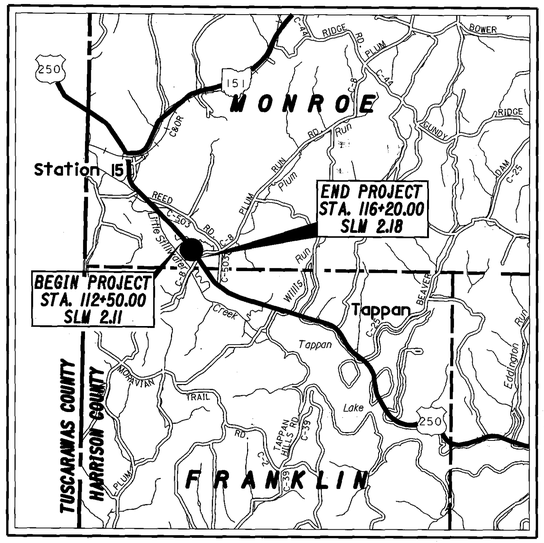
STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

HAS-250-2.11

MONROE TOWNSHIP
HARRISON COUNTY



LOCATION MAP

LATITUDE: N40°22'30" LONGITUDE: W81°14'55"

SCALE IN MILES
0 1 2 3 4

PORTION TO BE IMPROVED
STATE & FEDERAL ROUTES
OTHER ROADS

DESIGN DESIGNATION

CURRENT ADT (2005)	5600
DESIGN YEAR ADT (2025)	7100
DESIGN HOURLY VOLUME (2025)	710
DIRECTIONAL DISTRIBUTION	55%
TRUCKS (24 HOUR B&C)	28%
DESIGN SPEED	55 MPH
LEGAL SPEED	55 MPH

DESIGN FUNCTIONAL CLASSIFICATION - PRINCIPAL ARTERIAL - OTHER (RURAL)
NHS PROJECT - YES

DESIGN EXCEPTION

NONE REQUIRED

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
JOHN P. BARNHOUSE
E-62295
REGISTERED PROFESSIONAL ENGINEER
SIGNED: J. P. Barnhouse
DATE: 08-15-05

INDEX OF SHEETS

PROJECT DESCRIPTION

IMPROVEMENT OF 0.07 MILE (370 FEET) OF U.S. 250 IN MONROE TOWNSHIP OF HARRISON COUNTY. THE IMPROVEMENT INCLUDES THE REHABILITATION OF EXISTING BRIDGE NO. HAS-250-0214 OVER PLUM RUN BY REPLACING THE DECK SLAB, APPROACH SLABS, REPAIRING THE SUBSTRUCTURE, AND MINIMAL APPROACH WORK.

PROJECT EDA	N/A (MAINTENANCE PROJECT)
CONTRACTOR EDA	N/A (MAINTENANCE PROJECT)
NOI EDA	N/A (MAINTENANCE PROJECT)

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.

2005 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.

APPROVED _____
DATE 8/17/05 DISTRICT DEPUTY DIRECTOR

APPROVED Gordon Proctor
DATE 9-12-05 DIRECTOR, DEPARTMENT OF TRANSPORTATION

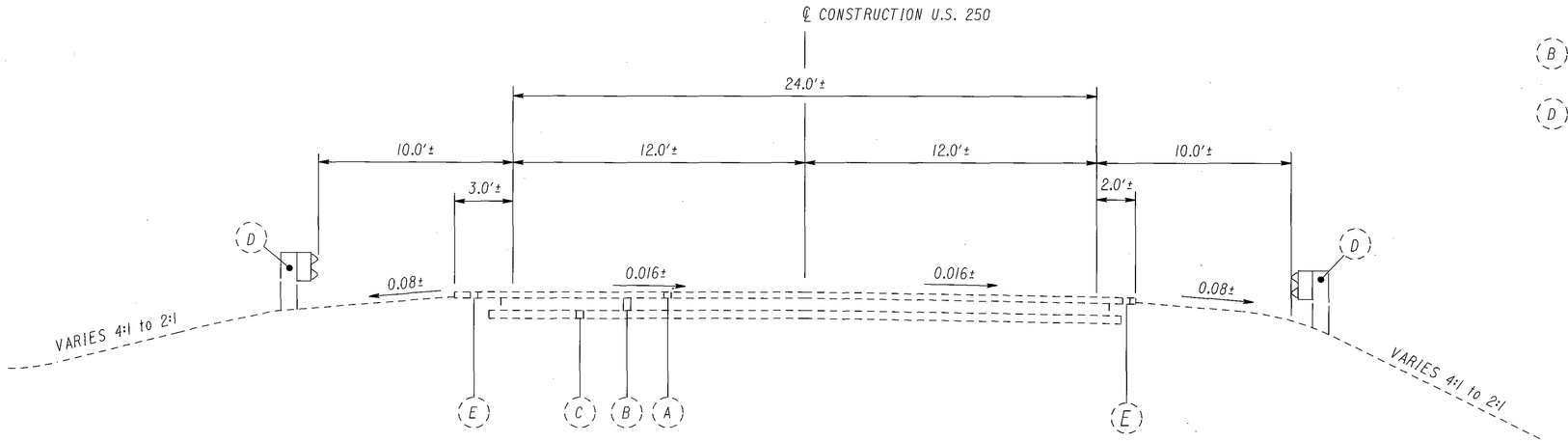
STANDARD CONSTRUCTION DRAWINGS

BP-2.4	7/16/04	TC-41.20	1/19/01	MT-96.11	4/19/02	AS-1-81	7/19/02		
BP-2.5	7/28/00	TC-42.20	7/16/04						
BP-3.1	7/16/04	TC-52.10	4/20/01	MT-96.21	4/19/02	PCB-91	7/19/02		
		TC-52.20	4/20/01	MT-96.26	4/20/01				
GR-1.1	7/16/04			MT-97.10	4/19/02	TST-1-99	10/17/03		
GR-2.1	1/16/04								
GR-3.6	1/16/04			MT-101.20	10/18/02				
				MT-101.70	10/18/02				
RM-4.2	4/18/03								
								SPECIAL PROVISIONS	
				MT-105.10	10/18/02				
DM-1.1	1/21/05			MT-105.11	10/18/02				
DM-4.3	7/19/02								
DM-4.4	7/19/02								

SUPPLEMENTAL SPECIFICATIONS

800	7/15/05
832	4/17/04
833	2/12/03
898	7/16/04

FEDERAL PROJECT NO. NON-FEDERAL
PID NO. 21867
CONSTRUCTION PROJECT NO.
RAILROAD INVOLVEMENT NONE
HAS-250-2.11
1/32



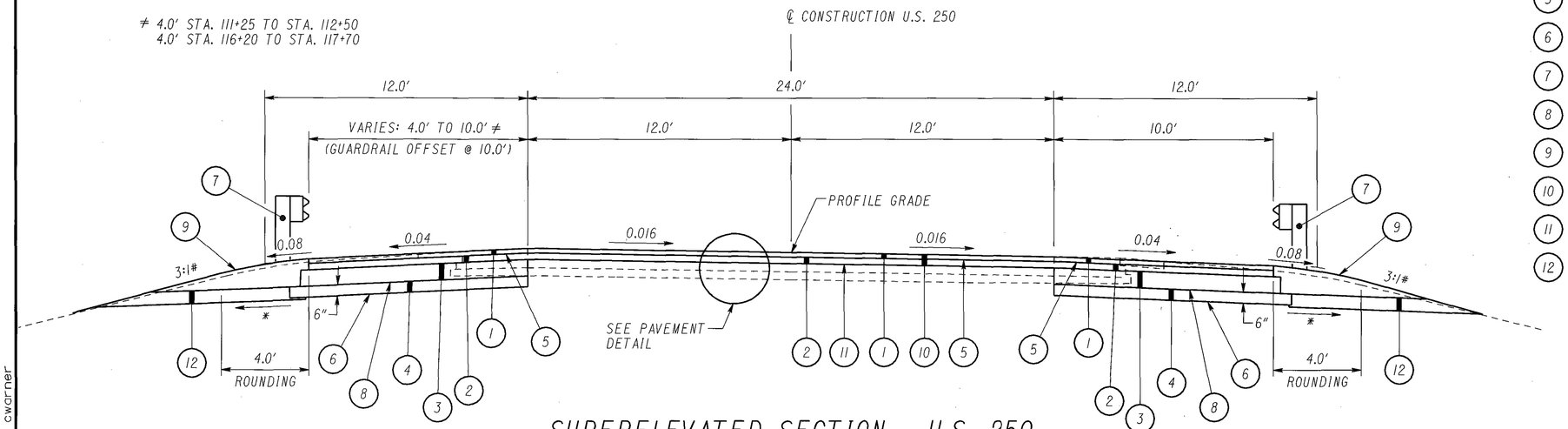
EXISTING SECTION - U.S. 250

- (A) — 4"± EXISTING ASPHALT CONCRETE
- (B) — 9"± EXISTING REINFORCED CONCRETE PAVEMENT
- (C) — 6"± EXISTING SUBBASE
- (D) — EXISTING GUARDRAIL
- (E) — EXISTING ASPHALT CONCRETE SHOULDER

LEGEND:

1. ITEM 448 - 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE I, PG64-22, AS PER PLAN
2. ITEM 448 - 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG64-22
3. ITEM 301 - 9" ASPHALT CONCRETE BASE, PG64-22
4. ITEM 304 - 6" AGGREGATE BASE
5. ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE (APPLIED @ 0.04 GAL./S.Y.)
6. ITEM 204 - SUBGRADE COMPACTION
7. ITEM 606 - GUARDRAIL, TYPE 5
8. ITEM 408 - PRIME COAT APPLIED @ 0.4 GAL./S.Y
9. ITEM 659 - SEEDING, MULCHING & WATER
10. ITEM 254 - PAVEMENT PLANING, ASPHALT CONCRETE (2" AVERAGE THICKNESS)
11. ITEM 407 - TACK COAT APPLIED @ 0.075 GAL./S.Y
12. ITEM 605 - AGGREGATE DRAINS

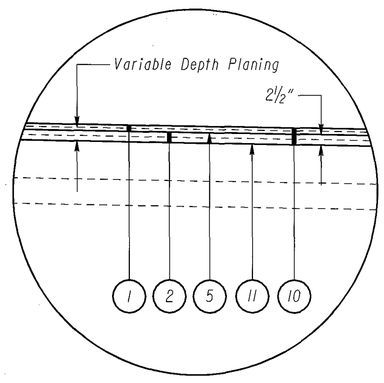
≠ 4.0' STA. 111+25 TO STA. 112+50
4.0' STA. 116+20 TO STA. 117+70



SUPERELEVATED SECTION - U.S. 250

SECTION APPLIES:
STA. 112+50 TO STA. 116+20 ≠ = 370.00 FT.
DEDUCT FOR BRIDGE NO. HAS-250-0214 AND APPROACH SLAB
STA. 113+78.28 TO STA. 114+74.88 = - 96.60 FT.
TOTAL LENGTH = 273.40 FT.

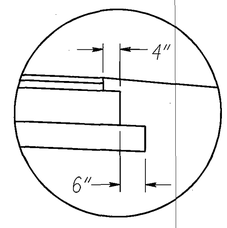
≠ EXCEPT AS NOTED ABOVE FOR LEFT SHOULDER



PAVEMENT DETAIL

PAVEMENT PLANING LIMITS:

VARIES FROM 4" @ STA. 112+50 to 0" @ STA. 113+40
NO PLANNING FROM STA. 113+40 TO STA. 113+78.28
NO PLANNING FROM STA. 114+74.88 TO STA. 115+20
VARIES FROM 0" @ STA. 115+20 TO 4" @ STA. 116+20



STEP DETAIL

* 0.04 MINIMUM, 0.08 DESIRABLE
# UNLESS OTHERWISE SHOWN ON CROSS SECTIONS.

CALCULATED KAH CHECKED JPB

TYPICAL SECTIONS

HAS-250-2.11

2/32

I:\Projects\21867\dgn\GY100.dgn 18-JAN-2005 9:45AM cwarner

CALCULATED KAH
CHECKED JPB

GENERAL NOTES

UTILITIES

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

DOMINION TRANSMISSION
7015 FREEDOM AVENUE NW
NORTH CANTON, OHIO 44720
330-497-5136

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

ELEVATION DATUM

ALL ELEVATIONS BASED ON NAVD 1929.

ROUNDING

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

WORK LIMITS

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

EXISTING PLANS

EXISTING PLANS ENTITLED HAS-36-(0.43-2.92)(11.92-14.12) MAY BE INSPECTED IN THE ODOT DISTRICT 11 OFFICE IN NEW PHILADELPHIA, OHIO.

CLEARING AND GRUBBING

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

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.

INSPECTION OF BRIDGES FOR BATS

PRIOR TO ANY DEMOLITION/REMOVAL OF THE EXISTING STRUCTURE, THE CONTRACTOR SHALL CAREFULLY EXAMINE THE UNDERSIDE OF THE STRUCTURE FOR THE PRESENCE OF BATS. IF ANY BATS ARE FOUND, THE ODOT DISTRICT 11 ENVIRONMENTAL COORDINATOR SHOULD BE CONTACTED AT 330-339-6633 BEFORE COMMENCING WITH THE BRIDGE'S DEMOLITION.

SEEDING AND MULCHING

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

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

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

STREAM CHANNEL EXCAVATION

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

ITEM 605 - AGGREGATE DRAINS

AGGREGATE DRAINS SHALL BE PLACED AT 50 FOOT INTERVALS ON EACH SIDE OF NORMAL CROWNED SECTIONS, STAGGERED SO THAT EACH DRAIN IS 25 FEET FROM THE ADJACENT DRAIN ON THE OPPOSITE SIDE OF THE ROAD, AND AT 25 FOOT INTERVALS ON THE LOW SIDE ONLY OF SUPERELEVATED SECTIONS. AN AGGREGATE DRAIN SHALL ALSO BE PLACED AT THE LOW POINT OF EACH SAG VERTICAL CURVE.

STA. 112+50.00 (RT.)	= 9 FT.
STA. 112+50.00 (LT.)	= 9 FT.
STA. 112+75.00 (RT.)	= 9 FT.
STA. 113+00.00 (RT.)	= 9 FT.
STA. 113+00.00 (LT.)	= 9 FT.
STA. 113+25.00 (RT.)	= 9 FT.
STA. 113+50.00 (RT.)	= 9 FT.
STA. 113+50.00 (LT.)	= 9 FT.
STA. 114+75.00 (RT.)	= 9 FT.
STA. 115+00.00 (RT.)	= 9 FT.
STA. 115+00.00 (LT.)	= 9 FT.
STA. 115+25.00 (RT.)	= 9 FT.
STA. 115+50.00 (RT.)	= 9 FT.
STA. 115+50.00 (LT.)	= 9 FT.
STA. 115+75.00 (RT.)	= 9 FT.
STA. 116+00.00 (RT.)	= 9 FT.
STA. 116+00.00 (LT.)	= 9 FT.
TOTAL	= 153 FT.

EXCAVATION FOR ROCK CHANNEL PROTECTION

TO MAINTAIN THE EXISTING WATERWAY OPENING, EXCAVATE THE EXISTING EARTH MATERIAL PRIOR TO PLACEMENT OF ROCK CHANNEL PROTECTION. DISPOSE OF EXCAVATED MATERIAL PER CMS 203.

EXISTING USGS BENCH MARK DISC # T 5 AAS

THE CONTRACTOR SHALL NOTIFY THE ODOT DISTRICT 11 SURVEY OPERATIONS MANAGER AT TELEPHONE NO. 330-308-7866 FIVE (5) WORKING DAYS PRIOR TO ANY ACTIVITY THAT WOULD DISTURB THE LOCATION OR ELEVATION OF AN U.S.G.S. BENCH MARK AT STA. 114+01.94, 22.4' LT.

THE DISTRICT OFFICE WILL FURNISH THE CONTRACTOR WITH A REPLACEMENT DISC MONUMENT, WHICH THE CONTRACTOR WILL PLACE IN AN ACCESSIBLE AND PREFERABLY HORIZONTAL LOCATION, AS DIRECTED BY THE ENGINEER, AT THE TIME OF CONSTRUCTION. THE EXISTING DISC SHALL BE SALVAGED AND RETURNED TO THE DISTRICT OFFICE.

PAYMENT FOR THE ABOVE SHALL BE INCLUDED IN THE LUMP SUM BID PRICE FOR ITEM 623, CONSTRUCTION LAYOUT STAKES.

SPRING DRAINS

THE FOLLOWING ESTIMATED QUANTITIES HAVE BEEN CARRIED TO THE GENERAL SUMMARY FOR USE AS DIRECTED BY THE ENGINEER FOR DRAINING ANY SPRINGS SHOWN IN THE PLAN OR ENCOUNTERED DURING CONSTRUCTION. THE FOLLOWING TYPES OF PIPES MAY BE USED: 707.33, 707.41, 707.42 or 707.45 PERFORATED PER 707.31.

SPRING DRAINS SHALL BE CONSTRUCTED AS SHOWN ON STANDARD CONSTRUCTION DRAWING DM-1.1 AND PAID FOR AT THE CONTRACT PRICE FOR:

ITEM 604, PRECAST REINFORCED CONCRETE OUTLET . . . . . **2 EACH**
ITEM 605, 6" UNCLASSIFIED PIPE UNDERDRAINS, FOR SPRINGS . . . . . **50 FT.**
ITEM 605, AGGREGATE DRAINS FOR SPRINGS . . . . . **12 FT.**

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	ET2000 PLUS 50'-0" PLAN, ELEVATION & SECTION 25'-0" RAIL, SLEEVE W/PL POSTS 1-4	4/12/00	7/31/00
SS141	ET2000 PLUS PLAN, ELEVATION & SECTION 25'-0" RAIL, HBA POSTS 1-4	2/29/00	7/31/00
SS158	ET2000 PLUS 50'-0" WITH 12'-6" PANELS & HBA POSTS 1-4 PLAN, ELEVATION & SECTION	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.

HAS-250-2.11

ITEM 614, MAINTAINING TRAFFIC

The Contractor shall maintain traffic at all times and in accordance with the requirements of Item 614 and the construction phasing described on sheet No. 7. Traffic shall be maintained at all times by use of the existing pavement, pavement for maintaining traffic and portions of the existing and proposed bridge.

The roadway is permitted to have a lane closure for a period not longer than 70 consecutive calendar days (total for both phase one and two). Liquidated damages will be assessed in accordance with 108.07 for each calendar day a lane remains closed to traffic beyond the approved 70 day period.

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.

Alternating one-way traffic shall be maintained during phases 1 through 2 by use of work zone traffic signals as shown on sheet no's. 5-6 and Standard Construction Drawing MT-96.11. Traffic shall be separated from the work area by means of Item 622 - Portable Concrete Barrier, 32".

The following estimated quantities have been included in the General Summary for use as directed by the Engineer for maintenance of traffic.

Item 614 - Asphalt Concrete For Maintaining Traffic - - - - - - - - - - - - - 10.0 C.Y.

Prior to the beginning of any construction that will require the closure of existing lanes to traffic, all work zone signals, signs, lights, portable concrete barrier, and work zone pavement markings shall be furnished and installed as shown on Standard Construction Drawing MT-96.11 and sheet no's. 5-6. Work zone pavement markings, raised pavement markings, and portable concrete barrier installation shall be accomplished in one day, with flaggers being utilized for the protection of vehicular traffic during the installation of these items. When the above requirements have been satisfied, signal controlled alternating one-way traffic may begin.

All maintenance of traffic signs shall have Type A warning lights.

All work and traffic control devices shall be in accordance with 614 and other applicable portions of the specifications, as well as the Ohio Manual of Uniform Traffic Control Devices. Payment for all labor, equipment and materials shall be included in the Lump Sum contract price for 614, Maintaining Traffic, unless separately itemized in the plan.

ITEM 622, PORTABLE CONCRETE BARRIER

It is anticipated that the same barrier will be used in various phases of construction. Movement of the concrete barrier between phases shall be accomplished in one working day. Flaggers shall be utilized for protection of vehicular traffic until movement of the barrier is complete.

WORK ZONE TRAFFIC SIGNALS

All work zone traffic signals shall have hardware installed with the controller to switch power to a portable generator. The Contractor shall have on the project a compatible portable generator at all times while the traffic signals are operational. The portable generator shall have the electrical capacity to power the temporary traffic signals in the event of an electrical power outage.

In lieu of the preceding requirements, the signal heads shall be Light Emitting Diode (LED) traffic signals. The LED shall be Dialight, 12" traffic signal bulbs with a minimum of 190 clusters or an approved equal. The controller for the LED shall have an automatic battery backup system in the event of an electrical power outage. The battery backup system shall have a minimum capacity to operate the traffic signals for a 24 hour period without recharging.

The Contractor shall be responsible for periodically recharging or refueling the system to keep the signals functioning for the entire duration of the power outage. All costs for materials, equipment, and labor shall be included in the contract price for Item 614, Maintaining Traffic.

ITEM 614, BARRIER REFLECTORS AND OBJECT MARKERS

Barrier reflectors and 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 50 feet.

In addition to the quantities on sheet 7, the following quantity has been carried to the General Summary for use during phase one and is to be applied on the existing left side guardrail:

Item 614 - Barrier Reflector, Type A2 - - - - - - - - - - - 7 Each

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 through the work site each night when the lighting is in place and operative prior to commencing any work. If glare is detected, the light placement and shielding shall be adjusted to the satisfaction of the Engineer before work proceeds.

Payment for all labor, equipment and materials shall be included in the lump sum contract price for Item 614 - Maintaining Traffic.

ITEM 615, PAVEMENT FOR MAINTAINING TRAFFIC, CLASS A, AS PER PLAN

The composition of the temporary pavement for areas PM-1 and PM-2 shall be rigid. Concrete for PM-1 & PM-2 shall be removed and broken into pieces suitable for placement as Rock Channel Protection. Areas removed and not replaced with full depth pavement shall be backfilled with 304 and included with Item 615, Pavement for Maintaining Traffic, Class A, As Per Plan for payment.

The course build up for areas PM-3 and PM-4 shall be with flexible material and shall remain in place upon completion of the project.

TRENCH FOR PAVEMENT FOR MAINTAINING TRAFFIC

Trench excavation shall only be on one side of the pavement at a time. The open trench shall be adequately maintained and protected with drums or barricades at all times. Placement of proposed Pavement for Maintaining Traffic shall follow as closely as possible behind excavation operations. The length of the trench that is open at any one time shall be held to a minimum, and shall at all times be subject to approval of the Engineer.

No open trenches or drop offs will be allowed overnight.

OVERHEAD MOUNTED WORK ZONE SIGNALS

Signals shall be overhead mounted in accordance with the details shown on SCD MT-96.21.

NOTIFICATION OF WORK ZONE LANE RESTRICTIONS

The Contractor shall notify the Engineer at least eighteen (18) days prior to implementing any work zone restrictions that will reduce the width or vertical clearance of any lane on which 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.

FULLY-ACTUATED OPERATION OF WORK ZONE TRAFFIC SIGNAL

The work zone signal control required for this project and shown on sheet no's. 5-7 and SCDs MT-96.11, MT-96.21 and MT-96.26 shall be fully traffic-actuated and operate in a manner similar to that described in Section 733.02 of the Construction and Material Specifications.

The Contractor shall also design, furnish, install and maintain a traffic detector on each traffic approach which will reliably detect all legal traffic approaching (but not leaving) the signal as it passes or waits in the designated detector zone shown in the plans. Detector designs which do not provide reliable detection, free from false calls, shall be immediately replaced by the Contractor.

For the initial controller timing chart, see sheet no. 7.

ITEM 614 - WORK ZONE IMPACT ATTENUATOR (BIDIRECTIONAL)

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	Drawing Name	Drawing/ Revision Date	ODOT Approval Date
QSCZCVR-T4	QuardGuard CZ System for Construction Zones	5/13/99 Rev. J	8/27/99
35-40-10	QuadGuard System Concrete Pad, CZ, QG	11/19/97 Rev. D	8/27/99
35-40-16	QuadGuard System Backup Assembly, CZ, QG	7/30/99 Rev. F	8/27/99
35405Iz	QuadGuard CZ System Nose Assembly, CZ, QG, 24, 30, 36	5/17/99	8/27/99
35-40-18	Transition Assembly, 4 Offset, QG	6/25/99 Rev. F	8/27/99
35400260	QuadGuard System PCMB Anchor Assembly	11/19/97 Rev. C	8/27/99

2) The TRACC (Trinity Attenuating Crash Cushion) manufactured by Syro Inc., 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	Drawing Name	Drawing/ Revision Date	ODOT Approval Date
SS450 SS450M	Crash-cushion Attenuating Terminal Plan, Elevation & Sections	3/12/99 Rev. 1	8/27/99
SS455	TRACC Transition to W-beam Median Barrier Plan, Elevation & Sections	2/18/99	8/27/99
SS461	TRACC Transition to Concrete Safety Shape Barrier Plan, Elevation & Sections	6/30/99 Rev. 1	8/27/99
SS462	TRACC Transition to Concrete Barrier Single Slope Plan, Elevation & Sections	6/30/99	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 (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.

CALCULATED KAH CHECKED JPB

MAINTENANCE OF TRAFFIC NOTES

HAS-250-2.11

LEGEND

- Work Zone Impact Attenuator
- Drums spaced at 10' c/c unless shown otherwise
- Work Zone Signal Head
- Temporary Sheeting
- (W) White Edge Line
- Work Area
- Pavement for Maintaining Traffic

CALCULATIONS:

Item 615 - Pavement for Maintaining Traffic, Class A, As Per Plan

(PM-1) Sta. 111+25.00 to Sta. 113+97.67
272.67' x 9' ÷ 9 = 272.67 Sq. Yd.

Sta. 113+97.67 to Sta. 114+01.00
3.33' x 9' x (½) ÷ 9 = 1.67 Sq. Yd.

Total = 274.34 Sq. Yd.
(Use 274 Sq. Yd.)

(PM-2) Sta. 114+64.21 to Sta. 114+67.44
3.23' x 9' x (½) ÷ 9 = 1.62 Sq. Yd.

Sta. 114+67.44 to Sta. 117+70
302.56' x 9' ÷ 9 = 302.56 Sq. Yd.

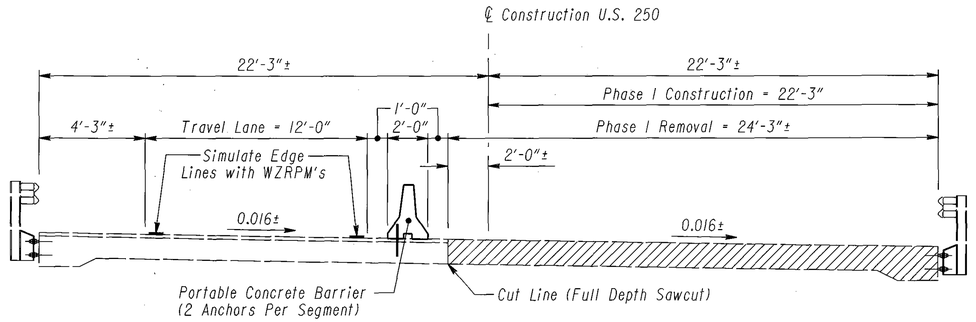
Total = 304.18 Sq. Yd.
(Use 304 Sq. Yd.)

(PM-3) Sta. 110+80.00 to Sta. 112+50.00
170' x (2' + 10')/2 ÷ 9 = 113.33 Sq. Yd.
(Use 113 Sq. Yd.)

(PM-4) Sta. 116+20.00 to Sta. 117+50.00
130' x (10' + 2')/2 ÷ 9 = 86.67 Sq. Yd.
(Use 87 Sq. Yd.)

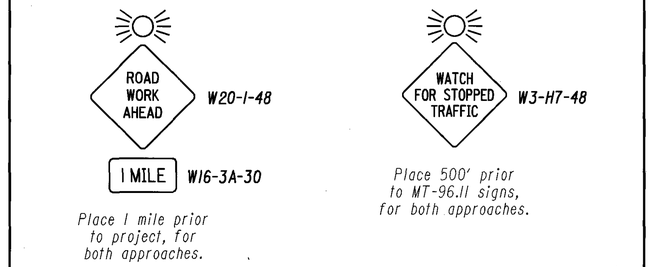
Totals Carried to Sheet No. 7.

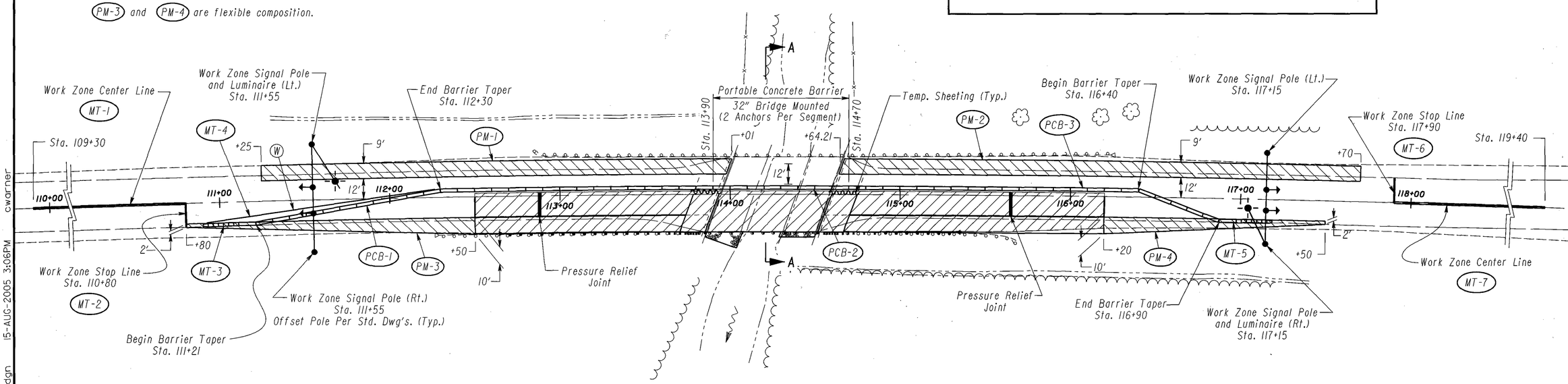
NOTE: (PM-1) and (PM-2) are rigid composition.
(PM-3) and (PM-4) are flexible composition.



SECTION A-A

ADDITIONAL SIGNS (Phases 1&2)





For Phase Construction Sequence, See Sheet No. 7.

For Details not Shown, See Standard Construction Drawings MT-96.11, MT-96.20, MT-96.21, MT-96.26, MT-101.20, MT-101.70, RM-4.2, & PCB-91.

For Maintenance of Traffic Quantities, See Sheet No. 7.

For Signal Timing, See Sheet No. 7.

HORIZONTAL SCALE IN FEET
0 15 30 60
CALCULATED CCW
CHECKED JPB

MAINTENANCE OF TRAFFIC PLAN PHASE 1

HAS-250-2.11

5
32

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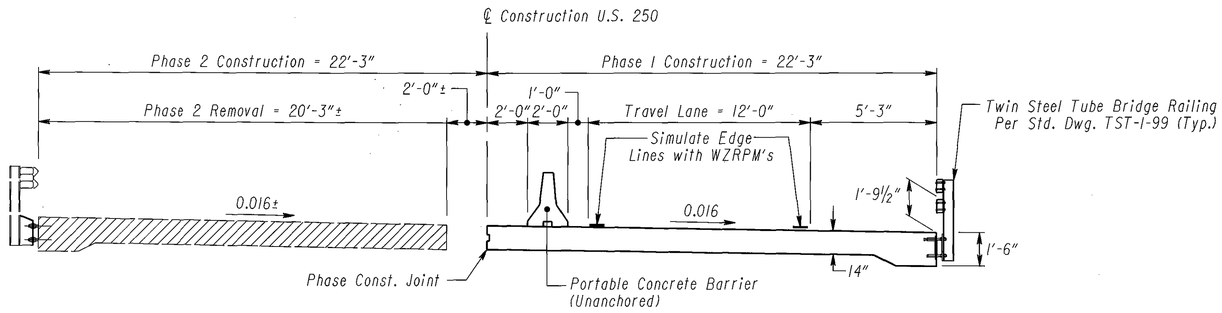
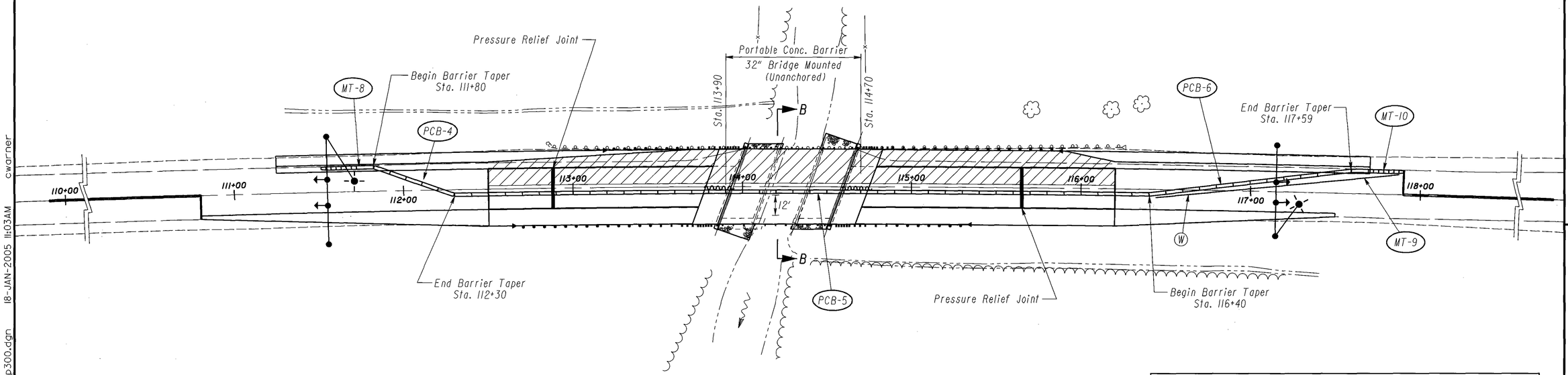
LEGEND

- Work Zone Impact Attenuator
- Drums spaced at 10' c/c unless shown otherwise
- Work Zone Signal Head
- Temporary Sheeting
- (W) White Edge Line
- Work Area



SECTION B-B



For Phase Construction Sequence, See Sheet No. 7.

For Details not Shown, See Standard Construction Drawings MT-96.11, MT-96.20, MT-96.21, MT-96.26, MT-101.20, MT-101.70, RM-4.2, & PCB-91.

For Maintenance of Traffic Quantities, See Sheet No. 7.

For Signal Timing, See Sheet No. 7.

HORIZONTAL SCALE IN FEET
0 15 30 60

CALCULATED CCW
CHECKED JPB

MAINTENANCE OF TRAFFIC PLAN
PHASE 2

HAS-250-2.11

6
32

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PHASE CONSTRUCTION SEQUENCE

PHASE 1

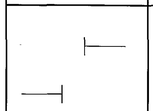
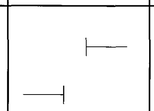
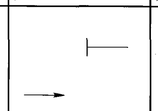
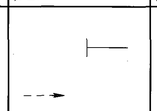
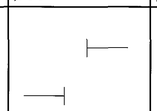
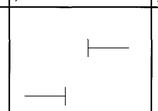
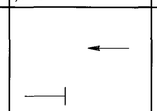
1. Install and maintain construction signs, signals, and luminaires as shown on the Standard Drawings and sht. no. 5. (Both approaches shall have advisory speed signs (W13-1) attached to Advanced Warning Signs that incrementally change from 55 MPH to 35 MPH.)
2. Construct pavement for maintaining traffic for westbound traffic.
3. Place portable concrete barrier, use anchored, bridge mounted on the bridge. Install temporary sheeting and work zone pavement markings as shown on plans. Provide all maintenance of traffic devices.
4. Maintain two-way traffic with one lane on westbound portion of bridge, via signal control.
5. Remove eastbound portions of superstructure, abutments, and approach slab as detailed in the plan.
6. Construct eastbound portions of superstructure, abutments, approach slab, proposed full depth pavement, work zone pavement (on eastbound side), pavement planing, proposed guardrail, and resurfacing.

PHASE 2

1. Place portable concrete barrier, use unanchored, bridge mounted on the bridge. Install temporary sheeting and work zone pavement markings as shown on Standard Drawings and sheet no. 6. Provide all maintenance of traffic devices. (Both approaches shall have advisory speed signs (W13-1) attached to Advanced Warning Signs that incrementally change from 55 MPH to 35 MPH.)
2. Maintain two-way traffic with one lane on eastbound portion of bridge, via signal control.
3. Remove westbound portions of superstructure, abutments, and approach slab as detailed in the plan.
4. Construct westbound portion of superstructure, abutments, approach slab, proposed full depth pavement, pavement planing and resurfacing, and proposed guardrail.
5. Open road for two-lane operation.

SIGNAL TIMING CHART

ALL RED ALL RED

Ø1G	Ø1Y	Ø2G	Ø2Y	Ø3G	Ø3Y	Ø4G	Ø4Y
							

INITIAL CONTROLLER TIMING CHART

	Phase *			
	1	2	3	4
Initial		15		15
Vehicle		3		3
Maximum		36		36
Yellow		4		4
All Red	19		19	
Recall	ON	OFF	ON	OFF

* Phases as shown on SCD MT-96.26 for actuated control.

MAINTENANCE OF TRAFFIC QUANTITIES

	SHEET NO.	REFERENCE	614 WORK ZONE IMPACT ATTENUATOR (BIDIRECTIONAL)	614 BARRIER REFLECTOR, TYPE B2	614 OBJECT MARKER, TWO WAY	614 WORK ZONE CENTER LINE, CLASS 1, 740.06, TYPE I	614 WORK ZONE EDGE LINE, CLASS 1, 740.06, TYPE I	614 WORK ZONE STOP LINE, CLASS 1, 740.06, TYPE I	615 PAVEMENT FOR MAINTAINING TRAFFIC, CLASS A, AS PER PLAN	622 PORTABLE CONCRETE BARRIER, 32"	622 PORTABLE CONCRETE BARRIER, 32", BRIDGE MOUNTED
			EACH	EACH	EACH	MILE	MILE	FEET	Sq. Yd.	FEET	FEET
PHASE 1	5	MT-1				0.03					
	5	MT-2						12			
	5	MT-3	1								
	5	MT-4					0.03				
	5	MT-5	1								
	5	MT-6						15			
	5	MT-7				0.03					
	5	PCB-1		6	6					280	
	5	PCB-2		2	2						80
	5	PCB-3		6	6					220	
	5	PM-1							274		
	5	PM-2							304		
	5	PM-3							113		
	5	PM-4							87		
	SUB-TOTAL		2	14	14	0.06	0.03	24	778	500	80
PHASE 2	6	MT-8	1								
	6	MT-9					0.03				
	6	MT-10	1								
	6	PCB-4		5	5					210	
	6	PCB-5		2	2						80
	6	PCB-6		7	7					300	
	SUB-TOTAL		2	14	14		0.03			510	80
TOTALS CARRIED TO GENERAL SUMMARY			4	28	28	0.06	0.06	24	778	1010	160

ITEM 614 - WORK ZONE RAISED PAVEMENT MARKERS

	STATIONING FROM	STATIONING TO	SIDE	SPACING FEET	TYPE A W	TYPE A Y	TYPE A Y/Y	REMARKS (LINE TYPE)
PHASE 1	109+30.00	110+80.00	℄	20			18	SUPPLEMENT CENTERLINE
	117+90.00	119+40.00	℄	20			18	SUPPLEMENT CENTERLINE
	110+80.00	116+40.00	LT.	5	112	112		SIMULATE EDGE LINE
	112+30.00	116+40.00	RT.	5	83	83		SIMULATE EDGE LINE
	116+40.00	117+90.00	LT.	5	31			SIMULATE EDGE LINE
PHASE 2	110+80.00	112+30.00	RT.	5	31			SIMULATE EDGE LINE
	112+30.00	116+40.00	LT.	5	83	83		SIMULATE EDGE LINE
	112+30.00	117+90.00	RT.	5	112	112		SIMULATE EDGE LINE
SUB-TOTAL					452	390	36	
TOTALS CARRIED TO GENERAL SUMMARY					878 EACH			

NOTE : SIDE IS IN RELATION TO INCREASING STATION.

CALCULATED KAH CHECKED JPB

MAINTENANCE OF TRAFFIC

HAS-250-2.11

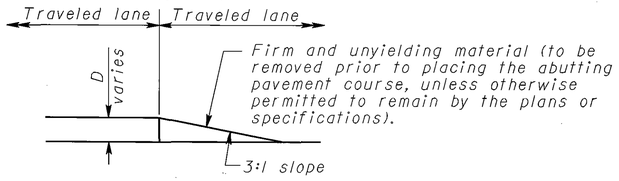
7/32

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.

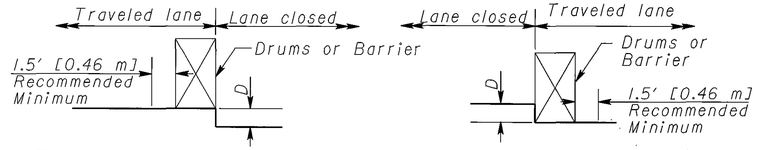


CONDITION I
DROP-OFFS BETWEEN TRAVELED LANES

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.

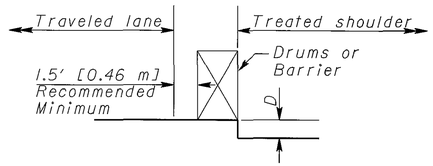


CONDITION II
DROP-OFFS WITHIN GRADED SHOULDER AREA

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].

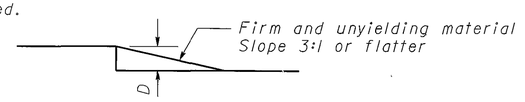
D	Treatment
≤1½" [≤40]	1) Erect OW-155 signs.
>1½"-5" [>40-125]	1) If minimum lane width* requirements can be met, maintain lanes utilizing drums as shown below OR 2) If minimum. lane width* requirements cannot be met, close adjacent lane utilizing drums OR 3) Optional Shoulder Treatment.
>5"-12" [125-305]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

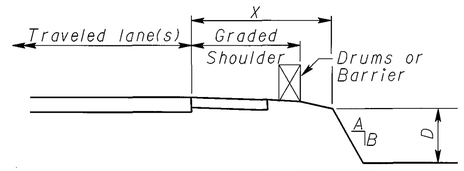


CONDITION III
DROP-OFFS BEYOND GRADED SHOULDER OR BACK OF CURB

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

CHART A

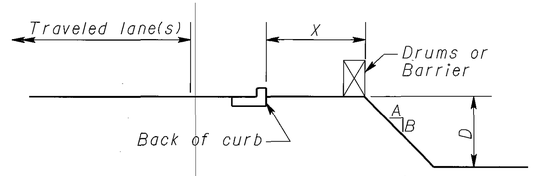
USE FOR: 1. Uncurbed Facilities.
2. Curbed Facilities, where:
   a. Curbs are less than 6" [150] in height.
   b. Curbs are 6" [150] or greater in height and the legal speed is greater than 40 mph [70 km/h].



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.

08-07-01

DROPOFFS IN WORK ZONES

HAS-250-2.11

SHEET NUMBER 3	SHEET NUMBER 11	SHEET NUMBER 12	ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE PLAN SHEET NO.
							ROADWAY	
LUMP			201	11000	LUMP		CLEARING AND GRUBBING	
		31	202	32700	31	SQ YD	GUTTER REMOVED	
		550	202	38000	550	FT	GUARDRAIL REMOVED	
		133	202	38500	133	FT	BRIDGE RAILING REMOVED	
		2	202	54000	2	EACH	RPM REMOVED	
	344	211	203	10000	555	CU YD	EXCAVATION	
	61		203	20000	61	CU YD	EMBANKMENT	
	975		204	10000	975	SQ YD	SUBGRADE COMPACTION	
		200	606	13000	200	FT	GUARDRAIL, TYPE 5	
		4	606	22010	4	EACH	ANCHOR ASSEMBLY, TYPE E-98	
		4	606	32160	4	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE TST	
							EROSION CONTROL	
		211	601	32200	211	CU YD	ROCK CHANNEL PROTECTION, TYPE C WITH FILTER	
	2		659	00100	2	EACH	SOIL ANALYSIS TEST	
	115		659	00300	115	CU YD	TOPSOIL	
	1033		659	10000	1033	SQ YD	SEEDING AND MULCHING	
	0.14		659	20000	0.14	TON	COMMERCIAL FERTILIZER	
	0.21		659	31000	0.21	ACRE	LIME	
	6		659	35000	6	M GAL	WATER	
			832	30000	1000	EACH	EROSION CONTROL	
							DRAINAGE	
2			604	36600	2	EACH	PRECAST REINFORCED CONCRETE OUTLET	
50			605	13402	50	FT	6" UNCLASSIFIED PIPE UNDERDRAINS FOR SPRINGS	
153			605	31100	153	FT	AGGREGATE DRAINS	
12			605	32200	12	FT	AGGREGATE DRAINS FOR SPRINGS	
							PAVEMENT	
	507		254	01000	507	SQ YD	PAVEMENT PLANING, ASPHALT CONCRETE	
		75	255	10050	75	SQ YD	FULL DEPTH PAVEMENT REMOVAL AND RIGID REPLACEMENT, CLASS S	
		62	255	20000	62	FT	FULL DEPTH PAVEMENT SAWING	
	177		301	46000	177	CU YD	ASPHALT CONCRETE BASE, PG64-22	
	164		304	20000	164	CU YD	AGGREGATE BASE	
	55		407	10000	55	GALLON	TACK COAT	
	56		407	14000	56	GALLON	TACK COAT FOR INTERMEDIATE COURSE	
	284		408	10000	284	GALLON	PRIME COAT	
	102		448	46050	102	CU YD	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG64-22	
	59		448	47021	59	CU YD	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64-22, AS PER PLAN	3
		48	SPECIAL	45132000	48	FT	PRESSURE RELIEF JOINT, TYPE C	
							TRAFFIC CONTROL	
		8	626	00100	8	EACH	BARRIER REFLECTOR, TYPE A	
	0.25		642	00100	0.25	MILE	EDGE LINE, TYPE 1	
	0.04		642	00300	0.04	MILE	CENTER LINE, TYPE 1	
							STRUCTURES	
							FOR BRIDGE NO. HAS-250-0214 QUANTITIES, SEE SHEET NO. 22.	

CALCULATED CCW
CHECKED JPB

GENERAL SUMMARY

HAS-250-2.11

SHEET NUMBER	ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE PLAN SHEET NO.
					MAINTENANCE OF TRAFFIC	
4	614	12338	4	EACH	WORK ZONE IMPACT ATTENUATOR (BIDIRECTIONAL)	
878	614	12800	878	EACH	WORK ZONE RAISED PAVEMENT MARKER	
10	614	13000	10	CU YD	ASPHALT CONCRETE FOR MAINTAINING TRAFFIC	
7	614	13202	7	EACH	BARRIER REFLECTOR, TYPE A2	
28	614	13302	28	EACH	BARRIER REFLECTOR, TYPE B2	
28	614	13360	28	EACH	OBJECT MARKER, TWO WAY	
0.06	614	21200	0.06	MILE	WORK ZONE CENTER LINE, CLASS I, 740.06, TYPE I	
0.06	614	22200	0.06	MILE	WORK ZONE EDGE LINE, CLASS I, 740.06, TYPE I	
24	614	26400	24	FT	WORK ZONE STOP LINE, CLASS I, 740.06, TYPE I	
778	615	20001	778	SQ YD	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS A, AS PER PLAN	4
1010	622	40020	1010	FT	PORTABLE CONCRETE BARRIER, 32"	
160	622	40040	160	FT	PORTABLE CONCRETE BARRIER, 32", BRIDGE MOUNTED	
LUMP	614	11000	LUMP		MAINTAINING TRAFFIC	
	619	16000	4	MONTH	FIELD OFFICE, TYPE A	
	623	10000	LUMP		CONSTRUCTION LAYOUT STAKES	
	624	10000	LUMP		MOBILIZATION	

CALCULATED CCW
CHECKED JPB

GENERAL SUMMARY

HAS-250-2.11

Item 204 - Subgrade Compaction

Sta. 113+78.28 to Sta. 114+74.88 (Approach Slabs)
*30' x 47.5' ÷ 9 = 158.33 Sq. Yd.

Shoulders:
Sta. 111+25.00 to Sta. 112+50.00 (Lt.)
125.0' x 5.5' ÷ 9 = 76.39 Sq. Yd.

Sta. 112+50.00 to Sta. 116+20.00 (Rt.)
**273.40' x 11.5' ÷ 9 = 349.34 Sq. Yd.

Sta. 112+50.00 to Sta. 113+70.00 (Lt.)
120.00' x 8.5' avg. ÷ 9 = 113.33 Sq. Yd.

Sta. 113+70.00 to Sta. 115+90.00 (Lt.)
**123.40' x 11.5' ÷ 9 = 157.68 Sq. Yd.

Sta. 115+90.00 to Sta. 116+20.00 (Lt.)
30' x 8.5' avg. ÷ 9 = 28.33 Sq. Yd.

Sta. 116+20.00 to Sta. 117+70.00 (Lt.)
150.0' x 5.5' ÷ 9 = 91.67 Sq. Yd.

Total = 975.07 Sq. Yd.

(Use 975 Sq. Yd.)

Item 254 - Pavement Planing, Asphalt Concrete (2" Average Thickness)

Sta. 112+50.00 to Sta. 113+40.00
90' x 24' ÷ 9 = 240.00 Sq. Yd.

Sta. 115+20.00 to Sta. 116+20.00
100' x 24' ÷ 9 = 266.67 Sq. Yd.

Total = 506.67 Sq. Yd.

(Use 507 Sq. Yd.)

Item 448 - 1½" Asphalt Concrete Surface Course, Type I, PG64-22, As Per Plan

Sta. 112+50.00 to Sta. 116+20.00
**273.40' x 24' x (1½" ÷ 12) ÷ 27 = 30.38 Cu. Yd.

Shoulders:
Sta. 111+25.00 to Sta. 112+50.00 (Lt.)
125.0' x 4' x (1½" ÷ 12) ÷ 27 = 2.32 Cu. Yd.

Sta. 112+50.00 to Sta. 116+20.00 (Rt.)
**273.40' x 10' x (1½" ÷ 12) ÷ 27 = 12.66 Cu. Yd.

Sta. 112+50.00 to Sta. 113+70.00 (Lt.)
120.00' x 7' avg. x (1½" ÷ 12) ÷ 27 = 3.89 Cu. Yd.

Sta. 113+70.00 to Sta. 115+90.00 (Lt.)
**123.40' x 10' x (1½" ÷ 12) ÷ 27 = 5.71 Cu. Yd.

Sta. 115+90.00 to Sta. 116+20.00 (Lt.)
30' x 7' avg. x (1½" ÷ 12) ÷ 27 = 0.97 Cu. Yd.

Sta. 116+20.00 to Sta. 117+70.00 (Lt.)
150.0' x 4' x (1½" ÷ 12) ÷ 27 = 2.78 Cu. Yd.

Total = 58.71 Cu. Yd.

(Use 59 Cu. Yd.)

Item 407 - Tack Coat for Intermediate Course (Applied @ 0.04 Gal./Sq. Yd.)

Sta. 112+50.00 to Sta. 116+20.00
**273.40' x 24' ÷ 9 x 0.04 Gal./Sq. Yd. = 29.16 Gal.

Shoulders:
Sta. 111+25.00 to Sta. 112+50.00 (Lt.)
125.0' x 4' ÷ 9 x 0.04 Gal./Sq. Yd. = 2.22 Gal.

Item 407 - Tack Coat for Intermediate Course (Applied @ 0.04 Gal./Sq. Yd.), Continued

Sta. 112+50.00 to Sta. 116+20.00 (Rt.)
**273.40' x 10' ÷ 9 x 0.04 Gal./Sq. Yd. = 12.15 Gal.

Sta. 112+50.00 to Sta. 113+70.00 (Lt.)
120.00' x 7' avg. ÷ 9 x 0.04 Gal./Sq. Yd. = 3.73 Gal.

Sta. 113+70.00 to Sta. 115+90.00 (Lt.)
**123.40' x 10' ÷ 9 x 0.04 Gal./Sq. Yd. = 5.48 Gal.

Sta. 115+90.00 to Sta. 116+20.00 (Lt.)
30' x 7' avg. ÷ 9 x 0.04 Gal./Sq. Yd. = 0.93 Gal.

Sta. 116+20.00 to Sta. 117+70.00 (Lt.)
150.0' x 4' ÷ 9 x 0.04 Gal./Sq. Yd. = 2.67 Gal.

Total = 56.34 Gal.

(Use 56 Gal.)

Item 448 - 2½" Asphalt Concrete Intermediate Course, Type 2, PG64-22

Sta. 112+50.00 to Sta. 116+20.00
**273.40' x 24' x (2½" ÷ 12) ÷ 27 = 50.63 Cu. Yd.

Shoulders:
Sta. 111+25.00 to Sta. 112+50.00 (Lt.)
125.0' x 4' x (2½" ÷ 12) ÷ 27 = 3.86 Cu. Yd.

Sta. 112+50.00 to Sta. 116+20.00 (Rt.)
**273.40' x 10' x (2½" ÷ 12) ÷ 27 = 21.10 Cu. Yd.

Sta. 112+50.00 to Sta. 113+70.00 (Lt.)
120.00' x 7' avg. x (2½" ÷ 12) ÷ 27 = 6.48 Cu. Yd.

Sta. 113+70.00 to Sta. 115+90.00 (Lt.)
**123.40' x 10' x (2½" ÷ 12) ÷ 27 = 9.52 Cu. Yd.

Sta. 115+90.00 to Sta. 116+20.00 (Lt.)
30' x 7' avg. x (2½" ÷ 12) ÷ 27 = 1.62 Cu. Yd.

Sta. 116+20.00 to Sta. 117+70.00 (Lt.)
150.0' x 4' x (2½" ÷ 12) ÷ 27 = 4.63 Cu. Yd.

Sta. 114+70.50 to Sta. 115+13.25 (Pavement Repair Area)
75 s.y. x 9 x (2" ÷ 12) ÷ 27 = 4.18 Cu. Yd.

Total = 102.02 Cu. Yd.

(Use 102 Cu. Yd.)

Item 407 - Tack Coat (Applied @ 0.075 Gal./Sq. Yd.)

Sta. 112+50.00 to Sta. 116+20.00
**273.40' x 24' ÷ 9 x 0.075 Gal./S.Y. = 54.68 Gal.

(Use 55 Gal.)

Item 301 - 9" Asphalt Concrete Base, PG64-22

Shoulders:
Sta. 111+25.00 to Sta. 112+50.00 (Lt.)
125.0' x 4.33' x (9" ÷ 12) ÷ 27 = 15.04 Cu. Yd.

Sta. 112+50.00 to Sta. 116+20.00 (Rt.)
**273.40' x 10.33' x (9" ÷ 12) ÷ 27 = 78.45 Cu. Yd.

Sta. 112+50.00 to Sta. 113+70.00 (Lt.)
120.00' x 7.33' avg. x (9" ÷ 12) ÷ 27 = 24.43 Cu. Yd.

Sta. 113+70.00 to Sta. 115+90.00 (Lt.)
**123.40' x 10.33' x (9" ÷ 12) ÷ 27 = 35.41 Cu. Yd.

Sta. 115+90.00 to Sta. 116+20.00 (Lt.)
30' x 7.33' avg. x (9" ÷ 12) ÷ 27 = 6.11 Cu. Yd.

Item 301 - 9" Asphalt Concrete Base, PG64-22, Continued

Sta. 116+20.00 to Sta. 117+70.00 (Lt.)
150.0' x 4.33' x (9" ÷ 12) ÷ 27 = 18.04 Cu. Yd.

Total = 177.48 Cu. Yd.

(Use 177 Cu. Yd.)

Item 408 - Prime Coat (Applied @ 0.4 Gal./Sq. Yd.)

Shoulders:
Sta. 111+25.00 to Sta. 112+50.00 (Lt.)
125.0' x 4.33' ÷ 9 x 0.4 Gal./Sq. Yd. = 24.06 Gal.

Sta. 112+50.00 to Sta. 116+20.00 (Rt.)
**273.40' x 10.33' ÷ 9 x 0.4 Gal./Sq. Yd. = 125.52 Gal.

Sta. 112+50.00 to Sta. 113+70.00 (Lt.)
120.00' x 7.33' avg. ÷ 9 x 0.4 Gal./Sq. Yd. = 39.09 Gal.

Sta. 113+70.00 to Sta. 115+90.00 (Lt.)
**123.40' x 10.33' ÷ 9 x 0.4 Gal./Sq. Yd. = 56.65 Gal.

Sta. 115+90.00 to Sta. 116+20.00 (Lt.)
30' x 7.33' avg. ÷ 9 x 0.4 Gal./Sq. Yd. = 9.77 Gal.

Sta. 116+20.00 to Sta. 117+70.00 (Lt.)
150.0' x 4.33' ÷ 9 x 0.4 Gal./Sq. Yd. = 28.87 Gal.

Total = 283.96 Gal.

(Use 284 Gal.)

Item 304 - 6" Aggregate Base

Sta. 113+78.28 to Sta. 114+74.88 (Approach Slabs)
*30' x (44.5' + 0.5' + 0.5') x (6" ÷ 12) ÷ 27 = 25.28 Cu. Yd.

Shoulders:
Sta. 111+25.00 to Sta. 112+50.00 (Lt.)
125.0' x 4.83' x (6" ÷ 12) ÷ 27 = 11.18 Cu. Yd.

Sta. 112+50.00 to Sta. 116+20.00 (Rt.)
**273.40' x 10.83' x (6" ÷ 12) ÷ 27 = 54.83 Cu. Yd.

Sta. 112+50.00 to Sta. 113+70.00 (Lt.)
120.00' x 7.83' avg. x (6" ÷ 12) ÷ 27 = 17.40 Cu. Yd.

Sta. 113+70.00 to Sta. 115+90.00 (Lt.)
**123.40' x 10.83' x (6" ÷ 12) ÷ 27 = 24.75 Cu. Yd.

Sta. 115+90.00 to Sta. 116+20.00 (Lt.)
30' x 7.83' avg. x (6" ÷ 12) ÷ 27 = 4.35 Cu. Yd.

Sta. 116+20.00 to Sta. 117+70.00 (Lt.)
150.0' x 4.83' x (6" ÷ 12) ÷ 27 = 13.42 Cu. Yd.

Sta. 114+70.50 to Sta. 115+13.25 (Pavement Repair Area)
75 s.y. x 9 x (6" ÷ 12) ÷ 27 = 12.50 Cu. Yd.

Total = 163.71 Cu. Yd.

(Use 164 Cu. Yd.)

EARTHWORK SUMMARY TABLE

FROM SHEET NO.	203 EXCAVATION CU. YD.	203 EMBANKMENT CU. YD.	659 SEEDING & MULCHING SQ. YD.
14	23	4	129
15	124	18	358
16	25	13	105
17	127	19	274
18	32	7	152
19	13	0	15
TOTALS	344	61	1033

SEEDING & MULCHING

Item 659 - Commercial Fertilizer

1033 Sq. Yd. x 9 x (20 lbs. + 10 lbs.)/1000 Sq. Ft. ÷ 2000 = 0.14 Ton

(Use 0.14 Ton)

Item 659 - Lime

1033 Sq. Yd. x 9 ÷ 43560 Sq. Ft./Acre = 0.21 Acre

(Use 0.21 Acre)

Item 659 - Water

1033 Sq. Yd. x 9 x 300 Gal./1000 Sq. Ft./1000 x 2 = 5.58 M Gal.

(Use 6 M Gal.)

Item 659 - Top Soil

1033 Sq. Yd. ÷ 1000 Sq. Yd. x 111 Cu. Yd. = 114.66 Cu. Yd.

(Use 115 Cu. Yd.)

Item 659 - Soil Analysis Test - 2 EACH

PAVEMENT MARKINGS

Item 642 - Edge Line, Type I

Sta. 110+80.00 to Sta. 117+50.00 (Rt.)
670' ÷ 5280 = 0.13 Mile

Sta. 111+25.00 to Sta. 117+70.00 (Lt.)
645' x 5280 = 0.12 Mile

Total = 0.25 Mile

(Use 0.25 Mile)

Item 642 - Center Line, Type I

Sta. 110+80.00 to Sta. 117+90.00 ℄
Equivalent Solid Line Length = 0.035 Mile

(Use 0.04 Mile)

* Deduct 66.60' for Bridge
** Deduct 96.60' for Bridge and Approach Slabs
Totals Carried to the General Summary.

CALCULATED CCW CHECKED JPB

CALCULATIONS & ESTIMATED QUANTITIES

HAS-250-2.11

11/32

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GR-1 Sta. 112+64.00 to Sta. 113+85.16

Item 606 - Guardrail, Type 5 = 68.75 Ft.

Item 606 - Bridge Terminal Assembly, Type TST = 1 Each

Item 606 - Anchor Assembly, Type E = 1 Each

GR-2 Sta. 113+18.09 to Sta 114+01.36

Item 606 - Guardrail, Type 5 = 31.25 Ft.

Item 606 - Bridge Terminal Assembly, Type TST = 1 Each

Item 606 - Anchor Assembly, Type E = 1 Each

GR-3 Sta. 114+51.76 to Sta 115+35.38

Item 606 - Guardrail, Type 5 = 31.25 Ft.

Item 606 - Bridge Terminal Assembly, Type TST = 1 Each

Item 606 - Anchor Assembly, Type E = 1 Each

GR-4 Sta. 114+67.96 to Sta 115+88.69

Item 606 - Guardrail, Type 5 = 68.75 Ft.

Item 606 - Bridge Terminal Assembly, Type TST = 1 Each

Item 606 - Anchor Assembly, Type E = 1 Each

R-1 Sta. 112+26.27 to Sta. 115+68.62 (Rt.)

Item 202 - Guardrail Removed = 275 Ft.

Item 202 - Bridge Railing Removed = 66.50 Ft.

R-2 Sta. 112+84.48 to Sta. 116+25.95 (Lt.)

Item 202 - Guardrail Removed = 275 Ft.

Item 202 - Bridge Railing Removed = 66.50 Ft.

Totals Carried to General Summary:

Item 606 - Guardrail, Type 5 = 200 Ft.

Item 606 - Bridge Terminal Assembly, Type TST = 4 Each

Item 606 - Anchor Assembly, Type E = 4 Each

Item 202 - Guardrail Removed = 550 Ft.

Item 202 - Bridge Railing Removed = 133 Ft.

Item 601 - Rock Channel Protection, Type C, with Filter

RCP-1 Sta. 113+94.62 to Sta. 114+15.17
19.95' x 53.78' x 2.5' ÷ 27 = 99.34 Cu. Yd.
19.95' x 6.79' x ½ x 2.5' ÷ 27 = 6.27 Cu. Yd.

RCP-2 Sta. 114+38.00 to Sta. 114+58.61
19.95' x 53.78' x 2.5' ÷ 27 = 99.34 Cu. Yd.
19.95' x 6.79' x ½ x 2.5' ÷ 27 = 6.27 Cu. Yd.
Total = 211.22 Cu. Yd.

(Use 211 Cu. Yd.)

Item 202 - Gutter Removed

R-3 Sta. 113+86.35 to Sta. 114+11.97
25.62' x 6' ÷ 9 = 17.08 Sq. Yd.

R-4 Sta. 114+29.43 to Sta. 114+50.55
21.12' x 6' ÷ 9 = 14.08 Sq. Yd.
Total = 31.16 Sq. Yd.

(Use 31 Sq. Yd.)

Item Special - Pressure Relief Joint, Type C

Pressure Relief Joint, 24' + 24' = 48 Ft.

(Use 48 Ft.)

Item 202 - RPM Removed and Disposed = 2 Each

Item 626 - Barrier Reflectors, Type A

Sta. 112+76.52 to Sta. 115+35.38 (Rt.)
258.86' ÷ 100 = 2.59 + 1 = 3.59 **(Use 4 Each)**

Sta. 113+18.09 to Sta. 115+76.21 (Lt.)
258.12' ÷ 100 = 2.58 + 1 = 3.58 **(Use 4 Each)**
Total = 8 Each

Item 203 - Excavation

For placement of Rock Channel Protection

Sta. 113+94.62 to Sta. 114+15.17
19.95' x 53.78' x 2.5' ÷ 27 = 99.34 Cu. Yd.
19.95' x 6.79' x ½ x 2.5' ÷ 27 = 6.27 Cu. Yd.

Sta. 114+38.00 to Sta. 114+58.61
19.95' x 53.78' x 2.5' ÷ 27 = 99.34 Cu. Yd.
19.95' x 6.79' x ½ x 2.5' ÷ 27 = 6.27 Cu. Yd.
Total = 211.22 Cu. Yd.

(Use 211 Cu. Yd.)

Item 255 - Full Depth Pavement Removal and Rigid Replacement, Class S

Sta. 114+70.50 to Sta. 114+92.50 (Rt.)
[(½ x 4.33' x 12') + (17.67' x 12')] ÷ 9 = 26.45 Sq. Yd.

Sta. 114+74.88 to Sta. 115+13.25 (Lt.)
[(½ x 4.33' x 12') + (34.04' x 12')] ÷ 9 = 48.27 Sq. Yd.
Total = 74.72 Sq. Yd.

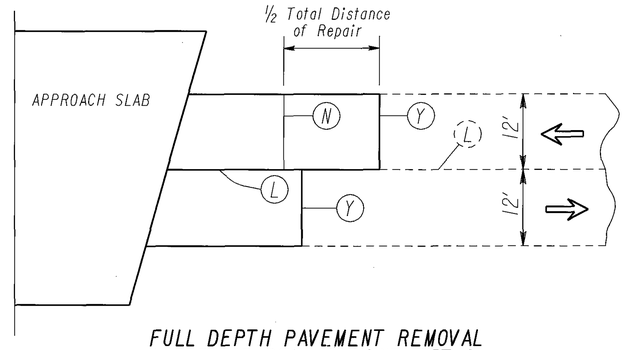
(Use 75 Sq. Yd.)

Item 255 - Full Depth Pavement Sawing

Sta. 114+74.88 to Sta. 115+13.25 = 38.37 Ft.
(12' x 2) + 38.37' = 62.37' **(Use 62 Ft.)**

JOINT TYPE LEGEND	
Y	TYPE Y - CONTRACTION
L	TYPE L - LONGITUDINAL JOINT
N	TYPE N - CONTRACTION JOINT
(L)	TYPE L - EXISTING LONGITUDINAL JOINT

FOR ADDITIONAL DETAILS AND NOTES
SEE STD. DWG. BP-2.5.



FULL DEPTH PAVEMENT REMOVAL AND RIGID REPLACEMENT DETAIL

Totals Carried to General Summary.

CALCULATED CCW CHECKED JPB

CALCULATIONS & ESTIMATED QUANTITIES

HAS-250-2.11

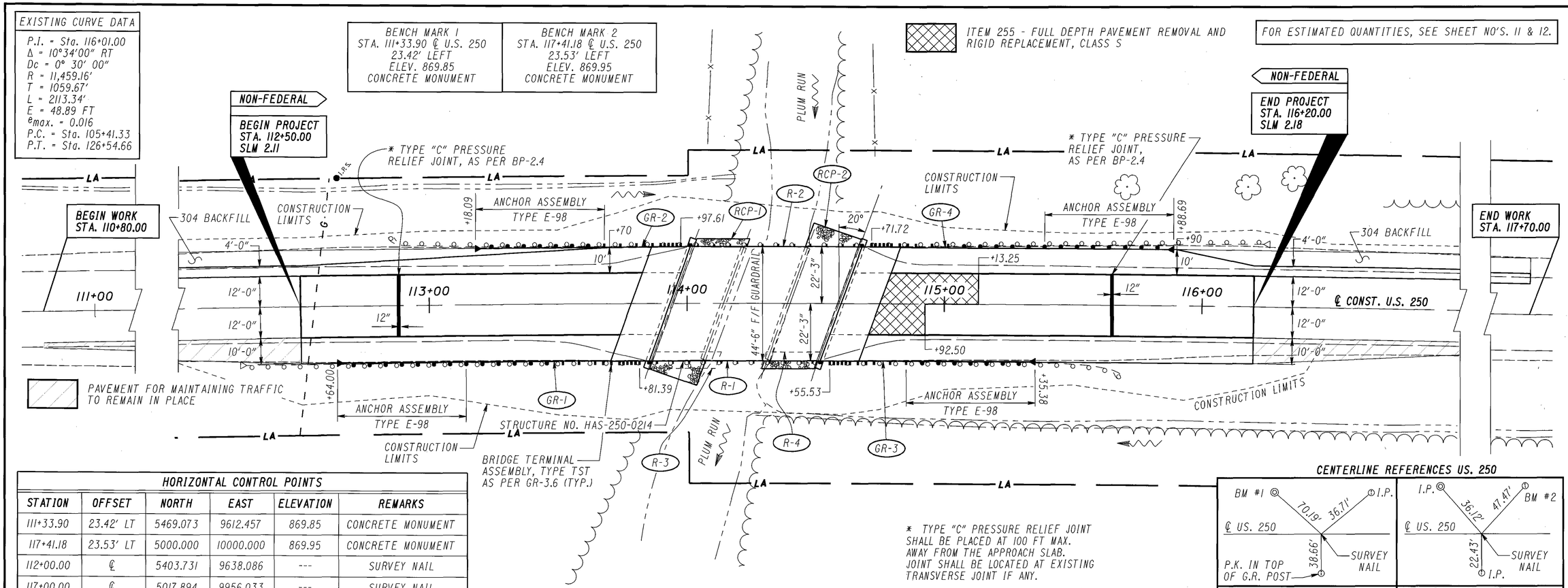
12/32

EXISTING CURVE DATA
P.I. = Sta. 116+01.00
Δ = 10°34'00" RT
Dc = 0° 30' 00"
R = 11,459.16'
T = 1059.67'
L = 2113.34'
E = 48.89 FT
emax. = 0.016
P.C. = Sta. 105+41.33
P.T. = Sta. 126+54.66

BENCH MARK 1	BENCH MARK 2
STA. 111+33.90 ℄ U.S. 250	STA. 117+41.18 ℄ U.S. 250
23.42' LEFT	23.53' LEFT
ELEV. 869.85	ELEV. 869.95
CONCRETE MONUMENT	CONCRETE MONUMENT

ITEM 255 - FULL DEPTH PAVEMENT REMOVAL AND RIGID REPLACEMENT, CLASS S

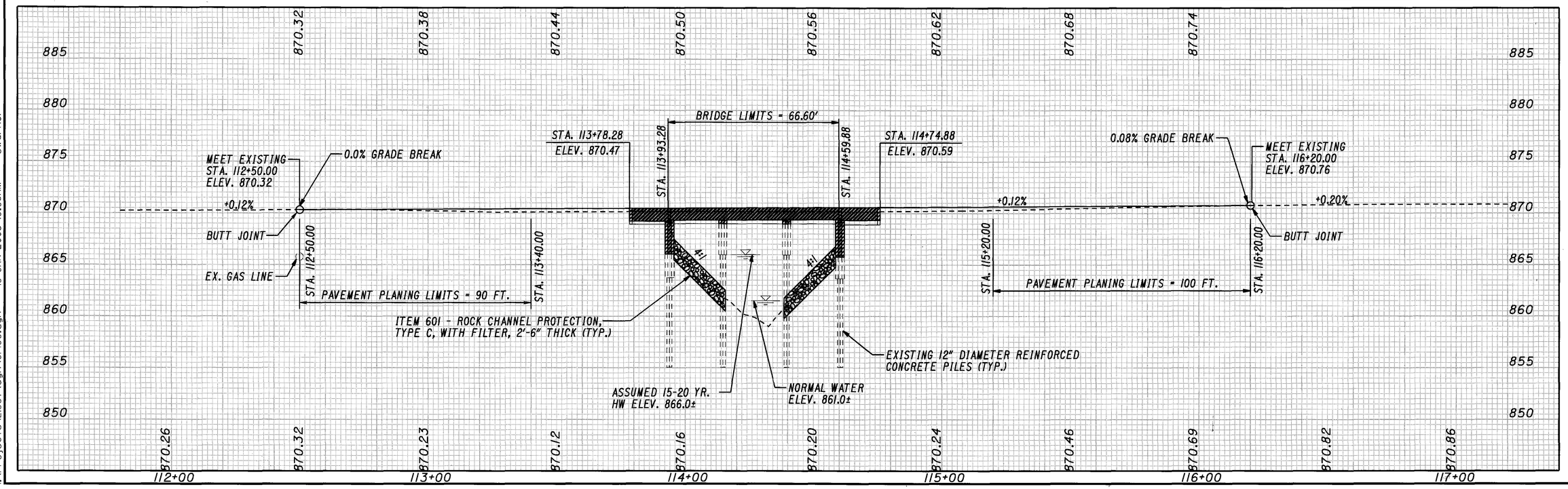
FOR ESTIMATED QUANTITIES, SEE SHEET NO'S. 11 & 12.



HORIZONTAL CONTROL POINTS					
STATION	OFFSET	NORTH	EAST	ELEVATION	REMARKS
111+33.90	23.42' LT	5469.073	9612.457	869.85	CONCRETE MONUMENT
117+41.18	23.53' LT	5000.000	10000.000	869.95	CONCRETE MONUMENT
112+00.00	℄	5403.731	9638.086	---	SURVEY NAIL
117+00.00	℄	5017.894	9956.033	---	SURVEY NAIL

* TYPE "C" PRESSURE RELIEF JOINT SHALL BE PLACED AT 100 FT MAX. AWAY FROM THE APPROACH SLAB. JOINT SHALL BE LOCATED AT EXISTING TRANSVERSE JOINT IF ANY.

CENTERLINE REFERENCES US. 250



PLAN AND PROFILE
STA. 112+00.00 TO STA. 117+00.00
HAS-250-2.11

HORIZONTAL SCALE IN FEET
0 10 20 40

CALCULATED KAH
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SEEDING END WIDTH	SEEDING SQ. YDS.
25	83
5	38
4	8
2	
129	Sheet Total

120 100 80 60 40 20 0 20 40 60 80 100 120

℄ Construction U.S. 250

880 870 860 850

4.0'

4:1

870.32

112+50.00

870.32

112+00.00

870.26

4.0'

111+25.00

870.17

111+00.00 Begin Earthwork & Seeding

℄ Construction U.S. 250

304 Backfill Per Item 615, Pavement for Maintaining Traffic, Class A, As Per Plan

END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
Ahead 23	4		
Back 5	4		
5	0		
		9	4
Ahead 5	0		
Back 0	0		
0	0		
		14	0
		0	0
Sheet Totals Carried To Sheet No. 11.		23	4

CALCULATED CCW

CHECKED JPB

CROSS SECTION SHEET

STA. 111+50.00 TO STA. 112+50.00

HAS-250-2.11

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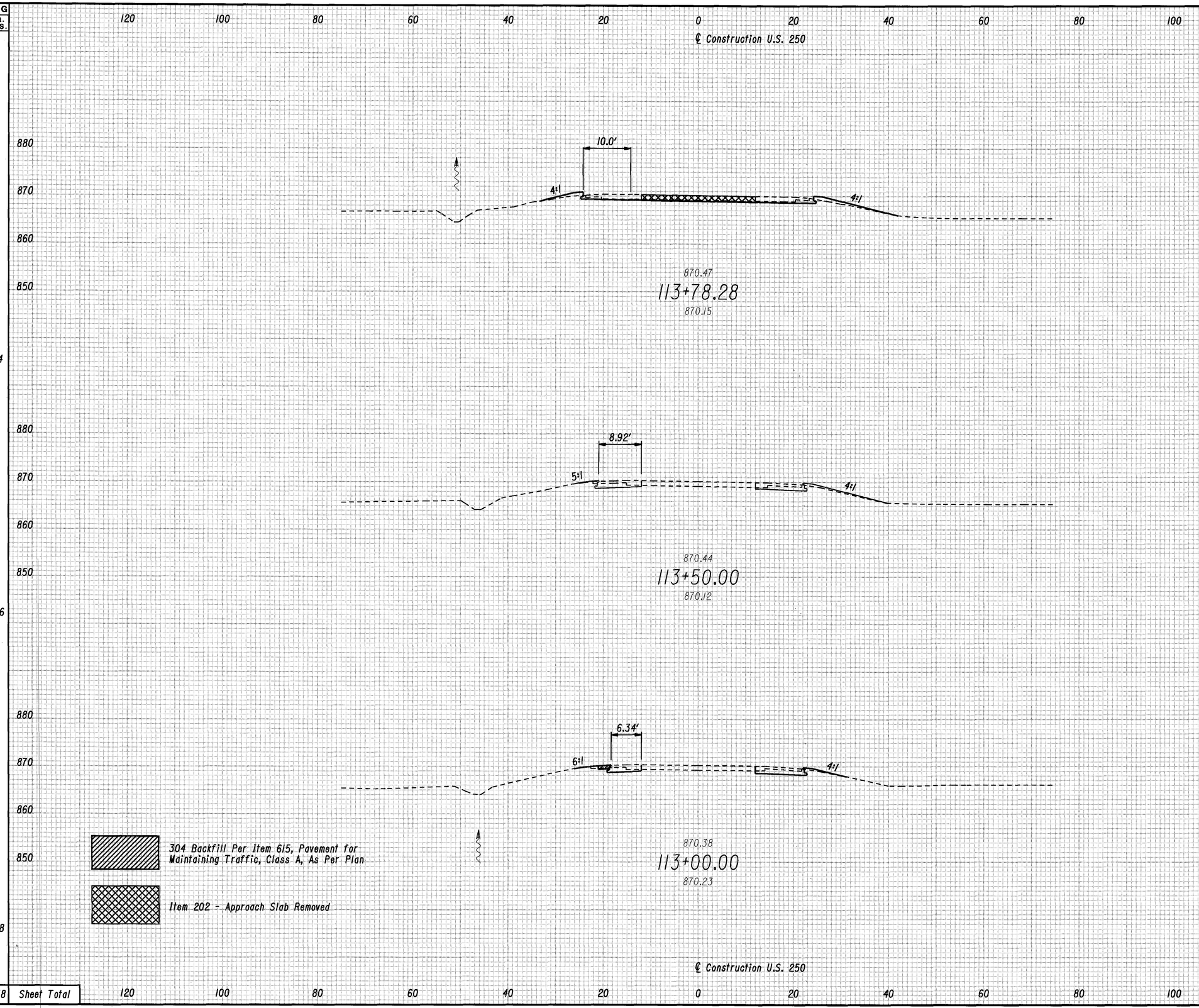
SEEDING END WIDTH	SEEDING SQ. YDS.
32	94
28	136
21	128
	358



END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
Ahead 56	11		
Back 30	2		
		30	4
27	6		
		49	8
26	3		
		45	6
Sheet Totals Carried To Sheet No. 11.		124	18

CALCULATED CCW
CHECKED JPB

CROSS SECTION SHEET
STA. 113+00.00 TO STA. 113+78.28

HAS-250-2.11

15/32

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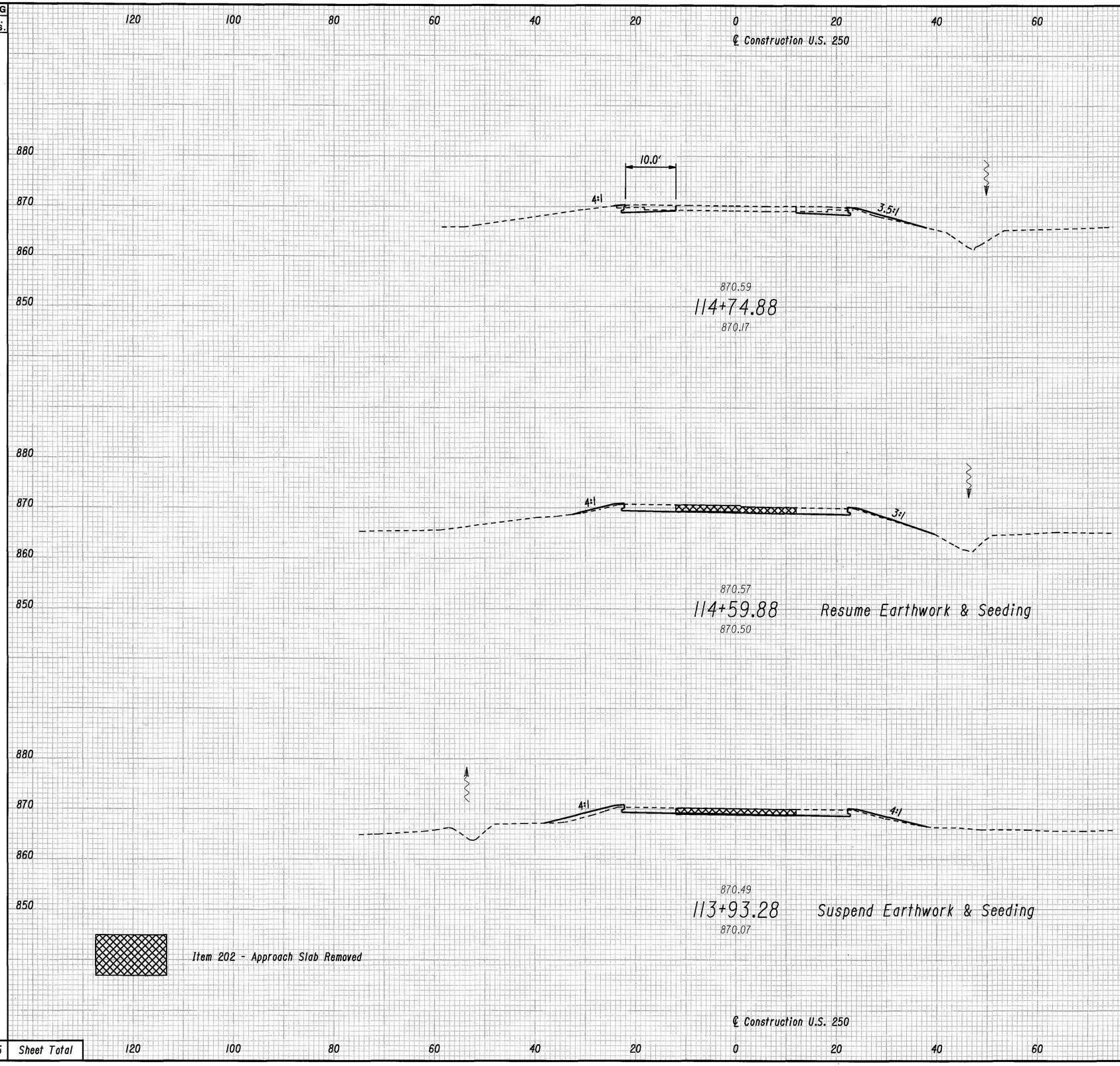
CROSS SECTION SHEET

STA. 113+93.28 TO STA. 114+74.88

HAS-250-2.11

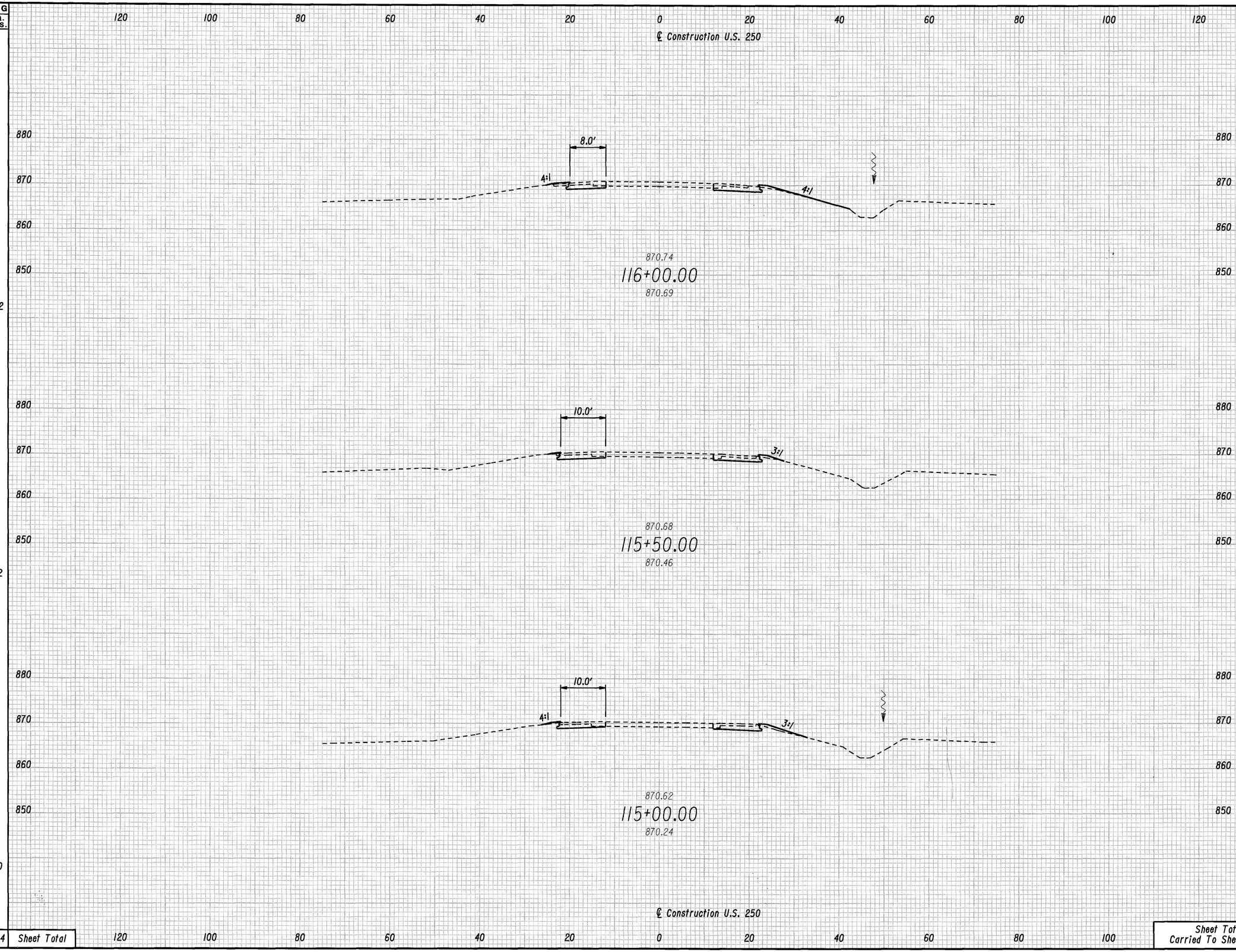
CALCULATED CCW

CHECKED JPB



SEEDING END WIDTH	SEEDING SQ. YDS.	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
23					
		Ahead 29	6		
		Back 49	12		
	47				
		Quantity Reflects 17 C.Y. Deduct For Approach Slab Removal 15' x 24' x 1.25' ÷ 27 = 16.67 C.Y. (Use 17 C.Y.)		13	5
33		58	6		
	37	49	16		
	58	Quantity Reflects 17 C.Y. Deduct For Approach Slab Removal 15' x 24' x 1.25' ÷ 27 = 16.67 C.Y. (Use 17 C.Y.)		12	8
105	Sheet Total	Sheet Totals Carried To Sheet No. 11.		25	13

SEEDING END WIDTH	SEEDING SQ. YDS.
31	
	122
13	
	92
20	
	60
274	Sheet Total



END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
26	5		
		50	7
28	3		
		51	7
27	5		
		26	5
Sheet Totals Carried To Sheet No. 11.		127	19

CALCULATED CCW
CHECKED JPB

CROSS SECTION SHEET
STA. 115+00.00 TO STA. 116+00.00

HAS-250-2.11

17/32

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SEEDING END WIDTH	SEEDING SQ. YDS.
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2	65
	37
	76
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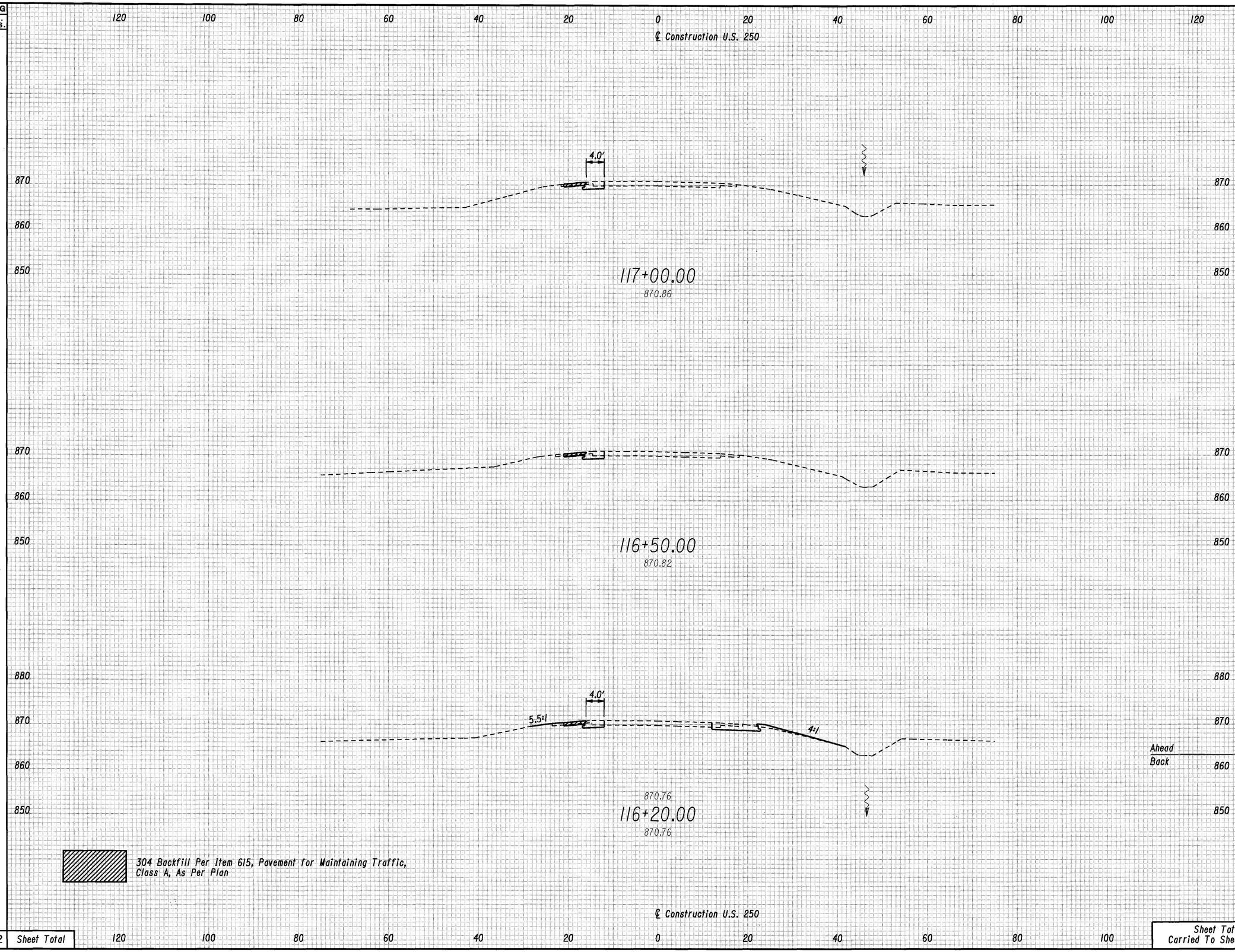

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		9	0
5	0		
		6	3
Ahead 5	6		
Back 21	6		
		17	4
Sheet Totals Carried To Sheet No. 11.		32	7

CALCULATED CCW
CHECKED JPB

CROSS SECTION SHEET
STA. 116+20.00 TO STA. 117+00.00

HAS-250-2.11

18
32

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SEEDING	
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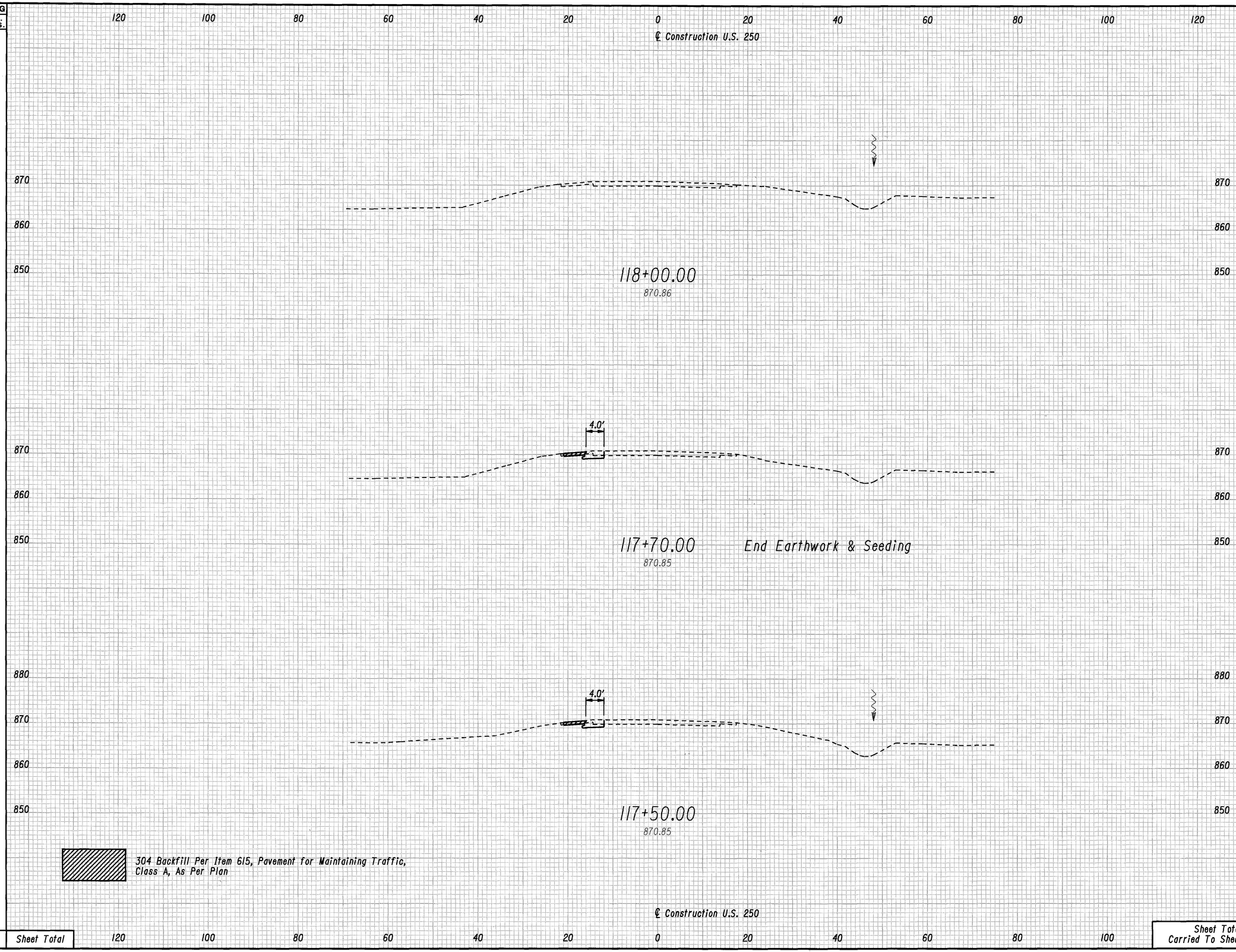
2	
4	
2	
11	
15	Sheet Total



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CUT	FILL	CUT	FILL
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		4	0
5	0		
		9	0
Sheet Totals Carried To Sheet No. 11.		13	0

CALCULATED CCW

CHECKED JPB

CROSS SECTION SHEET

STA. 117+50.00 TO STA. 118+00.00

HAS-250-2.11

19
32

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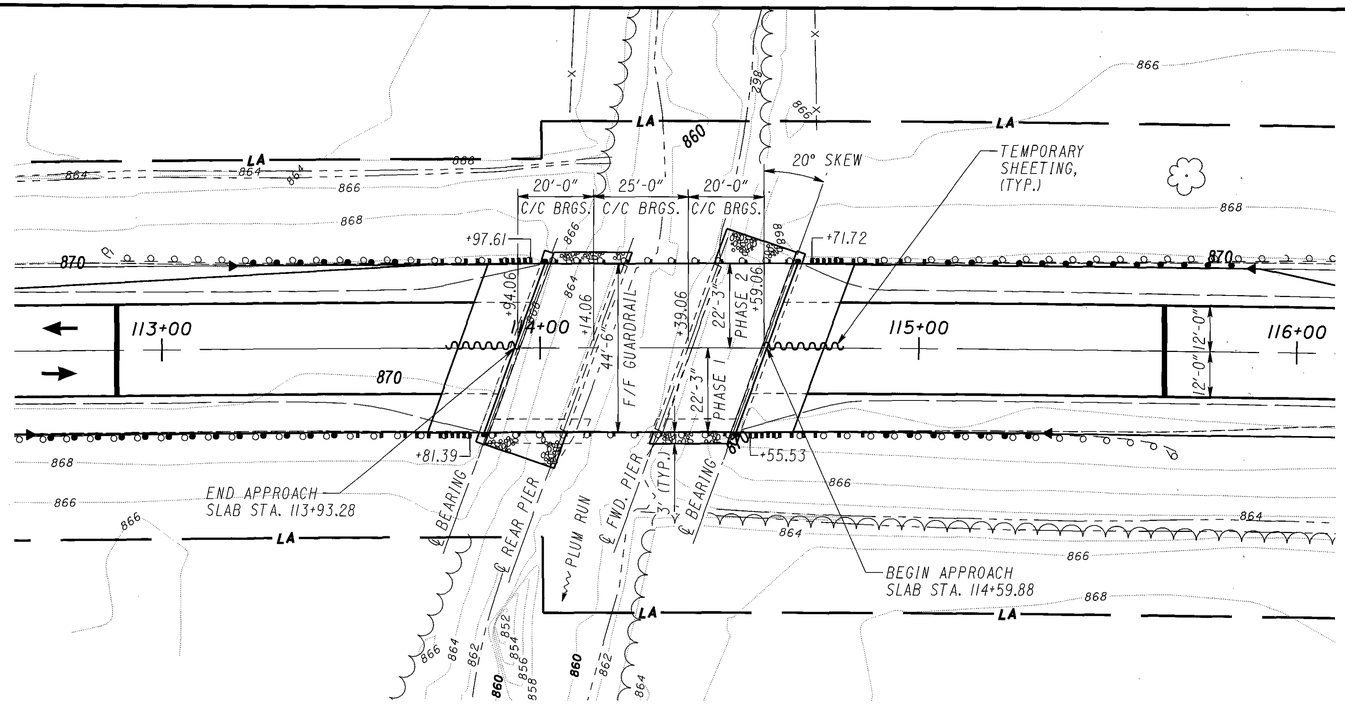


PLAN

NOTES:

1.) EXISTING ABUTMENT INFORMATION BELOW GRADE WAS OBTAINED FROM EXISTING PLANS AND NOT FIELD VERIFIED.

PROPOSED WORK:

THE PROPOSED WORK INCLUDES THE FOLLOWING:

1.) INSTALL PORTABLE CONCRETE BARRIER (UNANCHORED) AND REMOVE PORTIONS OF THE EXISTING CONCRETE DECK, ABUTMENT AND APPROACH SLABS AS SHOWN IN PHASE 1.

2.) CONSTRUCT PHASE 1 PORTION OF DECK, ABUTMENTS AND APPROACH SLABS.

3.) INSTALL PORTABLE CONCRETE BARRIER ON PHASE 1 CONSTRUCTION (UNANCHORED) AND MAINTAIN TRAFFIC FOR PHASE 2 CONSTRUCTION.

4.) REMOVE PROTIONS OF EXISTING CONCRETE DECK, ABUTMENTS AND APPROACH SLABS AS SHOWN IN THE PLANS.

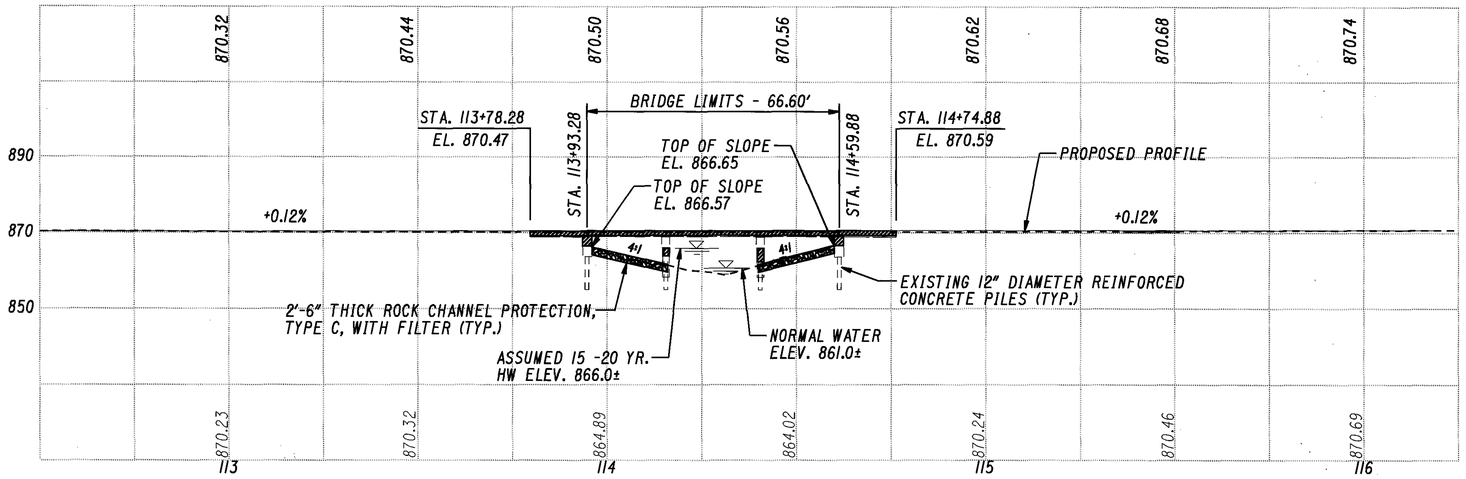
5.) CONSTRUCT PHASE 2 PORTION OF PROPOSED DECK, ABUTMENTS AND APPROACH SLABS.

6.) REMOVE PORTABLE CONCRETE BARRIER.

CURVE DATA
P.I. = STA. 116+01.00
Δ = 10°34'00.0" (RT.)
Dc = 0°30'00.0"
R = 11,459.16'
T = 1059.67'
L = 2113.34'
E = 48.89'
e_{max} = 0.016
P.C. = STA. 105+41.33
P.T. = STA. 126+54.66

TRAFFIC DATA
CURRENT ADT (2005) - 5600
DESIGN YEAR ADT (2025) - 7100

BENCH MARK #1	BENCH MARK #2
STA. 111+33.90 ℄ U.S. 250, 23.42' LEFT ELEV. 869.85 CONCRETE MONUMENT	STA. 117+41.18 ℄ U.S. 250, 23.53' LEFT ELEV. 869.95 CONCRETE MONUMENT



PROFILE ALONG ℄ CONSTRUCTION & SURVEY U.S. 250

EXISTING STRUCTURE
TYPE : CONTINUOUS REINFORCED CONCRETE SLAB WITH CAPPED PILE SUBSTRUCTURE
SPAN LENGTH : 20' - 25' - 20' c/c BEARINGS
ROADWAY WIDTH : 44'-0" F/F RAIL
LOADING : S-20-46
SKEW : 20°0'0" LT. FWD. SUPERELEVATION : 0.016
ALIGNMENT : 0°-30' CURVE RIGHT
WEARING SURFACE : BITUMINOUS ASPHALT CONCRETE
STRUCTURAL FILE NO. : 3401537 APPROACH SLAB : 15'-0"
DATE BUILT : 1951

PROPOSED STRUCTURE
PROPOSED WORK : NEW THREE SPAN CONTINUOUS REINFORCED CONCRETE DECK ON EXISTING CAPPED PILE SUBSTRUCTURE.
SPAN LENGTH : 20'± - 25'± - 20'± c/c BEARINGS
ROADWAY WIDTH : 44'-6" F/F RAILING
LOADING : HS20-44 AND THE ALTERNATE MILITARY LOADING
SKEW : 20° LT. FWD. SUPERELEVATION : 0.016
ALIGNMENT : 0°-30' CURVE RIGHT
WEARING SURFACE : 1" MONOLITHIC CONCRETE
APPROACH SLAB : AS-1-81 (15'-0") LATITUDE : N 40° 22' 30" LONGITUDE : W 81° 14' 55"

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

DESIGNED	DRAWN	REVIEWED	DATE
KAH	KAH	SAL	01-04-05
CHECKED	REVISED	STRUCTURE FILE NUMBER	
JPB		3401537	

HARRISON COUNTY
STA. 113+93.28
STA. 114+59.88

SITE PLAN
BRIDGE NO. HAS-250-0214
OVER PLUM RUN

HAS-250-2.11
PID 21867

1/13

20/32

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REFERENCES:

REFERENCE SHALL BE MADE TO STANDARD DRAWINGS:

AS-1-81	(REVISED) :	7-19-02
PCB-91	(REVISED) :	7-19-02
TST-1-99	(REVISED) :	10-17-03
DM-1.1	(REVISED) :	7-18-03

AND TO SUPPLEMENTAL SPECIFICATIONS:

898 DATED 07-16-04

DESIGN SPECIFICATIONS:

THIS STRUCTURE CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 2002 AND INTERIM SPECS, AND THE ODOT BRIDGE DESIGN MANUAL.

DESIGN DATA:

DESIGN LOADING:

HS20-44 AND THE ALTERNATE MILITARY LOADING

FUTURE WEARING SURFACE (FWS) OF 60 LBS/FT.

DESIGN STRESSES:

QC/QA CONCRETE, CLASS QSC2 (SUPERSTRUCTURE), COMPRESSIVE STRENGTH 4500 PSI
QC/QA CONCRETE, CLASS QSC1 (SUBSTRUCTURE), COMPRESSIVE STRENGTH 4000 PSI

REINFORCING STEEL - ASTM A615 OR A996
GRADE 60 MINIMUM YIELD STRENGTH 60,000 P.S.I.

DECK PROTECTION METHOD:

DECK PROTECTION METHOD : EPOXY COATED REINFORCING STEEL, 2½" CONCRETE COVER, SEALING OF CONCRETE SURFACES

MONOLITHIC WEARING SURFACE:

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

EXISTING STRUCTURE PLANS:

THE FOLLOWING PREVIOUS PLAN OF THE EXISTING BRIDGE IS AVAILABLE FOR REFERENCE AT THE DISTRICT II OFFICE OF THE OHIO DEPARTMENT OF TRANSPORTATION, 2201 REISER AVENUE, S.E., NEW PHILADELPHIA, OHIO 44663:

HAS-36-(0.43-2.92) (11.92-14.12) ORIGINAL CONSTRUCTION PLAN (1951)

INSPECTION OF BRIDGES FOR BATS

PRIOR TO ANY DEMOLITION/REMOVAL OF THE EXISTING STRUCTURE, THE CONTRACTOR SHALL CAREFULLY EXAMINE THE UNDERSIDE OF THE STRUCTURE FOR THE PRESENCE OF BATS. IF ANY BATS ARE FOUND, THE ODOT DISTRICT II ENVIRONMENTAL COORDINATOR SHOULD BE CONTACTED AT 330-339-6633 BEFORE COMMENCING WITH THE BRIDGE'S DEMOLITION.

MAINTENANCE OF TRAFFFIC:

FOR MAINTENANCE OF TRAFFIC PLAN, QUANTITIES AND NOTES, SEE SHEETS 4/32 THROUGH 8/32

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

DESCRIPTION:

THIS WORK SHALL CONSIST OF THE REMOVAL OF THE CONCRETE DECK, ASPHALT WEARING COURSE INCLUDING APPURTENANCES AND PORTIONS OF SPECIFIED SUBSTRUCTURES. CARE SHALL BE TAKEN DURING DECK REMOVALS TO PROTECT PORTIONS OF SUCH SYSTEMS THAT ARE TO BE SALVAGED AND INCORPORATED INTO THE PROPOSED STRUCTURE. IN THIS RESPECT, THE USE OF EXPLOSIVES, HEADACHE BALLS AND/OR HOE RAM TYPE OF EQUIPMENT IS PROHIBITED.

REMOVAL METHODS:

CONCRETE MAY BE REMOVED BY CUTTING AND BY MEANS OF HAND OPERATED PNEUMATIC HAMMERS EMPLOYING POINTED OR BLUNTED CHISEL TYPE TOOLS.

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

CUT LINE CONSTRUCTION JOINT PREPARATION:

SAW CUT BOUNDARIES OF PROPOSED CONCRETE REMOVALS 1 INCH DEEP. REMOVE CONCRETE TO A ROUGH SURFACE. THE EXISTING REINFORCING STEEL, IF REQUIRED IN THE PLANS, SHALL BE LEFT IN PLACE. INSTALL DOWEL BARS IF SPECIFIED. PRIOR TO CONCRETE PLACEMENT ABRASIVELY CLEAN JOINT SURFACES AND EXISTING EXPOSED REINFORCEMENT TO REMOVE LOOSE AND DISINTEGRATED CONCRETE AND LOOSE RUST. THE JOINT SURFACE AND EXPOSED REINFORCEMENT SHALL BE THOROUGHLY CLEANED OF ALL DIRT, DUST, RUST OR OTHER FOREIGN MATERIAL BY THE USE OF WATER, AIR UNDER PRESSURE, OR OTHER METHODS THAT PRODUCE SATISFACTORY RESULTS. EXISTING REINFORCING STEEL DOES NOT HAVE TO HAVE A BRIGHT STEEL FINISH BUT ALL PACK AND LOOSE RUST SHALL BE REMOVED. EXISTING CONCRETE SURFACES WHICH NEW CONCRETE WILL BE PLACED AGAINST SHALL BE WET, BUT WITHOUT FREE WATER, AT THE TIME OF CONCRETE PLACEMENT.

LOADING LIMITATIONS:

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

MEASUREMENT & PAYMENT:

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

ITEM 519 - PATCHING CONCRETE STRUCTURES, AS PER PLAN :

PRIOR TO THE SURFACE CLEANING SPECIFIED IN 519.04, AND WITHIN 24 HOURS OF PLACING PATCHING MATERIAL, BLAST CLEAN ALL SURFACES TO BE PATCHED INCLUDING THE EXPOSED REINFORCING STEEL. ACCEPTABLE METHODS INCLUDE HIGH-PRESSURE WATER BLASTING WITH OR WITHOUT ABRASIVES IN THE WATER, ABRASIVE BLASTING WITH CONTAINMENT, OR VACUUM ABRASIVE BLASTING.

EXISTING STRUCTURE VERIFICATION:

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

CONTRACT BID PRICES SHALL BE BASED UPON A RECOGNITION OF THE UNCERTAINTIES DESCRIBED ABOVE AND 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.

ITEM 526 - REINFORCED CONCRETE APPROACH SLABS (T=12"), AS PER PLAN :

CONCRETE FOR APPROACH SLABS SHALL BE CLASS S, CMS 499.

ITEM 503 - UNCLASSIFIED EXCAVATION, AS PER PLAN :

THE BACKFILL MATERIAL BEHIND THE ABUTMENTS SHALL BE TYPE B GRANULAR MATERIAL, 703.16.C, PLACED AND COMPACTED IN 6 INCH LIFTS.

ITEM 509 REINFORCING STEEL, REPLACEMENT OF EXISTING REINFORCING STEEL, AS PER PLAN :

REPLACE ALL EXISTING REINFORCING BARS DEEMED BY THE ENGINEER TO BE UNUSABLE BECAUSE OF CORROSION. THE DEPARTMENT WILL MEASURE THE REPLACEMENT REINFORCING STEEL BY THE NUMBER OF POUNDS ACCEPTED IN PLACE.

REPLACE ALL EXISTING REINFORCING STEEL BARS WHICH ARE TO BE INCORPORATED INTO THE NEW WORK AND ARE DEEMED BY THE ENGINEER TO BE MADE UNUSABLE BY CONCRETE REMOVAL OPERATIONS WITH NEW EPOXY COATED REINFORCING STEEL OF THE SAME SIZE AT NO COST TO THE DEPARTMENT.

ITEM SPECIAL - PILE ENCASEMENT

ENCASE THE REMAINING PILES FOR THE CAPPED PILE PIERS IN CLASS C CONCRETE. PROVIDE A CONCRETE SLUMP BETWEEN 6 TO 8 INCHES WITH THE USE OF A SUPER-PLASTICIZER. PLACE THE CONCRETE WITHIN A FORM THAT MATCHES THE EXISITNG ENCASEMENT DETAILED IN THE PLANS. THE ENCASEMENT SHALL EXTEND FROM THE EXISTING ENCASEMENT TO THE BOTTOM OF THE PIER CAP.

PRIOR TO ENCASEMENT, HAND BRUSH ALL LOOSE RUST TO THE SATISFACTION OF THE ENGINEER.

THE DEPARTMENT WILL MEASURE PILE ENCASEMENT BY THE NUMBER OF FEET. THE DEPARTMENT WILL DETERMINE THE SUM AS THE LENGTH MEASURED ALONG THE AXIS OF EACH PILE FROM THE TOP OF THE EXISTING ENCASEMENT TO THE BOTTOM OF THE PIER CAP. THE DEPARTMENT WILL PAY FOR ACCEPTED QUANTITIES AT THE CONTRACT PRICE FOR ITEM - SPECIAL, PILE ENCASEMENT.

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

DESIGNED	DRAWN	REVIEWED	DATE
KAH	KAH	SAL	01-04-05
CHECKED	REVISED	STRUCTURE FILE NUMBER	
JPB		3401537	

GENERAL NOTES
BRIDGE NO. HAS-250-0214
OVER PLUM RUN

HAS-250-2.11
PID 21867

2/13

21/32

CALCULATED BY : JPB DATE : 12-10-04
CHECKED BY : TKB DATE : 12-13-04

ESTIMATED QUANTITIES

ITEM	ITEM EXT.	TOTAL	UNIT	DESCRIPTION	SUPERSTRUCTURE	ABUTMENTS	PIERS	GENERAL	SEE STRUCTURE SHT. NO.
202	11203	LUMP		PORTIONS OF STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN				LUMP	2/13
202	22900	80	SQ YD	APPROACH SLAB REMOVED				80	
503	11100	LUMP		COFFERDAMS, CRIBS AND SHEETING				LUMP	
503	21301	LUMP		UNCLASSIFIED EXCAVATION, AS PER PLAN				LUMP	2/13
SPECIAL	50771200	31	FT	PILE ENCASEMENT			31		2/13
509	10000	32,892	POUND	EPOXY COATED REINFORCING STEEL	28,712	4180			
509	20001	100	POUND	REINFORCING STEEL, REPLACEMENT OF EXISTING REINFORCING STEEL, AS PER PLAN				100	2/13
510	10000	160	EACH	DOWEL HOLES WITH NONSHRINK, NONMETALLIC GROUT		160			
512	10050	152	SQ YD	SEALING OF CONCRETE SURFACES (NON-EPOXY)	152				
512	10100	210	SQ YD	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)	53	35	122		
512	33000	40	SQ YD	TYPE 2 WATERPROOFING		40			
516	13200	16	SQ FT	1/2" PREFORMED EXPANSION JOINT FILLER		16			
517	70000	143	FT	RAILING (TWIN STEEL TUBE)	143				
518	21230	LUMP		POROUS BACKFILL WITH FILTER FABRIC		LUMP			
518	40000	112	FT	6" PERFORATED CORRUGATED PLASTIC PIPE		112			
518	40010	56	FT	6" NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS		56			
519	11101	44	SQ FT	PATCHING CONCRETE STRUCTURE, AS PER PLAN		10	34		2/13
526	10001	150	SQ YD	REINFORCED CONCRETE APPROACH SLABS (T=12"), AS PER PLAN				150	2/13
898	10200	136	CU YD	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (DECK)	136				
898	20000	26	CU YD	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE		26			

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

DESIGNED CCW | DRAWN CCW | CHECKED JPB | REVISED
REVIEWED SAL | DATE 01-04-05 | STRUCTURE FILE NUMBER 3401537

ESTIMATED QUANTITIES
BRIDGE NO. HAS-250-0214
OVER PLUM RUN

HAS-250-2.11
PID 21867

3/13

22/32

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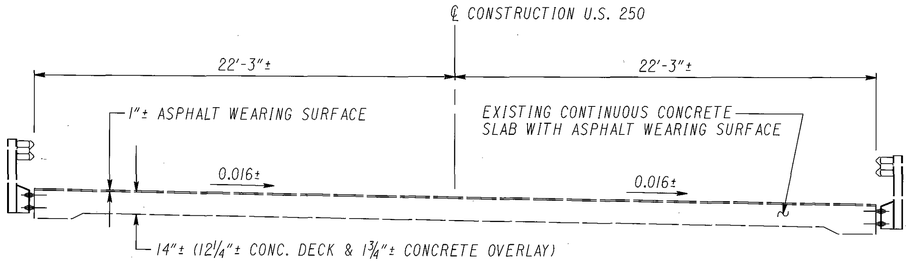
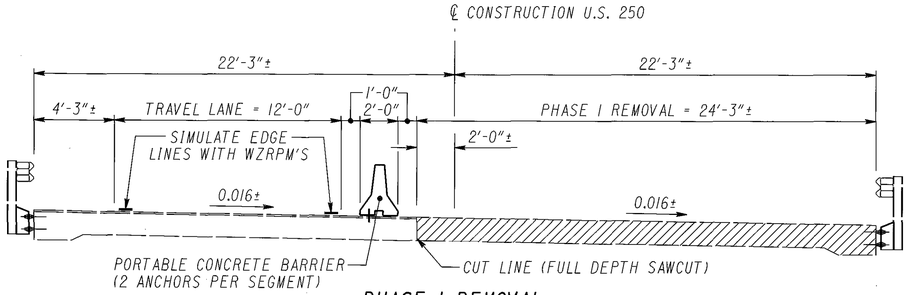
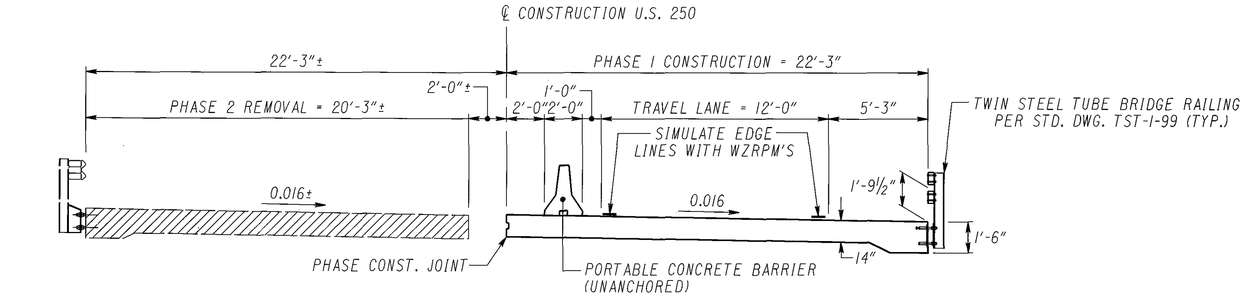


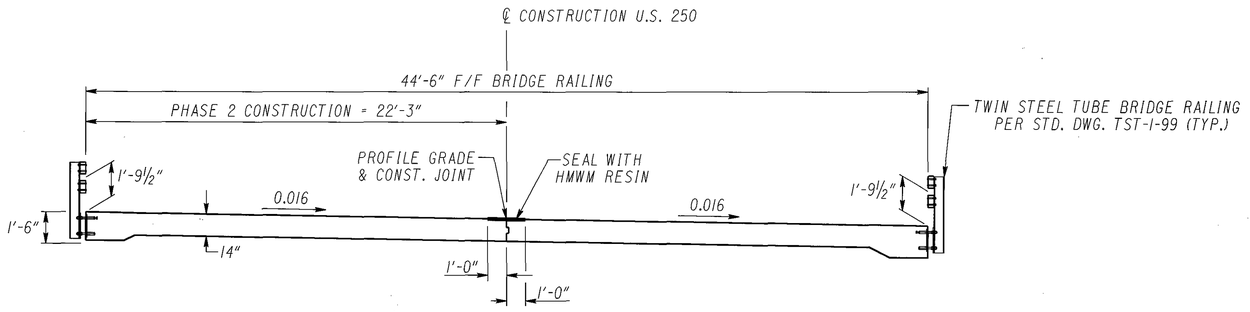
EXISTING TRANSVERSE SECTION



PHASE 1 REMOVAL



PHASE 1 CONSTRUCTION & PHASE 2 REMOVAL



PHASE 2 CONSTRUCTION

PHASE 1 REMOVAL

1.) ERECT AND ANCHOR THE PORTABLE CONCRETE BARRIER ON THE EXISTING STRUCTURE AS SHOWN PER STD. DWG. PCB-91. MAINTAIN 1-LANE, 2-WAY TRAFFIC.

2.) SAWCUT THE EXISTING DECK FULL DEPTH AS SHOWN ON THE PLANS.

3.) REMOVE THE RIGHT PORTION OF THE EXISTING SUPERSTRUCTURE AND APPROACH SLABS AS SHOWN. CUT AND REMOVE PORTIONS OF THE REAR AND FORWARD ABUTMENTS. DRIVE SHEET PILING WHEN NECESSARY.

PHASE 1 CONSTRUCTION & PHASE 2 REMOVAL

4.) CONSTRUCT THE RIGHT PORTION OF THE PROPOSED SUPERSTRUCTURE, PORTIONS OF THE ABUTMENTS AND APPROACH SLABS. PLACE THE PROPOSED TWIN STEEL TUBE BRIDGE RAILING TO THE RIGHT PORTION OF THE DECK.

5.) PLACE THE PORTABLE CONCRETE BARRIER UNANCHORED ON THE NEWLY CONSTRUCTED DECK AS SHOWN. MAINTAIN 1-LANE, 2-WAY TRAFFIC.

6.) REMOVE THE REMAINDER OF THE EXISTING SUPERSTRUCTURE AND APPROACH SLABS AS SHOWN. CUT AND REMOVE PORTIONS OF THE REAR AND FORWARD ABUTMENTS.

PHASE 2 CONSTRUCTION

7.) CONSTRUCT THE LEFT PORTION OF THE PROPOSED SUPERSTRUCTURE. CONSTRUCT THE REMAINING PORTIONS OF THE ABUTMENTS AND APPROACH SLABS. PLACE THE PROPOSED TWIN STEEL TUBE BRIDGE RAILING TO THE LEFT PORTION OF THE DECK.

8.) APPLY THE HMWM RESIN TO THE PHASE CONSTRUCTION JOINT.

9.) REMOVE THE UNANCHORED PORTABLE CONCRETE BARRIER ACROSS THE STRUCTURE.

10.) SAWCUT GROOVES INTO DECK SURFACE.

PORTION OF STRUCTURE TO BE REMOVED

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

DESIGNED	DRAWN	REVIEWED	DATE
KAH	KAH	SAL	01-04-05
CHECKED	REVISED	STRUCTURE FILE NUMBER	
JPB		3401537	

PHASE CONSTRUCTION DETAILS

BRIDGE NO. HAS-250-0214
OVER PLUM CREEK

HAS-250-2.11
PID 21867

4/13

23/32

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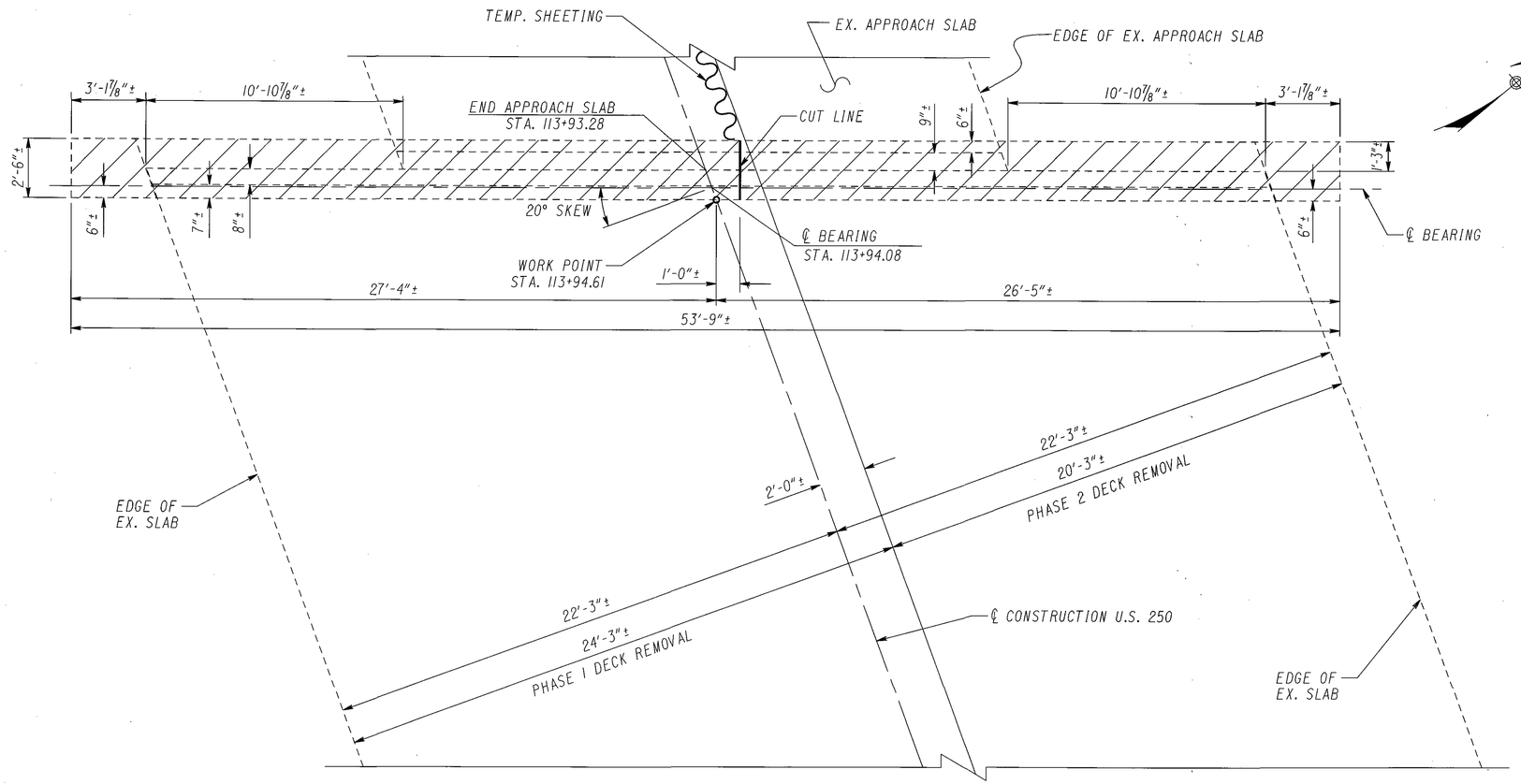
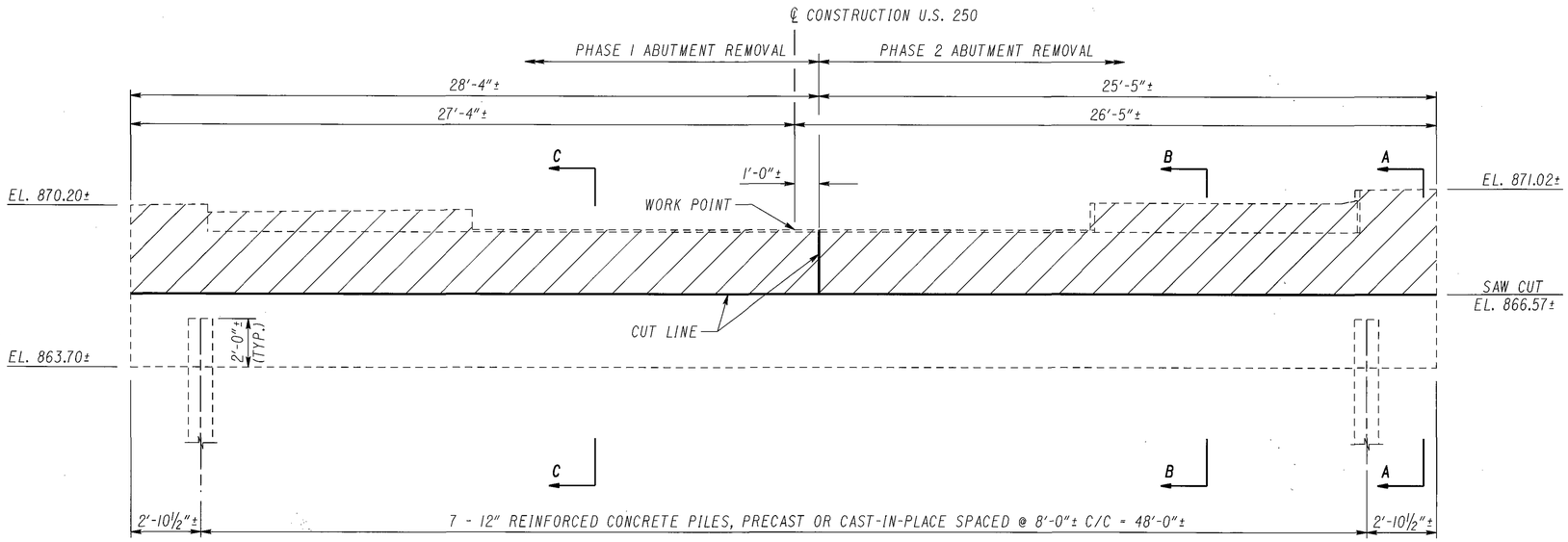
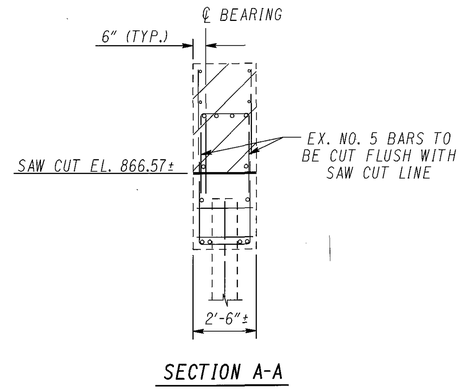


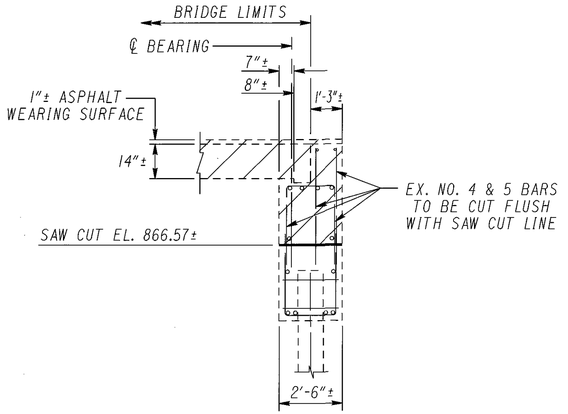
PLAN



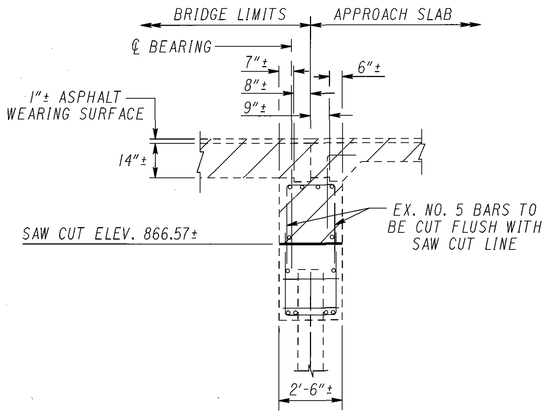
ELEVATION
(DECK NOT SHOWN)



SECTION A-A



SECTION B-B



SECTION C-C

NOTES:

1. REMOVE ALL EXISTING HORIZONTAL AND VERTICAL REINFORCING STEEL ABOVE THE SAW CUT ELEVATION.

- PORTIONS OF STRUCTURE TO BE REMOVED

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

DESIGNED	DRAWN	REVIEWED	DATE
KAH	KAH	SAL	01-04-05
CHECKED	REVISED	STRUCTURE FILE NUMBER	
JPB	CCW	3401537	

REAR ABUTMENT REMOVAL DETAILS

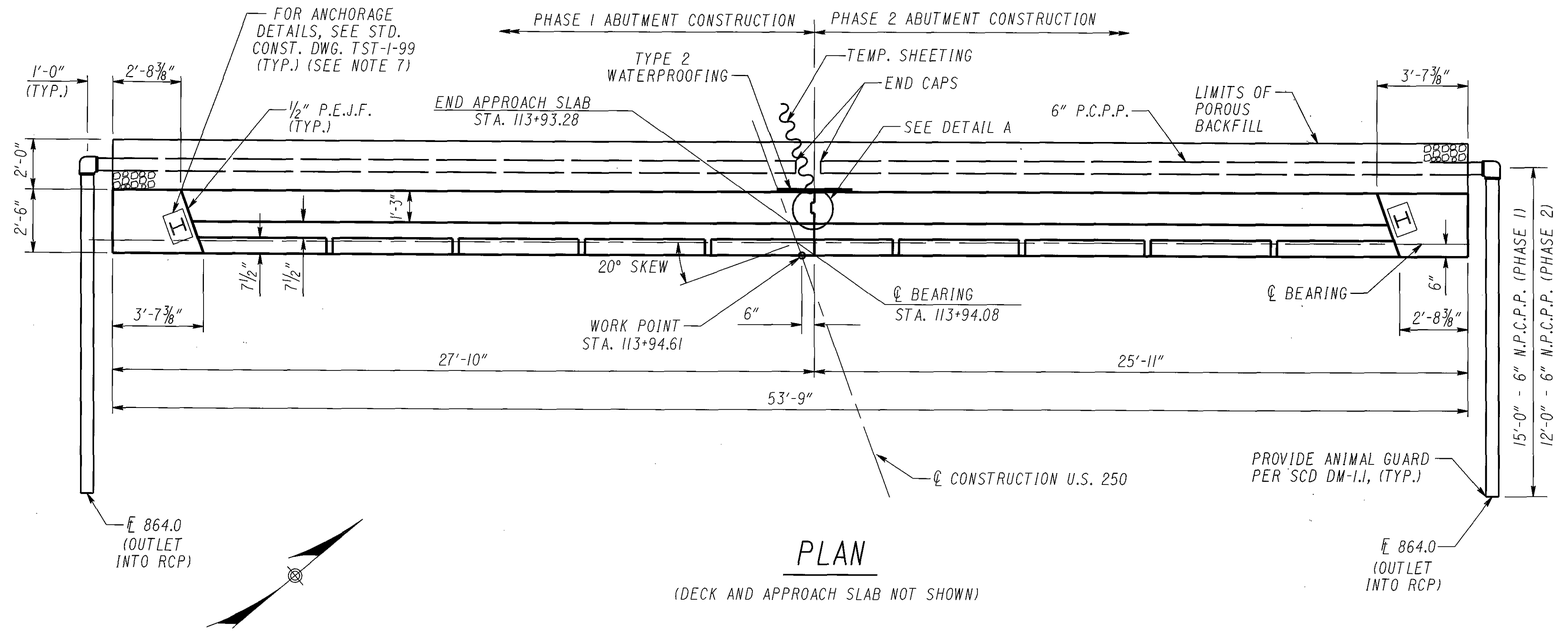
BRIDGE NO. HAS-250-0214
OVER PLUM RUN

HAS-250-2.11
PID 21867

5/13

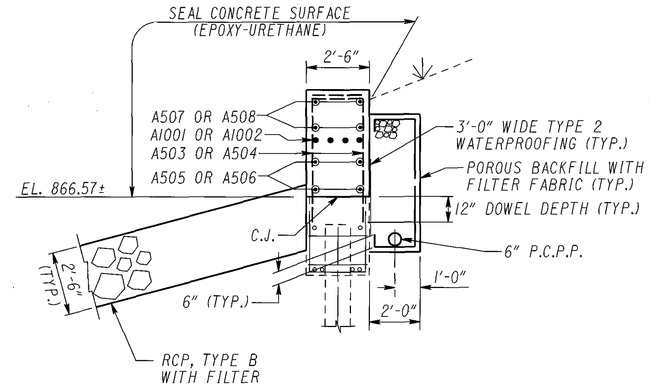
24/32

I:\Projects\21867\dgn\sal00 ex rearabut.dgn 18-JAN-2005 11:19AM cwarner

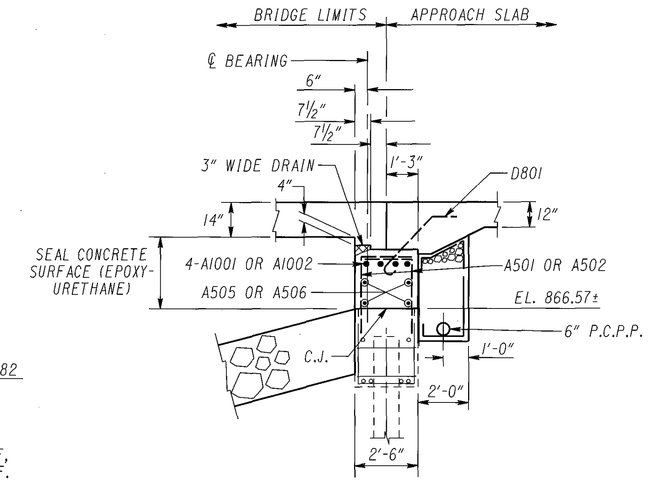


PLAN

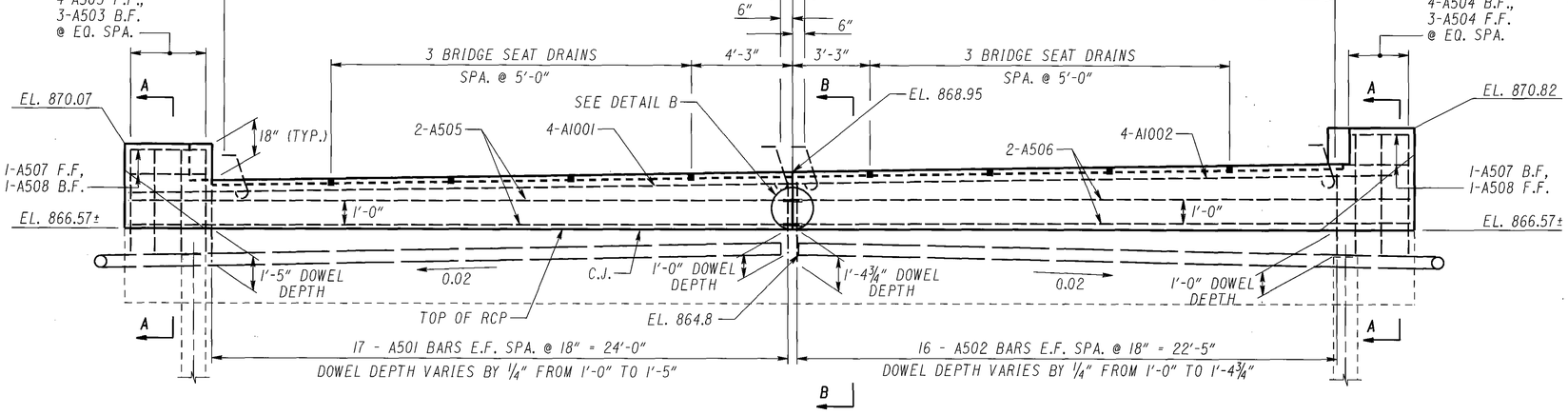
(DECK AND APPROACH SLAB NOT SHOWN)



SECTION A-A



SECTION B-B

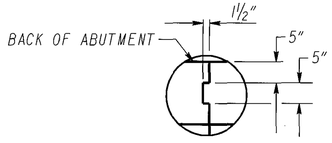


ELEVATION

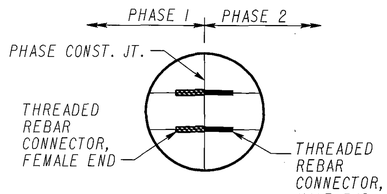
(DECK AND APPROACH SLAB NOT SHOWN)

LEGEND:

RCP - ROCK CHANNEL PROTECTION
EX. - EXISTING
C.J. - CONSTRUCTION JOINT
EL. - ELEVATION
P.E.J.F. - PREFORMED EXPANSION JOINT FILLER
STA. - STATION
P.C.P.P. - PERFORATED CORRUGATED PLASTIC PIPE
N.P.C.P.P. - NON-PERFORATED CORRUGATED PLASTIC PIPE
SPA. - SPACE(D)
EQ. - EQUAL
TYP. - TYPICAL
E.F. - EACH FACE
F.F. - FRONT FACE
B.F. - BACK FACE



DETAIL A



DETAIL B

NOTES:

1.) FOR ADDITIONAL REINFORCED CONCRETE APPROACH SLAB DETAILS, SEE STD. DWG. AS-1-81.

2.) FOR REINFORCING STEEL LIST, SEE STRUCTURE SHEET NO. 13/13.

3.) 2" REBAR CLEARANCE, UNLESS OTHERWISE SHOWN.

4.) POROUS BACKFILL WITH FILTER FABRIC, 2 FEET THICK SHALL EXTEND UP TO THE PLANE OF THE SUBGRADE, TO 1 FOOT BELOW THE EMBANKMENT SURFACE, AND LATERALLY TO THE ENDS OF THE WINGWALLS.

5.) ALL DOWEL BAR DEPTHS SHALL BE 1'-0" MINIMUM. DOWEL BAR DEPTHS FOR THE A501 & A502 BARS VARY. SEE THE ELEVATION VIEW DETAILS.

6.) APPLY ITEM 512, TYPE 2 WATERPROOFING, 3'-0" WIDE CENTERED ON THE JOINT FOR THE PHASE CONST. JOINT AND HORIZONTAL CONST. JOINT.

7.) PLACE RAILING POST ANCHOR PLATE AND BOLTS IN WINGWALL, FROM SCD TST-1-99, PRIOR TO POURING THE ABUTMENT CONCRETE.

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

DESIGNED	DRAWN	REVIEWED	DATE
KAH	KAH	SAL	01-04-05
CHECKED	REVISED	STRUCTURE FILE NUMBER	
JPB		3401537	

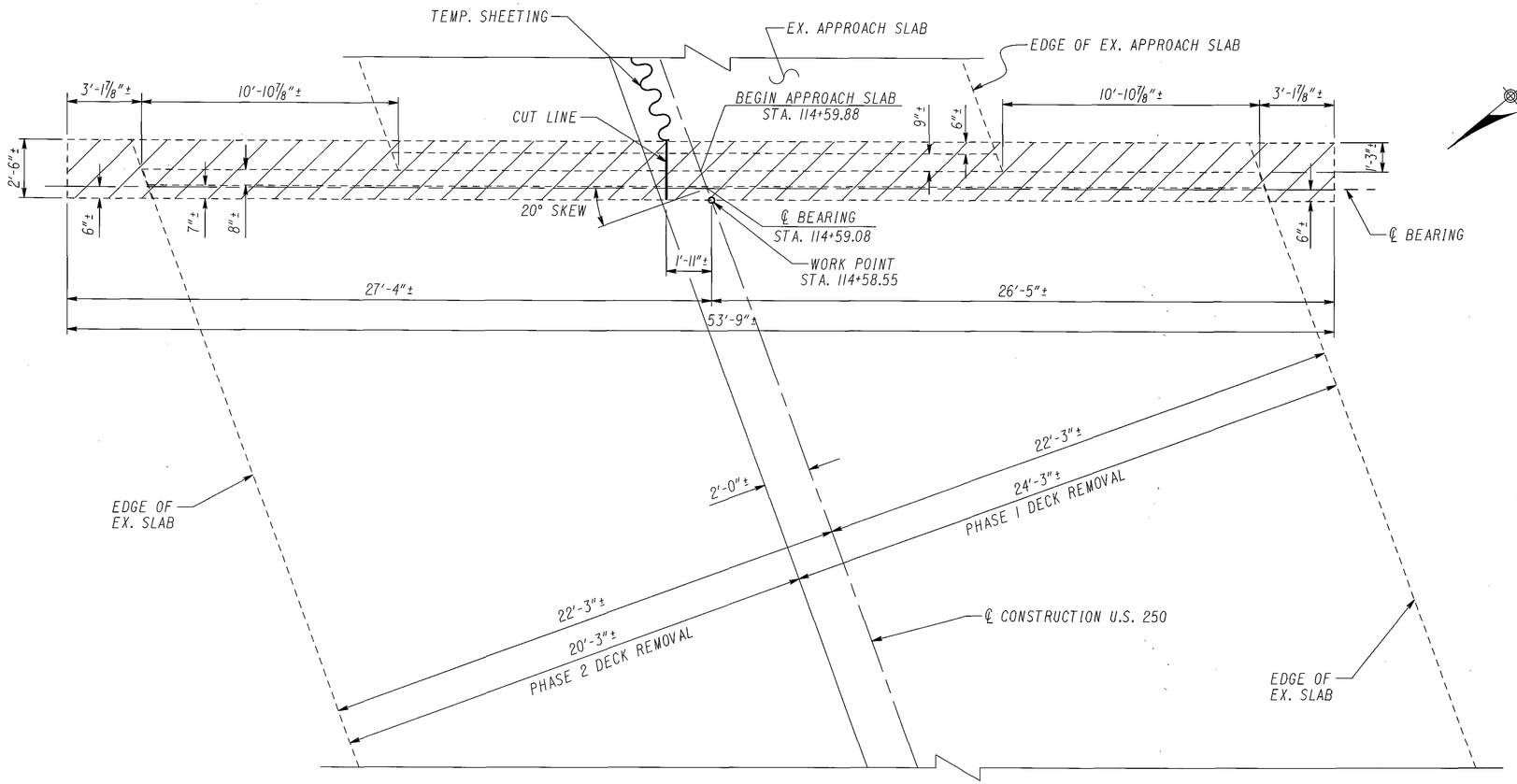
REAR ABUTMENT DETAILS

BRIDGE NO. HAS-250-0214
OVER PLUM RUN

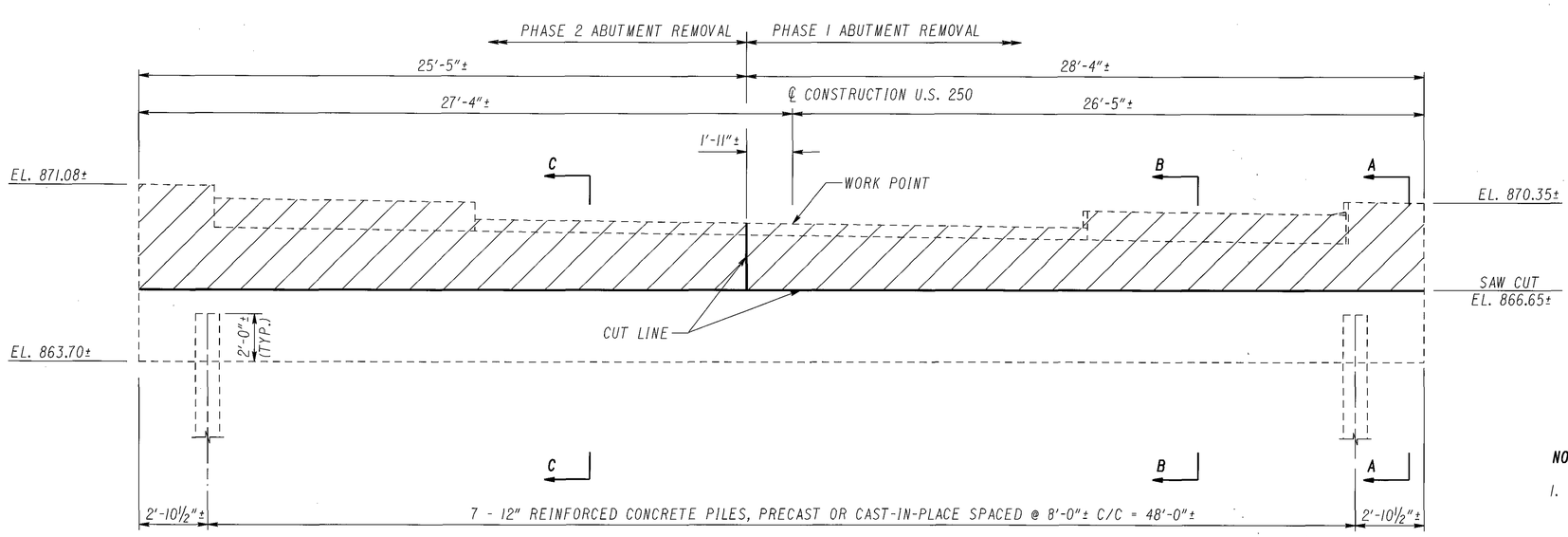
HAS-250-2.11
PID 21867

6 / 13

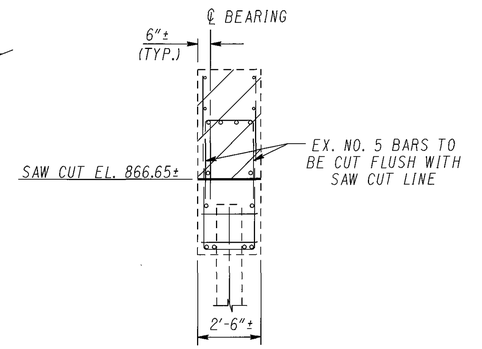
25 / 32



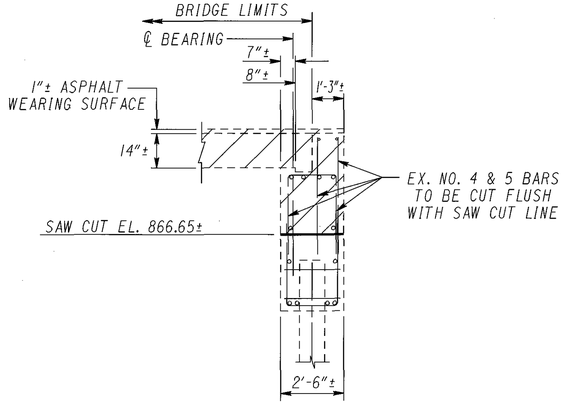
PLAN



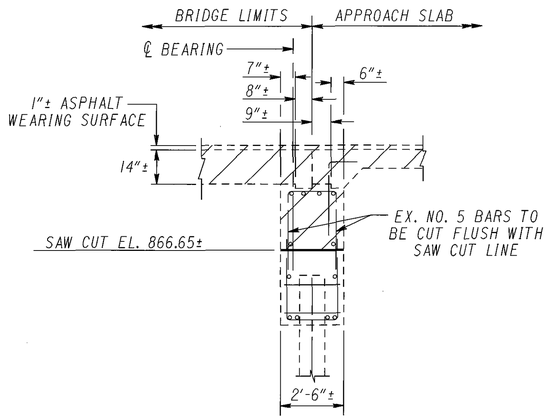
ELEVATION
(DECK NOT SHOWN)



SECTION A-A



SECTION B-B



SECTION C-C

NOTES:

1. REMOVE ALL EXISTING HORIZONTAL AND VERTICAL REINFORCING STEEL ABOVE THE SAW CUT ELEVATION.

- PORTIONS OF STRUCTURE TO BE REMOVED

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

DESIGNED	DRAWN	REVIEWED	DATE
KAH	KAH	SAL	01-04-05
CHECKED	REVISED	STRUCTURE FILE NUMBER	
JPB	CCW	340/537	

FWD. ABUTMENT REMOVAL

BRIDGE NO. HAS-250-0214
OVER PLUM RUN

HAS-250-2.11
PID 21867

7/13

26/32

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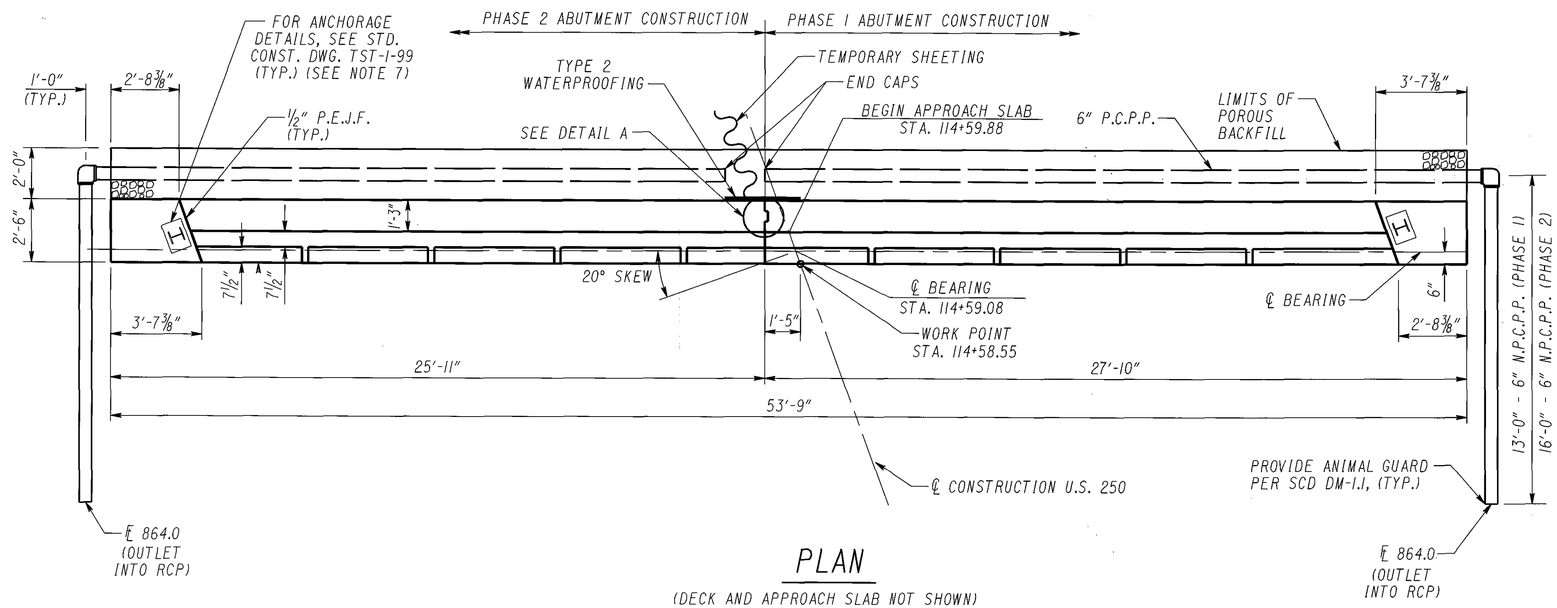
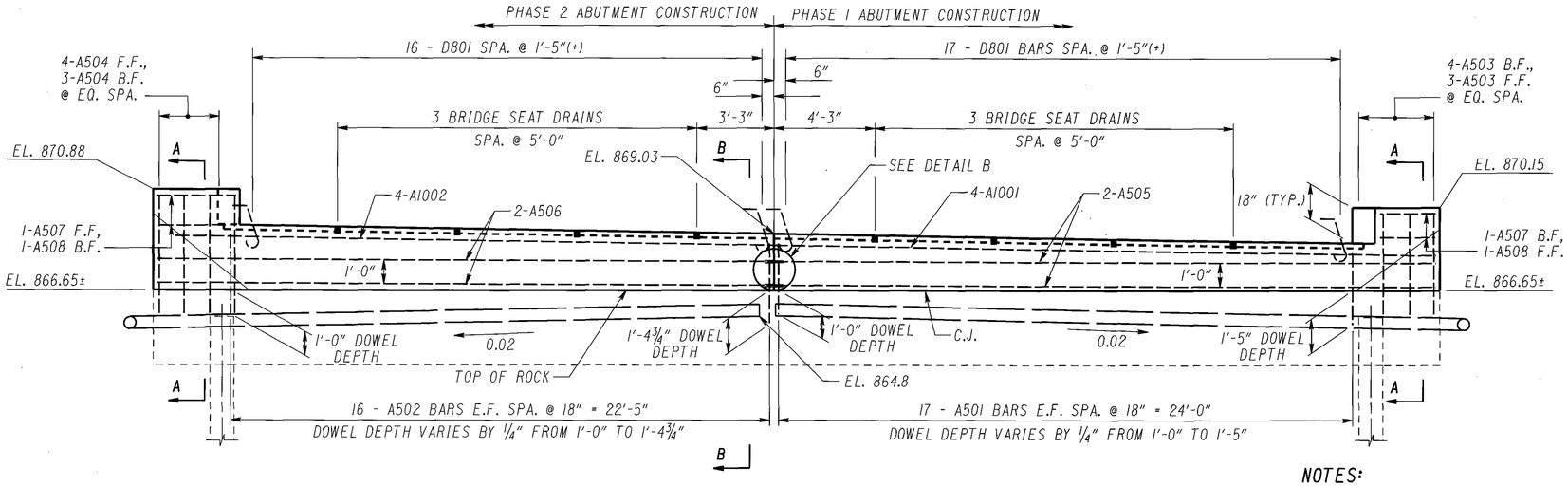


PLAN

(DECK AND APPROACH SLAB NOT SHOWN)



ELEVATION

(DECK AND APPROACH SLAB NOT SHOWN)

LEGEND:

RCP - ROCK CHANNEL PROTECTION
EX. - EXISTING
C.J. - CONSTRUCTION JOINT
EL. - ELEVATION
P.E.J.F. - PREFORMED EXPANSION JOINT FILLER
STA. - STATION
P.C.P.P. - PERFORATED CORRUGATED PLASTIC PIPE
N.P.C.P.P. - NON-PERFORATED CORRUGATED PLASTIC PIPE
SPA. - SPACE(D)
EQ. - EQUAL
TYP. - TYPICAL
E.F. - EACH FACE
F.F. - FRONT FACE
B.F. - BACK FACE

NOTES:

1.) FOR ADDITIONAL REINFORCED CONCRETE APPROACH SLAB DETAILS, SEE STD. DWG. AS-1-81.

2.) FOR REINFORCING STEEL LIST, SEE STRUCTURE SHEET NO. 13/13 .

3.) 2" REBAR CLEARANCE, UNLESS OTHERWISE SHOWN.

4.) POROUS BACKFILL WITH FILTER FABRIC, 2 FEET THICK SHALL EXTEND UP TO THE PLANE OF THE SUBGRADE, TO 1 FOOT BELOW THE EMBANKMENT SURFACE, AND LATERALLY TO THE ENDS OF THE WINGWALLS.

5.) ALL DOWEL BAR DEPTHS SHALL BE 1'-0" MINIMUM. DOWEL BAR DEPTHS FOR THE A501 & A502 BARS VARY. SEE THE ELEVATION VIEW DETAILS.

6.) APPLY ITEM 512, TYPE 2 WATERPROOFING, 3'-0" WIDE CENTERED ON THE JOINT FOR THE PHASE CONST. JOINT AND HORIZONTAL CONST. JOINT.

7.) PLACE RAILING POST ANCHOR PLATE AND BOLTS IN WINGWALL, FROM SCD TST-1-99, PRIOR TO POURING THE ABUTMENT CONCRETE.

8.) FOR SECTIONS A-A, B-B AND DETAILS A AND B, SEE STRUCTURE SHEET NO. 6/13 .

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

DESIGNED	DRAWN	REVIEWED	DATE
KAH	KAH	SAL	01-04-05
CHECKED	REVISED	STRUCTURE FILE NUMBER	
JPB		3401537	

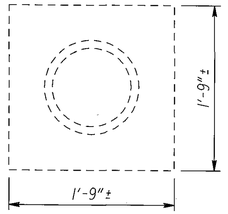
FORWARD ABUTMENT DETAILS

BRIDGE NO. HAS-250-0214
OVER PLUM RUN

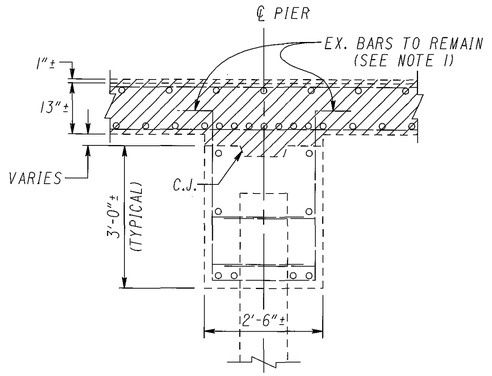
HAS-250-2.11
PID 21867

8/13

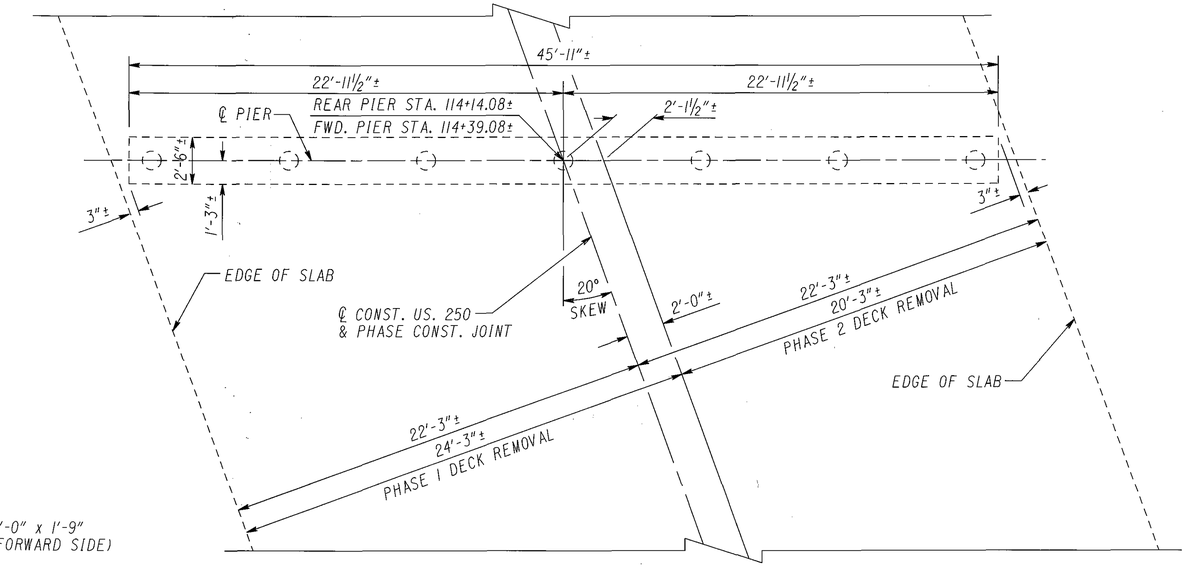
27/32



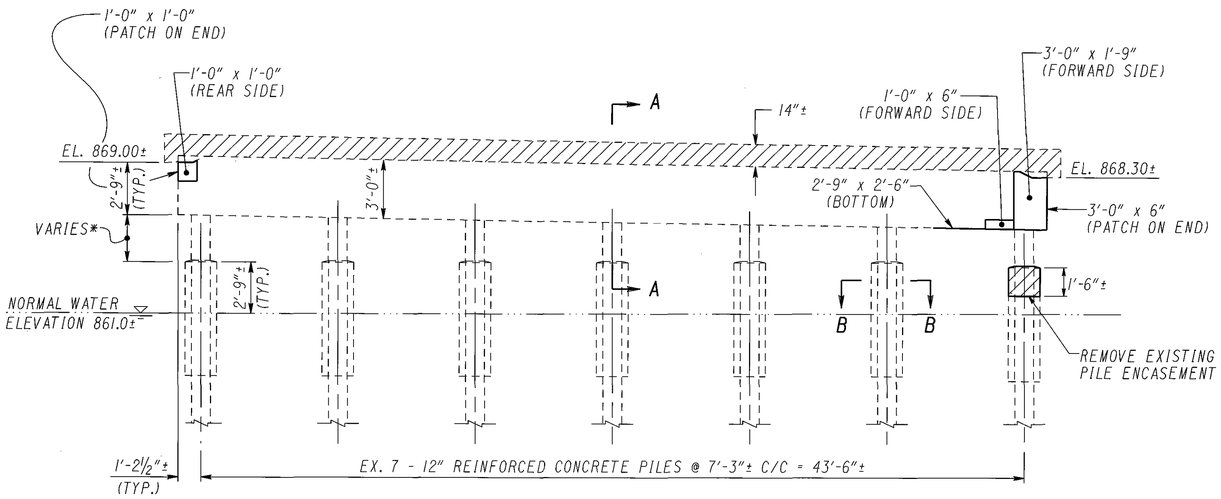
SECTION B-B



SECTION A-A

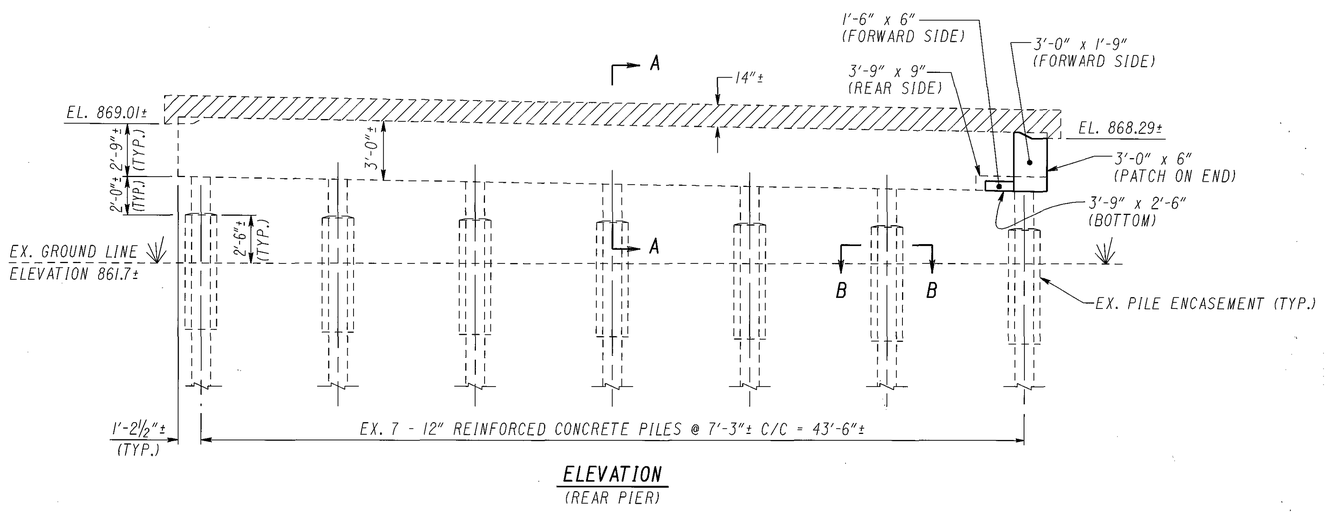


PLAN
(REAR PIER SHOWN, FORWARD SIMILAR)



ELEVATION
(FORWARD PIER)

* FROM 2'-6"± LT. SIDE TO 2'-0" RT. SIDE



ELEVATION
(REAR PIER)

NOTES:

1.) DO NOT CUT, REMOVE, OR DAMAGE THESE BARS. DOWELLING IS PROHIBITED UNLESS APPROVED BY DESIGN ENGINEER.

PORTIONS OF STRUCTURE REMOVED

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

DESIGNED	DRAWN	REVIEWED	DATE
KAH	KAH	SAL	01-04-05
CHECKED	REVISED	STRUCTURE FILE NUMBER	
JPB		340537	

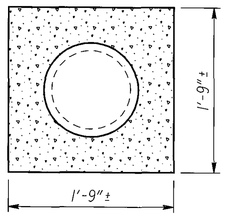
PIER DETAILS - EXISTING

BRIDGE NO. HAS-250-0214
OVER PLUM RUN

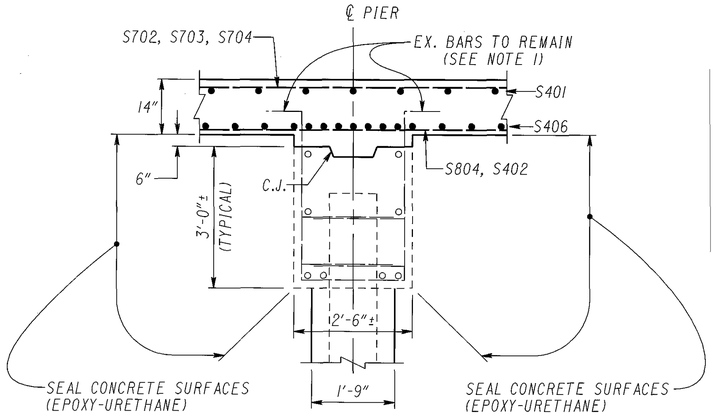
HAS-250-2.11
PID 21867

9/13

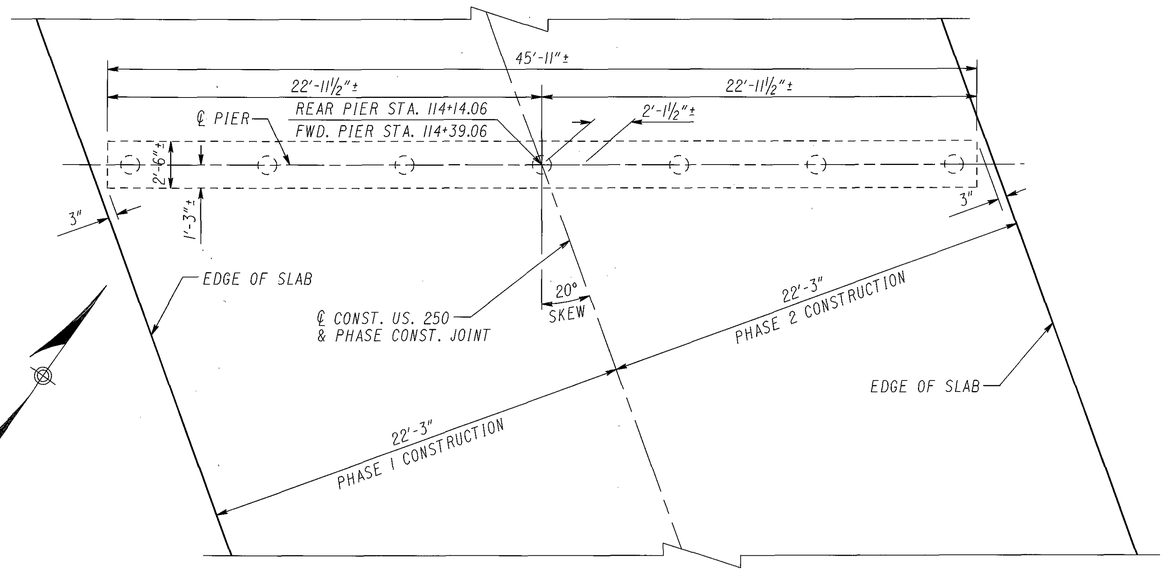
28/32



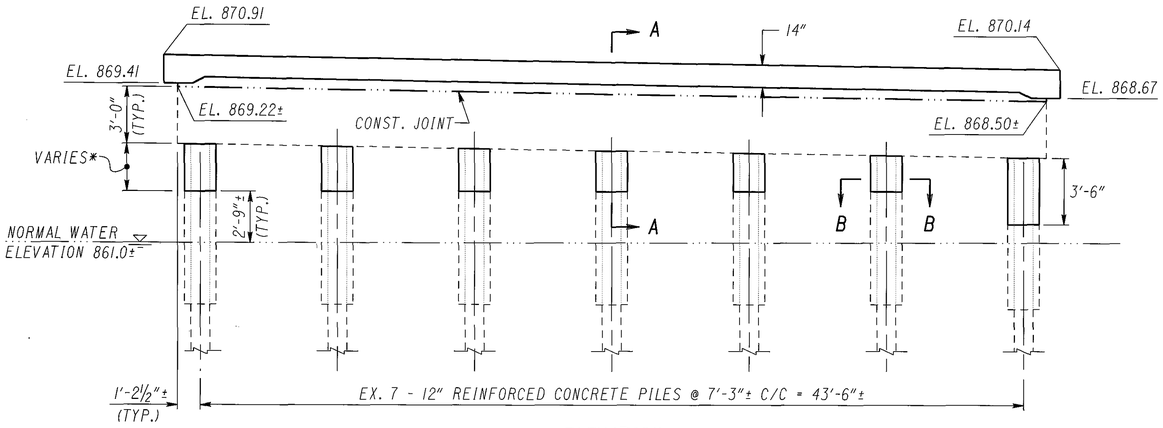
SECTION B-B



SECTION A-A

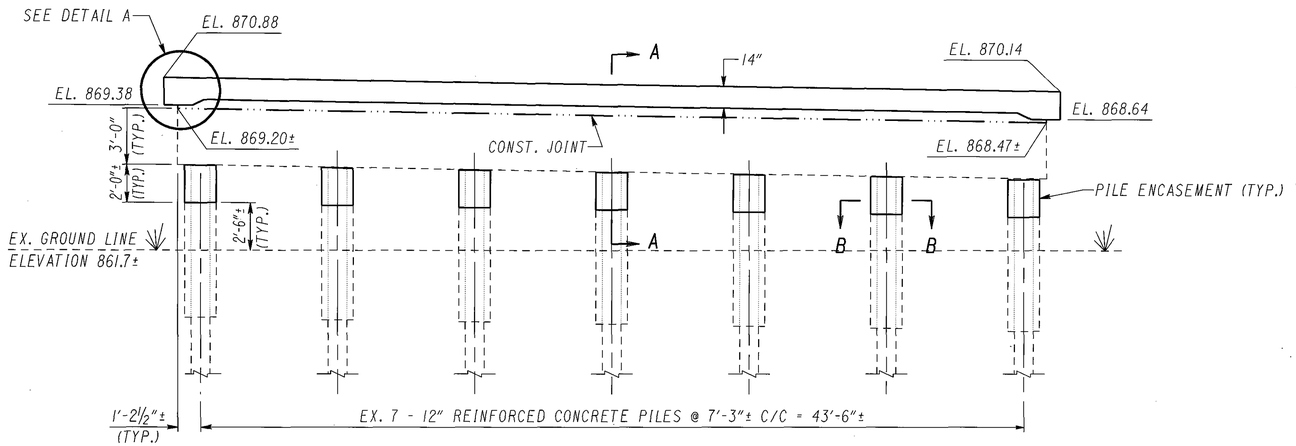


PLAN
(REAR PIER SHOWN, FORWARD SIMILAR)

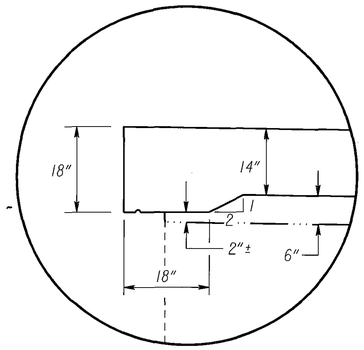


ELEVATION
(FORWARD PIER)

* FROM 2'-6"± LT. SIDE TO 2'-0" RT. SIDE



ELEVATION
(REAR PIER)



DETAIL A

NOTES:

1.) DO NOT CUT, REMOVE, OR DAMAGE THESE BARS. DOWELLING IS PROHIBITED UNLESS APPROVED BY DESIGN ENGINEER.

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

DESIGNED	DRAWN	REVIEWED	DATE
KAH	KAH	SAL	01-04-05
CHECKED	REVISED	STRUCTURE FILE NUMBER	
JPB		3401537	

PIER DETAILS - PROPOSED

BRIDGE NO. HAS-250-0214
OVER PLUM RUN

HAS-250-2.11
PID 21867

10/13

29/32

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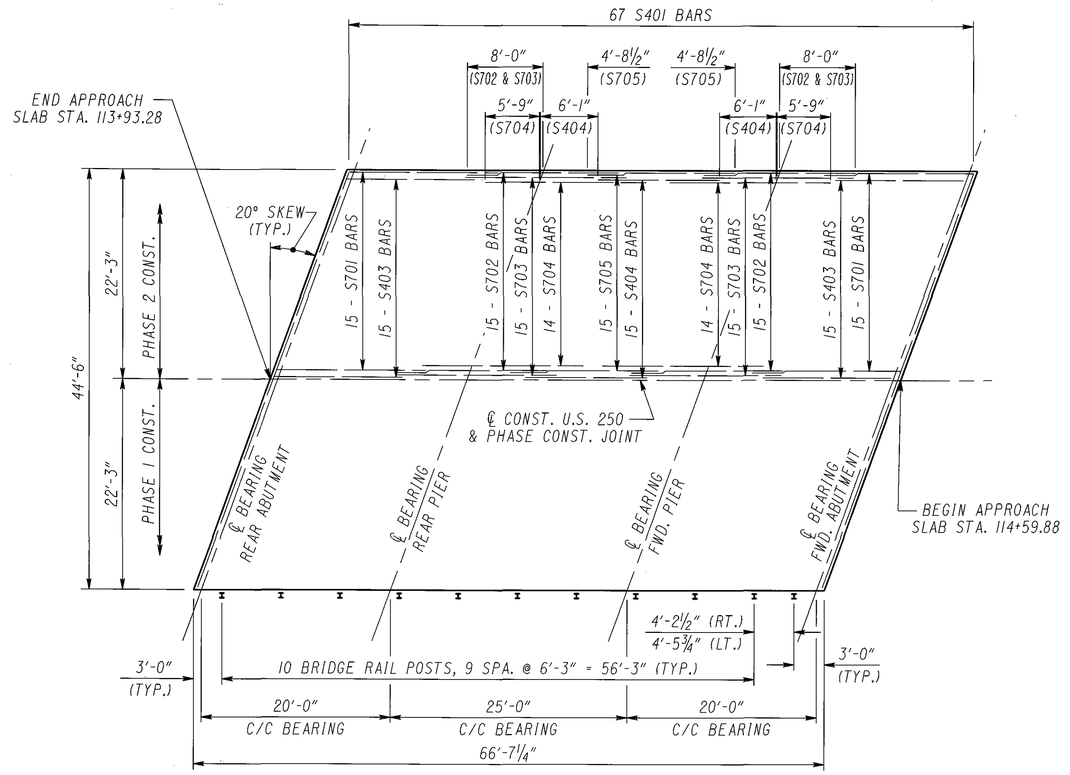
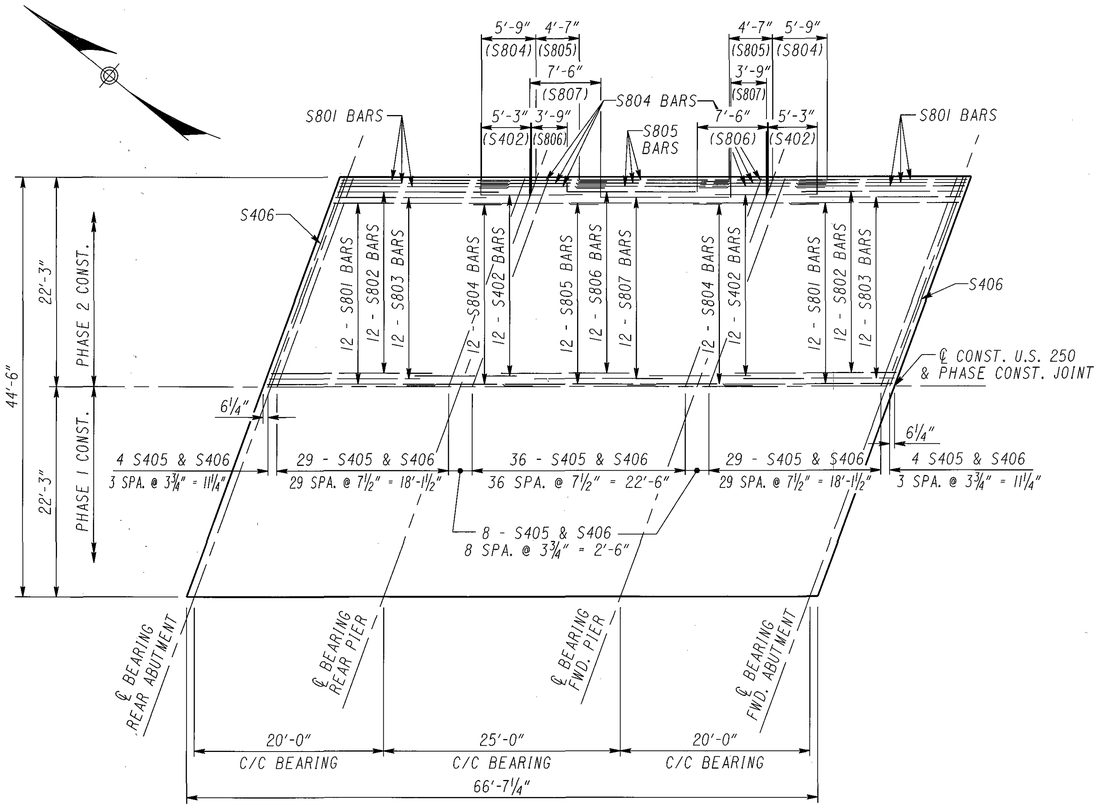


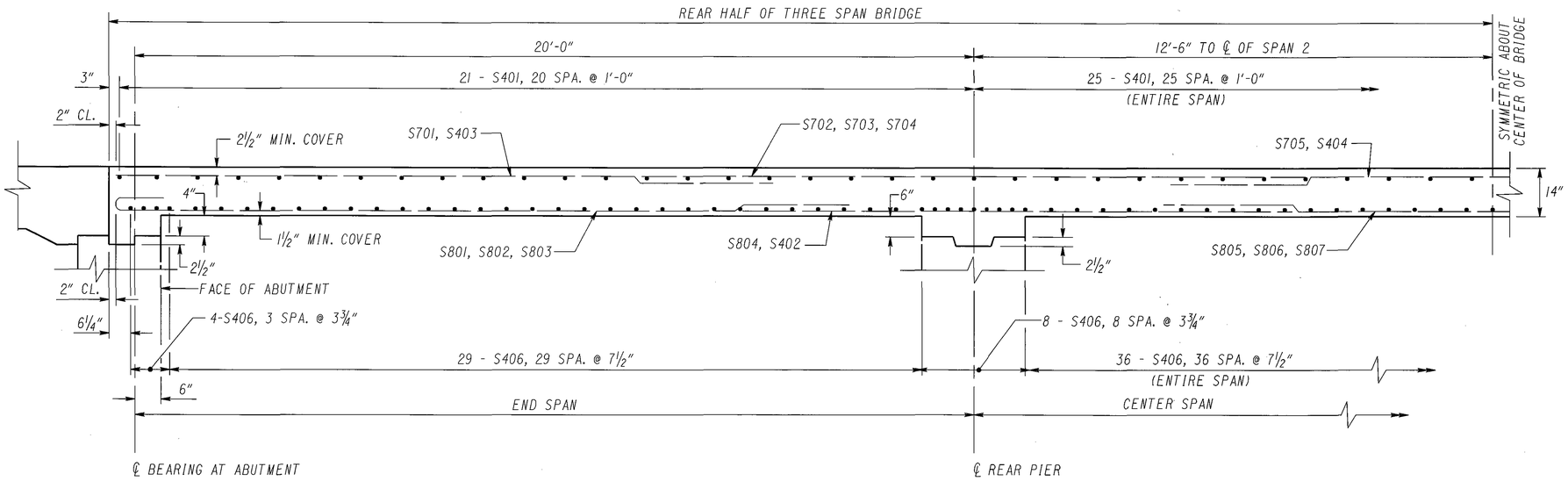
STEEL IN TOP OF SLAB

REBAR SYMMETRIC ABOUT ℄ CONSTRUCTION



STEEL IN BOTTOM OF SLAB

REBAR SYMMETRIC ABOUT ℄ CONSTRUCTION



PARTIAL LONGITUDINAL SECTION

LEGEND

SPA. - SPACES
STA. - STATION
CL. - CLEARANCE

NOTES:

1.) REINFORCING STEEL IS SYMMETRIC ABOUT THE CONSTRUCTION JOINT.

2.) LONGITUDINAL BARS SHALL BE PLACED PARALLEL TO CENTERLINE OF THE ROADWAY AND TRANSVERSE BARS PARALLEL TO PIERS AND ABUTMENTS.

3.) PLACEMENT OF CONCRETE DECK SLAB SHALL BE CONTINUOUS. CONSTRUCTION JOINTS SHALL BE PROVIDED ONLY IF A DECK POUR CANNOT BE COMPLETED DUE TO INCLEMENT WEATHER CONDITIONS. THE CONSTRUCTION JOINT SHALL CONFORM TO THE REQUIREMENTS OF CMS 511.

DESIGN AGENCY: O.D.O.T. DISTRICT 11 PRODUCTION DEPARTMENT
DESIGNED: CCW | DRAWN: CCW | REVIEWED: SAL | DATE: 01-04-05
CHECKED: JPB | REVISED: | STRUCTURE FILE NUMBER: 3401537

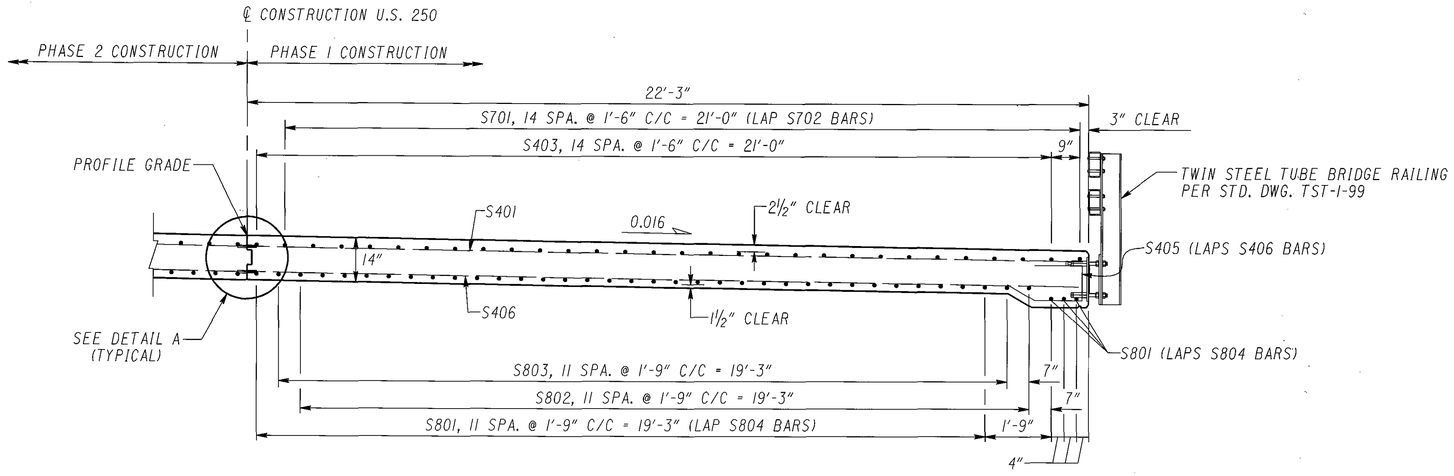
DECK SLAB DETAILS

BRIDGE NO. HAS-250-02I4
OVER PLUM RUN

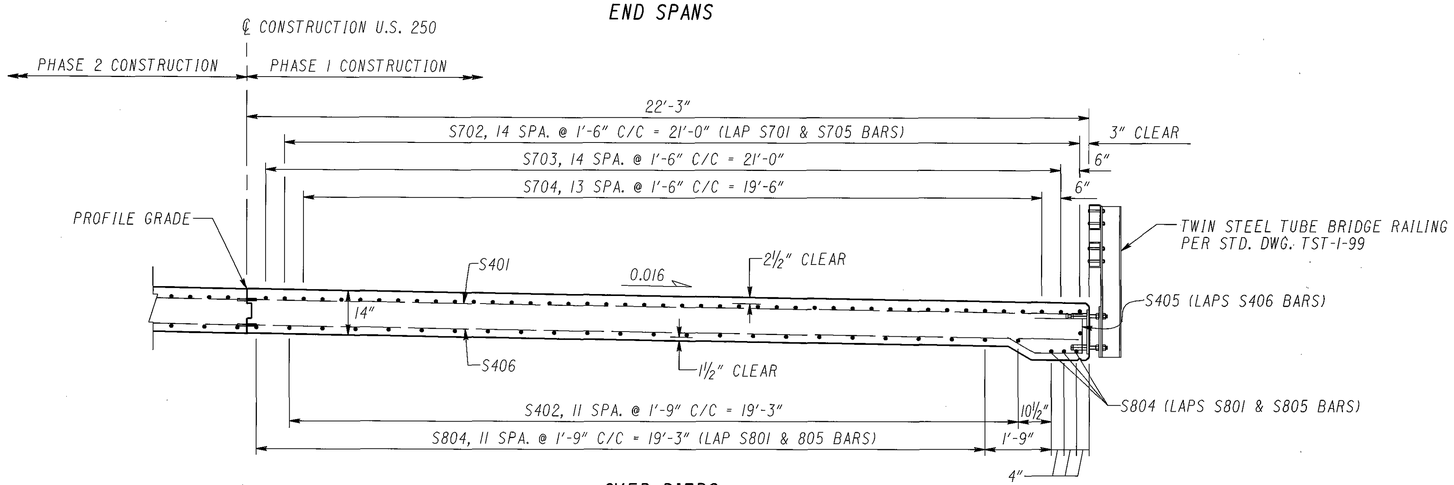
HAS-250-2.11
PID 21867

11/13

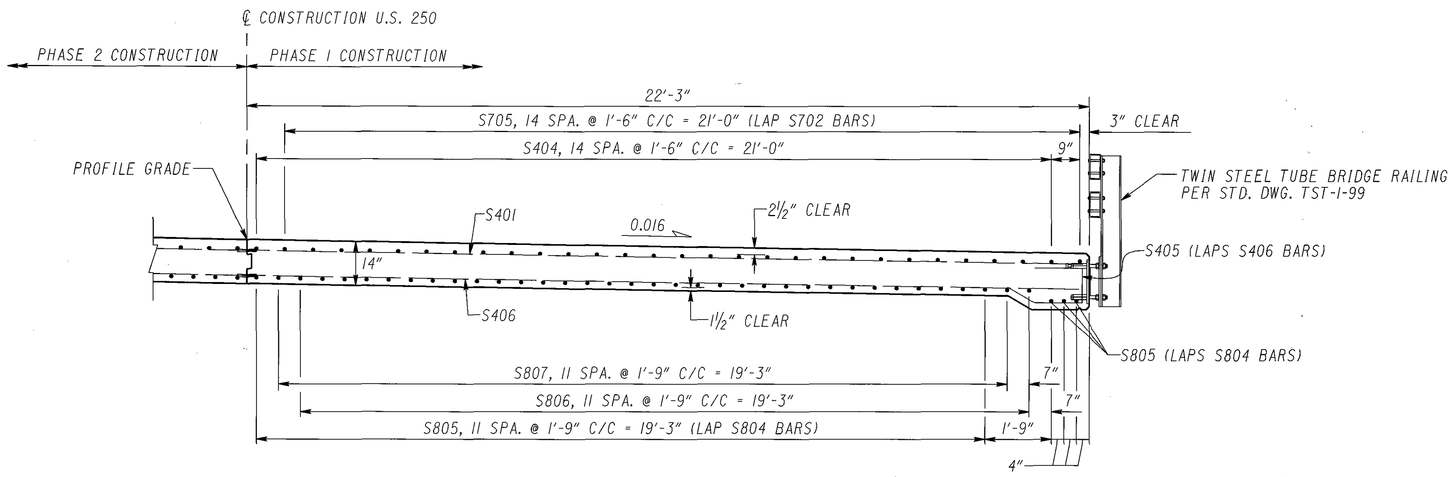
30/32



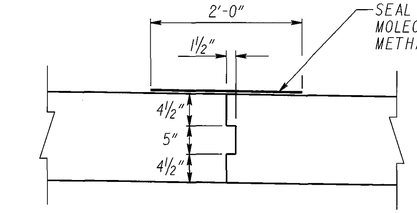
END SPANS



OVER PIERS

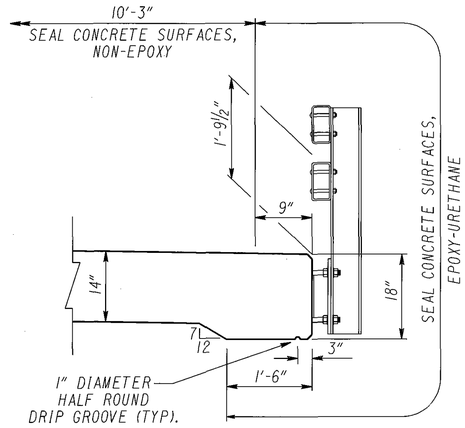


CENTER SPAN

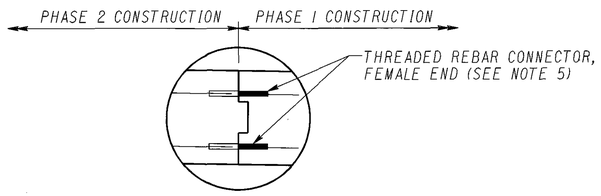


CONSTRUCTION JOINT

SEAL JOINT 2'-0" WIDE WITH HWWM TO BE INCLUDED WITH BRIDGE DECK CONCRETE FOR PAYMENT



DECK EDGE DETAIL



DETAIL A

LEGEND

SPA. - SPACES
C/C - CENTER TO CENTER

NOTES:

1.) *FOR REINFORCING STEEL LIST, SEE STRUCTURE SHEET NO. 13/13.*

2.) *THE NON-EPOXY SEALER CAN BE APPLIED 28 DAYS AFTER THE CONCRETE POUR BUT NO LATER THAN NOVEMBER 1st.*

3.) *THE REINFORCING STEEL IS SYMMETRIC ABOUT THE CONSTRUCTION JOINT.*

4.) *EDGE BEAM OPTION : IN LIEU IF FORMING AN EDGE BEAM, THE CONTRACTOR MAY FURNISH AN 18" SLAB OR A SLAB VARYING IN THICKNESS FROM 18" AT THE EDGE TO 14" AT THE CENTER OF THE ROADWAY AT NO ADDITIONAL COST TO THE STATE.*

5.) *MECHANICAL REINFORCING STEEL CONNECTORS SHALL BE CAPABLE OF DEVELOPING 125% OF THE YIELD STRENGTH OF THE REINFORCING BAR.*

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

DESIGNED	DRAWN	REVIEWED	DATE
CCW	CCW	SAL	01-04-05
CHECKED	REVISED	STRUCTURE FILE NUMBER	
JPB		3401537	

DECK DETAILS-TRANSVERSE SECTION

BRIDGE NO. HAS-250-0214
OVER PLUM RUN

HAS-250-2.11
PID 21867

12/13

31/32

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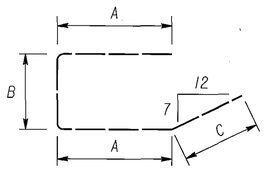
EPOXY COATED REINFORCING STEEL LIST

MARK	NUMBER PHASE 1	NUMBER PHASE 2	TOTAL	LENGTH	WEIGHT	TYPE	DIMENSION A	DIMENSION B	DIMENSION C	DIMENSION INC.
SUPERSTRUCTURE :										
*S401	67	67	134	23'-6"	2104	STR.				
S402	24	24	48	10'-9"	345	STR.				
S403	30	30	60	14'-4"	574	STR.				
S404	15	15	30	12'-10"	257	STR.				
S405	118	118	236	4'-1"	644	1	1'-3"	11"	10"	
*S406	118	118	236	23'-6"	3705	STR.				
S701	30	30	60	15'-9"	1932	STR.				
S702	30	30	60	16'-0"	1962	STR.				
S703	30	30	60	17'-0"	2085	STR.				
S704	28	28	56	17'-0"	1946	STR.				
S705	15	15	30	15'-7"	956	STR.				
S801	30	30	60	17'-8"	2830	STR.				
S802	24	24	48	17'-0"	2179	STR.				
S803	24	24	48	15'-11"	2040	2	14'-9"			
S804	30	30	60	13'-3"	2123	STR.				
S805	15	15	30	15'-10"	1268	STR.				
S806	12	12	24	13'-9"	881	STR.				
S807	12	12	24	13'-9"	881	STR.				
SUB-TOTAL FOR SUPERSTRUCTURE					28,712					

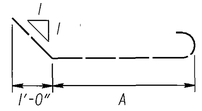
MARK	NUMBER PHASE 1 REAR	NUMBER PHASE 1 FORWARD	NUMBER PHASE 2 REAR	NUMBER PHASE 2 FORWARD	TOTAL	LENGTH	WEIGHT	TYPE	DIMENSION A	DIMENSION B	DIMENSION C	DIMENSION INC.
SUBSTRUCTURE :												
A501	34	34	- -	- -	68	4'-11½"	352	3	2'-1"	3'-0"		
A502	- -	- -	32	32	64	5'-3½"	353	3	2'-1"	3'-4"		
A503	7	7	- -	- -	14	6'-2½"	91	3	2'-1"	4'-3"		
A504	- -	- -	7	7	14	6'-11½"	102	3	2'-1"	5'-0"		
*A505	4	4	- -	- -	8	27'-7"	230	STR.				
*A506	- -	- -	4	4	8	25'-9"	215	STR.				
A507	2	2	2	2	8	3'-3"	27	STR.				
A508	2	2	2	2	8	2'-4"	19	STR.				
*A1001	4	4	- -	- -	8	27'-7"	950	STR.				
*A1002	- -	- -	4	4	8	25'-9"	886	STR.				
D801	17	17	16	16	66	5'-5"	955	4	3'-1½"			
SUB-TOTAL SUBSTRUCTURE :							4180					
TOTAL WEIGHT							32,892					

* - REQUIRES MECHANICAL CONNECTOR

BENDING DIAGRAM



TYPE 1



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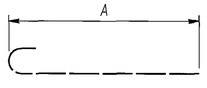

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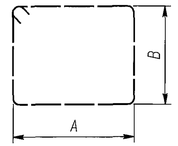

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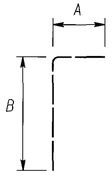


TYPE 3

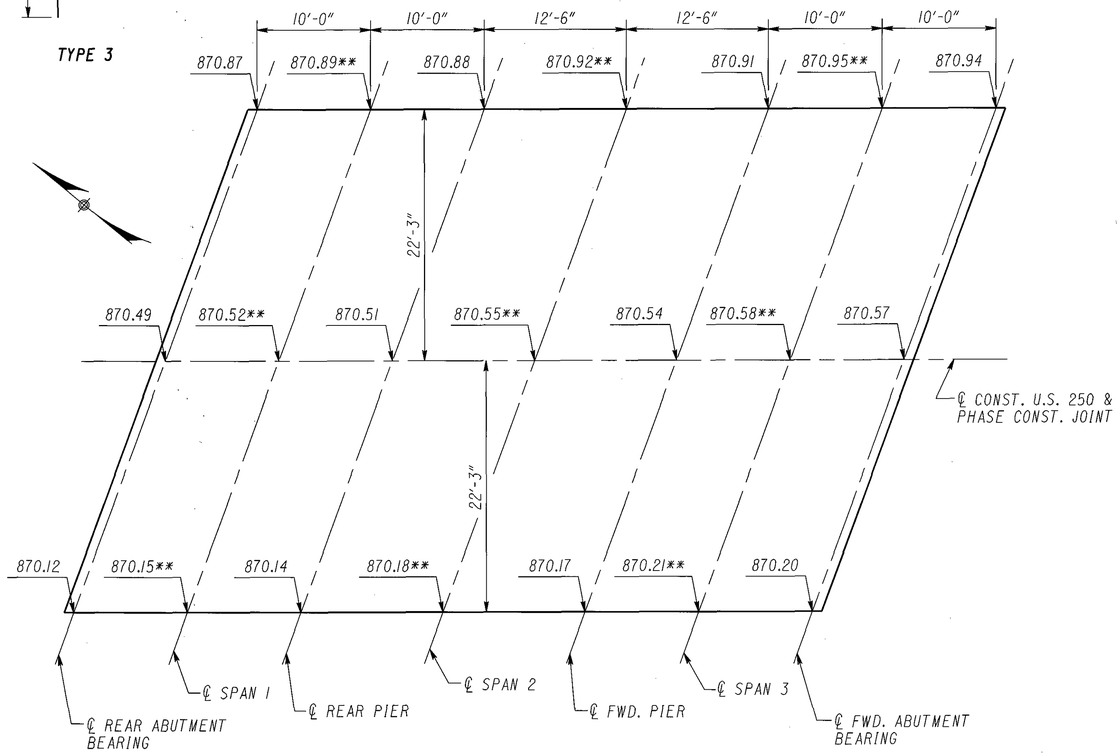
REINFORCING STEEL NOTES :

1. THE BAR SIZE NUMBER IS SPECIFIED ON THE PLANS IN THE BAR MARK COLUMN. THE FIRST DIGIT WHERE THREE DIGITS ARE USED, AND THE FIRST TWO DIGITS WHERE FOUR ARE USED, INDICATES THE BAR SIZE NUMBER. FOR EXAMPLE, S501 IS A NO. 5 BAR. BAR DIMENSIONS SHOWN ARE OUT TO OUT UNLESS OTHERWISE NOTED. R INDICATES INSIDE RADIUS, UNLESS OTHERWISE NOTED.
2. ALL REINFORCING STEEL SHALL BE EPOXY COATED.
3. "STR" IN THE TYPE COLUMN INDICATES STRAIGHT BARS.
4. ALL DIMENSIONS ARE OUT TO OUT.
5. REFER TO C.M.S. SECTION 509.05 FOR STANDARD BEND DIMENSIONS.
6. ALL REINFORCING STEEL CLEARANCES ARE 2" UNLESS OTHERWISE NOTED.
7. * - REQUIRES MECHANICAL CONNECTOR

MECHANICAL CONNECTORS :

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

NO. 4 REINFORCING BAR L = 2'-11"
NO. 5 REINFORCING BAR L = 3'-7"
NO. 10 REINFORCING BAR L = 11'-3"



SCREED ELEVATIONS

SCREED ELEVATIONS NOTES :

1.) THE SCREED ELEVATIONS SHOWN ARE FOR THE SURFACE OF THE DECK PRIOR TO CONCRETE PLACEMENT. ALLOWANCE HAS BEEN MADE FOR THE ANTICIPATED CALCULATED DEAD LOAD DEFLECTION OF THE CONCRETE. ADDITIONALLY, ELEVATIONS MARKED WITH ** SHALL BE ADJUSTED UPWARDS TO COMPENSATE FOR THE ANTICIPATED DEFLECTION OF THE FALSEWORK DUE TO THE WEIGHT OF THE CONCRETE DECK.

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

DESIGNED CCW | DRAWN CCW | CHECKED JPB | REVISED | REVIEWED SAL | DATE 01-04-05 | STRUCTURE FILE NUMBER 3401537

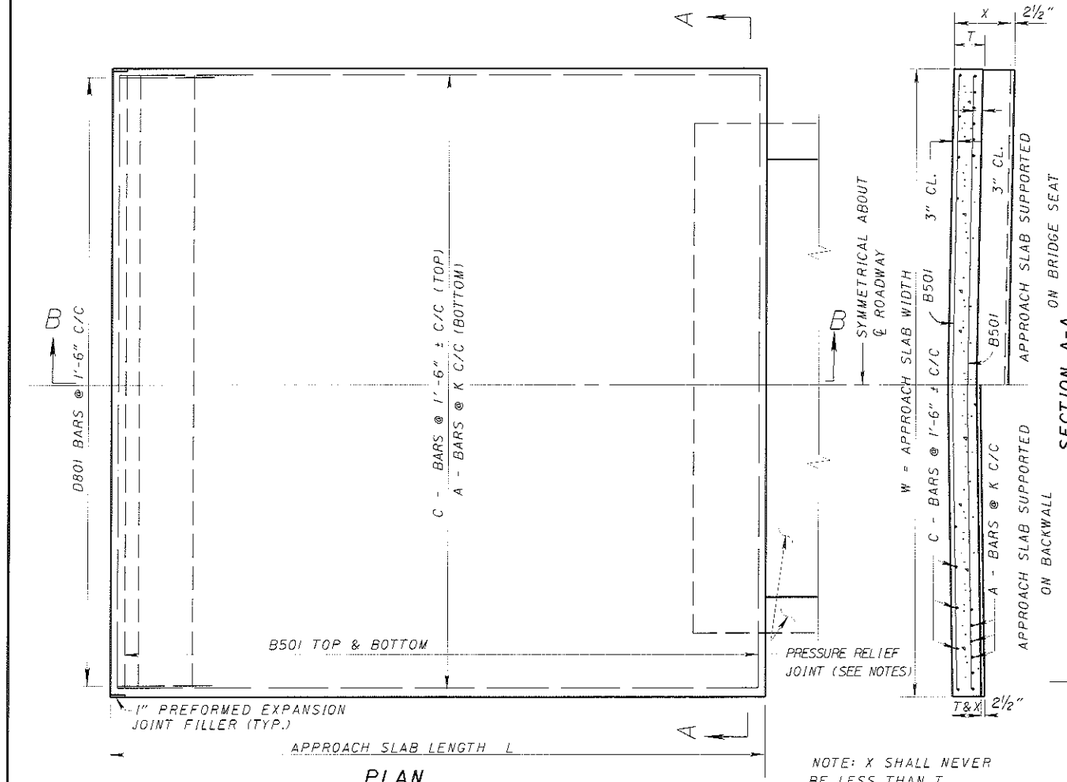
REINFORCING STEEL LIST & SCREED ELEVATIONS

BRIDGE NO. HAS-250-0214 OVER PLUM RUN

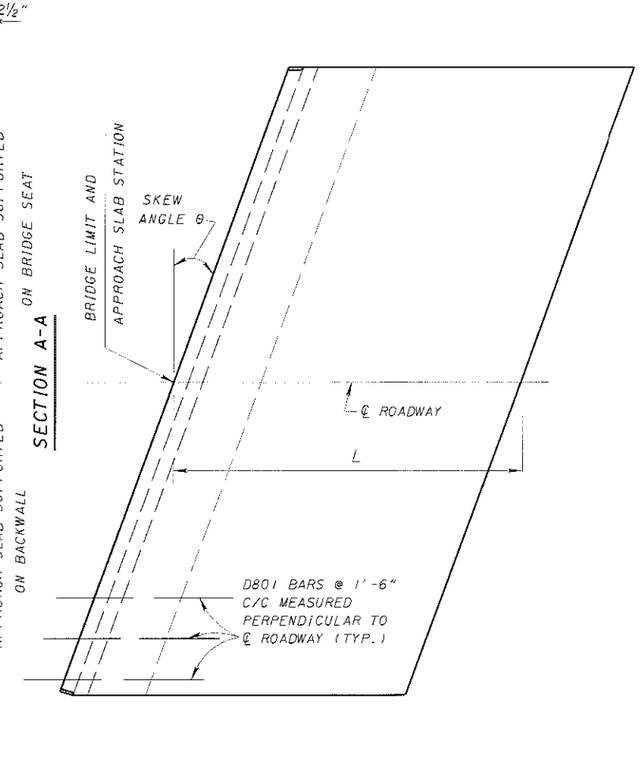
HAS-250-2.11
PID 21867

13/13

32/32

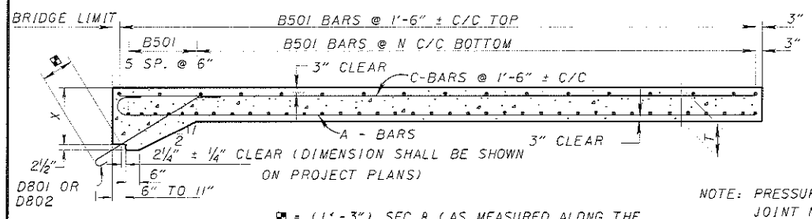


PLAN



SECTION A-A

NOTE: X SHALL NEVER BE LESS THAN T



■ = (1'-3") SEC θ (AS MEASURED ALONG THE LENGTH OF THE D801 OR D802 BAR)

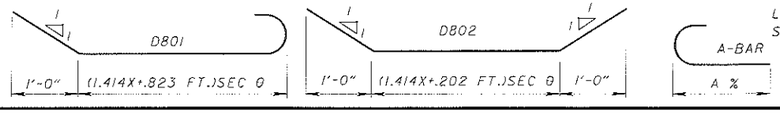
NOTE: PRESSURE RELIEF JOINT NOT SHOWN

SECTION B-B

REINFORCING STEEL (FOR ONE APPROACH SLAB)

LENGTH L	THICKNESS T	A-BARS					B501 (BOTTOM)			B501 (TOP)		C-BARS			D801 OR D802
		SP'C'G K	MARK	LENGTH	DIMENSION A	NO. REQ'D.	* LENGTH	SP'C'G N	NO. REQ'D.	* LENGTH	NO. REQ'D.	MARK	LENGTH	NO. REQ'D.	NO. REQ'D.
15'-0"	12"	10"	A1001	15'-11"	14'-6"	$\frac{W-0.5}{12}\frac{}{K}+1$	(W-0.5)sec θ	9"	22	(W-0.5)sec θ	11	C501	14'-6"	$\frac{W-0.5}{12}\frac{}{18}+1$	$\frac{W-0.5}{12}\frac{}{18}+1$
20'-0"	13"	7½"	A1002	20'-11"	19'-6"			8"	31		14	C502	19'-6"		
25'-0"	15"	7"	A1003	25'-11"	24'-6"			8"	39		18	C503	24'-6"		
30'-0"	17"	6½"	A1004	30'-11"	29'-6"			8½"	44		21	C504	29'-6"		

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



APPROACH SLAB FOR SKEWED STRUCTURE

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

THE D801 OR D802 ANCHOR BARS SHALL BE DIMENSIONED IN THE CONTRACT PLANS AND INCLUDED WITH ITEM 509 FOR PAYMENT FOR EACH SPECIFIC BRIDGE. D801 BARS CANNOT BE USED AS SHOWN IF APPROACH SLABS ARE SUPPORTED ON BACKWALLS LESS THAN 14 INCHES THICK. D802 BARS SHALL BE USED ON PRESTRESSED CONCRETE BOX BEAM BRIDGES WITH APPROACH SLABS SUPPORTED ON BACKWALLS 11 INCHES THICK.

D801 BARS CANNOT BE USED AS SHOWN WHERE APPROACH SLABS ARE SUPPORTED ON BACKWALLS LESS THAN 14 INCHES THICK. D802 BARS SHALL BE USED ON PRESTRESSED CONCRETE BOX BEAM BRIDGES WHERE THE APPROACH SLAB IS SUPPORTED ON AN 11 INCH THICK BACKWALL.

* AT THE OPTION OF THE CONTRACTOR AND AT NO ADDITIONAL COST TO THE STATE, B501 BARS MAY BE LAPPED 2'-6" MINIMUM AT THE CENTERLINE OF ROADWAY, OR WHERE REQUIRED FOR LONGITUDINAL CONSTRUCTION JOINTS, IN LIEU OF PROVIDING FULL LENGTH BARS AS SHOWN.

DESIGN SPECIFICATIONS: THIS STANDARD DRAWING CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1996, INCLUDING THE 1997, 1998 & 1999 INTERIM SPECIFICATIONS AND THE ODOT BRIDGE DESIGN MANUAL.

DESIGN DATA:

DESIGN LOADING: DEAD LOAD - 60 LB/FT² (F.W.S.)
LIVE LOAD - HS25 AND THE ALTERNATE MILITARY LOADING.

CONCRETE - COMPRESSIVE STRENGTH = 4500 PSI.

REINFORCING STEEL - MIN. YIELD STRENGTH = 60,000 PSI.

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

LONGITUDINAL CONSTRUCTION JOINTS REQUIRED FOR STAGE CONSTRUCTION SHALL BE ACCORDING TO 511.12.

CURBS, BRIDGES WITH SIDEWALKS : FOR BRIDGES CONSTRUCTED WITH RAISED SIDEWALKS, DEFLECTOR PARAPETS OR OTHER TYPES OF CONSTRUCTION WHICH RETAIN ROADWAY SURFACE DRAINAGE, THE APPROACH SLABS SHALL EITHER INCLUDE INTEGRAL CURBS OR BE CONSTRUCTED IN CONJUNCTION WITH BRIDGE CURBS. CURB HEIGHT SHALL BE TRANSITIONED UNIFORMLY BETWEEN BRIDGE CURB HEIGHT AND ROADWAY CURB HEIGHT IN A LENGTH AS FOLLOWS: WHERE WINGWALL EXTENDS BEYOND END OF APPROACH SLAB, USE A MINIMUM LENGTH OF 10 FEET BEYOND END OF WINGWALL. WHERE THE APPROACH SLAB EXTENDS BEYOND THE END OF WINGWALL, TRANSITION IN THIS LENGTH. HOWEVER, THE TRANSITION LENGTH SHALL NOT BE LESS THAN 10 FEET AND THE TRANSITION SHALL EXTEND BEYOND THE END OF APPROACH SLAB IF NECESSARY.

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

APPROACH SLAB LENGTH (L): THE LENGTH SHOULD BE BASED ON FACTORS SUCH AS THE SIZE AND AMOUNT OF EXCAVATION BEHIND THE ABUTMENTS, NEW OR EXISTING EMBANKMENTS AND SKEW OF THE BRIDGE. THE LENGTH SHALL BE SHOWN ON THE PROJECT PLANS.

DECK CROWN AND SLOPE: THE LOCATION OF THE CROWN POINT AND THE RATE OF CROSS SLOPE ON THE APPROACH SLAB SHALL CONFORM TO THAT OF THE BRIDGE DECK AND APPROACH PAVEMENT. IF THE RATE OF CROSS SLOPE OF THE BRIDGE DECK DIFFERS FROM THAT OF THE APPROACH PAVEMENT, A SMOOTH TRANSITION SHALL BE PROVIDED WITHIN THE LIMITS OF THE APPROACH SLAB WHENEVER POSSIBLE.

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

PRESSURE RELIEF JOINTS: RELIEF JOINTS, TYPE A, ARE TO BE PROVIDED REGARDLESS OF ABUTMENT DESIGN AT ALL BRIDGE APPROACHES WHERE APPROACH PAVEMENT IS RIGID, OR COMPOSITE CONSISTING OF A RIGID BASE. SEE STANDARD CONSTRUCTION DRAWING BP-2.3 FOR DETAILS

BASIS OF PAYMENT: IN ADDITION TO THE INCIDENTAL ITEMS LISTED IN 526.08, THE DEPARTMENT WILL INCLUDE THE FOLLOWING ITEMS FOR PAYMENT: THE PREFORMED EXPANSION JOINT FILLER AND JOINT SEALER AT THE CORNERS AND SIDES OF THE APPROACH SLAB; AND THE TYPE "A" WATERPROOFING AND THE PREFORMED ELASTOMERIC COMPRESSION JOINT SEAL AT THE BRIDGE LIMIT END OF THE APPROACH SLAB.

THE DEPARTMENT WILL PAY FOR THE PRESSURE RELIEF JOINTS AND ANCHOR BARS (D801 OR D802) SEPARATELY.

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

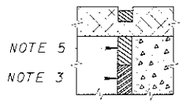
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ENGINEER OF BRIDGES
10-25-94
DATE

REVISIONS	DESIGNED	CHECKED	REVIEWED
9-15-94	JFF	JAM	LMW
04-20-01	DRAWN		
07-19-02	JFF		

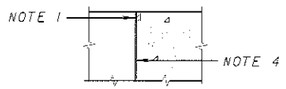
AS-1-81

STANDARD
REINFORCED CONCRETE APPROACH SLAB

1 / 3



DETAIL A



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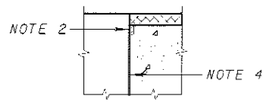

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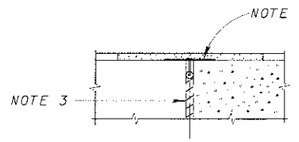

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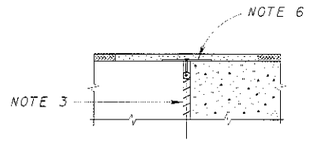

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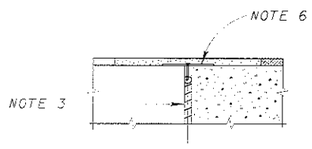
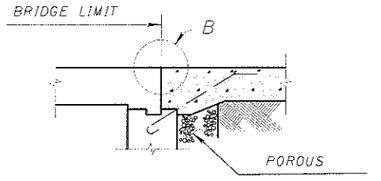
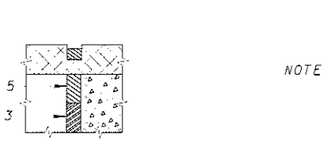


DETAIL F



ON SLAB BRIDGES

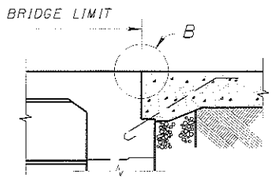
CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB



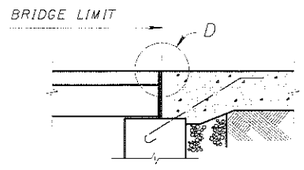
ON PRESTRESSED CONCRETE BOX BEAM BRIDGES ◆

APPROACH SLAB SUPPORTED ON ABUTMENT BACKWALL

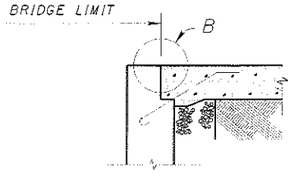
ASPHALT CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB



ON BRIDGES WITH INTEGRAL CONSTRUCTION
(SEMI-INTEGRAL SIMILAR)

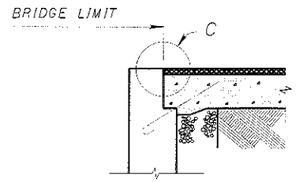


ON PRESTRESSED CONCRETE BOX BEAM BRIDGES ◆



APPROACH SLAB SUPPORTED ON ABUTMENT BACKWALL

CONCRETE WEARING SURFACE ON BRIDGE DECK AND APPROACH SLAB



APPROACH SLAB SUPPORTED ON ABUTMENT BACKWALL

ON PRESTRESSED CONCRETE BOX BEAM BRIDGES ◆

CONCRETE WEARING SURFACE ON BRIDGE DECK ONLY

◆ - THE APPROACH SLAB SEAT FOR THIS PRESTRESSED CONCRETE BOX BEAM BRIDGE IS SHOWN AT THE SAME ELEVATION AS THE BEAM SEAT. HOWEVER, IT MAY ACTUALLY BE HIGHER OR LOWER THAN THE BEAM SEAT DEPENDING ON THE BOX BEAM DEPTH.

NOTE 1: PREFORMED ELASTOMERIC COMPRESSION JOINT SEAL, 705.11 (1¼" WIDE FOR A ½" WIDE GROOVE) PLACED IN ½" x 2¼" GROOVE.

NOTE 2: PREFORMED ELASTOMERIC COMPRESSION JOINT SEAL, 705.11 (1¼" WIDE FOR A ½" WIDE GROOVE) PLACED IN ½" x 2⅛" GROOVE.

NOTE 3: 1" PREFORMED EXPANSION JOINT FILLER, 705.03.

NOTE 4: TYPE "A" WATERPROOFING.

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

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

TYPE "A" WATERPROOFING SHALL NOT EXTEND ABOVE THE BOTTOM OF THE GROOVE INTO WHICH THE PREFORMED ELASTOMERIC COMPRESSION JOINT SEAL IS TO BE PLACED. IT SHALL BE APPLIED TO THE ENTIRE AREA OF THE ABUTMENT OR SUPERSTRUCTURE WHICH COMES INTO CONTACT WITH THE APPROACH SLAB.

FOR PRESTRESSED CONCRETE BOX BEAM BRIDGES WITH ASPHALT CONCRETE ON BOTH BRIDGE DECK AND APPROACH SLAB, THE TOP OF APPROACH SLAB AT THE BRIDGE END SHALL BE CONSTRUCTED TO THE LEVEL OF THE TOP OF THE BEAMS TO FACILITATE WATERPROOFING OF THE JOINT. THE THICKNESS OF ASPHALT CONCRETE AT THE APPROACH END OF THE SLAB SHALL BE THE THICKNESS OF ASPHALT CONCRETE USED ON THE ROADWAY PAVEMENT. THE THICKNESS OF ASPHALT CONCRETE SHALL VARY UNIFORMLY, IF NECESSARY, IN THE LENGTH OF THE APPROACH SLAB. THE SUBGRADE (SUBBASE) SHALL BE GRADED TO PERMIT THE BOTTOM OF THE APROACH SLAB TO BE PARALLEL TO THE TOP.

FOR STRUCTURES WITHOUT STRIP SEAL, COMPRESSION SEAL OR POLYMER MODIFIED ASPHALT EXPANSION JOINTS, THAT HAVE AN ASPHALT CONCRETE WEARING SURFACE ON BOTH THE BRIDGE DECK AND APPROACH SLAB, EXTEND THE DECK WATERPROOFING 2'-0" BEYOND THE BRIDGE LIMITS. FOR STRUCTURES WITH STRIP SEAL AND COMPRESSION SEAL EXPANSION JOINTS, END THE DECK WATERPROOFING AT THE PRESTRESSED BOX BEAM NOTCH. FOR STRUCTURES WITH POLYMER MODIFIED ASPHALT EXPANSION JOINTS, EXTEND THE DECK WATERPROOFING TO THE CENTERLINE OF THE JOINT.

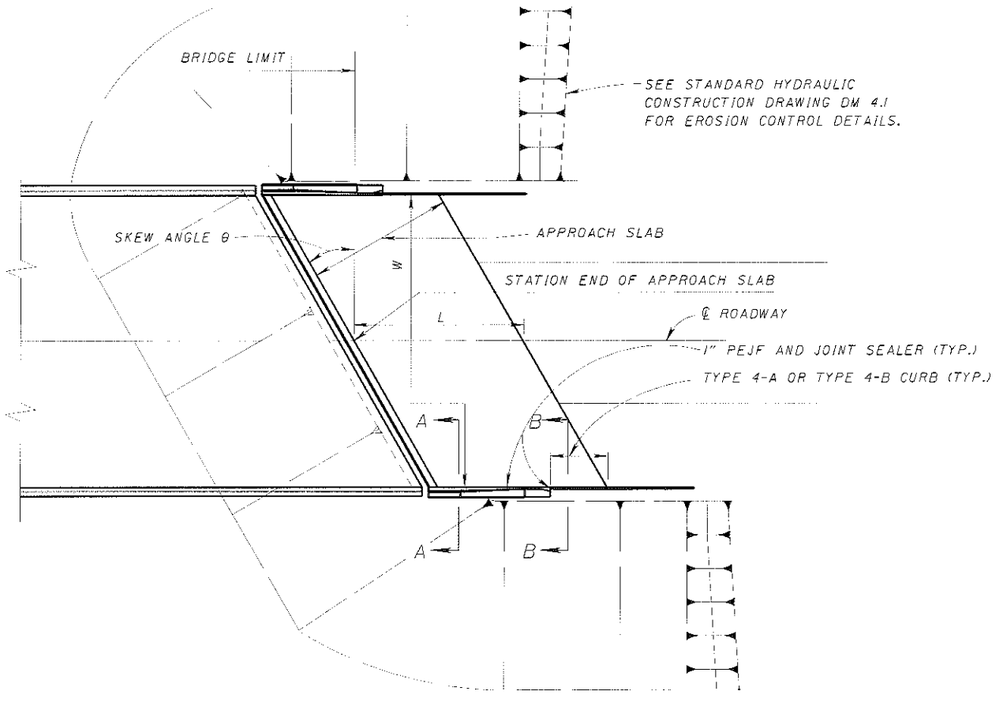
DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

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

REVISIONS
9-15-94
04-20-01
07-19-02

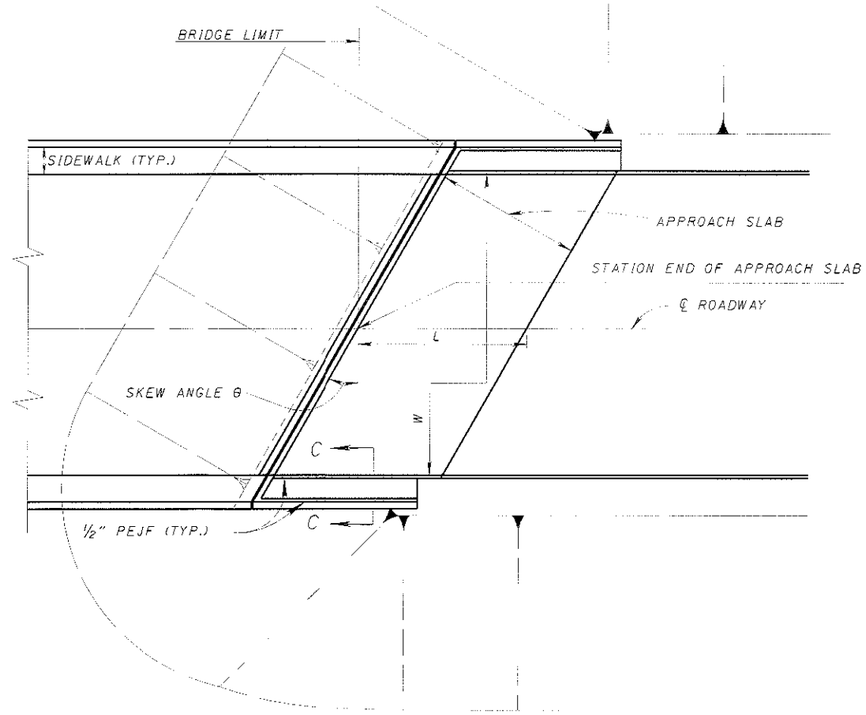
DESIGNED JFF
DRAWN JFF
CHECKED JAM
REVIEWED LMW
AS-1-81

STANDARD
REINFORCED CONCRETE
APPROACH SLAB



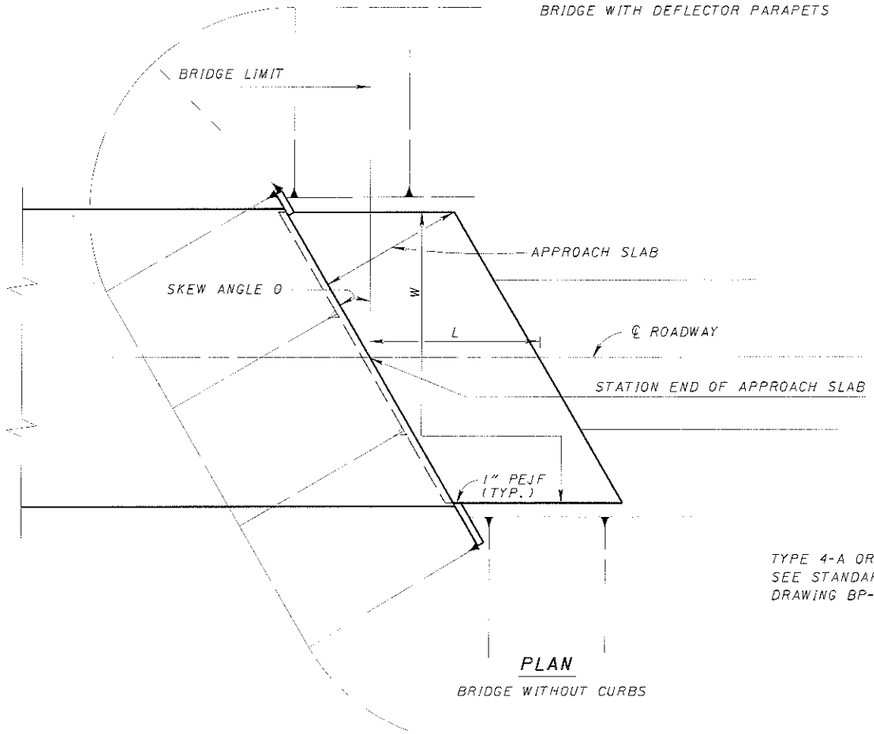
PLAN

BRIDGE WITH DEFLECTOR PARAPETS



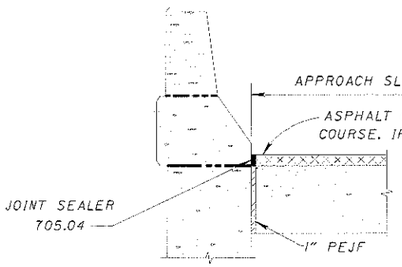
PLAN

BRIDGE WITH SIDEWALKS

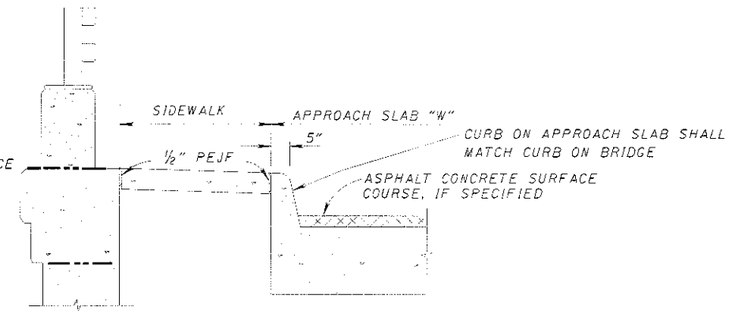


PLAN

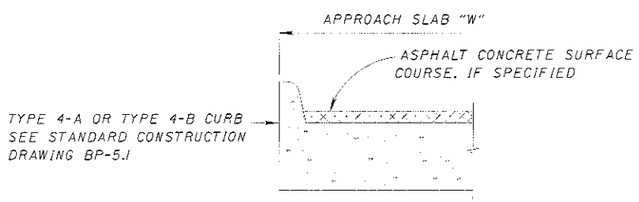
BRIDGE WITHOUT CURBS



SECTION A-A



SECTION C-C



SECTION B-B

LEGEND

W= APPROACH SLAB WIDTH,OUT TO OUT,IN FEET.

L= APPROACH SLAB LENGTH.

PEJF = PREFORMED EXPANSION JOINT FILLER.

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

ENGINEER OF BRIDGES

10-25-94
DATE

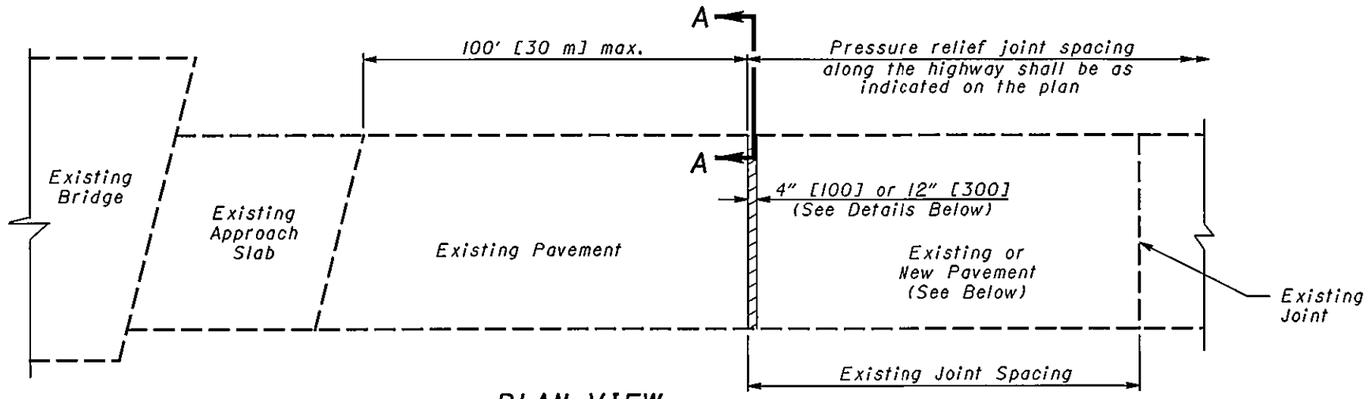
REVISIONS
9-15-94
04-20-01
07-19-02

DESIGNED JFF
DRAWN JFF
CHECKED JAM
REVIEWED LMW

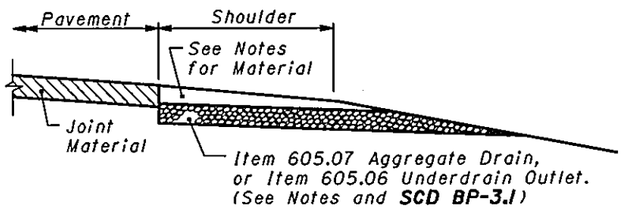
AS-1-81

STANDARD
REINFORCED CONCRETE APPROACH SLAB

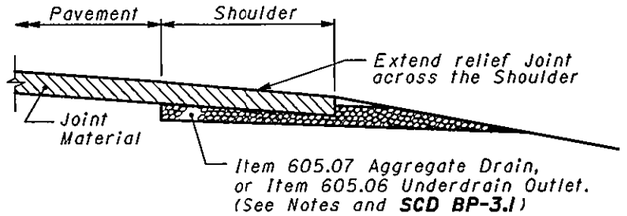
3 / 3



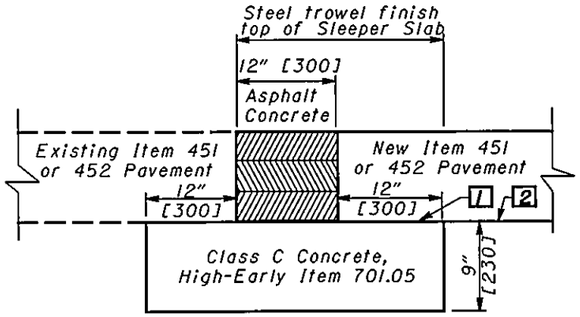
PLAN VIEW



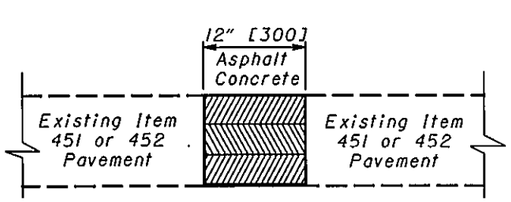
SECTION A-A
WITH ASPHALT SHOULDERS



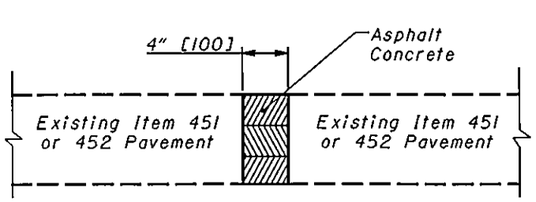
SECTION A-A
WITH CONCRETE SHOULDERS



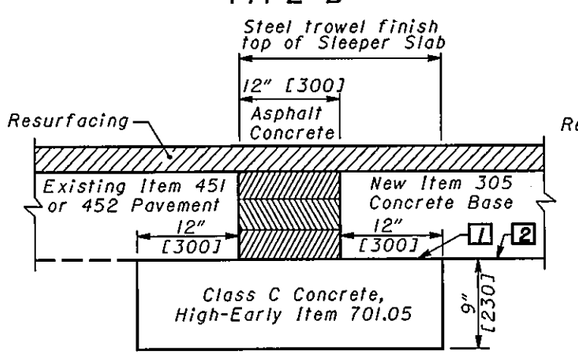
TYPE B



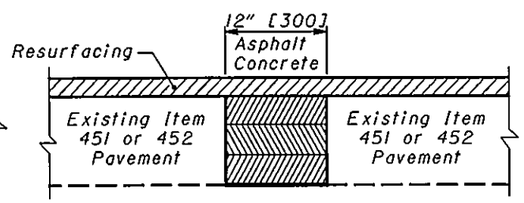
TYPE C



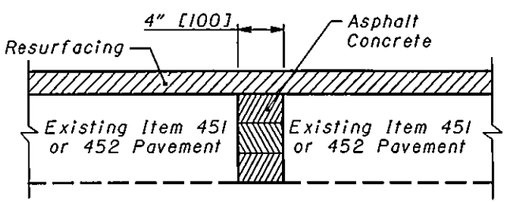
TYPE D



TYPE B
WITH RESURFACING



TYPE C
WITH RESURFACING



TYPE D
WITH RESURFACING

NOTES

JOINTS: *Joints shall be located at existing transverse joints. All joints shall be sawed full depth, however, the cut may be made in two passes. To reduce the possibility of saw binding, joints should be cut, if possible, on overcast days and/or when the temperature is less than 70° F [21° C].*

CURBED PAVEMENTS: *The pressure relief joint shall be cut through to the back of curb. After filling the joint, asphalt concrete shall be formed and tamped in place to conform to the adjacent curb.*

PAVEMENTS WITH CONCRETE SHOULDERS: *The pressure relief joint shall be cut through to the outer edge of the shoulder.*

ASPHALT CONCRETE: *Any of the pressure relief joints shown may be filled with three or more lifts of well compacted asphalt concrete material approved by the Engineer.*

AGGREGATE DRAINS: *shall be provided from the low end (or ends) of each pressure relief joint to the embankment slope or ditch inslope. A drain will be required at both ends of the joint if the pavement is crowned with transverse slopes toward both edges. If a feasible outlet is not available for aggregate drains, then metal pipe underdrains, with perforated pipe and aggregate backfill, shall be provided instead of aggregate drains and the pipe extended to a suitable outlet. The material above the filter aggregate of the drain in paved shoulder area may be the same as the shoulder pavement or may be the same as the asphalt material used in the pressure relief joint and included in Item 605 for payment.*

MEASUREMENT: *Pressure relief joint measurement for pay purposes shall be along the centerline of the joint, edge to edge of pavement when asphalt shoulders are used, edge to edge of shoulder work when concrete shoulders are used, or back to back of curbs. Payment shall be per Linear Foot [Meters] for* ***Item Special - Pressure Relief Joint Type ____,*** *which shall include all work and materials necessary to complete the joint except for the aggregate drains or pipe underdrains which shall be constructed and paid for as Item 605.*

CEMENT: *Cement other than the Item 701.05 specified may be used if approved by the Engineer, provided an accelerating admixture meeting the requirements of ASTM C494 Type C or E, and an air entraining admixture meeting the requirements of Item 705.10 is added at the mixer.*

LEGEND

1. *A bond breaker, consisting of two 2-foot [0.6 m] wide sheets of clear or opaque polyethylene film, Item 705.06, shall be centered on top of the joint between the subbase and the sleeper slab. The film shall have a nominal thickness of 4 mils [0.1].*
2. *Care shall be taken to ensure the subbase or sub-grade surface is smooth and constructed as high as or slightly higher than the top of the Sleeper Slab.*

THIS DRAWING REPLACES BP-2.4 DATED 7-28-00.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER — *DATE* 7-16-04

STDS. ENGR. D. Focke

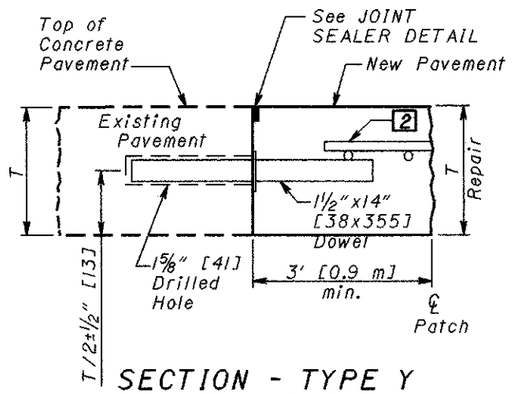
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

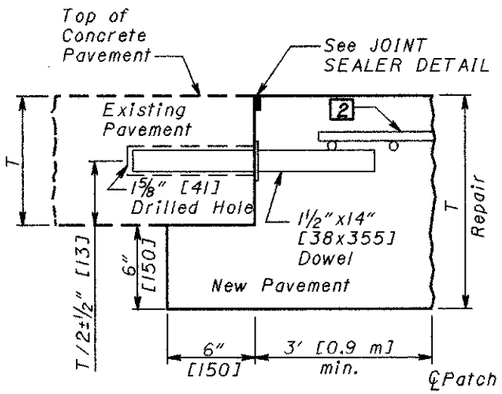
STANDARD ROADWAY CONSTRUCTION DRAWING
PRESSURE RELIEF JOINT TYPES B, C, & D

NUMBER **BP-2.4**

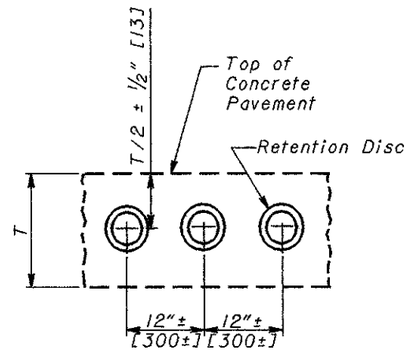
1 / 1



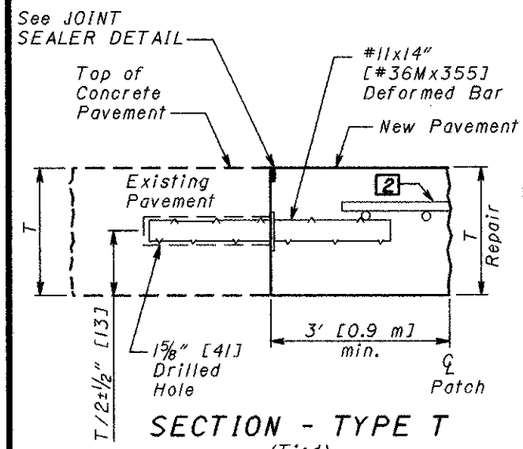
SECTION - TYPE Y
(Contraction)



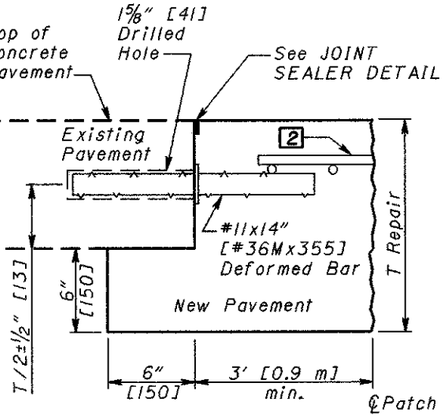
SECTION - TYPE YU
(Undercut : Contraction)



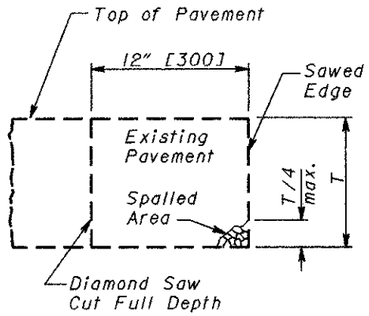
HOLE DRILLING DETAIL



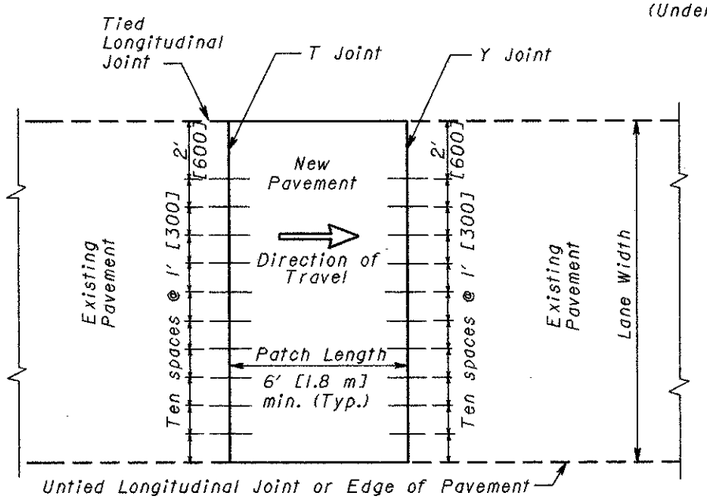
SECTION - TYPE T
(Tied)



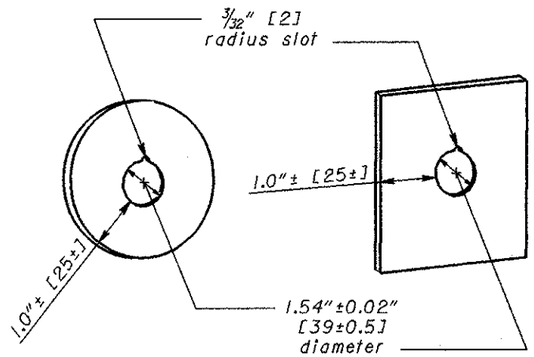
SECTION - TYPE TU
(Undercut : Tied)



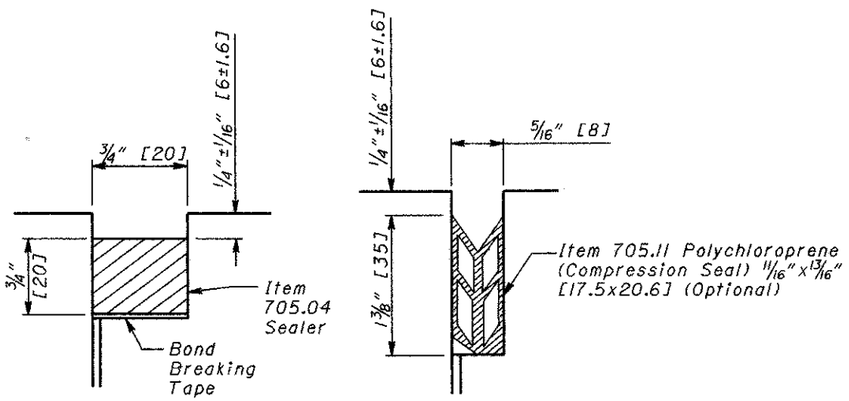
ADDITIONAL PAVEMENT REMOVALS



TIE / DOWEL BAR PLACEMENT DETAIL
(See [1] for Bar Placement)



NYLON OR PLASTIC GROUT RETENTION DISCS FOR DOWEL/TIE BARS [3]
(1/16" [1.6] min. thickness)



JOINT SEALER DETAIL

NOTES

GENERAL: All joints shall be constructed normal to the centerline of the pavement lane unless otherwise specified in the plans.

All dowel holes shall be drilled by a mechanical device that will allow independent adjustment of all drill shafts in the horizontal and vertical direction. The device shall be capable of drilling a minimum of three holes at a time.

All smooth dowels shall be coated with a thin layer of oil or other "bond-breaking" material after they have been installed in the existing pavement and just prior to placing the patch. All dowels shall be placed parallel to the pavement surface and the centerline of the pavement lane.

This standard drawing is intended for use in repairing both concrete and composite pavements. For clarity, asphalt overlays are not shown.

When Prefabricated Edge Drains are used, they shall be placed after joint repairs are completed.

TYPE N JOINT: Joints referred to as Type N joints on the plan shall be constructed as contraction joints per **SCD BP-2.2.**

ADDITIONAL PAVEMENT REMOVAL: If, after the sawing and removal of the pavement from the area to be repaired, the face of the remaining pavement is spalled or deteriorated for a height greater than one-fourth (1/4) the thickness of the rigid pavement, an additional saw cut shall be made as shown and as directed by the Engineer. This additional work shall be measured for additional payment for full depth pavement sawing, rigid pavement removal and replacement.

LONGITUDINAL JOINT: For patches 10' [3.0 m] or greater in length, the longitudinal joint shall be constructed per **SCD BP-2.1.**

The tie bars or hook bolts shall be spaced at no more than 30" [760] nor less than 24" [610] on center.

LEGEND

[1] Bars shall be placed 2' [600] from the tied longitudinal joint and continue across with a 1' [300] spacing to the edge of pavement or an untied longitudinal joint. Where lane widths are between two tied longitudinal joints, begin bars 2' [600] from each tied longitudinal joint and continue across with a 1' [300] spacing.

[2] Reinforcement will be required for all repairs greater than 10' [3.0 m] in length or for repairs that will be opened to traffic within 24 hours of placement. The fabric shall consist of W8.5 or D8.5 [MW55 or MD55] longitudinal wires spaced 6" [150] c/c and W4 or D4 [MW26 or MD26] transverse wires spaced 12" [300] c/c. The clearance from the end of the wire fabric to the edge of pavement or new transverse joint shall be 4"±2" [100±50].

[3] Nylon or plastic grout retention discs shall be clear or opaque white in color.

THIS DRAWING REPLACES BP-2.5M DATED 4-8-97.

OHIO DEPARTMENT OF TRANSPORTATION — DATE: 7-28-00
ROADWAY DESIGN ENGINEER

REVISIONS	STDS. ENGR. M. Evans	DRAWN D. Focke

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

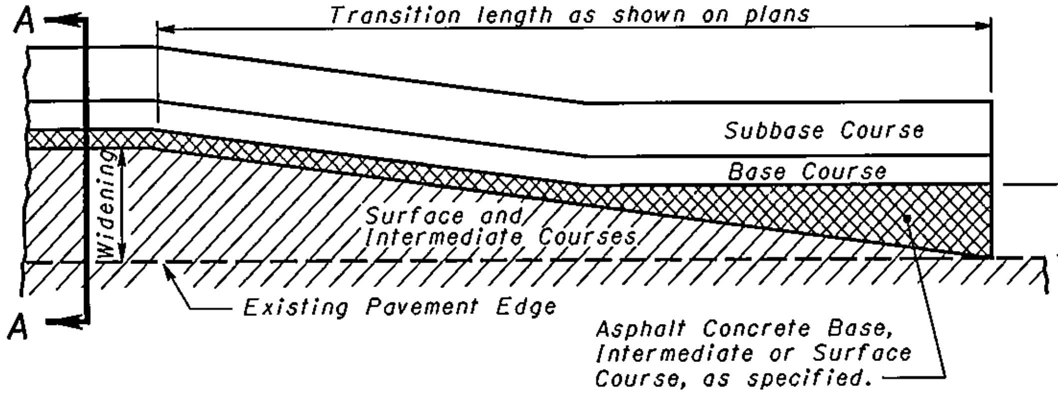
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING

RIGID REPLACEMENT

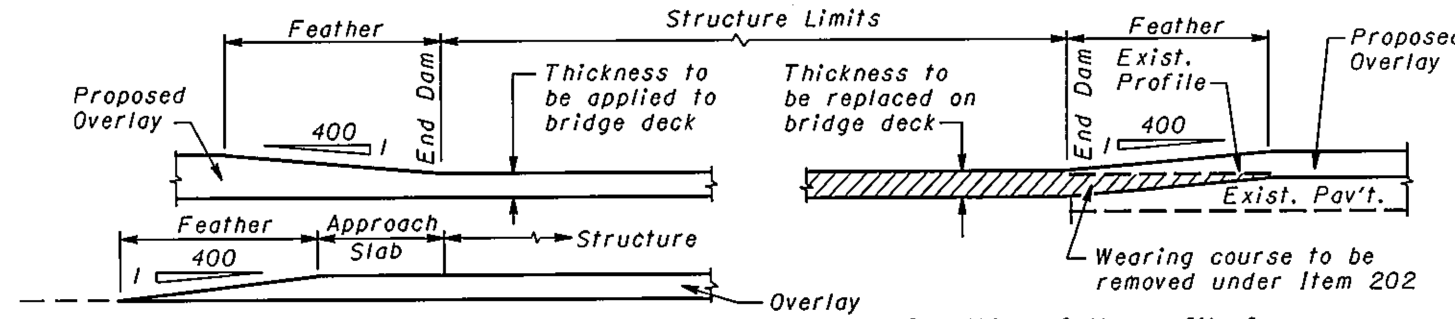
NUMBER BP-2.5

1 / 1



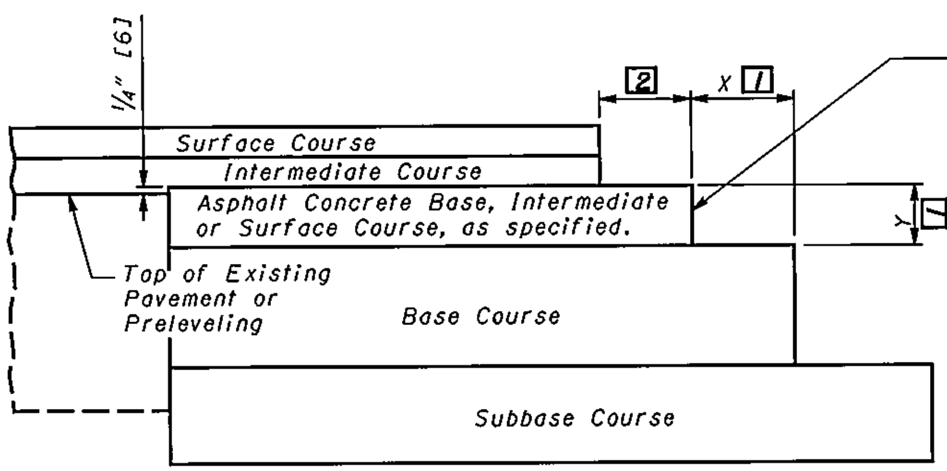
PLAN

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 Asphalt Concrete in the upper part of the base widening shall finish approximately ¼" [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 ¼" [6] above the preleveling.

SECTION A-A

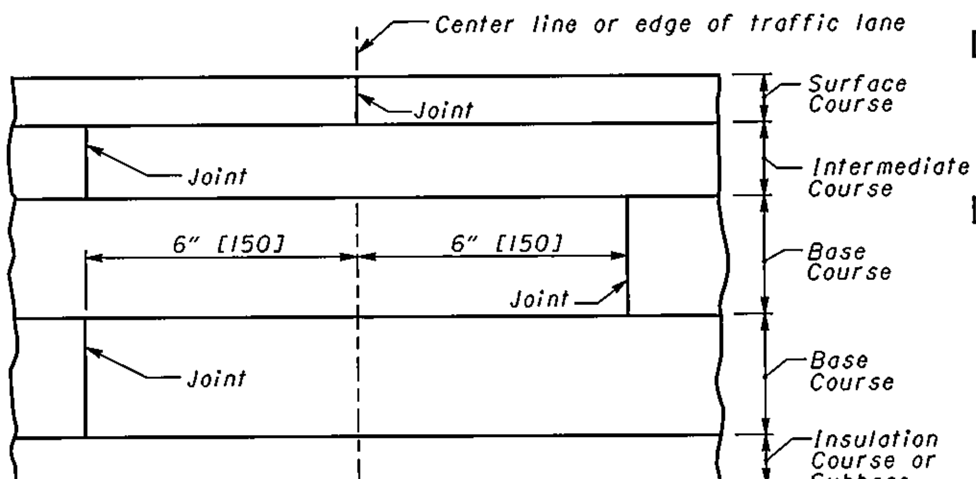
COURSE DETAIL FOR WIDENING

LEGEND

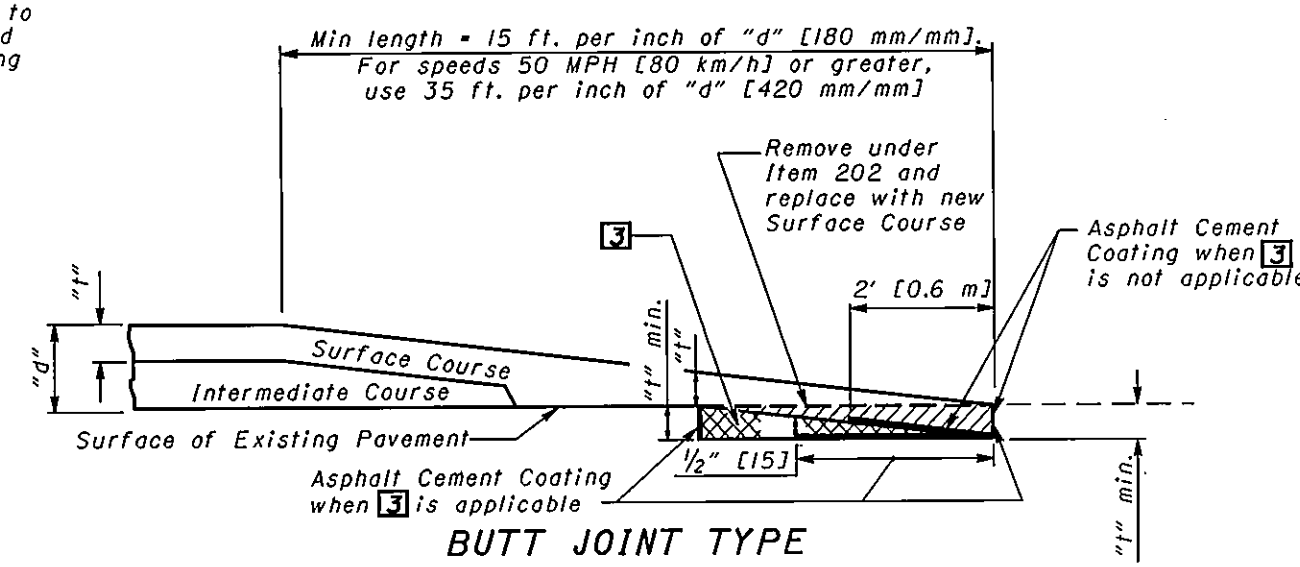
1 The extended width (X) of a base or subbase course shall be equal to the depth (Y) of the overlaying course or 6" [150], whichever is greater, or as shown on the plans.

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.

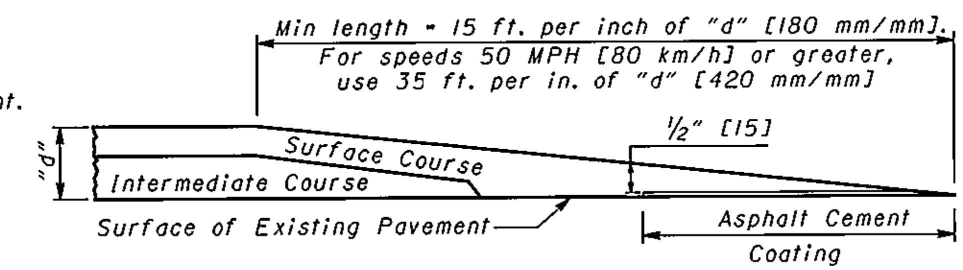
3 Permissible removal and replacement.



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-3.1 DATED 7-28-00.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
7-16-04
DATE

STDS. ENGR. D. Focke

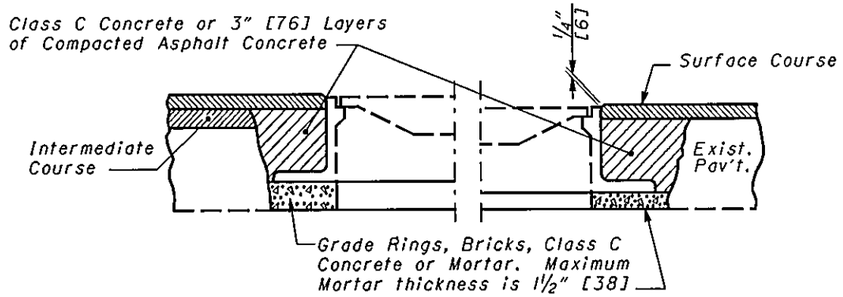
All metric dimensions in brackets [ ] are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

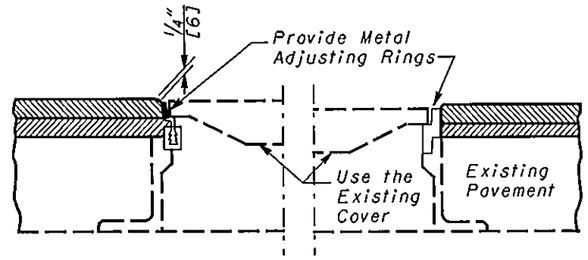
STANDARD ROADWAY CONSTRUCTION DRAWING
ASPHALT PAVING

NUMBER BP-3.1

1/2



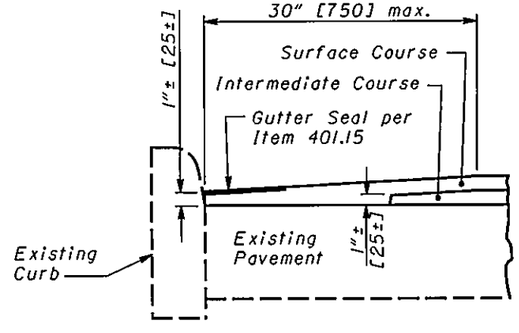
USING CONCRETE OR MORTAR



USING METAL ADJUSTING RINGS

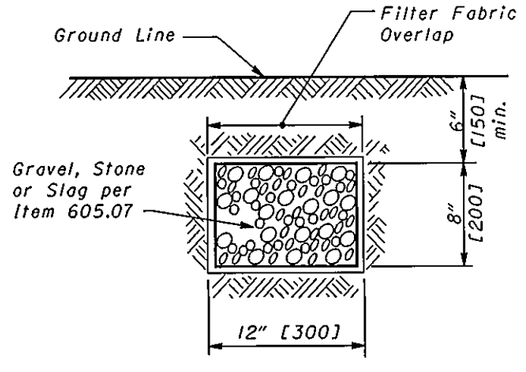
Metal adjusting rings shall:
(a) attach securely to the existing frame by welding or mechanical devices;
(b) consist either of cast metal having an integral rim and seat, or be fabricated metal with a sturdy connection between the seat and rim; and
(c) provide an even seat for the manhole cover.
In addition, 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 BP3.1 DATED 7-28-00.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
7-16-04
DATE

STDS. ENGR.
D. Focke

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

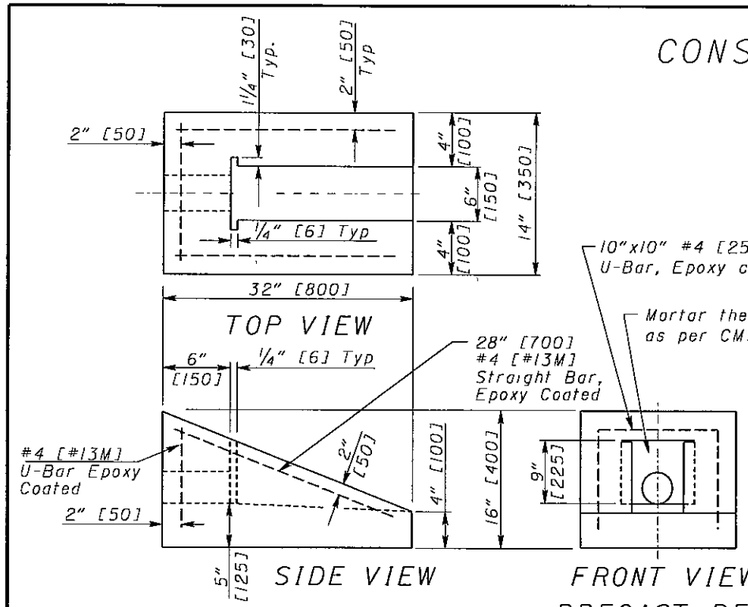
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
ASPHALT PAVING

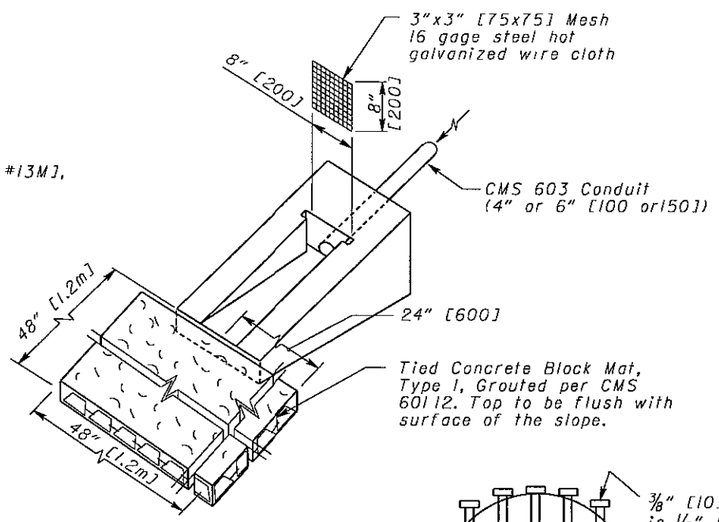
NUMBER
BP-3.1

2/2

CONSTRUCTION METHODS



PRECAST REINFORCED CONCRETE OUTLET



NOTES

MASONRY COLLARS: *A masonry collar shall be provided where plans require that a pipe extension be joined to the end of an existing pipe with a butt joint The cost shall be included in the unit price bid for the new conduit.*

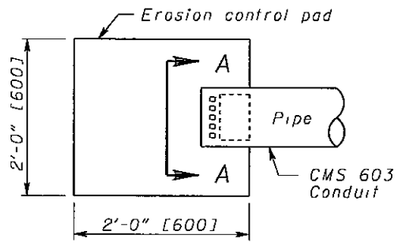
EROSION CONTROL PAD AND ANIMAL GUARDS: *These items shall be provided at the outlet end of all farm drains except where they outlet into a drainage structure. The steel bolts or rods for the animal guard shall be galvanized per CMS 710.06 In lieu of drilling or punching the ½" [13] diameter holes into the pipe, a metal collar meeting all of the above requirements may be clamped onto the pipe if approved by the Engineer*

PAYMENT: *Erosion control pads, masonry collars, and animal guards shall be included in the unit price bid for* ***Item 603 - __ inch [mm] Conduit, Type __ .***

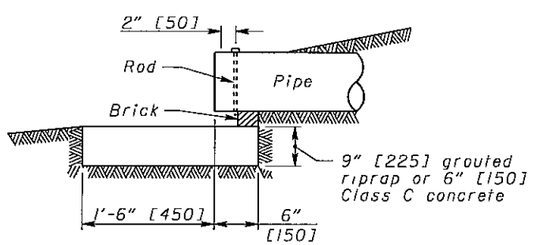
PRECAST REINFORCED CONCRETE OUTLET: *The concrete outlet shall meet the requirements of CMS 604.*

PAYMENT: *The precast reinforced concrete outlet shall be paid at the contract unit price bid for* ***Item 604 - Precast Reinforced Concrete Outlet.***

The Mortar; Tied Concrete Block Mat, Type 1, Grouted, and Wire Mesh shall be included in the unit price bid for ***Item 601 - Tied Concrete Block Mat, Type 1.***

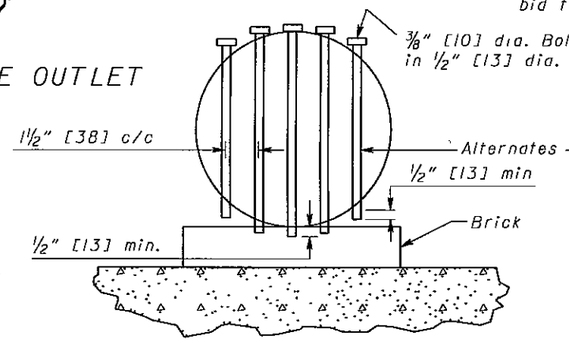


PLAN

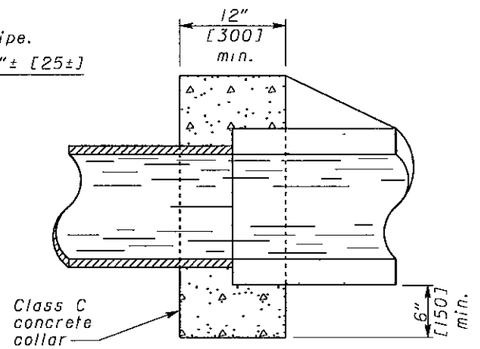


PROFILE

EROSION CONTROL PAD AND ANIMAL GUARD FOR OUTLET PIPE

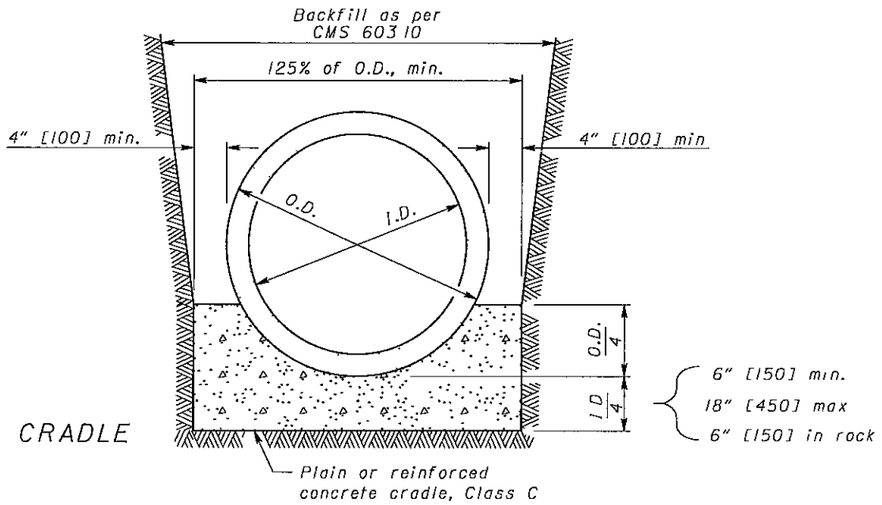


SECTION A-A



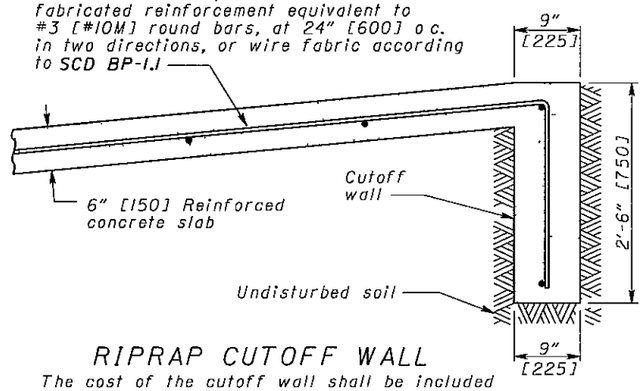
MASONRY COLLAR

CONDUIT SIZE	4" [100]	6" [150]	8" [200]	10" [250]	12" [300]	15" [375]	18" [450]
No. of Bolts	2	3	5	6	7	9	11



CONCRETE CRADLE

As per CMS 601.04.D, reinforce the slab approximately midway between the top and bottom of the slab, with steel bars or fabricated reinforcement equivalent to #3 [#10M] round bars, at 24" [600] o.c. in two directions, or wire fabric according to SCD BP-1.1



RIPRAP CUTOFF WALL

The cost of the cutoff wall shall be included in the unit price bid for Item 601 Riprap using 6" [150] reinforced concrete slab.

OHIO DEPARTMENT OF TRANSPORTATION
STATE HYDRAULIC ENGINEER

DATE
7-20-01
7-19-02
7-18-03
1-21-05

HYDRAULIC ENGINEER
J. Syar

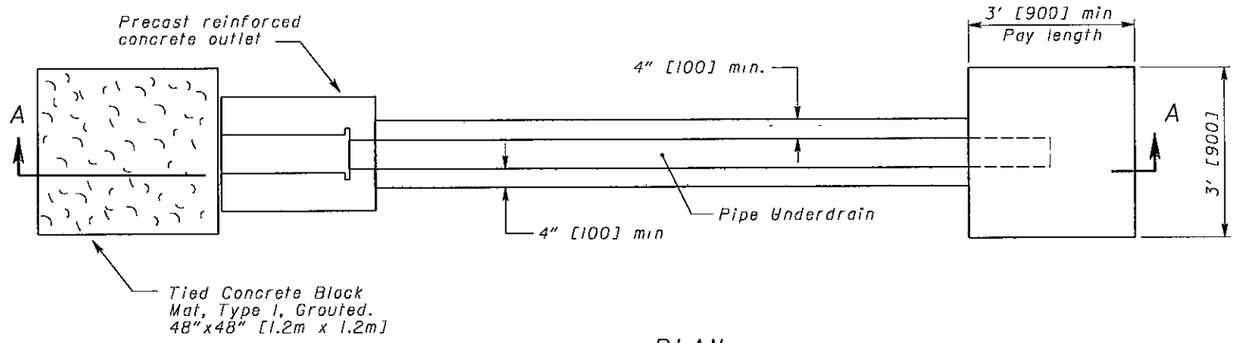
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted

OFFICE OF STRUCTURAL ENGINEERING

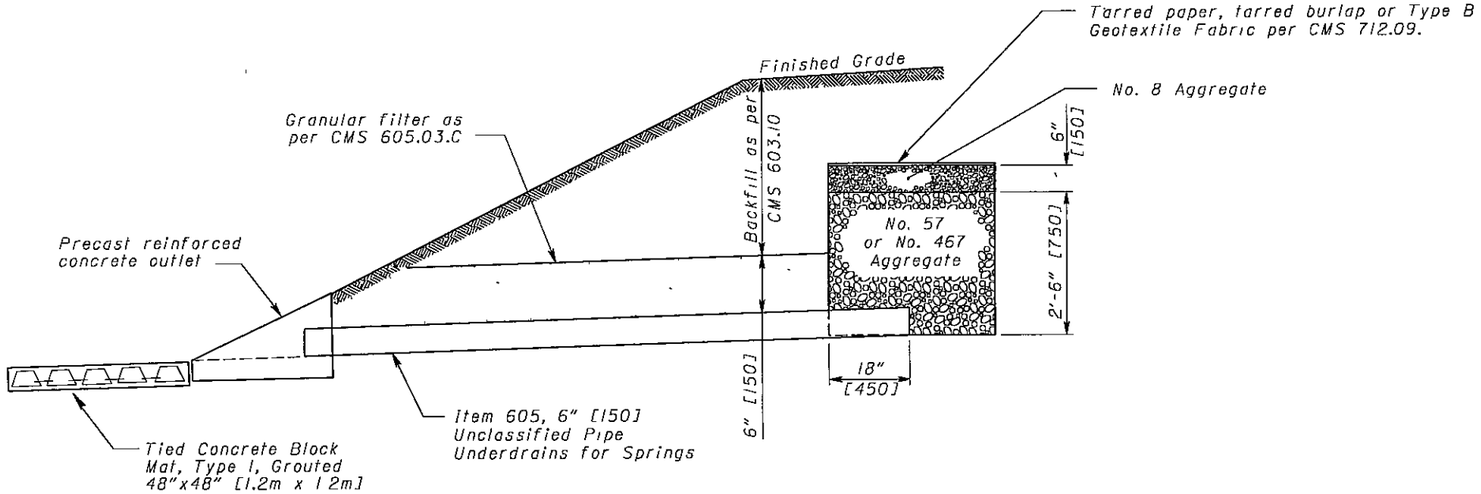
STANDARD HYDRAULIC CONSTRUCTION DRAWING
OUTLETS, DRAINS AND SEWERS

NUMBER
DM-1.1

1/2



PLAN



SECTION A-A

SPRING DRAIN DETAIL

NOTES

SPRING DRAIN: Aggregates, tarred paper, tarred burlap, or geotextile fabric backfill and necessary excavation for spring drains shall be included for payment in the unit price bid per Foot [Meter] for **Item 605 - Aggregate Drains for Springs.**

PAYMENT: The pipe shall be included in the unit price bid per Foot [Meter] for **Item 605 - 6" [150] Unclassified Pipe Underdrains for Springs.**

PRECAST REINFORCED CONCRETE OUTLET: The concrete outlet shall meet the requirements of CMS 604.

PAYMENT: The precast reinforced concrete outlet shall be paid at the contract unit price bid for **Item 604 - Precast Reinforced Concrete Outlet.**

The Mortar; Tied Concrete Block Mat, Type I, Grouted, and Wire Mesh shall be included in the unit price bid for **Item 601 - Tied Concrete Block Mat, Type I.**

OHIO DEPARTMENT OF TRANSPORTATION
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7-19-02
7-18-03
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J. Syar

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

OFFICE OF STRUCTURAL ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING
OUTLETS, DRAINS AND SEWERS

NUMBER
DM-1.1

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.

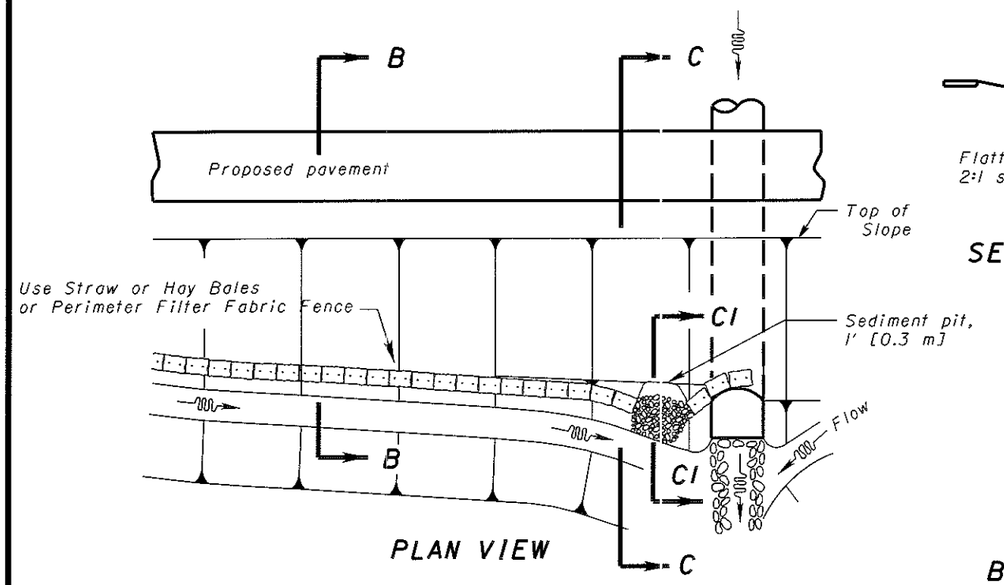
Use sand and gravel for the sediment pit filter material.

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

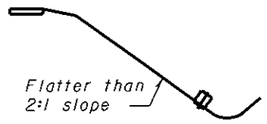
When straw or hay bales are used conform to the following: Tightly place each bale adjacent to one another. Entrench 2" [50] to 3" [75] into the ground prior to staking. Firmly stake each bale with at least two stakes. Use loose hay or straw to fill the voids under and between the bales.

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.

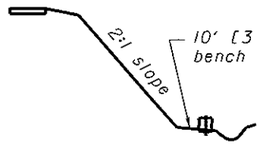
PAYMENT: The Department will pay for the accepted quantities at the contract prices in feet [meters] as follows: **Item 207 - Bale Filter Dike.**



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.

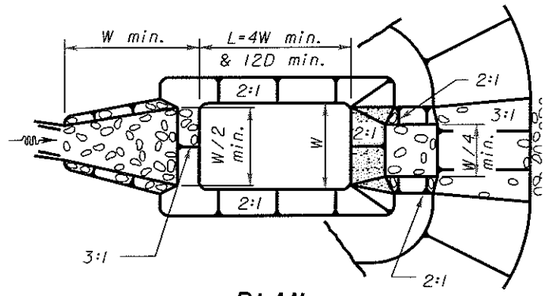
CONSTRUCTION: Construct the Basin and Dams as detailed. Constuct the construction fence in urban areas or in high pedestrian traffic areas. Construct the fence to completely surround the sediment basin or dam. Place the fence post on 8' [2.6 m] centers 2' [0.6 m] deep. Securely attach the plastic construction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

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

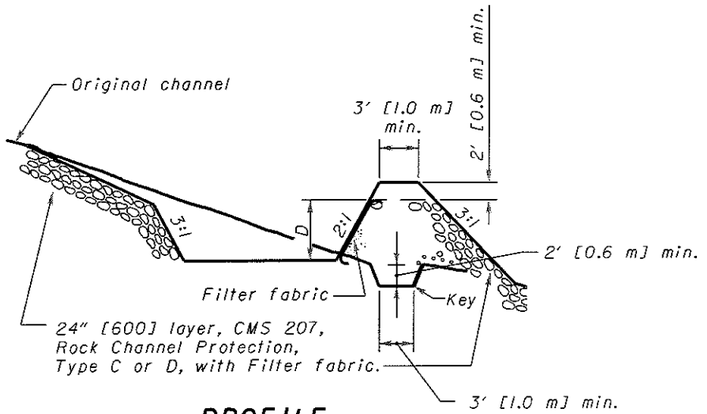
Item 207 - Sediment Basins and Dams in cubic yards [cubic meters]

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

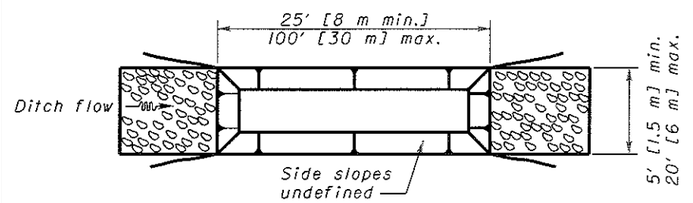
Item 207 - Construction Fence per foot [meter]



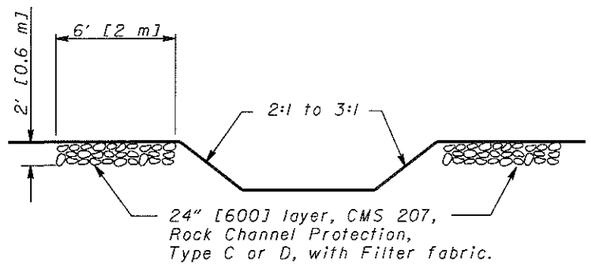
PLAN



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.

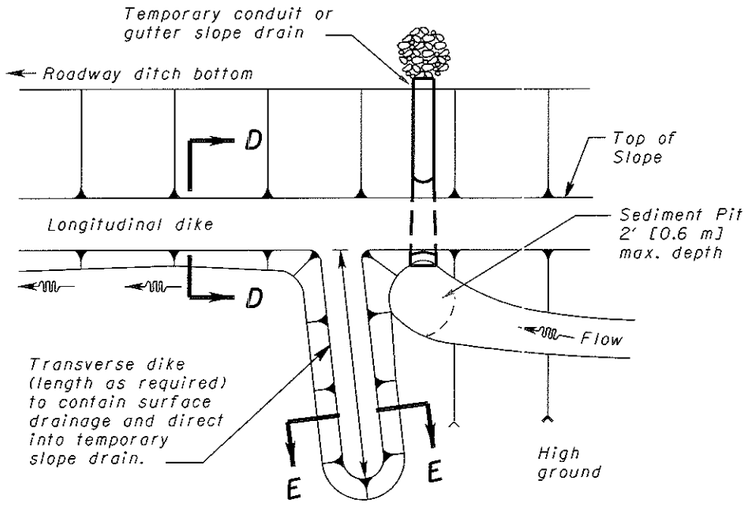
OFFICE OF STRUCTURAL ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING

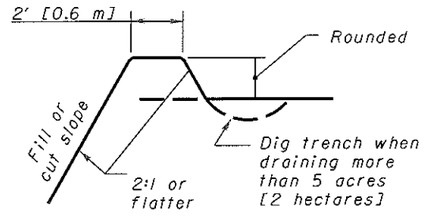
SEDIMENT AND EROSION CONTROLS

NUMBER
DM-4.3

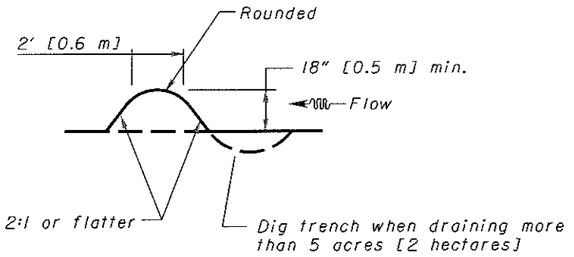
DIKES AND SLOPE PROTECTION



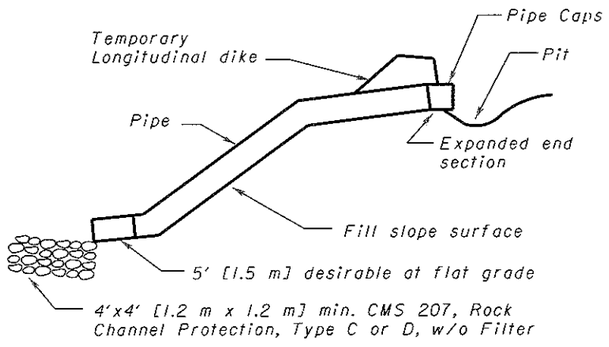
PLAN VIEW



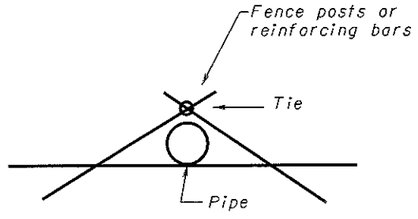
SECTION D-D



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
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DATE
4-29-99
7-19-02

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D. Gruver

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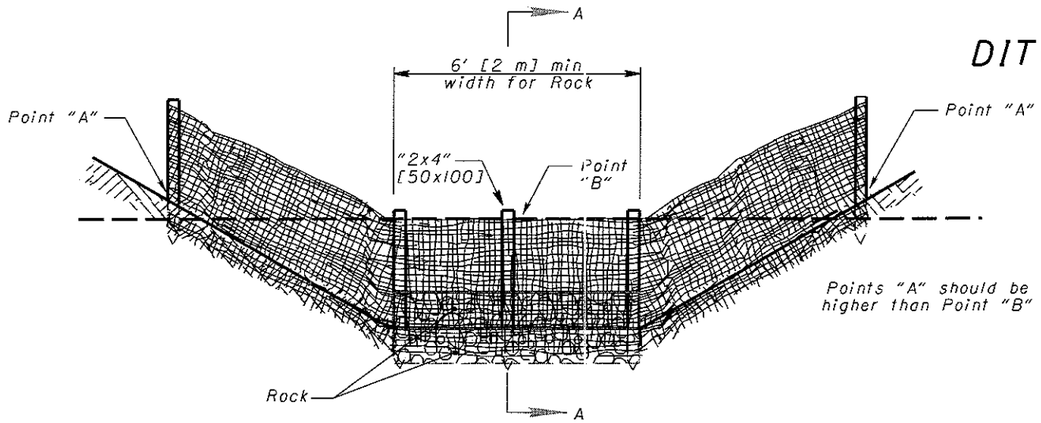
OFFICE OF STRUCTURAL ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING
SEDIMENT AND EROSION CONTROLS

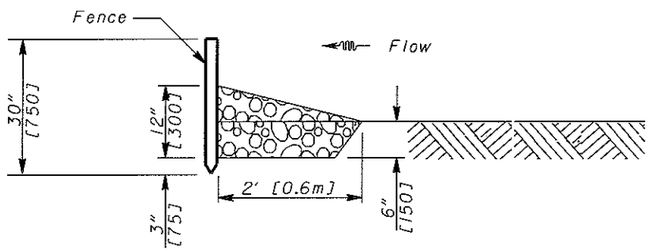
NUMBER
DM-4.3

2 / 2

DITCH CHECKS

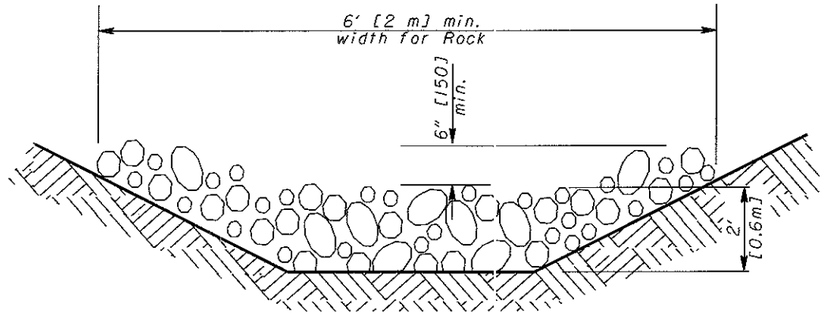


ELEVATION VIEW OF FLAT BOTTOM DITCH



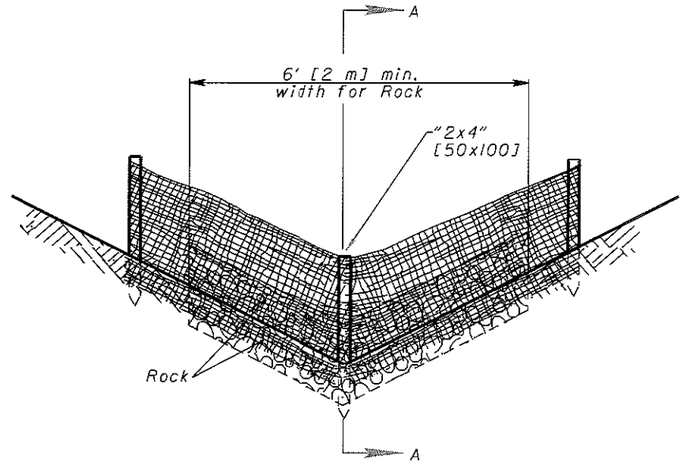
SIDE VIEW OF FLAT BOTTOM AND V DITCH

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

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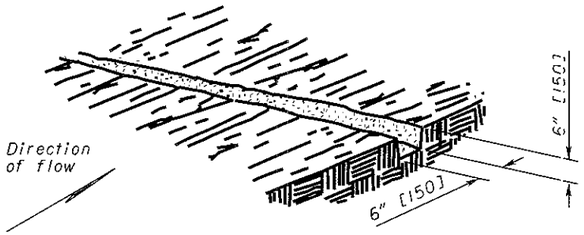
OFFICE OF STRUCTURAL ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING
CONSTRUCTION EROSION CONTROL

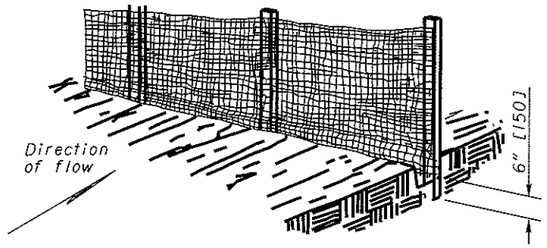
NUMBER
DM-4.4

PERIMETER FILTER FABRIC FENCE



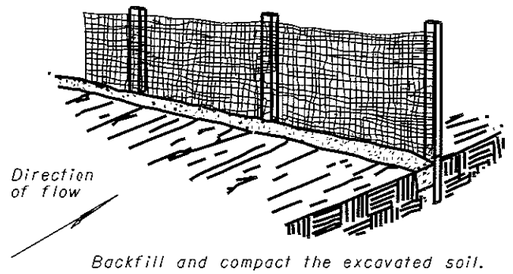
Excavate a 6"x6" [150x150] trench along the proposed fence line.

STEP 1



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

STEP 2



Backfill and compact the excavated soil.

STEP 3

NOTES

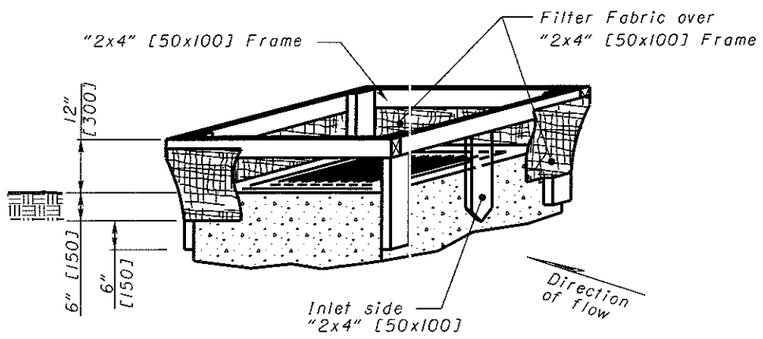
MATERIALS: Furnish 30" [0.8 m] wide filter fabric with sound wood supports with maximum on-center spacing of 10' [3.0 m]. Use filter fabric conforming to 712.09 Type C. The Contractor may elect to use straw or hay bales. Use 30" [750] long 2"x2" [50x50] wooden stakes, reinforcing bars or fence posts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

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OFFICE OF STRUCTURAL ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING
CONSTRUCTION EROSION CONTROL

NUMBER
DM-4.4

2/2

NOTES

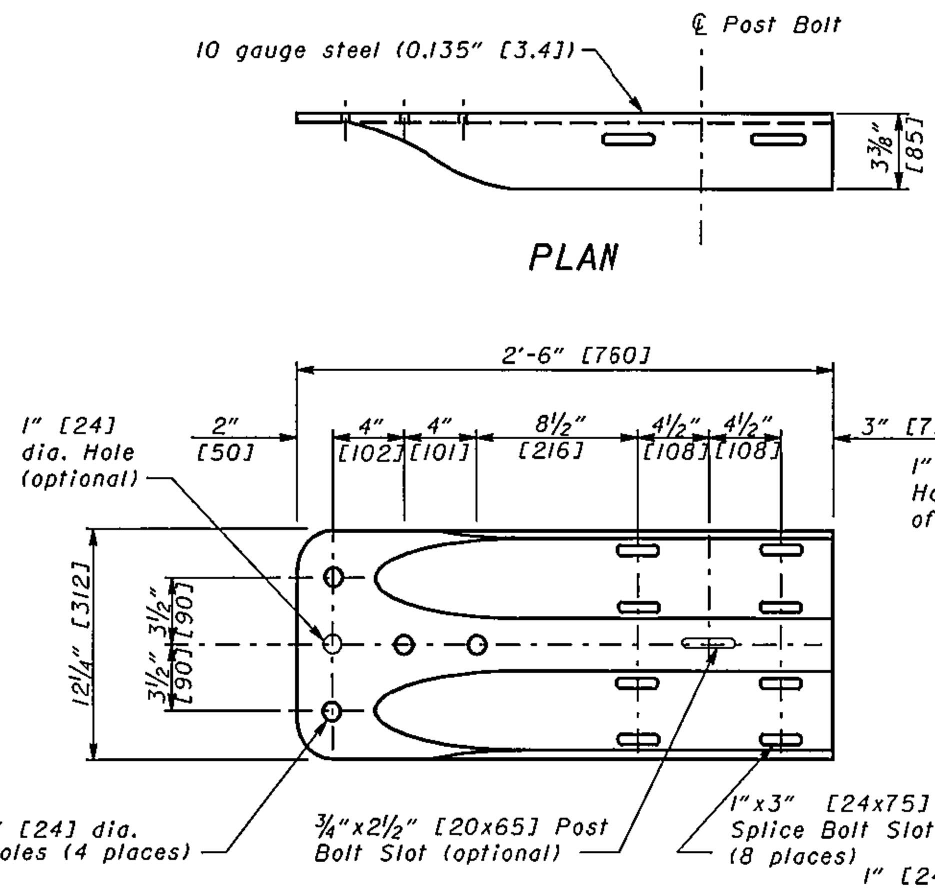
GENERAL: Components shown on this drawing are used in a variety of guardrail systems. See individual guardrail drawing for specific applications.

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

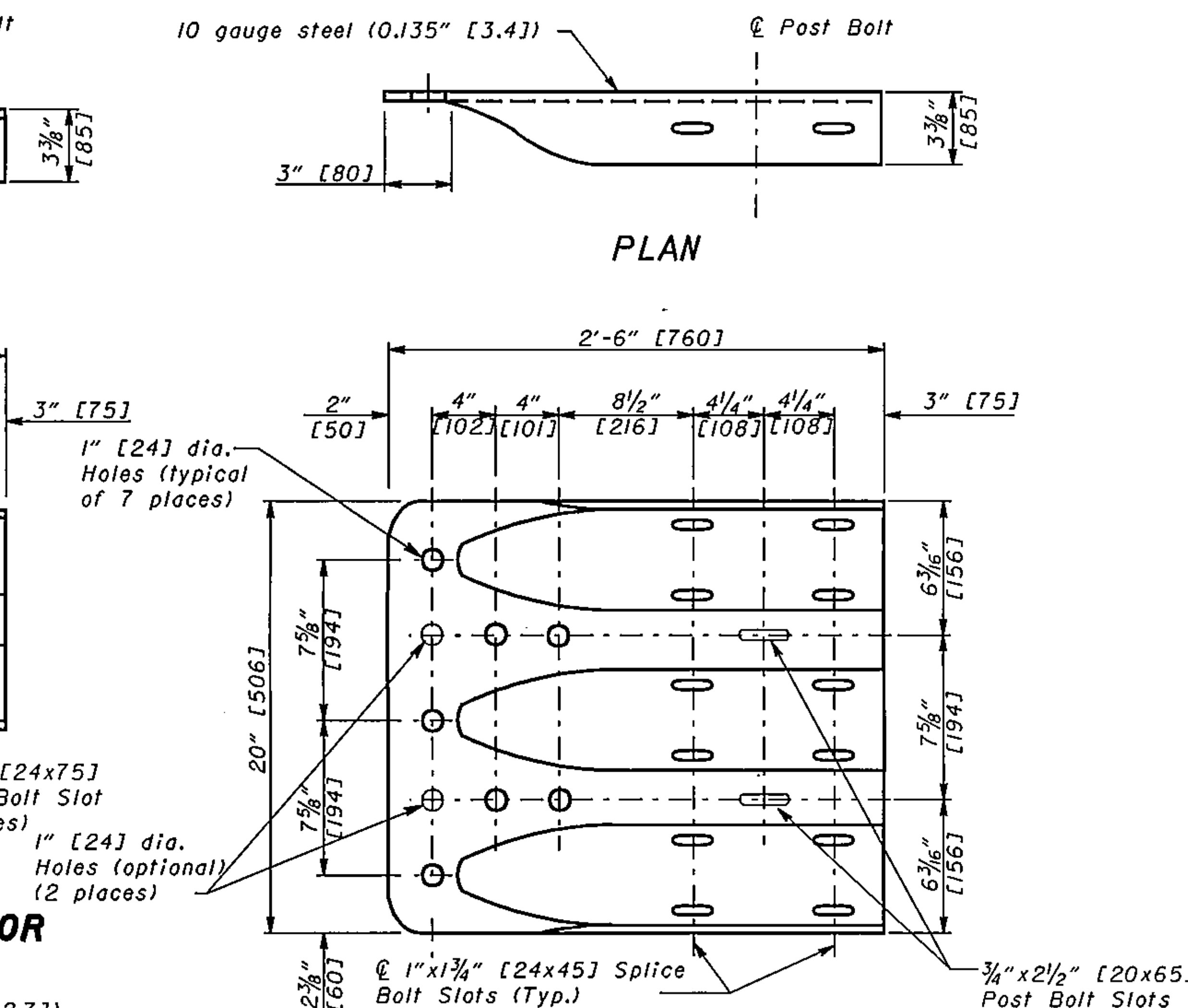
Refer to AASHTO M 180 for dimensional details of W-Beam and Thrie-Beam rail elements, related buffer and end sections, beam splices, post and splice bolts, nuts, and Type I W-Beam to Thrie-Beam Transition sections.

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.

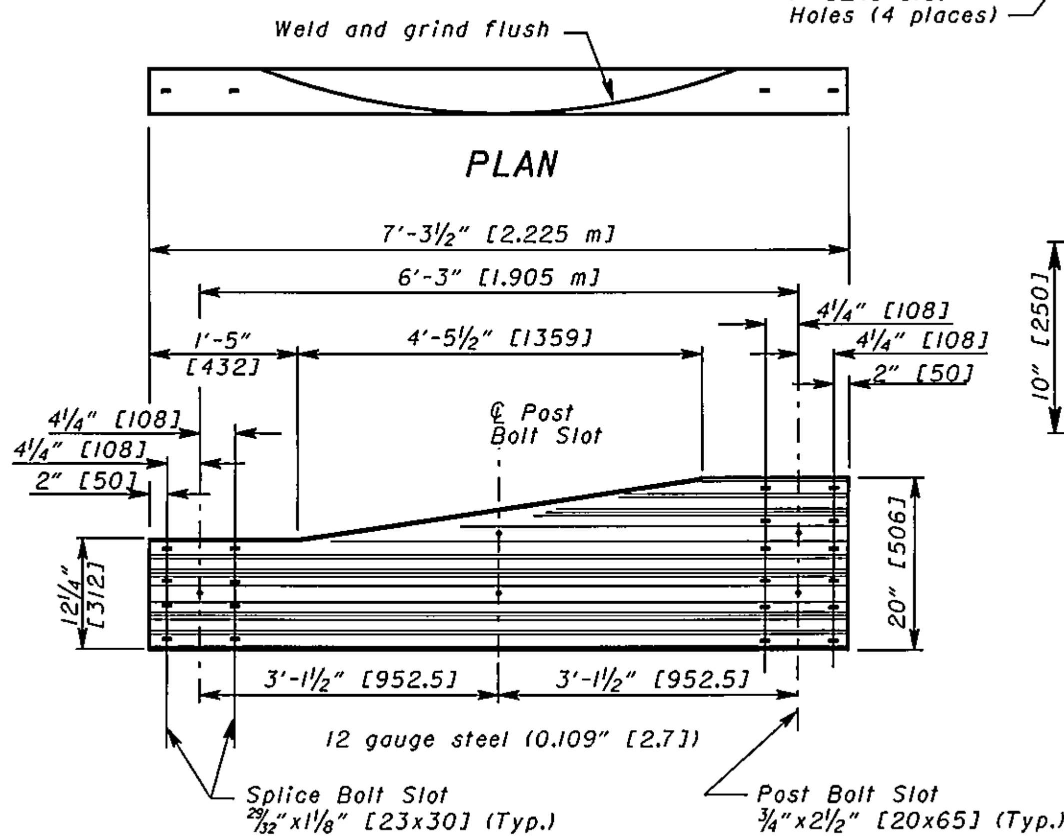
RAIL SPLICE: Lap splices between two rail elements or between a rail and terminal connector in the direction of traffic. Lap the buffer or flared end sections in the direction of traffic.



ELEVATION
W-BEAM TERMINAL CONNECTOR

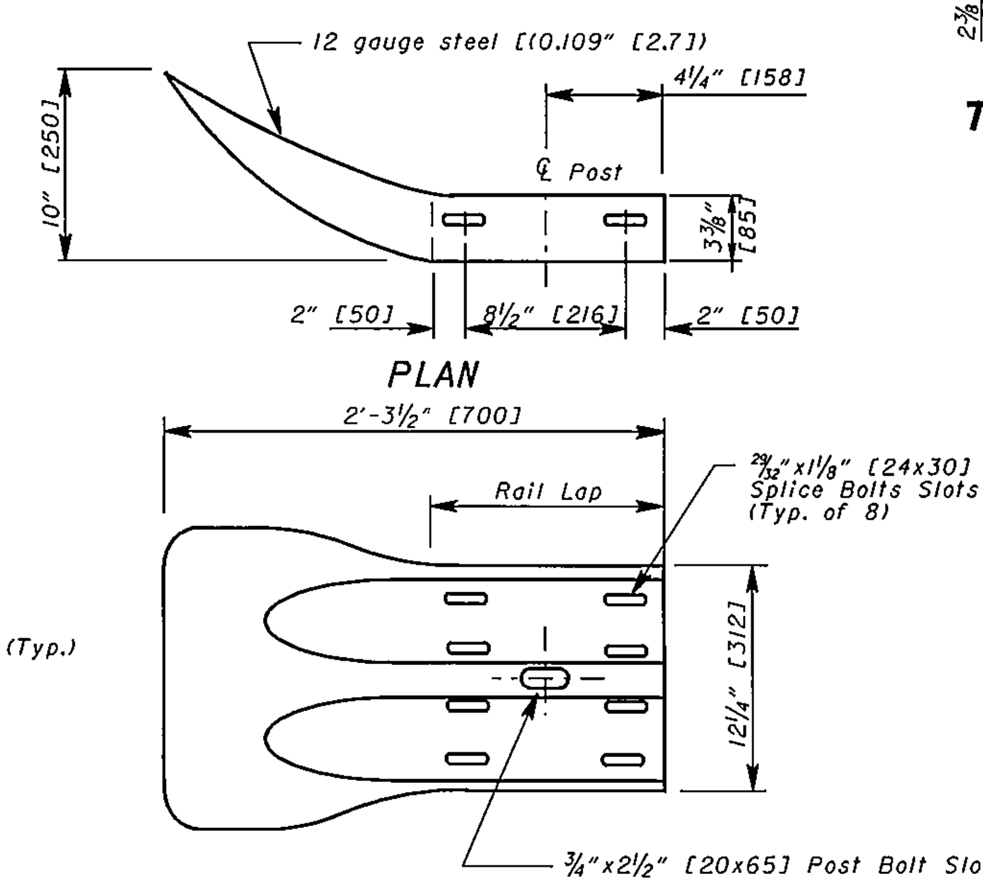


ELEVATION
THRIE-BEAM TERMINAL CONNECTOR

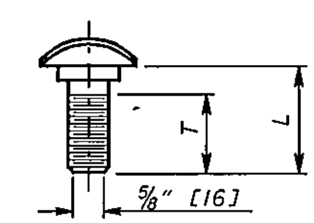


ELEVATION
TYPE 2 TRANSITION SECTION
(Asymmetric W to Thrie-Beam)

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
1¼" [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 GR-1.1 DATED 4-18-03.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
7-16-04 DATE

STDS. ENGR. D. Focke

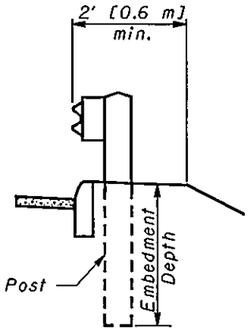
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

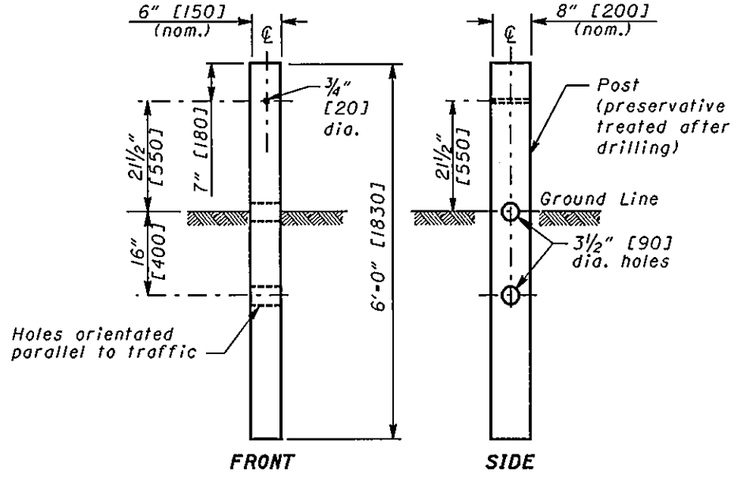
STANDARD ROADWAY CONSTRUCTION DRAWING
GUARDRAIL DETAILS (Rail Components)

NUMBER GR-1.1

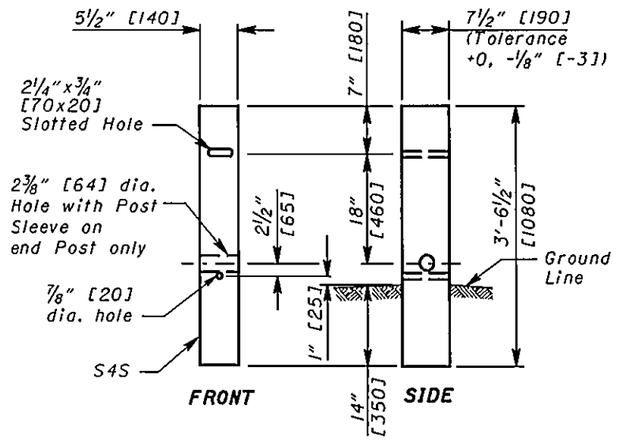
1/3



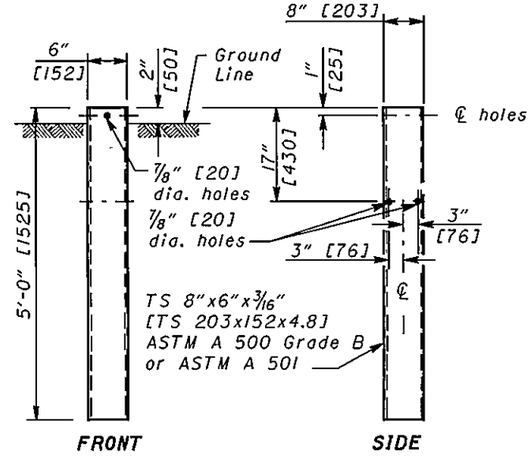
DETAIL A
See POST EMBEDMENT DEPTH Note



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.

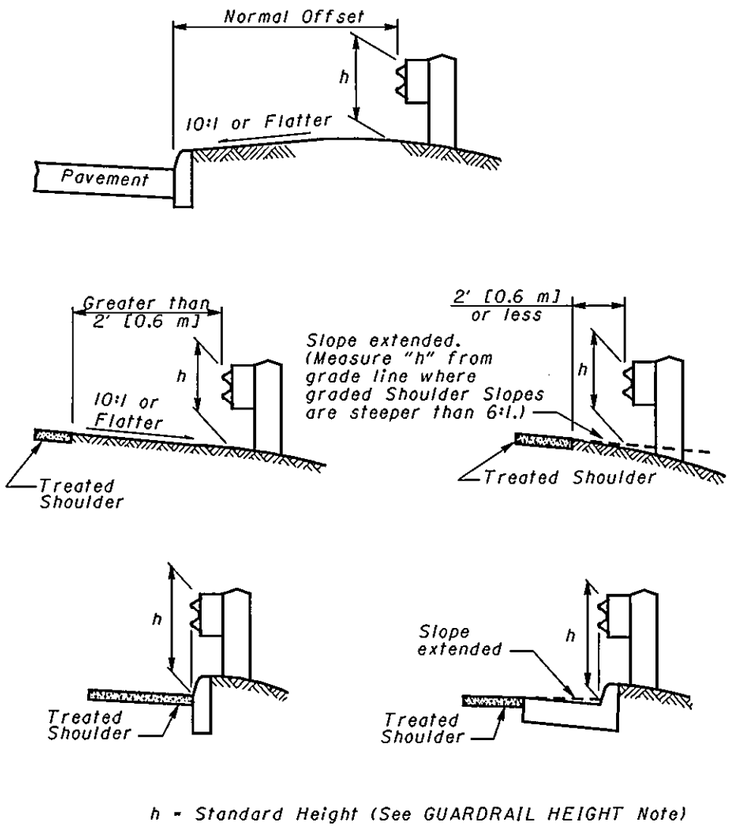
Do not drive posts located over a culvert with less than 4'-3" [1.3 m] of cover; instead set in drilled or dug holes. Where the available post embedment depth is less than 3'-5" [1.04 m], encase the post with a minimum of 4" [100] concrete.

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.

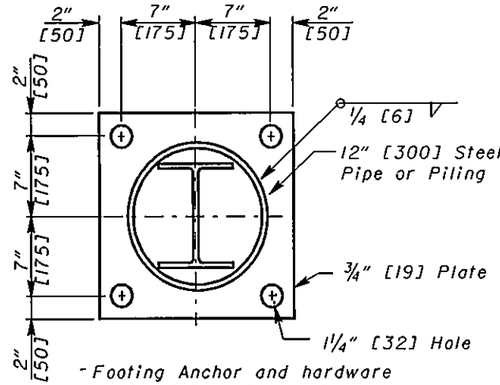
Expansion shield anchors as specified in CMS 712.01 may be substituted except where concrete deterioration has occurred, as determined by the Engineer. Where self-drilling anchors are used, drill the holes with the expansion shield (not by a drill bit) and install the shield flush with the concrete surface.

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.)



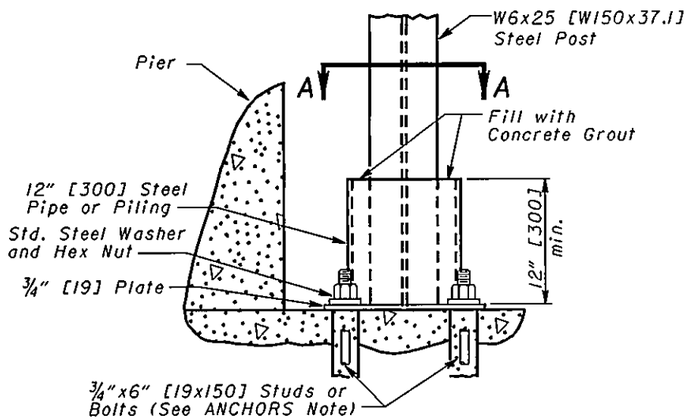
h = Standard Height (See GUARDRAIL HEIGHT Note)

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-1.1 DATED 4-18-03.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
7-16-04
DATE

STDS. ENGR.
D. Focke

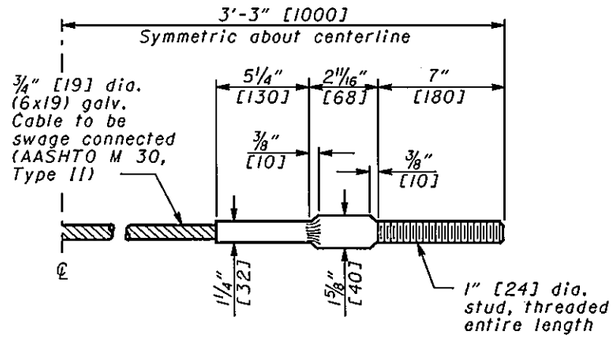
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
GUARDRAIL DETAILS (Posts)

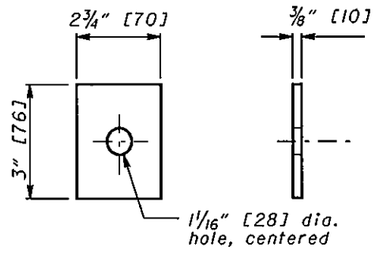
NUMBER
GR-1.1

2 / 3

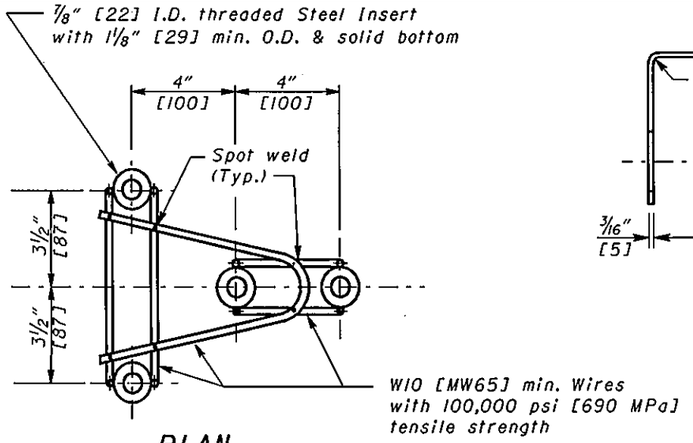


STANDARD SWAGED FITTING AND STUD

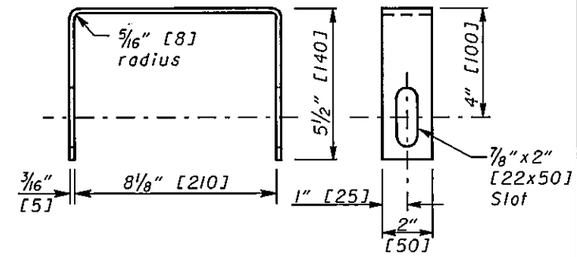
CABLE ANCHOR



END PLATE

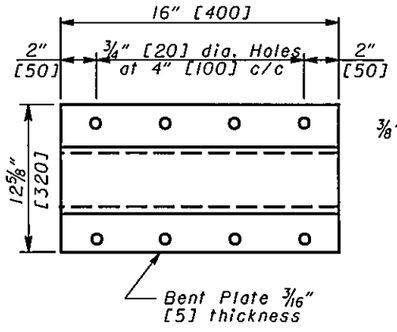


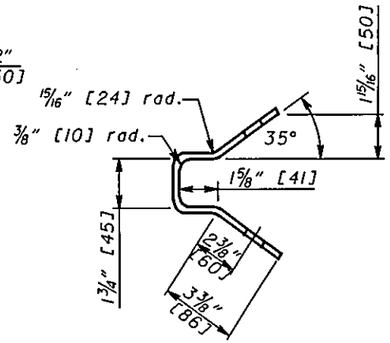
PLAN



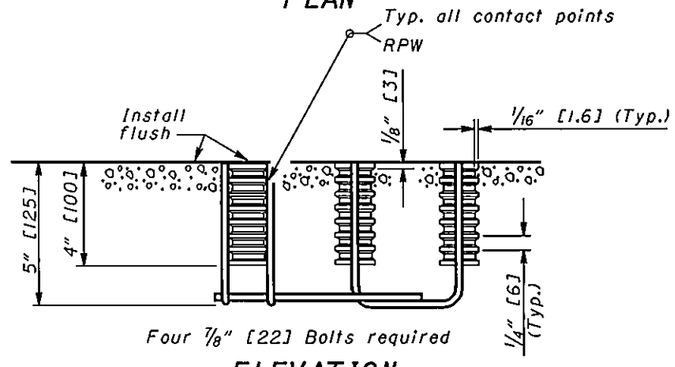
YOKE

Two required in Assembly

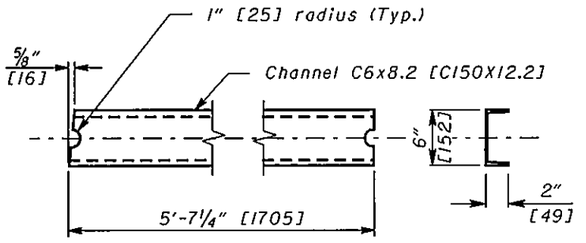




ANCHOR BRACKET



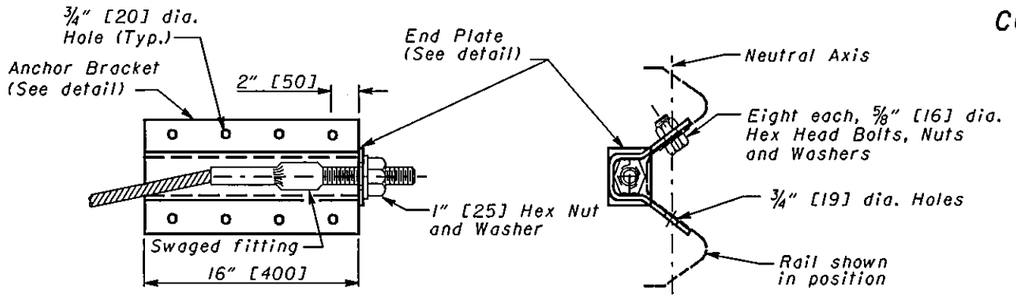
ELEVATION



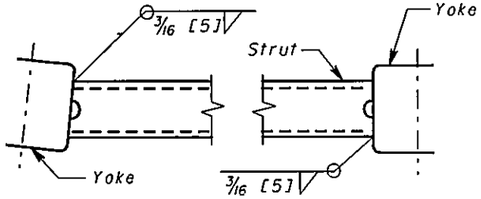
STRUT

CONCRETE INSERT ANCHOR ASSEMBLY (W-BEAM ONLY)

See ANCHORS and PROTECTIVE COATINGS Notes on Sheet 2

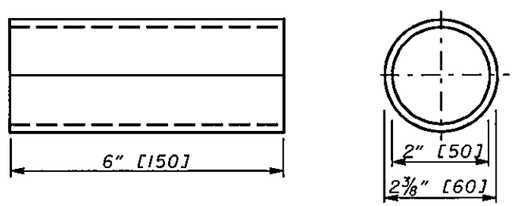


ANCHOR BRACKET ASSEMBLY DETAILS

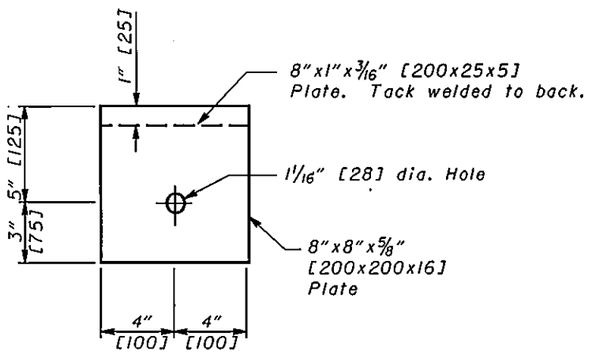


Channel legs shown down. For opposite hand, install Channel legs up.

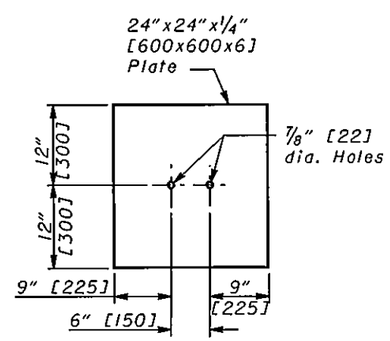
STRUT AND YOKE ASSEMBLY



POST SLEEVE



BEARING PLATE



SOIL PLATE

THIS DRAWING REPLACES GR-1.1 DATED 4-18-03.

OHIO DEPARTMENT OF TRANSPORTATION
7-16-04 DATE
ROADWAY DESIGN ENGINEER

STDS. ENGR. D. Focke

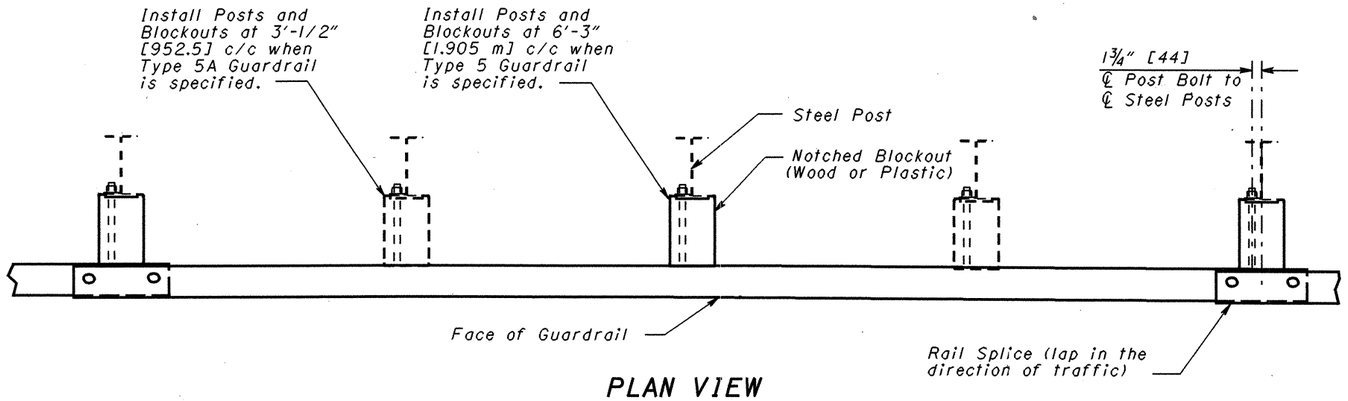
All metric dimensions [] are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

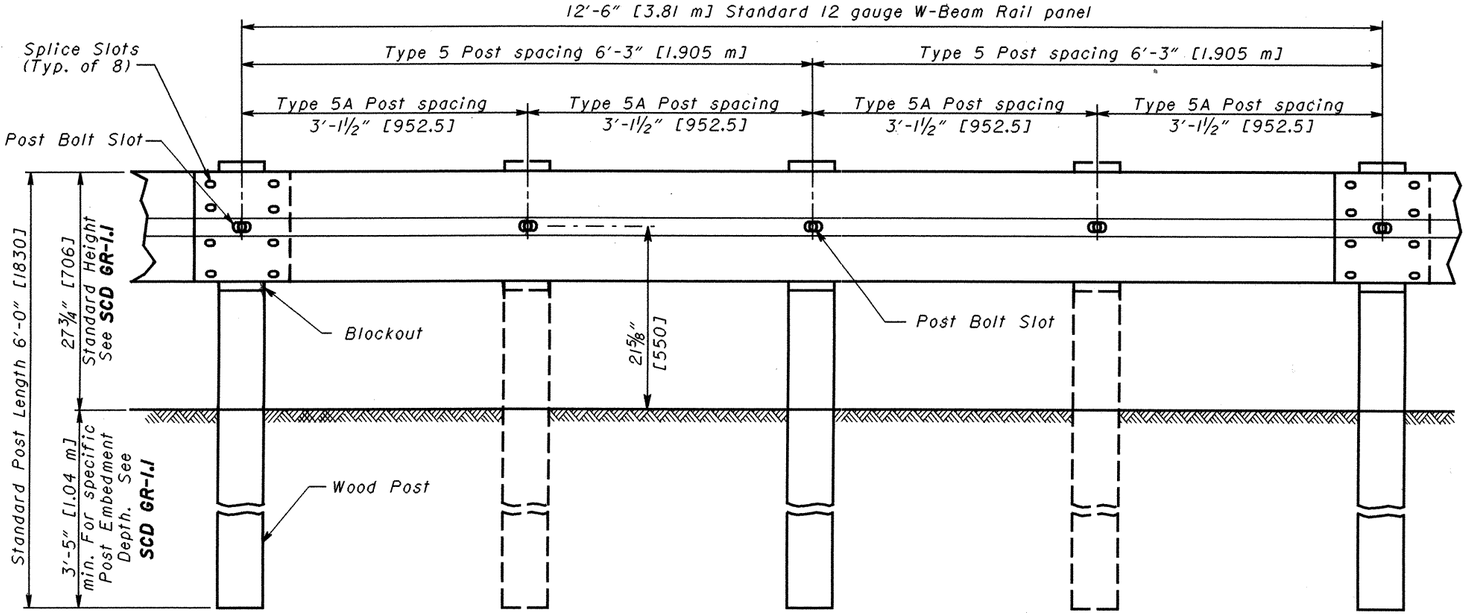
STANDARD ROADWAY CONSTRUCTION DRAWING

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

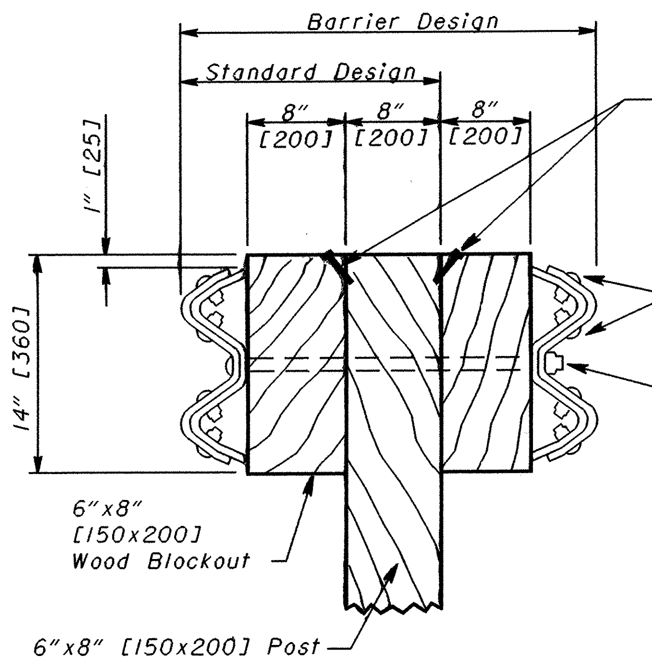
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

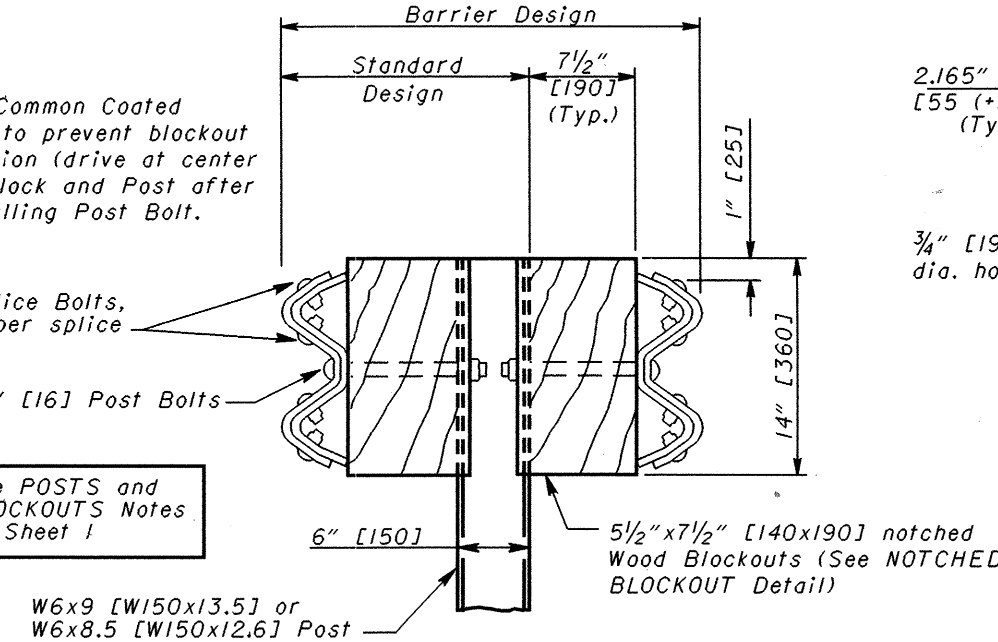
STANDARD ROADWAY CONSTRUCTION DRAWING

GUARDRAIL TYPE 5 & 5A

NUMBER **GR-2.1**

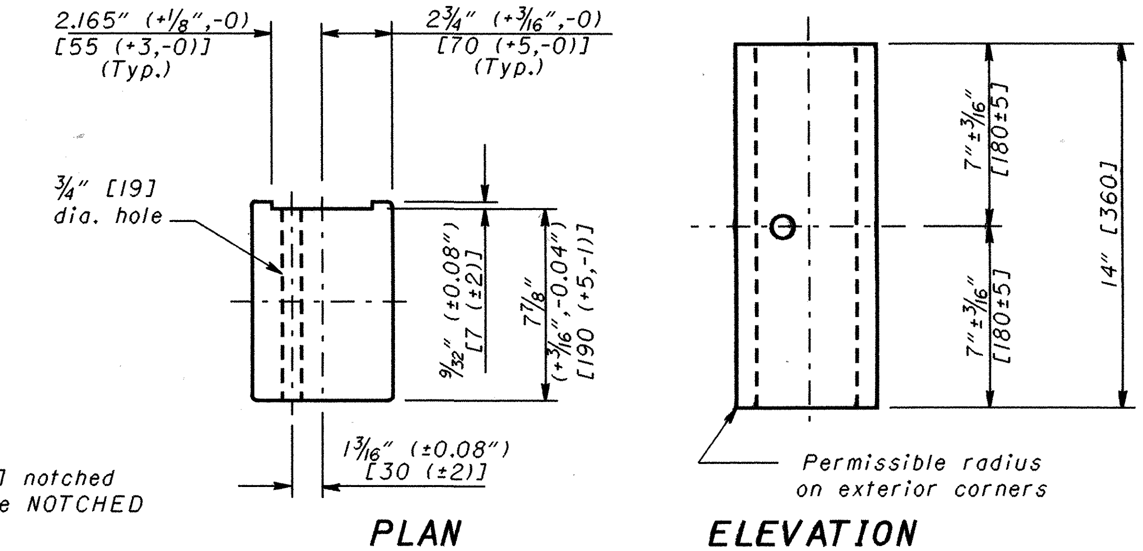


SQUARE WOOD POST



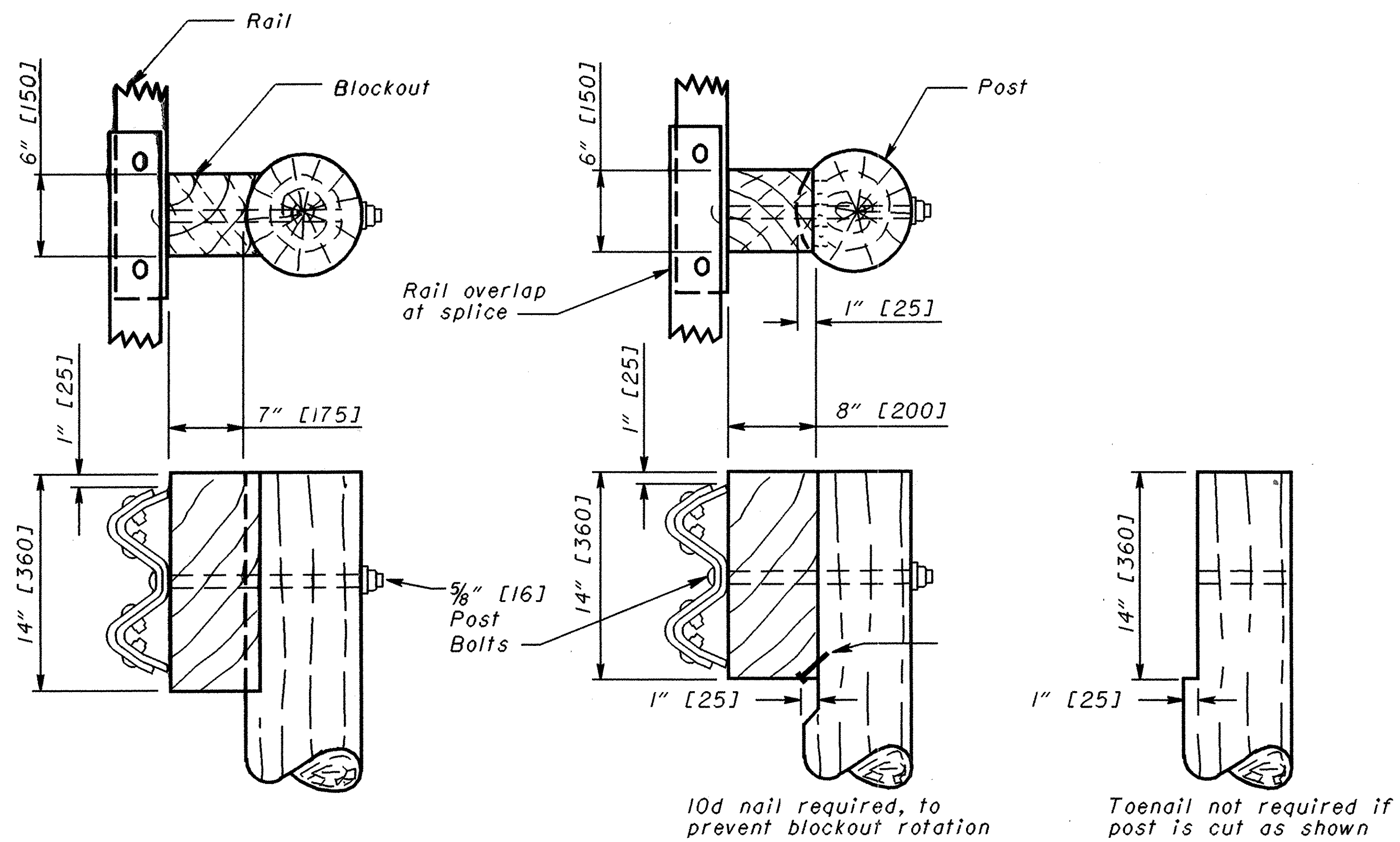
STEEL POST

See POSTS Note, Sheet 1



NOTCHED BLOCKOUTS FOR STEEL POSTS

See BLOCKOUTS Note on Sheet 1



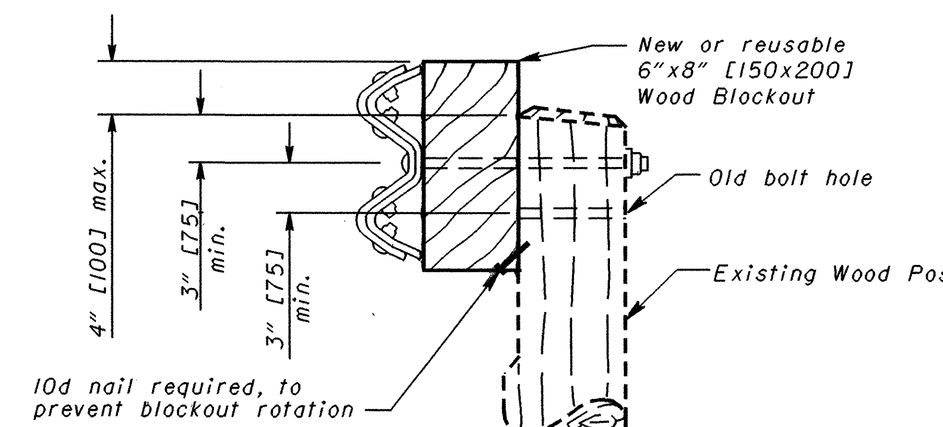
METHOD 1
Routed Blockout

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.

STANDARD ROADWAY CONSTRUCTION DRAWING

GUARDRAIL TYPE 5 & 5A

NUMBER GR-2.1

ROADWAY ENGINEERING SERVICES

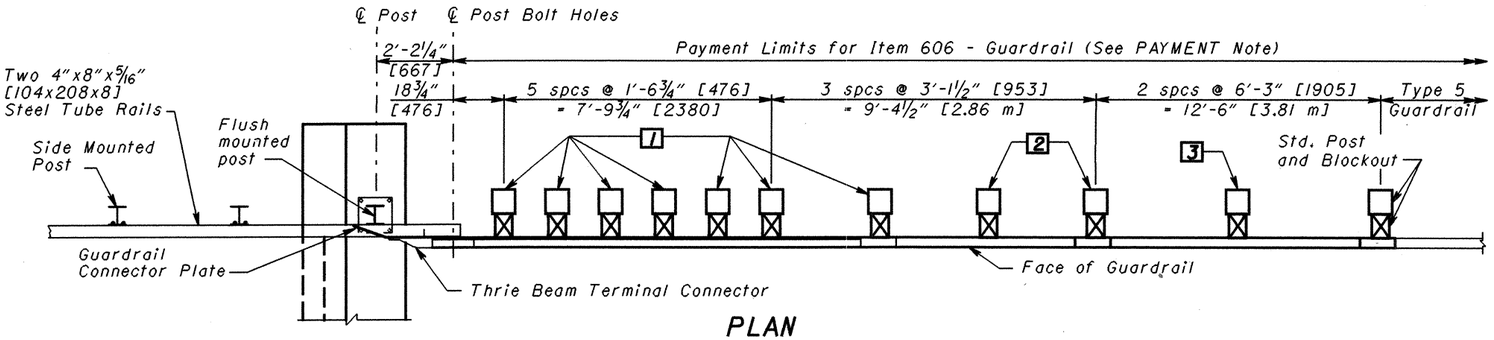
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

STDS. ENGR. D. Focke

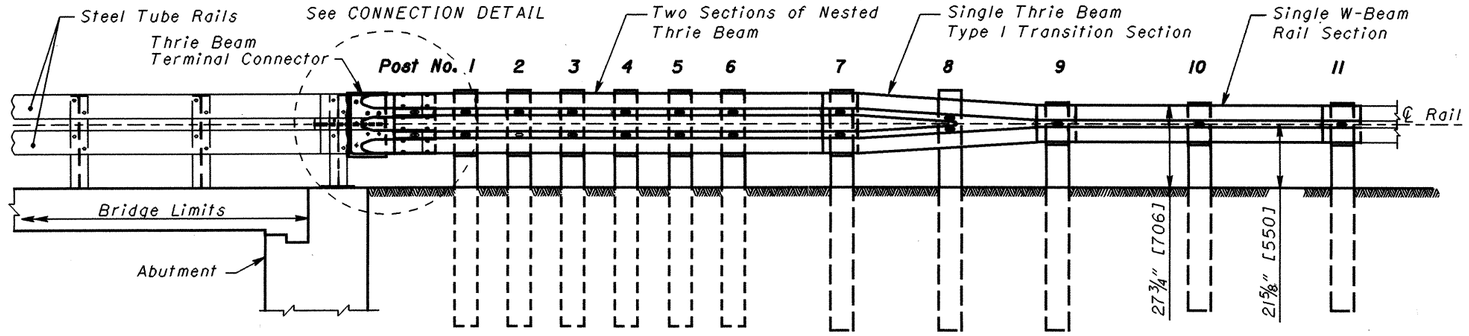
OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER

1-16-04
DATE

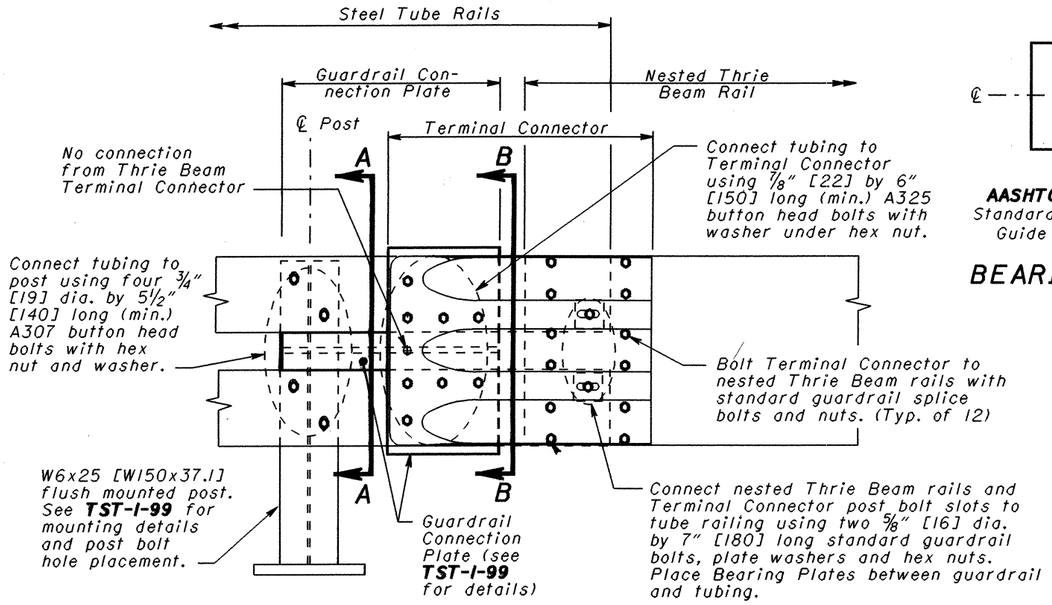
2/2



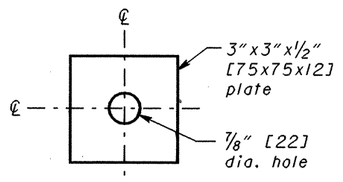
PLAN



ELEVATION

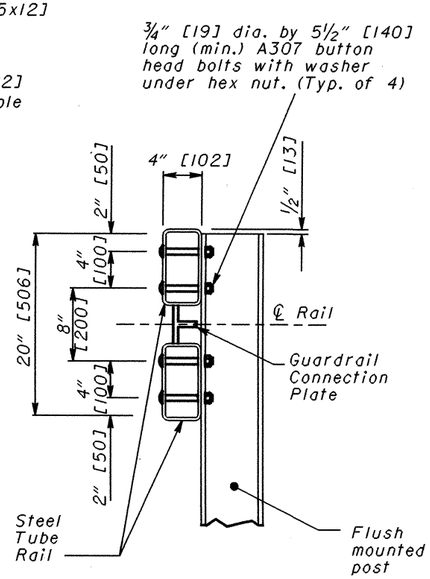


CONNECTION DETAILS

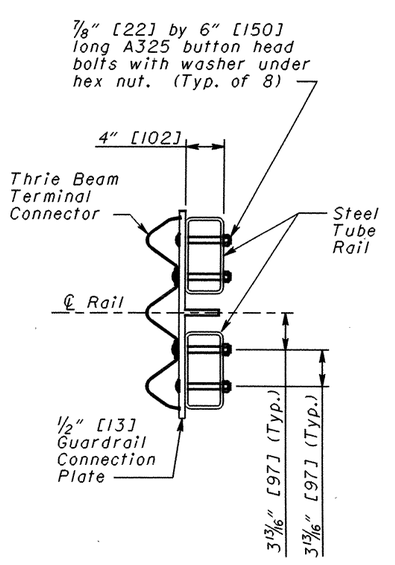


AASHTO/AGC/ARTBA
Standardized Hardware Guide part FWR09

BEARING PLATE



SECTION A-A
Section through Tubing at Post



SECTION B-B
Section through Tubing at Terminal Connector

NOTES

GENERAL: *For additonal guardrail details, including Thrie Beam Terminal Connector, see* ***SCD's GR-1.1.***

APPLICATION: *The Type TST Bridge Terminal Assembly shall be used to connect guardrail runs to both the approach and trailing ends of twin steel tube bridge railings.*

See ***Structural Engineering's SCD TST-1-99.*** *for Flush Mounted post and Guardrail Connection Plate and tubing details, (including tubing bolt hole placement).*

POSTS: *Posts may be set in drilled holes or driven to grade.*

WOOD POSTS shall be square, sawed pressure treated wood per CMS 710.14 and fabricated with square ends. Bolt holes shall be bored and tops of posts trimmed, if required, after posts are set.

STEEL POSTS: W6x9 [W150x13.5] (or W6x8.5 [W150x12.9]) posts may be substitued for 6x8 [150x200] wood posts. Notched wood blockouts, as shown on ***SCD GR-2.1****, (except 22" [550] long for posts 1 thru 7), are to be used with steel posts. Plastic blockouts are not permitted.*

PAYMENT: ***Item 606 - Bridge Terminal Assembly, Type TST, Each,*** *shall include the extra cost, in excess of normal guardrail costs, for additional and different type posts and blockouts, nested Thrie Beam sections, Transition sections, Terminal Connector, bearing plates, bolts, nuts, washers and other hardware.*

LEGEND

1 *Posts 1 thru 7:*
6"x8"x6'-6" [150x200x1980] Wood Posts with 6"x8"x22" [150x200x550] Wood Blockouts

2 *Posts 8 & 9:*
6"x8"x6'-6" [150x200x1980] Wood Posts with 6"x8"x14" [150x200x360] Wood Blockouts

3 *Post 10:*
6"x8"x6'-0" [150x200x1830] Wood Post with 6"x8"x14" [150x200x360] Wood Blockout

THIS DRAWING REPLACES GR-3.6 DATED 8-22-03.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
Larry T. Sutherland
1-16-04
DATE

STDS. ENGR.
D. Focke

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

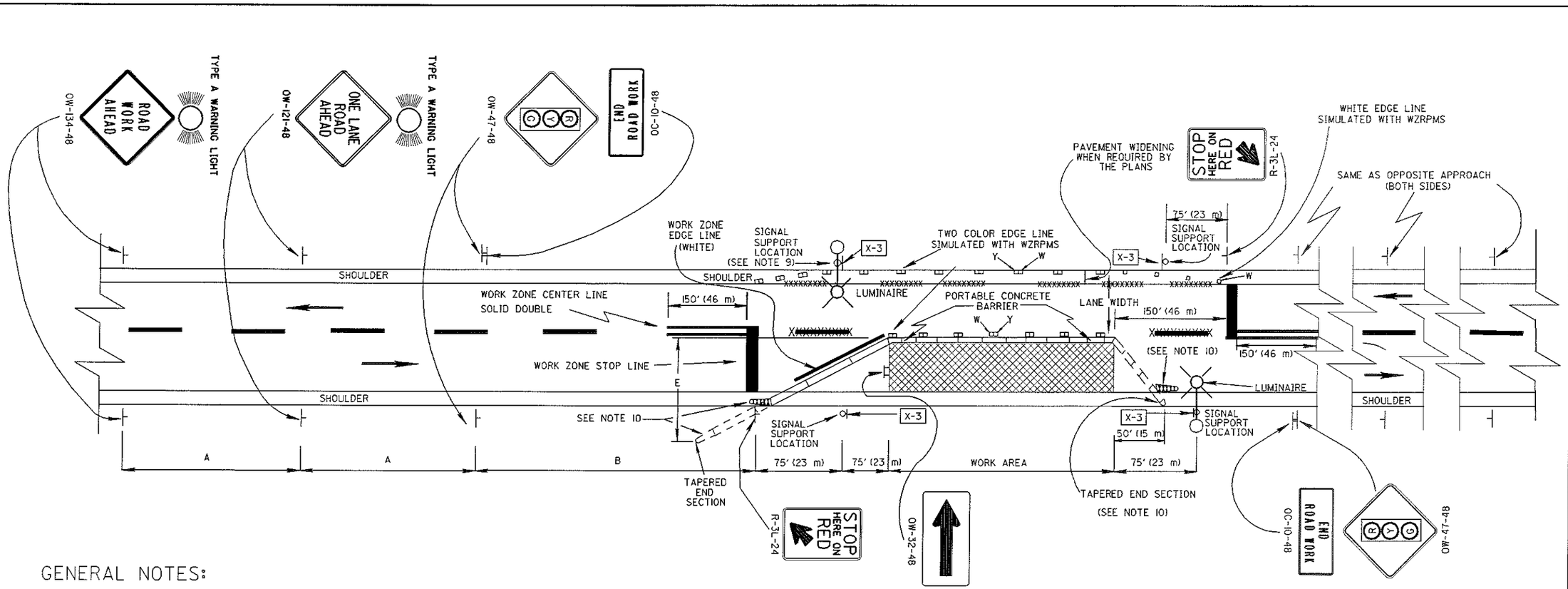
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING

BRIDGE TERMINAL ASSEMBLY, TYPE TST

NUMBER **GR-3.6**

1 / 1



GENERAL NOTES:

1. Initial signal timing and phasing shall be as shown in the plans. Changes shall be approved by the Engineer.

2. Signals shall be installed and operated in accordance with the requirements of Part 6 of the Ohio Manual of Uniform Traffic Control Devices.

3. Work zone center line, solid, double, shall be installed and maintained when existing center line , solid double is not in place. 12" (300 mm) stop lines shall be installed. Work Zone Raised Pavement Markers (WZRPMs) to simulate a two color edge line shall be provided. Existing conflicting pavement markings and raised pavement marker reflectors shall be removed. 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.

4. The horizontal or vertical alignment of the roadway may require adjustments in the location of the Advance Warning signs or the signal heads. Tree or brush trimming to provide adequate sight distance to sign and signals shall be provided as directed by the Engineer. The distances shown for Advance Warning Sign spacings in Table I are minimum.

5. 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.

6. All traffic signal and lighting equipment used in this installation, such as signal or lighting cable, signal heads, luminaires or signal controller shall be in conformance with specification Items 625, 632, 633, 713, 732 and 733. However, the performance tests of 625.22e and 632.27(6), the working drawing requirements of 625.04, 632.03 and 633.03, the wiring diagram and service manual requirement of 633.04 and the testing and prequalification requirement of 633.05 are waived. Also the requirements of 733.01 concerning expansible 3-dial units and twelve signal circuits are waived. Used equipment is acceptable. Conflict monitors shall be used except with electromechanical pretimed controllers with camshaft.

7. If the signal is changed to flashing operation, red shall be flashed to all approaches on all signal heads.

8. Existing barrier between work zone stop lines shall be delineated with Item 614-barrier reflectors.

9. For side mounted signals, see MT-96.20. For overhead mounted signals, see MT-96.21.

10. 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.

11. Work zone raised pavement markers shall be provided as per MT-101.20.

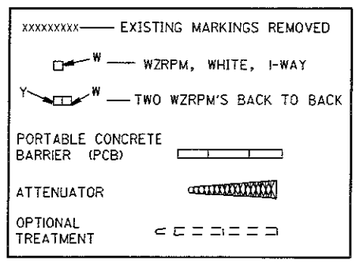
12. This standard drawing shall be used with standard drawing MT-101.70.

TABLE I

DISTANCE FT (m)	A	B	C
URBAN (≤ 40 MPH)	200 (60)	350 (105)	50 (15)
URBAN (≥ 45 MPH)	350 (105)	750 (230)	100 (30)
RURAL	500 (150)	750 (230)	100 (30)

TABLE II

SPEED LIMIT (MPH)	CLEAR ZONE WIDTH (E) FT (m)
40 OR LESS	15 (5)
45-50	19 (6)
55	23 (7)



SIGNALIZED CLOSING 1 LANE OF A 2 LANE HIGHWAY WITH PCB

04-19-02

OFFICE OF TRAFFIC ENGINEERING

MT-96.11

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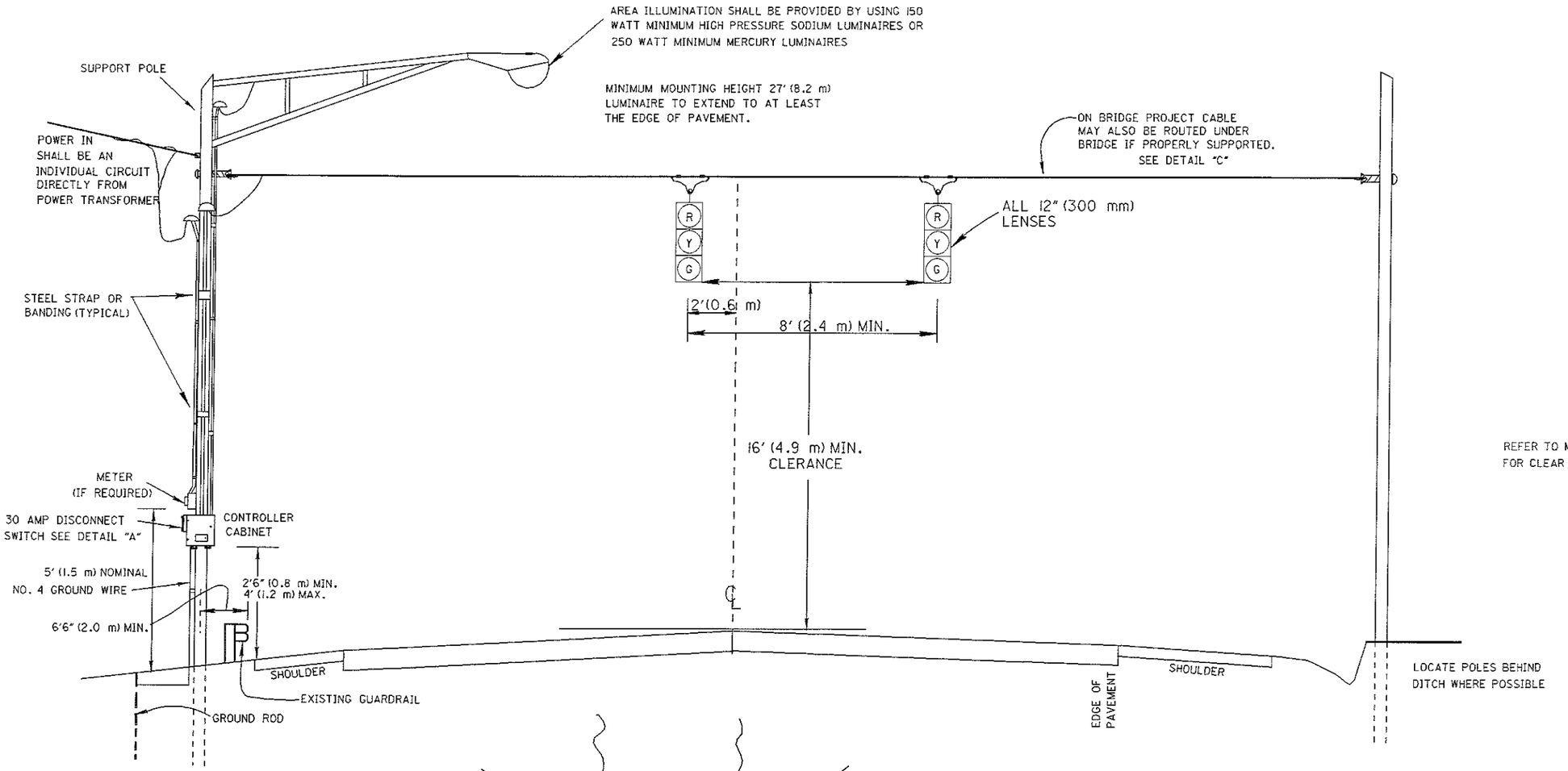
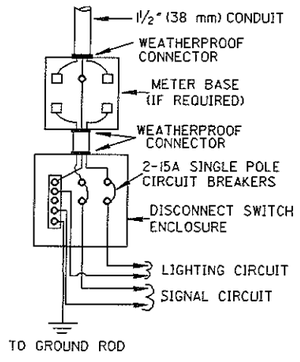
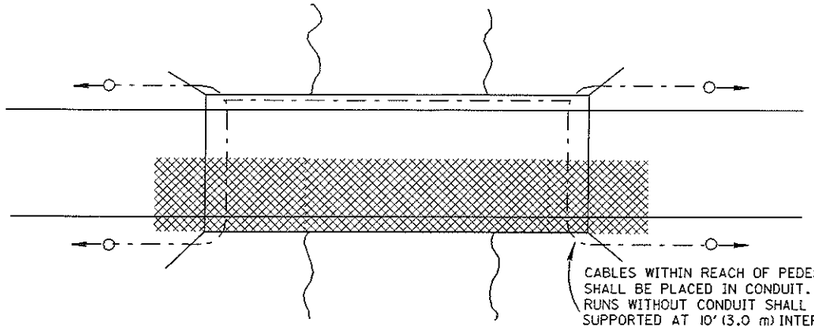


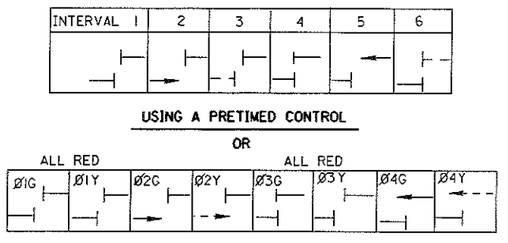


DETAIL "A"



ALTERNATE CABLE ROUTING

DETAIL "C"



USING A PRETIMED CONTROL

OR

USING A 4 PHASE ACTUATED CONTROL

WHEN CALLED FOR IN THE PLANS, Ø2 GREEN AND Ø4 GREEN SHALL BE ACTUATED BY DETECTORS AT APPROACH TO THE WORK ZONE. Ø1 & Ø3 ARE DUMMY PHASES TO TIME ALL RED INTERVAL. TIMING INITIALIZES ON PHASE ONE.

DETAIL "B"
SIGNAL PHASING

04-19-02

DETAILS FOR SIGNALIZED CLOSING 1 LANE OF A 2 LANE HIGHWAY-OVERHEAD MOUNTED

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MT-96.21

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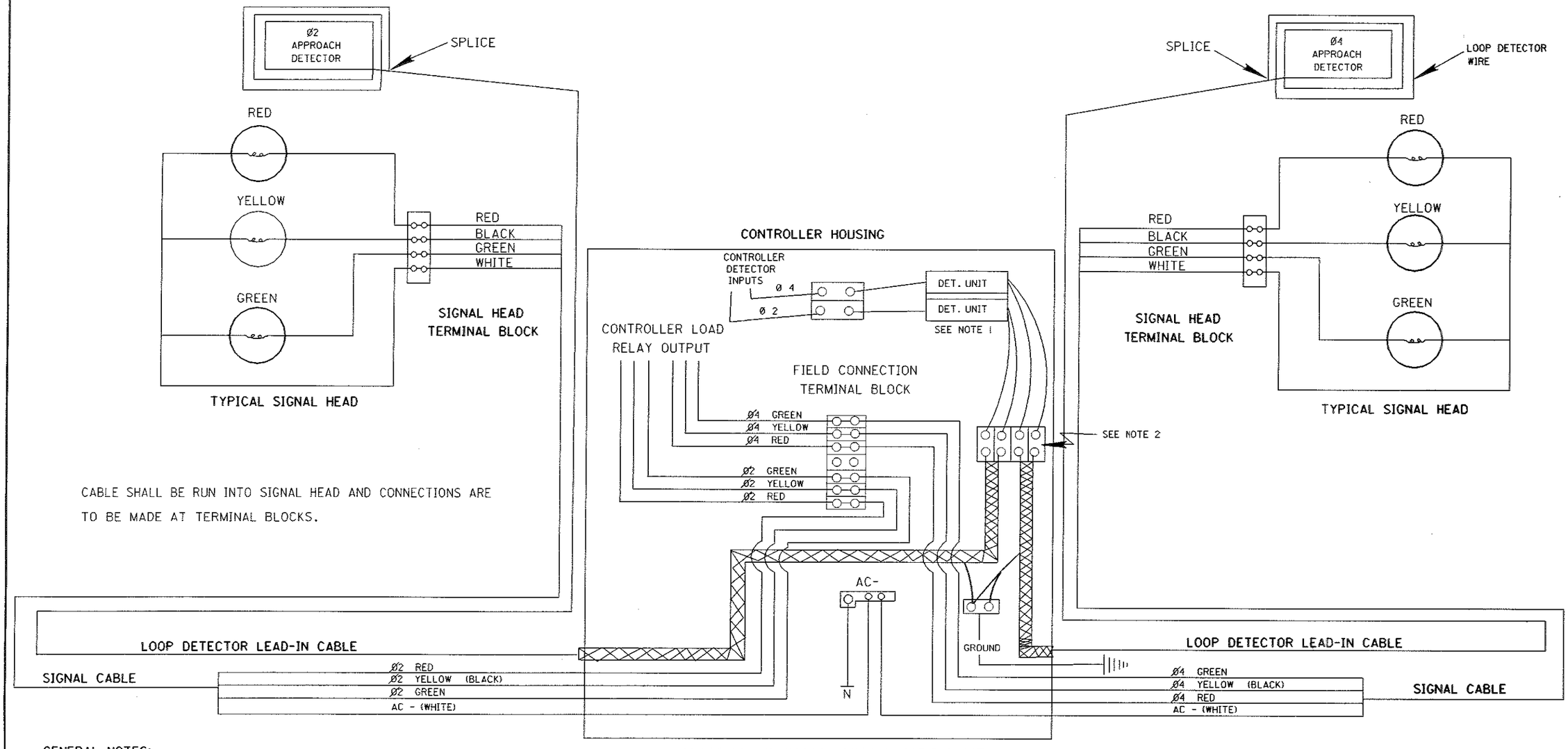

TYPICAL SIGNAL HEAD HOOK-UP

GENERAL NOTES:

1. Detection may be loop, magnetometer, sonic or infra-red but shall be chosen, installed and operated to provide dependable accurate detection on each approach without false calls resulting from other traffic. Cabling shown is for loop detectors. However, suitable cable types, as recommended by the manufacturers shall be used for other detectors.

2. Lightning protection, as required in 733.04 shall be provided for solid state electronic controllers and detectors.

3. Signal cable shall be 5/c No. 14 AWG as specified in 732.19. All electrical connections to be made at terminal blocks using lock fork terminals. Splices in signal cable should be avoided but if necessary splice kits shall be used. All connections at splice points shall be soldered.

4. Signal timing settings shall be as shown in the plans or provided to the Contractor by the Engineer prior to implementation of signal control. The Contractor shall periodically monitor the signal operation to determine failure or inefficient operation.

   All equipment failures including timing mechanisms and detectors shall be reported to the Engineer and fully repaired by the Contractor as soon as possible, but in no case longer than 8 hours following notification of the Contractor by the Engineer. All failures resulting in unsafe operations of the signal (i.e., signal or lamp failure, short-timing of yellow or all red intervals, mis-aimed signals, conflicting displays) shall result in the Contractor using 2-way radios to control traffic through the work area until the signal is fully repaired. Failures shall include situations caused by traffic accidents, acts of God or any other cause whether under the control of the Contractor or not.

   If the Engineer determines that the signal operation, although in accordance with the plans and previous orders, is not providing acceptable safe and efficient movement of traffic, the Engineer shall order that appropriate changes such as timing alterations, signal or detector relocations, etc. be made to remedy the situation, at no additional cost to the State. Timing changes and signal relocations shall be implemented within four hours, detector relocations and changes within 24 hours. Failure to make required changes within these time limits shall result in the assessment of liquidated damages of $100.00 per calendar day until the changes are completed.

WIRING DIAGRAM FOR SIGNALIZED ACTUATED-WIRING DIAGRAM FOR SIGNALIZED 1 LANE OF A 2 LANE HIGHWAY CLOSING 1 LANE OF A 2 LANE HIGHWAY

4-20-01

OFFICE OF TRAFFIC ENGINEERING

MT-96.26

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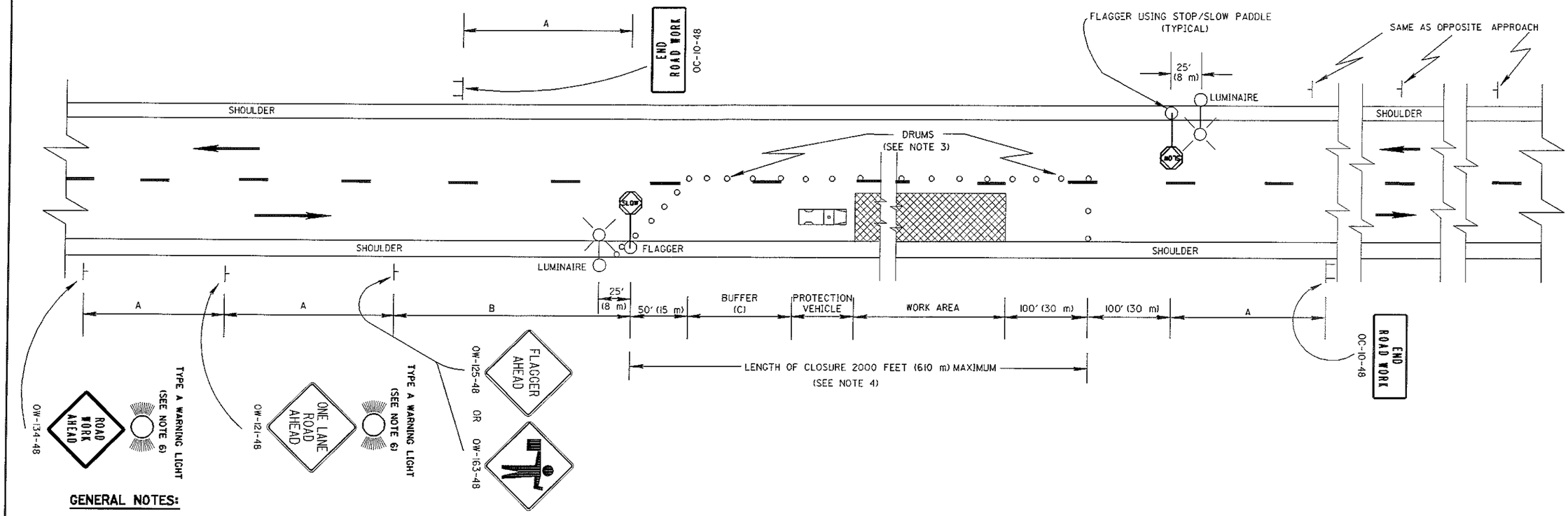

GENERAL NOTES:

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

2. Flaggers, one for each direction shall be used to control traffic continuously for as long as a one lane operation is in effect. The flaggers shall be able to communicate with each other at all times.

3. Drums shall be spaced at 50' (15 m) center to center along the closure. Drums on the advance taper shall be spaced at 10' (3 m) center to center. Cones having a minimum height of 28" (0.7 m) may be substituted for drums for daytime lane closures. Provisions shall be made to stabilize the cones to prevent them from blowing over.

4. Several small work areas close together shall be combined into one work zone. However, the closure shall not be more than 2000' (610 m) long unless approved by the Engineer. The minimum length between closures shall be 2000' (610 m). Only one side of the road shall be closed in any one work zone.

5. The protection vehicle shown at the beginning of the work area shall be in place and unoccupied whenever workers are in the work area. This protection vehicle shall be removed from the pavement when workers are not in the work area. Other protective devices such as truck mounted attenuator may be used. The vehicle shall be equipped with a 360° rotation or flashing amber beacon clearly visible a minimum of on quarter mile (400 m).

6. The Type A flashing warning lights shown on the OW-134 and the OW-121 signs are required whenever a night lane closure is necessary.

7. Adequate area illumination of each flagger station shall be provided at night by using 150 watt minimum high pressure sodium luminaires or 250 watt minimum mercury luminaires. Luminaires shall be located adjacent to one flagger station for each direction of traffic as shown above. The mounting height for luminaires shall be a minimum of 27' (8.2 m) above the pavement and mounted on a support of adequate strength to provide a satisfactory installation. The overhead conductor clearance shall be a minimum of 18' (5.5 m) above the pavement. The luminaire arm shall be of sufficient length to extend to the edge of the pavement. Poles shall be erected a minimum of 6'6" (2.1 m) behind face of guardrail where existing, or 12' (3.6 m) from the edge of pavement, where possible locate the luminaires behind ditch. Lighting material shall comply with specification 713.

8. Within the length of closure, provision shall be made to control traffic entering from intersecting streets and major drives as necessary to prevent wrong way movements and to keep vehicles off of new pavement not ready for traffic. The method of control shall be subject to the approval of the Engineer.

9. 36 inch (900 mm) warning sign sizes may be used when the legal speed limit is 40 mph or less.

MINIMUM DISTANCE FT (m)	A	B	C
URBAN (≤ 40 MPH)	200 (60)	200 (60)	170 (50)
URBAN (≥ 45 MPH)	350 (105)	350 (105)	335 (100)
RURAL	500 (150)	500 (150)	335 (100)

FLAGGERS CLOSING 1 LANE OF A 2 LANE HIGHWAY STATIONARY OPERATION

04-19-02

OFFICE OF TRAFFIC ENGINEERING

MT-97.10

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JAM

614 WORK ZONE RAISED PAVEMENT MARKERS

GENERAL

This item of work shall consist of furnishing, installing, maintaining and subsequently removing work zone raised pavement markers (TRPMs). The markers shall be yellow or white, as described in the plan.

MATERIAL

All markers and retroreflectors shall be of sufficient strength and properly shaped so as not to be dislodged or broken by impacts from vehicles tires, including those of high pressure truck tires loaded to 4500 pounds (2040 kilograms).

Retroreflectors shall be provided in one or two directions on each marker as required by the usage and shall return white or yellow light as is appropriate for the application.

The reflector shall have an effective area of 0.35 sq. inches (225 sq. mm) for Type A or 3.0 sq. inches (1935 sq. mm) for Type B. Its brightness or specific intensity (when tested at 0.2 degree angle of observation and the following angles of incidence) shall meet or exceed the following:

SPECIFIC INTENSITY

TYPE A

INCIDENCE ANGLE (DEGREES)	WHITE	YELLOW
0	1.0	0.6
20	0.4	0.24
45	—	—

TYPE B

	WHITE	YELLOW
0	3.0	1.8
20	1.2	0.72
45	0.3	0.2

Angle of incidence formed by a ray from light source to the marker and the normal to the leading edge of the marker face (also horizontal entrance angle).

Angle of observation formed by a ray from light source to the marker and the returned ray from the marker to the measuring receptor.

Specific intensity is the mean candlepower of the reflected light (at given incidence and divergence angles) for each foot candle (10.7 lux) at the reflector (on a plane perpendicular to the incident light) .

Type A markers are intended to provide high visibility both day and night. Their daytime visibility shall be assured by size, shape and color as follows:

1) The markers shall be a high visibility yellow or white color which will not degrade substantially due to traffic wear and which will match the color of the reflector.

2) When viewed from above, the markers shall have a visible area of not less than 14 sq. inches (9030 sq. mm).

3) When viewed from the front, parallel to the pavement, as from approaching traffic, the marker shall have a width of approximately 4 inches (100 mm) and a visible area of not less than 1.5 sq. inches (970 sq. mm).

Type B markers are intended to provide high visibility at night by retroreflecting light from automotive headlights back to the driver.

INSTALLATION

WZRPMs shall be attached to clean, dry pavement by a butyl adhesive pad, a bituminous adhesive or other construction grade adhesives (such as Franklin Panel and Metal Adhesive) suitable to anchor the marker under the above conditions. When it is necessary to attach markers to new concrete pavement with curing compound remaining, the curing compound membrane shall be removed by sandblasting or other mechanical cleaning method. Markers shall be installed in accordance with the manufacturer's recommendations.

The Contractor shall immediately replace, at his expense, any markers which fail (broken housing, housing worn to the extent that daytime visibility is significantly diminished or of an unacceptable color, detached or broken reflector, housing detached from adhesive).

Markers are likely to be removed by snow plowing operations, thus they are not considered suitable for use during the period from october 15 until april 30. The Contractor is advised to schedule his work and/or the use of these devices to avoid this period. Should the Contractor choose to use WZRPMs during this period and they are subsequently removed or destroyed by snow and ice control activities. The Contractor shall immediately, at his expense, provide a substitute traffic guidance system effective during day and night and which is acceptable to the Engineer.

The markers shall be placed accurately to depict straight or uniformly curving lines. When used to supplement work zone pavement markings, they shall be placed on or immediately adjacent to the pavement marking. Locations shall be adjusted up to 12 inches (300 mm) longitudinally or 6 inches (150 mm) laterally to avoid placement on joints, or on cracked or deteriorated pavement. Markers shall not be placed directly on pavement markings if this detracts from their ability to remain attached to the pavement.

APPLICATION

1) When required to supplement pavement marking, work zone raised pavement markers shall be placed as follows:

LINE	TYPE	SPACING
EDGE LINE	A OR B	20' (6 m) C/C
LANE LINE	A OR B	40' (12 m) C/C*
CENTER LINE (SINGLE BROKEN)	A OR B	40' (12 m) C/C*
CENTER LINE (DOUBLE/SOLID)	A OR B	2 UNITS SIDE BY SIDE 4" (100 mm) APART 20' (6 m) C/C
CHANNELIZING LINE (INCLUDES EXIT GORE NOSE)	A OR B	10' (3 m) C/C

* CENTERED IN GAP

2) When used to substitute for (replace) pavement marking, work zone raised pavement markers shall be placed as follows:

LINE	TYPE	SPACING
EDGE LINE	A	5' (1.5 m) C/C
LANE LINE	A	5 @ 2.5' (0.75 m) C/C 30' (9 m) GAP [40' (12 m) CYCLE]
CHANNELIZING LINE (INCLUDES EXIT GORE NOSE)	A	5' (1.5 m) C/C
EDGE LINE (TWO COLOR) (WHITE/YELLOW)	A	BACK TO BACK 5' (1.5 m) C/C

Yellow markers used to separate opposite flows of traffic (center lines) shall include retroreflectors for both directions. All other yellow and white markers shall provide retroreflectivity for one direction only.

REMOVAL

Removal shall be accomplished in a manner such that little or none of the adhesive remains on the pavement. Permanent pavement surfaces shall not be scarred, broken or roughened significantly.

PAYMENT

Basis of payment shall be at the contract unit price per each marker and shall include all labor, equipment, hardware and incidentals required to perform the work. It shall also include replacement at no additional cost of all work zone raised pavement markers which, in the judgement of the Engineer, fail for any reason, execpt due to failure of the pavement to which they are attached.

ITEM	UNIT	DESCRIPTION
614	EACH	WORK ZONE RAISED PAVEMENT MARKER

10-18-02

WORK ZONE RAISED PAVEMENT MARKERS

OFFICE OF TRAFFIC ENGINEERING

MT-101.20

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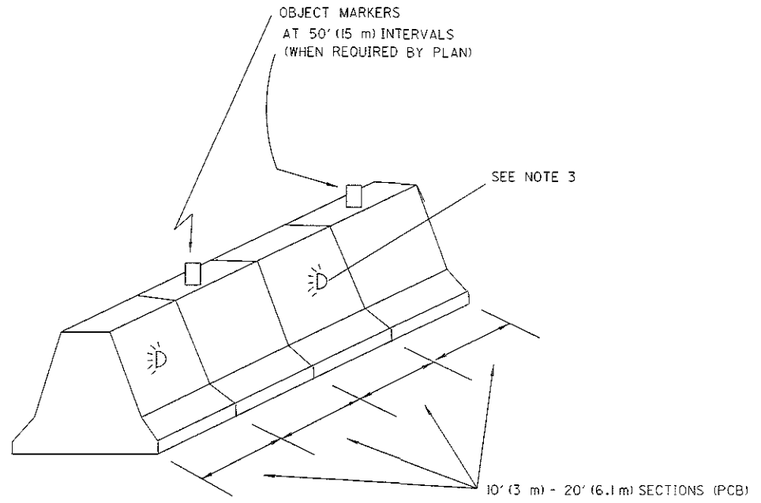
1. PCB SHALL BE DELINEATED AS FOLLOWS:

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

OFFICE OF TRAFFIC ENGINEERING

MT-101.70

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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

OFFICE OF TRAFFIC ENGINEERING

MT-105.10

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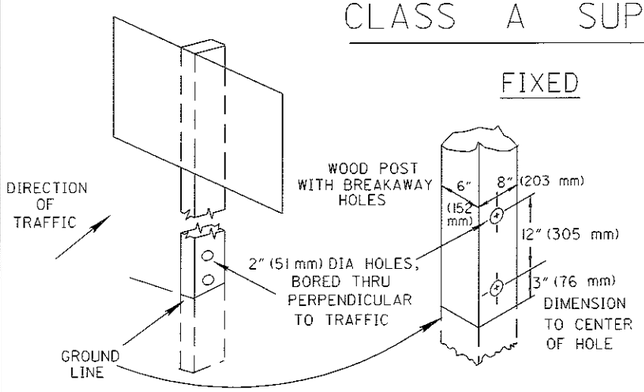
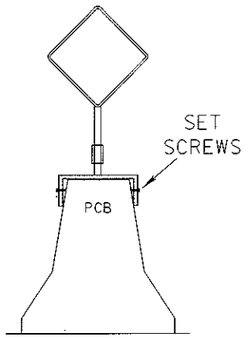
CLASS A SUPPORTS

FIXED



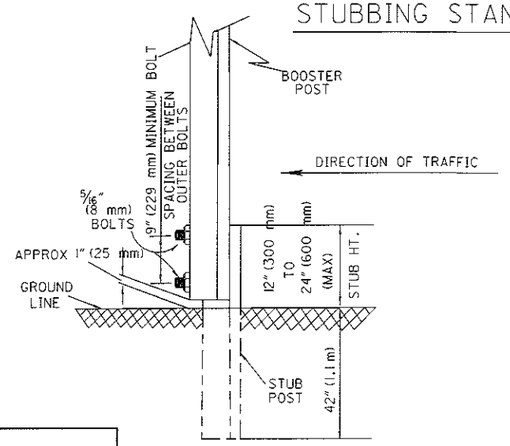
TYPE E (6"x8" max.)



TYPE I

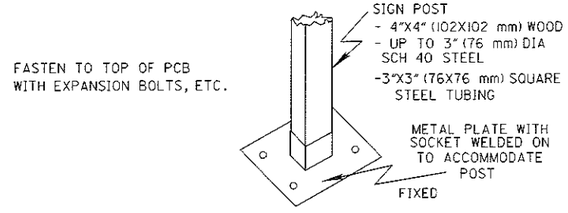
CLASS A SUPPORTS

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

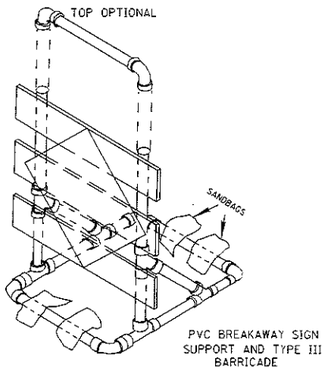


TYPE 2

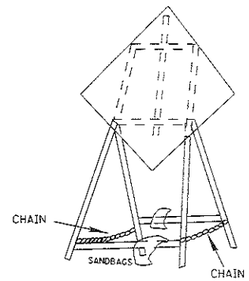
NOTE: SPECIFIC INFORMATION SEE MT-105.10

CLASS A SUPPORTS

PORTABLE

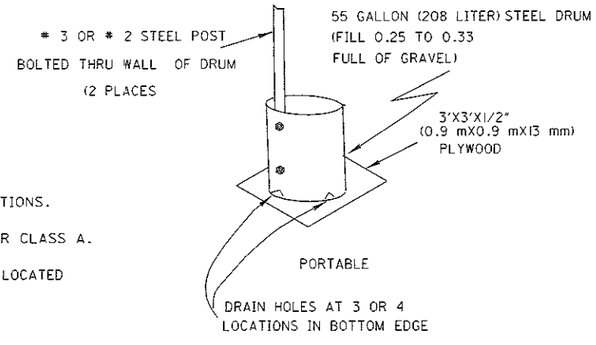


PVC BREAKAWAY SIGN SUPPORT AND TYPE III BARRICADE



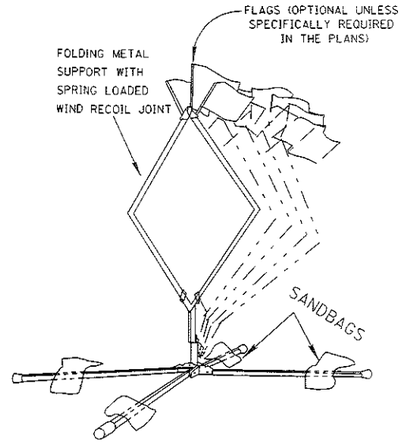
EASEL

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

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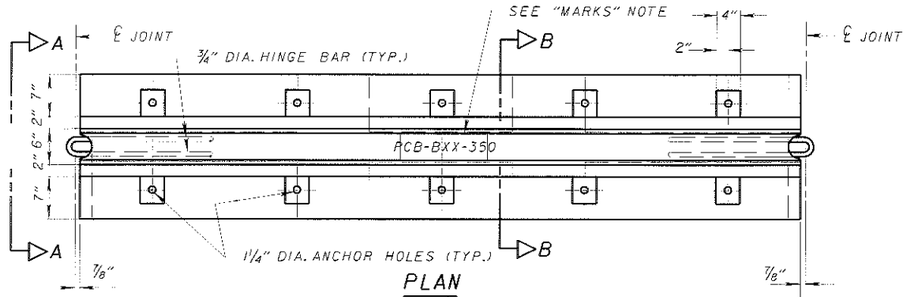
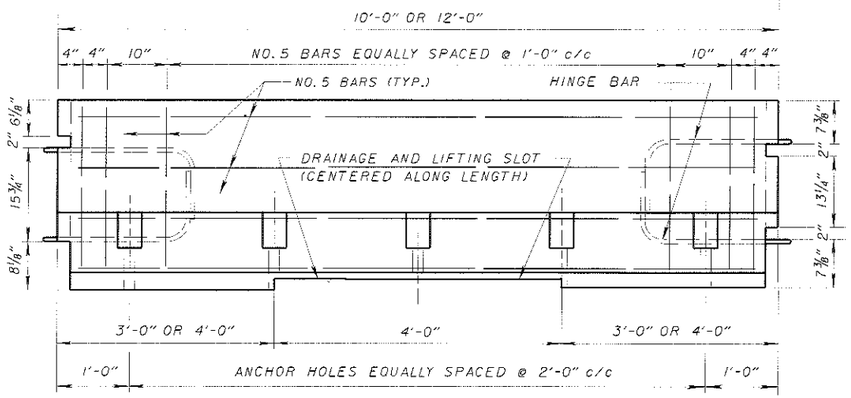
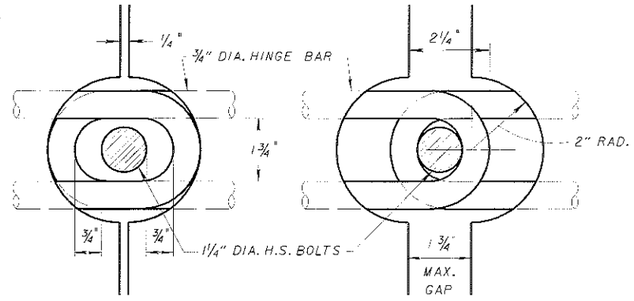
JAM



PLAN

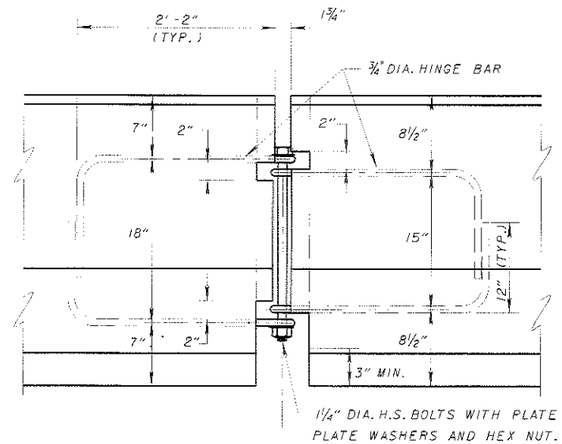


ELEVATION



(1) CLOSED JOINT (2) OPEN JOINT

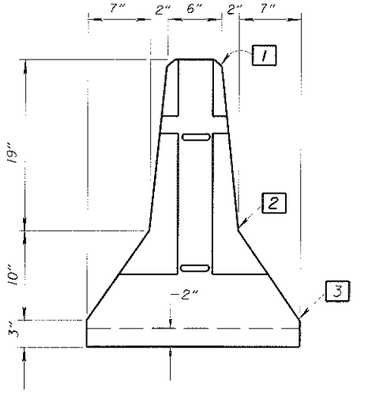
JOINT CONNECTION DETAILS



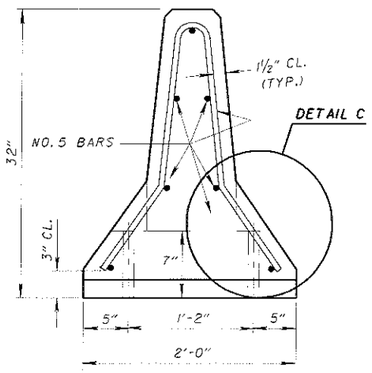
DETAIL AT HINGED CONNECTION

(1) **BARRIERS** SHALL INITIALLY BE PLACED CLOSER TOGETHER SO BOLTS CAN BE EASILY INSERT-THROUGH HINGE BAR LOOPS.

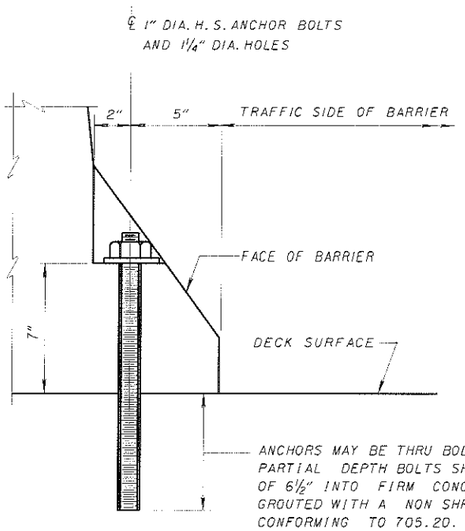
(2) **BARRIER JOINTS** SHALL BE FULLY OPEN BEFORE NUT IS TIGHTENED ONTO BOLT



VIEW A-A



SECTION B-B



ANCHORS MAY BE THRU BOLTS OR PARTIAL DEPTH BOLTS. PARTIAL DEPTH BOLTS SHALL BE EMBEDDED A MINIMUM OF 6½" INTO FIRM CONCRETE ACCORDING TO 510 AND GROUTED WITH A NON SHRINK, NON METALLIC GROUT CONFORMING TO 705.20. WHEN NO LONGER NEEDED, REMOVE ANCHORS AS DIRECTED BY THE ENGINEER. WHERE DECK IS TO REMAIN, FILL HOLES WITH GROUT, 705.20.

DETAIL C

[1] 1" RADIUS OR ¾" CHAMFER ALL TOP AND END CORNERS

[2] PERMISSIBLE 10" RADIUS

[3] PERMISSIBLE 1" RADIUS

GENERAL NOTES

DESCRIPTION: THE BRIDGE MOUNTED PORTABLE CONCRETE BARRIER IS COMPLIANT WITH NCHRP REPORT 350. UNANCHORED, THE BARRIER HAS BEEN SUCCESSFULLY CRASH TESTED TO THE TEST LEVEL 3 CRITERIA. FULLY ANCHORED ON THE TRAFFIC SIDE, THE BARRIER SATISFIES THE TEST LEVEL 4 CRITERIA.

HARDWARE: ALL BOLTS, ANCHORS, NUTS AND WASHERS SHALL CONFORM TO 711.09 (ASTM A325) AND SHALL BE GALVANIZED ACCORDING TO 711.02.

REINFORCING STEEL: FURNISH ALL REINFORCING STEEL, INCLUDING THE ¾" DIA. HINGE BARS, ACCORDING TO 509.02. GALVANIZE THE HINGE BARS ACCORDING TO 711.02 AFTER FABRICATION.

CONCRETE: FURNISH CLASS C CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.

BRIDGE DECK SURFACE PREPARATION: THE CONCRETE SURFACE, WHERE THE BARRIER IS TO BE PLACED, SHALL BE FREE OF LOOSE SAND, GRAVEL, DIRT OR OTHER FOREIGN MATERIAL. LEVEL ALL SURFACE IRREGULARITIES TO THE SATISFACTION OF THE ENGINEER WITH GROUT OR ASPHALT. PLACE ROLLED ASPHALT ROOFING MATERIAL ON THE SURFACE AREAS THAT, AT THE DISCRETION OF THE ENGINEER, HAVE INSUFFICIENT ROUGHNESS TO PROVIDE THE REQUIRED FRICTION CONTACT BETWEEN THE BARRIER SEGMENTS AND THE DECK.

ANCHORS: ONCE ALL BARRIER SECTIONS HAVE BEEN PROPERLY SECURED, REMOVE ALL PORTIONS OF THE ANCHORS THAT PROTRUDE BEYOND THE FACE OF THE BARRIER.

MARKS: CLEARLY MARK ALL BARRIER SEGMENTS ON THE TOP AS SHOWN. XX INDICATES THE YEAR THE BARRIER WAS CAST. THESE MARKINGS SHALL BE PERMANENTLY IMPRESSED IN THE BARRIER USING A MINIMUM OF 2" HIGH LETTERING. EACH SEGMENT SHALL HAVE ON ITS TOP, A UNIQUE IDENTIFICATION AS TO ITS MANUFACTURER; AND, SOMEWHERE ON THE BARRIER, THE DAY AND MONTH THE BARRIER WAS MANUFACTURED.

HANDLING DEVICES MAY BE USED IN LIEU OF THE LIFTING SLOT FOR MOVING THE BARRIER. THE DESIGN OF THE DEVICES SHALL BE SUFFICIENT TO HANDLE THE WEIGHT OF THE SECTION BEING LIFTED. REMOVE ALL PORTIONS OF HANDLING DEVICES THAT PROTRUDE ABOVE THE BARRIER SURFACE.

PROJECT PLANS: THE DESIGNERS SHALL INDICATE THE FOLLOWING INFORMATION ON THE PROJECT PLANS: THE NUMBER OF ANCHORS PER SEGMENT, SPECIAL ANCHORAGE REQUIREMENTS (IF NECESSARY) AND THE LOCATION OF THE BARRIER ON THE BRIDGE DECK.

"J-J HOOKS" END CONNECTIONS MAY BE UTILIZED IN LIEU OF THE END CONNECTIONS DETAILED. NO MODIFICATIONS TO THE REINFORCING STEEL LAYOUT DETAILED HEREIN WILL BE ALLOWED. 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.

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ADMINISTRATOR
DATE 4-24-02

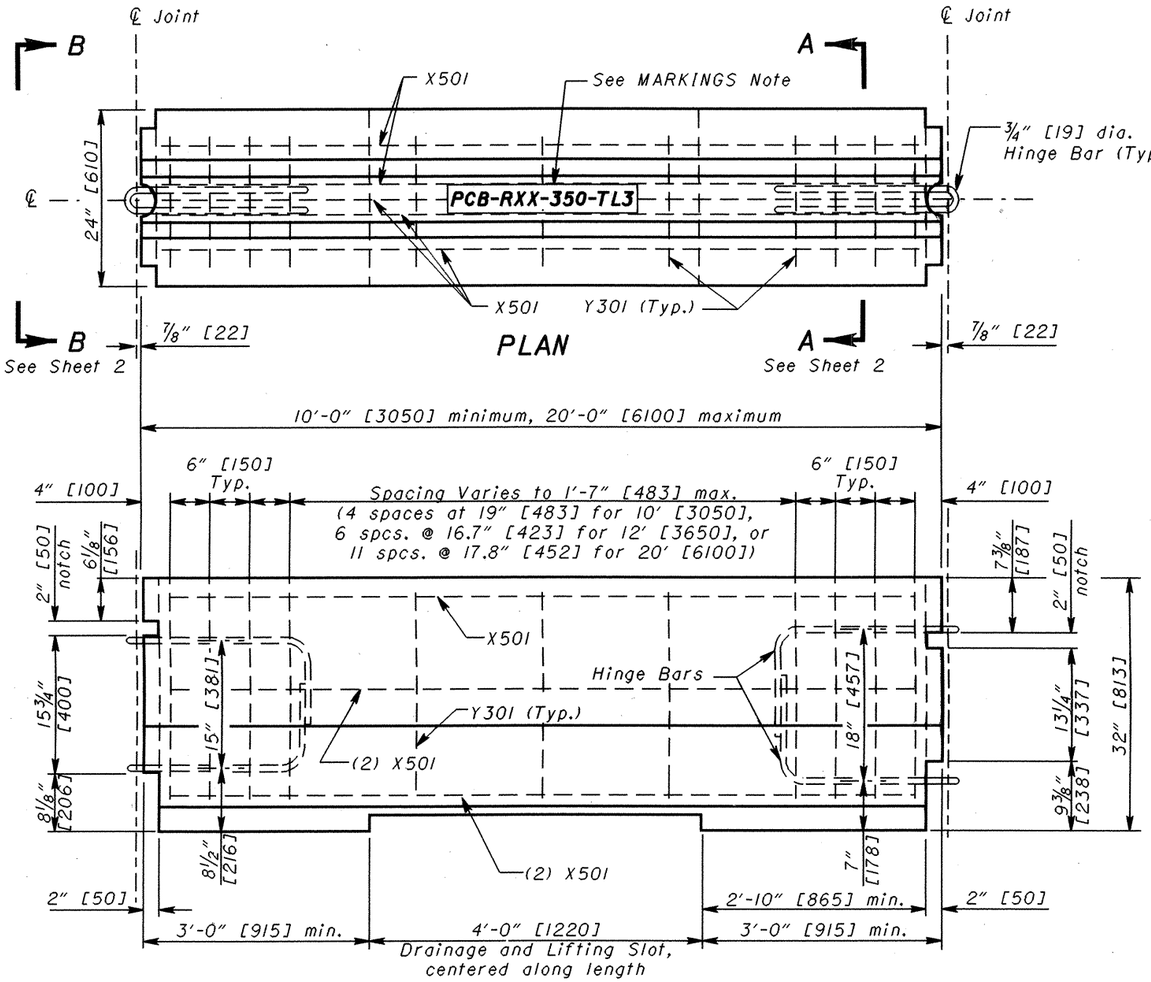
REVISIONS
07-06-99
07-19-02

REVIEWED LMW
CHECKED WTF
DESIGNED AJM
DRAWN CFJ

PCB-91

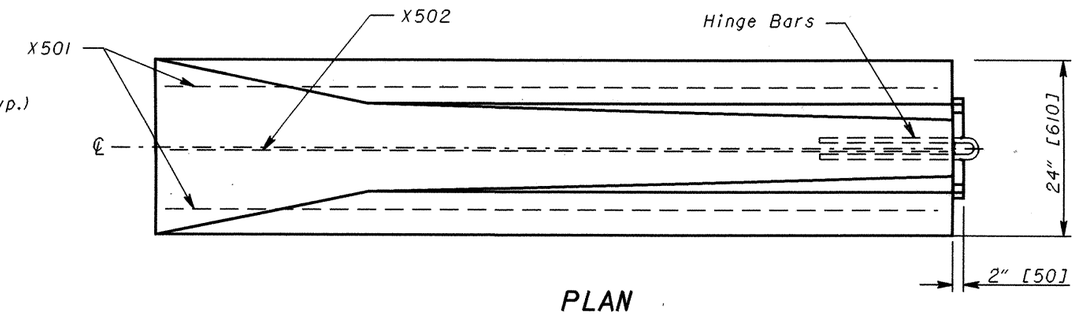
STANDARD
PORTABLE CONCRETE BARRIER
DETAILS

1 / 1

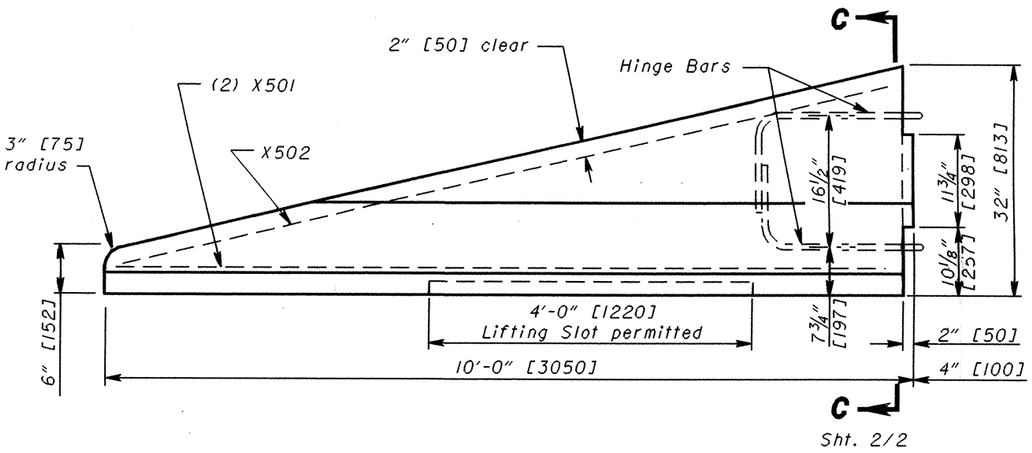


ELEVATION

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

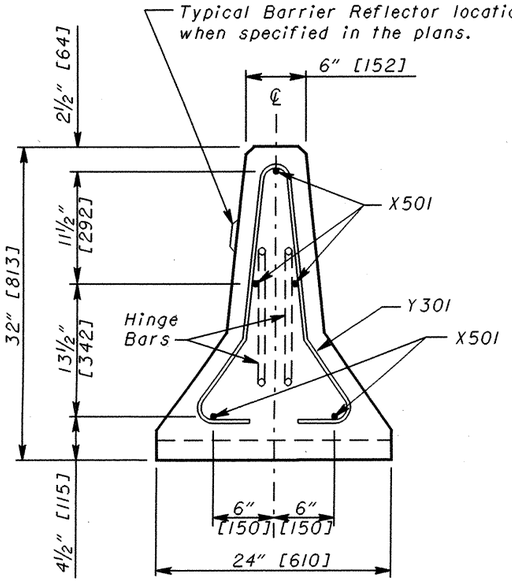
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING

32" PORTABLE CONCRETE BARRIER

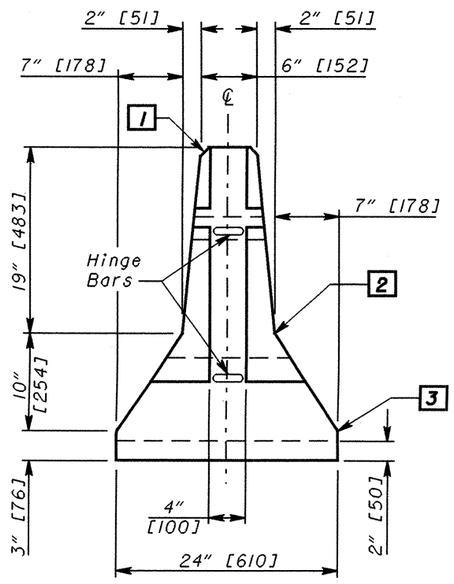
NUMBER RM-4.2



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

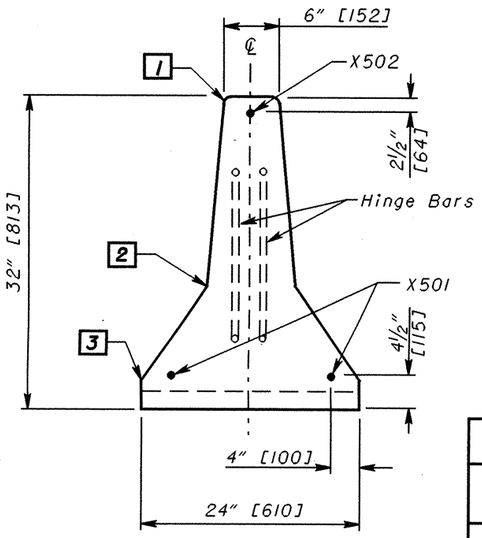
SECTION A-A

See Sheet 1.



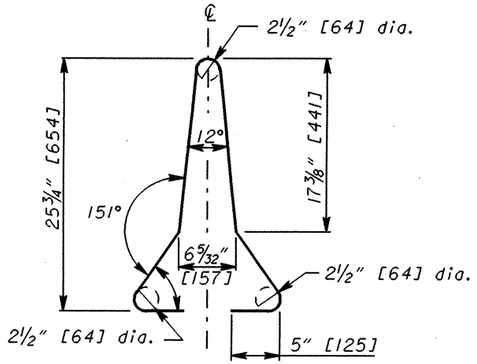
VIEW B-B

See Sheet 1.



SECTION C-C
Tapered End Section

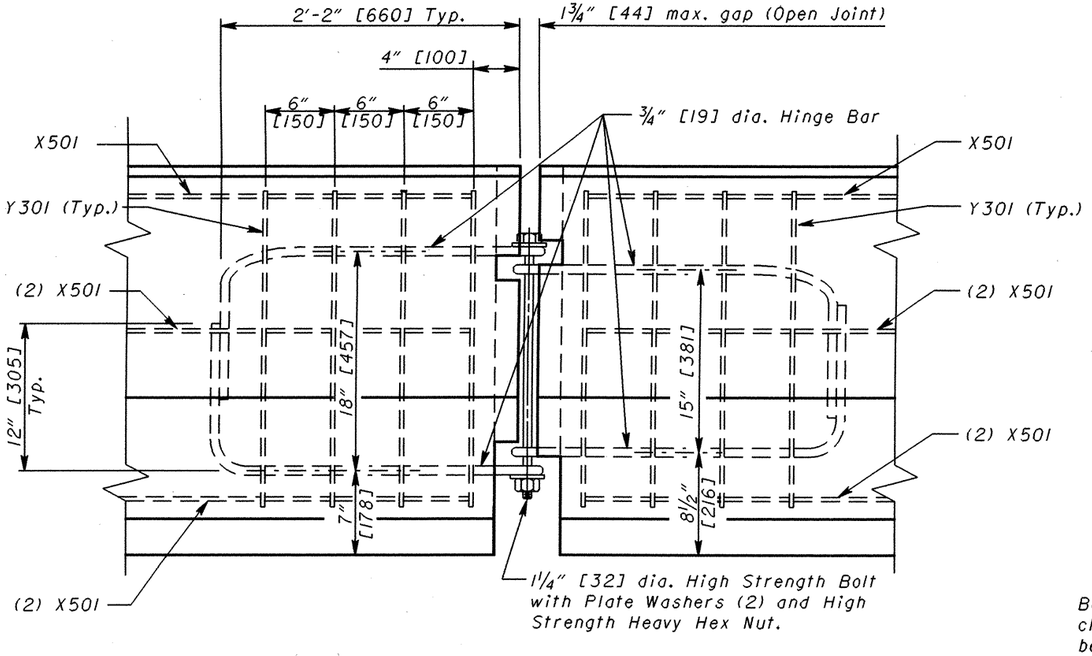
See Sheet 1.



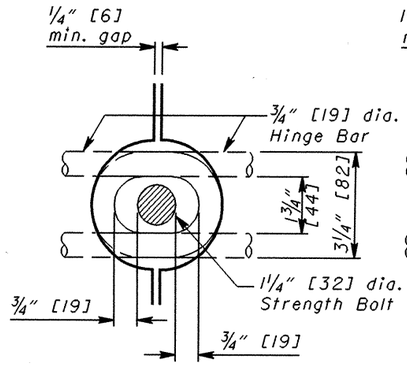
Y301
BENDING DIAGRAM

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	---	---

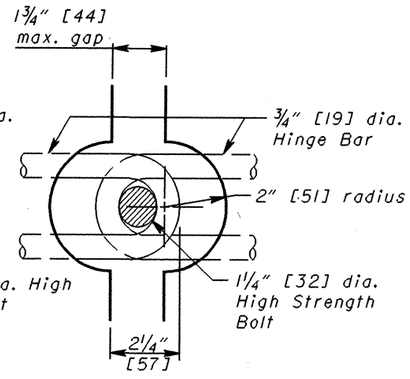


DETAIL AT HINGED CONNECTION



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

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 800
REVISIONS TO THE 2005 CONSTRUCTION & MATERIAL SPECIFICATIONS
DATED 4-15-2005

SHOP DRAWING APPROVAL FOR STRUCTURES CARRYING RAILROAD TRAFFIC. In addition to the requirements of Item 501.04A, submit four copies of the prepared shop drawings at least 40 days prior to the pre-fabrication meeting to each railroad company involved for review and approval. Resolve all railroad comments prior to supplying the letter of written acceptance to the Department. The acceptance submission to the Department shall include one set of shop drawings approved by each railroad company involved; copies of all documentation between the railroad(s) and the Contractor; and four sets of Contractor accepted shop drawings for each railroad company involved.

ITEM 614 PORTABLE CHANGEABLE MESSAGE SIGN. In lieu of the requirement in 614.03 requiring the use of portable changeable message signs prequalified according to Supplement 1061 (i.e., evaluated by NTPEP), the use of portable changeable message signs prequalified via ODOT evaluation is also acceptable until December 31, 2006. (Essentially, two prequalified lists, ODOT-based and NTPEP-based, will exist until that date.) After December 31, 2006 only those portable changeable message signs prequalified according to Supplement 1061 will be allowed for use on ODOT contract projects.

ITEM 614 MAINTAINING TRAFFIC: CONFORMANCE OF WORK ZONE DEVICES TO NCHRP 350. Erect signs used on item 614 Maintaining Traffic on supports conforming to standard drawings MT-105.10, MT-105.11 at spacings conforming to TC-52.10, TC-52.20, and details conforming to TC-41.20.

The following devices must meet NCHRP 350 and acceptable written manufacturer certification submitted to the Engineer before the devices are installed on the project. Only ballasting specified by the manufacturer is allowed.

- Drums, with or without lights.
- Cones, with or without lights.
- Vertical panels, with or without lights, and the panel support.
- Portable sign supports.
- Workzone impact attenuators.
- Portable concrete barrier.
- Barricades.

This certification submission requirement is waived if the device is specified in the plans or other bid documents by manufacturer and product number, or if the device appears on the FHWA web page, http://safety.fhwa.dot.gov/fourthlevel/pro_res_road_nchrp350.htm, listing Roadway Hardware meeting NCHRP 350.

Portable concrete barrier, 32-inches high, and manufactured according to standard construction drawing RM-4.2 or J-J Hook Barrier as identified in RM-4.2 is NCHRP 350 approved. Use of RM-4.2 barrier is allowed without certification if the project verifies that the sections are marked according to RM-4.2.

Contractors are allowed to use GREAT CZ impact attenuators, manufactured by Energy Absorption Systems Inc., in their inventory for their useful life or until January 1, 2007, if they were purchased before October 1, 1998.

Contractors are allowed to use portable concrete barrier in their inventory for its useful life or until January 1, 2008, provided it was manufactured according to construction standard drawings MC-9.1 or MC-9.2 (or subsequently RM-4.1 or RM-4.2) and purchased before October 1, 2002.

SUPPLEMENT 1069 (2-08-2002). PRE-QUALIFIED AGGREGATE SUPPLIER PROGRAM. Only pre-qualified suppliers will provide aggregate materials to the Ohio Department of Transportation conforming with the requirements of the Construction and Materials Specifications. This supplement applies to all aggregates provided the Department either directly, or indirectly through a contractor or subcontractor. The program applies to all aggregate materials provided in conformance to or referenced to the 703 section of CMS.

SUPPLEMENT 1084 (10/18/02) REQUIRED FOR BRIDGE PAINT. The Department will accept bridge paint in 708.01 and 708.02 under Supplement 1084.

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:

_____

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_____

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.

Part VII

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.

Part VII

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 898

QC/QA CONCRETE FOR STRUCTURES
July 16, 2004

898.01 DESCRIPTION. This work consists of designing a concrete mix, providing an acceptable quality control plan, performing quality control sampling and testing, performing quality assurance testing.

Results of the Contractor's acceptance testing will be used to establish final pay factors, 898.15, and to calculate final payment under Basis of Payment, 898.17.

Use provisions of 511.08 thru 511.22 and 499.06 thru 499.09 except as modified by this specification or the Contractor's approved quality control plan. Place and cure all superstructure concrete according to the Class HP requirements.

898.02 DEFINITIONS AND REFERENCED SPECIFICATIONS

ACI	American Concrete Institute
AMRL	AASHTO Materials Reference Laboratory
Acceptance Tests	Compressive strength, plastic air and permeability tests that are the contractor's responsibility to obtain samples, make specimens and have tested. These test results are used for payment.
Arithmetic Mean ($\bar{X}$)	The value obtained by adding individual values and dividing by the number of individual values to obtain an average.
Certified Laboratory	An AMRL - PCC accredited laboratory
Defective Material	Concrete which is placed but fails to meet strength or air content requirements.
Design Permeability	A measurement of the concrete's resistance to the penetration of chloride ions. Tested according to AASHTO T277, as modified herein to approximate 90 day results. The value reported is reported in coulombs.
f'c	Specified Design Strength at 28 days.
f'cr	Required average compressive strength at 28 days (ACI 301 4.2.3.3)
Lot	The quantity of concrete considered to be uniform in properties. The total cubic yards (cubic meters) required in the structure of the same class of concrete.
Pay Factor	A numerical value established, based on the final quality, as an adjustment to the Contractor's final payment per bid item.
QA Samples	Quality Assurance samples of concrete taken by the Department to verify results from the contractor's quality control and acceptance tests.
QC Samples	Quality Control samples taken by the contractor, or designee, in order to control the materials and processes and insure the delivery of concrete that meets this specification. May also include acceptance samples.
Standard Deviation (S_c)	The positive square root of the square of the difference between an Individual sample value and the mean of the sample.
Sublot	Division of a Lot into a minimum of 2 or more segments for the purpose of evaluating uniformity and consistency. For this specification, a sublot is defined as 50 cubic yards (40 cubic

meters).

Substructure Concrete — Concrete used in the following bridge components: abutments, piers, footings, wingwalls, columns, pier caps, intermediate diaphragms between prestressed I-beams, cast in place piles and backwalls.

Superstructure Concrete — Concrete used in the following bridge components: Decks supported on steel or concrete beams, girders or box sections, slab bridge decks, abutment and pier diaphragms encasing prestressed I-beam or box beam members, abutment diaphragms encasing steel beams or girders; sidewalks and deflector parapets.

REFERENCED SPECIFICATIONS

ACI 301 Standard Specification for Structural Concrete

ASTM C31 Method of Making and Curing Concrete Test Specimens in the Field

ASTM C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens

ASTM C42 Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

ASTM C94 Standard Specification for Ready-Mixed Concrete

ASTM C143 Test Method for Slump of Portland Cement Concrete

ASTM C172 Method of Sampling freshly Mixed Concrete

ASTM C173 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

ASTM C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C989 Standard Specification for Ground Granulated Blast-Furnace Slag for use in Concrete and Mortars

ASTM C1064 Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete

AASHTO T277 Standard Test Method for Electrical Indication of Concrete's Ability to

Resist Chloride Ion Penetration - modified by this specification

ASTM C1240 Standard Specification for Silica Fume for use as a Mineral Admixture in Hydraulic Cement Concrete, Mortar and Grout

898.03 MATERIALS

Coarse aggregate 703.02

1. Use sizes No. 8, 78, 7, 67, 57 either alone or in combination.
2. The maximum sodium sulfate soundness loss will be12 percent.
3. Unless approved by the Engineer, use the same kind and color of aggregates for all concrete above the ground line in a given substructure or superstructure unit.

Fine aggregate	703.02
Portland cement	701.01, 701.02, 701.04, 701.05 or blended cements*
Fly ash	701.13
Ground granulated blast furnace slag	701.11
Micro-silica	701.10
Air-entraining admixture	705.10
Chemical admixtures	705.12
High Molecular Weight Methacrylate Resin	705.15
Curing materials	705.05, 705.06 (white opaque) 705.07 type 1 or 1D
Joint filler - 1/4 (6 mm)	711.28 or 705.03

Seals (preformed elastomeric compression joint) 705.11

* Blended cements will be approved by the Office of Materials Management; will be certified from the plant; will have specific defined limitations on percentages of blended materials; and will be comprised of components that meet the applicable specifications.

Document and report changes in the source(s) of cement, fly ash or GGBF slag to the Engineer. Store bulk fly ash or GGBF slag in waterproof bins.

Provide a technical representative from either the admixture company or the concrete supplier to be in charge of dispensing admixtures. The representative will act in an *advisory capacity reporting to the Contractor and the Engineer any operations or* procedures considered to be detrimental to the integrity of the concrete. The technical representative will be present during concrete placement unless waived by the Contractor.

898.04 WATER Provide water free of sewage, oil, acid, strong alkalies, vegetable matter, clay or loam. Water will conform with ASTM C94. Concrete produced with either wash water or storm water shall use a reclaiming system monitoring the quality of the water to meet ASTM C94 and produce no more than 0.06% total chlorides by weight of cement into the concrete. The Department will approve the reclaiming system.

898.05 CONCRETE MIX DESIGN Develop concrete mix designs according to ACI 301, section 4, and as modified in this specification. Submit test data from a Certified Laboratory to the Office of Materials Management.

Establish the maximum air content for the concrete mix design and produce concrete within 0.5% of that maximum for the submitted data. If the test values meet the requirements of this specification, this value becomes the maximum air content, for the mix design, acceptable at the project.

The Certified Laboratory shall mix the trial batch, sample and test the samples (ACI 301, 4.2.3.4.b). Batching and sampling may be performed by an ACI Grade I Technician with the laboratory only witnessing the process. The certified laboratory shall perform the compressive strength and permeability testing.

Determine the required average compressive strength (f'cr) according to ACI 301, section 4.2.3. If there is no field data available, select the over-design of the mix from ACI 301, Table 4.2.3.3b. Follow ACI 301 section 4.2.3.4.a., or 4.2.3.4.b when using field or laboratory data, respectively, to establish a mix design. Use field test data from previous ODOT projects under this specification or other sources approved by the Office of Materials Management.

If the laboratory trial mix procedure is used to support the mix design, a single mix can be prepared, but it must meet all of the requirements of this specification. Produce the trial mix using the maximum water and all admixtures required to achieve the maximum placement slump and maximum air. Record the slump and air, and produce the strength and permeability test samples from the same mix.

Use a cement or cementitious content meeting the minimums given in TABLE 3.

TABLE 1

CONCRETE MIX DESIGN REQUIREMENTS			
Concrete Use (Class)	Specified Compressive Strength (f'c) psi (MPa)	Design Permeability (P_d) ** Coulombs	Plastic Air Content %
Substructure (QSC1)	4000 (28.0)	< 2000	TABLE 2
Superstructure (QSC2)	4500 (31.0)	< 1500	TABLE 2
Project Specific (QSC3)	As per plan	As per plan	TABLE 2

** Determine the design permeability values by testing in conformance with AASHTO T-277 except as modified as follows: Moist cure permeability samples for 7 days at 73° F (23°C) followed by 21 days of moist curing at 100° F (38°C). Perform permeability testing at 28 days.

TABLE 2

AIR CONTENT LIMITATIONS		
Aggregate Size	Maximum Air Content	Minimum Air Content
8, 7, 78	Established by the Producer as tested for each mix design	6.0%
67, 57		5.0%

Blending coarse aggregate is acceptable. Report the production blend.

TABLE 3

CONCRETE MIX DESIGN LIMITATIONS	
Minimum Cementitious Content *	565 lbs/yd^3 (335 kg/m^3)
Fly Ash	up to 30%
Ground Granulated Blast Furnace Slag	up to 30%
Micro-Silica	up to 10%
The total combination of pozzolan materials shall not exceed their individual percentage nor total more than 50% of the total cementitious content	

* The cementitious content shown above is a minimum. The Contractor is responsible for proportioning a mix that is workable and meets all of the requirements of this specification. To accomplish this, quantities above the minimum shown may be required.

898.06 MIX DESIGN DOCUMENTATION Mix designs for each class of concrete required on the project shall include certified test data documenting results for the following:

- Maximum Air Content
- Compressive Strength
- Slump
- Unit Weight
- Yield
- Aggregate Correction Factor
- Specified Design Strength (*f'c*)
- Required Over- Design Value
- Permeability

Also include:

TABLE 4

Mix Design Batching Data					
Material	**Batch Weight (SSD)**	**Source**	**Type**	**Specific Gravity**	**Absorption (%)**
Fine Aggregate	Required	Required	Required	Required	Required
Coarse Aggregate 1	Required	Required	Required	Required	Required
Coarse Aggregate 2	Required	Required	Required	Required	Required
Cement *	Required	Required	Required	Required	Not Applicable
Fly Ash	Required	Required	Required	Required	Not Applicable
GGBF	Required	Required	Required	Required	Not Applicable
Micro-silica	Required	Required	Required	Required	Not Applicable
Other	Required	Required	Required	Required	Not Applicable
Water	Required	Required	Not Applicable	Not Applicable	Not Applicable

Admixtures	Type	Brand Name	Dosage Rate
Admixture 1	Required	Required	Required
Admixture 2	Required	Required	Required
Admixture 3	Required	Required	Required
Admixture 4	Required	Required	Required
Water/Cementitious Ratio	Required		

* If a blended cement is used, indicate the components of the blended cement and the proportions of those components.

Changing sources of materials from those tested for the design submittal may require retesting of the mix for acceptance. The Department will request certification that the source changes will not adversely affect the tested mix. Changing aggregate type or size, cement type or pozzolan type or grade will require retesting.

Test any workability issues in the trial process. Unworkable mixes in the field will require a new mix and retesting. Modifying aggregate weights, excluding adjustments for specific gravity or absorption changes, by more than 3% will constitute a change to the mix design.

898.07 MIX DESIGN ACCEPTANCE Submit one copy of the mix design and test data to the Office of Materials Management at least 10 calendar days prior to placement. The mix design will be reviewed to ensure that the design parameters in TABLE 1 are met; limitations in TABLES 2 and 3 are not exceeded; and the design batching data in TABLE 4 is included.

Also submit a copy of the mix design data to the Engineer to be reviewed for compliance with the specifications and for project information and control. Do not place concrete until the mix design has been accepted.

898.08 LOT, SUBLOT AND RANDOM LOAD DETERMINATION FOR STRENGTH AND PERMIBILITY ACCEPTANCE

Use a single lot for each mix design.

Provide the Engineer with a proposed placement schedule and division of the concrete lot into a minimum of 3 sublots. The maximum size of each sublot shall be 50 yd^3. The Engineer will approve the sublot divisions. A sequential numbering system should be used for lots and sublots (i.e. Lot 1: sublot 1, sublot 2, etc).

The Engineer will determine the random load from which the Contractor will sample the concrete to perform acceptance testing as required in 898.15 as follows:

1. A starting number will be randomly chosen from TABLE 7.
2. The starting number will be multiplied by the volume of the first sublot and rounded to the nearest whole number to determine an individual yardage. The Contractor will sample the load containing this individual yardage.
3. The individual yardage and load to be sampled for the next sublots will be determined by using the next sequential number in the random number table and repeating step 2.
4. Complete sampling all sublots for the given class of concrete.
5. The Contractor will be informed of the sublot test locations at the beginning of the day's placement.

898.09 CONTRACTOR QUALITY CONTROL PLAN Develop a Quality Control Plan (QCP) defining the responsibilities, duties and frequency of quality control testing for both in-process quality control at the job site and at the concrete's source. Use either a certified

laboratory to perform all quality control responsibilities or the Contractor may perform some of the sampling and testing with an ACI certified Grade 1 Field Testing Technician. Use a certified lab to test compression and permeability samples used to establish pay factors, 898.15 and test QA samples (898.11).

Included in any QCP will be **TABLE 10** for reporting plastic air acceptance results and **TABLE 9** for reporting compressive strength and permeability. The Engineer will establish documentation for other items, such as core results for in-place evaluation, if needed.

Submit a complete QCP to the Engineer for review and acceptance with the mix design submission. Include at least the following information:

1. The name of the certified laboratory. (Include AMRL accreditation)
2. Name and certification of all laboratory, and/or Contractor's, technicians who will perform plant and/or field site sampling and testing. (Minimum: ACI Grade1 Field Testing Technician certification)
3. Method of reporting test results for compressive strength & permeability and plastic air. (Minimum requirements: The certified laboratory will furnish and certify all results using the QC/QA reporting forms, **TABLES 9** and **10**)
4. Testing equipment calibration records
5. Method for field curing specimens
6. Methods for transporting samples to the certified laboratory
7. Certified laboratory curing procedures.
8. In-process quality control program defining method of:
   (a) Raw materials certification and control
   (b) Aggregate moisture controls
   (c) Concrete delivery controls.
   (d) Minimum required rate of concrete delivery for continuous placement
   (e) Concrete plant controls
   (f) Construction site controls
   (g) Methods for curing and testing samples for form release/removal See 898.102.
   (h) Concrete placement procedures, equipment, finishing methods, curing methods, lighting, etc..
   (i) Methods of protecting concrete if inclement weather or evaporation rate exceeds specification requirements
9. Proposed modifications to construction processes of 511and 499.

Address in the QCP whether plant control includes quality control personnel monitoring the mixing process. Use the NRMCA Publication No 190, NRMCA Guideline Manual for Quality Assurance/Quality Control, as one possible source to model the Quality Control Plan.

Provide a delivery ticket conforming with 499.08.

Mix concrete in a central mixing plant or by a ready-mixed truck capable of discharging concrete with a maximum water cementitious ratio equal to or less than that required of the concrete mix. Provide mixing equipment conforming with 499.06-B. Introduce admixtures into the concrete to facilitate dispersion throughout entire load. Provide batch plants

conforming with 499.06-A. Mix, deliver and discharge concrete within 60 minutes of combining water and cement. If using an approved type B, D or G admixture, complete discharge within 90 minutes after combining the water and cement.

Establish the desired slump for each item and maintain that slump within ± 1 ½ inches (38mm). Measure the slump when performing the air and compression testing (898.10) to verify consistent results within the specified tolerance. If slump loss occurs before placement, replasticize with either water, if the maximum water/cementitious ratio is not exceeded, or admixture to restore plasticity. Recheck the air content. Reject any loads that segregate.

898.10 CONTRACTOR QUALITY CONTROL (QC) & ACCEPTANCE TESTING

Perform air content QC testing at the point of discharge from the Ready Mix concrete truck. Use the following quality control procedures during the placement:

1. Test the air content on at least the first three (3) loads of concrete delivered for each day's placement. Insure that the air content is stabilized and within the specified parameters for the mix design before extending the sampling and testing frequency.

2. Once the air content is stabilized to the Engineer's satisfaction, extend the sampling frequency to no more than one test for every three (3) loads of concrete delivered.

   If a load of concrete is tested and found to have an air content less than the minimum in TABLE 2 or above the maximum air established for the mix, do not accept and place that load unless it can be adjusted to be within the specified limits. Test at least the next three loads for air to insure that the air content is stabilized to the Engineers satisfaction. The sampling frequency may then be extended back to one test for every three (3) loads of concrete delivered.

3. For concrete delivered to the point of placement by means of pumping equipment, provide a hose at the end of the line that is at least ½" in diameter smaller than the line on the boom to provide back pressure in the system and minimize the amount of air lost in the concrete

   During the first three loads, test the concrete at the point of discharge and the point of placement to verify that the loss of air going through the pump does not exceed 1%. If the amount of air loss is not controlled to the Engineers satisfaction, make adjustments to the pump setup that results in an air loss of less than 1%. If that can not be achieved, test the air at the point of placement on every load and reduce the minimum air content in Table 2 by 1%.

4. Use methods to produce back pressure in the system other than the ½" diameter smaller hose upon approval of the Engineer. Provide a trial placement of concrete, at the most severe condition, using the proposed method to prove to the Engineer's satisfaction that the method has acceptable air loss at each of the extreme position of the pump

5. Provide the Engineer a signed copy of the plastic air results (**TABLE 10**) after each placement.

Any concrete with an air content above the maximum air or below the minimum air that is placed into the structure is defective material for the amount of material represented by the sampling frequency.

Perform the following quality control/acceptance sampling and testing for compressive strength and permeability from the load determined by the random number:

1. Sample each sublot by making one (1) set of three (3) - 6"x12" (150x300mm) quality control/acceptance compressive strength cylinders. Make additional compressive or flexural samples required to meet 898.12. Perform all required curing, transporting, capping and testing of the samples to conform to the applicable ASTM specification. Report actual test values for quality control/acceptance using **TABLE 9**.

2. Determine the concrete temperature in accordance with ASTM C1064 from the same sample taken for compressive strength. Assure compliance with 499.09 and 511.15.

3. Make one (1) - 4"x 8" (100 x 200 mm) permeability sample conforming with ASTM C 39 for each sublot. The Engineer will select three (3) of the lot's samples for testing. Test the three (3) samples to determine an average and maximum permeability for establishing a pay factor.

898.11 ODOT QUALITY ASSURANCE ODOT will perform QA sampling and testing as specified or as deemed necessary.

The Department will perform side by side testing with the Contractor and compare results. If the differences between the Department's and the contractor's testing is greater than the tolerances listed below, the Contractor and Engineer will determine the reason for slump and air content differences and make necessary adjustments. The Engineer may stop the placement until the reason for the difference is established and corrected. The Engineer will check one of the first three loads delivered. Once the results are within the tolerances listed below, the Engineer may reduce the QA sampling and testing frequency to 10% of the Contractor's subsequent acceptance tests.

1. Slump - ± 1 inch (25 mm)

2. Air Content - ± 1%.

The Engineer will obtain compressive strength QA samples from the same location as the Contractor's quality control/acceptance samples. QA samples will be obtained for every 10 sublots or at least one per lot. Four (4) 6" x 12" (150 x 300 mm) cylinders for each sample will be made. The Engineer will mark the cylinders with identification and the Contractor

will take ownership for handling, shipping, curing, transporting and testing the specimens.

After fourteen (14) days curing, deliver two (2) of the QA cylinders to the ODOT Laboratory. Continue to cure the other two (2) QA cylinders with the QC & acceptance cylinders at the Certified Laboratory. The Certified laboratory will test the two (2) QA cylinders with the QC & acceptance cylinders and report the 28 day test results on the accepted QCP form. The report will distinguish the QA cylinder results from the QC & acceptance results, including the sublot.

The Engineer will verify the QA and the matching QC acceptance test results are within 500 psi (3.9 MPa). Investigate the results with the Engineer to determine the reason difference is greater than 500 psi (3.9 MPa). If no reason is determined, the Engineer will require the Contractor to either non-destructively test or core the concrete represented by the cylinder tests to determine compressive strength. The additional testing will be performed by an independent laboratory hired by the Contractor. The Engineer will witness the testing and evaluate the results. The Department will reimburse the Contractor for all testing costs when the Department's results are in error. The cylinder acceptance results will be used if found valid or if cores were taken during the evaluation, use the core's test results to determine the compressive strength values for pay factors, 898.15.

The Engineer will reject a mix design when a single compressive strength QC & acceptance test result drops below 88% of *f'c* or a lot of concrete has a Percent Acceptable Material, 898.15, below 75. If the mix design is rejected, develop a new mix design according to 898.03 and 898.05.

The Engineer will reject loads and stop placement when quality control processes do not control balling, segregation, inconsistent or variable concrete indicating poor quality control. Do not restart placement until the cause of the problem is determined and corrected.

898.12 CURING AND LOADING Perform all testing required in this section as part of the quality control program. Modify 511.17 as follows:

Do not use the falsework removal and traffic loading tables of 511.17. Do not remove formwork or falsework for structure concrete, QSC1, QSC2 or QSC3, or subject it to construction or erection loads until field cured compressive strength test cylinders reach a strength of 85% of *f'c* or greater. If using flexural beams, obtain a center-point Modulus of Rupture of 650 psi (4.6MPa) or greater before opening to traffic. Do not shorten the minimum required curing time for Method (A) regardless of strength test results. Allow formwork construction if no motorized equipment applies loads to the concrete and field cured compressive strengths are 60% of *f'c*.

The Department will not approve time extensions to the project completion date for delays caused by slow strength gain of the concrete.

898.13 SLIPFORMING. Follow 511.11 except:

Reducing the established water-cementitious ratio or amount of admixture of an approved mix to achieve the desired consistency will not require a new mix design. Adjustments to the mix beyond those permitted in 898.06 will require a separate mix design conforming to 898.05.

898.14 REEVALUATION OF STRENGTH

A. If a single compressive strength acceptance test result for a sublot of concrete is less than 88% of the specified *f'c*, the Engineer will evaluate and accept or reject the material, at no cost to the Department, as follows:

The Engineer will determine the location for evaluating the strength of the sublot represented by the low compressive strength. Evaluate using either nondestructive testing or cores. If nondestructive testing is used, the results will only determine if further action is necessary. The Engineer will accept the concrete if nondestructive test results are greater than the specified *f'c* . Use the original cylinder results for calculating the compressive strength pay factor (PF_c) only if further testing confirms the original cylinder results are accurate. If further testing confirms the original results are not accurate, the Engineer will not use the original cylinder results for determining the pay factor. Then the sublot will not be used when determining the pay factor. Coring will be required if the nondestructive test results are less than the specified *f'c*.

Core the concrete at locations determined by the Engineer. Provide the cores to the Engineer for testing by the Department. Patch core holes with approved patching material. Base the final payment of the sublot and lot on the core strength results. If the core results indicate that the compressive strength of the concrete is below 88% *f'c*, submit a plan for corrective action to the Engineer for approval. If the corrective plan is not approved the Engineer will require the Contractor to:

1. Remove and replace the defective sublot at no cost to the Department, or
2. Leave the defective material in place and pay for the sublot with a pay factor of 0.75.

B. If the Percent Acceptable Material, 898.15, for a lot of concrete is below 75 per cent, submit a plan for corrective action to the Engineer for approval. If the corrective plan is not approved the Engineer will require the Contractor to:

1. Remove and replace the lot of defective material at no cost to the Department, or
2 Leave the defective material in place and pay for the lot of with a pay factor of 0.75.

898.15 PAY FACTOR DETERMINATION The Department will use pay factors (PF) to establish a final adjusted price, per lot, for each bid item quantity of concrete. The Department will calculate pay factors using the Contractor's quality control/acceptance test results, per lot. The Department will calculate a compressive strength pay factor (PF_c) and a permeability pay factor (PF_p), if applicable, for each lot.

The Department will determine PF_c as follows:

Determine arithmetic mean ($\bar{x}$) for both compressive strength using the following formula:

$$\bar{x}=(\sum x)/n$$

x = Test values
n = Total number of test values in each lot

Determine, for each lot, the sample standard deviation for compressive strength (S_c). Use the following formula:

$$S_c = [\Sigma(x - \bar{x})^2 / (n-1)]^{½}$$

x = Individual test value
n = Total number of compressive strength sublot values in each lot
$\bar{x}$ = Arithmetic mean of individual test values in each lot

Determine the compressive strength quality index (Q_{LLC}) for each lot. Use the following formula:

$$Q_{LLC} = (\bar{x} - f'c)/S_c$$

Round the Q_{LLC} value to the nearest 1/100. Using the Q_{LLC} value, enter TABLE 8 and determine the percentage of defective material for compressive strength (PD_c). Do so by first choosing the correct table based on the number of samples; Then determine the correct row by matching the whole number and first number after the decimal of the Q_{LLC}; finally determine the correct column by matching the second number after the decimal of the Q_{LLC}. Calculate the Percent Acceptable Material by subtracting the PD_c from 100%.

Percent Acceptable Material = 100 -PD_c

Determine the PF_c for the mix design lot using TABLE 5 (See example)

TABLE 5

COMPRESSIVE STRENGTH	
Percent Acceptable Material	PFc Pay Factor
98.0 - 100	1.04
95 - 97.9	1.02
85 - 94.9	1.00
75 - 84.9	.95

Below 75	See 898.14

The Department will determine an permeability pay factor (PF_p) for class QSC2 (or QSC3 if applicable) superstructure concrete. Use the permeability test results for the concrete lot. The Department will determine the pay factor for the lot by calculating a mean and maximum value from the permeability test results.

Determine the PF_p for the lot using **TABLE 6** (See example)

TABLE 6

PERMEABILITY		
Average Tested Permeability ($\bar{X}_p$)and,	No (X) Value Greater Than	PFp Pay factor for QSC2 (or QSC3 if applicable) Superstructure
<1000 for QSC2, or 2/3(P_d) for QSC3 (if applicable)	2000 for QSC2, or 4/3 (P_d) for QSC3 (if applicable)	1.02
≥1000 for QSC2, or 2/3(P_d) for QSC3 (if applicable)		1.00

898.16 METHOD OF MEASUREMENT The Department will measure the appropriate concrete item by the number of cubic yards (cubic meters) determined by calculations from plan dimensions, in place, completed and accepted. The Department will not make deductions for volume of reinforcing steel, conduits, or structural steel other than beam flanges embedded in deck slabs. The Department will not make deductions for the volume of embedded timber or concrete piles.

The Department may measure deck concrete by either volume or area using plan dimensions.

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

The Department will calculate separate quantities of defective material due to air content, 898.10 and compressive strength 898.14.

898.17 BASIS OF PAYMENT The Department will pay for accepted quantities as follows:

The Department will not pay for the reevaluation of low strength test results, 898.14

The Department will not make separate payment for surface finish or sawing grooves in the deck. All costs are incidental to the appropriate concrete item.

The Department will initially pay the full bid price to the Contractor upon completing the work.

The Department will calculate the final adjusted payment for each item as follows:

PF_1 The final adjusted pay per cubic yard (meter) or square yard (meter), per item. Apply only to quantities of concrete placed determined to not be defective according to 898.10 or 898.14.

$$PF_1 = (\text{Contract Bid Price}) \times PFc \times PFp$$

PF_2 The final adjusted pay per cubic yard (meter) or square yard (meter) for the quantity of concrete placed in an item that contains defective concrete based on compressive strength and allowed to stay in place, according to 898.14

$$PF_2 = (\text{Contract Bid Price}) \times 0.75$$

Calculate the adjusted price per bid item by multiplying PF_1 and PF_2 by the appropriate quantities of concrete, then sum the values. Subtract the full bid price paid to the contractor from the adjusted price to determine the difference. The Department will execute final adjustments by change order upon receipt of all test data..(See example)

Item	Units	Description
898	Cubic yard (cubic meter)	QC/QA concrete class ____ ____
898	Cubic yard (cubic meter)	QC/QA concrete class QSC2 superstructure (deck)
898	Square yard (square meter)	QC/QA concrete class QSC2 superstructure (deck)
898	Cubic yard (cubic meter)	QC/QA Concrete class QSC2 superstructure (parapet)
898	Cubic yard (cubic meter)	QC/QA Concrete class ____ superstructure
898	Cubic yard (cubic meter)	QC/QA Concrete class QSC1 substructure ____

Compressive Strength Example: A 420 yd^3 bridge deck using QSC2 concrete is placed. There are 8 sublots @ 50yd^3 and1 sublot @ 20 yd^3 for the lot. The compressive strength acceptance test results are as follows: 5060, 5820, 5210, 5930, 5740, 6130, 6560, 5040 and 7080 psi.

1. Calculate the Average Strength and Standard Deviation (S_c) as follows* :

SAMPLE	COMPRESSION (X)	$X - \bar{X}$	$(X - \bar{X})^2$
1	5,060	-781	609,961
2	5,820	-21	441
3	5,210	-631	389,161
4	5,930	89	7,921
5	5,740	-101	10,201
6	6,130	289	83,521
7	6,560	719	516,961
8	5,040	-801	641,601
9	7,080	1239	1,535,121
Total	52,570	0	3,803,889
Avg. ($\bar{X}$)	**5,841**		

Formula: $S_c = [\Sigma(x - \bar{X})^2 / (n-1)]^{1/2}$
$= [3,803,889 / (9-1)]^{1/2}$
$= [3,803,889 / 8]^{1/2}$
$S_c = 690$

* This can also be calculated using standard computer programs. Make sure that the **Sample Std Dev** is used rather than the **Population Std Dev.**

2. Calculate the Quality Index (Q_{LLC}):

Formula: $Q_{LLC} = (\bar{X} - f'c)/S_c$
$= (5,841 - 4500) / 690$
$= 1341 / 690$
$= 1.94$

3. Determine the Percent Defective (PD_c) and then Percent Acceptable Material:

Go to **TABLE 8**; n = 9; Q_{LLC} = 1.94 (1.9 on the column on the left side of the table and 0.04 across the top row)
% Defective = 1.32, therefore
Percent Acceptable Material = 100 - 1.32 = **98.68 %**

4. Go to **TABLE 5** to determine the compressive strength Pay Factor **(PFc)** = **1.04** @ 98.68%

Permeability Example: The permeability results for the bridge deck in the first example are 900, 1400, 600 coulombs for QSC 2 superstructure concrete.

The Design Permeability (P_d) from **TABLE 1** = 1500 Coulombs;
The average Permeability needed to obtain an incentive (2/3 P_d) = 1000 Coulombs; and
The max permeability allowed to receive an incentive (4/3 P_d) = 2000

Results:

Average permeability ($\bar{X}_p$) = (900 + 1400 + 600)/3 = **966** and,
The maximum value = **1400**
Therefore, the Permeability Pay Factor (PFp) = **1.02**

Applying Pay Factors for Final Payment example:

Bid Price	$325.00 / yd^3
Quantity	420 yd^3
Amount paid to Contractor upon completion of work	325.00 x 420 =$136,500.00
Total payment owed to Contractor due to pay factors (PF_1)	325 x 420 x1.04 x 1.02 = $144,799.20
Amount of additional money owed to contractor via change order	$144,799.20 - $136,500.00 = +$8,299.20

TABLE 7

RANDOM NUMBERS					
0.889	0.848	0.612	0.806	0.774	0.115
0.745	0.127	0.317	0.867	0.645	0.212
0.697	0.138	0.236	0.447	0.651	0.436
0.123	0.326	0.775	0.467	0.419	0.725
0.807	0.121	0.369	0.778	0.796	0.570
0.653	0.529	0.688	0.887	0.449	0.419
0.524	0.161	0.899	0.155	0.526	0.722
0.192	0.897	0.798	0.244	0.205	0.180
0.654	0.174	0.133	0.262	0.380	0.828
0.127	0.796	0.608	0.102	0.428	0.194
0.615	0.385	0.102	0.782	0.589	0.113
0.333	0.309	0.692	0.559	0.860	0.421
0.562	0.497	0.210	0.220	0.592	0.850
0.346	0.789	0.523	0.368	0.716	0.193
0.564	0.621	0.804	0.641	0.183	0.351
0.649	0.521	0.850	0.189	0.332	0.736
0.403	0.510	0.562	0.670	0.881	0.723
0.792	0.203	0.318	0.608	0.107	0.572
0.454	0.682	0.521	0.588	0.141	0.110
0.703	0.634	0.846	0.826	0.475	0.313

TABLE 8: Estimated percent defective for compressive strength (PDc)
Sample size (n) = 2

Q	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	50.00	49.66	49.33	48.99	48.66	48.32	47.99	47.65	47.32	46.98
0.1	46.64	46.31	45.97	45.64	45.30	44.97	44.63	44.30	43.96	43.62
0.2	43.29	42.95	42.62	42.28	41.95	41.61	41.28	40.94	40.60	40.27
0.3	39.93	39.60	39.26	38.93	38.59	38.26	37.92	37.58	37.25	36.91
0.4	36.58	36.24	35.91	35.57	35.23	34.90	34.56	34.23	33.89	33.56
0.5	33.22	32.89	32.55	32.21	31.88	31.54	31.21	30.87	30.54	30.20
0.6	29.87	29.53	29.19	28.86	28.52	28.19	27.85	27.52	27.18	26.85
0.7	26.51	26.17	25.84	25.50	25.17	24.83	24.50	24.16	23.83	23.49
0.8	23.15	22.82	22.48	22.15	21.81	21.48	21.14	20.81	20.47	20.13
0.9	19.80	19.46	19.13	18.79	18.46	18.12	17.79	17.45	17.11	16.78
1.0	16.44	16.11	15.77	15.44	15.10	14.77	14.43	14.09	13.76	13.42
1.1	13.09	12.75	12.42	12.08	11.75	11.41	11.07	10.74	10.40	10.07
1.2	9.73	9.40	9.06	8.72	8.39	8.05	7.72	7.38	7.05	6.71
1.3	6.38	6.04	5.70	5.37	5.03	4.70	4.36	4.03	3.69	3.36
1.4	3.02	2.68	2.35	2.01	1.68	1.34	1.01	0.67	0.34	0.00

For values of Q greater than or equal to zero, the estimate of percent defective (PDc) is read directly from the table. For values of Q less than zero, the table value must be subtracted from 100. Values of Q greater than what is on the table indicate that there is 0.00 % defective material.

TABLE 8 (CONT.): Estimated percent defective for compressive strength (PDc)
Sample size (n) = 3

Q	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	50.00	49.72	49.45	49.17	48.90	48.62	48.35	48.07	47.79	47.52
0.1	47.24	46.96	46.69	46.41	46.13	45.85	45.58	45.30	45.02	44.74
0.2	44.46	44.18	43.90	43.62	43.34	43.05	42.77	42.49	42.20	41.92
0.3	41.63	41.35	41.06	40.77	40.49	40.20	39.91	39.62	39.33	39.03
0.4	38.74	38.45	38.15	37.85	37.56	37.26	36.96	36.66	36.35	36.05
0.5	35.75	35.44	35.13	34.82	34.51	34.20	33.88	33.57	33.25	32.93
0.6	32.61	32.28	31.96	31.63	31.30	30.97	30.63	30.30	29.96	29.61
0.7	29.27	28.92	28.57	28.22	27.86	27.50	27.13	26.76	26.39	26.02
0.8	28.64	25.25	24.86	24.47	24.07	23.67	23.26	22.84	22.42	21.99
0.9	21.55	21.11	20.66	20.19	19.73	19.25	18.74	18.25	17.74	17.21
1.0	16.67	16.11	15.53	14.93	14.31	13.66	12.98	12.27	11.51	10.71
1.1	9.84	8.89	7.82	6.60	5.08	2.87	0.00	0.00	0.00	0.00

For values of Q greater than or equal to zero, the estimate of percent defective (Pdc) is read directly from the table. For values of Q less than zero, the table value must be subtracted from 100. Values of Q greater than what is on the table indicate that there is 0.00 % defective material.

TABLE 8 (CONT.): Estimated percent defective for compressive strength (PDc)
Sample size (n) = 4

Q	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	50.00	49.76	49.33	49.00	48.67	48.33	48.00	47.67	47.33	47.00
0.1	46.67	46.33	46.00	45.67	45.33	45.00	44.67	44.33	44.00	43.67
0.2	43.33	43.00	42.67	42.33	42.00	41.67	41.33	41.00	40.76	40.33
0.3	40.00	39.67	39.33	39.00	38.67	38.33	38.00	37.67	37.33	37.00
0.4	36.67	36.33	36.00	35.67	35.33	35.00	34.67	34.33	34.00	33.67
0.5	33.33	33.00	32.67	32.33	32.00	31.67	31.33	31.00	30.67	30.33
0.6	30.00	29.67	29.33	29.00	28.67	28.33	28.00	27.67	27.33	27.00
0.7	26.67	26.33	26.00	25.67	25.33	25.00	24.67	24.33	24.00	23.67
0.8	23.33	23.00	22.67	22.33	22.00	21.67	21.33	21.00	20.67	20.33
0.9	20.00	19.67	19.33	19.00	18.67	18.33	18.00	17.67	17.33	17.00
1.0	16.67	16.33	16.00	15.67	15.33	15.00	14.67	14.33	14.00	13.67
1.1	13.33	13.00	12.67	12.33	12.00	11.67	11.33	11.00	10.67	10.33
1.2	10.00	9.67	9.33	9.00	8.67	8.33	8.00	7.67	7.33	7.00
1.3	6.67	6.33	6.00	5.67	5.33	5.00	4.67	4.33	4.00	3.67
1.4	3.33	3.00	2.67	2.33	2.00	1.67	1.33	1.00	0.67	0.33
1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

For values of Q greater than or equal to zero, the estimate of percent defective (PDc) is read directly from the table. For values of Q less than zero, the table value must be subtracted from 100. Values of Q greater than what is on the table indicate that there is 0.00 % defective material.

TABLE 8 (CONT.): Estimated percent defective for compressive strength (PDc)
Sample size (n) = 5

Q	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	50.0	49.64	49.29	48.93	48.58	48.22	47.86	47.51	47.15	46.80
0.1	46.44	46.09	45.73	45.38	45.02	44.76	44.31	43.96	43.60	43.25
0.2	42.90	42.54	42.19	41.84	41.48	41.13	40.78	40.43	40.08	39.72
0.3	39.37	39.02	38.67	38.32	37.97	37.62	37.28	36.93	36.58	36.23
0.4	35.88	35.54	35.19	34.85	34.50	34.16	33.81	33.47	33.12	32.78
0.5	32.44	32.10	31.76	31.42	31.08	30.74	30.40	30.06	29.73	29.39
0.6	29.05	28.72	28.39	28.05	27.72	27.39	27.06	26.73	26.40	26.07
0.7	25.74	25.41	25.09	24.76	24.44	24.11	23.79	23.47	23.15	22.83
0.8	22.51	22.19	21.87	21.56	21.24	20.93	20.62	20.31	20.00	19.69
0.9	19.38	19.07	18.77	18.46	18.16	17.86	17.55	17.25	16.96	16.66
1.0	16.36	16.07	15.78	15.48	15.19	14.91	14.62	14.33	14.05	13.76
1.1	13.48	13.20	12.93	12.65	12.37	12.10	11.83	11.56	11.29	11.02
1.2	10.76	10.50	10.23	9.97	9.72	9.46	9.21	8.96	8.71	8.46
1.3	8.21	7.97	7.73	7.49	7.25	7.02	6.79	6.56	6.33	6.10
1.4	5.88	5.66	5.44	5.23	5.02	4.81	4.60	4.39	4.19	3.99
1.5	3.80	3.61	3.42	3.23	3.05	2.87	2.69	2.52	2.35	2.19
1.6	2.03	1.87	1.72	1.57	1.42	1.28	1.15	1.02	0.89	0.77
1.7	0.66	0.55	0.45	0.36	0.27	0.19	0.12	0.06	0.02	0.00

For values of Q greater than or equal to zero, the estimate of percent defective (PDc) is read directly from the table. For values of Q less than zero, the table value must be subtracted from 100. Values of Q greater than what is on the table indicate that there is 0.00 % defective material.

TABLE 8 (CONT.): Estimated percent defective for compressive strength (PDc)
Sample size (n) = 6

Q	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	50.00	49.63	49.27	48.90	48.53	48.16	47.80	47.43	47.06	46.70
0.1	46.33	45.96	45.60	45.23	44.86	44.50	44.13	43.77	43.40	43.04
0.2	42.68	42.31	41.95	41.59	41.22	40.86	40.50	40.14	39.78	39.42
0.3	39.06	38.70	38.34	37.98	37.62	37.27	36.91	36.55	36.20	35.84
0.4	35.49	35.14	34.79	34.43	34.08	33.73	33.38	33.04	32.69	32.34
0.5	32.00	31.65	31.31	30.96	30.62	30.28	29.94	29.60	29.26	28.93
0.6	28.59	28.25	27.92	27.59	27.26	26.92	26.60	26.27	25.94	25.61
0.7	25.29	24.96	24.64	24.32	24.00	23.68	23.37	23.05	22.74	22.42
0.8	22.11	21.80	21.49	21.18	20.88	20.57	20.27	19.97	19.67	19.37
0.9	19.07	18.78	18.49	18.19	17.90	17.61	17.33	17.04	16.76	16.48
1.0	16.20	15.92	15.64	15.37	15.09	14.82	14.55	14.29	14.02	13.76
1.1	13.50	13.24	12.98	12.72	12.47	12.22	11.97	11.72	11.47	11.23
1.2	10.99	10.75	10.51	10.28	10.04	9.81	9.58	9.36	9.13	8.91
1.3	8.69	8.48	8.26	8.05	7.84	7.63	7.42	7.22	7.02	6.82
1.4	6.63	6.43	6.24	6.05	5.87	5.68	5.50	5.33	5.15	4.98
1.5	4.81	4.64	4.47	4.31	4.15	4.00	3.84	3.69	3.54	3.40
1.6	3.25	3.11	2.97	2.84	2.71	2.58	2.45	2.33	2.21	2.09
1.7	1.98	1.87	1.76	1.66	1.55	1.45	1.36	1.27	1.18	1.09
1.8	1.01	0.93	0.85	0.78	0.71	0.64	0.57	0.51	0.46	0.40
1.9	0.35	0.30	0.26	0.22	0.18	0.15	0.12	0.09	0.07	0.05
2.0	0.03	0.02	0.01	.0.00	0.00	0.00	0.00	0.00	0.00	0.00

For values of Q greater than or equal to zero, the estimate of percent defective (PDc) is read directly from the table. For values of Q less than zero, the table value must be subtracted from 100. Values of Q greater than what is on the table indicate that there is 0.00 % defective material.

TABLE 8 (CONT.): Estimated percent defective for compressive strength (PDc)
Sample size (n) = 7

Q	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	50.00	49.63	49.25	48.88	48.50	48.13	47.75	47.38	47.01	46.63
0.1	46.26	45.89	45.51	45.14	44.77	44.40	44.03	43.65	43.28	42.91
0.2	42.54	42.17	41.80	41.44	41.07	40.70	40.33	39.97	39.60	39.23
0.3	38.87	38.50	38.14	37.78	37.42	37.05	36.69	36.33	35.98	35.62
0.4	35.26	34.90	34.55	34.19	33.84	33.49	33.13	32.78	32.43	32.08
0.5	31.74	31.39	31.04	30.70	30.36	30.01	29.67	29.33	28.99	28.66
0.6	28.32	27.98	27.65	27.32	26.99	26.66	26.33	26.00	25.68	25.35
0.7	25.03	24.71	24.39	24.07	23.75	23.44	23.12	22.81	22.50	22.19
0.8	21.88	21.58	21.27	20.97	20.67	20.37	20.07	19.78	19.48	19.19
0.9	18.90	18.61	18.33	18.04	17.76	17.48	17.20	16.92	16.65	16.37
1.0	16.10	15.83	15.56	15.30	15.03	14.77	14.51	14.26	14.00	13.75
1.1	13.49	13.25	13.00	12.75	12.51	12.27	12.03	11.79	11.56	11.33
1.2	11.10	10.87	10.65	10.42	10.20	9.98	9.77	9.55	9.34	9.13
1.3	8.93	8.72	8.52	8.32	8.12	7.92	7.73	7.54	7.35	7.17
1.4	6.98	6.80	6.62	6.45	6.27	6.10	5.93	5.77	5.60	5.44
1.5	5.28	5.13	4.97	4.82	4.67	4.52	4.38	4.24	4.10	3.96
1.6	3.83	3.69	3.57	3.44	3.31	3.19	3.07	2.95	2.84	2.73
1.7	2.62	2.51	2.41	2.30	2.20	2.11	2.01	1.92	1.83	1.74
1.8	1.65	1.57	1.49	1.41	1.34	1.26	1.19	1.12	1.06	0.99
1.9	0.93	0.87	0.81	0.76	0.70	0.65	0.60	0.56	0.51	0.47
2.0	0.43	0.39	0.36	0.32	0.29	0.26	0.23	0.21	0.18	0.16
2.1	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.04	0.03	0.02
2.2	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00

For values of Q greater than or equal to zero, the estimate of percent defective (PDc) is read directly from the table. For values of Q less than zero, the table value must be subtracted from 100. Values of Q greater than what is on the table indicate that there is 0.00 % defective material.

TABLE 8 (CONT.): Estimated percent defective for compressive strength (PDc)
Sample size (n) =8

Q	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	50.00	49.62	49.24	48.86	48.49	48.11	47.73	47.35	46.97	46.59
0.1	46.22	45.84	45.46	45.08	44.71	44.33	43.96	43.58	43.21	42.83
0.2	42.46	42.08	41.71	41.34	40.97	40.59	40.22	39.85	39.48	39.11
0.3	38.75	38.38	38.01	37.65	37.28	36.92	36.55	36.19	35.83	35.47
0.4	35.11	34.75	34.39	34.04	33.68	33.33	32.97	32.62	32.27	31.92
0.5	31.57	31.22	30.87	30.53	30.18	29.84	29.50	29.16	28.82	28.48
0.6	28.15	27.81	27.48	27.15	26.82	26.49	26.16	25.83	25.51	25.19
0.7	24.86	24.54	24.23	23.91	23.59	23.28	22.97	22.66	22.35	22.04
.0.8	21.74	21.44	21.14	20.84	20.54	20.24	19.95	19.66	19.37	19.08
0.9	18.79	18.51	18.23	17.95	17.67	17.39	17.12	16.85	16.57	16.31
1.0	16.04	15.78	15.51	15.25	15.00	14.74	14.49	14.24	13.99	13.74
1.1	13.49	13.25	13.01	12.77	12.54	12.30	12.07	11.84	11.61	11.39
1.2	11.17	10.94	10.73	10.51	10.30	10.09	9.88	9.67	9.47	9.26
1.3	9.06	8.87	8.67	8.48	8.29	8.10	7.91	7.73	7.55	7.37
1.4	7.19	7.02	6.85	6.68	6.51	6.35	6.19	6.03	5.87	5.71
1.5	5.56	5.41	5.26	5.12	4.97	4.83	4.69	4.56	4.42	4.29
1.6	4.16	4.03	3.91	3.79	3.67	3.55	3.43	3.32	3.21	3.10
1.7	2.99	2.89	2.79	2.69	2.59	2.49	2.40	2.31	2.22	2.13
1.8	2.04	1.96	1.88	1.80	1.72	1.65	1.58	1.51	1.44	1.37
1.9	1.31	1.24	1.18	1.12	1.07	1.01	0.96	0.91	0.86	0.81
2.0	0.76	0.72	0.67	0.63	0.59	0.55	0.52	0.48	0.45	0.42
2.1	0.39	0.36	0.33	0.30	0.28	0.26	0.23	0.21	0.19	0.17
2.2	0.16	0.14	0.13	0.11	0.10	0.09	0.08	0.07	0.06	0.05
2.3	0.04	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.00

For values of Q greater than or equal to zero, the estimate of percent defective (PDc) is read directly from the table. For values of Q less than zero, the table value must be subtracted from 100. Values of Q greater than what is on the table indicate that there is 0.00 % defective material.

TABLE 8 (CONT.): Estimated percent defective for compressive strength (PDc)
Sample size (n) =9

Q	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	50.00	49.62	49.24	48.85	48.47	48.09	47.71	47.33	46.95	46.57
0.1	46.18	45.80	45.42	45.04	44.66	44.29	43.91	43.53	43.15	42.77
0.2	42.40	42.02	41.64	41.27	40.89	40.52	40.15	39.77	39.40	39.03
0.3	38.66	38.29	37.92	37.55	37.19	36.82	36.46	36.09	35.73	35.37
0.4	35.00	34.64	34.29	33.93	33.57	33.21	32.86	32.51	32.15	31.80
0.5	31.45	31.10	30.76	30.41	30.07	29.72	29.38	29.04	28.70	28.36
0.6	28.03	27.69	27.36	27.03	26.70	26.37	26.04	25.72	25.39	25.07
0.7	24.75	24.43	24.11	23.80	23.49	23.17	22.86	22.56	22.25	21.94
0.8	21.64	21.34	21.04	20.75	20.45	20.16	19.87	19.58	19.29	19.00
0.9	18.72	18.44	18.16	17.88	17.61	17.33	17.06	16.79	16.53	16.26
1.0	16.00	15.74	15.48	15.23	14.97	14.72	14.47	14.22	13.98	13.73
1.1	13.49	13.26	13.02	12.79	12.55	12.32	12.10	11.87	11.65	11.43
1.2	11.21	10.99	10.78	10.57	10.36	10.15	9.95	9.75	9.55	9.35
1.3	9.16	8.96	8.77	8.59	8.40	8.22	8.04	7.86	7.68	7.51
1.4	7.33	7.17	7.00	6.83	6.67	6.51	6.35	6.20	6.04	5.89
1.5	5.74	5.60	5.45	5.31	5.17	5.03	4.90	4.77	4.64	4.51
1.6	4.38	4.26	4.14	4.02	3.90	3.78	3.67	3.56	3.45	3.34
1.7	3.24	3.14	3.03	2.94	2.84	2.75	2.65	2.56	2.47	2.39
1.8	2.30	2.22	2.14	2.06	1.98	1.91	1.84	1.76	1.70	1.63
1.9	1.56	1.50	1.44	1.37	1.32	1.26	1.20	1.15	1.10	1.05
2.0	1.00	0.95	0.90	0.86	0.82	0.77	0.73	0.70	0.66	0.62
2.1	0.59	0.55	0.52	0.49	0.46	0.43	0.41	0.38	0.36	0.33
2.2	0.31	0.29	0.27	0.25	0.23	0.21	0.20	0.18	0.17	0.15
2.3	0.14	0.13	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.05
2.4	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01
2.5	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00

For values of Q greater than or equal to zero, the estimate of percent defective (PDc) is read directly from the table. For values of Q less than zero, the table value must be subtracted from 100. Values of Q greater than what is on the table indicate that there is 0.00 % defective material.

TABLE 8 (CONT.): Estimated percent defective for compressive strength (PDc)
Sample size (n) =10

Q	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	50.0	49.62	49.23	48.85	48.46	48.08	47.70	47.31	46.93	46.54
0.1	46.16	45.78	45.40	45.01	44.63	44.25	43.87	43.49	43.11	42.73
0.2	42.35	41.97	41.60	41.22	40.84	40.47	40.09	39.72	39.34	38.97
0.3	38.60	38.23	37.86	37.49	37.12	36.75	36.38	36.02	35.65	35.29
0.4	34.93	34.57	34.21	33.85	33.49	33.13	32.78	32.42	32.07	31.72
0.5	31.37	31.02	30.67	30.32	29.98	29.64	29.29	28.95	28.61	28.28
0.6	27.94	26.60	27.27	26.94	26.61	26.28	25.96	25.63	25.31	24.99
0.7	24.67	24.35	24.03	23.72	23.41	23.10	22.79	22.48	22.18	21.87
0.8	21.57	21.27	20.98	20.68	20.39	20.10	19.81	19.52	19.23	18.95
0.9	18.67	18.39	18.11	17.84	17.56	17.29	17.03	16.76	16.49	16.23
1.0	15.97	15.72	15.46	15.21	14.96	14.71	14.46	14.22	13.97	13.73
1.1	13.50	13.26	13.03	12.80	12.57	12.34	12.12	11.90	11.68	11.46
1.2	11.24	11.03	10.82	10.61	10.41	10.21	10.00	9.81	9.61	9.42
1.3	9.22	9.03	8.85	8.66	8.48	8.30	8.12	7.95	7.77	7.60
1.4	7.44	7.27	7.10	6.94	6.78	6.63	6.47	6.32	6.17	6.02
1.5	5.87	5.73	5.59	5.45	5.31	5.18	5.05	4.92	4.79	4.66
1.6	4.54	4.41	4.30	4.18	4.06	3.95	3.84	3.73	3.62	3.52
1.7	3.41	3.31	3.21	3.11	3.02	2.93	2.83	2.74	2.66	2.57
1.8	2.49	2.40	2.32	2.25	2.17	2.09	2.02	1.95	1.88	1.81
1.9	1.75	1.68	1.62	1.56	1.50	1.44	1.38	1.33	1.27	1.22
2.0	1.17	1.12	1.07	1.03	0.98	0.94	0.90	0.86	0.82	0.78
2.1	0.74	0.71	0.67	0.64	0.61	0.58	0.55	0.52	0.59	0.46
2.2	0.44	0.41	0.39	0.37	0.34	0.32	0.30	0.29	0.27	0.25
2.3	0.23	0.22	0.20	0.19	0.18	0.16	0.15	0.14	0.13	0.12
2.4	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06	0.05	0.05
2.5	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01
2.6	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00

For values of Q greater than or equal to zero, the estimate of percent defective (PDc) is read directly from the table. For values of Q less than zero, the table value must be subtracted from 100. Values of Q greater than what is on the table indicate that there is 0.00 % defective material.

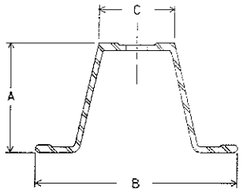
TABLE 8 (CONT.): Estimated percent defective for compressive strength (PDc)
Sample size (n) >10

Q	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	50.00	49.60	49.20	48.80	48.40	48.01	47.61	47.21	46.81	46.41
0.1	46.02	45.62	45.22	44.83	44.43	44.04	43.64	43.25	42.86	42.47
0.2	42.07	41.68	41.29	40.90	40.52	40.13	39.74	39.36	38.97	38.59
0.3	38.21	37.83	37.45	37.07	36.69	36.32	35.94	35.57	35.20	34.83
0.4	34.46	34.09	33.72	33.36	33.00	32.64	32.28	31.92	31.56	31.21
0.5	30.85	30.50	30.15	29.81	29.46	29.12	28.77	28.43	28.10	27.76
0.6	27.43	27.09	26.76	26.43	26.11	25.78	25.46	25.14	24.38	24.51
0.7	24.20	23.89	23.58	23.27	22.95	22.66	22.36	22.06	21.77	21.48
0.8	21.19	20.90	20.61	20.33	20.05	19.77	19.49	19.22	18.94	18.67
0.9	18.41	18.14	17.88	17.62	17.36	17.11	16.85	16.60	16.35	16.11
1.0	15.87	15.62	15.39	15.15	14.92	14.69	14.46	14.23	14.01	13.79
1.1	13.57	13.35	13.14	12.92	12.71	12.51	12.30	12.10	11.90	11.70
1.2	11.51	11.31	11.12	10.93	10.75	10.56	10.38	10.20	10.03	9.85
1.3	9.68	9.51	9.34	9.80	9.01	8.85	8.69	8.53	8.38	8.23
1.4	8.08	7.93	7.78	7.64	7.49	7.35	7.21	7.08	6.94	6.81
1.5	6.68	6.55	6.43	6.30	6.18	6.06	5.94	5.82	5.71	5.59
1.6	5.48	5.37	5.26	5.16	5.05	4.95	4.85	4.75	4.65	4.55
1.7	4.46	4.36	4.27	4.18	4.09	4.01	3.92	3.84	3.75	3.67
1.8	3.59	3.51	3.44	3.36	3.29	3.22	3.14	3.07	3.01	2.94
1.9	2.87	2.81	2.74	2.68	2.62	2.56	2.50	2.44	2.39	2.33
2.0	2.28	2.22	2.17	2.12	2.07	2.02	1.97	1.92	1.88	1.83
2.1	1.79	1.74	1.70	1.66	1.62	1.58	1.54	1.50	1.46	1.43
2.2	1.39	1.36	1.32	1.29	1.25	1.22	1.19	1.16	1.13	1.10
2.3	1.07	1.04	1.02	0.99	0.96	0.94	0.91	0.89	0.87	0.84
2.4	0.82	0.80	0.78	0.75	0.73	0.71	0.69	0.68	0.68	0.64
2.5	0.62	0.60	0.59	0.57	0.55	0.54	0.52	0.51	0.49	0.48
2.6	0.47	0.45	0.44	0.43	0.41	0.40	0.39	0.38	0.37	0.36
2.7	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26
2.8	0.26	0.25	0.24	0.23	0.23	0.22	0.21	0.21	.20	.19
2.9	.19	.18	.18	.17	.16	.16	.15	.15	.14	.14
3.0	.13	.13	.13	.12	.12	.11	.11	.11	.10	.10

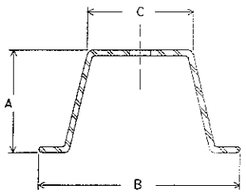
For values of Q greater than or equal to zero, the estimate of percent defective (PDc) is read directly from the table. For values of Q less than zero, the table value must be subtracted from 100. Values of Q greater than what is on the table indicate that there is 0.00 % defective material.

TABLE 9	COMPRESSIVE STRENGTH AND PERMEABILITY TEST RESULTS								
SAMPLE DATE	LOCATION	QC / QA INDICATOR	LOT	SUBLOT	CONCRETE CLASS	AIR	SLUMP	COMPRESSIVE STRENGTH (28 D)	PERMEABILITY T277 (MODIFIED)
Certified Laboratory Signature									
Contractor Signature									

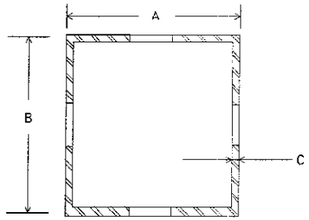
TABLE 10	PLASTIC AIR CONCRETE TEST RESULTS			
CLASS OF CONCRETE		MAX AIR		MIN AIR
SAMPLE DATE	LOAD NO.	AIR @ DISCHARGE	BACK PRESSURE METHOD	SLUMP
Certified Laboratory Signature				
Contractor Signature				



TYPE P



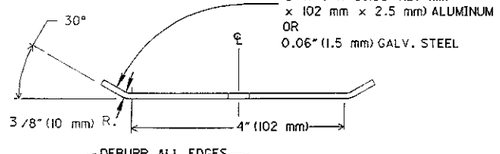
TYPE F



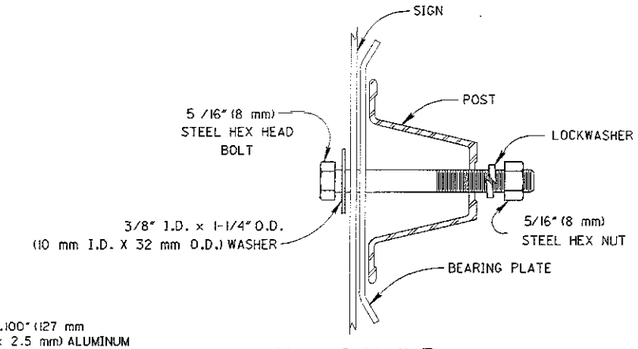
TYPE S

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



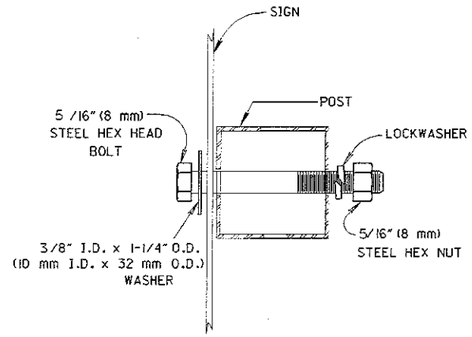
BEARING PLATE



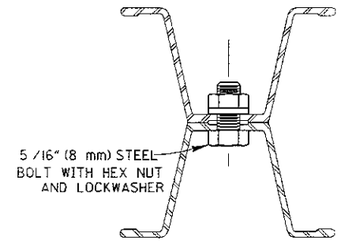
U - CHANNEL
SIGN ATTACHMENT DETAIL

NOTES

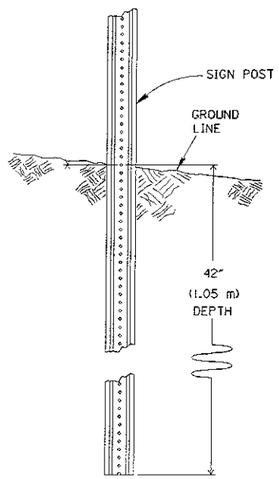
1. Install number 4 type P and F posts, and number 6 type P and F posts, only in protected locations (e.g. behind guardrail). Install two post installations of number 4 type S posts within 7 foot (2.1m) path only in protected locations.
2. Use of anchor base with No. 2 and No. 3 square post is optional.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



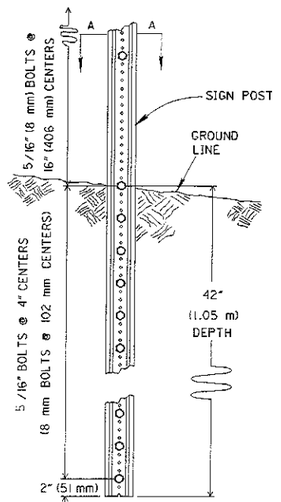
SQUARE POST
SIGN ATTACHMENT DETAIL



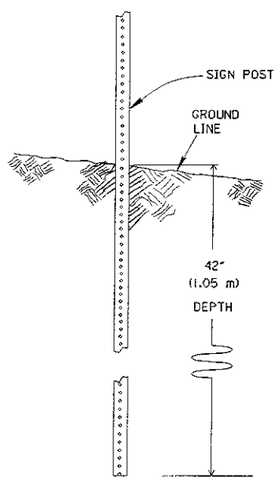
SECTION A - A



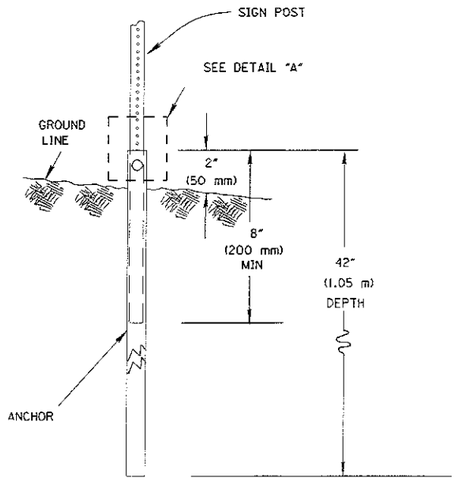
TYPICAL NO. 1, NO. 2 AND NO. 3 U - CHANNEL DRIVEN INSTALLATION



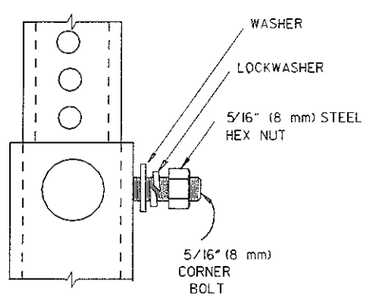
TYPICAL NO. 4 AND NO. 6 U - CHANNEL DRIVEN INSTALLATION



TYPICAL SQUARE POST DRIVEN INSTALLATION



TYPICAL SQUARE POST ANCHOR BASE INSTALLATION



DETAIL "A"

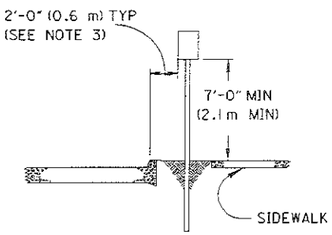
01-19-01

YIELDING POST

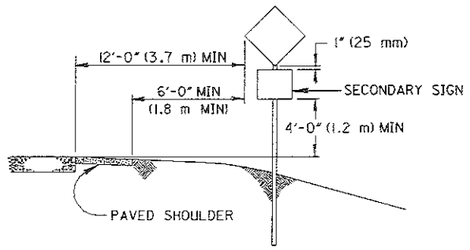
OFFICE OF TRAFFIC ENGINEERING

TC-41.20

LAM

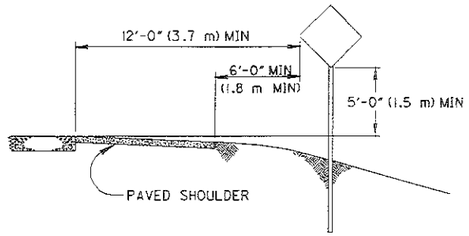


URBAN-RESIDENTIAL AND BUSINESS



RURAL

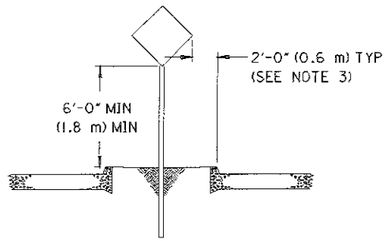
W/SECONDARY SIGN



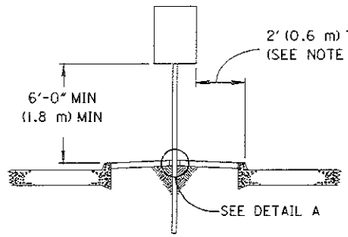
RURAL

NOTES

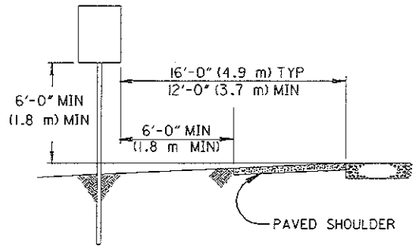
1. See drawing TC-41.20 for details on yielding supports.
2. All signs shall be placed 90° to the roadway, except parking signs with arrow shall be set at an angle of not less than 30° nor more than 45° with a line parallel to the flow of traffic.
3. A clearance of 1 foot (0.3 m) is permissible where sidewalk width is limited or where existing poles are close to the curb.
4. See drawings TC-52.10 and TC-52.20 for dimensions between supports.



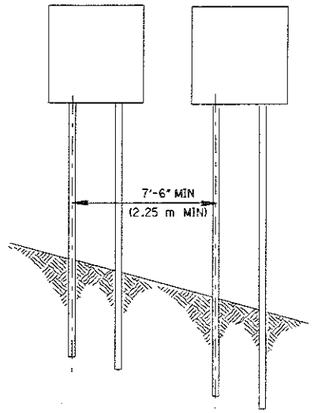
MEDIAN



PAVED MEDIAN

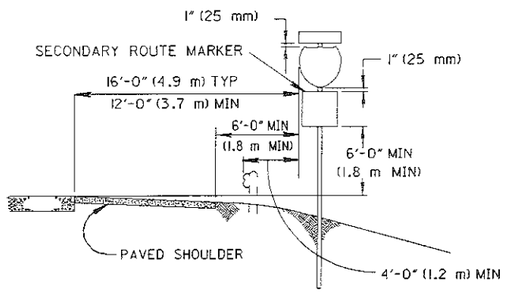


MEDIAN-EXPRESSWAY OR FREEWAY



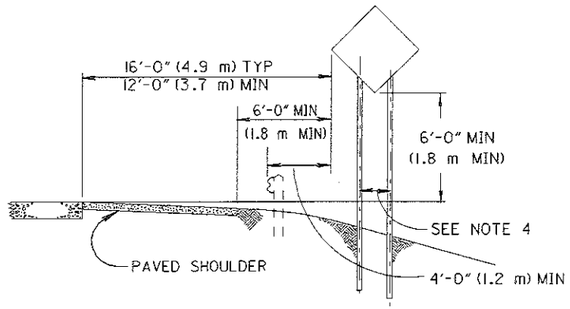
ADJACENT SIGN INSTALLATION

FOR NO. 2 AND NO. 3 YIELDING POST SUPPORTS IN EXPOSED LOCATIONS

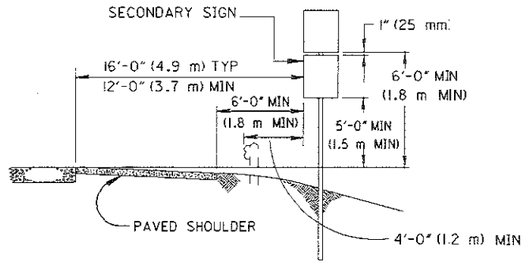


EXPRESSWAY OR FREEWAY

W/SECONDARY SIGN

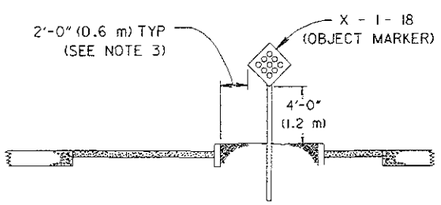


EXPRESSWAY OR FREEWAY

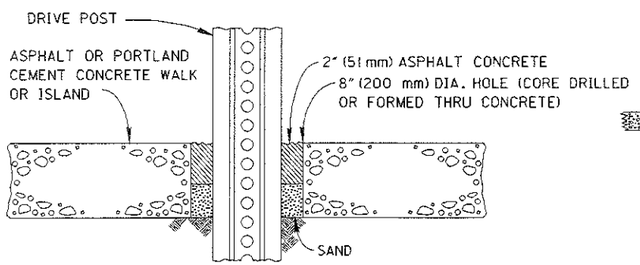


EXPRESSWAY OR FREEWAY

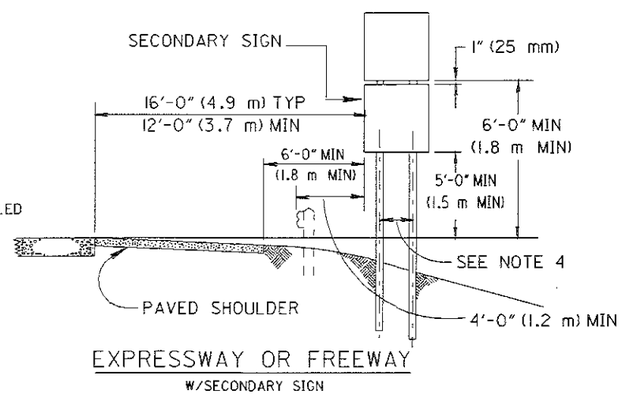
W/SECONDARY SIGN



EXPRESSWAY OR FREEWAY



DETAIL A



EXPRESSWAY OR FREEWAY

W/SECONDARY SIGN

4-20-01

TYPICAL FLAT SHEET SIGN PLACEMENT

OFFICE OF TRAFFIC ENGINEERING

TC-42.20

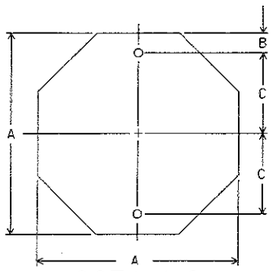
1 / 1

LAM

NOTES

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

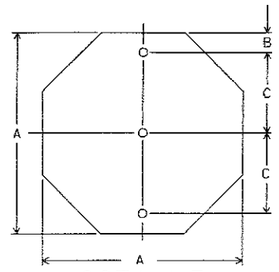
SHAPE — OCTA-2-6 — NO. BOLTS REQUIRED
NO. SUPPORTS REQUIRED



OCTA-1-2

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

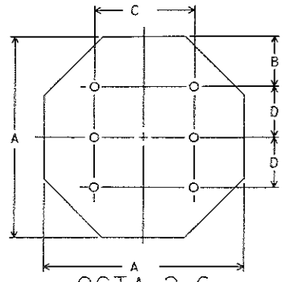
A	B	C	THICKNESS	m^2
450	75	150	1.6	0.20
600	75	225	1.6	0.36



OCTA-1-3

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

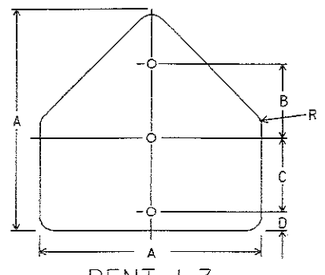
A	B	C	THICKNESS	m^2
750	75	300	2.0	0.56
900	150	300	2.0	0.81



OCTA-2-6

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

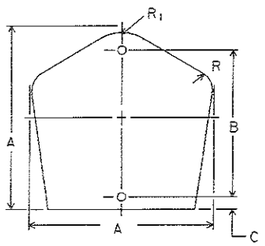
A	B	C	D	THICKNESS	m^2
1200	300	600	300	2.5	1.44



PENT-1-3

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

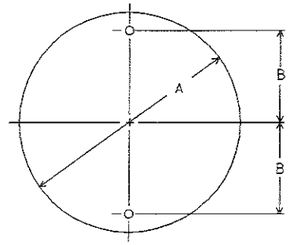
A	B	C	D	R	THICKNESS	m^2
750	250	275	75	48	2.0	0.56
900	300	300	75	57	2.0	0.81
1050	350	325	100	64	2.5	1.10



CO-1-2

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

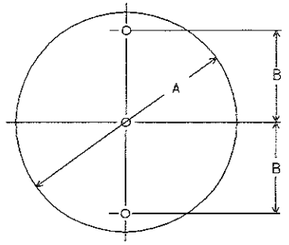
A	B	C	R_1	R	THICKNESS	m^2
450	375	25	125	50	1.6	0.20
600	450	50	135	68	1.6	0.36
750	600	50	168	86	2.0	0.56



CIR-1-2

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

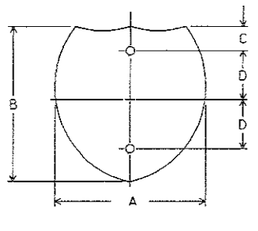
A	B	THICKNESS	m^2
450	150	1.6	0.20
600	225	2.0	0.36



CIR-1-3

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

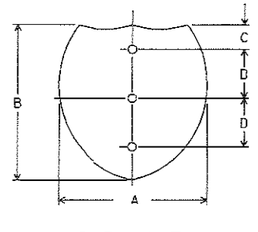
A	B	THICKNESS	m^2
750	300	2.0	0.56
900	375	2.0	0.81



I.S.-1-2

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

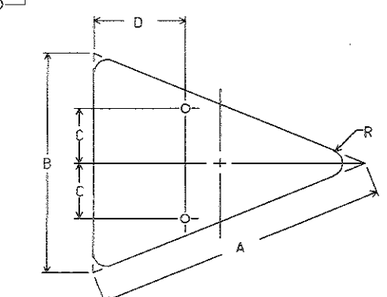
A	B	C	D	THICKNESS	m^2
600	600	75	225	1.6	0.36
750	600	75	225	2.0	0.45
750	750	75	300	2.0	0.56
1000	750	75	300	2.0	0.75



I.S.-1-3

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

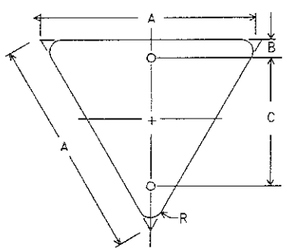
A	B	C	D	THICKNESS	m^2
900	900	150	300	2.0	0.81
1200	900	150	300	2.5	1.08



ISOS-1-2

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

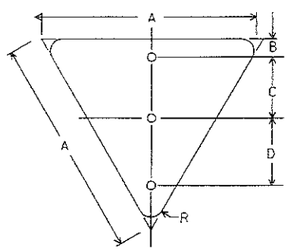
A	B	C	D	R	THICKNESS	m^2
1000	750	187	300	48	2.0	0.35
1200	900	225	375	57	2.5	0.50



TRI-1-2

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

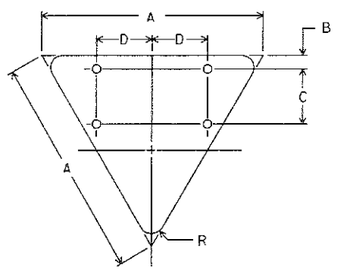
A	B	C	R	THICKNESS	m^2
600	50	350	38	2.0	0.16



TRI-1-3

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

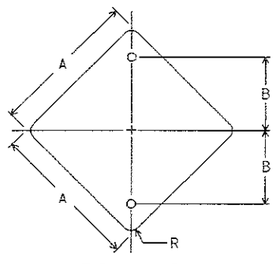
A	B	C	D	R	THICKNESS	m^2
900	75	250	275	50	2.5	0.35



TRI-2-4

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

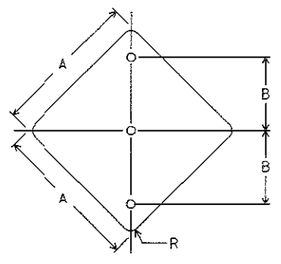
A	B	C	D	R	THICKNESS	m^2
1200	75	300	300	75	2.5	0.62
1500	75	450	375	100	2.5	0.97



DIA-1-2

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

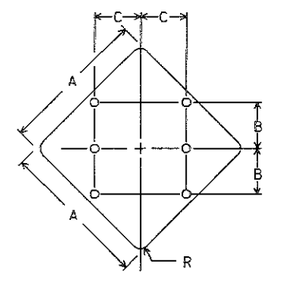
A	B	R	THICKNESS	m^2
450	225	38	1.6	0.20



DIA-1-3

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

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



DIA-2-6

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

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

4-20-01

BLANK DETAILS I

SIGN B

OFFICE OF TRAFFIC ENGINEERING

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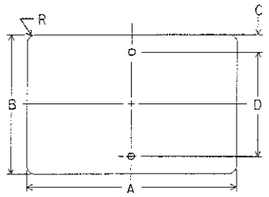
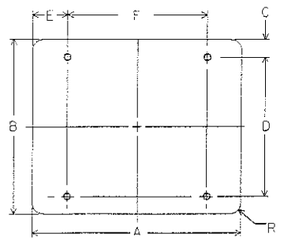


H-REC-1-2

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

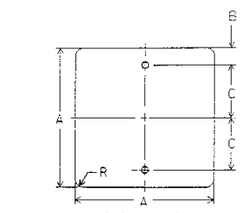
A	B	C	D	R	THICKNESS	m^2
300	100	25	50	38	1.6	0.03
300	150	37.5	75	38	1.6	0.05
300	225	37.5	150	38	1.6	0.07
450	150	37.5	75	38	1.6	0.07
450	300	37.5	225	38	1.6	0.14
525	375	37.5	300	38	1.6	0.20
525	450	75	300	38	1.6	0.24
600	150	37.5	75	38	1.6	0.09
600	200	37.5	125	38	1.6	0.12
600	250	37.5	175	38	1.6	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

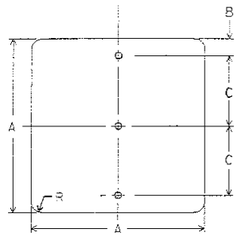
A	B	C	D	E	F	R	THICKNESS	m^2
900	600	75	450	150	600	38	2.0	0.54
900	750	75	600	150	600	48	2.0	0.68
1000	500	75	350	150	700	38	2.0	0.50
1050	900	150	600	225	600	57	2.5	0.95
1125	900	150	600	225	675	57	2.5	1.01
1200	200	37.5	125	225	750	38	2.0	0.24
1200	212	37.5	137	225	750	38	2.0	0.25
1200	350	37.5	275	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

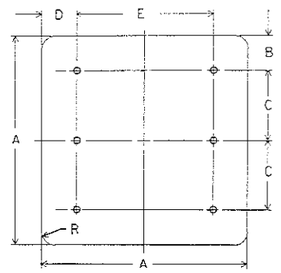
A	B	C	R	THICKNESS	m^2
375	75	112.5	38	1.6	0.14
450	75	150	38	1.6	0.20
600	75	225	38	1.6	0.36



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



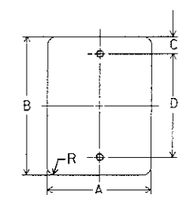
SQ-2-6

	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

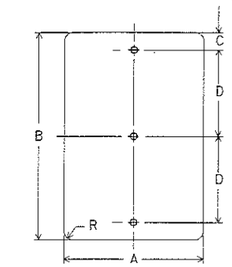
* "DO NOT ENTER" SIGN



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

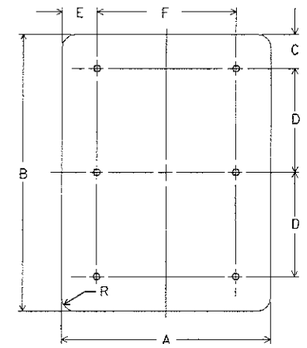
A	B	C	D	R	THICKNESS	m^2
200	650	125	400	38	1.6	0.13
225	300	37.5	225	38	1.6	0.07
300	450	37.5	375	38	1.6	0.14
300	600	75	450	38	1.6	0.18
450	600	75	450	38	1.6	0.27



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

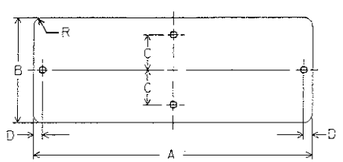
A	B	C	D	R	THICKNESS	m^2
150	1350	225	450	38	2.0	0.20
300	900	75	375	38	1.6	0.27
300	1200	150	450	38	2.0	0.36
600	750	75	300	38	2.0	0.45
600	900	75	375	38	2.0	0.54
600	1200	225	375	38	2.5	0.72
750	900	75	375	48	2.0	0.68
750	950	75	400	38	2.0	0.68
750	1050	225	300	38	2.0	0.79
900	1050	225	300	57	2.5	0.95



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

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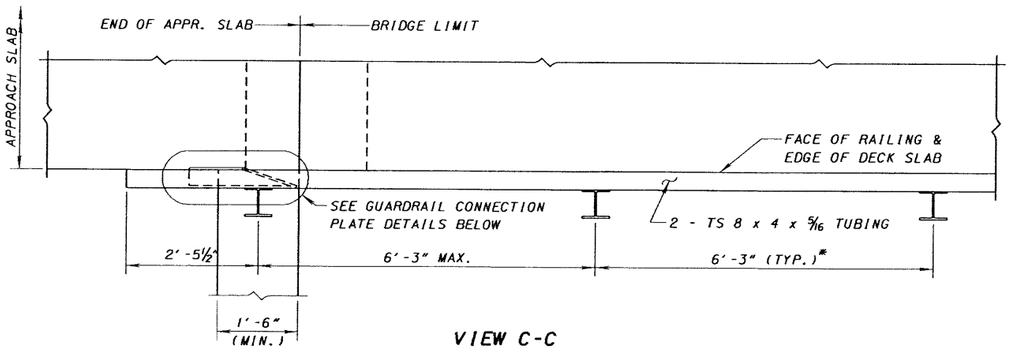
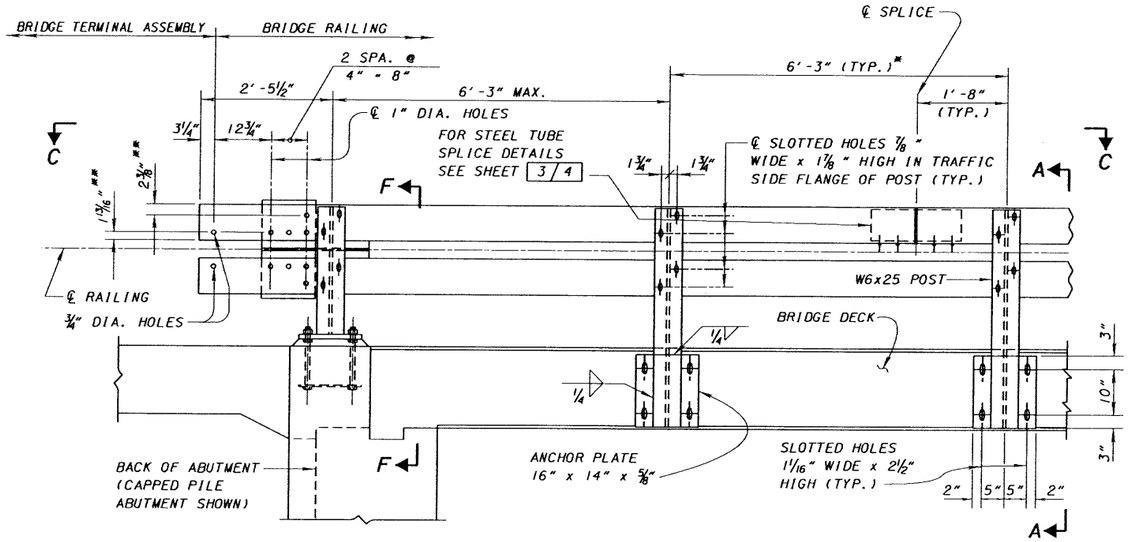


VIEW C-C



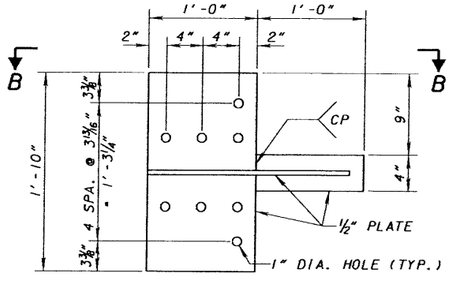
RAILING ELEVATION ON CONCRETE SLAB

FOR SECTION A-A SEE SHEET 2/4 .

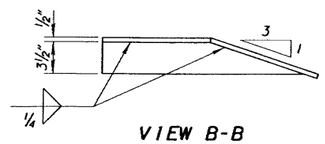
BRIDGE TERMINAL ASSEMBLY NOT SHOWN. REFER TO STANDARD CONSTRUCTION DRAWING GR-3.6 FOR DETAILS.

* - ON EACH SIDE OF THE BRIDGE, ONE POST SPACING PER SPAN MAY BE DECREASED TO ACCOUNT FOR ANY REQUIRED CONSTRUCTION CLEARANCES . NO POST SPACING SHALL EXCEED 6'-3".

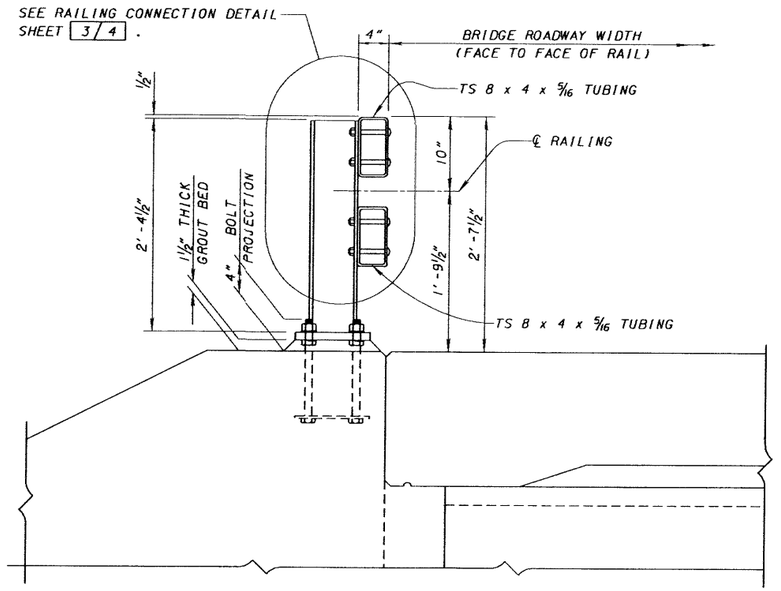
** - SYMMETRICAL ABOUT ℄ RAILING



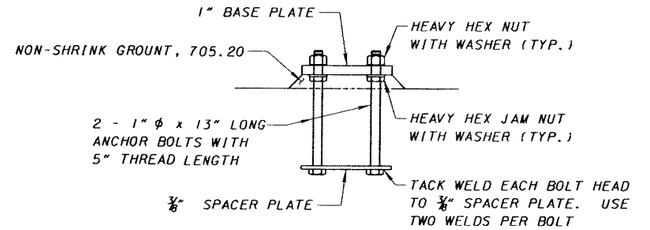
GUARDRAIL CONNECTION PLATE DETAILS



VIEW B-B

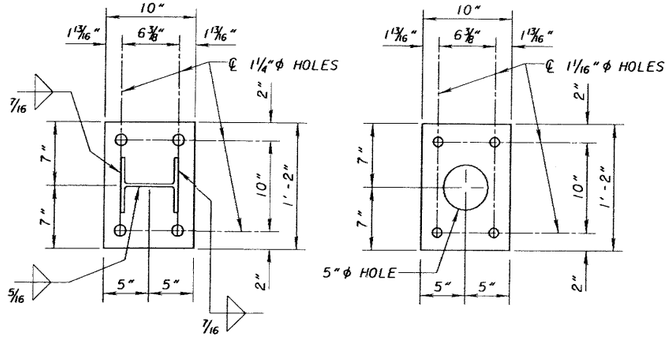


SECTION F-F



FLUSH MOUNTED POST ANCHOR DETAIL

(POST NOT SHOWN)



BASE PLATE

(1" PLATE)

SPACER PLATE

(⅜" PLATE)

DESIGN AGENCY
OFFICE OF
STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fogarell — ADMINISTRATOR
7-06-99 — DATE

REVISIONS	DESIGNED	CHECKED	REVIEWED
10-20-00	AJM/SAM	JS	WTL
07-19-02	DRAWN		
04-18-03	SAM		

STANDARD
TWIN STEEL TUBE
BRIDGE RAILING

TST-1-99

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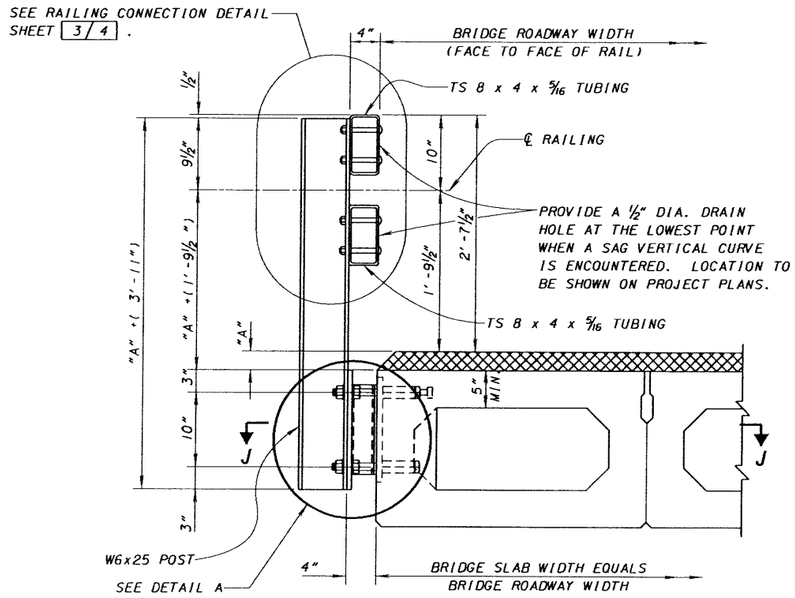
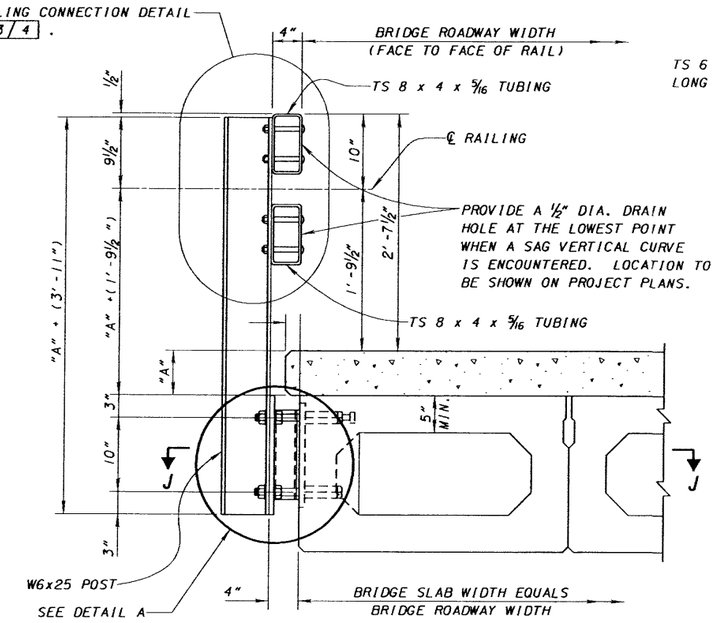


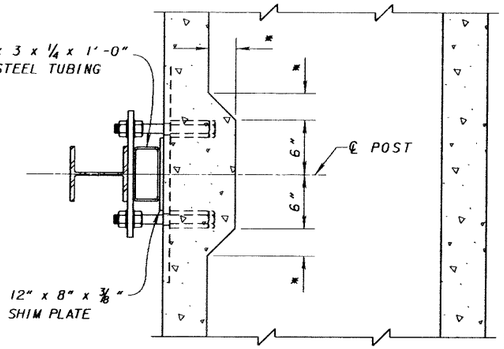
SECTION A-A

(FOR 17" AND DEEPER NONCOMPOSITE PRESTRESSED BOX BEAM BRIDGES)



SECTION A-A

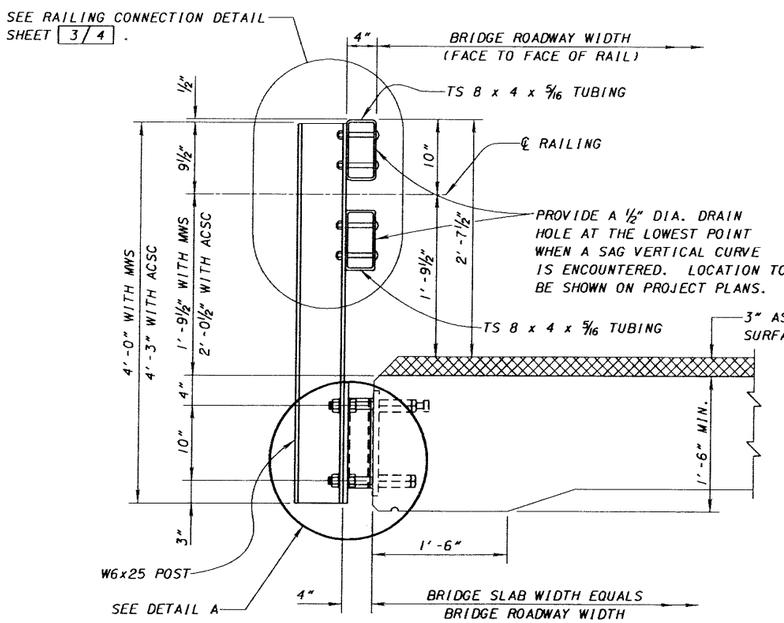
(FOR 17" AND DEEPER COMPOSITE PRESTRESSED BOX BEAM BRIDGES)



SECTION J-J

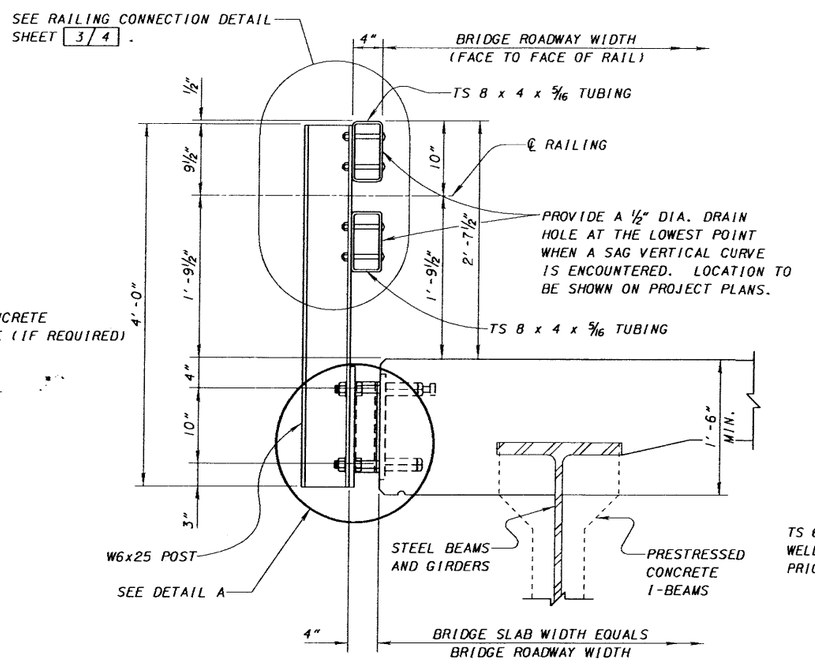
LEGEND

MWS - MONOLITHIC WEARING SURFACE
ACSC - ASPHALT CONCRETE SURFACE COURSE
"A" - DECK OR OVERLAY THICKNESS, THIS DIMENSION VARIES ACROSS THE LENGTH OF THE BRIDGE.
* - THIS DIMENSION IS THE SAME AS THE WIDTH OF FILLET IN THE BOX BEAMS'S VOID.



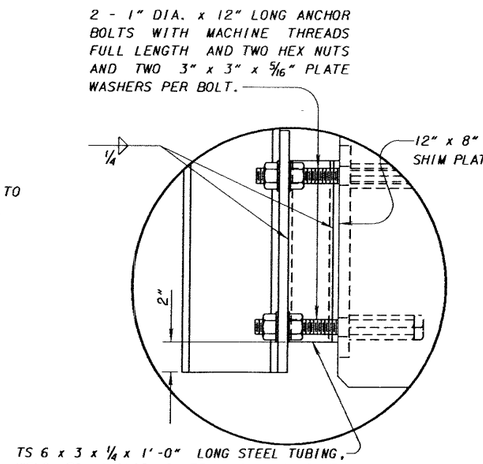
SECTION A-A

(FOR SLAB BRIDGES)



SECTION A-A

(FOR CONCRETE OR STEEL I-BEAM BRIDGES)



DETAIL A

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fogell — ADMINISTRATOR
7-06-99 — DATE

STANDARD
TWIN STEEL TUBE BRIDGE RAILING

REVISIONS	DESIGNED	CHECKED	REVIEWED
10-20-00	AJM/SAM	JS	WTL
07-19-02	DRAWN		
04-18-03	SAM		

TST-1-99

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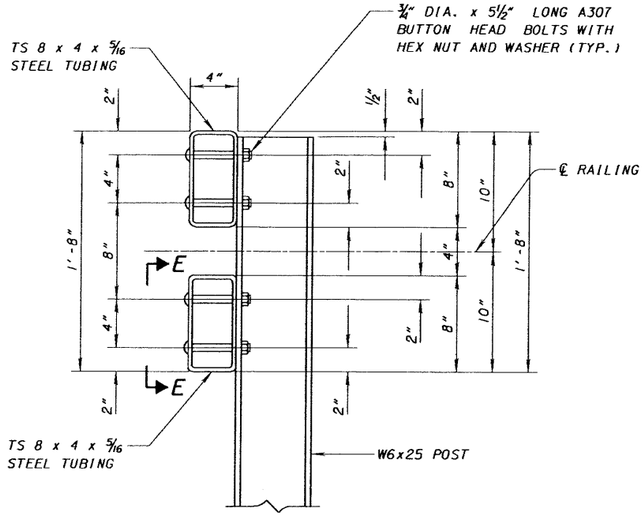
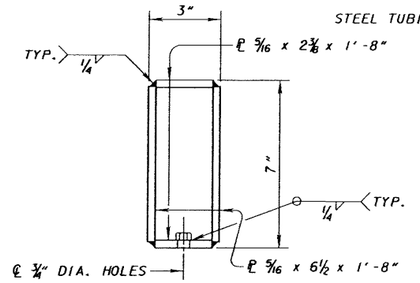
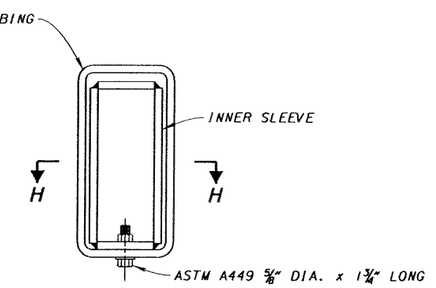


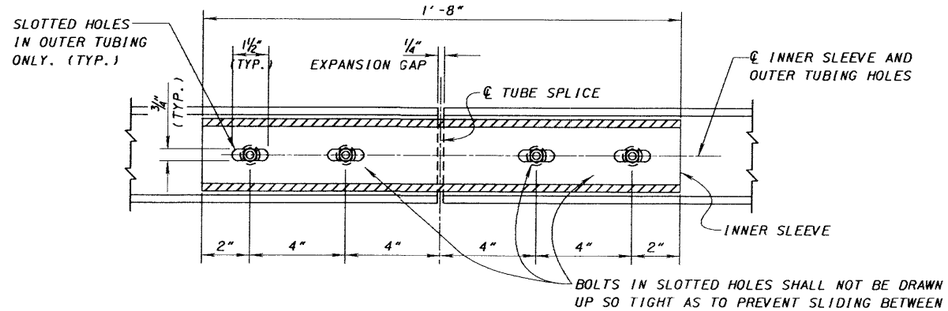
RAILING CONNECTION DETAIL



FINISHED DIMENSIONS OF INNER SLEEVE

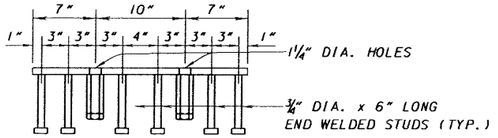


SECTION THRU SPLICE

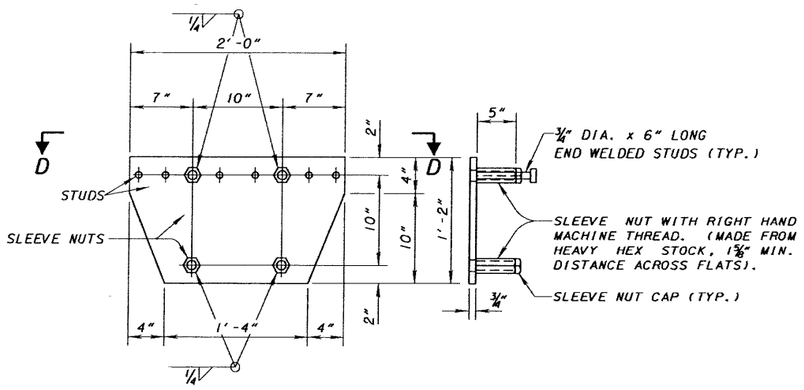


SECTION H-H

STEEL TUBE SPLICE DETAILS



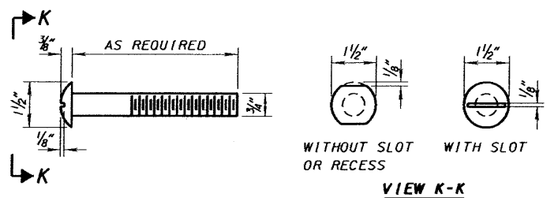
VIEW D-D



ELEVATION

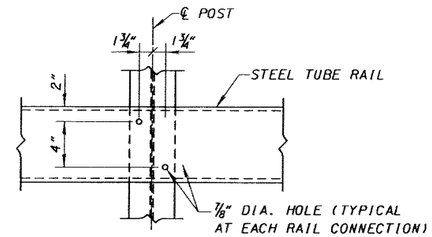
END VIEW

POST ANCHOR DEVICE

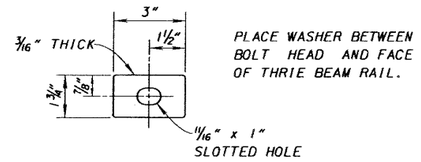


VIEW K-K

DETAIL OF 3/4" DIA. ROUND HEAD BOLT



VIEW E-E



SPECIAL WASHER

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fogwell ADMINISTRATOR
7-06-99 DATE

REVISIONS	DESIGNED	CHECKED	REVIEWED
10-20-00	AJM/SAM	JS	WTL
07-19-02	DRAWN		TST-1-99
04-18-03	SAM		

STANDARD
TWIN STEEL TUBE BRIDGE RAILING

TST-1-99 GENERAL NOTES:

GENERAL: THIS DRAWING PROVIDES DESIGN AND CONSTRUCTION DETAILS. THE PROJECT PLANS FOR EACH STRUCTURE SHALL PROVIDE NECESSARY ADDITIONAL RAILING DIMENSIONS INCLUDING RAILING LENGTHS, POST SPACINGS, POST LENGTHS AND ANY OTHER PERTINENT INFORMATION INCLUDING SPECIAL NOTES AND DETAILS. FOR ADDITIONAL GUARDRAIL DETAILS, SEE STD. CONSTR. DWGS. GR-1.1, GR-1.2 AND OTHER DRAWINGS PERTAINING TO DESIGN OF SPECIFIC GUARDRAIL TYPES.

APPLICATION: THE TWIN STEEL TUBE RAILING SHALL BE USED ON STRUCTURES DESIGNED TO DRAIN SURFACE WATER OVER THE SIDES OF THE STRUCTURE. THIS RAILING IS NOT APPLICABLE TO COMPOSITE BOX BEAM BRIDGES WITH DESIGN OVERHANGS GREATER THAN 2" OR TOP FLANGE THICKNESSES LESS THAN 5".

CONNECT THE APPROACH AND TRAILING ENDS OF THE TWIN STEEL TUBE RAILING TO THE BRIDGE TERMINAL ASSEMBLY DETAILED IN STANDARD CONSTRUCTION DRAWING GR-3.6. THE FIRST POST AT THE APPROACH END AND THE LAST POST AT THE TRAILING END OF THE BRIDGE RAILING SHALL BE FLUSH MOUNTED AS SHOWN ON SHEET 1 OF 4.

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

DESIGN DATA:
REINFORCING STEEL - MINIMUM YIELD STRENGTH - 60,000 PSI
STEEL TUBING - MINIMUM YIELD STRENGTH - 46,000 PSI
ALL OTHER STEEL - MINIMUM YIELD STRENGTH - 50,000 PSI

MATERIALS: FURNISH SHAPED STRUCTURAL TUBING ACCORDING TO 707.10 (ASTM A500, GRADE B). IN LIEU OF THE "DROP WEIGHT TEAR TEST" (ASTM E436), THE MANUFACTURER MAY CHOOSE TO SUPPLY TUBING THAT MEETS IMPACT TOUGHNESS ACCORDING TO AASHTO T266, "NOTCHED BAR IMPACT TESTING OF METALLIC MATERIALS (CVN)". THE CVN IMPACT REQUIREMENTS SHALL BE 15 FT-LBS AT 0°F. FOR EACH HEAT SUPPLIED, THE MANUFACTURER SHALL FURNISH ONE 2" x 18" SPECIMEN, MARKED WITH ITS HEAT NUMBER, FOR IMPACT TESTING.

FURNISH STRUCTURAL STEEL SHAPES, PLATES AND PLATE WASHERS ACCORDING TO 711.01.

FURNISH NON SHRINK, NON METALLIC GROUT ACCORDING TO CMS 705.20.

GALVANIZING: GALVANIZE ALL SHAPED STRUCTURAL TUBES, POSTS, PLATES, HARDWARE AND ACCESSORIES IN ACCORDANCE WITH 711.02. PRIOR TO GALVANIZING, ROUND ALL STRUCTURAL TUBING ENDS AND REMOVE BURRS FROM ALL STEEL TUBING, SHAPES AND PLATES.

HORIZONTAL CURVATURE: THIS STANDARD IS APPLICABLE TO STRUCTURES HAVING A RAILING CURVATURE RADIUS OF 20 FEET OR MORE. FOR A RADIUS OF LESS THAN 20 FEET, THE DESIGN SHALL BE SPECIAL. FOR ALL CURVED STRUCTURES, HEAT CURVE THE HORIZONTAL RAIL ELEMENTS ACCORDING TO THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.

TUBE SPLICES: LOCATE SPLICES SO THAT EACH TUBE SEGMENT IS CONNECTED TO NOT LESS THAN TWO POSTS. STAGGER SPLICES IN THE TOP AND BOTTOM TUBES TO AVOID OCCURRENCES IN THE SAME PANEL.

FASTENERS: FURNISH MATERIAL CONFORMING TO THE FOLLOWING:

ALL ANCHOR BOLTS, SLEEVE NUTS, NUTS AND WASHERS SHALL CONFORM TO CMS 711.09 (ASTM A325). THE THREAD LENGTH REQUIREMENT OF A325 MAY BE WAIVED.

END WELDED STUDS SHALL CONFORM TO ASTM A108.

THE TUBE RAIL TO POST CONNECTION BOLTS AND HEX NUTS SHALL CONFORM TO 711.10 (ASTM A307). REFER TO STANDARD CONSTRUCTION DRAWING GR-3.6 FOR THE BRIDGE TERMINAL ASSEMBLY CONNECTION HARDWARE.

THE HEX CAP SCREWS (BOLTS), HEX NUTS AND WASHERS SHALL CONFORM TO ASTM A 449.

BOX BEAMS: THE DISTANCE FROM THE CENTERLINE OF A GUARDRAIL POST TO THE ABUTMENT END OF THE BEAM OR TO THE CENTERLINE OF A TIE ROD SHALL NOT BE LESS THAN 1'-8". THE DISTANCE FROM THE CENTERLINE OF A GUARDRAIL POST TO THE PIER END OF THE BEAM SHALL NOT BE LESS THAN 2'-10". THE LOCATION OF THE HORIZONTAL TIE RODS MAY NEED TO BE ADJUSTED IN ORDER TO ACCOMMODATE EACH POST ANCHOR DEVICE.

METHOD OF MEASUREMENT: THE DEPARTMENT WILL MEASURE TWIN STEEL TUBE BRIDGE RAILING BY THE NUMBER OF FEET. THE DEPARTMENT WILL MEASURE THE LENGTH OF RAILING AS THE DISTANCE BETWEEN THE CENTERS OF THE FLUSH MOUNTED POSTS AT THE APPROACH AND TRAILING ENDS PLUS 4'-11".

BASIS OF PAYMENT: THE DEPARTMENT WILL CONSIDER THE COSTS ASSOCIATED WITH FURNISHING AND INSTALLING STEEL TUBING, STEEL POSTS, POST ANCHOR DEVICES, ANCHOR PLATES, TUBE SPLICE PLATES, STEEL SHIM PLATES, GUARDRAIL CONNECTION PLATES, ANCHOR BOLTS, GROUT, ¾" ROUND HEAD BOLTS, SLEEVE NUTS, NUTS, CAP SCREWS, WASHERS AND OTHER HARDWARE TO BE INCLUDED WITH THE TWIN STEEL TUBE RAILING. THE DEPARTMENT WILL PAY FOR ACCEPTED QUANTITIES AT THE CONTRACT PRICE FOR ITEM 517, RAILING (TWIN STEEL TUBE).

THE DEPARTMENT WILL PAY FOR BRIDGE TERMINAL ASSEMBLY HARDWARE SEPARATELY.

DESIGN AGENCY
OFFICE OF
STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fogwell — 7-06-99
ADMINISTRATOR — DATE

REVISIONS
10-20-00
07-19-02
04-18-03

DESIGNED AJM/SAM
DRAWN SAM
CHECKED JS
REVIEWED WTL

STANDARD
TWIN STEEL TUBE BRIDGE RAILING

TST-1-99

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