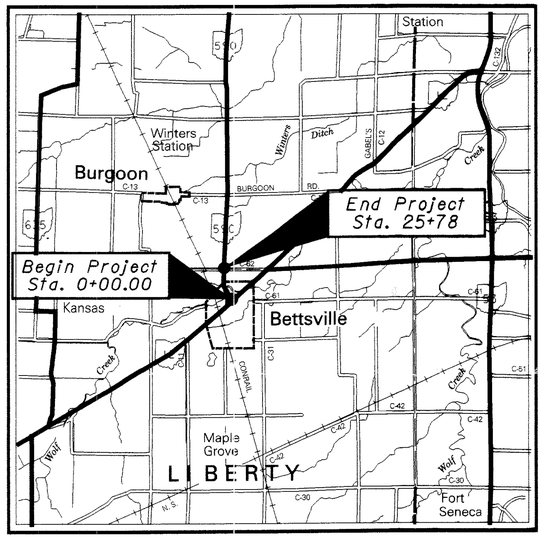

LOCATION MAP

LATITUDE: 41°15'00" LONGITUDE: 83°14'06"

SCALE IN MILES

0 1 2 3 4

N

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

DESIGN DESIGNATION

CURRENT ADT (2002)	1420
DESIGN YEAR ADT (2022)	1640
DESIGN HOURLY VOLUME (2022)	250
DIRECTIONAL DISTRIBUTION	50%
TRUCKS (24 HOUR B&C)	8%
DESIGN SPEED	50 mph
LEGAL SPEED	50 mph

DESIGN FUNCTIONAL CLASSIFICATION - RURAL MAJOR COLLECTOR

DESIGN EXCEPTIONS

Shoulder Width	12/4/01
Horizontal Alignment	12/4/01
Superelevation	12/4/01

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

PLAN PREPARED BY:
ODOT District 2
Doug Rogers
Fred Judson
Andi Fintel

ENGINEERS SEAL:

STATE OF OHIO
DOUG A. ROGERS
E-63903
REGISTERED
PROFESSIONAL ENGINEER

SIGNED: Doug A. Rogers
DATE: 1-18-02

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SEN-590-0.00
VILLAGE OF BETTSVILLE
LIBERTY TOWNSHIP
SENECA COUNTY

INDEX OF SHEETS:

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STRUCTURE: SEN-590-0023	27-39
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PROJECT DESCRIPTION

IMPROVEMENT OF 0.39 MILE OF SR 590 BY RESURFACING THE PAVEMENT AND REPLACEMENT OF BRIDGE NO. SEN-590-0023 OVER WOLF CREEK.

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 REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY EXCEPT AS NOTED ON SHEET 11, AND THAT DETOURS WILL BE PROVIDED AS INDICATED ON THE PLANS.

UNDER AUTHORITY OF SECTION 4511.21, DIVISION (I) OF THE OHIO REVISED CODE, THE REVISED PRIMA FACIE SPEED LIMITS AS INDICATED HEREIN ARE DETERMINED TO BE REASONABLE AND SAFE, AND ARE HEREBY ESTABLISHED FOR THE DURATION OF THIS PROJECT. THE PRIMA FACIE SPEED LIMIT OR LIMITS HEREBY ESTABLISHED SHALL BECOME EFFECTIVE WHEN APPROPRIATE SIGNS GIVING NOTICE THEREOF ARE ERECTED.

APPROVED D.S. Mortensky
DATE 12-11-01 DISTRICT DEPUTY DIRECTOR

APPROVED Gordon Proctor Jr.
DATE 2-5-02 DIRECTOR, DEPARTMENT OF TRANSPORTATION

STANDARD CONSTRUCTION DRAWINGS

BP-3.1	7/28/00	MT-97.11M	1/30/95	AS-1-81	4/20/01		
BP-4.1	7/28/00	MT-99.10M	1/30/95	CS-1-93	6/30/95		
		MT-101.60M	4/25/94	DS-1-92	12/15/94		
DM-4.1	7/20/01	MT-105.10M	4/25/94	EXJ-3-82	4/20/01		
DM-4.3	7/20/01	MT-105.11M	4/25/94	PSBD-1-93	3/4/94		
DM-4.4	7/20/01			SB-06-94	12/19/94		
				TST-1-99	10/20/00		
GR-1.1M	10/21/97	TC-65.10	10/19/01				
GR-1.2M	1/3/96	TC-65.11	10/19/01				
GR-1.3M	11/30/94	TC-65.12	10/19/01				
GR-2.1M	4/14/98	TC-73.10	1/19/01				
GR-4.2M	10/21/97						
GR-5.1M	4/21/95						
GR-5.3M	11/30/94						

SUPPLEMENTAL SPECIFICATIONS

806	9/9/97	877	4/13/99
842	1/6/99	899	10/21/98
858	11/7/00	1023	12/8/95
864	7/11/00	1062	4/13/99
865	2/22/00	1082	1/11/00
870	3/27/01	907 10/21/98	
905 4/1/98		908 11/7/00	
906 5/5/98			

SPECIAL PROVISIONS

U.S. Army Corps. of Engineers

Nationwide No. 3
Dated 1-18-02

Nationwide No. 33
Dated 1-18-02

FEDERAL PROJECT NO. TEZI-G020 (107)
PID NO. 20693
CONSTRUCTION PROJECT NO.
RAILROAD INVOLVEMENT NONE
SEN-590-0.00
1/36

SEN-SR 590 - 0.00
PID #20693
06-05-02
028006
DIST 02

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Butt Joint As Per Std. BP-3.1.

POT Sta. 2+13.19 - ℄ SURVEY
PI Sta. 2+13.19 - ℄ CONST.
(NO CURVE)

N 0° 07′ 16″ W
486.82′ - ℄ CONST.
Due North
586.36′ - ℄ SURVEY

℄ CONST. SR 590
℄ SURVEY SR 590

Match Line - Sta. 4+25

℄ CONST.
S 89° 22′ 00″ W
235.37′ - ℄ CONST.

N 0° 0′ 0″ E
℄ SURVEY
N 0° 07′ 16″ W
℄ CONST.
P.K.F.
M.N.F.
89° 14′ 44″
℄ CONST.
89° 22′ 0″
℄ SURVEY
S 89° 22′ 0″ W
℄ CONST.
POT Sta. 2+13.19 - ℄ SURVEY=
PI Sta. 2+13.19 - ℄ CONST.
(NO CURVE)

Begin Location I
Sta. 0+00

℄ SR 12

POT Sta. -22.18 - ℄ CONST.

Match Line - Sta. 4+25

N 0° 07′ 16″ W
486.82′ - ℄ CONST.
Due North
586.36′ - ℄ SURVEY

℄ CONST. SR 590
℄ SURVEY SR 590

TS Sta. 7+00.01
℄ CONST.

PC Sta. 7+99.55
℄ SURVEY

SC Sta. 8+65.01
℄ CONST.

PI Sta. 8+10.08
℄ CONST.

PI Sta. 9+52.00
℄ SURVEY

PI Sta. 9+56.96
℄ CONST.

End Sheet - Sta. 9+75

R/W

Curve information- ℄ of Survey	Spiral information- ℄ of Construction
℄ SURVEY P.I. Sta = 9+52.00 D = 26° 54′ 11″ (LT) Dc = 8° 59′ 22″ R = 637.37′ T = 152.45′ L = 299.28′ E = 17.98′	℄ CONST. P.I. Sta = 9+49.67 D = 26° 22′ 44″ (LT) Dc = 7° 59′ 02″ R = 717.64′ Lc = 182.90′ Es = 20.76′

PI Of ℄ Survey At STA. 9+52.00 (No Curve) ▲ = 26°54′11″ Lt.

Butt Joint As Per Std. BP-3.1.

N

0 10 20 40
HORIZONTAL SCALE IN FEET

SCHEMATIC PLAN

SEN-590-0.00

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36

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Butt Joint As Per Std. BP-3.1.

Begin Sheet - Sta. 9+75

CS Sta. 10+47.91 ℄ CONST.

PT Sta. 10+98.83 ℄ SURVEY

ST Sta. 11+77.91 ℄ CONST.

Wolf Creek

191.98' - ℄ CONST.
N 26° 30' 00" W

PI Sta. 13+86.56 ℄ CONST.

PRT Sta. 14+50.39 ℄ SURVEY

44.11' - ℄ SURVEY
N26° 54' 11"W

Match Line - Sta. 14+75

10+00

11+00 ℄ CONST. SR 590

11+00 ℄ SURVEY SR 590

12+00

13+00

14+00

20'-0" 20'-0"

4' 12' 12' 4'

R/W

P.K.S.

351.17' - ℄ SURVEY
N 26° 54' 11" W

PI Sta. 10+91.27 ℄ CONST.

TS Sta. 13+69.89 ℄ CONST.

SC Sta. 13+94.89 ℄ CONST.

EQUATION - ℄ SURVEY
Sta 14+50.00 BK =
Sta 14+50.39 AH

Match Line - Sta. 14+75

Sta. 14+94.50 ℄ SURVEY

PC Sta. 15+00

15+00

PI Sta. 15+29.85 ℄ CONST.

PI Sta. 15+56.80 ℄ SURVEY

I.P.F.

16+00

Sta. 16+80 Bettsville Corp. Limits

PI Sta. 16+94.47 ℄ CONST.

17+00

18+00

N2°19'30"E
918.01'-℄ SURVEY
765.30'-℄ CONST.
N2°08'39"E

19+00

℄ SURVEY SR 590

℄ CONST. SR 590

PT Sta. 16+16.39 ℄ SURVEY

CS Sta. 16+61.12 ℄ CONST.

ST Sta. 17+61.12 ℄ CONST.

End Sheet - Sta. 19+75

Spiral information- ℄ of Construction

P.I. Sta = 9+13.67
D = 26° 22' 44" (LT)
Dc = 7° 59' 02"
R = 717.64'
Dc = 14° 36' 10" (LT)
Lc = 182.90'
Es = 20.76'

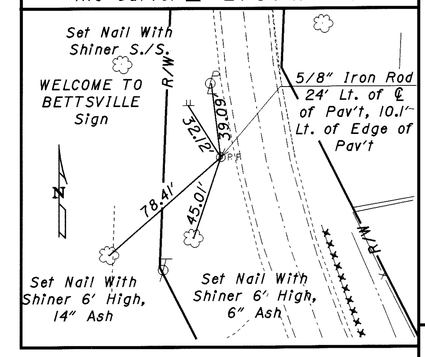
P.I. Sta = 15+51.52
D = 28° 38' 42" (RT)
Dc = 8° 42' 50"
R = 657.52'
Dc = 23° 11' 56" (RT)
Lc = 266.23'
Es = 21.44'

Curve information- ℄ of Survey

P.I. Sta = 9+52.00
D = 26° 54' 11" (LT)
Dc = 8° 59' 22"
R = 637.37'
T = 152.45'
L = 299.28'
E = 17.98'

P.I. Sta = 15+56.80
D = 29° 13' 42" (RT)
Dc = 23° 58' 48"
R = 238.93'
T = 62.30'
L = 121.89'
E = 7.99'

PI Of ℄ Survey At STA. 15+56.39
(No Curve) ▲= 24°34'41" Rt.



HORIZONTAL SCALE IN FEET
0 10 20 40

SCHEMATIC PLAN

SEN-590-0.00

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36

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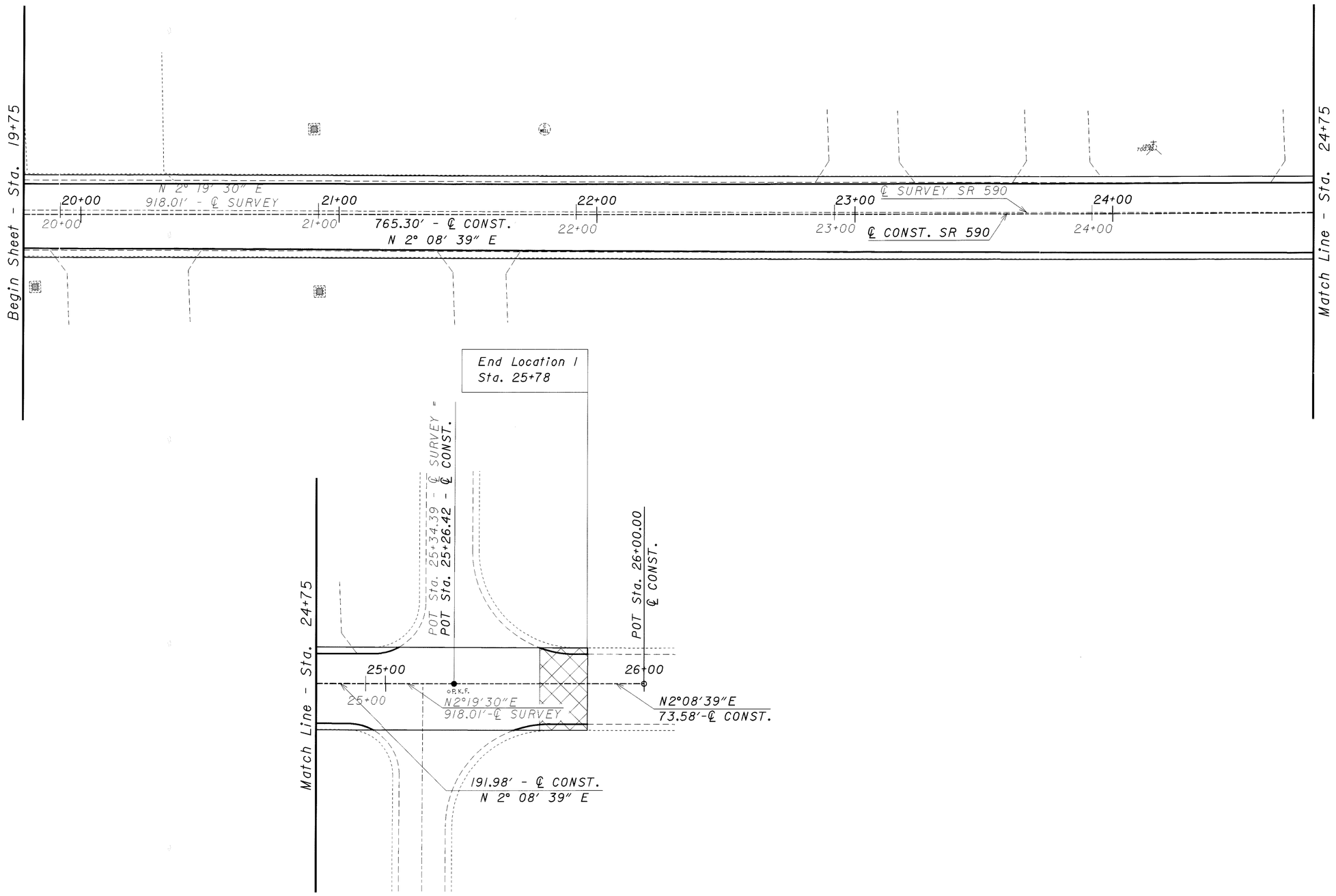
Butt Joint As Per Std. BP-3.I.



HORIZONTAL SCALE IN FEET
0 10 20 40

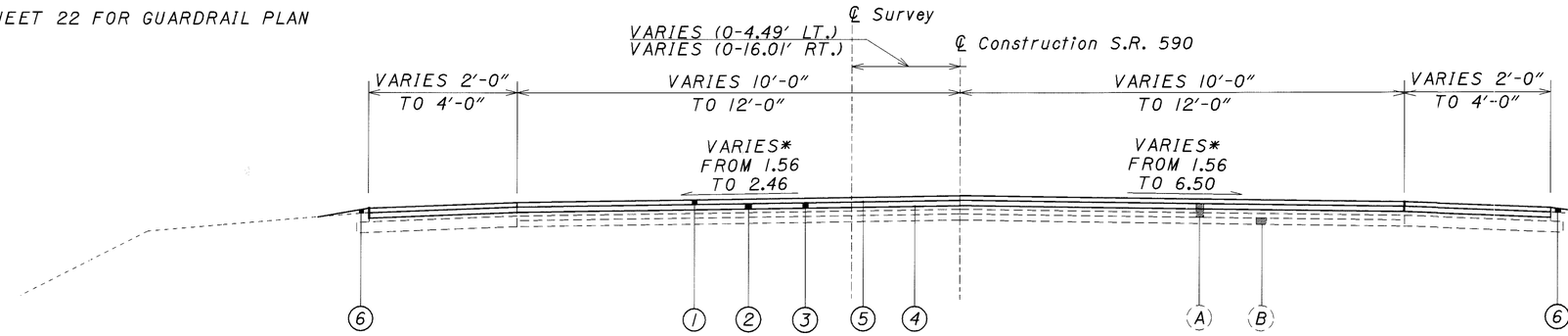
SCHEMATIC PLAN

SEN-590-0.00

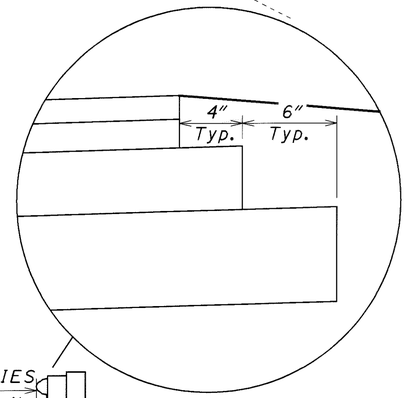
4
36

* MEET EXISTING CROSS SLOPES
** SEE SUPERELEVATION SHEET 21 FOR PROPOSED CROSS SLOPES
NOTE: SEE SHEET 22 FOR GUARDRAIL PLAN

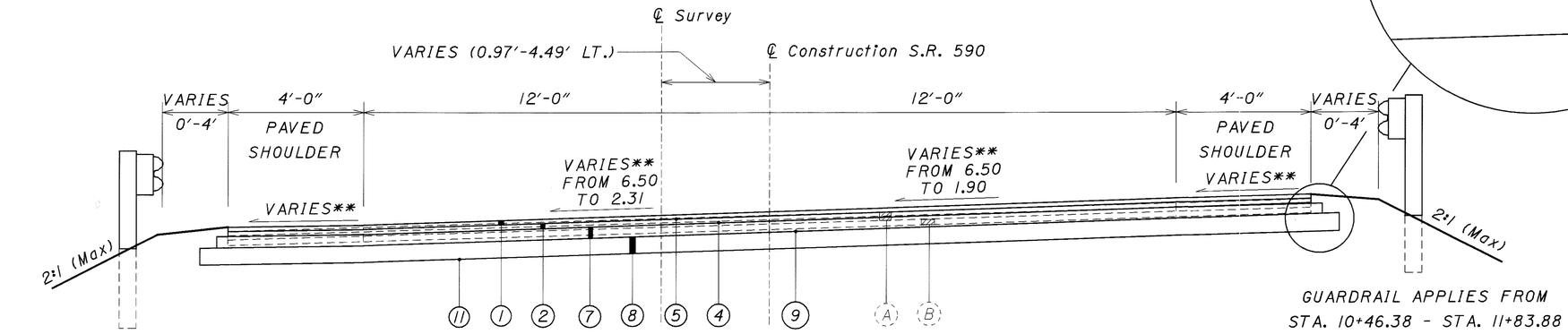
TYPICAL SECTION "A" - RESURFACING SECTION



Typical Section Applies To Sta. 0+00 to Sta. 10+00 = 1000 LIN FT
Typical Section Applies To Sta. 15+00 to Sta. 25+78 = 1078 LIN FT
2078 LIN FT



TYPICAL SECTION "B" - SUPERELEVATED SECTION



GUARDRAIL APPLIES FROM STA. 10+60.23 - STA. 11+72.73

GUARDRAIL APPLIES FROM STA. 10+46.38 - STA. 11+83.88

Sta. 10+00 to Sta. 11+55.79 = 155.79 LIN. FT

LEGEND

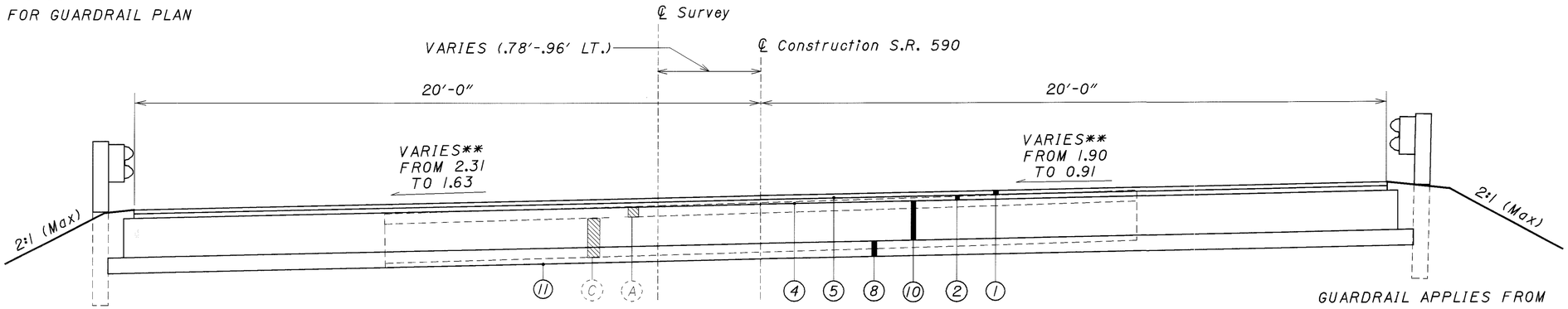
(1) ITEM 858 - 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE A, PG70-22M, APP
(2) ITEM 858 - 1¾" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE A, PG70-22, APP
(3) ITEM 254 - 1½" PAVEMENT PLANING, BITUMINOUS
(4) ITEM 407 - TACK COAT, 0.075 GAL/SQ. YD.
(5) ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE, 0.04 GAL/SQ. YD.
(6) ITEM 617 - COMPACTED AGGREGATE, TYPE A
(7) ITEM 302 - 4" BITUMINOUS AGGREGATE BASE, PG64- 22
(8) ITEM 304 - 6" AGGREGATE BASE
(9) ITEM 408 - BITUMINOUS PRIME COAT
(10) ITEM 611 - REINFORCED CONCRETE APPROACH SLAB (T=15")
(11) ITEM 203 - SUBGRADE COMPACTION
(12) ITEM 606 - GUARDRAIL, TYPE 5
(13) ITEM 870 - SEEDING AND MULCHING
(A) ASHPHALT CONCRETE (5±")
(B) CRUSHED AGGREGATE BASE, (9±")
(C) REINFORCED CONCRETE APPROACH SLAB, (T = 9" WITH 12" EDGE THICKNESS)

TYPICAL SECTION

SEN-590-0.00

* MEET EXISTING CROSS SLOPES
** SEE SUPERELEVATION SHEET 21
FOR PROPOSED CROSS SLOPES
NOTE: SEE SHEET 22 FOR GUARDRAIL PLAN

TYPICAL SECTION "C" - BRIDGE APPROACH SECTION

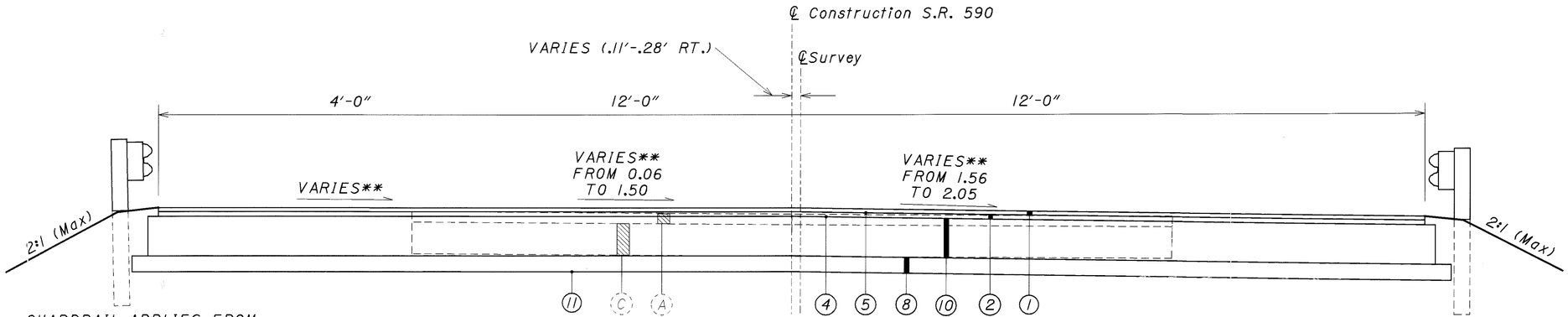


GUARDRAIL APPLIES FROM
STA. 10+60.23 - STA. 11+72.73

Sta. 11+55.79 to Sta. 11+80.79 = 25 LIN. FT

GUARDRAIL APPLIES FROM
STA. 10+46.38 - STA. 11+83.88

TYPICAL SECTION "D" - BRIDGE APPROACH SECTION



GUARDRAIL APPLIES FROM
STA. 13+04.04 - STA. 14+35.29

Sta. 13+05.51 to Sta. 13+30.51 = 25 LIN. FT

GUARDRAIL APPLIES FROM
STA. 13+15.73 - STA. 14+27.63

LEGEND

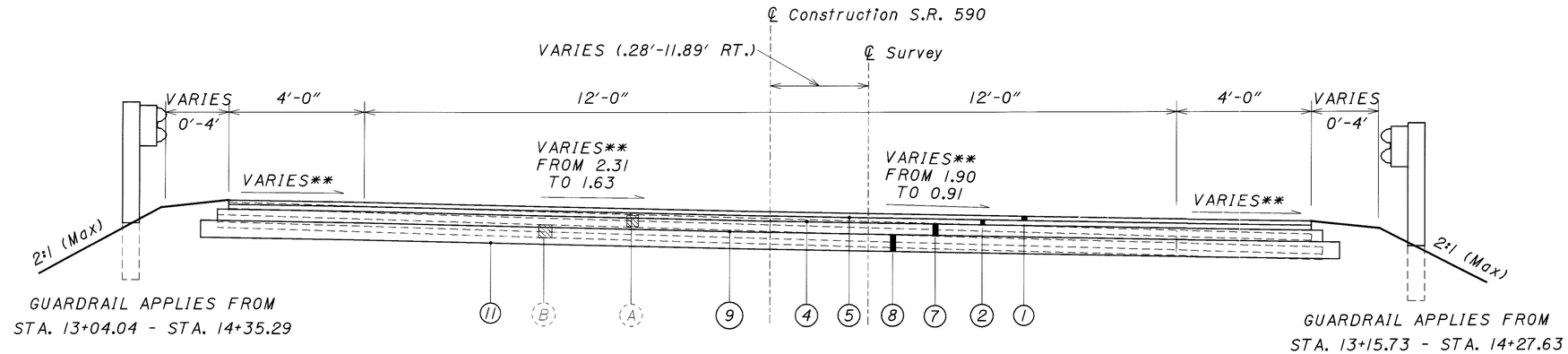
(1)	ITEM 858 - 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE A, PG70-22M, APP
(2)	ITEM 858 - 1¾" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE A, PG70-22, APP
(3)	ITEM 254 - 1½" PAVEMENT PLANING, BITUMINOUS
(4)	ITEM 407 - TACK COAT, 0.075 GAL/SQ. YD.
(5)	ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE, 0.04 GAL/SQ. YD.
(6)	ITEM 617 - COMPACTED AGGREGATE, TYPE A
(7)	ITEM 302 - 4" BITUMINOUS AGGREGATE BASE, PG64- 22
(8)	ITEM 304 - 6" AGGREGATE BASE
(9)	ITEM 408 - BITUMINOUS PRIME COAT
(10)	ITEM 611 - REINFORCED CONCRETE APPROACH SLAB (T=15")
(11)	ITEM 203 - SUBGRADE COMPACTION
(12)	ITEM 606 - GUARDRAIL, TYPE 5
(13)	ITEM 870 - SEEDING AND MULCHING
(A)	ASHPHALT CONCRETE (5±")
(B)	CRUSHED AGGREGATE BASE, (9±")
(C)	REINFORCED CONCRETE APPROACH SLAB, (T = 9" WITH 12" EDGE THICKNESS)

TYPICAL SECTION

SEN-590-0.00

* MEET EXISTING CROSS SLOPES
** SEE SUPERELEVATION SHEET 21
FOR PROPOSED CROSS SLOPES
NOTE: SEE SHEET 22 FOR GUARDRAIL PLAN

TYPICAL SECTION "E" - SUPERELEVATED SECTION



Sta. 13+30.51 to Sta. 15+00 = 169.49 LIN. FT

LEGEND

1. ITEM 858 - 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE A, PG70-22M, APP
2. ITEM 858 - 1¾" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE A, PG70-22, APP
3. ITEM 254 - 1½" PAVEMENT PLANING, BITUMINOUS
4. ITEM 407 - TACK COAT, 0.075 GAL/SQ. YD.
5. ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE, 0.04 GAL/SQ. YD.
6. ITEM 617 - COMPACTED AGGREGATE, TYPE A
7. ITEM 302 - 4" BITUMINOUS AGGREGATE BASE, PG64- 22
8. ITEM 304 - 6" AGGREGATE BASE
9. ITEM 408 - BITUMINOUS PRIME COAT
10. ITEM 611 - REINFORCED CONCRETE APPROACH SLAB (T=15")
11. ITEM 203 - SUBGRADE COMPACTION
12. ITEM 606 - GUARDRAIL, TYPE 5
13. ITEM 870 - SEEDING AND MULCHING

(A) ASHPHALT CONCRETE (5±")
(B) CRUSHED AGGREGATE BASE, (9±")
(C) REINFORCED CONCRETE APPROACH SLAB, (T = 9" WITH 12" EDGE THICKNESS)

TYPICAL SECTION

SEN-590-0.00

7
36

UTILITIES

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

Ameritech
130 N. Erie Street
Room 206
Toledo, OH 43624
(419) 245-7301

Swickard Gas Co.
P.O. Box 387
Bettsville, OH 44815
(419) 986-5171

Time Warner Cable
3157 Fern Road
Willard, OH 44890
(419) 465-4661

AEP
2738 N. Main St.
Findlay, Ohio 45839
(419)-425-7545

Verizon
26935 Northwest Highway
Suite 100
Southfield, MI 48034
(248) 915-3560

Bettsville, Village of
P.O. Box 485
Bettsville, OH 44815
(419) 986-5636

STREAM CHANNEL EXCAVATION

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

NO IN-WATER WORK SHALL BE PERFORMED BETWEEN APRIL 15 AND JUNE 15 TO PRECLUDE ADVERSE IMPACTS ON THE SPAWNING, NURSERY, AND FEEDING ACTIVITIES OF INDIGENOUS FISH SPECIES.

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.

PROFILE AND ALIGNMENT

THE PROPOSED PAVEMENT RESURFACING SHALL FOLLOW THE EXISTING PAVEMENT PROFILE AND CROSS SLOPES. THE PROPOSED ASPHALT CONCRETE PAVEING OPERATIONS SHALL RESULT IN A UNIFORM INCREASED THICKNESS OF 1¾ INCHES.

CHANNEL EMBANKMENTS

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

AREAS WHERE CHANNEL EMBANKMENTS ARE TO BE PLACED SHALL BE CLEARED OF WEEDS AND BRUSH. THE REQUIREMENTS FOR MOISTURE, DENSITY CONTROL, BENCHING AND SUITABLE MATERIALS SHALL BE WAIVED. IN LIEU OF THE REQUIREMENTS OF ITEM 203, THE DEPTH OF LAYERS IN WHICH THE EMBANKMENTS ARE TO BE PLACED, AND THEIR COMPACTION, SHALL CONFORM WITH ACCEPTABLE CONSTRUCTION PRACTICES AS DETERMINED BY THE ENGINEER.

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

ITEM 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. PER SQ. YARD

407, TACK COAT FOR INTERMEDIATE COURSE, 0.04 GAL. PER SQ. YARD

PLACEMENT OF ASPHALT CONCRETE

TWO-WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES EXCEPT THAT ONE-WAY TRAFFIC WILL BE PERMITTED FOR MINIMUM PERIODS OF TIME CONSISTENT WITH THE REQUIREMENTS OF THE SPECIFICATIONS FOR PROTECTION OF COMPLETED ASPHALT CONCRETE COURSES.

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.

614 BARRIER REFLECTORS

THESE REFLECTORS AND THEIR MOUNTING SHALL CONFORM TO SPECIFICATION 626 EXCEPT THAT SPACING SHALL BE AS SHOWN IN THE SUBSUMMARY TABLE.

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.

ITEM 606 - ANCHOR ASSEMBLY, TYPE E-98

THIS ITEM SHALL CONSIST OF FURNISHING AND INSTALLING EITHER OF THE FOLLOWING GUARDRAIL END TERMINALS.

1) THE ET-2000 (1997) MANUFACTURED BY SYRO, INC., 1170 N. STATE STREET, GIRARD, OHIO 44420 (TELEPHONE: 330-545-4373).

THE LENGTH OF THE ET-2000 (1997) SYSTEM IS CONSIDERED TO BE 50'-0", INCLUSIVE OF TWO 25'-0" LONG RAIL ELEMENTS. INSTALLATION SHALL BE AT THE LOCATIONS SPECIFIED IN THE PLANS, IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AS DETAILED ON THE FOLLOWING PRE-APPROVED SHOP DRAWINGS:

DWG. NO.	DRAWING NAME	DWG./ REV. DATE	ODOT APPROVAL DATE
SS265	ET-2000 (1997) PLAN, ELEVATION AND SECTIONS	6/20/97	3/6/98
SS142	ET2000 PLUS 50'-0" PLAN, ELEVATION AND SECTION 25'-0" RAIL, SLEEVE W/PL POSTS 1-4	4/12/00	7/31/00
SS141	ET2000 PLUS PLAN, ELEVATION AND SECTION 25'-0" RAIL, HBA POSTS 1-4	2/29/00	7/31/00
SS158	ET2000 PLUS 50'-0" WITH 12'-6" PANELS AND HBA POSTS 1-4 PLAN, ELEVATION AND SECTION	5/22/00	7/31/00

2) THE SKT-350 MANUFACTURED BY ROAD SYSTEMS, INC., 7631 NEW CASTLE DRIVE, FRANKFORT, IL 60423 (TELEPHONE: 815-464-5917).

THE LENGTH OF THE SKT-350 SYSTEM IS CONSIDERED TO BE 50'-0", INCLUSIVE OF FOUR 12'-6" LONG RAIL ELEMENTS. INSTALLATION SHALL BE AT THE LOCATIONS SPECIFIED IN THE PLANS, IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AS DETAILED ON THE FOLLOWING PRE-APPROVED SHOP DRAWINGS:

DWG. NO.	DRAWING NAME	DWG./ REV. DATE	ODOT APPROVAL DATE
SKT-4M	SEQUENTIAL KINKING TERMINAL (SKT-350) ASSEMBLY WITH 4 FOUNDATION TUBES	12/11/97	3/6/98

THE FACE OF THE TYPE E-98 IMPACT HEAD SHALL BE COVERED WITH A SHEET OF TYPE G REFLECTIVE SHEETING, PER CMS 730.19, APPROXIMATELY 18" X 18".

PAYMENT FOR THE ABOVE WORK SHALL BE MADE AT THE UNIT PRICE BID FOR ITEM 606, ANCHOR ASSEMBLY, TYPE E-98, EACH, AND SHALL INCLUDE ALL LABOR, TOOLS, EQUIPMENT AND MATERIALS NECESSARY TO CONSTRUCT A COMPLETE AND FUNCTIONAL ANCHOR ASSEMBLY SYSTEM, INCLUDING ALL RELATED TRANSITIONS, REFLECTIVE SHEETING, HARDWARE, GRADING, EMBANKMENT AND EXCAVATION NOT SEPARATELY SPECIFIED, AS REQUIRED BY THE MANUFACTURER.

ROUNDING

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

ITEM 203 - PROOF ROLLING

THE FOLLOWING ESTIMATED QUANTITY FOR THIS ITEM HAS BEEN PROVIDED IN THE GENERAL SUMMARY FOR USE AS DIRECTED BY THE ENGINEER.

ITEM 203 2 HOUR PROOF ROLLING

ITEM 203 - LINEAR GRADING

GRADED SHOULDERS AT LOCATIONS WERE EXISTING GUARDRAIL IS REMOVED, OR WHERE NEW GUARDRAIL IS TO BE ERECTED, SHALL BE RESHAPED AS DIRECTED BY THE ENGINEER TO INSURE A SMOOTH DRAINABLE SURFACE FREE OF ALL IRREGULARITIES. EXCESS EXCAVATION RESULTING FROM RESHAPING SHOULDERS SHALL BE DISPOSED OF AS DIRECTED BY THE ENGINEER. PAYMENT FOR RESHAPING GRADED SHOULDERS AS DESCRIBED SHALL BE INCLUDED IN THE CONTRACT PRICE PER STATION FOR ITEM 203, LINEAR GRADING.

202 RAISED PAVEMENT MARKERS, REMOVED FOR STORAGE

THE FOLLOWING ESTIMATED QUANTITY HAS BEEN INCLUDED IN THE PLANS TO REMOVE RAISED PAVEMENT MARKERS FOR STORAGE. THE SENECA COUNTY MANAGER SHALL BE CONTACTED FOR INSTRUCTIONS ON WHERE TO DELIVER THE RAISED PAVEMENT MARKERS.

ITEM 202	RAISED PAVEMENT MARKERS REMOVED FOR STORAGE	10 EACH

CALCULATED FCJ
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GENERAL NOTES

SEN-590-0.00

614 BARRIER REFLECTORS

THESE REFLECTORS AND THEIR MOUNTING SHALL CONFORM TO SPECIFICATION 626 EXCEPT THAT SPACING SHALL BE AS SHOWN IN THE SUBSUMMARY TABLE.

SEEDING AND MULCHING

THE FOLLOWING QUANTITIES ARE PROVIDED TO PROMOTE GROWTH AND CARE OF PERMANENT SEEDED AREAS:

870, SEEDING AND MULCHING	1266 SQ. YD.
870, SOIL ANALYSIS TEST	2 EACH
870, TOPSOIL	141 CU. YD.
870, COMMERCIAL FERTILIZER	0.20 TON
870, AGRICULTURAL LIME	0.5 TON
870, WATER	5 M. GAL.

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.

EROSION CONTROL

ITEMS 601,660, 667, 668, 670, 671, 672 AND 673 ARE PROVIDED IN THE PLANS FOR EROSION CONTROL. ROCK OF A STABLE NATURE SHALL NOT BE REMOVED IN ORDER TO PLACE ANY OF THESE ITEMS AND TURF OF A STABLE NATURE SHALL NOT BE REMOVED IN ORDER TO PLACE 660, 667, 668, 671, 672 OR 673. THE ENGINEER SHALL CHECK AND NON-PERFORM QUANTITIES OR ADJUST LOCATIONS AND QUANTITIES OF THESE ITEMS WHERE INDICATED BY FIELD CONDITIONS DURING CONSTRUCTION. IN ADDITION, THESE ITEMS SHALL MEET THE REQUIREMENT OF 108.04.

TEMPORARY SOIL EROSION AND SEDIMENT CONTROL

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

877, TEMPORARY SEEDING AND MULCHING 253 SQ. YD.

877, TEMPORARY PERIMETER FILTER FABRIC FENCE 600 LIN. FT.

870, COMMERCIAL FERTILIZER 0.20 TON

870, REPAIR SEEDING AND MULCHING 63 SQ. YD.

870, WATER 4 M. GAL.

ROUNDING

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

WORK LIMITS

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

ITEM 858, ASPHALT CONCRETE, DISTRICT 2, AS PER PLAN:

858.01 DESCRIPTION
858.02 MIX DESIGN FOR ASPHALT CONCRETE MIX TYPE A
858.03 MIX DESIGN FOR ASPHALT CONCRETE MIX TYPE B
858.04 BINDER
858.05 QUALITY CONTROL
858.06 ACCEPTANCE
858.07 BASIS OF PAYMENT

858.01 DESCRIPTION

FOLLOWING ARE THE GYRATORY MIX DESIGN, MATERIAL AND QUALITY CONTROL REQUIREMENTS FOR CONSTRUCTING AN ASPHALT CONCRETE PAVEMENT SURFACE OR INTERMEDIATE COURSE. THE REQUIREMENTS OF 441 SHALL APPLY EXCEPT AS NOTED. THE ASPHALT CONCRETE PAVEMENT COURSE SHALL CONSIST OF AGGREGATE AND PERFORMANCE GRADED BINDER OR MODIFIED BINDER MIXED IN A CENTRAL PLANT AND SPREAD AND COMPACTED ON A PREPARED SURFACE IN ACCORDANCE WITH THE SPECIFICATIONS AND IN REASONABLY CLOSE CONFORMITY WITH THE LINES, GRADES AND TYPICAL SECTIONS SHOWN ON PLAN OR ESTABLISHED BY THE ENGINEER.

858.02 MIX DESIGN FOR ASPHALT CONCRETE MIX TYPE A.

THE MIXTURE COMPOSITION FOR ASPHALT CONCRETE TYPE A SHALL BE PER 441.02 AND THE MOST RECENT ASPHALT INSTITUTE SUPERPAVE MIX DESIGN MANUAL SP-2 FOR DESIGN PROCEDURES AND MATERIAL PROPERTIES EXCEPT AS MODIFIED BELOW. JMF SUBMITTALS SHALL INCLUDE THE STANDARD DEPARTMENT COVER AND SUMMARY PAGE, ALL PRINTOUTS FROM THE COMPACTOR (ALL GYRATORY POINTS NOT NECESSARY), AND ANALYSIS COVERING THE REQUIRED MIX PROPERTIES. ONE COMPACTED GYRATORY SAMPLE AND LOOSE MIX FOR COMPACTION OF ANOTHER SAMPLE, IN ADDITION TO A 4.4-POUND (2000-GRAM) LOOSE SAMPLE, SHALL BE SUBMITTED FOR EACH JMF.

AGGREGATE AND ASPHALT CEMENT TO BE USED MUST BE SUBMITTED TO THE DISTRICT LABORATORY WITH 2 WEEKS LEAD TIME TO VERIFY JMF BY DISTRICT LABORATORY PERSONNEL.

DESIGN GYRATIONS SHALL BE PER THE LANE CURRENT AVERAGE DAILY TRUCK TRAFFIC (ADTT) AS FOLLOWS UNLESS OTHERWISE SPECIFIED IN THE PLANS. LANE ADTT CAN BE CALCULATED FROM THE PLAN AS FOLLOWS:

LANE ADTT = CURRENT ADT X %B&C TRUCKS X 0.5 X 0.9

IF MULTIPLE N_{des} EXIST DUE TO A MULTIPLE SECTION PROJECT ETC. THE LOWER DESIGN GYRATIONS SHALL APPLY UNLESS OTHERWISE SPECIFIED IN THE PLANS.

Gyration Level and Material Requirements							
Lane ADTT	N_{ini}	N_{des}	N_{max}	Coarse Agg. Fract. Faces	Fine Agg. Angularity	Flat and Elon. Particles	Sand Equiv.
<4000	7	75	115	95/90	44	10	45
>4000	8	100	160	100/100	44	10	50

ALL VIRGIN AGGREGATE USED SHALL BE APPROVED BY THE DEPARTMENT. IF FINE AGGREGATE IS FROM CRUSHED CARBONATE STONE OR AIR COOLED BLAST FURNACE SLAG, THE FINE AGGREGATE ANGULARITY (FAA) TEST IS NOT REQUIRED. FOR ANY OTHER MATERIAL FAA SHALL BE 44. A BLEND OF A MATERIAL NOT MEETING FAA WITH A MATERIAL THAT MEETS FAA IS ALLOWED, BUT THE FAA RESULT SHALL BE CALCULATED MATHEMATICALLY BASED ON THE INDIVIDUAL DEPARTMENT FAA RESULTS AND ACTUAL BLEND PERCENTAGES. BLENDS MUST BE APPROVED BY THE DEPARTMENT. ALL OTHER DEPARTMENT AGGREGATE REQUIREMENTS WILL APPLY EXCEPT GRADATION FOR FINE AGGREGATE. AGGREGATE TO BE USED MUST BE SUBMITTED TO THE LABORATORY WITH SUFFICIENT LEAD TIME TO PERFORM TESTING FOR JMF APPROVAL.

GRADATION LIMITS AS FOLLOWS. THE RESTRICTED ZONE DOES NOT APPLY.

Sieve	9.5mm mix	12.5mm mix	19mm mix
No. 200 (0.075mm)	2-8	2-8	2-6
No. 8 (2.36mm)	32-52	32-45%	28-45%
No. 4 (4.75mm)	70 max		
3/8 inch (9.5mm)	90-100		
1/2 inch (12.5mm)	100	95-100%	90 max
3/4 inch (19mm)		100	85-100%
1 1/2 inch (37.5mm)			100%

THE F/A RATIO SHALL BE 1.2 MAX. A TWO HOUR CURE IN DESIGN SHALL BE USED.

IF MORE THAN 15 PERCENT FINE AGGREGATE NOT MEETING FAA IS USED, A LOADED WHEEL TEST (LWT) PER SUPPLEMENT 1057 IS REQUIRED. FOR ESTIMATING LWT SAMPLE MIX VOLUME, THE BULK DENSITY FROM GYRATORY SPECIMENS AT N_{des} IS REQUIRED. RESULTS LESS THAN 0.20 IN (5.0MM) AT 115° F (46° C) ARE CONSIDERED PASSING.

ROLLERS KEEPING FAR BACK ON A MIX AT NORMAL COMPACTION TEMPERATURE IS AN INDICATION OF A TENDER, RUT PRONE MIX AND MAY BE JUSTIFICATION FOR REQUIRING A REDESIGN. THE MARSHALL FLOW TEST MAY BE USED IN DESIGN AS AN INDICATOR OF POTENTIAL FOR EXCESS TENDERNESS.

RECYCLED ASPHALT CONCRETE OR BITUMINOUS AGGREGATE BASE (RAP) CAN BE USED IN ACCORDANCE WITH THE REQUIREMENTS OF SUPPLEMENTAL SPECIFICATION 908 IN SURFACE COURSES OR UP TO 20 PERCENT IN INTERMEDIATE COURSES PER 441.03. RAP STOCKPILES SHALL BE VISUALLY INSPECTED AND APPROVED BY THE DISTRICT PRIOR TO PRODUCTION. FINAL RAP GRADATION AND ASPHALT CONTENT IS TO BE BASED ON FOUR SEPARATE STOCKPILE (OR ROADWAY FOR CONCURRENT GRINDING) SAMPLES ALL AGREEING WITHIN 0.4 PERCENT FOR ASPHALT CONTENT AND 5 PERCENT PASSING THE NO. 4 (4.75MM) SIEVE. ALL FOUR TEST RESULTS AND AN AVERAGE SHALL BE REPORTED IN THE JMF.

DESIGN VOLUMETRIC PROPERTIES SHALL BE TESTED AT N_{des} . N_{max} SHALL BE TESTED FOR THE REQUIRED CRITERIA.

SP-2 TABLE 5.2 VMA SHALL BE (PERCENT MINIMUM): 9.5MM-15.0
12.5MM - 14.0
19.0MM - 13

AASHTO T 283 WITH FREEZE CYCLES AND A TSR OF 80 ARE REQUIRED PER SP-2. TESTING OF MIX AND STORAGE OF ANTISTRIP SHALL BE PER SUPPLEMENTS 1051 AND 1053. 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. REQUIREMENTS FOR TREATMENT IF NEEDED ARE AS FOLLOWS:

LIQUID ANTISTRIP MATERIAL - THE MIX SHALL INCLUDE LIQUID ANTISTRIP MATERIAL AT A RATE OF 0.50 TO 1.25 PERCENT BY WEIGHT OF THE BINDER.

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GENERAL NOTES

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HYDRATED LIME - THE MIX SHALL INCLUDE HYDRATED LIME IN DRY FORM AT A RATE OF 1.0 PERCENT BY DRY AGGREGATE WEIGHT FOR ASPHALT CONCRETE. THE HYDRATED LIME SHALL MEET THE REQUIREMENTS OF AASHTO M303, TYPE 1. THE FOLLOWING INFORMATION SHALL BE PROVIDED TO THE DET FOR EACH SHIPMENT OF HYDRATED LIME: (1) LETTER OF CERTIFICATION, (2) PRODUCTION DATE, (3) SHIPMENT DATE, (4) SHIPMENT DESTINATION, (5) BATCH OR LOT NUMBER, AND (6) NET WEIGHT.

THE JMF SHALL INCLUDE:

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).

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 VERIFYING AASHTO M 303 IS MET.

AT THE END OF THE PROJECT OR 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 (KILOGRAMS) OF ANTISTRIP ADDITIVE USED. THE ENGINEER SHALL VERIFY THE QUANTITY OF ANTISTRIP ADDITIVE 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.

858.03 MIX DESIGN FOR ASPHALT CONCRETE MIX TYPE B.

THE MIX DESIGN AS IN 858.02 ABOVE SHALL APPLY FOR ASPHALT CONCRETE TYPE B EXCEPT AS FOLLOWS:

Gyration Level and Material Requirements							
Lane ADTT	N_{ini}	N_{des}	N_{max}	Coarse Agg. Fract. Faces	Fine Agg. Angularity	Flat and Elon. Particles	Sand Equiv.
<4000	7	75	115	65	44	10	45
>4000	8	100	160	75/70	44	10	50

IF FINE AGGREGATE IS FROM CRUSHED CARBONATE STONE OR AIR COOLED BLAST FURNACE SLAG, THE FAA TEST IS NOT REQUIRED. AT LEAST 50 PERCENT BY WEIGHT OF VIRGIN FINE AGGREGATE SHALL BE AGGREGATE MEETING FAA OR BE CRUSHED CARBONATE STONE OR AIR COOLED BLAST FURNACE SLAG. AGGREGATE TO BE USED MUST BE SUBMITTED TO THE LABORATORY FOR APPROVAL THREE WEEKS PRIOR TO A JMF SUBMITTAL FOR APPROVAL.

GRADATION LIMITS AS FOLLOWS. THE RESTRICTED ZONE DOES NOT APPLY.

Sieve	9.5mm mix	12.5mm mix	19mm mix
No. 200 (0.075mm)	2-8	2-8	2-6
No. 8 (2.36mm)	32-52	34-40%	28-45%
No. 4 (4.75mm)	70 max		
3/8 inch (9.5mm)	90-100		
1/2 inch (12.5mm)	100	95-100%	90 max
3/4 inch (19mm)		100	85-100%
1 1/2 inch (37.5mm)			100%

A F/T VALUE OF +2 SHALL APPLY PER 441.02 AND 441.10.

858.04 BINDER.

BINDER SHALL MEET THE REQUIREMENTS OF SUPPLEMENTAL SPECIFICATIONS 908 AS FOLLOWS:

12.5MM SURFACE COURSE	PG70-22M
19MM INTERMEDIATE COURSE	PG70-22M

THE MINIMUM TOTAL BINDER CONTENT FOR A SURFACE COURSE SHALL BE:

5.6 PERCENT FOR N_{des} = 75
5.4 PERCENT FOR N_{des} = 100

858.05 QUALITY CONTROL.

441.10 SHALL BE FOLLOWED WITH THE FOLLOWING EXCEPTIONS. A CONTRACTOR'S REPRESENTATIVE HOLDING A LEVEL 2 QUALIFICATION IS REQUIRED TO BE AT THE ASPHALT PLANT UNTIL A FULL PRODUCTION DAY IS ACHIEVED WITH RESULTS SATISFACTORY TO THE DET. PLANT OPERATION AND QUALITY CONTROL TESTING SHALL CONFORM TO THE CONTRACTOR'S PLANT OPERATION QUALITY CONTROL PROGRAM.

A GYRATORY COMPACTOR MEETING THE REQUIREMENTS OF SUPERPAVE AND VERIFIED BY FHWA (OR A REPRESENTATIVE OF THEIR OFFICE) IS REQUIRED. IF THE GYRATORY COMPACTOR WAS MOVED TO THE PLANT PRIOR TO PRODUCTION, IT MUST BE CALIBRATED AND HAVE RESULTS PRESENTED TO THE DET. SAMPLES FOR AIR VOIDS SHALL BE CONDITIONED TWO HOURS. BULK GRAVITY FOR AIR VOIDS DETERMINATION SHALL BE DETERMINED ON SPECIMENS COMPACTED TO N_{des}. ONCE EACH DAY FOR THE FIRST THREE PRODUCTION DAYS AND ONCE EACH THIRD PRODUCTION DAY THEREAFTER, ONE SET OF SPECIMENS SHALL BE COMPACTED TO N_{max} DENSITY AT N_{max} BASED ON PERCENT GMM SHALL BE LESS THAN 98.0. PRODUCTION WILL CEASE IF N_{max} IS GREATER THAN OR EQUAL TO 98.0 UNLESS ACCEPTABLE CORRECTIONS AND RETEST ARE MADE.

IF THE DESIGN GRADATION REQUIRES AN LWT TEST, A SAMPLE SUFFICIENT TO COMPACT ONE LWT TEST BEAM MUST BE TAKEN ONCE EACH DAY FOR THE FIRST THREE DAYS AND TESTED ACCORDING TO SUPPLEMENT 1057. THE LWT CAN BE IN THE CONTRACTOR'S LEVEL 2 LAB, BUT THE SAMPLE BEAM MUST BE COMPACTED THE SAME DAY THE SAMPLE WAS TAKEN, CURED OVERNIGHT AND TESTED THE FOLLOWING DAY. THE TEST RESULT AND BEAM DENSITY MUST BE GIVEN TO THE DET THE DAY OF THE LWT TEST. THE LWT DATA SHALL BE REPORTED ON THE TE 199.

ONCE IN EVERY FIVE HOT MIX PRODUCTION DAYS, A DEPARTMENT MONITOR WILL INSTRUCT THE CONTRACTOR TO TAKE A 1 QUART (1 LITER) BINDER SAMPLE FROM BETWEEN THE LAST PIPING 'TEE' IN THE LINE AND INLET INTO THE ASPHALT PLANT FOR EACH BINDER TYPE USED. TWO SAMPLES WILL BE TAKEN, ONE FOR THE DEPARTMENT AND THE OTHER FOR THE CONTRACTOR. THE CONTRACTOR WILL LABEL THE SAMPLES WITH BINDER TYPE, SUPPLIER, PROJECT NUMBER AND DATE AND RETAIN THEM IN THE PLANT LABORATORY

FOR FUTURE REFERENCE BY THE DEPARTMENT. THIS SAMPLE WILL BE HELD UNTIL OTHERWISE NOTIFIED BY THE MONITORING TEAM.

858.06 ACCEPTANCE.

ACCEPTANCE OF THE ASPHALT CONCRETE MIX WILL BE BASED ON THE ITEM SPECIFIED IN THE CONTRACT (SUCH AS 446, 448, ETC.)

858.07 BASIS OF PAYMENT.

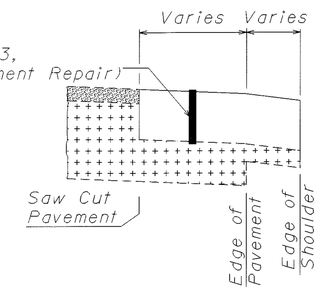
ITEM	UNIT	DESCRIPTION
858	CUBIC YARD	ASPHALT CONCRETE SURFACE COURSE, 12.5MM, TYPE A (446), AS PER PLAN
858	CUBIC YARD	ASPHALT CONCRETE INTERMEDIATE COURSE, 19.0MM, TYPE A (448), AS PER PLAN

ITEM 253, PAVEMENT REPAIR:

THE FOLLOWING ESTIMATED QUANTITIES ARE TO BE USED FOR 9" PAVEMENT REPAIR ON PARTS 1 & 2 AS DIRECTED BY THE ENGINEER AND ARE BASED ON THE PERCENTAGES SHOWN BASED ON THE TOTAL AREA OF EACH PART. PAVEMENT AND SHOULDER REPAIRS SHALL BE ACCOMPLISHED BY USING 9" OF ITEM 302, BITUMINOUS AGGREGATE BASE, PG64-22.

ITEM 253, PAVEMENT REPAIR (2%+) 150 SQ. YARDS

QUANTITIES CARRIED TO THE GENERAL SUMMARY



Note: All locations are approx. The engineer shall field verify all locations prior to the beginning of work. Any adjustments necessary shall be as directed by the engineer.

CALCULATED FCJ CHECKED DAR

GENERAL NOTES

SEN-590-0.00

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ITEM 614 - MAINTAINING TRAFFIC

THE CONTRACTOR SHALL MAINTAING AT ALL TIMES IN ACCORDANCE WITH THE REQUIREMENTS OF ITEM 614 "MAINTANIN TRAFFIC" AND THE FOLLOWING:

THE CONTRACTOR SHALL PROVIDE, ERECT, AND MAINTAIN STANDARD 48" X 30" "ROAD CLOSED" SIGNS, SIGN SUPPORTS, BARRICADES, GATES, AND LIGHTS, AS DETAILED IN STANDARD CONSTRUCTION DRAWING MT-101.60M AT THE FOLLOWING LOCATIONS DURING PERIODS IN WHICH THE AFFECTED ROADS ARE CLOSED TO TRAFFIC:

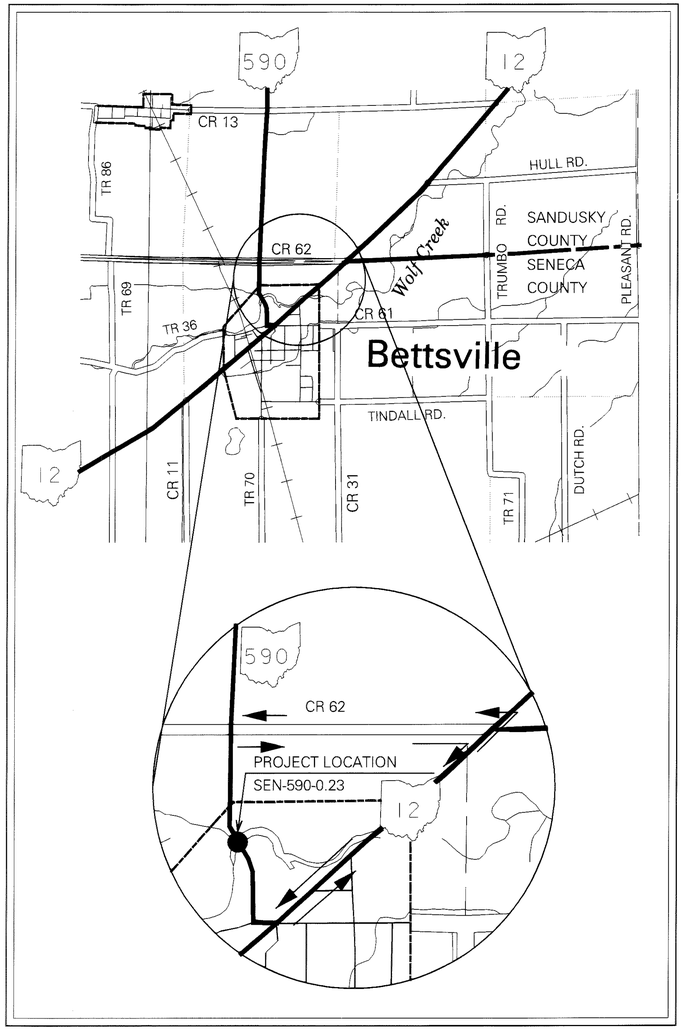
THE CONTRACTOR SHALL PROVIDE, ERECT, AND MAINTAIN SIGNS AND SIGN SUPPORTS, AS DETAILED IN THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, AND TYPE III BARRICADES OF THE TYPE AND LOCATION AS FOLLOWS:

TYPE III BARRACADE WITH R-76B AT THE INTERSECTION

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.

NOTICE OF CLOSURE SIGNS, AS DETAILED IN THESE PLANS, SHALL BE ERECTED BY THE CONTRACTOR AT LEAST ONE WEEK IN ADVANCE OF THE SCHEDULED ROAD OR RAMP CLOSURE. THE SIGNS SHALL BE ERECTED ON THE RIGHT HAND SIDE OF THE ROAD/RAMP FACING TRAFFIC. THEY SHALL BE PLACED SO AS NOT TO INTERFERE WITH THE VISIBILITY OF ANY OTHER TRAFFIC CONTROL SIGNS. ON ROADWAYS, THEY SHOULD BE ERECTED AT THE POINT OF CLOSURE. THE SIGNS MAY BE ERECTED ANYWHERE ON RAMPS AS LONG AS THEY ARE VISIBLE TO THE MOTORISTS USING THE RAMP. ON ENTRANCE RAMPS, THE SIGN SHALL BE ERECTED WELL IN ADVANCE OF THE MERGE AREA TO AVOID DISTRACTING MOTORISTS.

DETOUR MAP



Notes:

1.	THE DETOUR SHOWN ON THIS PAGE IS ONLY TO BE USED FOR THE SIXTY (60) CONSECUTIVE DAY CLOSURE NEEDED TO DO THE SEN-590-0023 BRIDGE REPLACEMENT.
2.	BEFORE DETOURING TRAFFIC THE CONTRACTOR SHALL NOTIFY, IN WRITING, THE PROJECT ENGINEER AND THE HIGHWAY MANAGEMENT ADMINISTRATOR AT THE OHIO DEPARTMENT OF TRANSPORTATION, DISTRICT 2, FOURTEEN (14) WORKING DAYS IN ADVANCE PRIOR TO CLOSING US 590 TO NOTIFY THE PUBLIC AND TO ERECT DETOUR SIGNING BY STATE FORCES.

CALCULATED FCJ
CHECKED DAR

MAINTENANCE OF TRAFFIC NOTES

SEN-590-0.00

SHEET NUMBER											ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE SHEET NO.
8	9	10	14	15	22	25	27									
															- ROADWAY -	
							80				202	22900	80	LIN. FT.	APPROACH SLAB REMOVED	
					187.5						202	38000	187.5	LIN. FT.	GUARDRAIL REMOVED	
						10					202	54100	10	SQ. YD.	RAISED PAVEMENT MARKER REMOVED FOR STORAGE	
							90				202	98300	90	SQ. YD.	REMOVAL MISC., CONCRETE SLOPE PROTECTION REMOVAL	
							45				202	98400	45	SQ. FT.	REMOVAL MISC., CONCRETE PAD REMOVAL	
			271								203	12000	271	CU. YD.	EXCAVATION NOT INCLUDING EMBANKMENT CONSTRUCTION	
			208								203	20000	208	CU. YD.	EMBANKMENT	
2											203	45000	2	HOUR	PROOF ROLLING	
				1369							203	50000	1369	SQ. YD.	SUBGRADE COMPACTION	
			1								604	09000	1	EACH	CATCH BASIN ADJUSTED TO GRADE	
					112.5						606	13000	112.5	LIN. FT.	GUARDRAIL TYPE 5	
					225						606	13030	225	LIN. FT.	GUARDRAIL, TYPE 5, Using 9 Foot Posts	
					1						606	20000	1	EACH	FLARED END SECTION	
					3						606	22010	3	EACH	ANCHOR ASSEMBLY, TYPE E-98	
					1						606	26500	1	EACH	ANCHOR ASSEMBLY, TYPE T	
					4						606	35124	4	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 3 (MODIFIED)	
															- EROSION CONTROL -	
	2										870	00100	2	EACH	SOIL ANALYSIS TEST	
	141										870	00300	141	CU. YD.	TOPSOIL	
	1266										870	10000	1266	SQ. YD.	SEEDING AND MULCHING	
	63										870	14000	63	SQ. YD.	REPAIR SEEDING AND MULCHING	
	0.40										870	20000	0.40	TON	COMMERCIAL FERTILIZER	
	0.50										870	30000	0.50	TON	AGRICULTURAL LIME	
	9										870	35000	9	M. GAL.	WATER	
	253										877	10000	253	CU. YD.	TEMPORARY SEEDING AND MULCHING	
	600										877	30100	600	LIN. FT.	TEMPORARY PERIMETER FILTER FABRIC FENCE	
															- PAVEMENT -	
		150									253	01000	150	SQ. YD.	PAVEMENT REPAIR	
				7321							254	01000	7321	SQ. YD.	PAVEMENT PLANING, BITUMINOUS	
				152							302	46000	152	CU. YD.	BITUMINOUS AGGREGATE BASE, PG64-22	
				229							304	20000	229	CU. YD.	AGGREGATE BASE	
				693							407	10000	693	GALLON	TACK COAT	
				370							407	14000	370	GALLON	TACK COAT FOR INTERMEDIATE COURSE	
				547							408	10000	547	GALLON	BITUMINOUS PRIME COAT	
				223							611	25001	223	SQ. YD.	REINFORCED CONCRETE APPROACH SLAB (T=15"), AS PER PLAN	26
				10							617	10100	10	CU. YD.	COMPACTED AGGREGATE, TYPE A	
				386							858	10001	386	CU. YD.	ASPHALT CONCRETE SURFACE COURSE, 12.5 MM, TYPE A (446), AS PER PLAN	9,10
				423							858	20201	423	CU. YD.	ASPHALT CONCRETE INTERMEDIATE COURSE, 19 MM, TYPE A (448), AS PER PLAN	9,10

FOR BRIDGE SUMMARY SEE SHEET NO. 28

CALCULATED FCJ
CHECKED DAR

GENERAL SUMMARY

SEN-590-0.00

SHEET NUMBER											ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE SHEET NO.
8	9	10	13	14	22	25										
															- TRAFFIC CONTROL -	
						10					621	00300	10	EACH	PRISMATIC RETROREFLECTOR	
						10					621	00600	10	EACH	RAISED PAVEMENT MARKER CASTING, INSTALLATION ONLY	
						0.96					828	10000	0.96	MILE	EDGE LINE	
						0.50					828	10200	0.50	MILE	CENTER LINE	
						129					828	10500	129	LIN. FT.	CROSSWALK LINE	
															- MAINTENANCE OF TRAFFIC -	
					8						614	13202	8	EACH	BARRIER REFLECTOR, TYPE A2	
											614	11000	LUMP		MAINTAINING TRAFFIC	
											623	10000	LUMP		CONSTRUCTION LAYOUT STAKES	
											624	10000	LUMP		MOBILIZATION	
											806	16010		MONTH	FIELD OFFICE, TYPE B	

FOR BRIDGE SUMMARY SEE SHEET NO. 28

CALCULATED FCJ
CHECKED DAR

GENERAL SUMMARY

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EARTHWORK

SHEET NO.	STATION FROM	STATION TO	203 EXCAVATION NOT INCLUDING EMBANKMENT	203 EMBANKMENT	870 SEEDING AND MULCHING		
			CU. YD.	CU. YD.	SQ. YD.		
17	9+25	10+50	59	8	77		
18	10+75	13+75	92	128	695		
19	14+00	14+75	79	70	416		
20	15+00	15+25	41	2	78		
TOTALS CARRIED TO GENERAL SUMMARY			271	208	1266*		

* CARRIED TO GENERAL NOTES

DRAINAGE

STATION	SIDE	604 CATCH BASIN ADJUSTED TO GRADE		
		CU. YD.		
14+42.20	RT	1		
TOTALS CARRIED TO GENERAL SUMMARY		1		

ITEM 870, COMMERCIAL FERTILIZER

TOTAL SEEDING AREA = 903 SQ YD

$$1266 \text{ SQ YD} \times \frac{9 \text{ SQ FT}}{1 \text{ SQ YD}} \times \frac{30 \text{ LBS}}{1000 \text{ SQ FT}} \times \frac{1 \text{ TON}}{2000 \text{ LBS}} = 0.20 \text{ TON}$$

CARRIED TO GENERAL NOTES

ITEM 870, WATER

TOTAL SEEDING AREA = 1266 SQ YD

$$1266 \text{ SQ YD} \times \frac{9 \text{ SQ FT}}{1 \text{ SQ YD}} \times \frac{300 \text{ GAL}}{1000 \text{ SQ FT}} \times \frac{1 \text{ M GAL}}{1000 \text{ GAL}} \times 2 = 5 \text{ M. GAL.}$$

CARRIED TO GENERAL NOTES

CALCULATED ALF
CHECKED DAR

MISCELLANEOUS SUBSUMMARIES

SEN-590-0.00

PAVEMENT SUBSUMMARY (RESURFACING)

ROUTE	STATION FROM (A)	STATION TO (B)	LENGTH (A-B=C)	AVERAGE PAVEMENT WIDTH	AVERAGE SHOULDER WIDTH	AVERAGE PAVEMENT AREA (*F)	AVERAGE SHOULDER AREA (*G)	TOTAL AVERAGE AREA (F+G=H)	203 SUBGRADE COMPACTION (H)		254 PAVEMENT PLANING, BITUMINOUS (H)	302 4" BITUMINOUS AGGREGATE BASE, PG64-22 (.111xH)	304 6" AGGREGATE BASE (.167xH)	407 TACK COAT (0.075xH)	407 TACK COAT FOR INTERMEDIATE COURSE (0.04xH)	408 BITUMINOUS PRIME COAT (0.4xH)	611 REINFORCED CONCRETE APPROACH SLAB (T=15") (.417xH)	617 COMPACTED AGGREGATE, TYPE A (Cx0.25/27)	858 ASPHALT CONC INT. COURSE, 19 MM, TYPE A (448), APP (0.04861xH)	858 ASPHALT CONC SURF. COURSE, 12.5 MM, TYPE A (446), PG70-22M, APP. (0.04167xH)		
	STA	STA	FT.	FT.	FT.	SQ. YD.	SQ. YD.	SQ. YD.	SQ. YD.		SQ. YD.	CU. YD.	CU. YD.	GAL.	GAL.	GAL.	SQ. YD.	CU. YD.	CU. YD.	CU. YD.		
SR 590	0+00	10+00	1000	24	4	2730	781	3511			3511			263	140			10	170.67	146.30		
SR 590	10+00	11+55.79	155.79	24	4	416	137	553	553			61.4	92.4	41	22	221			26.88	23.04		
SR 590	11+55.79	11+80.79	25	40		111		111	111			12.3	18.5	8	5	44	46		5.40	4.63		
SR 590	11+80.79	13+05.51	124.72	40		554		554						42	22					23.09		
SR 590	13+05.51	13+30.51	25	40		111		111	111			12.3	18.5	8	5	44	46		5.40	4.63		
SR 590	13+30.51	15+00	169.49	24	4	452	142	594	594			65.9	99.2	45	24	238			28.90	24.75		
SR 590	15+00	25+78	1078	24	4	3068	742	3810			3810			286	152			10	185.21	158.75		
SUBTOTALS									1369		7321	151.9	228.6	693	370	547	93	20	422.46	385.19		
TOTALS CARRIED TO GENERAL SUMMARY									1369		7321	152	229	693	370	547	93	20	423	386		

* VALUES GENERATED BY CADD

CALCULATED FCJ
CHECKED ALF

PAVEMENT CALCULATIONS

SEN-590-0.00

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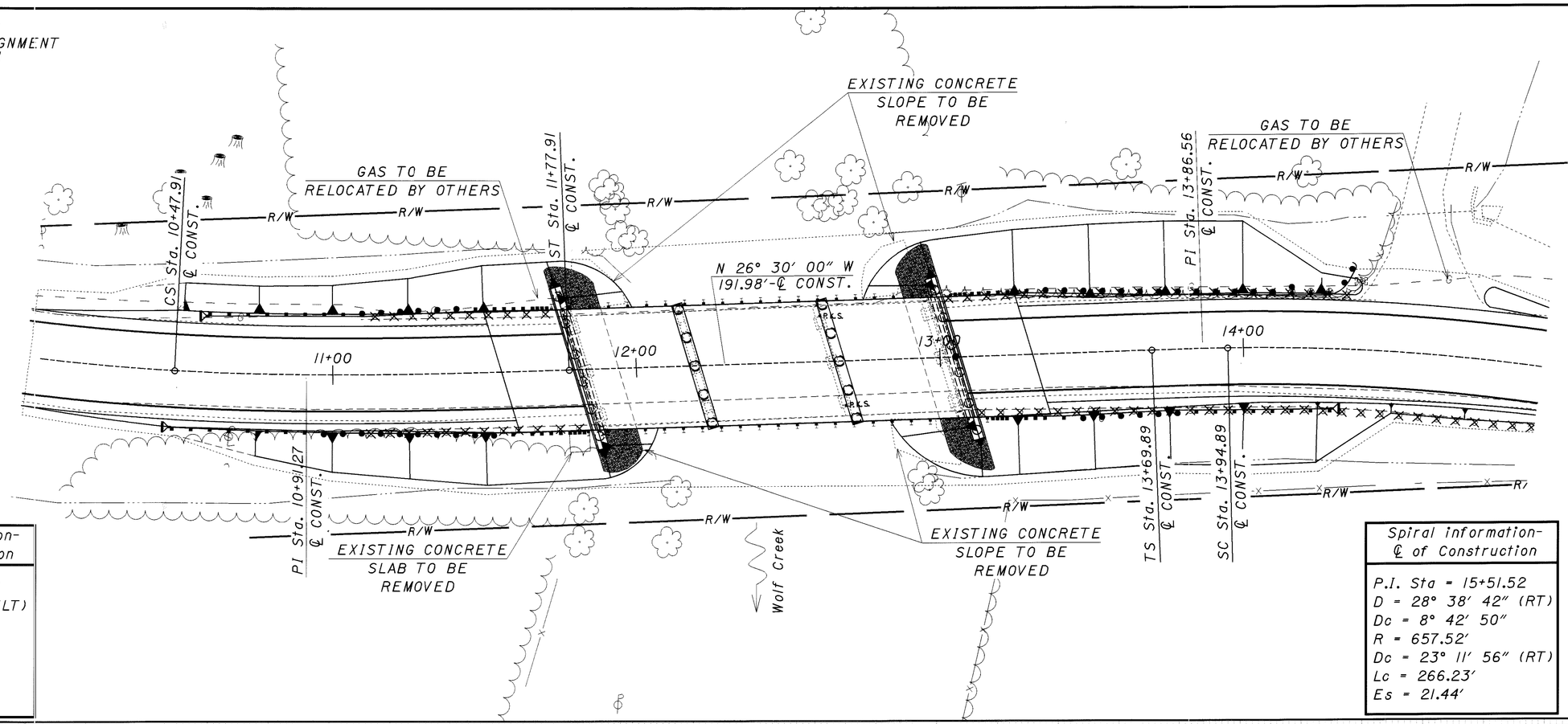
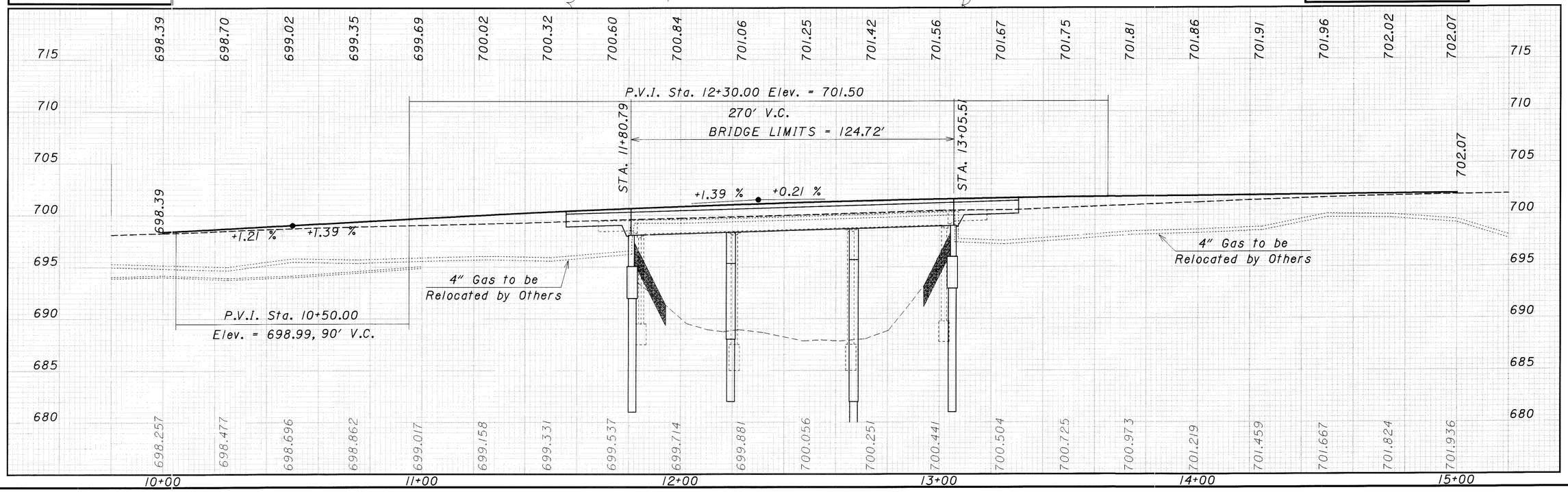
NOTE: SEE SHEETS 2-4 FOR ALIGNMENT INFORMATION



Spiral information- ℄ of Construction
P.I. Sta = 9+49.67
D = 26° 22′ 44″ (LT)
Dc = 7° 59′ 02″
R = 717.64′
Lc = 182.90′
Es = 20.76′

Spiral information- ℄ of Construction
P.I. Sta = 15+51.52
D = 28° 38′ 42″ (RT)
Dc = 8° 42′ 50″
R = 657.52′
Dc = 23° 11′ 56″ (RT)
Lc = 266.23′
Es = 21.44′



HORIZONTAL SCALE IN FEET
0 10 20 40

PLAN AND PROFILE - SR 590
STA. 10+00 TO STA. 15+00

SEN-590-0.00

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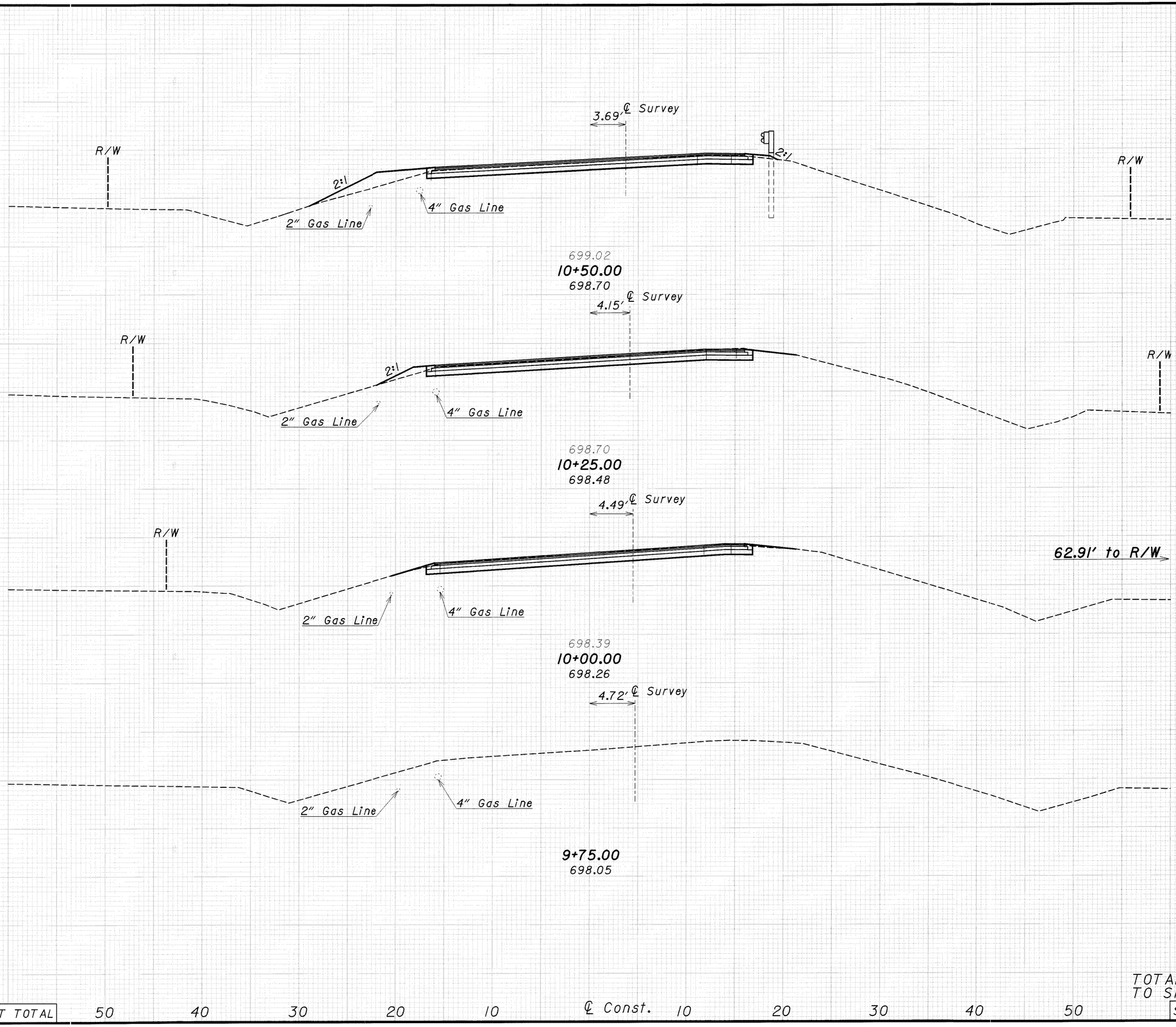
SEEDING	
END WIDTH	SQ. YDS.
28	58
14	19
0	
0	
	77



END AREA		VOLUME	
CUT	FILL	CUT	FILL
28	11		
		28	6
32	2		
		31	2
35	1		
		59	8

TOTAL CARRIED TO SHEET 13

SHEET TOTAL

SHEET TOTAL

CALCULATED FCJ
CHECKED DAR

CROSS SECTIONS
STA. 9+25 TO 10+50

SEN-590-0.00

17
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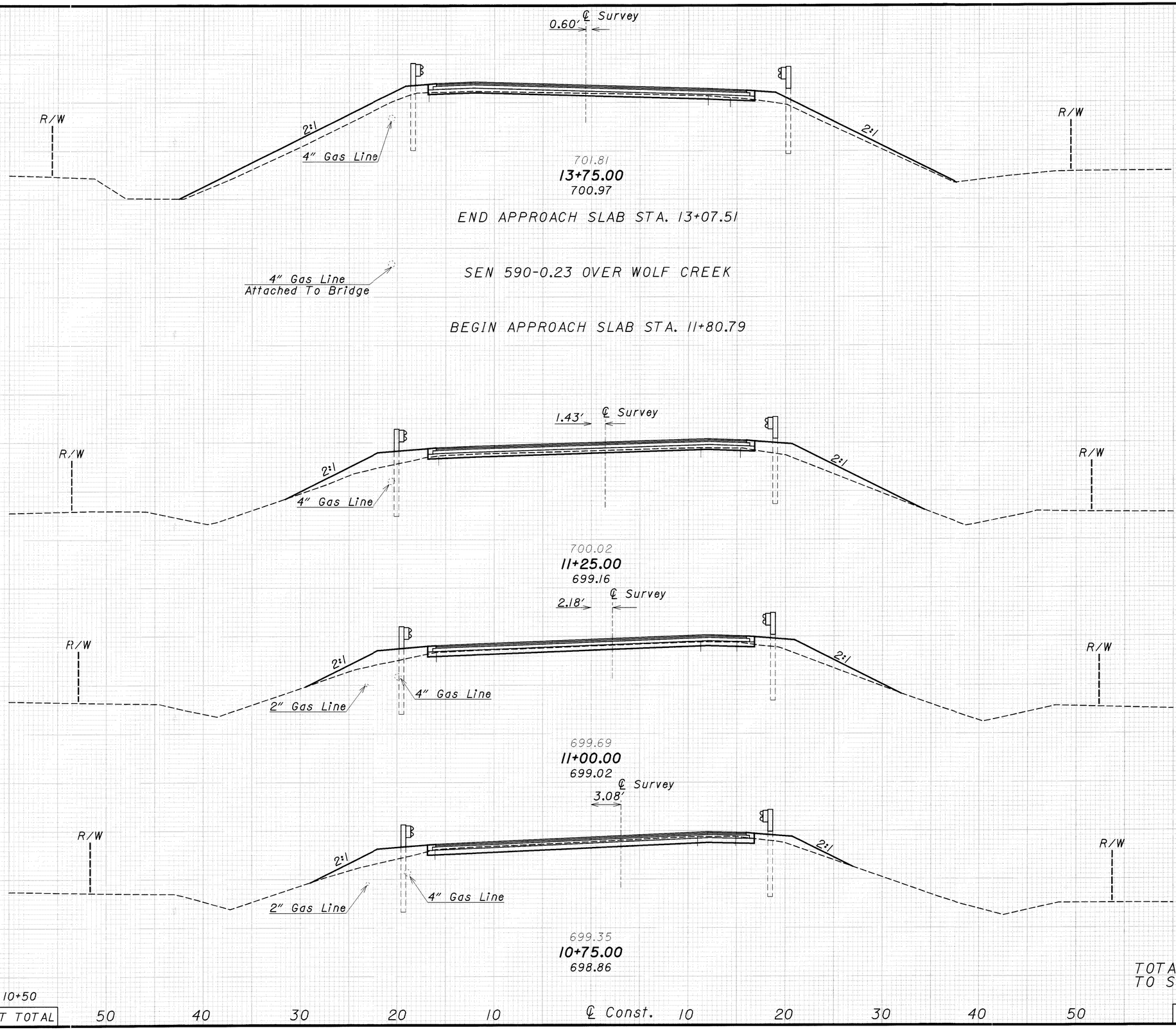
SEEDING END WIDTH	SEEDING SQ. YDS.
59	144
45	126
46	124
43	114
39	101
34	86
28	STA. 10+50
	695 SHEET TOTAL



END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
15	31		
		15	26
18	25		
		15	23
14	24		
		11	24
9	27		
		11	23
15	23		
		17	19
22	17		
		23	13
28	11		
SHEET TOTAL		92	128

CALCULATED FCJ
CHECKED DAR

CROSS SECTIONS
STA. 10+75 TO STA. 13+75

SEN-590-0.00

18
36

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CROSS SECTIONS
STA. 14+00 TO STA. 14+75

CALCULATED FCJ
CHECKED DAR

SEN-590-0.00

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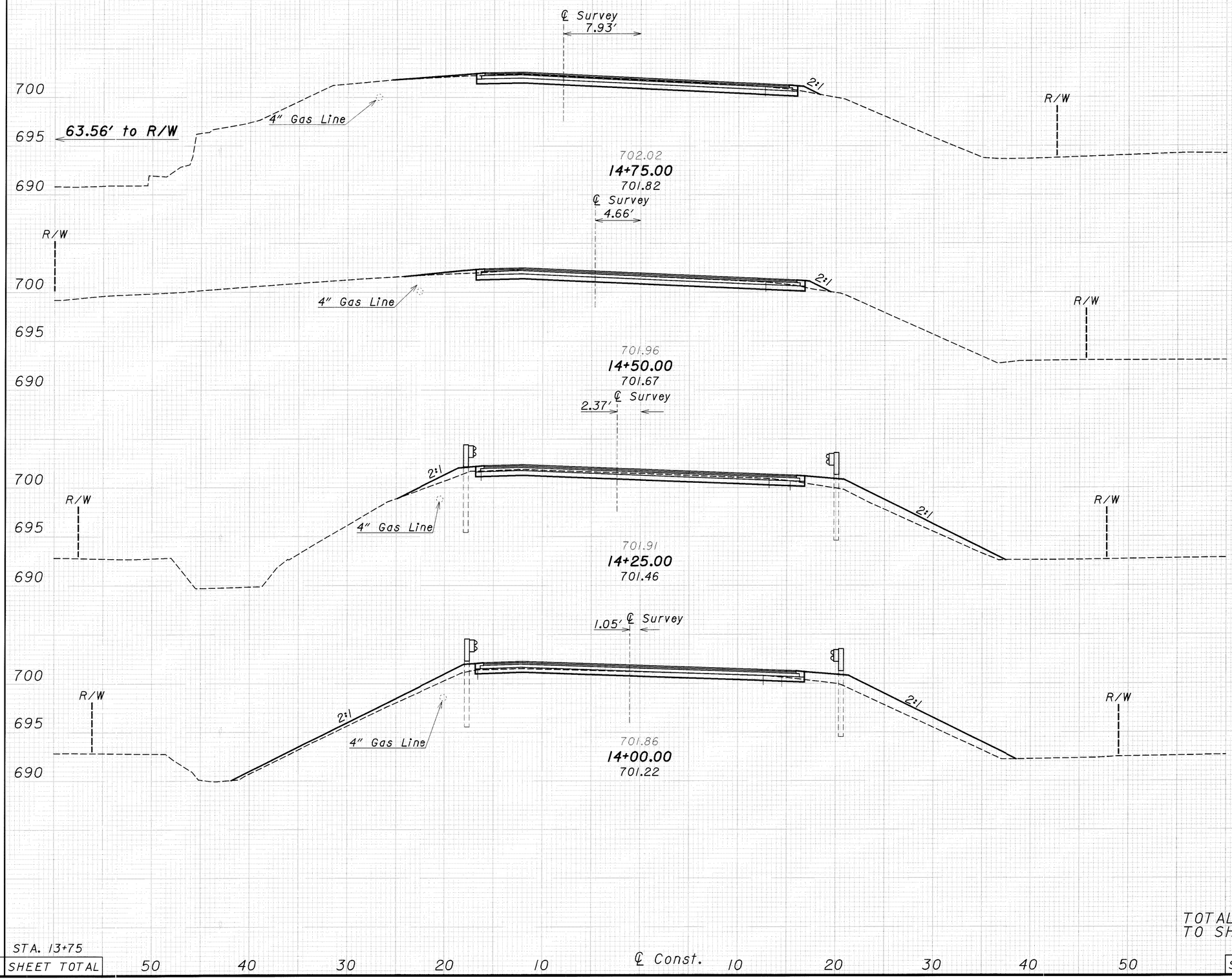
SEEDING END WIDTH	SEEDING SQ. YDS.	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
24	46	29	2	26	2
9	68	26	2	22	12
40	138	21	23	17	26
59	164	15	33	14	30
59	416	15	31	79	70



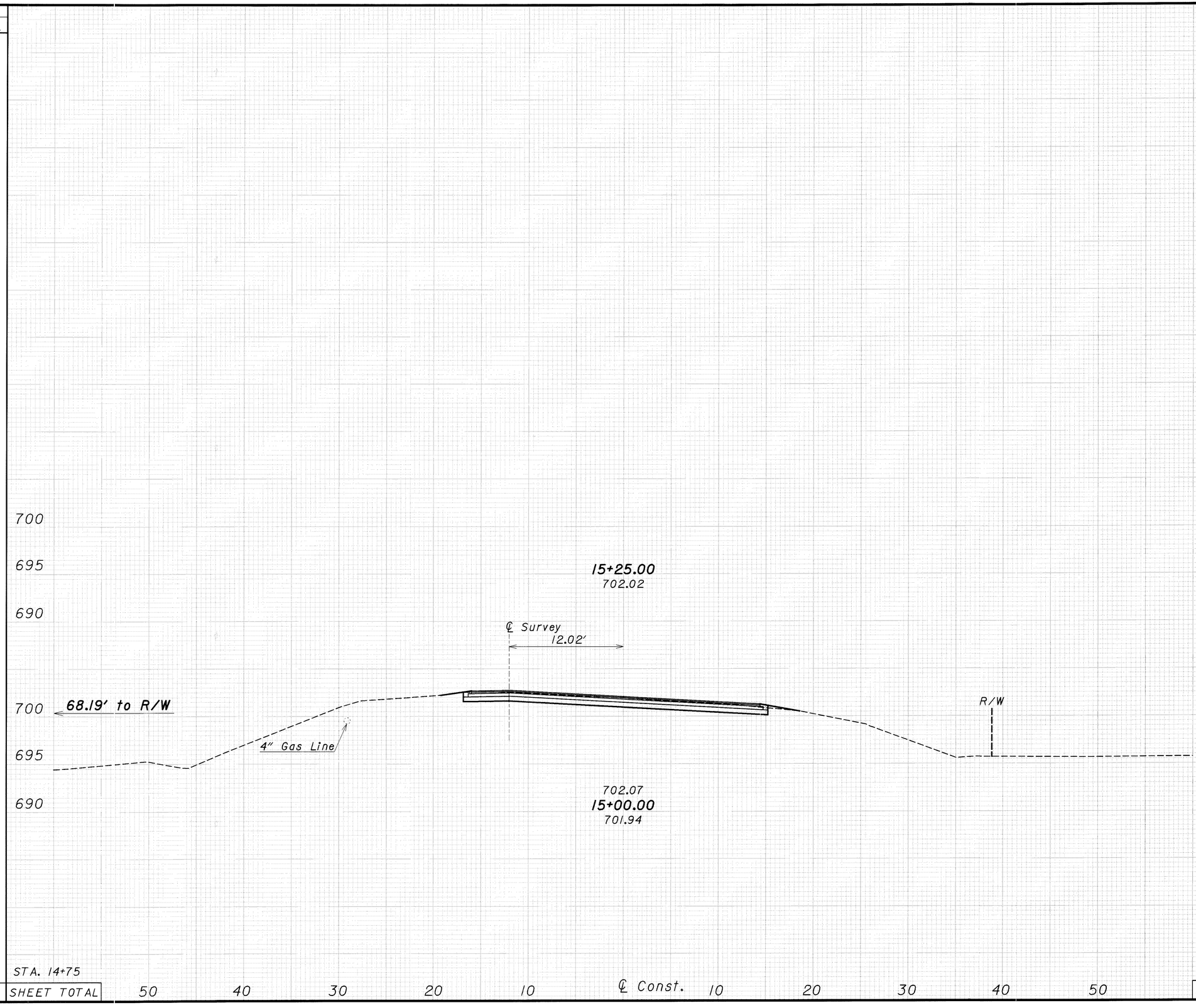
TOTAL CARRIED TO SHEET 13

SHEET TOTAL

SHEET TOTAL

I:/projects/seneca/20693.02/Dgn/gx001590.dgn

SEEDING	
END WIDTH	SQ. YDS.
0	
	22
16	
	56
24	
	78



END AREA		VOLUME	
CUT	FILL	CUT	FILL
0	0		
		14	1
30	1		
		27	1
STA. 14+75			
29	2		
SHEET TOTAL		41	2

CALCULATED FCJ
CHECKED DAR

CROSS SECTIONS
STA. 15+00 TO STA. 15+25

SEN-590-0.00

20
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SUPERELEVATION TABLE

P.I. STATION 9+49.67 | Dc = 7°59'02"

LEFT SIDE					CENTERLINE CONTROL		RIGHT SIDE					REMARKS
EDGE ELEVATION	TRANSITION RATE	ELEVATION CORRECTION	CROSS SLOPE	WIDTH	STATION	PROFILE GRADE	WIDTH	CROSS SLOPE	ELEVATION CORRECTION	TRANSITION RATE	EDGE ELEVATION	
697.61		0.78	0.0650	12.00	10+00.00	698.39	12.00	0.0650	0.78		699.17	MATCH
697.68		0.76	0.0637	12.00	10+05.00	698.45	12.00	0.0637	0.76		699.21	
697.91		0.72	0.0596	12.00	10+20.00	698.63	12.00	0.0596	0.72		699.35	
697.99		0.70	0.0583	12.00	10+25.00	698.69	12.00	0.0583	0.70		699.39	
698.23		0.65	0.0542	12.00	10+40.00	698.88	12.00	0.0542	0.65		699.53	
698.39		0.62	0.0515	12.00	10+50.00	699.01	12.00	0.0515	0.62		699.63	
698.56		0.59	0.0489	12.00	10+60.00	699.14	12.00	0.0489	0.59		699.73	
698.80		0.54	0.0448	12.00	10+75.00	699.34	12.00	0.0448	0.54		699.88	
698.89		0.52	0.0435	12.00	10+80.00	699.41	12.00	0.0435	0.52		699.93	
699.14		0.47	0.0394	12.00	10+95.00	699.62	12.00	0.0394	0.47		700.09	
699.24		0.46	0.0381	12.00	11+00.00	699.69	12.00	0.0381	0.46		700.15	
699.64		0.38	0.0314	12.00	11+25.00	700.02	12.00	0.0314	0.38		700.40	
699.95		0.31	0.0260	12.00	11+45.00	700.26	12.00	0.0260	0.31		700.58	
699.97		0.31	0.0257	12.00	11+45.94	700.27	12.00	0.0257	0.31		700.58	R.C.
700.03		0.30	0.0246	12.00	11+50.00	700.32	12.00	0.0230	0.28		700.60	
700.38		0.22	0.0179	12.00	11+75.00	700.60	12.00	0.0058	0.07		700.67	
700.50		0.19	0.0156	12.00	11+83.53	700.68	12.00	0.0000	0.00		700.68	½ LEVEL
700.66		0.19	0.0156	12.00	12+00.00	700.84	12.00	-0.0069	-0.08		700.76	
700.84		0.19	0.0156	12.00	12+21.12	701.03	12.00	-0.0156	-0.19		700.68	N.C.

SUPERELEVATION TABLE

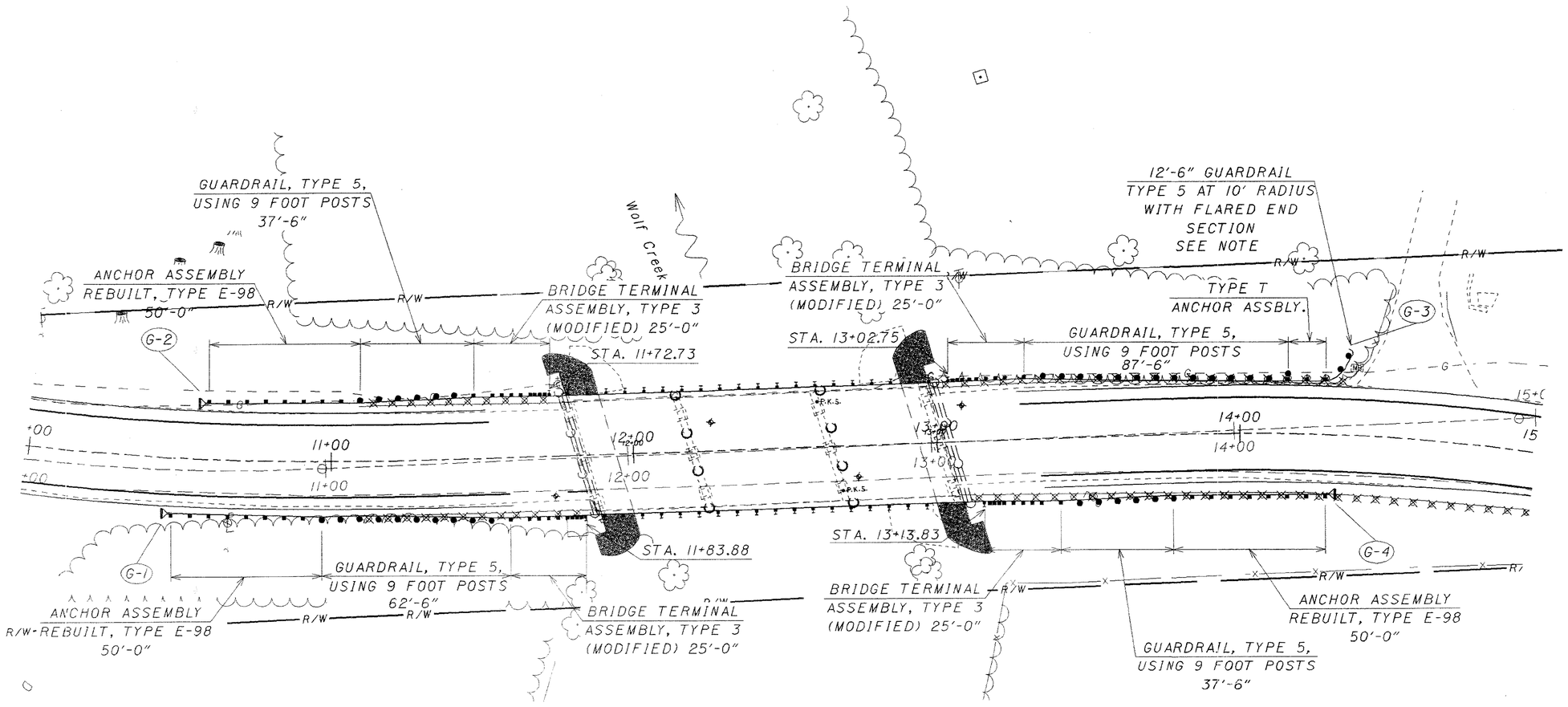
P.I. STATION 15+51.52 | Dc = 8°42'50"

LEFT SIDE					CENTERLINE CONTROL		RIGHT SIDE					REMARKS
EDGE ELEVATION	TRANSITION RATE	ELEVATION CORRECTION	CROSS SLOPE	WIDTH	STATION	PROFILE GRADE	WIDTH	CROSS SLOPE	ELEVATION CORRECTION	TRANSITION RATE	EDGE ELEVATION	
701.19		0.19	0.0156	12.00	12+68.65	701.38	12.00	-0.0156	-0.19		700.70	N.C.
701.27		0.16	0.0130	12.00	12+75.00	701.42	12.00	-0.0156	-0.19		701.23	
701.53		0.03	0.0026	12.00	13+00.00	701.56	12.00	-0.0156	-0.19		701.37	
701.59		0.00	0.0000	12.00	13+06.63	701.59	12.00	-0.0156	-0.19		701.40	½ LEVEL
701.60		-0.14	-0.0021	12.00	13+10.00	701.60	12.00	-0.0164	-0.20		701.41	
701.80		-0.30	-0.0115	12.00	13+25.00	701.67	12.00	-0.0195	-0.23		701.43	
702.03		-0.36	-0.0233	12.00	13+43.83	701.73	12.00	-0.0233	-0.28		701.45	R.C.
702.04		-0.30	-0.0246	12.00	13+50.00	701.75	12.00	-0.0246	-0.30		701.45	
702.16		-0.36	-0.0297	12.00	13+75.00	701.81	12.00	-0.0297	-0.36		701.45	
702.28		-0.42	-0.0349	12.00	14+00.00	701.86	12.00	-0.0349	-0.42		701.44	
702.39		-0.48	-0.0400	12.00	14+25.00	701.91	12.00	-0.0400	-0.48		701.43	
702.50		-0.54	-0.0451	12.00	14+50.00	701.96	12.00	-0.0451	-0.54		701.42	
702.62		-0.60	-0.0503	12.00	14+75.00	702.02	12.00	-0.0503	-0.60		701.41	
702.73		-0.66	-0.0554	12.00	15+00.00	702.07	12.00	-0.0554	-0.66		701.40	MATCH

CALCULATED DAR | CHECKED FCJ

SUPERELEVATION TABLE

SEN-590-00.00



REFERENCE	LOCATION	STATION FROM	STATION TO	SIDE	202 GUARDRAIL REMOVED	606 GUARDRAIL, TYPE 5	606 GUARDRAIL, TYPE 5, USING 9 FOOT POSTS	606 FLARED END SECTION	606 ANCHOR ASSEMBLY, TYPE E-98	606 ANCHOR ASSEMBLY, TYPE T	606 BRIDGE TERMINAL ASSEMBLY, TYPE 3 (MODIFIED)	614 BARRIER REFLECTOR, TYPE A2
					LIN FT	LIN FT	LIN FT	EACH	EACH	EACH	EACH	EACH
G-1	SR 590	10+46.38	11+83.88	RT.	67.5	25	62.5		1		1	2
G-2	SR 590	10+60.23	11+72.73	LT.	75.0	25	37.5		1		1	2
G-3	SR 590	13+02.75	14+35.23	LT.	150	37.5	87.5	1		1	1	2
G-4	SR 590	13+13.83	14+27.38	RT.	187.5	25	37.5		1		1	2
TOTALS CARRIED TO GENERAL SUMMARY					480.0	112.5	225.0	1	3	1	4	8

NOTE: Caution shall be used when placing proposed Guardrail, as to avoid damaging any existing drainage (pipes, culverts, utilities, etc.) within the length of the run of Guardrail.

NOTE: The intent of these proposed sections of guardrail is to wrap them at the drives as to leave a minimum distance of 4' and maximum distance of 8' from the face of the guardrail to the edge of drives. The length should be adjusted either by adding or removing a full panel. The lengths of the guardrail wrapped at the drive approaches should be adjusted to meet these requirements as in the Location and Design Manual Volume 1, Section 600.

HORIZONTAL SCALE IN FEET
0 10 20 40

CALCULATED FCJ
CHECKED DAR

GURADRAIL PLAN & SUBSUMMARY

SEN-590-0.00

22
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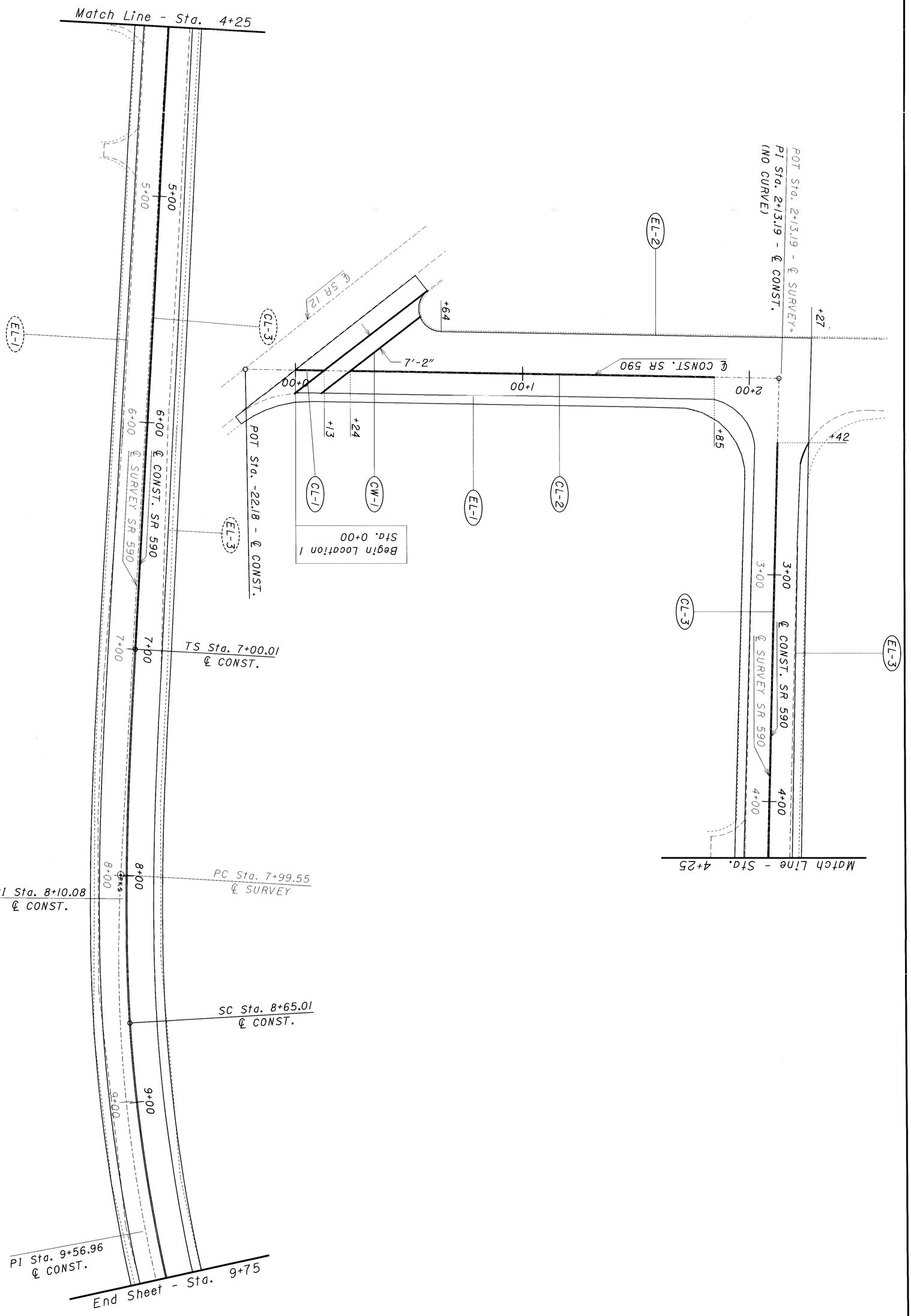
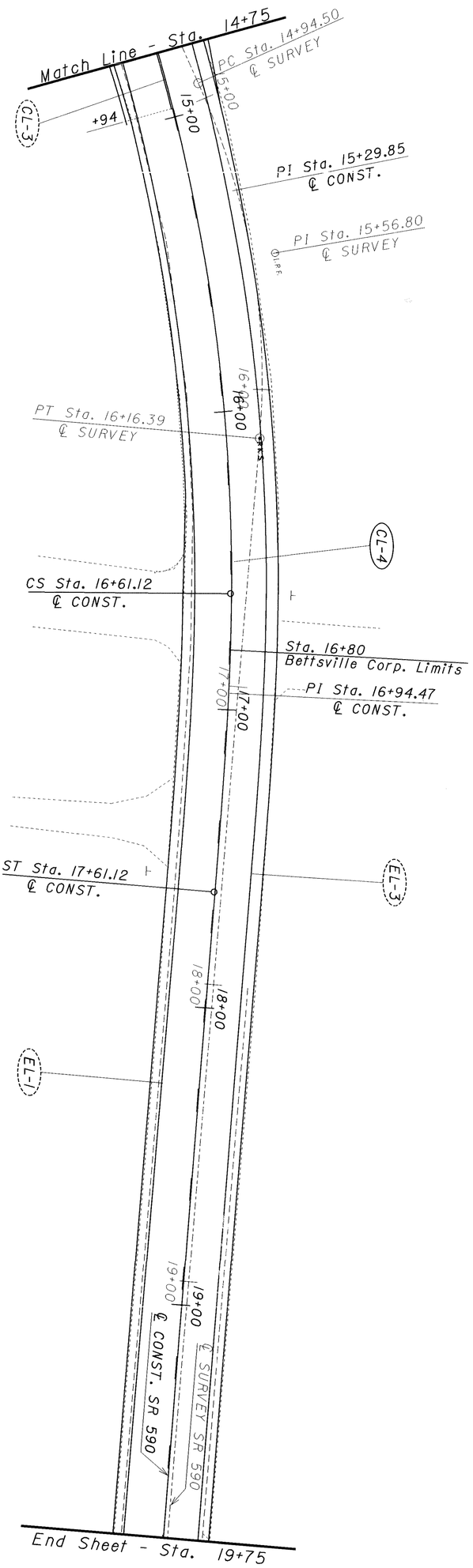
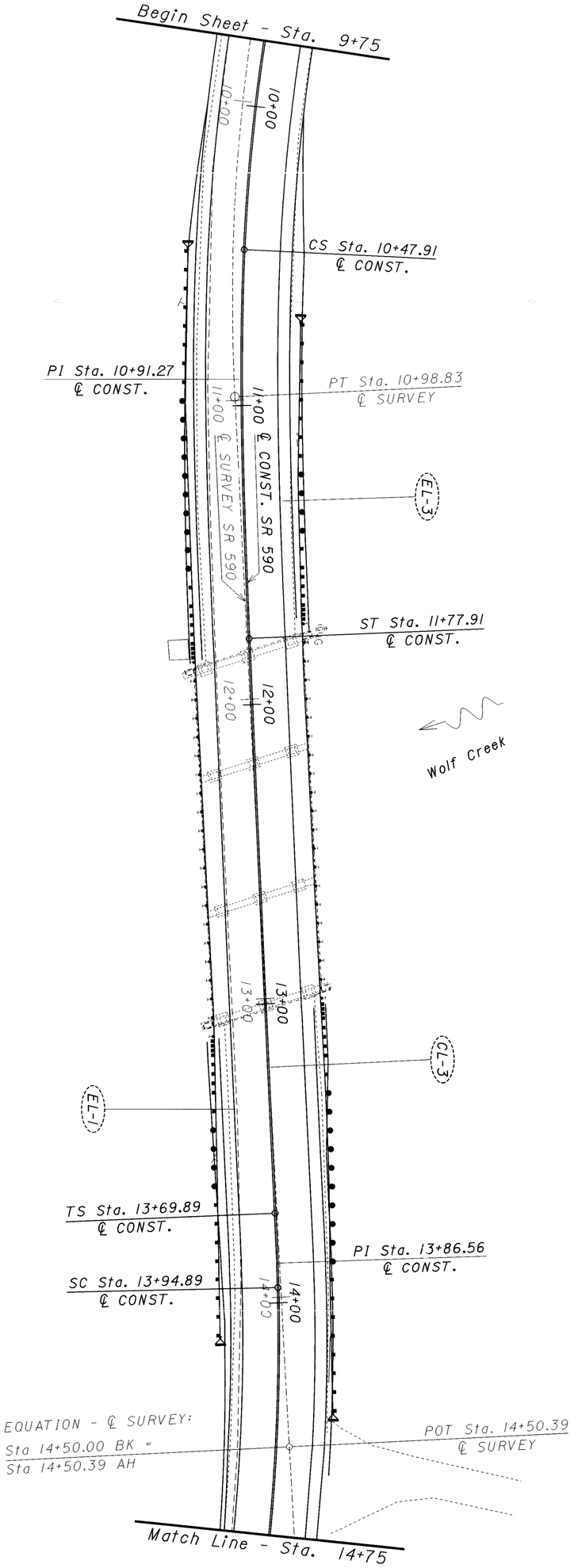


23/36	SEN-590-0.00	TRAFFIC CONTROL PLAN	HORIZONTAL SCALE IN FEET (0, 10, 20, 40)



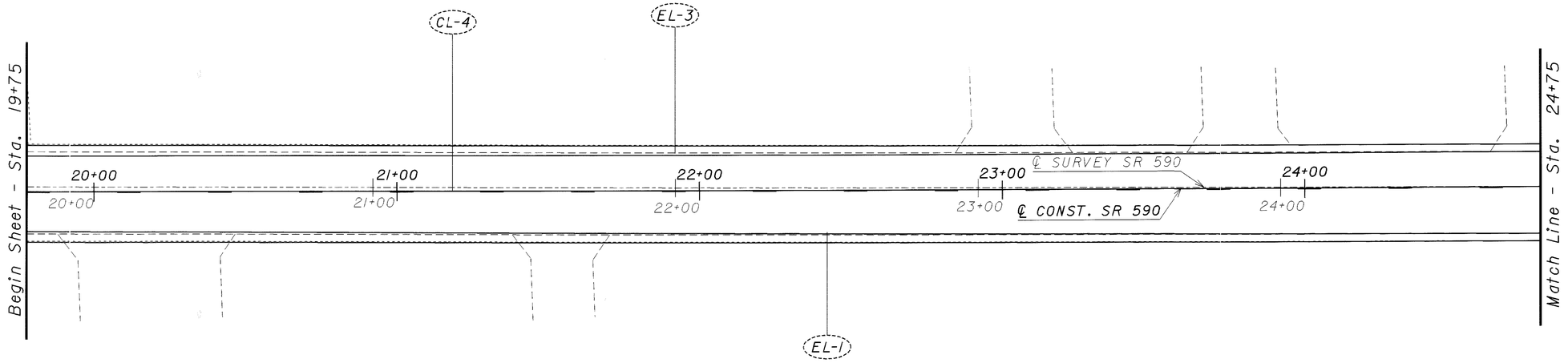


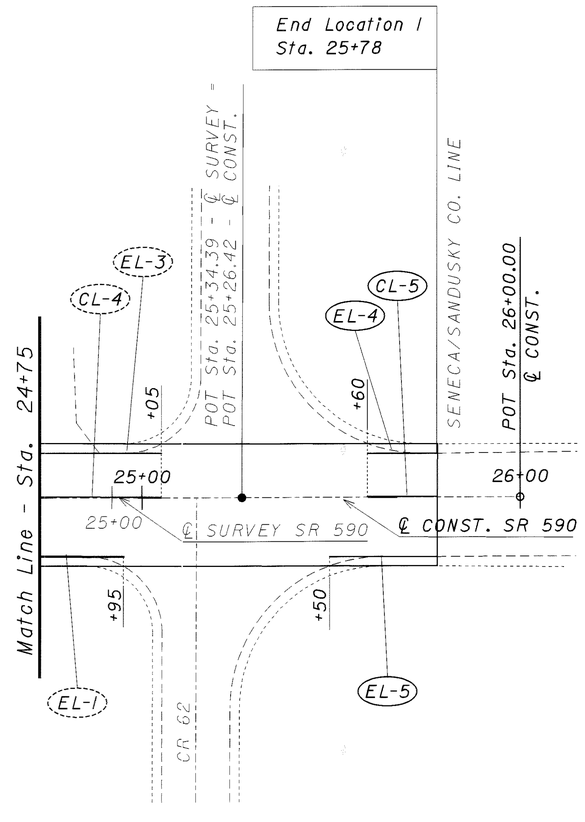
SEN-590-0.00

TRAFFIC CONTROL PLAN

0 20 10 40
HORIZONTAL SCALE IN FEET

N





TRAFFIC CONTROL SUBSUMMARY

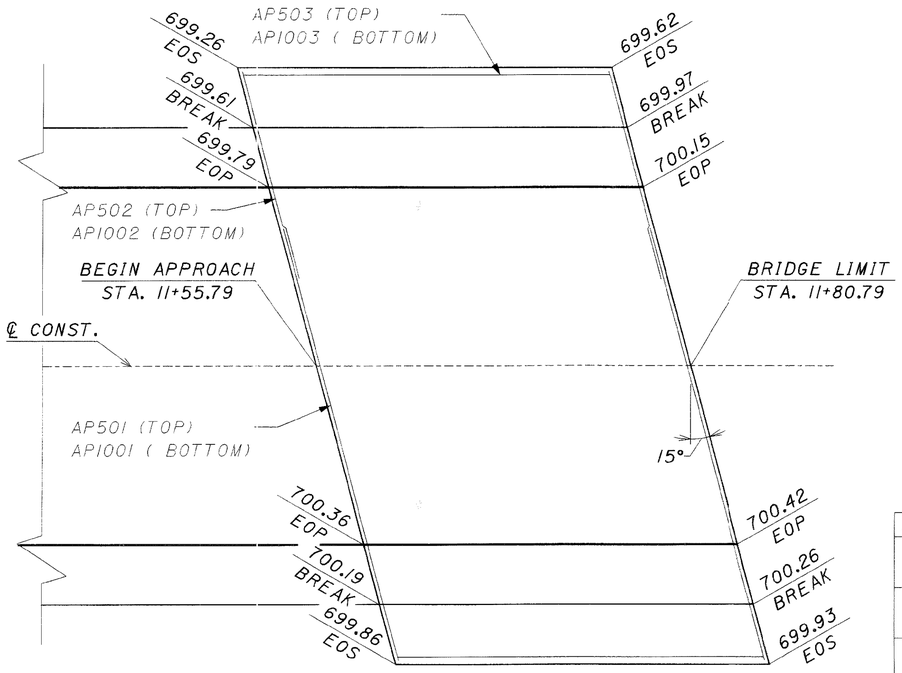
SHEET NO.	REFERENCE NO.	STATION FROM	STATION TO	LOCATION	SIDE	828 4" WHITE EDGE LINE	828 CENTER LINE DOUBLE/SOLID	828 CENTER LINE SOLID/DASHED	828 CROSSWALK LINE	202 RPM REMOVED FOR STORAGE	621 PRISMATIC RETRO-REFLECTOR	621 RPM CASTING INSTALLATION ONLY	FOR INFORMATION ONLY DETAIL	PRISMATIC RETROREFLECTOR COLORS ONE WAY WHITE	ONE WAY YELLOW	TWO WAY YELLOW/RED	TWO WAY YELLOW/YELLOW	TWO WAY WHITE/RED
						MILE	MILE		LIN. FT.	EACH	EACH	EACH		EACH	EACH	EACH	EACH	EACH
22	CL-1	0+00	0+13	SR 590	℄		0.01											
22	CL-2	0+24	1+85	SR 590	℄		0.03											
22-23	CL-3	1+42	14+94	SR 590	℄		0.26											
23-24	CL-4	14+94	25+05	SR 590	℄			0.19		10	10	10					10	
24	CL-5	25+60	25+78	SR 590	℄			0.01										
22-24	EL-1	0+00	24+95	SR 590	RT	0.47												
22	EL-2	0+00	2+27	SR 590	LT	0.04												
22-24	EL-3	2+42	25+05	SR 590	LT	0.43												
24	EL-4	25+60	25+78	SR 590	LT	0.01												
24	EL-5	25+60	25+78	SR 590	RT	0.01												
22	CW-1	0+13	0+24	SR 590	ACROSS				129									
SUB TOTALS						0.96	0.30	0.20	129	10	10	10						
TOTALS CARRIED TO GENERAL SUMMARY						0.96	0.50		129	10	10	10						

HORIZONTAL SCALE IN FEET
0 10 20 40
CALCULATED ALF
CHECKED DAR

TRAFFIC CONTROL PLAN

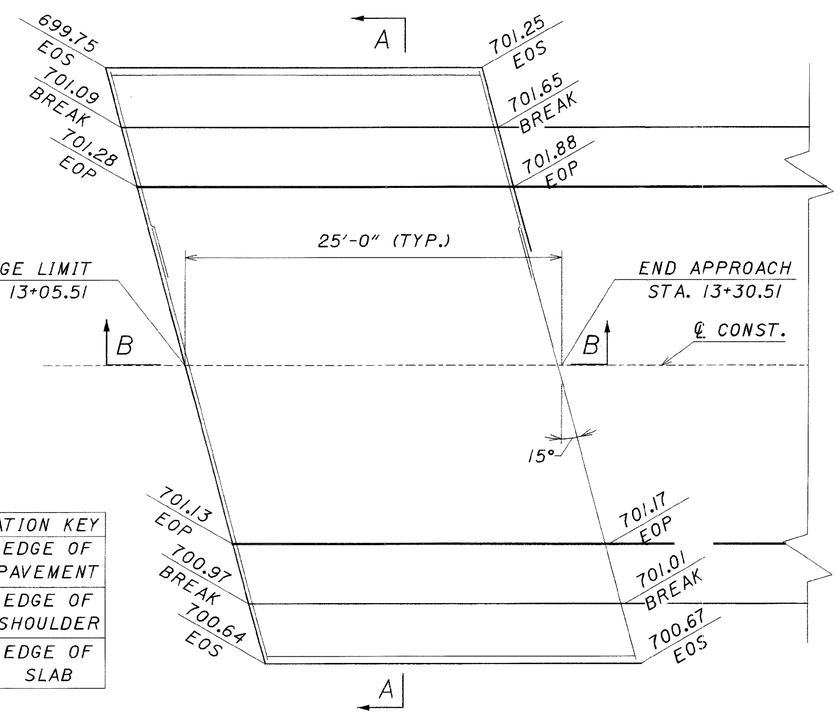
SEN-590-0.00

25
36

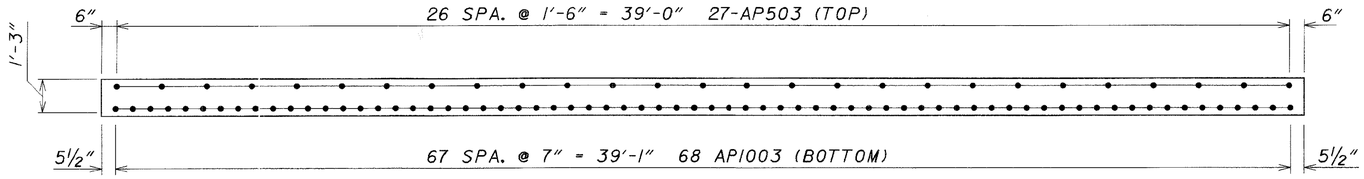


REAR APPROACH SLAB

ABBREVATION KEY	
EOP	EDGE OF PAVEMENT
BREAK	EDGE OF SHOULDER
EOS	EDGE OF SLAB

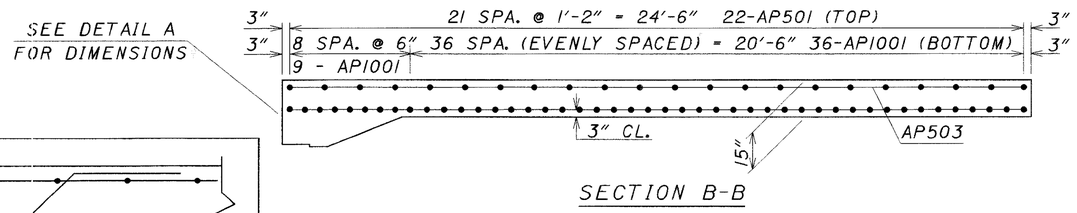


FORWARD APPROACH SLAB

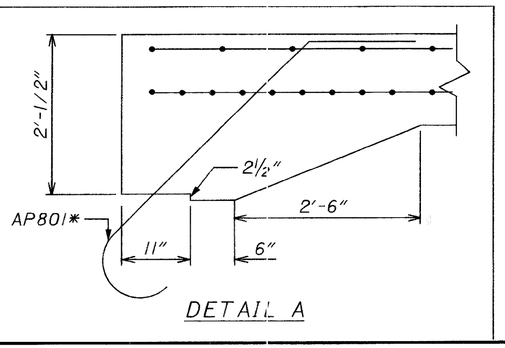


SECTION A-A

ITEM 611 REINFORCED CONCRETE APPROACH SLAB T=15", AS PER PLAN: CONCRETE SHALL BE CLASS S.



SECTION B-B



DETAIL A

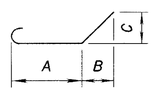
NOTES:

* AP801 BARS SHOULD BE PLACED TO AVOID 2" DOWEL HOLES REQUIRED IN THE ABUTMENTS

REINFORCING STEEL SPLICE LENGTHS: REINFORCING STEEL SPLICE LENGTH SHALL BE AS FOLLOWS UNLESS OTHERWISE NOTED:

NO. 10 BARS = 6'-4" NO. 5 BARS = 2'-10"

MARK	NUMBER REAR	NUMBER FWD	NUMBER TOTAL	LENGTH		TYPE	DIMENSIONS A	B	C	D	E	R	INC.
APPROACH SLABS													
AP501	22	22	44	30'-0"		STR	30'-0"						
AP502	22	22	44	13'-9"		STR	13'-9"						
AP503	27	27	54	24'-6"		STR	24'-6"						
AP801	28	28	56	5'-9"		18	4'-2"	1'-0"	1'-0"				
AP1001	45	45	90	30'-0"		STR	30'-0"						
AP1002	45	45	90	17'-4"		STR	17'-4"						
AP1003	68	68	136	24'-6"		STR	24'-6"						



TYPE-18

CALCULATED F.C.J. CHECKED D.A.R.

APPROACH SLAB DETAILS
BRIDGE NO. SEN-590-0023

SEN-590-0.00

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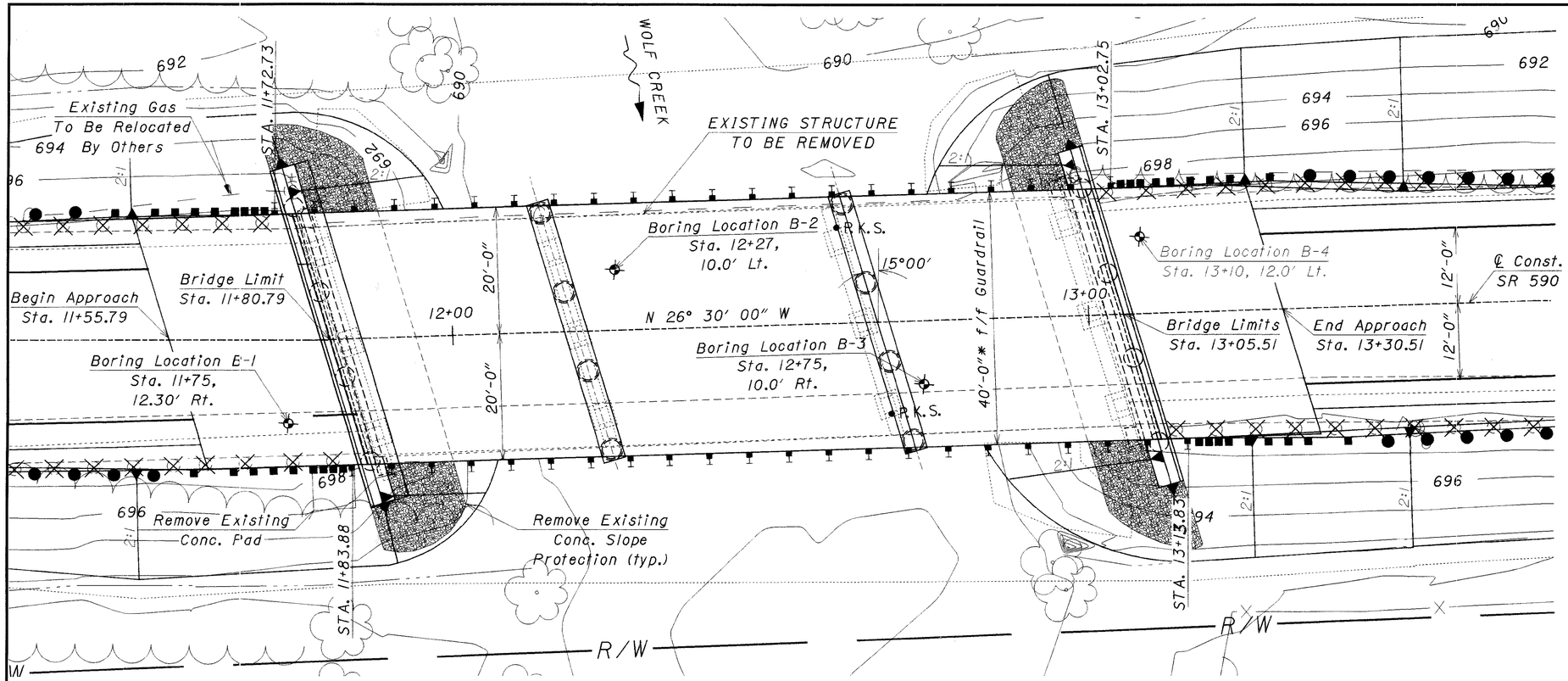


PLAN

NOTE: SEE SHEETS 2-4 FOR ALIGNMENT INFORMATION

BM #6 SET LARGE RR. SPIKE IN NW SIDE OF TELE/POWER POLE, RT. SIDE OF SR 590 STA. 10+31.0 ℄ CONST. 123.04 RT. ELEV. = 693.91

BM #7 SET LARGE RR. SPIKE IN SE/S SIDE OF LIGHT/POWER POLE, LT. SIDE OF SR 590 STA. 15+87.96 ℄ CONST. 22.06 LT. ELEV. = 703.42

DESIGN DESIGNATION

CURRENT ADT (2002)	1420
DESIGN YEAR ADT (2022)	1640
DESIGN HOURLY VOLUME (2022)	250
DIRECTIONAL DISTRIBUTION	50%
TRUCKS (24 HOUR B&C)	8%
DESIGN SPEED	50 mph
LEGAL SPEED	50 mph

DESIGN FUNCTIONAL CLASSIFICATION - RURAL MAJOR COLLECTOR

EXISTING STRUCTURE DATA
TO BE REMOVED

TYPE: Cont. reinf. conc. slab with reinf. conc. piers and abutments.
SPAN: 36'-45'-36' c/c of bearings
ROADWAY WIDTH: 24'-0"
OVERALL WIDTH: 36'-0"± to face of guardrails
STRUCTURAL FILE NO. 7403844
SKEW: 15° R.F.
ALIGNMENT: Tangent
DATE BUILT: 1955
WEARING SURFACE: BITUMINOUS

PROPOSED STRUCTURE

TYPE: 3 span prestressed box beam reinf. conc. piers and stub abutments
SPAN: 38' - 47'-6" - 38'
ROADWAY: 40'-0" f/f guardrail
SKEW: 15° R.F.
ALIGNMENT: tangent
APPROACH SLAB: 25'-0" (T=15")
WEARING SURFACE: ASPHALT CONC.
SUPERELEVATION: RUNOFF TRANS.
LOADING: HS-25 AND ALT. MILT.

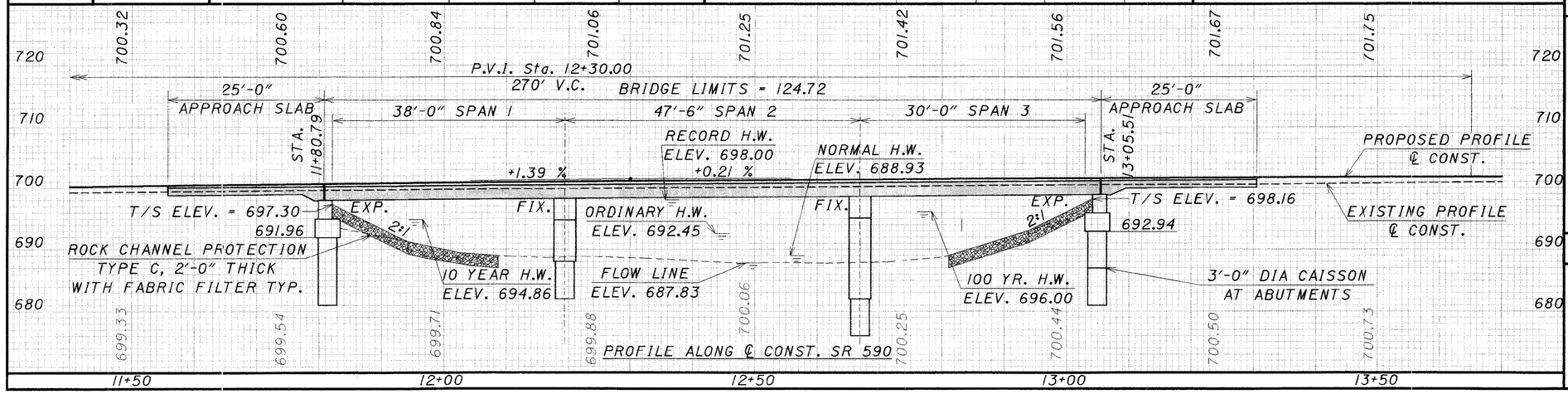
LEGEND	
⌖ Boring Locations	
* Plus Fit-Up	
BORING	TOP OF ROCK
B-1	687.8±
B-2	687.9±
B-3	682.7±
B-4	687.1±

HYDRALIC DATA				
DRANAGE AREA=66.22 SQ.MI.		PROPOSED STRUCTURE TOTAL WATER AREA = 1063.45 Sq. Ft.		
FLOOD FREQUENCY (YEARS)	DISCHARGE C.F.S.	VELOCITY F.P.S.	ELEV.	
10 YR. DESIGN	2740	7.25	694.86	387.78
100 YR.	4130	9.00	696.00	470.56

DRILLED SHAFT ESTIMATED PAY LENGTHS ARE AS FOLLOWS:

	36" SHAFT		42" SHAFT	
	BEARING ELEV.	LENGTH	BEARING ELEV.	LENGTH
REAR ABUTMENT	681.00	10.96		
PIER 1	682.00	6.00	688.00	1.93
PIER 2	676.00	6.00	682.00	7.93
FORWARD ABUTMENT	681.00	11.94		

EARTHWORK LIMITS SHOWN ARE APPROXIMATE ACTUAL SLOPE SHALL CONFORM TO PLAN CROSS SECTIONS



PROFILE ALONG ℄ CONST. SR 590

DESIGN AGENCY
OHIO DEPARTMENT OF TRANSPORTATION
DISTRICT 5
PRODUCTION DEPARTMENT

DATE 11/01
REVIEWED JTB
STRUCTURE FILE NUMBER 7403844
DRAWN FCJ
REVISED
DESIGNED DAR
CHECKED JTB

SENECA COUNTY
STA. 11+80.79
STA. 13+05.51

SITE PLAN
BRIDGE NO. SEN-590-0023
OVER WOLF CREEK

SEN-590-0.00

1 / 10

27
36

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ESTIMATED QUANTITIES BRIDGE NO. SEN S.R. 590-0023

QUANTITIES BY: DAR
CHECKED BY: FCJ

ITEM	ITEM EXT.	TOTAL	UNIT	DESCRIPTION	ABUT.	PIER	SUPER-STRUCTURE	GENERAL	APP REF
202	11003	LUMP		STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN				LUMP	28
448	46021	42	CU. YD.	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 1, PG64-22,			42		28
				AS PER PLAN (LEVELING COURSE)					
503	11100	LUMP		COFFERDAMS, CRIBS, AND SHEETING				LUMP	
503	21301	LUMP		UNCLASSIFIED EXCAVATION, AS PER PLAN				LUMP	28
512	33010	555	SQ. YD.	TYPE 3 WATERPROOFING				555	
516	31011	83	LIN. FT.	2" DEEP JOINT SEALER, AS PER PLAN				83	36
SPECIAL	51631200	83	LIN. FT.	SAWING AND SEALING BITUMINOUS CONCRETE JOINTS				83	
517	70000	262.5	LIN. FT.	RAILING (TWIN STEEL TUBE)			262.5		
516	41100	60	EACH	1/8" PREFORMED BEARING PAD, 711.21			60		
516	43100	120	EACH	ELASTOMERIC BEARING WITH INTERNAL LAMINATES ONLY			120		
				(NEOPRENE), 1"x5"x9" (SEE PROPOSAL NOTE)					
518	21230	LUMP		POROUS BACKFILL WITH FILTER FABRIC				LUMP	
SPECIAL	51822300	250	LIN. FT.	STEEL DRIP STRIP			250		
518	40000	118	LIN. FT.	6" PERFORATED CORRUGATED PLASTIC PIPE	118				
518	40012	51	LIN. FT.	6" NON-PERFORATED CORRUGATED PLASTIC PIPE	51				
518	42300	20	LIN. FT.	8" NON-PERFORATED CORRUGATED STEEL PIPE, INCLUDING	20				
				SPECIALS, 707.01					
524	94702	44	LIN. FT.	DRILLED SHAFTS, 36" DIAMETER, ABOVE BEDROCK	44				
524	94704	96	LIN. FT.	DRILLED SHAFTS, 36" DIAMETER, INTO BEDROCK	48	48			
524	94802	40	LIN. FT.	DRILLED SHAFTS, 42" DIAMETER, ABOVE BEDROCK		40			
601	32204	141	CU. YD.	ROCK CHANNEL PROTECTION, TYPE C WITH FABRIC FILTER				141	
842	31500	6	CU. YD.	CLASS S CONCRETE, SUPERSTRUCTURE			6		
842	41000	52	CU. YD.	CLASS C CONCRETE, PIER ABOVE FOOTINGS		60			
842	43500	78	CU. YD.	CLASS C CONCRETE, ABUTMENT INCLUDING FOOTING	78				
864	10100	170	SQ. YD.	SEALING OF CONCRETE SURFACES (EPOXY URETHANE)	72		98		
865	10070	30	EACH	PRESTRESSED CONCRETE NON-COMPOSITE BOX BEAM BRIDGE			30		
				MEMBERS, LEVEL 1, B27-48					

GENERAL NOTES

STANDARD DRAWINGS AND SUPPLEMENTAL SPECIFICATIONS:

REFERENCE SHALL BE MADE TO STANDARD DRAWINGS:

AS-1-81 DATED (REVISED) 4-20-01
DS-1-92 DATED (REVISED) 12-15-94
PSBD-1-93 DATED 3-04-94
TST-1-99 DATED (REVISED) 10-20-00

AND TO SUPPLEMENTAL SPECIFICATIONS:

842 DATED 01/06/99 899 DATED 10/21/98
864 DATED 07/11/00
865 DATED 02/22/00

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, 1998, 1999, 2000, AND 2002 INTERIM SPECIFICATIONS AND THE ODOT BRIDGE DESIGN MANUAL.

DESIGN DATA:

DESIGN LOADING:	HS25, AND THE ALTERNATE MILITARY LOADING.
CONCRETE CLASS C	COMPRESSIVE STRENGTH 4000 PSI (SUBSTRUCTURE)
CONCRETE CLASS S	COMPRESSIVE STRENGTH 4500 PSI (SUPERSTRUCTURE)
CONCRETE S MODIFIED	COMPRESSIVE STRENGTH 4000 PSI (DRILLED SHAFT)
REINFORCING STEEL	ASTM A615, A616 OR A617 GRADE 60 MINIMUM YIELD STRENGTH 60,000 PSI
SPIRAL REINFORCEMENT	MAY BE PLAIN BARS, ASTM A82 OR A615
PRESTRESSING STRAND ASTM A416	1/2" DIAMETER AREA = 0.153 SQ. IN. F'S = 270 KSI INITIAL STRESS = 0.75 F'S (LOW RELAXATION STRANDS)
CONCRETE FOR PRESTRESSED BEAMS	COMPRESSIVE STRENGTH (FINAL) - 5500 PSI COMPRESSIVE STRENGTH (RELEASE) - 4000 PSI UNIT STRESS - 2200 PSI COMPRESSION 444 PSI TENSION

REMOVAL OF EXISTING STRUCTURE, AS PER PLAN:

WHEN NO LONGER NEEDED TO MAINTAIN TRAFFIC THE EXISTING STRUCTURE SHALL BE REMOVED UPON RECEIVING PERMISSION FROM THE ENGINEER. (STRUCTURAL STEEL SHALL BE CAREFULLY DISMANTLED AND STORED ALONG THE RIGHT-OF-WAY FOR DISPOSAL BY THE STATE'S FORCES). ABUTMENTS SHALL BE REMOVED TO ELEVATION 687.5± AND PIERS TO ELEVATION 685±.

REASONABLE CARE SHALL BE USED BY THE CONTRACTOR TO PREVENT REMOVED MATERIALS FROM FALLING INTO THE WATER. ANY DROPPED MATERIALS SHALL BE IMEDIATELY RECOVERED AND DISPOSED OF AWAY FROM THE SITE EXCEPT FOR APPROVED MASONRY MATERIAL WHICH MAY BE USED AS BANK PROTECTION AS DIRECTED BY THE ENGINEER.

ITEM 503, UNCLASSIFIED EXCAVATION, AS PER PLAN:

UNCLASSIFIED EXCAVATION SHALL BE IN ACCORDANCE WITH 503 EXCEPT THAT THE BACKFILL MATERIAL BEHIND THE ABUTMENTS SHALL BE 304.02 MATERIAL PLACED IN 6 INCH LIFTS AND PER 304.04.

DRILLED SHAFTS:

THE DESIGN LOAD TO BE SUPPORTED BY EACH DRILLED SHAFT IS 41 TONS AT THE ABUTMENTS AND 44 TONS AT THE PIERS. THIS LOAD IS RESISTED BY SHAFT ADHESION WITHIN A PORTION OF THE BEDROCK SOCKET AND ALSO BY SHAFT END BEARING. THE ALLOWABLE BEDROCK SOCKET ADHESION IS 1 TON PER SQ. FT. ASSUMED TO ACT ALONG THE BOTTOM 4 FEET OF THE BEDROCK SOCKET FOR THE ABUTMENT AND 4 FEET OF THE BEDROCK SOCKET FOR THE PIERS. THE ALLOWABLE END BEARING PRESSURE IS 40 TONS PER SQUARE FOOT.

UTILITY LINES:

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

BEARING PAD SHIMS:

1/8" THICK PREFORMED BEARING PAD SHIMS, PLAN AREA 5 INCHES BY 9 INCHES (THE SAME SIZE OF THE ELASTOMERIC BEARING PAD SHOULD BE USED) SHALL BE PLACED UNDER THE ELASTOMERIC BEARING PADS WHERE REQUIRED FOR PROPER BEARING. THE AMOUNT SUPPLIED IS SUFFICIENT FOR TWO SHIMS PER BEAM. PAYMENT WILL BE MADE AT THE CONTRACT BID PRICE FOR ITEM 516 - 1/8" PREFORMED BEARING PADS. ANY UNUSED SHIMS SHALL BECOME THE PROPERTY OF THE STATE.

PRESTRESSED CONCRETE BOX BEAMS:

CALCULATED CAMBER AT TIME OF PAVING IS 7/8± INCH (SPAN 1 AND 3) AND 1 1/4 INCH (SPAN 2).

CALCULATED DEFLECTION DUE TO WEIGHT OF SURFACE COURSE AND RAILING (DEFLECTOR PARAPETS, RAILINGS, SIDEWALKS, ETC.) IS 1/16 INCH (SPAN 1 AND 3) AND 1/16 INCH (SPAN 2).

A FINAL CAMBER OF 1/8 INCH AT CENTER OF SPANS IS REQUIRED FOR THE VERTICAL CURVE ALONG THE CENTERLINE OF CONSTRUCTION.

NET FINAL CAMBER OF BEAMS IS 1/8" (SPANS 1 AN 3) AND 1/16" (SPAN 2). THIS IS 1/8 INCH (SPAN 1 AND 3) AND 1/16 INCH (SPAN 2) IN EXCESS OF THE AMOUNT REQUIRED TO PLACE THE TOP OF THE BEAM PARALLEL TO PROFILE GRADE. THIS EXCESS AMOUNT SHALL BE COMPENSATED FOR BY THICKENING THE 448 INTERMEDIATE COURSE FROM A MINIMUM OF 1 1/2" AT CENTER OF SPANS TO 1 5/8" AT THE ABUTMENTS AND 1 9/16" AT THE PIERS.

ALL CALCULATED DEFLECTION DATA IS THEORETICAL AND WILL VARY WITH THE CONDITIONS FOUND AT THE TIME OF CASTING, PRESTRESS RELEASE AND CURING.

ITEM 448 ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 1, AS PER PLAN

SHALL CONSIST OF A VARIABLE THICKNESS OF 448 ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 1, PG64-28. THE 448 INTERMEDIATE COURSE SHALL BE PLACED IN TWO OPERATIONS. THE FIRST PORTION OF THE COURSE SHALL BE OF 1 1/2" UNIFORM THICKNESS. THE SECOND PORTION OF THE COURSE SHALL BE FEATHERED TO PLACE THE SURFACE PARALLEL TO AND 1 1/2" BELOW FINAL PAVEMENT SURFACE ELEVATION. ITEM 858 ASPHALT CONCRETE SURFACE COURSE IS PAID FOR ON THE GENERAL SUMMARY.

ELASTOMERIC BEARINGS

ELASTOMERIC BEARINGS SHALL COMPLY WITH ITEM 516 AND AASHTO STANDARD SPECIFICATION FOR HIGHWAY BRIDGES, SECTION 18, BEARING DEVICES, DIVISION II, CONSTRUCTION, ARTICLES 18.4.5.1 AND 18.5.6.2. BEARINGS SHALL BE GRADE 3, 60 DUROMETER ELASTOMER, AND SHALL BE SUBJECTED TO THE LOAD TESTING REQUIREMENTS DEFINED IN ARTICLE 18.7.4.5 OF THE AASHTO DOCUMENT LISTED ABOVE. BEARINGS WERE DESIGNED UNDER SECTION 14.6.5 OF SECTION 14, BEARINGS, DIVISION 1. DESIGN. TESTING SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE BEARINGS, EACH.

DESIGN AGENCY
OHIO DEPARTMENT OF TRANSPORTATION DISTRICT No. 2 PRODUCTION DEPARTMENT

DESIGNED DAR | DRAWN MTR | CHECKED FCJ | REVISED

REVIEWED JTB DATE 11/01

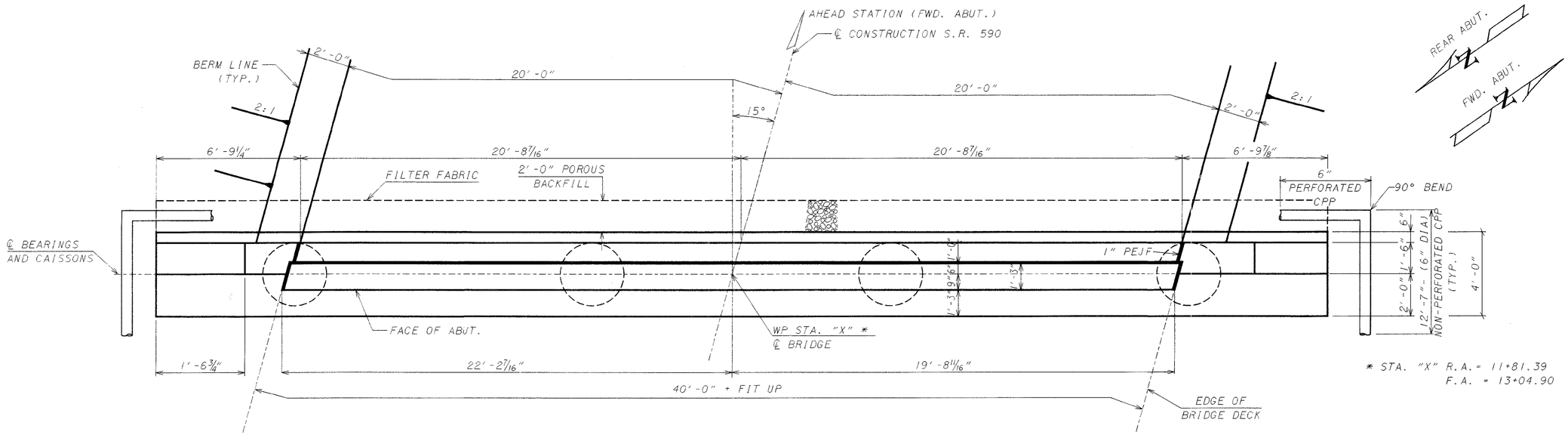
STRUCTURE FILE NUMBER 7403844

ESTIMATED QUANTITIES & GENERAL NOTES
SEN S.R. 590-0023
OVER WOLF CREEK

SEN-590-0.00

2 / 10

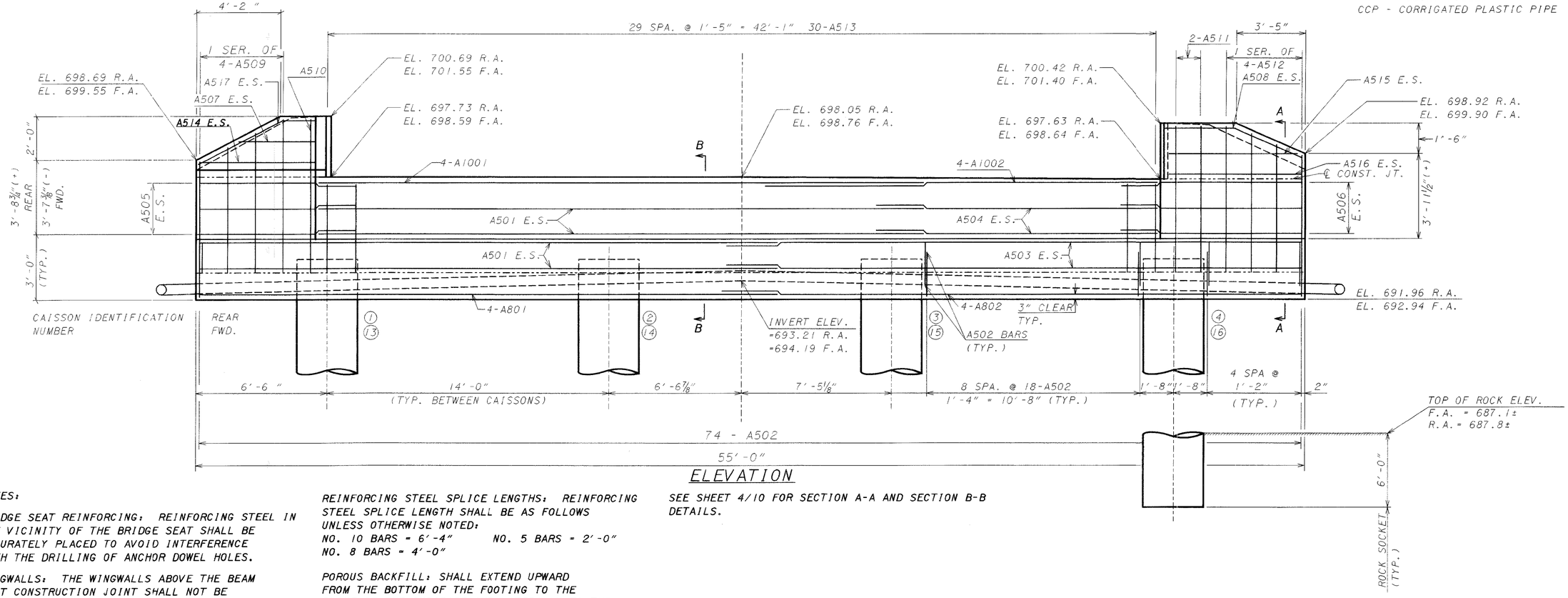
28 / 36



PLAN

* STA. "X" R.A. = 11+81.39
F.A. = 13+04.90

E.S. - EACH SIDE
PEJF - PREFORMED EXPANSION JOINT FILLER
CCP - CORRIGATED PLASTIC PIPE



ELEVATION

NOTES:

BRIDGE SEAT REINFORCING: REINFORCING STEEL IN THE VICINITY OF THE BRIDGE SEAT SHALL BE ACCURATELY PLACED TO AVOID INTERFERENCE WITH THE DRILLING OF ANCHOR DOWEL HOLES.

WINGWALLS: THE WINGWALLS ABOVE THE BEAM SEAT CONSTRUCTION JOINT SHALL NOT BE CONSTRUCTED UNTIL AFTER THE PRESTRESSED BEAMS ARE IN THEIR FINAL POSITION.

REINFORCING STEEL SPLICE LENGTHS: REINFORCING STEEL SPLICE LENGTH SHALL BE AS FOLLOWS UNLESS OTHERWISE NOTED:
NO. 10 BARS = 6'-4" NO. 5 BARS = 2'-0"
NO. 8 BARS = 4'-0"

POROUS BACKFILL: SHALL EXTEND UPWARD FROM THE BOTTOM OF THE FOOTING TO THE PLANE OF THE SUBGRADE AND LATERALLY TO THE SURFACE OF THE EMBANKMENT SLOPES.

SEE SHEET 4/10 FOR SECTION A-A AND SECTION B-B DETAILS.

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

DESIGNED	DRAWN	REVISED	DATE
DAR	DAR	JTB	11/01
CHECKED	REVISED	STRUCTURE FILE NUMBER	
JTB		7403844	

ABUTMENT DETAILS
SEN-590-0023
OVER WOLF CREEK

SEN-590-0.00

NOTES:

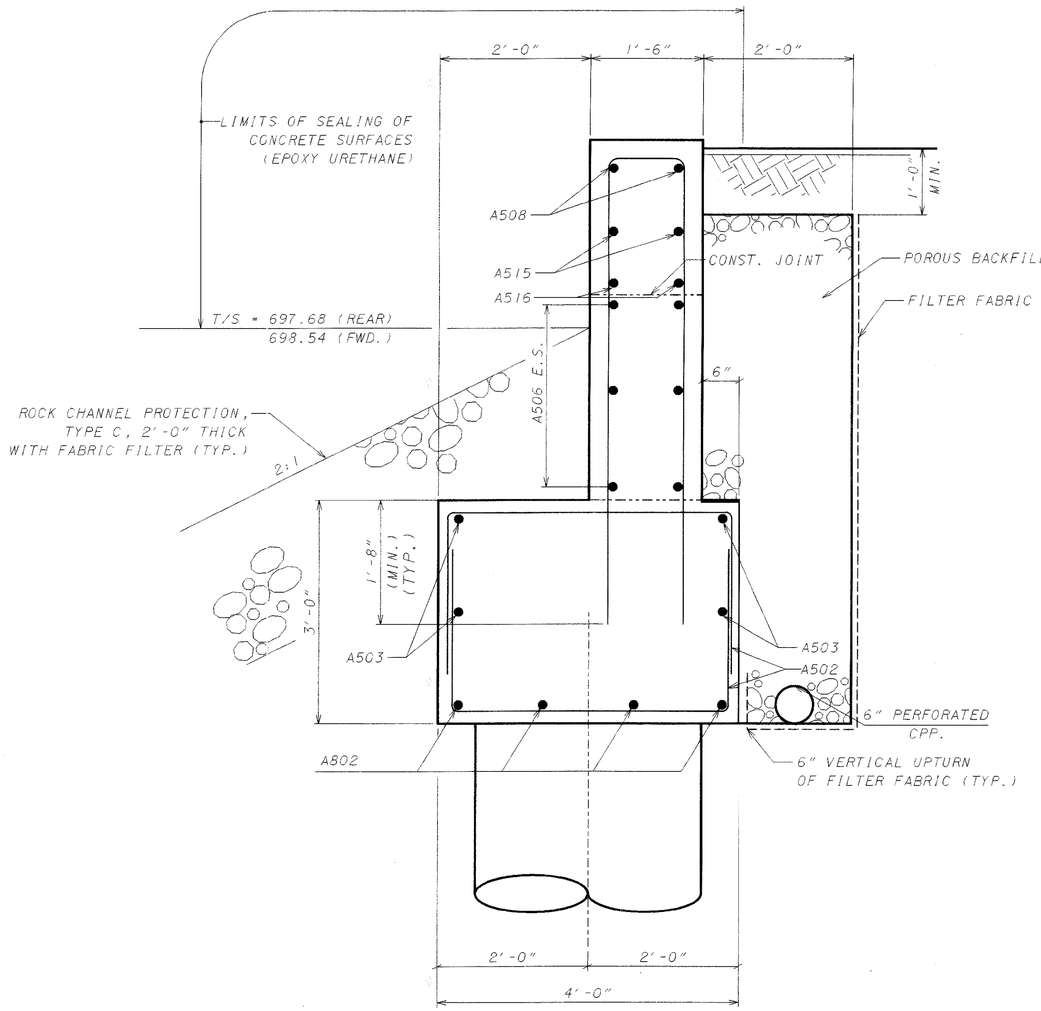
BRIDGE SEAT REINFORCING: REINFORCING STEEL IN THE VICINITY OF THE BRIDGE SEAT SHALL BE ACCURATELY PLACED TO AVOID INTERFERENCE WITH THE DRILLING OF ANCHOR DOWEL HOLES.

WINGWALLS: THE WINGWALLS ABOVE THE BEAM SEAT CONSTRUCTION JOINT SHALL NOT BE CONSTRUCTED UNTIL AFTER THE PRESTRESSED BEAMS ARE IN THEIR FINAL POSITION.

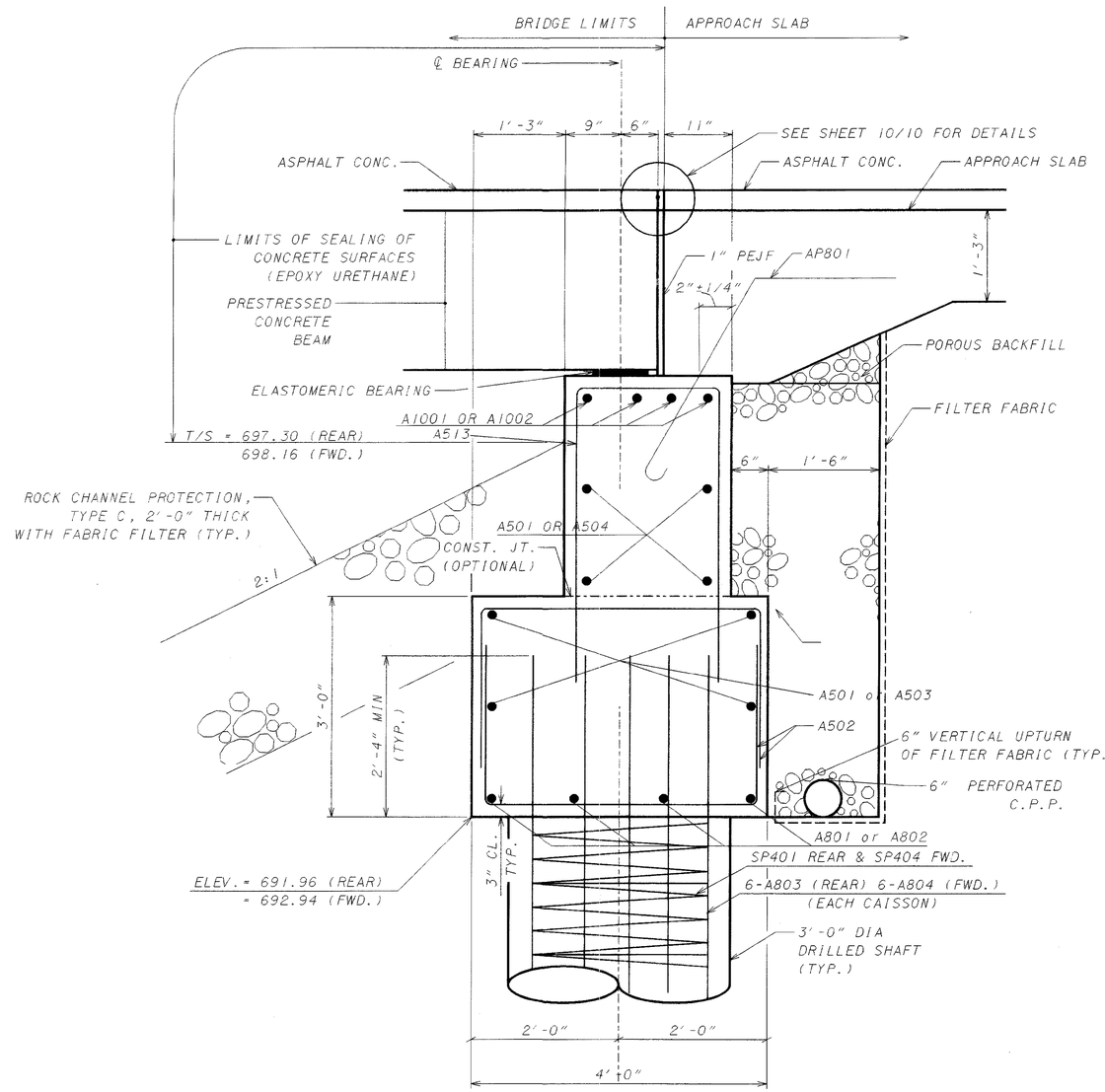
REINFORCING STEEL SPLICE LENGTHS: REINFORCING STEEL SPLICE LENGTH SHALL BE AS FOLLOWS UNLESS OTHERWISE NOTED:
NO. 10 BARS = 6'-4" NO. 5 BARS = 2'-0"
NO. 8 BARS = 4'-0" NO. 4 BARS = 1'-7"

POROUS BACKFILL: SHALL EXTEND UPWARD TO THE PLANE OF THE SUBGRADE AND LATERALLY TO THE SURFACE OF THE EMBANKMENT SLOPES.

THE LOCATIONS OF AP801 SHOULD MATCH THE LOCATIONS OF A513.



SECTION A-A



SECTION B-B

DESIGN AGENCY
OHIO DEPARTMENT OF TRANSPORTATION
DISTRICT No. 2
PRODUCTION DEPARTMENT

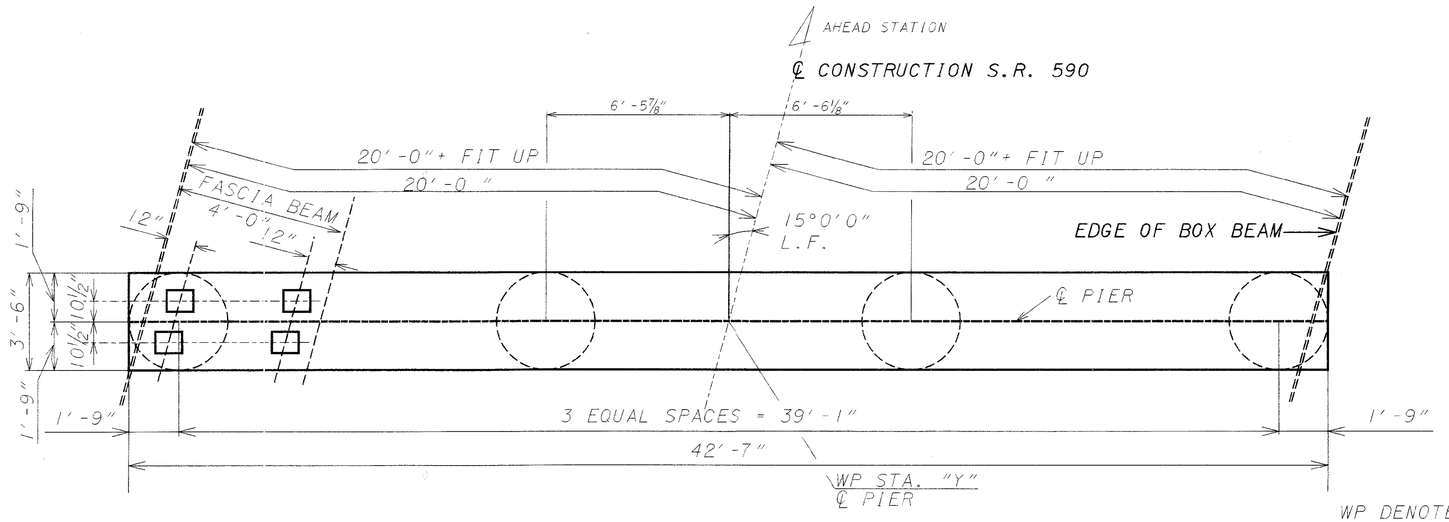
DESIGNED	DRAWN	REVIEWED	DATE
DAR	DAR	JTB	11/01
CHECKED	REVISED	STRUCTURE FILE NUMBER	7403852

ABUTMENT DETAILS
SEN-590-0023
OVER WOLF CREEK

SEN-590-0.00

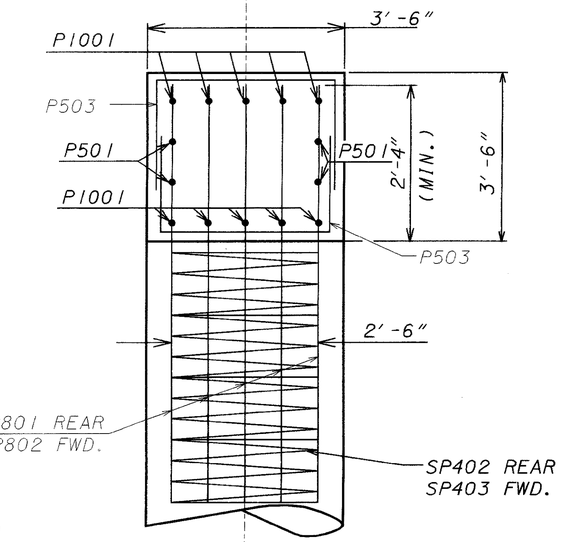
4/10

30/36



PIER PLAN VIEW

WP DENOTES WORKING POINT
STA. "Y" = 12+19.40 (REAR)
= 12+66.90 (FWD.)



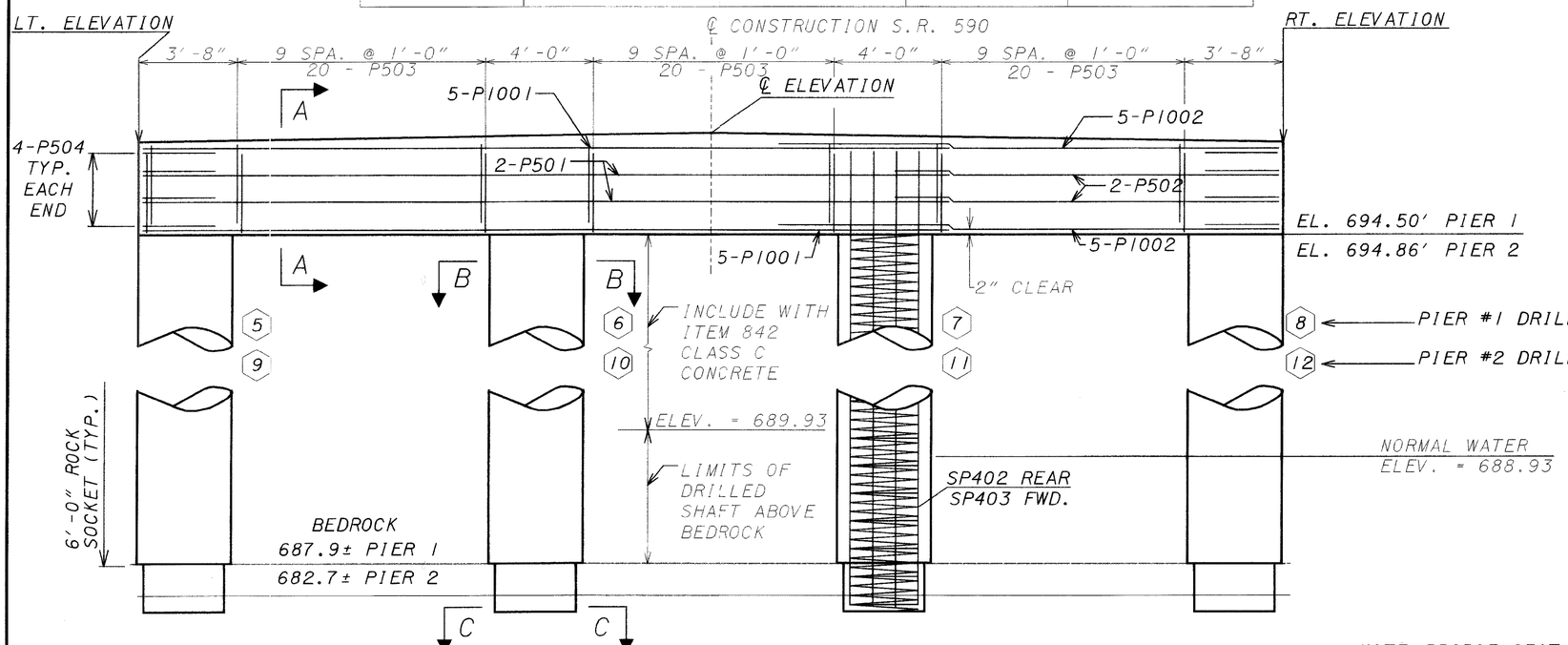
SECTION A-A

(SEE SHEET 7/10 FOR ADDITIONAL DETAILS)

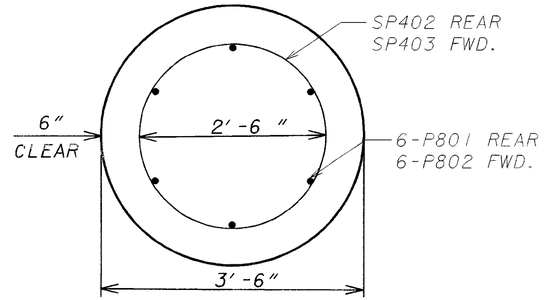
REINFORCING STEEL SPLICE LENGTHS: REINFORCING STEEL SPLICE LENGTH SHALL BE AS FOLLOWS UNLESS OTHERWISE NOTED:
NO. 10 BARS = 6'-4"
NO. 8 BARS = 4'-0"
NO. 5 BARS = 2'-0"

CENTERLINE PIER STATIONS AND ELEVATIONS

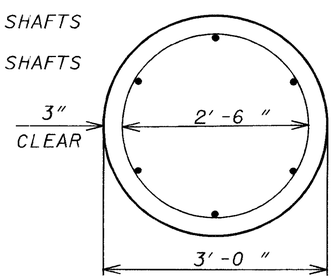
PIER NUMBER	℄ PIER STATION	LT. ELEVATION	℄ ELEVATION	RT. ELEVATION
PIER #1	12+19.40	698.00	698.41	698.08
PIER #2	12+66.90	698.36	698.76	698.43



PIER ELEVATION VIEW



SECTION B-B



SECTION C-C

NOTE: BRIDGE SEAT REINFORCING: REINFORCING STEEL IN THE VICINTY OF THE BRIDGE SEAT SHALL BE PLACED ACCURATLY TO AVOID INTERFERENCE WITH THE DRILLING OF ANCHOR BAR HOLES.

DESIGN AGENCY
OHIO DEPARTMENT OF TRANSPORTATION
DISTRICT NO. 4
PRODUCTION DEPARTMENT

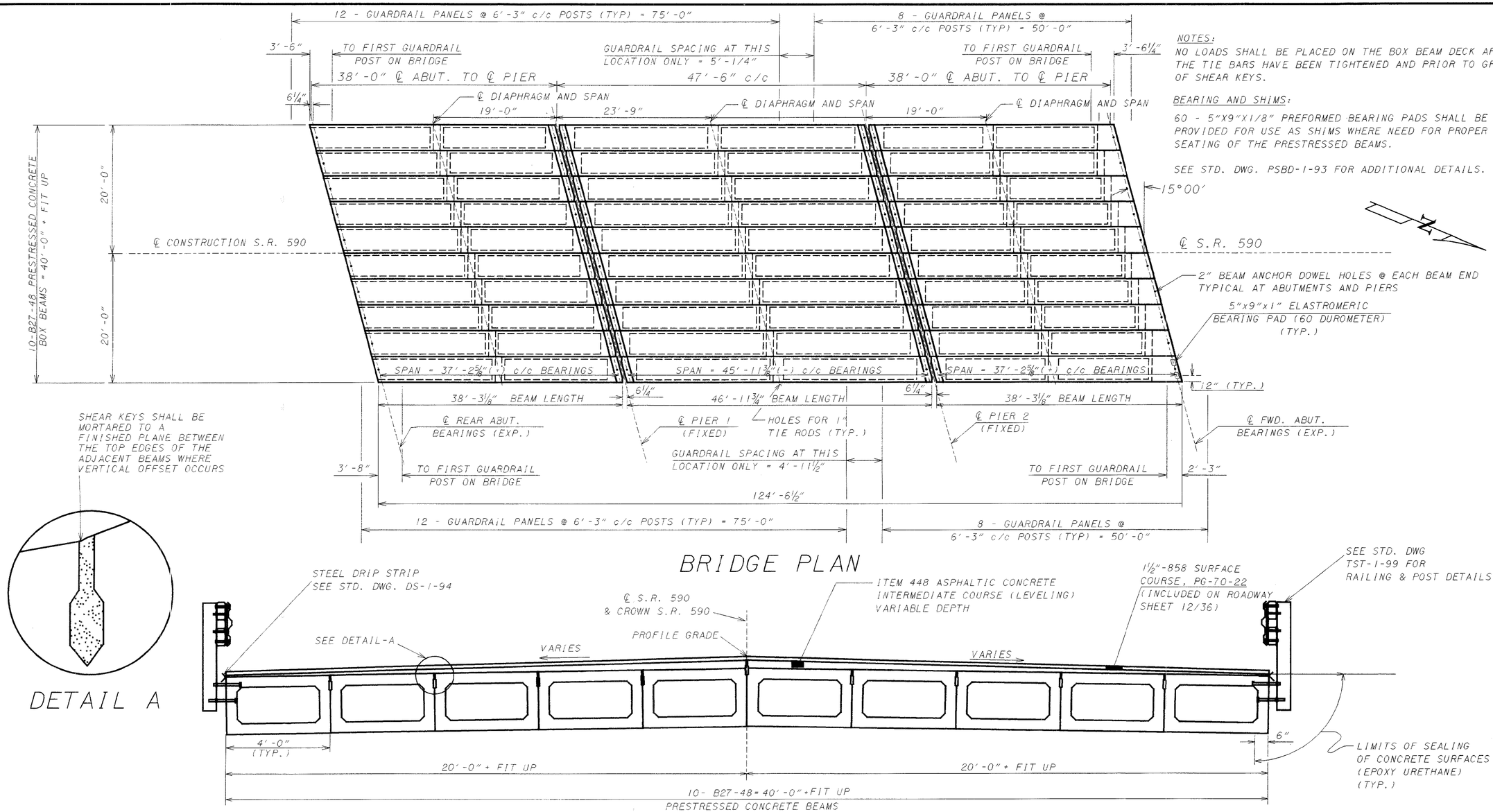
DESIGNED MTR
DRAWN MTR
CHECKED DAR
REVISED
REVIEWED JTB
DATE 11/01
STRUCTURE FILE NUMBER 7403852

PIER DETAILS
BRIDGE NO. SEN-590-0023
OVER WOLF CREEK

SEN-590-0.00

5/10

31/36



BRIDGE PLAN

NOTES:

NO LOADS SHALL BE PLACED ON THE BOX BEAM DECK AFTER THE TIE BARS HAVE BEEN TIGHTENED AND PRIOR TO GROUTING OF SHEAR KEYS.

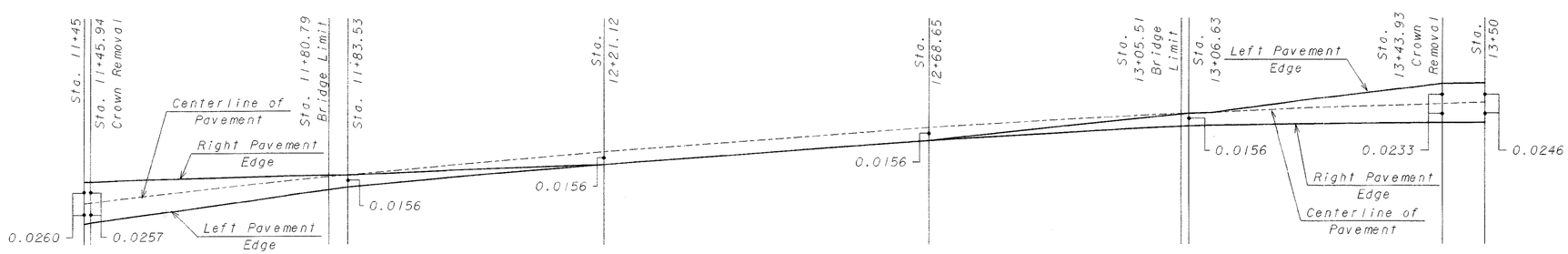
BEARING AND SHIMS:

60 - 5"X9"X1/8" PREFORMED BEARING PADS SHALL BE PROVIDED FOR USE AS SHIMS WHERE NEED FOR PROPER SEATING OF THE PRESTRESSED BEAMS.

SEE STD. DWG. PSBD-1-93 FOR ADDITIONAL DETAILS.

DETAIL A

TRANSVERSE SECTION OF DECK



PAVEMENT TRANSITION DETAIL

DESIGN AGENCY
OHIO DEPARTMENT OF TRANSPORTATION
HIGHWAY ENGINEERING
PRODUCTION DEPARTMENT

DESIGNED	DRAWN	REVIEWED	DATE
MTR	MTR	JTB	11/01
CHECKED	REVISED	STRUCTURE FILE NUMBER	
DAR		7403844	

SUPERSTRUCTURE DETAILS

BRIDGE NO. SEN-590-0023
OVER WOLF CREEK

SEN-590-0.00

6/10

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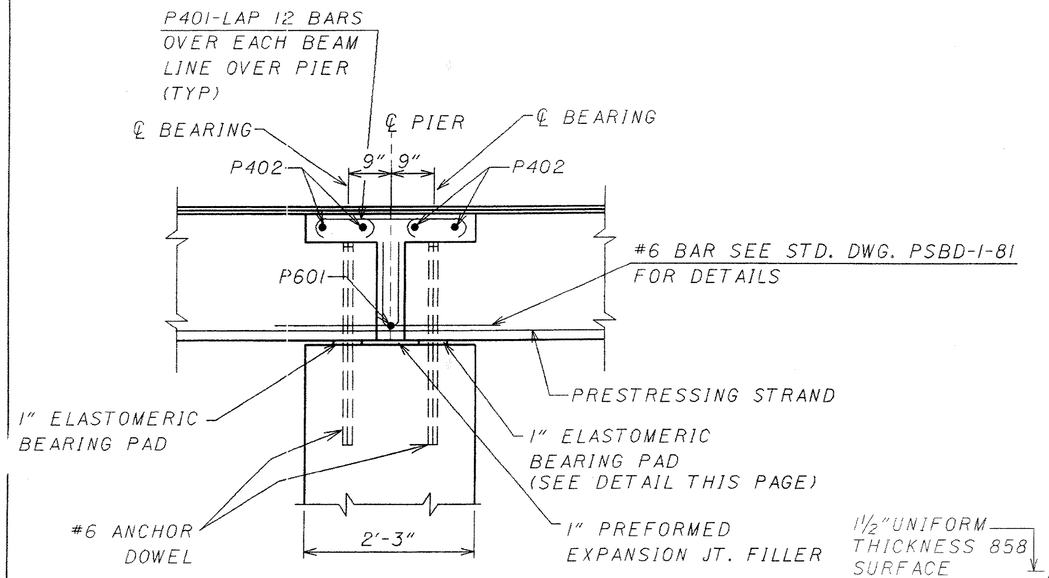
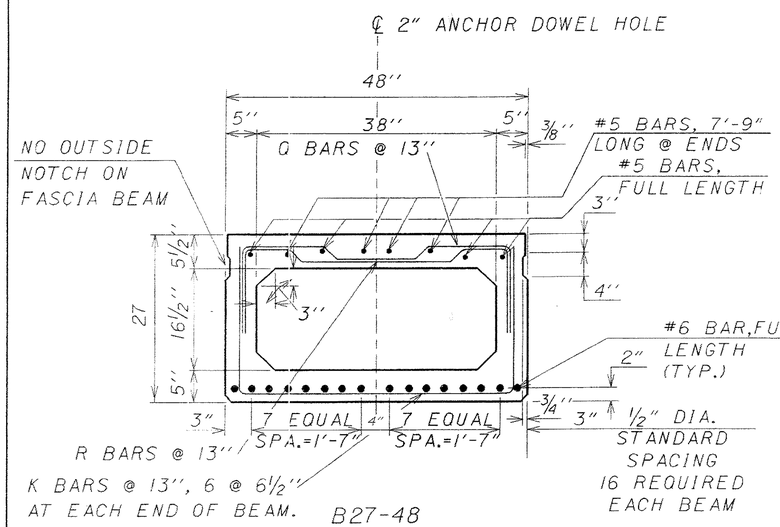


BEAM CONNECTION OVER PIER



48" WIDE NON-COMPOSITE BEAMS

(30 REQUIRED)

NOTES:

BOX BEAM REINFORCING STEEL COST SHALL BE INCLUDED WITH ITEM 865.

SEE STANDARD DRAWING PSBD-1-81 FOR DETAILS NOT INCLUDED ON THIS SHEET

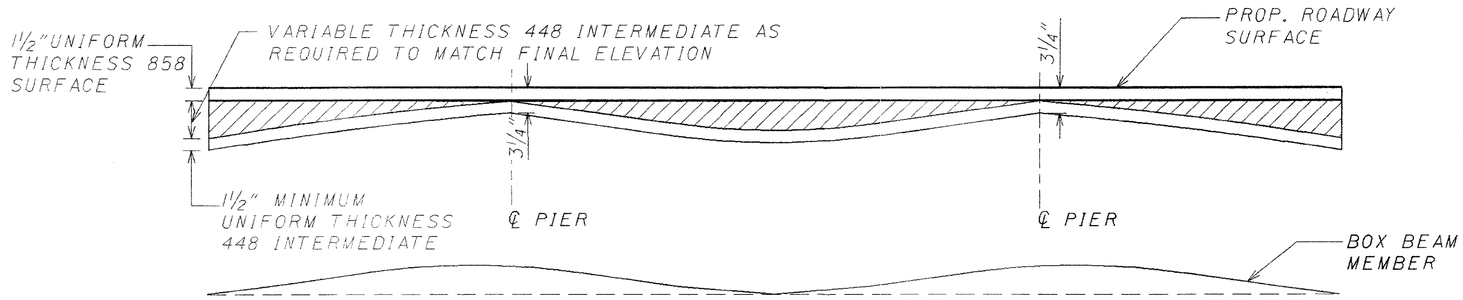
BEAM ANCHOR DOWEL

BOND BREAKER SHALL BE APPLIED TO DOWEL ABOVE PIER CAP. FILL DOWEL HOLE WITH NON-SHRINK GROUT. STOP GROUT 1" FROM TOP OF BEAM AND PLUG HOLE WITH 1" P.E.J.F.

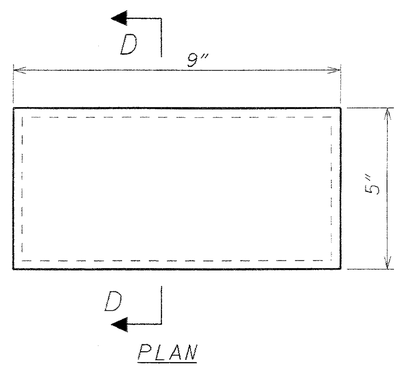
PAVEMENT TABLE

	LOCATION						
	REAR ABUTMENT	½ SPAN	PIER 1	½ SPAN	PIER 2	½ SPAN	FWD. ABUTMENT
RIGHT EDGE OF DECK	700.73	700.70	700.75	700.93	701.09	701.20	701.27
ASPHALT THICKNESS (in.)*	7.95	5.54	4.00	4.10	3.90	3.95	3.61
CENTERLINE CONST.	700.66	700.85	701.01	701.20	701.37	701.48	701.58
ASPHALT THICKNESS (in.)*	3.34	3.39	3.25	3.42	3.29	3.39	3.30
LEFT EDGE OF DECK	700.24	700.48	700.65	700.85	701.02	701.24	701.49
ASPHALT THICKNESS (in.)*	3.36	3.95	3.81	3.99	3.87	5.15	6.80

* MAY VARY BASED ON ACTUAL BEAM CAMBER



ASPHALT THICKNESS DIAGRAM

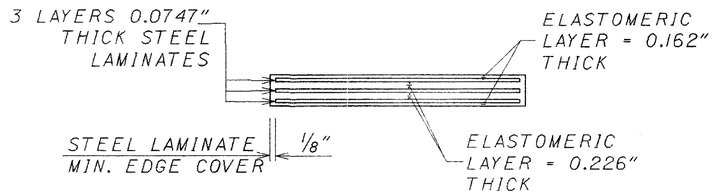


PLAN

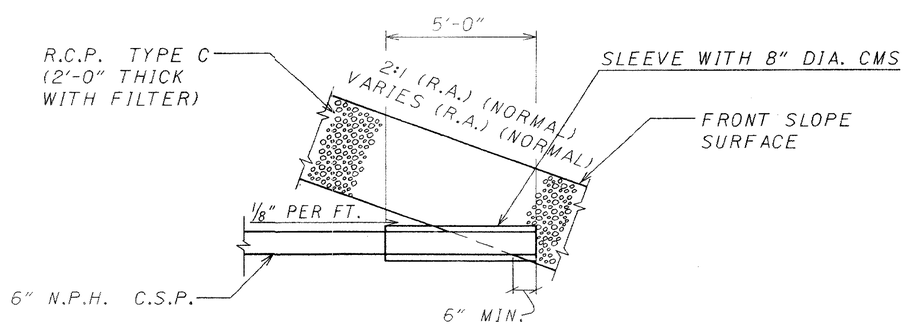
ELASTOMERIC BEARING PAD DESIGN LOADS: LOAD/PAD	END SPANS	MID SPANS
D.L.	7.95	9.85
L.L.	27.96	37.47
TOTAL LOAD	35.91	47.32

FOR BEARING PAD NOTES. SEE SHT. 2/10

LAMINATED BEARING PAD DETAILS



SECTION D-D



6" NON-PERFORATED HELICAL C.S.P.

FRONT SLOPE TERMINATING DETAIL

DESIGN AGENCY
OHIO DEPARTMENT OF TRANSPORTATION
DISTRICT No. 2
PRODUCTION DEPARTMENT

DESIGNED	DRAWN	REVIEWED	DATE
FCJ	FCJ	JTB	11/01
CHECKED	REVISED	STRUCTURE FILE NUMBER	
DAR		7403852	

MISC. DETAILS
SEN-590-0023
OVER WOLF CREEK

SEN-590-0.00

7 / 10

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36

INSPECTION RECORD FOR DRILLED SHAFTS

PROJECT NO.________

GENERAL CONTRACTOR________________
DRILLED CONTRACTOR________________
PROJECT ENGINEER________________

TYPE AND MODEL OF DRILLING MACHINERY________________
MAX CONTINUOUS TORQUE________________LBS./FT
CROWD (MAX. CONTIUOUS DOWNWARD FORCE) LBS.

TYPE OF CONCRETE PUMP______________.
HOSE DIAMETER______________(IN)
CAPACITY________________.FT /

COST PER LINEAR FOOT________________
ABOVE BEDROCK SOCKET________________
IN BEDROCK SOCKET________________
TYPE OF ROCK________________

PIER OR ABUT.	PIER OR ABUT.	STARTED	FINISHED	APPROX. ELEVATION OF TOP OF OVER BURDON	LENGTH OF DRILLED SHAFTS ABOVE THE BEDROCK SOCKET				OBSTRUCTIONS ENCOUNTERED			LENGTH OF DRILLED SHAFTS IN BEDROCK SOCKET			STEEL CASING			REINFORCING STEEL				CONCRETE					TOLERANCES			PLAN SHAFT DIAMETER (IN)	CONST. SHAFT DIAMETER (IN)
		DATE / TIME	DATE / TIME		THROUGH AIR (IN)	THROUGH WATER (IN)	THROUGH OVER BURDON (IN)	PAY LENGTH (IN)	NUMBER	SIZE (IN)	ELAPSED TIME FOR REMOVAL (HR.)	APPROX. ELEV. OF TOP OF BEDROCK	ELEV. OF BOTTOM OF BEDROCK SOCKET	LENGTH OF BEDROCK SOCKET (IN)	LENGTH (IN)	CASING GAUGE	WAS CASING LEFT IN PLACE?	VERTICAL BAR SIZE NO.	VERTICAL NO. OF REBARS	SPIRAL BAR SIZE NO.	SPIRAL PITCH (IN)	SLUMP TEST RESULT (IN)	CYLINDER STRENGTH F'C (kPa)	AIR TEMP (C)	TIME NEEDED TO PLACE CONCRETE (HR)	QUANTITY (IN	DEVIATION FROM PLUMB N-S (IN)	DEVIATION FROM PLUMB E-W (IN)	DEVIATION OF COLUMN TOP CENTER FROM PLAN LOCATION HORIZONTALLY (IN)		

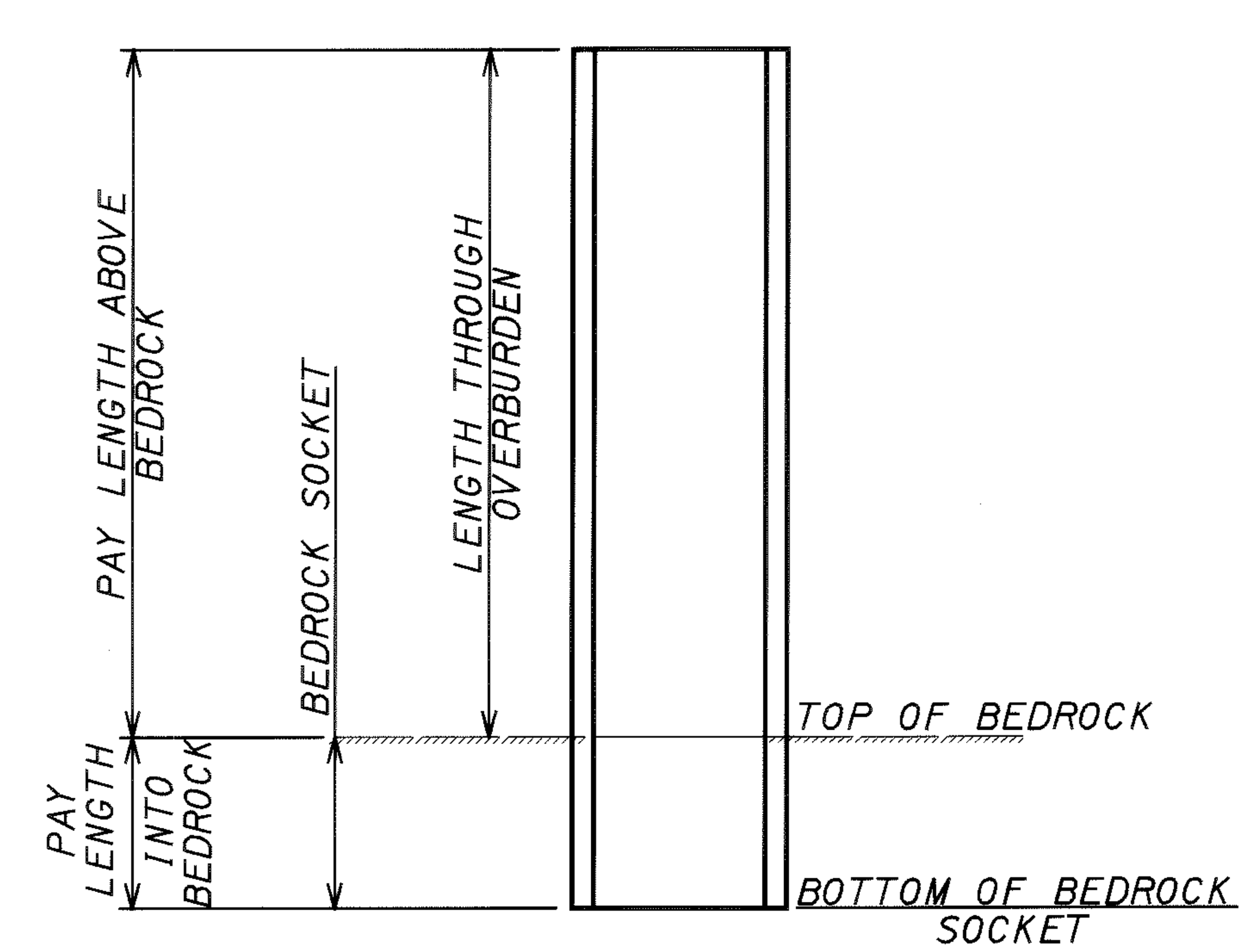
PROJECT ENGINEER COMMENTS

1. LOCATION AND EXTENT OF CAVITIES ________________

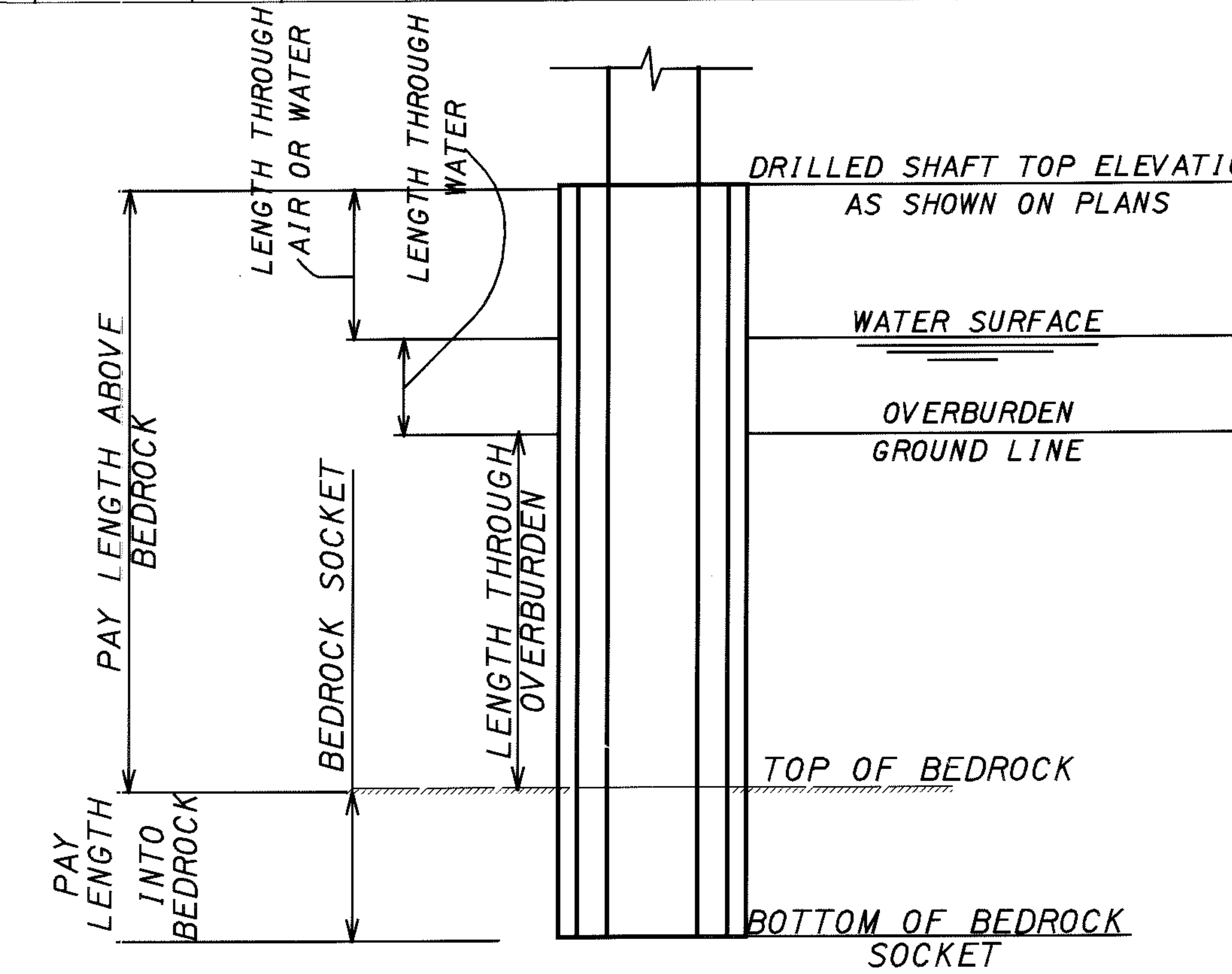
2. PROCEDURES FOR CONTROLLING WATER ________________

3. WERE UNEXPECTED SURFACE CONDITIONS ENCOUNTERED ________________

4. ANY SUGGESTIONS FOR IMPROVING PLANS ________________



ABUTMENT



PIER

DESIGN AGENCY
OHIO DEPARTMENT OF TRANSPORTATION
DISTRICT No. 2
PRODUCTION DEPARTMENT

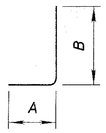
REVIEWED	DATE	STRUCTURE FILE NUMBER
JTB	11/01	
DRAWN MTR	REVISED	
DESIGNED MTR	CHECKED DAR	

CAISSON INSPECTION SHEET
SEN-590-0023
OVER WOLF CREEK

SEN-590-0.00

8/10

MARK	NUMBER REAR	NUMBER FWD	NUMBER TOTAL	LENGTH		TYPE	DIMENSIONS A	B	C	D	E	R	INC.
REINFORCEMENT SCHEDULE													
ABUTMENTS													
A1001	4	4	8	30'-0"		Str.	30'-0"						
A1002	4	4	8	19'-5"		Str.	19'-5"						
A801	4	4	8	30'-0"		Str.	30'-0"						
A802	4	4	8	28'-9"		Str.	28'-9"						
A803		36	36	13'-0"		Str.	13'-0"						
A804	36		36	14'-0"		Str.	14'-0"						
A501	8	8	16	30'-0"		Str.	30'-0"						
A502	74	74	148	7'-7"		2	2'-2"	3'-6"	2'-2"				
A503	4	4	8	28'-4"		Str.	28'-4"						
A504	4	4	8	13'-11"		Str.	13'-11"						
A505	6	6	12	7'-9"		Str.	7'-9"						
A506	6	6	12	9'-0"		Str.	9'-0"						
A507	2	2	4	3'-9"		Str.	3'-9"						
A508	2	2	4	7'-1"		19	3'-6"	3'-7"	1'-6"				
	1	1	2	11'-11"			5'-6"	1'-2"	5'-6"				
A509	SER	SER	SER	TO		2	TO	TO	TO				1'-5 3/8"
	4	4	4	16'-3"			7'-8"	1'-2"	7'-8"				
A510	1	1	2	16'-3"		2	7'-8"	1'-2"	7'-8"				
A511	2	2	4	15'-5"		2	7'-3"	1'-2"	7'-3"				
	1	1	2	12'-7"			5'-10"	1'-2"	5'-10"				
A512	SER	SER	SER	TO		2	TO	TO	TO				11 3/8"
	4	4	4	15'-5"			7'-3"	1'-11"	7'-3"				
A513	30	30	60	10'-8"		2	4'-7"	1'-11"	4'-7"				
A514	2	2	4	5'-8"		Str.	5'-8"						
A515	2	2	4	6'-4"		Str.	6'-4"						
A516	2	2	4	6'-7"		Str.	6'-7"						
A517	2	2	4	6'-5"		19	4'-10"	1'-7"	9"				
PIERS													
P1001	10	10	20	30'-0"		Str.	30'-0"						
P1002	10	10	20	18'-7"		Str.	18'-7"						
P801		30	30	15'-2"		Str.	15'-2"						
P802	30		30	21'-6"		Str.	21'-6"						
P601	4	4	8	22'-3"		17	22'-3"						
P501	4	4	8	30'-0"		Str.	30'-0"						
P502	4	4	8	14'-3"		Str.	14'-3"						
P503	58	58	116	7'-11"		2	2'-10"	3'-0"	2'-10"				
P504	8	8	16	6'-7"		2	2'-2"	3'-0"	2'-2"				
P401	120	120	240	3'-8"		Str.	2'-8"						
P402	8	8	16	6'-7"		Str.	22'-1"						
SP401		36	36	10'-5"		27	10'-5"	2'-6"	4½"				
SP402		30	30	12'-1"		27	12'-1"	2'-6"	4½"				
SP403	30		30	18'-4"		27	18'-4"	2'-6"	4½"				
SP404	36		36	11'-5"		27	11'-5"	2'-6"	4½"				



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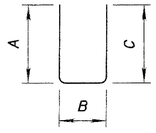
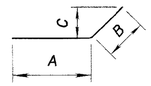


TYPE-2

TYPE-17



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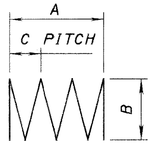

TYPE-27

NOTE: REBAR DIMENSIONS ARE SHOWN FOR INFORMATION PURPOSES ONLY. IF THE REINFORCING LIST IS USED, IT SHALL BE VERIFIED BY THE CONTRACTOR. ANY REVISION IN THE REINFORCING SHALL NOT BE A REASON FOR ADJUSTMENT IN THE BID PRICE OF STRUCTURAL CONCRETE.

BAR DIMENSIONS SHOWN ARE OUT TO OUT UNLESS OTHERWISE INDICATED. "R" INDICATES INSIDE RADIUS, UNLESS OTHERWISE NOTED. "STD" WRITTEN IN PLACE OF A DIMENSION INDICATES A STANDARD BEND AT THE END OF THE BAR.

ALL REINFORCING STEEL TO BE EPOXY COATED.

DESIGN AGENCY
OHIO DEPARTMENT OF TRANSPORTATION
DISTRICT No. 2
PRODUCTION DEPARTMENT

DESIGNED DAR | DRAWN DAR | CHECKED FCJ | REVISED | REVISED | REVISED JTB | DATE 11/01

STRUCTURE FILE NUMBER 7403844

REINFORCEMENT SCHEDULE

BRIDGE NO. SEN-590-0023
SR 590 OVER WOLF CREEK

SEN-590-0.00

9 / 10

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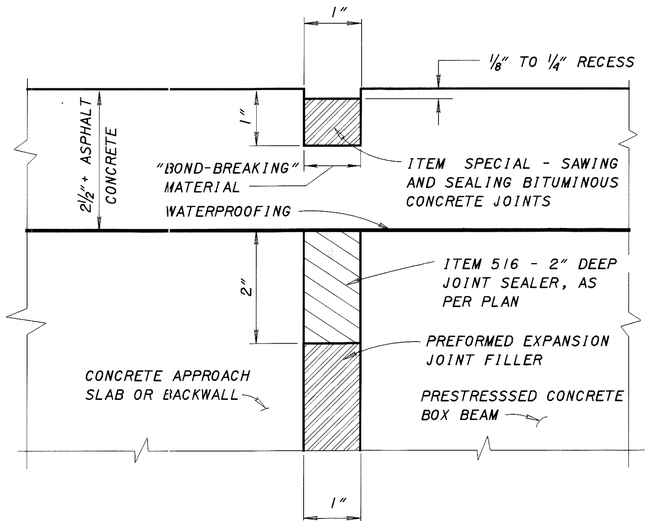


SEALING OF JOINTS AT ABUTMENTS

ITEM SPECIAL-SAWING AND SEALING BITUMINOUS CONCRETE JOINTS

1) DESCRIPTION:

THIS WORK SHALL CONSIST OF CUTTING AND SEALING TRANSVERSE JOINTS IN THE NEW BITUMINOUS CONCRETE OVERLAY OF BOX BEAM BRIDGES. BITUMINOUS CONCRETE JOINTS SHALL BE CONSTRUCTED DIRECTLY OVER, AND IN LINE WITH, THE EXISTING UNDERLYING TRANSVERSE ABUTMENT JOINT OF THE BOX BEAMS.

2) MATERIALS:

THE JOINT SEALANT SHALL MEET THE REQUIREMENTS OF ITEM 705.04, JOINT SEALANTS, HOT-POURED, FOR CONCRETE AND ASPHALT PAVEMENTS. ACCEPTABLE ALTERNATE MATERIALS ARE:

A SILICONE SEALANT MEETING FEDERAL SPECIFICATIONS TT-S-001543A CLASS A (ONE-PART SILICONE SEALANTS) AND TT-S-00230C CLASS A (ONE-COMPONENT SEALANTS), SUCH AS THOSE MANUFACTURED BY GENERAL ELECTRIC, SILICONE PRODUCTS DIVISION, 4015 EXECUTIVE PARK DRIVE, CINCINNATI, OHIO 45242 (513-243-1953)OR DOW CORNING, 400 TECHNE CENTER, SUITE 103, MILFORD, OHIO 45150 (513-831-3586); OR SOF-SEAL,A COLD-APPLIED, LOW-MODULUS,TWO-COMPONENT POLYMERIC COMPOUND HORIZONTAL SEALANT AS MANUFACTURED BY W.R.MEADOWS, INC., P.O.BOX 543,ELGIN,ILLINOIS 60121 (800-342-5976).

3) CONSTRUCTION DETAILS:

A) GENERAL: THE CONTRACTOR SHALL CONDUCT HIS OPERATION SO THAT THE CUTTING, CLEANING AND SEALING OF TRANSVERSE JOINTS IS A CONTINUOUS OPERATION THAT WILL BE PERFORMED AS SOON AS PRACTICAL AFTER THE PAVING, BUT NO LATER THAN FOUR (4) DAYS AFTER PLACEMENT OF THE ASPHALT CONCRETE SURFACE COURSE. TRAFFIC SHALL NOT BE ALLOWED TO KNEAD TOGETHER OR DAMAGE JOINT CUT PRIOR TO SEALING.

B) CUTTING OF TRANSVERSE JOINTS: THE CONTRACTOR SHALL SAW OR ROUTE TRANSVERSE JOINTS TO THE DIMENSIONS SHOWN IN THE DETAILS ON THIS SHEET. THE CUT JOINTS SHALL LIE DIRECTLY ABOVE EACH BOX BEAM ABUTMENT JOINT.

THE BLADE OR BLADES SHALL BE OF SUCH SIZE THAT THE FULL WIDTH AND DEPTH OF THE CUT CAN BE MADE WITH ONE PASS. DRY OR WET CUTTING WILL BE ALLOWED. JOINTS SHALL EXTEND THE FULL WIDTH OF THE BRIDGE.

C) CLEANING JOINTS: DRY SAWED JOINTS SHALL BE THOROUGHLY CLEANED WITH A SUFFICIENT AMOUNT OF COMPRESSED AIR TO REMOVE ANY DIRT, DUST, OR DELETERIOUS MATTER. WET SAWED JOINTS SHALL BE WASHED CLEAN OF ALL CUTTINGS BY FLUSHING WITH A JET OF WATER AND WITH OTHER TOOLS AS NECESSARY. AFTER FLUSHING, THE JOINT SHALL BE BLOWN OUT WITH COMPRESSED AIR. WHEN THE SURFACES ARE THOROUGHLY CLEAN AND DRY, AND JUST PRIOR TO PLACING THE JOINT SEALER, COMPRESSED AIR HAVING A PRESSURE OF AT LEAST 90 P.S.I. SHALL BE USED TO BLOW OUT THE JOINT AND REMOVE ALL TRACES OF DUST. IN THE EVENT FRESHLY CUT JOINTS BECOME CONTAMINATED BEFORE THEY ARE SEALED, THEY SHALL BE RECLEANED OF ALL FOREIGN MATERIAL BY HIGH PRESSURE WATER JET.

D) SEALING JOINTS: THE JOINT SHALL BE THOROUGHLY DRY WHEN THE SEALANT IS PLACED. AFTER CLEANING AND DRYING, A BOND-BREAKER MATERIAL SHALL BE APPLIED TO THE BOTTOM OF THE GROOVE.

HOT-POURED JOINT SEALANT MATERIAL SHALL BE HEATED IN A KETTLE OR MELTER CONSTRUCTED AS A DOUBLE BOILER, WITH THE SPACE BETWEEN THE INNER AND OUTER SHELLS FILLED WITH OIL OR OTHER HEAT TRANSFER MEDIUM. POSITIVE TEMPERATURE CONTROL AND MECHANICAL AGITATION SHALL BE PROVIDED. HEATING MUST BE IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION. JOINT SEALER MATERIAL SHALL NEVER BE KEPT HEATED AT THE POURING TEMPERATURE FOR MORE THAN FOUR (4) HOURS AND SHALL NEVER BE REHEATED. SEALER LEFT IN THE APPLICATOR AT THE END OF A DAY'S WORK SHALL NOT BE USED.

HOT-POURED SEALANT SHALL BE APPLIED IMMEDIATELY THROUGH A NOZZLE, WHICH MUST PROJECT INTO THE SAWED JOINT, FILLING FROM THE BOTTOM UP. THE SEALANT SHALL COMPLETELY FILL THE JOINT IN SUCH A MANNER THAT, AFTER COOLING, THE LEVEL OF THE SEALANT WILL NOT BE HIGHER THAN 1/8" BELOW THE PAVEMENT SURFACE. ANY DEPRESSION IN THE COOLED SEAL GREATER THAN 3/16" SHALL BE BROUGHT UP TO THE SPECIFIED LIMIT BY FURTHER ADDITION OF HOT-POURED SEALANT. CARE SHALL BE TAKEN IN THE SEALING OF THE JOINTS SO THAT THE FINAL APPEARANCE WILL PRESENT A NEAT FINE LINE.

THE COLD APPLIED SEALANT MATERIALS (POLYURETHANE, SILICONE, AND POLYMERIC COMPOUNDS) SHALL BE INSTALLED AS PER MANUFACTURERS' RECOMMENDATIONS, EXCEPT AS MODIFIED BY THIS DRAWING. THE SEALANT SHALL BE INSTALLED WHEN THE AMBIENT TEMPERATURE IS 40 DEGREES F OR HIGHER. TRAFFIC SHALL NOT BE ALLOWED ON THE JOINT FOR ONE HOUR AFTER APPLICATION OF THE SEALANT.

4) METHOD OF MEASUREMENT:

THE QUANTITY TO BE PAID FOR UNDER THIS ITEM WILL BE THE NUMBER OF LINEAR FEET OF JOINTS SAWED AND SEALED AS PER THE ABOVE REQUIREMENTS.

5) BASIS OF PAYMENT:

THE UNIT PRICE PER LINEAR FOOT FOR ITEM SPECIAL-"SAWING AND SEALING BITUMINOUS CONCRETE JOINTS" SHALL INCLUDE THE COST OF ALL LABOR, MATERIALS, AND EQUIPMENT NECESSARY TO COMPLETE THE WORK, INCLUDING THE FURNISHING AND PLACING OF THE JOINT SEALER MATERIAL.

ITEM 516 - 2" DEEP JOINT SEALER, AS PER PLAN

THIS ITEM SHALL MEET THE MATERIAL (SECTION 2) AND SEALING (SECTION 3D) SPECIFICATIONS OF ITEM SPECIAL-SAWING AND SEALING BITUMINOUS CONCRETE JOINTS.

DESIGN AGENCY
OHIO DEPARTMENT OF TRANSPORTATION
DISTRICT No. 2
PRODUCTION DEPARTMENT

DESIGNED	DRAWN	REVIEWED	DATE
VEB/JFF	MJB/BDB	WJJ/LMW	
CHECKED	REVISED	STRUCTURE FILE NUMBER	
WTF/JAM			

PLAN INSERT SHEET
ABUTMENT JOINTS IN BITUMINOUS CONCRETE, BOX BEAM BRIDGES

SEN-590-0.00

10/10

36/36

SPECIAL PROVISIONS

WATERWAY PERMITS
FOR
SEN - SR 590 - 0.00

PID
20693

U.S. ARMY CORPS OF ENGINEERS
PERMIT NUMBER: NATIONWIDE # 3, #33

OHIO EPA
PERMIT NUMBER: _____

DATE: January 18, 2002

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO
ATTENTION OF:

January 18, 2002

Regulatory Branch

SUBJECT: Application No. 2002-00668(0), Nationwide Permit Nos. (03), and (33) as Published in the Federal Register, Volume 61, No. 241, on Friday December 13, 1996, and as modified in the Federal Register, Volume 65, No. 47, on Thursday March 9, 2000

Mr. Gordon Proctor
Ohio Department of Transporation
Office of Environmental Services
Attention: William Cody
1980 West Broad Street
Columbus, Ohio 43223

Dear Mr. Proctor:

This pertains to your application for a Department of the Army permit to replace the bridge over Wolf Creek SEN-SR 590 PID: 20693, located at SR 590 Bridge over Wolf Creek, in the City of Bettsville, Seneca County, Ohio.

I have evaluated the impacts associated with your proposal, and have concluded that they are authorized by the enclosed Nationwide Permits provided that the attached conditions are satisfied.

Verification of the applicability of Nationwide Permit Nos. 1, 2, 4-11, 13, 15-25, and 28-38, and authorization to commence work pursuant to these permits, is valid until February 11, 2002. Verification of Nationwide Permit Nos. 3, 7, 12, 14, 27, and 39-43 is valid for two years from the affirmation date unless these Nationwide Permits are subsequently modified, suspended, or revoked. The expiring permits are currently under review for reauthorization. If your affirmation is based on one of the expiring Nationwide Permits, your affirmation will remain valid for two years if the expiring permits are reissued without modification, or your project complies with any subsequent permit modifications. Please note that if you commence or are under contract to commence this activity in reliance of your affirmation, you have twelve months from the date of permit modification, expiration, or revocation to complete the work under the present terms and conditions of these Nationwide

Permits unless these Nationwide Permits have been subject to the provisions of discretionary authority.

It is your responsibility to remain informed of changes to the Nationwide Permit program. A public notice announcing any changes will be issued when they occur. The may also be found on the internet at "www.usace.army.mil/inet/functions/cw/cecwo/reg/citizen.htm". Finally, note that if your activity is not undertaken within the defined period or the project specifications have changed, you must immediately notify this office to determine the need for further approval or reverification.

In addition to the general conditions attached to the Nationwide Permit, your attention is directed to the following Special Conditions which are also appended at the end of the Nationwide Permit General Conditions:

1. That you are responsible for ensuring that the contractor and/or workers executing the activity(s) authorized by this permit have knowledge of the terms and conditions of the authorization and that a copy of the permit document is at the project site throughout the period the work is underway.

2. That efforts shall be made to keep construction debris from entering the waterway or wetland, and shall be removed immediately should any such debris be present in the waterway or wetland.

3. That no in-water work shall be performed between April 15 and June 15 to preclude adverse impacts on the spawning, nursery, and feeding activities of indigenous fish species.

4. That the mechanical equipment used to execute the work authorized herein shall be operated in such a way as to minimize turbidity that could degrade water quality and adversely affect aquatic plant and animal life.

5. That during the dewatering of areas behind cofferdams precautions shall be taken to minimize the release of suspended solids into any water of the United States.

6. Disturbance to the bed and/or banks of the stream shall be

limited to those areas shown on the attached project plans.

Your initiation of work as authorized by the enclosed Nationwide Permits acknowledges your acceptance of the general and special conditions contained therein. Be advised, this affirmation is limited to the attached Nationwide Permits and associated Water Quality Certification, and does not obviate the need to obtain any other project specific Federal, state, or local authorization.

Questions pertaining to this matter should be directed to me at (716) 879-4331, by writing to the following address: U.S. Army Corps of Engineers, 1776 Niagara Street, Buffalo, New York 14207, or by e-mail at: geraldine.l.larson@usace.army.mil

Sincerely,

Geraldine L. Larson
Biologist

Enclosures

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

(ii) Discharges of dredged or fill material, including excavation, into all waters of the United States to remove accumulated sediments and debris in the vicinity of, and within, existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.) and the placement of new or additional rip rap to protect the structure, provided the permittee notifies the District Engineer in accordance with General Condition 13. The removal of sediment is limited to the minimum necessary to restore the waterway in the immediate vicinity of the structure to the approximate dimensions that existed when the structure was built, but cannot extend further than 200 feet in any direction from the structure. The placement of rip rap must be the minimum necessary to protect the structure or to ensure the safety of the structure. All excavated materials must be deposited and retained in an upland area unless otherwise specifically approved by the District Engineer under separate authorization. Any bank stabilization measures not directly associated with the structure will require a separate authorization from the District Engineer.

(iii) Discharges of dredged or fill material, including excavation, into all waters of the United States for activities associated with the restoration of upland areas damaged by a storm, flood, or other discrete event, including the construction, placement, or installation of upland protection structures and minor dredging to remove obstructions in waters of the United States. (Uplands lost as a result of a storm, flood, or other discrete event can be replaced without a Section 404 permit provided the uplands are restored to their original pre-event location. This NWP is for the activities in waters of the United States associated with the replacement of the uplands.) The permittee must notify the District Engineer, in accordance with General Condition 13, within 12 months of the date of the damage and the work must commence, or be under contract to commence, within two years of the date of the damage. The permittee should provide evidence, such as a recent topographic survey or photographs, to justify the extent of the proposed restoration. The restoration of the damaged areas cannot exceed the contours, or ordinary high water mark, that existed prior to the damage. The District Engineer retains the right to determine the extent of the pre-existing conditions and the extent of any restoration work authorized by this permit. Minor dredging to remove obstructions from the adjacent waterbody is limited to 50 cubic yards below the plane of the ordinary high water mark, and is limited to the amount necessary to restore the pre-existing bottom contours of the waterbody. The dredging may not be done primarily to obtain fill for any restoration activities. The discharge of dredged or fill material and all related work needed to restore the upland must be part of a single and complete project. This permit cannot be used in conjunction with NWP 18 or NWP 19 to restore damaged upland areas. This permit does not authorize the replacement of lands lost through gradual erosion processes.

Maintenance dredging for the primary purpose of navigation and beach restoration are not authorized by this permit. This permit does not authorize new stream channelization or stream relocation projects. Any work authorized by this permit must not cause more than minimal degradation of water quality, more than minimal changes to the flow characteristics of the stream, or increase flooding (See General Conditions 9 and 21). (Sections 10 and 404)

Note: This NWP authorizes the minimal impact repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the Section 404(f) exemption for maintenance.

(33) Temporary Construction, Access and Dewatering. Temporary structures, work and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites; provided that the associated primary activity is authorized by the Corps of Engineers or the U.S. Coast Guard, or for other construction activities not subject to the Corps or U.S. Coast Guard regulations. Appropriate measures must be taken to maintain near normal downstream flows and to minimize flooding. Fill must be of materials, and placed in a manner, that will not be eroded by expected high flows. The use of dredged material may be allowed if it is determined by the District Engineer that it will not cause more than minimal adverse effects on aquatic resources. Temporary fill must be entirely removed to upland areas, or dredged material returned to its original location,

following completion of the construction activity, and the affected areas must be restored to the pre-project conditions. Cofferdams cannot be used to dewater wetlands or other aquatic areas so as to change their use. Structures left in place after cofferdams are removed require a Section 10 permit if located in navigable waters of the United States. (See 33 CFR Part 322). The permittee must notify the District Engineer in accordance with the "Notification" general condition. The notification must also include a restoration plan of reasonable measures to avoid and minimize adverse effects to aquatic resources. The District Engineer will add special conditions, where necessary, to ensure that adverse environmental effects are minimal. Such conditions may include: limiting the temporary work to the minimum necessary; requiring seasonal restrictions; modifying the restoration plan; and requiring alternative construction methods (e.g., construction mats in wetlands where practicable.). (Sections 10 and 404)

PERMIT CONDITIONS

C. Nationwide Permit General Conditions

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

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

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

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

4. Aquatic Life Movements. No activity may substantially disrupt the movement of those species of aquatic life indigenous to the waterbody, including those species which normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.

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

6. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions which may have been added by the division engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the State or tribe in its Section 401 water quality certification and Coastal Zone Management Act consistency determination.

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

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

9. Water Quality.

(a) In certain States and tribal lands an individual 401 water quality certification must be obtained or waived (See 33 CFR 330.4(c)).

(b) For NWPs 12, 14, 17, 18, 32, 39, 40, 42, 43, and 44, where the State or tribal 401 certification (either generically or individually) does not require or approve a water quality management plan, the permittee must include design criteria and techniques that will ensure that the authorized work does not result in more than minimal degradation of water quality. An important component of a water quality management plan includes stormwater management that minimizes degradation of the downstream aquatic system, including water quality. Refer to General Condition 21 for stormwater management requirements. Another important component of a water quality management plan is the establishment and maintenance of vegetated buffers next to open waters, including streams. Refer to General Condition 19 for vegetated buffer requirements for the NWPs.

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

11. Endangered Species.

(a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act, or which will destroy or adversely modify the critical habitat of such species. Non-federal permittees shall notify the District Engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or is located in the designated critical habitat and shall not begin work on the activity until notified by the District Engineer that the requirements of the Endangered Species Act have been satisfied and that the activity is authorized. For activities that may affect Federally-listed endangered or threatened species or designated critical habitat, the notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. As a result of formal or informal consultation with the FWS or NMFS, the District Engineer may add species-specific regional endangered species conditions to the NWPs.

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

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

13. Notification.

(a) **Timing:** Where required by the terms of the NWP, the prospective permittee must notify the District Engineer with a preconstruction notification (PCN) as early as possible. The District Engineer must determine if the PCN is complete within 30 days of the date of receipt and can request the additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the District

Engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the District Engineer. The prospective permittee shall not begin the activity:

(1) Until notified in writing by the District Engineer that the activity may proceed under the NWP with any special conditions imposed by the District or Division Engineer; or

(2) If notified in writing by the District or Division Engineer that an individual permit is required; or

(3) Unless 45 days have passed from the District Engineer's receipt of the complete notification and the prospective permittee has not received written notice from the District or Division Engineer. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

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

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

(2) Location of the proposed project;

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

(4) For NWPs 7, 12, 14, 18, 21, 34, 38, 39, 40, 41, 42, and 43, the PCN must also include a delineation of affected special aquatic sites, including wetlands, vegetated shallows (e.g., submerged aquatic vegetation, seagrass beds), and riffle and pool complexes (see paragraph 13(f));

(5) For NWP 7, Outfall Structures and Maintenance, the PCN must include information regarding the original design capacities and configurations of those areas of the facility where maintenance dredging or excavation is proposed.

(6) For NWP 14, Linear Transportation Crossings, the PCN must include a compensatory mitigation proposal to offset permanent losses of waters of the United States and a statement describing how temporary losses of waters of the United States will be minimized to the maximum extent practicable.

(7) For NWP 21, Surface Coal Mining Activities, the PCN must include an Office of Surface Mining (OSM) or state-approved mitigation plan.

(8) For NWP 27, Stream and Wetland Restoration, the PCN must include documentation of the prior condition of the site that will be reverted by the permittee.

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

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

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

(iii) A description of the entire parcel, including its size, and a delineation of wetlands. For the purpose of this NWP, parcels of land measuring 1/4 acre or less will not require a formal on-site delineation. However, the applicant shall provide an indication of where the wetlands are and the amount of wetlands that exists on the property. For parcels greater than 1/4 acre in size, a formal wetland delineation must be prepared in accordance with the current method required by the Corps. (See paragraph 13(f));

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

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

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

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

(iii) Location of the dredged material disposal site.

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

(12) For NWPs 39, 43, and 44, the PCN must also include a written statement to the District Engineer explaining how avoidance and minimization of losses of waters of the United States were achieved on the project site.

(13) For NWP 39, Residential, Commercial, and Institutional Developments, and NWP 42, Recreational Facilities, the PCN must include a compensatory mitigation proposal that offsets unavoidable losses of waters of the United States or justification explaining why compensatory mitigation should not be required.

(14) For NWP 40, Agricultural Activities, the PCN must include a compensatory mitigation proposal to offset losses of waters of the United States.

(15) For NWP 43, Stormwater Management Facilities, the PCN must include, for the construction of new stormwater management facilities, a maintenance plan (in accordance with State and local requirements, if applicable) and a compensatory mitigation proposal to offset losses of waters of the United States.

(16) For NWP 44, Mining Activities, the PCN must include a description of all waters of the United States adversely affected by the project, a description of measures taken to minimize adverse effects to waters of the United States, a description of measures taken to comply with the criteria of the NWP, and a reclamation plan (for aggregate mining activities in isolated waters and non-tidal wetlands adjacent to headwaters and any hard rock/mineral mining activities).

(17) For activities that may adversely affect Federally-listed endangered or threatened species, the PCN must include the name(s) of those endangered or threatened species that may be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work.

(18) For activities that may affect historic properties listed in, or eligible for listing in, the National Register of Historic Places, the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property.

(19) For NWPs 12 and 14, where the proposed work involves discharges of dredged or fill material into waters of the United States resulting in permanent, above-grade fills within 100-year floodplains (as identified on FEMA's Flood Insurance Rate Maps or FEMA-approved local floodplain maps), and for NWPs 29, 39, 40, 42, 43, and 44, where the proposed work involves discharges of dredged or fill material into waters of the United States resulting in permanent, above-grade fills within 100-year floodplains of headwater streams, the notification must include documentation demonstrating that the proposed work complies with the appropriate FEMA or FEMA-approved local floodplain construction requirements.

(c) Form of Notification: The standard individual permit application form (Form ENG 4345) may be used as the notification but must clearly indicate that it is a PCN and must include all of the information required in (b) (1)-(19) of General Condition 13. A letter containing the requisite information may also be used.

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

Any compensatory mitigation proposal must be approved by the District Engineer prior to commencing work. If the prospective permittee is required to submit a compensatory mitigation proposal with the PCN, the proposal may be either conceptual or detailed. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the District Engineer will expeditiously review the proposed compensatory mitigation plan. The District Engineer must review the plan within 45 days of receiving a complete PCN and determine whether the conceptual or specific proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the District Engineer to be minimal, the District Engineer will provide a timely written response to the applicant stating that the project can proceed under the terms and conditions of the nationwide permit.

If the District Engineer determines that the adverse effects of the proposed work are more than minimal, then he will notify the applicant either: (1) that the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (2) that the project is authorized under the NWP subject to the applicant's submission of a mitigation proposal that would reduce the adverse effects on the aquatic environment to the minimal level; or (3) that the project is authorized under the NWP with specific modifications or conditions. Where the District Engineer determines that mitigation is required in order to ensure no more than minimal adverse effects on the aquatic environment, the activity will be authorized within the 45-day PCN period, including the necessary conceptual or specific mitigation or a requirement that the applicant submit a mitigation proposal that would reduce the adverse effects on the aquatic environment to the minimal level. When conceptual mitigation is included, or a mitigation plan is required under item (2) above, no work in waters of the United States will occur until the District Engineer has approved a specific mitigation plan.

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

For activities requiring notification to the District Engineer that result in the loss of greater than 1/2 acre of waters of the United States, the District Engineer will, upon receipt of a notification, provide immediately (e.g., via facsimile transmission, overnight mail, or other expeditious manner), a copy to the appropriate offices of the Fish and Wildlife Service, State natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO), and, if appropriate, the National Marine Fisheries Service. With the exception of NWP 37, these agencies will then have 10 calendar days from the date the material is transmitted to telephone or fax the District Engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the District Engineer will wait an additional 15 calendar days before making a decision on the notification. The District Engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency, except as provided below. The District Engineer will indicate in the administrative record associated with each notification that the resource agencies' concerns were considered. As required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act, the District Engineer will provide a response to National Marine Fisheries Service within 30 days of receipt of any Essential Fish Habitat conservation recommendations. Applicants are encouraged to provide the Corps multiple copies of notifications to expedite agency notification.

(f) Wetlands Delineations: Wetland delineations must be prepared in accordance with the current method required by the Corps. For NWP 29 see paragraph (b)(9)(iii) for parcels less than 1/4 acre in size. The permittee may ask the Corps to delineate the special aquatic site. There may be some delay if the Corps does the delineation. Furthermore, the 45-day period will not start until the wetland delineation has been completed and submitted to the Corps, where appropriate.

14. Compliance Certification. Every permittee who has received a Nationwide permit verification from the Corps will submit a signed certification regarding the completed work and any required mitigation. The certification will be forwarded by the Corps with the authorization letter. The certification will include: a.) A statement that the authorized work was done in accordance with the Corps authorization, including any general or specific conditions; b.) A statement that any required mitigation was completed in accordance with the permit conditions; and c.) The signature of the permittee certifying the completion of the work and mitigation.

15. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3 acre.

16. Water Supply Intakes. No activity, including structures and work in navigable waters of the United States or discharges of dredged or fill material, may occur in the proximity of a public water supply intake except where the activity is for repair of the public water supply intake structures or adjacent bank stabilization.

17. Shellfish Beds. No activity, including structures and work in navigable waters of the United States or discharges of dredged or fill material, may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWP 4.

18. Suitable Material. No activity, including structures and work in navigable waters of the United States or discharges of dredged or fill material, may consist of unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.) and material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

19. Mitigation. The project must be designed and constructed to avoid and minimize adverse effects to waters of the United States to the maximum extent practicable at the project site (i.e., on site). Mitigation will be required when necessary to ensure that the adverse effects to the aquatic environment are minimal. The District Engineer will consider the factors discussed below when determining the acceptability of appropriate and practicable mitigation necessary to offset adverse effects on the aquatic environment that are more than minimal.

(a) Compensatory mitigation at a minimum 1:1 ratio will be required for all wetland impacts requiring a PCN. Consistent with National policy, the District Engineer will establish a preference for restoration of wetlands to meet the minimum compensatory mitigation ratio, with preservation used only in exceptional circumstances.

(b) To be practicable, the mitigation must be available and capable of being done considering costs, existing technology, and logistics in light of the overall project purposes. Examples of mitigation that may be appropriate and practicable include, but are not limited to: reducing the size of the project; establishing and maintaining wetland or upland vegetated buffers to protect open waters such as streams; and replacing losses of aquatic resource functions and values by creating, restoring, enhancing, or preserving similar functions and values, preferably in the same watershed;

(c) The District Engineer will require restoration, creation, enhancement, or preservation of other aquatic resources in order to offset the authorized impacts to the extent necessary to ensure that the adverse effects on the aquatic environment are minimal. An important element of any compensatory mitigation plan for projects in or near streams or other open waters is the establishment and maintenance, to the maximum extent practicable, of vegetated buffers next to open waters on the project site. The vegetated buffer should consist of native species. The District Engineer will determine the appropriate width of the vegetated buffer and in which cases it will be required. Normally, the vegetated buffer will be 25 to 50 feet wide on each side of the stream, but the District Engineer may require wider vegetated buffers to address documented water quality concerns. If there are open waters on the project site and the District Engineer requires compensatory mitigation for wetland impacts to ensure that the net adverse effects on the aquatic environment are minimal, any vegetated buffer will comprise no more than 1/3 of the remaining compensatory mitigation acreage after the permanently filled wetlands have been replaced on a one-to-one acreage basis. In addition, compensatory mitigation must address adverse effects on wetland functions and values and cannot be used to offset the acreage of wetland losses that

would occur in order to meet the acreage limits of some of the NWPs (e.g., for NWP 39, 1/4 acre of wetlands cannot be created to change a 1/2 acre loss of wetlands to a 1/4 acre loss; however, 1/2 acre of created wetlands can be used to reduce the impacts of a 1/3 acre loss of wetlands). If the prospective permittee is required to submit a compensatory mitigation proposal with the PCN, the proposal may be either conceptual or detailed.

(d) To the extent appropriate, permittees should consider mitigation banking and other appropriate forms of compensatory mitigation. If the District Engineer determines that compensatory mitigation is necessary to offset losses of waters of the United States and ensure that the net adverse effects of the authorized work on the aquatic environment are minimal, consolidated mitigation approaches, such as mitigation banks, will be the preferred method of providing compensatory mitigation, unless the District Engineer determines that activity-specific compensatory mitigation is more appropriate, based on which is best for the aquatic environment. These types of mitigation are preferred because they involve larger blocks of protected aquatic environment, are more likely to meet the mitigation goals, and are more easily checked for compliance. If a mitigation bank or other consolidated mitigation approach is not available in the watershed, the District Engineer will consider other appropriate forms of compensatory mitigation to offset the losses of waters of the United States to ensure that the net adverse effects of the authorized work on the aquatic environment are minimal.

20. Spawning Areas. Activities, including structures and work in navigable waters of the United States or discharges of dredged or fill material, in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., excavate, fill, or smother downstream by substantial turbidity) of an important spawning area are not authorized.

21. Management of Water Flows. To the maximum extent practicable, the activity must be designed to maintain preconstruction downstream flow conditions (e.g., location, capacity, and flow rates). Furthermore, the activity must not permanently restrict or impede the passage of normal or expected high flows (unless the primary purpose of the fill is to impound waters) and the structure or discharge of dredged or fill material must withstand expected high flows. The activity must, to the maximum extent practicable, provide for retaining excess flows from the site, provide for maintaining surface flow rates from the site similar to preconstruction conditions, and must not increase water flows from the project site, relocate water, or redirect water flow beyond preconstruction conditions. In addition, the activity must, to the maximum extent practicable, reduce adverse effects such as flooding or erosion downstream and upstream of the project site, unless the activity is part of a larger system designed to manage water flows.

22. Adverse Effects From Impoundments. If the activity, including structures and work in navigable waters of the United States or discharge of dredged or fill material, creates an impoundment of water, adverse effects on the aquatic system caused by the accelerated passage of water and/or the restriction of its flow shall be minimized to the maximum extent practicable.

23. Waterfowl Breeding Areas. Activities, including structures and work in navigable waters of the United States or discharges of dredged or fill material, into breeding areas for migratory waterfowl must be avoided to the maximum extent practicable.

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

25. Designated Critical Resource Waters. Critical resource waters include, NOAA-designated marine sanctuaries, National Estuarine Research Reserves, National Wild and Scenic Rivers, critical habitat for Federally listed threatened and endangered species, coral reefs, State natural heritage sites, and outstanding national resource waters or other waters officially designated by a State as having particular environmental or ecological significance and identified by the District Engineer after notice and opportunity for public comment. The District Engineer may also designate additional critical resource waters after notice and opportunity for comment.

(a) Except as noted below, discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, and 44 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters. Discharges of dredged or fill materials into waters of the United States may be authorized by the above NWPs in National Wild and Scenic Rivers if the activity complies with General Condition 7. Further, such discharges may be authorized in designated critical habitat for Federally listed threatened or endangered species if the activity complies with General Condition 11 and the U.S. Fish and Wildlife Service or the National Marine Fisheries Service has concurred in a determination of compliance with this condition.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with General Condition 13, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The District Engineer may authorize activities under these NWPs only after he determines that the impacts to the critical resource waters will be no more than minimal.

26. Fills Within 100-Year Floodplains. For purposes of this general condition, 100-year floodplains will be identified through the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps or FEMA-approved local floodplain maps.

(a) Discharges Below Headwaters. Discharges of dredged or fill material into waters of the United States resulting in permanent, above-grade fills within the 100-year floodplain at or below the point on a stream where the average annual flow is five cubic feet per second (i.e., below headwaters) are not authorized by NWPs 29, 39, 40, 42, 43, and 44. For NWPs 12 and 14, the prospective permittee must notify the District Engineer in accordance with General Condition 13 and the notification must include documentation that any permanent, above-grade fills in waters of the United States within the 100-year floodplain below headwaters comply with FEMA or FEMA-approved local floodplain construction requirements.

(b) Discharges in Headwaters (i.e., above the point on a stream where the average annual flow is five cubic feet per second).

(1) Flood Fringe. Discharges of dredged or fill material into waters of the United States resulting in permanent, above-grade fills within the flood fringe of the 100 year floodplain of headwaters are not authorized by NWPs 12, 14, 29, 39, 40, 42, 43, and 44, unless the prospective permittee notifies the District Engineer in accordance with General Condition 13. The notification must include documentation that such discharges comply with FEMA or FEMA-approved local floodplain construction requirements.

(2) Floodway. Discharges of dredged or fill material into waters of the United States resulting in permanent, above-grade fills within the floodway of the 100-year floodplain of headwaters are not authorized by NWPs 29, 39, 40, 42, 43, and 44. For NWPs 12 and 14, the permittee must notify the District Engineer in accordance with General Condition 13 and the notification must include documentation that any permanent, above grade fills proposed in the floodway comply with FEMA or FEMA-approved local floodplain construction requirements.

D. Further Information:

1. District engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other Federal, State, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project.

E. Definitions:

Best management practices: Best Management Practices (BMPs) are policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural. A BMP policy may affect the limits on a development.

Compensatory mitigation: For purposes of Section 10/404, compensatory mitigation is the restoration, creation, enhancement, or in exceptional circumstances, preservation of wetlands and/or other aquatic resources for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Creation: The establishment of a wetland or other aquatic resource where one did not formerly exist.

Enhancement: Activities conducted in existing wetlands or other aquatic resources which increase one or more aquatic functions.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Farm tract: A unit of contiguous land under one ownership which is operated as a farm or part of a farm.

Flood Fringe: That portion of the 100-year floodplain outside of the floodway (often referred to as "floodway fringe."

Floodway: The area regulated by Federal, state, or local requirements to provide for the discharge of the base flood so the cumulative increase in water surface elevation is no more than a designated amount (not to exceed one foot as set by the National Flood Insurance Program) within the 100-year floodplain.

Independent utility: A test to determine what constitutes a single and complete project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases are not built can be considered as separate single and complete projects with independent utility.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that include the filled area and other waters that are permanently adversely affected by flooding, excavation, or drainage as a result of the regulated activity. Permanent adverse effects include permanent above-grade, at-grade, or below-grade fills that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is the threshold measurement of the impact to existing waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and values. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to preconstruction contours and elevations after construction, are not included in the measurement of loss of waters of the United States.

Non-tidal wetland: A non-tidal wetland is a wetland (i.e., a water of the United States) that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., the spring high tide line).

Open waters: An area that, during a year with normal patterns of precipitation, has standing or flowing water for sufficient duration to establish an ordinary high water mark. Aquatic vegetation within the area of standing or flowing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. The term "open water" includes rivers, streams, lakes, and ponds. For the purposes of the NWPs, this term does not include ephemeral waters.

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Permanent above-grade fill: A discharge of dredged or fill material into waters of the United States, including wetlands, that results in a substantial increase in ground elevation and permanently converts part or all of the waterbody to dry land. Structural fills authorized by NWPs 3, 25, 36, etc. are not included.

Preservation: The protection of ecologically important wetlands or other aquatic resources in perpetuity through the implementation of appropriate legal and physical mechanisms. Preservation may include protection of upland areas adjacent to wetlands as necessary to ensure protection and/or enhancement of the overall aquatic ecosystem.

Restoration: Re-establishment of wetland and/or other aquatic resource characteristics and function(s) at a site where they have ceased to exist, or exist in a substantially degraded state.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Steep gradient sections of streams are sometimes characterized by riffle and pool complexes. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. Pools are characterized by a slower stream velocity, a streaming flow, a smooth surface, and a finer substrate.

Single and complete project: The term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers (see definition of independent utility). For linear projects, the "single and complete project" (i.e., a single and complete crossing) will apply to each crossing of a separate water of the United States (i.e., a single waterbody) at that location. An exception is for linear projects crossing a single waterbody several times at separate and distant locations: each crossing is considered a single and complete project. However, individual channels in a braided stream or river, or individual arms of a large, irregularly-shaped wetland or lake, etc., are not separate waterbodies.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and BMPs, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream channel to increase the rate of water flow through the stream channel. Manipulation may include deepening, widening, straightening, armoring, or other activities that change the stream cross-section or other aspects of stream channel geometry to increase the rate of water flow through the stream channel. A channelized stream remains a water of the United States, despite the modifications to increase the rate of water flow.

Tidal wetland: A tidal wetland is a wetland (i.e., a water of the United States) that is inundated by tidal waters. The definitions of a wetland and tidal waters can be found at 33 CFR 328.3(b) and 33 CFR 328.3(f), respectively. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line (i.e., spring high tide line) and are inundated by tidal waters two times per lunar month, during spring high tides.

Vegetated buffer: A vegetated upland or wetland area next to rivers, streams, lakes, or other open waters which separates the open water from developed areas, including agricultural land. Vegetated buffers provide a variety of aquatic habitat functions and values (e.g., aquatic habitat for fish and other aquatic organisms, moderation of water temperature changes, and detritus for aquatic food webs) and help improve or maintain local water quality. A vegetated buffer can be established by maintaining an existing vegetated area or planting native trees, shrubs, and herbaceous plants on land next to open waters. Mowed lawns are not considered vegetated buffers because they provide little or no aquatic habitat functions and values. The establishment and maintenance of vegetated buffers is a method of compensatory mitigation that can be used in conjunction with the restoration, creation, enhancement, or preservation of aquatic habitats to ensure that activities authorized by NWPs result in

minimal adverse effects to the aquatic environment. (See General Condition 19.)

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: A waterbody is any area that in a normal year has water flowing or standing above ground to the extent that evidence of an ordinary high water mark is established. Wetlands contiguous to the waterbody are considered part of the waterbody.

Ohio

Nationwide Permit Program -- Further Information

The Buffalo District Engineer has added the following Regional Special Condition for the geographic areas described below:

For any discharge involving Nationwide Permit Nos. 12, 13, 14, 18, 23, and 26 the prospective permittee must notify the District Engineer in accordance with the "Notification" general condition.

This Special Condition applies to all affected waters of the United States, including named waterbodies, unnamed tributaries, isolated wetlands, and wetlands adjacent to above-headwaters streams, within the following geographic areas:

(1) The Chagrin River watershed from U.S. Route 6 upstream, including the Aurora Branch and Bass Lake. Included within the watershed are all or parts of: Kirtland Township, Lake County; the municipalities of Beachwood, Gatesville, Mayfield, Mayfield Heights, Highland Heights, Pepper Pike, Hunting Valley, Chagrin Falls, Orange, Woodmere, and Bentleyville and Moreland Hills, Warrensville and Solon Townships, Cuyahoga County; Chester, Munson, Russell, Newbury, Bainbridge and Auburn Townships, Geauga County; and Aurora, Mantua, Streetsboro and Shalersville Townships, Portage County.

(2) The entire East Branch Watershed from its confluence with the Chagrin River, upstream. Included within the watershed are parts of Kirtland Township, Lake County; and Chardon, Munson and Chester Townships, Geauga County.

(3) The entire Tinker's Creek Watershed from its confluence with the Cuyahoga River, upstream. Included within this geographic area are parts of: the municipalities of Valley View, Walton Hills, Maple Heights, Bedford, Bedford Heights, Oakwood, Glenwillow, Warrensville Heights, North Randall and Orange, and Warrensville, Bedford and Solon Townships, Cuyahoga County; Twinsburg and Hudson Townships, Summit County; and Streetsboro and Franklin Townships, Portage County.

(4) The Twin Lakes Watershed from the confluence of the outlet at Lake Rockwell, upstream. The watershed is located in Streetsboro and Franklin Townships, Portage County.

(5) The Lake Brunswick Watershed from the outlet of Lake Brunswick, upstream. The watershed is located in Brunswick Hills and Hinckley Townships, Medina County.

(6) The Oak Openings Region of the Lake Erie Sand Plains west of Toledo, Ohio. The region includes parts of Richfield, Sylvania, Spencer, Springfield, Harding, Monclova, Swanton, Waterville and Providence Townships, Lucas County; Swan Creek and York Townships, Fulton County; and Washington and Liberty Townships, Henry County.

The following general limitations, in accordance with the Ohio Environmental Protection Agency Water Quality Certification, have been attached to your Nationwide Permit(s):

PART 1: NATIONWIDE PERMITS (NWPs) - GENERAL LIMITATIONS

A) Stream limitations:

1) Temporary or permanent impacts to intermittent and perennial streams for any single and complete project are limited to a maximum of two hundred (200) linear feet [except for NWPs 12 & 27].

2) Temporary or permanent impacts to ephemeral streams for any single and complete project are limited to a maximum of three hundred (300) linear feet [except for NWPs 12 & 27].

3) Temporary or permanent impacts to Exceptional Warmwater Habitat (EWH), Cold Water Habitat (CWH), Seasonal Salmonid (SS) or equivalent stream designation are prohibited [except for NWP 3 and maintenance activities covered under NWP 12].

4) Temporary or permanent impacts to the designated portions of national or state scenic rivers are prohibited [except for NWP 3 and maintenance activities covered under NWP 12].

5) Stream reconstruction activities shall adhere to natural channel design techniques.

B) Wetland limitations:

1) Temporary or permanent impacts to Category 3 wetlands are prohibited.

2) Temporary or permanent impacts to Category 1 and 2 wetlands for any single and complete project are limited to a maximum total of ½ acre [except for NWP 27].

3) Wetland mitigation shall adhere to the requirements set forth in Ohio EPA's Wetland Water Quality Standards (OAC 3745-1-50 through 54). [In the event that suitable mitigation cannot be located within the watershed, mitigation may be located outside of the watershed if there are significant ecological reasons to do so].

C) General limitations:

1) Impacts shall be measured linearly from upstream to downstream, including the length of stream impoundments, when calculating the total length of stream impacts [except for NWP 12, for which impacts shall be measured bank-to-bank].

2) NWPs cannot be combined to increase any of the aforementioned limitations.

3) The Best Management Practices (BMPs) listed in Part 3 of this certification shall be utilized with all NWPs when applicable.

4) For any real estate subdivision which is exempted by the Corps of Engineers from the ½ acre threshold, the aggregate total loss of waters of the state in such subdivision shall not exceed one (1) acre of temporary or permanent impacts to wetlands or two hundred (200) feet of temporary or permanent impacts to streams.

5) Authorization under this Certification does not relieve the permittee from the responsibility of obtaining any other federal, state or local permits, approvals or authorizations required by law, including without limitation, National Pollutant Discharge Elimination System (NPDES) permits or Permits to install (PTIs).

PART 2: NATIONWIDE PERMITS (NWPs) - SPECIAL CONDITIONS

Nationwide Permit 3 (maintenance):

1) Total surface water and vegetation impacts on either side of the replacement structure shall be limited to the greater of 25 feet beyond the structure, or 25 feet beyond the toe of the slope of the structure's approach embankment. [Where the use of a crane necessary to conduct a maintenance activity, total impacts shall not exceed 50 feet on either side

of the structure or approach embankment]. In either case, total impacts, including the structure, shall not exceed 200 feet [except for stabilization projects]. Width shall be measured at the structure's narrowest point as it crosses the waterbody, and be measured parallel to stream flow.

2) Culvert replacement:

A) This Certification shall only authorize minor deviations from the existing structure's centerline and minor deviations in culvert dimensions, unless these deviations are necessary to follow current safety standards.

3) Bridge Replacement:

A) This Certification shall only authorize minor deviations from the existing structure's centerline, unless these deviations are necessary to follow current safety standards.

B) Bridge replacements shall not result in additional lanes unless necessary to follow current safety standards.

4) Maintenance or repair of existing fills (stabilization projects):

A) Impacts from maintenance or repair of existing fills shall not exceed the dimensions of the fill prior to the damage.

5) Removal of accumulated sediment:

A) Removal of accumulated sediment shall occur only once per year, except in cases of emergency situations which threaten life or property.

B) Removal of accumulated sediments shall be limited to low-flow conditions whenever practicable, except in cases of emergency situations which threaten life or property.

Nationwide Permit 33 (Temporary Construction, Access and Dewatering):

1) Temporary shall be defined as less than one year in duration.

2) This Nationwide Permit (33) does not authorize construction, or maintenance, or modification of marina basins.

3) This Nationwide Permit (33) does not authorize activities in special aquatic sites as defined in 40 CFR 230.3(q-1).

4) This Nationwide Permit (33) shall not authorize temporary construction access and dewatering associated with mining activities.

PART 3: BEST MANAGEMENT PRACTICES (BMPs)

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

2) Vegetated buffer strips extending to the top of both stream banks and beyond as stipulated by the Corps or Ohio EPA, using native tree and shrub species with rapid growth characteristics shall be planted as soon as practicable after impacting stream channel slopes.

3) Impacts to riparian vegetation shall be minimized to the maximum extent practicable. Entry to stream channels shall be through a single point of access per stream bank whenever practicable to minimize disturbance to the riparian corridor.

4) Excavating equipment shall not be placed below the Ordinary High Water Mark of any surface water, except when no other alternative is practicable.

5) Chemicals, fuel, lubricants, sewage and waste materials shall not be discharged to waters of the state.

6) In-stream activities shall not result in the destabilization of the stream banks or stream bed so that aquatic habitat is degraded or adversely affected by turbidity, erosion or scouring.

7) Any fill used for bank stabilization shall be limited to that amount necessary to provide erosion protection.

8) Asphalt and rubber tires may not be used as fill below the Ordinary High Water Mark or as bank protection.

9) In-stream work shall be conducted during low-flow conditions whenever practicable in order to minimize adverse impacts to water quality away from the project site, except in cases of emergency situations which threaten life or property.

10) All dredged material placed at an upland site shall be controlled so that sediment runoff to the waterway is minimized to the maximum extent practicable.

You are hereby notified that these actions of the Director are final and may be appealed to the Environmental Review Appeals Commission pursuant to Section 3745.04 of the Ohio Revised Code by any person who was a party to this proceeding. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. It must be filed with the Environmental Review Appeals Commission within thirty (30) days after the notice of the Director's action. A copy of the appeal must be served on the Director of the Ohio Environmental Protection Agency and the Environmental Enforcement Section of the Office of the Attorney General within three days (3) of the filing with the Commission. An appeal may be filed with the Environmental Review Appeals Commission, 236 East Town Street, Room 30, Columbus, Ohio 43266-0557.

INFORMATION ON NATIONWIDE PERMIT VERIFICATION

Verification of the applicability of this Nationwide permit is valid for two years from the date of affirmation unless the Nationwide permit is modified, suspended or revoked. This verification will remain valid for two years if during this two year period the Nationwide permit is reissued without modification or your activity complies with any subsequent permit modification. Please note that if you commence or are under contract to commence this activity in reliance of your permit prior to the date this Nationwide permit is suspended or revoked, or is modified such that your activity no longer complies with the terms and conditions, you have twelve months from the date of permit modification, expiration, or revocation to complete the activity under the present terms and conditions of this permit, unless this permit has been subject to the provisions of discretionary authority.

It is your responsibility to remain informed of changes to the Nationwide Permit program. A public notice announcing any changes will be issued when they occur. Finally, note that if your activity is not undertaken within the two year period or the project specifications have changed, you must immediately notify this office to determine the need for further approval or reverification.

Possession of this permit does not obviate you of the need to contact all appropriate state and/or local governmental officials to insure that the project complies with their requirements.

OHIO'S SCENIC RIVERS FACT SHEET

Little Miami River* - Designated Scenic on 3 separate dates.
April 23, 1969 - Clermont County line at Loveland to headwaters, including North Fork.
September 19, 1969 - Clermont County line at Loveland to confluence with East Fork.
October 27, 1971 - From confluence with East Fork to Ohio River.
Miles designated (approximate): 105

Sandusky River - Designated Scenic on January 5, 1970.
U.S. Route 30 in Upper Sandusky to Roger Young Memorial Park in Fremont.
Miles designated (approximate): 65

Olentangy River - Designated Scenic on August 24, 973.
Delaware Dam to Wilson Bridge Road in Worthington.
Miles designated (approximate): 22

Little Beaver Creek** - Designated Wild and Scenic on January 15, 1974.
Wild segments - West Fork from 0.25 mile downstream from Township Road 914 to confluence with Middle Fork. North Fork from Township Road 952 to confluence with Little Beaver Creek. Little Beaver Creek from confluence of West and Middle Forks downstream to 0.75 mile north of Grimm's Bridge.
Scenic segments - North Fork from Ohio-Pennsylvania line downstream to Jackman Road. Middle Fork from Elkton Road (Township Road 901) downstream to confluence with West Fork. Little Beaver Creek from 0.75 mile north of Grimm's Bridge downstream to the Ohio-Pennsylvania line.
Miles designated (approximate): Wild 20, Scenic 16

Grand River - Designated Wild and Scenic on January 17, 1974.
Wild segment - from Harpersfield covered bridge downstream to Norfolk and Western Railroad trestle south of Painesville.
Scenic segment - from State Route 322 bridge in Ashtabula County downstream to Harpersfield covered bridge.
Miles designated (approximate): Wild 23, Scenic 33

Upper Cuyahoga River - Designated Scenic on June 26, 1974.
Troy-Burton Township line in Geauga County to U.S. Route 14.
Miles designated (approximate): Scenic 25

Maumee River - Designated Scenic and Recreational on July 18, 1974.
Scenic segment - Ohio-Indiana line to State Route 24 bridge west of Defiance.
Recreational segment - State Route 24 Bridge west of Defiance to U.S. Route 25 Bridge near Perrysburg.
Miles designated (approximate): Scenic 43, Recreational 10

Stillwater River System - Designated Recreational on July 1, 1975~ Designated Scenic on October 14, 1980 and April 27, 1982.
Recreational segment - Englewood dam to confluence with Great Miami River.
Scenic segments - Stillwater River from Riffle Road Bridge in Darke County to Englewood Dam. Greenville Creek from the Ohio-Indiana state line to the confluence with the Stillwater.
Miles designated (approximate): Scenic 83, Recreational 10

Chagrin River - Designated Scenic on July 2, 1979.
Aurora Branch from State Route 82 bridge downstream to confluence with Chagrin. Chagrin River from confluence with Aurora Branch downstream to State Route 6 Bridge. East Branch from Heath Road Bridge downstream to confluence with Chagrin.
Miles designated (approximate): Scenic 49

Big and Little Darby Creeks - Designated Scenic on June 22, 1984.
Big Darby Creek from the Champaign-Union County line downstream to the Conrail railroad trestle and from the confluence with the Little Darby Creek downstream to the Scioto River. Little Darby Creek from the Lafayette-Plain City Road Bridge downstream to within 0.8 mile from the confluence with Big Darby Creek.
Miles designated (approximate): Scenic 82

* In August 1973, the Little Miami was designated a Scenic component of the National System from Clifton to Foster. In January, 1980 the portion from Foster to the Ohio River was designated a Recreational component of the National system. Total designation is 92 miles.

** In October, 1975, Little Beaver Creek was designated a component of the National Wild and Scenic River System: Little Beaver Creek main stem, from confluence of West Fork with Middle Fork near Williamsport to mouth~ North Fork from confluence of Brush Run and North Fork to confluence of North Fork with main stem at Fredericktown~ Middle Fork from vicinity of County Road 901 (Elkton Road) bridge crossing to confluence of Middle Fork with West Fork near Williamsport~ West fork from vicinity of County Road 914 (Y-camp Road) bridge crossing east to confluence of West Fork with Middle Fork near Williamsport. Total designation is approximately 33 miles.

For more information, contact:
Ohio Department of Natural Resources
Division of Natural Areas and Preserves
1889 Fountain Square Court
Columbus, Ohio 43224
(614) 265-6453

NATIONWIDE PERMIT SPECIAL CONDITIONS

1. That you are responsible for ensuring that the contractor and/or workers executing the activity(s) authorized by this permit have knowledge of the terms and conditions of the authorization and that a copy of the permit document is at the project site throughout the period the work is underway.

2. That efforts shall be made to keep construction debris from entering the waterway or wetland, and shall be removed immediately should any such debris be present in the waterway or wetland.

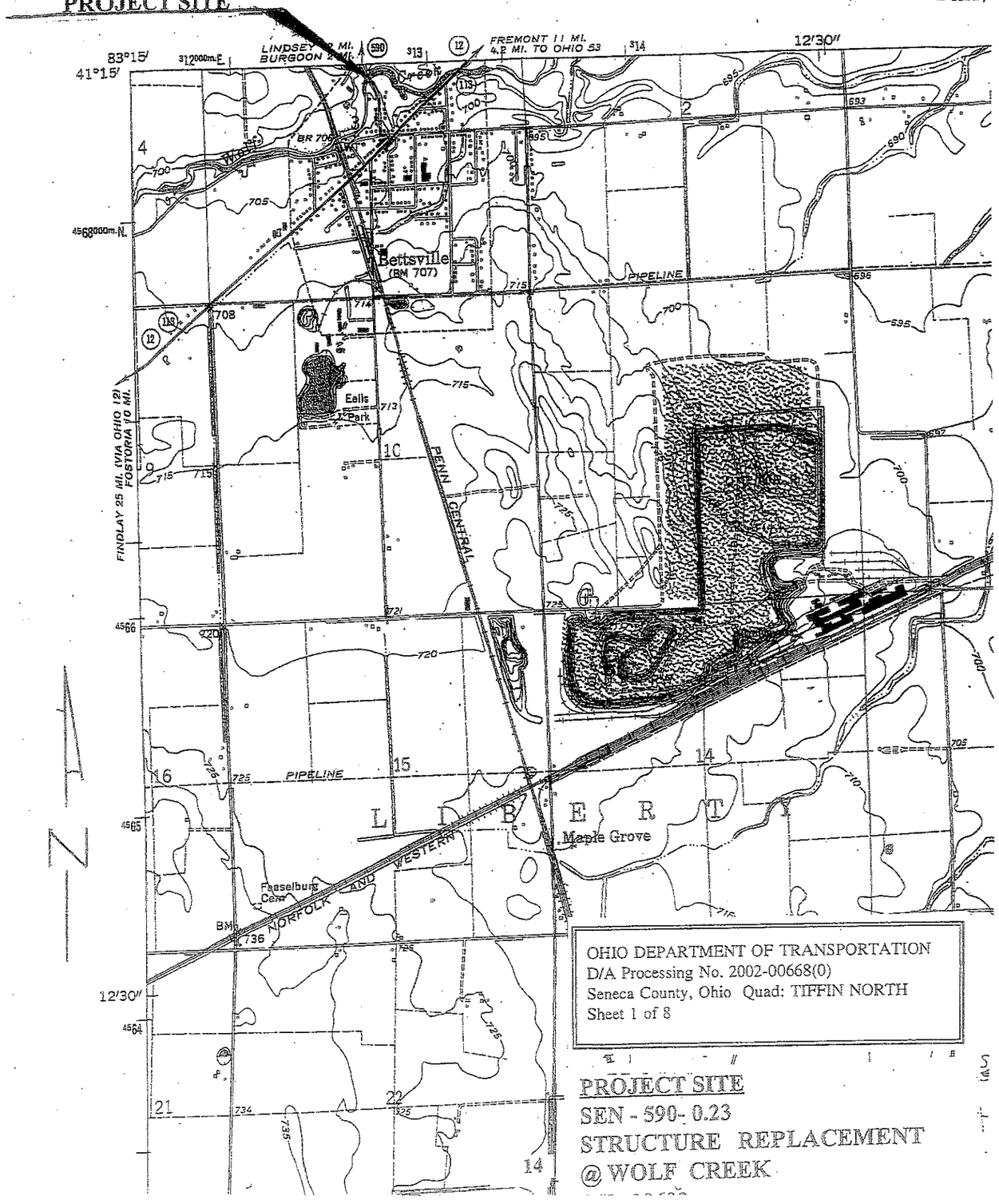
3. That no in-water work shall be performed between April 15 and June 15 to preclude adverse impacts on the spawning, nursery, and feeding activities of indigenous fish species.

4. That the mechanical equipment used to execute the work authorized herein shall be operated in such a way as to minimize turbidity that could degrade water quality and adversely affect aquatic plant and animal life.

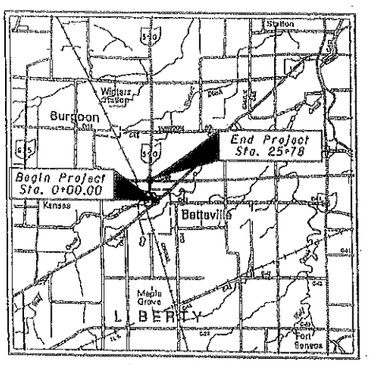
5. That during the dewatering of areas behind cofferdams precautions shall be taken to minimize the release of suspended solids into any water of the United States.

6. Disturbance to the bed and/or banks of the stream shall be limited to those areas shown on the attached project plans.

TIFFIN NORTH QUADRANGLE
OHIO—SENECA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SEN-590-0.00
VILLAGE OF BETTSVILLE
LIBERTY TOWNSHIP
SENECA COUNTY



LOCATION MAP

LATITUDE: 41°15'00" LONGITUDE: 83°14'06"

SCALE IN MILES
0 1 2 3 4

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

DESIGN DESIGNATION

CURRENT ADT (2002) 1420
ADT (20221 1640
GROWTH (2022) 250
DISTRIBUTION 50%
D (K) 6%
..... 50 mph
..... 50 mph

CLASSIFICATION -
COLLECTOR

FUNCTIONS - 2 Lanes

UTILITIES
48 DAYS
DIAL OHIO UTILITIES PROTECTION SERVICE
1-800-362-2764 (TOLL FREE)
OHIO UTILITIES PROTECTION SERVICE
CALL BEFORE YOU DIG
DIRECTLY

PREPARED BY:
Engineers
Division
Control

ENGINEERS SEAL
STATE OF OHIO
DOUG A. ROGERS
E-63903
REGISTERED PROFESSIONAL ENGINEER

SIGNED: 4/28/99
DATE:

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SUBSURFACE INVESTIGATION SHEETS	

PROJECT DESCRIPTION

IMPROVEMENT OF 0.39 MILE OF SR 590 BY RESURFACING THE PAVEMENT AND REPLACEMENT OF BRIDGE NO. SEN-590-0023 OVER WOLF CREEK.

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 REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY EXCEPT AS NOTED ON SHEET 11, AND THAT DETOURS WILL BE PROVIDED AS INDICATED ON THE PLANS.

UNDER AUTHORITY OF SECTION 4511.21, DIVISION (I) OF THE OHIO REVISED CODE, THE REVISED PRIMA FACIE SPEED LIMITS AS INDICATED HEREIN ARE DETERMINED TO BE REASONABLE AND SAFE, AND ARE HEREBY ESTABLISHED FOR THE DURATION OF THIS PROJECT. THE PRIMA FACIE SPEED LIMIT OR LIMITS HEREBY ESTABLISHED SHALL BECOME EFFECTIVE WHEN APPROPRIATE SIGNS GIVING NOTICE THEREOF ARE ERECTED.

APPROVED _____
DATE _____ DISTRICT DEPUTY DIRECTOR

APPROVED _____
DATE _____ DIRECTOR, DEPARTMENT OF TRANSPORTATION

FEDERAL PROJECT NO.	PID NO.	CONSTRUCTION PROJECT NO.	RAILROAD INVOLVEMENT	
	20693		NONE	SEN-590-0.00

1/34

STANDARD CONSTRUCTION DRAWINGS

BP-3.1	7/20/00	MT-97.11M	1/30/98	
BP-4.1	7/20/00	MT-99.10M	1/30/95	
		MT-101.60M	4/25/94	
DM-4.1	7/20/01	MT-103.10M	4/25/94	
DM-4.2	7/20/01	MT-105.11M	4/25/94	
DM-4.4	7/20/01			
GR-1.1M	10/21/97	TC-65.10	10/19/01	
GR-1.2M	1/1/96	TC-65.11	10/19/01	
GR-1.3M	11/20/96	TC-65.12	10/19/01	
GR-2.2M	4/14/98	TC-73.10	1/19/01	
GR-4.4M	10/ [illegible]			
GR-5.1M	4/28/99			
GR-5.3M	11/30/94			

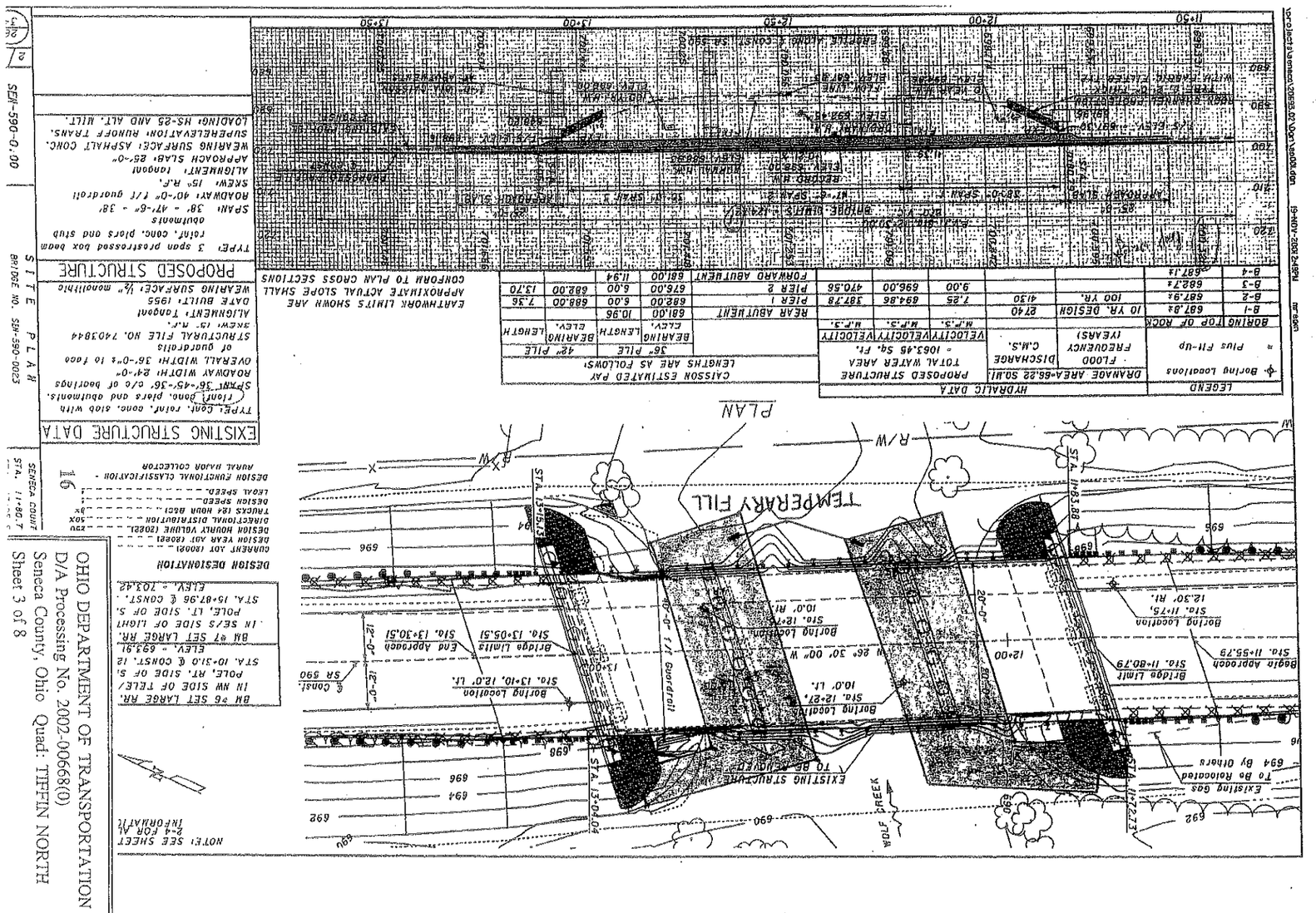
SPECIAL PROVISIONS

AS-1-98	4/20/01	805
CS-1-93	6/30/95	848
DS-1-92	12/15/94	858
EXJ-3-88	4/20/01	864
FSBD-1-93	3/4/94	865
SB-06-94	12/19/04	870
TST-1-99	10/20/00	877
		899
		1023
		1062
		1082

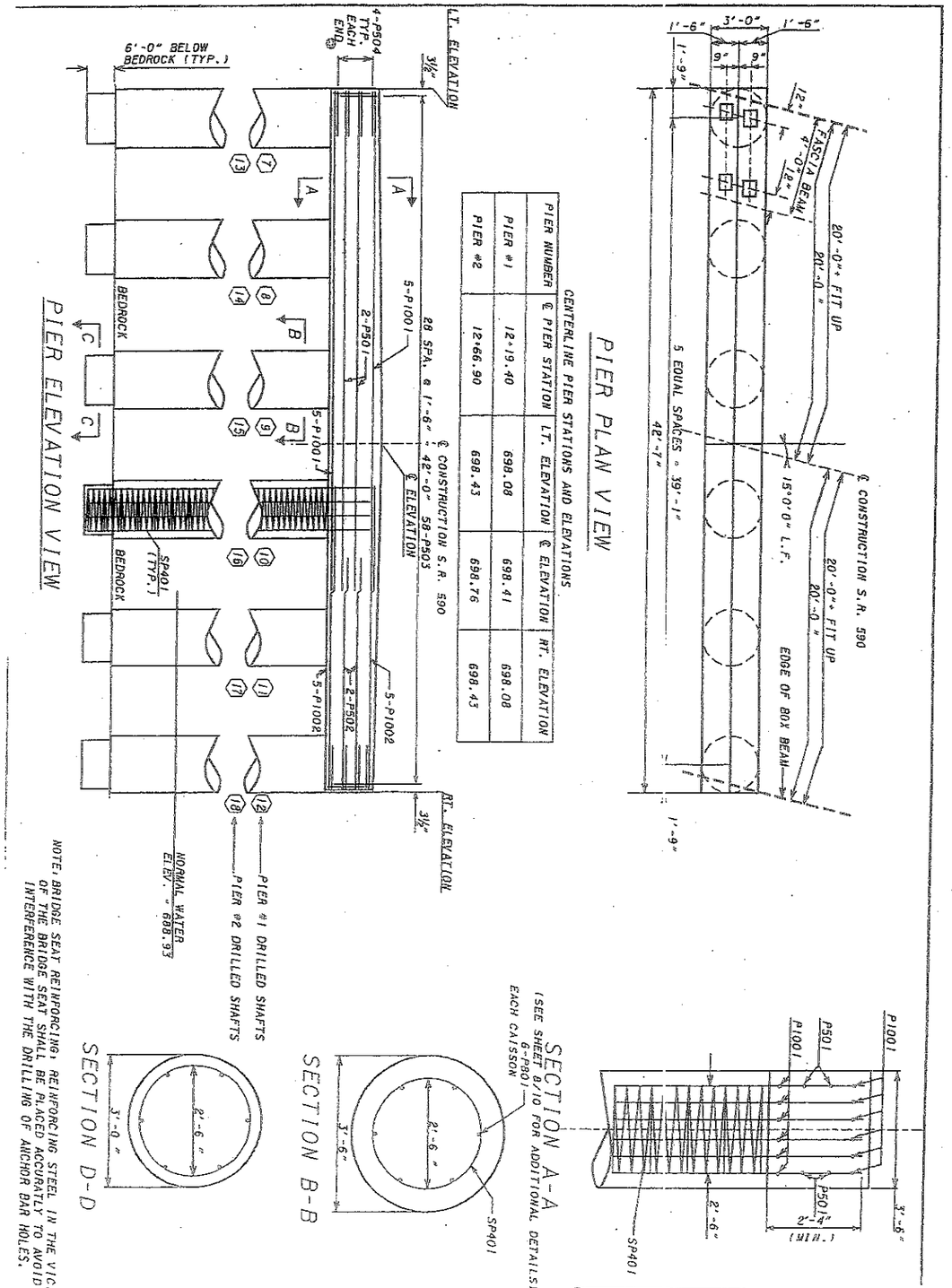
SUPPLEMENTAL SPECIFICATIONS

805	9/3/97
848	1/8/99
858	11/7/00
864	7/11/00
865	2/22/00
870	3/27/01
877	4/13/99
899	10/21/99
1023	12/8/95
1062	4/13/99
1082	7/11/00

OHIO DEPARTMENT OF TRANSPORTATION
D/A Processing No. 2002-00668(0)
Seneca County, Ohio Quad: TIFFIN NORTH
Sheet 2 of 8



OHIO DEPARTMENT OF TRANSPORTATION
D/A Processing No. 2002-00668(0)
Seneca County, Ohio Quad: TIFFIN NORTH
Sheet 3 of 8



CENTERLINE PIER STATIONS AND ELEVATIONS

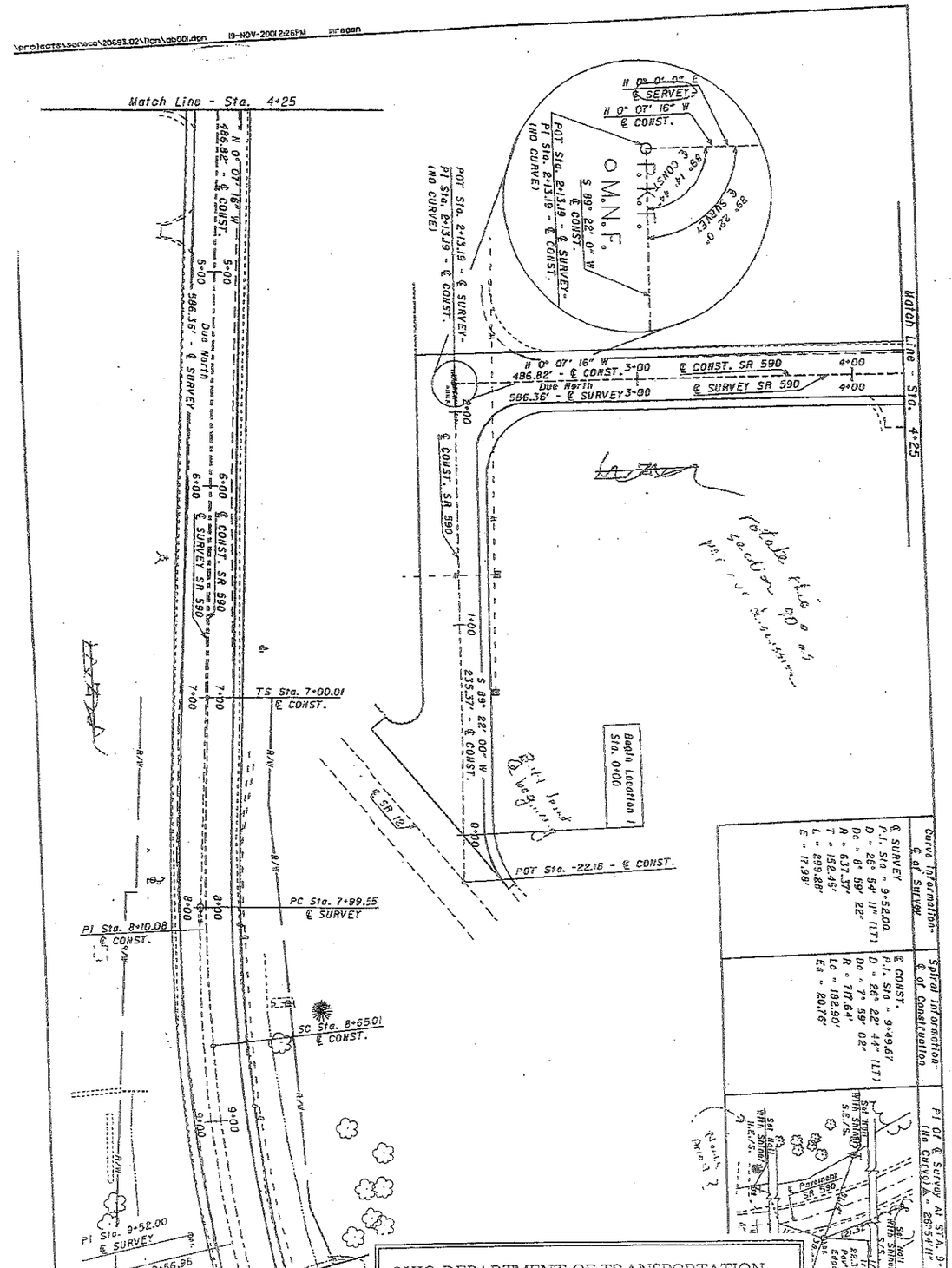
PIER NUMBER	℄ PIER STATION	LT. ELEVATION	℄ ELEVATION	RT. ELEVATION
PIER #1	12+19.40	698.08	698.41	698.08
PIER #2	12+66.90	698.43	698.76	698.43

NOTE: BRIDGE SEAT REINFORCING REINFORCING STEEL IN THE VICINITY OF THE BRIDGE SEAT SHALL BE PLACED ACCURATELY TO AVOID INTERFERENCE WITH THE DRILLING OF ANCHOR BAR HOLES.

6	SEN-590-0.00	PIER DETAILS
30		BRIDGE NO. SEN-590-0023
37		OVER WOLF CREEK

17

OHIO DEPARTMENT OF TRANSPORTATION
D/A Processing No. 2002-00668(0)
Seneca County, Ohio Quad: TIFFIN NORTH
Sheet 4 of 8



OHIO DEPARTMENT OF TRANSPORTATION
D/A Processing No. 2002-00668(0)
Seneca County, Ohio Quad: TIFFIN NORTH
Sheet 5 of 8

18

Match Line - Sta. 14+75

PI Sta. 14+94.50 ℄ SURVEY

PI Sta. 15+29.85 ℄ CONST.

PI Sta. 15+56.80 ℄ SURVEY

PT Sta. 16+16.39 ℄ SURVEY

CS Sta. 16+61.12 ℄ CONST.

Sta. 16+80 Bettsville Corp. Limits

PI Sta. 16+94.47 ℄ CONST.

ST Sta. 17+61.12 ℄ CONST.

End Sheet - Sta. 19+75

Begin Sheet - Sta. 9+75

CS Sta. 10+47.91 ℄ CONST.

PI Sta. 10-91.27 ℄ CONST.

PT Sta. 10-98.83 ℄ SURVEY

ST Sta. 11+77.91 ℄ CONST.

TS Sta. 13+69.89 ℄ CONST.

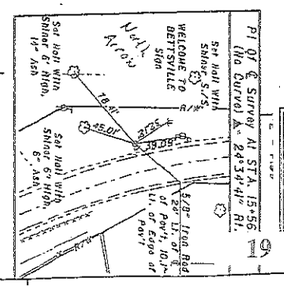
PI Sta. 13+86.56 ℄ CONST.

SC Sta. 13+94.89 ℄ CONST.

EQUATION - ℄ SURVEY
Sta 14+50.00 BK =
Sta 14+50.39 AH

PRT Sta. 14+50.39 ℄ SURVEY

Match Line - Sta. 14+75



OHIO DEPARTMENT OF TRANSPORTATION
D/A Processing No. 2002-00668(0)
Seneca County, Ohio Quad: TIFFIN NORTH
Sheet 6 of 8

Begin Sheet - Sta. 19+75

Match Line - Sta. 24+75

POT Sta. 25+34.39 - SURVEY
POT Sta. 25+26.42 - CONST.

End Location 1 Sta. 25+78

POT Sta. 26+00.00 ℄ CONST.

Match Line - Sta. 24+75

SEN-590-0.00

OHIO DEPARTMENT OF TRANSPORTATION
D/A Processing No. 2002-00668(0)
Seneca County, Ohio Quad: TIFFIN NORTH
Sheet 7 of 8

HORIZONTAL SCALE IN FEET

projects\seneca\20683.02\Dgn\dp001.dgn 19-NOV-2001 2:36PM oregon

NOTE: SEE SHEETS 13 AND 14 FOR ALIGNMENT INFORMATION

Spiral Information- ℄ of Construction

P.I. Sta = 9+49.67
D = 26° 22' 44" (LT)
Do = 7° 59' 02"
R = 717.64'
Lc = 182.90'
Es = 20.76'

CS Sta. 10+47.91 ℄ CONST.

PI Sta. 10+91.27 ℄ CONST.

EXISTING CONCRETE SLAB TO BE REMOVED

GAS TO BE RELOCATED BY OTHERS

ST Sta. 11+77.91 ℄ CONST.

11+00

Wolf Creek

Δ 26° 30' 00" W 19.90' ℄ CONST.

EXISTING CONCRETE SLOPE TO BE REMOVED

TS Sta. 13+69.89 ℄ CONST.

PI Sta. 13+86.56 ℄ CONST.

SC Sta. 13+94.89 ℄ CONST.

14+00

GAS TO BE RELOCATED BY OTHERS

Spiral Information- ℄ of Construction

P.I. Sta = 15+51.52
D = 29° 38' 42" (RT)
Do = 8° 42' 50"
R = 657.52'
Lc = 266.23'
Es = 21.44'

OHIO DEPARTMENT OF TRANSPORTATION
D/A Processing No. 2002-00668(0)
Seneca County, Ohio Quad: TIFFIN NORTH
Sheet 8 of 8 21

SEN–590–0.00
SENECA COUNTY, OHIO

SITE GEOLOGY

THE SITE IS LOCATED WITHIN THE WOODVILLE LAKE–PLAIN REEFS PHYSIOGRAPHIC REGION OF OHIO. THIS REGION IS CHARACTERIZED BY A VERY LOW RELIEF LACUSTRINE PLAIN, WITH LOW DUNES AND LAKE MARGIN FEATURES OVERLYING ANCIENT BEDROCK REEFS. THE REGIONAL GEOLOGY CONSISTS OF THIN TO ABSENT WISCONSIN–AGE WAVE–PLANED TILL, LACUSTRINE DEPOSITS, AND SAND. AT THE PROJECT SITE, THE NEAR–SURFACE SOILS CONSIST OF SILT LOAM OF THE CHAGRIN AND NAPPANEE ASSOCIATIONS. THE NAPPANEE SOILS FORMED IN LAKE–PLAIN DEPOSITS, WHEREAS THE CHAGRIN SOILS FORMED IN ALLUVIUM IN THE FLOOD PLAIN OF WOLF CREEK. THE OVERBURDEN SOILS ARE UNDERLAIN BY SILURIAN–AGE REEFAL LOCKPORT DOLOMITE.

INVESTIGATIVE PROCEDURES

FOUR TEST BORINGS, DESIGNATED AS B–1 THROUGH B–4, WERE DRILLED BY TOLTEST ON JANUARY 31 AND FEBRUARY 1, 2001. THE NUMBER AND LOCATIONS OF THE BORINGS WERE DETERMINED BY ODOT AND WERE ESTABLISHED IN THE FIELD BY ODOT DISTRICT 2 PERSONNEL. BORINGS B–1 AND B–4 WERE DRILLED FOR THE ABUTMENTS AND BORINGS B–2 AND B–3 WERE DRILLED FOR THE INTERMEDIATE PIERS. THE BORING LOCATIONS ARE SHOWN ON THE ATTACHED SOIL PROFILE SHEETS. THE STATIONING, OFFSETS, AND ELEVATIONS OF THE BORINGS WERE PROVIDED BY ODOT.

THE TEST BORINGS PERFORMED DURING THIS INVESTIGATION WERE DRILLED WITH A TRUCK–MOUNTED ROTARY DRILLING RIG UTILIZING HOLLOW–STEM AUGERS. ALL OF THE BORINGS WERE ADVANCED TO AUGER REFUSAL AT DEPTHS RANGING FROM 11.4 TO 17.6 FEET BELOW THE EXISTING ROADWAY OR BRIDGE DECK. SOIL SAMPLES WERE GENERALLY COLLECTED AT 2½–FOOT INTERVALS. THE TEST BORINGS WERE PERFORMED IN GENERAL ACCORDANCE WITH GEOTECHNICAL INVESTIGATIVE PROCEDURES OUTLINED IN ASTM D 1452 AND ODOT "SPECIFICATIONS FOR SUBSURFACE INVESTIGATIONS" (JANUARY 1996).

SPLIT–SPOON (SS) SAMPLES WERE OBTAINED BY THE STANDARD PENETRATION TEST (SPT) METHOD (ASTM D 1586), WHICH CONSISTS OF DRIVING A 2–INCH OUTSIDE DIAMETER SPLIT–SPOON SAMPLER INTO THE SOIL WITH A 140–POUND WEIGHT FALLING FREELY THROUGH A DISTANCE OF 30 INCHES. THE SAMPLER IS DRIVEN IN THREE SUCCESSIVE 6–INCH INCREMENTS, WITH THE NUMBER OF BLOWS PER INCREMENT BEING RECORDED. THE NUMBER OF BLOWS REQUIRED TO ADVANCE THE SAMPLER THE LAST 12 INCHES IS TERMED THE STANDARD PENETRATION RESISTANCE (N–VALUE) AND IS PRESENTED ON THE LOGS OF TEST BORINGS. THE SPLIT–SPOON SAMPLES WERE SEALED IN JARS AND TRANSPORTED TO OUR LABORATORY FOR FURTHER CLASSIFICATION AND TESTING.

A SAMPLE OF THE SUBSURFACE ROCK WAS COLLECTED FROM EACH OF THE BORINGS USING AN NX DIAMOND CORE BARREL AND CORING TECHNIQUES IN GENERAL ACCORDANCE WITH ASTM D 2113. THE ROCK CORE SAMPLES WERE COLLECTED AFTER ENCOUNTERING AUGER REFUSAL. THE CORE LENGTHS RANGED FROM 5 TO 10 FEET. RECOVERY OF THE CORE IS EXPRESSED AS THE PERCENTAGE RATIO OF THE RECOVERED ROCK LENGTH TO THE TOTAL LENGTH OF THE CORE RUN. THE ROCK QUALITY DESIGNATION (RQD) IS THE PERCENTAGE RATIO OF THE SUMMED LENGTH OF ROCK PIECES GREATER THAN 4 INCHES LONG TO THE TOTAL LENGTH OF THE RUN. THE ROCK CORE SAMPLES ARE DESIGNATED AS "RC" ON THE TABULATION OF TEST DATA SHEETS.

SOIL AND ROCK CONDITIONS ENCOUNTERED IN THE TEST BORINGS ARE PRESENTED IN THE LOGS OF TEST BORINGS, ALONG WITH INFORMATION RELATED TO SAMPLE DATA, SPT RESULTS, WATER CONDITIONS OBSERVED IN THE BORINGS, AND LABORATORY TEST DATA. IT SHOULD BE NOTED THAT THESE LOGS HAVE BEEN PREPARED ON THE BASIS OF LABORATORY CLASSIFICATION AND TESTING AS WELL AS FIELD LOGS OF THE SOILS AND ROCK ENCOUNTERED.

THE SUBSOIL SAMPLES WERE CLASSIFIED USING THE ODOT SOIL CLASSIFICATION SYSTEM. SELECTED SAMPLES OF THE SUBSOILS WERE TESTED IN OUR LABORATORY FOR NATURAL MOISTURE CONTENT (ASTM D 2216) AND IN–PLACE DRY DENSITY (ASTM D 2937). UNCONFINED COMPRESSIVE STRENGTH TESTS WERE DETERMINED FOR INTACT COHESIVE SPLIT–SPOON SAMPLES UTILIZING A CALIBRATED HAND PENETROMETER OR BY CONTROLLED STRAIN RATE METHODS (ASTM D 2166). UNCONFINED COMPRESSIVE STRENGTH TESTS WERE ALSO PERFORMED ON SELECTED SPECIMENS OF ROCK CORES (ASTM D 2938). ADDITIONALLY, ATTERBERG LIMITS TESTS (ASTM D 4318) AND PARTICLE SIZE ANALYSES (ASTM D 422) WERE PERFORMED ON SELECTED SOIL SAMPLES.

EXPERIENCE INDICATES THAT THE ACTUAL SUBSOIL CONDITIONS AT A SITE COULD VARY FROM THOSE GENERALIZED ON THE BASIS OF TEST BORINGS MADE AT SPECIFIC LOCATIONS. THEREFORE, IT IS ESSENTIAL THAT A GEOTECHNICAL ENGINEER BE RETAINED TO PROVIDE SOIL ENGINEERING SERVICES DURING THE SITE PREPARATION, EXCAVATION, AND FOUNDATION PHASES OF THE PROPOSED PROJECT. THIS IS TO OBSERVE COMPLIANCE WITH THE DESIGN CONCEPTS, SPECIFICATIONS, AND RECOMMENDATIONS, AND TO ALLOW DESIGN CHANGES IN THE EVENT SUBSURFACE CONDITIONS DIFFER FROM THOSE ANTICIPATED PRIOR TO THE START OF CONSTRUCTION.

INVESTIGATION AND FINDINGS

THE PAVEMENT MATERIALS ENCOUNTERED IN THE BORINGS CONSISTED OF 4 TO 6 INCHES OF ASPHALT OVERLYING 12 TO 15 INCHES OF CONCRETE.

AT BORING B–1, THE PAVEMENT MATERIALS WERE UNDERLAIN BY FILL CONSISTING OF MEDIUM DENSE GRAVEL AND STONE FRAGMENTS WITH SAND, SILT AND CLAY TO A DEPTH OF 3 FEET.

BASED ON THE ENCOUNTERED CONDITIONS IN THE BORINGS, THE SHALLOW DEPTH OVERBURDEN SOILS OVERLYING THE BEDROCK VARIED WITH LOCATION. UNDERLYING THE PAVEMENT MATERIALS AND FILL AT BORING B–1 (THE SOUTHERN ABUTMENT), MEDIUM DENSE SANDY SILT (A–4A) EXTENDED TO 6 FEET. VERY LOOSE COARSE AND FINE SAND (A–3A) EXTENDED FROM 6 TO 8 FEET, UNDERLAIN BY VERY LOOSE SANDY SILT (A–4A) TO AUGER REFUSAL AT 11.4 FEET. AT BORINGS B–2 AND B–3 (IN THE CREEK), THE CHANNEL BOTTOM WAS ENCOUNTERED AT 11.4 TO 11.6 FEET BELOW THE BRIDGE DECK. THE IMMEDIATE ZONE OF THE CHANNEL BOTTOM CONSISTED OF COBBLES, BOULDERS, AND FRACTURED ROCK TO AUGER REFUSAL AT DEPTHS RANGING FROM 12 TO 17.6 FEET IN BORINGS B–2 AND B–3, RESPECTIVELY. AT BORING B–4 (THE NORTHERN ABUTMENT), THE PAVEMENT MATERIALS WERE GENERALLY UNDERLAIN BY MEDIUM STIFF SILT AND CLAY (A–6A) TO AUGER REFUSAL AT 13.5 FEET. WITHIN THE SILT AND CLAY STRATA AT BORING B–4, MEDIUM STIFF CLAY (A–7–6) WAS ENCOUNTERED FROM A DEPTH OF 8 TO 11 FEET.

THE UNDERLYING DOLOMITIC BEDROCK WAS CORED AT BORINGS B–1 THROUGH B–4 TO BORING TERMINATION DEPTHS RANGING FROM 18 TO 27.6 FEET BELOW EXISTING GRADE OF THE ROADWAY OR BRIDGE DECK. THE UPPER 2½ TO 3 FEET OF THE BEDROCK CORES CONTAINED NUMEROUS SOLUTION CAVITIES, AS WELL AS VERTICAL AND HORIZONTAL JOINTS. SOME OF THE SOLUTION CAVITIES WERE AS LARGE AS ½ INCH IN DIAMETER, SOME OF WHICH EXHIBITED SECONDARY DEPOSITS OF CALCITE. BELOW THE UPPER ZONE, THE ROCK IS GENERALLY COMPETENT WITH OCCASIONAL THIN SHALE LAMINAE. IT SHOULD BE NOTED THAT THE CORE SPECIMENS SELECTED FOR UNCONFINED COMPRESSIVE STRENGTH TESTING WERE TAKEN FROM THE MORE COMPETENT, LOWER PORTION OF THE ROCK CORE.

LEGEND FOR PROJECT

AVERAGE RESULTS OF TEST – 7 SAMPLES TESTED

DESCRIPTION	AASHTO CLASS	OHIO CLASS	% AGG.	% C.SAND	% F.SAND	% SILT	% CLAY	% SILT &CLAY	LIQUID LIMIT	PLASTICITY INDEX	WATER CONTENT	SAMPLES TESTED
RANDOM FILL	A–2–6 (0)	A–2–6 (0)	46	14	10			30			6	1
COARSE AND FINE SAND	–	A–3a (0)	1	30	42			27			22	1
SANDY SILT	A–4 (5)	A–4a (5)	15	12	13	32	28		23	9	18	2
SILT AND CLAY	A–6 (10)	A–6a (10)	1	6	14	22	57		30	14	20	2
CLAY	A–7–6 (12)	A–7–6 (12)	0	5	8	17	70		42	20	34	1

ASPHALT	VISUAL CLASSIFICATION
CONCRETE	VISUAL CLASSIFICATION
RANDOM FILL	VISUAL CLASSIFICATION
DOLOMITE	VISUAL CLASSIFICATION
AIR	DRILLER NOTED BASED ON DRILLING CONDITIONS
WATER	DRILLER NOTED BASED ON DRILLING CONDITIONS
FRACTURED ROCK	VISUAL CLASSIFICATION
BOULDERS	DRILLER NOTED BASED ON DRILLING CONDITIONS

DRIVE SAMPLE AND/OR CORE BORING – PLAN VIEW

DRIVE SAMPLE AND/OR CORE BORING
PLOTTED TO VERTICAL SCALE ONLY IN PROFILE VIEW

X / Y / Z
NUMBERS OF BLOWS FOR 'STANDARD PENETRATION' TEST.
X = NUMBER OF BLOWS FOR FIRST 6 INCHES
Y = NUMBER OF BLOWS FOR SECOND 6 INCHES
Z = NUMBER OF BLOWS FOR THIRD 6 INCHES

15 – FIGURE BESIDE BORINGS INDICATES MOISTURE CONTENT IN PERCENT

W – FREE WATER INITIALLY ENCOUNTERED DURING DRILLING
▼ – STATIC WATER AT COMPLETION OF DRILLING

PROJECT INDEX

PROJECT SECTION	STATION FROM	STATION TO	PLAN VIEW SHEET	PROFILE SHEET
SEN–590	10+00	15+00	2,3	2,3
	BORING LOGS			4,5

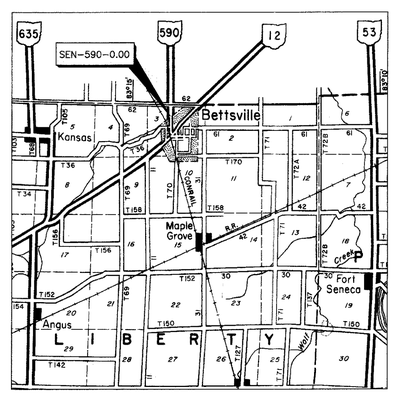
THE ROCK CORE DATA OBTAINED FROM EACH OF THE TEST BORINGS IS PRESENTED IN THE FOLLOWING TABLE:

BORING NO.	ROCK CORE DEPTH BELOW EXISTING GRADE (FEET)	ROCK CORE RECOVERY (%)	RQD (%)	UNCONFINED COMPERSSIVE STRENGTH (PSI)
B–1	11.4 TO 18.0	97	58	4,140
B–2	12.0 TO 22.0	91	74	4,225
B–3	17.6 TO 27.6	100	63	4,085
B–4	13.5 TO 18.5	100	45	5,780

GROUNDWATER WAS INITIALLY ENCOUNTERED AT A DEPTH OF 11 AND 12 FEET IN BORINGS B–1 AND B–4, RESPECTIVELY. AT BORINGS B–2 AND B–3, THE CREEK LEVEL WAS ENCOUNTERED AT 7 AND 9.5 FEET, RESPECTVELY, BELOW THE BRIDGE DECK. THESE CREEK LEVEL MEASUREMENTS WERE MADE ONE DAY APART, INDICATING THAT THE CREEK LEVEL CAN CHANGE QUICKLY OVER SHORT PERIODS OF TIME DEPENDING ON PRECIPITATION AND RUNOFF. AT COMPLETION OF THE OVERBURDEN DRILLING OPERATIONS IN BORINGS B–1 AND B–4, STATIC GROUNDWATER ELEVATIONS OF 13.4 AND 12.4 FEET, RESPECTIVELY, WERE OBTAINED PRIOR TO WATER BEING INDUCED INTO THE BOREHOLE TO FACILITATE THE CORING OPERATIONS OF THE UNDERLYING ROCK.

IT SHOULD BE NOTED THAT ALL OF THE BOREHOLES WERE BACKFILLED WITHIN THE SAME DAY AS THE DRILLING OPERATIONS, AND STABILIZED WATER LEVELS MAY NOT HAVE OCCURRED OVER THIS LIMITED TIME PERIOD. BASED ON THE SOIL AND GROUNDWATER CONDITIONS ENCOUNTERED IN THE BORINGS, IT IS OUR OPINION THAT THE "NORMAL" GROUNDWATER TABLE AT THE SITE CAN GENERALLY BE EXPECTED BETWEEN APPROXIMATE ELEVS. 691 TO 693, ROUGHLY COINCIDING WITH THE WATER LEVEL OF WOLF CREEK.

HOWEVER, GROUNDWATER ELEVATIONS WILL TEND TO FLUCTUATE WITH SEASONAL INFLUENCES, AND THE POTENTIAL EXISTS FOR SEASONALLY HIGH AND/OR "PERCHED" GROUNDWATER CONDITIONS TO OCCUR DURING PERIODS OF ABOVE–NORMAL PRECIPITATION. IN PARTICULAR, PERCHED GROUNDWATER CONDITIONS MAY BE ENCOUNTERED WITHIN THE FILL UNDERLAIN BY CLAY STRATA. THEREFORE, GROUNDWATER CONDITIONS AT DIFFERENT TIMES OF THE YEAR MAY VARY FROM THOSE ENCOUNTERED DURING THIS INVESTIGATION.

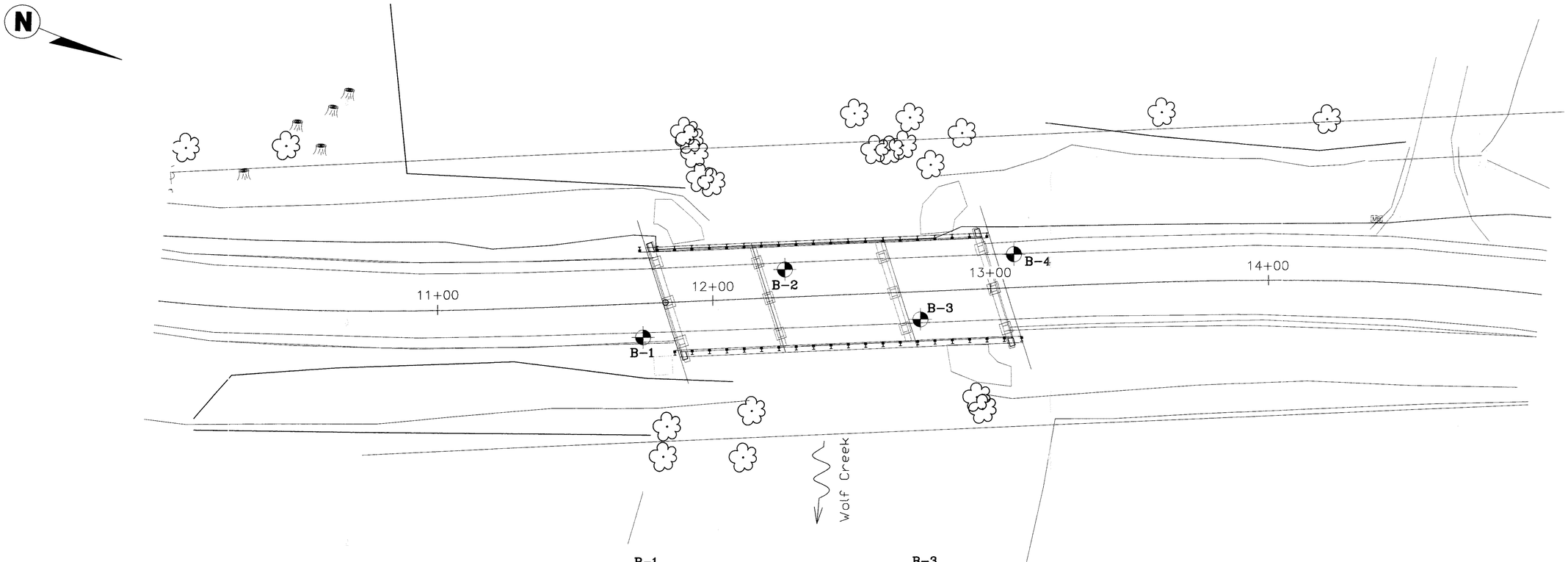


TOLTEST, INC.
1915 N. 12th STREET
TOLEDO, OHIO 43624

DRAWN BY: B GALLAGHER
DATE: 11–1–01
DRAWING NO. 4018203–GP
PROJECT NO. 40182.03

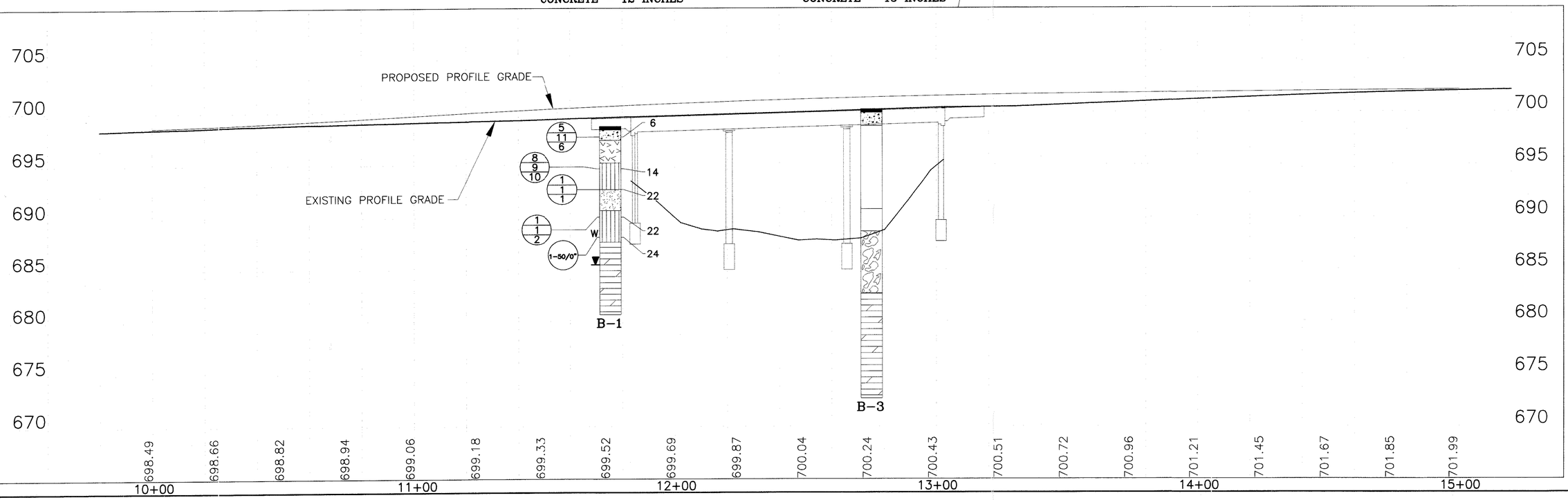
STRUCTURE FOUNDATION INVESTIGATION

SEN–590–0.00
SENECA COUNTY, OHIO
PID NO. 20693



B-1
STA. 11+75.0; 12.3' RT
ELEVATION 698.7 FEET
ASPHALT - 4 INCHES
CONCRETE - 12 INCHES

B-3
STA. 12+75.0; 10.0' RT
ELEVATION 700.3 FEET
ASPHALT - 4 INCHES
CONCRETE - 15 INCHES



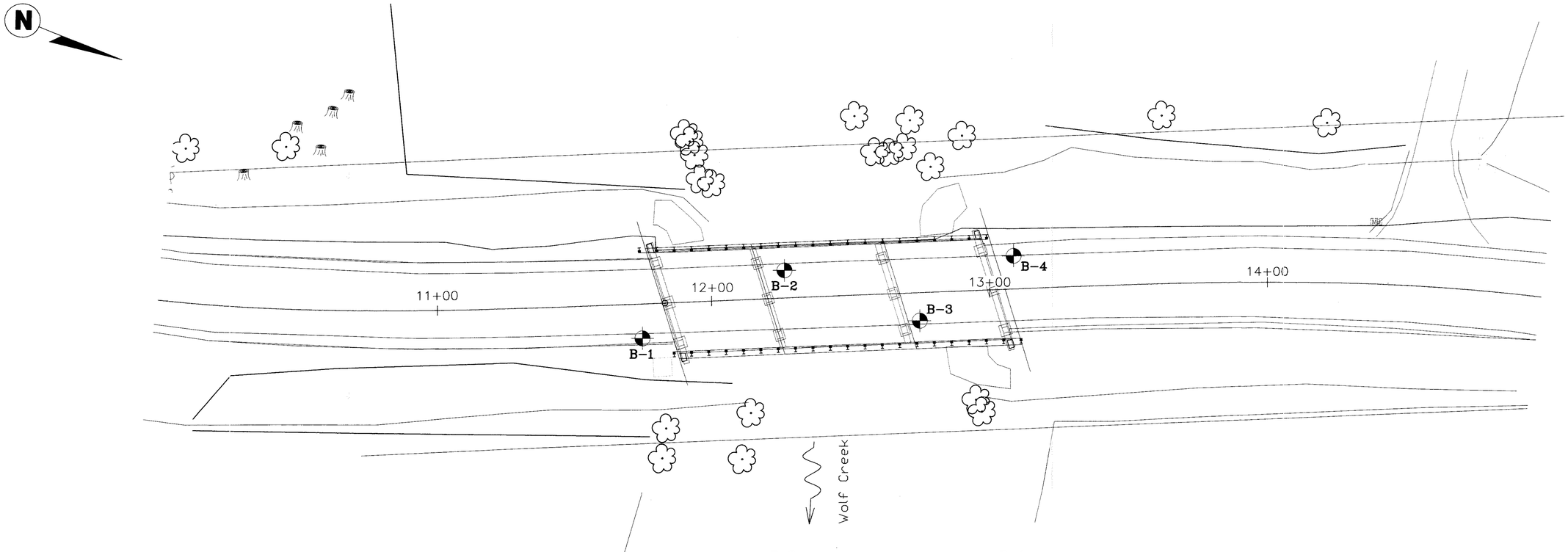
SOIL PROFILE

TOLEDO, INC.
1915 N. 12th STREET
TOLEDO, OHIO 43624

0 10 20 40

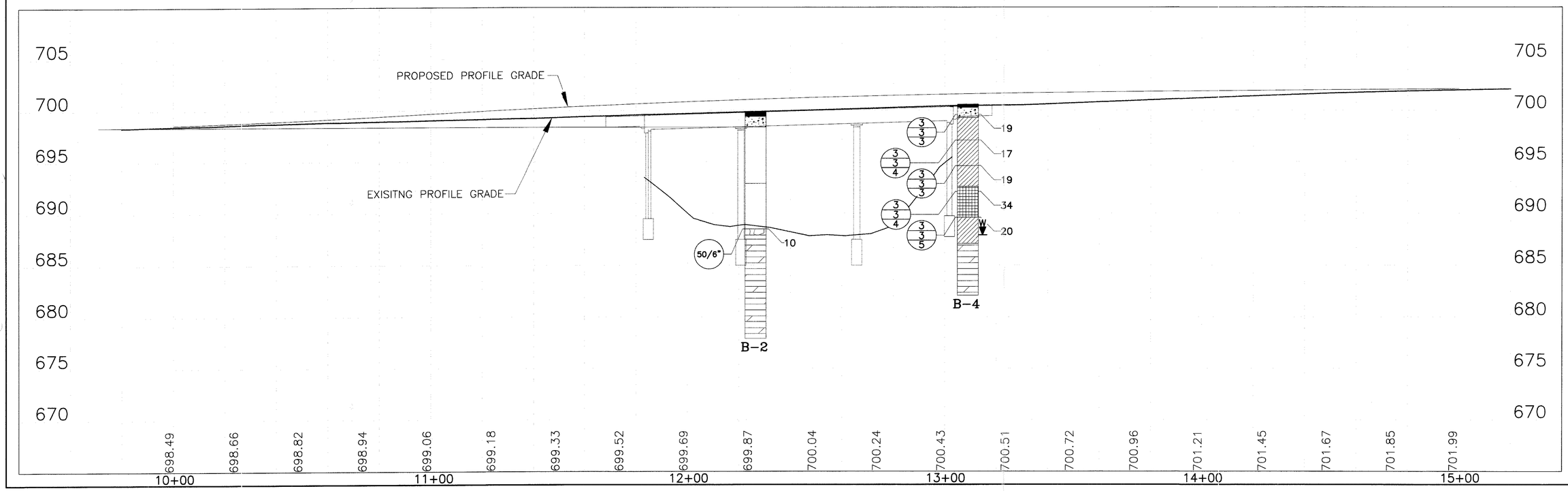
DRAWN BY: M. BURRIOLA
DATE: 11-1-01
DRAWING NO. 40182-02G
PROJECT NO. 40182.03

SEN-590-0.00
SENECA COUNTY, OHIO
PID NO. 20693



B-2
STA. 12+27.0; 10.0' LT
ELEVATION 699.9 FEET
ASPHALT – 6 INCHES
CONCRETE – 12 INCHES

B-4
STA. 13+10.0; 12.0' LT
ELEVATION 700.6 FEET
ASPHALT – 4 INCHES
CONCRETE – 12 INCHES



SOIL PROFILE

TOLLES, INC.
1915 N. 12th STREET
TOLEDO, OHIO 43624

0 10 20 40

DRAWN BY: M. BURRIOLA
DATE: 11-1-01
DRAWING NO. 40182-03G
PROJECT NO. 40182.03

SEN-590-0.00
SENECA COUNTY, OHIO
PID NO. 20693

3/5

LOG OF TEST BORING

Boring No.: B-1

Project: ODOT-SEN-590-0.00 Bridge over Wolf Creek

Sta.: 11+75.0

Project Location: Seneca County, OH

Offset: 12.3' Rt.

TolTest Project No.: 40182.03

Ground Surface Elev.: 698.7

Drill Date: 2/1/01

Elevation (feet)	Depth (feet)	Material Description	Strata	Sample Type	Sample Number	Blows per 6"	SPT N-Value (bpf)	Recovery (inches)	Uncon. Comp. Strength (psf)	Dry Density (pcf)	Water Content (%)	Gravel (%)	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index
	0	ASPHALT – 4 Inches																	
697.4	1	CONCRETE – 12 Inches																	
		FILL – Damp Medium Dense Grey GRAVEL and STONE FRAGMENTS w/Sand, Silt, and CLAY A-2-6 (0)		SS	1	5-11-6	17	18			5.6	46	14	10	Both	30			
695.7	3	Moist Medium Dense Brown SANDY SILT w/Some Gravel and Clay A-4a (3)		SS	2	8-9-10	19	18		124.0	14.1	28	12	10	27	23	22	14	8
692.7	6	Wet Very Loose Grey COARSE and FINE SAND w/Some Silt and Trace Gravel A-3a (0)		SS	3	1-1-1	2	18		98.7	22.2	1	30	42	Both	27			
690.7	8	Wet Very Loose Grey SANDY SILT w/Some Clay and Trace Gravel A-4a (7)		SS	4	1-1-2	3	18			21.9	2	13	15	37	33	24	15	9
				SS	5	1-50/0"	SSR	3		97.5	24.2								
687.3	12	Little Fractured Grey DOLOMITE w/Calcite Pittings (11.4 – 13.4') 79" Run 97% Recovery 58% RQD		RC	1			77											
680.7	18	Bottom of Boring																	

WATER LEVEL OBSERVATIONS

Initial: 11.0 Feet

At Completion: 13.4 Feet

After Completion: N/A

Water Used In Drilling: Coring

Note1: Auger refusal was encountered at the depth 11.4 feet and 6.6 feet of rock cored.

Note2: "SSR" – Split Spoon Refusal

Note3:

Drilling Method: HSA

Drillers: NW/JL

Sampling Method: SS/RC

Rig No.: 111

Figure No.: 1

LOG OF TEST BORING

Boring No.: B-2

Project: ODOT-SEN-590-0.00 Bridge over Wolf Creek

Sta.: 12+27.0

Project Location: Seneca County, OH

Offset: 10.0' Lt.

TolTest Project No.: 40182.03

Ground Surface Elev.: 699.9

Drill Date: 1/31/01

Elevation (feet)	Depth (feet)	Material Description	Strata	Sample Type	Sample Number	Blows per 6"	SPT N-Value (bpf)	Recovery (inches)	Uncon. Comp. Strength (psf)	Dry Density (pcf)	Water Content (%)	Gravel (%)	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index
	0	ASPHALT – 6 Inches																	
698.4	1	CONCRETE – 12 Inches																	
		AIR																	
692.9	7	WATER																	
688.5	11	Very Dense Grey FRACTURED ROCK w/Cobbles		SS	1	50/6"	SSR	4			9.7								
687.9	12	Little Fractured Grey DOLOMITE w/Calcite Pittings (12.0 – 15.0') 120" Run 91% Recovery 74% RQD		RC	1			*											
677.9	22	Bottom of Boring																	

WATER LEVEL OBSERVATIONS

Initial: 7.0 Feet

At Completion: 7.0 Feet

After Completion: N/A

Water Used In Drilling: Coring

Note1: Auger refusal was encountered at the depth 12.0 feet and 10.0 feet of rock cored.

Note2: *Recovery = 109.5 inches.

Note3: "SSR" – Split Spoon Refusal

Drilling Method: HSA

Drillers: NW/JL

Sampling Method: SS/RC

Rig No.: 111

Figure No.: 2

TOLTEST, INC.
1915 N. 12th STREET
TOLEDO, OHIO 43624

DRAWN BY: RJ OKONSKI
DATE: 11-1-01
DRAWING NO. 40182.03-B1
PROJECT NO. 40182.03

STRUCTURE FOUNDATION INVESTIGATION

SEN-590-0.00
SENECA COUNTY, OHIO
PID NO. 20693

LOG OF TEST BORING

Boring No.: B-3

Project: ODOT-SEN-590-0.00 Bridge over Wolf Creek

Project Location: Seneca County, OH

TolTest Project No.: 40182.03

Drill Date: 2/1/01

Sta.: 12+75.0

Offset: 10.0' Rt.

Ground Surface Elev.: 700.3

Elevation (feet)	Depth (feet)	Material Description	Strata	Sample Type	Sample Number	Blows per 6"	SPT N-Value (bpf)	Recovery (inches)	Uncon. Comp. Strength (psf)	Dry Density (pcf)	Water Content (%)	Gravel (%)	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index
698.7	1	ASPHALT – 4 Inches CONCRETE – 15 Inches																	
	2	AIR																	
	3																		
	4																		
	5																		
	6																		
	7																		
	8																		
690.8	9																		
	10	WATER																	
	11																		
688.7	12	BOULDERS w/Fractured Rock																	
	13																		
	14																		
	15																		
	16																		
	17																		
682.7	18	Little Fractured Grey DOLOMITE w/Calcite Pittings (17.6 – 20.6') 120" Run 100% Recovery 63% RQD		RC	1				120										
	19																		
	20																		
	21																		
	22																		
	23																		
	24																		
	25																		
	26																		
	27																		
672.7	28	Bottom of Boring																	
	29																		
	30																		

WATER LEVEL OBSERVATIONS

Initial: 9.5 Feet

At Completion: 9.5 Feet

After Completion: N/A

Water Used In Drilling: Coring

Note1: Auger refusal was encountered at the depth 17.6 feet and 10.0 feet of rock cored.

Note2:

Note3:

Drilling Method: HSA

Drillers: NW/JL

Sampling Method: SS/RC

Rig No.: 111

Figure No.: 3

LOG OF TEST BORING

Boring No.: B-4

Project: ODOT-SEN-590-0.00 Bridge over Wolf Creek

Project Location: Seneca County, OH

TolTest Project No.: 40182.03

Drill Date: 1/31/01

Sta.: 13+10.0

Offset: 12.0' Lt.

Ground Surface Elev.: 700.6

Elevation (feet)	Depth (feet)	Material Description	Strata	Sample Type	Sample Number	Blows per 6"	SPT N-Value (bpf)	Recovery (inches)	Uncon. Comp. Strength (psf)	Dry Density (pcf)	Water Content (%)	Gravel (%)	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index
699.3	1	ASPHALT – 4 inches CONCRETE – 12 Inches																	
	2	Moist Medium Stiff Grey/Brown SILT and CLAY w/Some Sand and Trace Gravel A-6a (9)		SS	1	3-3-3	6	18	*2000	106.3	18.8	2	5	16	22	55	28	15	13
	3																		
697.1	4	–Brown/Grey w/Trace Gravel		SS	2	3-3-4	7	18	*5750	108.0	16.9								
	5																		
694.6	6	–Medium Stiff Grey w/Trace Sand		SS	3	3-3-3	6	18	*5000	110.3	19.4								
	7																		
692.6	8	Wet Medium Stiff Grey CLAY w/Little Silt and Sand A-7-6 (12)		SS	4	3-3-4	7	18	1290	79.4	34.2	0	5	8	17	70	42	22	20
	9																		
	10																		
689.6	11	Moist Medium Stiff Grey SILT and CLAY w/Little Sand A-6a (10)		SS	5	3-3-5	8	18	875	89.2	20.1	0	8	11	23	58	31	16	15
	12																		
	13																		
687.1	14	Some Fractured Grey DOLOMITE w/Calcite Pittings (13.5 – 15.5') 60" Run 100% Recovery 45% RQD		RC	1			60											
	15																		
	16																		
	17																		
	18																		
682.1	19	Bottom of Boring																	
	20																		
	21																		
	22																		
	23																		
	24																		
	25																		
	26																		
	27																		
	28																		
	29																		
	30																		

WATER LEVEL OBSERVATIONS

Initial: 12.0 Feet

At Completion: 12.4 Feet

After Completion: N/A

Water Used In Drilling: Coring

Note1: Auger refusal was encountered at the depth 13.5 feet and 5.0 feet of rock cored.

Note2: "*" – Unconfined Strength was derived from a calibrated hand penetrometer.

Note3:

Drilling Method: HSA

Drillers: NW/JL

Sampling Method: SS/RC

Rig No.: 111

Figure No.: 4

TOLTEST, INC.
1915 N. 12th STREET
TOLEDO, OHIO 43624

DRAWN BY: RJ OKONSKI
DATE: 11-1-01
DRAWING NO. 40182.03-B3
PROJECT NO. 40182.03

STRUCTURE FOUNDATION INVESTIGATION

SEN-590-0.00
SENECA COUNTY, OHIO
PID NO. 20693

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 806

FIELD OFFICE
September 9, 1997

806.01 Description
806.02 General
806.03 Computer Equipment for Field Office
806.04 Basis of Payment

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 842

CONCRETE FOR STRUCTURES

January 6, 1999

842.01 Description
842.02 Materials
842.03 Proportions
842.04 Concrete Test Specimens
842.05 High-Early-Strength Concrete
842.06 Mixing of Concrete
842.07 Slump
842.08 Placing Concrete
842.081 Slipform Construction of Bridge Railing.
842.09 Construction Joints
842.10 Emergency
842.11 Depositing Concrete Under Water
842.12 Depositing, Protecting and Curing Concrete During Cold Weather
842.13 Removal of Forms
842.14 Curing and Loading
842.15 Surface Finish
842.16 Roadway Finish
842.161 Bridge Deck Grooving
842.17 Sidewalk Finish
842.18 Method of Measurement
842.19 Basis of Payment

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.

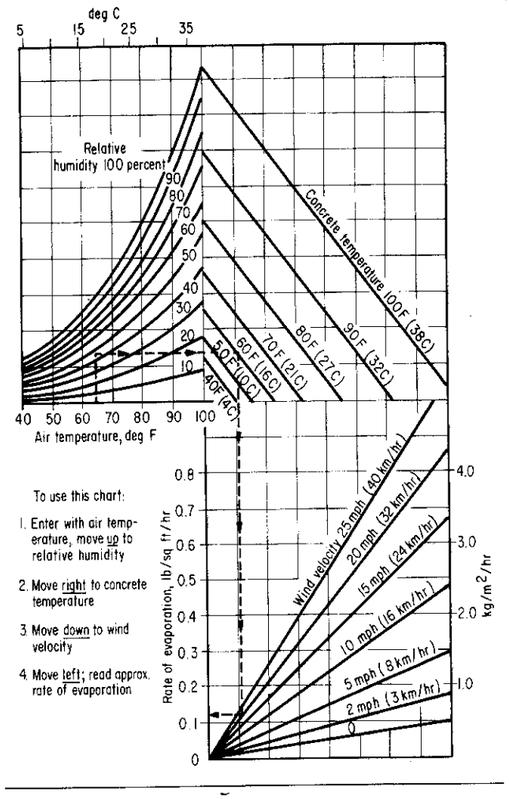
When a concrete deck is to be placed on continuous steel beams or girders, the placing of the concrete deck in any span shall not be started until all of the main beam or girder splices have been completed at least two piers beyond the pier or piers supporting the span in question.

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 858

Superpave Asphalt Concrete

November 7, 2000

858.01 Description
858.02 Mix Design for Asphalt Concrete Mix Type A
858.03 Mix Design for Asphalt Concrete Mix Type B
858.04 Binder
858.05 Quality Control
858.06 Acceptance
858.07 Basis of Payment

858.01 Description. Following are the gyratory mix design, material and quality control requirements for constructing an asphalt concrete pavement surface or intermediate course. The requirements of 441 shall apply except as noted. The asphalt concrete pavement course shall consist of aggregate and performance graded binder or modified binder mixed in a central plant and spread and compacted on a prepared surface in accordance with the specifications and in reasonably close conformity with the lines, grades and typical sections shown on the plan or established by the Engineer.

858.02 Mix Design for Asphalt Concrete Mix Type A. The mixture composition for Asphalt Concrete Type A shall be per 441.02 and the most recent Asphalt Institute Superpave Mix Design manual SP-2 for design procedures and material properties except as modified below. JMF submittals shall include the standard Department cover and summary page, all printouts from the compactor (all gyratory points not necessary), and analysis covering the required mix properties. One compacted gyratory sample and loose mix for compaction of another sample, in addition to a 4.4-pound (2000-gram) loose sample, shall be submitted for each JMF.

Design gyrations shall be per the lane current Average Daily Truck Traffic (ADTT) as follows unless otherwise specified in the plans. Lane ADTT can be calculated from the plan as follows:

Lane ADTT = Current ADT x %B&C trucks x 0.5 x 0.9

If multiple N_{des} exist due to a multiple section project etc. the lower design gyrations shall apply unless otherwise specified in the plans.

Gyration Level and Material Requirements							
Lane ADTT	N_{ini}	N_{des}	N_{max}	Coarse Agg. Fract. Faces	Fine Agg. Angularity	Flat and Elon. Particles	Sand Equiv.
<4000	7	75	115	95/90	44	10	45
>4000	8	100	160	100/100	44	10	50

All virgin aggregate used shall be approved by the Department. If fine aggregate is from crushed carbonate stone or air cooled blast furnace slag, the fine aggregate angularity (FAA) test is not required. For any other material FAA shall be 44. A blend of a material not meeting FAA with a material that meets FAA is allowed, but the FAA result shall be calculated mathematically based on the individual Department FAA results and actual blend percentages. Blends must be approved by the Department. All other Department aggregate requirements will apply except gradation for fine aggregate. Aggregate to be used must be submitted to the Laboratory with sufficient lead time to perform testing for JMF approval.

Gradation limits as follows. The restricted zone does not apply.

Sieve	9.5mm mix	12.5mm mix	19mm mix
No. 200 (0.075mm)	2-8	2-8	2-6
No. 8 (2.36mm)	32-52	32-45%	28-45%
No. 4 (4.75mm)	70 max		
3/8 inch (9.5mm)	90-100		
1/2 inch (12.5mm)	100	95-100%	90 max
3/4 inch (19mm)		100	85-100%
1 1/2 inch (37.5mm)			100%

The F/A ratio shall be 1.2 max. A two hour cure in design shall be used.

If more than 15 percent fine aggregate not meeting FAA is used, a loaded wheel test (LWT) per Supplement 1057 is required. For estimating LWT sample mix volume, the bulk density from gyratory specimens at N_{des} is required. Results less than 0.20 in (5.0mm) at 115°F (46°C) are considered passing.

Rollers keeping far back on a mix at normal compaction temperature is an indication of a tender, rut prone mix and may be justification for requiring a redesign. The Marshall flow test may be used in design as an indicator of potential for excess tenderness.

Recycled asphalt concrete or bituminous aggregate base (RAP) can be used in accordance with the requirements of Supplemental Specification 908 in surface courses or up to 20 percent in intermediate courses per 441.03. RAP stockpiles shall be visually inspected and approved by the District prior to production. Final RAP gradation and asphalt content is to be based on four separate stockpile (or roadway for concurrent grinding) samples all agreeing within 0.4 percent for asphalt content and 5 percent passing the No. 4 (4.75mm) sieve. All four test results and an average shall be reported in the JMF.

Design volumetric properties shall be tested at N_{des}. N_{max} shall be tested for the required criteria.

SP-2 Table 5.2 VMA shall be (percent minimum): 9.5mm - 15
12.5mm - 14.0
19.0mm - 13

AASHTO T 283 with freeze cycles and a TSR of 80 are required per SP-2. Testing of mix and storage of antistrip shall be per Supplements 1057 and 1053. 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. Requirements for treatment if needed are as follows:

Liquid Antistrip Material - the mix shall include liquid antistrip material at a rate of 0.50 to 1.25 percent by weight of the binder.

Hydrated Lime - the mix shall include hydrated lime in dry form at a rate of 1.0 percent by dry aggregate weight for asphalt concrete. The hydrated lime shall meet the requirements of AASHTO M303, Type 1. The following information shall be provided to the DET for each shipment of hydrated lime: (1) letter of certification, (2) production date, (3) shipment date, (4) shipment destination, (5) batch or lot number, and (6) net weight.

The JMF shall include:

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).

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 verifying AASHTO M 303 is met.

At the end of the project or 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 (kilograms) of antistrip additive used. The Engineer shall verify the quantity of antistrip additive 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.

858.03 Mix Design for Asphalt Concrete Mix Type B. The mix design as in 858.02 above shall apply for Asphalt Concrete Type B except as follows:

Gyration Level and Material Requirements							
Lane ADTT	N_{ini}	N_{des}	N_{max}	Coarse Agg. Fract. Faces	Fine Agg. Angularity	Flat and Elon. Particles	Sand Equiv.
<4000	7	75	115	65	44	10	45
>4000	8	100	160	75/70	44	10	50

If fine aggregate is from crushed carbonate stone or air cooled blast furnace slag, the FAA test is not required. At least 50 percent by weight of virgin fine aggregate shall be aggregate meeting FAA or be crushed carbonate stone or air cooled blast furnace slag. Aggregate to be used must be submitted to the Laboratory for approval three weeks prior to a JMF submittal for approval.

Gradation limits as follows. The restricted zone does not apply.

Sieve	9.5mm mix	12.5mm mix	19mm mix
No. 200 (0.075mm)	2-8	2-8	2-6
No. 8 (2.36mm)	32-52	34-40%	28-45%
No. 4 (4.75mm)	70 max		
3/8 inch (9.5mm)	90-100		
1/2 inch (12.5mm)	100	95-100%	90 max
3/4 inch (19mm)		100	85-100%
1 1/2 inch (37.5mm)			100%

A F/T value of +2 shall apply per 441.02 and 441.10.

858.04 Binder. Binder shall meet the requirements of Supplemental Specification 908 as follows:

12.5mm Surface course PG 70-22M
9.5mm Surface course PG 70-22M
9.5mm Intermediate course PG 64-28
19mm Intermediate course PG 64-28

The minimum total binder content for a surface course shall be:
5.6 percent for N_{des} = 75
5.4 percent for N_{des} = 100

858.05 Quality Control. 441.10 shall be followed with the following exceptions. A Contractor's representative holding a Level 2 qualifcation is required to be at the asphalt plant until a full production day is achieved with results satisfactory to the DET. Plant operation and quality control testing shall conform to the contractor's Plant Operation Quality Control Program.

A gyratory compactor meeting the requirements of Superpave and verified by FHWA (or a representative of their office) is required. If the gyratory compactor was moved to the plant prior to production, it must be calibrated and have results presented to the DET. Samples for air voids shall be conditioned two hours. Bulk gravity for air voids determination shall be determined on specimens compacted to $N_{des.}$ Once each day for the first three production days and once each third production day thereafter, one set of specimens shall be compacted to $N_{max.}$ Density at N_{max} based on percent Gmm shall be less than 98.0. Production will cease if Nmax is greater than or equal to 98.0 unless acceptable corrections and retest are made.

If the design gradation requires an LWT test, a sample sufficient to compact one LWT test beam must be taken once each day for the first three days and tested according to Supplement 1057. The LWT can be in the Contractor's Level 2 lab, but the sample beam must be compacted the same day the sample was taken, cured overnight and tested the following day. The test result and beam density must be given to the DET the day of the LWT test. The LWT data shall be reported on the TE 199.

Once in every five hot mix production days, a Department monitor will instruct the Contractor to take a 1 quart (1 liter) binder sample from between the last piping 'Tee' in the line and inlet into the asphalt plant for each binder type used. Two samples will be taken, one for the Department and the other for the Contractor. The Contractor will label the samples with binder type, supplier, project number and date and retain them in the plant laboratory for future reference by the Department. This sample will be held until otherwise notified by the monitoring team.

858.06 Acceptance. Acceptance of the asphalt concrete mix will be based on the Item specified in the Contract (such as 446, 448, etc.)

858.07 Basis of Payment.

Item	Unit	Description
858	Cubic yard (cubic meter)	Asphalt concrete surface course, 12.5mm, Type A (446)
858	Cubic yard (cubic meter)	Asphalt concrete surface course, 12.5mm, Type B (446)
858	Cubic yard (cubic meter)	Asphalt concrete surface course, 9.5mm, Type A (446)
858	Cubic yard (cubic meter)	Asphalt concrete surface course, 9.5mm, Type B (446)
858	Cubic yard (cubic meter)	Asphalt concrete Intermediate course, 19mm, Type A (446)
858	Cubic yard (cubic meter)	Asphalt concrete intermediate course, 19mm, Type B (446)
858	Cubic yard (cubic meter)	Asphalt concrete intermediate course, 9.5mm, Type A (448)
858	Cubic yard (cubic meter)	Asphalt concrete intermediate course, 9.5mm, Type B (448)
858	Cubic yard (cubic meter)	Asphalt concrete surface course, 12.5mm, Type A (448)
858	Cubic yard (cubic meter)	Asphalt concrete surface course, 12.5mm, Type B (448)
858	Cubic yard (cubic meter)	Asphalt concrete surface course, 9.5mm, Type A (448)
858	Cubic yard (cubic meter)	Asphalt concrete surface course, 9.5mm, Type B (448)
858	Cubic yard (cubic meter)	Asphalt concrete intermediate course, 19mm, Type A (448)
858	Cubic yard (cubic meter)	Asphalt concrete intermediate course, 19mm, Type B (448)

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 864
SEALING OF CONCRETE SURFACES

July 11, 2000

864.01 **Description**
864.02 **Materials**
864.03 **Equipment.**
864.04 **Mixing**
864.05 **Storage**
864.06 **Surface Condition**
864.07 **Surface Preparation**
864.08 **Application and Coverage**
864.09 **Test Site/Application**
864.10 **Appearance**
864.11 **Traffic**
864.12 **Safety Precautions**
864.13 **Protection of Adjoining Surfaces and the Public**
864.14 **Environmental Requirements**
864.15 **Method of Measurement**
864.16 **Basis of Payment**

864.01 Description. This work consists of applying an approved sealer on existing and new concrete surface areas after the concrete is cured and repairs completed and cured. Apply the sealer to locations described in the plans. Use sealers on the Office of Materials Management's approved list. Apply the sealer listed in the pay item description. Choose a type of sealer if no sealer is listed in the pay item description.

864.02 Materials. Approved sealer systems meet the following performance requirements:

1. Absorption - ASTM C642 (non-air entrained concrete). Concrete should be proportioned and mixed in accordance with ASTM C672. Sealed concrete, under total immersion, will not exceed 1.0% after 48 hours or 2.0% after 50 days
2. Scaling Resistance - ASTM C672 A rating of "No Scaling" after 100 cycles on the sealed concrete (non-air entrained concrete) as compared to "Severe Scaling' on untreated concrete.
3. NCHRP 244, Series 11 - Cube Test
   3.1 Weight gain - not to exceed 25% of untreated cube
   3.2 Absorbed chloride - not to exceed 25% of untreated cube
4. NCHRP 244, Series IV - Southern Exposure
   4.1 Absorbed chloride - not to exceed 10% of untreated concrete

5. Record and report the application rate (square footage/gallon) of sealer during the tests.

Provide test data from an approved independent testing facility. The sealer manufacturer funds the testing costs. Furnish the test data, a one quart (one liter) sample, and the MSDS to the Office of Materials Management. Pre-qualified sealers will be on the Department's approved list

864.03 Equipment. Use application equipment recommended by the sealer manufacturer. Use spray equipment, tanks, hoses, brooms, rollers, coaters, squeegees, etc., that is clean, free of foreign matter, oil residue and water.

864.04 Mixing. Mix the sealer according to the manufacturer's recommended procedures. Furnish the Engineer with the manufacturer's application instructions. Don't mix or apply the sealer until the manufacturer's written recommendations are supplied to the Engineer. Mixed materials to a uniform consistency and maintain during application.

864.05 Storage. Store all sealer components in tightly sealed containers, in a dry location, and as recommended by the manufacturer. Deliver unopened drums or containers of the sealer or sealer components to the job site with the manufacturer's numbered seal intact.

864.06 Surface Condition. Apply sealers to surfaces which are dry, free from dust, dirt, oil, wax, curing compounds, efflorescence, laitance, coatings and other foreign materials. Repair any structurally unsound surfaces, weak sections or spalled areas before applying any sealer.

Air dry concrete surfaces for at least five (5) days after completion of required curing. Air dry any cavities which require grout filling and curing for five days. Do not apply sealer until the air drying is complete.

Seal accelerated cured precast concrete after it has attained the required 28 day strength and after any cavities which require grout filling have been filled, cured and air-dried for five days.

864.07 Surface Preparation. Remove dust, dirt, oil, wax, curing compounds, efflorescence, laitance, coatings and other foreign materials from surfaces to be sealed. Use chemicals or other cleaning compounds if removal requires their use but only use products approved by the sealer manufacturer. Furnish the Engineer documentation of the sealer manufacturer's approval. Apply the sealer within 48 hours of surface preparation.

Install suitable traps, filters, drip pans and other separation devices in the cleaning equipment so oil and other foreign material isn't deposited on the surface.

Use the following cleaning methods depending on the surface type:
A. New water cured exposed concrete surfaces.
   1. Water blast at 7,000 psi (48 MPa) minimum
B. New, liquid membrane cured, exposed concrete surfaces.

1. Water blast at 7,000 psi (48 MPa) minimum, or
2. Sandblast, followed by air brooming or power sweeping, to remove dust and sand from the surfaces and opened pores. Remove all membrane curing compound.C. Exposed surfaces of new prestressed concrete box beams
1. Clean with high pressure hot water or steam jenny, or
2. Water blast at 7,000 psi (48 MPa) minimum, or
3. Sandblast, followed by air brooming or power sweeping, to remove dust and sand from the surfaces and opened pores

D. Existing concrete surfaces.
1. Water blast at 7,000 psi (48 MPa) minimum, or
2. Sandblast, followed by air brooming or power sweeping, to remove dust and sand from the surface and opened pores.

864.08 Application and Coverage.

A. Epoxy - Urethane sealers.
1. Apply each coat of the Epoxy-urethane sealer at the coverage rate specified on the Office of Materials Management's approved list.
(Web site is: **http://www.dot.state.oh.us/testlab/applists/cement/Epoxies.htm**)
If no application rate is listed, apply each coat at 120 square feet per gallon (2.9 square meter/liter).
2. Only apply sealer when the surface temperature is 50F (10 C) or above
3. Apply with a brush, squeegee, roller or spraying equipment and as recommended by the manufacturer.
4. Apply one coat of epoxy and one coat of the urethane top coat. Time between coats shall meet the manufacturer's recommendation. Use epoxy and urethane from the same manufacturer. Achieve specified coverage regardless of the number of passes per coat.
5. Tint so the final color is Federal Color Standard No. 17778 - Light Neutral. Pigment content shall be limited so as not to reduce sealing effectiveness of the second coat. Refer to the plans for colors for specific projects.
6. Sags and runs are not acceptable in the sealer.
7. For sealed sidewalks or other horizontal surfaces with repetitive foot traffic or vehicular traffic, integrate 1-1/2 lbs. per square yard(0.8 kg/square meter) of silica sand into the surface of the second coat to produce a non-skid surface satisfactory to the Engineer.

B. Non-epoxy sealer.
1. Apply the sealer according to the manufacturer's recommended mode of application and under the observation of the Engineer.
2. Coverage.
Surfaces subject to abrasive wear (bridge decks, bridge deck shoulders and sidewalks)
1. Minimum, one gallon (3.875 liter) of sealer for each 100 square feet (9.0 square meter);

Curbs, vertical surfaces of beams and deck slabs subject to direct roadway drainage
2. Minimum, one gallon (3.875 liter) for each 125 square feet (11.5 square meter)
Other surfaces (for example, parapets, abutments, pier caps and median dividers)
3. Minimum, one gallon (3.875 liter) for each 150 square feet (14.0 square meter)

3. Apply sealer on surfaces in a one-pass operation at the required coverage. Acceptable applications saturate a horizontal surface and take a few seconds before completely penetrating. Broom in the sealer if recommended by the manufacturer.
4. Vertical surface sealer spraying will create runs. Acceptable applications of penetrating sealer developing 6 to 12 inch (150 to 300 mm) runs below the spray pattern. Apply additional passes in 10 to 15 minutes if coverage rate is not achieved with first pass. Apply sealers with brush or roller if recommended by the manufacturer.
5. After 10 to 15 minutes, squeegee off excess material on smooth finished or dense concretes where the required coverage is not absorbed.
6. For sealed sidewalks or other horizontal surfaces with repetitive foot traffic or vehicular traffic, integrate 1-1/2 lbs. per square yard(0.8 kg/square meter) of silica sand into the sealer application to produce a non-skid surface satisfactory to the Engineer.
7. Tint clear non-epoxy sealers with a vanishing dye that will not damage the concrete.
8. Don't apply sealer if the ambient temperature is below 40F (5 C) or will fall below 32 F (0 C) within 12 hours after application.

General. Do not apply sealer if rain is anticipated within 2 hours after application. Clearly mark where the sealer application stops if not continuous.

864.09 Test Site/Application Apply sealer to measured coverage areas, both on a horizontal and vertical surfaces, and on different concrete types, demonstrating:

1. The project's visual effects for the epoxy/urethane sealer application at the required coverage rate.
2. Visually, the absorption necessary to achieve the specified coverage rate for the non-epoxy sealer. Use at least ½ gallon (2 liter) of sealer, following the manufacturer's recommended method of application, for the total of the test surfaces.
3.

Apply to the deck, safety curb or sidewalk for the horizontal test surfaces Use an abutment parapet or pier face for the vertical test surface and so different textures are tested.

864.10 Appearance.

Epoxy/Urethane sealers. Uniform appearance and the final color shall visually match the test section. Re-coating, removal and re-application or other methods recommended by the manufacturer will be

required to final appearance.

Non Epoxy Sealers. The sealer shall result in a uniform appearance.

864.11 Traffic. Allow traffic on deck shoulder areas after 12 hours of drying time for an epoxy/urethane sealer. Keep traffic off a non-epoxy sealer until the sealer appears totally dry.

864.12 Safety Precautions. Follow precautions defined on the manufacturer's MSDS. Provide the Engineer a copy of the MSDS sheet for information before any work commences.

864.13 Protection of Adjoining Surfaces and the Public. Protect the public during all operations, specially when applying sealer to the fascia or the underside portions a bridge that span an area used by the public.

During sealing, mask off, or use other means of protection, for surfaces not being sealed . Protect asphalt and mastic type surfaces from spillage and heavy overspray. Do not apply sealers to joint sealants which have not cured according to the manufacturer's instructions. Joint sealants, traffic paints and asphalt overlays may be applied to the treated surfaces 48 hours after the sealer has been applied. Protect nearby steel, aluminum or glass surfaces when non-epoxy overspray could be deposited on those surfaces.

864.14 Environmental Requirements. Protect plants and vegetation from overspray by covering with drop cloths.

864.15 Method of Measurement. The quantity will be the actual area in square meters (square yards) of surfaces sealed.

864.16 Basis of Payment. Payment will be made for completed and accepted work, including surface preparation, material, application, and pre-qualification testing costs, under the following:

ITEM	UNIT	DESCRIPTION
864	Square yard (Square Meter)	Sealing of concrete surfaces
864	Square yard (Square Meter)	Sealing of concrete surfaces (non-epoxy)
864	Square yard (Square Meter)	Sealing of concrete surfaces (epoxy-urethane)

Designer's Note: This new Supplemental Specification 864, Sealing of Concrete Surfaces, replaces existing Proposal Note 516-84 by October 1, 2001. Used whenever concrete surfaces, either existing or new, are to be sealed. The limits of sealing are to be shown in the plans. The designer is allowed the option of either specifying a specific type (not brand) of sealer or leaving the choice up to the Contractor. The designer should coordinate this with the owner of the structure. The designer should be aware that the Bridge Design Manual has specific guidance as to which types of sealers are to be used and where their use is acceptable. Questions regarding this note should be directed to Mr. Brad M. Fagrell in the Office of Structural Engineering at 614-752-9963.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 865

PRESTRESSED CONCRETE BRIDGE MEMBERS

February 22, 2000

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865.01 Description and Definitions. This item shall consist of the manufacture, transportation, storage and erection, fabricator performed quality control (QC) and documentation of prestressed concrete bridge members produced in accordance with the plans, proposal and this specification.

ASTM	American Society of Testing and Materials
OMM	Office of Materials Management.
OSE	Office of Structural Engineering.
PCI	Precast/Prestressed Concrete Institute.
PFQCS	Prestressed fabrication quality control specialist.
QA	Quality assurance.
QC	Quality control.

865.02 Fabricator Approval. Fabricators shall be pre-qualified by the Office of Materials Management (OMM). Requests for pre-qualification shall be made by the Fabricator in writing to the Office of Materials Management, Cement and Concrete Engineer. The pre-qualification process and its requirements are listed in this specification. The Contractor shall select a fabricator from the pre-qualified prestressed fabricator list in effect at the date of contract letting. The list will be on file in the Office of Materials Management. The Contractor shall inform the District Construction Engineer and the Office of Materials Management of the selected Fabricator.

865.03 Fabricator Pre-qualification. OMM shall perform a facilities inspection for pre-qualification evaluation of a fabricator. Fabricators that meet all requirements will be assigned a fabrication level and will be included on the pre-qualified prestressed fabricator list. The pre-qualified prestressed fabricator list will be updated as necessary by OMM.

A pre-qualified Fabricator does not guarantee the work performed will meet quality and conformance requirements of the contract. Final conformance is the responsibility of the Contractor.

865.04 Levels of Fabrication Qualification. There are three levels of Fabricator qualification. Each Fabricator shall be listed at the highest level of fabrication they are qualified to perform.

Level	Description of Capabilities
One	Straight strand prestressed box beam members
Two	Straight strand prestressed I-beam members
Three	Draped strand prestressed I-beam members

865.05 Fabricator Evaluation and Required Qualifications. Fabricators requesting pre-qualification shall have a fabrication facilities inspection performed by OMM. A facilities inspection check list is part of this specification (see Appendix I). During the inspection the

Fabricator will furnish OMM's representative with documentation to validate the Fabricator meets the criteria listed below:

Precast/Prestressed Concrete Institute (PCI) Certification

Level 1 - PCI Group B3
Level 2 - PCI Group B3
Level 3 - PCI Group B4

Fabricator inspection personnel shall meet the requirements of 865.051.

Welders shall meet the requirements of 865.11.

865.051 Quality Control Personnel Qualifications. The Fabricator shall designate one individual as their Prestressed Fabrication Quality Control Specialist (PFQCS) The PFQCS shall be a PCI Certified Level II Technician. The Fabricator shall furnish the PFQCS with all tools and equipment necessary to provide quality control (QC) on all facets of the prestressed fabrication. The PFQCS shall have a thorough understanding of the plans, supplements, proposal and specifications pertaining to the project. The PFQCS shall be responsible for inspecting all equipment at the specified intervals and the fabricated work at all quality control points. The PFQCS shall have the direct authority to stop work and report non-conforming work to the Contractor and OMM. The person assigned as a PFQCS shall be designated the duties full time with no other assigned duties.

The qualifications of the PFQCS shall be approved prior to the Fabricator being qualified. The Fabricator shall provide a resume listing qualifications, work experience and date of PCI certification. The PFQCS shall not be changed without the approval of OMM.

The PFQCS shall be responsible for documenting all inspection hold points (Appendix II) for each fabricated component to show conformance with the specification and contract documents. The Fabricator is responsible for providing supervisory and/or 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 PFQCS's responsibility for documentation, QC and final acceptance of fabricated components at all required hold points.

QA inspection forms in Appendix II are for OMM quality assurance (QA) inspectors. While they define areas of rating by QA inspectors, these forms are not intended as forms for the Fabricator's PFQCS to use. QC inspection forms are the responsibility of the Fabricator to develop to assure that all facets of fabrication are documented for each member and to assure their QA rating by OMM inspectors.

865.06 Fabricator Rating System. OMM shall evaluate the Fabricator's level of quality throughout the fabrication process. This evaluation will include quality assurance reviews of shop drawings, material test reports and control, QC documentation, and shop Quality Assurance (QA) inspection.

OMM shall perform random and/or specific hold point QA inspections (see Appendix II). OMM may choose to waive any or all parts of the QA inspection. The Office of Structural Engineering, under OMM oversight, will perform QA reviews of Contractor approved shop drawings. The QA rating forms associated with each process are in the Appendix II of this specification.

The Fabricator shall perform QC and provide documentation for each main material member at specified QA hold points (Appendix II). QA hold point inspections are points in the fabrication process that require both QC inspection by the Fabricator and QA inspection by OMM before the recommencement of the fabrication process.

The results of OMM and field construction QA evaluations shall be the Fabricator's rating. This rating shall be reported to the fabricator and shall affect the future qualification of the fabricator as follows:

A-Rated Fabricators: Fabrication performed that results in an average rating for five consecutive bridges, based on structural file number, of 90 percent or above, within the last 36 months, and with no single bridge rating less than 80 percent will be defined as an A-rated Fabricator. These Fabricators shall have the A-rating QA hold points and random QA inspection performed. The A-rating QA hold point is: Final before shipment (hold point 10, Appendix II). A single rating below 80 percent, or the average of five consecutive ratings dropping the average below 90 percent, will result in the Fabricator's qualification being lowered to a B-rating.

B-Rated Fabricators: Fabrication performed that results in an average rating for five consecutive bridges, based on structural file number, of 80 to 89 percent, within the last 36 months and with no single bridge rating less than 70 percent will be defined as a B-rated Fabricator. These Fabricators shall have all B-rating QA hold points and random QA inspection performed. The B-rating QA hold points are: Testing and De-tensioning (hold point 8, Appendix II), and Final before shipment (hold point 10, Appendix II). 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 QA hold points and random QA inspection performed. The C-rating QA hold points are: Strand tensioning and pre-pour inspection (hold point 5, Appendix II); Testing and De-tensioning (hold point 8, Appendix II); Post inspection (hold point 9, Appendix II); and, Final before shipment (hold point 10, Appendix II).

The C-rating is not a permanent qualification level for Fabricators. Fabricators who fail to achieve an average rating above 80 percent but average between 70 to 79 percent based on five consecutive bridges, based on structural file numbers, within the last 36 months, with no individual rating less than 60 percent, will either be reduced one level on the pre-qualification list or if already a level C will be consided on probation. The reduced level Fabricator shall then have three additional consecutive bridge, structural file, numbers to be averaged with the previous five to achieve a B-rating. Fabricators that do not achieve a B-rating will be removed 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 re-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.

865.061 Fabricator Rating Review Process. If a fabricator disagrees with or questions their rating two review options are available. The first is a meeting between the fabricator and rater to discuss the specific rated items in question and see if any resolution can be reached.

If the first option does not resolve the issues, the second option is for the fabricator to request, in writing, a reconsideration of their rating by the Department's review board comprised of the Deputy Director, Division of Engineering Policy, or his representative, the Administrator of the Office of Materials Management, or his representative, and the Administrator of the Office of Structural Engineering, or his representative. The written request must be submitted within 10 days of receiving the Department's total rating. The request shall Include documentation or evidence bearing on the performance of the work and the rating.

The board shall hear appeals concerning the Fabricator's rating on a specific bridge and structural file number. The board has no authority to hear appeals for revocation or suspension of a Fabricator from the pre-qualification list.

The Office of Materials Management shall schedule a meeting so the Fabricator has an opportunity to present its case to the board. The Department may have representatives at the meeting offering evidence in rebuttal. The board shall consider the evidence and issue its decision within fifteen days of the meeting.

865.07 General. All members shall be produced in accordance with 511, except as herein provided in this specification.

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.

865.071 Fabricator Documentation Responsibility. The Fabricator shall keep and maintain documentation records for each project bridge, structural file, number concerning:

1. Fabricator approval
2. Shop drawing approval
3. Material test reports
4 Welding qualifications
5. Quality control inspection

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-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, strand tensioning procedures, release procedures, concrete release and final strengths 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.

865.08 Fabrication Shop Drawings. Prestressed fabricated items sold under this specification, or other similar items requiring fabrication, shall be detailed on shop drawings by the Contractor or Fabricator in accordance with AASHTO "Standard Specifications for Highway Bridges", the Bridge Design Manual and this supplemental specification.

Deviation from the contract plans or these shop drawings will not be permitted without written order or consent of the Office of Materials Management (OMM). 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 PFQCS with one additional set of these drawings before the pre-fabrication meeting 865.081.

The Contractor shall accept these shop drawings and forward the submission to OMM, Cement & Concrete Engineer, 7 days before the pre-fabrication meeting (see 865.081).

The pre-fabrication meeting shall not be scheduled until the drawings have been received by OMM. Fabrication can begin after the prefabrication meeting is completed.

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, the Bridge Design Manual and Supplemental Specification 865. Each drawing of the four copies shall include the engineer's signature and registration number or the engineer's 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.

The prints shall be made from tracings, neatly and accurately drawn on sheets 22 x 34 inches (559 mm x 864 mm).

Shop drawings shall show details, dimensions, size of materials, match mark diagrams for field connection and erection, and any other information necessary for the complete fabrication and erection of the prestressed members.

When changes on submitted drawings are requested by the Department, or the Contractor makes changes in addition to those expressly requested, the shop drawings shall be submitted with suitable revision marks to identify the changes

Deviation from the contract plans or accepted shop drawings will not be permitted without the order of the OMM. Requests for such deviation or change shall be submitted in writing to OMM. After acceptance by the Engineer, such plans shall be taken as supplemental to, but in no sense a substitute for, the contract. The Contractor shall be responsible for supplying documentation and any revised drawings or changes listed above.

If the shop drawing approval process is complete and plan or fabricator errors are found during the fabrication process, shop drawings shall be revised, checked, and four (4) sets

supplied the Department. The fabricator may either submit the drawings through the Contractor to the Department or document in their cover letter the Contractor's verbal approval of the revised plans.

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. These microfilm copies shall be submitted to the OSE, Attention Structural Steel Engineer. 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.

865.081 Pre-Fabrication Meeting. A pre-fabrication meeting 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 points, unique fabrication items, special processes, etc. for the project. Attendance at the meeting shall include the Fabricator, the PFQCS, the Contractor, or designated representative, and OMM's QA inspector. The meeting will be conducted by the PFQCS. If all parties feel documentation is required, minutes can be taken and distributed. The issue of minutes shall be the first item during the meeting.

The time of the meeting shall be agreeable to all parties, but no earlier than 7 days after submittal of Contractor approved shop drawings, 865.08. OMM may waive the pre-fabrication meeting if accepted by the Fabricator and the Contractor. If Contractor submitted shop drawings do not comply with the requirements of 865.08, no pre-fabrication meeting can be scheduled or waived.

865.09 Materials. Materials shall conform to the following:

Concrete	865.12
Aggregate*	703.02
Portland cement	701.01 thru 701.06
Air-entraining admixture	705.10
Chemical admixtures for concrete	705.12
Prestressing steel	711.27
Reinforcing steel	509
Transverse tie rods	711.01

*Fine aggregate shall be natural sand for members that will not have a separate wearing course. Coarse aggregate shall be modified as follows:

Deleterious materials, max.	0.4%

Gradation shall be No. 57, 6, 67, 68, 7, 78 or 8 standard size coarse aggregate.

Materials Approval. All materials either incorporated into the prestressed fabricated item or supplied under 865 as component parts of the fabricated items shall be the responsibility of the Fabricator to control, have tested, validate materials requirements and provide supporting documentation at the time of final inspection by the QA inspector. The Fabricator's PFQCS is responsible for the documentation, test results, or certification required by ODOT needed to validate that the materials meet the specification.

Department specified materials have either specific ASTM requirements, ODOT specification requirements or specific project requirements. The Department reserves the right to perform random check sampling of materials. Approval sampling of materials at the Fabricator's plant will not be performed.

865.091 Fabricator Materials Control. The Fabricator's PFQCS shall be responsible for materials approval. The PFQCS shall be responsible for delivered materials meeting specification requirements. This includes inspection of material; checking test reports for conformance to applicable specifications; requiring test reports, certifications and other required documentation at time of delivery; rejecting un-acceptable and/or un-documented materials; completing documentation forms for each bridge number and assembling complete and correct documentation packages for each project.

The forms in Appendix III are to be completely filled out for each project before presentation to the QA inspector. The QA inspector will verify from documented results the materials incorporated into the fabricated products to be shipped meet requirements. As verification will be done after the product is completed, any incomplete documentation will cause all products to be rejected. The QA inspector either at time of shipment, or at a time designated by the QA inspector, may require review of the complete materials package to support the completed forms or for required fabrication information.

If a coating is required, such as epoxy or galvanizing, coating records shall also be required showing date, type, and quality control records from the coater and actual thickness measurements of the coating. The PFQCS is responsible for making actual coating measurements on the delivered materials to assure the product meets specification and recording those measurements.

865.101 Casting Beds. Casting beds shall be constructed of steel or concrete. The beds shall be above grade to assure that they will not be submerged due to accumulation of water as a result of curing operations. Beds and abutments shall be so designed that they are capable of safely resisting all forces applied to them without appreciable movement or deflection. These forces consist of compression and eccentric forces due to end-jacking operations, forces at hold down points when draped strands are used, and downward forces due to the dead weight of the members.

865.102 Cold Weather Operations. The following procedures will be employed when the ambient air temperature is below 50° F (10° C). Mixing water, aggregates or both shall be heated as necessary to result in concrete temperatures not less than 50° F (10° C) nor more than 70° F (21° C) when placed. Water heated above 150° F (66° C) shall not be permitted to come in direct contact with the cement. Concrete shall not be placed in contact with forms, reinforcing steel, prestressing strand or other hardware materials having a temperature less than 32° F (0° C). When casting bed temperatures are less than 30° F (-1° C), prestressing strand shall be tensioned to provide the design tension at 50° F (10° C).

865.103 Equipment. Hydraulic jacks of sufficient capacity and stroke shall be used for tensioning strands. Either single or multiple strand tensioning may be used. Tensioning jacks shall be equipped with automatic cutoff valves and gages with a minimum diameter of 6 inches (150 mm) and 500 pound (2 kN) increments. Gages shall be calibrated for the jacks with which they are to be used and a graph or table showing the calibration shall be available to the QA inspector. Calibration of jacks shall be done by a method acceptable to the Office of Materials Management, at least once every six months or as ordered by the Director. Calibration documentation shall be part of project's QC documentation.

The jacking system shall be of such design as to assure uniform stress in all strands. When multiple strands are tensioned simultaneously, plants shall be equipped with approved types of dynamometers for equalizing the initial stress on all strands prior to application of the full tensioning load with the master jack. The capacity of the dynamometers shall be such that the desired readings are in the middle to upper range.

865.104 Inspection Facilities. The plant shall provide minimum floor area of 120 square feet (11 m^2) for the use of QA Inspectors. This area shall be adequately heated and ventilated and equipped with necessary desks, chairs, tables, and electrical outlets.

865.11 Construction Methods. Forms shall be adequate to produce members within the tolerances set forth on the plans. Only metal forms shall be used, with the exception of bulkheads and voids. The surface of the forms in contact with the concrete shall be smooth, and the joints between panels shall be tight. The soffit form shall have a plane surface at right angles to the vertical axis of the members and the two bottom edges shall be beveled 3/4 inch (19 mm) with a triangular strip built into the forms. The length of the members shall be increased for elastic shortening and normal concrete shrinkage, and the forms shall be so designed that they will not resist this movement.

Forms for voids in box beams shall be water-resistant and shall be constructed of a material that will resist breakage and deformation during the placing of the concrete, and they shall not excessively increase the dead load of the beams.

When forms are coated with an approved release agent, care shall be taken to prevent the oil from coming in contact with the prestressing strands or reinforcing steel.

Reinforcing steel shall be installed and assembled as per approved shop drawings. If authorized, welding of reinforcing cages shall be performed by welders qualified to AWS D1.4. Epoxy coated or galvanized reinforcing steel shall not be welded, except as approved by OMM. All coating areas damaged by welding shall be repaired as per coating manufacturer's instructions. Loss of cross-section of reinforcing due to welding shall be automatic cause for rejection of the reinforcing steel. Strands shall be accurately placed in the positions shown on the plans. Strands with kinks, bends, nicks, broken wires, or other defects, including scale or loose rust will not be permitted. Slight rusting, provided it is not sufficient to cause visible pits, shall not be cause for rejection. Before placing of the concrete, the strands shall be carefully cleaned of all dirt, grease, oil or other foreign matters. Splicing of the strands within a member will not be permitted.

Each strand shall be tensioned to the stress indicated on the plans. When two or more strands are stressed by one jack, each strand shall be individually stressed to about 3000 pounds (13 kN), or other approved initial pre-load, by means of a dynamometer before being attached to the jacking system. The required stress in the strands shall be measured by the jacking equipment gages and checked by the elongation of the strands. If the gages and the measured elongation don't match within a 5 percent tolerance the stressing shall be stopped and the reason for the differences determined. The PFQCS shall keep a record of all jacking forces and elongations.

The strands shall be secured by suitable anchorage devices capable of developing at least 85 percent of the ultimate strength of the strands. The anchorage shall be such that no slippage of the strand will occur after the tensioning operation.

When draped strands are used, the loss of stress due to friction shall not exceed 5 percent. The PFQCS shall be responsible for validating loss due to friction by a procedure approved by the Office of Materials Management. In order not to exceed 5 percent, the strands shall be tensioned at both ends. Hold-down points shall be placed within 3 inches (90 mm) of the locations shown on shop drawings and within 12 inches (0.3m) of the locations on the plans.

865.12 Concrete. The concrete shall be machine mixed according to Supplemental Specification 899, except that 899.03 does not apply. The plastic air content of the concrete before placement shall be 6 ± 2 percent. Slump shall be maintained in accordance with the manufacturer's submitted mix design. No slump will be allowed which causes segregation of the mix. Mix designs should have a specified water/cement ratio. Any increase of slump to meet the required slump of the manufacturer's mix design shall be achieved by the addition of a chemical admixture meeting the requirements of 705.12, Type F or G. An approved corrosion inhibiting admixture shall be used in all prestressed concrete. The admixture and dosage rate shall be approved by the Laboratory.

The concrete shall be proportioned of materials specified in 865.09 to provide a minimum cylinder strength of 5500 psi (38.0 MPa), or plan specified strength, in 28 days, as determined by testing a group of cylinders comprised of at least two individual cylinders.

Each group of cylinders shall have an average strength of not less than 5500 psi (38.0 MPa), or plan specified strength, and no individual cylinder shall have less than 95 percent of the specified strength. At least two cylinders shall be made from both the first and last loads of each casting bed being poured per day. If more than 200 feet (60 m) of beam is being produced on the same bed, at least two additional cylinders shall be made for each additional 200 feet (60 m). The sample location for the additional cylinders shall be at the PFQCS's choice but generally in the middle of the production. The group of cylinders for determining strength, both release and final, shall be one individual cylinder from each sample location.

The QA inspector has the option to require additional cylinders samples at any location that does not appear in conformation with mix design or placement requirements. Those additional cylinders shall be included in the group of cylinders for determining strength.

Fabricator concrete mix designs shall be submitted to OMM with test data validating the mix's capability to achieve the required 28 day strength under the curing method used.

Calcium chloride or admixtures containing calcium chloride are prohibited.

Concrete may be placed in the bottom flange of a box beam before the interior forms and reinforcement for the upper portion of the member is placed, providing continuous placement is not interrupted for more than 45 minutes.

The top surfaces of non-composite members shall be screeded and finished with a burlap drag, or other means to provide a uniform surface with a gritty texture suitable for waterproofing. The top surface of composite members shall be screeded and given a wire broom finish, in a transverse direction, penetrating the finished surface approximately 1/4 inch (6 mm).

The concrete shall be given an accelerated cure by low pressure steam or radiant heat within a suitable enclosure to contain the live steam or heat. The initial application of the steam or heat shall be from two to four hours after the final placement of concrete to allow the initial set to take place. If retarders are used, the waiting period shall be increased to four to six hours. The time of initial set may be determined by ASTM C 403, and the time limits described above may then be waived.

During the waiting period the temperature within the curing enclosure shall be not less than 50° F (10° C).

The allowable temperature rise and range of the plastic concrete before initial set shall not be greater than 10° F(5° C) per hour; shall not have a total rise of greater than 40° F(22° C) nor exceed a maximum temperature of 100° F(38° C)

During the initial application of live steam or radiant heat, the ambient temperature within the curing enclosure shall increase at an average rate not exceeding 40° F (22° C) per hour until the curing temperature is reached. The maximum curing temperature shall not exceed 160° F (71° C). A maximum curing temperature of 180° F(82° C) can be used if the prestressed concrete manufacturer can document to the Department delayed ettrinite or alkali silica reaction is not at issue. The maximum temperature shall be held until the concrete has reached the desired strength. De-tensioning shall be accomplished immediately after the steam or radiant heat curing has been discontinued. Additional curing is not required after de-tensioning.

(1) Curing with low pressure steam. Application of live steam shall not be directed on the concrete forms so as to cause localized high temperature.

(2) Curing with radiant heat. Radiant heat may be applied by means of pipes circulating steam, hot oil or hot water, or by electric heating elements. Moisture loss shall be minimized by covering all exposed concrete surfaces with plastic sheeting or by applying an approved liquid membrane curing compound to all exposed concrete surfaces. Shear faces of composite members and other surfaces to which field-cast concrete or other materials will be bonded in the finished structure shall have the curing compound removed.

Cavities in the exposed surface of beams shall be neatly filled with grout. Grout used shall be non-shrink, conforming to ASTM C 1107. Cleaning, application and curing of the grout shall be as per manufacturer's published recommendations. Honeycomb that is considered to impair the member's performance shall be cause for rejection.

865.13 Release of Prestressing Strands. Prestressed strands shall not be released until the concrete has reached a strength of at least 4000 psi (28.0 MPa), or plan defined release strength, as determined by the testing of pairs of concrete cylinders made according to AASHTO T 23, cured by the exact method used to cure the beam, and tested according to AASHTO T 22. These cylinders shall be tested in the Fabricator's laboratory. Both tested cylinders shall meet or exceed the required strength of 4000 psi (28.0 MPa), or plan defined release strength. The QA Inspector shall be notified in advance and shall have the right to observe the testing of the cylinders. A-rated Fabricators are not required to provide notification.

The strands shall be released immediately after accelerated curing by steam has been discontinued. Prior to release of prestressed strands, forms and hold-downs which restrict either horizontal or vertical movement of prestressed members shall be loosened or removed. Each strand shall be burned or heat released simultaneously at selected exposed points between anchorages and the sequence should follow a predetermined pattern, approved by the Director, to equalize the forces being transferred to the various areas of the cross section of the member. For heat release, a low-oxygen flame shall be used and at least a 4 inch (100 mm) length of strand be uniformly heated.

865.14 Transportation, Storage and Erection. Prestressed members shall not be shipped until the 28-day design strength of the concrete is reached and approval by the QA inspector has been received.

The members shall be stored, transported and erected in an upright position, and points of support and direction of reactions shall be approximately the same during storage and transportation as when the members are in their final position. Whenever members are to be stored, care shall be taken to provide unyielding horizontal supports capable of maintaining the members in a vertical position. If it is found necessary to transport the members in any position other than vertical, it shall be done only with the written approval of the Director. The members shall be lifted and erected through the use of lifting devices capable of withstanding any required loads. Members damaged by improper handling, storing, transportation or erection shall be repaired or replaced, at the discretion of the Director, at no expense to the Department. In no instance shall any vehicular load be allowed on an individual prestressed concrete box beam in a prestressed concrete box beam deck after the tie rods have been tightened and prior to grouting of the keyway and the grout obtaining the specified design strength.

Prestressed box beams shall be accurately placed during erection to assure uniform load on all bearings. Box beams shall be placed to assure correct fit of the keyways and to assure that the keyways can be properly grouted. Keyway grouts approved by the Laboratory shall be mixed, installed and cured as per grout manufacturer's published recommendations to obtain a design compressive strength of 5000 psi (34.5 MPa). Any proposed deviations to the manufacturer's published recommendations shall not be acceptable without approval of the Office of Materials Management.

Where erection of prestressed members will require placement of cranes or launching devices on previously erected spans, erection procedures shall be submitted for approval as per 501.06.

865.15 Method of Measurement. The quantity shall be the number of members, or the length of the members in linear feet (meters).

This item includes all inserts, sleeves, fittings, reinforcing steel fully or partially encased in the members, and all transverse tie rods necessary to complete this item.

Concrete diaphragms, 511, and bearing plates or pads or other expansion materials, 516, will be paid for as separate items.

865.16 Basis of Payment. Payment will be made at contract price for:

Item	Unit	Description
865	Each, linear foot (meter)	Prestressed concrete non-composite box beam bridge members, Level 1
865	Each, linear foot (meter)	Prestressed concrete composite box beam bridge members, Level 1
865	Each, linear foot (meter)	Straight strand prestressed concrete bridge I-beam members, Level 2
865	Each, linear foot (meter)	Draped strand prestressed concrete bridge I-beam members, Level 3

APPENDIX I

OHIO DEPARTMENT OF TRANSPORTATION
1600 W Broad Street
Columbus, OH 43223
614-275-1325 / fax 614-275-1543 / bstruble@dot.state.oh.us

Facilities inspection has been performed by _____ From the Office of Materials Management (OMM)___/___/___ Based upon this report your facility will be evaluated for acceptance into the Prequalified Prestressed Fabricator List as specified by Supplemental Specification 865.

Facilities Evaluation Check List

1.Company Name:_____
2.Address:_____
3.Phone: _____ Fax:_____ E Mail_____
4.PCI Certification, enclose copy of certification:_____
   a. Level 1 fabricator:
   b. Level 2 fabricator:
   c. Level 3 fabricator:
5. Company Representative
   a. President: _____
   b. Chief Engineer: _____
   c. Prestressed fabrication superintendent_____
   d. PFQCS, enclose certifications:_____
6. Prestressed Beds
   Length (ft) _____
   Length (ft) _____
   Length (ft) _____
   Length (ft) _____
   Length (ft) _____
   Length (ft) _____
7. Building facilities:
   Reinforcing steel fabrication Area (dimensions) _____
   Adequate bending equipment _____
   Projection method for epoxy coating reinforcement _____
   Method of cage construction _____
   Reinforcing steel welders AWS qualified_____

   Prestressed Concrete Cylinder Testing facilities:
   Capacity of cylinder testing equipment
   Calibration documentation
   Capping method equipment

APPENDIX I

ODOT QA inspection office (dimensions)
- Adequate heating _____
- Adequate lighting _____
- Phone line _____

8. Lifting methods for beams
   - Crane capacity _____
9. Concrete Quality
   - Source of concrete _____
   - Mix design _____
   - QC procedure established for concrete _____
   - Moisture control methods for aggregate _____
   - Admixture batching method and QC _____
10. Fabrication Quality
    - Written prestressed strand tension method
      - straight
      - draped
    - Written prestressed strand release method
    - Method of debonding
11. Materials controls

Control and method of tracking
- cement
- aggregate
- admixtures
- reinforcing
- prestressed strand
- inserts and fabricated items

APPENDIX II

FABRICATOR RATING FOR SHOP DRAWINGS : PRESTRESSED CONCRETE

County:_____ **Project:**_____ **SFN:**_____ **Date:**_____
Bridge:_____ **Fabricator**_____

Contractor Coordination (10%) (1 point each)	Y	N	NA
1. The Contractor's P.E. provided a certification cover letter.			
2. The shop drawings are approved and stamped by the Contractor.			
3. Shop drawings were received seven (7) working days before prefabrication meeting.			
4. Contractor's field verification of the existing structure is reflected on the shop drawings.			
5. Contractual changes due to field conditions, plan errors, fabrication substitutions or other conditions been addressed by the fabricator.			

Title Block (1%) (1 point each)			
1.The project number is shown.			
2.The reference number(s) is/are shown.			
3.The county, route and section of the structure is shown.			
4.The checker/reviewer initials are shown			
5.The shop drawings are numbered sequentially			
6.The Fabricator's name and address are shown.			

General Notes (15%) (1 point each unless noted)			
1. The release and 28 day concrete strengths are defined and conform to the Contract (5 points)			
2. Corrosion inhibitor type and dosage as per Contract (2 points)			
3. The keyways are sand-blasted four (4) days prior to shipment.			
4. The beam ends are waterproofed as per Contract			
5. The top of the beams are textured per 865.12.			
6. Correct ODOT standard construction drawing is referenced			
7. Release pattern for detensioning strands is symmetrical and defined (3 points)			
8. The strand type, grade, diameter and initial stressing force as per Contract (5 points)			
9. Reinforcing steel grade is meets Contract requirements. (4 points)			
10. Final camber, prior to erection, detailed in conformance to Contract.			
11. Keyways omitted on the exterior side of the fascia beam as per Contract.			
12. Procedure defined for bending extended strands without heat.			

Framing Plan (10%) (1 point each)	Y	N	N/A
1. Member size(s) shown.			
2. The skew is shown from the vertical to center line of bearing.			
3. For each span, the center to center bearings are dimensioned.			
4. The end of beam to centerline of bearing is dimensioned.			

APPENDIX II

	Y	N	NA
5. The beams are dimensioned out to out.			
6. The diaphragm/tierod plan are per the Contract.			
7. The guardrail inserts are per Contract.			
8. The beams piece marked for erection.			
9. The phased construction width meets the Contract dimensions			

Beam Details (34%) (1 point each unless noted)

	Y	N	NA
1. End & intermediate diaphragm connections are dimensionally located per the framing plan (2 points)			
2. Continuity connection details of beam end supported at piers meets the Contract (3 points)			
3. Expansion device supports and dimensional details meets Contract requirements (2 points)			
4 The beams are piece marked according to the framing plan.			
5 Beam voids are dimensionally correct, spaced correctly and do not interfere with beam lifting devices (2 points)			
6. Beams detailed to theoretically fit tight at crown or change in roadway cross-slope (2 points)			
7. Members meet plan skew and are dimensioned correctly. (5 points)			
8. Location of draped points as per plans or approved location (5 points)			
9. Longitudinal reinforcing steel is detailed and lapped per the Contract requirements (4 points)			
10. Epoxy coated reinforcing steel located as per Contract requirements. (2 points)			
11. Transverse reinforcing steel detailed and located as per Contract requirements. (4 points)			
12. Concrete cover meets the Contract requirements (3 points)			
13. End block reinforcing steel detailed as per Contract (3 points)			
14. Railing, diaphragm other plan or Contractor required inserts are completely detailed, properly dimensioned, located, and any interference with reinforcing steel or strand does not occur with inserts. (3 points)			
15. Holes in members, not limited to anchor dowels and diaphragms, meet Contract requirements. (3 points)			
	Y	N	NA
16. Connections for, utilities, metal diaphragm, scuppers, etc. are as per Contract requirements. (2 points)			
17. All hardware cast in the beam has protective coating meets Contract requirements.			
18. Dimensions, location and fabrication of embedded bearing load plates meet Contract requirements. (2 points)			

Cross Section Details (30%) (1 point each unless noted)

	Y	N	NA
1. The strand pattern and spacing are per the Contract requirements (5 points)			
2. The strands are debonded as per Contract requirements. (3 points)			
3. Extended strands are not debonded strands. (3 points)			
4. Concrete cross-section dimensions meet Contract requirements. (4 points)			
5. Longitudinal reinforcing steel is spaced and sized as per Contract requirements. (3 point			

APPENDIX II

Y = yes, N = no, NA = not applicable
No partial points are used for Y, N or NA selection

Sum of {Y/(Y+N)} x Selection Factor = Fabricator Rating

Contractor Coordination	_____	(Y)/	_____	(Y+N) x 10 =	_____
Title Block	_____	(Y)/	_____	(Y+N) x 1 =	_____
General Notes	_____	(Y)/	_____	(Y+N) x 15 =	_____
Framing Plan	_____	(Y)/	_____	(Y+N) x 10 =	_____
Beam Details	_____	(Y)/	_____	(Y+N) x 34 =	_____
Cross Section	_____	(Y)/	_____	(Y+N) x 30 =	_____

Summation fabricator rating for performance of shop drawings (%) = _____

FABRICATOR_____ **RATING FOR SHOP FABRICATION**

County:_____**Project:** _____ **SFN:**_____**Shop ID.**_____

APPENDIX II

Office of Materials Management QA Inspector: _____

Hold Point Descriptions for Prestressed Fabricators - Levels 1 thru 3	Points	Y	N	N/A
Strand and Reinforcing validation	**QA Hold point 1**			
1. Certified test data's Heat number matches tagging identification on rebar and strand	5			
2. Yield Strength of reinforcing meets plan requirements, Fy (psi)	3			
3. Tensile Strength of reinforcing steel meets plan specifications, Fu (psi)	1			
4. Tensile Strength of prestressing strand meets plans and specifications, Fu (psi)	5			
5. Strand and reinforcing inspected for acceptable surface conditions rust, etc.	1			
Hold Point 1 Sub Total	**15**			
Concrete Mix Inspection	**QA Hold Point 2**			
1. Mix design documented to OMM	5			
2. Batching weights controlled- equipment calibrated	3			
3. Corrosion inhibitor Admixture batched correctly	3			
4. Aggregates checked for segregation, contaminants, and proper handling	2			
Hold Point 2 Sub Total	**13**			
Reinforcing inspection - pre-form:	**QA Hold Point 3**			
1. Pre-fabrication cages meet dimensional requirements	5			
2. Individual bars checked dimensionally, size and grade before installation	1			
3. Tack welded assemblies, welds acceptable	3			
4. Welders qualified D1.4 (D1.5 if performing structural plate welding)	2			
5. Welder following qualified procedure for reinforcing	2			
6. Lap lengths built into longitudinal bar assemblies meet requirements when stirrups properly spaced	2			
Hold Point 3 Sub Total	**15**			
Form Inspection	**QA Hold Point 4**			
1. Cross-section dimensionally correct	3			
2. Skew ends meet dimensions and angle	2			
3. Hold down points located as per shop drawings (+/- 6 inches)	3			
4. Holes plugged and flush, welds ground flush	1			
5. Form joints sealed	1			
Hold Point Descriptions for Prestressed Fabricators - Levels 1 thru 3	**Points**	**Y**	**N**	**N/A**

APPENDIX II

6. Forms string lined for straightness	2			
7. Length of members conforms with specifications with bulkheads correctly installed	4			
Hold Point 4 Sub Total	**16**			
Strand tensioning and pre-pour inspection:	**QA Hold Point 5**			
1. Strand diameter correct	5			
2. Strands inspected in bed for nicks, gouges	2			
3. Correct strands debonded and for correct length	3			
4. Check Elongation established using Strand reel Modulus of Elasticity (E), measured area of strand and corrections for temperature, bed shortening, additional strand length due to draping, slippage at ends and seating losses	5			
5. Jacking equipment calibrated as per specification	2			
6. Written strand stressing procedure at jacking location	1			
7. Pre-load applied	2			
8. Strands loaded symmetrically, Final load applied, elongation checked	6			
9. Draped strand force at bed ends shall be validated to be within 5%	4			
Hold Point 5 Sub Total	**30**			
Reinforcing Placement Pre-pour:	**QA Hold Point 6**			
1. Reinforcing steel sizes correct	5			
2. Clearance of reinforcing and strand from forms meets concrete cover	3			
3. Lap splice reinforcing installed and meet specifications	3			
4. Reinforcing adequately tied against movement	2			
5. Guardrail and inserts installed correctly	3			
6. Reinforcing located as per shop drawings	2			
7. Tierod holes and anchor holes dimensionally correct	2			
8. Release agent applied on forms	1			
9. Lifting devices installed	3			
Hold Point 6 Sub Total	**24**			
Member Fabrication Concrete QC	**QA Hold Point 7**			
1. Unit weight, slump and air tested and meet requirements	3			
2. Verification cylinders made	5			
Hold Point Descriptions for Prestressed Fabricators - Levels 1 thru 3	**Points**	**Y**	**N**	**N/A**

3. Vibration performed as per specifications and plant approved procedure	2			
4. Slump and air tested minimum every 20 yd or 2 tests per fabricated member	2			
Dimensional				
1. Concrete cover checked during placement	3			
2. Concrete depth checks performed for top and bottom flange	4			
3. Composite reinforcing checked for extension out of member	2			
4. Voids inspected for location after concrete placed (box beam)	2			
5. Top of member surface finish meets specifications	1			
6. Lifting devices final location meets specifications	4			
Cure Application				
1. Protection of concrete before initial set performed	2			
2. Set time of mix exceeded before accelerated cure applied	3			
3. Temperature measurement during accelerated cure	5			
4. Cylinders cured as per member	3			
Hold Point 7 Sub Total	**43**			
Testing and De-tensioning:	**QA Hold Point 8**			
1. Cylinders tested for release strength	5			
2. Cylinder testing equipment calibrated	1			
3. Cure removed	2			
4. De-tensioning procedure performed and meets specifications	4			
5. Initial camber checked and recorded	2			
Hold Point 8 Sub Total	**14**			
Post Inspection	**QA Hold Point 9**			
1. Beam length dimensionally correct	3			
2. Cavities in concrete surfaces repaired	1			
3. Honeycombing inspected and documented QA inspector notified	2			
4. Validate dimensional locations of tierods, guardrails and other inserts	3			
5. Sweep meets required tolerances	2			
6. Composite reinforcing meets required clearance	1			
7. reinforcing steel coating inspected and repaired as per requirements	1			
Hold Point 9 Sub Total	**14**			
Final Inspection Before Shipment	**QA Hold Point 10**			
1. Cylinders tested for 28 day strength to meet specifications	5			
Hold Point Descriptions for Prestressed Fabricators - Levels 1 thru 3	**Points**	**Y**	**N**	**N/A**

APPENDIX II

2. Final camber measured and evaluated against adjacent members and tolerances	2			
3. Final sealing applied Documentation of cleaning and rate of application	3			
4. Inspection for cracks, lifting damage, etc.	3			
Hold Point 10 Sub Total	**13**			

Y = Yes, N = No, NA = Not Applicable, No partial points are available for a Y, N or NA answer

APPENDIX II

Hold Point	Yes/(Yes + No)	Weight Factor	Rating Total
1		12	
2		10	
3		5	
4		5	
5		16	
6		7	
7		12	
8		13	
9		8	
10		12	
		Total Rating	

Summation Fabricator rating for performance of QA Inspection = _____

* Y /(Y + N) x 100 for Hold Points 1, 5 and 8. If any of these individual ratings are lower than the summation fabricator rating, then the Fabricator rating shall be based upon the lowest individual section rating.

Required Hold points
A Rating hold points = 10
B Rating hold points = 8 and 10
C Rating hold points = 5, 8, 9 and 10

Final Total Fabricator Rating .20 x Shop Drawing Rating _____
.80 x Fabrication Rating _____

If no shop QA rating is performed, the Fabrication QA rating will be the fabricator's QA rating for the project.

APPENDIX III

ODOT MATERIALS CERTIFICATION FORM
PRESTRESSED/PRECAST CONCRETE

Precast Producer _____
ODOT Project Number _____ **Bridge Number** _____

Cement

Manufacturer	Plant	Type	Insp. App.

Cementatious Materials (fly Ash, GGBF, Micro-silica)

Manufacturer	Source	Type	Insp. App.

Aggregate FINE

Producer	Type	Soundness %	Insp. App.

Aggregate COARSE

Producer	Type & Size	Deleterious Materials	Soundness %	Abrasion %	Insp. App.

ADMIXTURES (corrosion inhibitor, retarders, air entrainers, superplasticizers)

Manufacturer	Brand name	Admixture Type	Dosage rate	Insp. App.

REINFORCING STEEL

Rebar Size (Epoxy/Black)						
Manufacturer						
Heat Number						
Yield Strength						
Tensile Strength						
Elongation %						
Coating Thickness						
Bar Mark						
Use of Rebar						
TE-24						
Insp. App.						

WIRE MESH REINFORCING

Mesh Size						
Heat Number						
Manufacturer						
Tensile Strength (LW)						
Dia. (LW)						
Area (LW)						
Tensile Strength (CW)						
Dia. (CW)						
Area (CW)						
Weld Shear						
Coating Thickness						
TE-24						
Insp. App.						

PRESTRESSING STRAND

Heat Number					
Coil No.					
Nominal Diameter					
Area					
Ultimate Strength					
Yield Strength					
Elongation					
Modulus of Elasticity					

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Coating Thickness					
Insp. App.					

TRANSVERSE TIE RODS

Heat Number					
Nominal Diameter					
Area					
Yield Strength					
Ultimate Strength					
Elongation					
Coating Thickness					
TE-24					
Insp. App.					

INSERTS INCLUDING EMBEDDED INSERTS, BOLTS, NUTS, WASHERS, COUPLING NUTS

Insert Description				
Certification or TE-24				
Mill Certs				
Coating Thickness				
Insp. App.				

FABRICATED PLATE (BEARING INSERT PLATES, WELDING CONNECTION PLATES, ETC.)

Description			
Diameter			
Length			
Width			
Thickness			
Depth			
Coating Thickness			
Insp. App.			

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 870
SEEDING AND MULCHING
March 27, 2001

870.01	Description
870.02	Testing of Soil
870.03	Agricultural Lime
870.04	Testing of Agricultural Liming Materials
870.05	Lime Application Rates
870.06	Commercial Fertilizer
870.07	Topsoil
870.08	Compost
870.09	Seeds
870.10	Legumes
870.11	Native Grasses and Wildflowers
870.12	Site Preparation
870.13	Placing Topsoil
870.14	Seeding Methods
870.15	Mulching Operation
870.16	Wood Fiber Mulch
870.17	Compost
870.18	Watering
870.19	Maintenance
870.20	Mowing
870.21	Fertilization: 2nd Application
870.22	Repair Seeding and Mulching
870.23	Inter-seeding
870.24	Method of Measurement
870.25	Performance
870.26	Basis of Payment

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 or CMS 207 which ever is in the contract.

This specification replaces Item 659 in the 1997 CMS and applies to all areas so designated on the project and areas designated or accepted as waste and borrow areas on or off the project limits.

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. , The Contractor shall have a Standard Test performed on 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). The test may be taken in the topsoil stock piles. One test is required for every 10,000 c.y. of topsoil.. Take a minimum of two tests per project.
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. Submit these test results to the Department. 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.

The standard application rates for lime, in 870.05, and Fertilizer, in 870.06 shall be used when the soil analysis test not in the contract.

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 and rate.

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 7-10 "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. The Contractor shall submit the analysis to the Department. Fertilizer shall be applied in an even pattern over all areas.

870.07 Topsoil. Topsoil shall consist of fertile, loose, friable, loamy material that contains humus material. The topsoil may be stripped from the upper most layers of the excavation areas or imported from off the project site. The Contractor shall remove all heavy, grass, weeds and other vegetation prior to the stripping operation..

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, 3A and 3B 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 (crown vetch) 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 be seed specifically grown for the Ohio climate. 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:

1. Name and location of the seed supplier.
2. Origin and date of harvest of each kind of seed.
3. A statement of the purity and germination of the seed.

SEED MIXTURES: TABLE 2

CLASS – TYPE	SEEDS	Lbs/1000 Sq Ft	Kg/1000 m^2
1 Lawn Mixture(Use for areas in front of residences,commercial properties, etc. between curb and sidewalks)	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 Mixtures (Use for flatter than or equal to 3:1	Use Mixtures 2, 3B, 3C or 4B.		

slopes)			
3B Low Growing Slope Mixture (Use for steeper than 3:1 slopes)	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 (Use for steeper than 3:1 slopes)	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(Use for flatter than 2:1 slopes and seeding and mulch for wild life)	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(Use for flatter than 2:1 slopes seed and mulch for wildlife and roadside mixture)	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(Use flatter than 2:1 slopes and for seeding and mulch for wildlife)	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 m^2**
5B Native Wildflower and Grass Mixture(Use for flatter than 2:1 slopes and for seeding and mulch for wildlife)	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)	0.34	1.66

	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)	 0.046 0.069 0.023 0.92	 0.224 0.337 0.112 4.49
6 Wildlife Mixture (Use flatter than 2:1 slopes and for seeding and mulch for wildlife)	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 or prepared for the seed under this item necessary to bring the surface to the proposed grade to the lines indicated on the plans. 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. Track the surface with the dozer cleats or other methods to open up the soil to receive the seed, topsoil or compost. The tracking shall be perpendicular to the natural flow of water except for areas 4:1 or flatter.

870.13 Placing Topsoil. Topsoil shall be placed in a loose lift to construct a compacted depth of 4 inches. The surface of the topsoil shall be at the finished grade as shown in the plans. ".

When pneumatic or hydraulic methods are used, the seed may be mixed with the topsoil and placed in the same operation. When this alternative method is used, the topsoil shall be tracked, or lightly compacted after the fertilizer, lime or other soil amendments are placed.

All seed bed areas or topsoil, 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 or top soil 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 the topsoil is placed the area shall be tracked back and forth to achieve good contact between soil and slope surface.

The prepared surface of topsoil or soil shall be uniform, free of gullies, rivulets, crusting, caking and satisfactorily shaped and finished the topsoil depth above the final grade. Surface shall be raked smooth prior to seeding on areas with a flatter than 3:1 slope . On areas with a 3:1 slope or steeper the topsoil surface shall be opened up by using the dozer cleats or other methods. The tracking shall be perpendicular to the natural flow of water except for areas 4:1 or flatter.

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 slopes steeper than 2:1. Shale cuts steeper than 2:1 shall be allowed to deteriorate to a soil type surface texture prior to seeding.

Fertilizer, lime or other soil amendments shall be applied to the soil or topsoil surface in separate operations. The fertilizer, lime or other soil amendments shall be incorporated into the soil or topsoil at a depth of 2 to 4 inches. The fertilizer, lime or other soil amendments may be incorporation into the soil or topsoil together or separately.

870.14 Seeding Methods. Seeding operation shall not be performed unless the area is properly prepared. When the seedbed or topsoil becomes compacted prior to seeding, the surface shall be redisked or loosened.

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.

When broad cast seeding, he Contractor shall seed classes 1,2, 3A and 3B between August 15 to October 30. When seeding classes 1,2, 3A or 3B is necessary prior to these months, the seeding rates shall be increased by 10 percent.

Hydro seeding shall be allowed for Classes 1, 2, 3A, 3B, 3C and 7. Hydro seeding applies the mulch, seed, water and fertilizer in the same operation. Use hydro seeding between March 1 and October 15.

All seeding performed between October 30 and March 1 shall be temporary seeding in accordance with Supplemental Specification 877 or CMS 207. 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, slit seeder or native seed grass drill. Seeding native grasses 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.

When broadcast seeding the area shall receive a light raking followed by rolling on flat surfaces or the area shall be tracked by a dozer on slopes. This work ensures a good seed soil-contact and shall be done immediately after sowing,.

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 substitution.

870.18 Watering. , All permanent seeded areas (Classes 1 to 6) , shall be thoroughly watered, after the seed has germinated.The total rate is 300 gallons per 1000 square feet (12.2 m^3/1000 m^2) for a 7 day period. This rate shall be applied in at least 2 applications spread over seven days.. More than 2 applications may be required to get the needed total rate. 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 applications. 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. A soil test shall be made to determine the need for the second application. In no case shall the second application be applied unless the grass has germinated. 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, except when damage or erosion of these areas occurs as a result of fault or negligence of the Contractor. Then the areas shall be satisfactorily repaired, fertilized, seeded and mulched at no additional cost to the Department.

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. Compost may be applied at a rate set in 870.17 in these areas. Such work will be measured and paid for as "Repair Seeding and Mulching."

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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. . . .

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. Unless there is quantity change greater than 5 %, the Contractor shall be paid the plan quantity. When the Contractor finds a discrepancy, submit supporting documentation concerning the possible changes. The quantity will be checked by using the average compacted or tracked depth measurements in the field.

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. Unless there is a change greater than 5%, then the Contractor is paid the plan quantity. When the Contractor finds a discrepancy, 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)	Topsoil
870	Ton (kilogram)	Commercial fertilizer
870	Ton (kilogram)	Agricultural lime
870	Square yard (square meter)	Seeding and mulching
870	Square yard (square meter)	Seeding and mulching for wild life
870	Square yard (square meter)	Seeding and mulching class____
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
877.02 Materials
877.03 Construction Requirements
877.04 Maintenance
877.05 Performance
877.06 Method of Measurement
877.07 Basis of Payment

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 899

CONCRETE - GENERAL

October 21, 1998

899.01 **Description**
899.02 **Materials**
899.03 **Proportioning**
899.04 **Proportioning Options**
899.05 **Additional Classes of Concrete for Rigid Replacement**
899.06 **Equipment**
899.07 **Handling, Measuring, and Batching Materials**
899.08 **Batch Plant Tickets**
899.09 **Mixing Concrete**

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
907.02 Sampling Procedure
907.03 Sulphur Leachate Test Procedure and Criteria

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

November 7, 2000

908.01 General
908.02 Materials and Manufacture
908.03 Performance
908.04 Storage
908.050 Requirements for PGM Binder
908.051 Sampling of PGM Binder
908.052 Mix Design for PGM Binder
908.053 Quality Control for PGM Binder

908.01 General. The requirements of AASHTO MP1-98 shall apply, deviations from these are as follows.

PG Binders with the suffix "M" (e.g., PG 70-22M, PG 76-22M) shall meet the requirements for a PGM Binder.

For this specification, an independent laboratory shall not be owned or operated, in whole or part, by the binder supplier, Contractor, or affiliates of either.

908.02 Materials and Manufacture. The requirements of the AASHTO MP1-98 "Materials and Manufacture" Section shall be completely replaced with the following:

5.1 The PG 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 PG Binder. In the event of a failure investigation where binders exhibit unusual properties a supplier may be requested by the Laboratory to supply information about the makeup of a PG Binder. Failure to cooperate will mean removal from Supplement 1032 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 PG 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 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 PG Binder sample of any unapproved previously used material will mean immediate removal from Supplement 1032 certification. Approved reprocessed materials will be limited to 6.0 percent by PG Binder weight.

5.4 The PG Binder shall be homogeneous, free from water and deleterious materials, and shall not foam when heated to 350F (175C). 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 PG 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.

5.6 Flash point shall be 500F (260C) min. Mass loss on RTFO of final PG grade binder shall be 0.5 percent max.

5.7 PG 58-28 shall have a minimum Viscosity (ASTM D2171 @ 60C) of 800 poise and PG 64-22 shall have a Penetration (ASTM D5) between 55 and 75.

5.8 Direct Tension testing is not required, unless otherwise required in this specification.

908.03 Performance. Should excess fat spots, regular random areas of flushing, or excess drainage occur on a project and not be attributable to over rolling, plant operation, or mix quality compared to the JMF, the PG Binder will be rejected. This rejection includes any PGM Binders with an incompatible polymer or that have been improperly handled. The Contractor will not be allowed to use any of the rejected PG Binder. Correction of problem areas will be at the District's discretion depending on the problem severity, but if an unsafe condition exists, the area in question will be removed and replaced. Before work is resumed, the Contractor or PG Binder supplier shall show to the Laboratory the material

properties and compatibility of another PG Binder, by reporting actual test data, and that proper binder production equipment is in use.

The Contractor has a responsibility to ensure traffic is not released early on the mat, unless overridden by the Department. This Contractor responsibility includes allowing sufficient cooling time when night paving before morning rush hour release of traffic. Should traffic be on the mat in a manner leading to flushing or excess surface/tire adhesion and tracking of binder, the mat area in question shall be evaluated for removal and replacement or repair. Any removal and replacement or repair shall be at the Contractor's expense, unless the responsibility was overridden by the Department.

908.04 Storage. PG Binder storage shall be in accordance with Supplement 1010, with the following additions:

A separate storage tank shall be used whenever a Contractor is providing a binder other than a PG Binder to customers other than the Department (excepting winter carryover work) or switching between different PG Binders because of alternating mix types.

When the Contractor switches between two different binder grades and is going to use the same storage tank, the storage tank shall be at least 90 percent empty by tank height. When the Contractor is switching to a PGM Binder or a PG Binder used to make a PGM Binder, the storage tank shall be at least 95 percent empty by tank height.

PGM Binder shall not be stored at the asphalt concrete mixing plant over the winter. No PG Binder to be used in producing a PGM Binder at the asphalt concrete mixing plant will be stored at the facility over the winter. SBR polymer shall be stored in a heated area over winter, but shall not exceed supplier requirements.

The Monitoring Team shall be notified before the delivery of the first load of each type of PG Binder with sufficient lead time to allow for verification of the storage tank condition and if the storage tank meets handling requirements of the binder supplier. The Monitoring Team may sample the first storage tank load or give the Contractor permission to proceed with no tank verification.

908.050 Requirements for PGM Binder. A PGM Binder shall meet the requirements of Table A and shall be obtained through modification of a non-oxidized, neat asphalt binder by using a styrene butadiene latex rubber compound (SBR polymer) or a styrene butadiene styrene polymer block copolymer (SBS polymer). The polymer supplier shall certify to the refiner and Contractor that the polymer used meets a minimum 68 percent by weight butadiene content. SBS polymer modification shall be performed prior to shipment to the asphalt concrete mixing plant (preblend). SBR polymer modification shall be performed at the asphalt concrete mixing plant (postblend) or prior to shipment to the asphalt concrete mixing plant (preblend).

For each project, the PGM Binder supplier shall give the Contractor a handling guide

specifying temperature, circulation, shelf life, and other requirements for assuring the PGM Binder will perform as desired. This handling guide will be given to the Monitoring Team and be available in the plant control room and plant laboratory. If PGM Binder is retained at the asphalt concrete mixing plant for more than two weeks before use or beyond the supplier recommended shelf life, whichever is less, a top and bottom sample test (material property difference between samples taken from the top and bottom of the storage tank) shall be performed by the Laboratory on samples retrieved by the Contractor at the District's direction and material on hand shall not be used until approved.

908.051 Sampling of PGM Binder. The Contractor shall take two 1quart (1 liter) binder samples from the first transport truck load, before incorporation into the storage tank. The Contractor will label the samples with binder type, supplier, project number and date and retain them in the plant laboratory for future reference by the Department.

In addition to the above sampling requirements, twice during each project (once if project has less than 3000 tons (3000 t) of mix), the Monitoring Team will direct the Contractor to take two 1 quart (1 liter) samples of a PGM Binder, except when SBR polymer is incorporated into batch plants. In this case the base binder and SBR polymer shall be sampled and stored independently. Samples shall be taken from the binder line between the last piping 'tee' and inlet into the plant. They shall be labeled and handled as above. All samples shall be held after project completion until the District Engineer of Tests (DET) collects or releases them.

908.052 Mix Design for PGM Binder. The PGM Binder supplier, as well as the polymer type, shall be identified on the Job Mix Formula (JMF) submittal. A change in binder or polymer source will require a redesign. The PGM Binder shall be graded, except for Direct Tension, and provide the actual pass temperatures confirming the grade requirement. All dated data shall be reported with the JMF submittal. In addition to the PG Binder grading, the dated test results for the requirements of Table A shall be reported. All data shall be neatly summarized on one page. No data shall be more than two months old. If SBR polymer is added at the asphalt concrete mixing plant, the JMF shall contain data from the SBR polymer supplier for total solids (percent) and ash (percent) according to the 702.14. As well, the submittal shall contain the target amount of SBR polymer greater than or equal to 3.5 percent to achieve the properties specified. A letter of certification from the polymer supplier verifying percent butadiene in the SBS or SBR polymer shall be included in the JMF submittal.

Each JMF submittal shall report results of temperature-viscosity testing for mixing and compaction temperatures performed according to Asphalt Institute Manual SP-2. Supplier recommended temperatures may be used in lieu of the Asphalt Institute Manual SP-2 temperatures, but the temperature-viscosity results must still be reported.

A maximum of 10 percent reclaimed asphalt concrete pavement or reclaimed bituminous aggregate base may be used in accordance with 401.031, except it shall be included in the JMF. At no time shall the amount of reclaimed asphalt concrete pavement or reclaimed

bituminous aggregate base in production exceed 10 percent of the mix by dry weight.

908.053 Quality Control for PGM Binder. The Contractor's Plant Operation Quality Control Plan (Supplement 1056) shall include plans for meeting this specification and any handling requirements of the PGM Binder supplier. If the Contractor does additional testing or plant modifications, this shall be explained in the plan.

A preapproved asphalt ignition oven is required to obtain an aggregate sample from an asphalt concrete sample. The asphalt ignition oven may be used in place of hot bin or belt samples.

Some solvent testing may be performed early in a project as information in helping to verify plant operation and determining an Asphalt Content Nuclear Gauge (AC Gauge) or asphalt ignition oven calibration. However, any solvent testing shall be accompanied by an asphalt ignition oven test.

For SBR polymers added at the asphalt concrete mixing plant, the flow meter printouts shall be totaled for each day's production. The percent of polymer versus neat binder in the mix shall be calculated each day and recorded on the TE-199. Calculation worksheets and printouts shall be available in the plant laboratory for review by the Monitoring Team. A +/- 0.2 percent tolerance from the target amount of SBR polymer shall be used as a guide for an acceptable amount of SBR polymer use, but shall not be consistently low. Disposition of all data records shall be at the direction of the DET.

Table A
Material Requirements for PGM Binder

Test / Requirement	SBR Polymer		SBS Polymer		Notes
Final PG Binder Grade	70-22 (a)	70-22 (b)	70-22 (a)	76-22 (a)	c
Actual Pass Temperatures	Report		Report		i
RTFO Mass Loss, percent	□ 0.5		□ 0.5		d
Phase Angle, max	76		80	76	d
Elastic Recovery, min			65	75	e
Toughness, in lb	118				f, d
Tenacity, in lb	68				f, d
Elongation, in, min	20				f, d
Ductility, in, min	28				j, d
Separation, F max	10		10		g
Homogeneity			None Visible		h, d

a. Preblended PGM Binder with a base binder of at least -22 grade or stiffer.
b. Post blended PGM Binder made from neat Supplement 1032 certified or preapproved standard PG Binder grade and rubber solids amount equal to or above 3.5 percent by weight of total binder to achieve the PG Binder grade.
c. As required by 908.052.
d. PGM Binder
e. ASTM D 113, 10cm @ 25C, on RTFO material
f. ASTM D 5801, 50cm/min @ 25C
g. Softening point difference of top and bottom of frozen sealed aluminum tube conditioned at 340F for 48 hours. Compatibility of polymer and neat binder is sole responsibility of supplier. PGM Binder shall be formulated to retain dispersion for 3 days minimum. Failure in the field to retain dispersion for this time will mean automatic removal from Supplement 1032 certification.
h. Heat a minimum 400 gram sample at 177C for 2.5-3 hours. Pour entire sample over a hot No 50 (300 µm) sieve at 340F. Look for retained polymer lumps.
i. Actual high and low temperature achieved by PGM Binder beyond required grade, but shall not grade out to the next standard PG Binder grade for low temperature.
j. ASTM D 113, @ 4C, 1 cm/min

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENT 1023

MAKING AND TESTING CONCRETE BEAMS

December 8, 1995

1023.01 Making and Testing Concrete Beams
1023.02 Making Beams
1023.03 Testing Beams with Center-Loading Hydraulic Beam Breaker

1023.01 Making and Testing Concrete Beams. The concrete control inspector shall make and test concrete beams as described in this specification. The test results shall be reported on the "Report for Concrete Beams" form TE-38. One copy of the concrete beam report shall be forwarded to District Testing for input into the Construction Management System (CMS) at the close of each work week. When beams are made for pavement concrete, a slump, yield and air test also shall be made and recorded using concrete from the same batch.

In lieu of forwarding the TE-38 to the District Lab, the project personnel may report the test results in the ODOT Construction Management System (CMS) as follows:

a) Appropriate information is entered into the Material Sample (**SMPL**) screen in order to create the sample record.

b) Press **F11** in order to bring up the PCC Inspectors Daily Report (**TEST**) screen. Enter the Job Mix Formula (**JMF**) and the batch weight information. The JMF number is required in order to enter the batch weights or to continue to the next test screen.

c) From the PCC Inspectors Daily Report screen, press **F5** in order to bring up the PCC Air/Slump/Yield/Strength Test (**PCTST**) screen. Enter the appropriate test data from the TE-38 and indicate that the test results are for a beam by putting an **N** for Cylinder and **Y** for Beam. When beams are made for pavement concrete, a slump, yield and air test also shall be made and recorded using the concrete from the same batch.

Where beam tests are made to determine when a section of pavement or base may be opened, two 150 x 150 x 1000 mm (6 x 6 x 40 in.) concrete beams shall be made using the same concrete being placed in the pavement or base.

The inspector will be provided the following equipment by the District Engineer of Tests for making and testing concrete beams:

150 x 150 x 1000 mm (6x6x40 in.) steel molds
Spading tool
Trowel
Rubber mallet
Beam testing machine

1023.02 Making Beams. The beams shall be made as hereinafter described. After making sure that the steel beam molds are free from dirt, hardened concrete or rust, they shall be placed on a smooth, clean, level and unyielding surface that has been lightly oiled to prevent the concrete from sticking. The inside of each mold shall be oiled in the same manner. Using a shovel, fill each mold half full (75 mm (3 in.)) of concrete that is representative of the batch. With the blade of the spading tool held at an angle to the ends of the mold, spade the concrete 20 times at equal intervals from one end of the mold to the other. Then, turning the blade of the spading tool, cross-spade 20 times at equal intervals back in the opposite direction to the end of the mold. Spade entirely around the sides and ends of the mold then tap along the long side of the mold 15 times (total of 30 taps per lift) with a rubber mallet while securing the beam mold from movement.

Fill the beam mold to overflowing with concrete and repeat the spading and tapping operations as before. Strike off the excess concrete and trowel the concrete flush with the top of the beam mold. After the concrete is set, the beam numbers shall be scratched into the concrete near one end of the beam for future identification.

Beams shall be cured as nearly as possible and in the same manner as the concrete that it represents.

Beams are normally tested at 3, 5 and 7 days of age when possible. If results are not needed before the end of the 7-day curing period, only one beam break is necessary. This break should be made at the end of 7 days. Beams made from high-early-strength cement concrete are normally tested at 1, 2 and 3 days.

Beams made to determine when falsework shall be removed shall be tested as required by the Project Engineer.

Beams shall be tested in the center-loading hydraulic beam breaker.

1023.03 Testing Beams with Center-Loading Hydraulic Beam Breaker

a) **General** - The center-loading hydraulic beam breaker is designed to test 150x150x1000 mm (6x6x40 in.) concrete beams twice for flexural strength and to indicate the strength in mega pascals (pounds per square inch) directly on the

dial. No calculations are needed to convert the reading on the dial to flexural strength. The standard 150x150 mm (6x6 in.) beam is the only size beam on which this breaker can be used.

b) **Component Parts and Accessories**

i) Beam Breaker - (To be provided by the Central Lab)

The beam breaker consists of two 180mm (7 in.) Channels connected back to back, hydraulic pump and ram, choker valve, dial gage and yoke assembly. Two support pins are connected to the channel and one on the yoke.

ii) Accessories - (To be provided by the District)

Carrying case

c) **Method of Operation** - The flexural strength, which is measured in mega pascal (MPa)(pounds per square inch (psi)), is obtained in the following manner:

i) Prepare the beam for testing by rotating it 90 degrees around the long axis from the position in which it molded. The original top of the beam should now be on the side and the top and bottom of the beam should be sides of the beam that were originally against the mold. Raise the beam at least 50 mm (2 in.) off the ground by supporting at each end. This allows clearance under the beam so that the center pin from the yoke of the beam breaker can be inserted under the beam.

ii) Place the breaker on the beam to be tested with one of the two support pins about 25 mm (1 in.) From one end.

iii) Remove the round pin from the clevises of the yoke by sliding it out. The yoke assembly containing the ram, pressure gage and choker valve can now be pivoted into the vertical (operating) position with the clevises extending below the bottom of the beam. There is a stop on one side of the main frame with which the yoke assembly hinge bracket must be in contact with in order for the yoke assembly to be in the vertical position. Return the pin to the clevises. The yoke pin should now be underneath the beam.

iv) Close the choker valve (the valve just below the gage dial), by turning it in a clockwise direction and then open it approximately 1/8 to 1/4 turn. Once the valve is adjusted to the desired position , this procedure does not need to be repeated with each use unless the valve has been inadvertently turned. Do not attempt to operate the beam breaker with the choker valve closed. The

purpose of the valve is to dampen the rebound of the needle on the gage upon breaking the beam. If there appears to be not enough dampening, the valve should be readjusted. Some models of the beam breaker do not have a choker valve, in which case the instructions of this paragraph do not apply.

v) Close the pump valve by turning the pinned extension valve stem in a clockwise direction. This valve is located on the right side of the pump and is opened and closed, on some models, by a bar extending through the flange of the aluminum channel forming the top of the main frame. This valve must be closed firmly in order for the pump to operate properly.

vi) Adjust the black hand of the gage to the zero point by turning the knob on the side of the gage housing if so equipped. If it is not equipped with an adjusting knob, return to the Central Lab for adjustment if the needle does not return to zero.

vii) Set the red hand (maximum indicating hand) near zero by turning the knob in the middle of the plastic dial cover.

viii) Operate the pump by using slow steady strokes until the beam breaks or the specified strength is reached. In order to avoid unnecessary damage to the beam breaker, do not continue loading the beam more than 1.0 MPa (100 psi) beyond the specified strength and remark on the report that the test was terminated before failure. The pressure can be released by turning the pump valve stem mentioned in step *v* counterclockwise. Read the flexural strength in mega pascals (MPa) (pounds per square inch (psi)) as indicated by the red hand.

ix) Open the pump valve and the pump plunger will retract allowing the yoke pin to be withdrawn and the broken portions of the beam readily removed. If additional tests are to be made immediately, repeat the forgoing procedure beginning with the step *v*.

x) If no more tests are to be made immediately, the yoke assembly should be folded down into the horizontal (carrying) position and the yoke pin again inserted through the clevises in the preparation for storage. Then place the beam breaker into the carrying case.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENT 1062
TESTING PROCEDURES FOR RAISED PAVEMENT MARKER MATERIALS

April 13, 1999

1062.01 **Description**
1062.02 **Eligibility for Field Service Testing**
1062.03 **Raised Pavement Marker Materials Installation**
1062.04 **Optical Performance**
1062.05 **Rating of Field Performance**
1062.06 **Field Performance**
1062.07 **List of Prequalified Materials**
1062.08 **Removal from the Prequalified List**
1062.09 **Reapproval**
1062.10 **Modifications to Prequalified Raised Pavement Marker Materials**

1062.01 Description. This supplement describes the testing procedure by which the Ohio Department of Transportation (ODOT) will maintain a List of Prequalified Raised Pavement Marker (RPM) Materials meeting the requirements of item 721. This procedure shall consist of comparative laboratory testing and evaluation of the field performance of RPM materials. ODOT will use the American Association of State Highway and Transportation Officials' National Transportation Product Evaluation Program (NTPEP) test data for comparative evaluation.

1062.02 Eligibility for Field Service Testing. Raised pavement marker materials (721.01 Raised Pavement Marker Castings, 721.02 Prismatic Reflector, 721.03 Casting Adhesive and 721.04 Prismatic Reflector Adhesive) must meet the criteria set by NTPEP, and be tested under NTPEP guidelines. Currently approved RPM materials are subject to laboratory and field testing at any time as determined by ODOT.

1062.03 Raised Pavement Marker Materials Installation. Raised pavement marker materials shall be installed at a selected location under the auspices of NTPEP. The NTPEP locations similar in climate to that of Ohio will be used.

1062.04 Optical Performance. The Coefficient of Luminous Intensity for white, yellow and red reflectors shall be measured according to ASTM D 4383. The Coefficient of Luminous Intensity values shall not be less than the values in Table 1 of ASTM D 4383.

1062.05 Rating of Field Performance. Raised pavement marker's field performance results, published by the NTPEP, will be reviewed and evaluated.

1062.06 Field Performance. ODOT will select those raised pavement marker materials that equal or outperform the durability and reflectivity of presently approved RPM materials and shall meet the requirements of 721. ODOT, at its sole discretion, may select these RPM materials from the NTPEP test data. The basis of selection will be released, upon request, as additions to the approved list are announced.

1062.07 List of Prequalified Materials. Raised pavement marker materials selected from the NTPEP test data will be added to the prequalified list. New RPM materials and/or techniques, if proven acceptable to ODOT, will also be added to the list.

1062.08 Removal from the Prequalified List. Raised pavement marker materials shall be removed from the prequalified list, at ODOT's sole discretion, if the RPM materials have substantially or recurrently failed to perform satisfactorily in the field.

1062.09 Reapproval. Raised pavement marker materials removed from the prequalified list due to unsatisfactory field performance shall not be returned to the list until the manufacturer identifies the reason for the failure, and the problem has been corrected to the satisfaction of ODOT. Experiences of other States or governmental agencies may be considered in this action.

Use of RPM materials returned to the prequalified list may be limited in quantity until field performance can be assured.

1062.10 Modifications to Prequalified Raised Pavement Marker Materials. It is recognized that manufacturers will occasionally modify certain aspects of their products in an effort to enhance performance, improve durability, reduce costs, or for other similar reasons. RPM material manufacturers shall notify ODOT whenever modifications are made to products contained on the prequalified list. ODOT will review the changes being made to the RPM materials, and, at its sole discretion, decide what action, if any, is appropriate. Appropriate action includes limitation of usage or removal from the prequalified list.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENT 1082
Recycled Raised Pavement Markers (RRPMs)
Authorization and Transfer Slip
January 11, 2000

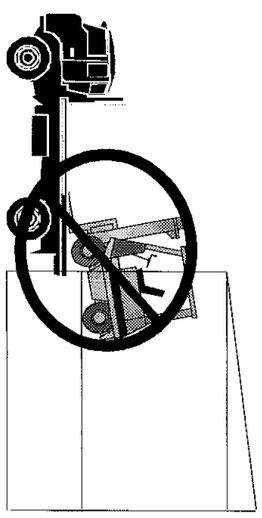
This form Authorizes the Contractor to pick up Department-supplied RRPMs for the project listed below.

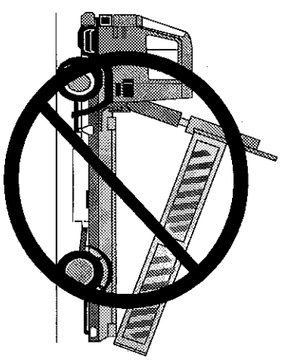
Project No:	Contractor:	Estimated Completion Date:
Sale Date:	Estimated Pick-up Date:	Date Picked Up:

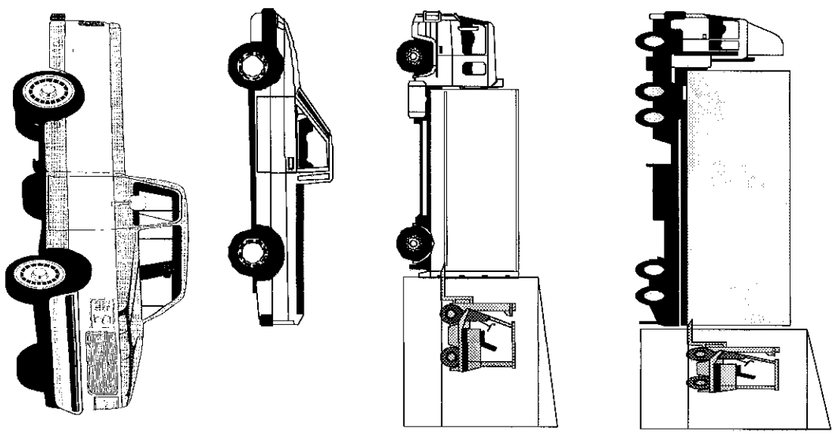
Authorized by _____
ODOT District ___ Representative / Date

Type of Recycled RPMs	OPI Catalog Number	Quantity Requested	Quantity Picked up	No of Skids	No Boxes
High Profile Conventional RPM with Yellow/Yellow Reflectors	RRPM 01				
Low Profile Tapered RPM with Yellow/Yellow Reflectors	RRPM 02				
High Profile Conventional Castings with no Reflectors	RRPM 03				
Low Profile Tapered Castings with no Reflectors	RRPM 04				
High Profile Conventional RPM with White/Red Reflectors	RRPM 05				
High Profile Conventional RPM with 1-Way White Reflectors	RRPM 06				
Low Profile Tapered RPM with White/Red Reflectors	RRPM 07				
Low Profile Tapered RPM with 1-Way White Reflectors	RRPM 08				
High Profile Conventional RPM with Yellow / Red Reflectors	RRPM 09				
Low Profile Tapered RPM with Yellow / Red Reflectors	RRPM 10				
High Profile Conventional RPM with 1 way Yellow Reflectors	RRPM 11				
Low Profile Tapered RPM with 1 way Yellow Reflectors	RRPM 12				
High Profile Conventional RPM with White/White Reflectors	RRPM 13				
Low Profile Tapered RPM with White/White Reflectors	RRPM 14				

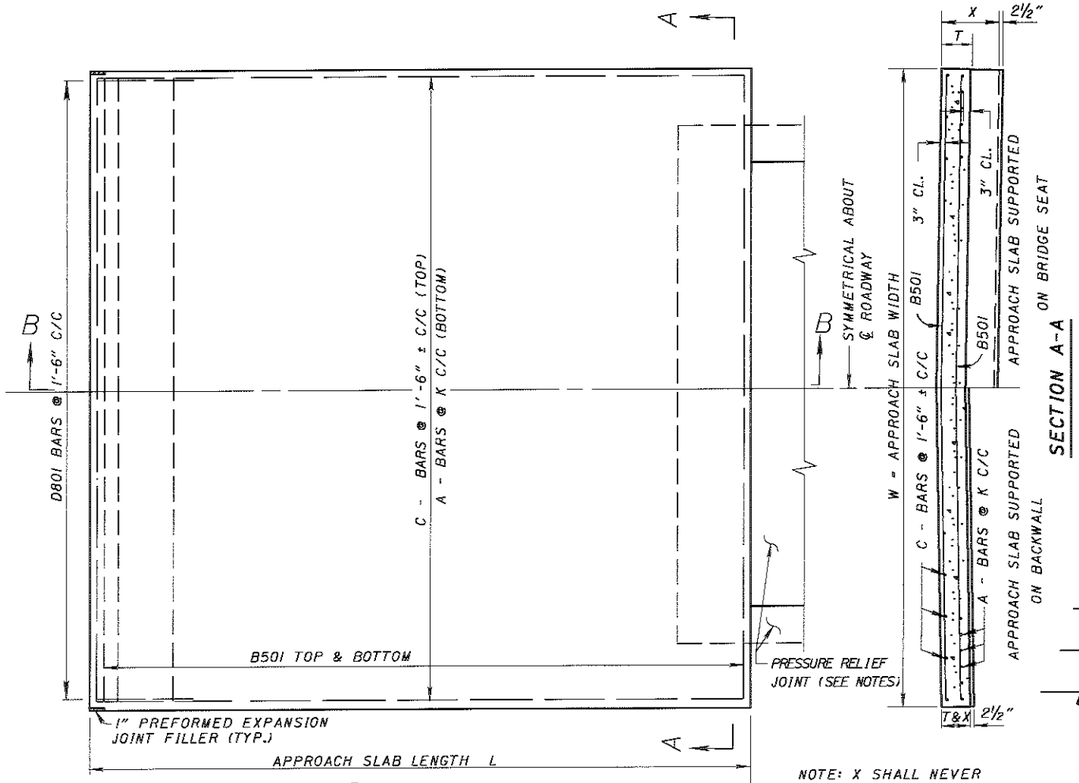
Before scheduling a RRPMs pickup, a copy of this transfer authorization form must be on file in the Office of Traffic Engineering. To schedule an RRPM Pick up, please call the Markings Section in the Office of Traffic Engineering at 614-752-9695 five calendar days before the desired pickup date. Contractors are notified that OPI will not load RRPMs if it deems that the truck is inappropriate or unsafe for the load of RRPMs being shipped. A list of appropriate trucks can be obtained from the Office of Traffic Engineering.



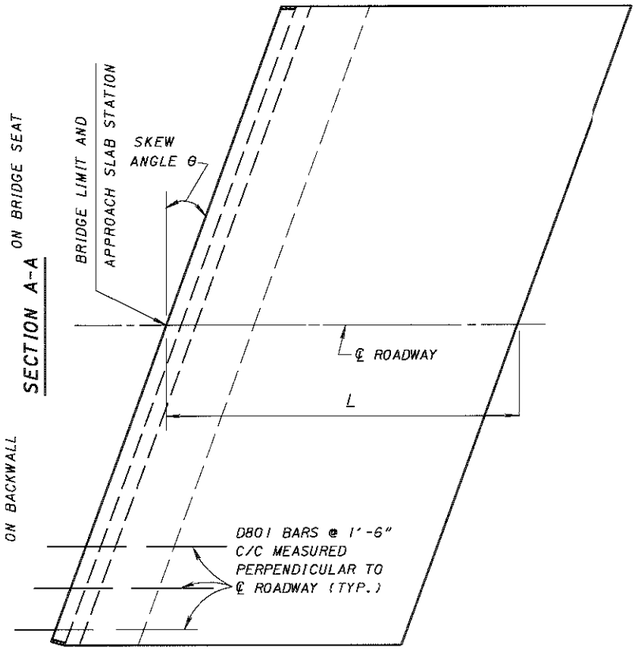


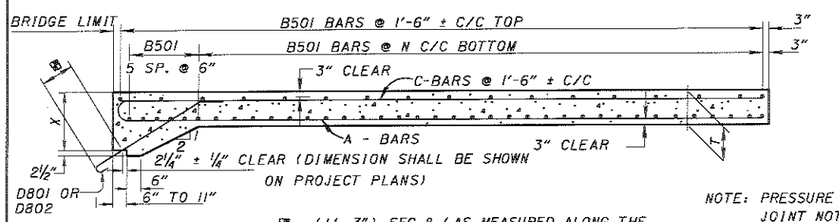


The OPI Warehouse will load RPMs onto trucks similar to the ones shown on this page. The OPI dock manager has the final say in whether a truck can be safely loaded, and how it will be loaded at the dock. The driver of the truck being loaded will assure that the RPMs are loaded so they constitute a safe legal load. OPI will not load tilt bodies, dump trucks, or noncommercial moving vans; or vehicles onto which a fork lift cannot safely drive. Trucks with a less than 1.2m (48 inches) loading height or that cannot be backed up flush to the OPI docks will not be loaded unless the load is less than 500 RPMs (approximately 1-½ skids of RPMs), and then only if the OPI dock manager agrees to it. Otherwise the Contractor will be either turned away, or have to load it. An exception may be made for loads of less than 500 RPMs that can be safely loaded onto pick-up trucks. Keep in mind that one box of RPMs weighs 45 kg (100 pounds), and a skid of RPMs weigh 950 kg (2100 pounds). Trucks that cannot safely carry the required load will be turned away. If the Contractor does not follow these procedures, and OPI cannot load the RPMs, the Contractor will be responsible for loading the RPMs. Any damage during transport is the Contractor's responsibility.



NOTE: X SHALL NEVER BE LESS THAN T





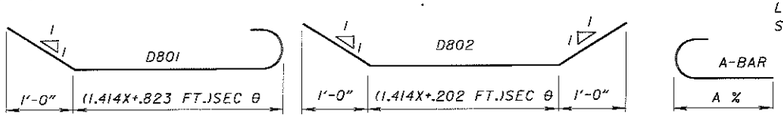
℄ - (1'-3") SEC θ (AS MEASURED ALONG THE LENGTH OF THE D801 OR D802 BAR)

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"	$\frac{W-0.5}{K}+1$	(W-0.5)sec θ	9"	22	(W-0.5)sec θ	11	C501	14'-6"	$\frac{W-0.5}{18}+1$	$\frac{W-0.5}{18}+1$
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



* AT THE OPTION OF THE CONTRACTOR AND AT NO ADDITIONAL COST TO THE STATE, B501 BARS MAY BE LAPPED 2'-6" MINIMUM AT THE CENTERLINE OF ROADWAY, OR WHERE REQUIRED FOR LONGITUDINAL CONSTRUCTION JOINTS, IN LIEU OF PROVIDING FULL LENGTH BARS AS SHOWN.

APPROACH SLAB FOR SKEWED STRUCTURE

GENERAL: THIS DRAWING PROVIDES DESIGN AND GENERAL CONSTRUCTION DETAILS. THE PROJECT PLANS WILL SHOW LENGTH, SKEW, CURBS (IF ANY), ESTIMATED QUANTITY (SQUARE 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 THE RESPECTIVE ABUTMENT OR SUPERSTRUCTURE CONCRETE ITEM 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.

DESIGN SPECIFICATIONS: THIS STANDARD DRAWING CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1996, INCLUDING THE 1997, 1998 & 1999 INTERIM SPECIFICATIONS AND THE ODOT BRIDGE DESIGN MANUAL.

DESIGN DATA:

DESIGN LOADING: HS25 AND THE ALTERNATE MILITARY LOADING.

CONCRETE: SS899, CLASS S OR SS844, HIGH PERFORMANCE CONCRETE, MIX 3 OR 4 - COMPRESSIVE STRENGTH 4500 PSI. (CONCRETE SHALL MATCH THE DECK SUPERSTRUCTURE CONCRETE BEING USED. IF NO DECK CONCRETE IS BEING PLACED, CLASS S IS REQUIRED.)

REINFORCING STEEL: ASTM A615, A616 OR A617-GRADE 60; MINIMUM YIELD STRENGTH OF 60,000 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.

MISCELLANEOUS ITEMS: THE PREFORMED EXPANSION JOINT FILLER AND JOINT SEALER AT THE CORNERS AND SIDES OF THE APPROACH SLAB, THE TYPE "A" WATERPROOFING AND THE PREFORMED ELASTOMERIC COMPRESSION JOINT SEAL SHOWN AT THE BRIDGE LIMIT END OF THE APPROACH SLAB SHALL BE INCLUDED IN THE PRICE BID PER SQUARE YARD FOR THE APPROACH SLAB FOR PAYMENT.

LONGITUDINAL CONSTRUCTION JOINTS REQUIRED FOR STAGE CONSTRUCTION SHALL BE AS PER SS842.09.

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 UNIFORMLY BETWEEN BRIDGE CURB HEIGHT AND ROADWAY 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.

APPROACH SLAB LENGTH (L): THE LENGTH 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. THE LENGTH SHALL BE SHOWN ON THE PROJECT PLANS.

DECK CROWN AND SLOPE: THE LOCATION OF THE CROWN POINT AND THE RATE OF CROSS SLOPE ON THE APPROACH SLAB SHALL CONFORM TO THAT OF THE BRIDGE DECK AND APPROACH PAVEMENT. IF THE RATE OF CROSS SLOPE OF THE BRIDGE DECK DIFFERS FROM THAT OF THE APPROACH PAVEMENT, A SMOOTH TRANSITION SHALL BE PROVIDED WITHIN THE LIMITS OF THE APPROACH SLAB WHENEVER POSSIBLE.

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.

PRESSURE RELIEF JOINTS: RELIEF JOINTS, TYPE A, ARE TO BE PROVIDED REGARDLESS OF ABUTMENT DESIGN AT ALL BRIDGE APPROACHES WHERE APPROACH PAVEMENT IS RIGID, OR COMPOSITE CONSISTING OF A RIGID BASE. SEE STANDARD CONSTRUCTION DRAWING BP-2.3 FOR DETAILS

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

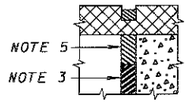
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Bob Brookhart
ENGINEER OF BRIDGES
10-25-94
DATE

REVISIONS
9-15-94
04-20-01

DESIGNED JFF
DRAWN JFF
CHECKED JAM
REVIEWED LMW

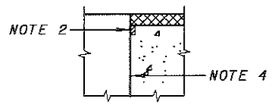
STANDARD
REINFORCED CONCRETE APPROACH SLAB
AS-1-81

1 / 3

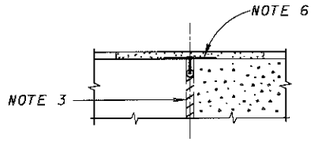


DETAIL A

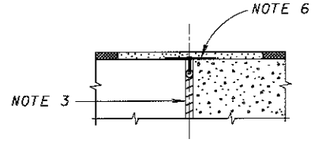
DETAIL B



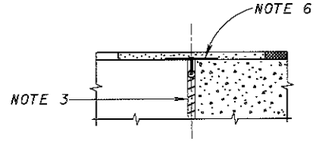
DETAIL C



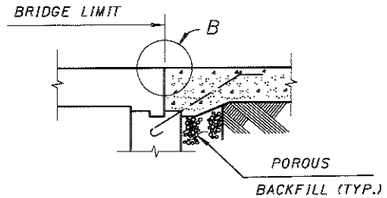
DETAIL D



DETAIL E

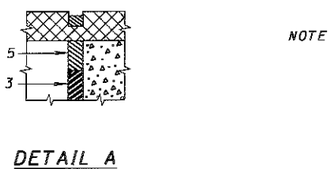


DETAIL F



ON SLAB BRIDGES

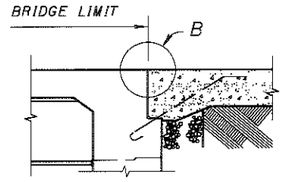
CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB



ON PRESTRESSED CONCRETE BOX BEAM BRIDGES ⊕

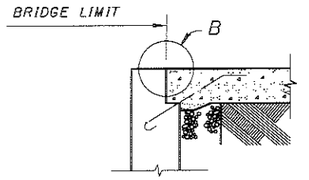
APPROACH SLAB SUPPORTED ON ABUTMENT BACKWALL

ASPHALT CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB



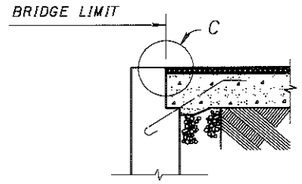
ON BRIDGES WITH INTEGRAL CONSTRUCTION
(SEMI-INTEGRAL SIMILAR)

ON PRESTRESSED CONCRETE BOX BEAM BRIDGES ⊕



APPROACH SLAB SUPPORTED ON ABUTMENT BACKWALL

CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB



APPROACH SLAB SUPPORTED ON ABUTMENT BACKWALL

ON PRESTRESSED CONCRETE BOX BEAM BRIDGES ⊕

CONCRETE WEARING SURFACE ON BRIDGE DECK ONLY

⊕ - THE APPROACH SLAB SEAT FOR THIS PRESTRESSED CONCRETE BOX BEAM BRIDGE IS SHOWN AT THE SAME ELEVATION AS THE BEAM SEAT. HOWEVER, IT MAY ACTUALLY BE HIGHER OR LOWER THAN THE BEAM SEAT DEPENDING ON THE BOX BEAM DEPTH.

NOTE 1: PREFORMED ELASTOMERIC COMPRESSION JOINT SEAL, 705.11 (1¼" WIDE FOR A ½" WIDE GROOVE) PLACED IN ½" x 2¼" GROOVE.

NOTE 2: PREFORMED ELASTOMERIC COMPRESSION JOINT SEAL, 705.11 (1¼" WIDE FOR A ½" WIDE GROOVE) 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."

TYPE "A" WATERPROOFING SHALL NOT EXTEND ABOVE THE BOTTOM OF THE GROOVE INTO WHICH THE PREFORMED ELASTOMERIC JOINT SEAL 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 OF THE SLAB 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 SUBGRADE (SUBBASE) SHALL BE GRADED TO PERMIT THE BOTTOM OF THE APROACH 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, INCLUDING THE POLYMER MODIFIED ASPHALT EXPANSION JOINT, ARE PROVIDED, THE DECK MEMBRANE WATERPROOFING SHALL EXTEND BEYOND THE BRIDGE LIMITS A DISTANCE OF 2'-0".

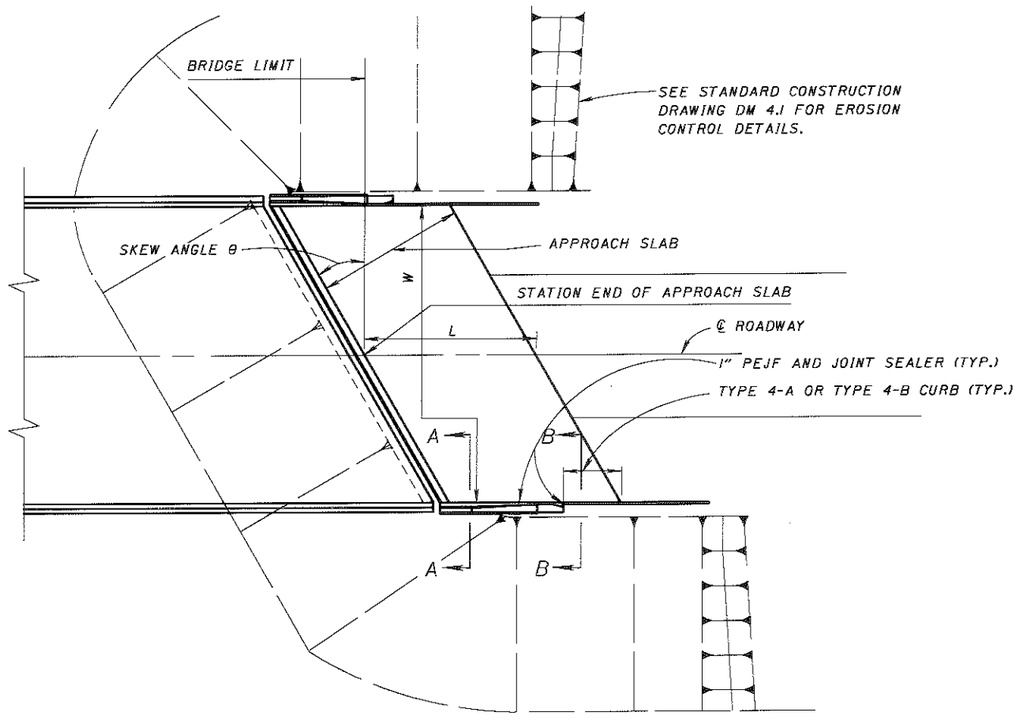
DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

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

REVISIONS	DESIGNED	CHECKED	REVIEWED
9-15-94	JFF	JAM	LMW
04-20-01	DRAWN JFF		

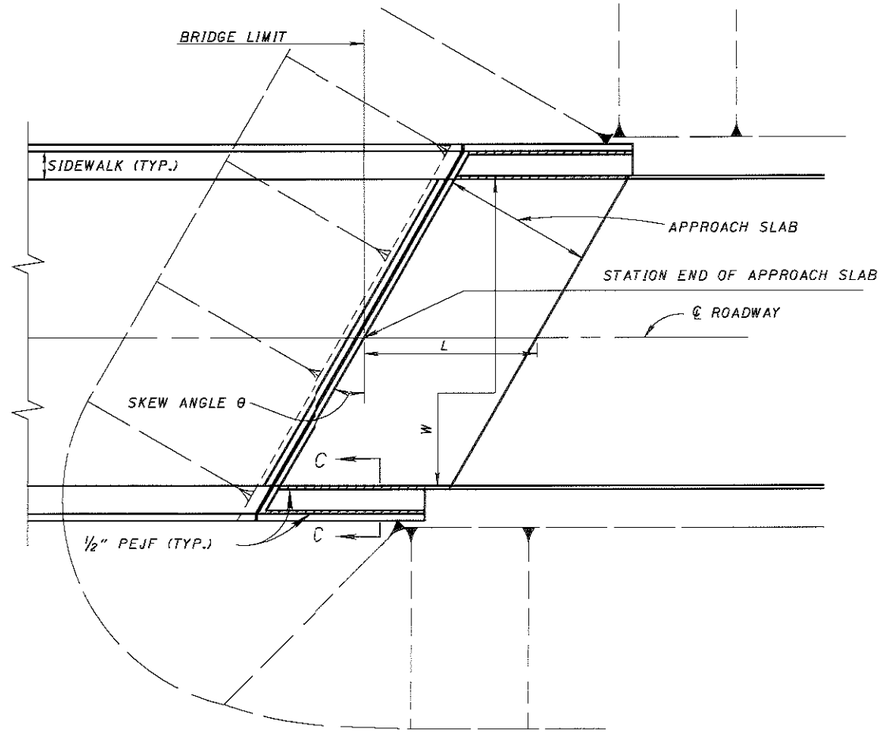
STANDARD
REINFORCED CONCRETE APPROACH SLAB

AS-1-81



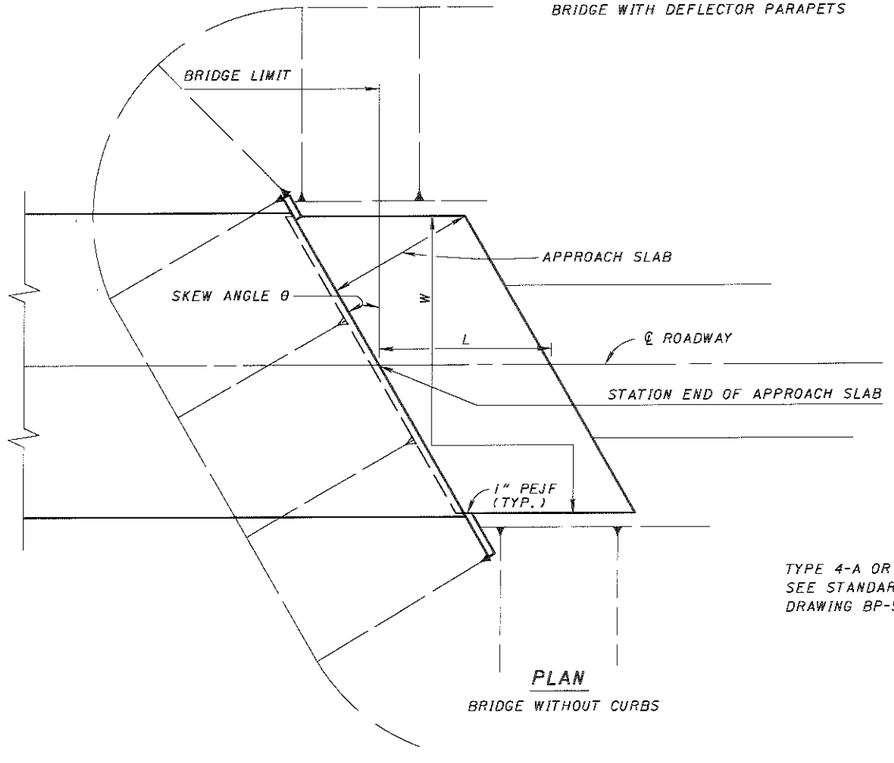
PLAN

BRIDGE WITH DEFLECTOR PARAPETS



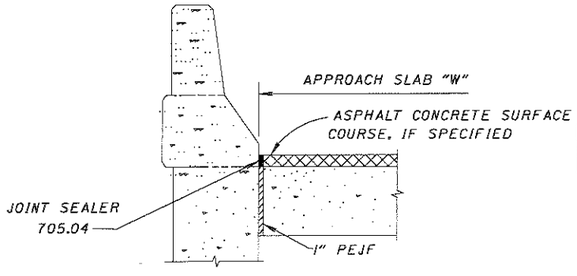
PLAN

BRIDGE WITH SIDEWALKS

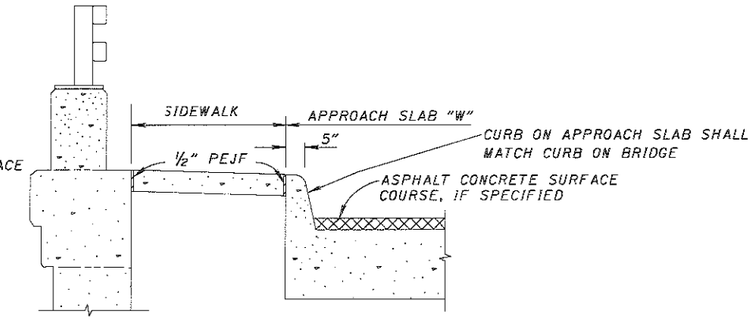


PLAN

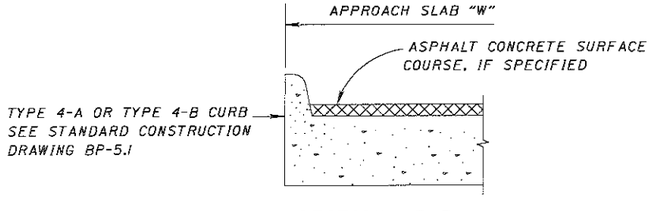
BRIDGE WITHOUT CURBS



SECTION A-A



SECTION C-C



SECTION B-B

LEGEND

W= APPROACH SLAB WIDTH,OUT TO OUT,IN FEET.

L= APPROACH SLAB LENGTH.

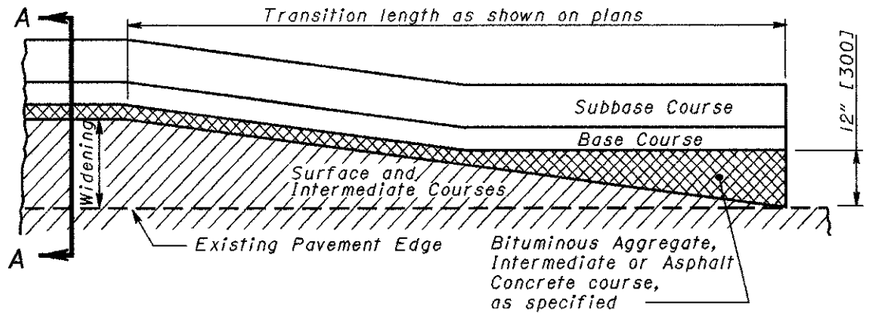
PEJF = PREFORMED EXPANSION JOINT FILLER.

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

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

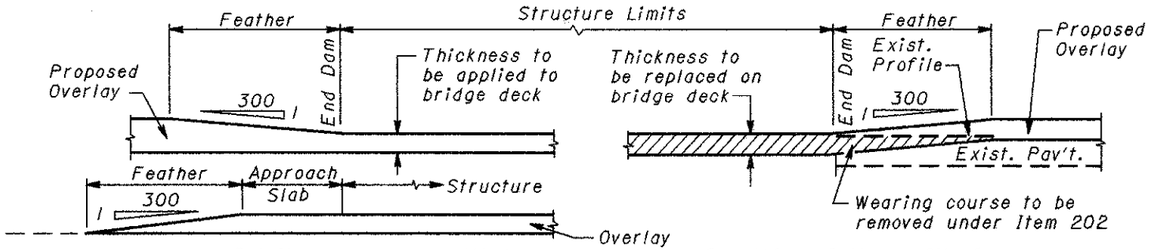
REVISIONS	DESIGNED	CHECKED	REVIEWED
9-15-94	JFF	JAM	LMW
04-20-01	DRAWN JFF	AS-1-81	

STANDARD
REINFORCED CONCRETE APPROACH SLAB



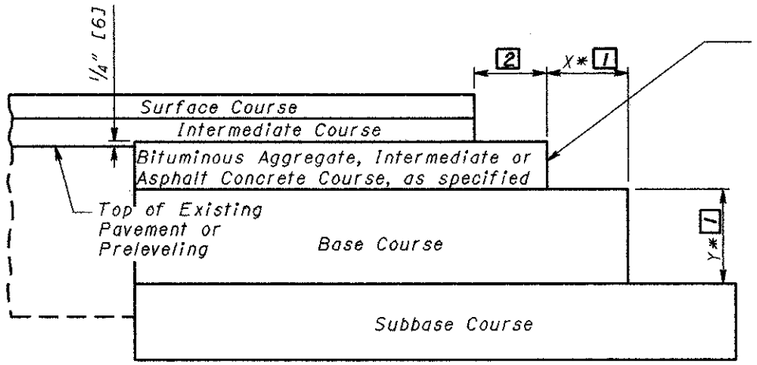
PLAN

MERGING EDGE OF PAVEMENT WIDENING WITH EDGE OF EXISTING PAVEMENT



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



The Bituminous Aggregate in the upper part of the base widening shall finish approximately 1/4" [6] 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" [6] above the preleveling.

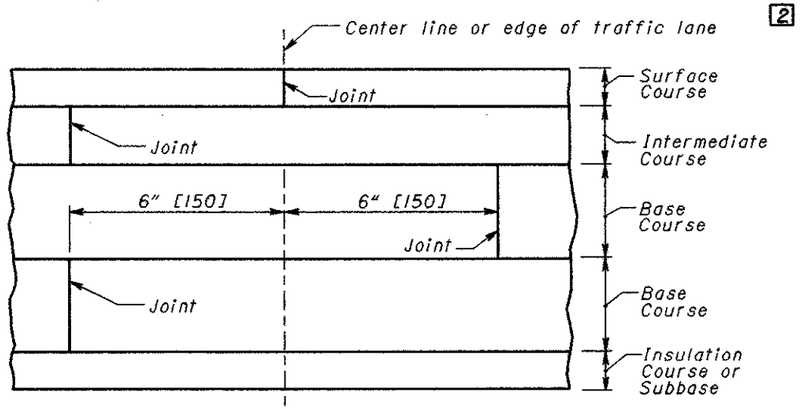
SECTION A-A

COURSE DETAIL FOR WIDENING

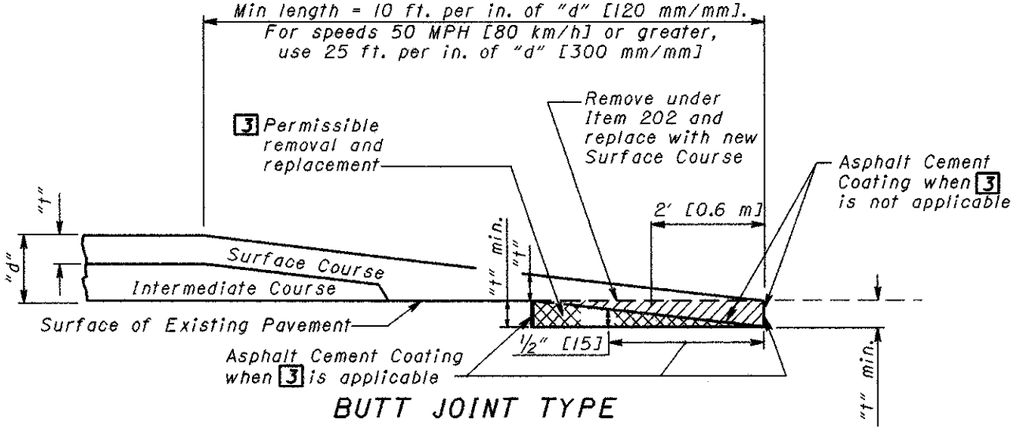
LEGEND

1 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.

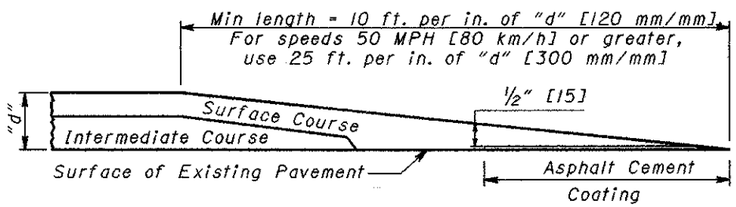
2 The extended width shall be equal to the thickness of the surface course plus the intermediate course, or 4 inches [100], whichever is greater.



LAPPING LONGITUDINAL JOINTS



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

Values for "t" and "d" are obtained from the plan.

THIS DRAWING REPLACES BP-3.1M DATED 10-28-94.

OHIO DEPARTMENT OF TRANSPORTATION
Raymond E. Shadeland
ROADWAY DESIGN ENGINEER
DATE 7-28-00

REVISIONS

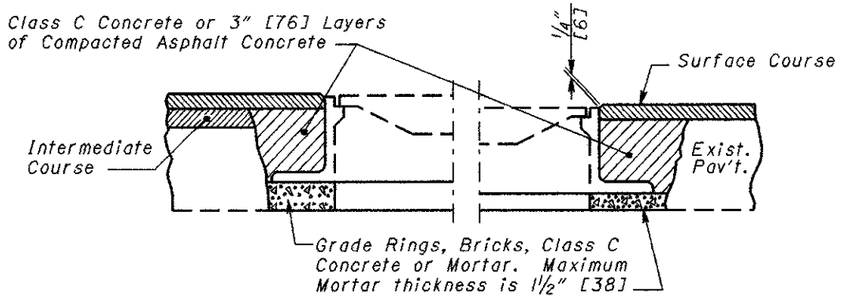
STDS. ENGR. M. Evans
DRAWN D. Focke

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

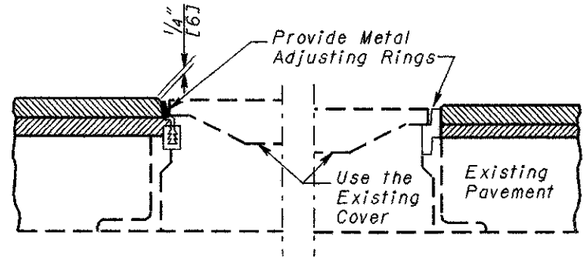
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
RESURFACING

NUMBER BP-3.1



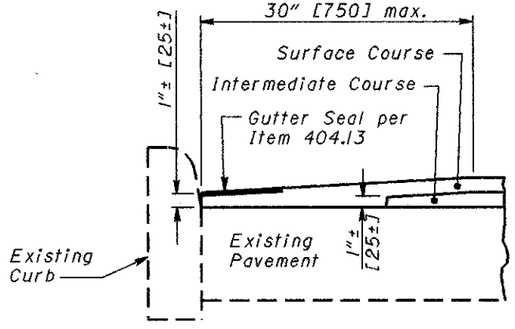
USING CONCRETE OR MORTAR



USING METAL ADJUSTING RINGS

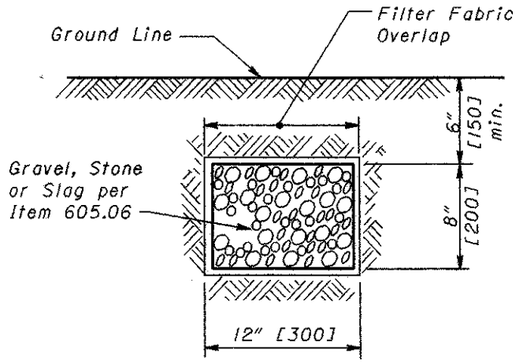
Metal adjusting rings shall:
(a) attach securely to the existing frame by welding or mechanical devices;
(b) consist either of cast metal having an integral rim and seat, or be fabricated metal with a sturdy connection between the seat and rim; and
(c) provide an even seat for the manhole cover.
In addition, 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



Special care shall be taken during construction to obtain maximum compaction of bituminous concrete in gutters.

GUTTER FINISH



Aggregate drains to be placed where and as directed by Engineer. Provide Filter Fabric when specified as a separate pay item.

AGGREGATE DRAIN

THIS DRAWING REPLACES BP-3.1M DATED 10-28-94.

OHIO DEPARTMENT OF TRANSPORTATION
Kurt D. Sandstrom 1-28-00
ROADWAY DESIGN ENGINEER — DATE

REVISIONS

STDS. ENGR. M. Evans
DRAWN D. Focke

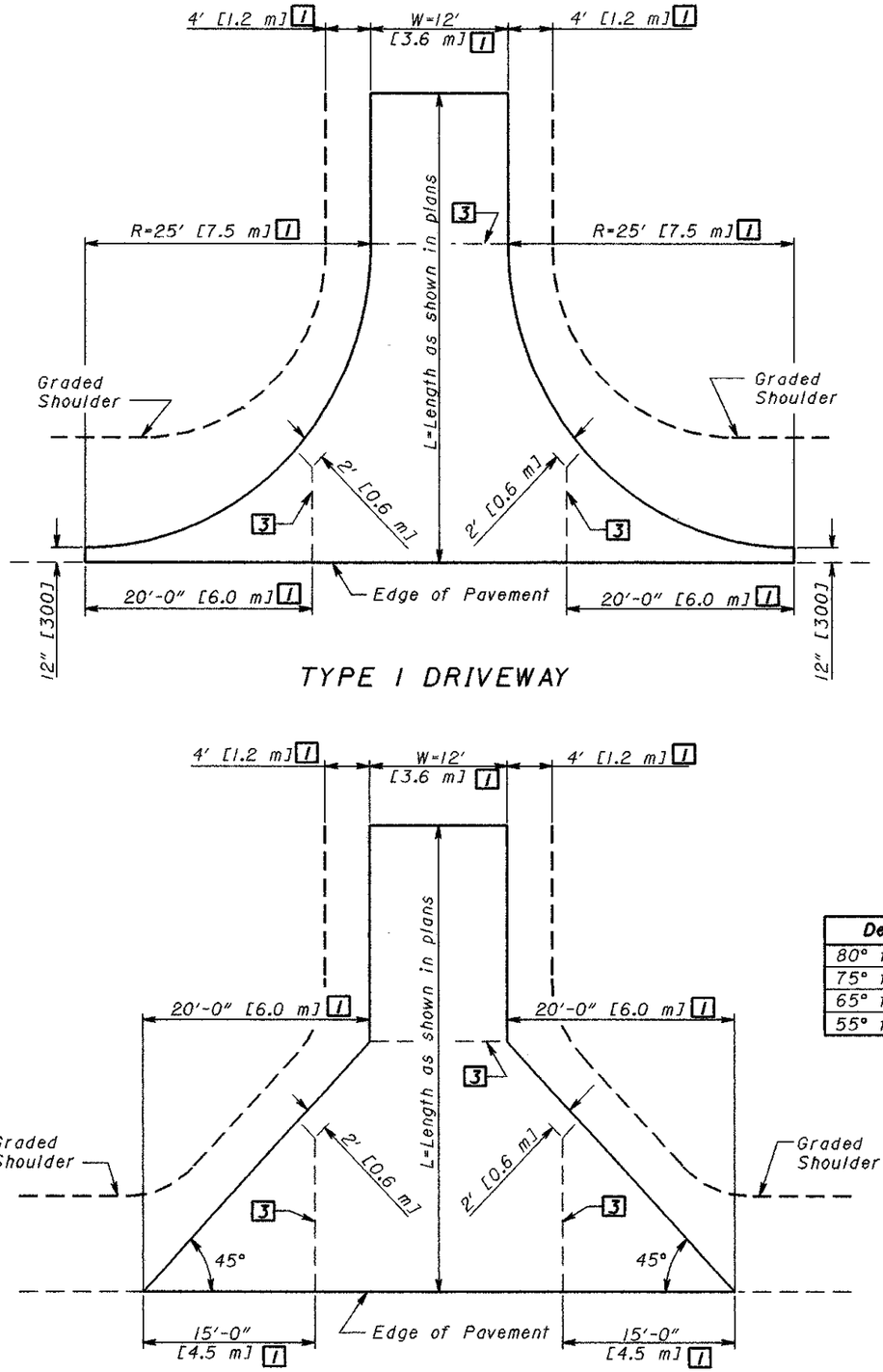
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
RESURFACING

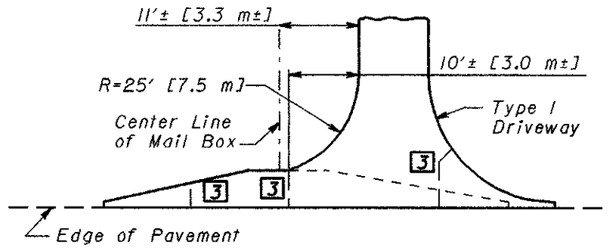
NUMBER BP-3.1

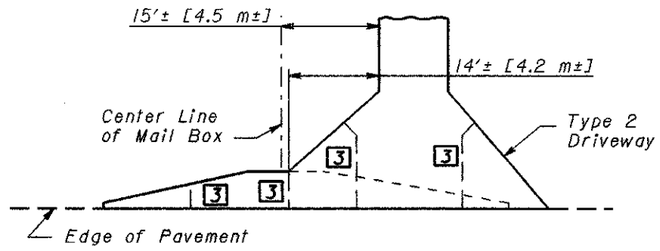
2 / 2



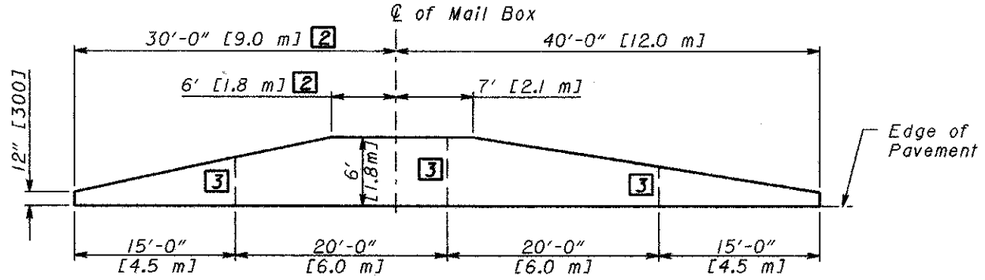
TYPE 1 DRIVEWAY

TYPE 2 DRIVEWAY

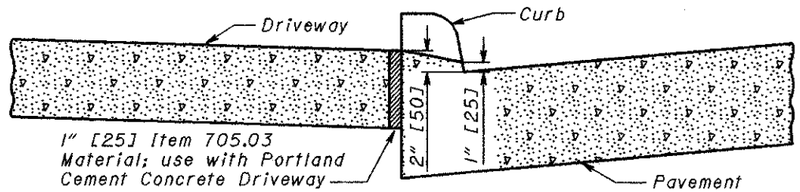




COMBINED DRIVEWAY & MAIL BOX APPROACH

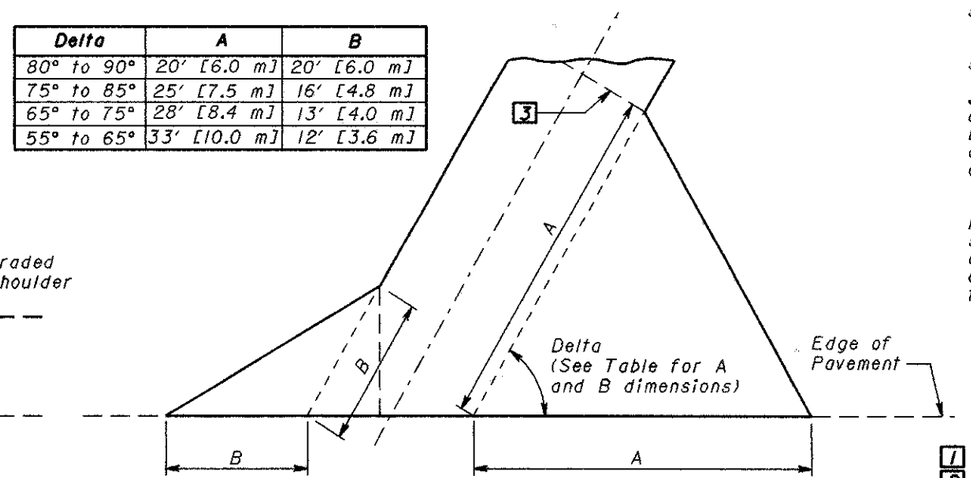


TYPICAL MAIL BOX APPROACH



DROP CURB DETAILS AT DRIVEWAYS

Delta	A	B
80° to 90°	20' [6.0 m]	20' [6.0 m]
75° to 85°	25' [7.5 m]	16' [4.8 m]
65° to 75°	28' [8.4 m]	13' [4.0 m]
55° to 65°	33' [10.0 m]	12' [3.6 m]



TYPE 2 SKEWED DRIVEWAY

Transition from Standard Curb Section to Drop Curb Section to be made in 18" [450] distance from Driveway

NOTES

GENERAL: The design details shown here shall govern the construction of driveways unless otherwise shown in the project plans.

The pavement type and thickness shall be specified in the project plans.

Driveway and mail box approaches shall be combined when feasible.

JOINTS: Impressed joints for portland cement concrete driveways shall be 1/4" [6] minimum width by 3"± [75±] depth and shall be sealed with Item 705.04 or ASTM D 1850.

In addition to the joints shown here, impressed joints without tie bars shall be placed in portland cement concrete driveways at intervals not to exceed 17' [5.2 m] in the portion of the driveway beyond the flare.

LEGEND

1 Unless otherwise shown in the plans.
2 Add 3' [0.9 m] for each additional Mail Box
3 Impressed Joint without Tie Bars for Portland Cement Surface

THIS DRAWING REPLACES BP-4.1M DATED 10-28-94.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER — DATE 7-28-00

REVISIONS

STDS. ENGR. M. Evans
DRAWN D. Focke

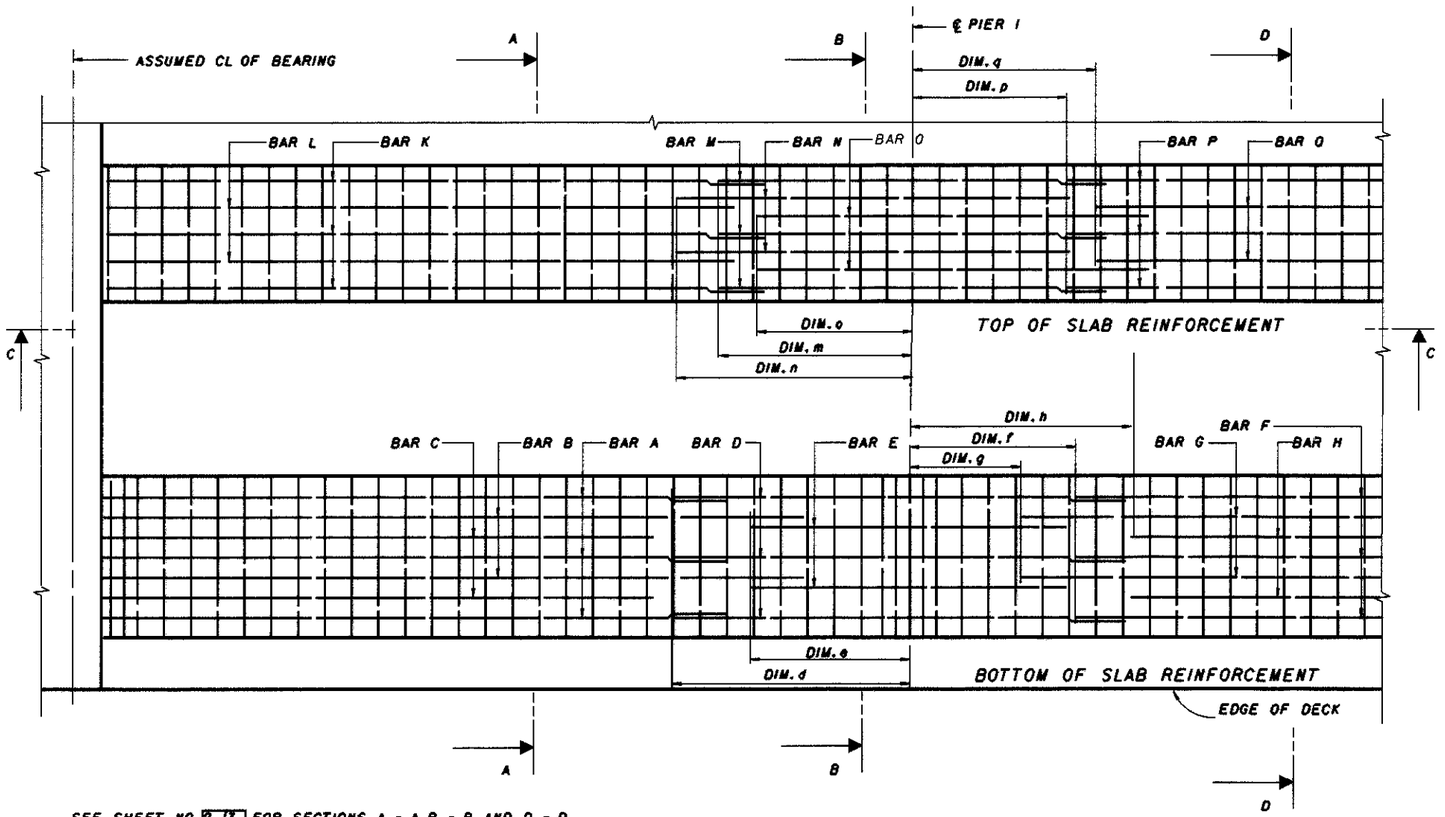
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
DRIVEWAYS

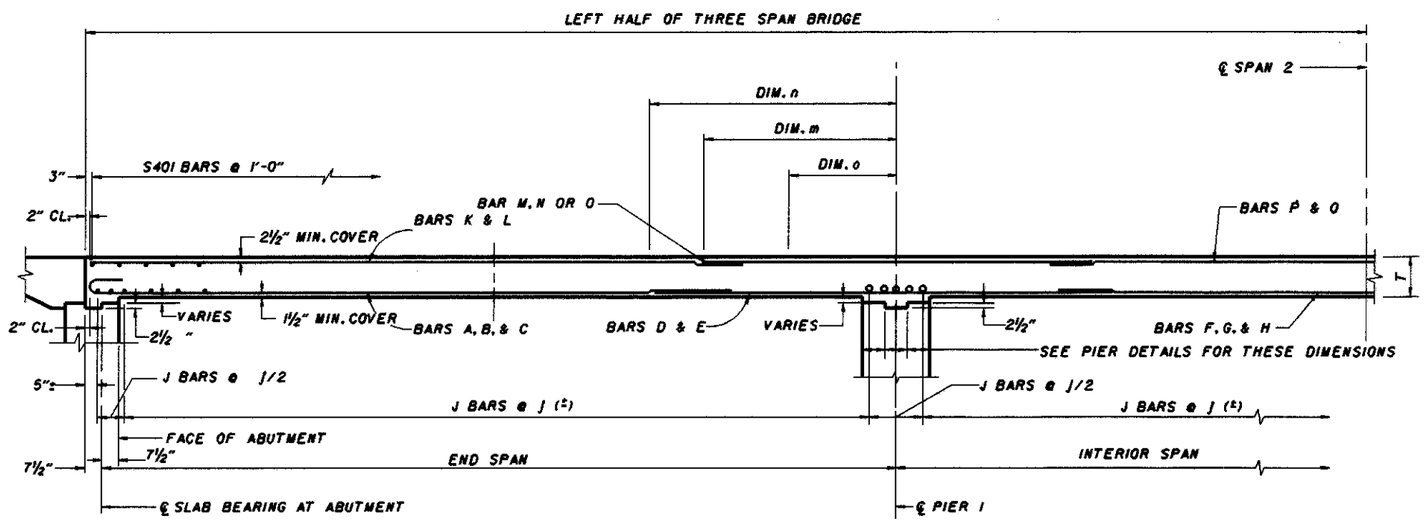
NUMBER BP-4.1

1 / 1



SEE SHEET NO. 2 /3 FOR SECTIONS A - A, B - B AND D - D

PARTIAL PLAN VIEW



SECTION C - C

GENERAL NOTES

GENERAL:
THIS STANDARD DRAWING PROVIDES DESIGN AND GENERAL CONSTRUCTION DETAILS FOR THREE SPAN SLAB BRIDGES. THE PROJECT PLANS FOR EACH STRUCTURE WILL SHOW SPAN LENGTHS, ROADWAY WIDTHS, SKEW, CURVE, AND SUPERELEVATION (IF ANY), ELEVATIONS, SLAB REINFORCEMENT DETAILS IN PLAN PLAN AND CROSS SECTIONS, SUBSTRUCTURE DETAILS. ESTIMATED QUANTITIES, REINFORCING STEEL LIST AND OTHER NECESSARY DETAILS AND SPECIAL NOTES.

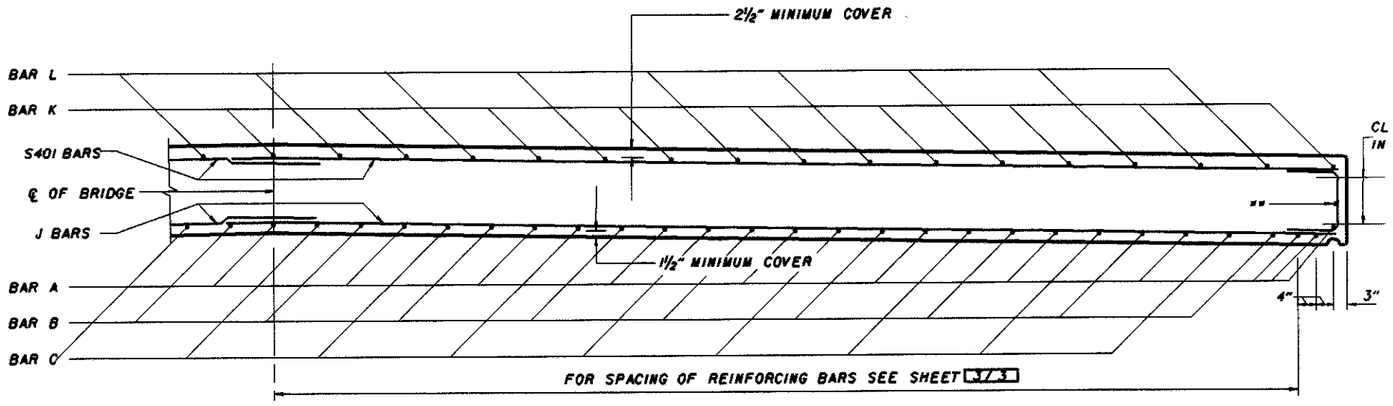
ADDITIONAL INTERIOR SPANS OF THE SAME LENGTH AS THE MIDDLE SPAN OF THE THREE SPAN SLAB BRIDGE WITH A .8 END SPAN RATIO MAY BE INCORPORATED INTO THE STRUCTURE WITHOUT CHANGE IN SLAB THICKNESS OR REINFORCEMENT. ADDITIONAL INTERIOR SPANS OF THE SAME LENGTH AS THE MIDDLE SPANS OF THE THREE SPAN SLAB BRIDGE WITH .7 END SPAN RATIOS REQUIRE A 20% INCREASE IN THE TOP SLAB REINFORCING STEEL AT THE PIERS OTHER THAN THE PIERS CLOSEST TO THE ABUTMENTS.

DESIGN SPECIFICATIONS: THIS STANDARD DRAWING CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1992, AND THE OHIO BRIDGE DESIGN MANUAL.

DESIGN METHOD: LOAD FACTOR DESIGN
DESIGN LOADING: HS20-44 AND THE ALTERNATE MILITARY LOADING
SUPERIMPOSED DEAD LOADS: 75 LBS. PER SQ. FT.
DESIGN STRESSES:
CONCRETE CLASS S - COMPRESSIVE STRENGTH 4500 P.S.I.
REINFORCING STEEL - ASTM A615, A616, A617 GRADE 60 MINIMUM YIELD STRENGTH 60,000 P.S.I.
WEARING SURFACE: MONOLITHIC CONCRETE - ONE INCH ASSUMED
DECK PROTECTION METHOD - EPOXY COATED REINFORCING STEEL, TOP AND BOTTOM MATS

SKEW:
FOR BRIDGES WITH SKEW, LONGITUDINAL BARS SHALL BE PLACED PARALLEL TO CENTERLINE OF THE ROADWAY AND TRANSVERSE BARS PARALLEL TO PIERS AND ABUTMENTS. THIS STANDARD SHALL NOT BE USED FOR SKEWS GREATER THAN 30°.

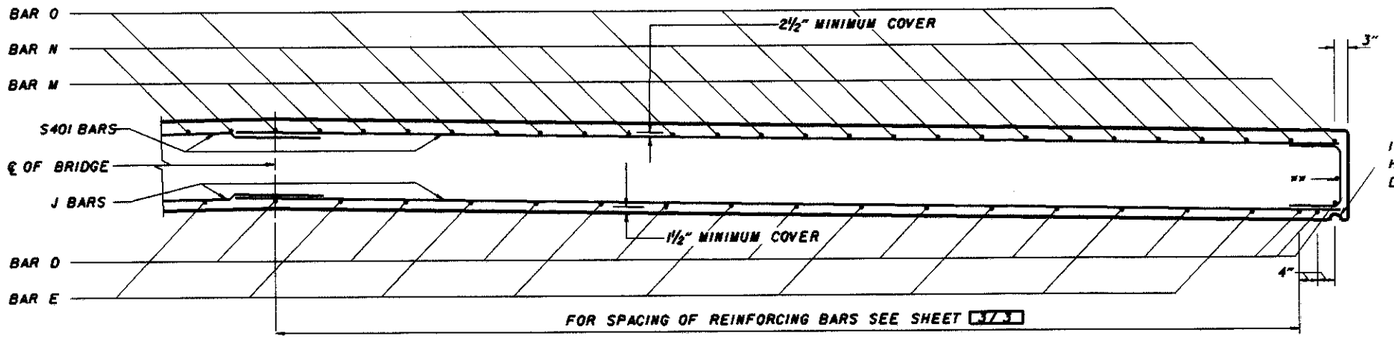
REVISIONS	STATE OF OHIO DEPARTMENT OF TRANSPORTATION BUREAU OF BRIDGES AND STRUCTURAL DESIGN	1 / 3
6-30-95	STANDARD: CONTINUOUS SLAB BRIDGES	
	APPROVED: Bd Hamblen — DATE: 5-11-93 ENGINEER OF BRIDGES	DRAWING NO. CS-1-93
	DESIGNED ASB · DETAILED JC · CHECKED · QUANTITIES RCI · CHECKED LMW	



SECTION A - A (END SPAN)

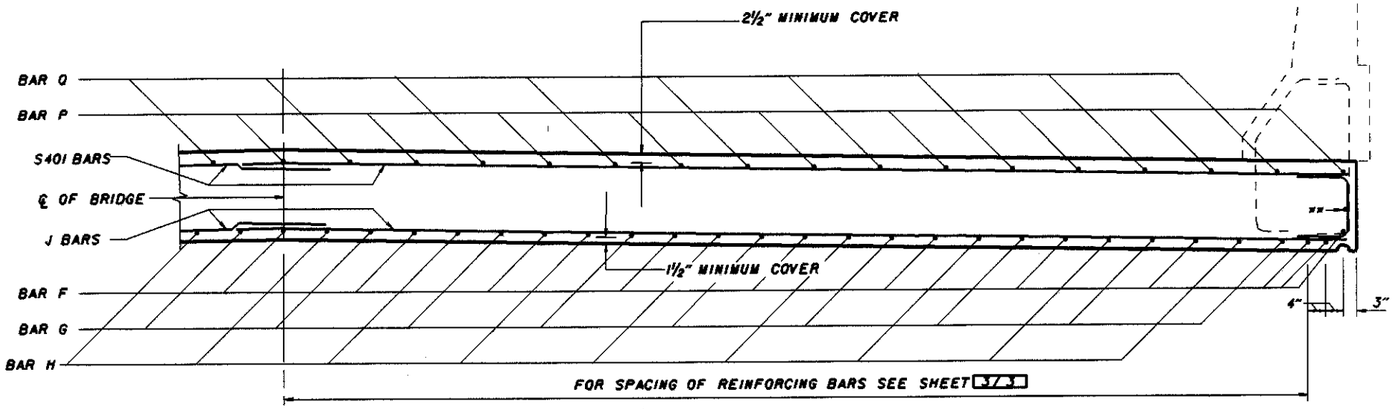
CL OF ANCHORS USED FOR BRIDGE RAILING IN STANDARD DRAWING

"" USE T401 BAR ONLY WITH T GREATER THAN 21"



SECTION B - B (AT PIERS)

1" DIAMETER HALF ROUND DRIP GROOVE(TYP).



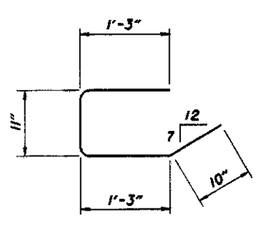
SECTION D - D (INTERIOR SPAN(S))

CONSTRUCTION JOINTS:
PLACEMENT OF THE CONCRETE DECK SLAB SHALL BE CONTINUOUS. CONSTRUCTION JOINTS SHALL BE PROVIDED ONLY IF A DECK POUR CANNOT BE COMPLETED DUE TO INCLEMATE CONDITIONS. THE CONSTRUCTION JOINT SHALL CONFORM TO THE REQUIREMENTS OF 511 IN THE CMS.

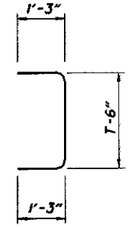
CAMBER:
CAMBER AS SHOWN IN THE SLAB AND REINFORCING TABLES SHALL BE PROVIDED TO COMPENSATE DEAD LOAD DEFLECTIONS. IN ADDITION TO ANY CAMBER REQUIRED FOR CONFORMANCE WITH THE PROFILE OF THE HIGHWAY.
ALLOWANCE SHALL BE MADE FOR THE DEFLECTION OF ANY FALSE-WORK MEMBERS SUPPORTING THE ACTUAL CONCRETE PLACEMENT.

EDGE BEAM OPTION:
IN LIEU OF FORMING AN EDGE BEAM, THE CONTRACTOR MAY FURNISH A 16" SLAB OR A SLAB VARYING IN THICKNESS FROM 16" AT THE EDGE TO "T" AT THE CENTER OF THE ROADWAY AT NO ADDITIONAL COST TO THE OWNER.

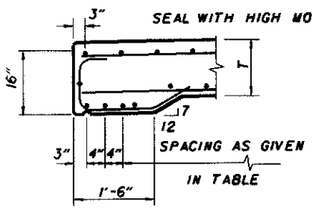
EXPANSION:
PROVISIONS SHALL BE MADE FOR EXPANSION WHEN THE BRIDGE LENGTH EXCEEDS 250 FEET OR WHEN A RIGID SUBSTRUCTURE (OTHER THAN A SINGLE LINE OF PILES) IS EMPLOYED.



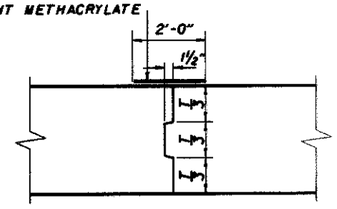
U401 BARS LENGTH =4'-1"



U402 BARS LENGTH =T+1'-10"



(EDGE BEAM DETAIL)
FOR T < 16"



CONSTRUCTION JOINT

REVISIONS	STATE OF OHIO DEPARTMENT OF TRANSPORTATION BUREAU OF BRIDGES AND STRUCTURAL DESIGN	2/3
6-30-95	STANDARD CONTINUOUS SLAB BRIDGE	
	APPROVED: B.D. Hamblen DATE: 5-11-93 ENGINEER OF BRIDGES	DRAWING NO. CS-1-93
	DESIGNED ASB · DETAILED JC · CHECKED · QUANTITIES RCI · CHECKED LMW	

THREE SPAN SLAB DATA

SPANS (FT.) (SPAN RATIOS 0.7-1-0.7)	T (IN)	BAR SIZES (NUMBER) BARS A,B, C,D, F,G,H	BARS K,M N,O P	BARS E,L Q	BAR J	BAR SPACINGS (IN.) BARS A,B, C,D,E, F,G,H	BARS K,L, M,N,O P,Q	BAR J	BAR LENGTHS AND DIMENSIONS (FT-IN) BAR A LENGTH	BAR B LENGTH	BAR C LENGTH	BAR C DIM. c	BAR D LENGTH	BAR D DIM. d	BAR E LENGTH	BAR E DIM. e	BAR F LENGTH	BAR F DIM. f	BARS G AND H LENGTH	BARS G AND H DIM. g	BARS G AND H DIM. h	BAR K LENGTH	BAR L LENGTH	BAR M LENGTH	BAR M DIM. m	BARS N AND O LENGTH	BARS N AND O DIM. n	BARS N AND O DIM. o	BAR P LENGTH	BAR P DIM. p	BAR Q LENGTH	BAR Q DIM. q	REQD. DEAD LOAD CAMBER AT MIDSPAN SPANS 1 & 3 (IN.)	REQD. DEAD LOAD CAMBER AT MIDSPAN SPAN 2 (IN.)	NUMBER OF J BARS	NUMBER OF S401 BARS	NUMBER OF T401 BARS	LENGTH OF T401 BARS	NUMBER OF U401 OR U402 BARS
14-20-14	12	7	6	4	4	18¾	18	7½	13-0	12-3	11-9	10-9	9-3	3-9	8-6	4-0	13-6	3-3	11-9	2-9	5-6	9-6	8-7	16-0	7-9	16-9	7-9	5-9	9-3	5-4½	7-5	6-3½	0	¼	85	50			170
15.25-22.5-15.25	13	7	7	4	4	18	20¼	7½	13-9	13-0	12-6	11-6	10-6	4-3	9-6	4-6	14-6	4-0	13-0	3-3	6-3	11-3	9-10	16-0	7-9	16-11	7-9	7-9	12-7	4-11½	9-10	6-4	0	¼	93	55			186
17.5-25-17.5	14	7	7	4	4	17¼	19½	7½	15-0	14-6	13-9	12-9	12-3	5-3	10-6	5-3	15-6	4-9	14-6	3-6	7-0	13-3	11-10	16-0	8-0	17-0	8-0	5-9	15-7	4-8½	12-10	6-1	0	¼	98	62			196
19.25-27.5-19.25	15	7	7	4	4	17¼	18	8	16-0	15-9	14-9	13-9	13-3	6-0	11-6	5-9	17-6	5-0	16-3	4-0	7-3	15-3	13-10	15-6	7-9	16-7	7-9	5-6	18-7	4-5½	15-10	5-10	0	¼	107	68			214
21-30-21	16	8	8	4	4	21	21	8	18-5	17-6	16-8	15-6	14-6	6-0	12-0	5-9	18-10	5-7	17-0	4-6	8-6	17-6	15-1	16-0	8-3	17-4	8-3	5-3	23-1	3-5½	18-3	5-10½	0	½	116	74			232
22.75-32.5-22.75	17	8	8	4	4	21¾	21	8½	19-5	18-6	17-8	16-6	15-3	6-9	13-0	6-6	21-4	5-7	19-3	4-9	8-6	19-6	17-1	15-6	8-0	16-10	8-0	5-0	26-1	3-2½	21-3	5-7½	0	½	118	80			236
24.5-35-24.5	18	8	8	4	4	21¾	18	9	20-5	19-9	18-8	17-6	16-6	7-6	13-9	7-0	22-10	6-1	21-0	5-0	9-0	21-6	19-1	15-0	7-9	16-5	7-9	4-9	29-1	2-11½	24-3	5-4½	0	½	120	86			240
26.25-37.5-26.25	19	8	8	4	4	21	18	9	21-5	20-9	19-8	18-6	18-0	8-3	15-0	7-9	23-10	6-10	22-3	5-6	9-9	24-0	21-7	15-0	7-0	16-6	7-0	4-0	30-1	3-8½	25-3	6-1½	0	¾	128	92			256
28-40-28	20	8	9	4	4	21	20¼	9	22-5	22-0	20-8	19-6	19-0	9-0	16-0	8-3	25-10	7-1	24-0	6-0	10-0	25-7	22-1	17-0	8-3	18-9	8-3	4-3	33-5	3-3½	26-5	6-9½	0	¾	136	98			272
29.75-42.5-29.75	21	8	9	4	4	21	18¾	9½	23-8	23-3	21-11	20-9	20-0	9-6	16-9	8-9	27-4	7-7	25-9	6-3	10-6	27-1	23-7	17-6	8-6	19-4	8-6	4-6	35-5	3-6½	28-5	7-0½	¼	1	137	104			274
31.5-45-31.5	22	8	10	4	4	20¼	21¾	9½	24-8	24-6	22-11	21-9	21-6	10-3	17-9	9-3	28-4	8-4	27-0	6-9	11-3	29-0	24-1	19-6	9-9	21-10	9-9	4-9	39-2	2-11	29-4	7-10	¼	1	144	110	4	55-8	288
33.25-47.5-33.25	23	8	10	4	4	20¼	20¼	9½	25-8	25-9	23-11	22-9	22-9	11-0	18-9	9-9	29-10	8-10	28-6	7-3	11-9	30-6	25-7	20-0	10-0	22-4	10-0	5-0	41-2	3-2	31-4	8-1	¼	1¼	152	116	4	58-8	304
35-50-35	24	8	10	4	4	19½	18¾	9½	26-8	26-9	24-11	24-3	24-3	11-9	20-0	10-6	30-10	9-7	29-9	7-9	12-6	32-0	27-1	20-6	10-3	22-11	10-3	5-3	43-2	3-5	33-4	8-10	¼	1¼	160	122	6	41-6	320
36.75-52.5-36.75	25	8	11	4	4	18¾	20¼	9½	27-8	27-9	25-11	24-9	25-6	12-6	21-3	11-3	32-4	10-1	31-3	8-3	13-0	33-9	27-4	23-6	11-9	26-5	11-9	5-6	45-10	3-4	32-11	9-9½	¼	1½	167	128	6	43-6	334
38.5-55-38.5	26	8	11	4	4	18	20¼	9	28-11	29-0	27-2	26-0	26-9	13-0	22-3	11-9	33-4	10-10	32-6	8-9	13-9	35-3	28-10	24-0	12-0	27-0	12-0	5-9	47-10	3-7	34-11	10-0¼	¼	1½	184	134	6	45-6	368

THREE SPAN SLAB DATA

SPANS (FT.) SPAN RATIOS (0.8-1-0.8)	T (IN)	BAR SIZES (NUMBER) BARS A,B, C,D, F,G,H	BARS K,M, N,O P	BARS E,L, Q	BAR J	BAR SPACINGS (IN.) BARS A,B, C,D,E, F,G,H	BARS K,L, M,N,O P,Q	BAR J	BAR LENGTHS AND DIMENSIONS (FT-IN) BAR A LENGTH	BAR B LENGTH	BAR C LENGTH	BAR C DIM. c	BAR D LENGTH	BAR D DIM. d	BAR E LENGTH	BAR E DIM. e	BAR F LENGTH	BAR F DIM. f	BARS G AND H LENGTH	BARS G AND H DIM. g	BARS G AND H DIM. h	BAR K LENGTH	BAR L LENGTH	BAR M LENGTH	BAR M DIM. m	BARS N AND O LENGTH	BARS N AND O DIM. n	BARS N AND O DIM. o	BAR P LENGTH	BAR P DIM. p	BAR Q LENGTH	BAR Q DIM. q	REQD. DEAD LOAD CAMBER AT MIDSPAN SPANS 1 & 3 (IN.)	REQD. DEAD LOAD CAMBER AT MIDSPAN SPAN 2 (IN.)	NUMBER OF J BARS	NUMBER OF S401 BARS	NUMBER OF T401 BARS	LENGTH OF T401 BARS	NUMBER OF U401 OR U402 BARS
14-17.5-14	11	7	6	4	5	18	18	11½	13-0	12-3	11-9	10-9	9-0	3-9	8-3	4-0	11-6	3-0	9-9	2-6	5-3	9-3	8-4	16-6	8-0	17-3	8-0	6-0	6-3	5-7½	4-5	6-6½	0	0	55	48			110
16-20-16	12	7	6	4	5	17¼	17¼	11½	14-0	13-9	12-9	11-9	10-9	4-9	9-3	4-6	12-6	3-9	11-0	3-0	6-0	11-6	10-7	16-0	7-9	16-9	7-9	5-9	9-3	5-4½	7-5	6-2½	0	¼	62	54			124
18-22.5-18	13	7	7	4	4	17¼	19½	8	15-3	15-3	14-0	13-0	12-0	5-6	10-0	5-0	14-0	4-3	12-9	3-3	6-6	13-6	12-1	16-6	8-3	17-5	8-3	6-0	12-7	4-11½	9-10	6-4	0	¼	96	61			192
20-25-20	14	8	7	4	4	21	18	7½	17-8	17-0	15-11	14-9	13-3	5-9	10-9	5-3	15-10	4-7	13-9	3-9	7-6	15-9	14-4	16-0	8-0	17-0	8-0	5-9	15-7	4-8½	12-10	6-1	¼	¼	112	67			224
22-27.5-22	15	8	8	4	4	21¾	21	8½	18-11	18-9	17-2	16-0	14-3	6-6	11-3	5-6	17-10	4-10	15-9	4-0	7-9	18-3	15-10	17-0	8-6	18-3	8-6	5-6	19-1	4-2½	14-3	6-7½	¼	¼	109	74			218
24-30-24	16	8	8	4	4	21	21	8½	20-2	20-0	18-5	17-3	16-0	7-3	12-6	6-3	18-4	5-10	16-9	4-6	8-9	19-6	17-1	17-6	9-3	18-10	9-3	6-3	22-1	3-11½	17-3	6-4½	¼	¼	118	80			236
26-32.5-26	17	8	8	4	4	21	18¾	9	21-5	21-6	19-8	18-6	17-3	8-0	13-6	6-9	19-10	6-4	18-3	5-0	9-3	21-9	19-4	17-6	9-0	18-10	9-0	6-0	24-1	4-2½	19-3	6-7½	¼	¼	121	87			242
28-35-28	18	8	8	4	4	21	18	9	22-5	23-0	20-8	19-6	18-9	9-0	14-3	7-3	21-4	6-10	20-0	5-3	9-9	24-0	21-7	18-0	8-9	18-11	8-9	5-9	26-1	4-5½	21-3	6-10½	¼	½	129	93			258
30-37.5-30	19	8	9	4	4	20¼	19½	9	23-8	24-6	21-11	20-9	20-3	9-9	15-6	7-9	22-4	7-7	21-0	6-0	10-6	26-4	22-10	18-6	9-9	20-2	14-6	5-6	30-5	3-6½	23-5	7-0½	¼	½	138	100			276
32-40-32	20	8	9	4	4	20¼	18	9½	24-11	26-0	23-2	22-0	21-6	10-6	16-3	8-3	23-10	8-1	22-9	6-3	11-0	28-7	25-1	18-6	9-3	20-3	9-3	5-3	32-5	3-9½	25-5	7-3½	½	½	139	106			278
34-42.5-34	21	8	10	4	4	20¼	21¾	9½	26-2	27-6	24-5	23-3	22-9	11-3	17-3	8-9	25-4	8-7	24-3	6-9	11-6	31-3	26-4	20-0	10-0	22-3	10-0	5-0	36-2	3-2	26-4	8-1	½	¾	148	113			296
36-45-36	22	8	10	4	4	20¼	20¼	10	27-8	29-3	25-11	24-9	23-9	11-9	18-0	9-0	26-10	9-1	25-9	7-3	12-0	33-6	28-7	19-6	9-9	21-10	9-9	4-9	39-2	2-11	29-4	7-10	½	¾	148	119	4	60-0	296
38-47.5-38	23	8	10	4	4	19½	18¾	10	28-8	30-6	26-11	25-9	25-6	12-6	19-3	9-9	27-10	9-7	27-0	7-9	12-9	35-3	30-4	20-0	10-0	22-4	10-0	5-0	41-2	3-2	31-4	8-1	¾	1	156	126	6	42-8	312
40-50-40	24	8	11	4	4	19½	20¼	10	30-2	32-0	28-5	27-3	26-6	13-3	20-3	10-3	29-4	10-4	28-6	8-3	13-3	37-3	30-10	23-0	11-6	25-8	11-6	5-3	43-10	3-1	30-11	9-6½	¾	1	164	132	6	44-10	328
42-52.5-42	25	8	11	4	4	19½	18¾	10½	31-11	33-9	30-2	29-0	27-0	13-6	21-0	10-5	31-4	10-7	30-3	8-9	13-6	39-0	32-7	23-6	11-9	26-5	11-9	5-6	45-10	3-4	32-11	9-9½	¾	1	164	139	6	47-0	328
44-55-44	26	8	11	4	4	18¾	18¾	11	33-2	35-0	31-5	30-3	28-6	14-3	22-0	11-0	32-4	11-4	31-6	9-3	14-3	40-9	34-3	24-0	12-0	27-0	12-0	5-9	47-10	3-7	46-9	10-0½	¾	1¼	180	145	6	49-2	360

DIMENSION C

BAR C

REVISIONS
6-30-95

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

3 / 3

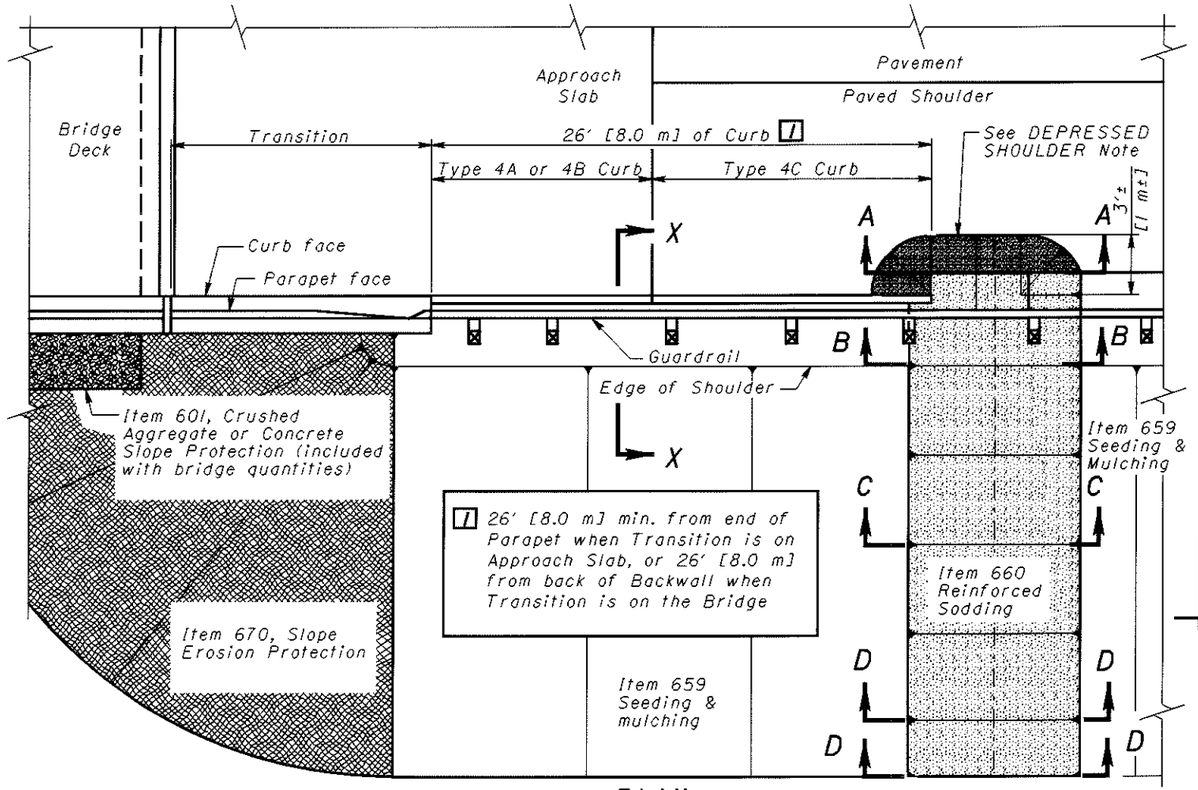
STANDARD

CONTINUOUS SLAB BRIDGE

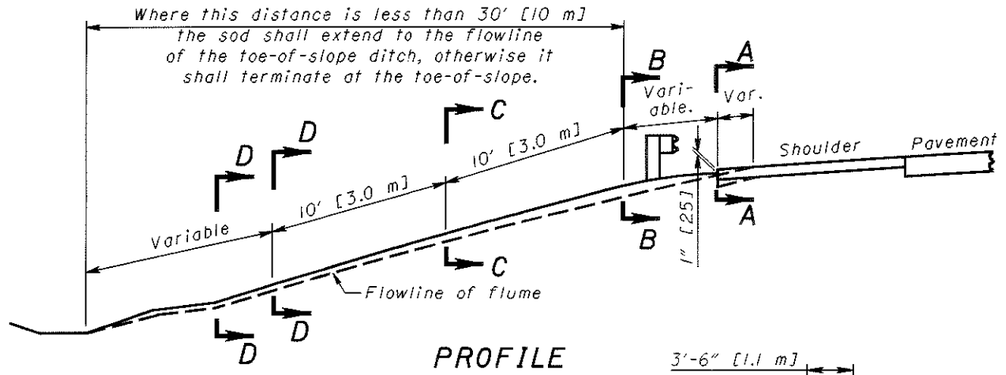
APPROVED: E. D. Hamblen
DATE: 5-11-93 ENGINEER OF BRIDGES

DRAWING NO. CS-1-93

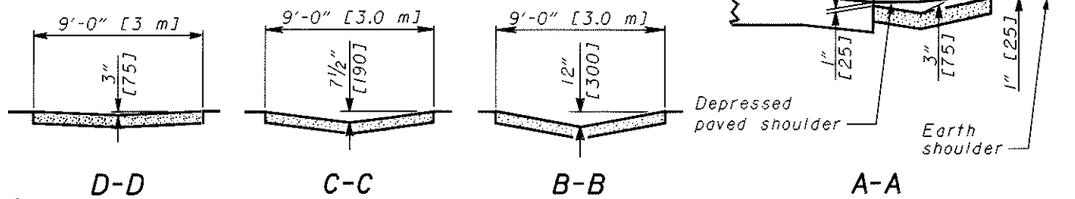
DESIGNED	DRAWN	TRACED	CHECKED	ADDENDUM
ASB	JC		RCI	LMW



PLAN

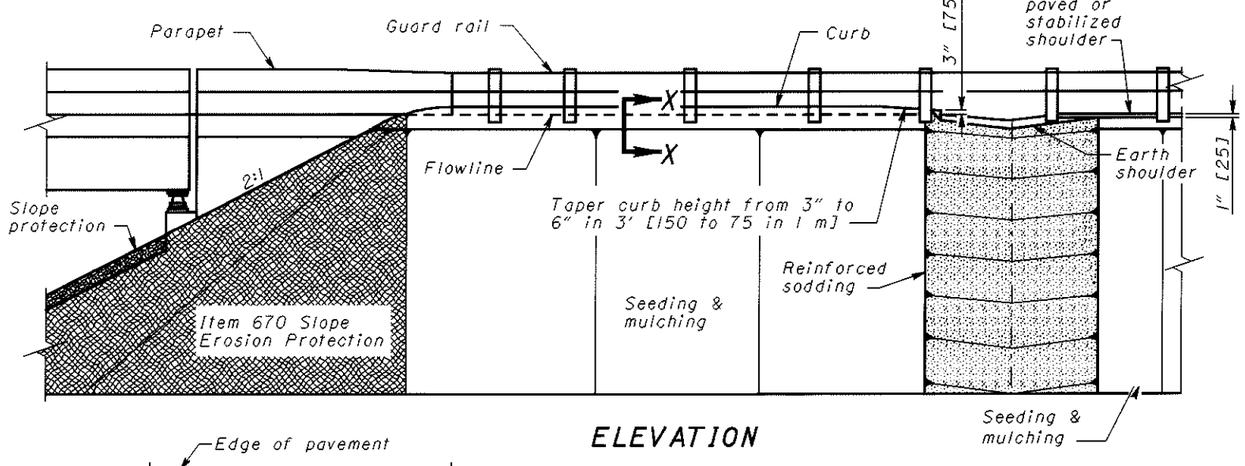


PROFILE

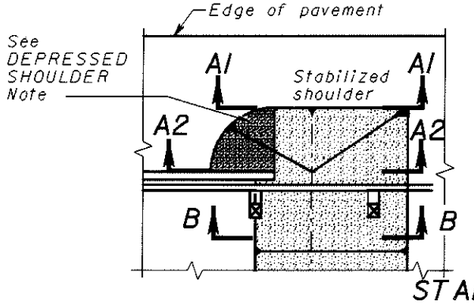


D-D C-C B-B A-A

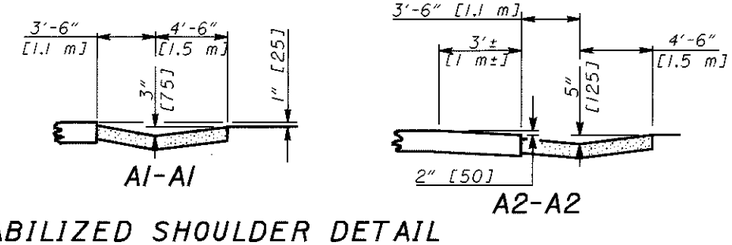
CROSS SECTIONS

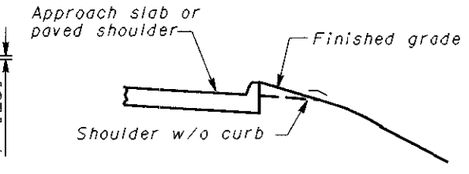


ELEVATION

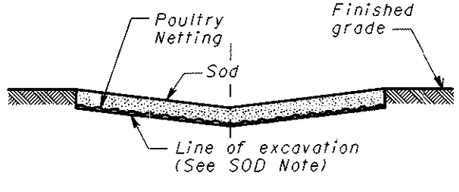


STABILIZED SHOULDER DETAIL





SECTION X-X



SOD INSTALLALLATION DETAIL

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 4' [1.2 m] wide, poultry netting or equivalent, with 2" [50] mesh and No. 20 gage minimum wire. Each strand shall be staked securely to the subgrade by using T-shaped pins or 1"x1"x8" [25x25x200] wood stakes of the size stated in CMS 660.06. The stakes or pins shall be placed at 4' [1.2 m] intervals on the top and bottom and in rows 4' [1.2 m] apart. The poultry netting shall be fastened to the wood stakes with staples. Where the sodding is from 8' to 9' [2.5 to 3.0 m] wide, two strands of netting for a total width of 8' [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, Reinforced Sodding, Square Foot [Meter].***

THIS DRAWING REPLACES DM-4.1M DATED 6-30-95.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
7-20-01
DATE

REVISIONS

STDS. ENGR. D. Focke
DRAWN D. Focke

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

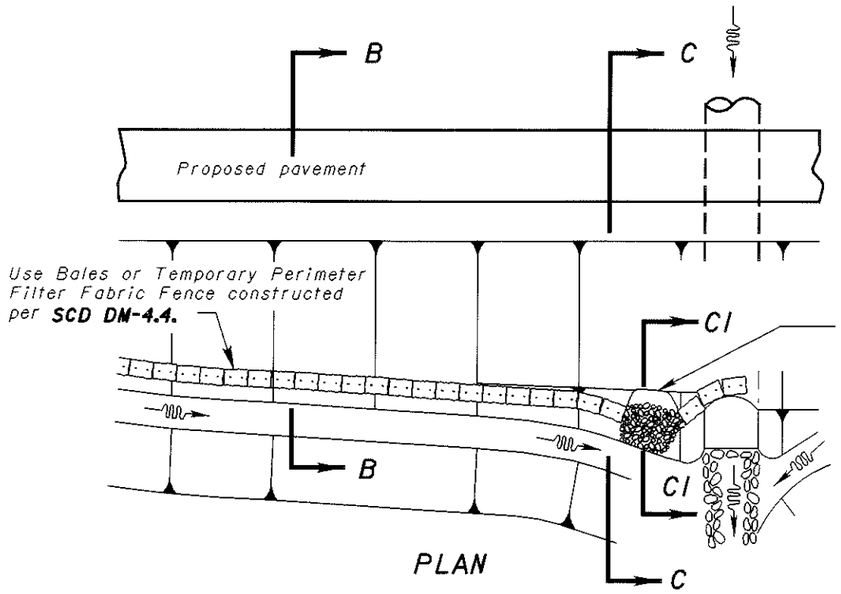
STANDARD ROADWAY CONSTRUCTION DRAWING

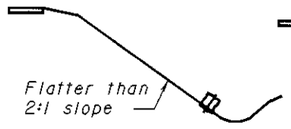
EROSION CONTROL AT BRIDGES

NUMBER DM-4.1

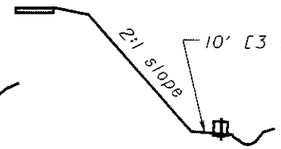
1 / 1

STRAW OR HAY BALES





SECTION B-B



SECTION C-C

SECTION CI-CI

BALE FILTER DIKE

NOTES

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 CMS 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.

SEDIMENT BASINS & DAMS

NOTES

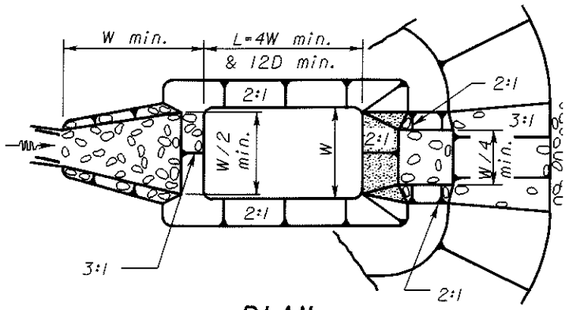
EMBANKMENT: Sediment basin embankment construction shall be per CMS 203.

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 Item 601, Rock Channel Protection, with Filter Fabric.

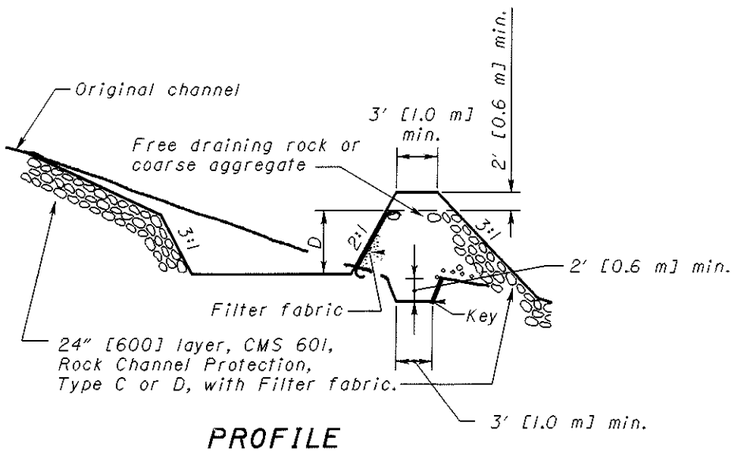
SIZE: The volume shown on the plans is the total storage volume required for the sediment basin or dam (67 cubic yards per acre [125 cubic meters per hectare]). A series of smaller basins or dams may be subsituted for a larger basin or dam.

MAINTENANCE: Sediment pits, dams and basins shall be accept ably maintained. The maintenance or replacement costs will be paid for by the Department under unit bid prices, agreed unit prices, or CMS 109.04.

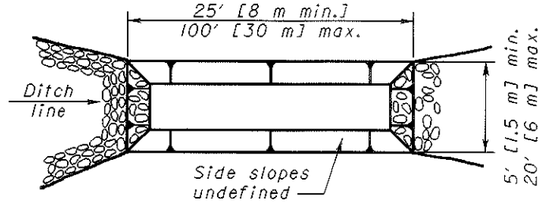
BASIS OF PAYMENT: Sediment Dams and Basins shall be paid for under **Item 877 - Temporary Dikes.** The pay quantity shall be the actual number of cubic yards [cubic meters] of excavation and embankment required to construct the basin or dam. Rock required shall be paid for under **Item - 601, Rock Channel Protection, Type C or D, with Filter.**



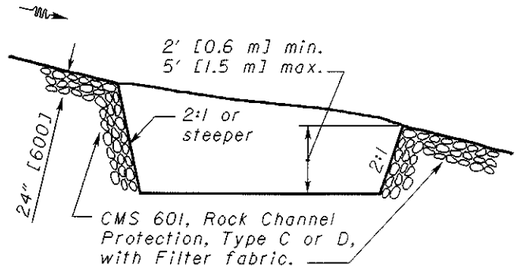
PLAN



PROFILE
SEDIMENT DAM



PLAN



PROFILE
SEDIMENT BASIN

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER — DATE 4-29-99

REVISIONS	STDS. ENGR. D. Focke
7-20-01	DRAWN D. Focke

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

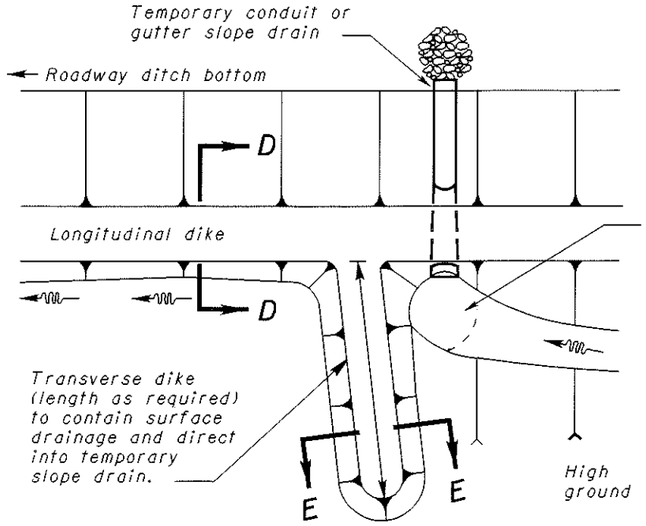
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING

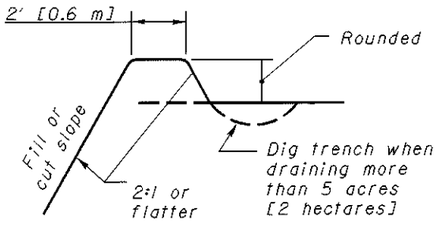
TEMPORARY EROSION CONTROL

NUMBER DM-4.3

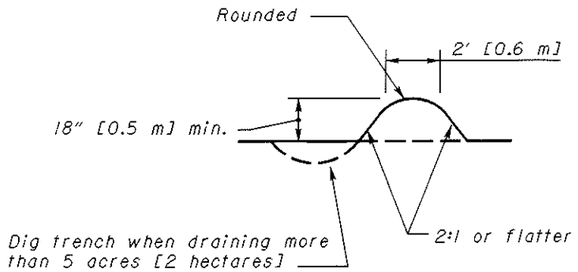
DIKES AND SLOPE PROTECTION



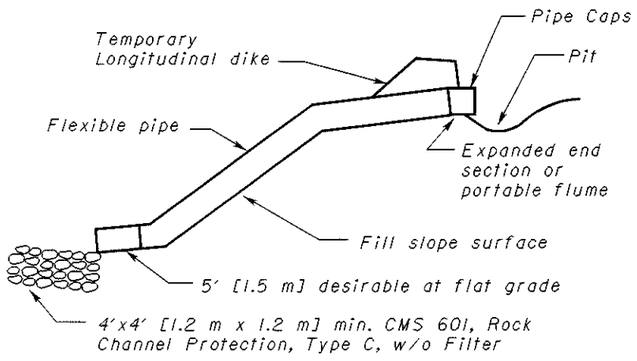
PLAN



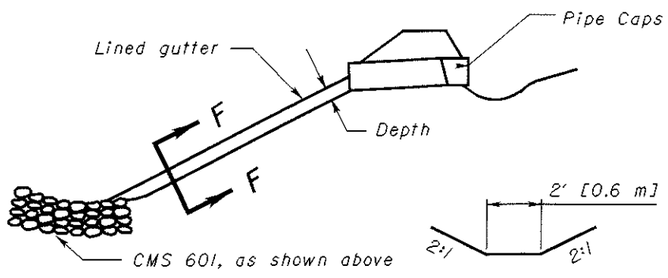
SECTION D-D



SECTION E-E



CONDUIT SLOPE DRAIN



SECTION F-F

GUTTER SLOPE DRAIN

NOTES

GENERAL: Dikes and drains shown shall be used when earthwork operations 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 4:1 maximum slopes), 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.**

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]

OHIO DEPARTMENT OF TRANSPORTATION
Gary V. Sandhaul 4-29-99
ROADWAY DESIGN ENGINEER DATE

REVISIONS 7/20/01

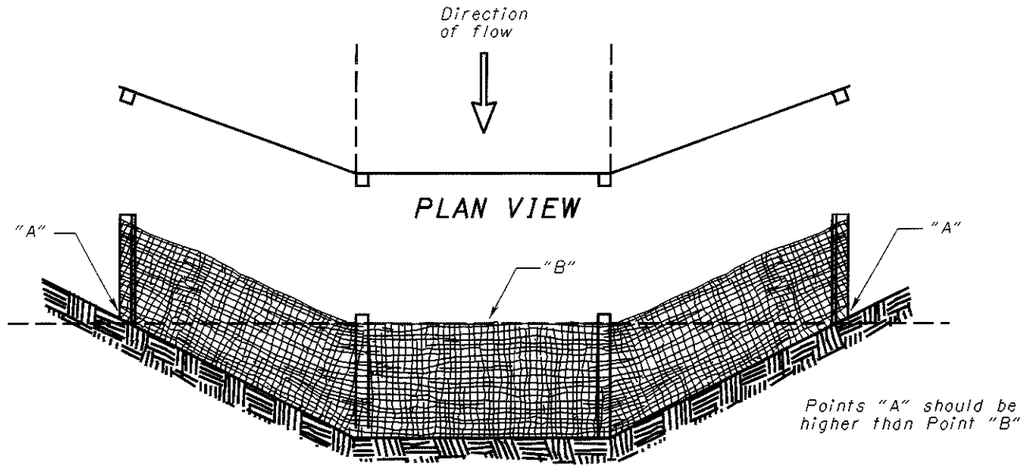
STDS. ENGR. D. Focke
DRAWN D. Focke

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
TEMPORARY EROSION CONTROL

NUMBER DM-4.3



PLACEMENT AND CONSTRUCTION OF DITCH CHECK FILTER FABRIC FENCE

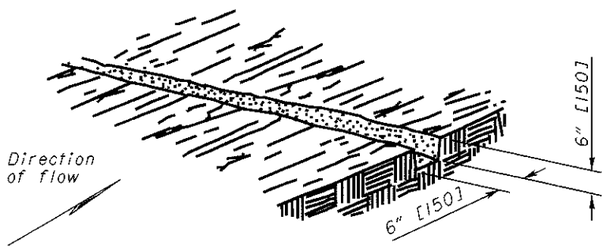
NOTES

MATERIALS: Filter fabric shall meet the requirements of CMS 712.09, Type C. Support stakes shall be a minimum of 1½"x1½" [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.

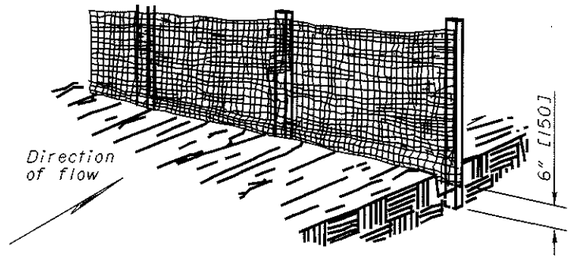
MAINTENANCE: The filter fabric fence shall be maintained to be functional. This shall include removal of trapped sediment and required cleaning, repair, and replacement of the filter fabric. The maintenance or replacement cost will be paid for by the Department under unit bid prices, agreed unit prices, 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].**



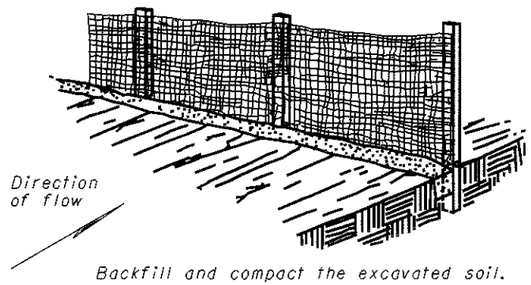
Excavate a 6"x6" [150x150] trench along the proposed fence line.

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

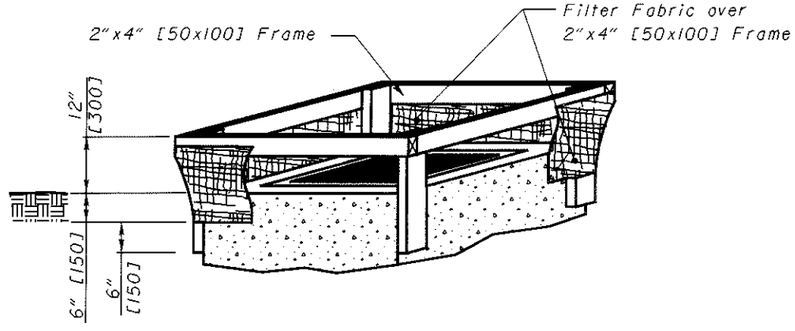
NOTES

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. 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 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].**



TEMPORARY INLET PROTECTION FILTER FABRIC FENCE

OHIO DEPARTMENT OF TRANSPORTATION
4-29-99
ROADWAY DESIGN ENGINEER
DATE

REVISIONS
7-20-01

STDS. ENGR. D. Focke
DRAWN D. Focke

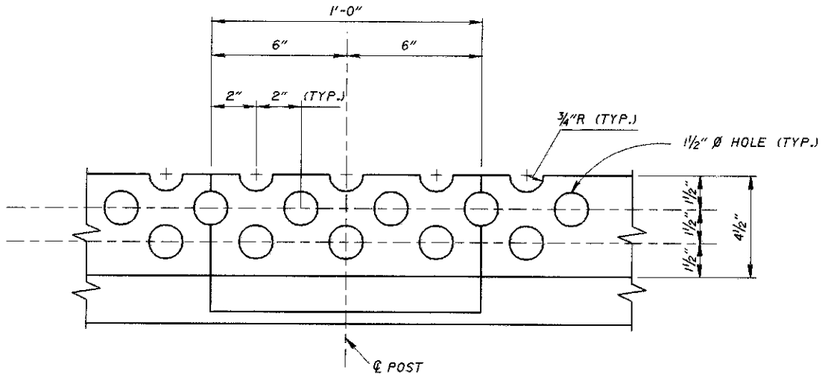
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

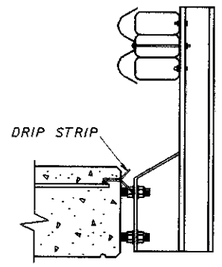
STANDARD ROADWAY CONSTRUCTION DRAWING
TEMPORARY EROSION CONTROL

NUMBER DM-4.4

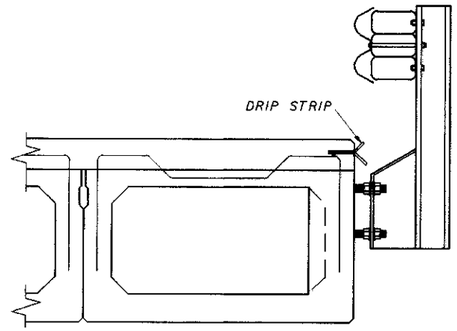
1 / 1



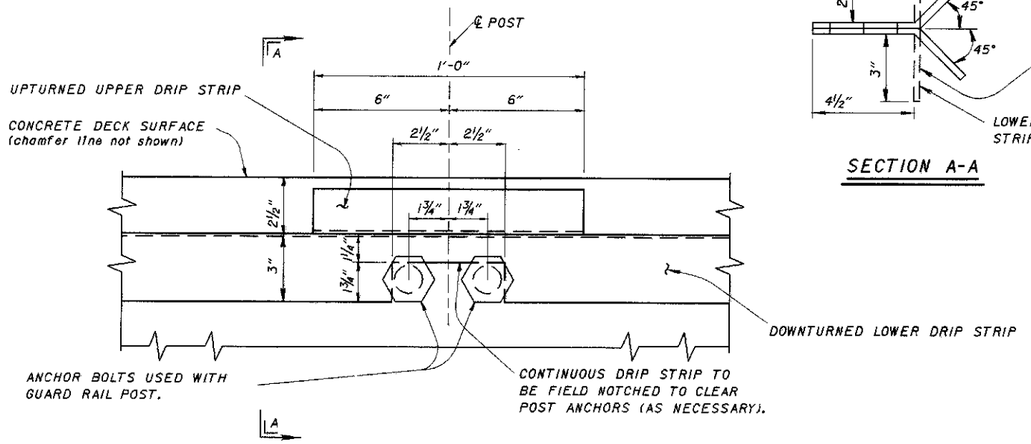
PARTIAL PLAN



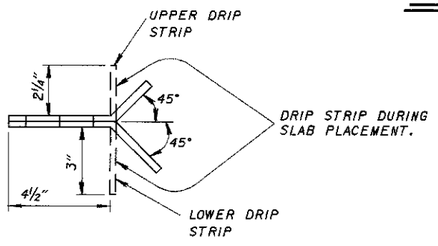
SECTION AT EDGE OF CONCRETE DECK SLAB



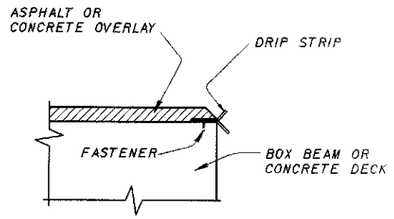
SECTION AT EDGE OF COMPOSITE PRESTRESSED BOX BEAM DECK



ELEVATION



SECTION A-A



✡ SECTION AT EDGE OF ASPHALT OR CONCRETE OVERLAY

✡ PRIOR TO PLACING AN ASPHALT OR CONCRETE OVERLAY, THE BENT DRIP STRIPS SHALL BE INSTALLED ALONG THE EDGE OF THE SLAB OR PRESTRESSED BOX BEAM AS SHOWN. THE DRIP STRIPS SHALL BE FASTENED WITH (1¼" length, 3/32" shank diameter) BUTTON HEAD SPIKES WITH DEFORMED SHANKS OR EXPANSION ANCHORS AT 1'-6" C/C MAX. ALL INSTALLATION DEVICES SHALL EITHER BE GALVANIZED OR STAINLESS STEEL.

OTHER SIMILAR DEVICES WHICH WILL NOT DAMAGE THE CONCRETE MAY BE USED SUBJECT TO THE APPROVAL OF THE ENGINEER.

DRIP STRIP NOTES:

LOWER STAINLESS STEEL DRIP STRIP, AS DETAILED, SHALL BE INSTALLED ALONG THE FULL LENGTH OF EACH SIDE OF THE BRIDGE. IF SPLICES ARE REQUIRED IN THE LOWER DRIP STRIP, THE INDIVIDUAL PIECES SHALL BE BUTTED TIGHTLY TOGETHER, NOT LAPPED. A 1'-0" LONG UPPER DRIP STRIP SHALL BE INSTALLED AT EACH RAILING POST. STRIPS SHALL BE BENT UP AT 90° AGAINST THE INSIDE FACE OF THE FORMS BEFORE CONCRETE IS PLACED. AFTER THE FORMS ARE REMOVED, THE DRIP STRIPS SHALL BE BENT TO A FINAL POSITION OF 45° AS SHOWN IN SECTION A-A.

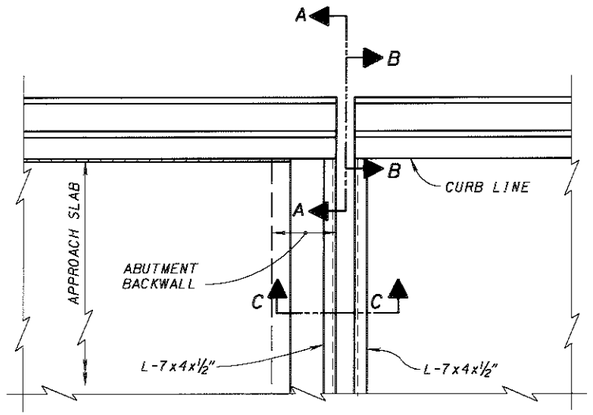
STAINLESS STEEL SHALL BE A MINIMUM OF 22 GAUGE ASTM A167, TYPE 304, MILL FINISH.

CARE SHALL BE USED WHEN STRIPPING FORMWORK SO AS NOT TO DAMAGE OR WRINKLE THE STAINLESS STEEL DRIP STRIP. TO FURTHER ENSURE THAT WRINKLING OF THE STRIPS DOES NOT OCCUR, AN ADEQUATE LENGTH BACKUP BAR SHALL BE USED DURING THE BENDING OUT OPERATION.

TOTAL QUANTITY FOR BID ITEM SHALL INCLUDE LINEAR FOOTAGE OF BOTH LOWER AND UPPER DRIP STRIPS.

PAYMENT SHALL BE AT THE CONTRACT PRICE BID FOR ITEM SPECIAL, LIN.FT. STEEL DRIP STRIP AND SHALL INCLUDE ALL MATERIALS, LABOR, TOOLS AND INCIDENTALS NECESSARY TO COMPLETE THIS ITEM.

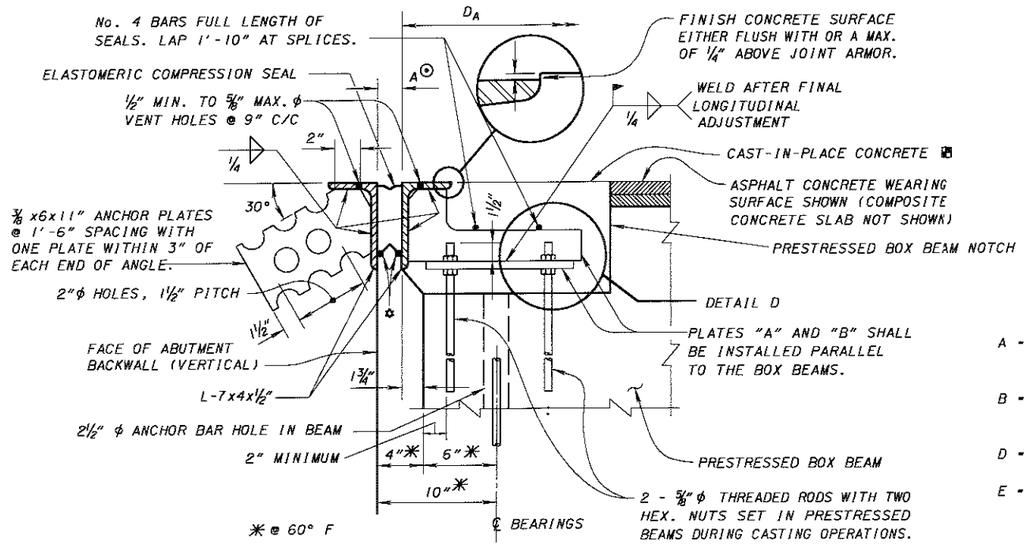
REVISIONS	STATE OF OHIO DEPARTMENT OF TRANSPORTATION BUREAU OF BRIDGES AND STRUCTURAL DESIGN	
12-15-94	STANDARD DRIP STRIP DETAIL FOR STRUCTURES WITH OVER THE SIDE DRAINAGE	
	APPROVED: E.D. Thomas ENGINEER OF BRIDGES DATE 14 - 5 - 93	DRAWING NO. DS-1-92
	PREPARED: REZA / DRAWN: REZA / CHECKED: LMW / REVIEWED: JS	SHEET NO. 1 OF 1 SHEET



PART PLAN AT ABUTMENT

FOR BRIDGES WITH DEFLECTOR PARAPET RAILING

(BR-1 RAILING SHOWN, SBR-1-99 SHALL BE SIMILAR)

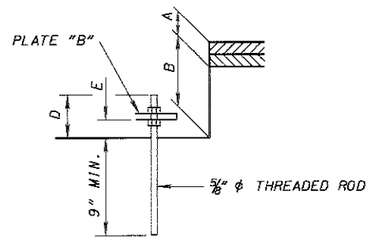


SECTION C-C

WITH ROADWAY GRADIENT OF 2% OR LESS SHOWN

NOTE: FOR DIMENSIONS A⊙, D_A, ADDITIONAL NOTES AND DETAILS SEE SHEET 4 / 4 .

✡ - ½"ϕ RETAINER BAR



DETAIL D

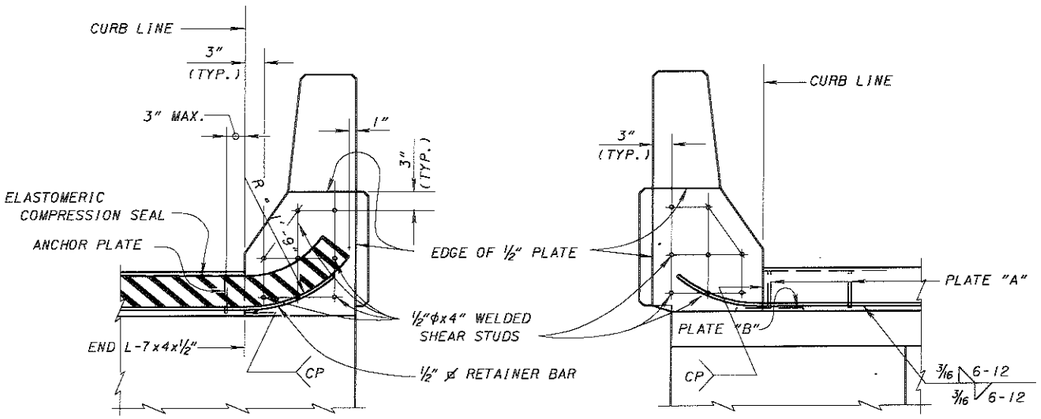
A - ASPHALT CONCRETE WEARING SURFACE THICKNESS (OR COMPOSITE SLAB THICKNESS) AT NOTCH.

B - 5" NOTCH FOR 17" BEAMS OR 7" NOTCH FOR 21" THRU 42" BEAMS.

D - A + B - 4" (SHALL BE SHOWN ON THE PROJECT PLANS)

E - A + B - 6" (IF DIM. "E" IS LESS THAN 3", A BED OF NON-SHRINK GROUT, CMS 705.22, SHALL BE PLACED AND COMPACTED UNDER EACH PLATE "B" AFTER FINAL VERTICAL ADJUSTMENT.)

◘ - SURFACE TEXTURE ON DECK JOINTS SHALL BE PARALLEL WITH THE JOINT FOR SKEWED BRIDGES WITH ASPHALT CONCRETE WEARING SURFACE. CONCRETE SHALL BE CLASS "S" OR SHALL MATCH THE CONCRETE SPECIFIED IN THE PLANS FOR A COMPOSITE DECK.



SECTION A-A

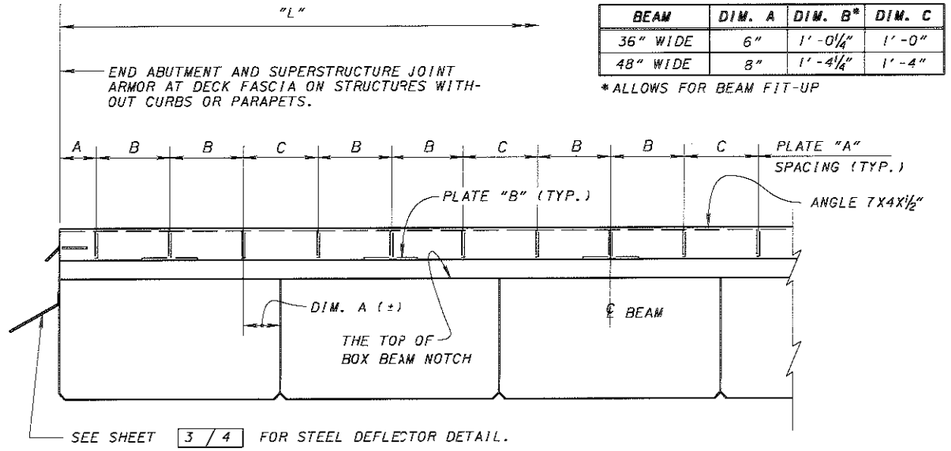
SECTION B-B

LEGEND:

R - RADIUS

SEE SHEET 4 / 4 FOR NOTES AND PLATES A & B

★SEE STEEL DRIP STRIP STANDARD BRIDGE DRAWING (NOT INCLUDED WITH EXPANSION JOINT FOR PAYMENT.)



BEAM	DIM. A	DIM. B*	DIM. C
36" WIDE	6"	1'-0¼"	1'-0"
48" WIDE	8"	1'-4¼"	1'-4"

*ALLOWS FOR BEAM FIT-UP

NOTE: WHERE THE TOTAL WIDTH OUT TO OUT OF BOX BEAMS IS EQUAL TO THE BRIDGE ROADWAY WIDTH, JOINT ARMOR SHALL BE OF SUFFICIENT LENGTH TO ALLOW FOR FIT-UP OF BEAMS. SEE FORMULA FOR LENGTH "L".

L - LENGTH OF JOINT, EDGE TO EDGE OF DECK (FEET) = [(N-1)(½)+N(W)]/(12 COS θ)

N - NUMBER OF BEAMS

W - NOMINAL WIDTH OF BEAMS (INCHES)

θ - SKEW ANGLE OF JOINT

END OF SUPERSTRUCTURE

WITHOUT CURBS OR PARAPETS

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

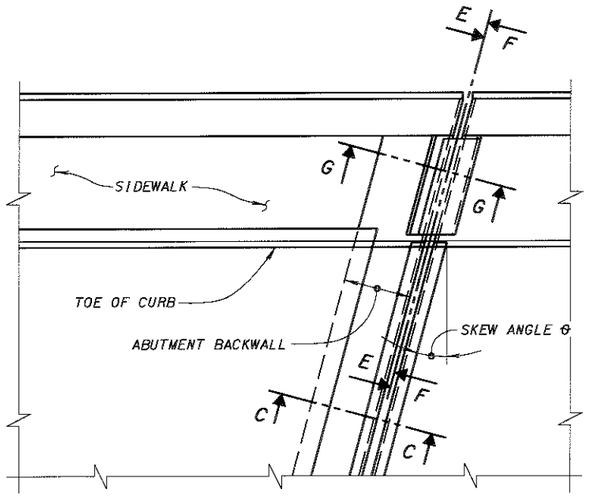
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Robert B. Taylor
ENGINEER OF BRIDGES
11-15-82
DATE

REVISIONS	DESIGNED	CHECKED	DRAWN	REVIEWED
8-1-84	RLD/AJM	JS/MPB	AJM	WTL/RLD
2-14-97				
04-20-01				

EXJ-3-82

STANDARD
COMPRESSION SEAL EXPANSION JOINTS AT ABUTMENTS FOR PRESTRESSED BOX BEAM STRUCTURES

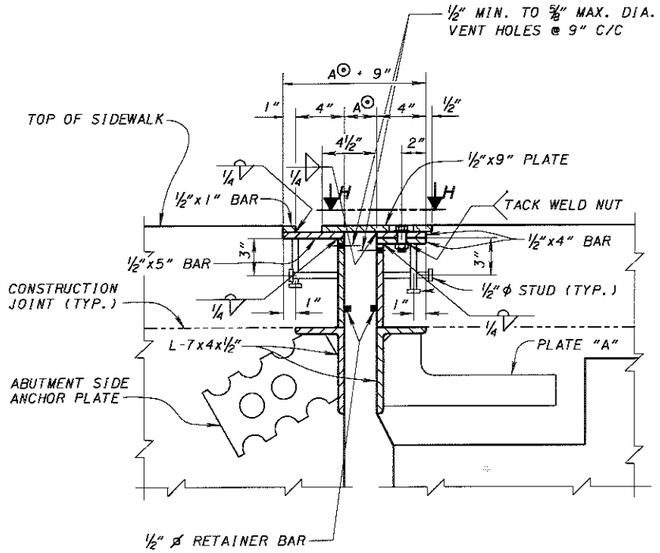
1 / 4



PART PLAN AT ABUTMENT

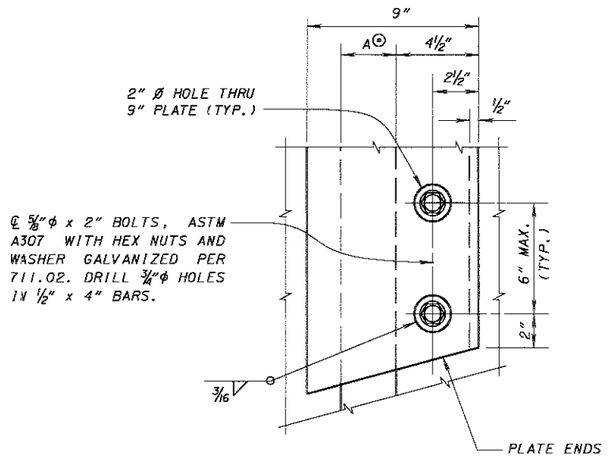
FOR BRIDGES WITH SIDEWALK PARAPET RAILING

SEE SHEET 1/4 FOR SECTION C-C.

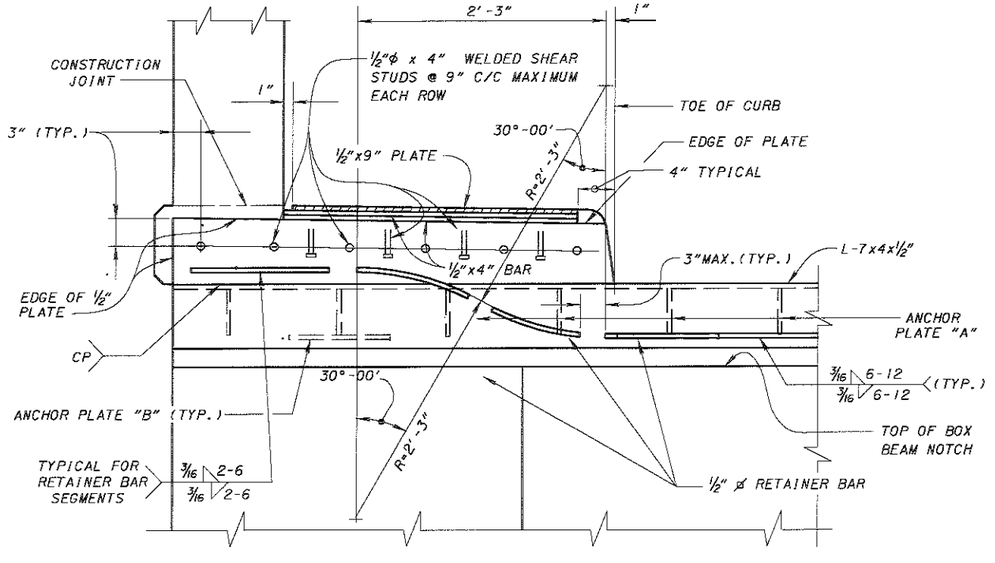


SECTION G-G

NOTE: FOR DIMENSION A⊙, ADDTIONAL NOTES AND DETAILS, SEE SHEET 4/4.



VIEW H-H



SECTION E-E

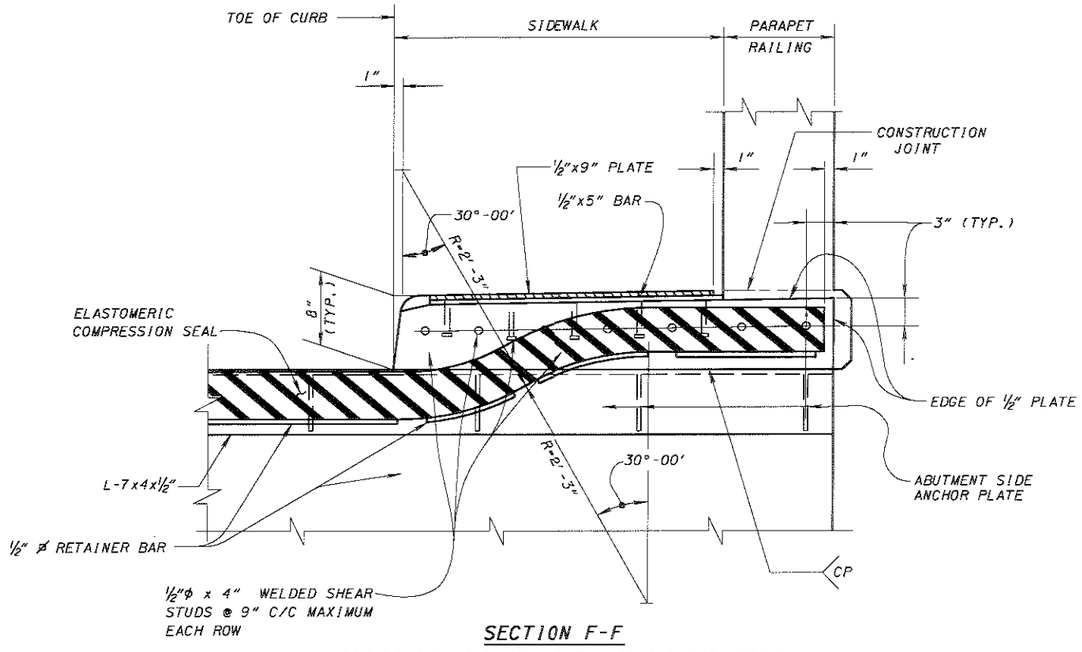
SEAL NOT SHOWN

SEE SECTION F-F FOR OTHER DETAILS NOT SHOWN

LEGEND:
R = RADIUS

SEE SHEET 4/4 FOR NOTES AND PLATES A & B.

SEE SHEET 1/4 FOR ADDTIONAL DETAILS.



SECTION F-F

SEE SECTION E-E FOR OTHER DETAILS NOT SHOWN

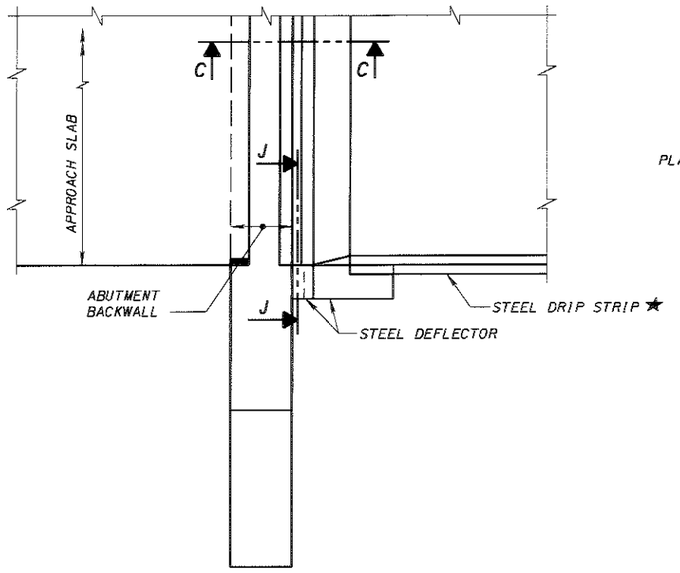
DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Robert B. Flynn
ENGINEER OF BRIDGES
11-15-82
DATE

REVISIONS	DESIGNED	CHECKED	REVIEWED
8-1-84	RLD/AJM	JS/MFB	WTL/RLD
2-14-97	DRAWN		
04-20-01	AJM		EXJ-3-82

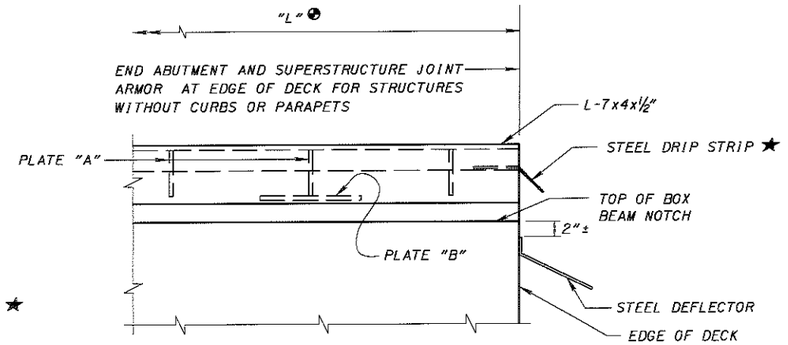
STANDARD
COMPRESSION SEAL EXPANSION JOINTS AT ABUTMENTS FOR PRESTRESSED BOX BEAM STRUCTURES

2/4

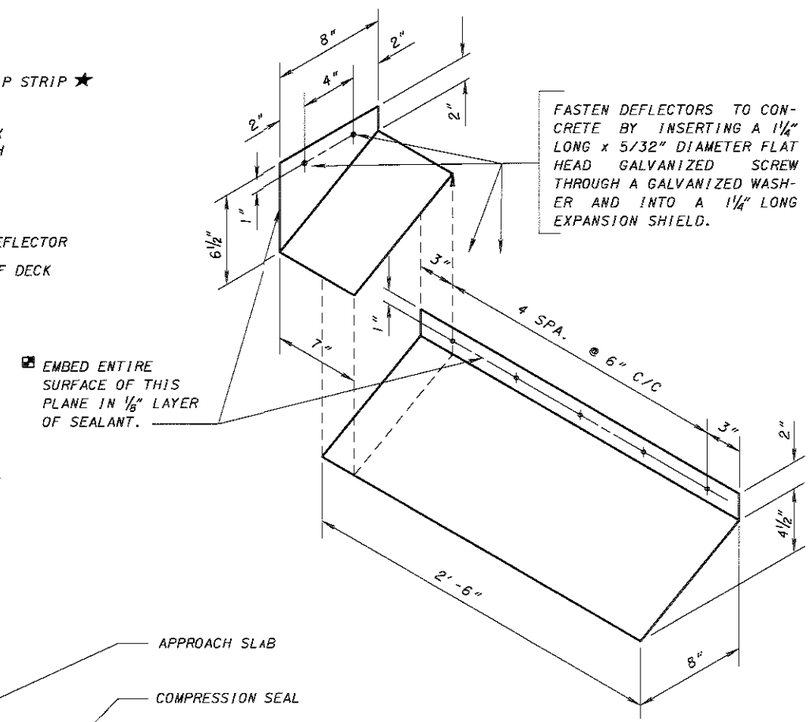


PART PLAN AT ABUTMENT
FOR FULL WIDTH STRUCTURES

(SEE SHEET 1 / 4 FOR SECTION C-C)



SECTION J-J

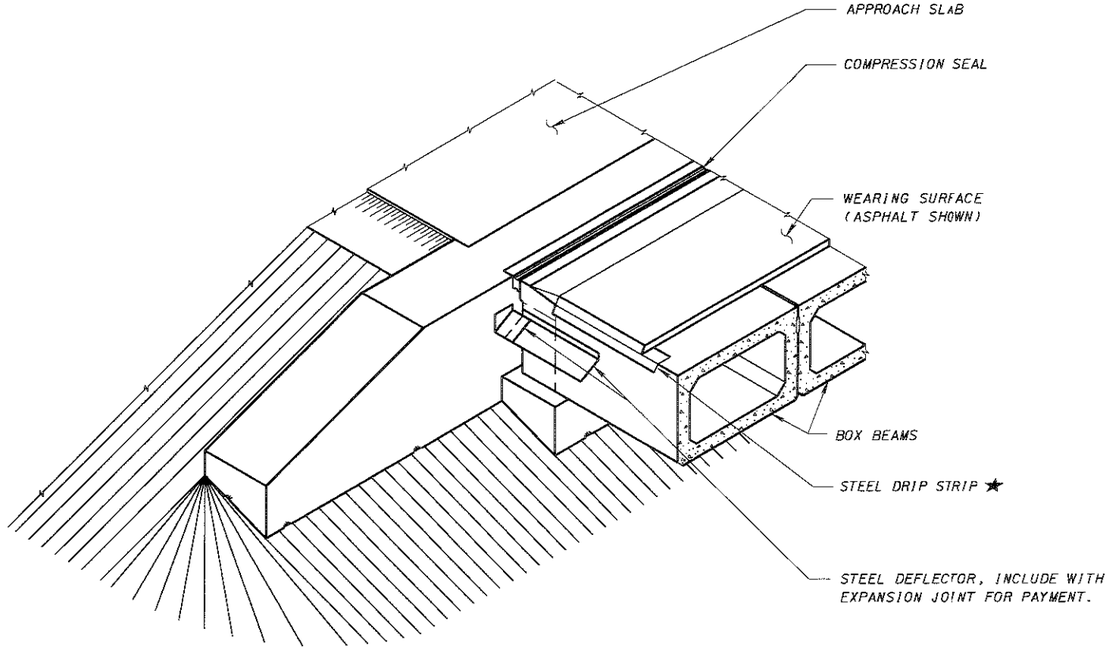


NOTES:

◕ SEE SHEET 1 / 4 FOR DEFINITION OF DIMENSION "L".

■ SEALANT SHALL MEET FEDERAL GOVERNMENT SPECIFICATION TT-S-00227E.

★ SEE STEEL DRIP STRIP STANDARD BRIDGE DRAWING (NOT INCLUDED WITH EXPANSION JOINT FOR PAYMENT)



SEE SHEET 4 / 4 FOR NOTES AND PLATES A & B.

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES — 11-15-82 DATE

DESIGNED	DRAWN	CHECKED	REVIEWED
RLD/AJM	AJM	JS/MPB	WTL/RLD

EXJ-3-82

REVISIONS
8-1-84
2-14-97
04-20-01

STANDARD
COMPRESSION SEAL EXPANSION JOINTS AT ABUTMENTS FOR PRESTRESSED BOX BEAM STRUCTURES

GENERAL NOTES:

COMPRESSION SEAL: SEAL MATERIAL SHALL CONFORM TO 705.11. SEAL CONFIGURATION SHALL BE SIMILAR TO THE DETAILS SHOWN HEREIN. ACCEPTED MANUFACTURERS ARE: D.S. BROWN (MODEL CV4000), WATSON-BOWMAN-ACME (MODEL WJ400) OR AN APPROVED EQUIVALENT. SEAL INSTALLATION PROCEDURE AND LUBRICANT ADHESIVE SHALL AS BE PER THE MANUFACTURER'S SPECIFICATIONS WITH SUPERVISION BY THE MANUFACTURER OR HIS DESIGNATED REPRESENTATIVE.

JOINTS IN COMPRESSION SEALS: SEALS SHALL BE FURNISHED IN ONE CONTINUOUS PIECE UNLESS APPROVED BY THE DIRECTOR.

ARMOR STEEL: ALL STEEL PARTS OF THE EXPANSION JOINT ASSEMBLY SHALL BE ASTM A709, GRADE 50.

JOINTS IN ARMOR STEEL: SHOP OR FIELD JOINTS IN THE ARMOR SHALL BE COMPLETE PENETRATION WELDS GROUND FLUSH WHERE IN CONTACT WITH THE SEAL AND THE RETAINER.

ARMOR COATING: ALL STEEL PARTS OF THE JOINT ASSEMBLY REQUIRE METALIZING WITH 100% ZINC WIRE. SURFACE PREPARATION AND APPLICATION OF THE COATING SHALL BE AS PER THE SOCIETY FOR PROTECTIVE COATINGS SSPC-CS-23.00(1). THE COATING THICKNESS SHALL BE 6 MILS MINIMUM. METALIZED SURFACES EMBEDDED OR PARTIALLY EMBEDDED IN CAST-IN-PLACE CONCRETE REQUIRE SEALING. THE SEALER SHALL BE THE INTERMEDIATE EPOXY COATING MEETING THE REQUIREMENTS OF SS910.03. THE SEALER SHALL COVER ALL PEAKS, VALLEYS AND SURFACE ROUGHNESS ATTRIBUTED TO METALIZING.

COATING REPAIRS: COATINGS DAMAGED DURING FABRICATION SHALL BE REPAIRED BY COMPLETE REMOVAL AND RE-METALIZING PER THE ARMOR COATING NOTES ABOVE. COATINGS DAMAGED IN SHIPMENT, BY CONSTRUCTION OR BY FIELD WELDING SHALL BE REPAIRED PER ASTM A780 ANNEX A1, "REPAIR USING ZINC BASED ALLOYS." THIS PROCESS INVOLVES REMOVAL OF SURFACE CONTAMINATES, PREHEAT TO 600°F AND APPLICATION OF ZINC COATING BY RUBBING WITH A PURE ZINC STICK OR SPRINKLING ZINC POWDER ON THE PREHEATED SURFACE. THE REPAIRED COATING SHALL BE 6 MILS MINIMUM THICKNESS.

TEMPORARY SUPPORTS: FABRICATOR DESIGNED AND INSTALLED TEMPORARY SUPPORTS ARE REQUIRED TO SUPPORT SHIPPING, ERECTION AND CONSTRUCTION FORCES WITHOUT DAMAGE TO THE STEEL ARMOR OR COATING. THESE SUPPORTS SHALL BE ADJUSTABLE IN THE FIELD TO ACCOUNT FOR VARIABLE TEMPERATURE SETTINGS. THE SUPPORTS SHALL BE INSTALLED AFTER THE FABRICATION AND COATING IS COMPLETE.

STEEL DEFLECTORS SHALL BE 22 GAGE STAINLESS STEEL MEETING THE REQUIREMENTS OF ASTM A240, TYPE 304 OR EQUIVALENT, WITH A NO. 1 FINISH

NON-SHRINKING GROUT OR MORTAR SHALL BE AS PER CMS 705.22 WITH THE BATCH SIZE LIMITED SO PLACEMENT CAN BE COMPLETED WITHIN 30 MINUTES. WATER SHALL NOT BE ADDED TO INCREASE FLOWABILITY WHICH HAS BEEN DECREASED BY DELAYED USE OF MORTAR. INCLUDE WITH SUPERSTRUCTURE CONCRETE FOR PAYMENT.

THREADED RODS: THE $\frac{7}{8}$" ϕ THREADED RODS AND NUTS SHALL BE A36 OR A307 STEEL GALVANIZED AS PER 711.02. INCLUDE WITH THE BOX BEAMS FOR PAYMENT.

MEASUREMENT: MEASUREMENT AND PAYMENT PER ITEM 516 SHALL INCLUDE ALL LABOR, MATERIALS, COATINGS AND EQUIPMENT NECESSARY TO COMPLETE THE JOINT IN PLACE.

CONCRETE PLACED IN THE BOX BEAM NOTCH SHALL BE PAID FOR UNDER ITEM 511, 842 OR 844 AS APPROPRIATE.

CONSTRUCTION PROCEDURE:

1. PLACE JOINT ASSEMBLY SO THE TWO (2) L7x4x$\frac{1}{2}$" ANGLES REMAIN PARALLEL TO EACH OTHER AND PERPENDICULAR TO THE ROADWAY GRADIENT.
2. FOR STRUCTURES WITH A COMPOSITE CONCRETE WEARING SURFACE, THE SUPERSTRUCTURE CONCRETE SHALL BE PLACED IN THE SPAN ADJACENT TO THE ABUTMENT PRIOR TO THE PLACEMENT OF ABUTMENT BACKWALL CONCRETE.
3. ⊕ NOT MORE THAN FOUR HOURS PRIOR TO THE DAY'S PEAK AMBIENT TEMPERATURE, SET ABUTMENT EXPANSION JOINT WIDTH TO DIMENSION "A" WHICH SHALL BE DETERMINED AS FOLLOWS:

   $A = 2\frac{1}{4}" \pm D_{TA}$, WHERE:
   A = JOINT WIDTH (INCHES) MEASURED NORMAL TO JOINT
   D_{TA} = ADJUSTMENT (INCHES) FOR A PEAK AMBIENT TEMPERATURE OTHER THAN 60°F (SEE CHART).

4. PLACE THE BACKWALL CONCRETE DURING STABLE OR RISING AMBIENT TEMPERATURES. CONCLUDE PLACEMENT AT OR IMMEDIATELY BEFORE THE DAY'S PEAK AMBIENT TEMPERATURE.
5. HAND PLACE AND VIBRATE CONCRETE UNDER JOINT ARMOR TO ACHIEVE COMPLETE CONSOLIDATION.
6. LOOSEN ANY TEMPORARY JOINT ARMOR SUPPORTS AFTER INITIAL SET OF THE CONCRETE, PREFERABLY NOT LATER THAN TWO HOURS AFTER CONCLUSION OF THE CONCRETE PLACEMENT.
7. FOR STRUCTURES WITH A NONCOMPOSITE ASPHALT WEARING SURFACE, PLACE THE CONCRETE IN THE BOX BEAM NOTCH PER STEP 5 AFTER THE BACKWALL CONCRETE HAS BEEN PLACED. THE SURFACE TEXTURE SHALL BE PARALLEL WITH THE JOINT. CONCRETE SHALL BE CLASS "S" UNLESS OTHERWISE SPECIFIED IN THE PLANS.

NOTES TO DESIGNER:

DESIGN LIMITS: THIS DESIGN IS INTENDED FOR STRUCTURES WITH SKEW ANGLES NOT GREATER THAN 15°, ROADWAY GRADES OF 2% OR LESS AND D_M (SEE CHART ON THIS SHEET) NOT LARGER THAN 150 FEET.

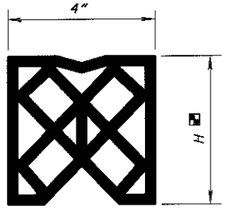
THE DESIGNER SHALL SUPPLY DETAILS FOR STRUCTURES WITH ROADWAY GRADES GREATER THAN 2%.

ANCHOR BAR HOLES IN ABUTMENT SEATS SHALL BE 2" ϕ UNLESS OTHERWISE SHOWN ON PROJECT PLANS.

COMPRESSION SEALS AT FIXED BEARINGS SHALL BE AS SHOWN WHERE DIMENSION "A" = $2\frac{1}{4}$" AT ANY AMBIENT TEMPERATURE.

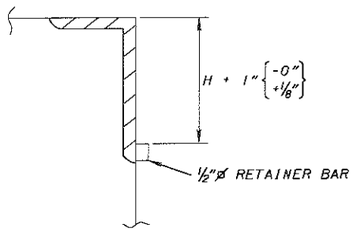
PRESTRESSED CONCRETE BOX BEAMS SHALL BE MODIFIED AS FOLLOWS FOR COMPRESSION SEAL INSTALLATION:

1. STIRRUP REINFORCING STEEL IN NOTCHED AREAS AT ENDS OF COMPOSITE BEAMS SHALL NOT PROJECT ABOVE THE TOP OF CONCRETE.
2. ENDS OF FASCIA BEAMS SHALL BE NOTCHED FULL WIDTH OF BEAMS.
3. 12 INCH DEEP BEAMS REQUIRE A SPECIAL DESIGN.
4. HOLES FOR ANCHOR BARS SHALL BE $2\frac{1}{2}$" DIAMETER.
5. BEAM ENDS FOR STRUCTURES ON GRADES OVER 2% SHALL BE MADE VERTICAL.

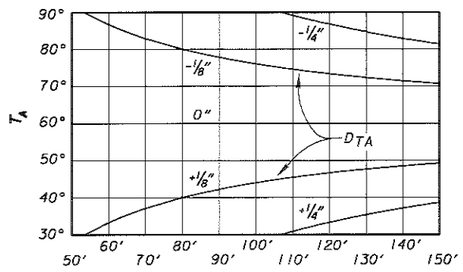


COMPRESSION SEAL DETAIL

■ SEE THE MANUFACTURER'S CATALOGUE FOR THE SEAL ACTUALLY CHOSEN FOR USE.



LOCATION OF SEAL RETAINER BARS



$D_M = D_A \cos \Theta$

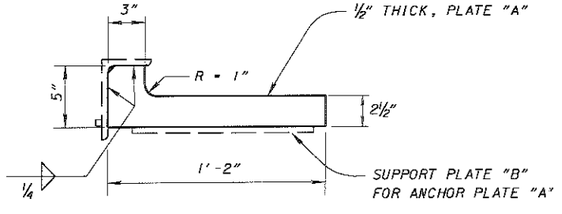
T_A - ANTICIPATED PEAK AMBIENT TEMPERATURE (°F).

D_A - ACTUAL DISTANCE, IN FEET, TO THE THERMAL NEUTRAL EXPANSION POINT OF THE SUPERSTRUCTURE ALONG THE CENERLINE OF THE ROADWAY. THE THERMAL NEUTRAL POINT OF THE SUPERSTRUCTURE IS THE POINT THAT HAS ZERO HORIZONTAL MOVEMENT DURING TEMPERATURE CHANGES.

D_M - MODIFIED DISTANCE FOR DETERMINING JOINT ADJUSTMENT (FEET).

Θ - SKEW ANGLE OF EXPANSION JOINT.

DIMENSION "A" ADJUSTMENT D_{TA}



ARMOR ANCHOR PLATE "A"

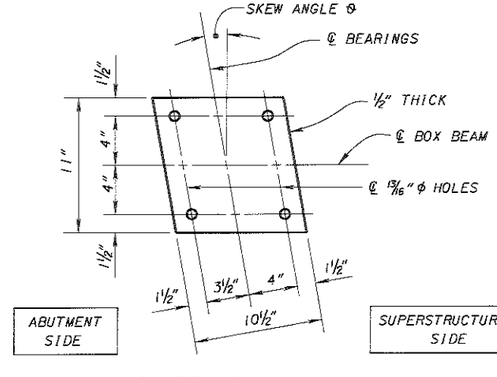


PLATE "B" PLAN

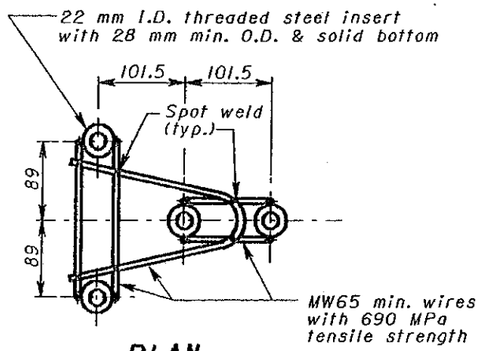
DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES
11-15-82
DATE

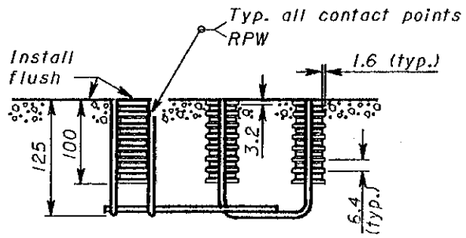
STANDARD
COMPRESSION SEAL EXPANSION JOINTS AT ABUTMENTS FOR PRESTRESSED BOX BEAM STRUCTURES

REVISIONS	DESIGNED	CHECKED	REVIEWED
8-1-84	RLD/AJM	JS/MPB	WTL/RLD
2-14-97	DRAWN		
04-20-01	AJM		EXJ-3-82

4 / 4



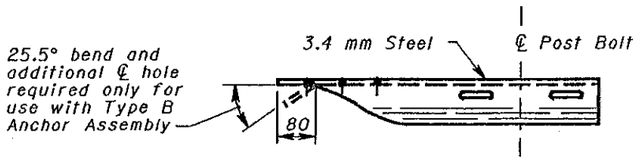
PLAN



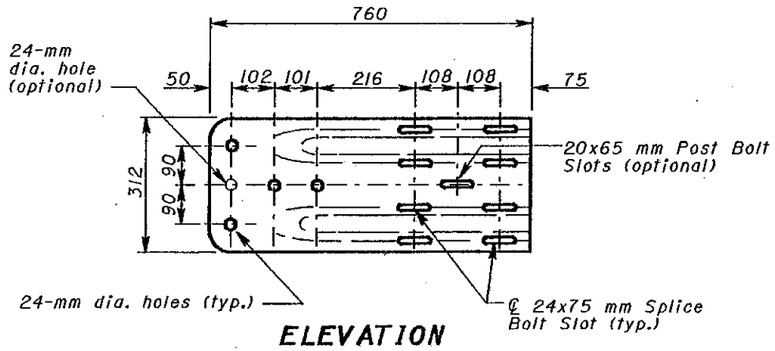
Four 22-mm bolts required

ELEVATION

CONCRETE INSERT ANCHOR ASSEMBLY (W-BEAM ONLY)

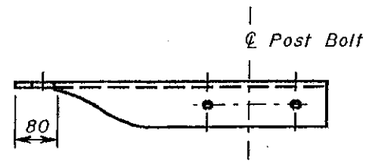


PLAN

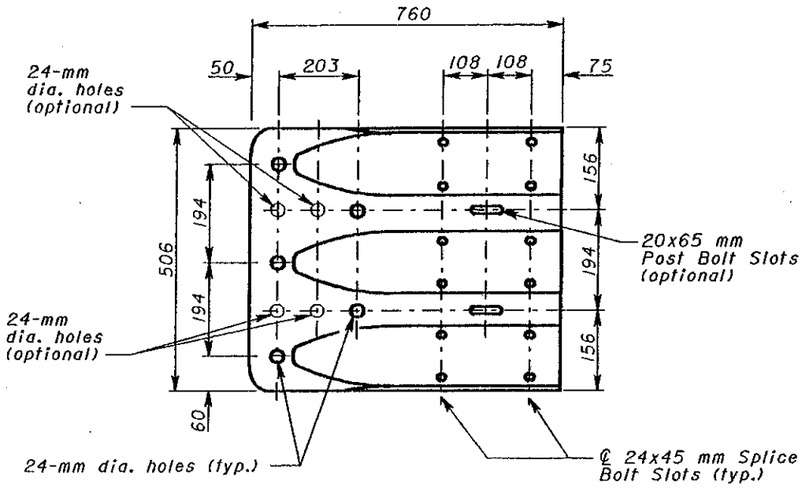


ELEVATION

W-BEAM TERMINAL CONNECTOR

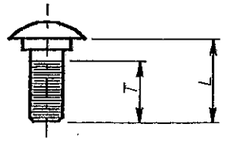


PLAN



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

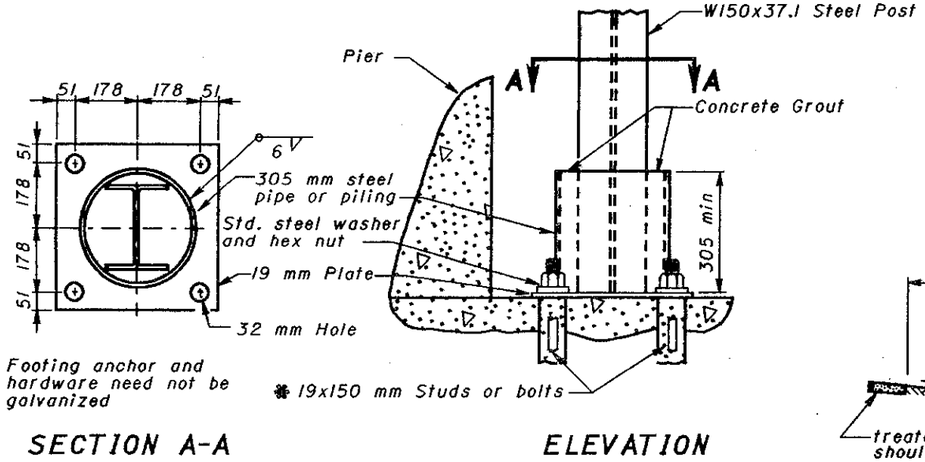
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL DETAILS

DATE
11-30-94
10-21-97

STANDARD CONSTRUCTION DRAWING GR-1.1M

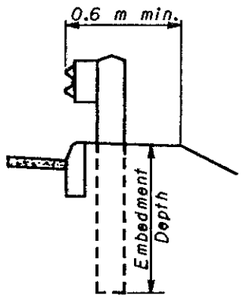
APPROVED Gary F. Sutherland



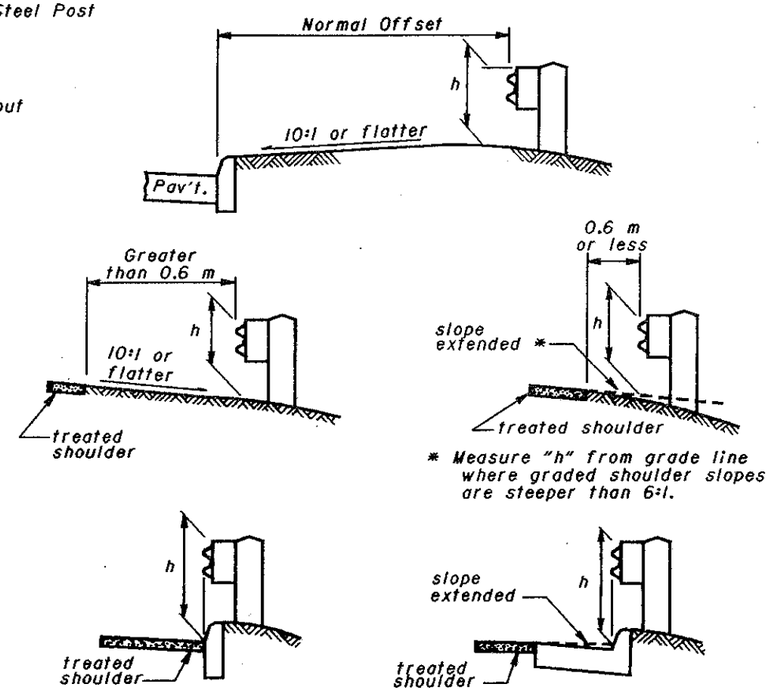
Footing anchor and hardware need not be galvanized

SECTION A-A ELEVATION

FOOTING ANCHOR



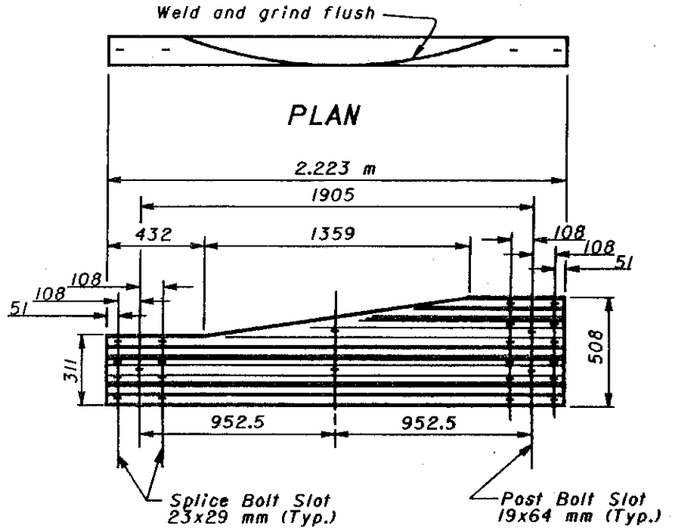
DETAIL A



* Measure "h" from grade line where graded shoulder slopes are steeper than 6:1.

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.

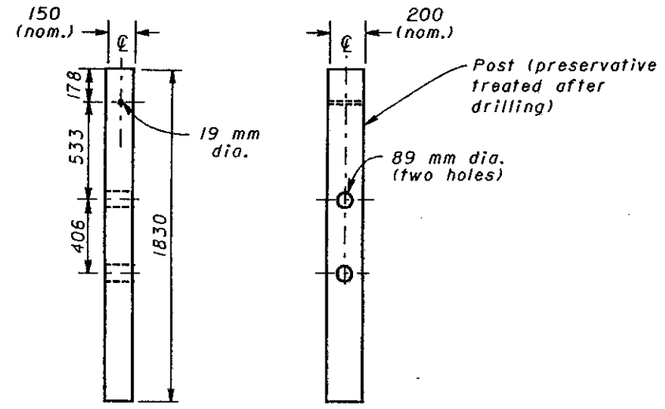
OFFICE OF ROADWAY ENGINEERING
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL DETAILS

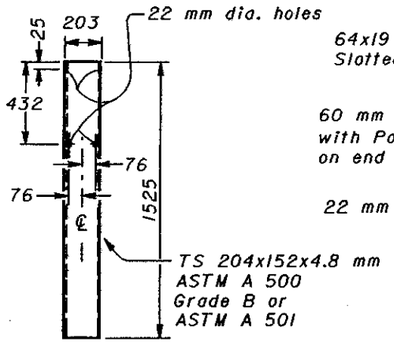
DATE 1-3-96

STANDARD CONSTRUCTION DRAWING **GR-1.2M**

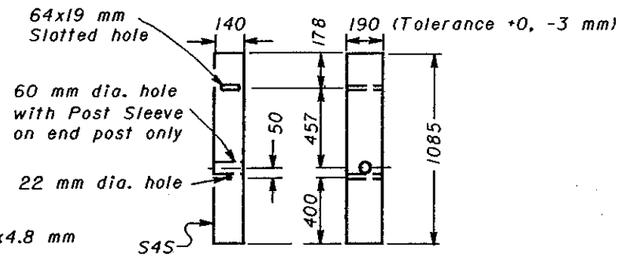
APPROVED D.K. Huelman, P.E.
ADMINISTRATOR



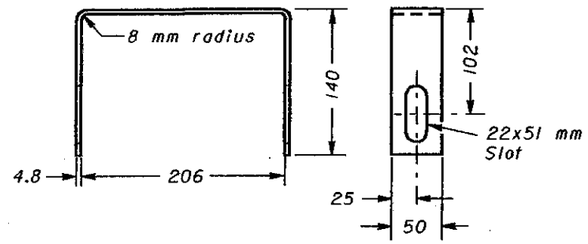
TYPE 1 BREAKAWAY POST



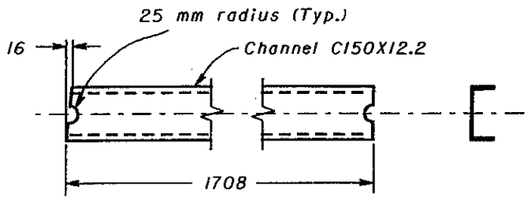
STEEL TUBE



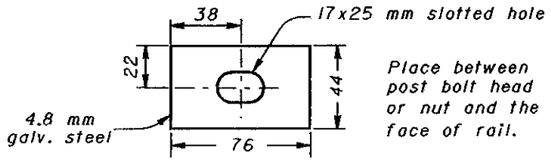
TYPE 2 BREAKAWAY POST



YOKE DETAILS

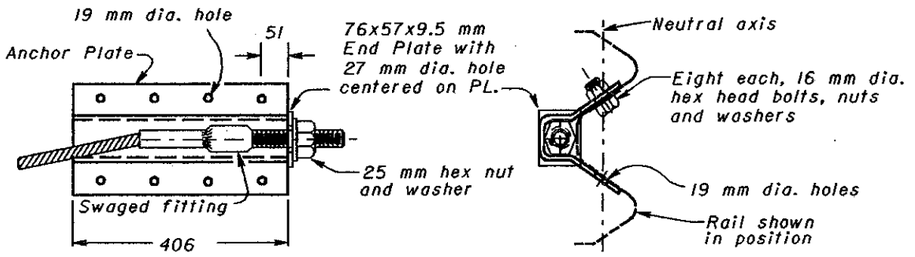


STRUT DETAILS

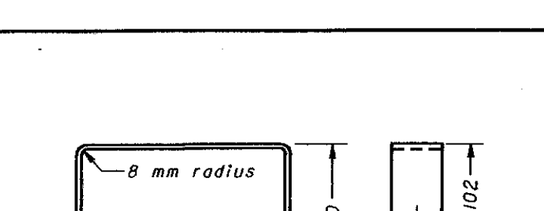


RECTANGULAR WASHER

(Not to be used in typical Type 4, 5 or 5A guardrail installations. Use only where specified.)



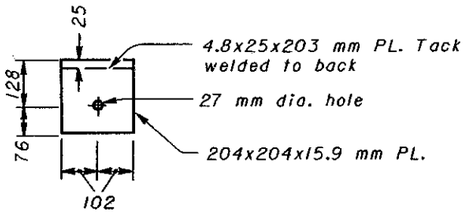
ANCHOR PLATE ASSEMBLY DETAILS



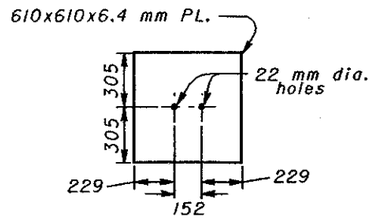
STRUT AND YOKE ASSEMBLY

All dimensions are in millimeters unless otherwise noted.

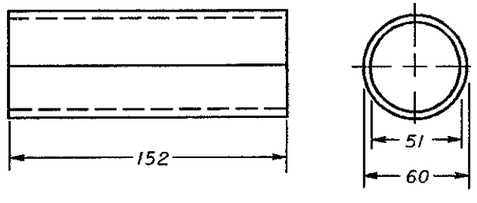
metric units



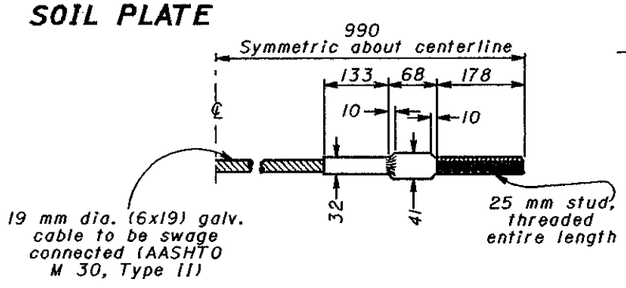
BEARING PLATE



SOIL PLATE

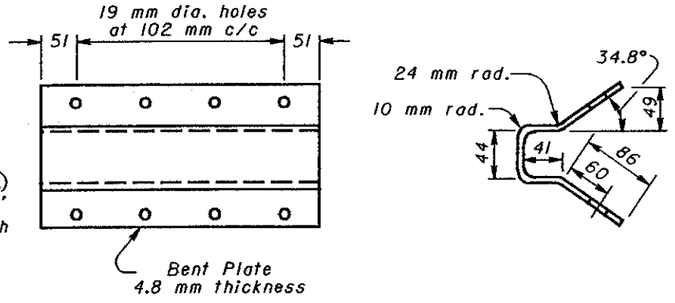


POST SLEEVE



STANDARD SWAGED FITTING AND STUD

CABLE ASSEMBLY



ANCHOR PLATE

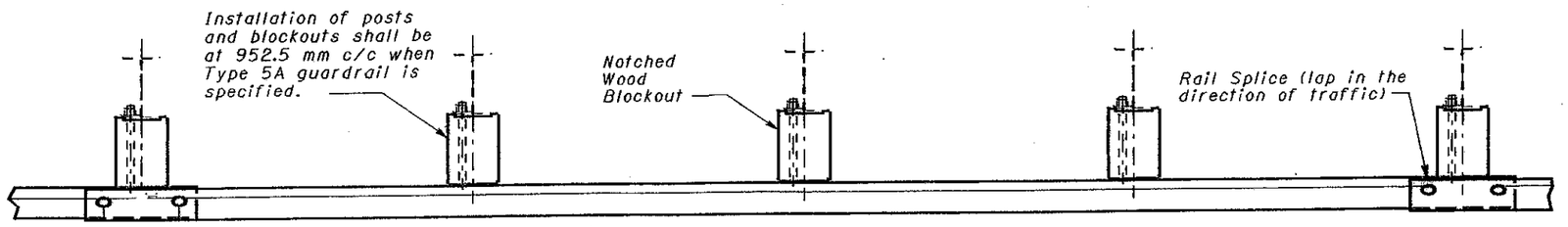
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL DETAILS

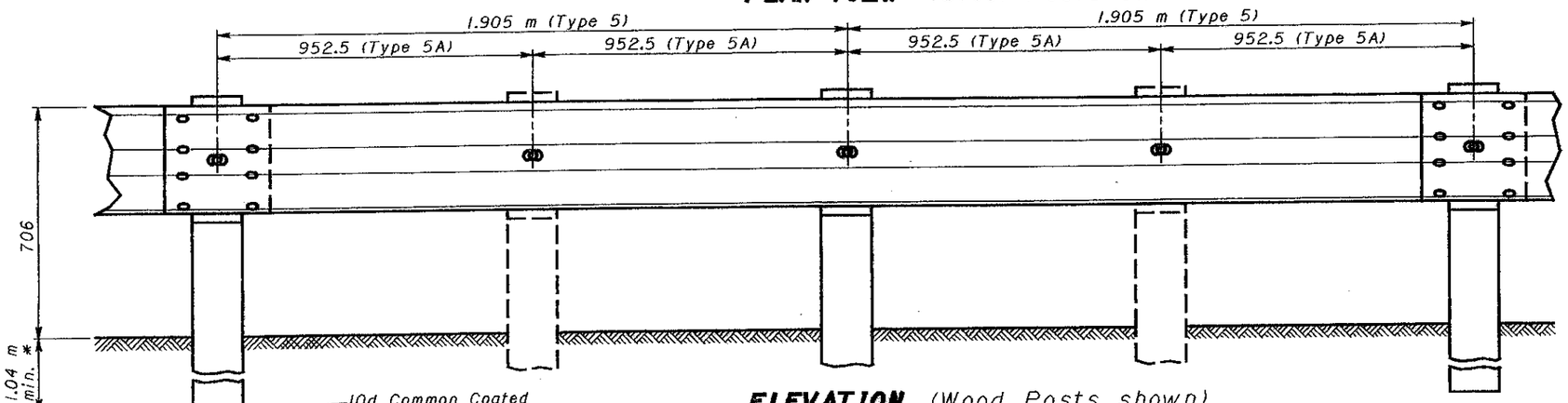
DATE 11-30-94

STANDARD CONSTRUCTION DRAWING **GR-1.3M**

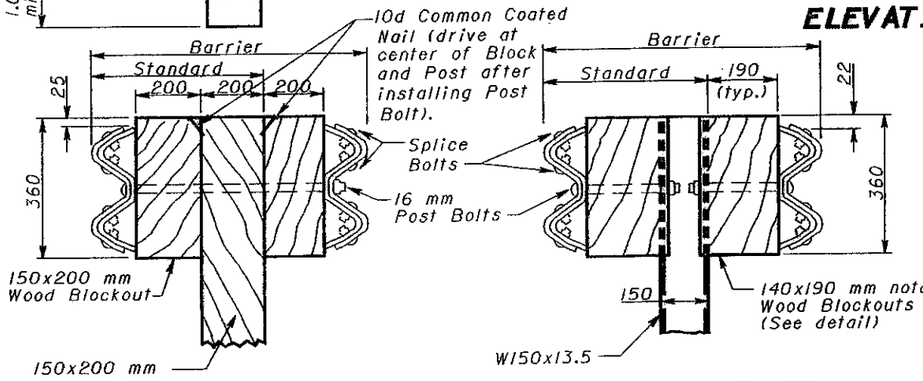
APPROVED R. K. Huhman
ENGR., L & D



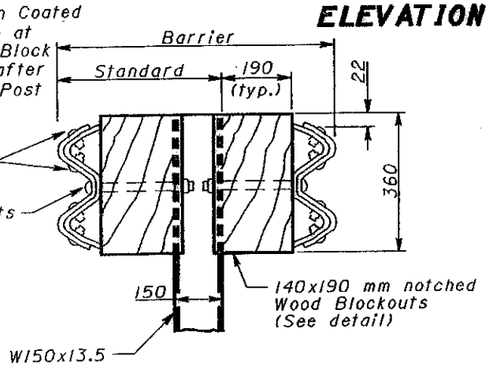
PLAN VIEW (Steel Posts shown)



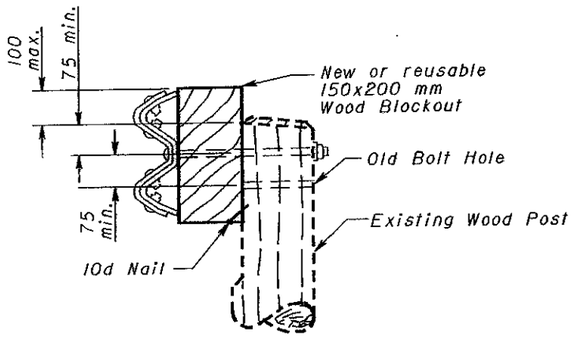
ELEVATION (Wood Posts shown)



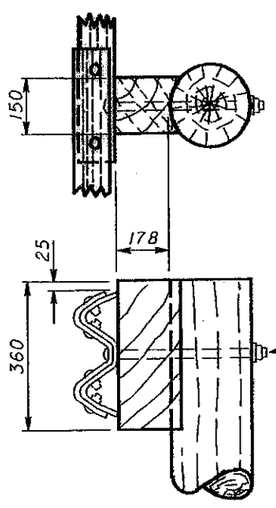
SQUARE WOOD POST



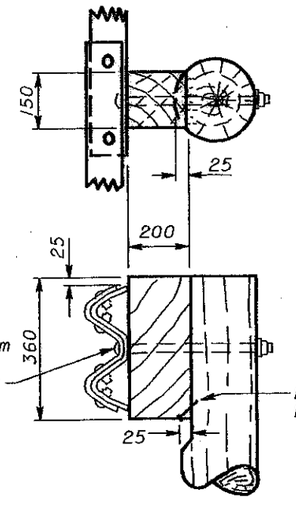
STEEL POST



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.

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.

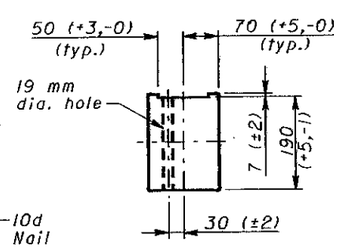
Sec. 12 Beams that have imperfections repaired by welding shall not be accepted for use in Item 606.

Sec. 13 Random samples shall be tested by the Department from materials delivered to the project site or other locations designated by the Laboratory.

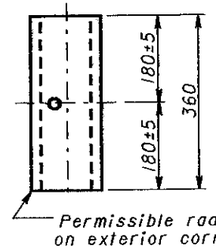
* ***POST EMBEDMENT DEPTH:*** *For specific depth requirements, see SCD GR-1.2M.*

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

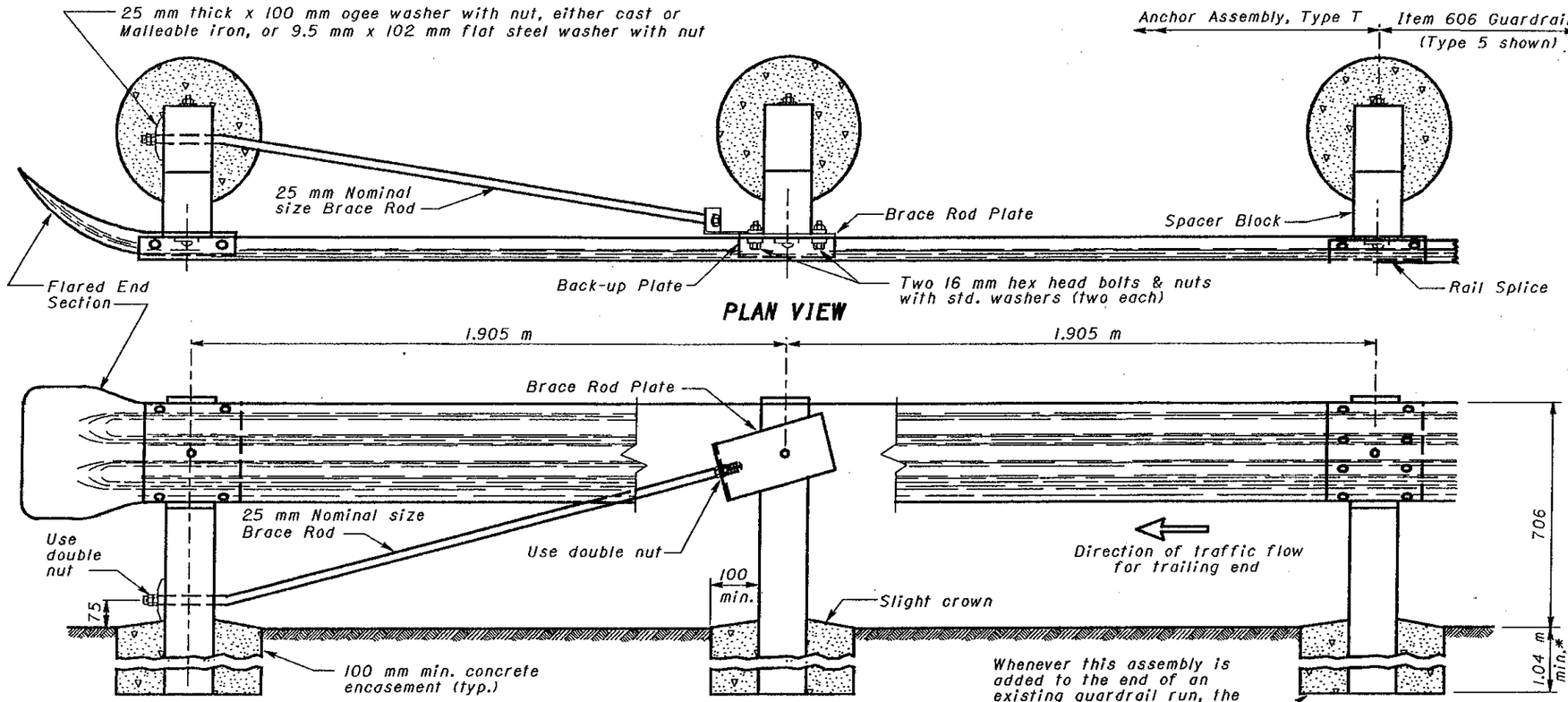
GUARDRAIL TYPE 5 & 5A

DATE
11-30-94
10-21-97
4-14-98

STANDARD CONSTRUCTION DRAWING **GR-2.1M**

APPROVED Larry F. Sutherland

metric units



NOTES

FOR DETAILS NOT SHOWN: See SCD's GR-1.1M, GR-1.2M and other Drawings pertaining to design of specific guardrail types.

WASHERS: All washers indicated are standard galvanized steel of the appropriate size.

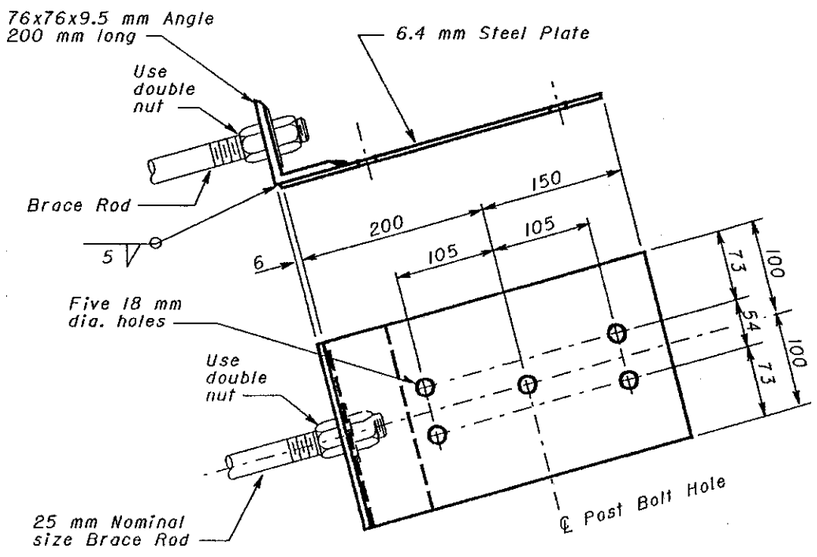
POSTS: Posts shall be the same as used on the adjacent guardrail, with 100 mm minimim concrete encasement.

SPACER BLOCKS: Blocks may be notched in the field, in a manner satisfactory to the Engineer, to accommodate the installation of the brace rod plate 16 mm attachment bolts.

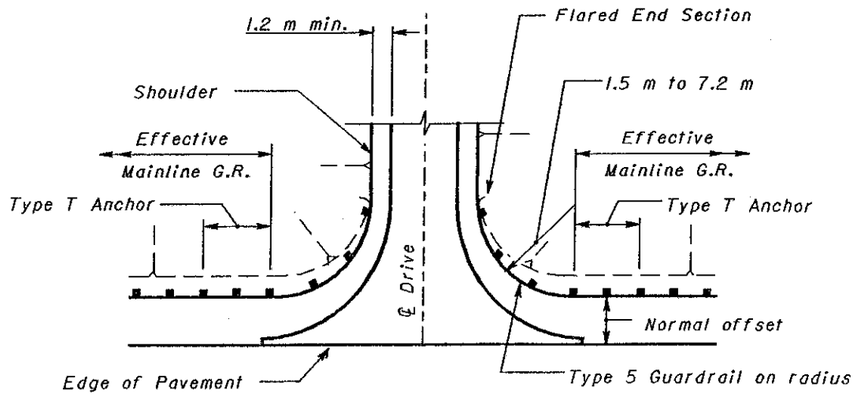
BRACE ROD ASSEMBLY: Rods shall be galvanized and develop a tensile strength of at least 178 kN.

* **FOR SPECIFIC POST EMBEDMENT:** See SCD GR-1.2M for depth requirements.

TYPE T



BRACE ROD PLATE

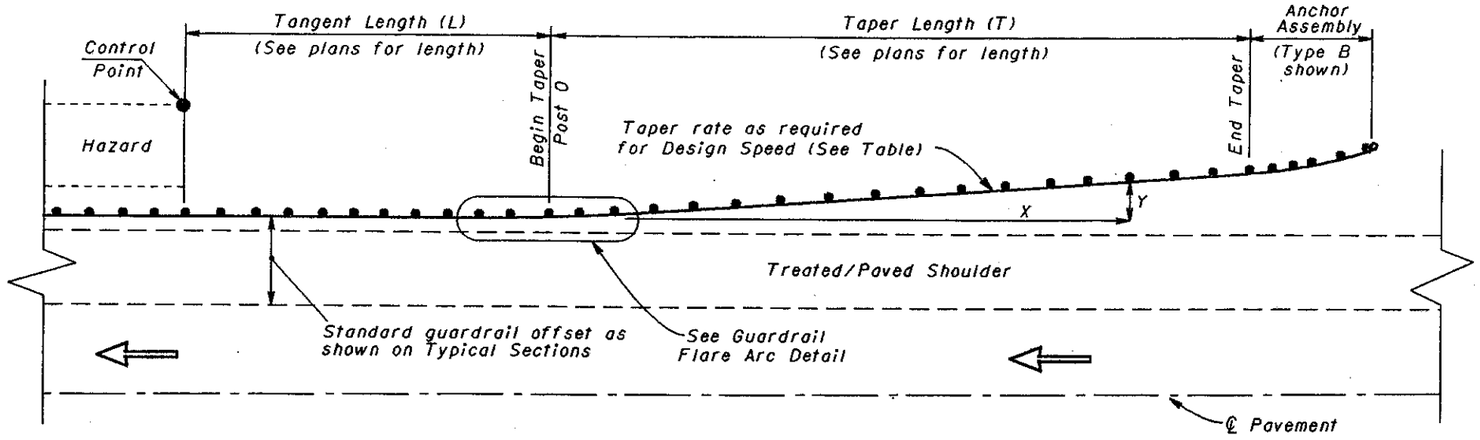


DRIVEWAY OPENING

All dimensions are in millimeters unless otherwise noted.

metric units

OHIO DEPARTMENT OF TRANSPORTATION	
TYPE T ANCHOR ASSEMBLY	DATE 4-21-95 10-21-97
STANDARD CONSTRUCTION DRAWING GR-4.2M	
APPROVED Larry T. Sutherland	



STANDARD GUARDRAIL FLARE

(Plan View)

NOTES

STANDARD GUARDRAIL FLARE: The flare shown herein shall be constructed when indicated in the construction plans and in conjunction with Std. Constr. Dwg. GR-5.2M. The Tangent Length and Taper Length used to construct each flare shall be as specified in the plans.

TAPER RATES AND OFFSET SPEEDS: Speeds used to determine taper rates and offsets shall be the design speed indicated in the plan. Where a design speed is not shown or available, the legal posted speed limit shall be used.
For design speeds below 70 km/h, the tapered guardrail offsets shown for 70 km/h may be used.

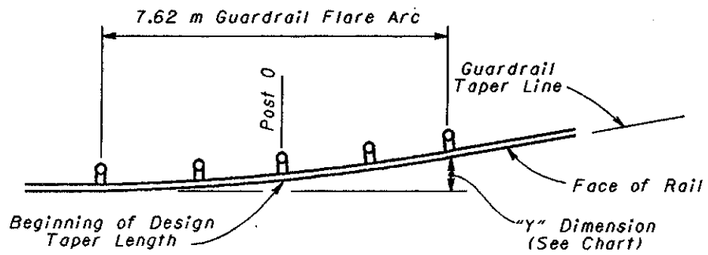
ANCHOR ASSEMBLY: A Type B Anchor Assembly shall be used with standard guardrail flares unless otherwise specified.

CONTROL POINT: The point shown designates the extent of the hazard being protected and is shown for design use only.

TAPERED GUARDRAIL OFFSETS (in meters)

		70 km/h 10:1 Taper		80 km/h 11:1 Taper		90 km/h 12:1 Taper		100 km/h 13:1 Taper		110 km/h 14:1 Taper		120 km/h 15:1 Taper	
	Post	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
	0	0	0.09	0	0.09	0	0.08	0	0.07	0	0.07	0	0.06
	2	3.79	0.38	3.79	0.35	3.80	0.32	3.80	0.29	3.80	0.27	3.80	0.25
7.62 m Taper Length	4	7.58	0.76	7.59	0.69	7.59	0.64	7.60	0.59	7.60	0.54	7.60	0.51
	6	11.37	1.14	11.38	1.04	11.39	0.95	11.40	0.88	11.40	0.82	11.40	0.76
15.24 m Taper Length	8	15.16	1.52	15.18	1.39	15.19	1.27	15.19	1.17	15.20	1.09	15.21	1.02
	10	18.95	1.91	18.97	1.73	18.98	1.59	18.99	1.47	19.00	1.36	19.01	1.27
22.86 m Taper Length	12	22.75	2.29	22.77	2.08	22.78	1.91	22.79	1.76	22.80	1.63	22.81	1.52
	14	26.54	2.67	26.56	2.42	26.58	2.22	26.59	2.05	26.60	1.91	26.61	1.78
30.48 m Taper Length	16	30.33	3.05	30.35	2.77	30.37	2.54	30.39	2.34	30.40	2.18	30.41	2.03
	18	34.12	3.43	34.15	3.12	34.17	2.86	34.19	2.64	34.20	2.45	34.21	2.29
38.10 m Taper Length	20	37.91	3.81	37.94	3.46	37.97	3.18	37.99	2.93	38.00	2.72	38.02	2.54
	22	41.70	4.19	41.74	3.81	41.76	3.49	41.79	3.22	41.80	2.99	41.82	2.79
45.72 m Taper Length	24	45.49	4.57	45.53	4.16	45.56	3.81	45.58	3.52	45.60	3.27	45.62	3.05
	26	49.28	4.95	49.32	4.50	49.36	4.13	49.38	3.81	49.40	3.54	49.42	3.30
53.34 m Taper Length	28	53.07	5.33	53.12	4.85	53.15	4.45	53.18	4.10	53.20	3.81	53.22	3.56
	30	56.86	5.72	56.91	5.20	56.95	4.76	56.98	4.40	57.00	4.08	57.02	3.81
60.96 m Taper Length	32	60.65	6.10	60.71	5.54	60.75	5.08	60.78	4.69	60.80	4.35	60.82	4.06

All "X" dimensions shown are from the centerline of Post 0 to the centerline of the indicated post along the the standard guardrail offset line extended.
All "Y" dimensions shown are from the standard guardrail offset line extended to the face of rail at the post indicated.



GUARDRAIL FLARE ARC DETAIL

metric units

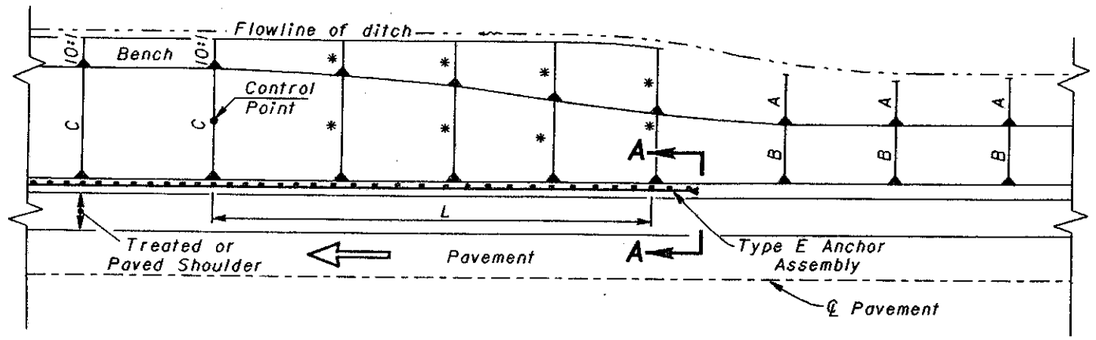
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL FLARE DETAILS

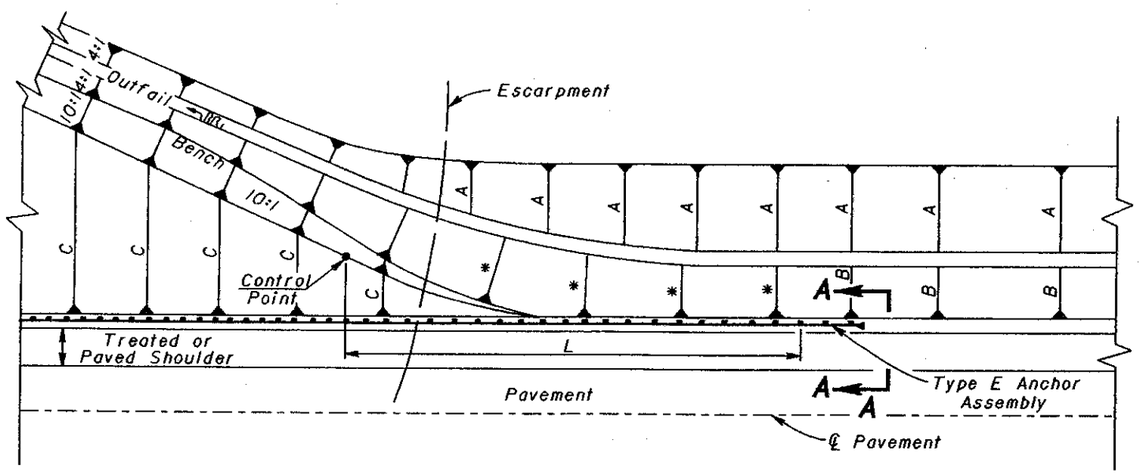
DATE 4-21-95

STANDARD CONSTRUCTION DRAWING **GR-5.1M**

APPROVED B.K. Hubman
ENGR., L & D



FILL TO FILL



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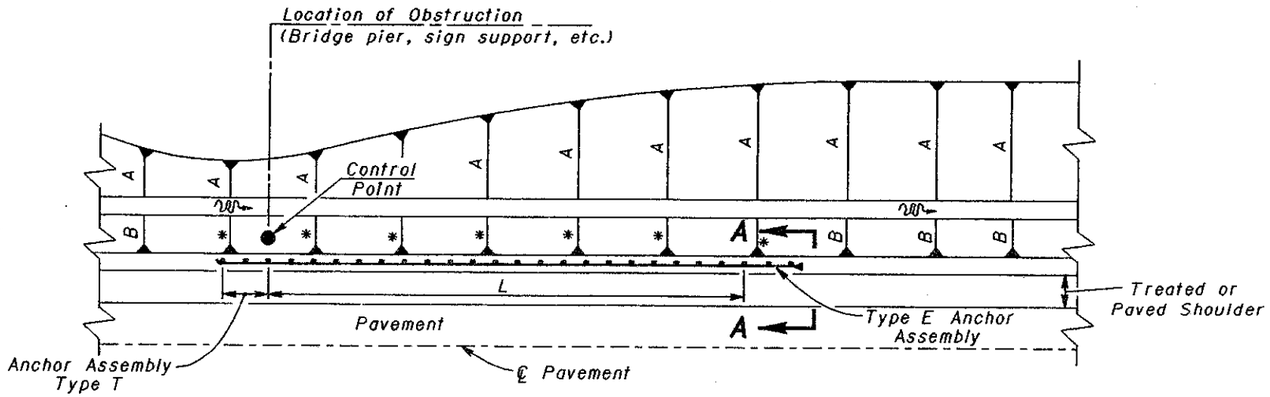


OBSTRUCTION

NOTES

APPLICATION: The application of details shown herein shall only be utilized where approach foreslopes are steeper than 6:1, but not steeper than 3:1.

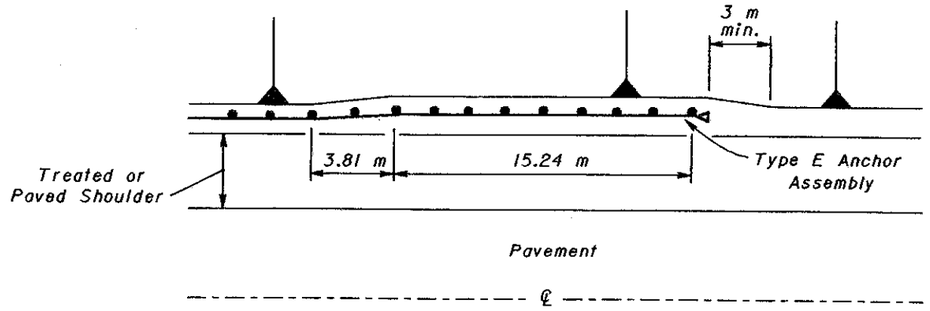
SLOPES: Slopes designated by * shall be 3:1 or flatter. Slopes labeled A, B or C shall be constructed as specified in the plans.

"L" DISTANCE: Dimensions shown as L shall be constructed as specified in the plans. Distance L is the length of guardrail extending beyond the control point parallel to the centerline. The control points shown designate the extent of the hazard being shielded and is shown for design use only.

GUARDRAIL END TERMINALS: Terminals utilized for the situations shown herein shall be Type E Anchor Assemblies unless otherwise specified in the plans.

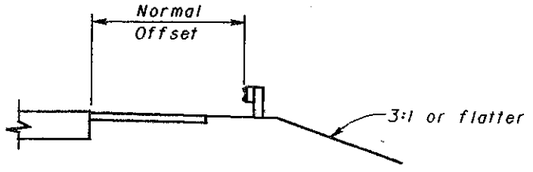
OBSTRUCTION INSTALLATION: The installation shown is applicable for one-directional roadways only.

OFFSET DESIGN: The design shown may be specified and/or constructed where it is deemed detrimental to lose effective shoulder width due to the dimensions of the Type E Anchor Assembly. The final 15.24 m of guardrail is to be offset an additional 230 mm from the normal guardail offset by tapering within the 3.81 m shown below. The graded shoulder width shall be increased 230 mm also and tapered back to the normal width in 3 m as shown.



OFFSET DESIGN
(Plan View)

metric units



SECTION A-A

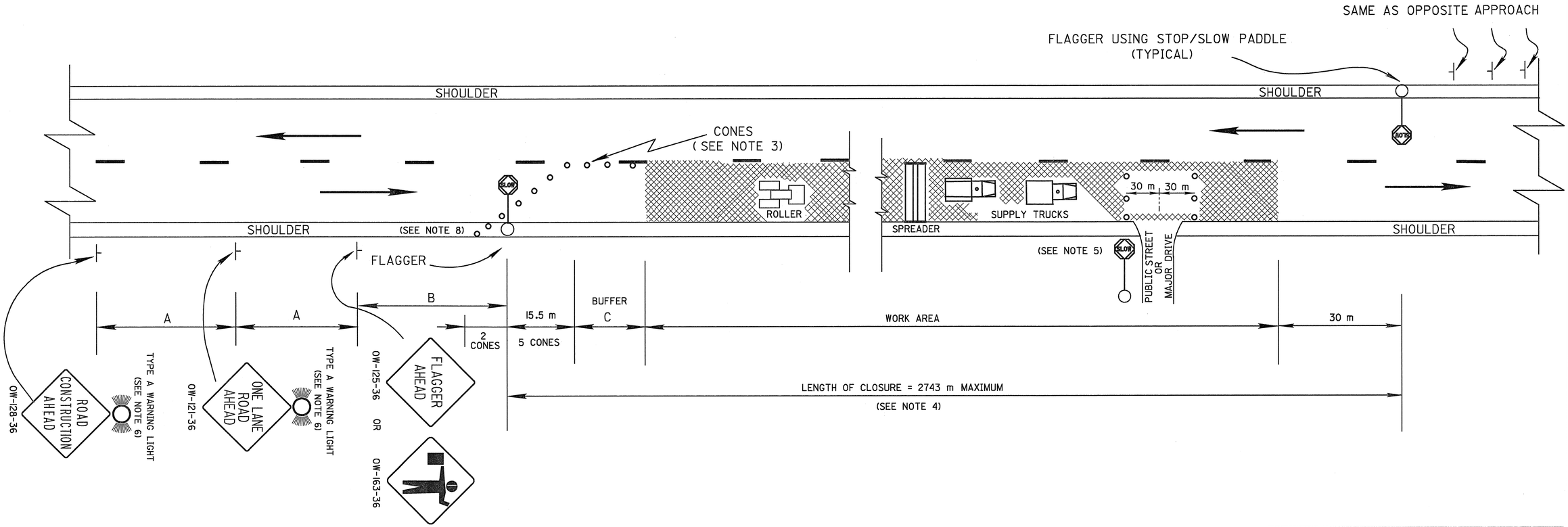
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

INTRODUCTION OF GUARDRAIL RUNS Foreslope steeper than 6:1

DATE 11-30-94

STANDARD CONSTRUCTION DRAWING **GR-5.3M**

APPROVED W. K. Hukman
ENGR., L & D



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. 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. CONES ON THE TAPERS SHALL BE SPACED AT 3 m CENTER TO CENTER. CONES IN THE BUFFER SHALL BE SPACED AT 12 m CENTER TO CENTER. CONES SHALL HAVE A MINIMUM HEIGHT OF 0.7 m AND SHALL BE SAFELY STABILIZED TO PREVENT THEM FROM BLOWING OVER. CLOSURES AT NIGHT SHALL USE DRUMS RATHER THAN CONES.

4. IT IS REQUIRED THAT THE LENGTH OF CLOSURE BE KEPT TO A MINIMUM AT ALL TIMES, AS DIRECTED BY THE ENGINEER.

   WHEN THE AMBIENT TEMPERATURE EXCEEDS 27° C, THE ENGINEER MAY INCREASE THE MAXIMUM ALLOWABLE LENGTH OF CLOSURE TO ALLOW FOR SUFFICIENT COOLING OF NEW PAVEMENT.

   THE ENGINEER MAY SHORTEN THE MAXIMUM ALLOWABLE LENGTH OF CLOSURE TO RELIEVE EXCESSIVE TRAFFIC BACKUPS OR TO IMPROVE TRAFFIC OPERATION.

4. CONT. ALL TRAFFIC CONTROL SIGNS, CONES (OR DRUMS), AND THE FLAGGER SHALL BE MOVED FORWARD AS A GROUP BEFORE THE CLOSURE REACHES THE MAXIMUM ALLOWABLE LENGTH. ONLY ONE SIDE OF THE ROAD SHALL BE CLOSED AT ANY TIME.

5. 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. AS A MINIMUM, THE CONTRACTOR SHALL:

   A) PROVIDE AN ADDITIONAL FLAGGER AT EVERY PUBLIC STREET INTERSECTION AND MAJOR DRIVEWAY OR -

   B) PLACE A ROW OF 3 CONES ACROSS THE CLOSED LANE APPROXIMATELY 30 m ON EACH SIDE OF THE INTERSECTION OR DRIVEWAY.

   ROWS OF CONES MAY BE MOVED OFF THE ROAD TO ALLOW PASSAGE OF ROLLERS, PAVING SPREADER OR SUPPLY TRUCKS BUT SHALL BE MOVED BACK ONTO THE ROAD WHEN THE ACTIVITY HAS PASSED.

6. THE TYPE A FLASHING WARNING LIGHTS ARE REQUIRED ON THE OW-128 AND THE OW-121 SIGNS 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.

8. TWO (2) CONES REQUIRED ON PAVED SHOULDER.

MINIMUM DISTANCE (METERS)	A MINIMUM	B RANGE	C MINIMUM
URBAN	61	61 TO 107	30
RURAL	152	152 TO 305	61

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

FLAGGER CLOSING
I LANE OF A 2 LANE HIGHWAY
FOR PAVING OPERATIONS

DATE 01/30/95

STANDARD CONSTRUCTION DRAWING MT-97.11M

APPROVED Gary J. Craig 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

DATE 01/30/95

WORK ZONE PAVEMENT MARKINGS AND SIGNS

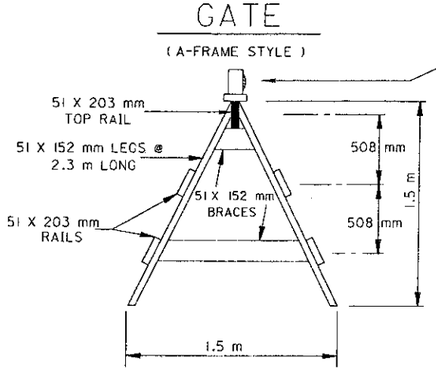
STANDARD CONSTRUCTION DRAWING MT-99.10M

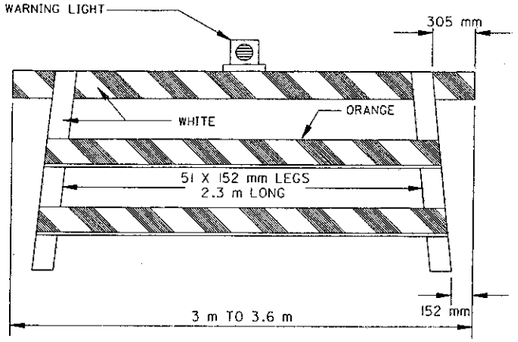
APPROVED _____ ENGR. OF DESIGN SERVICES

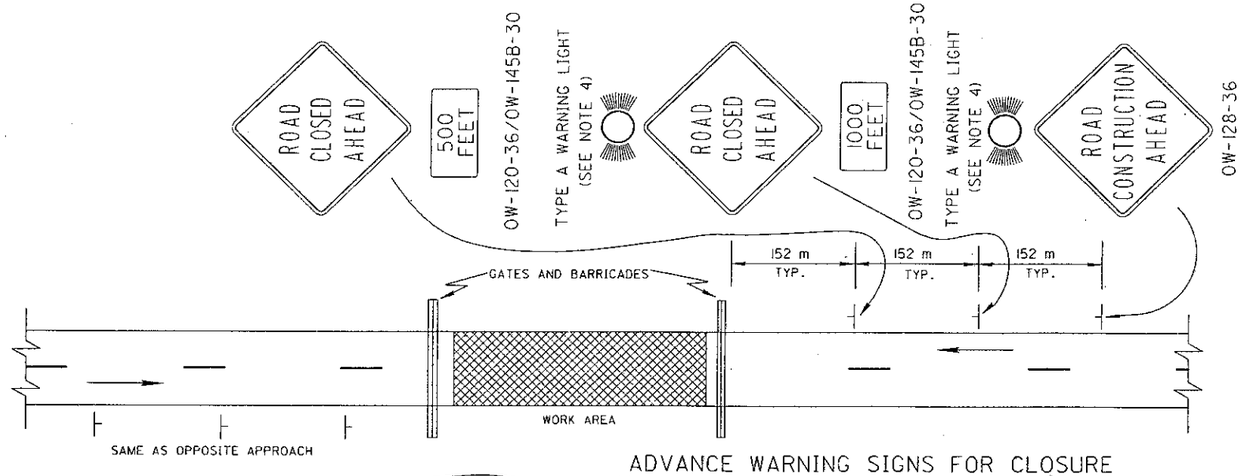
WCC

GATE

(A-FRAME STYLE)

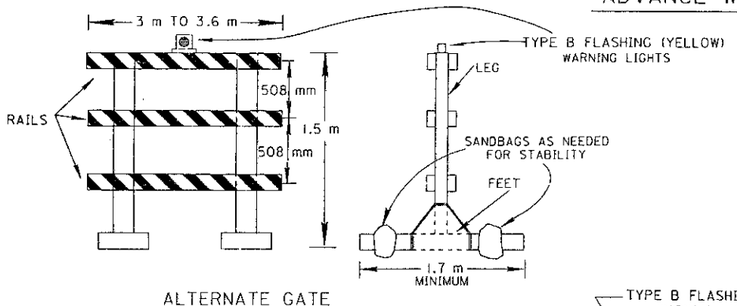




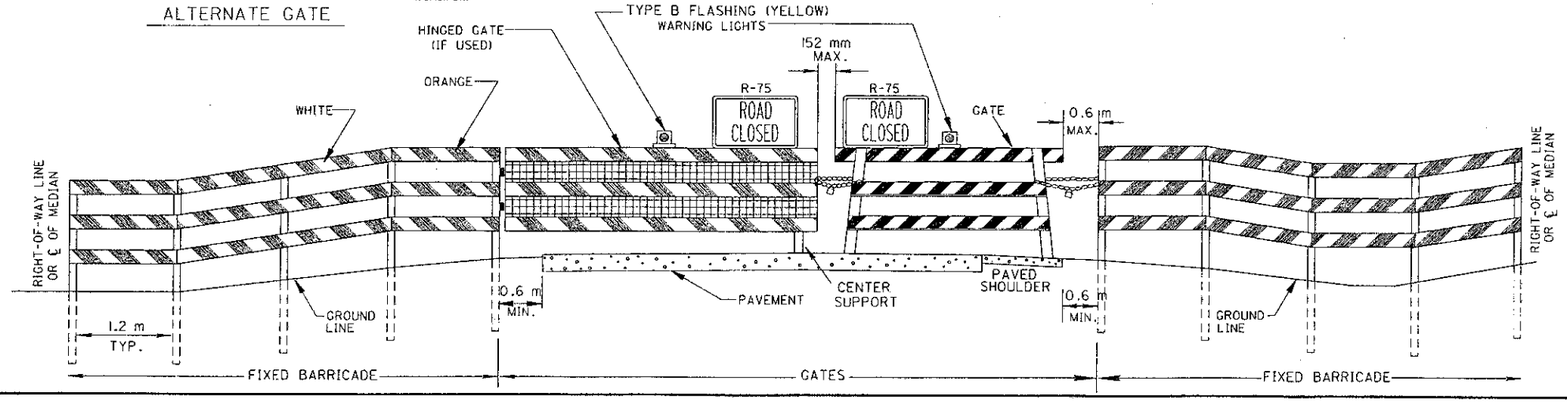


ADVANCE WARNING SIGNS FOR CLOSURE

(SEE NOTE 6)



ALTERNATE GATE



GENERAL NOTES

1. BARRICADES: BARRICADES SHALL BE CONSTRUCTED ACCORDING TO DETAILS SHOWN. WHEN THE ROAD IS CLOSED TO TRAFFIC, BARRICADES AND GATES SHALL BE USED TO EFFECTIVELY CLOSE THE ENTIRE ROADWAY INCLUDING THE MEDIAN OF DIVIDED HIGHWAYS. IN URBAN AREAS AND AT LOCATIONS WHERE IT IS IMPRACTICAL TO EXTEND THE BARRICADE TO THE RIGHT-OF-WAY LINE BECAUSE OF A SIDEWALK WHICH IS TO REMAIN OPEN OR OTHER OBSTRUCTION, THE ENDS OF THE BARRICADE SHALL BE LOCATED AS DIRECTED BY THE ENGINEER TO EFFECT THE DESIRED CLOSING OF THE HIGHWAY.

2. PAINTING AND REFLECTORIZATION: IN CONSTRUCTION OR MAINTENANCE AREAS ALL RAILS OF THE BARRICADES AND GATES SHALL BE REFLECTORIZED WITH ORANGE AND WHITE REFLECTORIZED TYPE G SHEETING IN 152 mm WIDE ALTERNATE STRIPES WHICH SLOPE DOWNWARD TOWARD THE CENTER LINE OF THE ROAD AT AN ANGLE OF 45°. THE TOP RAIL OF THE A-FRAME AND ALL THREE RAILS OF THE HINGED GATE SHALL BE STRIPED ON BOTH SIDES. ALL POST, BRACES, GATE LEGS, AND ANY UNSTRIPED RAILS SHALL BE PAINTED WHITE. (GATES AND BARRICADES USED IN PERMANENT OR SEMIPERMANENT APPLICATION SHALL DIFFER ONLY IN THAT THEY SHALL USE RED AND WHITE STRIPES).

3. GATES: ONE GATE SHALL BE ERECTED FOR EACH TRAFFIC LANE. GATES SHALL BE CHAINED AND PADLOCKED TO ONE ANOTHER AND TO ADJACENT POST OF THE BARRICADES. CHAINS SHALL BE 6.4 mm STOCK OR LARGER WITH WELDED LINKS. A HINGED GATE MAY BE USED AND SHALL BE SUPPORTED AT THE CENTER IN AN APPROVED MANNER.

4. TYPE A FLASHING WARNING LIGHTS:

TYPE A FLASHING WARNING LIGHTS ARE REQUIRED ON THE OW-128 AND THE FIRST OW-120 SIGNS.

5. TYPE B FLASHING WARNING LIGHTS:

EACH GATE SHALL BE EQUIPPED WITH A TYPE B FLASHING WARNING LIGHT, CONSPICUOUSLY VISIBLE AT ALL DISTANCES UP TO 305 m UNDER NORMAL ATMOSPHERIC CONDITIONS. THE LIGHT SHALL BE IN OPERATION AT ALL TIMES DURING THE PERIOD THE HIGHWAY IS CLOSED.

6. SIGNS: WHERE THE ROAD IS CLOSED TO TRAFFIC BY THE ERECTION OF GATES AND BARRICADES, R-75 SIGNS SIGNS SHALL BE MOUNTED ON THE GATES AS SHOWN. THE ADVANCE WARNING SIGNS SHOWN ON THIS DRAWING WILL NOT BE REQUIRED WHEN ALL TRAFFIC HAS BEEN DIRECTED FROM THE ROADWAY AT OR JUST IN ADVANCE OF THE GATES AND BARRICADES SUCH AS ON A LIMITED ACCESS HIGHWAY OR WHEN A TEMPORARY RUNAROUND SIMILAR TO FIGURE C-24 OF THE OHIO MANUAL IS USED. ADVANCE WARNING SIGNS SHALL BE REQUIRED IN ALL OTHER SITUATIONS AND WHEN REQUIRED IN THE PLANS. ADVANCE WARNING SIGNS ON AN APPROACH SHALL CONSIST OF TWO OW-120 SIGNS WITH DISTANCE PLAQUES PLACED ABOUT 152 m AND 305 m FROM THE CLOSURE AND A OW-128 PLACED ABOUT 457 m FROM CLOSURE, THE SIGNS SHALL BE PLACED ON BOTH SIDES OF THE ROAD (DUALLED) FOR 4-LANE DIVIDED HIGHWAYS OR WHEN REQUIRED BY THE PLANS.

7. OPERATION: ON A 2-LANE 2-WAY ROADWAY THE CONTRACTOR WILL NORMALLY OPEN ONLY THE LEFT HAND GATE AS NECESSARY TO ALLOW VEHICLES TO ENTER AND IMMEDIATELY CLOSE IT. BOTH GATES WILL NOT NORMALLY BE OPENED AT THE SAME TIME. THE CONTRACTOR SHALL ASSIGN AN EMPLOYEE TO ASSURE THAT GATES ARE CLOSED AND CHAINED SHUT AT THE END OF EACH WORKDAY.

8. MATERIALS: GATES OR BARRICADES SHALL BE FABRICATED OF THE FOLLOWING MATERIALS:

FIXED BARRICADE:

POST: - 102 X 102 mm SQUARE OR 127 mm DIA. (MAXIMUM) WOOD (MAY BE TREATED)
- NO. 3, DRIVE POST (712.20)
- UP TO 51 mm SQUARE, 14 GAUGE PUNCHED STEEL TUBING

RAILS: - 25 X 203 mm OR 51 X 203 mm COMMON LUMBER
- 203 X (16 TO 25 mm) THICK EXTERIOR PLYWOOD
- EXTRUDED PLASTIC OR FORMED SHEET METAL WITH A 203 mm WIDE SURFACE AND OF SUFFICIENT STIFFNESS TO RESIST TYPICAL WIND LOADS OF UP TO 1436 pascals, BUT HAVING A WEIGHT OF NOT MORE THAN 7.5 kg/m.

FASTENERS: - SPIKES (OF SUFFICIENT LENGTH TO CLINCH)
- SCREWS/BOLTS (8 mm MIN. DIA.) METAL GUSSETT PLATES AND FORMED OR WELDED METAL JOINTS OF SUFFICIENT SIZE AND QUANTITY TO RESIST THE WIND LOAD SPECIFIED ABOVE. ALL SLIPFIT CONNECTIONS SHALL ALSO BE BOLTED TO PREVENT UNAUTHORIZED DISASSEMBLY

GATES:

LEGS: - 51 X 152 mm COMMON LUMBER ("A FRAME" ONLY)
- 102 X 102 mm WOOD
- UP TO 51 mm SQUARE, 14 GAUGE PUNCHED STEEL TUBING
- NO. 3 DRIVE POST (712.20)

RAILS - 51 X 203 mm COMMON LUMBER

FASTENERS: (SAME AS BARRICADES ABOVE)

FEET: - 152 X 152 mm WOOD
- NO. 3 DRIVE POST (712.20)
- UP TO 57 mm SQUARE, 12 GAUGE PUNCHED STEEL TUBING

BRACES: - 51 X 152 mm (MAXIMUM) COMMON LUMBER
- 102 mm WIDE X 19 mm THICK PLYWOOD STRIPS
- NO. 2 DRIVE POST (712.20)

HINGED GATE:

GATE: - 3.6 m X 1.2 m STEEL FRAME, FARM GATE

RAILS: (SAME AS FIXED BARRICADES ABOVE)

HARDWARE: - HINGED SCREWHOOKS FOR HANGING GATE TO POST

9. LUMBER: LUMBER USED IN THE CONSTRUCTION OF GATES AND BARRICADES SHALL BE COMMON YELLOW PINE OR COMMON DOUGLAS FIR, SURFACED ON FOUR SIDES STANDARD, ALL SIZES ARE NOMINAL.

METRIC

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

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

DATE 04/25/94

GATES AND BARRICADES IN POSITION

STANDARD CONSTRUCTION DRAWING MT-101.60M

APPROVED Jay Grey 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

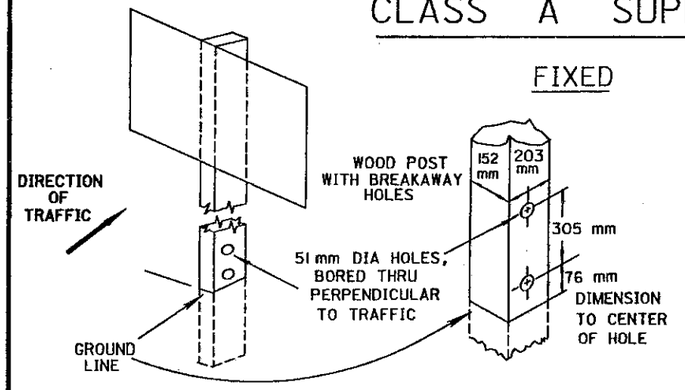
BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

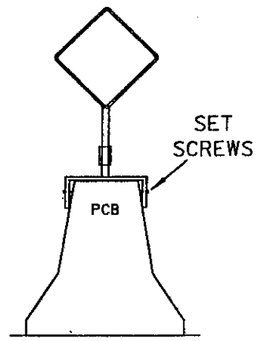
MAINTENANCE OF TRAFFIC	DATE
TEMPORARY SIGN SUPPORT	04/25/94
STANDARD CONSTRUCTION DRAWING MT-105.10M	
APPROVED Jay Bragg ENGR. OF DESIGN SERVICES	

WCC

CLASS A SUPPORTS

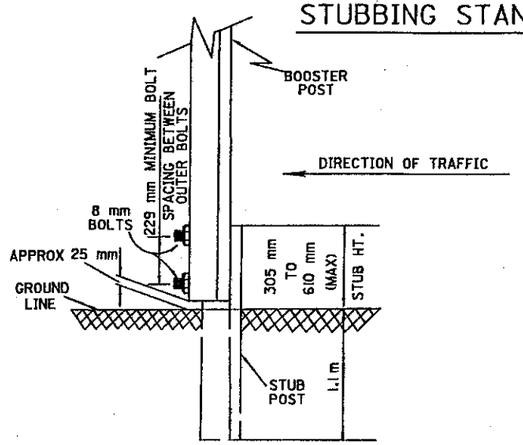
FIXED





CLASS A SUPPORTS

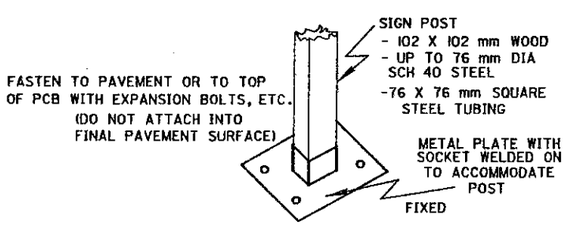
STUBBING STANDARD

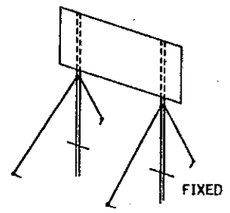


NOTES

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

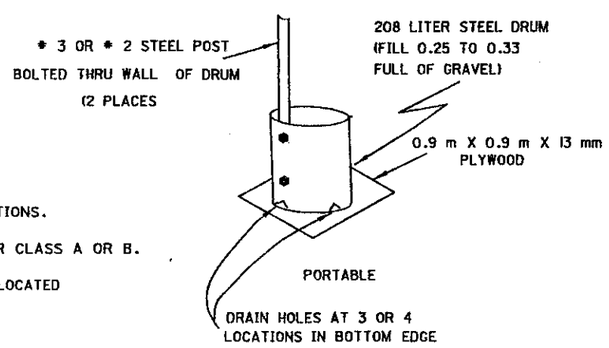
CLASS B SUPPORTS





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

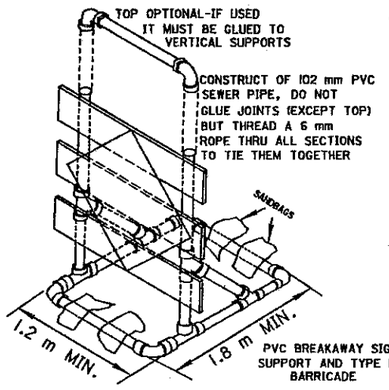
CLASS C SUPPORTS

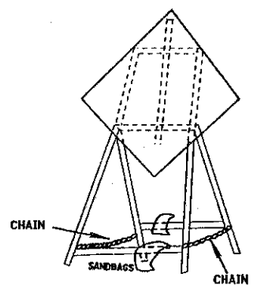


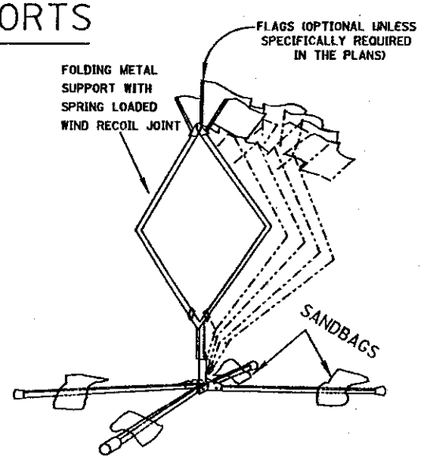
1. ALL BEAM TYPE SUPPORTS WITHOUT BREAKAWAY CONNECTIONS.
2. SUPPORTS SIMILAR TO BUT LARGER THAN PERMITTED FOR CLASS A OR B.
3. THE STEEL DRUM(S) SHOWN BELOW MAY BE USED ONLY WHEN LOCATED BEHIND GUARDRAIL OR BARRIER.

CLASS A SUPPORTS

PORTABLE







NOTES

RAIL MATERIALS:

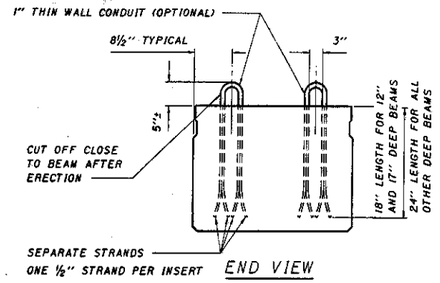
25 X 203 mm OR 51 X 203 mm COMMON LUMBER
203 mm X (16 mm TO 25 mm) THICK EXTERIOR PLYWOOD
EXTRUDED PLASTIC OR FORMED SHEET METAL WITH A 203 mm WIDE SURFACE AND OF SUFFICENT STIFFNESS TO RESIST TYPICAL WIND LOADS OF UP TO 147 kg/m², BUT HAVING A WEIGHT OF NOT MORE THAN 7.5 kg/m.

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

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

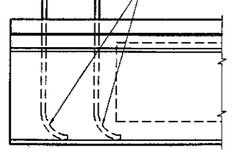
MAINTENANCE OF TRAFFIC	DATE 04/25/94
TEMPORARY SIGN SUPPORT	
STANDARD CONSTRUCTION DRAWING MT-105.11M	
APPROVED Daryl Cuyo ENGR. OF DESIGN SERVICES	



END VIEW

NOTE: ALL LIFTING INSERTS MUST BE UNIFORMLY ENGAGED DURING HANDLING.

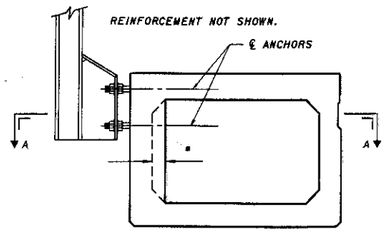
FOR SHALLOW BEAMS BEND LOWER ENDS OF INSERTS TOWARD MIDSPAN TO MAINTAIN MINIMUM COVER OF 1¾"



ELEVATION

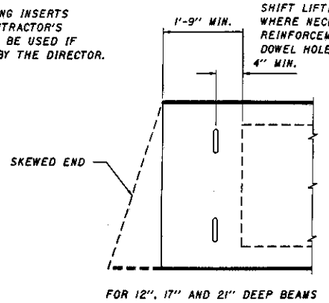
FOR ADDITIONAL RAILING DETAILS.

REINFORCEMENT NOT SHOWN.



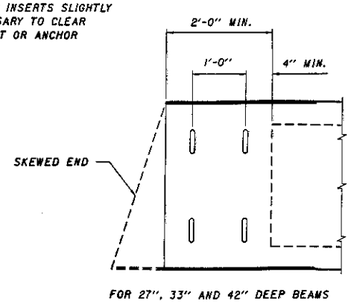
SECTION SHOWING WALL THICKENING AT GUARDRAIL ANCHORS

NOTE: LIFTING INSERTS OF THE CONTRACTOR'S DESIGN MAY BE USED IF APPROVED BY THE DIRECTOR.



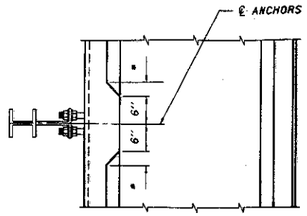
FOR 12", 17" AND 21" DEEP BEAMS

PLAN



FOR 27", 33" AND 42" DEEP BEAMS

PLAN



* THIS DIMENSION SAME AS WIDTH OF FILLET IN VOID.

SECTION A-A

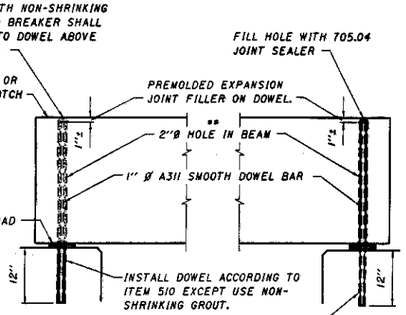
BEAM LIFTING INSERTS AT PIER

FILL HOLE WITH NON-SHRINKING GROUT. BOND BREAKER SHALL BE APPLIED TO DOWEL ABOVE BRIDGE SEAT.

FILL HOLE WITH 705.04 JOINT SEALER

TOP OF BEAM OR BOTTOM OF NOTCH

PREMOLDED EXPANSION JOINT FILLER ON DOWEL.



FIXED EXPANSION

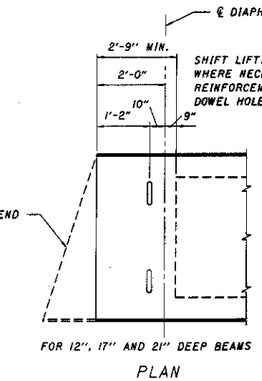
** PROVIDE 2½" Ø HOLE IN BEAM WHEN USING COMPRESSION SEAL EXPANSION JOINT AS PER STD. DRWG. EXJ-3-82

ANCHOR DOWELS

6"x6" PREFORMED EXPANSION JOINT FILLER AS PER CMS 705.03 AROUND DOWEL TO PREVENT ESCAPE OF MORTAR OR JOINT SEALER.

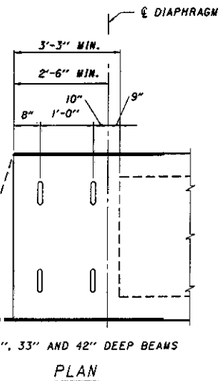
DOWEL CLEARS ELASTOMERIC BEARING

END VIEW



FOR 12", 17" AND 21" DEEP BEAMS

PLAN



FOR 27", 33" AND 42" DEEP BEAMS

PLAN

BEAM LIFTING INSERTS AT ABUTMENT

SEE BEAM LIFTING INSERTS WHERE NOTCH IS SPECIFIED ON PROJECT PLANS

1'-3" NOTCH

OPTIONAL NOTCH SHAPE

30°±

No. 4 BARS

B

C

C

B

No. 4 SLOPE BARS

3"

SEE BEAM CROSS-SECTION ON BRIDGE PLANS

SEE PSBD-1-93 SHEET 3 AND 4 OF 4 FOR REINFORCING

U-BARS No. 4 @ 4"

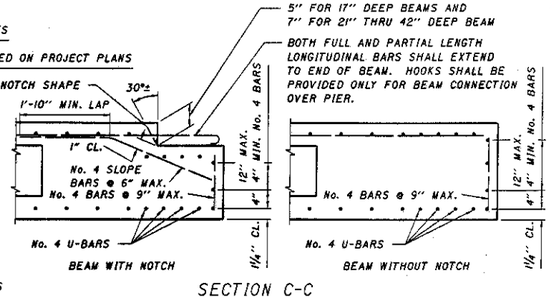
TOP AND BOTTOM

PLAN

SEE ALTERNATE PLAN FOR FASCIA BEAM.

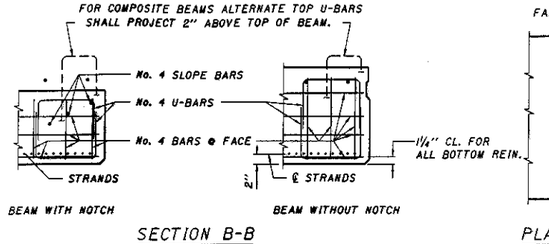
5" FOR 17" DEEP BEAMS AND 7" FOR 21" THRU 42" DEEP BEAM

BOTH FULL AND PARTIAL LENGTH LONGITUDINAL BARS SHALL EXTEND TO END OF BEAM. HOOKS SHALL BE PROVIDED ONLY FOR BEAM CONNECTION OVER PIER.

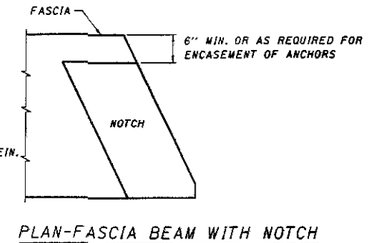


SECTION C-C

FOR COMPOSITE BEAMS ALTERNATE TOP U-BARS SHALL PROJECT 2" ABOVE TOP OF BEAM.



SECTION B-B



PLAN-FASCIA BEAM WITH NOTCH

DETAILS AND REINFORCEMENT OF BEAM ENDS

NOTE: THE FABRICATOR'S SHOP DRAWINGS SHALL SHOW COMPLETE DETAILS OF THE BEAM REINFORCING.

NOTES:

TRANSVERSE TIE RODS SHALL BE 1" DIAMETER STEEL RODS OF GRADE A31I GI018 STEEL. THREADED BOTH ENDS, AND WITH NUT AND WASHER AT EACH END. THREADS MAY BE CUT OR ROLLED. IF ROLLED THREADS ARE USED, MINIMUM DIAMETER OF ROD AT ROOT OF THREADS SHALL BE 0.838". TENSION SHALL BE APPLIED BY A TORQUE OF APPROXIMATELY 250 FOOT-POUNDS. AFTER THE TIE RODS ARE TIGHTENED THE RECESSES IN THE FASCIA BEAMS SHALL BE FILLED WITH NON-SHRINKING MORTAR OF THE SAME COLOR AS THE BEAM. ONE TRANSVERSE TIE ROD WILL BE PERMITTED TO TIE A MAXIMUM OF THREE BEAMS TOGETHER.

PRESTRESSING STRANDS: SHALL BE ASTM 416 GRADE 270, ½" DIAMETER SEVEN-WIRE,UNCOATED, LOW-RELAXATION STRANDS

GALVANIZING: ALL ANCHOR BOLTS, STUDS, INSERTS, TIE RODS, NUTS AND WASHERS SHALL BE GALVANIZED PER 711.02.

ANCHOR DOWELS: THE BEAM ENDS TO BE ANCHORED SHALL BE INDICATED ON THE PROJECT PLANS. ANCHOR DOWEL HOLES AND PRESTRESSING STRANDS SHALL BE LOCATED TO AVOID MUTUAL INTERFERENCE. THE LATERAL SPACING OF THE HOLES IN THE BEAM SHALL BE SUCH THAT THE ANCHOR DOWELS CLEAR THE ELASTOMERIC BEARING, AND ARE AS CLOSE TO THE ℄ OF BEAM AS POSSIBLE.

AFTER TENSIONING OF THE TRANSVERSE TIE RODS THE DOWEL HOLES SHALL BE DRILLED INTO THE ABUTMENT OR PIER SEAT AND DOWELS INSTALLED.

ELASTOMERIC BEARINGS: FOUR ELASTOMERIC BEARINGS ARE REQUIRED PER BEAM. POSITIONED AS SHOWN ON SHEET 4 OF 4.

PREFORMED BEARING PADS ON SKEWED BRIDGES, PREFORMED BEARING PADS PER 711.21, ½" THICK AND OF THE SAME PLAN DIMENSIONS AS THE ELASTOMERIC BEARING PADS SHOULD BE PROVIDED AS SHIMS.

NOTCHES SHALL BE PROVIDED IN BEAM ENDS WHERE SHOWN ON THE PROJECT PLANS TO ELIMINATE AN OPEN JOINT OVER PIERS (SEE SHEET 4 OF 4) OR TO ACCOMMODATE ANCHORAGE FOR END DAMS OR EXPANSION JOINTS.

ENDS OF BEAMS, AGAINST WHICH CONCRETE IS NOT TO BE PLACED, SHALL BE PROTECTED BY TYPE B WATER PROOFING AS PER 512.06 AND APPLIED IN THE FIELD.

SEALING OF CONCRETE SURFACES (NON-EPOXY): SHALL BE PROVIDED FOR THE FASCIA AND THE BOTTOM OF THE EXTERIOR BEAMS.

DRIP GROOVES: ON THE UNDERSIDE OF THE FASCIA BEAM SHALL NOT BE PERMITTED.

PREPARATION OF CONCRETE SURFACES IN CONTACT WITH MORTAR: THE KEYWAY SURFACES SHALL BE GIVEN A MEDIUM SANDBLAST AT THE PLANT WITHIN FOUR DAYS BEFORE THE BEAMS LEAVE THE PLANT. BEFORE MORTARING, THE KEYWAYS SHALL BE THOROUGHLY CLEANED OF ALL DIRT, DUST AND OTHER FOREIGN MATTER BY MEANS OF HIGH PRESSURE WASHING OF AT LEAST 1000 PSI AND A DELIVERY RATE OF NOT LESS THAN 4 GAL./MIN.

MORTAR:
MORTAR OR GROUT FOR KEYWAYS BETWEEN PRESTRESSED CONCRETE BOX BEAMS, FOR TIE ROD RECESSSES AND FOR ANCHOR DOWEL HOLES SHALL BE A NON-SHRINKING MORTAR. THE MORTAR SELECTED AS DEFINED IN THE BELOW ALTERNATIVES SHALL BE PREPARED, PLACED AND CURED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. AT LEAST THREE (3) 3" DIAMETER BY 6 INCH LONG MORTAR TEST CYLINDERS OF THE GROUTING MATERIAL SHALL BE TAKEN DURING THE ACTUAL GROUTING OPERATION AND SUBMITTED TO THE TESTING LABORATORY FOR COMPRESSION TESTING OF MINIMUM STRENGTH OF GROUT.

ALTERNATE 1
IF EITHER CONSTRUCTION OR NORMAL VEHICLE TRAFFIC WILL NOT BE ON THE BOX BEAMS WITHIN 7 DAYS OF PLACEMENT OF THE MORTAR OR GROUT, THE MORTAR MATERIAL SHALL CONFORM WITH CORPS OF ENGINEER'S SPECIFICATION CRD-C621-89A OR SHEAR KEY MORTAR AS PER PROPOSAL NOTE. MINIMUM STRENGTH OF THE MORTAR SHALL BE 5000 PSI BEFORE ANY TRAFFIC IS ALLOWED ON THE STRUCTURE.

ALTERNATE 2
IF PART-WIDTH CONSTRUCTION IS BEING USED, OR ANY CONSTRUCTION OR NORMAL VEHICLE TRAFFIC WILL BE ON THE BOX BEAMS WITHIN 7 DAYS OF PLACEMENT OF THE MORTAR OR GROUT, THE MORTAR MATERIAL SHALL BE SHEAR KEY MORTAR AS PER PROPOSAL NOTE. MINIMUM STRENGTH OF THE MORTAR SHALL BE 5000 PSI BEFORE ANY TRAFFIC IS ALLOWED ON THE STRUCTURE.

MORTARING OF SHEAR KEYS: AFTER THE TRANSVERSE TIE RODS HAVE BEEN TIGHTENED SHEAR KEYS SHALL BE FILLED WITH NON-SHRINKING MORTAR. BEFORE MORTARING WITH CRD-C621-89A, THE KEYWAY SURFACES SHALL BE WETTED, BUT NO FREE WATER SHALL BE ALLOWED TO REMAIN IN THE KEYWAYS. SURFACES WHEN OTHER MORTAR IS USED SHALL BE AS PER MANUFACTURES RECOMMENDATION. MORTAR SHALL BE PLACED INTO THE KEYWAYS IN A MANNER THAT INSURES COMPLETE AND SOLID FILLING

COMPOSITE BRIDGES: THE FOLLOWING NOTES APPLY TO COMPOSITE BRIDGES ONLY:
1.) CLEANING PRIOR TO PLACEMENT OF COMPOSITE SLAB:
BEFORE PLACEMENT OF THE SLAB CONCRETE, THE TOPS OF ALL BEAMS SHALL BE THOROUGHLY CLEANED OF ALL DIRT, DUST AND OTHER FOREIGN MATTER. THE SURFACE SHALL BE FLUSHED WITH CLEAR WATER AND SHALL BE WET, WITHOUT FREE WATER, WHEN THE CONCRETE IS PLACED.

2.) SLAB PLACEMENT: ON MULTI-SPAN BRIDGES WITH SLAB CONTINUOUS OVER PIERS, CONSTRUCTION JOINTS PERPENDICULAR TO THE CENTERLINE OF ROADWAY MAY BE PLACED NEAR THE CENTER OF A SPAN. HOWEVER, COMPOSITE SLAB POURS SHALL BE AS LONG AS PRACTICABLE. ON MULTI-SPAN BRIDGES WITH JOINTS AT PIERS, COMPOSITE SLABS SHALL BE PLACED BETWEEN JOINTS WITHOUT ADDITIONAL CONSTRUCTION JOINTS, BUT SHALL COMPLY WITH THE REQUIREMENTS OF ITEM 511.

PROJECT PLANS: SHALL SPECIFY THE DETAILS OF THE STANDARD DRAWING WHICH ARE TO APPLY AND WILL INCLUDE THE FOLLOWING:
A BEAM LAYOUT PLAN SHOWING SPAN LENGTH, BEAM LENGTH, SKEW ANGLE, FIXED AND EXPANSION ENDS OF BEAMS, LOCATION OF ANCHOR DOWELS, SIZE, LOCATION AND HARDNESS OF ELASTOMERIC BEARING PADS, LOCATION OF DIAPHRAM CENTERLINES AND LOCATIONS OF RAILING POSTS.
A TRANSVERSE CROSS-SECTION THRU THE DECK.
A CROSS-SECTION OF THE BEAM SHOWING BEAM TYPE, SIZE, NUMBER, STRENGTH AND LOCATION OF STRANDS, DEBONDED STRANDS, ALL REINFORCING STEEL DETAILS AND THE DESIGN DATA.

DETAILS AT ABUTMENTS AND PIERS.
ALL OTHER NECESSARY DETAILS AND INFORMATION.
IT IS NOT INTENDED THAT DETAILS SHOWN ON THIS STANDARD DRAWING BE REPEATED ON THE PROJECT PLANS EXCEPT AS MAY BE REQUIRED FOR CLARITY.

ITEMS INCLUDED WITH ITEM 515 FOR PAYMENT:

1. ANCHOR DOWELS AND INSTALLATION
2. ALL PREFORMED EXPANSION JOINT FILLER REQUIRED.
3. TYPE B WATER PROOFING AT ENDS OF BEAMS
4. MORTAR AND LABOR REQUIRED.
5. ALL OTHER MATERIAL & LABOR REQUIRED FOR FABRICATION AND ERECTION.

REVISIONS

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

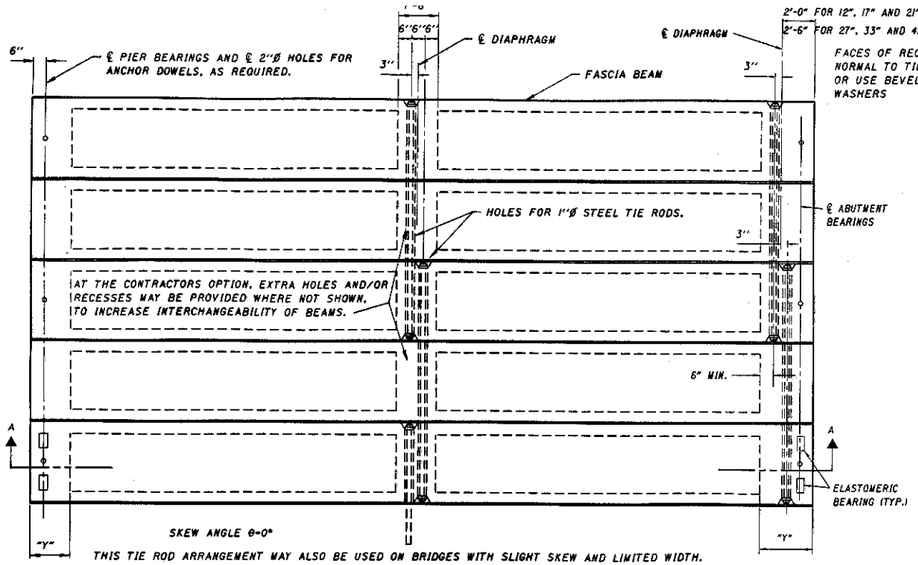
STANDARD

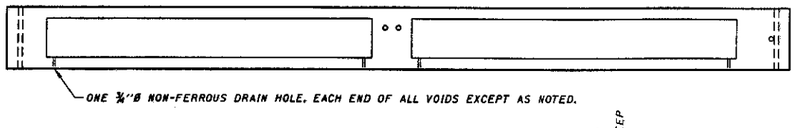
PRESTRESSED CONCRETE BOX BEAM BRIDGE DETAILS

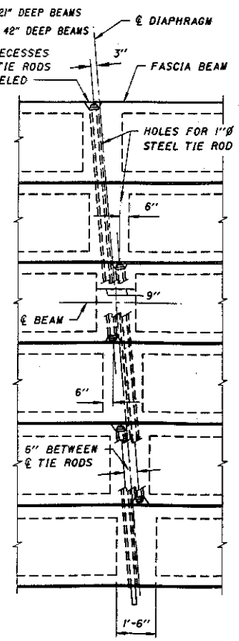
APPROVED: [signature] ENGINEER OF BRIDGES
DATE: 3-4-94

DRAWING NO. PSBD-1-93

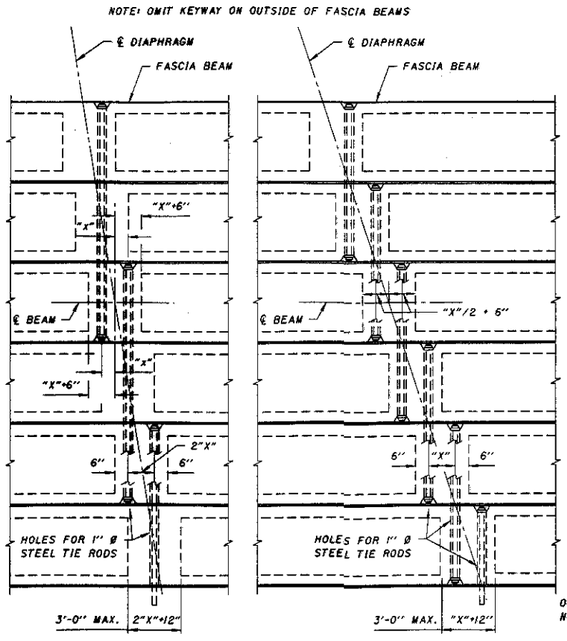
PREPARED	DRAWN	CHECKED	REVIEWED	SHEET NO. 1
MRG	REF	SEM	LMW	OF 4 SHEETS







θ=0° TO 5° FOR 3' WIDE BEAMS *
θ=0° TO 4° FOR 4' WIDE BEAMS *



θ OVER 5° TO 18° FOR 3' WIDE BEAMS *
θ OVER 4° TO 14° FOR 4' WIDE BEAMS *

θ OVER 18½° TO 33° FOR 3' WIDE BEAMS *
θ OVER 14½° TO 26° FOR 4' WIDE BEAMS *

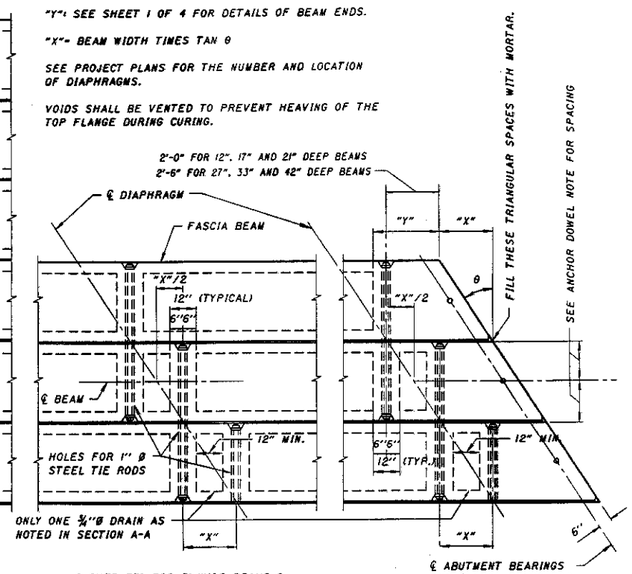
* AS AN OPTION THE FABRICATOR MAY MAKE PROVISION FOR GREATER INTERCHANGEABILITY OF INTERIOR BEAMS BY FURNISHING DOUBLE TIE ROD HOLES IN THE DIAPHRAGMS AND PERMITTING ONE TIE ROD TO TIE TWO BEAMS TOGETHER.

"Y": SEE SHEET 1 OF 4 FOR DETAILS OF BEAM ENDS.

"X"= BEAM WIDTH TIMES TAN θ

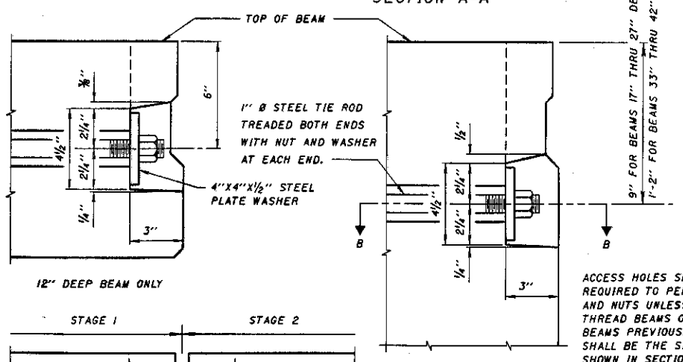
SEE PROJECT PLANS FOR THE NUMBER AND LOCATION OF DIAPHRAGMS.

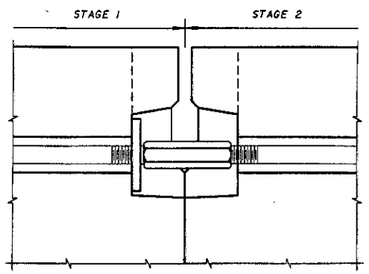
VOIDS SHALL BE VENTED TO PREVENT HEAVING OF THE TOP FLANGE DURING CURING.

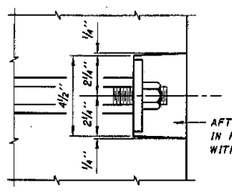


θ OVER 33° FOR 3' WIDE BEAMS *
θ OVER 26° FOR 4' WIDE BEAMS *

SECTION A-A



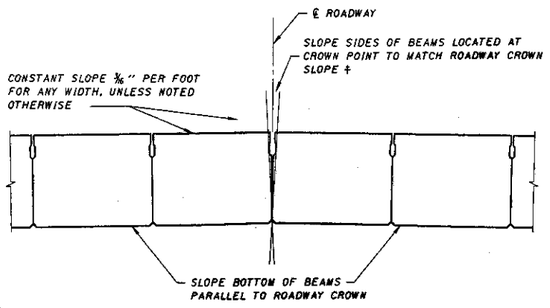




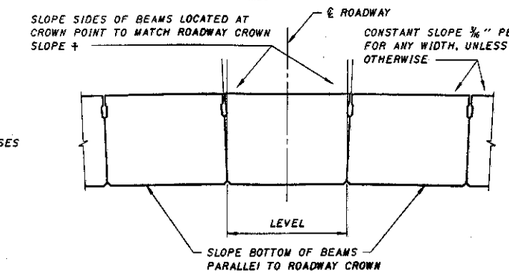
SECTION B-B (ALL BEAMS)

END DETAILS OF TRANSVERSE TIE ROD ANCHORAGE

TYPICAL PLANS OF DIAPHRAGMS AND TRANSVERSE TIE RODS



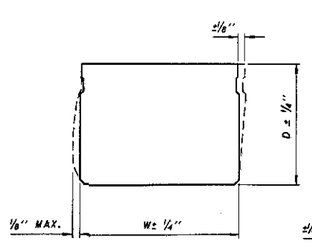
JOINT AT ℄ ROADWAY



JOINT OFFSET FROM ℄ ROADWAY

+ REQUIRED ONLY FOR ROADWAY CROWN SLOPES OF ¼" PER FOOT OR GREATER.

NORMAL CROWN TREATMENT AT ℄ ROADWAY

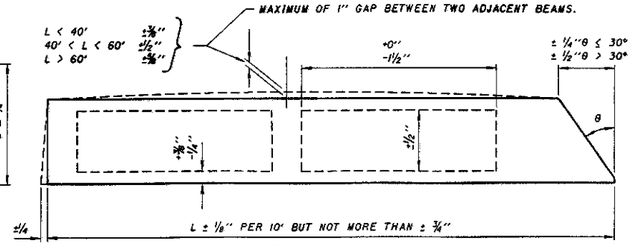


SECTION C-C

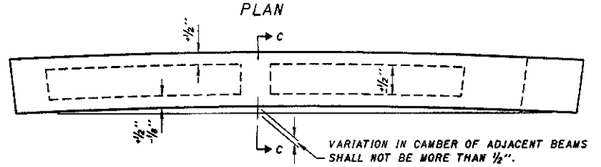
ADDITIONAL TOLERANCES
POSITION OF HOLES FOR ANCHOR DOWELS AND TIE RODS ±½"
POSITION OF GUARDRAIL ANCHORS ±½"
POSITIONS OF LIFTING INSERTS ±6"
CENTER OF GRAVITY OF STRAND GROUP ±¼"
CENTER OF GRAVITY OF DRAPED STRAND GROUP AT END OF BEAM ±½"
SPACING OF STIRRUP BARS ±1"
LONGITUDINAL SCUPPER LOCATION ±6"

HOLES IN BEAMS FOR TRANSVERSE TIE RODS SHALL BE NOT LESS THAN 2"Ø AND NOT MORE THAN 3"Ø.

DIMENSIONS OF RECESSES IN FASCIA BEAMS AND SHEAR KEYS AND VERTICAL LOCATION OF TRANSVERSE TIE RODS MAY VARY FROM THE DIMENSIONS SHOWN HEREON, SUBJECT TO APPROVAL BY THE DIRECTOR.



PLAN



DIMENSIONAL VARIATION IN EXCESS OF THE TOLERANCES SHOWN MAY BE CAUSE FOR REJECTION OF THE MEMBER. GENERALLY THE DIMENSIONS SHOULD BE WELL WITHIN THE TOLERANCE LIMIT.

ELEVATION

BEAM DIMENSIONAL TOLERANCES

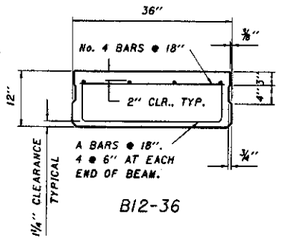
REVISIONS

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

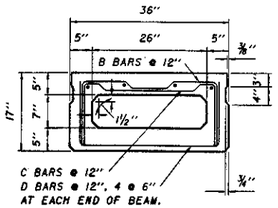
STANDARD

PRESTRESSED CONCRETE BOX BEAM BRIDGE DETAILS

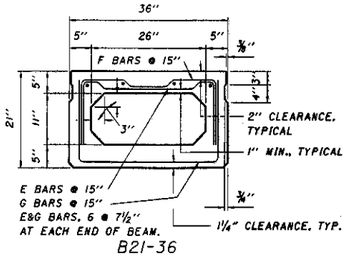
APPROVED:				DRAWING NO.
DATE: 7-4-96	ENGINEER OF BRIDGES			PSBD-1-93
PREPARED	DRAWN	CHECKED	REVIEWED	SHEET NO. 2 OF 4 SHEETS
MRG	REF	SEM	LMW	



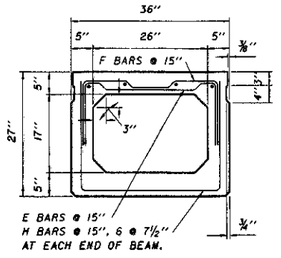
B12-36



B17-36



B21-36



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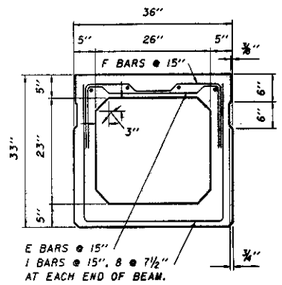

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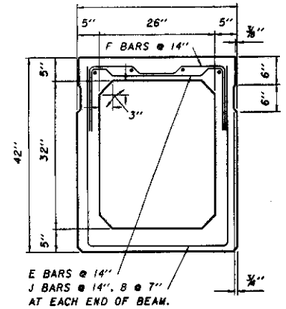
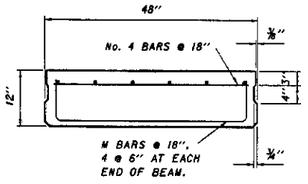
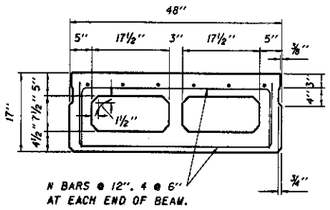


B42-36

36" WIDE NON-COMPOSITE BEAMS



B12-48



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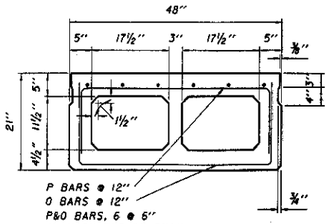

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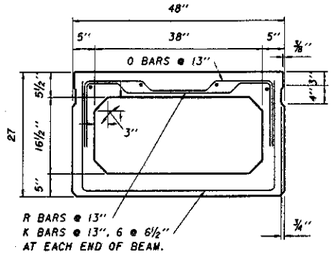

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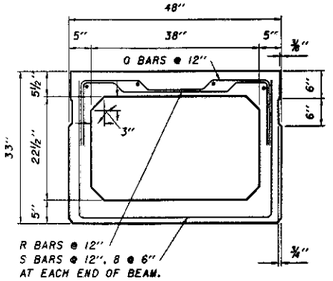

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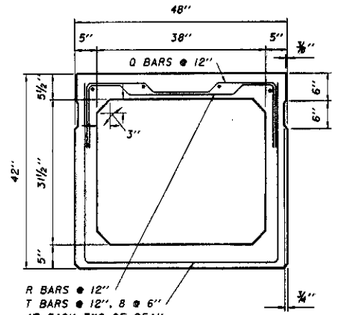
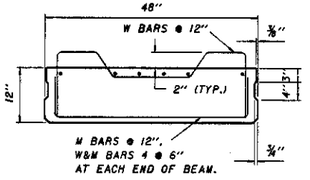
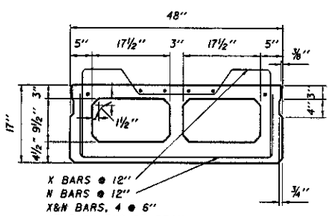


B42-48

48" WIDE NON-COMPOSITE BEAMS



CB12-48



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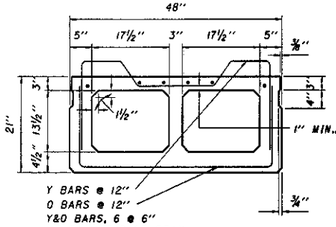

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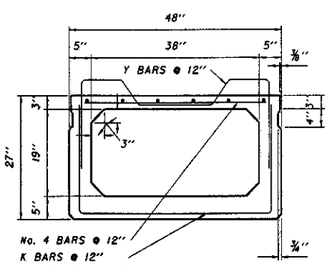

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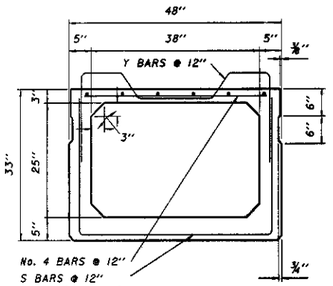

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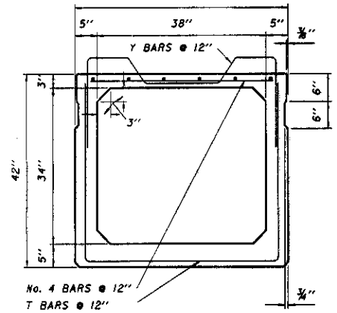
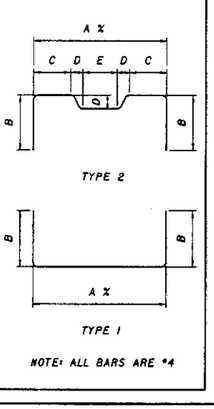


CB42-48

48" WIDE COMPOSITE BEAMS

BENT REINFORCING BARS

MARK	TYPE	A	B	C	D	E	BENDING DIAGRAMS
A	1	31"	8"				
B	2	31"	13"	10"	1½"	8"	
C	2	31"	13"	4"	1½"	20"	
D	1	31"	13"				
E	2	31"	17"	4"	1½"	20"	
F	2	31"	17"	10"	1½"	8"	
G	1	31"	17"				
H	1	31"	23"				
I	1	31"	29"				
J	1	31"	38"				
K	1	43"	23"				
M	1	43"	8"				
N	1	43"	13"				
O	1	43"	17"				
P	1	43"	17"				
Q	2	43"	17"	13"	2"	13"	
R	2	43"	17"	7"	2"	25"	
S	1	43"	29"				
T	1	43"	38"				
W	2	43"	10"	9"	4"	17"	
X	2	43"	17"	9"	4"	17"	
Y	2	43"	21"	9"	4"	17"	
WW	2	31"	12"	6"	4"	11"	
XX	2	31"	17"	6"	4"	11"	
YY	2	31"	21"	6"	4"	11"	



NOTE: ALL BARS ARE #4

NOTE:
ALTERNATE TOP STIRRUPS TO LAP BOTTOM STIRRUPS AT EACH END OF BEAM WHERE TWO TYPES OF TOP STIRRUPS ARE PROVIDED.

36" WIDE COMPOSITE BEAMS ARE SHOWN ON SHEET 4 OF 4.

MINIMUM TOP LONGITUDINAL REINFORCING STEEL
36" WIDE NON-COMPOSITE & COMPOSITE BEAMS: 4-No. 5 BARS.
48" WIDE NON-COMPOSITE BEAMS: B12 THRU B21, 6-No. 4 BARS
B27 THRU B42, 4-No. 5 BARS

48" WIDE COMPOSITE BEAMS: 6-No. 4 BARS
SEE PROJECT PLANS FOR ANY ADDITIONAL LONGITUDINAL REINFORCING STEEL BARS REQUIRED.
ALL REINFORCING STEEL ARE GRADE 60 BARS

FABRICATOR'S SHOP DRAWINGS SHALL SHOW COMPLETE DETAILS OF BEAM REINFORCING.

REVISIONS

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

STANDARD

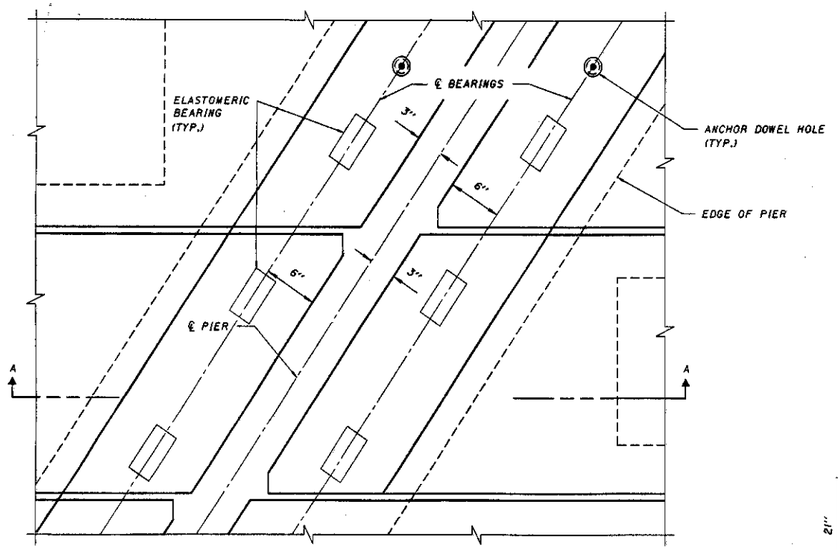
PRESTRESSED CONCRETE BOX BEAM BRIDGE DETAILS

APPROVED: [signature] ENGINEER OF BRIDGES
DATE: 3-4-94

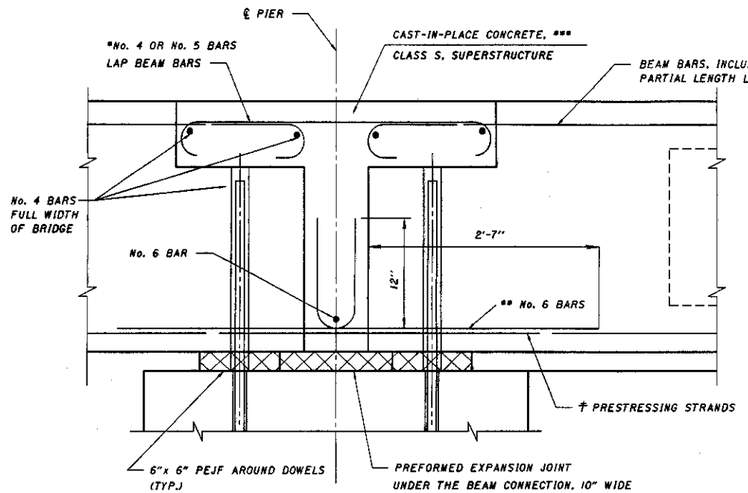
DRAWING NO. PSBD-1-93

PREPARED	DRAWN	CHECKED	REVIEWED
MRG	REF	SEM	LMW

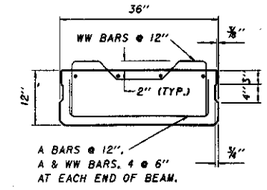
SHEET NO. 3 OF 4 SHEETS



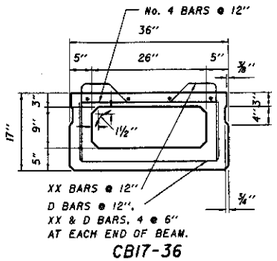
PARTIAL PLAN OF BEAM CONNECTION OVER PIER



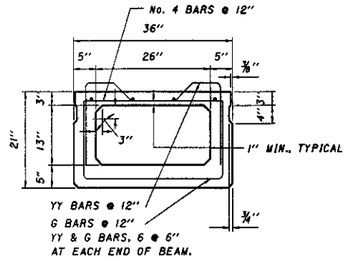
SECTION A-A



CB12-36



CB17-36



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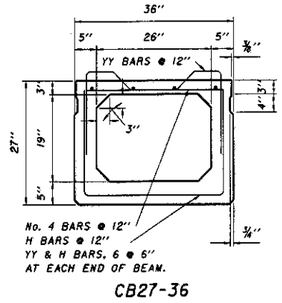
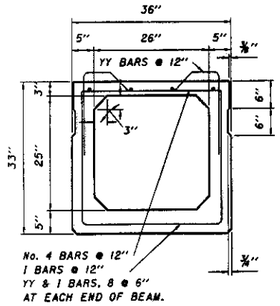
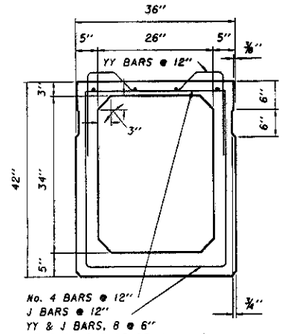


CB27-36



CB33-36

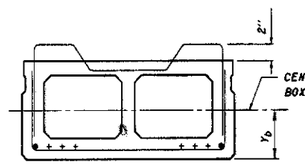


CB42-36

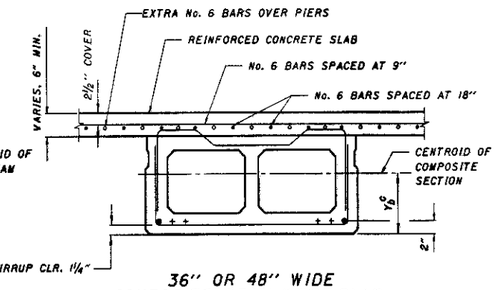
36" WIDE COMPOSITE BEAMS

SECTION PROPERTIES		48" WIDE COMPOSITE BOX BEAM					
		CB12-48	CB17-48	CB21-48	CB27-48	CB33-48	CB42-48
BEAM ONLY	A_b	567.8	484.4	536.4	583.9	638.5	728.6
	I_b	6,833	16,749	29,272	55,814	92,534	169,413
	Y_b	5.98	7.94	9.77	12.18	14.86	19.02
	Z_t	1,135	1,849	2,607	3,766	5,101	7,372
	Z_b	1,143	2,109	2,996	4,582	6,227	8,907
COMPOSITE SECTION	I_c	18,685	37,233	58,857	103,738	162,001	278,449
	Y_b^c	8.34	11.52	13.73	16.87	20.10	24.87
	Z_t^c	5,102	6,791	8,091	10,245	12,555	16,254
	Z_b^c	2,241	3,233	4,288	6,148	8,061	11,220

SECTION PROPERTIES		36" WIDE COMPOSITE BOX BEAM					
		CB12-36	CB17-36	CB21-36	CB27-36	CB33-36	CB42-36
BEAM ONLY	A_b	423.9	374.4	427.9	487.9	542.6	632.6
	I_b	5,105	12,596	22,529	43,595	73,199	136,202
	Y_b	5.97	7.81	9.65	12.39	15.12	19.36
	Z_t	847	1,370	1,984	2,984	4,095	6,017
	Z_b	855	1,614	2,335	3,518	4,840	7,034
COMPOSITE SECTION	I_c	14,003	28,468	45,491	79,672	125,553	218,378
	Y_b^c	8.34	11.35	13.47	16.67	19.82	24.51
	Z_t^c	3,823	5,035	6,039	7,713	9,529	12,483
	Z_b^c	1,680	2,509	3,378	4,779	6,333	8,911



36" OR 48" WIDE COMPOSITE BEAM



36" OR 48" WIDE COMPOSITE BEAM WITH SLAB

* LAP BARS SAME SIZE AND NUMBER AS BEAM BARS. HOOKS MAY BE ROTATED FROM THE VERTICAL POSITION TO PROVIDE THE REQUIRED CLEARANCE.

** PROVIDE 6 No. 6 BARS EACH BEAM END IN 48" WIDE BEAMS AND 4 No. 6 BARS EACH BEAM END IN 36" WIDE BEAMS. No. 6 BARS SHALL BE LOCATED ON TOP OF STIRRUPS AND SHALL BE UNIFORMLY SPACED ACROSS THE BEAM.

† AT THE FABRICATOR'S OPTION, STRANDS MAY BE EXTENDED AND BENT UP IN LIEU OF No. 6 BARS. 48" WIDE BEAMS WITH A TOTAL OF 12 OR MORE STRANDS SHALL HAVE A MINIMUM OF 6 STRANDS BENT UP. 48" WIDE BEAMS WITH LESS THAN 12 STRANDS TOTAL SHALL HAVE APPROXIMATELY ONE HALF OF THE TOTAL NUMBER OF STRANDS BENT UP. 36" WIDE BEAMS WITH A TOTAL OF 8 OR MORE STRANDS SHALL HAVE A MINIMUM OF 4 STRANDS BENT UP. 36" WIDE BEAMS WITH LESS THAN 8 STRANDS TOTAL SHALL HAVE APPROXIMATELY ONE HALF OF THE TOTAL NUMBER OF STRANDS BENT UP

*** IN LIEU OF CLASS S CONCRETE, THE CONTRACTOR AT HIS OPTION MAY USE OTHER CONCRETE MIXTURES IN ACCORDANCE WITH CMS 499.03 FOR ACHIEVING THE REQUIRED STRENGTH EARLIER.

NOTE: THE PRESTRESSING STRANDS WHICH ARE BENT UP SHALL BE STAGGERED IN ABUTTING BEAM ENDS TO AVOID INTERFERENCE.

NOTE:
REINFORCING BAR DATA AND NOTES ARE SHOWN ON SHEET 3 OF 4.

SECTION PROPERTIES FOR COMPOSITE SECTONS ARE COMPUTED WITH A SLAB THICKNESS OF 5". TOTAL THICKNESS OF SLAB IS 6" WHICH INCLUDES 1" MONOLITHIC WEARING SURFACE.

SLAB CONCRETE IS CLASS S CONCRETE : f'_c =4500 P.S.I.
MINIMUM BEAM CONCRETE STRENGTH AT 28 DAYS : f'_c= 5500 P.S.I.

ALL REINFORCING STEEL IN THE COMPOSITE DECK SLAB AND BARS PROJECTING FROM THE PRESTRESSED BOX BEAMS SHALL BE GRADE 60 EPOXY COATED BARS.

$\frac{E_{slab}}{E_{beam}}$ = 0.90

REVISIONS

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

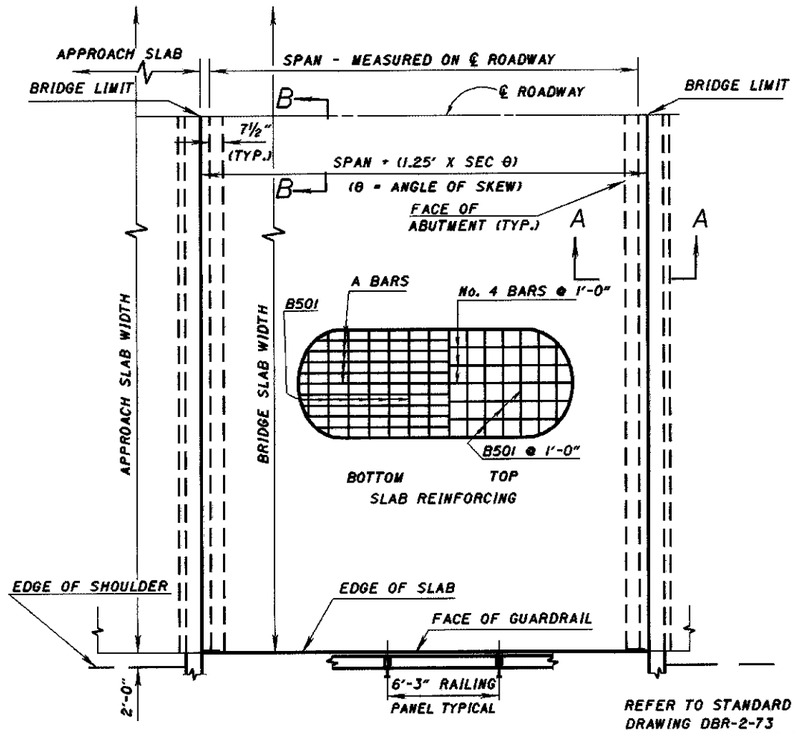
STANDARD

PRESTRESSED CONCRETE BOX BEAM BRIDGE DETAILS

APPROVED : ENGINEER OF BRIDGES
DATE : 3-4-94

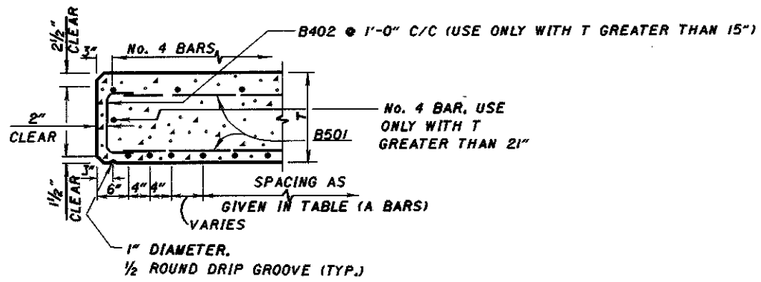
DRAWING NO. PSBD-1-93

PREPARED	DRAWN	CHECKED	REVIEWED	SHEET NO. 4 OF 4 SHEETS
MRG	REF	WLF SEM	LMW	



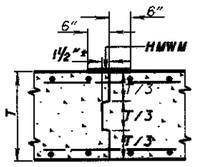
REFER TO STANDARD DRAWING DBR-2-73 FOR RAILING DETAILS.

PART PLAN

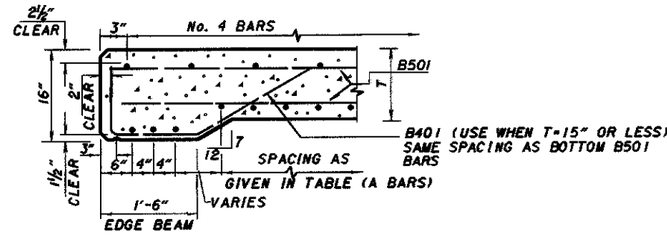


PART SECTION DECK FASCIA

(DO NOT USE EDGE BEAM WHERE T IS MORE THAN 16")

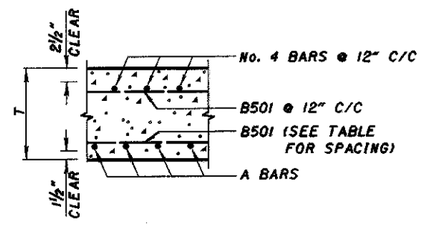


LONGITUDINAL DECK CONSTRUCTION JOINT (SEE NOTE)

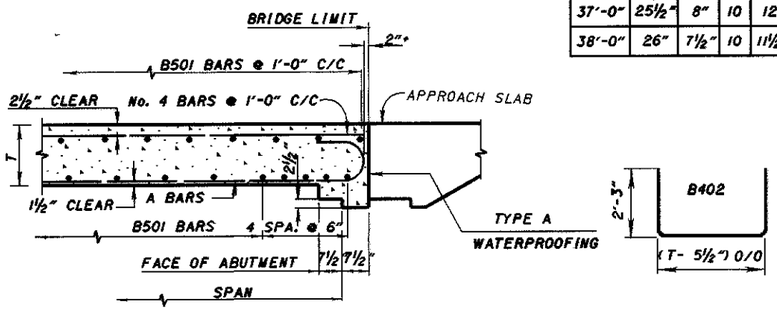


PART SECTION DECK FASCIA

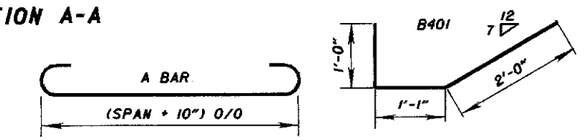
(USE EDGE BEAM WHERE T IS LESS THAN 16")



SECTION B-B



SECTION A-A



LEGEND: O/O - OUT TO OUT

SLAB DATA				
SPAN	THICKNESS T	REINFORCING		
		A BARS		B501
		SPACING	BAR SIZE NUMBER	SPACING (BOTTOM)
11'-0"	11¼"	8"	7	14"
12'-0"	11¾"	7½"	7	14"
13'-0"	12½"	7¼"	7	14"
14'-0"	13"	7"	7	14"
15'-0"	13½"	6¾"	7	14"
16'-0"	14"	6¼"	7	13½"
17'-0"	14¾"	8¼"	8	13½"
18'-0"	15¼"	7¾"	8	13½"
19'-0"	15¾"	7¾"	8	13½"
20'-0"	16¼"	7½"	8	13½"
21'-0"	16¾"	7¼"	8	13½"
22'-0"	17¼"	8¾"	9	13"
23'-0"	17¾"	8¾"	9	13"
24'-0"	18¼"	8½"	9	13"
25'-0"	18¾"	8¼"	9	13"
26'-0"	19¼"	8¼"	9	13"
27'-0"	19¾"	8"	9	13"
28'-0"	20½"	9¾"	10	13"
29'-0"	21"	9½"	10	13"
30'-0"	21½"	9¼"	10	12½"
31'-0"	22"	9"	10	12½"
32'-0"	22¾"	8¾"	10	12½"
33'-0"	23¼"	8¾"	10	12½"
34'-0"	23¾"	8½"	10	12½"
35'-0"	24¼"	8¼"	10	12½"
36'-0"	25"	8¼"	10	12"
37'-0"	25½"	8"	10	12"
38'-0"	26"	7½"	10	11½"

GENERAL NOTES

DESIGN SPECIFICATIONS: THIS STANDARD DRAWING CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1992, INCLUDING THE 1993 INTERIM SPECIFICATIONS AND THE ODOT BRIDGE DESIGN MANUAL.

DESIGN LOADING: HS20-44 AND THE ALTERNATE MILITARY LOADING.

DESIGN DATA:
CONCRETE CLASS "S" - COMPRESSIVE STRENGTH 4500 P.S.I. (SUPERSTRUCTURE)
REINFORCING STEEL- ASTM A615, A616 OR A617, GRADE 60, WITH A MINIMUM YIELD STRENGTH OF 60,000 P.S.I. AND SHALL BE EPOXY COATED.

SKEW: THIS STANDARD SHOULD NOT BE USED FOR ANY BRIDGE WHICH IS TO BE BUILT AT A SKEW ANGLE WHICH EXCEEDS 35°.

DECK CONSTRUCTION JOINT: A LONGITUDINAL CONSTRUCTION JOINT IN THE DECK SLAB, PREFERABLY AT OR NEAR THE CENTERLINE OF THE ROADWAY, WILL BE PERMITTED. SEAL WITH HIGH MOLECULAR WEIGHT METHACRYLATE (HMWM) RESIN.

EDGE BEAM OPTION: IN LIEU OF FORMING AN EDGE BEAM, THE CONTRACTOR MAY FURNISH A 16" SLAB, OR A SLAB VARYING IN THICKNESS FROM 16" AT THE EDGE TO T AT THE CENTERLINE OF ROADWAY. IF THE CONTRACTOR CHOOSES TO USE EITHER OPTION HE SHALL REPLACE THE B401 BARS WITH B402 BARS. AN EDGE BEAM SHALL BE USED FOR COMPUTING THE PAY QUANTITY FOR THE SUPERSTRUCTURE CONCRETE.

CAMBER: THE DECK SLAB FORMS SHALL BE CAMBERED IN ORDER TO COMPENSATE FOR SLAB AND FALSEWORK DEFLECTIONS AND TO PROVIDE FOR ROADWAY VERTICAL CURVATURE.

DESIGN INSTRUCTIONS

GENERAL: THIS DRAWING PROVIDES DESIGN AND GENERAL CONSTRUCTION DETAILS. THE PROJECT PLANS FOR EACH STRUCTURE SHALL SHOW STATIONS, SPAN LENGTH, ROADWAY WIDTH, SKEW, CURVE AND SUPERELEVATION (IF ANY) DATA, ELEVATIONS, ABUTMENT DETAILS, ESTIMATED QUANTITIES, REINFORCING STEEL LIST AND OTHER NECESSARY DETAILS AND SPECIAL NOTES.

DECK CROSS-SECTION: PROJECT PLANS SHALL SHOW DECK CROSS-SECTIONS IN ACCORDANCE WITH THE APPROVED TYPICAL SECTION.

REINFORCING STEEL: THE TRANSVERSE B501 REINFORCING BARS, AT THE OPTION OF THE CONTRACTOR, MAY BE FURNISHED EITHER IN ONE LENGTH AS SHOWN HEREON, OR SPLICED. IF THE SPLICE OPTION IS CHOSEN, THE B501 BAR SHALL BE LAPPED THREE FEET. A STAGGERED LAP SPLICE ARRANGEMENT SHOULD BE USED.

PAYMENT FOR REINFORCING SHALL BE THE PLAN QUANTITY. DO NOT ADJUST THE PLAN QUANTITY TO INCLUDE BAR WEIGHTS FURNISHED TO PROVIDE LAP SPLICES.

THE TOP AND BOTTOM LONGITUDINAL REINFORCING STEEL SHALL BE PLACED PARALLEL TO THE CENTER LINE OF ROADWAY. THE TOP AND BOTTOM TRANSVERSE REINFORCING STEEL SHALL BE PLACED PARALLEL TO THE FACE OF ABUTMENTS.

DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
12-19-94 DATE
ENGINEER OF BRIDGES

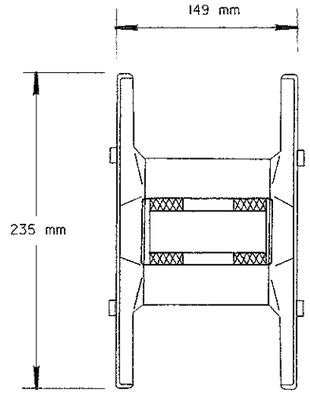
REVISIONS	DESIGNED	DRAWN	CHECKED	REVISED
	JAM	RJS/JFF	MLM	LMW

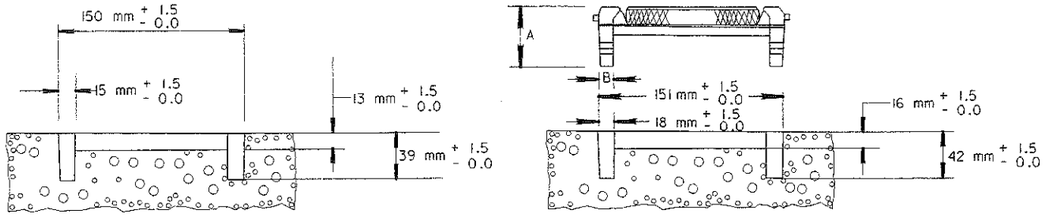
SB-06-94

STANDARD
SINGLE SPAN SLAB BRIDGE

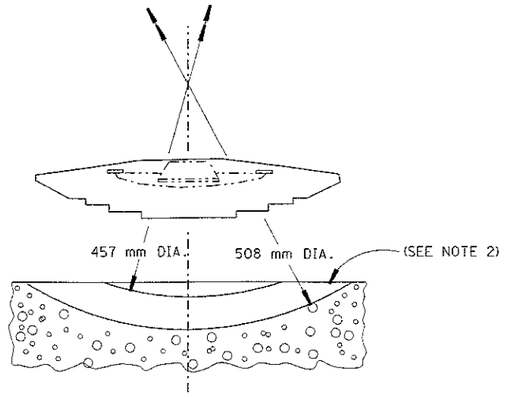
1 / 1

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





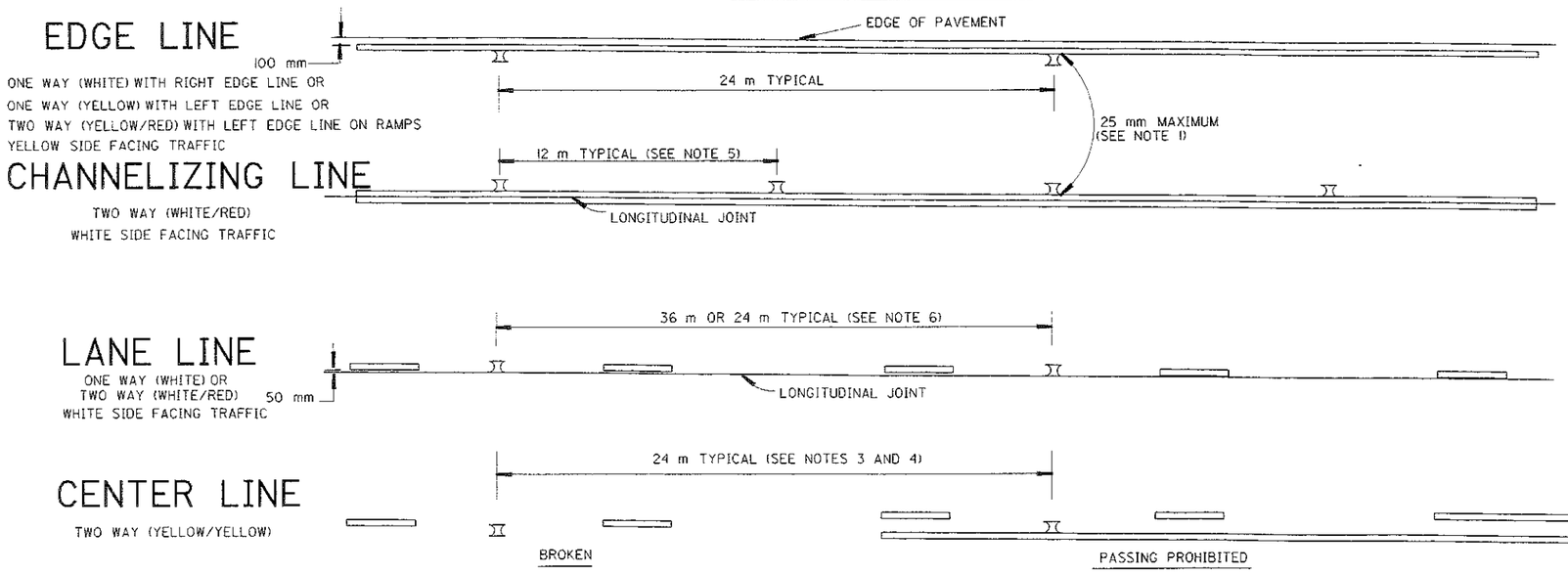
OPTIONAL FOR CONVENTIONAL TYPE



NOTES

1. CENTER LINE MARKERS SHALL BE PLACED BETWEEN THE TWO LINES. MARKERS INSTALLED ALONG AN EDGE LINE OR CHANNELIZING LINE SHALL BE PLACED SO THAT THE CASTING IS NO MORE THAN 25 mm FROM THE NEAR EDGE OF THE LINE. MARKERS INSTALLED ALONG A LANE LINE OR DASHED YELLOW CENTER LINE SHALL BE PLACED BETWEEN AND IN LINE WITH THE DASHES. MARKERS SHALL NOT BE PLACED OVER THE LINES EXCEPT WHERE THE LINES DEVIATE VISIBLY FROM THEIR CORRECT ALIGNMENT, AND THEN ONLY WITH THE APPROVAL OF THE ENGINEER.
2. TO FACILITATE THE CUTTING OF THE TWO PARALLEL SLOTS AND INTERVENING CONCAVED SURFACE SIMULTANEOUSLY, IT IS RECOMMENDED THAT AN ARBOR AND SAW BLADES ASSEMBLY BE USED. FOR ADDITIONAL DETAILS AND TOLERANCES OF THE CASTING AND ARBOR-SAW ASSEMBLY CONTACT THE CASTING MANUFACTURE.
3. FOR HORIZONTAL CURVE RADIUS OF 380 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS SHALL BE REDUCED TO 12 m BETWEEN P.C. OR T.S. AND P.T. OR S.T.
4. FOR HORIZONTAL CURVE RADIUS OF 250 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS MAY BE REDUCED TO 6 m BETWEEN P.C. OR T.S. AND P.T. OR S.T. WHEN USING 6m SPACING, 12 RAISED PAVEMENT MARKERS AT 12 m SPACING SHALL BE INSTALLED ON EACH END OF THE 6 m SPACING.
5. WHEN A CHANNELIZING LINE IS LESS THAN 24 m IN LENGTH, ONE RAISED PAVEMENT MARKER SHALL BE PLACED AT EACH END OF THE LINE AND ONE SHALL BE PLACED IN THE CENTER OF THE LINE.
6. RAISED PAVEMENT MARKERS ON LANE LINES ON FREEWAYS SHALL BE ONE WAY WHITE SPACED AT 36 METERS. ALL OTHER RAISED PAVEMENT MARKERS ON LANE LINES ON MULTILANE OR DIVIDED ROADWAYS SHALL BE TWO WAY RED/WHITE SPACED AT 24 METERS.

CASTING AND SAW CUT DETAILS



TYPICAL RAISED PAVEMENT MARKER PLACEMENT WITH LONGITUDINAL PAVEMENT MARKINGS

metric units

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

TRAFFIC CONTROL

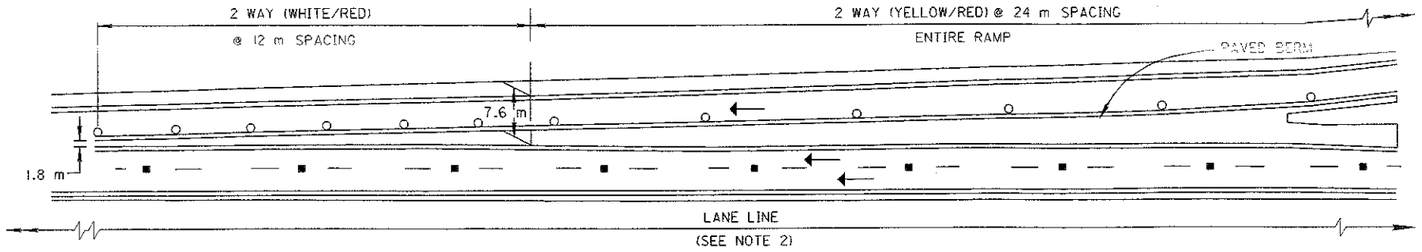
DATE
11/03/93
11/01/95

RAISED PAVEMENT MARKER INSTALLATION DETAILS

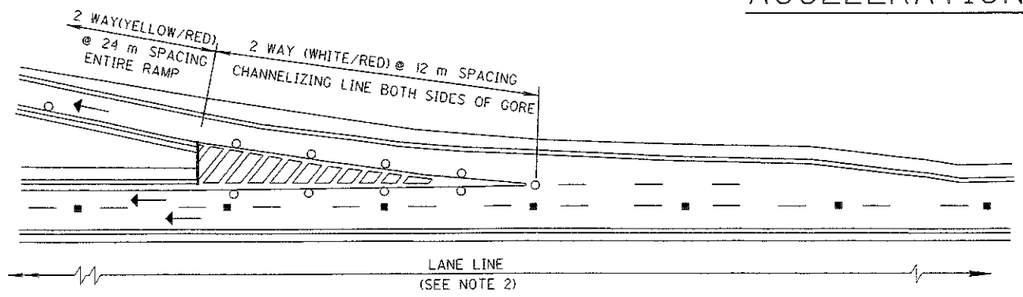
STANDARD CONSTRUCTION DRAWING TC-65.10M

APPROVED _____ ADMINISTRATOR

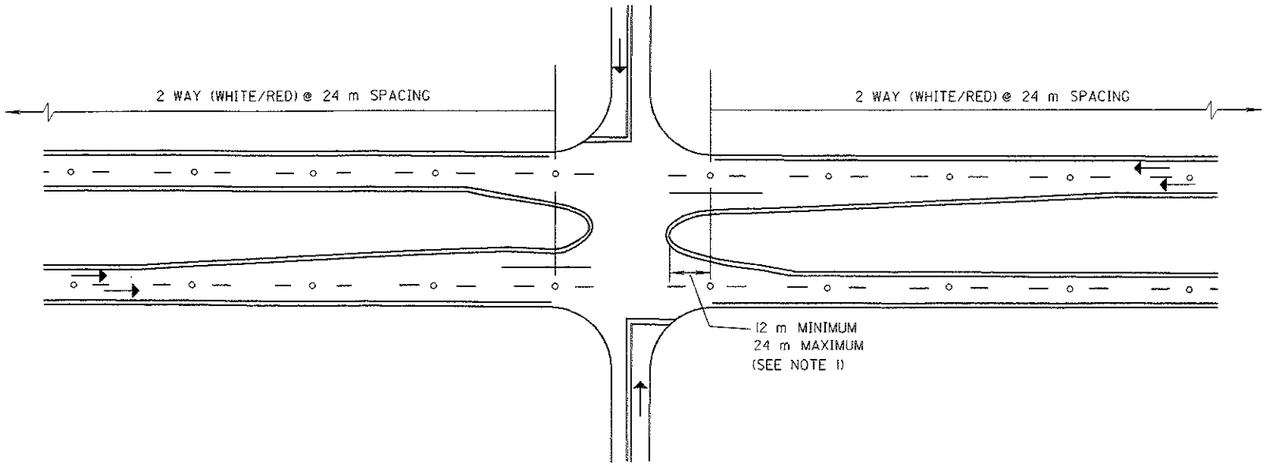
WCC



ACCELERATION LANE

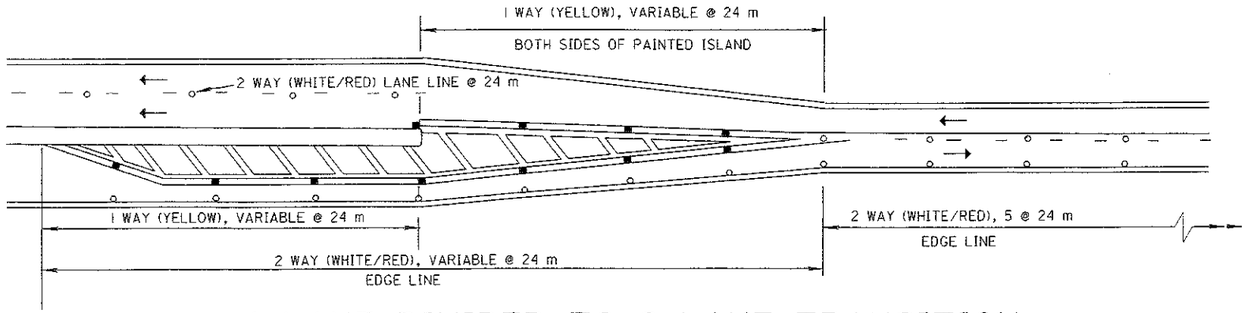


DECELERATION LANE

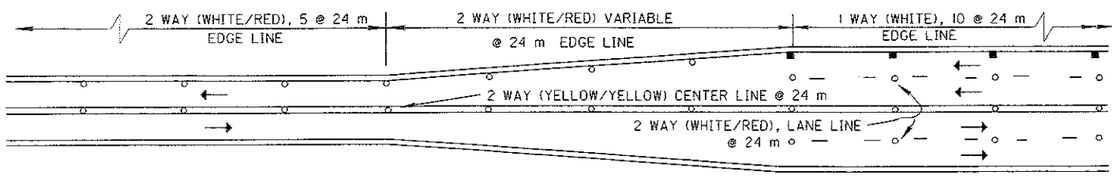


MULTILANE DIVIDED-CONTROLLED ACCESS

(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.

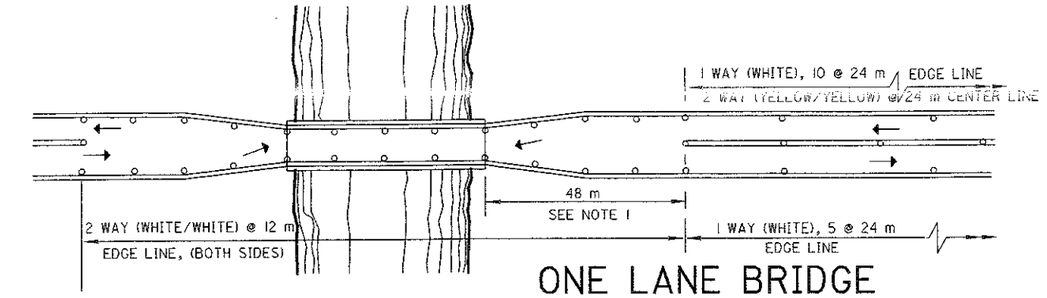
LEGEND

- ■ 1 WAY REFLECTORS
- ○ 2 WAY REFLECTORS

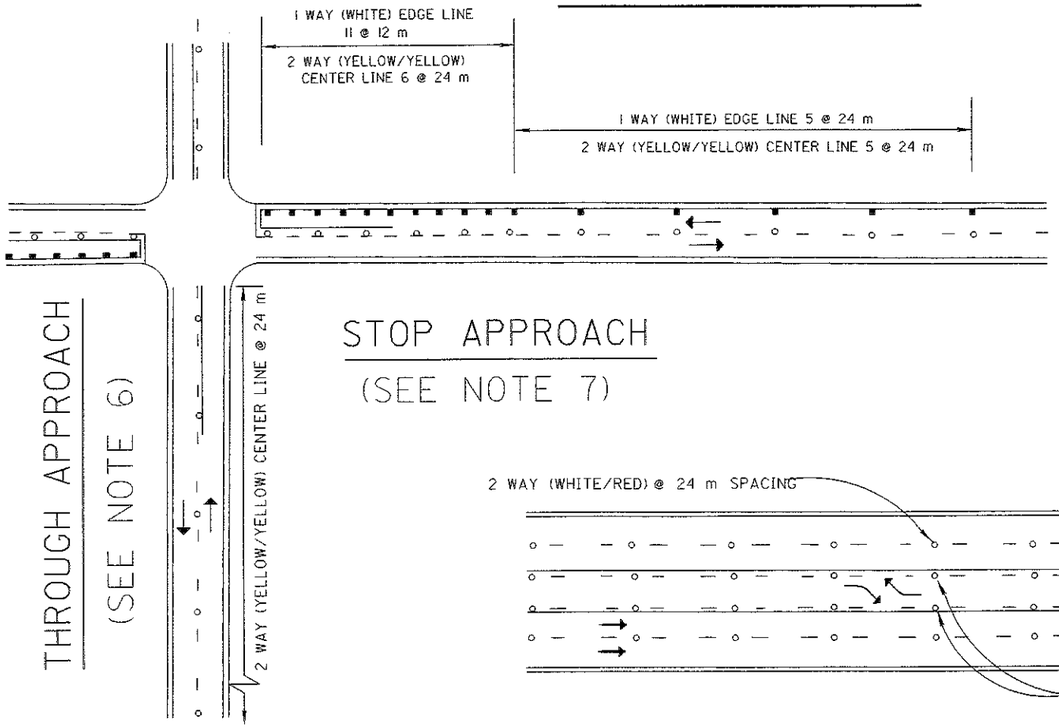
metric units

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	

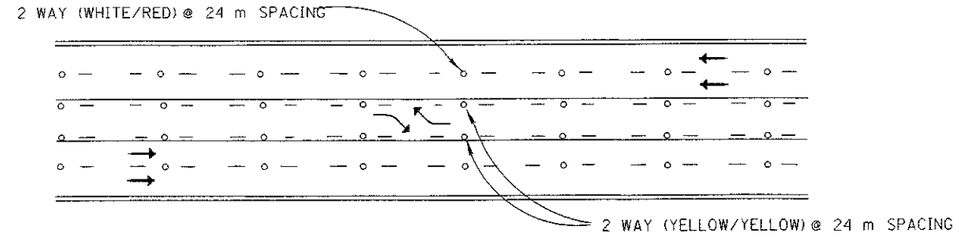


ONE LANE BRIDGE

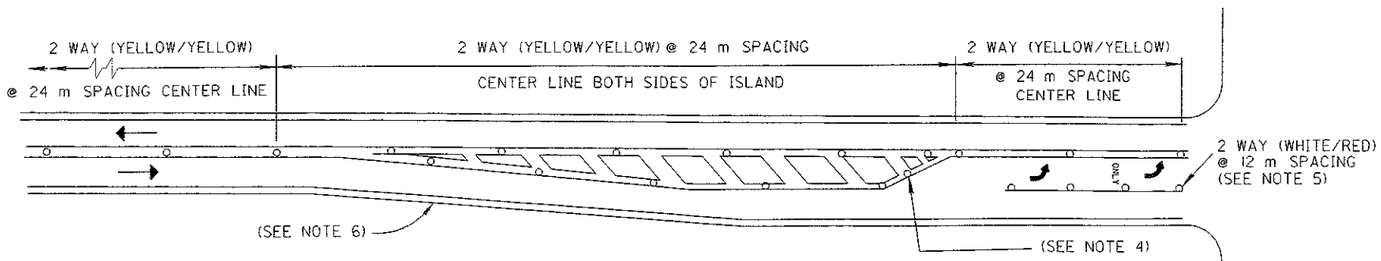


THROUGH APPROACH (SEE NOTE 6)

STOP APPROACH (SEE NOTE 7)



TWO WAY LEFT TURN LANE



APPROACH W/LEFT TURN LANE

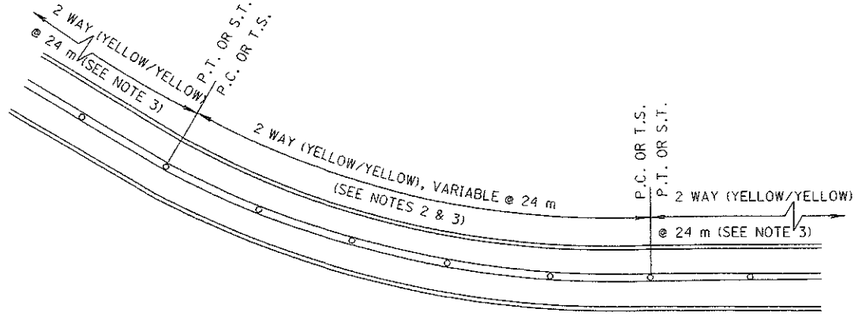
LEGEND

■ 1 WAY REFLECTORS

○ 2 WAY REFLECTORS

NOTES

1. FOR ONE LANE BRIDGES, PAINTED CENTER LINE AND CENTER LINE MARKERS SHALL BE OMITTED 48 METERS ON EACH SIDE AND ACROSS THE BRIDGE.
2. FOR HORIZONTAL CURVE RADIUS OF 380 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS SHALL BE REDUCED TO 12 m BETWEEN P.C. OR T.S. AND P.T. OR S.T.
3. FOR HORIZONTAL CURVE RADIUS OF 250 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS MAY BE REDUCED TO 6 m BETWEEN P.C. OR T.S. AND P.T. OR S.T. WHEN USING 6 m SPACING, 12 RAISED PAVEMENT MARKERS AT 12 m SPACING SHALL BE INSTALLED ON EACH END OF THE 6 m SPACING.
4. A MINIMUM OF 3 EQUALLY SPACED RAISED PAVEMENT MARKERS SHALL BE INSTALLED ON THE BACK TAPER.
5. WHEN A CHANNELIZING LINE IS LESS THAN 24 m LONG, ONE RAISED PAVEMENT MARKER SHALL BE PLACED AT EACH END OF THE LINE AND ONE SHALL BE PLACED IN THE CENTER OF THE LINE.
6. RAISED PAVEMENT MARKERS SHALL NOT BE PLACED ON EDGE LINES ON A THROUGH APPROACH.
7. ALL APPROACHES AT A SIGNALIZED INTERSECTION SHALL BE TREATED AS SHOWN IN THE STOP APPROACH DETAIL.



HORIZONTAL CURVE

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 II	
STANDARD CONSTRUCTION DRAWING TC-65.12M APPROVED _____ ADMINISTRATOR	

WCC