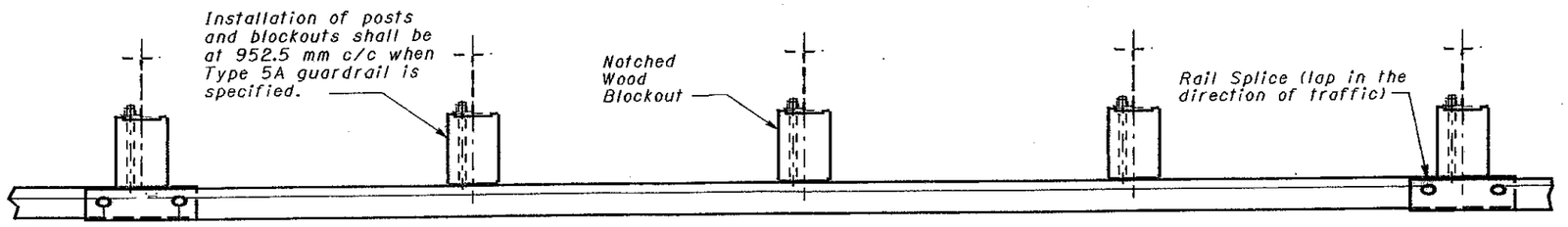
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Richard L. Engel
ENGINEER OF BRIDGES
12-15-94
DATE

REVISIONS

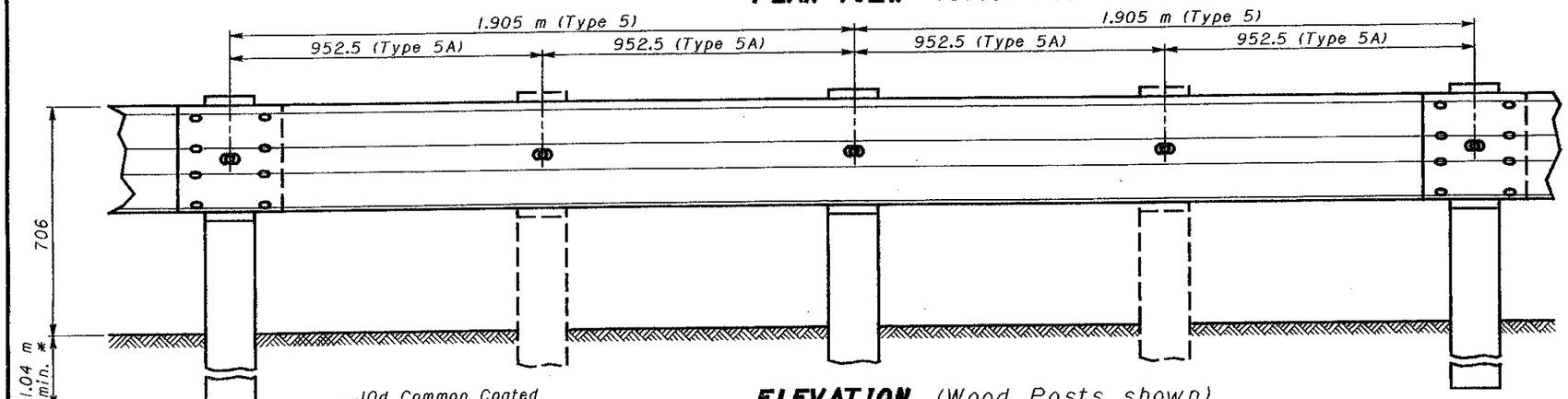
DESIGNED REZA
DRAWN REZA
CHECKED JS
REVIEWED LWM
DS-1-94M

STANDARD
DRIP STRIP DETAIL
FOR STRUCTURES WITH
OVER THE SIDE DRAINAGE

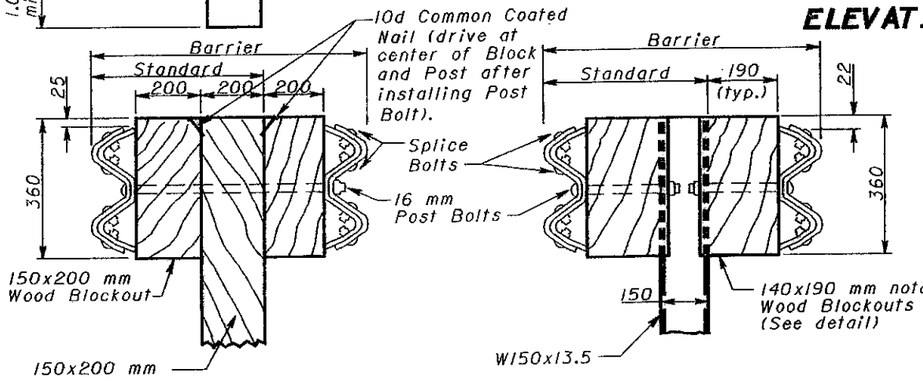
1 / 1



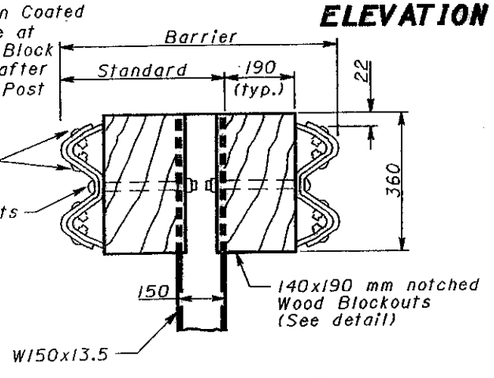
PLAN VIEW (Steel Posts shown)



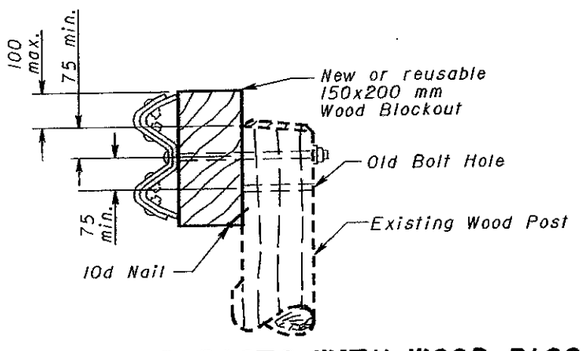
ELEVATION (Wood Posts shown)



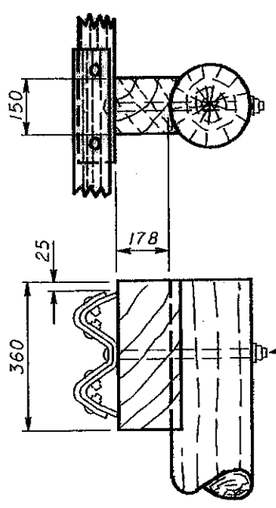
SQUARE WOOD POST



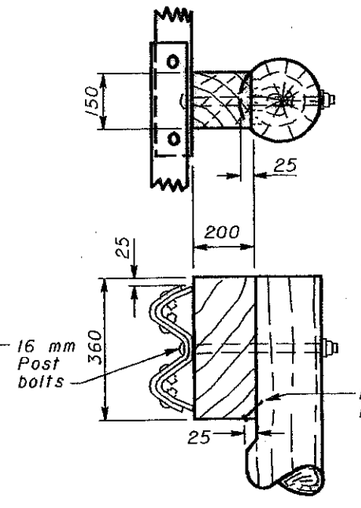
STEEL POST



WOOD POSTS WITH WOOD BLOCK RAISING EXISTING GUARDRAIL HEIGHT



METHOD 1



METHOD 2

Alternate methods of placing the blockouts on round posts may be submitted for consideration and approved by the Engineer.

ROUND WOOD POSTS

All dimensions are in millimeters unless otherwise noted.

metric units

NOTES

POSTS: Posts may be round (standard single rail only) or 150x200 mm square-sawed pressure-treated wood or W150x13.5 galvanized steel. The same type post shall be used throughout the length of the project unless otherwise required by the plans or permitted by the Engineer. Round posts shall be 200 mm ± 25 mm in diameter at the top and not more than 75 mm larger at the butt with a uniform taper. Post may be set in drilled holes or may be driven to grade.

Wood posts shall be fabricated with square ends. Posts and blockouts shall be pressure-treated per CMS 710.14. Bolt holes shall be bored and the tops of posts shall be trimmed as shown, if required, after posts are set.

ALTERNATE BLOCKOUTS: Approved plastic blockouts may be used in lieu of the wood blockouts shown. The approved list is maintained by the Office of Materials Management.

WASHERS: Standard galvanized steel washers of the appropriate size shall be installed on the nut side of bolts through wood posts.

WELDED BEAMS: Welded beam guardrail posts may be used for Item 606, Guardrail, provided the web and flange sizes are as shown hereon. Welding of the web to the flanges shall conform to ASTM A 769M, Class I using Grade 36 steel (250 MPa yield point) with the following exceptions:

Sec. 7.2 Test reports of tensile properties for each lot shall accompany each shipment.

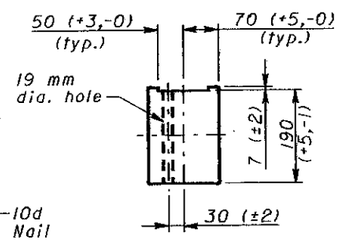
Sec. 12 Beams that have imperfections repaired by welding shall not be accepted for use in Item 606.

Sec. 13 Random samples shall be tested by the Department from materials delivered to the project site or other locations designated by the Laboratory.

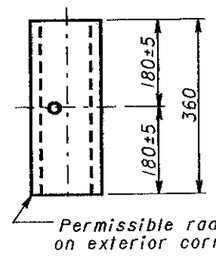
* **POST EMBEDMENT DEPTH:** For specific depth requirements, see SCD GR-1.2M.

STEEL BEAM POSTS				
Size	Beam depth	Flange width	Flange thickness	Web thickness
Rolled W150x12.6	148 mm	100 mm	4.9 mm	4.3 mm
Rolled W150x13.5	150 mm	100 mm	5.5 mm	4.3 mm
Welded 150x12.6	152 mm	100 mm	4.9 mm	4.3 mm
Welded 150x13.5	152 mm	100 mm	5.5 mm	4.3 mm

MISCELLANEOUS: For details not shown see SCD's GR-1.1M and GR-1.2M.



PLAN



ELEVATION

NOTCHED BLOCKOUTS FOR STEEL POSTS

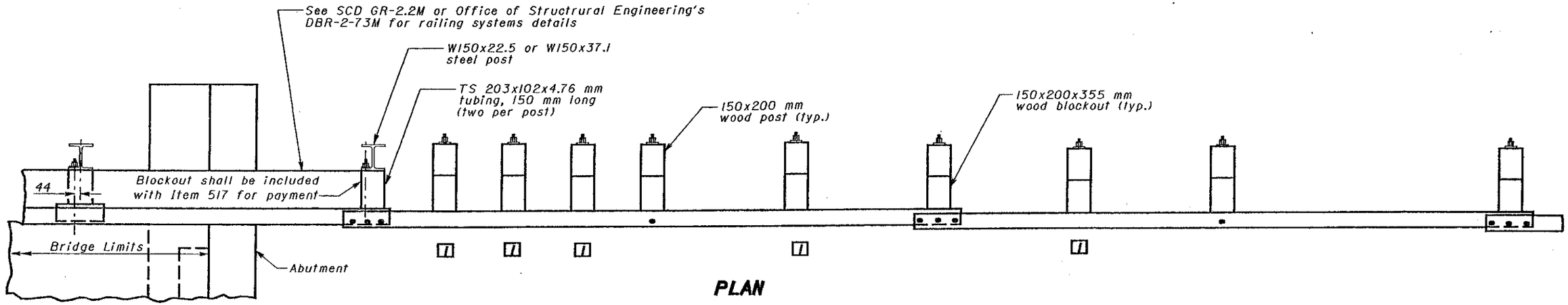
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL TYPE 5 & 5A

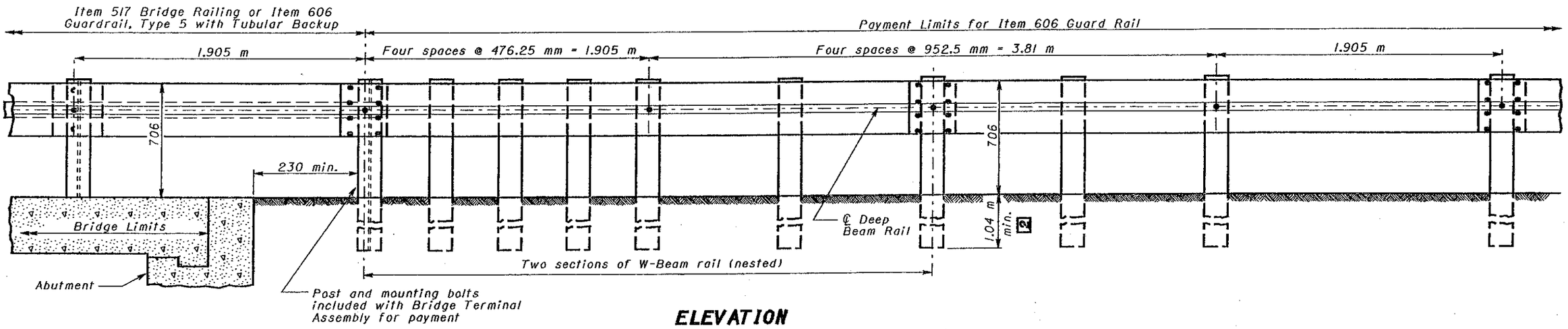
DATE
11-30-94
10-21-97
4-14-98

STANDARD CONSTRUCTION DRAWING **GR-2.1M**

APPROVED Larry F. Sutherland



PLAN



ELEVATION

All dimensions are in millimeters unless otherwise noted.

[1] Guardrail not attached to posts. Blockout fastened to post with standard post bolt.

[2] See SCD GR-1.2M for additional post embedment details.

NOTES

GENERAL: For additional details, see SCD's GR-1.1M, GR-1.2M and other Drawings pertaining to the design of specific guardrail types.

APPLICATION: The Type 4 Bridge Terminal Assembly shall be used to connect guardrail runs to bridges having W-Beam railing with Tubular Backup.

DETAIL INFORMATION: The first post off the bridge shall be steel (W150x22.5 or W150x37.1). All holes in the off-structure end of the approach panel W-Beam rail section that spans the abutment shall be slotted 19x64 mm and the bolts shall be tightened as specified for expansion joints in Item 606.05.

POSTS: General - Posts may be set in drilled holes or driven to grade.

Wood Posts shall be square-sawed pressure treated wood, as per CMS 710.14, and fabricated with square ends. Bolt holes shall be bored and tops of posts trimmed, if required, after posts are set.

Steel Posts and Blockouts for Type 4 Bridge Terminal Assemblies may be furnished as an alternate. The steel alternate for the 150 mm by 200 mm wood posts and blockouts shall be W150x13.5.

PAYMENT: Payment for Item 606 - Each, Bridge Terminal Assembly, Type 4, shall include the extra cost, in excess of normal guardrail costs, for additional posts and other hardware. The TS 203x102 mm spacers and tubular back-up rail extending to the first post off the bridge shall be included with Item 517 - Railing, or Item 606 - Guardrail, Type 5, with Tubular Backup, for payment.

metric units

This Drawing Replaces GR-3.4.

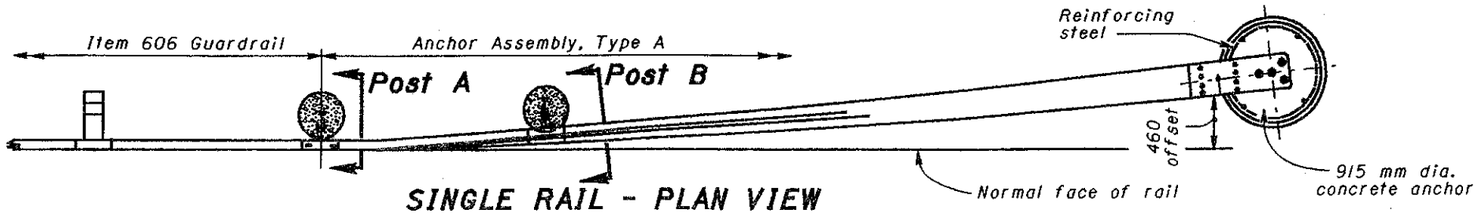
OHIO DEPARTMENT OF TRANSPORTATION

BRIDGE TERMINAL ASSEMBLY, TYPE 4

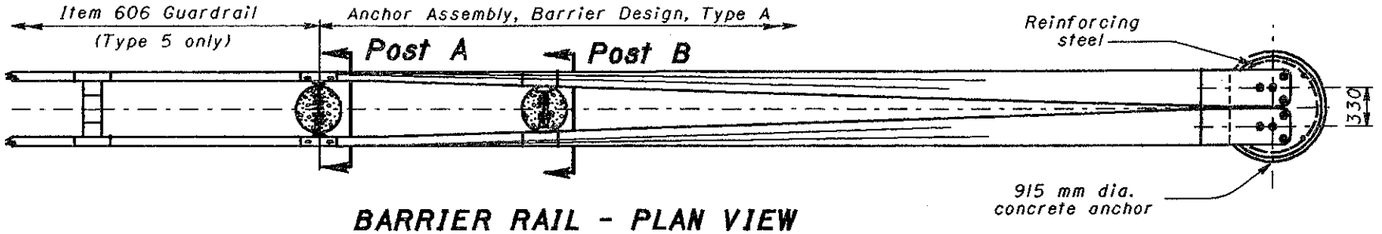
DATE
1-3-96
10-21-97

STANDARD CONSTRUCTION DRAWING **GR-3.4M**

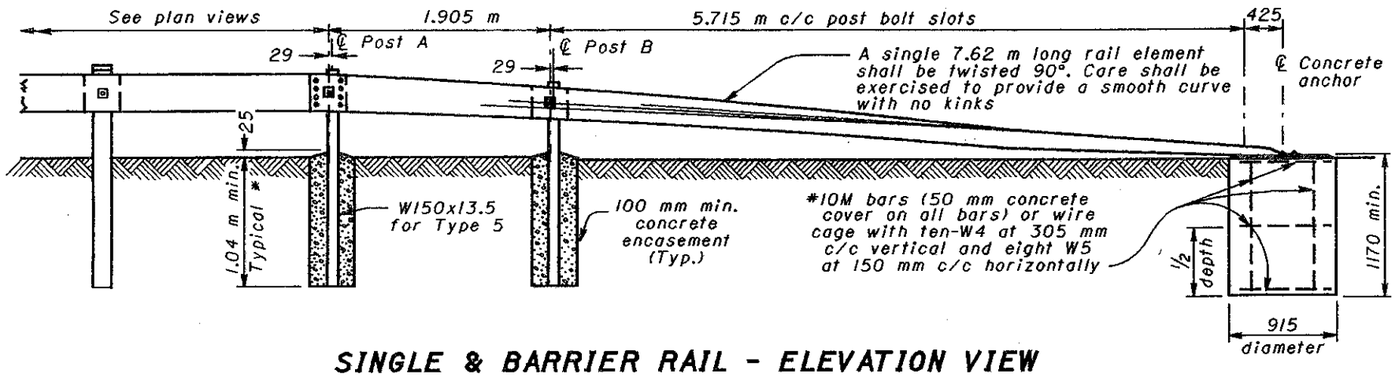
APPROVED Gary F. Sutherland



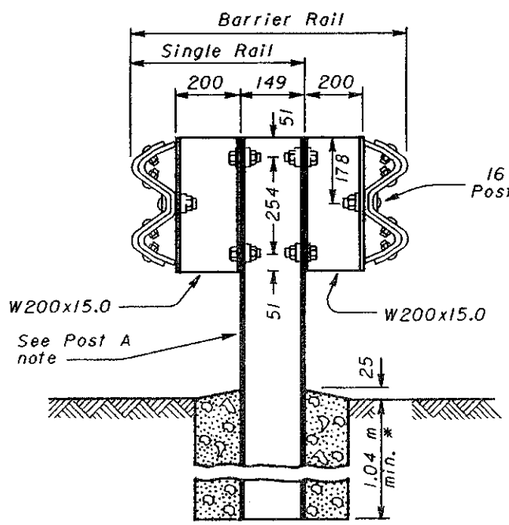
SINGLE RAIL - PLAN VIEW



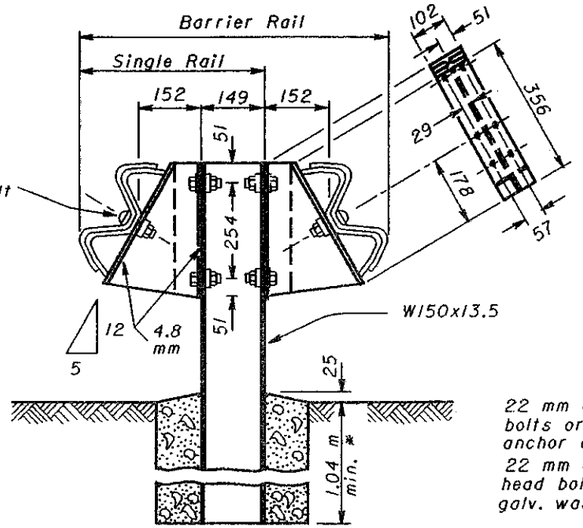
BARRIER RAIL - PLAN VIEW



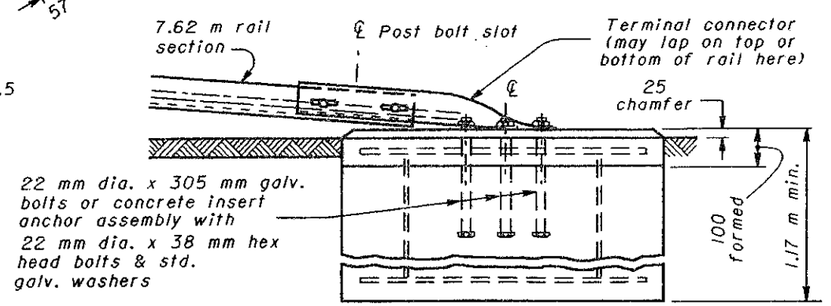
SINGLE & BARRIER RAIL - ELEVATION VIEW



POST A



POST B



CONCRETE ANCHOR

NOTES

GENERAL: For details not shown, see Std. Constr. Dwgs. GR-1.1M, GR-1.2M and other Drawings pertaining to specific guardrail type. All steel parts shall be galvanized.

The 460 mm flare offset from normal face of rail, shown in the plan view (for single rail installations), will be utilized only where shoulder width is insufficient for providing standard offsets.

SPACERS: Post B spacers shall be made of 4.8 mm steel plate as per CMS 710.15 or two sections of W150x13.5 or W200x15.0 cut in the web (see dashed line) and welded together on both sides.

All steel spacers and posts may be provided with additional bolt holes so that these items will not be required to be made right and left handed.

Spacers shall be fastened to their posts with two 16 mm hexhead bolts and nuts with standard washers on both sides.

WASHERS: All washers indicated on this drawing are standard galvanized steel of the appropriate size.

CONCRETE ANCHOR: Form top 100 mm of anchor and slope the top to conform to slope of the adjacent ground. The 915 mm diameter anchor may be replaced by a 760 mm square anchor at the contractor's option.

POST A: Rail details are shown for Type 5 guardrail. Where anchor assembly is attached to Type 4 guardrail, Post A shall be a standard Type 4 line post set in concrete, and the spacer block shall be omitted. Post bolt shall be 16 mm in diameter.

* **SINGLE RAIL INSTALLATIONS:** See GR-1.2M for additional post embedment details.

All dimensions are in millimeters unless otherwise noted.

metric units

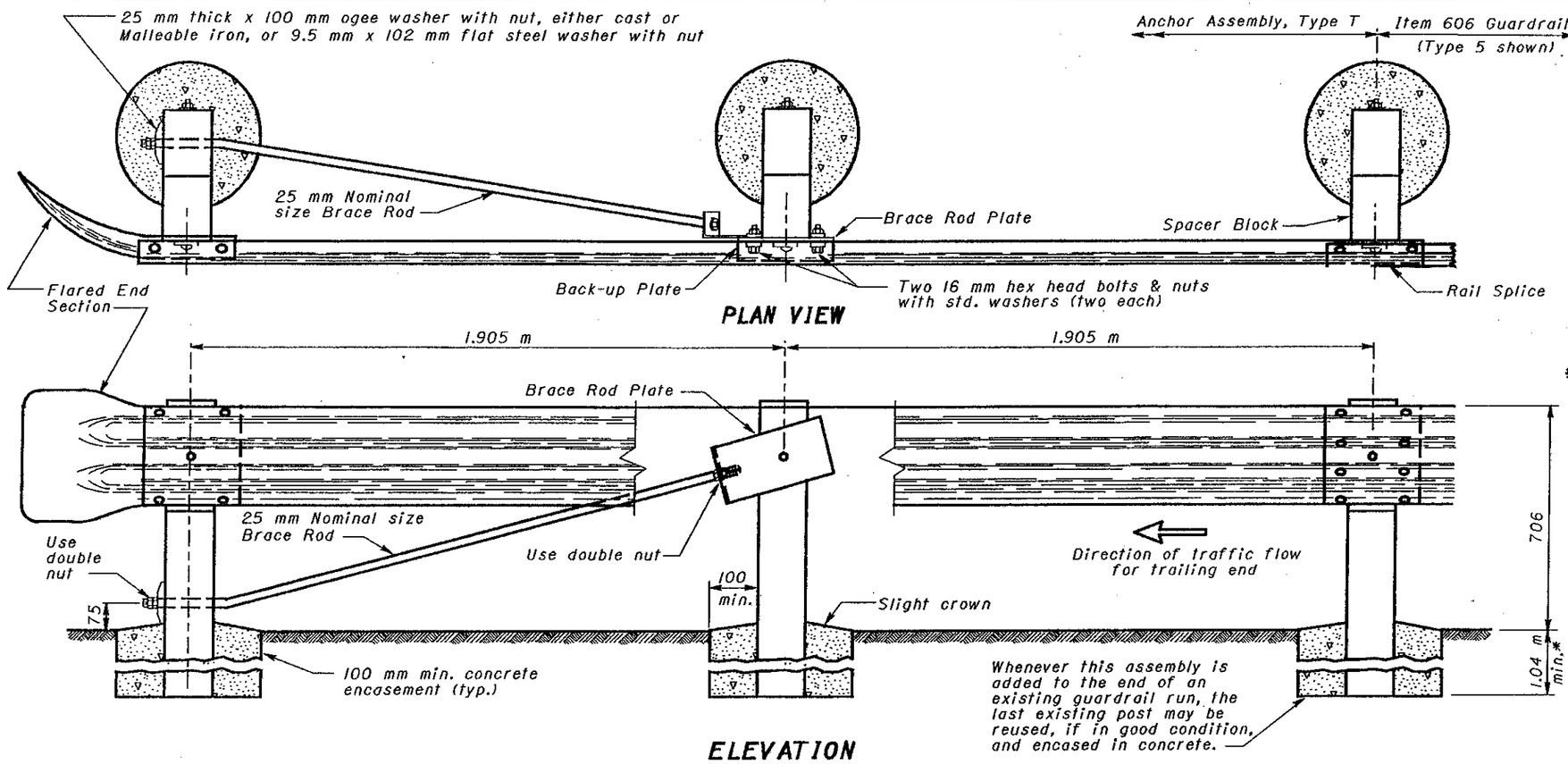
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

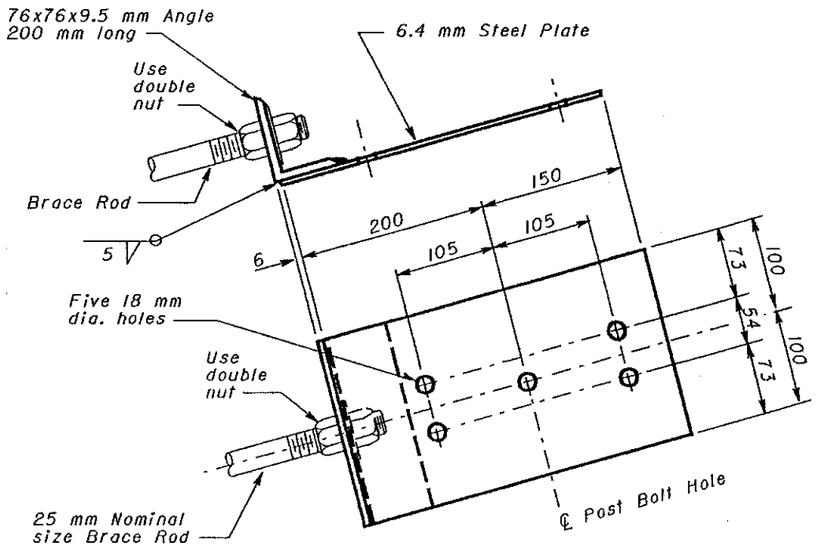
TYPE A ANCHOR ASSEMBLY

DATE 11-30-94

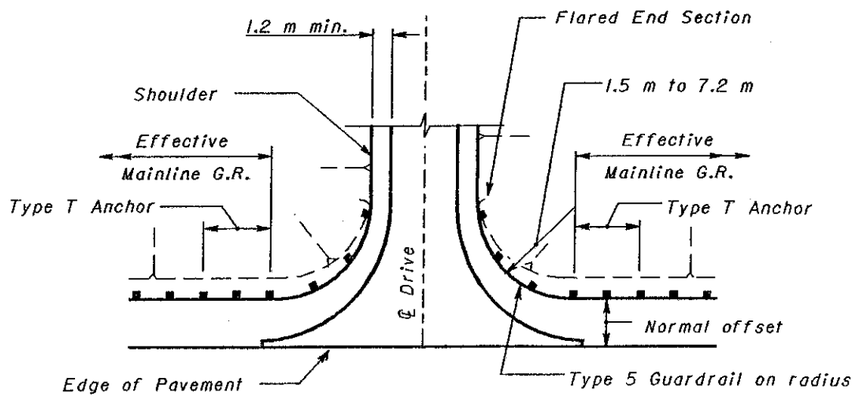
STANDARD CONSTRUCTION DRAWING **GR-4.1M**

APPROVED D.K. Hulman
ENGR., L & D





BRACE ROD PLATE



DRIVEWAY OPENING

NOTES

FOR DETAILS NOT SHOWN: See SCD's GR-1.1M, GR-1.2M and other Drawings pertaining to design of specific guardrail types.

WASHERS: All washers indicated are standard galvanized steel of the appropriate size.

POSTS: Posts shall be the same as used on the adjacent guardrail, with 100 mm minimim concrete encasement.

SPACER BLOCKS: Blocks may be notched in the field, in a manner satisfactory to the Engineer, to accommodate the installation of the brace rod plate 16 mm attachment bolts.

BRACE ROD ASSEMBLY: Rods shall be galvanized and develop a tensile strength of at least 178 kN.

* **FOR SPECIFIC POST EMBEDMENT:** See SCD GR-1.2M for depth requirements.

All dimensions are in millimeters unless otherwise noted.

metric units

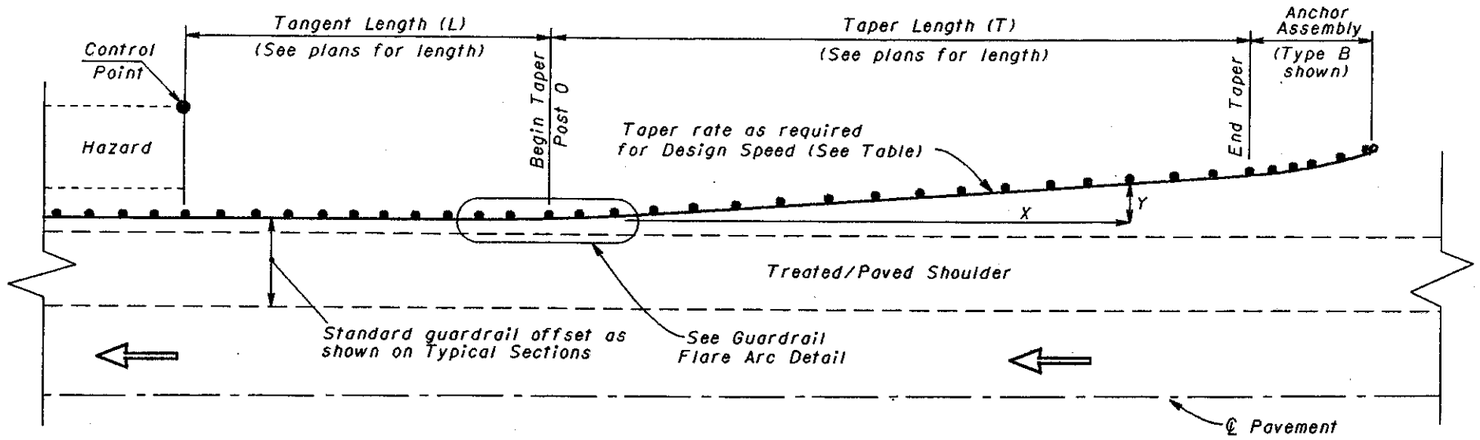
OHIO DEPARTMENT OF TRANSPORTATION

TYPE T ANCHOR ASSEMBLY

DATE
4-21-95
10-21-97

STANDARD CONSTRUCTION DRAWING **GR-4.2M**

APPROVED Dwight F. Sutherland



STANDARD GUARDRAIL FLARE

(Plan View)

NOTES

STANDARD GUARDRAIL FLARE: The flare shown herein shall be constructed when indicated in the construction plans and in conjunction with Std. Constr. Dwg. GR-5.2M. The Tangent Length and Taper Length used to construct each flare shall be as specified in the plans.

TAPER RATES AND OFFSET SPEEDS: Speeds used to determine taper rates and offsets shall be the design speed indicated in the plan. Where a design speed is not shown or available, the legal posted speed limit shall be used.
For design speeds below 70 km/h, the tapered guardrail offsets shown for 70 km/h may be used.

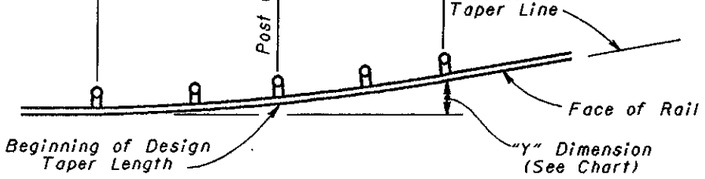
ANCHOR ASSEMBLY: A Type B Anchor Assembly shall be used with standard guardrail flares unless otherwise specified.

CONTROL POINT: The point shown designates the extent of the hazard being protected and is shown for design use only.

TAPERED GUARDRAIL OFFSETS (in meters)

		70 km/h 10:1 Taper		80 km/h 11:1 Taper		90 km/h 12:1 Taper		100 km/h 13:1 Taper		110 km/h 14:1 Taper		120 km/h 15:1 Taper	
	Post	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
	0	0	0.09	0	0.09	0	0.08	0	0.07	0	0.07	0	0.06
	2	3.79	0.38	3.79	0.35	3.80	0.32	3.80	0.29	3.80	0.27	3.80	0.25
7.62 m Taper Length	4	7.58	0.76	7.59	0.69	7.59	0.64	7.60	0.59	7.60	0.54	7.60	0.51
	6	11.37	1.14	11.38	1.04	11.39	0.95	11.40	0.88	11.40	0.82	11.40	0.76
15.24 m Taper Length	8	15.16	1.52	15.18	1.39	15.19	1.27	15.19	1.17	15.20	1.09	15.21	1.02
	10	18.95	1.91	18.97	1.73	18.98	1.59	18.99	1.47	19.00	1.36	19.01	1.27
22.86 m Taper Length	12	22.75	2.29	22.77	2.08	22.78	1.91	22.79	1.76	22.80	1.63	22.81	1.52
	14	26.54	2.67	26.56	2.42	26.58	2.22	26.59	2.05	26.60	1.91	26.61	1.78
30.48 m Taper Length	16	30.33	3.05	30.35	2.77	30.37	2.54	30.39	2.34	30.40	2.18	30.41	2.03
	18	34.12	3.43	34.15	3.12	34.17	2.86	34.19	2.64	34.20	2.45	34.21	2.29
38.10 m Taper Length	20	37.91	3.81	37.94	3.46	37.97	3.18	37.99	2.93	38.00	2.72	38.02	2.54
	22	41.70	4.19	41.74	3.81	41.76	3.49	41.79	3.22	41.80	2.99	41.82	2.79
45.72 m Taper Length	24	45.49	4.57	45.53	4.16	45.56	3.81	45.58	3.52	45.60	3.27	45.62	3.05
	26	49.28	4.95	49.32	4.50	49.36	4.13	49.38	3.81	49.40	3.54	49.42	3.30
53.34 m Taper Length	28	53.07	5.33	53.12	4.85	53.15	4.45	53.18	4.10	53.20	3.81	53.22	3.56
	30	56.86	5.72	56.91	5.20	56.95	4.76	56.98	4.40	57.00	4.08	57.02	3.81
60.96 m Taper Length	32	60.65	6.10	60.71	5.54	60.75	5.08	60.78	4.69	60.80	4.35	60.82	4.06

All "X" dimensions shown are from the centerline of Post 0 to the centerline of the indicated post along the the standard guardrail offset line extended.
All "Y" dimensions shown are from the standard guardrail offset line extended to the face of rail at the post indicated.



GUARDRAIL FLARE ARC DETAIL

metric units

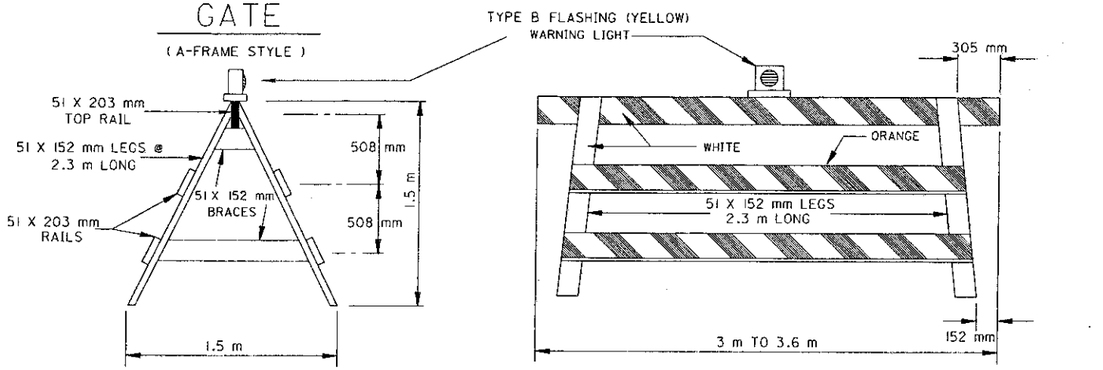
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

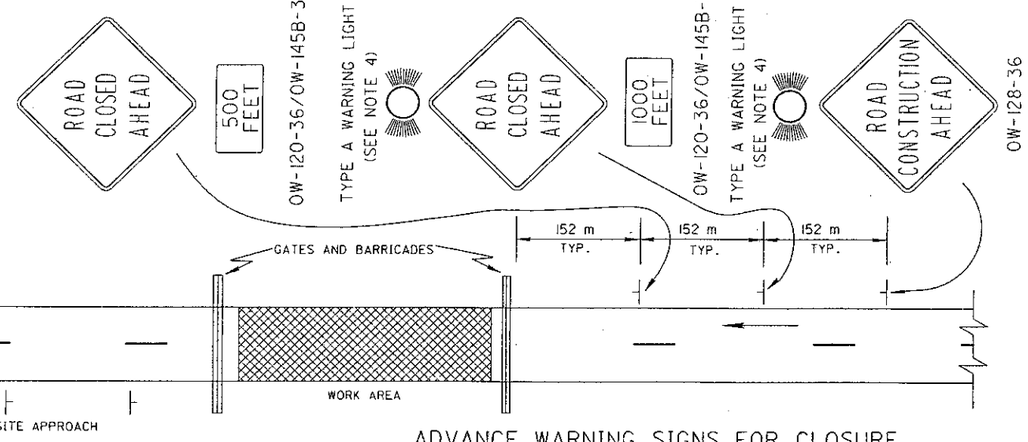
GUARDRAIL FLARE DETAILS

DATE 4-21-95

STANDARD CONSTRUCTION DRAWING **GR-5.1M**

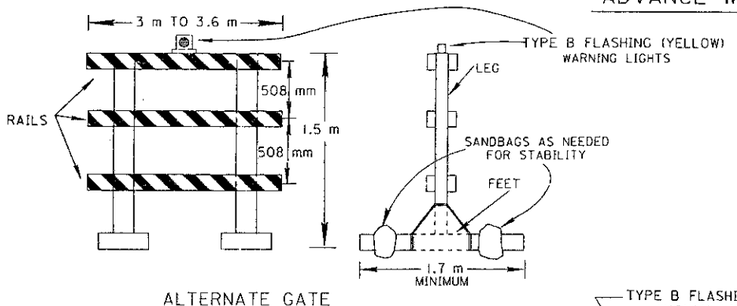
APPROVED B.K. Hulsman
ENGR., L & D



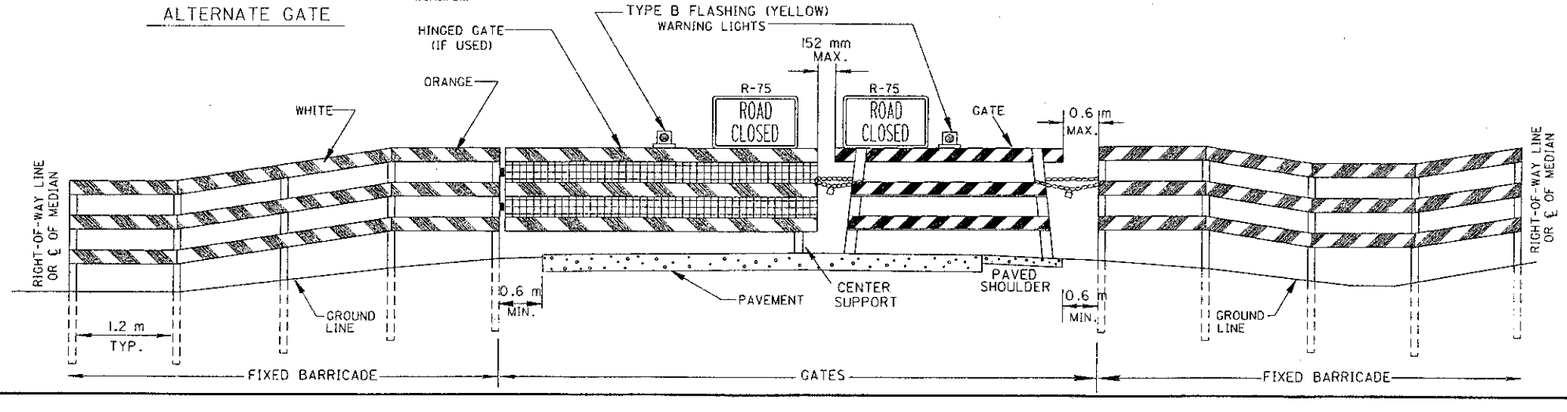


ADVANCE WARNING SIGNS FOR CLOSURE

(SEE NOTE 6)



ALTERNATE GATE



GENERAL NOTES

1. BARRICADES: BARRICADES SHALL BE CONSTRUCTED ACCORDING TO DETAILS SHOWN. WHEN THE ROAD IS CLOSED TO TRAFFIC, BARRICADES AND GATES SHALL BE USED TO EFFECTIVELY CLOSE THE ENTIRE ROADWAY INCLUDING THE MEDIAN OF DIVIDED HIGHWAYS. IN URBAN AREAS AND AT LOCATIONS WHERE IT IS IMPRACTICAL TO EXTEND THE BARRICADE TO THE RIGHT-OF-WAY LINE BECAUSE OF A SIDEWALK WHICH IS TO REMAIN OPEN OR OTHER OBSTRUCTION, THE ENDS OF THE BARRICADE SHALL BE LOCATED AS DIRECTED BY THE ENGINEER TO EFFECT THE DESIRED CLOSING OF THE HIGHWAY.

2. PAINTING AND REFLECTORIZATION: IN CONSTRUCTION OR MAINTENANCE AREAS ALL RAILS OF THE BARRICADES AND GATES SHALL BE REFLECTORIZED WITH ORANGE AND WHITE REFLECTORIZED TYPE G SHEETING IN 152 mm WIDE ALTERNATE STRIPES WHICH SLOPE DOWNWARD TOWARD THE CENTER LINE OF THE ROAD AT AN ANGLE OF 45°. THE TOP RAIL OF THE A-FRAME AND ALL THREE RAILS OF THE HINGED GATE SHALL BE STRIPED ON BOTH SIDES. ALL POST, BRACES, GATE LEGS, AND ANY UNSTRIPED RAILS SHALL BE PAINTED WHITE. (GATES AND BARRICADES USED IN PERMANENT OR SEMIPERMANENT APPLICATION SHALL DIFFER ONLY IN THAT THEY SHALL USE RED AND WHITE STRIPES).

3. GATES: ONE GATE SHALL BE ERECTED FOR EACH TRAFFIC LANE. GATES SHALL BE CHAINED AND PADLOCKED TO ONE ANOTHER AND TO ADJACENT POST OF THE BARRICADES. CHAINS SHALL BE 6.4 mm STOCK OR LARGER WITH WELDED LINKS. A HINGED GATE MAY BE USED AND SHALL BE SUPPORTED AT THE CENTER IN AN APPROVED MANNER.

4. TYPE A FLASHING WARNING LIGHTS:
TYPE A FLASHING WARNING LIGHTS ARE REQUIRED ON THE OW-128 AND THE FIRST OW-120 SIGNS.

5. TYPE B FLASHING WARNING LIGHTS:
EACH GATE SHALL BE EQUIPPED WITH A TYPE B FLASHING WARNING LIGHT, CONSPICUOUSLY VISIBLE AT ALL DISTANCES UP TO 305 m UNDER NORMAL ATMOSPHERIC CONDITIONS. THE LIGHT SHALL BE IN OPERATION AT ALL TIMES DURING THE PERIOD THE HIGHWAY IS CLOSED.

6. SIGNS: WHERE THE ROAD IS CLOSED TO TRAFFIC BY THE ERECTION OF GATES AND BARRICADES, R-75 SIGNS SIGNS SHALL BE MOUNTED ON THE GATES AS SHOWN. THE ADVANCE WARNING SIGNS SHOWN ON THIS DRAWING WILL NOT BE REQUIRED WHEN ALL TRAFFIC HAS BEEN DIRECTED FROM THE ROADWAY AT OR JUST IN ADVANCE OF THE GATES AND BARRICADES SUCH AS ON A LIMITED ACCESS HIGHWAY OR WHEN A TEMPORARY RUNAROUND SIMILAR TO FIGURE C-24 OF THE OHIO MANUAL IS USED. ADVANCE WARNING SIGNS SHALL BE REQUIRED IN ALL OTHER SITUATIONS AND WHEN REQUIRED IN THE PLANS. ADVANCE WARNING SIGNS ON AN APPROACH SHALL CONSIST OF TWO OW-120 SIGNS WITH DISTANCE PLAQUES PLACED ABOUT 152 m AND 305 m FROM THE CLOSURE AND A OW-128 PLACED ABOUT 457 m FROM CLOSURE, THE SIGNS SHALL BE PLACED ON BOTH SIDES OF THE ROAD (DUALLED) FOR 4-LANE DIVIDED HIGHWAYS OR WHEN REQUIRED BY THE PLANS.

7. OPERATION: ON A 2-LANE 2-WAY ROADWAY THE CONTRACTOR WILL NORMALLY OPEN ONLY THE LEFT HAND GATE AS NECESSARY TO ALLOW VEHICLES TO ENTER AND IMMEDIATELY CLOSE IT. BOTH GATES WILL NOT NORMALLY BE OPENED AT THE SAME TIME. THE CONTRACTOR SHALL ASSIGN AN EMPLOYEE TO ASSURE THAT GATES ARE CLOSED AND CHAINED SHUT AT THE END OF EACH WORKDAY.

8. MATERIALS: GATES OR BARRICADES SHALL BE FABRICATED OF THE FOLLOWING MATERIALS:

FIXED BARRICADE:

POST: - 102 X 102 mm SQUARE OR 127 mm DIA. (MAXIMUM) WOOD (MAY BE TREATED)
- NO. 3, DRIVE POST (712.20)
- UP TO 51 mm SQUARE, 14 GAUGE PUNCHED STEEL TUBING

RAILS: - 25 X 203 mm OR 51 X 203 mm COMMON LUMBER
- 203 X (16 TO 25 mm) THICK EXTERIOR PLYWOOD
- EXTRUDED PLASTIC OR FORMED SHEET METAL WITH A 203 mm WIDE SURFACE AND OF SUFFICIENT STIFFNESS TO RESIST TYPICAL WIND LOADS OF UP TO 1436 pascals, BUT HAVING A WEIGHT OF NOT MORE THAN 7.5 kg/m.

FASTENERS: - SPIKES (OF SUFFICIENT LENGTH TO CLINCH)
- SCREWS/BOLTS (8 mm MIN. DIA.) METAL GUSSETT PLATES AND FORMED OR WELDED METAL JOINTS OF SUFFICIENT SIZE AND QUANTITY TO RESIST THE WIND LOAD SPECIFIED ABOVE. ALL SLIPFIT CONNECTIONS SHALL ALSO BE BOLTED TO PREVENT UNAUTHORIZED DISASSEMBLY

GATES:

LEGS: - 51 X 152 mm COMMON LUMBER ("A FRAME" ONLY)
- 102 X 102 mm WOOD
- UP TO 51 mm SQUARE, 14 GAUGE PUNCHED STEEL TUBING
- NO. 3 DRIVE POST (712.20)

RAILS - 51 X 203 mm COMMON LUMBER

FASTENERS: (SAME AS BARRICADES ABOVE)

FEET: - 152 X 152 mm WOOD
- NO. 3 DRIVE POST (712.20)
- UP TO 57 mm SQUARE, 12 GAUGE PUNCHED STEEL TUBING

BRACES: - 51 X 152 mm (MAXIMUM) COMMON LUMBER
- 102 mm WIDE X 19 mm THICK PLYWOOD STRIPS
- NO. 2 DRIVE POST (712.20)

HINGED GATE:

GATE: - 3.6 m X 1.2 m STEEL FRAME, FARM GATE

RAILS: (SAME AS FIXED BARRICADES ABOVE)

HARDWARE: - HINGED SCREWHOOKS FOR HANGING GATE TO POST

9. LUMBER: LUMBER USED IN THE CONSTRUCTION OF GATES AND BARRICADES SHALL BE COMMON YELLOW PINE OR COMMON DOUGLAS FIR, SURFACED ON FOUR SIDES STANDARD, ALL SIZES ARE NOMINAL.

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

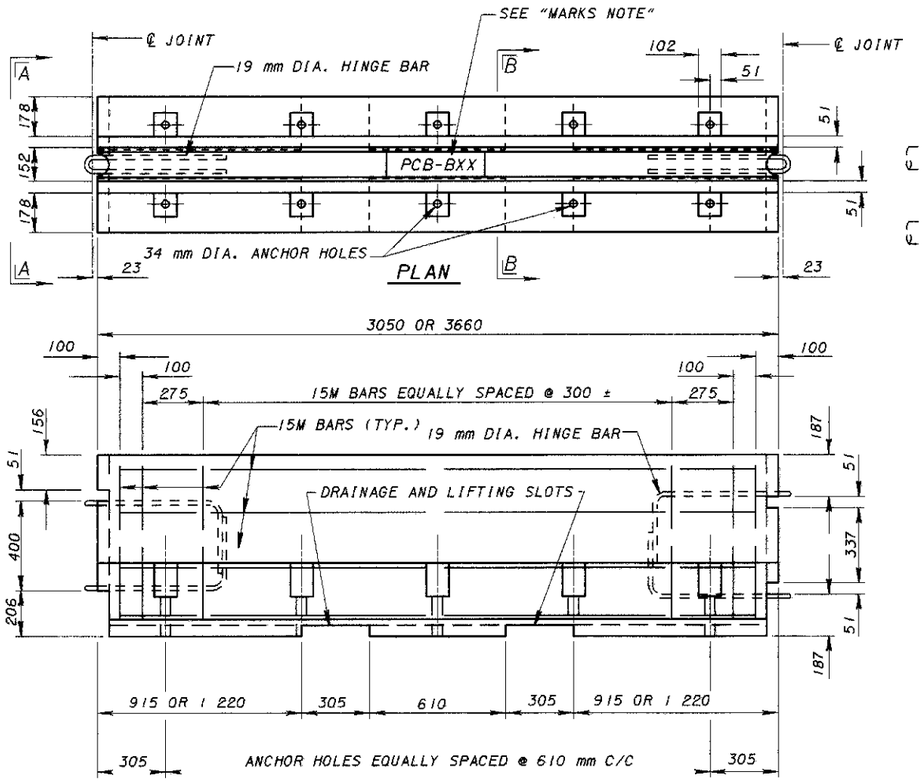
DATE 04/25/94

GATES AND BARRICADES IN POSITION

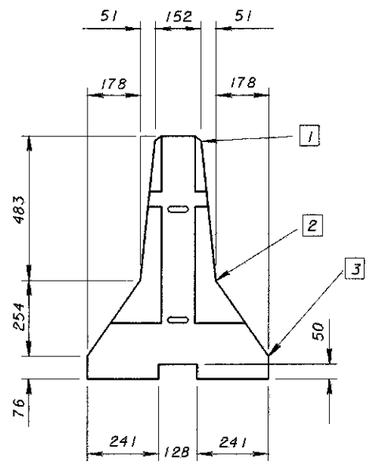
STANDARD CONSTRUCTION DRAWING MT-101.60M

APPROVED _____ ENGR. OF DESIGN SERVICES

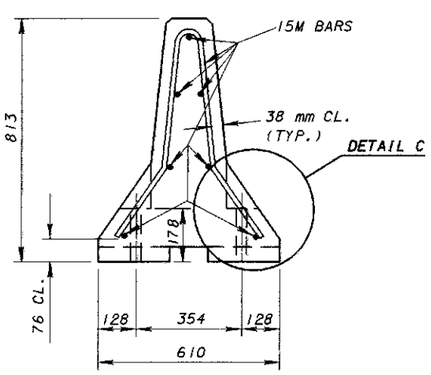
WCC



ELEVATION



VIEW A-A

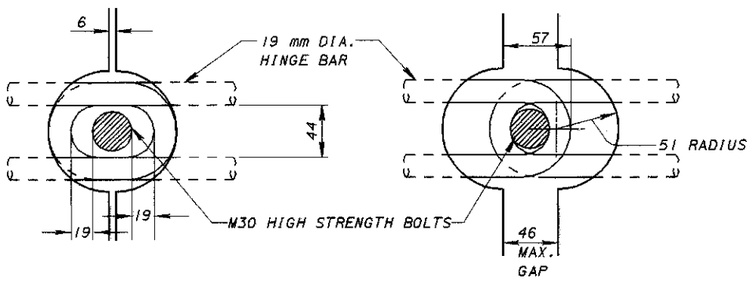


SECTION B-B

1 25 mm RADIUS OR 19 mm CHAMFER, ALL TOP AND END CORNERS.

2 PERMISSIBLE 250 mm RADIUS.

3 PERMISSIBLE 25 mm RADIUS.



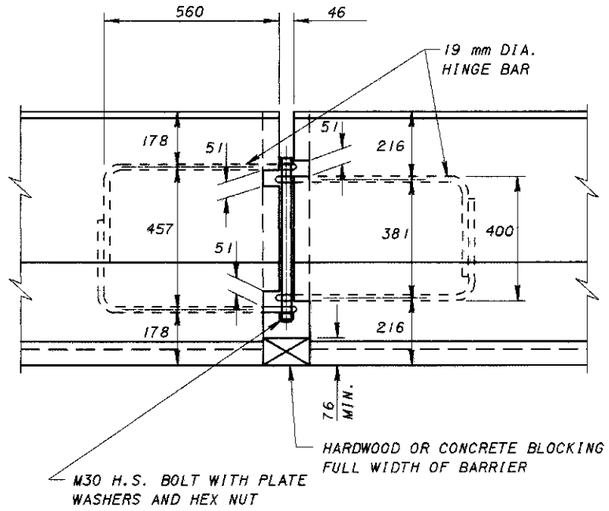
1 CLOSED JOINT

2 OPEN JOINT

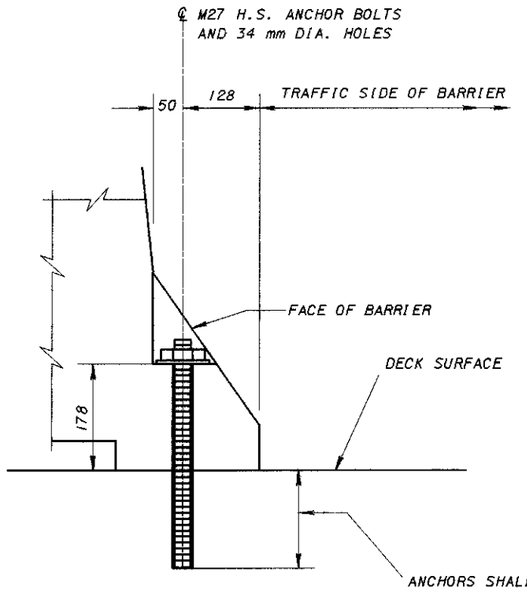
JOINT CONNECTION DETAILS

1 BARRIER SHALL INITIALLY BE PLACED CLOSER TOGETHER SO BOLTS CAN BE EASILY INSERTED THROUGH HINGE BAR LOOPS.

2 BARRIER JOINTS SHALL BE FULLY OPEN BEFORE NUT IS TIGHTENED ONTO BOLT AND OPENING IS SNUGGLY BLOCKED.



DETAIL AT HINGED CONNECTION



DETAIL C

GENERAL NOTES

HARDWARE:
BOLTS, DECK ANCHORING BOLTS AND ALL NUTS AND WASHERS SHALL CONFORM TO ASTM A325M. THEY SHALL BE GALVANIZED IN ACCORDANCE WITH CMS 711.02.

REINFORCING STEEL:
ALL REINFORCING STEEL (INCLUDING THE 19 mm DIAMETER HINGE BARS) SHALL MEET THE REQUIREMENTS OF CMS 509.02. HINGE BARS SHALL BE GALVANIZED AFTER FABRICATION.

CONCRETE:
PORTABLE CONCRETE BARRIER SEGMENTS SHALL BE CONSTRUCTED OF CLASS C CONCRETE WITH A MINIMUM COMPRESSIVE STRESS OF 28 MPa.

BRIDGE DECK SURFACE PREPARATION:
THE SURFACE AREA ON WHICH THE PORTABLE CONCRETE BARRIER WILL REST SHALL BE CLEAR OF ALL LOOSE SAND, GRAVEL, DIRT AND DEBRIS.

ANY IRREGULARITIES IN THE BRIDGE DECK AREAS, UNLESS JUDGED BY THE ENGINEER TO BE INCONSEQUENTIAL, SHALL BE LEVELED WITH GROUT AND/OR ASPHALT.

ASPHALT ROLL ROOFING SHALL BE PLACED ON THOSE BRIDGE DECK AREAS, AS JUDGED BY THE ENGINEER, TO HAVE A SURFACE ROUGHNESS WHICH WOULD INHIBIT FRICTION CONTACT BETWEEN BARRIER SEGMENTS AND DECK.

ANCHORS:
ONCE ALL BARRIER SECTIONS HAVE BEEN PROPERLY SECURED, ANY PORTION OF AN ANCHOR THAT PROTRUDES BEYOND THE FACE OF THE BARRIER SHALL BE REMOVED.

MARKS:
ALL BARRIER SEGMENTS SHALL BE CLEARLY MARKED, WHERE "XX" IS THE YEAR IN WHICH THE BARRIER WAS CAST. EACH SHALL ALSO HAVE, ON IT'S TOP SURFACE, A UNIQUE IDENTIFICATION OF THE MANUFACTURER AND, SOMEWHERE ON THE BARRIER, THE DAY AND MONTH THE BARRIER WAS CAST.

ALL MARKINGS SHALL BE PERMANENTLY IMPRINTED ON THE BARRIER USING A MINIMUM OF 50 mm HIGH LETTERING.

HANDLING DEVICES MAY BE USED IN LIEU OF THE LIFTING SLOTS FOR MOVING THE BARRIER. THEY MAY BE OF ANY DESIGN SUFFICIENT TO HANDLE THE WEIGHT OF THE SECTION BEING LIFTED. NO REMAINING HANDLING DEVICES SHALL PROTRUDE ABOVE THE BARRIER SURFACE.

THE PROJECT PLANS SHALL INDICATE THE NUMBER OF ANCHORS PER SEGMENT, AS WELL AS THE BARRIER LOCATION ON THE BRIDGE DECK, AND ANY SPECIAL ANCHORAGE REQUIREMENTS.

"J-J HOOKS" CONNECTIONS MAY BE UTILIZED IN LIEU OF THE END CONNECTIONS DETAILED. EACH BRIDGE BARRIER SECTION USING "J-J HOOKS" SHALL REQUIRE ANCHORING AS PER DETAIL C. THE NUMBER OF ANCHORS SHALL BE THE GREATER OF TWO ANCHORS, IF THE PROJECT PLANS DO NOT SPECIFY A NUMBER OF ANCHORS PER BARRIER SECTION, OR DOUBLE THE NUMBER OF ANCHORS SPECIFIED BY THE PLANS. "J-J HOOKS" IS A TRADEMARK OF EASI-SET INDUSTRIES, P.O. BOX 300, MIDLAND, VA 22728.

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

Richard L. Engen — 3-20-95
ENGINEER OF BRIDGES — DATE

DESIGNED	CHECKED	REVIEWED
AJM	WTF/JS	LMW
DRAWN		
GFJ/TDB		

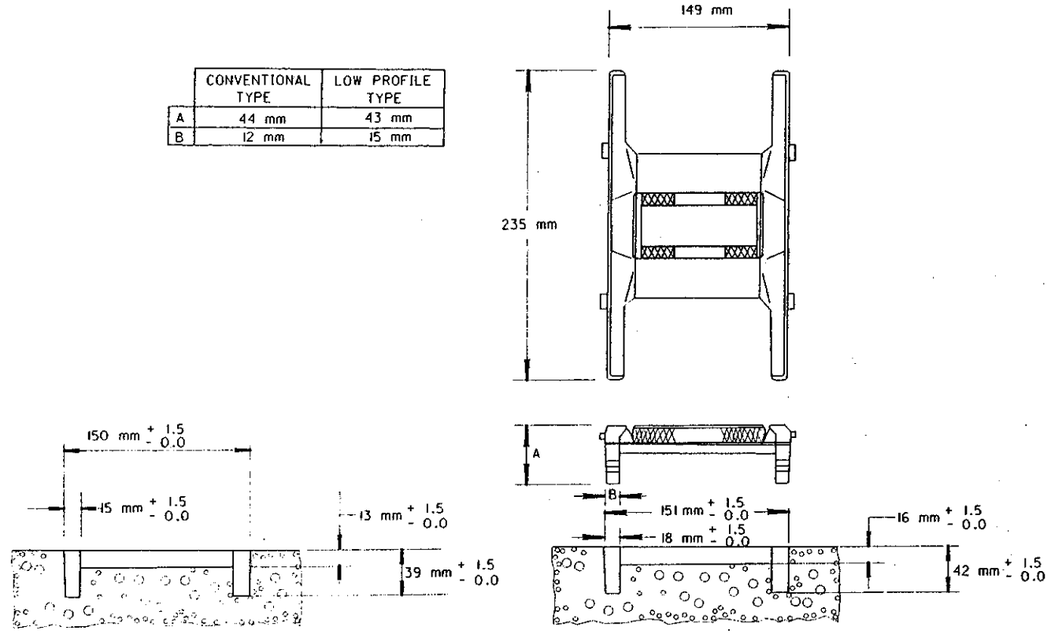
REVISIONS
07-06-99

STANDARD
PORTABLE CONCRETE BARRIER DETAILS

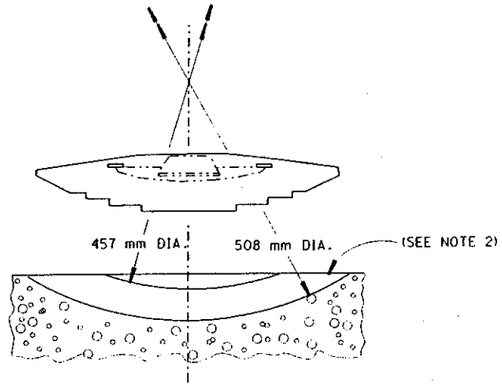
PCB-91M

1 / 1

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



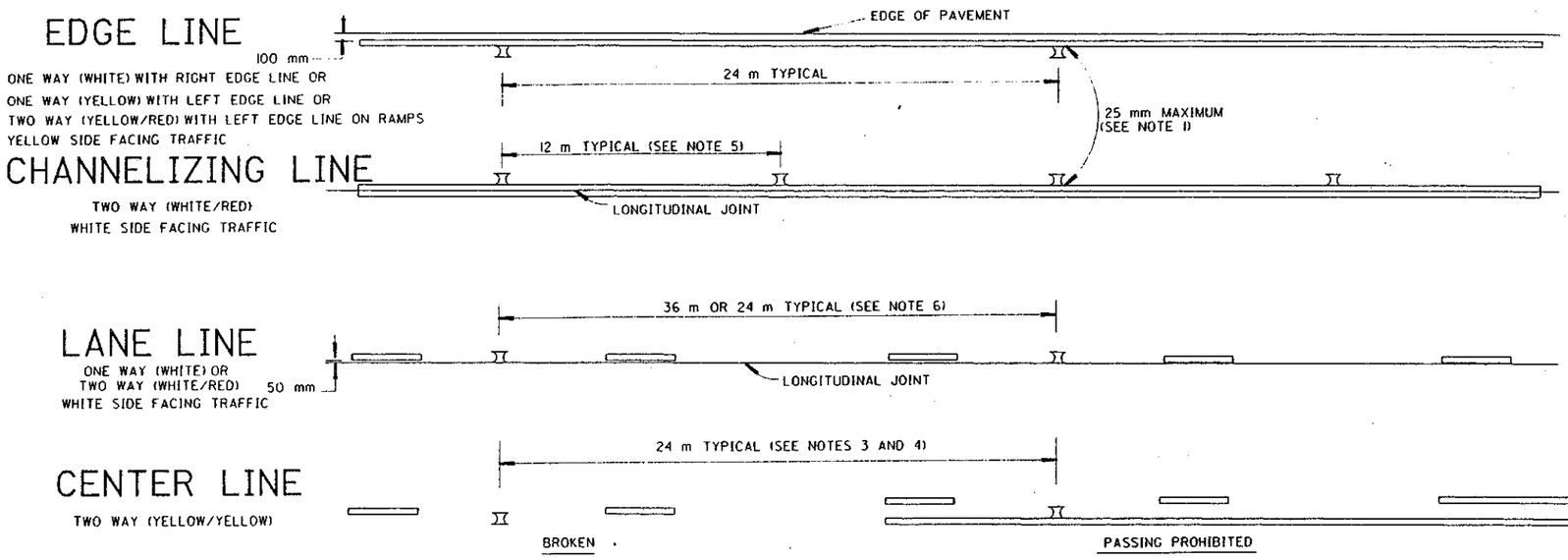
OPTIONAL FOR CONVENTIONAL TYPE



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 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 BLADES ASSEMBLY BE USED. FOR ADDITIONAL DETAILS AND TOLERANCES OF THE CASTING AND ARBOR-SAW ASSEMBLY CONTACT THE CASTING MANUFACTURE.
3. FOR HORIZONTAL CURVE RADIUS OF 380 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS SHALL BE REDUCED TO 12 m BETWEEN P.C. OR T.S. AND P.T. OR S.T.
4. FOR HORIZONTAL CURVE RADIUS OF 250 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS MAY BE REDUCED TO 6 m BETWEEN P.C. OR T.S. AND P.T. OR S.T. WHEN USING 6m SPACING, 12 RAISED PAVEMENT MARKERS AT 12 m SPACING SHALL BE INSTALLED ON EACH END OF THE 6 m SPACING.
5. WHEN A CHANNELIZING LINE IS LESS THAN 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 36 METERS. ALL OTHER RAISED PAVEMENT MARKERS ON LANE LINES ON MULTILANE OR DIVIDED ROADWAYS SHALL BE TWO WAY RED/WHITE SPACED AT 24 METERS.

CASTING AND SAW CUT DETAILS



TYPICAL RAISED PAVEMENT MARKER PLACEMENT WITH LONGITUDINAL PAVEMENT MARKINGS

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

metric Units

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

TRAFFIC CONTROL

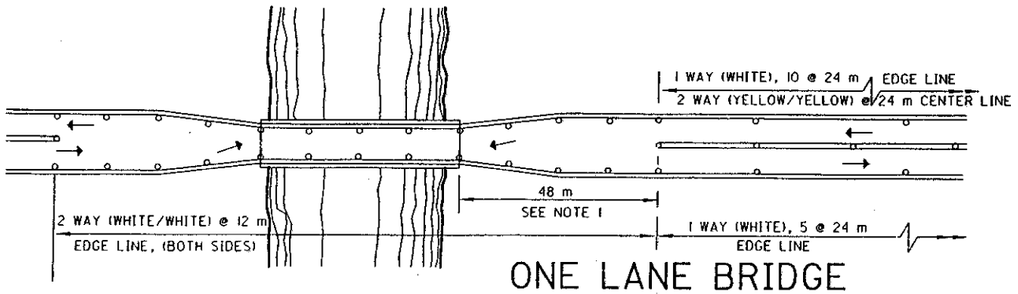
RAISED PAVEMENT MARKER INSTALLATION DETAILS

DATE
11/03/93
11/01/95

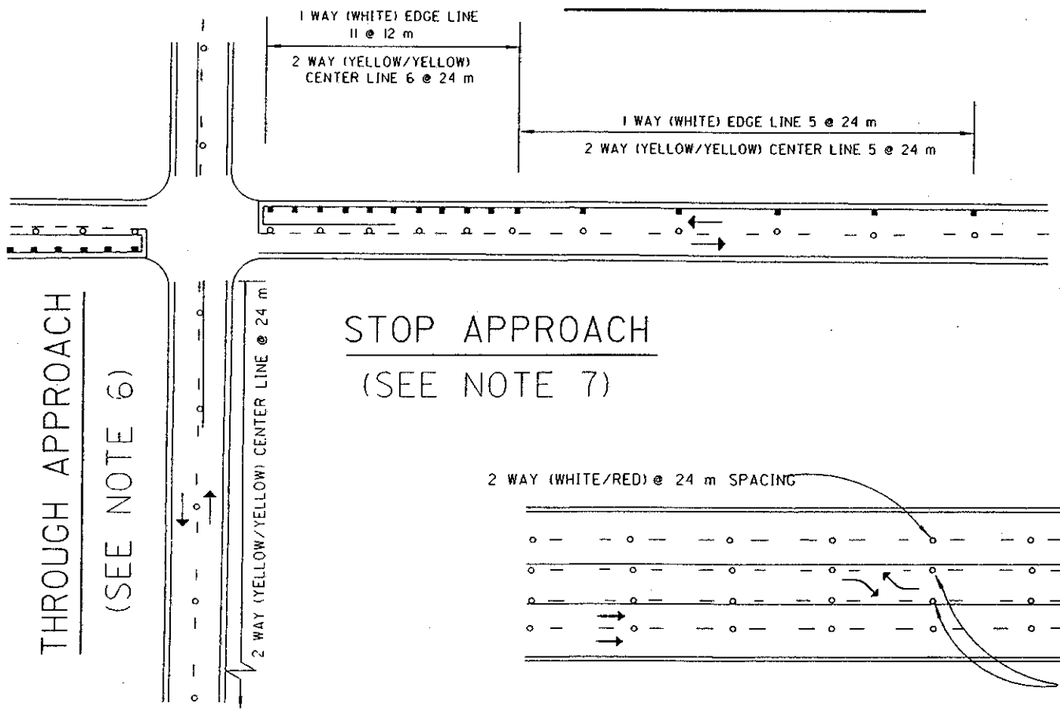
STANDARD CONSTRUCTION DRAWING TC-65.10M

APPROVED _____ ADMINISTRATOR

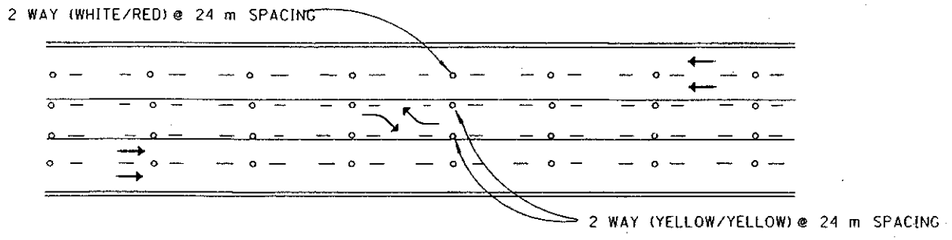
WCC



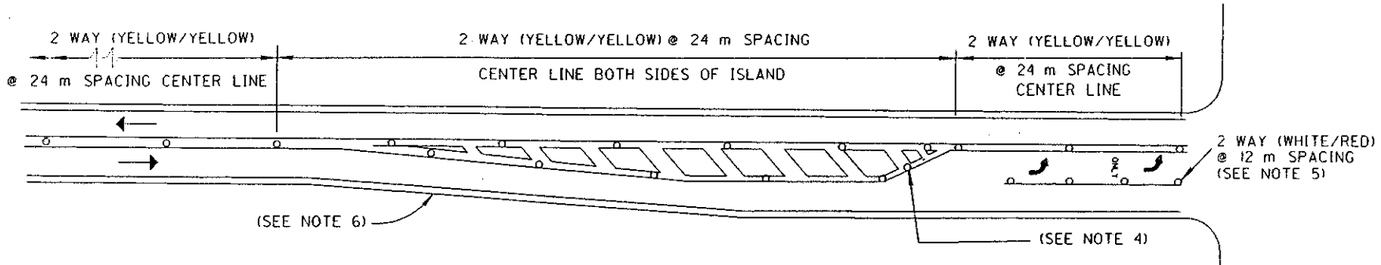
ONE LANE BRIDGE



STOP APPROACH
(SEE NOTE 7)



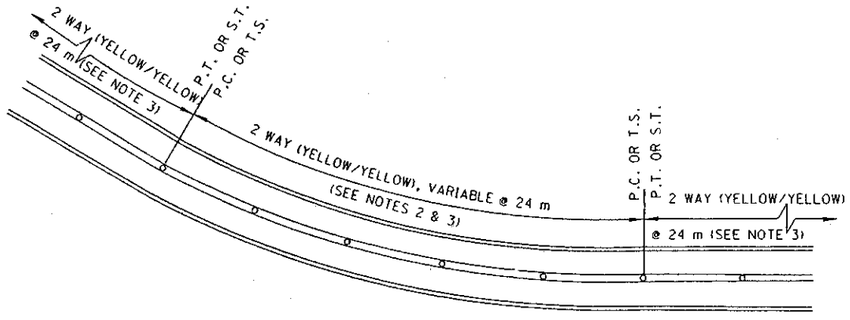
TWO WAY LEFT TURN LANE



APPROACH W/LEFT TURN LANE

LEGEND

- ■ 1 WAY REFLECTORS
- ○ 2 WAY REFLECTORS



HORIZONTAL CURVE

NOTES

1. FOR ONE LANE BRIDGES, PAINTED CENTER LINE AND CENTER LINE MARKERS SHALL BE OMITTED 48 METERS ON EACH SIDE AND ACROSS THE BRIDGE.
2. FOR HORIZONTAL CURVE RADIUS OF 380 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS SHALL BE REDUCED TO 12 m BETWEEN P.C. OR T.S. AND P.T. OR S.T.
3. FOR HORIZONTAL CURVE RADIUS OF 250 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS MAY BE REDUCED TO 6 m BETWEEN P.C. OR T.S. AND P.T. OR S.T. WHEN USING 6 m SPACING, 12 RAISED PAVEMENT MARKERS AT 12 m SPACING SHALL BE INSTALLED ON EACH END OF THE 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 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.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

metric units

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DIVISION OF ENGINEERING POLICY
OHIO DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL	DATE 11/03/93 11/01/95
RAISED PAVEMENT MARKER DETAILS II	
STANDARD CONSTRUCTION DRAWING TC-65.12M	
APPROVED ..... ADMINISTRATOR	