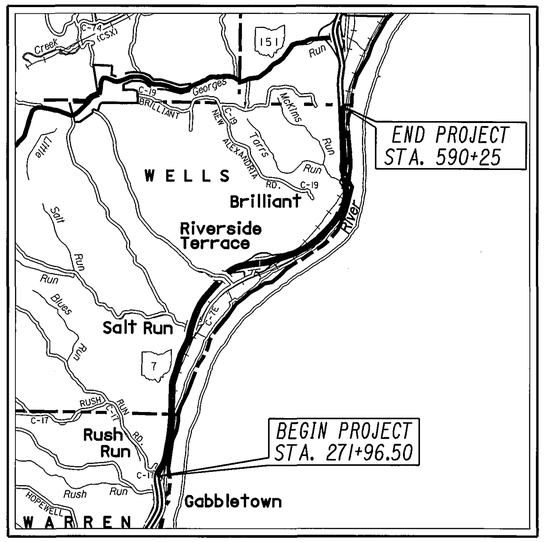
STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

JEF-7-4.77

WELLS & WARREN TOWNSHIP
JEFFERSON COUNTY



LOCATION MAP

LATITUDE: N40°15'25" LONGITUDE: W80°38'50"

SCALE IN MILES
0 1 2 3 4

PORTION TO BE IMPROVED
STATE & FEDERAL ROUTES
OTHER ROADS

INDEX OF SHEETS

DESIGN DESIGNATION

	From SLM 4.77 to CR-7E	From CR-7E to SLM 10.82
CURRENT ADT (2005)	14,410	17,270
DESIGN YEAR ADT (2017)	17,340	19,550
DESIGN HOURLY VOLUME (2017)	1734	1955
DIRECTIONAL DISTRIBUTION	60%	55%
TRUCKS (24 HOUR B&C)	17%	16%
DESIGN SPEED	55 MPH	55 MPH
LEGAL SPEED	55 MPH	55 MPH

DESIGN FUNCTIONAL CLASSIFICATION - RURAL ARTERIAL

DESIGN EXCEPTION	DATE	SHEET NO.
GRADED SHOULDER WIDTH	8-7-03	5-12
BRIDGE WIDTH	8-7-03	2-4

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:
O.D.O.T.
DISTRICT 11
NEW PHILADELPHIA, OHIO

ENGINEERS SEAL:
STATE OF OHIO
TIMOTHY EARL STILLION
61138
REGISTERED PROFESSIONAL ENGINEER
SIGNED: Timothy E Stillion
DATE: 3/3/04

PROJECT EARTH DISTURBED AREA = N/A MAINTENANCE PROJECT
ESTIMATED CONTRACTOR EARTH DISTURBED AREA = N/A MAINTENANCE PROJECT
NOTICE OF INTENT EARTH DISTURBED AREA = N/A MAINTENANCE PROJECT

STANDARD CONSTRUCTION DRAWINGS

BP-3.1	7-28-00	RM-4.2	4-18-03	TBR-91	7-19-02	MT-35.10	4-20-01		
BP-9.1	10-17-03	RM-4.5	4-18-03			MT-95.30	4-19-02		
		RM-4.6	1-16-04			MT-95.40	7-18-03		
GR-1.1	4-18-03			TC-41.20	1-19-01	MT-98.12	4-19-02		
GR-2.1	1-16-04			TC-52.10	4-20-01	MT-98.13	4-19-02		
GR-2.3	4-18-03	I-2.2	7-19-02	TC-52.20	4-20-01	MT-98.14	4-19-02		
GR-3.1	4-18-03			TC-65.10	10-19-01	MT-98.15	4-19-02		
GR-3.2	4-18-03			TC-65.11	10-19-01	MT-98.16	4-19-02		
GR-3.3	4-18-03	DM-4.3	7-19-02	TC-71.10	4-19-02	MT-98.17	10-18-02		
GR-4.1	4-18-03	DM-4.4	7-19-02	TC-72.20	1-19-01	MT-98.18	10-18-02	SPECIAL PROVISIONS	
GR-4.2	10-17-03			TC-73.10	1-19-01	MT-99.20M	1-30-95		
GR-5.1	4-18-03					MT-101.70	10-18-02		
GR-5.3	1-16-04					MT-102.10	10-18-02		
						MT-102.20	10-18-02		
						MT-105.10	10-18-02		
						MT-105.11	10-18-02		

SUPPLEMENTAL SPECIFICATIONS

832	4-17-04
833	2-12-03
864	7-11-00
908	4-18-03

APPROVED _____
DATE 03-03-04 DISTRICT DEPUTY DIRECTOR

APPROVED _____
DATE 7-7-04 DIRECTOR, DEPARTMENT OF TRANSPORTATION

PROJECT DESCRIPTION

RESURFACING 6.05 MILES OF S.R. 7 INCLUDING NEW GUARDRAIL, PAVEMENT MARKINGS, AND RUMBLE STRIPS.

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.

2002 SPECIFICATIONS

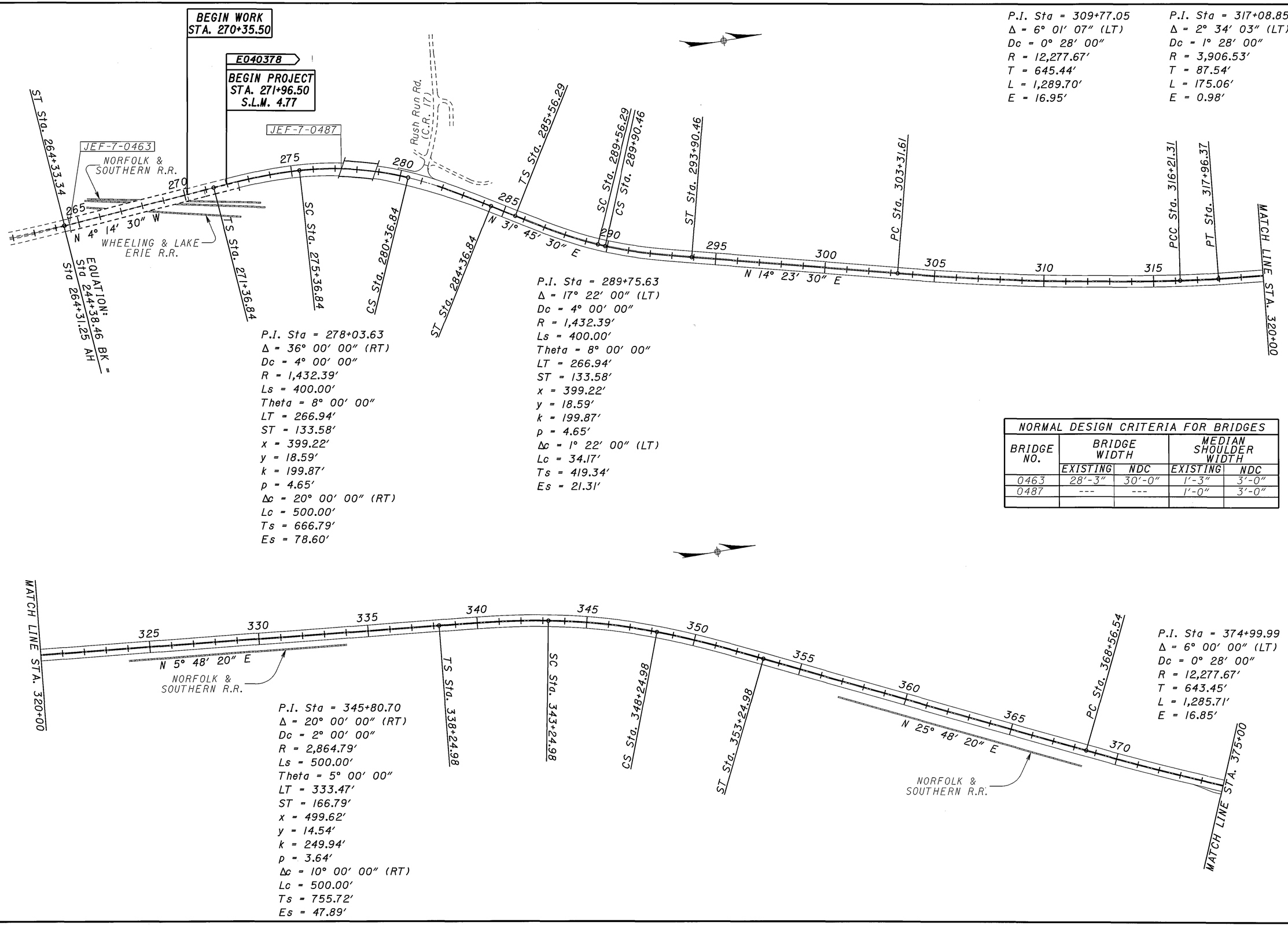
THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING CHANGES AND SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.

I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL NOT REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY AND THAT THE PROVISIONS FOR THE MAINTENANCE AND SAFETY OF TRAFFIC WILL BE AS SET FORTH ON THE PLANS AND ESTIMATES.

UNDER AUTHORITY OF SECTION 4511.21, DIVISION (I) OF THE REVISED CODE OF OHIO, 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.

FEDERAL PROJECT NO. E040(378)
PID NO. 19503
CONSTRUCTION PROJECT NO.
RAILROAD INVOLVEMENT
JEF-7-4.77
1 / 49

JEF - SR 7-4.77
040590 PID - 19503
Dist 11 11/17/2004



NORMAL DESIGN CRITERIA FOR BRIDGES

BRIDGE NO.	BRIDGE WIDTH		MEDIAN SHOULDER WIDTH	
	EXISTING	NDC	EXISTING	NDC
0463	28'-3"	30'-0"	1'-3"	3'-0"
0487	---	---	1'-0"	3'-0"

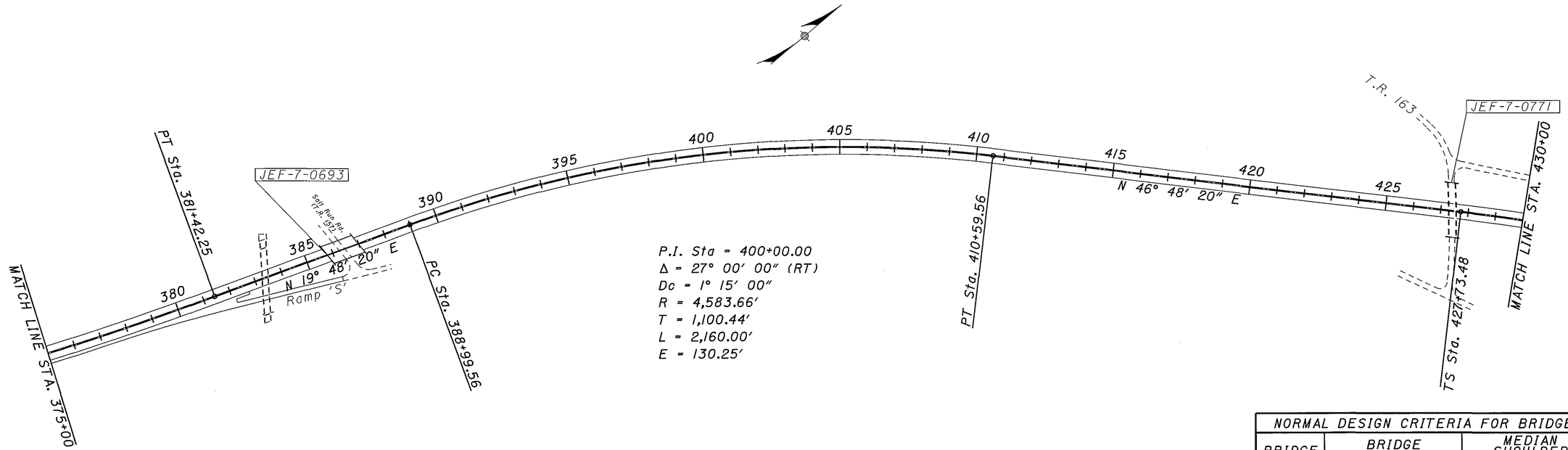
HORIZONTAL SCALE IN FEET
0 200 400

CALCULATED RDA
CHECKED TES

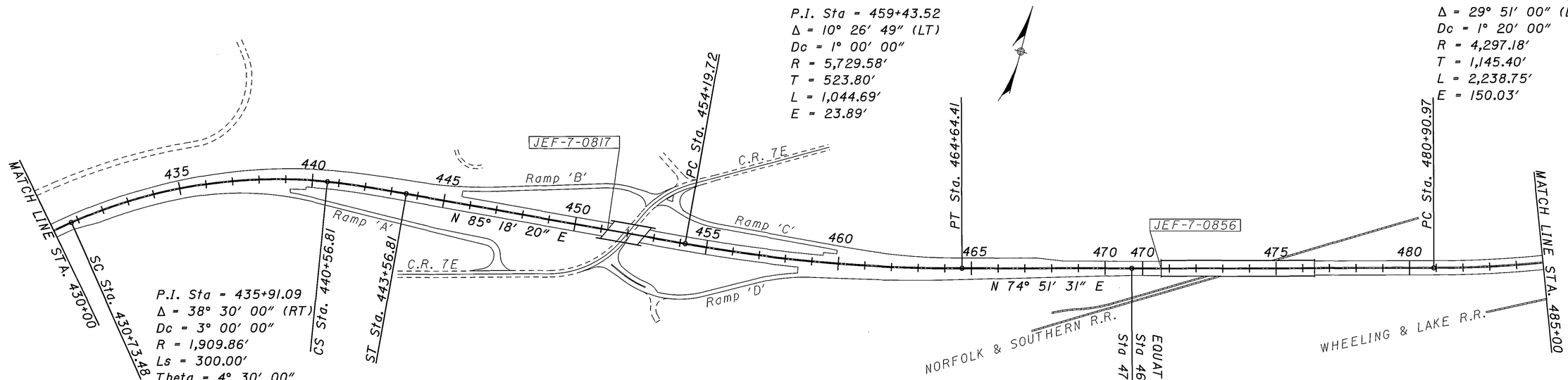
SCHEMATIC PLAN
STA. 242+00 TO STA. 375+00

JEF-7-4.77

2
49



NORMAL DESIGN CRITERIA FOR BRIDGES				
BRIDGE NO.	BRIDGE WIDTH		MEDIAN SHOULDER WIDTH	
	EXISTING	NDC	EXISTING	NDC
0693	---	---	1'-0"	3'-0"
0817	---	---	1'-0"	3'-0"
0856	27'-3"	30'-0"	1'-0"	3'-0"



P.I. Sta = 435+91.09
Δ = 38° 30' 00" (RT)
Dc = 3° 00' 00"
R = 1,909.86'
Ls = 300.00'
Theta = 4° 30' 00"
LT = 200.06'
ST = 100.06'
x = 299.81'
y = 7.85'
k = 149.97'
p = 1.96'
Δc = 29° 30' 00" (RT)
Lc = 983.33'
Ts = 817.61'
Es = 115.18'

HORIZONTAL SCALE IN FEET
0 200 400

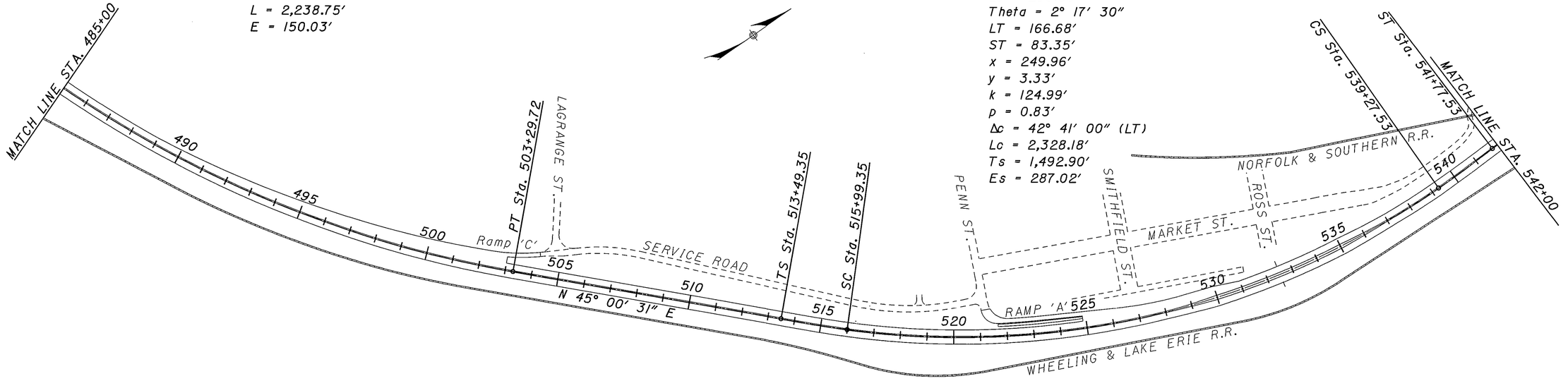
CALCULATED RDA
CHECKED TES

SCHEMATIC PLAN
STA. 375+00 TO STA. 485+00

JEF-7-4.77

P.I. Sta = 492+36.37
Δ = 29° 51′ 00″ (LT)
Dc = 1° 20′ 00″
R = 4,297.18′
T = 1,145.40′
L = 2,238.75′
E = 150.03′

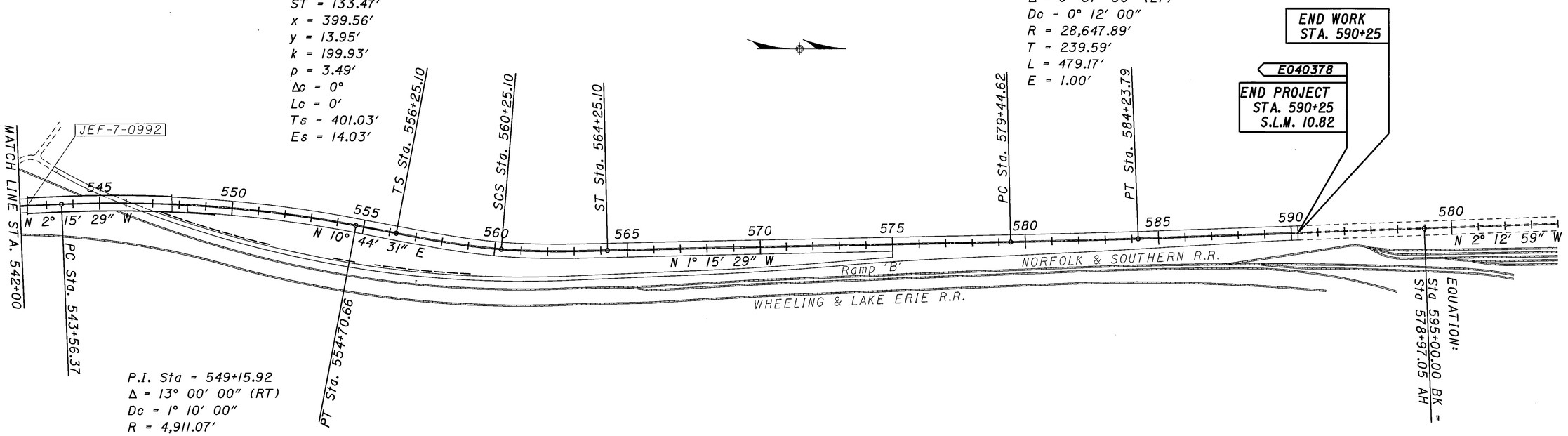
P.I. Sta = 528+42.25
Δ = 47° 16′ 00″ (LT)
Dc = 1° 50′ 00″
R = 3,125.22′
Ls = 250.00′
Theta = 2° 17′ 30″
LT = 166.68′
ST = 83.35′
x = 249.96′
y = 3.33′
k = 124.99′
p = 0.83′
Δc = 42° 41′ 00″ (LT)
Lc = 2,328.18′
Ts = 1,492.90′
Es = 287.02′



NORMAL DESIGN CRITERIA FOR BRIDGES				
BRIDGE NO.	BRIDGE WIDTH		MEDIAN SHOULDER WIDTH	
	EXISTING	NDC	EXISTING	NDC
0992	---	---	1′-0″	3′-0″

P.I. Sta = 560+26.13
Δ = 12° 00′ 00″ (LT)
Dc = 3° 00′ 00″
R = NA
Ls = 400.00′
Theta = 6° 00′ 00″
LT = 266.82′
ST = 133.47′
x = 399.56′
y = 13.95′
k = 199.93′
p = 3.49′
Δc = 0°
Lc = 0′
Ts = 401.03′
Es = 14.03′

P.I. Sta = 581+84.21
Δ = 0° 57′ 30″ (LT)
Dc = 0° 12′ 00″
R = 28,647.89′
T = 239.59′
L = 479.17′
E = 1.00′



P.I. Sta = 549+15.92
Δ = 13° 00′ 00″ (RT)
Dc = 1° 10′ 00″
R = 4,911.07′
T = 559.55′
L = 1,114.29′
E = 31.77′

HORIZONTAL SCALE IN FEET
0 200 400

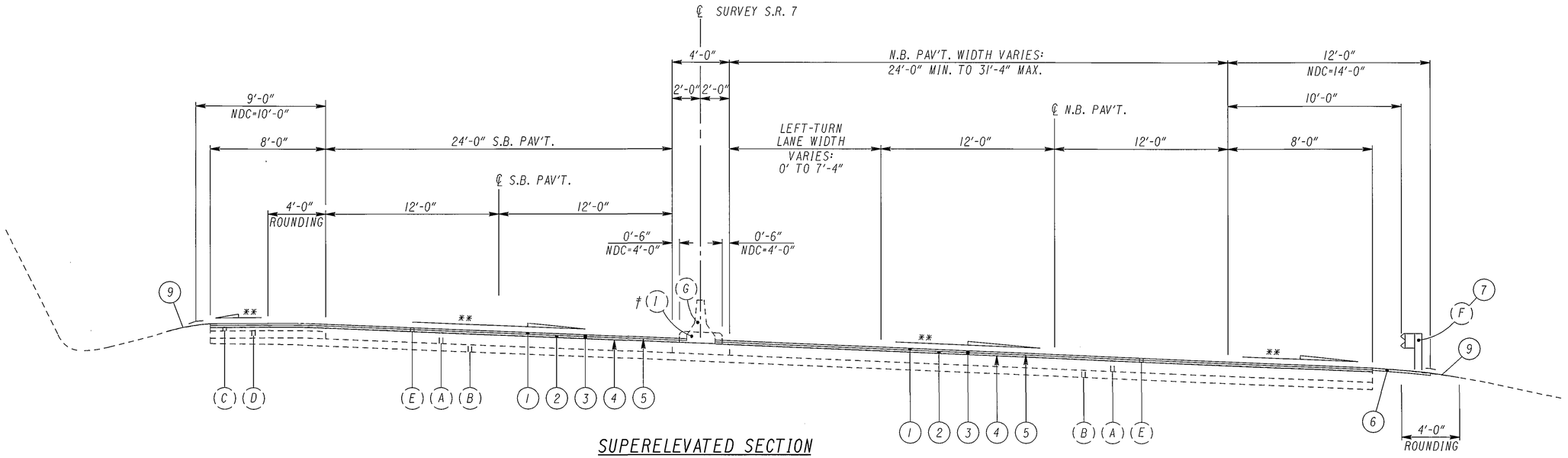
CALCULATED RDA
CHECKED TES

SCHEMATIC PLAN
STA. 485+00 TO STA. 584+00

JEF-7-4.77

4
49

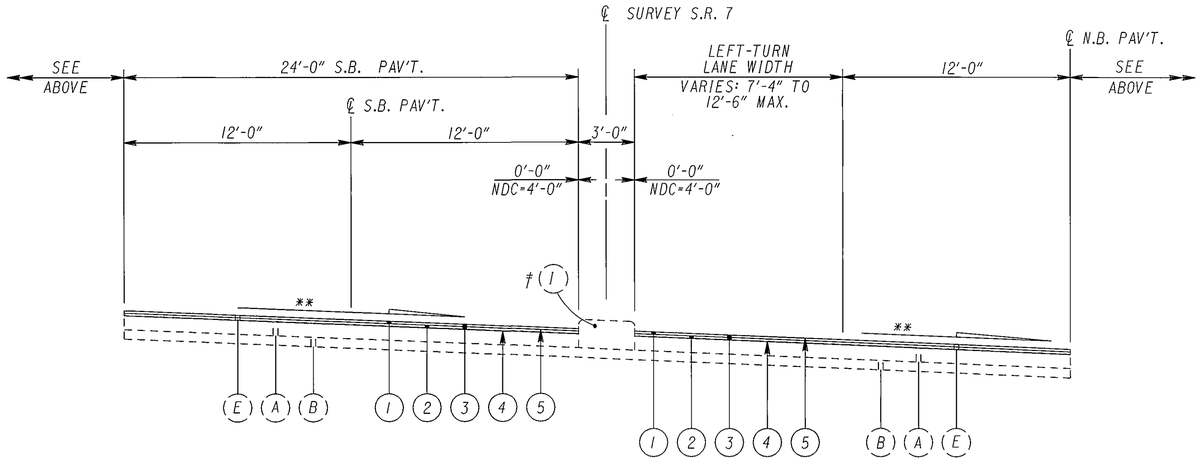
** SAME SLOPE AS EXISTING PAVEMENT



SUPERELEVATED SECTION

† FROM STA 281+75 TO STA 282+00 ONLY

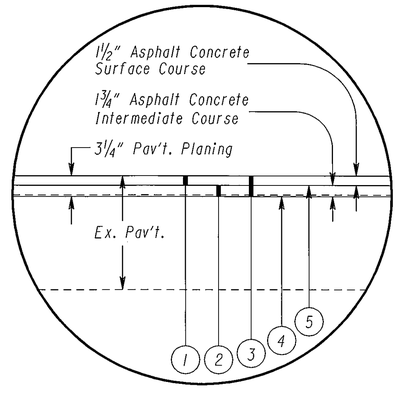
STA 271+96.50 TO STA 277+03.64 = 507.14 FT.
STA 281+75.00 TO STA 285+50.00 = 375.00 FT.
TOTAL = 882.14 FT.



SUPERELEVATED SECTION

STA 279+10.29 TO STA 281+75.00 = 264.71 FT.

† FROM STA 279+10.29 TO STA 280+30 ONLY



RESURFACING DETAIL (MAINLINE & SHOULDER)

STA 271+96.50 TO STA 285+50

EXISTING LEGEND

- (A) 9" REINFORCED CONCRETE PAVEMENT
- (B) 6" SUBBASE
- (C) ASPHALT CONCRETE BASE
- (D) AGGREGATE BASE
- (E) ASPHALT CONCRETE PAVEMENT
- (F) GUARDRAIL
- (G) 32" CONCRETE BARRIER
- (H) 4" UNDERDRAIN
- (I) CONCRETE MEDIAN
- (J) AGGREGATE DRAIN

PROPOSED LEGEND

- (1) ITEM 442 - ASPHALT CONCRETE SURFACE COURSE, 12.5MM, TYPE B (446), AS PER PLAN
- (2) ITEM 442 - ASPHALT CONCRETE INTERMEDIATE COURSE, 19MM, TYPE B (446)
- (3) ITEM 254 - PAVEMENT PLANING, ASPHALT CONCRETE
- (4) ITEM 407 - TACK COAT
- (5) ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE
- (6) ITEM 448 - 2" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I, UNDER GUARDRAIL, PG64-22, AS PER PLAN
- (7) ITEM 606 - GUARDRAIL, TYPE 5
- (8) ITEM 606 - GUARDRAIL, TYPE 5A
- (9) ITEM 209 - LINEAR GRADING, AS PER PLAN

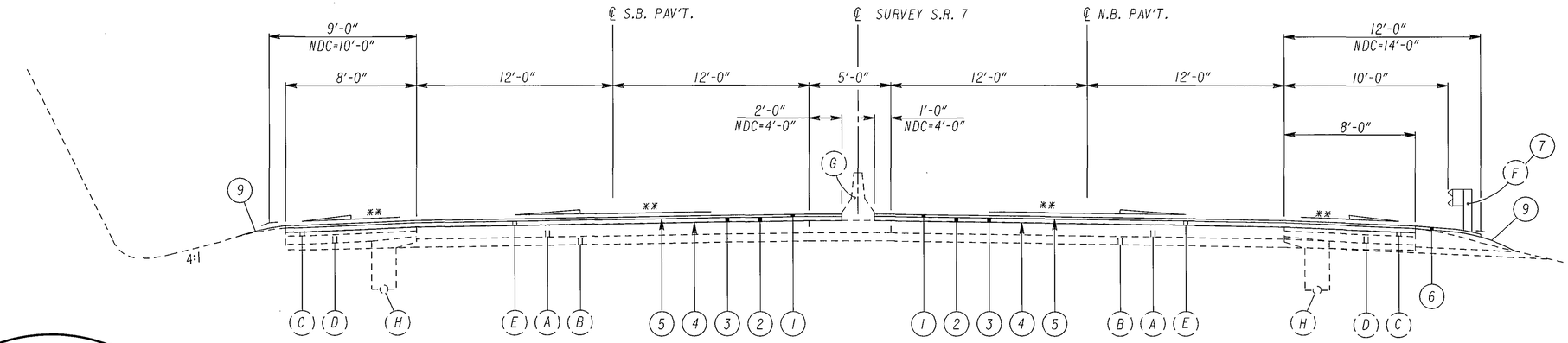
CALCULATED RDA
CHECKED TES

TYPICAL SECTIONS

JEF-7-4.77

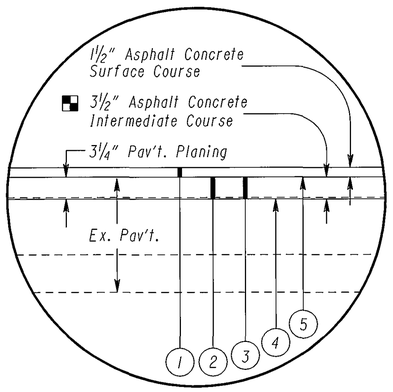
5
49

** SAME SLOPE AS EXISTING PAVEMENT



NORMAL SECTION

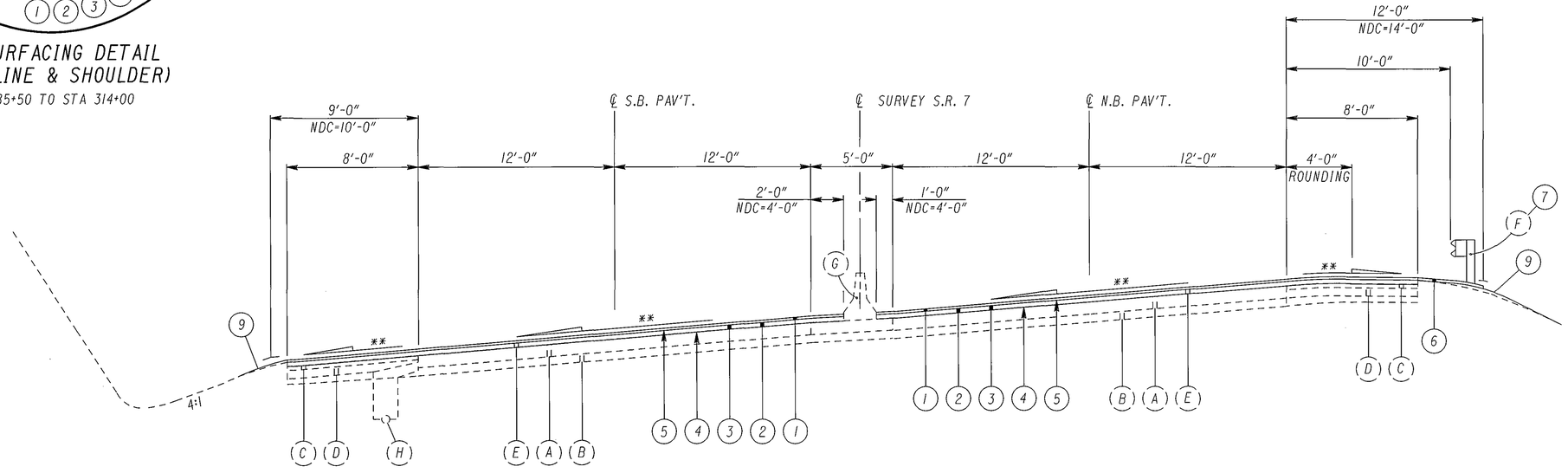
STA. 293+90.48 TO STA. 314+00 = 2009.52 FT.



■ 2 - 1¾" Lifts

RESURFACING DETAIL (MAINLINE & SHOULDER)

STA 285+50 TO STA 314+00



SUPERELEVATED SECTION

STA. 285+50 TO STA. 293+90.48 = 840.48 FT.

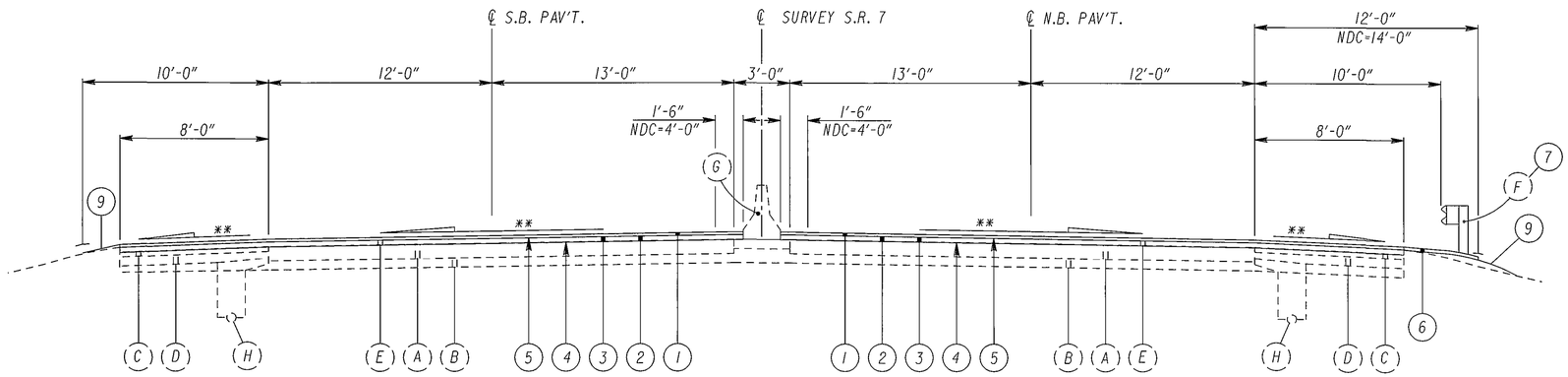
FOR LEGEND SEE SHEET NO. 5.

CALCULATED RDA CHECKED TES

TYPICAL SECTIONS

JEF-7-4.77

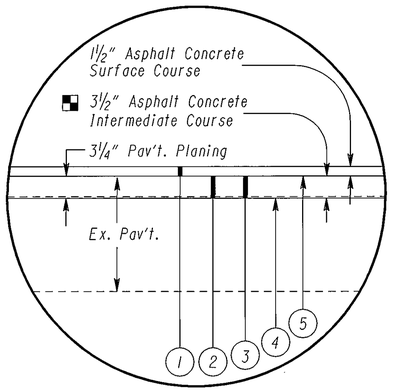
** SAME SLOPE AS EXISTING PAVEMENT



NORMAL SECTION

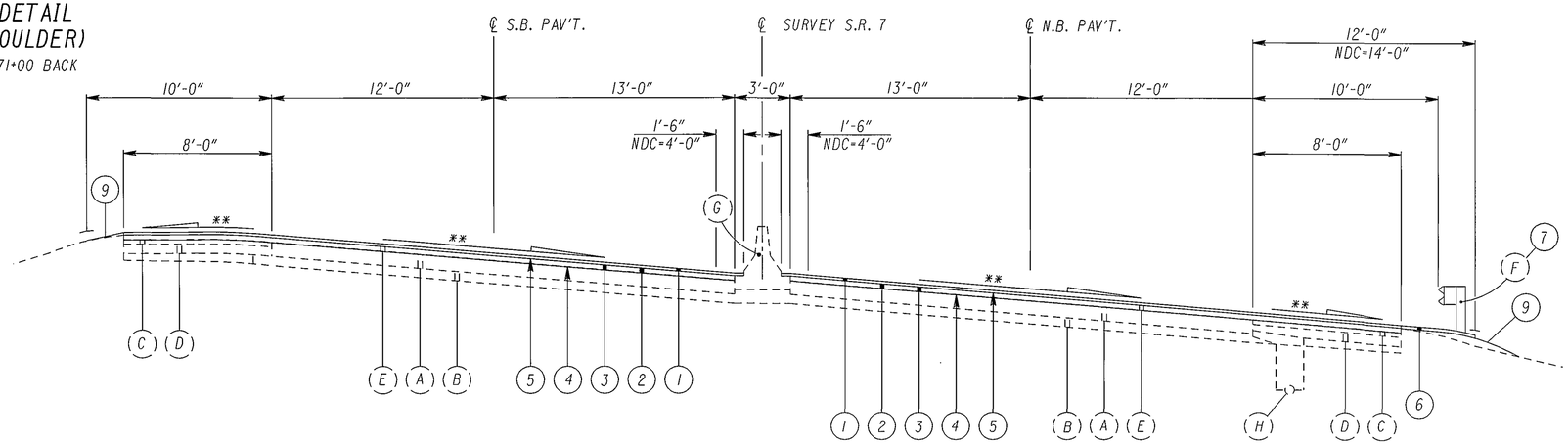
STA 320+50 TO STA 338+25	=	1775.00 FT.
STA 353+25 TO STA 385+52.97	=	3227.97 FT.
STA 413+00 TO STA 426+00	=	1300.00 FT.
STA 445+25 TO STA 450+98.40	=	573.40 FT.
STA 466+75 TO STA 471+00 BACK	=	425.00 FT.
TOTAL	=	7301.37 FT.

(STATION EQUATION: STA. 471+00 BACK = STA. 469+59.52 AHEAD)



■ 2 - 1¾" Lifts

RESURFACING DETAIL
(MAINLINE & SHOULDER)
STA 314+00 TO STA 471+00 BACK



SUPERELEVATED SECTION

STA 314+00 TO STA 320+50	=	650.00 FT.
STA 338+25 TO STA 353+25	=	1500.00 FT.
STA 387+24.73 TO STA 413+00	=	2575.27 FT.
STA 426+00 TO STA 445+25	=	1925.00 FT.
STA 452+92.60 TO STA 466+75	=	1382.40 FT.
TOTAL	=	8032.67 FT.

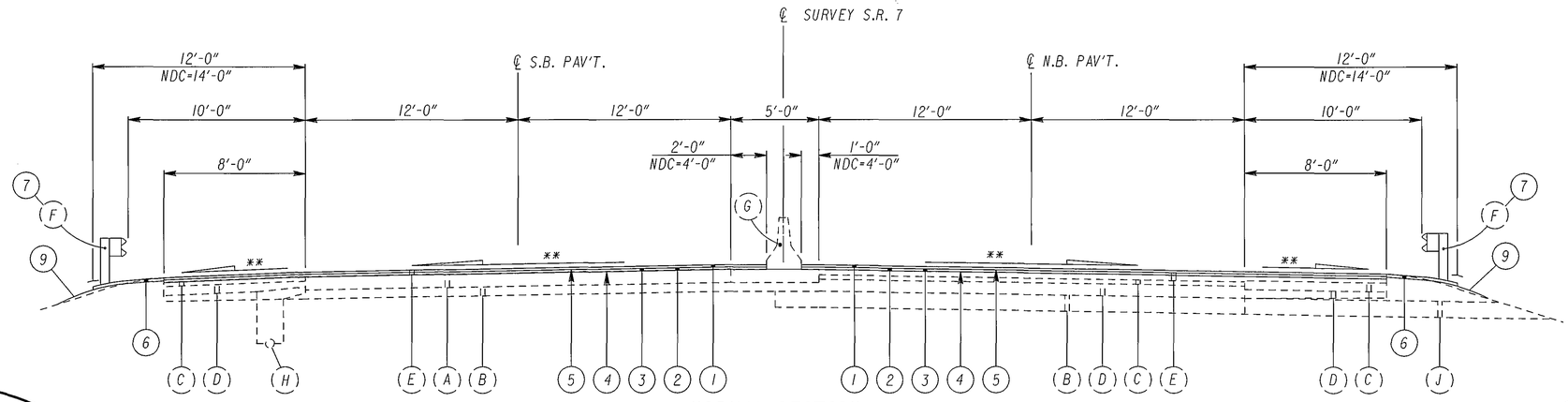
FOR LEGEND SEE SHEET NO. 5.

CALCULATED RDA
CHECKED TES

TYPICAL SECTIONS

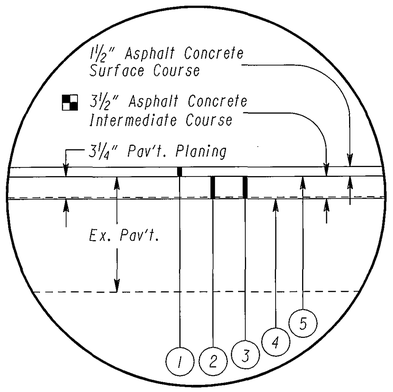
JEF-7-4.77

** SAME SLOPE AS EXISTING PAVEMENT



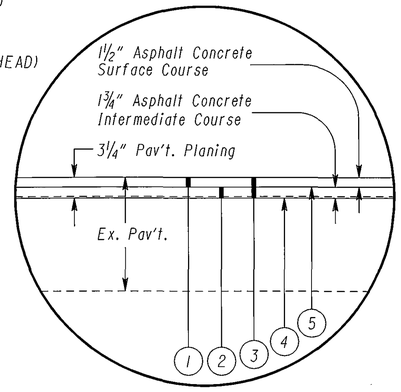
NORMAL SECTION

STA 469+59.52 AHEAD TO STA 470+44.00 = 84.48 FT. (STATION EQUATION: STA 471+00 BACK = STA 469+59.52 AHEAD)

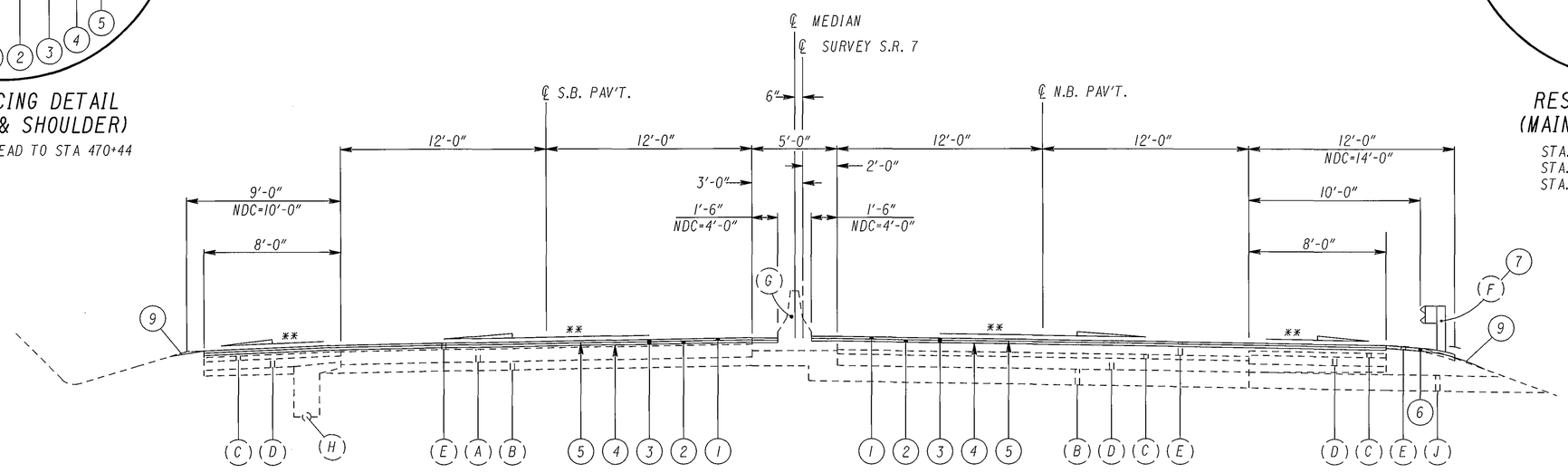


■ 2 - 1¾" Lifts

RESURFACING DETAIL
(MAINLINE & SHOULDER)
STA 469+59.52 AHEAD TO STA 470+44



RESURFACING DETAIL
(MAINLINE & SHOULDER)
STA. 476+45 TO STA. 480+00
STA. 504+00 TO STA. 513+50
STA. 563+50 TO STA. 586+25



NORMAL SECTION

STA. 476+45 TO STA. 480+00	=	355.00 FT.
STA. 504+00 TO STA. 513+50	=	950.00 FT.
STA. 563+50 TO STA. 586+25	=	2275.00 FT.
TOTAL	=	3580.00 FT.

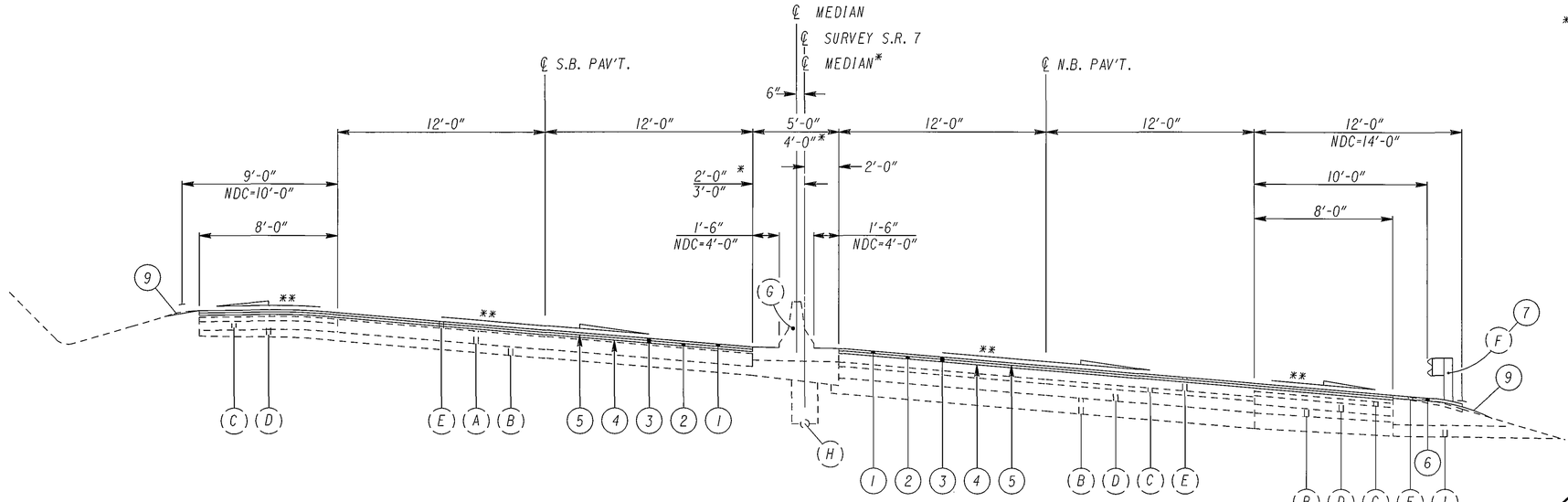
FOR LEGEND SEE SHEET NO. 5.

CALCULATED RDA CHECKED TES

TYPICAL SECTIONS

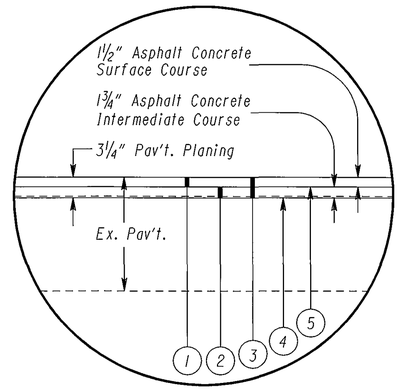
JEF-7-4.77

** SAME SLOPE AS EXISTING PAVEMENT



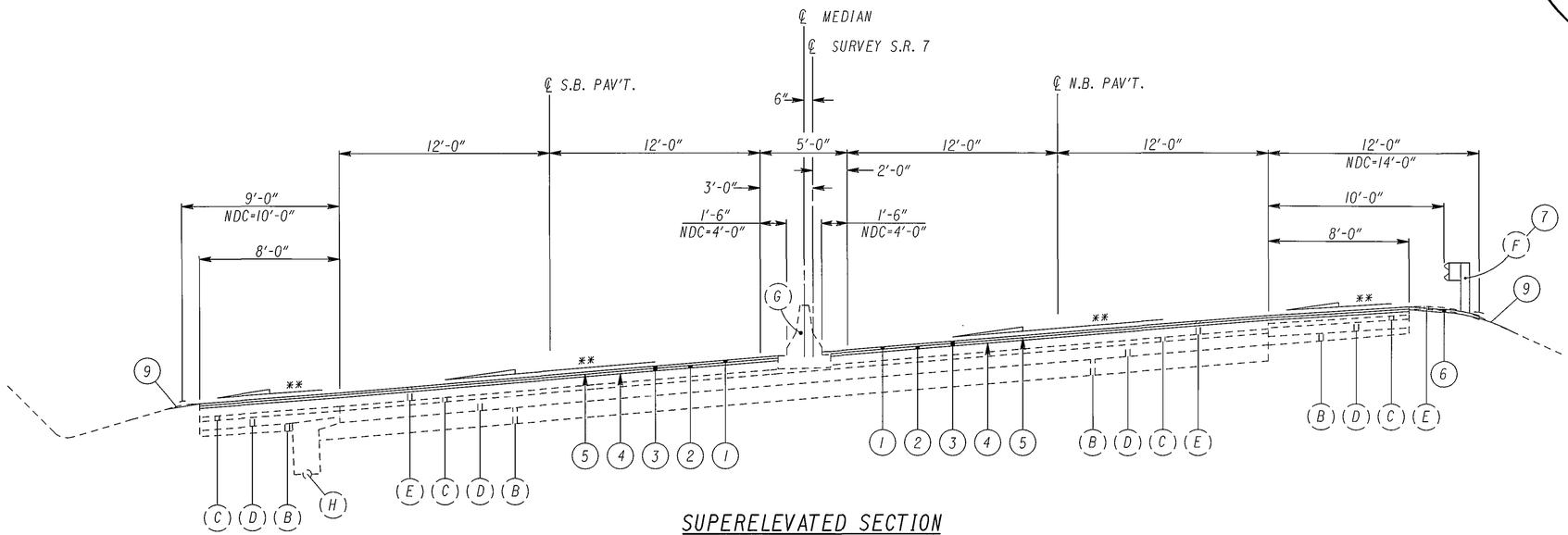
SUPERELEVATED SECTION

STA. 480+00 TO STA. 504+00 = 2400.00 FT.
STA. 513+50 TO STA. 524+00 = 1050.00 FT.
* STA. 540+51 TO STA. 542+04 = 153.00 FT.
STA. 547+97.50 TO STA. 563+50 = 1552.50 FT.
TOTAL = 5,155.50 FT.



RESURFACING DETAIL (MAINLINE & SHOULDER)

STA. 480+00 TO STA. 504+00
STA. 513+50 TO STA. 527+88.40
STA. 537+13.50 TO STA. 563+50



SUPERELEVATED SECTION

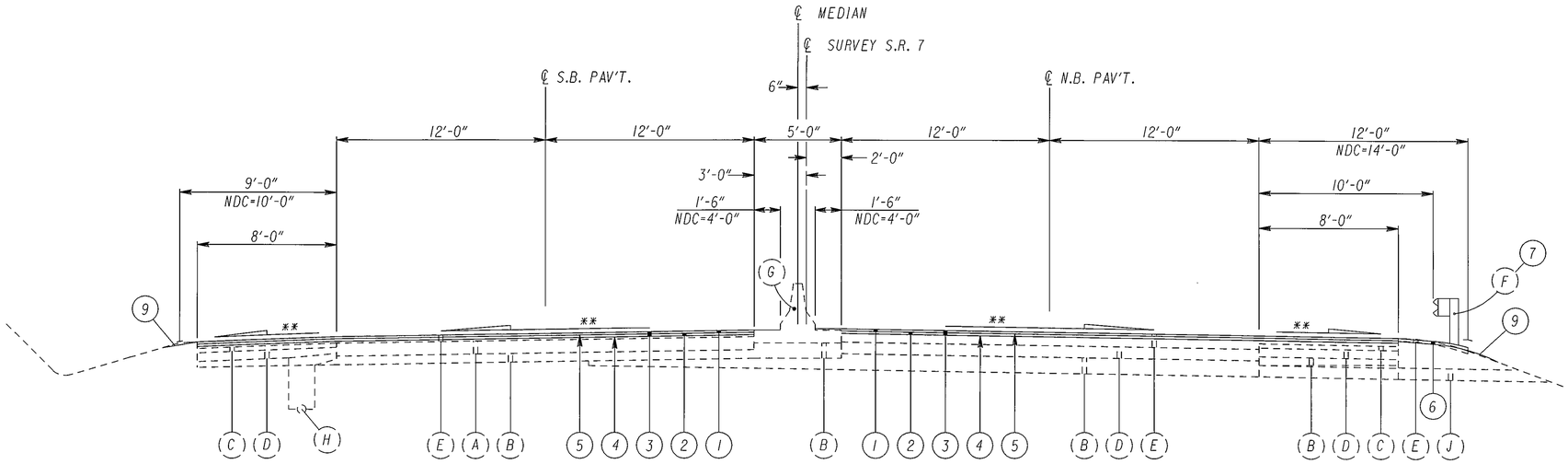
STA. 524+00 TO STA. 527+88.40 = 388.40 FT.
STA. 537+13.50 TO STA. 540+51.00 = 337.50 FT.
TOTAL = 725.90 FT.

FOR LEGEND SEE SHEET NO. 5.

CALCULATED RDA
CHECKED TES

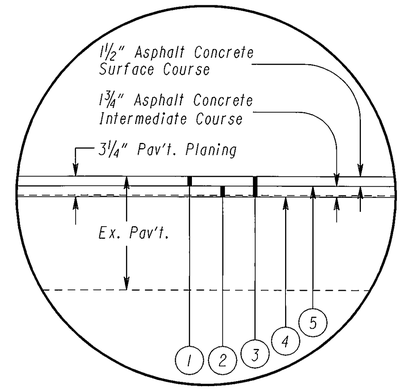
TYPICAL SECTIONS

JEF-7-4.77



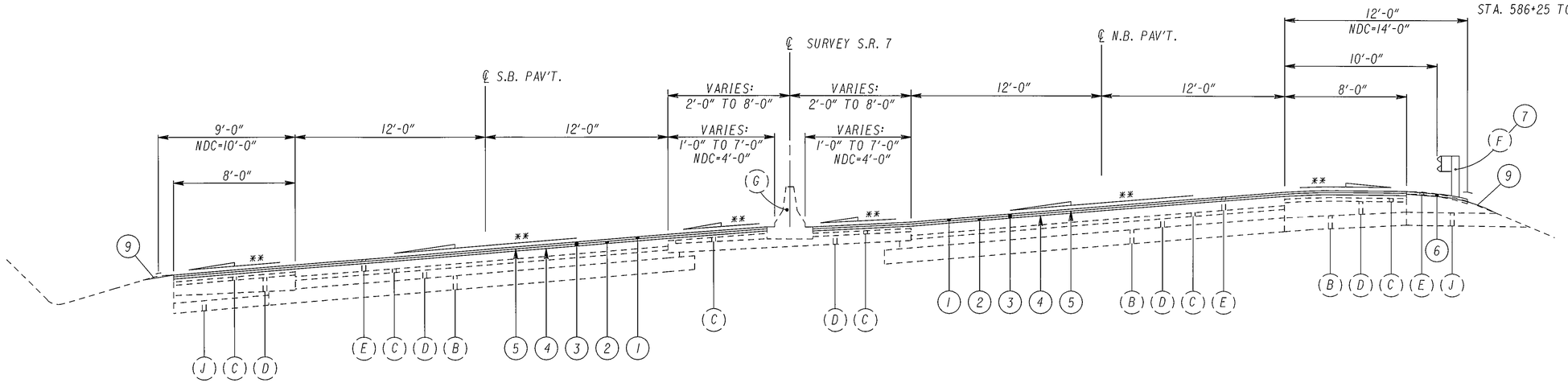
NORMAL SECTION

STA. 586+25 TO STA. 590+25 = 400.00 FT.



RESURFACING DETAIL
(MAINLINE & SHOULDER)

STA. 527+88.40 TO STA. 537+13.50
STA. 586+25 TO STA. 590+25



SUPERELEVATED SECTION

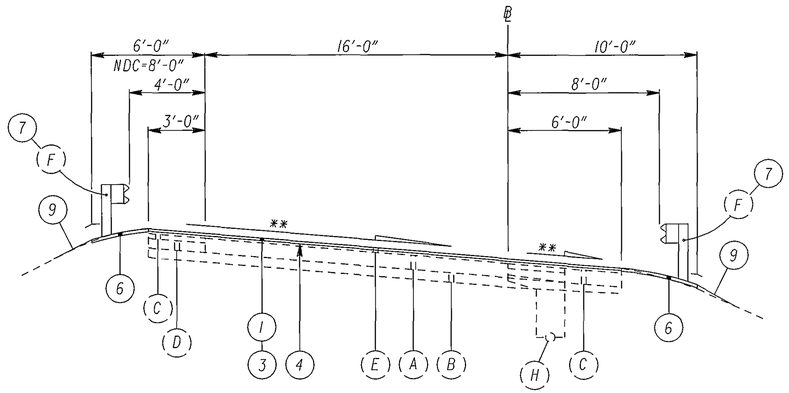
STA. 527+88.40 TO STA. 537+13.50 = 925.10 FT.

FOR LEGEND SEE SHEET NO. 5.

CALCULATED RDA
CHECKED TES

TYPICAL SECTIONS

JEF-7-4.77



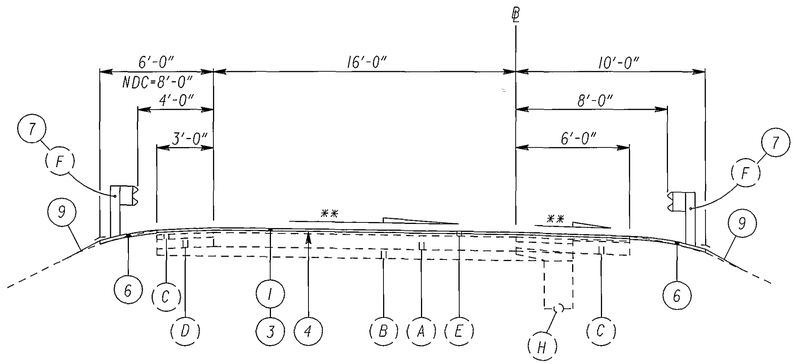
RAMP SUPERELEVATED SECTION

℄ RAMP "A" STA 439+19.00 TO STA 441+25.00 = 206.00 FT.
℄ RAMP "B" STA 445+63.80 TO STA 447+50.00 = 186.20 FT.
℄ RAMP "B" STA 449+00.00 TO STA 451+75.00 = 275.00 FT.
℄ RAMP "C" STA 454+25.00 TO STA 456+00.00 = 175.00 FT.
℄ RAMP "C" STA 459+25.00 TO STA 459+92.00 = 67.00 FT.
℄ RAMP "D" STA 453+75.00 TO STA 458+51.40 = 476.40 FT.
TOTAL = 1385.60 FT.

** SAME SLOPE AS EXISTING PAVEMENT

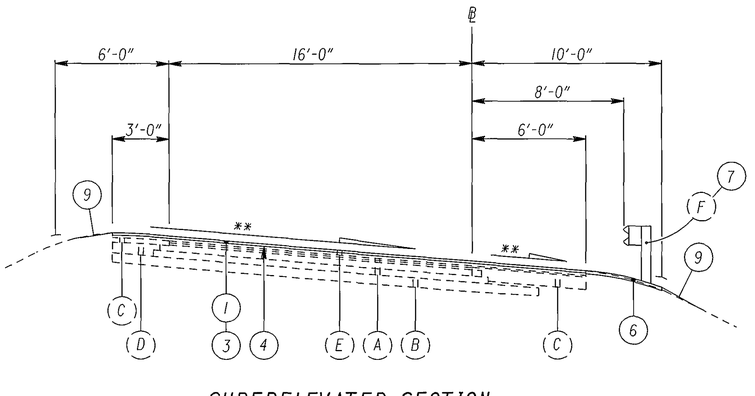
NOTE:
LEFT AND RIGHT SIDE CONFIGURATION ON RAMPS IS REFERENCED TO THE DIRECTION OF TRAVEL.

FOR LEGEND SEE SHEET NO. 5.



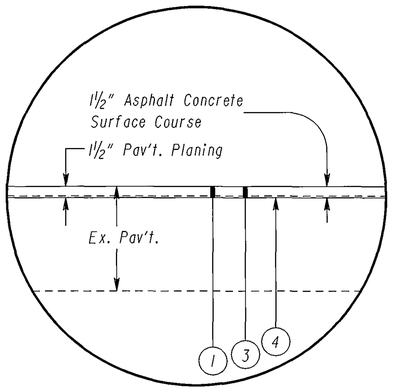
RAMP NORMAL SECTION

℄ RAMP "A" STA 441+25.00 TO STA 446+64.92 = 539.92 FT.
℄ RAMP "B" STA 447+50.00 TO STA 449+00.00 = 150.00 FT.
℄ RAMP "C" STA 456+00.00 TO STA 459+25.00 = 325.00 FT.
℄ RAMP "S" STA 382+13.00 TO STA 386+00.00 = 387.00 FT.
TOTAL = 1401.92 FT.

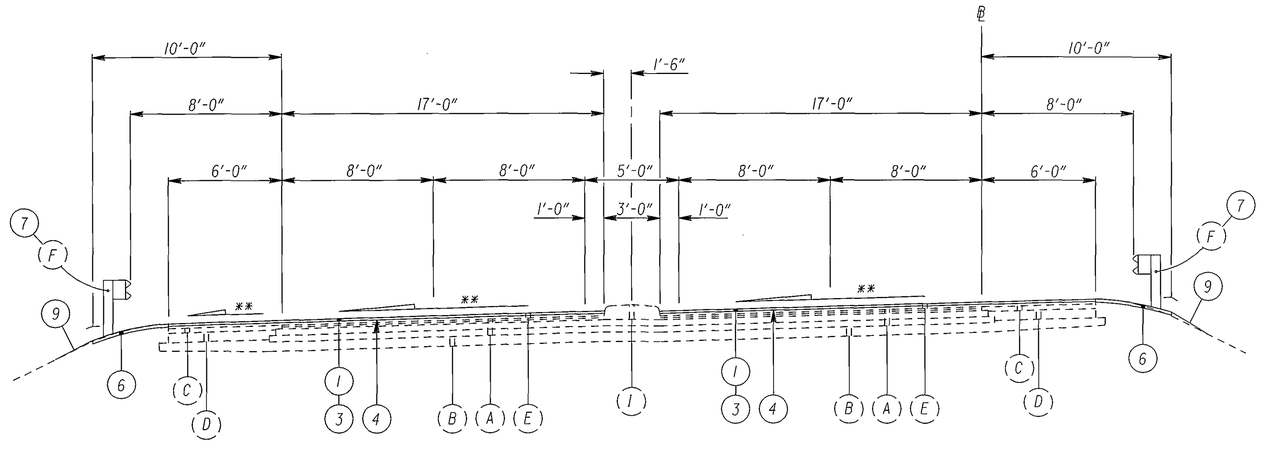


SUPERELEVATED SECTION

℄ RAMP "A" STA 446+64.92 TO STA 447+87.60 = 122.68 FT.
℄ RAMP "B" STA 451+75.00 TO STA 453+09.81 = 134.81 FT.
℄ RAMP "C" STA 453+05.38 TO STA 454+25.00 = 119.62 FT.
℄ RAMP "D" STA 452+56.00 TO STA 453+75.00 = 119.00 FT.
TOTAL = 496.11 FT.



RESURFACING DETAIL (RAMP & SHOULDER)



SUPERELEVATED SECTION

℄ RAMP "D" STA 450+49.55 TO STA 452+56 = 206.45 FT.

CALCULATED RDA
CHECKED TES

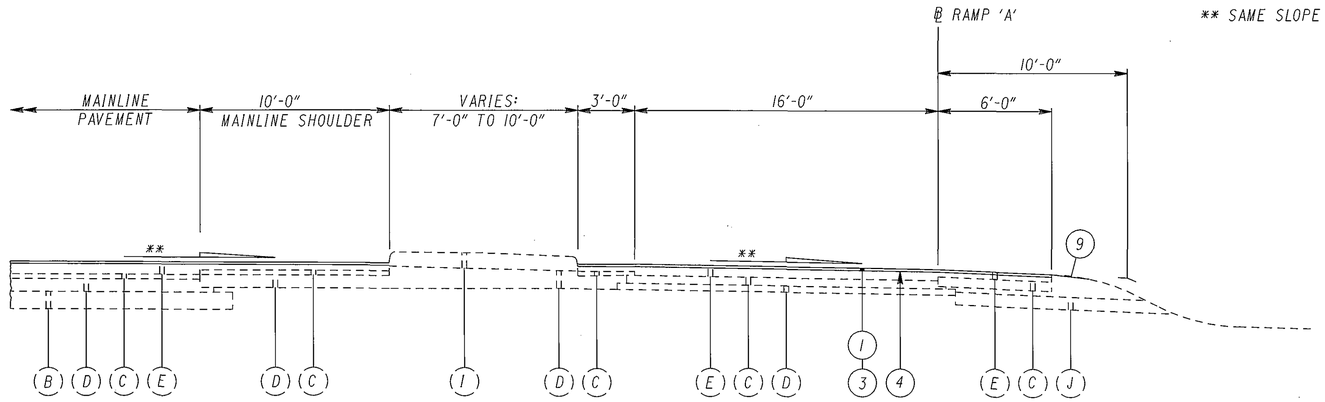
TYPICAL SECTIONS

JEF-7-4.77

11
49

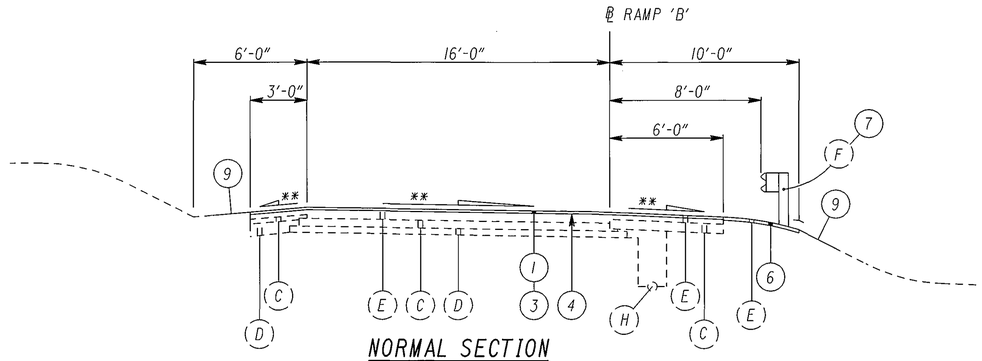
NOTE:
LEFT AND RIGHT SIDE CONFIGURATION ON RAMPS IS REFERENCED TO THE DIRECTION OF TRAVEL.

FOR LEGEND SEE SHEET NO. 5.



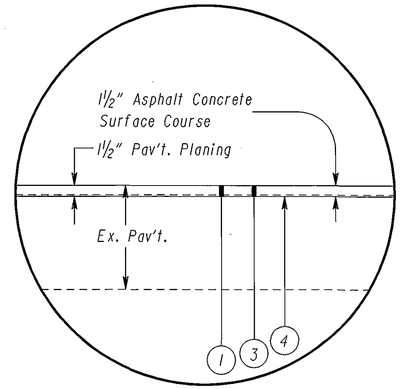
NORMAL SECTION

℄ RAMP "A" STA. 521+27.88 TO STA. 524+87.98 = 360.10 FT.

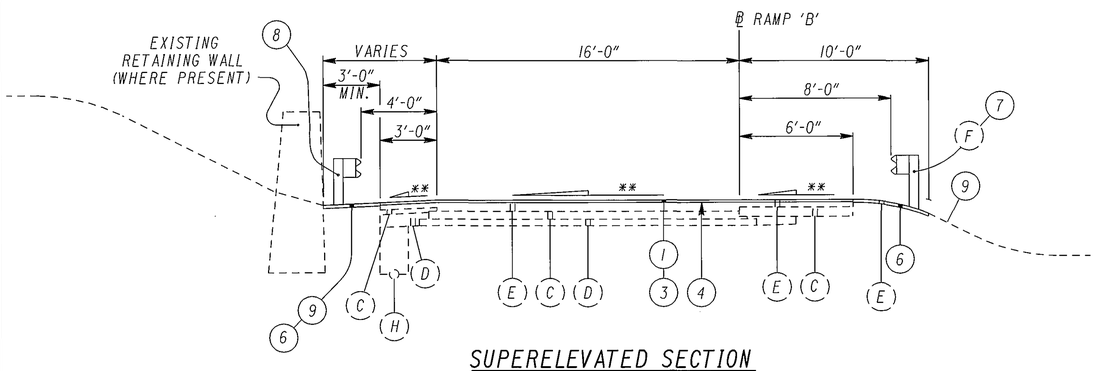


NORMAL SECTION

℄ RAMP "B" STA. 564+25.00 TO STA. 574+99.03 = 1074.03 FT.

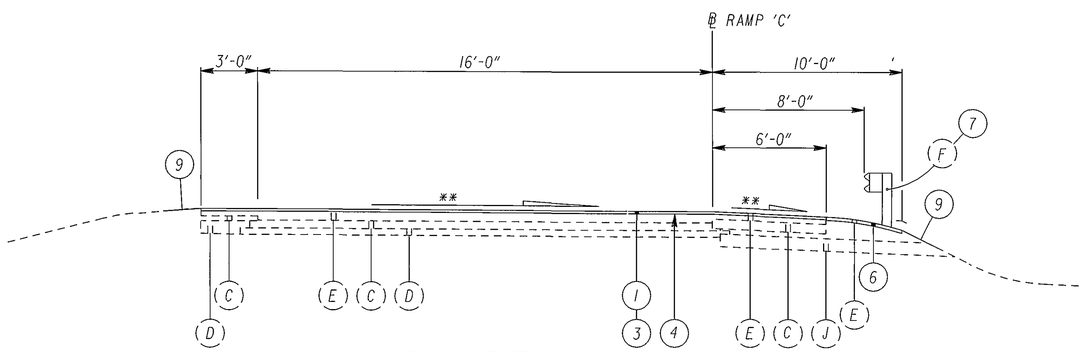


RESURFACING DETAIL
(RAMP & SHOULDER)



SUPERELEVATED SECTION

℄ RAMP "B" STA. 543+10 TO STA. 564+25 = 2115.00 FT.



NORMAL SECTION

℄ RAMP "C" STA. 102+93.21 TO STA. 104+14.56 = 121.35 FT.

CALCULATED RDA CHECKED TES

TYPICAL SECTIONS

JEF-7-4.77

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49

CALCULATED GDM CHECKED TES

GENERAL NOTES

ROUNDING

The rounding at slope breakpoints shown on the Typical Sections apply to all cross sections even though otherwise shown.

UTILITIES

Listed below are all utilities located within the project construction limits together with their respective owners:

Columbia Gas of Ohio, Inc. Attn: Desi Molina
2429 Linden Ave.
Zanesville, Ohio 43701
Ph. 740/450-1205

Columbia Gas Transmission Attn: Keith Spires
950 Manifold Rd.
Washington, Pa. 15301
Ph. 724/627-2114

Comcast Attn: Bob Jackson
908 National Road
P.O. Box 469
Bridgeport, Ohio 43912
Ph. 740/699-5635

AEP Ohio Power Attn: Jeff Turner
P.O. Box 99
47687 National Rd.
St. Clairsville, Ohio 43950
Ph. 740/699-7845

Verizon Attn: Jennifer Lofton
6223 Norwalk Rd.
Medina, Ohio 44256
Ph. 330/364-0501

Ohio Department of Transportation
District 11, Roadway Service Manager
2201 Reiser Ave.
New Philadelphia, Oh 44663
Ph. 330/308-7809

There are no underground utilities shown on this plan. The nature of the work required by this project will not affect any known underground utilities that exist under or adjacent to the work area.

CONTINGENCY QUANTITIES

The Contractor shall not order materials or perform work for items designated by plan note to be used "as directed by the Engineer" unless authorized by the Engineer. The actual work locations and quantities used for such items shall be incorporated into the final change order governing completion of this project.

ELEVATION DATUM

All elevations are based on NAVD 1988.

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.

PROFILE AND ALIGNMENT

The work proposed by this project is for the grinding of the existing pavement. The alignment and superelevation rates of the existing pavement will not be changed and the profile of the proposed surface will be similar to that of the existing pavement except that it will be raised as shown in the typical sections. Previous construction plans showing the original alignment and profile are listed below.

PREVIOUS CONSTRUCTION PLANS

The following previous construction plans, which show the original alignment and profile, are available for inspection at the ODOT District 11 office:

JEF-7-(4.67-6.06) Original Construction Plan, 1954
JEF-7-(8.22-10.35) Original Construction Plan, 1956
JEF-7-(4.63-8.99) Original Construction Plan, 1968
JEF-7-9.29 Original Construction plan, 1973
JEF-7-4.77 Upgrading plan, 1987
JEF-7-8.56 Upgrading plan, 1988

SAME SEASON COMPLETION OF SURFACE COURSE

Any length of resurfacing work started in a construction season shall have the surface course placed that same season.

CONVERSION OF METRIC STANDARD DRAWINGS

The metric standard drawings referenced in this plan shall be converted to English units using the SI (Metric) to English Conversion Factors provided in Section 109.02 of the 2002 Construction and Materials Specifications. Conversions shall be appropriately precise and shall reflect standard industry English values where suitable.

ITEM 442 - ASPHALT CONCRETE SURFACE COURSE, 12.5mm, TYPE B (446), AS PER PLAN

Materials furnished for fine and coarse aggregates used in this item shall exclude all stone and crushed carbonate stone.

PAVING UNDER GUARDRAIL

This operation shall include preparation of the graded shoulder using Item 209, Linear Grading, As Per Plan, and paving under the guardrail using Item 448, Asphalt Concrete Intermediate Course, Type I, Under Guardrail, PG64-22, As Per Plan.

Item 209, Linear Grading, As Per Plan, shall consist of excavating topsoil, placing granular material, and applying herbicide as specified in the plans and in accordance with the following:

All collected debris and topsoil, including rhizomes, roots, and other vegetative plant material, shall be removed and disposed of as specified in 105.17.

The removed material shall be replaced with compactable granular material conforming to 703.16, placed to grade as detailed on the Typical Sections, or as approved by the Engineer.

Herbicide shall be EPA approved for paving under guardrail. It shall be applied to the prepared area after final leveling and grading has been completed. The application shall be just prior to paving, and shall strictly adhere to the manufacturer's instructions.

Each successful bidder must be licensed by the Ohio Department of Agriculture as a commercial applicator and all persons involved in the actual spraying shall be licensed as commercial operators in the appropriate spray category.

Herbicide label, material safety data sheet and copy of applicators licenses shall be submitted to the Engineer for verification prior to commencing work.

All equipment, materials, and labor required to preform the work outlined above shall be included for payment under item 209, Linear Grading, As Per Plan.

Paving under guardrail shall consist of placing a 2" course of Item 448 using the following method:

1) Place Item 448
2) Bore asphalt at post locations (may be omitted if steel posts are used)
3) Set guardrail posts
4) Patch around posts. The materials used for patching shall be an asphalt concrete approved by the Engineer. Patched areas shall be compacted using either hand or mechanical methods. Finished surfaces shall be smooth and sloped to drain away from the posts.

All equipment, materials, and labor required to perform the work outlined above, with the exception of setting guardrail posts, shall be included for payment under Item 448, Asphalt Concrete Intermediate Course, Type I, Under Guardrail, PG64-22, As Per Plan.

ITEM 864, SEALING OF CONCRETE SURFACES (EPOXY-URETHANE), AS PER PLAN

The Contractor shall apply the epoxy-urethane concrete sealer to all exposed surfaces of the concrete median barrier with the exception of the median barrier on bridge no's JEF-7-0487, JEF-7-0693, and JEF-7-0992. The epoxy sealer shall also be applied to the D-50 rock wall and the outside parapets on bridge no's JEF-7-0817 and JEF-7-0856. The epoxy sealer shall be tinted to Federal Color Standard No. 17778 (Light Neutral). The following quantity has been carried to the General Summary for sealing concrete surfaces.

Item 864, Sealing of Concrete Surfaces (Epoxy-Urethane), As Per Plan - - 22,337 Sq. Yd.

ITEM 626 BARRIER REFLECTOR, TYPE B, AS PER PLAN

This item shall consist of the removal and replacement of the median barrier reflectors within the project limits. Barrier reflectors shall be removed prior to the sealing of the concrete sufaces. Payment for the above work shall be made at the unit price bid for Item 626, Barrier Reflector, Type B, As Per Plan and shall include all labor, tools, equipment, and materials. The following quantity has been carried to the General Summary for barrier reflectors.

Item 626, Barrier Reflector, Type B, As Per Plan - - - - - - 630 Each

COOPERATION BETWEEN CONTRACTORS

The Contractor is hereby advised that a Bridge Replacement Project, JEF-7-4.87, may be ongoing during the same period this project is to be constructed. Upon award of this contract, the Contractor shall notify the Engineer and the other contractors of the effects of this contract upon the JEF-7-4.87 project. The Contractor shall cooperate with the other contractors in accordance with Sec. 105.08 and arrange a mutually acceptable work schedule, subject to the approval of the Engineer. Any conflicts between contractors involving work schedules, work areas or cooperation will be resolved by the Engineer.

ITEM 209, LINEAR GRADING, AS PER PLAN

Graded shoulders shall be reshaped as directed by the engineer to ensure a smooth, drainable surface that is free of all irregularities. Vegetation, material buildup, and collected debris on the shoulder or within the linear grading limits shall be removed and disposed of by the Contractor as specified in section 209.01, or wasted over fill slopes at the direction of the Engineer.

This item shall meet the requirements of Item 209 Linear Grading except as follows:

The Contractor shall use the grindings from the project in lieu of the suitable material.

The cost for storing the grindings on the project and placing the grindings on the shoulders shall be included in the unit price bid for Item 209 Linear Grading, As Per Plan.

Linear grading in areas of the existing or proposed guardrail shall be as specified in these plans. (see Paving Under Guardrail note).

All equipment, materials, and labor required to perform the work outlined above shall be included for payment under Item 209, Linear Grading, As Per Plan.

ITEM 202, RAISED PAVEMENT MARKER REMOVED AND DISPOSED, AS PER PLAN

Existing raised pavement markers shall become the property of the Contractor for disposal off the project. The requirement to fill the depressions shall be waived. The following quantity has been carried to the General Summary to remove existing raised pavement markers:

Item 202, Raised Pavement Marker Removed and Disposed, As Per Plan - - - 932 Each

ITEM 604 INLET, NO. 3C, AS PER PLAN

This item shall consist of removing the existing precast top section and trough of the median inlets and replacing them as detailed in the plans.

The proposed precast trough shall meet all the requirements of Item 604 Inlet, No. 3C except that the height of the trough shall be 1'-5¾" as shown in the plans. The Contractor may reuse the top provided it is undamaged during removal, as determined by the Engineer. Care shall be taken to prevent damage to the concrete base of the inlet. Any damage to the base shall be repaired by the Contractor at no additional cost to the state.

Payment for the above work shall include all labor, tools, equipment, and materials necessary to construct the complete Inlet No. 3C, As per Plan.

ITEM 622, CONCRETE BARRIER, TYPE A, AS PER PLAN

The Contractor shall transition the existing barrier shape and elevation to match the shape and elevation of the proposed Inlet within 5' as shown in the plans. Payment for the above work shall be made at the unit price bid for Item 622, Concrete Barrier, Type A, As Per Plan, and shall include all labor, tools, equipment, and materials.

ITEM 407, TACK COAT FOR INTERMEDIATE COURSE

Where it is necessary to maintain traffic on the first lift of the intermediate course the Contractor shall be required to tack before the second lift is placed. The following quantity has been carried to the General Summary for this purpose.

Item 407, Tack Coat for Intermediate Course - - - - - - 5146 Gallon

CONNECTION BETWEEN EXISTING AND PROPOSED GUARDRAIL

When it is necessary to splice proposed guardrail to existing guardrail, only the existing guardrail shall be cut, drilled, or punched. The connection shall be made using a "W-Beam Rail Splice" as shown on Standard Construction Drawing GR-1.1. Payment shall be included in the contract price for the respective guardrail items.

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 Trinity Industry, 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. #	Drawing Name	Dwg./Rev. Date	ODOT Approval Date
SS265M	ET-2000 (1997) Plan, Elevation & Sections	6/20/97	3/6/98
SS142	E2000 PLUS 50'-0" Plan, Elevation & Sections 25'-0" Rail, Sleeve w/PL Posts 1-4	4/12/00	7/31/00
SS141	ET2000 PLUS Plan, Elevation & Sections 25'-0" Rail, HBA Posts 1-4	2/29/00	7/31/00
SS158	ET2000 PLUS 50'-0" WITH 12'-6" Rail, HBA Posts 1-4 Plan, Elevation & Sections	5/22/00	7/31/00

2). The SKT-350 manufactured by Road Systems, Inc., 2516 Mallory Lane, Stow, Ohio 44224 (Telephone: 330-346-0721).

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. #	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".

Refer to the manufacturer's instruction regarding the installation of, and the grading around, the foundation tubes and ground strut. The top of any foundation tube should be less than 4-inches above the ground. The placement of the foundation tubes should be an appropriate depth below the level line in order to maintain the finished guardrail height of 27-3/4-inches from the edge of the shoulder.

On-site grading is required if the top of the foundation tubes or top of the ground strut does project more than 4-inches above the ground line.

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.

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.

CENTERLINE REFERENCE MONUMENTS

Existing centerline monument assemblies are located at the station and offset shown below. The Contractor shall take care not to disturb any of these centerline reference monuments.

CENTERLINE REFERENCE MONUMENTS

LOCATION	OFFSET FROM ℄ S.R. 7	
	LT.	RT.
	FEET	
T.S. 271 + 36.85	36	
S.C. 275 + 36.85	36	42
C.S. 280 + 36.85	36	49
S.T. 284 + 36.85	38	38
T.S. 285 + 56.31	37	36
S.C. 289 + 56.31	37	38
C.S. 289 + 90.48	37	38
S.T. 293 + 90.48	37	38
P.O.T. 298 + 00	37	38
P.C. 303 + 32	37	38
P.O.C. 308 + 00	37	38
P.O.C. 312 + 00	37	38
P.C.C. 316 + 21.33	37	39
P.T. 317 + 96.39	37	39
P.O.T. 323 + 00	37	39
P.O.T. 328 + 00	37	39
P.O.T. 339 + 00	37	39
T.S. 338 + 25	37	39
S.C. 343 + 25	37	39
C.S. 348 + 25	37	39
S.T. 353 + 25	37	39
P.O.T. 358 + 00	39	39
P.O.T. 363 + 50	37	39
P.C. 368 + 56.55	37	39
P.O.C. 372 + 00	37	39
P.O.C. 377 + 00	39	51
P.T. 381 + 42.27	37	69
P.O.T. 385 + 00	39	39
P.O.T. 388 + 75	37	39
P.O.C. 395 + 00	37	37
P.O.C. 400 + 00	37	37
P.O.C. 405 + 00	37	39
P.T. 410 + 59.56	37	39
P.O.T. 415 + 00	37	37
P.O.T. 420 + 00	37	37
P.O.T. 425 + 00	39	39
T.S. 427 + 73.48	39	39
S.C. 430 + 73.48	37	38
P.O.C. 435 + 00	40	49
C.S. 440 + 56.82	53	39
S.T. 443 + 56.82	62	39
P.O.T. 450 + 00	37	39
P.C. 454 + 19.68	39	37
P.O.C. 459 + 00	37	37
P.T. 464 + 64.32	51	52
P.O.T. 471 + 00 BACK	39	39
P.C. 388 + 99.56	37	37

CENTERLINE REFERENCE MONUMENTS

LOCATION	OFFSET FROM ℄ S.R. 7	
	LT.	RT.
	FEET	
P.O.T. 478 + 00	39	38
P.C. 480 + 90.95	39	38
P.O.C. 485 + 00	39	38
P.O.C. 491 + 00	44	38
P.O.C. 495 + 00	54	38
P.O.C. 500 + 00	67	38
P.T. 503 + 29.70	80	38
P.O.T. 508 + 00	37	38
T.S. 513 + 49.33	37	38
S.C. 515 + 99.33	37	38
P.O.C. 520 + 00	37	36
P.O.C. 525 + 00	72	36
P.O.C. 530 + 00	54	42
P.O.C. 535 + 00	42	44
C.S. 539 + 27.51	38	38
S.T. 541 + 77.51	38	38
P.O.C. 550 + 00	39	38
P.T. 554 + 70.64	37	38
T.S. 556 + 25.08	37	38
S.C.S. 560 + 25.08	37	38
S.T. 564 + 25.08	37	38
P.O.T. 570 + 00	37	38
P.O.T. 575 + 00	37	74
P.C. 579 + 44.59	37	63
P.T. 584 + 23.75	37	51
P.O.T. 590 + 00	37	38

COORDINATION OF RESURFACING AND PLANING OPERATIONS

The pavement planing and resurfacing operation shall be completed in a timely manner as directed by the Engineer. The grindings shall remain the property of ODOT with the exception that some grindings will be utilized by the Contractor as noted in the plans. The Contractor shall deliver the remaining grindings at his expense to the following location:

Jefferson Co. Garage, Weigh scale area, 1 mile south of CR-17 on SR 7

The Contractor will supply all labor and equipment to stockpile the material in a manner acceptible to the Engineer. Continuous end dumping will not be permitted. For additional information contact the Jefferson County Manager at 740/264-1722

CALCULATED GDM CHECKED TES

GENERAL NOTES

JEF-7-4.77

CALCULATED TES CHECKED JPB

MAINTENANCE OF TRAFFIC

TRAFFIC MAINTENANCE

THE CONTRACTOR SHALL MAINTAIN TRAFFIC AT ALL TIMES IN ACCORDANCE WITH THE REQUIREMENTS OF CMS ITEM 614, THESE MAINTENANCE OF TRAFFIC NOTES AND DETAILS, THE STANDARD CONSTRUCTION DRAWINGS, AND THE TRAFFIC CONTROL DETAILS DESCRIBED IN THESE PLANS.

THE MINIMUM LANE WIDTH FOR TRAFFIC CONTROL SHALL BE 11 FEET AT ALL TIMES ON SR 7. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ORGANIZE HIS WORK IN SUCH A MANNER TO PROVIDE THE MOST SAFETY WITH THE LEAST INCONVENIENCE TO THE TRAVELING PUBLIC.

THE CONTRACTOR IS RESPONSIBLE FOR DESIGNING THE MAINTENANCE OF TRAFFIC SCHEME. THE CONTRACTOR SHALL SUBMIT, IN WRITING, THIS MAINTENANCE OF TRAFFIC SCHEME AND A SCHEDULE OF OPERATIONS TO THE ENGINEER AND RECEIVE APPROVAL BEFORE WORK IS STARTED ON THE PROJECT.

ANY OPEN PAVEMENT TRENCH OR DROPOFF SHALL BE ADEQUATELY MAINTAINED AND PROTECTED WITH BARRICADES, DRUMS, VERTICAL PANELS OR PORTABLE CONCRETE BARRIER. THE PROTECTION USED SHALL MEET THE REQUIREMENTS OF THE DROPOFFS IN THE WORK ZONE SHEET INCLUDED IN THIS PLAN.

UNDER NO CIRCUMTANCES SHALL THE CONTRACTOR BE PERMITTED TO HAVE WORK ZONES WHICH ALTERNATELY CLOSE BOTH THE PASSING AND TRAVEL LANE UNLESS THE DISTANCE BETWEEN LANE RESTRICTIONS EXCEEDS 2 MILES.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR SMOOTH AND ORDERLY FLOW OF TRAFFIC THROUGH THE PROJECT AREA 24 HOURS PER DAY FOR THE DURATION OF THE PROJECT. THIS CONSISTS OF NOTIFYING THE OHIO STATE PATROL AFTER ENCOUNTERING ANY ACCIDENTS OR DISABLED VEHICLES OR OBJECTS HINDERING THE FLOW OF TRAFFIC.

THE CONTRACTOR SHALL DESIGNATE TO THE ENGINEER, A PERSON RESPONSIBLE FOR MAINTENANCE OF TRAFFIC CONTROL DURING NON-WORK HOURS WHO SHALL BE AVAILABLE WITHIN THIRTY (30) MINUTES AFTER NOTIFICATION.

PAYMENT FOR PROVIDING WATCHMEN, FURNISHING, ERECTING, MAINTAINING AND REMOVING SIGNS, BARRICADES, CONES, MARKERS, SPECIAL LIGHTING, PORTABLE CONCRETE BARRIER AND APPLICABLE END TREATMENTS, FLOODLIGHTING, WORK ZONE PAVEMENT MARKINGS, WORK ZONE RAISED PAVEMENT MARKERS, ETC., SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 614 MAINTAINING TRAFFIC, AS PER PLAN.

THE CONTRACTOR SHALL FURNISH, INSTALL AND MAINTAIN ALL ADDITIONAL SIGNS OR OTHER TRAFFIC CONTROL DEVICES DEEMED NECESSARY BY THE ENGINEER. ALL COSTS INVOLVED IN FURNISHING, INSTALLING AND MAINTAINING THESE DEVICES SHALL BE INCLUDED IN THE LUMP SUM PRICE BID ITEM 614 MAINTAINING TRAFFIC, AS PER PLAN.

UNLESS PHYSICALLY IMPOSSIBLE, ALL CONSTRUCTION EQUIPMENT SHALL EXIT ALL WORK ZONES FROM THE DOWNSTREAM END OF THE WORK ZONE OR BY INTERCHANGE RAMPS. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR BE PERMITTED TO DIRECTLY TRANSPORT OR OPERATE ANY EQUIPMENT ACROSS THE OPEN LANES OF S.R. 7.

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

THE PLANING AND RESURFACING WILL PROCEED CONTINUOUSLY A MINIMUM OF FIVE (5) DAYS PER WEEK, WEATHER PERMITTING, EXCEPTING HOLIDAYS AND EVENTS LISTED BELOW:

NO WORK SHALL BE PERFORMED AND ALL EXISTING LANES SHALL BE OPEN TO TRAFFIC DURING THE FOLLOWING DESIGNATED HOLIDAYS OR EVENTS:

MEMORIAL DAY	FOURTH OF JULY
LABOR DAY	THANKSGIVING

THE PERIOD OF TIME THAT THE LANES ARE TO BE OPENED DEPENDS ON THE DAY OF THE WEEK ON WHICH THE HOLIDAY OR EVENT FALLS. THE FOLLOWING SCHEDULE SHALL BE USED TO DETERMINE THIS PERIOD:

DAY OF THE WEEK	TIME ALL LANES MUST BE OPENED TO TRAFFIC
SUNDAY	12:00N FRIDAY THROUGH 12:00N MONDAY
MONDAY	12:00N FRIDAY THROUGH 12:00N TUESDAY
TUESDAY	12:00N MONDAY THROUGH 12:00N WEDNESDAY
WEDNESDAY	12:00N TUESDAY THROUGH 12:00N THURSDAY
THURSDAY	12:00N WEDNESDAY THROUGH 12:00N MONDAY
FRIDAY	12:00N THURSDAY THROUGH 12:00N MONDAY
SATURDAY	12:00N FRIDAY THROUGH 12:00N MONDAY

NO EXTENSIONS OF TIME SHALL BE GRANTED FOR DELAYS IN MATERIAL DELIVERIES, UNLESS SUCH DELAYS ARE INDUSTRY-WIDE, OR FOR LABOR STRIKES, UNLESS SUCH STRIKES ARE AREA-WIDE.

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, AS PER PLAN, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

NOTIFICATION OF WORK ZONE LANE RESTRICTIONS

THE CONTRACTOR SHALL NOTIFY THE ENGINEER AT LEAST EIGHTEEN (18) DAYS PRIOR TO IMPLEMENTING ANY WORK ZONE RESTRICTION THAT WILL REDUCE THE WIDTH OR VERTICAL CLEARANCE OF ANY LANE ON WHICH TRAFFIC WILL BE MAINTAINED DURING CONSTRUCTION. THE ENGINEER SHALL IMMEDIATELY NOTIFY THE DISTRICT ROADWAY SERVICES MANAGER TO ADVISE THE OFFICE OF HIGHWAY MANAGEMENT OF THE RESTRICTIONS.

CONTRACTOR'S EQUIPMENT - OPERATION AND STORAGE

IN ADDITION TO THE REQUIREMENTS OF SECTION 614.03 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS THE FOLLOWING SHALL APPLY. THE CONTRACTOR'S EQUIPMENT SHALL BE OPERATED IN THE DIRECTION OF TRAFFIC WHERE PRACTICAL. A FLAGGER SHALL BE USED WHERE THE CONTRACTOR'S EQUIPMENT MUST MERGE WITH THE TRAFFIC STREAM. THE CONTRACTOR'S VEHICLES AND EQUIPMENT SHALL BE EQUIPPED WITH AT LEAST ONE AMBER FLASHING LIGHT.

EQUIPMENT MAY BE PARKED IN AREAS ALONG THE HIGHWAY, THIRTY FEET (30') FROM THE EDGE OF TRAVELED HIGHWAY UNLESS BEHIND GUARDRAIL, WHEN VARIOUS OPERATIONS ARE SCHEDULED TO CONTINUE THE NEXT WORKDAY. ON WEEKENDS OR AT OTHER TIMES OF SUSPENSION OF WORK, THE EQUIPMENT SHALL BE STORED AT A STORAGE AREA REMOVED FROM THE STATE ROUTE RIGHT OF WAY. NO EQUIPMENT SHALL BE PARKED IN THE MEDIAN OF THE HIGHWAY. ADEQUATE BARRICADES AND LIGHT SHALL BE PLACED ON THE PAVEMENT SIDE OF THE EQUIPMENT TO IDENTIFY THE LIMITS OF THE EQUIPMENT. ALL OTHER EQUIPMENT, INCLUDING PRIVATE VEHICLES, SHALL BE STORED AT THE APPROVED CONTRACTOR'S STORAGE AREA.

THE CONTRACTOR SHALL NOT STORE ANY MATERIAL OR EQUIPMENT BETWEEN THE NORTHBOUND LANES AND THE RAILROAD.

MOVEMENT OF DRUMS

THE ROW OF DRUMS ALONG A CLOSED LANE SHALL BE MOVED OUT OF THE OPEN LANE ONTO THE NEW PAVEMENT AS SOON AS PAVING OPERATIONS PERMIT.

COORDINATION OF CONTRACTORS

SINCE THE MAINTENANCE OF TRAFFIC AND WORK OF THIS PROJECT MAY OVERLAP OTHER PROJECTS, IT IS ESSENTIAL THAT EACH CONTRACTOR CONDUCT THEIR WORK AND COOPERATE WITH EACH OTHER IN SUCH A MANNER AS NOT TO HINDER THE PROGRESS OR COMPLETION OF THE WORK BEING PERFORMED BY THE OTHER CONTRACTOR.

ITEM 614, LAW ENFORCEMENT OFFICER WITH PATROL CAR

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

1) PLANING AND PAVING OPERATIONS ON RAMPS AND SPEED CHANGE LANES AS DIRECTED BY THE ENGINEER.

2.) RESTRICTING ACCESS TO SR 7 FROM A SIDE STREET AS THE PLANING AND PAVING OPERATIONS PASS THRU THE INTERSECTION.

3.) FOR ANY OPERATION OR LOCATION DIRECTED BY THE ENGINEER.

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

THE CONTRACTOR SHALL MAKE ARRANGEMENTS FOR THESE SERVICES WITH:

JEFFERSON COUNTY SHERIFFS DEPARTMENT
16001 STATE ROUTE 7
STEUBENVILLE, OH 43952
PH.: (740) 283-8600

STEUBENVILLE HIGHWAY PATROL POST
1377 CADIZ ROAD
WINTERSVILLE, OH 43953
PH. (740) 264-1641

LAW ENFORCEMENT OFFICERS WITH PATROL CAR REQUIRED BY THE TRAFFIC MAINTENANCE TASKS ABOVE SHALL BE PAID FOR ON AN HOURLY BASIS UNDER ITEM 614, LAW ENFORCEMENT OFFICER WITH PATROL CAR. THE FOLLOWING ESTIMATED QUANTITY HAS BEEN CARRIED TO THE GENERAL SUMMARY:

ITEM 614, LAW ENFORCEMENT OFFICER WITH PATROL CAR - - - - - - - - - - 300 HOUR

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

IF THE CONTRACTOR WISHES TO UTILIZE LEO'S FOR FLAGGING AND TRAFFIC CONTROL OTHER THAN THAT REQUIRED IN THESE PLANS, HE MAY DO SO AT HIS OWN EXPENSE. PAYMENT FOR THE EXCESS ABOVE THE CONTRACT REQUIREMENTS WILL BE INCLUDED UNDER ITEM 614, MAINTAINING TRAFFIC, AS PER PLAN.

PORTABLE CONCRETE BARRIER 32 INCH

IF REQUIRED, THIS STANDARD TYPE OF P.C.B. SHALL BE FURNISHED AND INSTALLED AS PER STD. DWG. RM-4.2. ALL BARRIERS SHALL USE "J-J" HOOKS OR CONNECTING PIN AND STEEL ROD CONNECTOR METHOD OF CONNECTING THE SECTIONS TOGETHER. NO TONGUE AND GROOVE CONNECTIONS SHALL BE PERMITTED.

IF IT IS REQUIRED FOR THE PCB TO BE MOVED, THE MOVEMENT OF THE CONCRETE BARRIER SHALL BE ACCOMPLISHED IN ONE WORKING DAY. APPROPRIATE TRAFFIC CONTROL SHALL BE UTILIZED FOR THE PROTECTION OF VEHICULAR TRAFFIC UNTIL THE MOVEMENT OF THE BARRIER IS COMPLETE.

ALL PCB SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE PROJECT AND FURNISHING, INSTALLING, MAINTAINING AND SUBSEQUENTLY REMOVING ALL PCB SHALL BE INCLUDED IN THE LUMP SUM PRICE BID ITEM 614 MAINTAINING TRAFFIC, AS PER PLAN. ALL PCB SHALL BE IN GOOD CONDITION, FREE OF CRACKS, SPALLING OR ANY OTHER DAMAGE OR DETERIORATION. PCB SHALL BE USED AT LOCATIONS REQUIRED BY THE DROPOFF IN WORK ZONES SHEET INCLUDED IN THESE PLANS.

RAMPS

RAMP TRAFFIC SHALL BE MAINTAINED BY USE OF PORTIONS OF THE EXISTING AND/OR RESURFACED PAVEMENT.

RAMP TRAFFIC MAY BE STOPPED BY MEANS OF FLAGGERS FOR INTERMITTENT PERIODS NOT TO EXCEED TEN (10) MINUTES DURING RAMP RESURFACING OPERATIONS.

HOWEVER, IN NO CASE SHALL TRAFFIC BE PERMITTED TO FORM A QUEUE WHICH EXTENDS BEYOND THE LIMITS OF THE RAMP ONTO THE SPEED CHANGE LANE, MAINLINE OR CROSSROAD PAVEMENT. THE LIMITS AND DURATION OF ANY TRAFFIC STOPPAGE SHALL AT ALL TIMES BE SUBJECT TO THE DIRECTION OF THE ENGINEER.

INTERSECTION OF SR 7 AND CR 17

BOTH A RIGHT TURN LANE FOR SOUTHBOUND SR 7 TRAFFIC AND A LEFT TURN LANE FOR NORTHBOUND SR 7 TRAFFIC SHALL BE PROVIDED AT THE INTERSECTION WITH COUNTY ROAD 17 FOR THE ENTIRE DURATION OF THE PROJECT.

A TEMPORARY RIGHT TURN LANE FOR SOUTHBOUND SR 7 TRAFFIC IS CURRENTLY PRESENT AT THE INTERSECTION. THIS TEMPORARY RIGHT TURN LANE IS TO BE UTILIZED FOR TRAFFIC TURNING RIGHT ONTO THE COUNTY ROAD WHILE SOUTHBOUND SR 7 TRAFFIC IS MAINTAINED IN THE OUTSIDE LANE. THIS PAVEMENT SHALL BE REMOVED BY THE CONTRACTOR AT THE COMPLETION OF THE PROJECT.

WHEN SOUTHBOUND SR 7 TRAFFIC IS MAINTAINED IN THE INSIDE LANE, A PORTION OF THE OUTSIDE LANE SHALL BE USED TO ACCOMMODATE A RIGHT TURN LANE FOR THE COUNTY ROAD.

THE COUNTY ROAD MAY NOT BE CLOSED TO TRAFFIC. HOWEVER, THE CONTRACTOR MAY LIMIT THE TURNING MOVEMENTS INTO AND OUT OF THE COUNTY ROAD DURING CERTAIN PHASES OF CONSTRUCTION AT THE APPROVAL OF THE ENGINEER. ANY REQUEST FOR RESTRICTIONS TO THE COUNTY ROAD SHALL BE INCLUDED IN THE MAINTENANCE OF TRAFFIC SCHEME SUBMITTED TO THE ENGINEER PRIOR TO THE START OF CONSTRUCTION.

PAYMENT FOR THE ABOVE WILL BE INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 614 MAINTAINING TRAFFIC, AS PER PLAN AND SHALL INCLUDE ALL LABOR, MATERIALS, AND INCIDENTALS REQUIRED TO PERFORM THE WORK.

WORK ZONE PAVEMENT MARKINGS

THE CONTRACTOR SHALL BE REQUIRED TO INSTALL VARIOUS TYPES OF WORK ZONE MARKINGS ACCORDING TO THE FOLLOWING CRITERIA CONTINGENT UPON THE SEQUENCE OF CONSTRUCTION.

WORK ZONE PAVEMENT MARKINGS SHALL BE 740.06, TYPE I PREFORMED MATERIAL OR 642 PAINT APPLIED USING THE FOLLOWING CRITERIA: ALL WORK ZONE MARKINGS INSTALLED ON A BRIDGE DECK OR ON FINAL PAVEMENT SURFACE SHALL BE 740.06, TYPE I PREFORMED MATERIAL.

PAINT MAY BE USED FOR WORK ZONE MARKINGS INSTALLED ON EXISTING PAVEMENT THAT WILL BE DIAMOND GROUND OR ON ASPHALT CONCRETE INTERMEDIATE COURSE.

PRIOR TO PLACEMENT OF ANY WORK ZONE PAVEMENT MARKINGS, THE CONTRACTOR SHALL COMPLETELY OBLITERATE, AS PER 641.10, ALL EXISTING PAVEMENT MARKINGS THAT WOULD CREATE CONFUSION OR CONFLICT WITH THE WORK ZONE PAVEMENT MARKINGS.

PAYMENT FOR THE ABOVE WILL BE INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 614 MAINTAINING TRAFFIC, AS PER PLAN.

WORK ZONE RAISED PAVEMENT MARKERS CANNOT BE USED TO SIMULATE (REPLACE) ANY TYPE OF WORK ZONE PAVEMENT MARKING.

ITEM 614 BARRIER REFLECTOR & OBJECT MARKER

BARRIER REFLECTORS & OBJECT MARKERS SHALL BE INSTALLED ON ALL PORTABLE CONCRETE BARRIER USED FOR TRAFFIC CONTROL. BARRIER REFLECTORS, OBJECT MARKERS AND THEIR INSTALLATION SHALL CONFORM TO ITEM 626 EXCEPT THAT THE SPACING SHALL BE 25 FEET. BASIS OF PAYMENT SHALL BE INCLUDED IN THE LUMP SUM PRICE BID ITEM 614 MAINTAINING TRAFFIC, AS PER PLAN AND SHALL INCLUDE ALL LABOR, EQUIPMENT, HARDWARE AND INCIDENTALS REQUIRED TO PERFORM THE WORK.

ITEM 614, WORK ZONE IMPACT ATTENUATOR (UNIDIRECTIONAL OR BIDIRECTIONAL)

THE CONTRACTOR SHALL PROTECT THE ENDS OF ANY PORTABLE CONCRETE BARRIER WITH WORK ZONE IMPACT ATTENUATOR AS SPECIFIED IN THE STANDARD DRAWINGS.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTION, REPAIRING, AND OTHERWISE RESTORING THE IMPACT ATTENUATOR IN ACCORDANCE WITH THE MANUFACTURER'S MAINTENANCE INSTRUCTIONS WHILE IT IS IN USE ON THE PROJECT. SUCH REPAIRS SHALL BE PERFORMED WITHIN 12 HOURS.

THIS ITEM SHALL CONSIST OF FURNISHING AND INSTALLING EITHER OF THE FOLLOWING IMPACT ATTENUATORS:

1. THE QUADGUARD CZ, (24 INCHES WIDE SIX-BAY) WORK ZONE IMPACT ATTENUATOR MANUFACTURED BY
   ENERGY ABSORPTION SYSTEMS, INC., ONE EAST WACKER DRIVE,
   CHICAGO, IL 60601 (TELEPHONE: 312-467-6750).

THE LENGTH OF THE SIX-BAY QUADGUARD CZ IS 20'-9" . 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:

DRAWING NUMBER: QSCZCVR-T4
DRAWING NAME : QUADGUARD CZ SYSTEM FOR CONSTRUCTION ZONES
REVISION DATE : 5/13/99 REV. J
ODOT APPROVAL DATE: 8/27/99

DRAWING NUMBER: 35-40-10
DRAWING NAME : QUADGUARD SYSTEM CONCRETE PAD, CZ, QG
REVISION DATE : 11/19/97 REV. D
ODOT APPROVAL DATE: 8/27/99

DRAWING NUMBER: 35-40-16
DRAWING NAME : QUADGUARD SYSTEM BACKUP ASSEMBLY, CZ, QG
REVISION DATE : 7/30/99 REV. F
ODOT APPROVAL DATE: 8/27/99

DRAWING NUMBER: 35405IZ
DRAWING NAME : QUADGUARD CZ SYSTEM NOSE ASSEMBLY, CZ, QG, 24, 30, 36
REVISION DATE : 5/17/99
ODOT APPROVAL DATE: 8/27/99

DRAWING NUMBER: 35-40-18
DRAWING NAME : TRANSITION ASSEMBLY, 4 OFFSET, QG
REVISION DATE : 6/25/99 REV. F
ODOT APPROVAL DATE: 8/27/99

DRAWING NUMBER: 35400260
DRAWING NAME : QUADGUARD SYSTEM PCMB ANCHOR ASSEMBLY
REVISION DATE : 11/19/97 REV. C
ODOT APPROVAL DATE: 8/27/99

2. THE TRACC (TRINITY ATTENUATING CRASH CUSHION) MANUFACTURED BY TRINITY INDUSTRY, 1170 N. STATE STREET, GIRARD, OHIO 44420 (TELEPHONE: 330-545-4373).

THE TRACC IS 21'-0" LONG AND 2'-7" WIDE. 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:

DRAWING NUMBER: SS450
DRAWING NAME : CRASH-CUSHION ATTENUATING TERMINAL PLAN, ELEVATION & SECTIONS
REVISION DATE : 3/12/99 REV. I
ODOT APPROVAL DATE: 8/27/99

DRAWING NUMBER: SS455
DRAWING NAME : TRACC TRANSITION TO W-BEAM MEDIAN BARRIER PLAN, ELEVATION & SECTIONS
REVISION DATE : 2/18/99
ODOT APPROVAL DATE: 8/27/99

DRAWING NUMBER: SS461
DRAWING NAME : TRACC TRANSITION TO CONCRETE SAFETY SHAPE BARRIER PLAN, ELEVATION & SECTIONS
REVISION DATE : 6/30/99 REV. I
ODOT APPROVAL DATE: 8/27/99

DRAWING NUMBER: SS462
DRAWING NAME : TRACC TRANSITION TO CONCRETE BARRIER SINGLE SLOPE PLAN, ELEVATION & SECTIONS
REVISION DATE : 6/30/99
ODOT APPROVAL DATE: 8/27/99

3. THE GREAT CZ IMPACT ATTENUATOR MANUFACTURED BY ENERGY ABSORPTION SYSTEMS, INC.

THIS ATTENUATOR MAY BE USED UNTIL JANUARY 1, 2007 IF THE ITEM WAS PURCHASED BEFORE OCTOBER 1, 1998 AND IS IN THE CONTRACTOR'S INVENTORY.

THE CONTRACTOR SHALL PROVIDE A REPLACEMENT UNIT WHEN AN IMPACT IS SEVERE ENOUGH TO REQUIRE COMPLETE REPLACEMENT OF THE ATTENUATOR. THE CONTRACTOR SHALL HAVE A SPARE PARTS PACKAGE AVAILABLE ON THE PROJECT SITE AT ALL TIMES WHEN AN ATTENUATOR IS IN PLACE. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF ONE COMPLETE SPARE PARTS PACKAGE FOR EVERY ONE TO SIX UNITS INSTALLED ON THE PROJECT SITE. FOR EXAMPLE, FIVE INSTALLED UNITS REQUIRE ONE SPARE PARTS PACKAGE AND SEVEN INSTALLED UNITS REQUIRE TWO SPARE PARTS PACKAGES.

WHEN BIDIRECTIONAL DESIGNS ARE SPECIFIED, THE CONTRACTOR SHALL SUPPLY APPROPRIATE TRANSITIONS. PAYMENT FOR THE ABOVE WORK SHALL BE MADE AT THE UNIT PRICE BID FOR ITEM 614, WORK ZONE IMPACT ATTENUATOR, (UNIDIRECTIONAL OR BIDIRECTIONAL), EACH, AND SHALL INCLUDE ALL LABOR, TOOLS, EQUIPMENT AND MATERIALS NECESSARY TO CONSTRUCT, MAINTAIN, REPAIR, REPLACE OR RELOCATE A COMPLETE AND FUNCTIONAL IMPACT ATTENUATOR SYSTEM, INCLUDING ALL RELATED BACKUPS, TRANSITIONS, LEVELING PADS, HARDWARE AND GRADING, NOT SEPARATELY SPECIFIED, AS REQUIRED BY THE MANUFACTURER.

PAYMENT FOR THE ABOVE WORK SHALL INCLUDE FURNISHING, INSTALLING, MAINTAINING, REMOVING AND RE-ERECTING, REMOVAL FROM THE PROJECT UPON COMPLETION, RESTORATION AFTER EACH VEHICLE IMPACT OF THE WORK ZONE IMPACT ATTENUATOR, INCLUDING ALL LABOR, TOOLS, EQUIPMENT AND MISCELLANEOUS HARDWARE AND MATERIALS NECESSARY TO COMPLETE THESE ITEMS OF WORK.

PAYMENT FOR ALL ABOVE WORK SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 614 MAINTAINING TRAFFIC, AS PER PLAN.

FLOODLIGHTING

FLOODLIGHTING OF THE WORK SITE FOR OPERATIONS CONDUCTED DURING NIGHT TIME PERIODS SHALL BE ACCOMPLISHED SO THAT THE LIGHTS DO NOT CAUSE GLARE TO THE DRIVERS ON THE ROADWAY. TO ENSURE THE ADEQUACY OF THE FLOODLIGHT PLACEMENT, THE CONTRACTOR AND THE ENGINEER SHALL DRIVE THROUGHOUT THE WORK SITE EACH NIGHT WHEN THE LIGHTING IS IN PLACE AND OPERATIVE PRIOR TO COMMENCING ANY WORK. IF GLARE IS DETECTED, THE LIGHT PLACEMENT AND SHIELDING SHALL BE ADJUSTED TO THE SATISFACTION OF THE ENGINEER BEFORE WORK PROCEEDS. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS SHALL BE INCLUDED IN THE LUMP SUM CONTRACT PRICE FOR ITEM 614, MAINTAINING TRAFFIC, AS PER PLAN.

CONSTRUCTION ZONE/FINES DOUBLED

RII-H5-48 SIGNS SHALL BE FURNISHED, ERECTED, AND MAINTAINED IN GOOD CONDITION AND/OR REPLACED AS NECESSARY AND SUBSEQUENTLY REMOVED BY THE CONTRACTOR. SIGNS SHALL BE MOUNTED AT THE APPROPRIATE OFFSETS AND ELEVATIONS AS PRESCRIBED BY THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. THEY SHALL BE MAINTAINED ON SUPPORTS MEETING CURRENT SAFETY CRITERIA.

THE SIGNS MAY BE ERECTED OR UNCOVERED NO MORE THAN FOUR HOURS BEFORE THE ACTUAL START OF WORK. THE SIGNS SHALL BE REMOVED OR COVERED NO LATER THAN FOUR HOURS FOLLOWING RESTORATION OF ALL LANES TO TRAFFIC WITH NO RESTRICTIONS, OR SOONER AS DIRECTED BY THE ENGINEER. TEMPORARY SIGN COVERING AND UNCOVERING DUE TO TEMPORARY LANE RESTORATIONS SHALL BE GUIDED BY THE FOUR-HOUR LIMITATIONS STATED ABOVE. SUCH LANE RESTORATIONS SHOULD BE EXPECTED TO REMAIN IN EFFECT FOR 30 OR MORE CONSECUTIVE CALENDAR DAYS, SUCH AS DURING WINTER SHUT-DOWNS.

THE SIGNS SHALL BE DUAL MOUNTED. THE FIRST SIGN SHALL BE PLACED BETWEEN THE "WORK AHEAD" (W20-1) SIGN AND THE NEXT SIGN IN THE SEQUENCE. SIGNS SHALL BE ERECTED ON EACH ENTRANCE RAMP AND EVERY 2 MILES THROUGH THE CONSTRUCTION WORK LIMITS.

THE CONTRACTOR MAY USE SIGNS AND SUPPORTS IN USED, BUT GOOD, CONDITION PROVIDED THE SIGNS MEET CURRENT ODOT SPECIFICATIONS. SIGN FACES SHALL BE REFLECTORIZED WITH TYPE G SHEETING COMPLYING WITH THE REQUIREMENTS OF CMS 614.03.

CONSTRUCTION ZONE/FINES DOUBLED SIGNS AND SUPPORTS WILL BE MEASURED AS THE NUMBER OF SIGN INSTALLATIONS, INCLUDING THE SIGN AND NECESSARY SUPPORTS. IF A SIGN AND SUPPORT COMBINATION IS REMOVED AND RE-ERECTED AT ANOTHER LOCATION AS DIRECTED BY THE ENGINEER, IT SHALL BE CONSIDERED AS ANOTHER UNIT.

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 FURNISHING, ERECTING, MAINTAINING, COVERING DURING SUSPENSION OF WORK, AND REMOVAL OF THE SIGN AND SUPPORT.

ITEM 614, CONSTRUCTION ZONE/FINES DOUBLED SIGN - - - - - - - - - - - 32 EACH

ITEM 614 - WORK ZONE SPEED LIMIT SIGN

THE CONTRACTOR SHALL FURNISH, INSTALL, MAINTAIN, COVER DURING SUSPENSION OF WORK, AND SUBSEQUENTLY REMOVE WORK ZONE SPEED LIMIT (R2-1-48) (45 MPH SPEED LIMIT) SIGNS AND SUPPORTS WITHIN THE WORK LIMITS IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:

THE CONTRACTOR SHALL COVER OR REMOVE ANY EXISTING SPEED LIMIT OR MINIMUM SPEED LIMIT SIGNS WITHIN THE REDUCED SPEED ZONE. THESE SIGNS SHALL BE RESTORED DURING SUSPENSION OR TERMINATION OF THE REDUCED SPEED LIMIT. THE EXPENSE OF COVERING OR REMOVAL AND RESTORATION OF EXISTING SPEED LIMIT OR MINIMUM SPEED LIMIT SIGNS SHALL BE INCLUDED IN THE PAY ITEM FOR THE WORK ZONE SPEED LIMIT SIGNS.

THE WORK ZONE SPEED LIMIT SIGNS MAY BE ERECTED OR UNCOVERED NO MORE THAN 4 HOURS BEFORE THE ACTUAL START OF WORK. THE SIGNS SHALL BE REMOVED OR COVERED NO LATER THAN 4 HOURS FOLLOWING RESTORATION OF ALL LANES TO TRAFFIC WITH NO RESTRICTIONS, OR SOONER AS DIRECTED BY THE ENGINEER. TEMPORARY SIGN COVERING AND UNCOVERING DUE TO TEMPORARY LANE RESTORATIONS SHALL BE GUIDED BY THE FOUR-HOUR LIMITATIONS STATED ABOVE. SUCH LANE RESTORATIONS SHOULD BE EXPECTED TO REMAIN IN EFFECT FOR 30 OR MORE DAYS, SUCH AS DURING WINTER SHUT-DOWNS.

THE CONTRACTOR SHALL ERECT A WORK ZONE SPEED LIMIT SIGN IN ADVANCE OF ANY LANE RESTRICTION EXPECTED TO LAST AT LEAST 30 CONSECUTIVE CALENDAR DAYS, OR AS DIRECTED BY THE ENGINEER. THE SIGN SHALL BE MOUNTED ON BOTH SIDES OF DIVIDED HIGHWAYS. THE FIRST WORK ZONE SPEED LIMIT SIGN SHALL BE PLACED 500 FEET IN ADVANCE OF THE LANE REDUCTION TAPER OR AT A POINT WHEREVER CONSTRUCTION BEGINS, WHICHEVER COMES FIRST. THE SIGN SHALL BE MOUNTED ON THE RIGHT SIDE, 250 FEET IN ADVANCE OF THE LANE REDUCTION TAPER ON UNDIVIDED HIGHWAYS. THE SIGN SHALL BE REPEATED, ON THE SIDE NEAREST TRAFFIC, EVERY 1 MILE FOR 55 MPH ZONES AND EVERY ONE-HALF MILE FOR 50 MPH AND 45 MPH ZONES. THESE SIGNS SHALL ALSO BE ERECTED IMMEDIATELY AFTER EACH OPEN ENTRANCE RAMP WITHIN THE ZONE.

A SIGN(S) TO INDICATE THE RESUMPTION OF THE STATUTORY SPEED LIMIT SHALL BE ERECTED AT THE END OF ANY REDUCED SPEED ZONE. R2-1 (SPEED LIMIT) SIGNS SHALL BE USED ON UNDIVIDED ROADWAYS. R2-1 (SPEED LIMIT) AND R2H2a (SPEED LIMIT) SIGNS SHALL BE USED ON DIVIDED ROADWAYS. WHEN USED THE R2-1 AND R2H2a SIGNS SHALL BE MOUNTED SIDE--BY-SIDE ON SEPARATE SUPPORTS. THE CONTRACTOR MAY USE SIGNS AND SUPPORTS IN USED, BUT GOOD, CONDITION PROVIDED THE SIGNS MEET CURRENT ODOT SPECIFICATIONS. SIGN FACES SHALL BE REFLECTORIZED WITH TYPE G SHEETING COMPLYING WITH THE REQUIREMENTS OF CMS 614.03.

WORK ZONE SPEED LIMIT SIGNS SHALL BE MOUNTED ON TWO ITEM 630, GROUND MOUNTED SUPPORTS, NO. 3 POSTS.

WORK ZONE SPEED LIMIT SIGNS AND SUPPORTS WILL BE MEASURED AS THE NUMBER OF SIGN INSTALLATIONS, INCLUDING THE SIGNS AND NECESSARY SUPPORTS. IF A SIGN AND SUPPORT COMBINATION IS REMOVED AND REERECTED AT ANOTHER LOCATION WITHIN THE PROJECT DUE TO CHANGES IN THE SPEED ZONE DIRECTED BY THE ENGINEER, IT SHALL BE CONSIDERED ANOTHER UNIT.

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 FURNISHING, ERECTING, MAINTAINING, COVERING DURING SUSPENSION OF WORK, AND REMOVING THE SIGNS AND SUPPORTS.

ITEM 614, WORK ZONE SPEED LIMIT SIGN - - - - - - - - - 31 EACH

COORDINATION OF RESURFACING AND PLANING OPERATIONS

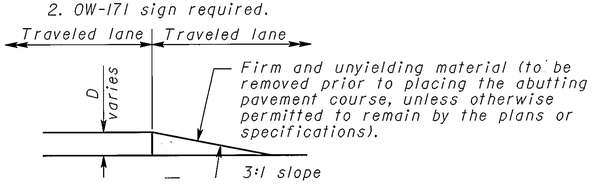
THE PAVEMENT PLANING AND RESURFACING OPERATION SHALL BE COMPLETED IN A TIMELY MANNER AS DIRECTED BY THE ENGINEER. TRAFFIC SHALL NOT BE PERMITTED TO RUN ON THE FINAL PLANED SURFACE THAT WILL HAVE ASPHALT CONCRETE INTERMEDIATE COURSE APPLIED TO IT.

GENERAL NOTES

1. It is intended that this drawing be used for treatment of drop-offs that develop during construction operations, and that are not otherwise provided for in the construction plans. The suggested treatments are intended for high volume projects that will last at least seven days and have an active work zone 1 mile [1.6 km] or less in length. For guidance on the use of this sheet, see L&D Manual Volume One, Section 500. Where the plans do not provide specific items for labor, equipment, or materials to implement the drop-off treatments specified hereon, they shall be included for payment in the lump sum bid for **Item 614 - Maintaining Traffic.**
2. While the need for certain advisory signing is noted hereon, it is not intended that this be indicative of all signing that may be required to advise or warn motorists, and all requirements of the Ohio Manual of Uniform Traffic Control Devices (OMUTCD) must be fulfilled.
3. In urban or otherwise heavily developed areas where pedestrians and/or bicyclists may be present in significant numbers, additional signing and protective measures other than those shown hereon may be required.
4. The drop-off treatment selected for use at any given location shall be as appropriate for the prevailing conditions at the site.
5. Where concrete barrier is specified, it shall be in accordance with **SCD RM-4.2** and Item 622.
6. When drums are specified for a drop-off condition, a minimum number of four drums shall be used. Spacing shall be as indicated in the plans or as specified in the OMUTCD.
7. When OW-151 (Low Shoulder) signs or OW-155 (Shoulder Drop-Off) signs or OW-171 (Uneven Lanes) signs are required, they shall be placed 750' [230 m] in advance of the condition, on all intersecting entrance ramps within the limits of the condition and immediately beyond all inter secting roadways within the limits of the condition. When the drop-off condition extends more than 0.5 mile [800 m], additional signs should be erected at intervals of 1.0 mile [1600 m] or less.
8. For locations, such as at ramps, lane shifts, lane closures, etc., where traffic is required to negotiate a difference in elevation between pavements, a 3:1 slope treatment similar to the Optional Wedge Treatment shall be provided.
9. Portable concrete barrier shall be placed on the same level as the traffic surface and shall not encroach on lane width(s) designated as the minimum required for traffic use. Where drums are used, and their presence would reduce traveled lane widths to less than 10' [3.0 m], drums may be placed on the opposite level from that of traffic provided the dropoff depth does not exceed 5" [125] and approval is granted by the Project Engineer.
10. Pavement Repairs (or similar work):
    a. Lengths greater than 60' [18 m] - utilize appropriate treatment from Condition I.
    b. Lengths of 60' [18 m] or less - repairs shall be effected in accordance with CMS 255.08. Drums may be used as a separtor adjacent to the traveled lane.

OPTIONAL WEDGE TREATMENT
(MILLING OR RESURFACING)

1. This treatment may be used when permitted for Condition I only.
2. OW-171 sign required.

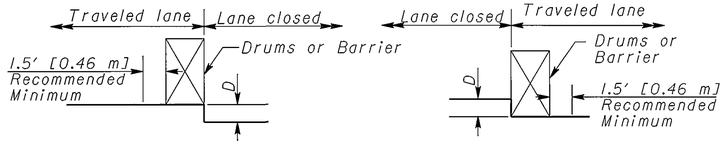


CONDITION I
DROP-OFFS BETWEEN TRAVELED LANES

1. These treatments are to be used for resurfacing, pavement planing, excavation, etc. between or within traveled lanes.

D	Treatment
≤1½" [≤40]	Erect OW-171 sign.
1½"-3" [40-75]	1) Lane closure utilizing drums* as shown below OR 2) Optional Wedge Treatment
>3"-5" [>75-125]	Lane closure utilizing drums as shown below.
>5" [>125]	Lane closure utilizing portable concrete barrier as shown below.

* Cones may be used for daytime only conditions.

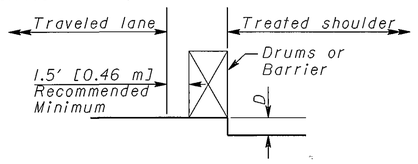


CONDITION II
DROP-OFFS WITHIN GRADED SHOULDER AREA

1. The treatments indicated below are for use in conjunction with resurfacing, planing, or excavations within the graded shoulder area.
2. The graded shoulder area is that flat or gradually sloping area between the edge of a normally traveled lane and the more steeply sloping ditch foreslope or embankment slope. Its surface may be soil or turf, and/or it may be inclusive of a "treated" area (improved with aggregates, asphaltic materials or concrete). For the purpose herein, its maximum width shall be considered to be 12' [3.6 m].

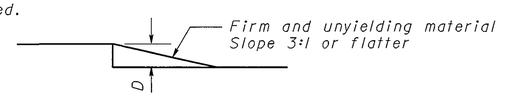
D	Treatment
≤1½" [≤40]	1) Erect OW-155 signs.
>1½"-5" [>40-125]	1) If minimum lane width* requirements can be met, maintain lanes utilizing drums as shown below OR 2) If minimum. lane width* requirements cannot be met, close adjacent lane utilizing drums OR 3) Optional Shoulder Treatment.
>5"-12" [125-305] Daylight only	If minimum lane width* requirements can be met, maintain lanes utilizing drums as shown below.
>5"-24" [>125-610]	1) If minimum lane width* requirements can be met, maintain lanes utilizing portable concrete barrier as shown below. OR 2) If minimum lane width* requirements cannot be met, close adjacent lane utilizing drums.
>24" [>610]	Lane closure utilizing portable concrete barrier as shown below.

* Minimum lane widths shall be 10' [3.0 m] unless otherwise specified in the plans.



OPTIONAL SHOULDER TREATMENT

1. This treatment may not be used within a bitumunos shoulder where a hot longitudnal joint per CMS 401.15 is required.
2. OW-151 signs required.

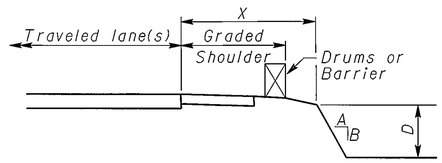


CONDITION III
DROP-OFFS BEYOND GRADED SHOULDER OR BACK OF CURB

1. See Note 2 under Condition II.
2. Use Chart A or B below, as applicable.

CHART A

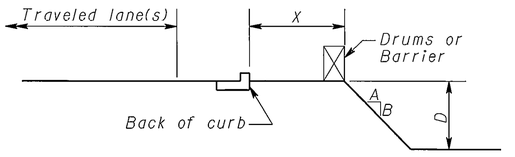
USE FOR: 1. Uncurbed Facilities.
2. Curbed Facilities, where:
   a. Curbs are less than 6" [150] in height.
   b. Curbs are 6" [150] or greater in height and the legal speed is greater than 40 mph [70 km/h].



X	D	A/B	Treatment Required	
			Day	Night
0-4' [0-1.2 m]	Any	Any	(a)	(a)
4'-30' [1.2-9.1 m]	Any	3:1 or Flatter	None	None
4'-12' [1.2-3.6 m]	≤3" [≤75]	Steeper than 3:1	None	None
4'-12' [1.2-3.6 m]	>3"-≤12" [>75-≤305]	Steeper than 3:1	Drums	Drums
4'-12' [1.2-3.6 m]	>12" [>305]	Steeper than 3:1	Drums	Barrier
>12'-20' [>3.6-6.1 m]	<12" [<305]	Steeper than 3:1	None	None
>12'-20' [>3.6-6.1 m]	>12"-≤24" [>305-≤610]	Steeper than 3:1	Drums	Drums
>12'-20' [>3.6-6.1 m]	>24" [>610]	Steeper than 3:1	Drums	Barrier
>20'-30' [>6.1-9.1 m]	<24" [<610]	Steeper than 3:1	None	None
>20'-30' [>6.1-9.1 m]	>24" [>610]	Steeper than 3:1	Drums	Barrier
>30' [>9.1 m]	Any	Any	None	None
(a) Use treatment specified under Condition II.				

CHART B

USE FOR: Curbed facilities, where the curb is 6" [150] or greater in height and the legal speed is 40 mph [70 km/h] or less.



X	D	A/B	Treatment Required	
			Day	Night
0-10' [0-3.0 m]	<12" [<305]	Any	None	Drums
0-10' [0-3.0 m]	>12" [>305]	Any	Drums	Drums
>10' [>3.0 m]	Any	Any	None	None

NOTE: All metric dimensions (in brackets []) are in millimeters unless otherwise noted.

CALCULATED | CHECKED

DROPOFFS IN WORK ZONES

JEF-7-4.77

SHEET NUMBER												ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	AS PER PLAN SHEET NO.
13	15	16	19	20	21	22	23	25	43	44	48						
																ROADWAY	
								39,012.5				202	38100	39,012.5	FT	GUARDRAIL REMOVED FOR STORAGE	
932												202	54001	932	EACH	RAISED PAVEMENT MARKER REMOVED AND DISPOSED, AS PER PLAN	13
					605.41		145					209	60201	750.41	STATION	LINEAR GRADING, AS PER PLAN	13
								37,637.5				606	13000	37,637.5	FT	GUARDRAIL, TYPE 5	
								1525				606	13050	1525	FT	GUARDRAIL, TYPE 5A	
								100				606	17300	100	FT	GUARDRAIL, TYPE 5, 25' LONG-SPAN	
								22				606	22010	22	EACH	ANCHOR ASSEMBLY, TYPE E-98	
								4				606	25000	4	EACH	ANCHOR ASSEMBLY, TYPE A	
								21				606	26500	21	EACH	ANCHOR ASSEMBLY, TYPE T	
								9				606	35000	9	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 1	
								9				606	35100	9	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 2	
								4				606	35120	4	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 3	
								102				622	10160	102	FT	CONCRETE BARRIER, SINGLE SLOPE, TYPE D	
									150			622	23301	150	FT	CONCRETE BARRIER, TYPE A, AS PER PLAN	13
								439				626	00100	439	EACH	BARRIER REFLECTOR, TYPE A	
								2				626	00200	2	EACH	BARRIER REFLECTOR, TYPE B	
630												626	00201	630	EACH	BARRIER REFLECTOR, TYPE B, AS PER PLAN	13
22,337												864	10101	22,337	SQ YD	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE), AS PER PLAN	13
																DRAINAGE	
									15			604	15001	15	EACH	INLET, NO. 3C, AS PER PLAN	13
																PAVEMENT	
			92,581	91,686	54,010	17,844	7514					254	01000	263,635	SQ YD	PAVEMENT PLANING, ASPHALT CONCRETE	
									10			304	20000	10	CU YD	AGGREGATE BASE	
			6944	6879	4051	1337	562					407	10000	19,773	GALLON	TACK COAT	
5146			3707	3666	2162							407	14000	14,681	GALLON	TACK COAT FOR INTERMEDIATE COURSE	
			3860	3818	2252	745	315					442	10051	10,990	CU YD	ASPHALT CONCRETE SURFACE COURSE, 12.5 MM, TYPE B (446), AS PER PLAN	13
			7254	7139	4215							442	10150	18,608	CU YD	ASPHALT CONCRETE INTERMEDIATE COURSE, 19MM, TYPE B (446)	
								502				448	46061	502	CU YD	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 1, UNDER	13
																GUARDRAIL, PG64-22, AS PER PLAN	
					60,637							618	40100	60,637	FT	RUMBLE STRIPS, TYPE 2 (ASPHALT CONCRETE)	
																TRAFFIC CONTROL	
										960		621	00100	960	EACH	RPM	
										27.18		642	00100	27.18	MILE	EDGE LINE, TYPE 1	
										12.50		642	00190	12.50	MILE	LANE LINE	
										2575		642	00400	2575	FT	CHANNELIZING LINE, TYPE 1	
										226		642	00500	226	FT	STOP LINE, TYPE 1	
										990		642	00700	990	FT	TRANSVERSE LINE, TYPE 1	
										760		642	00900	760	SQ FT	ISLAND MARKING, TYPE 1	
										7		642	01300	7	EACH	LANE ARROW, TYPE 1	
																STRUCTURES	
											345	517	73008	345	FT	RAILING (THRIE BEAM RAIL), MISC.: TOP MOUNTED THRIE BEAM	
																RAILING FOR 1'-0" SAFETY CURB	
																MAINTENANCE OF TRAFFIC	
	300											614	11100	300	HOUR	LAW ENFORCEMENT OFFICER WITH PATROL CAR	
		31										614	12470	31	EACH	WORK ZONE SPEED LIMIT SIGN	
		32										614	12480	32	EACH	CONSTRUCTION ZONE/FINES DOUBLED SIGN	
	LUMP											614	11001	LUMP		MAINTAINING TRAFFIC, AS PER PLAN	15
												619	16010	4	MONTH	FIELD OFFICE, TYPE B	
												623	10000	LUMP		CONSTRUCTION LAYOUT STAKES	
												624	10000	LUMP		MOBILIZATION	

CALCULATED RDA
CHECKED TES

GENERAL SUMMARY

JEF-7-4.77

LOCATION	STATION			LENGTH	WIDTH	AREA	ITEM 254 PAVEMENT PLANING, ASPHALT CONCRETE 3 1/4" NOMINAL	ITEM 407 TACK COAT @ 0.075 GALLON/ SQ. YD.	ITEM 407 TACK COAT FOR INTERMEDIATE COURSE @ 0.04 GALLON/ SQ. YD.	THICKNESS	ITEM 442 ASPHALT CONCRETE SURFACE COURSE, 12.5mm TYPE B, (446) AS PER PLAN	THICKNESS	ITEM 442 ASPHALT CONCRETE INTERMEDIATE COURSE, 19mm TYPE B, (446)				REMARKS
MAINLINE PAVEMENT	FROM	TO		FT.	FT.	SQ. YD.	SQ. YD.	GALLON	GALLON	INCH	CU. YD.	INCH	CU. YD.				
NORTHBOUND																	
BRIDGE NO. JEF-7-0463																	
	272+50	273+12		62	27	186	186	14	7	1½	8	1¾	9				
	273+12	274+00		88	27.3 avg	267	267	20	11	1½	11	1¾	13				
	274+00	274+25		25	27.8 avg	77	77	6	3	1½	3	1¾	4				
	274+25	276+51.17		226.17	28.7 avg	721	721	54	29	1½	30	1¾	35				
	276+51.17	276+68.67		17.50	30.4 avg	59	59	4	2	1½	2	1¾	2				
	276+68.67	276+96.17		27.50	30.7 avg	94	94	7	4	1½	4	1¾	5				
	276+96.17	277+21.17		25	31.6 avg	88	88	7	4	1½	4	1¾	4				
BRIDGE NO. JEF-7-0487																	
	278+81.98	279+06.98		25	31.3	87	87	7	3	1½	4	1¾	4				
	279+06.98	279+34.48		27.50	32 avg	98	98	7	4	1½	4	1¾	5				
	279+34.48	279+51.98		17.50	33.1 avg	64	64	5	3	1½	3	1¾	3				
	279+51.98	280+30		78.02	34.2 avg	296	296	22	12	1½	12	1¾	14				
	280+30	281+75		145	37.3 avg	601	601	45	24	1½	25	1¾	29				CO RD 17 INTERSECTION
	281+75	282+80		105	30.7 avg	358	358	27	14	1½	15	1¾	17				
	282+80	283+00		20	28.7 avg	64	64	5	3	1½	3	1¾	3				
	283+00	285+50		250	26.8 avg	744	744	56	30	1½	31	1¾	36				
	285+50	373+65		8815	25	24,486	24,486	1836	979	1½	1020	3½	2381				
	373+65	374+65		100	31 avg	344	344	26	14	1½	14	3½	33				
	374+65	377+42.27		277.27	37	1140	1140	86	46	1½	48	3½	111				INCLUDES ENTRANCE RAMP "S" SPEED CHANGE LANE
	377+42.27	382+13		470.73	51.5 avg	2694	2694	202	108	1½	112	3½	262				
	382+13	382+65.79		52.79	25	147	147	11	6	1½	6	3½	14				
	382+65.79	385+13.01		247.22	25	687	687	52	27	1½	29	3½	57				
	385+13.01	385+30.51		17.50	25	49	49	4	2	1½	2	3½	5				
	385+30.51	385+58.01		27.50	25	76	76	6	3	1½	3	3½	7				
	385+58.01	385+83.01		25	25.3 avg	70	70	5	3	1½	3	3½	6				
BRIDGE NO. JEF-7-0693																	
	387+04.77	387+29.77		25	25.3 avg	70	70	5	3	1½	3	3½	7				
	387+29.77	430+67.80		4338.03	25	12,050	12,050	904	482	1½	502	3½	1172				
	430+67.80	431+67.80		100	31 avg	344	344	26	14	1½	14	3½	33				
	431+67.80	435+00		332.30	37	1366	1366	102	55	1½	57	3½	133				INCLUDES ENTRANCE RAMP "A" SPEED CHANGE LANE
	435+00	439+19		419	51.5 avg	2398	2398	180	96	1½	100	3½	233				
	439+19	439+78.84		59.84	25	166	166	12	7	1½	7	3½	16				
	439+78.84	450+90.03		1111.19	25	3087	3087	232	123	1½	129	3½	300				
	450+90.03	451+15.03		25	25.3 avg	70	70	5	3	1½	3	3½	7				
BRIDGE NO. JEF-7-0817																	
	452+59.23	452+84.23		25	24.9	69	69	5	3	1½	3	3½	7				
	452+84.23	458+51.40		567.17	25	1575	1575	118	63	1½	66	3½	153				
	458+51.40	461+00		248.60	57 avg	1574	1574	118	63	1½	66	3½	153				
	461+00	471+00Bk		1000	37.5 avg	4167	4167	313	167	1½	174	3½	405				INCLUDES ENTRANCE RAMP "D" SPEED CHANGE LANE
	469+59.52Ah	470+34		74.48	24.9	206	206	15	8	1½	9	3½	20				
	470+34	470+69		35	24.5	95	95	7	4	1½	4	3½	9				
BRIDGE NO. JEF-7-0856																	
	476+45	476+70		25	24.8	69	69	5	3	1½	3	1¾	3				
	476+70	542+04		6534	24	17,424	17,424	1307	697	1½	726	1¾	847				
	542+04	542+29		25	24.8	69	69	5	3	1½	3	1¾	3				
BRIDGE NO. JEF-7-0992																	
	548+31.85	549+13.10		81.25	26.8 avg.	242	242	18	10	1½	10	1¾	12				
	549+13.10	574+99.03		2585.93	24	6896	6896	517	276	1½	287	1¾	335				
	574+99.03	579+44.59		445.56	57 avg.	2822	2822	212	113	1½	118	1¾	137				RAMP "B"
	579+44.59	589+44.59		1000	37 avg.	4111	4111	308	164	1½	171	1¾	200				
	589+44.59	590+25		80.41	24	214	214	16	9	1½	9	1¾	10				
TOTALS (CARRIED TO GENERAL SUMMARY)							92,581	6944	3707		3860		7254				

CALCULATED GDM CHECKED TES

MAINLINE PAVEMENT RESURFACING QUANTITIES

JEF-7-4.77

19 / 49

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LOCATION	STATION			LENGTH	WIDTH	AREA	ITEM 254 PAVEMENT PLANING, ASPHALT CONCRETE 3 1/4" NOMINAL	ITEM 407 TACK COAT @ 0.075 GALLON/ SQ. YD.	ITEM 407 TACK COAT FOR INTERMEDIATE COURSE @ 0.04 GALLON/ SQ. YD.	THICKNESS	ITEM 442 ASPHALT CONCRETE SURFACE COURSE, 12.5mm TYPE B, (446) AS PER PLAN	THICKNESS	ITEM 442 ASPHALT CONCRETE INTERMEDIATE COURSE, 19mm TYPE B, (446)				REMARKS
MAINLINE PAVEMENT	FROM	TO		FT.	FT.	SQ. YD.	SQ. YD.	GALLON	GALLON	INCH	CU. YD.	INCH	CU. YD.				
SOUTHBOUND																	
BRIDGE NO. JEF-7-0463																	
	271+96.50	277+08.54		512.04	25	1422	1422	107	57	1½	59	1¾	69				
	277+08.54	277+33.54		25	25.3 avg	70	70	5	3	1½	3	1¾	3				
BRIDGE NO. JEF-7-0487																	
	278+87.46	279+12.46		25	24.5	68	68	5	3	1½	3	1¾	3				
	279+12.46	279+57.46		45	24.5	123	123	9	5	1½	5	1¾	6				
	279+57.46	280+30		72.54	24.5	197	197	15	8	1½	8	1¾	10				CO RD 17 INTERSECTION
	280+30	281+75		145	24	387	387	29	15	1½	16	1¾	19				
	281+75	282+80		105	24.5	286	286	21	11	1½	12	1¾	14				
	282+80	283+00		20	24.8 avg	55	55	4	2	1½	2	1¾	3				
	283+00	285+50		250	25	694	694	52	28	1½	29	1¾	34				
	285+50	314+00		2850	26	8233	8233	617	329	1½	343	3½	800				
	314+00	385+02.93		7102.93	25	19,730	19,730	1480	789	1½	822	3½	1918				
	385+02.93	385+72.93		70	25	194	194	15	8	1½	8	3½	19				
BRIDGE NO. JEF-7-0693																	
	386+94.69	387+69.69		75	25	208	208	16	8	1½	9	3½	20				
	387+69.69	433+56.82		4587.13	25	12,742	12,742	956	510	1½	531	3½	1239				
	433+56.82	443+56.82		1000	37.5 avg	4167	4167	313	167	1½	174	3½	405				
	443+56.82	445+63.80		206.98	57 avg	2083	1311	98	52	1½	55	3½	127				INCLUDES ENTRANCE RAMP "B" SPEED CHANGE LANE
	445+63.80	451+06.77		542.97	25	2083	1508	113	60	1½	63	3½	147				
	451+06.77	451+31.77		25	25.3 avg	70	70	5	3	1½	3	3½	7				
BRIDGE NO. JEF-7-0817																	
	452+75.97	453+50.97		75	25	208	208	16	8	1½	9	3½	20				
	453+50.97	459+40.77		589.80	25	1638	1638	123	66	1½	68	3½	159				
	459+40.77	459+92		51.23	25	142	142	11	6	1½	4	3½	14				
	459+92	464+64.41		472.41	51.5 avg	2703	2703	203	108	1½	113	3½	263				
	464+64.41	467+45.32		280.91	37	1155	1155	87	46	1½	48	3½	112				INCLUDES ENTRANCE RAMP "C" SPEED CHANGE LANE
	467+45.32	468+45.32		100	31 avg	344	344	26	14	1½	14	3½	33				
	468+45.32	471+00Bk		254.68	25	707	707	53	28	1½	29	3½	59				
	469+59.52Ah	469+64		4.48	26 avg	13	13	1	1	1½	1	3½	1				
	469+64	469+81.50		17.5	25.8 avg	50	50	4	2	1½	2	3½	5				
	469+81.50	470+24		42.50	25.5 avg	120	120	9	5	1½	5	3½	12				
	470+24	470+44		20	24.9 avg	55	55	4	2	1½	2	3½	5				
	470+44	470+69		25	24.5	68	68	5	3	1½	3	3½	7				
BRIDGE NO. JEF-7-0856																	
	476+45	489+00		1255	24	3347	3347	251	134	1½	139	1¾	163				
	489+00	499+00		1000	36.5 avg	4056	4056	304	162	1½	169	1¾	197				
	499+00	503+00		400	56 avg	2489	2489	187	100	1½	104	1¾	121				INCLUDES ENTRANCE RAMP "C" SPEED CHANGE LANE
	503+00	524+87.98		2187.98	24	5835	5835	438	233	1½	243	1¾	284				
	524+87.98	528+60.91		372.93	49.5 avg	2051	2051	154	82	1½	85	1¾	100				
	528+60.91	529+94.55		133.64	36	535	535	40	21	1½	22	1¾	26				INCLUDES ENTRANCE RAMP "A" SPEED CHANGE LANE
	529+94.55	530+94.55		100	30 avg	333	333	25	13	1½	14	1¾	16				
	530+94.55	542+04		1109.45	24	2959	2959	222	118	1½	123	1¾	144				
	542+04	542+29		25	24.8 avg	69	69	5	3	1½	3	1¾	3				
BRIDGE NO. JEF-7-0992																	
	547+72.50	548+31.85		59.35	24.5	162	162	12	6	1½	7	1¾	8				
	548+31.85	590+25		4193.15	24	11,182	11,182	839	447	1½	466	1¾	544				
TOTALS (CARRIED TO GENERAL SUMMARY)							91,686	6879	3666		3818		7139				

CALCULATED GDM
CHECKED TES

MAINLINE PAVEMENT RESURFACING QUANTITIES

JEF-7-4.77

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LOCATION MAINLINE SHOULDER	STATION			LENGTH	WIDTH	AREA		ITEM 254 PAVEMENT PLANING, ASPHALT CONCRETE 3 1/4" NOMINAL	ITEM 407 TACK COAT @ 0.075 GALLON/ SQ. YD.	ITEM 407 TACK COAT FOR INTERMEDIATE COURSE @ 0.04 GALLON/ SQ. YD.	THICKNESS	ITEM 442 ASPHALT CONCRETE SURFACE COURSE, 12.5mm TYPE B, (446) AS PER PLAN	THICKNESS	ITEM 442 ASPHALT CONCRETE INTERMEDIATE COURSE, 19mm TYPE B, (446)	ITEM 618 RUMBLE STRIPS, TYPE 2 (ASPHALT CONCRETE)	ITEM 209 LINEAR GRADING, AS PER PLAN				
NORTHBOUND	FROM	TO		FT.	FT.	SQ. YD.		SQ. YD.	GALLON	GALLON	INCH	CU. YD.	INCH	CU. YD.	FT.	FT.			
BRIDGE NO. JEF-7-0463																			
FEATHER	272+50	273+24.10		74.10	4 avg	33		33	2	1	1½	1	1¾	2	74	74.10			
	273+24.10	275+56		231.90	8	206		206	15	8	1½	9	1¾	10	232	232			
	275+56	276+51.17		95.17	5.6 avg	59		59	4	2	1½	2	1¾	3	95	95.17			
	276+51.17	276+68.67		17.50	2.8 avg	5		5	1	1	1½	1	1¾	1	18	17.50			
FEATHER	276+68.67	277+16.53		47.86	1.2 avg	6		6	1	1	1½	1	1¾	1	48	47.86			
BRIDGE NO. JEF-7-0487																			
	278+79.93	279+34.48		54.55	2.2 avg	13		13	1	1	1½	1	1¾	1	55	54.55			
	279+34.48	279+51.98		17.50	5.2 avg	10		10	1	1	1½	1	1¾	1	18	18			
	279+51.98	285+50		598.02	6.9 avg	458		458	34	18	1½	19	1¾	22	598	598			
	285+50	385+13.01		9963	8	8856		8856	664.20	354.24	1½	369	3½	861	9963	9963			
FEATHER	385+13.01	385+88.58		75.57	8	67		67	5.03	2.68	1½	2.79	3½	7	76	75.57			
BRIDGE NO. JEF-7-0693																			
	387+10.34	450+62.53		6352.19	8	5646		5646	423	226	1½	235	3½	549	6352	6352.19			
FEATHER	450+62.53	451+05.79		43.26	8	38		38	3	1.52	1½	1.58	3½	4	43	43.26			
BRIDGE NO. JEF-7-0817																			
FEATHER	452+49.99	458+54		604.01	8	537		537	40	21	1½	22	3½	52	604	537			
	458+54	461+00		246	8	219		219	16	8.76	1½	9.13	3½	21	246	219			
	461+00	469+10		810	8	720		720	54	28.80	1½	30	3½	70	810	810			
	469+10	471+00Bk		190	6.6 avg	139		139	10	5.56	1½	5.79	3½	14	190	190			
	469+59.52Ah	470+16.50		56.98	4.1 avg	26		26	2	1.04	1½	1.08	3½	3	57	56.98			
	470+16.50	470+34		17.50	2.6 avg	5		5	0.38	0.20	1½	0.21	3½	0.22	18	17.50			
FEATHER	470+34	470+69		35	1.5 avg	6		6	0.45	0.24	1½	0.25	3½	1	35	35			
BRIDGE NO. JEF-7-0856																			
FEATHER	476+45	476+70		25	8	22		22	2	1	1½	1	1¾	1	25	25			
	476+70	542+04		6534	8	5808		5808	436	232.32	1½	242	1¾	282	6534	6534			
FEATHER	542+04	542+29		25	8	22		22	2	1	1½	1	1¾	1	25	25			
BRIDGE NO. JEF-7-0992																			
	549+36	574+99.03		2563.03	8	2278		2278	171	91	1½	95	1¾	111	2563	2563.03			
	574+99.03	579+44.59		445.56	8	396		396	30	15.84	1½	16.50	1¾	19	446	445.56			
	579+44.59	590+25		1080.41	8	960		960	72	38.40	1½	40	1¾	47	1080	1080.41			
		SUB-TOTAL						26,535	1990.06	1062.60		1107.33		2084.22	30,205	30,109.70			
SOUTHBOUND																			
BRIDGE NO. JEF-7-0463																			
	271+96.50	276+63.54		467.04	8	415		415	31	17	1½	17	1¾	20	467	467.04			
FEATHER	276+63.54	277+39.01		75.47	8	67		67	5	3	1½	3	1¾	3	75	75			
BRIDGE NO. JEF-7-0487																			
FEATHER	278+89.89	285+50		660.11	8	587		587	44	23	1½	24	1¾	29	660	660.11			
	285+50	385+20.43		9970.43	8	8863		8863	665	355	1½	369	3½	862	9970	9970			
FEATHER	385+20.43	385+67.36		43.93	8	42		42	3	2	1½	2	3½	4	47	47			
BRIDGE NO. JEF-7-0693																			
FEATHER	386+89.12	387+64.69		75.57	8	67		67	5	3	1½	3	3½	7	76	75.57			
	387+64.69	445+64		5799.31	8	5155		5155	387	206	1½	215	3½	501	5799	5799			
	445+64	451+41.01		577.01	8	513		513	38	20.52	1½	21.38	3½	50	577	577			
BRIDGE NO. JEF-7-0817																			
	452+85.21	453+45.97		60.76	8	54		54	4	2	1½	2	3½	5	61	60.76			
	453+45.97	471+00Bk		1754.03	8	1559		1559	117	62.36	1½	64.96	3½	152	1754	1754			
	469+59.52Ah	470+19		59.48	8	53		53	4	2.12	1½	2.21	3½	5	59	59.48			
FEATHER	470+19	470+69		50	5.4 avg	30		30	2.25	1.20	1½	1.25	3½	3	50	50			
BRIDGE NO. JEF-7-0856																			
FEATHER	476+45	476+70		25	8	22		22	2	1	1½	1	1¾	1	25	25			
	476+70	489+00		1230	8	1093		1093	82	43.72	1½	45.54	1¾	53	1230	1230			
	489+00	499+00		1000	8	889		889	67	35.56	1½	37.04	1¾	43	1000	1000			
	499+00	504+00		500	8	444		444	33	17.76	1½	18.50	1¾	22	500	500			
	504+00	520+55		1655	8	1471		1471	110	58.84	1½	61.29	1¾	72	1655	1655			
	520+55	521+05		50	9 avg	50		50	4	2	1½	2.08	1¾	2	50	50			
	521+05	524+87.98		382.98	10 avg	426		426	32	17.04	1½	17.75	1¾	21	383	382.98			
	524+87.98	540+51		1563.02	10 avg	1737		1737	130	69.48	1½	72.38	1¾	84	1563	1563.02			
	540+51	542+04		153	8	136		136	10	5.44	1½	5.67	1¾	7	153	153			
FEATHER	542+04	542+29		25	8	22		22	2	1	1½	1	1¾	1	25	25			
BRIDGE NO. JEF-7-0992																			
	547+72.50	548+41.25		68.75	8	61		61	5	2	1½	3	1¾	3	69	68.75			
	548+41.25	590+25		4183.75	8	3719		3719	279	148.76	1½	154.9	1¾	181	4184	4183.75			
		SUB-TOTAL						27,475	2061.25	1099.80		1144.95		2131	30,432	30,431.50			
TOTALS (CARRIED TO GENERAL SUMMARY)								54,010	4051	2162		2252		4215	60,637	STATION 605.41			

CALCULATED GDM CHECKED TES

MAINLINE SHOULDER RESURFACING QUANTITIES

JEF-7-4.77

LOCATION	STATION		LENGTH	WIDTH	AREA	ITEM 254 PAVEMENT PLANING, ASPHALT CONCRETE 1 1/2" NOMINAL	ITEM 407 TACK COAT @ 0.075 GALLON/ SQ. YD.	THICKNESS	ITEM 442 ASPHALT CONCRETE SURFACE COURSE, 12.5mm TYPE B, (446), AS PER PLAN	REMARKS
RAMPS	FROM	TO	FT.	FT.	SQ. YD.	SQ. YD.	GALLON	INCH	CU. YD.	
RAMP S	382+13.40	382+65.66	52.26	17 avg	99	99	7	1½	4	
	382+65.66	386+00	334.34	16	594	594	45	1½	25	
		Total Ramp "S"	386.60		693	693	52		29	
RAMP A	439+19	439+67.80	48.8	17 avg	92	92	7	1½	4	
	439+67.80	444+64.92	497.12	16	884	884	66	1½	37	
	444+64.92	446+64.92	200	20 avg	444	444	33	1½	19	
	446+64.92	447+19.60	54.68	24	146	146	11	1½	6	
	Ramp "A" Intersection				335	335	25	1½	14	CADD GENERATED (See Sheet No. 40)
		Total Ramp "A"	800.60		1901	1901	142		80	
RAMP B	451+90	445+63.80	626.20	16	1113	1113	83	1½	46	
	Ramp "B" Intersection				351	351	26	1½	15	CADD GENERATED (See Sheet No. 40)
		Total Ramp "B"	626.20		1464	1464	109		61	
RAMP C	459+92	459+45.32	46.68	17 avg	88	88	7	1½	4	
	459+45.32	454+08.14	537.18	16	955	955	72	1½	40	
	Ramp "C" Intersection				428	428	32	1½	18	CADD GENERATED (See Sheet No. 40)
		Total Ramp "C"	583.86		1471	1471	111		62	
RAMP D	458+51.40	453+75	476.4	16	847	847	64	1½	35	
	453+75	453+10.38	64.62	16	115	115	9	1½	5	
	Ramp "D" Intersection				1111	1111	83	1½	46	CADD GENERATED (See Sheet No.40)
		Total Ramp "D"	541.02		2073	2073	156		86	
RAMP A	542+87.98	521+72.88	2115.10	16	3760	3760	282	1½	157	
	521+72.88	522+18.61	45.73	16	81	81	6	1½	3	
	Ramp "A" Intersection				337	337	25	1½	14	CADD GENERATED (See Sheet No. 41)
		Total Ramp "A"	2160.83		4178	4178	313		174	
RAMP B	543+10	564+25	2115	16	3760	3760	282	1½	157	
	564+25	574+99.03	1074.03	16	1909	1909	143	1½	80	
		Total Ramp "B"	3189.03		5669	5669	425		237	
RAMP C	104+14.56	102+93.21	121.35	16	216	216	16	1½	9	
		Total Ramp "C"	121.35		216	216	16		9	
CR 17 Return (Rush Run Rd.)					170	170	13	1½	7	CADD GENERATED (See Sheet No. 41)
		Total CR 17			170	170	13		7	
TOTALS (CARRIED TO GENERAL SUMMARY)						17,844	1,337		745	

CALCULATED GDM
CHECKED TES

RAMP PAVEMENT RESURFACING QUANTITIES

JEF-7-4.77

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LOCATION	STATION		SIDE	LENGTH	WIDTH	AREA		ITEM 254		ITEM 407		ITEM 442		ITEM 209				REMARKS
			*					PAVEMENT PLANING, ASPHALT CONCRETE 1 1/2" NOMINAL		TACK COAT @ 0.075 GALLON/SQ. YD.	THICKNESS	ASPHALT CONCRETE SURFACE COURSE, 12.5mm TYPE B, (446), AS PER PLAN		LINEAR GRADING, AS PER PLAN				* RT & LT ARE IN DIRECTION OF TRAVEL
RAMPS SHOULDER	FROM	TO		FT.	FT.	SQ. YD.		SQ. YD.		GALLON	INCH	CU. YD.		FT.				
RAMP S	382+13	385+87.50	LT	374.50	3	125		126		9	1½	5		374				
	385+87.50	386+00	LT	12.50	3	4		4		1	1½	1		12.50				
	382+13	382+65.66	RT	52.66	7 avg	41		41		3	1½	2		52.66				
	382+65.66	385+75	RT	309.34	6	206		206		15	1½	9		309.34				
	385+75	386+00	RT	25	6	17		17		1	1½	1		25				
		Sub-Total		773.60				394		29		18		773.60				
RAMP A	439+19	447+18.42	LT	799.42	3	266		266		20	1½	11		799				
	447+18.42	8+62.50-CR 7E	LT	61.97	3	21		21		1	1½	1		61.97				CADD Generated (See Sheet No. 40)
	439+19	439+67.80	RT	48.80	7 avg	38		38		3	1½	2		48.80				
	439+67.80	447+18.42	RT	750.62	6	500		500		38	1½	21		750.62				
	447+18.42	7+07.90-CR 7E	RT	113.16	6	75		75		1	1½	1		113.16				CADD Generated (See Sheet No. 40)
		Sub-Total		1773.99				900		63		36		1773.99				
RAMP B	451+90	445+63.80	LT	626.20	3	209		209		16	1½	9		626				
	451+90	14+69-CR 7E	LT	80.67	3	27		27		2	1½	1		81				CADD Generated (See Sheet No. 40)
	451+90	445+63.80	RT	626.20	6	417		417		31	1½	17		626				
	451+90	15+93.36-CR 7E	RT	170.37	6	114		114		9	1½	5		170.37				CADD Generated (See Sheet No. 40)
		Sub-Total		1503.44				767		58		32		1503.44				
RAMP C	459+92	454+08.14	LT	583.86	3	195		195		15	1½	8		583.86				
	454+08.14	15+00.39-CR 7E	LT	110.86	3	37		37		3	1½	2		110.86				CADD Generated (See Sheet No. 40)
	459+92	459+45.32	RT	46.68	7 avg	36		36		3	1½	2		46.88				
	459+45.32	454+08.14	RT	537.18	6	358		358		27	1½	15		537.18				
	454+08.14	16+82-CR 7E	RT	130.88	6	87		87		7	1½	4		130.88				CADD Generated (See Sheet No. 40)
		Sub-Total		1409.46				713		55		31		1409.46				
RAMP D	458+51.40	453+75	LT	476.40	3	159		159		12	1½	7		476.40				
	453+75	453+16.09	LT	58.91	3	20		20		2	1½	1		58.91				
	453+16.09	13+44.48-CR 7E	LT	310.66	6	207		207		16	1½	9		310.66				CADD Generated (See Sheet No. 40)
	458+51.40	453+75	RT	476.40	6	318		318		24	1½	13		476.40				
	453+75	453+10.38	RT	64.62	6	43		43		3	1½	2		64.62				
	453+10.38	12+27.29-CR 7E	RT	290.16	6	193		193		14	1½	8		290.16				CADD Generated (See Sheet No. 40)
		Sub-Total		1677.15				940		71		40		1677.15				
RAMP A	524+87.98	524+62.98	RT	25	7.75 avg	22		22		2	1½	1		25				
	524+62.98	523+87.98	RT	75	6.75 avg	56		56		4	1½	2		75				
	523+87.98	521+27.88	RT	260.10	6	173		173		13	1½	7		260.10				
	524+87.98	521+27.88	LT	360.10	3	120		120		9	1½	5		360.10				
		Sub-Total		720.20				371		28		15		720.20				
RAMP B	543+10	564+25	RT	2115	6	1410		1410		106	1½	59		2115				
	564+25	574+99.03	RT	1074.03	7 avg	835		835		63	1½	35		1074.03				
	543+10	564+25	LT	2115	3	705		705		53	1½	29		2115				
	564+25	574+99.03	LT	1074.03	3	358		358		27	1½	15		1074.03				
		Sub-Total		6378.06				3308		249		138		6378.06				
RAMP C	104+14.56	102+93.21	RT	121.35	6	81		81		6	1½	3		121.35				
	104+14.56	102+93.21	LT	121.35	3	40		40		3	1½	2		121.35				
		Sub-Total		242.70				121		9		5		242.70				
TOTALS (CARRIED TO GENERAL SUMMARY)								7514		562		315		STATIONS 145				

CALCULATED GDM CHECKED TES

RAMP SHOULDER RESURFACING QUANTITIES

JEF-7-4.77

REF. NO.	PLAN SHEET NO.	STATION FROM	STATION TO	SIDE	202 GUARDRAIL REMOVED FOR STORAGE	606 GUARDRAIL, TYPE 5	606 GUARDRAIL, TYPE 5A	606 GUARDRAIL, TYPE 5, 25' LONG-SPAN	606 ANCHOR ASSEMBLY TYPE A	606 ANCHOR ASSEMBLY TYPE E-98	606 ANCHOR ASSEMBLY TYPE T	606 BRIDGE TERMINAL ASSEMBLY TYPE 1	606 BRIDGE TERMINAL ASSEMBLY TYPE 2	606 BRIDGE TERMINAL ASSEMBLY TYPE 3	622 CONCRETE BARRIER, SINGLE SLOPE, TYPE D	626 BARRIER REFLECTOR TYPE A	626 BARRIER REFLECTOR TYPE B	448 2" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 1, UNDER GUARDRAIL, PG64-22, AS PER PLAN LENGTH	448 WIDTH	448 CU. YD.	COMMENTS
					FT.	FT.	FT.	FT.	EA.	EA.	EA.	EA.	EA.	EA.	FT.	EA.	EA.				
1-GR	26	270+35.5	272+82	Lt.	250																
		270+35.5	272+82	Lt.		200				1		1				3		250	2	3.09	
2-GR	26	272+50	276+91.75	Rt.	437.5																
		272+50	276+91.75	Rt.		437.5							1			6		437.5	2	5.40	Connect to existing bridge terminal assembly at Br. No. JEF-7-0487
3-GR	26	No Work		Lt.																	
4-GR	26	No Work		Lt.																	
5-GR	26	281+43	285+18	Lt.	375																
		281+20.5	285+18	Lt.		350				1	1					5		412.5	2	5.09	50' of rail at 40' radius
6-GR	26	279+06	386+76' S'	Rt.	10850																
	Thru	279+06	332+77	Rt.		5387.5										55		5387.5	2	66.51	Connect to existing bridge terminal assembly at Br. No. JEF-7-0487
	30	332+77	333+77	Rt.				100								1					
		333+77	387+52' S'	Rt.		5325				1						54		5375	2	66.36	
7-GR	28	333+00	337+25	Lt.	425																
		333+00	337+25	Lt.		362.5				1	1					5		425	2	5.25	
8-GR	29	344+66	346+16	Lt.	150																
		344+66	346+16	Lt.		87.5				1	1					2		150	2	1.85	
9-GR	29	357+34	358+59	Lt.	125																
&		360+89	362+14	Lt.	125																
10-GR		357+34	362+21.5	Lt.		425				1	1					6		487.5	2	6.02	
11-GR	29	366+25	367+50	Lt.	125																
		366+25	367+50	Lt.		62.5				1	1					2		125	2	1.54	
12-GR	30	378+26	379+51	Lt.	125																
		382+00	385+62.5	Lt.	362.5																
		378+25	385+62.5	Lt.		725					1		1			8		737.5	2	9.11	
13-GR	30	382+32	385+82	Rt.	350																
		382+32	385+82	Rt.		300				1		1				4		350	2	4.32	
14-GR	30	386+84	388+71.5	Lt.	187.5																
		386+84	388+71.5	Lt.		137.5				1		1				3		187.5	2	2.32	
15-GR	30	387+06	388+93.5	Rt.	187.5																
		387+06	388+93.5	Rt.		175					1		1			3		187.5	2	2.32	
16-GR	31	401+65	414+00	Rt.	1225																
		401+65	414+00	Rt.		1162.5				1	1					13		1225	2	15.12	
17-GR	31	420+50	428+00	Rt.	750																
	&	420+45	427+20	Rt.		625				1			1			8		675	2	8.33	
	32	427+17.9	427+61.9	Rt.											44		1				See Std. Dwg. RM-4.5
18-GR	31	422+81	428+93.5	Lt.	612.5																
	&	422+85.7	427+10.7	Lt.		412.5					1			1		5		425	2	5.25	
	32	427+08.6	427+66.6	Lt.											58		1				See Std. Dwg. RM-4.5
		427+64.5	429+02.02	Lt.		87.5				1		1				2		137.5	2	1.70	
19-GR	32	435+70' A'	441+32.5' A'	Rt.	562.5																
	& 33	435+70' A'	441+32.5' A'	Rt.		500				1	1					6		562.5	2	6.94	
20-GR	32	436+30	441+80	Lt.	562.5																
	& 33	436+30	441+80	Lt.		500				1	1					6		562.5	2	6.94	
21-GR	32	439+62	450+87	Rt.	1125																
	& 33	439+62	450+87	Rt.		1075				1				1		12		1125	2	13.89	See Bridge Railing Detail, Sheet No. 48 & 49.
22-GR	33	452+68	453+68	Rt.	100																
		452+68	453+68	Rt.		87.5					1			1		2		100	2	1.24	See Bridge Railing Detail, Sheet No. 48 & 49.
23-GR	33	450+37	451+12	Lt.	75																
		450+37	451+12	Lt.		62.5					1			1		2		75	2	0.93	See Bridge Railing Detail, Sheet No. 48 & 49.
24-GR	33	452+92.5	457+55	Lt.	462.5																
	& 34	452+92.5	457+55	Lt.		412.5				1				1		5		462.5	2	5.71	See Bridge Railing Detail, Sheet No. 48 & 49.
25-GR	33	16+72 C.R. 7E	470+69	Lt.	1912.5																Equation: Sta 471+00 Bk = Sta 469+59.52 Ah
	- 35	16+72 C.R. 7E	470+69	Lt.		1887.5			1				1			20		1912.5	2	23.61	75' of rail at 37' radius
26-GR	33	11+35 C.R. 7E	452+93' D'	Rt.	287.5																
		11+35 C.R. 7E	452+93' D'	Rt.		250			1		1					4		287.5	2	3.55	75' of rail at 100' radius and 62.5' of rail at 42' radius
27-GR	33	453+27' D'	470+69	Rt.	1912.5																Equation: Sta 471+00 Bk = Sta 469+59.52 Ah
	- 35	453+27' D'	470+69	Rt.		1900					1					20		1912.5	2	23.61	62.5' of rail at 32' radius
28-GR	35	476+45	104+26' C'	Lt.	2762.5																
	& 36	476+45	104+26' C'	Lt.		2712.5				1			1			28		2762.5	2	34.11	
29-GR	35	476+45	516+99	Rt.	4075																
	& 36	476+45	516+99	Rt.		4062.5					1			1		42		4075	2	50.31	
30-GR	36	503+78	506+28	Lt.																	
		503+78	506+28	Lt.		187.5				1	1					3		250	2	3.09	
31-GR	36	521+25.5' A'	521+84' A'	Rt.	87.5																
		521+25.5' A'	521+84' A'	Rt.		37.5			2							2		87.5	2	1.08	37.5' of rail at 63' radius, face of guardrail flush with face of curb
32-GR	37	531+64.3	542+29	Rt.	1025																
		531+64.3	542+29	Rt.		1025						1				12		1075	2	13.27	Connect to existing Type E
33-GR	37	536+11.5	542+29	Lt.	612.5																
		536+11.5	542+29	Lt.		600					1			1		7		612.5	2	7.56	
34-GR	37	547+72.5	550+08.5	Lt.	237.5																
		547+72.5	550+08.5	Lt.		187.5				1		1				3		237.5	2	2.93	
TOTALS		QUANTITIES CARRIED TO SHEET NO. 25			32,462.5	31,750		100	4	19	18	8	7	4	102	359	2			408.35	

CALCULATED RDA CHECKED TES

GUARDRAIL SUMMARY

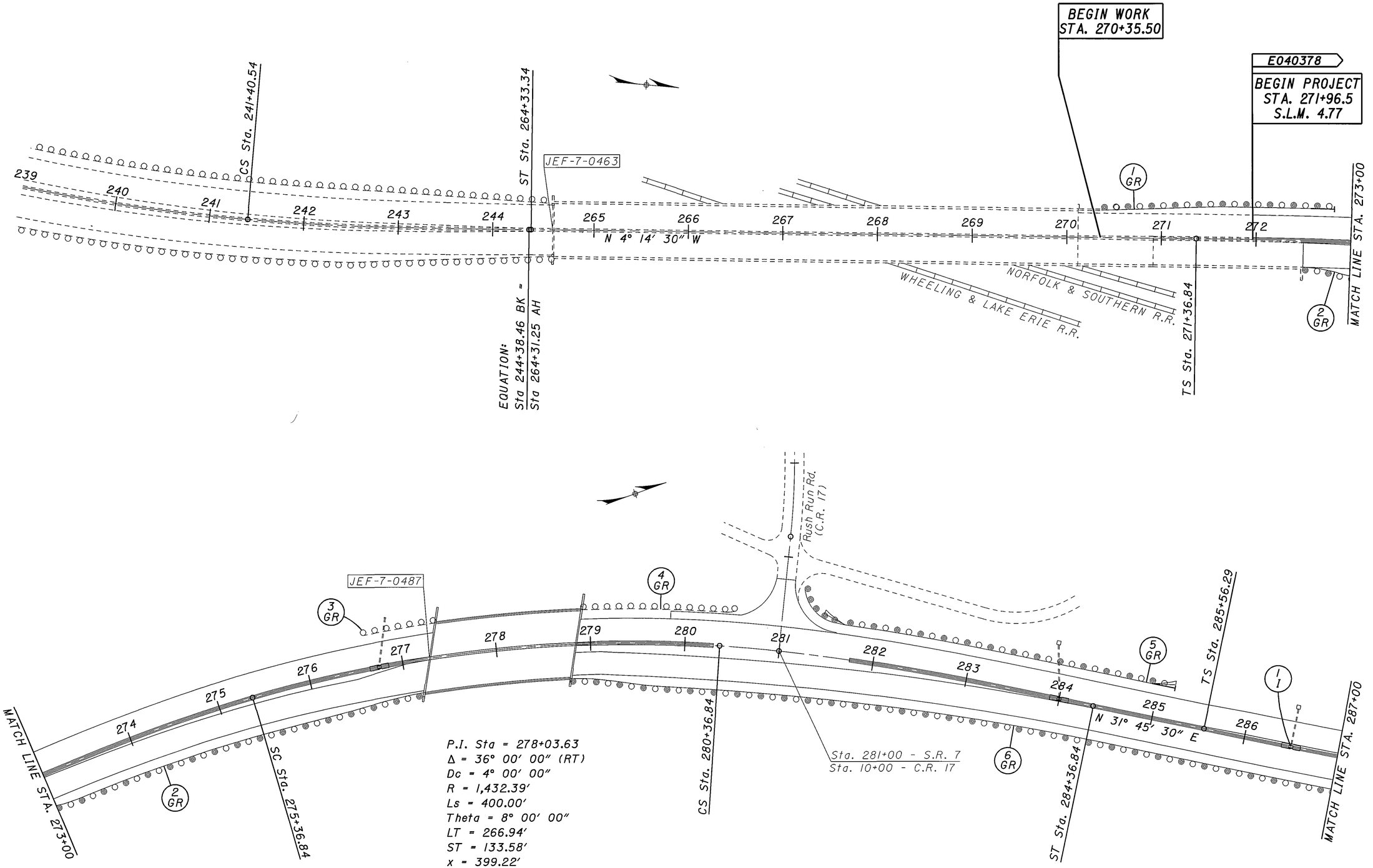
JEF-7-4.77

REF. NO.	PLAN SHEET NO.	STATION FROM	STATION TO	SIDE	202 GUARDRAIL REMOVED FOR STORAGE		606 GUARDRAIL, TYPE 5	GUARDRAIL, TYPE 5A	GUARDRAIL, TYPE 5, 25' LONG-SPAN	ANCHOR ASSEMBLY TYPE A	ANCHOR ASSEMBLY TYPE E-98	ANCHOR ASSEMBLY TYPE T		BRIDGE TERMINAL ASSEMBLY TYPE 1	BRIDGE TERMINAL ASSEMBLY TYPE 2	BRIDGE TERMINAL ASSEMBLY TYPE 3		622 CONCRETE BARRIER, SINGLE SLOPE, TYPE D	626 BARRIER REFLECTOR TYPE A	626 BARRIER REFLECTOR TYPE B	448 2" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 1, UNDER GUARDRAIL, PG64-22, AS PER PLAN LENGTH	448 WIDTH	448 CU. YD.	COMMENTS
					FT.		FT.	FT.	FT.	EA.	EA.	EA.		EA.	EA.	EA.		FT.	EA.	EA.				
35-GR	37 & 38	549+36	573+95.5	Rt.	2462.5		2450					1			1			26		2462.5	2	30.40	
36-GR	37 & 38	543+16.5'B'	543+41.5'B'	Lt.	387.5																		
		553+06'B'	553+81'B'	Lt.	75																		
		554+64.7'B'	555+40'B'	Lt.	75																		
		543+18.7'B'	559+15'B'	Lt.				1525			1	1						16		1587.5	2	19.60	
37-GR	37	543+90'B'	545+77'B'	Rt.	187.5																		
		543+90'B'	545+77'B'	Rt.			137.5				1			1				3		187.5	2	2.32	
38-GR	37 - 39	546+77.5'B'	579+88	Rt.	3312.5																		
		546+77.5'B'	579+88	Rt.			3300					1			1			34		3312.5	2	40.90	
39-GR	39	587+00	587+50	Rt.	50																		
		587+00	587+50	Rt.							1												
																		1		50	2	0.62	
TOTALS		QUANTITIES CARRIED FROM SHEET NO. 24			32,462.5		31,750		100	4	19	18		8	7	4		102	359	2			408.35	
		QUANTITIES FROM THIS SHEET			6550		5887.5	1525			3	3		1	2				80				93.84	
		QUANTITIES CARRIED TO GENERAL SUMMARY			39,012.5		37,637.5	1525	100	4	22	21		9	9	4		102	439	2			502.19	

CALCULATED RDA
CHECKED TES

GUARDRAIL SUMMARY

JEF-7-4.77



P.I. Sta = 278+03.63
Δ = 36° 00′ 00″ (RT)
Dc = 4° 00′ 00″
R = 1,432.39′
Ls = 400.00′
Theta = 8° 00′ 00″
LT = 266.94′
ST = 133.58′
x = 399.22′
y = 18.59′
k = 199.87′
p = 4.65′
Δc = 20° 00′ 00″ (RT)
Lc = 500.00′
Ts = 666.79′
Es = 78.60′

FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR INTERSECTION DETAILS, SEE SHEET NO. 41.
FOR DRAINAGE QUANTITIES, SEE SHEET NO. 43.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

HORIZONTAL SCALE IN FEET
0 50 100

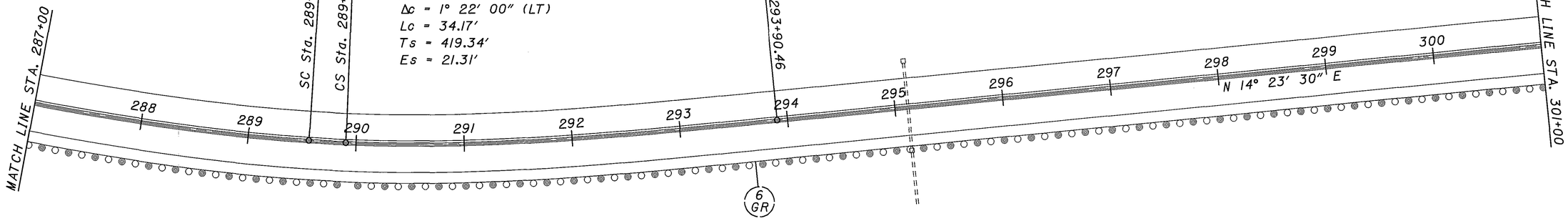
CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 239+00 TO STA. 287+00

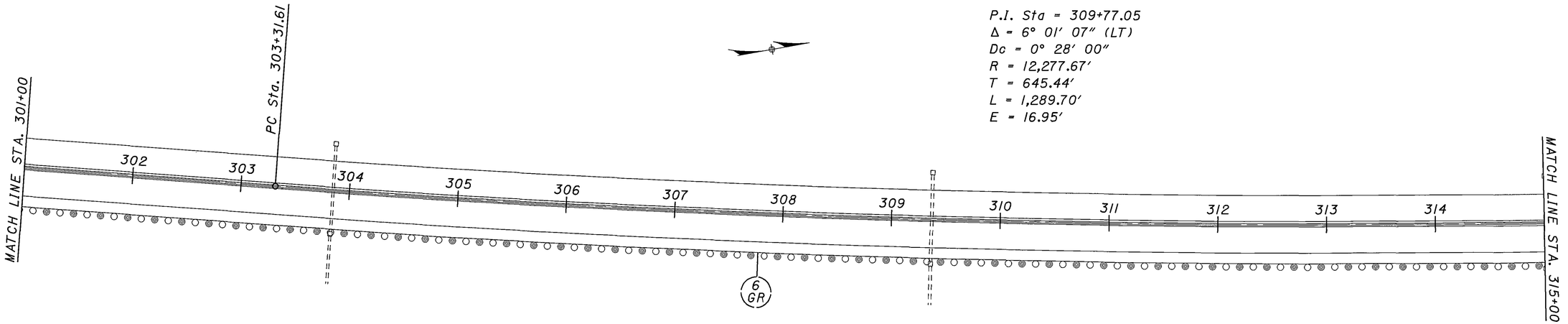
JEF-7-4.77

26
49

P.I. Sta = 289+75.63
Δ = 17° 22′ 00″ (LT)
Dc = 4° 00′ 00″
R = 1,432.39′
Ls = 400.00′
Theta = 8° 00′ 00″
LT = 266.94′
ST = 133.58′
x = 399.22′
y = 18.59′
k = 199.87′
p = 4.65′
Δc = 1° 22′ 00″ (LT)
Lc = 34.17′
Ts = 419.34′
Es = 21.31′



P.I. Sta = 309+77.05
Δ = 6° 01′ 07″ (LT)
Dc = 0° 28′ 00″
R = 12,277.67′
T = 645.44′
L = 1,289.70′
E = 16.95′



FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

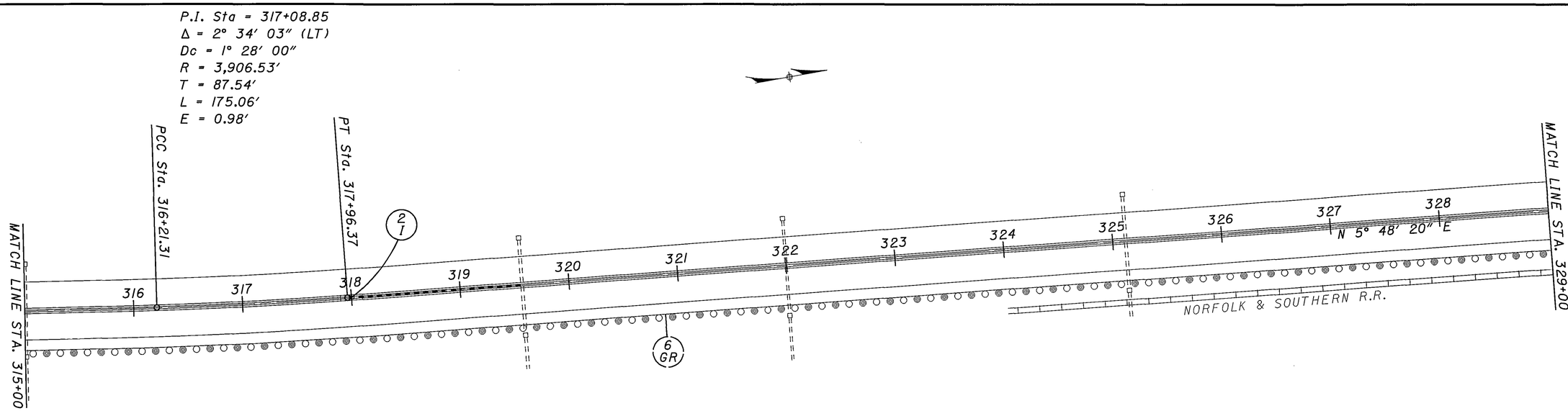
HORIZONTAL SCALE IN FEET
0 50 100

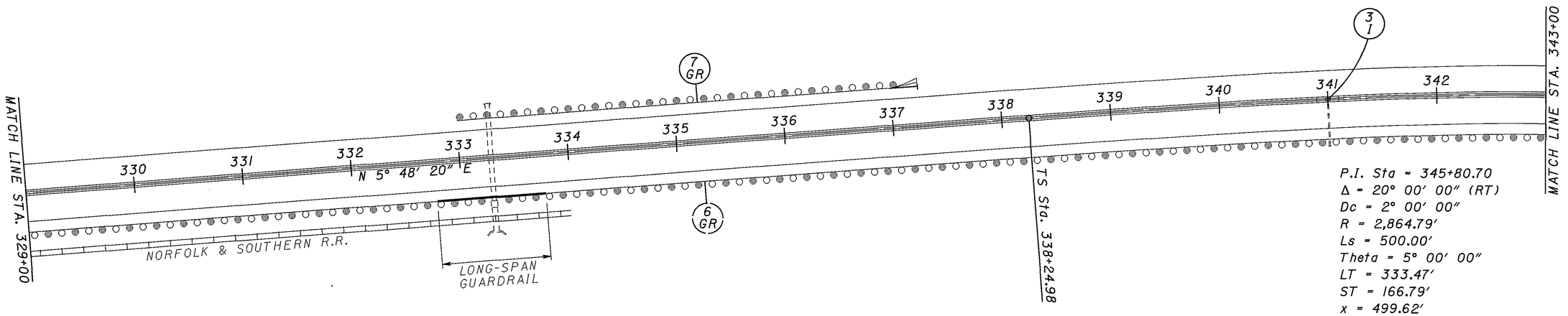
CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 287+00 TO STA. 315+00

JEF-7-4.77

27
49





FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR DRAINAGE QUANTITIES, SEE SHEET NO. 43.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

P.I. Sta = 345+80.70
Δ = 20° 00′ 00″ (RT)
Dc = 2° 00′ 00″
R = 2,864.79′
Ls = 500.00′
Theta = 5° 00′ 00″
LT = 333.47′
ST = 166.79′
x = 499.62′
y = 14.54′
k = 249.94′
p = 3.64′
Δc = 10° 00′ 00″ (RT)
Lc = 500.00′
Ts = 755.72′
Es = 47.89′

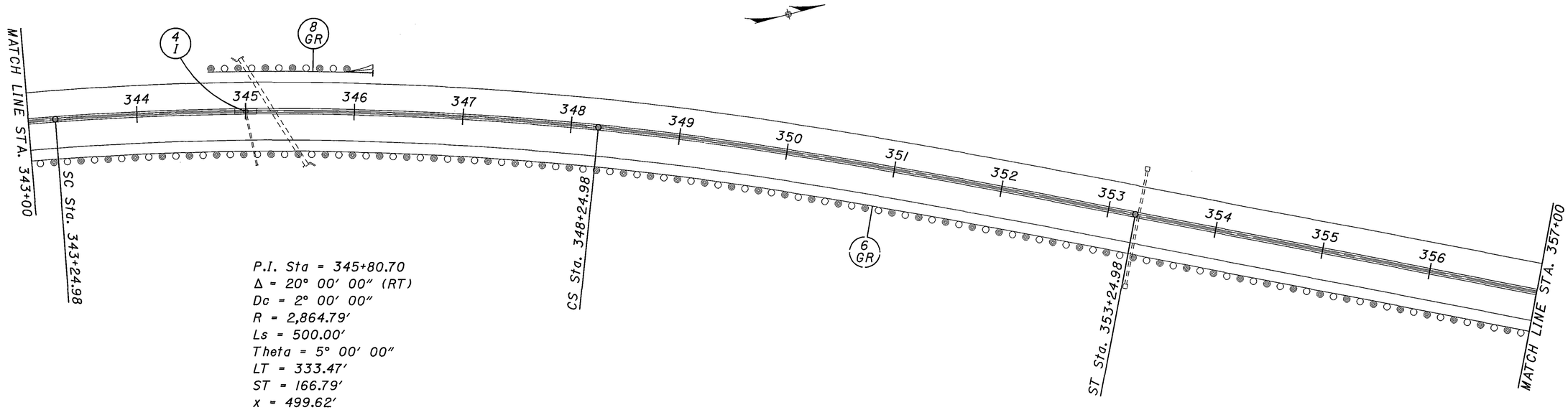
0 50 100
HORIZONTAL SCALE IN FEET

CALCULATED RDA
CHECKED TES

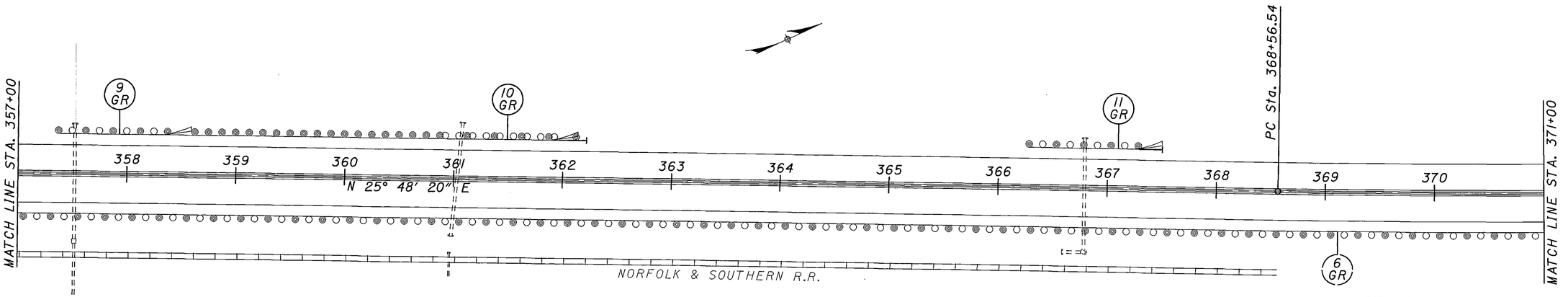
PLAN SHEET
STA. 315+00 TO STA. 343+00

JEF-7-4.77

28
49



P.I. Sta = 345+80.70
Δ = 20° 00′ 00″ (RT)
Dc = 2° 00′ 00″
R = 2,864.79′
Ls = 500.00′
Theta = 5° 00′ 00″
LT = 333.47′
ST = 166.79′
x = 499.62′
y = 14.54′
k = 249.94′
p = 3.64′
Δc = 10° 00′ 00″ (RT)
Lc = 500.00′
Ts = 755.72′
Es = 47.89′



P.I. Sta = 374+99.99
Δ = 6° 00′ 00″ (LT)
Dc = 0° 28′ 00″
R = 12,277.67′
T = 643.45′
L = 1,285.71′
E = 16.85′

FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR DRAINAGE QUANTITIES, SEE SHEET NO. 43.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

HORIZONTAL SCALE IN FEET
0 50 100

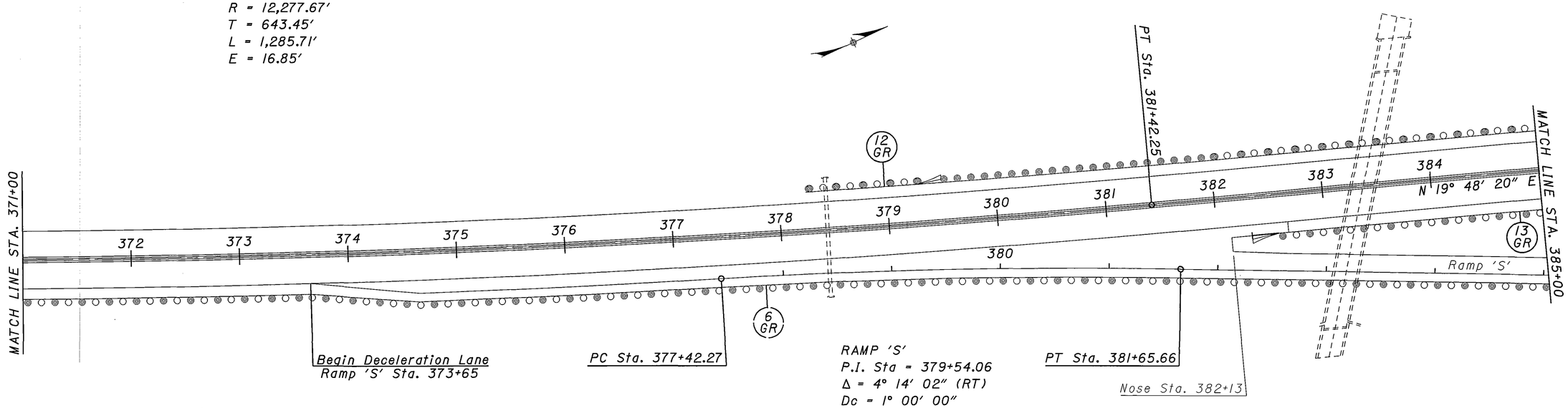
CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 343+00 TO STA. 371+00

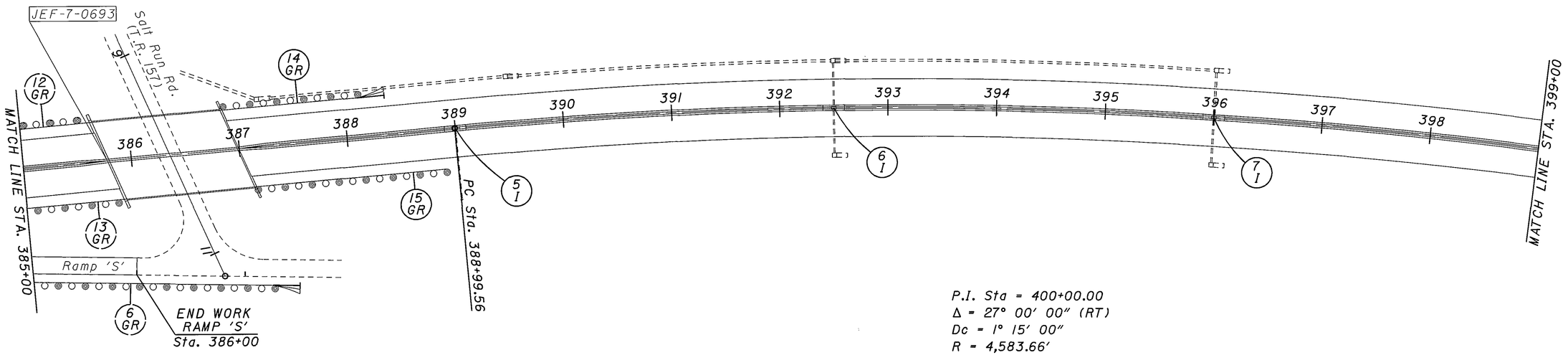
JEF-7-4.77

29
49

P.I. Sta = 374+99.99
Δ = 6° 00′ 00″ (LT)
Dc = 0° 28′ 00″
R = 12,277.67′
T = 643.45′
L = 1,285.71′
E = 16.85′



RAMP 'S'
P.I. Sta = 379+54.06
Δ = 4° 14′ 02″ (RT)
Dc = 1° 00′ 00″
R = 5729.58′
T = 211.79′
L = 423.39′
E = 3.91′



P.I. Sta = 400+00.00
Δ = 27° 00′ 00″ (RT)
Dc = 1° 15′ 00″
R = 4,583.66′
T = 1,100.44′
L = 2,160.00′
E = 130.25′

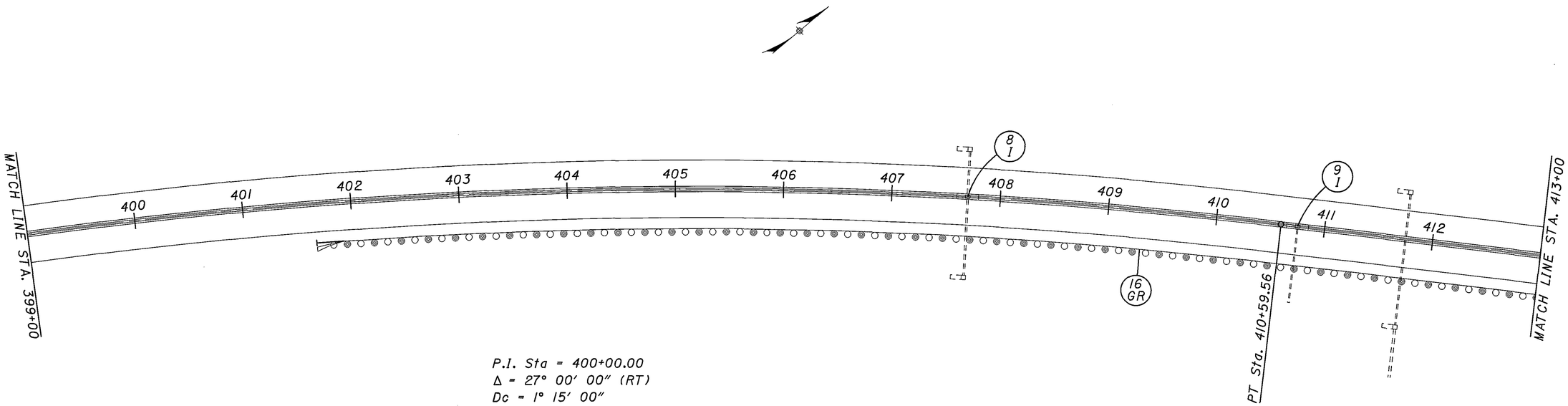
FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR DRAINAGE QUANTITIES, SEE SHEET NO. 43.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

HORIZONTAL SCALE IN FEET
0 50 100
CALCULATED RDA
CHECKED TES

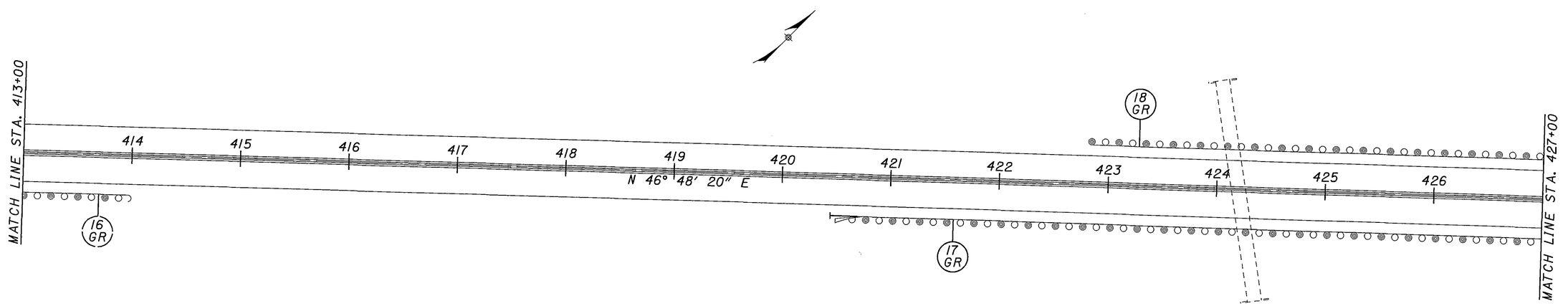
PLAN SHEET
STA. 371+00 TO STA. 399+00

JEF-7-4.77

30
49



P.I. Sta = 400+00.00
Δ = 27° 00′ 00″ (RT)
Dc = 1° 15′ 00″
R = 4,583.66′
T = 1,100.44′
L = 2,160.00′
E = 130.25′



FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR DRAINAGE QUANTITIES, SEE SHEET NO. 43.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

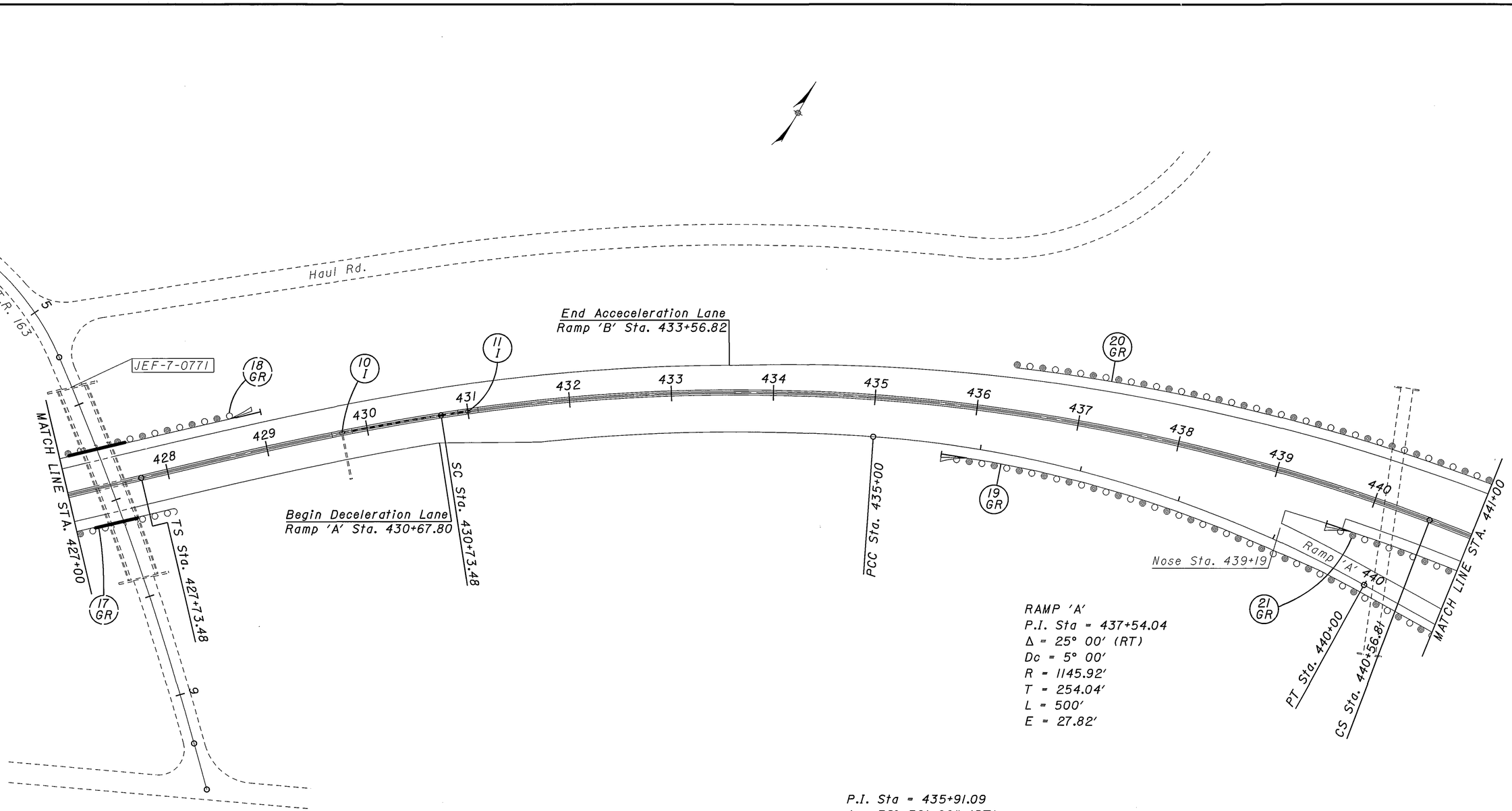
HORIZONTAL SCALE IN FEET
0 50 100

CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 399+00 TO STA. 427+00

JEF-7-4.77

31
49



RAMP 'A'
P.I. Sta = 437+54.04
Δ = 25° 00' (RT)
Dc = 5° 00'
R = 1145.92'
T = 254.04'
L = 500'
E = 27.82'

P.I. Sta = 435+91.09
Δ = 38° 30' 00" (RT)
Dc = 3° 00' 00"
R = 1,909.86'
Ls = 300.00'
Theta = 4° 30' 00"
LT = 200.06'
ST = 100.06'
x = 299.81'
y = 7.85'
k = 149.97'
p = 1.96'
Δc = 29° 30' 00" (RT)
Lc = 983.33'
Ts = 817.61'
Es = 115.18'

FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR DRAINAGE QUANTITIES, SEE SHEET NO. 43.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

HORIZONTAL SCALE IN FEET
0 50 100

CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 427+00 TO STA. 441+00

JEF-7-4.77

32
49

RAMP 'B'
P.I. Sta = 451+98.58
Δ = 34° 48′ 00″ (RT)
Dc = 16° 00′
R = 358.10′
T = 112.22′
L = 217.50′
E = 17.17′

RAMP 'C'
P.I. Sta = 454+66.36
Δ = 22° 46′ 15″ (LT)
Dc = 16° 00′
R = 358.10′
T = 72.11′
L = 142.32′
E = 7.19′

P.I. Sta = 459+43.52
Δ = 10° 26′ 49″ (LT)
Dc = 1° 00′ 00″
R = 5,729.58′
T = 523.80′
L = 1,044.69′
E = 23.89′

HORIZONTAL SCALE IN FEET
0 50 100

CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 441+00 TO STA. 455+00

JEF-7-4.77

33
49

RAMP 'B'
P.I. Sta = 445+28.88
Δ = 12° 00′ (LT)
Dc = 3° 30′
R = 1637.02′
T = 172.06′
L = 342.86′
E = 9.02′

1000′ Acceleration Lane @ 40:1

PC Sta. 443+56.82

PT Sta. 446+99.68

Nose Sta. 445+63.80

Ramp 'B'

Sta. 453+05.38 - Ramp 'C'
Sta. 15+40.65 - C.R. 7E

Sta. 453+09.81 - Ramp 'B'
Sta. 15+23.47 - C.R. 7E

PT Sta. 453+03.86

PC Sta. 450+86.36

Sta. 452+00 - S.R. 7
Sta. 13+50 - C.R. 7E

JEF-7-0817

PC Sta. 454+19.72

PC Sta. 14+43.47

C.R. 7E

PT Sta. 16+59.90

PC Sta. 453+94.25

Ramp 'C'

MATCH LINE STA. 455+00

N 85° 18′ 20″ E

PT Sta. 13+19.73

MATCH LINE STA. 441+00

ST Sta. 443+56.81

Sta. 450+49.55 - Ramp 'D'
Sta. 12+00 - C.R. 7E

PC Sta. 451+53.50

PC Sta. 10+10.02

Ramp 'A'

PC Sta. 446+64.92

PT Sta. 447+17.81

Ramp 'D'

Sta. 447+87.60 - Ramp 'A'
Sta. 8+00 - C.R. 7E

C.R. 7E

20 GR
12 I
21 GR
22 GR
23 GR
24 GR
25 GR
19 GR
26 GR
27 GR

P.I. Sta = 435+91.09
Δ = 38° 30′ 00″ (RT)
Dc = 3° 00′ 00″
R = 1,909.86′
Ls = 300.00′
Theta = 4° 30′ 00″
LT = 200.06′
ST = 100.06′
x = 299.81′
y = 7.85′
k = 149.97′
p = 1.96′
Δc = 29° 30′ 00″ (RT)
Lc = 983.33′
Ts = 817.61′
Es = 115.18′

RAMP 'A'
P.I. Sta = 446+96.03
Δ = 75° 45′ 27″ (RT)
Dc = 143°14′22″
R = 40′
T = 31.11′
L = 52.89′
E = 10.68′

C.R. 7E
P.I. Sta = 11+75.31
Δ = 49° 33′ 11″ (LT)
Dc = 16° 00′
R = 358.10′
T = 165.29′
L = 309.71′
E = 36.31′

C.R. 7E
P.I. Sta = 15+55.10
Δ = 34° 37′ 41″ (RT)
Dc = 16° 00′
R = 358.10′
T = 111.63′
L = 216.43′
E = 17.00′

RAMP 'D'
P.I. Sta = 453+33.58
Δ = 53° 23′ 33″ (LT)
Dc = 16° 00′
R = 358.10′
T = 180.08′
L = 333.70′
E = 42.73′

FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR INTERSECTION DETAILS, SEE SHEET NO. 40.
FOR DRAINAGE QUANTITIES, SEE SHEET NO. 43.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.
FOR RAILING DETAILS ON BRIDGE NO. JEF-7-0817, SEE SHEET NO'S. 48, 49.

P.I. Sta = 459+43.52
Δ = 10° 26′ 49″ (LT)
Dc = 1° 00′ 00″
R = 5,729.58′
T = 523.80′
L = 1,044.69′
E = 23.89′

RAMP 'C'
P.I. Sta = 462+55.48
Δ = 10° 28′ 34″ (LT)
Dc = 2° 30′
R = 2291.83′
T = 210.11′
L = 419.04′
E = 9.61′

Begin Deceleration Lane
Ramp 'C' Sta. 468+45.32

MATCH LINE STA. 469+00

PT Sta. 464+64.41

PC Sta. 460+45.37

Nose Sta. 459+92

PT Sta. 455+36.57

Ramp 'C'

N 74° 51′ 31″ E

MATCH LINE STA. 455+00

PC Sta. 461+00

1000′ Acceleration Lane @ 40:1

PT Sta. 459+00

Nose Sta. 458+51.40

PC Sta. 457+00

455 Ramp 'D'

PT Sta. 454+87.20

RAMP 'D'
P.I. Sta = 458+00.66
Δ = 16° 00′ (RT)
Dc = 8° 00′
R = 716.20′
T = 100.66′
L = 200′
E = 7.04′

FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR DRAINAGE QUANTITIES, SEE SHEET NO. 43.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

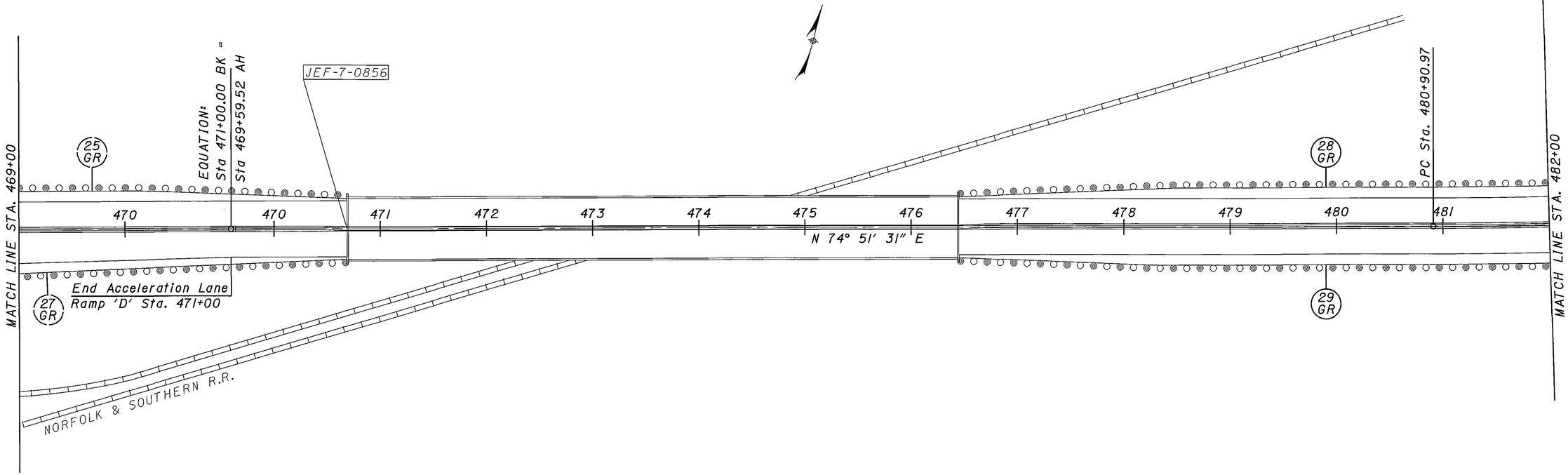
HORIZONTAL SCALE IN FEET
0 50 100

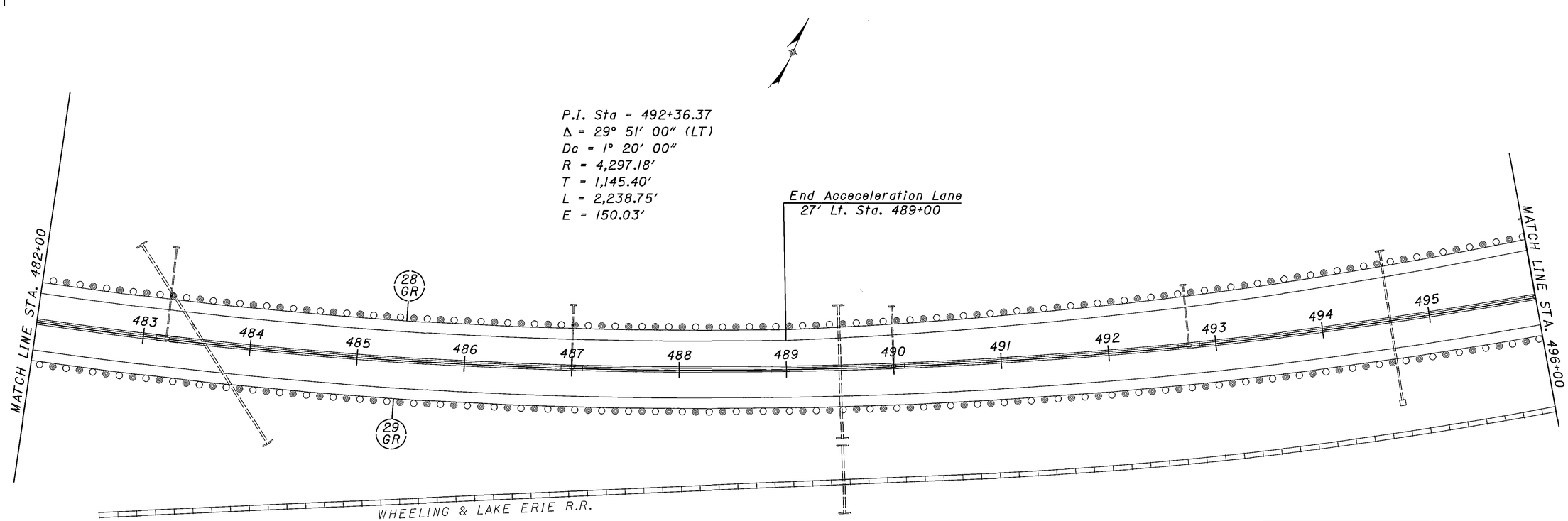
CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 455+00 TO STA. 469+00

JEF-7-4.77

34
49





FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

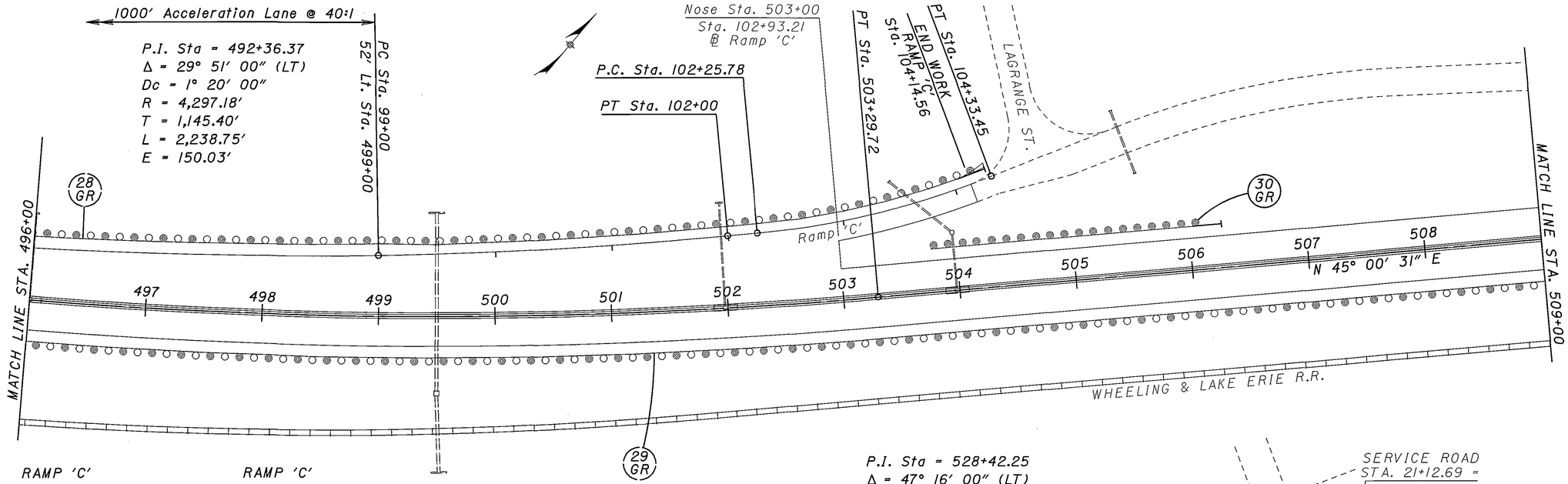
HORIZONTAL SCALE IN FEET
0 50 100

CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 469+00 TO STA. 496+00

JEF-7-4.77

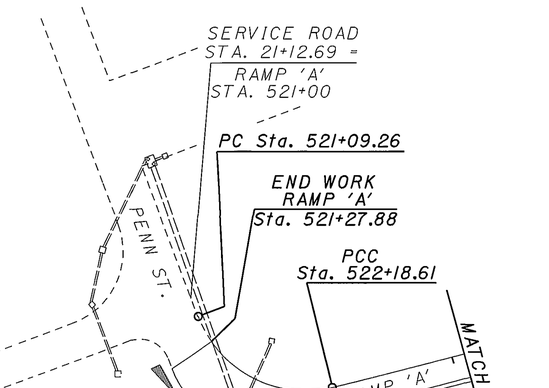
35
49

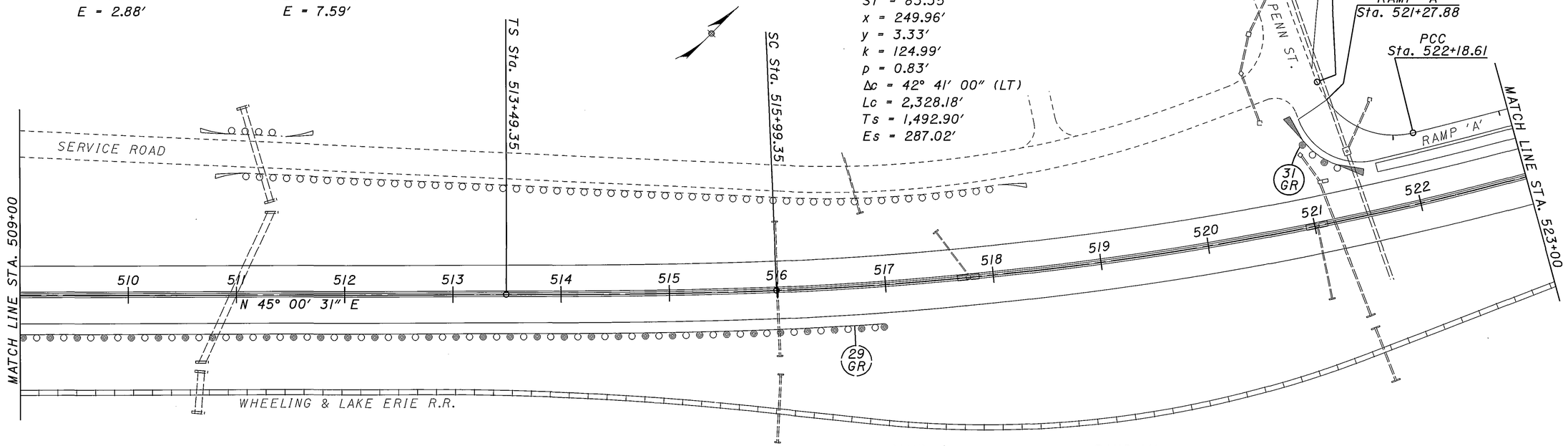


RAMP 'C'
P.I. Sta = 100+50.07
Δ = 4° 24' 00" (LT)
Dc = 1° 28' 00"
R = 3906.53'
T = 150.07'
L = 300'
E = 2.88'

RAMP 'C'
P.I. Sta = 103+30.35
Δ = 16° 36' 50" (LT)
Dc = 8° 00' 00"
R = 716.20'
T = 104.57'
L = 207.67'
E = 7.59'

P.I. Sta = 528+42.25
Δ = 47° 16' 00" (LT)
Dc = 1° 50' 00"
R = 3,125.22'
Ls = 250.00'
Theta = 2° 17' 30"
LT = 166.68'
ST = 83.35'
x = 249.96'
y = 3.33'
k = 124.99'
p = 0.83'
Δc = 42° 41' 00" (LT)
Lc = 2,328.18'
Ts = 1,492.90'
Es = 287.02'





RAMP 'A'
P.I. Sta = 521+76.08
Δ = 83° 06' 18" (LT)
Dc = 76° 00' 00"
R = 75.39'
T = 66.82'
L = 109.35'
E = 25.35'

RAMP 'A'
P.I. Sta = 522+88.46
Δ = 2° 36' 58" (LT)
Dc = 1° 52' 22"
R = 3059.23'
T = 69.85'
L = 139.68'
E = 0.80'

FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR INTERSECTION DETAILS, SEE SHEET NO. 41.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

HORIZONTAL SCALE IN FEET
0 50 100
CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 496+00 TO STA. 523+00

JEF-7-4.77

36
49

RAMP 'A'
P.I. Sta = 522+88.46
Δ = 2° 36′ 58″ (LT)
Dc = 1° 52′ 22″
R = 3059.23′
T = 69.85′
L = 139.68′
E = 0.80′

PT Sta. 523+58.29

MATCH LINE STA. 523+00

RAMP 'A'

Nose Sta. 524+87.98

PC Sta. 526+26.74

SMITHFIELD ST.

MARKET ST.

RAMP 'A'
P.I. Sta = 527+44.09
Δ = 9° 22′ 00″ (LT)
Dc = 4° 00′ 00″
R = 1432.40′
T = 117.35′
L = 234.17′
E = 4.80′

PCC Sta. 528+60.91

P.I. Sta = 528+42.25
Δ = 47° 16′ 00″ (LT)
Dc = 1° 50′ 00″
R = 3,125.22′
Ls = 250.00′
Theta = 2° 17′ 30″
LT = 166.68′
ST = 83.35′
x = 249.96′
y = 3.33′
k = 124.99′
p = 0.83′
Δc = 42° 41′ 00″ (LT)
Lc = 2,328.18′
Ts = 1,492.90′
Es = 287.02′

ROSS ST.

Begin Deceleration Lane
Ramp 'A' Sta. 530+94.55

MATCH LINE STA. 537+00

524 525 526 527 528 529 530 531 532 533 534 535 536

33 GR

32 GR

WHEELING & LAKE ERIE R.R.

RAMP 'B'
P.I. Sta = 543+43.03
Δ = 9° 13′ (LT)
Dc = 3° 40′
R = 1562.61′
T = 125.95′
L = 251.36′
E = 5.07′

RAMP 'B'
P.I. Sta = 553+89.91
Δ = 25° 22′ 40″ (LT)
Dc = 1° 24′
R = 4092.56′
T = 921.47′
L = 1812.70′
E = 102.45′

ST Sta. 541+77.53

PC Sta. 542+17.08

BEGIN WORK
RAMP 'B'
Sta. 543+10

PCC Sta. 544+68.44

CS Sta. 539+27.53

NORFOLK & SOUTHERN R.R.

543

37 GR

34 GR

MATCH LINE STA. 551+00

538 539 540 541 542 543 544 545 547 548 549 550

N 2° 15′ 29″ W

33 GR

36 GR

35 GR

JEF-7-0992

32 GR

Ramp 'B' 550

Sta. 545+86.44 - S.R. 7
Sta. 545+58.62 - Ramp 'B'

38 GR

WHEELING & LAKE ERIE R.R.

PC Sta. 543+56.37

P.I. Sta = 549+15.92
Δ = 13° 00′ 00″ (RT)
Dc = 1° 10′ 00″
R = 4,911.07′
T = 559.55′
L = 1,114.29′
E = 31.77′

FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

HORIZONTAL SCALE IN FEET
0 50 100

CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 523+00 TO STA. 551+00

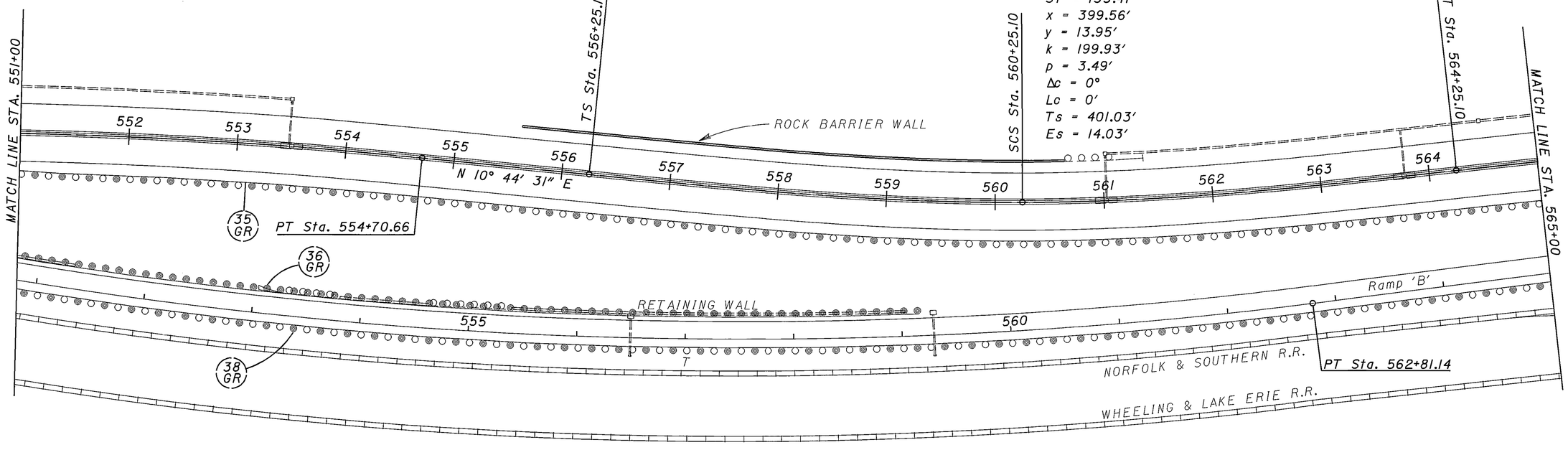
JEF-7-4.77

37
49

P.I. Sta = 549+15.92
Δ = 13° 00′ 00″ (RT)
Dc = 1° 10′ 00″
R = 4,911.07′
T = 559.55′
L = 1,114.29′
E = 31.77′

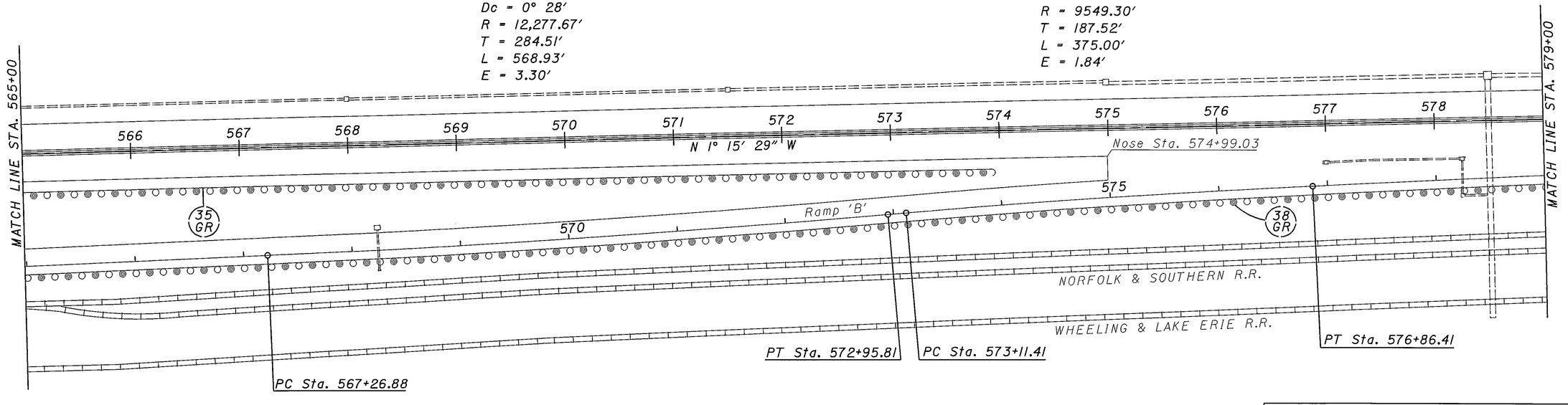
RAMP 'B'
P.I. Sta = 553+89.91
Δ = 25° 22′ 40″ (LT)
Dc = 1° 24′
R = 4092.56′
T = 921.47′
L = 1812.70′
E = 102.45′

P.I. Sta = 560+26.13
Δ = 12° 00′ 00″ (LT)
Dc = 3° 00′ 00″
R = NA
Ls = 400.00′
Theta = 6° 00′ 00″
LT = 266.82′
ST = 133.47′
x = 399.56′
y = 13.95′
k = 199.93′
p = 3.49′
Δc = 0°
Lc = 0′
Ts = 401.03′
Es = 14.03′



RAMP 'B'
P.I. Sta = 570+11.39
Δ = 2° 39′ 18″ (LT)
Dc = 0° 28′
R = 12,277.67′
T = 284.51′
L = 568.93′
E = 3.30′

RAMP 'B'
P.I. Sta = 574+98.93
Δ = 2° 15′ (RT)
Dc = 0° 36′
R = 9549.30′
T = 187.52′
L = 375.00′
E = 1.84′



FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

HORIZONTAL SCALE IN FEET
0 50 100

CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 551+00 TO STA. 579+00

JEF-7-4.77

38
49

P.I. Sta = 581+84.21
Δ = 0° 57′ 30″ (LT)
Dc = 0° 12′ 00″
R = 28,647.89′
T = 239.59′
L = 479.17′
E = 1.00′

END WORK
STA. 590+25

E040378
END PROJECT
STA. 590+25
S.L.M. 10.82

PC Sta. 579+44.62

PT Sta. 584+23.79

MATCH LINE STA. 579+00

580 581 582 583 584 585 586 587 588 589 590 591 592 593

N 2° 12′ 59″ W

39 GR

End Acceleration Lane
Sta. 589+44.59 - 26′ Rt.

38 GR

NORFOLK & SOUTHERN R.R.

WHEELING & LAKE ERIE R.R.

Sta. 579+44.59
51′ RT.

1000′ Acceleration Lane @ 40:1

FOR RESURFACING QUANTITIES, SEE SHEET NO'S. 19-23.
FOR GUARDRAIL QUANTITIES, SEE SHEET NO'S. 24, 25.
FOR TRAFFIC CONTROL QUANTITIES, SEE SHEET NO'S. 44-47.

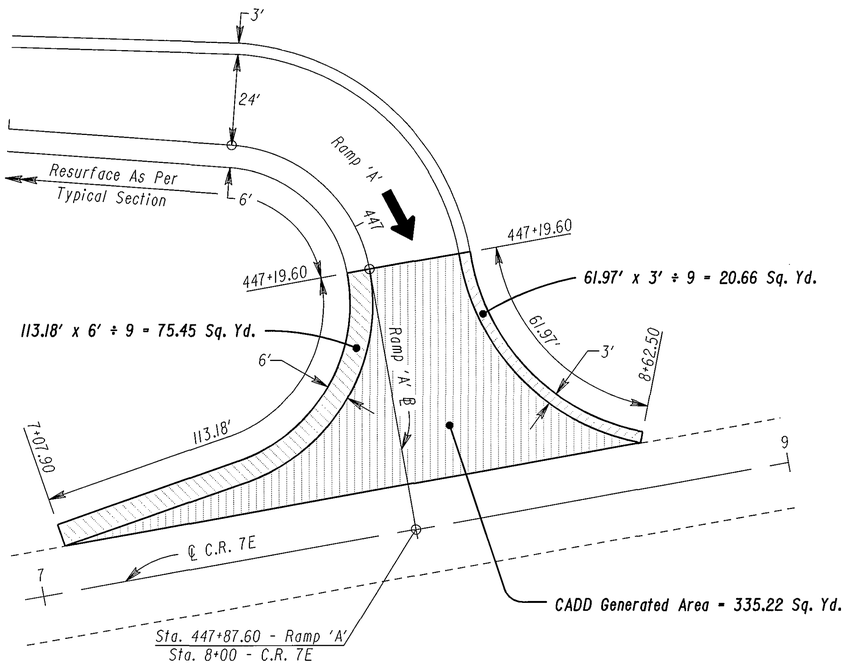
HORIZONTAL SCALE IN FEET
0 50 100

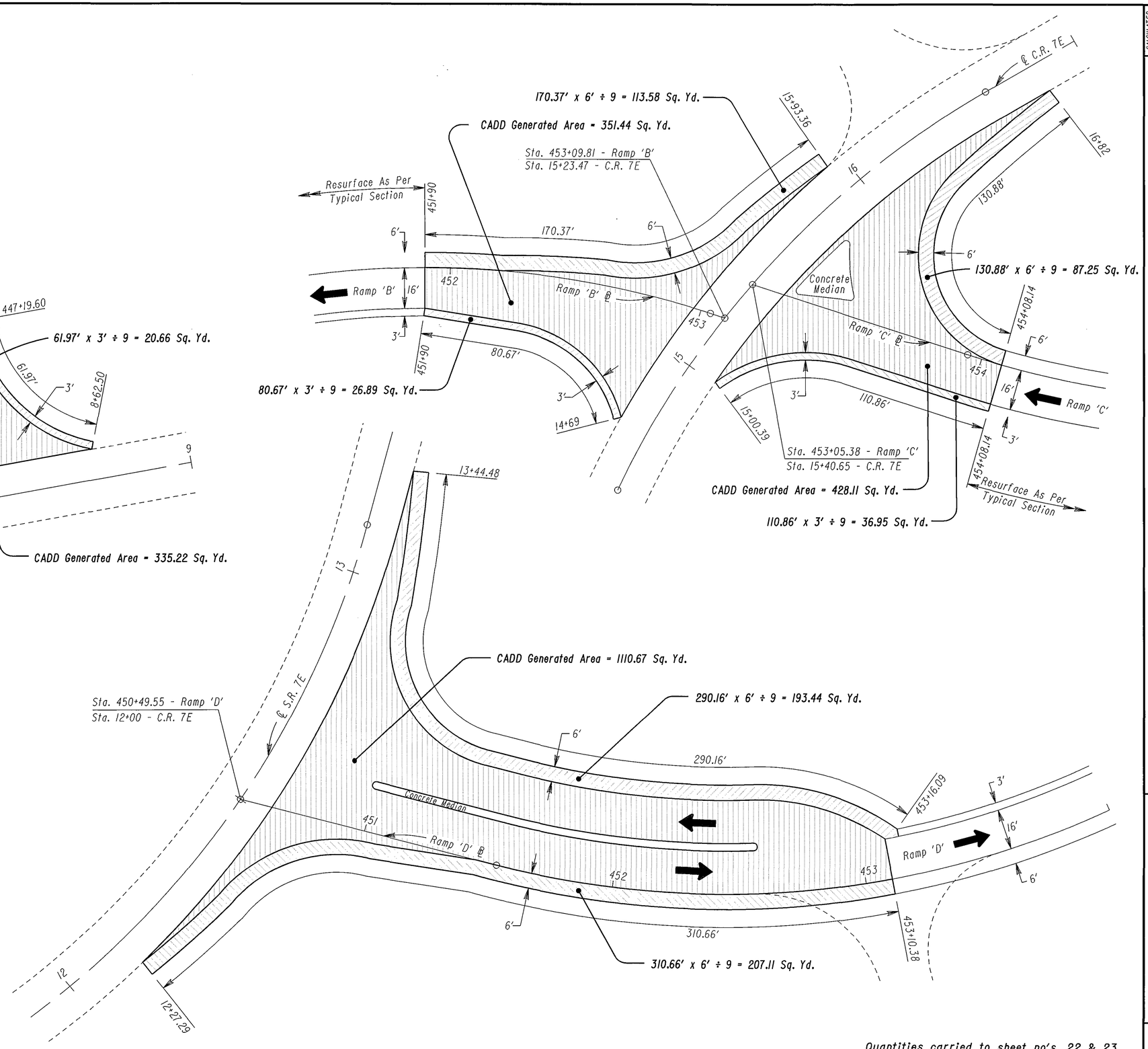
CALCULATED RDA
CHECKED TES

PLAN SHEET
STA. 579+00 TO STA. 593+00

JEF-7-4.77

39
49





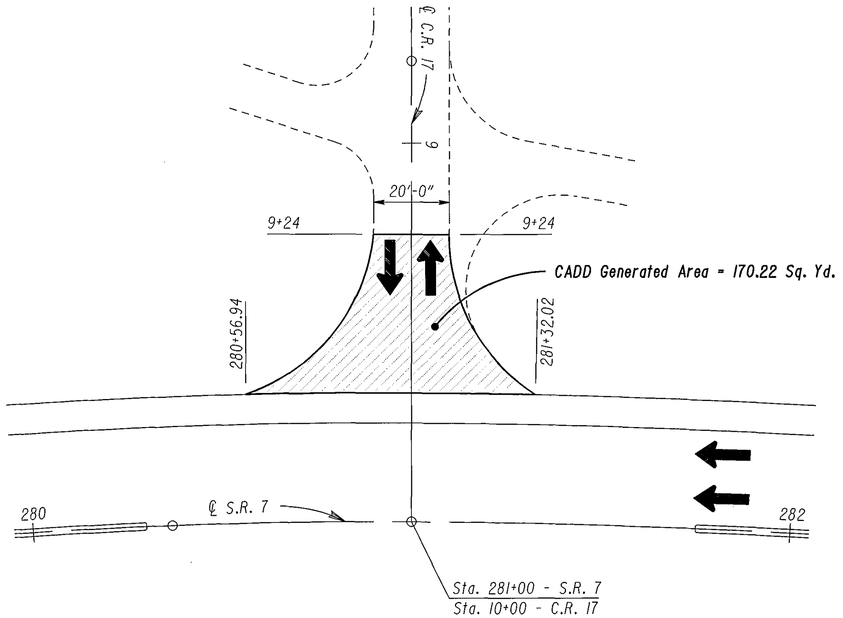
Quantities carried to sheet no's. 22 & 23.

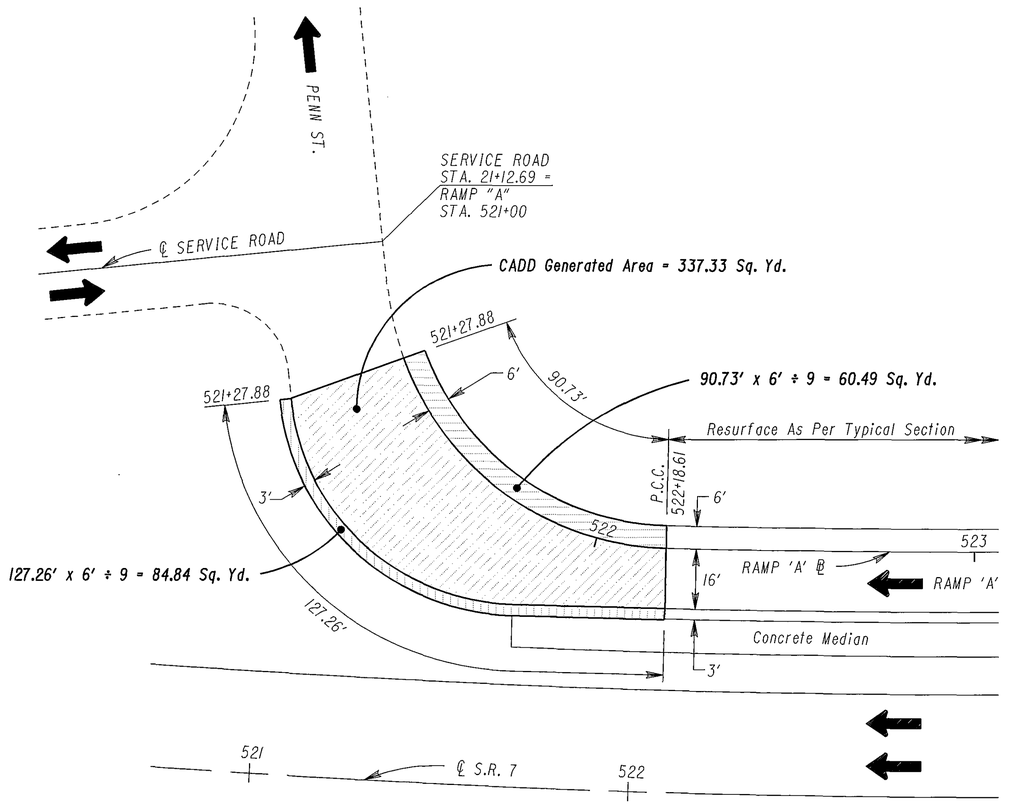
CALCULATED RDA
CHECKED TES

INTERSECTION DETAILS

JEF-7-4.77

40
49



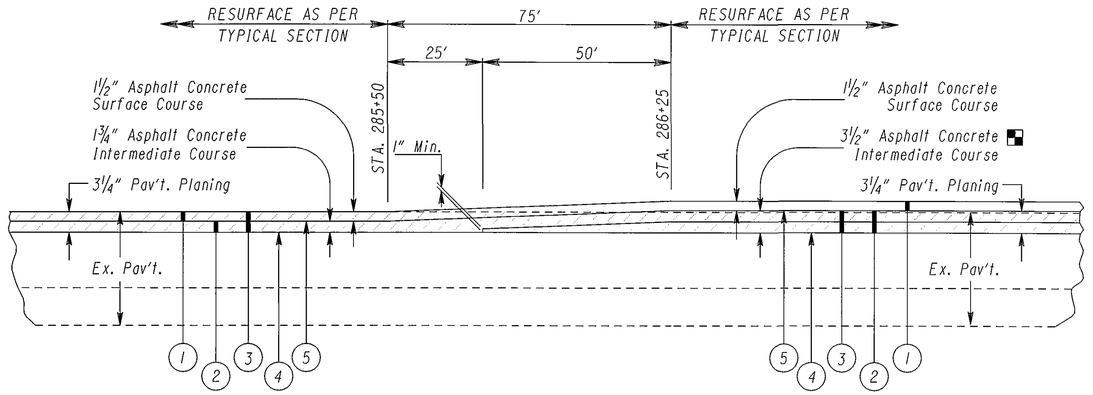


Quantities carried to sheet no's. 22 & 23.

CALCULATED RDA
CHECKED TES

INTERSECTION DETAILS

JEF-7-4.77

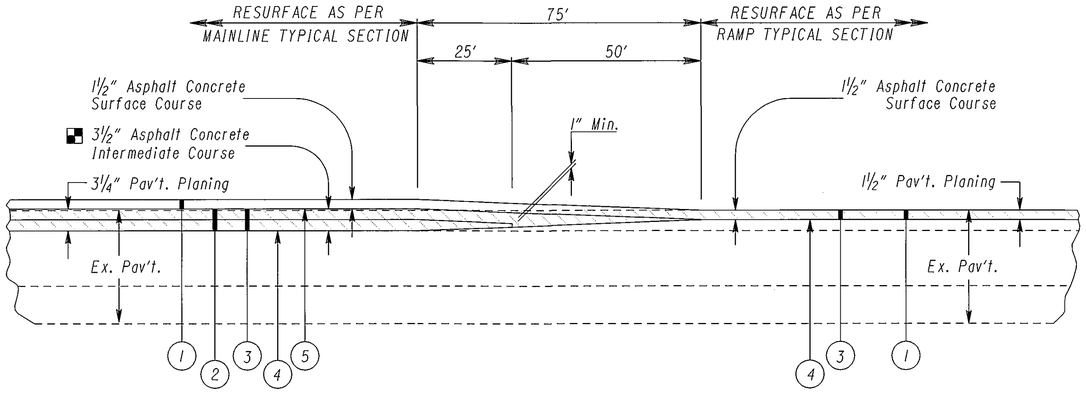


PAVEMENT TRANSITION - STA. 285+50 TO STA. 286+25

Pavement Planing

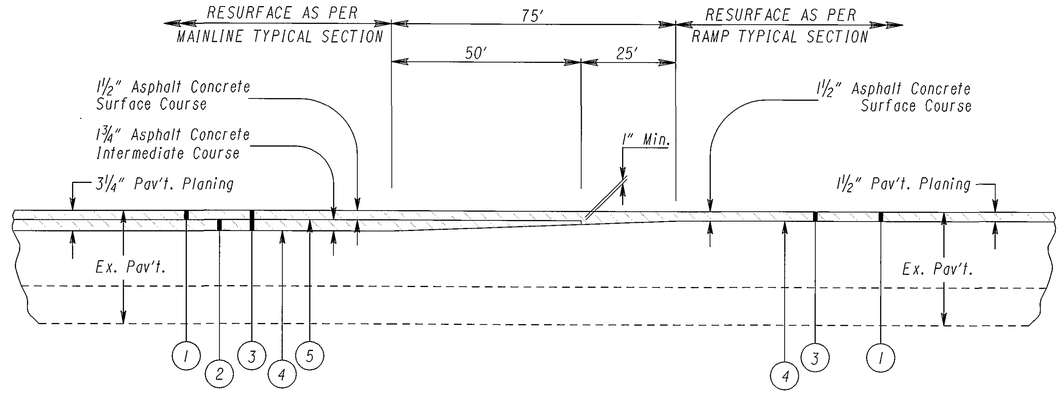
Placed in Two Lifts.

For Legend See Sheet No. 5



PAVEMENT TRANSITION AT RAMPS

RAMP 'S' - STA. 382+13.00 to STA. 382+88.00
RAMP 'A' - STA. 439+19.00 to STA. 439+94.00
RAMP 'B' - STA. 445+63.80 to STA. 446+38.80
RAMP 'C' - STA. 459+17.00 to STA. 459+92.00
RAMP 'D' - STA. 457+76.40 to STA. 458+51.40



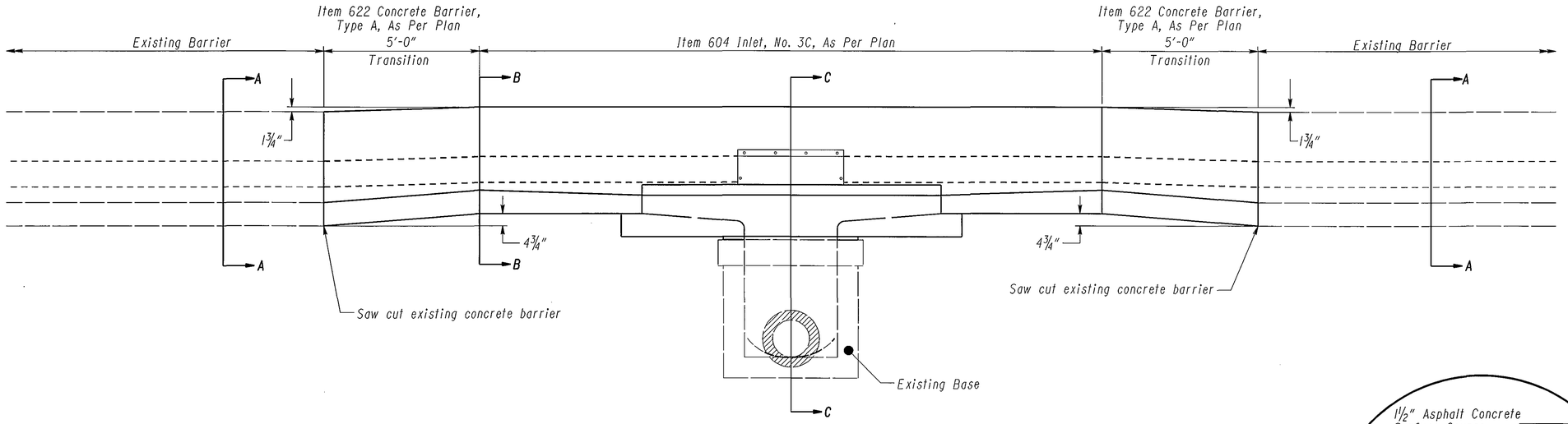
PAVEMENT TRANSITION AT RAMPS

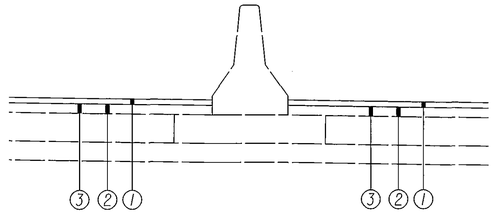
RAMP 'C' - STA. 102+93.21 to STA. 103+68.21
RAMP 'A' - STA. 524+12.98 to STA. 524+87.98
RAMP 'B' - STA. 574+24.03 to STA. 574+99.03

CALCULATED RDA
CHECKED TES

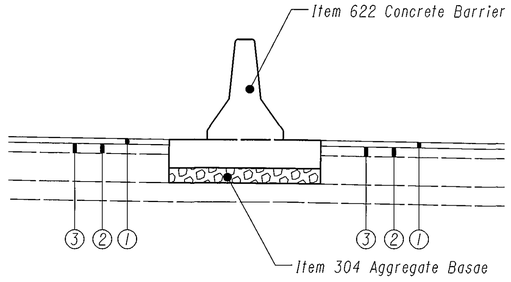
FEATHER DETAILS

JEF-7-4.77

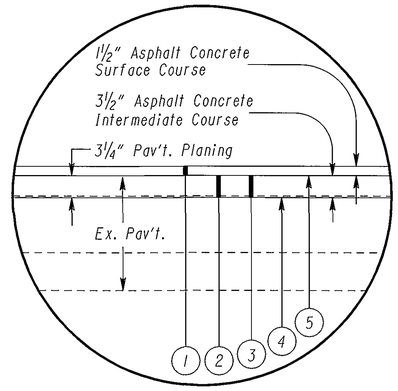




SECTION A-A
See sheet no. 5 for legend



SECTION B-B
See sheet no. 5 for legend



RESURFACING DETAIL
(MAINLINE & SHOULDER)
See sheet no. 5 for legend

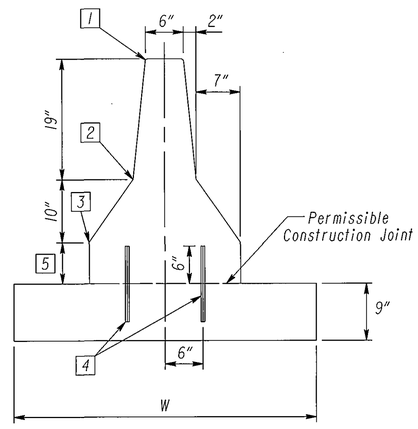
1 1" Radius or ¾" chamfer

2 Permissible 10" radius

3 Permissible 1" radius

4 No. 8 Epoxy coated deformed steel bars, 12" long, spaced 4' between successive bars on a staggered pattern. Omit dowels when top is contructed integral with base.

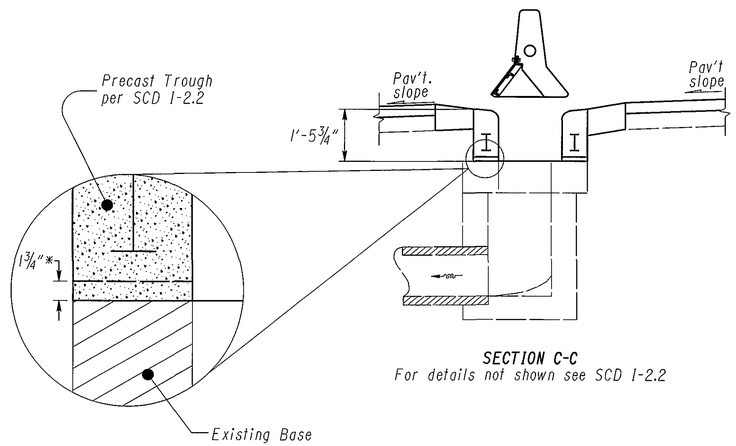
5 Varies from 6" to 3"



MEDIAN BARRIER DETAIL

MEDIAN INLET QUANTITIES

REF. NO.	PLAN SHEET NO.	STATION	WIDTH	304 AGGREGATE BASE	604 INLET, NO. 3C, AS PER PLAN	622 CONCRETE BARRIER, TYPE A, AS PER, PLAN
				CU. YD.	EACH.	FT.
1-1	26	286+50	5	1.03	1	10
2-1	28	318+00	3	0.62	1	10
3-1	28	341+00	3	0.62	1	10
4-1	29	345+00	3	0.62	1	10
5-1	30	389+00	3	0.62	1	10
6-1	30	392+50	3	0.62	1	10
7-1	30	396+00	3	0.62	1	10
8-1	31	407+70	3	0.62	1	10
9-1	31	410+75	3	0.62	1	10
10-1	32	429+75	3	0.62	1	10
11-1	32	431+00	3	0.62	1	10
12-1	33	442+75	3	0.62	1	10
13-1	34	459+50	3	0.62	1	10
14-1	34	460+50	3	0.62	1	10
15-1	34	461+50	3	0.62	1	10
QUANTITIES CARRIED TO GENERAL SUMMARY				9.71	15	150



SECTION C-C
For details not shown see SCD 1-2.2

* Additional height to be added to precast trough section.

CALCULATED TES
CHECKED RDA

INLET DETAILS AND QUANTITIES

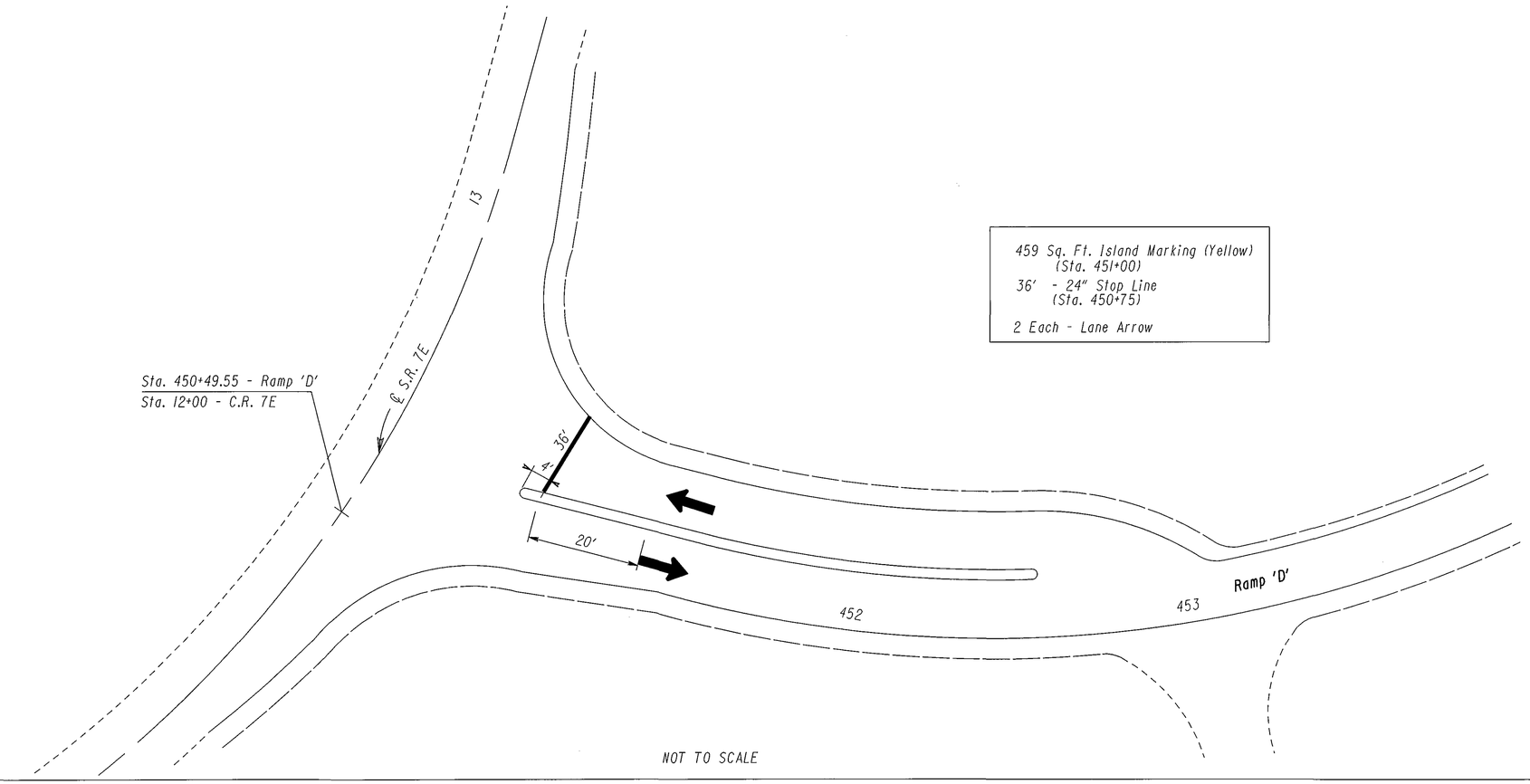
JEF-7-4.77

STATION FROM	STATION TO	Lane or Ramp	* SIDE	642 Edge Line, Type I (Yellow) Ft.	642 Edge Line, Type I (White) Ft.	642 Lane Line Ft.	642 Stop Line, Type I Ft.	642 Channelizing Line, Type I Ft.	642 Transverse Line, Type I (White) Ft.	642 Transverse Line, Type I (Yellow) Ft.	642 Island Marking, Type I (Yellow) Sq. Ft.	642 Lane Arrow, Type I Each	621 RPM 2-Way, White/Red Each	621 RPM 2-Way, Yellow/Red Each	621 RPM 1-Way, White Each	621 RPM 2-Way, Yellow Each	REMARKS * Indicates Direction of Travel
272+50	471+00Bk	NORTHBOUND	Ctr			19,850									248		
469+59.52Ah	590+25		Ctr			12,065.48									151		
272+50	471+00Bk		Rt		19,850												
469+59.52Ah	590+25		Rt		12,065.48												
272+50	471+00Bk		Lt	19,850													
469+59.52Ah	590+25		Lt	12,065.48													
TURNLANE																	
279+55	280+30		Lt					75					3				Turnlane at Co. Rd. 17
279+75			Lt									1					
280+15			Lt									1					
273+00	283+50		Lt							144							
271+96.50	471+00Bk	SOUTHBOUND	Ctr			19,903.50									249		
469+59.52Ah	590+25		Ctr			12,065.48									151		
271+96.50	471+00Bk		Rt		19,903.50												
469+59.52Ah	590+25		Rt		12,065.48												
271+96.50	471+00Bk		Lt	19,903.50													
469+59.52Ah	590+25		Lt	12,065.48													
280+64		CO. RD. 17					36										
7+07.90	8+21.08				113.18												
8+62.5	9+24.47				61.97												
377+06	380+50	RAMP S	Lt			344											
380+50	382+13		Lt					326	193				9				
382+13	386+00		Lt	387										5			
382+13	386+00		Rt		387							1					
386+10							16										
434+00	437+25	RAMP A	Lt			325											
437+25	439+19		Lt					388	167				10				
439+19	8+62.50 -CR 7E		Lt	862.57										11			
439+19	7+07.90 -CR 7E		Rt		913.78												
447+66			Rt-Lt				78					1					
441+31.80	443+63.80	RAMP B	Lt			232											
443+63.80	445+63.80		Lt					200					5				
445+63.80	15+93.36 -CR 7E		Rt		796.57												
445+63.80	14+69-CR 7E		Lt	706.87										9			
461+24.32	464+84.82	RAMP C	Lt			360.50											
459+92	461+24.32		Lt					314	195				8				
453+23	453+47		Rt								301						
453+24			Rt-Lt				60										
459+92	16+82 -CR 7E		Rt		714.74							1					
459+92	15+00.39 -CR 7E		Lt	694.72										9			
451+00	452+56	RAMP D	Rt-Lt	312													
451+00			Lt				36				459	2					
458+51.40	461+00		Lt					248.60					6				
461+00	462+89.79		Lt			189.79											
458+51.40	12+27.29 -CR 7E		Rt		851.68												
458+51.40	13+44.48 -CR 7E		Lt	825.47										11			
524+87.98	527+31.47	RAMP A	Lt					486.98	291				12				
527+31.47	529+13.01		Lt			181.54											
521+27.88	524+87.98		Rt		360.10												
521+27.88	524+87.98		Lt	360.10										4			
579+44.59	581+44.59	RAMP B	Lt					200					5				
581+44.59	583+84.59		Lt			240											
543+10	574+99.03		Rt		3189.03												
543+10	574+99.03		Lt	3189.03										40			
494+60	497+00	RAMP C	Lt			240											
497+00	501+32.38		Lt					336					8				
104+14.56	99+00		Rt		514.56												
104+14.56	99+00		Lt	514.56										6			
TOTALS CARRIED TO GENERAL SUMMARY			**SUBTOTALS**	71,736.78	71,787.07	65,997.29			846	144			66	95	799		
				27.18 Mile		12.50 Mile	226	2575	990		760	7	960				

CALCULATED GDM
CHECKED TES

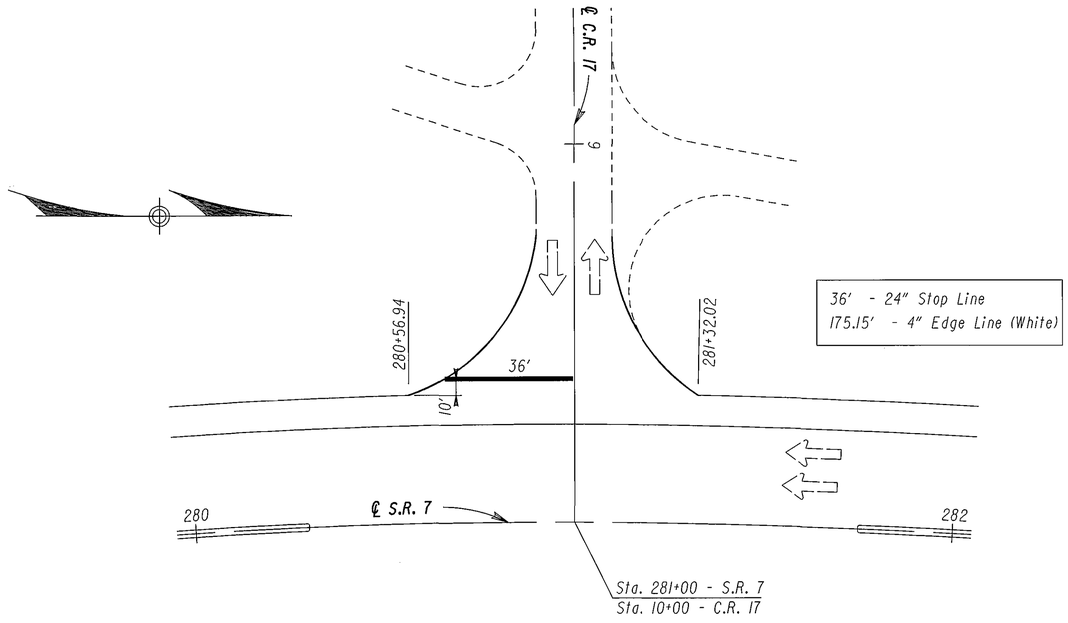
TRAFFIC CONTROL SUBSUMMARY

JEF-7-4.77



NOT TO SCALE

QUANTITIES CARRIED TO SHEET NO. 44.



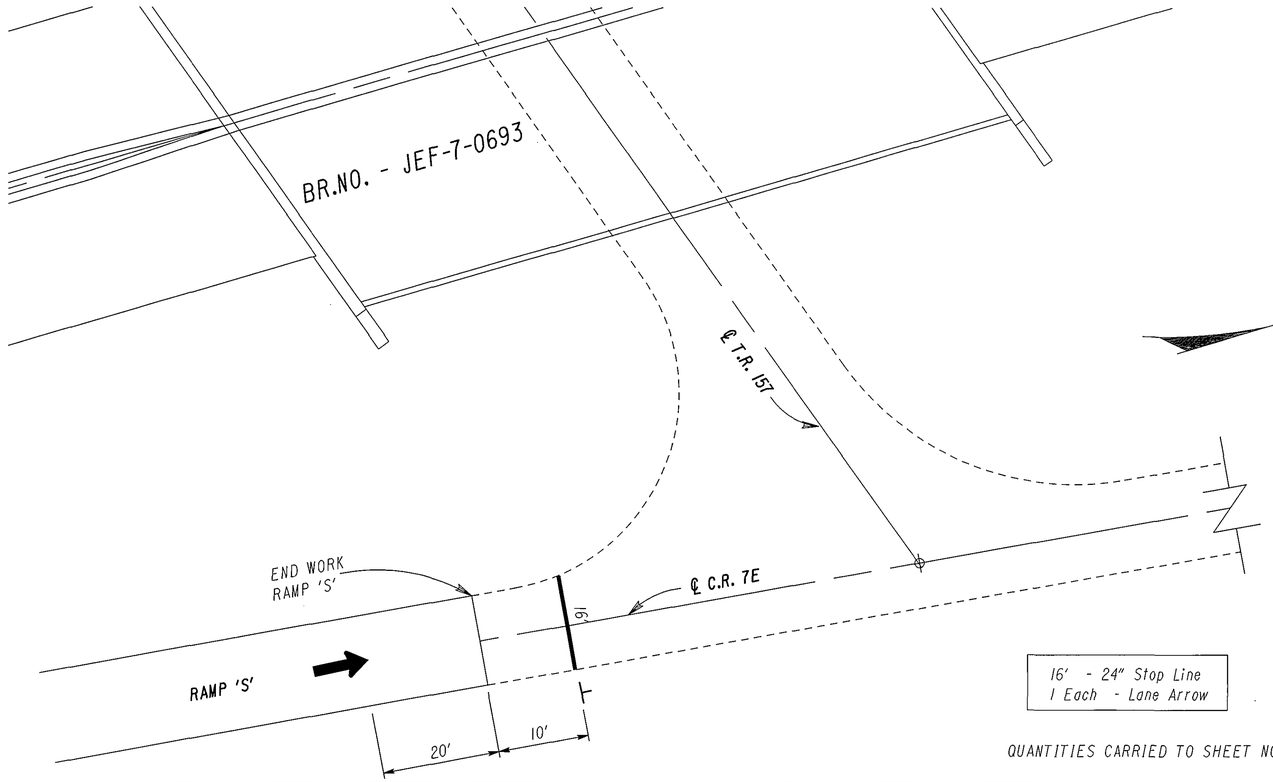
NOT TO SCALE

QUANTITIES CARRIED TO SHEET NO. 44.

CALCULATED GDM
CHECKED RDA

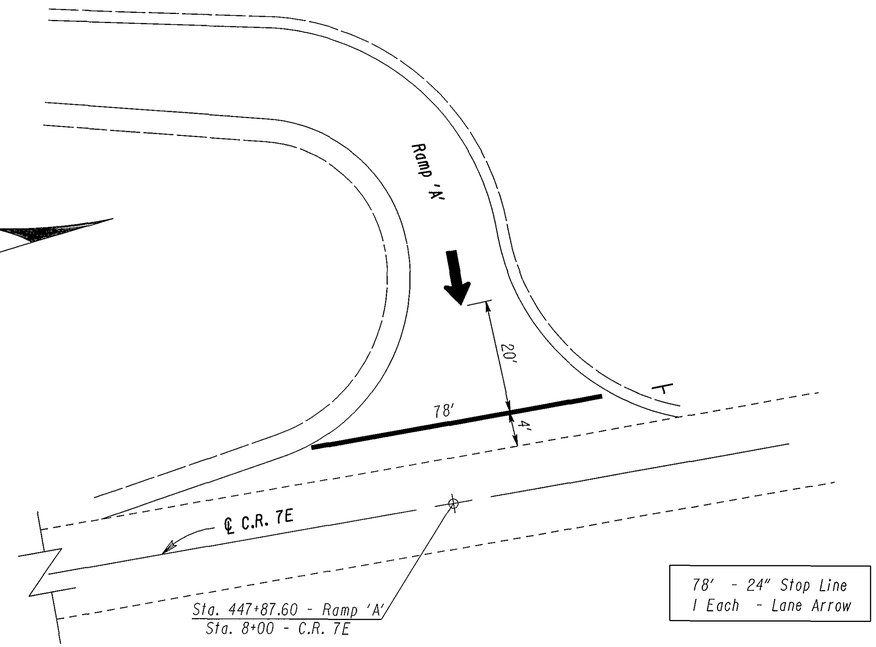
AUXILIARY PAVEMENT MARKING

JEF-7-4.77



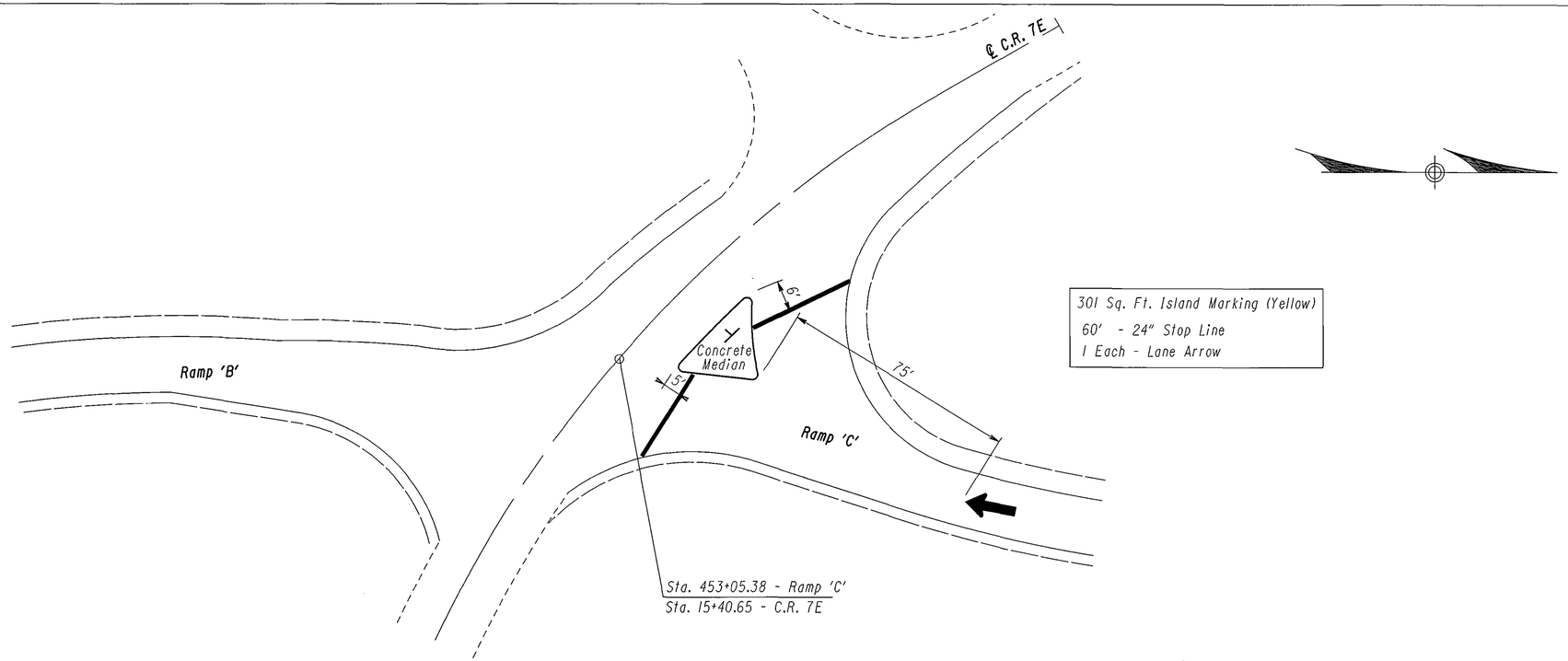
16' - 24" Stop Line
1 Each - Lane Arrow

QUANTITIES CARRIED TO SHEET NO. 44.



78' - 24" Stop Line
1 Each - Lane Arrow

NOT TO SCALE



301 Sq. Ft. Island Marking (Yellow)
60' - 24" Stop Line
1 Each - Lane Arrow

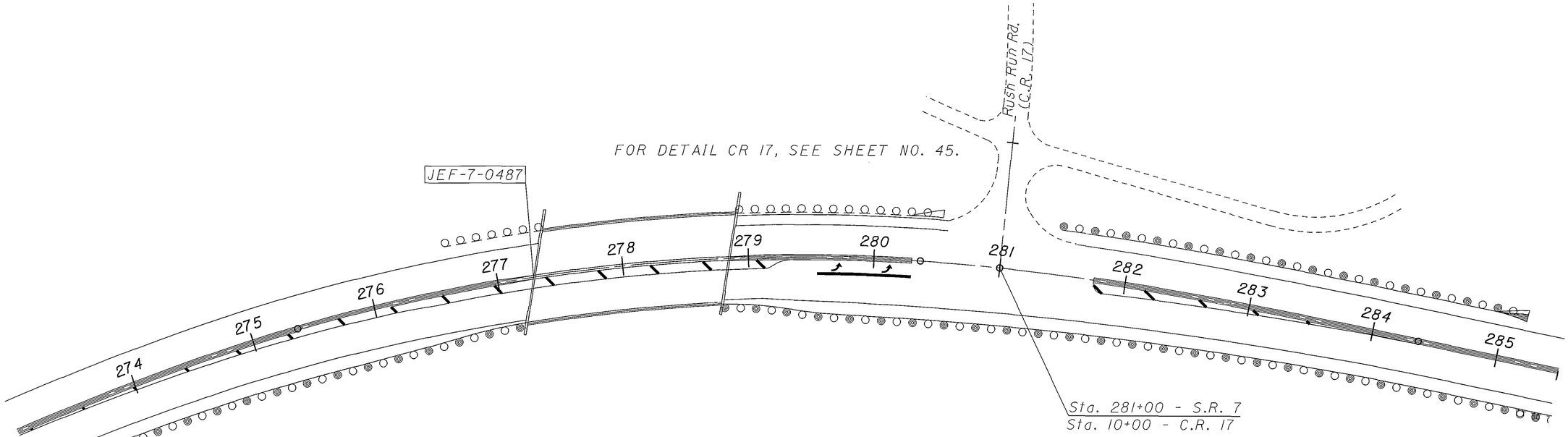
NOT TO SCALE

QUANTITIES CARRIED TO SHEET NO. 44.

CALCULATED GDM
CHECKED RDA

AUXILIARY PAVEMENT MARKING

JEF-7-4.77



144 Ft. - 24" Transverse Line (Yellow)
(Sta. 273+00 - 279+30 and Sta. 281+70 - 283+50)
2 - Lane Arrows
75' - 8" Channelizing Line

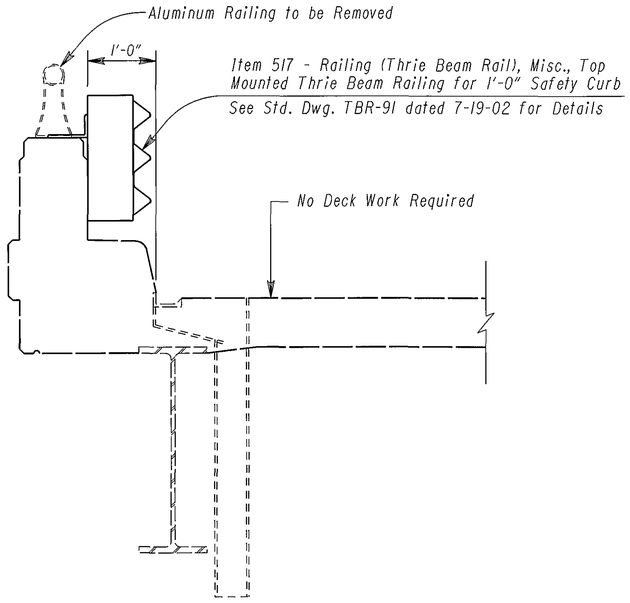
QUANTITIES CARRIED TO SHEET NO. 44.

NOT TO SCALE

CALCULATED GDM
CHECKED RDA

AUXILIARY PAVEMENT MARKING

JEF-7-4.77



PARTIAL TYPICAL SECTION

JEF-7-0817	ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	As Per Plan Sheet
345	517	73008	345	FEET	RAILING (THRIE BEAM RAIL), MISC., TOP MOUNTED THRIE BEAM RAILING FOR 1'-0" SAFTEY CURB	

QUANTITY CARRIED TO GENERAL SUMMARY

BRIDGE NOTES

CONTINGENCY QUANTITIES

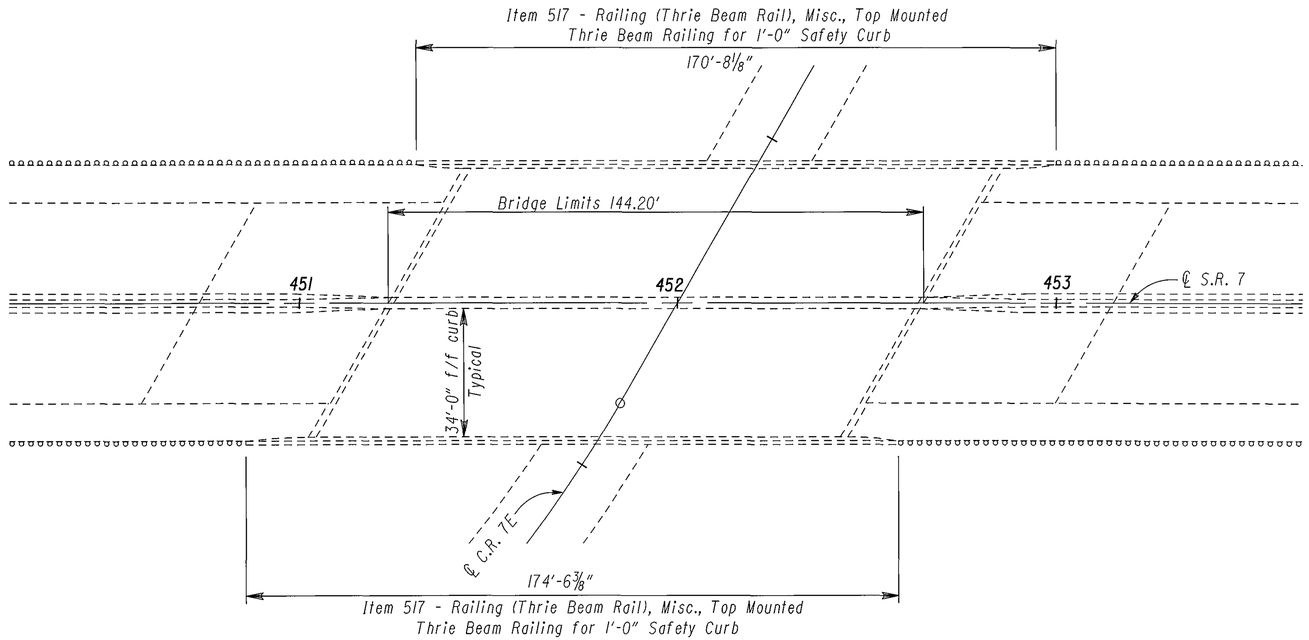
Specific locations and usage of the estimated quantities set up on this plan to be used "As directed by the Engineer" shall be made a matter of record by incorporation into the final change order governing completion of this project. Estimated quantities of materials shall not be ordered for delivery to the project unless authorized by the Engineer.

EXISTING STRUCTURE VERIFICATION

Details and dimensions on these plans pertaining to the existing structure have been obtained from plans of the existing structure and/or from field observations and measurements. Consequently, they are indicative of the existing structure and the proposed work but they shall be considered tentative and approximate. The Contractor is referred to CMS sections 102.05, 105.02 and 513.04. Contract bid prices shall be based upon a prebid examination of the existing structure by the Contractor. However, all project work shall be based upon actual details and dimensions which have been verified by the Contractor in the field.

REMOVAL OF EXISTING RAIL

Removal of aluminum railing from Br. No. JEF-7-0817, shall be in accordance with CMS section 202.03. As Per Std. Bridge Dwg. TBR-91, payment for removal shall be included with Item - 517, Railing.



GENERAL PLAN

DESIGN AGENCY O.D.O.T. DISTRICT 11 PRODUCTION DEPARTMENT

DESIGNED	DRAWN	REVIEWED	DATE
RDA	RDA	TES	
CHECKED	REVISED	STRUCTURE FILE NUMBER	
TES		4100360	

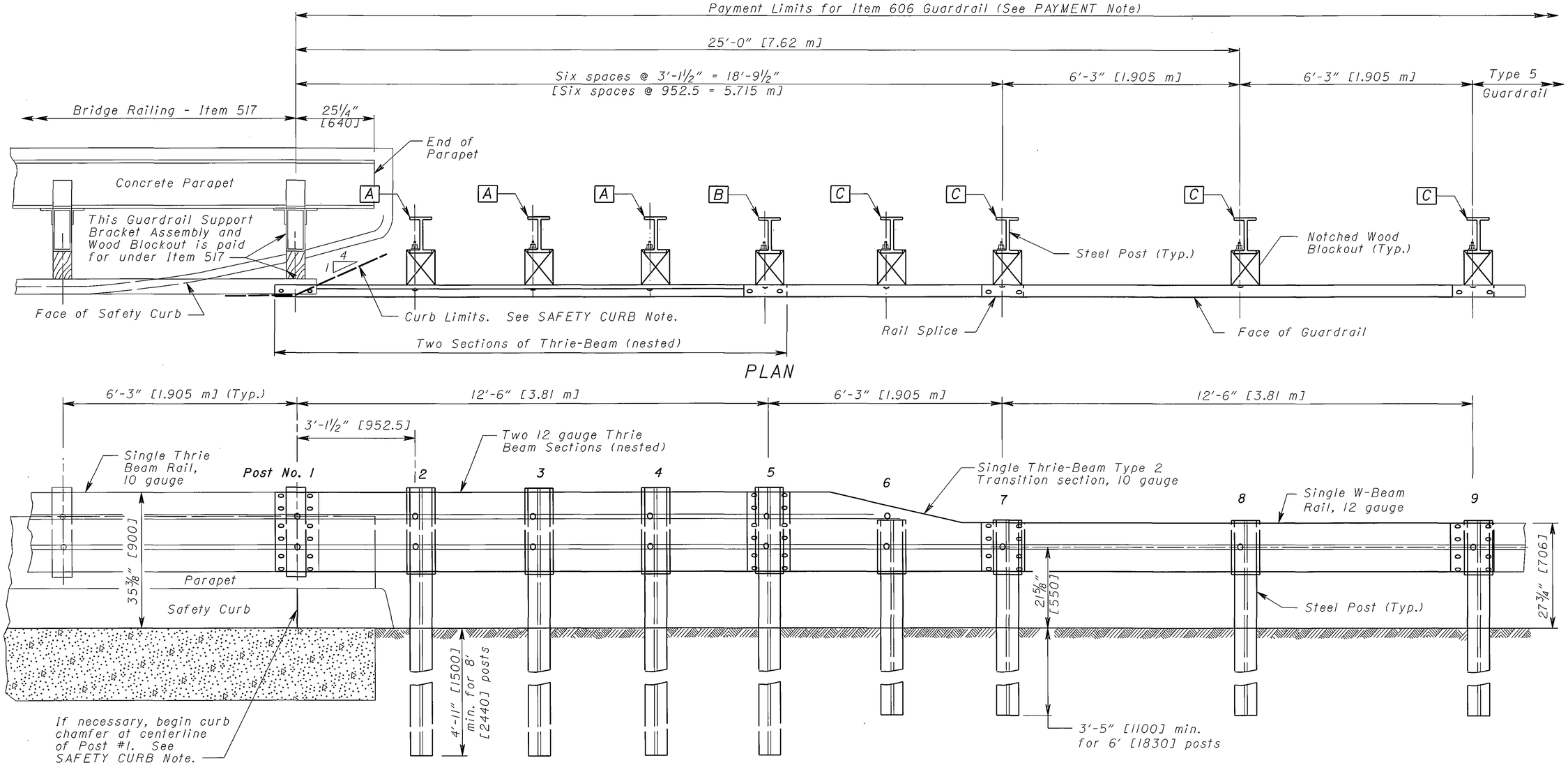
GENERAL PLAN & SUPERSTRUCTURE DETAILS

Bridge No. JEF-7-0817 L&R

JEF-7-4.77

1 / 1

48
49



NOTES

GENERAL: For additional rail and post details, see **SCD GR-1.1.**

APPLICATION: Use Type 3 Bridge Terminal Assembly to connect guardrail runs to both the approach and trailing end of Thrie Beam Bridge Railings. The design detailed on the sheet is approved to NCHRP 350 Test Level 3. See **Structural Engineering's SCD TBR-91** for the associated Bridge Railing.

SAFETY CURB: A safety curb on an existing structure may have to be cut and removed so that it does not interfere with the performance of the Bridge Terminal Assembly. Remove any curb that projects onto the traffic side of the 4:1 chamfer line as shown in the PLAN view. Payment for curb work in conjunction with this Bridge Terminal Assembly will be paid under Item 202.

THRIE BEAM TRANSITION: The asymmetrical W-Beam to Thrie Beam transition panel shall be 10 gauge.

POSTS: Use Steel posts only. Wood posts are not permitted in this design. Posts may be driven to grade or set in drilled holes. After placing posts in drilled holes, backfill and tamp disturbed soil. If Post #2 cannot be installed at the location shown and to full enmbedment depth, do not use this design.

BLOCKOUTS: Steel posts in this design requires the use of notched wood blockouts. Steel or plastic blockouts are not permitted. (See NOTCHED BLOCKOUTS FOR STEEL POSTS Detail on **SCD GR-2.1.**)

FLARED GUARDRAIL: Start Standard Guardrail Flares as shown on **SCD GR-5.1** at or beyond Post No. 9; however, the flare may begin at Post No. 7.

PAYMENT:Item 606 - Bridge Terminal Assembly, Type 3, As Per Plan, Each, includes the cost of extra components, in excess of normal guardrail, for additional and different sizes and lengths of posts and blockouts, including nested Thrie Beam rails, transition panel and connector sections, and other hardware.

LEGEND

A — Posts 2, 3 & 4:
W8x24x8'-0" [W200x36x2440] Steel Post with 8"x8"x22½" [200x200x570] notched Wood Blockout (See POSTS Note)

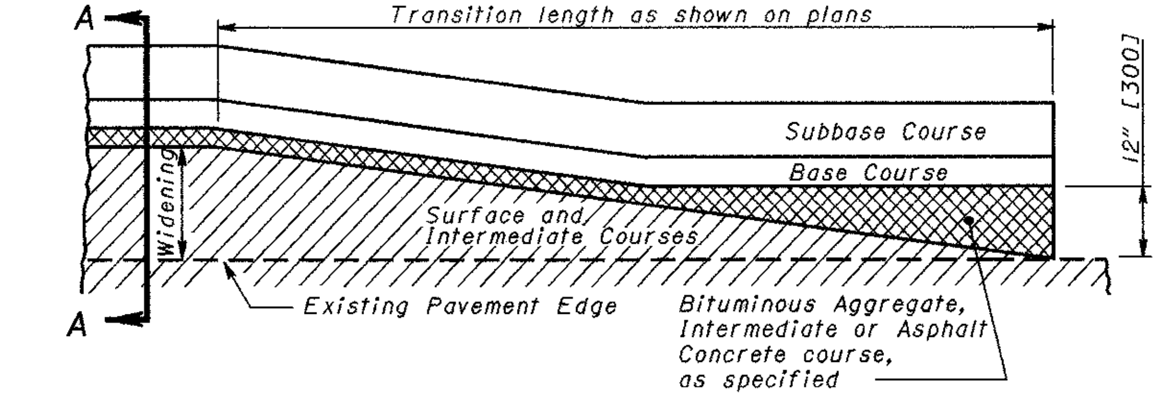
B — Post 5:
W6x25x8'-0" [W150x37x2440] Steel Post with 8"x8"x22½" [200x200x570] notched Wood Blockout (See POSTS Note)

C — Posts 6, 7, 8 & 9:
W6x25x6'-0" [W150x37x1830] Steel Post with 8"x8"x14" [200x200x360] notched Wood Blockout (See POSTS Note)

1-23-04

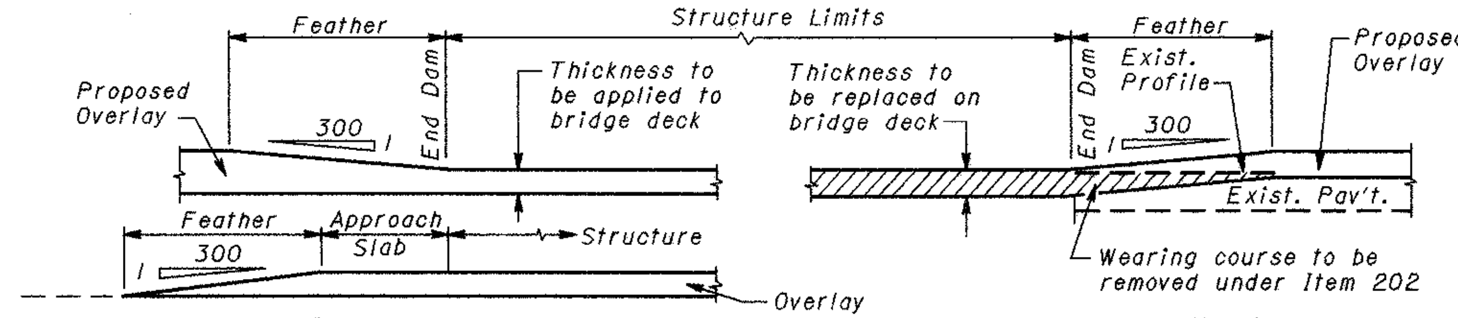
BTA TYPE 3, TL-3

JEF-7-4.77



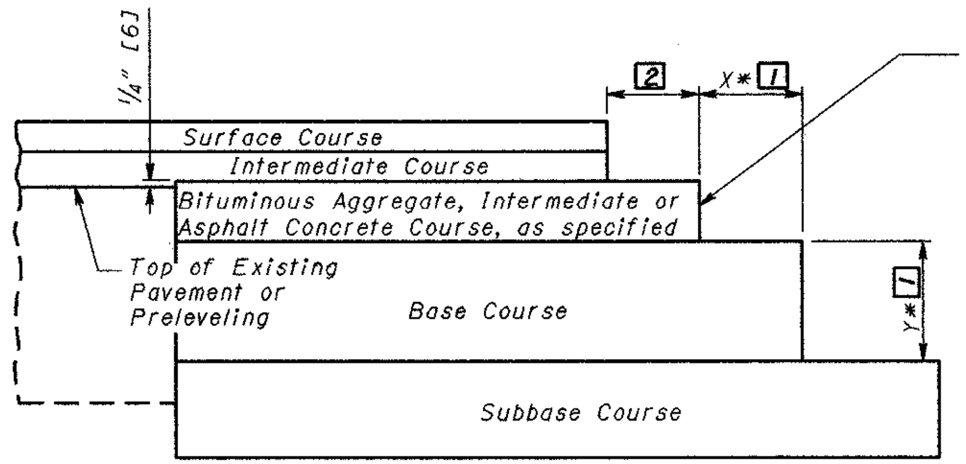
PLAN

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.

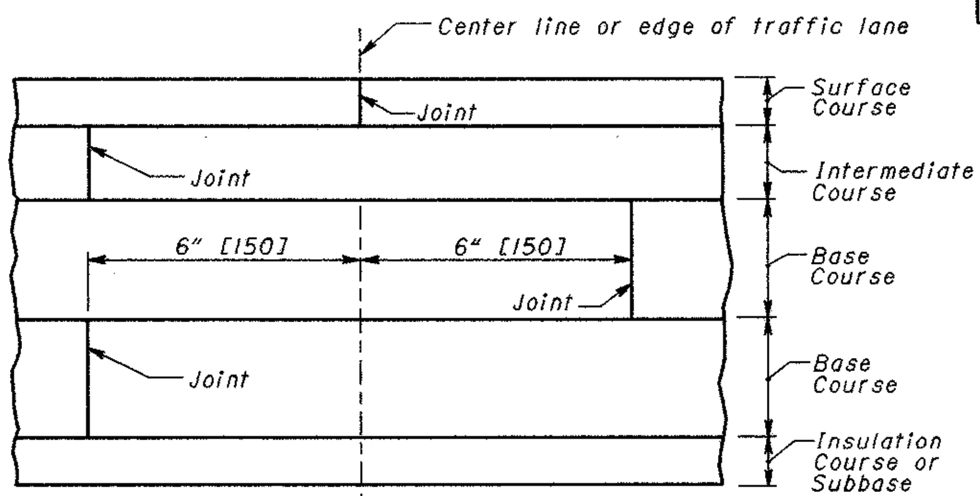
SECTION A-A

COURSE DETAIL FOR WIDENING

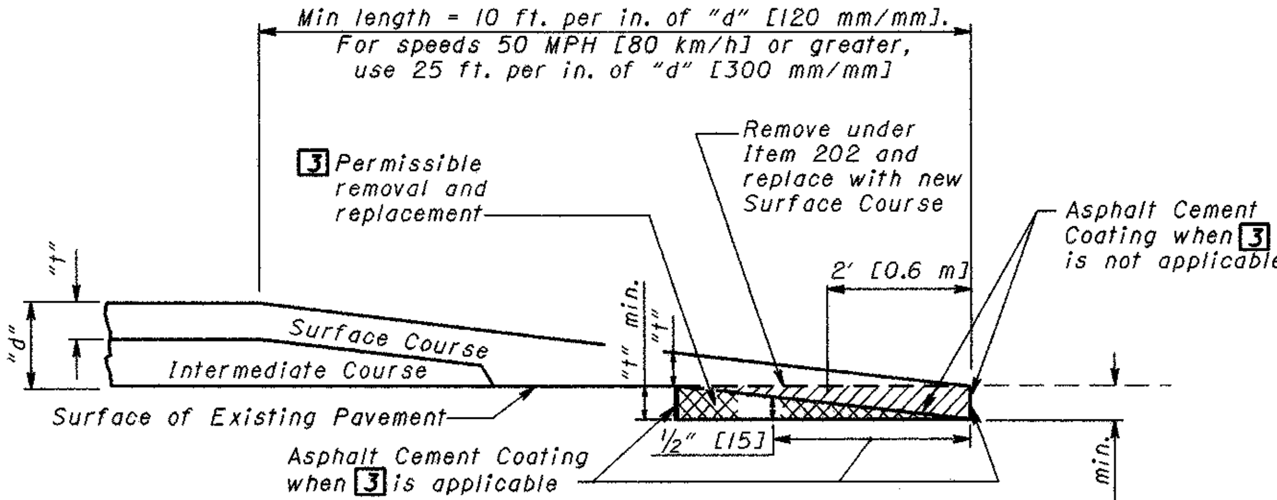
LEGEND

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.

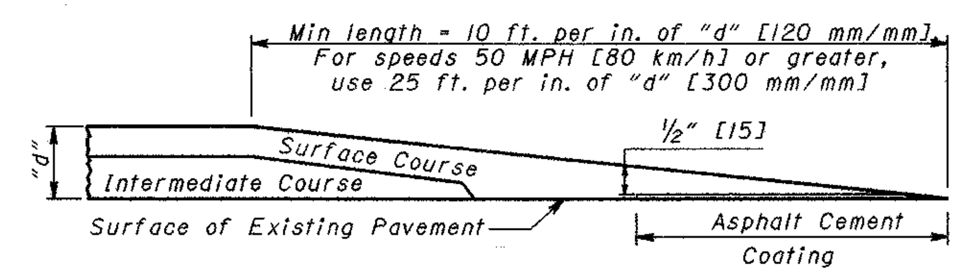
2 The extended width shall be equal to the thickness of the surface course plus the intermediate course, or 4 inches [100], whichever is greater.



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
ROADWAY DESIGN ENGINEER
7-28-00
DATE

REVISIONS

STDS. ENGR. M. Evans
DRAWN D. Focke

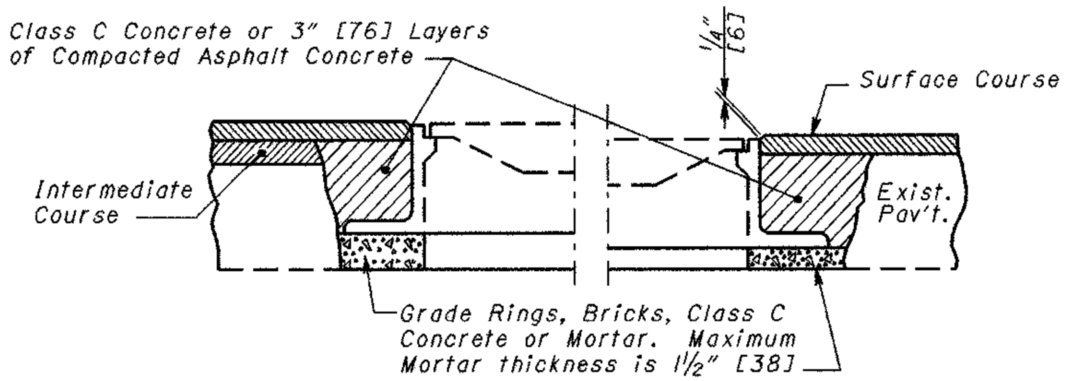
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

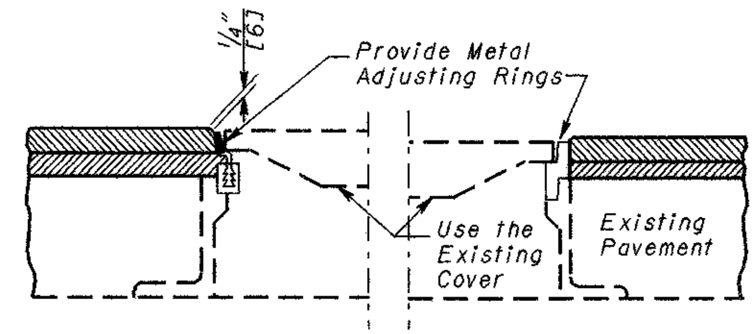
STANDARD ROADWAY CONSTRUCTION DRAWING
RESURFACING

NUMBER BP-3.1

1/2



USING CONCRETE OR MORTAR

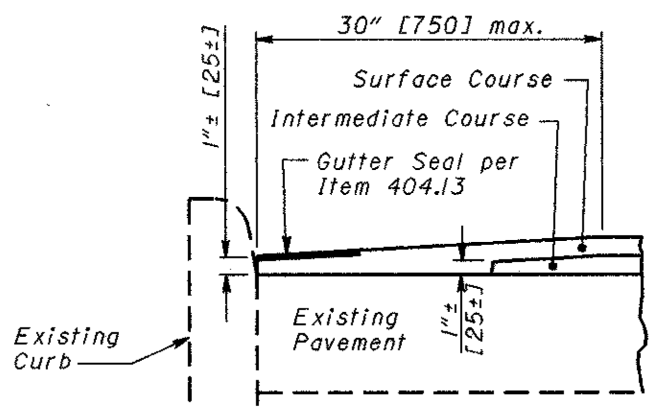


USING METAL ADJUSTING RINGS

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.

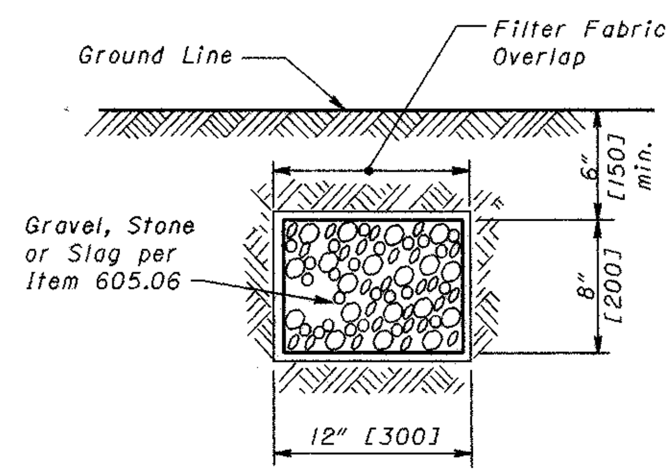
In addition, the adjusting ring type shall be a design acceptable to the local governmental agency responsible for street and sewer maintenance. Any installation unacceptable to the Engineer shall be replaced by the Contractor at his expense.

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
ROADWAY DESIGN ENGINEER
7-28-00 DATE

REVISIONS

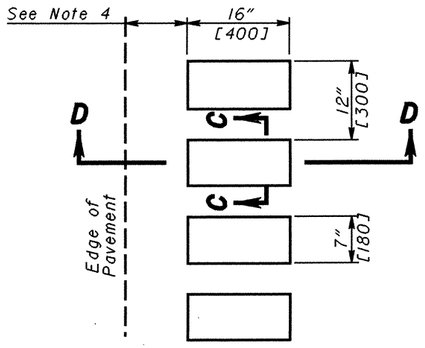
STDS. ENGR. M. Evans
DRAWN D. Focke

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

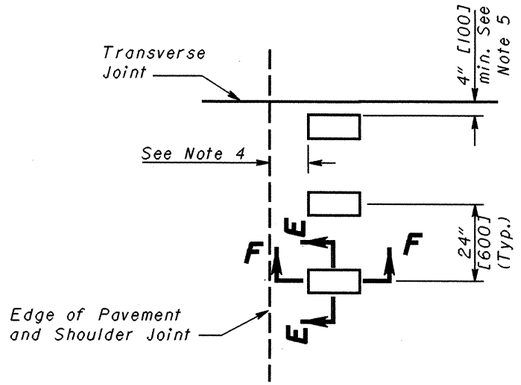
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
RESURFACING

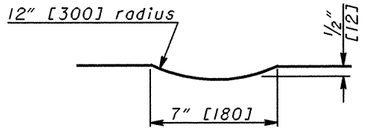
NUMBER BP-3.1



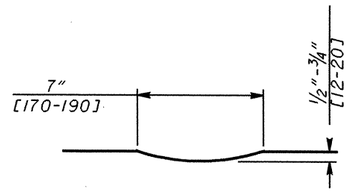
TYPICAL SPACING PLAN
TYPE 2



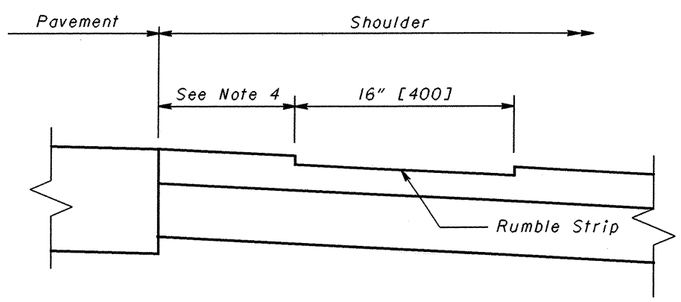
TYPICAL SPACING PLAN
TYPE 3



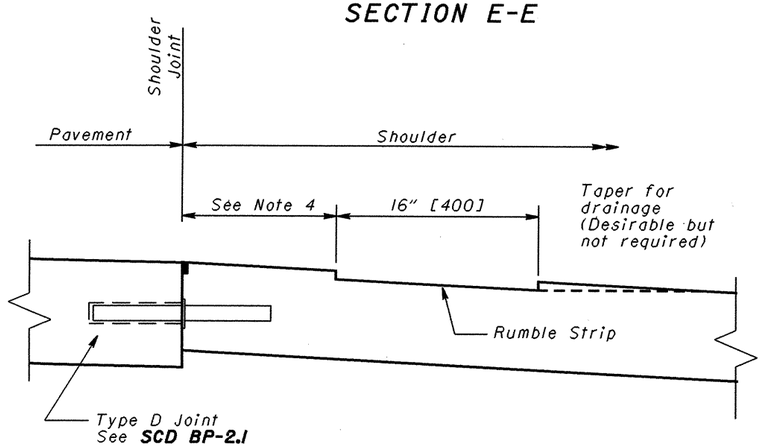
SECTION C-C



SECTION E-E



SECTION D-D



SECTION F-F

NOTES

1. Type 1 Rumble Strips (rolled or pressed into freshly-paved asphalt shoulders) are no longer a standard.

2. Type 2 Rumble Strips are for use on new or existing asphalt or concrete shoulders. The pattern is designed so that it can be milled or ground into the shoulder material. See specifications for details.

3. Type 3 Rumble Strips are for use on freshly-paved concrete shoulders. The pattern is designed so that it may be formed into the concrete shoulder surface prior to the material hardening. See specifications for details.

4. See Sheet 2 of 2 for Offset Dimensions.

5. A rumble strip should not be closer than 4" [100] to any joint, transverse or longitudinal, in concrete shoulders.

6. Rumble Strips are to be paid under **Item 618 - Rumble Strips, Type ____ Lineal Feet [Meter] (Miles [Kilometers]).**

THIS DRAWING REPLACES BP-9.1 DATED 7-28-00.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
10-17-03
DATE

STDS. ENGR.
D. Focke

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

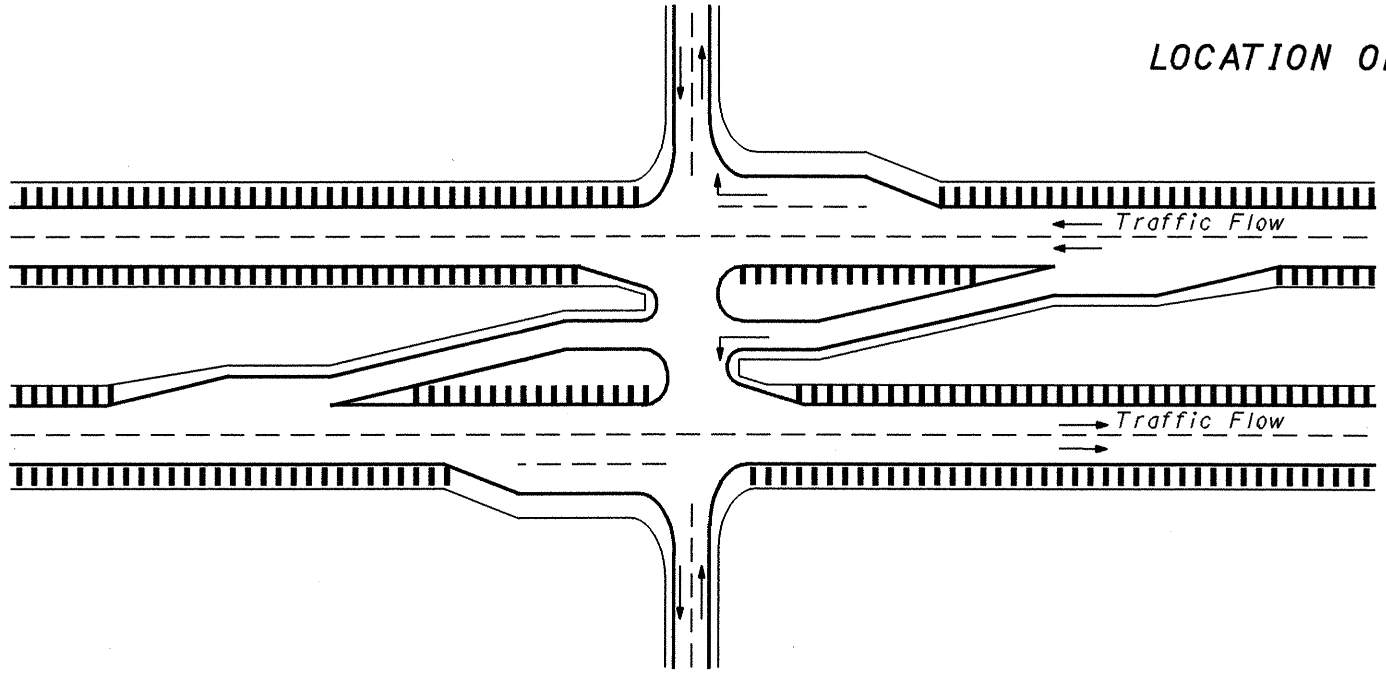
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
SHOULDER RUMBLE STRIPS

NUMBER
BP-9.1

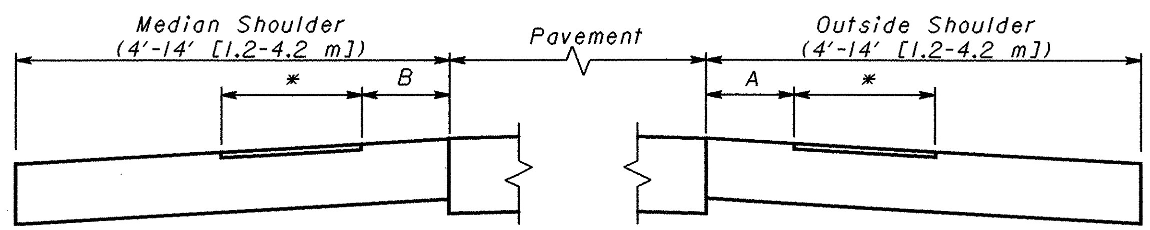
1/2

LOCATION OF RUMBLE STRIPS



AT-GRADE INTERSECTIONS

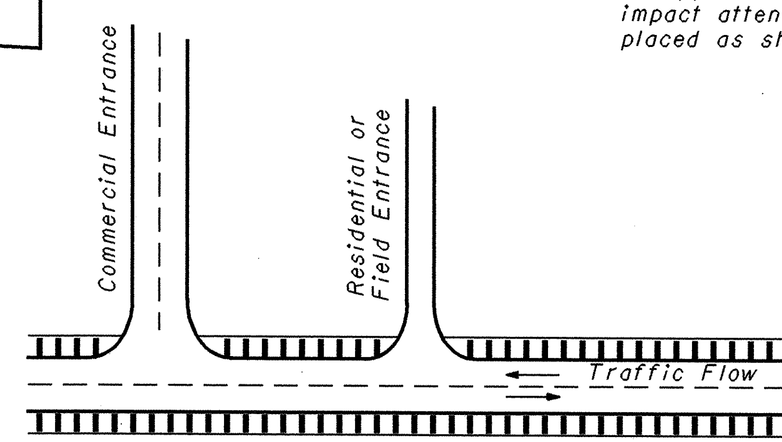
(See Note 4.)



* See Sheet 1 of 2 for Rumble Strip details

OUTSIDE SHOULDER OFFSET (See Note 6.)	
A = 6" [150] for 4' to 6' [1.2 to 1.8 m] shoulders	
A = 10" [250] for shoulders greater than 6' [1.8 m]	
MEDIAN SHOULDER OFFSET (See Note 2.)	
B = 6" [150] for 4' to 6' [1.2 m to 1.8 m] shoulders	
B = 10" [250] for 8' to 10' [2.4 to 3.0 m] shoulders	
B = 5' [1.5 m] for 12' [3.6 m] shoulders	
B = 6' [1.8 m] for 14' [4.2 m] shoulders	

OFFSET DIMENSIONS



ACCESS POINTS ON ARTERIALS

(See Note 5)

NOTES

1. See Sheet 1 of 2 for Rumble Strip details.

2. On median shoulders 12 feet [3.6 m] or wider, where the shoulders have been designed for maintenance of traffic during construction, the pattern should be placed near the middle of the shoulder (see table at left for offsets). The purpose for this is so that traffic can be maintained on the median shoulder during a "Phase 1" traffic maintenance sequence and straddle the pattern. "Phase 2" traffic can be maintained on the newly-paved outside shoulder prior to placement of the new rumble strip pattern.

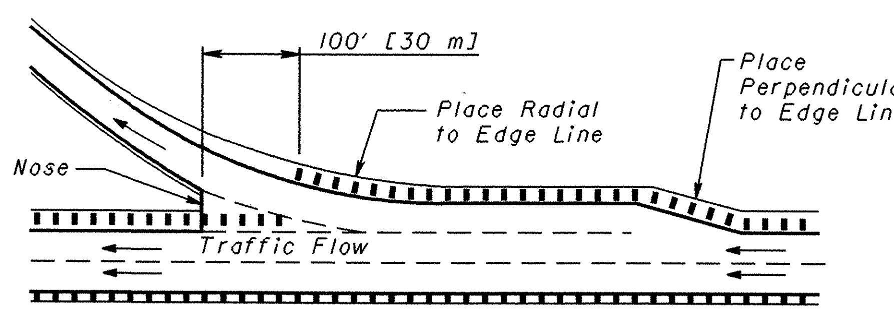
3. At entrance and exit terminals, the outside shoulder pattern should be extended toward the ramp juncture as far as possible, and then shifted over to the outside shoulder of the terminal area. The "nose" of an entrance or exit terminal is a logical reference point. On either terminal, extend the pattern 100' [30 m] into the terminal area and then transfer to the outside shoulder.

4. The AT-GRADE INTERSECTION diagram shows a typical application for divided roadways, but the patterns on the outside shoulders are also applicable to undivided roadways.

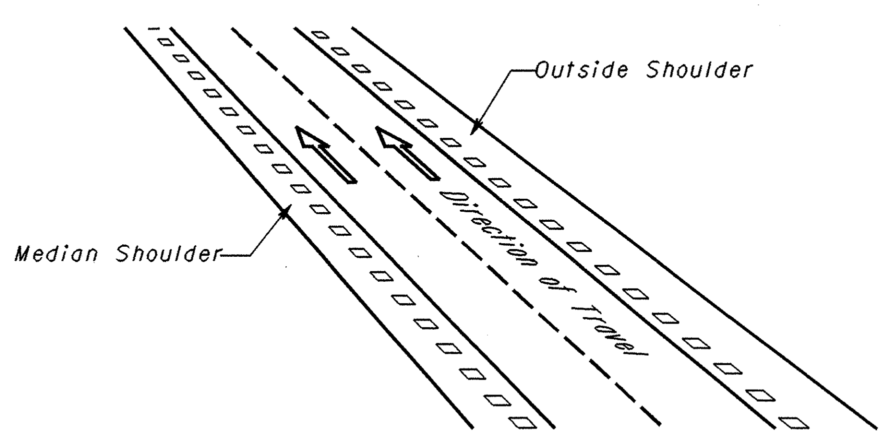
5. Where rumble strips are used on the shoulders of arterial roadways, the pattern should be interrupted across residential or commercial drives.

6. In built-up residential areas where noise may be objectionable, this dimension may be increased, but should not exceed 24" [600].

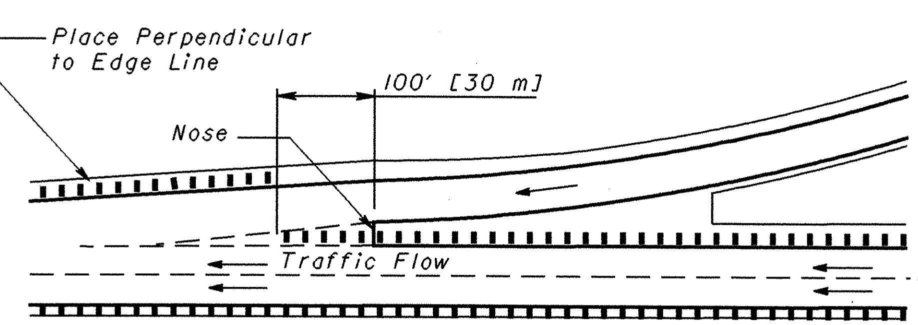
7. Rumble strips, when used in advance of critical locations, such as approaches to narrow bridges, in gore areas, and ahead of impact attenuators or other barrier end treatments, should be placed as shown.



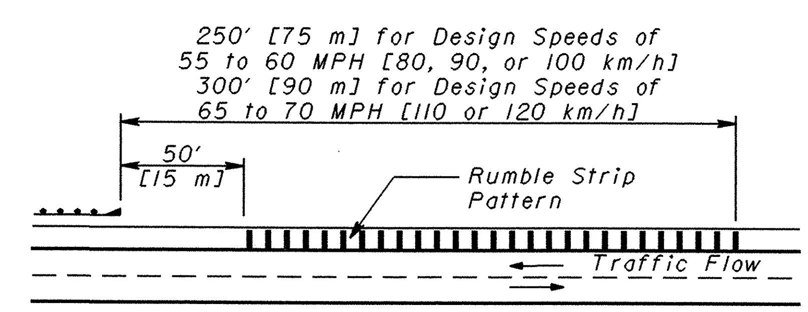
EXIT TERMINALS (See Note 3)



GENERAL ISOMETRIC VIEW - DIVIDED ROADWAY



ENTRANCE TERMINALS (See Note 3)



RUMBLE STRIPS LOCATIONS IN ADVANCE OF CRITICAL LOCATIONS

(See Note 7)

THIS DRAWING REPLACES BP-9.1 DATED 7-28-00.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
10-17-03
DATE
STDS. ENGR. D. Focke
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.
ROADWAY ENGINEERING SERVICES
STANDARD ROADWAY CONSTRUCTION DRAWING
SHOULDER RUMBLE STRIPS
NUMBER BP-9.1

NOTES

MATERIAL: Furnish straw or hay bales. Use 30" [0.8 m] long 2"x2" [50x50] wooden stakes, reinforcing bars or fence posts to stake the bales in place. The use of filter fabric fence in lieu of straw or hay bales will be allowed. Furnish 30" [0.8 m] wide filter fabric with sound wood supports with maximum on-center spacing of 10' [3.0m]. Use filter fabric conforming to 712.09 Type C.

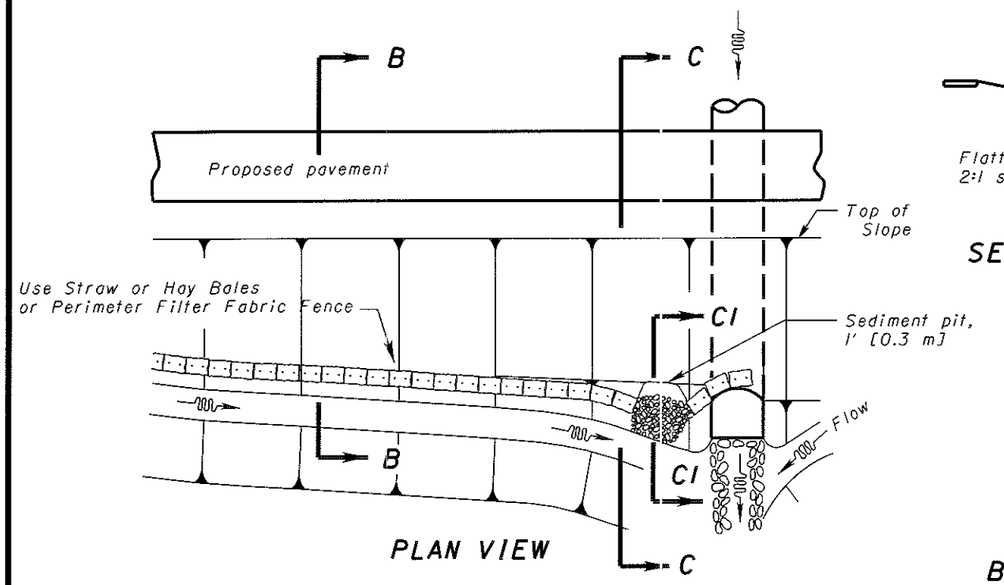
Use sand and gravel for the sediment pit filter material.

CONSTRUCTION: Trench the filter fabric fence as detailed for perimeter filter fabric fence. **(see DM-4.4)**

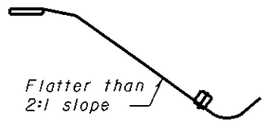
When straw or hay bales are used conform to the following: Tightly place each bale adjacent to one another. Entrench 2" [50] to 3" [75] into the ground prior to staking. Firmly stake each bale with at least two stakes. Use loose hay or straw to fill the voids under and between the bales.

Construct a 3'x3'x1' [1 m x 1 m x 0.3 m] pit for the sediment pit filter material. Fill with filter material 1' [0.3 m] above ground level.

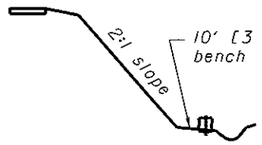
PAYMENT: The Department will pay for the accepted quantities at the contract prices in feet [meters] as follows: **Item 207 - Bale Filter Dike.**



PLAN VIEW



SECTION B-B



SECTION C-C

SECTION CI-CI

BALE FILTER DIKE

NOTES

MATERIAL: Furnish materials conforming to Item 203 Embankment and Item 601 Rock Channel Protection, Type C or D with filter. Furnish construction fence consisting of 4'-0" [1.3 m] high plastic fence with 6' [2 m] long metal fence posts.

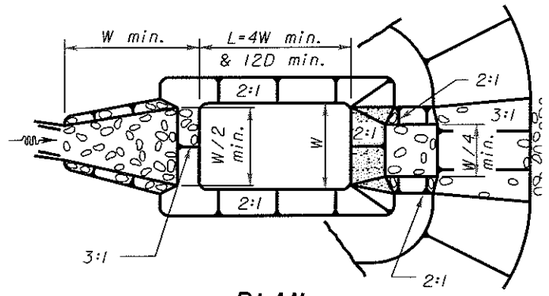
CONSTRUCTION: Construct the Basin and Dams as detailed. Constuct the construction fence in urban areas or in high pedestrian traffic areas. Construct the fence to completely surround the sediment basin or dam. Place the fence post on 8' [2.6 m] centers 2' [0.6 m] deep. Securely attach the plastic construction fence to the fence post.

PAYMENT: The Department will pay for the accepted quantities at the contract prices as follows:

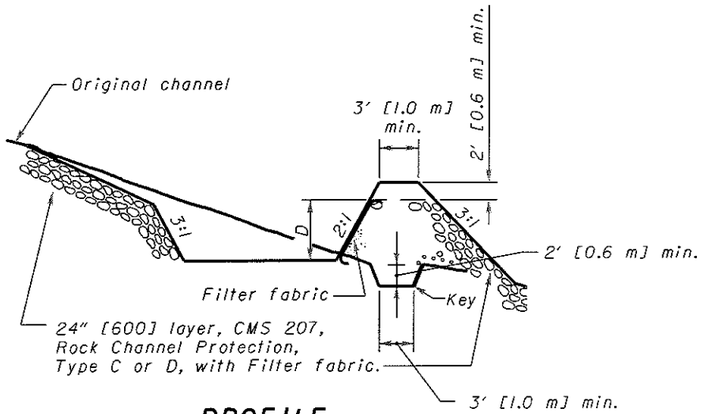
Item 207 - Sediment Basins and Dams in cubic yards [cubic meters]

Item 207 - Rock Channel Protection Type C or D with filter in cubic yards [cubic meters]

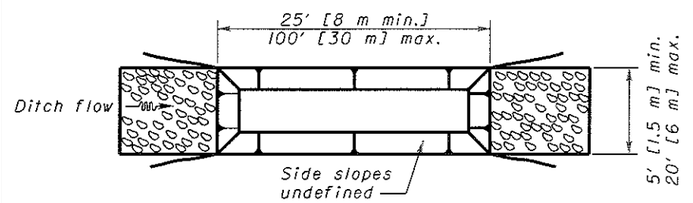
Item 207 - Construction Fence per foot [meter]



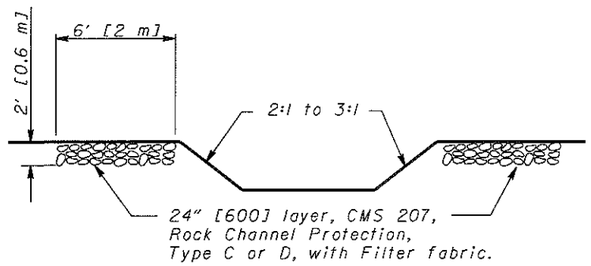
PLAN



PROFILE
SEDIMENT DAM



PLAN



PROFILE
SEDIMENT BASIN

OHIO DEPARTMENT OF TRANSPORTATION
Tim Keller
ENGINEER OF BRIDGES

DATE
4-29-99
7-19-02

HYDRAULIC ENGINEER
D. Gruver

All metric dimensions [in brackets] are in millimeters unless otherwise noted.

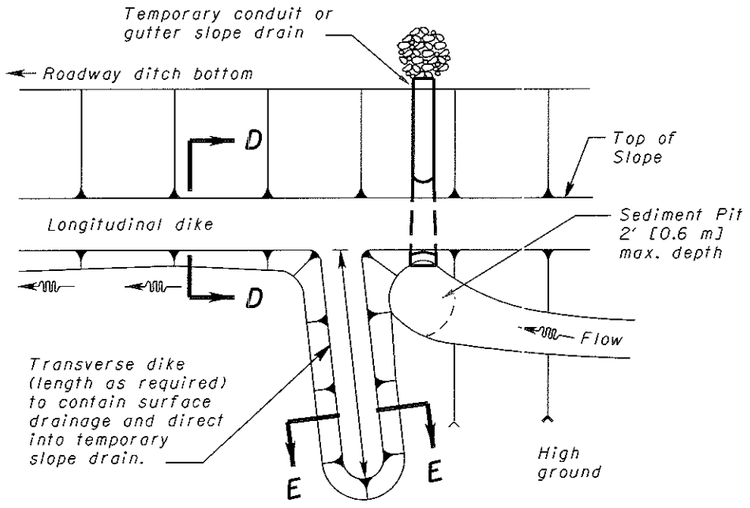
OFFICE OF STRUCTURAL ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING

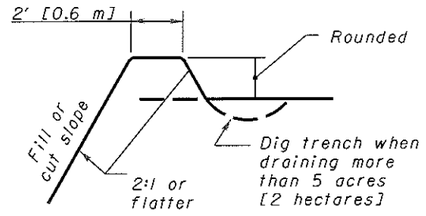
SEDIMENT AND EROSION CONTROLS

NUMBER
DM-4.3

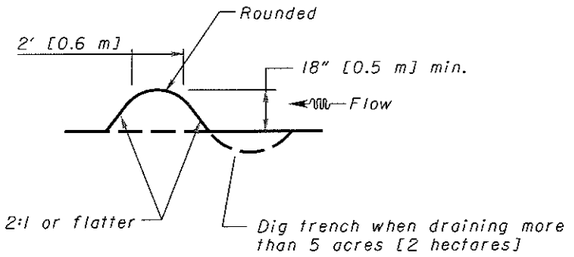
DIKES AND SLOPE PROTECTION



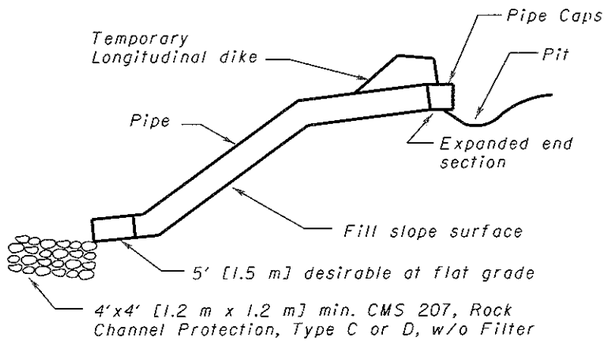
PLAN VIEW



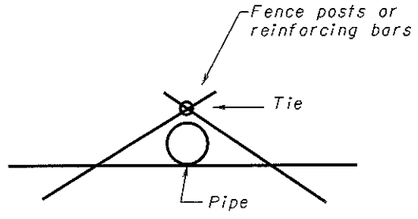
SECTION D-D



SECTION E-E



CONDUIT SLOPE DRAIN



TIE-DOWN SLOPE DRAIN

NOTES

MATERIAL: Furnish materials conforming to Item 203 Embankment and Item 601 Rock Channel Protection, Type C or D, without filter.

Furnish the following for the slope drains: corrugated steel pipe, corrugated or smooth plastic pipe, pipe caps with: holes that comprise at least 30 percent of the cross sectional area of the cap and specifically designed to connect to the pipe, reinforcing bars or fence posts and sand and gravel for the sediment pit filter material.

CONSTRUCTION: Construct as detailed. Compact the dike to 85% of the maximum density as determined by Supplement 1015.

Use reinforcing bars or fence posts to tie down the slope drains and to keep the pipe from moving.

Construct a 3'x3'x2' [1 m x 1 m x 0.6 m] pit for the sediment pit filter material. Fill with filter material to the ground level.

BASIS OF PAYMENT: The Department will pay for the accepted quantities at the contract prices as follows:

Item 207 - Dikes in cubic yards [cubic meters]

Item 207 - Slope Drains in feet [meters]

Item 207 - Rock Channel Protection Type C or D without filter in cubic yards [cubic meters]

TEMPORARY SLOPE DRAINS RECOMMENDED SIZES

AREA in acres [hectares]	PIPE SIZES	
	Smooth	Corrugated
0-4 [0-1.6]	6" [150]	6" [150]
4-8 [1.6-3.2]	8" [200]	12" [300]
8-12 [3.2-4.9]	10" [250]	15" [375]

OHIO DEPARTMENT OF TRANSPORTATION
Tim Keller
ENGINEER OF BRIDGES

DATE
4-29-99
7-19-02

HYDRAULIC ENGINEER
D. Gruver

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

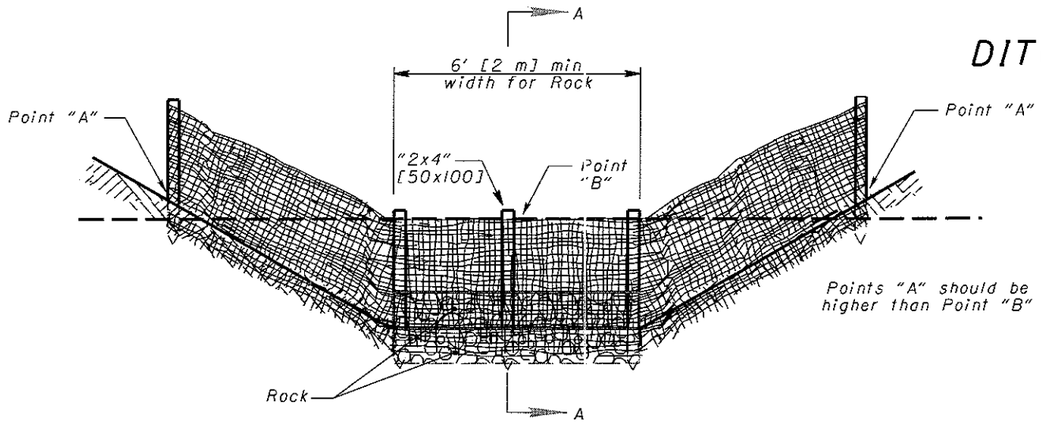
OFFICE OF STRUCTURAL ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING
SEDIMENT AND EROSION CONTROLS

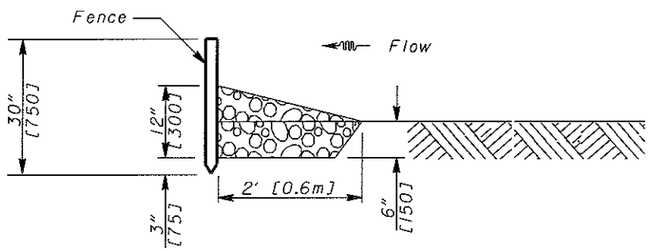
NUMBER
DM-4.3

2 / 2

DITCH CHECKS

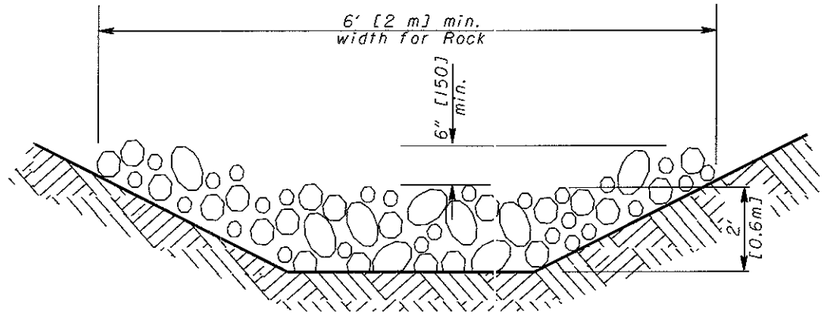


ELEVATION VIEW OF FLAT BOTTOM DITCH



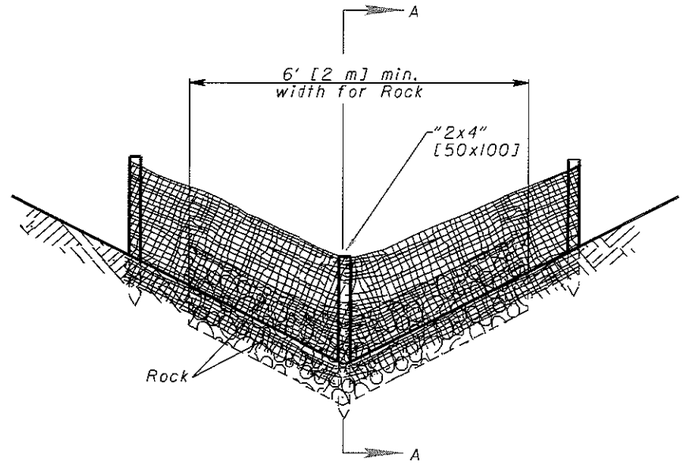
SIDE VIEW OF FLAT BOTTOM AND V DITCH

SECTION A-A



Minimum dimensions: 2' [0.6 m] high x 6' [2 m] wide x 3' [0.9 m] long

ELEVATION VIEW
ROCK CHECK



ELEVATION VIEW OF "V" DITCH

NOTES

FILTER FABRIC DITCH CHECKS:

MATERIALS: Furnish filter fabric ditch checks consisting of the following materials:

1. 30" [0.8 m] wide filter fabric with sound wood supports with maximum on-center spacing of 10' [3.0 m]. Use filter fabric conforming to 712.09 Type C.
2. A vertically driven "2x4" [50x100] stake in the center of the ditch
3. Gravel or limestone material conforming to one of the following gradations No. 1 through No. 4 on Table 703.01-1.

CONSTRUCTION: Trench the filter fabric fence as detailed for PERIMETER FILTER FABRIC FENCE. (see Sheet 2/2) Place a vertical "2x4" [50x100] stake in the center of the ditch with the top level to the top of the fence and at least 6" [150] below the bottom of the ditch. Excavate for and place the gravel or limestone on the upstream side of the ditch check.

PAYMENT: The Department will pay for the accepted quantities at the contract prices in feet [meters] as follows: **Item 207 - Filter Fabric Ditch Check.**

ROCK CHECKS:

MATERIALS: Furnish material conforming to Item 601 Rock Channel Protection Type C or D without filter.

CONSTRUCTION: Place the rock outside the traffic clear zone in the ditch.

PAYMENT: The Department will pay for the accepted quantities at the contract prices in cubic yards [cubic meters] as follows: **Item 207 - Rock Channel Protection Type C or D without filter.**

OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES

DATE
4-29-02
7-19-02

HYDRAULIC ENGINEER
D. Gruver

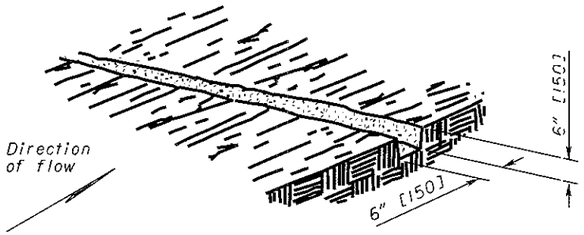
All metric dimensions [in brackets [ ]] are in millimeters unless otherwise noted.

OFFICE OF STRUCTURAL ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING
CONSTRUCTION EROSION CONTROL

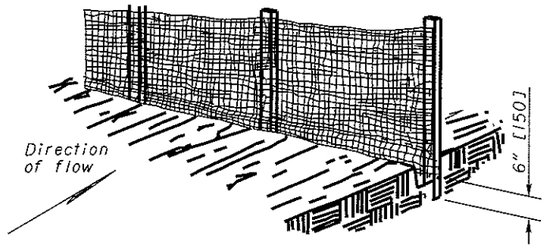
NUMBER
DM-4.4

PERIMETER FILTER FABRIC FENCE



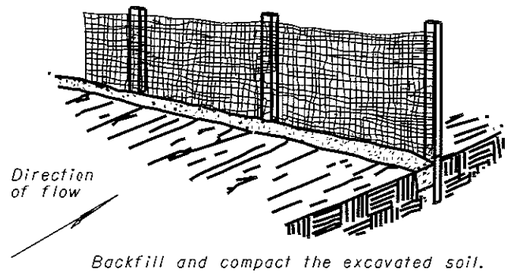
Excavate a 6"x6" [150x150] trench along the proposed fence line.

STEP 1



Place fabric and support stakes and extend fabric into the trench.

STEP 2



Backfill and compact the excavated soil.

STEP 3

NOTES

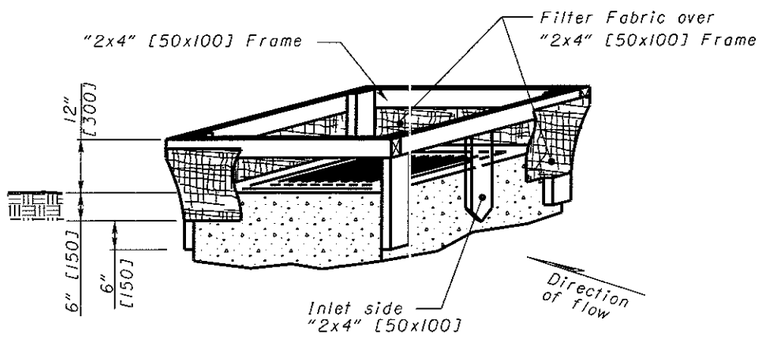
MATERIALS: Furnish 30" [0.8 m] wide filter fabric with sound wood supports with maximum on-center spacing of 10' [3.0 m]. Use filter fabric conforming to 712.09 Type C. The Contractor may elect to use straw or hay bales. Use 30" [750] long 2"x2" [50x50] wooden stakes, reinforcing bars or fence posts for the straw or hay bales.

CONSTRUCTION: Trench the filter fabric fence as detailed. The Ccontractor may elect to trench the fence detailed on steps 1 through 3 in one plowing operation.

When straw or hay bales are used conform to the following: Tightly place each bale adjacent to one another. Entrench 2" [50] to 3" [75] into the ground prior to staking. Firmly stake each bale with at least two stakes. Use loose hay or straw to fill the voids under or between the bales.

PAYMENT: The Department will pay for the accepted quantities at the contract prices in feet [meters] as follows: **Item 207 - Perimeter Filter Fabric Fence.**

INLET PROTECTION



INLET PROTECTION

NOTES

MATERIALS: Furnish inlet protection consisting of 18" [0.5 m] wide filter fabric fence with a securely nailed "2x4" [50x100] wood frame with a vertically driven "2x4" [50x100] on the inlet or flow side of the structure. Use filter fabric conforming to 712.09 Type C.

CONSTRUCTION: Construct an 18" [0.5 m] wide filter fabric fence supported around a storm drain inlet or catch basin with a securely nailed "2x4" [50x100] wood frame. Excavate a 6" [150] trench around the inlet, and drive support posts 6" [150] below the excavated trench bottom. Stretch the fabric around the frame. Secure it tightly ensuring that 6" [150] of fabric is in the trench. Overlap the fabric on one side of the inlet so that the fabric ends are not attached to the same post. Backfill and compact the excavated soil tightly onto the fabric. Place a vertical "2x4" [50x100] in the center of the inlet so that the top is at the top of the fence and the bottom is at least 6" [150] below the bottom of the ditch.

PAYMENT: The Department will pay for the accepted quantites at the contract prices in feet [meters] as follows: **Item 207 - Inlet Protection.**

OHIO DEPARTMENT OF TRANSPORTATION
Tim Keller
ENGINEER OF BRIDGES

DATE
4-29-02
7-19-02

HYDRAULIC ENGINEER
D. Gruver

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

OFFICE OF STRUCTURAL ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING
CONSTRUCTION EROSION CONTROL

NUMBER
DM-4.4

2/2

NOTES

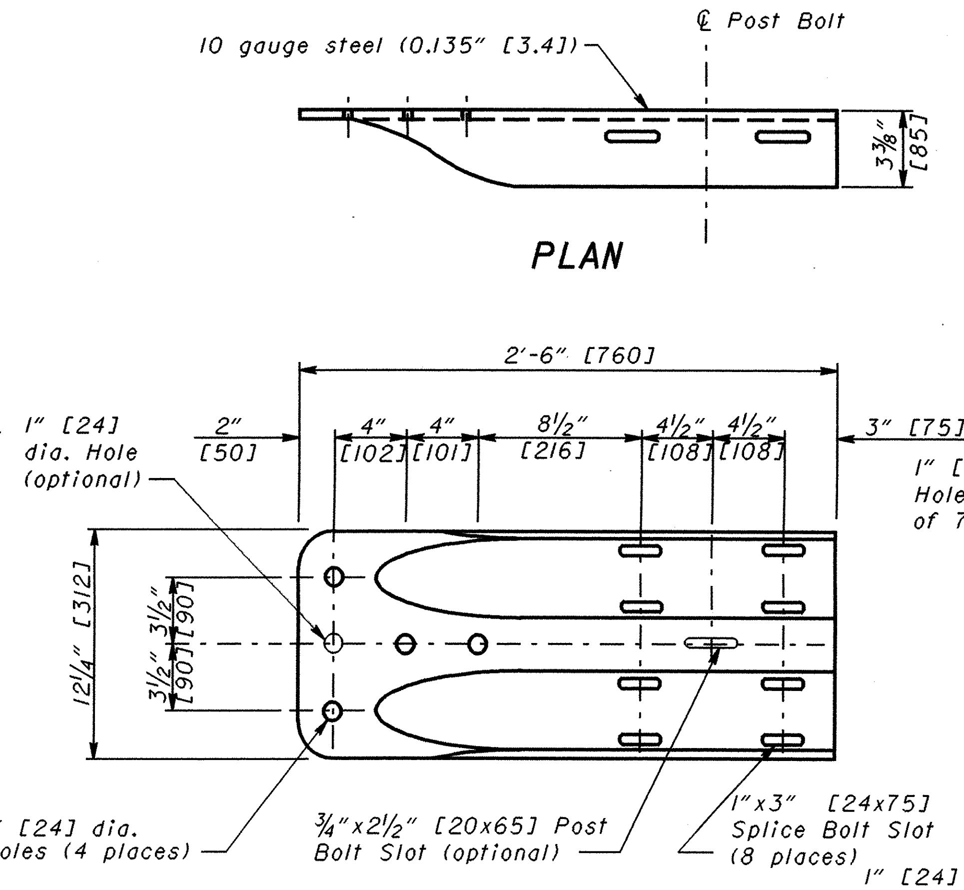
GENERAL: Components shown on this drawing are used in a variety of guardrail systems. See individual guardrail drawing for specific applications.

See CMS 606 for guardrail specifications not covered on these drawings.

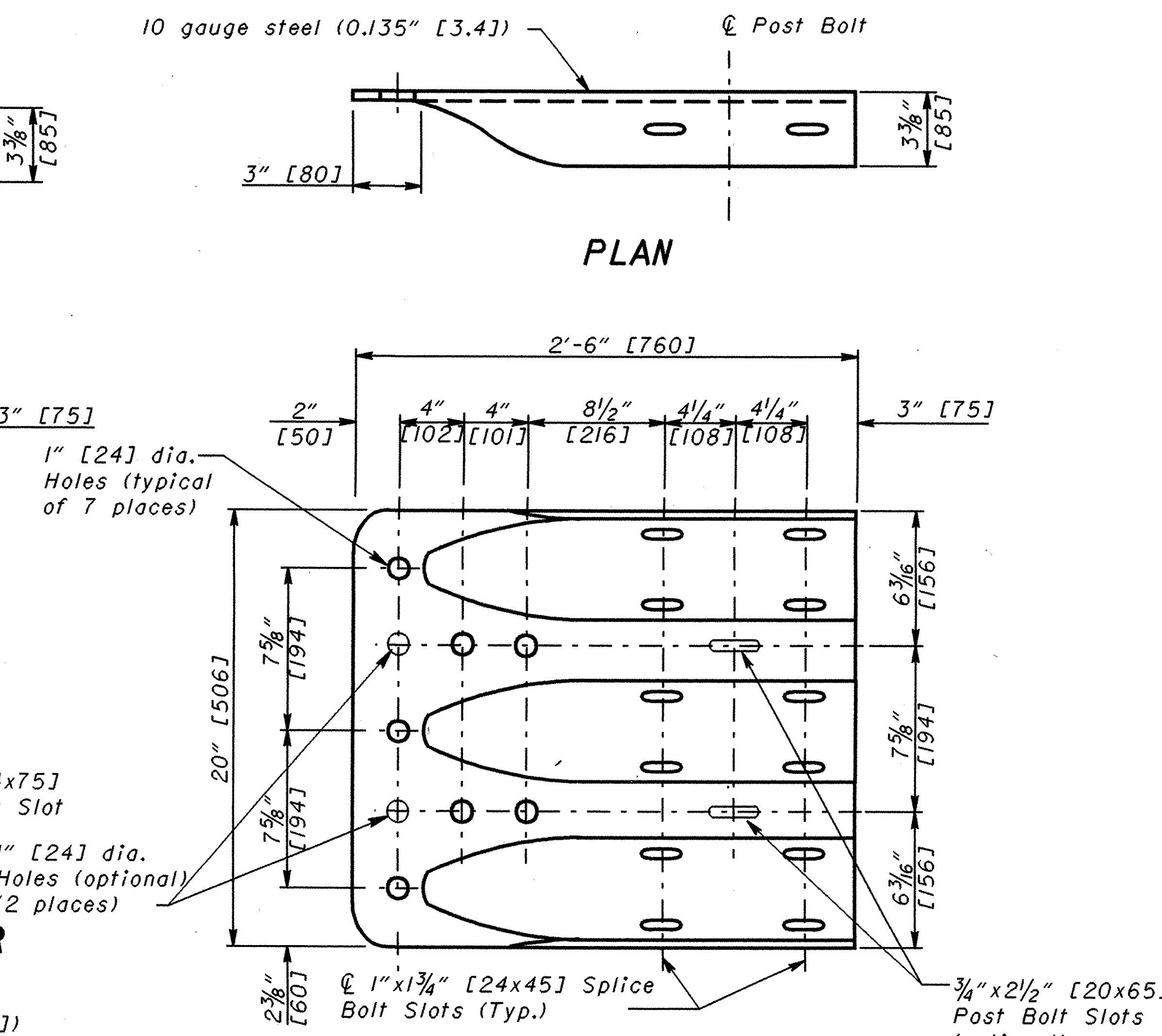
Refer to AASHTO M 180 for dimensional details of W-Beam and Thrie-Beam rail elements, related buffer and end sections, beam splices, post and splice bolts, nuts, and Type I W-Beam to Thrie-Beam Transition sections.

RAIL ELEMENTS: W-Beam Rail has an effective length of 12'-6" [3.81 m], unless otherwise specified, with ¾"x2½" [19x64] post bolt slots on 6'-3" [1.905 m] centers regardless of post spacing. Field punch or drill bolt holes or slots for irregularly spaced posts as specified in CMS 606.04.

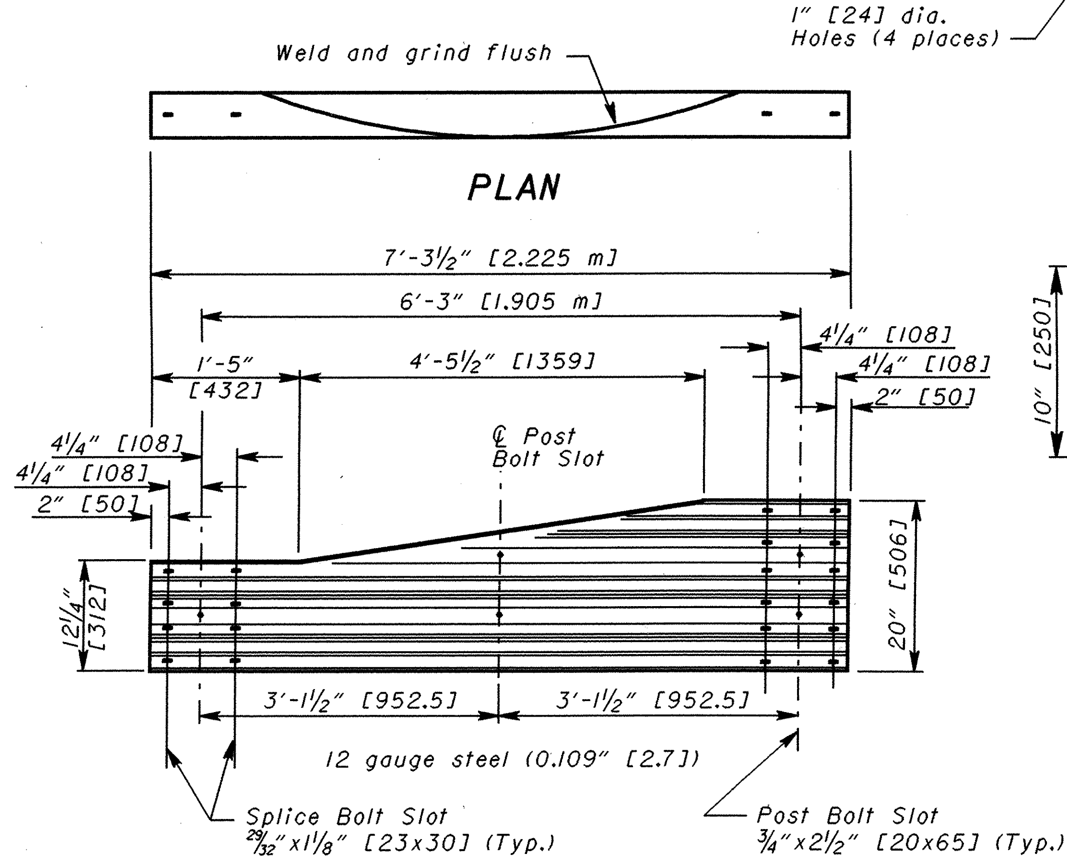
RAIL SPLICE: Lap splices between two rail elements or between a rail and terminal connector in the direction of traffic. Lap the buffer or flared end sections in the direction of traffic.



ELEVATION
W-BEAM TERMINAL CONNECTOR

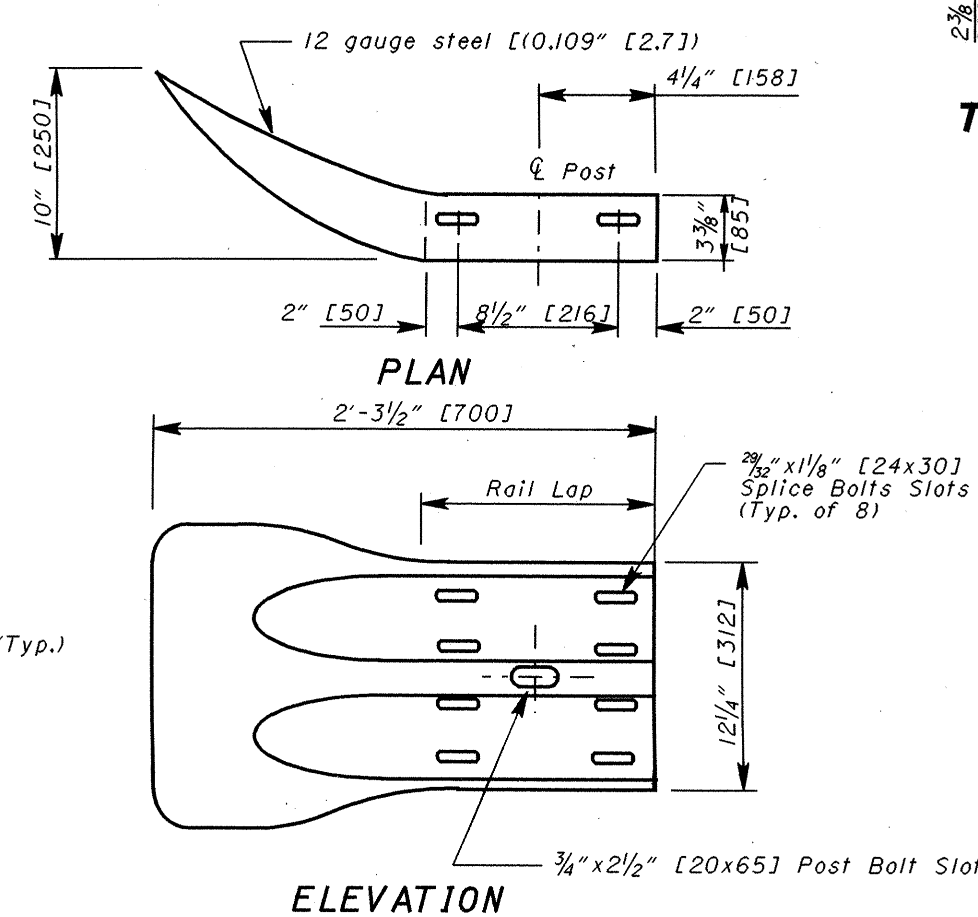


ELEVATION
THRIE-BEAM TERMINAL CONNECTOR

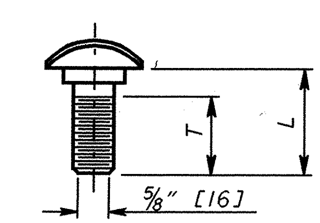


ELEVATION
TYPE 2 TRANSITION SECTION
(Asymmetric W to Thrie-Beam)

For details of Type I Transition Section (Symmetric), refer to AASHTO M 180, Figure 4.



ELEVATION
W-BEAM FLARED END SECTION

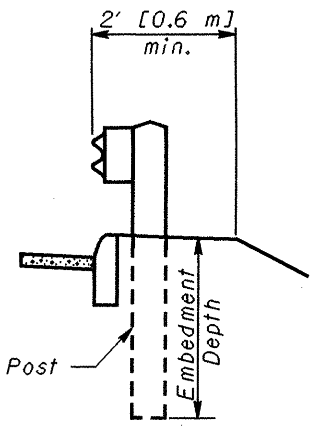


GUARDRAIL BOLT (For Post and Splice Bolts)		
L	**T min.**	**Bolt Use**
18" [460] (Standard Rail)	4" [100]	Type 5: WP/WB, PB
26" [640] (Barrier Rail)		
10" [255]	4" [100]	Type 5: SP/WB, PB
1⅜" [35]	1⅛" [30]	Splice Bolt

WP= Wood Post WB= Wood Blockout
SP= Steel Post PB= Plastic Blockout
Longer Bolt may be needed for round Wood Post larger than 8" [200] dia.

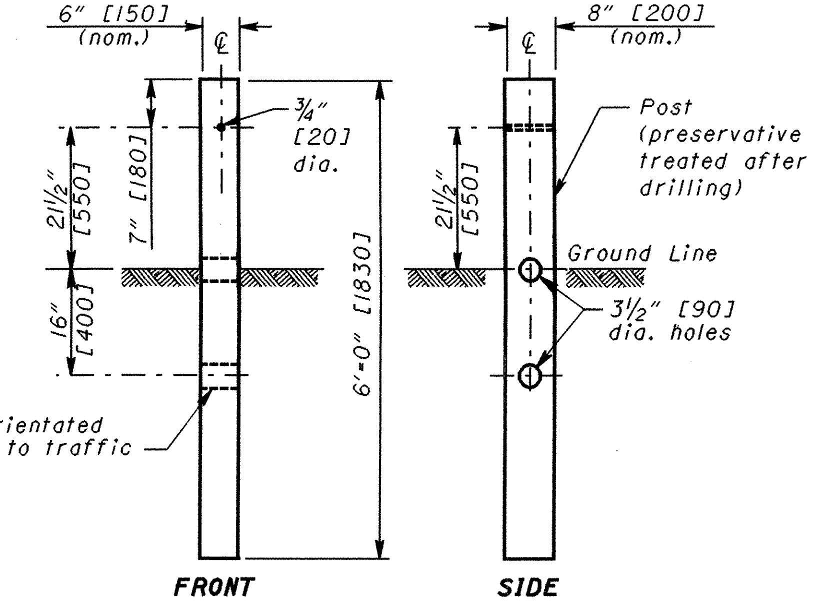
THIS DRAWING REPLACES GR1.1M DATED 10-21-97.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
4-18-03
DATE
STDS. ENGR. D. Focke
All metric dimensions [in brackets []] are in millimeters unless otherwise noted.
ROADWAY ENGINEERING SERVICES
STANDARD ROADWAY CONSTRUCTION DRAWING
GUARDRAIL DETAILS (Rail Components)
NUMBER GR-1.1
1/3

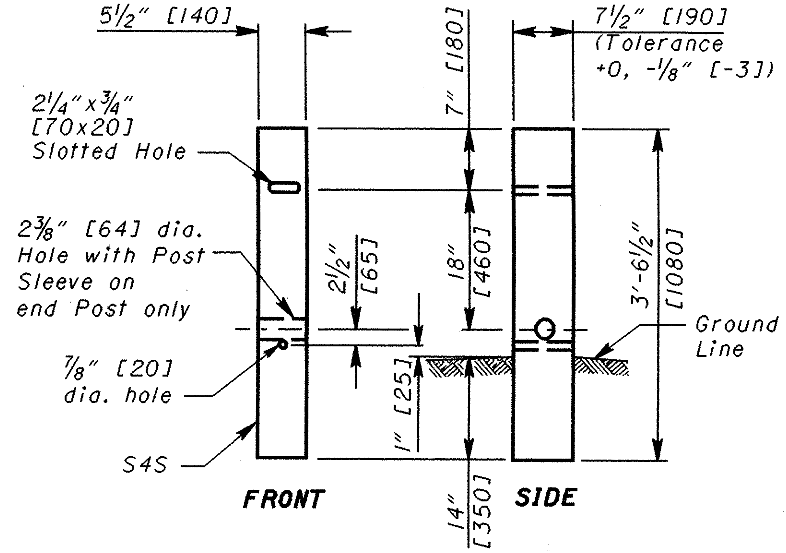


DETAIL A

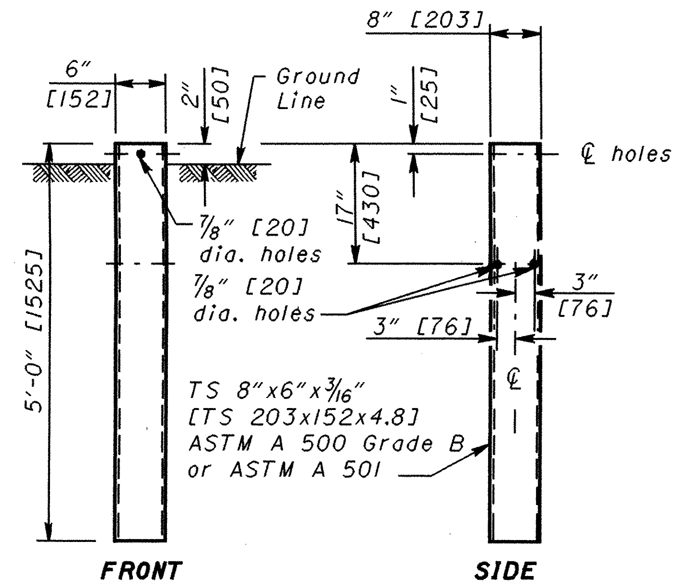
See POST EMBEDMENT DEPTH Note



TYPE 1 BREAKAWAY CRT POST



TYPE 2 BREAKAWAY CRT POST



STEEL GROUND TUBE

NOTES

GUARDRAIL HEIGHT: For initial installation, construct the guardrail within ± 1" [25] of the standard height, h, or 27¾" [706] to the top of W-Beam rail. (See MEASURING GUARDRAIL HEIGHT Detail.)
When subsequent projects, such as resurfacings, affect the height of existing guardrail, the finished height is to be within ±3" [75] of the standard height.

POST EMBEDMENT DEPTH: Where less than 2' [0.6 m] of graded shoulder shoulder width (10:1 or flatter) exists, measured from from the face of the guardrail (see DETAIL "A"), use longer posts so that a minimum of 5'-5" [1.65 m] embedment depth is provided. Payment for the longer posts will be made at the unit price bid for **Item 606 - Guardrail Post, 9' [2.75 m], Each.**

SPECIAL POST MOUNTINGS: Install posts located over a drainage inlet or structure as shown in the FOOTING ANCHOR Detail, or anchor per the details shown on **SCD GR-2.2.**

Install posts located over a footing with a cover of less than 2'-6" [0.75 m] with a footing anchor as detailed here. (A plate, as detailed on SECTION B-B of **SCD GR-2.2,** may be used as an alternative attachment method.) Where the cover is between 2'-6" [0.75 m] and 3'-5" [1.04 m], the footing anchor may be omitted and the post encased instead with 4" [100] (min.) of concrete.

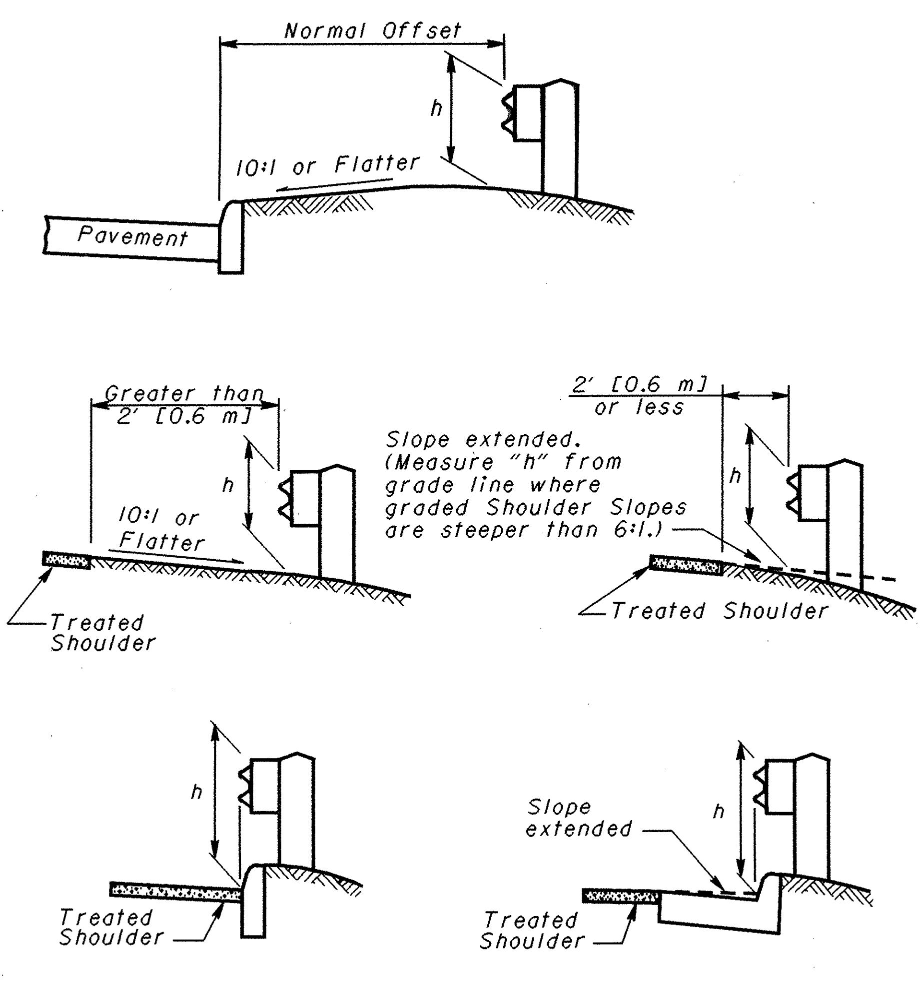
Do not drive posts located over a culvert with less than 4'-3" [1.3 m] of cover; instead set in drilled or dug holes. Where the available post embedment depth is less than 3'-5" [1.04 m], encase the post with a minimum of 4" [100] concrete.

All costs associated with special post mountings are included in the unit price bid for Item 606 Guardrail of the type specified in the plans.

ANCHORS: Holes and grouting shall comply with CMS 510. Use either cement or nonshrink, nonmetallic grout.

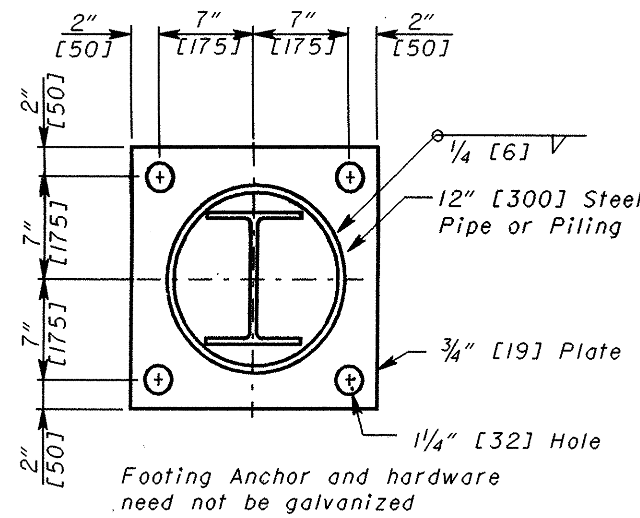
Expansion shield anchors as specified in CMS 712.01 may be substituted except where concrete deterioration has occurred, as determined by the Engineer. Where self-drilling anchors are used, drill the holes with the expansion shield (not by a drill bit) and install the shield flush with the concrete surface.

PROTECTIVE COATING: In lieu of the complying with CMS 710.06, coat expansion shields, anchors and concrete insert anchor assemblies embedded in concrete in accordance with ASTM A 153 or be of stainless steel. Any bolts screwed into these devices shall meet CMS 710.06. (See sheet 3 for Concrete Insert Anchor Assembly Detail.)



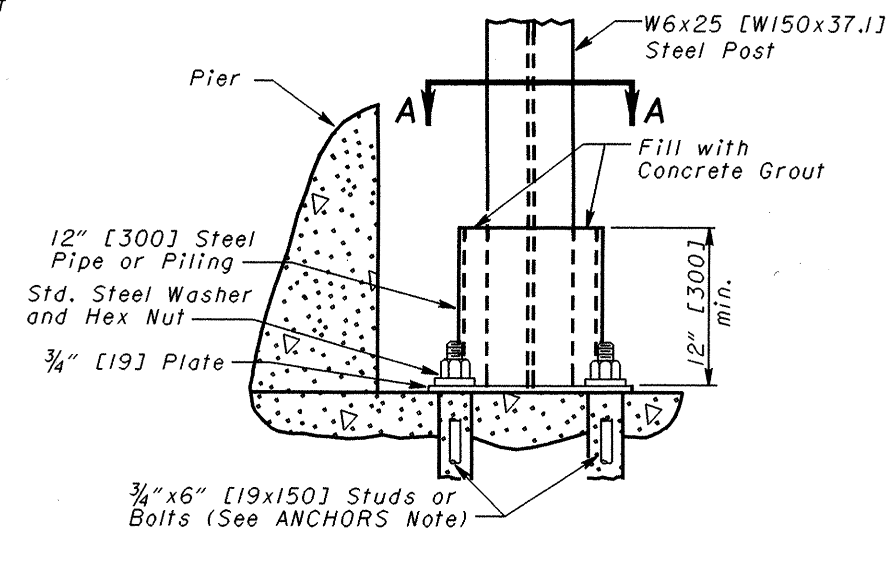
h = Standard Height (See GUARDRAIL HEIGHT Note)

MEASURING GUARDRAIL HEIGHT



Footing Anchor and hardware need not be galvanized

SECTION A-A



ELEVATION

FOOTING ANCHOR

See SPECIAL POST MOUNTINGS Note.

THIS DRAWING REPLACES GR-1.2M DATED 1-3-96.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
DATE 4-18-03

STDS. ENGR. D. Focke

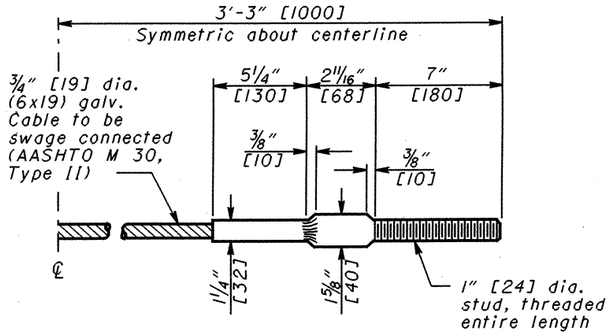
All metric dimensions (in brackets []) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
GUARDRAIL DETAILS (Posts)

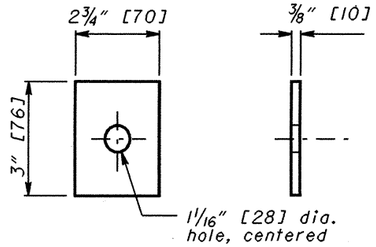
NUMBER **GR-1.1**

2/3

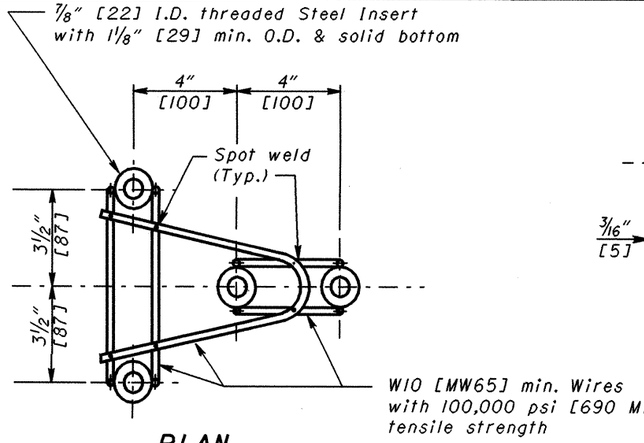


STANDARD SWAGED FITTING AND STUD

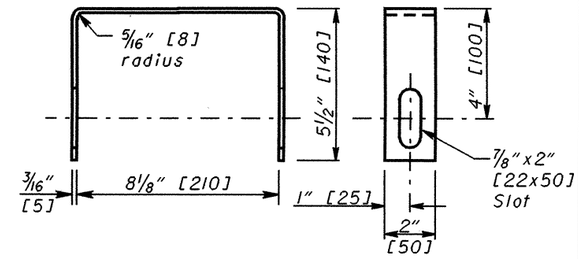
CABLE ANCHOR



END PLATE

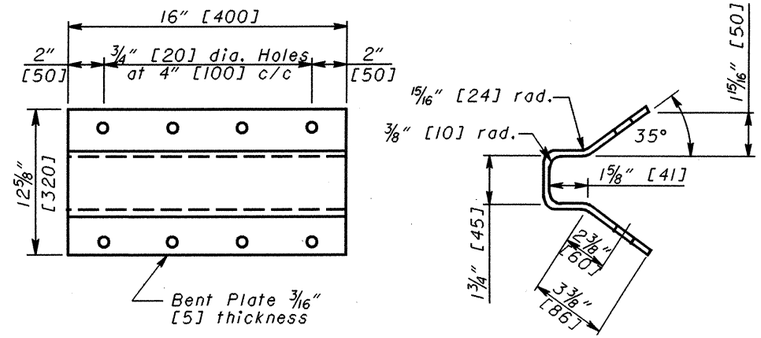


PLAN

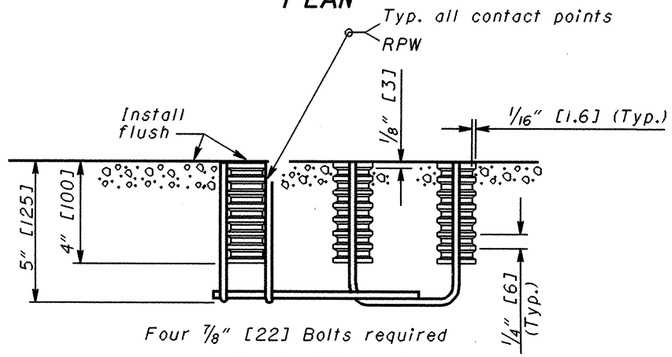


YOKE

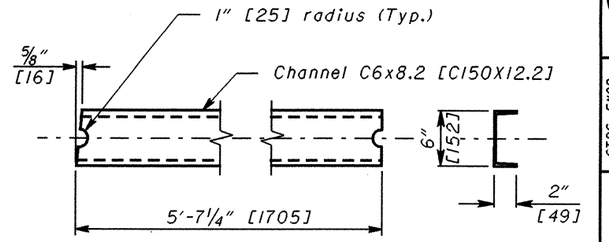
Two required in Assembly



ANCHOR BRACKET



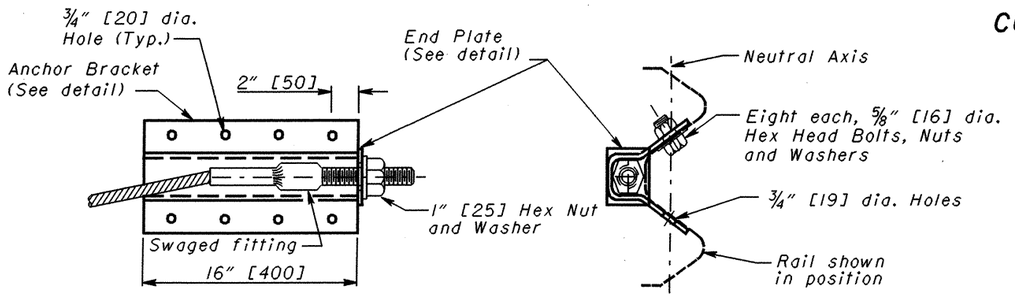
ELEVATION



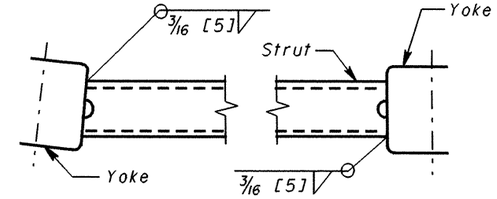
STRUT

CONCRETE INSERT ANCHOR ASSEMBLY (W-BEAM ONLY)

See ANCHORS and PROTECTIVE COATINGS Notes on Sheet 2

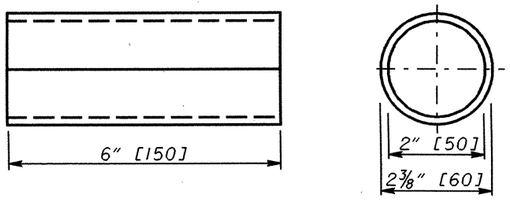


ANCHOR BRACKET ASSEMBLY DETAILS



Channel legs shown down. For opposite hand, install Channel legs up.

STRUT AND YOKE ASSEMBLY



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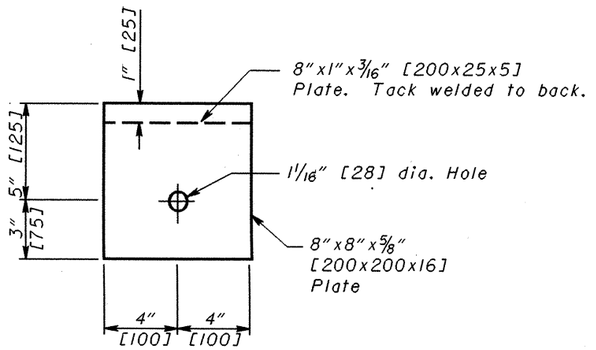
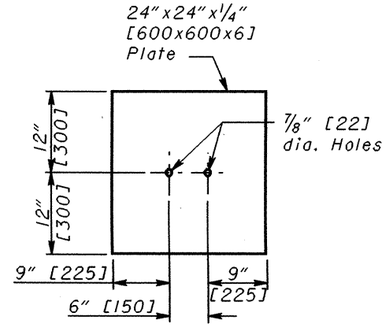


BEARING PLATE



SOIL PLATE

THIS DRAWING REPLACES GR-1.3M DATED 11-30-94.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
4-18-03
DATE

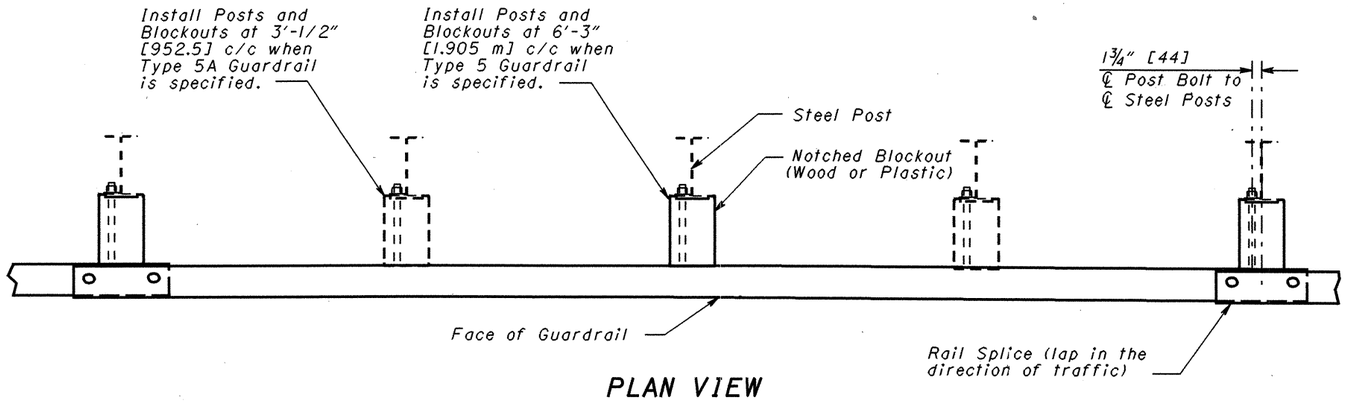
STDS. ENGR.
D. Focke

All metric dimensions [in brackets] are in millimeters unless otherwise noted.

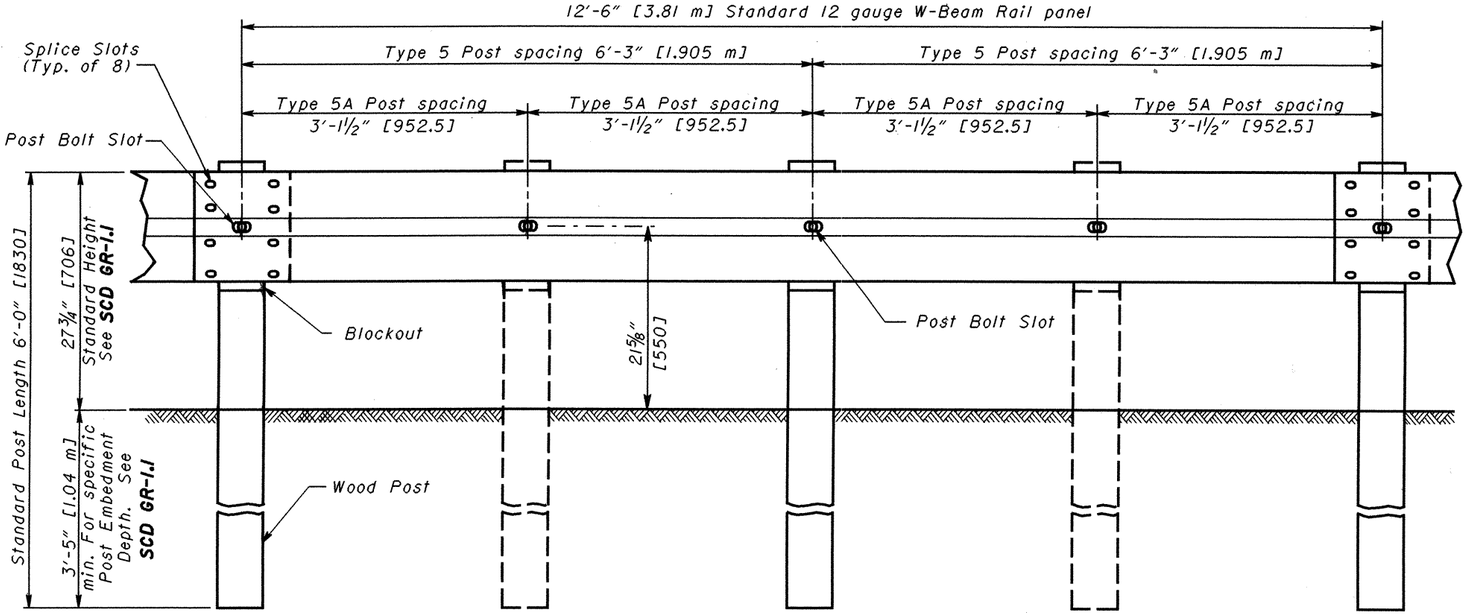
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
GUARDRAIL DETAILS (Misc. Components)

NUMBER
GR-1.1



PLAN VIEW
(Steel Posts shown)



ELEVATION
(Wood Posts shown)

NOTES

RAIL: Use W-Beam rail meeting AASHTO M 180 Type II Class A, as specified in CMS 606.

POSTS: Posts may be constructed of wood or steel. Wood posts may be round or 6"x8" [150x200] square-sawed.

Use round wood posts on runs of single-sided rail. The round posts shall be 8"±1 [200±25] in diameter at the top and not more than 3" [75] larger at the butt with a uniform taper.

Fabricate wood posts with square ends. Posts shall be pressure-treated as per CMS 710.14. Bore bolt holes and, if required, trim the tops of posts after the posts are set.

Steel posts are to be W6x9 [W150X13.5] or W6x8.5 [W150x12.8] galvanized steel. Use the same type of post throughout the length of the project unless otherwise specified in the plans or permitted by the Engineer.

All posts are 6'-0" [1830] long unless specified otherwise in the Contract Document. Posts may be set in drilled holes or may be driven to grade.

WELDED BEAM POSTS: Welded beam guardrail posts may be used for Item 606, Guardrail, provided the web and flange sizes are as shown here. Welding of the web to the flanges must comply with ASTM A 769, 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.

ALTERNATE POSTS: Engineered guadrail posts having met NCHRP 350 criteria, and listed on the **Office of Materials Management's** Approved List are permitted as an equal alternate when installed according to the Manufacturer's instructions and within the limitations shown on the Approved List.

BLOCKOUTS: Blockout dimensions are dependent on post used. Wood Blockouts are to be pressure treated as specified in CMS 710.14. Bore bolt holes. Approved alternate blockouts may be used in lieu of the wood blockouts shown. The approved list is maintained by the **Office of Materials Management.**

WASHERS: Install appropriate sized standard galvanized steel washers on the nut side of bolts installed on wood posts.

DELINEATION: For barrier reflectors, see CMS 626.

MISCELLANEOUS: For other guardrail details, see **SCD GR-1.1.**

STEEL BEAM POSTS (English)				
Size	**Beam depth**	**Flange width**	**Flange thickness**	**Web thickness**
Rolled W6x8.5	5.8"	3.94"	0.193"	0.170"
Rolled W6x9	5.9"	3.94"	0.215"	0.170"
Welded 6x8.5	6.0"	3.94"	0.193"	0.170"
Welded 6x9	6.0"	3.94"	0.215"	0.170"

STEEL BEAM POSTS (Metric)				
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

THIS DRAWING REPLACES GR-2.1 DATED 4-18-03.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
1-16-04 DATE

STDS. ENGR. D. Focke

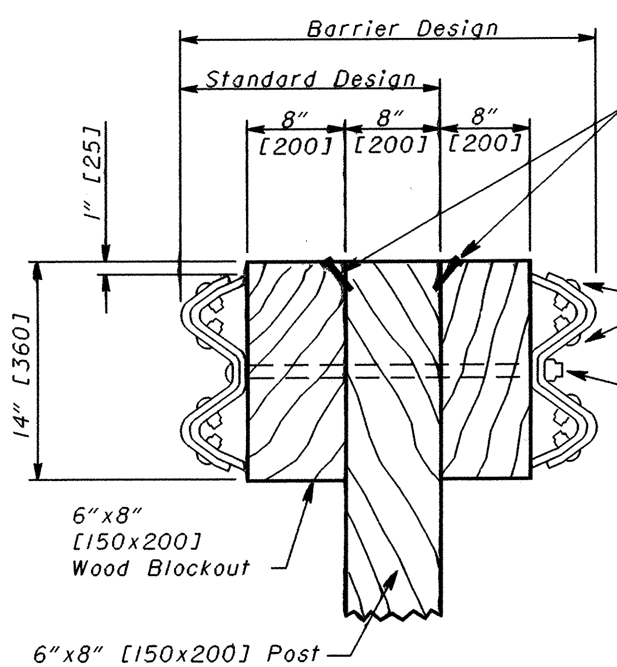
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

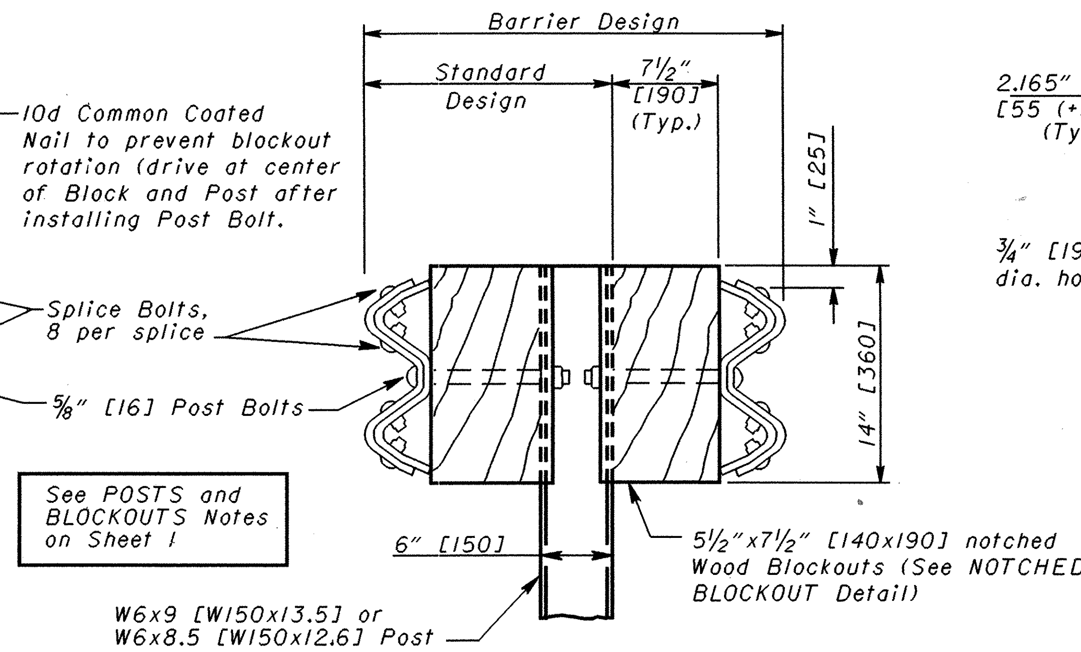
STANDARD ROADWAY CONSTRUCTION DRAWING

GUARDRAIL TYPE 5 & 5A

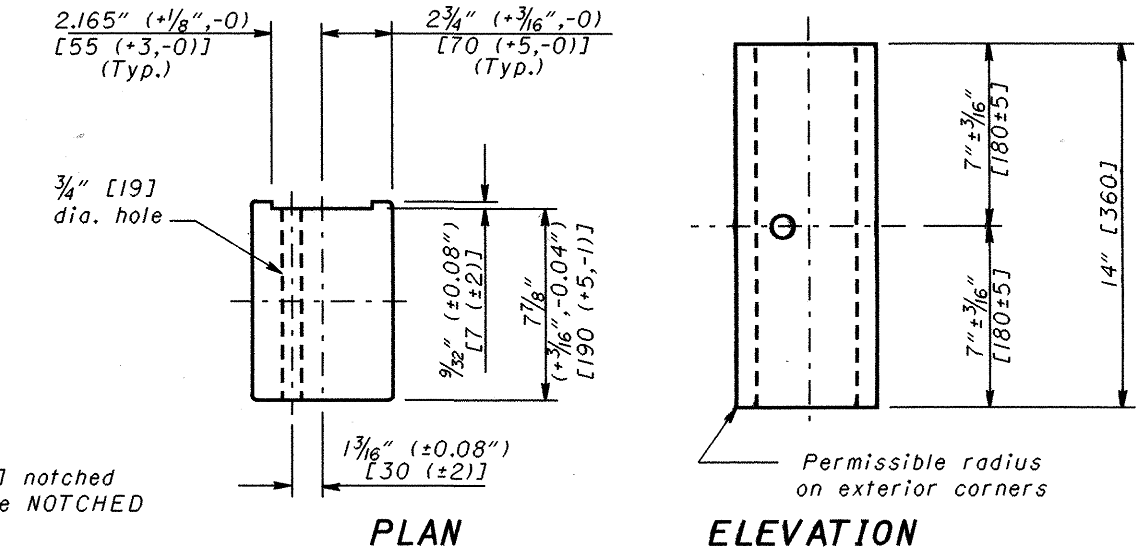
NUMBER **GR-2.1**



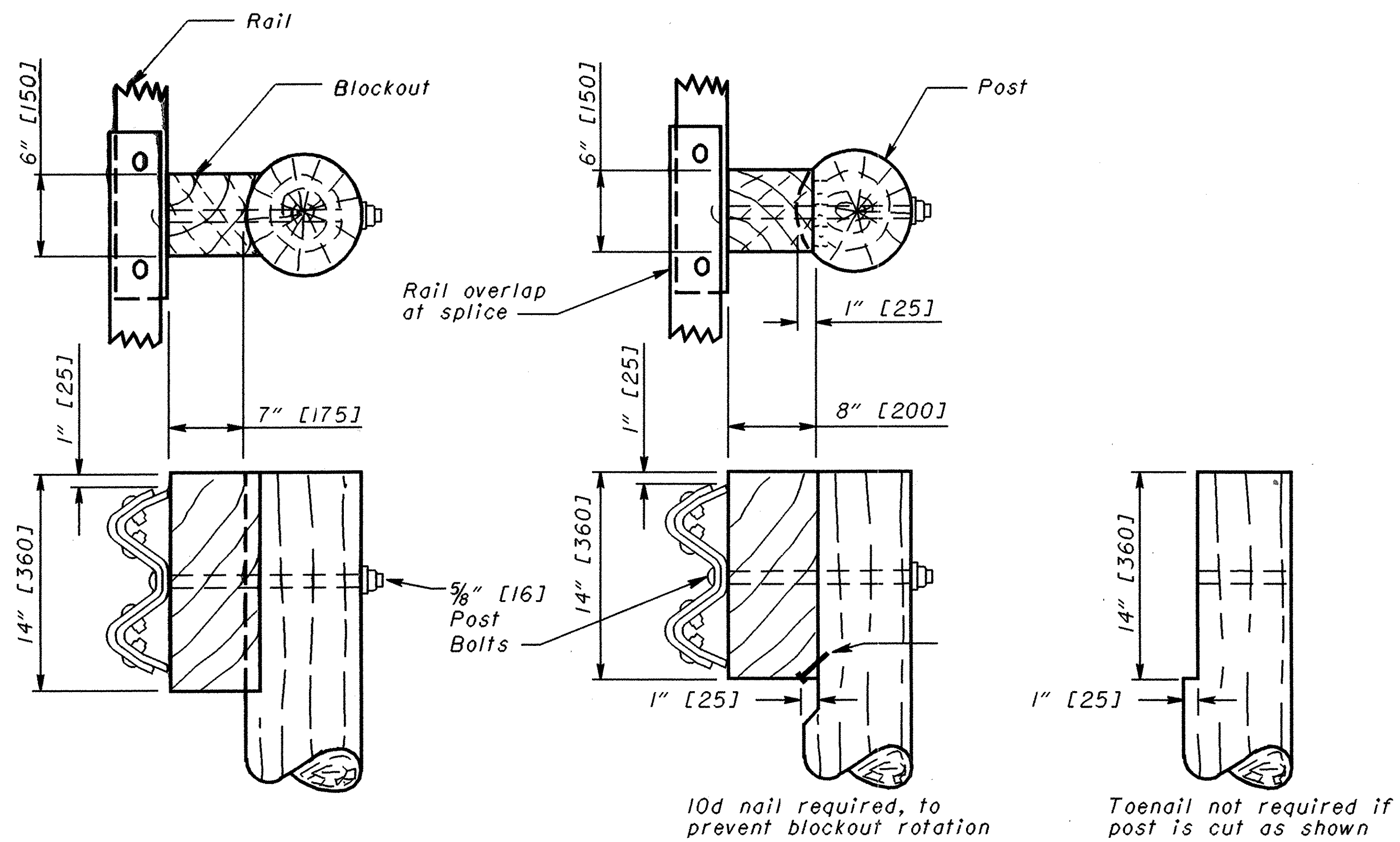
SQUARE WOOD POST



STEEL POST
See POSTS Note, Sheet 1



NOTCHED BLOCKOUTS FOR STEEL POSTS
See BLOCKOUTS Note on Sheet 1

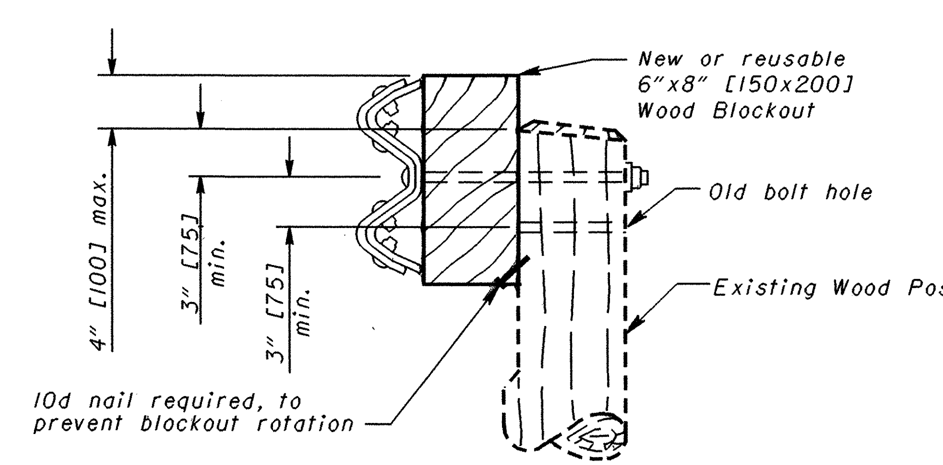


METHOD 1
Routed Blockout

METHOD 2
Notched Post

Alternate methods of placing the Blockouts on round Posts may be submitted for consideration and approved by the Engineer.

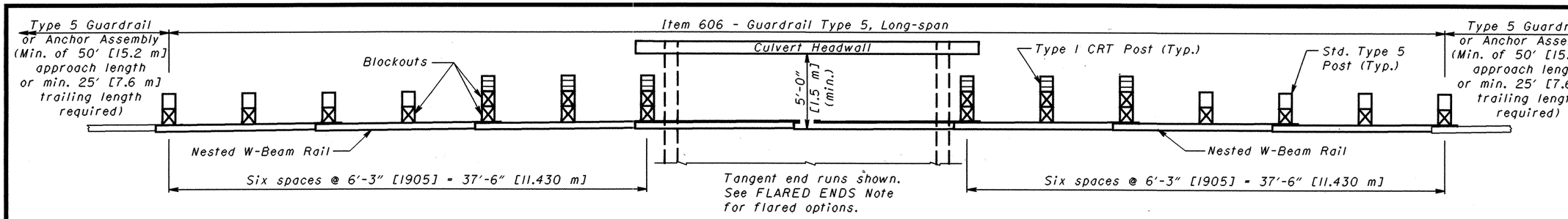
ROUND WOOD POSTS
Single Sided runs only (Standard Design)



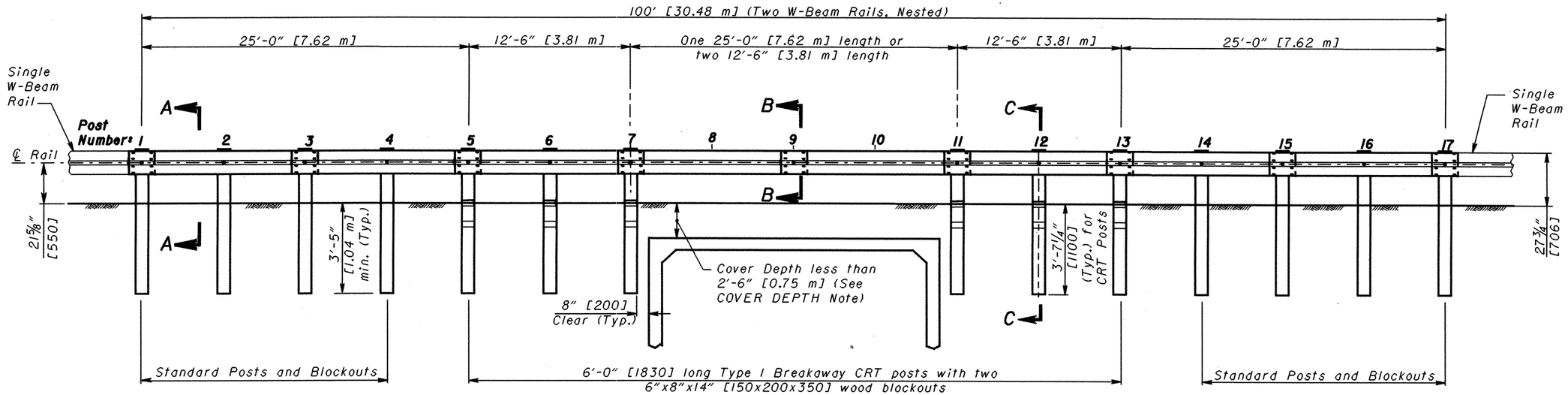
WOOD POSTS WITH WOOD BLOCK RAISING EXISTING GUARDRAIL HEIGHT

THIS DRAWING REPLACES GR-2.1 DATED 4-18-03.

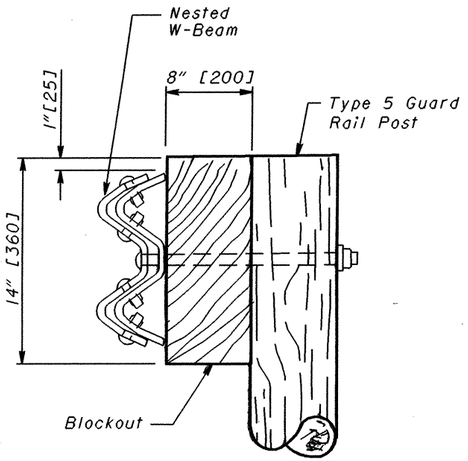
OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
1-16-04
DATE
STDS. ENGR. D. Focke
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.
ROADWAY ENGINEERING SERVICES
STANDARD ROADWAY CONSTRUCTION DRAWING
GUARDRAIL TYPE 5 & 5A
NUMBER GR-2.1
2/2



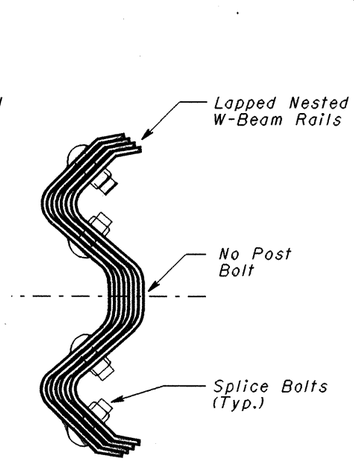
PLAN



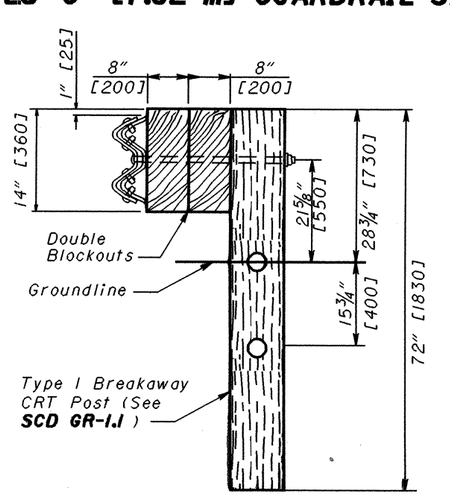
ELEVATION
25'-0" [7.62 m] GUARDRAIL SPAN



SECTION A-A



RAIL SPLICE
SECTION B-B



SECTION C-C

NOTES

APPLICATION: This drawing details the 25'-0" [7.62 m] Long-span Guardrail cross culvert option, which meets the requirements of NCHRP 350 Test Level 3.

25'-0" [7.62 m] SPAN: Posts may be eliminated such that a maximum of one rail splice is located within the unsupported length. A 25'-0" [7.62 m] length of nested W-Beam rail may be used to eliminate a splice when 12'-6" [3.81 m] long rail elements are used throughout the guardrail run.

CRT POSTS: For Details see **SCD GR-1.1.** Place holes parallel to traffic. The CRT Posts should have a 3'-7¼" [1100] embedment depth.

COVER DEPTH: This depth is measured at the locations of the missing posts. For cover depths greater than or equal to 2'-6" [0.75 m], see **SCD GR-2.2.**

FLARED ENDS: Install the system with either one or both ends flared away from the traveled way. For locations where a guardrail flare will be used, the minimum recommended length of tangent section adjacent to the unsupported length is 25' [7.62 m]. Taper rates should be as shown on **SCD GR-5.1.**

MATERIALS: All posts, blockouts, rails, and hardware shall comply with Item 606, Guardrail Type 5 as detailed on **SCD GR-2.1** except as noted. For other details not shown, see **SCD GR-1.1.**

PAYMENT: **Item 606 - Guardrail, Type 5, 25' Long-Span** is paid for in Feet [Meters] for the length specified in the plans and includes the double rail elements, blockouts, posts, and the other hardware, materials and labor required to construct the guardrail as shown.

NEW DRAWING

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER — 4-18-03 DATE

STDS. ENGR. D. Focke

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

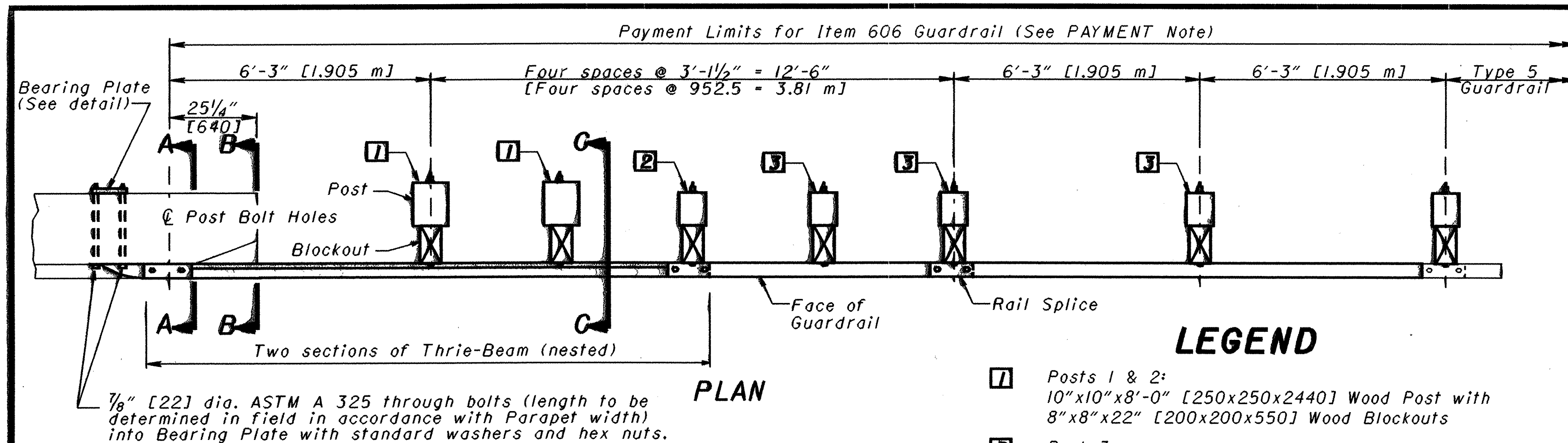
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING

25' LONG-SPAN GUARDRAIL

NUMBER GR-2.3

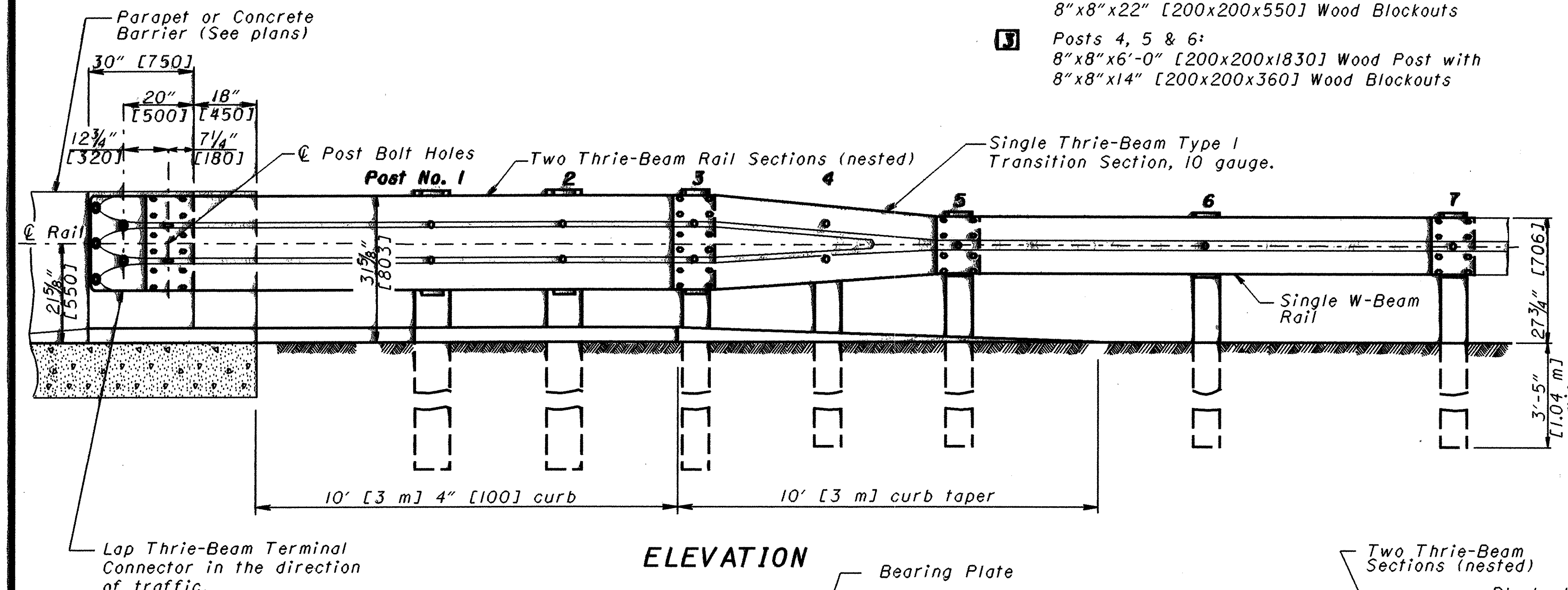
1 / 1



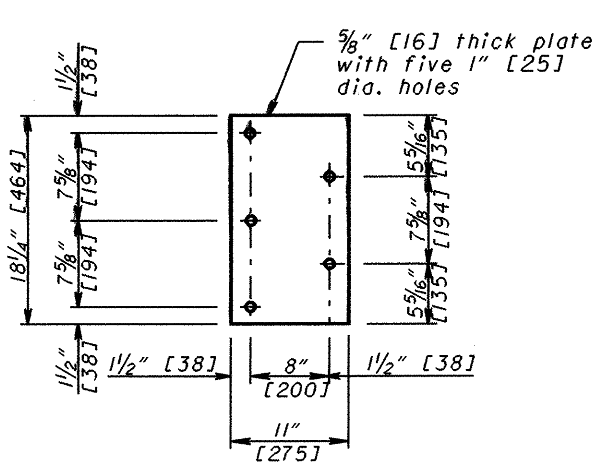
PLAN

LEGEND

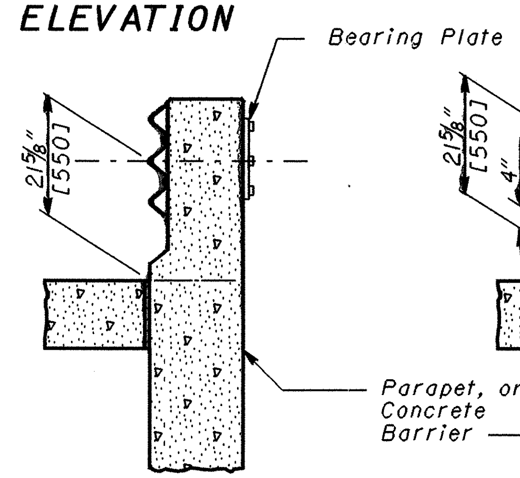
- **1** Posts 1 & 2: 10"x10"x8'-0" [250x250x2440] Wood Post with 8"x8"x22" [200x200x550] Wood Blockouts
- **2** Post 3: 8"x8"x8'-0" [200x200x2440] Wood Post with 8"x8"x22" [200x200x550] Wood Blockouts
- **3** Posts 4, 5 & 6: 8"x8"x6'-0" [200x200x1830] Wood Post with 8"x8"x14" [200x200x360] Wood Blockouts



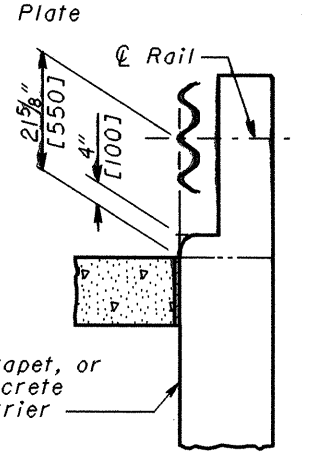
ELEVATION



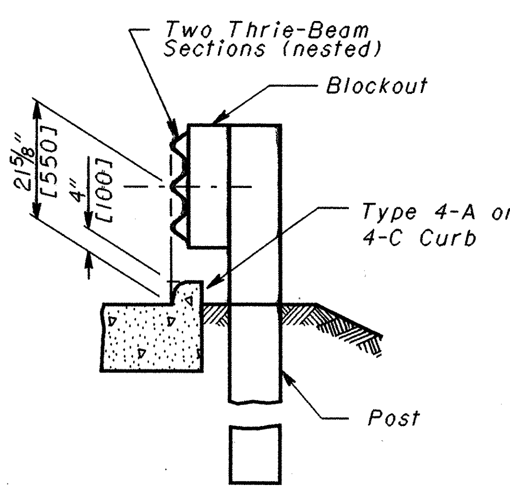
BEARING PLATE



SECTION A-A



SECTION B-B



Front of curb to be flush with face of guardrail.

SECTION C-C

NOTES

GENERAL: For additional details, see **SCD GR-1.1**.

APPLICATION: Use Type 1 Bridge Terminal Assembly to connect guardrail runs to bridges having Deflector Parapet type Bridge Railing (see **Structural Engineering's SCD BR-1**). It may also be used to connect guardrail runs to the approach ends of Concrete Barrier (see **SCD RM-4.6**).

On undivided, bi-directional roadways, Type 1's may be used to anchor guardrail runs to the trailing end of Deflector Parapets or Concrete Barrier installations.

THRIE BEAM TRANSITION: Symmetrical W-Beam to Thrie Beam transition panel shall be 10 gauge.

POSTS: Posts may be set in drilled holes or driven to grade. See **SCD GR-1.1** for additional Post embedment details.

WOOD POSTS - Use square sawed pressure treated wood as per CMS 710.14 and fabricate with square ends. Bore bolt holes and trim the tops of posts, if required, after the posts are set.

STEEL POSTS - are allowed as an alternate. Use W8x24 [W200x35.9] for 10"x10" [250x250] wood posts and use W6x25 [W150x37.1] for 8"x8" [200x200] posts. Use same post material throughout assembly.

BLOCKOUTS: Use wood blockouts only, steel or plastic blockouts are not permitted. Use routed blockouts with steel posts.

CURB: Provide a Type 4-A or 4-C concrete curb minimum of 20' [6 m], or longer as shown on plans, including a 10' [3 m] taper (from curb height to flush). Front of curb to be flush with face of guardrail.

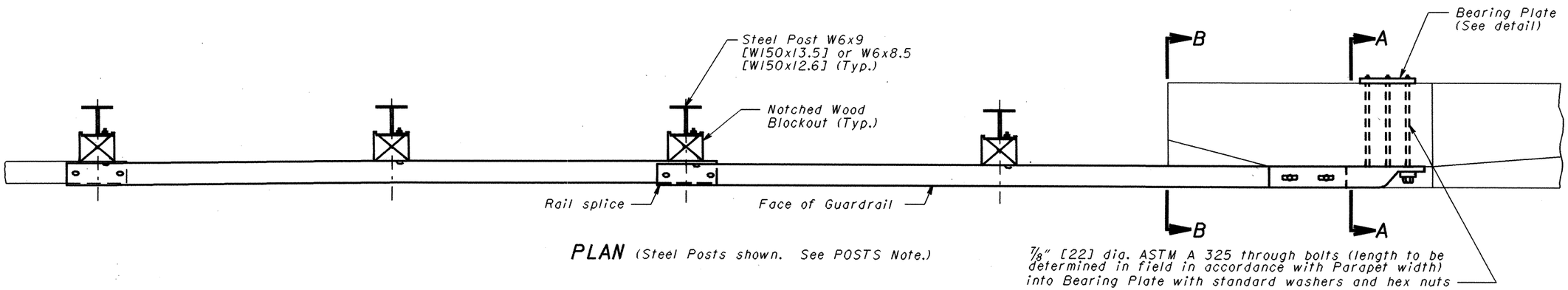
FLARED GUARDRAIL: Begin Standard Guardrail Flares as shown on **SCD GR-5.1** preferably at or beyond Post No. 7; however, the flare may begin at Post No. 5.

PAYMENT: Item 606 - Bridge Terminal Assembly, Type 1, Each, includes the cost of extra components, in excess of normal guardrail, for additional and different size of posts and blockouts, nested Thrie-Beam, transition and connector sections, Bearing Plate, bolts, washers, nuts, other hardware, and curbs.

THIS DRAWING REPLACES GR-3.1M DATED 10-21-97.

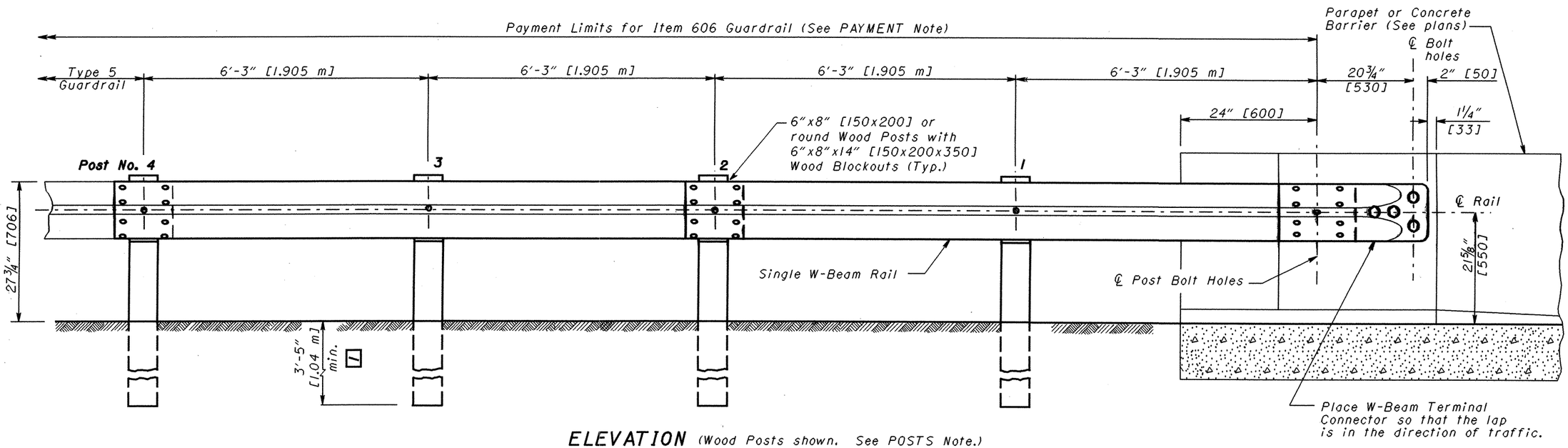
All metric dimensions in brackets [ ] are in millimeters unless otherwise noted.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
4-18-03
DATE
STDS. ENGR. D. Focke
ROADWAY ENGINEERING SERVICES
STANDARD ROADWAY CONSTRUCTION DRAWING
BRIDGE TERMINAL ASSEMBLY, TYPE 1
NUMBER GR-3.1
1/1

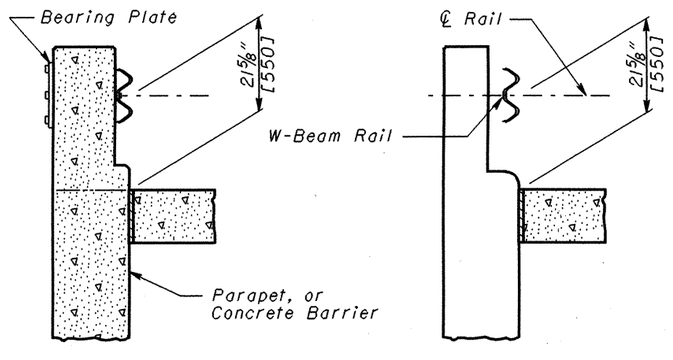


PLAN (Steel Posts shown. See POSTS Note.)

7/8" [22] dia. ASTM A 325 through bolts (length to be determined in field in accordance with Parapet width) into Bearing Plate with standard washers and hex nuts

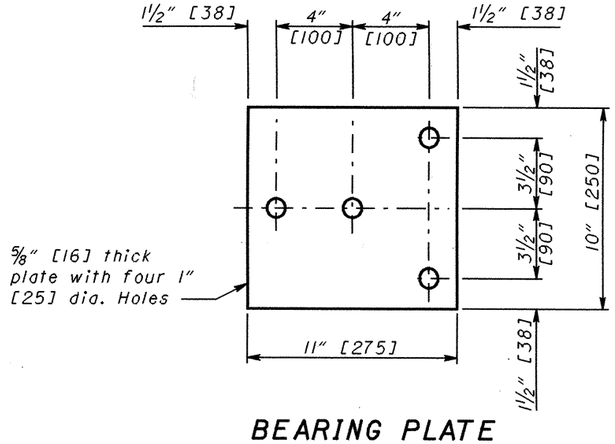


ELEVATION (Wood Posts shown. See POSTS Note.)



SECTION A-A

SECTION B-B



BEARING PLATE

NOTES

GENERAL: For additional rail and post details, see **SCD GR-1.1.**

APPLICATION: Use Type 2 Bridge Terminal Assembly to connect guardrail runs to the trailing end of Parapets or Concrete Barriers (see **SCD RM-4.6** for barrier) on one-directional roadways. Do not use if located within clear zone of opposing traffic.

POSTS: Posts shall be of standard size and material specified for the appropriate type of guardrail to be installed leaving the bridge or barrier. For Type 5 guardrail, see **SCD GR-2.1.**

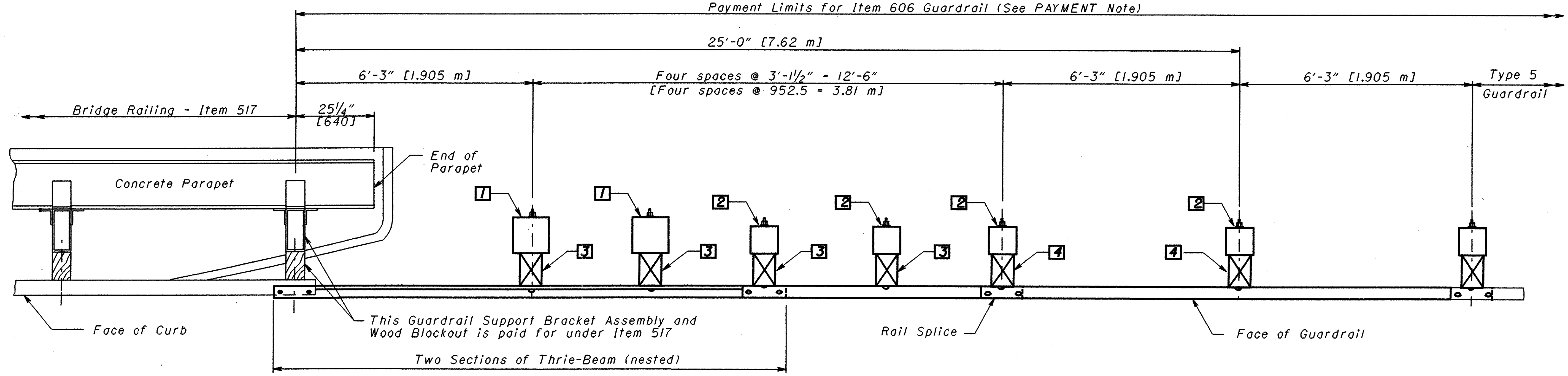
BLOCKOUTS: Use Wood Blockouts only. Steel or plastic blockouts are not permitted.

FLARED GUARDRAIL: Begin Standard Guardrail Flares as shown on **SCD GR-5.1,** preferably at or beyond Post No. 4; however, the flare may begin at Post No. 2.

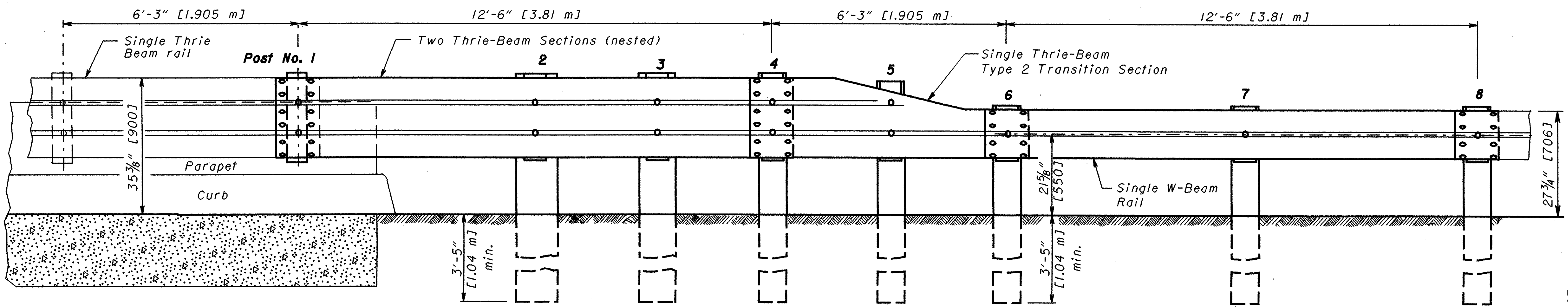
PAYMENT: **Item 606 - Bridge Terminal Assembly, Type 2, Each.** includes the cost of extra components, in excess of normal guardrail, for the Terminal connector, Bearing Plates, bolts, washers, nuts, and other hardware.

THIS DRAWING REPLACES GR-3.2M DATED 10-21-97.

OHIO DEPARTMENT OF TRANSPORTATION — DATE 4-18-03
ROADWAY DESIGN ENGINEER — Raul F. Gutierrez
STDS. ENGR. D. Focke
All metric dimensions [in brackets [ ]] are in millimeters unless otherwise noted.
ROADWAY ENGINEERING SERVICES
STANDARD ROADWAY CONSTRUCTION DRAWING
BRIDGE TERMINAL ASSEMBLY, TYPE 2
NUMBER **GR-3.2**
1 / 1



PLAN



ELEVATION

NOTES

GENERAL: For additional rail and post details, see **SCD GR-1.1**.

APPLICATION: Use Type 3 Bridge Terminal Assembly to connect guardrail runs to both the approach and trailing ends of Thrie-Beam Bridge Railings (see **Structural Engineering's SCD TBR-91**). Do not use on the NHS.

POSTS: Posts may be set in drilled holes or driven to grade. See **SCD GR-1.1** for additional Post embedment details.

WOOD POSTS - Use square sawed pressure treated wood as specified in CMS 710.14 and fabricate with square ends. Bore bolt holes and trim the tops of posts, if required, after the posts are set.

STEEL POSTS - are allowed as an alternate. Use W8x24 [W200x35.9] for 10"x10" [250x250] wood posts and use W6x25 [W150x37.1] for 8"x8" [200x200] posts. Use same post material throughout assembly.

BLOCKOUTS: Use wood blockouts only. Steel or plastic blockouts are not permitted.

FLARED GUARDRAIL: Start Standard Guardrail Flares as shown on **SCD GR-5.1** at or beyond Post No. 8; however, the flare may begin at Post No. 6.

PAYMENT: Item 606 - Bridge Terminal Assembly, Type 3, Each, includes the cost of extra components, in excess of normal guardrail, for additional and different types of posts and and blockouts, nested Thrie-Beam, transition and connector sections, and other hardware.

LEGEND

1	10"x10" [250x250] Wood Post (See STEEL POSTS Note)
2	8"x8" [200x200] Wood Post (See STEEL POSTS Note)
3	6"x8"x22½" [150x200x570] Wood Blockout (See BLOCKOUTS Note)
4	6"x8"x14" [150x200x350] Wood Blockout (See BLOCKOUTS Note)

THIS DRAWING REPLACES GR-3.3M DATED 10-21-97.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
4-18-03
DATE

STDS. ENGR. D. Focke

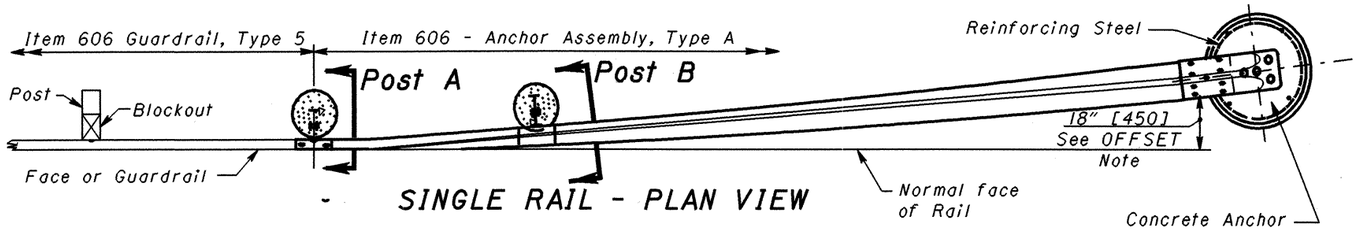
All metric dimensions (in brackets []) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

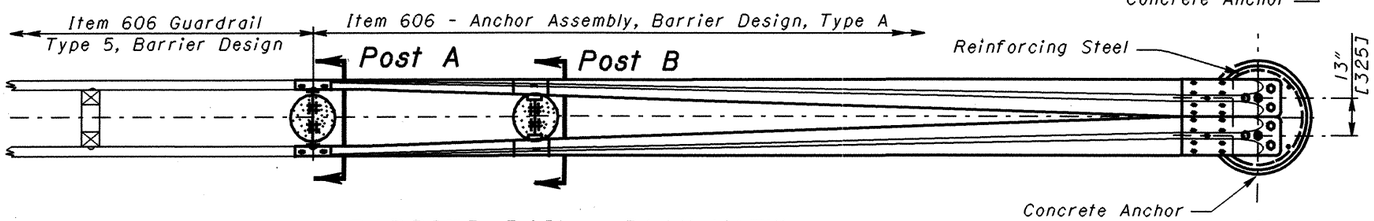
STANDARD ROADWAY CONSTRUCTION DRAWING
BRIDGE TERMINAL ASSEMBLY, TYPE 3

NUMBER **GR-3.3**

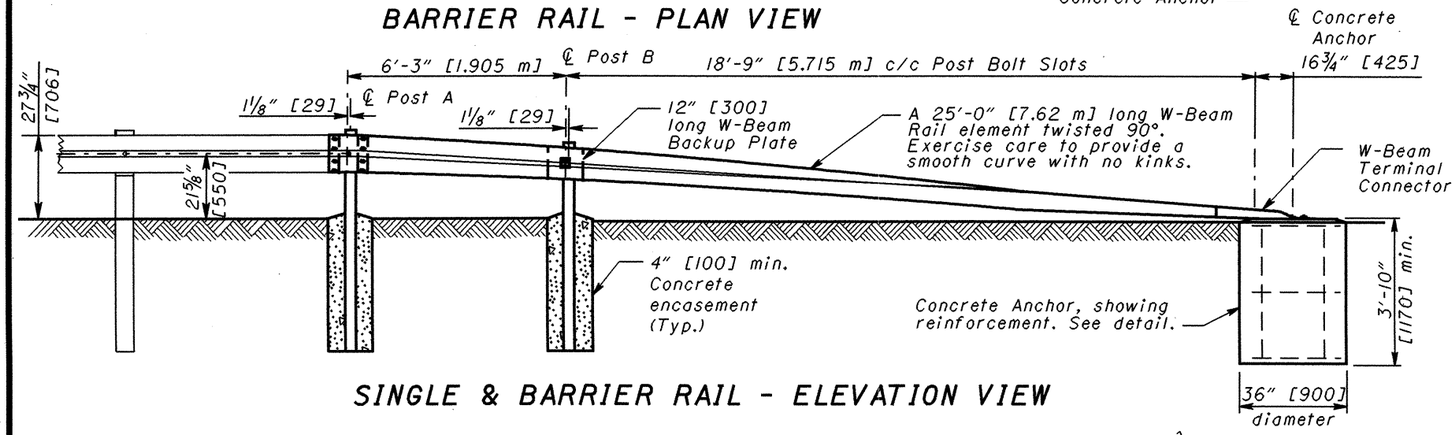
1/1



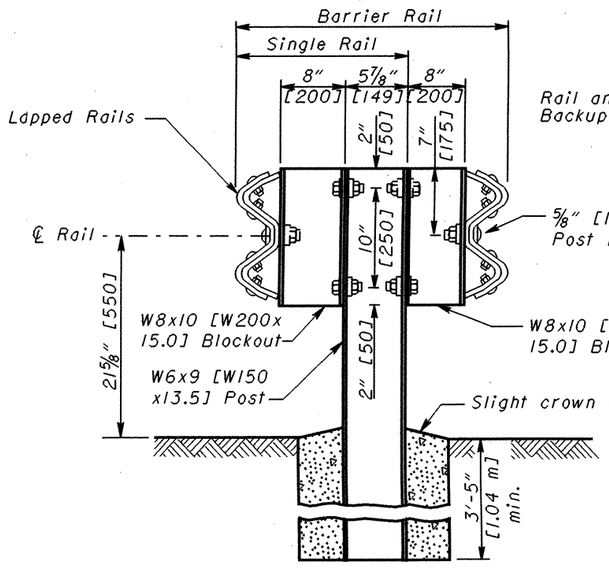
SINGLE RAIL - PLAN VIEW



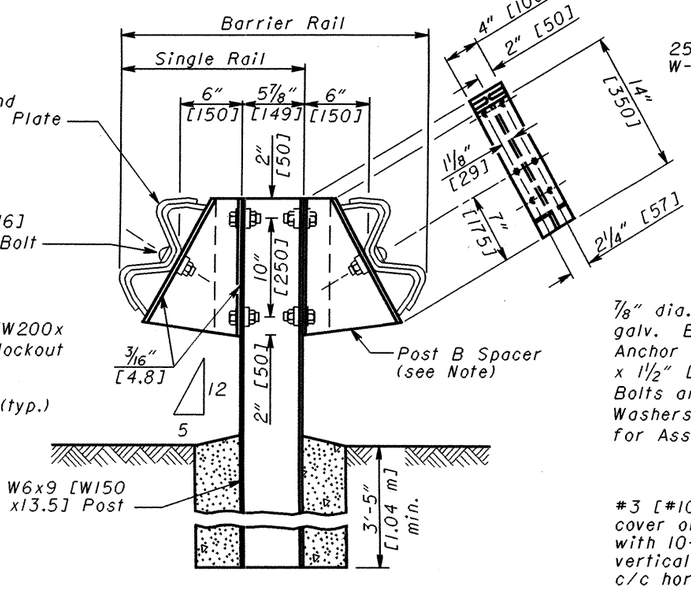
BARRIER RAIL - PLAN VIEW



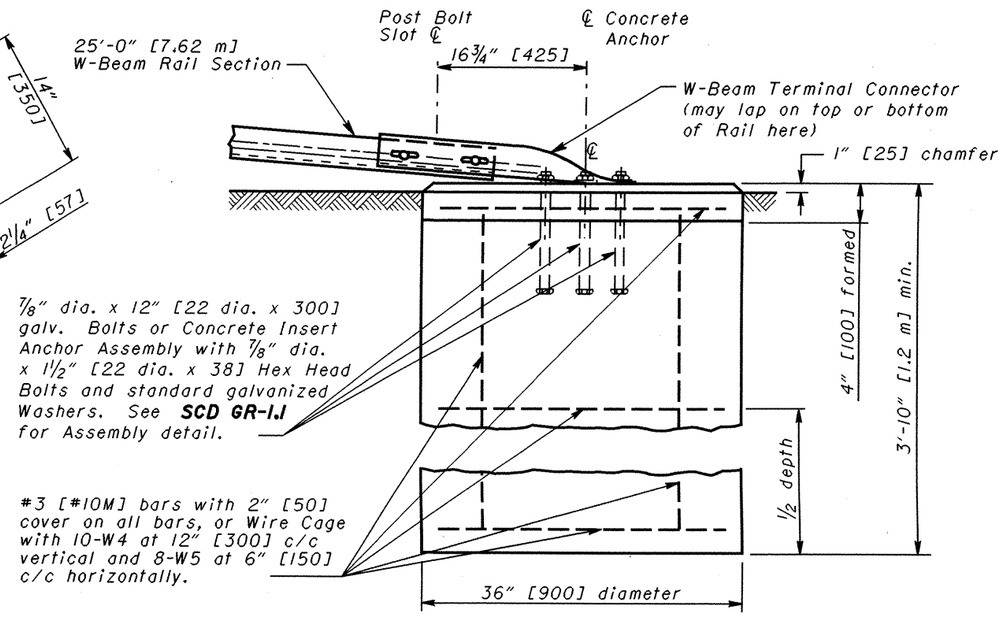
SINGLE & BARRIER RAIL - ELEVATION VIEW



POST A



POST B



CONCRETE ANCHOR

NOTES

APPLICATION: Use the Type A Anchor Assembly outside the clear zone on any roadway. On Non-NHS roadways it may be used in the clear zone, with restrictions. See **Location & Design Manual, Volume 1,** Section 603.

GENERAL: For details not shown, see **SCD GR-1.1** and other Drawings pertaining to specific guardrail type. Galvanize all steel parts.

OFFSETS: See **SCD GR-5.1** for Standard Guardrail Flare. The 18" [450] flare offset from normal face of rail, shown in the plan view (for single rail installations) will be utilized only where shoulder is insufficient for providing standard flares.

POSTS: Steel posts W6x9 [W150x13.5] are shown, but W6x8.5 [W150x12.6] posts are also permitted. See **SCD GR-1.1** for additional embedment details.

SPACERS: Post B Spacers shall be made of 3⁄16" [5] Steel Plate as specified in CMS 710.15 or two sections of W6x9 [W150x13.5] or W8x10 [W200x15.0] cut in the web (see dashed line on POST B Detail) and welded together on both sides.

All steel spacers and posts may be provided with additional bolt holes so that these items will not be required to be made right and left handed.

Spacers shall be fastened to Posts with two ⅝" [16] hex head bolts and nuts with standard washers on both sides.

WASHERS: All washers indicated on this drawing are standard galvanized steel of the appropriate size.

CONCRETE ANCHOR: Form top 4" [100] of anchor and slope the top to conform to slope of the adjacent ground. The 36" [900] diameter anchor may be replaced by a 2'-6" [750] square anchor at the contractor's option.

PAYMENT: Include all materials and labor for the 25'-0" [7.62 m] Single Rail, Type A Anchor Assembly in the unit price bid for **Item 606 - Anchor Assembly, Type A, Each.**

Pay for all materials and labor for the 25'-0" [7.62 m] Barrier Rail under the unit bid price **Item 606 - Anchor Assembly, Barrier Design, Type A, Each.**

THIS DRAWING REPLACES GR-4.1M DATED 11-30-94.

OHIO DEPARTMENT OF TRANSPORTATION — 4-18-03 DATE
STDS. ENGR. D. Focke
ROADWAY DESIGN ENGINEER

All metric dimensions [in brackets []] are in millimeters unless otherwise noted.

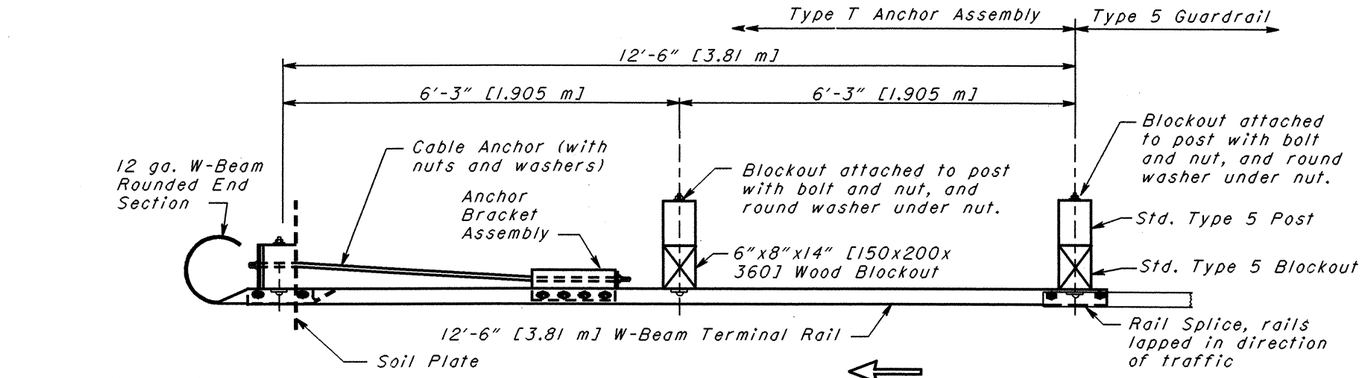
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING

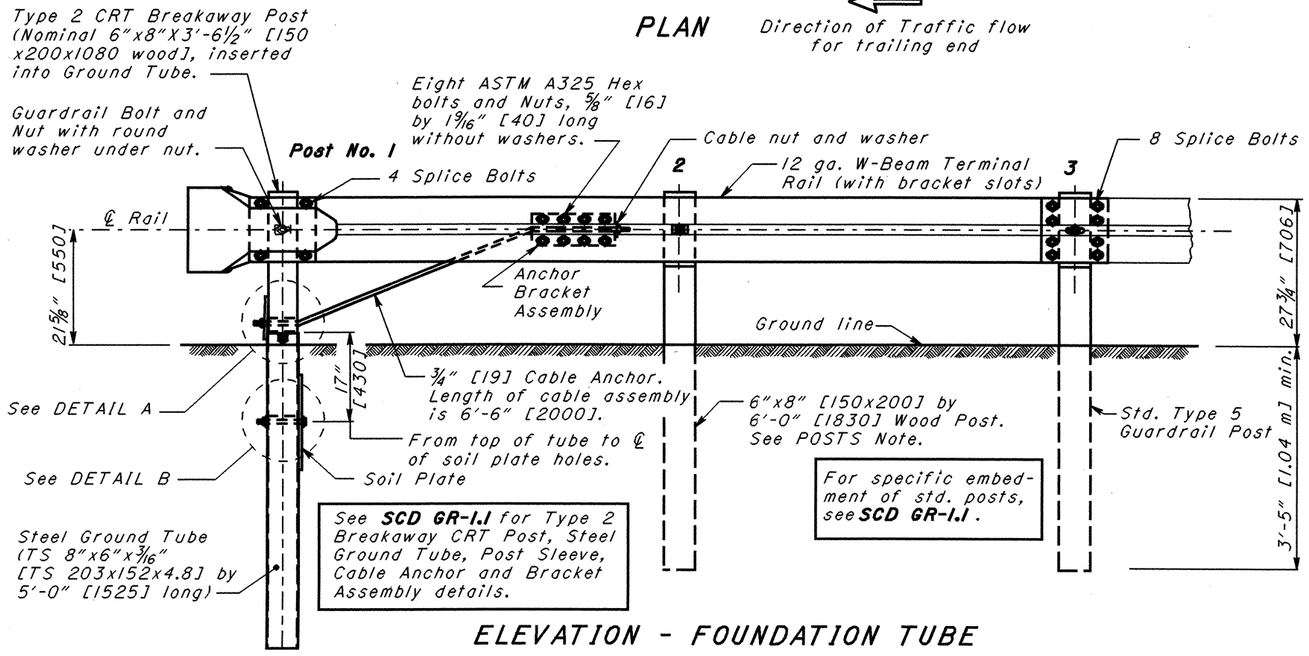
TYPE A ANCHOR ASSEMBLY

NUMBER **GR-4.1**

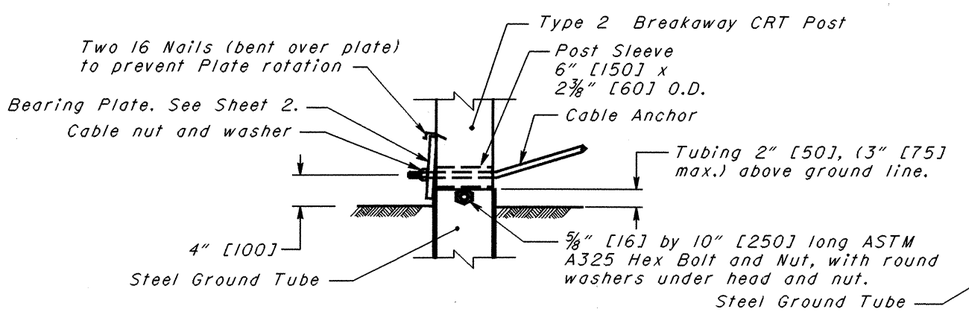
1 / 1



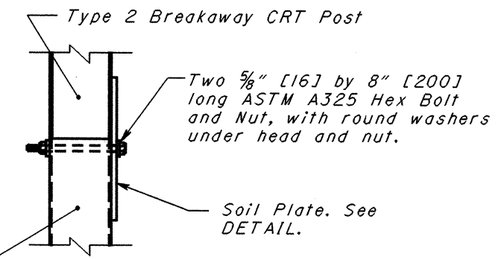
PLAN



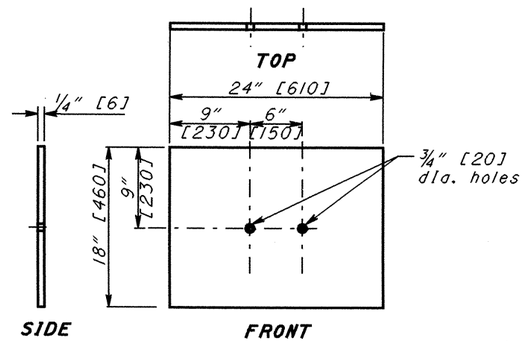
ELEVATION - FOUNDATION TUBE



DETAIL A



DETAIL B



SOIL PLATE DETAIL

NOTES

APPLICATION: Use Type T Anchor Assemblies on the trailing end of guardrail runs, located outside of the clear zone of opposing traffic. The assembly is 12'-6" [3.81] long, none of which can be considered the Length of Need for the guardrail run.

For termination requirements at driveways, see DRIVEWAY OPENING Detail on Sheet 2. For side road approaches and Terminals at Structures, see **Location & Design Manual, Volume 1,** Figure 603-3.

ANCHORING OPTIONS: Contractor may choose either the foundation tube (shown on this Sheet) or the concrete footing option (Sheet 2) to construct this anchor assembly.

If the foundation tube option is chosen, the contractor will take proper care to insure that the Soil Plate fasteners are not broken during the driving process.

Concrete footings may be cast-in-place or precast. Compact fill after placing precast unit.

MATERIALS: See **SCD GR-1.1** for parts used on this anchor, including the CRT Breakaway Posts, Steel Ground Tube, Post Sleeve, Cable Anchor and Bracket Assembly.

Bearing Plate and Soil Plate is ASTM A709 Grade 36. Steel Ground Tube shall be ASTM A500, Grade B, and meet CMS 707.10. All angles, channels and plates shall meet CMS 711.01. All structural steel shall be galvanized as specified in CMS 711.02. All bolt washers indicated are standard galvanized steel of the appropriate size.

Concrete shall be class C.

Components on this anchor that are not detailed on **SCD GR-1.1** include: 1) 12'-6" [3.81 m] W-Beam Terminal Rail (standard part RWM14a), and 2) W-Beam Rounded End Section (RWE03a). For complete details and specifications, see part descriptions in the **AASHTO/AGC/ARTBA Standardized Hardware Guide.**

See **SCD GR-2.1** for Type 5 Guardrail Details.

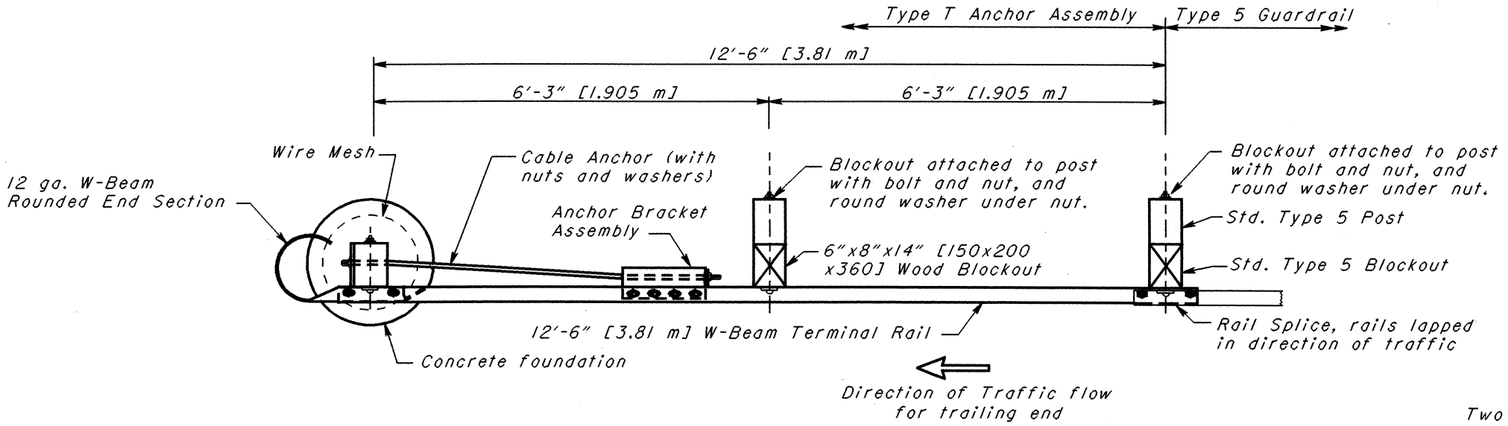
POSTS: Post No. 2 can be W6x9 [W150x13.9] (or W6x8.5 [W150x12.9]) with notched wood blockouts.

Use of alternate posts or recycled plastic blockouts is not permitted.

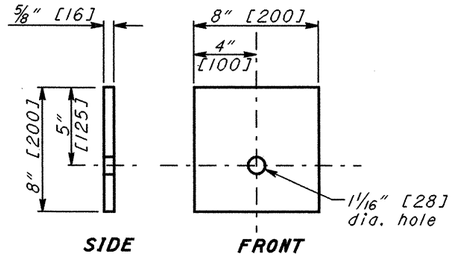
PAYMENT: All labor and materials, including the W-Beam Rounded End Section and the W-Beam Terminal Rail for the 12'-6" [3.81] anchor assembly shall be included in the unit price bid for **Item 606 - Anchor Assembly, Type T, Each.**

THIS DRAWING REPLACES GR-4.2 DATED 4-18-03.

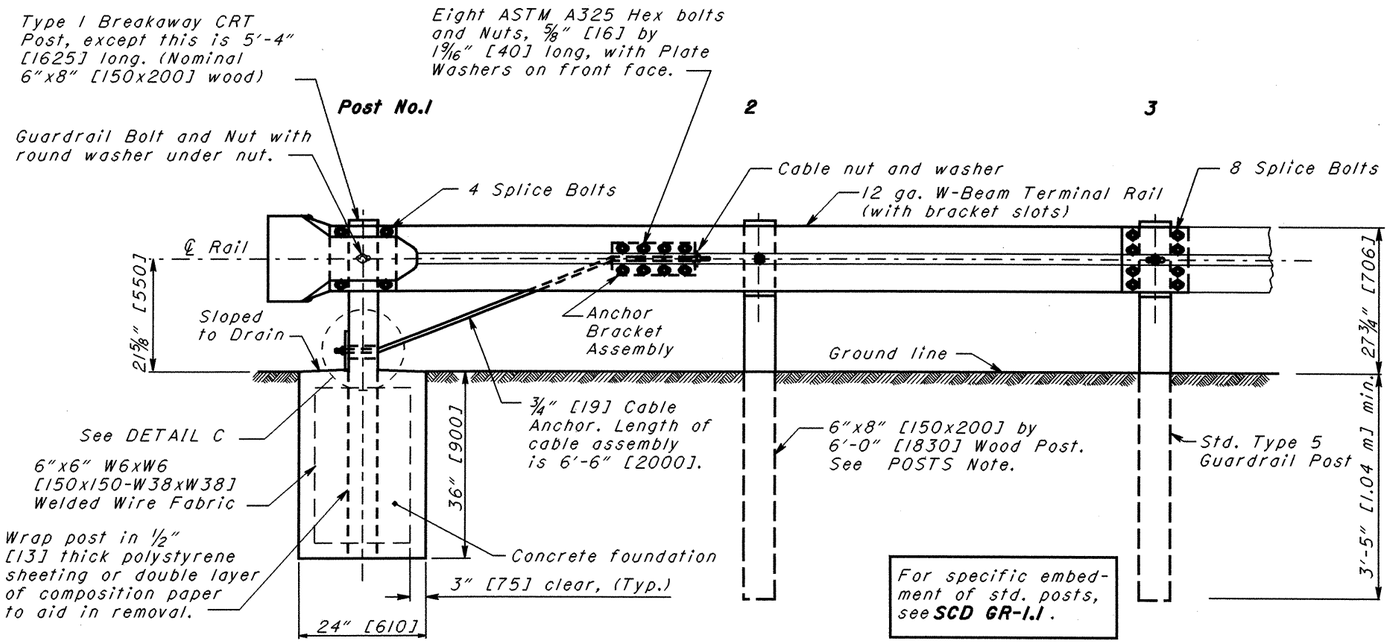
OHIO DEPARTMENT OF TRANSPORTATION — 10-17-03 (DATE)
ROADWAY DESIGN ENGINEER — Larry E. Sutherland
STDS. ENGR. — D. Focke
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.
ROADWAY ENGINEERING SERVICES
STANDARD ROADWAY CONSTRUCTION DRAWING
TYPE T ANCHOR ASSEMBLY (Foundation Tube Option)
NUMBER **GR-4.2**
1 / 2



PLAN

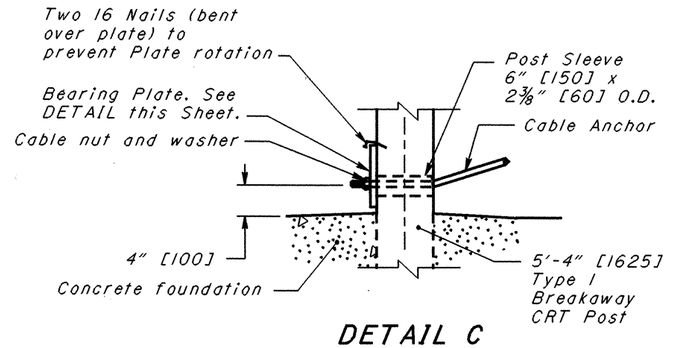


BEARING PLATE DETAIL

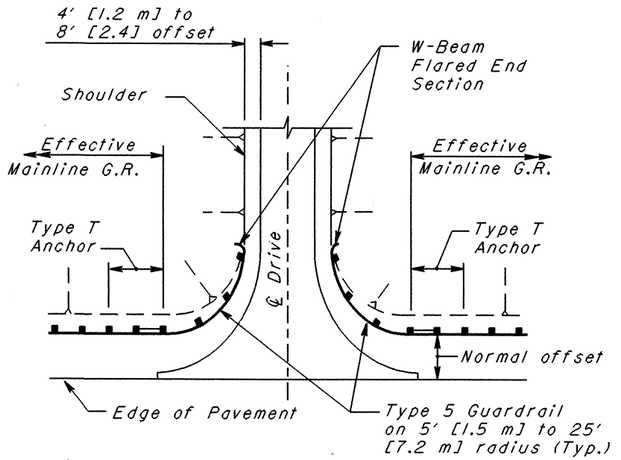


See **SCD GR-1.1** for Type 1 Breakaway CRT Post, Steel Ground Tube, Post Sleeve, Cable Anchor and Bracket Assembly details.

ELEVATION - CONCRETE FOOTER



DETAIL C



DRIVEWAY OPENING

THIS DRAWING REPLACES GR-4.2 DATED 4-18-03.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
10-17-03
DATE

STDS. ENGR.
D. Focke

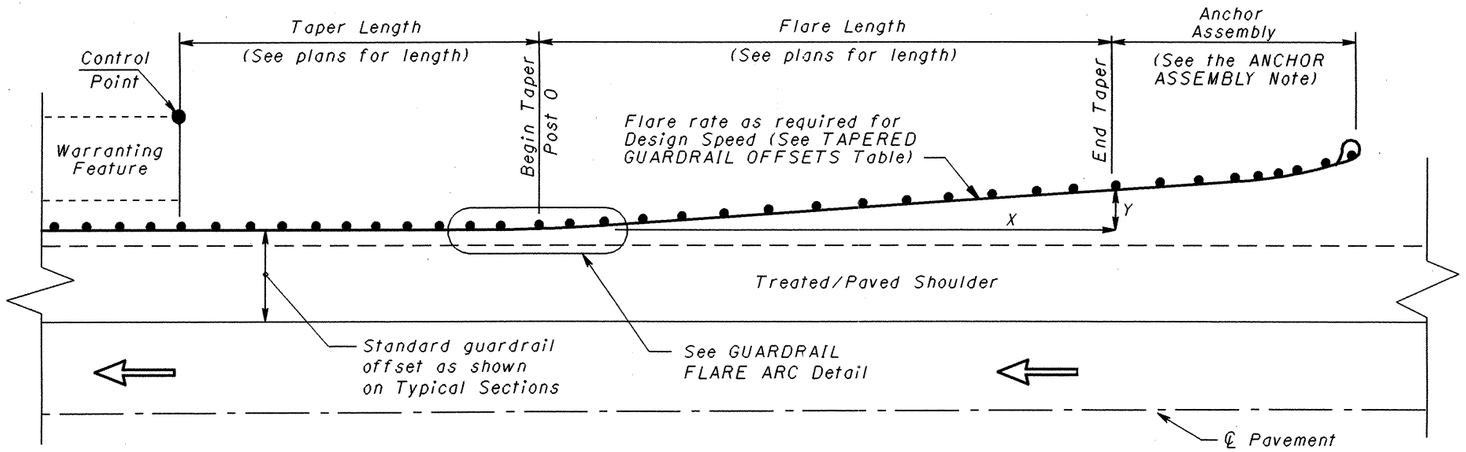
All metric dimensions [in brackets] are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
TYPE T ANCHOR ASSEMBLY
(Concrete Footer Option)

NUMBER
GR-4.2

2/2



STANDARD GUARDRAIL FLARE
(Plan View)

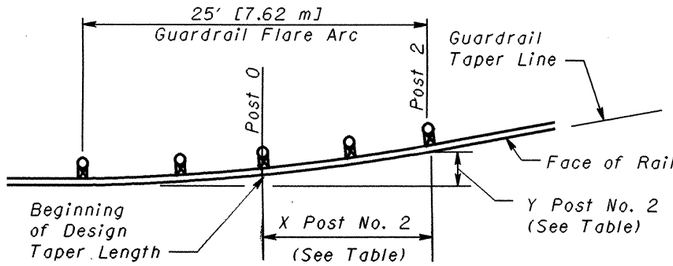
NOTES

STANDARD GUARDRAIL FLARE: Construct the flare shown here when indicated in the construction plans and in conjunction with **SCD GR-5.2.**

FLARE RATES AND OFFSET SPEEDS: Use the Design Speed shown on the plans to determine flare rates and offsets. Where a Design Speed is not shown or available, use the legal posted speed limit.

ANCHOR ASSEMBLY: Use a Type B-98 Anchor Assembly with standard guardrail flares unless otherwise specified. The Type A can be used, with restrictions. See **Location & Design Manual, Volume 1,** Section 603.

CONTROL POINT: The point shown designates the extent of the hazard being protected and is shown for design use only.



GUARDRAIL FLARE ARC DETAIL

TAPERED GUARDRAIL OFFSETS (Feet)

Post No.	Flare Length	45 MPH or less 10:1 Taper		50 MPH 11:1 Taper		55 MPH 12:1 Taper		60 MPH 13:1 Taper		65 MPH 14:1 Taper		70 MPH 15:1 Taper	
		X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
0		0	0.3	0	0.3	0	0.3	0	0.2	0	0.2	0	0.2
2		12.4	1.3	12.5	1.1	12.5	1.0	12.5	1.0	12.5	0.9	12.5	0.8
4	25	24.9	2.5	24.9	2.3	24.9	2.1	24.9	1.9	24.9	1.8	24.9	1.7
6		37.3	3.7	37.3	3.4	37.4	3.1	37.4	2.9	37.4	2.7	37.4	2.5
8	50	49.8	5.0	49.8	4.5	49.8	4.1	49.9	3.8	49.9	3.6	49.9	3.3
10		62.2	6.2	62.2	5.7	62.3	5.2	62.3	4.8	62.3	4.5	62.4	4.2
12	75	74.6	7.5	74.7	6.8	74.7	6.2	74.8	5.7	74.8	5.3	74.8	5.0
14		87.1	8.7	87.1	7.9	87.2	7.3	87.2	6.7	87.3	6.2	87.3	5.8
16	100	99.5	9.9	99.6	9.1	99.7	8.3	99.7	7.7	99.7	7.1	99.8	6.7
18		111.9	11.2	112.0	10.2	112.1	9.3	112.2	8.6	112.2	8.0	112.3	7.5
20	125	124.4	12.4	124.5	11.3	124.6	10.4	124.7	9.5	124.7	8.9	124.7	8.3
22		136.8	13.7	136.9	12.5	137.0	11.4	137.1	10.5	137.1	9.8	137.2	9.1
24	150	149.3	14.9	149.4	13.6	149.5	12.5	149.6	11.5	149.6	10.7	149.7	10.0
26		161.7	16.2	161.8	14.7	161.9	13.5	162.0	12.5	162.1	11.6	162.1	10.8
28	175	174.1	17.4	174.3	15.8	174.4	14.5	174.5	13.4	174.6	12.5	174.6	11.6
30		186.6	18.7	186.7	17.0	186.9	15.6	186.9	14.4	187.0	13.4	187.1	12.5
32	200	199.0	19.9	199.2	18.1	199.3	16.6	199.4	15.3	199.5	14.3	199.6	13.3

All "X" dimensions shown are from the centerline of Post 0 to the centerline of the indicated post along 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.

TAPERED GUARDRAIL OFFSETS (Meters)

Post No.	Flare Length	70 km/h or less 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	
		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	3.80	0.35	3.80	0.32	3.80	0.29	3.80	0.27	3.80	0.25
4	7.62	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
8	15.24	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
12	22.86	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
16	30.48	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
20	38.10	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
24	45.72	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
28	53.34	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
32	60.96	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 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.

THIS DRAWING REPLACES GR-5.1M DATED 4-21-95.

OHIO DEPARTMENT OF TRANSPORTATION
Paul F. Sutherland 4-18-03
ROADWAY DESIGN ENGINEER — DATE

STDS. ENGR. D. Focke

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

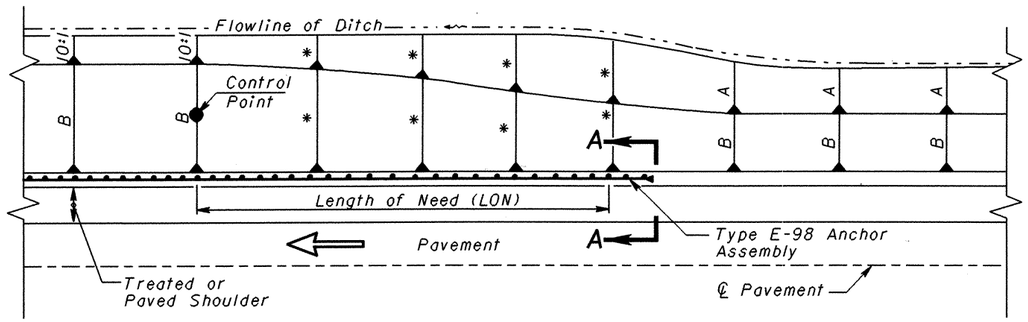
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING

GUARDRAIL FLARE DETAILS

NUMBER GR-5.1

1 / 1



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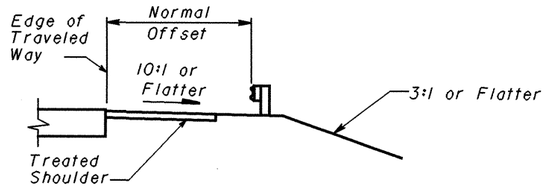
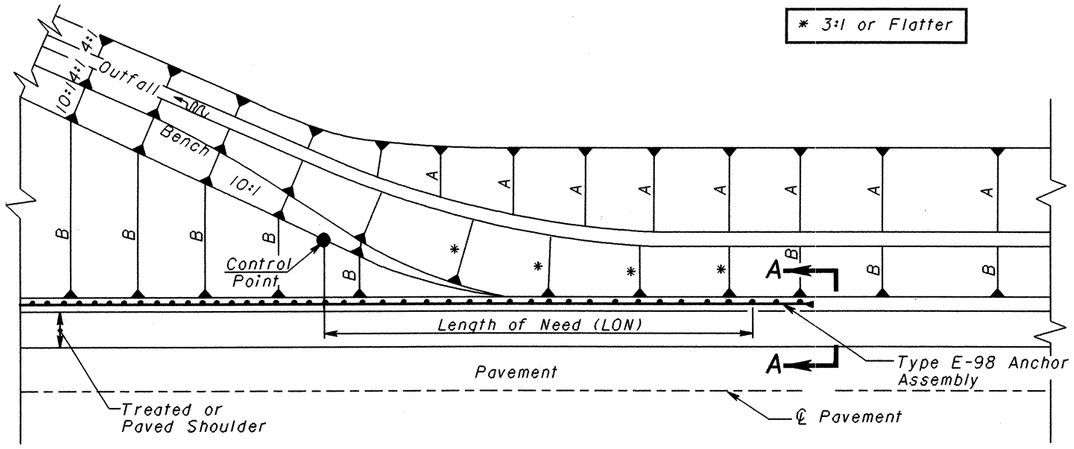


SECTION A-A



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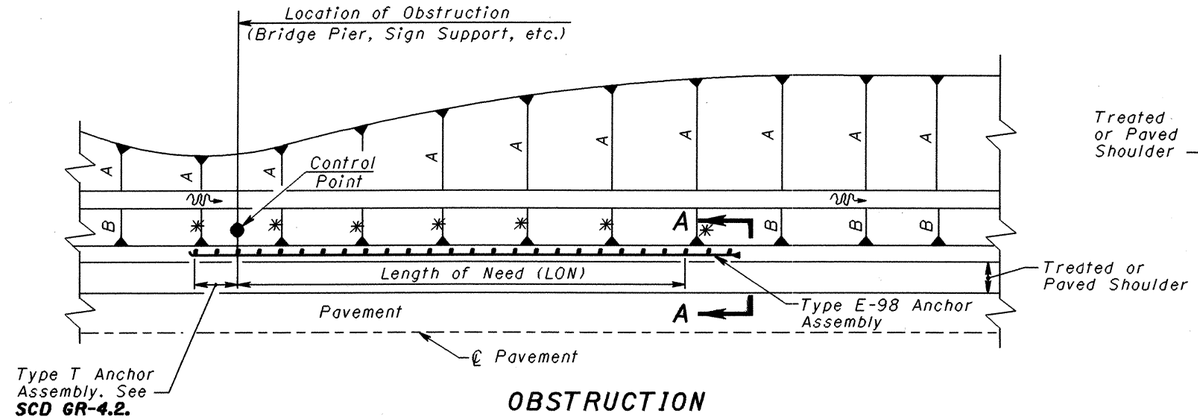


OBSTRUCTION

NOTES

APPLICATION: *Utilitize details shown here only where approach foreslopes are steeper than 6:1, but not steeper than 3:1.*

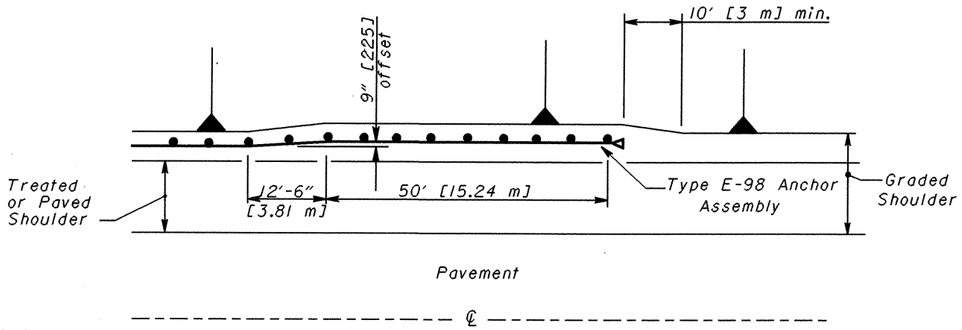
SLOPES: *Slopes designated by * shall be 3:1 or flatter. Slopes labeled "A" and "B" shall be constructed as specified in the plans.*

"LON" DISTANCE: *The Length of Need, LON, represents the distance from the control point to the beginning of the end treatment. The control point shown designates the extent of the hazard being shielded and is shown for design use only. See* ***Location & Design Manual, Volume 1,*** *Section 602.*

GUARDRAIL END TERMINALS: *Terminals utilized for the situations shown here shall be Type E-98 Anchor Assemblies unless otherwise specified in the plans.*

OBSTRUCTION INSTALLATION: *Use this installation for one-directional roadways only.*

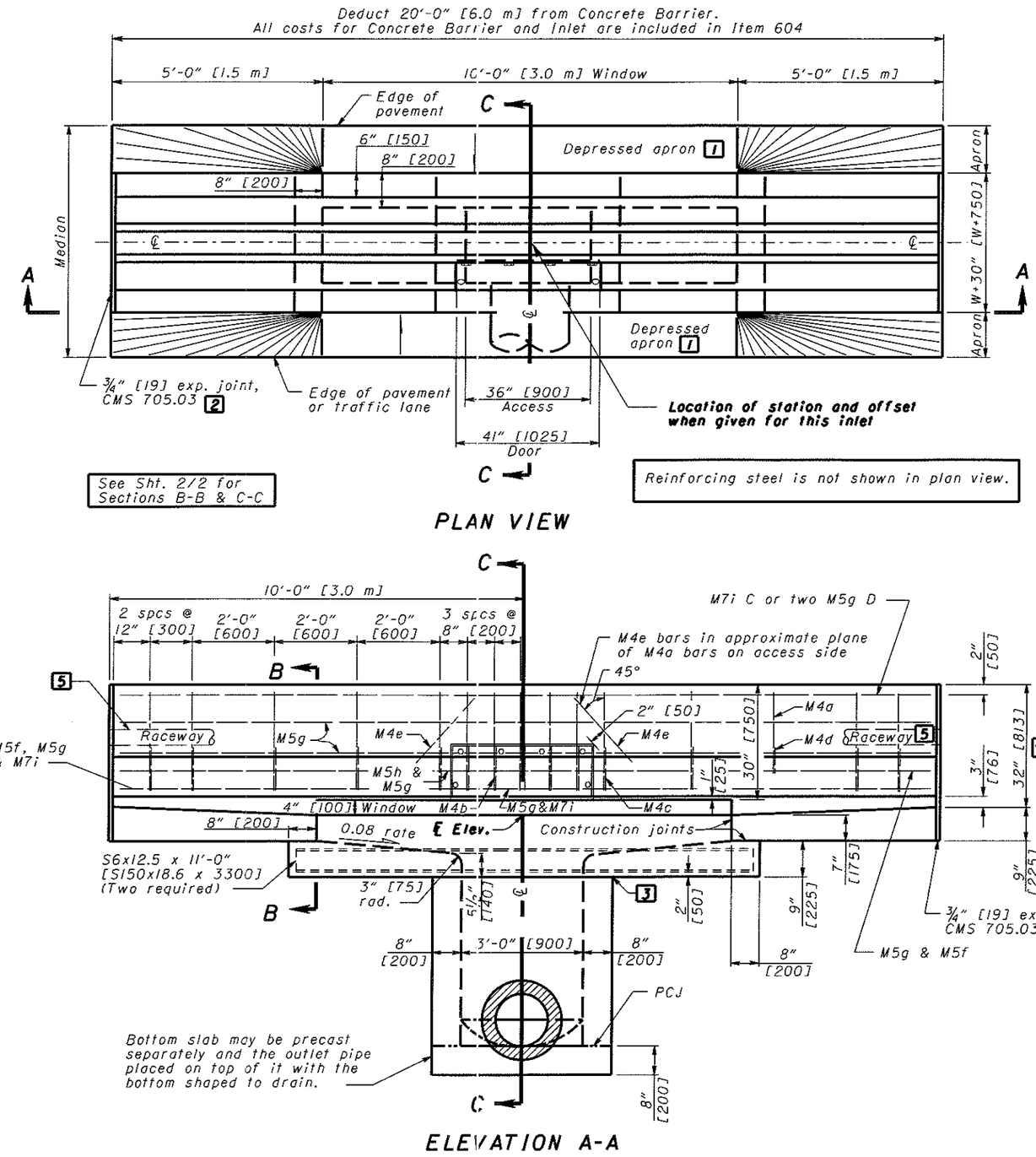
OFFSET DESIGN: *The design shown may be specified on the plans where it is deemed detrimental to lose effective shoulder width due to the dimensions of the Type E-98 Anchor Assembly. The Type E-98 which represents the final 50' [15.24 m] of guardrail is to be offset an additional 9" [225] from the normal guardrail offset by tapering within the 12'-6" [3.81 m] shown below. The graded shoulder width shall be increased 9" [225] and tapered back to the normal width to 10' [3 m] as shown.*



OFFSET DESIGN
(Plan View)

THIS DRAWING REPLACES GR-5.3 DATED 4-18-03.

OHIO DEPARTMENT OF TRANSPORTATION — 1-16-04 DATE
ROADWAY DESIGN ENGINEER
STDS. ENGR. D. Focke
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.
ROADWAY ENGINEERING SERVICES
STANDARD ROADWAY CONSTRUCTION DRAWING
INTRODUCTION OF GUARDRAIL RUNS
Foreslope steeper than 6:1
NUMBER GR-5.3
1 / 1



NOTES

GENERAL: For details of concrete barriers, see **SCD RM-4.3.**

WALLS: The walls between the bottom slab and the upper permissible construction joint may be built of brick, concrete block or cast-in-place concrete, 8" [200] nominal thickness for depths of 12' [3.5 m] or less. Precast walls shall have a minimum thickness of 6" [150] and be reinforced sufficiently to permit shipping and handling without damage.

HEIGHT: When placed in 50" [1270] high barrier the 30" [763] height shall be made 48" [1220].

CONCRETE: Cast-in-place concrete is to be Class C. All precast concrete shall meet the requirements of CMS 706.13. Required markings shall include the inlet number. Exposed concrete surfaces of the barrier shall be sealed with an approved sealer.

REINFORCING STEEL: Reinforcing steel shall be epoxy coated in accordance with CMS 509.09.

STEPS: Steps shall be in accordance with **SCD MH-1.1.**

INLETS OVER 12 FEET [3.5 m] IN DEPTH: Such inlets shall be precast or cast-in-place concrete; reinforced with #4 [#13M] bars on 12" [300] centers both vertically and horizontally with 2" [50] clearance from the inside wall face.

OPENINGS: Pipe openings shall be the outside diameter of the pipe being supplied plus 2" [50] when fabricated or field cut. The interstitial space shall be filled with grout per CMS 601.

ACCESS DOOR: The steel door, frame and all inserts, shall be galvanized. The hex head bolts shall be stainless steel. (See ACCESS DOOR DETAIL, Sht. 2/2).

PCJ: Permissible Consiruction Joint.

STANDARD INLET NUMBERS

I-3C Type A	(32" [813] Barrier with W=6" [150])
I-3C Type A1	(50" [1270] Barrier with W=6" [150])
I-3D Type B	(32" [813] Barrier with W=12" [300])
I-3D Type B1	(50" [1270] Barrier with W=12" [300])

LEGEND

1. Aprons on both sides of the inlet shall be sloped toward windows and filled with Class C concrete. On superelevated sections, the aprons shall be sloped as shown in SECTION C-C on Sht. 2/2. Cost of any pavement removal and material is included in Item 604.
2. A 1½" [38] minimum exp. joint shall be provided in concrete pavement or concrete shoulders.
3. Inlet top profile shall match the adjacent concrete median barrier profile by constructing the top surface of the base to match the median barrier profile.
4. Barrier height equals either 32" [813] or 50" [1270].
5. 4" [100] Lighting raceway, if required else where by the plans. (Only when W=12" [300].)

OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES

DATE
7-20-01
7-19-02

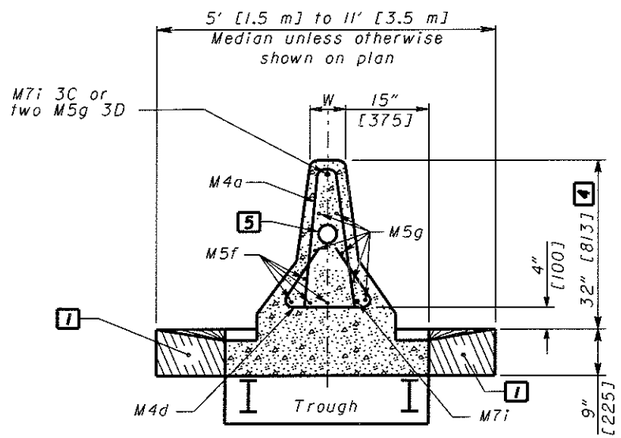
HYDRAULIC ENGINEER
D. Gruver

All metric dimensions [in brackets] are in millimeters unless otherwise noted.

OFFICE OF STRUCTURAL ENGINEERING

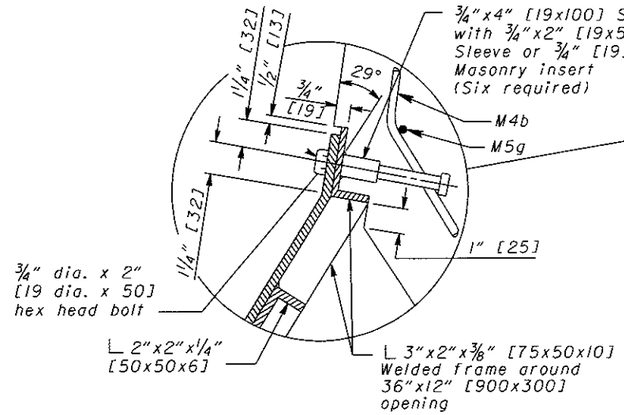
STANDARD HYDRAULIC CONSTRUCTION DRAWING
BARRIER MEDIAN INLETS 3C & 3D

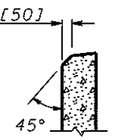
NUMBER
I-2.2



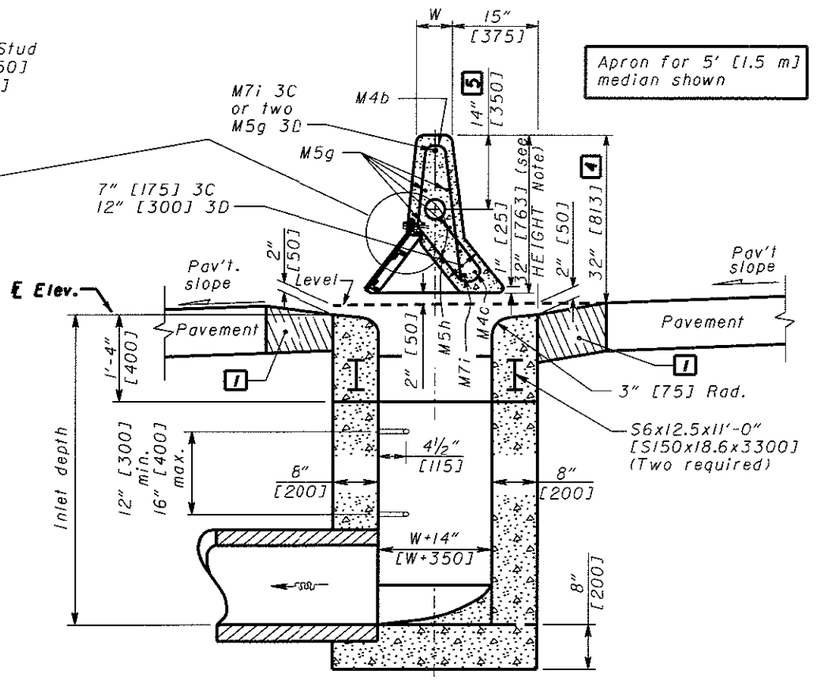
SECTION B-B
(See Sht. 1/2)

See Sheet 1 of 2 for NOTES and LEGEND

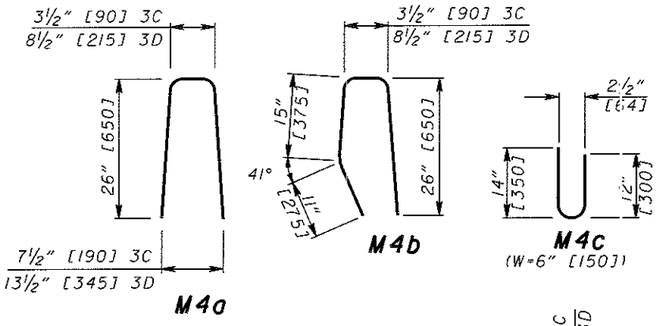


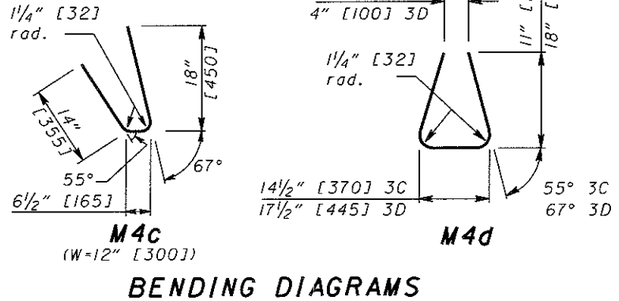


ALTERNATE SPILLWAY SHAPE

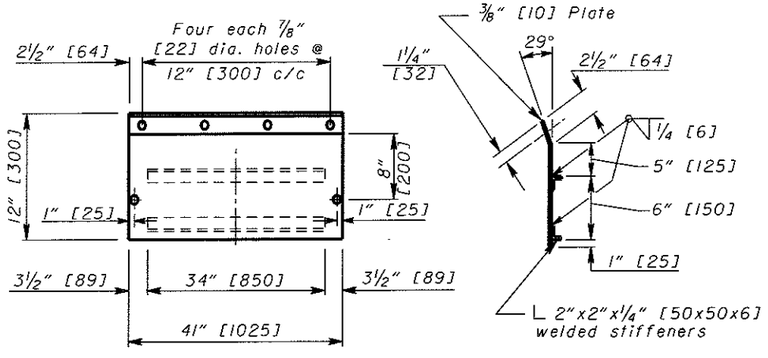


SECTION C-C
(See Sht. 1/2)





BENDING DIAGRAMS

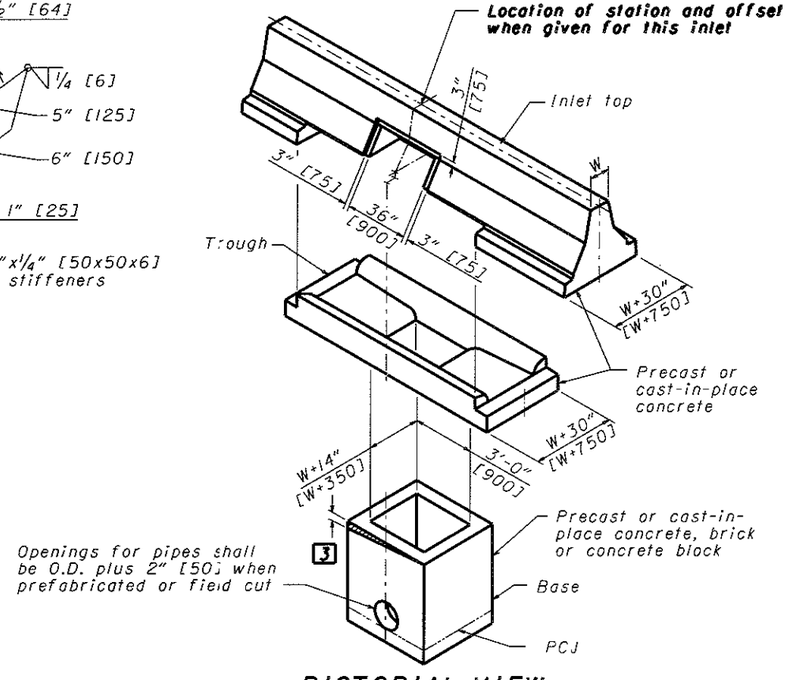


ACCESS DOOR DETAIL

REINFORCING STEEL LIST

SIZE	BAR	1-3C W=6" [W=150] Ea.	1-3C W=6" [W=150] Length	1-3D W=12" [W=300] Ea.	1-3D W=12" [W=300] Length
#4 [#13M]	M4a	10	4'-6" [1370]	10	5'-0" [1525]
	M4b	5	4'-6" [1370]	5	5'-0" [1525]
	M4c	5	2'-4" [710]	5	3'-2" [965]
	M4d	10	3'-1" [940]	10	4'-6" [1370]
	M4e	2	2'-0" [610]	2	2'-0" [610]
#5 [#16M]	M5f	8	8'-2" [2490]	8	8'-2" [2490]
	M5g	6	19'-8" [5995]	8	19'-8" [5995]
	M5h	1	5'-0" [1525]	1	5'-0" [1525]
#7 [#22M]	M7i	2	19'-8" [5995]	1	19'-8" [5995]
S6x12.5 [S150x18.6]		2	11'-0" [3300]	2	11'-0" [3300]

Included for estimating purposes only. The cost of furnishing and placing all reinforcing steel shall be included in Item 604 for payment.



Openings for pipes shall be O.D. plus 2" [50] when prefabricated or field cut

PICTORIAL VIEW

OHIO DEPARTMENT OF TRANSPORTATION
Tim Keller
ENGINEER OF BRIDGES

DATE
7-20-01
7-19-02

HYDRAULIC ENGINEER
D. Gruver

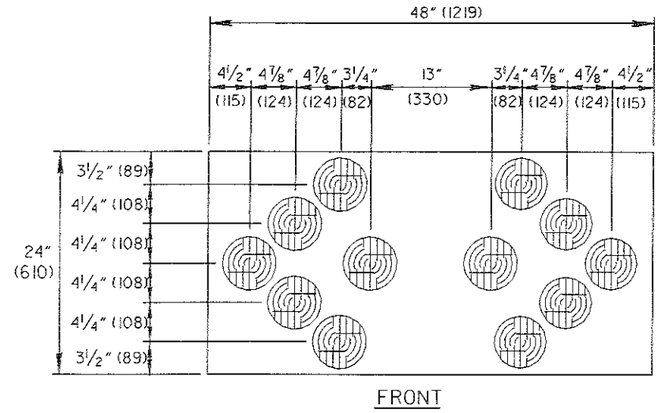
All metric dimensions [in brackets] are in millimeters unless otherwise noted.

OFFICE OF STRUCTURAL ENGINEERING

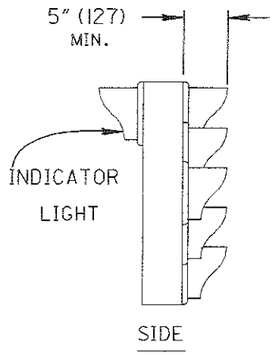
STANDARD HYDRAULIC CONSTRUCTION DRAWING
BARRIER MEDIAN INLETS 3C & 3D

NUMBER
1-2.2

2/2

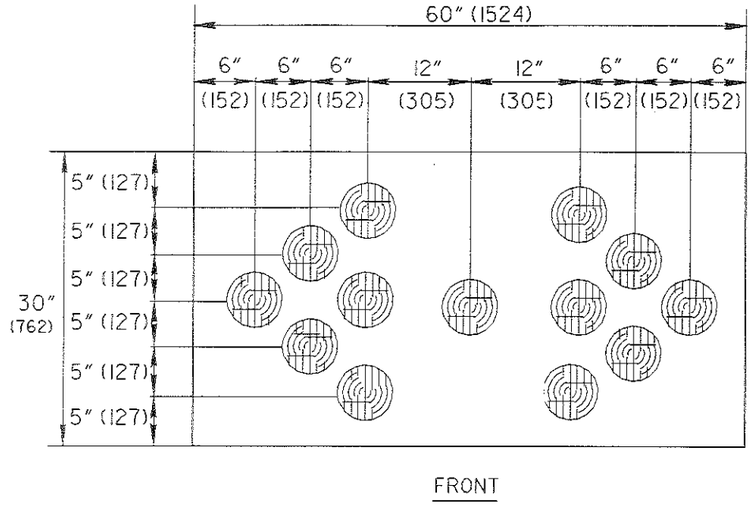


FRONT



SIDE

TYPE A PANEL



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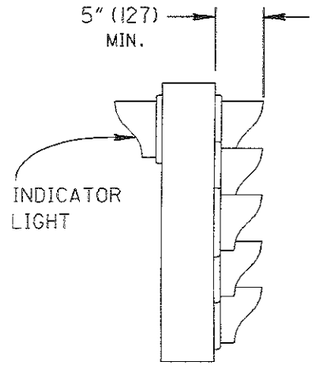
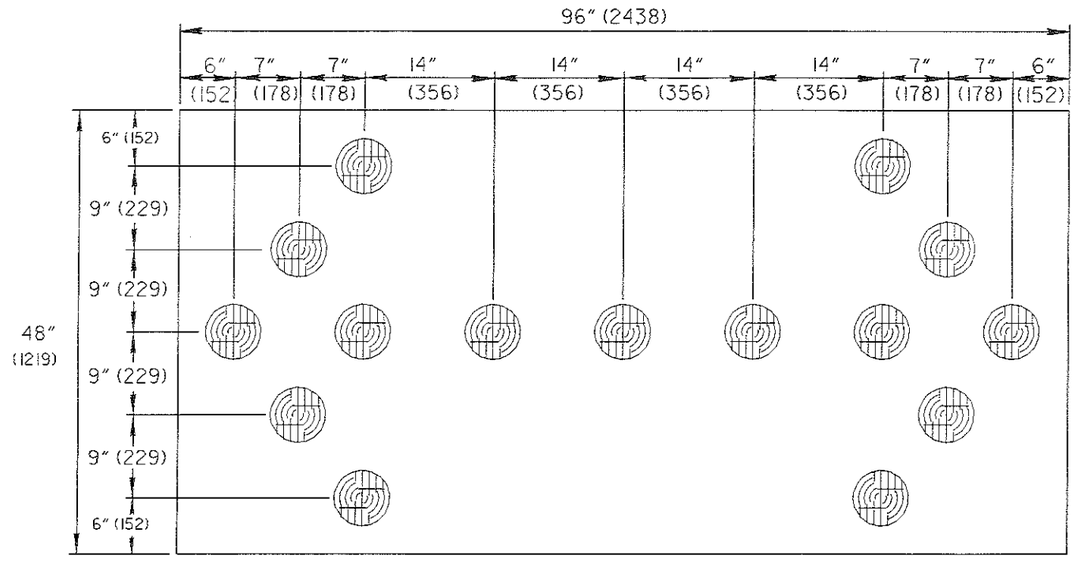
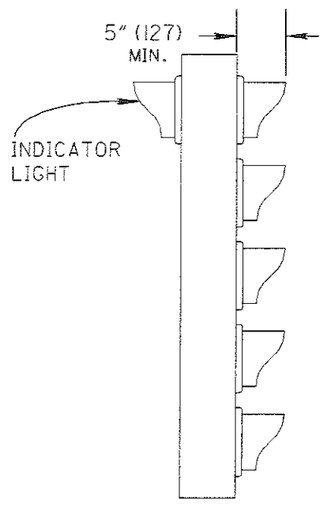


SIDE

TYPE B PANEL



FRONT



SIDE

TYPE C PANEL

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

4-20-01

FLASHING ARROW PANEL

OFFICE OF TRAFFIC ENGINEERING

MT-35.10

FLASHING ARROW PANEL

The flashing arrow panel shall consist of the following components:

A. flasher panel

B. lamps

C. controls

D. power supply

E. mounting

A. Flasher panel

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

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

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

B. Lamps

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

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

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

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

CANDLE POWER CHART

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

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

Figure 1

C. Controls

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

1. Flasher control

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

2. Dimmer control

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

D. Power supply

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

D. Cont.

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

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

E. Mounting

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

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

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

Use and operation

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

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

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

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

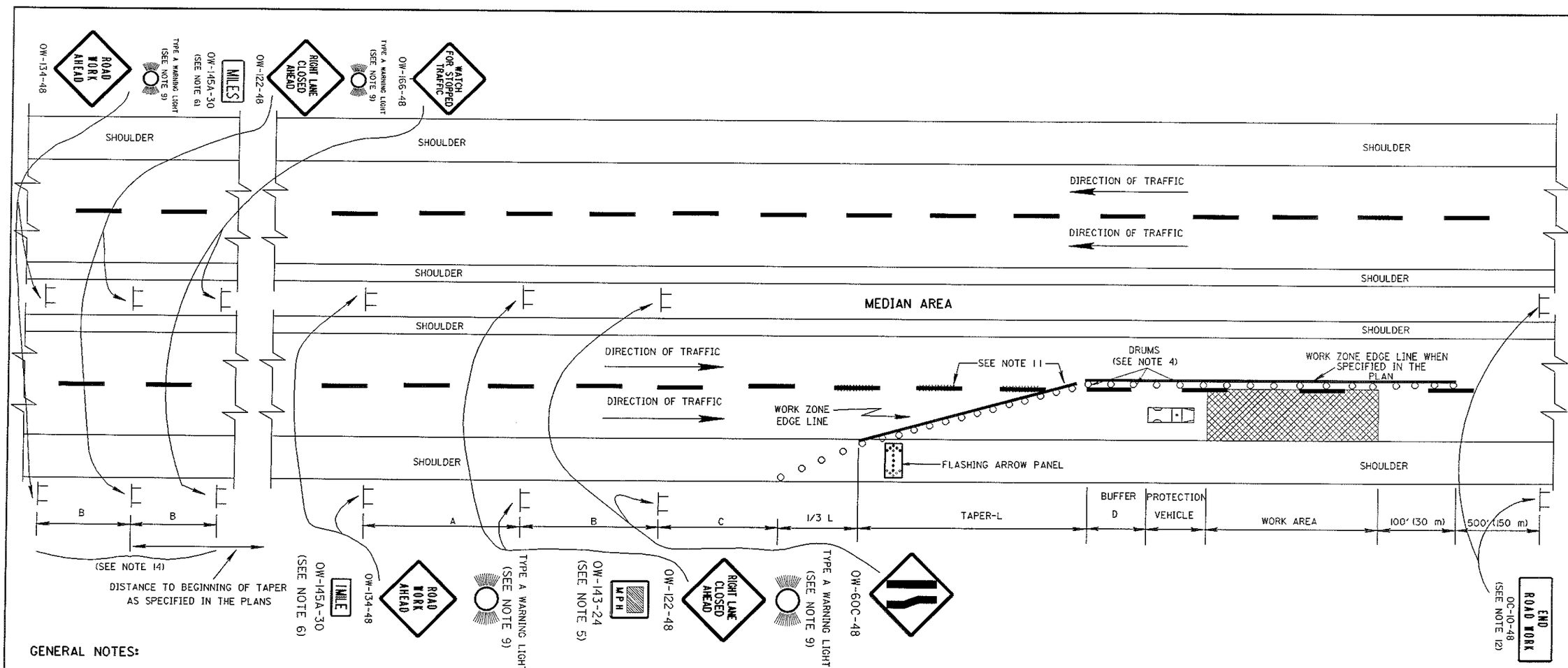
Flashing arrow panels are not to be used on two lane-two way roadways.

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

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

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

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



GENERAL NOTES:

1. The location of the merging taper and the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.
2. The spacing between proposed signs should be adjusted to not conflict with and to provide a minimum of 200 ft (60 m) clearance to existing signs.
3. The taper length (L) and spacing (s) of drums shall conform to table II. Drum spacing (s) shall be used for the merging taper, the buffer area and for the first 1000 ft (300 m) of the work area and at other hazardous locations as directed by the engineer. The maximum drum spacing for the balance of the work area is to be two times the spacing (s) in table II. A minimum of 5 drums shall be used to close the shoulder.
4. Cones having a minimum height of 28 inches (0.7 m) may be substituted for drums for daytime lane closures. Provisions shall be made to safely stabilize the cones to prevent them from blowing over. If this cannot be achieved, drums shall be used.
5. The advisory speed sign OW-143 shall be used when specified in the plan.
6. The distance plate OW-145A shall indicate the distance to the beginning of the merging taper (L). Distances less than one mile may be expressed in feet. The plaque may be omitted if extra advance sign groups are not used.
7. The protection vehicle, located close to the work, shall be in place and unoccupied whenever workers are in the work area. This vehicle shall be removed from the pavement whenever workers are not in the work area. The vehicle shall be equipped with a 360 degree rotating or flashing amber beacon clearly visible a minimum of ¼mile (400 m). Other protective devices may be used in lieu of the protection vehicle shown when approved by the Engineer.
8. The flashing arrow panel shall meet the requirements of Standard Construction Drawing MT-35.10.
9. Type A flashing warning lights shown on the OW-134 and OW-122 (123) signs are required whenever a night lane closure is necessary
10. When work is being performed in the lane adjacent to the median on a divided highway, OW-123 signs shall be substituted for the OW-122 signs and OW-60D signs shall be substituted for the OW-60C signs.
11. If the construction operation requires the lane closure for more than one day then the existing conflicting pavement markings and reflectors from the raised pavement markers (RPMs) shall be removed and the appropriate color work zone edge line shall be applied along the taper. Work zone edge lines which would conflict with final traffic lanes shall be removable (740.06 type I) tape unless the area will be resurfaced in the next work phase. After completion of the work, pavement markings other than 740.06 type I shall be removed in accordance with 641.10. The original markings and raised pavement marker reflectors shall be restored at no additional cost.
12. The OC-10 signs are only required for lane closures of more than one day and may be omitted if they fall within the limits of a construction project.
13. OW-134 signs shall be provided on entrance ramps and/or side roads located within the work limits or the advance warning sign group. Within the length of closure, provision shall be made to control traffic entering from intersecting streets and driveways. Three drums shall be placed on each side across the closed lane at each intersection and driveway.
14. Extra advance warning sign groups consisting of OW-134, OW-122 and OW-166 signs plus distance plates may be specified in the plans or required to be erected at the direction of the Engineer.
15. All material and equipment shall be removed from the closure and the work area when no work is being done.
16. The speed limit chosen for design of tapers shall be the normal legal speed except where the legal speed limit is reduced due to the construction and the subject lane closure is not the first active construction area encountered by traffic within the project.
17. This drawing should be used on projects with dropoffs less than 5" in the work area. Projects with dropoffs greater than 5" in the work area should refer to MT-95.40 or MT-95.41.

TABLE I

MINIMUM DISTANCE FT (METERS)	A	B	C
MAJOR STANDARD	500 (150)	500 (150)	500 (150)
FREEWAY & EXPRESSWAY	2600 (780)	1600 (480)	1000 (300)

TABLE II

NORMAL SPEED LIMIT (MPH)	MINIMUM TAPER (L) FT (m)	MAXIMUM SPACING (S) OF DRUMS FT (m)	BUFFER (D) FT (m)
30-40	320 (98)	30 (9)	170 (52)
45-55	660 (201)	40 (12)	335 (102)
60-65	780 (238)	60 (18)	485 (148)

04-19-02

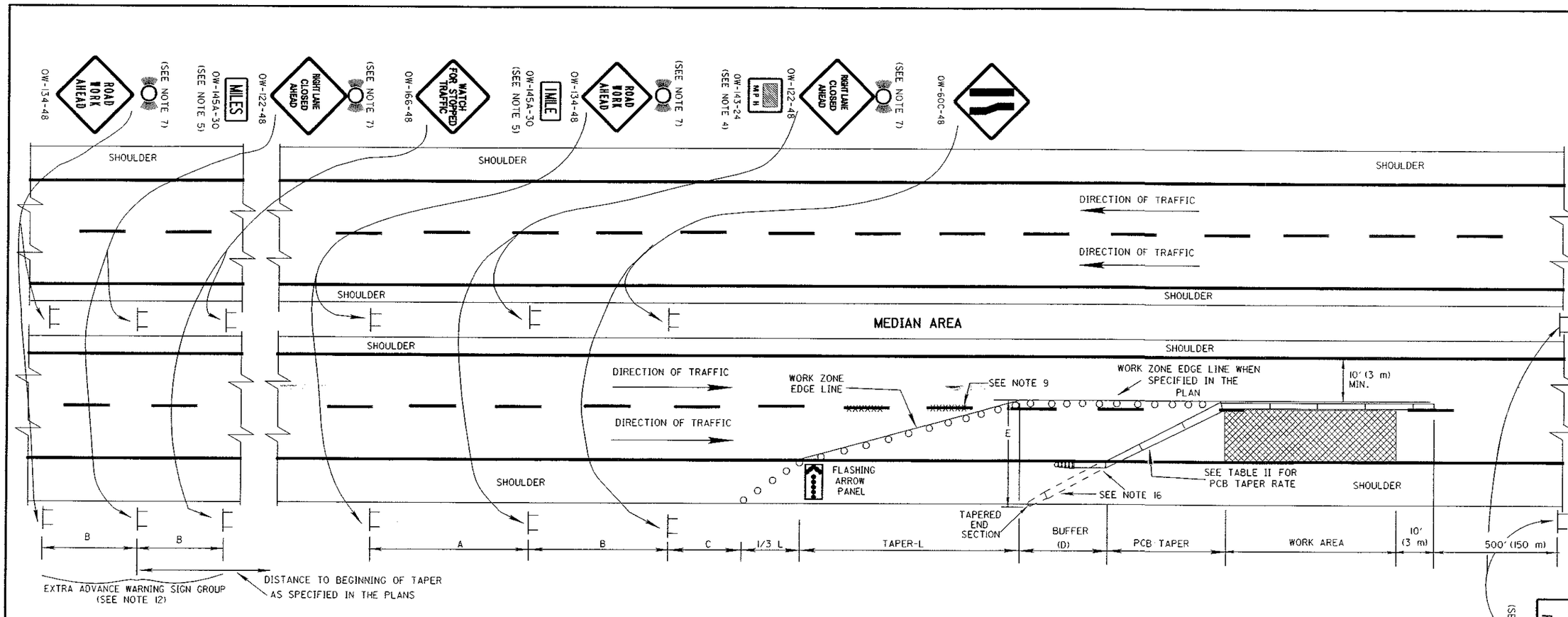
CLOSING RIGHT OR LEFT LANE OF A MULTI-LANE DIVIDED HIGHWAY WITH DRUMS

OFFICE OF TRAFFIC ENGINEERING

MT-95.30

1 / 1

JAM



GENERAL NOTES:

1. The location of the merging taper and the Advance Warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

2. The spacing between proposed signs should be adjusted to not conflict with and to provide a minimum of 200 ft (60 m) clearance to existing signs.

3. The taper length (L) and spacing (S) of drums shall conform to table II. Drum spacing (s) shall be used for the merging taper and the buffer area. A minimum of 5 drums shall be used to close the shoulder.

4. The advisory speed sign OW-143 shall be used when specified in the plan.

5. The distance plate OW-145A shall indicate the distance to the beginning of the merging taper (L). Distances less than one mile may be expressed in feet. The plaque may be omitted if extra advance sign groups are not used.

6. The flashing arrow panel shall meet the requirements of Standard Construction Drawing MT-35.10.

7. Type A flashing warning lights shown on the OW-134 and OW-122 (123) signs are required.

8. When work is being performed in the lane adjacent to the median on a divided highway, OW-123 signs shall be substituted for the OW-122 signs and OW-600 signs shall be substituted for the OW-60C signs.

9. The existing conflicting pavement markings and reflectors from the raised pavement markers (RPMs) shall be removed and the appropriate color work zone edge line shall be applied along the taper. Work zone edge lines which would conflict with final traffic lanes shall be removable (740.06 Type-I) tape unless the area will be resurfaced in the next work phase. After completion of the work, pavement markings other than 740.06, Type I shall be removed in accordance with 641.10. The original markings and raised pavement marker reflectors shall be restored at no additional cost.

10. The OC-10 signs may be omitted if they fall within the limits of a construction project.

11. OW-134 signs shall be provided on entrance ramps and/or side roads located within the work limits or the advance warning sign group. Within the length of closure, provision shall be made to control traffic entering from intersecting streets and driveways. Three drums shall be placed across the closed lane at each intersection and driveway.

12. Extra advance warning sign groups consisting of OW-134, OW-122 and OW-166 signs plus distance plates may be specified in the plans or required to be erected at the direction of the Engineer.

13. The speed limit chosen for design of tapers shall be the normal legal speed except where the legal speed limit is reduced due to the construction and the subject lane closure is not the first active construction area encountered by traffic within the project.

14. No equipment or material shall be located other than behind the PCB.

15. This standard drawing shall be used with standard drawing MT-101.70.

16. A taper end section may be used in place of the impact attenuator at locations where the last full section of PCB can be extended outside of the clear zone for approaching traffic. See TABLE II for clear zone widths.

17. This standard drawing should be used in projects with Drop-Offs in the work area that are 5" or greater.

TABLE I

MINIMUM DISTANCE FT (m)	A	B	C
MAJOR STANDARD	500 (150)	500 (150)	500 (150)
FREEWAY & EXPRESSWAY	2600 (780)	1600 (480)	1000 (300)

LEGEND

DRUMS
PORTABLE CONCRETE BARRIER (PCB)
REMOVE EXISTING MARKINGS
ATTENUATOR
OPTIONAL TREATMENT

TABLE II

SPEED LIMIT (MPH)	MINIMUM DRUM TAPER (L) FT (m)	MAXIMUM SPACING (S) OF DRUMS FT (m)	PCB TAPER RATE	BUFFER (D) FT (m)	CLEAR ZONE WIDTH (E) FT (m)
30-40	320 (98)	30 (10)	11 : 1	170 (52)	15 (5)
45-55	660 (201)	40 (12)	16 : 1	335 (102)	23 (7)
60-65	780 (238)	60 (18)	19 : 1	485 (148)	30 (9)

CLOSING RIGHT OR LEFT LANE OF A MULTI-LANE DIVIDED HIGHWAY WITH PORTABLE CONCRETE BARRIER

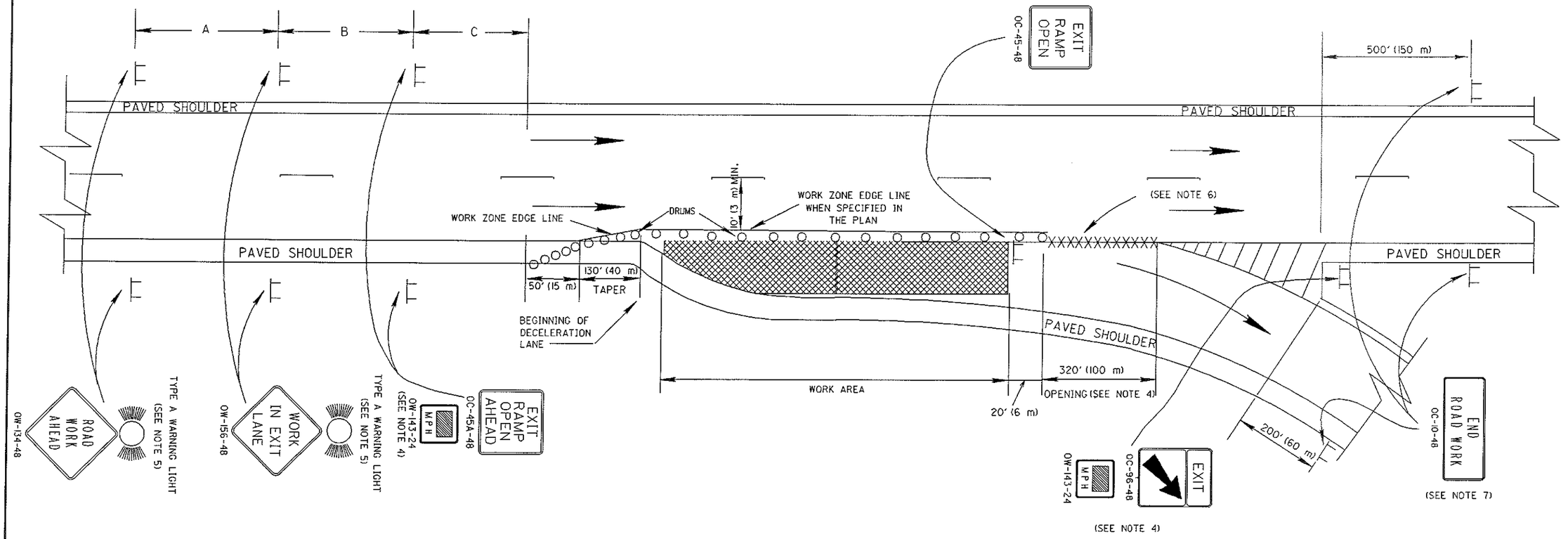
07-18-03

OFFICE OF TRAFFIC ENGINEERING

MT-95.40

1 / 1

JAM



GENERAL NOTES:

1. The location of the Advance Warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

2. The spacing between proposed signs should be adjusted to not conflict with and to provide a minimum of 200' (60 m) clearance to existing signs, except the OW-96-48 sign which may be adjacent to the GF sign in the gore.

3. Along the closure drums shall be spaced at 20' (6 m) center to center. A minimum of 5 drums shall be used to close the shoulder. Cones having a minimum height of 28" (0.7 m) may be substituted for drums for daytime lane closures. Provisions shall be made to safely stabilize the cones to prevent them from blowing over. If this cannot be achieved, drums shall be used.

4. The opening to the ramp shall be 320' (100 m) or more, whenever possible. A lesser opening may be provided if no other alternative is available. When a lesser opening is provided, Advisory Speed plaques (OW-143) shall be added to the OW-96 and OC-45A signs as follows:

Opening	Advisory speed
290' (90 m)	50 mph
260' (80 m)	45 mph
230' (70 m)	40 mph
200' (60 m)	35 mph

If a 200' (60 m) opening cannot be provided, the ramp should be closed.

4. cont. The Advisory Speed displayed shall not be greater than would otherwise be required to accommodate the permanent ramp geometry near the exit. Advisory speeds within 10 MPH of the legal speed limit need not be displayed. If no speed reduction is required then the existing sign should be used. If a reduction is required then the existing sign should be covered and the sign configuration shown should be used.

5. Type A flashing warning lights shown on the OW-134 and OW-156 signs are required whenever a night lane closure is necessary.

6. If the construction operation requires the lane closure for more than one day then the existing conflicting pavement markings and reflectors from the raised pavement markers (RPMs) shall be removed and the appropriate color work zone edge lines shall be applied along the taper. Work zone edge lines which would conflict with final traffic lanes shall be removable (740.05 Type I) tape unless the area will be resurfaced in the next work phase. After completion of the work, pavement markings other than 740.05 Type I shall be removed in accordance with 641.10. The original markings and raised pavement marker reflectors shall be restored at no additional cost.

7. The OC-10 signs are only required for lane closures of more than one day and may be omitted if they fall within the limits of a construction project.

8. All material and equipment shall be removed from the closure and the work area when no work is being done.

TABLE I

MINIMUM DISTANCE - FT (m)			
	A	B	C
FREEWAY & EXPRESSWAY	2600 (780)	1600 (480)	1000 (300)

LANE CLOSURE IN DECELERATION LANE

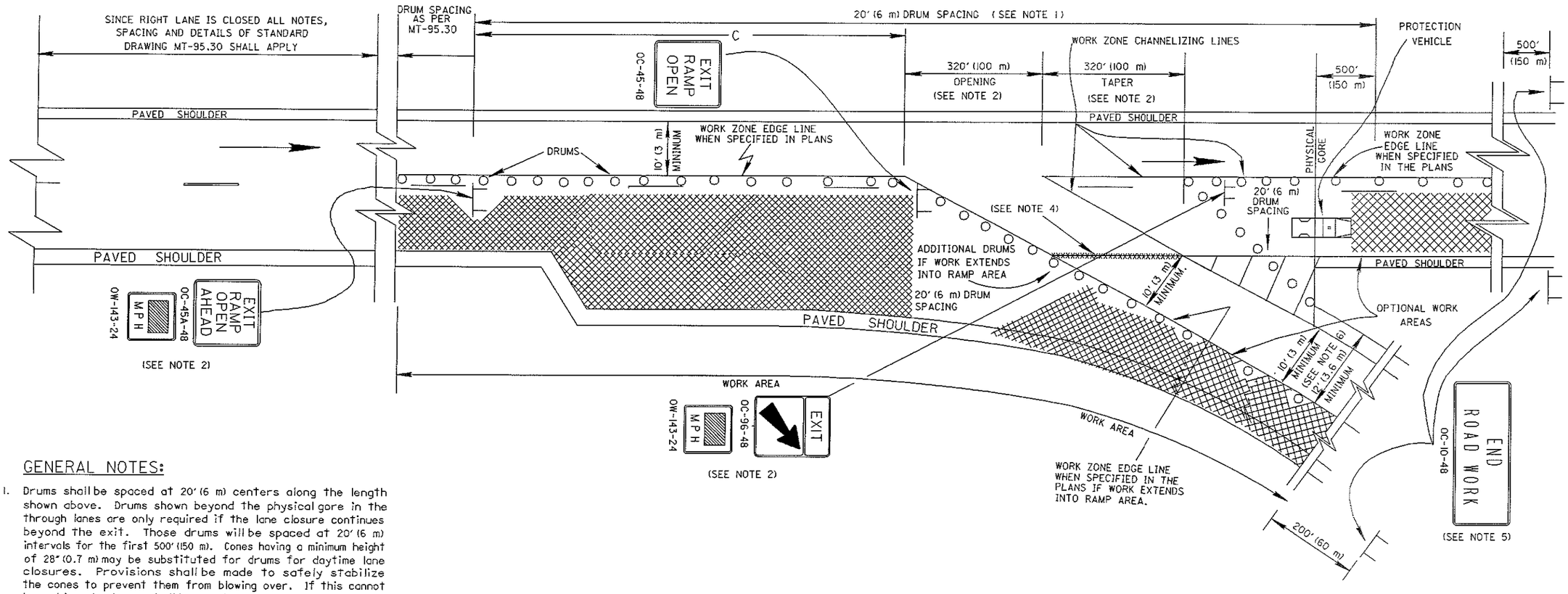
04-19-02

OFFICE OF TRAFFIC ENGINEERING

MT-98.12

1/1

JAM



GENERAL NOTES:

1. Drums shall be spaced at 20' (6 m) centers along the length shown above. Drums shown beyond the physical gore in the through lanes are only required if the lane closure continues beyond the exit. Those drums will be spaced at 20' (6 m) intervals for the first 500' (150 m). Cones having a minimum height of 28" (0.7 m) may be substituted for drums for daytime lane closures. Provisions shall be made to safely stabilize the cones to prevent them from blowing over. If this cannot be achieved, drums shall be used.

2. The opening to the ramp and the taper across the closed lane should each be 320' (100 m) or more whenever possible. A lesser opening and/or taper may be provided if no other alternative is available. The opening shall never be less than the taper, but may be more. When lesser opening and/or taper lengths are provided, advisory speed plaques (OW-143) shall be added to the OC-96 and OC-45A signs as follows:

Opening/taper	Advisory speed
290' (90 m)	50 mph
260' (80 m)	45 mph
230' (70 m)	40 mph
200' (60 m)	35 mph

   If 200' (60 m) minimum dimensions cannot be provided, the ramp should be closed.

   The advisory speed displayed shall not be greater than would otherwise be required to accommodate the permanent ramp geometry near the exit.

   Advisory speeds within 10 mph of the legal speed limit need not be displayed.

3. The protection vehicle located close to the work shall be in place and unoccupied whenever workers are in the work area. This vehicle shall be removed from the pavement whenever workers are not in the work area. The vehicle shall be equipped with a 360 degree rotating or flashing amber beacon clearly visible a minimum of one quarter mile (400 m). Other protective devices may be used in lieu of the protection vehicle shown when approved by the Engineer.

4. If the construction operation requires the lane closure for more than one day then the existing conflicting pavement markings and reflectors from the raised pavement markers (RPMs) shall be removed and a) work zone channelizing lines shall be applied and b) the appropriate color work zone edge lines shall be applied when specified in the plans. Work zone channelizing lines and edge lines which would conflict with final traffic lanes shall be removable (740.06 Type I) tape unless the area will be resurfaced in the next work phase. After completion of the work, pavement markings other than 740.06 Type I shall be removed in accordance with 641.10. The original markings and raised pavement marker reflectors shall be restored at no additional cost.

5. The OC-10 signs are only required for lane closures of more than one day and may be omitted if they fall within the limits of a construction project.

6. Normally a 10' (3 m) minimum ramp width shall be maintained on existing ramp pavement. Where this is not possible, a minimum width of 12' (3.6 m) including the paved shoulder may be used only: (1) if the traffic will be on the shoulder less than one day and the shoulder is in good condition, or (2) if the shoulder pavement is strengthened to hold the anticipated load.

7. All material and equipment shall be removed from the closure and the work area when no work is being done.

TABLE I

MINIMUM DISTANCE - FT (m)	
	C
FREEWAY & EXPRESSWAY	1000 (300)

LANE CLOSURE BEFORE EXIT GORE

OFFICE OF TRAFFIC ENGINEERING

MT-98.13

04-19-02

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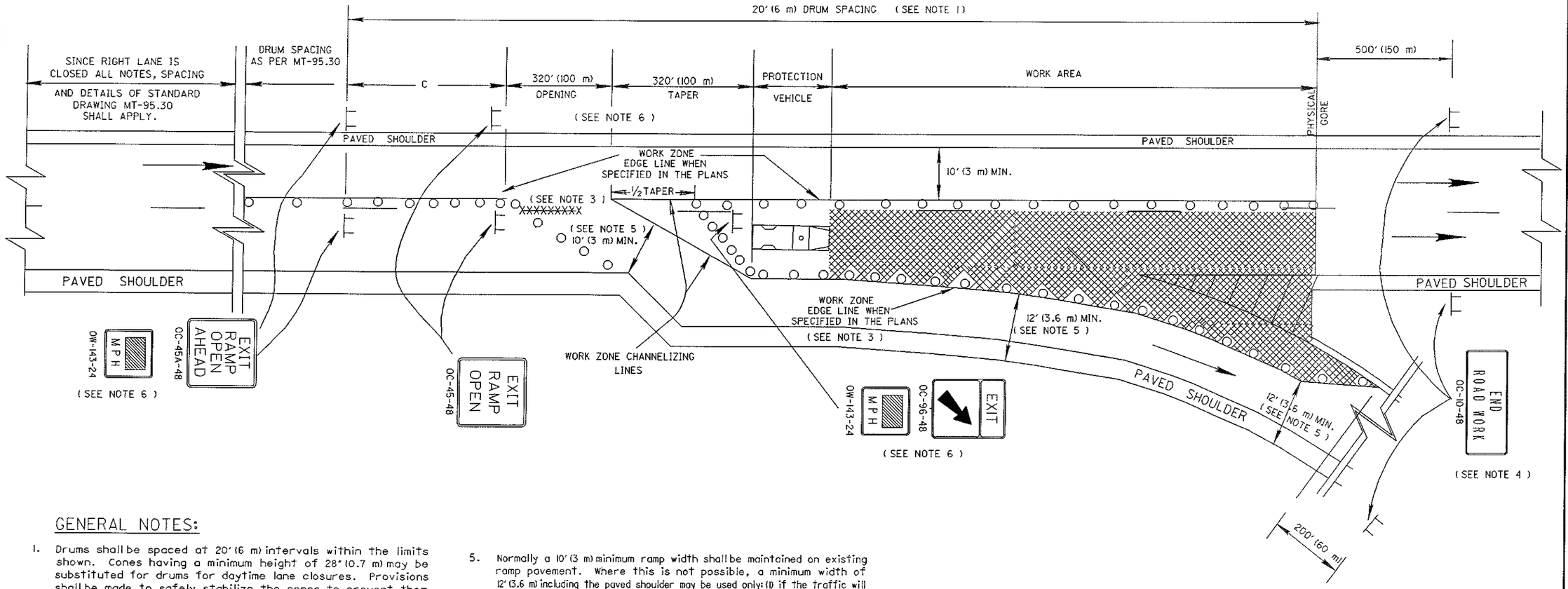
JAM



GENERAL NOTES:

1. Drums shall be spaced at 20' (6 m) intervals within the limits shown. Cones having a minimum height of 28" (0.7 m) may be substituted for drums for daytime lane closures. Provisions shall be made to safely stabilize the cones to prevent them from blowing over. If this cannot be achieved, drums shall be used.

2. The protection vehicle located close to the work shall be in place and unoccupied whenever workers are in the work area. This vehicle shall be removed from the pavement whenever workers are not in the work area. The vehicle shall be equipped with a 360 degree rotating or flashing amber beacon clearly visible a minimum of one quarter mile (400 m). Other protective devices may be used in lieu of the protection vehicle shown when approved by the Engineer.

3. If the construction operation requires the lane closure for more than one day then the existing conflicting pavement markings and reflectors from the raised pavement markers (RPMs) shall be removed and a) work zone channelizing lines shall be applied and b) the appropriate color work zone edge lines shall be applied when specified in the plans. Work zone channelizing lines and edge lines which would conflict with final traffic lanes shall be removable (740.06 Type I) tape unless the area will be resurfaced in the next work phase. After completion of the work, pavement markings other than 740.06 Type I shall be removed in accordance with 641.10. The original markings and raised pavement marker reflectors shall be restored at no additional cost.

4. The OC-10 signs are only required for lane closures of more than one day and may be omitted if they fall within the limits of a construction project.

5. Normally a 10' (3 m) minimum ramp width shall be maintained on existing ramp pavement. Where this is not possible, a minimum width of 12' (3.6 m) including the paved shoulder may be used only: (1) if the traffic will be on the shoulder less than one day and the shoulder is in good condition, or (2) if the shoulder pavement is strengthened to hold the anticipated load.

6. The opening to the ramp and the taper in advance of the closed lane should each be 320' (100 m) or more whenever possible. A lesser opening and/or taper length may be provided if no other alternative is available. The opening shall never be less than the taper, but may be more. When lesser opening and/or taper lengths are provided, advisory speed plaques (OW-143) shall be added to the OC-96 and OC-45A signs as follows:

Opening/Taper	Advisory speed
290' (90 m)	50 mph
260' (80 m)	45 mph
230' (70 m)	40 mph
200' (60 m)	35 mph

If 200' (60 m) minimum dimension cannot be provided, the ramp should be closed.

The advisory speed displayed shall not be greater than would otherwise be required to accommodate the permanent ramp geometry near the exit.

Advisory speeds within 10 mph of the legal speed limit need not be displayed.

7. All material and equipment shall be removed from the closure and the work area when no work is being done.

TABLE I

MINIMUM DISTANCE - FT (m)	
	C
FREEWAY & EXPRESSWAY	1000 (300)

LANE CLOSURE AT EXIT GORE

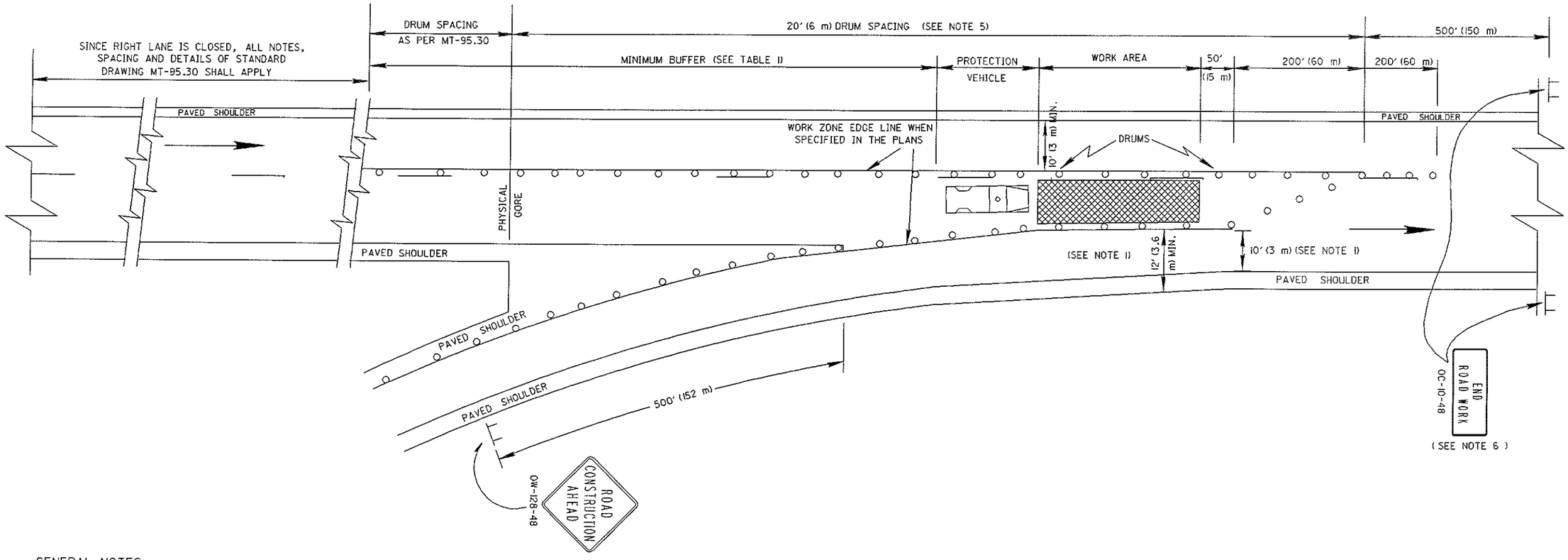
04-19-02

OFFICE OF TRAFFIC ENGINEERING

MT-98.14

1/1

JAM



GENERAL NOTES:

1. This work area traffic control application shall be employed only when the lateral clearance between the channelizing devices at the right edge of the work area and the edge of the ramp pavement is 10' (3 m) or more. Normally a 10' (3 m) minimum ramp width shall be maintained on existing ramp pavement. Where this is not possible, a minimum width of 12' (3.6 m) including the paved shoulder may be used only: (1) if the traffic will be on the shoulder less than one day and the shoulder is in good condition, or (2) if the shoulder pavement is strengthened to hold the anticipated load. When the ramp is closed appropriate detour signs shall be provided.

2. When the ramp is not long enough to allow sign placement as specified above, they may be spaced proportionately within the space available as determined by the Engineer (a 200' (60 m) minimum spacing must be maintained).

3. The protection vehicle located close to the work area shall be in place and unoccupied whenever workers are in the work area. This vehicle shall be removed from the pavement whenever workers are not in the work area. The vehicle shall be equipped with a 360 degree rotating or flashing amber beacon visible a minimum of one quarter mile (400 m). Other protective devices may be used in lieu of the protection vehicle shown when approved by the Engineer.

4. If the construction operation requires the lane closure for more than one day then the existing conflicting pavement markings and reflectors from the raised pavement markers (RPMs) shall be removed and the appropriate color work zone edge lines shall be applied when specified in the plans. Work zone edge lines which would conflict with final traffic lanes shall be removable (740.05 Type I) tape unless the area will be resurfaced in the next work phase. After completion of the work, pavement markings other than 740.05 Type I shall be removed in accordance with 641.10. The original markings and raised pavement marker reflectors shall be restored at no additional cost.

5. Drums shall be spaced at 20' (6 m) intervals on both sides of the work area within the limits shown. Cones having a minimum height of 28" (0.7 m) may be substituted for drums for daytime lane closures. Provisions shall be made to safely stabilize the cones to prevent them from blowing over. If this cannot be achieved, drums shall be used.

6. The OC-10 signs are only required for lane closures of more than one day and may be omitted if they fall within the limits of a construction project.

7. All material and equipment shall be removed from the closure and the work area when no work is being done.

TABLE I

SPEED LIMIT (MPH)	BUFFER AREA FT (METERS)
45 - 50	280 (85)
60 - 65	485 (145)

LANE CLOSURE AT ENTRANCE RAMP: PLAN A

04-19-02

OFFICE OF TRAFFIC ENGINEERING

MT-98.15

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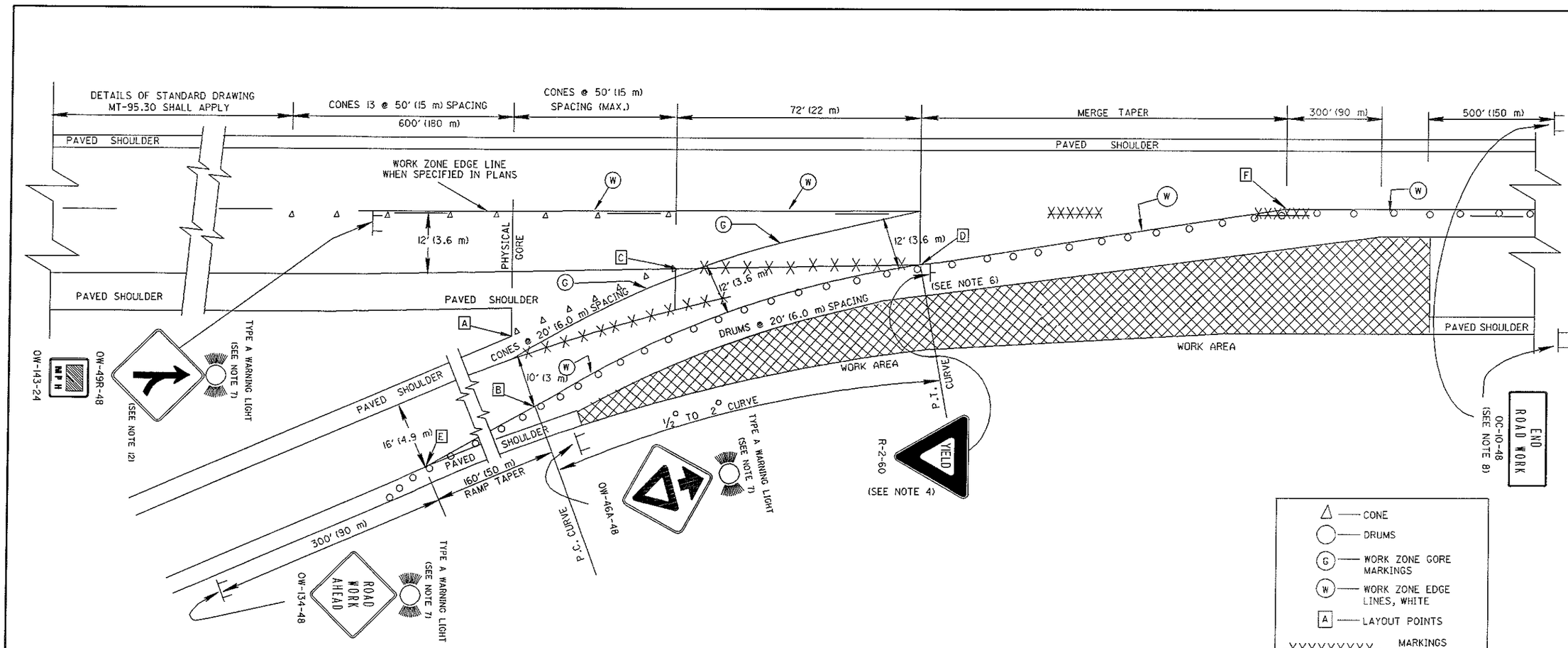
JAM



GENERAL NOTES :

1. This work area traffic control application shall be employed when: (1) the lateral clearance between channelizing devices at the right edge of the work area and the edge of pavement is less than 10' (3 m) [12' (3.6 m) if the shoulder pavement is used] as shown on drawing MT-98.15, and (2) the required ramp tapers and curves can be provided as shown except as described in note 4. In the event the work zone condition would permit the use of either MT-98.15 or MT-98.16, MT-98.15 shall be used. This traffic control measure shall not be placed in effect until immediately before the Contractor is fully prepared to perform the work on the ramp or lane adjacent to it. Once this measure is placed into effect, the Contractor shall expeditiously pursue the work (working continuously with full crew in the ramp area on all normal working days) until it is completed and shall immediately open the area to normal traffic or, as a minimum, revert to the methods shown on MT-98.15. It is the intent that the longest merging taper length possible shall be chosen, commensurate with the requirements of construction.

2. The ramp taper shall desirably be located to provide a 10' (3 m) minimum path between drums and the paved shoulder in the gore. The ramp traffic may be placed on the paved gore as shown above only if: (1) the traffic will use the paved shoulder pavement less than one day and the shoulder pavement is in good condition and is level and smooth or (2) if the shoulder pavement is adequately strengthened, leveled and smoothed to carry the anticipated load. A minimum of 3 drums shall be used to close the ramp shoulder.

3. When the ramp is not long enough to allow sign placement as specified above, they may be spaced proportionately within the space available as determined by the Engineer (a 200' (60 m) minimum spacing must be maintained).

4. It will be necessary to move the location of any existing yield sign. In these cases, the permanent R-2 sign installation shall be removed (and subsequently restored) and the temporary installation shall be mounted appropriately. If the required distances (ramp taper, curve and merge taper) cannot be obtained, the Engineer may approve slightly lower values for a short time, in which case the yield sign shall be removed and a 48" (1200 mm) stop sign placed appropriately to be visible to ramp traffic but not be obtrusive to mainline traffic.

5. If the construction operation requires the lane closure for more than one day then the existing conflicting pavement markings and reflectors from the raised pavement markers (RPMs) shall be removed at no additional cost. The appropriate color temporary edge lines shall be applied along the taper. Work zone pavement markings which would conflict with final traffic lanes shall be removable (740.05 Type I) tape unless the area will be resurfaced in the next work phase. After completion of the work, work zone pavement markings shall be removed in accordance with 641.10 and the original markings and raised pavement marker reflectors shall be restored at no additional cost.

6. Drum spacing adjacent to the mainline and on the ramp shall be not more than 20' (6 m) C - C in the area from the physical gore to 300' (90 m) beyond the merge taper. Cones having a minimum height of 28" (0.7 m) may be substituted for drums for daytime lane closures. Cones shall be reflectorized and safely stabilized.

7. Type A flashing warning lights are required on the OW-134, OW-49R and the OW-46 signs whenever a night lane closure is necessary.

8. The OC-10 signs are only required for lane closures of more than one day and may be omitted if they fall within the limits of a construction project.

9. From the end of the gore area graded shoulder (point A), locate the PC of the curve by measuring perpendicular to the ramp centerline 10' (3 m) of ramp pavement, not including paved shoulder width (point B). From the end of the gore area paved shoulder (point C), locate the PT of the curve by measuring 72' (22 m) from point C along the edge of pavement extended (point D).

10. Placement of drums shall begin at (point E) 160' (50 m) upstream from the previously located PC (point B) and at the right edge of ramp pavement. From this point a drum taper shall be placed to the PC (point B) and then along a curve as shown to the PT (point D) where a 48:1 (min.) merge taper shall meet mainline traffic control (point F).

11. All material and equipment shall be removed from the closure and the work area when no work is being done.

12. It is intended that the merge sign OW-49R-48 be located to the right of the through lane as shown. However if the sign cannot be located as shown due to the activity at the location, the sign may be located to the left of the through lane as an alternate location.

LANE CLOSURE AT ENTRANCE RAMP: PLAN B

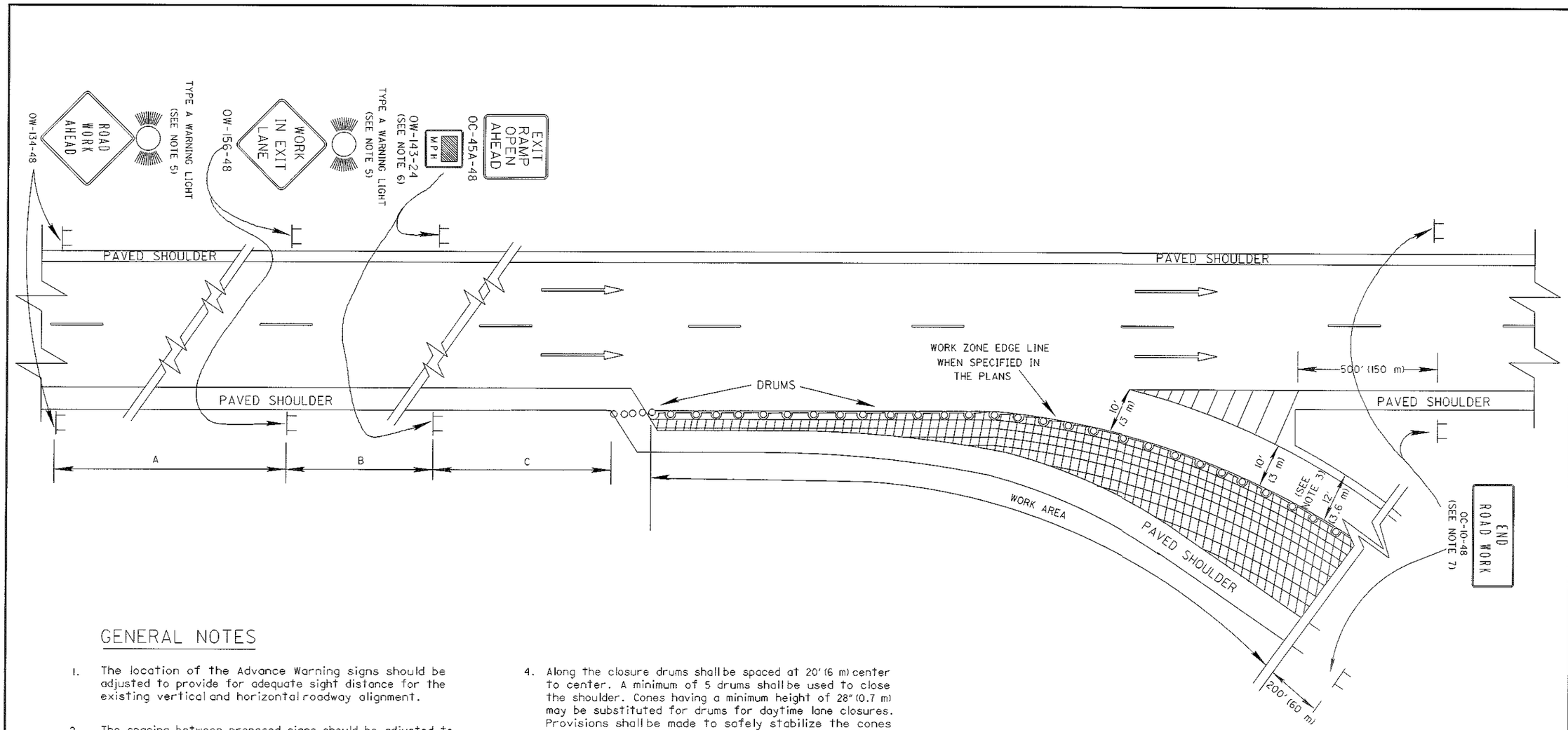
OFFICE OF TRAFFIC ENGINEERING

MT-98.16

04-19-02

1/1

JAM



GENERAL NOTES

1. The location of the Advance Warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

2. The spacing between proposed signs should be adjusted to not conflict with and to provide a minimum of 200' (60 m) clearance to existing signs.

3. This work area traffic control application shall only apply when work along an exit ramp leaves at least one lane open to ramp traffic. Normally a 10' (3 m) minimum ramp width shall be maintained on existing ramp pavement. Where this is not possible, a minimum width of 12' (3.6 m) including the paved shoulder may be used only: (1) if the traffic will be on the shoulder less than one day and the shoulder is in good condition, or (2) if the shoulder pavement is strengthened to hold the anticipated load. If a 10' (3 m) lane or 12' (3.6 m) lane including shoulder area cannot be maintained along an exit ramp, it shall be closed. If the ramp is closed for more than one day, detour signing shall be provided in accordance with the OMUTCD.

4. Along the closure drums shall be spaced at 20' (6 m) center to center. A minimum of 5 drums shall be used to close the shoulder. Cones having a minimum height of 28" (0.7 m) may be substituted for drums for daytime lane closures. Provisions shall be made to safely stabilize the cones to prevent them from blowing over. If this cannot be achieved, drums shall be used.

5. Type A flashing warning lights shown on the OW-134 and OW-156 signs are required whenever a night lane closure is necessary.

6. The advisory speed sign OW-143 shall be used when specified in the plan.

7. The OC-10 signs are only required for lane closures of more than one day and may be omitted if they fall within the limits of a construction project.

8. All material and equipment shall be removed from the closure and the work area when no work is being done.

TABLE I

MINIMUM DISTANCE - FEET(METERS)			
	A	B	C
FREEWAY & EXPRESSWAY	2600 (780)	1600 (480)	1000 (300)

TYPICAL LANE CLOSURE IN DECELERATION LANE AND RAMP FOR CLOSING INSIDE PORTION OF CURVE

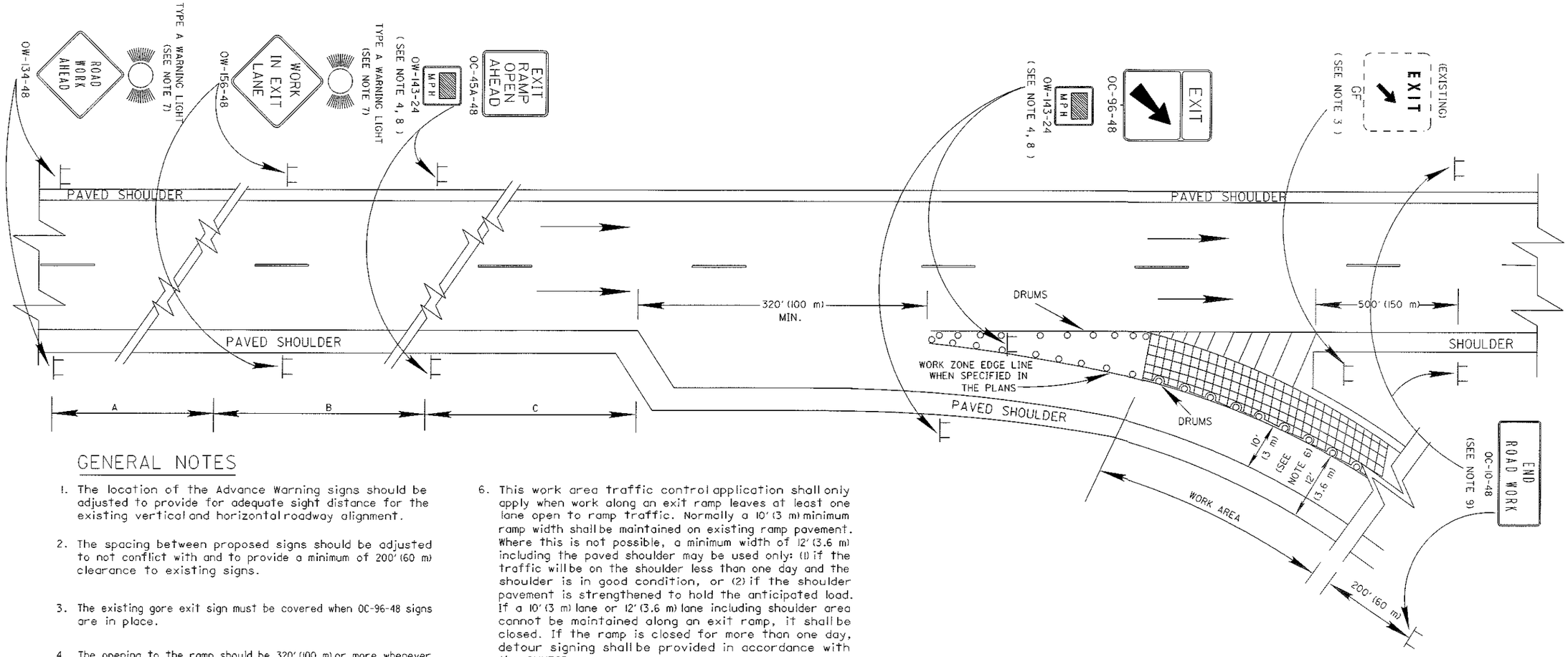
10-18-02

OFFICE OF TRAFFIC ENGINEERING

MT-98.17

1 / 1

JAM



GENERAL NOTES

1. The location of the Advance Warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

2. The spacing between proposed signs should be adjusted to not conflict with and to provide a minimum of 200' (60 m) clearance to existing signs.

3. The existing gore exit sign must be covered when OC-96-48 signs are in place.

4. The opening to the ramp should be 320' (100 m) or more whenever possible. A lesser opening may be provided if no other alternative is available. When a lesser opening length is provided, advisory speed plaques (OW-143) shall be added to the OC-96 and OC-45A signs as follows:

Opening	Advisory speed
290' (90 m)	50 mph
260' (80 m)	45 mph
230' (70 m)	40 mph
200' (60 m)	35 mph

   If 200' (60 m) minimum dimensions cannot be provided, the ramp should be closed.

   The advisory speed displayed shall not be greater than would otherwise be required to accommodate the permanent ramp geometry near the exit.

   Advisory speeds within 10 mph of the legal speed limit need not be displayed.

5. Along the closure drums shall be spaced at 20' (6 m) center to center. Cones having a minimum height of 28" (0.7 m) may be substituted for drums for daytime closures. Provisions shall be made to safely stabilize the cones to prevent them from blowing over. If this cannot be achieved, drums shall be used.

6. This work area traffic control application shall only apply when work along an exit ramp leaves at least one lane open to ramp traffic. Normally a 10' (3 m) minimum ramp width shall be maintained on existing ramp pavement. Where this is not possible, a minimum width of 12' (3.6 m) including the paved shoulder may be used only: (1) if the traffic will be on the shoulder less than one day and the shoulder is in good condition, or (2) if the shoulder pavement is strengthened to hold the anticipated load. If a 10' (3 m) lane or 12' (3.6 m) lane including shoulder area cannot be maintained along an exit ramp, it shall be closed. If the ramp is closed for more than one day, detour signing shall be provided in accordance with the OMUTCD.

7. Type A flashing warning lights shown on the OW-134 and OW-156 signs are required whenever a night closure is necessary.

8. The advisory speed sign OW-143 shall be used when specified in the plan or as required in note 2.

9. The OC-10 signs are only required for lane closures of more than one day and may be omitted if they fall within the limits of a construction project.

10. All material and equipment shall be removed from the closure and the work area when no work is being done.

TABLE I

MINIMUM DISTANCE - FEET (METERS)			
	A	B	C
FREEWAY & EXPRESSWAY	2600 (780)	1600 (480)	1000 (300)

TYPICAL LANE CLOSURE IN RAMP FOR CLOSING OUTSIDE PORTION OF CURVE

10-18-02

OFFICE OF TRAFFIC ENGINEERING

MT-98.18

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JAM

GENERAL

IN ADDITION TO 614, TRAFFIC SHALL BE MAINTAINED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS.

THE PURPOSE OF THE FOLLOWING REQUIREMENTS FOR TRAFFIC CONTROL FOR PAVEMENT MARKING OPERATIONS IS TO PROVIDE SAFETY FOR HIGHWAY USERS, WORKERS AND EQUIPMENT AND TO PROTECT THE MARKINGS FROM DAMAGE DURING APPLICATION. THESE REQUIREMENTS ARE THE REQUIRED MINIMUMS. IF AT ANY TIME DURING THE APPLICATION OF MARKINGS IT IS FOUND BY THE ENGINEER THAT THESE MINIMUM TRAFFIC CONTROL REQUIREMENTS ARE NOT ACHIEVING THE NECESSARY SAFETY AND MARKING PROTECTION, ADDITIONAL TRAFFIC CONTROL SHALL BE IMPLEMENTED AT NO ADDITIONAL COST.

THE ENGINEER MAY SUSPEND WORK IN ORDER TO RELIEVE TRAFFIC CONGESTION AT ANY TIME. NO WORK SHALL BE DONE DURING PEAK HOURS, AS DETERMINED BY THE ENGINEER.

VEHICLES TRANSPORTING FLAMMABLE PAVEMENT MARKING MATERIALS (MATERIAL SUPPLY VEHICLES) SHALL NOT BE UTILIZED FOR LEAD OR TRAIL VEHICLES OR FOR POWER BROOM EQUIPMENT. ALL PAVEMENT MARKING APPLICATION, PROTECTION AND SUPPORT EQUIPMENT FOLLOWING THE LINE MARKING MACHINE SHALL HAVE THE TRAFFIC CONTROL EQUIPMENT OF A TRAIL VEHICLE.

LINE MARKING MACHINES SHALL NOT BE USED FOR SIGN AND CONE PLACEMENT.

LEAD VEHICLE

A LEAD VEHICLE IS TO BE USED TO WARN OPPOSING TRAFFIC OF THE APPROACH OF CENTER LINE AND OTHER MARKING EQUIPMENT WHEN THIS EQUIPMENT EXTENDS INTO THE ADJACENT OPPOSING TRAFFIC LANE. THE LEAD VEHICLE SHALL PRECEDE THE "LEFT OF CENTER" MARKING EQUIPMENT A DISTANCE THAT WILL PROVIDE ADVANCE SAFE WARNING TO APPROACHING TRAFFIC. THE OPERATOR OF THIS UNIT SHALL DRIVE AHEAD OF THE CREST OF A VERTICAL CURVE OR AROUND A HORIZONTAL CURVE AND WAIT UNTIL THE "LEFT OF CENTER" MARKING EQUIPMENT NEARS AND THEN PROCEED, MAINTAINING AN ADVANCE LOCATION OF 122 m TO 183 m.

A LEAD VEHICLE SHALL BE EQUIPPED AND OPERATED WITH THE FOLLOWING TRAFFIC CONTROL DEVICES:

1. A 360° ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE IN ALL DIRECTIONS A MINIMUM OF 400 m.
2. LIGHTED HEADLIGHTS AND TAILLIGHTS , AND
3. A KEEP RIGHT SIGN (OC-31R-48) AND WET PAINT SIGN (OC-52-48) MOUNTED A MINIMUM OF 1.5 m ABOVE THE ROAD SURFACE MEASURED TO THE BOTTOM OF THE SIGN, AND VISIBLE TO OPPOSING TRAFFIC.

POWER BROOM EQUIPMENT

POWER BROOM EQUIPMENT SHALL BE EQUIPPED AND OPERATED DURING PAVEMENT PREPARATIONS WITH THE FOLLOWING TRAFFIC CONTROL DEVICES:

1. A 360° ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE IN ALL DIRECTIONS A MINIMUM OF 400 m.
2. LIGHTED HEADLIGHTS AND TAILLIGHTS , AND
3. ✳ A FLASHING ARROW PANEL 1.4 X .76 m CONFORMING TO MT-35.10M (TYPE B) VISIBLE TO THE REAR MOUNTED A MINIMUM OF 2 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE PANEL, AND USED ONLY ON MULTI-LANE HIGHWAYS.

LINE MARKING MACHINE

ALL TRAFFIC LINE MARKING MACHINES SHALL BE EQUIPPED AND OPERATED WITH THE FOLLOWING TRAFFIC CONTROL EQUIPMENT:

1. THREE 360° ROTATING OR FLASHING AMBER BEACONS CLEARLY VISIBLE IN ALL DIRECTIONS A MINIMUM OF 400 m, MOUNTED A MINIMUM OF 2 m ABOVE THE ROAD SURFACE, ONE FORWARD, ONE ON THE RIGHT REAR AND ONE ON THE LEFT REAR OF THE VEHICLE.
2. ✳ (A) A FLASHING ARROW PANEL 1.4 X .76 m CONFORMING TO MT-35.10M (TYPE B) DISPLAYED TO THE REAR MOUNTED A MINIMUM OF 2 m ABOVE THE THE ROAD SURFACE, MEASURED TO BOTTOM OF THE PANEL, AND USED ONLY ON MULTI-LANE HIGHWAYS, OR
   (B) A DO NOT PASS SIGN (R-33A-48) VISIBLE TO THE REAR DURING CENTER LINE MARKING ON TWO-LANE, TWO-WAY ROADWAYS AND MOUNTED A MINIMUM OF 2 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE SIGN. THIS SIGN MAY BE USED TO COVER THE ARROW PANEL WHICH SHALL NOT BE USED ON TWO-LANE, TWO WAY ROADWAYS.
3. A WET PAINT WITH ARROW SIGN (OC-50-24 OR OC-51-48) SHALL FACE THE REAR. THE SIGN SHALL BE POSITIONED WITH THE ARROW POINTING TO THE WET LINE. WHEN USED, OC-50-24 SHALL BE MOUNTED ON THE SIDE OF THE VEHICLE NEAREST THE WET MARKING MATERIAL. OC-50-24 AND OC-51-48 SIGNS SHALL BE MOUNTED A MINIMUM OF 0.3 m ABOVE THE ROAD SURFACE.
4. A KEEP RIGHT SIGN (OC-31R-48) AND WET PAINT SIGN (OC-52-48) MOUNTED A MINIMUM OF 1.5 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE SIGN FACING OPPOSING TRAFFIC WHEN THIS UNIT EXTENDS INTO THE ADJACENT OPPOSING TRAFFIC LANE.
5. THE GUIDE AND SIDE MOUNTED MARKING CARRIAGES SHALL EACH BE EQUIPPED WITH A CLEAN RED FLAG NOT LESS THAN 0.4 m SQUARE AND FASTENED TO A STAFF OF SUFFICIENT LENGTH SO AS TO PERMIT THE FLAG TO MOVE FREELY OF ANY OBSTRUCTION.

TRAIL VEHICLE

WHEN REQUIRED, A TRAIL VEHICLE SHALL BE POSITIONED AT THE TRACK FREE END OF THE WET LINE.

TRAIL VEHICLES SHALL BE EQUIPPED AND OPERATED WITH THE FOLLOWING TRAFFIC CONTROL EQUIPMENT:

1. A 360° ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE IN ALL DIRECTIONS A MINIMUM OF 400 m,
2. ✳ (A) A FLASHING ARROW PANEL 1.4 X .76 m CONFORMING TO MT-35.10M (TYPE B) VISIBLE TO THE REAR MOUNTED AT A MINIMUM HEIGHT OF 2 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE PANEL, AND USED ONLY ON MULTI-LANE HIGHWAYS, OR
   (B) A DO NOT PASS SIGN (R-33A-48) VISIBLE TO THE REAR DURING CENTER LINE MARKING ON TWO-LANE, TWO-WAY ROADWAYS AND MOUNTED A MINIMUM OF 2 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE SIGN. THIS SIGN MAY BE USED TO COVER THE ARROW PANEL, WHICH SHALL NOT BE USED ON TWO-LANE, TWO-WAY ROADWAYS.
3. A WET PAINT WITH ARROW SIGN (OC-50-24 OR OC-51-48) SHALL FACE THE REAR. THE SIGN SHALL BE POSITIONED WITH THE ARROW POINTING TO THE WET LINE. WHEN USED, OC-50.24 SHALL BE MOUNTED ON THE SIDE OF THE VEHICLE NEAREST, THE WET MARKING MATERIAL. OC-50-24 SHALL BE MOUNTED A MINIMUM OF 1.4 m ABOVE THE ROAD SURFACE AND OC-51-48 SHALL BE MOUNTED A MINIMUM OF 1.5 m ABOVE THE ROAD SURFACE, BOTH MEASURED TO THE BOTTOM OF THE SIGN.

✳ WHEN A VEHICLE IS OPERATING ON A TWO-LANE TWO-WAY ROADWAY THE FLASHING ARROW PANEL SHALL BE TILTED HORIZONTALLY OR COVERED.

CONES AND WET PAINT-KEEP OFF SIGNS

CONES AND WET PAINT-KEEP OFF SIGNS (R-87-24) SHALL BE PLACED TO PROTECT THE LINE WHENEVER THE TRACK FREE TIME EXCEEDS 2 MINUTES. THESE DEVICES SHALL NOT BE REMOVED UNTIL THE LINE HAS DRIED TO A TRACK FREE CONDITION. RETRIEVAL EQUIPMENT SHALL HAVE THE TRAFFIC CONTROL EQUIPMENT OF A TRAIL VEHICLE. CONES SHALL HAVE A MINIMUM HEIGHT OF 0.46 m. THEY SHALL BE SPACED TO PROTECT THE WET LINE NORMALLY BETWEEN 37 m AND 61 m. IN AREAS OF TRAFFIC CONGESTION , ON CURVES AND AT OTHER LOCATIONS WHERE TRACKING OF THE WET LINE IS EXPECTED SPACINGS AS CLOSE AS 6.1 m MAY BE REQUIRED. THE WET PAINT-KEEP OFF SIGNS (R-87-24) SHALL BE PLACED FACING TRAFFIC AT:

A. THE BEGINNING AND END OF LINE APPLICATION,
B. ALL SIDE AND CROSS ROADS, AND
C. MAXIMUM INTERVALS OF 1.6 km.

WHEN LANE LINE MARKINGS REQUIRE GREATER THAN A TWO MINUTE DRYING TIME, THE LANE FROM WHICH THE LINE MARKING MACHINE APPLIES LANE LINE MARKINGS SHALL BE CLOSED UNTIL THE LINE HAS DRIED TO A TOTALLY TRACK FREE CONDITION.

IMMOBILE OPERATIONS

WHEN LOADING MATERIAL, CLEANING OR PERFORMING OTHER OPERATIONS IN THE FIELD, EVERY EFFORT SHALL BE MADE TO HAVE ALL EQUIPMENT COMPLETELY OFF OF THE TRAVELED WAY. WHEN IT BECOMES NECESSARY TO ENTER UPON PRIVATE PROPERTY, PERMISSION SHALL BE OBTAINED IN ADVANCE. WHEN THE CONTRACTOR CANNOT REMOVE HIS EQUIPMENT FROM THE TRAVELED WAY ALL TRAFFIC CONTROL DEVICES ON THE VEHICLES SHALL BE IN OPERATION AND FLAGGERS AND VEHICLES SHALL BE STATIONED TO PROTECT THE WORK SITE AND THE TRAVELING PUBLIC.

TWO-WAY TRAFFIC SHALL BE MAINTAINED. FLAGGERS SHALL BE EQUIPPED IN ACCORDANCE WITH ITEM 614.03.

AUXILIARY MARKINGS

PAVEMENT PREPARATION AND PLACING OF AUXILIARY MARKINGS (SEE (3)) ARE CONSIDERED TO BE STATIONARY OPERATIONS AND TRAFFIC CONTROL SHALL BE IN ACCORDANCE WITH PLAN DETAILS, STANDARD CONSTRUCTION DRAWINGS AND THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (OMUTCD).

LAYOUT AND PREMARKING

THE VEHICLE USED IN LAYOUT AND PREMARKING SHALL BE EQUIPPED AND OPERATED WITH THE FOLLOWING EQUIPMENT:

1. A 360° ROTATING OR FLASHING AMBER BEACON CLEARLY VISIBLE IN ALL DIRECTIONS A MINIMUM OF 400 m.
2. LIGHTED HEADLIGHTS AND TAILLIGHTS, AND
3. A KEEP RIGHT SIGN (OC-31R-48) MOUNTED A MINIMUM OF 1.5 m ABOVE THE ROAD SURFACE, MEASURED TO THE BOTTOM OF THE SIGN, AND VISIBLE TO OPPOSING TRAFFIC.

NIGHTTIME OPERATION

NIGHTTIME OPERATION IS DEFINED TO INCLUDE THE TIME FROM ONE-HALF HOUR AFTER SUNSET TO ONE-HALF HOUR BEFORE SUNRISE , AND AT ANY OTHER TIME WHEN THERE ARE UNFAVORABLE ATMOSPHERIC CONDITIONS OR WHEN THERE IS NOT SUFFICIENT NATURAL LIGHT TO RENDER DISCERNIBLE PERSONS, VEHICLES, AND SUBSTANTIAL OBJECTS ON THE HIGHWAY AT A DISTANCE OF 305 m.

DURING NIGHTTIME CONDITIONS THE FOLLOWING TRAFFIC CONTROL SHALL BE PROVIDED:

1. CONES SHALL BE REFLECTORIZED OR EQUIPPED WITH LIGHTING DEVICES FOR MAXIMUM VISIBILITY (SEE 7F-5, OMUTCD), AND
2. THE GUIDE AND SIDE-MOUNTED CARRIAGES SHALL BE ILLUMINATED.

THE PRESENCE OF HIGHWAY LIGHTING DOES NOT WAIVE THESE REQUIREMENTS.

MINIMUM PAVEMENT MARKING TRAFFIC CONTROL EQUIPMENT REQUIREMENTS

THIS TABLE INDICATES THE TRAFFIC CONTROL EQUIPMENT WHICH SHALL BE FURNISHED FOR EACH TYPE OF LONG LINE PAVEMENT MARKING OPERATION. IN ADDITION, THE TYPE OF TRAFFIC CONTROL EQUIPMENT WHICH SHALL BE FURNISHED WHEN DIRECTED BY THE ENGINEER IS INDICATED.

EQUIPMENT	PAVEMENT MARKING LINE TYPE (1)					
	CENTER LINE		EDGE LINE		LANE LINE (2) CHANNELIZING LINE (3)	
	LONGER THAN 2 MIN. DRY	2 MIN. OR LESS DRY	LONGER THAN 2 MIN. DRY	2 MIN. OR LESS DRY	LONGER THAN 2 MIN. DRY	2 MIN. OR LESS DRY
LEAD VEHICLE	A	A	C	C	C	C
POWER BROOM EQUIPMENT	B	B	A	A	B	B
LINE MARKING MACHINE	A	A	A	A	A	A
TRAIL VEHICLE	D	A	D	A	LANE CLOSURE REQUIRED (0.7 m CONES REQUIRED)	A
TRAIL VEHICLE (ADDITIONAL)	C	B	C	B		A
TRAIL VEHICLE (SIGN & CONE RETRIEVAL)	A	C	A	C		C
TRAIL VEHICLE (SHADOW FOR RETRIEVAL)	A	C	A	C		C

(1) FOR EQUIPMENT REQUIREMENTS FOR AUXILIARY MARKING OPERATIONS SEE THE PLANS AND PART 7, OMUTCD.

(2) INCLUDES BOTH DASHED AND SOLID LANE LINES.

(3) CHANNELIZING LINE SEGMENTS OF 61 m OR LESS SHALL BE CONSIDERED AUXILIARY MARKINGS, EXECPT WHEN APPLIED AS COMPONENTS OF GORE MARKINGS SPRAYED IN MOVING OPERATIONS SEPARATE FROM THE APPLICATION OF TRANSVERSE LINES.

A	REQUIRED EQUIPMENT
B	EQUIPMENT REQUIRED WHEN DIRECTED BY THE ENGINEER
C	NOT REQUIRED
D	REQUIRED EQUIPMENT FOR SIGN & CONE PLACEMENT

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

TRAFFIC CONTROL FOR LONG LINE PAVEMENT MARKING OPERATIONS

DATE 01/30/95

STANDARD CONSTRUCTION DRAWING **MT-99.20M**

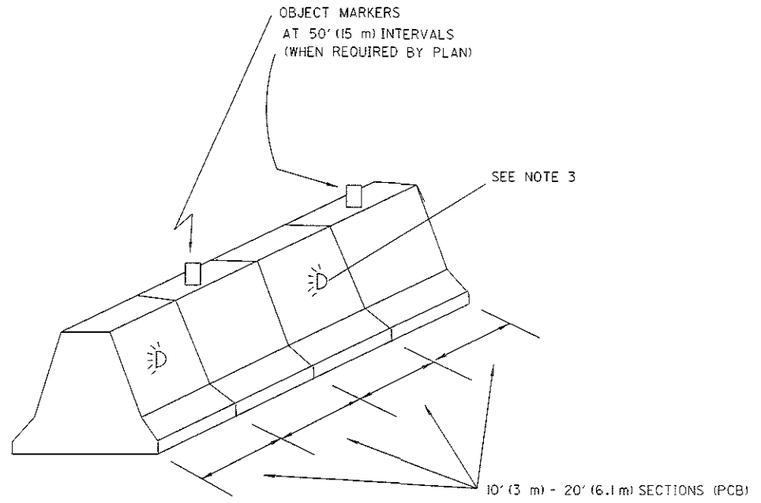
APPROVED Lloyd Cruzan ENGR. OF DESIGN SERVICES

1. PCB SHALL BE DELINEATED AS FOLLOWS:

PCB TYPE	DELINEATION
32" (813 mm) HIGH WITHOUT GLARE SCREEN	BARRIER REFLECTORS @ 50' (15 m) C-C (MAX.) TOP MOUNTED OBJECT MARKERS 6"X12" (150 X 300 mm) @ 50' (15 m) C-C (MAX.)
32" (813 mm) HIGH WITH GLARE SCREEN	BARRIER REFLECTORS @ 50' (15 m) C-C VERTICAL STRIPES ON PADDLES 2"X12" (50 X 300 mm) @ 50' (7.6 m) C-C (MAX.)
50" (1270 mm) HIGH	BARRIER REFLECTORS @ 25' (7.6 m) C- C (MAX.)
TAPERED END SECTION AND EXPOSED END	OBJECT MARKERS 6"X12" (150 X 300 mm) TOP MOUNTED @ EACH END

2. DRAWING SHALL BE USED WHEN PCB IS SPECIFIED IN THE PLANS.

3. THE TOP OF THE BARRIER REFLECTOR SHALL BE MOUNTED AT 26 INCHES (660 mm) FROM THE BASE.



REFER TO RM-4.1 and 4.2
FOR PCB CONNECTION

PORTABLE CONCRETE BARRIER (PCB)

PORTABLE CONCRETE BARRIER DELINEATION

10-18-02

PORTABLE

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MT-101.70

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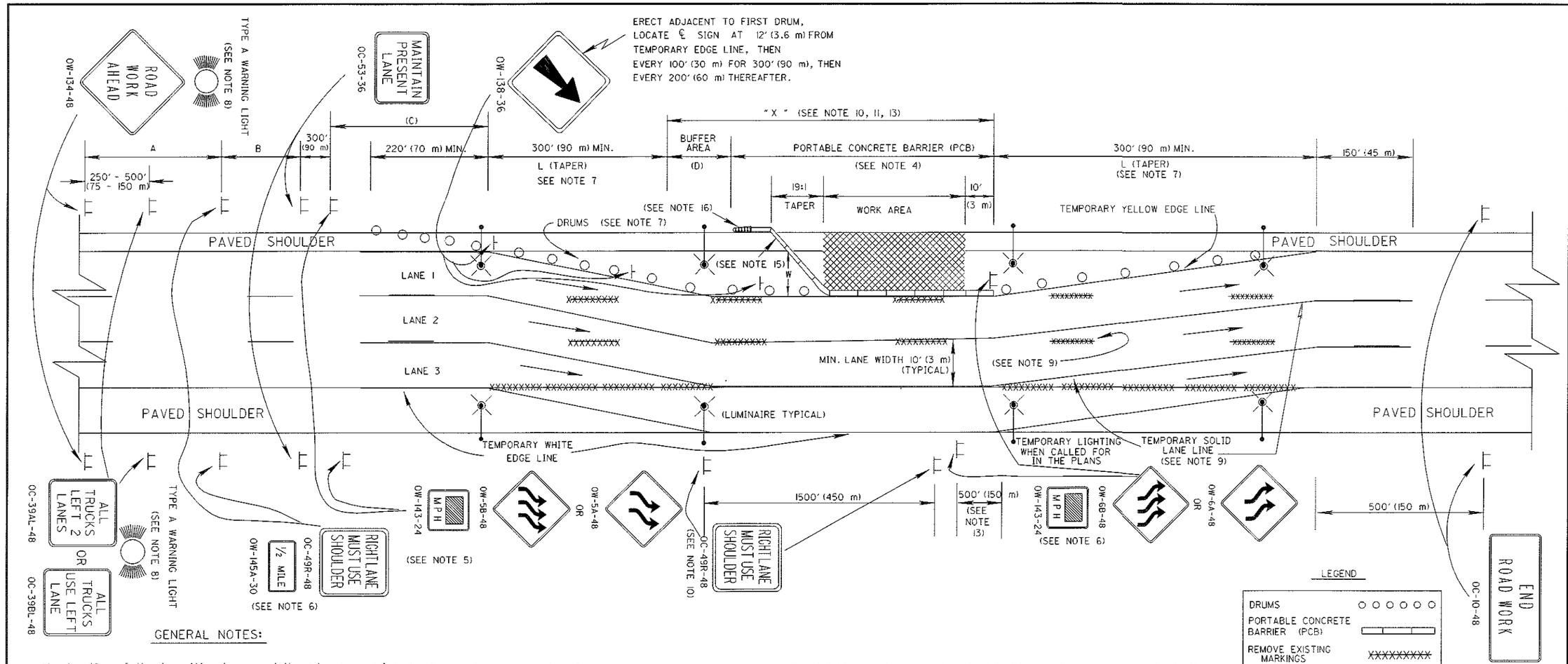

GENERAL NOTES:

1. The location of the transition taper and the Advance Warning Signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

2. The spacing between proposed signs should be adjusted to not conflict with and to provide a minimum of 200' (60 m) clearance to existing signs.

3. This traffic control plan should be used when the work area extends into either the right or left hand lane of a multiple lane divided highway and it is not desirable, for capacity reasons, to reduce the number of available lanes. The minimum resultant width of any lane is 10' (3 m). The plan shown is for a Left-Lane closure. When there is a Right-Lane closure, make the following sign substitutions: an OC-49L for the OC-49R: an OC-39AR, for the OC-39AL: an OW-6A or OW-6B for the OW-5A or OW-5B: and an OW-5A or OW-5B, for the OW-6A or OW-6B.

4. Portable Concrete Barrier (PCB) as described in Standard Construction Drawings shall be used for this work protection plan. The taper rate for the barrier approach taper should be 19:1. When used to protect work areas at lane closures on Multi-Lane roadways, PCBs should be preceded by channelizing devices to direct traffic from the closed lane at least 300' (90 m) prior to the beginning of the PCB.

5. The Advisory Speed Sign OW-143 shall be used when specified in the plan.

6. The distance plate OW-145A shall indicate the distance to the beginning of the pavement taper (l). Distances less than 1 mile may be expressed in feet.

7. The Taper Rate (R) of drums shall be based upon the average approach speed or speed limit whichever is greater and shall be as shown in Table II, except that the resulting length of taper should not be less than 300' (90 m). The taper (L) shall equal the Taper Rate (R) multiplied by the offset (W). A minimum of five channelizing devices shall be used to form the taper on the shoulder.

8. The Type A Flashing Warning Lights shown on OW-134 signs, and OC-39AL signs are required.

9. The existing conflicting Pavement Markings and Reflectors from the Raised Pavement Markers (RPM's) shall be removed and the appropriate color Temporary Lines shall be applied. Temporary Lines which would conflict with final traffic lanes shall be removable (740.06 Type-I) tape unless the area will be resurfaced in the next work phase. After completion of the work, Temporary Markings shall be removed in accordance with 641.10 and the original markings and Raised Pavement Marker Reflectors shall be restored at no additional cost.

10. The maximum spacing of the OC-49R, near the work area is 1500' (450 m). When the distance " X " is less than 1700' (520 m), the second OC-49R should be deleted. Also if it would be within 200' (60 m) of the OW-6A or OW-6B sign the OR-49R sign should be deleted.

11. Lighting poles not located behind existing guardrail shall be set back 40' (12 m) from edge of the nearest traffic lane (including any shoulder or temporary pavement used as a traffic lane). Where local conditions prevent the 40' (12 m) set back, it may be reduced to 30' (9 m) with the approval of the Engineer. When located behind existing guardrail, light poles shall be a minimum of 3' (.9 m) clear from back of guardrail post to face of pole. Any poles provided for power service shall be set back at least as far as the lighting poles. Spacing and type of luminaires shall provide an average illumination of 1.0 to 1.2 foot candles (10.8 lux to 12.9 lux) with max. uniformity ratios of 4:1 average to minimum and 10:1 maximum to minimum throughout the lighted area. When tapers are required to be lighted and dimension " X " is less than 2000' (600 m) lighting shall be continuous between tapers.

12. The OC-10 signs are only required for lane closures of more than one day and may be omitted if they fall within the limits of a Construction Project.

13. If distance " X " is less than 1000' (300 m), place the OW-6A or OW-6B sign at the mid point of distance " X ".

14. This standard drawing shall be used with standard drawing MT-101.70.

15. A taper end section may be used in place of the impact attenuator at locations where the last full section of PCB can be extended outside of the clear zone for approaching traffic. See TABLE II for clear zone widths.

16. Impact attenuators must be installed parallel to traffic. Refer to manufacturer's installation instructions.

TABLE II

SPEED (MPH)	TAPER RATE (R)	MAXIMUM SPACING (S) OF DRUMS	BUFFER (D)	CLEAR ZONE WIDTH (E) FT (m)
30 - 40	27:1	30' (9 m)	170' (52 m)	15 (5)
45 - 55	55:1	40' (12 m)	335' (102 m)	23 (7)
60 - 65	65:1	60' (18 m)	485' (148 m)	30 (10)

TABLE I

MINIMUM DISTANCE	A FT (m)	B FT (m)	C FT (m)
MAJOR STANDARD	500' (150)	500' (150)	500' (150)
FREEWAY & EXPRESSWAY	2600' (780)	1600' (480)	1000' (300)

TRANSITION PLAN FOR USE OF SHOULDER WITH PCB

10-18-02

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MT-102.10

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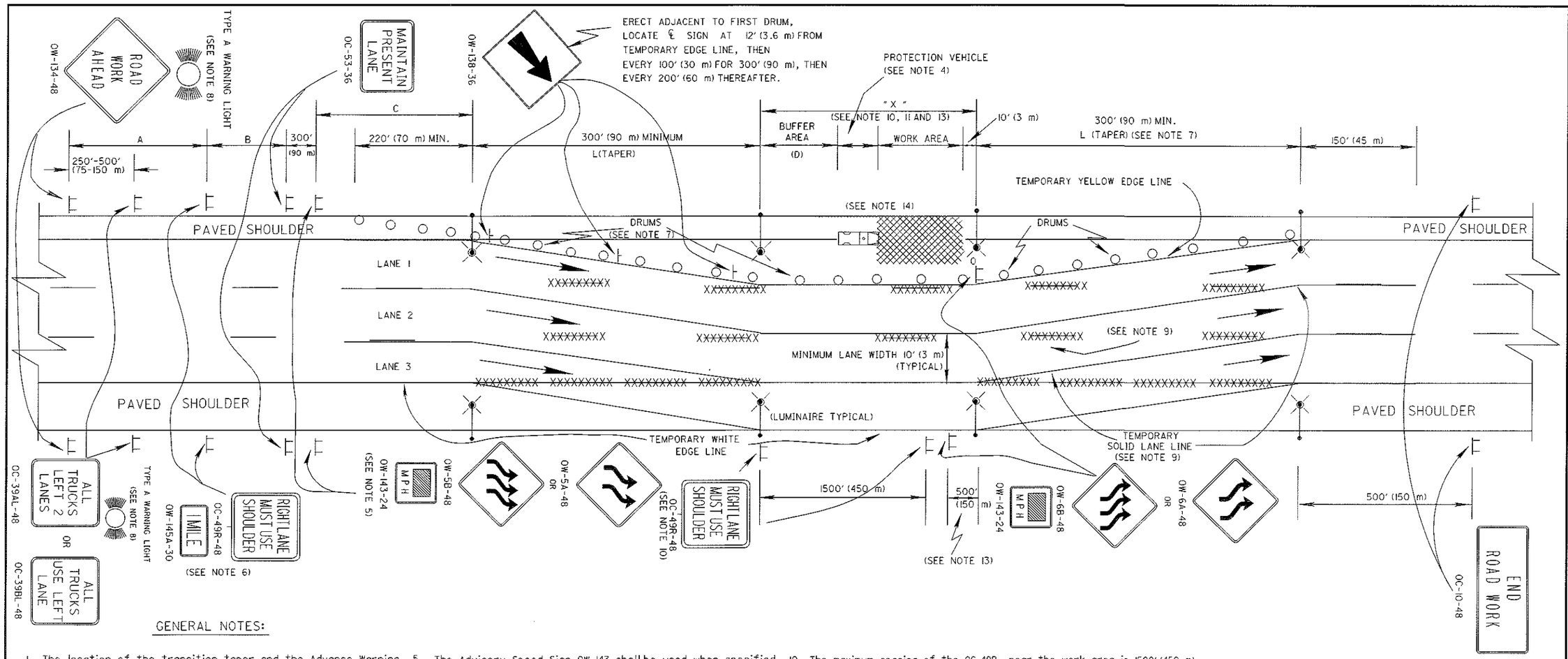

GENERAL NOTES:

1. The location of the transition taper and the Advance Warning Signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.
2. The spacing between proposed signs should be adjusted to not conflict with and to provide a minimum of 200' (60 m) clearance to existing signs.
3. This traffic control plan should be used when the work area extends into either the right or left hand lane of a multiple lane divided highway and it is not desirable, for capacity reasons, to reduce the number of available lanes. The minimum resultant width of any lane is 10' (3 m). The plan shown is for a Left-Lane closure. When there is a Right-Lane closure, make the following sign substitutions: an OC-49L for the OC-49R: an OC-39AR, for the OC-39AL: an OW-6A or OW-6B for the OW-5A or OW-5B: and an OW-5A or OW-5B, for the OW-6A or OW-6B.
4. The protection vehicle shown at the beginning of the work area shall be in place and unoccupied whenever workers are in the work area. This vehicle shall be removed from the pavement whenever workers are not in the work area. Other protective devices may be used in lieu of the protection vehicle shown when approved by the Engineer. The vehicle shall be equipped with a 360 degree rotating or flashing amber beacon clearly visible a minimum of 1/4 mile (400 m).
5. The Advisory Speed Sign OW-143 shall be used when specified in the plan.
6. The distance plate OW-145A shall indicate the distance to the beginning of the pavement taper (L). Distances less than 1 mile may be expressed in feet.
7. The Taper Rate (R) of drums shall be based upon the average approach speed or speed limit whichever is greater and shall be as shown in Table II, except that the resulting length of taper should not be less than 300' (90 m). The taper (L) shall equal the Taper Rate (R) multiplied by the offset (O). A minimum of five channelizing devices shall be used to form the taper on the shoulder.
8. The Type A Flashing Warning Lights shown on OW-134 signs, and OC-39AL signs are required.
9. The existing conflicting Pavement Markings and Reflectors from the Raised Pavement Markers (RPM's) shall be removed and the appropriate color Temporary Lines shall be applied. Temporary Lines which would conflict with final traffic lanes shall be removable (740.06 Type-I) tape unless the area will be resurfaced in the next work phase. After completion of the work, Temporary Markings shall be removed in accordance with 641.10 and the original markings and Raised Pavement Marker Reflectors shall be restored at no additional cost.
10. The maximum spacing of the OC-49R, near the work area is 1500' (450 m). When the distance "X" is less than 1700' (520 m), the second OC-49R should be deleted. Also if it would be within 200' (60 m) of the OW-6A or OW-6B sign the OR-49R sign should be deleted.
11. Lighting poles not located behind existing guardrail shall be set back 40' (12 m) from edge of the nearest traffic lane (including any shoulder or temporary pavement used as a traffic lane). Where local conditions prevent the 40' (12 m) set back, it may be reduced to 30' (9 m) with the approval of the Engineer. When located behind existing guardrail, light poles shall be a minimum of 3' (.9 m) clear from back of guardrail post to face of pole. Any poles provided for power service shall be set back at least as far as the lighting poles. Spacing and type of luminaires shall provide an average illumination of 1.0 to 1.2 foot candles (10.8 lux to 12.9 lux) with max. uniformity ratios of 4:1 average to minimum and 10:1 maximum to minimum throughout the lighted area. When tapers are required to be lighted and dimension "X" is less than 2000' (600 m) lighting shall be continuous between tapers.
12. The OC-10 signs are only required for lane closures of more than one day and may be omitted if they fall within the limits of a Construction Project.
13. If distance "X" is less than 1000' (300 m), place the OW-6A or OW-6B sign at the mid point of distance "X".
14. All material and equipment shall be removed from work area when no work is being done.

TABLE II

SPEED (MPH)	TAPER RATE (R)	MAXIMUM SPACING (S) OF DRUMS	BUFFER (D)
30 - 40	27:1	30' (9 m)	170' (52 m)
45 - 55	55:1	40' (12 m)	335' (102 m)
60 - 65	65:1	60' (18 m)	485' (148 m)

TABLE I

MINIMUM DISTANCE	A FT (m)	B FT (m)	C FT (m)
MAJOR STANDARD	500' (150)	500' (150)	500' (150)
FREEWAY & EXPRESSWAY	2600' (780)	1600' (480)	1000' (300)

TRANSITION PLAN FOR USE OF SHOULDER WITH DRUMS

10-18-02

OFFICE OF TRAFFIC ENGINEERING

MT-102.20

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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 2' (0.6 m) behind face of curb.

   C) Uncurbed roadway- 12' (3.6 m) from edge of traffic lane or 6' (1.8 m) from edge of paved or useable shoulder, whichever is greater.

   D) Behind guardrail or barrier - preferably 2' (0.6 m) behind face of guardrail (minimum 1' (0.3 m)) for signs on class a supports: 4' (1.2 m) for Class B or C supports: 1' (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 - 5' (1.5 m) when parked cars, construction equipment, etc will not obscure sign visibility.

   B) Rural areas with parked cars or construction equipment - 7' (2.1 m)

   C) Urban - 7' (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 400' (120 m) to 600' (180 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 1' (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 may only be used where fully protected by guardrail, concrete barrier and in locations positively protected from traffic such as on retaining walls.

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 30' (9 m) FROM EDGE OF PAVEMENT	WITHIN 30' (9 m) FROM EDGE OF PAVEMENT
40 AND HIGHER	A OR B	A OR B	A OR B **	A ONLY
26 TO 39	A OR B	A OR B	A OR B	A OR B
0 TO 25	A OR B	A OR B	A OR B	A OR B

* If supports are behind guardrail but not fully 5'6" (1.7 m) behind face of rail or if sign is not 1' (0.3 m) behind face of concrete barrier.

** 30' (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 1' (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 1' (0.3 m) deep by 1' (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.

3) Supports that are not NCHRP 350 compliant.

CLASS A SUPPORTS

FIXED SUPPORTS

1) All #2 and #3 posts when installed singly or in pairs (side by side) according to the details of TC-41.20. The number of supports shall be as shown on TC-52.10 and TC-52.20.

2) The following post types, when installed singly, by imbedment or driving into earth to a depth of about 42 inches (1.1 m).

   A) - up to 4"x4" (102x102 mm) wood.

   B) - up to 2" (51 mm) diameter schedule 40 steel pipe.

   C) - up to 3" (76 mm) diameter schedule 40 aluminum pipe.

   D) - up to 2¼" (56.4 mm) square, 12 gauge wall, punched steel post.

   E) - up to 6"x8" (152x203 mm) wood with breakaway holes shown on MT-105.11.

3) The following post types when installed in pairs (side by side) with less than 6'-⅝" (2 m) between posts, by imbedment or driving into earth to a depth of about 42 inches (1.1 m):

   A) - up to 4"x4" (102x102 mm) wood.

   B) - up to 2" (51 mm) diameter schedule 40 steel pipe.

   C) - up to 3" (76 mm) diameter schedule 40 aluminum pipe.

   D) - up to 2" (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-41.10 with a minimum clear distance between supports of 7' (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-105.11)

10-18-02

TEMPORARY SIGN SUPPORT I

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MT-105.10

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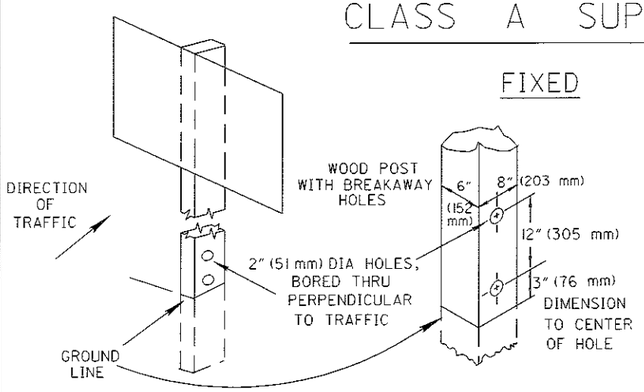
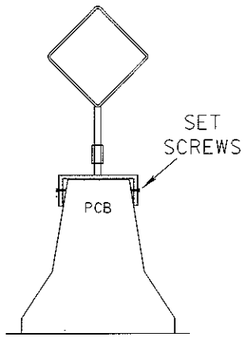
CLASS A SUPPORTS

FIXED



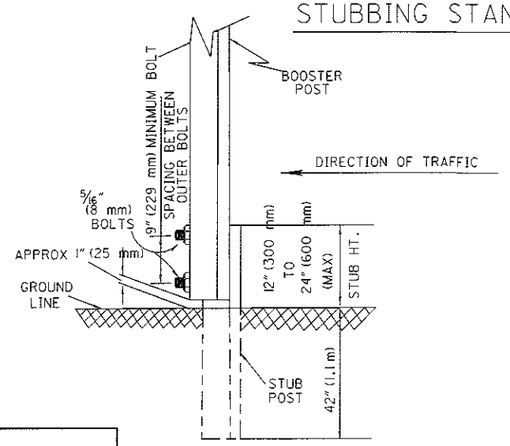
TYPE E (6"x8" max.)



TYPE I

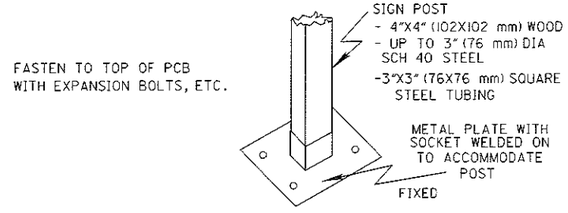
CLASS A SUPPORTS

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 LB/FT (1.5 kg/m) LESS THAN STUB POST

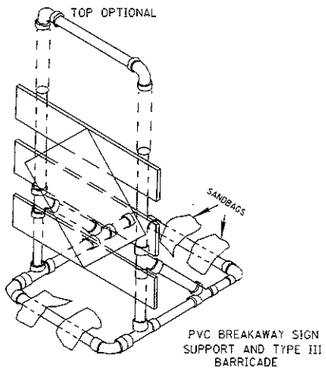


TYPE 2

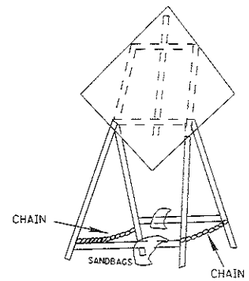
NOTE: SPECIFIC INFORMATION SEE MT-105.10

CLASS A SUPPORTS

PORTABLE

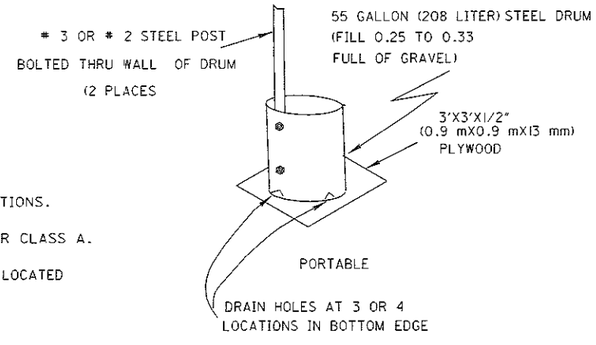


PVC BREAKAWAY SIGN SUPPORT AND TYPE III BARRICADE



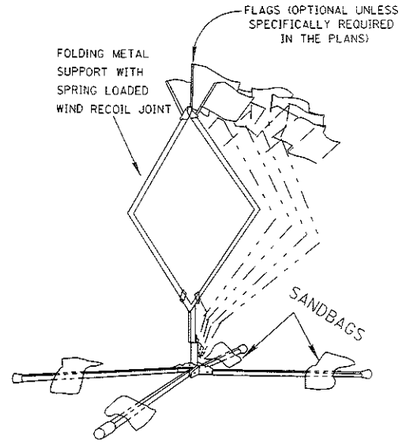
EASEL

CLASS B SUPPORTS



PORTABLE

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



10-18-02

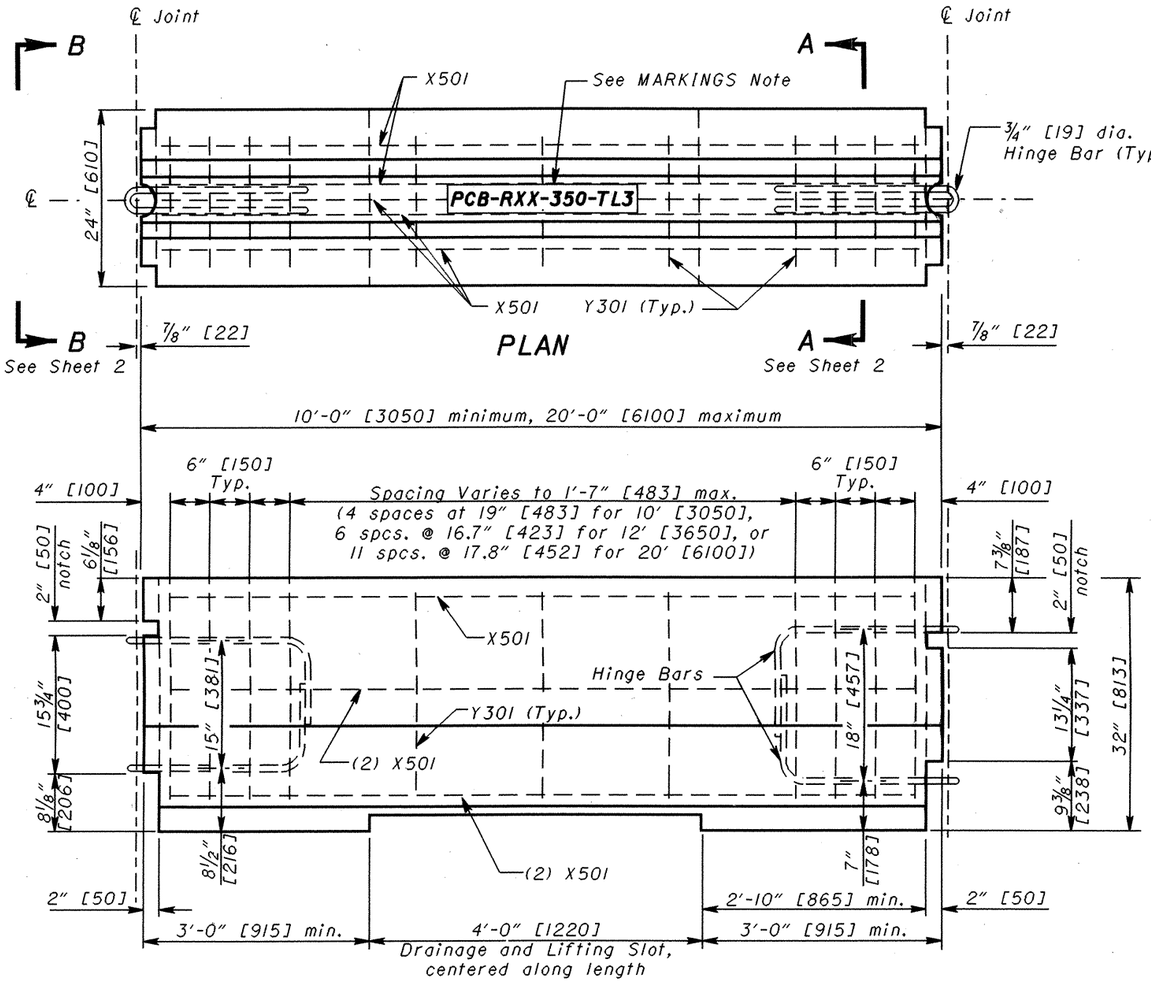
TEMPORARY SIGN SUPPORT II

OFFICE OF TRAFFIC ENGINEERING

MT-105.11

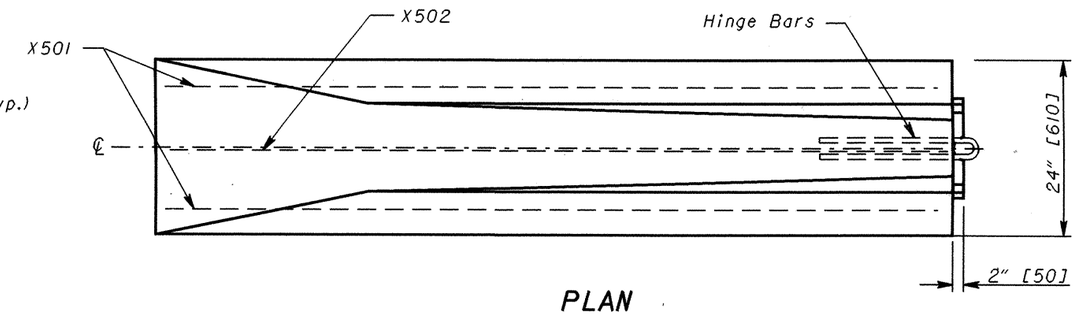
1 / 1

JAM

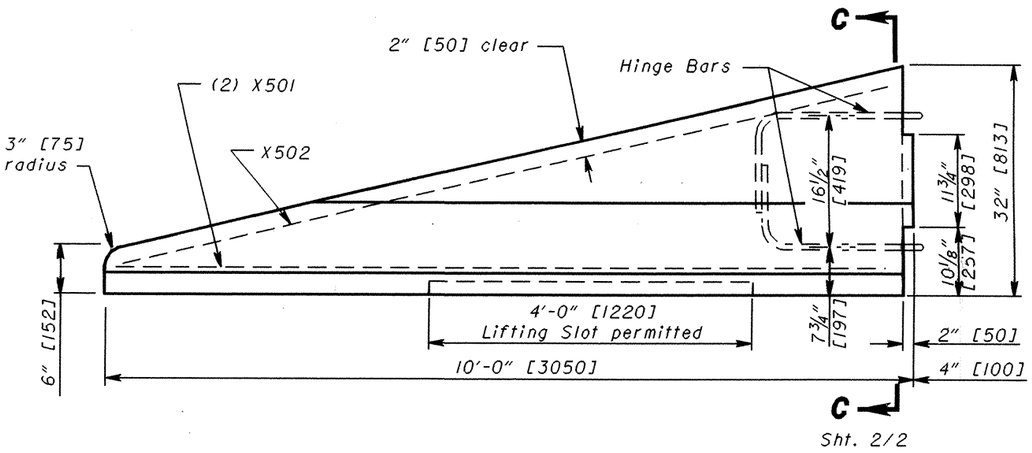


ELEVATION

32" [813-mm] BARRIER SECTION



PLAN



The Tapered End section is not a crashworthy terminal and should not be used on the approach end of temporary barrier unless it is fully located beyond the clear zone.

ELEVATION

32" [813] TAPERED END

NOTES

GENERAL: *See CMS 622 for additional information.*

PORTABLE CONCRETE BARRIER (PCB): *PCB, as shown, shall not be used on bridge deck edges. PCB, Bridge Mounted, shall be used at such locations in accordance with* ***Structural Engineering's Standard Drawing PCB-91 [PCB-91M].***

CONNECTING HARDWARE: *Bolts, washers and hex nuts shall be galvanized after fabrication per CMS 711.02 and shall meet the requirements of CMS 711.09 except that the Rotational Capacity test specified in ASTM A 325 shall be waived.*

In lieu of the pin and loop connections detailed on this Standard Construction Drawing, barrier sections with "J-J Hooks" end connections may be utilized.

Transition barrier sections with pin and loop connections on one end and "J-J Hooks" on the other shall be used to connect runs of "J-J Hooks" barrier to other permitted barrier types. The heights of the transition sections shall be the same as the barrier runs being connected.

"J-J Hooks" is a trademark of Easi-Set Industries, P.O. Box 300, Midland, VA 22728, (540) 439-8911 or (800) 547-4045.

HINGE AND REINFORCING BARS: The ¾" [19] hinge may be ASTM A-36. Rebars shall meet the requirements of CMS 509. Black steel is permitted.

HANDLING DEVICES: *Such devices may be used in lieu of the lifting slot for moving the barrier. They may be of any design sufficient to safely handle the weight of the section being lifted. No handling devices shall protrude from the surface of the barrier when in place.*

MARKINGS: *All barrier segments shall be marked on the top, as shown, where XX indicates the year cast. These markings shall be permanently impressed in the barrier using a minimum of 2" [50] high lettering. The tapered end section is not required to be marked.*

Each segment, including the tapered end section, shall have on its top, a unique identification as to its manufacturer. And somewhere on the barrier, the day and the month that the barrier was manufactured.

REFLECTORIZATION: *Barrier reflectors shall be installed in accordance with* ***Traffic Engineering Standard Drawing MT-95.82,*** *when specified in the plans.*

THIS DRAWING REPLACES RM-4.2 DATED 1-18-02.

OHIO DEPARTMENT OF TRANSPORTATION — 4-18-03 — DATE
STDS. ENGR. — D. Focke
ROADWAY DESIGN ENGINEER

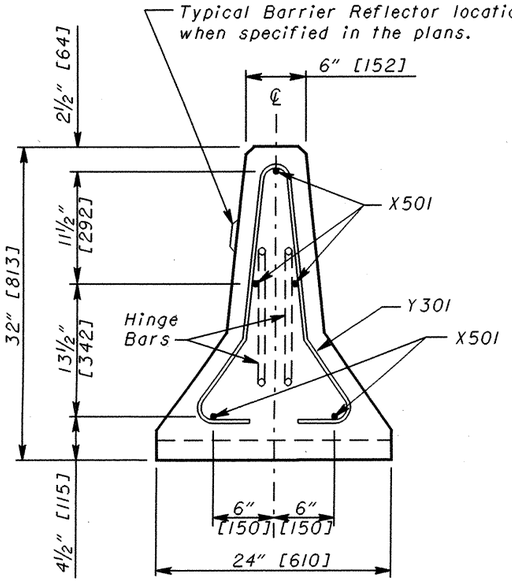
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING

32" PORTABLE CONCRETE BARRIER

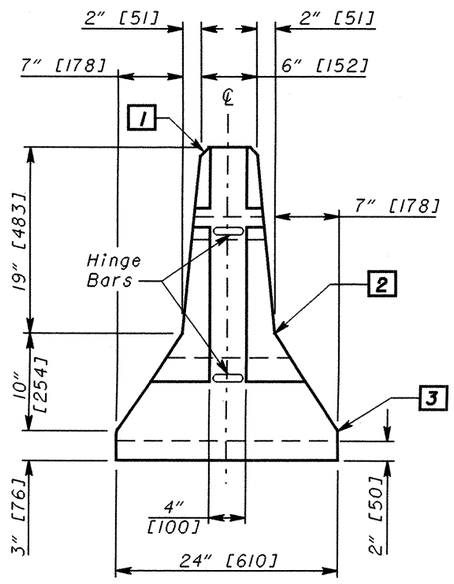
NUMBER RM-4.2



Vertical edges on Lifting Slot may be battered. Depth 2" ±¼" [50±6].

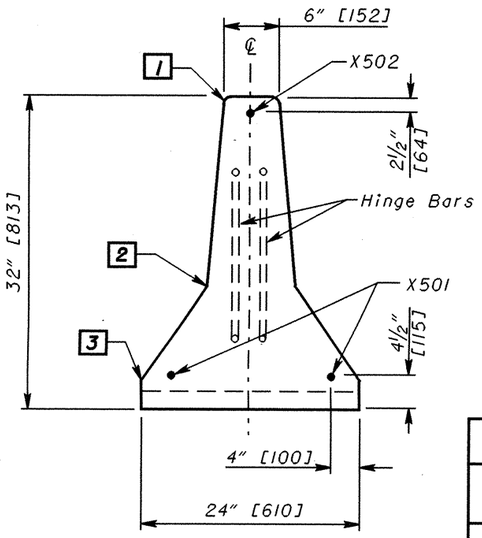
SECTION A-A

See Sheet 1.



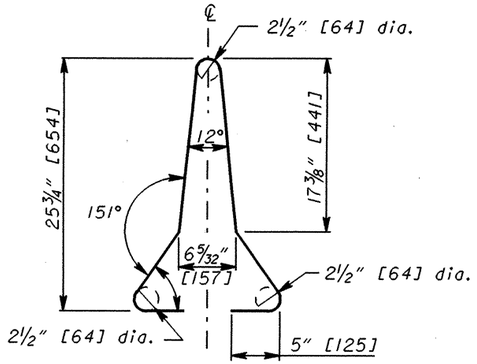
VIEW B-B

See Sheet 1.



SECTION C-C
Tapered End Section

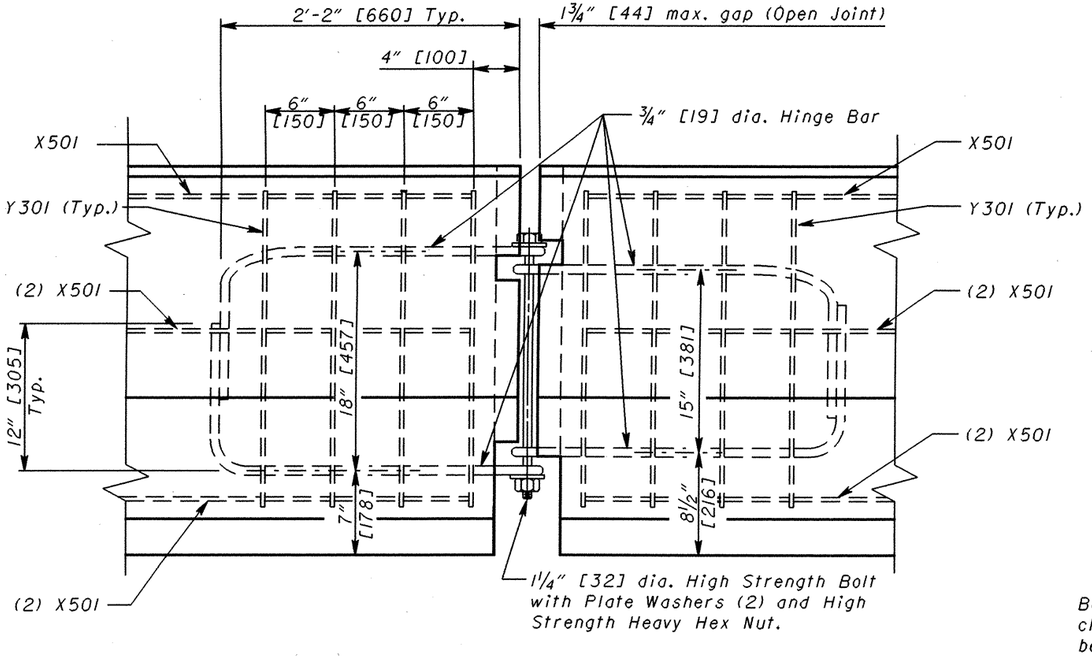
See Sheet 1.



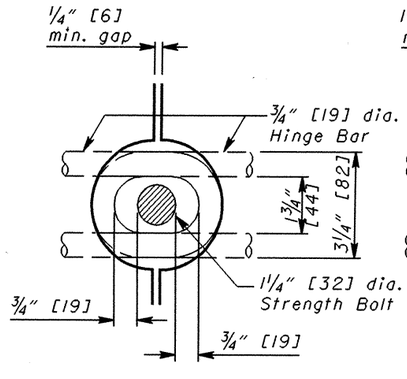
Y301
BENDING DIAGRAM

REINFORCING BAR LIST

	Mark	Bar	Bar Length	Shape	Quantity per typ. length 10' [3050]	12' [3660]	20' [6100]
BARRIER SECTION	X501	#5 [#16M]	9'-4" [2850]	Str.	5	---	---
			11'-4" [3450]	Str.	---	5	---
			19'-4" [5890]	Str.	---	---	5
	Y301	#3 [#10M]	5'-5" [1650]	Bent	11	13	18
TAPERED END	X501	#5 [#16M]	9'-6" [2900]	Str.	2	---	---
	X502	#5 [#16M]	9'-8" [2950]	Str.	1	---	---

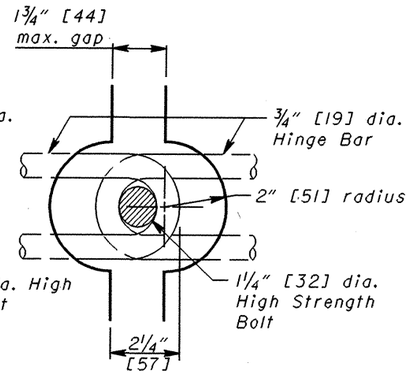


DETAIL AT HINGED CONNECTION



CLOSED JOINT

Barriers shall initially be placed close together so that Bolts can be easily inserted through Hinge Bar loop.



OPEN JOINT

Barrier joints shall be fully open before the Nut is tightened onto Bolt.

JOINT CONNECTION DETAILS

LEGEND

1. 1" [25] radius or ¾" [19] chamfer, all top and end corners.
2. Permissible 10" [250] radius.
3. Permissible 1" [25] radius.

THIS DRAWING REPLACES RM-4.2 DATED 1-18-02.

OHIO DEPARTMENT OF TRANSPORTATION — DATE 4-18-03
STDS. ENGR. D. Focke
ROADWAY DESIGN ENGINEER

All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

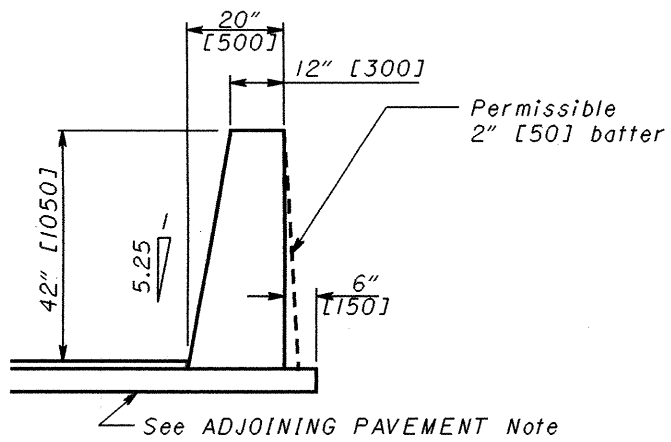
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING

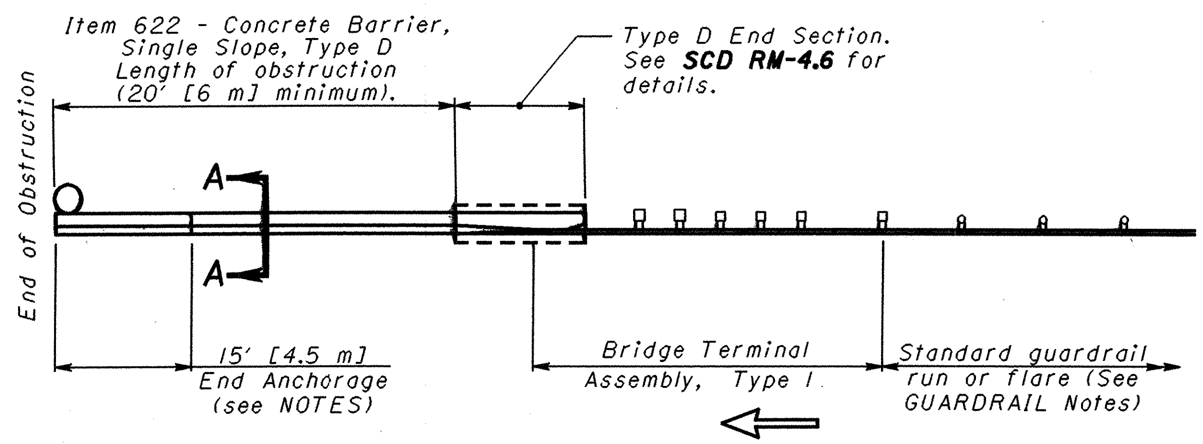
32" PORTABLE CONCRETE BARRIER

NUMBER RM-4.2

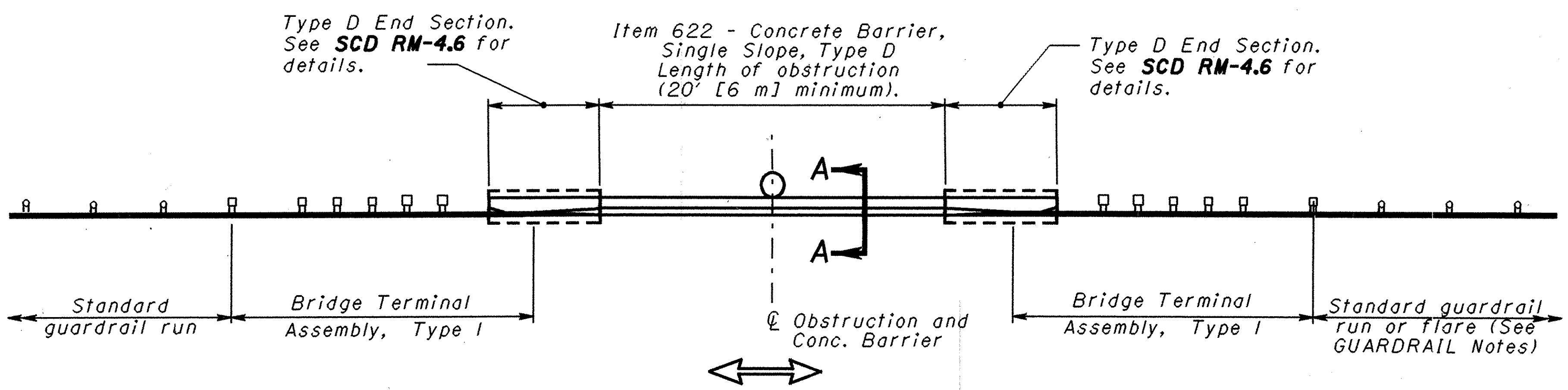
2 / 2



SECTION A-A



Directional Travel where no trailing guardrail is used.



Use Bridge Terminal Assembly, Type 2 for directional roadways where trailing guardrail is used and is out of the Clear Zone of opposite direction traffic.

Bi-directional Travel or Directional Travel where trailing guardrail is used.

TYPICAL INSTALLATIONS CONCRETE BARRIER AT OBSTRUCTIONS

NOTES

GENERAL: Single Slope Concrete Barrier, Type D, may be cast-in-place or slip-formed. See **SCD RM-4.3** for other standard barrier types and any details not shown, including materials, adjoining pavement, and doweling details. Longitudinal steel is not required when top width of barrier is 12″ [300] or greater.

CONTRACTION JOINTS: Maximum allowable spacing of unsealed joints is 20′ [6.0 m] throughout the run of the barrier. Construct joints by using metal inserts inside the forms, preformed full width joint filler, a grooving tool, or by sawing. Inserts, tooled or sawed joints will have a 3″ [75] minimum depth.

Construct all joints for the full height of the barrier. Saw as soon as curing will allow to prevent spalling. When used in conjunction with concrete pavement, match joints to those in the concrete pavement but not exceeding the maximum allowable spacing.

ADJOINING PAVEMENT: When the barrier is constructed in conjunction with new asphalt pavement, place it directly on the intermediate course. Construct the surface course directly against the barrier. Set barrier placed on existing pavement with a continuous wedge of surface material tapering from a 1″ [25] minimum thickness at the toe of the barrier to zero. For unidirectional installations, construct the wedge on the traveled way side and the width may be reduced to 12″ [300] minimum.

When the barrier is constructed in conjunction with new concrete pavement, place it directly on the base material. Construct the concrete slab against the barrier.

Barrier may be placed on top of existing concrete pavement and doweled as shown in DOWELING DETAILS (see Sheet 2). When pavement is to be constructed on one side of the barrier only, then compacted soil on the opposite side must be placed against the barrier at a minimum height of 3″ [75].

SEALING JOINTS: Use a butt longitudinal joint between the barrier and any adjoining concrete pavement sealed with CMS 705.04 joint sealer.

INCORPORATED INSTALLATIONS: For barrier installations that cannot be constructed at the normal guardrail offset the incorporated installations shown on Sheet 2 may be installed at vertical wall, piers or other similar obstructions.

For pier-incorporated installations the contractor may use the optional treatment, forming the back face of the Single Slope Barrier, Type D, to the location shown (between piers only), with any additional cost being included in the cost of Item 622.

END SECTIONS: End Sections are used when barrier connects to Bridge Terminal assemblies, Guardrail runs, or Impact Attenuators. See **SCD RM-4.6** for Type D End Section details.

END ANCHORAGE: At barrier ends not requiring End Sections, construct a reinforced End Anchorage as shown on Sheet 2. See Sheet 2 for additional Notes.

GUARDRAIL: For Bridge Terminal Assembly, Type 1, details and connections, see **SCD GR-3.1**.

Barrier installations that cannot be constructed at the normal guardrail offset and are to be connected to the approach or trailing guardrail runs shall have a 25:1 guardrail taper to meet the existing or normal guardrail offset.

Installations that are not to be connected to the approach or trailing guardrail runs must include the standard guardrail flare as per **SCD GR-5.1**.

PAYMENT: will be made at the unit price bid per Feet [Meter] for **Item 622 - Concrete Barrier, Single Slope, Type D.** Include all materials and labor to construct the Barrier, and any End Anchorages, as shown.

THIS DRAWING REPLACES RM-4.5M DATED 10-21-97.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
DATE 4-18-03

STDS. ENGR. D. Focke

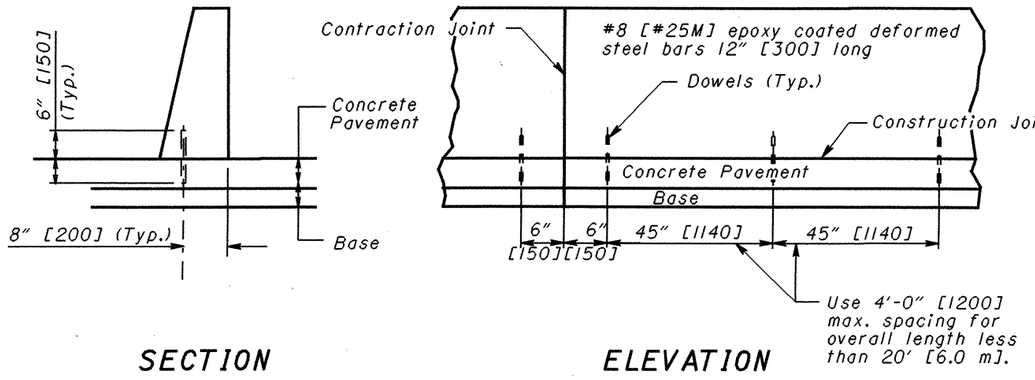
All metric dimensions (in brackets []) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
SINGLE SLOPE BARRIER, TYPE D

NUMBER RM-4.5

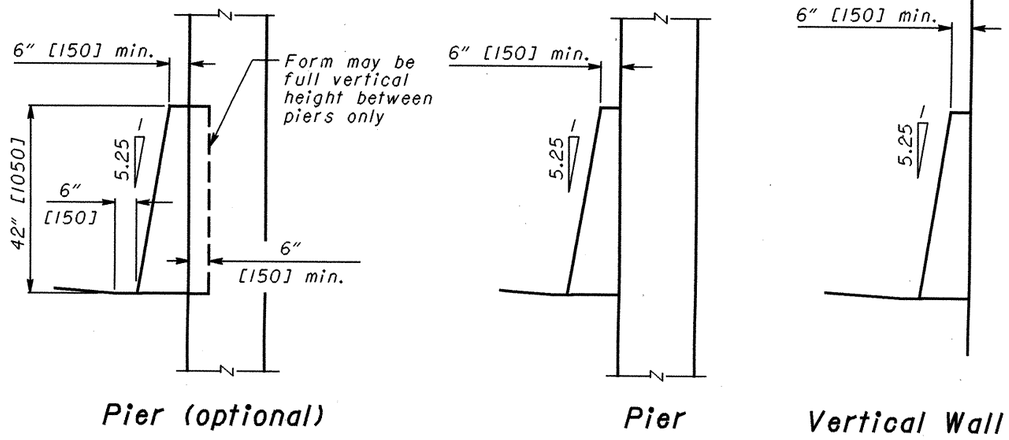
1/2



SECTION ELEVATION

DOWELING DETAILS

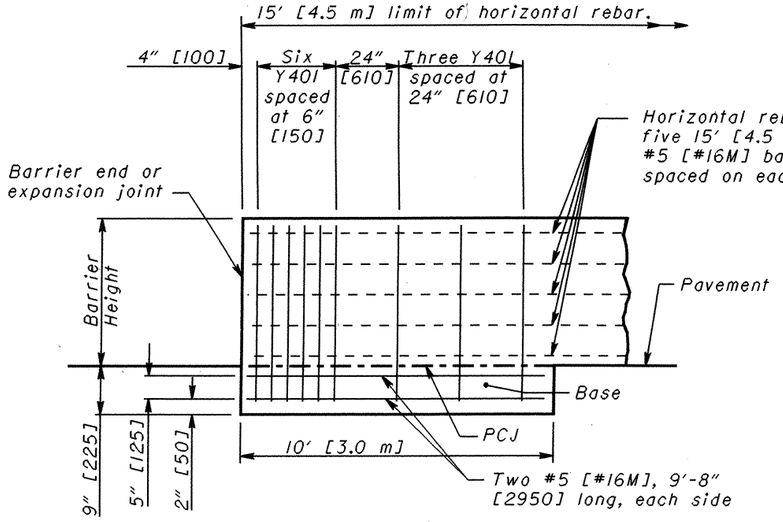
See ADJOINING PAVEMENT Notes on Sheet 1



Pier (optional) Pier Vertical Wall

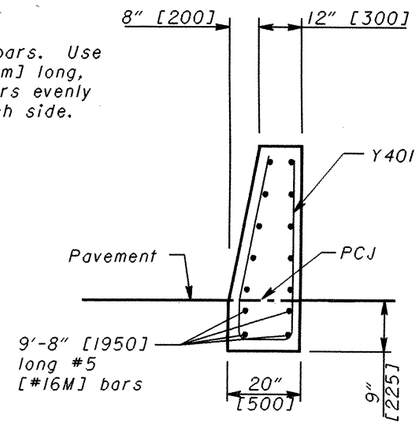
INCORPORATED INSTALLATIONS

See Notes on Sheet 1

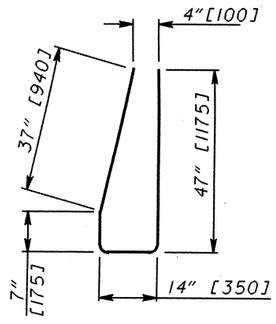


ELEVATION

Barrier section shown on Sheet 1



SECTION



Y401
#4 [#13M]

BENDING DIAGRAM

END ANCHORAGE

See Notes on Sheet 1 and 2.

NOTES

END ANCHORAGE: Reinforced End Anchorages are required at ends and at interuptions in Concrete Barrier. When barrier does not abut another barrier run, construct the last 15' [4.5 m] using the END ANCHORAGE Detail.

At all expansion joints, construct an End Anchorage on both sides of the joint,, with a maximum gap of 2" [50] for the open joint.

It the barrier abuts barrier shown on other SCD's or plans (such as another barrier Type, Transitiitions, End Sections, Tapered Ends or Inlets), then carry the horizontal rebar throughout a permissible construction joint to continuously reinforce abutting barrier. End Anchorages are not needed.

Base may be constructed with permissible construction joint (PCJ).

THIS DRAWING REPLACES RM-4.5M DATED 10-21-97.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
4-18-03 DATE

STDS. ENGR. D. Focke

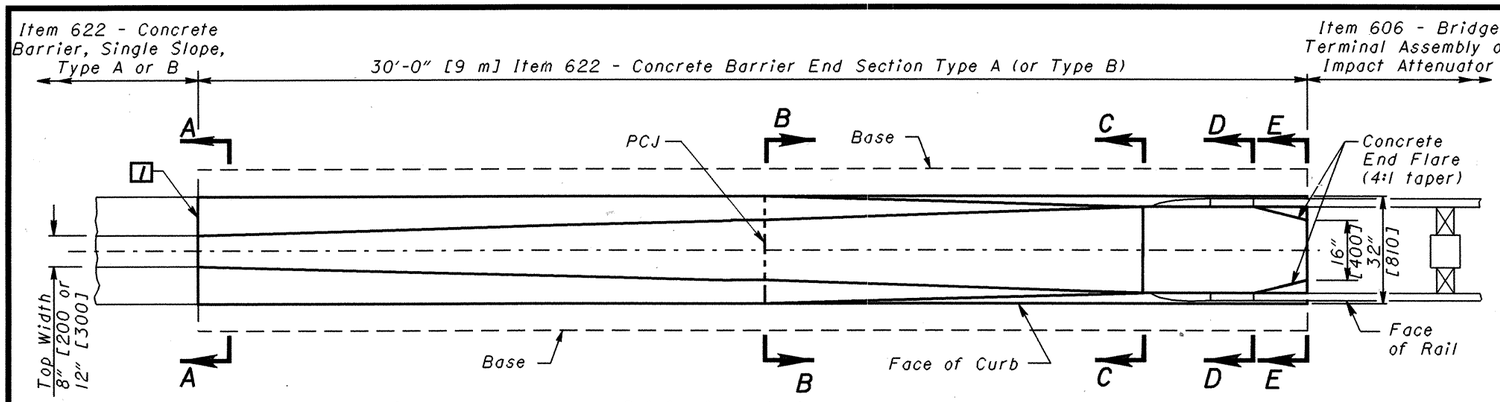
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
SINGLE SLOPE BARRIER, TYPE D

NUMBER RM-4.5

2 / 2

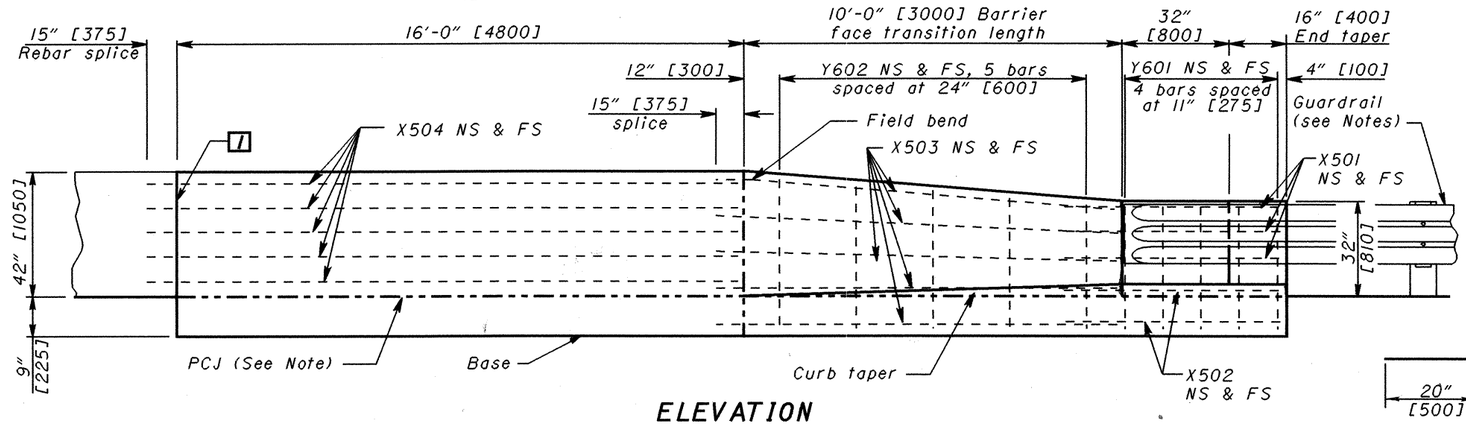


PLAN

LEGEND

[I] Contraction Joint. See NOTES on **SCD RM-4.3,** Provide rebar cover of 3½" [90].

NS = Near Side
FS = Far Side



ELEVATION

BARRIER END SECTION TYPES A, AND B

NOTES

GENERAL: This End Section is to be used in median applications when traffic is on both sides and attaches to a Single Slope Concrete Barrier, Type A or B. See **SCD RM-4.3** for Single Slope Barrier details and materials. Provide 2" [50] concrete cover over rebars, except as noted.

GUARDRAIL: For Bridge Terminal Assembly and attachment details see **SCD GR-3.5.** Information on Impact Attenuators is found in **Location & Design Manual, Voume 1,** Section 603.

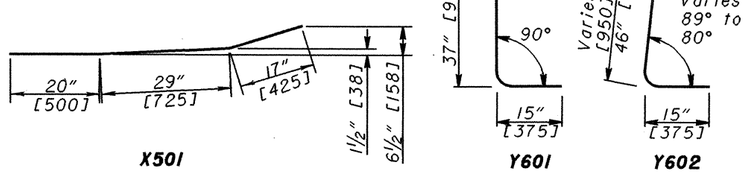
BARRIER FACE TRANSITIONS: To prevent vehicle snagging, smooth transitions from vertical faces to the single slope faces are made over a 10' [3000] distance.

PCJ: Permissible Construction Joint. In the unreinforced base section, barrier may be placed on top of concrete base if doweled as shown on **SCD RM-4.3.**

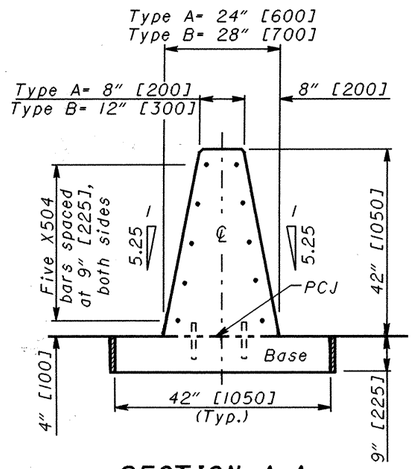
PAYMENT: Payment for the Concrete End Section shall be made at the unit price for **Item 622 - Concrete Barrier End Section, Type ___ (A, or B), Each,** and shall include all materials, labor, and reinforcing steel required to construct the barrier end section as shown.

Types A & B STEEL LIST

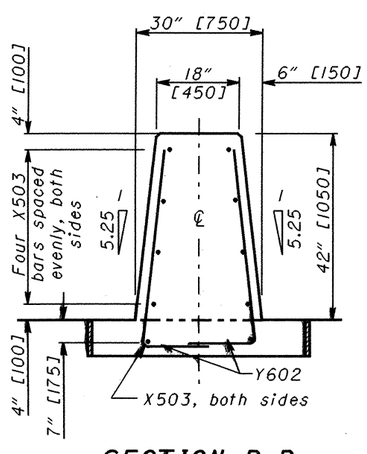
Mark	Bar	Shape	No.	Length
X501	#5 [#16M]	Bent	6	5'-6" [1650]
X502	#5 [#16M]	Str.	4	5'-6" [1650]
X503	#5 [#16M]	Str.	10	11'-1" [3325]
X504	#5 [#16M]	Str.	10	17'-2" [5150]
Y601	#6 [#19M]	Bent	10	4'-2" [1250]
Y602	#6 [#19M]	Bent	2 series of 5	Varies: 4'-3" [1275] to 5'-3" [1575]



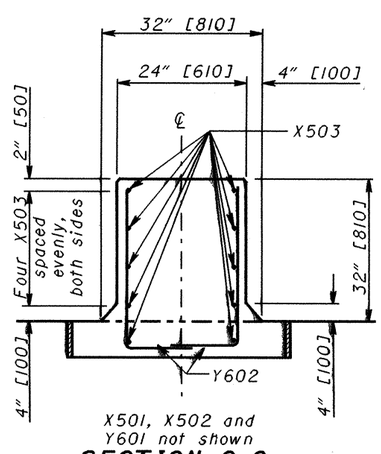
BENDING DIAGRAMS



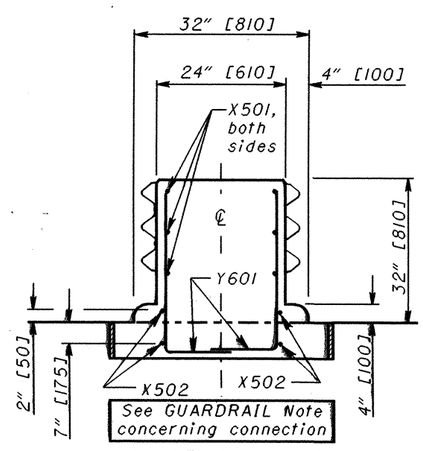
SECTION A-A



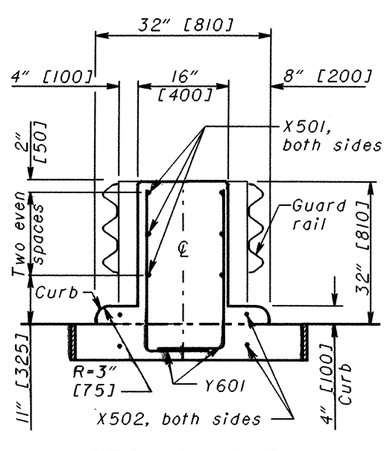
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

THIS SHEET REPLACES RM-4.6 DATED 4-18-03.

OHIO DEPARTMENT OF TRANSPORTATION — DATE: 1-16-04
STDS. ENGR. D. Focke
ROADWAY DESIGN ENGINEER

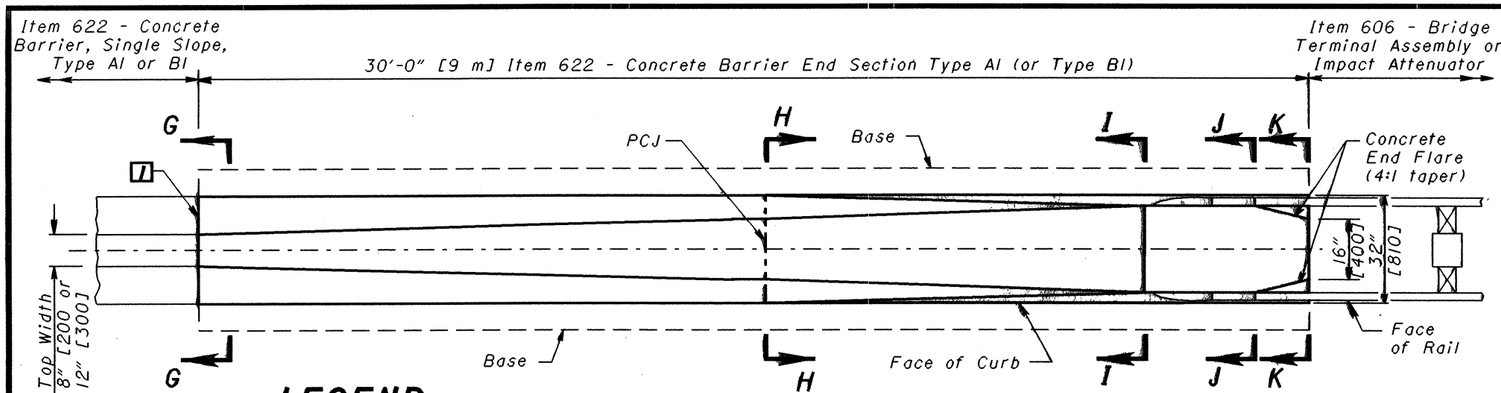
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
CONCRETE BARRIER END SECTIONS (Types A & B)

NUMBER **RM-4.6**

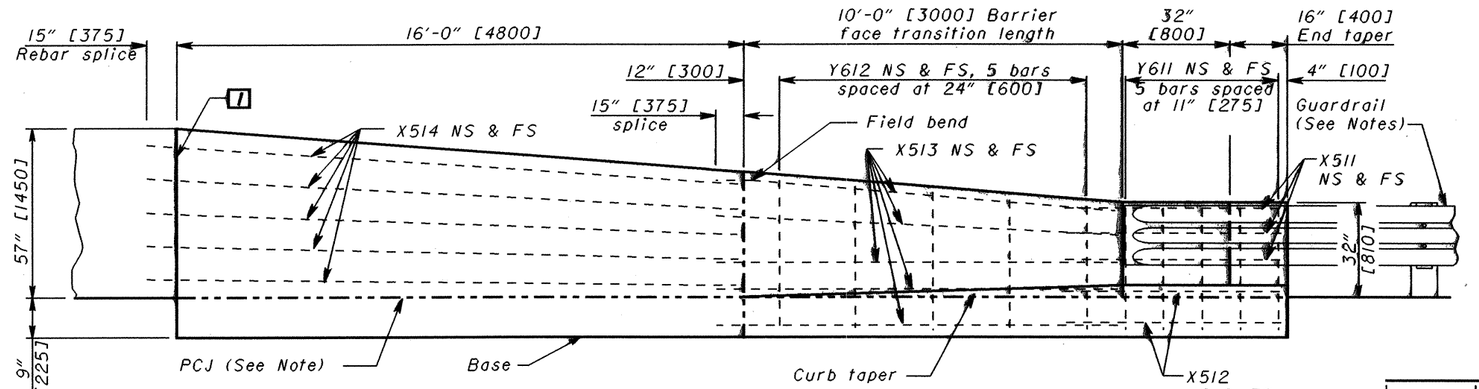
1 / 3



LEGEND

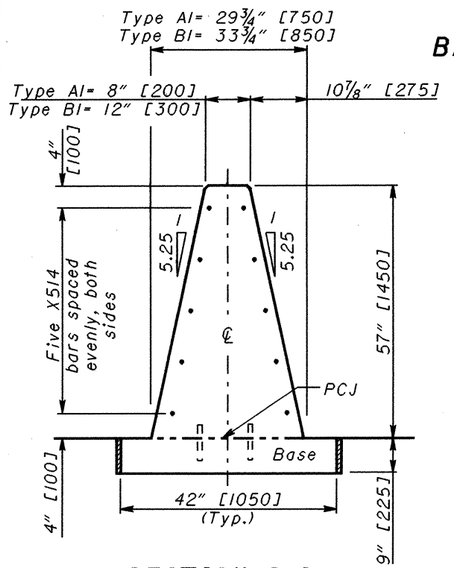
[1] Contraction Joint. See NOTES on **SCD RM-4.3,** Provide rebar cover of 3½" [90].

NS = Near Side
FS = Far Side

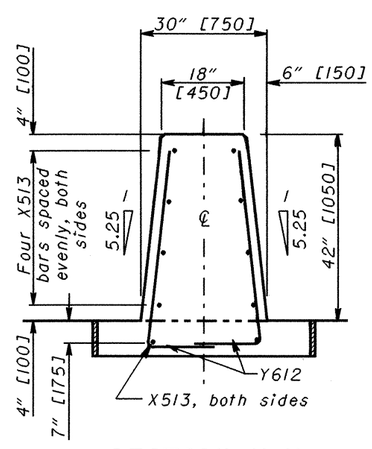


ELEVATION

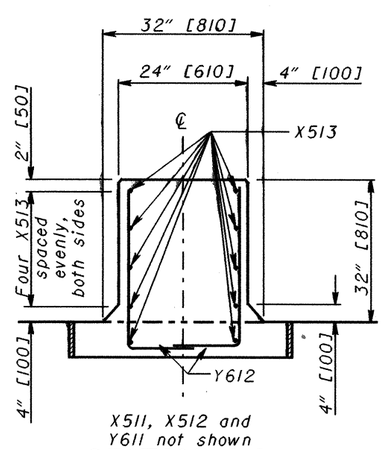
BARRIER END SECTION TYPES AI, AND BI



SECTION G-G

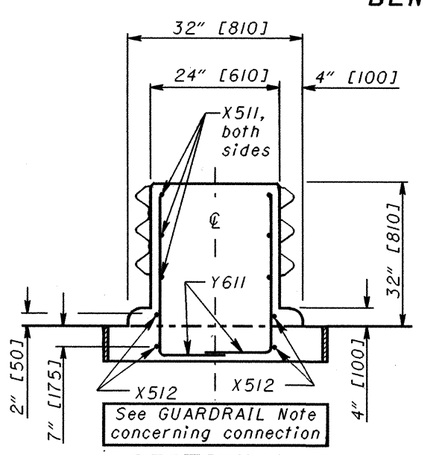


SECTION H-H



X511, X512 and Y611 not shown

SECTION I-I



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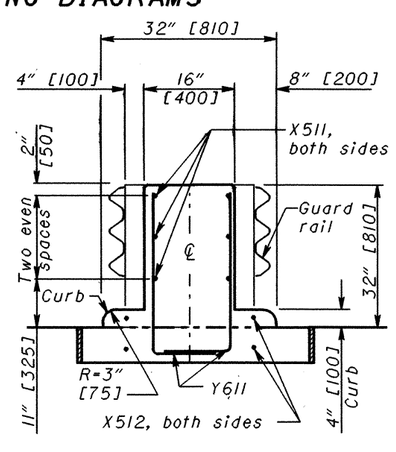
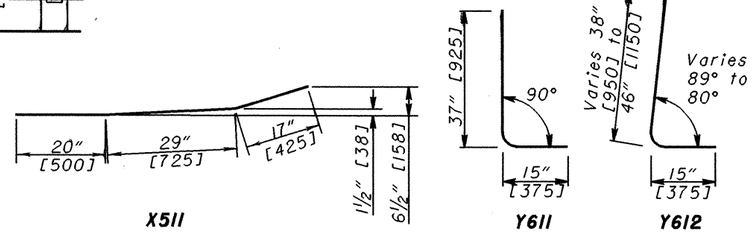


SECTION K-K



BENDING DIAGRAMS

NOTES

GENERAL: This End Section is to be used in median applications when traffic is on both sides and attaches to a Single Slope Concrete Barrier, Type AI or BI. See **SCD RM-4.3** for Single Slope Barrier details and materials. Provide 2" [50] concrete cover over rebars, except where noted.

GUARDRAIL: For Bridge Terminal Assembly and attachment details see **SCD GR-3.5.** Information on Impact Attenuators is found in **Location & Design Manual, Volume 1,** Section 603.

BARRIER FACE TRANSITIONS: To prevent vehicle snagging, smooth transitions from vertical faces to the single slope faces are made over a 10' [3000] distance.

PCJ: Permissible Construction Joint. In the unreinforced base section, barrier may be placed on top of concrete base if doweled as shown on **SCD RM-4.3.**

PAYMENT: Payment for the Concrete End Section shall be made at the unit price for **Item 622 - Concrete Barrier End Section, Type ___ (AI, or BI), Each,** and shall include all materials, labor, and reinforcing steel required to construct the barrier end section as shown.

Types AI & BI STEEL LIST

Mark	Bar	Shape	No.	Length
X511	#5 [#16M]	Bent	6	5'-6" [1650]
X512	#5 [#16M]	Str.	4	5'-6" [1650]
X513	#5 [#16M]	Str.	10	11'-1" [3325]
X514	#5 [#16M]	Str.	10	17'-2" [5150]
Y611	#6 [#19M]	Bent	10	4'-2" [1250]
Y612	#6 [#19M]	Bent	2 series of 5	Varies: 4'-3" [1275] to 5'-3" [1575]

THIS SHEET REPLACES RM-4.6 DATED 4-18-03.

OHIO DEPARTMENT OF TRANSPORTATION — 1-16-04 DATE
Paul F. Ballard
ROADWAY DESIGN ENGINEER

STDS. ENGR. D. Focke

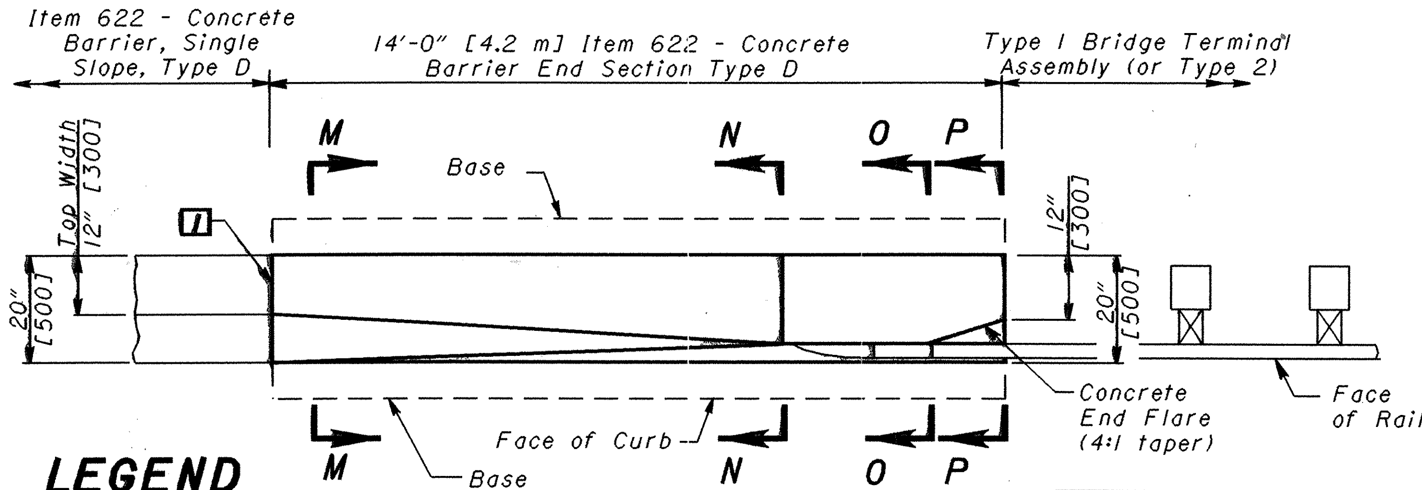
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
CONCRETE BARRIER END SECTIONS (Types AI & BI)

NUMBER **RM-4.6**

2 / 3

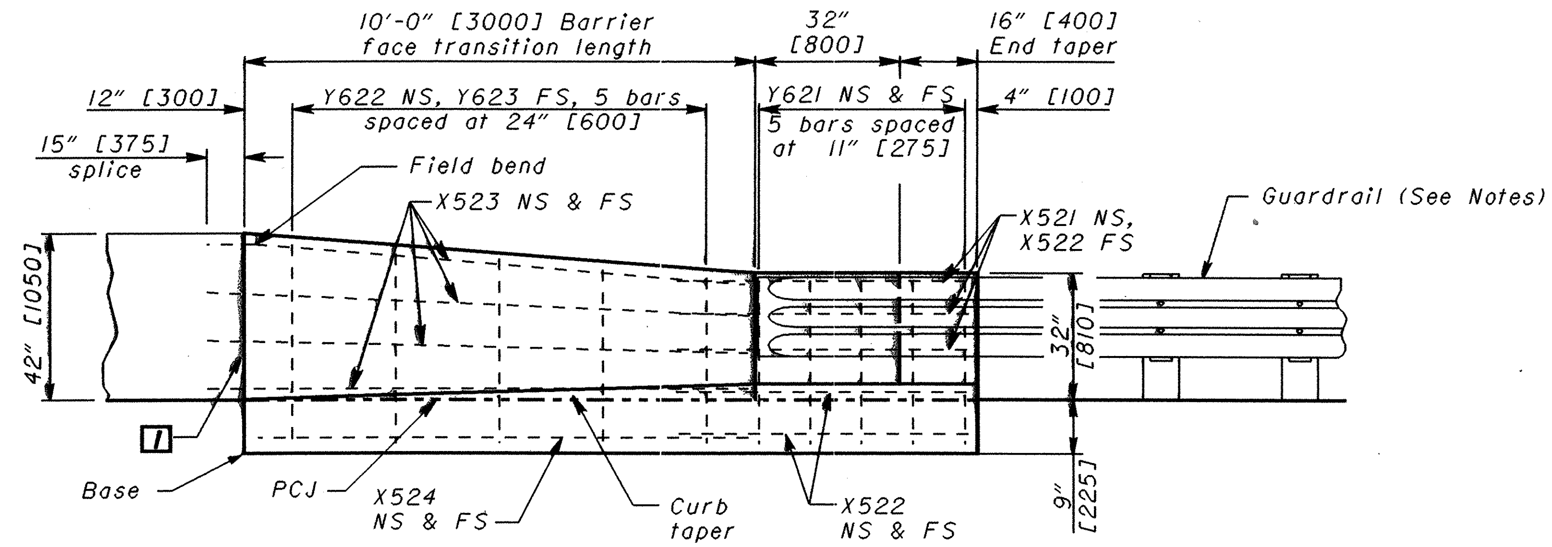


PLAN

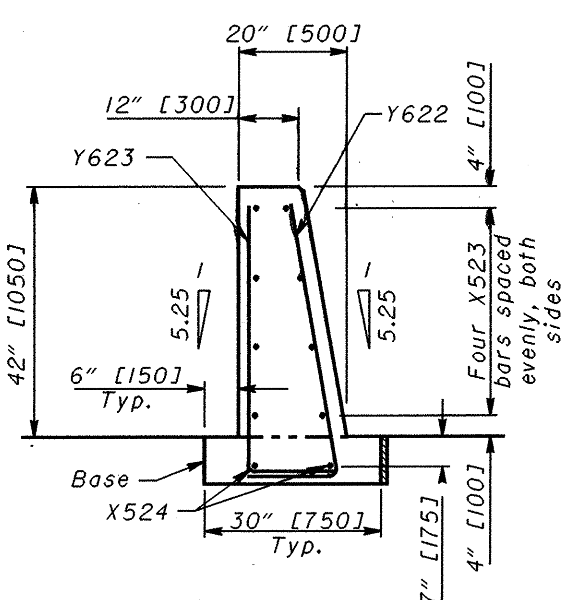
NS = Near Side
FS = Far Side

LEGEND

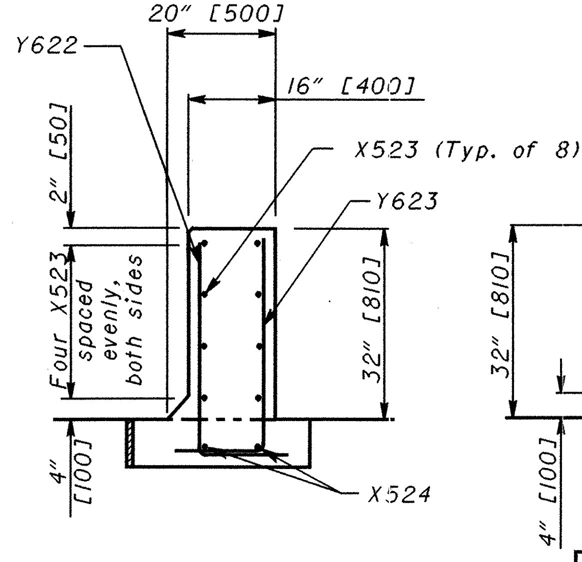
[1] Contraction Joint. See NOTES on **SCD RM-4.3,** Provide rebar cover of 3½" [90].



ELEVATION
BARRIER END SECTION TYPE D

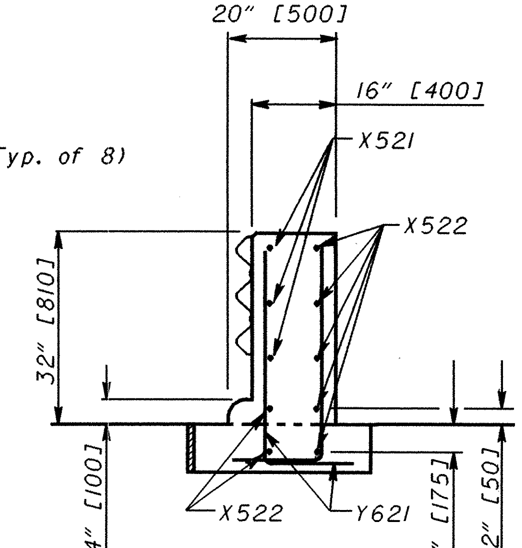


SECTION M-M



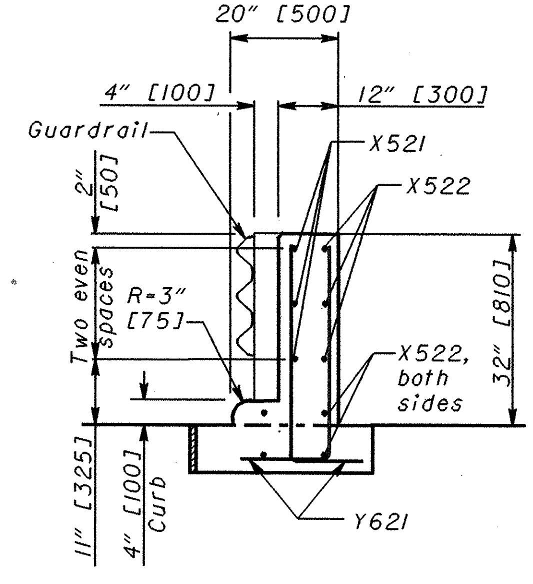
X521, X522 and Y621 not shown

SECTION N-N



See GUARDRAIL Note concerning connection

SECTION O-O



SECTION P-P

NOTES

GENERAL: This End Section is to be used in roadside applications when traffic is only on one side. This section attaches to a Single Slope Concrete Barrier, Type D, as shown on **SCD RM-4.5**. See **SCD RM-4.3** for Single Slope Barrier materials and other details. Provide 2" [50] concrete cover over rebar, except as noted.

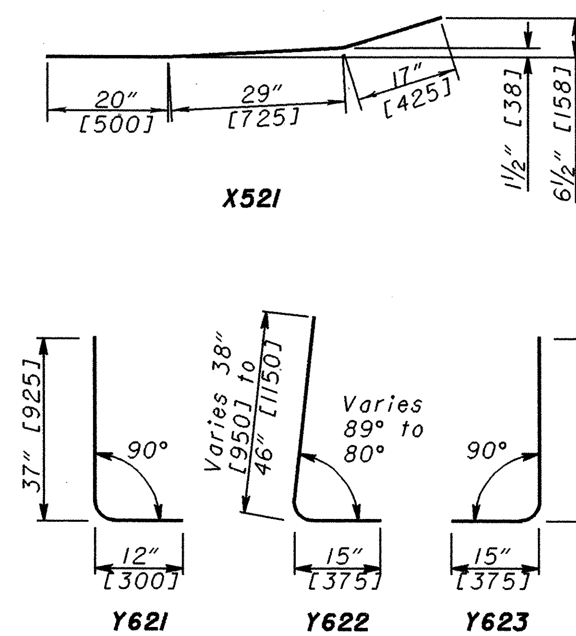
GUARDRAIL: For Bridge Terminal Assembly and attachment details see **SCD GR-3.1** (or **GR-3.2**).

BARRIER FACE TRANSITION: To prevent vehicle snagging, a smooth transition from the vertical face to the single slope face are made over a 10' [3000] distance.

PCJ: Permissible Construction Joint.

PAYMENT: Payment for the Concrete End Section shall be made at the unit price for **Item 622 - Concrete Barrier End Section, Type D, Each,** and shall include all materials, labor, and reinforcing steel required to construct the barrier end as shown.

Type D STEEL LIST				
Mark	Bar	Shape	No.	Length
X521	#5 [#16M]	Bent	3	5'-6" [1650]
X522	#5 [#16M]	Str.	7	5'-6" [1650]
X523	#5 [#16M]	Str.	8	11'-1" [3325]
X524	#5 [#16M]	Str.	2	9'-8" [2950]
Y621	#6 [#19M]	Bent	10	3'-11" [1175]
Y622	#6 [#19M]	Bent	Series of 5	Varies: 4'-3" [1275] to 5'-3" [1575]
Y623	#6 [#19M]	Bent	Series of 5	Varies: 4'-3" [1275] to 5'-3" [1575]



BENDING DIAGRAMS

THIS SHEET REPLACES RM-4.6 DATED 4-18-03.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
1-16-04
DATE
STDS. ENGR. D. Focke
All metric dimensions (in brackets []) are in millimeters unless otherwise noted.
ROADWAY ENGINEERING SERVICES
STANDARD ROADWAY CONSTRUCTION DRAWING
CONCRETE BARRIER END SECTIONS (Type D)
NUMBER **RM-4.6**

State of Ohio
Department of Transportation
Supplemental Specification 832
Temporary Sediment and Erosion Control

April 17, 2004

832.01 Description This work consists of furnishing and locating TSEC (Temporary Sediment and Erosion Control) BMP (Best Management Practices) for both project and off project EDA (Earth Disturbing Activity) areas and developing a SWPPP (Storm Water Pollution Prevention Plan) as required and a Co-Permittee form as required. Furnish these TSEC BMP prior to any EDA. Furnish a SWPPP if required prior to any EDA. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, State, or local agencies, adhere to the more restrictive laws, rules, or regulations.

832.02 Definitions

BMP Best Management Practices
CMS Construction and Material Specifications of the Ohio Department of Transportation Dated as shown on the plans
Co-Permittee A requirement in SS833 Part VII. Definitions O
Earth Disturbing Activity (EDA) Any activity that exposes bare ground or an erodible material to storm water and anywhere CMS Item 659 Seeding, SS 870 Seeding, CMS Item 660 Sodding, or SS 870 Sodding is being furnished
Contractor EDA Any EDA that is NOT shown on the plans as part of the project be the EDA inside the project limits or not

Project EDA Any EDA that is shown on the plans as part of the project
EPA Environmental Protection Agency
Isolated Wetland Permit Ohio EPA permit allowing the discharge of fill material into an isolated wetland
NOI Notice of Intent
NOT Notice of Termination
NPDES National Pollutant Discharge Elimination System
OEPA Ohio EPA
OES Office of Environmental Services-ODOT
OWPCA Ohio Water Pollution Control Act
OHWM Ordinary High Water Mark; the USACE's jurisdictional limits involving streams; usually equivalent to a 2 year high water elevation.
PCN Pre-Construction Notification for 404 permit
SCD Standard Construction Drawing
Supplemental Specification 833 (SS 833) OEPA NPDES Construction Effluent Guidelines Permit
SWPPP Storm Water Pollution Prevention Plan
TSEC Temporary Sediment and Erosion Control
USACE United States Army Corps of Engineers
404 Permit USACE permit authorizing discharge of fill material into Waters of the US, per Section 404 of the Clean Water Act
401 Water Quality Certification (401 WQC) Ohio EPA permit authorizing discharge of fill material, per Section 401 of the Clean Water Act

832.03 Standard Construction Drawing References

Bale Filter Dike	SCD DM-4.3/4.4
Construction Fence	SCD DM-4.3
Dikes	SCD DM-4.3
Filter Fabric Ditch Check	SCD DM-4.4
Inlet Protection	SCD DM-4.4
Perimeter Filter Fabric Fence	SCD DM-4.4
Rock Channel Protection Type C or D with/without Filter	SCD DM-4.3/4.4
Sediment Basins and Dams	SCD DM-4.3
Slope Drains	SCD DM-4.3

832.04 Requirements. Furnish and locate TSEC BMP to represent and warrant compliance with the Clean Water Act, 33 USC Section 1251 et seq. and the OWPCA, ORC 6111.01 et seq.-,all conditions of 404 permit/401 WQC/Isolated Wetland Permit, and related rules, local government agency requirements, specifications, SCD, and permits. Furnish a SWPPP to represent and warrant compliance with SS 833, related rules, specifications, SCD, and permits. The Department will furnish the Contractor a copy of the NOI and the OEPA approval letter at or before the Pre-Construction meeting.

A Co-Permittee form is required when the project requires a SWPPP. Information about the Co-Permittee form can be found at "WWW.epa.state.oh/dsw/strom/stromform" For a copy of the Co-Permittee form see Appendix D.

Post Construction controls as described in SS 833 are not a part of this specification. All post construction controls are furnished in the project.

832.05 Provisions These provisions survive the completion and/or termination of the contract. The following provisions must be followed:

A. Provision 1. If a governmental agency or a local governmental authority finds a violation of the above noted requirements, or that the TSEC BMP are incomplete, or that the SWPPP is incomplete or that the implementation of the SWPPP is not being performed correctly or completely, full responsibility will be borne by the Contractor to make all corrections.

B. Provision 2. If a governmental agency or a local governmental authority furnishes an assessment, damage judgment or finding, fine, penalty, or expense for a violation of the above noted requirements, or that the TSEC BMP are incomplete, or that the SWPPP is incomplete or that the implementation of the SWPPP is not being performed correctly or completely, the Contractor will reimburse the Department within 10 Calendar Days of the amount for any of the above. The Department may withhold the amount of money requested for the above from the Contractor's next pay estimate and deliver that sum to the governmental agency or local governmental authority issuing the assessment, damage judgment or finding, fine, penalty or expense.

C. Provision 3. The Contractor agrees to indemnify and hold harmless the Department, and will reimburse the Department for any assessments, damage judgment or finding, fine, penalty, or expense as a result of the failure of performing this portion of the Contract. The Department may withhold the amount of any assessments, damage judgment or finding, fine, penalty or expense from the Contractor's next pay estimate.

D. Provision 4. If a governmental agency or a local governmental authority furnishes a stop work order for a violation of the above noted requirements, or that the TSEC BMP are incomplete, or that the SWPPP is incomplete or that the implementation of the SWPPP is not being performed correctly or completely the Department will find the Contractor in default.

E. Provision 5. If the Department finds a violation of the above noted requirements, or that the TSEC BMP are incomplete, or that the SWPPP is incomplete or that the implementation of the SWPPP is not being performed correctly or completely, the Contractor will make all corrections. The Department may withhold and continue to withhold progress payments until such corrections are made.

832.06 EDA Requirements. Comply with CMS 105.16 when EDA (including borrow and waste areas) are involved, unless the areas in question have been cleared through prior environmental studies. Furnish TSEC BMP for any EDA. An encumbered amount is established in the proposal for TSEC BMP to be used for project EDA and possible Contractor EDA as outlined below.

A. The project is identified as Maintenance on the plan title sheet. All TSEC BMP used for Contractor EDA will not be compensated.
If Contractor EDA < 1 acre: no SWPPP, NOI, NOT, or weekly inspections are required.
If Contractor EDA $\geq$ 1 acre: Furnish a SWPPP, NOI, and NOT for only this area. The SWPPP, NOI and NOT will not be compensated.

Clarification: Maintenance projects are permitted to have Project Only EDA of 5 acres or less without requiring an SWPPP, NOI, NOT. The Contractor will be compensated for all TSEC BMP for all Project EDA, however, no compensation will be made for TSEC BMP used for Contractor EDA. For Maintenance projects, the Contractor and Project EDA are considered independent of one another.

Example: A culvert replacement project is labeled as Maintenance on the title sheet. All TSEC BMP used on the Project EDA will be compensated. The Contractor clears a storage site for the project that is 2 acres in size. The Contractor will need to file a NOI, and furnish a SWPPP, NOT, and weekly inspections for this work without any compensation.

B. Project Identified EDA = 0, Contractor EDA = 0, Total EDA = 0 Acre: There are no requirements.

C. Project Identified EDA = 0, Contractor EDA > 0, Total EDA < 1 Acre: Furnish TSEC BMP for the EDA areas. These TSEC BMP will not be compensated. No SWPPP, NOI , NOT , or, weekly inspections are required.

D. Project Identified EDA = 0, Contractor EDA $\geq$ 1, Total EDA $\geq$1 Acre: Furnish a NOI, SWPPP with TSEC BMP, and a NOT for those EDA areas. The NOI, SWPPP and those TSEC BMP, and the NOT will not be compensated.

E. Project Identified EDA < 1, Contractor EDA > 0, Total EDA < 1 Acre: Furnish TSEC BMP for the EDA areas. These TSEC BMP will be compensated. No NOI, SWPPP, NOT, or, weekly inspections are required. The Department will furnish a NOI and NOT.

F. Project Identified EDA < 1, Contractor EDA > 0, Total EDA $\geq$ 1 Acre: Furnish a SWPPP with TSEC BMP for the EDA areas and a file a Co-Permittee form. The SWPPP, and these TSEC BMP will be compensated. The Department will furnish a NOI and NOT.

G. Project Identified EDA $\geq$ 1, Contractor EDA $\geq$ 0, Total EDA $\geq$ 1 Acre: Furnish a SWPPP with TSEC BMP for the EDA areas and a file a Co-Permittee form. The SWPPP,

and these TSEC BMP will be compensated. The Department will furnish a NOI and NOT.

832.07 TSEC BMP Materials. Furnish commercial fertilizer, seed, and mulch materials conforming to CMS Item 659.

Furnish filter fabric ditch checks, rock checks, inlet protection, perimeter filter fabric fence, bale filter dikes, sediment basins and dams, dikes, slope drains, and rock channel protection materials as specified on the SCD. Furnish construction ditch and slope protection conforming to the requirements of CMS Item 670. The seeding and mulching of the mats are not required. The Department may accept other materials as BMP.

832.08 Furnish and Locate TSEC BMP. Furnish and locate the TSEC BMP as required or as outlined in the Ohio Department of Transportation Location Design Manual Volume II - Drainage Design, or as outlined in the SWPPP. Keep TSEC BMP functional until the areas are fully stabilized.

Construct items A, B, and D through G below according to the SCD.

A. Perimeter Controls. Use perimeter filter fabric fence to protect the project from sheet flow runoff from off Right-of-Way and off construction limit locations. Use perimeter filter fabric fence to protect the following project items from sheet flow runoff: water bodies, wetlands, or other significant items shown on the plans.

Use dikes to prevent sediment flow from coming onto the project and to non-vegetated barren areas on the project.

Install perimeter filter fabric fence and dikes before any clearing and grubbing operations.

Ensure that the ponding of water behind the perimeter filter fabric fence or dike will not damage property or risk the safety of life.

B. Inlet Protection. Construct the inlet protection for existing inlets at the beginning of construction and for new inlets immediately after completing the sump. Ensure that the ponding of water behind the inlet will not damage property or risk the safety of life.

C. Construction Seeding and Mulching. Apply seed and mulch materials according to CMS Item 659 as modified below. When straw mulch is used, apply at a rate of 2 tons per acre (0.5 metric ton/1000 m2). Seed and mulch during and after construction, and before or during winter shut down to stabilize EDA areas and as required. Fertilize construction seeding areas at one-half the application rate specified in CMS Item 659. If project conditions prevent fertilizing the soil and preparing the seed bed, then the fertilizing and preparation requirements of CMS Item 659 may be waived. Do not place construction seed on frozen ground. For areas defined below Construction Seeding and Mulching may be

applied by hand at the following rate mixture.

Area	Seed Mixture	Straw or Hay Bales
≤ 15,000 ft² (0.14 ha) > 10,000 ft² (0.1 ha)	Kentucky 31, 3 lb/1000 ft² 14.67 kg/1000 m² Annual Ryegrass 2 lb/1000ft² 9.76 kg/1000 m²	2 / 1000 ft² (0.01 ha)
≤ 10,000 ft² (.1 ha) > 5000 ft² (0.05 ha)	Kentucky 31, 4 lb/1000 ft² 19.28 kg/1000 m² Annual Ryegrass 3 lb/1000ft² 14.64 kg/1000 m²	2 / 1000 ft² (0.01 ha)
≤ 5000 ft² (0.05 ha)	Kentucky 31, 5 lb/1000 ft² 24.4 kg/1000 m² Annual Ryegrass 4 lb/1000ft² 19.28 kg/1000 m²	2 / 1000 ft² (0.01 ha)

For areas as defined above the material specifications are waived.

D. Slope Protection. Place dikes, install slope drains, and construct ditches to divert water from bare non-vegetated areas and to protect cut and fill slopes. Protect the side slopes from erosion by placing dikes at the top of fill slopes.

Before furnishing a cut slope, construct a ditch at the top of the cut slope to reduce runoff coming on the slope.

Furnish Construction Slope Protection at the required locations or at the locations shown on the SWPPP as the slopes are constructed. Furnish all permanent slope protection as shown in the construction plans when final grade is complete.

E. Ditch Checks and Ditch Protection. Place filter fabric ditch checks or rock checks across a ditch and perpendicular to the flow to protect the ditch from erosion and to filter sediment from the flowing water.

Place ditch checks as soon as the ditch is cut. If working on a ditch, replace the ditch checks by the end of the workday.

Install filter fabric ditch checks for drainage areas less than or equal to 2 acres (0.8 ha) as shown in the SCD. Install rock checks for drainage areas between 2 to 5 acres (0.8 to 2.0 ha) as shown in the SCD.

Install ditch checks in conjunction with sediment basins and dams.

Furnish Construction Ditch Protection at the required locations or at the locations shown on the SWPPP as the ditches are cut. Furnish all permanent ditch protection as shown in the construction plans when final grade is complete.

F. Bale Filter Dike. Install bale filter dike a few feet (meters) from the toe of a slope to filter and direct sediment to an appropriate control item before the runoff enters a water body on or off the Project limits.

Use the bale filter dike to collect sediment from:

1. Areas less than 1/4 acre (0.1 ha) for each sediment pit.
2. Slopes with a length of less than 100 feet (30 m) and having a maximum 2:1 slope.

Use a sediment pit every 100 feet (30 m) for a 2:1 slope for every 1/4 acre (0.1 ha). Use a greater spacing of the sediment basin for flatter slopes.

Begin constructing bale filter dikes within 7 days of commencing grubbing operations. Complete the construction of the bale filter dike before starting the grading operations.

G. Sediment Basins and Dams. Construct basins and dams at concentrated and critical flow locations to settle out sediment before the water leaves the EDA area. Use basins at the bottom of a ravine, at a culvert inlet, or outlet, along or at the end of a ditch and at any concentrated water exit point of the project. Construct the basins to retain 67 cubic yards (125 m^3) of water for every acre (1.0 ha) of drainage area. Use a series of smaller basins or dams as a substitute for a larger basin or dam. No sediment basins will be constructed in a stream, a temporary channel or ditches that carry water of the United States.

Begin constructing sediment basins and dams within 7 days of commencing grubbing operations. Complete the construction of the sediment basins and dams before starting the grading operations.

When needed construct construction fence around the sediment basins or dams.

H. River, Stream, and Water Body Protection. Protect all streams or water bodies passing through or on the project using Perimeter Filter Fabric Fence or Bale Filter Dike to line the water edge. Divert project water flow using dikes and slope protection. The Contractor may use a combination of items listed.

I. Stream Relocation, Temporary Channels and Ditches that carry waters of the United States. Fully stabilize the above with Construction Slope Protection or 70 percent grass growth before diverting flow into the new channel.

J. Concrete washout areas TSCE BMP. For the purpose of payment this BMP is part of the concrete work for payment.

K. Project access TSEC BMP locations. For the purpose of payment this BMP is part of the total project for payment.

L. Project fueling and refueling TSCE BMP locations. For the purpose of payment this BMP is part of the total project for payment.

M. All other TSEC BMP. All other TSEC BMP that are required but not specifically referenced will not be paid as a separate item but will be included by the Contractor as part of the total project cost.

832.09 Causeways and Access Fills (Stream and River Crossings and Fills) . Fording of streams and rivers is not allowed. Evaluate the 404/401 permits to determine whether or not a causeway and access fills has been permitted by the USACE/OEPA. If a causeway and access fills has been permitted, construct the causeway and access fills per the 404/401 permits, and the application submitted for those permits. Only the surface area (acreage) of temporary fill, and volume of temporary fill that was permitted and contained in the permit application will be allowed. This information surface area (acreage) of temporary fill, and volume of temporary fill maybe furnished in the construction plans. The construction plans may furnish additional information or restrictions for causeways or access fills. The project engineer will consult with the Office of Environmental Services (OES) for any technical questions regarding 404/401 permits.

If the Contractor wants a causeway and access fills and they have not been permitted through the 404/401 permit process, the Contractor must coordinate the request for the causeway and access fills with the project engineer and OES. The Department makes no guarantee to granting the request. The causeway and access fills request will be coordinated by OES with the USACE through the pre-construction notification (PCN) process for authorization under the 404 nationwide permit (NWP) program. Supply the project engineer/OES with the following information:

A. a plan and profile drawing showing the causeway and access fills with OHWM elevation

B. volume of temporary fill below the OHWM

C. the surface area of temporary fill below the OHWM

D. a restoration plan for the area affected by the causeway and access fills

E. time frames for placement and removal of the causeway and access fills

The time frame allowed for the coordination of the causeway and access fills will be 60 days, at a minimum, and the causeway and assess fills will not occur prior to the 404 NWP being authorized by the USACE. All coordination with the USACE and/or OEPA will be performed through OES.

832.10 Causeway and Access Fills **Construction and Payment.** Begin planning and installing causeways and access fills as early in construction as possible to avoid conflicts with 404/401 permits or other environmental commitments that have been included in the construction plans. Access Fills in Streams or Rivers may include, but is not limited to, cofferdams, access pads, temporary bridges, etc.

Make every attempt to minimize disturbance to water bodies during construction, maintenance and removal of the causeway and access fills. Construct the causeway and access fills as narrow as practical and perpendicular to the stream banks. Make the causeway and access fills in shallow areas rather than deep pools where possible. Minimize clearing, grubbing, and excavation of stream banks, bed, and approach sections. Construct the causeway and access fills as to not erode stream banks or allow sediment deposits in the channel.

Construct the causeway and access fills to a water elevation at least 1 foot (0.3 m) above the normal water elevation. If the causeway fills more than one-third the width of the stream, then use culvert pipes to allow the movement of aquatic life. Normal downstream flows will be maintained. Ensure that any ponding of water behind the causeway and access fills will not damage property or cause a human safety concern.

A. The following minimum requirements apply to causeways where culverts are used.

1. Furnish culverts on the existing stream bottom.

2. Avoid a drop in water elevation at the downstream end of the culvert.

3 Furnish culverts with a diameter at least two times the depth of normal stream flow measured at the causeway centerline or with a minimum diameter of 18 inches (0.5 m) whichever is greater

4 Furnish a sufficient number of culverts normal to the flow to completely cross the channel from stream bank to stream bank with no more than 10 feet (3 m) between each culvert.

For all fill and surface material placed in the channel, around the culverts, or on the surface of the

causeway and access fills furnish clean, non-erodible, nontoxic dumped rock fill, Type B, C, or D, as specified in CMS 703.19.B. Extend rock fill up the slope from original stream bank for 50 feet (10 m) to catch and remove erodible material from equipment.

When the work requiring the causeway and access fills all portions of the causeway (including all rock and culverts) and access fills will be removed in its entirety. The material will not be disposed in other waters of the US or isolated wetland. The stream bottom affected by the causeway and access fills will be restored to its pre-construction elevations. The causeway and access fills will not be paid as a separate item but will be included by the Contractor as part of the total project cost.

832.11 Maintenance. Properly maintain all TSEC BMP. Dispose of silt removed from TSEC BMP according to CMS 105.16. When the Contractor properly places the erosion control Items then the Department will pay for the cost to maintain or replace these items of work by the following:

If a recorded rain event is greater than 0.5 inches (13mm) the Department will pay to replace all TSEC BMP that have failed at the unit price for those Items and all of the sediment removed per the unit price for Item Sediment Removal. If a portion of a TSEC BMP is damaged and that portion is repaired but not replaced the Department will pay for that portion as if it was replaced. Example
.6 inch rain and 300 ft. of filter fabric fence was damaged out of a 900 ft. long run. The 300 ft. was stood back up and sediment was removed. How do we pay for the 300 ft of repair and sediment removed? Pay for 300 feet of new fence and Item Sediment Removal.

If a recorded rain event is less than or equal to 0.5 inches (13mm) the Department will pay to remove the sediment per the unit price for Item Sediment Removal. All properly installed TSEC BMP are furnished and located such that they are able to provide protection during a rain event that is less than or equal to 0.5 inches (13mm), therefore no other compensation is due.

If the sediment reaches a height of one-half the following TSEC BMP Perimeter Filter Fabric Fence, Filter Fabric Ditch Checks, Rock Checks, Inlet Protection, Dikes, and Bale Filter Dikes then remove trapped sediment per the unit price for Item Sediment Removal.

If the sediment reduces the initial volume of the sediment basin or dam by one-half remove deposited sediment per the unit price for Item Sediment Removal. Remove dams and basins after the up slope has been stabilized.

Remove all TSEC BMP before the project is accepted. Dispose of the removed materials including sediment according to CMS 105.16 and CMS 105.17. Maintain the TSEC BMP until the up-slope permanent grass coverage is 70 percent or better. At this stage, remove the TSEC BMP.

832.12 Storm Water Pollution Prevention Plan. If required, prepare the SWPPP as outlined in this specification and Supplemental Specification 833. Additional guidance can be found in the Ohio Department of Transportation Location and Design Manual Volume II - Drainage Design and the Ohio Department of Transportation Location and Design Manual Volume III-Highway Plans. Examples of some of the design and information requirements that must be shown on the SWPPP are as follows:

A. A Professional Engineer qualified in TSEC BMP must design and sign the SWPPP.

B. Locate the required TSEC BMP for both on and off project EDA areas.

C. Furnish quantity totals for all TSEC BMP.

D Locate the following a minimum of 100 Ft. (30 m) from the water's edge of any stream, ephemeral stream, wetland, or body of water:

1. Concrete or asphalt plant areas
2. Material and equipment staging or storage areas
3. Dewatering Areas
4. Concrete truck wash out areas
5. Construction access locations
6. Vehicle fueling and refueling locations

E. Furnish an implementation schedule for each construction sequence.

F. For any additional requirements, See CMS 107.19

G. Furnish the total EDA areas in acres.

H. Locate all slopes that will be inactive for 21 calendar days or longer.

I. Furnish the name of the individual on site who is in charge of the SWPPP and the TSEC BMP practices.

J. Describe the type of construction activities that will be taking place.

K. Furnish a quantity for Item 832 Sediment Removal for removing sediment from basins and dams, inlet protection, ditch checks, rock checks, perimeter filter fabric fence, bale filter dikes, and all other types of filter fabrics, straw or hay bales, or any other TSEC BMP.

L. Furnish signatures of all contractors and subcontractors involved in TSEC practices (see App. B).

If there are plan sheets which meet any of the SS 833 requirements use that information. Design files may be furnished to the awarded Contractor in electronic form in the future.

832.13 SWPPP Acceptance. Furnish the initial SWPPP to the Department for acceptance. The Department will grant a start of work upon receiving the SWPPP that has a P.E. stamp. See Appendix C for a sample acceptance form. The Department may critique the following:

A. The type and location of TSEC BMP with totals.

B. The SWPPP is for this project.

C. There is no language in the SWPPP about any TSEC BMP being directed for use by the Engineer .

D. The TSEC BMP Items when priced out closely agree with the Each amount set up in the plans.

Revise the accepted SWPPP as needed. These revisions to the accepted SWPPP will be at no additional cost to the Department . Payment for Department caused revisions to the SWPPP will be included as part of the revised work.

832.14 Inspections. Perform SS 833 required inspections. The inspection reports are to be prepared for projects that have a SWPPP. Submit a copy of the inspection reports to the project. Use the report form furnished in Appendix A.

832.15 Compensation. The Department will furnish Item 832 Each Erosion Control with an amount in the proposal to pay for TSEC BMP work. This amount is an estimate by the Department of the total cost of TSEC BMP work. If the TSEC BMP work exceeds this amount the TSEC BMP work will still be paid at the pre-determined prices. The pre-determined prices are located in the Proposal. All TSEC BMP work will be paid at the proposal pre-determined unit price times the correctly installed TSEC BMP number of units. The payment due will be deducted from Item 832 Each Erosion Control.

The Department will only pay for one accepted SWPPP regardless of the number of Construction phases, revisions, or project redesigns.

832.16 Method of Measurement

A. The Department will measure the SWPPP plan as each.

B. The Department will measure Construction Seeding and Mulching by the number of square yards (square meters).

C. The Department will measure Slope Drains by the number of feet (meters).

D. The Department will measure Sediment Basins and Dams by the number of cubic yards (cubic meters) of excavation and embankment.

E. The Department will measure Perimeter Filter Fabric Fence, Bale Filter Dike and Construction Fence by the number of feet (meters).

F. The Department will measure Filter Fabric Ditch Check by the number of feet (meters).

G. The Department will measure Inlet Protection by the number of feet (meters).

H. The Department will measure Dikes by the number of cubic yards (cubic meters) of excavation and embankment.

I. The Department will measure Construction Ditch Protection and Construction Slope Protection by the number of square yards (square meters).

J. The Department will measure Rock Channel Protection, Type C or D (with or without filter) by the number of cubic yards (cubic meters).

K. The Department will measure Sediment Removal by the number of cubic yards (cubic meters).

832.17 Basis of Payment

A. The Department will not pay if temporary erosion and sediment control Items are required due to the Contractor's negligence, carelessness, or failure to install permanent controls.

B. The Department will not pay for any causeway and access fills..

C. The Department will not pay to replace TSEC BMP that has failed due to lack of proper maintenance or installation.

D. The Department will not pay for concrete washout areas.

E. The Department will not pay for project access locations.

F. The Department will not pay for all other TSEC BMP that are required but not specifically referenced as a separate item but will be included by the Contractor as part of the total project cost.

G. The Department will pay for the following Erosion Control Items (TSEC BMP) that are properly placed at the pre-determined price in the proposal conforming to 832.13.

Item	Unit	Description
832	Square Yard (Square Meter)	Construction Seeding and Mulching
832	Foot (Meter)	Slope Drains
832	Cubic Yard (Cubic Meter)	Sediment Basins and Dams
832	Foot (Meter)	Perimeter Filter Fabric Fence
832	Foot (Meter)	Bale Filter Dike
832	Foot (Meter)	Filter Fabric Ditch Check
832	Foot (Meter)	Inlet Protection
832	Cubic Yard (Cubic Meter)	Dikes
832	Square Yard (Square Meter)	Construction Ditch Protection
832	Square Yard (Square Meter)	Construction Slope Protection
832	Cubic Yard (Cubic Meter)	Rock Channel Protection Type C or D with Filter
832	Cubic Yard (Cubic Meter)	Rock Channel Protection Type C or D without Filter
832	Cubic Yard (Cubic Meter)	Sediment Removal
832	Foot (Meter)	Construction Fence

H. The Department will pay the contract price for each SWPPP plan.

Item	Unit	Description
832	Each	Storm Water Pollution Prevention Plan

Appendix A

Weekly and Rain Event Erosion Control Checklist

Contractor _____

Project Number _____ **Co.-Rt.-Sec.** _____ **Date** _____

R=Replacement W=Working M=Maintenance I=Install D=Delete Rain Amt Inspection_____ Date_____

Station	To	Station	Side	Offset	Balloon Ref.	Perimeter control	Inlet Protection	Constr. Seed	Dikes Fill Slopes	Ditch Cut Slopes	Slope Drains	FF Ditch Checks	Rock Ditch Ch	Bale Filter Dike	Sediment Basins	Stream Relocate	Stream Crossing	Date Work Was Complete
	To																	
	To																	
	To																	
	To																	
	To																	
	To																	
	To																	
	To																	
	To																	
	To																	

Notes:

_____

_____

_____

_____

_____

_____

Total Station-to-Station Inspected

_____

_____

_____

_____

Inspect By Signature Title Date Given To ODOT

Appendix B

Signature list

Signature	Printed Name	Title	Company	Date

The Department has received the SWPPP for Project :_____
CO.-RT.-Sec: _____
The Submittal is Dated :_____

The Department Accepts the Submittal.

_____

Project Engineer, Project Supervisor Date

OhioEPA

Co-Permittee Notice of Intent for Coverage Under Ohio EPA Storm Water Construction General Permit

Submission of this NOI constitutes notice that the party identified in Section I of this form intends to be authorized by Ohio's NPDES general permit for storm water associated with construction activity. Becoming a permittee obligates a discharger to comply with the terms and conditions of the permit. NOTE: All necessary information must be provided on this form. Read the accompnying instructions *carefully* before completing the form. Do not use correction fluid on this form. Forms transmitted by fax will not be accepted. There is no fee associated with submitting this form.

I. Applicant Information/Mailing Address

Company (Applicant) Name: _____

Mailing (Applicant) Address: _____

City: _____ State: _____ Zip Code: _____

Contact Person: _____ Phone: _____ Fax: _____

Contact E-Mail Address: _____

II. Facility/Site Location Information

Existing Ohio EPA Facility Permit Number: _ GC _ _ _ _ _* _ G or OHR1 _ _ _ _ _

Initial Permittee Name: _____

Phone: _____

Facility/Site Name: _____

City: _____ Townships(s): _____

County(ies): _____ State: Ohio Zip Code: _____

Facility Contact Person: _____ Phone: _____ Fax: _____

Facility Contact E-Mail Address: _____

III. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Applicant Name: _____ Title: _____

Applicant Signature: _____ Date: _____

EPA 4496 (Rev. 4/03)

Designer Note:

This supplemental specification will be provided with both supplemental specification 833 and proposal note 205.

State Of Ohio
Department of Transportation

Supplemental Specification 833
Ohio Environmental Protection Agency National Pollutant Discharge Elimination System
Construction Effluent Guidelines Permit
February 12, 2003

Ohio EPA Permit No.: OHC000002
Effective Date: April 21, 2003 Expiration Date: April 20, 2008

OHIO ENVIRONMENTAL PROTECTION AGENCY AUTHORIZATION FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et. seq. hereafter referred to as "the Act") and the Ohio Water Pollution Control Act [Ohio Revised Code ("ORC") Chapter 6111], dischargers of storm water from sites where construction activity is being conducted, as defined in Part I.B of this permit, are authorized by the Ohio Environmental Protection Agency, hereafter referred to as "Ohio EPA," to discharge from the outfalls at the sites and to the receiving surface waters of the state identified in their Notice of Intent ("NOI") application form on file with Ohio EPA in accordance with the conditions specified in Parts I through VII of this permit.

This permit is conditioned upon payment of applicable fees, submittal of a complete NOI application form and written approval of coverage from the director of Ohio EPA in accordance with Ohio Administrative Code ("OAC") Rule 3745-38-06.

Original signed by Christopher Jones
Christopher Jones
Director

TABLE OF CONTENTS

PART I. COVERAGE UNDER THIS PERMIT

A. Permit Area.

This permit covers the entire State of Ohio.

B. Eligibility.

1. Construction activities covered. Except for storm water discharges identified under Part I.B.2, this permit may cover all new and existing discharges composed entirely of storm water discharges associated with construction activity that enter surface waters of the state or a storm drain leading to surface waters of the state.

For the purposes of this permit, construction activities include any clearing, grading, excavating, grubbing and/or filling activities that disturb the threshold acreage described in the next paragraph. Discharges from trench dewatering are also covered by this permit as long as the dewatering activity is carried out in accordance with the practices outlined in Part III.G.2.g.iv of this permit.

Prior to March 10, 2003, only construction activities disturbing five or more acres of total land were required to obtain NPDES construction storm water permit coverage. On and after March 10, 2003, construction activities disturbing one or more acres of total land will be eligible for coverage under this permit. The threshold acreage includes the entire area disturbed in the larger common plan of development or sale.

This permit also authorizes storm water discharges from support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided:

a. The support activity is directly related to a construction site that is required to have NPDES permit coverage for discharges of storm water associated with construction activity;

b. The support activity is not a commercial operation serving multiple unrelated construction projects and does not operate beyond the completion of the construction activity at the site it supports;

c. Appropriate controls and measures are identified in a storm water pollution prevention plan (SWP3) covering the discharges from the support activity; and

d. The support activity is on or contiguous with the property defined in the NOI;

Part I.B

2. Limitations on coverage. The following storm water discharges associated with construction activity are not covered by this permit:

a. Storm water discharges that originate from the site after construction activities have been completed, including any temporary support activity, and the site has achieved final stabilization. Industrial post-construction storm water discharges may need to be covered by an NPDES permit;

b. Storm water discharges associated with construction activity that the director has shown to be or may reasonably expect to be contributing to a violation of a water quality standard; and

c. Storm water discharges authorized by an individual NPDES permit or another NPDES general permit;

3. Waivers. After March 10, 2003, sites whose larger common plan of development or sale have at least one, but less than five acres of land disturbance, which would otherwise require permit coverage for storm water discharges associated with construction activities, may request that the director waive their permit requirement. Entities wishing to request such a waiver must certify in writing that the construction activity meets one of the two the waiver conditions:

a. Rainfall erosivity waiver. For a construction site to qualify for the rainfall erosivity waiver, the cumulative rainfall erosivity over the project duration must be five or less and the site must be stabilized with at least a 70 percent vegetative cover or other permanent, non-erosive cover. The rainfall erosivity must be calculated according to the method in U.S. EPA Fact Sheet 3.1 Construction Rainfall Erosivity Waiver dated January 2001. If it is determined that a construction activity will take place during a time period where the rainfall erosivity factor is less than five, a written waiver certification must be submitted to Ohio EPA at least 21 days before construction activity is scheduled to begin. If the construction activity will extend beyond the dates specified in the waiver certification, the operator must either:

(a) recalculate the waiver using the original start date with the new ending date (if the R factor is still less than five, a new waiver certification must be submitted) or

(b) submit an NOI application form and fee for coverage under this general permit at least seven days prior to the end of the waiver period (see Attachment A); or

Part I.B.3

b. TMDL (Total Maximum Daily Load) waiver. Storm water controls are not needed based on a TMDL approved or established by U.S. EPA that addresses the pollutant(s) of concern or, for non-impaired waters that do not require TMDLs, an equivalent analysis that determines allocations for small construction sites for the pollutant(s) of concern or that determines that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. The pollutant(s) of concern include sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. The operator must certify to the director of Ohio EPA that the construction activity will take place, and storm water discharges will occur, within the drainage area addressed by the TMDL or equivalent analysis. A written waiver certification must be submitted to Ohio EPA at least 21 days before the construction activity is scheduled to begin.

4. Prohibition on non-storm water discharges. All discharges covered by this permit must be composed entirely of storm water with the exception of the following: discharges from fire fighting activities; fire hydrant flushings; potable water sources including waterline flushings; irrigation drainage; lawn watering; routine external building washdown which does not use detergents; pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; springs; uncontaminated ground water from trench or well point dewatering and foundation or footing drains where flows are not contaminated with process materials such as solvents. Dewatering activities must be done in compliance with Part III.G.2.g.iv of this permit. Discharges of material other than storm water or the authorized non-storm water discharges listed above must comply with an individual NPDES permit or an alternative NPDES general permit issued for the discharge.

Except for flows from fire fighting activities, sources of non-storm water listed above that are combined with storm water discharges associated with construction activity must be identified in the SWP3. The SWP3 must identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

Part I.B

5. Spills and unintended releases (Releases in excess of Reportable Quantities). This permit does not relieve the permittee of the reporting requirements of 40 CFR Part 117 and 40 CFR Part 302. In the event of a spill or other unintended release, the discharge of hazardous substances in the storm water discharge(s) from a construction site must be minimized in accordance with the applicable storm water pollution prevention plan for the construction activity and in no case, during any 24-hour period, may the discharge(s) contain a hazardous substance equal to or in excess of reportable quantities.

40 CFR Part 117 sets forth a determination of the reportable quantity for each substance designated as hazardous in 40 CFR Part 116. The regulation applies to quantities of designated substances equal to or greater than the reportable quantities, when discharged to surface waters of the state. 40 CFR Part 302 designates under section 102(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, those substances in the statutes referred to in section 101(14), identifies reportable quantities for these substances and sets forth the notification requirements for releases of these substances. This regulation also sets forth reportable quantities for hazardous substances designated under section 311(b)(2)(A) of the Clean Water Act (CWA).

C. Requiring an individual NPDES permit or an alternative NPDES general permit.

1. The director may require an alternative permit. The director may require any operator eligible for this permit to apply for and obtain either an individual NPDES permit or coverage under an alternative NPDES general permit in accordance with OAC Rule 3745-38-04. Any interested person may petition the director to take action under this paragraph.

The director will send written notification that an alternative NPDES permit is required. This notice shall include a brief statement of the reasons for this decision, an application form and a statement setting a deadline for the operator to file the application. If an operator fails to submit an application in a timely manner as required by the director under this paragraph, then coverage, if in effect, under this permit is automatically terminated at the end of the day specified for application submittal.

Part I.C

2. Operators may request an individual NPDES permit. Any owner or operator eligible for this permit may request to be excluded from the coverage of this permit by applying for an individual permit. The owner or operator shall submit an individual application with reasons supporting the request to the director in accordance with the requirements of 40 CFR 122.26. If the reasons adequately support the request, the director shall grant it by issuing an individual NPDES permit.

3. When an individual NPDES permit is issued to an owner or operator otherwise subject to this permit or the owner or operator is approved for coverage under an alternative NPDES general permit, the applicability of this permit to the individual NPDES permittee is automatically terminated on the effective date of the individual permit or the date of approval for coverage under the alternative general permit, whichever the case may be.

D. Permit requirements when portions of a site are sold.

If an operator obtains a permit for a development, and then the operator (permittee) sells off lots or parcels within that development, permit coverage must be continued on those lots until a Notice of Termination (NOT) in accordance with Part IV.B is submitted. For developments which require the use of centralized sediment and erosion controls (i.e., controls that address storm water runoff from one or more lots) for which the conveyance of permit coverage for a portion of the development will either prevent or impair the implementation of the controls and therefore jeopardize compliance with the terms and conditions of this permit, the permittee will be required to maintain responsibility for the implementation of those controls. For developments where this is not the case, it is the permittee's responsibility to temporarily stabilize all lots sold to individual lot owners unless an exception is approved in accordance with Part III.G.4. In cases where permit coverage for individual lot(s) will be conveyed, the permittee shall inform the individual lot owner of the obligations under this permit and ensure that the Individual Lot NOI application is submitted to Ohio EPA.

Part I

E. Authorization

1. Obtaining authorization to discharge. Operators that discharge storm water associated with construction activity must submit an NOI application form in accordance with the requirements of Part II of this permit to obtain authorization to discharge under this general permit. As required under OAC Rule 3745-38- 06(E), the director, in response to the NOI submission, shall notify the applicant in writing that he/she has been granted general permit coverage to discharge storm water associated with construction activity under the terms and conditions of this permit or that the applicant must apply for an individual NPDES permit or coverage under an alternate general NPDES permit as described in Part I.C.1.

2. No release from other requirements. No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations. Other permit requirements commonly associated with construction activities include, but are not limited to, section 401 water quality certifications, isolated wetland permits, permits to install sanitary sewers or other devices that discharge or convey polluted water, permits to install drinking water lines, single lot sanitary system permits and disturbance of land which was used to operate a solid or hazardous waste facility (i.e., coverage under this NPDES general permit does not satisfy the requirements of OAC Rule 3745-27-13 or ORC Section 3734.02(H)). This permit does not relieve the permittee of other responsibilities associated with construction activities such as contacting the Ohio Department of Natural Resources, Division of Water, to ensure proper well installation and abandonment of wells.

Part II. NOTICE OF INTENT REQUIREMENTS

A. Deadlines for notification.

Initial coverage: Operators who intend to obtain initial coverage for a storm water discharge associated with construction activity under this general permit must submit a complete and accurate NOI application form and appropriate fee at least 21 days prior to the commencement of construction activity. If more than one operator, as defined in Part VII of this general permit, will be engaged at a site, each operator shall seek coverage under this general permit. Where one operator has already submitted an NOI prior to other operator(s) being identified, the additional operator shall request modification of coverage to become a co-permittee. In such instances, the co-permittees shall be covered under the same facility permit number. No additional permit fee is required.

Part II.A

Individual lot transfer of coverage: Operators must each submit an individual lot notice of intent (Individual Lot NOI) application form (no fee required) to Ohio EPA at least seven days prior to the date that they intend to accept responsibility for permit requirements for their portion of the original permitted development from the previous permittee. The original permittee may submit an Individual Lot NOT at the time the Individual Lot NOI is submitted. Transfer of permit coverage is not granted until an approval letter from the director of Ohio EPA is received by the applicant.

B. Failure to notify.

Operators who fail to notify the director of their intent to be covered and who discharge pollutants to surface waters of the state without an NPDES permit are in violation of ORC Chapter 6111. In such instances, Ohio EPA may bring an enforcement action for any discharges of storm water associated with construction activity.

C. Where to submit an NOI.

Operators seeking coverage under this permit must submit a signed NOI form, provided by Ohio EPA, to the address found in the associated instructions.

D. Additional notification.

The permittee shall make NOIs and SWP3s available upon request of the director of Ohio EPA, local agencies approving sediment and erosion control plans, grading plans or storm water management plans, local governmental officials, or operators of municipal separate storm sewer systems (MS4s) receiving drainage from the permitted site. Each operator that discharges to an NPDES permitted MS4 shall provide a copy of its Ohio EPA NOI submission to the MS4 in accordance with the MS4's requirements, if applicable.

E. Renotification.

Upon renewal of this general permit, the permittee is required to notify the director of his intent to be covered by the general permit renewal. Permittees covered under the previous NPDES general permit for storm water discharges associated with construction activity (NPDES permit number OHR100000) shall have continuing coverage under this permit. The permittees covered under OHR100000 shall submit a letter within 90 days of receipt of written notification by Ohio EPA expressing their intent that coverage be continued. There is no fee associated with these letters of intent for continued coverage. Permit coverage will be terminated after the 90-day period if the letter is not received by Ohio EPA. Ohio EPA will provide instructions on the contents of the letter and where it is to be sent within the notification letter.

PART III. STORM WATER POLLUTION PREVENTION PLAN (SWP3)

A. Storm Water Pollution Prevention Plans.
A SWP3 shall be developed for each site covered by this permit. For a multi-phase construction project, a separate NOI shall be submitted when a separate SWP3 will be prepared for subsequent phases. SWP3s shall be prepared in accordance with sound engineering and/or conservation practices by a professional experienced in the design and implementation of standard erosion and sediment controls and storm water management practices addressing all phases of construction. The SWP3 shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges associated with construction activities. In addition, the SWP3 shall describe and ensure the implementation of best management practices (BMPs) that reduce the pollutants in storm water discharges during construction and pollutants associated with post-construction activities to ensure compliance with ORC Section 6111.04, OAC Chapter 3745-1 and the terms and conditions of this permit.

B. Timing
A SWP3 shall be completed prior to the timely submittal of an NOI and updated in accordance with Part III.D. Upon request and good cause shown, the director may waive the requirement to have a SWP3 completed at the time of NOI submission. If a waiver has been granted, the SWP3 must be completed prior to the initiation of construction activities. The SWP3 must be implemented upon initiation of construction activities.

Permittees continuing coverage from the previous generation of this permit (OHR100000) that have initiated construction activity prior to the receipt of written notification from Ohio EPA to submit a letter of intent to continue coverage, as required in Part II.E, are not required to update their SWP3 as a result of this renewal (OHC000002). All permittees developing sites with coverage under OHR100000 that seek continuation of coverage do not need to update the post-construction section of their SWP3 as required in Part III.G.2.e of this permit.

C. SWP3 Signature and Review.

1. Plan Signature and Retention On Site. The SWP3 shall be signed in accordance with Part V.G. and retained on site during working hours.

2. Plan Availability

   a. On-site: The plan shall be made available immediately upon request of the director or his authorized representative during working hours. A copy of the NOI and letter granting permit coverage under this general permit also shall be made available at the site.

   b. By written request: The permittee must provide a copy of the SWP3 within 10 days upon written request of any of the following:

      i. The director or the director's authorized representative;

      ii. A local agency approving sediment and erosion plans, grading plans or storm water management plans; or

      iii. In the case of a storm water discharge associated with construction activity which discharges through a municipal separate storm sewer system with an NPDES permit, to the operator of the system.

   c. To the public: All NOIs, general permit approval for coverage letters, and SWP3s are considered reports that shall be available to the public in accordance with the Ohio Public Records law. The permittee shall make documents available to the public upon request or provide a copy at public expense, at cost, in a timely manner. However, the permittee may claim to Ohio EPA any portion of an SWP3 as confidential in accordance with Ohio law.

3. Plan Revision. The director or authorized representative, may notify the permittee at any time that the SWP3 does not meet one or more of the minimum requirements of this part. Within 10 days after such notification from the director, (or as otherwise provided in the notification) or authorized representative, the permittee shall make the required changes to the SWP3 and, if requested, shall submit to Ohio EPA the revised SWP3 or a written certification that the requested changes have been made.

D. Amendments
The permittee shall amend the SWP3 whenever there is a change in design, construction, operation or maintenance, which has a significant effect on the potential for the discharge of pollutants to surface waters of the state or if the SWP3 proves to be ineffective in achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity. Amendments to the SWP3 may be reviewed by Ohio EPA in the same manner as Part III.C.

Part III

E. Duty to inform contractors and subcontractors.
The permittee shall inform all contractors and subcontractors not otherwise defined as "operators" in Part VII of this general permit, who will be involved in the implementation of the SWP3, of the terms and conditions of this general permit. The permittee shall maintain a written document containing the signatures of all contractors and subcontractors involved in the implementation of the SWP3 as proof acknowledging that they reviewed and understand the conditions and responsibilities of the SWP3. The written document shall be created and signatures shall be obtained prior to commencement of work on the construction site.

F. Total Maximum Daily Load (TMDL) allocations
If a TMDL is approved for any waterbody into which the permittee's site discharges and requires specific BMPs for construction sites, the director may require the permittee to revise his/her SWP3.

G. SWP3 Requirements
Operations that discharge storm water from construction activities are subject to the following requirements and the SWP3 shall include the following items:

1. Site description. Each SWP3 shall provide:

a. A description of the nature and type of the construction activity (e.g., low density residential, shopping mall, highway, etc.);

b. Total area of the site and the area of the site that is expected to be disturbed (i.e., grubbing, clearing, excavation, filling or grading, including off-site borrow areas);

c. A calculation of the runoff coefficients for both the pre-construction and post construction site conditions;

d. An estimate of the impervious area and percent imperviousness created by the construction activity;

e. Existing data describing the soil and, if available, the quality of any discharge from the site;

f. A description of prior land uses at the site;

Part III.G.1

g. An implementation schedule which describes the sequence of major construction operations (i.e., grubbing, excavating, grading, utilities and infrastructure installation) and the implementation of erosion, sediment and storm water management practices or facilities to be employed during each operation of the sequence;

h. The name and/or location of the immediate receiving stream or surface water(s) and the first subsequent named receiving water(s) and the areal extent and description of wetlands or other special aquatic sites at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project;

i. For subdivided developments where the SWP3 does not call for a centralized sediment control capable of controlling multiple individual lots, a detail drawing of a typical individual lot showing standard individual lot erosion and sediment control practices. This does not remove the responsibility to designate specific erosion and sediment control practices in the SWP3 for critical areas such as steep slopes, stream banks, drainage ways and riparian zones.

j. Location and description of any storm water discharges associated with dedicated asphalt and dedicated concrete plants covered by this permit and the best management practices to address pollutants in these storm water discharges;

k. A copy of the permit requirements (attaching a copy of this permit is acceptable);

l. Site map showing:

i. Limits of earth-disturbing activity of the site including associated off-site borrow or spoil areas that are not addressed by a separate NOI and associated SWP3;

ii. Soils types should be depicted for all areas of the site, including locations of unstable or highly erodible soils;

iii. Existing and proposed contours. A delineation of drainage watersheds expected during and after major grading activities as well as the size of each drainage watershed, in acres;

Part III.G.1.l

iv. Surface water locations including springs, wetlands, streams, lakes, water wells, etc., on or within 200 feet of the site, including the boundaries of wetlands or stream channels and first subsequent named receiving water(s) the permittee intends to fill or relocate for which the permittee is seeking approval from the Army Corps of Engineers and/or Ohio EPA;

v. Existing and planned locations of buildings, roads, parking facilities and utilities;

vi. The location of all erosion and sediment control practices, including the location of areas likely to require temporary stabilization during the course of site development;

vii. Sediment and storm water management basins noting their sediment settling volume and contributing drainage area;

viii. Permanent storm water management practices to be used to control pollutants in storm water after construction operations have been completed;

ix. Areas designated for the storage or disposal of solid, sanitary and toxic wastes, including dumpster areas, areas designated for cement truck washout, and vehicle fueling;

x. The location of designated construction entrances where the vehicles will access the construction site;

xi. The location of any in-stream activities including stream crossings.

2. Controls. The SWP3 must contain a description of the controls appropriate for each construction operation covered by this permit and the operator(s) must implement such controls. The SWP3 must clearly describe for each major construction activity identified in Part III.G.1.g: (a) appropriate control measures and the general timing (or sequence) during the construction process that the measures will be implemented; and (b) which contractor is responsible for implementation (e.g., contractor A will clear land and install perimeter controls and contractor B will maintain perimeter controls until final stabilization). Ohio EPA recommends that the erosion, sediment, and storm water management practices used to satisfy the conditions of this permit, should meet the standards and specifications in the current edition of Ohio's Rainwater and Land Development (see definitions) manual or other standards acceptable to Ohio EPA. The controls shall include the following minimum components:

Part III.G.2

a. Non-Structural Preservation Methods. The SWP3 must make use of practices which preserve the existing natural condition as much as feasible. Such practices may include: preserving riparian areas adjacent to surface waters of the state, preserving existing vegetation and vegetative buffer strips, phasing of construction operations in order to minimize the amount of disturbed land at any one time and designation of tree preservation areas or other protective clearing or grubbing practices. The recommended buffer that operators should leave undisturbed along a surface water of the state is 25 feet as measured from the ordinary high water mark of the surface water.

b. Erosion Control Practices. The SWP3 must make use of erosion controls that are capable of providing cover over disturbed soils unless an exception is approved in accordance with Part III.G.4. A description of control practices designed to restabilize disturbed areas after grading or construction shall be included in the SWP3. The SWP3 must provide specifications for stabilization of all disturbed areas of the site and provide guidance as to which method of stabilization will be employed for any time of the year. Such practices may include: temporary seeding, permanent seeding, mulching, matting, sod stabilization, vegetative buffer strips, phasing of construction operations, use of construction entrances and the use of alternative ground cover.

i. Stabilization. Disturbed areas must be stabilized as specified in the following tables below. Permanent and temporary stabilization are defined in Part VII.

Table 1: Permanent Stabilization

Area requiring permanent stabilization	**Time frame to apply erosion controls**
Any areas that will lie dormant for one year or more	Within seven days of the most recent disturbance
Any areas within 50 feet of a stream and at final grade	Within two days of reaching final grade
Any other areas at final grade	Within seven days of reaching final grade within that area

Part III.G.2.b.i

Table 2: Temporary Stabilization

Area requiring temporary stabilization	Time frame to apply erosion controls
Any disturbed areas within 50 feet of a stream and not at final grade	Within two days of the most recent disturbance if the area will remain idle for more than 21 days
For all construction activities, any disturbed areas that will be dormant for more than 21 days but less than one year, and not within 50 feet of a stream	Within seven days of the most recent disturbance within the area For residential subdivisions, disturbed areas must be stabilized at least seven days prior to transfer of permit coverage for the individual lot(s).
Disturbed areas that will be idle over winter	Prior to the onset of winter weather
Where vegetative stabilization techniques may cause structural instability or are otherwise unobtainable, alternative stabilization techniques must be employed.	

ii. Permanent stabilization of conveyance channels. Operators shall undertake special measures to stabilize channels and outfalls and prevent erosive flows. Measures may include seeding, dormant seeding (as defined in the 1996 edition of the Rainwater and Land Development manual), mulching, erosion control matting, sodding, riprap, natural channel design with bioengineering techniques or rock check dams.

c. Runoff Control Practices. The SWP3 shall incorporate measures which control the flow of runoff from disturbed areas so as to prevent erosion from occurring. Such practices may include rock check dams, pipe slope drains, diversions to direct flow away from exposed soils and protective grading practices. These practices shall divert runoff away from disturbed areas and steep slopes where practicable.

d. Sediment Control Practices. The plan shall include a description of structural practices that shall store runoff allowing sediments to settle and/or divert flows away from exposed soils or otherwise limit runoff from exposed areas. Structural practices shall be used to control erosion and trap sediment from a site remaining disturbed for more than 14 days. Such practices may include, among others: sediment settling ponds, silt fences, earth diversion dikes or channels which direct runoff to a sediment settling pond and storm drain inlet protection. All sediment control practices must be capable of ponding runoff in order to be considered functional. Earth diversion dikes or channels alone are not considered a sediment control practice unless those are used in conjunction with a sediment settling pond.

Part III.G.2.d

The SWP3 must contain detail drawings for all structural practices.

i. Timing. Sediment control structures shall be functional throughout the course of earth disturbing activity. Sediment basins and perimeter sediment barriers shall be implemented prior to grading and within seven days from the start of grubbing. They shall continue to function until the up slope development area is restabilized. As construction progresses and the topography is altered, appropriate controls must be constructed or existing controls altered to address the changing drainage patterns.

ii. Sediment settling ponds. Concentrated storm water runoff and runoff from drainage areas, which exceed the design capacity of silt fence or inlet protection, shall pass through a sediment settling pond. For common drainage locations that serve an area with 10 or more acres disturbed at one time, a temporary (or permanent) sediment settling pond must be provided until final stabilization of the site. The permittee may request approval from Ohio EPA to use alternative controls if it can demonstrate the alternative controls are equivalent in effectiveness to a sediment settling pond. It is recommended for drainage locations serving less than 10 acres, smaller sediment basins and/or sediment traps should be used.

The sediment settling pond shall be sized to provide at least 67 cubic yards of storage per acre of total contributing drainage area. When determining the total contributing drainage area, off-site areas and areas which remain undisturbed by construction activity must be included unless runoff from these areas is diverted away from the sediment settling pond and is not co-mingled with sediment-laden runoff. The depth of the sediment settling pond must be less than or equal to five feet. The configuration between inlets and the outlet of the basin must provide at least two units of length for each one unit of width (> 2:1 length:width ratio). Sediment must be removed from the sediment settling pond when the design capacity has been reduced by 40 percent (This is typically reached when sediment occupies one-half of the basin depth). When designing sediment settling ponds, the permittee must consider public safety, especially as it relates to children, as a design factor for the sediment basin and alternative sediment controls must be used where site limitations would preclude a safe design. The use of a combination of sediment and erosion control measures in order to achieve maximum pollutant removal is encouraged.

Part III.G.2.d

iii. Silt Fence and Diversions. Sheet flow runoff from denuded areas shall be intercepted by silt fence or diversions to protect adjacent properties and water resources from sediment transported via sheet flow. Where intended to provide sediment control, silt fence shall be placed on a level contour. This permit does not preclude the use of other sediment barriers designed to control sheet flow runoff. The relationship between the maximum drainage area to silt fence for a particular slope range is shown in the table below.

Maximum drainage area (in acres) to 100 linear feet of silt fence	Range of slope for a particular drainage area (in percent)
0.5	< 2%
0.25	≥ 2% but < 20%
0.125	≥ 20% but < 50%

Storm water diversion practices shall be used to keep runoff away from disturbed areas and steep slopes where practicable. Such devices, which include swales, dikes or berms, may receive storm water runoff from areas up to 10 acres.

iv. Inlet Protection. Other erosion and sediment control practices shall minimize sediment laden water entering active storm drain systems, unless the storm drain system drains to a sediment settling pond.

v. Stream Protection. If construction activities disturb areas adjacent to streams, structural practices shall be designed and implemented on site to protect all adjacent streams from the impacts of sediment runoff. No structural sediment controls (e.g., the installation of silt fence or a sediment settling pond in-stream) shall be used in a stream. For all construction activities immediately adjacent to surface waters of the state, it is recommended that a setback of at least 25-feet, as measured from the ordinary high water mark of the surface water, be maintained in its natural state as a permanent buffer. Where impacts within this setback area are unavoidable due to the nature of the construction activity (e.g., stream crossings for roads or utilities), the project shall be designed such that the number of stream crossings and the width of the disturbance within the setback area are minimized.

vi. Modifying Controls. If periodic inspections or other information indicates a control has been used inappropriately or incorrectly, the permittee must replace or modify the control for site conditions.

Part III.G.2

e. Post-Construction Storm Water Management Requirements. So that receiving stream's physical, chemical, and biological characteristics are protected and stream functions are maintained, post-construction storm water practices shall provide perpetual management of runoff quality and quantity. To meet the post-construction requirements of this permit, the SWP3 must contain a description of the post-construction BMPs that will be installed during construction for the site and the rationale for their selection. The rationale must address the anticipated impacts on the channel and floodplain morphology, hydrology, and water quality.

Detail drawings and maintenance plans must be provided for all post - construction BMPs. Maintenance plans shall be provided by the permittee to the post-construction operator of the site (including homeowner associations) upon completion of construction activities (prior to termination of permit coverage). For sites located within a community with a regulated municipal separate storm sewer system (MS4), the permittee, land owner, or other entity with legal control of the property may be required to develop and implement a maintenance plan to comply with the requirements of the MS4. Maintenance plans must ensure that pollutants collected within structural post-construction practices, be disposed of in accordance with local, state, and federal regulations. Permittees, except for those regulated under the small MS4 program, are not responsible under this permit for operation and maintenance of post-construction practices once coverage under this permit is terminated.

This permit does not preclude the use of innovation or experimental post-construction storm water management technologies. However, the director may require discharges from such structures to be monitored to ensure compliance with Part III.G.2.e of this permit. The installation of structural controls in certain scenarios may also require a separate permit under section 404 of the CWA. Permittees are only responsible for the installation and maintenance of storm water management measures prior to final stabilization of the site and are not responsible for maintenance after storm water discharges associated with construction activity have been eliminated from the site. However, post-construction storm water BMPs that discharge pollutants from point sources once construction is completed, may in themselves, need authorization under a separate NPDES permit.

Linear construction projects, (e.g., pipeline or utility line installation), which do not result in the installation of impervious surface, are not required to comply with the conditions of Part III.G.2.e of this permit. However, linear construction projects must be designed to minimize the number of stream crossings and the width of disturbance.

Part III.G.2.e

Large Construction Activities. For all large construction activities (involving the disturbance of five or more acres of land or will disturb less than five acres, but is a part of a larger common plan of development or sale which will disturb five or more acres of land), the post construction BMP(s) chosen must be able to detain storm water runoff for protection of the stream channels, stream erosion control, and improved water quality. Structural (designed) post-construction storm water treatment practices shall be incorporated into the permanent drainage system for the site. The BMP(s) chosen must be sized to treat the water quality volume (WQ_v) and ensure compliance with Ohio's Water Quality Standards in OAC Chapter 3745-1. The WQ_v shall be equivalent to the volume of runoff from a 0.75-inch rainfall and shall be determined according to one of the two following methods:

i. Through a site hydrologic study approved by the local municipal permitting authority that uses continuous hydrologic simulation and local long-term hourly precipitation records or

ii. Using the following equation: $WQ_v = C * P * A / 12$
where:
WQ_v = water quality volume in acre-feet
C = Runoff Coefficient appropriate for storms less than 1 inch (see Table 1)
P = 0.75 inch precipitation depth
A = area draining into the BMP in acres

Table 1
Runoff Coefficients Based on the Type of Land Use

Land Use	Runoff Coefficient
Industrial & Commercial	0.8
High Density Residential (>8 dwellings/acre)	0.5
Medium Density Residential (4 to 8 dwellings/acre)	0.4
Low Density Residential (<4 dwellings/acre)	0.3
Open Space and Recreational Areas	0.2

Where the land use will be mixed, the runoff coefficient should be calculated using a weighted average. For example, if 60% of the contributing drainage area to the storm water treatment structure is Low Density Residential, 30% is High Density Residential, and 10% is Open Space, the runoff coefficient is calculated as follows (0.6)(0.3) + (0.3)(0.5) + (0.1)(0.2) = 0.35.

Part III.G.2.e

An additional volume equal to 20 percent of the WQ_v shall be incorporated into the BMP for sediment storage and/or reduced infiltration capacity. Ohio EPA recommends that BMPs be designed according to the methodology included in the Rainwater and Land Development manual or in another design manual acceptable for use by Ohio EPA.
BMPs shall be designed such that the drain time is long enough to provide treatment, but short enough to provide storage available for successive rainfall events as described in Table 2 below.

Table 2
Target Draw Down (Drain) Times for Structural Post-Construction Treatment Control Practices

Best Management Practice	Drain Time of WQ_v
Infiltration	24 - 48 hours
Vegetated Swale and Filter Strip	24 hours
Extended Detention Basin (Dry Basins)	48 hours
Retention Basins (Wet Basins)*	24 hours
Constructed Wetlands (above permanent pool)	24 hours
Media Filtration, Bioretention	40 hours

* Provide both a permanent pool and an extended detention volume above the permanent pool, each sized at 0.75 * WQ_v

The permittee may request approval from Ohio EPA to use alternative structural post-construction BMPs if the permittee can demonstrate that the alternative BMPs are equivalent in effectiveness to those listed in Table 2 above. Construction activities shall be exempt from this condition if it can be demonstrated that the WQ_v is provided within an existing structural post-construction BMP that is part of a larger common plan of development or if structural post-construction BMPs are addressed in a regional or local storm water management plan. Public entities (i.e., the state, counties, townships, cities, or villages) shall comply with the post-construction storm water management requirements of Part III.G.2.e for roadway construction projects initiated after March 10, 2006 and where practicable for projects initiated as of the effective date of this permit and thereafter.
For redevelopment projects (i.e., developments on previously developed property), post-construction practices shall either ensure a 20 percent net reduction of the site impervious area, provide for treatment of at least 20 percent of the WQ_v, or a combination of the two.

Part III.G.2.e

Small Construction Activities. For all small land disturbance activities (which disturb one or more, but less than five acres of land and is not a part of a larger common plan of development or sale which will disturb five or more acres of land), a description of measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed must be included in the SWP3. Structural measures should be placed on upland soils to the degree attainable.

i. Such practices may include, but are not limited to: storm water detention structures (including wet basins); storm water retention structures; flow attenuation by use of open vegetated swales and natural depressions; infiltration of runoff onsite; and sequential systems (which combine several practices). The SWP3 shall include an explanation of the technical basis used to select the practices to control pollution where flows exceed pre-development levels.

ii. Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel to provide non-erosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g., no significant changes in the hydrological regime of the receiving water).

f. Surface Water Protection. If the project site contains any streams, rivers, lakes, wetlands or other surface waters, certain construction activities at the site may be regulated under the CWA and/or state isolated wetland permit requirements. Sections 404 and 401 of the Act regulate the discharge of dredged or fill material into surface waters and the impacts of such activities on water quality, respectively. Construction activities in surface waters which may be subject to CWA regulation and/or state isolated wetland permit requirements include, but are not limited to: sewer line crossings, grading, backfilling or culverting streams, filling wetlands, road and utility line construction, bridge installation and installation of flow control structures. If the project contains streams, rivers, lakes or wetlands or possible wetlands, the permittee must contact the appropriate U.S. Army Corps of Engineers District Office. (CAUTION: Any area of seasonally wet hydric soil is a potential wetland - please consult the Soil Survey and list of hydric soils for your County, available at your county's Soil and Water Conservation District. If you have any questions about Section 401 water quality certification, please contact the Ohio Environmental Protection Agency, Section 401 Coordinator.)

Part III.G.2.f

U.S. Army Corps of Engineers (Section 404 regulation): Huntington, WV District
(304) 529-5210 (Muskingum, Hocking and Scioto River Basin)
Buffalo, NY District (716) 879-4329 (Lake Erie Basin)
Pittsburgh, PA District (412) 395-7152 (Mahoning River Basin)
Louisville, KY District (502) 315-6678 (Little & Great Miami River Basin)
Ohio Environmental Protection Agency (Section 401 regulation):
Columbus, OH (614) 644-2001 (all of Ohio)

g. Other controls.

i. Non-Sediment Pollutant Controls. No solid (other than sediment) or liquid waste, including building materials, shall be discharged in storm water runoff. The permittee must implement all necessary BMPs to prevent the discharge of non-sediment pollutants to the drainage system of the site or surface waters of the state. Under no circumstance shall concrete trucks wash out directly into a drainage channel, storm sewer or surface waters of the state. No exposure of storm water to waste materials is recommended.

ii. Off-site traffic. Off-site vehicle tracking of sediments and dust generation shall be minimized.

iii. Compliance with other requirements. The SWP3 shall be consistent with applicable State and/or local waste disposal, sanitary sewer or septic system regulations, including provisions prohibiting waste disposal by open burning and shall provide for the proper disposal of contaminated soils to the extent these are located within the permitted area.

iv. Trench and ground water control. There shall be no turbid discharges to surface waters of the state resulting from dewatering activities. If trench or ground water contains sediment, it must pass through a sediment settling pond or other equally effective sediment control device, prior to being discharged from the construction site. Alternatively, sediment may be removed by settling in place or by dewatering into a sump pit, filter bag or comparable practice. Ground water dewatering which does not contain sediment or other pollutants is not required to be treated prior to discharge. However, care must be taken when discharging ground water to ensure that it does not become pollutant laden by traversing over disturbed soils or other pollutant sources.

Part III.G.2

h. Maintenance. All temporary and permanent control practices shall be maintained and repaired as needed to ensure continued performance of their intended function. All sediment control practices must be maintained in a functional condition until all up slope areas they control are permanently stabilized. The SWP3 shall be designed to minimize maintenance requirements. The applicant shall provide a description of maintenance procedures needed to ensure the continued performance of control practices.

i. Inspections. At a minimum, procedures in an SWP3 shall provide that all controls on the site are inspected at least once every seven calendar days and within 24 hours after any storm event greater than one-half inch of rain per 24 hour period. The permittee shall assign qualified inspection personnel (those with knowledge and experience in the installation and maintenance of sediment and erosion controls) to conduct these inspections to ensure that the control practices are functional and to evaluate whether the SWP3 is adequate and properly implemented in accordance with the schedule proposed in Part III.G.1.g of this permit or whether additional control measures are required. Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the SWP3 shall be observed to ensure that those are operating correctly. Discharge locations shall be inspected to ascertain whether erosion and sediment control measures are effective in preventing significant impacts to the receiving waters. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site vehicle tracking.

The permittee shall maintain for three years following the submittal of a notice of termination form, a record summarizing the results of the inspection, names(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the SWP3 and a certification as to whether the facility is in compliance with the SWP3 and the permit and identify any incidents of non-compliance. The record and certification shall be signed in accordance with Part V.G. of this permit.

i. When practices require repair or maintenance. If the inspection reveals that a control practice is in need of repair or maintenance, with the exception of a sediment settling pond, it must be repaired or maintained within three days of the inspection. Sediment settling ponds must be repaired or maintained within 10 days of the inspection.

Part III.G.2.i

ii. When practices fail to provide their intended function. If the inspection reveals that a control practice fails to perform its intended function and that another, more appropriate control practice is required, the SWP3 must be amended and the new control practice must be installed within 10 days of the inspection.

iii. When practices depicted on the SWP3 are not installed. If the inspection reveals that a control practice has not been implemented in accordance with the schedule contained in Part III.G.1.g of this permit, the control practice must be implemented within 10 days from the date of the inspection. If the inspection reveals that the planned control practice is not needed, the record must contain a statement of explanation as to why the control practice is not needed.

3. Approved State or local plans. All dischargers regulated under this general permit must comply, except those exempted under state law, with the lawful requirements of municipalities, counties and other local agencies regarding discharges of storm water from construction activities. All erosion and sediment control plans and storm water management plans approved by local officials shall be retained with the SWP3 prepared in accordance with this permit. Applicable requirements for erosion and sediment control and storm water management approved by local officials are, upon submittal of a NOI form, incorporated by reference and enforceable under this permit even if they are not specifically included in an SWP3 required under this permit. When the project is located within the jurisdiction of a regulated municipal separate storm sewer system (MS4), the permittee must certify that the SWP3 complies with the requirements of the storm water management program of the MS4 operator.

4. Exceptions. If specific site conditions prohibit the implementation of any of the erosion and sediment control practices contained in this permit or site specific conditions are such that implementation of any erosion and sediment control practices contained in this permit will result in no environmental benefit, then the permittee shall provide justification for rejecting each practice based on site conditions. Exceptions from implementing the erosion and sediment control standards contained in this permit will be approved or denied on a case-by-case basis.

PART IV. NOTICE OF TERMINATION REQUIREMENTS

A. Failure to notify.
The terms and conditions of this permit shall remain in effect until a signed Notice of Termination (NOT) form is submitted. Failure to submit an NOT constitutes a violation of this permit and may affect the ability of the permittee to obtain general permit coverage in the future.

B. When to submit a NOT

1. Permittees wishing to terminate coverage under this permit must submit an NOT form in accordance with Part V.G. of this permit. Compliance with this permit is required until an NOT form is submitted. The permittee's authorization to discharge under this permit terminates at midnight of the day the NOT form is submitted.

2. All permittees must submit an NOT form within 45 days of completing all permitted land disturbance activities. Enforcement actions may be taken if a permittee submits an NOT form without meeting one or more of the following conditions:

a. Final stabilization (see definition in Part VII) has been achieved on all portions of the site for which the permittee is responsible (including, if applicable, returning agricultural land to its pre-construction agricultural use);

b. Another operator(s) has assumed control over all areas of the site that have not been finally stabilized;

c. For residential construction only, temporary stabilization has been completed and the lot, which includes a home, has been transferred to the homeowner. (Note: individual lots without housing which are sold by the developer must undergo final stabilization prior to termination of permit coverage.); or

d. An exception has been granted under Part III.G.4.

C. How to submit a NOT
Permittees must use Ohio EPA's approved NOT form. The form must be completed and mailed according to the instructions and signed in accordance with Part V.G of this permit.

PART V. STANDARD PERMIT CONDITIONS.

A. Duty to comply.

1. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of ORC Chapter 6111. and is grounds for enforcement action.

2. Ohio law imposes penalties and fines for persons who knowingly make false statements or knowingly swear or affirm the truth of a false statement previously made.

B. Continuation of an expired general permit.
An expired general permit continues in force and effect until a new general permit is issued.

C. Need to halt or reduce activity not a defense.
It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to mitigate.
The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. Duty to provide information.
The permittee shall furnish to the director, within 10 days of written request, any information which the director may request to determine compliance with this permit. The permittee shall also furnish to the director upon request copies of records required to be kept by this permit.

F. Other information.
When the permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in the NOI, SWP3, NOT or in any other report to the director, he or she shall promptly submit such facts or information.

Part V

G. Signatory requirements.
All NOIs, NOTs, SWP3s, reports, certifications or information either submitted to the director or that this permit requires to be maintained by the permittee, shall be signed.

1. These items shall be signed as follows:

a. For a corporation: By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

i. A president, secretary, treasurer or vice-president of the corporation in charge of a principal business function or any other person who performs similar policy or decision-making functions for the corporation; or

ii. The manager of one or more manufacturing, production or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

b. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

c. For a municipality, State, Federal or other public agency: By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes (1) the chief executive officer of the agency or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA).

2. All reports required by the permits and other information requested by the director shall be signed by a person described in Part V.G.1 of this permit or by a duly authorized representative of that person. A person is a duly authorized representative only if:

Part V.G.2

a. The authorization is made in writing by a person described in Part V.G.1 of this permit and submitted to the director;

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of manager, operator of a well or well field, superintendent, position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

c. The written authorization is submitted to the director.

3. Changes to authorization. If an authorization under Part V.G.2 of this permit is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part V.G.2 of this permit must be submitted to the director prior to or together with any reports, information or applications to be signed by an authorized representative.

H. Certification.
Any person signing documents under this section shall make the following certification:
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

I. Oil and hazardous substance liability.
Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties to which the permittee is or may be subject under section 311 of the CWA or 40 CFR Part 112. 40 CFR Part 112 establishes procedures, methods and equipment and other requirements for equipment to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into or upon the navigable surface waters of the State or adjoining shorelines.

Part V

J. Property rights.
The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

K. Severability.
The provisions of this permit are severable and if any provision of this permit or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

L. Transfers.
Ohio NPDES general permit coverage is transferable. Ohio EPA must be notified in writing sixty days prior to any proposed transfer of coverage under an Ohio NPDES general permit. The transferee must inform Ohio EPA it will assume the responsibilities of the original permittee transferor.

M. Environmental laws.
No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.

N. Proper operation and maintenance.
The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of SWP3s. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee only when necessary to achieve compliance with the conditions of the permit.

O. Inspection and entry.
The permittee shall allow the director or an authorized representative of Ohio EPA, upon the presentation of credentials and other documents as may be required by law, to:

Part V.O

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).

PART VI. REOPENER CLAUSE

A. If there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with construction activity covered by this permit, the permittee of such discharge may be required to obtain coverage under an individual permit or an alternative general permit in accordance with Part I.C of this permit or the permit may be modified to include different limitations and/or requirements.

B. Permit modification or revocation will be conducted according to ORC Chapter 6111.

PART VII. DEFINITIONS

A. "Act" means Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92- 500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, Pub. L. 97-117 and Pub. L. 100-4, 33 U.S.C. 1251 et. seq.

B. "Best management practices (BMPs)" means schedules of activities, prohibitions of practices, maintenance procedures and other management practices (both structural and non-structural) to prevent or reduce the pollution of surface waters of the state. BMP's also include treatment requirements, operating procedures and practices to control plant and/or construction site runoff, spillage or leaks, sludge or waste disposal or drainage from raw material storage.

C. "Commencement of construction" means the initial disturbance of soils associated with clearing, grubbing, grading, placement of fill or excavating activities or other construction activities.

D. "Concentrated storm water runoff" means any storm water runoff which flows through a drainage pipe, ditch, diversion or other discrete conveyance channel.

E. "Director" means the director of the Ohio Environmental Protection Agency.

Part VII

F. "Discharge" means the addition of any pollutant to the surface waters of the state from a point source.

G. "Disturbance" means any clearing, grading, excavating, filling, or other alteration of land surface where natural or man-made cover is destroyed in a manner that exposes the underlying soils.

H. "Final stabilization" means that either:

1. All soil disturbing activities at the site are complete and a uniform perennial vegetative cover (e.g., evenly distributed, without large bare areas) with a density of at least 70 percent cover for the area has been established on all unpaved areas and areas not covered by permanent structures or equivalent stabilization measures (such as the use of mulches, rip-rap, gabions or geotextiles) have been employed. In addition, all temporary erosion and sediment control practices are removed and disposed of and all trapped sediment is permanently stabilized to prevent further erosion; or

2. For individual lots in residential construction by either:

a. The homebuilder completing final stabilization as specified above or

b. The homebuilder establishing temporary stabilization including perimeter controls for an individual lot prior to occupation of the home by the homeowner and informing the homeowner of the need for and benefits of, final stabilization. (Homeowners typically have an incentive to put in the landscaping functionally equivalent to final stabilization as quick as possible to keep mud out of their homes and off sidewalks and driveways.); or

3. For construction projects on land used for agricultural purposes (e.g., pipelines across crop or range land), final stabilization may be accomplished by returning the disturbed land to its pre-construction agricultural use. Areas disturbed that were previously used for agricultural activities, such as buffer strips immediately adjacent to surface waters of the state and which are not being returned to their pre-construction agricultural use, must meet the final stabilization criteria in (1) or (2) above.

I. "Individual Lot NOI" means a Notice of Intent for an individual lot to be covered by this permit (see parts I and II of this permit).

J. "Larger common plan of development or sale"- means a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.

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K. "MS4" means municipal separate storm sewer system which means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains) that are:

1. Owned or operated by the federal government, state, municipality, township, county, district(s) or other public body (created by or pursuant to state or federal law) including special district under state law such as a sewer district, flood control district or drainage districts or similar entity or a designated and approved management agency under section 208 of the act that discharges into surface waters of the state; and

2. Designed or used for collecting or conveying solely storm water,

3. Which is not a combined sewer and,

4. Which is not a part of a publicly owned treatment works.

L. "National Pollutant Discharge Elimination System (NPDES)" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits and enforcing pretreatment requirements, under sections 307, 402, 318 and 405 of the CWA. The term includes an "approved program."

M. "NOI" means notice of intent to be covered by this permit.

N. "NOT" means notice of termination.

O. "Operator" means any party associated with a construction project that meets either of the following two criteria:

1. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or

2. The party has day-to-day operational control of those activities at a project which are necessary to ensure compliance with an SWP3 for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWP3 or comply with other permit conditions).

As set forth in Part II.A, there can be more than one operator at a site and under these circumstances, the operators shall be co-permittees.

P. "Owner or operator" means the owner or operator of any "facility or activity" subject to regulation under the NPDES program.

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Q. "Permanent stabilization" means the establishment of permanent vegetation, decorative landscape mulching, matting, sod, rip rap and landscaping techniques to provide permanent erosion control on areas where construction operations are complete or where no further disturbance is expected for at least one year.

R. "Percent imperviousness" means the impervious area created divided by the total area of the project site.

S. "Point source" means any discernible, confined and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or the floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

T. "Rainwater and Land Development" is a manual describing construction and post-construction best management practices and associated specifications. A copy of the manual may be obtained by contacting the Ohio Department of Natural Resources, Division of Soil & Water Conservation.

U. "Riparian area" means the transition area between flowing water and terrestrial (land) ecosystems composed of trees, shrubs and surrounding vegetation which serve to stabilize erodible soil, improve both surface and ground water quality, increase stream shading and enhance wildlife habitat.

V. "Runoff coefficient" means the fraction of total rainfall that will appear at the conveyance as runoff.

W. "Sediment settling pond" means a sediment trap, sediment basin or permanent basin that has been temporarily modified for sediment control, as described in the latest edition of the Rainwater and Land Development manual.

X. "State isolated wetland permit requirements" means the requirements set forth in Sections 6111.02 through 6111.029 of the ORC.

Y. "Storm water" means storm water runoff, snow melt and surface runoff and drainage.

Z. "Surface waters of the state" or "water bodies" means all streams, lakes, reservoirs, ponds, marshes, wetlands or other waterways which are situated wholly or partially within the boundaries of the state, except those private waters which do not combine or effect a junction with natural surface or underground waters. Waters defined as sewerage systems, treatment works or disposal systems in Section 6111.01 of the ORC are not included.

Part VII

AA. "SWP3" means storm water pollution prevention plan.

BB. "Temporary stabilization" means the establishment of temporary vegetation, mulching, geotextiles, sod, preservation of existing vegetation and other techniques capable of quickly establishing cover over disturbed areas to provide erosion control between construction operations.

CC. "Water Quality Volume (WQ_v)" means the volume of storm water runoff which must be captured and treated prior to discharge from the developed site after construction is complete. WQ_v is based on the expected runoff generated by the mean storm precipitation volume from post-construction site conditions at which rapidly diminishing returns in the number of runoff events captured begins to occur.

Designer Note:
This is ODOT's general permit issued by Ohio Environmental Protection Agency.
This supplemental specification will be provided with both supplemental specification 832 and proposal note 205.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 864
SEALING OF CONCRETE SURFACES

July 11, 2000

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 908

PERFORMANCE GRADE (PG) BINDER REQUIREMENTS

April 19, 2002

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 402, 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 metric tons) 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 401.04, 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 (403.03) 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.

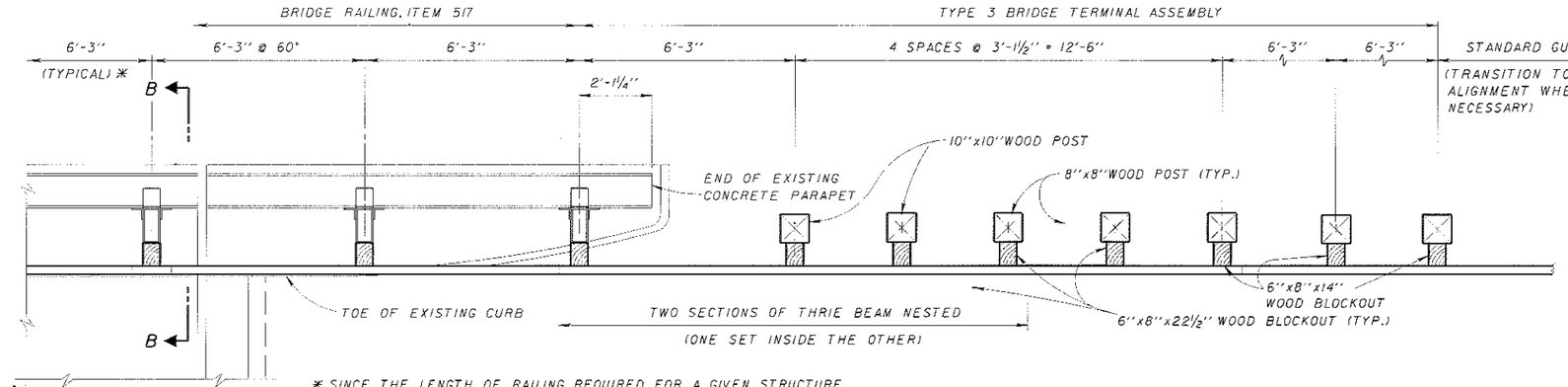
Some solvent testing may be performed early in a project as information in helping to verify plant operation and determining an Asphalt Content Nuclear Gauge (AC Gauge) or asphalt ignition oven calibration. However, any solvent testing shall be accompanied by an asphalt ignition oven test.

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

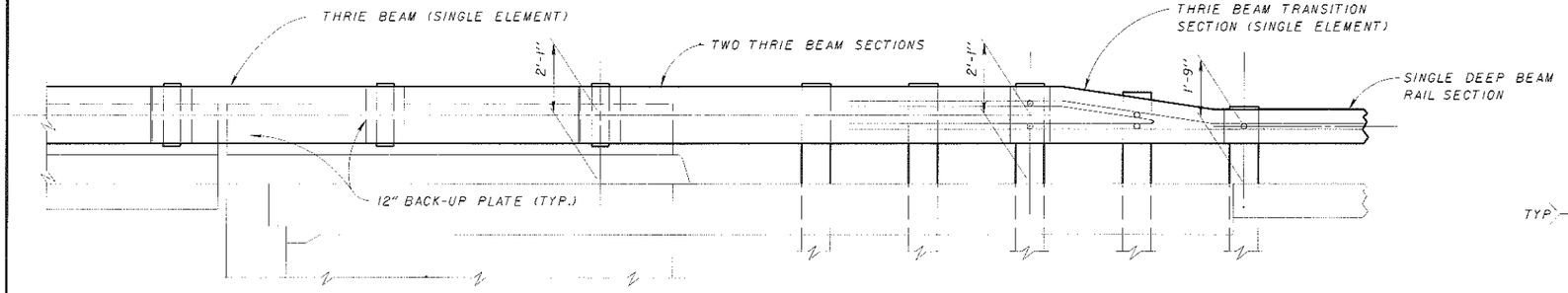
Test / Requirement	SBR Polymer		SBS Polymer		Notes
Final PG Binder Grade	70-22 (a)	70-22 (b)	70-22 (a)	76-22 (a)	c
Actual Pass Temperatures	Report		Report		i
RTFO Mass Loss, percent	≤ 0.5		≤ 0.5		d
Phase Angle, max	76		80	76	d
Elastic Recovery, min			65	75	e
Toughness, in lb	118				f, d
Tenacity, in 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

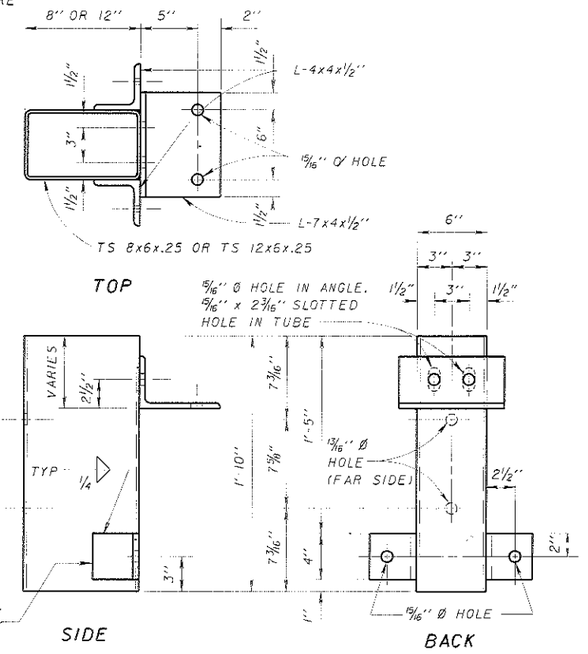
a. Preblended PGM Binder with a base binder of at least -22 grade or stiffer.
b. Post blended PGM Binder made from neat Supplement 1032 certified or preapproved standard PG Binder grade and rubber solids amount equal to or above 3.5 percent by weight of total binder to achieve the PG Binder grade.
c. 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



* SINCE THE LENGTH OF RAILING REQUIRED FOR A GIVEN STRUCTURE WILL NOT BE DIVISIBLE BY 6'-3", ODD PANEL LENGTHS SHALL BE PROVIDED NEAR THE CENTER OF BRIDGE. THE PANEL LENGTHS MAY VARY FROM THE TYPICAL BY PLUS ONE FOOT OR MINUS TWO FEET MAXIMUM.

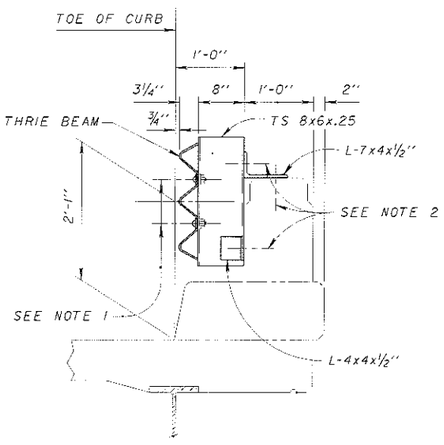
PART PLAN AT ABUTMENT



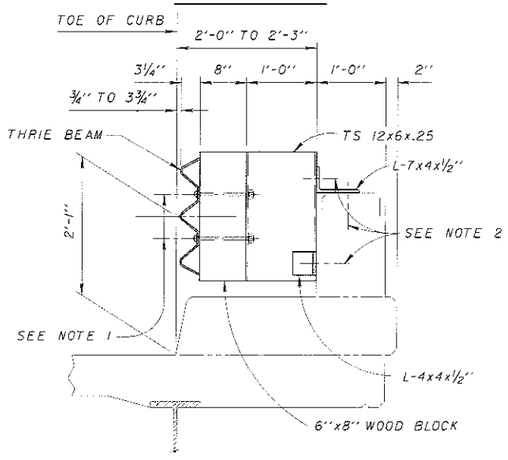


RAILING SUPPORT BRACKET ASSEMBLY

SECTION A-A



(1'-0" SAFETY CURB) (EXISTING)



(2'-0" AND 2'-3" SAFETY CURB) (EXISTING)

SECTION B-B

GENERAL NOTES:

DESIGN SPECIFICATIONS: "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY AASHTO. 1989. INCLUDING THE 1990 AND 1991 INTERIM SPECIFICATIONS AND THE OHIO "SUPPLEMENT" TO THESE SPECIFICATIONS.

THRIE BEAM BRIDGE RAILING: FURNISH MATERIAL ACCORDING TO THE PROVISIONS OF 710.06 WITH THE FOLLOWING EXCEPTION: THE MATERIAL SHALL BE AASHTO M180, TYPE II, CLASS B.

FOR BRIDGE TERMINAL ASSEMBLY DETAILS, REFER TO STANDARD CONSTRUCTION DRAWING GR-3.3.

STRUCTURAL STEEL ANGLES SHALL CONFORM TO ASTM A709 GRADE 36 OR 50.

STRUCTURAL TUBING SHALL CONFORM TO THE PROVISIONS OF 707.10.

NOTE 1: ⅝" DIA. BUTTON HEAD BOLT (ASTM A307) WITH PLATE WASHER UNDER HEAD AND STANDARD WASHER UNDER THE NUT.

NOTE 2: ¾" DIA. HIGH STRENGTH THREADED ANCHORS, BOLTS, NUTS AND WASHERS SHALL CONFORM TO 711.09 (ASTM A325). INSTALL ANCHORS ACCORDING TO ITEM 510 USING NON-SHRINK GROUT, 705.20. ANCHORS SHALL BE EMBEDDED A MINIMUM OF 7" INTO THE EXISTING CONCRETE PARAPET.

GALVANIZING: ALL RAILING SUPPORT BRACKET ASSEMBLIES. HARDWARE AND ACCESSORIES SHALL BE GALVANIZED IN ACCORDANCE WITH 711.02.

THRIE BEAM EXPANSION: TIGHTEN ALL BOLTS IN THE OFF STRUCTURE END OF THE APPROACH PANEL THRIE BEAM RAIL SECTION THAT SPANS THE ABUTMENT AS SPECIFIED FOR EXPANSION JOINTS IN 606.04.

REMOVALS: REMOVE EXISTING ALUMINUM RAILING AND POSTS ACCORDING TO ITEM 202.

METHOD OF MEASUREMENT: THE DEPARTMENT WILL MEASURE RETROFIT RAILING BY THE NUMBER OF FEET. THE MEASURED LENGTH WILL BE BETWEEN THE CENTER OF THE FIRST POST BLOCKOUT ON THE BRIDGE TO THE CENTER OF THE LAST POST BLOCKOUT ON THE BRIDGE.

BASIS OF PAYMENT: THE DEPARTMENT WILL INCLUDE ALL COSTS ASSOCIATED WITH REMOVALS OF EXISTING RAILING AND POSTS WITH THE RETROFIT RAILING FOR PAYMENT. THE DEPARTMENT WILL PAY FOR ACCEPTED QUANTITIES AT THE CONTRACT PRICE FOR ITEM 517, RAILING (THRIE BEAM RETROFIT).

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
4-24-92
DATE
ENGINEER OF BRIDGES

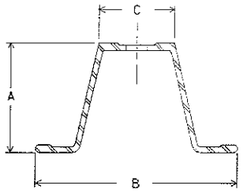
DESIGNED	DRAWN	CHECKED	REVIEWED
A.J.M	GFJ	MRG	LMW

TBR-91

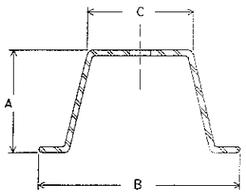
REVISIONS	
07-19-02	

STANDARD
BRIDGE RETROFIT RAILING
THRIE BEAM BRIDGE RAILING
FOR BRIDGES WITH SAFETY CURBS

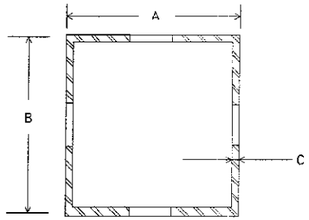
1 / 1



TYPE P



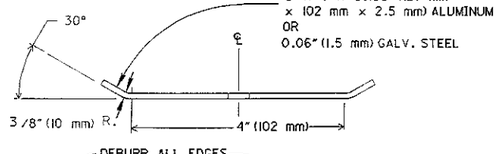
TYPE F



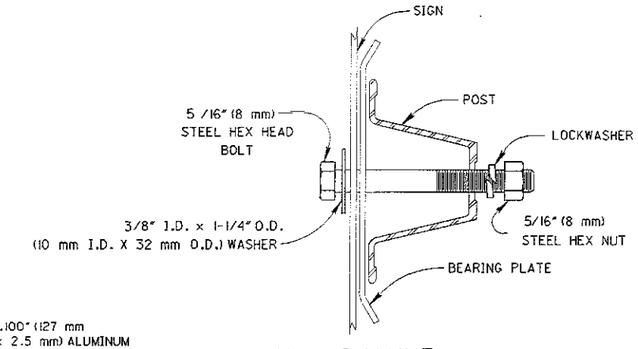
TYPE S

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

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



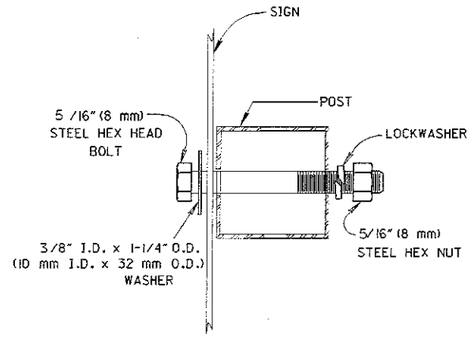
BEARING PLATE



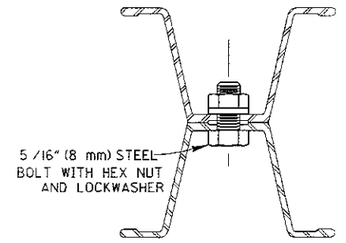
U - CHANNEL
SIGN ATTACHMENT DETAIL

NOTES

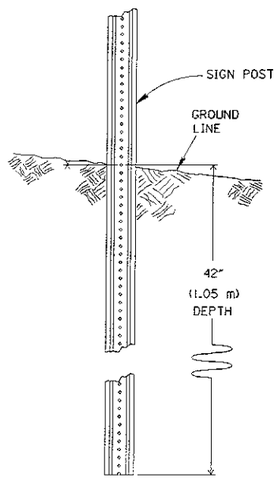
1. Install number 4 type P and F posts, and number 6 type P and F posts, only in protected locations (e.g. behind guardrail). Install two post installations of number 4 type S posts within 7 foot (2.1m) path only in protected locations.
2. Use of anchor base with No. 2 and No. 3 square post is optional.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



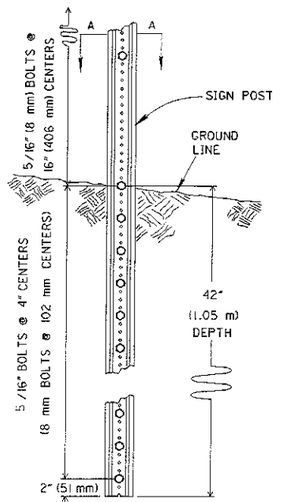
SQUARE POST
SIGN ATTACHMENT DETAIL



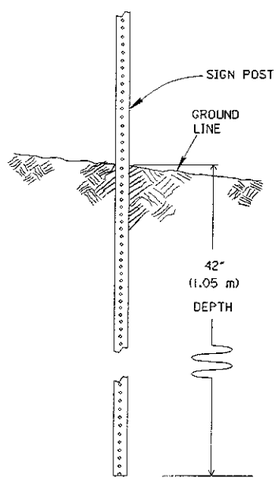
SECTION A - A



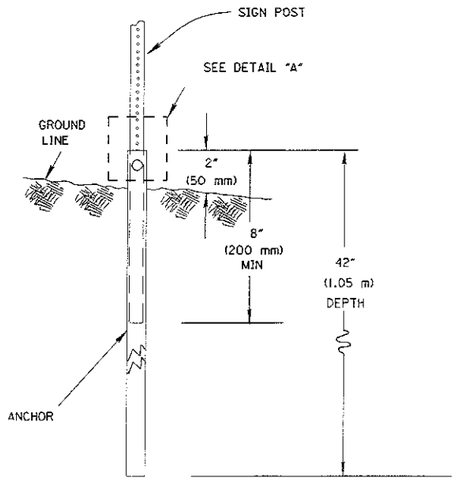
TYPICAL NO. 1, NO. 2 AND NO. 3 U - CHANNEL DRIVEN INSTALLATION



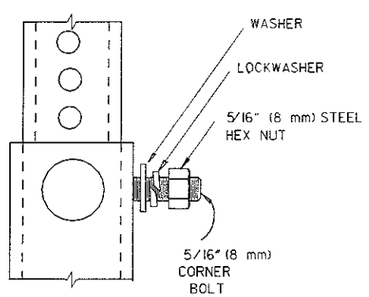
TYPICAL NO. 4 AND NO. 6 U - CHANNEL DRIVEN INSTALLATION



TYPICAL SQUARE POST DRIVEN INSTALLATION



TYPICAL SQUARE POST ANCHOR BASE INSTALLATION



DETAIL "A"

01-19-01

YIELDING POST

OFFICE OF TRAFFIC ENGINEERING

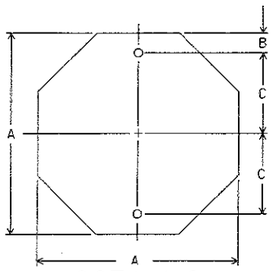
TC-41.20

LAM

NOTES

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

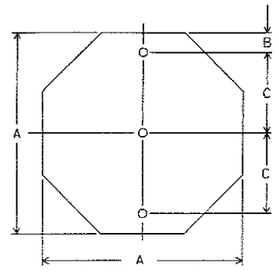
SHAPE — OCTA-2-6 — NO. BOLTS REQUIRED
NO. SUPPORTS REQUIRED



OCTA-1-2

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

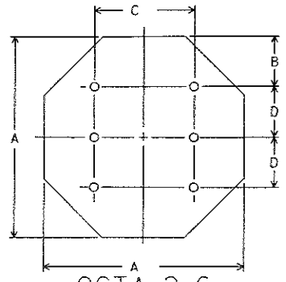
A	B	C	THICKNESS	m^2
450	75	150	1.6	0.20
600	75	225	1.6	0.36



OCTA-1-3

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

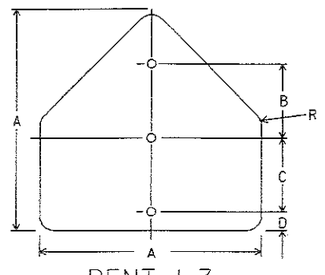
A	B	C	THICKNESS	m^2
750	75	300	2.0	0.56
900	150	300	2.0	0.81



OCTA-2-6

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

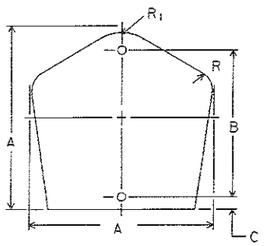
A	B	C	D	THICKNESS	m^2
1200	300	600	300	2.5	1.44



PENT-1-3

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

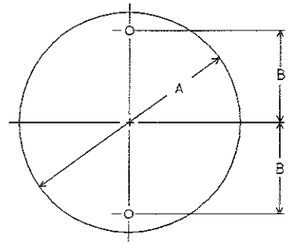
A	B	C	D	R	THICKNESS	m^2
750	250	275	75	48	2.0	0.56
900	300	300	75	57	2.0	0.81
1050	350	325	100	64	2.5	1.10



CO-1-2

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

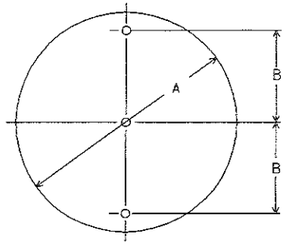
A	B	C	R_1	R	THICKNESS	m^2
450	375	25	125	50	1.6	0.20
600	450	50	135	68	1.6	0.36
750	600	50	168	86	2.0	0.56



CIR-1-2

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

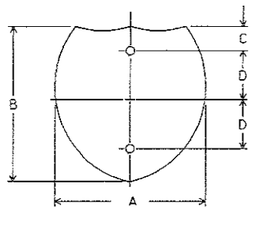
A	B	THICKNESS	m^2
450	150	1.6	0.20
600	225	2.0	0.36



CIR-1-3

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

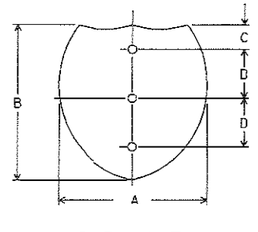
A	B	THICKNESS	m^2
750	300	2.0	0.56
900	375	2.0	0.81



I.S.-1-2

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

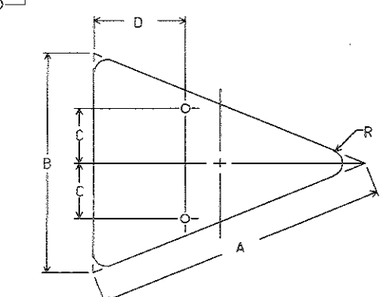
A	B	C	D	THICKNESS	m^2
600	600	75	225	1.6	0.36
750	600	75	225	2.0	0.45
750	750	75	300	2.0	0.56
1000	750	75	300	2.0	0.75



I.S.-1-3

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

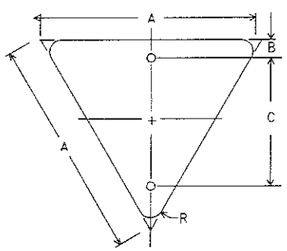
A	B	C	D	THICKNESS	m^2
900	900	150	300	2.0	0.81
1200	900	150	300	2.5	1.08



ISOS-1-2

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

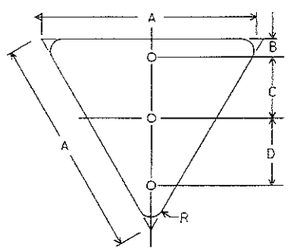
A	B	C	D	R	THICKNESS	m^2
1000	750	187	300	48	2.0	0.35
1200	900	225	375	57	2.5	0.50



TRI-1-2

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

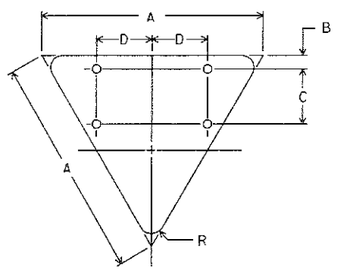
A	B	C	R	THICKNESS	m^2
600	50	350	38	2.0	0.16



TRI-1-3

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

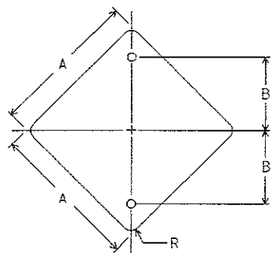
A	B	C	D	R	THICKNESS	m^2
900	75	250	275	50	2.5	0.35



TRI-2-4

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

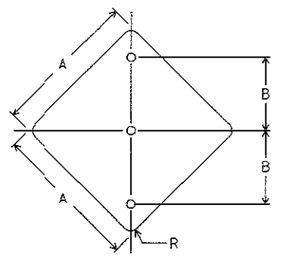
A	B	C	D	R	THICKNESS	m^2
1200	75	300	300	75	2.5	0.62
1500	75	450	375	100	2.5	0.97



DIA-1-2

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

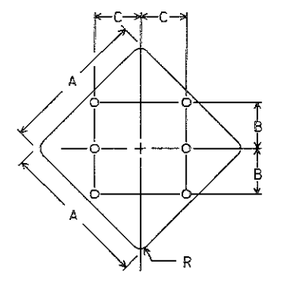
A	B	R	THICKNESS	m^2
450	225	38	1.6	0.20



DIA-1-3

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

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



DIA-2-6

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

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

4-20-01

BLANK DETAILS I

SIGN B

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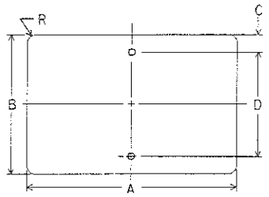
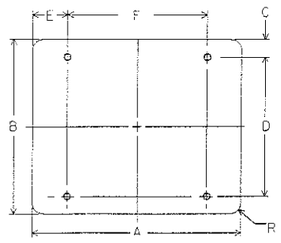


H-REC-1-2

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

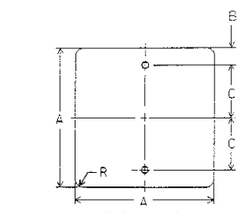
A	B	C	D	R	THICKNESS	m^2
300	100	25	50	38	1.6	0.03
300	150	37.5	75	38	1.6	0.05
300	225	37.5	150	38	1.6	0.07
450	150	37.5	75	38	1.6	0.07
450	300	37.5	225	38	1.6	0.14
525	375	37.5	300	38	1.6	0.20
525	450	75	300	38	1.6	0.24
600	150	37.5	75	38	1.6	0.09
600	200	37.5	125	38	1.6	0.12
600	250	37.5	175	38	1.6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



H-REC-2-4

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

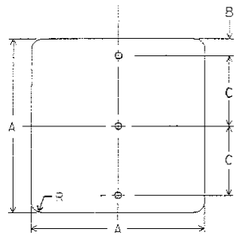
A	B	C	D	E	F	R	THICKNESS	m^2
900	600	75	450	150	600	38	2.0	0.54
900	750	75	600	150	600	48	2.0	0.68
1000	500	75	350	150	700	38	2.0	0.50
1050	900	150	600	225	600	57	2.5	0.95
1125	900	150	600	225	675	57	2.5	1.01
1200	200	37.5	125	225	750	38	2.0	0.24
1200	212	37.5	137	225	750	38	2.0	0.25
1200	350	37.5	275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



SQ-1-2

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

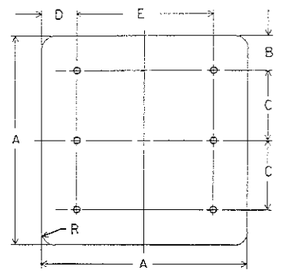
A	B	C	R	THICKNESS	m^2
375	75	112.5	38	1.6	0.14
450	75	150	38	1.6	0.20
600	75	225	38	1.6	0.36



SQ-1-3

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

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



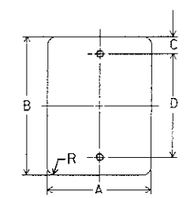
SQ-2-6

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

* "DO NOT ENTER" SIGN

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

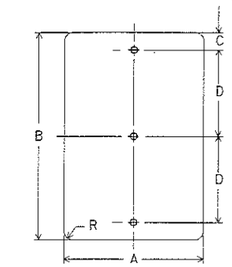
* "DO NOT ENTER" SIGN



V-REC-1-2

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

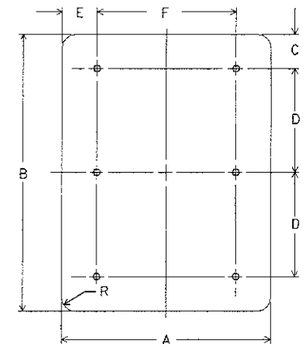
A	B	C	D	R	THICKNESS	m^2
200	650	125	400	38	1.6	0.13
225	300	37.5	225	38	1.6	0.07
300	450	37.5	375	38	1.6	0.14
300	600	75	450	38	1.6	0.18
450	600	75	450	38	1.6	0.27



V-REC-1-3

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

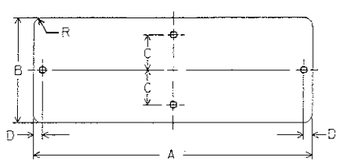
A	B	C	D	R	THICKNESS	m^2
150	1350	225	450	38	2.0	0.20
300	900	75	375	38	1.6	0.27
300	1200	150	450	38	2.0	0.36
600	750	75	300	38	2.0	0.45
600	900	75	375	38	2.0	0.54
600	1200	225	375	38	2.5	0.72
750	900	75	375	48	2.0	0.68
750	950	75	400	38	2.0	0.68
750	1050	225	300	38	2.0	0.79
900	1050	225	300	57	2.5	0.95



V-REC-2-6

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

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



H-REC-1-4 (ONE WAY)

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

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

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

NO. SUPPORTS REQUIRED

NOTES

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

4-20-01

SIGN BLANK DETAILS II

OFFICE OF TRAFFIC ENGINEERING

TC-52.20

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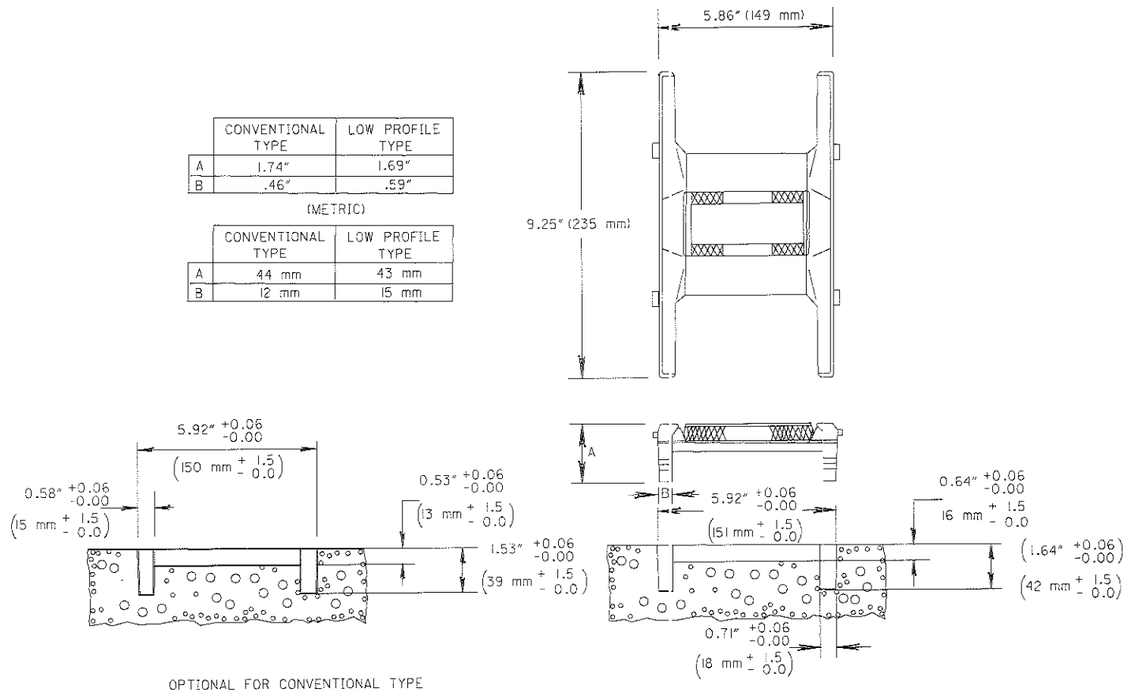
LAM

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

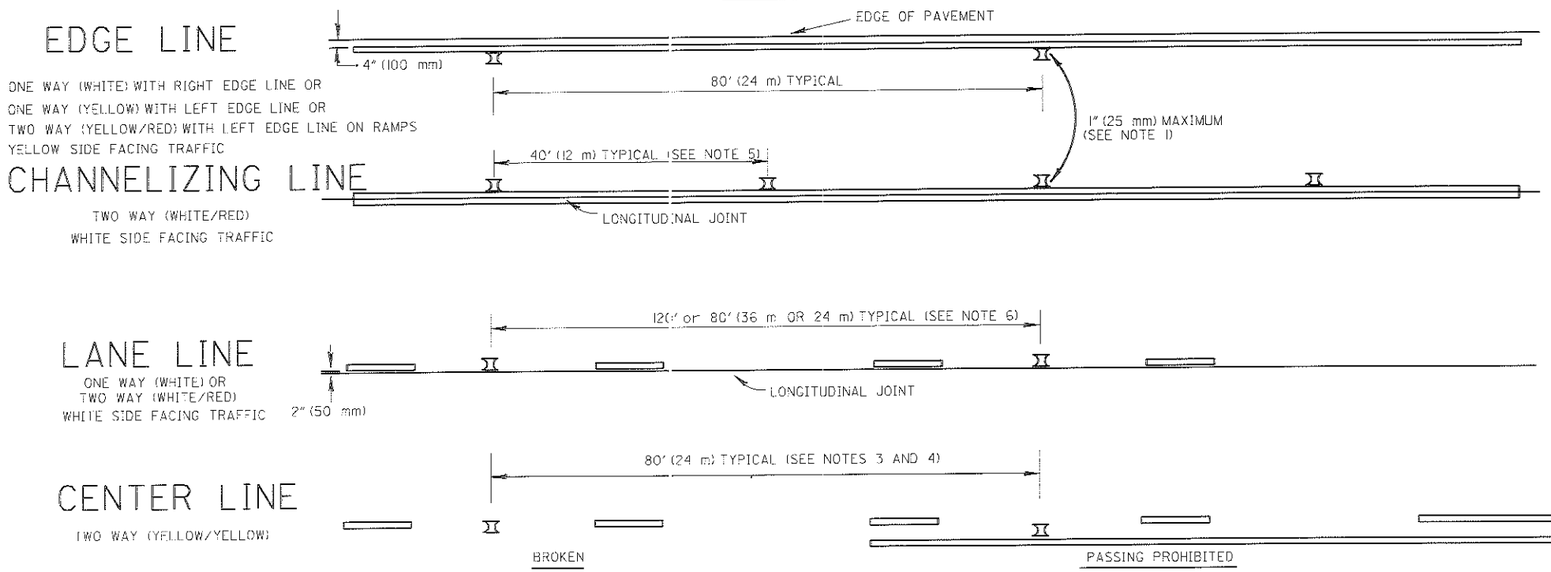
(METRIC)

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



OPTIONAL FOR CONVENTIONAL TYPE

CASTING AND SAW CUT DETAILS



TYPICAL RAISED PAVEMENT MARKER PLACEMENT WITH LONGITUDINAL PAVEMENT MARKINGS

NOTES

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

10-19-01

RAISED PAVEMENT MARKER INSTALLATION DETAILS

OFFICE OF TRAFFIC ENGINEERING

TC-65.10

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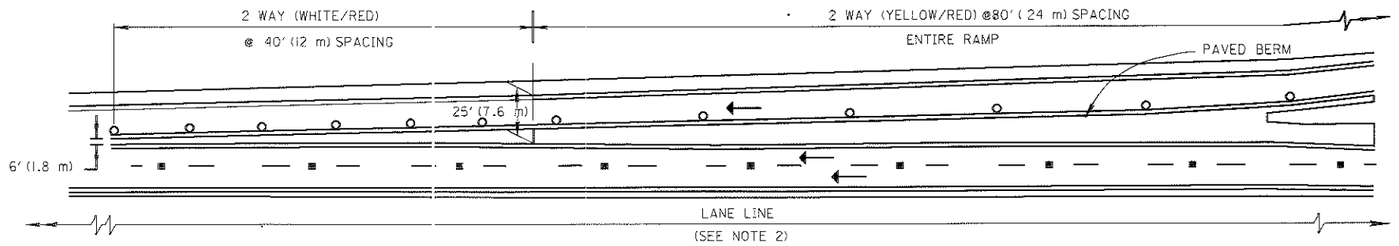
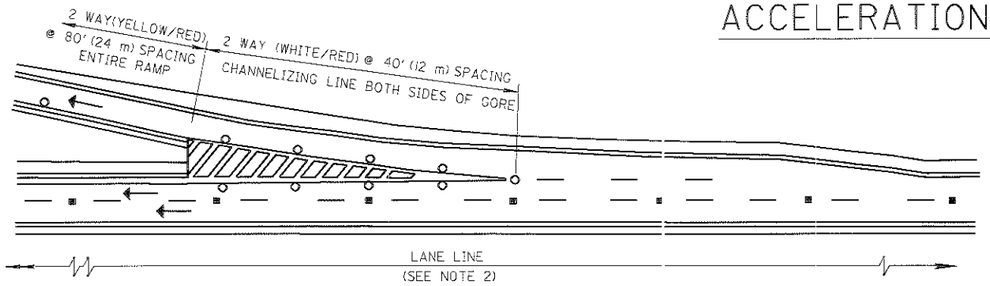
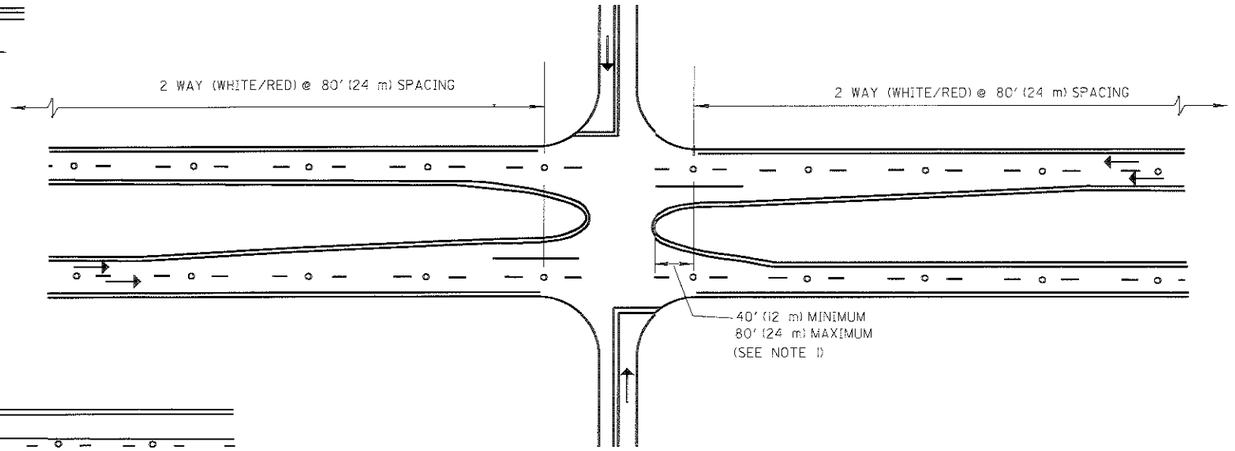


ACCELERATION LANE

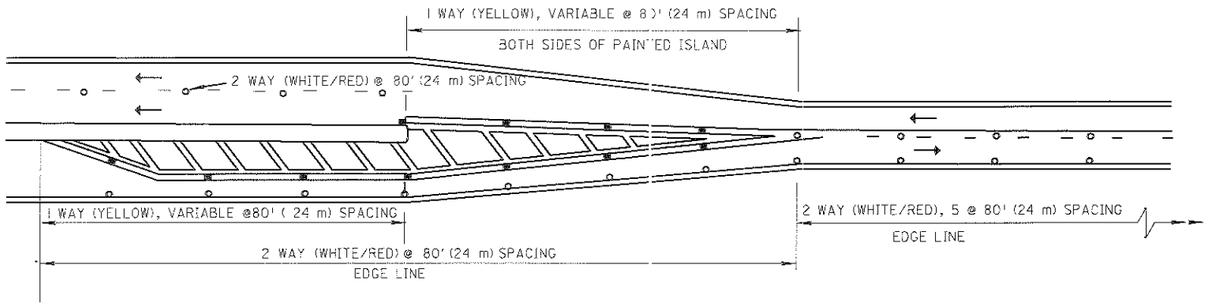


DECELERATION LANE

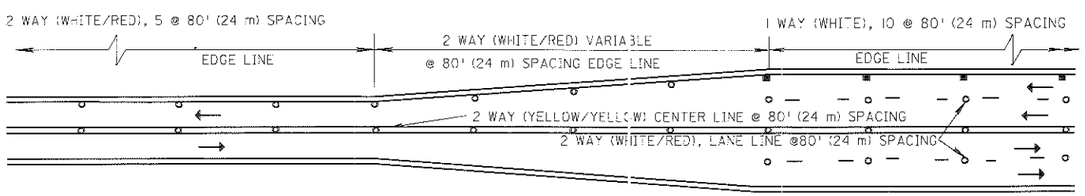


MULTILANE DIVIDED-CONTROLLED ACCESS

(SEE NOTE 2)



4 LANE DIVIDED TO 2 LANE TRANSITION



4 LANE UNDIVIDED TO 2 LANE TRANSITION

NOTES

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

LEGEND

- ■ 1 WAY REFLECTORS
- ○ 2 WAY REFLECTORS

10-19-01

RAISED PAVEMENT MARKER DETAILS I

OFFICE OF TRAFFIC ENGINEERING

TC-65.11

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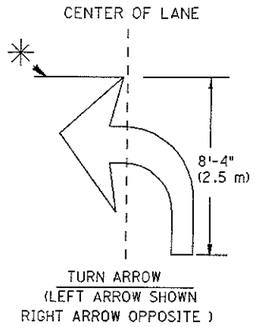
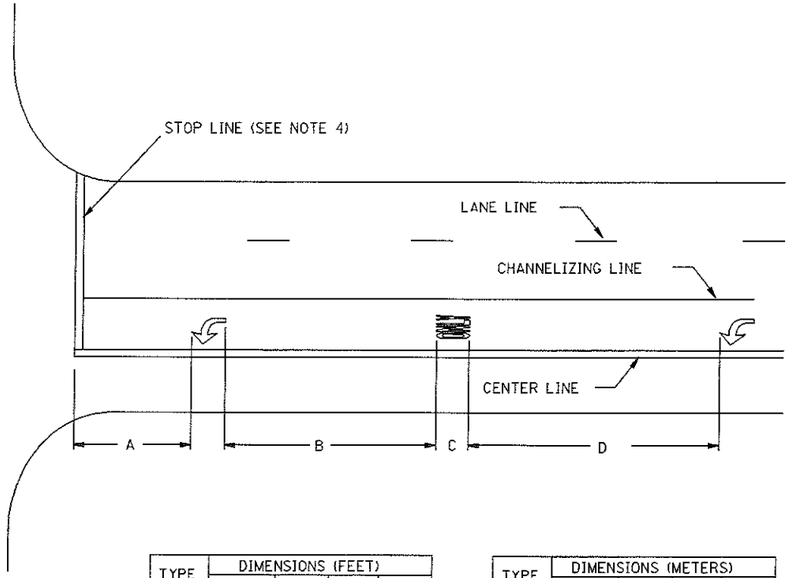
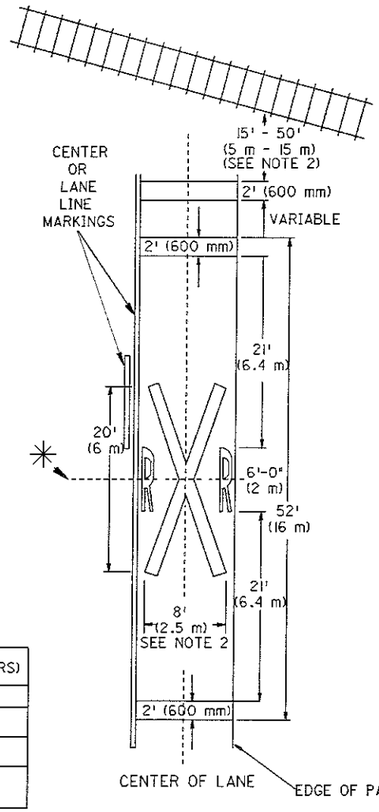


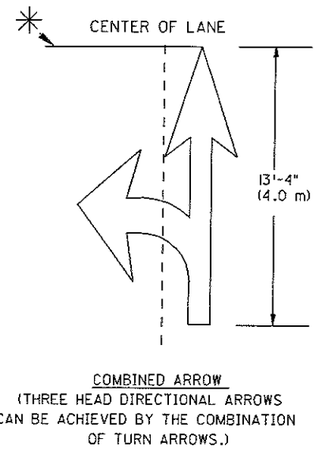


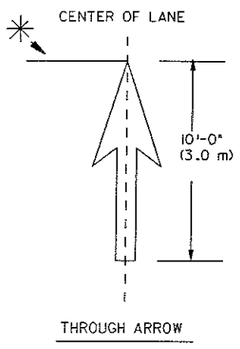


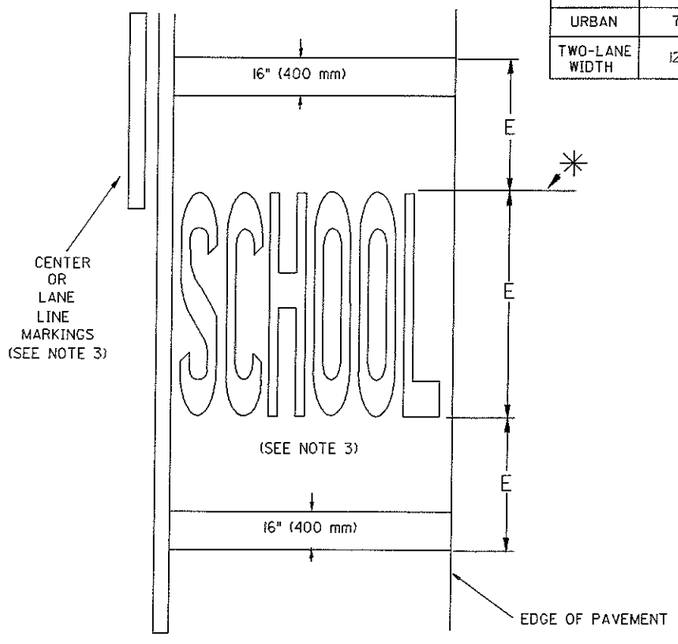
TYPE	DIMENSIONS (FEET)			
	A	B	C	D
RURAL	30 MIN.	32-80	8	32-80
URBAN	10 MIN.	24-60	6	24-60

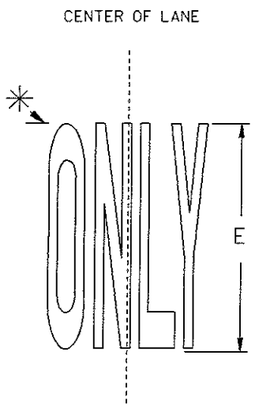
TYPE	DIMENSIONS (METERS)			
	A	B	C	D
RURAL	9 MIN.	10-25	2.5	10-25
URBAN	3 MIN.	7-18	1.8	7-18

TYPE	E INCHES	E (MILLIMETERS)
	STANDARD	STANDARD
RURAL	96	2500
URBAN	72	1800
TWO-LANE WIDTH	120	3000









NOTES

1. On multi-lane approaches, the transverse lines used with the railroad symbols shall extend across all approach lanes, and symbols shall be placed in each approach lane.

2. The railroad symbol shall be located so that the W-94, "railroad advance warning sign", is within the two transverse boundary lines of the railroad symbol. The stop line shall be located for best sight distance within 15' to 50' (5 m to 15 m) of the near edge of the tracks. Width of "x" may vary according to lane width. Stop lines shall be approximately 8' (2.4 m) from a gate (if present). Refer to Figure M-27 and Table WS-1 of the OMUTCD to determine the distance between the Stop Line and adjacent transverse pavement marking.

3. Preferably, the word "SCHOOL" should be contained in a single lane. On one lane applications, the transverse lines should extend across the lane which approaches the zone with the word "SCHOOL" centered across that lane. When a two-lane width is used the characters should be 10' (3 m) or more in height. For two approach lanes, each lane should have a separate word "SCHOOL" centered across it. On two lane, two way roadways with insufficient pavement width, the word and transverse lines shall extend across both lanes of traffic. On four lane, two way roadways with insufficient pavement width, the word and transverse lines shall extend across both lanes entering the school zone. Center or lane lines shall not pass through the "SCHOOL" marking. (OMUTCD section 5C-19)

4. The stop line should be placed where cross-corner vision is maximum, in no case more than 30' (9.1 m) or less than 4' (1.2 m) from the nearest edge of the intersecting roadway. For normal intersections a maximum distance of 10' (3 m) is recommended.

   If a marked crosswalk is present, the stop line should be placed 4' (1.2 m) in advance of, and parallel to the nearest crosswalk line.

5. For traffic paint and polyester application, template gaps shall be filled with marking material in accordance with 641.03. For extruded thermoplastic material, these gaps may remain unfilled in accordance with 641.03.

✳ - INDICATES STATION REFERENCE POINT

04-19-02

WORDS, SYMBOLS AND ARROWS FOR PAVEMENT MARKINGS

OFFICE OF TRAFFIC ENGINEERING

TC-71.10

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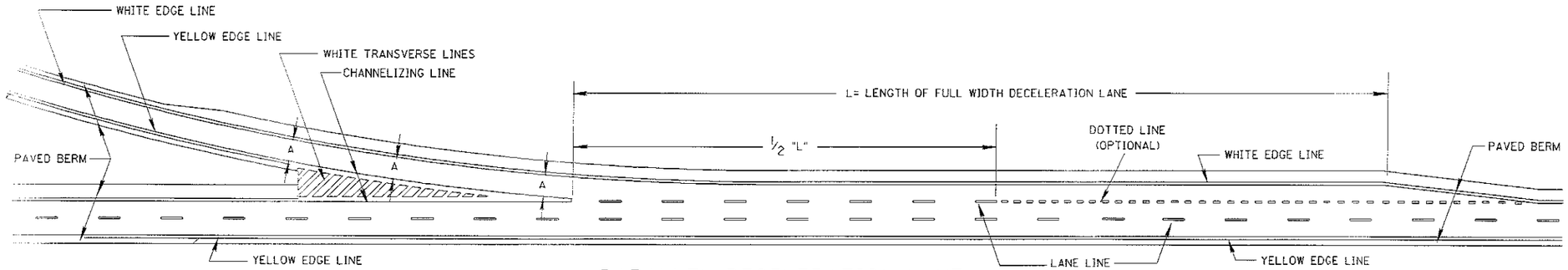
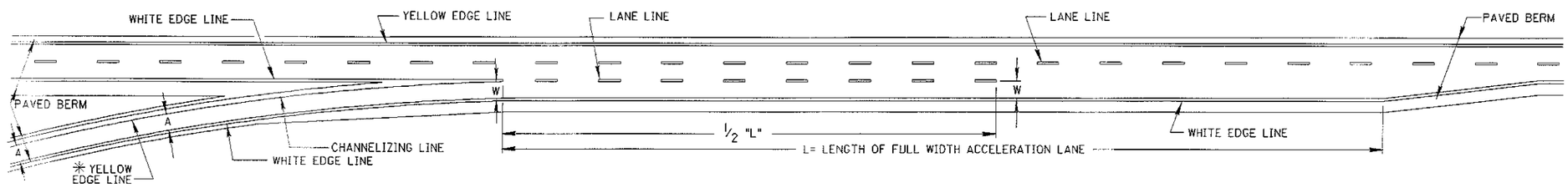
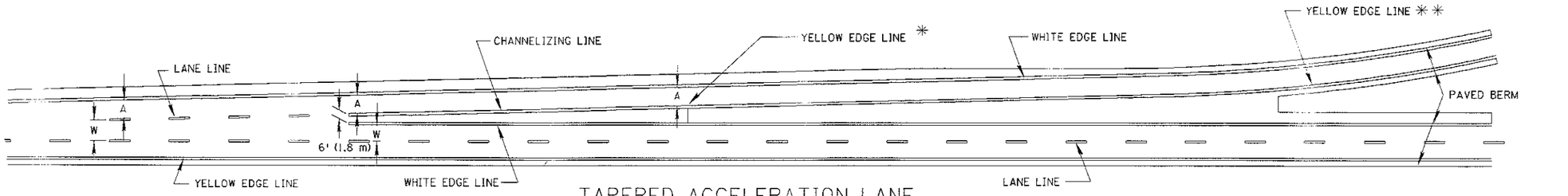
JAM



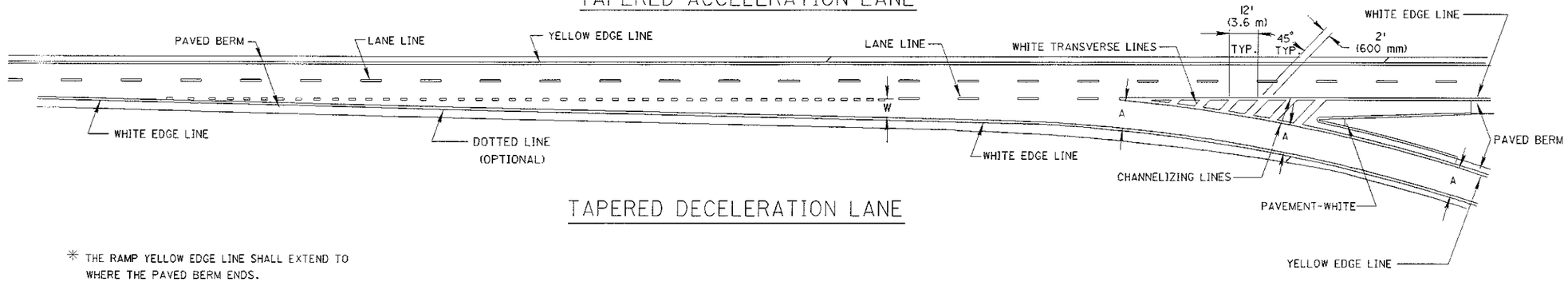
PARALLEL DECELERATION LANE



PARALLEL ACCELERATION LANE



TAPERED ACCELERATION LANE



TAPERED DECELERATION LANE

✳ THE RAMP YELLOW EDGE LINE SHALL EXTEND TO WHERE THE PAVED BERM ENDS.

✳✳ ANY EXISTING CURB SHALL BE PAINTED WHITE.

A = UNIFORM RAMP WIDTH

W = LANE WIDTH

FREEWAY ENTRANCE AND EXIT MARKINGS

OFFICE OF TRAFFIC ENGINEERING

TC-72.20

01-19-01

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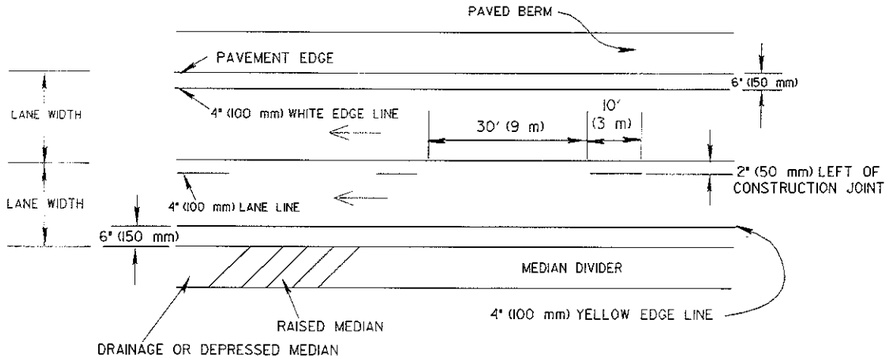
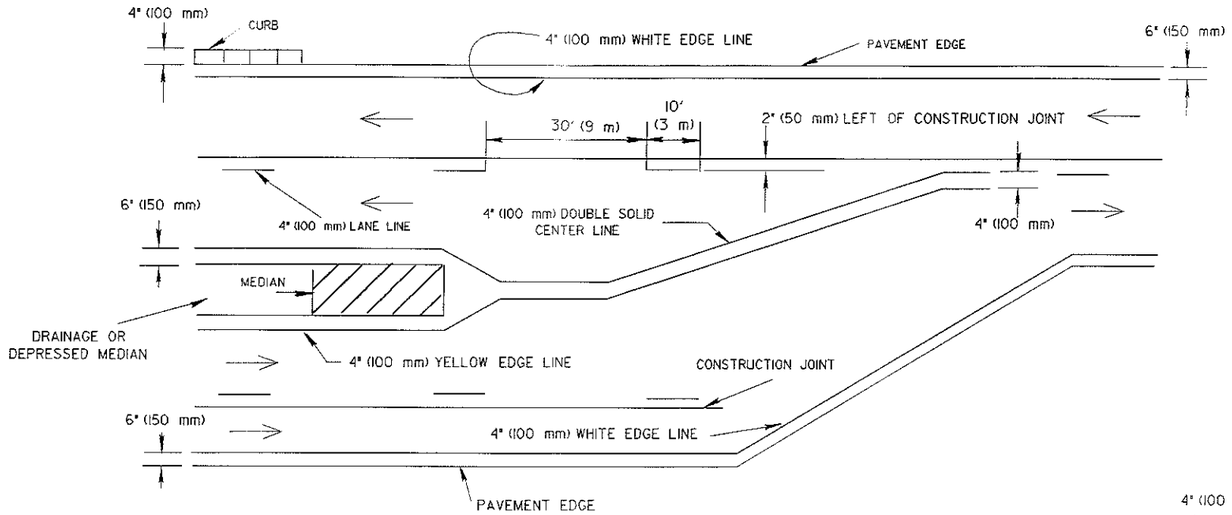


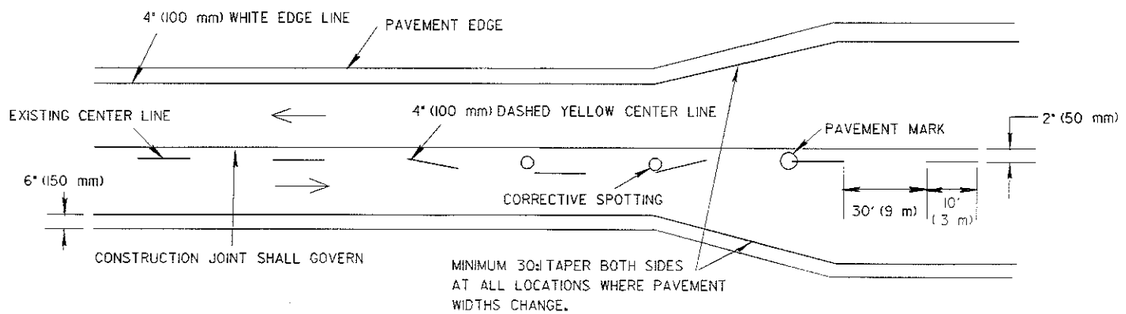
FREEWAY & EXPRESSWAY MAINLINE MARKINGS



MULTILANE DIVIDED & UNDIVIDED HIGHWAY MARKINGS

NOTES

1. The distance from the pavement edge to the nearside edge of the edge line may be increased with the approval of the Engineer in order to maintain uniform lane width.
2. See TC-72.20 for entrance and exit ramp markings.
3. The cycle length for dashed lines shall be 40' (12 m) plus or minus 6" (150 mm) The minimum length of dash shall be sufficiently long to maintain a 3:1 ratio between length of gap and length of dash.
4. Edge Line transitions shall be marked at the same time as the adjoining Edge Lines.



TWO LANE MARKINGS

01-19-01

PAVEMENT MARKING DETAILS

OFFICE OF TRAFFIC ENGINEERING

TC-73.10

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