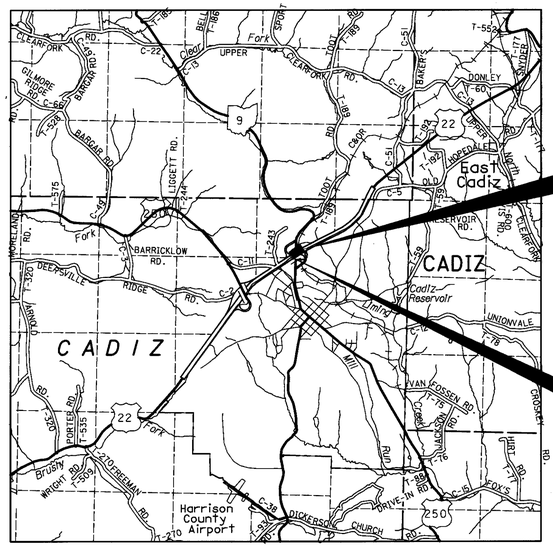

LOCATION MAP

LATITUDE: N 40°17'00" LONGITUDE: W 81°01'00"

SCALE IN MILES

0 1 2 3 4

PORTION TO BE IMPROVED

STATE & FEDERAL ROUTES

OTHER ROADS

DESIGN DESIGNATION

CURRENT ADT (2000)	5300
DESIGN YEAR ADT (2020)	6300
DESIGN HOURLY VOLUME (2013)	630
DIRECTIONAL DISTRIBUTION	0.55
TRUCKS (24 HOUR B&C)	25%
DESIGN SPEED	65 MPH
LEGAL SPEED	55 MPH

DESIGN FUNCTIONAL CLASSIFICATION - PRINCIPAL ARTERIAL (RURAL)

DESIGN EXCEPTIONS

NONE

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
HAS-22-17.48
CADIZ TOWNSHIP
HARRISON COUNTY

INDEX OF SHEETS:

PROJECT DESCRIPTION

IMPROVEMENT OF 0.08 MILES OF U.S. ROUTE 22 BY REDECKING TWO TWIN STRUCTURES OVER STATE ROUTE 9 AND COLUMBUS & OHIO RIVER RAILROAD.

LIMITED ACCESS

THIS IMPROVEMENT IS ESPECIALLY DESIGNED FOR THROUGH TRAFFIC AND HAS BEEN DECLARED A LIMITED ACCESS HIGHWAY OR FREEWAY BY ACTION OF THE DIRECTOR IN ACCORDANCE WITH THE PROVISIONS OF SECTION 5511.02 OF THE OHIO REVISED CODE.

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 NOT REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY AND THAT PROVISIONS FOR THE MAINTENANCE AND SAFETY OF TRAFFIC WILL BE AS SET FORTH ON THE PLANS AND ESTIMATES.

APPROVED _____
DATE 08/15/00 DISTRICT DEPUTY DIRECTOR

APPROVED Gordon Proctor
DATE 8-29-00 DIRECTOR, DEPARTMENT OF TRANSPORTATION

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:

GANNETT FLEMING
5015 PINE CREEK DRIVE
COLUMBUS, OHIO 43081

ENGINEERS SEAL: STATE OF OHIO KEVIN JOSEPH GRATHWOL E-58282 REGISTERED PROFESSIONAL ENGINEER
SIGNED: _____ ROADWAY PLANS
DATE: 5/22/2000

ENGINEERS SEAL: STATE OF OHIO JOSEPH RIKK, JR E-62228 REGISTERED PROFESSIONAL ENGINEER
SIGNED: _____ BRIDGE PLANS
DATE: 5/22/2000

STANDARD CONSTRUCTION DRAWINGS

								SUPPLEMENTAL SPECIFICATIONS			
BP-2.1	7-28-00	DM-1.1M	10-21-97	MT-35.10M	1-30-95			806	9-9-97	954	9-9-97
BP-2.2	7-28-00	DM-1.2M	10-21-97	MT-35.11M	1-30-95			815	5-30-96		
BP-2.3	7-28-00	DM-4.1M	6-30-95	MT-95.30M	4-25-94	AS-1-81	9-15-94	816	4-21-97		
BP-3.1	7-28-00	DM-4.3	4-29-99	MT-95.40M	4-25-94	BR-1	1-06-99	830	10-21-98		
		DM-4.4	4-29-99	MT-96.11M	1-30-95	EXJ-4-87	2-14-97	842	1-6-99		
GR-1.1M	10-21-97	HW-2.1M	7-12-95	MT-96.20M	1-30-95	GSD-1-96	2-12-97	844	1-6-99		
GR-1.2M	1-3-96	HW-2.2M	7-12-95	MT-96.21M	1-30-95	PCB-91	7-06-99	846	9-9-97		
GR-1.3M	11-30-94			MT-97.10M	4-25-94			863	10-12-99		
GR-2.1M	4-14-98			MT-98.12M	6-24-93			870	8-10-99	SPECIAL PROVISIONS	
GR-3.1M	10-21-97			MT-98.13M	6-24-93			877	4-13-99		
GR-3.2M	10-21-97			MT-98.14M	6-24-93			885	8-10-99		
		TC-21.20M	12-10-96	MT-99.10M	1-30-95			894	10-12-99		
RM-4.2M	10-21-97	TC-42.10M	3-31-94	MT-99.20M	1-30-95			899	10-21-98		
		TC-65.11M	11-1-95	MT-102.10M	1-30-95			905	4-1-98		
CB-3.3M	7-12-95	TC-72.20M	9-1-93	MT-105.10M	4-25-94			906	5-5-98		
				MT-105.11M	4-25-94			907	10-21-98		
								908	1-6-99		
								910	7-28-98		

FEDERAL PROJECT NO. TE21-G000(173)
PID NO. 15936
CONSTRUCTION PROJECT NO.
RAILROAD INVOLVEMENT
COLUMBUS & OHIO RIVER R.R.
HAS-22-17.48
1 / 67

HAS - USR 22 - 17.48
000511
PID# 15936
11/08/00
DIST 11

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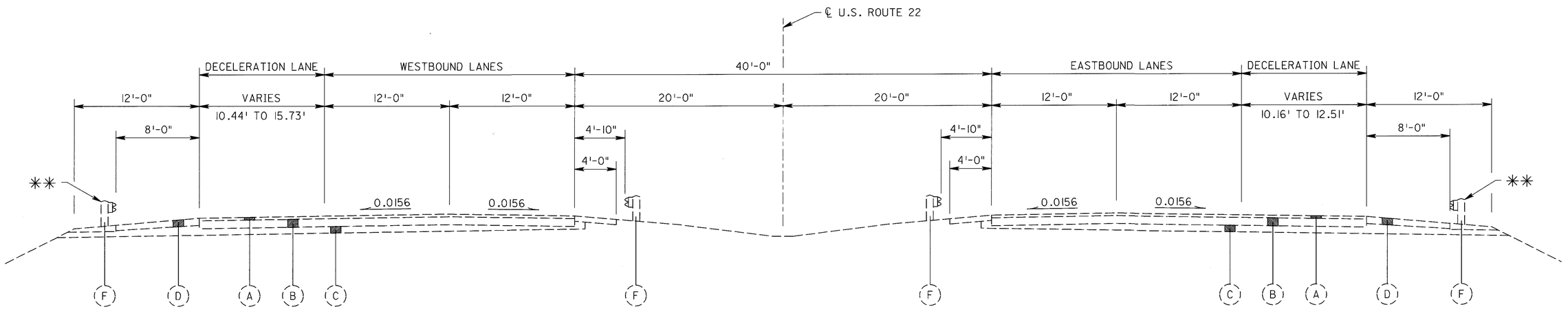
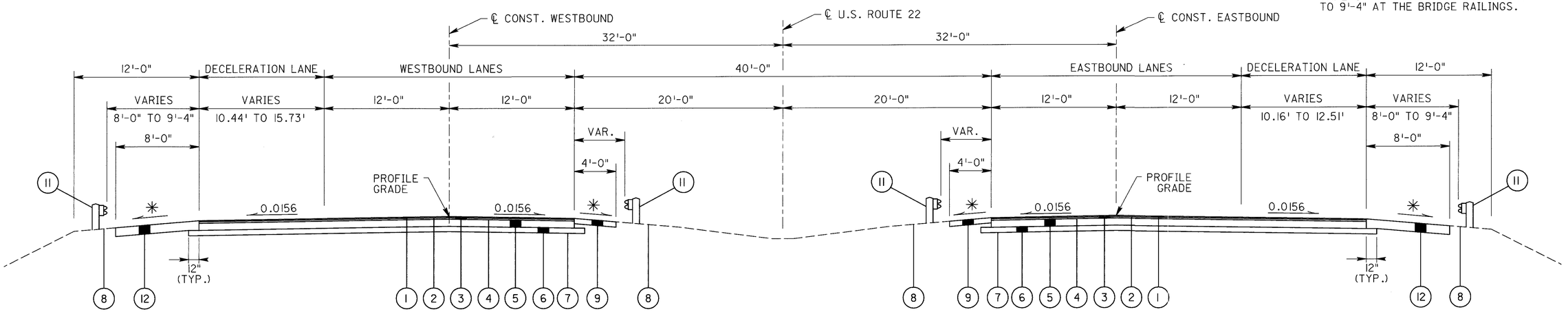


EXISTING SECTION - U.S. ROUTE 22

EAST AND WEST ADJOINING SECTION

* TRANSITION FROM 0.0156 AT APPROACH TO MATCH EX. SHOULDER CROSS SLOPE

** EXISTING GUARDRAIL ON THE OUTSIDE TAPERS FROM THE 8' OFFSET SHOWN TO 9'-4" AT THE BRIDGE RAILINGS.



NORMAL SECTION - U.S. ROUTE 22
FULL DEPTH PAVEMENT REPLACEMENT

LIMITING STATIONS LEFT	
STA. 926+08.00 TO STA. 926+35.57 =	27.57 L.F.
STA. 928+22.85 TO STA. 928+45.54 =	22.69 L.F.
STA. 929+90.29 TO STA. 930+13.00 =	22.71 L.F.
TOTAL =	72.97 L.F.

LIMITING STATIONS RIGHT	
STA. 925+65.00 TO STA. 925+96.26 =	31.26 L.F.
STA. 927+83.52 TO STA. 928+22.82 =	39.30 L.F.
STA. 929+67.49 TO STA. 929+90.00 =	22.51 L.F.
TOTAL =	93.07 L.F.

LEGEND

- (A) EXISTING ASPHALT WEARING SURFACE
- (B) EXISTING 9" REINFORCED CONCRETE BASE
- (C) EXISTING 6" SUBBASE
- (D) EXISTING ASPHALT SHOULDER
- (E) EXISTING APPROACH SLAB
- (F) EXISTING GUARDRAIL

- (1) ITEM 448 - 1 1/4" ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64-22, AS PER PLAN
- (2) ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE (SEE GENERAL NOTE)
- (3) ITEM 448 - 1 3/4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG64-22
- (4) ITEM 407 - TACK COAT (SEE GENERAL NOTES)
- (5) ITEM 305 - 9" CONCRETE BASE
- (6) ITEM 304 - 6" AGGREGATE BASE
- (7) ITEM 203 - SUBGRADE COMPACTION
- (8) ITEM 659 - SEEDING AND MULCHING
- (9) ITEM 301 - 6" BITUMINOUS AGGREGATE BASE, PG64-22
- (10) ITEM 611 - REINFORCED CONCRETE APPROACH SLAB (T=15")
- (11) ITEM 606 - GUARDRAIL, TYPE 5
- (12) ITEM 615 - TEMPORARY PAVEMENT, CLASS A (FLEXIBLE), AS PER PLAN

CALCULATED LAM
CHECKED JAR

TYPICAL SECTIONS

HAS-22-17.48

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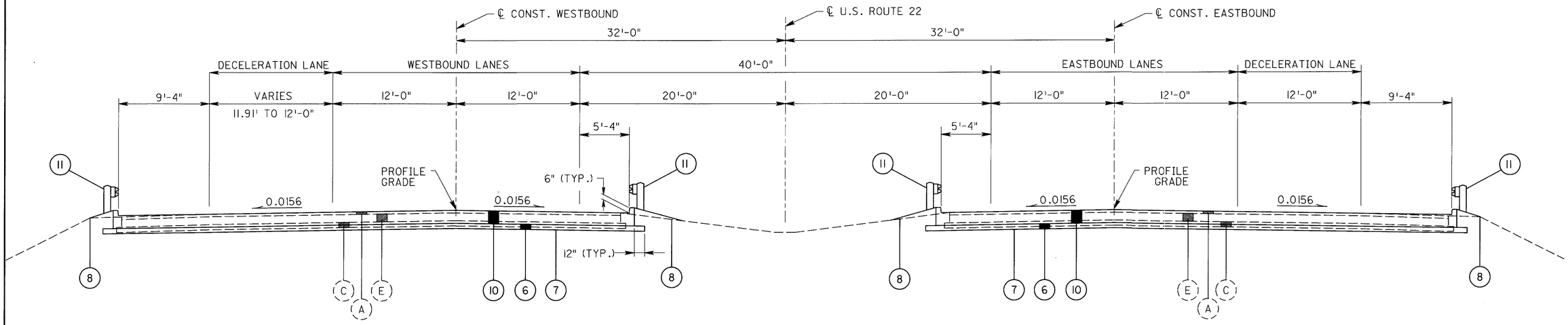

APPROACH SLAB SECTION - U.S. ROUTE 22

LIMITING STATIONS LEFT

STA. 926+35.57 TO STA 926+60.57 = 25.00 L.F.
STA. 927+97.85 TO STA 928+22.85 = 25.00 L.F.
STA. 928+45.54 TO STA 928+70.54 = 25.00 L.F.
STA. 929+65.29 TO STA 929+90.29 = 25.00 L.F.
TOTAL = 100.00 L.F.

LIMITING STATIONS RIGHT

STA. 925+96.26 TO STA 926+21.26 = 25.00 L.F.
STA. 927+58.52 TO STA 927+83.52 = 25.00 L.F.
STA. 928+22.82 TO STA 928+47.82 = 25.00 L.F.
STA. 929+42.49 TO STA 929+67.49 = 25.00 L.F.
TOTAL = 100.00 L.F.

LEGEND

(A) EXISTING ASPHALT WEARING SURFACE
(C) EXISTING 6" SUBBASE
(E) EXISTING APPROACH SLAB
(6) ITEM 304 - 6" AGGREGATE BASE
(7) ITEM 203 - SUBGRADE COMPACTION
(8) ITEM 659 - SEEDING AND MULCHING
(10) ITEM 611 - REINFORCED CONCRETE APPROACH SLAB (T=15")
(11) ITEM 606 - GUARDRAIL, TYPE 5

CALCULATED LAM CHECKED JAR

TYPICAL SECTIONS

HAS-22-17.48

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ROUNDING

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

UTILITIES

LISTED BELOW ARE ALL UTILITIES LOCATED WITHIN THE PROJECT CONSTRUCTION LIMITS TOGETHER WITH THEIR RESPECTIVE OWNERS:

WATER:
BOARD OF PUBLIC AFFAIRS,
VILLAGE OF CADIZ
P.O. BOX 153 CADIZ, OHIO 43907
TELEPHONE: (614) 942-8844

GAS:
COLUMBIA GAS OF OHIO
216 HIGHLAND AVE.
CAMBRIDGE, OHIO 43725
TELEPHONE: (740) 432-8226

TELEPHONE:
GTE NORTH, INC.
1168 KENNEL RD.
MINERVA, OHIO 44657
TELEPHONE: (330) 868-4155

THE LOCATION OF THE UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE AS OBTAINED FROM THE OWNERS AS REQUIRED BY SECTION 153.64 O.R.C.

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.

ELEVATION DATUM

ALL ELEVATIONS ARE BASED ON NORTH AMERICA VERTICAL DATUM 1988.

WORK LIMITS

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

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 SEEDING AND MULCHING, ARE BASED ON THESE LIMITS.

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

ITEM 670, SEEDING AND MULCHING	4300	SQ. YD.

CONNECTION BETWEEN EXISTING AND PROPOSED GUARDRAIL

WHEN IT IS NECESSARY TO SPLICE PROPOSED GUARDRAIL TO EXISTING GUARDRAIL, ONLY THE EXISTING GUARDRAIL SHALL BE CUT, DRILLED, OR PUNCHED. THE CONNECTION SHALL BE MADE USING A "W-BEAM RAIL SPLICE" AS SHOWN IN AASHTO M 180. PAYMENT SHALL BE INCLUDED IN THE CONTRACT PRICE FOR THE RESPECTIVE GUARDRAIL ITEMS.

ITEM 407 - TACK COAT AND ITEM 407 - 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	0.075 GAL./SQ. YD.
407, TACK COAT FOR INTERMEDIATE COURSE	0.040 GAL./SQ. YD.

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:

ITEM 870, WATER	23	M.GAL.

PART-WIDTH CONSTRUCTION

BECAUSE OF THE NECESSITY TO BUILD THIS PROJECT UNDER TRAFFIC AND CONSTRUCTING THE FULL PAVEMENT WIDTH IN STAGES, EXTREME CARE SHALL BE TAKEN TO PREVENT THE CONSTRUCTION OF A BUTT JOINT IN THE BASE COURSES. LONGITUDINAL JOINTS SHALL BE LAPPED AS SHOWN ON STANDARD CONSTRUCTION DRAWING BP-3.1.

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: (SEE CALCULATION SHEET)

877, TEMPORARY SEEDING AND MULCHING	860	SQ. YD.
877, TEMPORARY PERIMETER FILTER FABRIC FENCE	800	LIN. FT.
877, TEMPORARY DITCH CHECK FILTER FABRIC FENCE	60	LIN. FT.
877, TEMPORARY INLET PROTECTION FILTER FABRIC FENCE	120	LIN. FT.
870, COMMERCIAL FERTILIZER	0.04	TON
870, WATER	5	M. GAL.

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

MATERIAL FURNISHED FOR FINE AND COARSE AGGREGATES USED IN THIS ITEM SHALL EXCLUDE ALL LIMESTONE AND CRUSHED CARBONATE STONE.

CONVERSION OF STANDARD CONSTRUCTION DRAWINGS

THE METRIC STANDARD DRAWINGS REFERENCED IN THIS PLAN SHALL BE CONVERTED TO ENGLISH UNITS USING THE SI (METRIC) TO ENGLISH CONVERSION FACTORS PROVIDED IN SECTION 109.011 OF THE 1997 CONSTRUCTION AND MATERIALS SPECIFICATIONS. THE APPENDIX OF ASTM E 380 SHALL BE UTILIZED FOR ANY ADDITIONAL CONVERSION FACTORS REQUIRED. CONVERSIONS SHALL BE APPROPRIATELY PRECISE AND SHALL REFLECT STANDARD INDUSTRY ENGLISH VALUES WHERE SUITABLE.

CLEARING AND GRUBBING

ALTHOUGH THERE ARE NO TREES OR STUMPS SPECIFICALLY MARKED FOR REMOVAL WITHIN THE LIMITS OF THE PROJECT, A LUMP SUM QUANTITY HAS BEEN INCLUDED IN THE GENERAL SUMMARY FOR ITEM 201, CLEARING AND GRUBBING. ALL PROVISIONS AS SET FORTH IN THE SPECIFICATIONS UNDER THIS ITEM SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 201, CLEARING AND GRUBBING.

ITEM 630, REMOVAL OF GROUND MOUNTED SIGN AND REERECTION, AS PER PLAN

THIS ITEM SHALL INCLUDE ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY FOR THE REMOVAL AND REERECTION OF THE EXISTING BEAM SUPPORTED SIGN. THE CONTRACTOR SHALL REUSE THE SIGN AND BEAM SUPPORTS. THE CONTRACTOR SHALL INSTALL NEW CONNECTORS AND FOUNDATION AS PER THE STANDARD DRAWING TC-21.20M. PAYMENT FOR ALL OF THE ABOVE WORK SHALL BE INCLUDED IN THE UNIT PRICE BID PER EACH FOR ITEM 630, REMOVAL OF GROUND MOUNTED SIGN AND REERECTION, AS PER PLAN.

CALCULATED LAM
CHECKED KJG

GENERAL NOTES

HAS-22-17.48

S:\PROJECTS\35765\ROADWAY\HAS22GNMDGN

ITEM 614 - MAINTAINING TRAFFIC

A MINIMUM OF ONE LANE OF TRAFFIC IN EACH DIRECTION SHALL BE MAINTAINED AT ALL TIMES BY USE OF THE EXISTING PAVEMENT, THE COMPLETED PAVEMENT, AND 615 TEMPORARY PAVEMENT.

LENGTH AND DURATION OF LANE CLOSURES AND RESTRICTIONS SHALL BE AT THE APPROVAL OF THE ENGINEER. IT IS THE INTENT TO MINIMIZE THE IMPACT TO THE TRAVELING PUBLIC. LANE CLOSURES OR RESTRICTIONS OVER SEGMENTS OF THE PROJECT IN WHICH NO WORK IS ANTICIPATED WITHIN A REASONABLE TIME FRAME, AS DETERMINED BY THE ENGINEER, SHALL NOT BE PERMITTED. THE LEVEL OF UTILIZATIONS OF MAINTENANCE OF TRAFFIC DEVICES SHALL BE COMMENSURATE WITH THE WORK IN PROGRESS.

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

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

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

614, BITUMINOUS CONCRETE FOR MAINTAINING TRAFFIC 25 CU. YD.

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.

ITEM 614 - LAW ENFORCEMENT OFFICER WITH PATROL CAR

IN ADDITION TO THE REQUIREMENTS OF 614 AND THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (OMUTCD), A UNIFORMED LAW ENFORCEMENT OFFICER AND OFFICIAL PATROL CAR WITH WORKING TOP MOUNTED EMERGENCY FLASHING LIGHTS SHALL BE PROVIDED FOR CONTROLLING TRAFFIC FOR THE FOLLOWING TASKS:

- FOR LANE CLOSURES: DURING INITIAL SET-UP PERIODS, TEAR DOWN PERIODS, SUBSTANTIAL SHIFTS OF A CLOSURE POINT OR WHEN NEW LANE CLOSURE ARRANGEMENTS ARE INITIATED.
- DURING THE ENTIRE ADVANCE PREPARATION AND CLOSURE SEQUENCE WHERE COMPLETE BLOCKAGE OF TRAFFIC IS REQUIRED.

LAW ENFORCEMENT OFFICERS (L.E.O.'S) SHOULD NOT BE USED WHERE THE OMUTCD INTENDS THAT FLAGGERS BE USED. THE LEO'S ARE CONSIDERED TO BE EMPLOYED BY THE CONTRACTOR AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR THEIR ACTIONS. ALTHOUGH THEY ARE EMPLOYED BY THE CONTRACTOR, THE PROJECT ENGINEER SHALL HAVE CONTROL OVER THEIR PLACEMENT. THE OFFICIAL PATROL CAR SHALL BE A PUBLIC SAFETY VEHICLE AS REQUIRED BY THE OHIO REVISED CODE.

THE CONTRACTOR SHALL MAKE ARRANGEMENTS FOR THESE SERVICES WITH:

STEUBENVILLE PATROL POST
1377 CADIZ ROAD
WINTERSVILLE, OHIO 43953
PHONE NUMBER: (740) 264-1641

LAW ENFORCEMENT OFFICERS WITH PATROL CAR REQUIRED BY THE TRAFFIC MAINTENANCE TASKS ABOVE SHALL BE PAID FOR ON A UNIT PRICE (HOURLY) BASIS UNDER ITEM 614 - LAW ENFORCEMENT OFFICER WITH PATROL CAR. THE FOLLOWING ESTIMATED QUANTITIES HAVE BEEN CARRIED TO THE GENERAL SUMMARY.

ITEM 614, LAW ENFORCEMENT OFFICER WITH PATROL CAR 80 HOURS

THE HOURS PAID SHALL INCLUDE MINIMUM SHOW-UP TIME REQUIRED BY THE LAW ENFORCEMENT AGENCY INVOLVED.

IF CONTRACTORS WISH TO UTILIZE LEO'S FOR FLAGGING AND TRAFFIC CONTROL OTHER THAN FOR THAT REQUIRED IN THESE PLANS, THEY MAY DO SO AT THEIR OWN EXPENSE. PAYMENT FOR THE EXCESS ABOVE THE CONTRACT REQUIREMENTS WILL BE INCLUDED UNDER ITEM 614 MAINTAINING TRAFFIC.

GUARDRAIL REPLACEMENT

NO HAZARD SHALL BE LEFT UNPROTECTED EXCEPT FOR THE ACTUAL TIME NECESSARY TO REMOVE THE EXISTING GUARDRAIL, PREPARE THE SITE, AND INSTALL NEW GUARDRAIL IN A CONTINUOUS OPERATION. THE REMOVAL OF ALL GUARDRAIL SHALL AT ALL TIMES BE AS DIRECTED BY THE ENGINEER. NO GUARDRAIL SHALL BE REMOVED UNTIL THE REPLACEMENT MATERIAL IS ON THE SITE, READY FOR INSTALLATION. FAILURE TO COMPLY WITH THIS REQUIREMENT SHALL BE DEEMED SUFFICIENT CAUSE TO ORDER WORK SUSPENDED UNTIL SUCH TIME AS THE ENGINEER IS ASSURED OF COMPLIANCE.

ITEM 614 - BARRIER REFLECTORS AND/OR OBJECT MARKERS

BARRIER REFLECTORS AND/OR OBJECT MARKERS SHALL BE INSTALLED ON ALL PORTABLE CONCRETE BARRIER USED FOR TRAFFIC CONTROL. BARRIER REFLECTORS, OBJECT MARKERS AND THEIR INSTALLATION SHALL CONFORM TO THE APPROPRIATE PROPOSAL NOTE AND ITEM 626 EXCEPT THAT THE SPACING SHALL BE 25 FEET. AN ESTIMATED QUANTITY OF 128 EACH OF ITEM 614 BARRIER REFLECTOR, TYPE B, AND **248** EACH OF ITEM 614 OBJECT MARKERS HAVE BEEN PROVIDED AND CARRIED TO THE GENERAL SUMMARY.

ITEM 615 - TEMPORARY PAVEMENT, CLASS A, AS PER PLAN

IN LIEU OF THE PAVEMENT COMPOSITION REQUIRED UNDER 615.05, THE FOLLOWING PAVEMENT COMPOSITION SHALL BE USED:

1-1/4" - 404 ASPHALT CONCRETE
8 -3/4" - 301 BITUMINOUS AGGREGATE BASE
4" - 304 AGGREGATE BASE

IN ADDITION, TEMPORARY PAVEMENT DELINEATED IN THE PLANS 'TO REMAIN' SHALL REMAIN IN PLACE UPON COMPLETION OF THE PROJECT.

S.R. 9 MAINTENANCE OF TRAFFIC

FOR THE DURATION OF THIS PROJECT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING TRAFFIC ON S.R. 9 FROM APPROXIMATELY FIVE HUNDRED FEET (500') NORTH TO APPROXIMATELY FIVE HUNDRED FEET (500') SOUTH OF U.S. 22. MAINTENANCE OF TRAFFIC OPERATIONS SHALL BE COMMENSURATE WITH THE WORK IN PROGRESS.

DURING BRIDGE DECK DEMOLITION AND ANY OTHER WORK WITH POTENTIAL FOR FALLING DEBRIS, THE CONTRACTOR SHALL MAINTAIN ONE LANE OF TRAFFIC ON S.R. 9 IN ACCORDANCE WITH STANDARD DRAWING MT-97.10M.

DURING PAINTING OPERATIONS OVER S.R. 9, THE CONTRACTOR SHALL MAINTAIN TRAFFIC IN ONE OF THE FOLLOWING WAYS:

1) MAINTAIN ONE LANE OF TRAFFIC UTILIZING FLAGGERS IN ACCORDANCE WITH STANDARD DRAWING MT-97.10M. AT THE END OF EACH DAYS WORK, ALL PAINTING EQUIPMENT AND MATERIALS SHALL BE REMOVED FROM THE ROADWAY AND TWO LANE, TWO WAY OPERATION SHALL BE RESTORED.

2) MAINTAIN ONE LANE OF TRAFFIC UTILIZING A TEMPORARY SIGNAL IN ACCORDANCE WITH STANDARD DRAWING MT-96.11M.

ANY ALTERNATE MEANS OF MAINTAINING TRAFFIC ON S.R. 9 SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.

PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS REQUIRED TO MAINTAIN TRAFFIC ON S.R. 9 SHALL BE INCLUDED IN THE LUMP SUM CONTRACT PRICE FOR 614, MAINTAINING TRAFFIC.

CONSTRUCTION SEQUENCE

PRIOR TO BEGINNING STAGE CONSTRUCTION, THE CONTRACTOR SHALL CONSTRUCT ALL TEMPORARY PAVEMENT REQUIRED FOR STAGE I MAINTENANCE OF TRAFFIC AND ALL TEMPORARY PAVEMENT, BEYOND THE PAVEMENT RECONSTRUCTION LIMITS, REQUIRED FOR STAGE 2 MAINTENANCE OF TRAFFIC. DURING THIS SHORT TERM OPERATION, THE CONTRACTOR SHALL CLOSE THE ADJACENT TRAFFIC LANE WITH DRUMS IN ACCORDANCE WITH STANDARD DRAWING MT-95.30M. AT THE END OF EACH WORK DAY, THE CONTRACTOR SHALL BACKFILL ANY OPEN TRENCH AND REOPEN THE LANE TO TRAFFIC.

IN CONSTRUCTING THE TEMPORARY PAVEMENT, THE CONTRACTOR SHALL PLACE THE 301 ASPHALT BASE MATERIAL TO WITHIN 1-1/4" OF THE ADJACENT PAVEMENT BY THE END OF EACH DAY. THE 404 ASPHALT MATERIAL SHALL THEN BE PLACED THE FOLLOWING DAY, IN ORDER TO ALLOW THE 301 MATERIAL TO SUFFICIENTLY COOL.

STAGE 1

UPON COMPLETION OF THE TEMPORARY PAVEMENT, THE CONTRACTOR SHALL PLACE ALL SIGNING, TEMPORARY PAVEMENT MARKINGS, PORTABLE CONCRETE BARRIER (PCB) AND DRUMS AS SHOWN ON THE PLANS, SHIFT TRAFFIC TOWARDS THE MEDIAN, AND MAINTAIN TWO LANES OF TRAFFIC IN EACH DIRECTION.

THE CONTRACTOR SHALL THEN REMOVE THE OUTER PORTION OF THE BRIDGE DECKS, PERFORM BRIDGE REHABILITATION, PLACE NEW CONCRETE DECK AND CONSTRUCT APPROACH SLABS AND FULL DEPTH PAVEMENT WITHIN THE STAGE I CONSTRUCTION AREAS OUTLINED ON THE PLAN. DURING THIS WORK, THE EXIT RAMPS SHALL REMAIN OPEN TO TRAFFIC.

UPON COMPLETION OF THIS WORK, THE CONTRACTOR SHALL CONSTRUCT THE FULL DEPTH PAVEMENT WITHIN THE STAGE IA CONSTRUCTION AREAS OUTLINED ON THE PLAN. DURING THIS WORK, THE CONTRACTOR SHALL CONTINUE TO MAINTAIN TRAFFIC ON THE EXIT RAMPS AND SHALL PLACE ANY NEEDED SIGNS TO AID MOTORISTS EXITING THE HIGHWAY.

STAGE 2

WITH THE TEMPORARY PAVEMENT REQUIRED FOR STAGE 2 IN PLACE, THE CONTRACTOR SHALL PLACE ALL SIGNING, TEMPORARY PAVEMENT MARKINGS, PCB AND DRUMS AS SHOWN ON THE PLANS, SHIFT TRAFFIC TO THE NEWLY CONSTRUCTED PAVEMENT, AND MAINTAIN ONE LANE OF TRAFFIC IN EACH DIRECTION.

THE CONTRACTOR SHALL THEN REMOVE THE REMAINDER OF THE BRIDGE DECKS, PERFORM BRIDGE REHABILITATION, PLACE NEW CONCRETE DECK AND CONSTRUCT APPROACH SLABS AND FULL DEPTH PAVEMENT WITHIN THE STAGE 2 CONSTRUCTION AREA OUTLINED ON THE PLAN. DURING THIS STAGE, THE EXIT RAMPS SHALL REMAIN OPEN TO TRAFFIC.

UPON COMPLETION OF THE ABOVE WORK, THE CONTRACTOR SHALL REMOVE THE PCB AND PLACE FINAL PAVEMENT MARKINGS OVER THE COMPLETED ROADWAY SURFACE.

STAGE 3

FOLLOWING COMPLETION OF BRIDGE CONSTRUCTION, THE CONTRACTOR SHALL PAINT THE EXISTING STEEL BEAMS OF ALL FOUR STRUCTURES.

CALCULATED LAM CHECKED KJG

MAINTENANCE OF TRAFFIC GENERAL NOTES

HAS-22-17.48

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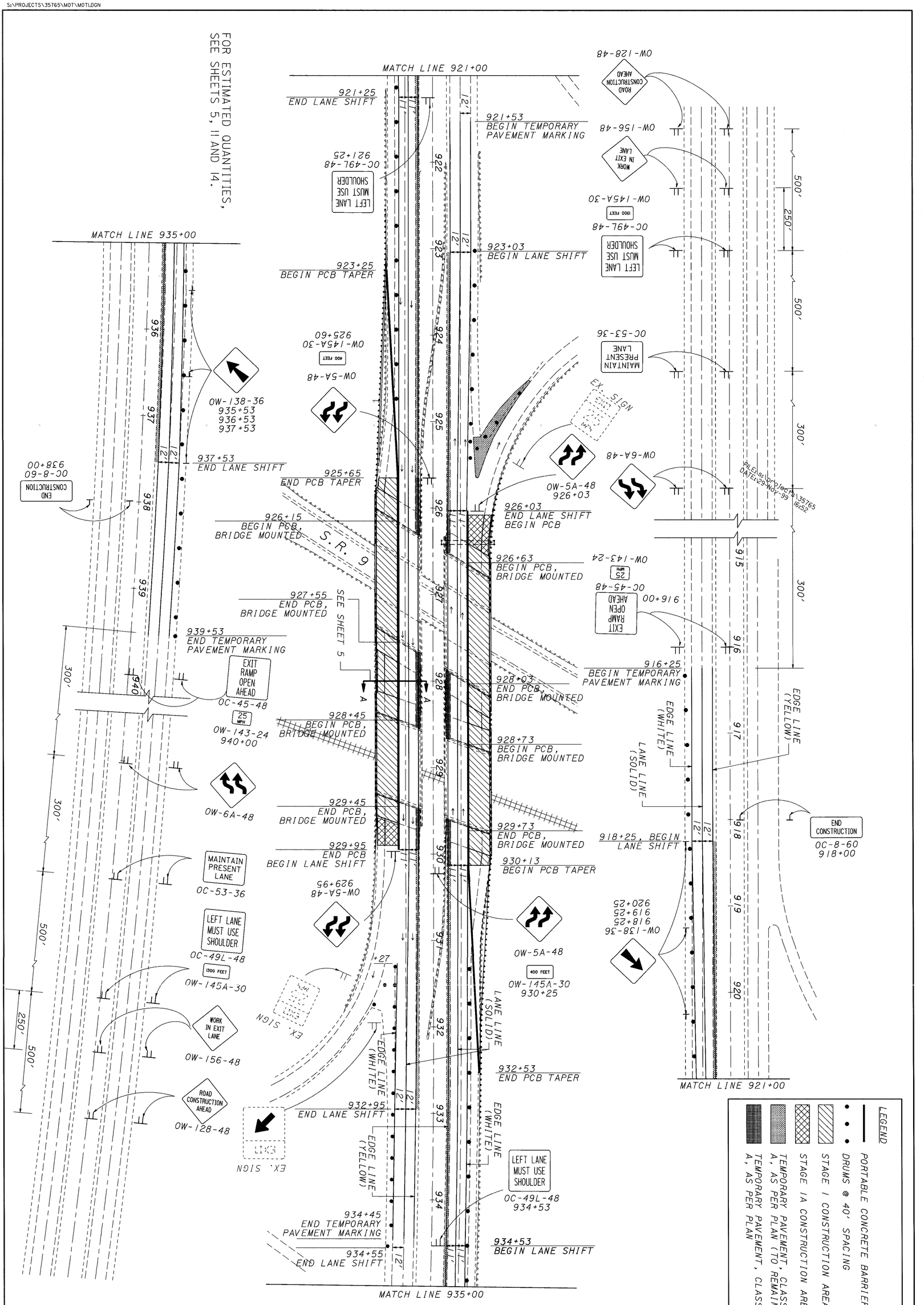

7 / 67	HAS-22-17.48	MAINTENANCE OF TRAFFIC STAGE 1	CALCULATED KJG / CHECKED JAR	0 50 100 HORIZONTAL SCALE IN FEET

MAINTENANCE OF TRAFFIC STAGE 2

HORIZONTAL SCALE IN FEET
0 50 100

CALCULATED KJG
CHECKED JAR

HAS-22-17.48

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OW-128-48 ROAD CONSTRUCTION AHEAD
OW-123-48 LEFT LANE CLOSED AHEAD
OW-60C-48
FLASHING ARROW PANEL
END CONSTRUCTION OC-8-60 916+40
MATCH LINE 921+00
915 916 917 918 919 920
12′ 12′
500′ 500′ 500′
914+05 BEGIN DRUMS
914+55 BEGIN LANE TAPER
BEGIN TEMPORARY PAVEMENT MARKING
916+15 OW-5-48
EDGE LINE (YELLOW)
EDGE LINE (WHITE)
MATCH LINE 921+00

LEGEND
PORTABLE CONCRETE BARRIER
DRUMS @ 40′ SPACING
STAGE 2 CONSTRUCTION AREA
TEMPORARY PAVEMENT, CLASS A, AS PER PLAN (TO REMAIN)

921+43 BEGIN LANE SHIFT
BEGIN TEMPORARY PAVEMENT MARKING
EDGE LINE (YELLOW)
EDGE LINE (WHITE)
EX. SIGN
925+93 END LANE SHIFT BEGIN PCB
926+63 BEGIN PCB, BRIDGE MOUNTED
928+03 END PCB, BRIDGE MOUNTED
928+73 BEGIN PCB, BRIDGE MOUNTED
OW-6-48 928+35 925+93
929+73 END PCB BRIDGE MOUNTED
930+13 BEGIN LANE SHIFT BEGIN PCB TAPER
OW-138-36 932+63 933+63 934+63
934+63 END LANE SHIFT END PCB TAPER BEGIN LANE TAPER
MATCH LINE 921+00
922 923 924 925 926 927 928 929 930 931 932 933 934
12′ 12′ 11′
B B
MATCH LINE 935+00

921+15 BEGIN PCB TAPER END LANE TAPER BEGIN LANE SHIFT
OW-138-36 922+15 923+15
EDGE LINE (YELLOW)
EDGE LINE (WHITE)
925+65 END PCB TAPER END LANE SHIFT
926+15 BEGIN PCB, BRIDGE MOUNTED
S.R. 9
SEE SHEET 5
927+55 END PCB, BRIDGE MOUNTED
OW-6-48 930+05 927+85
928+45 BEGIN PCB, BRIDGE MOUNTED
929+45 END PCB BRIDGE MOUNTED
930+05 END PCB BEGIN LANE SHIFT
EX. SIGN
EX. SIGN
934+55 END LANE SHIFT END TEMPORARY PAVEMENT MARKING
MATCH LINE 935+00

EDGE LINE (WHITE)
EDGE LINE (YELLOW)
936 937 938 939 940 941 942
12′ 12′
OW-5-48 939+63
941+23 END LANE TAPER END TEMPORARY PAVEMENT MARKING
941+73 END DRUMS
OW-60C-48
LEFT LANE CLOSED AHEAD OW-123-48
ROAD CONSTRUCTION AHEAD OW-128-48
END CONSTRUCTION OC-8-60 939+55
FLASHING ARROW PANEL
500′ 500′ 500′

FOR ESTIMATED QUANTITIES, SEE SHEETS 5, 11 AND 14.

SHEET NUMBER											ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE SHEET NO.
		4				11	12	13	14							
															ROADWAY	
		LUMP									201	11000	LUMP		CLEARING AND GRUBBING	
							800				202	22900	800	SQ. YD.	APPROACH SLAB REMOVED	
							658				202	23000	658	SQ. YD.	PAVEMENT REMOVED	
							1091				202	38000	1091	LIN. FT.	GUARDRAIL REMOVED	
									62		202	54100	62	EACH	RAISED PAVEMENT MARKER REMOVED FOR STORAGE	
							263				203	12000	263	CU. YD.	EXCAVATION NOT INCLUDING EMBANKMENT CONSTRUCTION	
						2022					203	50000	2022	SQ. YD.	SUBGRADE COMPACTION	
							1090.62				606	13000	1090.62	LIN. FT.	GUARDRAIL, TYPE 5	
							8				606	35000	8	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 1	
							6				606	35100	6	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 2	
															EROSION CONTROL	
								17			601	32200	17	CU. YD.	ROCK CHANNEL PROTECTION, TYPE C WITH FILTER	
								144			660	20000	144	SQ. YD.	SODDING REINFORCED	
		4300									870	10000	4300	SQ. YD.	SEEDING AND MULCHING	
						215					870	14000	215	SQ. YD.	REPAIR SEEDING AND MULCHING	
		0.04				0.58					870	20000	0.62	TON	COMMERCIAL FERTILIZER	
						1.78					870	30000	1.78	TON	AGRICULTURAL LIME	
		28									870	35000	28	M. GAL.	WATER	
		860									877	10000	860	SQ. YD.	TEMPORARY SEEDING AND MULCHING	
		800									877	30100	800	LIN. FT.	TEMPORARY PERIMETER FILTER FABRIC FENCE	
		60									877	30200	60	LIN. FT.	TEMPORARY DITCH CHECK FILTER FABRIC FENCE	
		120									877	30300	120	LIN. FT.	TEMPORARY INLET PROTECTION FILTER FABRIC FENCE	
															DRAINAGE	
								0.29			602	20000	0.29	CU. YD.	CONCRETE MASONRY	
								145			603	01500	145	LIN. FT.	6" CONDUIT, TYPE F	
								65			603	06100	65	LIN. FT.	15" CONDUIT, TYPE C	
								1			604	02800	1	EACH	CATCH BASIN, NO. 8	
								5			604	36600	5	EACH	PRECAST REINFORCED CONCRETE OUTLET	
								242			605	11100	242	LIN. FT.	6" SHALLOW PIPE UNDERDRAIN	
															PAVEMENT	
						15					301	46000	15	CU. YD.	BITUMINOUS AGGREGATE BASE, PG64-22	
						290					304	20000	290	CU. YD.	AGGREGATE BASE	
						563					305	13000	563	SQ. YD.	9" CONCRETE BASE	
						43					407	10000	43	GAL.	TACK COAT	
						27					407	14000	27	GAL.	TACK COAT FOR INTERMEDIATE COURSE	

CALCULATED LAM
CHECKED KJG

GENERAL SUMMARY

HAS-22-17.48

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SHEET NUMBER										ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE SHEET NO.
			5			11		13	14						
														PAVEMENT (CONT.)	
						33				448	46050	33	CU. YD.	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG64-22	
						24				448	47021	24	CU. YD.	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64-22, AS PER PLAN	4
								237.6		SPECIAL	45130000	237.6	LIN. FT.	PRESSURE RELIEF JOINT, TYPE A	
						1132				611	25000	1132	SQ. YD.	REINFORCED CONCRETE APPROACH SLAB (T=15")	
								48		830	26000	48	LIN. FT.	CURB, TYPE 6	
														TRAFFIC CONTROL	
									62	621	00100	62	EACH	RAISED PAVEMENT MARKER	
									12	626	00100	12	EACH	BARRIER REFLECTOR, TYPE A	
									16	626	00200	16	EACH	BARRIER REFLECTOR, TYPE B	
									1	630	85101	1	EACH	REMOVAL OF GROUND MOUNTED SIGN AND REERECTION, AS PER PLAN	4
									1.57	642	00100	1.57	MILE	EDGE LINE, TYPE 1	
									0.84	642	00200	0.84	MILE	LANE LINE, TYPE 1	
									438	642	00400	438	LIN. FT.	CHANNELIZING LINE, TYPE 1	
									94	642	00700	94	LIN. FT.	TRANSVERSE LINE, TYPE 1	
									12,748	642	30000	12,748	LIN. FT.	REMOVAL OF PAVEMENT MARKING	
														FOR STRUCTURES (OVER 20'), SEE SHEETS 29 AND 49	
														MAINTENANCE OF TRAFFIC	
			80							614	11100	80	HOUR	LAW ENFORCEMENT OFFICER WITH PATROL CAR	
			25							614	13000	25	CU. YD.	BITUMINOUS CONCRETE FOR MAINTAINING TRAFFIC	
			128							614	13300	128	EACH	BARRIER REFLECTOR, TYPE B	
			248							614	13350	**248**	EACH	OBJECT MARKER	
									0.68	614	20200	0.68	MILE	TEMPORARY LANE LINE, CLASS 1, **740.06, TYPE 1**	
									2.88	614	22200	2.88	MILE	TEMPORARY EDGE LINE, CLASS 1, **740.06, TYPE 1**	
						3226				615	20001	3226	SQ. YD.	TEMPORARY PAVEMENT, CLASS A, AS PER PLAN	5
									2120	622	40020	2120	LIN. FT.	PORTABLE CONCRETE BARRIER, 32"	
									960	622	40040	960	LIN. FT.	PORTABLE CONCRETE BARRIER, 32", BRIDGE MOUNTED	
			LUMP							614	11000	LUMP		MAINTAINING TRAFFIC	
										623	10000	LUMP		CONSTRUCTION LAYOUT STAKES	
										624	10000	LUMP		MOBILIZATION	
										806	16010	**8**	MONTH	FIELD OFFICE, TYPE B	

CALCULATED LAM
CHECKED KJG

GENERAL SUMMARY

HAS-22-17.48

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PAVEMENT CALCULATIONS

ITEM 203 - SUBGRADE COMPACTION
[9538.08 (E.B.) + 8653.30 (W.B.)] x 1/9 = 2021.26 SQ. YD.
USE = 2022 SQ. Y.D.

ITEM 301 - BITUMINOUS AGGREGATE BASE, PG64-22
[372.40 (E.B.) + 392.00 (W.B.)] x 6/12 x 1/27 = 14.15 CU. YD.
USE = 15 CU. YD.

ITEM 304 - AGGREGATE BASE
[8171.41 (E.B.) + 7467.95 (W.B.)] x 6/12 x 1/27 = 289.62 CU. YD.
USE = 290 CU. YD.

ITEM 305 - 9" CONCRETE BASE
[2859.36 (E.B.) + 2206.15 (W.B.)] x 1/9 = 562.83 SQ. YD.
USE = 563 SQ. YD.

ITEM 407 - TACK COAT
[2859.36 (E.B.) + 2206.15 (W.B.)] x 1/9 x 0.075 = 42.21 GAL.
USE = 43 GAL.

ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE
[3328.93 (E.B.) + 2685.30 (W.B.)] x 1/9 x 0.04 = 26.73 GAL.
USE = 27 GAL.

ITEM 448 - ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG64-22
[3328.93 (E.B.) + 2685.30 (W.B.)] x 1.75/12 x 1/27 = 32.48 CU. YD.
USE = 33 CU. YD.

ITEM 448 - ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64-22
[3328.93 (E.B.) + 2685.30 (W.B.)] x 1.25/12 x 1/27 = 23.20 CU. YD.
USE = 24 CU. YD.

ITEM 611 - REINFORCED CONCRETE APPROACH SLAB (T=15")
[5095.55 (E.B.) + 5092.00 (W.B.)] x 1/9 = 1131.95 SQ. YD.
USE = 1132 SQ. YD.

ITEM 615 - TEMPORARY PAVEMENT, CLASS A, AS PER PLAN

STAGE 1
STA. 918+25 TO STA. 926+30 (EASTBOUND MEDIAN): 805 x 4 x 1/9 = 357.8 SQ. YD.
STA. 927+68 TO STA. 928+54 (EASTBOUND MEDIAN): 86 x 4 x 1/9 = 38.2 SQ. YD.
STA. 929+48 TO STA. 932+95 (EASTBOUND MEDIAN): 347 x 4 x 1/9 = 154.2 SQ. YD.
STA. 923+03 TO STA. 926+52 (WESTBOUND MEDIAN): 349 x 4 x 1/9 = 155.1 SQ. YD.
STA. 927+90 TO STA. 928+67 (WESTBOUND MEDIAN): 77 x 4 x 1/9 = 34.2 SQ. YD.
STA. 929+60 TO STA. 937+53 (WESTBOUND MEDIAN): 793 x 4 x 1/9 = 352.4 SQ. YD.
STA. 924+52 TO STA. 925+65 (WESTBOUND OUTSIDE): CADD PLANIMETERED AREA = 152.2 SQ. YD.

STAGE 2
STA. 921+15 TO STA. 925+80 (EASTBOUND OUTSIDE): 465 x 10.1 (AVG.) x 1/9 = 521.8 SQ. YD.
STA. 927+67 TO STA. 928+13 (EASTBOUND OUTSIDE): 46 x 8 x 1/9 = 40.9 SQ. YD.
STA. 929+60 TO STA. 930+70 (EASTBOUND OUTSIDE): 110 x 8 x 1/9 = 97.8 SQ. YD.
STA. 931+25 TO STA. 934+55 (EASTBOUND OUTSIDE): 330 x 11.1 (AVG.) x 1/9 = 407.0 SQ. YD.
STA. 921+43 TO STA. 925+18 (WESTBOUND OUTSIDE): 375 x 8 x 1/9 = 333.3 SQ. YD.
STA. 925+90 TO STA. 926+52 (WESTBOUND OUTSIDE): 62 x 8 x 1/9 = 55.1 SQ. YD.
STA. 928+40 TO STA. 928+56 (WESTBOUND OUTSIDE): 16 x 8 x 1/9 = 14.2 SQ. YD.
STA. 930+02 TO STA. 934+63 (WESTBOUND OUTSIDE): 461 x 10.0 (AVG.) x 1/9 = 512.2 SQ. YD.
TOTAL = 3226.4 SQ. YD.
USE = 3226 SQ. YD.

PERMANENT EROSION CONTROL CALCULATIONS

ITEM 870 - COMMERCIAL FERTILIZER
(4300 x 9 x 20/1000 + 4300 x 9 x 10/1000) x 1/2000 = 0.58 TON

ITEM 870 - WATER
4300 x 9 x 300/1000 x 1/1000 x 2 = 23 M. GAL.
(QUANTITY CARRIED TO SHEET 4)

ITEM 870 - REPAIR SEEDING AND MULCHING
4300 x 0.05 = 215 SQ. YD.

ITEM 870 - AGRICULTURAL LIMING
4300 x 9 x 92/1000 x 1/2000 = 1.78 TON

TEMPORARY EROSION CONTROL CALCULATIONS

(QUANTITIES CARRIED TO SHEET 4)

ITEM 877 - TEMPORARY SEEDING AND MULCHING
4300 x 0.2 = 860 SQ. YD.

ITEM 870 - WATER
860 x 9 x 300/1000 x 1/1000 x 2 = 5 M. GAL.

ITEM 870 - COMMERCIAL FERTILIZER
860 x 9 x 10/1000 x 1/2000 = 0.04 TON

EASTBOUND PAVEMENT AREA CALCULATIONS

ITEM NUMBER	STA. 925+65.00 TO STA. 925+96.26	STA. 925+96.26 TO STA. 926+21.26	STA. 927+58.52 TO STA. 927+83.52	STA. 927+83.52 TO STA. 928+22.82	STA. 928+22.82 TO STA. 928+47.82	STA. 929+42.49 TO STA. 929+67.49	STA. 929+67.49 TO STA. 929+90.00	TOTAL AREA
203	47.3 x 27.5 = 1300.75	50.67 x 25.00 + (9.2 + 8.5) x 0.5 = 1275.60	50.67 x 25.00 + (7.9 + 8.9) x 0.5 = 1275.15	48.00 x 40.7 = 1953.60	50.67 x 25.00 + (5.4 + 4.9) x 0.5 = 1271.90	50.67 x 25.00 + (5.7 + 6.6) x 0.5 = 1272.90	48.3 x 24.6 = 1188.18	9538.08
301	4.00 x 40.0 = 160.00	———	———	4.00 x 35.6 = 142.40	———	———	4.00 x 17.5 = 70.00	372.40
304	37.3 x 22.8 = 850.44	50.67 x 25.00 + (9.2 + 8.5) x 1.5 = 1293.30	50.67 x 25.00 + (7.9 + 8.9) x 1.5 = 1291.95	38.00 x 36.5 = 1387.00	50.67 x 25.00 + (5.4 + 4.9) x 1.5 = 1282.20	50.67 x 25.00 + (5.7 + 6.6) x 1.5 = 1285.20	38.3 x 20.4 = 781.32	8171.41
305	35.3 x 22.8 = 804.84	———	———	36.00 x 36.5 = 1314.00	———	———	36.3 x 20.4 = 740.52	2859.36
407	35.3 x 22.8 = 804.84	———	———	36.00 x 36.5 = 1314.00	———	———	36.3 x 20.4 = 740.52	2859.36
407(INTERMED.)	35.3 x 27.5 = 970.75	———	———	36.00 x 40.7 = 1465.20	———	———	36.3 x 24.6 = 892.98	3328.93
448(INTERMED.)	35.3 x 27.5 = 970.75	———	———	36.00 x 40.7 = 1465.20	———	———	36.3 x 24.6 = 892.98	3328.93
448 (SURFACE)	35.3 x 27.5 = 970.75	———	———	36.00 x 40.7 = 1465.20	———	———	36.3 x 24.6 = 892.98	3328.93
611	———	50.67 x 25.00 + (9.2 + 8.5) x 0.5 = 1275.60	50.67 x 25.00 + (7.9 + 8.9) x 0.5 = 1275.15	———	50.67 x 25.00 + (5.4 + 4.9) x 0.5 = 1271.90	50.67 x 25.00 + (5.7 + 6.6) x 0.5 = 1272.90	———	5095.55

WESTBOUND PAVEMENT AREA CALCULATIONS

ITEM NUMBER	STA. 926+08.00 TO STA. 926+35.57	STA. 926+35.57 TO STA. 926+60.57	STA. 927+97.85 TO STA. 928+22.85	STA. 928+22.85 TO STA. 928+45.54	STA. 928+45.54 TO STA. 928+70.54	STA. 929+65.29 TO STA. 929+90.29	STA. 929+90.29 TO STA. 930+13.00	TOTAL AREA
203	50.5 x 31.2 = 1575.60	50.67 x 25.00 + (8.5 + 9.1) x 0.5 = 1275.55	50.67 x 25.00 + (8.8 + 8.0) x 0.5 = 1275.15	48.00 x 21.1 = 1012.80	50.67 x 25.00 + (5.1 + 1.5) x 0.5 = 1270.05	50.67 x 25.00 + 9.0 x 0.5 = 1271.25	47.0 x 20.7 = 972.90	8653.30
301	4.00 x 44.0 = 176.00	———	———	4.00 x 26.3 = 105.20	———	———	4.00 x 27.7 = 110.80	392.00
304	40.5 x 26.5 = 1073.25	50.67 x 25.00 + (8.5 + 9.1) x 1.5 = 1293.15	50.67 x 25.00 + (8.8 + 8.0) x 1.5 = 1291.95	38.00 x 16.9 = 642.20	50.67 x 25.00 + (5.1 + 1.5) x 1.5 = 1276.65	50.67 x 25.00 + 9.0 x 1.5 = 1280.25	37.0 x 16.5 = 610.50	7467.95
305	38.5 x 26.5 = 1020.25	———	———	36.00 x 16.9 = 608.40	———	———	35.0 x 16.5 = 577.50	2206.15
407	38.5 x 26.5 = 1020.25	———	———	36.00 x 16.9 = 608.40	———	———	35.0 x 16.5 = 577.50	2206.15
407(INTERMED.)	38.5 x 31.2 = 1201.20	———	———	36.00 x 21.1 = 759.60	———	———	35.0 x 20.7 = 724.50	2685.30
448(INTERMED.)	38.5 x 31.2 = 1201.20	———	———	36.00 x 21.1 = 759.60	———	———	35.0 x 20.7 = 724.50	2685.30
448 (SURFACE)	38.5 x 31.2 = 1201.20	———	———	36.00 x 21.1 = 759.60	———	———	35.0 x 20.7 = 724.50	2685.30
611	———	50.67 x 25.00 + (8.5 + 9.1) x 0.5 = 1275.55	50.67 x 25.00 + (8.8 + 8.0) x 0.5 = 1275.15	———	50.67 x 25.00 + (5.1 + 1.5) x 0.5 = 1270.05	50.67 x 25.00 + 9.0 x 0.5 = 1271.25	———	5092.00

CALCULATED K.JG CHECKED JAR

QUANTITY CALCULATIONS

HAS-22-17.48

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DATE: Jan. 31, 2000
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STATION FROM	STATION TO	LIN. FT.	WIDTH FEET	SQ. YD.	202 PAVEMENT REMOVED SQ. YD.	202 APPROACH SLAB REMOVED SQ. YD.	202 GUARDRAIL REMOVED LIN. FT.	203 EXCAVATION NOT INCLUDING EMBANKMENT CONST. CU. YD.			606 GUARDRAIL, TYPE 5 LIN. FT.		606 BRIDGE TERMINAL ASSEMBLY, TYPE I EACH	606 BRIDGE TERMINAL ASSEMBLY, TYPE 2 EACH		
PAVEMENT																
W.B. LANES																
926+08	926+35.57	31.30 (AVG.)	37.75 (AVG.)	131.3	131.3			22								
926+35.57	926+60.57	25.0	36	100		100		17								
927+97.85	928+22.85	25.0	36	100		100		17								
928+22.85	928+45.54	21.3 (AVG.)	36	85.2	85.2			15								
928+45.54	928+70.54	25.0	36	100		100		17								
929+65.29	929+90.29	25.0	36	100		100		17								
929+90.29	930+13.00	19.4 (AVG.)	35.0 (AVG.)	75.4	75.4			13								
E.B. LANES																
925+65.0	925+96.26	28.0 (AVG.)	35.3 (AVG.)	109.8	109.8			19								
925+96.26	926+21.26	25.0	36	100		100		17								
927+58.52	927+83.52	25.0	36	100		100		17								
927+83.52	928+22.82	40.8 (AVG.)	36	163.2	163.2			28								
928+22.82	928+47.82	25.0	36	100		100		17								
929+42.49	929+67.49	25.0	36	100		100		17								
929+67.49	929+90.0	23.35 (AVG.)	36	93.4	93.4			16								
SHOULDER																
W.B. LANES																
926+08.0	926+27.50	19.5	4	8.7				2								
928+14	928+41	27	4	12.0				2								
929+86	930+13	27	4	12.0				2								
E.B. LANES																
925+65.0	926+05	40	4	17.8				3								
927+93	928+29	36	4	16.0				3								
929+73	929+90.0	17	4	7.6				2								
GUARDRAIL																
W.B. LANES																
OUTSIDE																
925+67.17	926+67.17						100.0				100.0			1		
928+33.20	928+60.81						27.61				27.61		1	1		
930+00.00	933+06.25						306.25				306.25		1			
INSIDE																
928+01.30	928+46.54						45.24				45.24		1	1		
929+75.43	930+31.68						56.25				56.25		1			
E.B. LANES																
OUTSIDE																
922+55.04	925+86.29						331.25				331.25		1			
927+52.36	928+17.92						65.56				65.56		1	1		
929+47.04	929+97.04						50.0				50.0			1		
INSIDE																
925+61.82	926+18.07						56.25				56.25		1			
927+84.29	928+36.50						52.21				52.21		1	1		
TOTAL CARRIED TO GENERAL SUMMARY					658	800	1091	263			1090.62		8	6		

CALCULATED LAM CHECKED KJG

QUANTITY CALCULATIONS

HAS-22-17.48

STATION					601 ROCK CHANNEL PROTECTION, TYPE C WITH FILTER (18" THICK)	602 CONCRETE MASONRY	603 6" CONDUIT, TYPE F	603 15" CONDUIT, TYPE C	604 CATCH BASIN, NO. 8	604 PRECAST REINFORCED CONCRETE OUTLET	605 6" SHALLOW PIPE UNDERDRAIN	SPECIAL PRESSURE RELIEF JOINT, TYPE A		660 SODDING REINFORCED		830 CURB, TYPE 6
FROM	TO				CU. YD.	CU. YD.	LIN. FT.	LIN. FT.	LIN. FT.	EACH	LIN. FT.	LIN. FT.		SQ. YD.		LIN. FT.
W.B. LANES																
928+51	928+60													29		
930+15	930+24													43		
926+35.57							23			1	43	42.2				
928+45.54							30			1	39	38.3				
929+90.29							23			1	39	38.3				
928+43.2 ±	928+52															9
930+03.9 ±	930+19															15
E.B. LANES																
927+77	927+86													43		
929+67	929+76													29		
925+96.26							20				43	42.2				
928+22.82							23			1	39	38.3				
929+67.49							26			1	39	38.3				
927+63.1 ±	927+77															14
929+58.0 ±	929+68															10
927+75	928+40				17	0.29		65	1							
TOTAL CARRIED TO THE GENERAL SUMMARY					17	0.29	145	65	1	5	242	237.6		144		48

CALCULATED LAM CHECKED KJC

QUANTITY CALCULATIONS

HAS-22-17.48

s:\projects\35765\roadway\HASCALC3.DGN

STATION		614 TEMPORARY EDGE LINE, CLASS I, 740.06, TYPE I		614 TEMPORARY LANE LINE, CLASS I, 740.06, TYPE I	622 PORTABLE CONCRETE BARRIER, 32"	622 PORTABLE CONCRETE BARRIER, 32" BRIDGE MOUNTED	202 RAISED PAVEMENT MARKERS REMOVED FOR STORAGE	642 REMOVAL OF PAVEMENT MARKING	626 BARRIER REFLECTOR, TYPE A	626 BARRIER REFLECTOR, TYPE B	642 EDGE LINE, TYPE I		*642 LANE LINE, TYPE I	*642 CHANNELIZING LINE, TYPE I	*642 TRANSVERSE LINE, TYPE I	**621 RAISED PAVEMENT MARKERS 2-WAY R/W	***630 REMOVAL OF GROUND MOUNTED SIGN AND REERECTION, AS PER PLAN
		MILE									MILE						
FROM	TO	WHITE	YELLOW	MILE	LIN. FT.	LIN. FT.	EACH	LIN. FT.	EACH	EACH	WHITE	YELLOW	MILE	LIN. FT.	LIN. FT.	EACH	EACH
TEMPORARY																	
STAGE 1																	
W.B. LANES																	
921+53	939+53	0.34	0.34	0.34													
926+03	932+53				410	240											
E.B. LANES																	
916+25	934+45	0.34	0.34	0.34													
923+25	929+95				430	240											
STAGE 2																	
W.B. LANES																	
921+43	941+23	0.38	0.38														
925+93	934+63				630	240											
E.B. LANES																	
914+55	934+55	0.38	0.38														
921+15	930+05				650	240											
W.B. LANES																	
921+43	941+23						31	6369									
E.B. LANES																	
914+55	934+55						31	6379									
PROPOSED																	
W.B. LANES																	
921+43	941+23								6	8	0.39	0.40	0.42	184	43	31	
E.B. LANES																	
914+55	934+55								6	8	0.39	0.39	0.42	254	51	31	
E.B. LANES																	
924+76																	1
SUBTOTAL		1.44	1.44								0.78	0.79					
TOTALS CARRIED TO GENERAL SUMMARY		2.88		0.68	2120	960	62	12748	12	16	1.57		0.84	438	94	62	1

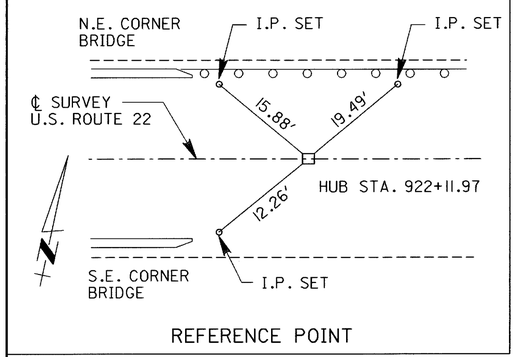
* SEE STANDARD DRAWING TC-72.20M
** SEE STANDARD DRAWING TC-65.11M
*** SEE STANDARD DRAWINGS TC-42.10M & TC-21.10M

CALCULATED DRM CHECKED JGR

(TEMPORARY & PROPOSED)
TRAFFIC CONTROL CALCULATIONS

HAS-22-17.48

s:\project\35765\traffic control\HASCALC4.DGN



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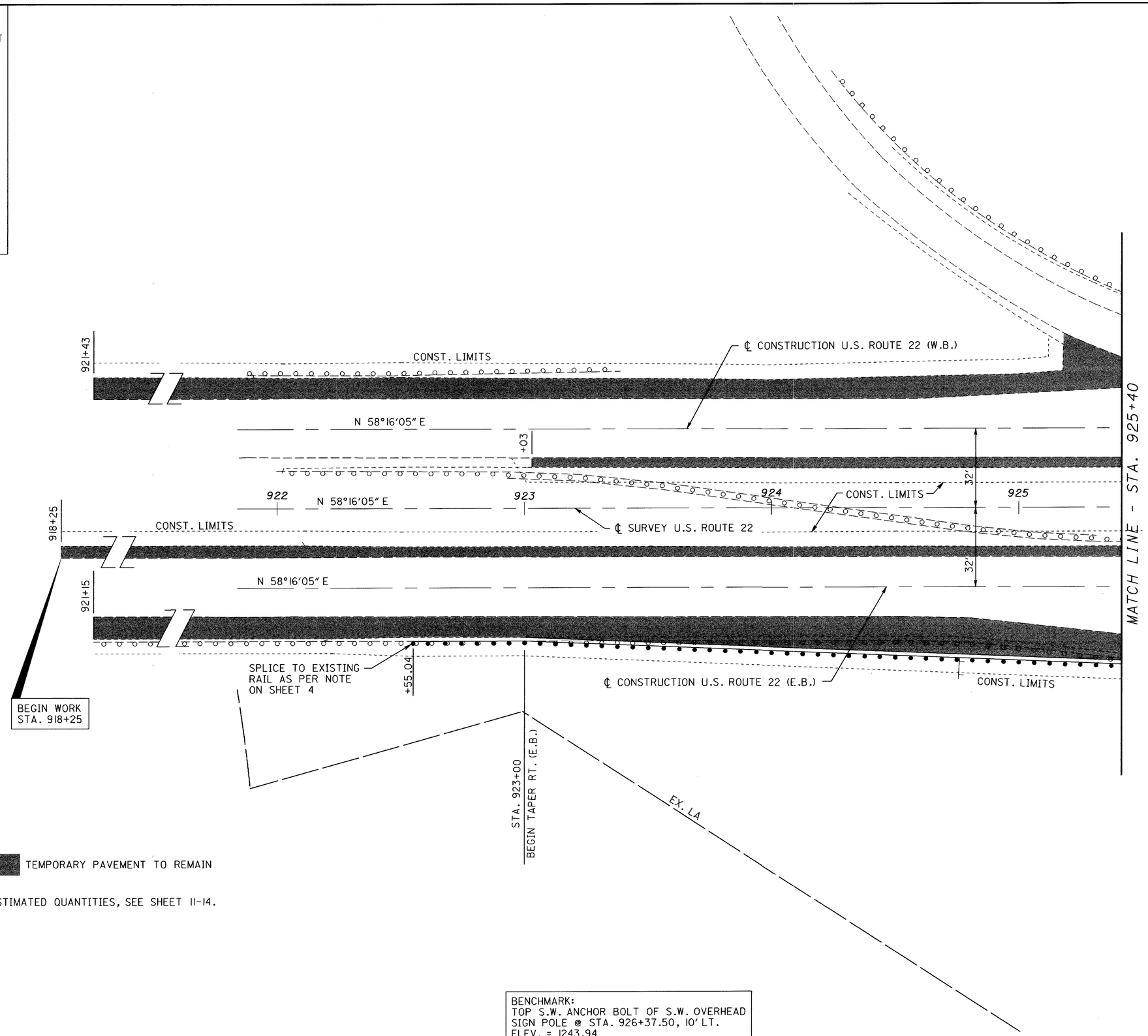


TEMPORARY PAVEMENT TO REMAIN

FOR ESTIMATED QUANTITIES, SEE SHEET 11-14.

BENCHMARK:
TOP S.W. ANCHOR BOLT OF S.W. OVERHEAD SIGN POLE @ STA. 926+37.50, 10' LT.
ELEV. = 1243.94

HORIZONTAL SCALE IN FEET
0 20 40

CALCULATED LAM
CHECKED JAR

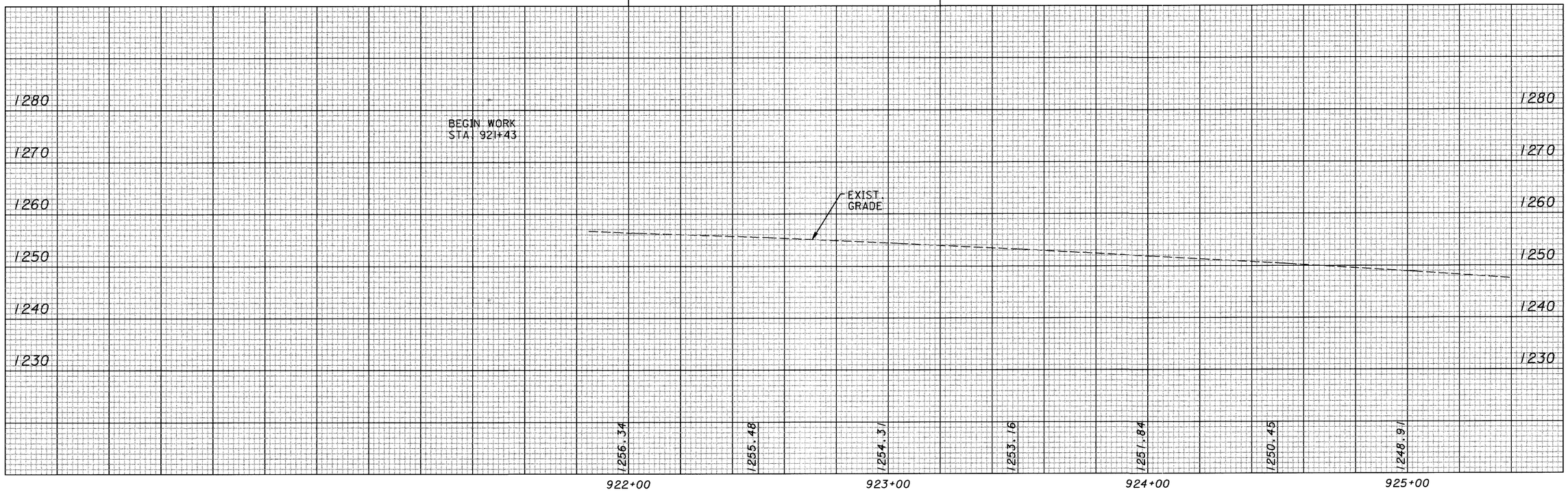
PLAN SHEET - STA. 922+00 TO STA. 925+40

HAS-22-17.48

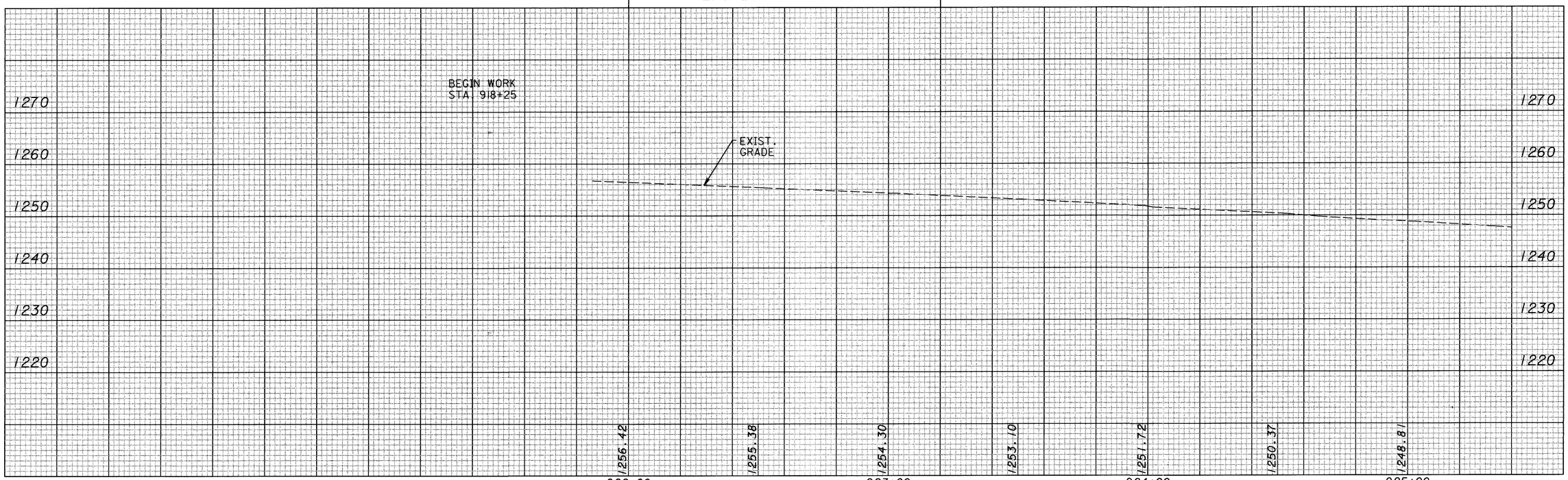
15
67

S:/Projects/35765/Roadway/roadp&pl.dgn
DATE: 31-Jan-00 8:36

WESTBOUND U.S 22



EASTBOUND U.S 22



CALCULATED LAM
CHECKED JAR

PROFILE SHEET - STA. 922+00 TO STA. 925+40

HAS-22-17.48

16
67

S:/Projects/35765/Roadway/roadp8pl.dgn
DATE: 31-Jan-00 8:56

S:/Projects/35765/Roadway/roadp&p2.dgn
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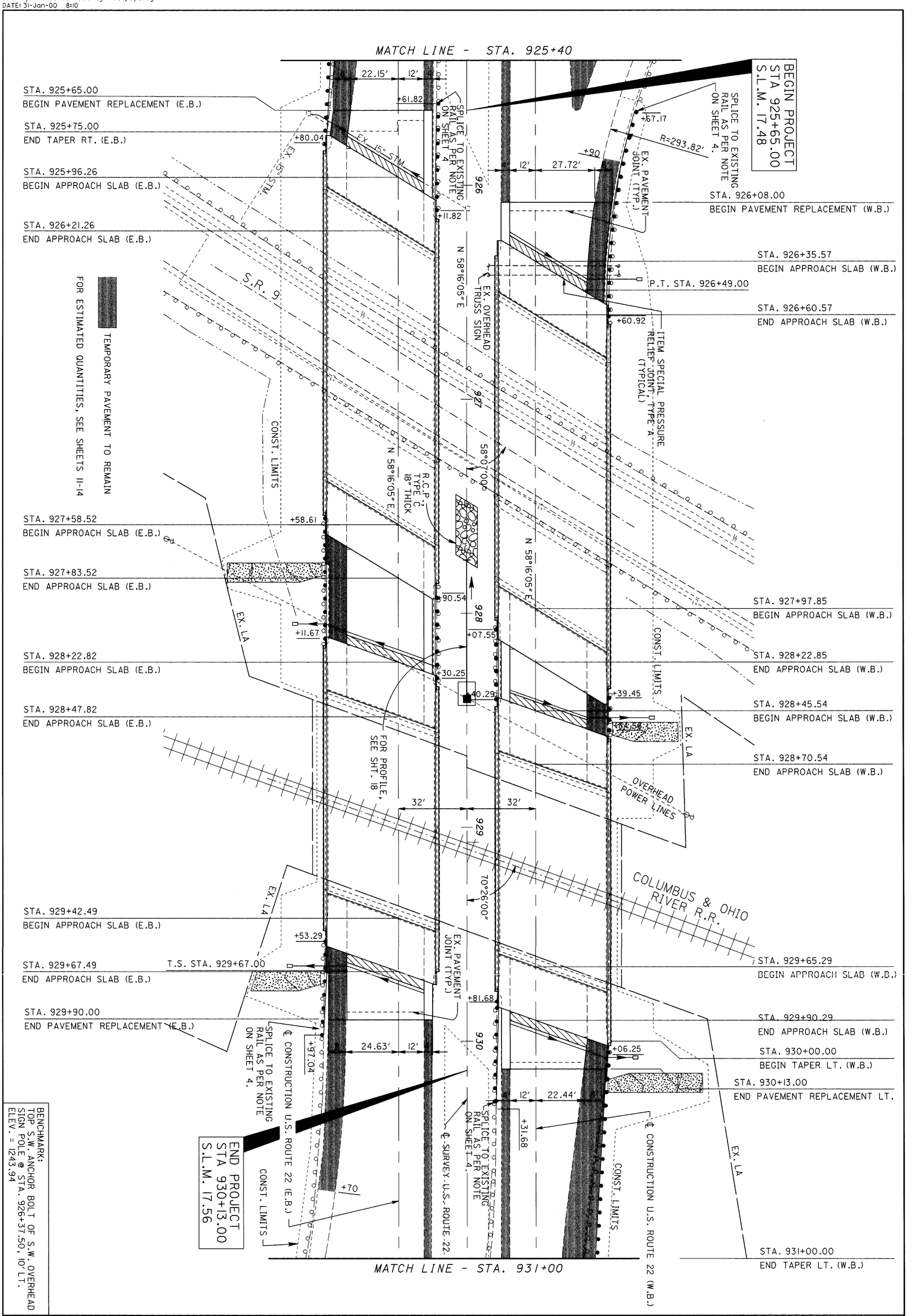
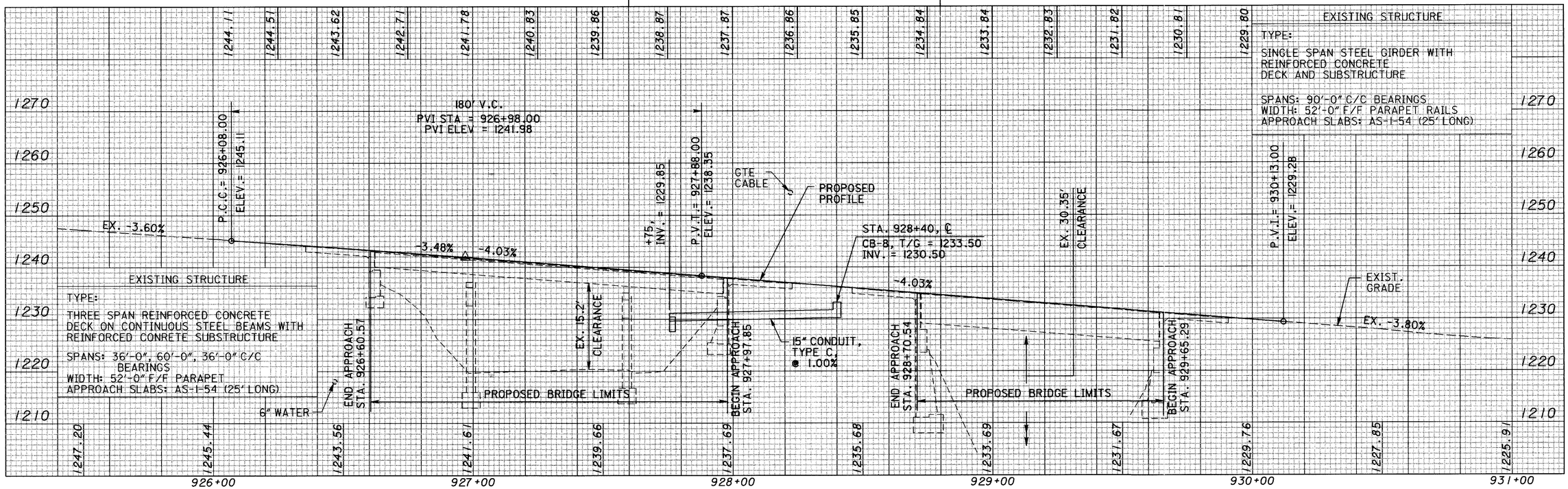


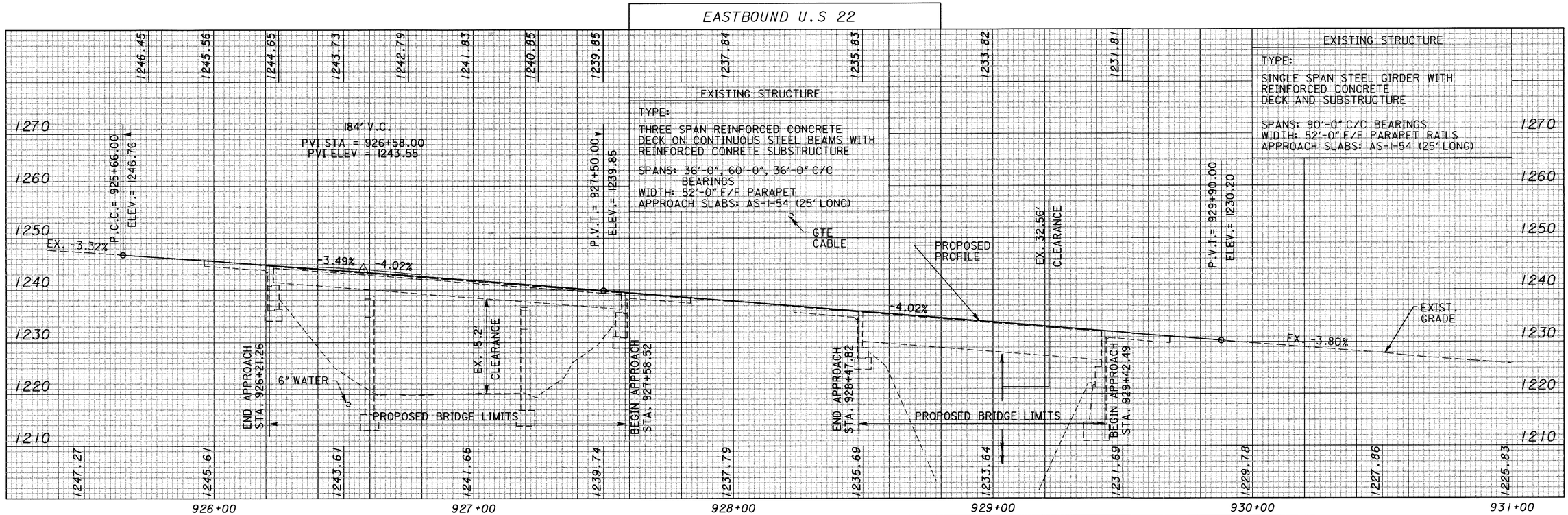
17/67	HAS-22-17.48	PLAN SHEET - STA. 925+40 TO STA. 931+00	CALCULATED LAM / CHECKED JAR	0 20 40 HORIZONTAL SCALE IN FEET

CALCULATED LAM | CHECKED JAR

WESTBOUND U.S 22



EASTBOUND U.S 22

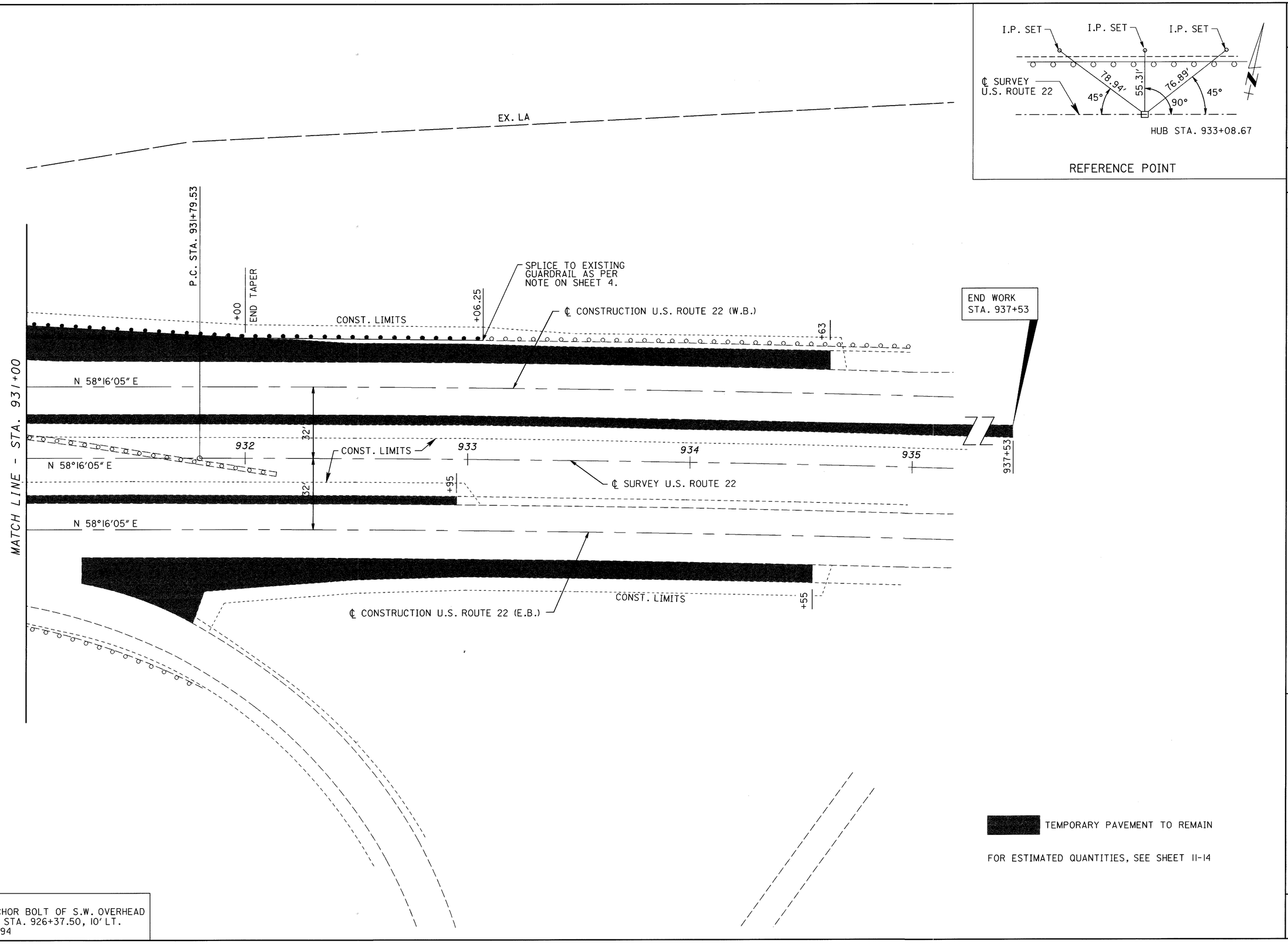


PROFILE SHEET - STA. 925+40 TO STA. 931+00

HAS-22-17.48

18
67

S:/Projects/35765/Roadway/roadp8p2.dgn
DATE: 31-Jan-00 8:10



BENCHMARK:
TOP S.W. ANCHOR BOLT OF S.W. OVERHEAD SIGN POLE @ STA. 926+37.50, 10' LT.
ELEV. = 1243.94

S:/Projects/35765/Roadway/roadp8p3.dgn
DATE: 03-Aug-99 10:42

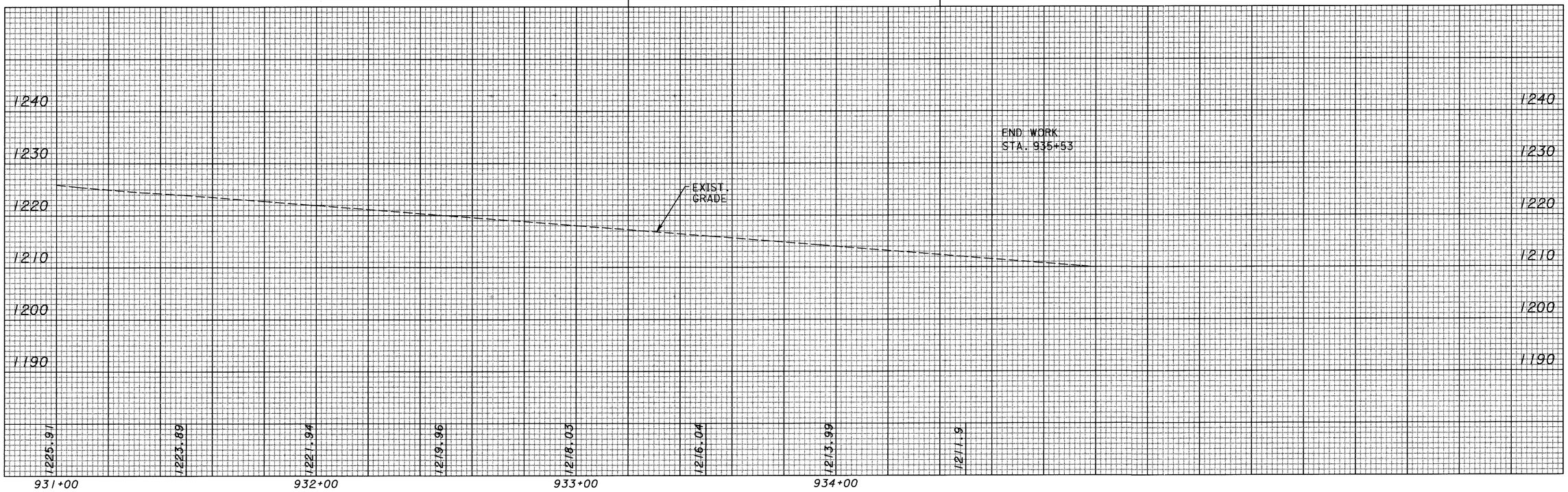
HORIZONTAL SCALE IN FEET
0 20 40

CALCULATED LAM
CHECKED JAR

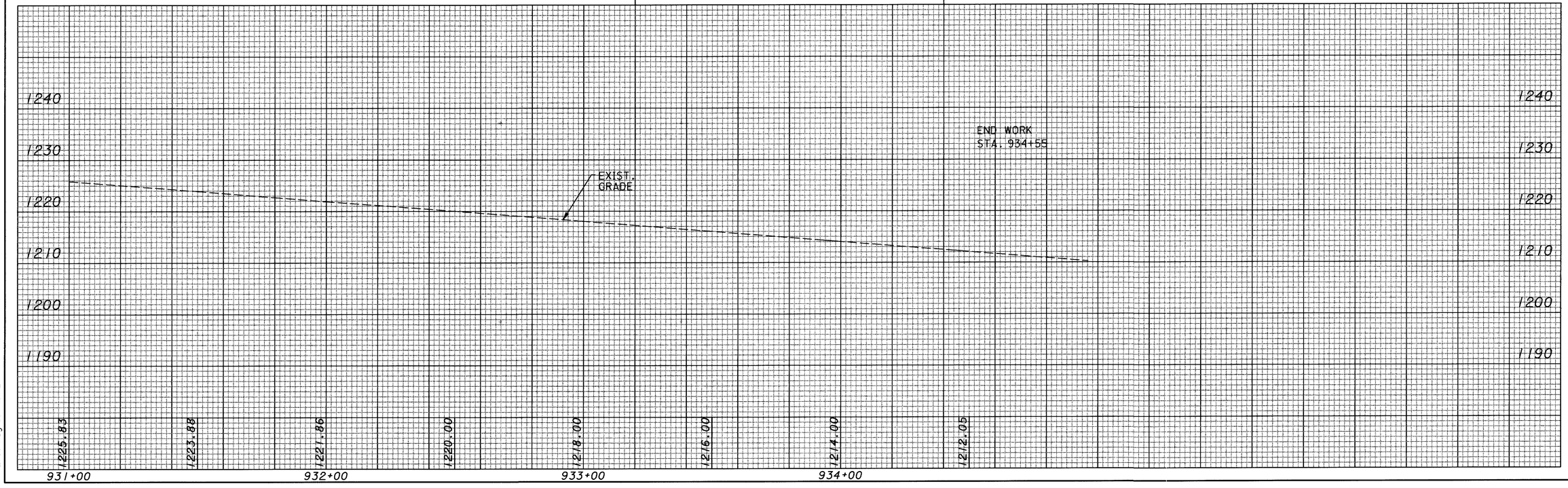
PLAN SHEET - STA. 931+00 TO STA. 935+00

HAS-22-17.48

WESTBOUND U.S 22



EASTBOUND U.S 22



CALCULATED LAM
CHECKED JAR

PROFILE SHEET - STA. 931+00 TO STA. 935+00

HAS-22-17.48

20
67

S:/Projects/35765/Roadway/roodp&p3.dgn
DATE: 03-Aug-99 10:42

SEEDING	
END WIDTH	SQ. YDS.

END AREA		VOLUME	
CUT	FILL	CUT	FILL

CALCULATED LAM
CHECKED KJG

℄ CONSTRUCTION WESTBOUND

℄ SURVEY U.S ROUTE 22

℄ CONSTRUCTION EASTBOUND

BEGIN APPROACH SLAB LT.
STA. 926+35.57

BEGIN FULL DEPTH
PAVEMENT REPLACEMENT LT.
STA. 926+08.00

TEMPORARY PAVEMENT,
CLASS A, AS PER PLAN

1245.44

STA. 926+00

1245.56

1245.61

BEGIN BRIDGE &
END APPROACH SLAB RT.
STA. 926+21.26

BEGIN APPROACH SLAB RT.
STA. 925+96.26

BEGIN FULL DEPTH
PAVEMENT REPLACEMENT RT.
STA. 925+65.00

BEGIN PROJECT
STA. 925+65
S.L.M. 17.48

1250 1240 1230 1220 1210 1260

TEMPORARY PAVEMENT,
CLASS A, AS PER PLAN

1248.91

STA. 925+00

1248.81

1260 1250 1240 1230

TEMPORARY PAVEMENT,
CLASS A, AS PER PLAN

1251.84

STA. 924+00

1251.72

BEGIN WORK
STA. 918+25

1260 1250 1240 1230

100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110

SHEET TOTAL

SHEET TOTAL

CROSS SECTIONS
STA. 924+00 TO STA. 926+00

HAS-22-17.48

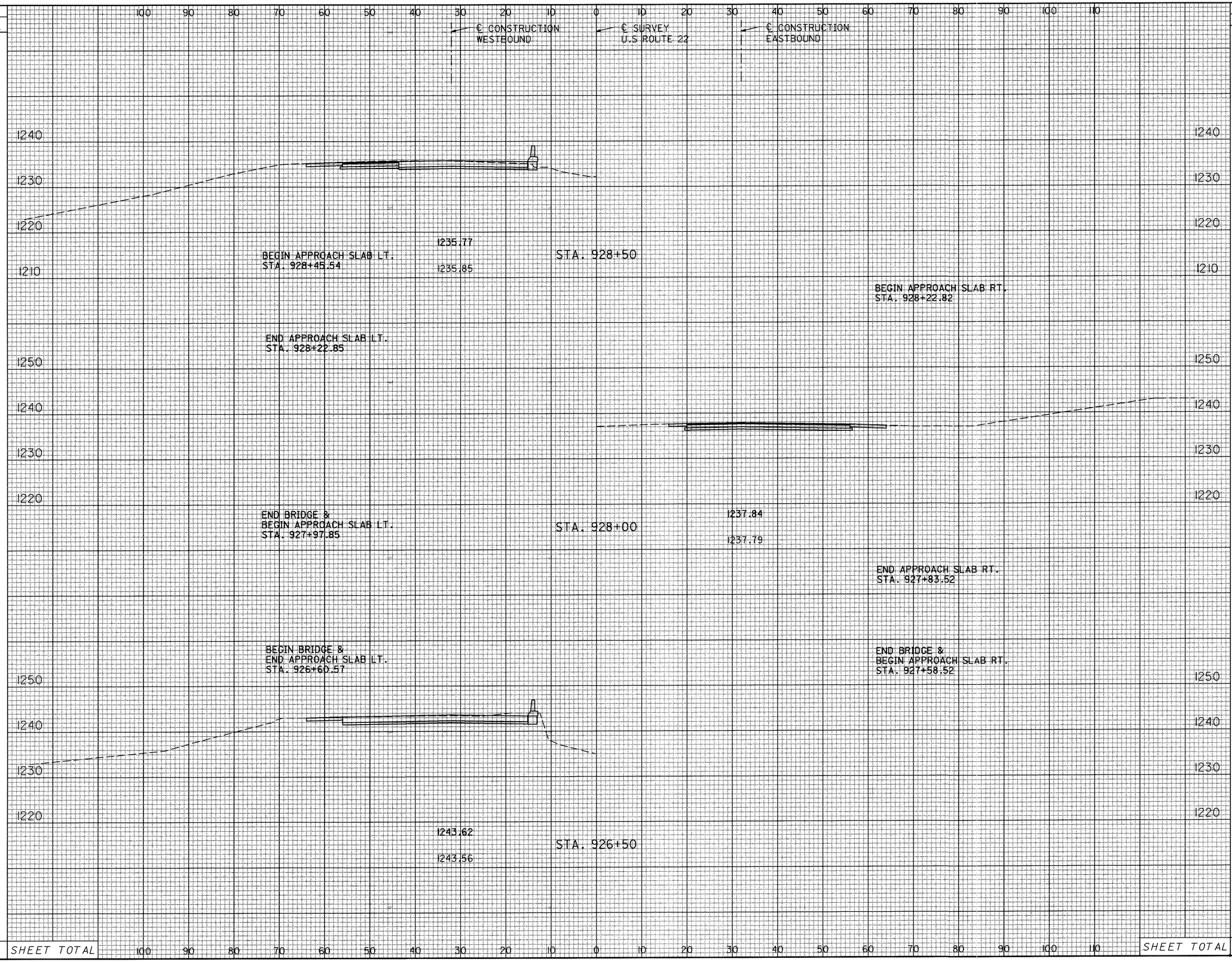
21
67

S:\Projects\35165\Roadway\xsect.dgn
DATE07-19-99

SEEDING	
END WIDTH	SQ. YDS.

END AREA		VOLUME	
CUT	FILL	CUT	FILL

CALCULATED LAM
CHECKED KJG



SHEET TOTAL

SHEET TOTAL

CROSS SECTIONS
STA. 926+50 TO STA. 928+50

HAS-22-17.48

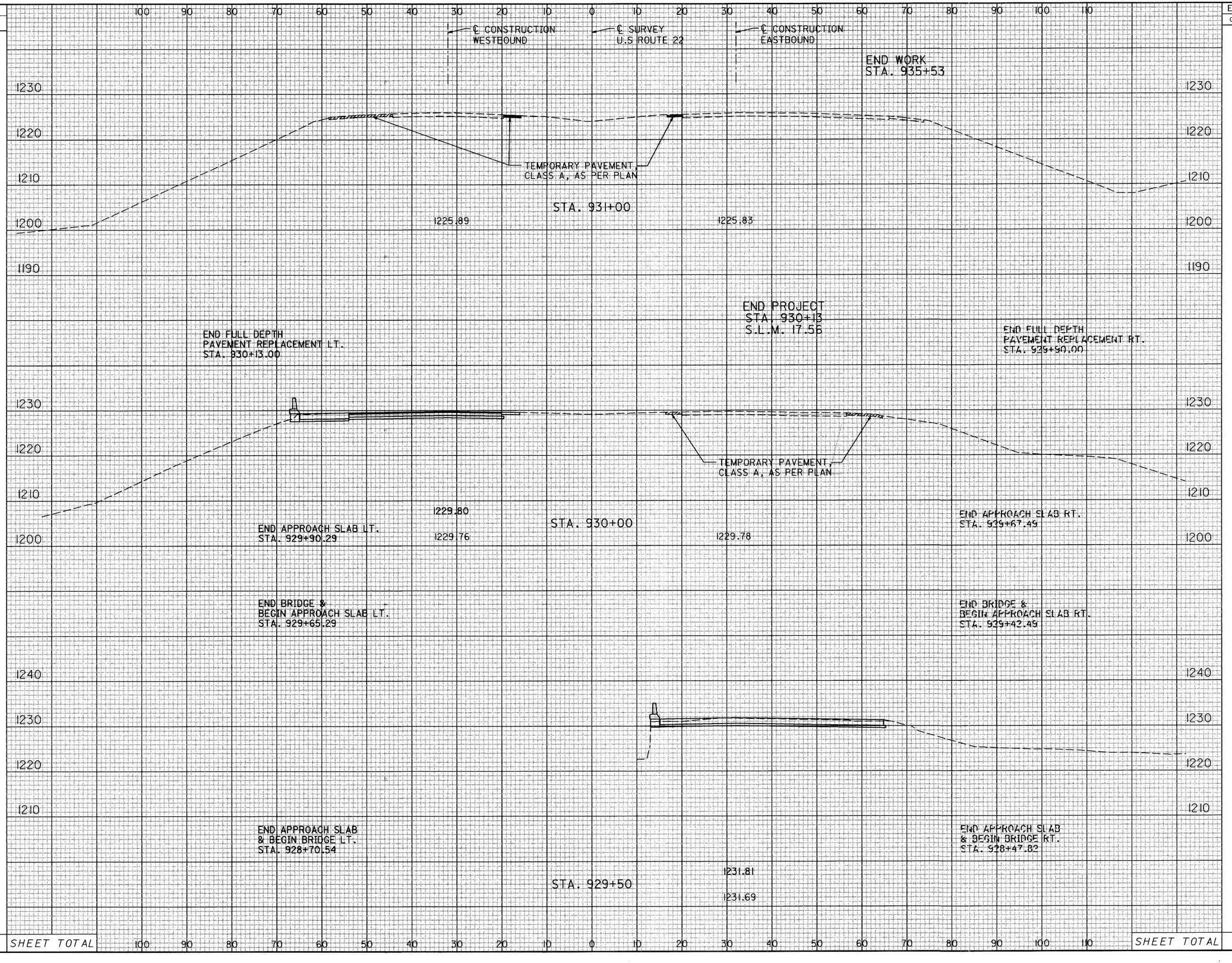
22
67

S:\Projects\35165\Roadway\xsect.dgn
DATE07-19-99

SEEDING	
END WIDTH	SQ. YDS.

END AREA		VOLUME	
CUT	FILL	CUT	FILL

CALCULATED LAM
CHECKED KJG



SHEET TOTAL

SHEET TOTAL

S:\Projects\35765\Roadway\xsections.dgn
DATE:07-19-99

CROSS SECTIONS STA. 929+50 TO STA. 931+00

HAS-22-17.48

LEGEND

LL = LANE LINE
DL = DASHED LINE
CL = CHANNELIZING LINE
TLY = TRANSVERSE LINE, YELLOW
SL = STOP LINE
ELW = EDGE LINE, WHITE
ELY = EDGE LINE, YELLOW
DY = DOUBLE YELLOW
TLW = TRANSVERSE LINE, WHITE

MATCH LINE 921+00

915 916 917 918 919 920

12'
12'

914+55
BEGIN PAV'T MARKING (EB)

ELY LL ELW

MATCH EXISTING
PAV'T MARKINGS
AT END OF GUARDRAIL

EX. SIGN

921+43
BEGIN PAV'T MARKING (WB)

ELY LL ELW ELY TLW CL LL ELY ELW ELW LL ELY

12' (typ)

926+50 928+50 930+00 930+50

12'
12'
12'

MATCH LINE 921+00

922 923 924 925 926 927 928 929 930 931 932 933 934

12'
12'
12'

12' (Typ)

MATCH LINE 935+00

250
Scio
Cadiz
EAST
9

EX. SIGN TO BE
RELOCATED BEHIND
NEW GUARDRAIL
TO STA 924+76
PER STANDARD
DRAWINGS

925+31 925+81 927+90 930+00

ELY LL ELW ELY ELW LL CL TLW ELY

12'

EX. SIGN

EX. SIGN

MATCH EXISTING
PAV'T MARKINGS
AT END OF GUARDRAIL

934+55
END PAV'T MARKING (EB)

MATCH LINE 935+00

ELY LL ELW

941+23
END PAV'T MARKING (WB)

936 937 938 939 940 941 942

12'
12'

MATCH LINE 935+00

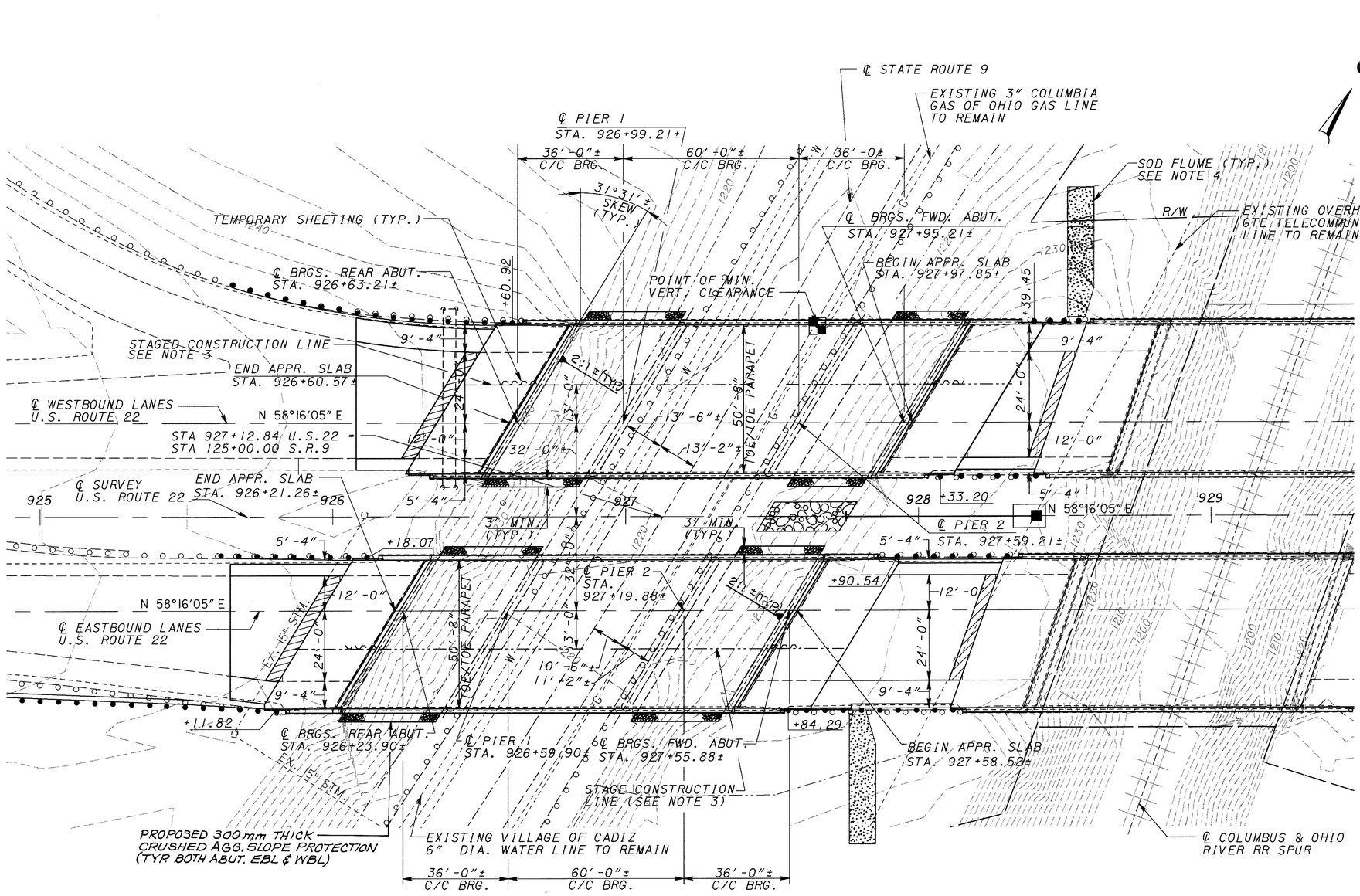
FOR ESTIMATED QUANTITIES,
SEE SHEET 14

HORIZONTAL
SCALE IN FEET
0 50 100

CALCULATED TAL
CHECKED DWB

SIGNING AND PAVEMENT MARKING PLAN

HAS-22-17.48



TRAFFIC DATA

CURRENT YEAR ADT (2000) - 5300
DESIGN YEAR ADT (2020) - 6300
DESIGN YEAR ADTT (2020) - 1575

BENCH MARK

TOP OF SOUTHWEST ANCHOR BOLT OF SOUTHWEST OVERHEAD FREEWAY SIGN POLE AT STA. 926+37.50, 10' LEFT. EL. = 1243.94

NOTES:

1. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
2. SEE SHEET 2720 FOR PROFILES.
3. SEE SHEET 6720 FOR STAGED CONSTRUCTION SEQUENCE AND GEOMETRY.
4. SODDED FLUMES PER STANDARD CONSTRUCTION DRAWING **DM-3.1M.** SEE ROADWAY PLANS FOR DRAINAGE DETAILS.

PROPOSED BRIDGE WORK

1. REMOVE EXISTING ABUTMENT BACKWALL DOWN TO THE TOP OF THE EXISTING BEAM SEAT. REMOVE PORTION OF WINGWALLS AS SHOWN ON PLANS. CONSTRUCT NEW CONCRETE BACKWALLS AND PORTIONS OF WINGWALLS.
2. INSTALL NEW POROUS BACKFILL WITH FILTER FABRIC BEHIND THE ABUTMENTS AND ALONG THE WINGWALLS.
3. CONSTRUCT NEW FULL WIDTH APPROACH SLABS.
4. REPLACE STRUCTURAL STEEL CROSSFRAMES AS SHOWN ON PLANS.
5. REMOVE ALL SCUPPERS AND SUPPORTS. GRIND SMOOTH THE SCUPPER SUPPORT TO BEAM CONNECTIONS.
6. REPAIR EXISTING SUBSTRUCTURE UNITS. PATCH UNSOUND AREAS OF CONCRETE AS NOTED ON THE PLANS. REPAIR CRACKS IN CONCRETE BY EPOXY INJECTION.
7. PROVIDE NEW ELASTOMERIC BEARINGS AT THE ABUTMENTS. REFURBISH AND RESET EXISTING BEARINGS AT PIERS.
8. CONSTRUCT A NEW REINFORCED CONCRETE DECK SLAB WITH 36" HIGH CONCRETE PARAPETS. INSTALL WELDED STUD SHEAR CONNECTORS TO MAKE THE NEW DECK COMPOSITE WITH THE STEEL BEAMS FOR THE COMPLETE LENGTH OF THE BRIDGE. INSTALL NEW STRIP SEAL EXPANSION JOINTS AT THE ABUTMENTS.
9. PAINT STRUCTURAL STEEL WITH SYSTEM OZEU.
10. APPLY EPOXY CONCRETE SEALER TO EXPOSED PORTIONS OF DECK FASCIAS, ABUTMENTS, AND PIERS.

STRUCTURE PLANS REVIEWED BY URS CONSULTANTS,
B.K.L. DATE 5/17/00

EXISITING STRUCTURE

TYPE: THREE SPAN REINFORCED CONCRETE DECK ON CONTINUOUS STEEL BEAMS WITH REINFORCED CONCRETE SUBSTRUCTURE
SPANS: 36'-0"±, 60'-0"±, 36'-0"± c/c BRGS.
ROADWAY: 49'-8"± t/t SAFETY CURBS
ORIGINAL DESIGN LOADING: CF-2000 (57)
SKEW: 31°31'± LEFT FORWARD
ALIGNMENT: TANGENT
STRUCTURE FILE #: 3401081(L) & 3401111(R)
APPROACH SLABS: AS-1-54 (25' LONG)
WEARING SURFACE: CONCRETE
ORIGINAL DATE BUILT: 1960

PROPOSED STRUCTURE

PROPOSED WORK: NEW COMPOSITE REINFORCED CONCRETE DECK WITH EXISTING CONTINUOUS STEEL BEAMS ON EXISTING CAP & COLUMN PIERS AND REHABILITATED STUB ABUTMENTS.
SPANS: 36'-0"±, 60'-0"±, 36'-0"± c/c BRGS.
ROADWAY: 50'-8" t/t PARAPETS
LOADING: HS20-44 (CASE II) WITH ALTERNATE MILITARY LOADING
SKEW: 31°31'± LEFT FORWARD
ALIGNMENT: TANGENT
APPROACH SLABS: AS-1-81 (25' LONG)
WEARING SURFACE: MONOLITHIC CONCRETE
CROWN: 0.0156
LATITUDE: N 40°17'00"
LONGITUDE: W 81°01'00"

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter, BLENDON VIEW OFFICE PARK, 5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081
DESIGNED BJM | DRAWN BJM | CHECKED DEK | REVIEWED JR | DATE 3/00
STRUCTURE FILE NUMBER 3401081/R

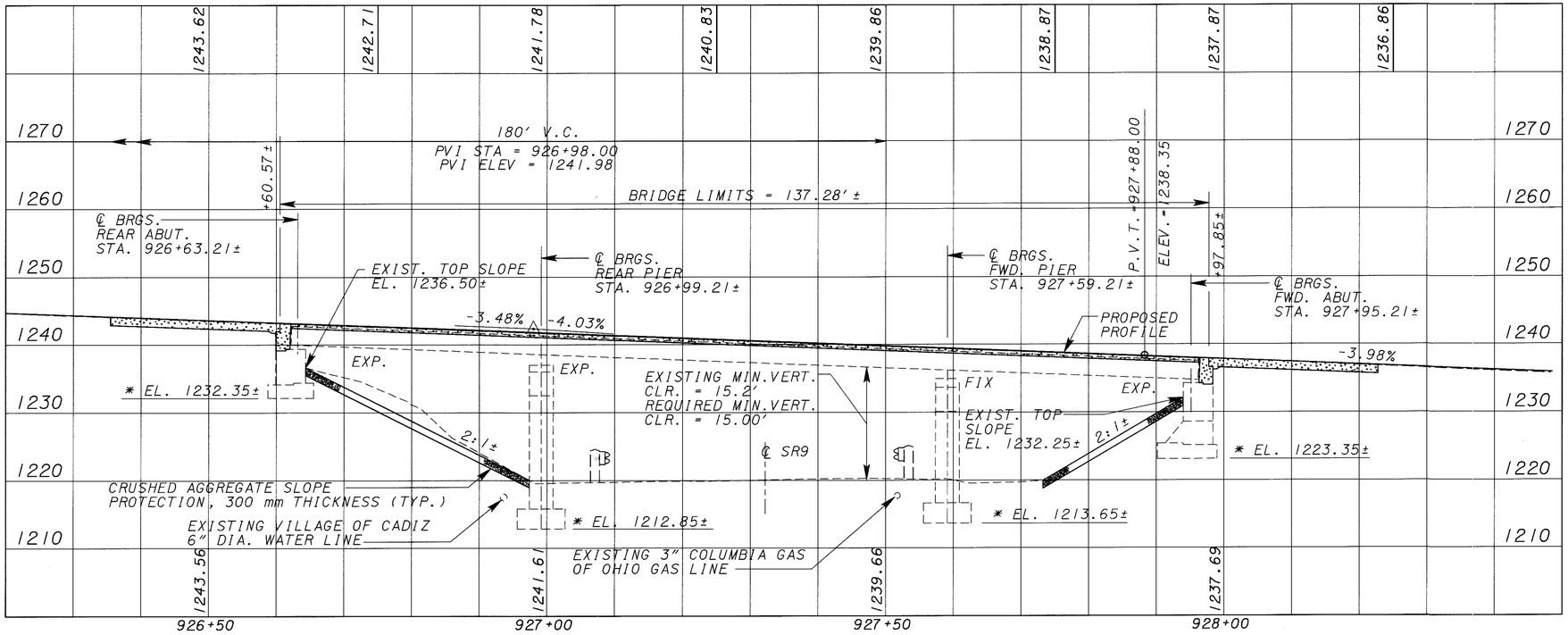
HARRISON COUNTY
WBL STA. 926+60.57 TO 927+97.85
EBL STA. 926+21.26 TO 927+58.52

SITE PLAN
BRIDGE NO. HAS-22-1749 (L. & R.) OVER S.R. 9

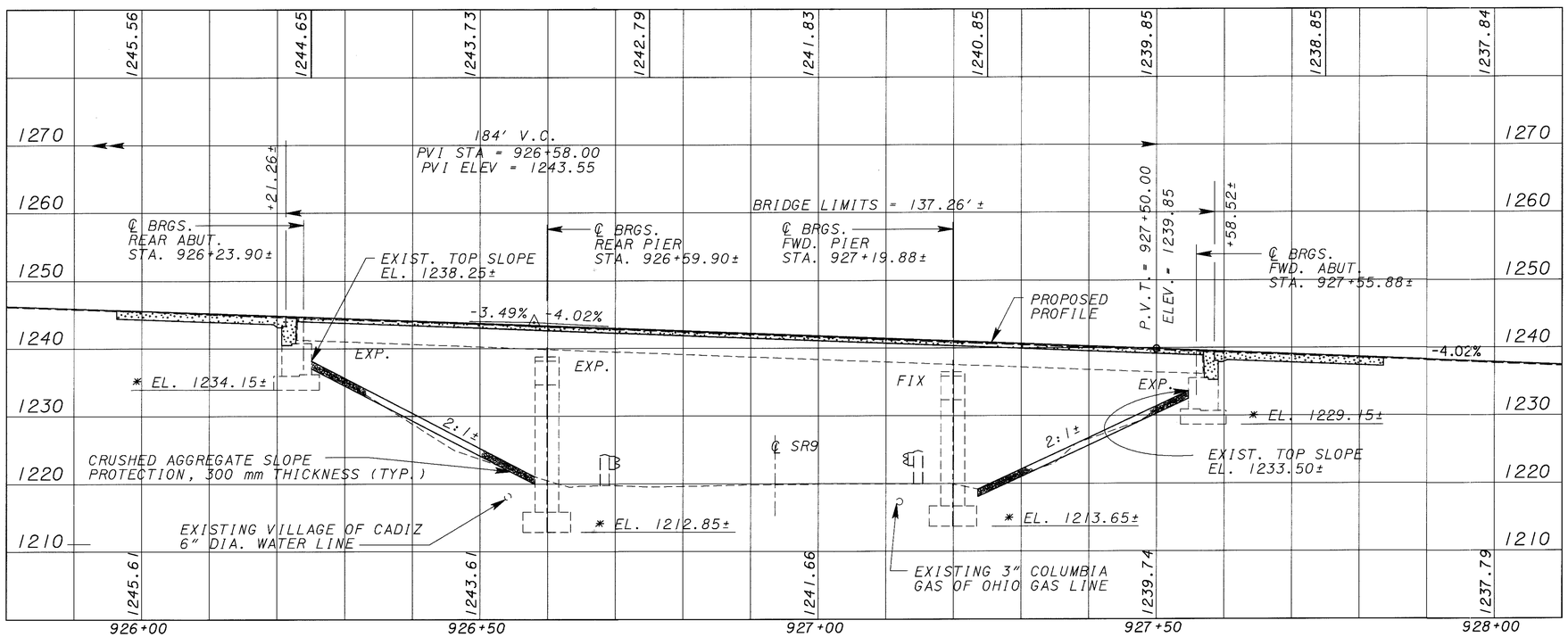
HAS-22-17.48

1 / 20
25 / 67

FILE: S:\projects\35165\BRIDGE\SR9\S9365PLAN
DATE: 10-Apr-00 16:04



PROFILE ALONG ℄ WESTBOUND U.S. 22 - LEFT BRIDGE



PROFILE ALONG ℄ EASTBOUND U.S. 22 - RIGHT BRIDGE

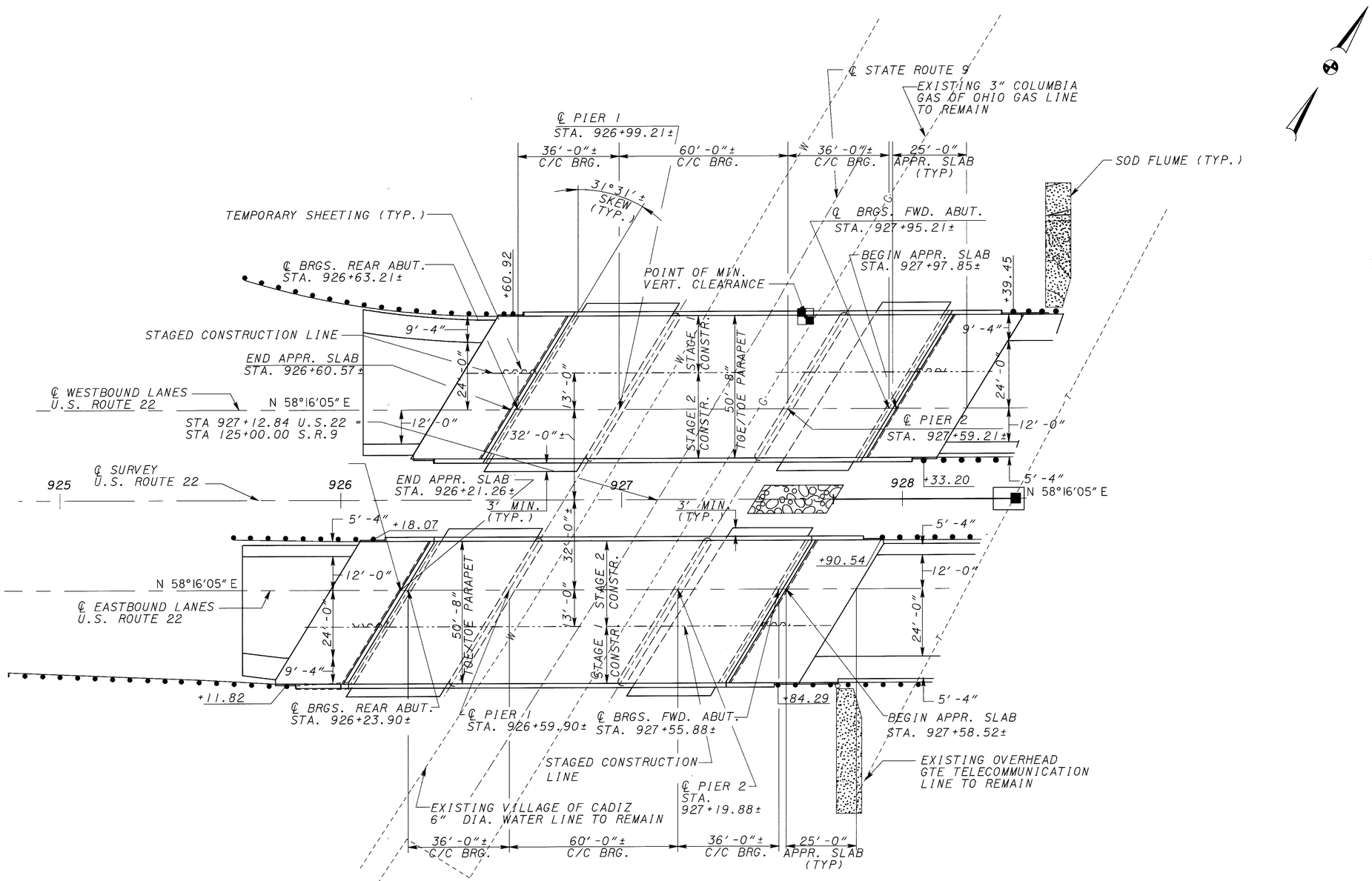
* ELEVATIONS SHOWN ARE BASED ON EXISTING PLANS

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
DEK	DEK	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
BJM		340/111/L 340/081/R	

PROFILES - LEFT & RIGHT BRIDGES
BRIDGE NO. HAS-22-1749 (L.& R.)
OVER S.R. 9

HAS-22-17.48



GENERAL PLAN

NOTES:

1. SEE SHEET 6/20 FOR STAGED CONSTRUCTION SEQUENCE AND GEOMETRY.

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED DEK | DRAWN DEK | CHECKED MTO | REVISED

REVIEWED JR | DATE 3/00 | STRUCTURE FILE NUMBER 340/111/L 340/081R

GENERAL PLAN
BRIDGE NO. HAS-22-1749 (L. & R.)
OVER S.R. 9

HAS-22-17.48

2A / 20

26A / 67

FILE: S:\projects\35765\BRIDGES\SR9\G9385P6.dgn
DATE: 10-Apr-00 15:56

STRUCTURE GENERAL NOTES

REFERENCE SHALL BE MADE TO THE FOLLOWING STANDARD DRAWINGS:

AS-1-81	REVISED	09-15-94
BR-1	REVISED	01-06-99
EXJ-4-87	REVISED	02-14-97
GSD-1-96	DATED	02-12-97
PCB-91	REVISED	07-06-99

AND TO THE FOLLOWING SUPPLEMENTAL SPECIFICATIONS:

815	DATED	05-30-96
816	DATED	04-21-97
842	DATED	01-06-99
844	DATED	01-06-99
846	DATED	09-09-97
863	DATED	09-09-97
899	DATED	10-21-98
905	DATED	04-01-98
907	DATED	10-21-98
910	DATED	07-28-98
954	DATED	09-09-97

DESIGN SPECIFICATIONS:

THIS STRUCTURE CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1996, INCLUDING THE 1997 THROUGH 1998 INTERIM SPECIFICATIONS, AND THE O.D.O.T BRIDGE DESIGN MANUAL.

DESIGN LOADING:

HS20-44, (CASE 2) AND THE ALTERNATE MILITARY LOADING
FUTURE WEARING SURFACE 60 P.S.F.

DESIGN STRESSES:

HIGH PERFORMANCE CONCRETE - COMPRESSIVE STRENGTH 4500 P.S.I. (SUPERSTRUCTURE)
HIGH PERFORMANCE CONCRETE - COMPRESSIVE STRENGTH 4000 P.S.I. (SUBSTRUCTURE)

REINFORCING STEEL - ASTM A615, A616 OR A617
GRADE 60 MINIMUM YIELD STRENGTH 60,000 P.S.I.

NEW STRUCTURAL STEEL - ASTM A572 - YIELD STRENGTH 50,000 P.S.I.
EXISTING STRUCTURAL STEEL - ASTM A373 - YIELD STRENGTH 33,000 P.S.I.

DECK PROTECTION METHODS:

EPOXY COATED REINFORCING STEEL
2-1/2" CONCRETE COVER
SEALING OF CONCRETE SURFACES

MONOLITHIC WEARING SURFACE:

MONOLITHIC WEARING SURFACE IS ASSUMED, FOR DESIGN PURPOSES, TO BE 1" THICK.

ITEM 202 - PORTIONS OF STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN:
DESCRIPTION:

THIS ITEM SHALL INCLUDE THE ELEMENTS INDICATED IN THE PLANS AND GENERAL NOTES THAT ARE NOT SEPARATELY LISTED FOR PAYMENT. ITEMS TO BE REMOVED INCLUDE ALL EXISTING MATERIALS BEING REPLACED BY NEW CONSTRUCTION AND MISCELLANEOUS ITEMS THAT ARE NOT SHOWN TO BE INCORPORATED INTO THE FINAL CONSTRUCTION AND ARE DIRECTED TO BE REMOVED BY THE ENGINEER. THE USE OF EXPLOSIVES, HEADACHE BALLS AND/OR HOE-RAMS WILL NOT BE PERMITTED. THE METHOD OF REMOVAL AND THE WEIGHT OF HAMMER SHALL BE APPROVED BY THE ENGINEER. ALL WORK SHALL BE DONE IN A MANNER THAT WILL NOT CUT, ELONGATE OR DAMAGE THE EXISTING REINFORCING STEEL TO BE PRESERVED. CHIPPING HAMMERS SHALL NOT BE HEAVIER THAN THE NOMINAL 90-POUND CLASS. PNEUMATIC HAMMERS SHALL NOT BE PLACED IN DIRECT CONTACT WITH REINFORCING STEEL THAT IS TO BE RETAINED IN THE REBUILT STRUCTURE.

CONCRETE DECK REMOVAL:

THIS WORK SHALL INCLUDE THE REMOVAL OF CONCRETE DECKS INCLUDING SIDEWALKS, PARAPETS, RAILINGS, DECK JOINTS AND OTHER APPURTENANCES FROM STEEL SUPPORTING SYSTEMS (BEAMS, GIRDERS, CROSS FRAMES, ETC.). CARE SHALL BE TAKEN DURING DECK REMOVALS TO PROTECT PORTIONS OF SUCH SYSTEMS THAT ARE TO BE SALVAGED AND INCORPORATED INTO THE PROPOSED STRUCTURE. IN THIS RESPECT, THE USE OF EXPLOSIVES, HEADACHE BALLS AND/OR HOE RAM TYPE OF EQUIPMENT IS PROHIBITED.

PROTECTION OF TRAFFIC:

PRIOR TO DEMOLITION OF ANY PORTIONS OF THE EXISTING SUPERSTRUCTURE, THE CONTRACTOR SHALL SUBMIT PLANS FOR THE PROTECTION OF TRAFFIC (VEHICULAR, PEDESTRIAN, RAILWAY, ETC.) ADJACENT TO AND/OR UNDER THE STRUCTURE TO THE DIRECTOR FOR APPROVAL. THESE PLANS SHALL INCLUDE PROVISIONS FOR ANY DEVICES AND STRUCTURES THAT MAY BE NECESSARY TO ENSURE SUCH PROTECTION. TEMPORARY VERTICAL CLEARANCES SPECIFIED ON THE PLANS OR IN THE PROPOSAL SHALL BE MAINTAINED AT ALL TIMES EXCEPT AS OTHERWISE APPROVED BY THE DIRECTOR.

PROTECTION OF STEEL SUPPORT SYSTEMS:

BEFORE DECK SLAB CUTTING IS PERMITTED, THE OUTLINE OF PRIMARY STEEL MEMBERS IN CONTACT WITH THE BOTTOM OF THE DECK SHALL BE DRAWN ON THE SURFACE OF DECK. SMALL DIAMETER PILOT HOLES SHALL BE DRILLED 2 INCHES OUTSIDE THESE LINES TO CONFIRM THE LOCATION OF FLANGE EDGES. DECK CUTS OVER OR WITHIN 2 INCHES OF FLANGE EDGES SHALL NOT EXTEND LOWER THAN THE BOTTOM LAYER OF DECK SLAB REINFORCING STEEL. CUTS MADE OUTSIDE 2" OF FLANGE EDGES MAY EXTEND THE FULL DEPTH OF THE DECK. DURING CUTTING OF THE DECK SLAB, CARE SHALL BE TAKEN NOT TO DAMAGE STEEL MEMBERS THAT ARE TO BE INCORPORATED INTO THE PROPOSED STRUCTURE.

REMOVAL METHODS:

CONCRETE MAY BE REMOVED BY CUTTING AND BY MEANS OF HAND OPERATED PNEUMATIC HAMMERS EMPLOYING POINTED OR BLUNTED CHISEL TYPE TOOLS. FOR REMOVALS ABOVE STEEL MEMBERS, A HAMMER HEAVIER THAN 35 POUNDS BUT NOT TO EXCEED 90-POUNDS MAY BE USED AT THE APPROVAL OF THE ENGINEER, TO ENSURE ADEQUATE DEPTH CONTROL AND TO PREVENT NICKING OR GOUGING THE PRIMARY STEEL MEMBERS.

DECK REMOVALS:

DUE TO THE POSSIBLE PRESENCE OF WELDED ATTACHMENTS TO EXISTING STRUCTURE STEEL (FINISHING MACHINE, SCUPPER AND FORM SUPPORTS, ETC.), CARE SHALL BE TAKEN DURING DECK REMOVAL TO AVOID DAMAGING STRINGERS WHICH ARE TO REMAIN. STRINGERS DAMAGED BY THE CONTRACTOR'S REMOVAL OPERATIONS SHALL, AT NO COST TO THE PROJECT, BE REPLACED OR REPAIRED. PROPOSED REPAIRS, DEVELOPED BY A REGISTERED PROFESSIONAL ENGINEER, SHALL BE SUBMITTED IN WRITING FOR REVIEW AND APPROVAL BY THE DIRECTOR.

EXTRANEOUS MEMBERS:

EXISTING EXTRANEOUS MEMBERS (I.E., FINISHING MACHINE AND FORM SUPPORTS, ETC., AND THE SUPPORT FOR SCUPPERS AND BULB ANGLES WHICH ARE TO BE REMOVED) ATTACHED BY WELDED CONNECTIONS TO PORTIONS OF THE TOP FLANGES DESIGNATED "TENSION" SHALL BE REMOVED AND THE FLANGE SURFACES GROUND SMOOTH. GRINDING SHALL BE CAREFULLY DONE AND PARALLEL TO THE FLANGES.

LOADING LIMITATIONS:

NO PART OF THE STRUCTURE SHALL BE SUBJECTED TO UNIT STRESSES THAT EXCEED 136.5% OF THE ALLOWABLE UNIT STRESSES GIVEN IN THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES DUE EITHER TO DEMOLITION, ERECTION OR CONSTRUCTION METHODS, OR TO THE USE OR MOVEMENT OF DEMOLITION OR ERECTION EQUIPMENT ON OR ACROSS THE STRUCTURE. STRUCTURAL ANALYSIS COMPUTATIONS, BY A REGISTERED PROFESSIONAL ENGINEER, SHOWING THE ALLOWABLE STRESSES AND THE MAXIMUM STRESSES PRODUCED BY THE CONTRACTOR'S METHODS OR EQUIPMENT SHALL BE SUBMITTED TO THE DIRECTOR FOR REVIEW AND APPROVAL AT LEAST TWO WEEKS PRIOR TO THE START OF THE WORK.

CUT LINE CONSTRUCTION JOINT PREPARATION:

SAW CUT BOUNDARIES OF PROPOSED CONCRETE REMOVALS 1" DEEP. REMOVE CONCRETE TO A ROUGH SURFACE. WHERE PRACTICABLE, THE EXISTING REINFORCING STEEL WHERE REQUIRED IN THE PLANS SHALL BE LEFT IN PLACE. INSTALL DOWEL BARS IF SPECIFIED. PRIOR TO CONCRETE PLACEMENT ABRASIVELY CLEAN JOINT SURFACE AND EXPOSED REINFORCEMENT TO REMOVE LOOSE AND DISINTEGRATED CONCRETE AND LOOSE RUST. THE JOINT SURFACE AND EXPOSED REINFORCEMENT SHALL BE THOROUGHLY CLEANED OF ALL DIRT, DUST, OR OTHER FOREIGN MATERIAL BY THE USE OF WATER, AIR UNDER PRESSURE, OR OTHER METHODS THAT PRODUCE SATISFACTORY RESULTS CONCRETE BONDING SURFACES SHALL BE WET WITHOUT FREE WATER AS CONCRETE IS PLACED.

SUBSTRUCTURE CONCRETE REMOVAL:

SHALL BE BY MEANS OF APPROVED PNEUMATIC HAMMERS EMPLOYING POINTED AND BLUNT CHISEL TOOLS. HYDRAULIC HOE-RAM TYPE HAMMERS WILL NOT BE PERMITTED. THE WEIGHT OF THE HAMMER SHALL NOT BE WORE THAN 35 POUNDS FOR REMOVAL WITHIN 18-INCHES OF PORTIONS TO BE PRESERVED. OUTSIDE THE 18-INCH LIMIT, A HAMMER HEAVIER THAN 35 POUNDS, BUT NOT TO EXCEED 90 POUNDS, MAY BE USED AT THE APPROVAL OF THE ENGINEER. PNEUMATIC HAMMERS SHALL NOT BE PLACED IN DIRECT CONTACT WITH REINFORCING STEEL THAT IS TO BE RETAINED IN THE REBUILT STRUCTURE.

PAYMENT:

THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE BID, WHICH PRICE AND PAYMENT SHALL BE FULL COMPENSATION FOR ALL LABOR EQUIPMENT, MATERIALS AND INCIDENTALS NECESSARY TO COMPLETE THE WORK IN CONFORMANCE WITH THESE REQUIREMENTS, WITH PERTINENT PROVISIONS OF 202, AND TO THE SATISFACTION OF THE ENGINEER.

UTILITY LINES:

ALL EXPENSE INVOLVED IN RELOCATION (INSTALLING) THE AFFECTED UTILITY LINES SHALL BE BORNE BY THE UTILITY(IES). THE CONTRACTOR AND THE UTILITY(IES) ARE TO COOPERATE BY ARRANGING THEIR WORK IN SUCH A MANNER THAT INCONVENIENCE TO EITHER WILL BE HELD TO A MINIMUM.

EXISTING STRUCTURE VERIFICATION:

DETAILS AND DIMENSIONS SHOWN ON THESE PLANS PERTAINING TO THE EXISTING STRUCTURE HAVE BEEN OBTAINED FROM PLANS OF THE EXISTING STRUCTURE AND FROM FIELD OBSERVATIONS AND MEASUREMENTS. CONSEQUENTLY, THEY ARE INDICATIVE OF THE EXISTING STRUCTURE AND THE PROPOSED WORK BUT THEY SHALL BE CONSIDERED TENTATIVE AND APPROXIMATE. THE CONTRACTOR IS REFERRED TO CMS SECTIONS 102.05, 105.02 AND 863.07.

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

REPLACEMENT OF EXISTING REINFORCING STEEL:

ANY EXISTING REINFORCING BARS WHICH ARE TO BE INCORPORATED INTO THE NEW WORK AND ARE MADE UNUSABLE BY CONCRETE REMOVAL OPERATIONS SHALL BE REPLACED WITH NEW STEEL AT THE CONTRACTOR'S COST. ANY EXISTING REINFORCING BARS DEEMED BY THE ENGINEER TO BE UNUSABLE BECAUSE OF CORROSION SHALL BE REPLACED WITH NEW STEEL.

A CONTINGENCY QUANTITY OF 500 POUNDS OF REINFORCING STEEL IS INCLUDED UNDER ITEM SPECIAL, STRUCTURE, MISC.: REPLACEMENT OF EXISTING REINFORCING STEEL, TO BE USED AS DIRECTED BY THE ENGINEER.

THE NUMBER OF POUNDS OF REINFORCING STEEL PAID FOR AT THE CONTRACT UNIT PRICE SHALL BE THE ACTUAL POUNDS OF REINFORCING STEEL SPECIFIED BY THE ENGINEER AS UNUSABLE DUE TO CORROSION, AND SHALL INCLUDE PLACEMENT, DOWELING, BENDING, SUPPORTING, TIE WIRES AND TYING OF THAT SPECIFIED REINFORCING STEEL.

ITEM 516 - REFURBISH AND RESET BEARING, AS PER PLAN:

THIS ITEM SHALL INCLUDE ALL WORK NECESSARY TO PROPERLY ALIGN BRIDGE BEARINGS AS WELL AS THEIR CLEANING AND PAINTING. INCLUDED SHALL BE THE DISASSEMBLY OF THE BEARINGS, HAND TOOL CLEANING (GRINDING IF NECESSARY), PAINTING AS REQUIRED BY SYSTEM OZEU, REPLACEMENT OF ANY DAMAGED SHEET LEAD WITH NEW PREFORMED BEARING PADS (711.21), INSTALLATION OF ANY NECESSARY STEEL SHIMS OF THE SAME SIZE AS THE BEARINGS TO PROVIDE A SNUG FIT, REALIGNMENT OF THE UPPER BEARING PLATE BY REMOVING EXISTING WELDS AND REWELDING SO THAT THE BEARINGS ARE VERTICALLY ALIGNED AT 60 DEGREES F, LUBRICATING SLIDING SURFACES, AND REASSEMBLY OF THE BEARINGS. THE CONTRACTOR SHALL ASSURE THAT ALL BEARINGS ARE SHIMMED ADEQUATELY AND THAT NO BEAMS AND/OR BEARING DEVICES ARE "FLOATING". IN ADDITION, ALL LOOSE OR DETERIORATED ANCHORS SHALL BE TIGHTENED OR RESET AS NECESSARY AND AS DIRECTED BY THE ENGINEER. RESET ANCHORS SHALL BE 1 1/4 INCH DIAMETER THREADED RODS AND SHALL BE SET PER ITEM 510, DOWEL HOLES WITH NONSHRINK, NONMETALLIC GROUT (705.20). AT THE OPTION OF THE CONTRACTOR AND AT NO ADDITIONAL COST TO THE STATE, NEW BEARINGS OF THE SAME TYPE AS THE EXISTING MAY BE INSTALLED IN PLACE OF REFURBISHING THE BEARINGS. ALL WORK SHALL BE TO THE SATISFACTION OF THE ENGINEER. PAYMENT FOR ALL THE ABOVE DESCRIBED LABOR AND MATERIALS WILL BE MADE AT THE CONTRACT PRICE BID FOR ITEM 516 - REFURBISH AND RESET BEARING, AS PER PLAN.

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DATE: 03-MAR-00 08:51

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
8115 PINE RIDGE DRIVE, COLUMBUS, OHIO 43081
DESIGNED MTO | DRAWN DEK | REVIEWED JR | DATE 3/00
CHECKED CLP | REVISED | STRUCTURE FILE NUMBER 3401[1]1 3401[8]1R

STRUCTURE GENERAL NOTES (L.& R.)
BRIDGE NO. HAS-22-1749 (L.& R.) OVER S.R. 9

HAS-22-17.48

STRUCTURE GENERAL NOTES

ITEM 516, JACKING AND TEMPORARY SUPPORT OF SUPERSTRUCTURE, AS PER PLAN:

THIS ITEM SHALL CONSIST OF FURNISHING ALL NECESSARY LABOR, MATERIALS, AND EQUIPMENT TO RAISE OR REPOSITION ANY EXISTING STRUCTURES TO THE DIMENSIONS AND REQUIREMENTS DEFINED IN THE PROJECT PLANS.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, INSTALLATION AND OPERATION OF AN ADEQUATE JACKING SYSTEM, INCLUDING ANY TEMPORARY OR PERMANENT SUPPORTS NECESSARY TO PERFORM THE WORK DESCRIBED IN THE PROJECT PLANS. THREE (3) SETS OF JACKING PLANS, WHICH INCLUDE THE INFORMATION DESCRIBED IN THIS NOTE, SHALL BE SUBMITTED TO THE DIRECTOR FOR APPROVAL AT LEAST THIRTY (30) DAYS BEFORE ACTUAL WORK IS TO BEGIN. THE PLANS SHALL BE PREPARED AND STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF OHIO.

JACKING SUBMITTALS SHALL INCLUDE AT LEAST THE FOLLOWING:

1. THE SIGNATURE AND NUMBER, OR PROFESSIONAL SEAL, OF THE REGISTERED PROFESSIONAL ENGINEER WHO PREPARED THE SUBMITTAL.
2. CALCULATIONS AND ANALYSIS OF THE STRUCTURE TO DETERMINE AND DEFINE THE ACTUAL LOADING APPLIED AT THE CONTRACTOR'S SELECTED JACKING POINTS.
3. A DRAWING SHOWING THE PHYSICAL AND DIMENSIONAL POSITION OF THE JACKS WITH RESPECT TO THE STRUCTURE, INCLUDING CLEARANCES AND CENTER OF LIFT.
4. A SCHEMATIC LAYOUT OF JACKS, CHECK VALVES, PUMPS WITH 3 WAY RETRACTOR VALVE, PRESSURE GAGES, FLOW CONTROL VALVES, ETC. IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. ALL JACKS FOR EACH ABUTMENT OR PIER SHALL BE CONNECTED TOGETHER. ALL JACKS AT EACH ABUTMENT OR PIER SHALL BE THE SAME SIZE.
5. ANALYSIS AND CALCULATIONS OF THE STRESSES INDUCED OR CREATED IN BOTH PRIMARY AND SECONDARY MEMBERS OF THE STRUCTURE, AND IN ANY TEMPORARY OR PERMANENT SUPPORTS. ALSO, DESIGN CALCULATIONS FOR ANY TEMPORARY OR PERMANENT SUPPORTS REQUIRED FOR THE SUPERSTRUCTURE.
6. PHYSICAL DIMENSIONS, MATERIALS, AND FABRICATION DETAILS OF ANY TEMPORARY OR PERMANENT SUPPORTS. HORIZONTAL AND VERTICAL MOVEMENT RESTRAINT SHALL BE PROVIDED.
7. A STEP BY STEP PROCEDURE DETAILING ALL STEPS IN THE JACKING OPERATION.
8. METHOD OF ATTACHMENT TO STRUCTURAL MEMBERS. WELDING TO TENSION AREAS WILL NOT BE PERMITTED.

THE ENTIRE SYSTEM INCLUDING JACKS SHALL HAVE 20% MORE CAPACITY THAN REQUIRED BASED ON CALCULATED LOADS.

FOR LIFTS GREATER THAN 1", JACKS SHALL HAVE LOCKING NUTS TO POSITIVELY LOCK AND SUPPORT THE STRUCTURE DURING THE LIFT.

JACKS SHALL HAVE A SWIVEL LOAD CAP, A DOWED PISTON HEAD, OR SOME OTHER DEVICE TO PROTECT AGAINST THE EFFECTS OF SIDE LOAD ON THE JACK.

JACKS ALONE SHALL NOT BE USED TO SUPPORT LOADS EXCEPT DURING THE ACTUAL JACKING OPERATION. TEMPORARY SUPPORTS, BLOCKING OR OTHER METHODS APPROVED BY THE DIRECTOR SHALL BE USED.

SINGLE ACTING RAMS WITH NO OVER-TRAVEL PROTECTION SYSTEM SHALL NOT BE USED.

SPARE EQUIPMENT SHALL BE AVAILABLE ON SITE FOR THE REQUIRED STRUCTURE RAISING TO PROCEED IN THE EVENT OF BREAKDOWN. A LIST OF SPARE EQUIPMENT SHALL BE PROVIDED TO THE ENGINEER.

AT A MINIMUM, A JACKING OPERATION SHALL LIFT ALL BEAMS AT ANY ONE ABUTMENT OR PIER SIMULTANEOUSLY. THE ONLY EXCEPTION IS THE SITUATION WHERE THE WORK INVOLVES REPLACING OR REHABILITATING INDIVIDUAL BEARINGS THAT REQUIRE NO PERMANENT SHIMMING AND WITH A HEIGHT OF LIFT NOT EXCEEDING 1/4 INCH.

MAXIMUM DIFFERENTIAL JACKING HEIGHT BETWEEN ANY ADJACENT ABUTMENTS OR PIERS SHALL BE 1".

DURING THE JACKING OPERATIONS, IF CRACKING OF THE CONCRETE SUPERSTRUCTURE, SEPARATION OF THE CONCRETE DECK FROM THE STEEL STRINGERS, OR OTHER DAMAGE TO THE STRUCTURE IS VISUALLY OBSERVED, THE JACKING OPERATION SHALL IMMEDIATELY CEASE AND APPROVED SUPPORTS SHALL BE INSTALLED. THE CONTRACTOR SHALL THEN ANAYLZE THE DAMAGE AND SUBMIT A METHOD OF CORRECTION TO THE ENGINEER FOR APPROVAL. ANY BEAMS THAT SEPARATE FROM THE DECK SHALL BE EPOXY INJECTED FOR THE DISTANCE OF THE SEPARATION IN ACCORDANCE WITH THE PROPOSAL NOTE "CONCRETE REPAIR BY EPOXY INJECTION". COST OF THIS EPOXY INJECTION OR OTHER REQUIRED REPAIRS SHALL BE BORNE BY THE CONTRACTOR.

THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER THAT THE BRIDGE BEARINGS ARE FULLY SEATED BETWEEN ALL CONTACT AREAS. IF FULL SEATING IS NOT ATTAINED, SUITABLE MEANS OF REPAIR, SUBJECT TO THE APPROVAL OF THE ENGINEER, WILL BE REQUIRED AT THE CONTRACTOR'S EXPENSE.

THE JACKING OPERATION SHALL BE DIRECTED BY A PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF OHIO, AND EMPLOYED BY THE CONTRACTOR. FAILURE TO HAVE A PROFESSIONAL ENGINEER PRESENT SHALL BE CAUSE FOR CEASING JACKING OPERATIONS.

PAYMENT SHALL BE MADE AT THE LUMP SUM PRICE BID FOR ITEM 516 - JACKING AND TEMPORARY SUPPORT OF SUPERSTRUCTURE, AS PER PLAN, AND SHALL INCLUDE ALL NECESSARY TOOLS, LABOR, EQUIPMENT AND MATERIALS NECESSARY TO COMPLETE THIS ITEM OF WORK AS SPECIFIED ABOVE.

ALL COSTS FOR THE REMOVAL AND REPLACEMENT OF THE EXISTING CROSSFRAMES BETWEEN BEAMS 4 AND 5, INCLUDING ALL NECESSARY LABOR, EQUIPMENT, TOOLS, AND MATERIALS, SHALL BE INCLUDED FOR PAYMENT WITH ITEMS 202 AND 863 AS APPLICABLE.

PAINTING OF STRUCTURAL STEEL:

NEW STEEL SHALL BE CLEANED AND PRIME PAINTED IN THE SHOP AND FIELD PAINTED WITH AN INTERMEDIATE AND FINISH COAT OF PAINT USING SYSTEM IZEU. FOR PAY PURPOSES, CLEANING AND PRIME PAINTING, NEW STEEL IS INCLUDED WITH ITEM 863 , INTERMEDIATE AND FINISH PAINTING OF NEW STEEL WITH ITEM 816.

ITEM 503 - COFFERDAMS, CRIBS, AND SHEETING, AS PER PLAN:

TEMPORARY SHORING SHALL BE USED TO ACCOMPLISH THE PROPOSED CONSTRUCTION IN STAGES. THE DESIGN OF THE TEMPORARY SHORING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, BE DESIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF OHIO, AND CONFORM WITH 501.05. FOR APPROVAL, FIVE (5) COPIES OF THE DRAWINGS SHALL BE SUBMITTED TO THE DIRECTOR AND CONCURRENTLY, ONE COPY TO THE OFFICE OF STRUCTURAL ENGINEERING. CONSTRUCTION OF THE SHORING SHALL NOT BEGIN UNTIL AFTER WRITTEN APPROVAL HAS BEEN RECEIVED FROM THE DIRECTOR. PORTIONS OF THE TEMPORARY SHORING COMPOSED OF STEEL OR CONCRETE MAY BE LEFT IN PLACE AT THE DISCRETION OF THE ENGINEER. PORTIONS COMPOSED OF OTHER MATERIALS SHALL BE REMOVED PRIOR TO COMPLETION OF THE WORK.

ITEM 503 - UNCLASSIFIED EXCAVATION, INCLUDING ROCK AND SHALE, AS PER PLAN:

UNCLASSIFIED EXCAVATION SHALL BE IN ACCORDANCE WITH ITEM 503 EXCEPT THAT THE BACKFILL MATERIAL BEHIND THE ABUTMENTS SHALL BE 203 MATERIAL PLACED IN 6 INCH LIFTS.

INSPECTION OF EXISTING STRUCTURAL STEEL:

THE ENGINEER WILL VISUALLY INSPECT ALL EXISTING BUTT-WELDED SPLICES AND/OR TOP FLANGE COVER PLATE FILLET WELDS TO ENSURE THE WELDS, PLATES AND BEAMS OR GIRDERS ARE FREE OF DEFECTS AND CRACKS. IF THE DECK SLAB HAUNCH FORMS IMMEDIATELY ADJACENT TO SUCH WELDS INTERFERE WITH THE ENGINEER'S INSPECTION THEY SHALL BE REMOVED OR NOT BE ERECTED UNTIL AFTER THE INSPECTION. THE INSPECTION SHALL NOT TAKE PLACE UNTIL AFTER THE TOP FLANGES ARE CLEANED AS SPECIFIED IN SS 842.08, BUT IT SHALL BE DONE BEFORE THE DECK SLAB REINFORCEMENT IS INSTALLED. THE COST ASSOCIATED WITH THIS INSPECTION SHALL BE INCLUDED WITH ITEM SS 894, SUPERSTRUCTURE CONCRETE FOR PAYMENT. ANY CRACKS FOUND SHOULD BE REPORTED TO THE OFFICE OF STRUCTURAL ENGINEERING, BRIDGE CONSTRUCTION SPECIALIST, ALONG WITH SPECIFIC INFORMATION ON LOCATION OF THE CRACKS, LENGTH, AND DEPTH SO AN EVALUATION AND REPAIR OR REPLACEMENT RECOMMENDATION CAN BE MADE.

ITEM 519 - PATCHING CONCRETE STRUCTURE, AS PER PLAN:

ALL SURFACES TO BE PATCHED AND THE EXPOSED REINFORCING STEEL WITHIN SHALL BE THOROUGHLY CLEANED BY ABRASIVE BLASTING PRIOR TO THE CLEANING SPECIFIED BY 519.04. CLEANING SHALL PRECEDE APPLICATION OF THE PATCHING MATERIAL OR ERECTION OF THE FORMS BY NOT MORE THAN 24 HOURS.

ITEM 863 STRUCTURAL STEEL MEMBERS MISCELLANEOUS LEVEL FABRICATION, AS PER PLAN:

ALL SECTIONS OF SS 863 APPLY EXCEPT AS REVISED HEREIN. THE ENGINEER IS RESPONSIBLE FOR ENSURING ANY FABRICATED STEEL SUPPLIED UNDER THIS BID ITEM IS ACCEPTABLE. THE REQUIREMENTS FOR SUBMITTAL OF SHOP DRAWINGS TO THE OFFICE OF STRUCTURAL ENGINEERING IS WAIVED. THE CONTRACTOR SHALL SUPPLY THE ENGINEER WITH SHOP DRAWINGS, STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF OHIO, AND DATED AS PER 863.08, PRIOR TO ANY INCORPORATION OF FABRICATED STEEL AT THE PROJECT. THE ENGINEER SHALL ASSURE THE SUBMITTED DRAWINGS MATCH THE FABRICATED STEEL DELIVERED BEFORE THE STEEL IS INCORPORATED INTO THE WORK. ONCE THE ENGINEER IS SATISFIED WITH THE DRAWINGS, THE CONTRACTOR SHALL SUPPLY A COPY SET, STAMPED AND DATED AS PER 863.08, TO THE OFFICE OF STRUCTURAL ENGINEERING FOR RECORD PURPOSES. SS 863'S REQUIRED TEST DATA SUBMITTAL TO THE OFFICE OF STRUCTURAL ENGINEERING IS WAIVED, BUT THE CONTRACTOR'S WRITTEN ACCEPTANCE OF THE MATERIAL TEST REPORTS SHALL BE FURNISHED TO BOTH THE ENGINEER AND THE OFFICE OF STRUCTURAL ENGINEERING PRIOR TO INSTALLATION OF ANY STEEL.

AT OR BEFORE THE PRE-FABRICATION MEETING, THE ENGINEER MAY CHOOSE TO REQUEST ASSISTANCE FROM THE OFFICE OF STRUCTURAL ENGINEERING IN WHATEVER CAPACITY IS REQUIRED.

STEEL MEMBERS INCLUDED IN THIS ITEM INCLUDE INTERMEDIATE AND END CROSSFRAMES.

TEMPORARY SHORING

BECAUSE THE ABUTMENTS ARE RELATIVELY CLOSE TO THE EXISTING ROCK, TRADITIONAL TEMPORARY SHORING TECHNIQUES ARE NOT POSSIBLE. THE CONTRACTOR SHALL PROVIDE DETAILS FOR PROPERLY DESIGNED SHORING. THE DESIGN OF THE SHORING SHALL BE DONE BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF OHIO AND CONFORM TO 501.05. FOR APPROVAL, FIVE (5) COPIES OF THE DRAWINGS SHALL BE SUBMITTED TO THE DIRECTOR AND ONE (1) COPY TO THE OFFICE OF STRUCTURAL ENGINEERING. CONSTRUCTION OF THE SHORING SHALL NOT BEGIN UNTIL AFTER WRITTEN APPROVAL HAS BEEN RECEIVED FROM THE DIRECTOR.

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter
8115 PINE CREEK DRIVE, COLUMBUS, OHIO 43081
BLACKBURN VIEW OFFICE PARK

DESIGNED	DRAWN	REVIEWED	DATE
MTO	DEK	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
CLP		3401111	
		3401081R	

STRUCTURE GENERAL NOTES (L. & R.)
BRIDGE NO. HAS-22-1749 (L. & R.)
OVER S.R. 9

HAS-22-17.48

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DATE: 10-Apr-2000 15:39

COMPUTED BY : DEK DATE : 11/99
CHECKED BY : MTO DATE : 3/00

ESTIMATED STRUCTURE QUANTITIES

ITEM	ITEM EXTENSION	TOTAL LEFT BRIDGE	TOTAL RIGHT BRIDGE	UNIT	DESCRIPTION	LEFT BRIDGE ABUTS.	LEFT BRIDGE PIERS	LEFT BRIDGE SUPER.	LEFT BRIDGE GENERAL	RIGHT BRIDGE ABUTS.	RIGHT BRIDGE PIERS	RIGHT BRIDGE SUPER.	RIGHT BRIDGE GENERAL	AS PER PLAN SHEET NO.
202	11203	LUMP	LUMP		PORTIONS OF STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN				LUMP				LUMP	3
503	11101	LUMP	LUMP		COFFERDAMS, CRIBS, AND SHEETING, AS PER PLAN				LUMP				LUMP	4
503	21331	LUMP	LUMP		UNCLASSIFIED EXCAVATION, INCLUDING ROCK AND SHALE, AS PER PLAN				LUMP				LUMP	4
512	33000	2	2	SQ. YD.	TYPE 2 WATERPROOFING	2				2				
SPECIAL	51267502	801	801	SQ. YD.	SEALING OF CONCRETE SURFACES (EPOXY) *	210	278	313		210	278	313		
516	11210	126	126	LIN. FT.	STRUCTURAL EXPANSION JOINT INCLUDING ELASTOMERIC STRIP SEAL			126				126		
516	44101	7	7	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE), AS PER PLAN (6 1/2" X 10" X 2" BEARING WITH 9 1/2" X 11" X 1 1/2" LOAD PLATE AND 9 1/2" X 19" X 1" MASONRY PLATE)	7				7				16
516	44101	7	7	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE), AS PER PLAN (6 1/2" X 10" X 2" BEARING WITH 7 1/2" X 11" X 1 1/2" LOAD PLATE)	7				7				16
516	46801	14	14	EACH	REFURBISH AND RESET BEARING, AS PER PLAN		14				14			3
516	47001	LUMP	LUMP		JACKING AND TEMPORARY SUPPORT OF SUPERSTRUCTURE, AS PER PLAN				LUMP				LUMP	4
518	21200	50	50	CU. YD.	POROUS BACKFILL WITH FILTER FABRIC	50				50				
519	11101	82	102	SQ. FT.	PATCHING CONCRETE STRUCTURE, AS PER PLAN	81	1			100	2			4
SPECIAL	51912600	40	13	LIN. FT.	CONCRETE REPAIR BY EPOXY INJECTION *	40				13				
SPECIAL	53000300	500	500	POUND	STRUCTURE MISC.: REPLACEMENT OF EXISTING REINFORCING STEEL				500				500	3
601	20000	430	462	SQ. YD.	CRUSHED AGGREGATE SLOPE PROTECTION	430				462				
816	00610	4947	4947	POUND	FIELD PAINTING OF NEW STEEL, INTERMEDIATE AND FINISH COAT, SYSTEM IZEU			4947				4947		
844	48020	40	40	CU. YD.	HIGH PERFORMANCE CONCRETE, SUPERSTRUCTURE (PARAPET)	9		31		9		31		
844	48040	57	57	CU. YD.	HIGH PERFORMANCE CONCRETE, SUBSTRUCTURE	57				57				
844	49000	LUMP	LUMP		HIGH PERFORMANCE CONCRETE TRIAL MIX			LUMP				LUMP		
844	49010	LUMP	LUMP		HIGH PERFORMANCE CONCRETE TESTING			LUMP				LUMP		
863	10201	4947	4947	POUND	STRUCTURAL STEEL MEMBERS, MISCELLANEOUS LEVEL FABRICATION, AS PER PLAN			4947				4947		4
863	20000	2289	2289	EACH	WELDED STUD SHEAR CONNECTORS			2289				2289		
885	10000	LUMP	LUMP		SURFACE PREPARATION OF EXISTING STEEL WITH WARRANTY			9860 SQ.FT.XX				9860 SQ.FT.XX		4
885	11000	LUMP	LUMP		FIELD PAINTING OF EXISTING STEEL, PRIME COAT, WITH WARRANTY			9860 SQ.FT.XX				9860 SQ.FT.XX		
885	12000	LUMP	LUMP		FIELD PAINTING OF EXISTING STEEL, INTERMEDIATE COAT, WITH WARRANTY			9860 SQ.FT.XX				9860 SQ.FT.XX		
885	13000	LUMP	LUMP		FIELD PAINTING OF EXISTING STEEL, FINISH COAT, WITH WARRANTY			9860 SQ.FT.XX				9860 SQ.FT.XX		
894	10000	198	198	CU. YD.	HIGH PERFORMANCE CONCRETE, FOR BRIDGE DECK WITH WARRANTY			198				198		

* SEE PROPOSAL NOTE

XX FOR INFORMATION ONLY

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter, 5615 PINE CREEK DRIVE, COLUMBUS, OHIO 43081
DATE: 3/00
REVIEWED: JR
STRUCTURE FILE NUMBER: 3401114, 3401081R
DRAWN: DEK
REVISED: .
DESIGNED: DEK
CHECKED: MTO

ESTIMATED STRUCTURE QUANTITIES
BRIDGE NO. HAS-22-1749 (L. & R.)
OVER S.R. 9

HAS-22-17.48

5 / 20

29 / 67

FILE: S:\projects\35765\BRIDGE\SR9\I5936ssl.dgn
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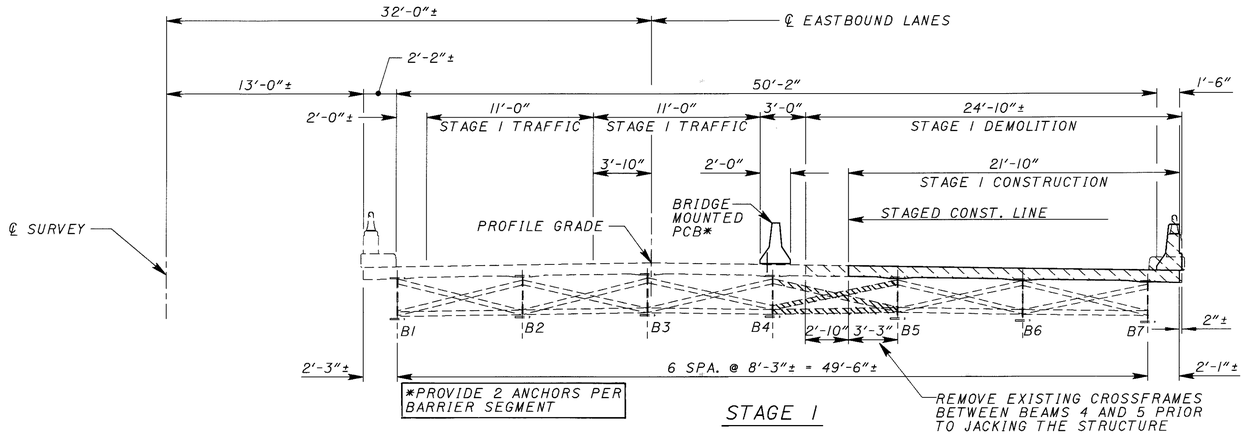
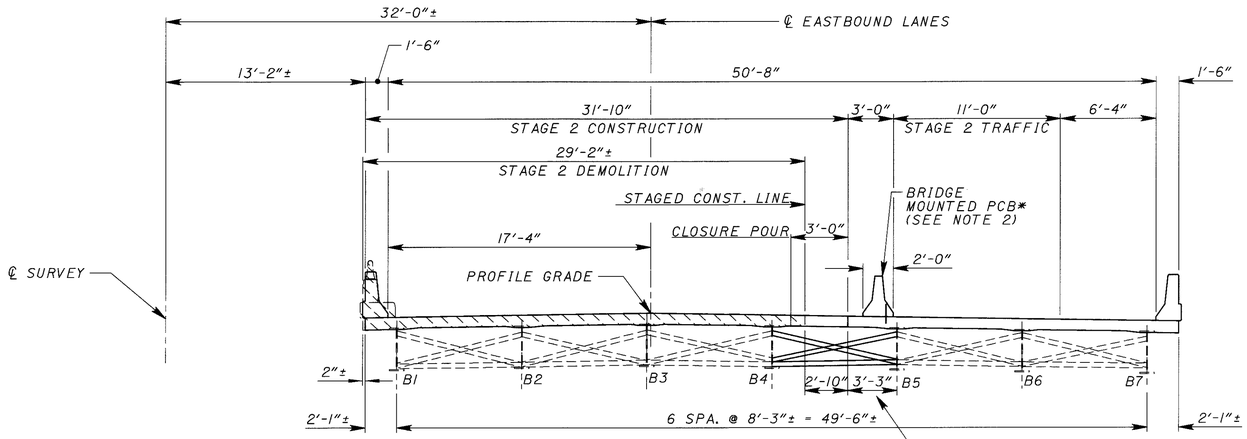
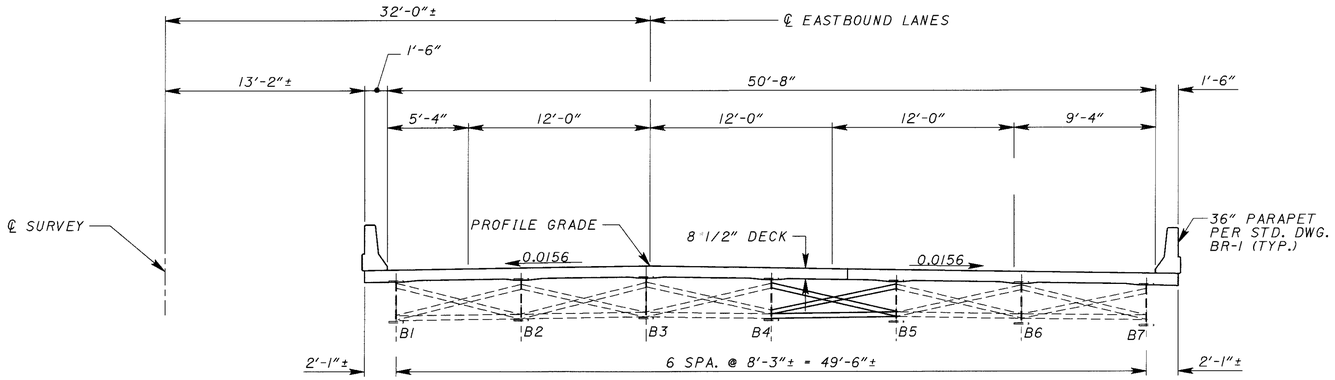


STAGE I



STAGE 2



PROPOSED TRANSVERSE SECTION

SUGGESTED OVERALL BRIDGE CONSTRUCTION SEQUENCE

1. CONSTRUCTION AREAS AND SEQUENCE WILL BE AS INDICATED BY THE STAGE NUMBER.
2. IMPLEMENT STAGE I TRAFFIC CONTROL. INSTALL PORTABLE CONCRETE BARRIER WITH TWO (2) ANCHORS PER BARRIER SEGMENT. PORTABLE CONCRETE BARRIER TO BE INSTALLED IN ACCORDANCE WITH STANDARD BRIDGE DRAWING PCB-91. INSTALL TEMPORARY SHEETING.
3. REMOVE EXISTING STRUCTURE WITHIN STAGE I REMOVAL LIMITS AS INDICATED. SAW-CUT EXISTING DECK FULL DEPTH ALONG STAGE I DEMOLITION LINE. JACK AND TEMPORARILY SUPPORT BEAMS 5, 6, AND 7, AND REFURBISH/RESET/REPLACE THE EXISTING BEARINGS.
4. CONSTRUCT NEW PORTIONS OF THE STRUCTURE AS INDICATED IN THE PLANS, WITHIN THE STAGE I CONSTRUCTION LIMITS.
5. IMPLEMENT STAGE 2 TRAFFIC CONTROL. INSTALL PORTABLE CONCRETE BARRIER WITH TWO (2) ANCHORS PER BARRIER SEGMENT. PORTABLE CONCRETE BARRIER TO BE INSTALLED IN ACCORDANCE WITH STANDARD BRIDGE DRAWING PCB-91 AND DESIGN DATA DRAWING PCB-DD.
6. REMOVE EXISTING STRUCTURE WITHIN STAGE 2 REMOVAL LIMITS AS INDICATED. JACK AND TEMPORARILY SUPPORT BEAMS 1, 2, 3, AND 4, AND REFURBISH/RESET/REPLACE THE EXISTING BEARINGS.
7. CONSTRUCT THE REMAINING PORTIONS OF THE NEW STRUCTURE AS INDICATED IN THE PLANS, WITHIN THE STAGE 2 CONSTRUCTION LIMITS. ATTACH NEW CROSSFRAMES BETWEEN BEAMS 4 AND 5 PRIOR TO COMPLETING THE CLOSURE POUR.
8. REMOVE STAGE 2 TRAFFIC CONTROL.

NOTES:

1. TRANSVERSE SECTIONS SHOWN ARE FOR THE EASTBOUND STRUCTURE. WESTBOUND STRUCTURE IS SYMMETRICAL ABOUT SURVEY CENTERLINE. ALL SECTIONS ARE SHOWN LOOKING EAST.
2. ANCHORS FOR PORTABLE CONCRETE BARRIER USED FOR STAGE 2 SHALL BE PARTIAL -DEPTH, RESIN-BONDED PER STD. DWG. PCB-91. WHEN THE PCB IS NO LONGER REQUIRED. THE ANCHORS SHALL BE REMOVED FROM THE CONCRETE DECK AND THE DOWEL HOLES FILLED WITH EPOXY, NON-SHRINK GROUT PER THE STD. DWG. ALL COSTS FOR REMOVING THE ANCHORS AND FILLING THE DOWEL HOLES, INCLUDING LABOR, MATERIALS, EQUIPMENT, AND INCIDENTALS, SHALL BE INCLUDED FOR PAYMENT WITH ITEM 622 PORTABLE CONCRETE BARRIER, 32", BRIDGE MOUNTED. QUANTITY CARRIED IN THE ROADWAY GENERAL SUMMARY, SHEET (10/67).

LEGEND

-PORTION OF STRUCTURE TO BE REMOVED

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
ELDORON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
BJM	BJM	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO	.	3401/A 3401B/A	

STAGE CONSTRUCTION DETAILS
BRIDGE NO. HAS-22-1749 (L.& R.)
OVER S.R. 9

HAS-22-17.48

6 / 20

30 / 67

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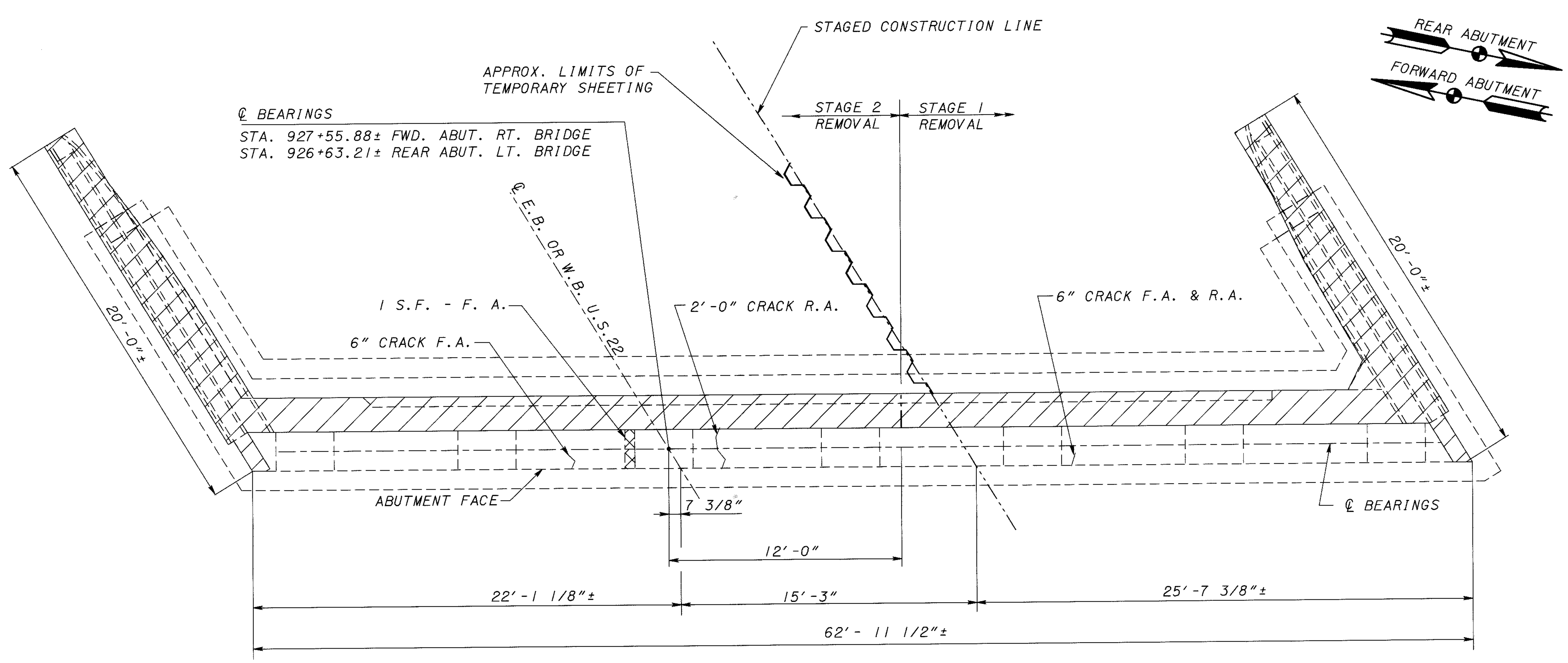


REAR ABUTMENT PLAN - LEFT BRIDGE

FORWARD ABUTMENT PLAN - RIGHT BRIDGE

(REAR ABUT., LT. BRIDGE SHOWN; FWD. ABUT., RT. BRIDGE, SIMILAR)

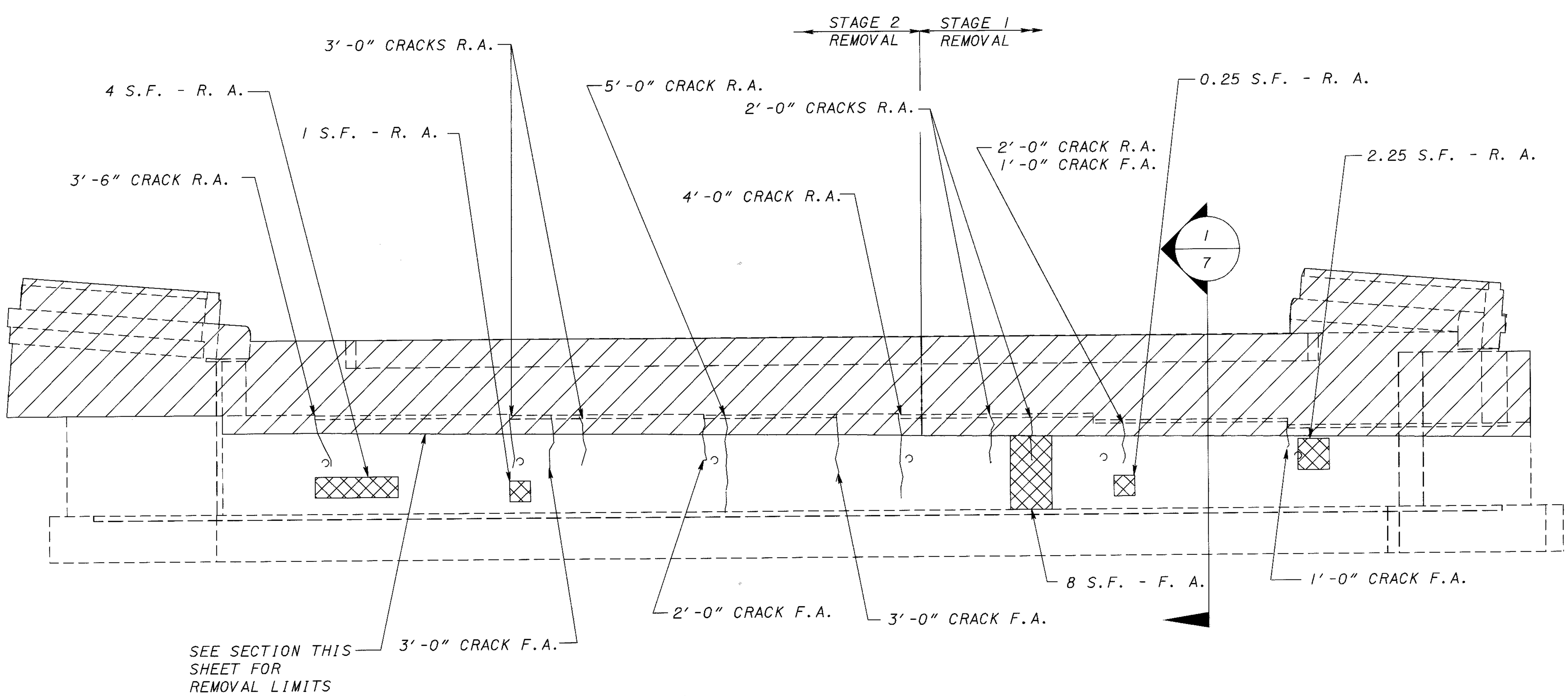
LEGEND:

- PORTIONS OF STRUCTURE TO BE REMOVED
- PORTIONS OF STRUCTURE TO BE PATCHED

R.A. - REAR ABUTMENT
F.A. - FORWARD ABUTMENT
S.F. - SQUARE FEET

NOTES:

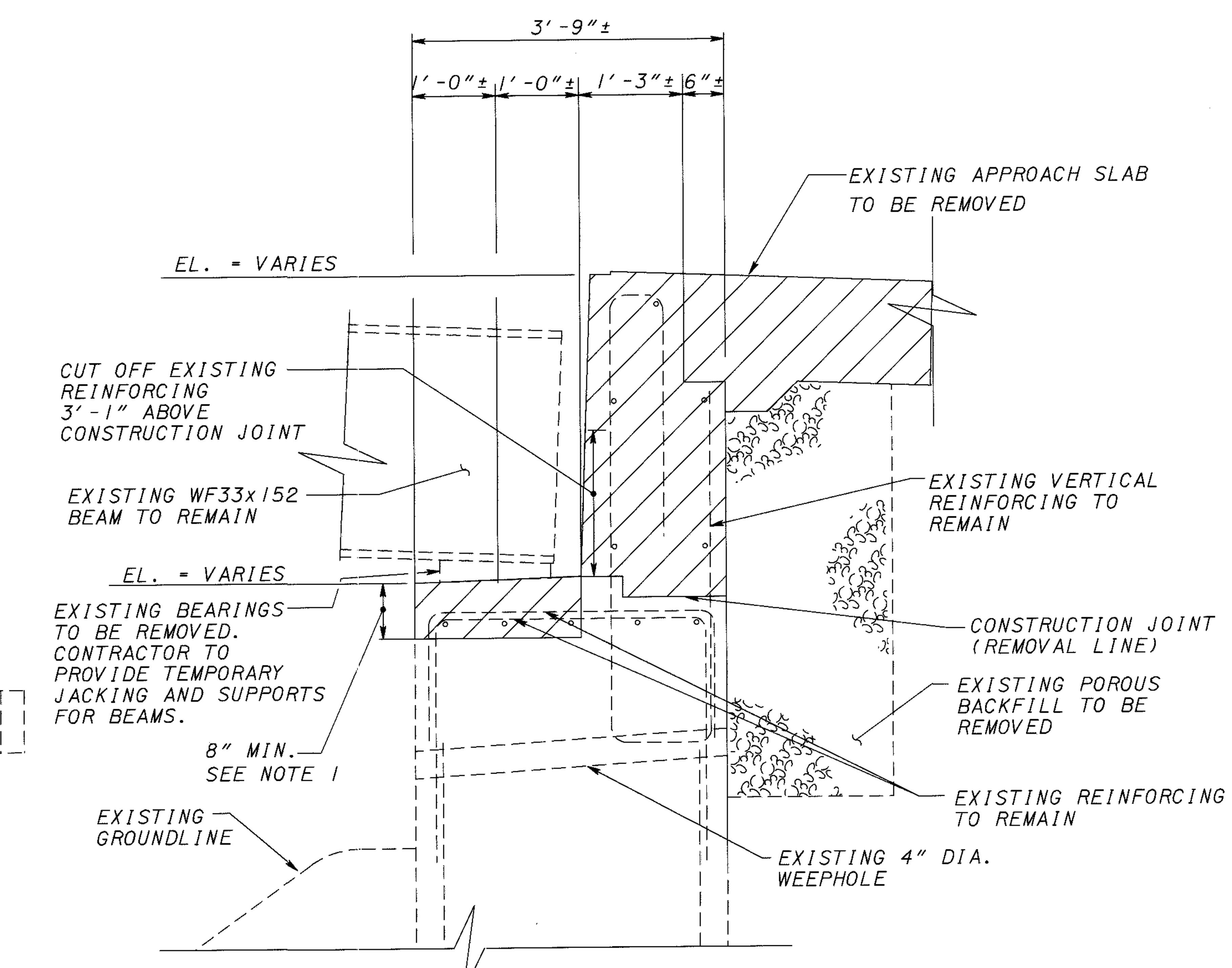
1. CONCRETE SHALL BE REMOVED A MINIMUM DEPTH OF 3" BELOW EXISTING TOP ROW OF MAIN HORIZONTAL REINFORCING BARS. EXISTING MAIN HORIZONTAL REINFORCING BARS WITHIN REMOVAL LIMITS ARE TO BE REPLACED. SEE SHEET 13/20 FOR NEW REINFORCING DETAILS.
2. FOR PATCHING QUANTITIES, SEE SHEET 8/20 .



REAR ABUTMENT ELEVATION - LEFT BRIDGE

FORWARD ABUTMENT ELEVATION - RIGHT BRIDGE

(REAR ABUT., LT. BRIDGE SHOWN; FWD. ABUT., RT. BRIDGE, SIMILAR)



SECTION 1/7 1/8

(FORWARD ABUTMENT, RIGHT BRIDGE SHOWN)

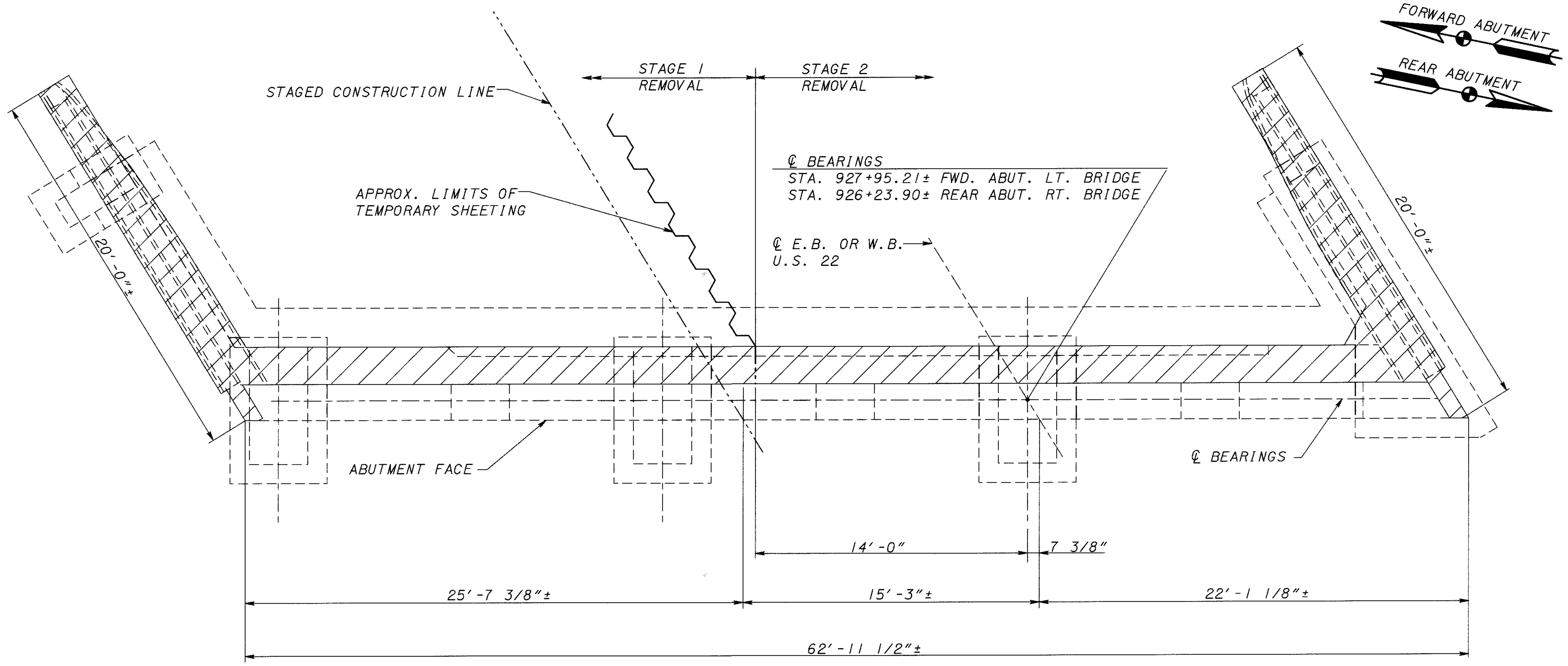
DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED PLC	CHECKED MTO
DRAWN BJM	REVISED
REVIEWED JR	STRUCTURE FILE NUMBER 3401111L 3401081R
DATE 3/00	

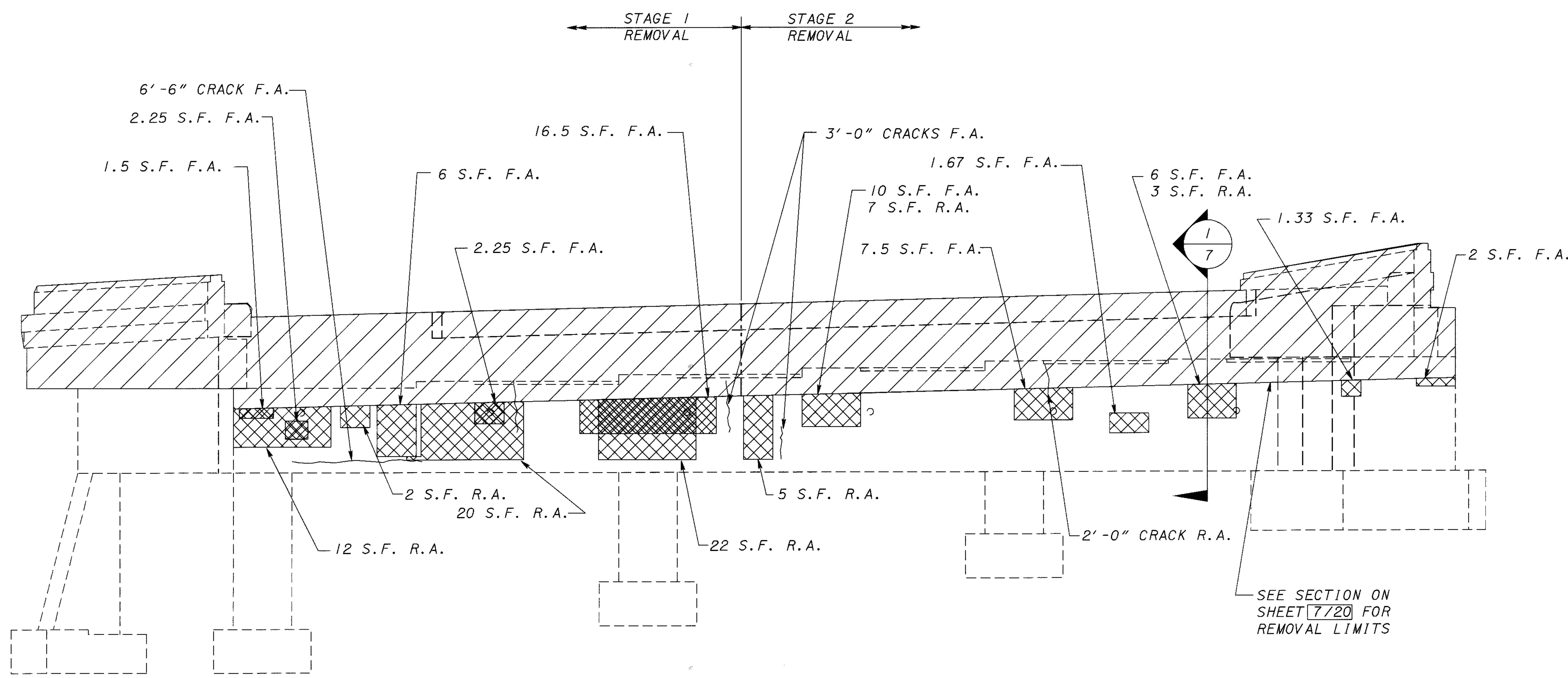
ABUTMENT DEMOLITION PLANS

BRIDGE NO. HAS-22-1749 (L.& R.) OVER S.R. 9

HAS-22-17.48



FORWARD ABUTMENT PLAN - LEFT BRIDGE
REAR ABUTMENT PLAN - RIGHT BRIDGE
(FWD. ABUT. LT. BRIDGE SHOWN; REAR ABUT. RT. BRIDGE SIMILAR)



FORWARD ABUTMENT ELEVATION - LEFT BRIDGE
REAR ABUTMENT ELEVATION - RIGHT BRIDGE
(FWD. ABUT. LT. BRIDGE SHOWN; REAR ABUT. RT. BRIDGE SIMILAR WITH SPREAD FOOTING)

LEGEND:

- PORTIONS OF STRUCTURE TO BE REMOVED.
- PORTIONS OF STRUCTURE TO BE PATCHED.

R.A. - REAR ABUTMENT
F.A. - FORWARD ABUTMENT
S.F. - SQUARE FEET

CONCRETE PATCHING - SUMMARY TABLE (SQ. FT.)	MEASURED QUANTITY	CONTINGENCY FACTOR	TOTAL QUANTITY
LEFT BRIDGE	64.5	1.25	81.0
RIGHT BRIDGE	80.0	1.25	100.0

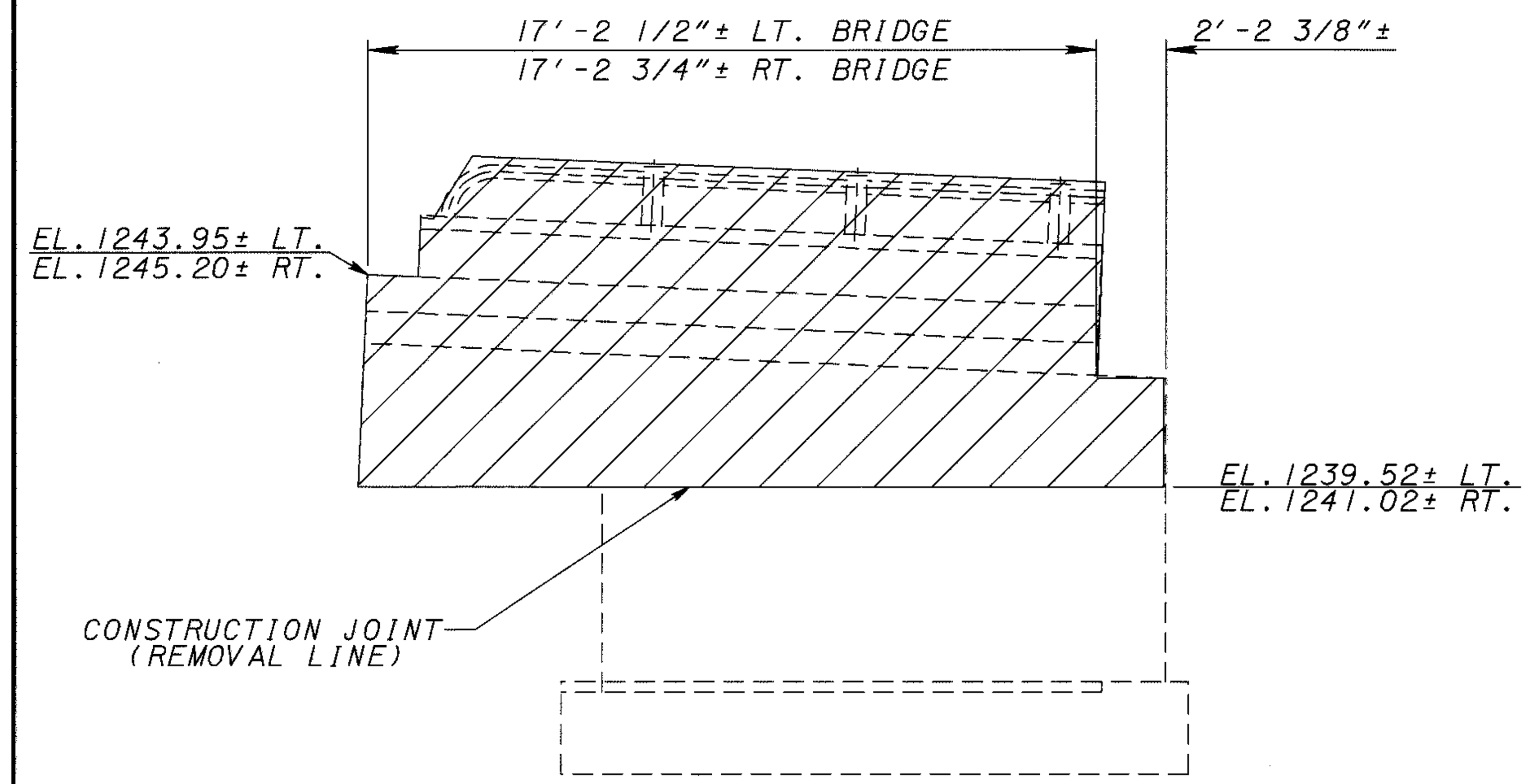
DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
PLC	BJM	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO	.	3401111L 3401081R	

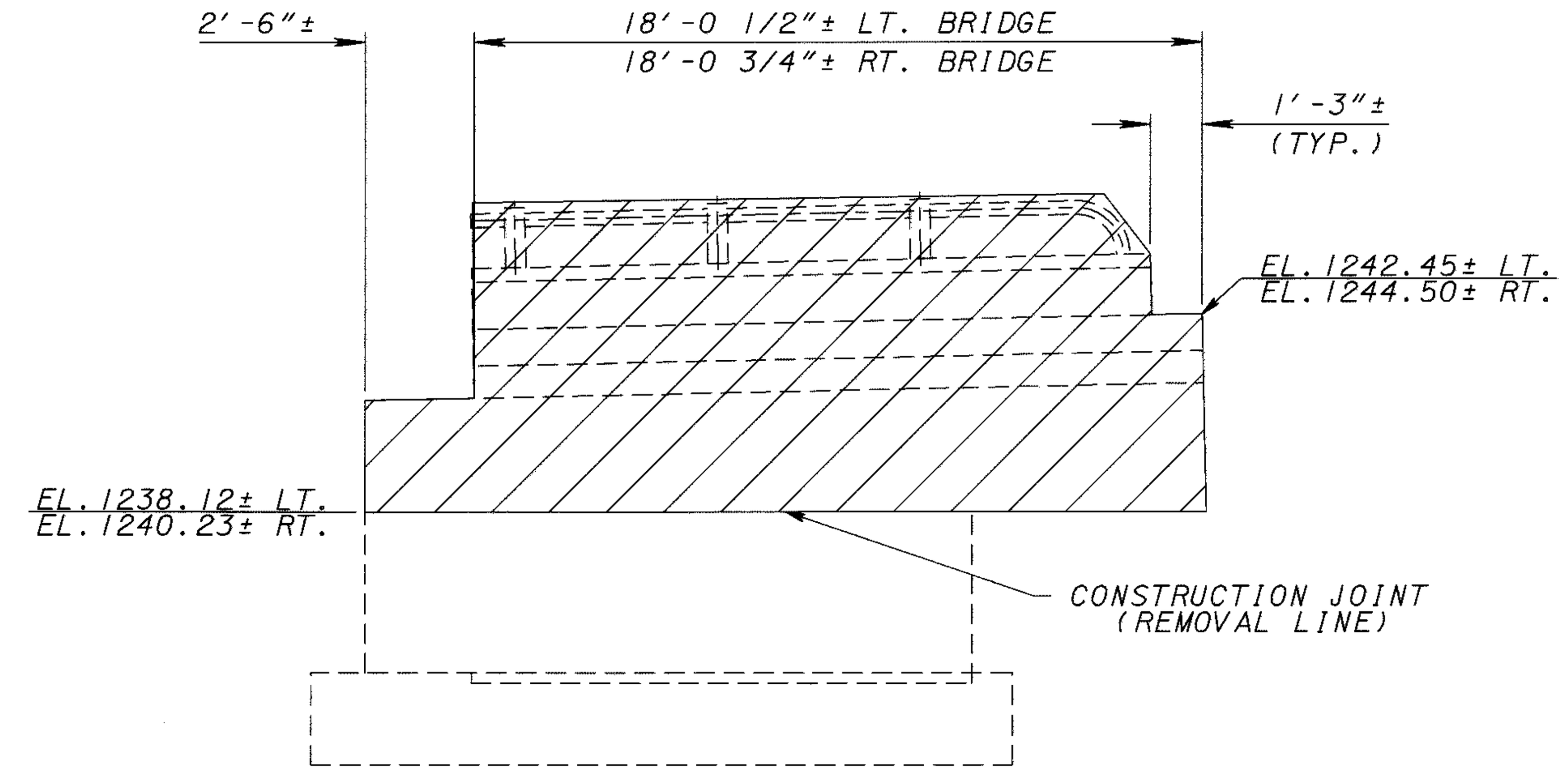
ABUTMENT DEMOLITION PLANS
BRIDGE NO. HAS-22-1749 (L.& R.)
OVER S.R. 9

HAS-22-17.48

S:\PROJECTS\35765\BRIDGE\S69 153GDM2.DGN
DATE:10-Apr-00 Rel2



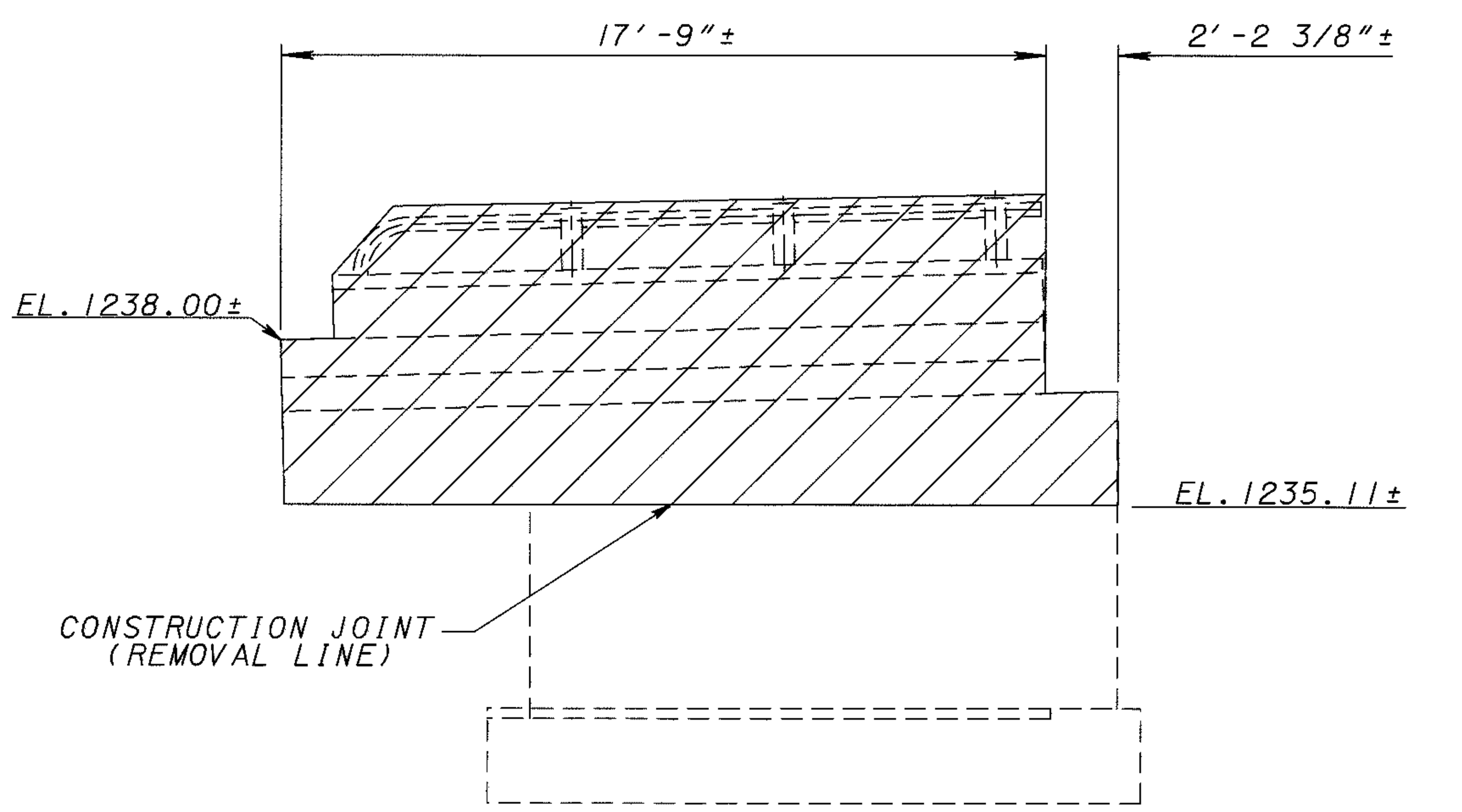
SOUTH WINGWALL ON REAR ABUTMENT - LEFT & RIGHT BRIDGE



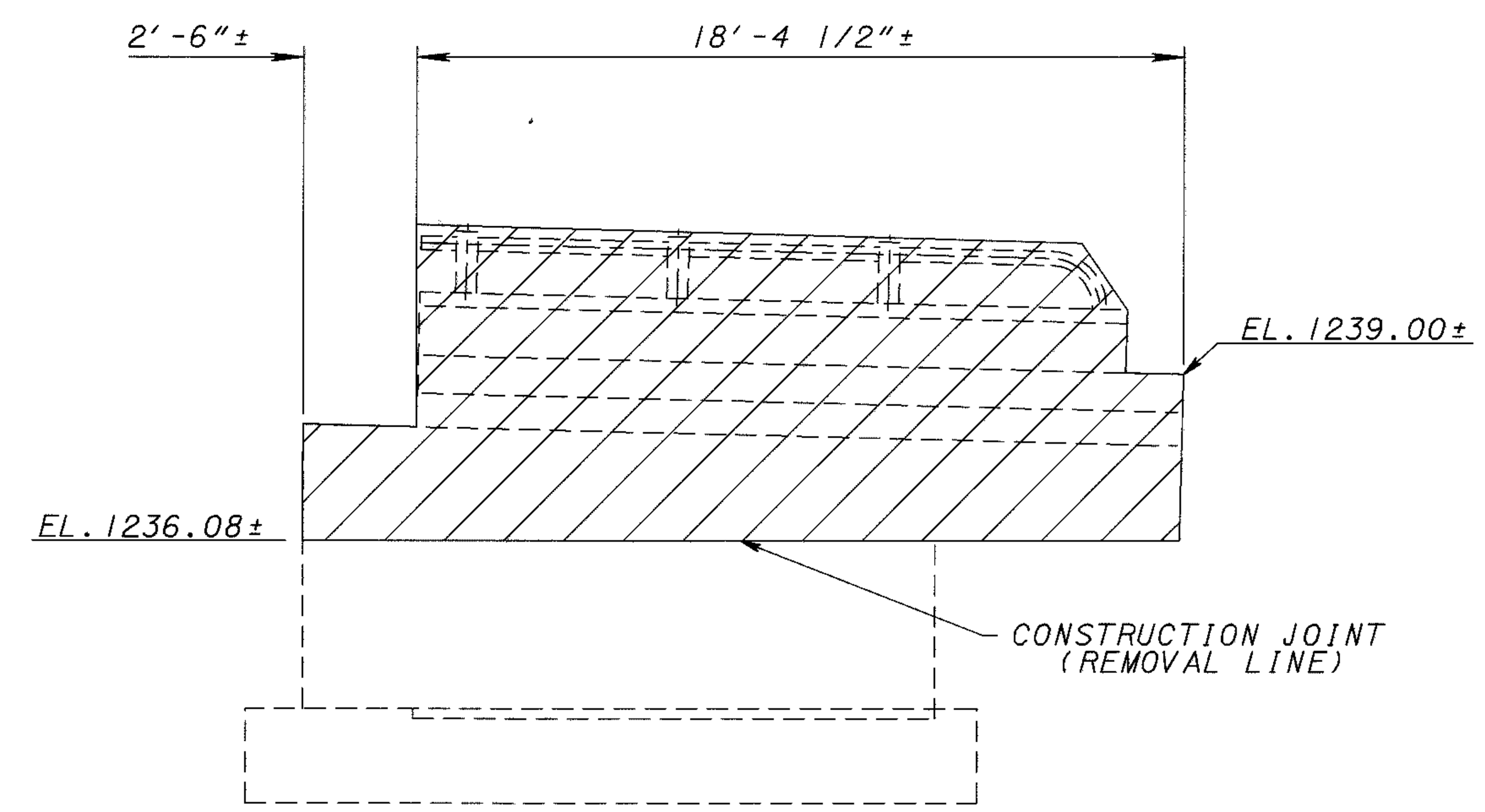
NORTH WINGWALL ON REAR ABUTMENT - LEFT & RIGHT BRIDGE

LEGEND:

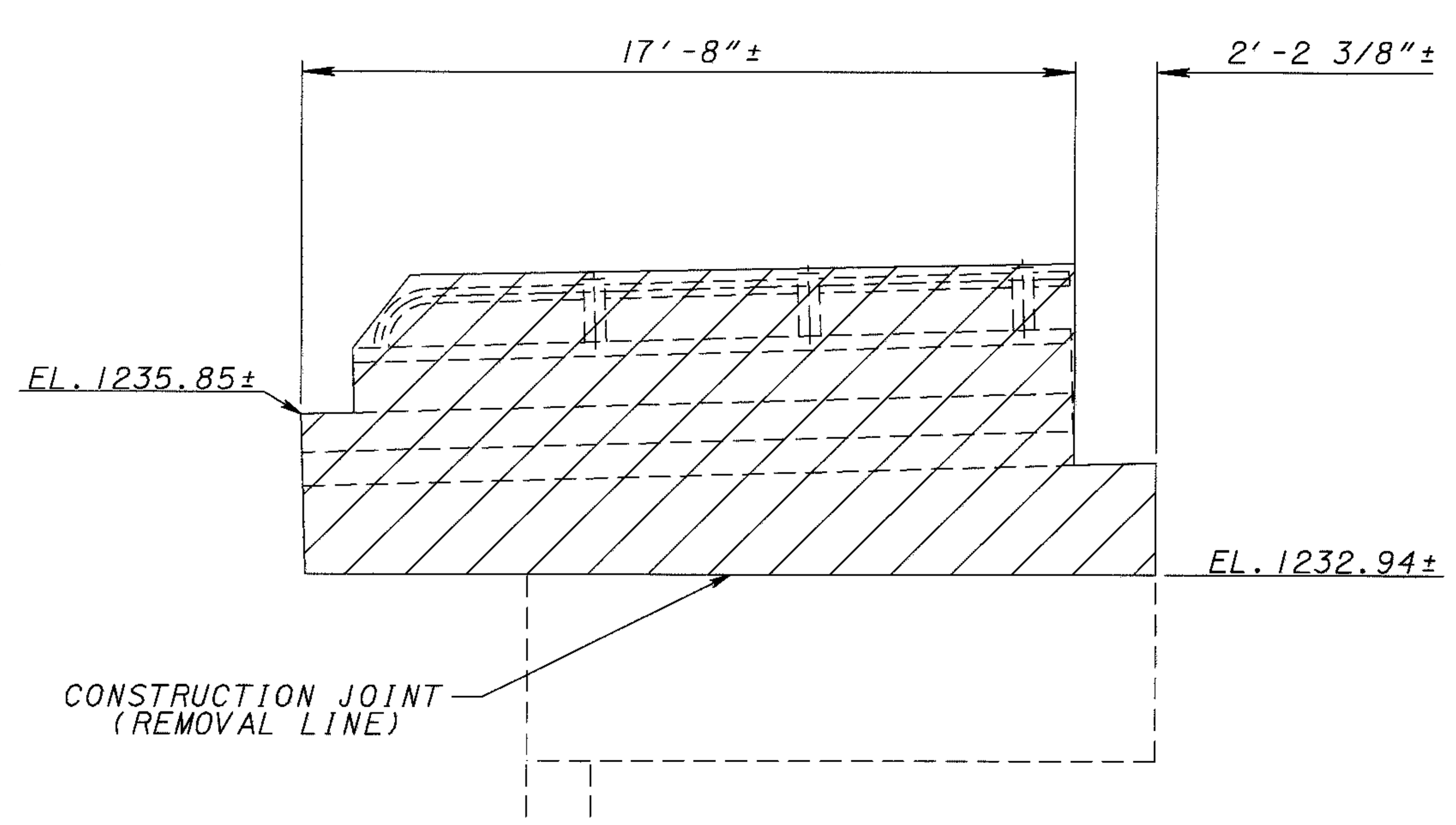
- PORTIONS OF STRUCTURE TO BE REMOVED



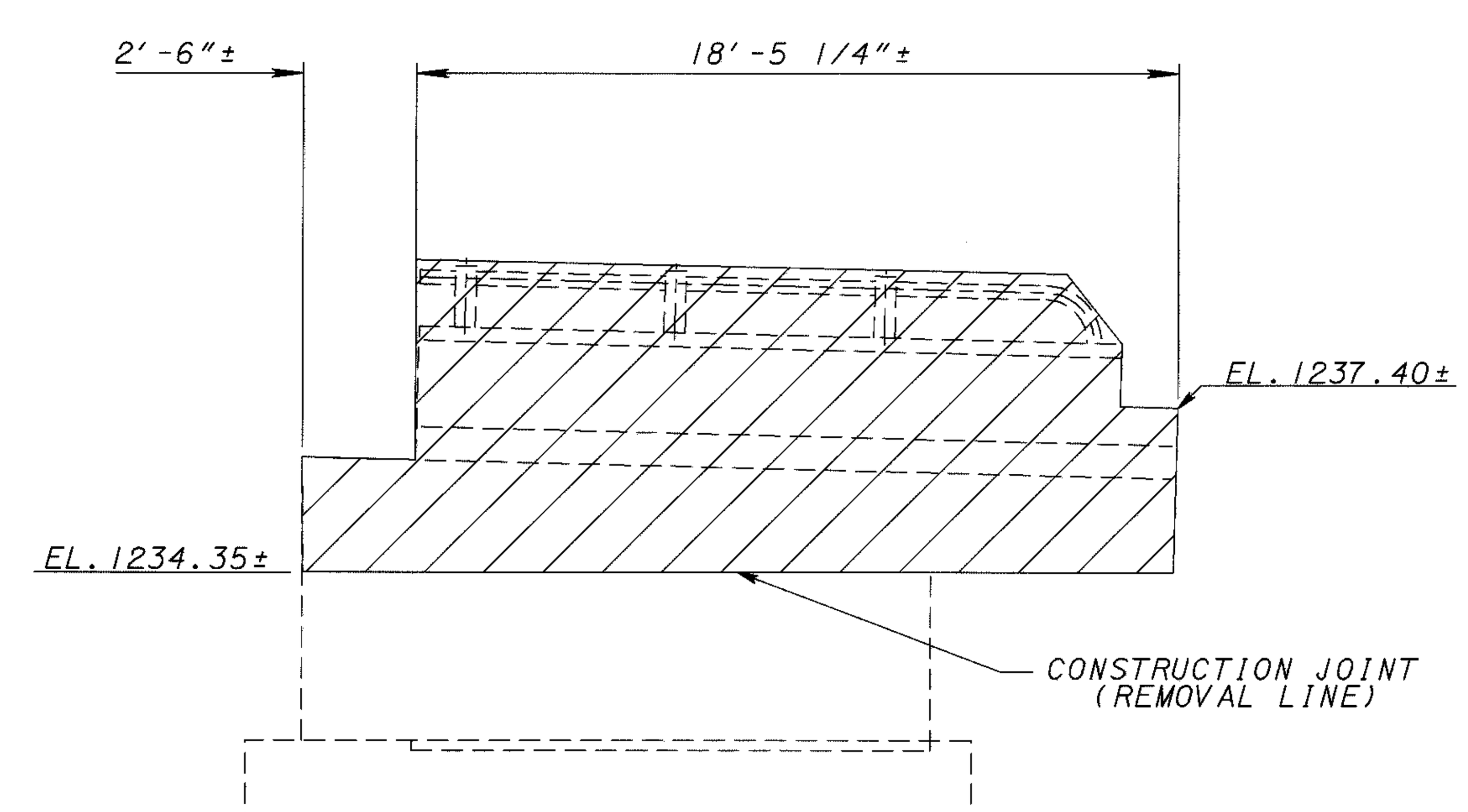
NORTH WINGWALL ON FORWARD ABUTMENT - RIGHT BRIDGE



SOUTH WINGWALL ON FORWARD ABUTMENT - RIGHT BRIDGE



NORTH WINGWALL ON FORWARD ABUTMENT - LEFT BRIDGE



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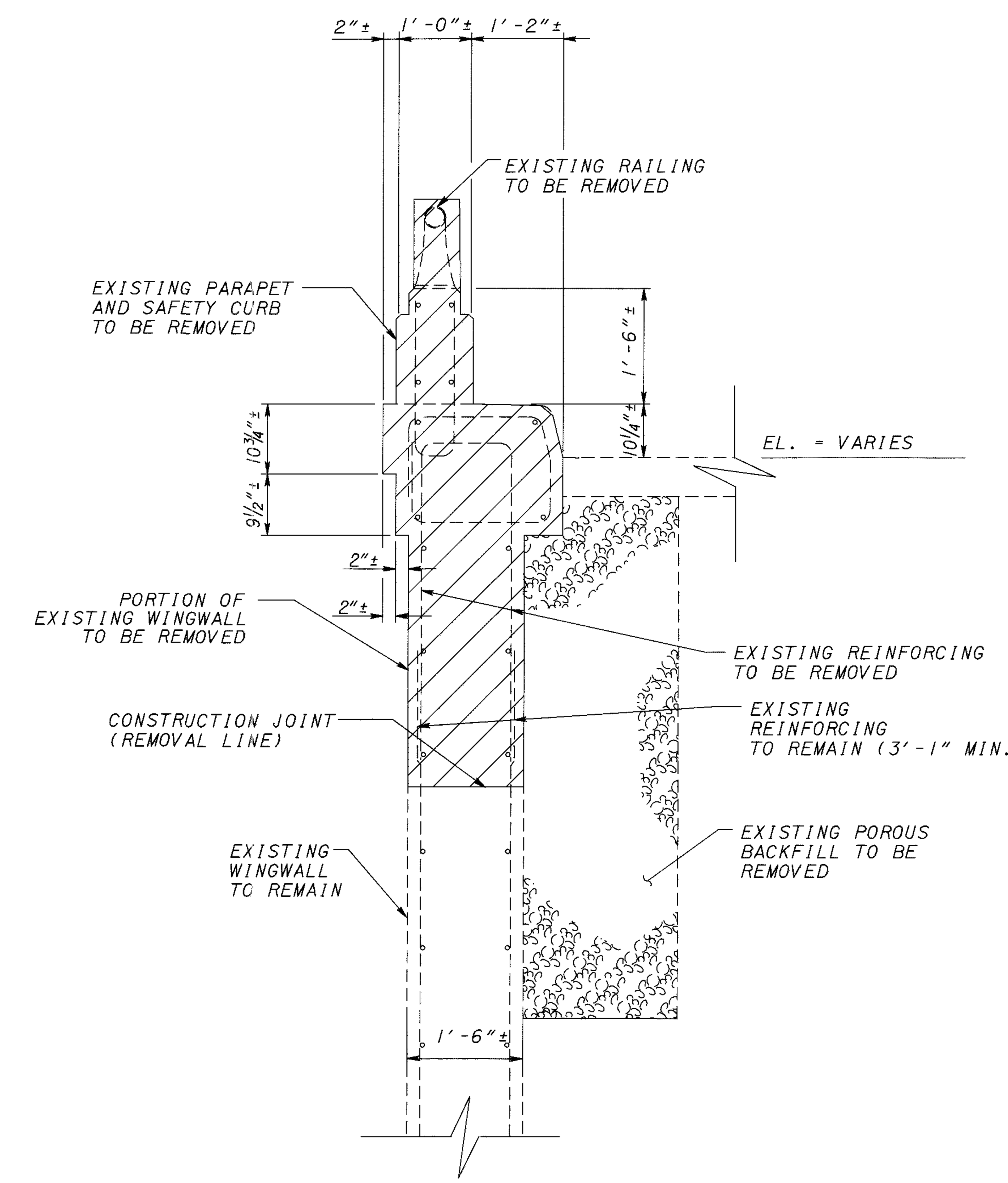


EXISTING WINGWALL SECTION

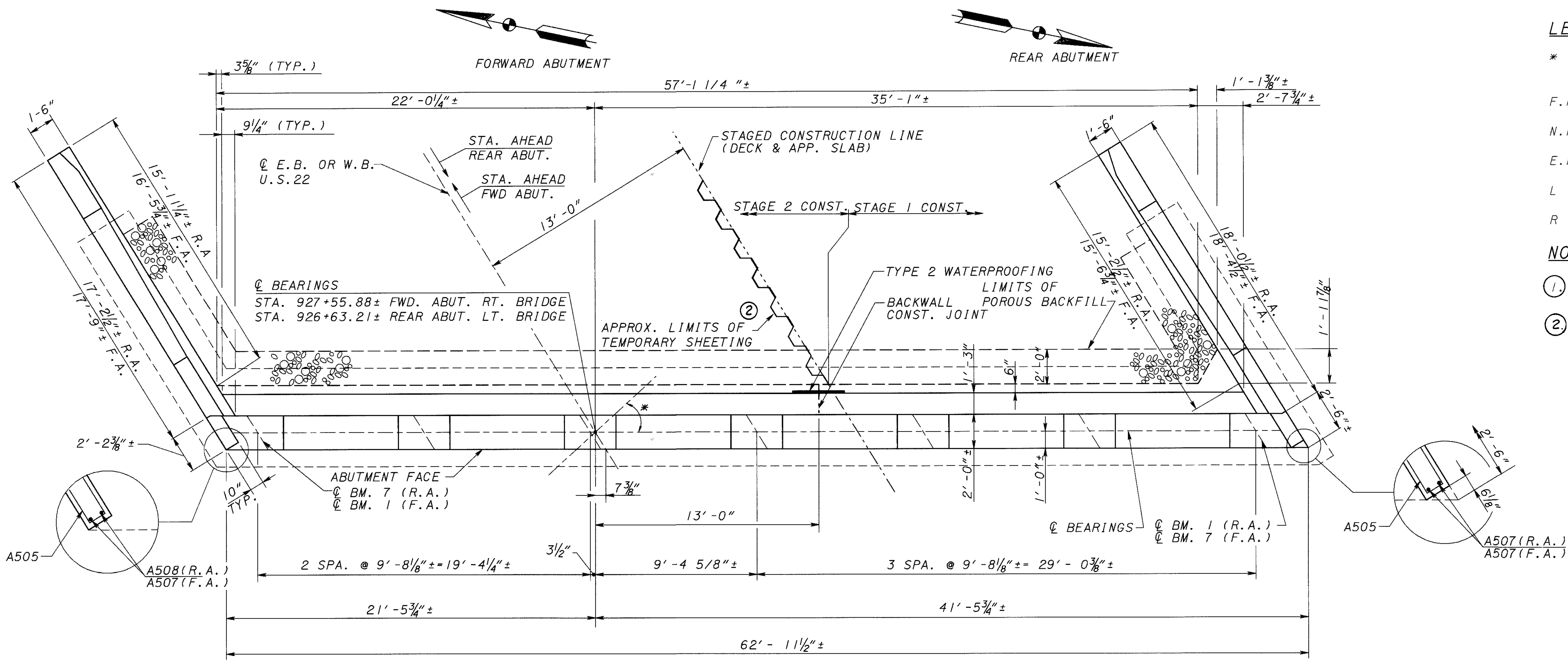
(NORTH WINGWALL - FORWARD ABUTMENT, RIGHT BRIDGE SHOWN)

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
GLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
PLC	BJM	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO	-	3401111L 3401081R	

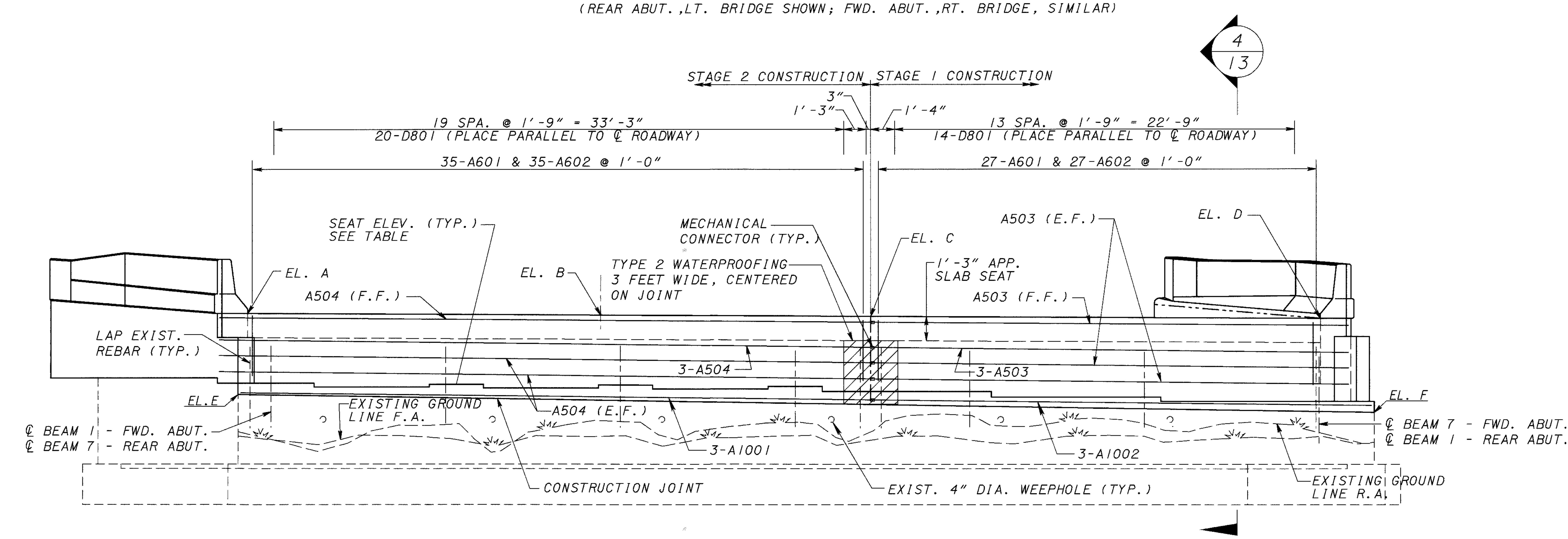
WINGWALL DEMOLITIONS PLANS
BRIDGE NO. HAS-22-1749 (L. & R.)
OVER S.R. 9

HAS-22-17.48



REAR ABUTMENT PLAN - LEFT BRIDGE
FORWARD ABUTMENT PLAN - RIGHT BRIDGE

(REAR ABUT.,LT. BRIDGE SHOWN; FWD. ABUT.,RT. BRIDGE, SIMILAR)



REAR ABUTMENT ELEVATION - LEFT BRIDGE
FORWARD ABUTMENT ELEVATION - RIGHT BRIDGE

(REAR ABUT.,LT. BRIDGE SHOWN; FWD. ABUT.,RT. BRIDGE, SIMILAR)

LEGEND:

* - 31°31'49"± - REAR ABUTMENT LEFT BRIDGE
31°28'05"± - FORWARD ABUTMENT RIGHT BRIDGE

F.F. - FAR FACE — R.A.-REAR ABUTMENT
N.F. - NEAR FACE — F.A.-FOWARD ABUTMENT
E.F. - EACH FACE
L - LEFT BRIDGE
R - RIGHT BRIDGE

NOTES:

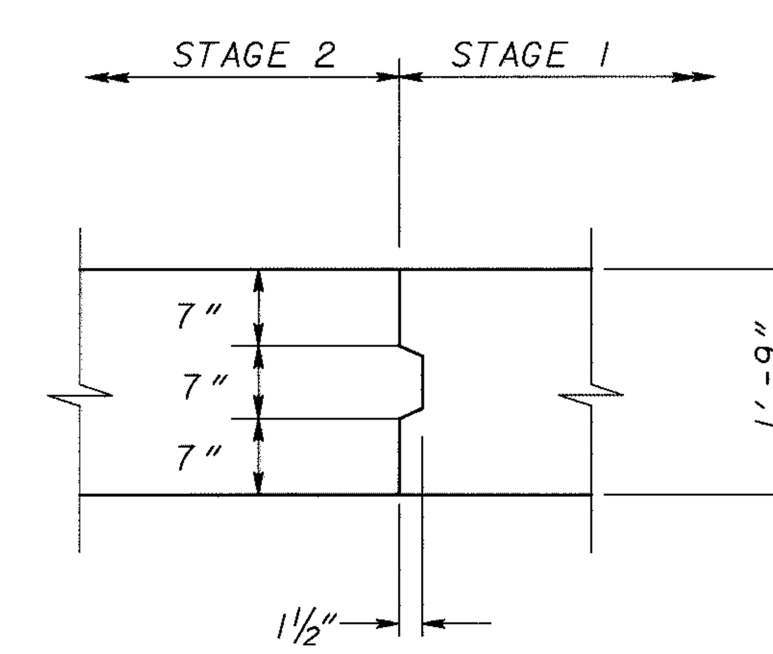
1. ABUTMENTS SHALL BE CONSTRUCTED IN STAGES IN ACCORDANCE WITH STAGE CONSTRUCTION DETAILS ON SHEET 6/20.
2. SEE STRUCTURE GENERAL NOTES FOR ADDITIONAL INFORMATION.

PROPOSED BACKWALL ELEVS		
LOCATION	FWD. ABUT. RT. BRIDGE	REAR ABUT. LT. BRIDGE
A	1238.81	1243.35
B	1239.51	1243.24
C	1239.62	1242.77
D	1239.81	1241.97

PROPOSED BEAM SEAT ELEVATIONS		
LOCATION	FWD. ABUT. RT. BRIDGE	REAR ABUT. LT. BRIDGE
BEAM 1	1235.07	1237.88
BEAM 2	1235.44	1238.24
BEAM 3	1235.77	1238.58
BEAM 4	1235.91	1238.90
BEAM 5	1235.92	1239.19
BEAM 6	1235.95	1239.24
BEAM 7	1236.03	1239.29
E	1234.36±	1238.77±
F	1235.33±	1237.37±

MINIMUM REINF. LAPS

#5 BAR= 2'-0"
#6 BAR= 3'-1"



BACKWALL CONST. JOINT DETAIL

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter, BLENDON VIEW OFFICE PARK, 5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DATE 3/00 | STRUCTURE FILE NUMBER 3401111L 3401081R | REVIEWED JR | DRAWN BJM | REVISED . | DESIGNED PLC | CHECKED MTO

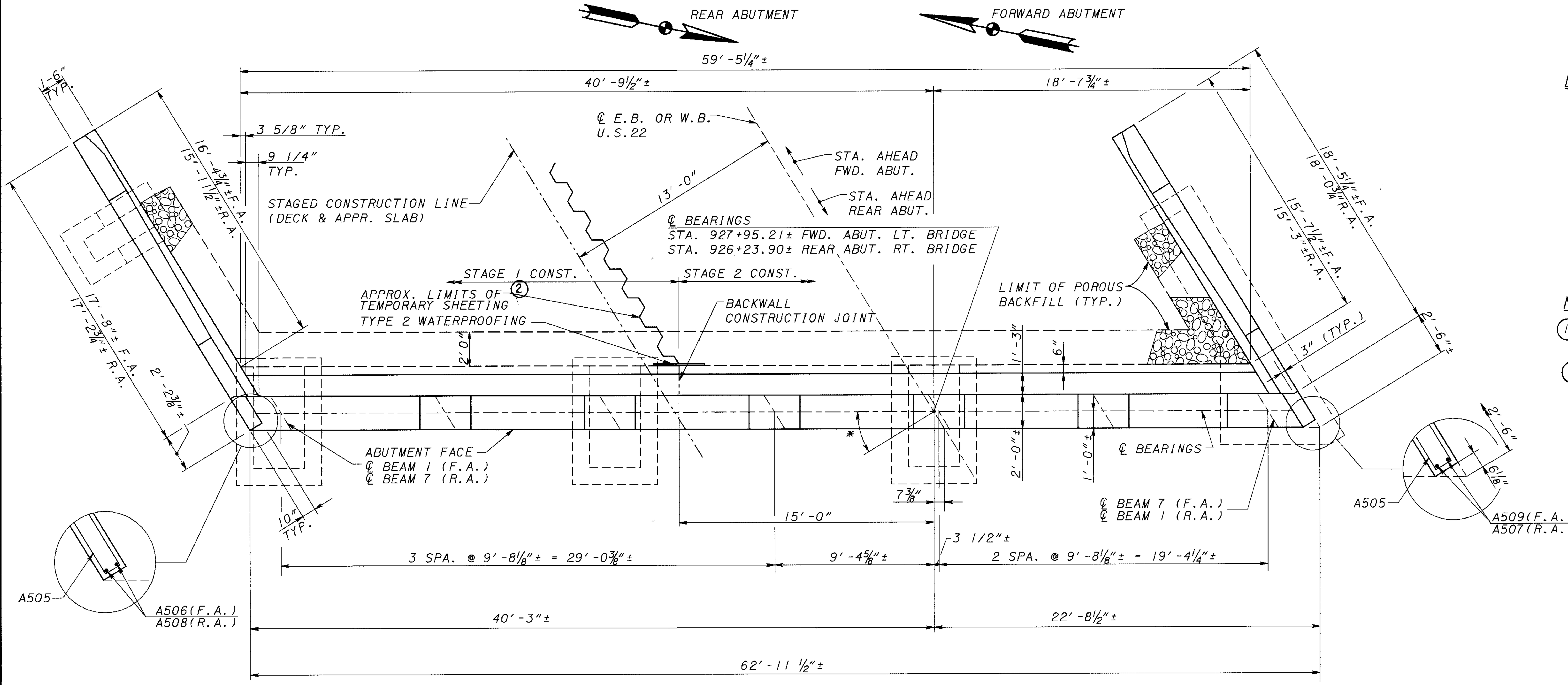
REAR ABUT. LT. BRIDGE & FWD. ABUT. RT. BRIDGE
BRIDGE NO. HAS-22-1749 (L.& R.) OVER S.R. 9

HAS-22-17.48

10/20

34/67

S:\PROJECTS\35764\BRIDGE\SPR 6935SAL.DGN DATE:10-Apr-00 16:4



FORWARD ABUTMENT PLAN - LEFT BRIDGE

REAR ABUTMENT PLAN - RIGHT BRIDGE

(FWD. ABUT. LT. BRIDGE SHOWN; REAR ABUT. RT. BRIDGE SIMILAR)

LEGEND:

* - 31°31'49"± - REAR ABUTMENT LEFT BRIDGE
31°28'05"± - FORWARD ABUTMENT RIGHT BRIDGE

F.F. - FAR FACE
N.F. - NEAR FACE
E.F. - EACH FACE
R.A. - REAR ABUTMENT
F.A. - FOWARD ABUTMENT

NOTES:

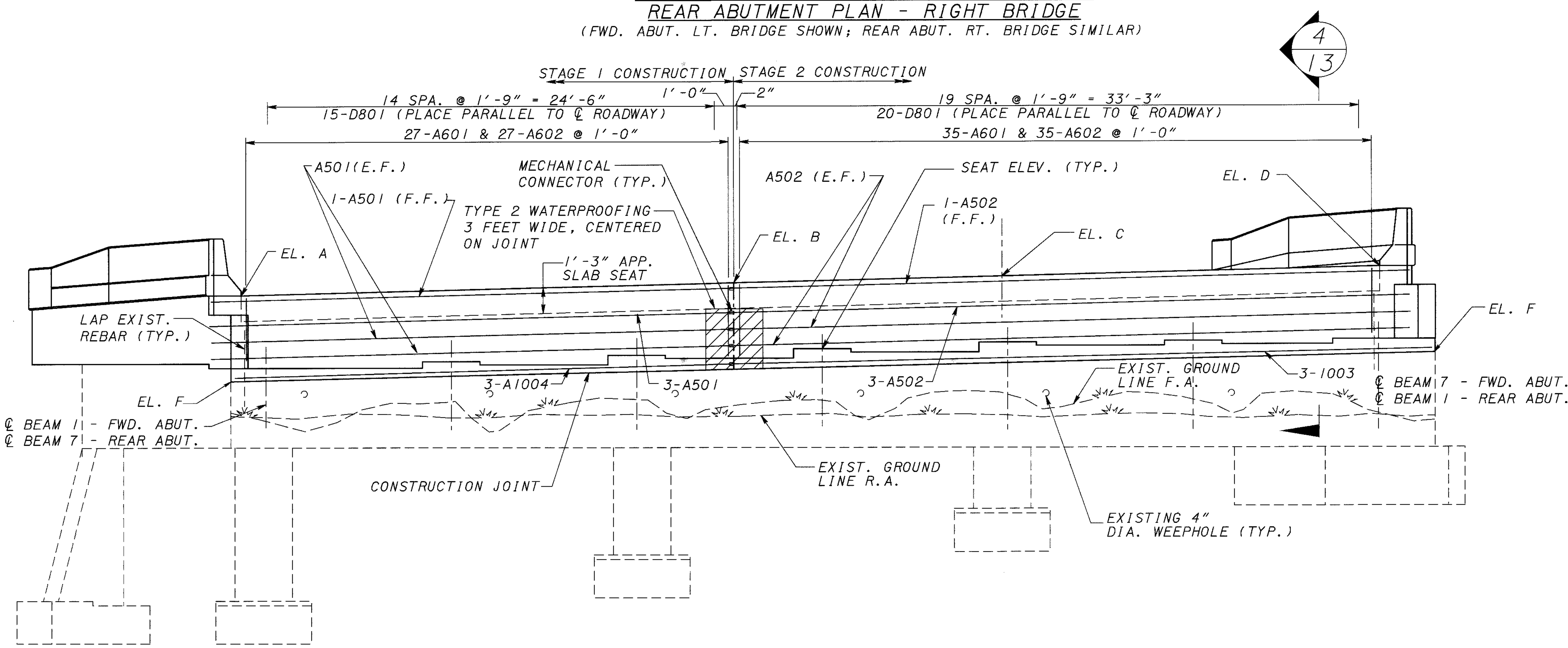
1. ABUTMENTS SHALL BE CONSTRUCTED IN STAGES IN ACCORDANCE WITH STAGE CONSTRUCTION DETAILS ON SHEET 6/20.
2. SEE NOTE ②, SHEET 10/20

PROPOSED BACKWALL ELEVS.		
LOCATION	FWD. ABUT. LT. BRIDGE	REAR ABUT. RT. BRIDGE
A	1236.61	1245.01
B	1237.48	1244.86
C	1237.95	1244.79
D	1238.11	1244.13

PROPOSED BEAM SEAT ELEVATIONS		
LOCATION	FWD. ABUT. LT. BRIDGE	REAR ABUT. RT. BRIDGE
BEAM 1	1232.88	1239.97
BEAM 2	1233.20	1240.31
BEAM 3	1233.52	1240.64
BEAM 4	1233.84	1240.69
BEAM 5	1234.18	1240.72
BEAM 6	1234.25	1240.76
BEAM 7	1234.33	1240.81
E	1232.19±	1240.27±
F	1233.60±	1239.48±

MINIMUM REINF. LAPS

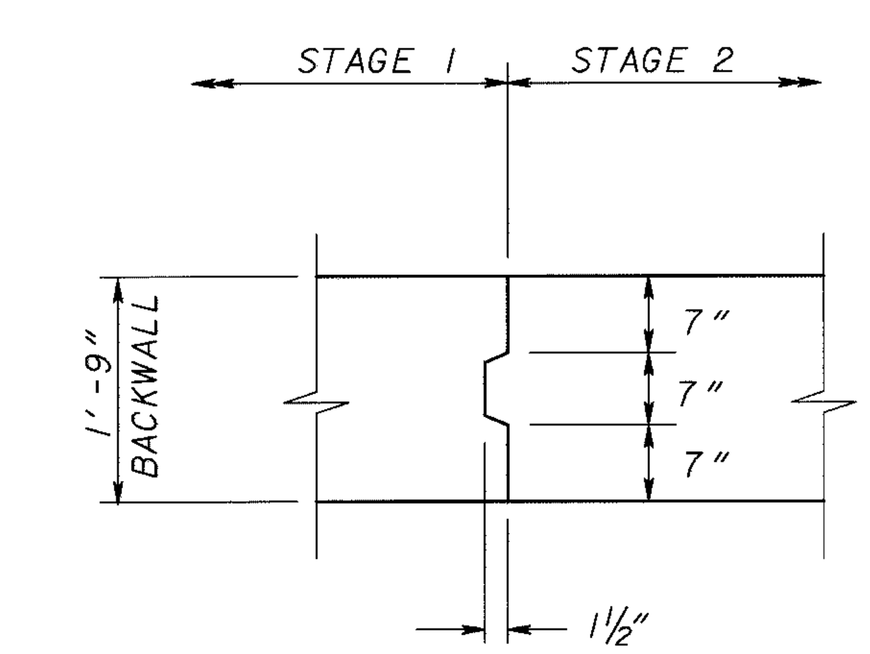
#5 BAR= 2'-0"
#6 BAR= 3'-1"



FORWARD ABUTMENT ELEVATION - LEFT BRIDGE

REAR ABUTMENT ELEVATION - RIGHT BRIDGE

(FWD. ABUT. LT. BRIDGE SHOWN; REAR ABUT. RT. BRIDGE SIMILAR WITH SPREAD FOOTING)



BACKWALL CONST. JOINT DETAIL

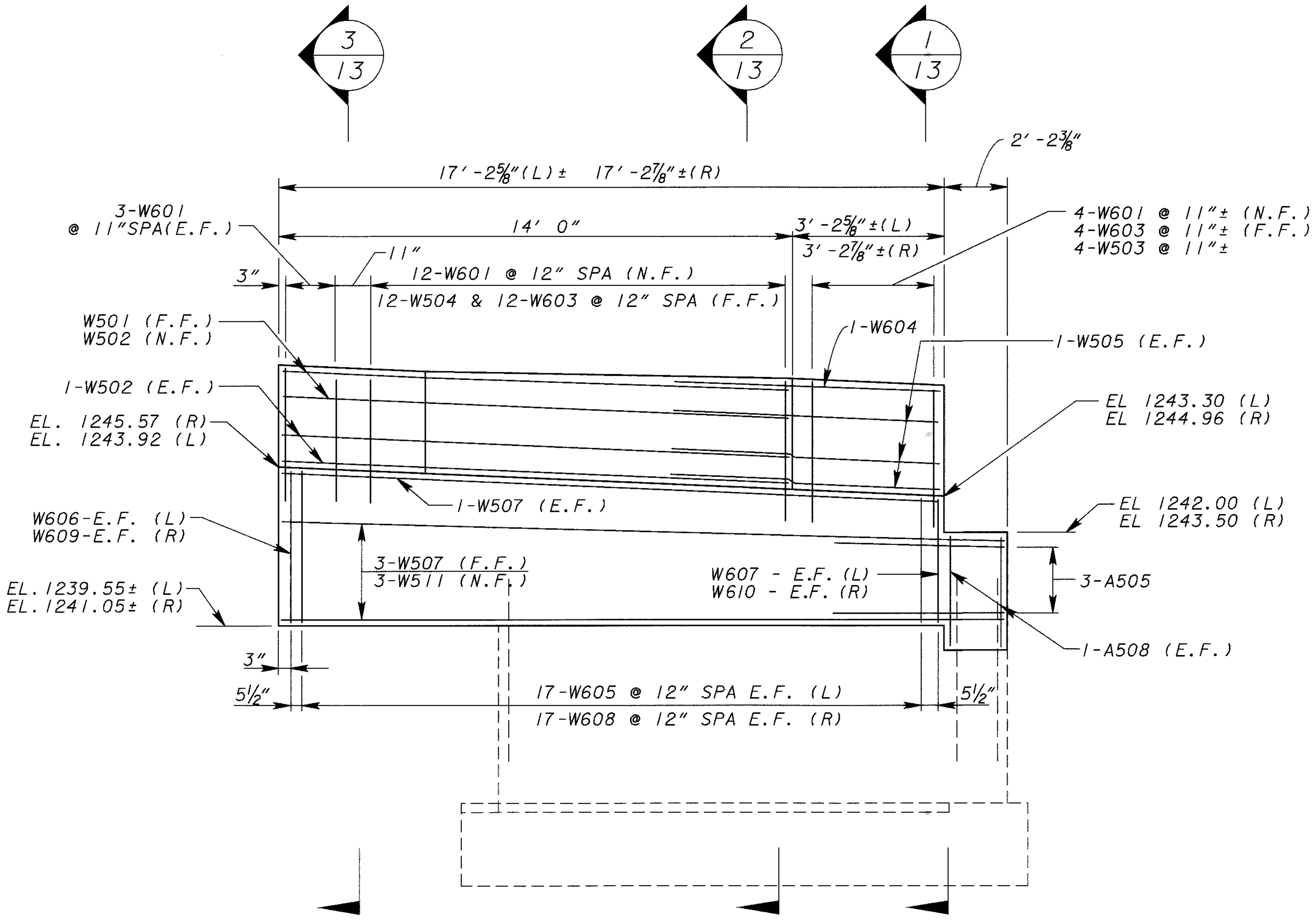
DESIGN AGENCY: Gannett Fleming Corddry & Carpenter, BLENDON VIEW OFFICE PARK, 5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED PLC | DRAWN BJM | REVIEWED JR | DATE 3/00 | CHECKED MTO | REVISED . | STRUCTURE FILE NUMBER 3401111L 3401081R

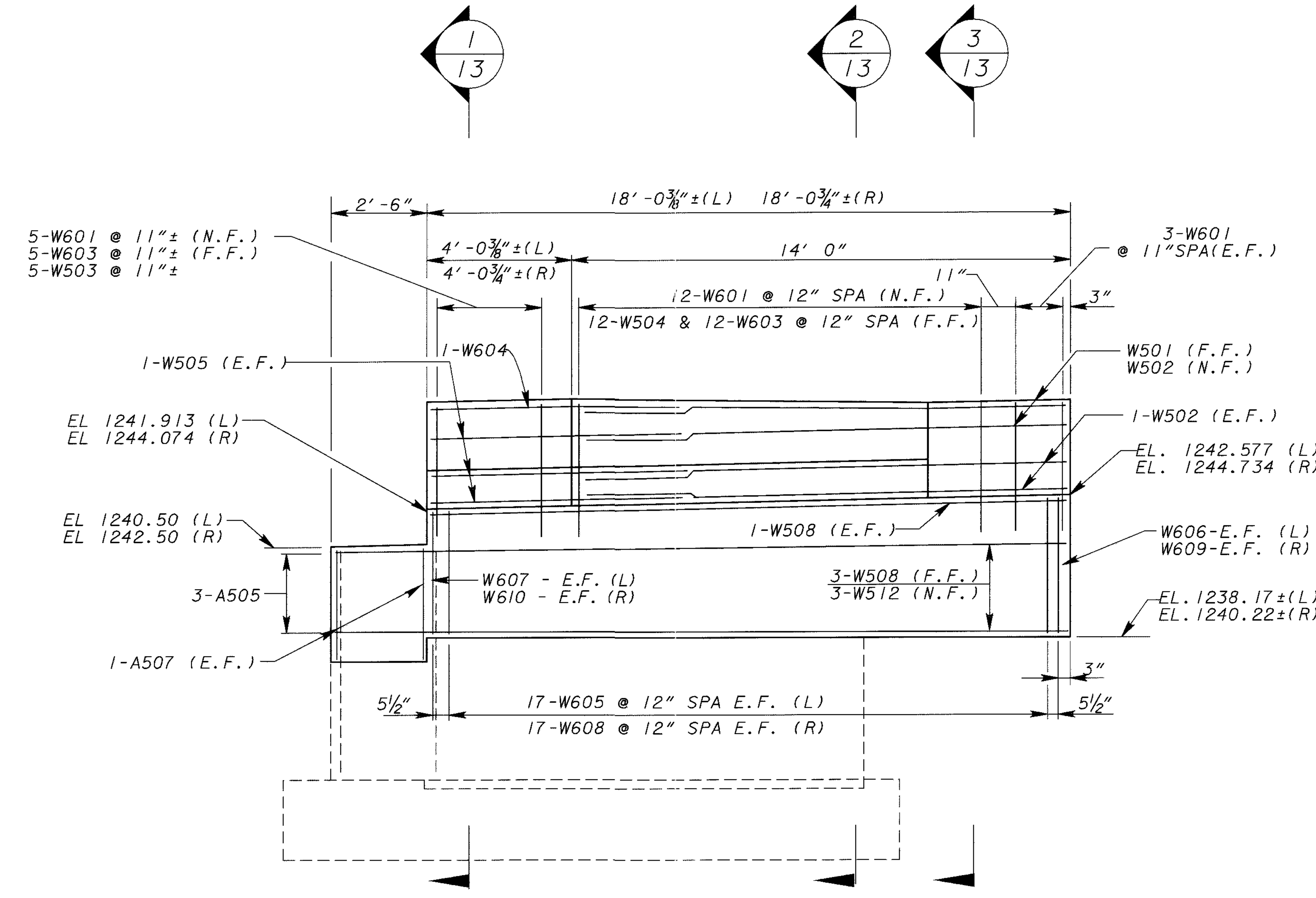
FWD. ABUT. LT. BRIDGE & REAR ABUT. RT. BRIDGE

BRIDGE NO. HAS-22-1749 (L.& R.) OVER S.R. 9

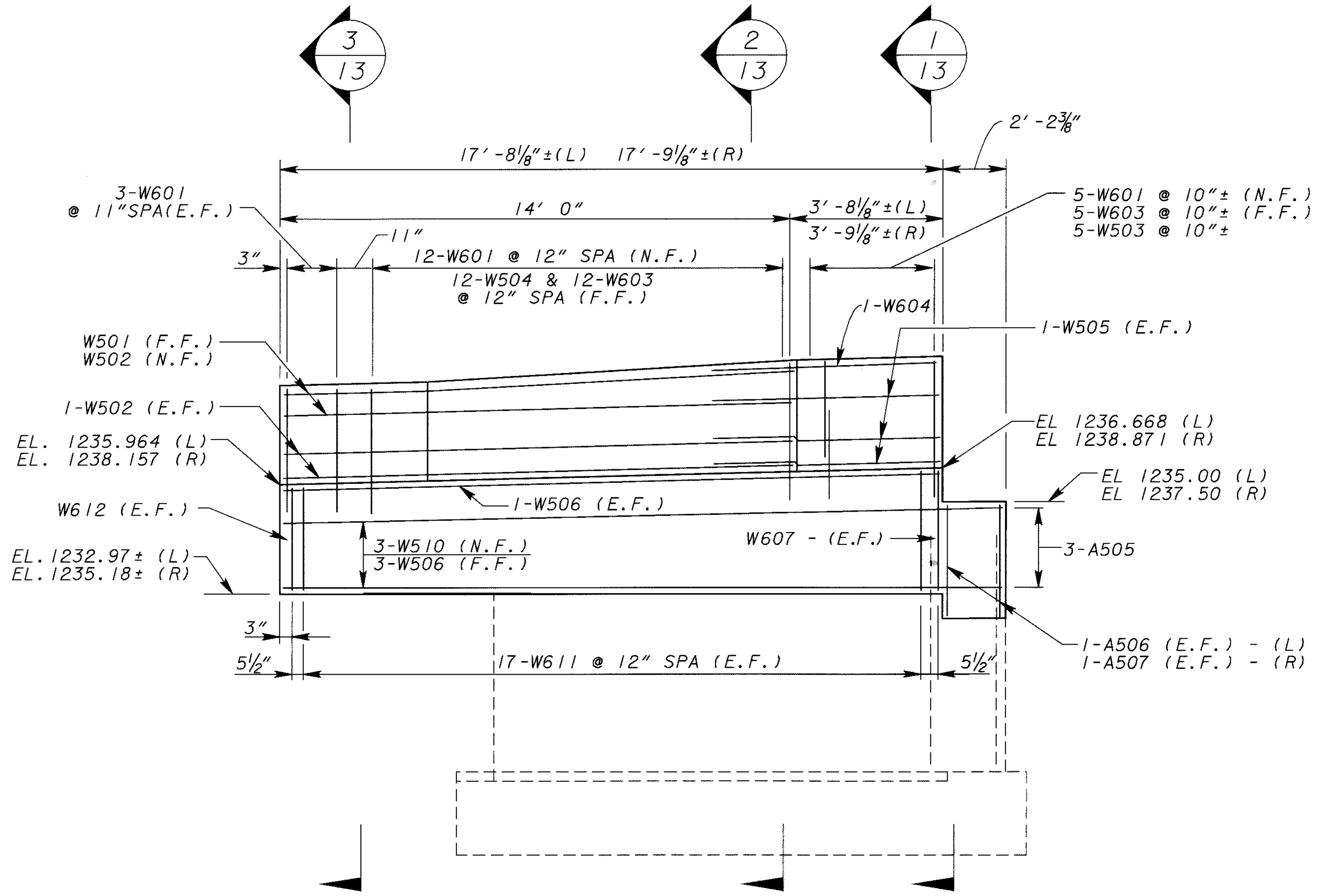
HAS-22-17.48



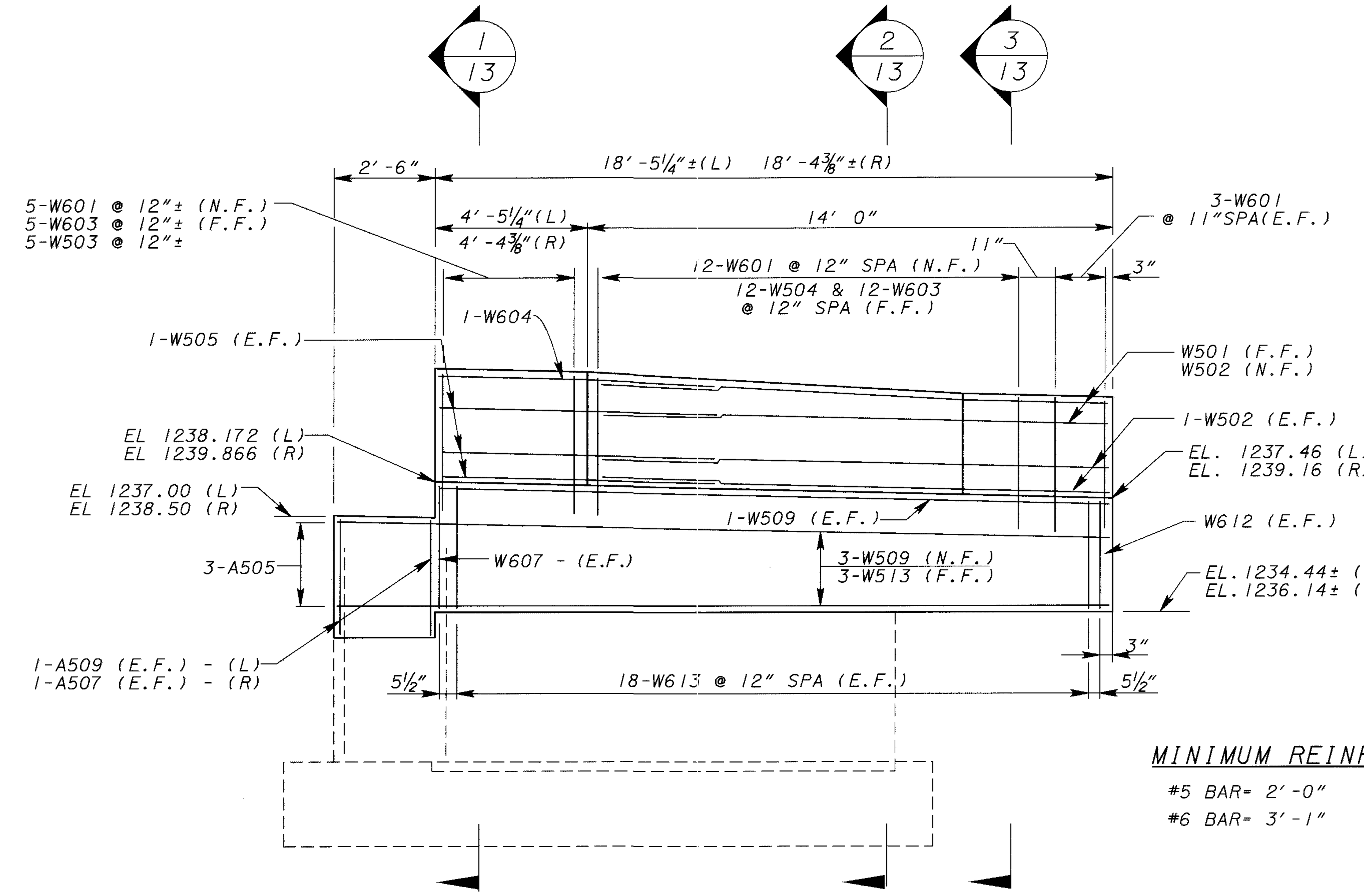
SOUTH WINGWALL ON REAR ABUTMENT - LEFT & RIGHT BRIDGE



NORTH WINGWALL ON REAR ABUTMENT - LEFT & RIGHT BRIDGE



NORTH WINGWALL ON FORWARD ABUTMENT - LEFT & RIGHT BRIDGE



MINIMUM REINF. LAPS

#5 BAR= 2'-0"
#6 BAR= 3'-1"

SOUTH WINGWALL ON FORWARD ABUTMENT - LEFT & RIGHT BRIDGE

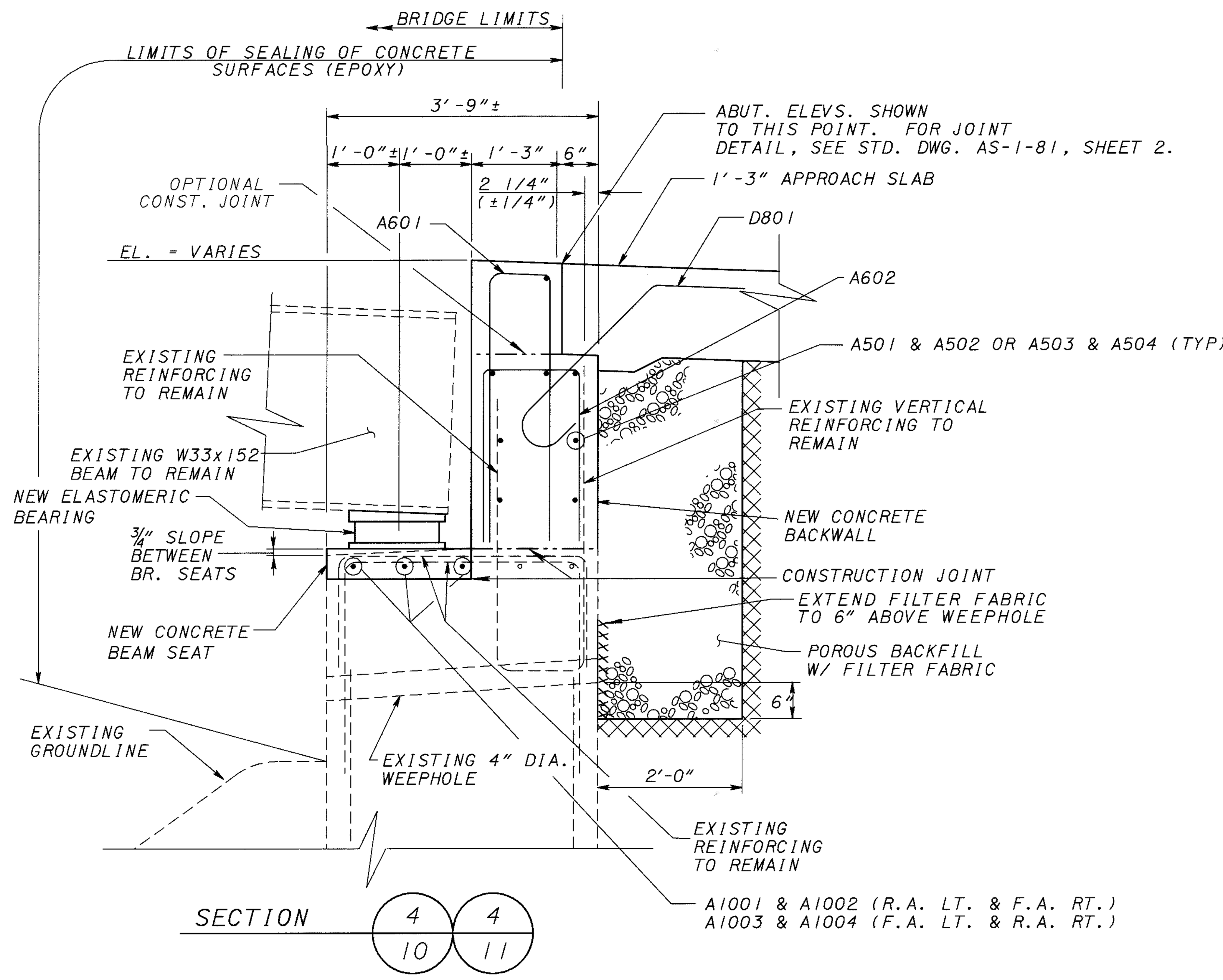
DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
PLC	BJM	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO	.	3401111L 3401081R	

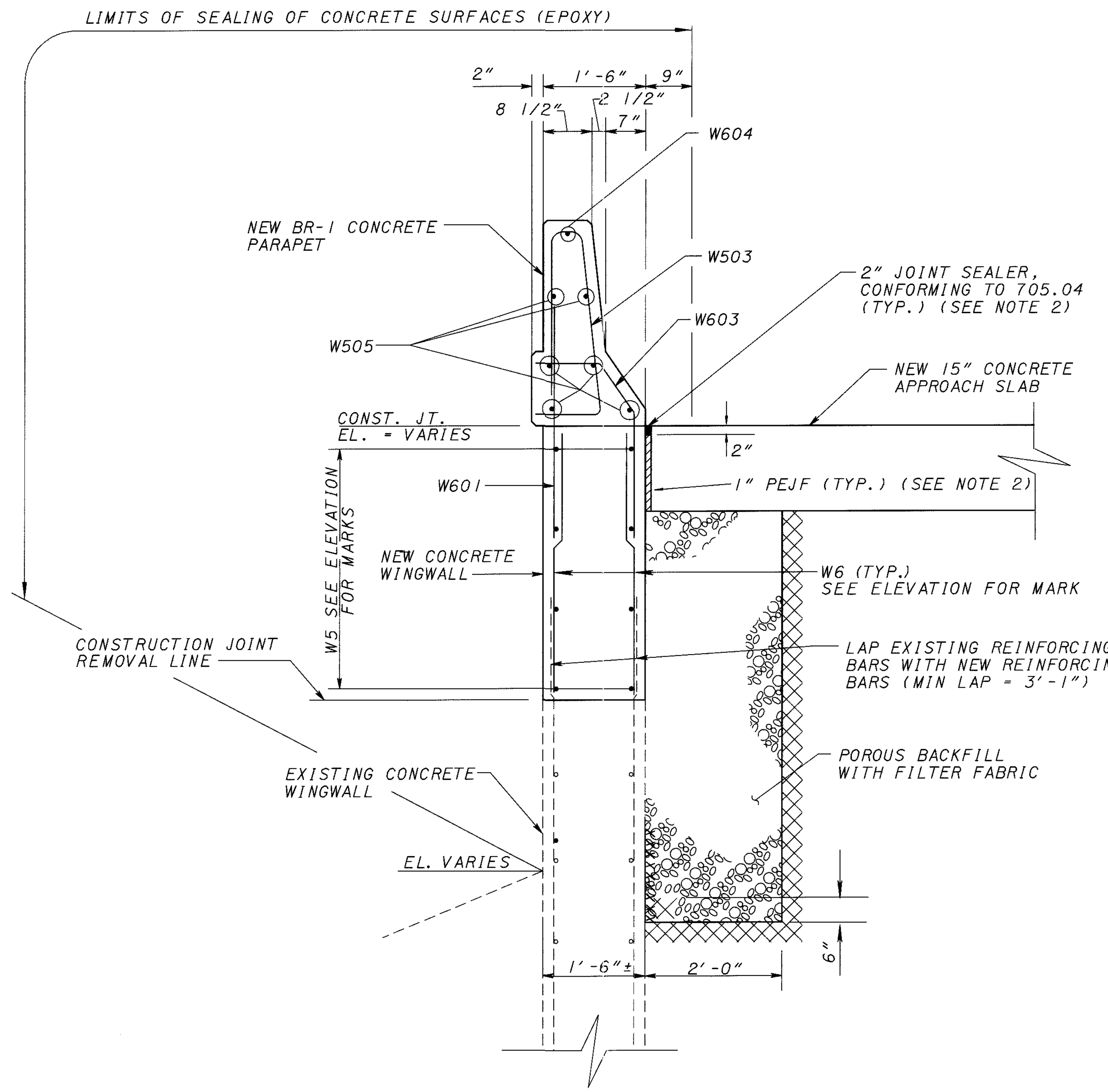
WINGWALL DETAILS
BRIDGE NO. HAS-22-1749 (L.& R.)
OVER S.R. 9

HAS-22-17.48

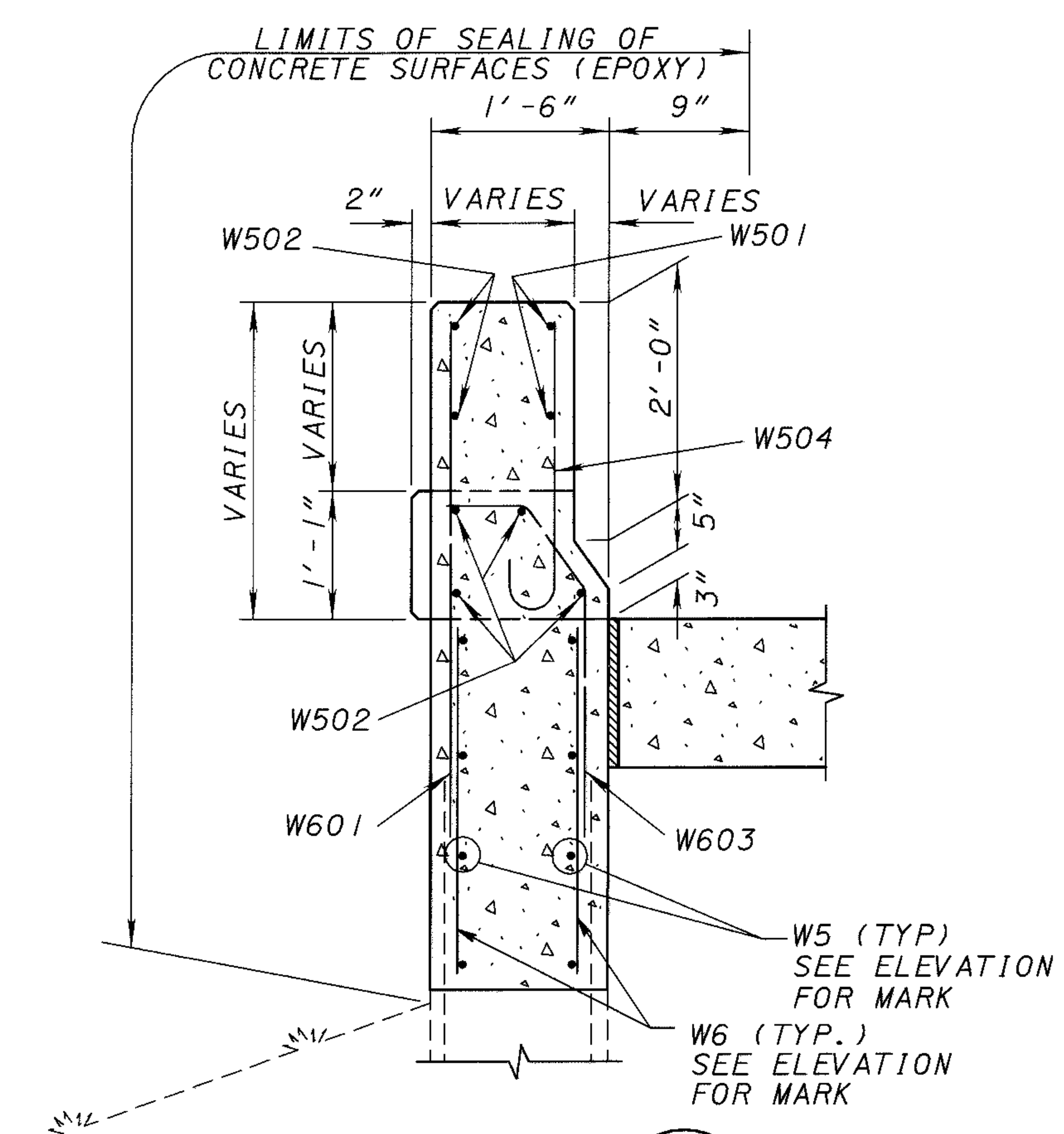
12/20



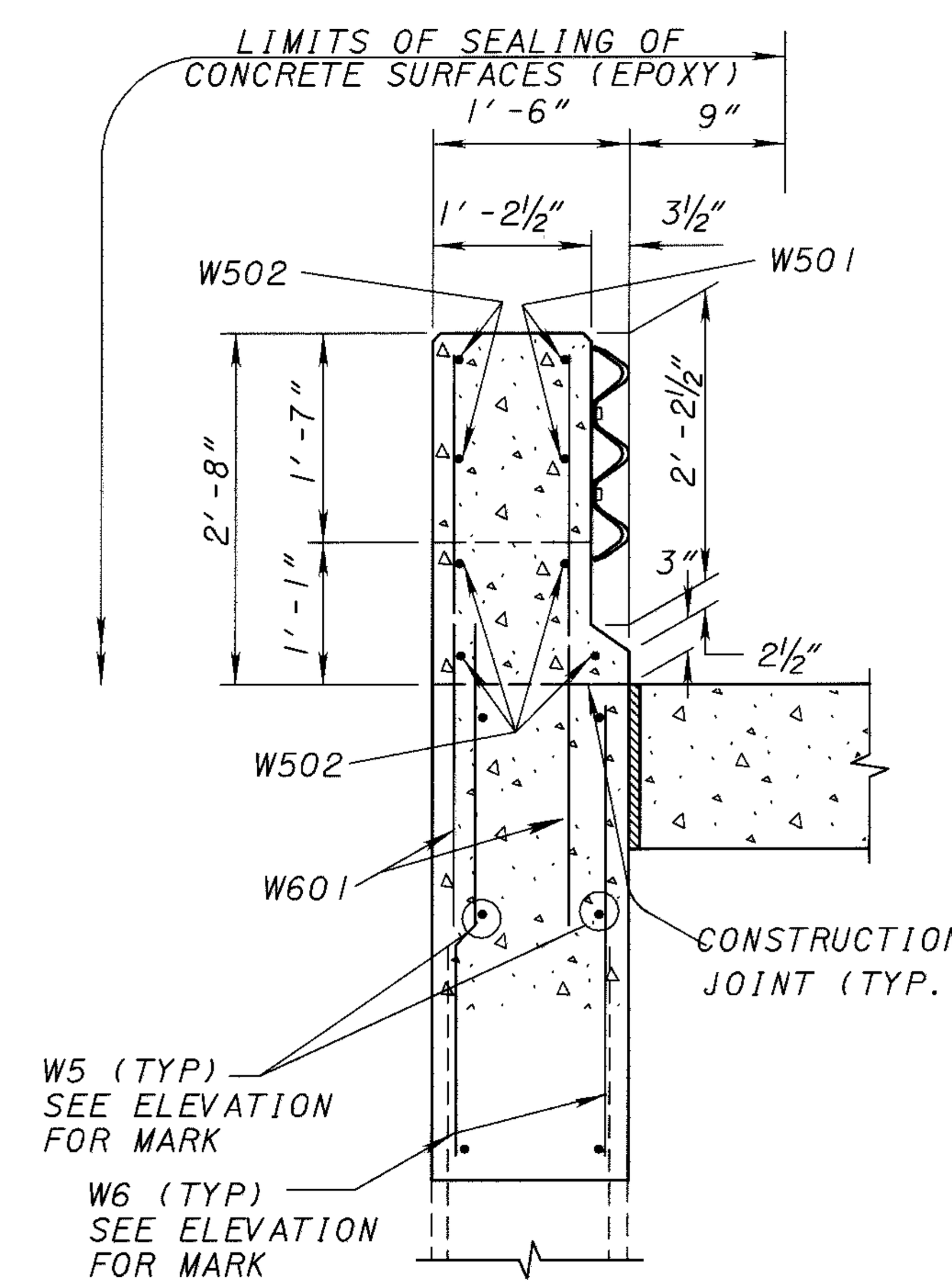
SECTION 4/10 4/11



SECTION 1/12



SECTION 2/12



SECTION 3/12

NOTES:

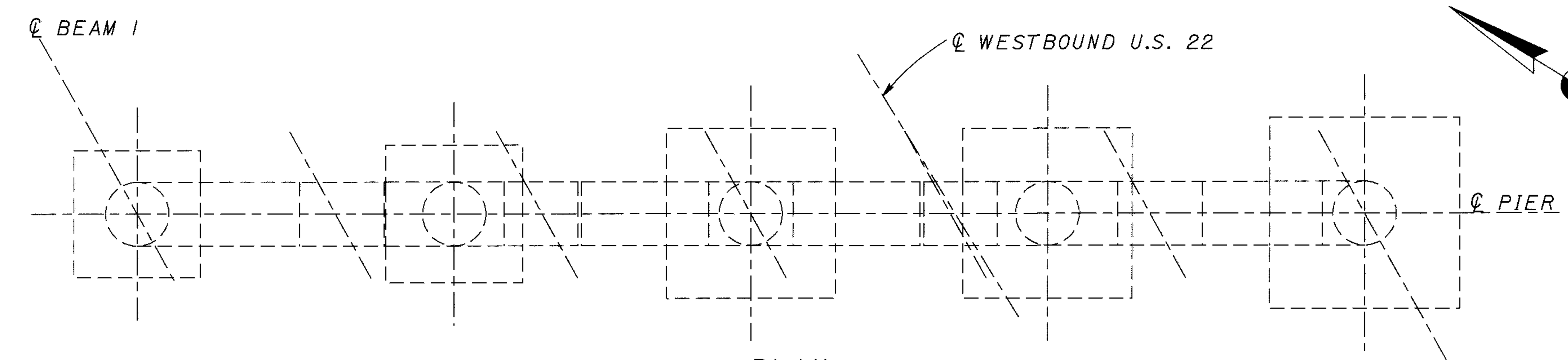
1. FOR ADDITIONAL TRANSITION BARRIER DETAILS, SEE STD. DWG. BR-1, SHT. 1 OF 2.
2. 1" P.E.J.F. AND 2" JOINT SEALER INCLUDED WITH ITEM 611 FOR PAYMENT.
3. POROUS BACKFILL WITH FILTER FABRIC, 2 FEET THICK SHALL EXTEND UP TO THE PLANE OF THE SUBGRADE, TO 1 FOOT BELOW THE EMBANKMENT SURFACE.
4. BACKWALL CONCRETE: IN ADDITION TO SS 842.08, BACKWALL CONCRETE ABOVE THE OPTIONAL CONSTRUCTION JOINT AT THE APPROACH SLAB SEAT SHALL NOT BE PLACED UNTIL AFTER THE DECK CONCRETE IN THE SPAN ADJACENT TO THE ABUTMENT HAS BEEN PLACED.

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
GLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

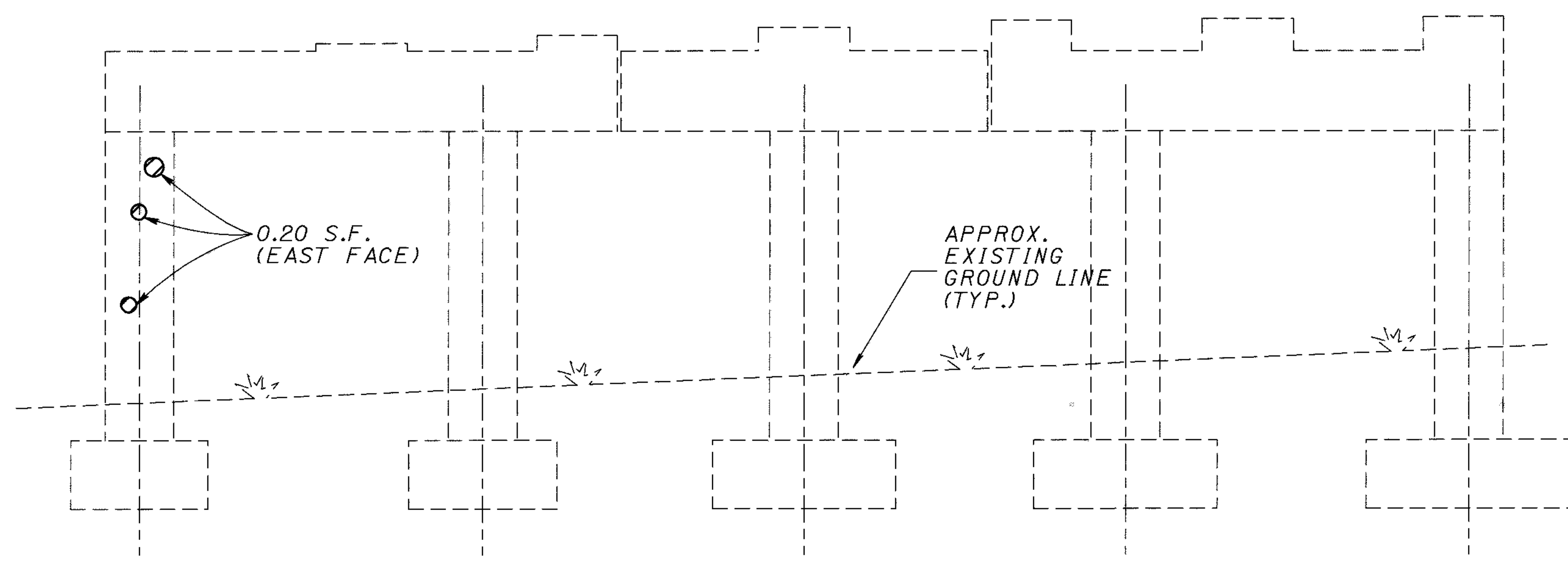
DESIGNED	DRAWN	REVIEWED	DATE
PLC	BJM	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO	-	3401111L 3401081R	

ABUTMENT & WINGWALL DETAILS
BRIDGE NO. HAS-22-1749 (L. & R.) OVER S.R. 9

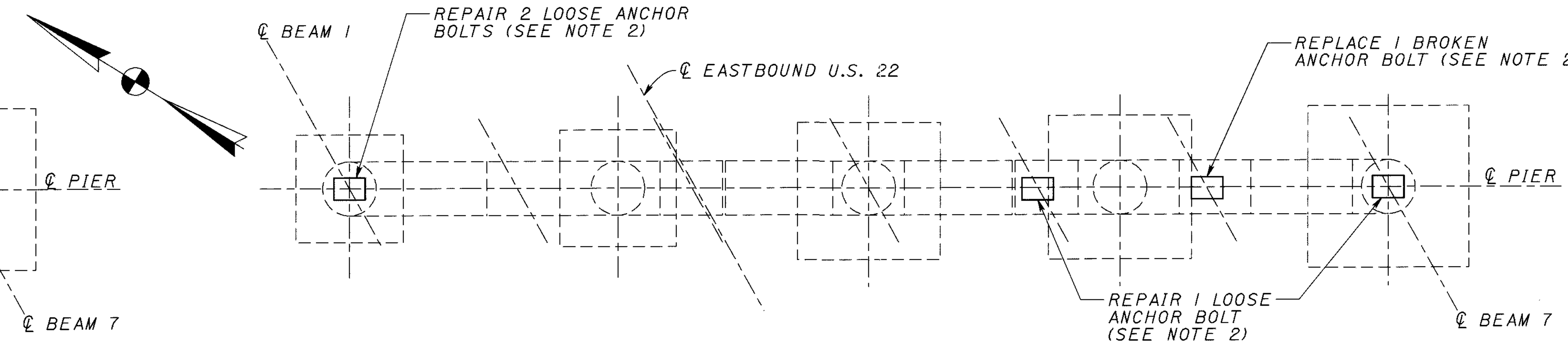
HAS-22-17.48



PLAN



LEFT BRIDGE - PIER 2 (FIXED)
WEST ELEVATION



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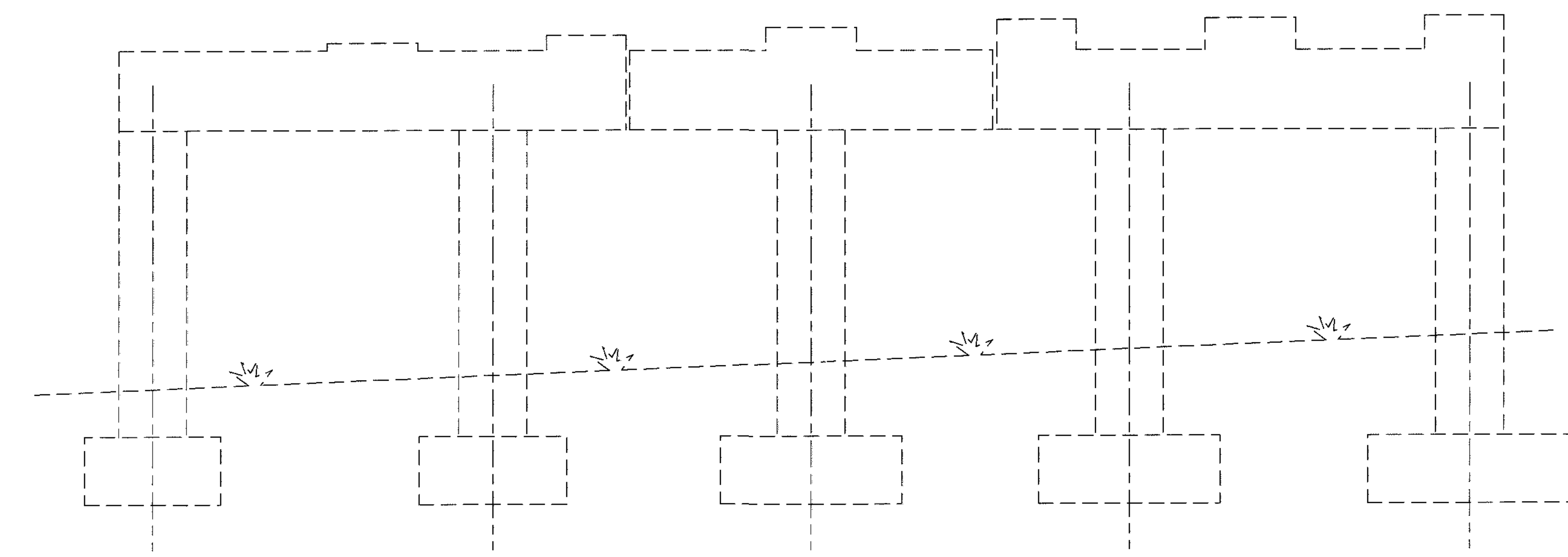
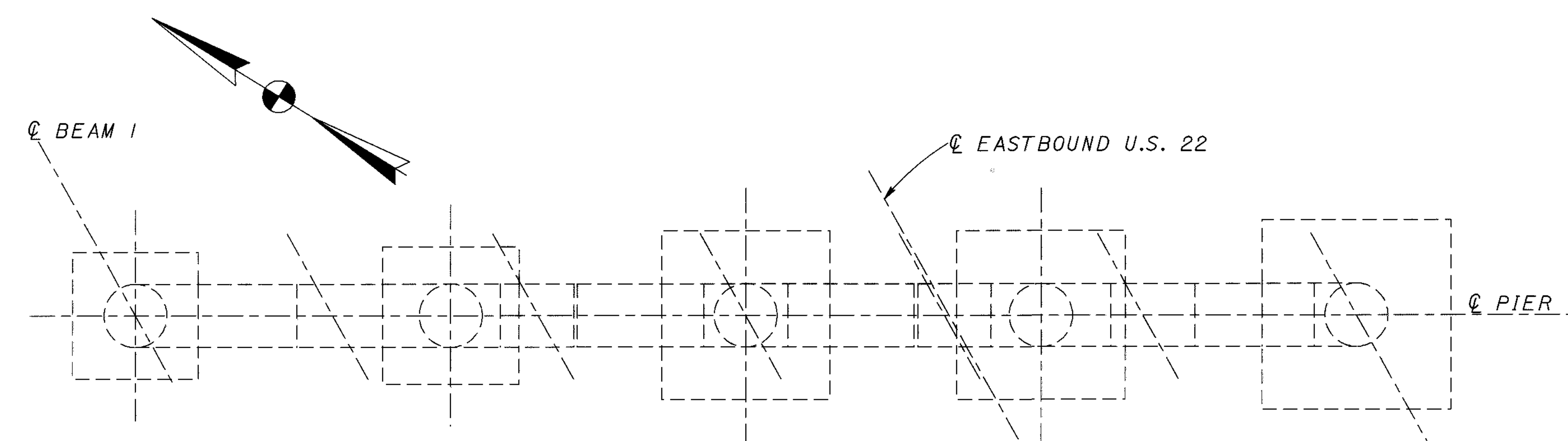


RIGHT BRIDGE - PIER 2 (FIXED)
WEST ELEVATION



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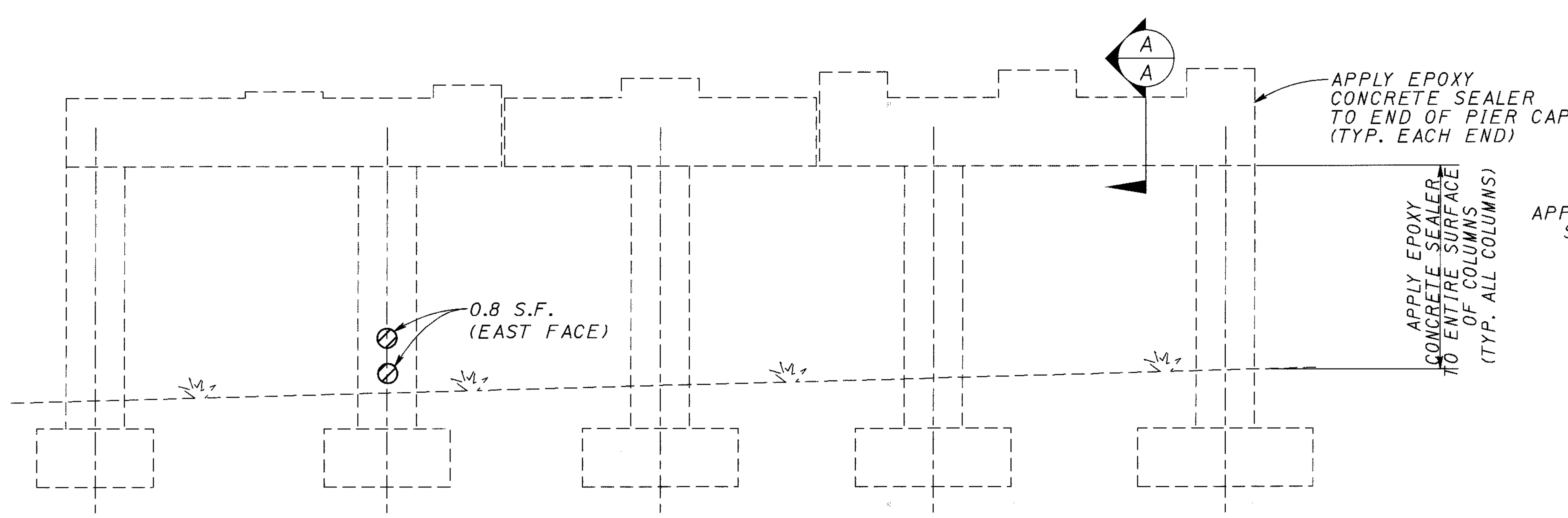
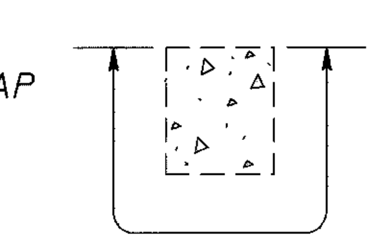


RIGHT BRIDGE - PIER 1 (EXP)
WEST ELEVATION



APPLY EPOXY CONCRETE
SEALER TO ENTIRE
SURFACE AREA

SECTION A-A

LEGEND

▨ INDICATES AREA TO BE PATCHED

S.F.- SQUARE FEET

NOTES

1. ALL CAVITIES PRODUCED BY FORM TIES AND ALL OTHER HOLES, HONEYCOMB SPOTS, BROKEN CORNERS OR EDGES AND OTHER DEFECTS SHALL BE PREPARED AND FILLED ACCORDING TO ITEM 519, AS PER PLAN.
2. SEE GENERAL NOTE ITEM 516, REFURBISH AND RESET BEARING DEVICE, AS PER PLAN.
3. LIMITS FOR SEALING OF CONCRETE SURFACES APPLY TO ALL PIERS.

CONCRETE PATCHING - SUMMARY TABLE (SQ. FT.)

	MEASURED QUANTITY	CONTINGENCY FACTOR	TOTAL QUANTITY
LEFT BRIDGE	0.60	1.25	0.75
RIGHT BRIDGE	1.60	1.25	2.00

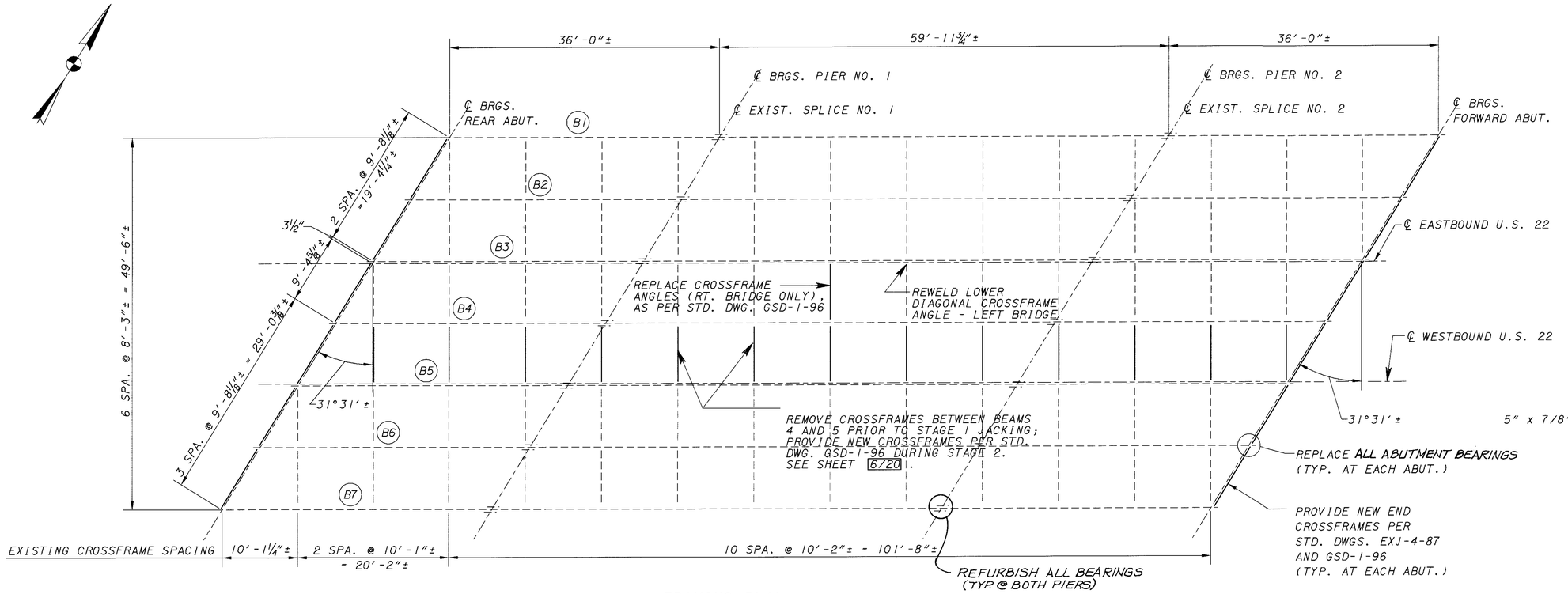
DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PIKE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
PLC	BJM	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO	-	340111L 340081R	

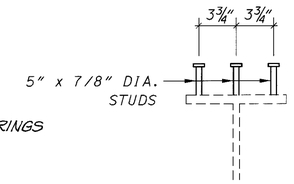
PIER REPAIR DETAILS
BRIDGE NO. HAS-22-1749 (L.& R.)
OVER S.R. 9

HAS-22-17.48

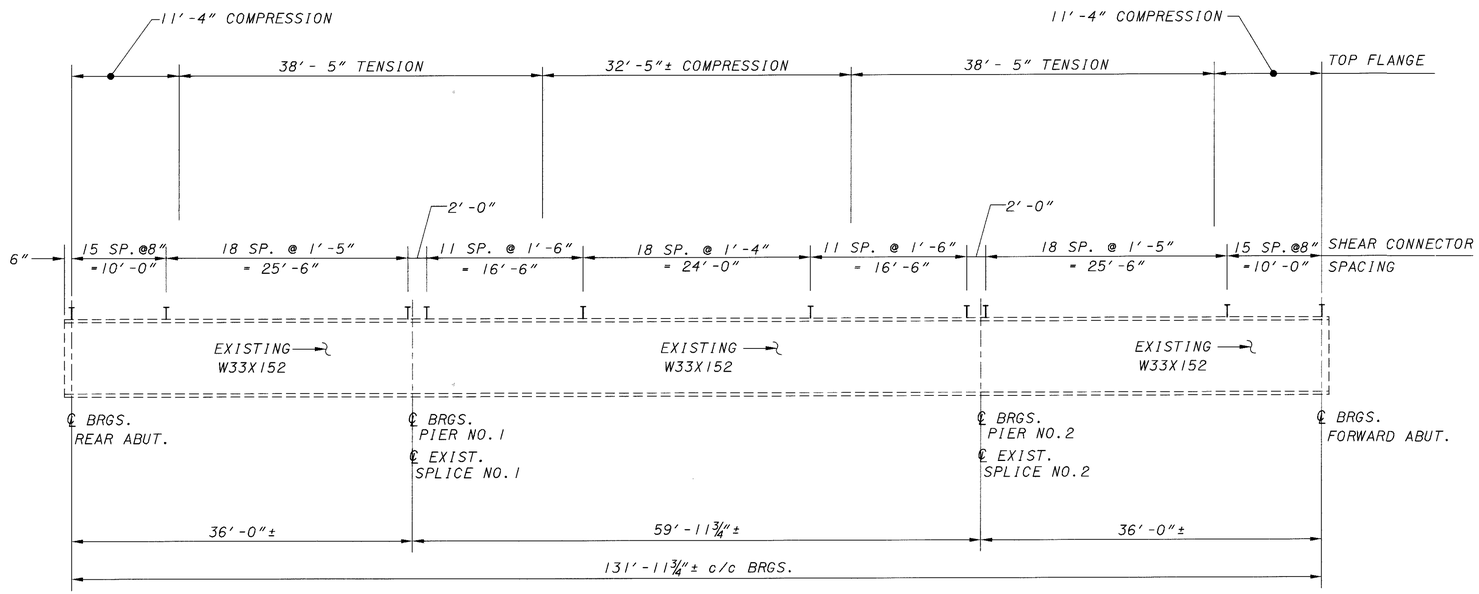
14/20



FRAMING PLAN



SHEAR CONNECTOR DETAIL



TYPICAL BEAM ELEVATION

NOTES:

1. WELDED ATTACHMENTS:

WELDED ATTACHMENT OF SUPPORTS FOR CONCRETE DECK FINISHING MACHINE MAY BE MADE TO AREAS OF THE FLANGES DESIGNATED "COMPRESSION". ATTACHMENTS SHALL NOT BE MADE TO AREAS DESIGNATED "TENSION" . FILLET WELDS TO COMPRESSION FLANGES SHALL BE NOT CLOSER THAN 1" FROM EDGE OF THE FLANGE, BE NOT MORE THAN 2" LONG AND BE NOT SMALLER THAN THE MINIMUM SIZE REQUIRED BY AWS D1.5.

2. ALL NEW STRUCTURAL STEEL SHALL BE ASTM A572, GRADE 50.

3. FOR ADDITIONAL DETAILS REFER TO STD. DWG. GSD-1-96.

4. ALL MATERIAL, LABOR, EQUIPMENT, AND INCIDENTAL COSTS FOR REWELDING EXISTING CROSSFRAME ANGLES TO THE BEAMS SHALL BE INCLUDED FOR PAYMENT WITH ITEM 863.

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
REGIONAL OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED PLC | DRAWN CLP | REVIEWED JR | DATE 3/00
CHECKED MTO | REVISED . | STRUCTURE FILE NUMBER 3401116 3401081R

FRAMING PLAN & BEAM DETAILS
BRIDGE NO. HAS-22-1749 (L. & R.)
OVER S.R. 9

HAS-22-17.48

15 / 20

39 / 67

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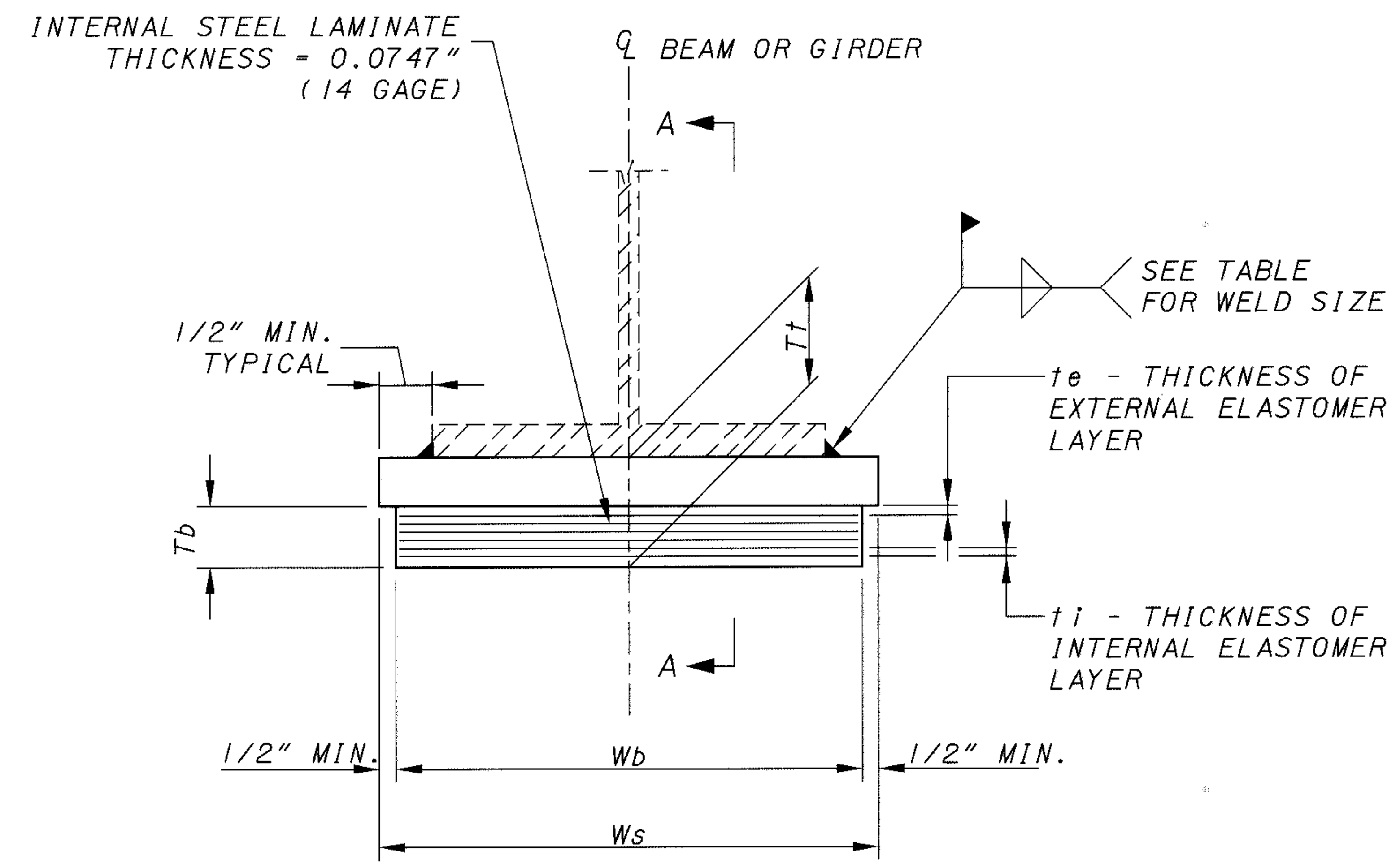
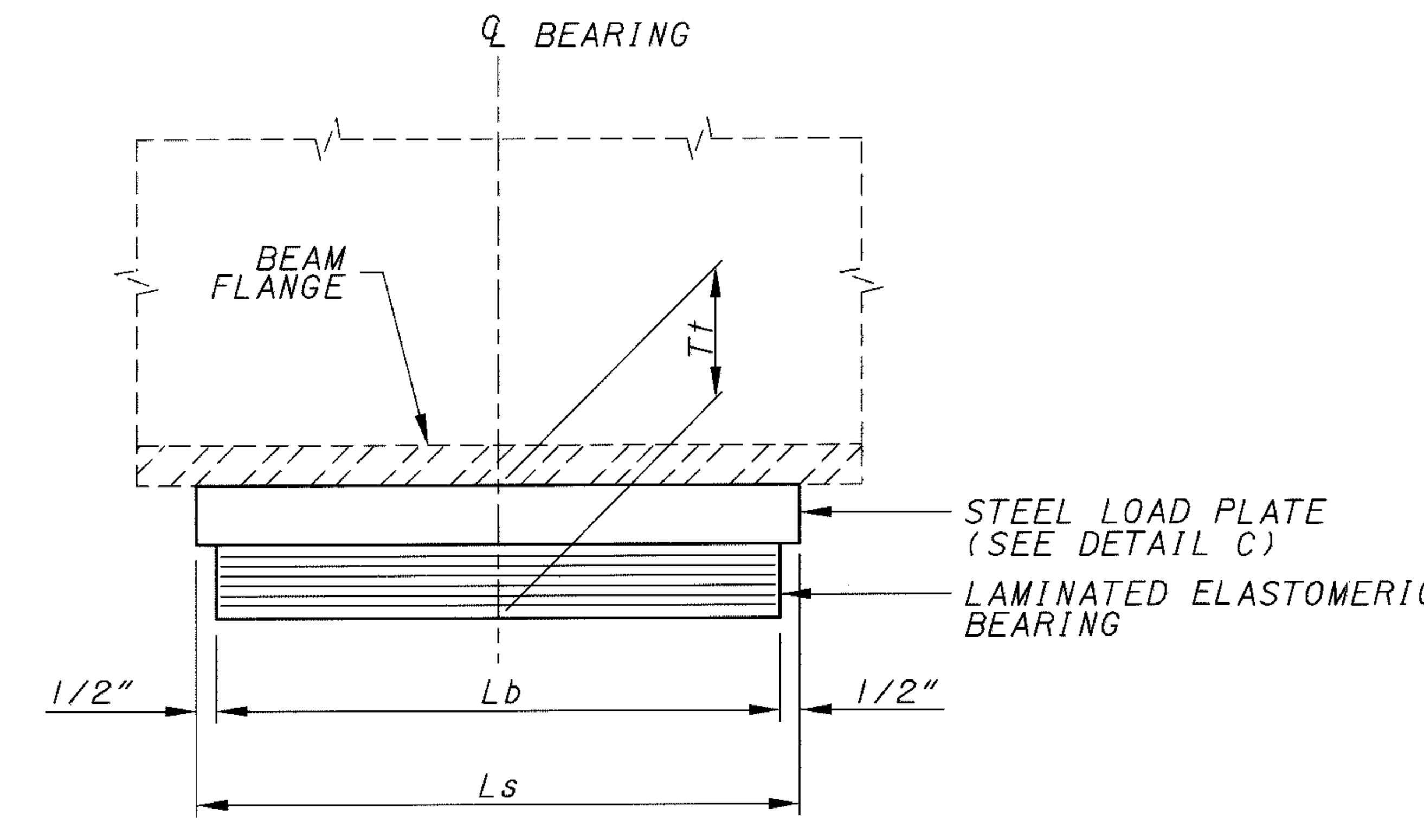
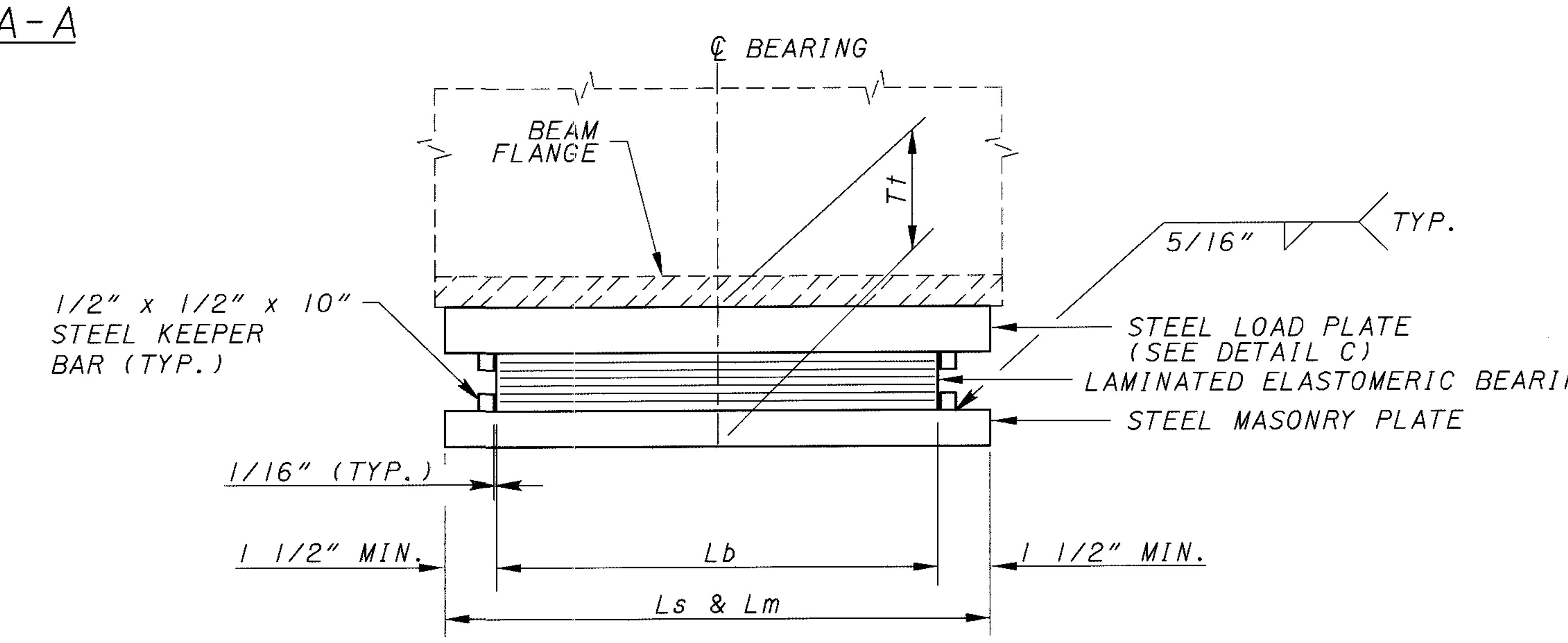


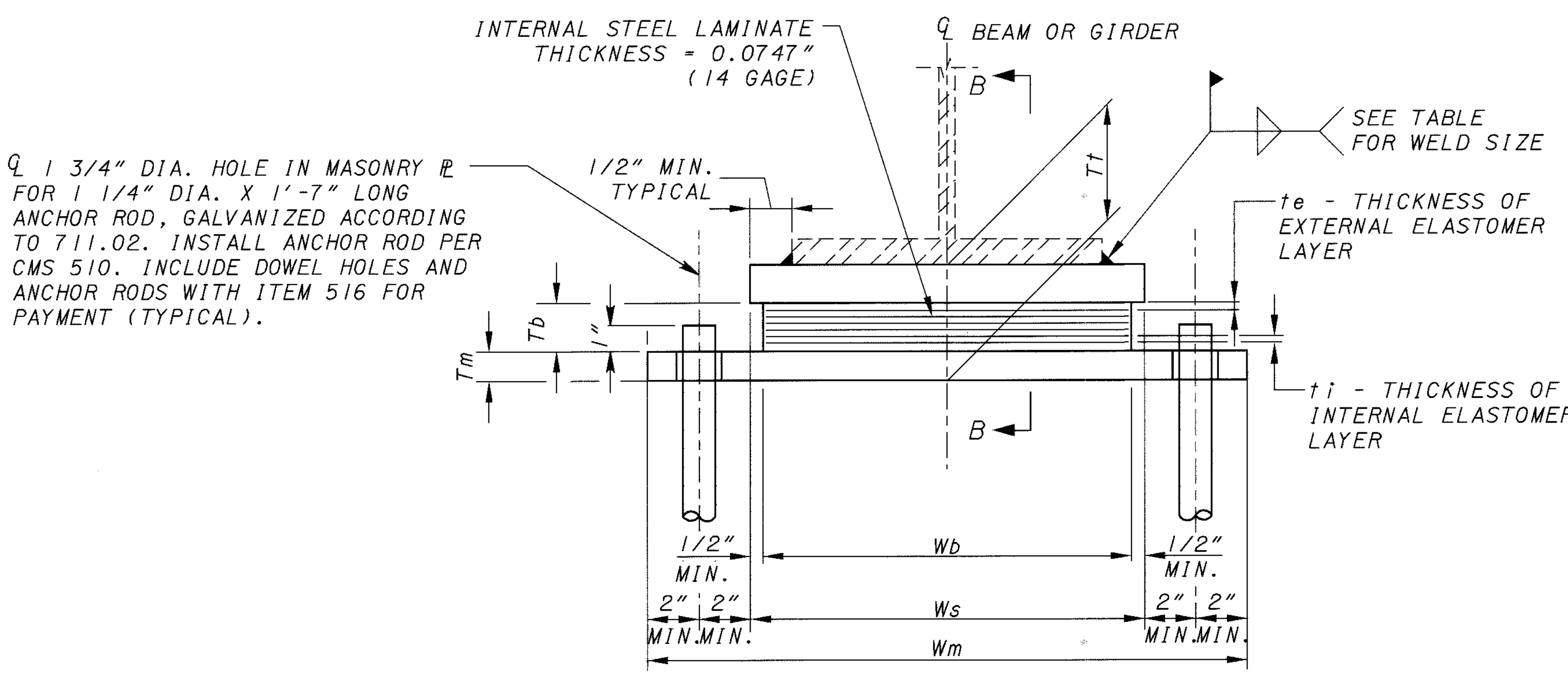
LAMINATED ELASTOMERIC EXPANSION BEARING



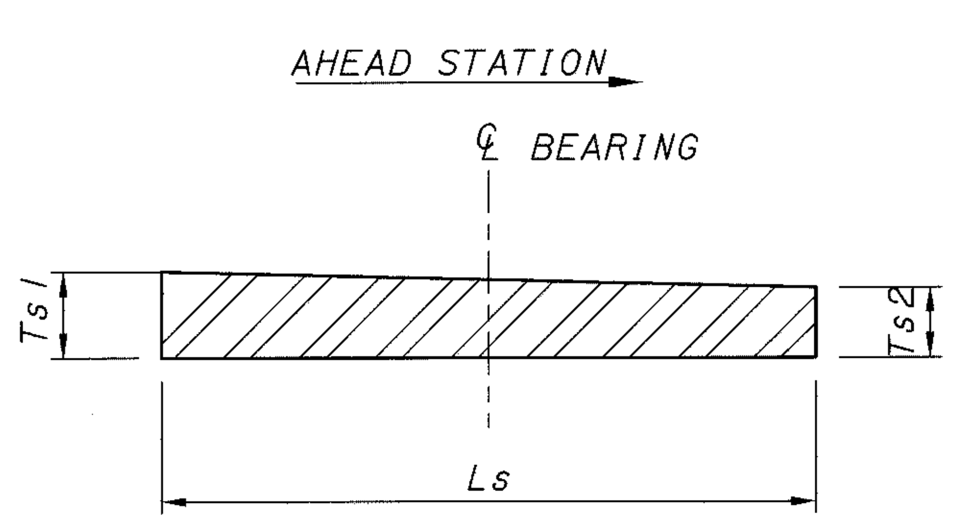
SECTION A-A



SECTION B-B



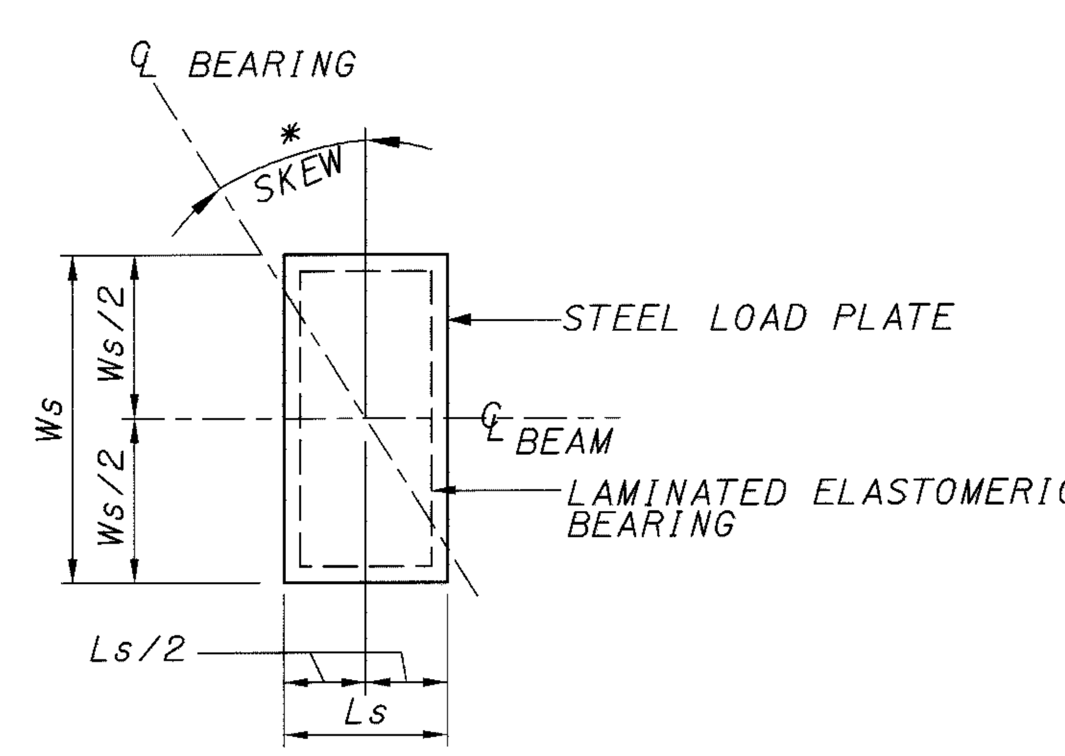
MODIFIED LAMINATED ELASTOMERIC EXPANSION BEARING



DETAIL C

STEEL LOAD PLATE

* 31°31'00"± LEFT & RIGHT BRIDGE REAR ABUT.
31°33'49"±LEFT BRIDGE FORWARD ABUT.
31°28'05"±RIGHT BRIDGE FORWARD ABUT.



BEARING ORIENTATION PLAN

NOTES:

1. ELASTOMERIC BEARINGS SHALL COMPLY WITH ITEM 516 AND ARTICLES 18.4.5.1 AND 18.5.6.2 OF SECTION 18, BEARING DEVICES, DIVISION II, CONSTRUCTION, OF THE AASHTO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES", SIXTEENTH EDITION, 1996, INCLUDING THE 1997 AND 1998 INTERIMS. BEARINGS SHALL BE GRADE 3, 50 DUROMETER ELASTOMER, AND SHALL BE SUBJECTED TO THE LOAD TESTING REQUIREMENTS DEFINED IN ARTICLE 18.7.4.5 OF THE AASHTO STANDARD. BEARINGS WERE DESIGNED UNDER ARTICLE 14.6.5 OF SECTION 14, BEARINGS, DIVISION I, DESIGN. THE TESTING SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE BEARINGS. THE MANUFACTURER SHALL SUPPLY A SAMPLE BEARING OF EACH DESIGN, AS SHOWN ON THE PLANS, FOR DESTRUCTIVE TESTING AND APPROVAL PURPOSES.
2. THE STEEL LOAD PLATE AND MASONRY PLATE SHALL BE ASTM A572, GRADE 50 STEEL, AND SHALL BE SIMILARLY CLEANED AND COATED AS THE ATTACHED STRUCTURAL STEEL THE STEEL LOAD PLATE SHALL BE BONDED BY VULCANIZATION TO THE ELASTOMER DURING THE MOLDING PROCESS. WELDING OF THE LOAD PLATE SHALL BE CONTROLLED SO THAT THE LOAD PLATE TEMPERATURE AT THE ELASTOMER BONDED SURFACE DOES NOT EXCEED 300° F AS DETERMINED BY THE USE OF PYROMETRIC STICKS OR OTHER TEMPERATURE MONITORING DEVICES.
3. BEARING REPOSITIONING: IF DECK CONCRETE IS PLACED AT AN AMBIENT TEMPERATURE HIGHER THAN 80° F OR LOWER THAN 40° F, AND THE BEARING SHEAR DEFLECTION EXCEEDS 1/6 OF THE BEARING HEIGHT AT 60° F (±10° F), THE BEAMS OR GIRDERS SHALL BE RAISED TO ALLOW THE BEARINGS TO RETURN TO THEIR UNDEFORMED SHAPE AT 60° F (±10° F).
4. BEARING ANCHOR RODS: THE BEARING ANCHOR RODS (OR FORMED HOLES), LOCATED AND SUPPORTED BY TEMPLATES, SHALL BE DOWELED WITH CEMENT GROUT IN ACCORDANCE WITH 510 OF THE CMS. ANCHOR RODS SHALL BE GALVANIZED IN ACCORDANCE WITH 711.02. ANCHOR RODS SHALL EXTEND 1" (MIN.) ABOVE THE LOAD PLATE.
5. THE TOTAL DESIGN LOAD FOR A BEARING EQUALS THE SUM OF THE DEAD LOAD AND LIVE LOAD TABULATED IN THE BEARING TABLE.
6. BASIS OF PAYMENT: THE UNIT BID PRICE SHALL INCLUDE ALL MATERIALS (INCLUDING THE STEEL LOAD PLATE), LABOR, TESTING, DOWEL HOLES, ANCHOR RODS, AND INCIDENTALS NECESSARY TO FURNISH AND INSTALL THE LAMINATED ELASTOMERIC BEARINGS. PAYMENT WILL BE MADE AT THE CONTRACT UNIT PRICE FOR ITEM 516, EACH, "ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)." SAMPLE BEARINGS SHALL NOT BE MEASURED FOR PAYMENT, BUT SHALL BE CONSIDERED INCIDENTAL TO THE ITEM.

BEARING SCHEDULE (INCHES)

BEARING LOCATION	BEARING TYPE	NO. REQ'D.	DEAD LOAD (kips)	LIVE LOAD (kips)	TOTAL LOAD (DL+LL) (kips)	BEARING		ti	NO. OF ti's	te (2 EA.)	NUMBER OF INTERNAL LAMINATES (14 GAGE)	Tb	STEEL LOAD PLATE				FILLET WELD SIZE	STEEL MASONRY PLATE			Tt
						Lb	Wb						Ls	Ws	Ts1	Ts2		Lm	Wm	Tm	
REAR ABUT.	MODIFIED	14	17.1	35.4	52.5	6.50	10.00	0.20	6	0.136	7	2.00	9.50	12.75	1.85	1.50	5/16	9.50	20.75	1.00	4.67
FORWARD ABUT.	EXPANSION	14	17.1	35.4	52.5	6.50	10.00	0.20	6	0.136	7	2.00	7.50	12.75	1.80	1.50	5/16	-	-	-	3.65

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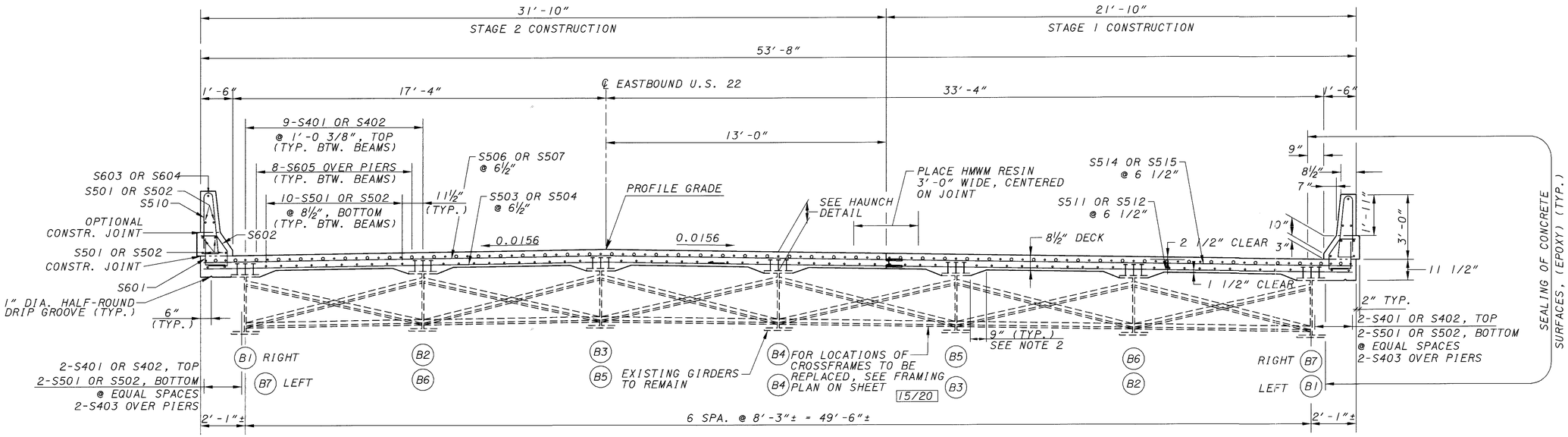
DESIGN AGENCY: Gannett Fleming Corddry & Carpenter, GLENDON VIEW OFFICE PARK, 5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
BJM	BJM	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
PLC	.	3401111L 3401081R	

BEARING DETAILS
BRIDGE NO. HAS-22-1749 (L.& R.) OVER S.R. 9

HAS-22-17.48

16/20

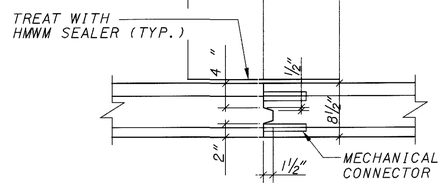


TRANSVERSE DECK SECTION

(RIGHT BRIDGE - SHOWN, LEFT BRIDGE - OPP. HAND)

HAUNCH DIMENSION "D" LEFT BRIDGE (INCHES)				
BEAM NO.	REAR ABUT.	PIER 1	PIER 2	FWD ABUT.
B1	9.96	10.85	9.45	9.12
B2	9.43	11.59	9.82	9.34
B3	9.14	11.13	9.82	9.44
B4	9.13	11.01	9.58	9.60
B5	9.27	11.63	10.19	9.42
B6	9.33	11.28	10.43	9.49
B7	9.44	11.16	9.70	9.50

HAUNCH DIMENSION "D" RIGHT BRIDGE (INCHES)				
BEAM NO.	REAR ABUT.	PIER 1	PIER 2	FWD ABUT.
B1	10.81	11.22	9.11	9.78
B2	10.57	11.70	9.58	8.88
B3	10.32	11.69	9.92	8.96
B4	10.48	11.92	9.77	8.50
B5	10.78	12.04	10.12	8.98
B6	10.95	12.04	10.34	9.50
B7	10.99	12.02	9.71	9.41



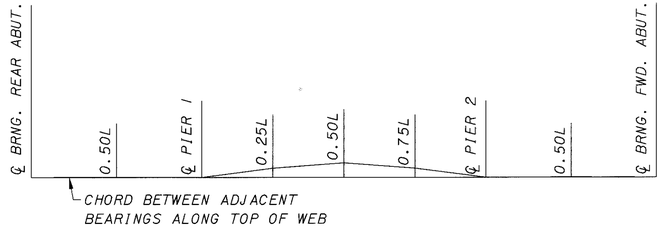
STAGE CONSTRUCTION JOINT DETAIL

LONGITUDINAL BARS NOT SHOWN.

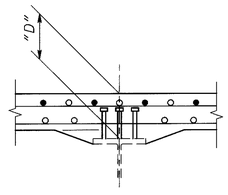
ALL STEEL CLEARANCES ARE 2" UNLESS OTHERWISE NOTED

DEFLECTION AND CAMBER					
	SPAN 1	SPAN 2			SPAN 3
	0.50L	0.25L	0.50L	0.75L	0.50L
DEFLECTION DUE TO WEIGHT OF STEEL	0"	0"	0"	0"	0"
DEFLECTION DUE TO REMAINING DEAD LOAD	0"	1/4"	3/8"	1/4"	0"
ADJUSTMENT DUE TO VERTICAL CURVE	0"	0"	0"	0"	0"
TOTAL CAMBER	0"	1/4"	3/8"	1/4"	0"

L = SPAN LENGTH



CAMBER DIAGRAM



HAUNCH DETAIL

NOTES:

1. CONCRETE DECK SLAB DEPTH

THE DISTANCE FROM TOP OF DECK SLAB TO TOP OF THE BEAM FLANGE IS THE THEORETICAL DESIGN DIMENSION, INCLUDING THE CALCULATED HAUNCH THICKNESS OF 2". THE QUANTITY OF DECK CONCRETE TO BE PAID FOR SHALL BE BASED ON THIS DIMENSION MINUS THE CALCULATED HAUNCH THICKNESS, EVEN THOUGH DEVIATION FROM IT MAY BE NECESSARY BECAUSE THE TOP FLANGE OF THE BEAM MAY NOT HAVE THE EXACT CAMBER OR CONFORMATION REQUIRED TO PLACE IT PARALLEL TO THE FINISHED GRADE.

2. CONCRETE DECK HAUNCH WIDTH

A HAUNCH WIDTH OF 9" SHALL BE USED FOR COMPUTING QUANTITY OF CONCRETE. HOWEVER, THE HAUNCH WIDTH MAY VARY BETWEEN 6" AND 1'-0".

3. MINIMUM LAP LENGTHS

LAP NO.4 BARS 1'-7".
LAP NO.5 BARS 2'-0".
LAP NO.6 BARS 3'-1".

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter, BLENDON VIEW OFFICE PARK, 5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081
DESIGNED PLC | DRAWN CLP | CHECKED MTO | REVIEWED JR | REVISED . | DATE 3/00
STRUCTURE FILE NUMBER 340111L, 340108R

TRANSVERSE SECTION & CAMBER DIAGRAM
BRIDGE NO. HAS-22-1749 (L. & R.) OVER S.R. 9

HAS-22-17.48

17 / 20

41 / 67

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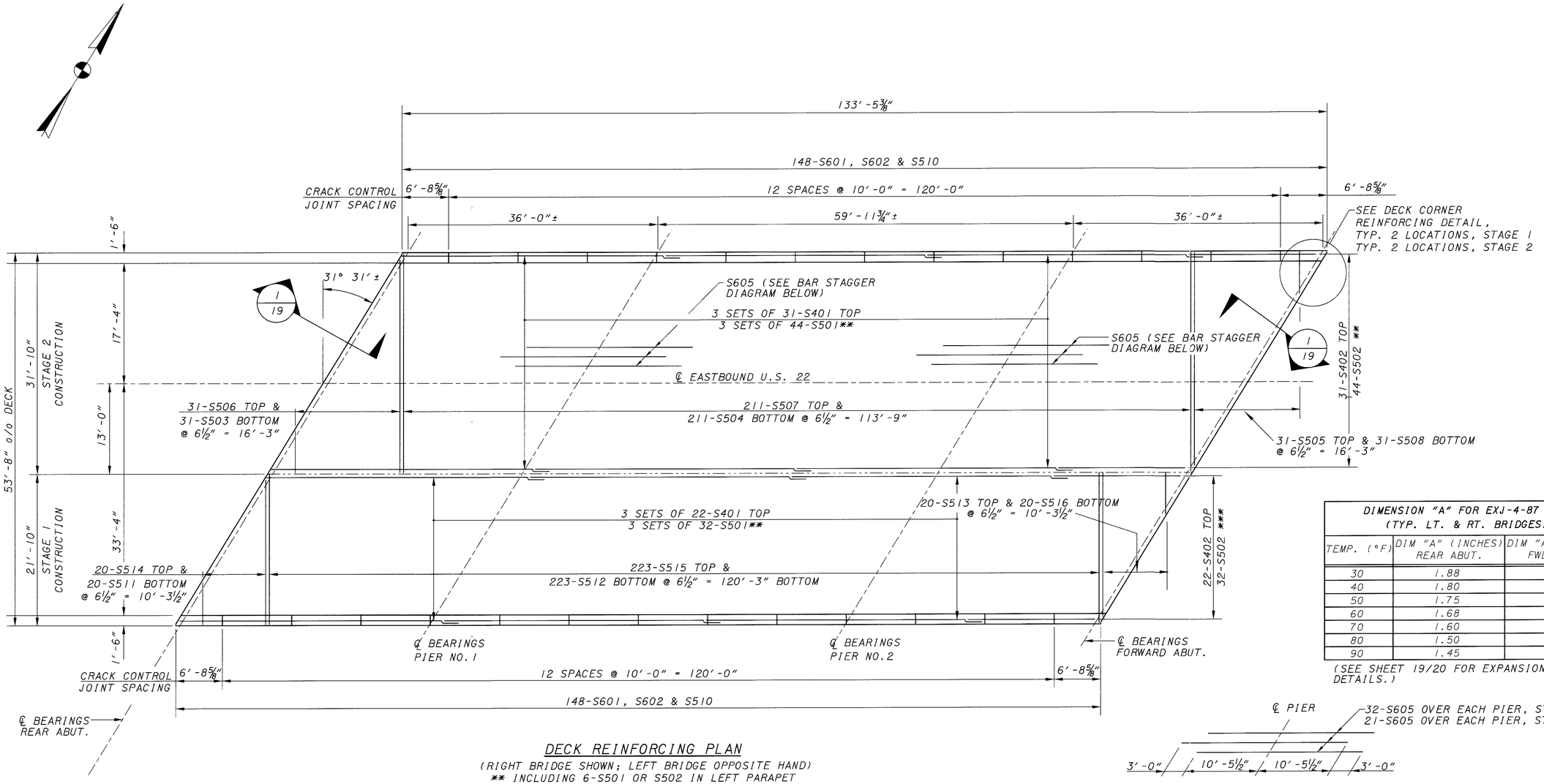


DECK REINFORCING PLAN

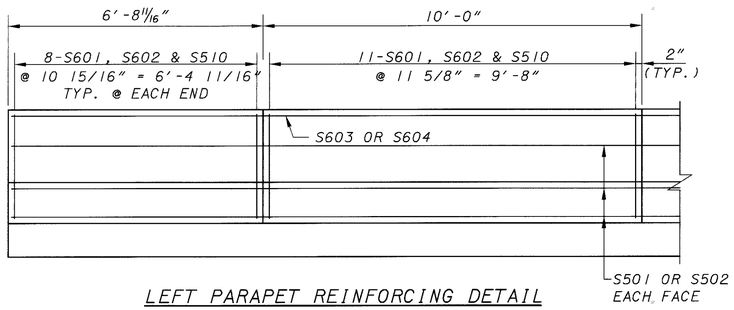
(RIGHT BRIDGE SHOWN; LEFT BRIDGE OPPOSITE HAND)
** INCLUDING 6-S501 OR S502 IN LEFT PARAPET
*** INCLUDING 6-S501 OR S502 IN RIGHT PARAPET

DIMENSION "A" FOR EXJ-4-87 JOINT (TYP. LT. & RT. BRIDGES)

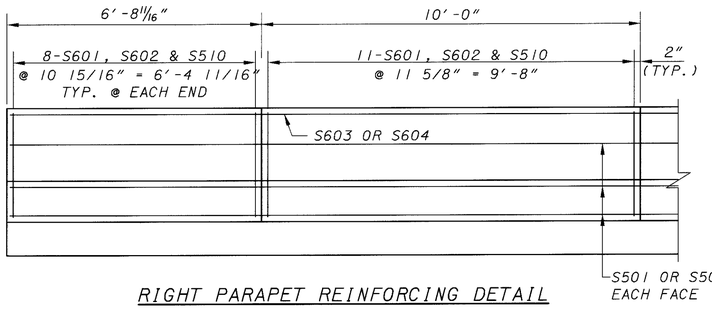
TEMP. (°F)	DIM "A" (INCHES) REAR ABUT.	DIM "A" (INCHES) FWD. ABUT.
30	1.88	1.78
40	1.80	1.75
50	1.75	1.73
60	1.68	1.70
70	1.60	1.68
80	1.50	1.65
90	1.45	1.63

(SEE SHEET 19/20 FOR EXPANSION JOINT DETAILS.)

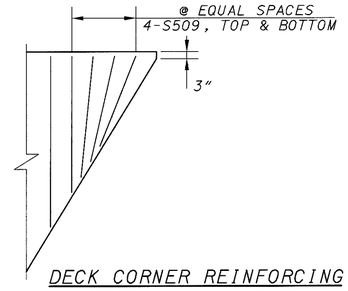
BAR STAGGER DIAGRAM OVER PIERS



LEFT PARAPET REINFORCING DETAIL



RIGHT PARAPET REINFORCING DETAIL



DECK CORNER REINFORCING

(TYPICAL @ 4 LOCATIONS)

MINIMUM REINF. LAPS

#4 BAR= 1′-7″
#5 BAR= 2′-0″
#6 BAR= 3′-1″

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
REGIONAL TIER DEVELOPMENT
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED PLC | DRAWN CLP | CHECKED MTO | REVIEWED JR | DATE 3/00 | REVISED . | STRUCTURE FILE NUMBER 3401/1/6 3401/81/R

DECK SLAB PLAN & PARAPET DETAILS

BRIDGE NO. HAS-22-1749 (L.& R.) OVER S.R. 9

HAS-22-17.48

18/20

42/67

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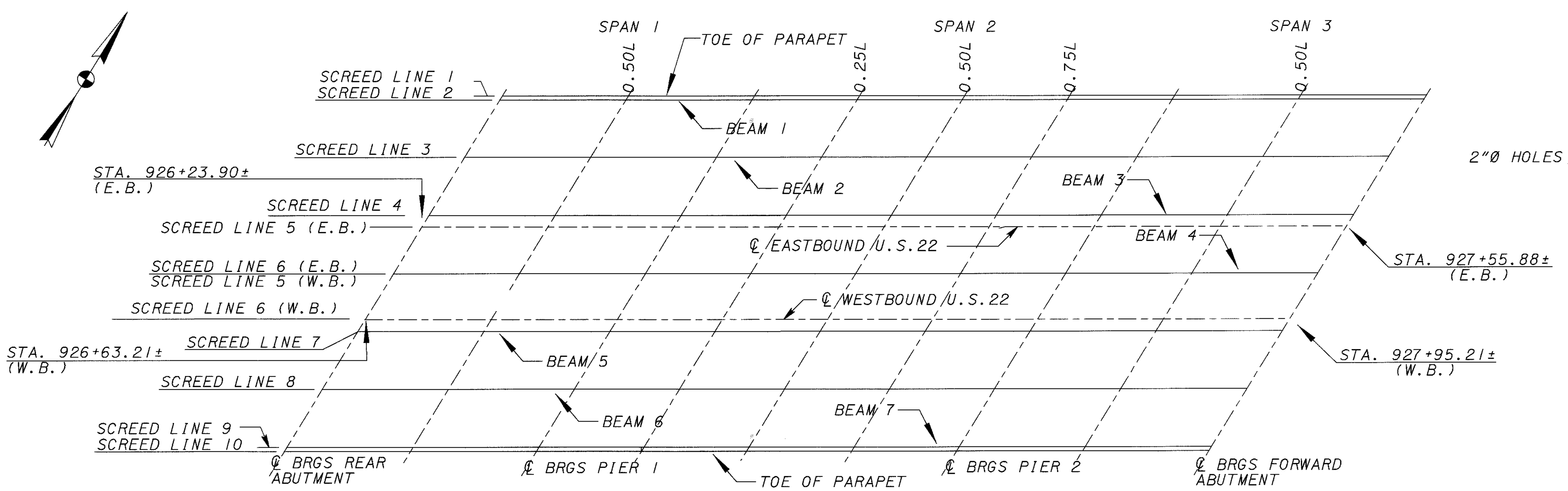
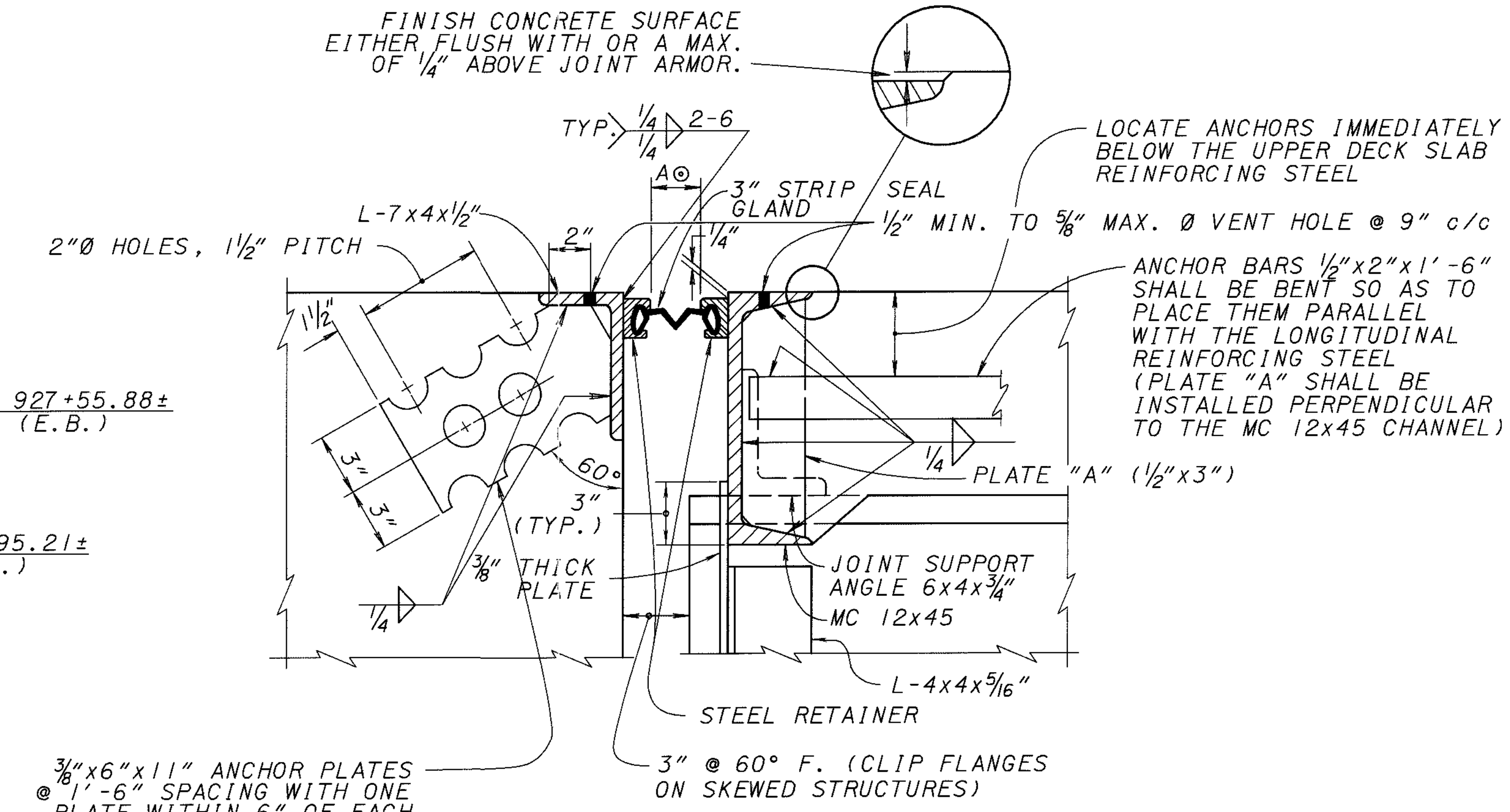


SCREED LINES LAYOUT



STRIP SEAL EXPANSION JOINT DETAIL SECTION (1/18)

NOTE: THE JOINT ASSEMBLY SHALL BE PLACED SO THAT THE 7x4x1/2 ANGLE AND THE MC12x45 CHANNEL REMAIN PARALLEL TO EACH OTHER AND PERPENDICULAR TO THE ROADWAY GRADIENT. THE STRIP SEAL GLAND SHALL BE INSTALLED IN ONE CONTINUOUS PIECE AFTER THE DECK CLOSURE POUR IS COMPLETE.

NOTES

1. SCREED ELEVATIONS
SCREED ELEVATIONS ARE FOR THE DECK SLAB SURFACE PRIOR TO CONCRETE PLACEMENT. ALLOWANCE HAS BEEN MADE FOR THE ANTICIPATED CALCULATED DEAD LOAD DEFLECTIONS.
2. L = SPAN LENGTH

SCREED ELEVATION TABLE - LEFT BRIDGE

		SCREED LINE 1		SCREED LINE 2		SCREED LINE 3		SCREED LINE 4		SCREED LINE 5		SCREED LINE 6		SCREED LINE 7		SCREED LINE 8		SCREED LINE 9		SCREED LINE 10	
SPAN NO.	LOCATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION
SPAN NO.1	0.00 L	926+83.65	1241.87	926+83.29	1241.89	926+78.23	1242.21	926+73.18	1242.52	926+68.12	1242.84	926+63.21	1243.14	926+63.06	1243.14	926+58.00	1243.20	926+52.94	1243.25	926+52.58	1243.26
	0.50 L	927+01.65	1241.20	927+01.29	1241.22	926+96.23	1241.54	926+91.18	1241.86	926+86.12	1242.17	926+81.21	1242.48	926+81.06	1242.48	926+76.00	1242.54	926+70.94	1242.60	926+70.58	1242.60
SPAN NO.2	0.00 L	927+19.65	1240.51	927+19.29	1240.54	927+14.23	1240.86	927+09.18	1241.18	927+04.12	1241.50	926+99.21	1241.81	926+99.06	1241.81	926+94.00	1241.87	926+88.94	1241.93	926+88.58	1241.94
	0.25 L	927+34.65	1239.96	927+34.29	1239.96	927+29.23	1240.28	927+24.18	1240.61	927+19.12	1240.93	927+14.21	1241.26	927+14.06	1241.24	927+09.00	1241.31	927+03.94	1241.37	927+03.58	1241.64
	0.50 L	927+49.65	1239.38	927+49.29	1239.38	927+44.23	1239.70	927+39.18	1240.03	927+34.12	1240.35	927+29.21	1240.70	927+29.06	1240.67	927+24.00	1240.74	927+18.94	1240.80	927+18.58	1240.84
	0.75 L	927+64.65	1238.79	927+64.29	1238.79	927+59.23	1239.12	927+54.18	1239.44	927+49.12	1239.77	927+44.21	1240.107	927+44.06	1240.09	927+39.00	1240.16	927+33.94	1240.22	927+33.58	1240.25
SPAN NO.3	0.00 L	927+79.65	1238.17	927+79.29	1238.19	927+74.23	1238.52	927+69.18	1238.85	927+64.12	1239.18	927+59.21	1239.50	927+59.06	1239.50	927+54.00	1239.57	927+48.94	1239.64	927+48.58	1239.65
	0.50 L	927+97.65	1237.44	927+97.31	1237.47	927+92.25	1237.80	927+87.18	1238.13	927+82.12	1238.46	927+77.21	1238.78	927+77.06	1238.79	927+71.99	1238.86	927+66.93	1238.93	927+66.58	1238.94
	1.00 L	928+15.65	1236.72	928+15.33	1236.74	928+10.26	1237.07	928+05.19	1237.41	928+00.13	1237.74	927+95.21	1238.06	927+95.06	1238.06	927+89.99	1238.14	927+84.92	1238.21	927+84.58	1238.22

SCREED ELEVATION TABLE - RIGHT BRIDGE

		SCREED LINE 1		SCREED LINE 2		SCREED LINE 3		SCREED LINE 4		SCREED LINE 5		SCREED LINE 6		SCREED LINE 7		SCREED LINE 8		SCREED LINE 9		SCREED LINE 10	
SPAN NO.	LOCATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION
SPAN NO.1	0.00 L	926+34.53	1244.03	926+34.17	1244.05	926+29.11	1244.37	926+24.05	1244.68	926+23.90	1244.69	926+18.99	1244.75	926+13.94	1244.80	926+08.88	1244.86	926+03.82	1244.91	926+03.46	1244.91
	0.50 L	926+52.53	1243.36	926+52.17	1243.39	926+47.11	1243.70	926+42.05	1244.02	926+41.90	1244.03	926+36.99	1244.09	926+31.94	1244.14	926+26.88	1244.20	926+21.82	1244.26	926+21.46	1244.26
SPAN NO.2	0.00 L	926+70.53	1242.68	926+70.17	1242.71	926+65.11	1243.03	926+60.05	1243.35	926+59.90	1243.36	926+54.99	1243.42	926+49.94	1243.48	926+44.88	1243.54	926+39.82	1243.60	926+39.46	1243.60
	0.25 L	926+85.52	1242.13	926+85.17	1242.14	926+80.11	1242.46	926+75.05	1242.78	926+74.90	1242.81	926+69.99	1242.85	926+64.93	1242.91	926+59.87	1242.98	926+54.81	1243.04	926+54.46	1243.06
	0.50 L	927+00.52	1241.57	927+00.16	1241.56	926+95.10	1241.88	926+90.04	1242.21	926+89.89	1242.25	926+84.98	1242.28	926+79.93	1242.34	926+74.87	1242.41	926+69.81	1242.47	926+69.45	1245.51
	0.75 L	927+15.51	1240.97	927+15.16	1240.97	927+10.10	1241.30	927+05.04	1241.63	927+04.89	1241.66	926+99.98	1241.70	926+94.92	1241.77	926+89.86	1241.84	926+84.80	1241.90	926+84.45	1241.93
SPAN NO.3	0.00 L	927+30.51	1240.36	927+30.15	1240.38	927+25.09	1240.71	927+20.03	1241.04	927+19.88	1241.05	927+14.97	1241.12	927+09.91	1241.19	927+04.86	1241.26	926+99.80	1241.32	926+99.44	1241.33
	0.50 L	927+48.51	1239.64	927+48.14	1239.67	927+43.09	1240.00	927+38.03	1240.33	927+37.88	1240.34	927+32.98	1240.41	927+27.92	1240.48	927+22.87	1240.55	927+17.82	1240.62	927+17.44	1240.62
	1.00 L	927+66.51	1238.92	927+66.13	1238.94	927+61.08	1239.27	927+56.03	1239.61	927+55.88	1239.61	927+50.98	1239.69	927+45.93	1239.76	927+40.89	1239.83	927+35.84	1239.91	927+35.44	1239.91

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DATE 3/00
STRUCTURE FILE NUMBER 3401114L 3401081R
REVIEWED JR
DRAWN DEK
REVISED
DESIGNED MTO
CHECKED PLC

SCREED ELEVATION TABLES
BRIDGE NO. HAS-22-1749 (L.& R.) OVER S.R. 9

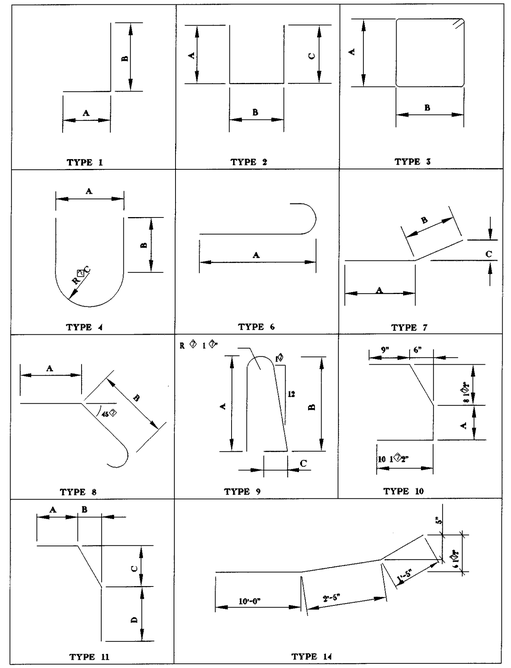
HAS-22-17.48

REINFORCING STEEL LIST

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	D	INCR.
SUPERSTRUCTURE-STAGE2									
S401	186	40'-0"	4970	STR					
S402	62	19'-10"	822	STR					
S501	264	40'-0"	11014	STR					
S502	88	21'-10"	2003	STR					
S503	2 S.O. 31	4'-1" TO 30'-7"	1121	STR					11"
S504	422	31'-6"	13865	STR					
S505	2 S.O. 31	4'-1" TO 30'-7"	1121	STR					11"
S506	2 S.O. 31	4'-1" TO 30'-7"	1121	STR					11"
S507	422	31'-6"	13865	STR					
S508	2 S.O. 31	4'-1" TO 30'-7"	1121	STR					11"
S509	4 S.O. 4	1'-10" TO 3'-2"	42	STR					4"
S510	296	6'-0"	1852	9	2'-9"	2'-6"			
S601	296	2'-6"	1112	1	11"	1'-8"			
S602	296	3'-1"	1370	10	11"				
S603	12	40'-0"	724	STR					
S604	4	23'-10"	144	STR					
S605	124	23'-11"	1981	STR					
SUPERSTRUCTURE-STAGE1									
S401	132	40'-0"	3527	STR					
S402	44	19'-10"	583	STR					
S501	192	40'-0"	7680	STR					
S502	64	21'-10"	1457	STR					
S509	4 S.O. 4	1'-10" TO 3'-2"	42	STR					4"
S510	296	6'-0"	1852	9	2'-9"	2'-6"	8"		
S511 *	2 S.O. 20	4'-1" TO 20'-9"	518	STR					11"
S512 *	446	21'-8"	10079	STR					
S513 *	2 S.O. 20	4'-1" TO 20'-9"	518	STR					11"
S514 *	2 S.O. 20	4'-1" TO 20'-9"	518	STR					11"
S515 *	446	21'-8"	10079	STR					
S516 *	2 S.O. 20	4'-1" TO 20'-9"	497	STR					11"
S601	296	2'-6"	1112	1	11"	1'-8"			
S602	296	3'-1"	1370	10	11"				
S605	84	23'-11"	1406	STR					
			99486	lbs.	**				

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	D	E	INCR.
SUBSTRUCTURE										
A501 *	8	25'-6"	213	STR						
A502	8	35'-8"	298	STR						
A503 *	8	26'-2"	218	STR						
A504	8	35'-8"	298	STR						
A505	24	7'-9"	194	2	3'-9"	6"	3'-9"			
A506	4	2'-4"	10	STR						
A507	16	2'-8"	45	STR						
A508	8	2'-10"	24	STR						
A509	4	2'-11"	12	STR						
A601	248	7'-1"	2639	2	3'-3"	11"	3'-3"			
A602	248	5'-1"	1894	2	2'-0"	1'-5"	2'-0"			
A1001	6	35'-8"	921	STR						
A1002	6	26'-2"	676	STR						
A1003	6	35'-8"	921	STR						
A1004	6	25'-6"	658	STR						
D801	138	5'-5"	1996	8	1'-5"	3'-0½"				
W501	16	13'-10"	231	14	10'-0"	2'-5"	1'-5"	6½"	5"	
W502	48	13'-10"	693	STR						
W503	38	6'-0"	238	9	2'-6"	2'-9"	8"			
W504	96	3'-0"	300	6	2'-5"					
W505	48	6'-3"	313	STR						
W506	10	17'-4"	181	STR						
W507	10	16'-10"	176	STR						
W508	10	17'-8"	184	STR						
W509	10	18'-0"	188	STR						
W510	6	19'-6"	122	STR						
W511	6	19'-0"	119	STR						
W512	6	20'-2"	126	STR						
W513	6	20'-6"	128	STR						
W601	182	4'-6"	1230	STR						
W602	NOT USED									
W603	134	3'-8"	738	11	8"	6"	8½"	2'-3"		
W604	8	6'-7"	79	STR						
W605	4 S.O. 17	4'-1" TO 3'-5"	383	STR						½"
W606	4	4'-1"	25	STR						
W607	12	3'-5"	62	STR						
W608	4 S.O. 17	4'-3" TO 3'-7"	400	STR						½"
W609	4	4'-3"	26	STR						
W610	4	3'-7"	22	STR						
W611	4 S.O. 17	3'-5" TO 2'-8"	310	STR						½"
W612	8	2'-8"	32	STR						
W613	4 S.O. 18	3'-5" TO 2'-8"	310	STR						½"
			17633	lbs.	**					

BENDING DIAGRAMS



NOTES:

1. THE BAR SIZE NUMBER IS SPECIFIED ON THE PLANS IN THE BAR MARK COLUMN. THE FIRST DIGIT WHERE THREE DIGITS ARE USED, AND THE FIRST TWO DIGITS WHERE FOUR ARE USED, INDICATES THE BAR SIZE NUMBER. FOR EXAMPLE, S501 IS A NO. 5 BAR. BAR DIMENSIONS SHOWN ARE OUT TO OUT UNLESS OTHERWISE NOTED. R INDICATES INSIDE RADIUS, UNLESS OTHERWISE NOTED.

2. ALL REINFORCING STEEL SHALL BE EPOXY COATED. PAYMENT FOR REINFORCING STEEL SHALL BE INCLUDED WITH APPROPRIATE 844 OR 894 CONCRETE ITEMS.

3. "STR" IN THE TYPE COLUMN INDICATES STRAIGHT BARS.

4. S.O. DENOTES "SERIES OF".

5. REFER TO C.M.S. SECTION 509.05 FOR STANDARD BEND DIMENSIONS.

6. ALL REINFORCING STEEL CLEARANCES ARE 2" UNLESS OTHERWISE NOTED.

7. MECHANICAL CONNECTORS: AN APPROVED TYPE OF MECHANICAL CONNECTOR FOR REINFORCING BARS SHALL BE PROVIDED. INSTALLATION OF CONNECTORS SHALL CONFORM WITH MANUFACTURER RECOMMENDED PROCEDURES. IF A DOWEL BAR SPLICE TYPE OF CONNECTOR IS FURNISHED, THE MINIMUM DOWEL BAR LENGTH TO BE INCLUDED WITH THE CONNECTOR SHALL BE AS GIVEN BY THE DIMENSION "L" SHOWN BELOW.

- #4 REINFORCING BARS L = 2'-3"
- #5 REINFORCING BARS L = 2'-11"
- #6 REINFORCING BARS L = 3'-5"
- #8 REINFORCING BARS L = 5'-9"

CONNECTORS AND DOWEL BARS USED WITH EPOXY COATED BARS SHALL BE EPOXY COATED. COATING FOR BOTH CONNECTORS AND BARS SHALL CONFORM TO THE SAME SPECIFICATIONS WITH RESPECT TO COLOR, CONTINUITY AND UNIFORMITY MAY BE REPAIRED AS DIRECTED BY THE ENGINEER OR THEY SHALL BE REPLACED WITH MATERIAL WHICH MEETS THE SPECIFICATIONS.

FOR BARS UTILIZING A MECHANICAL CONNECTOR, THE BAR LENGTH FOR PAYMENT IS MEASURED TO THE CONSTRUCTION JOINT. EXTRA BAR LENGTH AND/OR BAR END PREPARATION MAY BE NECESSARY DEPENDING UPON THE TYPE OF MECHANICAL CONNECTOR FURNISHED AND THOSE COSTS SHALL BE INCLUDED IN THE BID PRICE FOR THE APPROPRIATE 844 OR 894 ITEM. CONNECTORS AND DOWEL BAR EXTENSIONS SHALL CONFORM TO ITEM 509 AND BE INCLUDED IN THE BID PRICE.

* WITH MECHANICAL CONNECTOR

** FOR INFORMATION PURPOSE ONLY.

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter, BLENDON VIEW OFFICE PARK, 8055 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED PLC | DRAWN CLP | CHECKED DEK | REVISED | REVISED JR 3/00 | DATE | STRUCTURE FILE NUMBER 3401111 3401081R

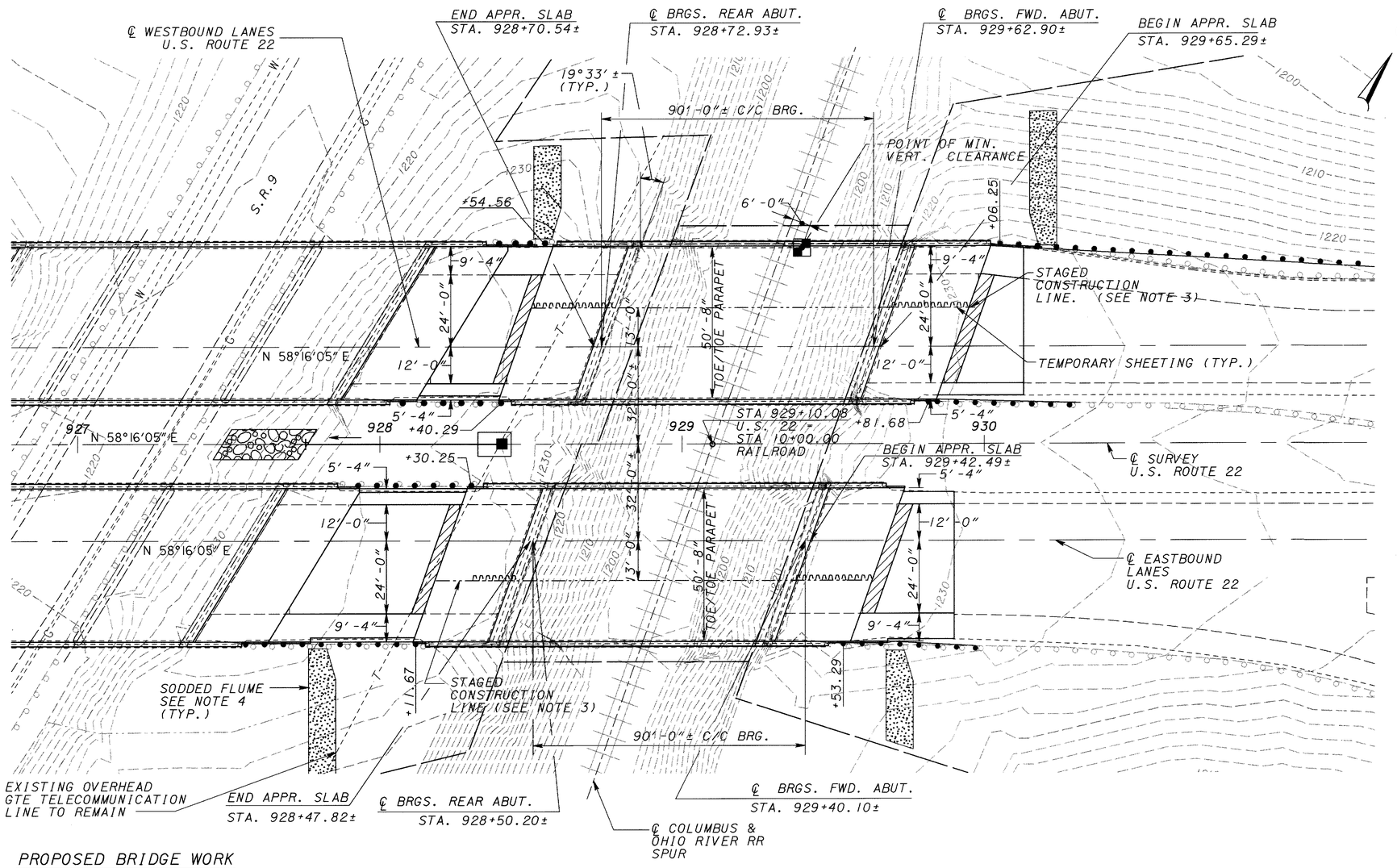
REINFORCING STEEL LIST
BRIDGE NO. HAS-22-1749 (L. & R.)
OVER S.R. 9

HAS-22-17.48

20/20

44/67

FILE: S:\projects\35765\BRIDGE\SR9\t5936rsl.dgn
DATE: 10-Apr-00 16:37



PROPOSED BRIDGE WORK

1. REMOVE EXISTING ABUTMENT BACKWALL DOWN TO THE TOP OF THE EXISTING BEAM SEAT. REMOVE PORTION OF WINGWALLS AS SHOWN ON PLANS. CONSTRUCT NEW CONCRETE BACKWALLS AND PORTIONS OF WINGWALLS
2. INSTALL NEW POROUS BACKFILL WITH FILTER FABRIC BEHIND THE ABUTMENTS AND ALONG THE WINGWALLS.
3. CONSTRUCT NEW FULL WIDTH APPROACH SLABS.
4. REPLACE EXISTING STRUCTURAL STEEL CROSSFRAMES AS SHOWN ON PLANS.
5. REMOVE ALL SCUPPERS AND SUPPORTS. GRIND SMOOTH THE SCUPPER SUPPORT TO BEAM CONNECTIONS.
6. PLACE CONCRETE BENEATH AND BEHIND UNDERCUT ABUTMENT FOUNDATIONS.
7. REMOVE ROCK OVERHANGS FROM SLOPES IN FRONT OF ABUTMENTS.
8. REPAIR EXISTING SUBSTRUCTURE UNITS. PATCH UNSOUND AREAS OF CONCRETE AS NOTED ON THE PLANS. REPAIR CRACKS IN CONCRETE BY EPOXY INJECTION.
9. CONSTRUCT A NEW REINFORCED CONCRETE DECK SLAB WITH 36″ HIGH CONCRETE PARAPETS. INSTALL WELDED STUD SHEAR CONNECTORS TO MAKE THE NEW DECK COMPOSITE WITH THE STEEL BEAMS FOR THE COMPLETE LENGTH OF THE BRIDGE. INSTALL NEW STRIP SEAL EXPANSION JOINTS AT THE ABUTMENTS.
10. PAINT STRUCTURAL STEEL WITH SYSTEM OZEU.
11. APPLY EPOXY CONCRETE SEALER TO EXPOSED PORTIONS OF DECK FASCIAS, ABUTMENTS, AND PIERS.
12. RESET AND REALIGN ALL BEARINGS.

STRUCTURE PLANS REVIEWED BY URS CONSULTANTS,
B.K.L. DATE 5/17/00

TRAFFIC DATA

CURRENT YEAR ADT (2000) - 5300
DESIGN YEAR ADT (2020) - 6300
DESIGN YEAR ADTT (2020) - 1575

BENCH MARK

TOP OF SOUTHWEST ANCHOR BOLT OF SOUTHWEST OVERHEAD FREEWAY SIGN POLE AT STA. 926+37.5, 10′ LEFT. EL. =1243.94

NOTES:

1. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
2. SEE SHEET 2/23 FOR PROFILES.
3. SEE SHEET 6/23 FOR STAGED CONSTRUCTION SEQUENCE AND GEOMETRY.
4. SODDED FLUMES PER STANDARD CONSTRUCTION DRAWING **DM-3.1M**. SEE ROADWAY PLANS FOR DRAINAGE DETAILS.

EXISITING STRUCTURE

TYPE: SINGLE SPAN STEEL GIRDER (A373) WITH REINFORCED CONCRETE DECK ON STUB ABUTMENTS
SPANS: 90′-0″± LT. & 90′-0″± RT. c/c BEARINGS
ROADWAY: 49′-8″± t/t SAFETY CURBS
ORIGINAL DESIGN LOADING: CF-2000 (57)
SKEW: 19°33′ ± LEFT FORWARD
ALIGNMENT: TANGENT
APPROACH SLABS: AS-1-54 (25′ LONG)
WEARING SURFACE: CONCRETE
ORIGINAL DATE BUILT: 1960
STRUCTURE FILE #: 3401146 (L) & 3401170 (R)

PROPOSED STRUCTURE

PROPOSED WORK: EXISTING STEEL GIRDERS (PAINTED A373) WITH NEW COMPOSITE REINFORCED CONCRETE DECK ON REHABILITATED STUB ABUTS.
SPAN: 90′-0″± LT. & 90′-0″± RT. c/c BEARINGS
ROADWAY: 50′-8″ t/t PARAPETS
LOADING: HS20-44 (CASE 2) WITH ALTERNATE MILITARY LOADING
SKEW: 19°33′ ± LEFT FORWARD
APPROACH SLABS: AS-1-81 (25′ LONG)
WEARING SURFACE: MONOLITHIC CONCRETE
ALIGNMENT: TANGENT
CROWN: 0.0156
LATITUDE: N 40°17′00″ LONGITUDE: W 81°01′00″

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED BJM | DRAWN BJM | REVIEWED JR | DATE 3/00
CHECKED DEK | REVISED | STRUCTURE FILE NUMBER 3401146L 3401170R

HARRISON COUNTY
WAL 928+70.54± TO 929+65.29±
928+47.82± TO 929+42.49±
EAL

SITE PLAN
BRIDGE NO. HAS-22-1753 (L. & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

1/23
45/67

FILE: S:\pc\client\35765\BRIDGE\RR\S935sp3.dgn
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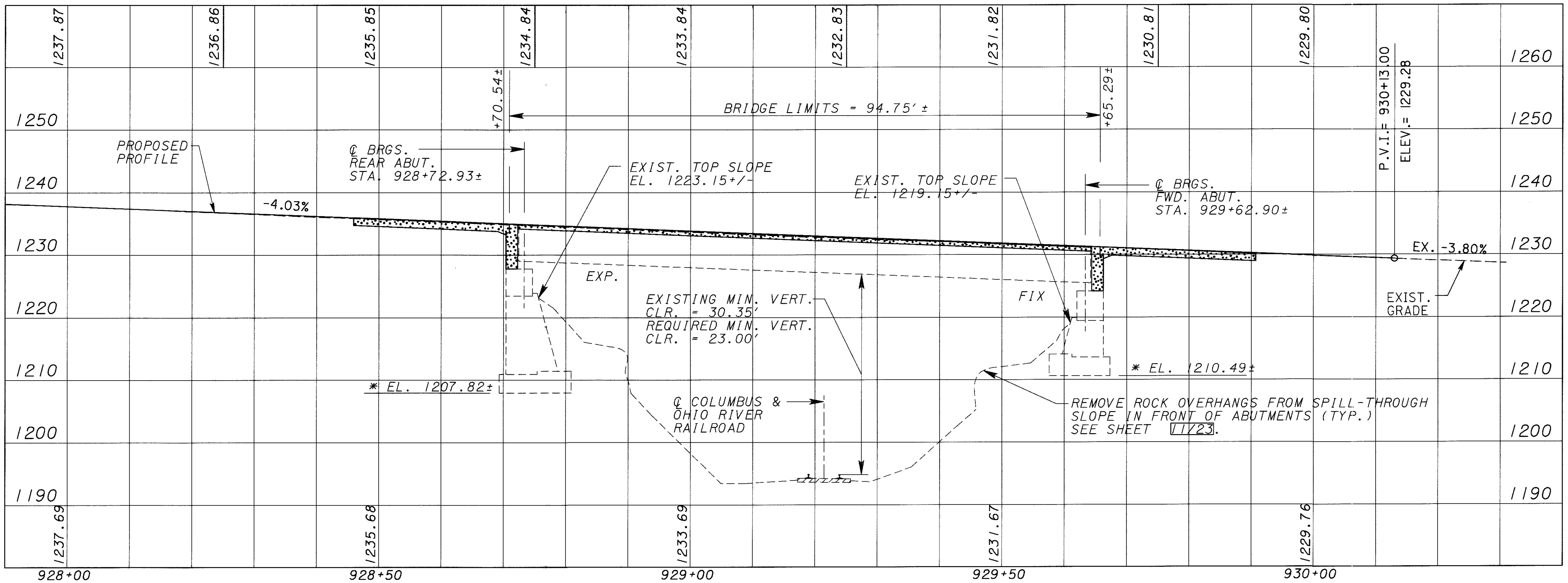
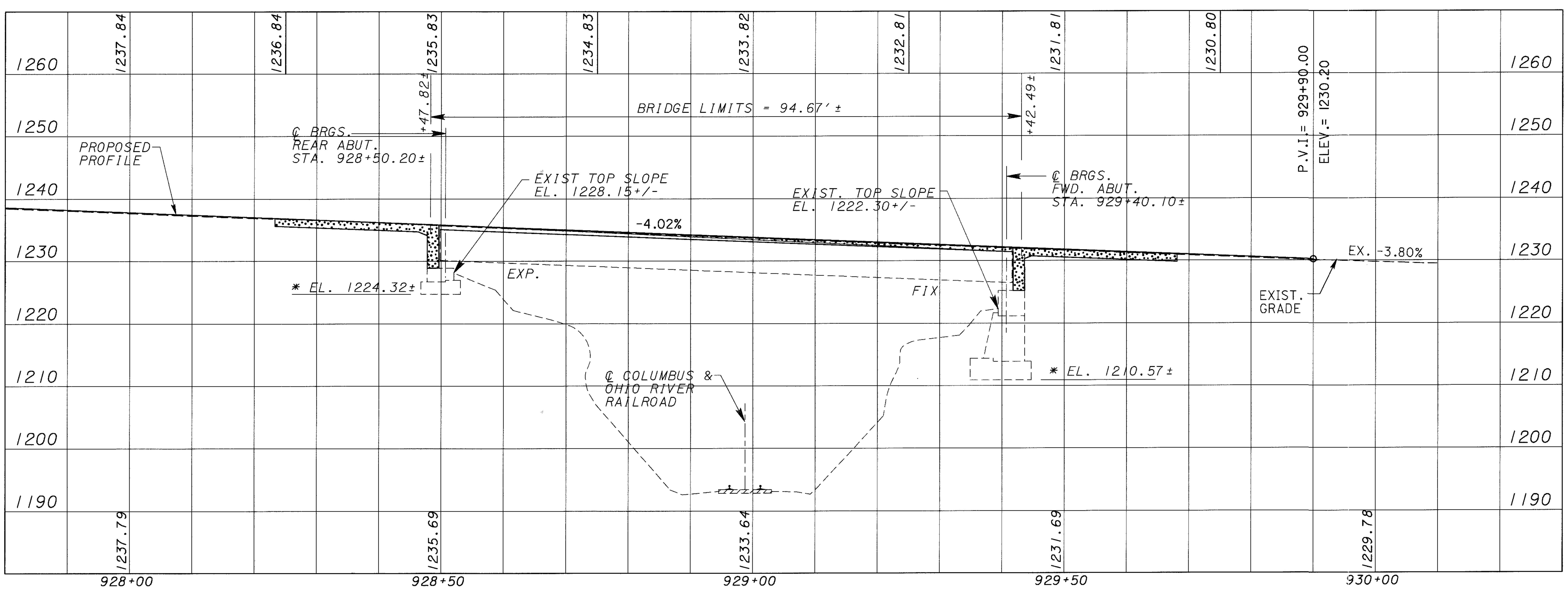


PROFILE ALONG ℄ WESTBOUND U.S. 22 - LEFT BRIDGE



PROFILE ALONG ℄ EASTBOUND U.S. 22 - RIGHT BRIDGE

∗ ELEVATIONS SHOWN ARE BASED ON EXISTING PLANS

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PIKE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
DEK	DEK	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
BJM		3401146L 3401170R	

PROFILES - LEFT & RIGHT BRIDGES

BRIDGE NO. HAS-22-1753 (L.& R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

2/23

46/67

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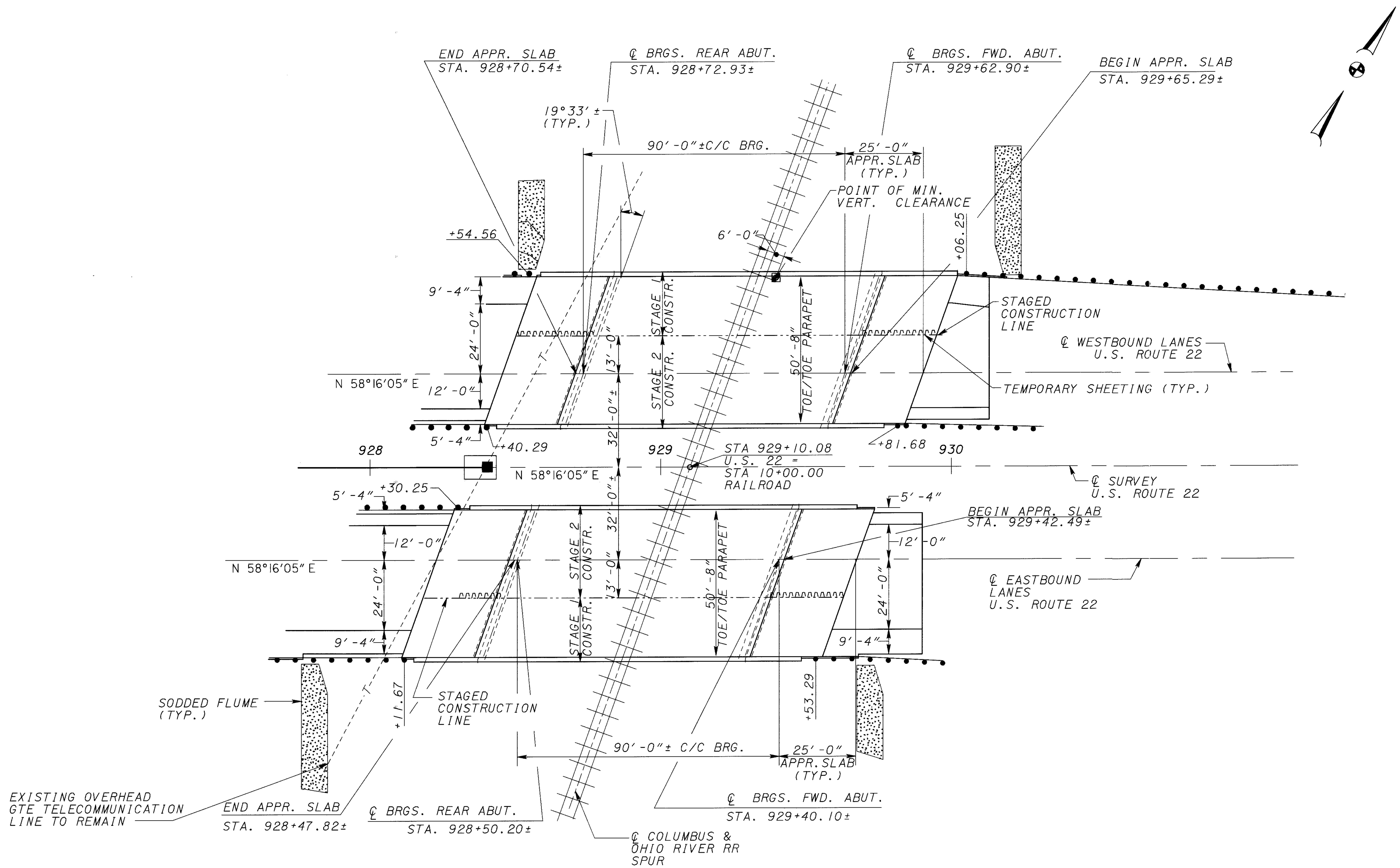

GENERAL PLAN

NOTES:

1. SEE SHEET 6/23 FOR STAGED CONSTRUCTION SEQUENCE AND GEOMETRY.

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter

DESIGNED	DRAWN	REVIEWED	DATE
DEK	DEK	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO		3401146L 3401170R	

GENERAL PLAN
BRIDGE NO. HAS-22-1753 (L. & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

2A/23

46A/67

FILE: s:\projects\35765\BRIDGE\RR\5936sp5.dgn
DATE: 11-Apr-2000 09:15

STRUCTURE GENERAL NOTES

REFERENCE SHALL BE MADE TO THE FOLLOWING STANDARD DRAWINGS:

AS-1-81	REVISED	09-15-94
BR-1	REVISED	01-06-99
EXJ-4-87	REVISED	02-14-97
GSD-1-96	DATED	02-12-97
PCB-91	REVISED	07-06-99

AND TO THE FOLLOWING SUPPLEMENTAL SPECIFICATIONS:

815	DATED	05-30-96
816	DATED	04-21-97
842	DATED	01-06-99
844	DATED	01-06-99
846	**DATED**	**09-09-97**
863	DATED	09-09-97
899	DATED	10-21-98
905	DATED	04-01-98
907	DATED	10-21-98
910	DATED	07-28-98
954	DATED	09-09-97

DESIGN SPECIFICATIONS:

THIS STRUCTURE CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1996, INCLUDING THE 1997 THROUGH 1998 INTERIM SPECIFICATIONS, AND THE O.D.O.T BRIDGE DESIGN MANUAL.

DESIGN LOADING:
HS20-44, (CASE 2) AND THE ALTERNATE MILITARY LOADING
FUTURE WEARING SURFACE 60 P.S.F.

DESIGN STRESSES:

HIGH PERFORMANCE CONCRETE - COMPRESSIVE STRENGTH 4500 P.S.I. (SUPERSTRUCTURE)
HIGH PERFORMANCE CONCRETE - COMPRESSIVE STRENGTH 4000 P.S.I. (SUBSTRUCTURE)

REINFORCING STEEL - ASTM A615, A616 OR A617
GRADE 60 MINIMUM YIELD STRENGTH 60,000 P.S.I.

NEW STRUCTURAL STEEL - ASTM A572 - YIELD STRENGTH 50,000 P.S.I.
EXISTING STRUCTURAL STEEL - ASTM A373 - YIELD STRENGTH 33,000 P.S.I.

DECK PROTECTION METHODS:

EPOXY COATED REINFORCING STEEL
2-1/2" CONCRETE COVER
SEALING OF CONCRETE SURFACES

MONOLITHIC WEARING SURFACE:

MONOLITHIC WEARING SURFACE IS ASSUMED, FOR DESIGN PURPOSES, TO BE 1" THICK.

ITEM 202 - PORTIONS OF STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN:
DESCRIPTION:

THIS ITEM SHALL INCLUDE THE ELEMENTS INDICATED IN THE PLANS AND GENERAL NOTES THAT ARE NOT SEPARATELY LISTED FOR PAYMENT. ITEMS TO BE REMOVED INCLUDE ALL EXISTING MATERIALS BEING REPLACED BY NEW CONSTRUCTION AND MISCELLANEOUS ITEMS THAT ARE NOT SHOWN TO BE INCORPORATED INTO THE FINAL CONSTRUCTION AND ARE DIRECTED TO BE REMOVED BY THE ENGINEER. THE USE OF EXPLOSIVES, HEADACHE BALLS AND/OR HOE-RAMS WILL NOT BE PERMITTED. THE METHOD OF REMOVAL AND THE WEIGHT OF HAMMER SHALL BE APPROVED BY THE ENGINEER. ALL WORK SHALL BE DONE IN A MANNER THAT WILL NOT CUT, ELONGATE OR DAMAGE THE EXISTING REINFORCING STEEL TO BE PRESERVED. CHIPPING HAMMERS SHALL NOT BE HEAVIER THAN THE NOMINAL 90-POUND CLASS. PNEUMATIC HAMMERS SHALL NOT BE PLACED IN DIRECT CONTACT WITH REINFORCING STEEL THAT IS TO BE RETAINED IN THE REBUILT STRUCTURE.

CONCRETE DECK REMOVAL:

THIS WORK SHALL INCLUDE THE REMOVAL OF CONCRETE DECKS INCLUDING SIDEWALKS, PARAPETS, RAILINGS, DECK JOINTS AND OTHER APPURTENANCES FROM STEEL SUPPORTING SYSTEMS (BEAMS, GIRDERS, CROSS FRAMES, ETC.). CARE SHALL BE TAKEN DURING DECK REMOVALS TO PROTECT PORTIONS OF SUCH SYSTEMS THAT ARE TO BE SALVAGED AND INCORPORATED INTO THE PROPOSED STRUCTURE. IN THIS RESPECT, THE USE OF EXPLOSIVES, HEADACHE BALLS AND/OR HOE RAM TYPE OF EQUIPMENT IS PROHIBITED.

PROTECTION OF TRAFFIC:

PRIOR TO DEMOLITION OF ANY PORTIONS OF THE EXISTING SUPERSTRUCTURE, THE CONTRACTOR SHALL SUBMIT PLANS FOR THE PROTECTION OF TRAFFIC (VEHICULAR, PEDESTRIAN, RAILWAY, ETC.) ADJACENT TO AND/OR UNDER THE STRUCTURE TO THE DIRECTOR FOR APPROVAL. THESE PLANS SHALL INCLUDE PROVISIONS FOR ANY DEVICES AND STRUCTURES THAT MAY BE NECESSARY TO ENSURE SUCH PROTECTION. TEMPORARY VERTICAL CLEARANCES SPECIFIED ON THE PLANS OR IN THE PROPOSAL SHALL BE MAINTAINED AT ALL TIMES EXCEPT AS OTHERWISE APPROVED BY THE DIRECTOR.

PROTECTION OF STEEL SUPPORT SYSTEMS:

BEFORE DECK SLAB CUTTING IS PERMITTED, THE OUTLINE OF PRIMARY STEEL MEMBERS IN CONTACT WITH THE BOTTOM OF THE DECK SHALL BE DRAWN ON THE SURFACE OF DECK. SMALL DIAMETER PILOT HOLES SHALL BE DRILLED 2 INCHES OUTSIDE THESE LINES TO CONFIRM THE LOCATION OF FLANGE EDGES. DECK CUTS OVER OR WITHIN 2 INCHES OF FLANGE EDGES SHALL NOT EXTEND LOWER THAN THE BOTTOM LAYER OF DECK SLAB REINFORCING STEEL. CUTS MADE OUTSIDE 2" OF FLANGE EDGES MAY EXTEND THE FULL DEPTH OF THE DECK. DURING CUTTING OF THE DECK SLAB, CARE SHALL BE TAKEN NOT TO DAMAGE STEEL MEMBERS THAT ARE TO BE INCORPORATED INTO THE PROPOSED STRUCTURE.

REMOVAL METHODS:

CONCRETE MAY BE REMOVED BY CUTTING AND BY MEANS OF HAND OPERATED PNEUMATIC HAMMERS EMPLOYING POINTED OR BLUNTED CHISEL TYPE TOOLS. FOR REMOVALS ABOVE STEEL MEMBERS, A HAMMER HEAVIER THAN 35 POUNDS BUT NOT TO EXCEED 90-POUNDS MAY BE USED AT THE APPROVAL OF THE ENGINEER, TO ENSURE ADEQUATE DEPTH CONTROL AND TO PREVENT NICKING OR GOUGING THE PRIMARY STEEL MEMBERS.

DECK REMOVALS:

DUE TO THE POSSIBLE PRESENCE OF WELDED ATTACHMENTS TO EXISTING STRUCTURE STEEL (FINISHING MACHINE, SCUPPER AND FORM SUPPORTS, ETC.), CARE SHALL BE TAKEN DURING DECK REMOVAL TO AVOID DAMAGING STRINGERS WHICH ARE TO REMAIN. STRINGERS DAMAGED BY THE CONTRACTOR'S REMOVAL OPERATIONS SHALL, AT NO COST TO THE PROJECT, BE REPLACED OR REPAIRED. PROPOSED REPAIRS, DEVELOPED BY A REGISTERED PROFESSIONAL ENGINEER, SHALL BE SUBMITTED IN WRITING FOR REVIEW AND APPROVAL BY THE DIRECTOR.

EXTRANEOUS MEMBERS:

EXISTING EXTRANEOUS MEMBERS (I.E., FINISHING MACHINE AND FORM SUPPORTS, ETC., AND THE SUPPORT FOR SCUPPERS AND BULB ANGLES WHICH ARE TO BE REMOVED) ATTACHED BY WELDED CONNECTIONS TO PORTIONS OF THE TOP FLANGES DESIGNATED "TENSION" SHALL BE REMOVED AND THE FLANGE SURFACES GROUND SMOOTH. GRINDING SHALL BE CAREFULLY DONE AND PARALLEL TO THE FLANGES.

LOADING LIMITATIONS:

NO PART OF THE STRUCTURE SHALL BE SUBJECTED TO UNIT STRESSES THAT EXCEED 136.5% OF THE ALLOWABLE UNIT STRESSES GIVEN IN THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES DUE EITHER TO DEMOLITION, ERECTION OR CONSTRUCTION METHODS, OR TO THE USE OR MOVEMENT OF DEMOLITION OR ERECTION EQUIPMENT ON OR ACROSS THE STRUCTURE. STRUCTURAL ANALYSIS COMPUTATIONS, BY A REGISTERED PROFESSIONAL ENGINEER, SHOWING THE ALLOWABLE STRESSES AND THE MAXIMUM STRESSES PRODUCED BY THE CONTRACTOR'S METHODS OR EQUIPMENT SHALL BE SUBMITTED TO THE DIRECTOR FOR REVIEW AND APPROVAL AT LEAST TWO WEEKS PRIOR TO THE START OF THE WORK.

CUT LINE CONSTRUCTION JOINT PREPARATION:

SAW CUT BOUNDARIES OF PROPOSED CONCRETE REMOVALS 1" DEEP. REMOVE CONCRETE TO A ROUGH SURFACE. WHERE PRACTICABLE, THE EXISTING REINFORCING STEEL WHERE REQUIRED IN THE PLANS SHALL BE LEFT IN PLACE. INSTALL DOWEL BARS IF SPECIFIED. PRIOR TO CONCRETE PLACEMENT ABRASIVELY CLEAN JOINT SURFACE AND EXPOSED REINFORCEMENT TO REMOVE LOOSE AND DISINTEGRATED CONCRETE AND LOOSE RUST. THE JOINT SURFACE AND EXPOSED REINFORCEMENT SHALL BE THOROUGHLY CLEANED OF ALL DIRT, DUST, OR OTHER FOREIGN MATERIAL BY THE USE OF WATER, AIR UNDER PRESSURE, OR OTHER METHODS THAT PRODUCE SATISFACTORY RESULTS CONCRETE BONDING SURFACES SHALL BE WET WITHOUT FREE WATER AS CONCRETE IS PLACED.

SUBSTRUCTURE CONCRETE REMOVAL:

SHALL BE BY MEANS OF APPROVED PNEUMATIC HAMMERS EMPLOYING POINTED AND BLUNT CHISEL TOOLS. HYDRAULIC HOE-RAM TYPE HAMMERS WILL NOT BE PERMITTED. THE WEIGHT OF THE HAMMER SHALL NOT BE MORE THAN 35 POUNDS FOR REMOVAL WITHIN 18-INCHES OF PORTIONS TO BE PRESERVED. OUTSIDE THE 18-INCH LIMIT, A HAMMER HEAVIER THAN 35 POUNDS, BUT NOT TO EXCEED 90 POUNDS, MAY BE USED AT THE APPROVAL OF THE ENGINEER. PNEUMATIC HAMMERS SHALL NOT BE PLACED IN DIRECT CONTACT WITH REINFORCING STEEL THAT IS TO BE RETAINED IN THE REBUILT STRUCTURE.

PAYMENT:

THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE BID, WHICH PRICE AND PAYMENT SHALL BE FULL COMPENSATION FOR ALL LABOR EQUIPMENT, MATERIALS AND INCIDENTALS NECESSARY TO COMPLETE THE WORK IN CONFORMANCE WITH THESE REQUIREMENTS, WITH PERTINENT PROVISIONS OF 202, AND TO THE SATISFACTION OF THE ENGINEER.

UTILITY LINES:

ALL EXPENSE INVOLVED IN RELOCATION (INSTALLING) THE AFFECTED UTILITY LINES SHALL BE BORNE BY THE UTILITY(IES). THE CONTRACTOR AND THE UTILITY(IES) ARE TO COOPERATE BY ARRANGING THEIR WORK IN SUCH A MANNER THAT INCONVENIENCE TO EITHER WILL BE HELD TO A MINIMUM.

EXISTING STRUCTURE VERIFICATION:

DETAILS AND DIMENSIONS SHOWN ON THESE PLANS PERTAINING TO THE EXISTING STRUCTURE HAVE BEEN OBTAINED FROM PLANS OF THE EXISTING STRUCTURE AND FROM FIELD OBSERVATIONS AND MEASUREMENTS. CONSEQUENTLY, THEY ARE INDICATIVE OF THE EXISTING STRUCTURE AND THE PROPOSED WORK BUT THEY SHALL BE CONSIDERED TENTATIVE AND APPROXIMATE. THE CONTRACTOR IS REFERRED TO CMS SECTIONS 102.05, 105.02 AND 863.07.

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

REPLACEMENT OF EXISTING REINFORCING STEEL:

ANY EXISTING REINFORCING BARS WHICH ARE TO BE INCORPORATED INTO THE NEW WORK AND ARE MADE UNUSABLE BY CONCRETE REMOVAL OPERATIONS SHALL BE REPLACED WITH NEW STEEL AT THE CONTRACTOR'S COST. ANY EXISTING REINFORCING BARS DEEMED BY THE ENGINEER TO BE UNUSABLE BECAUSE OF CORROSION SHALL BE REPLACED WITH NEW STEEL.

A CONTINGENCY QUANTITY OF 500 POUNDS OF REINFORCING STEEL IS INCLUDED UNDER ITEM SPECIAL, STRUCTURE, MISC.: REPLACEMENT OF EXISTING REINFORCING STEEL, TO BE USED AS DIRECTED BY THE ENGINEER.

THE NUMBER OF POUNDS OF REINFORCING STEEL PAID FOR AT THE CONTRACT UNIT PRICE SHALL BE THE ACTUAL POUNDS OF REINFORCING STEEL SPECIFIED BY THE ENGINEER AS UNUSABLE DUE TO CORROSION, AND SHALL INCLUDE PLACEMENT, DOWELING, BENDING, SUPPORTING, TIE WIRES AND TYING OF THAT SPECIFIED REINFORCING STEEL.

ITEM 516 - REFURBISH AND RESET BEARING, AS PER PLAN:

THIS ITEM SHALL INCLUDE ALL WORK NECESSARY TO PROPERLY ALIGN BRIDGE BEARINGS AS WELL AS THEIR CLEANING AND PAINTING. INCLUDED SHALL BE THE DISASSEMBLY OF THE BEARINGS, HAND TOOL CLEANING (GRINDING IF NECESSARY), PAINTING AS REQUIRED BY SYSTEM OZEU, REPLACEMENT OF ANY DAMAGED SHEET LEAD WITH NEW PREFORMED BEARING PADS (711.21), INSTALLATION OF ANY NECESSARY STEEL SHIMS OF THE SAME SIZE AS THE BEARINGS TO PROVIDE A SNUG FIT, REALIGNMENT OF THE UPPER BEARING PLATE BY REMOVING EXISTING WELDS AND REWELDING SO THAT THE BEARINGS ARE VERTICALLY ALIGNED AT 60 DEGREES F, LUBRICATING SLIDING SURFACES, AND REASSEMBLY OF THE BEARINGS. THE CONTRACTOR SHALL ASSURE THAT ALL BEARINGS ARE SHIMMED ADEQUATELY AND THAT NO BEAMS AND/OR BEARING DEVICES ARE "FLOATING". IN ADDITION, ALL LOOSE OR DETERIORATED ANCHORS SHALL BE TIGHTENED OR RESET AS NECESSARY AND AS DIRECTED BY THE ENGINEER. RESET ANCHORS SHALL BE 1¼ INCH DIAMETER THREADED RODS AND SHALL BE SET PER ITEM 510, DOWEL HOLES WITH NONSHRINK, NONMETALLIC GROUT (705.20). AT THE OPTION OF THE CONTRACTOR AND AT NO ADDITIONAL COST TO THE STATE, NEW BEARINGS OF THE SAME TYPE AS THE EXISTING MAY BE INSTALLED IN PLACE OF REFURBISHING THE BEARINGS. ALL WORK SHALL BE TO THE SATISFACTION OF THE ENGINEER. PAYMENT FOR ALL THE ABOVE DESCRIBED LABOR AND MATERIALS WILL BE MADE AT THE CONTRACT PRICE BID FOR ITEM 516 - REFURBISH AND RESET BEARING, AS PER PLAN.

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
MTO	DEK	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
PLC	...	3401/461 3401/700	

STRUCTURE GENERAL NOTES
BRIDGE NO. HAS-22-1753 (L & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

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STRUCTURE GENERAL NOTES

ITEM 516, JACKING AND TEMPORARY SUPPORT OF SUPERSTRUCTURE, AS PER PLAN:

THIS ITEM SHALL CONSIST OF FURNISHING ALL NECESSARY LABOR, MATERIALS, AND EQUIPMENT TO RAISE OR REPOSITION ANY EXISTING STRUCTURES TO THE DIMENSIONS AND REQUIREMENTS DEFINED IN THE PROJECT PLANS.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, INSTALLATION AND OPERATION OF AN ADEQUATE JACKING SYSTEM, INCLUDING ANY TEMPORARY OR PERMANENT SUPPORTS NECESSARY TO PERFORM THE WORK DESCRIBED IN THE PROJECT PLANS. THREE (3) SETS OF JACKING PLANS, WHICH INCLUDE THE INFORMATION DESCRIBED IN THIS NOTE, SHALL BE SUBMITTED TO THE DIRECTOR FOR APPROVAL AT LEAST THIRTY (30) DAYS BEFORE ACTUAL WORK IS TO BEGIN. THE PLANS SHALL BE PREPARED AND STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF OHIO.

JACKING SUBMITTALS SHALL INCLUDE AT LEAST THE FOLLOWING:

1. THE SIGNATURE AND NUMBER, OR PROFESSIONAL SEAL, OF THE REGISTERED PROFESSIONAL ENGINEER WHO PREPARED THE SUBMITTAL.

2. CALCULATIONS AND ANALYSIS OF THE STRUCTURE TO DETERMINE AND DEFINE THE ACTUAL LOADING APPLIED AT THE CONTRACTOR'S SELECTED JACKING POINTS.

3. A DRAWING SHOWING THE PHYSICAL AND DIMENSIONAL POSITION OF THE JACKS WITH RESPECT TO THE STRUCTURE, INCLUDING CLEARANCES AND CENTER OF LIFT.

4. A SCHEMATIC LAYOUT OF JACKS, CHECK VALVES, PUMPS WITH 3 WAY RETRACTOR VALVE, PRESSURE GAGES, FLOW CONTROL VALVES, ETC. IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. ALL JACKS FOR EACH ABUTMENT OR PIER SHALL BE CONNECTED TOGETHER. ALL JACKS AT EACH ABUTMENT OR PIER SHALL BE THE SAME SIZE.

5. ANALYSIS AND CALCULATIONS OF THE STRESSES INDUCED OR CREATED IN BOTH PRIMARY AND SECONDARY MEMBERS OF THE STRUCTURE, AND IN ANY TEMPORARY OR PERMANENT SUPPORTS. ALSO, DESIGN CALCULATIONS FOR ANY TEMPORARY OR PERMANENT SUPPORTS REQUIRED FOR THE SUPERSTRUCTURE.

6. PHYSICAL DIMENSIONS, MATERIALS, AND FABRICATION DETAILS OF ANY TEMPORARY OR PERMANENT SUPPORTS. HORIZONTAL AND VERTICAL MOVEMENT RESTRAINT SHALL BE PROVIDED.

7. A STEP BY STEP PROCEDURE DETAILING ALL STEPS IN THE JACKING OPERATION.

8. METHOD OF ATTACHMENT TO STRUCTURAL MEMBERS. WELDING TO TENSION AREAS WILL NOT BE PERMITTED.

THE ENTIRE SYSTEM INCLUDING JACKS SHALL HAVE 20% MORE CAPACITY THAN REQUIRED BASED ON CALCULATED LOADS.

FOR LIFTS GREATER THAN 1", JACKS SHALL HAVE LOCKING NUTS TO POSITIVELY LOCK AND SUPPORT THE STRUCTURE DURING THE LIFT.

JACKS SHALL HAVE A SWIVEL LOAD CAP, A DOMED PISTON HEAD, OR SOME OTHER DEVICE TO PROTECT AGAINST THE EFFECTS OF SIDE LOAD ON THE JACK.

JACKS ALONE SHALL NOT BE USED TO SUPPORT LOADS EXCEPT DURING THE ACTUAL JACKING OPERATION. TEMPORARY SUPPORTS, BLOCKING OR OTHER METHODS APPROVED BY THE DIRECTOR SHALL BE USED.

SINGLE ACTING RAMS WITH NO OVER-TRAVEL PROTECTION SYSTEM SHALL NOT BE USED.

SPARE EQUIPMENT SHALL BE AVAILABLE ON SITE FOR THE REQUIRED STRUCTURE RAISING TO PROCEED IN THE EVENT OF BREAKDOWN. A LIST OF SPARE EQUIPMENT SHALL BE PROVIDED TO THE ENGINEER.

AT A MINIMUM, A JACKING OPERATION SHALL LIFT ALL BEAMS AT ANY ONE ABUTMENT OR PIER SIMULTANEOUSLY. THE ONLY EXCEPTION IS THE SITUATION WHERE THE WORK INVOLVES REPLACING OR REHABILITATING INDIVIDUAL BEARINGS THAT REQUIRE NO PERMANENT SHIMMING AND WITH A HEIGHT OF LIFT NOT EXCEEDING 1/4 INCH.

MAXIMUM DIFFERENTIAL JACKING HEIGHT BETWEEN ANY ADJACENT ABUTMENTS OR PIERS SHALL BE 1".

DURING THE JACKING OPERATIONS, IF CRACKING OF THE CONCRETE SUPERSTRUCTURE, SEPARATION OF THE CONCRETE DECK FROM THE STEEL STRINGERS, OR OTHER DAMAGE TO THE STRUCTURE IS VISUALLY OBSERVED, THE JACKING OPERATION SHALL IMMEDIATELY CEASE AND APPROVED SUPPORTS SHALL BE INSTALLED. THE CONTRACTOR SHALL THEN ANAYLZE THE DAMAGE AND SUBMIT A METHOD OF CORRECTION TO THE ENGINEER FOR APPROVAL. ANY BEAMS THAT SEPARATE FROM THE DECK SHALL BE EPOXY INJECTED FOR THE DISTANCE OF THE SEPARATION IN ACCORDANCE WITH THE PROPOSAL NOTE "CONCRETE REPAIR BY EPOXY INJECTION". COST OF THIS EPOXY INJECTION OR OTHER REQUIRED REPAIRS SHALL BE BORNE BY THE CONTRACTOR.

THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER THAT THE BRIDGE BEARINGS ARE FULLY SEATED BETWEEN ALL CONTACT AREAS. IF FULL SEATING IS NOT ATTAINED, SUITABLE MEANS OF REPAIR, SUBJECT TO THE APPROVAL OF THE ENGINEER, WILL BE REQUIRED AT THE CONTRACTOR'S EXPENSE.

THE JACKING OPERATION SHALL BE DIRECTED BY A PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF OHIO, AND EMPLOYED BY THE CONTRACTOR. FAILURE TO HAVE A PROFESSIONAL ENGINEER PRESENT SHALL BE CAUSE FOR CEASING JACKING OPERATIONS.

PAYMENT SHALL BE MADE AT THE LUMP SUM PRICE BID FOR ITEM 516 - JACKING AND TEMPORARY SUPPORT OF SUPERSTRUCTURE, AS PER PLAN, AND SHALL INCLUDE ALL NECESSARY TOOLS, LABOR, EQUIPMENT AND MATERIALS NECESSARY TO COMPLETE THIS ITEM OF WORK AS SPECIFIED ABOVE.

INSPECTION OF EXISTING STRUCTURAL STEEL:
THE ENGINEER WILL VISUALLY INSPECT ALL EXISTING BUTT-WELDED SPLICES AND/OR TOP FLANGE COVER PLATE FILLET WELDS TO ENSURE THE WELDS, PLATES AND BEAMS OR GIRDERS ARE FREE OF DEFECTS AND CRACKS. IF THE DECK SLAB HAUNCH FORMS IMMEDIATELY ADJACENT TO SUCH WELDS INTERFERE WITH THE ENGINEER'S INSPECTION THEY SHALL BE REMOVED OR NOT BE ERECTED UNTIL AFTER THE INSPECTION. THE INSPECTION SHALL NOT TAKE PLACE UNTIL AFTER THE TOP FLANGES ARE CLEANED AS SPECIFIED IN SS 842.08, BUT IT SHALL BE DONE BEFORE THE DECK SLAB REINFORCEMENT IS INSTALLED. THE COST ASSOCIATED WITH THIS INSPECTION SHALL BE INCLUDED WITH ITEM SS 894, SUPERSTRUCTURE CONCRETE FOR PAYMENT. ANY CRACKS FOUND SHOULD BE REPORTED TO THE OFFICE OF STRUCTURAL ENGINEERING, BRIDGE CONSTRUCTION SPECIALIST, ALONG WITH SPECIFIC INFORMATION ON LOCATION OF THE CRACKS, LENGTH, AND DEPTH SO AN EVALUATION AND REPAIR OR REPLACEMENT RECOMMENDATION CAN BE MADE.

PAINTING OF STRUCTURAL STEEL:

NEW STEEL SHALL BE CLEANED AND PRIME PAINTED IN THE SHOP AND FIELD PAINTED WITH AN INTERMEDIATE AND FINISH COAT OF PAINT USING SYSTEM IZEU.
FOR PAY PURPOSES, CLEANING AND PRIME PAINTING NEW STEEL IS INCLUDED WITH ITEM 863, INTERMEDIATE AND FINISH PAINTING OF NEW STEEL WITH ITEM 816.

ITEM 503 - COFFERDAMS, CRIBS, AND SHEETING, AS PER PLAN:
TEMPORARY SHORING SHALL BE USED TO ACCOMPLISH THE PROPOSED CONSTRUCTION IN STAGES. THE DESIGN OF THE TEMPORARY SHORING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, BE DESIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF OHIO, AND CONFORM WITH 501.05. FOR APPROVAL, FIVE (5) COPIES OF THE DRAWINGS SHALL BE SUBMITTED TO THE DIRECTOR AND CONCURRENTLY, ONE COPY TO THE OFFICE OF STRUCTURAL ENGINEERING. CONSTRUCTION OF THE SHORING SHALL NOT BEGIN UNTIL AFTER WRITTEN APPROVAL HAS BEEN RECEIVED FROM THE DIRECTOR. PORTIONS OF THE TEMPORARY SHORING COMPOSED OF STEEL OR CONCRETE MAY BE LEFT IN PLACE AT THE DISCRETION OF THE ENGINEER. PORTIONS COMPOSED OF OTHER MATERIALS SHALL BE REMOVED PRIOR TO COMPLETION OF THE WORK.

ITEM 503 - UNCLASSIFIED EXCAVATION, INCLUDING ROCK AND SHALE, AS PER PLAN:
UNCLASSIFIED EXCAVATION SHALL BE IN ACCORDANCE WITH ITEM 503 EXCEPT THAT THE BACKFILL MATERIAL BEHIND THE ABUTMENTS SHALL BE 203 MATERIAL PLACED IN 6 INCH LIFTS.

ITEM 518 - 6" PERFORATED CORRUGATED PLASTIC PIPE, AS PER PLAN:

CORRUGATED PIPE USED IN ABUTMENT DRAINAGE SHALL BE 6 INCH DIAMETER, POLYVINYL CHLORIDE CORRUGATED SMOOTH INTERIOR PIPE, 707.42. THIS ITEM SHALL ALSO INCLUDE ALL COSTS FOR PLUGGING THE EXISTING WEEPHOLES WITH NON-SHRINK GROUT (705.22), AS SHOWN IN THE PLANS.

ITEM 518 - 6" NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS, AS PER PLAN:

CORRUGATED PIPE USED IN ABUTMENT DRAINAGE SHALL BE 6 INCH DIAMETER, POLYVINYL CHLORIDE CORRUGATED SMOOTH INTERIOR PIPE, 707.42.THIS ITEM SHALL INCLUDE ALL CONNECTIONS AND FITTINGS REQUIRED TO COMPLETE THE ABUTMENT DRAINAGE SYSTEM, AS WELL AS THE CORING AND SUBSEQUENT GROUTING OF HOLES THROUGH THE EXISTING ABUTMENT WALLS TO INSTALL THE PIPE AS SHOWN IN THE PLANS.

ITEM 519 - PATCHING CONCRETE STRUCTURE, AS PER PLAN:

ALL SURFACES TO BE PATCHED AND THE EXPOSED REINFORCING STEEL WITHIN SHALL BE THOROUGHLY CLEANED BY ABRASIVE BLASTING PRIOR TO THE CLEANING SPECIFIED BY 519.04. CLEANING SHALL PRECEDE APPLICATION OF THE PATCHING MATERIAL OR ERECTION OF THE FORMS BY NOT MORE THAN 24 HOURS.

ITEM 863 STRUCTURAL STEEL MEMBERS MISCELLANEOUS LEVEL FABRICATION, AS PER PLAN:

ALL SECTIONS OF SS 863 APPLY EXCEPT AS REVISED HEREIN. THE ENGINEER IS RESPONSIBLE FOR ENSURING ANY FABRICATED STEEL SUPPLIED UNDER THIS BID ITEM IS ACCEPTABLE. THE REQUIREMENTS FOR SUBMITTAL OF SHOP DRAWINGS TO THE OFFICE OF STRUCTURAL ENGINEERING IS WAIVED. THE CONTRACTOR SHALL SUPPLY THE ENGINEER WITH SHOP DRAWINGS, STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF OHIO, AND DATED AS PER 863.08, PRIOR TO ANY INCORPORATION OF FABRICATED STEEL AT THE PROJECT. THE ENGINEER SHALL ASSURE THE SUBMITTED DRAWINGS MATCH THE FABRICATED STEEL DELIVERED BEFORE THE STEEL IS INCORPORATED INTO THE WORK. ONCE THE ENGINEER IS SATISFIED WITH THE DRAWINGS, THE CONTRACTOR SHALL SUPPLY A COPY SET, STAMPED AND DATED AS PER 863.08, TO THE OFFICE OF STRUCTURAL ENGINEERING FOR RECORD PURPOSES. SS 863'S REQUIRED TEST DATA SUBMITTAL TO THE OFFICE OF STRUCTURAL ENGINEERING IS WAIVED, BUT THE CONTRACTOR'S WRITTEN ACCEPTANCE OF THE MATERIAL TEST REPORTS SHALL BE FURNISHED TO BOTH THE ENGINEER AND THE OFFICE OF STRUCTURAL ENGINEERING PRIOR TO INSTALLATION OF ANY STEEL.

AT OR BEFORE THE PRE-FABRICATION MEETING, THE ENGINEER MAY CHOOSE TO REQUEST ASSISTANCE FROM THE OFFICE OF STRUCTURAL ENGINEERING IN WHATEVER CAPACITY IS REQUIRED.

STEEL MEMBERS INCLUDED IN THIS ITEM INCLUDE INTERMEDIATE AND END CROSSFRAMES.

TEMPORARY SHORING

BECAUSE THE ABUTMENTS ARE RELATIVELY CLOSE TO THE EXISTING ROCK, TRADITIONAL TEMPORARY SHORING TECHNIQUES ARE NOT POSSIBLE. THE CONTRACTOR SHALL PROVIDE DETAILS FOR PROPERLY DESIGNED SHORING. THE DESIGN OF THE SHORING SHALL BE DONE BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF OHIO AND CONFORM TO 501.05. FOR APPROVAL, FIVE (5) COPIES OF THE DRAWINGS SHALL BE SUBMITTED TO THE DIRECTOR AND ONE (1) COPY TO THE OFFICE OF STRUCTURAL ENGINEERING. CONSTRUCTION OF THE SHORING SHALL NOT BEGIN UNTIL AFTER WRITTEN APPROVAL HAS BEEN RECEIVED FROM THE DIRECTOR.

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
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DESIGNED MTO | DRAWN DEK | REVIEWED JR | DATE 3/00
CHECKED PLC | REVISED | STRUCTURE FILE NUMBER 3401146L 3401170R

STRUCTURE GENERAL NOTES
BRIDGE NO. HAS-22-1753 (L.& R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

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DATE: 11-Apr-2000 09:23

COMPUTED BY : BJM DATE : 11/99
CHECKED BY : DEK DATE : 3/00

ESTIMATED STRUCTURE QUANTITIES

ITEM	ITEM EXTENSION	TOTAL LEFT BRIDGE	TOTAL RIGHT BRIDGE	UNIT	DESCRIPTION	LEFT BRIDGE				RIGHT BRIDGE				AS PER PLAN SHEET NO.
						ABUTS.	PIERS	SUPER.	GENERAL	ABUTS.	PIERS	SUPER.	GENERAL	
202	11203	LUMP	LUMP		PORTIONS OF STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN				LUMP				LUMP	3
503	11101	LUMP	LUMP		COFFERDAMS, CRIBS, AND SHEETING, AS PER PLAN				LUMP				LUMP	4
503	21331	LUMP	LUMP		UNCLASSIFIED EXCAVATION, INCLUDING ROCK AND SHALE, AS PER PLAN				LUMP				LUMP	4
503	31100	42	42	CU. YD.	ROCK EXCAVATION				42				42	
503	41101	27	29	CU. YD.	BACKFILL, AS PER PLAN	27				29				11
512	33000	4	4	SQ. YD.	TYPE 2 WATERPROOFING	4				4				
SPECIAL	51267502	505	506	SQ. YD.	SEALING OF CONCRETE SURFACES (EPOXY) *	295		210		296		210		
516	11211	114	114	LIN. FT.	STRUCTURAL EXPANSION JOINT INCLUDING ELASTOMERIC STRIP SEAL, AS PER PLAN			114				114		21
516	46801	12	12	EACH	REFURBISH AND RESET BEARING, AS PER PLAN	12				12				3
516	47001	LUMP	LUMP		JACKING AND TEMPORARY SUPPORT OF SUPERSTRUCTURE, AS PER PLAN				LUMP				LUMP	4
518	21200	59	72	CU. YD.	POROUS BACKFILL WITH FILTER FABRIC	59				72				
518	40001	108	108	LIN. FT.	6" PERFORATED CORRUGATED PLASTIC PIPE, AS PER PLAN	108				108				4
518	40011	14	14	LIN. FT.	6" NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS, AS PER PLAN	14				14				4
519	11101	440	158	SQ. FT.	PATCHING CONCRETE STRUCTURE, AS PER PLAN	440				158				4
SPECIAL	51912600	5		LIN. FT.	CONCRETE REPAIR BY EPOXY INJECTION *	5								
SPECIAL	53000300	500	500	POUND	STRUCTURE MISC.: REPLACEMENT OF EXISTING REINFORCING STEEL				500				500	3
601	20500	2	3	CU. YD.	CRUSHED AGGREGATE SLOPE PROTECTION	2				3				
816	00610	2832	2832	POUND	FIELD PAINTING OF NEW STEEL, INTERMEDIATE AND FINISH COAT, SYSTEM IZEU			2832				2832		
842	71100	67	56	CU. YD.	CONCRETE, MISC.: REPAIR OF UNDERCUT FOUNDATIONS USING CLASS F CONCRETE	67				56				11
844	48020	32	31	CU. YD.	HIGH PERFORMANCE CONCRETE, SUPERSTRUCTURE (PARAPET)	11		21		10		21		
844	48040	70	76	CU. YD.	HIGH PERFORMANCE CONCRETE, SUBSTRUCTURE	70				76				
844	49000	LUMP	LUMP		HIGH PERFORMANCE CONCRETE TRIAL MIX			LUMP				LUMP		
844	49010	LUMP	LUMP		HIGH PERFORMANCE CONCRETE TESTING			LUMP				LUMP		
863	10201	2832	2832	POUND	STRUCTURAL STEEL MEMBERS, MISCELLANEOUS LEVEL FABRICATION, AS PER PLAN			2832				2832		4
863	20000	1098	1098	EACH	WELDED STUD SHEAR CONNECTORS			1098				1098		
885	10000	LUMP	LUMP		SURFACE PREPARATION OF EXISTING STEEL WITH WARRANTY			8400 sq.ft.xx				8400sq.ft.xx		4
885	11000	LUMP	LUMP		FIELD PAINTING OF EXISTING STEEL, PRIME COAT, WITH WARRANTY			8400 sq.ft.xx				8400 sq.ft.xx		
885	12000	LUMP	LUMP		FIELD PAINTING OF EXISTING STEEL, INTERMEDIATE COAT, WITH WARRANTY			8400 sq.ft.xx				8400 sq.ft.xx		
885	13000	LUMP	LUMP		FIELD PAINTING OF EXISTING STEEL, FINISH COAT, WITH WARRANTY			8400 sq.ft.xx				8400 sq.ft.xx		
894	10000	144	144	CU. YD.	HIGH PERFORMANCE CONCRETE, FOR BRIDGE DECK WITH WARRANTY			144				144		

* SEE PROPOSAL NOTE

XX FOR INFORMATION ONLY

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED BJM | DRAWN MTO | CHECKED DEK | REVISED | REVIEWED JR | DATE 3/00

STRUCTURE FILE NUMBER
340146L
340170R

ESTIMATED STRUCTURE QUANTITIES
BRIDGE NO. HAS-22-1753 (L. & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

5/23

49/67

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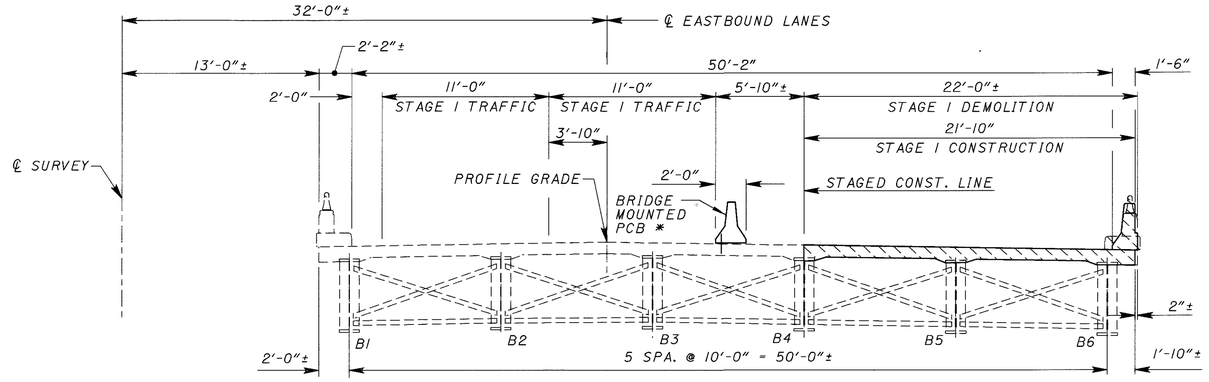
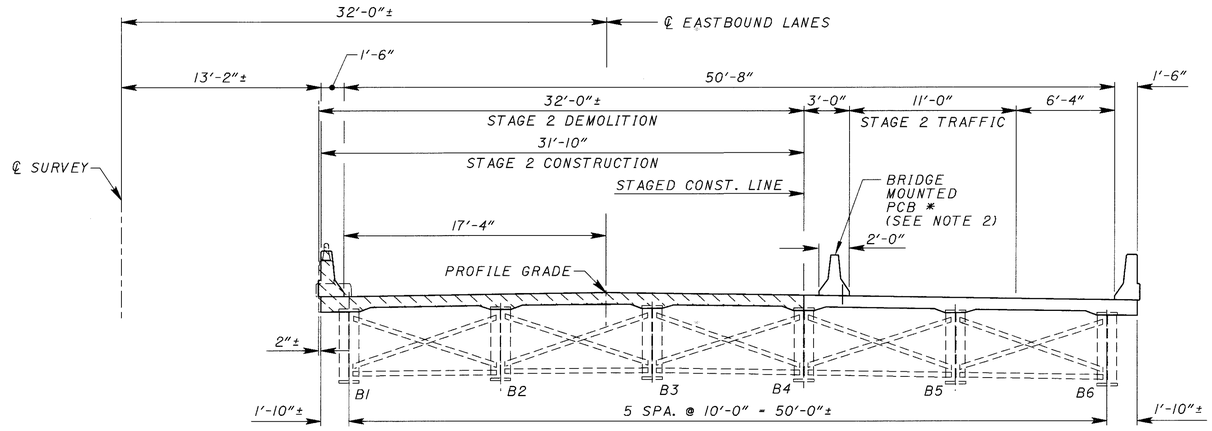
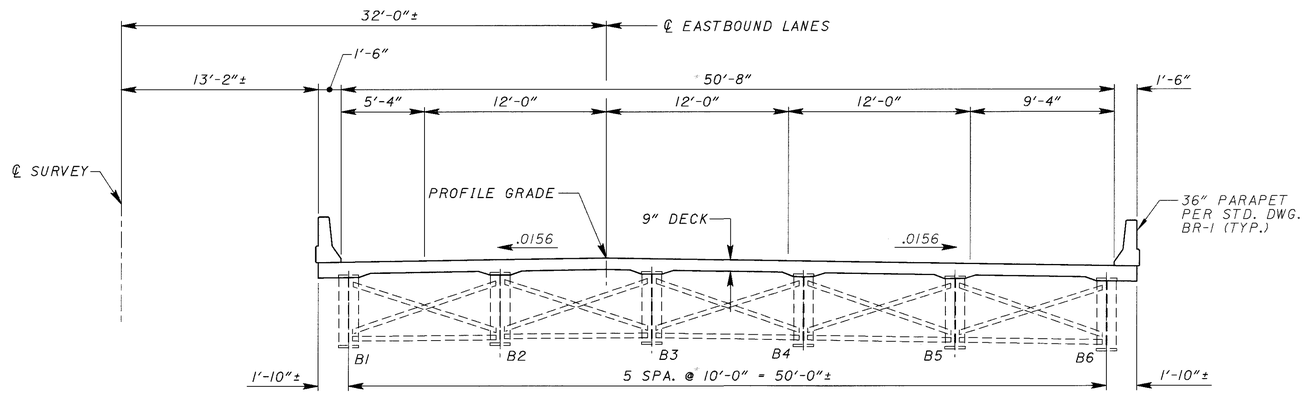


*PROVIDE 2 ANCHORS PER BARRIER SEGMENT

STAGE I



STAGE 2



PROPOSED TRANSVERSE SECTION

SUGGESTED OVERALL BRIDGE CONSTRUCTION SEQUENCE

1. CONSTRUCTION AREAS AND SEQUENCE WILL BE AS INDICATED BY THE STAGE NUMBER.
2. IMPLEMENT STAGE I TRAFFIC CONTROL. INSTALL PORTABLE CONCRETE BARRIER WITH TWO (2) ANCHORS PER BARRIER SEGMENT. PORTABLE CONCRETE BARRIER TO BE INSTALLED IN ACCORDANCE WITH STANDARD BRIDGE DRAWING PCB-91. INSTALL TEMPORARY SHEETING.
3. JACK AND TEMPORARILY SUPPORT GIRDERS 4, 5, AND 6, AND REFURBISH/RESET THE EXISTING BEARINGS. REMOVE EXISTING STRUCTURE WITHIN STAGE I REMOVAL LIMITS AS INDICATED. SAW-CUT EXISTING DECK FULL DEPTH ALONG STAGE I DEMOLITION LINE.
4. CONSTRUCT NEW PORTIONS OF THE STRUCTURE AS INDICATED IN THE PLANS, WITHIN THE STAGE I CONSTRUCTION LIMITS.
5. IMPLEMENT STAGE 2 TRAFFIC CONTROL. INSTALL PORTABLE CONCRETE BARRIER WITH TWO (2) ANCHORS PER BARRIER SEGMENT. PORTABLE CONCRETE BARRIERS TO BE INSTALLED IN ACCORDANCE WITH STANDARD BRIDGE DRAWING PCB-91 AND DESIGN DATA DRAWING PCB-DD.
6. JACK AND TEMPORARILY SUPPORT GIRDERS 1, 2, AND 3, AND REFURBISH/RESET THE EXISTING BEARINGS. REMOVE EXISTING STRUCTURE WITHIN STAGE 2 REMOVAL LIMITS AS INDICATED.
7. CONSTRUCT THE REMAINING PORTIONS OF THE NEW STRUCTURE AS INDICATED IN THE PLANS, WITHIN THE STAGE 2 CONSTRUCTION LIMITS.
8. REMOVE STAGE 2 TRAFFIC CONTROL.

NOTES:

1. TRANSVERSE SECTIONS SHOWN ARE FOR THE EASTBOUND STRUCTURE. WESTBOUND STRUCTURE IS SYMMETRICAL ABOUT SURVEY CENTERLINE. ALL SECTIONS ARE SHOWN LOOKING EAST.
2. ANCHORS FOR PORTABLE CONCRETE BARRIER USED FOR STAGE 2 SHALL BE PARTIAL -DEPTH, RESIN-BONDED PER STD. DWG. PCB-91. WHEN THE PCB IS NO LONGER REQUIRED. THE ANCHORS SHALL BE REMOVED FROM THE CONCRETE DECK AND THE DOWEL HOLES FILLED WITH AN EPOXY, NON-SHRINK GROUT PER THE STD. DWG. ALL COSTS FOR REMOVING THE ANCHORS AND FILLING THE DOWEL HOLES, INCLUDING LABOR, MATERIALS, EQUIPTMENT, AND INCIDENTALS, SHALL BE INCLUDED FOR PAYMENT WITH ITEM 622- PORTABLE CONCRETE BARRIER, 32", BRIDGE MOUNTED. QUANTITY CARRIED IN THE ROADWAY GENERAL SUMMARY, SHEET 10/67.

LEGEND

- PORTION OF STRUCTURE TO BE REMOVED

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter, BLENDON VIEW OFFICE PARK, 5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED BJM | DRAWN BJM | CHECKED MTO | REVIEWED JR | DATE 3/00 | REVISED | STRUCTURE FILE NUMBER 3401146L 3401170R

STAGE CONSTRUCTION DETAILS

BRIDGE NO. HAS-22-1753 (L & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

6 / 23

50 / 67

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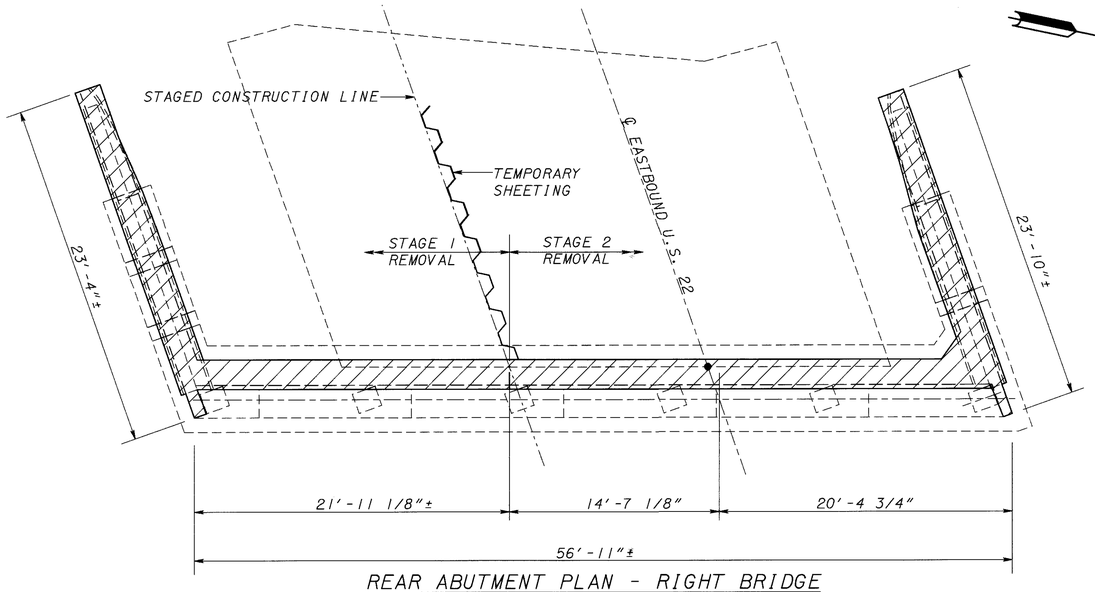
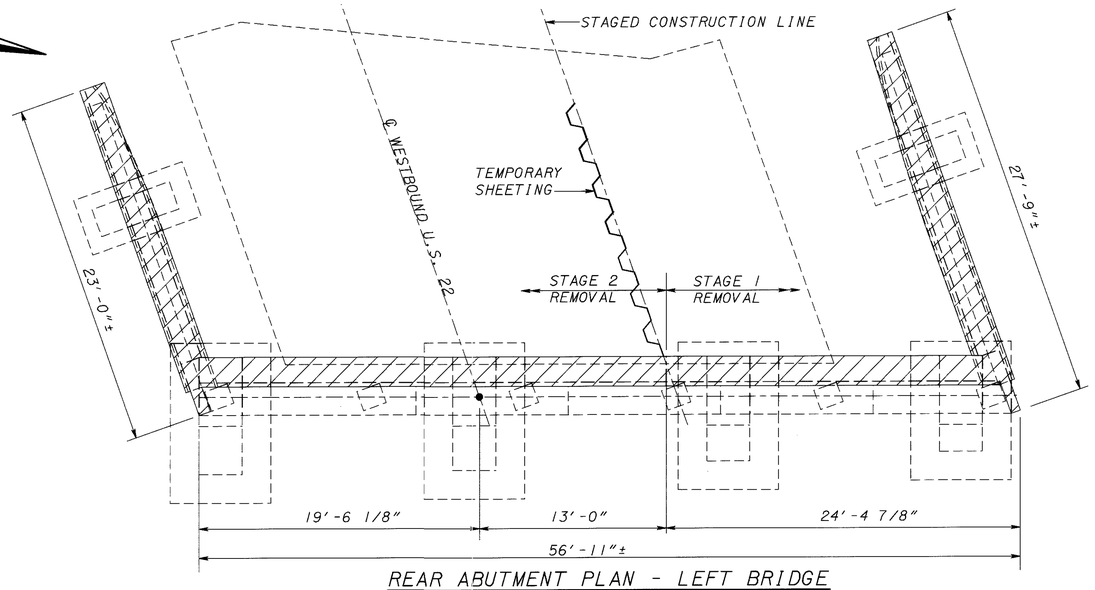
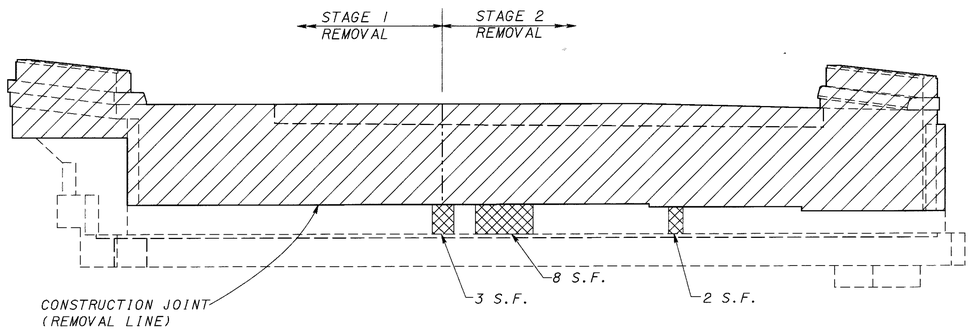
DATE: 11-Apr-00 09:57



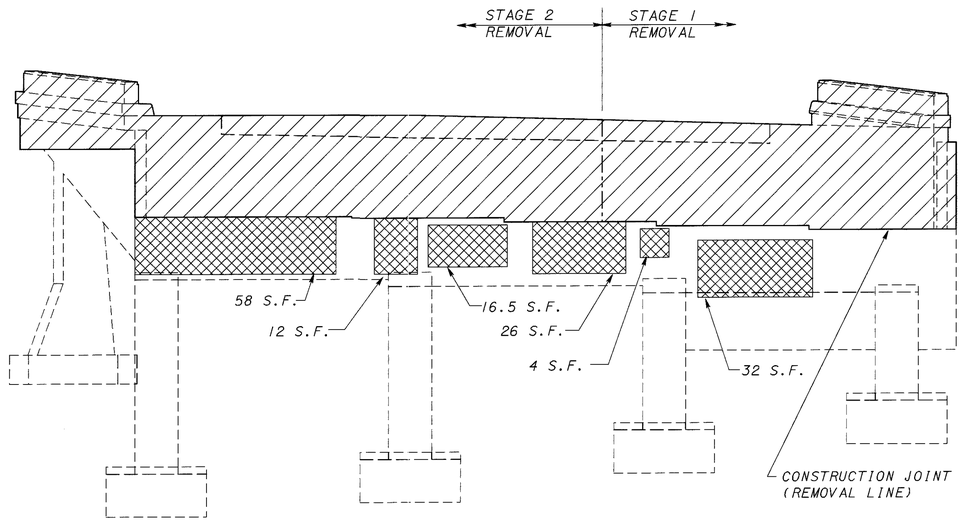
REAR ABUTMENT PLAN - RIGHT BRIDGE



REAR ABUTMENT PLAN - LEFT BRIDGE



REAR ABUTMENT ELEVATION - RIGHT BRIDGE



REAR ABUTMENT ELEVATION - LEFT BRIDGE

NOTES

1. FOR ABUTMENT SECTION, SEE SHEET 10/23.

CONCRETE PATCHING - SUMMARY TABLE (SQ. FT.)			
	MEASURED QUANTITY	CONTINGENCY FACTOR	TOTAL QUANTITY
LEFT BRIDGE	352	1.25	440
RIGHT BRIDGE	126	1.25	158

LEGEND

INDICATES EXISTING AREA TO BE REMOVED

INDICATES EXISTING AREA TO BE PATCHED

S.F. - SQUARE FEET

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
ELEANOR VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
MTO	CLP	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
PLC		3401/46L 3401/170R	

REAR ABUTMENT DEMOLITION PLANS

BRIDGE NO. HAS-22-1753 (L & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

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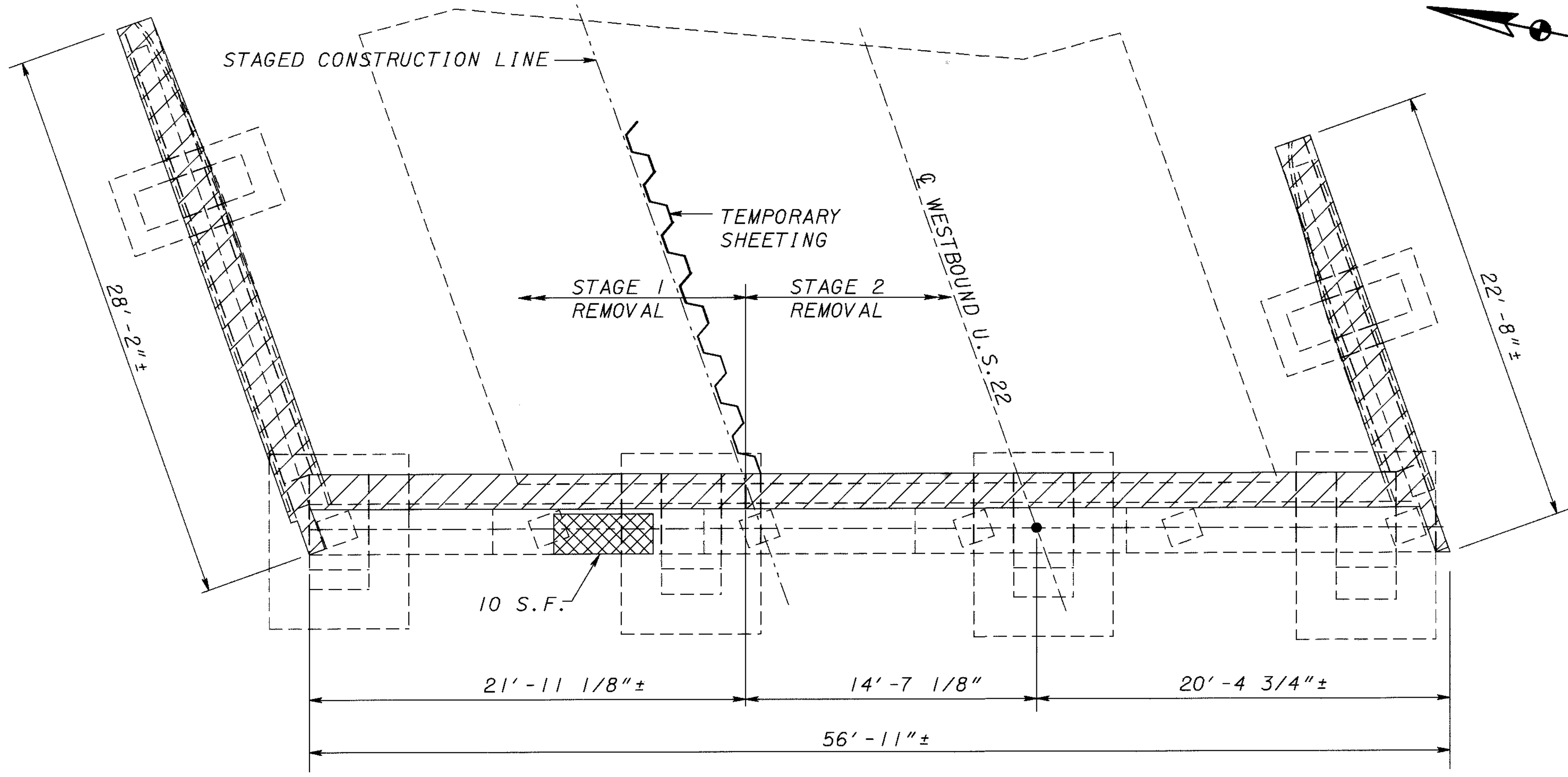
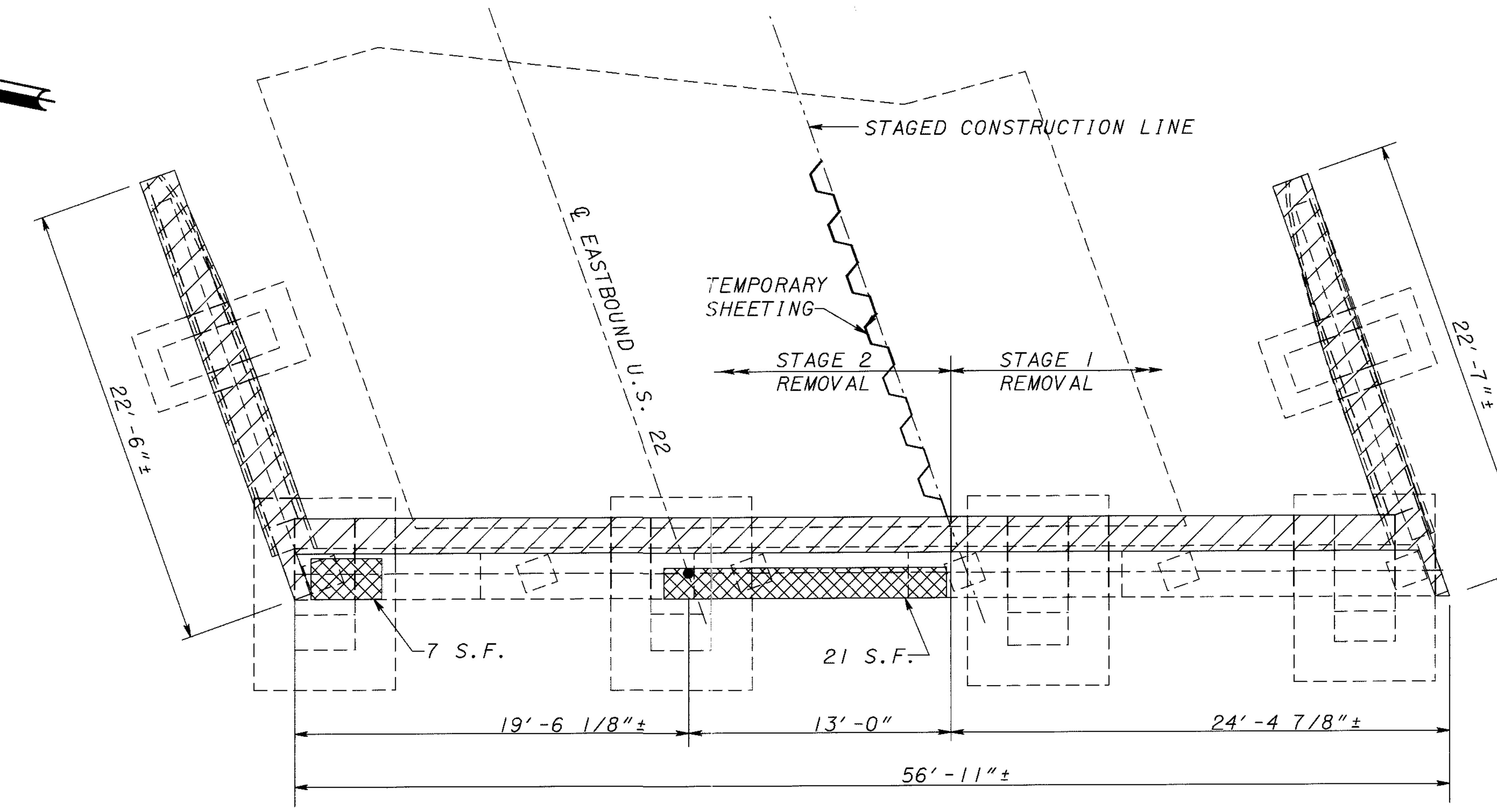
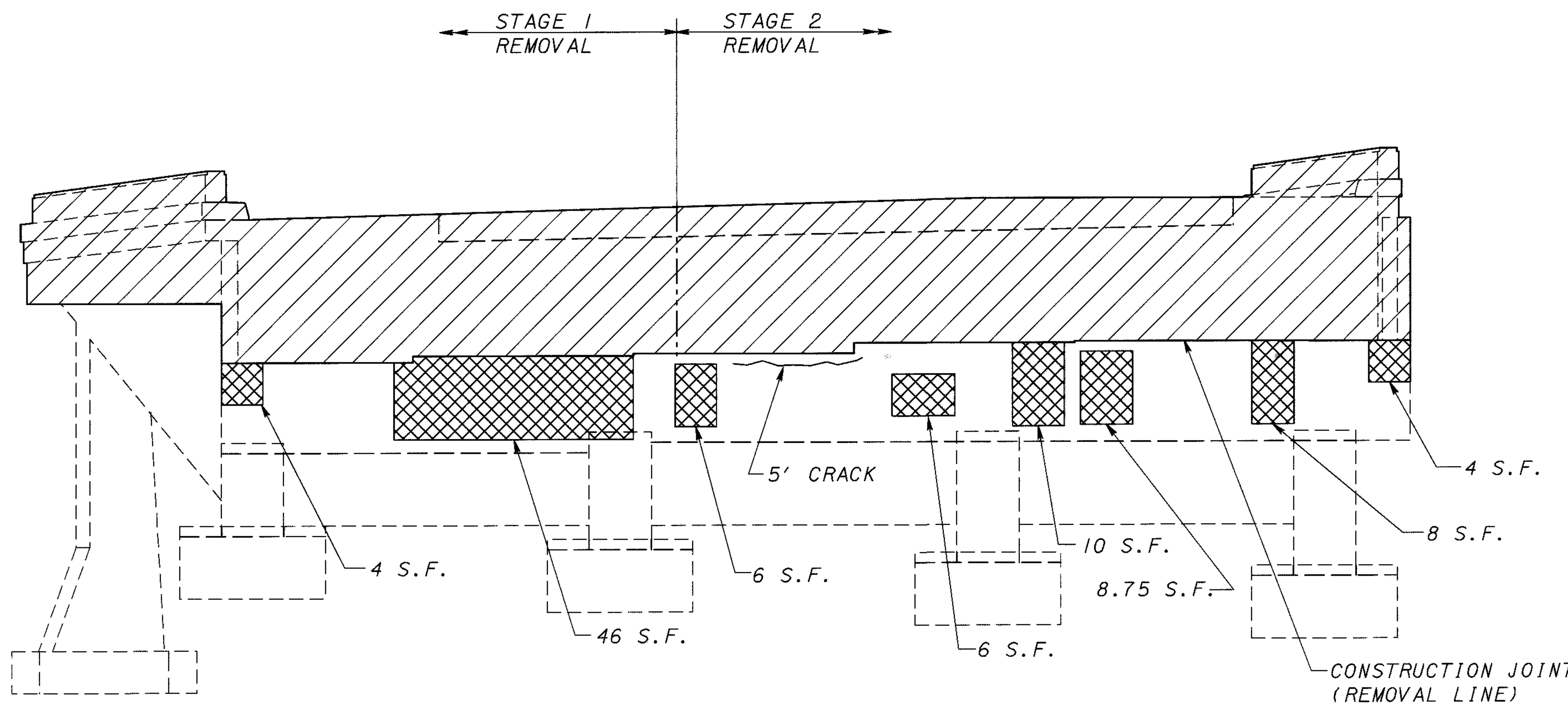


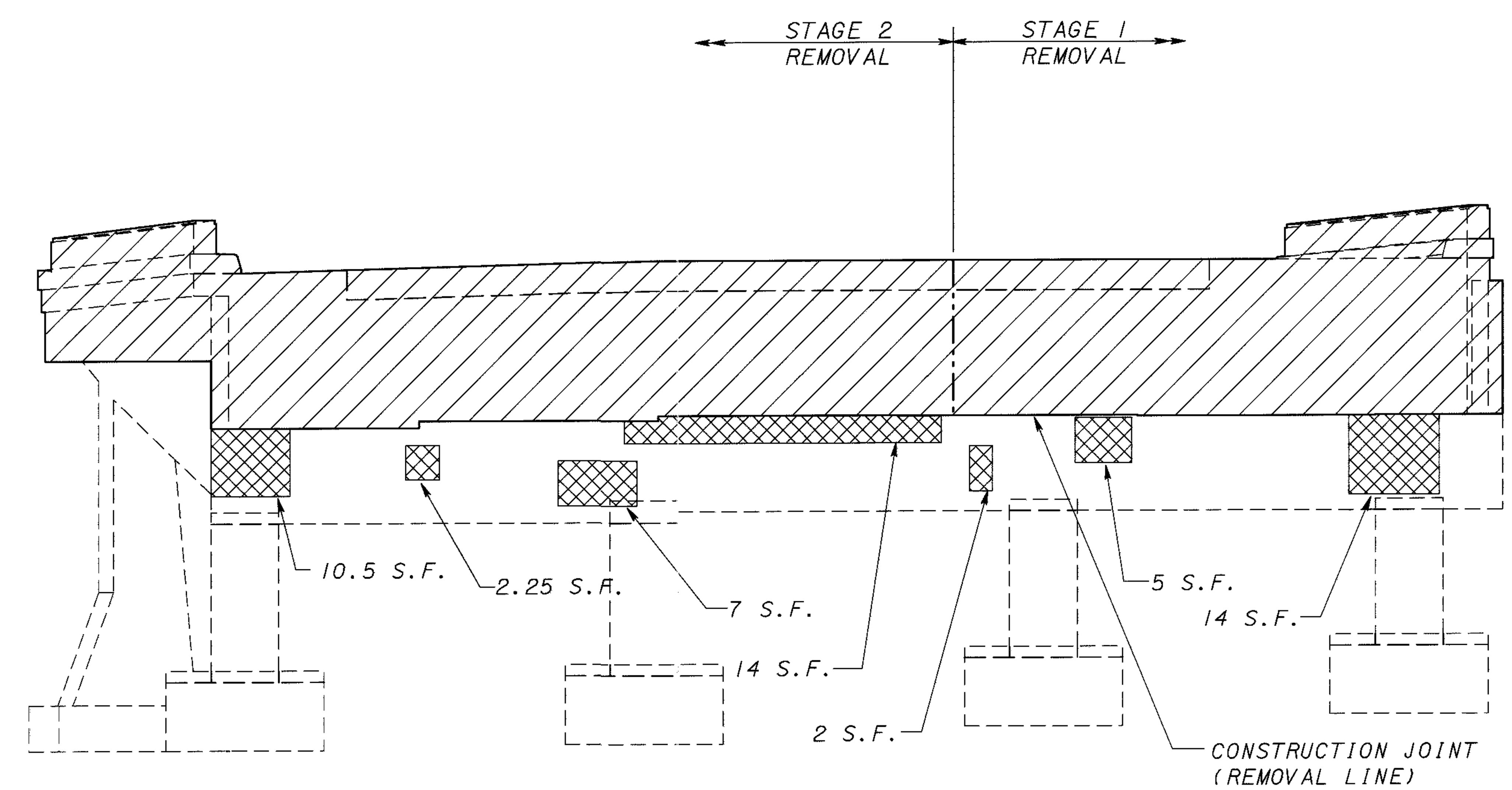
FORWARD ABUTMENT PLAN - LEFT BRIDGE



FORWARD ABUTMENT PLAN - RIGHT BRIDGE



FORWARD ABUTMENT ELEVATION - LEFT BRIDGE



FORWARD ABUTMENT ELEVATION - RIGHT BRIDGE

LEGEND

- INDICATES EXISTING AREA TO BE REMOVED (single hatch)
- INDICATES EXISTING AREA TO BE PATCHED (cross hatch)

S.F. - SQUARE FEET

NOTES

1. FOR PATCHING QUANTITIES, SEE SHEET 7/23 .
2. FOR ABUTMENT SECTION, SEE SHEET 10/23 .

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
MTO	CLP	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
PLC	...	3401146L 3401170R	

FORWARD ABUTMENT DEMOLITION PLANS
BRIDGE NO. HAS-22-1753 (L.& R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

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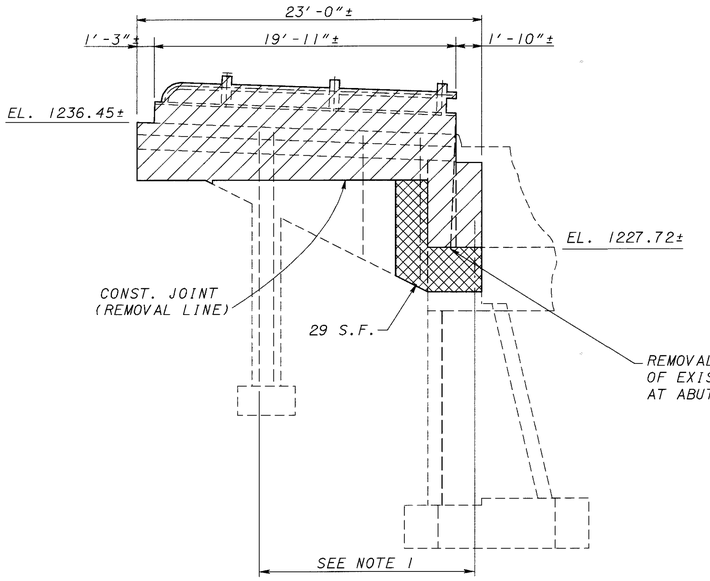
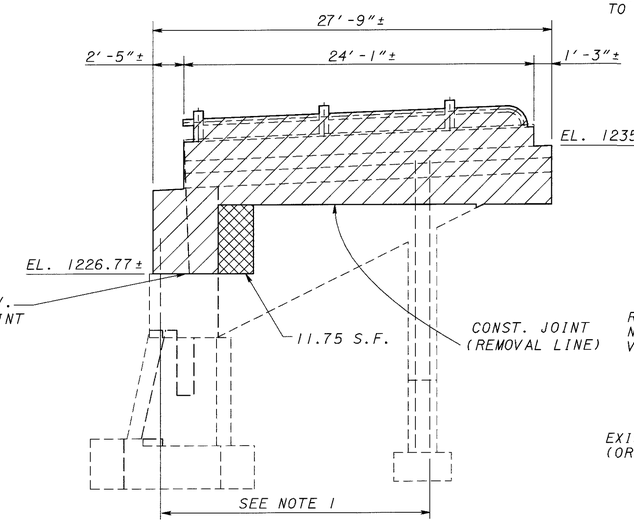
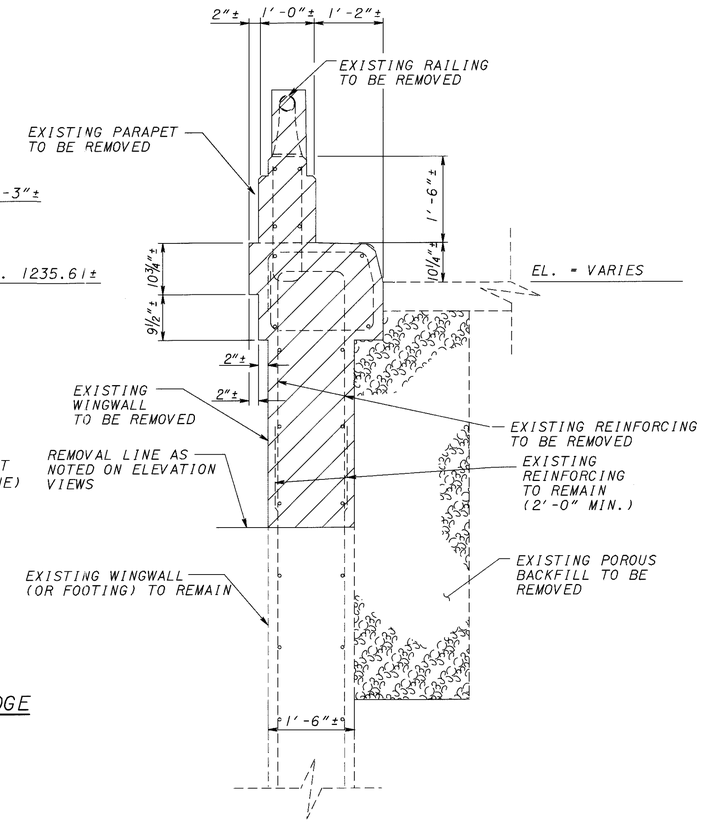
DATE: 10-Apr-2000 09:55



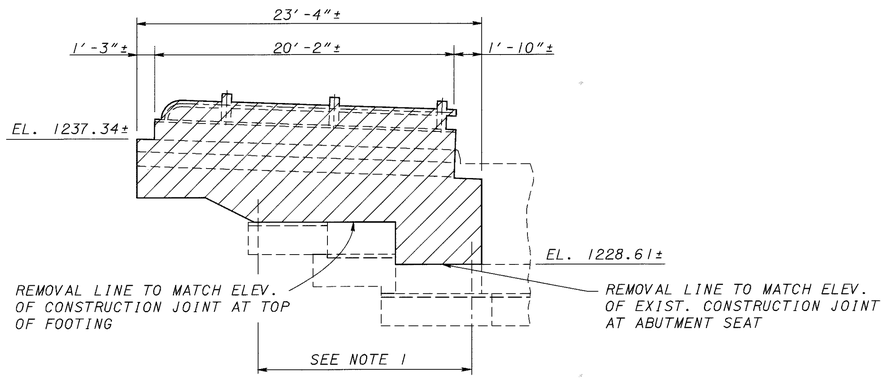
SOUTH WINGWALL ON REAR ABUTMENT - LEFT BRIDGE



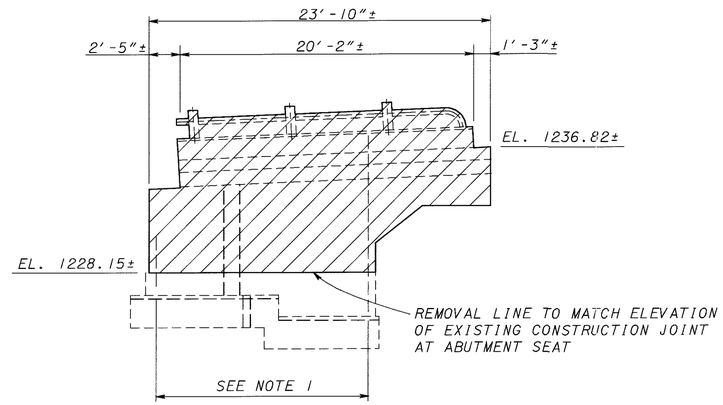
NORTH WINGWALL ON REAR ABUTMENT - LEFT BRIDGE



TYPICAL WINGWALL SECTION



SOUTH WINGWALL ON REAR ABUTMENT - RIGHT BRIDGE



NORTH WINGWALL ON REAR ABUTMENT - RIGHT BRIDGE

LEGEND

INDICATES EXISTING AREA TO BE REMOVED

INDICATES EXISTING AREA TO BE PATCHED

S.F. - SQUARE FEET

NOTES

1. EXISTING VERTICAL REINFORCING TO REMAIN. PROVIDE MIN. 2'-0"/MAX. 2'-6" HEIGHT.
2. FOR PATCHING QUANTITIES, SEE SHEET 7 / 23 .

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
CLP	CLP	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO		3401/462 3401/1062	

REAR ABUTMENT WINGWALL DEMOLITION DETAILS
BRIDGE NO. HAS-22-1753 (L. & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

9 / 23

53
67

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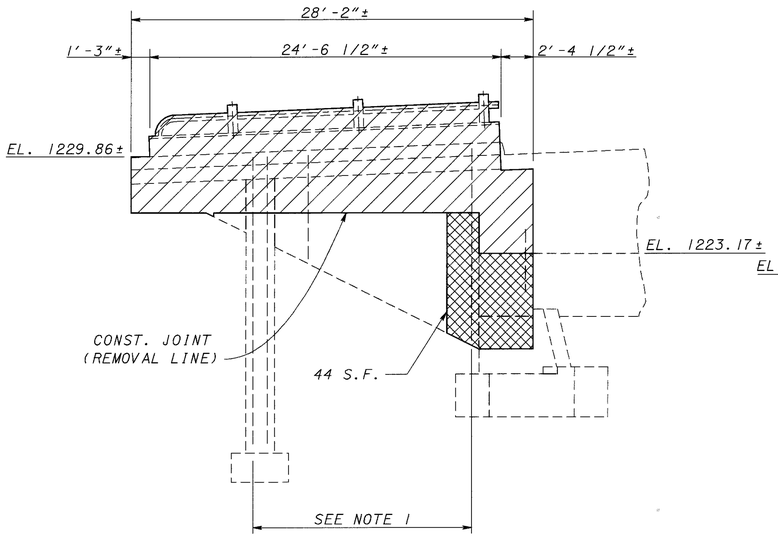
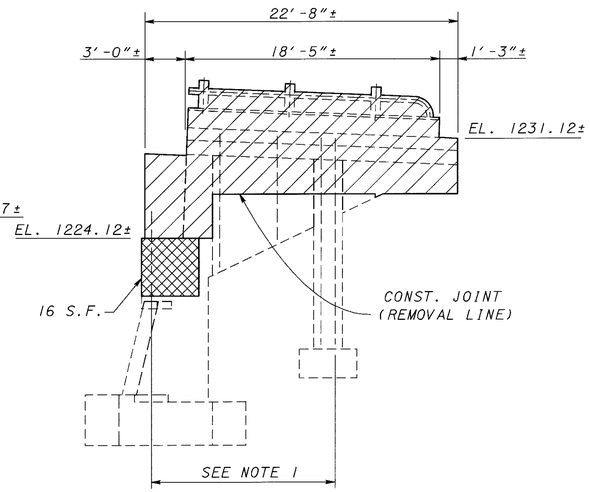
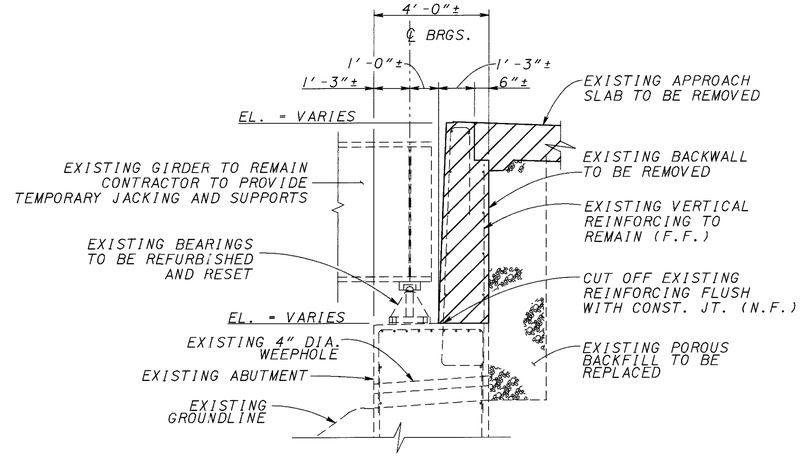


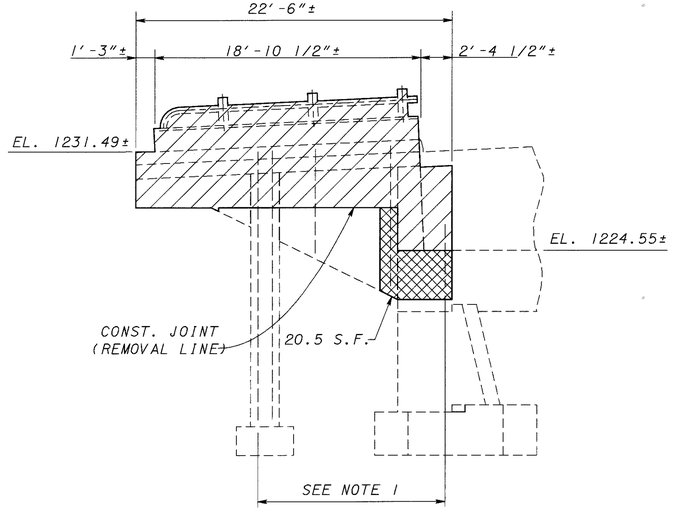
NORTH WINGWALL ON
FORWARD ABUTMENT - LEFT BRIDGE



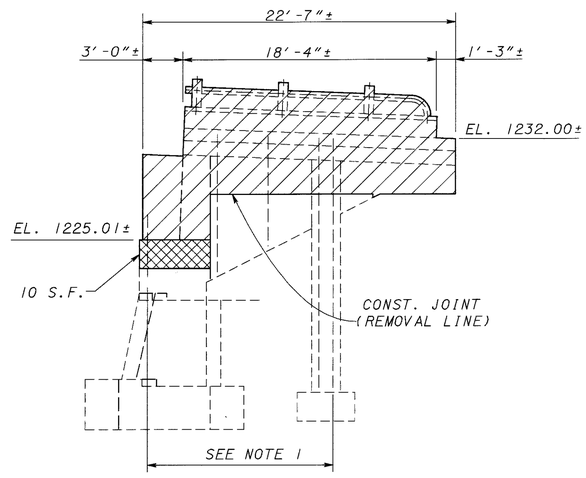
SOUTH WINGWALL ON
FORWARD ABUTMENT - LEFT BRIDGE



EXISTING ABUTMENT SECTION
(FORWARD ABUTMENT OF EASTBOUND STRUCTURE SHOWN)



NORTH WINGWALL ON
FORWARD ABUTMENT - RIGHT BRIDGE



SOUTH WINGWALL ON
FORWARD ABUTMENT - RIGHT BRIDGE

LEGEND

INDICATES EXISTING AREA TO BE REMOVED

INDICATES EXISTING AREA TO BE PATCHED

S.F. - SQUARE FEET

NOTES

1. EXISTING VERTICAL REINFORCING TO REMAIN. PROVIDE MIN. 2'-0"/MAX. 2'-6" HEIGHT.
2. FOR PATCHING QUANTITIES, SEE SHEET 7 / 23.

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
ELDORON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
CLP	CLP	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO		3401461 3401701OR	

DEMOLITION DETAILS

FORWARD ABUTMENT WINGWALL DEMOLITION
BRIDGE NO. HAS-22-1753 (L.&R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

10/23

54/67

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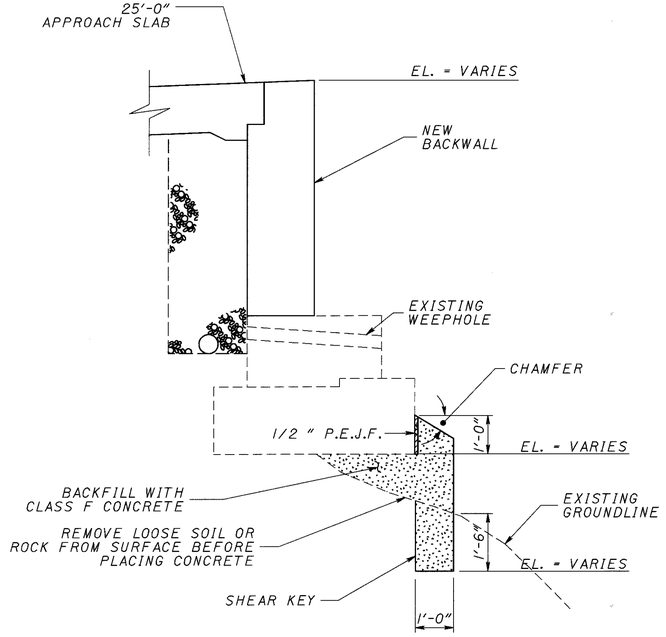
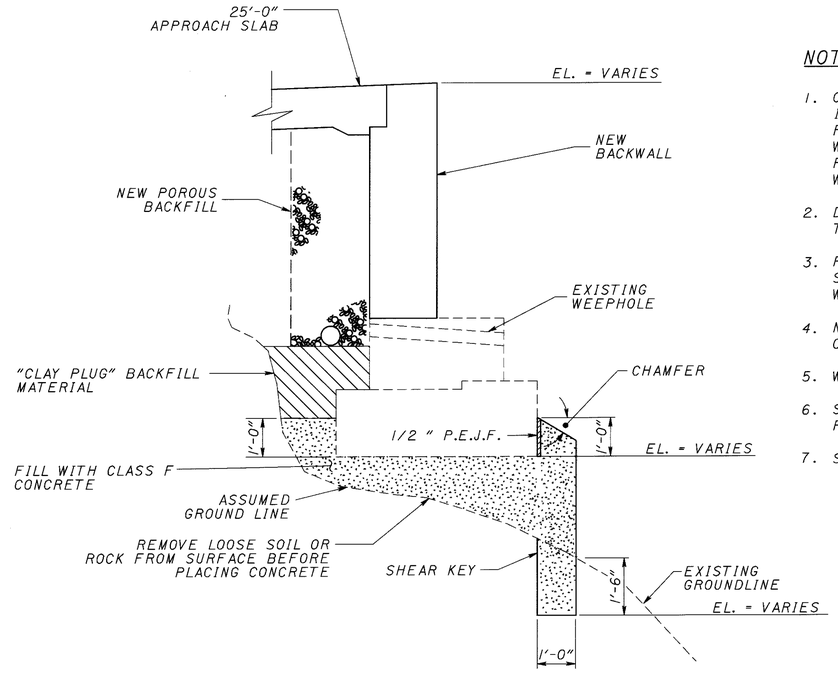


DETAIL A
PARTIALLY UNDERCUT CONTINUOUS STRIP FOOTING



DETAIL B
COMPLETELY UNDERCUT CONTINUOUS STRIP FOOTING

NOTES - UNDERCUT FOUNDATION DETAILS:

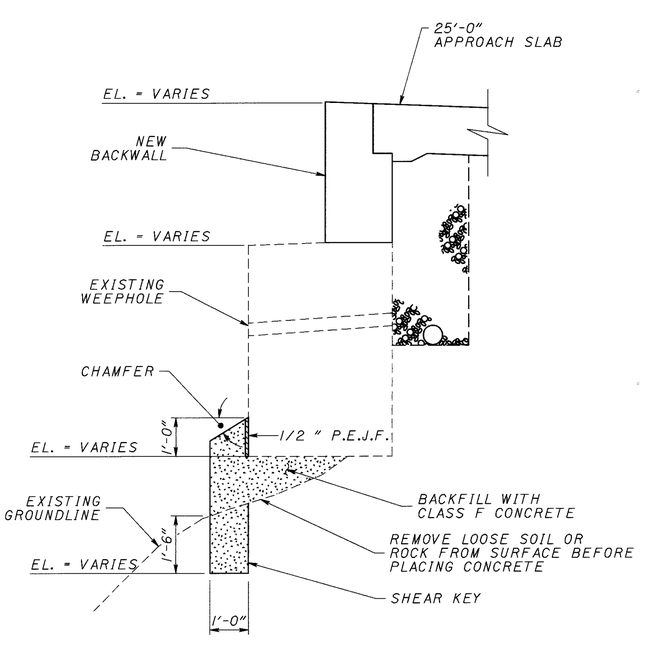
1. CONCRETE SHALL BE CLASS F AND SHALL BE PLACED IN ACCORDANCE WITH ITEM 842. COSTS OF ALL LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS FOR FURNISHING AND PLACING THE CONCRETE SHALL BE INCLUDED FOR PAYMENT WITH ITEM 842, CONCRETE, MISC. PREFORMED EXPANSION JOINT FILLER TO BE PLACED IN ACCORDANCE WITH ITEM 516 AND INCLUDED FOR PAYMENT WITH TO ITEM 842, CONCRETE, MISC.
2. DETAILS B AND D REQUIRE CONCRETE TO BE PLACED FROM BEHIND THE BACKWALL.
3. PLACEMENT OF CONCRETE IN STANDING WATER IS PROHIBITED; STANDING WATER SHALL BE REMOVED BEFORE PLACING CONCRETE. DISPLACING STANDING WATER WITH FLOWING CONCRETE IS PROHIBITED.
4. NO REINFORCING STEEL IS REQUIRED FOR THE CONCRETE WORK SHOWN ON THIS SHEET.
5. WALLS OF THE SHEAR KEY MAY BE ROUGHER THAN ILLUSTRATED.
6. SHEAR KEY EXCAVATION SHALL BE IN ACCORDANCE WITH ITEM 503, AND PAYMENT INCLUDED WITH ITEM 503, ROCK EXCAVATION.
7. SEE SHEETS 12, 13 & 14 FOR ADDITIONAL FOUNDATION REPAIR DETAILS.

LEGEND

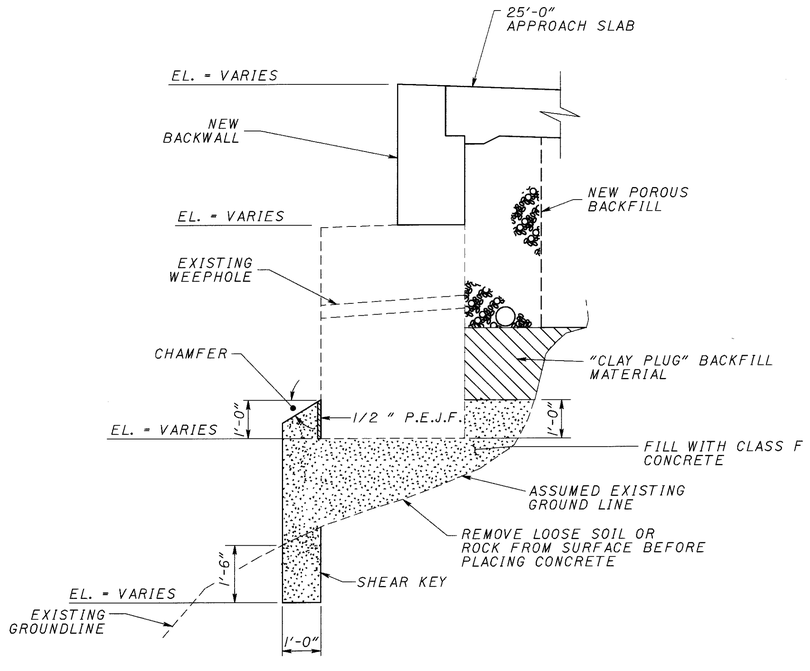
- "CLAY PLUG" BACKFILL MATERIAL SHALL CONFORM TO AND BE PLACED IN ACCORDANCE WITH ITEM 503.10 EXCEPT THAT THE MATERIAL SHALL BE ODOT SOIL CLASSIFICATIONS A-6a, A-6b, A-7-5, OR A-7-6. PAYMENT IS INCLUDED WITH ITEM 503, BACKFILL, AS PER PLAN.

APPROX. FOUNDATION REPAIR QUANTITY (CLASS F CONCRETE)

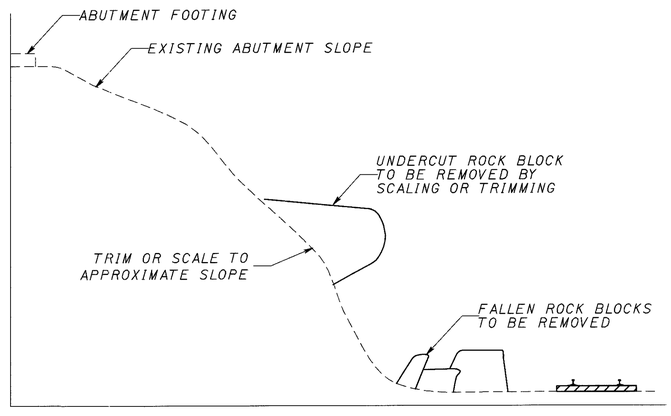
R.A. RT. = 34 C.Y.
R.A. LT. = 46 C.Y.
F.A. RT. = 22 C.Y.
F.A. LT. = 21 C.Y.



DETAIL C
PARTIALLY UNDERCUT PEDESTAL FOUNDATION



DETAIL D
COMPLETELY UNDERCUT PEDESTAL FOUNDATION



ABUTMENT SLOPE RESTORATION
TYPICAL SECTION SR22 OVER
THE COLUMBUS AND OHIO RIVER RAILROAD

NOTES - SLOPE RESTORATION DETAIL:

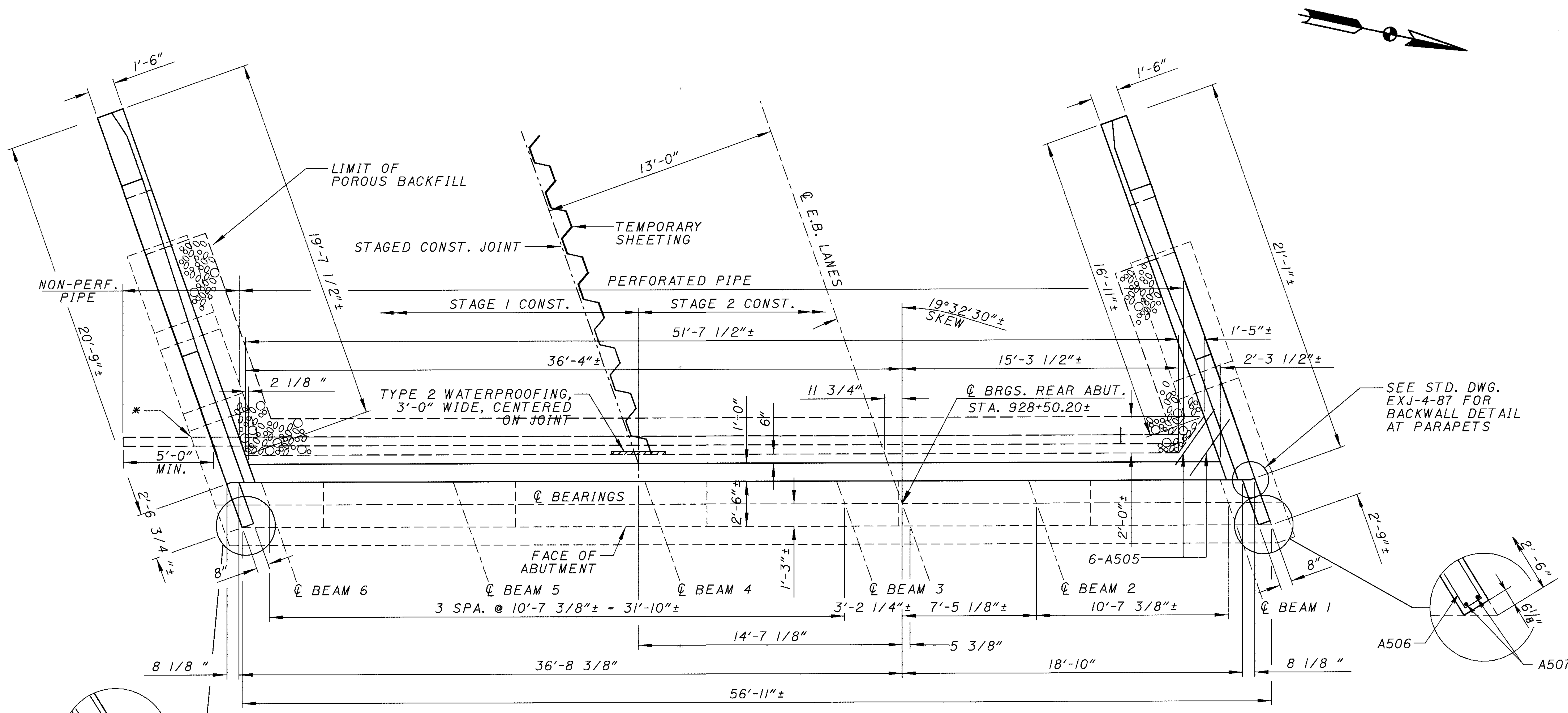
1. USE OF EXPLOSIVES IS PROHIBITED FOR TRIMMING OPERATIONS.
2. ROCK BLOCKS SHALL BE TRIMMED OR SCALED BACK TO THE APPROXIMATE EXISTING SLOPE ANGLE.
3. RAILROAD TRACKS MUST BE PROTECTED FROM DAMAGE DUE TO INTENTIONAL OR UNINTENTIONAL FALLING ROCKS.
4. THE WORK SHALL BE PERFORMED IN ACCORDANCE WITH ITEM 503. COSTS OF ALL LABOR, MATERIALS, EQUIPMENT, AND INCIDENTALS FOR TRIMMING AND REMOVING THE ROCK BLOCKS SHALL BE INCLUDED FOR PAYMENT WITH ITEM 503, ROCK EXCAVATION.

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
ELDON YEO OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
MWW	JMT	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO		3401/146L 3401/170R	

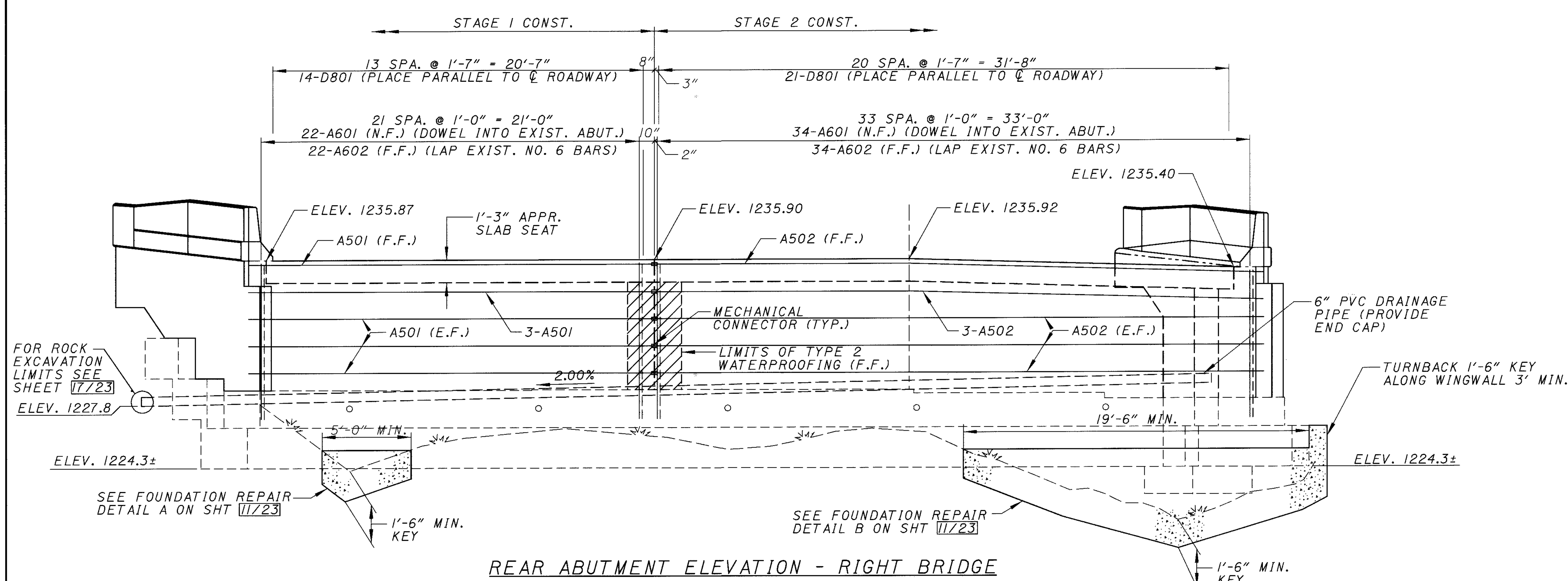
UNDERCUT FOUNDATION REPAIR DETAILS
BRIDGE NO. HAS-22-1753 (L & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

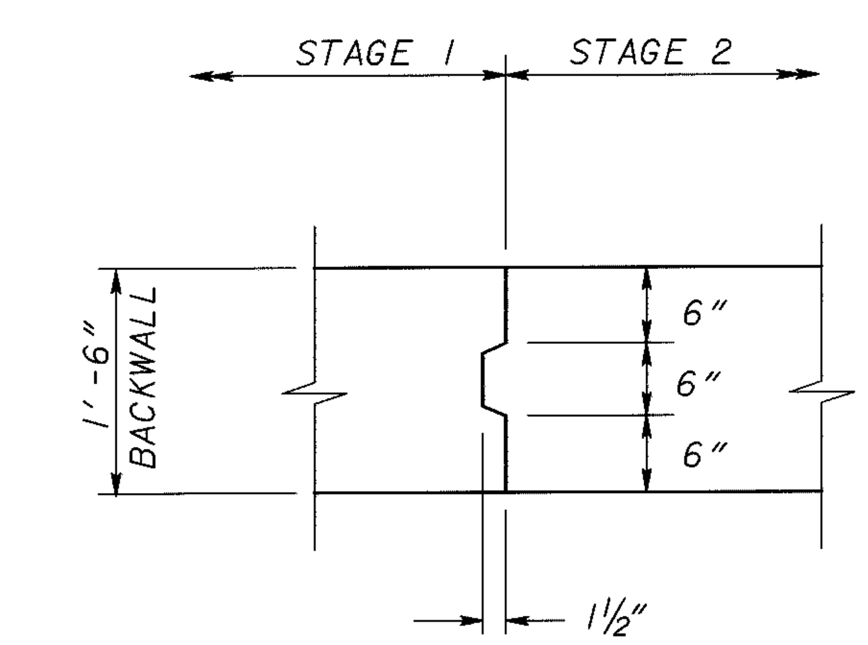


REAR ABUTMENT PLAN - RIGHT BRIDGE

* CORE 8" DIA. HOLE THROUGH ABUTMENT WALL FOR 6" PVC PIPE. PLACE PIPE THROUGH OPENING AND PLACE NON-SHRINK GROUT (705.22) IN REMAINDER OF OPENING. ALL COSTS FOR THIS WORK SHALL BE INCLUDED WITH ITEM 518 FOR PAYMENT.



REAR ABUTMENT ELEVATION - RIGHT BRIDGE



BACKWALL CONST. JOINT DETAIL

LEGEND

P.G.L. - PROFILE GRADE LINE
F.F. - FAR FACE
N.F. - NEAR FACE
E.F. - EACH FACE
C.J. - CONSTRUCTION JOINT
PEJF - PREFORMED EXPANSION JOINT FILLER

MINIMUM REINF. LAPS

#5 BAR= 2'-0"
#6 BAR= 3'-1"

NOTES

1. ABUTMENT SHALL BE CONSTRUCTED IN PHASES IN ACCORDANCE WITH STAGE CONSTRUCTION DRAWINGS.
2. SEE STRUCTURE GENERAL NOTES FOR ADDITIONAL INFORMATION.

ALL STEEL CLEARANCES ARE 2" UNLESS OTHERWISE NOTED.

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter, BLENDON VIEW OFFICE PARK, 5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
MTO	MTO	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
PLC		3401146L 3401170R	

REAR ABUTMENT PLAN & ELEVATION - RIGHT BRIDGE

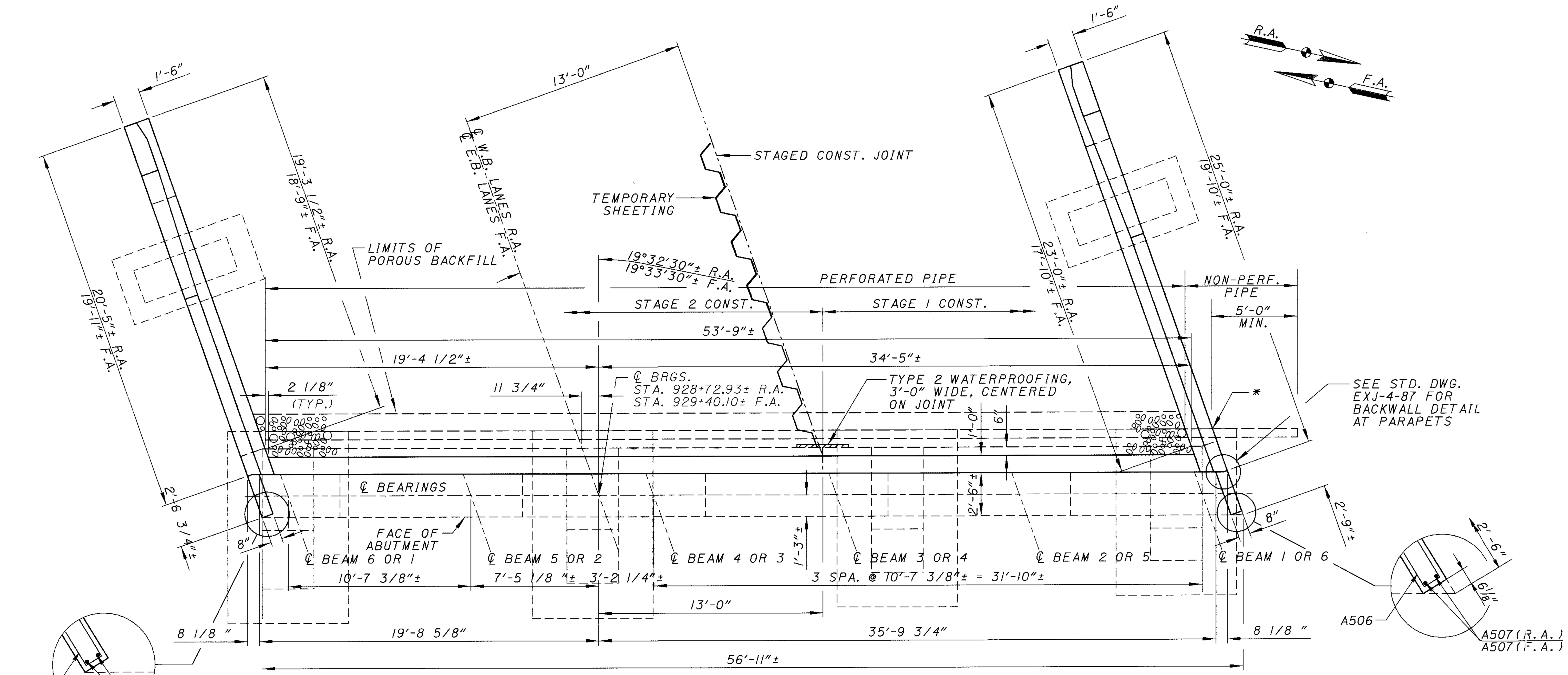
BRIDGE NO. HAS-22-1753 (L.& R.) OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

12/23

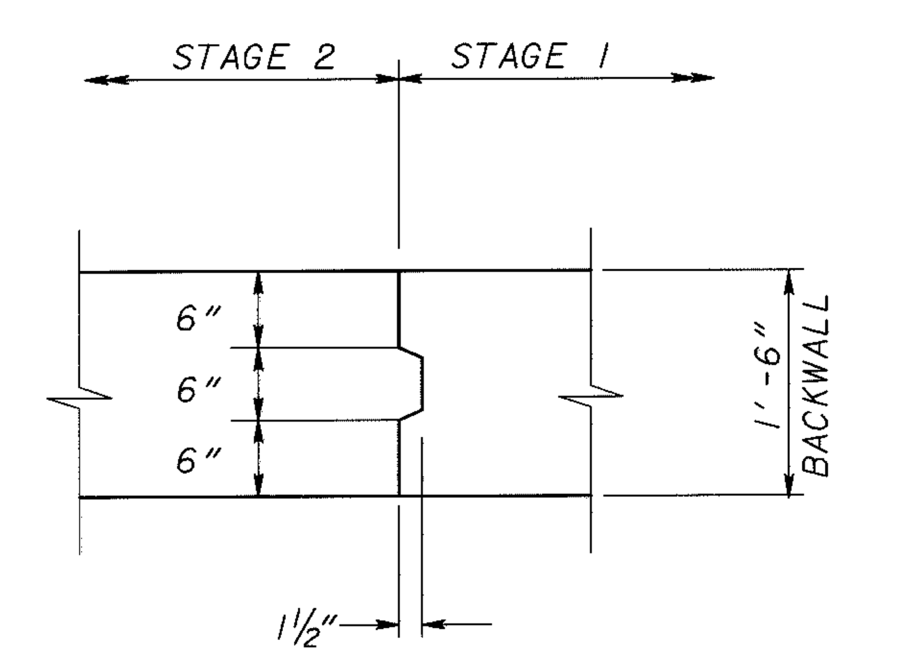
56/67

FILE: s:\projects\35765\BRIDGE\RR\1535abut.dgn DATE: 07-Apr-2000 07:04

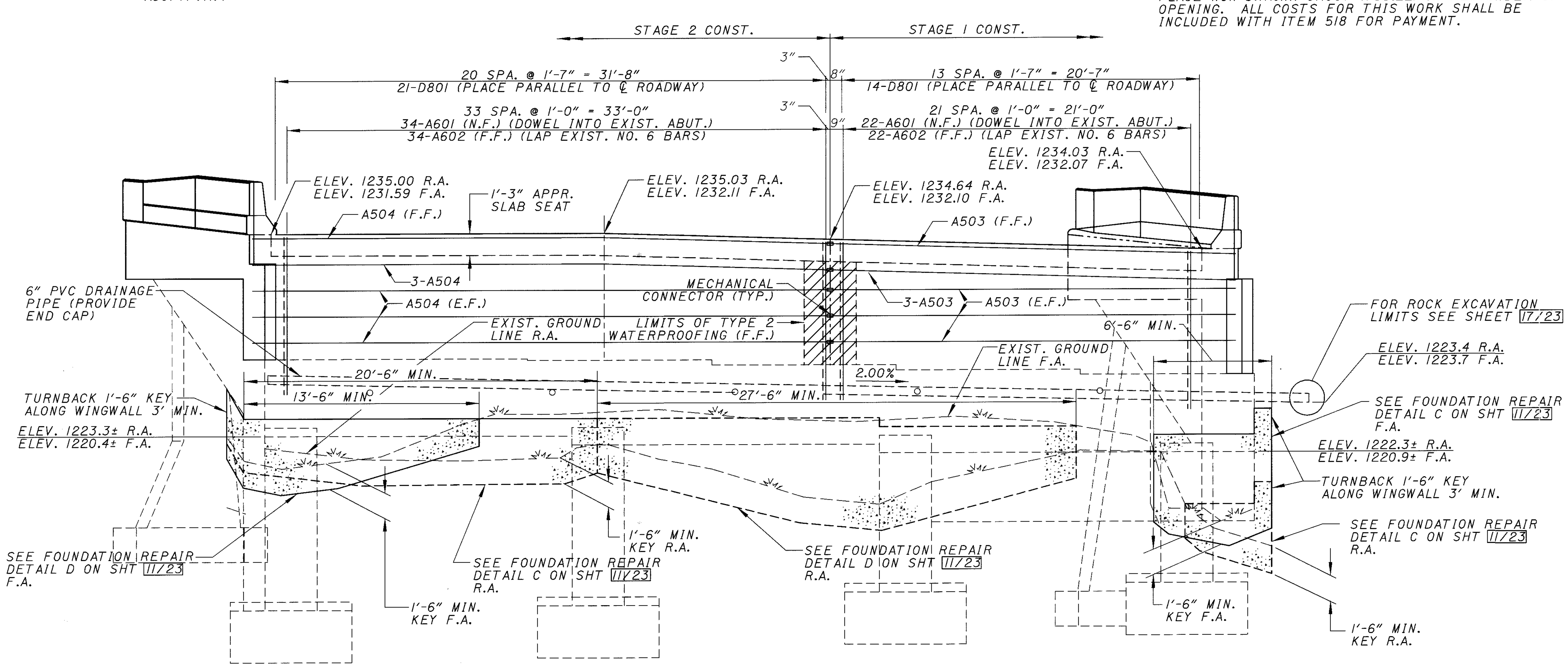


REAR ABUTMENT PLAN - LEFT BRIDGE
FORWARD ABUTMENT PLAN - RIGHT BRIDGE

* CORE 8" DIA. HOLE THROUGH ABUTMENT WALL FOR 6" PVC PIPE. PLACE PIPE THROUGH OPENING AND PLACE NON-SHRINK GROUT (705.22) IN REMAINDER OF OPENING. ALL COSTS FOR THIS WORK SHALL BE INCLUDED WITH ITEM 518 FOR PAYMENT.



BACKWALL CONST. JOINT DETAIL



REAR ABUTMENT ELEVATION - LEFT BRIDGE
FORWARD ABUTMENT ELEVATION - RIGHT BRIDGE

LEGEND

- P.G.L. - PROFILE GRADE LINE
- F.F. - FAR FACE
- N.F. - NEAR FACE
- E.F. - EACH FACE
- R.A. - REAR ABUTMENT
- F.A. - FORWARD ABUTMENT
- C.J. - CONSTRUCTION JOINT
- PEJF - PREFORMED EXPANSION JOINT FILLER

MINIMUM REINF. LAPS

#5 BAR= 2'-0"
#6 BAR= 3'-1"

NOTES

1. ABUTMENT SHALL BE CONSTRUCTED IN PHASES IN ACCORDANCE WITH STAGE CONSTRUCTION DRAWINGS.

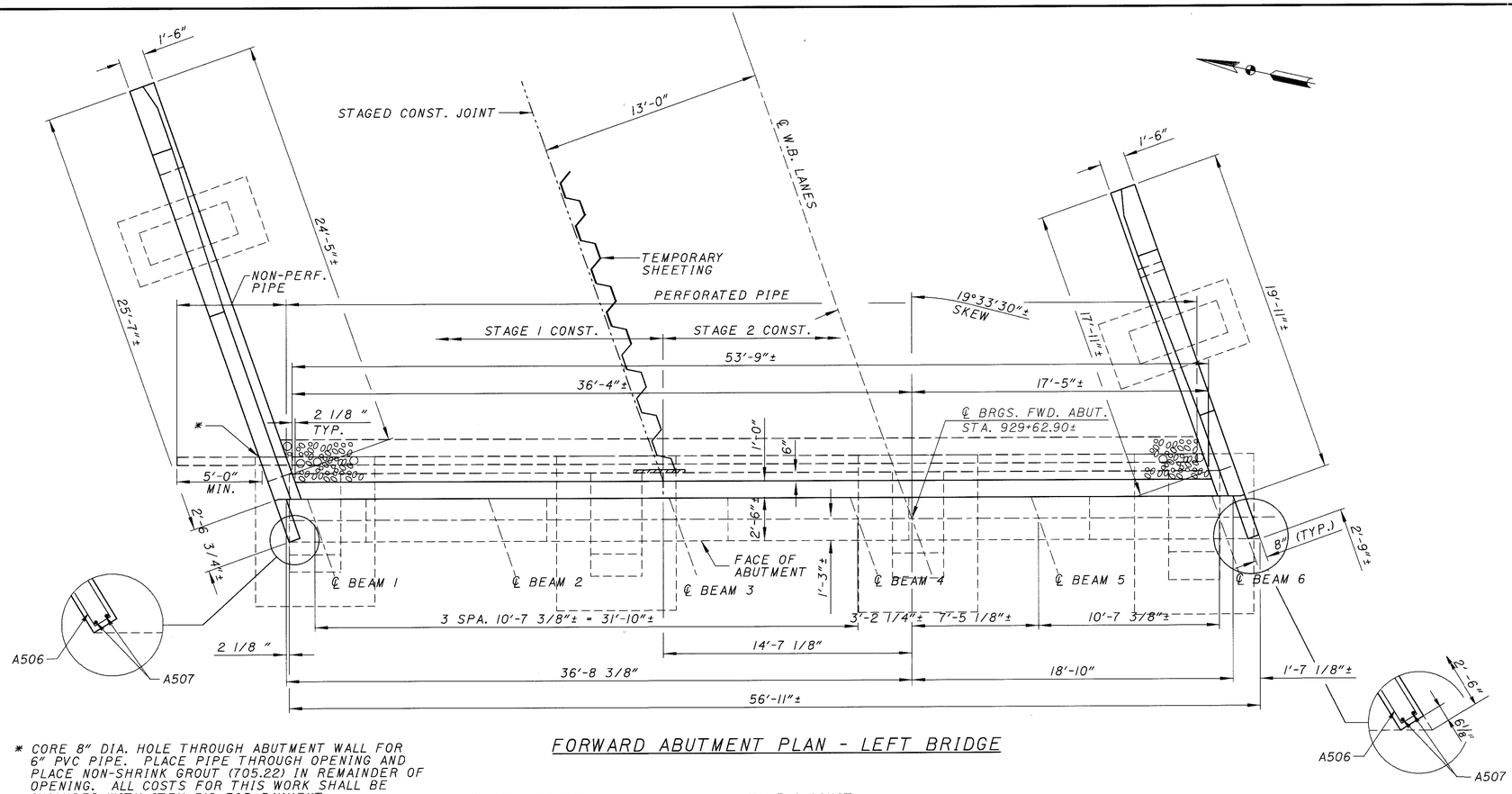
ALL STEEL CLEARANCES ARE 2" UNLESS OTHERWISE NOTED.

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PIKE CREEK DRIVE, COLUMBUS, OHIO 43081

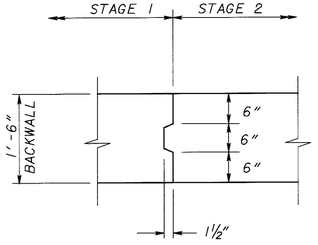
DESIGNED	DRAWN	REVIEWED	DATE
MTO	MTO	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
PLC		3401146L 3401170R	

REAR ABUT. LEFT BRIDGE & FWD. ABUT. RIGHT BRIDGE
BRIDGE NO. HAS-22-1753 (L.& R.) OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

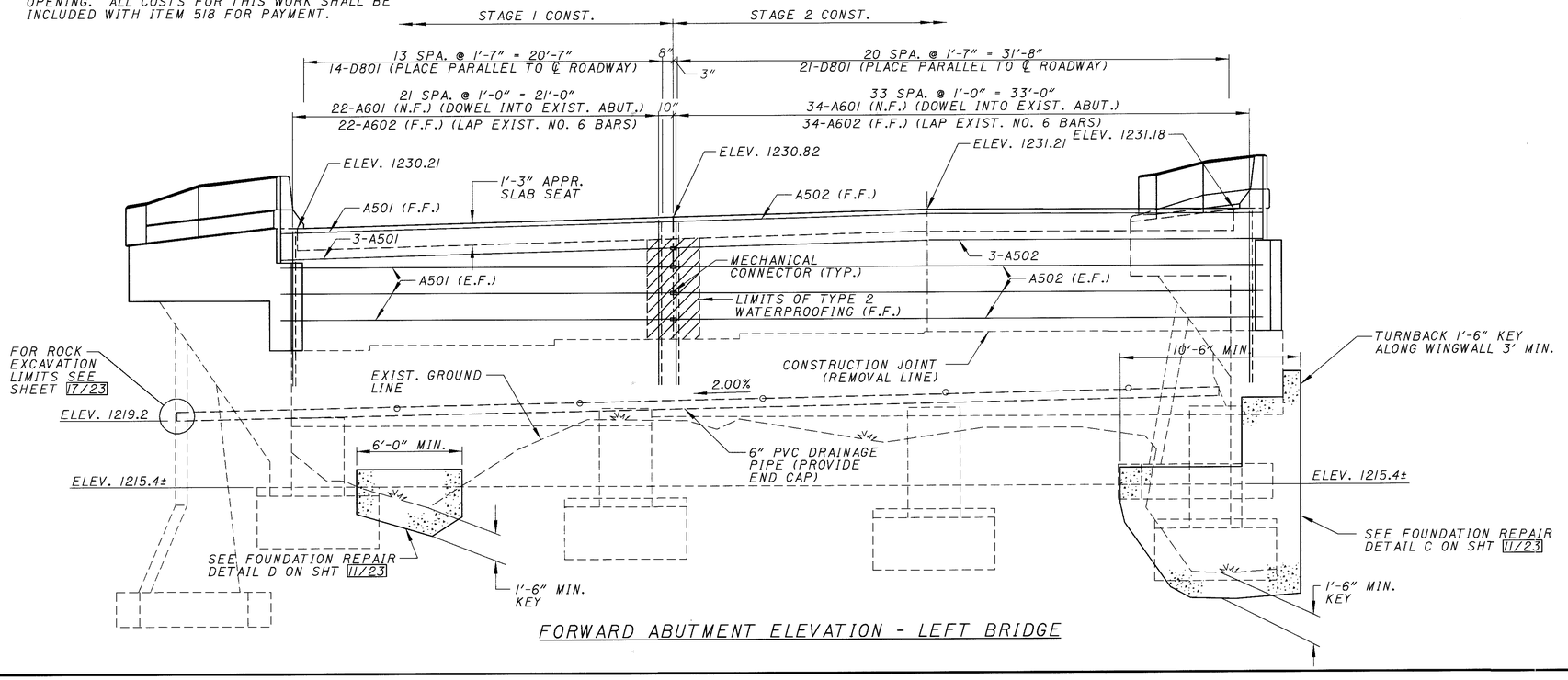


FORWARD ABUTMENT PLAN - LEFT BRIDGE



BACKWALL CONST. JOINT DETAIL

* CORE 8" DIA. HOLE THROUGH ABUTMENT WALL FOR 6" PVC PIPE. PLACE PIPE THROUGH OPENING AND PLACE NON-SHRINK GROUT (705.22) IN REMAINDER OF OPENING. ALL COSTS FOR THIS WORK SHALL BE INCLUDED WITH ITEM 518 FOR PAYMENT.



FORWARD ABUTMENT ELEVATION - LEFT BRIDGE

LEGEND

P.G.L. - PROFILE GRADE LINE
F.F. - FAR FACE
N.F. - NEAR FACE
E.F. - EACH FACE
C.J. - CONSTRUCTION JOINT
PEJF - PREFORMED EXPANSION JOINT FILLER

MINIMUM REINF. LAPS

#5 BAR= 2'-0"
#6 BAR= 3'-1"

NOTES

1. ABUTMENT SHALL BE CONSTRUCTED IN PHASES IN ACCORDANCE WITH STAGE CONSTRUCTION DRAWINGS.
2. SEE NOTE 2, SHEET 12/13.

ALL STEEL CLEARANCES ARE 2" UNLESS OTHERWISE NOTED.

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
MTO	MTO	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
PLC		340//46L 340//70R	

FORWARD ABUT. PLAN & ELEVATION - LEFT BRIDGE
BRIDGE NO. HAS-22-1753 (L & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

14/23

58/67

FILE: e:\projects\53765\BRIDGE\RR\ss38es6.dgn
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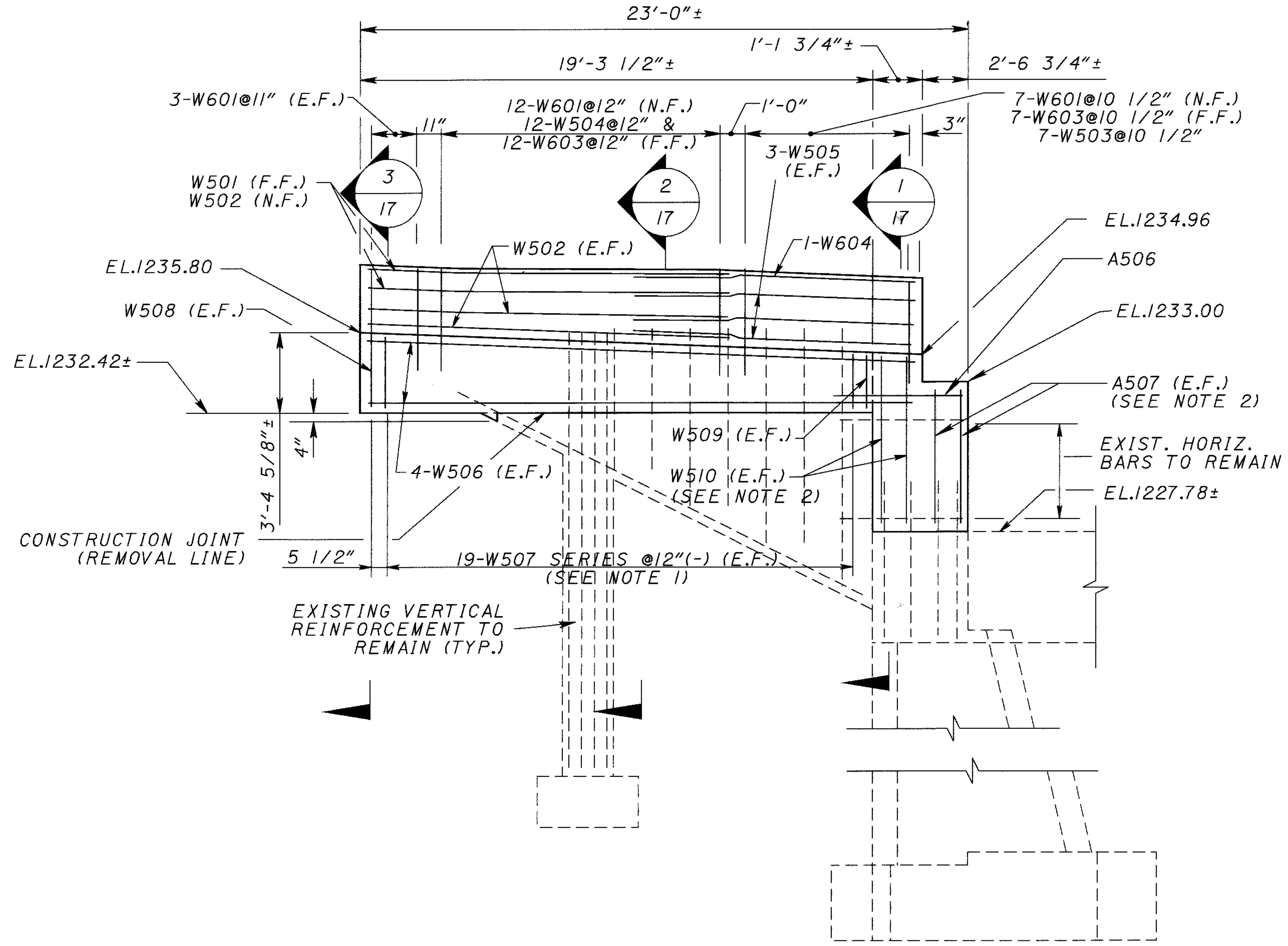
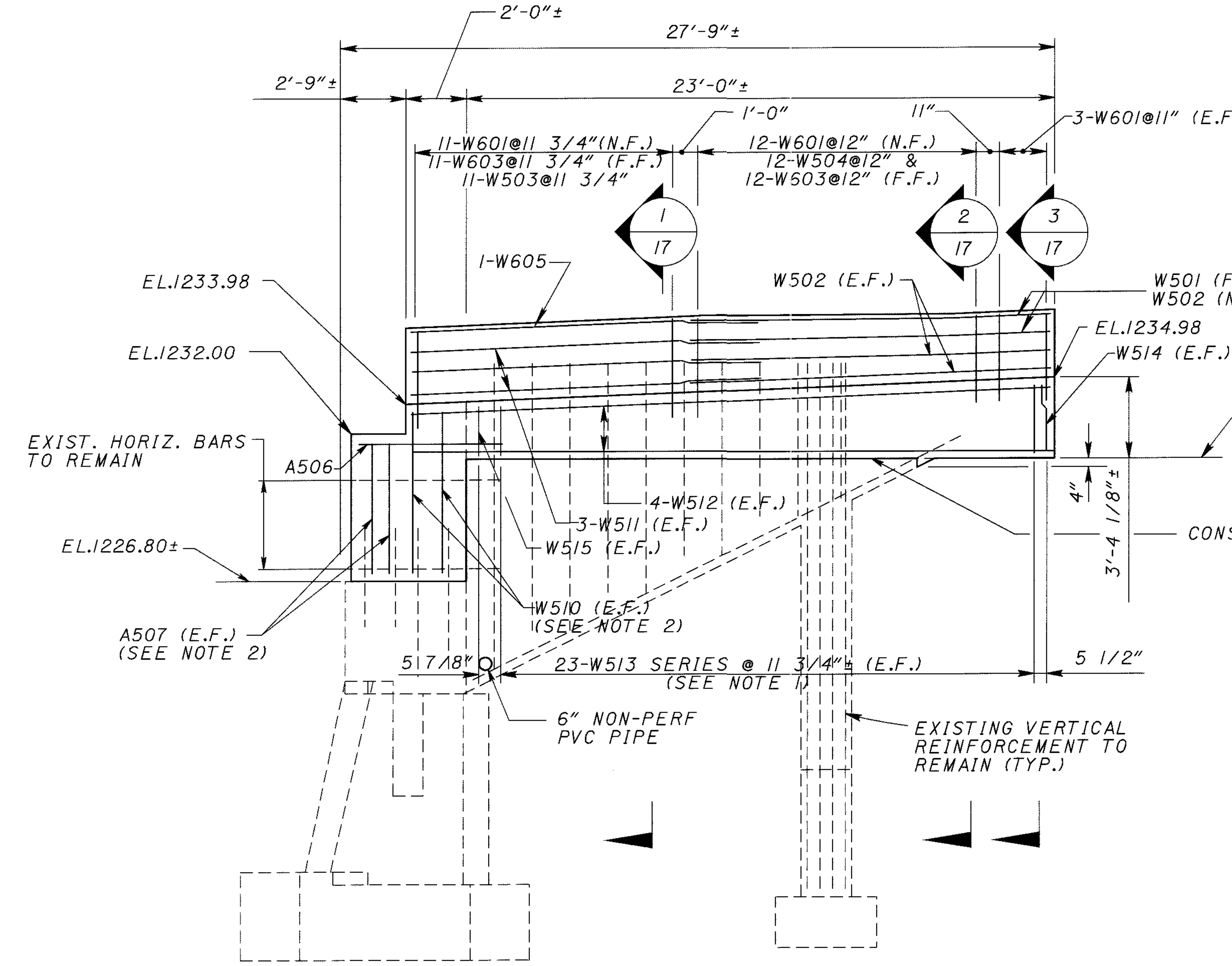


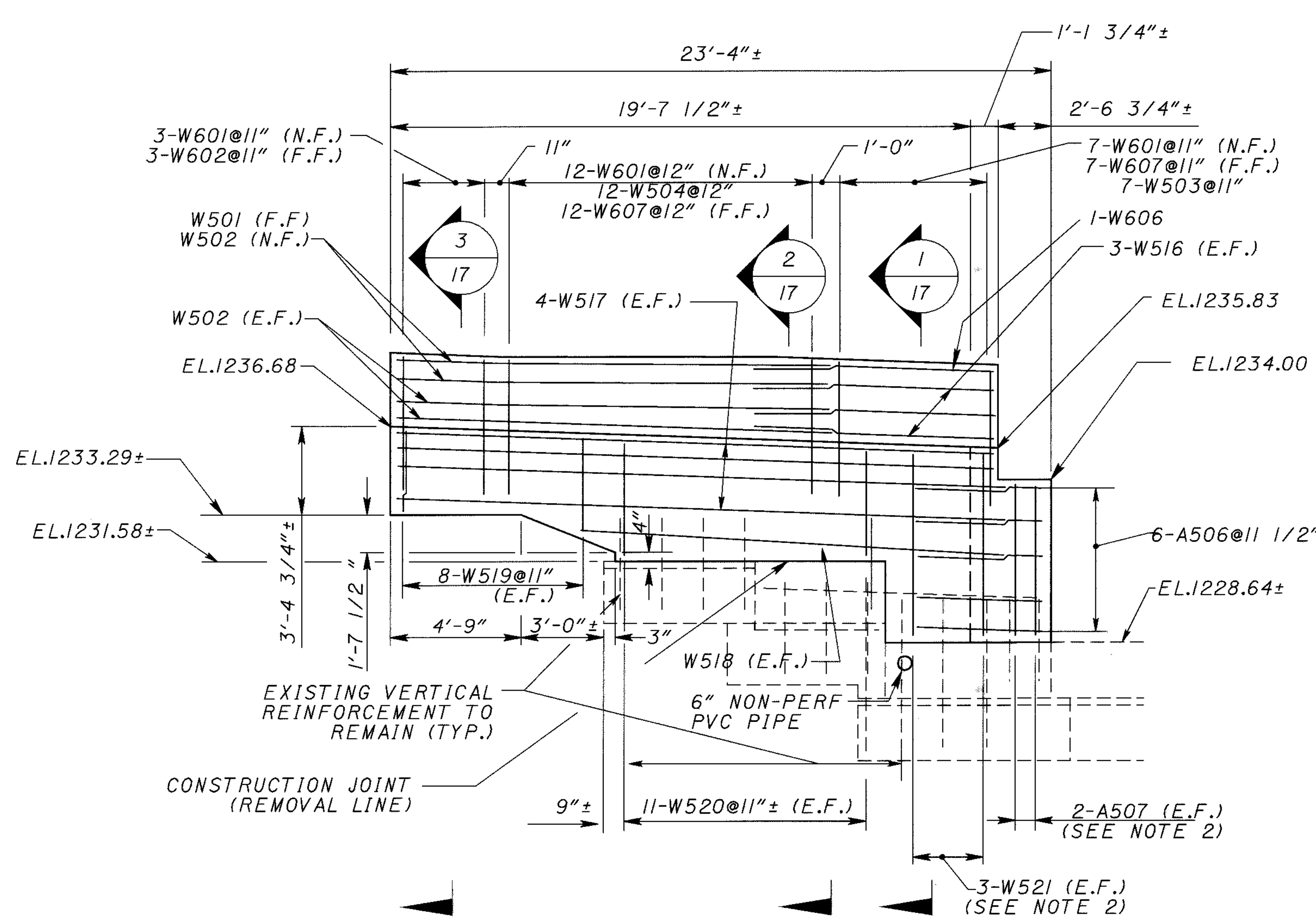
SOUTH WINGWALL ON REAR ABUTMENT - LEFT BRIDGE



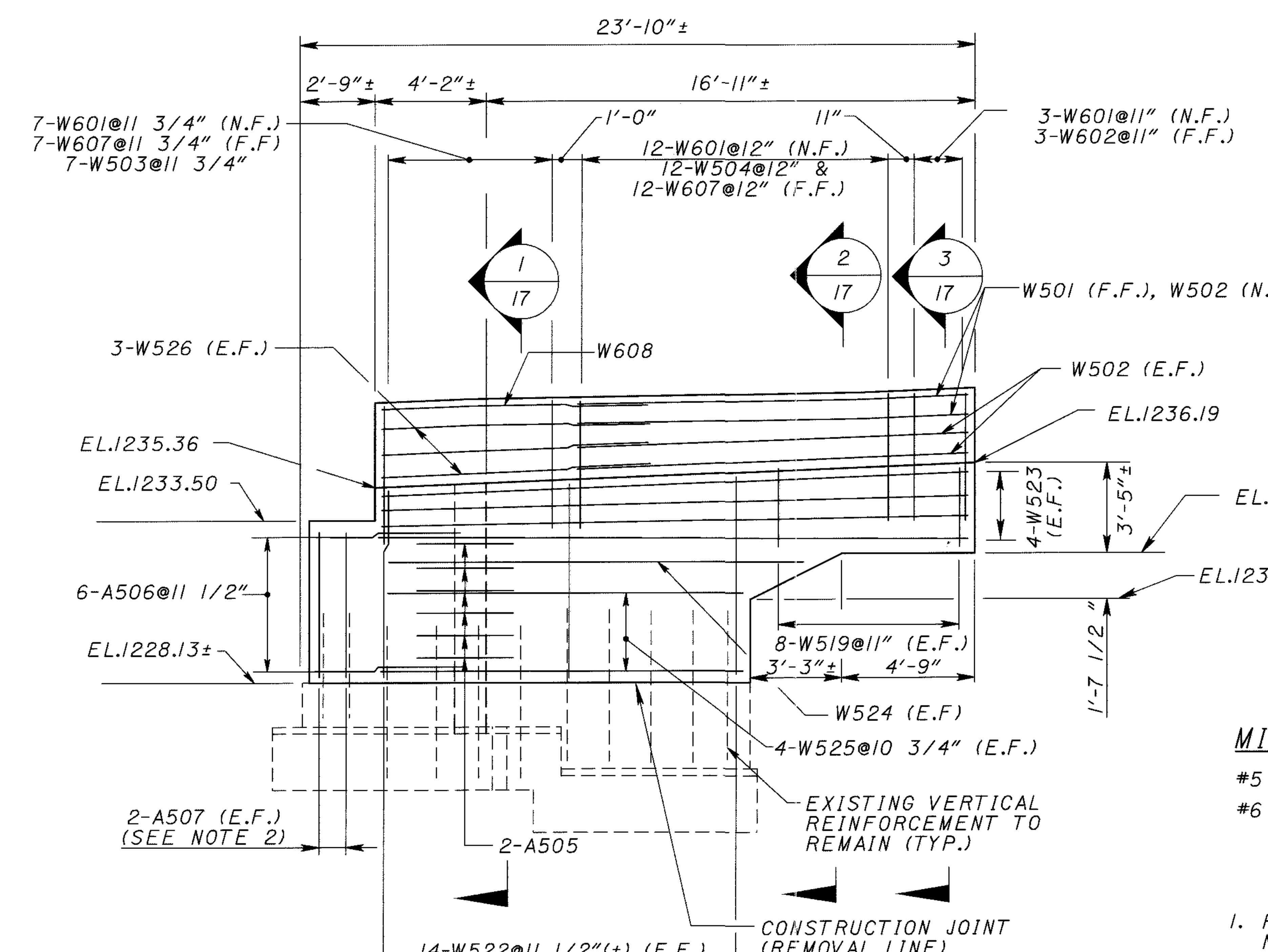
NORTH WINGWALL ON REAR ABUTMENT - LEFT BRIDGE

LEGEND:

F.F. - FAR FACE
N.F. - NEAR FACE
E.F. - EACH FACE
C.J. - CONSTRUCTION JOINT



SOUTH WINGWALL ON REAR ABUTMENT - RIGHT BRIDGE



NORTH WINGWALL ON REAR ABUTMENT - RIGHT BRIDGE

MINIMUM REINF. LAPS

#5 BAR= 2'-0"
#6 BAR= 3'-1"

NOTES:

1. PLACE W501 & W513 BARS BETWEEN NEW BARRIER REINFORCING ALONG LENGTH OF WING WALL.
2. LAP W510, W521, A510, A512 AND A514 BARS TO EXISTING VERTICAL BARS REMAINING.

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
PLC	BJM	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO		3401146L 3401170R	

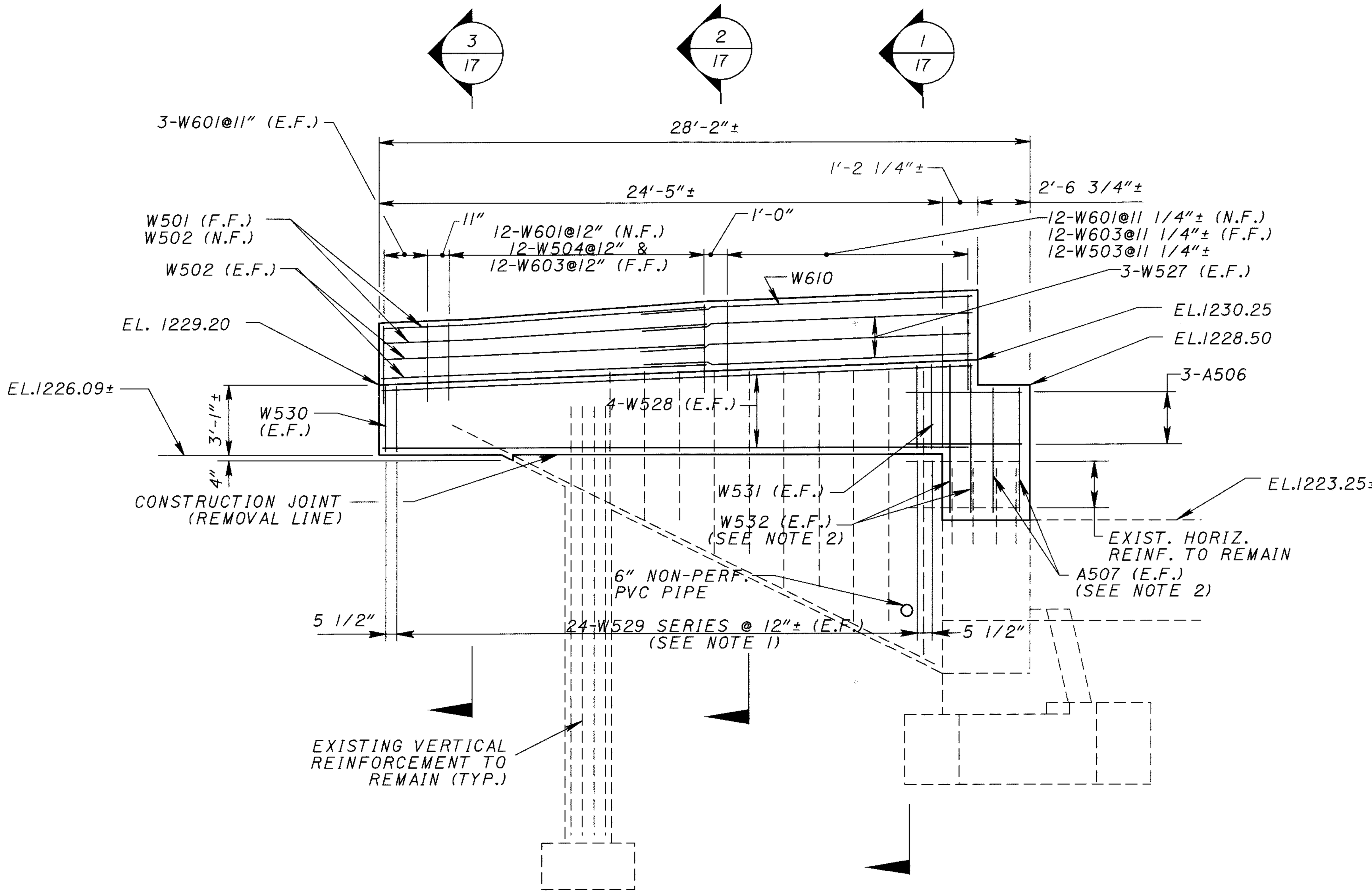
REAR ABUTMENT WINGWALL ELEVATIONS

BRIDGE NO. HAS-22-1753 (L.& R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

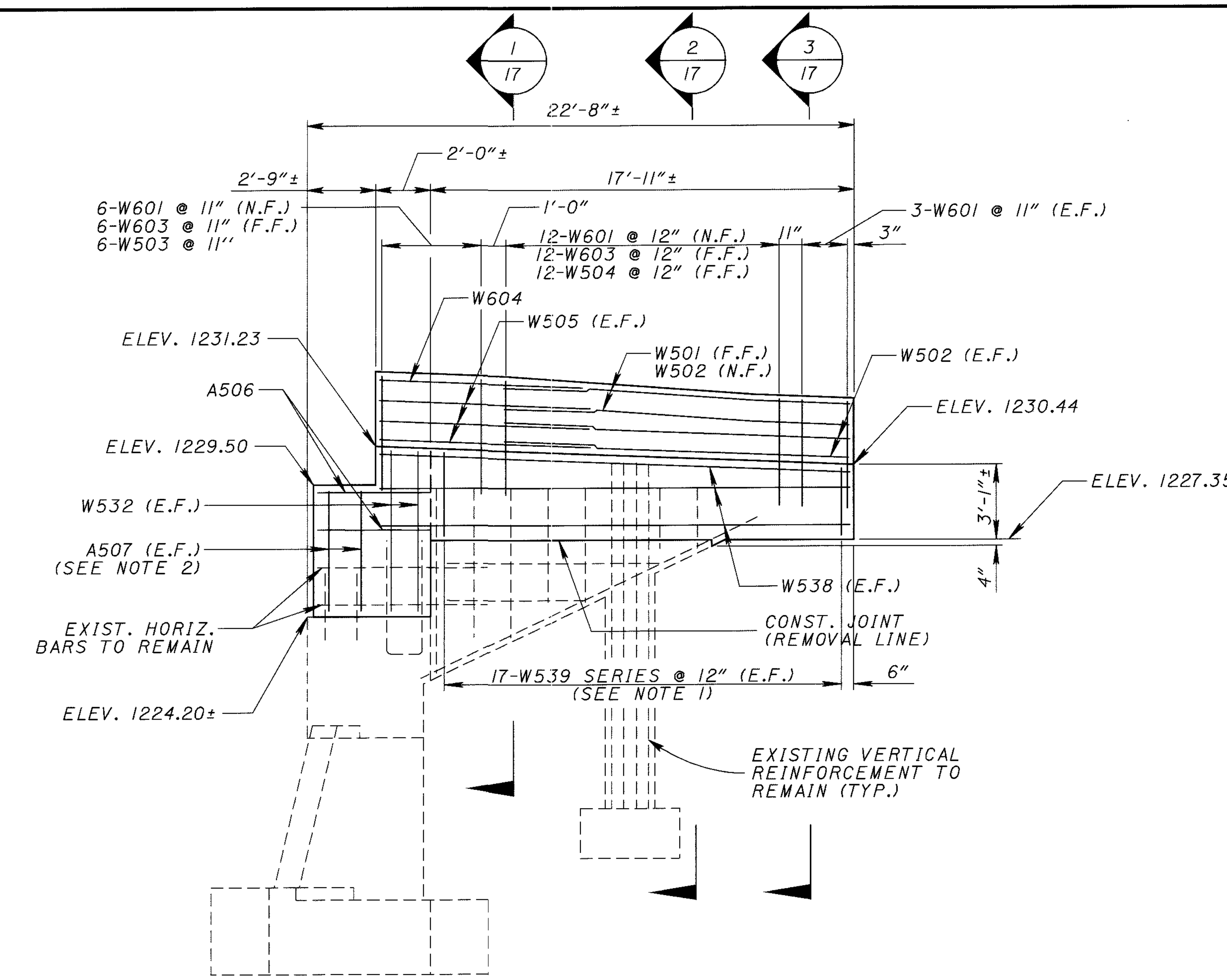
HAS-22-17.48

15/23

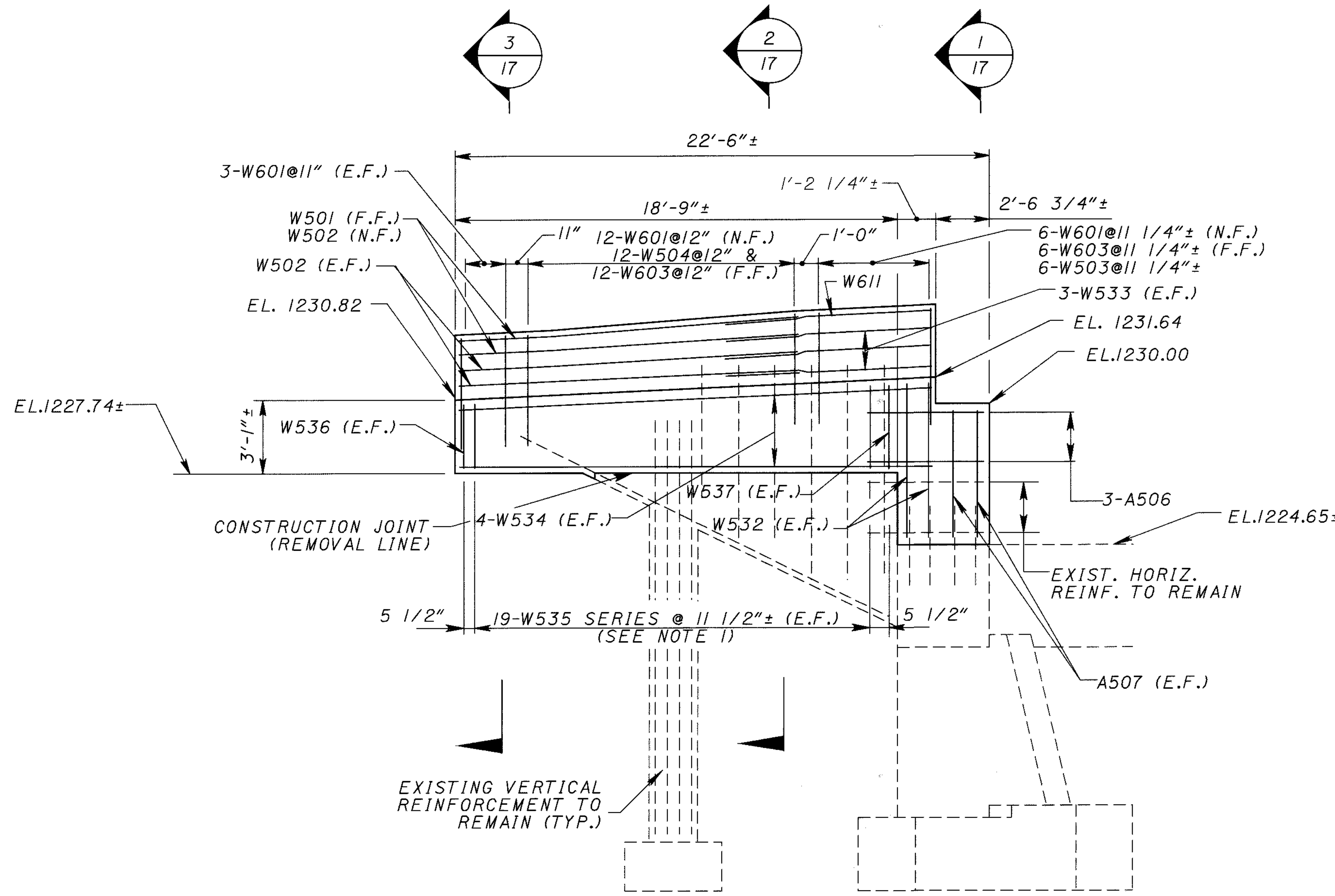
59/67



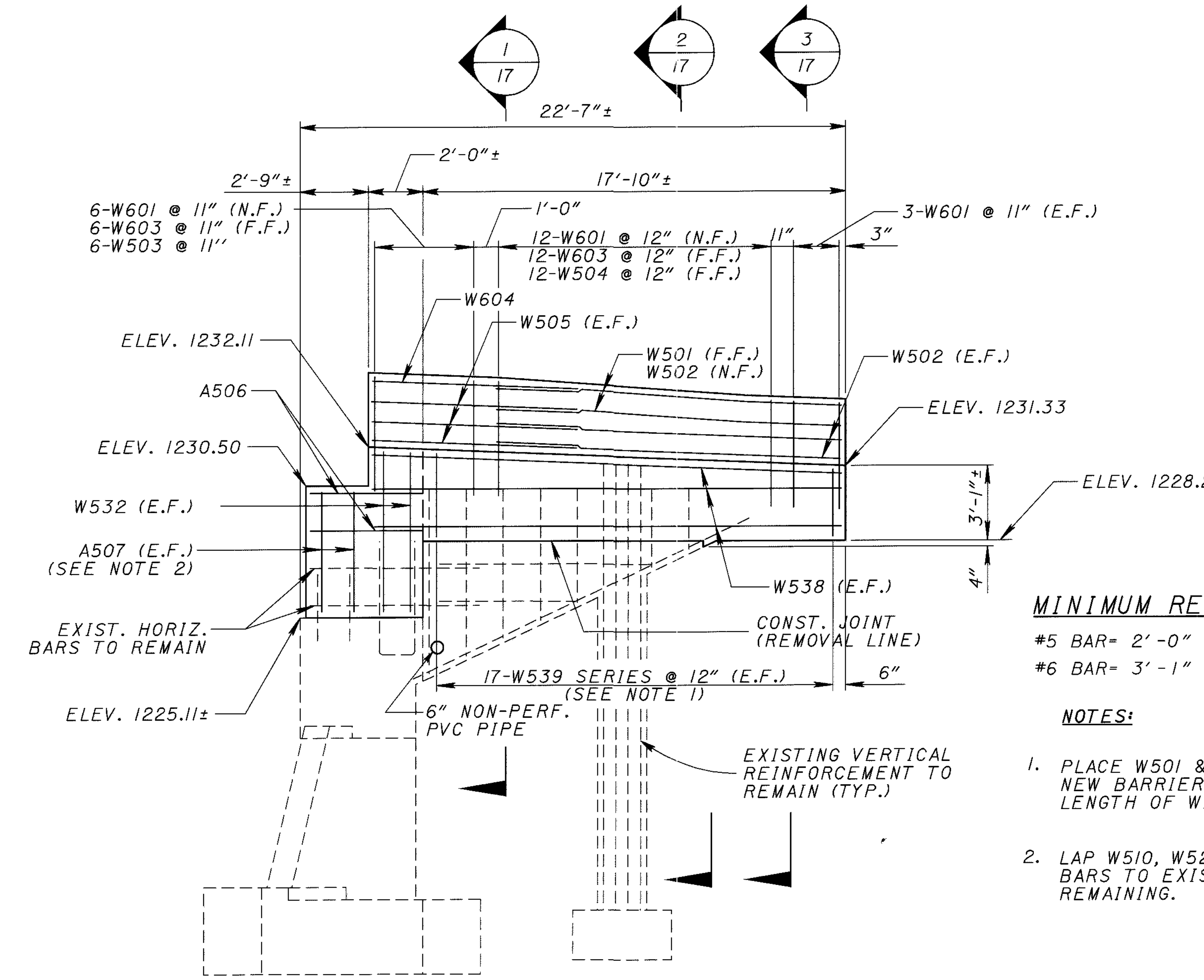
NORTH WINGWALL ON FORWARD ABUTMENT - LEFT BRIDGE



SOUTH WINGWALL ON FORWARD ABUTMENT - LEFT BRIDGE



NORTH WINGWALL ON FORWARD ABUTMENT - RIGHT BRIDGE



SOUTH WINGWALL ON FORWARD ABUTMENT - RIGHT BRIDGE

MINIMUM REINF. LAPS

#5 BAR= 2'-0"

#6 BAR= 3'-1"

NOTES:

1. PLACE W501 & W513 BARS BETWEEN NEW BARRIER REINFORCING ALONG LENGTH OF WING WALL

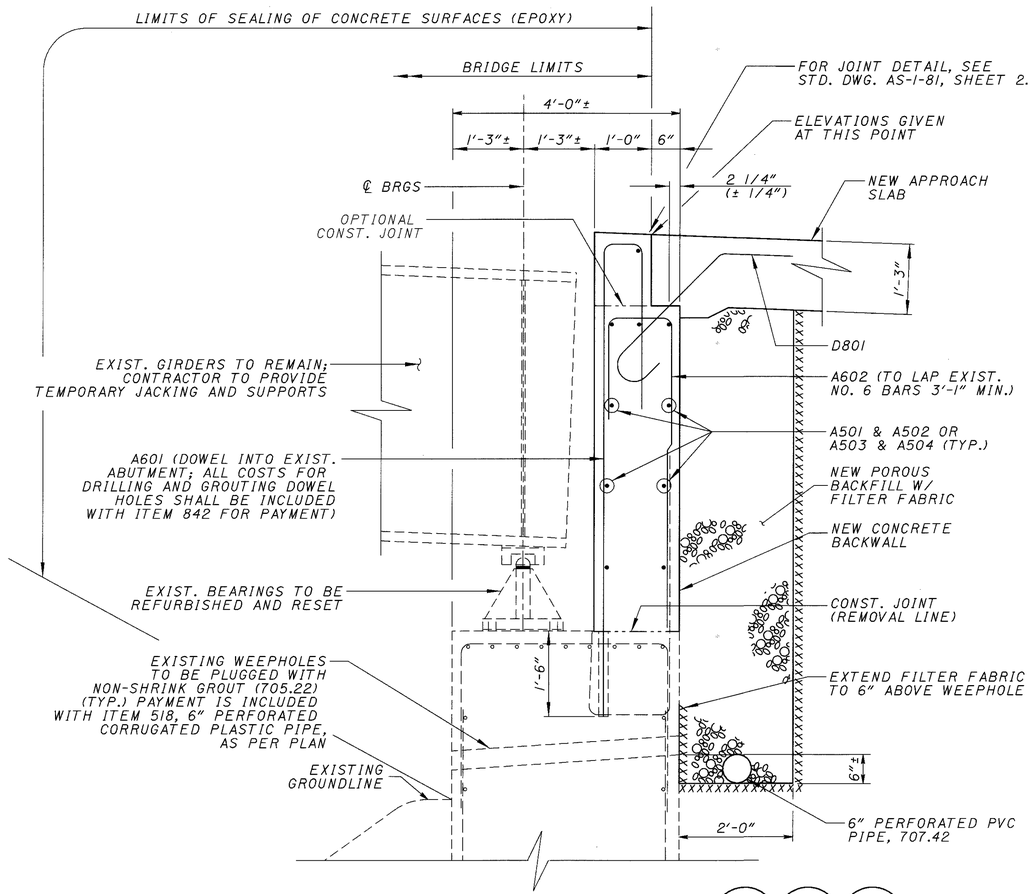
2. LAP W510, W521, A510, A512 AND A514 BARS TO EXISTING VERTICAL BARS REMAINING.

DESIGN AGENCY	
Gannett Fleming Corddry & Carpenter	BLENDON VIEW OFFICE PARK, 5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081
DESIGNED PLC	CHECKED MTO
DRAWN BJM	REVISED
REVIEWED JR	DATE 3/00
STRUCTURE FILE NUMBER	340/146L 340/170R

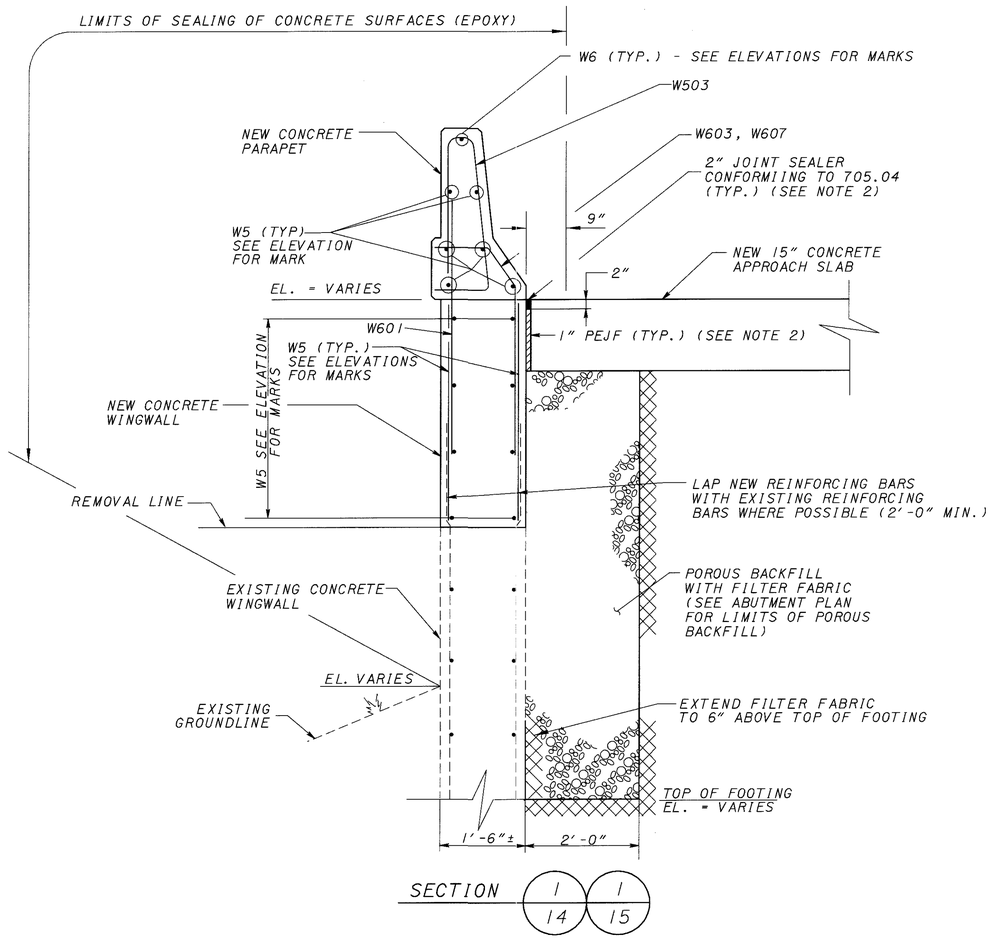
FORWARD ABUTMENT WINGWALL ELEVATIONS

BRIDGE NO. HAS-22-1753 (L.& R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48



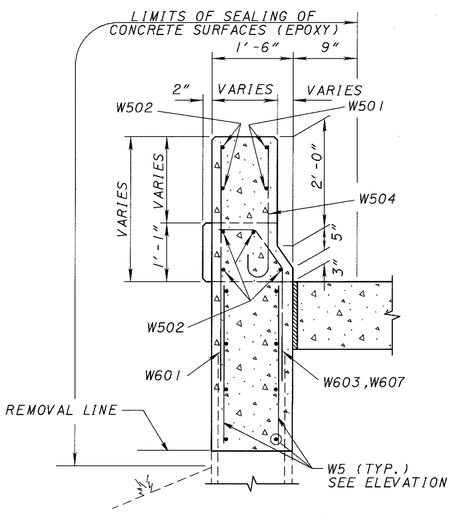
PROPOSED ABUTMENT SECTION 4/12 4/13 4/14



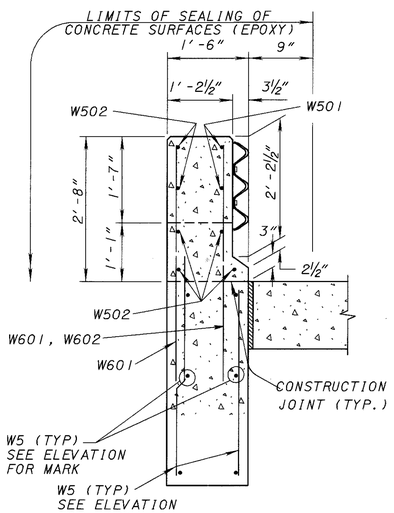
SECTION 1/14 1/15

PROPOSED WINGWALL REHABILITATION

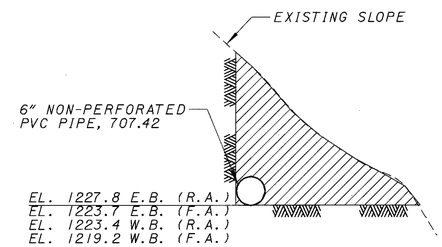
(POROUS BACKFILL TO BE PLACED TO TOP OF FOOTING)



SECTION 2/14 2/15



SECTION 3/14 3/15



ROCK EXCAVATION LIMITS

(EXCAVATE 1' BEYOND THE END OF THE DRAINAGE PIPE. PLACE DRAINAGE PIPE AT COMPLETION OF EXCAVATION AND BACKFILL WITH CRUSHED AGGREGATE SLOPE PROTECTION. EXCAVATION SHALL BE PERFORMED IN ACCORDANCE WITH ITEM 503, AND PAYMENT INCLUDED WITH ITEM 503, ROCK EXCAVATION. BACKFILL PAYMENT IS INCLUDED WITH ITEM 601 CRUSHED AGGREGATE SLOPE PROTECTION)

▨ - EXCAVATION LIMITS

NOTES:

1. FOR ADDITIONAL TRANSITION BARRIER DETAILS, SEE STD. DWG. BR-1, SHT. 1 OF 2
2. 1" P.E.J.F. AND 2" JOINT SEALER INCLUDED WITH ITEM 611 FOR PAYMENT.
3. POROUS BACKFILL WITH FILTER FABRIC, 2 FEET THICK SHALL EXTEND UP TO THE PLANE OF THE SUBGRADE, TO 1 FOOT BELOW THE EMBANKMENT SURFACE.
4. BACKWALL CONCRETE: IN ADDITION TO SS 842.08, BACKWALL CONCRETE ABOVE THE OPTIONAL CONSTRUCTION JOINT AT THE APPROACH SLAB SEAT SHALL NOT BE PLACED UNTIL AFTER THE DECK CONCRETE IN THE SPAN ADJACENT TO THE ABUTMENT HAS BEEN PLACED.
5. REINFORCING STEEL: NEW REINFORCING STEEL MAY REQUIRE FIELD CUTTING OR BENDING TO BE PROPERLY FITTED. PAYMENT SHALL BE INCLUDED IN THE APPLICABLE CONCRETE ITEM.

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter, BLENDON VIEW OFFICE PARK, 5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
PLC	BJM	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
MTO		3401760	

ABUTMENT AND WINGWALL DETAILS

BRIDGE NO. HAS-22-1753 (L.R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

17/23

61/67

FILE: s:\projects\35765\BRIDGE\RR\35316sd8.dgn
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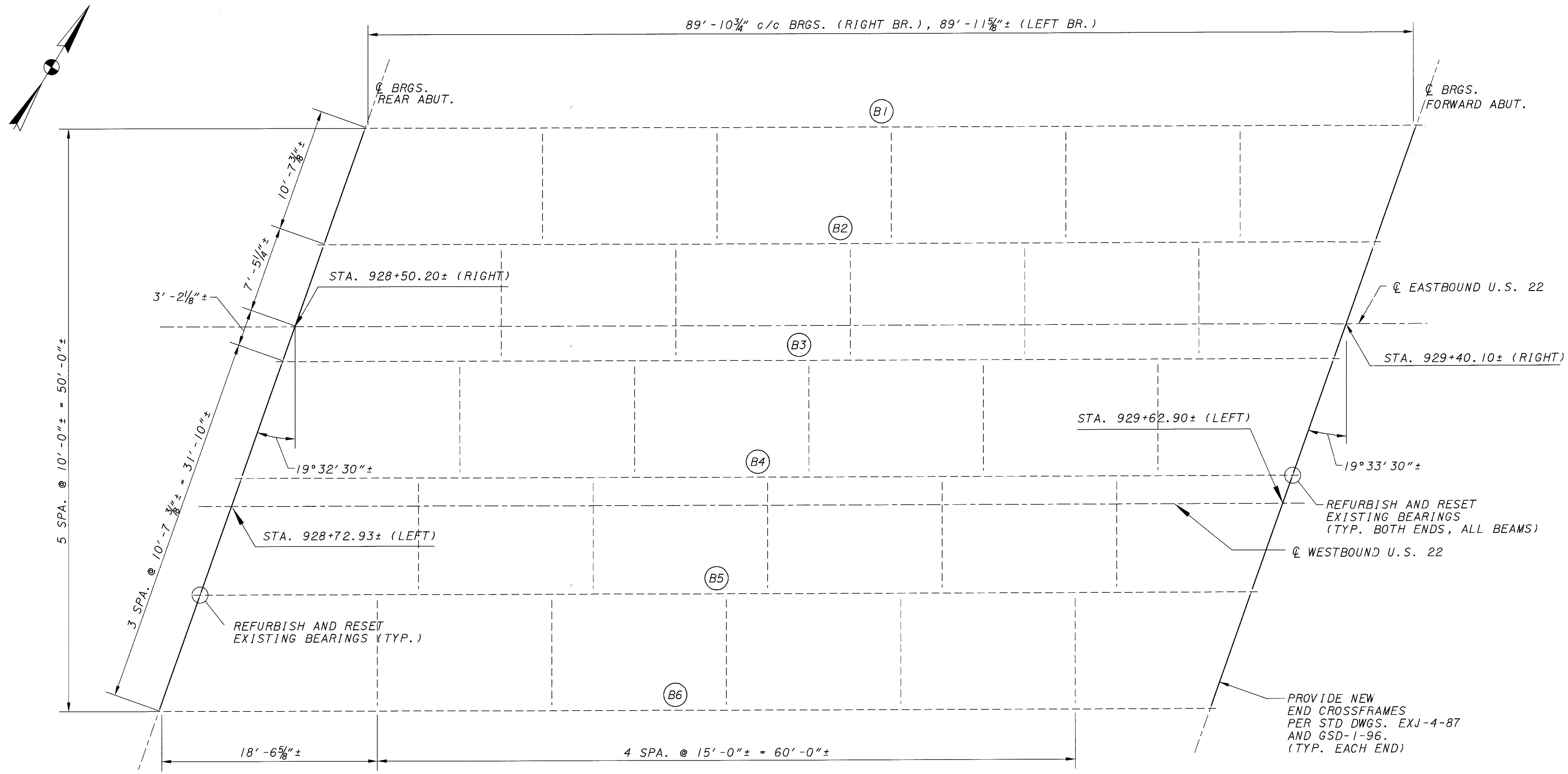
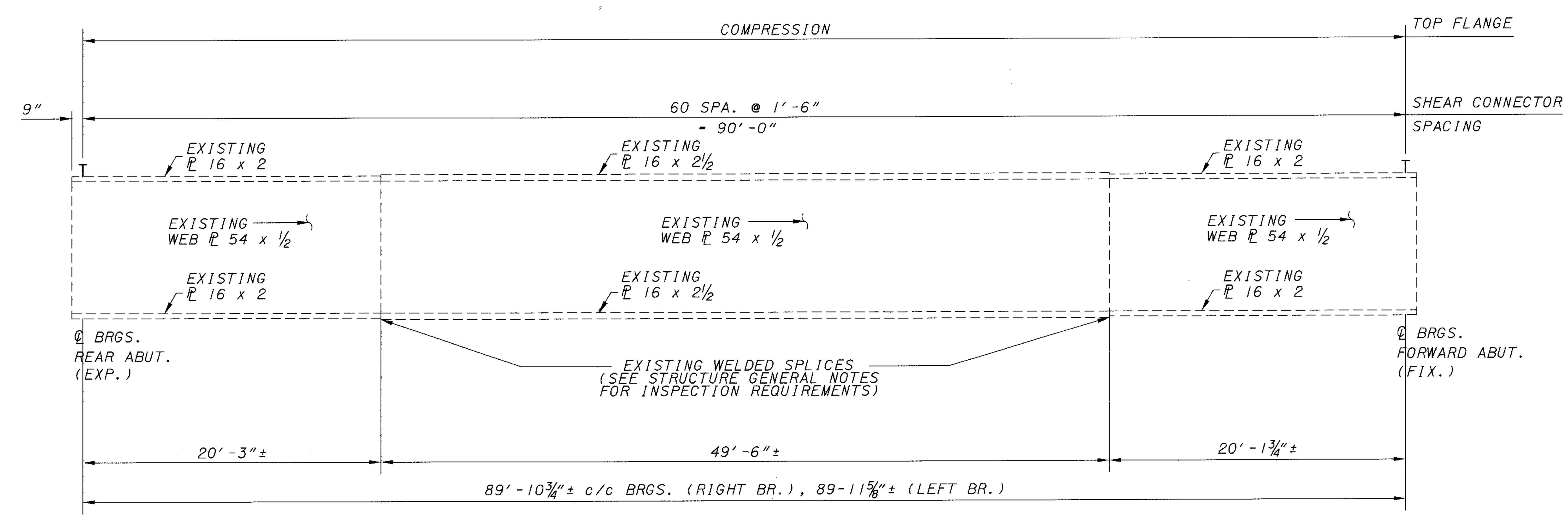
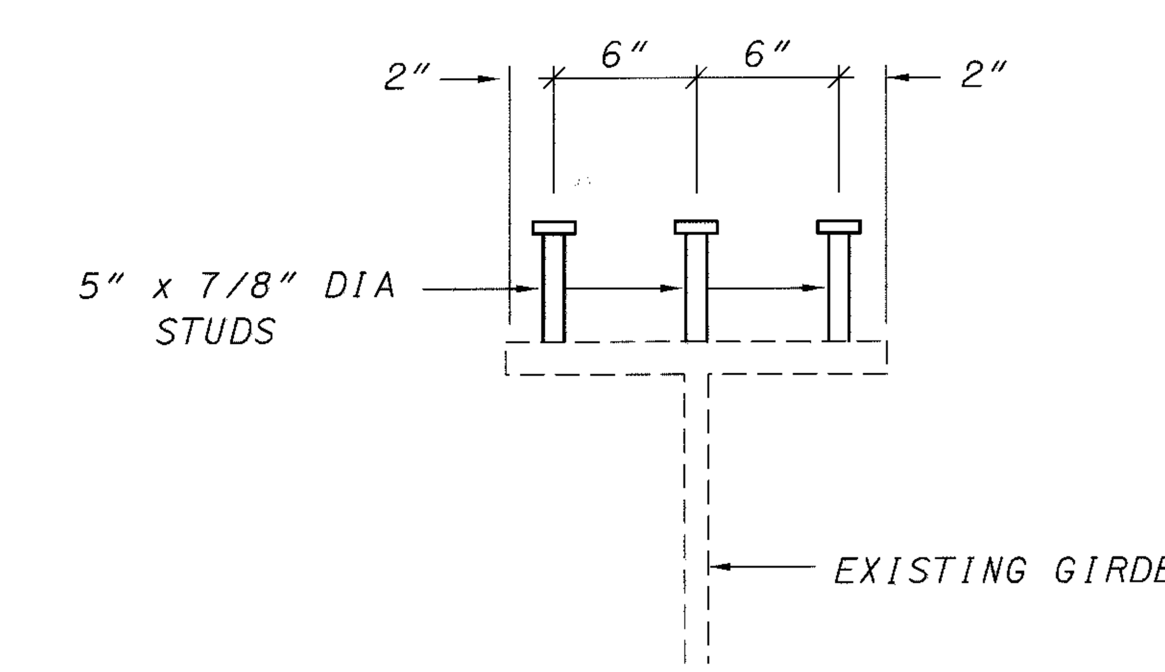


FRAMING PLAN



TYPICAL GIRDER ELEVATION



SHEAR CONNECTOR DETAIL

NOTES:

1. WELDED ATTACHMENT

WELDED ATTACHMENT OF SUPPORTS FOR CONCRETE DECK FINISHING MACHINE MAY BE MADE TO AREAS OF THE FLANGES DESIGNATED "COMPRESSION". ATTACHMENTS SHALL NOT BE MADE TO AREAS DESIGNATED "TENSION". FILLET WELDS TO COMPRESSION FLANGES SHALL BE NOT CLOSER THAN 1" FROM EDGE OF THE FLANGE, BE NOT MORE THAN 2" LONG AND BE NOT SMALLER THAN THE MINIMUM SIZE REQUIRED BY AASHTO.

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter

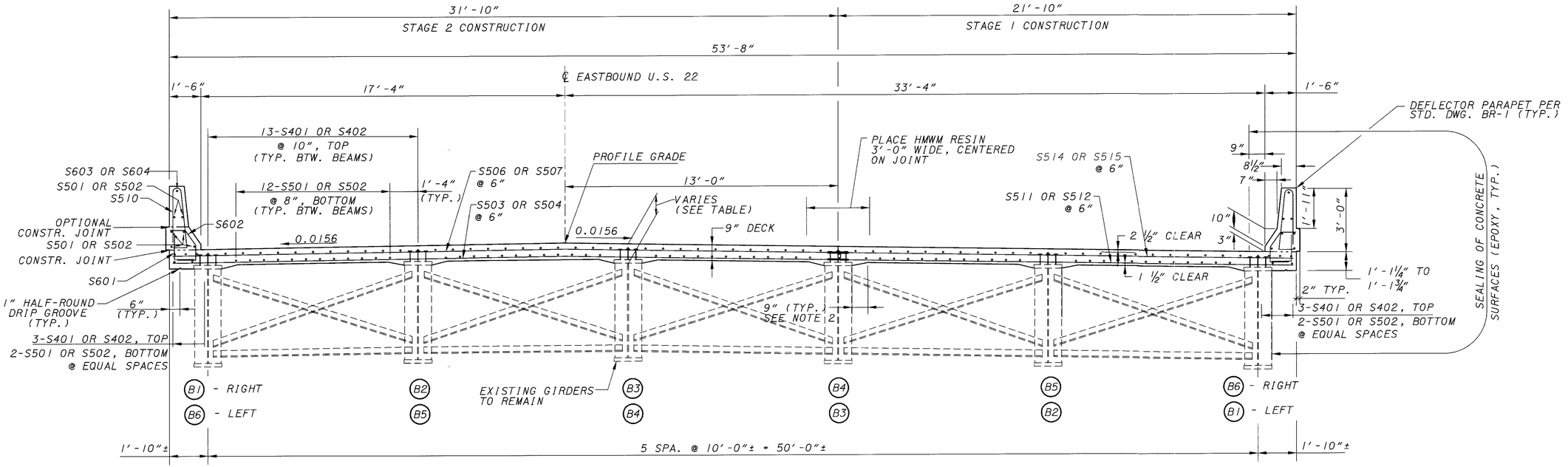
DESIGNED	DRAWN	REVIEWED	DATE
MTO	CLP	JR	3/00
CHECKED PLC	REVISED	STRUCTURE FILE NUMBER 3401146L 3401170R	

FRAMING PLAN & GIRDER DETAILS
BRIDGE NO. HAS-22-1753 (L.& R.) OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

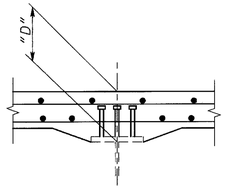
18/23

62/67



TRANSVERSE SECTION

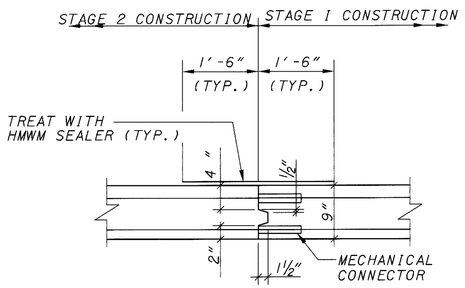
(RIGHT BR. SHOWN, LEFT BR. OPPOSITE HAND EXCEPT AS NOTED)



HAUNCH DETAIL

DEFLECTION AND CAMBER (INCHES)			
	SPAN 1		
	0.25L	0.50L	0.75L
DEFLECTION DUE TO WEIGHT OF STEEL	0"	0"	0"
DEFLECTION DUE TO REMAINING DEAD LOAD	11/16"	1"	11/16"
ADJUSTMENT DUE TO VERTICAL CURVE	0"	0"	0"
TOTAL CAMBER	11/16"	1"	11/16"

L = SPAN LENGTH



STAGE CONSTRUCTION JOINT DETAIL

LONGITUDINAL BARS NOT SHOWN.

HAUNCH DIMENSION "D" LEFT BRIDGE (INCHES)					
BEAM NO.	REAR ABUT.	FIRST QUARTER	MID-SPAN	THIRD QUARTER	FWD. ABUT.
B1	14.44	13.38	13.79	13.59	13.05
B2	14.55	13.62	13.66	13.94	13.52
B3	14.43	13.49	13.53	13.81	13.51
B4	14.54	13.60	13.76	13.68	13.15
B5	14.30	13.13	13.41	13.33	13.27
B6	14.63	14.05	13.97	13.77	13.48

HAUNCH DIMENSION "D" RIGHT BRIDGE (INCHES)					
BEAM NO.	REAR ABUT.	FIRST QUARTER	MID-SPAN	THIRD QUARTER	FWD. ABUT.
B1	15.33	13.95	14.15	13.63	13.36
B2	14.72	13.94	13.90	13.61	12.75
B3	14.54	13.88	13.60	13.08	12.94
B4	14.14	13.12	13.32	13.52	13.37
B5	14.82	13.68	13.40	13.11	12.73
B6	14.65	13.76	13.47	13.31	13.41

NOTES:

1. CONCRETE DECK SLAB DEPTH:

THE DISTANCE SHOWN FROM THE TOP OF DECK SLAB TO THE TOP OF THE WEB IS THE THEORETICAL DESIGN DIMENSION, INCLUDING THE DESIGN HAUNCH THICKNESS OF 2". THE QUANTITY OF DECK CONCRETE TO BE PAID FOR SHALL BE BASED ON THIS DIMENSION, MINUS THE DESIGN HAUNCH THICKNESS, EVEN THOUGH DEVIATION FROM IT MAY BE NECESSARY BECAUSE THE TOP FLANGE OF THE GIRDER MAY NOT HAVE THE EXACT CAMBER OR CONFORMATION REQUIRED TO PLACE IT PARALLEL TO THE FINISHED GRADE. DEDUCTION SHALL BE MADE FOR VOLUME OF ENCASED STEEL PLATES AS PER **894.07**

2. CONCRETE DECK HAUNCH WIDTH:

A HAUNCH WIDTH OF 9" SHALL BE USED FOR COMPUTING QUANTITY OF CONCRETE. HOWEVER, THE HAUNCH WIDTH MAY VARY BETWEEN 6" AND 1'-0".

3. MINIMUM LAP LENGTHS

LAP NO.4 BARS 1'-7".
LAP NO.5 BARS 2'-0".
LAP NO.6 BARS 3'-1".

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DATE 3/00
REVIEWED JR
STRUCTURE FILE NUMBER 340/466, 340/470R
DRAWN CLP
REVISED
DESIGNED MTO
CHECKED PLC

TRANSVERSE SECTION & CAMBER DIAGRAM
BRIDGE NO. HAS-22-1753 (L. & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

19/23

63/67

FILE: s:\projects\35765\BRIDGE\RR\15936sc3.dgn
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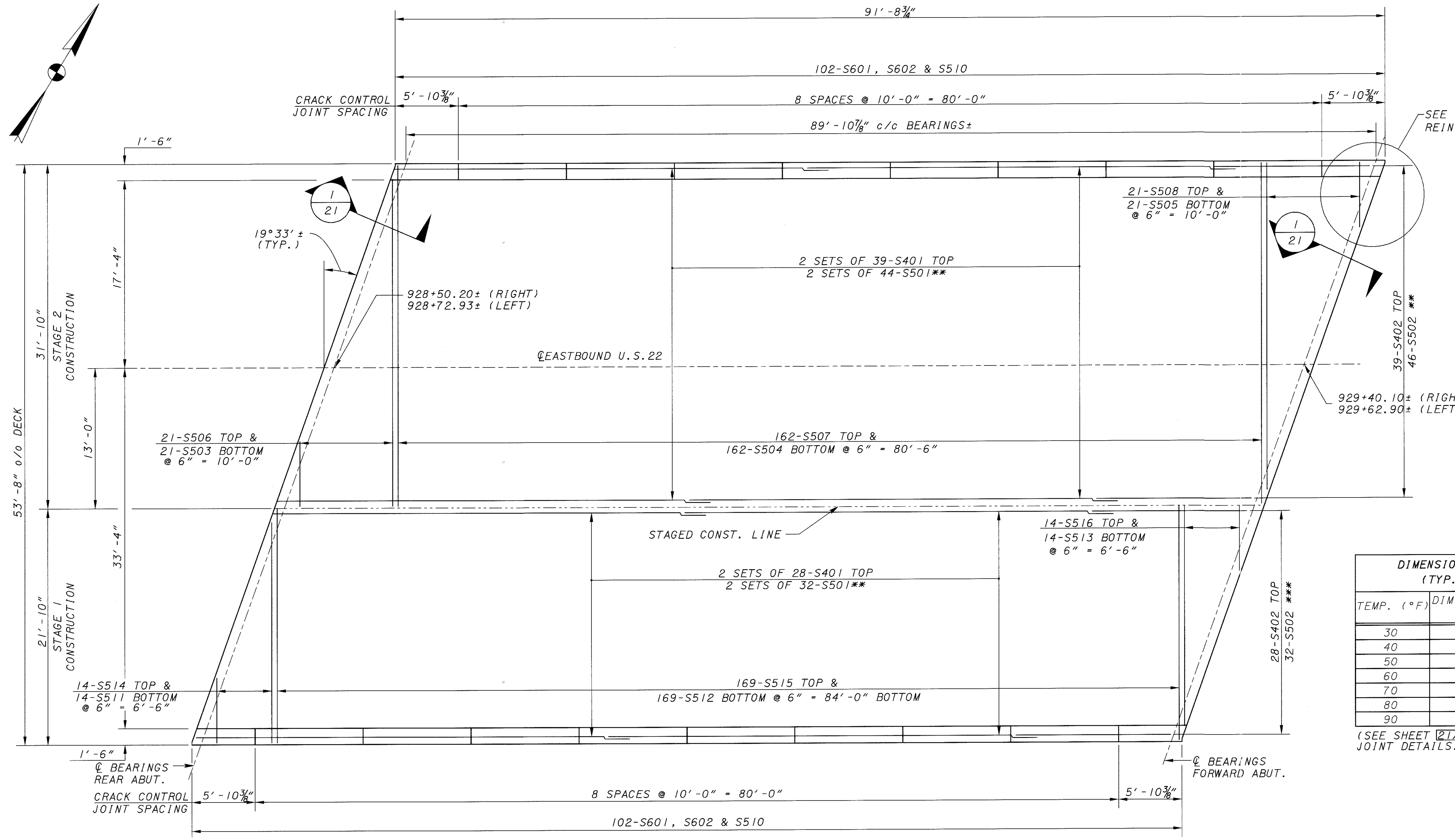


MINIMUM REINF. LAPS

#4 BAR= 1'-7"
#5 BAR= 2'-0"
#6 BAR= 3'-1"

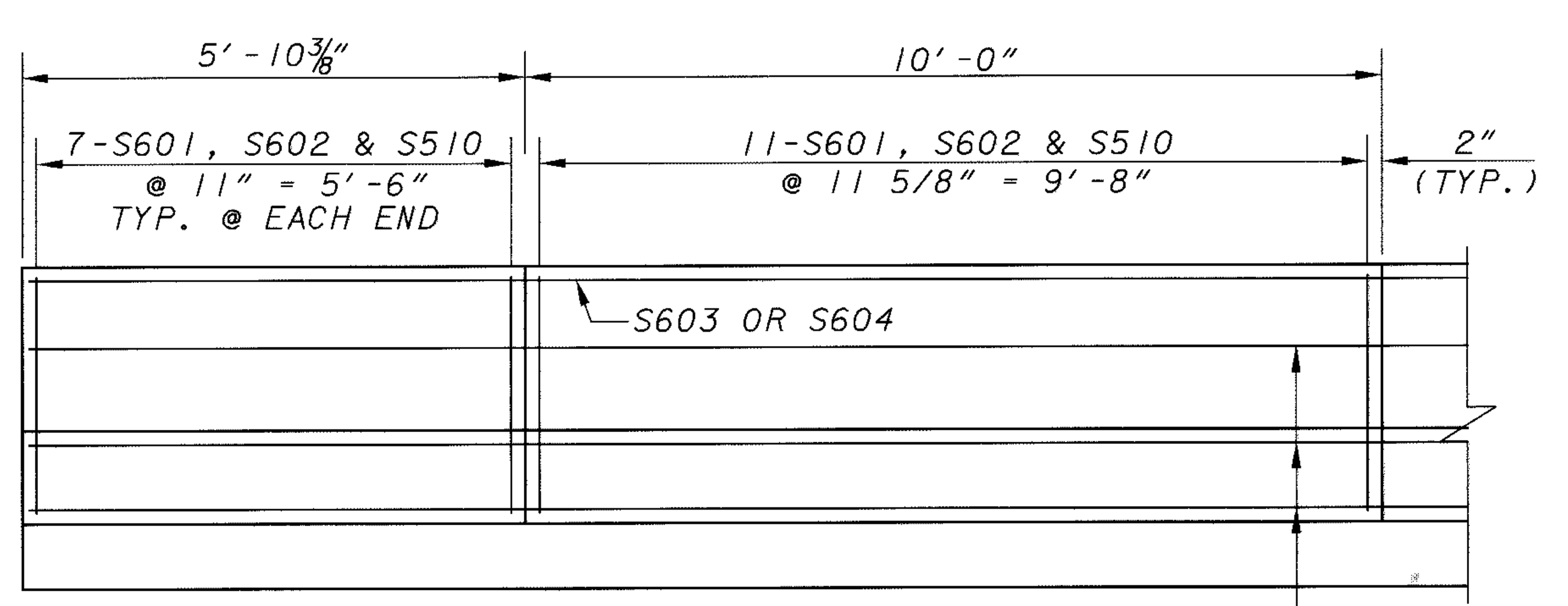
DIMENSION "A" FOR EXJ-4-87 JOINT (TYP. LT. & RT. BRIDGES)

TEMP. (°F)	DIM "A" (INCHES) REAR ABUT.	DIM "A" (INCHES) FWD. ABUT.
30	1.40	2.00
40	1.50	2.00
50	1.58	2.00
60	1.65	2.00
70	1.73	2.00
80	1.80	2.00
90	1.85	2.00

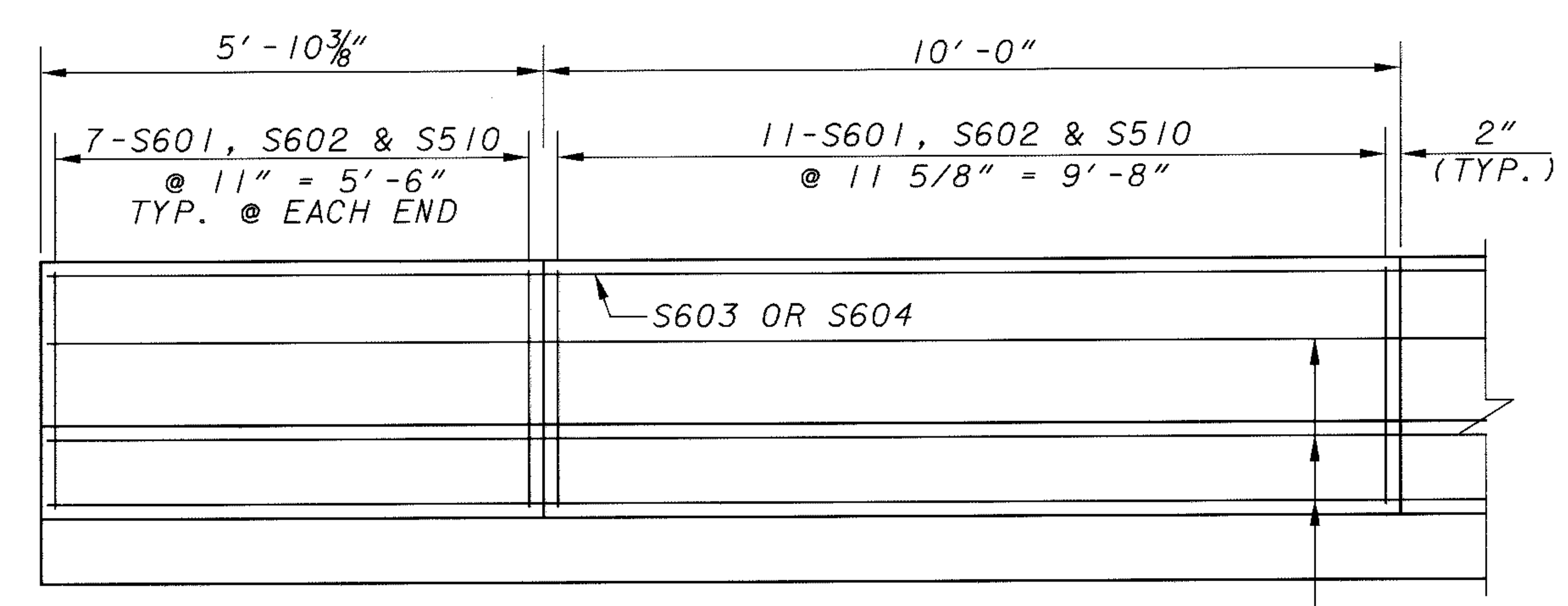
(SEE SHEET 21/23 FOR EXPANSION JOINT DETAILS.)

DECK REINFORCING PLAN

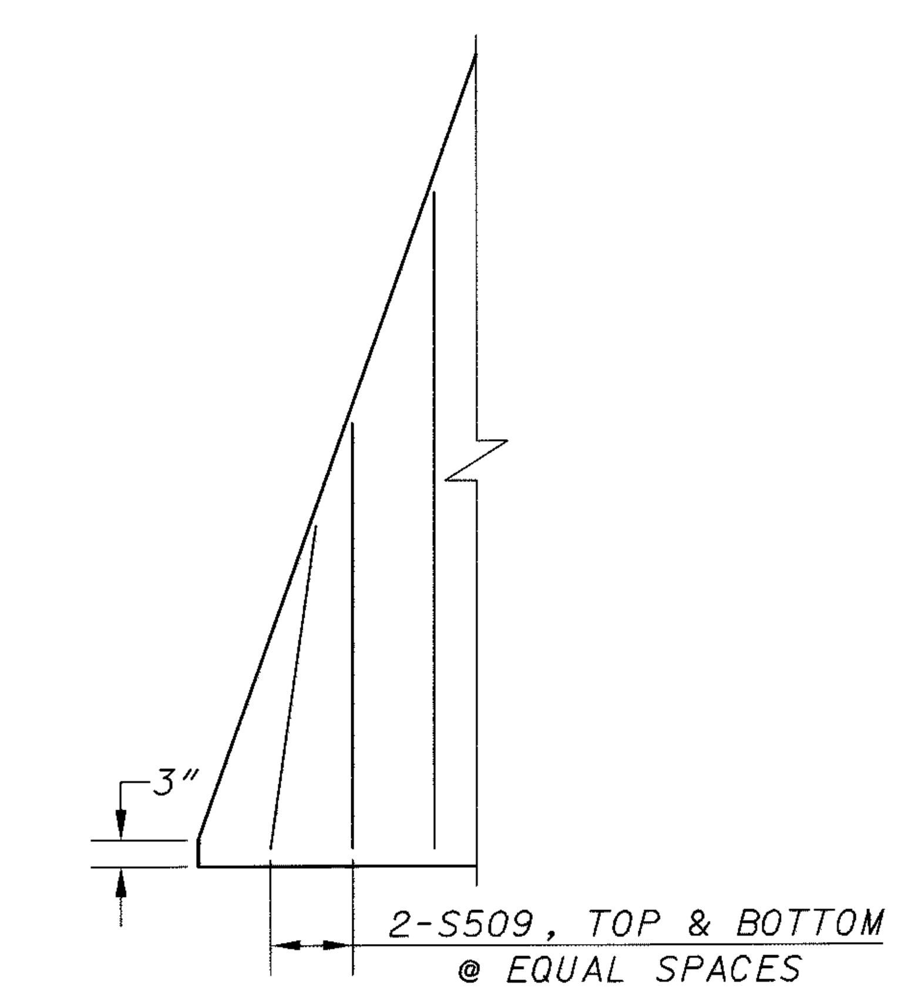
(RIGHT BRIDGE SHOWN; LEFT BRIDGE OPPOSITE HAND)
** INCLUDING 6-S501 OR S502 IN LEFT PARAPET
*** INCLUDING 6-S501 OR S502 IN RIGHT PARAPET



LEFT PARAPET REINFORCING DETAIL



RIGHT PARAPET REINFORCING DETAIL



DECK CORNER REINFORCING
(TYPICAL @ 4 LOCATIONS)

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED	DRAWN	REVIEWED	DATE
MTO	CLP	JR	3/00
CHECKED	REVISED	STRUCTURE FILE NUMBER	
DEK		3401146L 3401170R	

DECK SLAB PLAN & PARAPET DETAILS

BRIDGE NO. HAS-22-1753 (L.& R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

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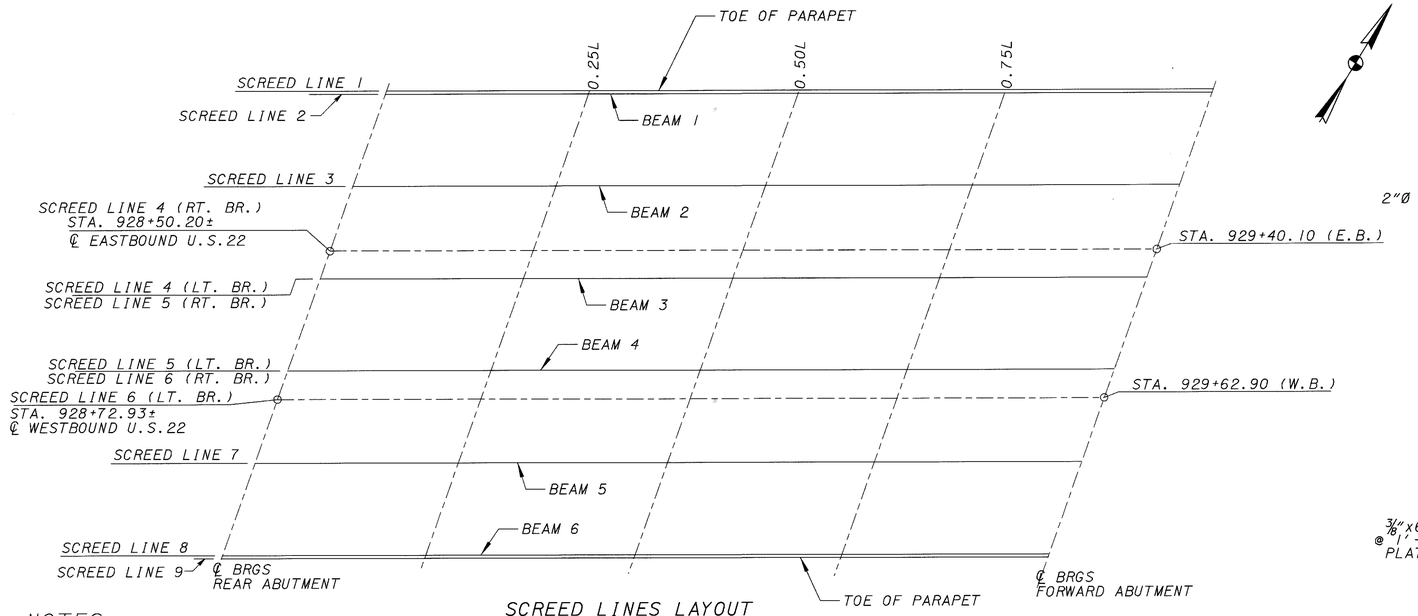
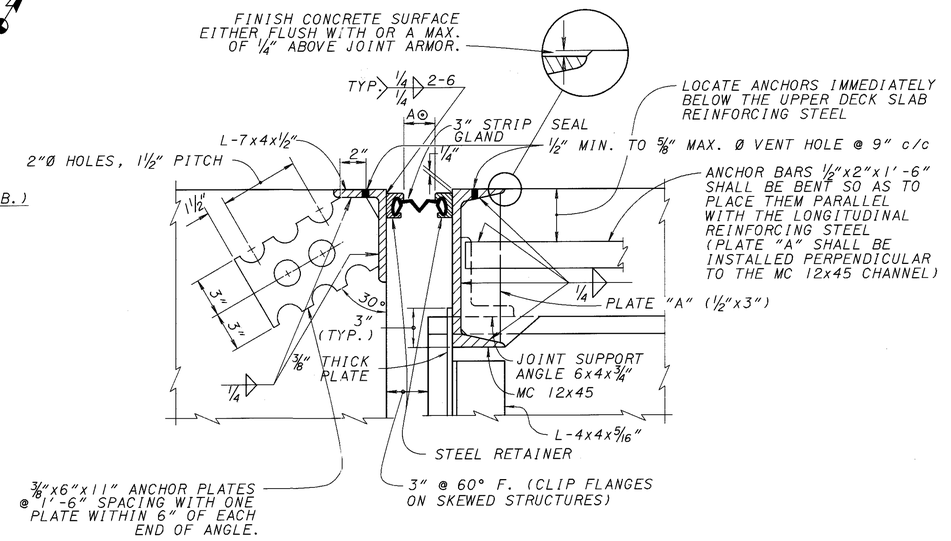


SCREED LINES LAYOUT



STRIP SEAL EXPANSION JOINT DETAIL SECTION 1/20

NOTE: THE JOINT ASSEMBLY SHALL BE PLACED SO THAT THE 7x4x1/2 ANGLE AND THE MC12x45 CHANNEL REMAIN PARALLEL TO EACH OTHER AND PERPENDICULAR TO THE ROADWAY GRADIENT. THE STRIP SEAL GLAND SHALL BE INSTALLED IN ONE CONTINUOUS PIECE AFTER THE DECK CLOSURE POUR IS COMPLETE.

NOTES

1. SCREED ELEVATIONS

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

2. L = SPAN LENGTH

3. ITEM 516 - STRUCTURAL EXPANSION JOINT INCLUDING ELASTOMERIC STRIP SEAL, AS PER PLAN:

THIS ITEM SHALL CONFORM TO 516 AND STD. DWG. EXJ-4-87 EXCEPT THAT THE ABUTMENT ANCHOR PLATE SHALL BE FABRICATED AT AN ANGLE OF 30° TO THE BACKWALL INSTEAD OF 60°.

4. INSTALLATION OF SEAL:

DURING INSTALLATION OF THE SUPPORT/ARMOR FOR THE SUPERSTRUCTURE SIDE OF THE EXPANSION JOINT SEAL, THE SEATING OF BEAMS ON BEARINGS SHALL BE CAREFULLY OBSERVED TO ASSURE THAT POSITIVE BEARING IS MAINTAINED. PROPER ELEVATION OF THE SUPPORT/ARMOR SHALL BE ACHIEVED BY ADJUSTING THE CONNECTION ANGLES AND BOLTS BETWEEN BEAM AND EXPANSION JOINT.

SCREED ELEVATION TABLE - LEFT BRIDGE

		SCREED LINE 1		SCREED LINE 2		SCREED LINE 3		SCREED LINE 4		SCREED LINE 5		SCREED LINE 6		SCREED LINE 7		SCREED LINE 8		SCREED LINE 9	
SPAN NO.	LOCATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION
SPAN NO. 1	0.00 L	928+84.77	1233.93	928+84.65	1233.94	928+81.10	1234.24	928+77.55	1234.54	928+73.99	1234.84	928+72.93	1234.93	928+70.44	1234.92	928+66.89	1234.91	928+66.77	1234.91
	0.25 L	929+07.26	1233.08	929+07.14	1233.09	929+03.59	1233.39	929+00.04	1233.69	928+96.49	1233.99	928+95.42	1234.08	928+92.94	1234.04	928+89.39	1234.06	928+89.27	1234.06
	0.50 L	929+29.75	1232.20	929+29.64	1232.21	929+26.08	1232.51	929+22.53	1232.81	929+18.98	1233.11	929+17.92	1233.20	929+15.43	1233.19	929+11.88	1233.18	929+11.76	1233.18
	0.75 L	929+52.25	1231.27	929+52.13	1231.28	929+48.58	1231.58	929+45.03	1231.88	929+41.48	1232.18	929+40.41	1232.27	929+37.92	1232.26	929+34.37	1232.24	929+34.26	1232.24
	1.00 L	929+74.74	1230.31	929+74.62	1230.32	929+71.07	1230.61	929+67.52	1230.91	929+63.97	1231.21	929+62.90	1231.30	929+60.42	1231.29	929+56.87	1231.28	929+56.75	1231.28

SCREED ELEVATION TABLE - RIGHT BRIDGE

		SCREED LINE 1		SCREED LINE 2		SCREED LINE 3		SCREED LINE 4		SCREED LINE 5		SCREED LINE 6		SCREED LINE 7		SCREED LINE 8		SCREED LINE 9	
SPAN NO.	LOCATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION	STATION	SCREED ELEVATION
SPAN NO. 1	0.00 L	928+56.36	1235.30	928+56.24	1235.31	928+52.69	1235.61	928+50.20	1235.82	928+49.13	1235.82	928+45.58	1235.80	928+42.03	1235.79	928+38.48	1235.78	928+38.36	1235.78
	0.25 L	928+78.83	1234.46	928+78.71	1234.47	928+75.16	1234.76	928+72.68	1234.97	928+71.61	1234.97	928+68.06	1234.96	928+64.51	1234.94	928+60.96	1234.93	928+60.84	1234.93
	0.50 L	929+01.31	1233.58	929+01.19	1233.59	928+97.64	1233.88	928+95.15	1234.09	928+94.09	1234.09	928+90.53	1234.08	928+86.98	1234.06	928+83.43	1234.05	928+83.31	1234.05
	0.75 L	929+23.78	1232.65	929+23.66	1232.66	929+20.11	1232.96	929+17.63	1233.17	929+16.56	1233.16	929+13.01	1233.15	929+09.46	1233.14	929+05.91	1233.12	929+05.79	1233.12
	1.00 L	929+46.26	1231.69	929+46.14	1231.70	929+42.59	1232.00	929+40.10	1232.21	929+39.04	1232.20	929+35.48	1232.19	929+31.93	1232.18	929+28.38	1232.16	929+28.26	1232.16

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter, BLENDON VIEW OFFICE PARK, 5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081
DESIGNED MTO | DRAWN DEK | REVIEWED JR | DATE 3/00
CHECKED PLC | REVISED | STRUCTURE FILE NUMBER 3401/146 3401/150

SCREED ELEVATION TABLES
BRIDGE NO. HAS-22-1753 (L & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

21/23

65/67

REINFORCING STEEL LIST

MARK	NO.	LENGTH	WEIGHT **	TYPE	A	B	C	D	INCR.
SUPERSTRUCTURE-STAGE 2									
S401	160	40'-0"	4275	STR					
S402	80	15'-11"	851	STR					
S501	176	40'-0"	7343	STR					
S502	88	17'-3"	1583	STR					
S503	2 S.O. 21	3'-4" TO 30'-3"	794	STR					1'-3"
S504	324	31'-8"	10702	STR					
S505	2 S.O. 21	3'-4" TO 30'-3"	794	STR					1'-3"
S506	2 S.O. 21	3'-4" TO 30'-3"	794	STR					1'-3"
S507	324	31'-8"	10702	STR					
S508	2 S.O. 21	3'-4" TO 30'-3"	794	STR					1'-3"
S509	8 S.O. 2	1'-7" TO 2'-3"	35	STR					8"
S510	204	6'-0"	1277	9	2'-9"	2'-6"	8"		
S601	204	2'-5"	740	1	11"	1'-8"			
S602	204	3'-1"	944	10	11"				
S603	8	40'-0"	480	STR					
S604	4	18'-2"	108	STR					
SUPERSTRUCTURE-STAGE 1									
S401	112	40'-0"	2993	STR					
S402	56	15'-11"	595	STR					
S501	128	40'-0"	5340	STR					
S502	64	17'-3"	1151	STR					
S509	8 S.O. 2	1'-7" TO 2'-3"	35	STR					8"
S510	204	6'-1"	1294	9	2'-9"	2'-6"	8"		
S511	2 S.O. 14	3'-4" TO 20'-3"	383	STR					1'-3"
S512	338	21'-8"	7638	STR					
S513	2 S.O. 14	3'-4" TO 20'-3"	383	STR					1'-3"
S514	2 S.O. 14	3'-4" TO 20'-3"	383	STR					1'-3"
S515	338	21'-8"	7638	STR					
S516	2 S.O. 14	3'-4" TO 20'-3"	383	STR					1'-3"
S601	204	2'-6"	740	1	11"	1'-8"			
S602	204	3'-1"	944	10	11"				
		TOTAL = 70,263 LBS. **							

MARK	NO.	LENGTH	WEIGHT **	TYPE	A	B	C	D	INCR.
ABUTMENTS									
A501	20	22'-10"	476	STR					
A502	20	33'-8"	702	STR					
A503	20	23'-0"	480	STR					
A504	20	33'-5"	697	STR					
A505	12	3'-9"	47	STR					
A506	24	10'-0"	250	4	6"	4'-9"	3"		
A507	16	5'-0"	83	STR					
A601	221	11'-8"	3874	2	8'-6"	8"	2'-11"		
A602	221	8'-3"	2739	2	5'-7"	1'-2"	1'-10"		
D801	140	5'-1"	1900	8	1'-5"	2'-9"			
W501	16	13'-10"	231	14					
W502	48	13'-10"	693	STR					
W503	62	6'-0"	388	9	2'-6"	2'-9"	8"		
W504	96	3'-0"	300	6	2'-5"				
W505	12	7'-9"	97	STR					
W506	8	20'-2"	168	STR					
W507	2 S.O. 19	3'-0" TO 2'-3"	104	STR					0½"
W508	2	3'-0"	6	STR					
W509	2	2'-3"	5	STR					
W510	8	6'-10"	57	STR					
W511	6	12'-11"	81	STR					
W512	8	24'-8"	206	STR					
W513	2 S.O. 23	3'-1" TO 2'-1"	124	STR					0½"
W514	2	3'-1"	6	STR					
W515	2	2'-1"	4	STR					
W516	6	8'-1"	51	STR					
W517	8	20'-5"	170	STR					
W518	2	11'-8"	24	STR					
W519	4 S.O. 8	3'-0" TO 3'-3½"	105	STR					0½"
W520	2 S.O. 11	3'-11" TO 4'-4"	95	STR					0½"
W521	6	6'-10"	43	STR					
W522	2 S.O. 14	7'-4" TO 6'-9½"	206	STR					0½"
W523	8	20'-9"	173	STR					
W524	2	14'-4"	30	STR					
W525	8	12'-9"	106	STR					
W526	6	8'-11"	56	STR					
W527	6	13'-4"	83	STR					
W528	8	25'-3"	211	STR					
W529	2 S.O. 24	3'-9" TO 2'-9½"	164	STR					0½"
W530	2	2'-9½"	6	STR					
W531	2	3'-9"	8	STR					
W532	16	6'-8"	111	STR					
W533	6	7'-9"	48	STR					
W534	8	19'-5"	162	STR					

NOTES:

1. FOR REINFORCING STEEL NOTES AND DIAGRAMS SEE SHEET 23/23.

DESIGN AGENCY: Gannett Fleming Corddry & Carpenter
BLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DESIGNED CLP | DRAWN CLP | REVIEWED JR | DATE 3/00
CHECKED DEK | REVISED | STRUCTURE FILE NUMBER 3401/146L 3401/170R

REINFORCING STEEL LIST
BRIDGE NO. HAS-22-1753 (L & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

22/23

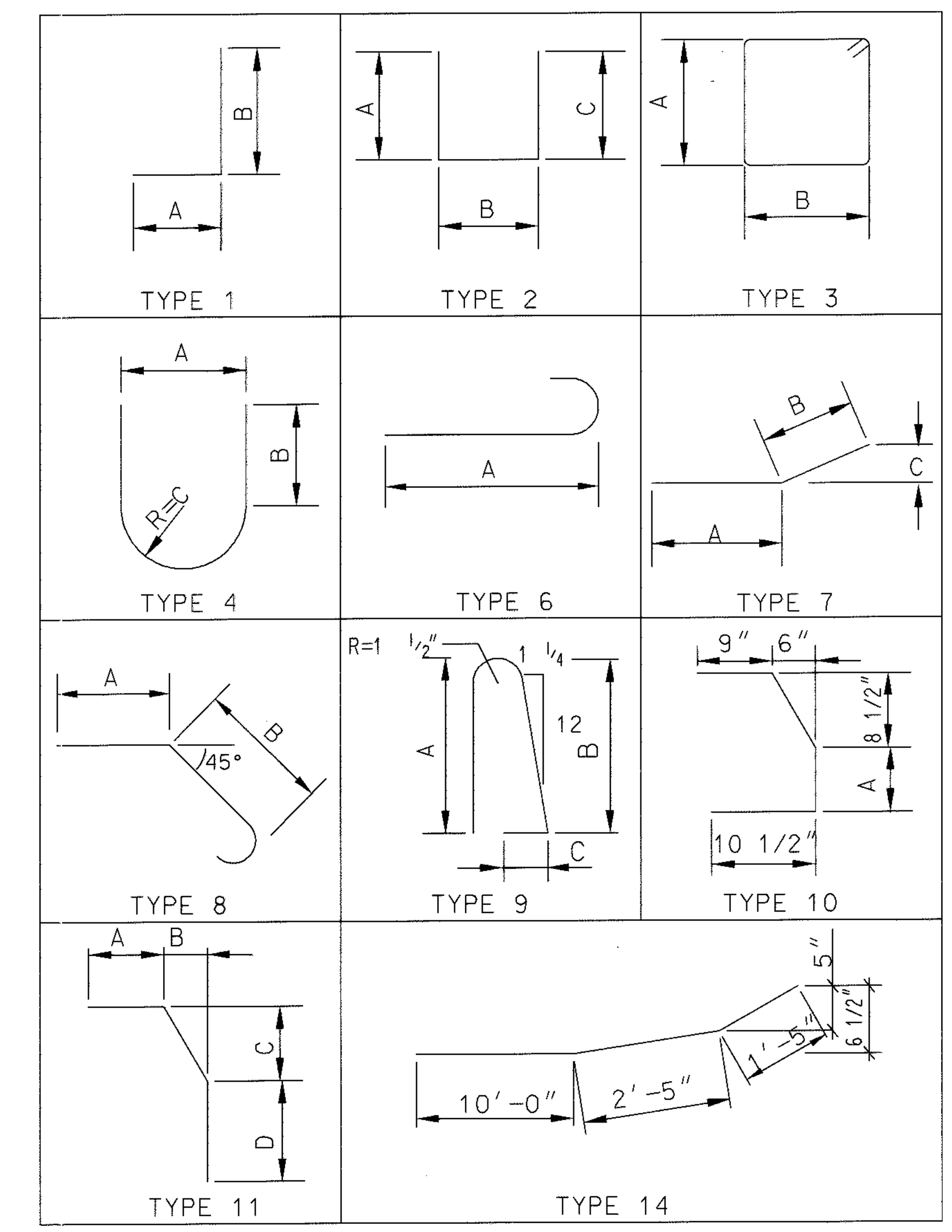
66
67

FILE: s:\projects\35765\BRIDGE\RR\15936sr02.dgn
DATE: 10-Apr-2000 09:59

REINFORCING STEEL LIST

MARK	NO.	LENGTH	WEIGHT **	TYPE	A	B	C	D	INCR.
ABUTMENTS (CONTINUED)									
W535	2 S.O. 19	3'-6'' TO 2'-9''	124	STR					0½"
W536	2	2'-9''	6	STR					
W537	2	3'-6''	7	STR					
W538	12	19'-7''	245	STR					
W539	4 S.O. 17	2'-11'' TO 3'-5''	225	STR					0½"
W601	200	4'-6''	1352	STR					
W602	6	5'-6''	50	STR					
W603	120	3'-8''	661	11	8''	6''	8½"	2'-3"	
W604	2	8'-1''	24	STR					
W605	1	13'-3''	20	STR					
W606	1	8'-7''	13	STR					
W607	38	4'-7''	262	11	8''	6''	8½"	3'-3"	
W608	1	9'-3''	28	STR					
W610	1	13'-8''	21	STR					
W611	1	8'-1''	12	STR					
		TOTAL = 18615 LBS. **							

BENDING DIAGRAMS



NOTES:

1. THE BAR SIZE NUMBER IS SPECIFIED ON THE PLANS IN THE BAR MARK COLUMN. THE FIRST DIGIT WHERE THREE DIGITS ARE USED, AND THE FIRST TWO DIGITS WHERE FOUR ARE USED, INDICATES THE BAR SIZE NUMBER. FOR EXAMPLE, S501 IS A NO. 5 BAR. BAR DIMENSIONS SHOWN ARE OUT TO OUT UNLESS OTHERWISE NOTED. R INDICATES INSIDE RADIUS, UNLESS OTHERWISE NOTED.

2. ALL REINFORCING STEEL SHALL BE EPOXY COATED. PAYMENT FOR REINFORCING STEEL SHALL BE INCLUDED WITH APPROPRIATE 844 **OR 894** CONCRETE ITEMS.

3. "STR" IN THE TYPE COLUMN INDICATES STRAIGHT BARS.

4. S.O. DENOTES "SERIES OF".

5. REFER TO C.M.S. SECTION 509.05 FOR STANDARD BEND DIMENSIONS.

6. ALL REINFORCING STEEL CLEARANCES ARE 2" UNLESS OTHERWISE NOTED.

7. MECHANICAL CONNECTORS: AN APPROVED TYPE OF MECHANICAL CONNECTOR FOR REINFORCING BARS SHALL BE PROVIDED. INSTALLATION OF CONNECTORS SHALL CONFORM WITH MANUFACTURER RECOMMENDED PROCEDURES. IF A DOWEL BAR SPLICE TYPE OF CONNECTOR IS FURNISHED, THE MINIMUM DOWEL BAR LENGTH TO BE INCLUDED WITH THE CONNECTOR SHALL BE AS GIVEN BY THE DIMENSION "L" SHOWN BELOW.

#4 REINFORCING BARS L = 2'-3"
#5 REINFORCING BARS L = 2'-11"
#6 REINFORCING BARS L = 3'-5"
#8 REINFORCING BARS L = 5'-9"

CONNECTORS AND DOWEL BARS USED WITH EPOXY COATED BARS SHALL BE EPOXY COATED. COATING FOR BOTH CONNECTORS AND BARS SHALL CONFORM TO THE SAME SPECIFICATIONS WITH RESPECT TO COLOR, CONTINUITY AND UNIFORMITY MAY BE REPAIRED AS DIRECTED BY THE ENGINEER OR THEY SHALL BE REPLACED WITH MATERIAL WHICH MEETS THE SPECIFICATIONS.

FOR BARS UTILIZING A MECHANICAL CONNECTOR, THE BAR LENGTH FOR PAYMENT IS MEASURED TO THE CONSTRUCTION JOINT. EXTRA BAR LENGTH AND/OR BAR END PREPARATION MAY BE NECESSARY DEPENDING UPON THE TYPE OF MECHANICAL CONNECTOR FURNISHED AND THOSE COSTS SHALL BE INCLUDED IN THE BID PRICE FOR THE APPROPRIATE 844 **OR 894 ITEM. CONNECTORS** AND DOWEL BAR EXTENSIONS SHALL CONFORM TO ITEM 509 AND BE INCLUDED IN THE BID PRICE.

* WITH MECHANICAL CONNECTOR
** FOR INFORMATION PURPOSE ONLY.

DESIGN AGENCY
Gannett Fleming Corddry & Carpenter
GLENDON VIEW OFFICE PARK
5015 PINE CREEK DRIVE, COLUMBUS, OHIO 43081

DATE 3/00 | STRUCTURE FILE NUMBER 340146L 340170R | REVIEWED JR | REVISED - - - | DRAWN CLP | DESIGNED CLP | CHECKED DEK

REINFORCING STEEL LIST
BRIDGE NO. HAS-22-1753 (L. & R.)
OVER COLUMBUS & OHIO RIVER R.R. SPUR

HAS-22-17.48

FILE: e:\projects\35765\BRIDGE\RR\5936rs3.dgn
DATE: 10-Apr-2000 10:01

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 815

FIELD PAINTING OF EXISTING STEEL, SYSTEM OZEU

May 30, 1996

815.01 DESCRIPTION. This item shall consist of furnishing all necessary labor, materials, and equipment to clean and paint all existing steel surfaces as specified herein.

815.02 MATERIALS. A three coat paint system consisting of: Organic Zinc Prime Coat, Epoxy Intermediate Coat and a Urethane Finish Coat. The Contractor shall select a coating system meeting the requirements of Supplemental Specification 910 entitled OZEU Structural Steel Paint. The approved list of coatings meeting this specification is on file at the Office of Materials Management and District Office.

815.03 QUALITY CONTROL Quality control will consist of the following items:

A. Contractor Quality Control Specialist. Before any work begins, the Contractor shall designate one individual on each project as a Quality Control Specialist (only one person per project will be necessary unless the Contractor is working at more than 3 sites simultaneously). In which case, it will be necessary to provide an additional Quality Control Specialist for each additional three (or portion of three) sites being painted simultaneously. This person will not be a Foreman or member of the Contractor's production staff (ie. he will not abrasive blast, paint, recover spent abrasives, etc.). He will not be involved in any other miscellaneous tasks (ie. mixing paint, running errands, running or working on equipment, etc.) while any production work is taking place. Documentation that personnel performing quality control related functions are qualified shall be submitted to the Engineer prior to allowing the Quality Control Specialist (QCS) to begin work. Documentation/verification shall be provided to the Engineer that the QCS has received formal training from one of the following: KTA Tator, S. G. Pinney, or Corrosion Control Consultants. He shall be equipped with material safety data sheets, product data sheets, tools and equipment to provide quality control on all facets of the work and shall have a thorough understanding of the plans and specifications pertaining to this project. He shall be responsible for inspecting the equipment at the specified intervals, the abrasives, and the work, at all quality control points. He shall also be responsible for verifying that all work is done within the specified work limitations. He shall cooperate with the Inspector and compare and document quality control readings. He shall have the authority to stop work and the responsibility to inform the Contractor's Foreman of nonconforming work.

B. Quality Control Points. Quality control points (QCP) are points in time when one phase of the work is complete and ready for inspection by both the Contractor and the Engineer prior to continuing with the next operational step. At these points: The Contractor shall afford access to inspect all affected surfaces. If inspection indicates a deficiency, that phase of the work shall be corrected in accordance with these specifications prior to beginning the next phase of work. Discovery of defective work or material after a Quality Control Point is past or failure of the final product before final acceptance, shall not in any way prevent rejection or obligate the State of Ohio to final acceptance.

Quality Control Points (QCP)	**PURPOSE**
1. Solvent Cleaning	Remove asphaltic cement, oil, grease, salt, dirt, etc. followed by washdown
2. Grinding Flange Edges	Remove sharp corners, as detailed on plans
3. Containment/Waste Disposal	Contain, collect & dispose of abrasive blasting debris
4. Abrasive Blasting	Blasted surface to receive paint
5. Prime Coat Application	Check surface cleanliness; apply prime coat; check coating thickness
6. Removing Fins, Tears, slivers	Remove surface defects and slivers
7. Caulking	Caulk areas detailed on plans
8. Intermediate Coat Application	Check surface cleanliness; apply intermediate coat, check coating thickness
9. Finish Coat Application	Check surface cleanliness, apply finish coat, check coating thickness
10. Final Review	Visual inspection of system for Acceptance and check total system thickness.

815.04 SURFACE PREPARATION. This item shall also consist of solvent cleaning (if required), abrasive blasting, and providing a wash facility for the Engineer and Inspectors.

A. Solvent Cleaning (QCP #1) If specifically required by plan note, the bridge shall be solvent cleaned to remove all traces of asphaltic cement, oil, grease, diesel fuel deposits, and other soluble contaminants, (QCP #1) (see SSPC-SP 1 Solvent Cleaning for recommended practices). Under no circumstances shall any abrasive blasting be done to areas with asphaltic cement, oil, grease, or diesel fuel deposits. All solvent cleaned areas shall be subsequently washed before abrasive blasting as detailed below.

Washing shall be accomplished with potable water having a nozzle pressure of at least 7 MPa(1,000 PSI)and a delivery rate of not less than 15 L (4 gallon) per minute. The Contractor, shall provide equipment specifications to verify the above. The equipment shall also be equipped with gauges to verify the pressure. The nozzle shall be held at a maximum of 300 mm (12 inches) from the surface being washed.

B. Grinding Flange Edges (QCP #2) . If a pay item for this work is shown on the plans, all exposed bottom flange edges of longitudinal rolled and welded beams in areas designated on the plans shall be rounded to a radius of 3 mm plus or minus 1.5 mm (1/8 inch plus or minus 1/16 inch) before abrasive blasting. This work may be done without weather and temperature restrictions.

C. Containment/Waste Disposal (QCP #3). Waste material generated by abrasive blasting operations is a solid waste and shall be handled as follows: (1) Contained, (2) Collected, (3) Stored, (4) Evaluated, (5) Properly disposed.

All equipment shall be parked on ground covers free of cuts, tears or holes to prevent contamination of pavement or soil and to protect area under and around equipment.

The Contractor shall erect an enclosure to completely surround (around and under) the blasting operations. The ground cannot be used as the bottom of the enclosure unless completely covered with plastic or tarps.

The enclosure shall be constructed of flexible materials such as tarpaulins or containment screens (specifically designed for this purpose), or of rigid materials such as plywood. All materials shall be maintained free of tears, cuts or holes; however, flexible material used for the sides of the enclosure only may be weaved to contain a maximum of 15 percent holes and a minimum of 85 percent material. All seams shall be overlapped a minimum of 150 mm (6 inches) and fastened together at 300 mm (12 inch) centers, or fastened and overlapped in a manner that insures a seal which does not allow openings between the screens in the containment. The vertical sides of the enclosure shall extend completely up to the bottom of the deck on a steel beam bridge. All blasting operations on a truss type bridge shall be completely enclosed, including top side. Bulkheads shall be used between beams to enclose the blasting area.

Vacuum blasting may be used in lieu of containment, providing that the vacuum blasting equipment is manufactured and marketed for this purpose and is equipped with controls which automatically shut down the blasting operation if the blast head brushes are not held in contact with the surface being cleaned.

All debris collected by these operations, removed from equipment or filters, or that has fallen to the ground, shall be collected and stored at the bridge site, if practical, for testing, evaluation and disposal. If not practical, an alternate location shall be mutually agreed upon by the Engineer and Contractor. Additionally, centralized cleaning stations for recyclable steel, ferric oxide, or aluminum oxide grit (if used) shall be set up at a location mutually agreed upon by the Contractor and Engineer. Storage shall be in steel containers and shall have lids which shall be locked at the end of each workday.

The Contractor shall obtain the services of a testing laboratory to obtain directly from the project site and evaluate a composite representative sample of the abrasive blasting debris for each bridge site. The person taking the sample will be an employee of the testing laboratory.

The composite sample shall consist of individual samples taken from all containers which are on the site at the time of the sampling. These individual samples shall be blended together to comprise one composite sample. The individual samples shall be of equal size. There shall be one individual sample taken from each drum and four randomly spaced individual samples taken from each container other than drums.

The individual samples shall be taken with stainless steel tools and placed into either clean glass or plastic containers.

All sampling shall be done in the presence of the Engineer. In addition to the above mentioned requirements, the sampling shall also comply with the requirements of U.S. EPA Publication SW 846.

A Chain of Custody must also accompany all composite samples. Included in this document shall be in the name of the person taking the sample, the Company for which he works, the date and time which the sample was taken, the bridge from which it was taken, the Township and Municipality where the bridge is located and signatures of all persons involved in the Chain of Custody, including dates of possession.

The sampling shall be done within the first week of production blasting at each bridge. If the sampling is not done within the time allotted above, all blasting and painting operations on the bridge from which waste was generated, shall promptly cease.

The composite sample shall be tested for lead and chromium in accordance with U.S. EPA Publication SW 846. The test results and Chain of Custody records shall immediately be forwarded to the Director. If the material is hazardous, the Contractor shall also forward the names of the hauler and treatment facility to the Director. Any additional testing required by the hauler, treatment facility, or landfill will be paid for by Contractor.

All federal, state and local environmental protection laws, regulations and ordinances including, but not limited to, air quality, waste containment and waste removal must be observed during the performance of this contract.

In respect to enforcement of the above mentioned laws, bidders are advised that various governmental bodies have this responsibility. It is the responsibility of the bidders to comply with those laws as enforced by those various governmental bodies.

The existing paint being removed from these bridges may contain lead or chromium. The Contractor is responsible to assure that workers take proper safety precautions when working in this environment (see bid proposal note entitled "Safety").

Hazardous Waste: If the tests reveal that the maximum concentration of either lead or chromium exceeds 5.0 milligrams per liter, the waste shall be treated as a hazardous waste and the steel containers shall be labeled as a hazardous waste. The Director will then obtain a generator number assigned to the State.

All containers of waste material which have been classified as hazardous shall be stored in a secured location until proper disposal. The storage site shall be surrounded with 1.5 m (5 foot) high chain link fence fabric supported by traffic sign drive posts at 3 m (10 foot) center to center. Drive posts shall be embedded into the ground at least 0.6 m (2 feet) deep. The fencing shall be secured with padlocks at the end of each day. Signs shall be posted in obvious locations on the enclosure warning of the hazardous material.

The Contractor shall then arrange for hauling, treating and disposal of all hazardous waste. All hazardous waste shall be disposed of after the Director has obtained a generator number. In every case, any and all hazardous waste shall be disposed of within 60 days after it is generated. Failure to comply with the 60 day disposal requirement shall be considered by the Department as a breach of contract by the Contractor and all abrasive blasting and painting of structural steel on the project shall immediately cease until the hazardous waste is properly disposed. Upon such breach, the Department shall cease processing all pay estimates and notification of the breach shall be sent to the Contractor's surety. Further, any fines or liens assessed by any governmental agency which has jurisdiction over the disposal of this material shall be the responsibility of the Contractor. The hauling and disposal shall be by a firm licensed by U.S. EPA and who shall also be responsible for providing the Uniform Hazardous Waste Manifest (EPA Form 8700-22A).

The Contractor shall decontaminate or dispose of all collection/ containment equipment in accordance with EPA guidelines.

Non-Hazardous Solid Waste: If the waste is determined to be non- hazardous as verified by test results which have been reviewed by the Director, it shall be hauled and disposed of at a facility which is licensed to accept non-hazardous solid waste. Prior to disposal of any material, the Contractor shall submit the test results and documentation that the disposal facility is licensed by the EPA to accept non-hazardous solid waste, to the Engineer. The Contractor shall obtain and provide the Engineer with a receipt documenting disposal of waste material at the approved landfill.

D. Abrasive Blasting (QCP #4), Prior to any abrasive blasting, all dirt, sand, bird nestings, bird droppings and other debris shall be completely removed from the scuppers, bulb angles, pier and abutment seats.

All steel to be painted shall be blast cleaned according to SSPC-SP10 and as shown SSPC-Vis 1-89 (pictorial surface preparation standards for painting steel surfaces). Steel shall be maintained in a blast cleaned condition until it has received a prime coat of paint.

The back side of end cross frame assemblies which are 75 mm (3 inches) or closer to backwalls may be commercial blast cleaned according to SSPC-SP6.

Galvanized steel (including corrugated steel bridge flooring), adjacent concrete which has been coated or sealed, and other surfaces not intended to be painted, shall be covered and protected to prevent damage from blasting and painting operations. Any adjacent coatings damaged during the blasting operation shall be repaired at the Contractor's expense.

The abrasive shall be a recyclable steel, ferric oxide, or aluminum oxide grit. After each use and prior to reuse, the grit shall be cleaned of paint chips, rust, mill scale and other foreign material by equipment specifically designed for such cleaning. The Contractor is responsible for assuring recycling and cleaning equipment is capable of operating with the chosen blasting media.

Abrasives shall also be checked for oil contamination before use. A small sample of abrasives shall be added to ordinary tap water. Any detection of a oil film on the surface of the water shall be cause for rejection. This test shall be conducted on each load of abrasives delivered to the job site.

The resultant surface profile shall be a minimum of 40 µm (1.5 mils) and a maximum of 90 µm (3.5 mils). Abrasives of a size suitable to develop the required surface profile shall be used. Any abrasive blasting which is done when the steel temperature is less than 3° C(5° F) above the dew point shall be reblasted when the steel temperature is at least 3° C(5° F) above the dew point. Dew point shall be defined as the temperature at which moisture condenses on the steel surfaces.

All abrasives and residue shall be removed from all surfaces to be painted. All steel blast cleaned in any one day shall be kept dust free and prime coated the same day. Failure to prime coat the same day will require reblasting before prime coating. No dust or abrasives from adjacent work shall be left on the finish coat. The Quality Control Specialist shall perform the following test (and the Inspector will verify) to insure that the air is not contaminated: blow air from the nozzle for 30 seconds onto a white cloth or blotter held in a rigid frame. If any oil or other contaminants are present on the cloth or blotter, abrasive blasting shall be suspended until the problem is corrected and the operation is verified by another test. This test shall be done at the start of each shift and at 4 hour intervals. The abrasive shall be tested for oil contamination at the same time.

Abrasive blasting and painting may take place simultaneously on any one bridge as long as abrasive blasting debris and/or dust by the blowing operation does not come in contact with freshly painted surfaces.

The Material Safety Data Sheet (MSDS) shall be provided at the preconstruction meeting for all abrasives to be used on this project. No work shall start until the MSDS has been submitted.

The Contractor shall provide the Engineer and Inspectors a wash facility with running water to permit washing of face and hands during the surface

preparation operation. It shall at all times contain an adequate supply of potable water, soap and towels. The Contractor shall be responsible to properly contain, test and dispose of the waste water. The wash facility shall be located at each bridge site in an area that will not be contaminated by the blasting debris.

E. Prime, Intermediate and Finish Coat Application (QCP #5, #8, & #9). Each coat of paint shall be in a proper state of cure or dryness before the application of succeeding coats. Paint shall be considered ready for overcoating when an additional coat can be applied without the development of any detrimental film irregularities, such as lifting, wrinkling or loss of adhesion of the undercoat. The time interval between coating applications shall be in compliance with manufacturer's written instructions and no more than 30 days between the prime and intermediate coats and 13 days between the intermediate and finish coats. These maximum recoat times include weather related days. No additional time for weather delays will be allowed. Any coat which has cured more than the above allotted time without overcoating shall be removed and the steel reblasted to SP 10.

The completion date (month and year) of the finish coat and the letters OZEU shall be stenciled on the steel in 100 mm (4 inch) letters with a black urethane paint. This date shall be applied at four locations near the end of each outside beam on the outside web visible from the road or as directed by the Engineer.

F. Removing Fins, Tears, Slivers (QCP #6). All fins, tears, slivers or any other burred or sharp edges that become evident after priming, shall be removed by grinding. All ground surfaces shall be retextured to produce a profile of 40 to 90 µm (1.5 to 3.5 mils) and reprimed prior to application of the intermediate coat. The Contractor may also begin removing fins, tears and slivers after blasting and prior to priming.

Temperature and weather restrictions do not apply to this item. Reapplying primer shall comply with weather restrictions.

G. Caulking (QCP #7). Caulking (if a pay item) will be performed in areas of the bridge where depicted/described in the plans.

H. Job Site Visual Standards. Job site visual standards include preparation of test section, subsequent test section, and photographs of approved test section. Job site visual standards shall be used in addition to the SSPC-Vis-1-89 standard for blasting. Before any abrasive blasting is started, the Contractor will prepare a test section on the first bridge to be painted. The test section will be a representative area to be blast cleaned [approximately 2 - 3 m^2 (20-30 square feet)]. The test section area shall be photographed and the steel surface checked for the proper profile after the Engineer and the Contractor agree that the area has been blast cleaned according to plan requirements. Only after a test section area has been approved and documented by photographs and replica tape, may the Contractor proceed with his blast cleaning operations. The job site visual standards (photographs) shall be used in addition to plan specifications to determine acceptance of blast cleaning procedures, but in all cases of dispute, the SSPC-Vis-1-89 standard shall govern. If, in the opinion of the Contractor or Engineer, a subsequent bridge is not indicative of the bridge on which the test section was performed, he may request another test section.

815.05 TESTING EQUIPMENT. The Contractor shall provide the Engineer the following testing equipment in good working order, for the duration of the project. When the Contractor's people are working at different locations simultaneously, additional test equipment shall be provided for each crew for the type of work being performed. When no test equipment is available, no work shall be performed.

1. A camera with the following features and 5 (unless otherwise specified on plans) rolls of color film: A) Uses self developing color print film, B) Lens with auto focus system, C) Focuses from 0.6 m (2 feet) to infinity, D) Built-in fill flash.
2. One Spring micrometer and 3 rolls of extra-coarse replica tape.
3. One Positector 2000 or 6000, Quanix 2200, or Elcometer A345FBI1; and the calibration plates, 38-200 µm and 250-625 µm (1.5 -8 mils and 10-25 mils) as per the NBS calibration standards in accordance with ASTM D 1186.
4. One Sling Psychrometer including Psychometric tables - Used to relative humidity and dew point temperature.
5. Two steel surface thermometers accurate within 1° C(2° F) or One portable infrared thermometer available from:

   Model: Raynger ST Series (-18° C to 400°C)
   Manufacturer: Raytek Inc.
   Santa Cruz, Ca.
   (800)227-8074

   or approved equal to the portable infrared thermometer
6. Flashlight 2-D cell
7. SSPC Visual Standard for Abrasive Blast Cleaned Steel SSPC-Vis 1-89
8. One Recorder Thermometer capable of recording the date, time, and temperature over a period of at least 12 hours.

815.06 HANDLING. All paint and thinner shall be delivered to the project site in original, unopened containers with labels intact. Minor damage to containers is acceptable provided the container has not been punctured. Thinner containers shall be a maximum of 19 L (5 gallons).

Paint shall be stored at the temperature recommended by the manufacturer to prevent paint deterioration.

Each container of paint and thinner shall be clearly marked or labeled to show paint identification, component, color, lot number, stock number, date of manufacture, and information and warnings as may be required by Federal and State laws.

All containers of paint and thinner shall remain unopened until required for use. The label information shall be legible and shall be checked at the time of use. Solvent used for cleaning equipment is exempt from the above requirements.

Paint which has livered, gelled or otherwise deteriorated during storage shall not be used: However, thixotropic materials which can be stirred to attain normal consistency may be used. The oldest paint of each kind shall be used first. No paint shall be used which has surpassed its shelf life.

Paint may be considered as eligible for payment for material on hand as specified in 109.07. However, only paint which the Contractor can prove to

the Engineer will be used during the construction season shall be eligible for payment. The Contractor shall provide the Engineer calculations indicating the total m^2 (square feet) of steel to be painted during the construction season. He shall also provide calculations showing the total number of liters (gallons) required. The Contractor shall be responsible to store the paint on the project in such manner to prevent theft and adverse temperatures. He shall provide thermometers capable of monitoring the maximum high and low temperatures within the storage facility. The Contractor is responsible for properly disposing of all unused paint and paint containers.

The Contractor shall furnish shipping invoices for all materials used on the project to the Engineer, prior to use.

815.07 MIXING AND THINNING. All ingredients in any container of paint shall be thoroughly mixed immediately before use and shall be agitated often enough during application to maintain a uniform composition; however, the primer shall be continuously mixed by an automated agitation system (hand held mixers not allowed). Paint shall be carefully examined after mixing for uniformity and to verify that no unmixed pigment remains on the bottom of the container. The paint shall be mixed with a high shear mixer (such as a Jiffy Mixer). Paddle mixers or paint shakers are not allowed. Paint shall not be mixed or kept in suspension by means of an air stream bubbling under the paint surface.

All paint shall be strained after mixing. Strainers shall be of a type to remove only skins and undesirable matter, but not pigment.

No thinner shall be added to the paint without the Engineer's approval, and only if necessary for proper application as recommended by the manufacturer. When the use of thinner is permissible, thinner shall be added slowly to the paint during the mixing process. All thinning shall be done under supervision of the Engineer. In no case shall more thinner be added than that recommended by the manufacturer's printed instructions. Only thinners recommended and supplied by the paint manufacturer may be added to the paint. No other additives shall be added to the paint.

Catalysts, curing agents, or hardeners which are in separate packages shall be added to the base paint only after the base paint has been thoroughly mixed. The proper volume of catalyst shall then be slowly poured into the required volume of base with constant agitation. Liquid which has separated from the pigment shall not be poured off prior to mixing. The mixture shall be used within the pot life specified by the manufacturer. Therefore only enough paint shall be catalyzed for prompt use. Most mixed, catalyzed paints cannot be stored, and unused portions of these shall be discarded at the end of each working day.

815.08 COATING APPLICATION. Coating application will be as follows.

A. General All structural steel, scuppers, expansion joints (except top surface), steel railing, exposed steel piling, drain troughs and other areas as indicated in the plans shall be painted. Galvanized surfaces shall not be painted unless otherwise noted on plans.

The following methods of application are permitted for use by this specification, as long as they are compatible with the paint being used: brush, spray, or any combination of these methods unless specified differently in the plans. Daubers, small diameter rollers or sheepskins may be used for places of difficult access when no other method is practical and in all cases shall be used where cross-frame angles are located within 50 mm (2 inches) of the bottom flange and where end cross frames are within 150 mm (6 inches) of the backwall and bottom of bottom flanges around bearings less than 150 mm (6 inches) in height.

If the surface is degraded or contaminated after surface preparation and before painting, the surface shall be restored before painting application. In order to prevent degradation or contamination of cleaned surface, the prime coat of paint shall be applied the same day of blast cleaning as required in surface preparation above.

Cleaning and painting shall be so programmed that dust or other contaminants do not fall on wet, newly-painted surfaces. Surfaces not intended to be painted shall be suitably protected from the effects of cleaning and painting operations. Overspray and pigeon droppings shall be removed with a stiff bristle brush, wire screen, or a water wash with sufficient pressure to remove overspray without damaging the paint. The overspray must be removed before applying the next coat. All abrasives and residue shall be removed from painted surfaces, before recoating, with a vacuum system equipped with a brush type cleaning tool.

No visible abrasives from adjacent work shall be left on the finish coat. Abrasives on the finish coat shall be removed.

If brush application of the coating is used, it shall produce a smooth coat. Care shall be taken to work the paint into all crevices, corners, and around all bolt and rivet heads.

B. Spray Application (General). All spray application of paint shall be in accordance with the following:

Primer ingredients shall be kept uniformly mixed in the spray pot or container during application by continuous, automated mechanical agitation (hand held mixers not allowed).

Spray equipment shall be kept clean so that dirt, dried paint and other foreign materials are not deposited in the paint film. Any solvent left in the equipment shall be completely removed before using.

Paint shall be applied in a uniform layer with overlapping at the edges of the spray pattern. The border of the spray pattern shall be painted first; with the painting of the interior of the spray pattern to follow, before moving to the next spray pattern area. A spray pattern area is such that the gun shall be held perpendicular to the surface and at a distance which will ensure that a wet layer of paint is deposited on the surface. The trigger of the gun should be released at the end of each stroke. All bolts and rivet heads shall be sprayed from at least 2 directions or brushed to assure coverage.

Each spray operator shall demonstrate to the Engineer his ability to apply the paint as specified. Any operator who does not demonstrate this ability shall not spray.

If mud cracking occurs, the affected area shall be cleaned to bare metal in accordance with surface preparation above and repainted.

All gaps and crevices 3 mm (1/8 inch) or less shall be filled with primer.

All spray equipment used shall be suitable for use with the specified paint. Paint manufacturer's equipment recommendations shall be followed to avoid paint application problems.

If air spray is used, traps or separators shall be provided to remove oil and condensed water from the air. The traps or separators must be of adequate size and must be drained periodically during operations. The following test shall be made by the Contractor and verified by the Engineer to insure that the traps or separators are working properly.

Air shall be blown from the spray gun for 30 seconds onto a white cloth or blotter held in a rigid frame. If any oil, water or other contaminants are

present on the cloth or blotter, painting shall be suspended until the problem is corrected and the operation is verified by repeating this test.

This test shall be made at the start of each shift and at 4 hour intervals. This is not required for an airless sprayer.

Spray application of all coats shall not be used unless the operation is totally enclosed to prevent overspray damage to the ground, public and private property, any and all vegetation, streams, lakes, etc. This containment shall be accomplished with tarps, plywood or other shields. If brush is used, more than one coat may be necessary to produce the required thickness.

C. Application Approval. The beginning of the application of each of the three different coats shall be subject to inspection and approval to detect any defects which might result from the Contractor's methods. If defects are discovered, the Contractor shall make all necessary adjustments to his method of application to eliminate them before proceeding with coat application.

D. Temperature. Paint shall not be applied when the temperature of the air, steel, or paint is below 10° C (50° F). Paint shall not be applied when the steel surface temperature is expected to drop below 10^0 C (50° F) before the paint has cured for the minimum times specified below:

	10° C (50° F)	16° C (60° F)	21° C (70° F)
Primer	4 hrs.	3 hrs.	2 hrs.
Intermediate	6 hrs.	5 hrs.	4 hrs.
Finish	8 hrs.	6 hrs.	4 hrs.

The above temperatures and times shall be monitored with the recording thermometer.

A heated enclosure may be used. The heat within the enclosure may be supplied by any means which will maintain the required temperature continuously and uniformly in all parts of the enclosure. The heat will be supplied as required to maintain the required minimum temperature until the coating has cured.

If combustion type heating units are used, they will be vented away from the enclosure, and exhaust fumes will not be permitted to enter the enclosure. No open combustion of any kind will be permitted in the enclosure.

E. Moisture. Paint shall not be applied when the steel surface temperature is less than 3° C (5° F) above the dew point. Paint shall not be applied to wet or damp surfaces or on frosted or ice-coated surfaces. Paint shall not be applied when the relative humidity is greater than 85%. Paint shall not be applied during rain, fog or mist unless the above moisture criteria is met.

F. Repair Procedures. Damaged areas, and areas which do not comply with the requirements of this specification, shall have the paint removed and all defects corrected. The steel should then be retextured to a near white condition to produce a profile of between 40 to 90 μm (1.5 to 3.5 mils). This profile should be measured immediately prior to the application of the prime coat to insure that the profile is not destroyed during the feathering procedure.

The existing paint should be feathered to expose a minimum of 13 mm (½ inch) of each coat.

During the reapplication of the paint, care shall be used to insure that each paint coat is applied only within the following areas. The prime coat shall only be applied to the surface of the bare steel and the existing prime coat which has been exposed by feathering. The prime coat shall not be applied to the adjacent intermediate coat. The intermediate coat shall only be applied to the new prime coat and the existing feathered intermediate coat. The intermediate coat shall not be applied to the adjacent finish coat. The finish coat shall only be applied to the new intermediate coat and the existing finish coat which has been feathered or lightly sanded. The finish coat shall not extend beyond the areas which have been feathered or lightly sanded.

At the perimeter of the repair area, the first two coats shall be applied by brush. The finish coat shall be applied by either brush or spray.

It may be necessary to make several applications in order to achieve the proper thickness for each coat.

During the application of the prime coat, the paint shall be continuously mixed.

All surface preparation and painting shall still be done in accordance with the specifications. In lieu of abrasive blasting, alternate methods of surface preparation may be allowed.

All repairs shall be made in a manner to blend the patched area with the adjacent coating. The finished surface of the patched area shall have a smooth, even profile with the adjacent surface.

The Contractor shall submit his method of correcting runs in writing to the Director for approval.

G. Continuity. Each coat of paint shall be applied as a continuous film of uniform thickness free of all defects such as holidays, runs, sags, etc. All thin spots or areas missed shall be repainted and permitted to dry before the next coat of paint is applied.

H. Dry Film Thickness. Prime thickness, cumulative prime and intermediate thickness, and cumulative prime, intermediate and finish thickness shall be determined by use of Type 2 magnetic gage in accordance with the following:

Five separate spot measurements shall be made, spaced evenly over each 9 m^2 (100 square feet)of area to be measured. These measurements shall be taken on flanges, webs, cross bracing, stiffeners, etc. Three gage readings shall be made for each spot measurement of either the substrate or the paint. The probe shall be moved a distance of 25 to 75 mm (1 to 3 inches) for each new gage reading. Any unusually high or low gage reading that cannot be repeated consistently shall be discarded. The average (mean) of the 3 gage readings shall be used as the spot measurement. The average of five spot measurements for each such 9 m^2 (100 square foot) area shall not be less that the specified thickness. No single spot measurement in any 9 m^2 (100 square foot) area shall be less than 80% of the specified minimum thickness nor greater than 150% of the maximum specified thickness. Any one of 3 readings which are averaged to produce each spot measurement, may under run or overrun by a greater amount. The 5 spot measurements shall be made for each 9 m^2 (100 square feet) of area as follows:

1. For structures not exceeding 27 m^2 (300 square feet) in area, each 9 m^2 (100 square foot) area shall be measured.
2. For structures not exceeding 90 m^2 (1,000 square feet) in area, three 9 m^2 (100 square foot) areas shall be randomly selected and measured.
3. For structures exceeding 90 m^2 (1,000 square feet) in area, the first 90 m^2 (1,000 square feet) shall be measured as stated in section 2 and for each additional 90 m^2 (1,000 square feet), or increment thereof, one 9 m^2 (100 square foot) area shall be randomly selected and measured.

4. If the dry film thickness for any 9 m^2 (100 square foot) area (sections 2 & 3) is not in compliance with the requirements of paragraph 1 of this section, then each 9 m^2 (100 square foot) area shall be measured.

5. Other size areas or number of spot measurements as specified in the contract plans shall be measured.
Each coat of paint shall have the following thickness measured above the peaks:

	Min. Spec. Thickness	Max. Spec. Thickness	Min. Spot	Max. Spot
Prime	75 µm (3.0 mil)	125 µm (5.0 mil)	60 µm (2.4mil)	188 µm (7.5mil)
Intermediate	125 µm (5.0 mil)	175 µm (7.0 mil)	100 µm (4.0 mil)	263 µm (10.5 mil)
Sub Total	200 µm (8.0 mil)	300 µm (12.0 mil)	160 µm (6.4 mil)	450 µm (18.0 mil)
Finish	50 µm (2.0 mil)	100 µm (4.0 mil)	40 µm (1.6 mil)	150 µm (6.0 mil)
Total	250 µm (10.0 mil)	400 µm (16.0 mil)	200 µm (8.0 mil)	600 µm (24.0 mil)

Film thicknesses greater than the maximum specified thicknesses that do not exhibit defects (such as runs, sags, bubbles, mudcracking, etc.) and for which the Contractor has received a written statement from the coating manufacturer stating that this excessive thickness is not detrimental, may remain in place at the discretion of the Director.

For any spot or maximum average thickness over 600 µm (24 mils) it will be necessary for the Contractor to prove to the Department that the excess thickness will not be detrimental to the coating system. This shall be accomplished by providing the Director, for approval, certified test data proving that the excessive thickness will adequately bond to the steel when subjected to thermal expansion and contraction. This thermal expansion and contraction test shall take place over five 5 cycles of a temperature ranges from -29^0 C to 49 ^{0} C (-20 ^{0} F to 120 ^{0} F). After the thermal contraction and expansion cycles have taken place, the tested system shall be subjected to pull off tests and the results compared to the results of pull off tests which have been performed on a paint system with the proper thicknesses. In addition to the certified test results, it will also be necessary for the Contractor to provide the Director a written statement from the paint manufacturer stating that this excessive thickness is not detrimental.

If the Director does not approve the excessive coating thicknesses or the Contractor elects not to provide the required written statement from the paint manufacturer and the certified test results when required, the Contractor, at his own expense, shall remove and replace the coating. The removal and replacement of the coating shall be done as specified in 815.08 F Repair Procedures.

815.09 CAULKING QCP #7. The material shall be a two component, 100% solids epoxy and shall be one of the following:

MANUFACTURER

Mark 270 Poly-Carb Solon, OH 216-248-1223	KOP-COAT A-788 Splash Zone Compound Carboline Company Hamilton, OH 513-896-1919
Sikadur Injection Gel Sika Chemical Corp. Lyndhurst, N.J. 201-933-8801	OR Other Commercially Available, 100% Solid, Non-Sag, Non-Shrink Epoxy Based System Capable Of Filling Voids Up To 25 mm (1 inch) Wide

815.10 SAFETY REQUIREMENTS AND PRECAUTIONS. The Contractor shall meet the applicable safety requirements of the Ohio Industrial Commission and the Occupational Safety and Health Administration (OSHA), in addition to the scaffolding requirements specified below.

The Material Safety Data Sheets (MSDS) shall be provided at the preconstruction meeting for all paints, thinners and abrasives used on this project. No work shall start until the MSDS has been submitted.

815.11 INSPECTION ACCESS. In addition to the requirements of 105.11, the Contractor shall furnish, erect, and move scaffolding and other appropriate equipment, to permit the Inspector the opportunity to closely observe all affected surfaces. This opportunity shall be provided to the Inspector during all phases of the work and continue for a period of at least 10 working days after each structure has been completely painted.

When scaffolding, or the hangers attached to the scaffolding are supported by horizontal wire ropes, or when scaffolding is placed directly under the

surface to be painted, the following requirements shall be complied with:

A. When scaffolding is suspended 1092 mm (43 inches) or more below the surface to be painted, two guardrails shall be placed on all sides of the scaffolding. One guardrail shall be placed at 1067 mm (42 inches) above the scaffolding and the other guardrail at 508 mm (20 inches) above the scaffolding.

B. When the scaffolding is suspended at least 533 mm (21 inches) but less than 1092 mm (43 inches) below the surface to be painted, one guardrail shall be placed on all sides of the scaffolding at 508 mm (20 inches) above the scaffolding.

C. Two guardrails shall be placed on all sides of scaffolding not previously mentioned. The guardrails shall be placed at 1067 mm (42 inches) and 508 mm (20 inches) above scaffolding, as previously mentioned.

D. All scaffolding must be at least 610 mm (24 inches) wide when guardrail is used and 711 mm (28 inches) wide when the scaffolding is suspended less than 533 mm (21 inches) below the surface to be painted and guardrail is not used. If 2 or more scaffolding are laid parallel to achieve the proper width, they must be rigidly attached to each other to preclude any differential movement.

E. All guardrail shall be constructed as a substantial barrier which is securely fastened in place and is free from protruding objects such as nails, screws and bolts. There shall be an opening in the guardrail, properly located, to allow the Inspector access onto the scaffolding.

F. The rails and uprights shall be either metal or wood. If pipe railing is used, the railing shall have a nominal diameter of no less than 38 mm (1.5 inches). If structural steel railing is used, the rails shall be 50x50x9 mm (2x2x3/8 inch) steel angles or other metal shapes of equal or greater strength. If wood railing is used, the railing shall be 50x100 mm (2x4 inches) (nominal) stock. All uprights shall be spaced at no more than 2.4 m (8 feet) on center. If wood uprights are used, the uprights shall be 50x100 mm (2x4 inches) (nominal) stock.

G. When the surface to be inspected is more than 4.57 m (15 feet) above the ground or water, and the scaffolding is supported from the structure being painted, the Contractor shall provide the Inspector with a safety harness (not a safety belt) and lifeline. The lifeline shall not allow a fall greater than 1.8 m (6 feet). The Contractor shall provide a method of attaching the lifeline to the structure independent of the scaffolding, cables, or brackets supporting the scaffolding.

H. When scaffolding is more than 762 mm (2.5 feet) above the ground, the Contractor shall provide a ladder for access onto the scaffolding. The ladder and any equipment used to attach the ladder to the structure shall be capable of supporting 113 kg (250 pounds) with a safety factor of at least four. All rungs, steps, cleats, or treads shall have uniform spacing and shall not exceed 305 mm (12 inches) on center. At least one side rail shall extend at least 914 mm (36 inches) above the landing near the top of the ladder.

I. An additional landing shall be required when the distance from the ladder to the point where the scaffolding may be accessed, exceeds 305 mm (12 inches). The landing shall be a minimum of at least 610 mm (24 inches) wide and 610 mm (24 inches) long. It shall also be of adequate size and shape so that the distance from the landing to the point where the scaffolding is accessed does not exceed 305 mm (12 inches). The landing shall be rigid and firmly attached to the ladder; however, it shall not be supported by the ladder. The scaffolding shall be capable of supporting a minimum of 454 kg (1000 pounds).

J. In addition to the aforementioned requirements, the Contractor shall be responsible to observe and comply with all Federal, State and local laws, ordinances, regulations, orders and decrees.

K. The Contractor shall furnish all necessary traffic control to permit inspection during and after all phases of the project.

815.12 PROTECTION OF PERSONS AND PROPERTY. The Contractor shall collect, remove and dispose of all buckets, rags or other discarded materials and shall leave the job site in a clean condition.

The Contractor shall protect all portions of the structure, which are not to be painted, against damage or disfigurement by splashes, spatters, and smirches of paint. Deck bottoms and backwalls are exempt from this requirement.

When or where any direct or indirect damage or injury is done to public or private property, the Contractor shall restore, at his own expense, such property, to a condition similar or equal to that existing before such damage or injury was done.

815.13 POLLUTION CONTROL The Contractor shall take all necessary precautions to comply with pollution control laws, rules or regulations of Federal, State or local agencies and as required in this specification.

815.14 WORK LIMITATIONS. Abrasive blasting and painting shall be done between April 1 and October 31. Even though the Contractor is permitted to work prior to May 1, April is considered a winter month and no extension due to adverse weather conditions will be granted for this period. Additional work limitations on specific bridges/projects may be required by plan note.

815.15 METHOD OF MEASUREMENT. Field painting of structural steel is based on a square meter (square foot) pay item. All field painting will include 3 coats of paint; prime coat, intermediate coat, and finish coat.

On steel beam and steel girder bridges, the surface area is based on a nominal measurement of the beams; ie. 2 times the beam depth plus 3 times the flange width. In addition to this nominal measurement, a percentage is added to account for incidentals such as cross frames, bearing assemblies, stiffeners, expansion joints, scuppers, etc. Thus, it is not necessary for the Inspector to field measure every detail of the bridge to verify quantities. Some extremely complex bridges, such as trusses, will be paid for as lump sum. In the case of a quantity dispute, exact field measurements of all painted surfaces and/or calculations will govern.

Grinding fins, tears, slivers is based on the manhours expended only by the workmen who are actually doing the grinding and will include all the time when the workmen are performing grinding and repairing prime coat and not limited to the actual grinding duration (ie. all hours of the workmen when assigned to grinding regardless of actual grinding time).

Grinding of flange edges: This pay item includes all labor and equipment to grind the bottom flange edges denoted in the plans. Each meter (one linear foot) of beam represents 4 m (4 linear feet) of edge grinding.

Caulking: Includes all labor, materials and equipment to caulk areas described in the plans. Each meter (linear foot) of caulk (regardless of width or

thickness) shall be measured for payment.

Surface Preparation: This lump sum or m^2 (square feet) item includes all labor, materials and equipment necessary to: contain, collect, store, evaluate, ship, treat and dispose of all waste materials generated by this project and to prepare the surface as required by these specifications, prior to applying the prime coat.

815.16 BASIS OF PAYMENT. Payment for field painting will be made at the contract prices for:

Item	Unit	Description
815	Square meter (square foot), lump sum	Surface preparation of existing steel, System OZEU
815	Square meter (square foot), lump sum	Field painting of existing steel, prime coat, System OZEU
815	Square mete, (square foot), Lump sum	Field Painting of existing steel, Intermediate coat, System OZEU
815	Square meter (square foot), Lump sum	Field Painting of existing steel, Finish coat, System OZEU
815	Man Hour	Grinding Fins, Tears, Slivers
815	Meter (Linear foot)	Grinding Flange Edges
815	Meter (Linear foot)	Caulking

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 816

ITEM 816 FIELD PAINTING OF NEW STEEL, SYSTEM IZEU

April 21, 1997

816.01 DESCRIPTION

These provisions contain requirements to field apply an **Epoxy Intermediate Coat** and a **Urethane Finish Coat** to new structural steel which has been shop primed with an **Inorganic Zinc Coat.**

816.02 MATERIALS

A. Inorganic Zinc Prime Coat

This coating shall conform to CMS 708.17, Inorganic Zinc Silicate Primer paint. Prime coat shall be applied in accordance with CMS 513.222 and CMS 514.01 through 514.04. Thickness of the prime coat and measurement of the thickness shall conform to Dry Film Thickness requirements in this specification. All bolts, nuts and washers that will be in contact with painted surfaces, shall be galvanized as per 711.02

B. Epoxy Intermediate Coat and Urethane Top Coat

These coatings shall be selected from the list of coatings approved for use under SS 910. Materials for each coat of the intermediate and finish coatings shall be supplied from the same manufacturer.

816.03 QUALITY CONTROL

A. Contractor Quality Control Specialist

At the preconstruction meeting, the Contractor shall designate one individual on each project as a Quality Control Specialist. Only one person per project will be necessary unless the Contractor is working at more than 3 sites simultaneously. In which case, it will be necessary to provide an additional Quality Control Specialist for each additional three (or portion of three) sites being painted simultaneously. This person will not be a foreman or member of the Contractor's production staff: (i.e. he or she will not abrasive blast, paint, recover spent abrasives, etc.) He or she will not be involved in any other miscellaneous tasks (i.e. mixing paint, running errands, running or working on equipment, etc.) while any production work is taking place. Documentation that personnel performing quality control related functions are qualified shall be submitted to the Engineer prior to allowing Quality Control Specialist (QCS) to begin work. Documentation/verification shall be provided to the Engineer that the QCS has received formal training from one of the following: KTA Tator, S.G. Pinney, or Corrosion Control Consultants. Heor she shall be trained and equipped with material safety data sheets, product data sheets, tools and equipment to provide quality control on all facets of the work and shall have a thorough understanding of the plans and specifications pertaining to this project. He or she shall be responsible for inspecting the equipment at the specified intervals, the abrasives, and the work at all quality control points. He shall also be responsible for verifying that all work is done within the specified work limitations. He or she shall cooperate with the Inspector and compare and document quality control readings. He or she shall have the authority to stop work and the responsibility to inform the Contractor's foreman of nonconforming work.

B. Quality Control Points

Quality control points (QCP) are points in time when one phase of the work is complete and ready for inspection by both the Contractor and the Engineer prior to continuing with the next operational step. At these points: If inspection indicates a deficiency, that phase of the work shall be corrected in accordance with these specifications prior to beginning the next phase of work. Discovery of defective work or material after a Quality Control Point is past or failure of the final product before final acceptance shall not in any way prevent rejection or obligate the State of Ohio to final acceptance.

Quality Control Points (QCP)		(PURPOSE)
1.)	Washing	Remove all water soluble materials; salt, dirt, etc.
2.)	Solvent Cleaning	Remove asphalt cement, oil, grease, and anything not removed during washing.
3.)	Intermediate Coat	Check surface cleanliness; apply intermediate coat; check coating thickness

4.)	Finish coat	Check surface cleanliness; apply finish coat; check coating thickness
5.)	Final Review	Visual inspection of system for acceptance and check total system thickness.

816.04 SURFACE PREPARATION

This work shall consist of washing and solvent cleaning of each structure.

A. Washing (QCP #1)

After steel is delivered, erected, and before painting, all surfaces shall be washed with potable water having a nozzle pressure of at least 7 MPa (1,000 PSI) and a delivery rate of not less than 15 L (4 gallons) per minute. The contractor, shall provide equipment specifications to verify the above. The equipment shall also be equipped with gauges to verify the pressure. The nozzle shall be held at a maximum of 300 mm (12") from the surface being washed or rinsed. Surface shall not be considered as clean until clear rinse water runs off the structure. After the surface is rinsed and allowed to dry, it shall be checked for remaining visible dirt. Surfaces shall be rewashed as necessary to remove all remaining dirt. The intermediate coat shall be applied within one (1) month after washing the structure.

All dirt, sand, bird nestings, bird droppings and debris shall be completely removed from all surfaces of the bridge before field painting.

B. Solvent Cleaning (QCP #2)

After washing, all traces of asphaltic cement, oil, grease, diesel fuel deposits, and other soluble contaminants which remain, shall be removed by solvent cleaning (see SSPC-SP 1 Solvent Cleaning for recommended practices). Under no circumstances shall any painting be done to areas with asphaltic cement, oil, grease, or diesel fuel deposits. All solvent cleaned areas shall be rewashed as previously noted.

816.05 TESTING EQUIPMENT

The Contractor shall provide the Engineer the following testing equipment in good working order, for the duration of the project. When the Contractor's people are working at different locations simultaneously, additional test equipment shall be provided for each crew for the type of work being performed. When no test equipment is available, no work shall be performed.

1.) One Spring micrometer and 3 (unless otherwise specified on plans) rolls of extra coarse replica tape.

2.) Two steel surface thermometers accurate within 1° C (2 ° F) or one portable infrated thermometer available from:

Model: Raynger ST Series (-18° C to 400 ° C)
Manufacturer: Raytek Inc.
Santa Cruz, Ca.
(800) 227-8074

or approved equal to the portable infrared thermometer.

3.) One sling Psychrometer including Psyschrometric tables - Used to calculate relative humidity and dew point temperature.

4.) One film thickness gauge (Positector 2000 or 6000, Quanix 2200, or Elcometer A345FBI1) and the calibration plates 38-200 mm and 250-625 mm (1.5 - 8 mils and 10-25 mils) as per the NBS calibration standards in accordance with ASTM D-1186.

5.) One Flashlight, 2-D cell batteries.

816.06 HANDLING

All paint and thinner shall be delivered to the project site in original, unopened containers with labels intact. Minor damage to containers is acceptable provided the container has not been punctured. Thinner containers shall be a maximum of 19 L (5 gallons).

Paint shall be stored at the temperature recommended by the manufacturer to prevent paint deterioration.

Each container of paint and thinner shall be clearly marked or labeled to show paint identification, component, color, lot number, stock number, date of manufacture, and information and warnings as may be required by Federal and State laws.

All containers of paint and thinner shall remain unopened until required for use. The label information shall be legible and shall be checked at the time of use.

Solvent used for cleaning equipment is exempt from the above requirements.

Paint that has livered, gelled, or otherwise deteriorated during storage shall not be used; however, thixotropic materials which can be stirred to attain normal consistency may be used.

The oldest paint of each kind shall be used first. In every case, paint shall be used before its' shelf life has expired.

Paint may be considered as eligible for payment for material on hand as specified in 109.07. However, only paint which the Contractor can prove to the Engineer will be used during the construction season shall be eligible for payment. The Contractor shall provide the Engineer calculations indicating the total square meters (square feet) of steel to be painted during the construction season. He shall also provide calculations showing the total number of liters (gallons) required. The Contractor shall be responsible to store the paint on the project in such manner to prevent theft and adverse temperatures. The contractor shall provide thermometers capable of monitoring the maximum high and low temperatures within the storage facility. The Contractor is responsible for properly disposing of all unused paint and empty containers.

The contractor shall furnish the shipping invoice for all materials used on the project to the Engineer, prior to use.

816.07 MIXING AND THINNING

All ingredients in any container of paint shall be thoroughly mixed immediately before use and shall be agitated often enough during application to maintain a uniform composition. Paint shall be carefully examined after mixing for uniformity and to verify that no unmixed pigment remains on the bottom of the container. The paint shall be mixed with a high shear mixer (such as a Jiffy Mixer). Paddle mixers or paint shakers are not allowed. Paint shall not be mixed or kept in suspension by means of an air stream bubbling under the paint surface.

All paint shall be strained after mixing. Strainers shall be of a type to remove only skins and undesirable matter, but not the pigment.

No thinner shall be added to the paint without the Engineer's approval, and only if necessary for proper application as recommended by the manufacturer. When the use of thinner is permissible, thinner shall be added slowly to the paint during the mixing process. All thinning shall be done under supervision of the Engineer. In no case shall more thinner be added than that recommended by the manufacturer's printed instructions. Only thinners recommended and supplied by the paint manufacturer may be added to the paint. No other additives shall be added to the paint.

Catalysts, curing agents, or hardeners which are in separate packages shall be added to the base paint only after the base paint has been thoroughly mixed. The proper volume of catalyst shall then be slowly poured into the required volume of base with constant agitation. Liquid which has separated from the pigment shall not be poured off prior to mixing. The mixture shall be used within the pot life specified by the manufacturer. Therefore only enough paint shall be catalyzed for prompt use. Most mixed, catalyzed paints cannot be stored, and unused portions of these shall be discarded at the end of each working day.

816.08 COATING APPLICATION

A. General

All structural steel, expansion joints (except top surfaces), steel railing, drain troughs and other areas (if indicated in the plans) shall be painted. Galvanized or metalized surfaces shall not be painted unless otherwise noted on plans or damaged during erection.

The following methods of application are permitted for use by this specification, as long as they are compatible with the paint being used: brush, spray, or any combination of these methods unless specified differently in the plans. Daubers or sheepskins may be used for places of difficult access when no other method is practical and in all cases shall be used where cross-frame angles are located within 50 mm (2") of the bottom flange and where end cross frames are within 150 mm (6") of the backwall and bottom of bottom flanges around bearings less than 150 mm (6") in height.

Painting shall be so programmed that dust or other contaminants do not fall on wet, newly

painted surfaces. Surfaces not intended to be painted shall be suitably protected from the effects of cleaning and painting operations. Over spray and pigeon droppings shall be removed with a stiff bristle brush, wire screen or a water wash with sufficient pressure to remove over spray without damaging the paint. The over spray must be removed before applying the next coat.

If brush application of the coating is used, it shall produce a smooth coat. Care shall be taken to work the paint into all crevices, corners, and around all bolt heads.

B. Spray Application (General)

All spray application of paint shall be in accordance with the following:

Spray equipment shall be kept clean so that dirt, dried paint and other foreign materials are not deposited in the paint film. Any solvent left in the equipment shall be completely removed before using.

Paint shall be applied in a uniform layer with overlapping at the edges of the spray pattern.

The border of the spray pattern shall be painted first; with the painting of the interior of the spray pattern to follow, before moving to the next spray pattern area. A spray pattern area is such that the gun shall be held perpendicular to the surface and at a distance which will ensure that a wet layer of paint is deposited on the surface. The trigger of the gun should be released at the end of each stroke. All bolts shall be sprayed from at least 2 directions or brushed to insure coverage.

Each spray operator shall demonstrate to the Engineer his ability to apply the paint as specified. Any operator who does not demonstrate this ability shall not spray.

If mud cracking occurs, the affected area shall be cleaned to bare metal in accordance with surface preparation above and repainted.

All spray equipment used shall be suitable for use with the specified paint. Paint manufacturer's equipment recommendations shall be followed to avoid paint application problems.

If air spray is used, traps or separators shall be provided to remove oil and condensed water from the air. The traps or separators must be of adequate size and must be drained periodically during operations. The following test shall be made by the Contractor and verified by the Engineer to insure that the traps or separators are working properly.

> "Air shall be blown from the spray gun for 30 seconds onto a white cloth or blotter held in a rigid frame. If any oil, water or other contaminants are present on the cloth or blotter, painting shall be suspended until the problem is corrected and verified by repeating this test".

This test shall be made at the start of each shift and at four (4) hour intervals. This is not required for an airless sprayer.

Spray application of all coats shall not be used unless the operation is totally contained to prevent over spray damage to public and private property, any and all vegetation, streams,

lakes, etc. This containment shall be accomplished with tarps, plywood or other shields. If brush is used, more that one coat may be necessary to produce the required thickness.

C. Application Approval

The beginning of the application of each of the different coats shall be subject to inspection and approval to detect any defects which might result from the Contractor's methods. If defects are discovered, the Contractor shall make all necessary adjustments to his or her method of application to eliminate them before proceeding with coating application.

D. Temperature

Paint shall not be applied when the temperature of the air, steel, or paint is below 10° C (50° F) (use of heaters is prohibited). Paint shall not be applied when the steel surface temperature is expected to drop below 10° C (50° F) before the paint has cured for the minimum times specified below:

	10° C (50° F)	16° C (60° F)	21° C (70° F)
Intermediate	6 hrs.	5 hrs.	4 hrs.
Finish	8 hrs.	6 hrs.	4 hrs.

E. Moisture

Paint shall not be applied during rain, fog, mist, or when the steel surface temperature is less than 3° C (5° F) above the dew point. Paint shall not be applied to wet or damp surfaces or on frosted or ice-coated surface. Paint shall not be applied when the relative humidity is greater than 85%. Paint shall not be applied during rain, fog or mist unless the above moisture criteria is met.

F. Intermediate and Finish Coat Application (QCP #5 & 6)

Each coat of paint shall be in a proper state of cure or dryness before the application of succeeding coats. Paint shall be considered ready for over coating when an additional coat can be applied without the development of any detrimental film irregularities, such as lifting, wrinkling or loss of adhesion of the undercoat. The time interval between coating applications shall be in compliance with manufacturer's written instructions and no more than 13 days between the intermediate and finish coats. Any coat which has cured more than the above allotted time without over coating, shall be removed and the steel reblasted to Sa 2 ½.

The compliance date (month and year) of the finish coat and the letters IZEU shall be stenciled on the steel in 100 mm (4") letters with a black urethane paint. This information shall be applied at 4 locations near the end of each outside beam on the outside web visible from the road or as directed by the Engineer.

G. Repair Procedures

Damaged areas of paint shall have the paint removed and all defects corrected. If the primer is damaged, the steel should then be retextured to a near white condition to produce a profile of between 40 to 90 mm (1.5 to 3.5 mils). This profile should be measured immediately prior to the application of the prime coat to insure that the profile is not destroyed during the feathering procedure.

The existing paint should be feathered to expose a minimum of 13 mm (½") of each coat.

During the reapplication of the paint, care shall be used to insure that each coat of paint is applied only within the following areas. The prime coat shall only be applied to the surface of the bare steel and the existing prime coat which has been exposed by feathering. The prime coat shall not be applied to the adjacent intermediate coat. The intermediate coat shall only be applied to the new prime coat and the existing feathered intermediate coat. The intermediate coat shall only be applied to the new intermediate coat and the existing finish coat which has been feathered or lightly sanded. The finish coat should not extend beyond the areas which have been feathered or slightly sanded.

At the perimeter of the repair area, the first two coats shall be applied by brush. The finish coat shall be applied by either brush or spray.

It may be necessary to make several applications in order to achieve the proper thickness for each coat.

During the application of the prime coat, the paint shall be continuously mixed. The prime coat shall be a prequalified organic zinc as per SS 910.

All surface preparation and painting shall be done in accordance with the specifications. Surface preparation shall be by power tools, steel grit or low dusting abrasive.

All repair shall be made in a manner to blend the patched area with the adjacent coating. The finished surface of the patched area shall leave a smooth, even profile with the adjacent surface.

The Contractor shall submit his or her method of correcting runs in writing to the Director for approval.

H. Continuity

Each coat of paint shall be applied as a continuous film of uniform thickness free of all defects such as holidays, runs, sags, etc.. All thin spots or areas missed shall be repainted and permitted to dry before the next coat of paint is applied.

I. Dry Film Thickness

Prime thickness, cumulative prime and intermediate thickness, intermediate, and finish thickness shall be determined by use of a Type 2 magnetic gage in accordance with the following:

Five separate spot measurements shall be spaced evenly over each 9 square meter (100 square feet) of area to be measured. These measurements shall be taken on flanges, webs, cross bracing, stiffeners, etc. Three gage readings shall be made for each spot measurement of either the substrate or the paint. The probe shall be moved a distance of 25 to 75 mm (1" to 3") for each new gage reading. Any unusually high or low gage reading that cannot be repeated consistently shall be discarded. The average (mean) of the 3 gage readings shall be used as the spot measurement. The average of 5 spot measurements for each such 9 square meter (100 square foot) area shall not be less than the specified thickness. No single spot measurement in any 9 square meter (100 square foot) area shall be less than 80% of the specified minimum thickness nor greater than 150% of the maximum specified thickness.

Any one of three readings which are averaged to produce each spot measurement may under-run by a greater amount. The 5 spot measurements shall be made for each 9 square meter (100 square foot) of area as follows:

1. For structures not exceeding 27 square meters (300 square feet) in area, each 9 square meter (100 square foot) area shall be measured.

2. For structures not exceeding 90 square meter (1,000 square feet) in area, three 9 square meter (100 square foot) areas shall be randomly selected and measured.

3. For structures exceeding 90 square meters (1,000 square feet) in area, the first 90 square meter (1,000 square feet) shall be measured as stated in section 2 and for each additional 90 square meter (1,000 square feet), or increment thereof, one 9 square meter (100 square foot) area shall be randomly selected and measured.

4. If the dry film thickness for any 9 square meter (100 square foot) area (sections 2 & 3) is not in compliance with the requirements of paragraph 1 of this section, then each 9 square meter (100 square foot) area shall be measured.

5. Other size areas, or number of spot measurements, may be specified in the contract plans or as appropriate for the size and shape of the structure.

Each coat of paint shall have the following mil thickness measured above the peaks:

	Min. Spec. Thickness	Max. Spec. Thickness	Min. Spot	Max. Spot
Prime	75 mm (3.0 mil)	125 mm (5.0 mil)		
Intermediate	125 mm (5.0 mil)	175 mm (7.0 mil)	100 mm (4.0 mil)	263 mm (10.5 mil)
Sub Total	200 mm (8.0 mil)	300 mm (12.0 mil)	160 mm (6.4 mil)	450 mm (18.0 mil)
Finish	50 mm (2.0 mil)	100 mm (4.0 mil)	40 mm (1.6 mil)	150 mm (6.0 mil)
Total	250 mm (10.0 mil)	400 mm (16.0 mil)	200 mm (8.0 mil)	600 mm (24.0 mil)

Film thickness greater than the maximum specified thickness that do not exhibit defects (such as runs, sags, bubbles, mudcracking, etc.) and for which the Contractor has received a written statement from the coating manufacturer stating that this excessive thickness is not detrimental, may remain in place at the discretion of the Director.

For any spot or maximum average thickness over 600 mm (24 mils), it will be necessary for the Contractor to prove to the Department that the excess thickness will not be detrimental to the coating system. This shall be accomplished by providing the Director, for approval, certified test data proving that the excessive thickness will adequately bond to the steel when subjected to thermal expansion and contraction. This thermal expansion and contraction test shall take place over five cycles of a temperature ranges from -29° C to 49° C (-20° F to 120° F). After the thermal contraction and expansion cycles have taken place, the tested system shall be subjected to pull off tests and the results compacted to the results of pull off tests which have been performed on a paint system with the proper thicknesses. In additional to the certified test results, it will also be necessary for the Contractor to provide the Director a written statement from the paint manufacturer stating that this excessive thickness is not detrimental.

If the Director does not approve the excessive coating thicknesses or the Contractor elects not to provide the required written statement from the paint manufacturer and the certified test results when required, the Contractor, at his own expense, shall remove and replace the coating. The removal and replacement of the coating shall be done as specified in 816.08 G Repair Procedures.

816.09 SAFETY REQUIREMENTS AND PRECAUTIONS

The contractor shall meet the applicable safety requirements of the Ohio Industrial Commission in addition to the scaffolding requirements specified below.

Material Safety Data Sheets (MSDS) shall be provided at the preconstruction meeting for all paints and thinners used on this project. No work shall start until the MSDS have been submitted.

816.10 INSPECTION ACCESS

In addition to the requirements of 105.11, the Contractor shall furnish, erect, and move scaffolding and other appropriate equipment, to permit the Inspector the opportunity to closely observe all affected surfaces. This opportunity shall be provided to the Inspector during all phases of the work and continue for a period of at least 10 working days after each structure has been completely painted.

When scaffolding, or the hangers attached to the scaffolding are supported by horizontal wire ropes, or when scaffolding is placed directly under the surface to be painted, the following requirements shall be complied with:

A. When scaffolding is suspended 1092 mm (43") or more below the surface to be painted, two guardrails shall be placed on all sides of the scaffolding. One guardrail shall be placed at 1067 mm (42") above the scaffolding and the other at 508 mm (20") above the scaffolding.

B. When the scaffolding is suspended at least 533 mm (21"), but less than 1092 mm (43") below the surface to be painted, a guardrail shall be placed on all sides of the scaffolding at 508 mm (20") above the scaffolding.

C. Two guardrails shall be placed on all sides of scaffolding not previously mentioned. The guardrails shall be placed at 1067 mm (42") and 508 mm (20") above scaffolding, as previously mentioned.

D. All scaffolding must be at least 610 mm (24") wide when guardrail is used and 711 mm (28") wide when the scaffolding is suspended less than 533 mm (21") below the surface to be painted and guardrail is not used. If 2 or more scaffolding are laid parallel to achieve the proper width, they must be rigidly attached to each other to preclude any differential movement.

E. All guardrail shall be constructed as a substantial barrier which is securely fastened in place and is free from protruding objects such as nails, screws and bolts. There shall be an opening in the guardrail, properly located, to allow the Inspector access onto the scaffolding.

F. The rails and uprights shall be either metal or wood. If pipe railing is used, the railing shall have a nominal diameter of no less than 38 mm (1.5"). If structural steel railing is use, the rails shall be 50x50x9 mm (2x2x3/8") steel angles or other metal shapes of equal or greater strength. If wood railing is used, the railing shall be 50x100 mm (2x4") (nominal) stock. All uprights shall be spaced at no more than 2.4 m (8 feet) on center. If wood uprights are used, the uprights shall be 50x100 mm (2x4") (nominal) stock.

G. When the surface to be inspected is more than 4.57 m (15 feet) above the ground or water, and the scaffolding is supported from the structure being painted, the Contractor shall provide the Inspector with a safety harness (not a safety belt) and lifeline. The lifeline shall not allow a fall greater than 1.8 m (6 feet). The Contractor shall provide a method of attaching the lifeline to the structure independent of the scaffolding cables, or brackets supporting the scaffolding.

H. When scaffolding is more than 762 mm (2.5 feet) above the ground, the Contractor shall provide a ladder for access onto the scaffolding. The ladder and any equipment used to attach the ladder to the structure shall be capable of supporting 113 kg. (250 pounds) with a safety factor of at least 4 . All rungs, steps, cleats, or treads shall have uniform spacing and shall not exceed 305 mm (12") on center. At least one side rail shall extend at least 914 mm (36") above the landing near the top of the ladder.

I. An additional landing shall be required when the distance from the ladder to the point where the scaffolding may be accessed exceeds 305 mm (12"). The landing shall be a minimum of at least 610 mm (24") wide and 610 mm (24") long. It shall also be of adequate size and shape so that the distance from the landing to the point where the scaffolding is accessed does not exceed 305 mm (12"). The landing shall be rigid and firmly attached to the ladder; however, it shall not be supported by the ladder. The scaffolding shall be capable of supporting a minimum of 454 kg (1,000 pound).

J. In addition to the aforementioned requirements, the Contractor shall be responsible to observe and comply with all Federal, State and local laws, ordinances, regulations, orders and decrees.

K. The Contractor shall furnish all necessary traffic control to permit inspection during and after all phases of the project.

816.11 PROTECTION OF PEOPLE AND PROPERTY

The Contractor shall collect, remove and dispose of all buckets, rags or other discarded materials and shall leave the job site in a clean condition.

The Contractor shall protect all portions of the structure which are not to be painted, against damage or disfigurement by splashes, spatters, and smirches of paint. deck bottoms and backwalls are exempt from this requirement.

When or where any direct or indirect damage or injury is done to public or private property, the Contractor shall restore, at his own expense, such property, to a condition similarly or equal to that existing before such damage or injury was done.

816.12 POLLUTION CONTROL

The contractor shall take all necessary precautions to comply with pollution control laws, rules or regulations of Federal, State, or local agencies, and as required in this specification.

816.13 WORK LIMITATIONS

Field painting shall be done between **April 15 and October 31.** Further work limitations shall be as designated in the plans.

816.14 METHOD OF MEASUREMENT

Field cleaning and painting of shop primed new structural steel may be based on a square meter (square foot), Kilogram (pound), or lump sum pay item. All field painting will include 2 coats of paint; intermediate coat, and finish coat on top of a shop applied prime coat.

If measurement is by a square meter (square foot) item on steel beam and girder bridges, then surface area is based on a nominal measurement of the beams; ie. 2 times the beam depth plus 3 times the flange width. In addition to this nominal measurement, a percentage is added to account for incidentals such as cross frames, bearing assemblies, stiffeners, expansion joints, scuppers, etc. Thus, it is not necessary for the Inspector to field measure every detail of the bridge to verify quantities. In the case of a quantity dispute, exact field measurements of all painted surfaces or calculations or both will govern.

816.15 BASIS OF PAYMENT

All labor, materials, and equipment required for surface preparation and prime coat application to steel surfaces to be painted shall be included with the structural steel for payment.

All labor, materials, and equipment required for field washing, cleaning, and application of the intermediate and finish coats of paint and galvanizing of bolts, nuts, and washers shall be included in:

Item	Unit	Description
816	Square meter (Square foot), lump sum, Kilogram (Pound)	Field Painting of New Steel, Intermediate and Finish Coat, System IZEU

Designer note:
This item is intended for all new steel that is to be coated.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 830
CURBING, CONCRETE MEDIANS AND TRAFFIC ISLANDS

October 21, 1998

830.01 Description. This work shall consist of furnishing and constructing curb, combination curb and gutter, medians and islands of the specified materials and types, in reasonably close conformity with the lines, grades and cross sections shown on the plans or established by the Engineer. This item shall also include necessary excavation and backfill, furnishing and installing joint materials, and the disposal of surplus excavation and discarded materials in accordance with 203.

830.02 Materials. Materials shall be:

Concrete (Class C)	499
Tie bar steel, epoxy coated	709.00, 709.01, 709.03, 709.05
Joint sealer	705.11, 705.04
Preformed filler	705.03
Coated dowel bars.	709.13

Sandstone shall be the best quality of Berea or Amherst gray sandstone, or sandstone of equal quality.

Asphalt curb shall meet 448 Intermediate Course, Type 1, designed for medium traffic, PG 64-22.

If a 448 mix is used, the asphalt concrete shall meet the composition requirements of 441 with the fine aggregate content set at the maximum permitted under this composition. Mineral filler meeting the requirements of 703.07 may be added provided the composition requirements of 441 are met. The method of introducing mineral filler shall be approved by the Laboratory.

830.03 Stone Curb. New sandstone curbs shall be as follows:

(a) Cutting and Dressing. Ninety-five percent of all straight curb shall be at least 5 feet (1.5

m) in length, with no piece less than 42 inches (1.1 m) except an occasional stone as short as 30 inches (0.8 m) may be used for closure. On curves of 50 feet (15 m) or greater radius, straight curb jointed radially may be used, in which case the lengths may be shorter than 42 inches (1.1 m) but not less than 36 inches (0.9 m). For curves and corners less than 50 feet (15 m) radius, the lengths shall be not less than 36 inches(0.9 m) and shall be dressed, jointed and set to the radii called for. All curb used for curves and corners shall be approximately uniform in length.

All curb shall be dressed to a straight edge on top and on the exposed face and ends to a depth below the gutter elevation of at least 6 inches (150 mm). The ends shall be dressed at right angles to the face for straight curb and radially for curb on curves. No slack or hollow joints shall be permitted. No projections shall remain after dressing the ends, which under expansion, would create contact with the end of the adjacent curb to cause spalling. The edge next to the gutter shall be cut to a 3 inch (75 mm) radius and the top dressed to a 1/4 inch (6 mm) bevel rising from the exposed face. All hand dressed curb shall be brought to the width called for by means of a pitching tool used on the edge at the back.

(b) Setting. The curb shall be set with a backward batter or incline from the vertical of 1 in 20 and on a thoroughly compacted subgrade. In clay soils or soils of a character that do not permit free drainage, a firm bed of porous material a minimum of 3 inches (75 mm) deep shall be placed as a foundation for curb. The curb shall be settled into place with a heavy rammer, and backed to a minimum width of 4 inches (100 mm) with porous backing to within 6 inches (150 mm) of the top. The balance of the backfill shall be brought to the level of the top of the curb for a distance of 2 feet (0.6 m) back, with soil or other acceptable material. Backing shall be thoroughly tamped in layers not exceeding 6 inches (150 mm) in thickness, loose measurement, with an approved tamper or rammer. As much of the backfilling and tamping as is consistent with alignment of the curb shall be done at the time the stone is first set. Circular curb shall be set in 499 Class C concrete when called for on the plans, 6 inches (150 mm) deep. The concrete shall be in a plastic state when the curb is placed. The concrete shall extend the width of the curb plus 6 inches (150 mm) behind the curb and shall be brought up behind the curb to within 4 inches (100 mm) of the top.

(c) Joints. The space between ends of adjacent sections of curbing below the dressed portion shall not be less than 1/8 inch (3 mm) at any point and shall not exceed 4 inches (100 mm). The joints between the dressed portion of adjacent sections of curbing shall be cushioned with 1/8-inch (3 mm) thick expansion joint material trimmed flush with the curbing on all edges.

If sandstone curb is placed after the pavement is placed, any joint remaining shall be filled with dry sand to within 2 inches (50 mm) of the surface of the pavement and the upper 2 inches (50 mm) shall be filled with bituminous material. Care shall be exercised in filling this joint so that no bituminous material comes in contact with the exposed surface of the curb.

(d) Resetting Curb. When specifically permitted by the plan, acceptable stone curb removed from the work under 202 may be used, to the extent available, in lieu of the furnishing of new stone curb. Such Salvaged curb shall be used continuously at locations designated by the Engineer. Interspersing of salvaged and new curb will not be permitted. Necessary storing and hauling of salvaged curb shall be a responsibility of the Contractor. All provisions for cutting and dressing, setting, and joints shall apply to salvaged curb.

830.04 Cast-in-Place Concrete Curb and Combination Curb and Gutter. These items

shall be as follows:

(a) Forms and joints. Curb forms shall be approved metal forms. They shall be securely braced and held to line and grade specified. Approved flexible forms of steel or wood may be used for construction of circular curb where radius is 200 feet (60 m), or less. The inner surface of the forms shall be clean and coated with a form release agent immediately before the concrete is placed.

All curb and combination curb and gutter not constructed integral with, or tied to, the base or pavement shall have 1/4-inch (6 mm) contraction joints constructed at 10 foot (3.0 m) intervals. The joint may be constructed with the use of metal separator plates, by the use of a grooving tool, or sawed in accordance with 451. The depth of joint shall average 2 inches (50 mm) or more for combination curb and gutter, and for curb shall average 1/5 or more of the curb height. Where expansion joints occur in the abutting pavement, they shall be provided for by separation of the section being placed with 1 inch (25 mm) 705.03 preformed filler.

When the curb is integral with, or tied to, the base or pavement, joints of the type used in the pavement shall be constructed in the curb and sealed with the same material. The joints shall be spaced identically with the joints in the base or pavement.

Curb forms shall be left in place for such length of time that the removal of same does not crack, shatter or otherwise injure the concrete.

Where the curbs built under this item are to later serve as a support for a finishing machine in the placing of a surface course, the alignment of the supporting edges shall be such that the distance between the curbs shall nowhere vary more than ½ inch (13 mm) from that specified.

(b) Placing. The concrete shall be placed in the forms, prepared as above described, and vibrated in such a manner as to eliminate all voids.

Concrete for curb which is to be integral with the concrete base or pavement shall be placed while the concrete is plastic, except when the presence of finishing equipment on the forms at the end of the day's run makes this impossible. When this condition prevails No. 5 (No. 15M) tie bars shall be placed vertically in the pavement at 1 foot (0.3 m) intervals and in a line 3 inches (75 mm) inside of and parallel to the edge forms. These tie bars shall extend to within 1 ½-inches (38 mm) of the subgrade or subbase and 2 inches (50 mm) above the pavement surface when placed. Immediately before the concrete curb is placed, the surface of the pavement or base on which the concrete curb is to be placed shall be flushed with mortar which contains one part cement to two parts sand. The mortar shall be worked into the surface cavities by brushing.

(c) Curb Machine. Concrete curb or curb and gutter may be placed with a self-propelled machine. The proper density and cross section shall be obtained by forcing the concrete through a mold of the proper cross section. Where a track is used the track on which the machine operates shall be set and held to the exact line and grade given by the Engineer. The concrete shall be of such consistency that it that it can be molded into the desired shape and then will remain as placed without slumping of the vertical faces.

(d) Finishing. The top of the curb shall be floated in such a manner to thoroughly compact the concrete and produce a smooth and even surface. The addition of extra mortar to secure this result will not be permitted. The edge of the curb shall be rounded by the use of a tool especially designed for the purpose. The exposed face of the curb shall be rubbed with a float immediately after removing the forms. Unnecessary tool marks shall be eliminated. The finished surface shall be free of irregularities and waves and shall be uniform in texture.

(e) Protection. Concrete curb, and combination curb and gutter shall be cured in accordance with 451 except that membrane cure shall be applied at a rate of not less than 1 gallon per 200 square feet (1 L/5m^2) of surface.

830.05 Asphalt Concrete Curb. The specified asphalt concrete material shall be furnished and placed to form a curb of the required cross section by one of the following methods or by any other method approved by the Engineer.

Method 1. After completion of the surface course, the area to be occupied by the curb shall be painted or sprayed with bituminous material meeting the requirements of 407.02 and applied at the rate of 0.15 gallons per square yard (0.7 L/m^2). Only the area to be occupied by the curb shall be so treated. The curb shall then be placed with a hand-operated or self-propelled machine consisting of a hopper and power-driven screw which forces the material through a tube by an extrusion method. The proper density and cross section of the curb shall be obtained by forcing the material through a die attached to the end of the extrusion tube.

Method 2. The material for the curb shall be placed as an independent operation preceding the final rolling of the surface course upon which the curb is to be placed. Loose material of sufficient height shall be placed and shaped by hand methods using suitable templates or by other means that will produce the specified cross section. The loose material shall then be compacted to final cross section dimensions by use of a hand-operated mechanical vibrating tamper equipped with a compacting shoe of such shape that will produce the specified cross section of the curb.

830.06 Concrete Median and Traffic Island. Concrete medians and traffic islands shall be constructed on the accepted, prepared subgrade, subbase or the completed and accepted base course or old pavement. These items shall be as follows:

(a) Forms and Joints. Forms shall be approved metal forms. They shall be securely braced and held to line and grade specified. Approved flexible forms of metal or wood may be used for construction of radii 200 feet (60 m) and less. The inner surface of the forms shall be clean and coated with a form release agent immediately before the concrete is placed.

All medians and traffic islands not anchored to the pavement shall have 1/4-inch (6 mm) contraction joints constructed at 10 foot (3.0 m) intervals. The joint may be constructed with the use of metal separator plates, by the use of a grooving tool, or sawed in accordance with 451. The depth of joint shall average 2 inches (50 mm) or more.

When the median or island is anchored to the pavement per the standard drawings, joints of the same type used in the pavement shall be constructed in the median or island. The joints shall be spaced identically with the joints in the pavement.

Forms shall be left in place for such length of time that the removal of same does not crack, shatter or otherwise injure the concrete.

(b) Placing. When placing the median or island on subgrade or subbase, the subgrade or subbase shall be sprinkled with water at such times and in such manner as directed by the Engineer so that it will be in a thoroughly moistened condition when the concrete is deposited thereon.

The concrete shall be placed in the forms and vibrated in such a manner as to eliminate all voids.

(c) Mechanical Placement. Medians and traffic islands may be placed with a self-propelled

machine. The proper density and cross section shall be obtained by forcing the concrete through a mold of the proper cross section. Where a track is used the track on which the machine operates shall be set and held to the exact line and grade given by the Engineer. The concrete shall be of such consistency that it can be molded into the desired shape and remain as placed without slumping of the vertical faces.

(d) Finishing. The top of the median or island shall be given a broom, turf, or similar texture. The addition of extra mortar to secure this result will not be permitted. The edges shall be rounded by the use of a tool especially designed for this purpose. The exposed faces shall be rubbed with a float immediately after removing the forms. Unnecessary tool marks shall be eliminated. The finished surface shall be free of irregularities and waves and shall be uniform in texture.

(e) Protection. Concrete medians and traffic islands shall be cured in accordance with 451 except that membrane cure shall be applied at a rate of not less than1 gallon per 200 square feet (1 L/5m^2) of surface.

830.07 Method of Measurement. The length of curb or combination curb and gutter measured will be the actual number of linear feet (meters) complete in place, measured along the front face of the curb section.

The quantity of concrete median or traffic island measured shall be the number of square yards (square meters) or the number of cubic yards (cubic meters) complete in place.

830.08 Basis of Payment. Payment for accepted quantities will be made at the contract price for:

Item	Unit	Description
830	Linear foot (meter)	Sandstone curb
830	Linear foot (meter)	Curb, Type_____
830	Linear foot (meter)	Combination curb and gutter, Type _____
830	Linear foot (meter)	Asphalt concrete curb, Type _____
830	Square yard or cubic yard (square meter or cubic meter)	Concrete traffic island
830	Square yard or cubic yard (square meter or cubic meter)	Concrete median

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.

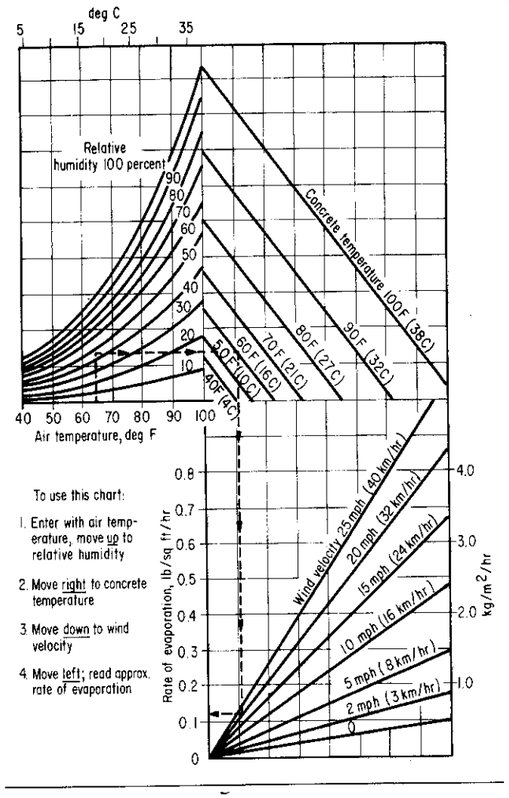
When a concrete deck is to be placed on continuous steel beams or girders, the placing of the concrete deck in any span shall not be started until all of the main beam or girder splices have been completed at least two piers beyond the pier or piers supporting the span in question.

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 846

TREATING CONCRETE BRIDGE DECKS WITH HMWM RESIN
September 9, 1997

846.01 DESCRIPTION. This work shall consist of preparing and treating the concrete wearing surfaces of bridge deck with a penetrating sealer in accordance with these specifications, in reasonably close conformity with the plans and the manufacturer's recommendation and as directed by the Engineer.

846.02 MATERIAL. The material used for treating the concrete shall meet Supplemental Specification 954, High Molecular Weight Methacrylate (HMWM) Resin.

846.03 LIMITATIONS. This work item shall not be performed during the period beginning November 1st and ending March 31st.

846.04 SURFACE PREPARATION. Roadway dirt and debris shall first be removed from the area of the deck to be treated. Surfaces to which the sealer is to be applied shall be swept, sandblasted then manual or power broom swept and blown with compressed air so that they shall be dry and free of dust and dirt. High pressure compressed air shall be used to blow all loose material from visible cracks. The cleaning equipment shall be fined with suitable traps, filters, drip pans, driers and other devices to prevent oil and other foreign material from being deposited on the surface. Traffic shall not be allowed on the clean surface prior to application of the sealer. Existing pavement markings shall be removed according to Section 641.10 of the Specifications. All traces of asphalt or petroleum products and concrete curing seals shall be removed by the abrasive blasting prior to air sweeping.

846.05 INSTALLATION. A compatible promoter/initiator system capable of providing the same physical qualities of the hardened resin as if promoted/initiated with 2% cobalt naphthanate (6%) and 2% cumene hydroperoxide shall also be provided. Materials shall be stored at 18-27 ºC (65-80ºF). The system shall provide a resin gel time of not less than 40 minutes to not more than 1½ hours at the time and temperature of application.

The gel time shall be adjusted to compensate for the change in temperature throughout the day. The temperature of the surfaces to be treated may range from 10 ºC (50ºF) to 49ºC (120 ºF). The Contractor shall arrange to have a technical representative on site to provide mixing proportions equipment suitability, and safety advice to the Contractor and Engineer. Any conflict these provisions and representative's advice shall be resolved at the job site. The technical representative shall remain at the job site until such time as he and the Engineer agree that the Contractor is qualified in all aspects of the application of the sealer.

The promoter and initiator, if supplied separate from the resin, shall not contact each other directly. Containers of promoter or initiators shall not be stored together in a manner that will allow leakage or spillage from one to contact the containers or materials of the other.

Machine application of the resin may be performed by using a two-part resin system utilizing a promoted resin for one part and an initiated resin for the other part. This two-part resin system may be combined at a spray bar through positive displacement atomization of the resin. Compressed air shall not be used to produce the spray.

Cleaning and flushing of equipment, tools, etc., shall be done with an appropriate solvent, as approved by the Engineer, in such a manner to minimize personal and environmental hazards. Workman should be advised the resin will soften gum rubber soles, and a face-mask should be used to protect from accidental splashes. Clothing and leather saturated with resin will harden and become useless.

The surface to be treated shall be visibly dry and its temperature between 10 ºC (120ºF) prior to resin application. The resin may not be applied within 24 hours after a rain or when rain is forecast within 12 hours or when the ambient air temperature is below 10 ºC (50 ºF). The deck shall be pre-marked to control mixed material usage and to provide a rate of application of approximately 2.45m^2/l (100 square feet per gallon). The exact rate shall be determined by the Engineer prior to commencing full-scale deck treatment operations.

Before using the material the Contractor shall submit to the Director copies of the manufacturer certified test data showing that material complies with the qualitative and qualitative requirements of this specification. The test data shall be developed by an independent approved testing laboratory, and shall include the brand name of the material, name of manufacturer, number of the lot tested and date of manufacture. When the material has been approved by the Director, further testing by the manufacturer will not be required unless the formulation of manufacturing process has been changed, in which case new certified test results will be required. The manufacturer shall certify that the formulation is the same as that for which data has been submitted. The state reserves the right to sample and test delivered lots for compliance.

The deck surfaces shall be flooded with resin, allowing penetration into the concrete and filling of all cracks. The initiated mix of promoted resin shall be limited to 19l (5 gallons) at a time for manual application. A significant increase in viscosity shall be cause for rejection. The treatment shall be applied within 5 minutes after complete mixing. Excess material shall be redistributed by squeegee or brooms within 10 minutes after application.

The Contractor shall take all steps necessary to prevent the resin from flowing into lanes open to traffic. The entire treated area of the bridge deck shall have sand broadcast by mechanical means to effect a uniform coverage of 0.43 kg/m^2 to 0.65 kg/m^2 (0.80 to 1.2 pounds per square yard). The sand shall be uniformly graded aggregate conforming to the quality requirements of 703 and shall conform to the following limits for grading:

Sieve Size%	Passing Max.
4.75mm (No. 4)	100
2.36mm (No. 8)	90-100
850 μm (No. 20)	5-15
300 μm (No. 50)	0-5

It is the intention of the specification to allow the use of commercially available blast sands applied by a common lawn broadcast type seeder/spreader. Sand shall be placed between 10 to 15 minutes behind the resin spreading front and before any jelling of the resin occurs. If the surface contains large deep cracks, the low-viscosity liquid could run completely through the concrete slab. In these areas, a second coat will be required after the first coat has started to cure.

Before the monomer hardens, imperfections or spalls with standing liquid shall be filled with commercial quality concrete or sandblast sand, and finished to a uniform surface. The sand shall have a maximum moisture content of 0.5 of the percent of absorption when tested in accordance to a California Test 226.

Traffic and equipment shall not be permitted on the tested deck until it is tack free and a minimum of 6 hours have elapsed since treatment and the sand cover adheres sufficiently to resist brushing by hand. The treatment shall be protected from moisture for not less than 4 hours after placement.

846.06 METHOD OF MEASUREMENT. The area under this item will be the number of square meter (square yards) of concrete bridge deck which are prepared, treated with high molecular weight methacrylate resin and are complete in place and accepted.

The accepted quantities of deck treatment will be paid for at the contract unit price per square meter (square yard), which price and payment shall be full compensation for furnishing all labor, materials including catalysts, tools, equipment and incidentals, and for performing all the work involved in preparing and treating the concrete surfaces

according to specifications.

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

Item	Units	Description
846	Square meter (square yard)	Treating concrete bridge decks with HMWM resin

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 863

STRUCTURAL STEEL MEMBERS

October 12, 1999

863.01 Description. This item shall consist of preparing shop drawings, furnishing, fabricating, nondestructive testing, fabricator performed quality control(QC), documentation, cleaning, shop painting, and erecting of all structural steel, and other structural metals, as specified. It shall also include any work required to move existing steel structures to the plan location, to make necessary repairs and alterations, and to connect or join new with old construction. Approval of Construction Plans required under section 501.06 of the Department's Construction and Material Specifications are required for Structural Steel Members.

863.02 Fabricator Approval Procedure. Fabricators performing work under this specification shall be Pre-qualified by the Office of Structural Engineering (OSE). Requests for such Pre-qualification shall be made by the fabricator in writing. The Pre-qualification process and its requirements are listed in this specification. The Contractor shall select a fabricator from the Pre-qualified Fabricator List in effect the date of Contract Letting. The Contractor shall inform the District Construction Engineer and the Office of Structural Engineering of the selected fabricator.

The OSE may accept subletting of processes which require specialized machinery or knowledge not common to AISC certified fabricators. All requests for subletting shall be made in writing to the OSE. The OSE shall determine if the process is uncommon and evaluate the qualifications of the sublet company. The pre-qualified fabricator must supply a member of his quality control staff to physically witness and perform quality control during the sublet fabrication process.

863.03 Fabricator Pre-qualification. OSE will perform facilities inspections for pre-qualification evaluation of a fabricator. Fabricators meeting all qualification requirements will be assigned a fabrication level and will be included on the Pre-qualified Fabricator List. The Pre-qualified Fabricator list will be updated as necessary by the OSE.

Fabricators shall perform all fabrication in plants located within the continental limits of the United States.

Final conformance of fabrication to contract requirements is the responsibility of the

Contractor. A pre-qualified fabricator does not guarantee the Contractor that work performed will meet quality and conformance requirements of the contract.

863.04 Levels of Fabrication Qualification. There are seven levels of fabricator qualification. Each fabricator shall be listed at the highest level of fabrication they are qualified to perform.

Level	Description of Capabilities
Misc.	Miscellaneous products not designed to carry tension live load but requiring , shop drawings, material test reports, and inspection quality assurance by the Department such as; curb plates, bearings, expansion joints, railings, catwalk, inspection access, drainage or other products not covered by ODOT standard bridge drawings. Also retrofit cross frames, retrofit gusset plates or retro fit lateral bracing or other misc. structural members not included below
ONE	Single span, straight, rolled beam bridges without stiffeners, secondary and detail materials such as retrofit moment plates. Case II Loading
TWO	Multiple span, straight, rolled beam bridges without stiffeners. Case II loading
THREE	Single or multiple span, straight, dog legged or curved, rolled beam bridges including stiffeners. Case I or II Loading
FOUR	Straight or dog legged welded plate girder bridges Case I or II loading
FIVE	Straight, curved, haunched or tapered welded plate girder bridges Case I or II loading
SIX	Truss bridges, fracture critical bridges or bridges with fracture critical members Case I or II loading

863.05 Fabricator Evaluation and Required Qualifications. Fabricators requesting pre-qualification shall have a facilities inspection performed by OSE. A facilities inspection check list is included in this specification (Appendix I). During the inspection the fabricator will furnish OSE's representative with documentation to validate the fabricator meets the criteria listed below:

AISC Certification

Misc. - No AISC category required
Level 1 - Category SBr with P endorsement
Level 2 thru 5 - Category MBr with P endorsement
Level 6 - Category MBr with P and F endorsements

Welding procedure qualifications in conformance with 863.23

Qualified welders in conformance with 863.23

Inspection personnel meeting requirements of 863.052

863.051 Miscellaneous Level Required Qualifications. Fabricators requesting qualification for the Miscellaneous Level shall meet requirements listed in all sections of 863 except as follows: Sections 863.052, 863.06 ,863.061 and 863.081 shall not apply. Where quality control inspection is required by the QCFS or QCPS per section 863.052, the documentation and quality control shall be the responsibility of one employee designated by the Miscellaneous Level fabricator.

863.052 Personnel Qualifications. The fabricator shall designate at least one individual as Quality Control Fabrication Specialist (QCFS). The QCFS shall be a AWS Certified Welding Inspector qualified and certified in accordance with the provisions of AWS QC-1, Standard for Qualification and Certification of Welding Inspectors. The QCFS shall have a thorough understanding of the plans and specifications pertaining to the project. The QCFS shall be responsible for inspecting the work at all quality control (QC) points described in this specification and appendices. The QCFS is also responsible for assuring all equipment is in working order and inspected at the required intervals. The QCFS shall have the direct authority to stop work and report non-conforming work to the Contractor and OSE.

The fabricator shall furnish the QCFS with all tools and equipment necessary to perform quality control (QC) on all facets of the work. The person assigned as QCFS shall be designated the duties full time during the duration of the fabrication work specified in this supplemental specification. No other duties shall be assigned the QCFS that are not quality control inspection.

The fabricator shall designate one individual as Quality Control Paint Specialist (QCPS). The QCPS and the QCFS may be the same person. The QCPS shall have received formal training on paint inspection from one of the following firms: KTA Tator, S. G. Pinney, Corrosion Control Consultants or be NACE Certified. The QCPS shall be responsible for all quality control points (QCP) listed in sections 863.29 and 863.30. The QCPS shall have a thorough understanding of the plans and specifications pertaining to this project. The QCPS shall be responsible for inspecting the coating application equipment at required intervals. The QCPS shall have the direct authority to stop work and report non-conforming work to the QCFS, the Contractor and OSE. The person assigned as a QCPS shall be designated the duties full time during the duration of the coating work. The fabricator shall furnish the QCPS with tools and equipment to provide (QC) on all facets of the coating application

Personnel performing nondestructive testing of weldments shall be qualified in accordance with the American Society for Nondestructive Testings (ASNT) ANSI/ASNT CP-189-1995, Standard for Qualification and Certification of Nondestructive Testing Personnel. Only individuals qualified for NDT Level II may perform nondestructive testing. All nondestructive

testing shall be under the authority of the QCFS or can be performed by the QCFS if qualified.

The fabricator shall have a minimum QC staff level of one QCFS and one QCPS or one person qualified to perform both the QCFS and QCPS functions and the required NDT technicians to perform the non-destructive testing functions. The QCFS and QCPS shall be full time employees of the fabricator, except level one and two fabricators may choose to use outside personnel who meet the qualifications for the QCFS and/or QCPS. The use of outside QC personnel does not eliminate the requirements for the QCFS and QCPS being full-time during the project.

The qualifications of the QCFS, the QCPS, NDT personnel or outside agency personnel shall be approved prior to the fabricator being pre-qualified. Each QC specialist, NDT personnel or agency shall provide a resume listing, qualifications and work experience. QC specialists or NDT staff shall not be modified without the approval of OSE.

The QCFS and QCPS shall be responsible for documenting all inspection points (Appendix II) for each main material piece to show conformance with the requirements of this specification and contract documents. The fabricator is responsible for providing supervisory and any additional QC inspection personnel to control the work properly and to assure satisfactory materials and workmanship. The use of production staff or additional QC staff for specific quality control functions does not eliminate the QCFS's and/or QCPS's responsibility for documentation, QC and final acceptance of fabricated components at all required points.

863.06 Rating System. OSE shall evaluate the fabricator's level of quality during the fabrication process. This evaluation will include quality assurance reviews of shop drawings, material test reports, QC documentation, and shop QA inspection. The rating forms associated with these evaluations are in the Appendix II. OSE shall perform random and/or specific QA inspections. OSE may choose to waive any or all parts of the QA inspection.

The fabricator may also be evaluated by the District construction personnel concerning quality issues effecting field erection. If field evaluations are performed the results will be incorporated into OSE's final rating.

The Fabricator shall perform QC and provide documentation for each main material member at specified check, hold or witness points per Appendix II check lists.

Check points require QC inspection and documentation by the fabricator before the fabrication process continues.
Hold points require QC inspection and documentation by the fabricator before QA inspection can be performed by OSE. The fabrication process can continue after QA inspection.

Witness points require concurrent QC inspection by the fabricator and QA inspection by OSE to physically witness the welding or nondestructive testing .

The results of OSE and field construction QA evaluations shall be the fabricator's rating. This rating shall be reported to the fabricator and shall effect the future qualification of the fabricator as follows:

A Rated Fabricators: Fabricators that perform fabrication resulting in ratings of 90 percent and above, based upon the average of five*consecutive bid line numbers, within the last 24 months and with no individual rating less than 80 percent will be defined as an A rated fabricator. These fabricators shall have the A rating hold points and random QA inspection performed. The A rating hold point is a final shop inspection, prior to shipping or storage, for levels one thru five and all hold and witness points concerning level six. A single rating below 80 percent, or the average of five*consecutive ratings dropping below 90 percent, will result in the fabricator's pre-qualification being lowered to a B rating.

B Rated Fabricators: Fabricators that perform fabrication with ratings 89 to 80 percent, based upon the average of five*consecutive bid line numbers, within the last 24 months and with no individual rating less than 70 percent will be defined as a B rated fabricator. These fabricators shall have all B rating hold points and random QA inspection performed. The B rating hold points are: Radiographic film review, Ultrasonic Inspection witnessing, and final shop inspection prior, to shipping or storage, for levels one thru five and all hold and witness points concerning level six. A single rating below 70 percent, or the average of five* consecutive ratings dropping below 80 percent, will result in the fabricator's pre-qualification being lowered to a C rating.

C Rated Fabricators: The C rating is an interim level for fabricators, newly approved, to validate their QC performance and upgrade to the Department's B and/or A rating level. These fabricators shall have all C rating hold points and random QA inspection performed. The C rating hold or witness points are: Radiographic film review, Ultrasonic Inspection witnessing, Magnetic Particle Inspection witnessing, prime painting inspection and final shop inspection prior to shipping or storage for levels one thru five and all hold or witness points concerning level six .

The C rating is not a permanent qualification level for fabricators. Fabricators who fail to achieve an average rating above 79 percent but average between 70 to 79 percent based on five consecutive bid line numbers within the last 24 months, with no individual rating less than 60 percent, will be reduced one level on the pre-qualification list. The reduced level fabricator shall then have three additional consecutive bid line numbers, within the next 12 months to be averaged to achieve a B rating. Fabricators that still do not achieve a B rating will result in removal from the pre-qualified fabricator list. Any time the average of three consecutive ratings drops below 70 percent, the fabricator shall be removed from the Pre-qualified Fabricator List. The fabricator can request pre-qualification, 863.03, 36 months after removal.

Any rated fabricator that receives a single rating below 60 percent shall be removed from the Pre-qualified Fabricator List. The fabricator can request pre-qualification, 863.03, 36 months after removal.

Fabricators that are rated A and B must complete a minimum of five bid line numbers every two years. Fabricators not this active will be reduced to a C rated fabricator.

*Fabricators achieving an A or B grade in levels four through six must have a minimum of two projects out of the required five bid line numbers in the four through six level.

863.061 Fabricator Rating Review Process. Fabricator may request in writing a reconsideration of the performance rating by a board created by the Department. The board shall be comprised of the Deputy Director, Division of Engineering Policy or his representative, the Administrator of the Office of Structural Engineering or his representative and the Chief Structural Steel Inspector from the Office of Structural Engineering. The board shall hear appeals concerning the Fabricator's performance rating on a specific bridge bid line number. The board has no authority to hear appeals for revocation or suspension of a fabricator from the pre-qualification list.

Within ten days upon receipt of the Department's performance rating the Fabricator may write to the Office of Structural Engineering requesting that the board evaluate the rating. The Fabricator shall also submit additional documentation or evidence bearing on the performance of the work.

The Office of Structural Engineering shall schedule an informal hearing where the Fabricator shall have an opportunity to present Its case. The Department may have representatives at the hearing offering evidence in rebuttal. The board shall consider the evidence and issue its decision within fifteen days of the hearing.

863.07 General. All steel fabrication including the shop application of paint shall be performed in a Pre-qualified structural steel fabricating shop having permanent buildings of adequate size with equipment, heating and lighting facilities and experienced personnel to satisfactorily perform all necessary operations. Areas where flame cutting, air carbon-arc gouging, cambering, welding, cleaning and painting are performed shall be inside permanent buildings. The required air temperature levels shall be maintained while these operations are in progress. Shop assembly of large pieces for fit-up of field connections may be performed outdoors. These provisions will not apply to steel requiring fabrication at the bridge site in the repair, alteration or extension of an existing structure.

Where work consists of repairing and extending or altering existing structures the Contractor shall make such measurements of the original construction as may be required to join accurately old and new work. Shop drawings shall include these measurements. Measurements which may appear upon contract plans to indicate the extent and nature

of such repair or extension shall not relieve the Contractor of this responsibility.

Shop inspection or acceptance of shop drawings by the Department shall not relieve the Contractor of responsibility for erroneous or inconsistent dimensions, notations, omissions or other errors. All parts forming a structure shall be built in accordance with the contract. The Contractor will not be responsible for any contract plan errors.

The Fabricator shall notify OSE at least two weeks in advance of the beginning of shop fabrication, and furnish a proposed fabrication schedule for the work.

The Fabricator shall cooperate fully with the QA inspector, in his inspection of the work in progress. This shall include the storage of members completed during the QA inspector's absence, in such a manner, that he can completely and safely inspect the finished work, unless such hold or witness point inspections have received a written waiver.

Fabricated material shall not be shipped from the shop without prior hold point QA inspections unless such QA inspection is waived by OSE. Failure to conform to this requirement will result in a rating for the reference of 60 percent and reduction of the fabricator's rating to C or loss of pre-qualification if the fabricator's rating is currently a C.

Miscellaneous level structural steel members shall have final inspection performed at the pre qualified fabrication shop. Miscellaneous structural steel members that are not complete at the scheduled inspection, have been shipped to the job site without shop inspection or do not conform to the shop drawings supplied to the QA inspector will be cause for removal of the fabricator from the pre-qualification list. Complete shall be defined as final fabrication and coating with QC inspection, QC documentation and Contractor acceptance of shop drawings and material test reports. The miscellaneous level fabricator will be given a maximum of three written warnings within any 12 month period. The third warning will cause removal from the pre qualified list. The fabricator may be reinstated to the prequalified list after 12 months with a request for prequalification from the fabricator and performance of facilities evaluation by the Office of Structural Engineering.

The Fabricator shall provide office accommodations having a minimum floor area of 11 m^2 (120 square feet) and a minimum ceiling height of 2.1 m (7 feet). This office shall be equipped with adequate working and storage facilities, lighting and electrical outlets. It shall also contain a telephone with direct access to an outside trunk line which shall be for the exclusive use of the QA inspector.

In this specification where the terms "Main," "Secondary" or "Detail" are used, it shall be understood that reference has been made as follows: "Main," refers to material, members and fasteners that are primarily stressed by live load and structure weight; "Secondary," refers to material, members and fasteners that do not directly support live load or main members; "Detail," refers to material, members and fasteners that are essentially non stressed.

Where steel stamps are used for identification purposes, they shall be of the "mini-stress" or "stressless" type.

863.071 Fabricator Documentation Responsibility. The fabricator shall keep and maintain documentation records for each project bid line number concerning;

1. Fabricator approval
2. Shop drawing approval
3. Material test reports
4 Welding qualifications
5. Quality control inspection
6. Non Destructive Testing of welds

This documentation shall be made available for auditing, inspection and copying upon the Department's request. The documentation shall be archived for at least a five (5) year period from the date of final shipment from the fabrication shop.

Documentation systems are the fabricator's responsibility to establish. Quality control documentation shall include all material quality checks, dimensional checks, weld quality inspection, coating inspection checks, etc. to document both to the fabricator and to the Department that all fabrication has been thoroughly inspected and meets the specification requirements. Evaluation of the fabricator's performance by Departmental personnel, using forms defined in Appendix II, will include validation of the fabricator's actual records of inspection. This validation is intended to assure that rating of an individual component will reflect the overall quality of all components.

When establishing documentation records, processes and procedures the fabricator shall review the QA rating forms (Appendix II) which define the Department's QA requirements. The fabricator must establish sufficient QC requirements to perform quality fabrication. The QCFS shall provide a letter of acceptance for each QA inspection check point with a listing of each main member piece marks, dates of QC acceptance and specific check point data as noted on the QA rating forms.

863.08 Shop Drawing and Submittal Process. Structural steel and other metal structural elements which are to be assembled, main and secondary bridge structural steel or main bridge rehabilitation steel, finger joints, modular joints and non-standard joint sealing devices, pot bearings, spherical bearings and non-standard bearing devises and other similar items requiring either shop or field fabrication shall be detailed on shop drawings by the Contractor or Fabricator in accordance with AASHTO "Standard Specifications for Highway Bridges" and this supplemental specification.

Deviation from the contract plans or these shop drawings will not be permitted without the written order or consent of the OSE. Requests for such deviation or change shall be submitted in writing.

The Contractor's shop drawing submission shall include; a written acceptance letter and four copies of these drawings, unless additional copies are requested. The Contractor shall also furnish the fabricator's QCFS with one additional set of these drawings before the pre-fabrication meeting 863.081.

The Contractor shall accept these shop drawings and forward a submission to OSE. The submission shall be received by OSE, seven days before the pre-fabrication meeting, 863.081(levels 1 thru 6) or prior to the start of fabrication (miscellaneous level).

The pre fabrication meeting shall not be scheduled until the drawings have been received by OSE(levels 1 thru 6). Fabrication can begin after the prefabrication meeting is complete (levels 1 thru 6) or after receipt of these drawings (miscellaneous level).

The shop drawings shall be prepared by or under direct supervisory control of an Ohio registered professional engineer having personal professional knowledge of AASHTO Standard Specifications for Highway Bridges, AWS Bridge Welding Code D1.5 and Supplemental Specification 863. Each drawing of the four copies shall bear his or her signature and registration number or his or her Ohio Professional Engineer seal. The submitted shop drawings shall be free of all questions and comments.

The written acceptance from the Contractor shall document acceptance of the shop drawings including confirmation of field verification as required and descriptions of issues resolved between the Contractor, the Engineer, the Fabricator or the Department.

By accepting these shop drawings, the Contractor represents to the Department that all materials, field measurements, construction requirements, contract requirements, performance criteria and similar data have been verified. The Contractor further represents that these drawings have been coordinated and verified with the details of the work to be performed by other fabricators and entities on the project. No allowance for additional cost or delays will be made to the Contractor for incorrect fabrication as a result of failure to coordinate or perform this acceptance.

When changes on these shop drawings are requested by the Department, or the Contractor makes changes in addition to those expressly requested, the shop drawings shall be accepted as above with suitable revision marks to identify the changes.

For changes in location, addition or elimination of splices, acceptance shall be obtained prior to ordering material. After acceptance by the OSE, such plans shall be taken as supplemental to, but in no sense a substitute for, the contract. The QCFS shall be responsible for having documentation of any revised drawings or changes listed above

The prints shall be made from tracings, neatly and accurately drawn on sheets 559 mm x 864 mm (22 x 34 inches).

Shop drawings shall show details, dimensions, size of materials, match mark diagrams for

field connections, and other information necessary for the complete fabrication and erection of the metal work. These drawings shall also show a diagram identifying, by some unique mark, each area of a welded splice to be covered by a single radiograph.

The shop drawings for all multiple span beam and girder bridges shall include an overall layout with dimensions showing the relative unloaded vertical and horizontal position of beam or girder segments with respect to a full length base or work line; camber and horizontal curvature of the beams or girders and the effect of deck surface profile shall be accounted for in this relationship. Required offsets for vertical and horizontal curvature shall be shown at approximately each 1/4 of span length, at field splices and bearing points. Each horizontally curved member shall have offsets shown for each 3.0 m (10 feet) of length to a baseline strung from end to end of the member.

Shop drawings shall specifically identify each piece of steel as to grade(ASTM designation), CVN, Fracture Critical or any special testing requirements. Pieces made of different grades of steel shall not be given the same assembling or erecting mark, even though they may be of identical dimensions and detail.

The shop drawings shall indicate the welding procedure(WPS number) to be used for each joint. Locations and identification numbers of all radiographs taken shall be detailed on the shop drawings.

After all fabrication is completed, the Contractor shall have the Fabricator furnish a 35-millimeter microfilm copy of each shop drawing mounted on an aperture card in accordance with Supplement 1002 on file in the Department. If the details shown on a drawing apply to more than one bridge, an aperture card for that drawing shall be furnished for each bridge to which it applies, each card bearing the applicable bridge number. For structures carrying railroad traffic, an additional set of aperture card-mounted films or, at the option of the railroad, a set of full-size drawings on mylar shall be furnished for each railway company involved.

863.081 Pre-Fabrication Meeting. A pre-fabrication meeting (levels 1thru 6) shall be held at the fabricator's facilities, or another location agreeable to all parties, for review of any fabrication issues, including information on shop drawings, inspection, hold or witness points, unique fabrication items, special processes, scheduling, etc. for the project. Attendance at the meeting shall include the fabricator, the QCFS, the QCPS, OSE's QA inspector and may include the Contractor, or designated representative. The meeting will be conducted by the QCFS, who will also be responsible for distribution of minutes of the meeting documenting all issues discussed.

The time of the meeting shall be agreeable to all parties but no earlier than 7 days after receipt of Contractor accepted shop drawings, 863.08. Fabrication can begin after the prefabrication meeting is complete (levels 1 thru 6). Prefabrication meetings are not required for the Miscellaneous level

863.09 Material. Structural steel and other structure metals shall conform to 711, except steel bar stock utilized for end dams and scuppers may be any weldable grade of low or mild carbon steel commercially available. Welded shear studs shall conform to the AASHTO/AWS Bridge Welding Code, as amended by Supplement 1011. Steel plates for main and secondary members shall be cut and fabricated so that the primary direction of rolling is parallel to the direction of the main tensile or compressive stresses.

For these materials the Contractor shall submit certified test data to the OSE showing compliance with the requirement of 711. All certified test data shall be accompanied by copies of mill shipping notices or invoices showing the quantity and size of material being accepted.

The Contractor shall check this material data, provide a letter of written acceptance then forward the submission to OSE seven days prior to member shipment(level 1 thru 6) or prior to final OSE inspection (miscellaneous level).

A single copy of this material data is required for each structure, except where the structure carries railway traffic. Then one additional copy shall be submitted for each railway company involved.

Additionally for Level one through six structural steel members, one copy of main material, certified test data with a letter documenting the QCFS acceptance shall be given to the QA shop inspector before the material passes check point one.

Materials will not be accepted for shipment from the fabrication shop until the Contractor accepted material data is received by the OSE.

When electrodes to be used are not included in the Laboratory's list of approved electrodes and combinations of shielding, certified test data showing compliance with CMS section 711.08 shall be submitted to the Office of Materials Management.

863.10 Material Control. Each piece of steel to be fabricated shall be properly identified for the Engineer or QA Inspector.

The issuance of cutting instructions by the Fabricator to the shop shall be by cross-referencing of the assembly marks shown on the shop drawings with the corresponding item covered on the mill purchase order. The Fabricator's system of assembly-marking individual pieces of steel and the aforementioned issuance of cutting instructions shall be such as to provide a direct reference to the appropriate mill test report.

The Fabricator may furnish from stock, material that he can identify by heat number and mill test report. Any excess material placed in stock for later use shall be marked with the

heat number and the ASTM A 6 specification identification color code, if any, when separated from the full-size piece furnished by the supplier.

During fabrication, each piece of steel shall show clearly and legibly its specification identification color code and heat number. Individually marked pieces of steel which are used in furnished size, or reduced from furnished size only by end or edge trim, that does not disturb the heat number or color code or leave any usable piece, may be used without further color coding provided that the heat number and color code remains legible.

Pieces of steel which are to be cut to smaller size pieces shall, before cutting, be legibly marked with the ASTM A 6 specification identification color code and heat number.

Individual pieces of steel which are furnished in tagged lifts or bundles shall be marked with the ASTM A 6 specification identification color code and heat number immediately upon being removed from the bundle or lift. Pieces of steel which will be subject to fabricating operations such as blast cleaning, galvanizing, heating for forming, or other operations which might obliterate paint color code and heat number marking, shall be marked with steel stamps or by a substantial tag firmly attached or shall be approved by the QA Inspector for obliteration of material identify markings. Main material tested for CVN shall have heat numbers steel stamped into the material at locations acceptable to OSE.

The QCFS shall document by a cover letter documenting QCFS acceptance that material control is performed per specification.

863.11 Care of Material. Structural material shall be stored at the shop or field above the ground, upon platforms, skids or other supports. It shall be straight and have clean and dry surfaces before being worked in the shop. Any rusted or corroded material shall be cleaned prior to use and shall meet ASTM A 6 thickness tolerances after cleaning. The QCFS shall provide a cover letter documenting QCFS acceptance stating that care of material is performed per specification.

863.12 Workmanship and Straightening. If straightening of rolled material is necessary, it shall be done by methods that will not damage the member. When carefully planned and supervised, the application of localized heat is permitted for straightening. The temperature of the heated area shall not exceed 620° C (1150° F) as controlled by pyrometric stick or thermometers. Quenching to accelerate cooling is prohibited.

Fabricated structural steel shall be within the dimensional tolerances specified by Arts. 3.5 and 9.19 of the AASHTO/AWS Bridge Welding Code except where indicated otherwise in these specifications, and with the following additions: Waviness, the deviation of the top or bottom surface of a flange from a straight line or plan curvature, shall not exceed 3 mm (1/8 inch) when the number of waves in a 3.0 m (10 foot) length is four or less, or 1.6 mm (1/16 inch) when more than four, but sharp kinks or bends shall be cause for rejection. For the measurement of camber during lay down, the bearing points shall be relatively

positioned both horizontally and vertically to plan dimensions ± 3 mm (± 1/8 inch). Rolled beams shall be cambered as called for on the plans in the pre-qualified fabricating shop by use of heat or hydraulic jacks. Heating shall be controlled as specified above and follow a formal shop heating procedure. Plate girders shall be cambered by trimming web plates prior to assembly.

Camber shall be measured as the vertical offset between the steel and the common base line extending from abutment bearing to abutment bearing. The maximum camber tolerance at mid span shall be - 0 mm (in.) and the greater of + 19 mm (3/4 inch) or the designed haunch height. The maximum camber tolerance at mid span shall be prorated between the center of the span and each adjacent bearing to provide a smooth unbroken curve. The camber tolerances in Art. 3.5.1.3 of the AASHTO/ AWS Bridge Welding Code shall not apply.

During fabrication, shipping and erection, members shall be so supported and handled that camber is maintained.

The QCFS shall provide a cover letter documenting QCFS acceptance that workmanship and straightness are performed per specification.

863.13 Finish. Sheared edges of all main material shall be planed to a minimum depth of 6 mm (1/4 inch) except for ASTM A709 grade 36 material having a thickness of 16 mm (5/8 inch) or less. Burrs shall be removed. All fins, tears, slivers and burred or sharp edges that are present on any steel member shall be removed by grinding. If these conditions appear during the blasting operation, they shall be removed by grinding and the area re-blasted to the required surface profile.

Structural steel permitted by these specifications may be flame cut, provided a smooth surface free from cracks and notches is secured and provided that an accurate profile is secured by the use of a mechanical guide. Rolled and flame cut surfaces shall meet the requirements of the AASHTO/AWS Bridge Welding Code, as amended by Supplement 1011. The surface finish of bearing and base plates and other bearing surfaces that are in contact with each other or with concrete shall meet the ANSI surface roughness requirements as defined in ANSI B46.1, Surface Roughness, Waviness and Lay, Part I:

	ANSI
Steel slabs	50.0a m (2000)
Heavy plates in contact in shoes to be welded	25.0a m (1000)
Milled ends of compression members, milled or ground ends of stiffeners and fillers	12.5a m (500)
Bridge rollers and rockers	6.4a m (250)
Pins and pin holes	3.2a m (125)
Sliding bearings	3.2a m (125)

The QCFS shall provide a cover letter documenting QCFS acceptance that material finish is performed per specification.

863.14 Stiffeners. The bearing ends of bearing stiffeners shall be flush and square with the web and shall have at least 75 percent of this area in contact with the inner surface of the flange. The other end of the stiffener shall have a tight fit as defined below. Bearing stiffeners shall be positioned to be vertical after erection. Intermediate stiffeners which are not used in pairs shall be welded to the compression flange, the tension flange shall be a tight fit. Intermediate stiffeners to which cross frame angles are connected shall be welded to the top and bottom flange. A tight fit is defined as one in which the stiffener and flange are in physical contact over some portion of the end of the stiffener and having no gap in excess of 1.6 mm (1/16 inch). Welds attaching stiffeners to the web plate shall not extend into the clip area. All stiffeners shall be clipped to clear flange-web welds and fillet or rolled shapes. The clip shall be 65 mm (2 ½ inches) along the web and 25 mm (1 inch) along the flange.

The QCFS shall provide a cover letter documenting QCFS acceptance that stiffener details are performed per specification.

863.15 Fillers. Fills shown on the shop drawings shall be dimensioned to the nearest 1.6 mm (1/16 inch) in thickness, but not less than 3 mm (1/8 inch) thick, based on the dimensions for detailing and intended relative position of the abutting elements to be spliced. However, in the final shop assembly, fills shall be furnished with thicknesses sufficient to compensate for any misalignment of abutting elements due to standard rolling mill tolerances or differences in thicknesses of flanges and webs at the splice location. The actual fills used shall be such as to compensate for differences in total thickness or relative positions of more than 1.6 mm (1/16 inch). Fill plates in bolted joints shall be made flush with the perimeter of the splice plates and not be tack welded. The QCFS shall provide a cover letter documenting QCFS acceptance that fills are performed per specification.

863.16 Horizontally Curved Beams and Girders. Beams and girders shall be heat curved as specified by AASHTO Standard Specifications for Highway Bridges, except that flanges for girders may be cut to shape. When members are to be heat curved, the detailed procedure including necessary calculations shall be submitted to OSE for acceptance prior to starting work. The QCFS shall provide a cover letter documenting QCFS acceptance that heat curving procedures are performed per specification.

863.17 Joints and Splices. In bolted construction where tension or flexural members are spliced, not more than 6 mm (1/4 inch) clearance will be allowed between the abutting surfaces of spliced members. For spliced compression members, the abutting surfaces shall be truly faced so as to have a uniform bearing when properly aligned and completely

bolted.

In welded construction, all abutting surfaces shall receive the proper joint preparation as shown on accepted shop drawings. The preparation for field welded butt joints in main members shall be verified by a complete shop assembly as specified in 863.26. The opening in any joint, which is located in the finished structure so as to permit the entrance of water, shall be filled as directed by the Engineer with an approved caulking before paint is applied.

The QCFS shall provide a cover letter documenting QCFS acceptance that joints and splices are performed per specification.

863.18 Pin Holes. Pin holes shall be bored true to size, at right angles to the axis of the member and parallel to each other. The boring shall be done after the member is completely fabricated. Pin holes for up to 127 mm (5 inch) diameter pins shall not exceed the pin diameter by more than 0.51 mm (0.020 inches); holes for larger pins shall not exceed the pin diameter by more than 0.79 mm (0.031 inches). The QCFS shall provide a cover letter documenting QCFS acceptance stating that pin holes are performed per specification.

863.19 Pins and Rollers. Pins and rollers shall be of cold rolled steel and accurately turned to size; they shall be straight and smooth and entirely free from flaws. Pins over 230 mm (9 inches) in diameter shall be annealed. In pins larger than 230 mm (9 inches) in diameter, a hole not less than 50 mm (2 inches) in diameter shall be bored full length along the axis. One pilot and one driving nut shall be furnished for each size of pin. The QCFS shall provide a cover letter documenting QCFS acceptance stating that pins and rollers are performed per specification.

863.20 Holes for High-Strength and Bearing Bolts. Holes shall be cylindrical, perpendicular to the member, clean cut, and free of ragged edges. All burrs shall be removed by countersinking not more than 1.6 mm (1/16 inch) or by grinding. The finished size of the holes for high-strength bolts shall be not larger than nominal diameter of the bolt plus 1.6 mm (1/16 inch), and for bearing type bolts, the holes shall provide a driving fit. The diameter shall not vary by more than 0.8 mm (1/32 inch) from a true circle for 85 percent of the holes in a contiguous group, and not more than 1.6 mm (1/16 inch) for the remainder.

Punched holes shall be made with a die whose diameter does not exceed that of the punch by more than 1.6 mm (1/16 inch). Reaming and drilling shall be done with twist drills and, wherever possible, the reamer shall be directed by mechanical means. Holes for shop bolts shall be sub-punched or sub-drilled 5 mm (3/16 inch) less in diameter than the nominal diameter of the bolt, and shall be reamed to size with the parts assembled, except:

1. A709 grade 36 material thicker than 19 mm (3/4 inch) and grade 50 or 50W steel

thicker than 16mm (5/8 inch) shall not be punched.
2. Materials assembled and adequately clamped together may be drilled full size.
3. Secondary and detail material of A709 Grade 36 steel not thicker than 19 mm (3/4 inch) and grade 50 or 50W steel not thicker than 16 mm (5/8 inch) fastened with high strength bolts may be punched full size.

Holes for field bolts shall be made in the same manner as holes for shop bolts except:

1. Field splices in and connections to main material shall be reamed or drilled assembled per 863.26.
2. Assemblies such as floor beams connected to girders and rolled beam spans connected by diaphragms may be made through steel templates.

All holes punched full size, sub-punched, or sub-drilled shall be located with sufficient accuracy such that after assembling (before sub-punched or sub-drilled holes are reamed) a cylindrical pin 3 mm (1/8 inch) less in diameter than the nominal size of the punched hole may be entered perpendicular to the face of the member without drifting in not less than 75 percent of the contiguous holes in the same plane. All holes shall permit a pin 5 mm (3/16 inch) smaller than the nominal size of the punched holes to be inserted in the above manner. After holes are reamed or drilled full size, 85 percent of the holes in any contiguous groups shall have no offset greater than 0.8 mm (1/32 inch) between adjacent plies. The remainder of the holes shall not be offset more than 1.6 mm (1/16 inch) between adjacent plies. Plugging of improperly located holes is not permitted unless written approval has been obtained from the OSE. Steel templates shall have hardened bushings in holes accurately located in relation to the centerline of the connection as inscribed on the template. Where holes are made using a roto-broach, shell drill or other similar tool, hardened bushings need not be used in the template. The template shall be accurately positioned and bolted or clamped firmly in place prior to its use in reaming or drilling full size holes.

Templates used for reaming matching members or the opposite faces of a single member shall be exact duplicates. Templates used for connections on like parts or members shall be located with sufficient accuracy that the parts or members are duplicates and require no individual match marking.

Holes through multiple piles shall be reamed or drilled full size only when the plies of the joint are held tightly together with bolts or clamps. The joint shall also be pinned if the holes have been sub-punched or sub-drilled. The plies shall be disassembled and cleaned of burrs and shavings prior to final assembly.

Contractor shall have the option to drill or punch bolt holes full sized in unassembled pieces and/or connections including templates for use with matching sub-sized and reamed holes, by means of suitable numerically controlled (N/C) drilling or punching equipment. If N/C drilling or punching equipment is used the Contractor will be required to demonstrate the accuracy of the drilling or punching procedure according to 863.26

Other methods of preparing holes for high strength bolts may be given consideration upon written request to the OSE.

The QCFS shall provide a cover letter and specified check point data documenting QCFS acceptance that holes have been performed per specification.

863.21 High-Strength Steel Bolts, Nuts and Washers. High strength steel bolts, nuts and washers shall meet the provisions of 711.09.

1. General. The Engineer shall be furnished the necessary access to the work in order to observe the installation, tightening and checking of the bolts.

Based on the experience gained by the Engineer and Contractor during the use of the below described installation and inspection procedures for a particular bridge, the Engineer may elect to modify the amount of testing specified in order to expedite the work while still accomplishing properly compacted joints and tightened bolts. Consideration will be given to the use of other fastening systems or assemblies and bolt tightening procedures, if a written request is submitted to the Office of Structural Engineering in accordance with 108.05. The required bolt length shall be determined by adding to the grip the value shown in Table 1. The table values are generalized, with an allowance for manufacturing tolerances, to provide for the nut and positive "stick-through" at the end of the bolt. For each hardened flat washer that is used, add 4 mm (5/32 inch); and for each beveled washer, add 8 mm (5/16 inch). The length determined by the use of Table 1 should be adjusted to the next longer 6 mm (1/4 inch); when installed, the end of the bolt shall be flush with or project several thread lengths outside the face of the nut.

TABLE 1

Bolt Size	To determine required bolt length, add to grip*
mm	mm
M16	24
M20	28
M22	31
M24	35
M27	38
M30	41
M36	47

TABLE 1

Bolt Size	To determine required bolt length, add to grip*
inches	inches
½	11/16
5/8	7/8
3/4	1
7/8	1-1/8
1	1-1/4
1-1/8	1-1/2
1-1/4	1-5/8
1-3/8	1-3/4
1-1/2	1-7/8

*Total thickness of all connected material exclusive of washers.

Washers may, when necessary, be clipped at one location not closer than 7/8 of the bolt diameter from the center of the washer.

2. Preparation. Joint surfaces, including those adjacent to the bolt heads, nuts or washers, shall be free of paint (except for inorganic zinc primers), lacquer, dirt, oil, loose scale, rust, burrs, pits and other substances or defects which would prevent solid seating of the parts or would interfere with the development of complete frictional contact. No gaskets or other yielding material shall be interposed.

Bolts, nuts and washers shall have a residual coating of lubricant when received. Bolts, nuts and washers without their original lubrication shall not be used.

3. Installation. In the final assembly of the parts to be bolted, drift pins shall be placed in a sufficient number of holes (preferably not less than 25 percent for field erection) to provide and maintain accurate alignment of holes and parts, and sufficient bolts shall be installed and brought to a snug tight condition to bring all parts of the joint into complete contact. However, in each flange and web of each beam or girder a minimum of two drift pins shall be used. Snug tight shall be defined as the tightness attained when an impact wrench begins to impact or when the full effort of a man using an ordinary spud wrench is applied. Bolts shall then be installed in any remaining open holes and tightened to a snug tight fit, after which all bolts shall be tightened completely by the turn-of-nut method. Where difficulty is experienced with the fit of the connection and the bolts are used to draw the elements into contact, the bolts in the affected portion of the connection shall be checked for sustained snug tightness after all the bolts are installed. Drift pins shall then be replaced with bolts tightened in the same manner. Field Reaming of full sized shop holes shall not be allowed.

After the bolts are snug tight, the outer face of the nut shall be match-marked with the protruding portion of the bolt to provide the Engineer visual means of determining the relative rotation occurring between the bolt and nut during the process of final tightening. Such marks shall be made by the wrench operator with crayon or paint.

Each bolt shall have a hardened washer under the element (nut or bolt head) turned in tightening. Where an outer face of the bolted parts has a slope of more than 1:20 with respect to a plane normal to the bolt axis, a smooth beveled washer shall be used to compensate for the lack of parallelism. Galvanized A 325M (A 325) bolts shall not be reused. Re-tightening previously tightened bolts, which have become loose by tightening adjacent bolts, is not considered a reuse.

4. Tightening. Tightening of the bolts in a joint should commence at the most rigidly fixed or stiffest point, and progress toward the free edges, both in the initial snugging up and in the final tightening. If required because of bolt entering and wrench operation clearances, tightening may be done by turning the bolt. Impact wrenches, if used, shall be of adequate capacity to perform the required tightening of each bolt in approximately ten seconds.

5. Bolt Tension. Each bolt shall be tightened to provide, when all bolts in the joint are tight, at least the minimum bolt tension shown on Table 2 for the size of bolt used.

TABLE 2

Bolt Size mm	Bolt Tension* kN, minimum A 325 M
M16	91
M20	142
M22	176
M24	206
M27	267
M30	327
M36	475

TABLE 2

Bolt Size inches	Bolt Tension* kips, minimum A 325
½	12
5/8	19
3/4	28
7/8	39
1	51
1-1/8	56
1-1/4	71
1-3/8	85
1-1/2	103

*Equal to 70 percent of specified minimum tensile strengths of bolts, rounded off to the nearest kN (kip).

The bolt tension specified in Table 2 shall be attained by tightening all bolts in the joint the applicable amount of nut rotation specified in Table 3 by the turn-of-nut method.

TABLE 3
NUT ROTATION FROM SNUG TIGHT CONDITION

	Disposition of Outer Faces of Bolted Parts		
Bolt Length (as measured from underside of head to extreme end of point)	Both faces normal to bolt axis	One face Normal to bolt axis and other face sloped not more than 1:20 (bevel washer not used)	Both faces sloped not more than 1:20 from normal to bolt axis (bevel washer not used)
Up to and including 4 diameters	1/3 turn	½ turn	2/3 turn
Over 4 diameters but not exceeding 8 diameters	½ turn	2/3 turn	5/6 turn
Over 8 diameters but not exceeding 12 diameters	2/3 turn	5/6 turn	1 turn

Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by ½ turn and less, a tolerance of plus or minus 30° is permitted. For bolts installed by 2/3 turn and more, a tolerance of plus or minus 45° is permitted.

6. Inspection. (a) The first completed connection of each bridge on the project and as many subsequent connections as are deemed necessary by the Engineer shall be inspected as per paragraph (b) below. Thereafter, where the Engineer has approved the joint compactness and snug-tight condition of bolts prior to bolt tightening by the turn-of-nut method, the bolt tension as required in Table 2 shall be considered as attained if the amount of nut rotation specified by Table 3 is verified by the required match-marking.

(b) Bolts shall be inspected by the use of manual torque wrenches furnished by the Contractor. This testing shall be witnessed by the Engineer and shall be performed to his satisfaction. The inspection wrenches shall be calibrated at least once each working day in a device capable of indicating bolt tension. In this device, which shall have been approved by the Engineer, three bolts representative of the grade, size, length and condition used in the structure shall be placed and tensioned individually. A washer shall be used under the part being turned.

(c) Each of the three bolts shall be tightened in any convenient manner to the tension shown in Table 2. Then, the inspection wrench shall be applied by a slow steady pull to the tightened bolt and the torque required to turn the nut or head 5 degrees, approximately 25 mm (1 inch) at a 300 mm (12 inch) radius, in the tightening direction shall be determined. The average torque measured in the tensioning of the three bolts shall be taken as the job inspection torque.

(d) Bolts represented by the sample described in paragraph (b) which have been tightened in the structure, shall be inspected by applying, in the tightening direction, the inspection wrench and its job inspection torque to 10 percent of the bolts, but not less than two bolts, selected at random in each connection. If no nut or bolt head is turned by this application of the job inspection torque, the connection will be accepted as properly tightened. If any nut or bolt head is turned by the application of the job inspection torque, this torque shall be applied to all the bolts in the connection, and all bolts whose nut or head is turned by the job inspection torque shall be tightened with the inspection wrench to the job inspection torque. The connection shall then be reinspected in the original manner.

7. Calibration Devices. Each calibration device shall be periodically examined by a manufacturer of such devices or by a qualified testing laboratory. Such examination shall be made at least once each year or more often if requested by the Engineer. The testing agency shall certify that each calibration device furnishes, after re-calibration if necessary, an accurate indication of actual bolt tension.

The QCFS shall provide a cover letter documenting QCFS acceptance that any shop applied bolts have been performed per specification.

863.22 Bearing Bolts. Turned, ribbed or other approved bearing type bolts shall meet the provisions of CMS 711.10. The bolts shall be of sufficient length to project at least 6 mm (1/4 inch) beyond the nut when tightened, and the threads on the projecting end shall be

burred. The thread shall not extend into the shear planes of the contact surfaces between the connected parts. In determining whether the bolt threads are excluded from the shear planes, thread length of bolts shall be calculated as two thread lengths greater than the specified thread length as an allowance for thread run out. A washer not thicker than 6 mm (1/4 inch) may be used under the nut. The QCFS shall provide a cover letter documenting QCFS acceptance that shop applied bolts have been performed per specification.

863.23 Welding. All welding shall be performed by the shielded metal-arc, submerged arc, flux cored arc, or stud welding process. Consideration will be given to other methods of metal-arc welding if a written request is submitted to the OSE in accordance with CMS 108.05.

In other respects, the AASHTO/AWS Bridge Welding Code, as amended by Supplement 1011 shall govern the work. Welding performed on main members requires procedure testing (PQR) and an approved welding procedure (WPS). The shielded metal arc welding(SMAW) process is considered pre-qualified, and does not requires procedure testing(PQR) but requires an approved welding procedure(WPS). The fabricator shall have an approved PQR, WPS and Welder Qualifications prior to Fabricator Pre-qualification.

If after two repairs to the same area of a weld requiring radiographic quality, there is any part of the original defect remaining or there is a new reject able indication the OSE shall have the right to have the total joint cut apart, all deposited weld metal removed, joint preparation made and the total joint re-welded.

Copies of the accepted shop welding procedures (WPS) shall be posted at each welding location.

The designated QCFS and QA inspectors shall be physically at the facility during all fracture critical (FCM)welding. The fabricator shall not perform FCM welding without prior scheduling with the QCFS and the QA inspectors. The QCFS shall witness at the minimum percentages specified in appendix II, check all welding processes and provide a cover letter with specific check point data. This QCFS acceptance is required for each FCM member weld. For non FCM welds the QCFS shall make frequent inspections, check all welding processes and provide a cover letter with specific check point data documenting acceptance of the welds for each main member.

863.24 Stud Shear Connectors. Stud welding shall conform to the requirements of 863.23 , to the AASHTO/AWS Bridge Welding Code, as amended by Supplement 1011, and the following.
Stud shear connectors that are to be welded to the top flanges of beams or girders may be placed after the steel has been erected and suitable scaffolding or deck forming has been provided. Studs that are to be welded to beam or girder webs, end dams, bearing

plates, or to other secondary members and detail material may be placed in the shop. In addition to the stud bend tests of Article 7.6.6.1 of the AASHTO/AWS Bridge Welding Code, bend tests of stud shear connectors shall also be made at the start of each work day, when welding has been interrupted for an hour or more, when changing grounds, when changing weld settings or when changing cable loop due to arc blow. In any case, no more than 500 studs shall be welded to a beam or girder without the welds being field bend tested in accordance with the specified procedure. All tested studs that show no sign of failure as determined by the Engineer may be left in the bent position.

863.25 Threads for Bolts and Pins. Threads for bolts and pins shall conform to the Unified Standard Series ANSI B1.13M (ANSI B1.1-UNC) Class 6g (2A) for external threads and Class 6H (2B) for internal threads, except that pin ends having a diameter of 35 mm (1 3/8 inches) or more shall be threaded 4.23 mm/thread (6 threads to the inch). The QCFS shall provide a cover letter documenting QCFS acceptance that threading for bolts has been performed per specification.

863.26 Shop Assembly. All contact surfaces shall be free of paint, grease, oil, rust, loose mill scale and protruding edges or burrs. The flanges and webs shall not be assembled and welded to form girders or other similar members, nor shall any fabrication or assembly which would interfere with the repair of a butt weld be accomplished until radiographs of all butt welds in the component parts are examined and approved by the QCFS for the A rated fabricators or the QA inspector for B and C rated fabricators unless waived by the OSE.

All fit-up work shall be done with the members assembled in their unloaded position as shown on the shop drawing layout required by 863.08. While assembled in the shop, members shall be adequately supported to prevent misalignment or deflection, especially at joints. Supports shall be designated to prevent settlement during the fit-up, reaming or drilling of connections. The QCFS shall maintain records of the actual dimensions and relative positions of each assembly for each offset required by 863.08 and furnish a copy to the QA inspector, upon request. This provision shall apply to both horizontal and vertical dimensions. Members that become a part of two assemblies shall be repositioned for the second assembly to the dimensions recorded for the first assembly.

All connecting parts assembled in the shop for the purpose of reaming or drilling of holes for field connections or for fit-up of field welded connections shall be match-marked with steel stamps prior to disassembly.

Continuous beam and plate girders including sections adjacent to hinged, pin connected, sliding or rocker bearing joints shall have at least three adjacent segments assembled and holes reamed or drilled while assembled. The fit-up of field welded connections shall be checked by similar shop assembly.

Longitudinal or transverse beams and girders to which diaphragms and floor beams frame

or connect shall be shop assembled to check fit-up of connections to be field welded or to ream or drill holes for bolted connections. Trusses shall be assembled in lengths not less than three abutting panels before field connections are drilled or reamed while assembled.

When the Contractor elects to use numerically controlled (N/C) drilling or punching, assembly shall be performed as specified. Other methods of checking hole alignment and match marking may be given consideration upon written request to the OSE. If the Contractor's proposed methods of CNC assembly fail to produce specified results, the OSE can require the Contractor to perform the work per 863.20 and 863.26 at no additional cost to the Department.

Deck expansion devices shall be shop assembled after fabrication to check fit-up, straightness and roadway cross slope changes. Where a phased construction sequence is a mandatory part of the contract plans, part-width deck segments may be fabricated without the required shop assembly if shop drawings have incorporated a lay down, similar to 863.08, defining vertical offset dimensions from a full length common baseline to all roadway changes including sidewalks, rounding, crowns and field splice points of the expansion device.

Parts not completely assembled in the shop shall be secured by bolts, as far as practicable, to prevent damage in handling and shipping. Field splice plates shall be bolted in their final position in the shop or shifted laterally with respect to their final position so that the ends of the plates are flush with the ends of the member. Welding or tacking will not be permitted on bolted assemblies unless by written acceptance from OSE. Welding authorized shall be performed according to 863.23.

The QCFS shall provide a cover letter and specific check point data documenting QCFS acceptance that shop assembly has been performed per specification.

863.27 Nondestructive Testing. Nondestructive testing (NDT) shall conform to the AASHTO/AWS Bridge Welding Code, as amended by Supplement 1011, and this item. Welded repairs in main members for thick scabs, deep kerfs or nicks and similar gross flaws shall be subject to ultrasonic or radiographic inspection as directed by the OSE or Engineer (field repairs). All examined welds and base metal adjacent to a welded joint shall be subject to the quality requirements specified in 863.23. Welds requiring nondestructive testing shall be allowed to cool before they are tested.

The Contractor or Fabricator shall notify the Department in advance of specified non-destructive testing. Such notification is required even if specific QA hold or witness point inspections are not required for A and B rated fabricators.

Where controversy may arise, regarding the interpretation of radiographs, magnetic particle indications or the acceptability of welds, the OSE has the final authority to accept the welds. Field radiographic inspection shall be accepted by the OSE prior to subsequent construction activities that would make weld repair inaccessible.

1. Radiographic Inspection of Welds. All members subject to radiographic testing shall have the welds ground smooth. Web splices shall be ground only where radiographed, except at outside fascia surfaces which shall be ground full length. Radiographic inspection shall be made of the following welds:

(a) The full length of all butt welds in flange material of plate girders or rolled beams. 100% of butt welds in back up bars that remain in the structure.

(b) The top and bottom one-third of transverse web splices in plate girders or rolled beams including any cope holes.

(c) Butt welds in longitudinal stiffeners attached to tension areas of webs.

(d) Twenty-five percent of each longitudinal web splice as selected by the inspector.

(e) Full length of field flange cut repairs.

(f) Any other weld specified by the Contract or AWS Bridge welding code.

The radiograph identification mark shown on the shop drawing layout shall be steel stamped in the area marked "Weld Identification" of Figures 6.1A thru 6.1D of the AASHTO/AWS Bridge Welding Code in a manner to make it visible in the radiograph of the area without resorting to superimposed like markings. Steel Stamped identification marks on flange plates shall be placed so that after assembly of girders, they will be on the inside of flange, but out of the area to which the web will fasten. Films of repaired welds shall also be identified by the letter "R". Steel Stamped identification numbers shall not be placed within the weld area. Other required markings shall be made by using superimposed characters. Where areas being radiographed are adjacent to the edge of the plate, the film shall be located and a technique employed which will include the top and bottom images of the plate edge. Films 114 by 432 mm (4 ½ by 17 inches) shall be used where practicable. The minimum film size shall be 114 by 254 mm (4 ½ by 10 inches).

Whenever an unacceptable weld occurs in the web sections enumerated, an adjoining 300 mm (12 inch) length of weld not previously examined shall be radiographed. If unacceptable flaws are found in this adjoining segment, the remainder of the weld (if any) shall be examined.

Radiographs shall be submitted to the OSE for acceptance and shall be accompanied by certification from the Contractor or Fabricator that the radiographic examination was performed in conformance to these specifications, field sketches and by two copies of the radiographic technician's analysis report listing unacceptable defects and causes for rejection. The technician's report shall include identification and energy level or source strength in becquerels of the radiation source, film to source distance, film type, and exposure time for each radiograph as well as the signature of the technician and his NDT level. The contact films shall become the property of the Department. Field main material

repairs shall have sketches which clearly show specific locations, lengths and depths of field cuts or damages repaired by field welding.

2. Magnetic Particle Inspection of Welds. All welding required in the fabrication of each beam or girder shall be completed and all visual defects shall be corrected prior to the examination by magnetic particle inspection. Dry powder magnetic particle inspection shall be made of at least 0.3 m (1 foot) of each 3.0 m (10 feet) or fraction thereof for each size of weld in the following:

(a) Flange-to-web welds, including ends of girder after trimming.
(b) Moment plate to flange welds
(c) Bearing stiffener welds
(d) Other welds designated by the Contract or AWS Bridge Welding Code.

Test sections shall be random locations selected by the QA inspector and/or the QCFS, and the examination shall be conducted with the QA inspector observing for C rated fabricators, unless waived by OSE. The Fabricator shall position the welds as necessary for the inspection with consideration of safety and convenience to the inspecting personnel.

Welds shall be inspected after they have been cleaned. When magnetic particle testing is used, the procedure and techniques shall be in accordance with the the dry powder magnetic-particle examination of welds using the prod or the yoke method per AWS 6.7.6. The prod test equipment shall have a functioning ammeter. The prod magnetizing current shall be 100 amperes per 25 mm (inch) of prod spacing but not less than 400 amperes. Only aluminum prods shall be permitted.

When unacceptable defects are found in a section, both adjacent 1.5 m (5 foot) segments or the full length of the weld if it is a lesser amount shall be tested. Welds requiring repair shall be retested after repairs are complete. Consideration will be given to performance of MPI inspections prior to complete welding, if the fabricator's quality control plan is acceptable to the Department and additional processing does not produce a potential for cracking.

Not all of the enumerated surface defects of Article 9.21 of the AASHTO/AWS Bridge Welding Code will be located by an inspection of this type. Welds shall be considered unacceptable if they produce such indications that are in excess of the above quality standards.

The Fabricator shall record the piece mark, the location on the member, the defect description and the proposed repairs for any defects found.

3. Ultrasonic Testing of Welds. Ultrasonic inspection shall be made of the following:

(a) Complete joint penetration flange-to-web, T or corner joints, 25% for non FCM, 25% compression or shear FCM and 100%. Tension FCM.

(b) Complete penetration butt welds 100% tension FCM and 25% compression FCM,

(c) Other welds designated by the Contract or AWS Bridge Welding Code.

The QCFS shall provide a cover letter, specified certification, sketches and technician reports documenting QCFS acceptance that nondestructive testing has been performed per specification.

863.28 Shipping, Storage and Erection. Members damaged by improper handling, storing, transportation or erection shall be repaired or replaced, at the discretion of the OSE, at no expense to the Department.

During transportation, adequate blocking shall be in place between members to prevent movement and facilitate unloading. Field connection holes shall not be used for tie-down, unless they are reinforced by additional plates, angles or other material bolted in place. Bearing components shall be banded together.

Material to be stored either in the fabricating shop or in the field shall be placed on skids or blocks to prevent the metal from coming in contact with the ground. Girders and beams shall be placed and shored in an upright position for shipment ,field storage and shop storage. Field splice plates shall be bolted in their final position or shifted laterally with respect to their final position. All material shall be kept clean and properly drained. Bearing devices and anchorages shall be installed according to 516. Bearing surfaces and surfaces to be in permanent contact shall be thoroughly cleaned before the members are assembled.

During erection, drifting will be permitted to draw the parts into position, but the holes shall not be enlarged nor the metal distorted. Erection (drift) pins shall be cylindrical and not more than 0.8 mm (1/32 inch) smaller than the hole diameter. Field splices and connections shall have not less than one-half of the holes filled with pins and snug tight bolts (preferably half bolts and half pins) before the member is released from the hoisting equipment. Field splices and connections commenced prior to erection of the connected parts shall be completed before erection. Splices and connections subject to construction loads during erection shall have not less than three-fourths of the holes so filled. Permanent fastening of steel truss tension chord members shall be completed before the falsework is removed, but compression chord members shall not be permanently fastened until the span is released sufficiently from the falsework to bring the compression chord joints into full bearing. Elevations of panel points and ends of floor beams shall be properly regulated and maintained until the falsework is removed.

Enlarging by any method the holes of splices and/or connections between segments or elements of main members is prohibited without approval by the OSE.

Structures shall be adjusted to correct alignment and camber before permanent fastening is begun. Cross frames and lateral bracing in continuous beam or girder spans shall not

be permanently fastened in any span until all main connections in adjacent spans have been completed; however, sufficient bracing shall be installed to meet the requirements of 501.06. Where erection bolts are used, they shall be not less than 16 mm (5/8-inch) diameter. Bolts for unpainted applications of A709 Grade 50W (A588) steel shall be A 325, Type 3. Erection bolts shall be A 307 bolts with lock washers or nuts tack welded to the bolt, or A 325 bolts tightened to a snug tight condition as described in 863.21 and having nuts tack welded to the bolt. End cross frames and end dams shall be erected in a manner that assures all bearing parts will remain in bearing contact.

The QCFS shall provide a cover letter documenting QCFS acceptance that shipping from the shop and shop storage has been performed per specification.

863.29 Shop Painting. This section contains requirements for the application and inspection of the shop prime coat as specified in the contract plans. The payment for the shop prime coat is included in the price bid for structural steel.

The QCPS shall be responsible for being familiar with the applicable paint specifications called for in the contract plans. Where specific shop Quality Control Points (QCP) are established in the specification, the QCPS shall comply with those requirements. If no shop prime coat QCPs are defined in the applicable paint specification, the QCPs in this section shall be the responsibility of the QCPS to assure that all QCPs meet specifications
.

Shop Prime coat shall be as specified in the contract documents.

Quality Control Points. Quality control points (QCP) are points in time when one phase of the work is complete and ready for inspection by the fabricator and QA Inspector. The next operational step shall not proceed unless the QCP has been accepted or QA inspection waived by the QA Inspector. At these points the Fabricator shall afford access to inspect all affected surfaces. If QA Inspection indicates a deficiency, that phase of the work shall be corrected in accordance with these specifications prior to beginning the next phase of work. Discovery of defective work or material after a Quality Control Point is past or failure of the final product before final acceptance, shall not in any way prevent rejection or obligate the Department to final acceptance.

Quality Control Points (QCP)	(PURPOSE)
1.) Shop Solvent Cleaning	Remove asphaltic cement, oil, grease salt, dirt, etc.
2.) Shop Grinding Flange Edges	Remove sharp corners, per AWS
3.) Shop Abrasive Blasting	Blasted surface to receive paint, including repair of fins, tears, slivers or sharp edges

4.) Shop Prime Coat Application	Check surface cleanliness apply prime coat check coating thickness

Shop Solvent Cleaning (QCP # 1). The steel shall be solvent cleaned were necessary to remove all traces of asphaltic cement, oil, grease, diesel fuel deposits, and other soluble contaminants per SSPC-SP 1 Solvent Cleaning. Under no circumstances shall any abrasive blasting be done to areas with asphaltic cement, oil, grease, or diesel fuel deposits. Steel shall be allowed to dry before blast cleaning begins.

Shop Grinding Edges (QCP # 2). All corners of thermally cut or sheared edges shall have a 1/16 inch radius or equivalent flat surface at a suitable angle. Thermally cut material thicker than 1 ½ inch shall have the sides ground to remove the heat effected zone, as necessary to achieve the specified surface profile.

Shop Abrasive Blasting (QCP #3). All steel to be painted shall be blast cleaned according to SSPC-SP10. Steel shall be maintained in a blast cleaned condition until it has received a prime coat of paint.

Metallized or galvanized steel, and other surfaces not intended to be painted, shall be covered and protected to prevent damage from blasting and painting operations. Any adjacent coatings damaged during the blasting operation shall be repaired at the fabricators expense.

The abrasive shall produce an angular profile. After each use and prior to reuse, the abrasive shall be cleaned of paint chips, rust, mill scale and other foreign material by equipment specifically designed for such cleaning.

Abrasives shall also be checked for oil contamination before use. A small sample of abrasives shall be added to ordinary tap water. Any detection of a oil film on the surface of the water shall be cause for rejection. The QCPS shall perform and record this test at the start of each shift.

The surface profile shall be a minimum of 40 mm (1.5 mils) and a maximum of 90 mm (3.5 mils). The QCPS shall record the surface profile with replica tape ASTM D 4417 Method C. For Automated blasting process: Five each recorded readings at random locations on one member for 20% of the main members or one beam per shift (which ever is greater) and One(1) recorded reading for 10% of all secondary material. For Manual blasting process: five each recorded readings at random locations for each main member and one recorded reading for 25 percent of all secondary material.

Abrasives of a size suitable to develop the required surface profile shall be used. Any abrasive blasting which is done when the steel temperature is less than 3° C(5° F) above the dew point shall be re-blasted when the steel temperature is at least 3° C(5° F) above the dew point. The QCPS shall record temperature and dew point shall be recorded prior

to blasting and at the start of each shift.

All abrasives and residue shall be removed from all surfaces to be painted with a vacuum cleaner equipped with a brush-type cleaning tool, or by double blowing. All blast cleaned steel shall be kept dust free, dry and shall be prime coated within 24 hours. The QCPS shall perform and record the following test to ensure that the compressed air is not contaminated: blow air from the nozzle for 30 seconds onto a white cloth or blotter held in a rigid frame. If any oil or other contaminants are present on the cloth or blotter, abrasive blasting shall be suspended until the problem is corrected and the operation is verified by a repeated test. This test shall be done prior to blowing and at the start of each shift.

Abrasive blasting and painting may take place simultaneously as long as abrasive blasting debris and/or dust by the blowing operation does not come in contact with freshly painted surfaces. Work areas for blasting and painting shall be physically separated to eliminate contamination of the priming operation.

All fins, tears, slivers and burred or sharp edges that are present on any steel member or that appear after the blasting operation shall be conditioned per ASTM A6 and the area reblasted to provide the specified surface profile.

Shop Prime Coat Application(QCP # 4). The surfaces to be painted shall be clean and dry. Paint shall not be applied in rain, snow, fog or mist, or to frosted or ice-coated surfaces. After QCP #3 has been accepted prime painting shall be completed before the cleaned surfaces have degraded from the prescribed standards, but in every case within 24 hours. The QCPS shall record the time between blasting and priming. Failure to prime coat the within 24 hours will require re-blasting before prime coating. The QCPS shall record that the paint is applied when the ambient temperature and humidity are as specified. Primer shall be applied by spray methods. The paint may be thinned for spraying. The type of thinner and the amount used shall be as recommended by the printed instructions of the manufacturer.

Before the paint is applied, it shall be mixed to a uniform consistency and maintained during its application. Primer shall be spray applied and continuously agitated by a automated agitation system(hand held mixers are not allowed) during application. The paint shall be mixed with a high shear mixer. Paddle mixers or paint shakers shall not be used. Paint shall also not be mixed or kept in suspension by means of an air stream bubbling under the surface.

The primer shall be applied in a neat workmanlike manner as a continuous film of uniform thickness which is free of holidays, pores, runs or sags. Spray application shall produce a wet coat at all times; the deposition of semi-dry particles on the surface shall be avoided. The Fabricator shall take precaution to prevent contamination of surfaces that have been prepared for painting and surfaces freshly painted. The prime coat shall be applied within the shop. The steel shall not be handled unnecessarily or removed from the shop until

paint has dried sufficiently to allow thickness gaging and to resist being marred in handling and shipping.

A prime coat shall coat all surfaces including insides of holes, behind stiffener clips and contact surfaces of connection or splice material which are to be fastened with shop or field bolts. Surfaces which are to be imbedded in concrete and surfaces within 50 mm (2 inches) of field welds other than those attaching intermediate or end cross frames to beams or girders shall only receive a mist coat not less that .5 mils(12.5 um) nor more than 1.5 mils(37.5 um). Pins, pin holes and contact surfaces of bearing assemblies, except those containing self-lubricating bronze inserts, shall be painted with one coat of prime paint. Erection marks shall be applied after the prime coat is dry, using a thinned paint of a type and color which is completely concealed by and compatible with the second coat.

The QCPS shall record the actual dry film thickness for the prime coat as specified. Thick films shall be reduced by screening, sanding, or sweep blasting. Any re-coating of prime paint that has cured longer than 24 hours with prime paint shall be done as recommended by the paint manufacturer's printed instructions. If "mud cracking" occurs, the affected area shall be scraped to soundly bonded paint and the area re-coated. Uncured paint damaged by rain, snow or condensation shall be permitted to dry; the damaged paint shall then be removed and the surface repainted.

The primed coat shall be adequately cured before the intermediate coat is applied. This curing time shall be not less than that recommended by the paint manufacturer's printed instructions.

Testing Equipment. The Fabricator shall provide the QCSP inspector the following testing equipment in good working order for the duration of the project. When the Fabricator's people are working at different locations simultaneously, additional test equipment shall be provided for each crew for the type of work being performed. When test equipment is not available, no work shall be performed.

1. One Spring micrometer and 3 (unless otherwise specified on plans) rolls of extra-coarse replica tape.

2. One (Positector 2000 or 6000, Quanix 2200, or Elcometer A345FBI1) and the calibration plates, 38-200 mm and 250-625 mm (1.5 -8 mils and 10-25 mils) as per the NBS calibration standards in accordance with ASTM D-1186.

3. One Sling Psychrometer including Psychometric tables - Used to calculate relative humidity and dew point temperature.

4. Two steel surface thermometers accurate within 1° C(2° F) or One portable infrared thermometer available from:
   Model: Raynger ST Series (-18° C to 400°C)

Manufacturer: Raytek Inc.
Santa Cruz, Ca.
(800)227-8074

or accepted equal to the portable infrared thermometer

5. Flashlight 2-D cell

6. SSPC Visual Standard for Abrasive Blast Cleaned Steel SSPC-Vis 1-89

Handling. All paint and thinner shall be delivered to the fabricator in original, unopened containers with labels intact. Minor damage to containers is acceptable provided the container has not been punctured. Thinner containers shall be a maximum of 19 L (5 gallons).

Paint shall be stored at the temperature recommended by the manufacturer to prevent paint deterioration. The QCPS shall record storage temperatures.

Each container of paint and thinner shall be clearly marked or labeled to show paint identification, component, color, lot number, stock number, date of manufacture, and information and warnings as may be required by Federal and State laws. The QCPS shall record the lot number, stock number and date of manufacture.

All containers of paint and thinner shall remain unopened until used. The label information shall be legible and checked at the time of use. Solvent used for cleaning equipment is exempt from the above requirements.

Paint which has livered, gelled or otherwise deteriorated during storage shall not be used. However, thixotropic materials which can be stirred to attain normal consistency may be used. The oldest paint of each kind shall be used first. No paint shall be used which has surpassed its shelf life.

The Fabricator shall provide thermometers capable of monitoring the maximum high and low temperatures within the storage facility. The Fabricator is responsible for properly disposing of all unused paint and paint containers.

The Fabricator shall furnish TE-24 and the QCPS records for all materials used on the project to the QA Inspector.

Mixing and Thinning. All ingredients in any container of paint shall be thoroughly mixed immediately before use and the primer shall be continuously mixed by an automated agitation system (hand held mixers not allowed). Paint shall be carefully examined after mixing for uniformity and to verify that no unmixed pigment remains on the bottom of the

container. The paint shall be mixed with a high shear mixer (such as a Jiffy Mixer). Paddle mixers or paint shakers are not allowed. Paint shall not be mixed or kept in suspension by means of an air stream bubbling under the paint surface. The QCPS shall record that all equipment is working correctly.

All paint shall be strained after mixing. Strainers shall be of a type to remove only skins and undesirable matter, but not pigment.

No thinner shall be added to the paint without the QCPS's approval, and only if necessary for proper application as recommended by the manufacturer. When the use of thinner is permissible, thinner shall be added slowly to the paint during the mixing process. All thinning shall be done under supervision of the QCPS. In no case shall more thinner be added than that recommended by the manufacturer's printed instructions. Only thinners recommended and supplied by the paint manufacturer may be added to the paint. No other additives shall be added to the paint.

Catalysts, curing agents, or hardeners which are in separate packages shall be added to the base paint only after the base paint has been thoroughly mixed. The proper volume of catalyst shall then be slowly poured into the required volume of base with constant agitation. Liquid which has separated from the pigment shall not be poured off prior to mixing. The mixture shall be used within the pot life specified by the manufacturer. Therefore only enough paint shall be catalyzed for prompt use. Most mixed, catalyzed paints cannot be stored, and unused portions of these shall be discarded at the end of each working day.

COATING APPLICATION

General. Galvanized or metallized surfaces shall not be painted. All new structural steel shall be painted. The following methods of application are permitted for use by this specification, as long as they are compatible with the paint being used: air-less or conventional spray. Brushes, daubers, small diameter rollers or sheepskins may be used for places of difficult access when no other method is practical.

Cleaning and painting shall be so programmed that dust or other contaminants do not fall on wet, newly-painted surfaces. Surfaces not intended to be painted shall be suitably protected from the effects of cleaning and painting operations. Over spray shall be removed with a stiff bristle brush or wire screen without damaging the paint. No visible abrasives from adjacent work shall be left on the prime. Abrasives on the prime coat shall be removed.

Spray Application (General). All spray application of paint shall be in accordance with the following:

Spray equipment shall be kept clean so dirt, dried paint and other foreign materials are not deposited in the paint film. Any solvent left in the equipment shall be completely removed before using.

Paint shall be applied in a uniform layer with overlapping at the edges of the spray pattern. The border of the spray pattern shall be painted first; with the painting of the interior of the

spray pattern to follow, before moving to the next spray pattern area. A spray pattern area is such that the gun shall be held perpendicular to the surface and at a distance which will ensure that a wet layer of paint is deposited on the surface. The trigger of the gun should be released at the end of each stroke. The QCPS shall record that each spray operator demonstrated to the QCPS the ability to apply the paint as specified. Any operator who does not demonstrate this ability shall not spray.

The QCPS shall document that all spray equipment used follows the paint manufacturer's equipment recommendations . Equipment shall be suitable for use with the specified paint. to avoid paint application problems.

If air spray is used, traps or separators shall be provided to remove oil and condensed water from the air. The traps or separators must be of adequate size and must be drained periodically during operations. The following test shall be made by the Fabricator and verified by the QCPS to insure that the traps or separators are working properly.

The QCPS shall perform and record that air is blown from the spray gun for 30 seconds onto a white cloth or blotter held in a rigid frame. If any oil, water or other contaminants are present on the cloth or blotter: painting shall be suspended until the problem is corrected and the operation is verified by repeating this test. This test shall be made at the start of each shift and at 4 hour intervals. This is not required for an airless sprayer.

Application Approval. The end of the application of primer for each beam or girder shall be subject to QCPS inspection and approval to detect any defects which might result from the fabricator's methods. If defects are discovered, the fabricator shall make all necessary adjustments to the method of application to eliminate defects before proceeding with additional prime coat application.

Temperature. Paint shall not be applied when the temperature of the air, steel, or paint is below 4° C (40° F). Paint shall not be applied when the steel surface temperature is expected to drop below 4° C (40° F) before the paint has cured for the minimum times specified below:

	10° C (50° F)	16° C (60° F)	21° C (70° F)
Primer	4 hrs.	3 hrs.	2 hrs.

The QCPS shall record and monitor the above temperatures and times.

Moisture. Paint shall not be applied when the steel surface temperature is less than 3° C (5° F) above the dew point. Paint shall not be applied to wet or damp surfaces or on frosted or ice-coated surfaces. Paint shall not be applied when the relative humidity is greater than 85%. Paint shall not be applied outdoors. The QCPS shall record the relative humidity prior to painting, at every shift and 4 hour intervals

Repair Procedures. Damaged areas, and areas which do not comply with the requirements of this specification, shall be repaired in a manner to blend the patched area with the adjacent coating. The finished surface of the patched area shall have a smooth, even profile with the adjacent surface.

The QCPS shall submit his method of conducting repairs, correcting runs, sags , mud cracking and un-workman like conditions in writing to the OSE.

Dry Film Thickness. Prime thickness, shall be determined by use of Type 2 magnetic gage in accordance with the following:

Five separate spot measurements shall be made, spaced evenly over each 9 square meters (100 square feet) of painted surface area. Three gage readings shall be made for each spot measurement. The probe shall be moved a distance of 25 to 75 mm (1 to 3 inches) for each new gage reading. Any unusually high or low gage reading that cannot be repeated consistently shall be discarded. The average (mean) of the 3 gage readings shall be used as the spot measurement. The average of five spot measurements for each such 9 square meter (100 square foot) area shall not be less that the specified thickness. No single spot measurement in any 9 square meter (100 square foot) area shall be less than 80% of the specified minimum thickness nor greater than 120% of the maximum specified thickness. Any one of 3 readings which are averaged to produce each spot measurement, may under-run or over-run by a greater amount. The 5 spot measurements shall be made for each 9 square meter (100 square feet) of area.

The specified coating thickness is 3 mils minimum to 5 mils maximum.

Safety Requirements and Precautions. The fabricator shall meet the applicable safety requirements of the Ohio Industrial Commission and the Occupational Safety and Health Administration (OSHA).

Inspection Access. In addition to the requirements of CMS 105.11, the fabricator shall furnish, erect, and move scaffolding and other appropriate equipment, to permit the QA Inspector the opportunity to closely observe all affected surfaces. Material shall be separated for inspection and safely braced. This opportunity shall be provided to the Inspector during all phases of the work and storage.

The QCPS shall provide a cover letter and specified check point data documenting QCPS acceptance that shop painting has been performed per specification.

863.30 Cleaning A709 Grade 50W Steel (ASTM A 588) Before the new steel is shipped All the exposed surfaces of A 709 Grade 50W (A588) steel that are to be left unpainted shall be solvent cleaned where necessary to remove all traces of asphaltic cement, oil, grease, diesel fuel deposits, chalk, paint marks and other soluble contaminants per SSPC-SP 1 Solvent Cleaning. QCP #1 and QCP #2 shall apply per 863.29.

Fascia beams (girders) shall be shop blast cleaned to SSPC- SP6 commercial blast. QCP#3 shall apply per 863.29.

After the placement of the superstructure concrete. All the exposed surfaces of A 709 Grade 50W (A588) steel that are to be left unpainted shall be solvent cleaned where necessary to remove all traces of asphaltic cement, oil, grease, diesel fuel deposits, and other soluble contaminants per SSPC-SP 1 Solvent Cleaning.

The use of acid for cleaning will not be permitted.

The QCPS shall provide a cover letter and specified check point data documenting QCPS acceptance that shop cleaning has been performed per specification.

863.31 Method of Measurement. Structural steel shall be measured by either lump sum or the plan weight of steel, whichever is stipulated in the contract.

If the quantity of structural steel to be paid is the plan weight of steel, the actual number of kilograms (pounds) shall be computed from the accepted shop drawing by using a unit weight of 7850 kg/m^3 (490 pounds per cubic foot). Waste material, such as is removed by burning, cutting, machining, etc., shall not be considered as pay weight except for that material removed in the edge preparation for groove welds. Material removed to form bolt holes shall be included in the pay quantity provided that only those portions of the bolts projecting beyond the holes are included for payment. Only bolts and materials that remain in place shall be included. Any thickness and weight of members in excess of that called for on the plans (due to overweight or other cause) shall not be included in determining the weight to be paid for, unless an increase in size of a member has been requested by then OSE.

Pay weight for steel castings shall be based on scale weights of the finished pieces prior to painting. Castings shall be weighed by the Fabricator, in the presence of the inspector, and weights recorded on shop bills.

The weight of paint coat, galvanized coat, run-off bars, and weld metal in all field or shop butt welds shall not be included. Fillet welds may be included if completely itemized.

The weight of other metals and preformed bearing pads not separately itemized are to be included with the structural steel. The following unit weights in kg/m^3 (pounds per cubic foot) shall be used: Cast steel and deposited weld metal 7850 (490), cast iron 7210 (450), phosphor or leaded bronze 8810 (550), lead 11370 (710). The weight of preformed bearing pads shall be calculated as an equivalent volume of lead.

The number of welded stud shear connectors to be paid for shall be the actual number installed and accepted.

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

Item	Unit	Description
863	Lump sum	Structural steel members, miscellaneous level fabrication
863	Lump sum	Structural steel members, level one fabrication
863	Lump sum	Structural steel members, level two fabrication
863	Lump sum	Structural steel members, level three fabrication
863	Lump sum	Structural steel members, level four fabrication
863	Lump sum	Structural steel members, level five fabrication
863	Lump sum	Structural steel members, fracture critical, level six fabrication
863	Kilogram (pound)	Structural steel members, miscellaneous level fabrication
863	Kilogram (pound)	Structural steel members, level one fabrication

863	Kilogram (pound)	Structural steel members, level two fabrication
863	Kilogram (pound)	Structural steel members, level three fabrication
863	Kilogram (pound)	Structural Steel Members, level four fabrication
863	Kilogram (pound)	Structural steel members, level five fabrication
863	Kilogram (pound)	Structural steel members, fracture critical, level six fabrication
863	Each	Welded stud shear connectors

OHIO DEPARTMENT OF TRANSPORTATION
P.O. Box 899
25 South Front Street
Columbus, OH 43215-0899
614-466-4082 / 614-752-4824 fax / jrandall@dot.state.oh.us

Facilities inspection has been performed by _____ From the Office of Structural Engineering (OSE)____/____/_____ Based upon this report your facility will be evaluated for acceptance into the Prequalified Fabricator List as specified by SS863.02

Facilities Evaluation Check List

1. Company Name: _____
2. Address: _____
3. Phone:_____ Fax:_____ E Mail_____

4. AISC Certification, enclose copy of certification:_____
   a. Level Miscellaneous: No AISC certification
   b. Level 1 Fabricator: S Br category with P endorsement
   c. Level 2 thru 5 Fabricator: M Br category with P endorsement
   d. Level 6 Fabricator: M Br category with P and F endorsements

5. Company Representative
   a. President: _____
   b. Chief Engineer: _____
   c. Shop Superintendent: _____
   d. QCFS, enclose certifications: _____
   e. QCPS, enclose certifications: _____
   f. NDT Staff or Agency, enclose certifications: _____
6. Building Facilities:
   a. Indoor heated fabrication area, length and width (ft): _____
   b. Indoor heated paint area, length and width (ft): _____
   c. Lay down assembly area, length and width (ft): _____
   d. QA Inspection Office area meets specification 863.07

7A. Lifting Equipment:
   1. Overhead equipment maximum piece lifting capacity (Lbs.) _____
   2. Mobile equipment maximum piece lifting capacity (Lbs.)_____

7B. Material Preparation:
   1. Shearing and planed edges, comments: _____

   2. Cutting, manual guided methods required for levels 1 thru 3
   3. Cutting Automated guided methods required for levels 4 thru 6, maximum length:_____
   4. Bending processes available, comments: _____
   5. Reentrant corners and rounding edges, comments: _____

7C. Welding Processes
   1. Levels 1 and 2 must have SMAW, check for calibration paperwork: _____
   2. Level 3 thru 6 must have SMAW and FCAW or SAW, check for calibration paperwork: _____
   3. Electrode oven, check operation and calibration paperwork: _____
   4. Level 6, flux hoppers check for calibration paperwork: _____
   5. Current approved PQR, separate submission required.
   6. Complete package of WPS, separate submission required.
   7. Qualified welders, separate submission required.

7D. NDT Technicians or Agency:
   1. Level 3 fabrication requirements:
      a. Magnetic Particle Inspection(MPI): Dry powder with aluminum prods or probe check machine calibration per ASTM E709 each 6 month: _____
      b. MPI ANSI/ASNT CP-189-1995 Level II, enclose certifications

   2. Level 4 thru 6 fabrication requirements:
      a. MPI as per level 3 above
      b. Ultrasonic Testing (UT) Equipment: AWS D1.5-95 section 6.15 and qualification 6.17: _____
      c. UT ANSI/ASNT CP-189-1995 Level II , enclose certifications
      d. Radiographic Testing (RT) Equipment: AWS D1.5-95 section 6.12 viewer: _____
      e. Evaluation of production sample RT film and report per AWS D1.5-95 section 6.10: _____
      f. RT ANSI/ASNT CP-189-1995 Level II, enclose certifications

7E. Drilling and Punching Processes, check work in process meets SS863.20 and 26:
_____

7F. Shop Bolting:
   1. Skidmore Tension Devise, calibrated yearly: _____
   2. Inspection Torque Wrench: _____

7G. Coating:
   1. Methods available for blast cleaning: _____
   2. Grit and shot mixture, examine sample work for profile: _____
   3. Methods available for painting: _____
   4. Check for operation of painting and paint inspection equipment see 863.29: _____
   5. Metallizing methods available: 85% Zinc, 15% Aluminum wire method: _____
   6. Galvanizing methods available: _____

Appendix II

FABRICATOR _____RATING FOR SHOP DRAWINGS

Project_____ Bid Line No. _____ Shop I.D. _____ Bridge:_____

Rater/Date _____ Reviewer/Date _____

Contractor Coordination (10 %) (1 point each)

	Y	N	NA
1. The contractor's P.E. has stamped and approved each shop drawing, including revisions.			
2. Shop drawing notes indicate that the contractor field verified the existing structure per the contract.			
3. Contractor submitted documentation addresses any contract changes due to, but not limited to, field conditions, plan errors or fabrication issues.			
4. Contractor accepted shop drawings were received seven (7) working days prior to the start of fabrication.			

Title Block (1%) (1 point each)

1. The project number is per the contract.			
2. All bid line numbers are shown and separated per the contract.			
3. The county, route and section of the structure are per the contract.			
4. The structure file number (SFN) is shown.			

General Notes (5%) (1 point u.n.o.)

1. The type and grade of steel are per the contract. (15 pts)			
2. Charpy V Notch (CVN) is specified per the contract. (15 pts)			
3. Non-destructive testing (NDT) is specified per the contract. (10 pts)			
4. Welding specifications are per the contract. (10 pts.)			
5. The system that produces high strength bolt holes is specified. (5 pts.)			
6. The match marking system is specified per supplemental specification 863.			
7. Surface preparation is specified per the contract.			
8. The coating system is specified per the contract.			
9. The rounding of all sheared or flame cut edges and corners is specified.			

Framing or Erection Plan (10%) (1 point u.n.o.)

	Y	N	NA
1. Main and secondary member piece marks correlate to detail drawings. (15 pts)			
2. The skew of substructures is per the contract.			
3. Transverse or radial center to center main member spacing is per the contract.			

4. The field splices are dimensioned from a centerline of bearing.			
5. The center to center of bearings is dimensioned along the full length base line.			

Lay down Assemblies (30%) (1 point u.n.o.)

Vertical Lay down Assemblies

1. A full length base line is from abutment to abutment. (5 pts)			
2. Cambers are dimensioned vertically from the baseline at points shown in the contract. At the minimum, these points shall be bearings, field splices and approximate span quarter points. (5 pts.)			
3. The baseline is horizontally dimensioned at the camber points. (5 pts)			
4. Vertical offsets are dimensioned to a consistent location on each member.			

Horizontal Lay down Assemblies

1. A full length base line is from abutment to abutment. (15 pts)			
2. Bearings, mid-ordinates and field splices are dimensioned to the centerline of web from a perpendicular to the baseline. (10 pts)			

Sub-Assemblies

1. Transverse or longitudinal main members, to which diaphragms and floor beams frame or connect, are detailed to locate bearings and splices from plan and elevation baselines. (15 pts)			

Main Member Details (30%) (1 point u.n.o.)

1. All material sizes, type, quantity and grade are per the contract. (30 pts)			
2. Fracture critical plates are identified per AWS and the contract. (25 pts)			
3. Fracture critical welds are identified by WPS number and FC designation per AWS and the contract. (25 pts)			
4. The bolt lengths, diameters, holes and types are shown per the contract. (20 pts)			
5. The splice pattern, edge distance, and maximum gap are per the contract (20 pts)			
6. All weld sizes, terminations and other details are per the contract. (20 pts)			
7. The bearing stiffeners are plumb at erection and have end fit conditions per the contract. (15 pts)			
8. The contract spacing for intermediate and connection stiffeners is not exceeded. (15 pts)			
9. All stiffeners have clips, section views and end fit conditions per the contract. (15 pts)			

Appendix II

10. End conditions, not limited to, integral or semi integral abutment details, flange clips, distances between end of member and center line of bearing or special fit-up are per the contract. (10 pts)
11. Re-entrant corners are provided with a 1" (25.4 mm) radius (10 pts)
12. Flange and web width or thickness transitions are per the contract. (10 pts)
13. Individual curved member camber diagrams are supplied with offsets at 10'-0" (3.048 m) centers. (5 pts)
14. Individual member camber diagrams are dimensioned at locations consistent with the contract. This includes approximate quarter span points. (5 pts.)
15. Radiograph locations and markings are identified per the contract. (2 pts)
16. Coated and un-coated areas are detailed per the contract.
17. Main member cross-sections are dimensioned.

Secondary Member Details (9%) (1 point u.n.o.)

1. Material size(s) and type(s) are shown per the contract. (15 pts)
2. Transverse bridge geometry is included in secondary member details. (10 pts.)
3. Shop and field weld sizes, terminations and other details are per the contract.(10 pts)
4. Bolt lengths, diameters, holes and types are shown per the contract. (10 pts)
5. Secondary member work points are dimensioned where necessary for the coordination of trades.
6. Strut and diagonal cross frame legs are matched on each side of the web.

Y= yes, N= no, NA = not applicable

Fabricator Rating = {Y / (Y + N) } x Section Factor (There are no partial points)

Contractor Coordination _____ (Y) / _____ (Y + N) x 10 = _____
Title Block _____ (Y) / _____ (Y + N) x 1 = _____
General Notes _____ (Y) / _____ (Y + N) x 5 = _____
Framing/Erection Plan _____ (Y) / _____ (Y + N) x 10 = _____
Lay down Assemblies _____ (Y) / _____ (Y + N) x 30 = _____
Main Member Details _____ (Y) / _____ (Y + N) x 35 = _____
Secondary Member Details _____ (Y) / _____ (Y + N) x 9 = _____

Appendix II

Fabricator_____**Rating for Performance of Shop Drawings**_____%

Appendix II

FABRICATOR _____ **RATING FOR TEST REPORTS**

Project:_____ **Bid line No.:**_____ **Shop ID.** _____ **Bridge No.:**_____
Rater/Date:_____ **Reviewer/Date:** _____

I. General Project Information	**Y**	**N**	**NA**
1. Project number is shown (1 point)			
2. Bid line number is called out (1 point)			
3. Bridge number is specified (1 point)			
4. Name of fabricator is identified (1 point)			
5 Bid line numbers are separated (1 point)			
6. Material test reports are cross referenced to drawing piece marking system (2 point)			

II. Complete Mill Test			
1. All materials shown on the shop drawings have test reports and shippers (30 points)			
2. Test reports meet all contract requirements; CMS, ASTM, CVN and/or Fracture Critical. (25 points)			
3. The producing mill is domestic (10 points)			
4. Test reports show material size, shape, & length (4 points)			
5. Test reports show grade of steel (3 points)			
6. Material quantity is shown on the Test Reports (2 points)			
7. Test reports show mill's name (2 points)			
8. Test reports show purchaser of material (2 points)			

III. Timeliness			
Test report submission was 7 working days prior to release for shipping (15 points)			

TEST REPORTS RATING TOTAL			

Y = yes, N = no, NA = not applicable
No partial points are available for a yes, no or not applicable section.

V. FOLLOW-UP SEQUENCE FOR INCOMPLETE MILL TEST

	DATE Performed	**DATE DUE**	**RESULT**
1. Fax and Phone call to the Contractor requesting incomplete information.			
2. Non-compliance letter and phone call to Contractor 30 days after sending fax.			
3. IOC to District after 10 days from sending non-compliance letter.			
4. District action performed.			

Appendix II

FABRICATOR_____ **RATING FOR SHOP FABRICATION**

Project: _____ **Bid line No.:**_____**Shop ID:**_____ **Level:**_____

Rater/Date:_____**Reviewer/Date:**_____

Check, Hold or Witness Point Descriptions for Levels of Fabrication 1 thru 5	**Yes**	**No**	**NA**
ASTM A709, Grade, Physical & Chemical Requirements, CVN : Check point one (1) QCFS acceptance by cover letter listing piece marks and dates			
Heat number and member description (1 point)			
Yield Strength, Fy (psi) (3 points)			
Tensile Strength, Fu (psi) (1 point)			
Elongation% and gage length (2 point)			
CVN minimum average energy(ft lb.) (1 point)			
Chemical Requirements (1 point)			
Heat No. Steel Stamped and matched to Mill Test Reports per 863.10 prior to release or painting (1 point)			
ASTM A6 Quality and permissible Variations: Check Point two(2) QCFS acceptance by cover letter listing piece marks and dates.			
ASTM A6, Permissible variations in cross-section (1 point)			
ASTM A6, Permissible variations in Straightness & Storage (1 point)			
ASTM A6 and 863.11, Surface indications, Pitting due to rusting (1 point)			
ASTM A6, Laminar indications (1 point)			
Material Preparation per AWS D1.5, AASHTO and 863: Check Point three (3) QCFS acceptance by cover letter listing piece marks and dates			
Cutting beyond (inside) the prescribed lines AWS 3.2.2 (1 point)			
Cutting roughness AWS 3.2.2 (1 point)			
Occasional notches AWS 3.2.2 (1 point)			
Cut Edge Discontinuities AWS 3.2.3 (1 point)			
Reentrant corners AWS 3.2.4 and Radii of Beam copes 3.2.5 (1 point)			
Rounding of edges main members AWS 3.2.9 (1 point)			
Shearing distortion 863.13 (1 point)			
Bending , 90 degrees to rolling direction, visual inspection look for cracks AASHTO (1 point)			

Cambering and Sweep per 863.12, AWS and AASHTO: Check Point four (4) QCFS acceptance by cover letter listing piece marks and dates.			
Cambering or Straightening, AASHTO shop procedure posted (1 point)			
1150 degrees F pyrometric sticks (follow shop procedure) (5 points)			
location and shape of heats (follow shop procedure) (1 point)			
location and number of support blocks (follow shop procedure) (1 point)			
Natural Cooling (follow shop procedure) (5 points)			
Straightness and camber are per 863.12 (5 points)			
Flange and Web Butt Splice Welding per AWS, 863.23 and AASHTO: Check Point five (5) QCFS acceptance by frequent audits and documentation of listed data for each splice and dates.			
Size, grade , piece mark and locations of parts to be fitted (1 point)			
Clean scale, moisture, grease & foreign material per AWS 3.2.1 (1 point)			
Groove weld fit up tolerance, AWS 3.3 (1 point)			
Shop Welding Procedure (WPS) identification and ODOT approval date. (5 point)			
Tackers Name and SS#, ODOT Qualified, procedure (1 point)			
Welders Name and SS#, ODOT Qualified, procedure (1 point)			
Flux and Wire combination, does it match WPS (1 point)			
Joint geometry tolerances per AWS figure 2.4 (2 point)			
Preheat Temperature (F) and Shop Temperature(F) (1 point)			
Amperage (Amps),Voltage (Volts),Travel Speed (IPM) (5 point)			
Back gouge and cleaning per AWS 3.2.6 (5 point)			
Visual inspection width, thickness AWS 3.6.3 (5 point)			
Visual inspection surface finish AWS 3.6.4 125 uin. (2 point)			
Radiographic Inspection per AWS, 863.27 and AASHTO: Check Point six (6), Hold Point for B & C Rated fabricators QCFS acceptance by cover letter listing piece marks , dates and with technician's reports.			
Radiographic inspection 100% flange butt welds and back up bar splices(ODOT review required, Critical process) (5 point)			
Radiographic inspection web butt welds, top & bottom 1/3 (ODOT review required, Critical process) (5 point)			

Radiographic inspection 100% longitudinal stiffeners butt welds (ODOT review required, Critical process) (5 point)			
Radiographic inspection 25% longitudinal web splice(ODOT review required, Critical process,) (5 point)			
Radiographic identification marked steel stamped and visible in radiographic film, correct image quality indicator (1 point)			
Top and bottom of plate edges visible in the radiographic film (5 point)			
Radiographic technician's signed analysis report (1 point)			
Ultrasonic Inspection per AWS, 863.27 and AASHTO: Check Point seven (7), Hold and Witness Point for B & C Rated Fabricators QCFS acceptance by cover letter listing piece marks , dates and with technician's reports.			
Ultrasonic inspection 25% of complete penetration T or corner joints . (ODOT review required, Critical Process, 100% QA witness with B and C rated fabricators (2 point)			
Ultrasonic technician's signed analysis report (1 point)			
Ultrasonic equipment qualification per AWS 6.17 (1 point)			
Flange to Web Fillet Welds per AWS, 863 and AASHTO: Check Point eight (8), QCFS acceptance by frequent audits , documentation of listed data for each member and dates.			
Size, grade , piece mark and locations of parts to be fitted (1 point)			
Clean scale, moisture, grease & foreign material per AWS 3.2.1 (1 point)			
Standard fillet weld fit up tolerance, 1/16" AWS 3.3 (1 point)			
Welding Procedure (WPS) identification and ODOT approval date (5 point)			
Tackers Name and SS#, ODOT Qualified, procedure (1 point)			
Welder Name and SS#, ODOT Qualified, procedure (3 point)			
Flux and Wire combination, does it match WPS (1 point)			
Preheat Temperature (F) and Shop Temperature(F) (2 points)			
Amperage (Amps),Voltage (Volts) and Travel Speed (IMP) (5 points)			
Visual inspection weld size and profile, AWS 3.6 (5 point)			
Stiffener Fitting per AWS, 863 and AASHTO: Check Point nine (9) QCFS acceptance by cover letter listing piece marks and dates.			
Bearing Stiffener, mill fit @ bearing, tight fit @ other end, 863.14 (1 point)			
Intermediate Stiffener without cross frames, tight fit at tension flange, 863.14 (1 point)			

Connection Stiffener weld fit at both flanges 863.14 (1 point)			
Clearance between clipped stiffener corners and fillets on rolled beams (1 point)			
Stiffener Fillet Welds per AWS, 863 and AASHTO: Check Point ten(10) QCFS acceptance by frequent audits ,documentation of listed data for each member and dates			
Size, grade , piece mark and locations of parts to be welded (1 point)			
Clean scale, moisture, grease & foreign material per AWS 3.2.1 (1 point)			
Standard fillet weld fit up tolerance, 1/16" AWS 3.3 (1 point)			
Welding Procedure (WPS) identification and ODOT approval date (5 points)			
Tackers Name and SS#, ODOT Qualified, procedure (1 point)			
Welder Name and SS#, ODOT Qualified, procedure (3 point)			
Flux and Wire combination, does it match WPS (1 point)			
Preheat Temperature(F) and Shop Temperature(F) (2 point)			
Amperage (Amps), Voltage(Volts) and Travel Speed (IMP) (5 point)			
Visual inspection weld size and profile, AWS 3.6 (5 point)			
Magnetic Particle Inspection per AWS, 863.27 and AASHTO: Check Point eleven (11), Hold and Witness point for C Rated Fabricators.QCFS acceptance by cover letter listing piece markes, dates and with technicians report's.			
Magnetic Particle Inspection 10% of flange to web welds and girder ends after trimming (ODOT review required, Critical Process) Dry powder prod method or probe. 100% QA witness with C rated fabricators. (2 point)			
Magnetic Particle Inspection 10% of Bearing Stiffener Welds (ODOT review required, Critical process) Dry powder prod method or probe. 100% QA witness with C rated fabricators. (2 point)			
Magnetic Particle technician's signed analysis report (1 point)			
Calibration of Magnetic Particle Equipment every 6 months (1 point)			
Shop Laydown per AWS, 863, and AASHTO: Check Point twelve (12) QCFS acceptance by frequent audits, documentation of listed data for each member and dates.			
Hole patterns, size, spacing, gage, accuracy, 863.20 (2 point)			
Hole deburring, 863.20 (1 point)			

Blocking horizontal & vertical dimensions @ bearings, after all welding is complete. 1/8" + or - 863.26 (5 point)			
Blocking camber dimensions @ points specified, after all welding is complete 863.12 (5 point)			
Horizontal curvature of curved members, after all welding is complete 1/8"/10'-0" AWS 3.5 (2 point)			
Fitup at bolted splice, 1/4" max gap SS863.11			
Shop applied bolts, nuts and washers accepted by TE-24			
Shop installed bolts calibration devise periodically examined per 863.21			
Bolts tightened per 863.21			
Center to center of field splices matches plan dimensions (1 point)			
Flatness at bearing seats, after all welding is complete AWS 3.5.1.9 (2 point)			
Cleaning per 863.27, SSPC and ASTM: Check Point thirteen (13) QCFS acceptance by documentation of listed data for each member and dates.			
Shop solvent cleaning per SSPC-SP1 where necessary (5 point)			
Shop grinding edges 1/16", material thicker than 1 ½" shall be checked for removal of the heat effected zone. (1 point)			
Shop blast cleaned SSPC-SP10, Automated process: Five(5) each recorded readings at random locations on one member for 20% of the main members and One(1) recorded reading for 10% of all secondary material with replica tape ASTM D4417 method C, 1.5 to 3.5 mil profile , 863.29 (10 point)			
Shop blast cleaned SSPC-SP10, Manual process: five(5) each recorded readings at random locations for each main member and one(1) recorded reading for 25% of all secondary material with replica tape ASTM D4417 method C, 1.5 to 3.5 mil profile, 863.29 (10 point)			
Steel ,Ambient (Dry bulb) and Wet bulb Temperatures, Humidity and Dew Point recorded prior to blasting and at the start of each shift (5 degree F above dew point). (2 point)			
Abrasive produces angular profile (1 point)			
Abrasive mix for oil contamination start of each shift (1 point)			
Removal of abrasives & residue by vacuum or double blowing (5 point)			
Test blow air for oil or other contaminants. Blotter test for 30 seconds at the start of each shift. Not required with vacuum (1 point)			
Condition all fins slivers and burred or sharp edges per ASTM A6. Re-blast to 1.5 to 3.5 mil profile, unless conditioned area is less than one square foot per main member (1 point)			

Painting per 863.29, SSPC and ASTM: Check Point fourteen (14), Hold Point for C Rated Fabricators. QCFS acceptance by documentation of listed data for each member and dates.			
Time and dates between blasting and painting (1 point)			
Ambient temperature & humidity (minimum 40 deg.F and 5 deg F above dew point) (5 point)			
Temperature of paint storage location (max/ min) (2 point)			
Paint TE-24, manufactures name and lot numbers (2 point)			
Painter mixes paint with a high shear mixer and strains (5 point)			
Painter is checking operation of automated agitation system with every new paint batch (5 point)			
Prime inside of bolt holes, behind stiffener clips (5 point)			
Prime thickness 3 to 5 mils: 3 gage readings for each spot measurement with 5 spot measurements in each 100 square foot (see additional instructions with paint system notes)(10 point)			
Workman like finish; mud cracking, holidays, pores, runs or sags. (5 point)			
Prime has dried sufficiently prior to handling (1 point)			
Cleaning ASTM A709 Grade 50W steel (A588) Check point fifteen (15). QCFS acceptance by documentation of listed data for each member and dates.			
Shop solvent cleaning per SSPC-SP1 where necessary (5 point)			
Shop grinding edges 1/16"(1 point)			
Shop blast fascia members cleaned SSPC-SP6 achieved			
Abrasive mix for oil contamination start of each shift (1 point)			
Removal of abrasives & residue by vacuum or double blowing (1 point)			
Test blow air for oil or other contaminants. Blotter test for 30 seconds at the start of each shift. Not required with vacuum (1 point)			
Condition all fins slivers and burred or sharp edges per ASTM A6. Re blast to 1.5 to 3.5 mil profile, unless conditioned area is less than one square foot per main member (1 point)			
Repair procedures, QA Inspection : Hold point sixteen (16), Required for all Fabricators.QCFS acceptance by documentation of listed data for each repaired member and dates.			
QCSF documentation describing problem and proposed repair method. (1 point)			
QA /OSE acceptance of proposed repair methods (1 point)			

Appendix II

Fabricator follows repair methods (2 points)			
NDT acceptance by QCSF and QA/OSE (2 points)			
Contractor acceptance and OSE received Shop drawings revised to show as built condition (1 point)			
Final Shop, Shipping or Storage, QA Inspection: hold Point seventeen (17), Required for all Fabricators. QCFS presents member and required QCSF documentaion from check points 1 thru 16 for QA acceptance.			

NA = Not Applicable, No partial points are available for a Yes, No or NA answer

Sum of {Y/(Y + N) x Section %}

Check Point 1_____(Y) / _____(Y + N) X 12 = _____
Check Point 2 _____(Y) / _____(Y + N) X 1 = _____
Check Point 3 _____(Y) / _____(Y + N) X 1 = _____
Check Point 4 _____(Y) / _____(Y + N) X 1 = _____
Check Point 5_____(Y) / _____(Y + N) X 12 = _____
Check Point 6_____(Y) / _____(Y + N) X 15 = _____
Check Point 7_____(Y) / _____(Y + N) X 12 = _____
Check Point 8_____(Y) / _____(Y + N) X 6 = _____
Check Point 9 _____(Y) / _____(Y + N) X 1 = _____
Check Point 10_____(Y) / _____(Y + N) X 1 = _____
Check Point 11_____(Y) / _____(Y + N) X 8 = _____
Check Point 12_____(Y) / _____(Y + N) X 9 = _____
Check Point 13_____(Y) / _____(Y + N) X 4 = _____
Check Point 14_____(Y) / _____(Y + N) X 4 = _____
Check Point 15_____(Y) / _____(Y + N) X 1 = _____
Check Point 16_____(Y) / _____(Y + N) X 12 = _____

Summation Fabricator rating for performance of QA Inspection = _____

Required Hold or Witness points
A Rating hold points = 7, 16 and 17
B Rating hold points = 6, 7, 16 and 17
C Rating hold or witness points = 6, 7, 11, 14, 16 and 17

Appendix II

FABRICATOR_____ RATING FOR SHOP FABRICATION LEVEL 6 (FCM)

Project: _____ Bid Line No.:_____Shop ID:_____

Rater/Date_____ Reviewer/Date _____

Check, Hold or Witness Point Descriptions for Level of Fabrication 6 , Fracture Critical Members (FCM)	**Yes**	**No**	**NA**
ASTM A709, Grade, Physical & Chemical Requirements, CVN : Check point One (1) QCFS acceptance by cover letter listing piece marks and dates			
Heat number and member description (1 point)			
Yield Strength, Fy (psi) (3 points)			
Tensile Strength, Fu (psi) (3 points)			
Elongation % and gage length (2 points)			
Material killed fine-grain practice (AWS 12.4.2) (5 point)			
Zone 2 CVN minimum average energy (A709 Table S1.3) (2 point)			
CVN impact testing "P" plate frequency (5 point)			
Chemical Requirements (1 point)			
Heat No. Steel Stamped and matched to Mill Test Report per 863.10 prior to release or painting (1 point)			
ASTM A6 Quality and permissible Variations: Check Point Two (2) QCFS acceptance by cover letter listing piece marks and dates.			
ASTM A6, Permissible variations in cross-section (1 point)			
ASTM A6, Permissible variations in Straightness & Storage (1 point)			
ASTM A6 and 863.11, Surface indications, Pitting due to rusting (1 point)			
ASTM A6, Laminar indications (1 point)			
Material Preparation per AWS D1.5, AASHTO and 863: Check Point Three (3) QCSF acceptance by cover letter listing piece marks and dates			
Cutting beyond (inside) the prescribed lines AWS 3.2.2 (1 point)			
Cutting roughness AWS 3.2.2 (1 point)			
Occasional notches AWS 3.2.2 (1 point)			
Cut Edge Discontinuities AWS 3.2.3 (1 point)			
Reentrant corners AWS 3.2.4 and Radii of Beam copes 3.2.5 (1 point)			
Rounding of edges AWS 3.2.9 (1 point)			

Shearing distortion 863.13 (1 point)			
Heat Bending , 90 degrees to rolling direction, visual inspection (document any cracking NDT required) AASHTO and AWS 12.12 (5 point)			
Cambering and Sweep per 863.12, AWS and AASHTO: Check Point Four (4) QCFS acceptance by cover letter listing piece marks and dates			
Cambering or Straightening, AASHTO and AWS 12.12 shop procedure posted (2 points)			
1150 degrees F pyrometric sticks (follow shop procedure) (5 points)			
location and shape of heats (follow shop procedure) (1 point)			
location and number of support blocks (follow shop procedure) (1 point)			
Natural Cooling (follow shop procedure) (5 point)			
Straightness and camber are per 863.12 (5 points)			
Flange and Web Butt Splice, Web-to-Flange CJP Welding per AWS, 863.23 and AASHTO: Hold and Witness Point Five (5) QCFS acceptance by witnessing, frequent audits and documentation of listed data for each splice and dates			
Size, grade, piece mark and location of parts to be fitted (1 point)			
Clean scale, moisture, grease & foreign material per AWS 3.2.1 (1 point)			
Groove weld fit up tolerance, AWS 3.3 (1 point)			
Shop Welding Procedure (WPS) identification and ODOT approval date. (5 point)			
Tackers Name and SS#, ODOT Qualified, procedure (2 point)			
Welders Name and SS#, ODOT Qualified, procedure (3 point)			
Flux and Wire combination, does it match WPS (2 point) Are Flux and Wire lot tested Check Temperature of Flux oven			
Joint geometry tolerances per AWS figure 2.4 (2 point) witness			
Preheat Temperature (F) and shop temperature(F) (3 point) witness			
Amperage (Amps), Voltage(Volts), Travel Speed(F) (3 point) witness			
Backgouge and cleaning per AWS 3.2.6 (3 point) witness			
Visual inspection width, thickness AWS 3.6.3 (5 point) witness			
Visual inspection surface finish AWS 3.6.4 125 uin. (5 point) witness			
Radiographic Inspection per AWS, 863.27 and AASHTO: Check Point Six (6) Hold point QCFS acceptance by cover letter listing piece marks, dates and with technician's reports.			

Radiographic inspection 100% flange butt welds and back up bars splices(ODOT review required, Critical process, Document separately) (5 point)			
Radiographic inspection web butt welds, top & bottom 1/3 (ODOT review required, Critical process ,Document separately) (5 point)			
Radiographic inspection100% longitudinal stiffeners butt welds (ODOT review required, Critical process, Document separately) (5 point)			
Radiographic inspection 25% longitudinal web splice(ODOT review required, Critical process, Document separately) (5 point)			
Radiographic identification marked steel stamped and visible in radiographic film, Hole-type image quality indicator (1 point)			
Top and bottom of plate edges visible in the radiographic film (5 point)			
Removal of weld reinforcement (1 point)			
Radiographic technician's signed analysis report (1 point)			
Ultrasonic Inspection per AWS, 863.27 and AASHTO: Check point Seven (7) Hold and witness point QCFS acceptance by cover letter listing piece marks, dates and with technicians reports			
Ultrasonic inspection 100% of complete penetration butt welds in FCM tension or reversal of stress flanges or back up bars. (ODOT review required, Critical Process, 100% QA witness (5 point)			
Ultrasonic inspection 25% of complete penetration butt welds in FCM compression flange or back up bar.(ODOT review required, Critical Process, 100% QA witness (2 point)			
Ultrasonic inspection 25% of complete penetration T or corner joints FCM subject to compression or shear. (ODOT review required, Critical Process, 100% QA witness (2 point)			
Ultrasonic inspection 100% of complete penetration T or corner joints FCM subject to tension or reversal of stress (ODOT review required, Critical Process, 100% QA witness (5 point)			
Ultrasonic technician's signed analysis report (1 point)			
Ultrasonic equipment qualification per AWS 6.17 (1 point)			
Repair procedure per AWS 12.17 hold and witness point Eight (8) QCFS acceptance by witnessing, frequent audits and documentation of listed data for each splice and dates			
Sketch of discontinuity with member piece mark and location on member (1 point)			
QA witness of discontinuity for determination of critical or non critical repairs (2 point)			
Noncritical repair, WPS and repair procedure pre approved (1 point)			

Critical repair, WPS and repair procedure approved for each repair by OSE (2 point)			
Welders Name and SS#, ODOT Qualified last 6 months or annual renewal (1 point)			
Preheat temperature prior to air carbon arc (1 point) witness*			
Grind surfaces to be welded smooth and bright (1 point) witness*			
Flux and Wire combination, does it match WPS (1 point) Are Flux and Wire lot tested, Check Temperature of Flux oven			
Joint geometry tolerances per AWS figure 2.4 (2 point) witness*			
Preheat Temperature (F) and shop temperature (F) (1 point) witness*			
Amperage (Amps), Voltage (Volts) and Travel Speed (IPM) (1 point) witness*			
Visual inspection width, thickness AWS 3.6.3 (2 point) witness*			
Visual inspection surface finish AWS 3.6.4 125 uin. (2 point) witness*			
Visual inspection weld size and profile, AWS 3.6 (2 point) witness*			
Non destructive testing as specified by repair procedure(5 points) witness*			
* witness required for critical repairs not required for non critical repairs			
Flange to Web Fillet Welds per AWS, 863 and AASHTO: Hold and witness Point nine(9),QCFS acceptance by witnessing, frequent audits and documentation of listed data for each splice and dates			
Size, grade, piece mark and locations of parts to be fitted (1 point)			
Clean scale, moisture, grease & foreign material per AWS 3.2.1 (1 point)			
Standard fillet weld fit up tolerance, 1/16" AWS 3.3.1 (1 point)			
Welding Procedure (WPS) identification and ODOT approval date (5 point)			
Tackers Name and SS#, ODOT Qualified, procedure (2 points)			
Welder Name and SS#, ODOT Qualified, procedure (3 points)			
Flux and Wire combination, does it match WPS Are Flux and Wire lot tested Check temperature of flux oven (2 points)			
Preheat Temperature (F) and shop temperature (1 point) witness			
Amperage (Amps)Voltage (Volts (1 point) Travel Speed (IMP) (5 points) witness			
Visual inspection weld size and profile, AWS 3.6 (5 point) witness			

Stiffener fitting per AWS, 863 and AASHTO: Check Point Ten(10) QCFS acceptance by frequent audits, documentation of listed data for each member and dates			
Bearing Stiffener, mill fit @ bearing, tight fit @ other end, 863.14 (1 point)			
Intermediate Stiffener without cross frames, tight fit at tension flange 863.14 (1 point)			
Connection stiffener weld fit at both flanges 863.14 (1 point)			
Clearance between clipped stiffener corners and fillets on rolled beams (1 point)			
Stiffener fillet welds per AWS, 863 and AASHTO: Hold and witness Point Eleven (11)QCFS acceptance by frequent audits, documentation of listed data for each member and dates			
Size, grade, piece mark and location of parts to be welded (1 point)			
Clean scale, moisture, grease & foreign material per AWS 3.2.21 (1 point)			
Standard fillet weld fit up tolerance 1/16" AWS 3.3 (1 point)			
Welding Procedure (WPS) identification and ODOT approval date (5 point)			
Tackers Name and SS#, ODOT Qualified, procedure (1 point)			
Welder Name and SS#, ODOT Qualified, procedure (3 point)			
Flux and Wire combination, does it match WPS (1 point) Are Flux and Wire lot tested Check temperature of flux oven			
Record Preheat Temperature(F) and shop temperature(F) (2 point) witness			
Amperage (Amps),Voltage(Volts), Travel Speed (IMP) (3 point) witness			
Visual inspection weld size and profile, AWS 3.6 (5 point) witness			
Magnetic Particle Inspection per AWS, 863 and AASHTO: Check Point twelve (12), Hold and witness for C rated fabricators. QCFS acceptance by cover letter listing piece marks, dates and with technicians reports			
Magnetic Particle Inspection 10% of flange to web welds and girder ends after trimming (ODOT review required, Critical Process, Document separately) Dry powder prod method or probe (2 point) 100% QA witness.			
Magnetic Particle Inspection 10% of Bearing Stiffener Welds (ODOT review required, Critical process, Document separately) Dry powder prod or probe method (2 point). 100% QA witness..			
Magnetic Particle technician's signed analysis report (1 point)			
Calibration of Magnetic Particle Equipment every 6 months (1 point)			

Shop Laydown per AWS, 863, and AASHTO: Check Point thirteen(13) QCFS acceptance by frequent audits, documentation of listed data for each member and dates			
Hole patterns, size, spacing, gage, accuracy, 863.20 (2 point)			
Hole de-burring, 863.20 (1 point)			
Blocking horizontal & vertical dimensions @ bearings, after all welding is complete. (document) 1/8" + or - 863.12 (document separately) (5 point)			
Blocking camber dimensions @ points specified, after all welding is complete 863.12 (document separately) (5 point)			
Horizontal curvature of curved members, after all welding is complete 1/8"/10'-0" AWS 3.5.1.4 (document separately) (2 point)			
Fit up at bolted splice, 1/4" max gap 863.17 (2 point)			
Center to center of bearings matches plan dimensions (1 point)			
Flatness at bearing seats, after all welding is complete AWS 3.5.1.9 (2 point)			
Cleaning per 863.27, SSPC and ASTM: Check Point fourteen(14)acceptance by documentation of listed data for each member and dates			
Shop solvent cleaning per SSPC-SP1 where necessary (5 point)			
Shop grinding edges 1/16", material thicker than 1 ½" shall be checked for removal of the heat effected zone. (1 point)			
Shop blast cleaned SSPC-SP10, Automated process: Five(5) each recorded readings at random locations on one member for 20% of the main members or one beam for each shift (which ever is greater) and One(1) recorded reading for 10% of all secondary material with replica tape ASTM D4417 method C, 1.5 to 3.5 mil profile (10 point)			
Shop blast cleaned SSPC-SP10, Manual process: five (5) each recorded readings at random locations for each main member and One(1) recorded reading for 25% of all secondary material with replica tape ASTM D4417 method C, 1.5 to 3.5 mil profile (10 point)			
Steel ambient (dry bulb) and wet bulb temperatures, humidity and dew point recorded prior to blasting and at the start of each shift (5 degree F above dew point). (2 point)			
Abrasive produces angular profile (1 point)			
Abrasive mix for oil contamination start of each shift (1 point)			
Removal of abrasives & residue by vacuum or double blowing (5 point)			
Test blow air for oil or other contaminants. Blotter test for 30 seconds at the start of each shift. Not required with vacuum (1 point)			

Conditioning all fins slivers and burred or sharp edges ASTM A6 then reblast to 1.5 to 3.5 mil profile, unless condition is less than one square foot per each side of the main member. (1 point)			
Painting per 863, SSPC and ASTM: Hold or Check Point fifteen(15)QCFS acceptance by documentation of listed data for each member and dates.			
Time and dates between blasting and painting (1 point)			
Ambient temperature & humidity (minimum 40 deg.F and 5 deg F above dew point) (1 point)			
Temperature of paint storage location (max/ min) (1 point)			
Paint TE-24, manufactures name and lot numbers (1 point)			
Painter mixes paint (high shear mixer) and strain (5 point)			
Painter is checking operation of automated agitation system with every new paint batch (5 point)			
Prime inside of bolt holes, behind stiffener clips (5 point)			
Prime thickness 3 to 5 mils: 3 gage readings for each spot measurement with 5 spot measurements in each 100 square foot (see additional instructions with paint system notes) (10 point)			
Workman like finish; mud cracking, holidays, pores, runs or sags. (5 point)			
Prime has dried sufficiently prior to handling (1 point)			
Cleaning ASTM A709 Grade 50W steel (A588) Check point sixteen (16). QCFS acceptance by documentation of listed data for each member and dates.			
Shop solvent cleaning per SSPC-SP1 where necessary (5 point)			
Shop grinding edges 1/16"(1 point)			
Shop blast fascia members cleaned SSPC-SP6 achieved			
Abrasive mix for oil contamination start of each shift (1 point)			
Removal of abrasives & residue by vacuum or double blowing (1 point)			
Test blow air for oil or other contaminants. Blotter test for 30 seconds at the start of each shift. Not required with vacuum (1 point)			
Condition all fins slivers and burred or sharp edges per ASTM A6. Re blast to 1.5 to 3.5 mil profile, unless conditioned area is less than one square foot per main member (1 point)			
Repair procedures, QA Inspection : Hold point seventeen (17), Required for all Fabricators.QCFS acceptance by documentation of listed data for each repaired member and dates.			

QCSF documentation describing problem and proposed repair method. (1 point)			
QA /OSE acceptance of proposed repair methods (1 point)			
Fabricator follows repair methods (2 points)			
NDT acceptance by QCSF and QA/OSE (2 points)			
Contractor acceptance and OSE received Shop drawings revised to show as built conditions (1 point)			
Final Shop, Shipping or Storage, QA Inspection: hold Point Eighteen (18), Required for all Fabricators. QCFS presents member and required QCSF documentation from check points 1 thru 17 for QA acceptance.			

Y = Yes, N = No, NA = Not Applicable, No partial points are available for a Y, N or NA answer

Sum of {Y/(Y + N) x Section %}

Check Point 1 _____(Y) / _____(Y + N) X 7 = _____
Check Point 2 _____(Y) / _____(Y + N) X 2 = _____
Check Point 3 _____(Y) / _____(Y + N) X 5 = _____
Check Point 4 _____(Y) / _____(Y + N) X 2 = _____
Check Point 5 _____(Y) / _____(Y + N) X 15 = _____
Check Point 6 _____(Y) / _____(Y + N) X 15 = _____
Check Point 7 _____(Y) / _____(Y + N) X 15 = _____
Check Point 8 _____(Y) / _____(Y + N) X 15 = _____
Check Point 9 _____(Y) / _____(Y + N) X 7 = _____
Check Point 10_____(Y) / _____(Y + N) X 2 = _____
Check Point 11_____(Y) / _____(Y + N) X 7 = _____
Check Point 12_____(Y) / _____(Y + N) X 15 = _____
Check Point 13_____(Y) / _____(Y + N) X 7 = _____
Check Point 14_____(Y) / _____(Y + N) X 7 = _____
Check Point 15_____(Y) / _____(Y + N) X 7 = _____
Check Point 16_____(Y) / _____(Y + N) X 7 = _____
Check Point 17_____(Y) / _____(Y + N) X 7 = _____

Summation Fabricator rating for performance of QA Inspection = _____

Required Hold or witness points = 5, 6, 7, 8, 9, 11, 12, 17 and 18

A Rating witness points require QC / QA inspection for 10 % of the work in progress.
B Rating witness points require QC / QA inspection for 25 % of the work in progress.
C Rating witness points require QC / QA inspection for 50 % of the work in progress.

Appendix III

Fabricator Rating: Summation of Appendix II check lists

Fabricator Rating For Performance Of Shop Drawings _____ x 20% = _____

Fabricator Rating For Performance Of Test Reports _____ x 20% = _____

Fabricator Rating For Performance Of Shop Fabrication _____ x 60% = _____

Fabricator Rating = _____

Fabricator Rating District's Construction Comments

Designer's Note

The selected bid item for 513 should be based on a comparison of the type of structure to be built versus the capability of the level of fabricator as defined in section 863.04. As example a continuous rolled beam bridge with no stiffeners would require a level 2 fabricator. If the rolled beam bridge had stiffeners required to attach cross frames then a level 3 fabricator would be specified.

A supplemental description should be added defining the type of steel

i.e.
863 Lump Sum Structural Steel Members, Level Four (4), A 709, grade 36

For bridges with fracture critical members or fracture critical bridges a level 6 is required (See Section 863.04)

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 870
SEEDING AND MULCHING

August 10, 1999

870.01 Description. This work shall consist of placing topsoil, preparing the seed bed, furnishing all seed, agricultural lime, commercial fertilizer, mulching material and placing and incorporating as specified. Seeding and mulching shall be performed in stages as per Supplemental Specification 877.

The Contractor shall place the seed and mulch within 7 days of obtaining final grade. If it is anticipated that the areas will be disturbed by future work, the area shall be temporary seeded (Class 7) and mulched as per Supplemental Specification 877.

Areas to be seeded shall include all areas within the right of way and as described in the plans. All areas outside the specified limits where the vegetation has been disturbed or destroyed by the Contractor including those defined in CMS 104.06 shall be restored and seeded in accordance with these specifications by the Contractor at no additional cost to the Department.

870.02 Testing of Soil. Contractor shall have a Standard Test performed of the soil. This test measures soil acidity or alkalinity and will indicate if additional lime is required above the standard. The tests should be taken near final grade but prior to seeding. There shall be at least one test per 20 acres (8.1 hectares).

How to Take a Soil Sample: In a random pattern, 15-20 cores should be taken at a depth of 6 to 7 inches (150 to 180 mm). Cores should be mixed together with one pint retained for testing. Large sites having different soil conditions may require more than one test. Test results shall be made available to the Engineer. Corrections to any deficiencies in nutrients or pH shall be made by following the test report recommendations.

Ohio County Extension offices can provide the Contractor with a soil sample kit and testing locations.

870.03 Agricultural Lime. Agricultural lime shall be obtained by the Contractor from a dealer or manufacturer whose brands and grades are registered or licensed by the State of Ohio, Department of Agriculture.

870.04 Testing of Agricultural Liming Materials. Liming materials shall be tested in accordance with Supplement 1007.

870.05 Lime Application Rates. For the basis of quality control agricultural ground limestone, having a minimum total neutralizing power (TNP) of 90+ percent, at least 40 percent passing a No. 100 (150 μm)sieve and 95 percent passing a No. 8 (2.36 mm) sieve, 100 percent of Ag-ground shall be applied. Application shall be at 92 pounds per 1000 sq ft (2 ton/acre). This rate shall be standard grade.

Other available forms of liming materials may be applied depending on their potential to neutralize soil acidity. An increase or decrease in the application rates, depending on the form used, are determined from the Table 7-2 "Equivalent Amounts of Liming Materials" found in Bulletin 472, "Ohio Agronomy Guide", published by the Cooperative Extension Service, The Ohio State University.

Changes to the lime requirements will be determined by the pH test, as indicated on the soil analysis results. A slightly acid soil (pH 6.5) is recommended. Agricultural lime shall be applied to the surface.

870.06 Commercial Fertilizer. Commercial fertilizer shall be obtained by the Contractor from a dealer or manufacturer whose brands and grades are registered or licensed by the State of Ohio, Department of Agriculture.

Fertilizer may be dry or liquid in analysis specified or in the same ratio as specified. The standard application rate shall be 20 pounds per 1000 sq ft (0.1 kg/m^2) of 10-20-10. Another analysis in the same ratio (1:2:1) may be used by varying the application rate. The soil test results will recommend corrective fertilizer application rates if needed above and beyond the standard. Fertilizer shall be

applied in an even pattern over all areas.

870.07 Topsoil. Topsoil shall consist of loose, friable, loamy topsoil without admixture of subsoil or refuse. For topsoil to be considered loamy, Topsoil should be screened through a 3/4 inch to 1½ inch (19.0 to 37.5 mm) harp screen and shall contain no more than 40 percent clay.

Acceptable topsoil shall contain not less than 3 percent or more than 20 percent organic matter as determined by loss on ignition of samples oven dried to constant weight at 212^0 F (100^0 C).

870.08 Compost. Acceptable compost shall include Ohio EPA rated Class IV compost, EQS biosolids compost or approved equal. Compost shall have a Nitrogen content of 1.4 percent or above. Compost shall be obtained from an Ohio EPA approved facility. Contractor shall provide the Engineer with the facility name and location prior to delivery.

870.09 Seeds. All grass seed shall be obtained by the Contractor from a dealer or grower who is registered or licensed by the State of Ohio, Department of Agriculture.

All grass seed specified shall meet the current specifications on file with the Department as to percentage purity, weed seed and germination. All grass seed to be used under this item shall be on an approved list kept on file at the Laboratory, and shall meet the requirements of these specifications. Minimum germination rates for cool season turfgrass species are listed in Table 1.

GERMINATION RATES: TABLE 1

Species	Minimum Percent	High Quality Percent
Kentucky Bluegrass	80	85
Fine Fescue	85	90
Perennial Ryegrass	85	90
Annual Ryegrass	85	90
Tall Fescue	85	90
Creeping Red Fescue	85	90

Seed shall be dated within the last 9 months of testing. No seed will be accepted with a date of test exceeding 9 months prior to the date of sowing. The Department reserves the right to test, reject or approve all seed after delivery. All seeds are to be furnished as separate species and cultivars, packaged or bagged separately, and labeled, tagged or marked in accordance with ORC 907.03.

Cool season turf Classes 1, 2, and 3 as listed in Table 2 shall be composed of no less than two and no more than four cultivars of the same species. Newer improved cultivars should be used when possible.

870.10 Legumes. All leguminous seeds shall be inoculated or treated with the proper amount of pure nitrogen-fixing bacteria selected for maximum vitality, not more than one year old, and mixed with sufficient water to thoroughly wet the seed. All culture shall be subject to approval.

If sown hydraulically, the inoculant shall be 4 times the rate specified by the inoculant manufacturer. Inoculant and sticking agent shall be placed directly into the slurry and thoroughly mixed immediately before seeding. Seed shall be sown as soon as possible after inoculation. Seed left standing more than 24 hours shall be re-inoculated before sowing. All seed shall be mixed on the project.

Preinoculated seed will be considered as inoculated at not more than one time the rate specified by the inoculant manufacturer. Additional inoculation will be required on preinoculated seed to comply with the above specifications.

870.11 Native Grasses and Wildflowers. The seed quantities indicated per 1000 square feet (m^2) as listed in Table 2, Classes 4, 5 and 6 shall be the amounts of pure live seed (PLS) for each species listed. Seed which has actual pure live seed (PLS) yield according to tests less than the intended yield, will have the specified quantity adjusted to meet the intended PLS yields.

All seed supplied under Classes 4, 5 and 6 shall only be that which is grown from an approved midwest or northern grower. The states where seed may be obtained from are Ohio, Michigan, Illinois, Wisconsin, Indiana, Minnesota, Iowa, North Dakota or South Dakota. Native seed may be obtained outside this area with the Engineer's approval. Annual seed listed in Class 5A may be obtained from any commercial grower or dealer and shall have been produced within the continental US. If the listed varieties are not available, other varieties may be substituted only with prior approval from the Engineer.

Sixty days prior to seeding, the Contractor shall provide for approval, a written description for the Class 4, 5 and 6 mixtures showing the percentage by weight (mass) of each kind of seed. This description shall also include the following:

a. Name and location of the seed supplier.
b. Origin and date of harvest of each kind of seed.
c. A statement of the purity and germination of the seed.

SEED MIXTURES: TABLE 2

CLASS - TYPE	SEEDS	Lbs/1000 Sq Ft	Kg/1000 m²
1 Lawn Mixture	Kentucky Bluegrass (Poa pratensis) Creeping Red Fescue (Festuca rubra) Annual Ryegrass (Lolium multiflorum) Perennial Ryegrass, turf type (Lolium perenne)	1.5 1.5 1.0 1.0	7.32 7.32 4.88 4.88
2 Roadside Mixture	Kentucky Bluegrass (Poa pratensis) Kentucky 31 Fescue (Festuca arundinacea var. KY 31) Perennial Ryegrass (Lolium perenne)	1.5 2.0 1.5	7.32 9.76 7.32
3A Slope Mixture (flatter than or equal to 3:1)	Use Mixtures 2, 3B, 3C or 4B.		
3B Low Growing Slope Mixture (steeper than 3:1)	Hard Fescue (Festuca longifolia) Creeping Red Fescue (Festuca rubra) Annual Ryegrass (Lolium multiflorum)	1.3 0.8 0.23	6.35 3.90 1.12
3C Crown Vetch Mixture (steeper than 3:1)	Crown Vetch (Coronilla varia) Perennial Ryegrass (Lolium perenne) Annual Ryegrass (Lolium multiflorum)	0.9 1.8 0.3	4.39 8.79 1.46
4A Native Grass Mixture	Big Blue Stem (Andropogon gernadi) Indian Grass (Sorghastrum nutans) Switch Grass (Panicum virgatum) Annual Ryegrass (Lolium multiflorum)	0.07 0.09 0.02 0.11 (spring) 0.34 (fall)	0.34 0.44 0.097 0.54 (spring) 1.66 (fall)
4B Low Growing Native Grass	Little Blue Stem (Andropogon scoparius) Side-Oats Gramma (Boutelova curtipendula) Prairie Dropseed (Sporobolus heterolepsis) Annual Ryegrass (Lolium multiflorum)	0.18 0.04 0.04 0.11 (spring) 0.34 (fall)	0.88 0.19 0.19 0.54 (spring) 1.66 (fall)
5A Annual and Perennial Wildflower Mixture	Annual Mixture (below) Perennial Wildflower Mixture (below) Annuals Mixture - not exceeding 25% by weight of any one species of the following: Corn Poppy (Papaver rhoeas) Cosmos (Cosmos bipinnatus) Yellow Cosmos (Cosmos sulphureus) Cornflower (Centaurea cyanus) Rocket Larkspur (Delphinium ajacis) Indian Blanket (Gaillardia pulchella) Perennial Wildflower Mixture - not exceeding 5% by weight PLS of any one species of the following: Black-eyed Susan (Rudbeckia hirta) Purple Coneflower (Echinacea purpurea) Lance-leaved Coreopsis (Coreopsis lanceolata)	0.07 0.28	0.34 1.37

CLASS - TYPE	SEEDS	Lbs/1000 Sq Ft	Kg/1000 m²
5B Native Wildflower and Grass Mixture	Native Wildflower Mixture - not exceeding 5% by weight PLS of any one species of the following: Butterflyweed (Asclepias tuberosa) New England Aster (Aster novae-angliae) Partridge Pea (Cassia fasciculata) Purple Coneflower (Echinacea purpurea) Rattlesnake Master (Eryngium yuccifolium) Ox-eye Sunflower (Heliopsis helianthoides) Bergamot (Monarda fistulosa) Grey-headed Coneflower (Ratibida pinnata) Orange Coneflower (Rudbeckia fulgida) Prairie Dock (Silphium terebinthin) Whorled Rosinweed (Silphium trifolium) Stiff Goldenrod (Solidago rigida) Grass Mixture Big Blue Stem (Andropogan gerardii) Little Blue Stem (Schizachyrium scoparium) Indian Grass (Sorghastrum nutans) Annual Ryegrass (Lolium multiflorum)	0.34 0.046 0.069 0.023 0.92	1.66 0.224 0.337 0.112 4.49
6 Wildlife Mixture	Big Blue Stem (Andropogon gernadi) Little Blue Stem (Andropogon scoparius) Indian Grass (Sorghastrum nutans) Ox-eye Sunflower (Heliopsis helianthoides) Prairie Dock (Silphium terebinthinaceum) Purple Coneflower (Echinacea purpurea) Whorled Rosinweed (Silphium trifolium) Downy Sunflower (Hellanthus mollis) New England Aster (Aster novae-angliae) Annual Ryegrass (Lolium multiflorum)	0.13 0.18 0.13 0.18 0.18 0.18 0.11 0.07 0.07 0.11 (spring) 0.34 (fall)	0.63 0.88 0.63 0.88 0.88 0.88 0.54 0.34 0.34 0.54 (spring) 1.66 (fall)
7 Temporary Erosion Control Mixture	Annual Ryegrass (Lolium multiflorum)	2.02	9.86

870.12 Site Preparation. The Contractor shall complete all grading within the areas to be covered with the topsoil under this item necessary to bring the surface of the proposed grade to the lines indicated on the plans, and parallel to the proposed finished grade. These areas are to be free from rock or other foreign material of 3 inches (75 mm) or greater in any dimension, except for shale cuts.

870.13 Placing Topsoil. Topsoil shall be placed and spread over all the areas to a minimum depth of 2 inches. It should be incorporated into the existing soil at a depth of 2 to 4 inches (50 to 100 mm). Staging areas, temporary roads or heavily compacted areas are be disked to a depth of 4 to 6 inches (100 to 150 mm). The area shall be made smooth and uniform and shall be in accordance with the finished grade and cross section shown in the plans or otherwise designated. Such loosening will be required to ensure a bond of the topsoil with the surface on which it is put and to form a uniform blend. Soil shall not be tilled if wet or overtilled to achieve desired seed bed.

Fertilizer, lime or other soil amendments shall be applied separately to the site after the soil test results have been forwarded to the Engineer. Amendments may be incorporated by disk, harrow or rake, at a depth of 2 to 4 inches, in the same operation.

The prepared surface of topsoil and soil shall be free of gullies, rivulets, crusting, caking and satisfactorily shaped and finished as provided in 203. This work shall be performed prior to seeding.

All seed bed areas, including slopes flatter than 2 to 1 shall be free of rock and other foreign material 2 inches (50 mm) or greater in any dimension. All seed bed areas with 2 to 1 slopes or steeper shall be free of rock and other foreign material 3 inches (75 mm) or greater in any dimension but shall not be fine graded. After topsoil is placed, the area shall be tracked back and forth to achieve good contact between soil and slope surface. Surface shall be raked smooth prior to seeding.

All seed bed areas in front of residences, commercial properties, etc. between curb and sidewalks or as indicated on the plans, shall be free of all stones 1 inch (25 mm) or greater in any dimension. Seed bed shall have a smooth surface. Hand raking will be required if site is inaccessible to machines or if machines do not provide results equivalent to hand raking.

Topsoil is not required for shale cuts steeper than 2:1. Shale cuts steeper than 2:1 shall be allowed to deteriorate to a soil type surface texture prior to seeding.

870.14 Seeding Methods. Seeding operation shall not be performed unless the area is properly prepared. Except with permission of the Engineer, the Contractor shall seed cool season grasses between August 15 to October 30. If permanent seeding is necessary prior to these months, seeding rates shall be increased by 10 percent. All seeding performed between October 15 and March 15 shall be temporary seeding in accordance with Supplemental Specification 877. Permanent seeding may be performed with permission for projects completed within the same calendar year.

Seeding shall be done prior to or concurrently with 660, 667, 668 or 670.

Crown vetch seeding shall not be permitted during September or October.

Wildflower classes 5 and 6 shall be seeded in the fall (September - October). Spring seeding may be allowed with approval. Class 4 shall be seeded during the spring (March - May) when possible.

Seeding native grasses and wildflowers in Classes 4, 5 and 6 shall be done with a rangeland type or native seed grass drill. Seeding natives shall be performed as a split rate application with no less than two passes in different directions. Broadcast seeding shall only be allowed with approval of the Engineer. Cultipacking or rolling will be required when broadcast seeding.

All seed shall be thoroughly mixed and then evenly sown over the prepared areas at the rates listed in Table 2. No seed shall be sown during high winds. Equipment shall be operated in a manner to ensure complete coverage of the entire area to be seeded. Immediately after sowing, the area shall receive a light raking followed by rolling on flat surfaces or tracking by dozer on slopes to

insure good seed soil-contact.

Seed and fertilizer mixtures in Classes 1, 2, 3 and 7 shall be applied with a hydraulic seeder between March 1 and October 15.

870.15 Mulching Operation. Materials used for mulching shall be straw, wood fiber, organic compost, or biosolids compost. Materials shall be reasonably free of weed seed, foreign materials, or other injurious materials that would prohibit seed germination.

Within 24 hours after any given area is seeded, straw mulch shall be evenly placed over all seeded areas at the following rates:

Seeding from March 15 to October 15:	2 tons per acre (0.5 t/1000 m^2)
Seeding from October 15 to March 15:	3 tons per acre (0.7 t/1000 m^2)

Mulching materials shall be kept in place with asphalt emulsion applied at a minimum rate of 60 gallons per ton (250 L/t) of mulch or with tackifiers per the manufacturer's recommendations. An additional application at a rate of 30 gallons per ton (125 L/t) of mulch shall be applied to the shoulder area, starting at the berm edge and extending out for a distance of 10 feet (3m). Asphalt emulsion for vegetative mulch shall conform to 702.04. Emulsion shall be nontoxic to plants and shall be so prepared that will not change in transportation or storage.

Displaced mulch shall be replaced at once but only after all work proceeding the seeding operation or that which was damaged during the mulching operation has been acceptably repaired.

870.16 Wood Fiber Mulch. Fiber mulch shall consist of pure wood fibers manufactured expressly from clean wood chips. The chips shall be processed in such a manner as to contain no lead paint, varnish, printing ink, petroleum based compounds or seed germination inhibitors. Fiber shall not be produced from unknown origin recycled material such as sawdust, paper, cardboard or residue from chlorine bleached pulp and paper mills.

The cellulose wood fiber mulch must maintain uniform suspension in water under agitation and shall blend with grass seed, fertilizer and other additives to form a homogeneous slurry. Tackifiers shall be manufacturer approved.

Using standard hydraulic mulching equipment, pure wood fiber mulch, tackifier, seed and fertilizer slurry shall be applied evenly over the soil surface in a one-step operation. Hydraulic application shall occur from March 1 to October 15 only. Applications rates are as follows:

Flat surfaces:	35 pounds per 1000 sq ft (170 kg/1000 m^2)
Slopes 3:1 or less:	46 pounds per 1000 sq ft (225 kg/1000 m^2)

All slopes subject to windy conditions shall be seeded and mulched by hydraulic methods only.

870.17 Compost. Compost may be applied as a mulch instead of straw or wood fiber. Grass seed shall be thoroughly mixed with the compost and distributed over the prepared seed bed area using pneumatic equipment. Compost/seed mixture shall be applied to a minimum 1/4 inch (6 mm)

depth. Mulch covering with tackifier is not needed when using compost in this method. No additional compensation will be made for this substitutuion.

870.18 Watering. For permanent seeded areas (Classes 1 to 6) and all sodded areas, they shall be throughly watered, after seed has germinated, at the rate of 300 gallons per 1000 square feet (12.2 m^3/1000 m^2). The water shall be applied by means of a hydro-seeder or a water tank under pressure with a nozzle that will produce a spray that will not dislodge the mulch material. A second water application shall be made between 7 and 10 days after the first application, providing ½ inch (13 mm) or greater rainfall has not occurred within 7 days after the first application. When ½ inch (13 mm) or greater of rainfall has occurred within the first 7 day period, the second application may be delayed or omitted entirely, depending on weather conditions. Water shall be paid for and measured separately.

870.19 Maintenance. The Contractor shall maintain all seeded and mulched areas until final inspection. Damaged areas shall be repaired to the original condition and grade.

870.20 Mowing. Mowing may be required prior to permanent seeding and any time during the growing season following permanent seeding. The Contractor will be notified by the Engineer to begin mowing.

The Contractor shall use suitable equipment for mowing. Mowers shall be of the rotary, flail, disk or sickle type. Bunching or wind-rowing of mowed vegetation will not be permitted. The final cutting height shall be no less than 6 inches (150 mm). More than one pass may be required for each mowing.

870.21 Fertilization: 2nd Application. Permanently seeded areas shall be fertilized with an application of 12-12-12 no less than 3 months after installation. Fertilizer shall be broadcast evenly over the surface without incorporation at a rate of 10 pounds per 1000 sq ft (0.05 kg/m^2). This shall be performed after all repair seeding and mulching or inter-seeding has been completed.

870.22 Repair Seeding and Mulching. The Contractor shall repair all damage or erosion of the seeded and mulched areas. The Department will pay for these repairs.

The repairs shall be made prior to completion of the project by reworking or reshaping to grade. Reworking or reshaping of the slopes shall include bringing in additional material, if necessary and using whatever equipment that is necessary to restore slopes to grade. Area shall then be fertilized, seeded, and mulched as per the specifications. Such work will be measured and paid for as "Repair Seeding and Mulching."

When damage or erosion of these areas occurs as a result of fault or negligence of the Contractor, the areas shall be satisfactorily repaired, fertilized, seeded and mulched at no additional cost to the Department.

870.23 Inter-seeding. Inter-seeding is the practice of seeding existing thin and spotty growing turf with a slit or drill type seeder. This work shall only be performed from March 15 to May 15 and

September 1 to October 15. Mowing may be required prior to seeding to achieve good seed soil contact. Cut material shall not be wind-rowed or left in a bunched condition.

A slit or drill type seeder shall be used. Exceptions may be when seeding steep slopes or inaccessible areas. Broadcast or hydraulic seeding methods may be used in these instances. Commercial fertilizer of 12-12-12 shall be broadcast over affected areas as specified. Water shall be applied at the rate specified in these areas to aid in seed/soil contact.

870.24 Method of Measurement. Topsoil, organic compost or other approved equal required to meet the specification shall be paid for by the number of cubic yards (cubic meters) furnished and placed. The quantity will be paid based on the amount shown in the plans. In the measurement of topsoil, organic compost, etc., no adjustment of the plan quantities or recalculation of the volumes shall be made for any volumes found different by less than five percent from the plan quantity. The Contractor shall accept the plan quantity with authorized changes as payment in full unless revised by the Engineer. The burden of proof of a plan discrepancy greater than five percent is on the Contractor. The Contractor shall submit supporting documentation concerning the possible changes.

The quantity of commercial fertilizer and agricultural lime will be the number of tons (kilograms) of each quantity of furnished, spread and incorporated.

Seeding and mulching will be the number of square yards (square meters) of the area seeded and mulched in accordance with these specifications. In the measurement of seeding and mulching, no adjustment of the plan quantities or recalculation of the areas shall be made for any areas found different by less than five percent from the plan quantity. The Contractor shall accept the plan quantity with authorized changes as payment in full unless revised by the Engineer. The burden of proof of a plan discrepancy greater than five percent is on the Contractor. The Contractor shall submit supporting documentation concerning the possible changes.

The quantity of repair seeding and mulching will be the number of square yards (square meters) of damaged or eroded areas reshaped, seeded and mulched.

The quantity of water shall be the amount in thousands of gallons (cubic meters) applied in accordance with the requirements of this item and measured in tanks, tank wagons or trucks of predetermined capacity, or by means of meters of a type satisfactory to the Engineer and furnished and installed by the contractor at his own expense, or determined by weight conversion.

The quantity of inter-seeding will be the number of square yards (square meters) of the seeded area.

Mowing satisfactorily performed will be measured in 1000 square foot units (square meters).

The quantity of soil analysis tests will be the number of tests submitted to the Engineer.

870.25 Performance. The Department will inspect all seeded areas no earlier than six months and no later than 12 months after final seeding. The Contractor shall repair, regrade, overseed, and

fertilize any area this inspection identifies without a uniform density of at least 70 percent grass cover.

Seeded areas damaged by traffic or erosion, due to no fault or negligence of the Contractor, shall also be regraded, refertilized, reseeded and remulched.

The Contractor shall be compensated for the above work and mobilization and demobilization by supplemental agreement.

870.26 Basis of Payment. Payment for accepted quantities will be made at contract prices for:

Item	Unit	Description
870	Each	Soil analysis test
870	Cubic yard (cubic meter)	Placing topsoil
870	Ton (kilogram)	Commercial fertilizer
870	Ton (kilogram)	Agricultural lime
870	Square yard (square meter)	Seeding and mulching
870	Square yard (square meter)	Repair seeding and mulching
870	M Gallons (cubic meters)	Water
870	Square yard (square meter)	Inter-seeding
870	M Square feet (square meter)	Mowing

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 885

FIELD PAINTING OF EXISTING STEEL WITH WARRANTY

August 10, 1999

885.01 Description. This item shall consist of furnishing all necessary labor, materials, and equipment to clean and paint all existing steel surfaces, as specified herein, and also unconditionally warrant the paint system applied to the bridge to be free of defects as defined in section 885.03. Acceptance by the Engineer of any portion of the work during the original cleaning and painting will not relieve the Contractor of the requirements of the warranty.

885.02 Warranty Maintenance Bond. When the Contractor provides the Department with the performance and payment bonds specified in 103.05, the Contractor shall also furnish a 5-year warranty maintenance bond equal to 100 percent of the total price for each item "885 Surface Preparation of Existing Steel, 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.

The effective date of the maintenance bond is the date the Department's Form C-85 is issued for all paint items on the project. After the C-85 is issued, the Department will notify the Surety of the official start date for the warranty bond and the project will be finalized using standard procedures. The maintenance bond expires after 5 years from the issuance of the C-85 if no corrective work is required or after completion of the Contractor's corrective work and approval by the Department.

The Contractor shall maintain the liability insurance specified in 107.14, covering any Contractor or Contractor authorized operations, persons, and equipment while any corrective work, or warranty evaluation review is being performed.

885.03 Warranty Item and Remedial Actions. The paint warranty items the Contractor is responsible for are listed below and will be determined by visual inspection, destructive inspection and paint thickness measurements of the applied paint system for the period of years as specified in 885.02 of this specification.

The paint system will be considered defective if any of the following conditions are discovered within the specified warranty period.

1. The occurrence of visible rust or rust breakthrough, paint blistering, peeling, scaling or un-removed slivers.

2. Paint applied over dirt, debris, blasting debris, or rust products not removed during blast cleaning.

3. Incomplete coating or coating thicknesses less than the minimums specified in the paint system specifications

4. Damage to the coating system caused by the Contractor while removing scaffolding, forms, or performing other work.

Exclusion to the warranty will be damage to the coating resulting from vehicle damage, fire, or other damage not caused by the Contractor or subcontractor.

885.04 Materials. A three coat paint system consisting of: Organic Zinc or Inorganic Zinc Prime Coat, Epoxy Intermediate Coat and a Urethane Finish Coat.

The Contractor shall select a coating system meeting the requirements of Supplemental Specification 910 entitled OZEU Structural Steel Paint. If the contractor elects to use an inorganic zinc primer, the inorganic zinc shall meet the requirements of 708.17. The intermediate and finish coats shall meet the requirements of Supplemental Specification 910 and all coats shall be from the same manufacturer. The approved list of coatings meeting this specification is on file at the Office of Materials Management. District Offices and on the internet at: http://www.dot.state.oh.us/testlab/applist/chem/chemindx.htm.

885.05 Quality Control Quality control will consist of the following items:

A. Contractor Quality Control Specialist. Before any work begins, the Contractor shall designate one individual on each project as a Quality Control Specialist (only one person per project will be necessary unless the Contractor is working at more than 3 sites simultaneously). In which case, it will be necessary to provide an additional Quality Control Specialist for each additional three (or portion of three) sites being painted simultaneously. This person will not be a Foreman or member of the Contractor's production staff (ie. he will not abrasive blast, paint, recover spent abrasives, etc.). He will not be involved in any other miscellaneous tasks (ie. mixing paint, running errands, running or working on equipment, etc.) while any production work is taking place. Documentation that personnel performing quality control related functions are qualified shall be submitted to the Engineer prior to allowing the Quality Control Specialist (QCS) to begin work. Documentation/verification shall be provided to the Engineer that the QCS has received formal training from one of the following: KTA Tator, S. G. Pinney, or Corrosion Control Consultants. He shall be equipped with material safety data sheets, product data sheets, tools and equipment to provide quality control on all facets of the work and shall have a thorough understanding of the plans and specifications pertaining to this project. He shall be responsible for inspecting the equipment at the specified intervals, the abrasives, and the work, at all quality control points. He shall also be responsible for verifying that all work is done within the specified work limitations. He shall cooperate with the Inspector and compare and document quality control readings. He shall have the authority to stop work and the responsibility to inform the Contractor's Foreman of nonconforming work.

B. Quality Control Points. Quality control points (QCP) are points in time when one phase of the work is complete and ready for inspection by both the Contractor and the Engineer prior to continuing with the next operational step. At these points: The Contractor shall afford access to inspect all affected surfaces. If inspection indicates a deficiency, that phase of the work shall be corrected in accordance with these specifications prior to beginning the next phase of work. Discovery of defective work or material after a Quality Control Point is past or failure of the final product before final acceptance, shall not in any way prevent rejection or obligate the State of Ohio to final acceptance.

Quality Control Points (QCP)	PURPOSE
1. Solvent Cleaning	Remove asphaltic cement, oil, grease, salt, dirt, etc. followed by washdown
2. Grinding Flange Edges	Remove sharp corners,
3. Containment/Waste Disposal	Contain, collect & dispose of abrasive blasting debris
4. Abrasive Blasting	Blasted surface to receive paint
5. Prime Coat Application	Check surface cleanliness; apply prime coat; check coating thickness
6. Removing Fins, Tears, slivers	Remove surface defects and slivers
7. Caulking	Caulk areas
8. Intermediate Coat Application	Check surface cleanliness; apply intermediate coat, check coating thickness
9. Finish Coat Application	Check surface cleanliness, apply finish coat, check coating thickness
10. Final Review	Visual inspection of system for Acceptance and check total system thickness.

885.06 Surface Preparation. This item shall also consist of solvent cleaning, grinding flange edges, abrasive blasting, and providing a wash facility for the Engineer and Inspectors.

A. Solvent Cleaning (QCP #1). All traces of asphaltic cement, oil, grease, diesel fuel deposits, and other soluble contaminants, shall be removed by solvent cleaning (QCP #1) (see SSPC-SP 1 Solvent Cleaning for recommended practices). Under no circumstances shall any abrasive blasting be done to areas with asphaltic cement, oil, grease, or diesel fuel deposits. All solvent cleaned areas shall be subsequently washed before abrasive blasting as detailed below.

Washing shall be accomplished with potable water having a nozzle pressure of at least 1,000 PSI (7 Mpa) and a delivery rate of not less than 4 gallon (15 L) per minute. The Contractor, shall provide equipment specifications to verify the above. The equipment shall also be equipped with gauges to verify the pressure. The nozzle shall be held at a maximum of 12 inches (300 mm) from the surface being washed.

B. Grinding Flange Edges (QCP #2). All exposed bottom flange edges of longitudinal rolled and welded beams shall be rounded to a radius of 1/8 inch plus or minus 1/16 inch (3 mm plus or minus 1.5 mm) before abrasive blasting. This work may be done without weather and temperature restrictions. This work is included with surface preparation for payment.

C. Containment/Waste Disposal (QCP #3). Waste material generated by abrasive blasting operations is a solid waste and shall be handled as follows:
(1) Contained, (2) Collected, (3) Stored, (4) Evaluated, (5) Properly disposed.

All equipment shall be parked on ground covers free of cuts, tears or holes to prevent contamination of pavement or soil and to protect area under and around equipment.

The Contractor shall erect an enclosure to completely surround (around and under) the blasting operations to prevent the escape of dust and abrasive blasting debris. The ground cannot be used as the bottom of the enclosure unless completely covered with plastic or tarps.

The enclosure shall be constructed of flexible materials such as tarpaulins or containment screens (specifically designed for this purpose), or of rigid materials such as plywood. All materials shall be maintained free of tears, cuts or holes. All seams shall be overlapped a minimum of 6 inches (150 mm) and fastened together at 12 inch (300 mm) centers, or fastened and overlapped in a manner that insures a seal which does not allow openings between the screens in the containment. The vertical sides of the enclosure shall extend completely up to the bottom of the deck on a steel beam bridge. All blasting operations on a truss type bridge shall be completely enclosed, including top side. Bulkheads shall be used between beams to enclose the blasting area.

Vacuum blasting may be used in lieu of containment, providing that the vacuum blasting equipment is manufactured and marketed for this purpose and is equipped with controls which automatically shut down the blasting operation if the blast head brushes are not held in contact with the surface being cleaned.

All debris collected by these operations, removed from equipment or filters, or that has fallen to the ground, shall be collected and stored at the bridge site, if practical, for testing, evaluation and disposal. If not practical, an alternate location shall be mutually agreed upon by the Engineer and Contractor. Additionally, centralized cleaning stations for recyclable steel, ferric oxide, or aluminum oxide grit (if used) shall be set up at a location mutually agreed upon by the Contractor and Engineer. Storage shall be in steel containers and shall have lids which shall be locked at the end of each workday.

The Contractor shall obtain the services of a testing laboratory to obtain directly from the project site and evaluate a composite representative sample of the abrasive blasting debris for each bridge site. The person taking the sample will be an employee of the testing laboratory.

The composite sample shall consist of individual samples taken from all containers which are on the site at the time of the sampling. These individual samples shall be blended together to comprise one composite sample. The individual samples shall be of equal size. There shall be one individual sample taken from each drum and four randomly spaced individual samples taken from each container other than drums.

The individual samples shall be taken with stainless steel tools and placed into either clean glass or plastic containers.

All sampling shall be done in the presence of the Engineer. In addition to the above mentioned requirements, the sampling shall also comply with the requirements of U.S. EPA Publication SW 846.

A Chain of Custody must also accompany all composite samples. Included in this document shall be in the name of the person taking the sample, the Company for which he works, the date and time which the sample was taken, the bridge from which it was taken, the Township and Municipality where the bridge is located and signatures of all persons involved in the Chain of Custody, including dates of possession.

The sampling shall be done within the first week of production blasting at each bridge. If the sampling is not done within the time allotted above, all blasting and painting operations on the bridge from which waste was generated, shall promptly cease.

The composite sample shall be tested for lead and chromium in accordance with U.S. EPA Publication SW 846. The test results and Chain of Custody records shall immediately be forwarded to the Director. If the material is hazardous, the Contractor shall also forward the names of the hauler and treatment facility to the Director. Any additional testing required by the hauler, treatment facility, or landfill will be paid for by Contractor.

All federal, state and local environmental protection laws, regulations and ordinances including, but not limited to, air quality, waste containment and waste removal must be observed during the performance of this contract.

In respect to enforcement of the above mentioned laws, bidders are advised that various governmental bodies have this responsibility. It is the responsibility of the bidders to comply with those laws as enforced by those various governmental bodies.

The existing paint being removed from these bridges may contain lead or chromium. The Contractor is responsible to assure that workers take proper safety precautions when working in this environment (see bid proposal note entitled "Safety").

Hazardous Waste: If the tests reveal that the maximum concentration of either lead or chromium exceeds 5.0 milligrams per liter, the waste shall be treated as a hazardous waste and the steel containers shall be labeled as a hazardous waste. The Director will then obtain a generator number assigned to the State.

All containers of waste material which have been classified as hazardous shall be

stored in a secured location until proper disposal. The storage site shall be surrounded with 5 foot (1.5 m) high chain link fence fabric supported by traffic sign drive posts at 10 foot (3 m) center to center. Drive posts shall be embedded into the ground at least 2 feet (0.6 m) deep. The fencing shall be secured with padlocks at the end of each day. Signs shall be posted in obvious locations on the enclosure warning of the hazardous material.

The Contractor shall then arrange for hauling, treating and disposal of all hazardous waste. All hazardous waste shall be disposed of after the Director has obtained a generator number. In every case, any and all hazardous waste shall be disposed of within 60 days after it is generated. Failure to comply with the 60 day disposal requirement shall be considered by the Department as a breach of contract by the Contractor and all abrasive blasting and painting of structural steel on the project shall immediately cease until the hazardous waste is properly disposed. Upon such breach, the Department shall cease processing all pay estimates and notification of the breach shall be sent to the Contractor's surety. Further, any fines or liens assessed by any governmental agency which has jurisdiction over the disposal of this material shall be the responsibility of the Contractor. The hauling and disposal shall be by a firm licensed by U.S. EPA and who shall also be responsible for providing the Uniform Hazardous Waste Manifest (EPA Form 8700-22A).

The Contractor shall decontaminate or dispose of all collection/ containment equipment in accordance with EPA guidelines.

Non-Hazardous Solid Waste: If the waste is determined to be non- hazardous as verified by test results which have been reviewed by the Director, it shall be hauled and disposed of at a facility which is licensed to accept non-hazardous solid waste. Prior to disposal of any material, the Contractor shall submit the test results and documentation that the disposal facility is licensed by the EPA to accept non-hazardous solid waste, to the Engineer. The Contractor shall obtain and provide the Engineer with a receipt documenting disposal of waste material at the approved landfill.

D. Abrasive Blasting (QCP #4). Prior to any abrasive blasting, all dirt, sand, bird nestings, bird droppings and other debris shall be completely removed from the scuppers, bulb angles, pier and abutment seats.

All steel to be painted shall be blast cleaned according to SSPC-SP10 and as shown SSPC-Vis 1-89 (pictorial surface preparation standards for painting steel surfaces). Steel shall be maintained in a blast cleaned condition until it has received a prime coat of paint.

The back side of end cross frame assemblies which are 3 inches (75 mm) or closer to backwalls may be commercial blast cleaned according to SSPC-SP6.

Galvanized steel (including corrugated steel bridge flooring), adjacent concrete which has been coated or sealed, and other surfaces not intended to be painted, shall be covered and protected to prevent damage from blasting and painting operations. Any adjacent coatings damaged during the blasting operation shall be repaired at the Contractor's expense.

The abrasive shall be a recyclable steel, ferric oxide, or aluminum oxide grit. After each use and prior to reuse, the grit shall be cleaned of paint chips, rust, mill scale and other foreign material by equipment specifically designed for such cleaning. The Contractor is responsible for assuring recycling and cleaning equipment is capable of operating with the chosen blasting media.

Abrasives shall also be checked for oil contamination before use. A small sample of abrasives shall be added to ordinary tap water. Any detection of a oil film on the surface of the water shall be cause for rejection. This test shall be conducted on each load of abrasives delivered to the job site.

The resultant surface profile shall be a minimum of 1.5 mils (40 μm) and a maximum of 3.5 mils (90 μm). Abrasives of a size suitable to develop the required surface profile shall be used. Any abrasive blasting which is done when the steel temperature is less than 5° F (3° C) above the dew point shall be reblasted when the steel temperature is at least 5° F (3° C) above the dew point. Dew point shall be defined as the temperature at which moisture condenses on the steel surfaces.

All abrasives and residue shall be removed from all surfaces to be painted. All steel blast cleaned in any one day shall be kept dust free and prime coated the same day. Failure to prime coat the same day will require reblasting before prime coating. No dust or abrasives from adjacent work shall be left on the finish coat. The Quality Control Specialist shall perform the following test (and the Inspector will verify) to insure that the air is not contaminated: blow air from the nozzle for 30 seconds onto a white cloth or blotter held in a rigid frame. If any oil or other contaminants are present on the cloth or blotter, abrasive blasting shall be suspended until the problem is corrected and the operation is verified by another test. This test shall be done at the start of each shift and at 4 hour intervals. The abrasive shall be tested for oil contamination at the same time.

Abrasive blasting and painting may take place simultaneously on any one bridge as long as abrasive blasting debris and/or dust by the blowing operation does not come in contact with freshly painted surfaces.

The Material Safety Data Sheet (MSDS) shall be provided at the preconstruction meeting for all abrasives to be used on this project. No work shall start until the MSDS has been submitted.

The Contractor shall provide the Engineer and Inspectors a wash facility with running water to permit washing of face and hands during the surface preparation operation. It shall at all times contain an adequate supply of potable water, soap and towels. The Contractor shall be responsible to properly contain, test and dispose of the waste water. The wash facility shall be located at each bridge site in an area that will not be contaminated by the blasting debris.

E. Prime, Intermediate and Finish Coat Application (QCP #5, #8, & #9). Each coat of paint shall be in a proper state of cure or dryness before the application of succeeding coats. Paint shall be considered ready for overcoating when an additional coat can be applied without the development of any detrimental film irregularities, such as lifting, wrinkling or loss of adhesion of the undercoat. The time interval between coating applications shall be in compliance with manufacturer's written instructions and no more than 30 days between the prime and intermediate coats and 13 days between the intermediate and finish coats. These maximum recoat times include weather related days. No additional time for weather delays will be allowed. Any coat which has cured more than the above allotted time without overcoating shall be removed and the steel reblasted to SP 10.

The completion date (month and year) of the finish coat and the letters OZEU shall be stenciled on the steel in 4 inch (100 mm) letters with a black urethane paint. This date shall be applied at four locations near the end of each outside beam on the outside web visible from the road or as directed by the Engineer.

F. Removing Fins, Tears, Slivers (QCP #6). All fins, tears, slivers or any other burred or sharp edges that become evident after priming, shall be removed by grinding. All ground surfaces shall be retextured to produce a profile of 1.5 to 3.5 mils (40 to 90 μm) and re-primed prior to application of the intermediate coat. The Contractor may also begin removing fins, tears and slivers after blasting and prior to priming.

Temperature and weather restrictions do not apply to this item. Reapplying primer shall comply with weather restrictions.

G. Caulking (QCP #7). Caulking will be performed in areas of the bridge where gaps and crevices are greater then 1/8 inch and also other areas as determined by the contractor where caulking is required to prevent bleed through.

885.07 Testing Equipment. The Contractor shall provide the Engineer the following testing equipment in good working order, for the duration of the project. When the Contractor's people are working at different locations simultaneously, additional test equipment shall be provided for each crew for the type of work being performed. When no test equipment is available, no work shall be performed.

1. A camera with the following features and 5 (unless otherwise specified on plans) rolls of color film: A) Uses self developing color print film, B) Lens with auto focus system, C) Focuses from 2 feet (0.6 m) to infinity, D) Built-in fill flash.

2. One Spring micrometer and 3 rolls of extra-coarse replica tape.

3. One Positector 2000 or 6000, Quanix 2200, or Elcometer A345FBI1; and the calibration plates, 1.5-8 mils and 10-25 mils (38-200 μm and 250-625 μm) as per the NBS calibration standards in accordance with ASTM D 1186.

4. One Sling Psychrometer including Psychometric tables - Used to relative humidity and dew point temperature.

5. Two steel surface thermometers accurate within 2° F (1° C) or One portable infrared thermometer available from:

Model:	Raynger ST Series (-18° C to 400° C)
Manufacturer:	Raytek Inc. Santa Cruz, Ca. (800)227-8074

or approved equal to the portable infrared thermometer

6. Flashlight 2-D cell

7. SSPC Visual Standard for Abrasive Blast Cleaned Steel SSPC-Vis 1-89

8. One Recorder Thermometer capable of recording the date, time, and temperature over a period of at least 12 hours.

885.08 Handling. All paint and thinner shall be delivered to the project site in original, unopened containers with labels intact. Minor damage to containers is acceptable provided the container has not been punctured. Thinner containers shall be a maximum of 5 gallons (19 L).

Paint shall be stored at the temperature recommended by the manufacturer to prevent paint deterioration.

Each container of paint and thinner shall be clearly marked or labeled to show paint identification, component, color, lot number, stock number, date of manufacture, and information and warnings as may be required by Federal and State laws.

All containers of paint and thinner shall remain unopened until required for use. The label information shall be legible and shall be checked at the time of use. Solvent used for cleaning equipment is exempt from the above requirements.

Paint which has livered, gelled or otherwise deteriorated during storage shall not be used:

However, thixotropic materials which can be stirred to attain normal consistency may be used. The oldest paint of each kind shall be used first. No paint shall be used which has surpassed its shelf life.

Paint may be considered as eligible for payment for material on hand as specified in 109.07. However, only paint which the Contractor can prove to the Engineer will be used during the construction season shall be eligible for payment. The Contractor shall provide the Engineer calculations indicating the total square feet (m^2) of steel to be painted during the construction season. He shall also provide calculations showing the total number of gallons (liters) required. The Contractor shall be responsible to store the paint on the project in such manner to prevent theft and adverse temperatures. He shall provide thermometers capable of monitoring the maximum high and low temperatures within the storage facility. The Contractor is responsible for properly disposing of all unused paint and paint containers.

The Contractor shall furnish shipping invoices for all materials used on the project to the Engineer, prior to use.

885.09 Mixing and thinning. All ingredients in any container of paint shall be thoroughly mixed immediately before use and shall be agitated often enough during application to maintain a uniform composition; however, the primer shall be continuously mixed by an automated agitation system (hand held mixers not allowed). Paint shall be carefully examined after mixing for uniformity and to verify that no unmixed pigment remains on the bottom of the container. The paint shall be mixed with a high shear mixer (such as a Jiffy Mixer). Paddle mixers or paint shakers are not allowed. Paint shall not be mixed or kept in suspension by means of an air stream bubbling under the paint surface. All paint shall be strained after mixing. Strainers shall be of a type to remove only skins and undesirable matter, but not pigment.

No thinner shall be added to the paint without the Engineer's approval, and only if necessary for proper application as recommended by the manufacturer. When the use of thinner is permissible, thinner shall be added slowly to the paint during the mixing process. All thinning shall be done under supervision of the Engineer. In no case shall more thinner be added than that recommended by the manufacturer's printed instructions. Only thinners recommended and supplied by the paint manufacturer may be added to the paint. No other additives shall be added to the paint.

Catalysts, curing agents, or hardeners which are in separate packages shall be added to the base paint only after the base paint has been thoroughly mixed. The proper volume of catalyst shall then be slowly poured into the required volume of base with constant agitation. Liquid which has separated from the pigment shall not be poured off prior to mixing. The mixture shall be used within the pot life specified by the manufacturer. Therefore only enough paint shall be catalyzed for prompt use. Most mixed, catalyzed paints cannot be stored, and unused portions of these shall be discarded at the end of each working day.

885.10 Coating Application. Coating application will be as follows:

A. General. All structural steel, scuppers, expansion joints (except top surface), steel railing, exposed steel piling, drain troughs and other areas as indicated in the plans shall be painted. Galvanized surfaces shall not be painted unless otherwise noted on plans.

The following methods of application are permitted for use by this specification, as long as they are compatible with the paint being used: brush, spray, or any combination of these methods unless specified differently in the plans. Daubers, small diameter rollers or sheepskins may be used for places of difficult access when no other method is practical and in all cases shall be used where cross-frame angles are located within 2 inches (50 mm) of the bottom flange and where end cross frames are within 6 inches (150 mm) of the backwall and bottom of bottom flanges around bearings less than 6 inches (150 mm) in height.

If the surface is degraded or contaminated after surface preparation and before painting, the surface shall be restored before painting application. In order to prevent degradation or contamination of cleaned surface, the prime coat of paint shall be applied the same day of blast cleaning as required in surface preparation above.

Cleaning and painting shall be so programmed that dust or other contaminants do not fall on wet, newly-painted surfaces. Surfaces not intended to be painted shall be suitably protected from the effects of cleaning and painting operations. Overspray and pigeon droppings shall be removed with a stiff bristle brush, wire screen, or a water wash with sufficient pressure to remove overspray without damaging the paint. The overspray must be removed before applying the next coat. All abrasives and residue shall be removed from painted surfaces, before recoating, with a vacuum system equipped with a brush type cleaning tool.

No visible abrasives from adjacent work shall be left on the finish coat. Abrasives on the finish coat shall be removed.

If brush application of the coating is used, it shall produce a smooth coat. Care shall be taken to work the paint into all crevices, corners, and around all bolt and rivet heads.

B. Spray Application (General). All spray application of paint shall be in accordance with the following:

Primer ingredients shall be kept uniformly mixed in the spray pot or container during application by continuous, automated mechanical agitation (hand held mixers not allowed).

Spray equipment shall be kept clean so that dirt, dried paint and other foreign materials are not deposited in the paint film. Any solvent left in the equipment shall be completely removed before using.

Paint shall be applied in a uniform layer with overlapping at the edges of the spray pattern. The border of the spray pattern shall be painted first; with the painting of the interior of the spray pattern to follow, before moving to the next spray pattern area. A spray pattern area is such that the gun shall be held perpendicular to the surface and at a distance which will ensure that a wet layer of paint is deposited on the surface. The trigger of the gun should be released at the end of each stroke. All bolts and rivet heads shall be sprayed from at least 2 directions or brushed to assure coverage. Flange edges should be striped

If mud cracking occurs, the affected area shall be cleaned to bare metal in accordance with surface preparation above and repainted.

All gaps and crevices 1/8 inch (3 mm) or less shall be filled with primer.

All spray equipment used shall be suitable for use with the specified paint. Paint manufacturer's equipment recommendations shall be followed to avoid paint application problems.

If air spray is used, traps or separators shall be provided to remove oil and condensed water from the air. The traps or separators must be of adequate size and must be drained periodically during operations. The following test shall be made by the Contractor and verified by the Engineer to insure that the traps or separators are working properly.

Air shall be blown from the spray gun for 30 seconds onto a white cloth or blotter held in a rigid frame. If any oil, water or other contaminants are present on the cloth or blotter, painting shall be suspended until the problem is corrected and the operation is verified by repeating this test.

This test shall be made at the start of each shift and at 4 hour intervals. This is not required for an airless sprayer.

Spray application of all coats shall not be used unless the operation is totally enclosed to prevent overspray damage to the ground, public and private property, any and all vegetation, streams, lakes, etc. This containment shall be accomplished with tarps, plywood or other shields. If brush is used, more than one coat may be necessary to produce the required thickness.

C. Application Approval. The beginning of the application of each of the three different coats shall be subject to inspection and approval to detect any defects which might result from the Contractor's methods. If defects are discovered, the

Contractor shall make all necessary adjustments to his method of application to eliminate them before proceeding with coat application.

D. Temperature. Paint shall not be applied when the temperature of the air, steel, or paint is below 50° F (10° C). Paint shall not be applied when the steel surface temperature is expected to drop below 50° F (10° C) before the paint has cured for the minimum times specified below:

	50° F (10° C)	60° F (16° C)	70° F (21° C)
Primer	4 hrs.	3 hrs.	2 hrs.
Intermediate	6 hrs.	5 hrs.	4 hrs.
Finish	8 hrs.	6 hrs.	4 hrs.

The above temperatures and times shall be monitored with the recording thermometer.

A heated enclosure may be used. The heat within the enclosure may be supplied by any means which will maintain the required temperature continuously and uniformly in all parts of the enclosure. The heat will be supplied as required to maintain the required minimum temperature until the coating has cured.

If combustion type heating units are used, they will be vented away from the enclosure, and exhaust fumes will not be permitted to enter the enclosure. No open combustion of any kind will be permitted in the enclosure.

E. Moisture. Paint shall not be applied when the steel surface temperature is less than 5° F (3° C) above the dew point. Paint shall not be applied to wet or damp surfaces or on frosted or ice-coated surfaces. Paint shall not be applied when the relative humidity is greater than 85%. Paint shall not be applied during rain, fog or mist unless the above moisture criteria is met.

F. Repair Procedures. Damaged areas, and areas which do not comply with the requirements of this specification, shall have the paint removed and all defects corrected. The steel should then be retextured to a near white condition to produce a profile of between 1.5 to 3.5 mils (40 to 90 μm). This profile should be measured immediately prior to the application of the prime coat to insure that the profile is not destroyed during the feathering procedure.

The existing paint should be feathered to expose a minimum of ½ inch (13 mm) of each coat.

During the re-application of the paint, care shall be used to insure that each paint coat is applied only within the following areas. The prime coat shall only be applied

to the surface of the bare steel and the existing prime coat which has been exposed by feathering. The prime coat shall not be applied to the adjacent intermediate coat. The intermediate coat shall only be applied to the new prime coat and the existing feathered intermediate coat. The intermediate coat shall not be applied to the adjacent finish coat. The finish coat shall only be applied to the new intermediate coat and the existing finish coat which has been feathered or lightly sanded. The finish coat shall not extend beyond the areas which have been feathered or lightly sanded.

At the perimeter of the repair area, the first two coats shall be applied by brush. The finish coat shall be applied by either brush or spray.

It may be necessary to make several applications in order to achieve the proper thickness for each coat.

During the application of the prime coat, the paint shall be continuously mixed.

All surface preparation and painting shall still be done in accordance with the specifications. In lieu of abrasive blasting, alternate methods of surface preparation may be allowed.

All repairs shall be made in a manner to blend the patched area with the adjacent coating. The finished surface of the patched area shall have a smooth, even profile with the adjacent surface.

The Contractor shall submit his method of correcting runs in writing to the Director for approval.

G. Continuity. Each coat of paint shall be applied as a continuous film of uniform thickness free of all defects such as holidays, runs, sags, etc. All thin spots or areas missed shall be repainted and permitted to dry before the next coat of paint is applied.

H. Dry Film Thickness. Prime thickness, cumulative prime and intermediate thickness, and cumulative prime, intermediate and finish thickness shall be determined by use of Type 2 magnetic gage in accordance with the following:

Five separate spot measurements shall be made, spaced evenly over each 100 square feet (9 m^2)of area to be measured. These measurements shall be taken on flanges, webs, cross bracing, stiffeners, etc. Three gage readings shall be made for each spot measurement of either the substrate or the paint. The probe shall be moved a distance of 1 to 3 inches (25 to 75 mm) for each new gage reading. Any unusually high or low gage reading that cannot be repeated consistently shall be discarded. The average (mean) of the 3 gage readings shall be used as the spot measurement. The average of five spot measurements for each such 100 square

foot (9 m^2) area shall not be less that the specified thickness. No single spot measurement in any 100 square foot (9 m^2) area shall be less than 80% of the specified minimum thickness nor greater than 150% of the maximum specified thickness. Any one of 3 readings which are averaged to produce each spot measurement, may under run or overrun by a greater amount. The 5 spot measurements shall be made for each 100 square feet (9 m^2) of area as follows:

1. For structures not exceeding 27 m^2 (300 square feet) in area, each 100 square foot (9 m^2) area shall be measured.

2. For structures not exceeding 1,000 square feet (90 m^2) in area, three 100 square foot (9 m^2) areas shall be randomly selected and measured.

3. For structures exceeding 1,000 square feet (90 m^2) in area, the first 1,000 square feet (90 m^2) shall be measured as stated in section 2 and for each additional 1,000 square feet (90 m^2), or increment thereof, one 100 square foot (9 m^2) area shall be randomly selected and measured.

4. If the dry film thickness for any 100 square foot (9 m^2) area (sections 2 & 3) is not in compliance with the requirements of paragraph 1 of this section, then each 100 square foot (9 m^2) area shall be measured.

5. Other size areas or number of spot measurements as specified in the contract plans shall be measured.

Each coat of paint shall have the following thickness measured above the peaks:

	Min. Spec. Thickness mil (μm)	Max. Spec. Thickness mil (μm)	Min Spot mil (μm)	Max Spot mil (μm)
Prime	3.0 mil (75 μm)	5.0 mil (125 μm)	2.4mil (60 μm)	7.5mil (188 μm)
Intermediate	5.0 mil (125 μm)	7.0 mil (175 μm)	4.0 mil (100 μm)	10.5 mil (263 μm)
Sub Total	8.0 mil (200 μm)	12.0 mil (300 μm)	6.4 mil (160 μm)	18.0 mil (450 μm)
Finish	2.0 mil (50 μm)	4.0 mil (100 μm)	1.6 mil (40 μm)	6.0 mil (150 μm)
Total	10.0 mil (250 μm)	16.0 mil (400 μm)	8.0 mil (200 μm)	24.0 mil (600 μm)

Film thicknesses greater than the maximum specified thicknesses that do not exhibit defects (such as runs, sags, bubbles, mudcracking, etc.) and for which the Contractor has received a written statement from the coating manufacturer stating that this excessive thickness is not detrimental, may remain in place at the discretion of the Director.

For any spot or maximum average thickness over 24 mils (600 μm) it will be necessary for

the Contractor to prove to the Department that the excess thickness will not be detrimental to the coating system. This shall be accomplished by providing the Director, for approval, certified test data proving that the excessive thickness will adequately bond to the steel when subjected to thermal expansion and contraction. This thermal expansion and contraction test shall take place over five 5 cycles of a temperature ranges from -20^0 F to 120^0 F (-29^0 C to 49^0 C). After the thermal contraction and expansion cycles have taken place, the tested system shall be subjected to pull off tests and the results compared to the results of pull off tests which have been performed on a paint system with the proper thicknesses. In addition to the certified test results, it will also be necessary for the Contractor to provide the Director a written statement from the paint manufacturer stating that this excessive thickness is not detrimental.

If the Director does not approve the excessive coating thicknesses or the Contractor elects not to provide the required written statement from the paint manufacturer and the certified test results when required, the Contractor, at his own expense, shall remove and replace the coating. The removal and replacement of the coating shall be done as specified in 885.10 F Repair Procedures.

885.11 Caulking QCP #7. The material shall be a two component, 100% solids epoxy and shall be one of the following:

Mark 270
Poly-Carb
Solon, OH
216-248-1223

KOP-COAT A-788
Splash Zone Compound
Carboline Company
Hamilton, OH
513-896-1919

Sikadur Injection Gel
Sika Chemical Corp.
Lyndhurst, N.J.
201-933-8801

OR Other Commercially Available, 100% Solid, Non-Sag, Non-Shrink Epoxy Based System Capable Of Filling Voids Up To 25 mm (1 inch) Wide

885.12 Safety Requirements and Precautions. The Contractor shall meet the applicable safety requirements of the Ohio Industrial Commission and the Occupational Safety and Health Administration (OSHA), in addition to the scaffolding requirements specified below.

The Material Safety Data Sheets (MSDS) shall be provided at the preconstruction meeting for all paints, thinners and abrasives used on this project. No work shall start until the MSDS has been submitted.

885.13 Inspection Access. In addition to the requirements of 105.11, the Contractor shall furnish, erect, and move scaffolding and other appropriate equipment, to permit the Inspector the opportunity to closely observe all affected surfaces. This opportunity shall

be provided to the Inspector during all phases of the work and continue for a period of at least 10 working days after each structure has been completely painted.

When scaffolding, or the hangers attached to the scaffolding are supported by horizontal wire ropes, or when scaffolding is placed directly under the surface to be painted, the following requirements shall be complied with:

A. When scaffolding is suspended 43 inches (1092 mm) or more below the surface to be painted, two guardrails shall be placed on all sides of the scaffolding. One guardrail shall be placed at 42 inches (1067 mm) above the scaffolding and the other guardrail at 20 inches (508 mm) above the scaffolding.

B. When the scaffolding is suspended at least 21 inches (533 mm) but less than 43 inches (1092 mm) below the surface to be painted, one guardrail shall be placed on all sides of the scaffolding at 20 inches (508 mm) above the scaffolding.

C. Two guardrails shall be placed on all sides of scaffolding not previously mentioned. The guardrails shall be placed at 42 inches (1067 mm) and 20 inches (508 mm) above scaffolding, as previously mentioned.

D. All scaffolding must be at least 24 inches (610 mm) wide when guardrail is used and 28 inches (711 mm) wide when the scaffolding is suspended less than 21 inches (533 mm) below the surface to be painted and guardrail is not used. If 2 or more scaffolding are laid parallel to achieve the proper width, they must be rigidly attached to each other to preclude any differential movement.

E. All guardrail shall be constructed as a substantial barrier which is securely fastened in place and is free from protruding objects such as nails, screws and bolts. There shall be an opening in the guardrail, properly located, to allow the Inspector access onto the scaffolding.

F. The rails and uprights shall be either metal or wood. If pipe railing is used, the railing shall have a nominal diameter of no less than 1.5 inches (38 mm). If structural steel railing is used, the rails shall be 2x2x3/8 inch (50x50x9 mm) steel angles or other metal shapes of equal or greater strength. If wood railing is used, the railing shall be 2x4 inches (50x100 mm) (nominal) stock. All uprights shall be spaced at no more than 8 feet (2.4 m) on center. If wood uprights are used, the uprights shall be 2x4 inches (50x100 mm) (nominal) stock.

G. When the surface to be inspected is more than 15 feet (4.57 m) above the ground or water, and the scaffolding is supported from the structure being painted, the Contractor shall provide the Inspector with a safety harness (not a safety belt) and lifeline. The lifeline shall not allow a fall greater than 6 feet (1.8 m). The Contractor shall provide a method of attaching the lifeline to the structure independent of the scaffolding, cables, or brackets supporting the scaffolding.

H. When scaffolding is more than 2.5 feet (762 mm) above the ground, the Contractor shall provide a ladder for access onto the scaffolding. The ladder and any equipment used to attach the ladder to the structure shall be capable of supporting 250 pounds (113 kg) with a safety factor of at least four. All rungs, steps, cleats, or treads shall have uniform spacing and shall not exceed 12 inches (305 mm) on center. At least one side rail shall extend at least 36 inches (914 mm) above the landing near the top of the ladder.

I. An additional landing shall be required when the distance from the ladder to the point where the scaffolding may be accessed, exceeds 12 inches (305 mm). The landing shall be a minimum of at least 24 inches (610 mm) wide and 24 inches (610 mm) long. It shall also be of adequate size and shape so that the distance from the landing to the point where the scaffolding is accessed does not exceed 12 inches (305 mm). The landing shall be rigid and firmly attached to the ladder; however, it shall not be supported by the ladder. The scaffolding shall be capable of supporting a minimum of 1000 pounds (454 kg).

J. In addition to the aforementioned requirements, the Contractor shall be responsible to observe and comply with all Federal, State and local laws, ordinances, regulations, orders and decrees.

K. The Contractor shall furnish all necessary traffic control to permit inspection during and after all phases of the project.

885.14 Protection of Persons and Property. The Contractor shall collect, remove and dispose of all buckets, rags or other discarded materials and shall leave the job site in a clean condition.

The Contractor shall protect all portions of the structure, which are not to be painted, against damage or disfigurement by splashes, spatters, and smirches of paint. Deck bottoms and backwalls are exempt from this requirement.

When or where any direct or indirect damage or injury is done to public or private property, the Contractor shall restore, at his own expense, such property, to a condition similar or equal to that existing before such damage or injury was done.

885.15 Pollution Control The Contractor shall take all necessary precautions to comply with pollution control laws, rules or regulations of Federal, State or local agencies and as required in this specification.

885.16 Work Limitations. Abrasive blasting and painting shall be done between April 1 and October 31. Even though the Contractor is permitted to work prior to May 1, April is considered a winter month and no extension due to adverse weather conditions will be granted for this period. Additional work limitations on specific bridges/projects may be required by plan note.

885.17 Warranty Evaluation Review. During the month before the end of the specified warranty period, the Engineer will inspect the bridge thoroughly for the paint system defects listed. This inspection will be performed jointly by ODOT personnel and Contractor with equipment provided by the Contractor. The inspection equipment shall be OSHA approved, vehicle-mounted, and provide access to all areas of the structure. The Engineer will determine if there are defective areas present as defined in section 885.03 and define those areas.

Traffic control and required signing are the Contractor's responsibilities to supply for the warranty evaluation inspection. The Contractor's traffic control plan shall be in accordance with the Ohio Manual of Uniform Traffic Control Devices and/or as detailed in the plans, and shall be submitted to the District Construction Engineer for approval before inspection is performed.

885.18 Warranty Corrective Work. All defective areas identified by the Engineer at anytime during the warranty period shall be repaired by the Contractor in accordance with this specification's repair procedures. A progress schedule shall be submitted in writing to the Engineer prior to any work. All paint repair work will be done the same season as the inspection, unless the seasonal limitations of this specification prevents the completion that season. If that is the case, corrective work will be completed the following season. Any additional defective areas that appear between the time of inspection and the actual corrective work being performed will also be repaired. The Engineer shall be given at least two weeks notification before the Contractor begins the corrective work and shall be allowed full inspection of all operations as per Section 885.13.

Traffic control and required signing are the Contractor's responsibilities to supply for the period of corrective work. The Contractor's traffic control plan shall be submitted to the District Construction Engineer for approval before inspection is performed.

885.19 Method of Measurement. Field painting of structural steel will be paid based on a lump sum basis. All field painting will include 3 coats of paint; prime coat, intermediate coat, and finish coat.

Caulking: Includes all labor, materials and equipment to perform the necessary caulking. This work shall be included with the prime coat for payment.

Surface Preparation: This lump sum item includes all labor, materials and equipment necessary to: perform the necessary solvent cleaning, grind flange edges, grinding fins, tears, slivers, contain, collect, store, evaluate, ship, treat and dispose of all waste materials generated by this project and to prepare the surface as required by these specifications, prior to applying the prime coat.

885.20 Basis of Payment. Payment for field painting, items Surface preparation of existing steel with warranty; Field painting of existing steel, prime coat, with warranty; Field painting of existing steel, intermediate coat, with warranty; Field painting of existing steel,

finish coat, with warranty, will be made at the contract prices bid.

These items shall include all costs associated with providing the bridge painting of existing steel with warranty, which shall include maintaining traffic during warranty evaluation, additional insurance, and labor, equipment, and materials necessary to complete the warranty repair work required in conformance with the pertinent repair provisions of this specification, and to the satisfaction of the Engineer.

Item	Unit	Description
885	Lump sum	Surface preparation of existing steel with warranty
885	Lump sum	Field painting of existing steel, prime coat, with warranty
885	Lump sum	Field painting of existing steel, intermediate coat, with warranty
885	Lump sum	Field painting of existing steel, finish coat, with warranty

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 894

HIGH PERFORMANCE CONCRETE FOR NEW BRIDGE DECKS WITH WARRANTY

October 12, 1999

894.01 Description. This item shall consist of furnishing and placing High Performance concrete for new bridge decks in conformance with SS 844 except as modified herein. This work shall also consist of warranting the structural bridge deck concrete for items listed in 894.03 and Appendix A for a period of Seven (7) years.

894.02 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 894 High Performance 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.

894.03 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.).

894.04 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.

894.05 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

894.06 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.

894.07 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.

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

Item	Unit	Description
894	Cubic yard (cubic meter), square yard (square meter)	High Performance 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 906

ANTISTRIP ADDITIVE FOR ASPHALT CONCRETE

May 5, 1998

On this project, if any gravel coarse aggregate or more than 25 percent natural sand or more than 20 percent reclaimed materials containing gravel coarse aggregate is used in any bituminous aggregate base designed in accordance with Supplement 1044 or any asphalt concrete designed in accordance with 441, then the Contractor shall perform the following additional tests:

1. Moisture damage potential test in accordance with Supplement 1051.
2. Washed gradation in accordance with AASHTO T 11 as modified by Supplement 1004.
3. Adherent fines test for each component in accordance with ASTM D 5711.

If the results of the moisture damage potential test show the Tensile Strength Ratio (TSR) of the bituminous aggregate base mix or asphalt concrete mix to be less than 0.70, then the mix shall be modified by one of the following antistrip additives:

Liquid Antistrip Material - The mix shall include liquid antistrip material at a rate of 0.50 to 1.00 percent by weight of the asphalt cement. The TSR of the bituminous aggregate base mix or asphalt concrete mix shall be greater than or equal to 0.80 after the addition of the liquid antistrip material.

Hydrated Lime - The mix shall include hydrated lime in the dry form at a rate of 1.0 percent by the dry weight of aggregate for asphalt concrete and 0.75 percent by the dry weight of aggregate for bituminous aggregate base. The hydrated lime shall meet the requirements of AASHTO M 303, Type 1. A list of approved sources of hydrated lime will be maintained by the Laboratory. To become an approved source, a source shall submit certified test data to the Laboratory showing their hydrated lime meets the requirements of AASHTO M 303, Type 1. Annual submittal of certified test data by January 1 each year will be necessary to maintain approval. The following information shall be provided to the Engineer for each shipment of hydrated lime: (1.) letter of certification; (2.) production date; (3.) shipment date; (4.) shipment destination; (5.) batch or lot number (6.) net weight.

The antistrip additive shall be included in the Contractors' mix design established in accordance with 441 or Supplement 1044. The following shall be submitted to the Laboratory with the proposed JMF:

1. All TSR data (before and after the addition of the antistrip additive).
2. Rate of addition of the liquid antistrip material, if used.
3. Product information, recent supplier State project information using the liquid antistrip material, and letter of certification (only for liquid antistrip material, if used).
4. Results of the washed gradation test of the individual components of the mix used in determining the combined gradation.
5. Results of the adherent fines testing for each component.

The Laboratory may perform additional tests in accordance with Supplements 1051, 1052, and 1004. These tests may be performed on material conforming to a proposed JMF or on material obtained during production of an approved JMF. If a change in the aggregate production is suspected, the District/ Laboratory may require the Contractor to perform washed gradations on components and calculate adherent fines to determine the need for additional TSR review. The Laboratory may obtain samples of the hydrated lime at any time to verify quality. If the quality of the hydrated lime is in question, the Laboratory may require independent laboratory testing for the hydrated lime supplier.

Antistrip additives shall be stored and introduced into the mix in accordance with Supplement 1053. Prior to the start of production,. the Laboratory shall approve the antistrip additive storage and feed systems. During production, if the antistrip additive is not being properly dispersed into the mix, the Laboratory may require modifications in the method of introducing the antistrip additive into the mix.

At the end of the project and at the end of each construction year on a multiple year project, the Contractor shall provide delivery tickets to the Engineer verifying the number of pounds of antistrip additive used is within 10 percent of the calculated amount of antistrip additive required for the total pounds of bitumen, based on the JMF, used in the bituminous aggregate base or asphalt concrete.

The cost of this additional testing and the addition of any antistrip additive shall be included in the contract price for the bituminous aggregate base or asphalt concrete.

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.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 908

PERFORMANCE GRADE (PG) BINDER REQUIREMENTS

March 28, 2000

908.01 Performance Grade Binder Specifications.
908.02 Contractor Storage Requirements
908.03 Contractor Sampling Requirements

908.01 Performance Grade Binder Specifications. The requirements of 702.01 shall be replaced with AASHTO Provisional Standard MP1-93, 1997 AASHTO Provisional Standard version for Performance Graded (PG) binders as modified below:

PG 64-22 shall meet: Penetration, 77°F (25°C), 3.53 oz (100g), 5s -	55 - 75
PG 58-28 shall meet: Viscosity, poise, 140°F (60°C)-	800 min

The Materials and Manufacture section 5 shall be modified for all performance grades (PG) as follows:

5.1 The performance grade binder shall be an asphalt cement from the refining of crude petroleum, or combination of asphalt cements from the refining of crude petroleum, or asphalt cements and suitable liquid from the refining of crude petroleum, and possible organic modifiers for performance enhancement. Material from the crude refining stream will be considered neat. Liquid from crude refining may be used for adjustments but shall not be used for the purpose of substitution of crude refined asphalt cement in a performance grade asphalt binder. In the event of a failure investigation where binders exhibit unusual properties a supplier may be requested by the Office of Materials Management to supply information about the makeup of a PG binder. Failure to cooperate will mean removal from certification.

5.2 A modifier may be any organic material of suitable manufacture that is proven compatible with asphalt cement (does not separate appreciably in routine storage), and that is dissolved, dispersed or reacted in asphalt cement to improve its performance. Performance enhancement is defined as a decrease in the temperature susceptibility of the asphalt cement while maintaining or improving desirable properties in a neat asphalt cement such as coatability, adhesiveness and cohesiveness. The use of modifiers shall be limited to 6.0 percent by performance grade binder weight.

5.3 The use of previously used materials must be approved by the Department. Since no standard test procedures exist for reprocessed materials (and original tests were not developed with the use of such materials in mind), appropriate test methods may be chosen by the Department for review. Department approval does not relieve the performance grade binder supplier from full responsibility for content and use of any previously used material nor guarantee suitable performance enhancement as defined above. The detected presence in a performance grade binder sample of any unapproved previously used material will mean immediate removal from certification. Approved reprocessed materials will be limited to 6.0 percent by performance grade binder weight.

5.4 The performance grade asphalt binder shall be homogeneous, free from water and deleterious materials, and shall not foam when heated to 350°F (175°C). The asphalt binder (before modification or after modification if liquid modifier used) shall be proven fully compatible with a negative result by means of the Spot Test per AASHTO T 102 using standard naphtha solvent. If standard naphtha shows a positive result, a retest using 35 percent Xylene/ 65 percent Heptane (volume) may be used.

5.5 The performance grade asphalt binder shall be at least 99.0 percent soluble as determined by ASTM D 5546 or D 2042. Any insoluble component shall be substantially free of fibers and have discrete particles less than 75μm.

908.02 Contractor Storage Requirements. Storage of a performance grade binder shall be in accordance with 750.01, with the following additions:

1. If a Contractor is providing a binder other than a performance grade binder to customers other than the Department (excepting winter carryover work), a separate storage tank shall be used.

2. When the Contractor switches between different performance grade binders because of alternating mix types, a separate storage tank shall be used.

3. When the Contractor switches from any asphalt cement or other performance grade binder to a different performance grade binder using the same storage tank, the storage tank shall be at least 90 percent empty by tank height.

The Monitoring Team shall be notified before the delivery of the first load of each type of performance grade binder, with sufficient lead time to allow for verification of the condition of the storage tank. The Monitoring Team may sample the first storage tank load or give the Contractor permission to proceed with no tank verification, at their discretion.

908.03 Contractor Sampling Requirements. The Contractor shall take two 1 quart (1 liter) samples from the first transport truck load of performance grade binder before incorporation into the storage tank. The Contractor will label and date the samples and retain them in the plant laboratory for future reference by the Department, if necessary.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 910
OZEU STRUCTURAL STEEL PAINT

July 28, 1998

910.01 Description. This specification covers the formulation and testing of a three coat structural steel paint system consisting of an organic zinc prime coat, an epoxy intermediate coat and a urethane finish coat (OZEU). Material requirements for the respective coats shall be as follows.

910.02 Organic Zinc Prime Coat. The organic zinc prime coat shall consist of a zinc dust filled, two or three-component epoxy polyamide, and selected additives as required:

A. Physical Requirements.

	Minimum
Total Solids, % by weight of paint, ASTM D 2369	70
Pigment, % by weight of total solids, ASTM D 2371	83
Total zinc dust, % by weight of pigment	93
Total zinc, % by weight, of total solids, by calculation	77
Total solids, % by volume, ASTM D 2697	45
Color, greenish gray, approximating FS-595B-34159, Visual comparison	
Pot Life at 25° C (77° F) and 50% Relative Humidity (R.H.), hours	6

By observation of Ford B cup viscosity, pot life is deemed exceeded if the viscosity rose more than 30% or if gelled particles appear in the mix. A one liter (quart) container of mixed material is used.

B. Qualitative Requirements.

Mixing shall conform to Section 5.2, SSPC-Paint 20 using only a high shear (Jiffy) mixer.
Storage life - Section 5.4, SSPC-Paint 20
Mudcracking - Section 5.7, SSPC-Paint 20

C. Material Quality Assurance : Analysis for each component.

1. Three-component systems.
   a. Resin

Nonvolatiles, % by weight	± 2
Density	± 0.02g/mL (± 0.2 lb. per gal.)
Viscosity	± 5 KU or ± 5 sec., Ford Cup

   b. Hardener

Nonvolatiles, % by weight	± 2
Density	± 0.02g/mL (± 0.2 lb. per gal.)
Viscosity	± 5 KU or ± 5 sec., Ford Cup

   c. Zinc

Total Zinc metal, % by weight	± 2

2. Two-component systems.
   a. Zinc/Resin Component

Total Zinc metal, % by weight	± 2
Density	± 2%
Viscosity	Dependent on test
Nonvolatiles, % by weight	± 2

   b. Hardener Component

	Variance*
Nonvolatiles, % by weight	± 2
Density	± 0.02g/mL (± 0.2 lb. per gal.)
Viscosity	± 5 KU or ± 5 sec., Ford Cup

* Variance within the mean of the tests of the previously submitted sample for qualification.

910.03 Epoxy Intermediate Coat. The epoxy intermediate coat shall be a two-part product composed of a base component and a curing agent suitable for application over the epoxy-polyamide zinc rich primer.

The base component shall contain an epoxy resin together with color pigments, mineral fillers, gellant, leveling agent, and volatile solvents. The curing agent component shall contain a liquid polyamide resin and volatile solvent. The coating shall also meet the following:

A. Physical Requirements

1. Color: White, meeting or exceeding, FS-595B-37875 as per ASTM E 1347
2. Components: Two, mixed prior to application
3. Volume solids, ASTM D 2697: 50.0% minimum

4. Pot life: 6 hours, minimum @ 25° C (77°F)
   By observation of Ford B cup viscosity, pot life is deemed exceeded if the viscosity rose more than 30% or if gelled particles appear in the mix. A one liter (quart) container of mixed material is used.
5. Curing Time:
   a. Set-to-touch, ASTM D 1640: 4 hours Maximum @ 25°C (77°F)
   b. Dry To recoat, ASTM D 1640: 24 hours Maximum @ 25°C (77°F)
   c. Full cure: 7 days @ 10°C (50°F), Maximum
      No pick-up when rubbed with a cloth soaked in Methyl Ethyl Ketone
6. Fineness of Grind, ASTM D 1210: Hegman 3 minimum
7. Volatile Organic Compounds, maximum, ASTM D 3960:
   0.419 g/mL (3.5 lbs./gal.), as applied.

B. Material Quality Assurance for each component.

TEST	VARIANCE*
Density	± 2%
Viscosity	Dependent on test
Total Solids, % by weight	± 2
Pigment, % by weight	± 2
Nonvolatile Vehicle, % by weight	± 2

*Variance shall be within the noted range based upon the test average of the previously submitted sample.

910.04 Urethane Finish Coat. The urethane finish coat shall be a two-component polyester and/or acrylic aliphatic urethane and shall be suitable for use as a finish coat over the white epoxy polyamide intermediate coat.

A. Physical Requirements.

1. Finish: Specular Gloss, 60 degree, ASTM D 523: 85% minimum;
   70% minimum after 3000 hours weathering resistance
2. Volume Solids, ASTM D 2697: 42% minimum
3. Cure (Dry) Time at 25°C (77°F) and 50% RH
   Set to touch ASTM D 1640: 30 Minutes, minimum
   4 Hours, maximum
4. Pot Life: 4 hours minimum at 25°C (77°F)
   By observation of Ford B cup viscosity, pot life is deemed exceeded if the viscosity rose more than 30% or if gelled particles appear in the mix. A one liter (quart) container of mixed material is used.
5. Volatile Organic Compounds, ASTM D 3960: maximum, 0.419 g/mL (3.5 lbs./gal.), as applied.
6. Colors**

Gray FS-595B - 16440 - Use for the gloss test
Green FS-595B - 14260
Blue FS-595B - 15450
**Contractor's choice unless specified on plans.

B. Material Quality Assurance: Analysis for each component.

TEST	VARIANCE*
Density	± 2%
Viscosity,	Dependent on test
Total Solids, by Weight	± 2%
Pigment, by Weight	± 2%
Nonvolatile Vehicle, by weight	± 2%

*Variance shall be within the noted range based upon the test average of the previously submitted sample.

910.05 Performance Requirements. The coating system, which consists of the organic zinc prime coat, the epoxy intermediate coat, and the urethane topcoat, shall be tested prior to use.

Three panels for each of the specified tests shall be prepared to the requirements of the ASTM D 609 except that the thickness shall be 3 mm (1/8 inch) minimum and the steel shall be ASTM A 36/A 36 M hot rolled steel. The surface shall be blast cleaned (using coal slag abrasive) to equal, as nearly as is practical, the standard Sa 2-1/2 of ASTM D 2200 (Steel Structures Painting Council SSPC-SP10 meets this requirement), and the surface shall have a nominal height of profile of 25 to 88 μm (1 to 3.5) mils verified by using appropriate replica tape. The panels shall be coated and permitted to cure in accordance with the manufacturer's printed instructions. The dry film coating thickness in the system to be tested shall be as follows:

Organic Zinc: 75 - 125 μm (3.0 - 5.0 Mils)
Epoxy: 125 - 175 μm (5.0 - 7.0 Mils)
Urethane: 50 - 100 μm (2.0 - 4.0 Mils)

The coating system shall pass each of the following tests:

A. Fresh water resistance test (ASTM D 870). The panels shall be scribed as per ASTM D 1654 to the depth of the base metal in the form of an "X" having at least 50 mm (2-inch) legs and then immersed in fresh tap water at 25 ± 3ºC (75 ± 5ºF). After 30 days of immersion, the panels shall show no rusting nor shall the coating show any blistering, softening or discoloration. Blistering shall be rated by ASTM D 714.

B. Salt water resistance test (ASTM D 870). The panel shall be scribed as specified in "A" above and then immersed in a water solution of 5 percent sodium chloride at 25 ±

3ºC (75 ± 5ºF). The panels shall show no rust nor shall the coating exhibit any blistering or softening after 7, 14, and 30 days. Blistering shall be rated by ASTM D 714. The sodium chloride solution shall be replaced with a fresh solution after examination at 7 and 14 days.

C. Weathering resistance test. The panels shall be tested in accordance with ASTM D 4587 Method D, utilizing Ultra Violet A 340 bulbs. The panels shall be placed on test at the beginning of a wet cycle. After 3000 hours continuous exposure, the coating shall show no blistering or loss of adhesion, nor shall the panels show any rusting. The 60 degree specular gloss measurements shall be performed on the sprayed panels utilized for this test. The three initial measurements (one per panel) will be average together. The three final measurements also will be averaged together.

D. Salt fog resistance test. The panels shall be scribed as specified in "A" above, and then tested in accordance with ASTM B 117. After 3000 hours of continuous exposure the coating shall show no loss of bond nor shall it show rusting or blistering beyond 2 mm (1/16 inch) form the center of the scribe mark. Blistering shall be rated by ASTM D 714.

E. Elcometer adhesion test, ASTM D 4541. The panels shall be tested in accordance with the following: lightly sand the coating surface and aluminum dolly and apply a quick set adhesive. Allow adhesive to cure overnight. Scribe the coating and adhesive around the dolly prior to testing. Make a minimum of four trials to failure and report the four trials. No trial shall be less than 2.8 Mpa (400 psi). Fracture at the primer-blast interface shall be caused for rejection.

910.06 Prequalification. Prior to approval, copies of the manufacturer's certified test data showing that the coating system complies with the performance requirements of this specification shall be submitted to the Engineer of Tests, 1600 W. Broad St., Columbus, Ohio 44223. The certified test data shall also state the following physical properties for each coating: Density, g/mL (lbs. per gal.); Solids, % by weight; Solids, % by volume; Viscosity; Drying time; Volatile Organic Compounds content, g/mL (lb. per gallon).

The test data shall be developed by an independent testing laboratory approved by the Lab and shall include the brand name of the paint, name of manufacturer, number of lots tested, and date of manufacture.

The following items shall also be submitted to the Lab prior to approval: manufacturer's technical data sheet for each coating; material Safety Data Sheet for each coating; enough components to produce a 4 liter (one gallon) sample of each coating; and, a one liter (one quart) sample of the thinner to be used with each coating.

When the coating has been approved by the Director, further performance testing by the manufacturer will not be required unless the formulation or manufacturing process has been changed, in which case new certified test results will be required.

910.07 Sampling. Acceptance variances shall be established by the Laboratory.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

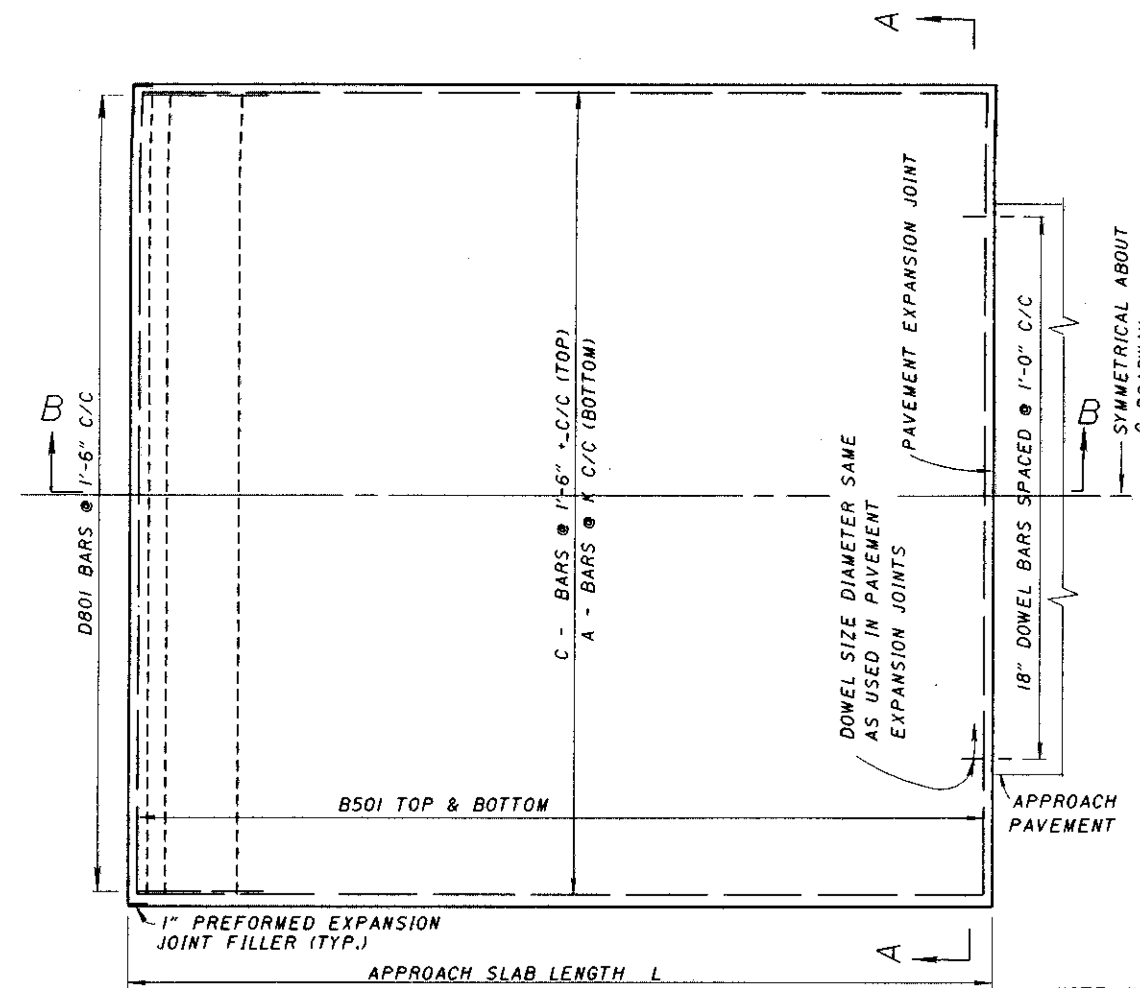
SUPPLEMENTAL SPECIFICATION 954
HIGH MOLECULAR WEIGHT METHACRYLATE (HMWM) RESIN

September 9, 1997

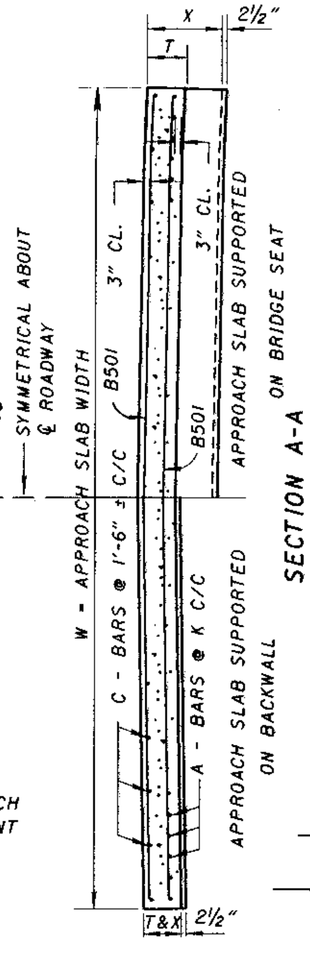
The high molecular weight methacrylate (HMWM) resin shall be low viscosity, non-fuming, conforming to the following:

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

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

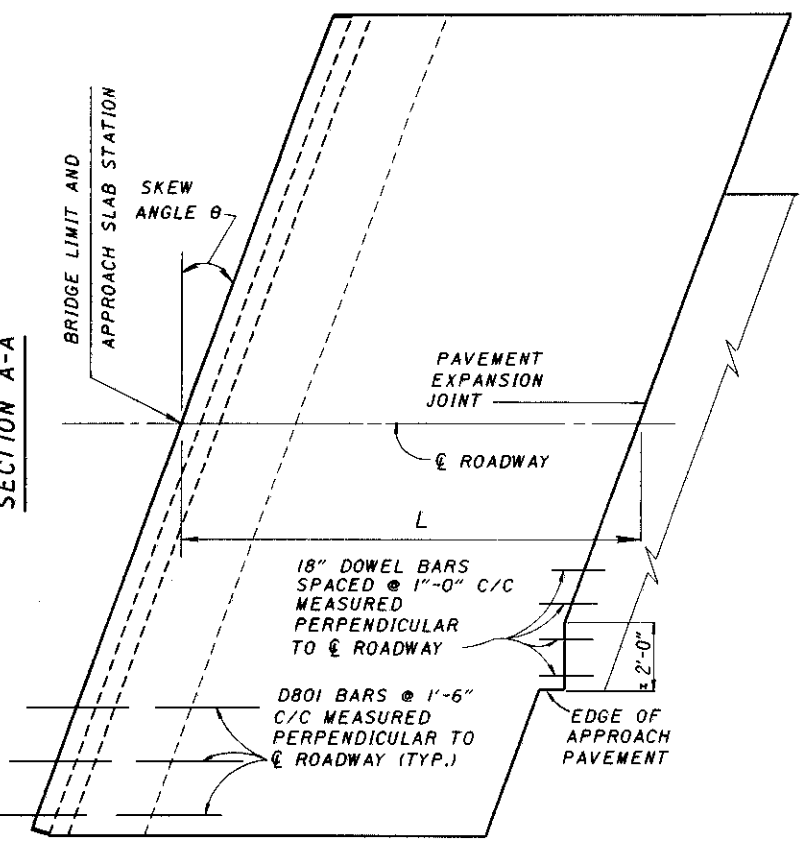


PLAN



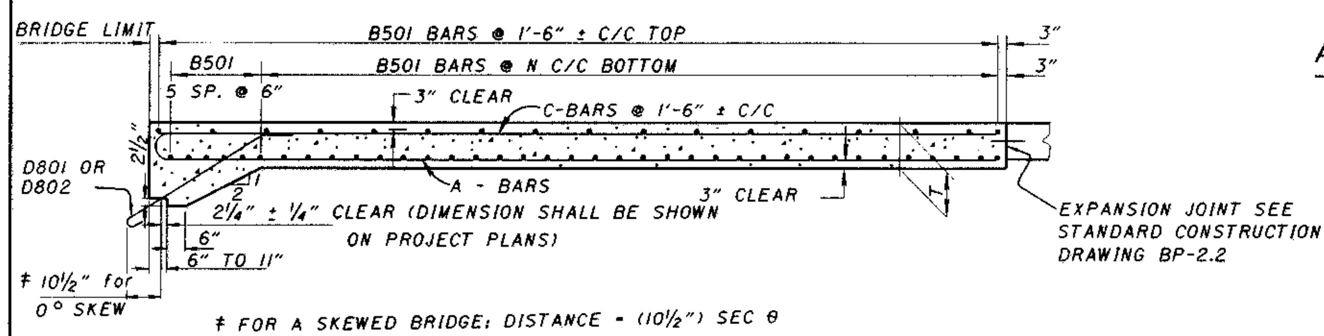
SECTION A-A

NOTE: X SHALL NEVER BE LESS THAN T



± 2'-0" FOR SKEWS LARGER THAN 20°; 0'-0" FOR SKEWS 20° OR LESS.

APPROACH SLAB FOR SKEWED STRUCTURE

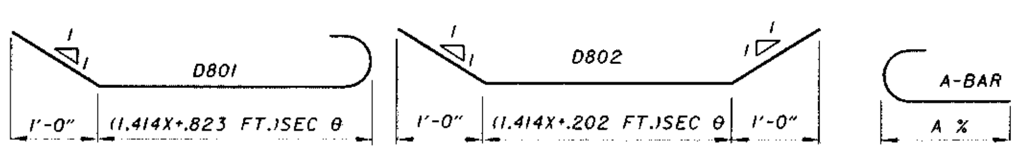


‡ FOR A SKEWED BRIDGE: DISTANCE = (10½") SEC θ

SECTION B-B

REINFORCING STEEL (FOR ONE APPROACH SLAB)																
LENGTH L	THICKNESS T	A-BARS					B501 (BOTTOM)			B501 (TOP)		C-BARS			D801 OR D802
		SP'C'G K	MARK	LENGTH	DIMENSION A	NO. REQ'D.	* LENGTH	SP'C'G N	NO. REQ'D.	* LENGTH	NO. REQ'D.	MARK	LENGTH	NO. REQ'D.	NO. REQ'D.
15'-0"	12"	10"	A1001	15'-11"	14'-6"	12[(W-0.5)/K]+1	(W-0.5)sec θ	9"	22	(W-0.5)sec θ	11	C501	14'-6"	12[(W-0.5)/18]+1	12[(W-0.5)/18]+1
20'-0"	13"	7½"	A1002	20'-11"	19'-6"			8"	31		14	C502	19'-6"		
25'-0"	15"	7"	A1003	25'-11"	24'-6"			8"	39		18	C503	24'-6"		
30'-0"	17"	6½"	A1004	30'-11"	29'-6"			8½"	44		21	C504	29'-6"		

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



GENERAL: THIS DRAWING PROVIDES DESIGN AND GENERAL CONSTRUCTION DETAILS. THE PROJECT PLANS WILL SHOW LENGTH, SKEW, CURBS (IF ANY), ESTIMATED QUANTITY (SQUARE YARDS), 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 D801 OR D802 SHALL BE DETAILED FOR A SPECIFIC BRIDGE AND SHALL BE INCLUDED WITH ITEM 509 UNDER ABUTMENTS OR SUPERSTRUCTURE FOR PAYMENT. D801 BARS CANNOT BE USED AS SHOWN WHERE APPROACH SLABS ARE SUPPORTED ON BACKWALLS LESS THAN 14 INCHES THICK. D802 BARS SHALL BE USED ON PRESTRESSED CONCRETE BOX BEAM BRIDGES WHERE THE APPROACH SLAB IS SUPPORTED ON AN 11 INCHES THICK BACKWALL.

* AT THE OPTION OF THE CONTRACTOR, B501 BARS MAY BE LAPPED 20 INCHES 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: HS-20-44 AND THE ALTERNATE MILITARY LOADING.

CONCRETE CLASS C : COMPRESSIVE STRENGTH 4000 P.S.I

REINFORCING STEEL: ASTM A615, A616 OR A617-GRADE 60: MINIMUM YIELD STRENGTH OF 6000 P.S.I. 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 YARDS 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 YARDS 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 10 FEET 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 10 FEET 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. YD. FOR THE APPROACH SLAB.

DESIGN AGENCY: BUREAU OF BRIDGES AND STRUCTURAL DESIGN

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

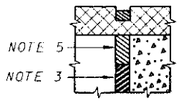
ENGINEER OF BRIDGES — DATE 11-27-81

REVIEWED LMW | CHECKED JAM | DESIGNED JFF | DRAWN JFF | REVISIONS 9-15-94

AS-1-81

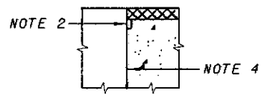
STANDARD: REINFORCED CONCRETE APPROACH SLAB

1 / 3



DETAIL A

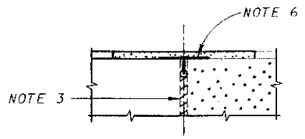
DETAIL B



DETAIL C

CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB

CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB



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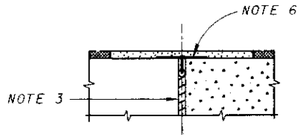
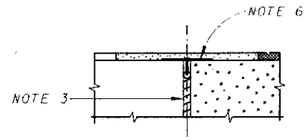


DETAIL E



DETAIL F

CONCRETE WEARING SURFACE ON BRIDGE DECK ONLY

NOTE 1 : PREFORMED ELASTOMERIC JOINT SEALER 705.11 (1¼" FOR ½" JOINT) DEPRESSED ⅛" BELOW ROADWAY, PLACED IN ½" x 2¼" GROOVE.

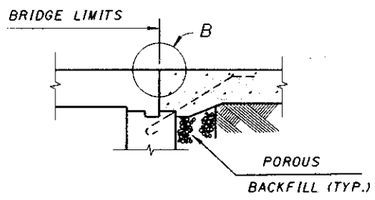
NOTE 2 : PREFORMED ELASTOMERIC JOINT SEALER 705.11 (1¼" FOR ½" JOINT) PLACED IN ½" x 2⅛" GROOVE.

NOTE 3 : 1" PREFORMED EXPANSION JOINT FILLER 705.03

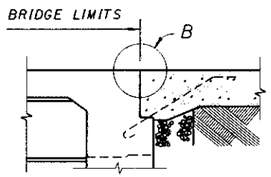
NOTE 4 : TYPE "A" WATERPROOFING.

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

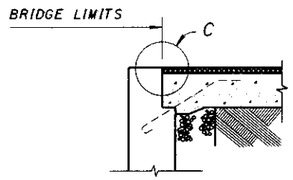
NOTE 6 : SEE PLAN INSERT SHEET. POLYMER MODIFIED ASPHALT EXPANSION JOINT SYSTEM.



ON SLAB BRIDGES

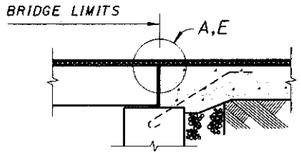


ON BRIDGES WITH INTEGRAL CONSTRUCTION

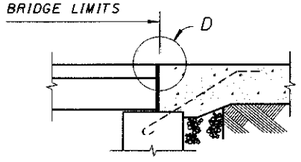


APPROACH SLAB SUPPORTED ON ABUTMENT BACKWALL

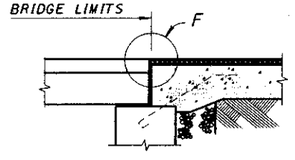
ASPHALT CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB



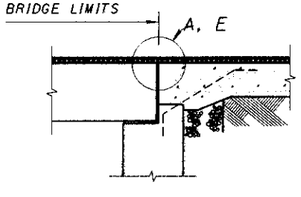
ON PRESTRESSED CONCRETE BOX BEAM BRIDGES



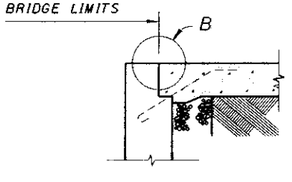
ON PRESTRESSED CONCRETE BOX BEAM BRIDGES



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.

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 2'-0".

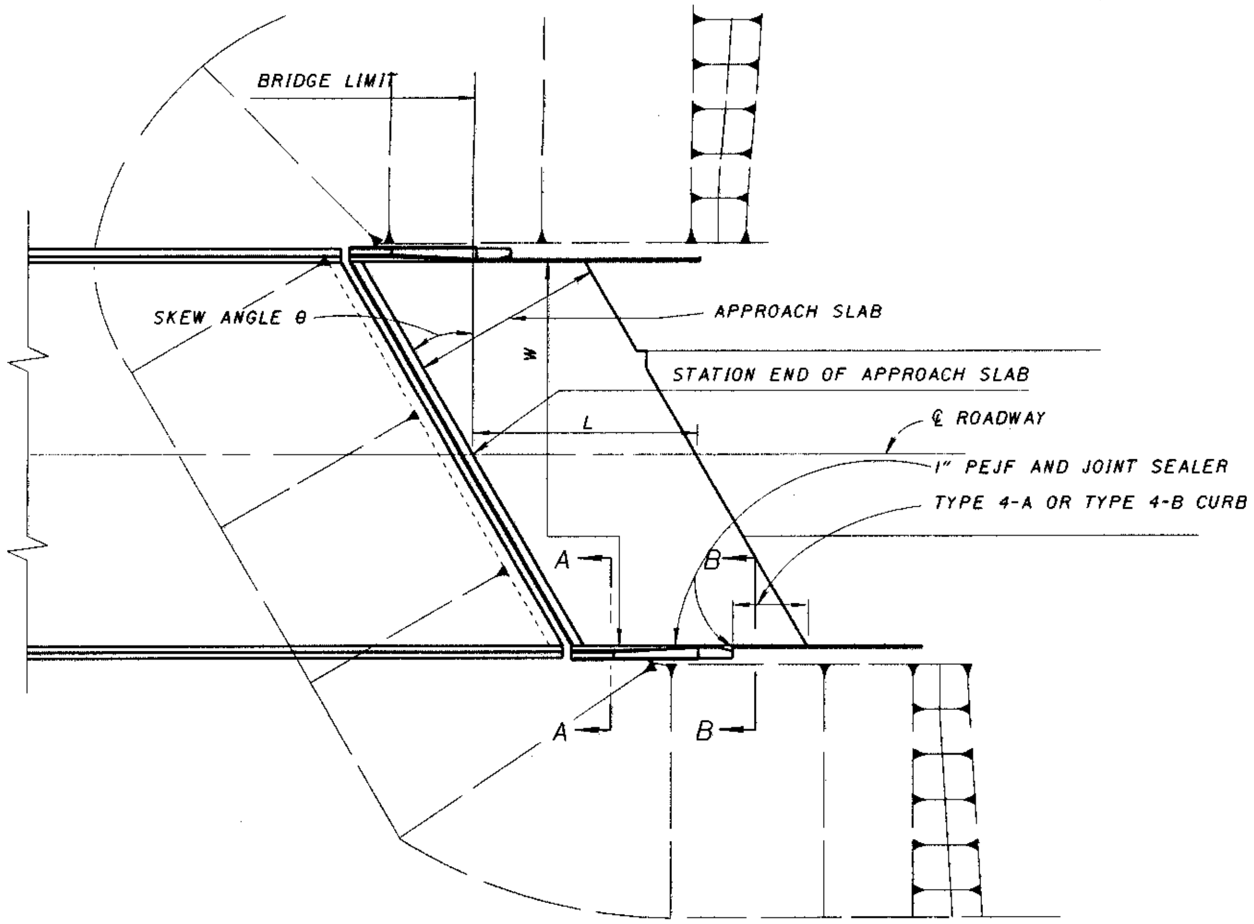
DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Robert B. Flowers — ENGINEER OF BRIDGES
11-22-81 — DATE

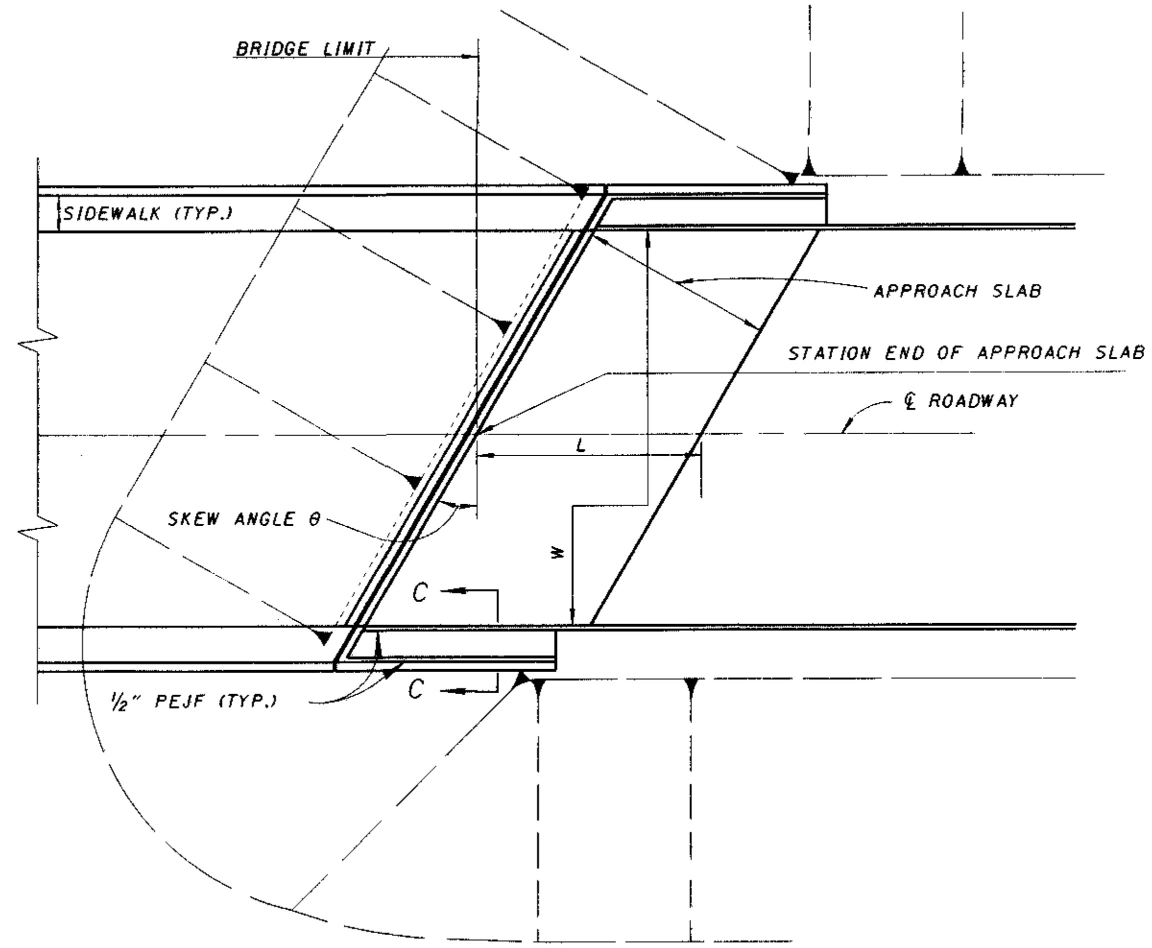
REVISED LMW
CHECKED JAM
DESIGNED JFF
DRAWN JFF
AS-1-81
REVISIONS 9-15-94

STANDARD
REINFORCED CONCRETE APPROACH SLAB

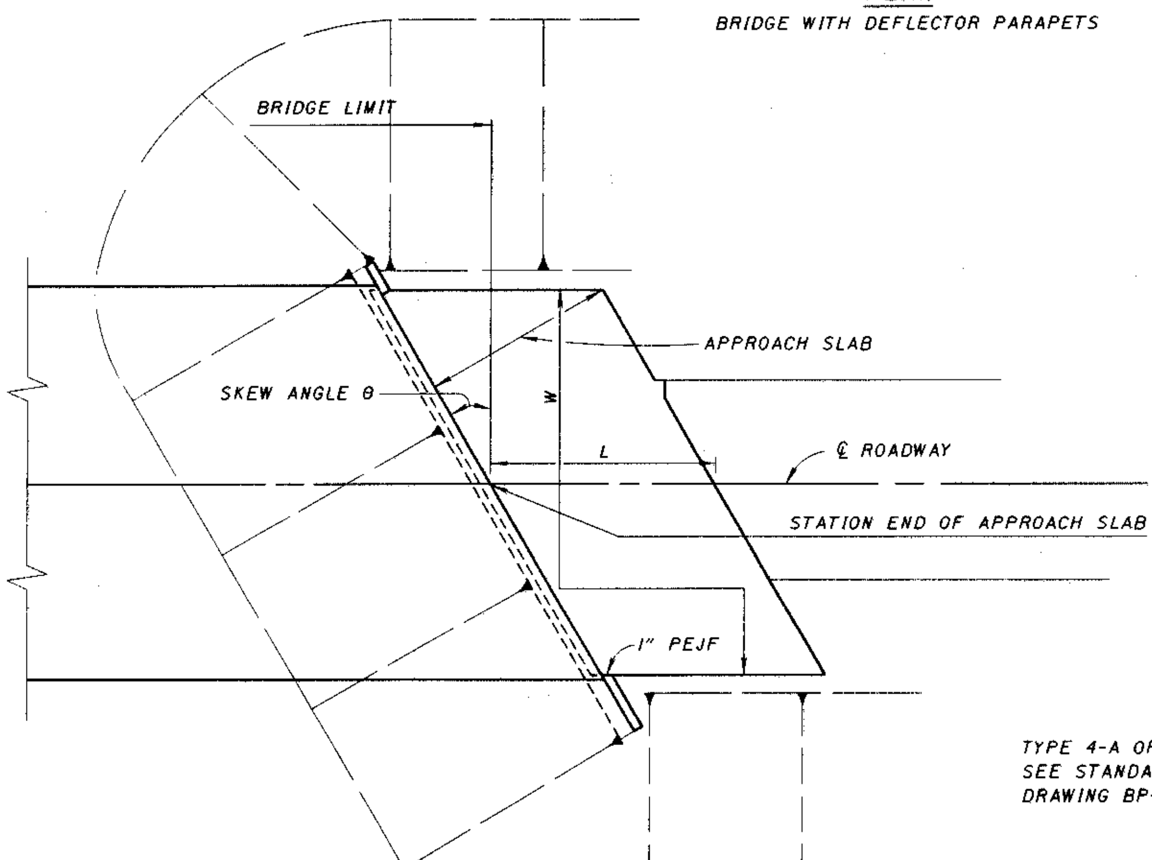
2 / 3



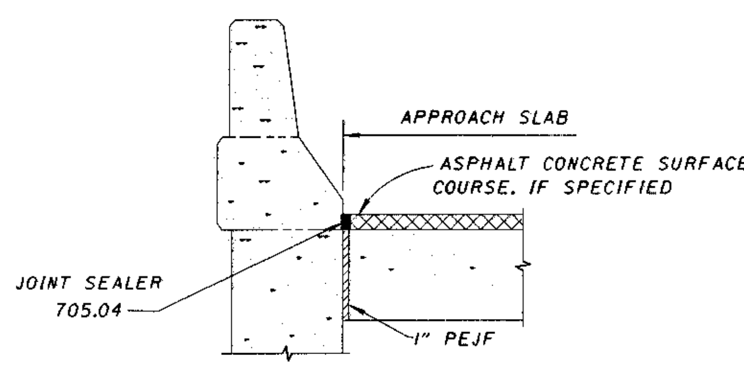
PLAN
BRIDGE WITH DEFLECTOR PARAPETS



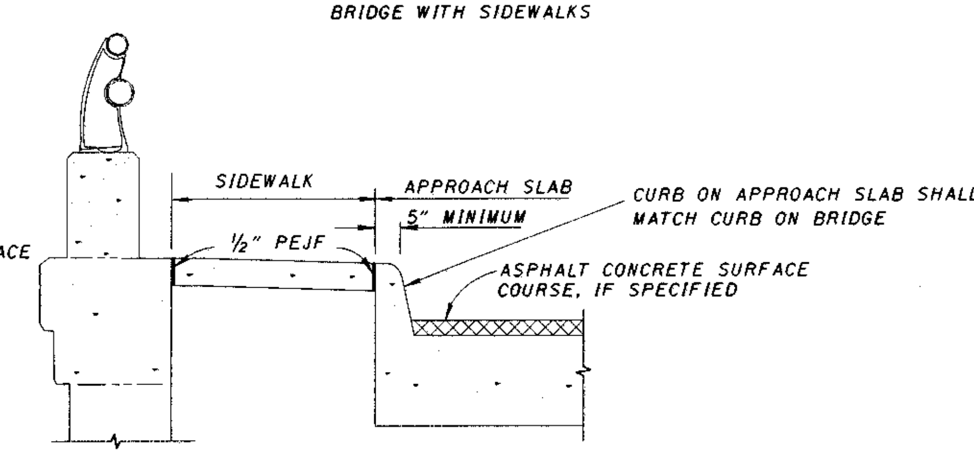
PLAN
BRIDGE WITH SIDEWALKS



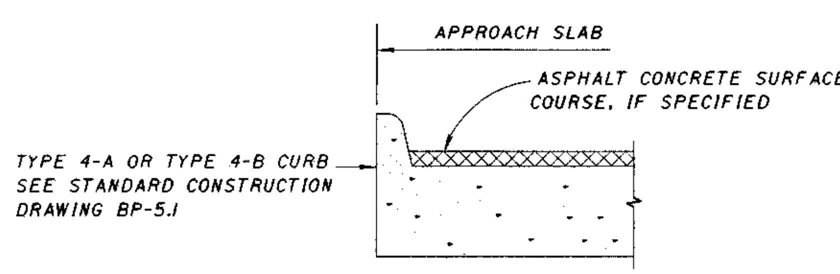
PLAN
BRIDGE WITHOUT CURBS



SECTION A-A



SECTION C-C



SECTION B-B

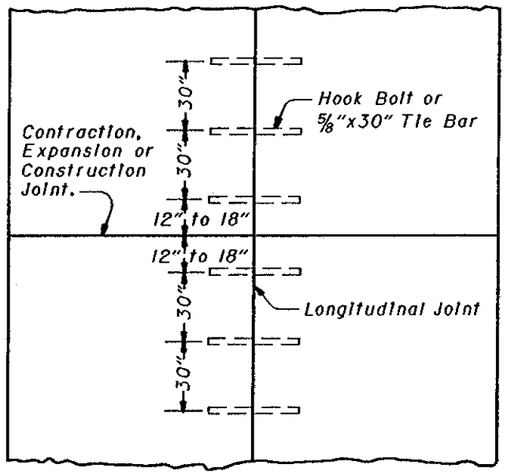
DESIGN AGENCY
BUREAU OF BRIDGES
AND
STRUCTURAL DESIGN

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES
11-27-81
DATE

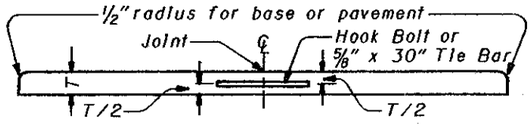
REVIEWED LMW
CHECKED JAM
AS-1-81
DESIGNED JFF
DRAWN JFF
REVISIONS 9-15-94

STANDARD
REINFORCED CONCRETE
APPROACH SLAB

TIE BAR OR HOOK BOLT SPACING

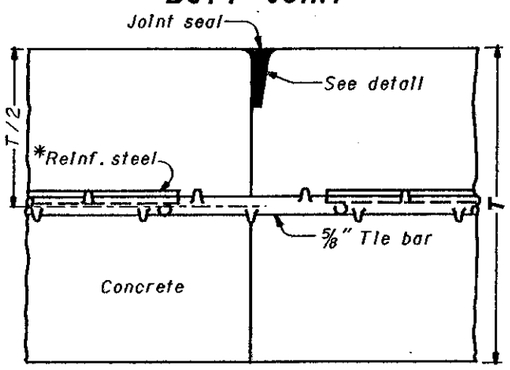


PLAN



CROSS SECTION

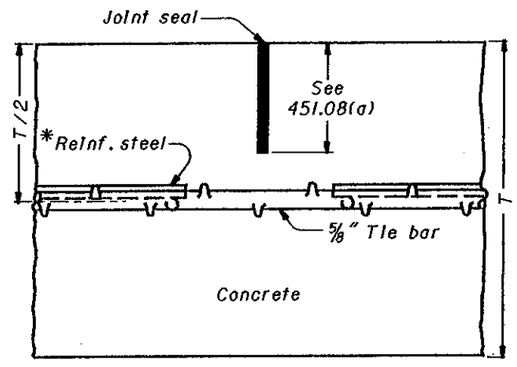
BUTT JOINT



DETAIL OF JOINT

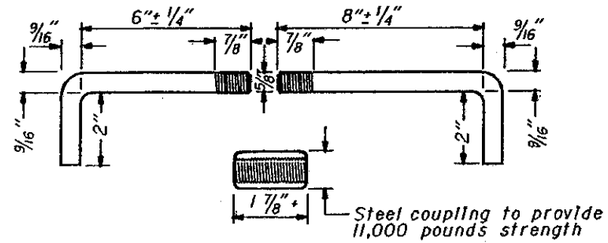
*For 451 only

SAWED JOINT

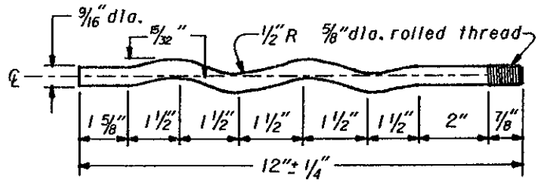


DETAIL OF JOINT

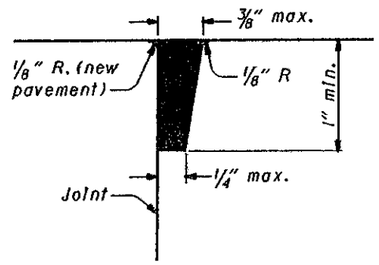
HOOK BOLT



HOOK BOLT ALTERNATE



GROOVE AND SEAL DETAIL



NOTES

GENERAL: Longitudinal joints shall be used when called for on the typical section and shall be constructed as shown on this drawing in 451 and 452 pavement and 305 base.

The joint shall be on the centerline of the pavement unless otherwise shown on the plans.

Tie bars shall be 5/8 inch round, deformed bars. A satisfactory device shall be used to hold the tie bars in proper position or they may be installed by a mechanical installing device.

BUTT JOINT: The longitudinal joint between adjoining slabs poured in separate operations shall be a butt joint with hook bolts or tie bars, unless otherwise shown on plans. Bent tie bar construction shall not be permitted.

TYPE D (DRILLED TIED LONGITUDINAL) JOINT: Type D joints shall be constructed in accordance with 255.05. Grout shall meet the requirements of 255.02. The use of 5/8" expansion anchors, FF-S-325, Group VIII, Type 1 or Group II, Type 4, Class 1 may be used lieu of the #5 x 24" deformed bar and shall be installed according to the manufacturer's recommendations.

The use of self drilling expansion shield anchors, FF-S-325, Group III, Type I(a) and (c) shall not be permitted.

GROOVES: Grooves for sealing expansion bolt or butt joints in 451 or 452 pavements shall be formed by impressing a device or bar into the newly deposited concrete adjacent to the existing or previously poured lane. The device or bar shall be removed as soon as the concrete is in such condition as to preclude distortion of the concrete.

Adjoining slabs adjacent to grooved joints shall be edged with a thin metal edger having a radius of 1/8 inch. Any impression left in the surface of the pavement by the flat part of the edging tool shall be eliminated.

In lieu of the above method the longitudinal joint may be constructed in accordance with 451.08(a).

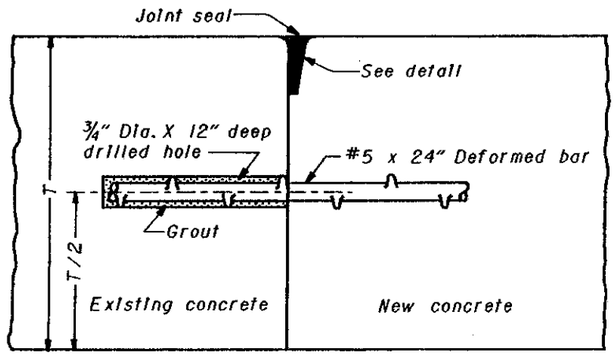
After the joint is formed it shall be protected from dirt and foreign matter until the joint seal is placed.

SEALING JOINTS: Sawed or hand-formed joints may be sealed with 705.04 or 705.11 joint sealer. Sealing of longitudinal joint in Item 305 Base is not required.

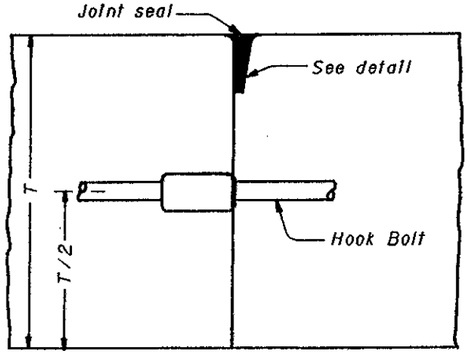
HOOK BOLTS: Hook bolt inserts shall be turned to a tight fit when installed in threaded hook bolts or couplings.

METAL STRENGTH: Tie bars, hook bolt assemblies and hook bolt alternate shall have a minimum strength of 11,000 pounds.

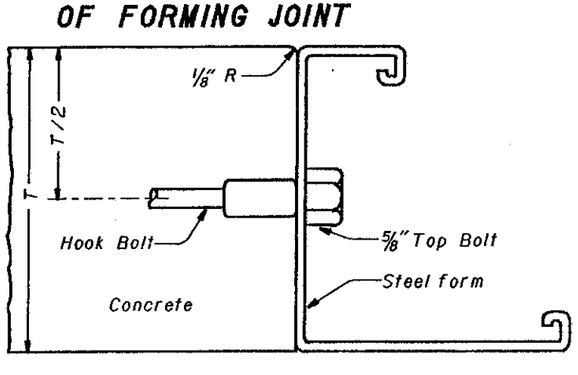
TYPE D (DRILLED TIED LONGITUDINAL) JOINT



BUTT JOINT



ACCEPTABLE METHOD OF FORMING JOINT



BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

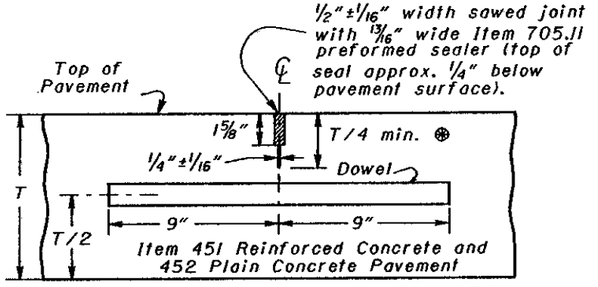
LONGITUDINAL PAVEMENT JOINTS

DATE
2-21-92
10-28-94

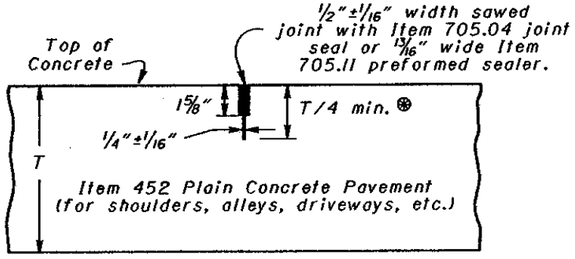
STANDARD CONSTRUCTION DRAWING **BP-2.1**

APPROVED D.K. Hulmes ENGR., L & D

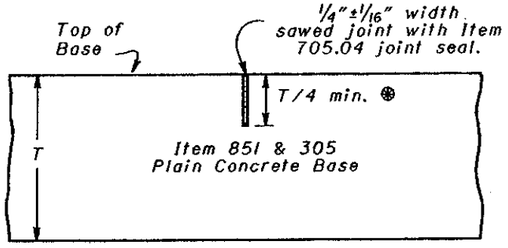
CONTRACTION JOINTS



SECTION - ITEM 451 & 452
(See Notes)



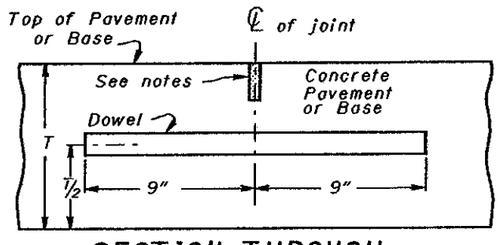
SECTION - ITEM 452
(See Notes)



SECTION - ITEM 851 & 305 BASE

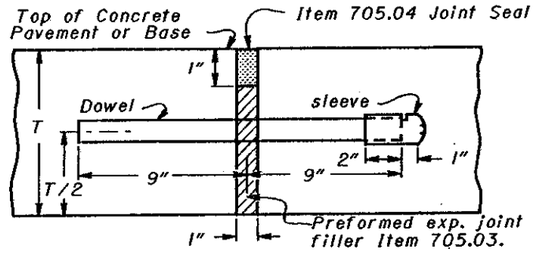
⊛ Where T > 10", the sawcut depth shall be T/3.

CONSTRUCTION JOINT

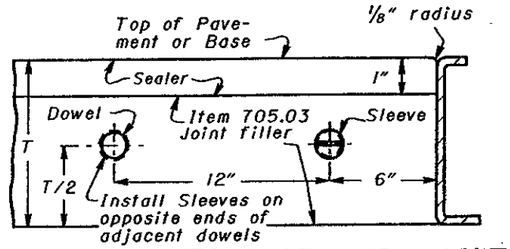


SECTION THROUGH CONSTRUCTION JOINT

EXPANSION JOINT



SECTION THROUGH EXP. JOINT



SIDE ELEVATION OF EXP. JOINT

NOTES

GENERAL: Notes and details shown on this drawing shall be considered in conjunction with and supplemental to the pertinent specifications for portland cement concrete pavement and bases, and incidentals related thereto.

All joints shall be constructed normal to the centerline of the pavement lane unless otherwise directed.

Where dowels are specified, they shall be round, straight steel bars of the size indicated in the following table. Steel bars and dowel basket assemblies shall be coated in accordance with the requirements of Item 709.13.

Dowels shall be spaced at 12" centers, beginning 6" from the longitudinal joint.

DOWEL SIZE	
(T) THICKNESS OF PAVEMENT	DIAMETER OF STEEL DOWEL
8.5" or less	1"
8.6" to 10"	1 1/4"
over 10"	1 1/2" or as shown on plan

ASSEMBLY: Each joint assembly used to hold dowels in position shall be continuous between longitudinal joints or between longitudinal joint and pavement edge. The assembly shall be firmly held in proper position by at least eight 1/2" steel pins driven at an angle to brace the assembly from lateral and vertical displacement during the placing of the concrete. These pins shall be at least 18" in length. Two of these pins shall be driven opposite each other at each end of the assembly and the remaining pins shall be driven in staggered positions on each side of the assembly. In exceptional cases where it is impractical to use the 18" length pins, such as where hardpan or rock is encountered, the Engineer may authorize use of shorter pins provided the assembly is held firmly. Where the assembly is placed on granular material which may allow settlement or distortion, the assembly shall be anchored to prevent settlement or distortion with some combination of pins and/or steel plates, or by some other means to the satisfaction of the Engineer.

When concrete pavement is placed on an existing concrete pavement or a stabilized base, the joint assemblies (baskets) shall be held firmly in position by the use of a power driven fastener and an appropriate clip at 6 locations along the assembly (3 each side of the assembly) to secure the basket from lateral and vertical displacement during concrete placement.

Dowel spacing is shown for pavement lanes of even foot widths. Where other widths are specified, standard cages may be used with dowel spacings adjusted as follows:

The 6" dowel spacing shall be maintained at the longitudinal joint. The spacing at the outer edge of the lane may be increased up to 12". Where an odd width of lane occurs, a dowel shall be placed 6" from the outer edge of the lane if the standard cage would provide for a space exceeding 12". Such a dowel shall be held rigidly in proper position by a method satisfactory to the Engineer or a dowel cage of greater length than required may be used by cutting the assembly and splicing to attain the required length.

This drawing is intended for use with a uniform depth pavement. When the project involves the placing of variable depth pavement, the joint components shall be held in place in accordance with the method shown in the plan or as approved by the Engineer.

EXPANSION JOINTS: Expansion joint filler shall be held rigidly in position and shall be continuous for the full width of each lane. The face of the expansion joint shall be perpendicular to the concrete surface and shall not be skewed horizontally except when abutting a skewed bridge approach slab.

Smooth dowels shall be used, and free movement shall be provided by applying a coating of a thin layer of oil or other "bond-breaking" material just prior to placing the concrete. One free end of each dowel shall be equipped, after coating, with a sleeve of metal or other approved material approximately 3" long, designed with crimped end and overlapping seams fitting closely around the dowel. Each sleeve shall be provided with a depression or interior projection to act as a stop for the dowel, sufficiently distant from the crimped end to allow 1" for longitudinal dowel movement with pavement expansion. In lieu of this requirement, any other means may be used if approved by the Director.

Proper size dowel holes shall be punched or drilled into the preformed expansion joint filler in order to insure tight fitting dowels.

CONTRACTION JOINTS: All contraction joints in Item 451 Reinforced Concrete Pavement shall be dowelled. Contraction joints in Item 452 Plain Concrete Pavement shall be dowelled where they are located in mainline pavement, ramps, acceleration/deceleration lanes, or collector/distributor lanes, or shoulders within 500 feet of a pressure relief joint. Contraction joints in Item 452 Plain Concrete Pavement shall not be dowelled in alleys, private drives, or commercial drives.

To provide for longitudinal movement at the joint, dowels shall be smooth and coated with a bond breaking material such as a thin layer of oil just prior to placing the concrete.

Contraction joints of the type specified shall be spaced in accordance with the following table:

CONTRACTION JOINT SPACING	
TYPES OF PAVEMENT OR BASE	MAXIMUM SPACING BETWEEN JOINTS
Item 451 Reinforced Concrete Pavement	21 lin. ft.
Item 452 Plain⊛ Concrete Pavement	17 lin. ft.
Items 851 & 305 Plain Concrete Base	20 lin. ft.

⊛ Where Item 452 Plain Concrete Pavement (for shoulders, etc.) is being placed and tied longitudinally to Item 451, Reinforced Concrete Pavement, or Item 305, Plain Concrete Base, the joints in Item 452 shall match the spacing alignment, sawing, and sealing requirements of the joints in the Item 451 or 305. Where Item 452, Plain Concrete Pavement, is being used as a shoulder, rumble strips shall be placed as per Std. Constr. Dwg. BP-8.1.

CONSTRUCTION JOINTS: Smooth dowels shall be used in transverse construction joints in all portland cement concrete pavements, shoulders and base. The joint shall be formed by using an adequate bulkhead that will provide a straight joint. The bulkhead shall have openings provided for dowel bars spaced as outlined under "GENERAL." The bulkhead shall be shaped to fit the typical section of the pavement or base. Dowels shall be held rigidly in position during the placing of the concrete.

Construction joints in reinforced concrete pavement may be located at a contraction joint or between contraction joints, provided they are not closer than 10 feet to another parallel joint. In plain concrete pavement or concrete base a construction joint shall not be located closer than 6 feet to another parallel joint.

Kerf and seal conforming in all respects to details shown for contraction joints shall be provided at each construction joint in concrete pavement and base.

SEALING BASE CONTRACTION JOINTS: All contraction joints for plain concrete bases shall be sealed as detailed hereon and the cost included in the unit price bid for Item 305 or 851.

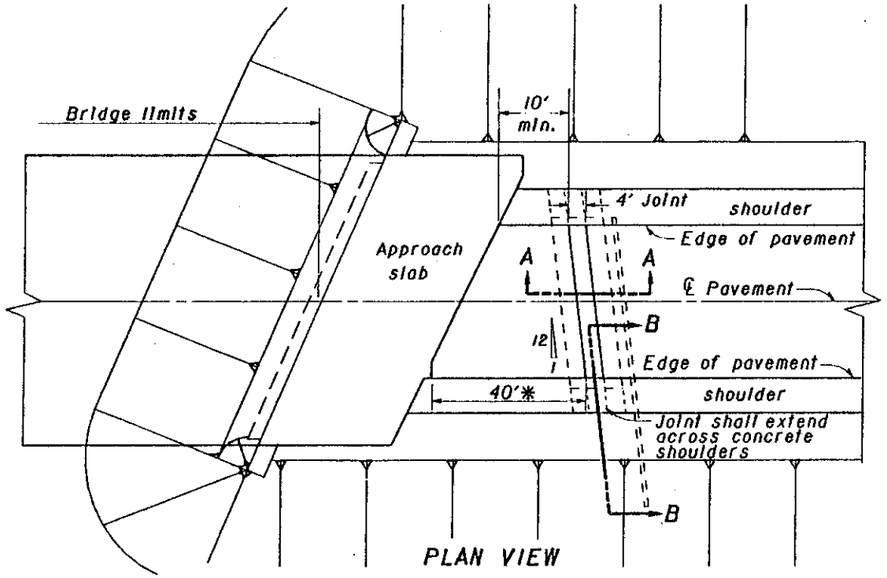
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

TRANSVERSE PAVEMENT JOINTS

DATE
2-21-92
10-28-94

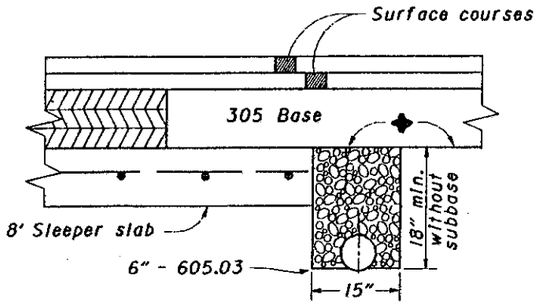
STANDARD CONSTRUCTION DRAWING **BP-2.2**

APPROVED T.K. Hulman
ENGR., L & D



PLAN VIEW

PRESSURE RELIEF JOINT - TYPE A



ALTERNATE PAVEMENT DETAIL

For details not shown, see Section A-A

REINFORCING STEEL LIST 5/8" Ø

Mark	Shape	No.	Length	Bending Diagram
R501	St.	8	S-6"	1'-7" 9" 1'-7"
R502	St.	⊛S	7'-6"	9"
R503	Bt.	⊛S-2	4'-3"	R503

⊛S = Length of sleeper slab (in feet).
R501 bars may be furnished in segments with a 1'-7" bar lap between segments.

NOTES

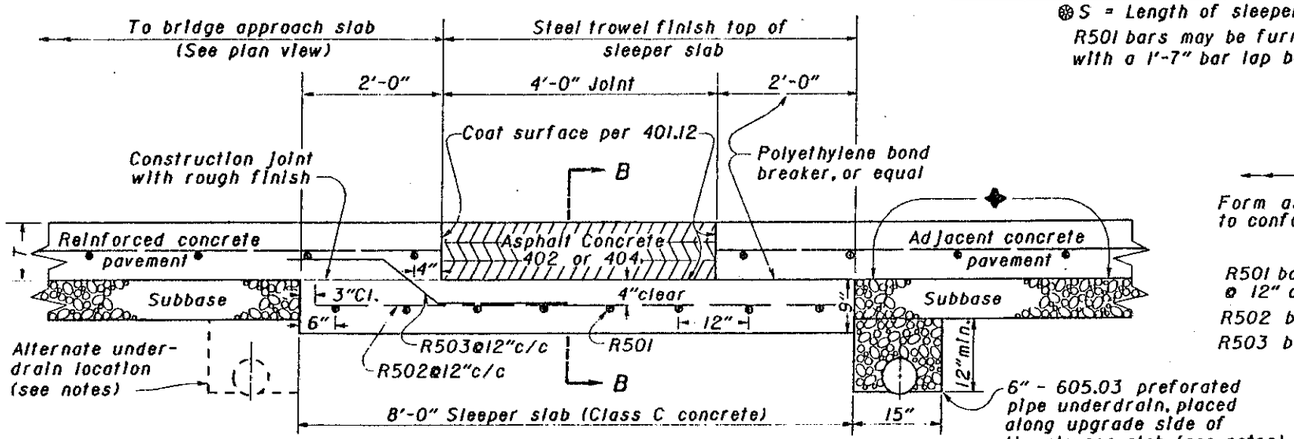
ASPHALT CONCRETE, 402 or 404, shall be compacted in three equal courses with compaction equipment as approved by the Engineer. Surface of the asphalt concrete shall be flush to 1/4" above the concrete pavement surface.

MEASUREMENT of the pressure relief joint for pay purposes shall be along the centerline of the joint, edge to edge of pavement when asphalt shoulders are used, edge to edge of shoulder when concrete shoulders are used, or back to back of curbs. Payment shall be per linear foot for item Special, Pressure Relief Joint, Type A, which shall include all work and materials necessary to complete the joint except for the aggregate drains or pipe underdrains which shall be constructed and paid for under item 605.

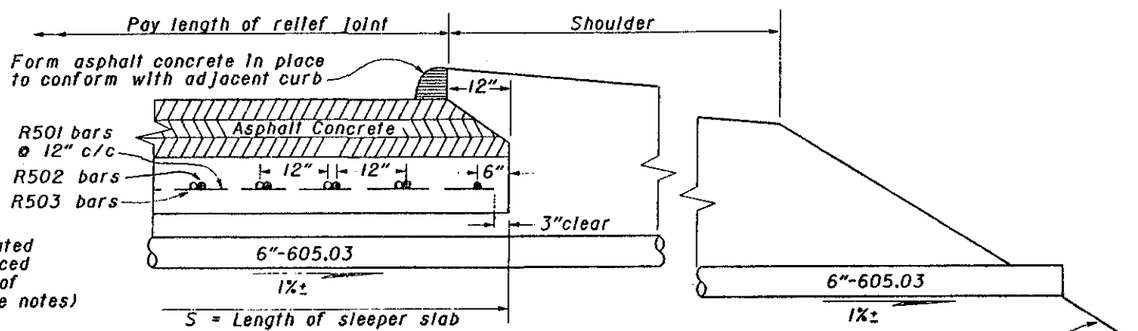
UNDERDRAIN: A perforated metal pipe underdrain, 707.01 or 707.21 shall be placed along the upgrade side of the sleeper slab. It shall extend from edge to edge of the sleeper slab and shall be outletted as shown on the plan, either to a longitudinal underdrain, a catch basin, or through the embankment or ditch inslope. These drains shall be paid for per linear foot of item 605 6" Shallow pipe underdrains, 707.01 or 707.21.

EXPANSION JOINTS normally required in the bridge approach pavement per 451.08(c) will not be required.

CONCRETE BASE AND PLAIN CONCRETE PAVEMENT placed between the approach slab and the pressure relief joint shall be reinforced with steel mesh and load transfer devices provided in transverse joints as per the requirements of BP-1.1, BP-2.2 and item 451. The cost of the mesh and dowels shall be considered incidental to the appropriate pavement item.

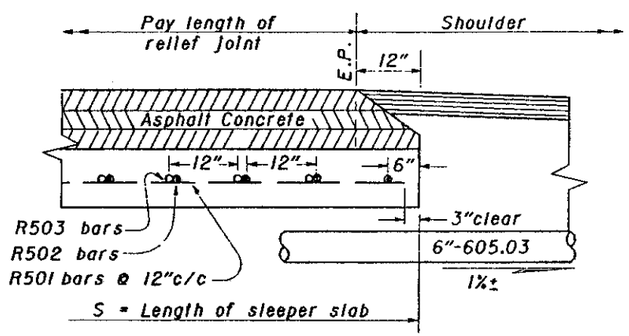


SECTION A-A

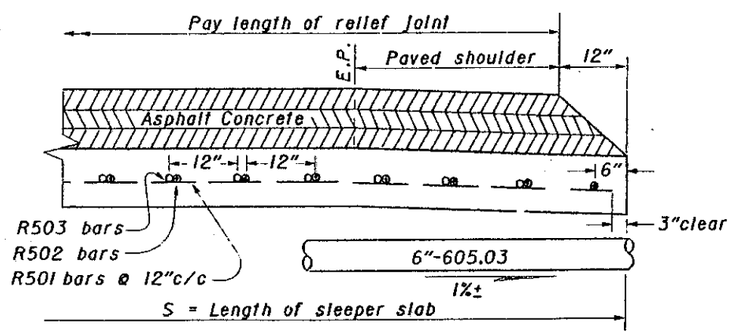


SECTION B-B WITH CURB

(showing on underdrain outlet "through the embankment")



SECTION B-B WITH ASPHALT SHOULDERS



SECTION B-B WITH CONCRETE SHOULDERS

✥ Care shall be taken in the area 0' to 4' from the sleeper slab to be sure the surface of the subbase or subgrade is finished smooth and is flush with or slightly higher than the surface of the sleeper slab.

* Where there are conflicts such as utilities, drainage structures, intersections, excessive bridge skew, etc., this dimension may be varied to fit the situation.

T = thickness as shown on plan

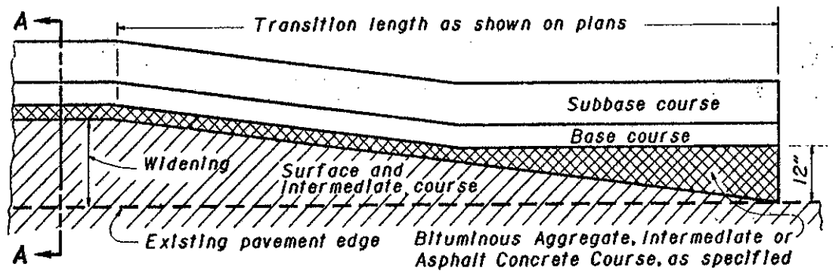
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

PRESSURE RELIEF JOINT TYPE A

DATE 2-21-92

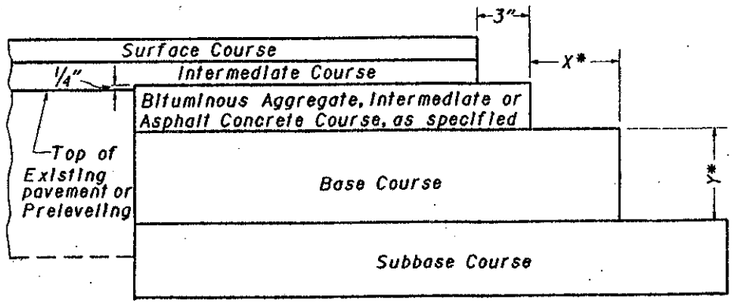
STANDARD CONSTRUCTION DRAWING **BP-2.3**

APPROVED R.K. Hulman ENGR. L & D



PLAN

MERGING EDGE OF PAVEMENT WIDENING WITH EDGE OF EXISTING PAVEMENT

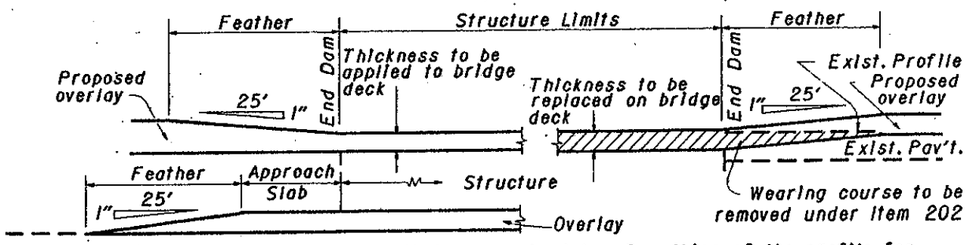


The Bituminous Aggregate in the upper part of the base widening shall finish approximately 1/4" above the edge of the existing pavement where no preleveling is used. Where a preleveling (using intermediate course material) is specified it shall be placed prior to excavation of the widening trench and the upper course of the base widening shall finish approximately 1/4" 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.

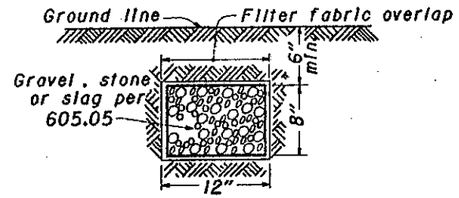
SECTION A-A

COURSE DETAIL FOR WIDENING



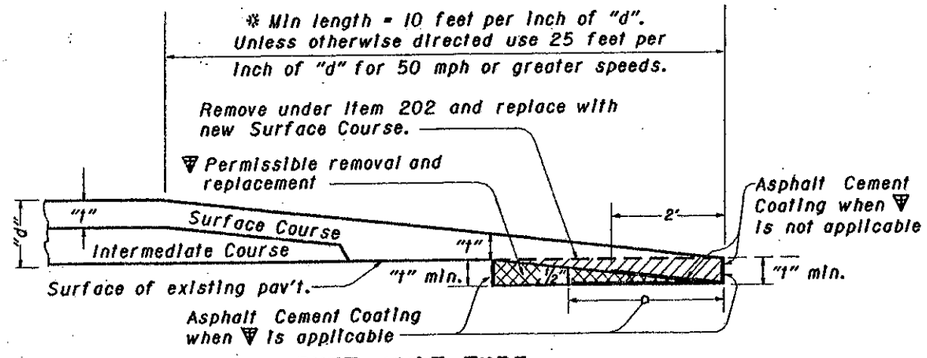
Details assume non-settled approach slabs. Smoothing of the profile for settlement is required per plan grades or as directed by the Engineer.

FEATHERING AT STRUCTURES

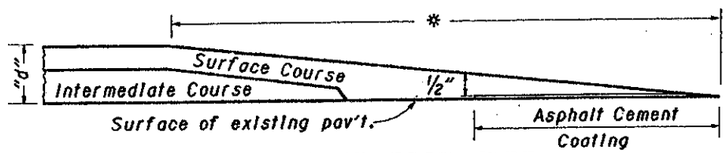


Aggregate drains to be placed where and as directed by Engineer. Provide filter fabric when specified as a separate pay item.

AGGREGATE DRAIN



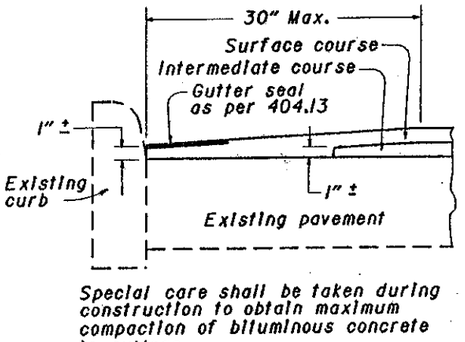
BUTT JOINT TYPE



TAPER EDGE TYPE

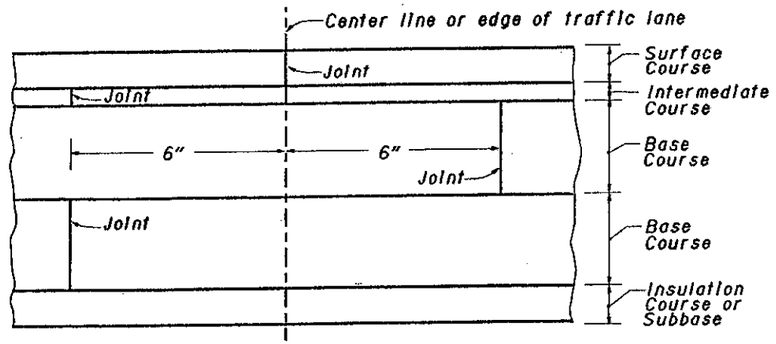
NOTE: Either butt or taper type may be used unless type is specified by the plan.

PLACING FEATHERED AREAS

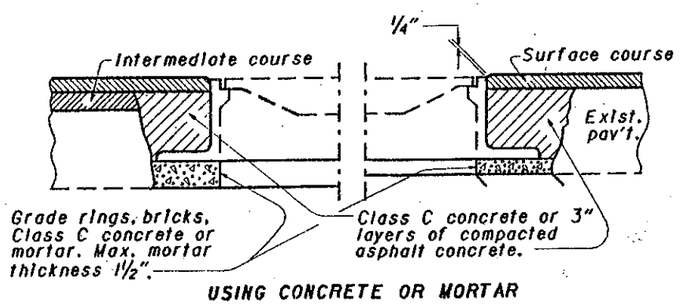


Special care shall be taken during construction to obtain maximum compaction of bituminous concrete in gutters.

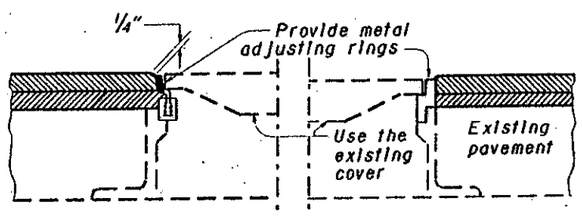
GUTTER FINISH



LAPPING LONGITUDINAL JOINTS



USING CONCRETE OR MORTAR



USING METAL ADJUSTING RINGS

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

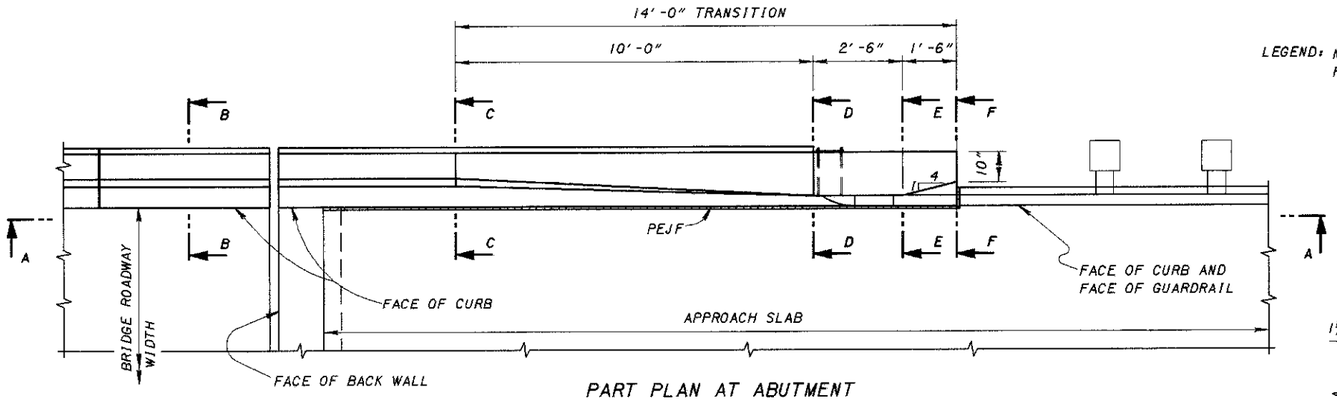
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

DATE 2-21-92

RESURFACING

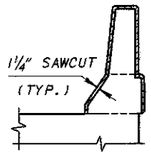
STANDARD CONSTRUCTION DRAWING **BP-3.1**

APPROVED D.K. Hulmes ENGR., L. & D

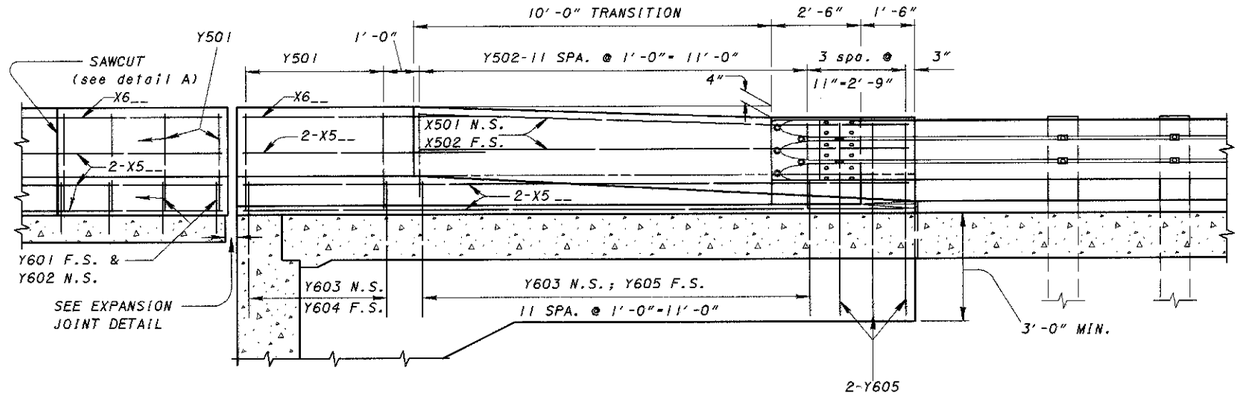


PART PLAN AT ABUTMENT

LEGEND: N.S.=NEAR SIDE
F.S.=FAR SIDE



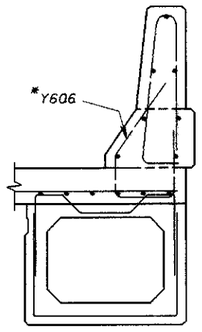
DETAIL A
(section through sawcut)
Sawcut Perimeter = 7'-1"



SECTION A-A

VERTICAL BARS SHALL BE SPACED AT 1'-0" MAXIMUM.
(see project plans)

* - BARS Y601 (DIM. B), Y604, Y606 (DIM. C) SHALL EXTEND 1'-9" TO 2'-0" ABOVE THE CONSTRUCTION JOINT BETWEEN DECK AND PARAPET.



BOX BEAM REINFORCING DETAIL
(composite deck)

DESIGN SPECIFICATIONS: "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY AASHTO, 1996, INCLUDING THE 1997 INTERIM SPECIFICATION.

DESIGN DATA: CONCRETE CLASS S f'c = 4500 PSI. REINFORCING STEEL ASTM A615, A616 OR A617 GRADE 60 fy = 60000 PSI.

CONTROL JOINTS FOR CONCRETE PARAPETS: THE JOINTS SHALL BE CONSTRUCTED BY SAWING 1/4 INCH DEEP ALONG PERIMETER OF THE PARAPET AS SOON AS THE SAW CAN BE OPERATED WITHOUT DAMAGING THE CONCRETE.

THE USE OF AN EDGE GUIDE, FENCE, OR JIG IS REQUIRED TO ENSURE THAT THE CUT JOINT IS STRAIGHT, TURE, AND ALIGNED ON ALL FACES OF THE PARAPET. THE JOINT WIDTH SHALL BE THE WIDTH OF THE SAW BLADE, A NOMINAL WIDTH OF 1/4 INCH.

THE PERIMETER OF THE DEFLECTION CONTROL JOINT SHALL BE SEALED WITH A CAULKING MATERIAL TO A MINIMUM DEPTH OF ONE INCH CONFORMING TO FEDERAL SPECIFICATION TT-S-00227E. THE BOTTOM ONE-HALF INCH OF BOTH THE INSIDE AND OUTSIDE FACES OF THE PARAPET SHOULD BE LEFT UNSEALED TO ALLOW ANY WATER WHICH MAY ENTER THE JOINT TO ESCAPE.

SAWCUT SHALL BE PLACED AT A MINIMUM OF 6'-0" AND MAXIMUM OF 10'-0" CENTERS.

QUANTITIES OF CONCRETE, REINFORCING STEEL, DEFLECTION JOINT SAWCUT AND CAULKING MATERIAL FOR PARAPET ARE INCLUDED WITH APPROPRIATE ITEM UNDER EITHER ABUTMENTS OR SUPERSTRUCTURE FOR PAYMENTS.

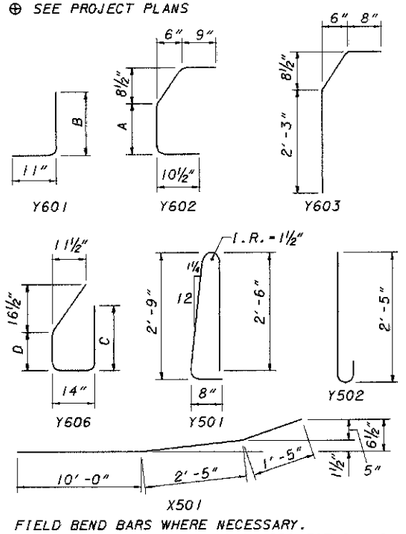
FOR BRIDGE TERMINAL ASSEMBLY SEE STANDARD CONSTRUCTION DRAWING GR-3.1 AND GR-3.2.

Volume of 14'-0" transition section is 1.7 Cu.Yd.

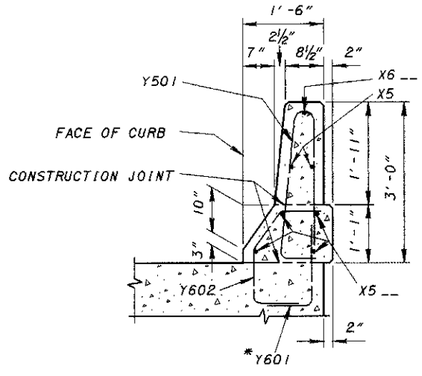
REINFORCING BAR LIST

MARK	LENGTH	SHP.	MARK	LENGTH	SHP.
X501	13'-10"	BT.	Y601	B+9"	BT.
X502	13'-10"	STR.	Y602	A+2'-2"	BT.
X5__	⊕	STR.	Y603	3'-8"	BT.
			Y604	2'-10"	STR.
X6__	⊕	STR.	Y605	4'-6"	STR.
			Y606	C+D+2'-6"	BT.
Y501	6'-0"	BT.			
Y502	3'-0"	BT.			

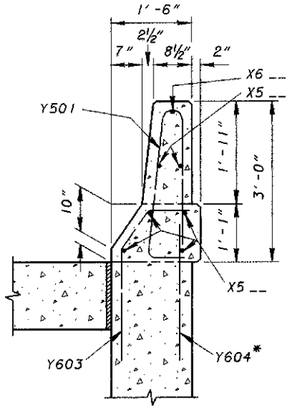
⊕ SEE PROJECT PLANS



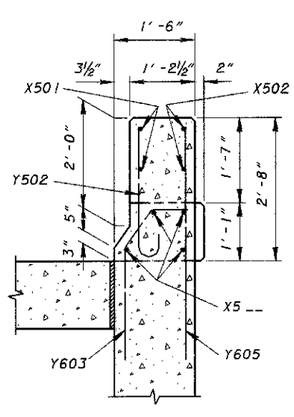
FIELD BEND BARS WHERE NECESSARY.
INCLUDE BENDING DIAGRAMS ON PROJECT PLANS.



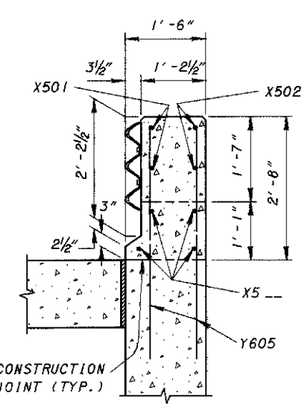
SECTION B-B
(except box beam)
Area = 449.25 Sq.In.



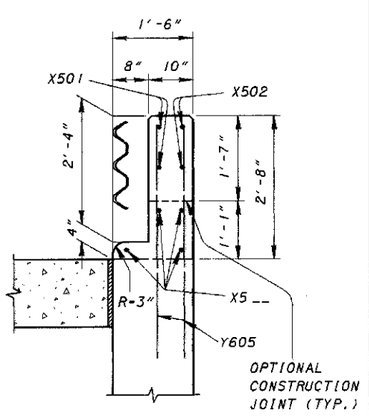
SECTION C-C



SECTION D-D



SECTION E-E



SECTION F-F

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
5-29-79 DATE
ADMINISTRATOR

DESIGN AGENCY
OFFICE OF
STRUCTURAL ENGINEERING

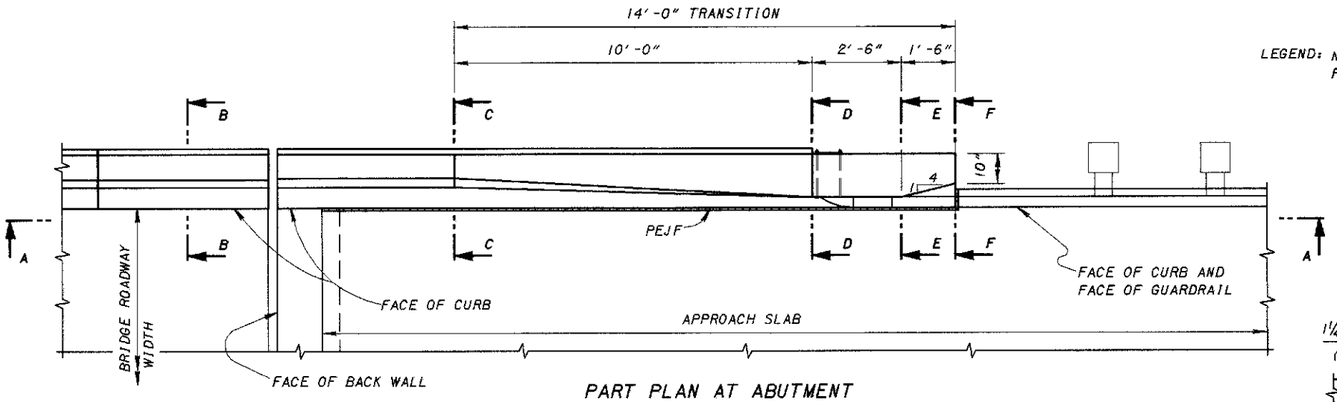
REVIEWED LAW
CHECKED JS
DESIGNED REZA
DRAWN REZA

REVISIONS
07-15-94
12-15-94
01-06-99

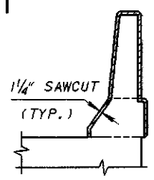
STANDARD
BRIDGE RAILING
DEFLECTOR PARAPET TYPE
36"

BR-1

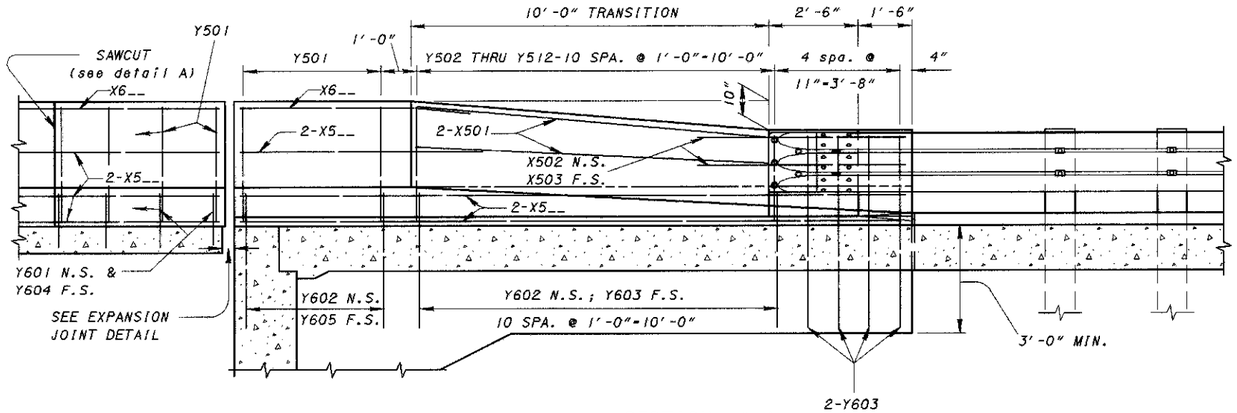
1/2



PART PLAN AT ABUTMENT



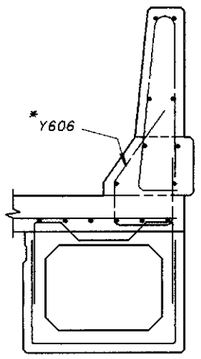
DETAIL A
(section through sawcut)
Sawcut Perimeter = 8'-1"



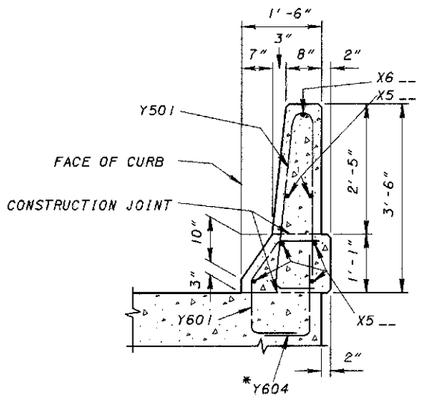
SECTION A-A

VERTICAL BARS SHALL BE SPACED AT 1'-0" MAXIMUM.
(see project plans)

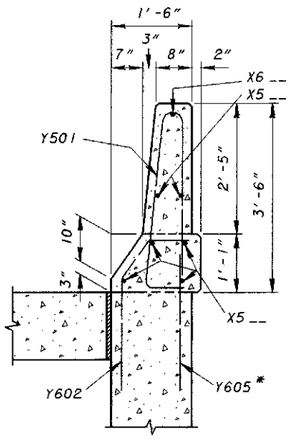
* - BARS Y604 (DIM. B), Y605, Y606 (DIM. C) SHALL EXTEND 1'-9" TO 2'-0" ABOVE THE CONSTRUCTION JOINT BETWEEN DECK AND PARAPET.



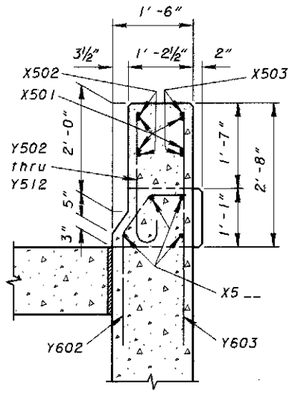
BOX BEAM REINFORCING DETAIL
(composite deck)



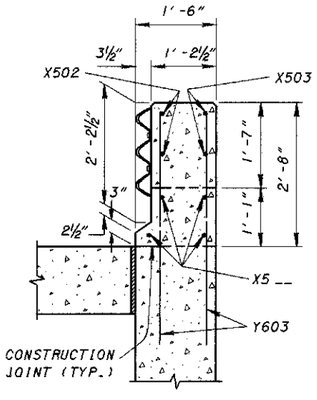
SECTION B-B
(except box beam)
Area = 500.5 Sq.In.



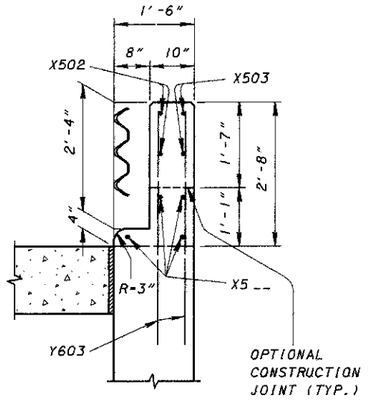
SECTION C-C



SECTION D-D



SECTION E-E



SECTION F-F

DESIGN SPECIFICATIONS: "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY AASHTO, 1996, INCLUDING THE 1997 INTERIM SPECIFICATION.

DESIGN DATA: CONCRETE CLASS S f'c = 4500 PSI. REINFORCING STEEL ASTM A615, A616 OR A617 GRADE 60 fy = 60000 PSI.

CONTROL JOINTS FOR CONCRETE PARAPETS: THE JOINTS SHALL BE CONSTRUCTED BY SAWING 1¼ INCH DEEP ALONG PERIMETER OF THE PARAPET AS SOON AS THE SAW CAN BE OPERATED WITHOUT DAMAGING THE CONCRETE.

THE USE OF AN EDGE GUIDE, FENCE, OR JIG IS REQUIRED TO ENSURE THAT THE CUT JOINT IS STRAIGHT, TURE, AND ALIGNED ON ALL FACES OF THE PARAPET. THE JOINT WIDTH SHALL BE THE WIDTH OF THE SAW BLADE, A NOMINAL WIDTH OF ¼ INCH.

THE PERIMETER OF THE DEFLECTION CONTROL JOINT SHALL BE SEALED WITH A CAULKING MATERIAL TO A MINIMUM DEPTH OF ONE INCH CONFORMING TO FEDERAL SPECIFICATION TT-S-00227E. THE BOTTOM ONE-HALF INCH OF BOTH THE INSIDE AND OUTSIDE FACES OF THE PARAPET SHOULD BE LEFT UNSEALED TO ALLOW ANY WATER WHICH MAY ENTER THE JOINT TO ESCAPE.

SAWCUT SHALL BE PLACED AT A MINIMUM OF 6'-0" AND MAXIMUM OF 10'-0" CENTERS.

QUANTITIES OF CONCRETE, REINFORCING STEEL, DEFLECTION JOINT SAWCUT AND CAULKING MATERIAL FOR PARAPET ARE INCLUDED WITH APPROPRIATE ITEM UNDER EITHER ABUTMENTS OR SUPERSTRUCTURE FOR PAYMENTS.

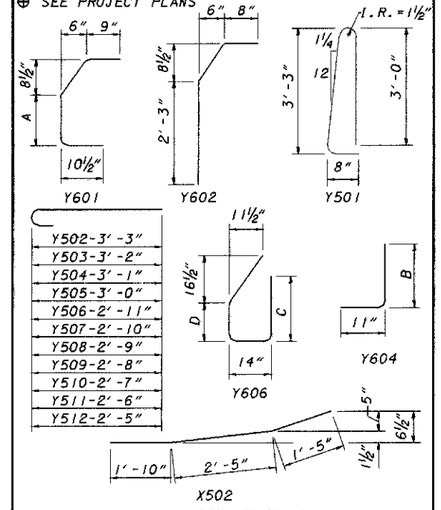
FOR BRIDGE TERMINAL ASSEMBLY SEE STANDARD CONSTRUCTION DRAWING GR-3.1 AND GR-3.2.

Volume of 14'-0" transition section is 1.78 Cu.Yd.

REINFORCING BAR LIST

MARK	LENGTH	SHP.	MARK	LENGTH	SHP.
X501	10'-0"	STR.	Y501	7'-1"	BT.
X502	5'-8"	BT.	Y502	3'-10"	BT.
X503	5'-8"	STR.	Y503	3'-9"	BT.
X5__	⊕	STR.	Y504	3'-8"	BT.
			Y505	3'-7"	BT.
X6__	⊕	STR.	Y506	3'-6"	BT.
			Y507	3'-5"	BT.
Y601	A+2'-2"	BT.	Y508	3'-4"	BT.
Y602	3'-8"	BT.	Y509	3'-3"	BT.
Y603	4'-6"	STR.	Y510	3'-2"	BT.
Y604	B+9"	BT.	Y511	3'-1"	BT.
Y605	2'-10"	STR.	Y512	3'-0"	BT.
Y606	C+D+2'-6"	BT.			

⊕ SEE PROJECT PLANS



FIELD BEND BARS WHERE NECESSARY.
INCLUDE BENDING DIAGRAMS ON PROJECT PLANS.

DESIGN AGENCY
OFFICE OF
STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
5-29-79 DATE
ADMINISTRATOR

REVIEWED LAW
CHECKED JS
DESIGNED REZA
DRAWN REZA

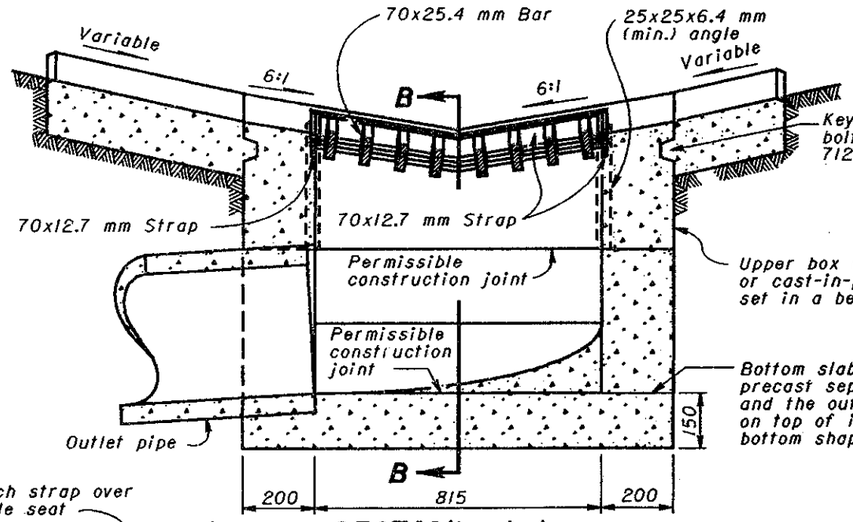
BR-1

REVISIONS
12-15-94
01-06-99

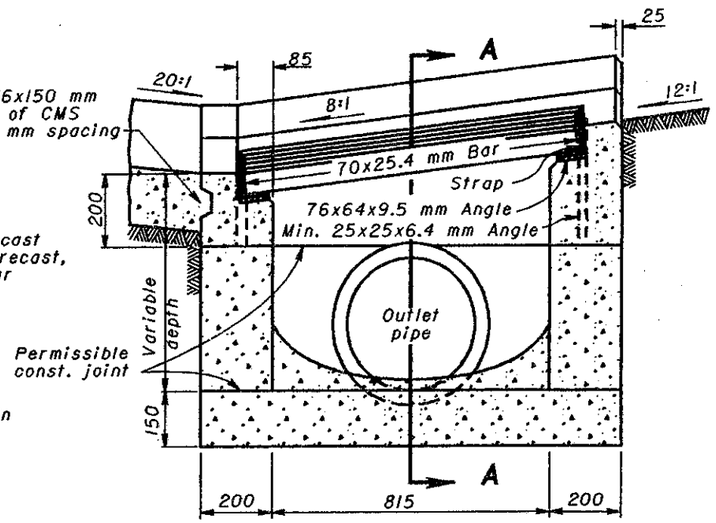
STANDARD
BRIDGE RAILING
DEFLECTOR PARAPET TYPE
42"

2/2

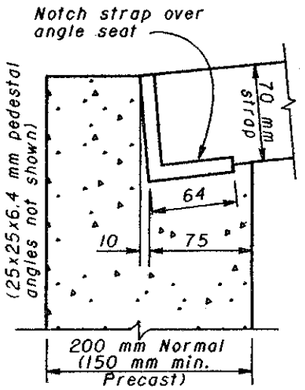
CATCH BASIN No. 8



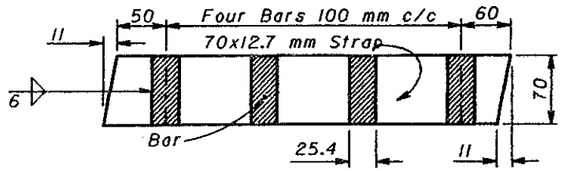
SECTION A-A



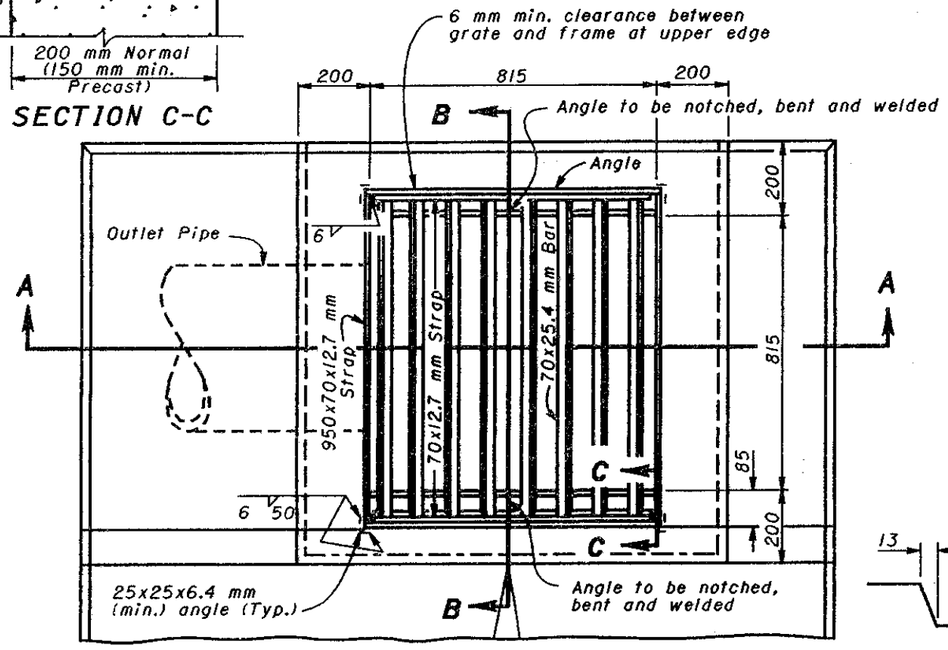
SECTION B-B



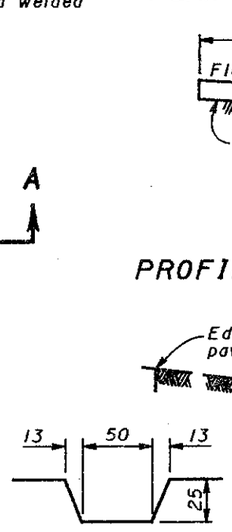
SECTION C-C



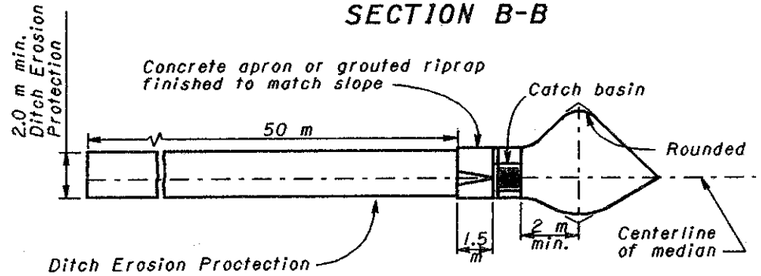
SECTION THRU HALF OF GRATE "C"



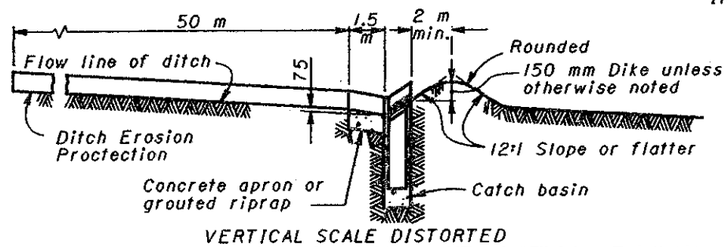
PLAN OF CATCH BASIN



KEY JOINT

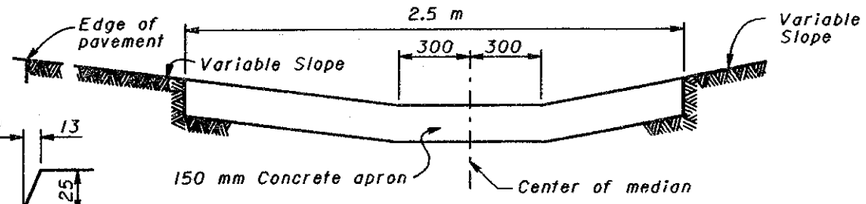


PLAN OF MEDIAN GRADING AT CATCH BASIN



VERTICAL SCALE DISTORTED

PROFILE OF MEDIAN GRADING AT CATCH BASIN



UPSTREAM END VIEW OF CONCRETE APRON OR GROUTED RIPRAP

NOTES

GRATE AND FRAME: Shall be of structural steel in accordance with CMS 711.01 and 513. The design shall be essentially the same and equally as strong as the one shown hereon.

GRATE: Grate shall be depressed 75 mm below the upstream end of the concrete apron at the centerline of the ditch.

WALLS: Brick or cast-in-place walls shall have a nominal thickness of 200 mm from the bottom slab to the upper box. Precast walls shall have a minimum thickness of 150 mm and be reinforced sufficiently to permit shipping and handling without damage.

STEPS: Steps meeting the requirements of Std. Constr. Dwg. MH-1.1M shall be provided where the depth exceeds 1.8 m.

BASINS OVER 3.5 m IN DEPTH: Shall be precast or cast-in-place concrete; reinforced with #15M bars on 300 mm centers both vertically and horizontally with 50 mm clearance from inside wall face.

LOCATION AND ELEVATION: When given on the plans the location is at the center of the grate. The elevation is at the lowest point on the grate.

OPENINGS: Pipe openings shall be the outside diameter of the pipe being supplied plus 50 mm when prefabricated or field cut. The interstitial space shall be filled with grout per CMS 601.

CONCRETE APRONS: Aprons are to be constructed in such a manner that the outside edges are at equal elevation.

DITCH PROTECTION: Provide a 50 m length of ditch erosion protection as shown. Installation and payment for the ditch erosion protection shall comply with CMS 670.

BASINS IN SAG: When in a sag, omit the earth dike and longitudinal slope of grate, and provide concrete apron and ditch protection on each side of the basin.

COST: The concrete apron or grouted riprap and downstream dike shall be considered incidental to Item 604, Catch Basins. However, the apron is not required when Item 604, Catch Basins, Without Apron is specified.

CONSTRUCTION INFORMATION
Typical mass of grate - 111 kg
Typical mass of frame - 29 kg

All dimensions are in millimeters unless otherwise noted.

metric units

This Drawing Replaces CB-8.

BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

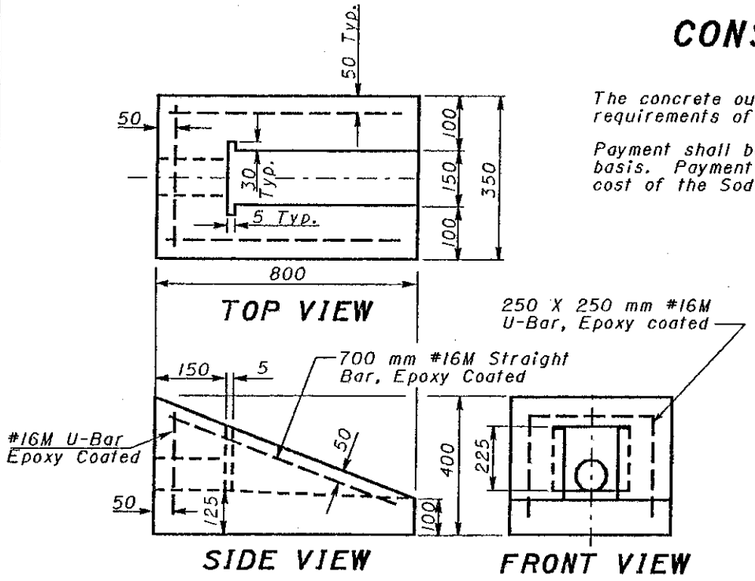
CATCH BASIN No. 8

DATE 7-12-95

STANDARD CONSTRUCTION DRAWING **CB-3.3M**

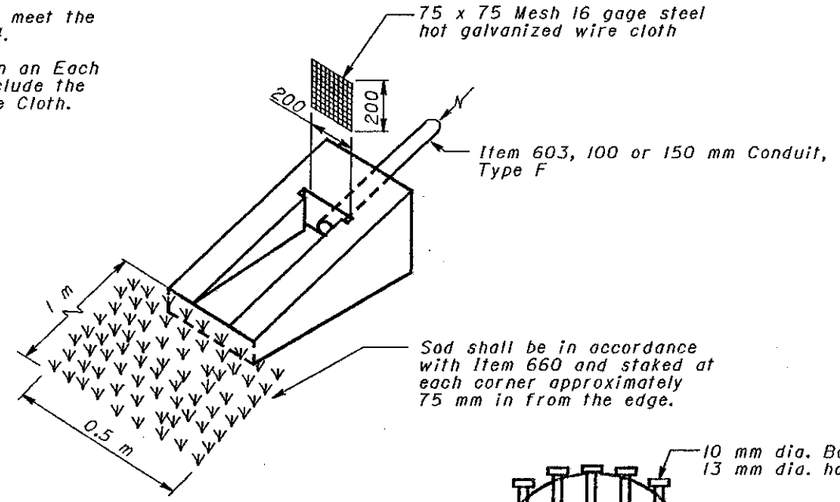
APPROVED D. K. Hinkman
ENGR., L & D

CONSTRUCTION METHODS



The concrete outlet shall meet the requirements of CMS 604.

Payment shall be made on an Each basis. Payment shall include the cost of the Sod and Wire Cloth.

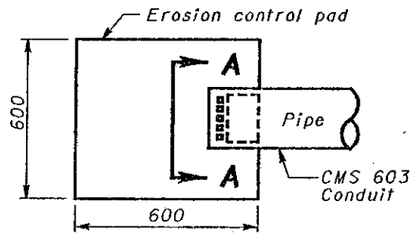


PRECAST REINFORCED CONCRETE OUTLET

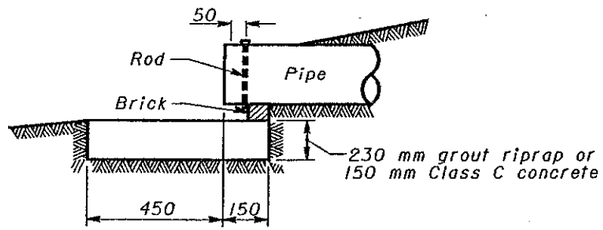
NOTES

MASONRY COLLARS: A masonry collar shall be provide where plans require that a pipe extension be joined to the end of an existing pipe with a butt joint. The cost shall be included in the unit price bid for the new conduit.

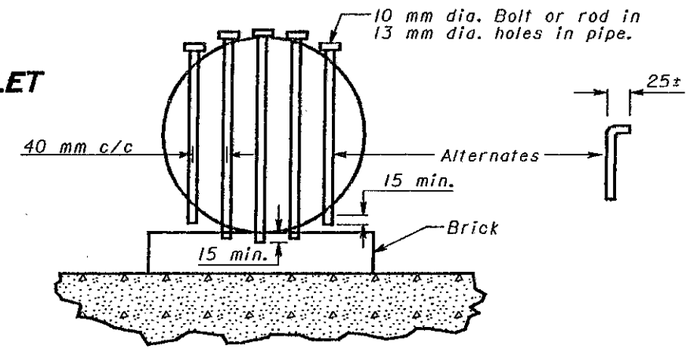
EROSION CONTROL PAD AND ANIMAL GUARDS: These items shall be provided at the outlet end of all farm drains except where they outlet into a drainage structure.
The steel bolts or rods for the animal guard shall be galvanized per CMS 710.06.
In lieu of drilling or punching the 13 mm diameter holes into the pipe, a metal collar meeting all of the above requirements may be clamped onto the pipe if approved by the Engineer.
Payment for the erosion control pads and animal guards shall be included in the unit price bid for Item 603 __ mm Conduit, Type __ .



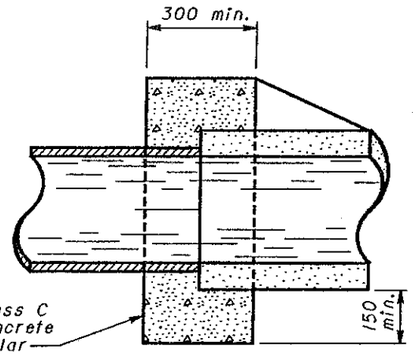
PLAN



PROFILE



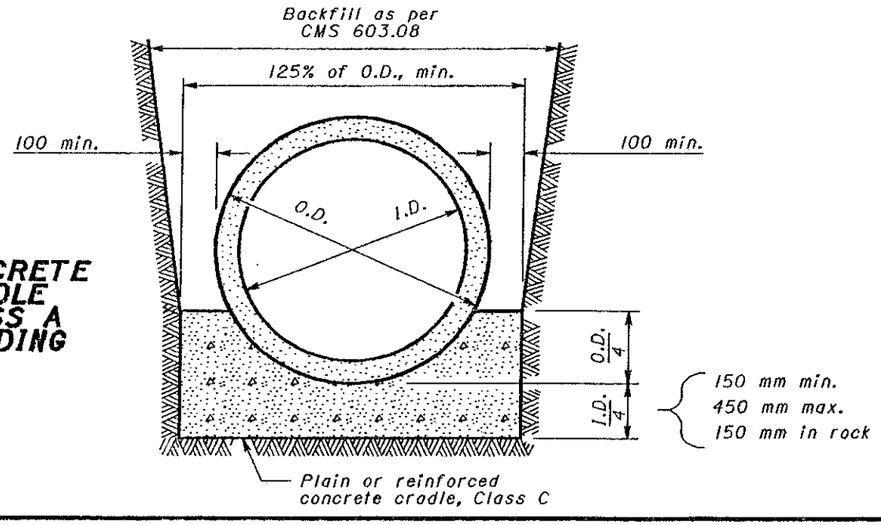
SECTION A-A



MASONRY COLLAR

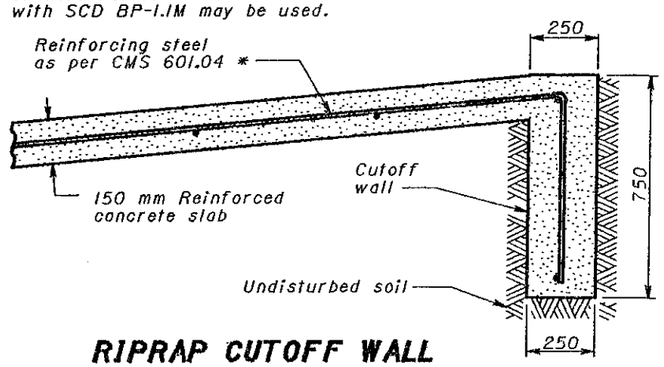
EROSION CONTROL PAD AND ANIMAL GUARD FOR OUTLET PIPE

Conduit Size (mm)	100	150	200	250	300	375	450
No. of Bolts	2	3	5	6	7	9	11



CONCRETE CRADLE CLASS A BEDDING

* If wire fabric is used in the slab, #10M bars at 600 mm overlapping the fabric. 300 mm, or wire fabric in accordance with SCD BP-1.1M may be used.



RIPRAP CUTOFF WALL

The cost of the cutoff wall shall be included in the unit price bid for Item 601 Riprap using 150 mm reinforced concrete slab

All dimensions are in millimeters unless otherwise noted.

metric units

This Drawing Replaces MC-4.

OHIO DEPARTMENT OF TRANSPORTATION

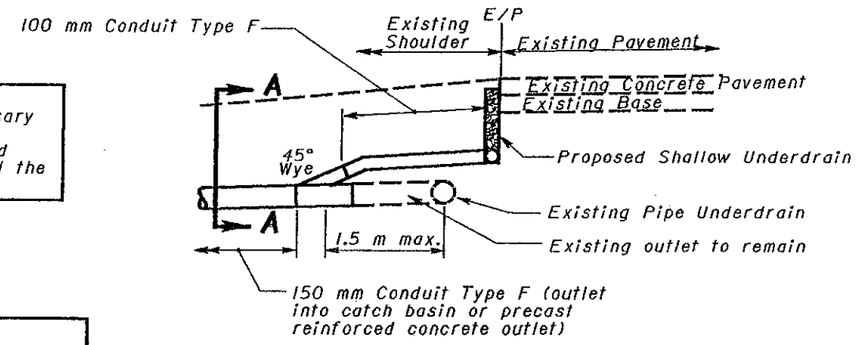
OUTLETS, DRAINS AND SEWERS

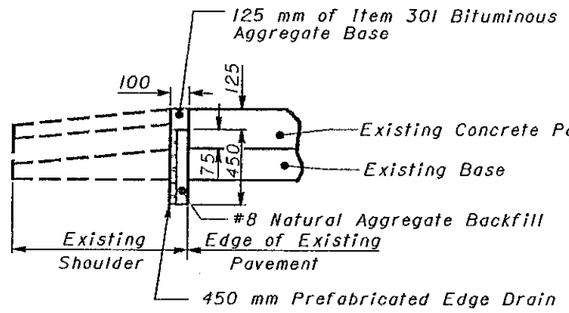
DATE: 6-30-95, 10-21-97

STANDARD CONSTRUCTION DRAWING **DM-1.1M**

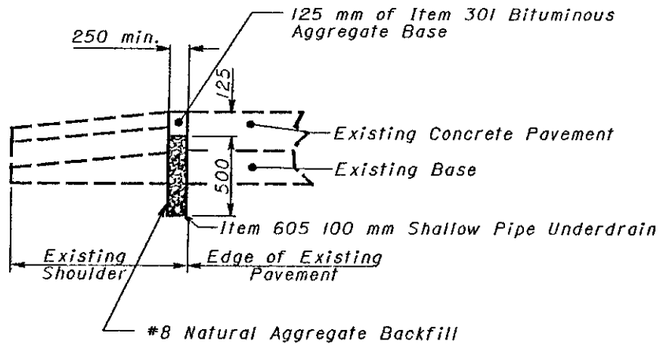
APPROVED Larry F. Sutherland

NOTE:
The cost of the 100 mm Conduit Type F and necessary pipe bends and branches needed to connect the existing and proposed underdrains shall be included with the cost of the 150 mm Conduit Type F beyond the existing underdrain.

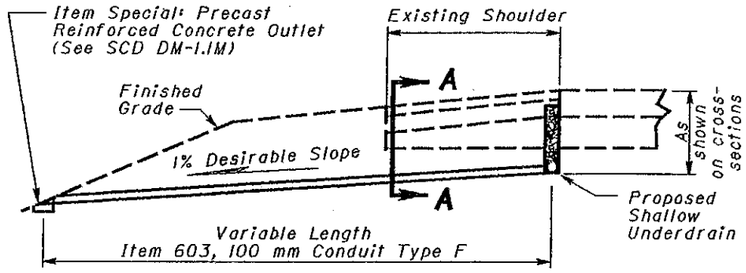


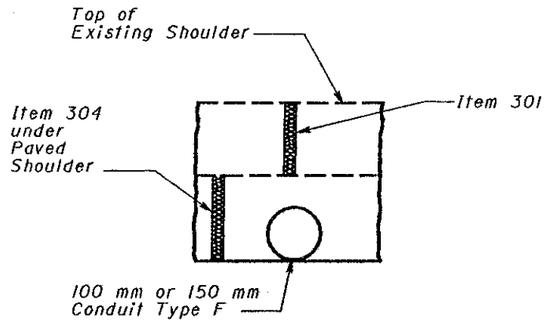


PREFABRICATED EDGE DRAIN SYSTEM



PIPE UNDERDRAIN SYSTEM





SECTION A-A

SHALLOW UNDERDRAIN SYSTEM

NOTES

DESCRIPTION: This item shall consist of furnishing and installing either a pipe underdrain system or a prefabricated edge drain system in accordance with the specifications and with the details on the plans or as directed by the Engineer.

MATERIALS: The underdrain shall either be a pipe underdrain system or a prefabricated edge drain system meeting the requirements of CMS 605.

BASIS OF PAYMENT FOR PIPE UNDERDRAIN SYSTEM ONLY: Work completed, accepted and measured under this item shall be paid for the contract unit price bid for Item 605 - 100 mm Shallow Pipe Underdrain. The price shall be full compensation for excavation and backfill; for furnishing materials, including materials for outlet fittings and Item 301; and for all labor, tools, equipment and incidentals necessary to complete the work.

BASIS OF PAYMENT FOR SHALLOW UNDERDRAIN SYSTEM: Work completed, accepted and measured under this item shall be paid for at the contract unit price bid for Item 605 - Shallow Underdrain. The price shall be full compensation for excavation and backfill; for removing and disposing of all surplus excavation in accordance with CMS 203; for furnishing materials, including materials for splices, outlet fittings, and Item 301; and for all labor, tools, equipment and incidentals necessary to complete the work associated with the installation of prefabricated edge drains or pipe underdrains.

BASIS OF PAYMENT FOR PREFABRICATED EDGE DRAIN SYSTEM: Work completed, accepted and measured under this item shall be paid for at the contract unit price bid for Item 605 - 450 mm Prefabricated Edge Drain. The price shall be full compensation for excavation and backfill; for removing and disposing of all surplus excavation in accordance with CMS 203; for furnishing materials, including materials for splices, outlet fittings, and Item 301; and for all labor, tools, equipment and incidentals necessary to complete the work associated with the installation of prefabricated edge drains or pipe underdrains.

All dimensions are in millimeters unless otherwise noted.

metric units

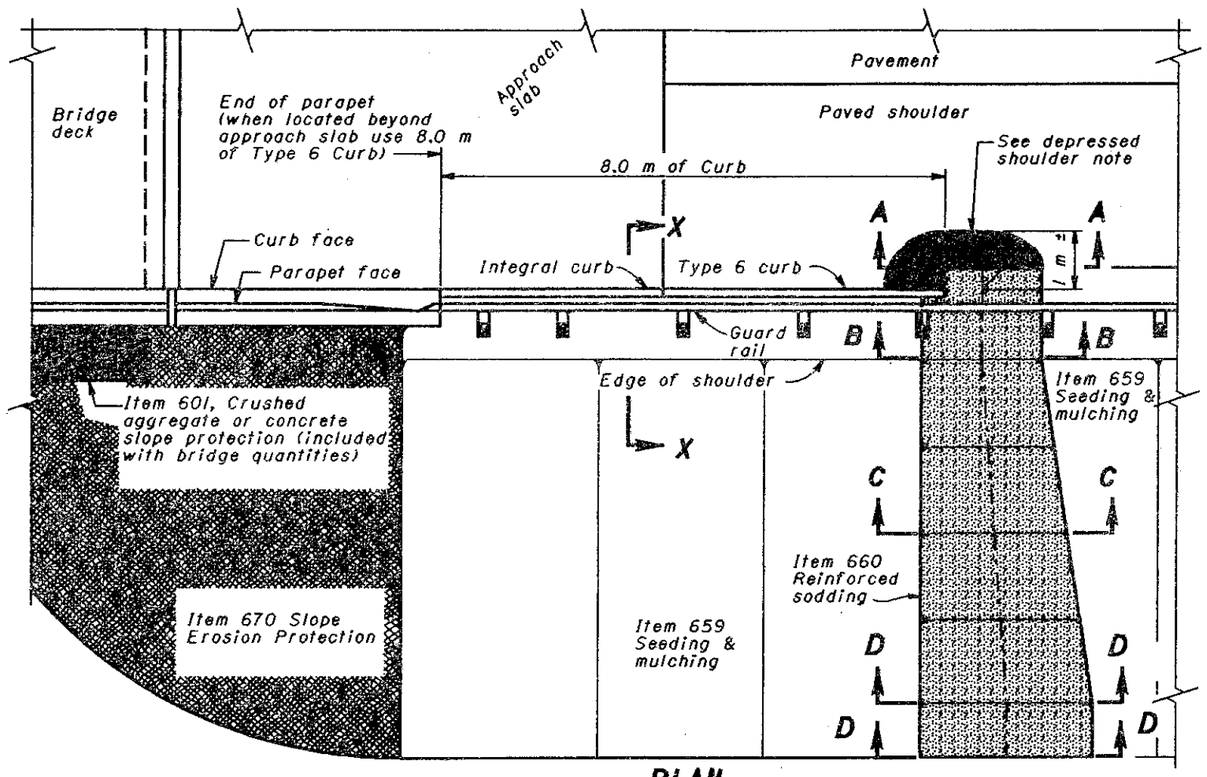
OHIO DEPARTMENT OF TRANSPORTATION

SHALLOW UNDERDRAINS

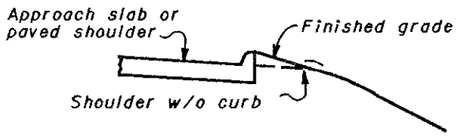
DATE
6-30-95
10-21-97

STANDARD CONSTRUCTION DRAWING **DM-1.2M**

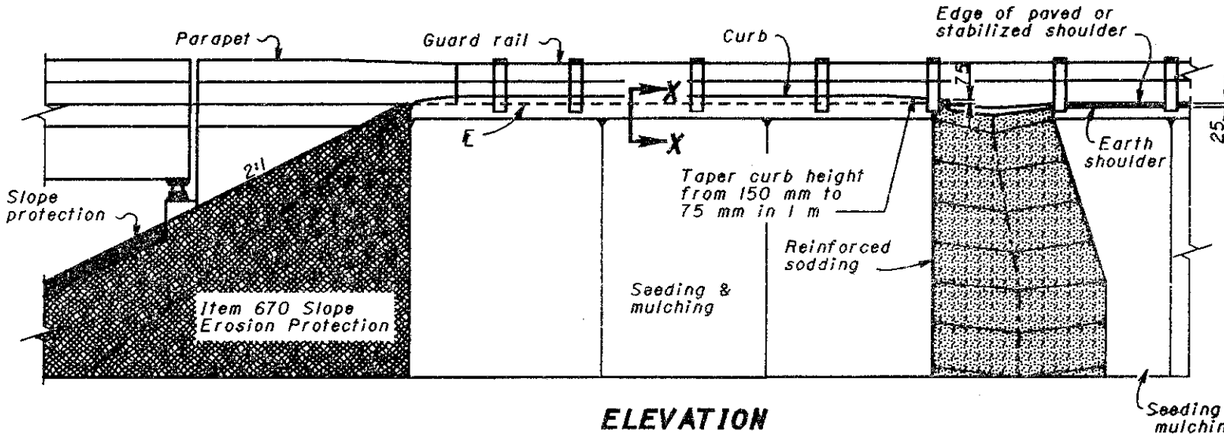
APPROVED Gary T. Sutherland



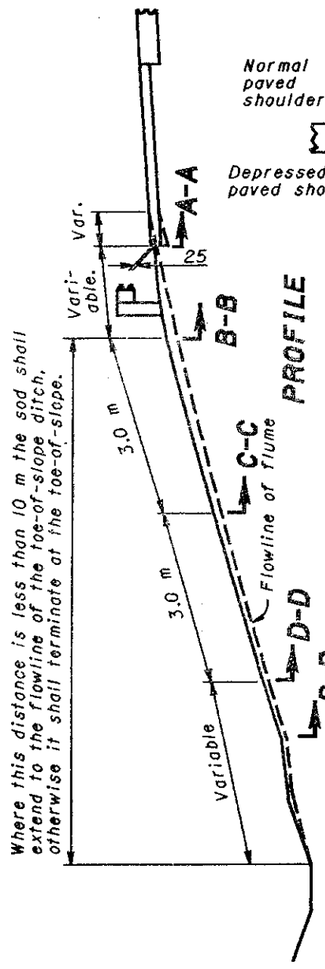
PLAN

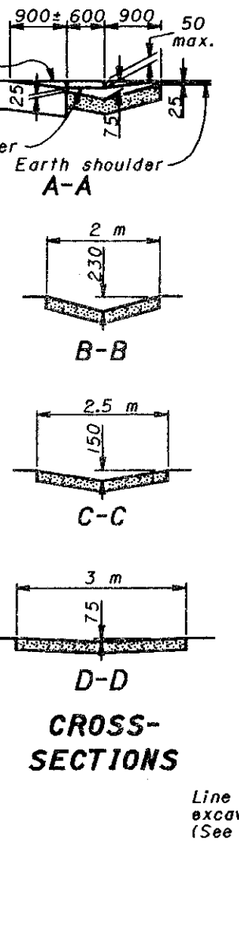


SECTION X-X



ELEVATION





CROSS-SECTIONS

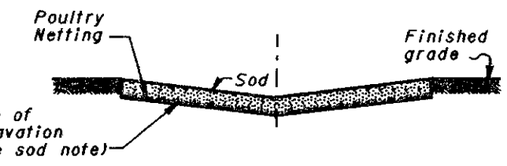
NOTES

DEPRESSED SHOULDER: This portion of the shoulder shall be depressed to ensure positive drainage into the sodded flume. It is especially important in the shoulder area to excavate and shape the subgrade according to the cross-sections.

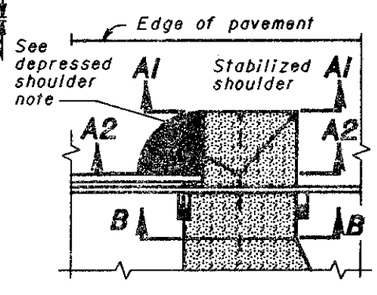
PLACING REINFORCED SODDING: Prior to placing the sod, galvanized poultry netting shall be placed on the finished subgrade. The netting shall be 1200 mm wide, poultry netting or equivalent, with 50 mm mesh and No. 20 gage minimum wire. Each strand shall be staked securely to the subgrade by using T-shaped pins or 25x25x200 mm wood stakes of the size stated in CMS 660.06. The stakes or pins shall be placed at 1.2 m intervals on the top and bottom and in rows 1.2 m apart. The poultry netting shall be fastened to the wood stakes with staples. Where the sodding is from 2.5 m to 3.0 m wide, two strands of netting for a total width of 2.4 m is permitted.

SOD: Sod shall be laid in accordance with CMS 660. Special care shall be taken to excavate the sod bed to a proper depth so that the sod is flush with the surrounding grade.

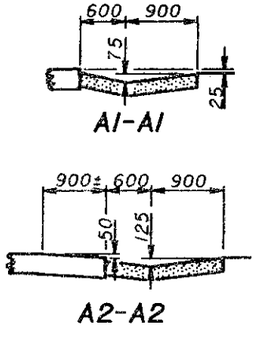
PAYMENT: Payment for all the above shall be included in the unit price bid for Item 660, Square Meter, Reinforced Sodding.



SOD INSTALLALLATION DETAIL



STABILIZED SHOULDER DETAIL



All dimensions are in millimeters unless otherwise noted.

metric units

This Drawing Replaces MC-7.

BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

EROSION CONTROL AT BRIDGES

DATE 6-30-95

STANDARD CONSTRUCTION DRAWING **DM-4.1M**

APPROVED B.K. Hubman
ENGR., L & D

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.

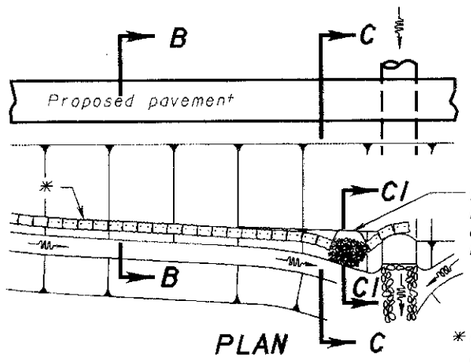
Each bale shall be firmly staked with a minimum of two stakes at least 3' [1 m] in length. Stakes shall be wooden 2"x2" [50x50], reinforcing bars or fence posts.

Loose straw or hay shall be wedged between and under staked bales.

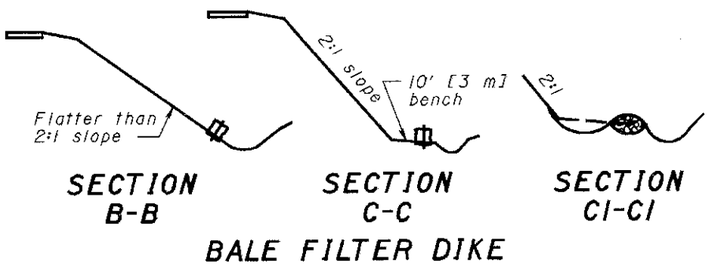
PITS: Sediment pits shall be provided and their cost included in the unit price bid for the adjacent SS 877 items.

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.

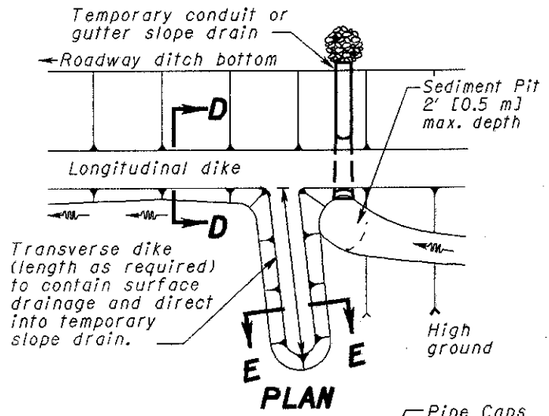


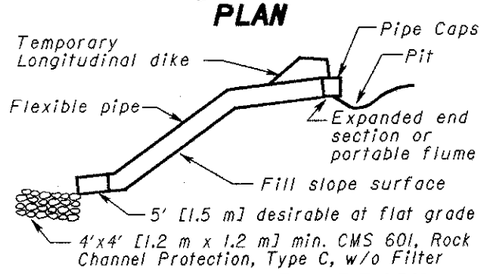
*Use Bales or Temporary Perimeter Filter Fabric Fence constructed per **SCD DM-4.4**



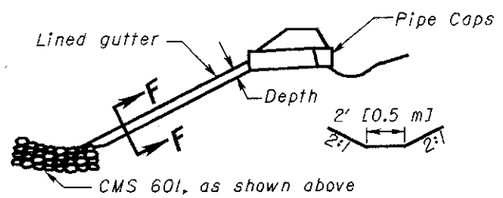
BALE FILTER DIKE

DIKES AND SLOPE PROTECTION

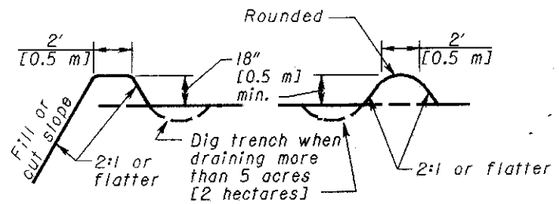




CONDUIT SLOPE DRAIN



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.

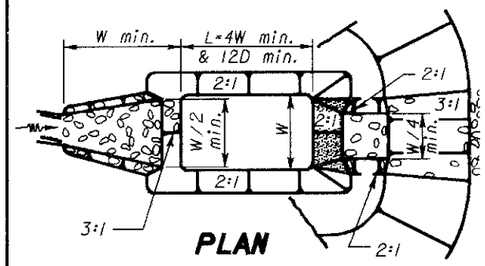
GUTTERS: Gutters for slope drains shall be lined with Type C rock channel protection, crushed aggregate slope protection, portland cement concrete, bituminous concrete, plastic sheeting (on slopes 4:1 max.), partial pipe sections or approved equal.

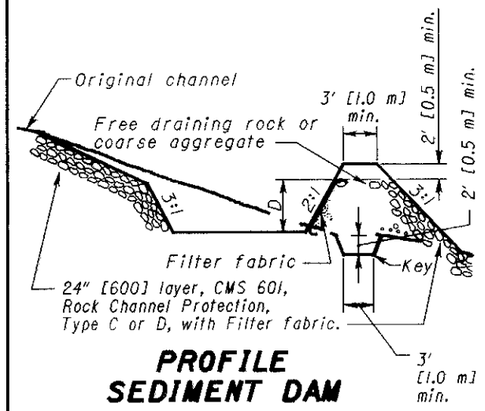
PITS: Sediment pits shall be provided and their cost included in the unit price bid for the adjacent items.

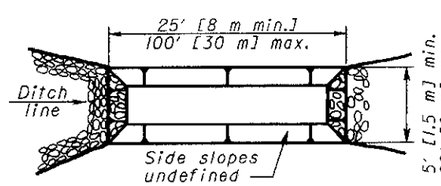
MAINTENANCE: Dikes and slope protection shall be acceptably maintained. The maintenance or replacement cost will be paid for by the Department under unit bid prices, agreed unit prices, or CMS 109.04.

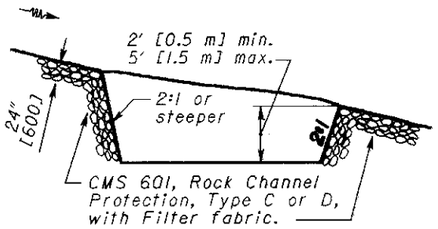
BASIS OF PAYMENT: Temporary dikes shall be paid for under **Item 877-Temporary Dikes.** Temporary slope drains shall be paid for under **Item 877-Temporary Slope Drains.** Rock required shall be paid for under **Item 601, Rock Channel protection, Type C, w/o Filter.**

SEDIMENT BASINS & DAMS









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 — 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

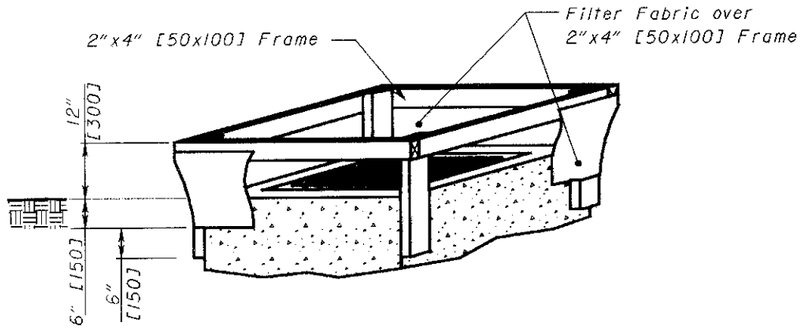
STANDARD ROADWAY CONSTRUCTION DRAWING

TEMPORARY EROSION CONTROL

NUMBER DM-4.3

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].**

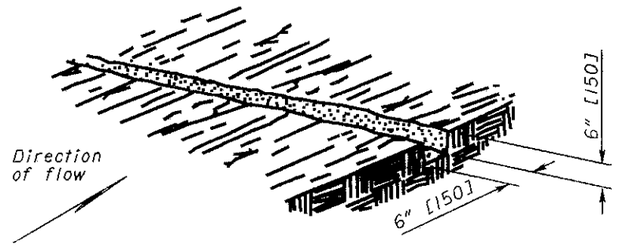
NOTES

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.

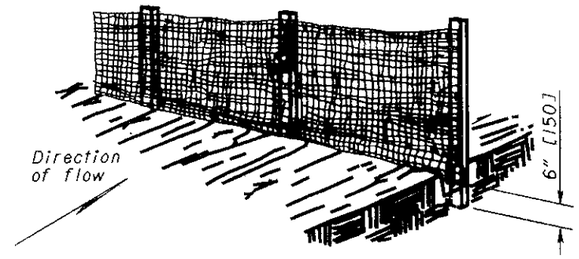
MAINTENANCE: The filter fabric fence shall be maintained to be functional. This shall include removal of trapped sediment and required cleaning, repair, and replacement of the filter fabric. The maintenance or replacement cost will be paid for by the Department under unit bid prices, agreed unit prices, 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].**



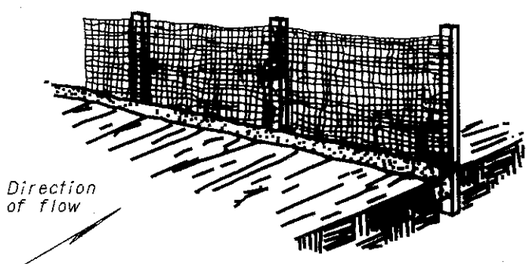
Excavate a 6"x6" [150x150] trench along the proposed fence line.

STEP 1



Place fabric and support stakes and extend fabric into the trench.

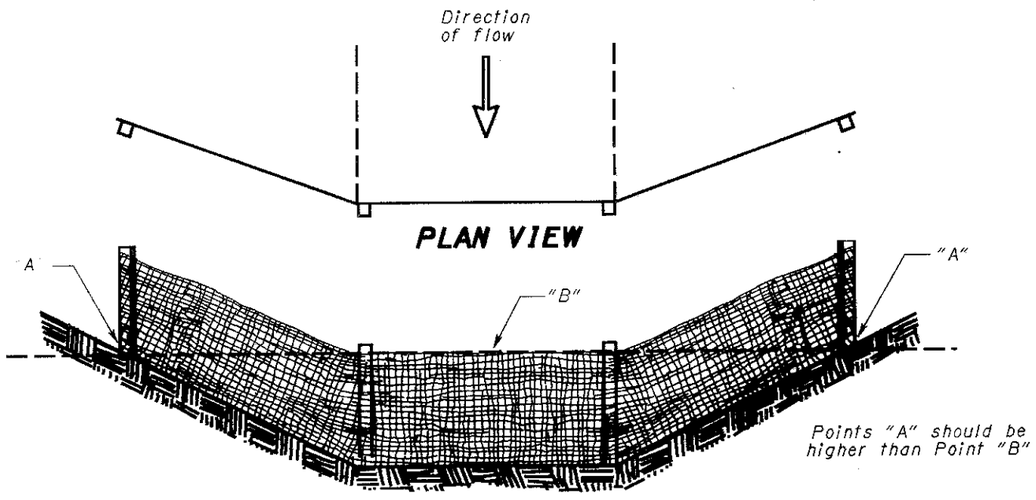
STEP 2



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
Randy St. Clair 4-29-99
ROADWAY DESIGN ENGINEER — DATE

REVISIONS

STDS. ENGR. M. EVANS
DRAWN D. FOCKE

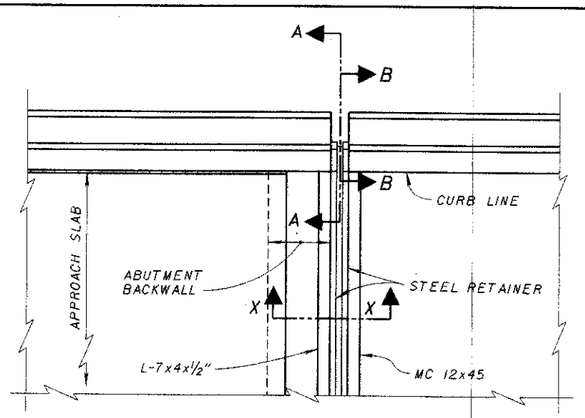
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

DESIGN AGENCY
OFFICE OF PLANNING

STANDARD ROADWAY CONSTRUCTION DRAWING
TEMPORARY EROSION CONTROL

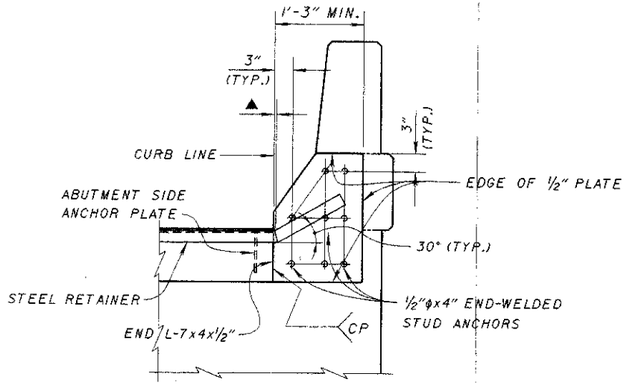
NUMBER DM-4.4

1 / 1

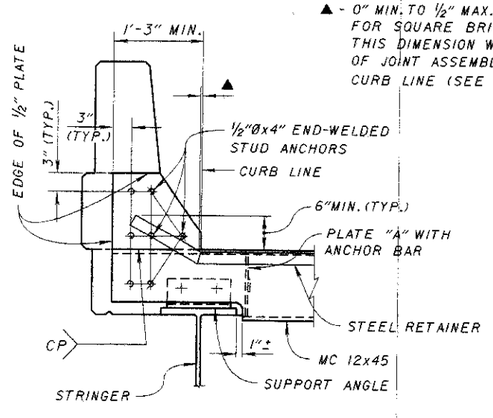


PART PLAN AT ABUTMENT

FOR SQUARE OR LOW SKEWED (15° OR LESS) BRIDGES WITH DEFLECTOR PARAPET RAILING



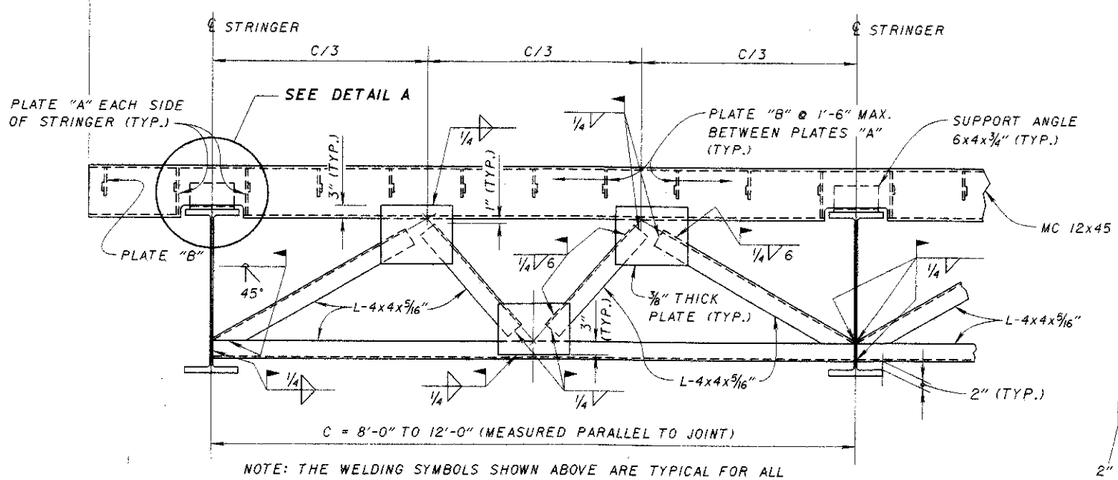
SECTION A-A



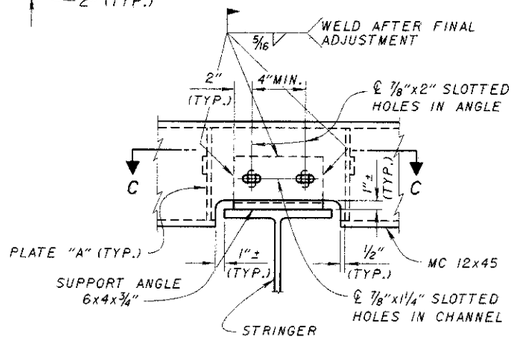
▲ - 0" MIN. TO 1/2" MAX. AT BREAKPOINT IN RETAINER FOR SQUARE BRIDGES. ON SKEWED BRIDGES THIS DIMENSION WILL ONLY APPLY TO THE SIDE OF JOINT ASSEMBLY WHICH IS NEAREST TO THE CURB LINE (SEE SHEET 2/5).

SECTION B-B

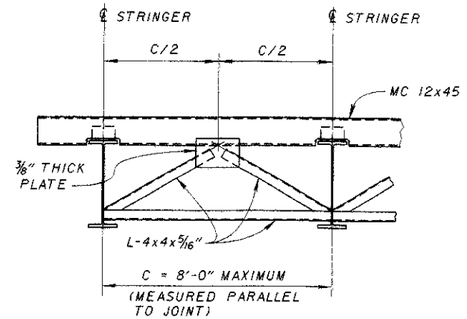
END ABUTMENT AND SUPERSTRUCTURE JOINT ARMOR 1" FROM DECK FASCIA ON STRUCTURES WITHOUT CURBS OR PARAPETS.

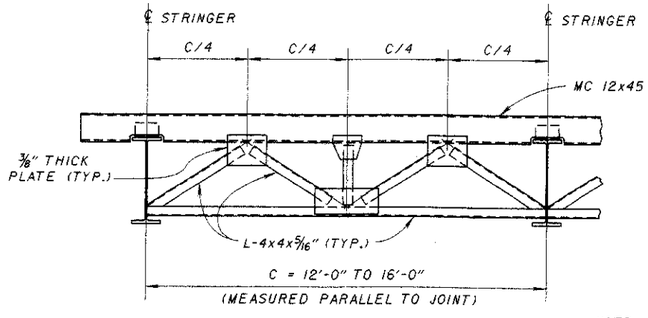


NOTE: THE WELDING SYMBOLS SHOWN ABOVE ARE TYPICAL FOR ALL SIMILAR LOCATIONS OF THIS END CROSSFRAME. ALSO, THE WELDED ATTACHMENT DETAILS AND TYPICAL DIMENSIONS SHOWN ARE TYPICAL FOR THE CROSSFRAMES DETAILED BELOW.



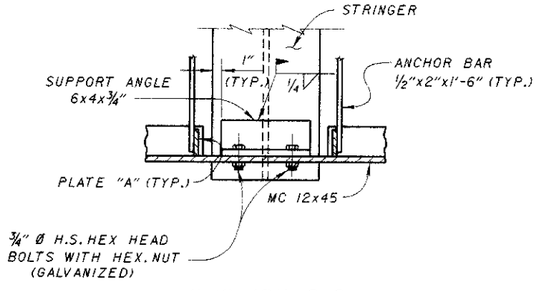
DETAIL A





END CROSSFRAME DETAILS

STEEL RETAINERS ARE NOT SHOWN



SECTION C-C

NOTE:
THE JOINT ARMOR SHOULD NOT BE PAINTED, EXCEPT FOR THE METALIZED SURFACES DAMAGED DURING CROSSFRAME INSTALLATION. THESE AREAS SHALL BE CLEANED AND PAINTED IN CONFORMANCE WITH THE STRUCTURE'S PAINT SYSTEM REQUIREMENTS. OVERSPRAY FROM PAINTING NEED NOT BE REMOVED. FOR REPAIR OF ALL OTHER METALIZED SURFACES SEE THE JOINT INSTALLATION NOTES ON SHEET 5/5.

DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

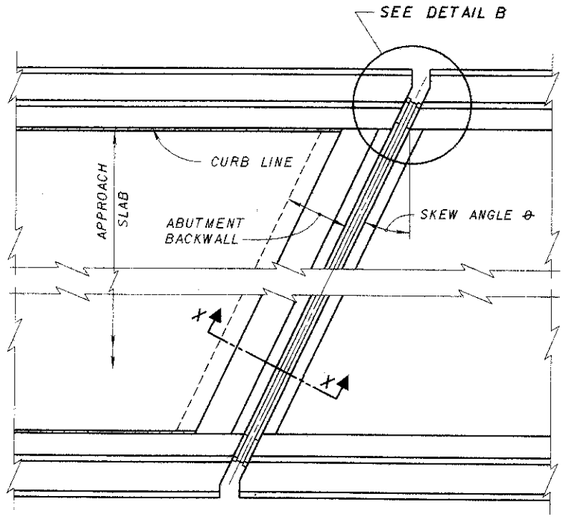
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
E.D. Graham Jr.
ENGINEER OF BRIDGES
01-20-94
DATE

REVIEWED	CHECKED	DESIGNED	REVISIONS
WTL/LWW	JS	AJM	11-12-93
		DRAWN	2-14-97
		GFJ/AJM	

EXJ-4-87

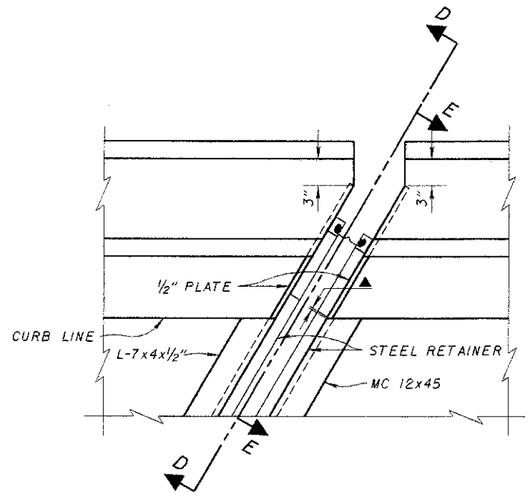
STANDARD
STRIP SEAL EXPANSION JOINTS
STEEL STRINGER STRUCTURES

1/5



PLAN AT ABUTMENT

FOR SKEWED BRIDGES (OVER 15°)
WITH DEFLECTOR PARAPET RAILING



DETAIL B

JOINTS IN END DAM ARMOR: TRANSVERSE JOINTS IN ARMOR SHALL HAVE COMPLETE PENETRATION BUTT WELDS. BUTT WELDS IN CONTACT WITH THE STEEL RETAINERS SHALL BE GROUND FLUSH.

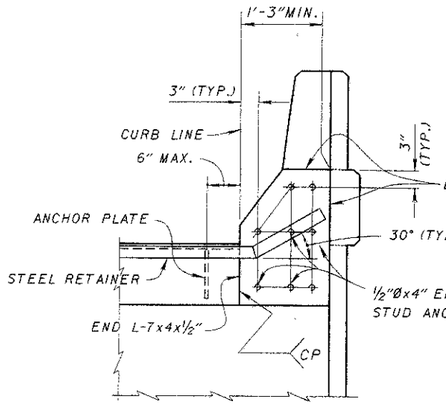
THE MINIMUM LENGTH OF RETAINER SHALL BE 6'-0" BETWEEN JOINTS UNLESS OTHERWISE SHOWN.

JOINTS IN RETAINERS SHALL HAVE WATERTIGHT, PARTIAL PENETRATION BUTT WELDS COMPLETELY AROUND THE OUTER PERIPHERY OF THE ABUTTING SURFACES. WELDS IN CONTACT WITH THE SEAL GLAND AND/OR JOINT ARMOR SHALL BE GROUND SMOOTH.

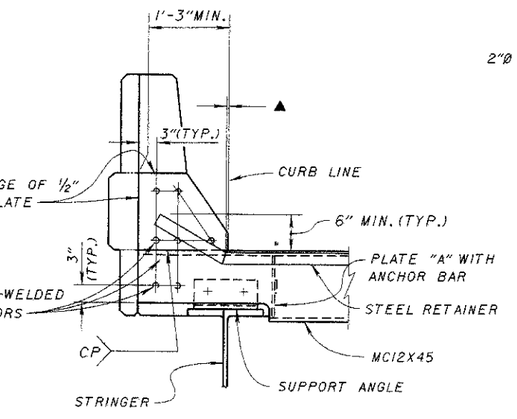
PROJECT PLANS SHALL LIST DIMENSION "A" FOR TEMPERATURES BETWEEN 30°F AND 90°F IN 10 DEGREE INCREMENTS.

JOINT SEAL GLANDS AT FIXED BEARINGS SHALL BE THE SAME SIZE AS AT THE EXPANSION BEARINGS WITH A DIMENSION "A" OF 2" AT ANY AMBIENT TEMPERATURE.

CONCRETE UNDER JOINT ARMOR SHALL BE HAND PLACED AND VIBRATED TO ACHIEVE SOLID FILLING.

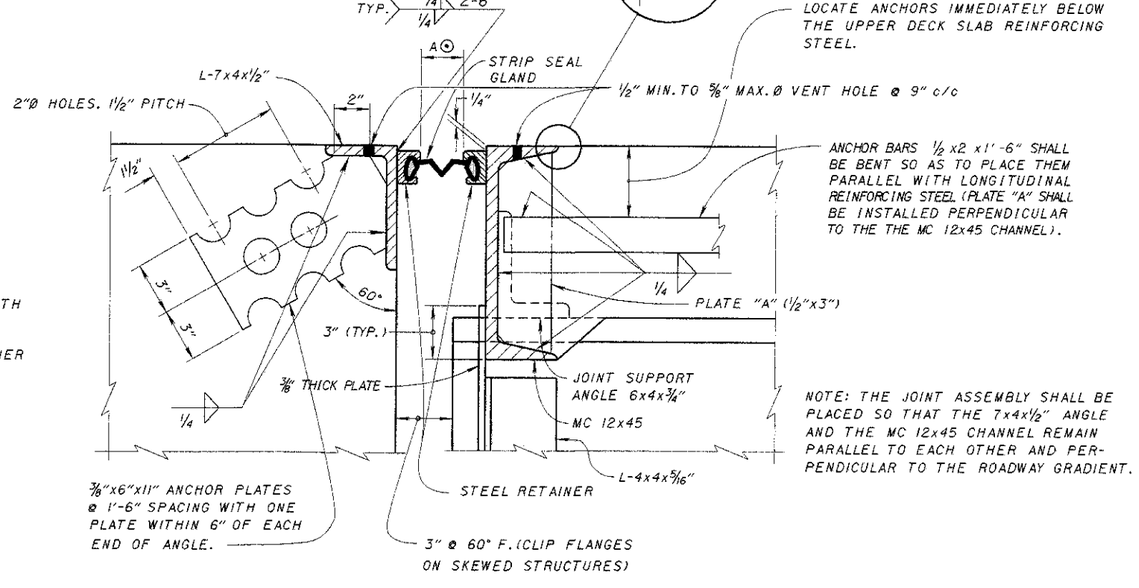


SECTION D-D



SECTION E-E

▲ - 0" MIN. TO ½" MAX. AT BREAKPOINT IN RETAINER FOR SQUARE BRIDGES. ON SKEWED BRIDGES THIS DIMENSION WILL ONLY APPLY TO THE SIDE OF JOINT ASSEMBLY WHICH IS NEAREST TO THE CURB LINE (SEE DETAIL "B" ABOVE).



SECTION X-X

⊙ - DIMENSION "A" SHALL BE DETERMINED FROM TABLE "B", TABLE "C" OR TABLE "D" ON SHEET 5/5.

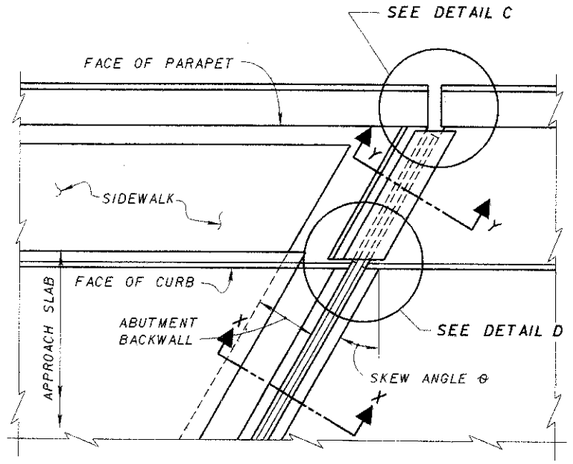
DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
01-20-94
ENGINEER OF BRIDGES — DATE

REVISIONS	DESIGNED	CHECKED	REVIEWED
11-12-93 2-14-97	AJM	JS	WTL/LWH
	DRAWN GFJ/AJM		EXJ-4-87

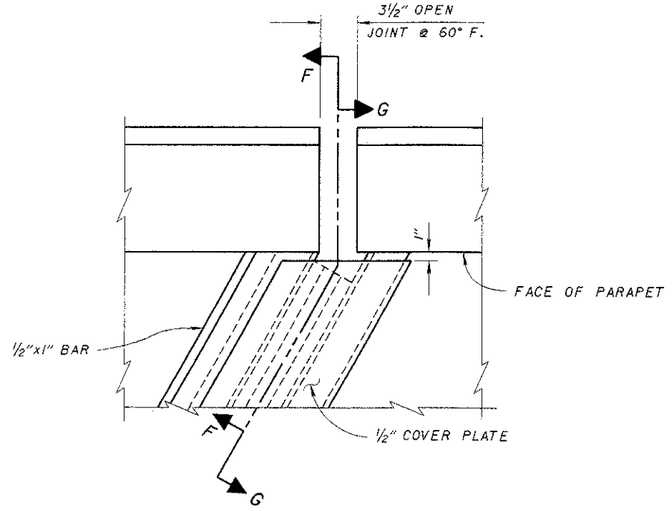
STANDARD
STRIP SEAL EXPANSION JOINTS
STEEL STRINGER STRUCTURES

2/5

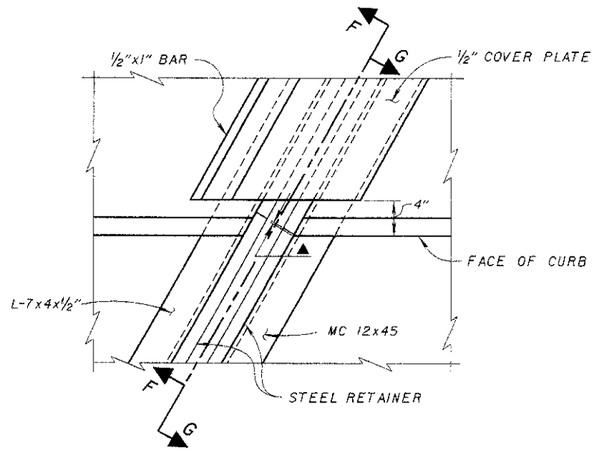


PART PLAN AT ABUTMENT

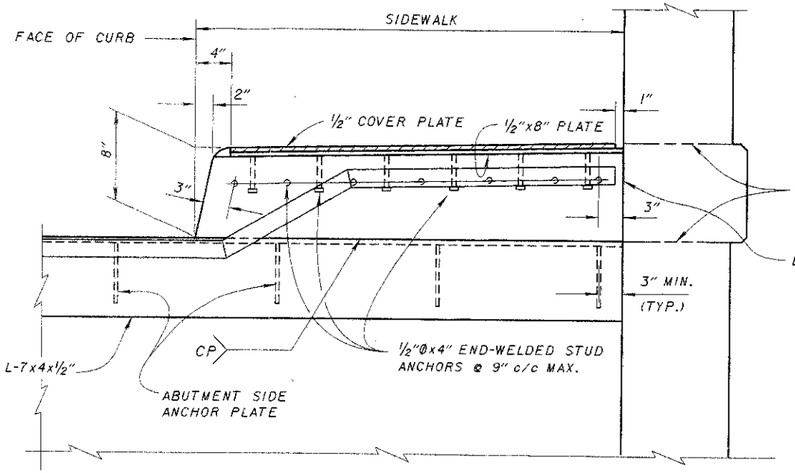
FOR BRIDGES WITH SIDEWALK PARAPET RAILING



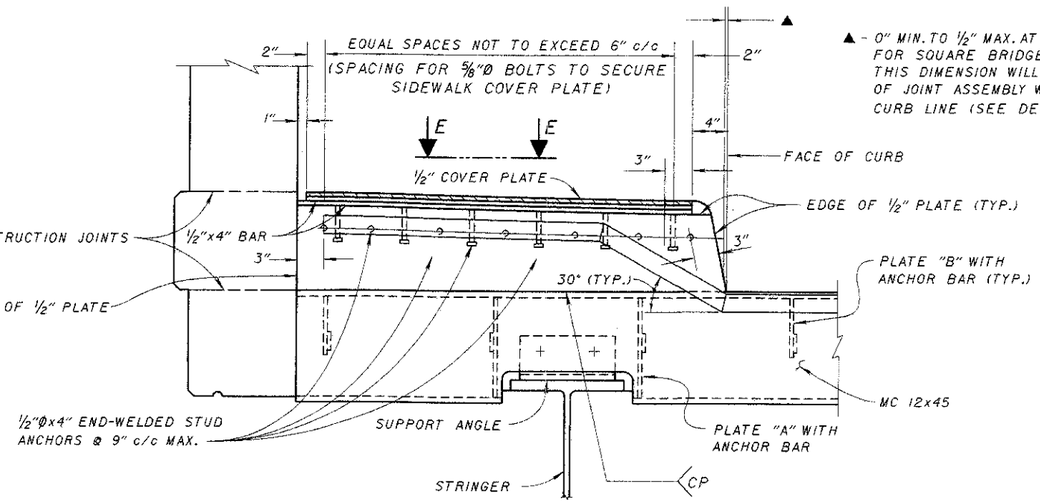
DETAIL C



DETAIL D



SECTION F-F



▲ - 0" MIN. TO ½" MAX. AT BREAKPOINT IN RETAINER FOR SQUARE BRIDGES. ON SKEWED BRIDGES THIS DIMENSION WILL ONLY APPLY TO THE SIDE OF JOINT ASSEMBLY WHICH IS NEAREST TO THE CURB LINE (SEE DETAIL "D" ABOVE).

SECTION G-G

FOR VIEW E-E SEE SHEET 4/5.
FOR SECTION X-X SEE SHEET 2/5.
FOR SECTION Y-Y SEE SHEET 4/5.

DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

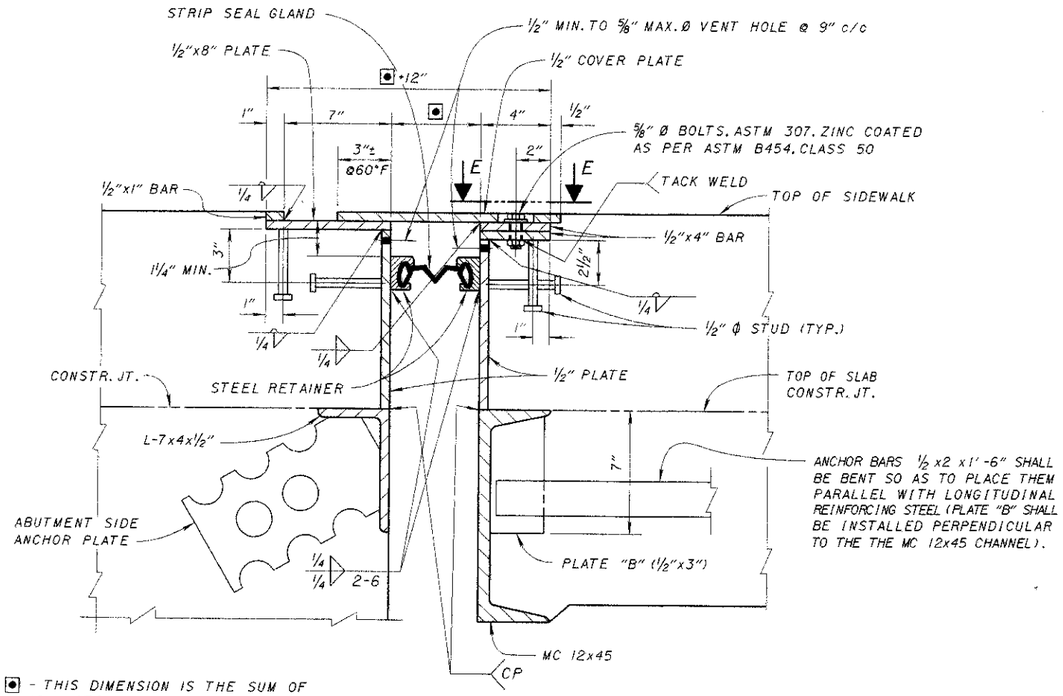
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES — 01-20-94 DATE

DESIGNED	DRAWN	CHECKED	REVIEWED
AJM	GFJ/AJM	JS	WTL/LMW

REVISIONS
11-12-93
2-14-97

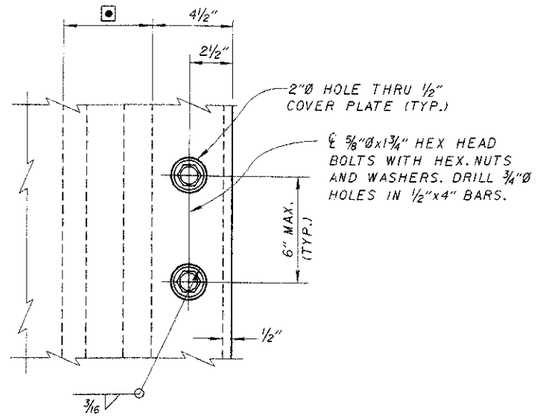
STANDARD
STRIP SEAL EXPANSION JOINTS
STEEL STRINGER STRUCTURES

EXJ-4-87

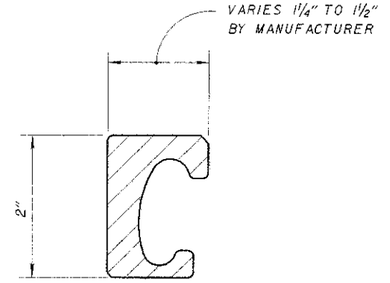


◉ - THIS DIMENSION IS THE SUM OF (2 x STEEL RETAINER WIDTH + DIM. "A").

SECTION Y-Y



VIEW E-E



RETAINER DETAIL

STEEL RETAINER REQUIREMENTS:

AT JOINT UPTURNS, ESPECIALLY ON SKEWED BRIDGE DECKS, THE USE OF SPLIT RETAINERS MAY BE NECESSARY TO ENSURE GOOD SEAL GLAND INSTALLATION. WHEN THE SPLIT RETAINER IS USED, THE DESIGN SHALL BE SUBMITTED TO THE DIRECTOR FOR APPROVAL.

THE PROPOSED STEEL RETAINER SHALL CONFORM TO THE DIMENSIONS SHOWN ABOVE. THE RETAINERS SHALL BE PRODUCED AS A SOLID SHAPE EXTRUSION, A HOT ROLLED SOLID SHAPE OR SOLID SHAPE MACHINED FROM A SOLID BAR OF STEEL. STEEL RETAINERS MANUFACTURED BY THE BENDING OF A PLATE OR WELDING OF PIECES TOGETHER ARE NOT ACCEPTABLE. THE INTERNAL DIMENSIONS OF THE STEEL RETAINER SHALL MATCH THE MANUFACTURER'S REQUIREMENTS FOR POSITIVE ANCHORAGE FOR THE GLAND.

ANY DEFECTS IN THE STEEL RETAINER OR THE ACTUAL EXPANSION JOINT THAT COULD CAUSE DAMAGE TO THE GLAND SHALL BE CORRECTED BEFORE THE GLAND IS INSTALLED.

TEMPORARY JOINT ARMOR SUPPORTS

TEMPORARY SUPPORTS SHALL BE INSTALLED THAT ARE CAPABLE OF SUPPORTING SHIPPING AND ERECTION FORCES WITHOUT DAMAGE TO THE EXPANSION DEVICE. FABRICATOR DESIGNED AND INSTALLED TEMPORARY SUPPORTS SHALL BE CAPABLE OF ADJUSTMENT FOR SETTING THE EXPANSION DEVICE IN THE FIELD AND SHALL BE INSTALLED AT THE FABRICATION SHOP AFTER FABRICATION AND COATING IS COMPLETED.

CONSTRUCTION PROCEDURE

1. ABUTMENT BACKWALL CONCRETE SHALL NOT BE PLACED UNTIL AFTER SUPERSTRUCTURE CONCRETE IN THE SPAN ADJACENT TO THE ABUTMENT HAS BEEN PLACED.
2. PLACE BACKWALL CONCRETE DURING STABLE OR RISING AMBIENT TEMPERATURES AND CONCLUDE PLACEMENT AT OR IMMEDIATELY BEFORE THE DAY'S PEAK AMBIENT TEMPERATURE.
3. NOT MORE THAN FOUR HOURS PRIOR TO THE DAY'S PEAK AMBIENT TEMPERATURE, SET ABUTMENT EXPANSION JOINT WIDTH TO DIMENSION "A". SEE DIMENSION "A" TABLE ON PROJECT PLANS.
4. LOOSEN ANY TEMPORARY JOINT ARMOR BOLTS AFTER INITIAL SET OF CONCRETE, PREFERABLY NOT LATER THAN TWO HOURS AFTER CONCLUSION OF CONCRETE PLACEMENT.

DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES
01-20-94
DATE

DESIGNED	DRAWN	CHECKED	REVIEWED
AJM	GFJ/AJM	JS	WTL/LWW

EXJ-4-87

REVISIONS
11-12-93
2-14-97

STANDARD
STRIP SEAL EXPANSION JOINTS
STEEL STRINGER STRUCTURES

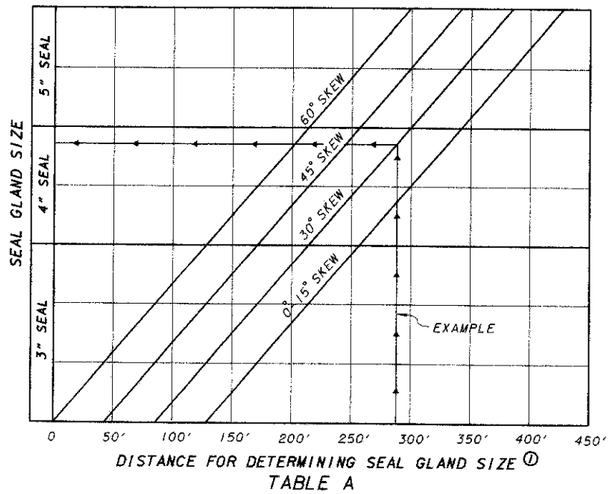


TABLE A

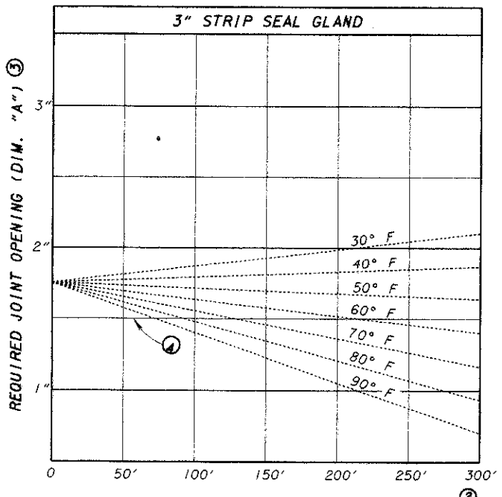


TABLE B

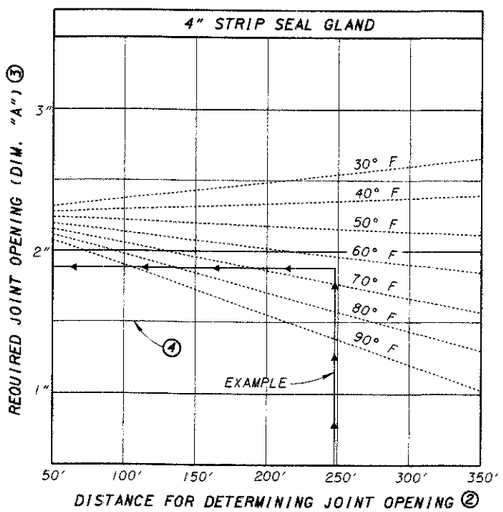


TABLE C

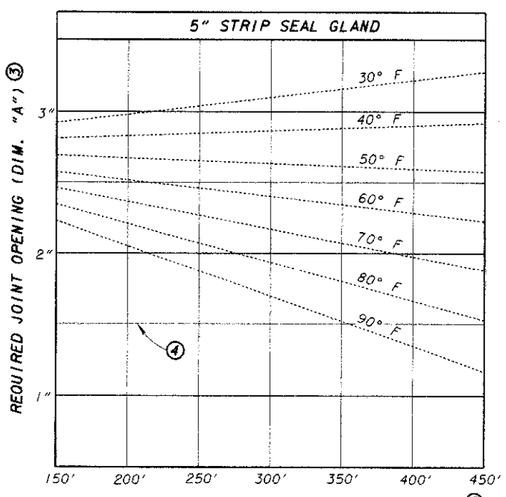


TABLE D

GENERAL NOTES:

MATERIALS: ALL STEEL PARTS OF THE JOINT ASSEMBLY SHALL BE ASTM A709, GRADE 36. THE FINISHED STEEL ASSEMBLY SHALL BE METALIZED. THE THICKNESS OF THE COATING SHALL BE 6-8 MILS. THE WIRE USED FOR THE METALLIZING SHALL CONSIST OF 85% ZINC AND 15% ALUMINUM. SURFACE PREPARATION AND APPLICATION SHALL CONFORM TO SSPC COATING SYSTEM GUIDE NO. 2300, "GUIDE FOR THERMAL SPRAY METALLIC COATING SYSTEMS". A SEALER AS PER SSPC PAINT SPECIFICATION NO. 27, SHALL BE APPLIED TO METALLIZED SURFACES THAT WILL BE IN CONTACT WITH CONCRETE. THERE IS NO NEED TO METALIZE THE SURFACES OF THE RETAINERS TO WHICH THE GLANDS WILL BE BONDED. THESE SURFACES MAY BE MASKED TO PREVENT THE BUILDUP OF OVERSPRAY WITHIN THE RETAINER GROOVE.

THE PREFORMED STRIP SEAL GLAND SHALL BE EXTRUDED POLYCHLOROPRENE MATERIAL MEETING THE REQUIREMENTS OF ASTM D2628. DUE TO THE CONFIGURATION OF THE STRIP SEAL, THE RECOVERY TEST IS NOT APPLICABLE. PHYSICAL PROPERITIES SHALL MEET THE REQUIREMENTS SPECIFIED IN TABLE "E" ON THIS SHEET.

EACH LOT OF STRIP SEAL GLANDS SHALL BE TESTED BY THE MANUFACTURER OR AN ACCREDITED LABORATORY TO ENSURE COMPLIANCE WITH THESE PROVISIONS. TWO CERTIFIED COPIES OF THE QUALIFICATION TEST DATA INDICATING THAT THE TESTED MATERIALS COMPLY WITH THESE PROVISIONS SHALL BE SUBMITTED TO THE ODOT TESTING LABORATORY.

THE STEEL RETAINER AND POLYCHLOROPRENE GLAND SHALL BE SUPPLIED BY THE SAME MANUFACTURER AND SHALL BE DESIGNED TO FUNCTION AS AN INTEGRAL UNIT.

TABLE E
(PHYSICAL PROPERTIES OF SEAL ELEMENT)

PROPERTY	REQUIREMENT	ASTM METHOD
TENSILE STRENGTH, MIN. PSI	2000	D412
ELONGATION @ BREAK, MIN. PERCENT	250	D412
HARDNESS, TYPE A DUROMETER, POINTS	60 ± 5	D2240 (MODIFIED)
OVEN AGING, 70 HR @ 212° F TENSILE STRENGTH, LOSS, MAX. ELONGATION, LOSS. MAX. HARDNESS, TYPE A DUROMETER, POINTS CHANGE	 20 PERCENT 20 PERCENT 0 TO +10	D573 D2240 (MODIFIED)
OIL SWELL, ASTM OIL 3 70 HR @ 212° F, WEIGHT CHANGE MAX	45 PERCENT	D471
OZONE RESISTANCE 20 PERCENT STRAIN, 300 PPHM IN AIR, 70 HR @ 104° F (WIPED WITH TOLUENE TO REMOVE SURFACE CONTAMINATION)	NO CRACKS	D1149
LOW TEMPERTURE STIFFENING 7 DAYS @ 14° F HARDNESS, TYPE A DUROMETER, POINTS CHANGE COMPRESSION SET, 70 HR @ 212° F MAX.	 0 TO +15 40 PERCENT	D2240 D2240 (MODIFIED) D395 METHOD B

LUBRICANT-ADHESIVE USED TO INSTALL THE PREFORMED STRIP SEALS SHALL BE A ONE PART MOISTURE CURING POLYURETHANE COMPOUND, MEETING THE REQUIREMENTS OF ASTM D4070, AND AS SPECIFIED BY THE SEAL GLAND MANUFACTURER. IT SHALL HAVE A SUITABLE CONSISTENCY AT THE TEMPERATURE AT WHICH THE SEALS ARE INSTALLED AND SHALL BE COMPATIBLE WITH THE SEALS AND THE STEEL RETAINERS.

SPLICE OR JOINT IN SEAL GLAND: SEAL GLANDS FOR BRIDGE DECK JOINTS SHALL BE FURNISHED IN ONE CONTINUOUS PIECE UNLESS SHOP FABRICATED SPLICES ARE SHOWN ON THE PLANS OR APPROVED BY THE DIRECTOR. FIELD SPLICING SHALL NOT BE PERMITTED.

COMPLETED SPLICES SHALL HAVE NO OFFSETS ON EXTERIOR SURFACES, AND AFTER INSTALLATION, THERE SHALL BE NO EVIDENCE OF BOND FAILURE AT THE SPLICES.

FOR OTHER THAN STRAIGHT SEALS WITHOUT INTERMEDIATE SPLICES, SEAL GLANDS SHALL BE SHOP FABRICATED IN ACCORDANCE WITH APPROVED SHOP DRAWINGS, SHOP DRAWING DIMENSIONS FOR EXISTING JOINTS OR FOR JOINTS WHICH ARE BEING MODIFIED SHALL BE BASED ON FIELD MEASUREMENTS PROVIDED BY THE CONTRACTOR.

PREPARATION FOR INSTALLATION: TO AVOID THE SUBSEQUENT CONTAMINATION OF THE PREPARED SURFACES, ALL SURFACES OF ELASTOMERIC STRIP SEAL GLANDS SHALL BE CLEANED WITH METHYL ETHYL KETONE (MEK), TOLUENE (T) OR ANOTHER APPROVED SOLVENT USING CLEAN DISPOSABLE CLOTHS.

NO MORE THAN 24 HOURS BEFORE APPLICATION OF THE LUBRICANT ADHESIVE, ONLY THE SURFACES OF THE STEEL RETAINER TO WHICH ADHESIVE IS APPLIED SHALL BE CLEANED TO SSPC VISUAL STANDARD SP-6.

INSTALLATION: IMMEDIATELY PRIOR TO APPLICATION OF LUBRICANT-ADHESIVE, BONDING SURFACES SHALL BE CLEAN, DRY AND WARMER THAN 45 DEGREES F. AND THEY SHALL BE MAINTAINED AT OR ABOVE THIS TEMPERATURE UNTIL THE ADHESIVE HAS CURED. LUBRICANT-ADHESIVE SHALL BE APPLIED LIBERALLY TO BOTH STEEL AND ELASTOMERIC BONDING SURFACES USING A STIFF BRUSH IF NECESSARY TO ACHIEVE A COMPLETE AND RELATIVELY UNIFORM COATING. THE BULBED EDGES OF THE ELASTOMERIC SEAL SHALL BE INSERTED INTO THE RETAINER GROOVES. AFTER INSTALLATION, EXCESS LUBRICANT-ADHESIVE SHALL BE REMOVED FROM THE EXPOSED SEAL SURFACES.

SEAL GLANDS SHALL BE INSTALLED WITH EQUIPMENT DESIGNED OR SPECIFICALLY ADAPTED FOR THE INSTALLATION OF ELASTOMERIC JOINT SEAL GLANDS. THIS EQUIPMENT SHALL NOT ELONGATE THE SEAL GLAND OR CAUSE STRUCTURAL DAMAGE TO THE COMPLETED INSTALLATION.

REPAIRS SHALL BE MADE PRIOR TO THE INSTALLATION OF THE SEAL. METALIZED SURFACES DAMAGED DURING FABRICATION SHALL BE REPAIRED BY REBLASTING AND METALIZING AS PER SSPC GUIDE 23.00. METALIZED SURFACES DAMAGED DURING SHIPMENT OR FIELD WELDING SHALL BE REPAIRED AS PER ASTM A 780-93a, ANNEX A1, REPAIR USING ZINC BASED ALLOYS. THIS FIELD PROCESS REQUIRES REMOVAL OF CONTAMINATES FROM THE SURFACE, PREHEATING THE SURFACE TO 600° F AND APPLICATION OF ZINC COATING BY EITHER RUBBING A PURE ZINC STICK OR SPRINKLING ZINC POWDER ON THE PREHEATED SURFACE. THE ZINC COATING THICKNESS SHALL BE THE SAME AS THAT SPECIFIED FOR THE METALIZING.

MEASUREMENT FOR PAY PURPOSES SHALL BE BASED ON THE LINEAR FEET OF SEALED JOINT SYSTEM, MEASURED HORIZONTALLY ALONG THE JOINT CENTERLINE AND BETWEEN THE OUTER LIMITS OF THE FABRICATED JOINT. THIS PAY ITEM SHALL INCLUDE ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY TO COMPLETE THE JOINT IN PLACE, WHICH INCLUDES: THE JOINT ARMOR, RETAINERS, GLAND, ANCHORING DEVICES, PLATE "A", PLATE "B", TEMPORARY SUPPORTS AND THE END CROSSFRAME TOP GUSSET PLATES. PAYMENT WILL BE MADE PER LINEAR METER FOR ITEM 516, "STRUCTURAL EXPANSION JOINTS, NCLUDING ELASTOMERIC STRIP SEALS".

THERMAL NEUTRAL POINT OF THE SUPERSTRUCTURE IS THAT POINT WHICH HAS ZERO HORIZONTAL MOVEMENT DURING TEMPERATURE CHANGES.

LEGEND

① - THIS IS THE ACTUAL DISTANCE FROM THE CENTERLINE OF JOINT TO THE THERMAL NEUTRAL POINT OF THE SUPERSTRUCTURE MEASURED ALONG THE CENTERLINE OF ROADWAY. THIS DIMENSION SHALL BE A MAXIMUM OF 299' FOR 60° SKEWS, 342' FOR 45° SKEWS, 385' FOR 30° SKEWS AND 427' FOR 0° THRU 15° SKEWS.

② - THIS DISTANCE FOR EXPANSION JOINTS HAVING SKEW ANGLES OF 15° OR LESS IS THE ACTUAL DISTANCE TO THE THERMAL NEUTRAL POINT OF THE SUPERSTRUCTURE ALONG CENTERLINE OF ROADWAY. THIS DISTANCE FOR EXPANSION JOINTS HAVING SKEW ANGLES OVER 15° BUT NOT GREATER THAN 60° IS ARRIVED AT BY MULTIPLYING THE ABOVE DEFINED DISTANCE ALONG THE CENTERLINE OF ROADWAY BY THE COSINE OF THE EXPANSION JOINT SKEW ANGLE.

③ - THIS IS THE JOINT OPENING (DIMENSION "A") REQUIRED AT THE TIME OF ABUTMENT BACKWALL CONCRETE PLACEMENT, BASED ON THE DAY'S ANTICIPATED PEAK AMBIENT TEMPERATURE.

④ - MINIMUM JOINT OPENING (DIMENSION "A") AT TIME OF SEAL GLAND INSTALLATION SHALL NOT BE LESS THAN 1½". IF THE JOINT OPENING IS LESS, INSTALLATION SHALL BE POSTPONED UNTIL THE TEMPERATURE DROPS A SUFFICIENT AMOUNT TO ALLOW THE MINIMUM 1½" OPENING.

EXAMPLE

GIVEN - DISTANCE FROM THE CENTERLINE OF JOINT TO THERMAL NEUTRAL POINT OF SUPERSTRUCTURE ALONG CENTERLINE OF ROADWAY IS 287.5'; SKEW ANGLE OF THE EXPANSION JOINT IS 30°; ANTICIPATED AMBIENT TEMPERATURE AT TIME OF JOINT INSTALLATION IS 65° F.

FIND - REQUIRED STRIP SEAL GLAND SIZE AND JOINT OPENING (DIMENSION "A") AT TIME OF JOINT ARMOR INSTALLATION.

SOLUTION -

(A) ENTER TABLE "A" AT ① WITH 287.5' AND FIND THAT THE REQUIRED STRIP SEAL GLAND SIZE IS 4 INCHES.

(B) ENTER TABLE "C" AT ② WITH 287.5' x COSINE OF 30°=248.98' AND FIND REQUIRED JOINT OPENING AT 65° F. IS 1.86".

NOTE: STEP (B) REQUIRED ONLY AT TIME OF CONSTRUCTION.

DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

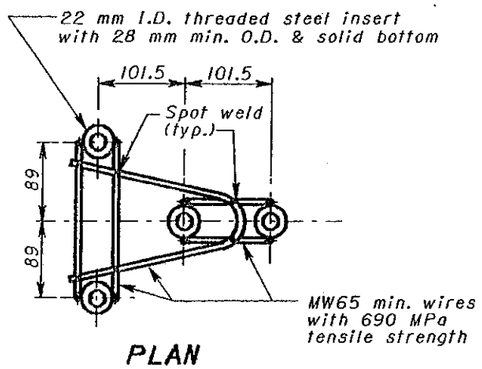
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
01-20-94
DATE
ENGINEER OF BRIDGES

DESIGNED	CHECKED	REVIEWED
AJM	JS	WTL/LWW
DRAWN		
GFJ/AJM		EXJ-4-87

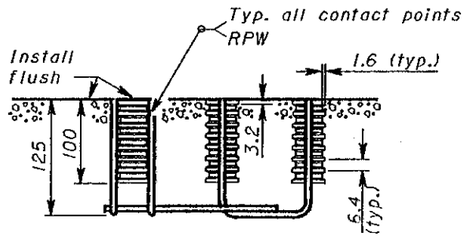
REVISIONS
11-12-93
2-14-97

STANDARD
STRIP SEAL EXPANSION JOINTS
STEEL STRINGER STRUCTURES

5 / 5



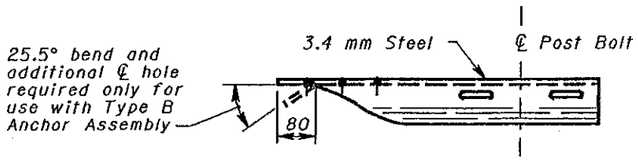
PLAN



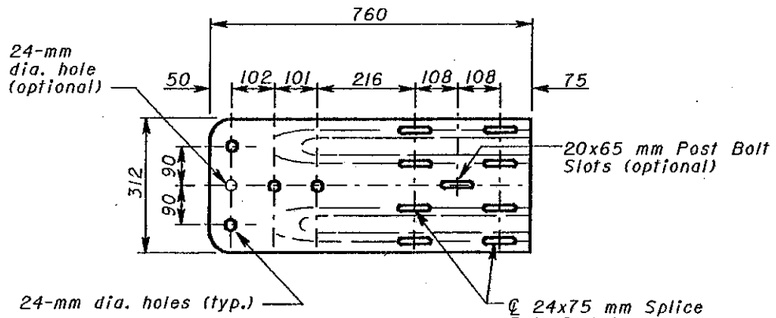
Four 22-mm bolts required

ELEVATION

CONCRETE INSERT ANCHOR ASSEMBLY (W-BEAM ONLY)

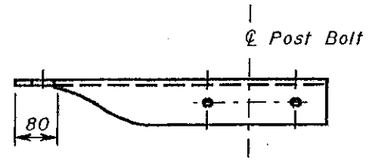


PLAN

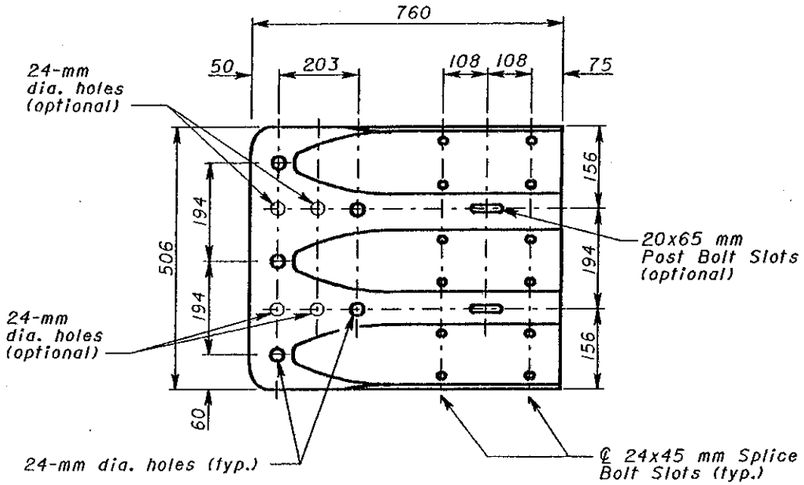


ELEVATION

W-BEAM TERMINAL CONNECTOR

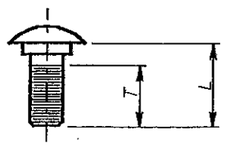


PLAN



ELEVATION

THRIE-BEAM TERMINAL CONNECTOR



L (mm)	T min. (mm)	Bolt Use
455 (Standard Rail)	85	Type 5: WP/WB, PB
660 (Barrier Rail)		
255	60	Type 4: WP Type 5: SP/WB, PB
50	35	Type 4: SP
32	Full	Splice Bolt

WP- wood post WB- wood blockout
SP- steel post PB- plastic blockout
Longer bolt may be needed for round WP larger than 200 mm dia.

BUTTON HEAD BOLT

(For post and splice bolts)

NOTE

Refer to AASHTO M 180 for dimensional details of W-Beam and Thrie-Beam rail elements, related buffer and end sections, beam splices, post and splice bolts and nuts, and Type 1 W-Beam to Thrie-Beam Transition section.

All dimensions are in millimeters unless otherwise noted.

metric units

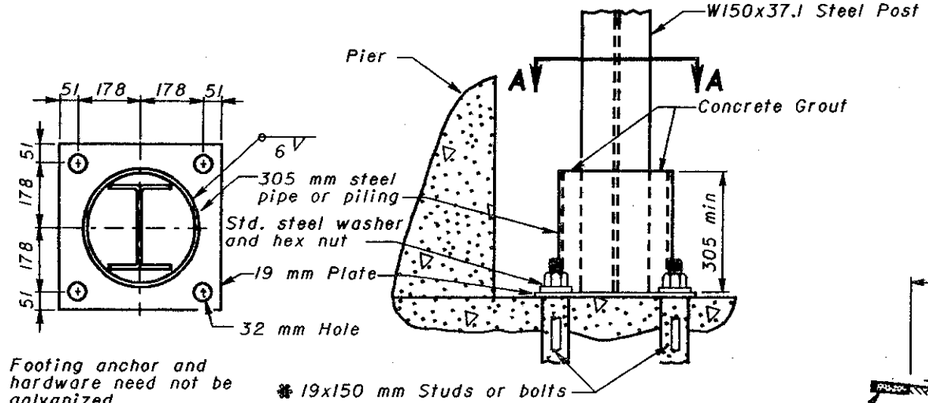
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL DETAILS

DATE
11-30-94
10-21-97

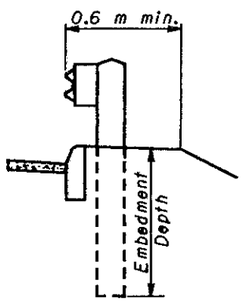
STANDARD CONSTRUCTION DRAWING GR-1.1M

APPROVED Gary F. Sutherland

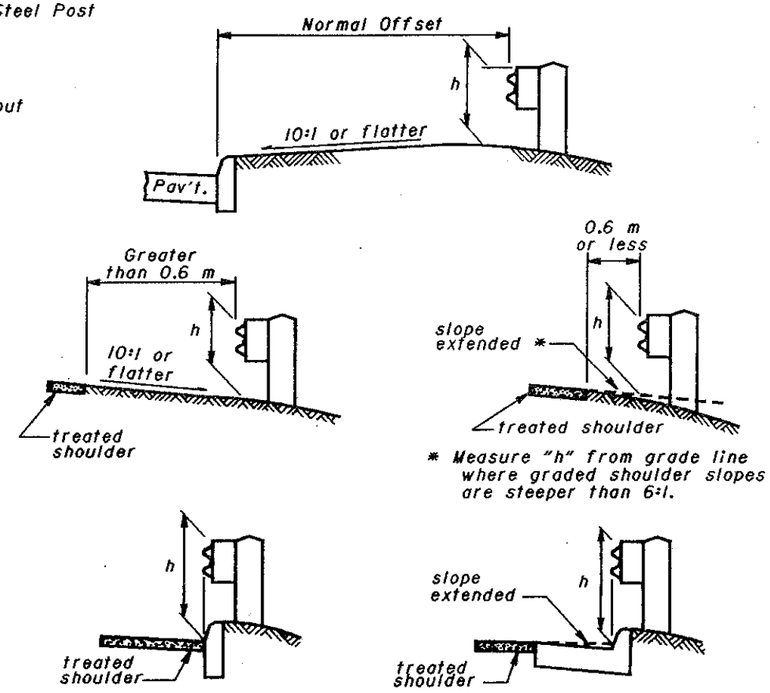


SECTION A-A ELEVATION

FOOTING ANCHOR

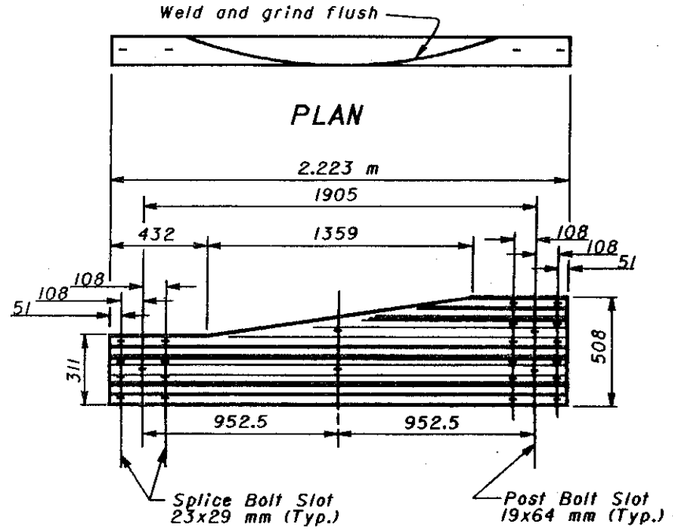


DETAIL A



h = Standard height (Tolerance ±25 mm)

MEASURING GUARDRAIL HEIGHT



ELEVATION

TYPE 2 TRANSITION SECTION *
(W-Beam to Thrie-Beam)

* For details of Type 1 Transition Section, refer to AASHTO M 180, Figure 4.

NOTES

BEAM RAIL ELEMENTS: Elements shall be 3.81 m effective length, unless otherwise specified, with 19x64 mm post bolt slots on 1.905 m centers regardless of post spacing. Field punching or drilling of bolt holes or slots for irregularly spaced posts shall be according to CMS 606.05.

BEAM RAIL SPLICE between two rail elements or between a rail and terminal connector shall be lapped in the direction of traffic. The buffer or flared end sections shall lap on the traffic face. A 305 mm length of beam rail (Back-up Plate), with a 19 mm diameter bolt hole or a 19x64 mm slot, shall be provided at steel posts not having a rail splice.

EMBEDMENT DEPTH: Where less than 0.6 m of graded shoulder width (10:1 or flatter) exists, measured from the face of the guardrail (see Detail "A"), longer posts shall be used so that a minimum of 1.65 m embedment depth is provided. Payment for the longer posts will be made at the unit price bid per Each, Item 606 - Guardrail Post, 2.75 m.

PROTECTIVE COATING: In lieu of the requirements of CMS 710.06, expansion shields, anchors and insert anchor assemblies installed (embedded) in concrete shall be coated in accordance with ASTM A 153 or be of stainless steel. Any bolts screwed into these embedded devices shall meet CMS 710.06.

SPECIAL POST MOUNTINGS:

Posts located over a drainage inlet or structure shall be encased or anchored per the details shown on Standard Construction Drawing GR-2.2M.

Posts located over a footing with a cover of less than 0.75 m shall be installed with a footing anchor as detailed hereon. (A plate, as detailed on Section B-B of Standard Construction Drawing GR-2.2M, may be used as an alternate attachment method.) Where the cover is between 0.75 m and 1.04 m, the footing anchor may be omitted and the post encased instead with 100 mm (min.) of concrete.

Posts located over a culvert with less than 1.3 m of cover shall not be driven, but shall be set in drilled or dug holes. Where the available post embedment depth is less than 1.04 m, the post shall be encased with 100 mm (min.) of concrete.

All costs associated with special post mountings shall be included in the unit price bid for 606 Guardrail of the type specified in the plans.

*** ANCHORS:** Holes and grouting shall comply with CMS 510. Either cement or nonshrink, nonmetallic grout may be used.

Expansion shield anchors conforming to CMS 712.01 may be substituted except where concrete deterioration has occurred, as determined by the Engineer. The same bolt diameter specified shall be required. Where self-drilling anchors are used, the holes shall be drilled with the expansion shield (not by a drill bit) and the shield installed flush with the concrete surface.

All dimensions are in millimeters unless otherwise noted.

metric units

This Drawing Replaces GR-1.2.

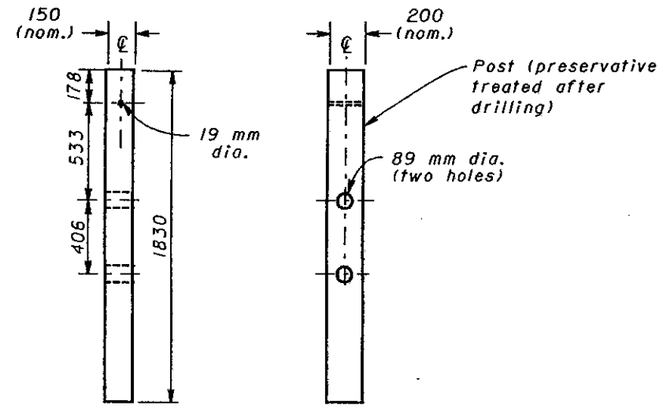
OFFICE OF ROADWAY ENGINEERING
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL DETAILS

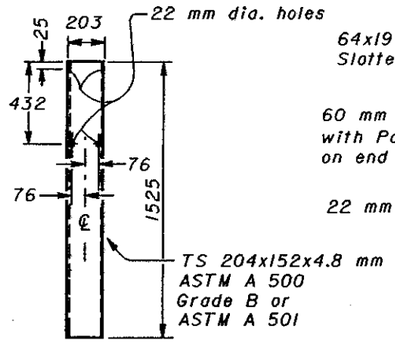
DATE 1-3-96

STANDARD CONSTRUCTION DRAWING **GR-1.2M**

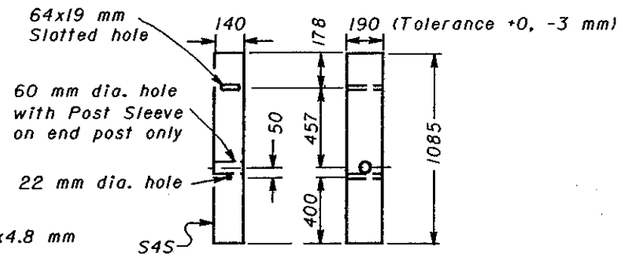
APPROVED R.K. Huelman, P.E.
ADMINISTRATOR



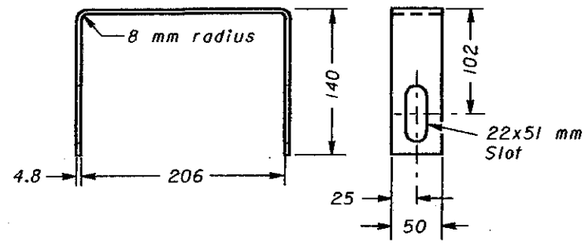
TYPE 1 BREAKAWAY POST



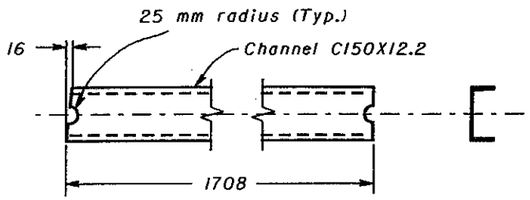
STEEL TUBE



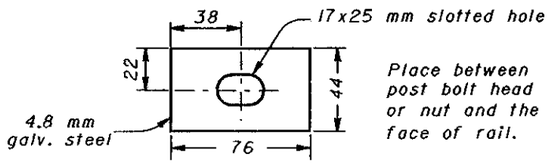
TYPE 2 BREAKAWAY POST



YOKE DETAILS

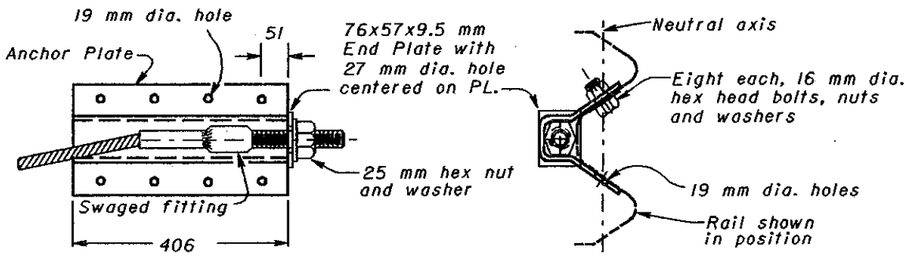


STRUT DETAILS

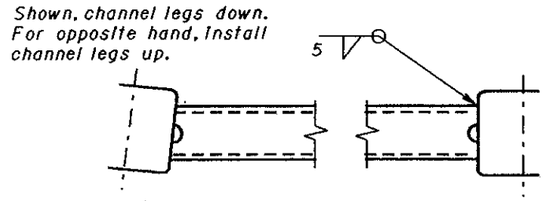


RECTANGULAR WASHER

(Not to be used in typical Type 4, 5 or 5A guardrail installations. Use only where specified.)



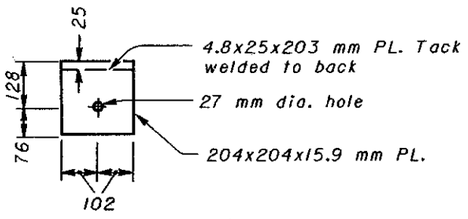
ANCHOR PLATE ASSEMBLY DETAILS



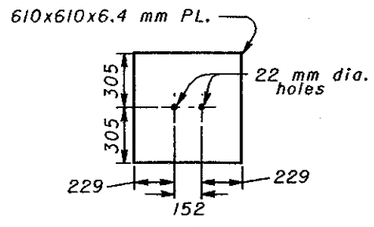
STRUT AND YOKE ASSEMBLY

All dimensions are in millimeters unless otherwise noted.

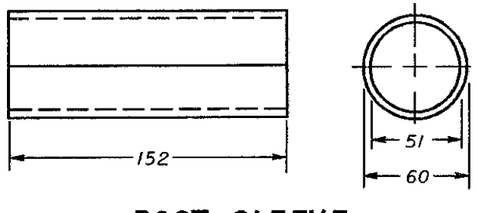
metric units



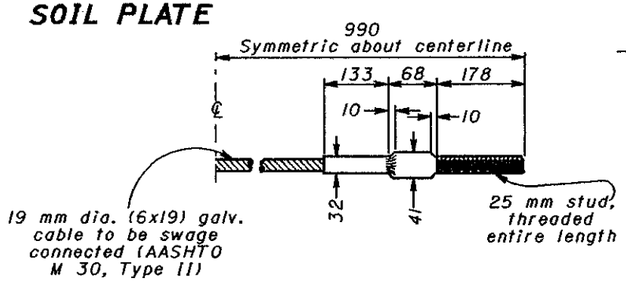
BEARING PLATE



SOIL PLATE

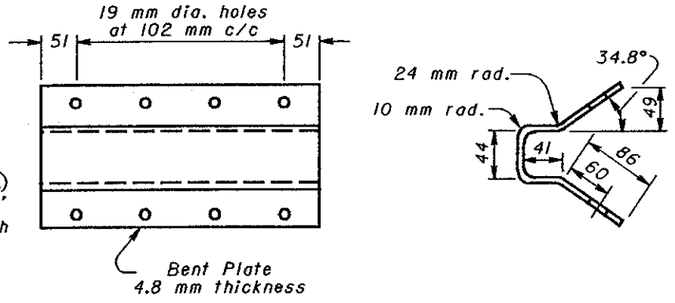


POST SLEEVE



STANDARD SWAGED FITTING AND STUD

CABLE ASSEMBLY



ANCHOR PLATE

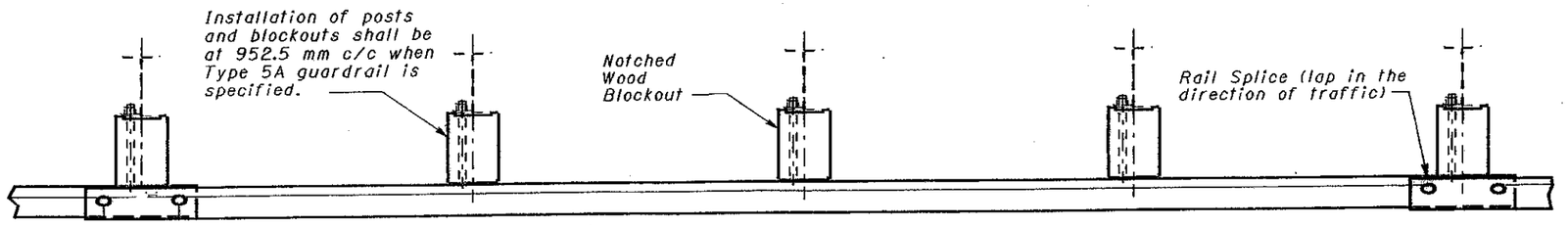
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL DETAILS

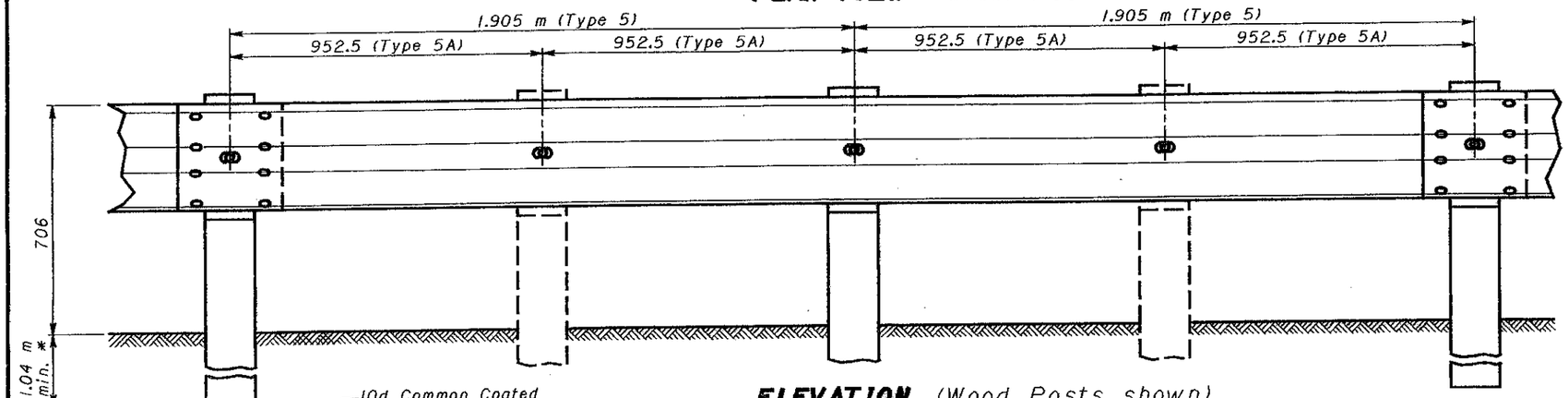
DATE 11-30-94

STANDARD CONSTRUCTION DRAWING **GR-1.3M**

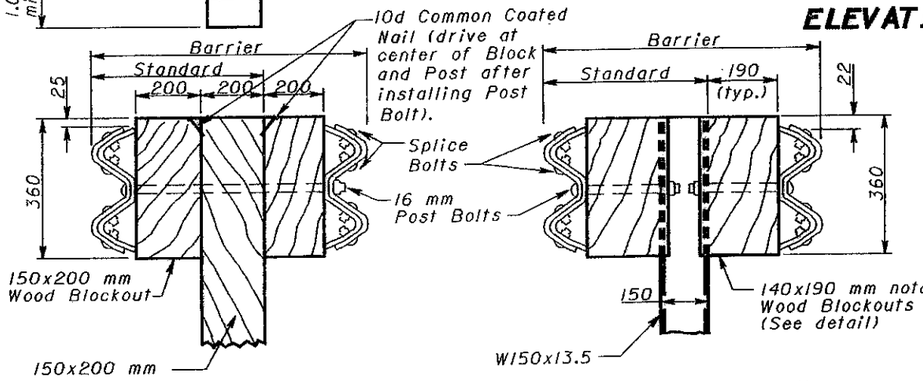
APPROVED D. K. Hulman
ENGR., L & D



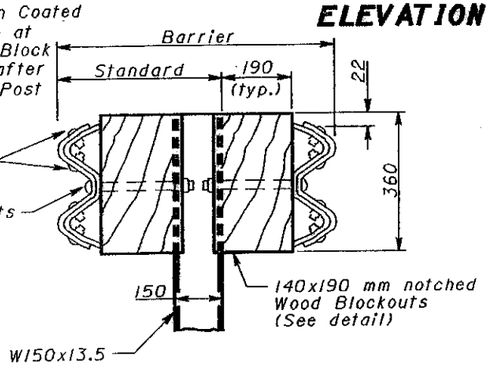
PLAN VIEW (Steel Posts shown)



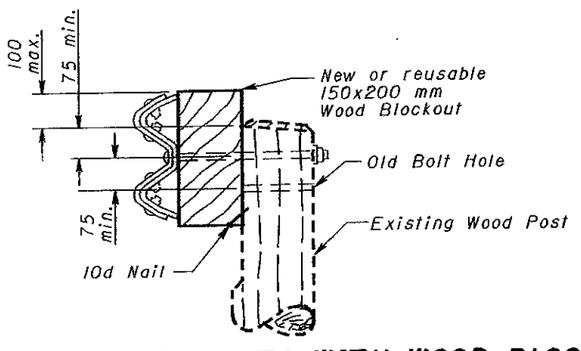
ELEVATION (Wood Posts shown)



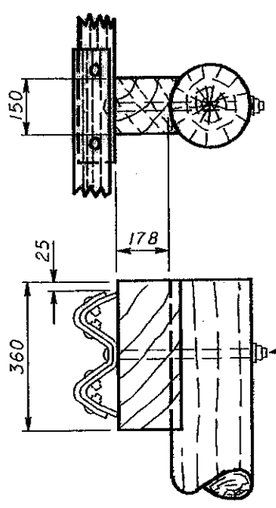
SQUARE WOOD POST



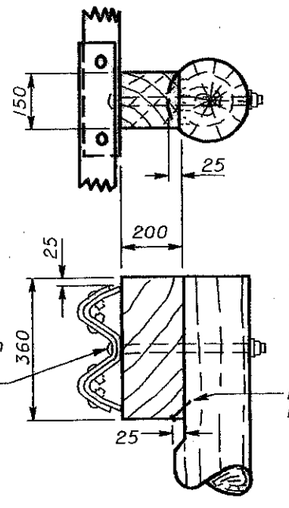
STEEL POST



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.

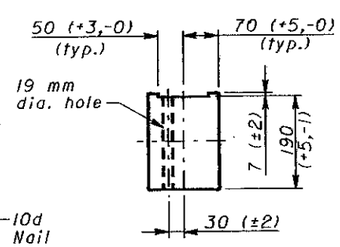
Sec. 12 Beams that have imperfections repaired by welding shall not be accepted for use in Item 606.

Sec. 13 Random samples shall be tested by the Department from materials delivered to the project site or other locations designated by the Laboratory.

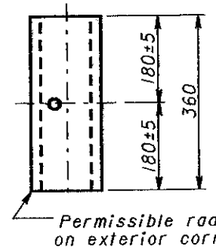
* ***POST EMBEDMENT DEPTH:*** *For specific depth requirements, see SCD GR-1.2M.*

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

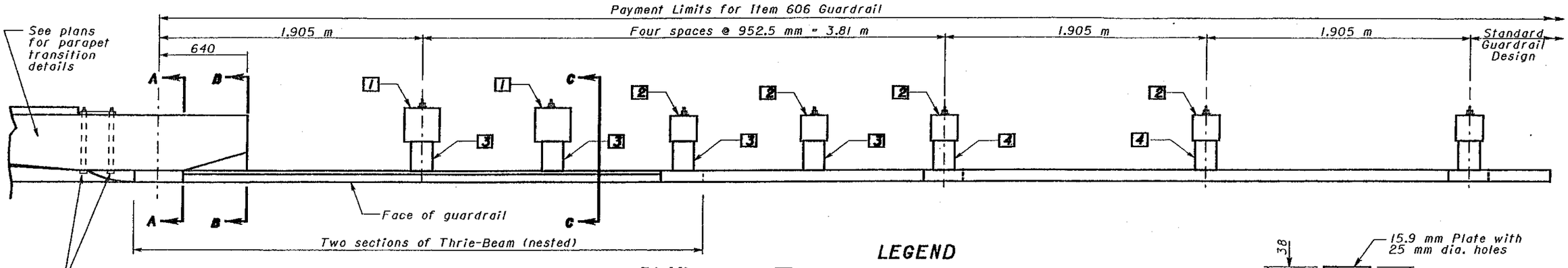
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL TYPE 5 & 5A

DATE
11-30-94
10-21-97
4-14-98

STANDARD CONSTRUCTION DRAWING **GR-2.1M**

APPROVED Larry F. Sutherland

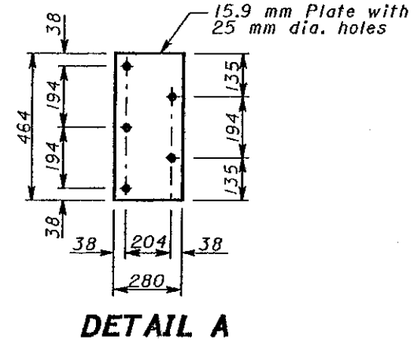


PLAN

22 mm dia. ASTM A 325M through bolts (length to be determined in field in accordance with parapet width) in 25 mm dia.holes with 464 x 280 x 15.9 mm plate with standard washers and hex nuts (See Detail A)

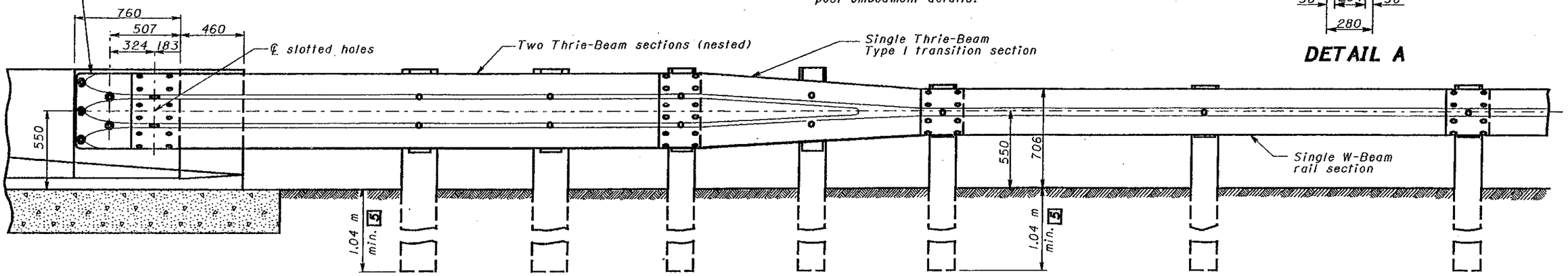
LEGEND

1	250 x 250 mm wood post
2	200 x 200 mm wood post
3	150 x 200 x 570 mm wood blockout (See ALTERNATE POSTS AND BLOCKOUTS note)
4	150 x 200 x 355 mm wood blockout (See ALTERNATE POSTS AND BLOCKOUTS note)
5	See SCD GR-1.2M for additional post embedment details.



DETAIL A

NOTE: The Thrie-Beam terminal connector shall be placed so that the lap is in the direction of traffic.



ELEVATION

All dimensions are in millimeters unless otherwise noted.

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 1 Bridge Terminal Assembly shall be used to connect guardrail runs to bridges having concrete deflector parapet railing. It shall be used to connect guardrail runs to the approach end of bridge parapets or other concrete barrier installations and to anchor guardrail runs to the trailing end of bridge parapets or other concrete barrier installations on undivided, bidirectional highways.

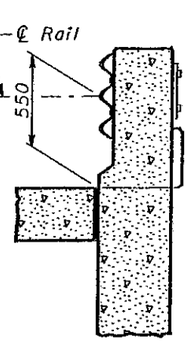
POSTS:
GENERAL - Posts may be set in drilled holes or driven to grade.

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.

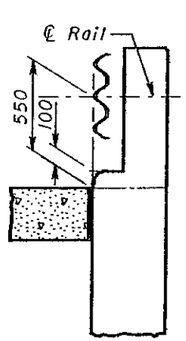
ALTERNATE POSTS AND BLOCKOUTS for Type 1 Bridge Terminal Assemblies may be furnished according to the following chart. Plastic blockouts shall not be permitted for Type 1 Bridge Terminal Assemblies.

Wood Posts & Blockouts	250x250 mm	200x200 mm
Steel Posts	W200x35.9	W150x37.1
Wood Blockouts	150x200 mm	
Steel Blockouts	W150x13.5	

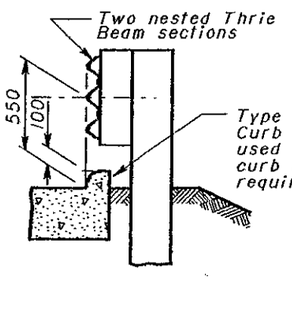
PAYMENT:
Payment for Item 606 - Each, Bridge Terminal Assembly, Type 1, shall include the extra cost, in excess of normal guardrail cost, for additional and different type posts and blockouts, nested Thrie-Beam sections, terminal connector, Thrie-Beam transition section, steel plate, bolts, hex nuts, washers, and other hardware.



SECTION A - A



SECTION B - B



SECTION C - C

metric units

This Drawing Replaces GR-3.1.

OHIO DEPARTMENT OF TRANSPORTATION

BRIDGE TERMINAL ASSEMBLY, TYPE 1

DATE
11-30-94
10-21-97

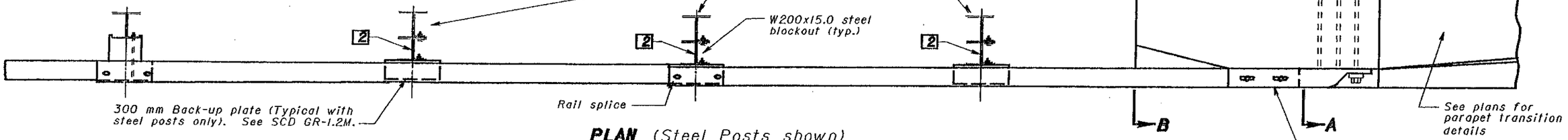
STANDARD CONSTRUCTION DRAWING **GR-3.1M**

APPROVED Larry F. Sutherland

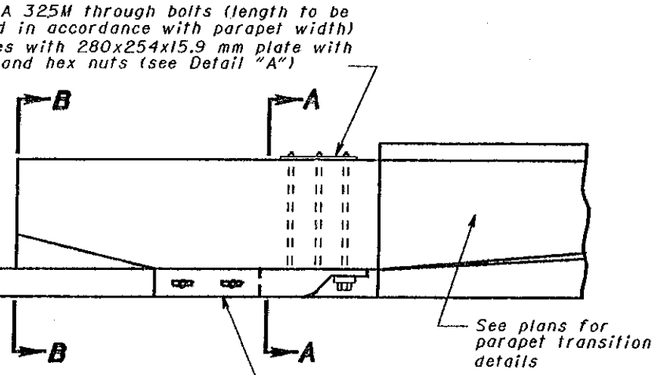
LEGEND

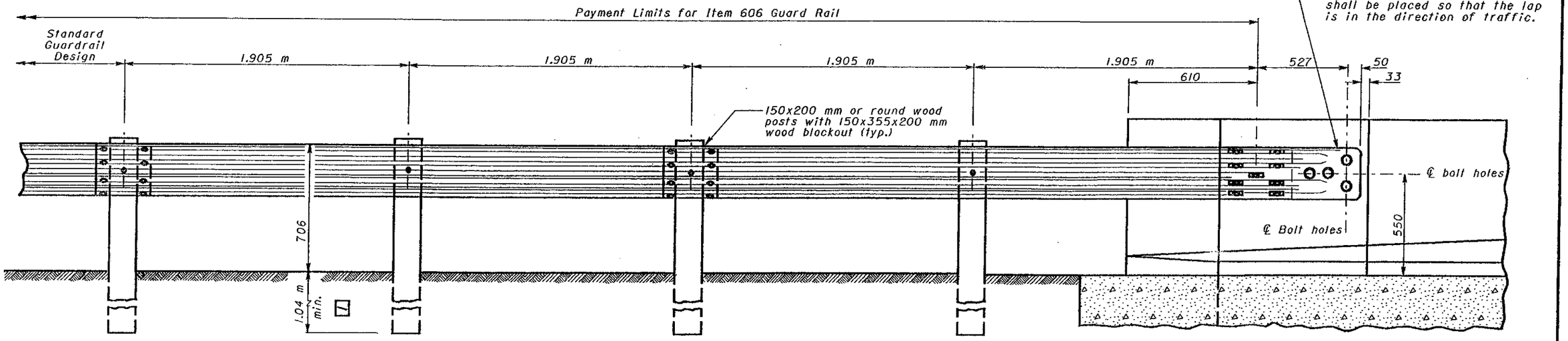
[1] See SCD GR-1.2M for additional post embedment details.

[2] Plastic blockouts shall not be permitted for Type 2 Bridge Terminal Assemblies.



PLAN (Steel Posts shown)





ELEVATION (Wood Posts shown)

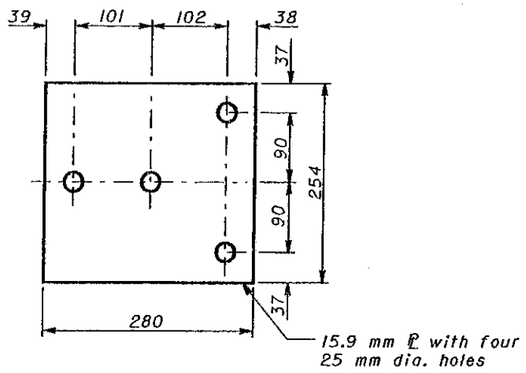
NOTES

GENERAL:
For additional details, see SCD's GR-1.1M, GR-1.2M and other drawings pertaining to the design of specific guardrail types.

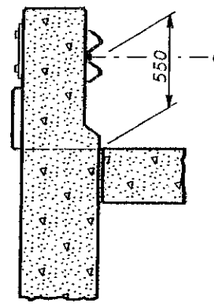
APPLICATION:
The Type 2 Bridge Terminal Assembly shall be used to connect guardrail runs to the trailing end of bridge parapets or other concrete barrier installations on one-direction roadways.

POSTS:
Posts shall be of standard size and material specified for the appropriate type of guardrail to be installed leaving the bridge or barrier.

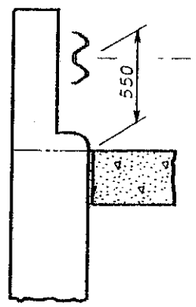
PAYMENT:
Payment for Item 606 - Each, Bridge Terminal Assembly, Type 2 shall include the extra cost, in excess of normal guardrail cost, for the terminal connector, steel blockouts, plates, bolts, hex nuts, washers and other hardware.



DETAIL A



SECTION A - A



SECTION B - B

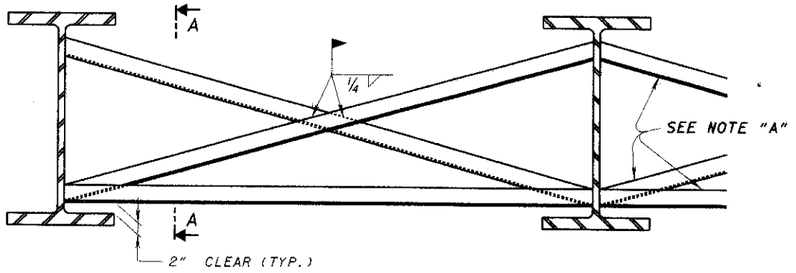
All dimensions are in millimeters unless otherwise noted.

metric units

This Drawing Replaces GR-3.2.

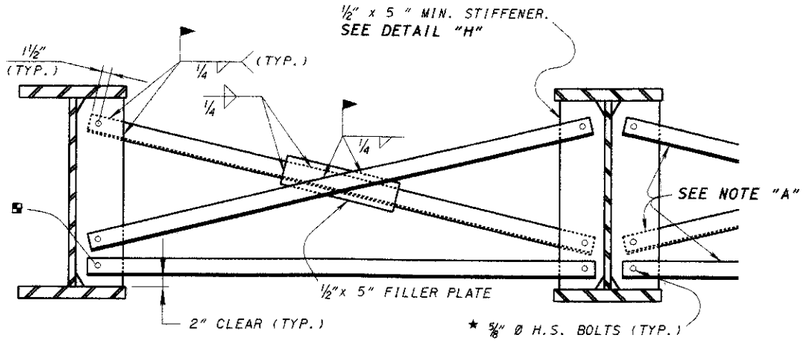
OHIO DEPARTMENT OF TRANSPORTATION

BRIDGE TERMINAL ASSEMBLY, TYPE 2	DATE 11-30-94 10-21-97
STANDARD CONSTRUCTION DRAWING GR-3.2M	
APPROVED Larry F. Sutherland	



TYPE 1: INTERMEDIATE WELDED CROSSFRAME DETAILS

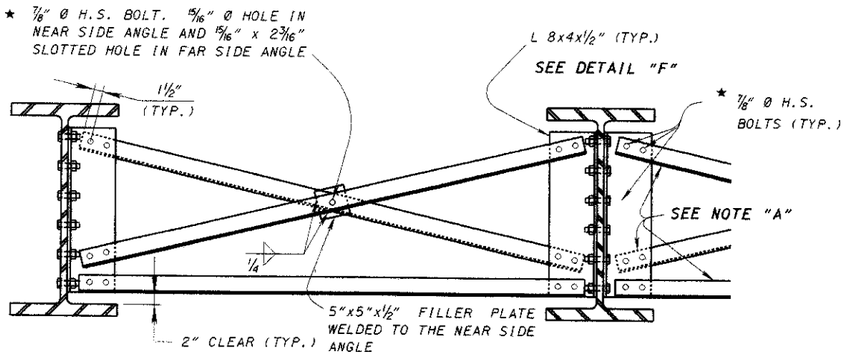
FOR ROLLED BEAM BRIDGES
AASHTO CASE II



TYPE 3 INTERMEDIATE WELDED CROSSFRAME DETAILS

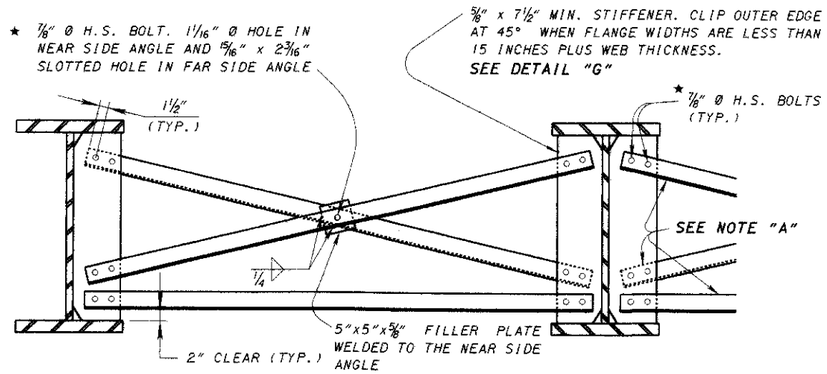
FOR GIRDER BRIDGES AND AASHTO CASE I ROLLED BEAM BRIDGES

CROSSFRAME ANGLE SIZE	
DEPTH OF BEAM/GIRDER	MINIMUM SIZE ANGLE
D < 48 INCH	3 x 3 x 5/16"
48 INCH < D < 52 INCH	3 1/2 x 3 1/2 x 3/8"
52 INCH < D < 60 INCH	4 x 4 x 3/8"



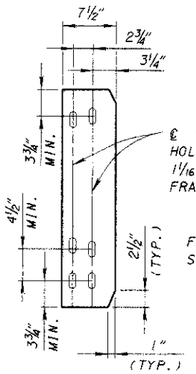
TYPE 2: INTERMEDIATE BOLTED CROSSFRAME DETAILS

FOR ROLLED BEAM BRIDGES
AASHTO CASE I OR CASE II

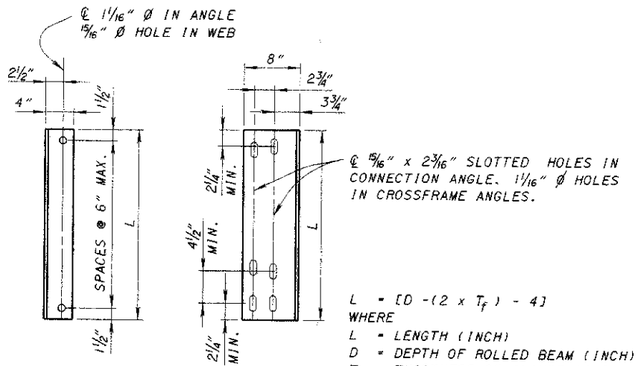


TYPE 4 INTERMEDIATE BOLTED CROSSFRAME DETAILS

FOR GIRDER BRIDGES AND AASHTO CASE I ROLLED BEAM BRIDGES



DETAIL "G"



$L = [D - (2 \times T_F) - 4]$
WHERE
L = LENGTH (INCH)
D = DEPTH OF ROLLED BEAM (INCH)
T_F = THICKNESS OF FLANGE (INCH)

DETAIL "F"

★ ALL BOLTS ARE A325 TYPE 1 GALVANIZED FOR A GALVANIZED OR PAINTED BRIDGE AND A325 TYPE 3 FOR A588 WEATHERING STEEL BRIDGE. EACH ANCHOR ASSEMBLY SHALL INCLUDE A BOLT, NUT AND TWO (2) WASHERS, TIGHTENED PER CMS SECTION 513.15.

THE FABRICATOR SHALL CHECK LONGITUDINAL CROSSFRAME SPACING SO THAT INTERFERENCE WITH BOLTED SPLICES, ANCHOR BOLTS, COMPLETE PENETRATION WEB OR FLANGE WELDED SPLICES AND BEARING STIFFENERS CAN BE AVOIDED. SPACING SHALL BE ADJUSTED TO PROVIDE AT LEAST SIX INCHES OF LONGITUDINAL CLEARANCE. THE FABRICATOR MAY ADJUST CROSS-FRAME SPACES UP TO A MAXIMUM OF 15'-0" CENTER TO CENTER UNLESS THE CONTRACT DRAWINGS PROVIDE A NOTED MAXIMUM.

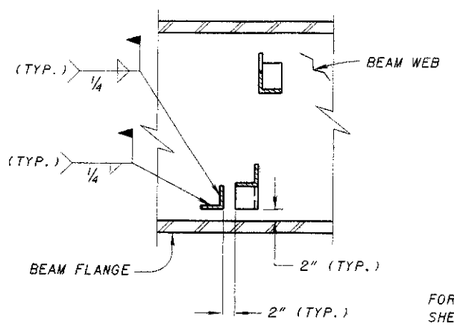
FOR COMPLETELY SHOP PAINTED OR GALVANIZED SYSTEMS, A TYPE 2 OR TYPE 4 CROSSFRAME SHALL BE USED.

AT THE OPTION OF THE CONTRACTOR, TYPE 2 CROSSFRAME CAN BE USED IN LIEU OF TYPE 1 CROSSFRAME AND TYPE 4 CROSSFRAME CAN BE USED INSTEAD OF TYPE 3 CROSSFRAME.

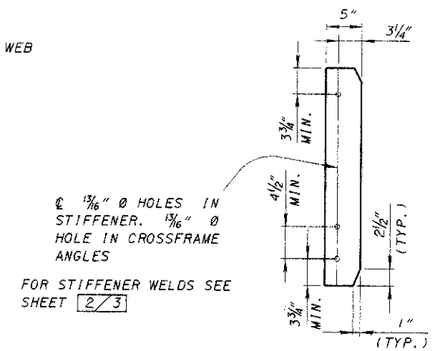
■ AT SKEWED STRUCTURES THE NEED OF SLOTTED HOLES AT EACH CROSS FRAME LOCATION SHALL BE INVESTIGATED AND SPECIFIED ON THE PLANS AS REQUIRED.

NOTE "A"

MATCH CROSSFRAME LEGS TO EACH SIDE OF THE WEB, SEE CROSSFRAME ANGLE SIZE GUIDE TABLE FOR SIZES



SECTION A-A



DETAIL "H"

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

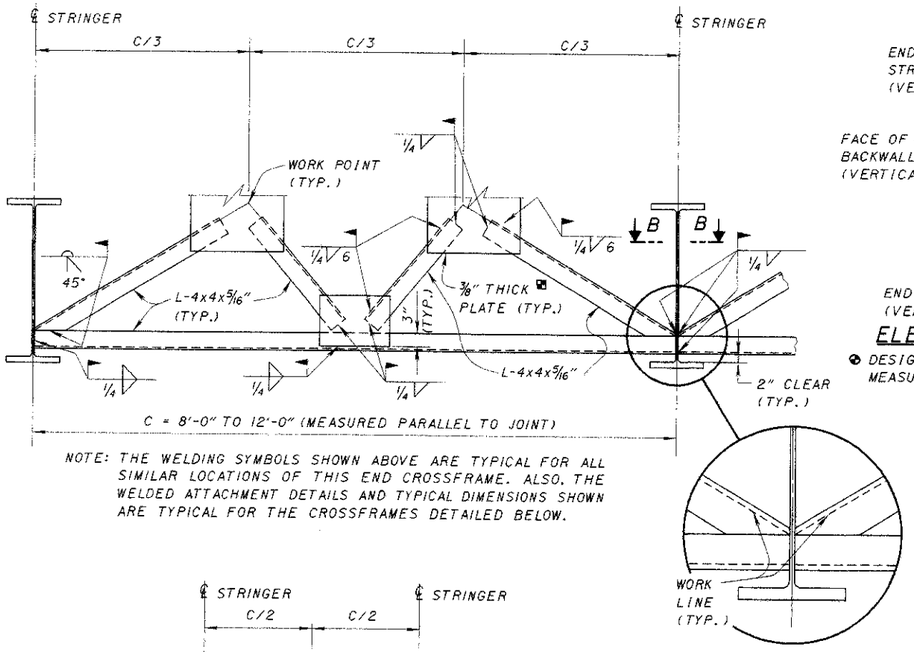
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fogwell
ADMINISTRATOR
2-12-97
DATE

REVISIONS	DESIGNED	DRAWN	CHECKED	REVIEWED
	JCR	BDB/FO	JS	WTL

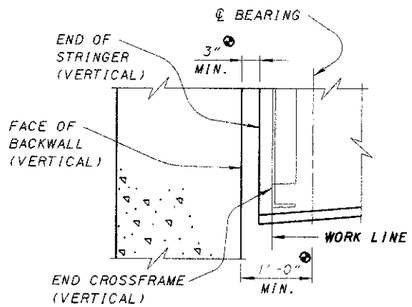
STANDARD
GENERAL STEEL DETAILS

GSD-1-96

1 / 3



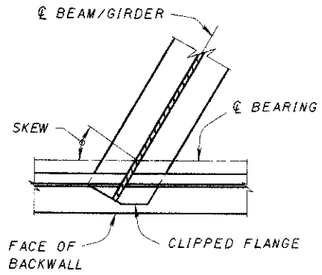
NOTE: THE WELDING SYMBOLS SHOWN ABOVE ARE TYPICAL FOR ALL SIMILAR LOCATIONS OF THIS END CROSSFRAME. ALSO, THE WELDED ATTACHMENT DETAILS AND TYPICAL DIMENSIONS SHOWN ARE TYPICAL FOR THE CROSSFRAMES DETAILED BELOW.



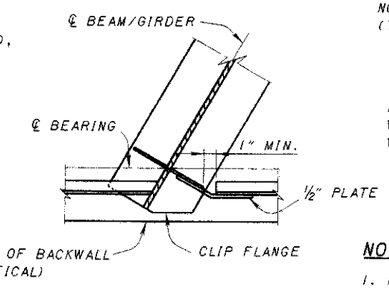
ELEVATION OF BEAM/GIRDER

◈ DESIGNER TO ESTABLISH DIMENSION REQUIRED, MEASURED NORMAL TO BACKWALL.

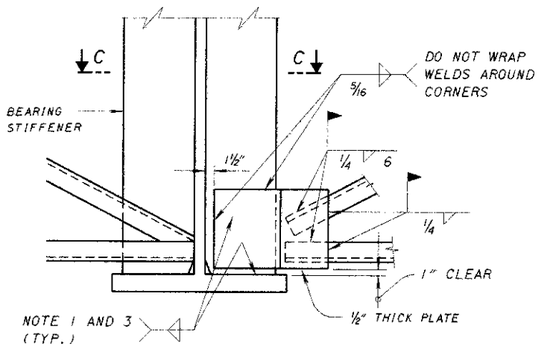
■ 3/8" THICK PLATE IS A PART OF THE EXPANSION JOINT SYSTEM. SEE EXPANSION JOINT STANDARD DRAWINGS FOR DETAILS.



SECTION B-B

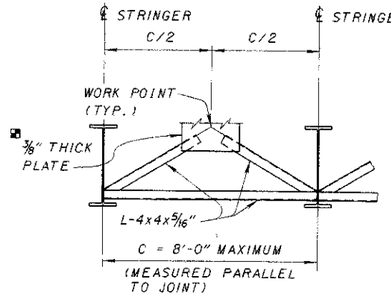


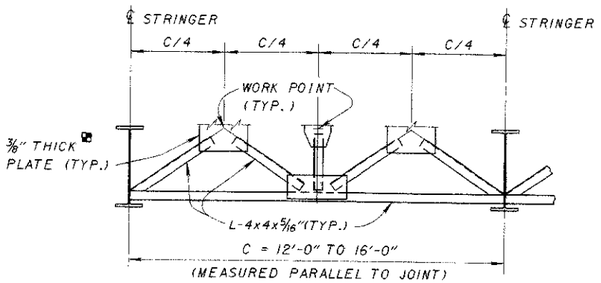
SECTION C-C



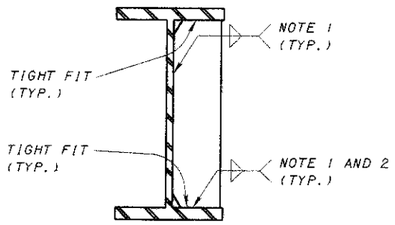
BEAM/GIRDER END

END CROSSFRAME FOR SKEWED BRIDGES WHERE BEARING STIFFENERS INTERFERE WITH END CROSSFRAMES.

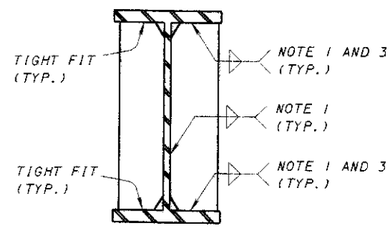




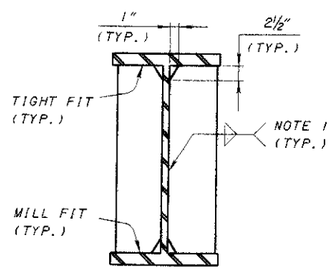
END CROSSFRAME DETAILS



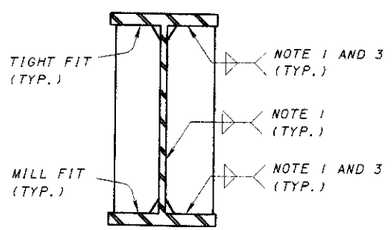
INTERMEDIATE STIFFENER



INTERMEDIATE STIFFENER WITH CROSSFRAMES



BEARING STIFFENER



BEARING STIFFENER WITH CROSSFRAMES

NOTES:

1. PROVIDE 1/4" WELD WHEN THE THICKER PLATE IS 3/4" OR LESS OR 5/16" WELD WHEN THE THICKER PLATE IS GREATER THAN 3/4", UNLESS DESIGN REQUIRES LARGER WELDS (SEE CMS 513.17).
2. INTERMEDIATE STIFFENERS REQUIRE FILLET WELDS TO THE COMPRESSION FLANGE ONLY PER CMS 513.08.
3. STIFFENERS TO WHICH CROSS FRAMES CONNECT REQUIRE FILLET WELDS TO BOTH FLANGES PER CMS 513.08

BEARING STIFFENER: BEARING STIFFENER SHALL BE VERTICAL AFTER ERECTION.

WELDS: STIFFENER TO STRINGER WELDS SHALL BE TERMINATED AS GIVEN BELOW:

A. STIFFENER TO STRINGER FLANGE WELDS 1/4" ± 1/8" AT BOTH ENDS OF THE STIFFENER.
B. STIFFENER TO STRINGER WEB WELDS 1/2" ± 1/4" AT BOTH ENDS OF THE STIFFENER.

MILL FIT: THE BEARING ENDS OF THE BEARING STIFFENER SHALL BE FLUSH AND SQUARE WITH THE WEB AND SHALL HAVE AT LEAST 75 PERCENT OF THIS AREA IN CONTACT WITH THE INNER SURFACE OF THE FLANGE.

TIGHT FIT: A TIGHT FIT IS DEFINED AS ONE IN WHICH THE STIFFENER AND FLANGE ARE IN PHYSICAL CONTACT OVER SOME PORTION OF THE END OF THE STIFFENER AND HAVING NO GAP IN EXCESS OF 1/16 INCH.

BEAM OR GIRDER ENDS: FOR STRUCTURES ON GRADE THE BEAM OR GIRDER ENDS SHALL BE CUT IN A MANNER THAT THEY ARE VERTICAL AFTER ERECTION. A THREE (3) INCH MINIMUM CLEARANCE AT 60 F SHALL BE MAINTAINED BETWEEN THE VERTICAL ENDS OF THE BEAMS OR GIRDERS AND THE VERTICAL FACE OF THE BACKWALL.

WORK POINTS: WORK POINTS SHALL BE COORDINATED BETWEEN EXPANSION JOINT AND STRUCTURAL STEEL SUPPLIERS TO ASSURE FIT UP AT ALL DESIGN LOCATIONS.

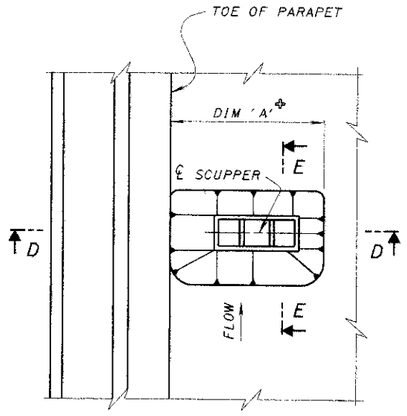
TRANSITION OF THICKNESS OR WIDTH AT BUTT JOINTS: REFER TO SECTION 9.20 OF THE AMERICAN WELDING SOCIETY (AWS) BRIDGE WELDING CODE AS AMENDED BY SUPPLIMENTAL SPECIFICATION 1011 WHICH PROVIDES TRANSITION DETAILS OF THICKNESSES AND WIDTHS AT COMPLETE PENETRATION BUTT JOINTS.

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fogwell
ADMINISTRATOR
2-12-97
DATE

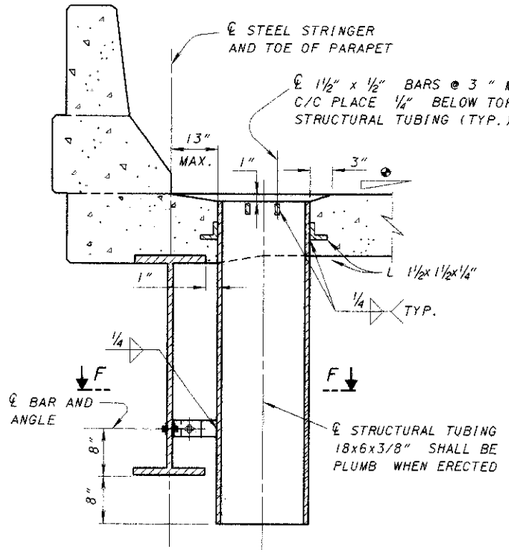
REVISIONS	DESIGNED JCR	DRAWN BDB/FO	CHECKED JS	REVIEWED WTL
				GSD-1-96

STANDARD
GENERAL STEEL DETAILS



PLAN

✠ DIMENSION 'A' SHALL NOT EXTEND BEYOND THE LIMITS OF THE SHOULDER (SHALL NOT FALL IN THE TRAFFIC LANE)



SECTION D-D

THE SCUPPERS SHALL BE LOCATED ON THE BRIDGE DECK BASED ON BRIDGE GEOMETRY AND THE CONTRIBUTING DECK DRAINAGE.

THE CONCRETE DECK, AT THE TWO SCUPPER CORNERS AWAY FROM THE CURB LINE, SHALL BE REINFORCED BY 3'-0" LONG #4 BAR, ONE BAR AT EACH CORNER, ORIENTED AT 45° TO THE SCUPPER.

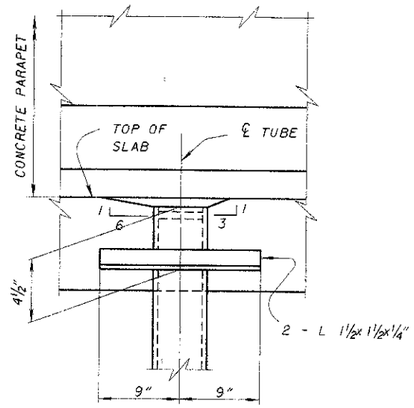
◐ SQUARE CUT TOP OF TUBE UNLESS DESIGNER SPECIFIES CROSS SLOPE GREATER THAN ½" PER FOOT IN WHICH CASE THE TOP IS TO BE CUT PARALLEL TO THE CROSS SLOPE.

◪ SLOTTED HOLES SHALL BE 11/16" x 1 9/16". THE SLOT SHALL BE HORIZONTAL IN THE 3 x 3/8" BAR AND VERTICAL IN THE ANGLE. USE A 5/8" Ø A325 HIGH STRENGTH HEX HEAD BOLT WITH HEX NUT AND WASHERS, TIGHTEN AS PER CMS 513.15.

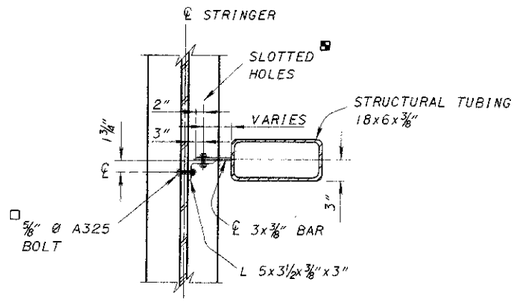
□ 5/8" Ø A325 TYPE 1 GALVANIZED FOR A GALVANIZED OR PAINTED BRIDGE AND A325 TYPE 3 FOR A588 WEATHERING STEEL BRIDGE. EACH ASSEMBLY SHALL INCLUDE A BOLT, NUT AND TWO (2) WASHERS, TIGHTENED PER CMS SECTION 513.15. FOR A GALVANIZED BRIDGE SYSTEM PROVIDED A 3.5" x 3.5" x 1/8" PREFORMED BEARING PAD WITH A 13/16" Ø HOLE AS PER CMS 711.21 BETWEEN THE BEAM WEB AND THE ANGLE. FIELD DRILL 13/16" DIAMETER HOLE IN THE WEB AFTER THE DECK CONCRETE HAS BEEN POURED.

THE SUPPORT ANGLES, BARS, SUPPORT BOLTS AND RELATED HARDWARE ARE INCLUDED WITH SCUPPERS FOR PAYMENT.

SCUPPERS INCLUDING SUPPORT ANGLES, BARS, BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH CMS 711.02.



SECTION E-E



SECTION F-F

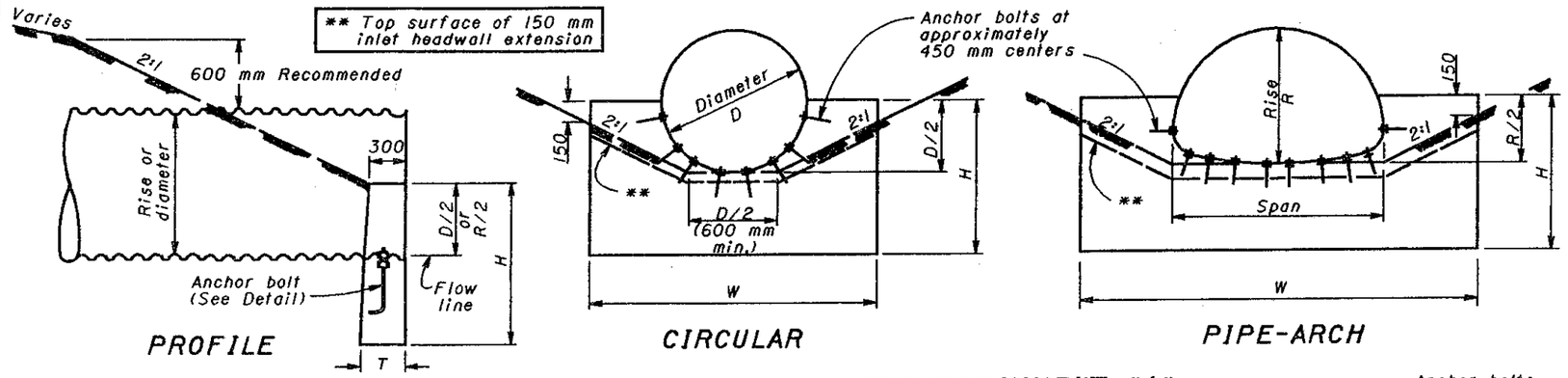
DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fague 2-12-97
ADMINISTRATOR DATE

REVISIONS	DESIGNED JCR	CHECKED JS	REVISED WTL
	DRAWN JFF/FO	GSD-1-96	

STANDARD
GENERAL STEEL DETAILS

3 / 3



END TREATMENT "A"

NOTES

CONCRETE: Headwall concrete shall be Class C. Concrete quantities are based on headwalls without the 150 mm extension under the channel protection.

ANCHOR BOLTS: Bolts (as detailed) for anchoring both ends of metal pipe shall meet ASTM A 307. The top 150 mm min. of bolt shall be galvanized according to ASTM a 153. Cost of anchors shall be included in the unit price bid per meter of CMS 603.

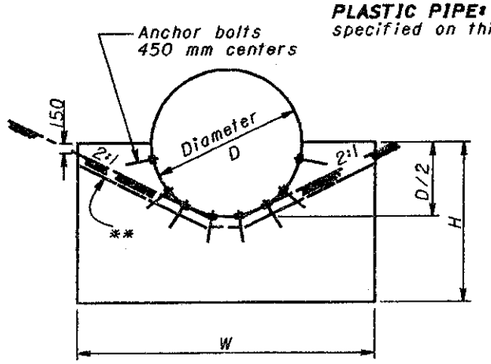
Headwall dimensions are based on end treatment "A" for pipe sizes up to and including 3000 mm, 1775 x 1175 mm, and 1650 x 1275 mm, and on end treatment "B" for sizes over and including 3300 mm, 3975 x 2800 mm, and 2175 x 1575 mm.

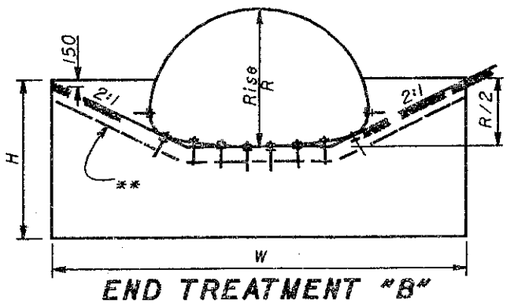
* Channel configuration for pipe sizes between end treatment "A" and end treatment "B" is determined by 2:1 slopes passing through a point 150 mm below the top and at each side of the headwall. For end treatment "B", 2:1 slopes are tangent to pipe.

PLASTIC PIPE: Plastic pipe may not be available in all the sizes specified on this Standard Construction Drawing.

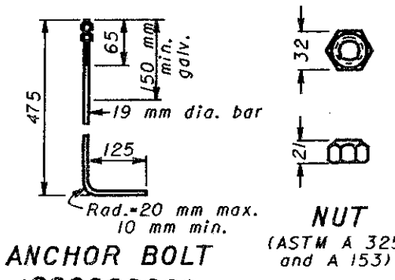
HEADWALL FOR CORRUGATED METAL PIPE & PLASTIC PIPE

CIRCULAR					PIPE ARCH						PIPE ARCH					
D	W	H	T	CONC. (m^3)	SPAN	RISE	W	H	T	CONC. (m^3)	SPAN	RISE	W	H	T	CONC. (m^3)
					68x13 mm Corrugations											
300	600	925	300	0.17							*1825	1375	3550	1600	300	1.70
375	750	975	300	0.22	425	325	925	925	300	0.26	*2025	1475	3750	1650	375	2.09
450	925	1000	300	0.28	525	375	1075	925	300	0.30	2175	1575	3950	1700	425	2.43
525	1075	1025	300	0.33	600	450	1225	975	300	0.36	2450	1675	4275	1750	500	2.99
600	1225	1075	300	0.39	700	500	1375	1000	300	0.41	2575	1775	4575	1800	550	3.50
675	1375	1125	300	0.46	875	600	1675	1050	300	0.53	2800	1875	4875	1850	600	4.06
750	1525	1150	300	0.53	1050	725	1975	1100	300	0.65	2925	1975	5400	1900	625	4.74
825	1675	1175	300	0.59	1225	825	2325	1150	300	0.80	3200	2075	5475	1950	650	5.07
900	1825	1225	300	0.67	1425	950	2750	1225	300	1.01	3425	2175	5800	2000	675	5.65
975	1975	1275	300	0.76	1600	1075	3050	1325	300	1.21	3550	2275	6325	2050	675	6.32
1050	2125	1300	300	0.83	1775	1175	3350	1425	300	1.43	150x50 mm Corrugations (450 mm Corner Radius)					
1200	2450	1375	300	1.01	*1925	1300	3550	1600	300	1.70						
1350	2825	1450	300	1.23	*2075	1425	3750	1650	375	2.09	*1825	1375	3550	1700	300	1.81
1500	3200	1675	300	1.61	150x50 mm Corrugations (775 mm Corner Radius)						*1900	1425	3650	1725	350	2.04
1650	3575	1750	300	1.88							*2025	1475	3750	1750	375	2.21
1800	3950	1825	300	2.16	3975	2800	7300	2425	825	9.95	*2100	1525	3850	1775	400	2.39
1950	4350	1900	350	2.68	4050	2850	7550	2450	825	10.40	2175	1575	3925	1800	425	2.56
2100	4725	1975	350	3.03	4200	2900	7575	2475	850	10.77	2300	1625	4025	1825	450	2.75
2250	5100	2050	400	3.66	4250	2950	7850	2500	850	11.28	2375	1675	4275	1850	500	3.16
2400	5475	2125	400	4.07	4325	3000	8100	2525	850	11.75	2450	1725	4475	1875	525	3.46
2550	5875	2200	450	4.84	4475	3050	8150	2550	875	12.20	2575	1775	4575	1900	550	3.69
2700	6250	2275	500	5.68	4600	3100	8200	2575	875	12.40	2650	1825	4825	1925	575	4.06
2850	6625	2350	550	6.61	4675	3150	8450	2600	875	12.90	2800	1875	4875	1950	600	4.28
3000	7000	2450	600	7.71	4750	3200	8700	2625	900	13.69	2850	1925	5125	1975	650	4.81
*3150	7000	2525	650	8.39	4875	3250	8750	2650	900	13.90	2925	1975	5400	2000	675	5.26
3300	7000	2600	700	9.10	4950	3300	9025	2675	900	14.48	3075	2025	5425	2025	675	5.35
3450	7350	2675	750	10.32	5100	3350	9050	2700	925	14.96	3200	2075	5450	2050	675	5.44
3600	7675	2750	825	11.87	5150	3400	9325	2725	925	15.56	3275	2125	5750	2075	700	5.96
3750	8025	2825	875	13.31	5225	3450	9575	2750	925	16.12	3425	2175	5775	2100	700	6.06
3900	8350	2900	925	14.83	5375	3500	9625	2775	950	16.68	3475	2225	6025	2125	700	6.40
4050	8700	2975	975	16.49	5425	3550	9875	2800	950	17.27	3550	2275	6325	2150	725	6.97
4200	9050	3050	1025	18.28	5575	3600	9900	2825	950	17.47	3700	2325	6350	2175	725	7.07
4350	9375	3125	1075	20.13	5625	3650	10 150	2850	975	18.43	3750	2375	6600	2200	725	7.44
4500	9725	3200	1100	21.78	5775	3700	10 175	2875	975	18.64	3800	2425	6875	2225	750	8.03
4650	10 050	3275	1125	23.44	5850	3750	10 500	2900	975	19.40	3850	2500	7200	2250	750	8.50
4800	10 425	3350	1150	25.31	5900	3800	10 750	2925	1000	20.43	4025	2525	7200	2275	750	8.59
4950	10 750	3425	1175	27.14	5975	3850	11 050	2950	1000	21.18	4175	2575	7200	2300	775	8.90
5100	11 075	3500	1200	29.06	6125	3900	11 050	2975	1000	21.36	4225	2625	7650	2325	775	9.55
5250	11 425	3575	1225	31.13	6175	3950	11 325	3000	1025	22.50	4275	2675	7775	2350	775	9.82
5400	11 750	3650	1250	33.23	75x25 mm Corrugations						4450	2725	7775	2400	825	10.49
5550	12 125	3725	1275	35.56	1000	775	1975	1100	300	0.65	4600	2775	7775	2425	825	10.60
5700	12 450	3800	1300	37.84	1150	900	2325	1150	300	0.80	4650	2825	8050	2450	825	11.09
5850	12 800	3875	1325	40.29	1325	1025	2750	1225	300	1.01	4700	2875	8350	2475	850	11.88
6000	13 125	3950	1350	42.76	1500	1150	3050	1325	300	1.21	4750	2950	8650	2500	850	12.43
6150	13 450	4050	1375	45.61	1650	1275	3350	1425	300	1.43	4925	2975	8650	2525	850	12.55
6300	13 825	4125	1400	48.46							4975	3025	8950	2550	875	13.40



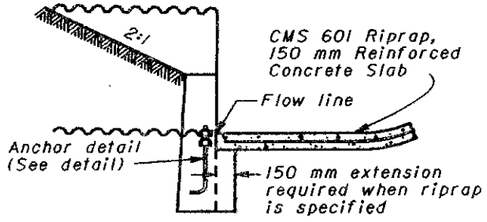


END TREATMENT "B"



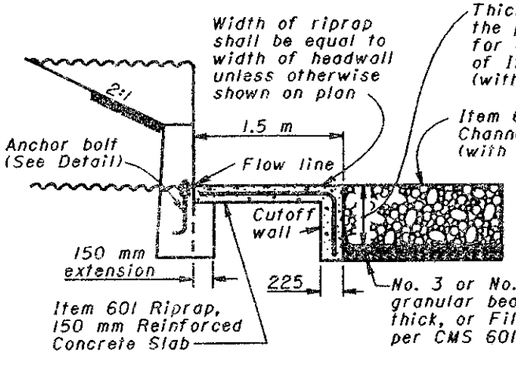
NUT (ASTM A 325 and A 153)

ANCHOR BOLT



INLET CHANNEL PROTECTION DETAIL

All dimensions are in millimeters unless otherwise noted.



OUTLET CHANNEL PROTECTION DETAIL

The depth of the riprap cutoff wall (750 mm min.) shall match the thickness of the rock channel protection shown on the plan plus 150 mm.

metric units

This Drawing Replaces HW-4A.

BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

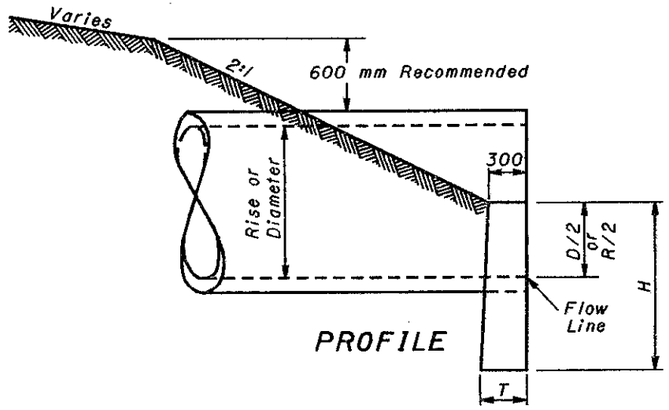
HALF-HEIGHT HEADWALLS FOR CORRUGATED METAL PIPE & PLASTIC PIPE

DATE 7-12-95

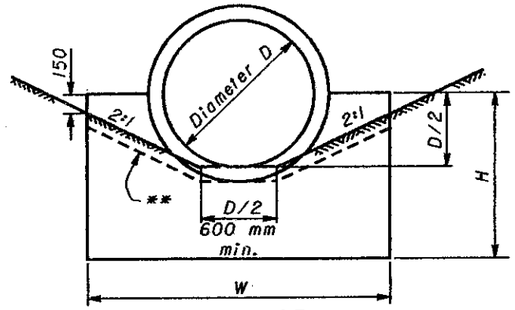
STANDARD CONSTRUCTION DRAWING **HW-2.1M**

APPROVED D. K. Hulsman
ENGR., L & D

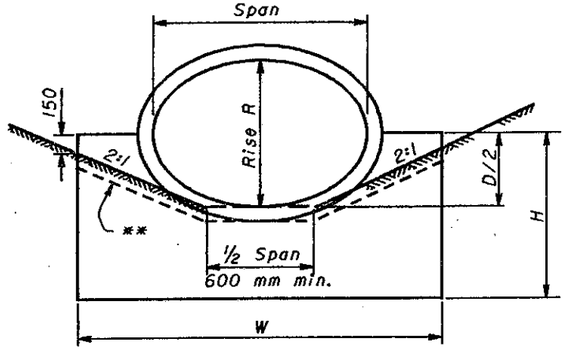
** Top surface of 150 mm inlet headwall extension



PROFILE



CIRCULAR

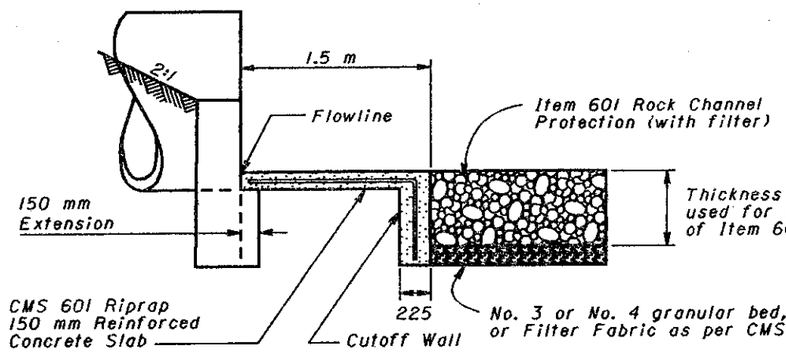


ELLIPTICAL

CONCRETE PIPE

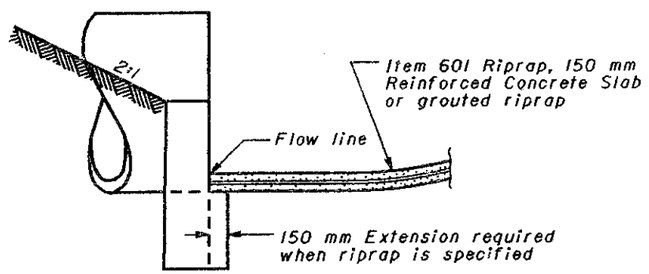
HEADWALL FOR CONCRETE PIPE

CIRCULAR					ELLIPTICAL					
D	W	H	T	Conc. (m^3)	Span	Rise	W	H	T	Conc. (m^3)
300	600	925	300	0.17	575	350	925	975	300	0.27
375	750	975	300	0.22	750	475	1100	1025	300	0.34
450	900	1000	300	0.27	850	550	1200	1050	300	0.38
525	1050	1025	300	0.32	950	600	1375	1075	300	0.44
600	1200	1075	300	0.39	1050	675	1425	1100	300	0.47
675	1350	1125	300	0.46	1125	725	1575	1125	300	0.53
750	1500	1150	300	0.52	1225	800	1650	1175	300	0.58
825	1650	1175	300	0.58	1325	850	1800	1225	375	0.74
900	1800	1225	300	0.66	1500	950	2075	1275	375	0.89
975	1950	1275	300	0.75	1700	1075	2450	1325	400	1.14
1050	2100	1300	300	0.82	1900	1200	2800	1525	400	1.49
1200	2400	1375	350	1.07	2075	1325	3150	1575	450	1.86
1350	2775	1450	350	1.31	2275	1450	3500	1650	450	2.16
1500	3150	1675	400	1.85	2450	1575	3825	1700	500	2.60
1650	3525	1750	450	2.31	2650	1700	4200	1775	500	2.98
1800	3900	1825	450	2.67	2825	1800	4500	1825	550	3.49
1950	4275	1900	500	3.25	3025	1925	4850	1900	550	3.91
2100	4650	1975	550	3.90	3200	2050	5175	1950	600	4.54
2250	5025	2050	550	4.38	3400	2175	5525	2025	600	5.03
2400	5400	2125	600	5.16	3575	2300	5900	2075	650	5.81
2550	5775	2200	650	6.03	3775	2425	6250	2150	650	6.38
2700	6150	2275	650	6.64	4150	2650	6875	2250	700	7.73
2850	6525	2350	700	7.66	4500	2900	7575	2400	750	9.54
3000	6900	2450	750	8.87						
3150	7275	2525	750	9.64						
3300	7650	2600	825	11.18						
3600	8400	2750	875	13.57						



OUTLET CHANNEL PROTECTION DETAIL

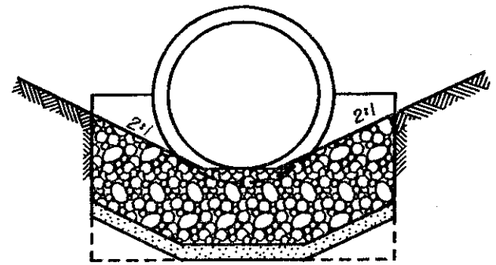
The depth of the riprap cutoff wall (750 mm min.) shall match the thickness of the rock channel protection shown on the plan plus 150 mm.



INLET CHANNEL PROTECTION DETAIL

NOTE

CONCRETE: Concrete for headwalls shall be Class C.
Concrete quantities are based on headwalls without the 150 mm extension under the channel protection.



Width of riprap and rock channel protection shall be equal to the width of headwall unless otherwise shown on the plans. (Minimum width 1.2 m.)

All dimensions are in millimeters unless otherwise noted.

metric units

This Drawing Replaces HW-4B.

BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

HALF-HEIGHT HEADWALLS FOR CONCRETE PIPE

DATE 7-12-95

STANDARD CONSTRUCTION DRAWING **HW-2.2M**

APPROVED D.K. Hulman
ENGR., L & D

GENERAL NOTES:

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

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

3. THIS TRAFFIC CONTROL PLAN SHOULD BE USED WHEN THE WORK AREA EXTENDS INTO EITHER THE RIGHT OR LEFT HAND LANE OF A MULTIPLE LANE DIVIDED HIGHWAY AND IT IS NOT DESIRABLE, FOR CAPACITY REASONS, TO REDUCE THE NUMBER OF AVAILABLE LANES. THE MINIMUM RESULTANT WIDTH OF ANY LANE IS 3 m. THE PLAN SHOWN IS FOR A LEFT-LANE CLOSURE. WHEN THERE IS A RIGHT-LANE CLOSURE, MAKE THE FOLLOWING SIGN SUBSTITUTIONS: AN OC-49L FOR THE OC-49R: AN OC-39AR, FOR THE OC-39AL: AN OW-6A OR OW-6B FOR THE OW-5A OR OW-5B: AND AN OW-5A OR OW-5B, FOR THE OW-6A OR OW-6B.

4. PORTABLE CONCRETE BARRIER (PCB) AS DESCRIBED IN STANDARD CONSTRUCTION DRAWINGS SHALL BE USED FOR THIS WORK PROTECTION PLAN. THE TAPER RATE FOR THE BARRIER APPROACH TAPER SHOULD BE 20 TO 1. WHEN USED TO PROTECT WORK AREAS AT LANE CLOSURES ON MULTI-LANE ROADWAYS. PCB'S SHOULD BE PRECEEDED BY CHANNELIZING DEVICES TO DIRECT TRAFFIC FROM THE CLOSED LANE AT LEAST 91 m PRIOR TO THE BEGINNING OF THE PCB.

PCB SHALL BE DELINEATED AS FOLLOWS:

PCB TYPE	DELINEATION
813 mm HIGH WITHOUT GLARE SCREEN	BARRIER REFLECTORS AT 7.6 m C-C (MAX.) ALTERNATED WITH TOP MOUNTED OBJECT MARKERS (229 X 381 mm) AT 7.6 m C-C (MAX.)
813 mm HIGH WITH GLARE SCREEN	BARRIER REFLECTORS AT 7.6 m C-C VERTICAL ORANGE REFLECTORIZED STRIPES ON PADDLES (51 X 305 mm) AT 3.8 m C-C (MAX.)
1270 mm HIGH	BARRIER REFLECTORS AT 3.8 m C-C (MAX.)
TAPERED END SECTION AND EXPOSED END	OBJECT MARKERS (229 X 381 mm) TOP MOUNTED AT EACH END

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

6. THE DISTANCE PLATE OW-145A SHALL INDICATE THE DISTANCE TO THE BEGINNING OF THE PAVEMENT TAPER (L). DISTANCES LESS THAN 1 MILE MAY BE EXPRESSED IN FEET.

7. THE TAPER RATE OF DRUMS SHALL BE BASED UPON THE AVERAGE APPROACH SPEED OR SPEED LIMIT WHICHEVER IS GREATER AND SHALL BE (R) AS SHOWN IN TABLE II. EXECPT THAT THE RESULTING LENGTH OF TAPER SHOULD NOT BE LESS THAN 90 m, THE TAPER (L) SHALL EQUAL THE TAPER RATE (R) MULTIPLIED BY THE OFFSET (O). A MINIMUM OF FIVE CHANNELIZING DEVICES SHALL BE USED TO FORM THE TAPER ON THE SHOULDER.

8. THE TYPE A FLASHING WARNING LIGHTS SHOWN ON OW-128 SIGNS, AND OC-39AL SIGNS ARE REQUIRED.

9. THE EXISTING CONFLICTING PAVEMENT MARKINGS AND REFLECTORS FROM THE RAISED PAVEMENT MARKERS (RPM'S) SHALL BE REMOVED AND THE APPROPRIATE COLOR TEMPORARY LINES SHALL BE APPLIED. TEMPORARY LINES WHICH WOULD CONFLICT WITH FINAL TRAFFIC LANES SHALL BE REMOVABLE (740.05 TYPE-C) TAPE UNLESS THE AREA WILL BE RESURFACED IN THE NEXT WORK PHASE. AFTER COMPLETION OF THE WORK, TEMPORARY MARKINGS SHALL BE REMOVED IN ACCORDANCE WITH 641.10 AND THE ORGINAL MARKINGS AND RAISED PAVEMENT MARKER REFLECTORS SHALL BE RESTORED AT NO ADDITIONAL COST.

10. THE MAXIMUM SPACING OF THE OC-49R, NEAR THE WORK AREA IS 457 m. WHEN THE DISTANCE "X" IS LESS THAN 518 m. THE SECOND OC-49R SHOULD BE DELETED. ALSO IF IT WOULD BE WITHIN 61 m OF THE OW-6A OR OW-6B SIGN THE OC-49R SIGN SHOULD BE DELETED.

11. LIGHTING POLES NOT LOCATED BEHIND EXISTING GUARDRAIL SHALL BE SET BACK 12.0 m FROM EDGE OF THE NEAREST TRAFFIC LANE (INCLUDING ANY SHOULDER OR TEMPORARY PAVEMENT USED AS A TRAFFIC LANE). WHERE LOCAL CONDITIONS PREVENT THE 12.0 m SET BACK, IT MAY BE REDUCED TO 9.0 m WITH THE APPROVAL OF THE ENGINEER. WHEN LOCATED BEHIND EXISTING GUARDRAIL, LIGHT POLES SHALL BE A MINIMUM OF .9 m CLEAR FROM BACK OF GUARDRAIL POST TO FACE OF POLE. ANY POLES PROVIDED FOR POWER SERVICE SHALL BE SET BACK AT LEAST AS FAR AS THE LIGHTING POLES. SPACING AND TYPE OF LUMINAIRES SHALL PROVIDE AN AVERAGE ILLUMINATION OF 10.8 lux TO 12.9 lux WITH MAXIMUM UNIFORMITY RATIOS OF 4:1 AVERAGE TO MINIMUM AND 10:1 MAXIMUM TO MINIMUM THROUGHOUT THE LIGHTED AREA. WHEN TAPERS ARE REQUIRED TO BE LIGHTED AND DIMENSION "X" IS LESS THAN 610 m LIGHTING SHALL BE CONTINUOUS BETWEEN TAPERS.

12. 36 INCH WARNING SIGN SIZES MAY BE USED ON DIVIDED ROADWAYS THAT ARE NOT CLASSIFIED AS FREEWAYS OR EXPRESSWAYS.

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

14. IF DISTANCE "X" IS LESS THAN 305 m, PLACE THE OW-6A OR OW-6B SIGN AT THE MID POINT OF DISTANCE "X".

TABLE I

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

TABLE II

SPEED (MPH)	TAPER RATE (R) (m/m)	MAXIMUM SPACING (S) OF DRUMS (m)
30 - 40	14:1	12
45 - 55	28:1	12
60 - 65	33:1	18

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 01/30/95

TRANSITION PLAN FOR USE OF SHOULDER WITH PCB

STANDARD CONSTRUCTION DRAWING MT-102.10M

APPROVED Gary S. Cuge ENGR. OF DESIGN SERVICES

WCC

TEMPORARY SIGN SUPPORT REQUIREMENTS

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

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

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

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

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

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

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

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

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

   c) URBAN - 2.1 m

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

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

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

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

2) MINIMUM OF 0.3 m ABOVE ROADWAY

C. CLASSES OF SUPPORTS:

ALL TEMPORARY SIGN SUPPORTS SHALL BE OF THE FOLLOWING TYPES:

1) CLASS A:

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

2) CLASS B:

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

3) CLASS C:

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

D. TRAFFIC APPROACH SPEEDS:

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

TABLE

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

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

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

E. BALLASTING

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

F. STRENGTH OF SIGN SUPPORTS

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

G. PROHIBITED SUPPORTS

THE FOLLOWING SUPPORT TYPES SHALL NOT BE PERMITTED ON PROJECTS:

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

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

CLASS A SUPPORTS

FIXED SUPPORTS

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

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

   a) - UP TO 102 X 102 mm WOOD.

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

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

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

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

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

   a) - UP TO 102 X 102 mm WOOD.

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

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

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

4) FIXED TYPE III BARRICADES:

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

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

(CONTINUED ON MT-105.11M)

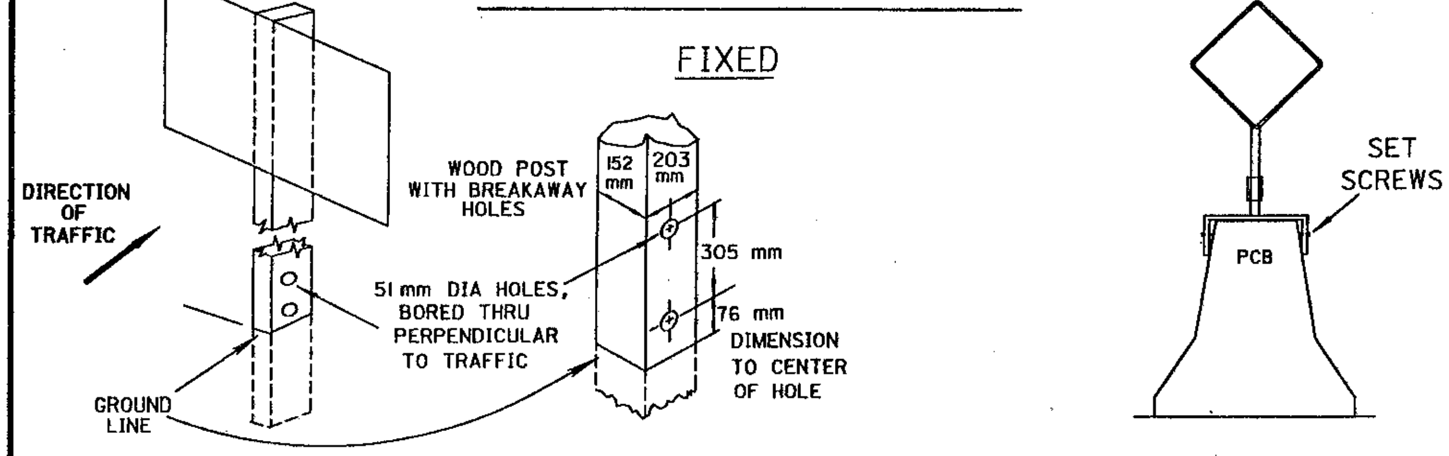
METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

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

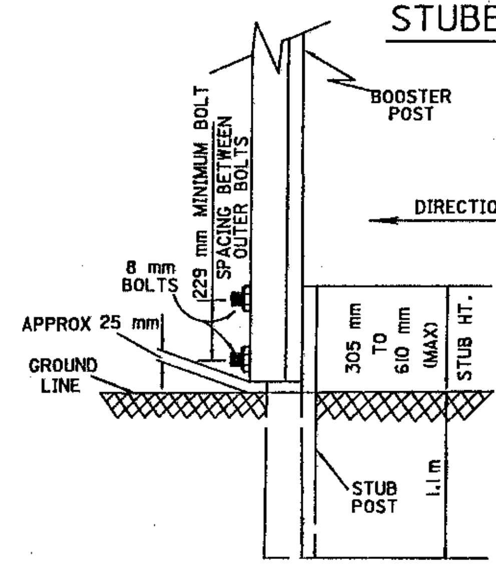
CLASS A SUPPORTS

FIXED



CLASS A SUPPORTS

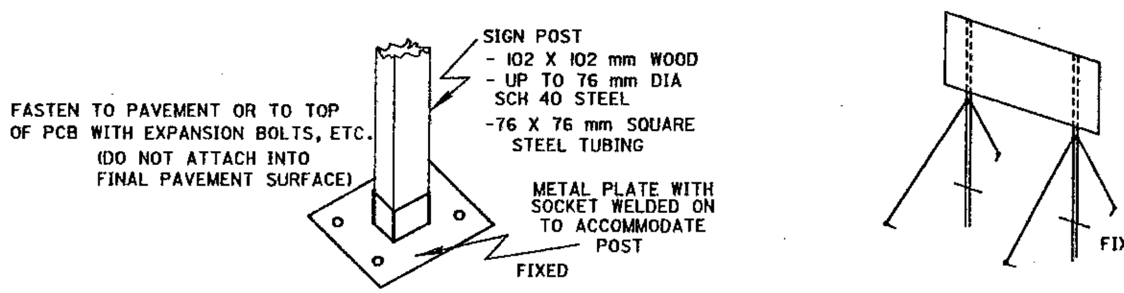
STUBBING STANDARD



NOTES

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

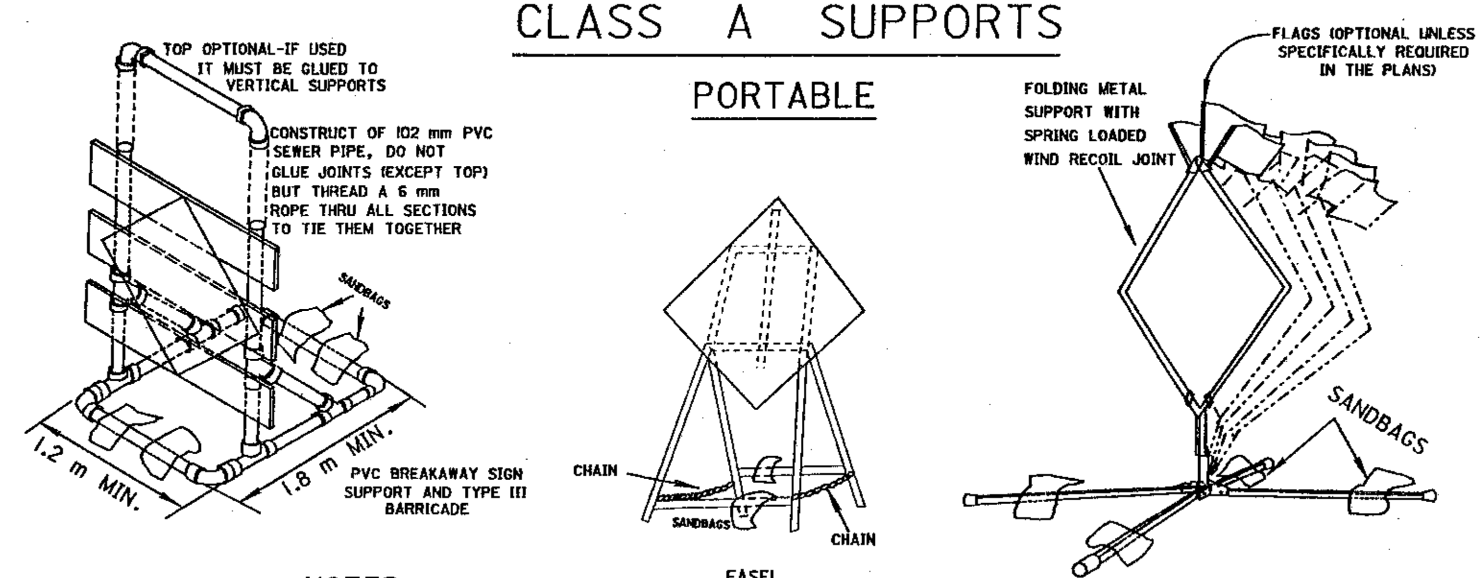
CLASS B SUPPORTS



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

CLASS A SUPPORTS

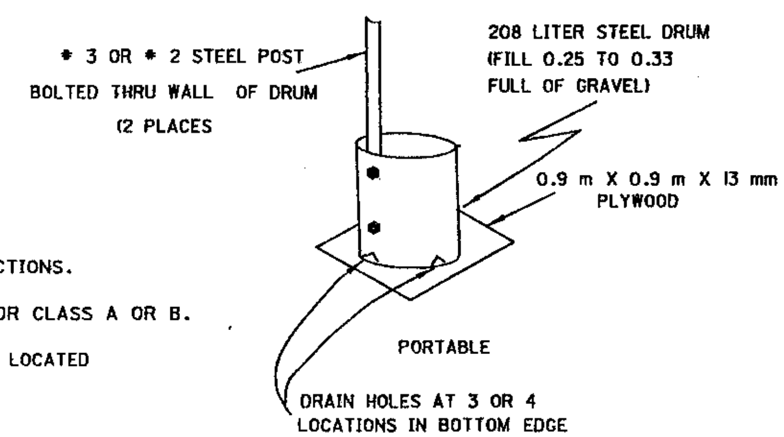
PORTABLE



NOTES

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

CLASS C SUPPORTS



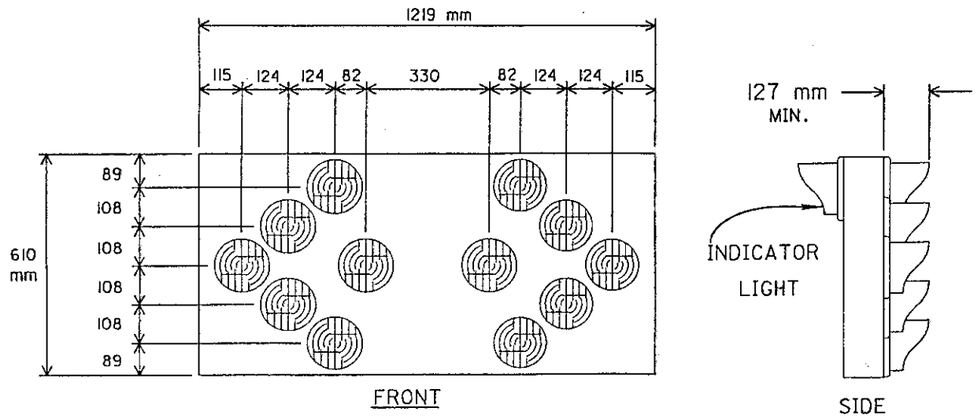
1. ALL BEAM TYPE SUPPORTS WITHOUT BREAKAWAY CONNECTIONS.
2. SUPPORTS SIMILAR TO BUT LARGER THAN PERMITTED FOR CLASS A OR B.
3. THE STEEL DRUM(S) SHOWN BELOW MAY BE USED ONLY WHEN LOCATED BEHIND GUARDRAIL OR BARRIER.

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

METRIC

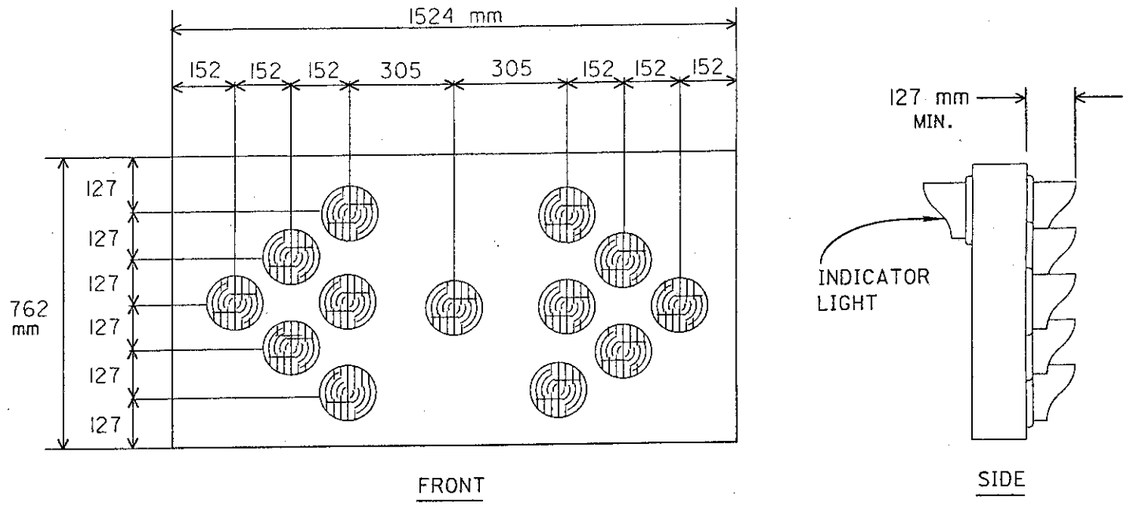
BUREAU OF DESIGN SERVICES DIVISION OF HIGHWAYS OHIO DEPARTMENT OF TRANSPORTATION	
MAINTENANCE OF TRAFFIC	DATE 04/25/94
TEMPORARY SIGN SUPPORT	
STANDARD CONSTRUCTION DRAWING	MT-105.11M
APPROVED [signature] ENGR. OF DESIGN SERVICES	

ALL MEASUREMENTS ARE IN MILLIMETERS



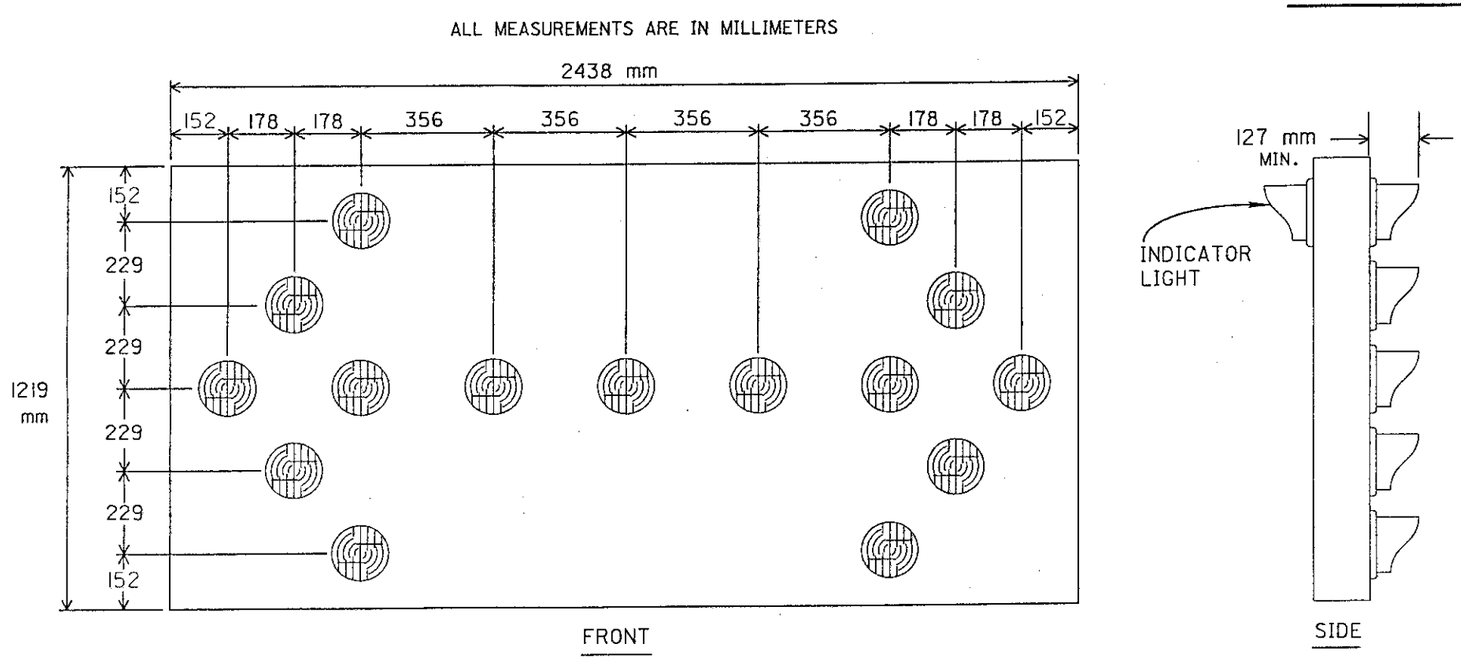
TYPE A PANEL

ALL MEASUREMENTS ARE IN MILLIMETERS



TYPE B PANEL

ALL MEASUREMENTS ARE IN MILLIMETERS



TYPE C PANEL

METRIC

(SEE MT-35.11M FOR NOTES)

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

DATE 01/30/95

FLASHING ARROW PANEL

STANDARD CONSTRUCTION DRAWING

MT-35.10M

APPROVED _____ ENGR. OF DESIGN SERVICES

WCC

FLASHING ARROW PANEL

THE FLASHING ARROW PANEL SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. FLASHER PANEL

B. LAMPS

C. CONTROLS

D. POWER SUPPLY

E. MOUNTING

A. FLASHER PANEL

THE FLASHER PANEL SHALL BE OF EXTERIOR TYPE PLYWOOD BY CORROSION RESISTANT METAL CONSTRUCTION OF ADEQUATE DESIGN AND STRENGTH. THE PANEL FINISH SHALL BE FLAT BLACK.

A FLASHER PANEL SHALL BE ONE OF THREE SIZES. THE TYPE A PANEL SHALL BE A NOMINAL 610 MILLIMETERS HIGH BY 1219 MILLIMETERS WIDE. TYPE B SHALL BE A NOMINAL 762 MILLIMETERS HIGH BY 1524 MILLIMETERS WIDE. TYPE C SHALL BE A NOMINAL 1219 MILLIMETERS HIGH BY 2438 MILLIMETERS WIDE.

FLASHING ARROW PANELS, SHALL NORMALLY UTILIZE HIGH OUTPUT (4412A AND 4415A) LAMPS POWERED BY AN ENGINE DRIVEN GENERATOR WHEN PERMITTED BY THE PLANS. THE CONTRACTOR MAY ALSO FURNISH UNITS POWERED BY A SOLAR ARRAY AND BATTERIES OR ONLY BATTERIES; HOWEVER THESE UNITS SHALL NOT BE USED WHERE THE APPROACHING TRAFFIC WOULD BE ON A HORIZONTAL CURVE IN EXCESS OF 3 DEGREES. THESE UNITS SHALL NOT BE USED IF THE APPROACHING TRAFFIC, CLOSER THAN 1.6 km (.8 km WHERE SPEED LIMITS ARE LESS THAN 64 km/h), IS MORE THAN 5½ DEGREES HORIZONTALLY OR 2 DEGREES VERTICALLY FROM THE CENTRAL AXIS OF THE LENSE UNITS.

B. LAMPS

FOR ENGINE POWERED GENERATOR UNITS, LAMPS SHALL BE ANSI NUMBER 4412A (PAR 46) FOR TYPE B AND C AND 4415A (PAR 36) FOR TYPE A. THE LAMP SHALL BE FITTED WITH AN UPPER HOOD OF NOT LESS THAN 180° AT LEAST 127 MILLIMETERS LONG. ARROW PANELS MAY USE A LOWER POWER (WATTAGE) LAMP THAN THE STANDARD ARROW PANELS. THE LAMPS SHALL BE APPROXIMATELY 127 MILLIMETER DIAMETER WITH A PARABOLIC REFLECTOR. THE LAMP SHALL PROVIDE IMPROVED LIGHT DISTRIBUTION CONTROL BY MEANS OF HIGH QUALITY REFLECTORS AND REFRACTORS. THE LIGHT OUTPUT FROM EACH LAMP OF THE ARROW SHALL NOT BE LESS THAN SHOWN IN FIGURE I WHEN OPERATING AT FULL DAYTIME BRIGHTNESS:

THE LAMPS SHALL BE SECURELY MOUNTED AND POSITIONED IN THE PANEL PERPENDICULAR TO THE PANEL FACE AND ORIENTED SO THAT THE LAMP LOCATION LUG (ON BACK OF THE LAMP) IS ON THE HORIZONTAL CENTER LINE THROUGH THE LENS. THE LUG WILL BE ON THE RIGHT SIDE OF THE LAMP AS VIEWED FROM THE FRONT.

THE LAMPS SHALL BE WIRED IN CIRCUITS THAT CAN BE SWITCHED TO DISPLAY ANY ONE OF THE FOLOWING MESSAGES: LEFT ARROW, RIGHT ARROW, LEFT AND RIGHT, AND CAUTION BAR. A MINIMUM OF THREE INDICATOR LIGHTS SHALL BE PLACED ON THE BACK OF THE PANEL TO INDICATE WHICH MESSAGE MODE IS IN OPERATION.

EACH PANEL SHALL CONTAIN THE FOLLOWING NUMBER OF LAMPS AS A MINIMUM: TYPE A-12 LAMPS, TYPE B-13 LAMPS, TYPE C-15 LAMPS.

LUX POWER CHART

		215	215	215			4°
108	1076	1614	2152	1614	1076	108	2°
215	2152	4304	5380	4304	2152	215	0° HORIZONTAL
108	1076	1614	2152	1614	1076	108	- 2°
		215	215	215			- 4°
7.5°	5°	2.5°	0°	2.5°	5°	7.5°	
LEFT			CENTER			RIGHT	

FIGURE I

(1) MEASUREMENTS EXPRESSED IN LUX.

(2) COLOR OF OUTPUT LIGHT SHALL BE YELLOW TO LIGHT YELLOW.

C. CONTROLS

EACH FLASHING ARROW PANEL SHALL CONTAIN A FLASHER CONTROL AND A DIMMER CONTROL UNIT HOUSED IN A CABINET WHICH CAN BE LOCKED.

1. FLASHER CONTROL

THE FLASH RATE FOR THE SIGN PANEL SHALL BE 25 TO 40 FLASHES PER MINUTE. THE FLASHER SHALL NOT CAUSE ELECTROMAGNETIC INTERFERENCE. THE LAMPS SHALL HAVE A MINIMUM "ON TIME" OF 50% AND A MAXIMUM OF 66%.

2. DIMMER CONTROL

LAMP INTENSITY SHALL BE VARIABLE BY MEANS OF A PHOTOELECTRICALLY CONTROLLED CIRCUIT WHICH SHALL REDUCE LAMP OUTPUT DURING LOW AMBIENT LIGHT CONDITIONS. THE PHOTOELECTRIC CONTROL SHALL BE CALIBRATED TO ACTUATE A LAMP DIMMING CIRCUIT AT 22 TO 54 AMBIENT LUX AND TO RESTORE THE LIGHTS TO NORMAL AT 54 TO 108 AMBIENT LUX. A TIME DELAY SHALL BE BUILT INTO THE CONTROL TO PREVENT FALSE OPERATION DUE TO LIGHT FLASHES. THE PHOTOELECTRIC CONTROL SHALL CONTAIN A SWITCH WHICH SHALL OVERRIDE THE PHOTOELECTRIC CONTROL. THE DIMMING CIRCUIT SHALL BE EXTERNALLY ADJUSTABLE SUCH THAT THE LIGHT OUTPUT MAY BE ADJUSTED WITHIN THE RANGE OF 50% TO 100% OF THE NORMAL LAMP OUTPUT. IT SHALL NORMALLY BE SET AT 50% UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

D. POWER SUPPLY

THE FLASHING ARROW PANEL SHALL OPERATE FROM POWER SOURCES CAPABLE OF CONTINUOUSLY FURNISHING THE PROPER VOLTAGE TO THE LAMPS A MINIMUM OF 24 HOURS WITHOUT ATTENDANCE.

D. CONT.

MOTOR GENERATORS, IF USED SHALL BE OF MODERN DESIGN TO PROVIDE LOW EMISSION OF POLLUTANTS AND SHALL BE PROPERLY MUFFLED. THE MOTOR GENERATOR SHALL BE ENCLOSED IN A MESH ENCLOSURE WHICH CAN BE LOCKED. THE FUEL TANK SHALL HAVE A CAP WHICH CAN BE LOCKED. MOTOR GENERATORS SUPPLYING POWER TO A FLASHING ARROW SIGN SHALL NOT BE USED TO SUPPLY POWER TO OTHER EQUIPMENT. GASOLINE FUELED ENGINES SHALL NOT BE USED.

BATTERY AND SOLAR/BATTERY UNITS SHALL HAVE A NO-CHARGE-LIFE OF NOT LESS THAN 15 DAYS. NO-CHARGE-LIFE IS THE NUMBER OF CONSECUTIVE DAYS THAT THE SYSTEM CAN CONTINUE TO FUNCTION (DOUBLE ARROW MODE, NORMAL DIMMING DURING 12 HOUR NIGHT, FULL OUTPUT DURING 12 HOUR DAY) STARTING WITH A FULL BATTERY CHARGE AND WITH NO ADDITIONAL CHARGE BEING PROVIDED BY THE SOLAR CELLS. THE NO-CHARGE-LIFE MAY BE BASED UPON CALCULATIONS PROVIDING THAT MANUFACTURER'S RATINGS AND EFFICIENCY CALCULATIONS ARE FURNISHED FOR EACH MAJOR COMPONENT.

E. MOUNTING

THE FLASHING ARROW PANEL MAY BE TRAILER OR VEHICLE MOUNTED OR MOUNTED ON A RIGID SUPPORTING DEVICE SUITABLE FOR MAINTAINING IT IN THE DESIGNATED POSITION. EACH OF THE MOUNTING METHODS SHALL BE SUITABLY STABLE SUCH AS TO PREVENT MOVEMENT DUE TO HIGH WINDS OR PASSAGE OF LARGE VEHICLES.

WHEN A TRAILER IS USED, CONSTRUCTION SHALL BE SUCH AS TO TRANSPORT THE FLASHING ARROW PANEL AND APPURTANCES ADEQUATELY AND LEGALLY AS WELL AS SUPPORT THEM PROPERLY DURING OPERATION. THE TRAILER SHALL BE EQUIPPED WITH DEVICES WHICH SHALL PROVIDE LEVELING AND STABILITY DURING OPERATION.

MINIMUM ARROW PANEL MOUNTING HEIGHT SHALL BE 2.1 m ABOVE THE PAVEMENT SURFACE (MEASURED TO THE BOTTOM OF THE PANEL).

USE AND OPERATION

THE FLASHING ARROW PANEL SHALL BE LOCATED AS SHOWN IN THE MAINTAINENCE OF TEAFFIC DRAWINGS OR AS DIRECTED BY THE ENGINEER AND OPERATED CONTINUOUSLY DURING TRAFFIC MAINTAINED PERIODS. THE CONTRACTOR SHALL SUPPLY ALL FUEL, LUBRICANTS AND PARTS NECESSARY TO OBTAIN CONTINUOUS OPERATION AND SHALL PROVIDE ALL SERVICE. THE CONTRACTOR SHALL INSPECT THE OPERATION OF THE UNIT DAILY, INCLUDING WEEKENDS AND HOLIDAYS. THE CONTRACTOR SHALL ARRANGE WITH THE ENGINEER, AN ACCEPTABLE METHOD OF OBTAINING SERVICE FOR A MALFUNCTIONING PANEL WITHIN 30 MINUTES OF A REPORTED MALFUNCTION. LAMP INTENSITY SHALL BE ADJUSTED TO PROVIDE MINIMUM LEGIBILITY DISTANCES OF .8 km (TYPE A), 1.21 km (TYPE B) AND 1.6 km (TYPE C).

TYPE C PANELS SHALL BE USED FOR STATIONARY OPERATIONS ON HIGH SPEED (88 km/h OR GREATER), HIGH VOLUME ROADWAYS. TYPE B SHALL BE USED FOR STATIONARY OPERATIONS ON INTERMEDIATE SPEED (64-80 km/h) FACILITIES, AND TYPE A ON LOW SPEED (32-56 km/h) FACILITIES.

IN ADDITION, TYPE B PANELS SHALL BE USD FOR MOVING OPERATIONS ON FREEWAYS AND EXPRESSWAYS AND TYPE A FOR MOVING OPERATIONS ON OTHER FACILITIES.

BATTERY AND SOLAR/BATTERY UNITS SHALL BE FULLY CHARGED WHEN FIRST SET UP. THEY SHALL HAVE GAUGES TO INDICATE APPROXIMATE BATTERY CHARGE REMAINING. THE CONTRACTOR SHALL VERIFY DAILY THAT THE UNIT IS OPERATING SATISFACTORILY AND THE REMAINING BATTERY CHARGE IS SUFFICIENT FOR AT LEAST 2 MORE DAYS.

FLASHING ARROW PANELS ARE NOT TO BE USED ON TWO LANE-TWO WAY ROADWAYS.

WHEN LEFT UNATTENDED THE CONTROL CABINET, MOTOR GENERATOR ENCLOSURE AND FUEL TANK SHALL BE LOCKED.

TYPE A AND TYPE B PANELS USED IN MOVING OPERATIONS MAY BE POWERED BY THE VEHICLE'S ELECTRICAL SYSTEM BUT SHALL NOT BE LEFT UNATTENDED WHEN SO POWERED.

WHEN NOT IN USE, THE FLASHING ARROW PANEL SHALL BE STORED AT A LOCATION WHICH WILL NOT BE HAZARDOUS TO TRAFFIC OR PEDESTRIANS.

THE PANELS SHALL BE DESIGNED FOR OPERATION IN 100% HUMIDITY AND TEMPERATURES FROM -29 TO + 54 DEGREES CELCIUS.

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC	DATE 01/30/95
FLASHING ARROW PANEL NOTES	
STANDARD CONSTRUCTION DRAWING MT-35.11M	
APPROVED Jay J Krueger ENGR. OF DESIGN SERVICES	

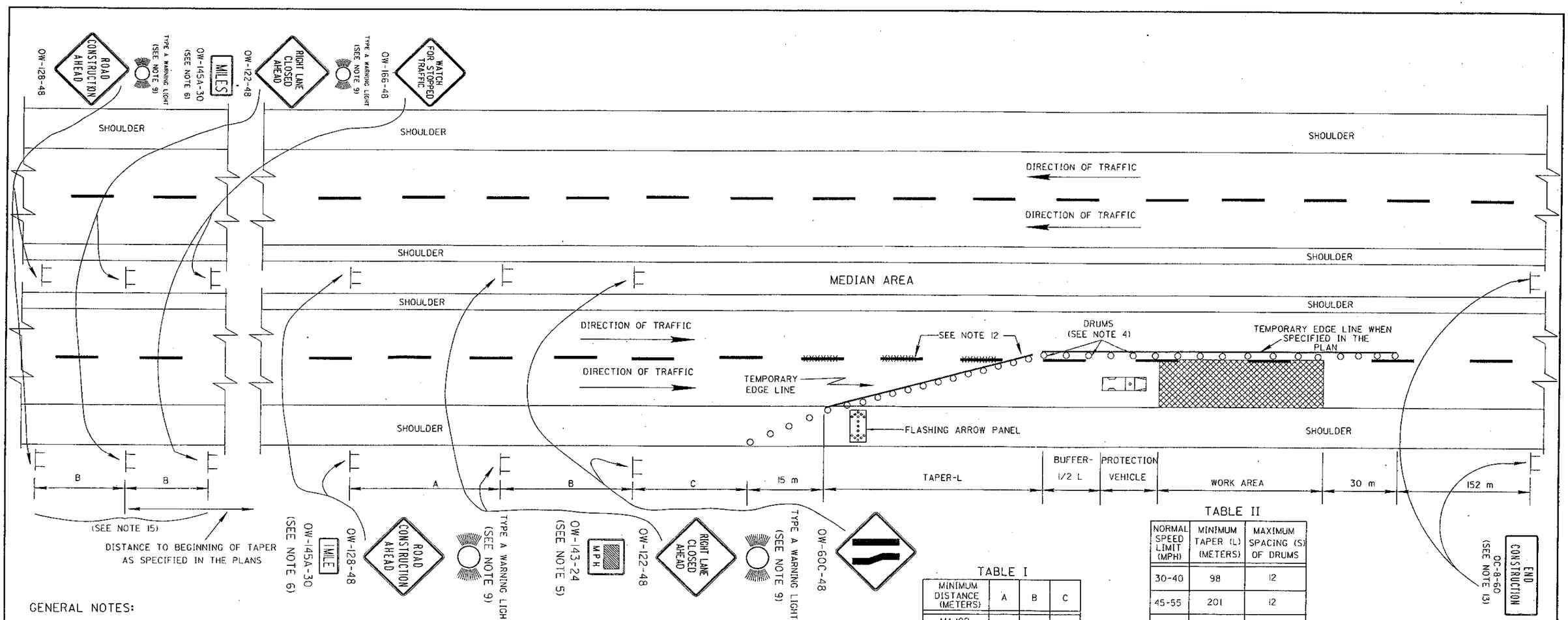


TABLE I

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

TABLE II

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

GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

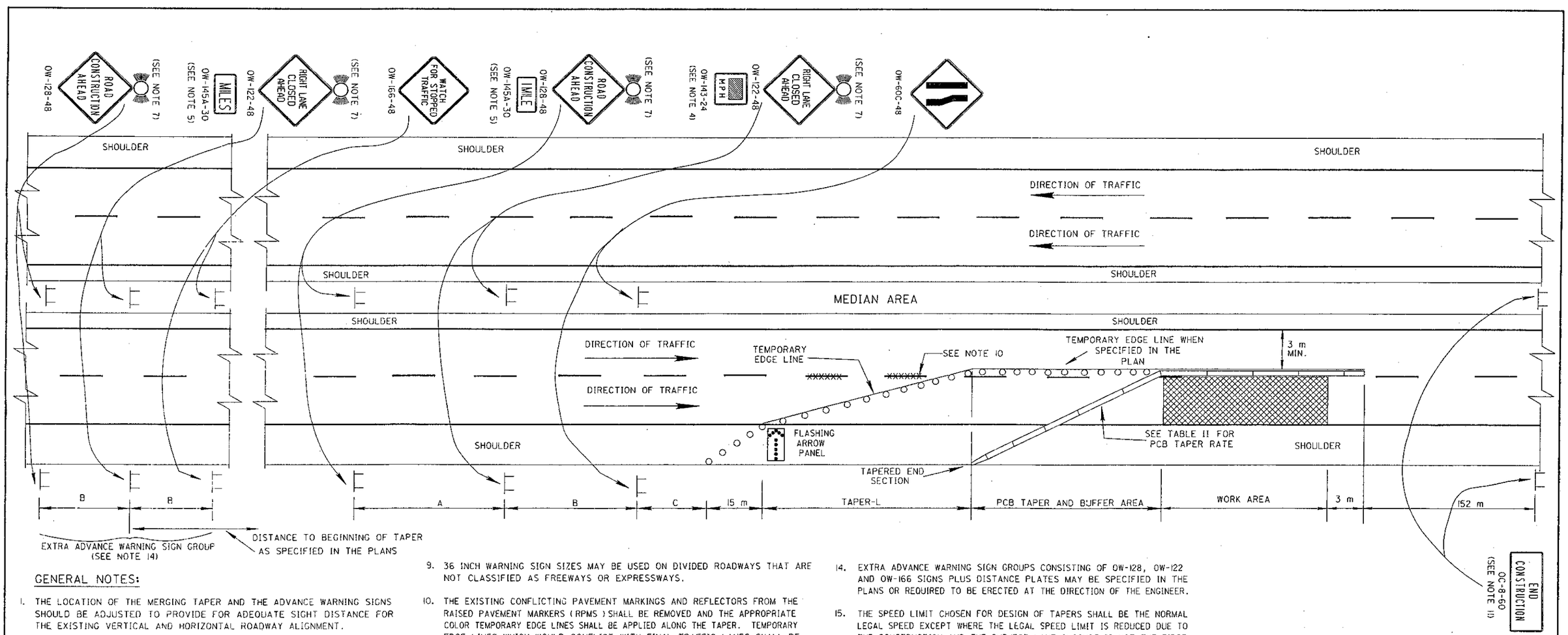
16. ALL MATERIAL AND EQUIPMENT SHALL BE REMOVED FROM THE CLOSURE AND THE WORK AREA WHEN NO WORK IS BEING DONE.

METRIC

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

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC	DATE
CLOSING RIGHT OR LEFT LANE OF A MULTI-LANE DIVIDED HIGHWAY WITH DRUMS	04/25/94
STANDARD CONSTRUCTION DRAWING MT-95.30M	
APPROVED _____ ENGR. OF DESIGN SERVICES	



GENERAL NOTES:

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

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

3. THE TAPER LENGTH (L) AND SPACING (S) OF DRUMS SHALL CONFORM TO TABLE II. DRUM SPACING (S) SHALL BE USED FOR THE MERGING TAPER AND THE BUFFER AREA. A MINIMUM OF 5 DRUMS SHALL BE USED TO CLOSE THE SHOULDER.

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

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

7. TYPE A FLASHING WARNING LIGHTS SHOWN ON THE OW-128 AND OW122 (123) SIGNS ARE REQUIRED.

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

9. 36 INCH WARNING SIGN SIZES MAY BE USED ON DIVIDED ROADWAYS THAT ARE NOT CLASSIFIED AS FREEWAYS OR EXPRESSWAYS.

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

11. THE OC-8 SIGNS MAY BE OMITTED IF THEY FALL WITHIN THE LIMITS OF A CONSTRUCTION PROJECT.

12. PCB SHALL BE DELINEATED AS FOLLOWS:

PCB TYPE	DELINEATION
813 mm HIGH WITHOUT GLARE SCREEN	BARRIER REFLECTORS @ 7.6 m C-C (MAX.) TOP MOUNTED OBJECT MARKERS (229 X 381mm) @ 7.6 m C-C (MAX.)
813 mm HIGH WITH GLARE SCREEN	BARRIER REFLECTORS @ 7.6 m C-C VERTICAL STRIPES ON PADDLES 51 X 305 mm) @ 3.8 m C-C (MAX.)
1270 mm HIGH	BARRIER REFLECTORS @ 3.8 m C- C (MAX.)
TAPERED END SECTION AND EXPOSED END	OBJECT MARKERS (229 X 381mm) TOP MOUNTED @ EACH END

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

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

15. THE SPEED LIMIT CHOSEN FOR DESIGN OF TAPERS SHALL BE THE NORMAL LEGAL SPEED EXCEPT WHERE THE LEGAL SPEED LIMIT IS REDUCED DUE TO THE CONSTRUCTION AND THE SUBJECT LANE CLOSURE IS NOT THE FIRST ACTIVE CONSTRUCTION AREA ENCOUNTERED BY TRAFFIC WITHIN THE PROJECT.

16. NO EQUIPMENT OR MATERIAL SHALL BE LOCATED OTHER THAN BEHIND THE PCB.

LEGEND

DRUMS	○ ○ ○ ○ ○ ○
PORTABLE CONCRETE BARRIER (PCB)	
REMOVE EXISTING MARKINGS	XXXXXXXXX

TABLE I

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

TABLE II

SPEED LIMIT (MPH) *	MINIMUM DRUM TAPER (L) METERS	MAXIMUM SPACING (S) OF DRUMS METERS	PCB TAPER RATE
30-40	98	12	11 : 1
45-55	201	12	16 : 1
60-65	238	18	19 : 1

* SEE NOTE (15)

METRIC

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

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

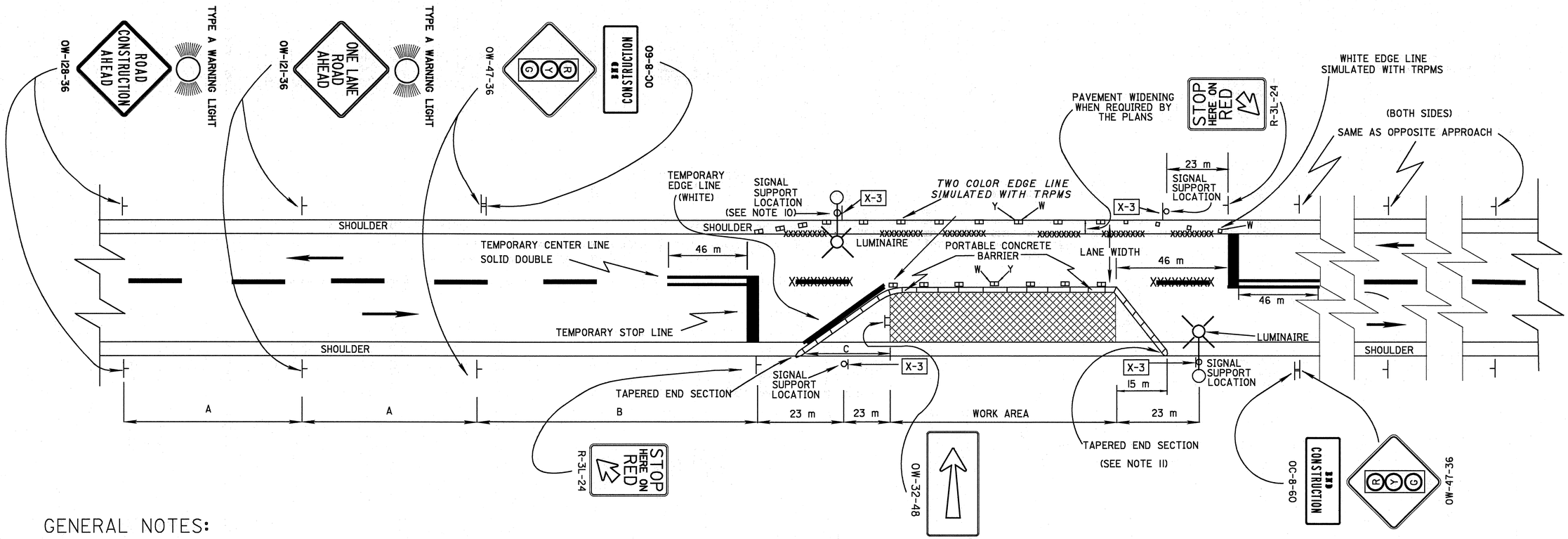
DATE 04/25/94

CLOSING RIGHT OR LEFT LANE OF A MULTI-LANE DIVIDED HIGHWAY WITH PORTABLE CONCRETE BARRIER

STANDARD CONSTRUCTION DRAWING MT-95.40M

APPROVED Gary L. Sieger ENGR. OF DESIGN SERVICES

WCC



GENERAL NOTES:

1. INITIAL SIGNAL TIMING AND PHASING SHALL BE AS SHOWN IN THE PLANS. CHANGES SHALL BE APPROVED BY THE ENGINEER.

2. SIGNALS SHALL BE INSTALLED AND OPERATED IN ACCORDANCE WITH THE REQUIREMENTS OF PART 6 OF THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

3. TEMPORARY CENTER LINE, SOLID, DOUBLE, SHALL BE INSTALLED AND MAINTAINED WHEN EXISTING CENTER LINE , SOLID DOUBLE IS NOT IN PLACE. 305 mm STOP LINES SHALL BE INSTALLED. TEMPORARY RAISED PAVEMENT MARKERS (TRPMS) TO SIMULATE A TWO COLOR EDGE LINE SHALL BE PROVIDED. EXISTING CONFLICTING PAVEMENT MARKINGS AND RAISED PAVEMENT MARKER REFLECTORS SHALL BE REMOVED. TEMPORARY EDGE LINES WHICH WOULD CONFLICT WITH FINAL TRAFFIC LANES SHALL BE REMOVABLE (740.05 TYPE C) TAPE UNLESS THE AREA WILL BE RESURFACED IN THE NEXT WORK PHASE. AFTER COMPLETION OF THE WORK, PAVEMENT MARKINGS OTHER THAN 740.05 TYPE C SHALL BE REMOVED IN ACCORDANCE WITH 641.10. THE ORIGINAL MARKINGS AND PAVEMENT MARKER REFLECTORS SHALL BE RESTORED AT NO ADDITIONAL COST.

4. PCB SHALL BE DELINEATED AS FOLLOWS:

PCB TYPE	DELINEATION
813 mm HIGH WITHOUT GLARE SCREEN	BARRIER REFLECTORS AT 7.6 m C-C (MAX.) ALTERNATED WITH TOP MOUNTED OBJECT MARKERS (229 X 381 mm) AT 7.6 m C-C (MAX.)
813 mm HIGH WITH GLARE SCREEN	BARRIER REFLECTORS AT 7.6 m C-C VERTICAL ORANGE REFLECTORIZED STRIPES ON PADDLES (305 X 305 mm) AT 3.8 m C-C (MAX.)
1270 mm HIGH	BARRIER REFLECTORS AT 3.8 m C-C (MAX.)
TAPERED END SECTION AND EXPOSED END	OBJECT MARKERS (229 X 381 mm) TOP MOUNTED AT EACH END

5. THE HORIZONTAL OR VERTICAL ALIGNMENT OF THE ROADWAY MAY REQUIRE ADJUSTMENTS IN THE LOCATION OF THE ADVANCE WARNING SIGNS OR THE SIGNAL HEADS. TREE OR BRUSH TRIMMING TO PROVIDE ADEQUATE SIGHT DISTANCE TO SIGN AND SIGNALS SHALL BE PROVIDED AS DIRECTED BY THE ENGINEER. THE DISTANCES SHOWN FOR ADVANCE WARNING SIGN SPACINGS ARE MINIMUM.

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

7. ALL TRAFFIC SIGNAL AND LIGHTING EQUIPMENT USED IN THIS INSTALLATION, SUCH AS SIGNAL OR LIGHTING CABLE, SIGNAL HEADS, LUMINAIRES OR SIGNAL CONTROLLER SHALL BE IN CONFORMANCE WITH SPECIFICATION ITEMS 625, 632, 633, 713, 732 AND 733. HOWEVER, THE PERFORMANCE TESTS OF 625.22E AND 632.27(6), THE WORKING DRAWING REQUIREMENTS OF 625.04, 632.03 AND 633.03, THE WIRING DIAGRAM AND SERVICE MANUAL REQUIREMENT OF 633.04 AND THE TESTING AND PREQUALIFICATION REQUIREMENT OF 633.05 ARE WAIVED. ALSO THE REQUIREMENTS OF 733.01 CONCERNING EXPANSIBLE 3-DIAL UNITS AND TWELVE SIGNAL CIRCUITS ARE WAIVED. USED EQUIPMENT IS ACCEPTABLE. CONFLICT MONITORS SHALL BE USED EXCEPT WITH ELECTROMECHANICAL PRETIMED CONTROLLERS WITH CAMSHAFT.

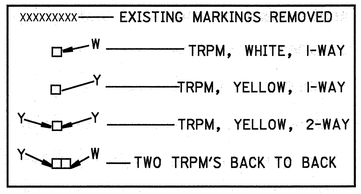
8. IF THE SIGNAL IS CHANGED TO FLASHING OPERATION, RED SHALL BE FLASHED TO ALL APPROACHES ON ALL SIGNAL HEADS.

9. EXISTING BARRIER BETWEEN TEMPORARY STOP LINES SHALL BE DELINEATED WITH ITEM 614-BARRIER REFLECTORS.

10. FOR SIDE MOUNTED SIGNALS, SEE MT-96.20M. FOR OVERHEAD MOUNTED SIGNALS, SEE MT-96.21M.

11. DURING WORKING HOURS ONLY A LENGTH OF BARRIER SUFFICIENT TO PROVIDE A 3.0 m ACCESS ON THE SHOULDER AND PART OF ROADWAY, MAY BE REMOVED FOR ACCESS. A SIMILAR BARRIER REMOVAL AT THE OPPOSITE END OF THE WORK AREA MAY ALSO BE PERMITTED ONLY WHEN NECESSARY.

DISTANCE (METERS)	A	B
URBAN	61	107
RURAL	152	229



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

SIGNALIZED CLOSING 1 LANE OF A 2 LANE HIGHWAY WITH PCB

DATE 01/30/95

STANDARD CONSTRUCTION DRAWING **MT-96.11M**

APPROVED Gary L Craig ENGR. OF DESIGN SERVICES

WCC

AREA ILLUMINATION SHALL BE PROVIDED BY USING 150 WATT MINIMUM HIGH PRESSURE SODIUM LUMINAIRES OR 250 WATT MINIMUM MERCURY LUMINAIRES

SUPPORT POLE

MINIMUM MOUNTING HEIGHT 8.2 m. LUMINAIRE TO EXTEND TO AT LEAST THE EDGE OF PAVEMENT.

ON BRIDGE PROJECT CABLE MAY ALSO BE ROUTED UNDER BRIDGE IF PROPERLY SUPPORTED. SEE DETAIL "C"

POWER IN SHALL BE AN INDIVIDUAL CIRCUIT DIRECTLY FROM POWER TRANSFORMER

4.6 m MINIMUM

ALL 305 mm LENSES

0.6 m TO 3.0 m

STEEL STRAP OR BANDING (TYPICAL)

MINIMUM CLEARANCE 5.5 m

102 X 102 mm SQUARE OR 114 mm DIA. NO. 1 TREATED YELLOW PINE OR DOUGLAS FIR.

0.6 m TO 3.1 m

METER (IF REQUIRED)

3.6 m MINIMUM W/O GUARDRAIL

2.4 m TO 4.6 m ABOVE PAVEMENT GRADE AT CENTERLINE

3.6 m MINIMUM

30 AMP DISCONNECT SWITCH SEE DETAIL "A"

CONTROLLER CABINET

1.5 m NOMINAL

0.8 m MIN. 1.2 m MAX.

NO. 4 GROUND WIRE

2.0 m MIN.

SHOULDER

EXISTING GUARDRAIL

GROUND ROD

EDGE OF PAVEMENT

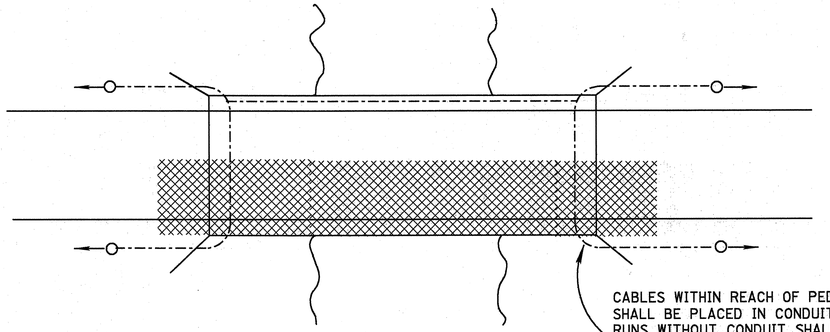
SHOULDER

1.1 m

LOCATE POLES BEHIND DITCH WHERE POSSIBLE

38.1 mm CONDUIT
WEATHERPROOF CONNECTOR
METER BASE (IF REQUIRED)
WEATHERPROOF CONNECTOR
2-15A SINGLE POLE CIRCUIT BREAKERS
DISCONNECT SWITCH ENCLOSURE
LIGHTING CIRCUIT
SIGNAL CIRCUIT
TO GROUND ROD

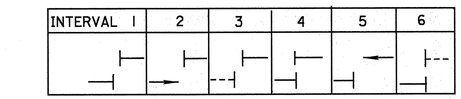
DETAIL "A"



CABLES WITHIN REACH OF PEDESTRIANS SHALL BE PLACED IN CONDUIT. CABLE RUNS WITHOUT CONDUIT SHALL BE SUPPORTED AT 3.0 m INTERVALS.

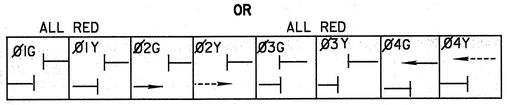
ALTERNATE CABLE ROUTING

DETAIL "C"



USING A PRETIMED CONTROL

OR



WHEN CALLED FOR IN THE PLANS, Ø2 GREEN AND Ø4 GREEN SHALL BE ACTUATED BY DETECTORS AT APPROACH TO THE WORK ZONE. Ø1 & Ø3 ARE DUMMY PHASES TO TIME ALL RED INTERVAL. TIMING INITIALIZES ON PHASE ONE.

USING A 4 PHASE ACTUATED CONTROL

DETAIL "B"
SIGNAL PHASING

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

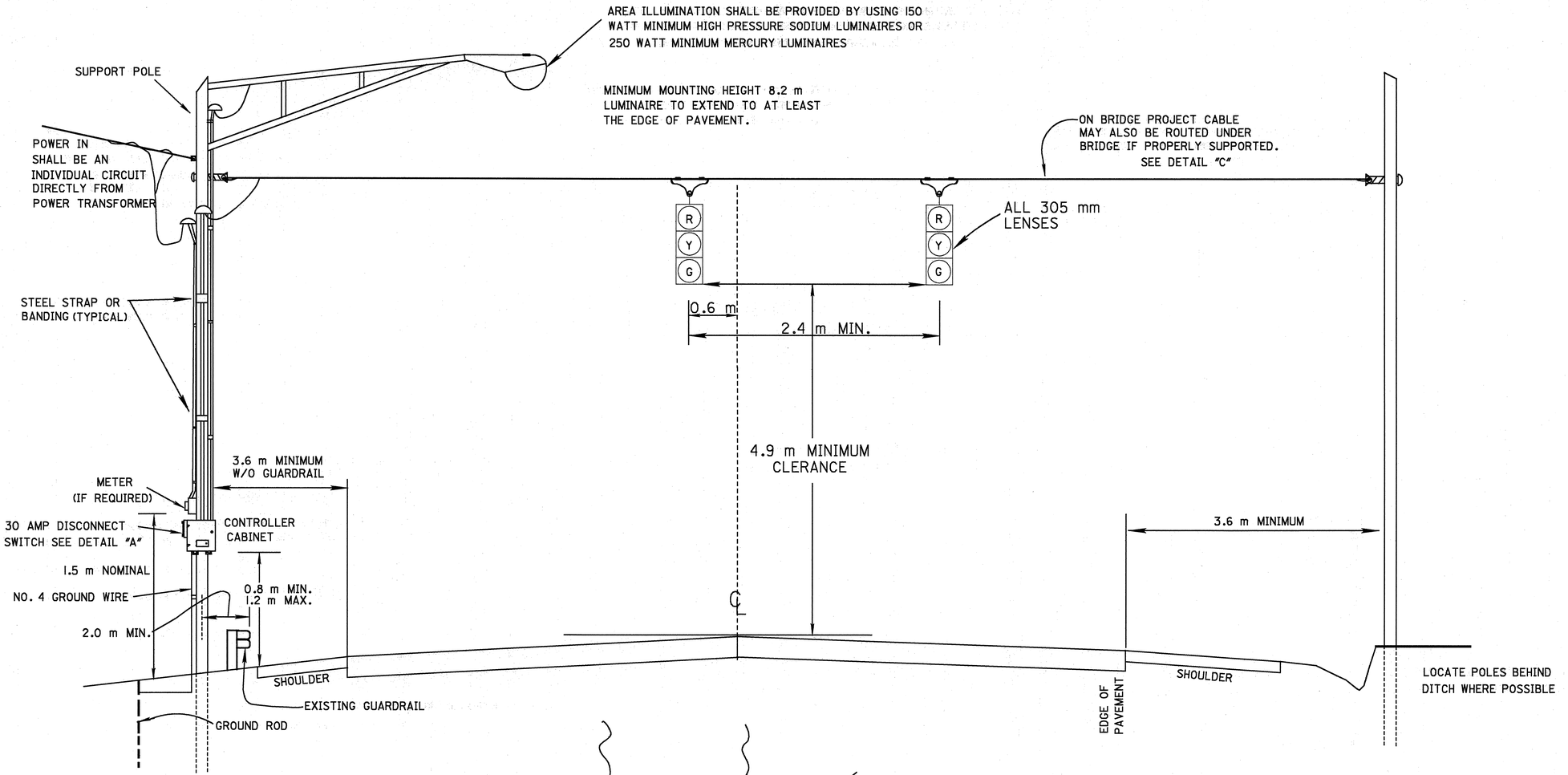
DETAILS FOR SIGNALIZED CLOSING 1 LANE OF A 2 LANE HIGHWAY -SIDE MOUNTED

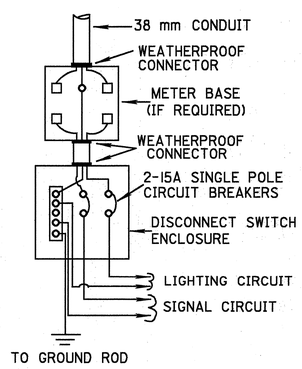
DATE 01/30/95

STANDARD CONSTRUCTION DRAWING MT-96.20M

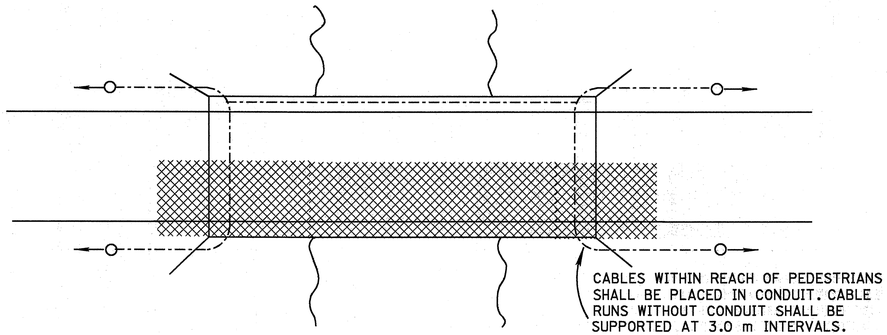
APPROVED Daryl Cuzzo ENGR. OF DESIGN SERVICES

WCC



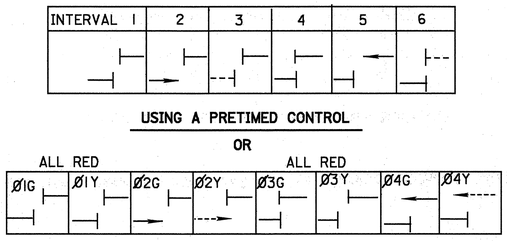


DETAIL "A"



ALTERNATE CABLE ROUTING

DETAIL "C"



USING A PRETIMED CONTROL

OR

WHEN CALLED FOR IN THE PLANS, Ø2 GREEN AND Ø4 GREEN SHALL BE ACTUATED BY DETECTORS AT APPROACH TO THE WORK ZONE. Ø1 & Ø3 ARE DUMMY PHASES TO TIME ALL RED INTERVAL. TIMING INITIALIZES ON PHASE ONE.

USING A 4 PHASE ACTUATED CONTROL

DETAIL " B "
SIGNAL PHASING

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

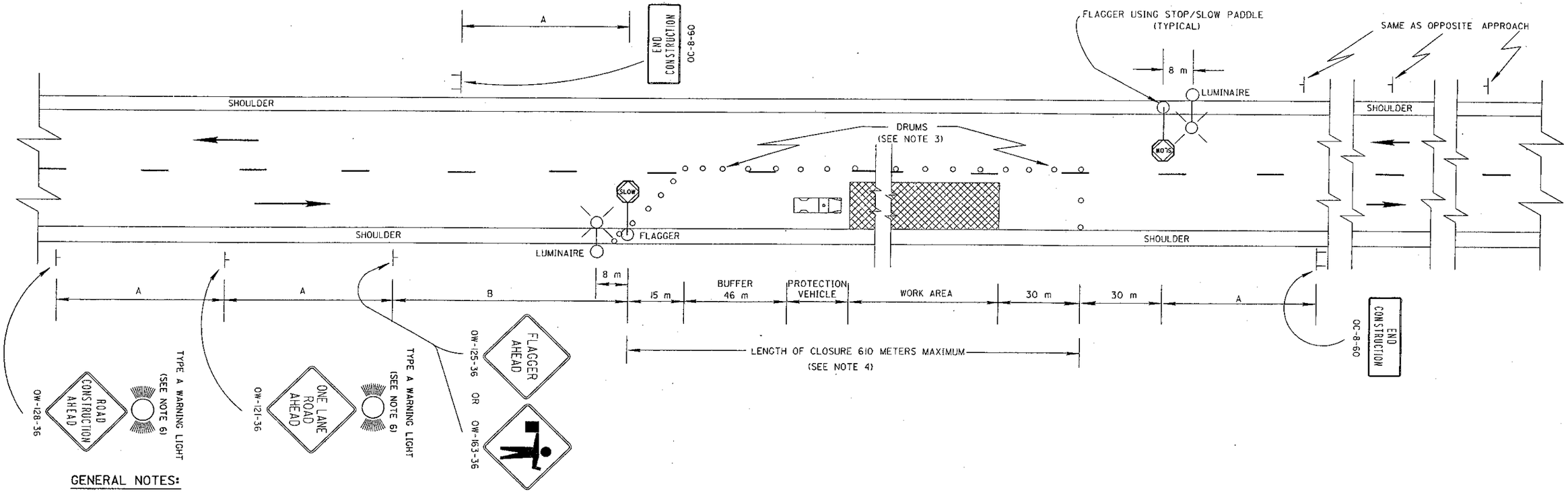
DETAILS FOR SIGNALIZED CLOSING 1 LANE OF A 2 LANE HIGHWAY - OVERHEAD MOUNTED

DATE 01/30/95

STANDARD CONSTRUCTION DRAWING **MT-96.21M**

APPROVED Gary L Craig ENGR. OF DESIGN SERVICES

WCC



GENERAL NOTES:

1. THE LOCATION OF THE ADVANCE WARNING SIGNS SHOULD BE ADJUSTED TO PROVIDE FOR ADEQUATE SIGHT DISTANCE FOR THE EXISTING VERTICAL AND HORIZONTAL ROADWAY ALIGNMENT. THE DISTANCES SHOWN ARE MINIMUMS. DISTANCE B MAY ALSO BE INCREASED, PRIOR TO IMPLEMENTATION OF THE CLOSURE OR AFTER IT IS IN EFFECT, AS DIRECTED BY THE ENGINEER FOR SUCH OCCURENCES AS LONG TRAFFIC BACKUPS.

2. FLAGGERS, ONE FOR EACH DIRECTION SHALL BE USED TO CONTROL TRAFFIC CONTINUOUSLY FOR AS LONG AS A ONE LANE OPERATION IS IN EFFECT. THE FLAGGERS SHALL BE ABLE TO COMMUNICATE WITH EACH OTHER AT ALL TIMES.

3. DRUMS SHALL BE SPACED AT 15 m CENTER TO CENTER ALONG THE CLOSURE. DRUMS ON THE ADVANCE TAPER SHALL BE SPACED AT 3 m CENTER TO CENTER. CONES HAVING A MINIMUM HEIGHT OF 0.7 m MAY BE SUBSTITUTED FOR DRUMS FOR DAYTIME LANE CLOSURES. PROVISIONS SHALL BE MADE TO STABILIZE THE CONES TO PREVENT THEM FROM BLOWING OVER.

4. SEVERAL SMALL WORK AREAS CLOSE TOGETHER SHALL BE COMBINED INTO ONE WORK ZONE. HOWEVER, THE CLOSURE SHALL NOT BE MORE THAN 610 m LONG UNLESS APPROVED BY THE ENGINEER. THE MINIMUM LENGTH BETWEEN CLOSURES SHALL BE 610 m ONLY ONE SIDE OF THE ROAD SHALL BE CLOSED IN ANY ONE WORK ZONE.

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

6. THE TYPE A FLASHING WARNING LIGHTS SHOWN ON THE OW-128 AND THE OW-121 SIGNS ARE REQUIRED WHENEVER A NIGHT LANE CLOSURE IS NECESSARY.

7. ADEQUATE AREA ILLUMINATION OF EACH FLAGGER STATION SHALL BE PROVIDED AT NIGHT BY USING 150 WATT MINIMUM HIGH PRESSURE SODIUM LUMINAIRES OR 250 WATT MINIMUM MERCURY LUMINAIRES. LUMINAIRES SHALL BE LOCATED ADJACENT TO ONE FLAGGER STATION FOR EACH DIRECTION OF TRAFFIC AS SHOWN ABOVE. THE MOUNTING HEIGHT FOR LUMINAIRES SHALL BE A MINIMUM OF 8.2 m ABOVE THE PAVEMENT AND MOUNTED ON A SUPPORT OF ADEQUATE STRENGTH TO PROVIDE A SATISFACTORY INSTALLATION. THE OVERHEAD CONDUCTOR CLEARANCE SHALL BE A MINIMUM OF 5.5 m ABOVE THE PAVEMENT. THE LUMINAIRE ARM SHALL BE OF SUFFICIENT LENGTH TO EXTEND TO THE EDGE OF THE PAVEMENT. POLES SHALL BE ERECTED A MINIMUM OF 1.7 m BEHIND FACE OF GUARDRAIL WHERE EXISTING, OR 3.6 m FROM THE EDGE OF PAVEMENT. WHERE POSSIBLE LOCATE BEHIND DITCH. LIGHTING MATERIAL SHALL COMPLY WITH SPECIFICATION 713.

8. WITHIN THE LENGTH OF CLOSURE, PROVISION SHALL BE MADE TO CONTROL TRAFFIC ENTERING FROM INTERSECTING STREETS AND MAJOR DRIVES AS NECESSARY TO PREVENT WRONG WAY MOVEMENTS AND TO KEEP VEHICLES OFF OF NEW PAVEMENT NOT READY FOR TRAFFIC. THE METHOD OF CONTROL SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

MINIMUM DISTANCE (METERS)	A	B
URBAN	61	61
RURAL	152	152

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 INCIDENTAL TO 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

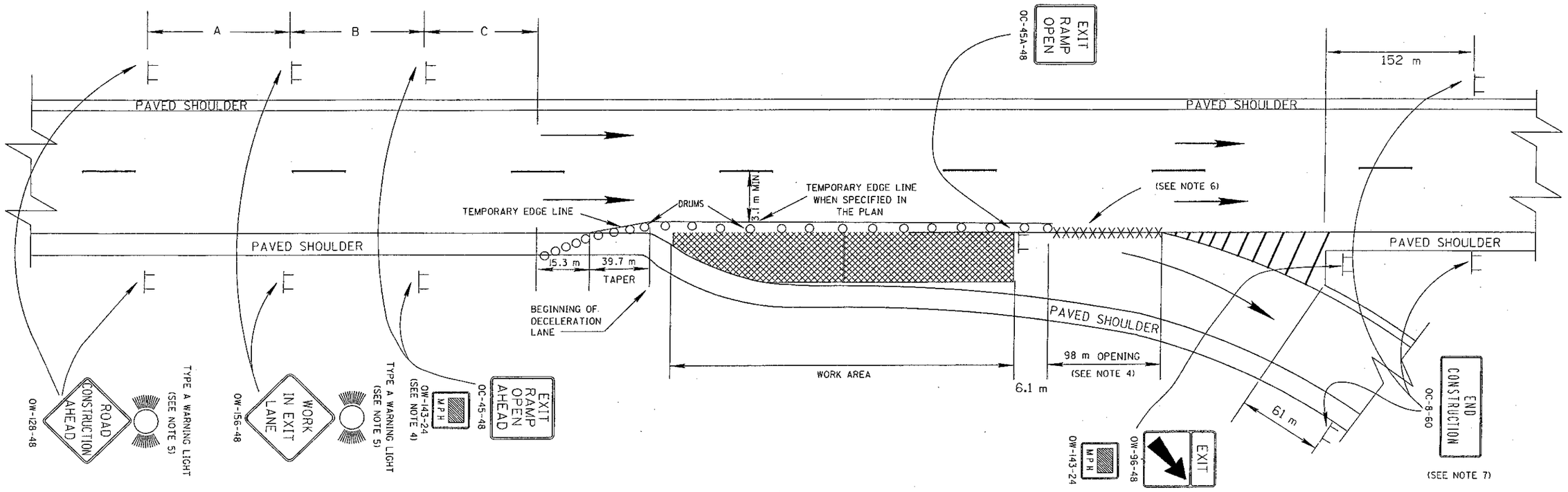
FLAGGERS CLOSING
1 LANE OF A 2 LANE HIGHWAY
STATIONARY OPERATION

DATE 04/25/94

STANDARD CONSTRUCTION DRAWING MT-97.10M

APPROVED _____ ENGR. OF DESIGN SERVICES

WCC



GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

TABLE I

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

METRIC

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

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

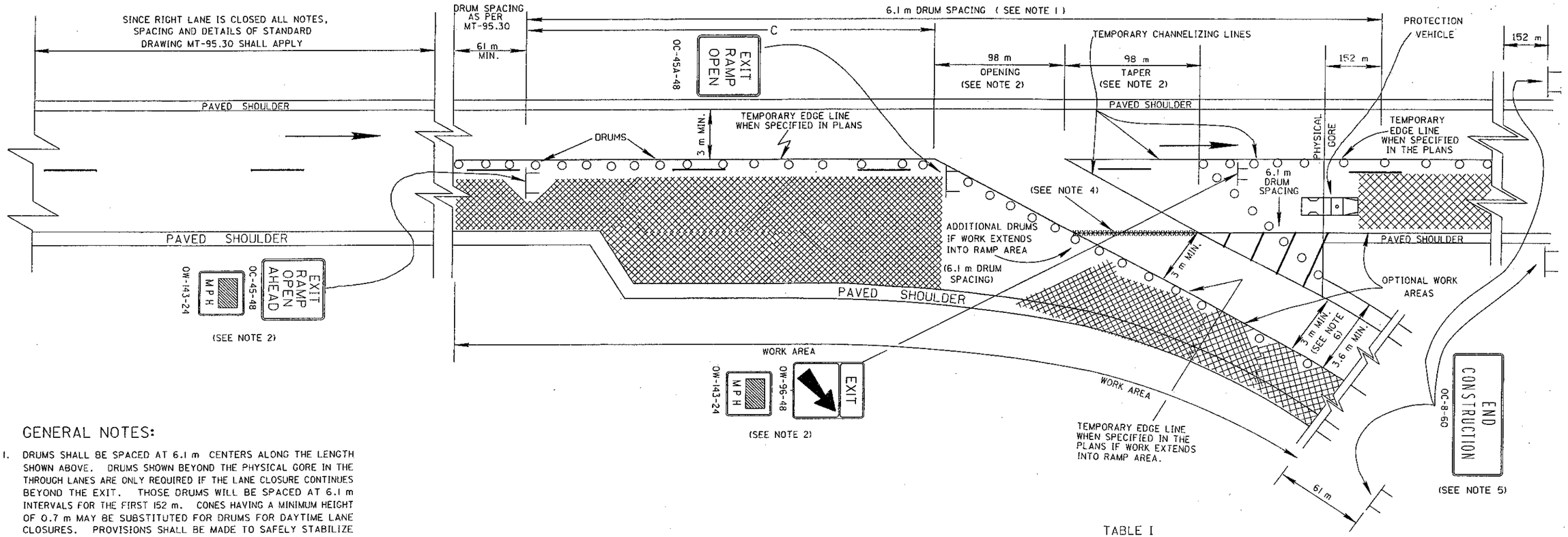
LANE CLOSURE IN DECELERATION LANE

DATE 06/24/93

STANDARD CONSTRUCTION DRAWING MT-98.12M

APPROVED Lloyd Cooper ENGR. OF DESIGN SERVICES

WCC



GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

TABLE I

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

METRIC

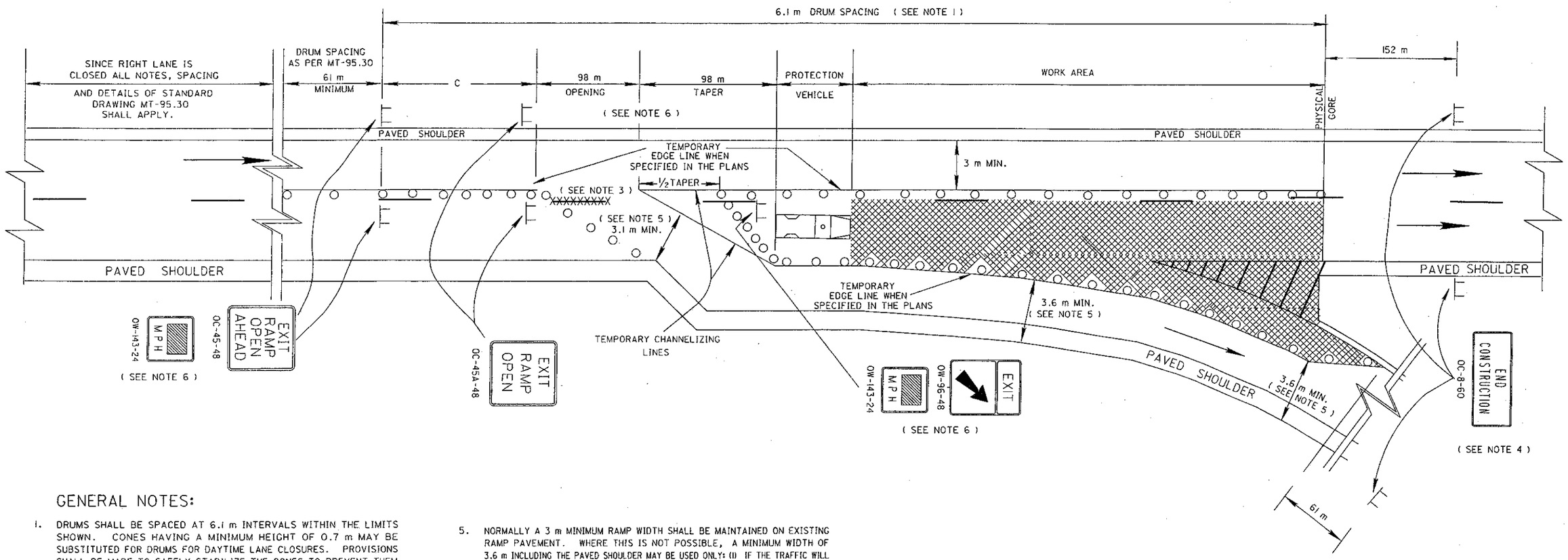
ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID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

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

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

APPROVED Amy L Creager ENGR. OF DESIGN SERVICES

WCC



GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

TABLE I

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

METRIC

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

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

DATE 06/24/93

LANE CLOSURE
AT EXIT GORE

STANDARD CONSTRUCTION DRAWING MT-98.14M

APPROVED Daryl Cregg ENGR. OF DESIGN SERVICES

WCC

614 WORK ZONE PAVEMENT MARKINGS

GENERAL

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

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

TEMPORARY PAVEMENT MARKING MATERIALS

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

PAINT

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

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

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

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

TYPE B AND TYPE C PREFORMED MATERIAL

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

PLACEMENT

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

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

TEMPORARY MARKING CLASSES

CLASS I MARKINGS

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

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

CLASS II MARKINGS

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

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

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

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

CONFLICTING EXISTING MARKINGS

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

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

ALLOWABLE DURATION OF CLASS II CENTER LINES

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

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

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

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

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

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

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

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

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

METHOD OF MEASUREMENT

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

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

BASIS OF PAYMENT

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

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

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

614 WORK ZONE MARKING SIGNS

GENERAL

THE CONTRACTOR SHALL FURNISH, INSTALL, MAINTAIN AND SUBSEQUENTLY REMOVE WORK ZONE MARKING SIGNS (OW-167, R-33 AND R-34) AND THEIR SUPPORTS WITHIN THE WORK LIMITS IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS.

THE CONTRACTOR SHALL, IN ADVANCE OF ANY SECTION OF ROADWAY LACKING OMUTCD STANDARD EDGE LINE MARKINGS, ERECT A 'NO EDGE LINES' (OW-167-36) SIGN. ON FREEWAYS AND EXPRESSWAYS AN OW-167-48 SIGN SHALL BE USED. THESE SIGNS SHALL BE IN PLACE PRIOR TO EXPOSING THE ROADWAY TO TRAFFIC. THESE SIGNS SHALL ALSO BE ERECTED ON EACH ENTRANCE RAMP, AT INTERSECTIONS OF THROUGH ROADS TO WARN ENTERING OR TURNING TRAFFIC OF THE CONDITIONS AND AT LEAST ONCE EVERY 3.2 km ALONG THE ROADWAY. THESE SIGNS SHALL BE REMOVED WHEN THEY DO NOT APPLY.

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

MATERIALS

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

METHOD OF MEASUREMENT

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

BASIS OF PAYMENT

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

ITEM	UNIT	DESCRIPTION
614	EACH	WORK ZONE MARKING SIGNS

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

WORK ZONE PAVEMENT MARKINGS AND SIGNS

DATE 01/30/95

STANDARD CONSTRUCTION DRAWING MT-99.10M

APPROVED _____ ENGR. OF DESIGN SERVICES

WCC

GENERAL

IN ADDITION TO 614, TRAFFIC SHALL BE MAINTAINED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS.

THE PURPOSE OF THE FOLLOWING REQUIREMENTS FOR TRAFFIC CONTROL FOR PAVEMENT MARKING OPERATIONS IS TO PROVIDE SAFETY FOR HIGHWAY USERS, WORKERS AND EQUIPMENT AND TO PROTECT THE MARKINGS FROM DAMAGE DURING APPLICATION. THESE REQUIREMENTS ARE THE REQUIRED MINIMUMS. IF AT ANY TIME DURING THE APPLICATION OF MARKINGS IT IS FOUND BY THE ENGINEER THAT THESE MINIMUM TRAFFIC CONTROL REQUIREMENTS ARE NOT ACHIEVING THE NECESSARY SAFETY AND MARKING PROTECTION. ADDITIONAL TRAFFIC CONTROL SHALL BE IMPLEMENTED AT NO ADDITIONAL COST.

THE ENGINEER MAY SUSPEND WORK IN ORDER TO RELIEVE TRAFFIC CONGESTION AT ANY TIME. NO WORK SHALL BE DONE DURING PEAK HOURS, AS DETERMINED BY THE ENGINEER.

VEHICLES TRANSPORTING FLAMMABLE PAVEMENT MARKING MATERIALS (MATERIAL SUPPLY VEHICLES) SHALL NOT BE UTILIZED FOR LEAD OR TRAIL VEHICLES OR FOR POWER BROOM EQUIPMENT. ALL PAVEMENT MARKING APPLICATION, PROTECTION AND SUPPORT EQUIPMENT FOLLOWING THE LINE MARKING MACHINE SHALL HAVE THE TRAFFIC CONTROL EQUIPMENT OF A TRAIL VEHICLE.

LINE MARKING MACHINES SHALL NOT BE USED FOR SIGN AND CONE PLACEMENT.

LEAD VEHICLE

A LEAD VEHICLE IS TO BE USED TO WARN OPPOSING TRAFFIC OF THE APPROACH OF CENTER LINE AND OTHER MARKING EQUIPMENT WHEN THIS EQUIPMENT EXTENDS INTO THE ADJACENT OPPOSING TRAFFIC LANE. THE LEAD VEHICLE SHALL PRECEDE THE "LEFT OF CENTER" MARKING EQUIPMENT A DISTANCE THAT WILL PROVIDE ADVANCE SAFE WARNING TO APPROACHING TRAFFIC. THE OPERATOR OF THIS UNIT SHALL DRIVE AHEAD OF THE CREST OF A VERTICAL CURVE OR AROUND A HORIZONTAL CURVE AND WAIT UNTIL THE "LEFT OF CENTER" MARKING EQUIPMENT NEARS AND THEN PROCEED, MAINTAINING AN ADVANCE LOCATION OF 122 m TO 183 m.

A LEAD VEHICLE SHALL BE EQUIPPED AND OPERATED WITH THE FOLLOWING TRAFFIC CONTROL DEVICES:

1. A 360° ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE IN ALL DIRECTIONS A MINIMUM OF 400 m.
2. LIGHTED HEADLIGHTS AND TAILLIGHTS , AND
3. A KEEP RIGHT SIGN (OC-31R-48) AND WET PAINT SIGN (OC-52-48) MOUNTED A MINIMUM OF 1.5 m ABOVE THE ROAD SURFACE MEASURED TO THE BOTTOM OF THE SIGN, AND VISIBLE TO OPPOSING TRAFFIC.

POWER BROOM EQUIPMENT

POWER BROOM EQUIPMENT SHALL BE EQUIPPED AND OPERATED DURING PAVEMENT PREPARATIONS WITH THE FOLLOWING TRAFFIC CONTROL DEVICES:

1. A 360° ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE IN ALL DIRECTIONS A MINIMUM OF 400 m.
2. LIGHTED HEADLIGHTS AND TAILLIGHTS , AND
3. ✳ A FLASHING ARROW PANEL 1.4 X .76 m CONFORMING TO MT-35.10M (TYPE B) VISIBLE TO THE REAR MOUNTED A MINIMUM OF 2 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE PANEL, AND USED ONLY ON MULTI-LANE HIGHWAYS.

LINE MARKING MACHINE

ALL TRAFFIC LINE MARKING MACHINES SHALL BE EQUIPPED AND OPERATED WITH THE FOLLOWING TRAFFIC CONTROL EQUIPMENT:

1. THREE 360° ROTATING OR FLASHING AMBER BEACONS CLEARLY VISIBLE IN ALL DIRECTIONS A MINIMUM OF 400 m, MOUNTED A MINIMUM OF 2 m ABOVE THE ROAD SURFACE, ONE FORWARD, ONE ON THE RIGHT REAR AND ONE ON THE LEFT REAR OF THE VEHICLE.
2. ✳ (A) A FLASHING ARROW PANEL 1.4 X .76 m CONFORMING TO MT-35.10M (TYPE B) DISPLAYED TO THE REAR MOUNTED A MINIMUM OF 2 m ABOVE THE THE ROAD SURFACE, MEASURED TO BOTTOM OF THE PANEL, AND USED ONLY ON MULTI-LANE HIGHWAYS, OR
   (B) A DO NOT PASS SIGN (R-33A-48) VISIBLE TO THE REAR DURING CENTER LINE MARKING ON TWO-LANE, TWO-WAY ROADWAYS AND MOUNTED A MINIMUM OF 2 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE SIGN. THIS SIGN MAY BE USED TO COVER THE ARROW PANEL WHICH SHALL NOT BE USED ON TWO-LANE, TWO WAY ROADWAYS.
3. A WET PAINT WITH ARROW SIGN (OC-50-24 OR OC-51-48) SHALL FACE THE REAR. THE SIGN SHALL BE POSITIONED WITH THE ARROW POINTING TO THE WET LINE. WHEN USED, OC-50-24 SHALL BE MOUNTED ON THE SIDE OF THE VEHICLE NEAREST THE WET MARKING MATERIAL. OC-50-24 AND OC-51-48 SIGNS SHALL BE MOUNTED A MINIMUM OF 0.3 m ABOVE THE ROAD SURFACE.
4. A KEEP RIGHT SIGN (OC-31R-48) AND WET PAINT SIGN (OC-52-48) MOUNTED A MINIMUM OF 1.5 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE SIGN FACING OPPOSING TRAFFIC WHEN THIS UNIT EXTENDS INTO THE ADJACENT OPPOSING TRAFFIC LANE.
5. THE GUIDE AND SIDE MOUNTED MARKING CARRIAGES SHALL EACH BE EQUIPPED WITH A CLEAN RED FLAG NOT LESS THAN 0.4 m SQUARE AND FASTENED TO A STAFF OF SUFFICIENT LENGTH SO AS TO PERMIT THE FLAG TO MOVE FREELY OF ANY OBSTRUCTION.

TRAIL VEHICLE

WHEN REQUIRED, A TRAIL VEHICLE SHALL BE POSITIONED AT THE TRACK FREE END OF THE WET LINE.

TRAIL VEHICLES SHALL BE EQUIPPED AND OPERATED WITH THE FOLLOWING TRAFFIC CONTROL EQUIPMENT:

1. A 360° ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE IN ALL DIRECTIONS A MINIMUM OF 400 m,
2. ✳ (A) A FLASHING ARROW PANEL 1.4 X .76 m CONFORMING TO MT-35.10M (TYPE B) VISIBLE TO THE REAR MOUNTED AT A MINIMUM HEIGHT OF 2 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE PANEL, AND USED ONLY ON MULTI-LANE HIGHWAYS, OR
   (B) A DO NOT PASS SIGN (R-33A-48) VISIBLE TO THE REAR DURING CENTER LINE MARKING ON TWO-LANE, TWO-WAY ROADWAYS AND MOUNTED A MINIMUM OF 2 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE SIGN. THIS SIGN MAY BE USED TO COVER THE ARROW PANEL, WHICH SHALL NOT BE USED ON TWO-LANE, TWO-WAY ROADWAYS.
3. A WET PAINT WITH ARROW SIGN (OC-50-24 OR OC-51-48) SHALL FACE THE REAR. THE SIGN SHALL BE POSITIONED WITH THE ARROW POINTING TO THE WET LINE. WHEN USED, OC-50.24 SHALL BE MOUNTED ON THE SIDE OF THE VEHICLE NEAREST, THE WET MARKING MATERIAL. OC-50-24 SHALL BE MOUNTED A MINIMUM OF 1.4 m ABOVE THE ROAD SURFACE AND OC-51-48 SHALL BE MOUNTED A MINIMUM OF 1.5 m ABOVE THE ROAD SURFACE, BOTH MEASURED TO THE BOTTOM OF THE SIGN.

✳ WHEN A VEHICLE IS OPERATING ON A TWO-LANE TWO-WAY ROADWAY THE FLASHING ARROW PANEL SHALL BE TILTED HORIZONTALLY OR COVERED.

CONES AND WET PAINT-KEEP OFF SIGNS

CONES AND WET PAINT-KEEP OFF SIGNS (R-87-24) SHALL BE PLACED TO PROTECT THE LINE WHENEVER THE TRACK FREE TIME EXCEEDS 2 MINUTES. THESE DEVICES SHALL NOT BE REMOVED UNTIL THE LINE HAS DRIED TO A TRACK FREE CONDITION. RETRIEVAL EQUIPMENT SHALL HAVE THE TRAFFIC CONTROL EQUIPMENT OF A TRAIL VEHICLE. CONES SHALL HAVE A MINIMUM HEIGHT OF 0.46 m. THEY SHALL BE SPACED TO PROTECT THE WET LINE NORMALLY BETWEEN 37 m AND 61 m. IN AREAS OF TRAFFIC CONGESTION , ON CURVES AND AT OTHER LOCATIONS WHERE TRACKING OF THE WET LINE IS EXPECTED SPACINGS AS CLOSE AS 6.1 m MAY BE REQUIRED. THE WET PAINT-KEEP OFF SIGNS (R-87-24) SHALL BE PLACED FACING TRAFFIC AT:

A. THE BEGINNING AND END OF LINE APPLICATION,
B. ALL SIDE AND CROSS ROADS, AND
C. MAXIMUM INTERVALS OF 1.6 km.

WHEN LANE LINE MARKINGS REQUIRE GREATER THAN A TWO MINUTE DRYING TIME, THE LANE FROM WHICH THE LINE MARKING MACHINE APPLIES LANE LINE MARKINGS SHALL BE CLOSED UNTIL THE LINE HAS DRIED TO A TOTALLY TRACK FREE CONDITION.

IMMOBILE OPERATIONS

WHEN LOADING MATERIAL, CLEANING OR PERFORMING OTHER OPERATIONS IN THE FIELD, EVERY EFFORT SHALL BE MADE TO HAVE ALL EQUIPMENT COMPLETELY OFF OF THE TRAVELED WAY. WHEN IT BECOMES NECESSARY TO ENTER UPON PRIVATE PROPERTY, PERMISSION SHALL BE OBTAINED IN ADVANCE. WHEN THE CONTRACTOR CANNOT REMOVE HIS EQUIPMENT FROM THE TRAVELED WAY ALL TRAFFIC CONTROL DEVICES ON THE VEHICLES SHALL BE IN OPERATION AND FLAGGERS AND VEHICLES SHALL BE STATIONED TO PROTECT THE WORK SITE AND THE TRAVELING PUBLIC.

TWO-WAY TRAFFIC SHALL BE MAINTAINED. FLAGGERS SHALL BE EQUIPPED IN ACCORDANCE WITH ITEM 614.03.

AUXILIARY MARKINGS

PAVEMENT PREPARATION AND PLACING OF AUXILIARY MARKINGS (SEE (3)) ARE CONSIDERED TO BE STATIONARY OPERATIONS AND TRAFFIC CONTROL SHALL BE IN ACCORDANCE WITH PLAN DETAILS, STANDARD CONSTRUCTION DRAWINGS AND THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (OMUTCD).

LAYOUT AND PREMARKING

THE VEHICLE USED IN LAYOUT AND PREMARKING SHALL BE EQUIPPED AND OPERATED WITH THE FOLLOWING EQUIPMENT:

1. A 360° ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE IN ALL DIRECTIONS A MINIMUM OF 400 m.
2. LIGHTED HEADLIGHTS AND TAILLIGHTS, AND
3. A KEEP RIGHT SIGN (OC-31R-48) MOUNTED A MINIMUM OF 1.5 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE SIGN, AND VISIBLE TO OPPOSING TRAFFIC.

NIGHTTIME OPERATION

NIGHTTIME OPERATION IS DEFINED TO INCLUDE THE TIME FROM ONE-HALF HOUR AFTER SUNSET TO ONE-HALF HOUR BEFORE SUNRISE , AND AT ANY OTHER TIME WHEN THERE ARE UNFAVORABLE ATMOSPHERIC CONDITIONS OR WHEN THERE IS NOT SUFFICIENT NATURAL LIGHT TO RENDER DISCERNIBLE PERSONS, VEHICLES, AND SUBSTANTIAL OBJECTS ON THE HIGHWAY AT A DISTANCE OF 305 m.

DURING NIGHTTIME CONDITIONS THE FOLLOWING TRAFFIC CONTROL SHALL BE PROVIDED:

1. CONES SHALL BE REFLECTORIZED OR EQUIPPED WITH LIGHTING DEVICES FOR MAXIMUM VISIBILITY (SEE 7F-5, OMUTCD), AND
2. THE GUIDE AND SIDE-MOUNTED CARRIAGES SHALL BE ILLUMINATED.

THE PRESENCE OF HIGHWAY LIGHTING DOES NOT WAIVE THESE REQUIREMENTS.

MINIMUM PAVEMENT MARKING TRAFFIC CONTROL EQUIPMENT REQUIREMENTS

THIS TABLE INDICATES THE TRAFFIC CONTROL EQUIPMENT WHICH SHALL BE FURNISHED FOR EACH TYPE OF LONG LINE PAVEMENT MARKING OPERATION. IN ADDITION, THE TYPE OF TRAFFIC CONTROL EQUIPMENT WHICH SHALL BE FURNISHED WHEN DIRECTED BY THE ENGINEER IS INDICATED.

EQUIPMENT	PAVEMENT MARKING LINE TYPE (1)					
	CENTER LINE		EDGE LINE		LANE LINE (2) CHANNELIZING LINE (3)	
	LONGER THAN 2 MIN. DRY	2 MIN. OR LESS DRY	LONGER THAN 2 MIN. DRY	2 MIN. OR LESS DRY	LONGER THAN 2 MIN. DRY	2 MIN. OR LESS DRY
LEAD VEHICLE	A	A	C	C	C	C
POWER BROOM EQUIPMENT	B	B	A	A	B	B
LINE MARKING MACHINE	A	A	A	A	A	A
TRAIL VEHICLE	D	A	D	A	LANE CLOSURE REQUIRED (0.7 m CONES REQUIRED)	A
TRAIL VEHICLE (ADDITIONAL)	C	B	C	B		A
TRAIL VEHICLE (SIGN & CONE RETRIEVAL)	A	C	A	C		C
TRAIL VEHICLE (SHADOW FOR RETRIEVAL)	A	C	A	C		C

(1) FOR EQUIPMENT REQUIREMENTS FOR AUXILIARY MARKING OPERATIONS SEE THE PLANS AND PART 7, OMUTCD.

(2) INCLUDES BOTH DASHED AND SOLID LANE LINES.

(3) CHANNELIZING LINE SEGMENTS OF 61 m OR LESS SHALL BE CONSIDERED AUXILIARY MARKINGS, EXECPT WHEN APPLIED AS COMPONENTS OF GORE MARKINGS SPRAYED IN MOVING OPERATIONS SEPARATE FROM THE APPLICATION OF TRANSVERSE LINES.

A	REQUIRED EQUIPMENT
B	EQUIPMENT REQUIRED WHEN DIRECTED BY THE ENGINEER
C	NOT REQUIRED
D	REQUIRED EQUIPMENT FOR SIGN & CONE PLACEMENT

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

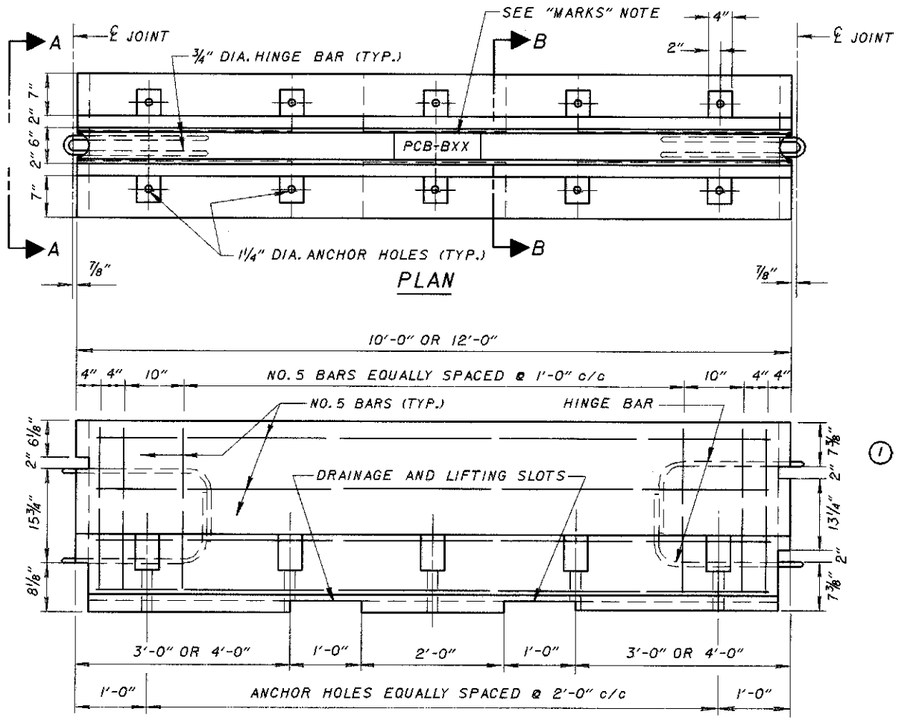
TRAFFIC CONTROL FOR LONG LINE PAVEMENT MARKING OPERATIONS

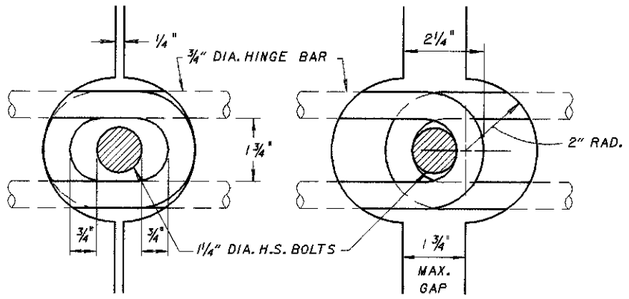
DATE 01/30/95

STANDARD CONSTRUCTION DRAWING MT-99.20M

APPROVED Gary J. Craig ENGR. OF DESIGN SERVICES

WCC

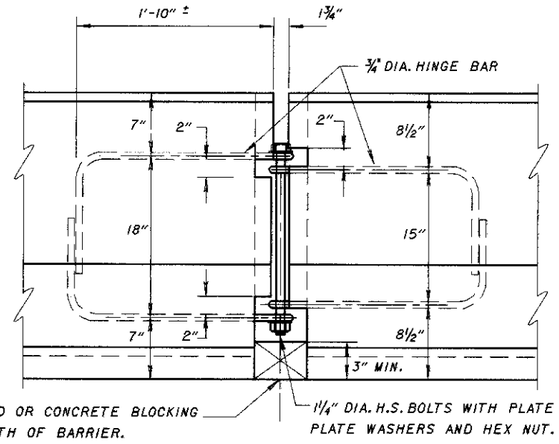




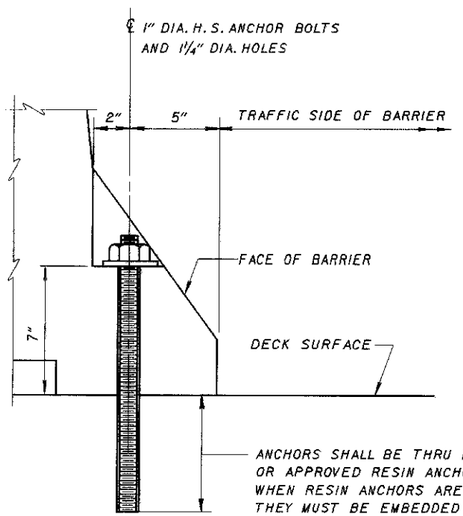
JOINT CONNECTION DETAILS

① ***BARRIERS*** *SHALL INITIALLY BE PLACED CLOSER TOGETHER SO BOLTS CAN BE EASILY INSERT-THROUGH HINGE BAR LOOPS.*

② ***BARRIER JOINTS*** *SHALL BE FULLY OPEN BEFORE NUT IS TIGHTENED ONTO BOLT AND OPENING IS SNUGLY BLOCKED.*



DETAIL AT HINGED CONNECTION



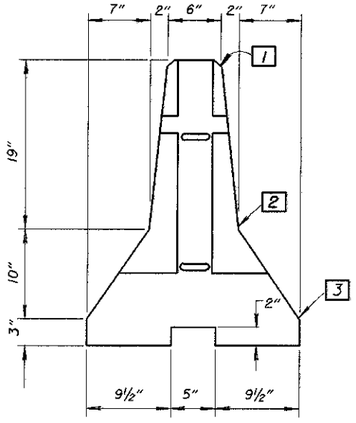
ANCHORS SHALL BE THRU BOLTS OR APPROVED RESIN ANCHORS. WHEN RESIN ANCHORS ARE USED, THEY MUST BE EMBEDDED A MINIMUM OF 6½" INTO FIRM CONCRETE. WHEN NO LONGER NEEDED, ANCHORS SHALL BE REMOVED AS DIRECTED BY THE ENGINEER. WHERE DECK IS TO REMAIN, HOLES SHALL BE FILLED WITH AN EPOXY NON-SHRINK GROUT.

DETAIL C

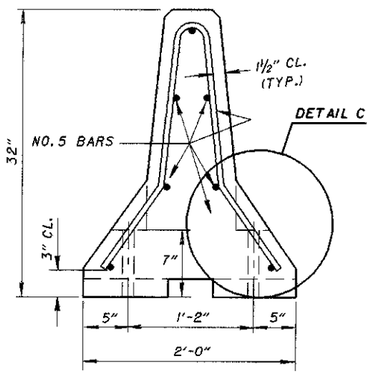
1 1" RADIUS OR ¾" CHAMFER ALL TOP AND END CORNERS

2 PERMISSIBLE 10" RADIUS

3 PERMISSIBLE 1" RADIUS



VIEW A-A



SECTION B-B

GENERAL NOTES

HARDWARE
BOLTS, DECK ANCHORING BOLTS AND ALL NUTS AND WASHERS SHALL CONFORM TO ASTM A325. THEY SHALL BE GALVANIZED IN ACCORDANCE WITH CMS 711.02.

REINFORCING STEEL *- ALL REINFORCING STEEL (INCLUDING THE ¾" DIA. HINGE BARS) SHALL MEET THE 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 4,000 PSI.*

BRIDGE DECK SURFACE PREPARATION:
THE SURFACE AREA ON WHICH THE PORTABLE CONCRETE BARRIERS 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 SEGMENT 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 2" 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
ADMINISTRATOR
4-24-92
DATE

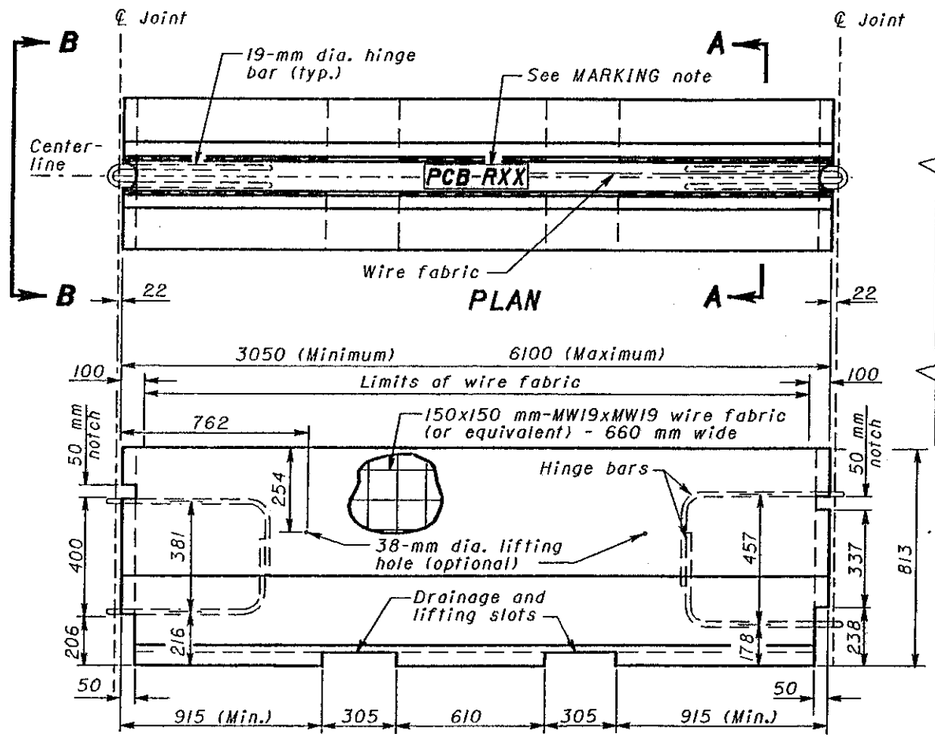
DESIGNED	DRAWN	CHECKED	REVIEWED
A.J.M	G.F.J	W.T.F	L.A.W

REVISIONS 7-6-99

STANDARD
PORTABLE CONCRETE BARRIER DETAILS

PCB-91

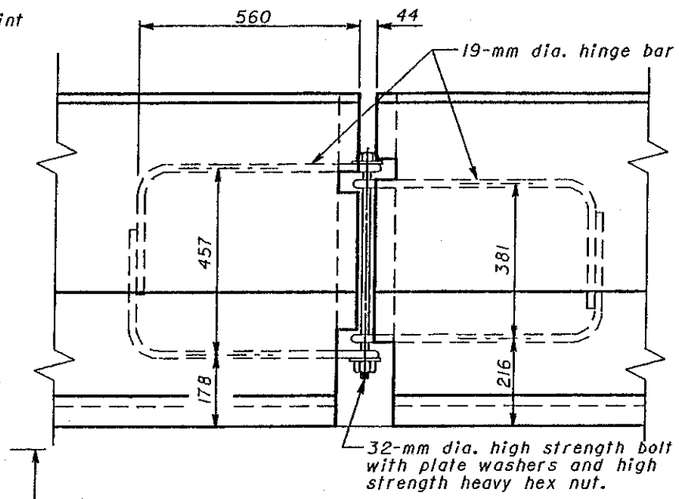
1 / 1



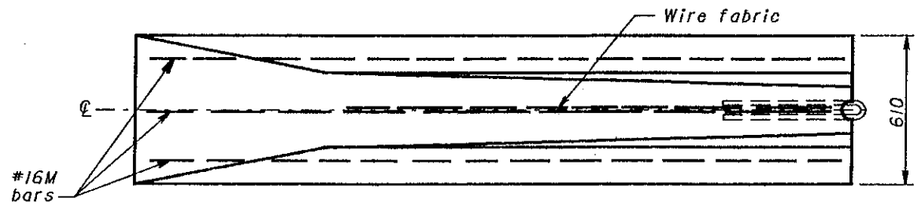
PLAN

ELEVATION

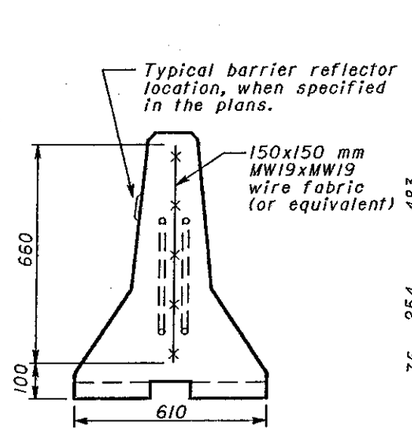
BARRIER DETAILS



DETAIL AT HINGED CONNECTION

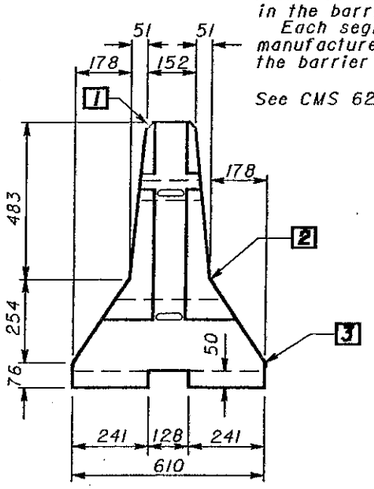


PLAN

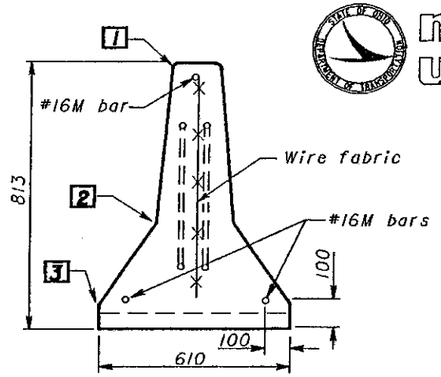


Vertical edges on keyway and drainage slots may be battered. Depth 50±6 mm.

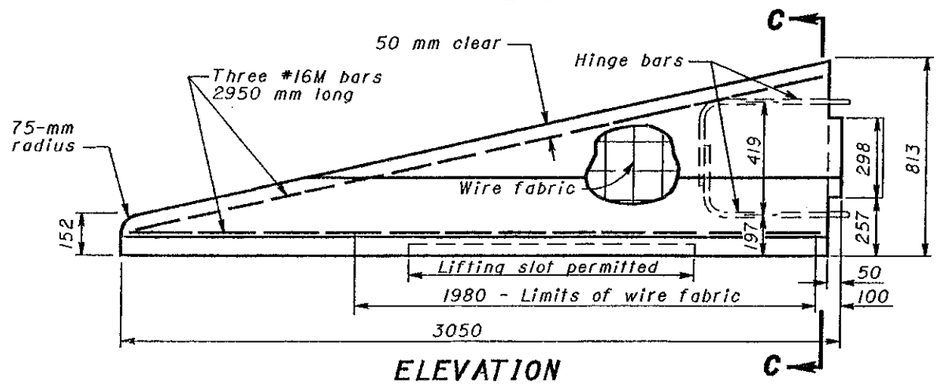
SECTION A-A



VIEW B-B

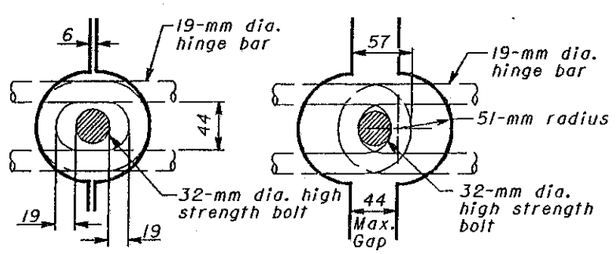


SECTION C-C



ELEVATION

TAPERED END SECTION DETAILS



CLOSED JOINT

Barriers shall initially be placed close together so that bolts can be easily inserted through hinge bar loop.

OPEN JOINT

Barrier joints shall be fully open before the nut is tightened onto bolt.

JOINT CONNECTION DETAILS

NOTES

PORTABLE CONCRETE BARRIER (PCB): PCB, as shown, shall not be used on bridge deck edges. PCB, Bridge Mounted, shall be used at such locations in accordance with the Office of Structural Engineering's Standard Drawing PCB-91M.

WIRE FABRIC: Shall meet the requirements of CMS 709.10.

CONNECTING HARDWARE: Bolts, washers and hex nuts shall be galvanized after fabrication as per CMS 711.02 and shall meet the requirements of CMS 711.09 except that the Rotational Capacity test specified in ASTM A 325M shall be waived.

In lieu of the pin and loop connections detailed on this Standard Construction Drawing, barrier sections with "J-J Hooks" end connections may be utilized.

Transition barrier sections with pin and loop connections on one end and "J-J Hooks" on the other shall be used to connect runs of "J-J Hooks" barrier to other permitted barrier types. The heights of the transition sections shall be the same as the barrier runs being connected.

"J-J Hooks" is a trademark of Easi-Set Industries, P.O. Box 300, Midland, VA 22728, (540) 439-8911 or (800) 547-4045.

HINGE AND REINFORCING BARS: The 19-mm hinge bars and #16M reinforcing bars shall meet the requirements of CMS 509.

HANDLING DEVICES: Such devices may be used in lieu of the lifting slot for moving the barrier. They may be of any design sufficient to handle the weight of the section being lifted. No handling devices shall protrude from the surface of the barrier when in place.

MARKING: All barrier segments shall be marked as shown, where XX indicates the year cast. These markings shall be permanently impressed in the barrier using a minimum of 50-mm high lettering.

Each segment shall have, on its top, a unique identification as to its manufacturer and, somewhere on the barrier, the day and month that the barrier was manufactured.

See CMS 622 for additional information.

metric units

LEGEND

1. 25-mm radius or 19-mm chamfer, all top and end corners.
2. Permissible 250-mm radius.
3. Permissible 25-mm radius.

All dimensions are in millimeters unless otherwise noted.

This Drawing Replaces MC-9.2.

OHIO DEPARTMENT OF TRANSPORTATION

813-mm PORTABLE CONCRETE BARRIER

DATE: 6-30-95, 10-21-97

STANDARD CONSTRUCTION DRAWING **RM-4.2M**

APPROVED Roger F. Sutherland

ALL DIMENSIONS IN MILLIMETERS, UNLESS OTHERWISE NOTED.

TC-9.10 TYPE SUPPORTS

DESIGN NO.	D (meters)	W	ANCHOR BOLTS SIZE	CIRCLE	P
1	2.4	762	38 X 1.4 m	343	171
2	2.4	762	38 X 1.4 m	343	171
3	2.7	914	45 X 2.1 m	406	197

TC-9.30 TYPE SUPPORTS

DESIGN NO.	D (meters)	W	ANCHOR BOLTS SIZE	CIRCLE	P
1	2.4	762	38 X 1.4 m	343	171
2	2.7	914	45 X 2.1 m	381	197
3	3.1	914	51 X 2.3 m	508	216
4	3.4	914	57 X 2.3 m	559	229
5	3.4	914	57 X 2.3 m	559	229

TC-16.20 & TC-81.20 TYPE SUPPORTS

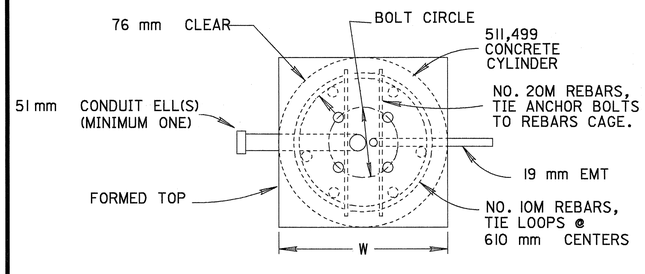
DESIGN NO.	D (meters)	W	ANCHOR BOLTS SIZE	CIRCLE	P
1	2.4	762	38 X 1.4 m	343	171
2	2.4	762	38 X 1.4 m	381	171
3	2.7	762	38 X 1.4 m	406	171
4	3.1	914	45 X 2.1 m	457	197
5	2.7	914	45 X 2.1 m	381	197
6	2.7	914	45 X 2.1 m	381	197
7	2.7	914	45 X 2.1 m	381	197
8	2.7	914	45 X 2.1 m	406	197
9	3.1	914	45 X 2.1 m	457	197
10	3.1	914	45 X 2.1 m	508	197
11	3.1	914	45 X 2.1 m	508	197
12	3.4	914	51 X 2.3m	508	216

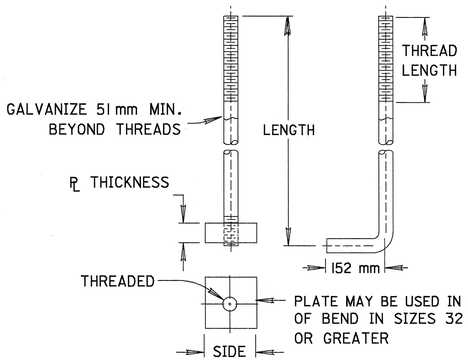
TC-17.10 & 81.10 TYPE SUPPORTS

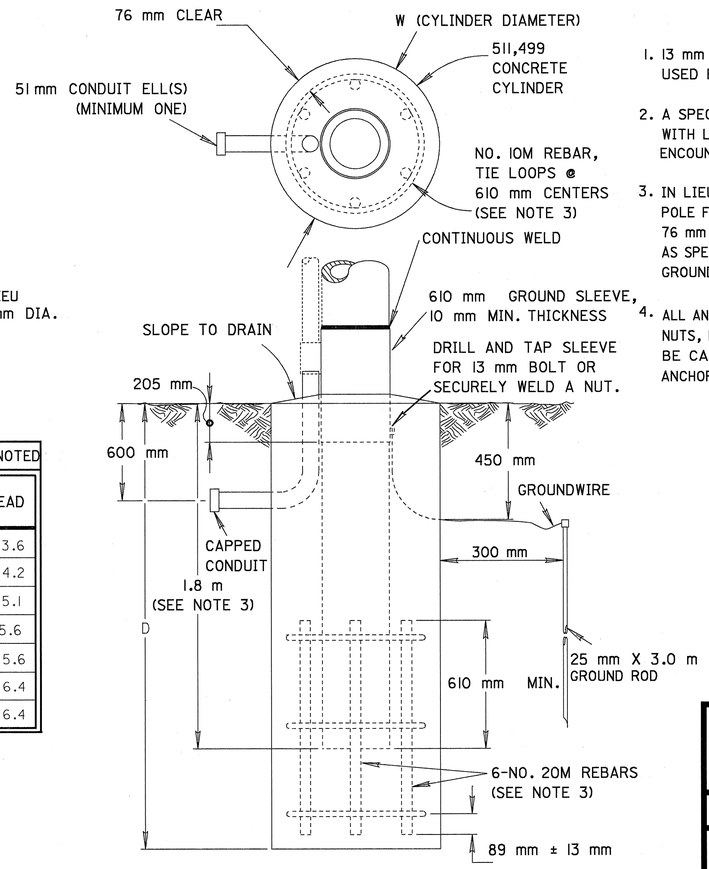
DESIGN NO.	D (meters)	W	ANCHOR BOLTS SIZE	CIRCLE	P
1	2.1	762	32 X 1.1 m	254	146
2	2.1	762	38 X 1.4 m	318	171
3	2.4	762	38 X 1.4 m	343	171
4	2.4	914	45 X 2.1 m	381	197
5	2.7	914	45 X 2.1 m	406	197
6	2.7	914	45 X 2.1 m	406	197
7	3.1	914	51 X 2.3 m	457	216
8	3.1	914	51 X 2.3 m	508	216
9	3.1	914	51 X 2.3 m	559	216
10	3.4	914	57 X 2.3 m	559	229
11	3.4	914	57 X 2.3 m	559	229
12	3.7	914	64 X 2.9 m	597	248

TC-12.30 TYPE SUPPORTS

DESIGN NO.	D (meters)	W	ANCHOR BOLTS SIZE	CIRCLE	P
1	2.7	914	45 X 2.1 m	381	197
2	2.7	914	45 X 2.1 m	381	197
3	3.4	914	51 X 2.3 m	457	216
4	3.4	914	51 X 2.3 m	457	216
5	3.4	914	51 X 2.3 m	559	216
6	3.4	914	51 X 2.3 m	559	216
7	4.6	914	64 X 2.9 m	597	248
8	4.6	914	64 X 2.9 m	597	248
9	4.6	914	64 X 2.9 m	597	248
10	5.2	914	64 X 2.9 m	648	248
11	5.2	914	64 X 2.9 m	648	248
12	5.5	914	76 X 3.5 m	648	286

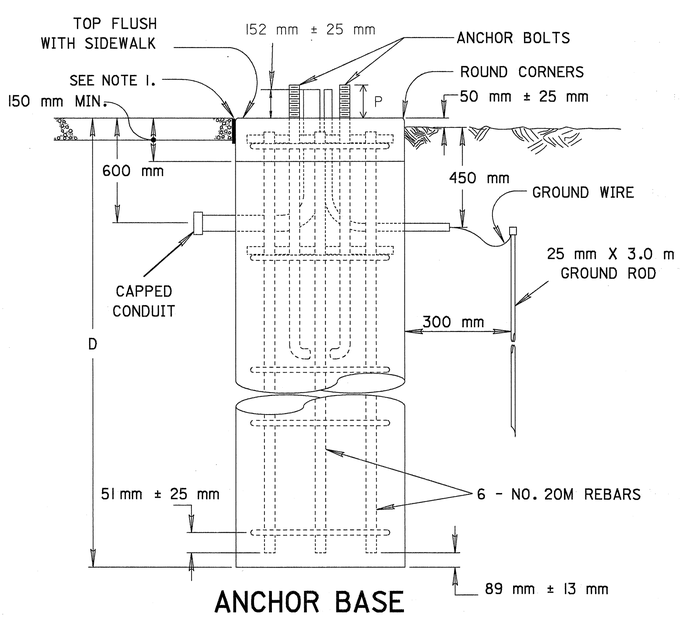






EMBEDDED POLE

(STRAIN POLE ONLY)



ANCHOR BASE

ALL DIMENSIONS IN MILLIMETERS, UNLESS OTHERWISE NOTED

DIA.	LENGTH (meters)	THREAD LENGTH	℄ THICK	℄ SIDE	THREAD
32	1.1	203	38	102	32 - 3.6
38	1.4	229	38	102	38 - 4.2
45	2.1	229	51	127	45 - 5.1
51	2.3	229	51	127	51 - 5.6
57	2.3	254	64	152	57 - 5.6
64	2.9	254	64	152	64 - 6.4
76	3.5	305	76	178	76 - 6.4

ANCHOR BOLTS

NOTES

1. 13 mm PREFORMED JOINT FILLER AS PER 705.03 SHALL BE USED BETWEEN FOUNDATIONS AND ADJACENT PAVED AREAS.
2. A SPECIAL FOUNDATION DESIGN WILL BE REQUIRED WHEN SOIL WITH LOAD BEARING CAPACITY OF LESS THAN 9700 kg/m² IS ENCOUNTERED.
3. IN LIEU OF PROVIDING REINFORCING STEEL IN THE EMBEDDED POLE FOUNDATION, THE POLE BUTT MAY BE EXTENDED TO WITHIN 76 mm OF THE FOUNDATION BOTTOM.THE POLE BASE DIAMETER AS SPECIFIED IN THE PLANS IS THE DIAMETER OF THE POLE AT THE GROUNDLINE.
4. ALL ANCHOR BOLTS SHALL BE PROVIDED WITH STANDARD STEEL HEX NUTS, LEVELING NUTS, PLAIN AND LOCKWASHERS. THE NUTS SHALL BE CAPABLE OF DEVELOPING THE FULL STRENGTH OF THE ANCHOR BOLTS.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

metric units

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

TRAFFIC CONTROL

DATE 02/01/94 12/10/96

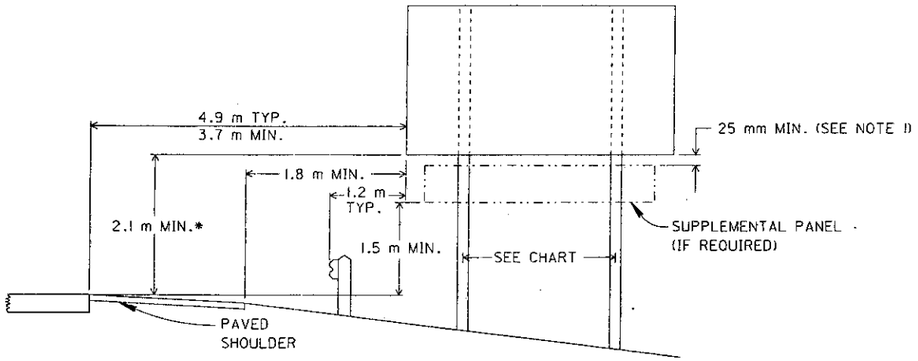
FOUNDATIONS

STANDARD CONSTRUCTION DRAWING TC-21.20M

APPROVED _____ ADMINISTRATOR

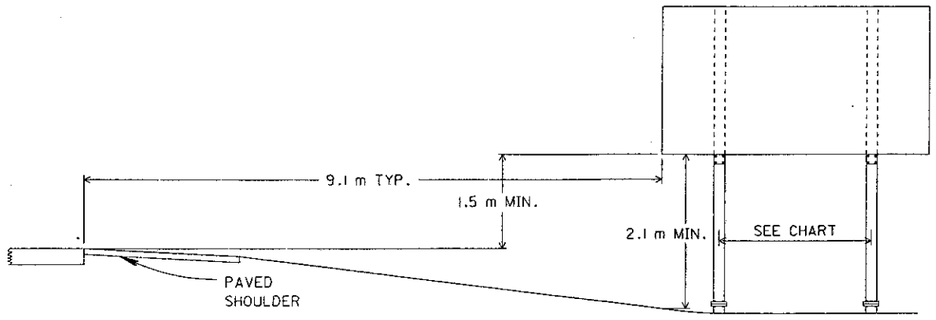
WCC

FREEWAYS AND EXPRESSWAYS

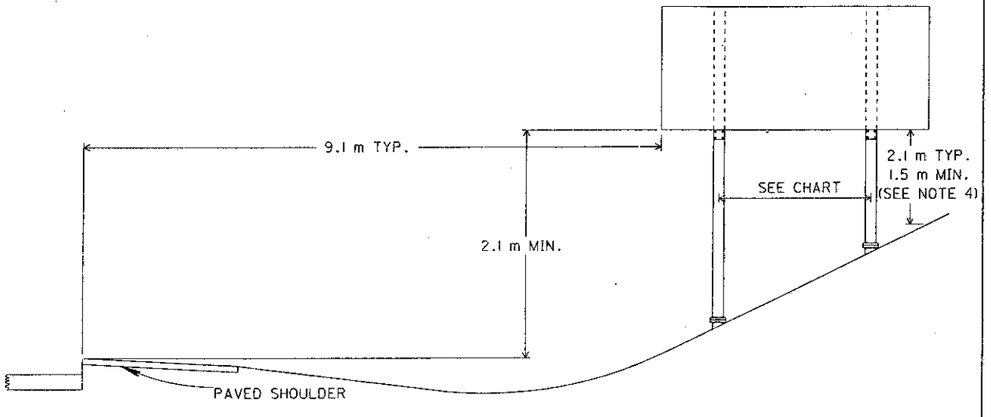


TYPICAL INSTALLATION WITH GUARDRAIL

* 2.4 m MIN. WITH SUPPLEMENTAL PANEL

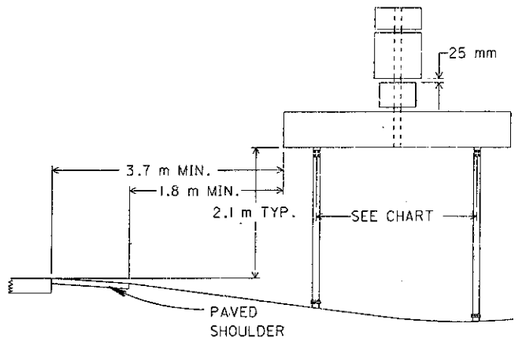


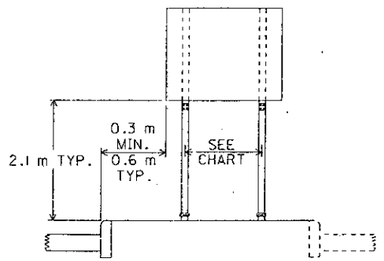
TYPICAL INSTALLATION, FILL SECTION, 9.1 m OFFSET



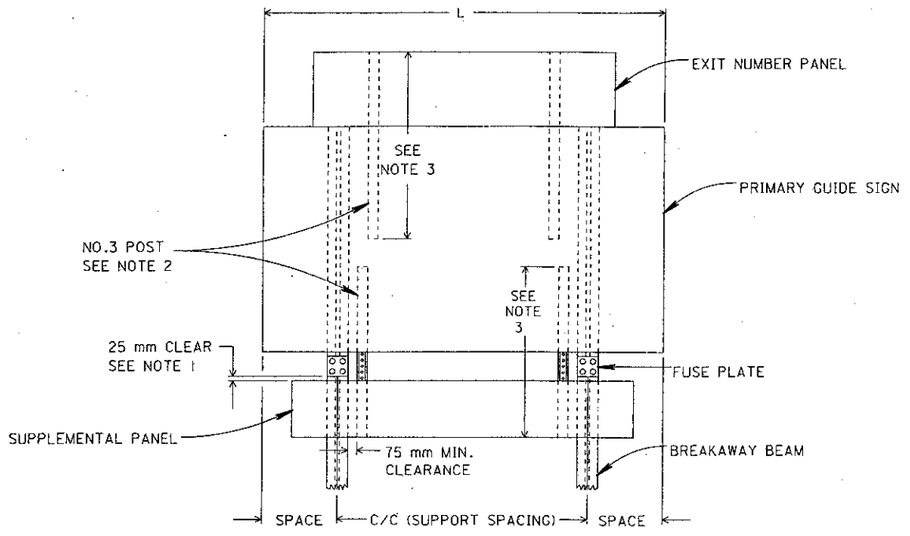
TYPICAL INSTALLATION, CUT SECTION, 9.1 m OFFSET

STREETS-RAMPS-HIGHWAYS





CURB SECTION



SUPPLEMENTAL PANEL ATTACHMENT

SUPPORT SPACING CHART

2 SUPPORTS				3 SUPPORTS				
L (meters)	SPACING (meters) SPACE	C/C	SPACE	L (meters)	SPACING (meters) SPACE	C/C	C/C	SPACE
1.5	0.33	0.84	0.33	6.0	0.40	2.60	2.60	0.40
1.8	0.40	1.00	0.40	6.3	0.55	2.60	2.60	0.55
2.1	0.46	1.18	0.46	6.6	0.70	2.60	2.60	0.70
2.4	0.52	1.36	0.52	6.9	0.85	2.60	2.60	0.85
2.7	0.59	1.52	0.59	7.2	1.00	2.60	2.60	1.00
3.0	0.65	1.70	0.65	7.5	1.00	2.75	2.75	1.00
3.3	0.72	1.86	0.72	7.8	1.05	2.85	2.85	1.05
3.6	0.50	2.60	0.50	8.1	1.10	2.95	2.95	1.10
3.9	0.65	2.60	0.65	8.4	1.15	3.05	3.05	1.15
4.2	0.80	2.60	0.80					
4.5	0.95	2.60	0.95					
4.8	1.05	2.70	1.05					
5.1	1.10	2.90	1.10					
5.4	1.20	3.00	1.20					
5.7	1.23	3.24	1.23					

NOTES

1. SUPPLEMENTAL PANELS SHALL BE MOUNTED 25 mm BELOW THE FUSE PLATE ON BREAKAWAY BEAM INSTALLATIONS AND 25 mm MINIMUM BELOW THE GUIDE SIGN WHEN THE SIGN SUPPORTS ARE RIGID BEAMS.
2. NO. 3 POST SHALL BE ATTACHED TO BOTH THE GUIDE SIGN AND THE EXIT NUMBER OR OTHER SUPPLEMENTAL PANELS BY MOUNTING CLIPS FASTENED ALTERNATELY AT EACH HORIZONTAL EXTRUSION AND BOTH SIDES AT THE TOP AND BOTTOM OF THE POSTS. NO CONNECTIONS SHALL BE MADE BETWEEN THE SUPPLEMENTAL PANEL AND BREAKAWAY BEAMS.
3. LENGTH OF POST SHALL BE 2.5 TIMES THE HEIGHT OF THE SUPPLEMENTAL PANEL. THE POST SPACING SHALL BE AS PER THE SUPPORT SPACING CHART.
4. USE 1.5 m MINIMUM IF BACK SLOPES ARE GREATER THAN 3 TO 1.

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL

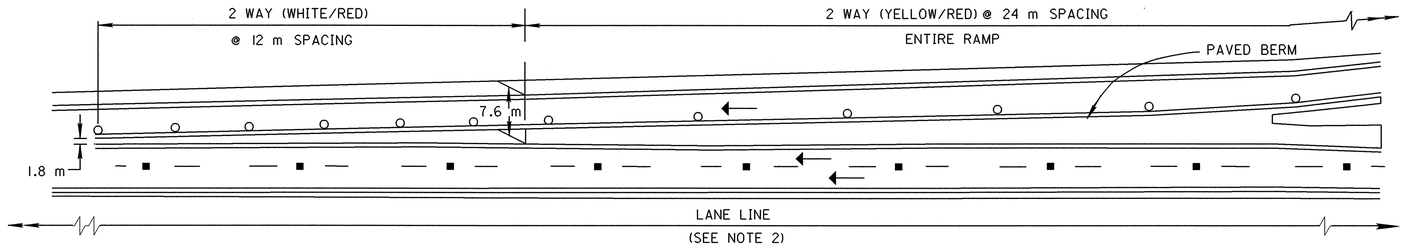
DATE 03/31/94

TYPICAL SIGN PLACEMENT GUIDE SIGNS

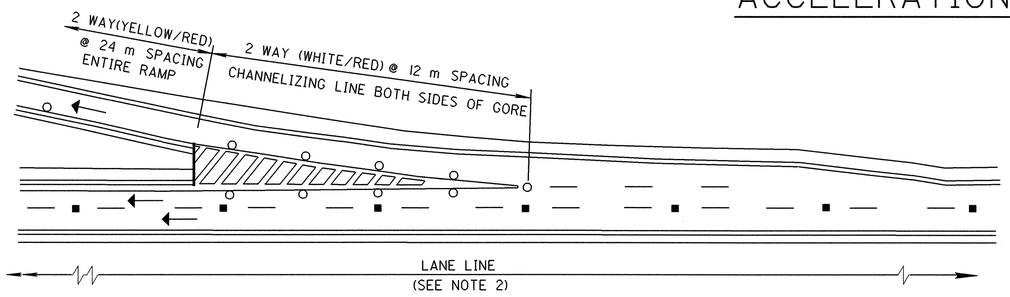
STANDARD CONSTRUCTION DRAWING TC-42.10M

APPROVED _____ ENGR. OF DESIGN SERVICES

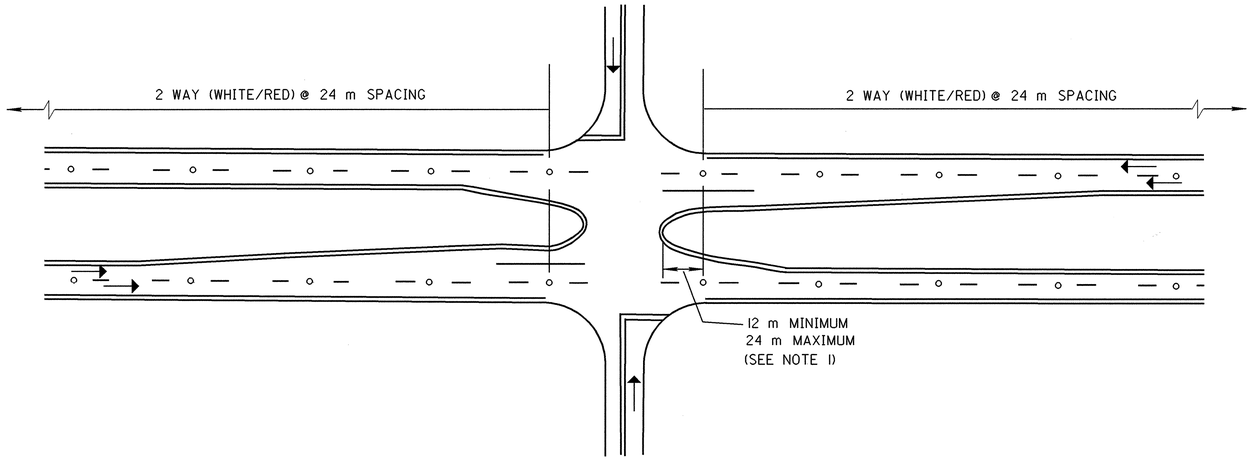
WCC



ACCELERATION LANE

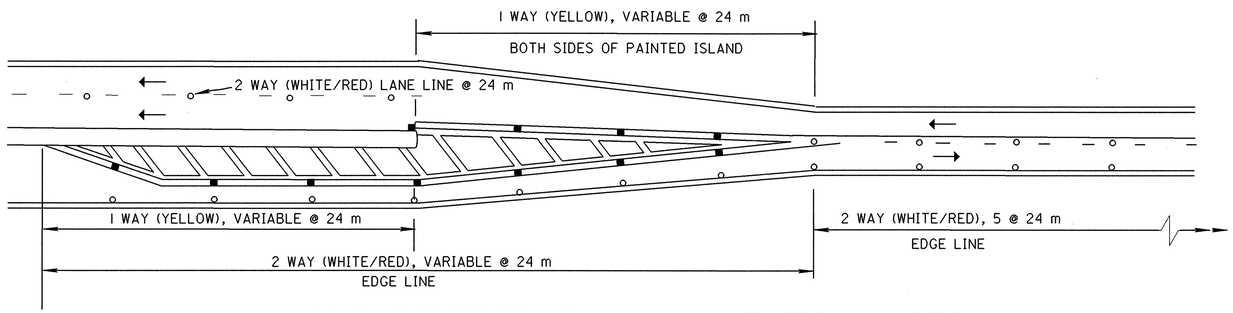


DECELERATION LANE

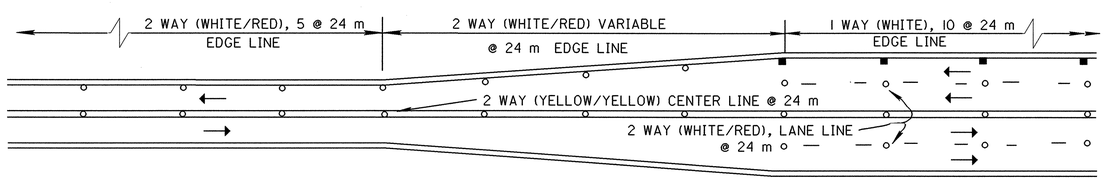


MULTILANE DIVIDED-CONTROLLED ACCESS

(SEE NOTE 2)



4 LANE DIVIDED TO 2 LANE TRANSITION



4 LANE UNDIVIDED TO 2 LANE TRANSITION

NOTES

1. RAISED PAVEMENT MARKERS SHALL NOT BE PLACED IN THE DIRECTIONAL ROADWAYS WITHIN THE INTERSECTION AREA.
2. RAISED PAVEMENT MARKERS ON LANE LINES ON FREEWAYS SHALL BE ONE WAY WHITE SPACED AT 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.

LEGEND

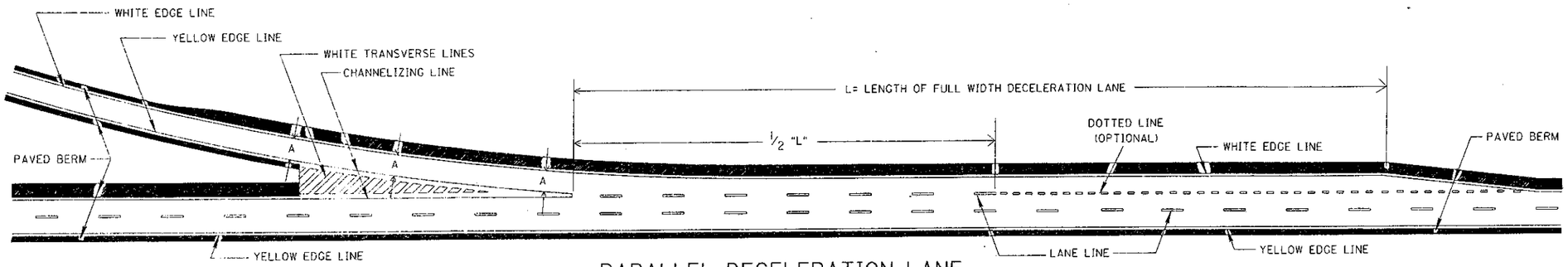
- ■ 1 WAY REFLECTORS
- ○ 2 WAY REFLECTORS

metric units

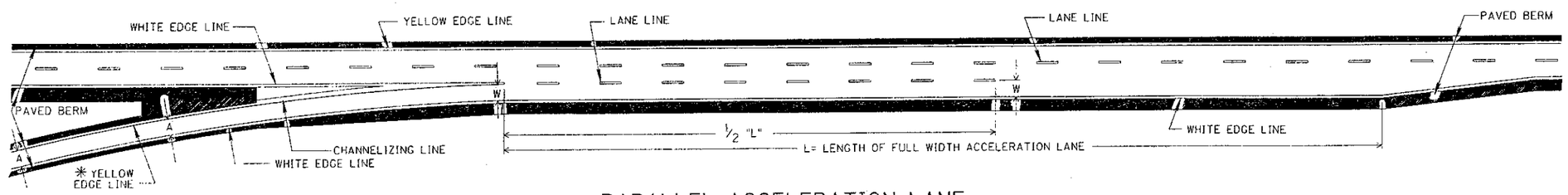
OFFICE OF TRAFFIC ENGINEERING
DIVISION OF ENGINEERING POLICY
OHIO DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL	DATE 11/03/93 11/01/95
RAISED PAVEMENT MARKER DETAILS I	
STANDARD CONSTRUCTION DRAWING TC-65.11M	
APPROVED _____ ADMINISTRATOR	

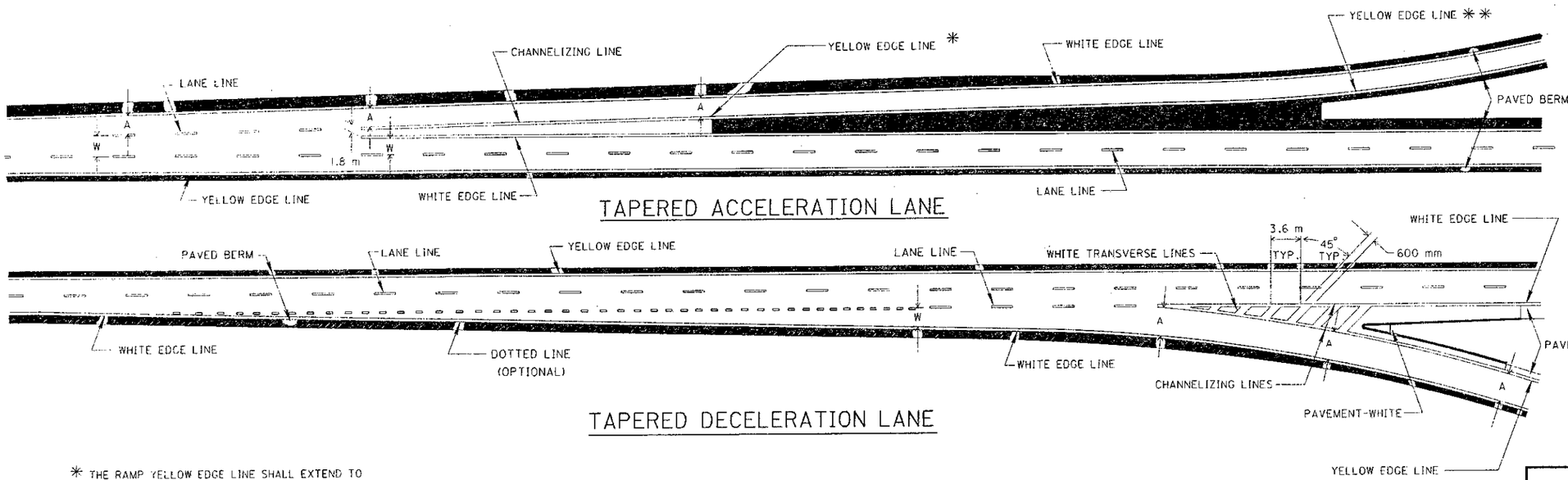
WCC



PARALLEL DECELERATION LANE



PARALLEL ACCELERATION LANE



TAPERED ACCELERATION LANE

TAPERED DECELERATION LANE

✳ THE RAMP YELLOW EDGE LINE SHALL EXTEND TO WHERE THE PAVED BERM ENDS.

✳✳ ANY EXISTING CURB SHALL BE PAINTED WHITE.

A = UNIFORM RAMP WIDTH

W = LANE WIDTH

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL	DATE 09/01/93
FREEWAY ENTRANCE AND EXIT MARKINGS	
STANDARD CONSTRUCTION DRAWING TC-72.20M	
APPROVED D. J. Mrega ENGR. OF DESIGN SERVICES	

WCC