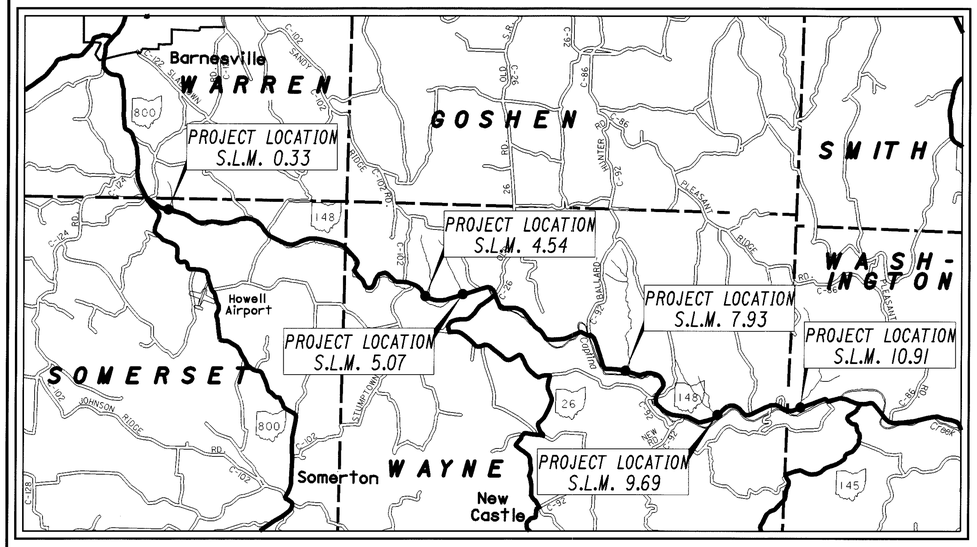
STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

BEL-148-(0.33)(4.54)(5.07)(7.93)(9.69)(10.91)

SOMERSET TOWNSHIP
WAYNE TOWNSHIP
WASHINGTON TOWNSHIP
BELMONT COUNTY



LOCATION MAP

LATITUDE: N39° 56′ 00″ LONGITUDE: W81° 05′ 00″

SCALE IN MILES
0 1 2 3 4

N

PORTION TO BE IMPROVED
STATE & FEDERAL ROUTES
OTHER ROADS

DESIGN DESIGNATION

CURRENT ADT (2000)	690
DESIGN YEAR ADT (2020)	880
DESIGN HOURLY VOLUME (2020)	106
DIRECTIONAL DISTRIBUTION	0.55
TRUCKS (24 HOUR B&C)	6%
DESIGN SPEED	55 mph
LEGAL SPEED	55 mph

DESIGN FUNCTIONAL CLASSIFICATION - RURAL ARTERIAL

DESIGN EXCEPTION

	DATE	SHEET NO.
HORIZONTAL ALIGNMENT (Section 4.54)	1/06/00	30
SUPERELEVATION RATE (Section 4.54, 5.07, 7.93, 9.69)	1/06/00	17
LANE WIDTH (Section 4.54, 7.93)	1/06/00	2-3
PAVEMENT CROSS SLOPE (Section 10.91)	1/06/00	17

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
TIMOHTY EARL STILLTON
61138
REGISTERED PROFESSIONAL ENGINEER
SIGNED Timothy E Stillton
DATE: 11/6/00

INDEX OF SHEETS

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PROJECT DESCRIPTION

IMPROVEMENT OF 555 FEET (0.11 MILES) OF S.R. 148 BY REPLACING ONE BRIDGE AND FIVE CULVERTS WITH PREFABRICATED CONCRETE BOX STRUCTURES WITH MINIMAL APPROACH WORK.

1997 SPECIFICATIONS

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

I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL 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 Wayne S. Paul
DATE 11-7-00 DISTRICT DEPUTY DIRECTOR

APPROVED Gordon Proctor Jr.
DATE 12-7-00 DIRECTOR, DEPARTMENT OF TRANSPORTATION

STANDARD CONSTRUCTION DRAWINGS

BP-3.1	7/28/00	DM-1.1M	10-21-97	MT-96.11M	1-30-95	MT-105.10M	4-25-94
BP-4.1	7/28/00	DM-4.3	4-29-99	MT-96.20M	1-30-95	MT-105.11M	4-25-94
		DM-4.4	4-29-99				
GR-1.1M	10-21-97			MT-96.25M	1-30-95	TC-65.10M	11-1-95
GR-1.2M	1-3-96						
GR-1.3M	11-30-94	RM-4.2M	10-21-97	MT-97.10M	4-25-94	TC-65.12M	11-1-95
GR-2.1M	4-14-98			MT-101.20M	3-1-96		
GR-2.2M	10-21-97						
GR-2.4M	10-21-97			MT-101.60M	4-25-94		
GR-3.4M	10-21-97						
GR-4.1M	11-30-94						
GR-4.2M	10-21-97						

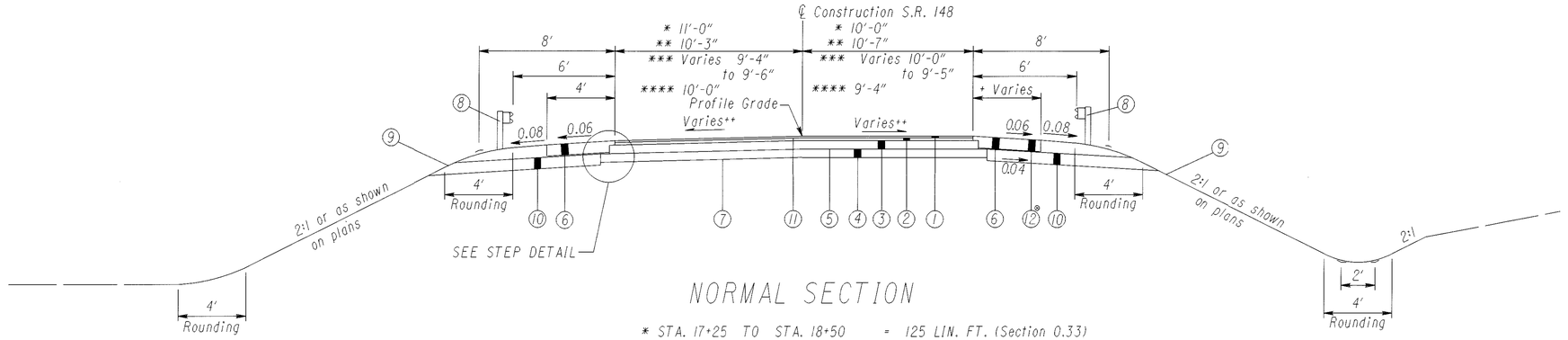
SUPPLEMENTAL SPECIFICATIONS

806	9-9-97	905	4-1-98
		906	5-5-98
842	1-6-99		
		907	10-21-98
870	8-10-99	908	3-28-00
877	4-13-99	1049	2-3-98

SPECIAL PROVISIONS
WATERWAY PERMITS
NWP #3 MAINTENANCE
12/2/99

FEDERAL PROJECT NO. TE21-G000(6)
PID NO. 13051
CONSTRUCTION PROJECT NO.
RAILROAD INVOLVEMENT NONE
BEL-148-(0.33)(4.54)(5.07) (7.93)(9.69)(10.91)
1 / 111

BEL - SR 148 - (0.33) (4.54) (5.07) (7.9
010138 PID - 13051
Dist 11 3/14/01



NORMAL SECTION

* STA. 17+25 TO STA. 18+50 = 125 LIN. FT. (Section 0.33)
** STA. 267+90 TO STA. 268+50 = 60 LIN. FT. (Section 5.07)
*** STA. 418+90 TO STA. 419+60 = 70 LIN. FT. (Section 7.93)
**** STA. 576+00 TO STA. 577+00 = 100 LIN. FT. (Section 10.91)
Total = 355 LIN. FT.

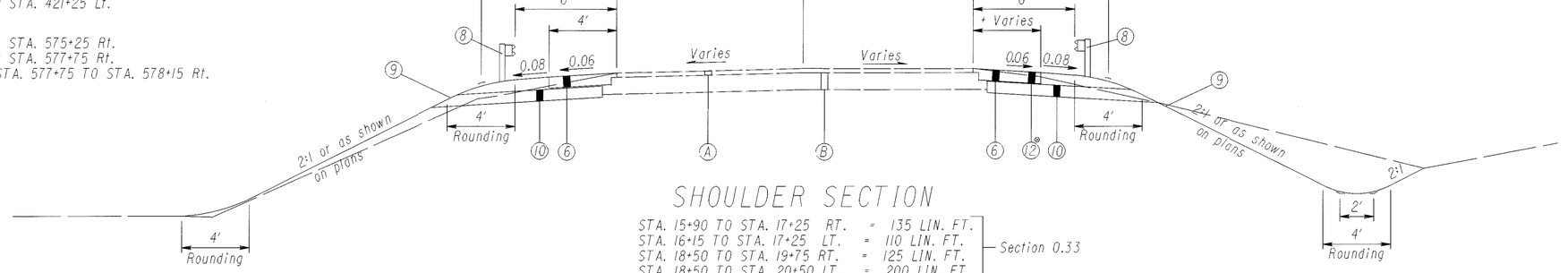
++ FOR PAVEMENT TRANSITION TABLE SEE SHEET NO. 17

⊗ This Applies to:
Section 5.07 (STA. 267+90 TO STA. 269+55 Rt.)
Section 7.93 (STA. 418+00 TO STA. 420+50 Lt.)
Section 10.91 (STA. 575+25 TO STA. 578+15 Rt.)

+ SECTION 5.07
4' FROM STA. 266+10 TO STA. 267+00 Rt.
6' FROM STA. 267+00 TO STA. 269+00 Rt.
VARIES 6' TO 4' FROM STA. 269+00 TO STA. 269+55 Rt.

+ SECTION 7.93
VARIES 4' TO 6' FROM STA. 418+00 TO STA. 418+90 Lt.
6' FROM STA. 418+90 TO STA. 420+50 Lt.
4' FROM STA. 420+50 TO STA. 421+25 Lt.

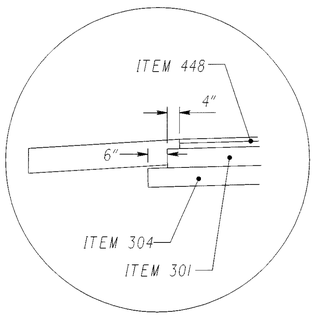
+ SECTION 10.91
4' FROM STA. 574+30 TO STA. 575+25 Rt.
6' FROM STA. 575+25 TO STA. 577+75 Rt.
VARIES 6' TO 4' FROM STA. 577+75 TO STA. 578+15 Rt.



SHOULDER SECTION

STA. 15+90 TO STA. 17+25 RT.	= 135 LIN. FT.	Section 0.33
STA. 16+15 TO STA. 17+25 LT.	= 110 LIN. FT.	
STA. 18+50 TO STA. 19+75 RT.	= 125 LIN. FT.	
STA. 18+50 TO STA. 20+50 LT.	= 200 LIN. FT.	
STA. 266+10 TO STA. 267+90 RT.	= 180 LIN. FT.	Section 5.07
STA. 266+95 TO STA. 267+90 LT.	= 95 LIN. FT.	
STA. 268+50 TO STA. 269+55 RT.	= 105 LIN. FT.	
STA. 268+50 TO STA. 270+05 LT.	= 155 LIN. FT.	
STA. 417+05 TO STA. 418+90 RT.	= 185 LIN. FT.	Section 7.93
STA. 418+00 TO STA. 418+90 LT.	= 90 LIN. FT.	
STA. 419+60 TO STA. 420+50 RT.	= 90 LIN. FT.	
STA. 419+60 TO STA. 421+25 LT.	= 165 LIN. FT.	
STA. 574+30 TO STA. 576+00 RT.	= 170 LIN. FT.	Section 10.91
STA. 575+75 TO STA. 576+00 LT.	= 25 LIN. FT.	
STA. 577+00 TO STA. 578+15 RT.	= 115 LIN. FT.	
STA. 577+00 TO STA. 578+30 LT.	= 130 LIN. FT.	

TOTAL = 2075 LIN. FT.



STEP DETAIL

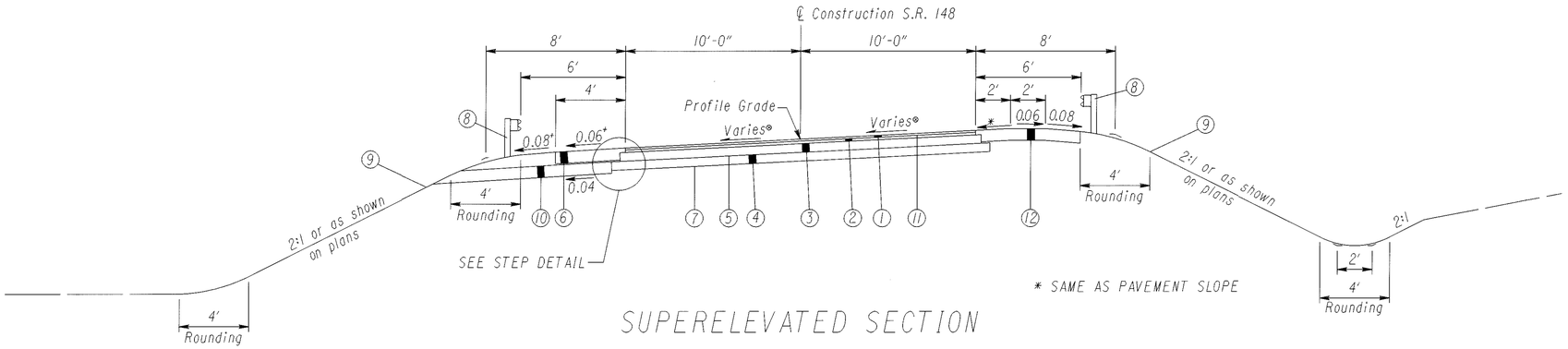
LEGEND

1 — Item 448- 1¼" Asphalt Concrete Surface Course, Type 1, PG 64-22, As Per Plan
2 — Item 448- 1¾" Asphalt Concrete, Intermediate Course, Type 2, PG 64-22
3 — Item 301- 6" Bituminous Aggregate Base, PG 64-22
4 — Item 304- 6" Aggregate Base
5 — Item 408- Bituminous Prime Coat Applied (at 0.4 Gal./ S.Y.)
6 — Item 304- 8" Aggregate Base
7 — Item 203- Subgrade Compaction
8 — Item 606- Guardrail, Type 5
9 — Item 870- Seeding and Mulching and Water
10 — Item 605- Aggregate Drain
11 — Item 407-Tack Coat For Intermediate Course (See General Notes)
12 — Item 615- Temporary Pavement, Class B, As Per Plan
13 — Item 407-Tack Coat (See General Notes)
A — Bituminous Concrete
B — Waterbound Macadam

CALCULATED ALF
CHECKED TES

TYPICAL SECTIONS

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)



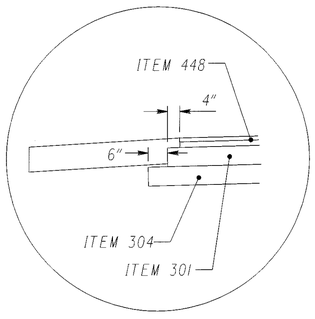
SUPERELEVATED SECTION

STA. 239+75 TO STA. 241+00 = 125 LIN. FT. (Section 4.54)

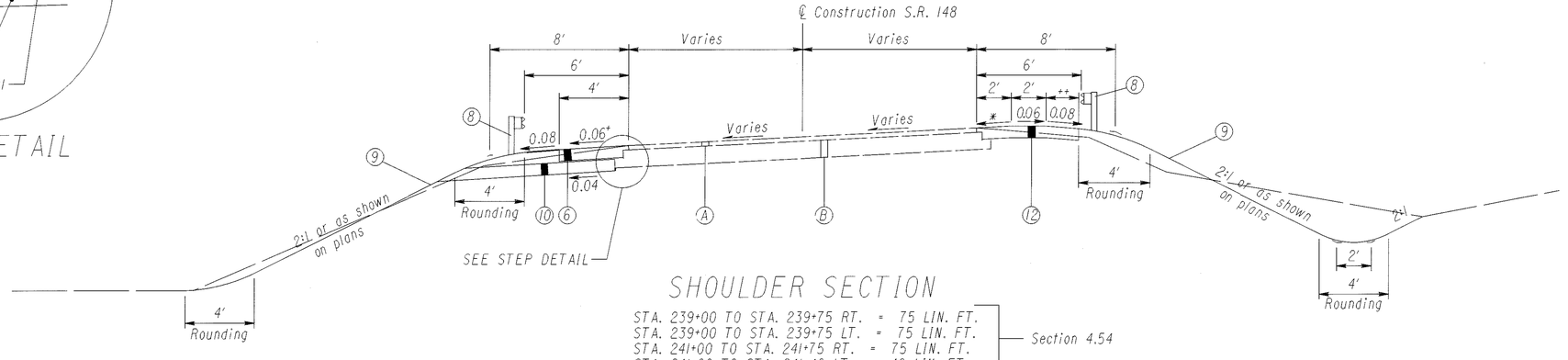
+ OR PAVEMENT SLOPE IF GREATER

FOR LEGEND SEE SHEET NO. 2

* FOR PAVEMENT TRANSITION TABLE SEE SHEET NO. 17



STEP DETAIL



SHOULDER SECTION

STA. 239+00 TO STA. 239+75 RT.	=	75 LIN. FT.
STA. 239+00 TO STA. 239+75 LT.	=	75 LIN. FT.
STA. 241+00 TO STA. 241+75 RT.	=	75 LIN. FT.
STA. 241+00 TO STA. 241+40 LT.	=	40 LIN. FT.
	TOTAL =	265 LIN. FT.

Section 4.54

+ OR PAVEMENT SLOPE IF GREATER

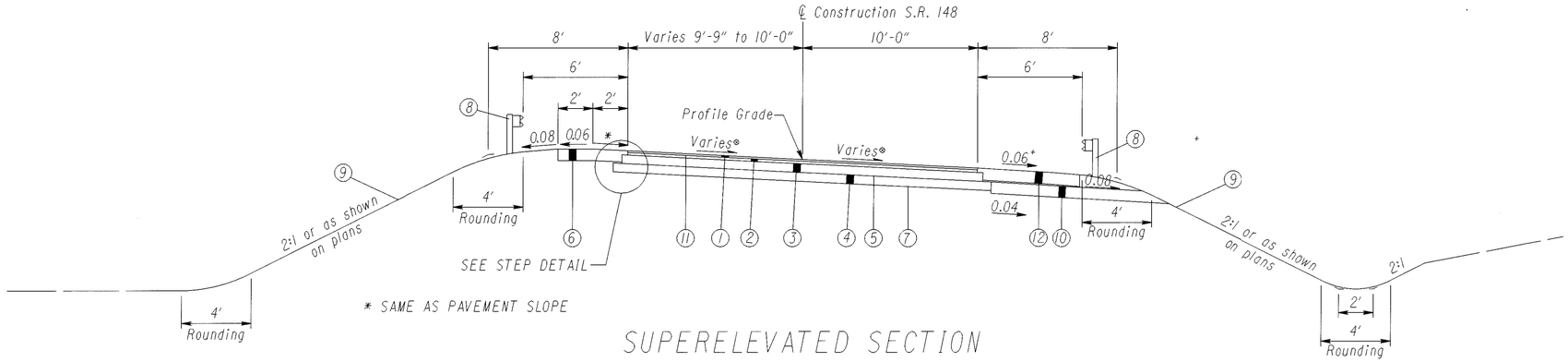
* SAME AS PAVEMENT SLOPE

++ VARIES 0' TO 2'
STA. 239+00 TO STA. 239+71.30
++ VARIES 2' TO 0'
STA. 241+03.60 TO STA. 241+75

CALCULATED ALF
CHECKED TES

TYPICAL SECTIONS

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

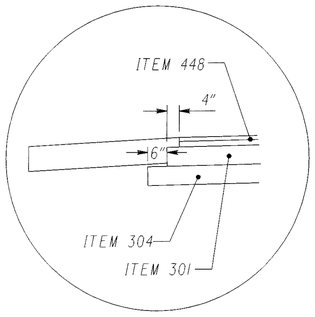


* SAME AS PAVEMENT SLOPE

SUPERELEVATED SECTION

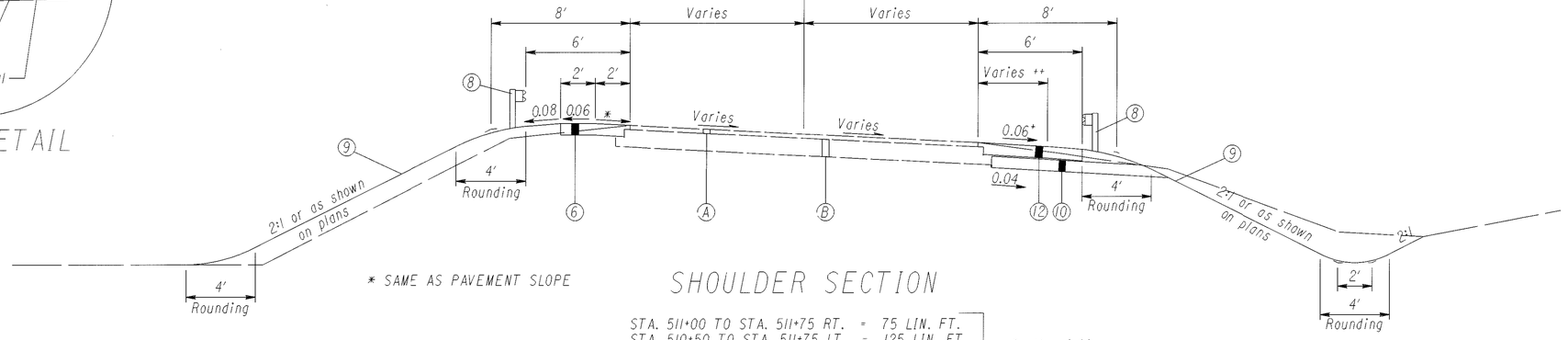
STA. 511+75 TO STA. 512+50 = 75 LIN. FT. (Section 9.69)

\+ OR PAVEMENT SLOPE IF GREATER



STEP DETAIL

FOR LEGEND, SEE SHEET NO. 2
*FOR PAVEMENT TRANSITION TABLE, SEE SHEET NO. 17



* SAME AS PAVEMENT SLOPE

SHOULDER SECTION

STA. 511+00 TO STA. 511+75 RT. = 75 LIN. FT.
STA. 510+50 TO STA. 511+75 LT. = 125 LIN. FT.
STA. 512+50 TO STA. 513+25 RT. = 75 LIN. FT.
STA. 512+50 TO STA. 513+25 LT. = 75 LIN. FT.
TOTAL = 350 LIN. FT.

Section 9.69

\+ OR PAVEMENT SLOPE IF GREATER

++ VARIES 4' TO 6'
STA. 511+00 TO STA. 511+73.50
++ VARIES 6' TO 4'
STA. 512+57.50 TO STA. 513+25

CALCULATED ALF
CHECKED TES

TYPICAL SECTIONS

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

REMOVAL OF TREES OR STUMPS

All trees and stumps specifically marked for removal within the construction limits shall be removed under the lump sum bid for Item 201, Clearing and Grubbing. The following is an approximate estimate of the number of trees and stumps to be removed:

Size	No. of Trees	No. of Stumps	Total
18"	17	0	17
30"	1	0	1
48"	1	0	1

ROUNDING

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

UTILITIES

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

Ameritech
160 North Sixth Street
Zanesville, Ohio 43701
Ph. 740-454-3513

National Gas and Oil
17167 Co. Rd. 40
Caldwell, Ohio 43724
Ph. 740-732-2336

Alltel
32699 Old National Road
Barnesville, Ohio 43713
Ph.740-758-5818

South Central Power Company
37801 Barnesville-Bethesda Road
Barnesville, Ohio 43713-0270
Ph. 740-425-4018

The location of the underground utilities shown on the plans are as obtained from the owners as required by O.R.C. Section 153.64.

ELEVATION DATUM

All elevations, unless denoted "assumed elevation", are based on U.S.G.S. NAV 1988 datum.

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.

WORK LIMITS

The work limits shown on these plans are for physical construction only. The installation and operation of all temporary traffic control and temporary traffic control devices required by these plans shall be provided by the Contractor whether inside or outside these work limits.

ITEM 407, TACK COAT FOR INTERMEDIATE COURSE

The rate of application of the 407 tack coat for Intermediate course shall be subject to adjustment as directed by the Engineer. Plan quantities indicate an average application rate of 0.04 Gallons per square yard of tack coat for estimating purposes only.

ITEM 407, TACK COAT

The rate of application of the 407 tack coat shall be subject to adjustment as directed by the Engineer. Plan quantities indicate an average application rate of 0.075 Gallons per square yard of tack coat for estimating purposes only.

ITEM 870, SEEDING AND MULCHING

The following quantities are provided to promote growth and care of the permanent seeded areas. One soil analysis shall be performed at each culvert location.

Item 870, Water - - - - - - - - - - - - 16 MGal
Item 870, Soil Analysis Test - - - - - 12 Each
Item 870, Placing Topsoil - - - - - - 287 Cu. Yd.

CONVERSION OF STANDARD CONSTRUCTION DRAWINGS

The metric standard drawings referenced in this plan shall be converted to english units using the SI (metric) to english conversion factors provided in section 109.011 of the 1997 construction and materials specifications. The appendix of ASTM E 380 shall be utilized for additional conversion factors required. Conversions shall be appropriately precise and shall reflect standard industry english values where suitable.

TEMPORARY SOIL EROSION AND SEDIMENT CONTROL

The following estimated quantities are to be used as directed by the Engineer for temporary erosion and sediment control measures:

Item 877, Temporary perimeter, ditch check
or inlet protection filter fabric fence - - - - - 1200 Lin. Ft.

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

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

EROSION CONTROL

Items 601 is provided in the plans for erosion control. Rock of a stable nature shall not be removed in order to place this item. The Engineer shall check and non-perform quantities, or adjust locations and quantities of this item where indicated by field conditions during construction. In addition, this item shall meet the requirement of 108.40.

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 clean out, excavation for rock channel protection and removal of any temporary fill associated with construction operations.

DEMOLITION DEBRIS

The Contractor shall take precautions to avoid and/or limit demolition debris from entering the stream. Any material that does fall into the stream shall be removed as soon as possible.

ITEM 605, AGGREGATE DRAIN

Aggregate drains shall be placed as shown in the plan.

ITEM 606 - GUARDRAIL TYPE 5, WITH TUBULAR BACKUP, AS PER PLAN

Partial depth resin-bonded anchoring systems or partial depth expansion shield anchors shall be used as described in Standard Drawing GR-2.2M. Through bolting to the underside of the structure shall not be permitted.

CHANNEL EMBANKMENTS

Portions of the existing channel shall be filled and sloped to drain as shown in these plans. In channel embankment areas which will not support any portion of the new road bed or structural embankments, the Contractor may utilize embankment methods meeting the following requirements:

Areas where channel embankments are to be placed shall be cleared of weeds and brush. The requirements for moisture, density control, benching and suitable materials shall be waived. In lieu of the requirements of Item 203, the depth of layers in which the embankments are placed, and their compaction, shall conform with acceptable construction practices as determined by the Engineer,

Payment for all the above shall be included in the contract price for Item 203, Embankment.

UNTREATED SEPTIC CONNECTIONS

This plan makes no provision for connecting, nor shall the Engineer or Contractor connect, any untreated septic drainage into the highway drainage system. Any pipe carrying untreated septic flow shall be plugged with Class C concrete at the right-of-way line. Payment for plugging shall be included in the contract price for Item 203, Excavation.

ITEM 606 - GUARDRAIL TYPE 5, WITH DOUBLE RAILS, AS PER PLAN

Partial depth resin-bonded anchoring systems or partial depth expansion shield anchors shall be used as described in Standard Drawing GR-2.2M. Through bolting to the underside of the structure shall not be permitted. Nested rails as per Standard Drawing GR-2.4M shall be provided in ieiu of the tubular backup. All other specifications of Standard Drawing GR-2.2M shall be met.

RAISED PAVEMENT MARKERS

The Contractor shall remove all existing Raised Pavement Markers located between station 17+25 and station 18+50 (section 0.33), station 239+75 and station 241+00 (section 4.54), station 267+90 and station 268+50 (section 5.07), station 418+90 and station 419+60 (section 7.93), station 511+75 and station 512+50 (section 9.69), and between station 576+00 and station 577+00 (section 10.91).

New raised pavement markers shall be placed at a spacing of 80' for sections 0.33, 5.08, 9.69, and 10.91 and at a spacing of 40' for sections 4.54 and 7.93.

The following quantities have been carried to the General Summary:

Item 202 - Raised Pavement Marker Removed For Storage - - - 21 Each
Item 621 - Raised Pavement Marker - - - - - - - - - - - - - - 19 Each

PART-WIDTH CONSTRUCTION

Because of the necessity to build this project under traffic, and to construct the full pavement width in stages, extreme care shall be taken to prevent the construction of a butt joint in the base courses. Longitudinal joints shall be lapped as shown on Standard Construction Drawing BP-3.1.

CONNECTION BETWEEN EXISTING AND PROPOSED GUARDRAIL

When it is necessary to splice proposed guardrail to existing guardrail, only the existing guardrail shall be cut, drilled, or punched. The connection shall be made using a "W-Beam Rail Splice" as shown in AASHTO M 180. Payment shall be included in the contract price for the respective guardrail items.

CALCULATED TES
CHECKED SKW

GENERAL NOTES

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

CALCULATED TES CHECKED DMB

ITEM 614 - MAINTENANCE OF TRAFFIC

A minimum of one lane of traffic in each direction shall be maintained at all times by use of the existing pavement, completed pavement and temporary pavement.

Length and duration of lane closures and restrictions shall be at the approval of the Engineer. It is the intent to minimize the impact to the traveling public. Lane closures or restrictions over segments of the project in which no work is anticipated within a reasonable time frame, as determined by the Engineer, shall not be permitted. The level of utilization of maintenance of traffic devices shall be commensurate with the work in progress.

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

614, Bituminous Concrete For Maintaining Traffic - - - - - - - - - - - - - - - 12 Cu. Yd.
410, Traffic Compacted Surface, Type A - 5 Cu. Yd.
614, Temporary Centerline, Class I, 642 Paint - - - - - - - - - - - - - - - - - 1 mile

Two lane traffic shall be maintained until the contractor is ready to remove the existing structure and the precast boxes are manufactured, approved and available for shipping.

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

NOTIFICATION OF WORK ZONE LANE RESTRICTIONS

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

The Engineer shall immediately notify the District Roadway Services Manager to advise the Office of Highway Management of the restrictions.

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.

The following estimated quantity has been included in the General Summary

Section 0.33:
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 252 Lin. Ft. (Phase I)
- Item 622, Portable Concrete Barrier, 32", Bridge Mounted (Anchored) - 48 Lin. Ft. (Phase I)
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 300 Lin. Ft. (Phase 2)

Section 4.54:
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 300 Lin. Ft. (Phase I)
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 240 Lin. Ft. (Phase 2)

Section 5.07:
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 240 Lin. Ft. (Phase I)
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 240 Lin. Ft. (Phase 2)

Section 7.93:
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 240 Lin. Ft. (Phase I)
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 240 Lin. Ft. (Phase 2)

Section 9.69:
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 252 Lin. Ft. (Phase I)
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 228 Lin. Ft. (Phase 2)

Section 10.91:
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 276 Lin. Ft. (Phase I)
- Item 622, Portable Concrete Barrier, 32" - - - - - - - - - - - - - - - 276 Lin. Ft. (Phase 2)

Total = 3084 Lin. Ft.
48 Lin. Ft. (Bridge Mounted)

ITEM 614, BARRIER REFLECTORS AND/OR OBJECT MARKERS

Barrier reflectors and/or object markers shall be installed on all portable concrete barrier used for traffic control. Barrier reflectors, object markers and their installation shall conform to the appropriate proposal note, and Item 626, except that the spacing shall be 25 feet.

CONSTRUCTION SEQUENCE

The phase construction sequence detailed below shall be the same for all six proposed culvert replacements.

PHASE I
Before starting any work which requires closing existing pavement to traffic, all portable concrete barriers, temporary signals, signs, lights, temporary pavement, temporary guardrail, temporary pavement markings, and raised pavement markers shown for phase one shall be furnished and erected by the Contractor. Flaggers shall be utilized for protection of vehicular traffic until erection of the above items are complete.

When the above requirements have been satisfied, alternating one-way traffic shall be maintained as shown for phase one on the existing and temporary pavement.

Complete the installation of the portion of the box culvert, shoulder work, grading, earthwork, guardrail, and proposed pavement construction shown for phase one.

Complete the installation of temporary pavement construction necessary for phase two.

PHASE 2
All temporary signs, lights, temporary pavement, temporary guardrail, temporary pavement markings, and raised pavement markers shown for phase two shall be furnished and erected by the Contractor. Relocate the portable concrete barrier as shown for phase two. Relocation of all portable concrete barrier between phases shall be accomplished in one working day.

When the above requirements have been satisfied, alternating one-way traffic shall be maintained as shown for phase two on the completed portion of the new pavement and temporary pavement.

Complete all remaining construction for the entire length of the project.

ITEM SPECIAL, TEMPORARY GUARDRAIL

This item shall consist of furnishing, constructing, maintaining, and subsequently removing the temporary guardrail which consists of Type 5 guardrail, Type 5 with Double Rails and two Type A Anchor Assemblies. Refer to Standard Drawings GR-2.1M, GR-2.4M, GR-3.4M and GR-4.1M for additional information.

When no longer needed, the temporary guardrail shall become the property of the Contractor.

Payment for the above work, including the Type 5 with Double Rails and Type A Anchor Assemblies, will be made at the contract price bid for Item Special, Linear Feet, Temporary Guardrail, and shall include the cost of all labor, materials, equipment, and incidentals as necessary to complete the work.

ITEM 615 TEMPORARY PAVEMENT, CLASS B, AS PER PLAN

Temporary pavement designated by As Per Plan shall remain in place after construction as shown in the plans. The composition of the temporary pavement shall be flexible.

SUPPORT OF EXISTING STRUCTURE

The portion of the existing structure to remain in place during phase I shall be adequately supported at the removal limit for the duration of this phase to maintain the structural integrity of the arch shape. Payment for this operation shall be included under Item 603 Conduit, Type A for each section.

MAINTENANCE OF TRAFFIC NOTES

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

MAINTENANCE OF TRAFFIC CALCULATIONS

ITEM 615 - Temporary Pavement, Class B

1TP: Sta. 16+50.00 To Sta. 17+83.00
133 x 2.5 ÷ 9 = 36.94 sq yd

2TP: Sta. 18+07.00 To Sta. 19+25.00
118 x 2.5 ÷ 9 = 32.78 sq yd

3TP: Sta. 16+50.00 To Sta. 17+21.00
[((71 x 2.67)÷2)+(71 x 4)]÷ 9 = 42.09 sq yd
Sta. 17+21.00 To Sta. 18+53.00
132 x 6.67 ÷ 9 = 97.83 sq yd
Sta. 18+53.00 To Sta. 19+25.00
[((72 x 2.67)÷2)+(72 x 4)]÷ 9 = 42.68 sq yd

4TP: Sta. 239+00.00 To Sta. 239+71.30
[((71.3x1.5)÷2)+(71.3 x 1)]÷ 9 = 13.86 sq yd
Sta. 239+71.30 To Sta. 241+03.60
132.3 x 2.5 ÷ 9 = 36.75 sq yd
Sta. 241+03.60 To Sta. 241+50.00
[((46.4x1.5)÷2)+(46.4x1)]÷ 9 = 9.03 sq yd

6TP: Sta. 267+15.00 To Sta. 269+29.00
[((214x0.25)÷2)+(214x2.58)]÷ 9 = 64.32 sq yd

8TP: Sta. 418+00.00 To Sta. 420+50.00
(250 x 4) ÷ 9 = 111.11 sq yd

10TP: Sta. 511+00.00 To Sta. 511+73.50
[((73.5x2.75)÷2)+(73.5x1)]÷ 9 = 19.40 sq yd
Sta. 511+73.50 To Sta. 512+57.50
[((84 x 0.42)÷2)+(84 x 3.33)]÷ 9 = 33.04 sq yd
Sta. 512+57.50 To Sta. 513+25.00
[((67.5x2.33)÷2)+(67.5x1)]÷9 = 16.24 sq yd

12TP: Sta. 575+23.00 To Sta. 575+96.00
[((73 x 4.5)÷2)+(73 x 1)]÷ 9 = 26.36 sq yd
Sta. 575+96.00 To Sta. 577+04.00
[((108 x 0.17)÷2)+(108 x 5.33)]÷ 9 = 64.98 sq yd
Sta. 577+04.00 To Sta. 577+78.00
[((74 x 4.33)÷2)+(74 x 1)]÷ 9 = 26.02 sq yd

Total = 673.43 S.Y.
(Use 674 S.Y.)

ITEM 615 - Temporary Pavement, Class B, As Per Plan

5TP: Sta. 239+00.00 To Sta. 239+71.30
[((71.3x2)÷2)+(71.3x4)]÷9 = 39.61 sq yd
Sta. 239+71.30 To Sta. 241+03.60
(132.3 x 6.0) ÷ 9 = 88.20 sq yd
Sta. 241+03.60 To Sta. 241+75.00
[((71.4x2)÷2)+(71.4x4)]÷9 = 39.67 sq yd

7TP: Sta. 267+00.00 To Sta. 269+00.00
(200 x 6.0) ÷ 9 = 133.33 sq yd
Sta. 269+00.00 To Sta. 269+55.00
[((55 x 2)÷2)+(55x4)] ÷ 9 = 30.56 sq yd

9TP: Sta. 418+00.00 To Sta. 418+89.50
[(89.50 x 4)+((89.50 x 2) ÷ 2)] ÷ 9 = 49.72 sq yd
Sta. 418+89.50 To Sta. 420+50.00
(160.50 x 6) ÷ 9 = 107.00 sq yd

11TP: Sta. 511+00.00 To Sta. 511+73.50
[((73.50 x 2.0)÷2)+(73.50 x 4)]÷ 9 = 40.83 sq yd
Sta. 511+73.50 To Sta. 512+57.50
(84 x 6.0) ÷ 9 = 56.00 sq yd
Sta. 512+57.50 To Sta. 513+25.00
[((67.5 x 2.0)÷2)+(67.5 x 4)]÷ 9 = 37.50 sq yd

13TP: Sta. 575+25.00 To Sta. 575+96.00
[((71 x 1.67)÷2)+(71 x 4)]÷ 9 = 38.14 sq yd
Sta. 575+96.00 To Sta. 577+75.00
(179 x 5.67) ÷ 9 = 112.77 sq yd
Sta. 577+75.00 To Sta. 578+15.00
[((40 x 1.67)÷2)+(40 x 4)]÷ 9 = 21.49 sq yd

Total = 794.82 S.Y.
(Use 795 S.Y.)

ITEM 614 - Barrier Reflectors, Type A2

Section 0.33:
212' ÷ 25' c/c + 2 = 11 each

Section 4.54:
175' ÷ 25' c/c + 2 = 9 each

Section 7.93:
200' ÷ 25' c/c + 2 = 10 each

Section 10.91:
200' ÷ 25' c/c + 2 = 10 each

Total Type A2 = 40 each

ITEM 614 - Barrier Reflectors, Type B2

Section 0.33:
Sta. 16+62.10 to Sta. 19+60.40
300 lin ft. @ 25' c/c + 1 = 13 each
Sta. 16+14.80 to Sta. 19+11.30
300 lin ft. @ 25 c/c + 1 = 13 each

Section 4.54:
Sta. 238+64.70 to Sta. 241+62.30
300 lin ft @ 25 c/c + 1 = 13 each
Sta. 239+13.30 to Sta. 241+49.00
240 lin ft @ 25 c/c + 1 = 11 each

Section 5.07:
Sta. 266+76.40 to Sta. 269+15.20
240 lin ft @ 25 c/c + 1 = 11 each
Sta. 267+26.30 to Sta. 269+62.80
240 lin ft @ 25 c/c + 1 = 11 each

Section 7.93:
Sta. 418+31.00 to Sta. 420+69.00
240 lin ft. @ 25' c/c + 1 = 11 each
Sta. 417+82.00 to Sta. 420.20.00
240 lin ft. @ 25 c/c + 1 = 11 each

Section 9.69:
Sta. 510+66.40 to Sta. 513+16.30
252 lin ft. @ 25' c/c + 1 = 11 each
Sta. 511+15.20 to Sta. 513+40.20
228 lin ft. @ 25 c/c + 1 = 10 each

Section 10.91:
Sta. 574+88.60 to Sta. 577+62.80
276 lin ft. @ 25' c/c + 1 = 12 each
Sta. 575+37.50 to Sta. 578+11.30
276 lin ft. @ 25 c/c + 1 = 12 each

Total Type B2 = 139 each

ITEM 614 - Object Markers

Section 0.33:
Sta. 16+62.10 to Sta. 19+60.40
(300 lin ft. @ 25' c/c + 1) x 2 = 26 each
Sta. 16+14.80 to Sta. 19+11.30
(300 lin ft. @ 25 c/c + 1) x 2 = 26 each

Section 4.54:
Sta. 238+64.70 to Sta. 241+62.30
(300 lin ft @ 25 c/c + 1) x 2 = 26 each
Sta. 239+13.30 to Sta. 241+49.00
(240 lin ft @ 25 c/c + 1) x 2 = 22 each

Section 5.07:
Sta. 266+76.40 to Sta. 269+15.20
(240 lin ft @ 25 c/c + 1) x 2 = 22 each
Sta. 267+26.30 to Sta. 269+62.80
(240 lin ft @ 25 c/c + 1) x 2 = 22 each

Section 7.93:
Sta. 418+31.00 to Sta. 420+69.00
(240 lin ft. @ 25' c/c + 1) x 2 = 22 each
Sta. 417+82.00 to Sta. 420.20.00
(240 lin ft. @ 25 c/c + 1) x 2 = 22 each

Section 9.69:
Sta. 510+66.40 to Sta. 513+16.30
(252 lin ft. @ 25' c/c + 1) x 2 = 22 each
Sta. 511+15.20 to Sta. 513+40.20
(228 lin ft. @ 25 c/c + 1) x 2 = 20 each

Section 10.91:
Sta. 574+88.60 to Sta. 577+62.80
(276 lin ft. @ 25' c/c + 1) x 2 = 24 each
Sta. 575+37.50 to Sta. 578+11.30
(276 lin ft. @ 25 c/c + 1) x 2 = 24 each

Total = 278 each

ITEM 614 - Temporary Stop Line, Class 1, 740.06, Type 1

Section 0.33:
Sta. 15+71.00 Rt. = 10 Lin. Ft.
Sta. 20+03.00 Lt. = 11 Lin. Ft.

Section 4.54:
Sta. 238+21.00 Rt. = 10 Lin. Ft.
Sta. 242+54.00 Lt. = 10 Lin. Ft.

Section 5.07:
Sta. 266+34.00 Rt. = 11 Lin. Ft.
Sta. 270+06.00 Lt. = 10 Lin. Ft.

Section 7.93:
Sta. 417+39.50 Rt. = 10 Lin. Ft.
Sta. 421+11.50 Lt. = 10 Lin. Ft.

Section 9.69:
Sta. 510+23.50 Rt. = 10 Lin. Ft.
Sta. 514+07.50 Lt. = 11 Lin. Ft.

Section 10.91:
Sta. 574+46.00 Rt. = 9.5 Lin. Ft.
Sta. 578+80.00 Lt. = 10 Lin. Ft.

Total = 122.5 Lin. Ft.
(Use 123 Lin. Ft.)

ITEM 614 - Temporary Center Line, Class1

Section 0.33:
Sta. 14+21.00 to Sta. 15+71.00 = 150 Lin. Ft.
Sta. 20+03.00 to Sta. 21+53.00 = 150 Lin. Ft.

Section 4.54:
Sta. 236+71.00 to Sta. 238+21.00 = 150 Lin. Ft.
Sta. 242+54.00 to Sta. 244+04.00 = 150 Lin. Ft.

Section 5.07:
Sta. 264+84.00 to Sta. 266+34.00 = 150 Lin. Ft.
Sta. 270+06.00 to Sta. 271+56.00 = 150 Lin. Ft.

Section 7.93:
Sta. 415+89.50 to Sta. 417+39.50 = 150 Lin. Ft.
Sta. 421+11.50 to Sta. 422+61.50 = 150 Lin. Ft.

Section 9.69:
Sta. 508+73.50 to Sta. 510+23.50 = 150 Lin. Ft.
Sta. 514+07.50 to Sta. 515+57.50 = 150 Lin. Ft.

Section 10.91:
Sta. 572+96.00 to Sta. 574+46.00 = 150 Lin. Ft.
Sta. 578+80.00 to Sta. 580+30.00 = 150 Lin. Ft.

Total = 1800 Lin. Ft. ÷ 5280
(Use 0.34 Mile)

ITEM 614 - Temporary Edge Line, Class 1, 740.06, Type 1

Section 0.33:
Sta. 18+53.00 to Sta. 19+60.40 = 108 Lin. Ft
Sta. 16+14.80 to Sta. 17+21.00 = 108 Lin. Ft

Section 4.54:
Sta. 238+64.70 to Sta. 239+71.30 = 108 Lin. Ft
Sta. 241+03.60 to Sta. 241+49.000 = 48 Lin. Ft

Section 5.07:
Sta 266+76.40 to Sta. 267+84.00 = 108 Lin. Ft
Sta. 268+56.00 to Sta. 269+62.80 = 108 Lin. Ft

Section 7.93:
Sta. 419+61.42 to Sta. 420+69.00 = 108 Lin. Ft
Sta. 417+82.00 to Sta. 418+89.50 = 108 Lin. Ft

Section 9.69:
Sta. 510+66.40 to Sta. 511+73.50 = 108 Lin. Ft
Sta 512+57.50 to Sta. 513+40.20 = 84 Lin. Ft

Section 10.91:
Sta. 574+88.60 to Sta. 575+96.00 = 108 Lin. Ft
Sta. 577+04.00 to Sta. 578+11.30 = 108 Lin. Ft

Total = 1212 Lin. Ft. ÷ 5280
(Use 0.23 Mile)

ITEM 614 - Temporary Guardrail, As Per Plan

Section 0.33:
Sta. 16+85.83 to 18+89.09 = 212 Lin. Ft.

Section 4.54:
Sta. 239+48.03 to 241+29.67 = 175 Lin. Ft.

Section 7.93:
Sta. 418+22.00 to 420+27.00 = 200 Lin. Ft.

Section 10.91:
Sta. 575+46.85 to 577+49.97 = 200 Lin. Ft.

Total = 787 Lin. Ft.
(Use 787 Lin. Ft.)

Quantities carried to General Summary.

CALCULATED DMB
CHECKED TES

MAINTENANCE OF TRAFFIC QUANTITIES

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

STATIONING			SPACING	TYPE A				REMARKS
FROM	TO	SIDE	(FT)	W	Y	Y/Y		(LINE TYPE)
SECTION 0.33								
14+21	15+71	℄	20′			18		DOUBLE YELLOW
20+03	21+53	℄	20′			18		DOUBLE YELLOW
PHASE 1								
15+71	17+21	RT.	5′	31				EDGELINE
17+21	20+03	RT.	5′	57	57			EDGELINE
17+21	18+53	RT.	5′	27	27			EDGELINE
PHASE 2								
17+21	18+53	LT.	5′	27	27			EDGELINE
15+71	18+53	LT.	5′	57	57			EDGELINE
18+53	20+03	LT.	5′	31				EDGELINE
TOTALS				230	168	36		
				398		36		TOTAL = 434

STATIONING			SPACING	TYPE A				REMARKS
FROM	TO	SIDE	(FT)	W	Y	Y/Y		(LINE TYPE)
SECTION 5.07								
264+84	266+34	℄	20′			18		DOUBLE YELLOW
270+06	271+56	℄	20′			18		DOUBLE YELLOW
PHASE 1								
266+34	268+56	LT.	5′	46	46			EDGELINE
268+56	270+06	LT.	5′	31				EDGELINE
267+84	268+56	LT.	5′	16	16			EDGELINE
PHASE 2								
266+34	267+84	RT.	5′	31				EDGELINE
267+84	270+06	RT.	5′	46	46			EDGELINE
267+84	268+56	RT.	5′	16	16			EDGELINE
TOTALS				186	124	36		
				310		36		TOTAL = 346

STATIONING			SPACING	TYPE A				REMARKS
FROM	TO	SIDE	(FT)	W	Y	Y/Y		(LINE TYPE)
SECTION 9.69								
508+73.50	510+23.50	℄	20′			18		DOUBLE YELLOW
514+07.50	515+57.50	℄	20′			18		DOUBLE YELLOW
PHASE 1								
510+23.50	512+57.50	LT.	5′	48	48			EDGELINE
512+57.50	514+07.50	LT.	5′	31				EDGELINE
511+73.50	512+57.50	LT.	5′	18	18			EDGELINE
PHASE 2								
510+23.50	511+73.50	RT.	5′	31				EDGELINE
511+73.50	514+07.50	RT.	5′	48	48			EDGELINE
511+73.50	512+57.50	RT.	5′	18	18			EDGELINE
TOTALS				194	132	36		
				326		36		TOTAL = 362

STATIONING			SPACING	TYPE A				REMARKS
FROM	TO	SIDE	(FT)	W	Y	Y/Y		(LINE TYPE)
SECTION 4.54								
236+71	238+21	℄	20′			18		DOUBLE YELLOW
242+54	244+04	℄	20′			18		DOUBLE YELLOW
PHASE 1								
239+71	241+03.60	LT.	5′	28	28			EDGELINE
238+21	241+03.60	LT.	5′	58	58			EDGELINE
241+03.60	242+54	LT.	5′	31				EDGELINE
PHASE 2								
238+21	239+71.30	RT.	5′	31				EDGELINE
239+71.30	242+54	RT.	5′	57	57			EDGELINE
239+71.30	241+03.60	RT.	5′	28	28			EDGELINE
TOTALS				233	171	36		
				404		36		TOTAL = 440

STATIONING			SPACING	TYPE A				REMARKS
FROM	TO	SIDE	(FT)	W	Y	Y/Y		(LINE TYPE)
SECTION 7.93								
415+89.50	417+39.50	℄	20′			18		DOUBLE YELLOW
421+11.50	422+61.42	℄	20′			18		DOUBLE YELLOW
PHASE 1								
417+39.50	418+89.50	RT.	5′	31				EDGELINE
418+89.50	421+11.50	RT.	5′	46	46			EDGELINE
418+89.50	419+61.42	RT.	5′	16	16			EDGELINE
PHASE 2								
417+39.50	419+61.42	LT.	5′	46	46			EDGELINE
419+61.42	421+11.50	LT.	5′	31				EDGELINE
418+89.50	419+61.42	LT.	5′	16	16			EDGELINE
TOTALS				186	124	36		
				310		36		TOTAL = 346

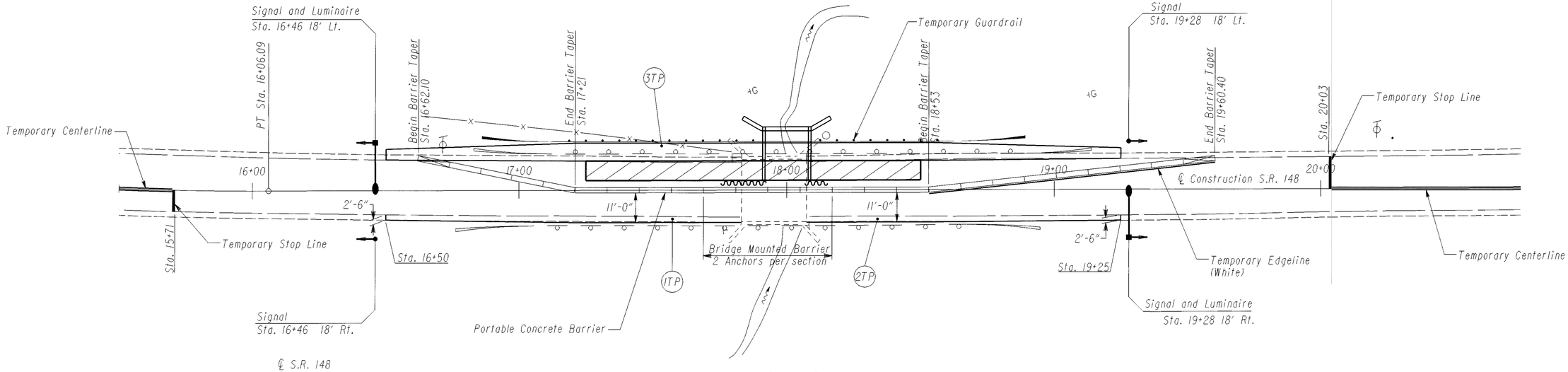
STATIONING			SPACING	TYPE A				REMARKS
FROM	TO	SIDE	(FT)	W	Y	Y/Y		(LINE TYPE)
SECTION 10.91								
572+96	574+46	℄	20′			18		DOUBLE YELLOW
578+80	580+30	℄	20′			18		DOUBLE YELLOW
PHASE 1								
574+46	577+04	LT.	5′	53	53			EDGELINE
577+04	578+80	LT.	5′	37				EDGELINE
575+96	577+04	LT.	5′	23	23			EDGELINE
PHASE 2								
574+46	575+96	RT.	5′	31				EDGELINE
575+96	578+80	RT.	5′	58	58			EDGELINE
575+96	577+04	RT.	5′	23	23			EDGELINE
TOTALS				225	157	36		
				382		36		TOTAL = 418

Quantities carried to General Summary sheet.

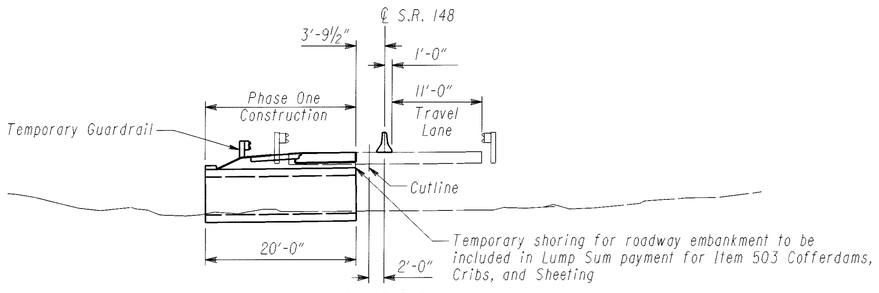
CALCULATED TES
CHECKED DMB

MAINTENANCE OF TRAFFIC QUANTITIES

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)



PHASE ONE



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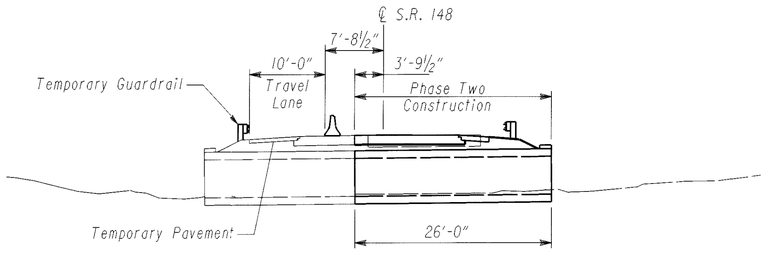
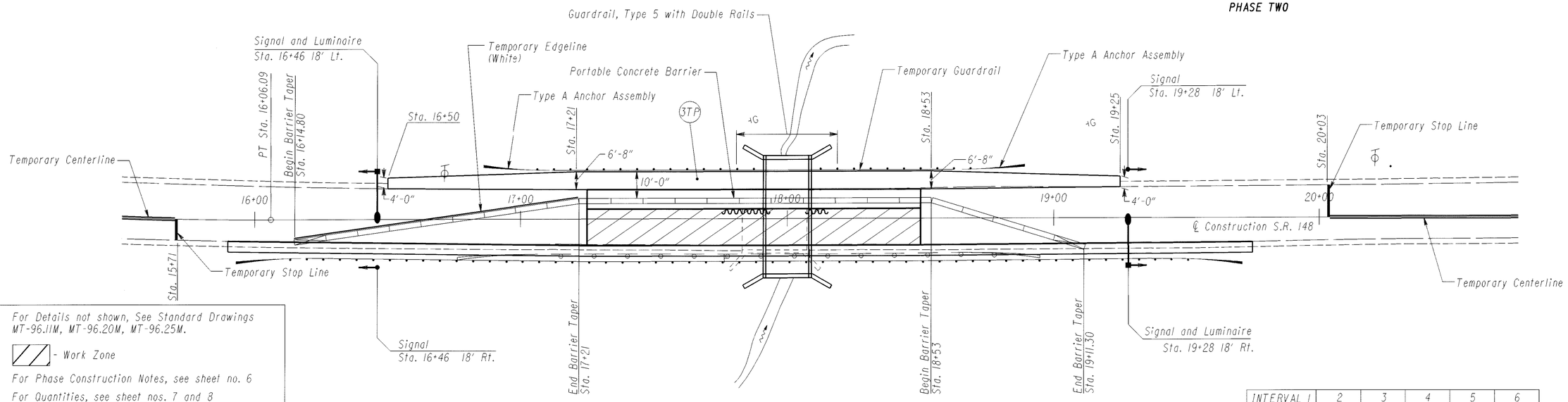


PHASE TWO



PHASE TWO

For Details not shown, See Standard Drawings MT-96.11M, MT-96.20M, MT-96.25M.

- Work Zone

For Phase Construction Notes, see sheet no. 6

For Quantities, see sheet nos. 7 and 8

(TP) Item 615, Temporary Pavement

Temporary Sheeting

Portable Concrete Barrier with Tapered End Section

INTERVAL	1	2	3	4	5	6
TIMING (Seconds)	12	14	4	12	14	4

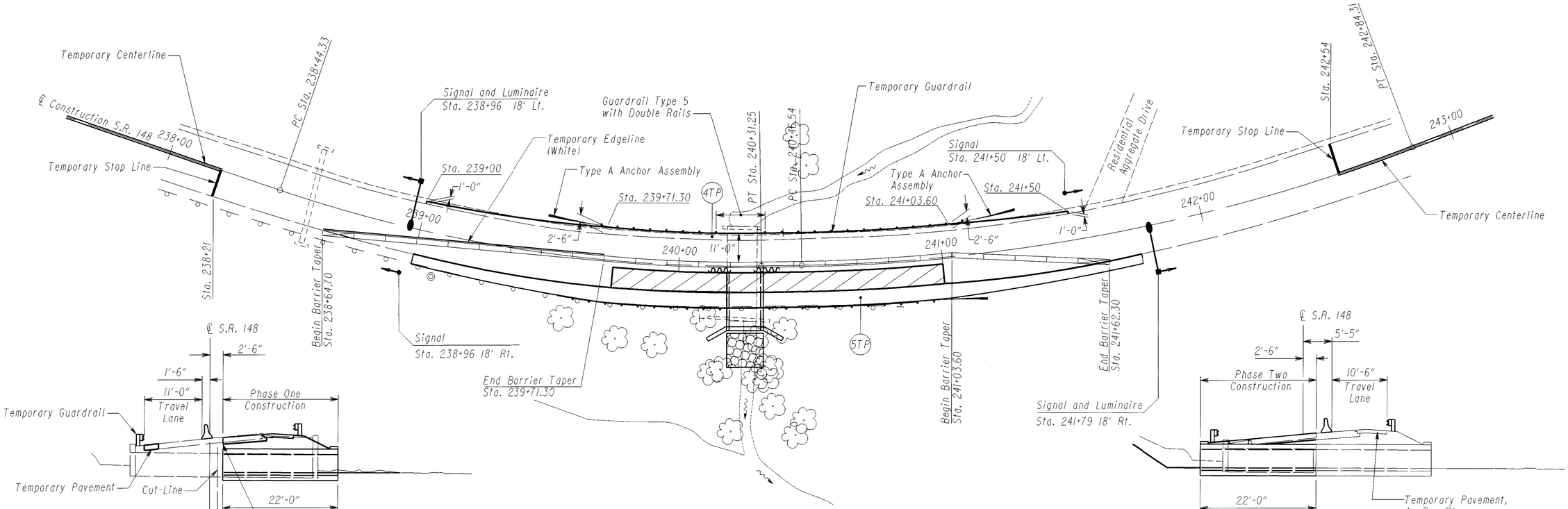
HORIZONTAL SCALE IN FEET
0 10 20 40

CALCULATED TES
CHECKED DWB

MAINTENANCE OF TRAFFIC - SECTION 0.33
STA. 15+50.00 TO STA. 20+75.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

9
11

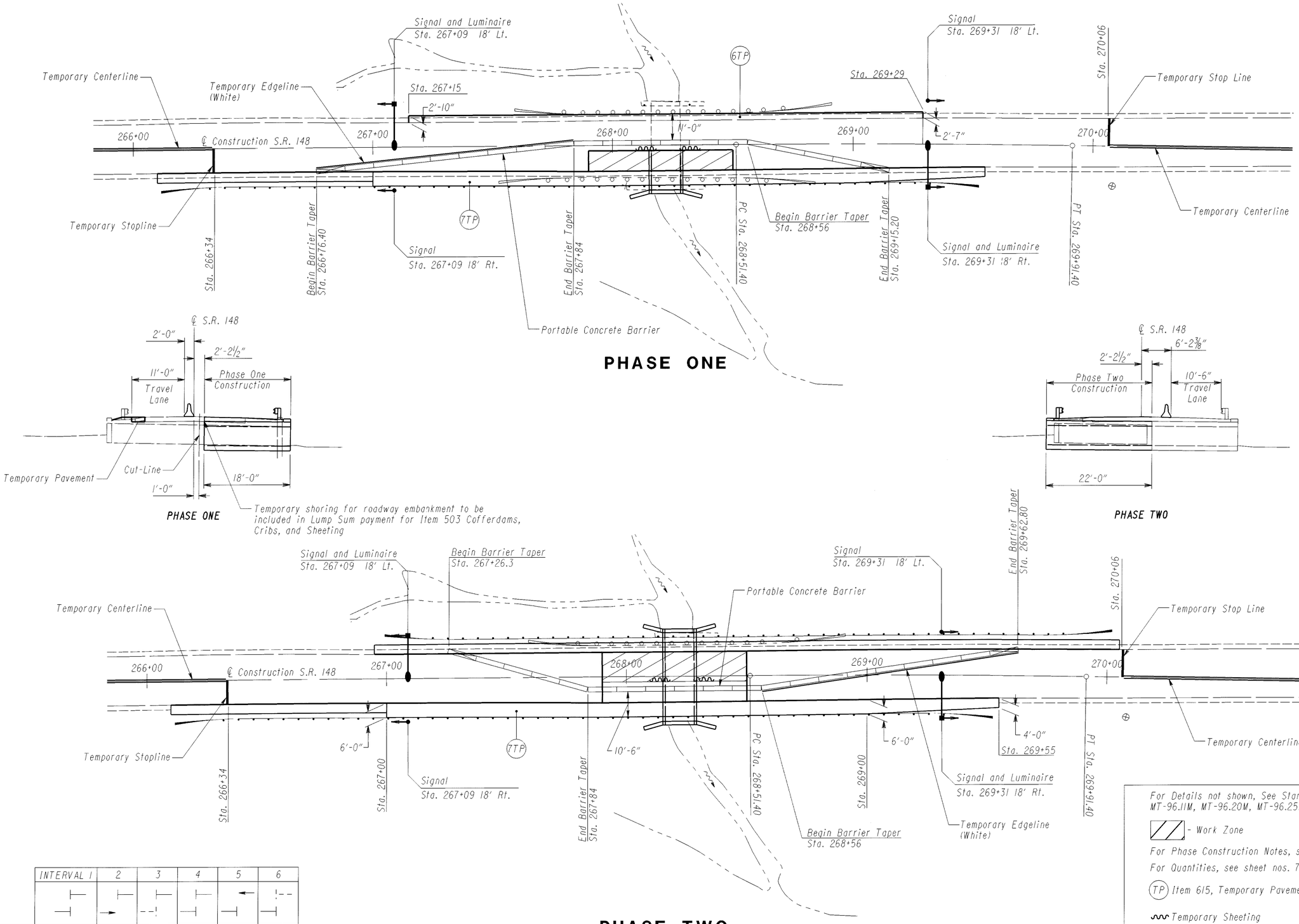


MAINTENANCE OF TRAFFIC - SECTION 4.54
STA. 238+00.00 TO STA. 243+00.00

HORIZONTAL SCALE IN FEET
0 10 20 40

CALCULATED TES
CHECKED DMB

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)



	INTERVAL 1	2	3	4	5	6
	⊢ ⊣	⊢ →	⊢ --!	⊢ ⊣	← ⊣	!-- ⊣
TIMING (Seconds)	11	15	4	11	15	4

For Details not shown, See Standard Drawings MT-96.11M, MT-96.20M, MT-96.25M.

- Work Zone

For Phase Construction Notes, see sheet no. 6

For Quantities, see sheet nos. 7 and 8

(TP) Item 615, Temporary Pavement

Temporary Sheeting

Portable Concrete Barrier with Tapered End Section

HORIZONTAL SCALE IN FEET

CALCULATED TES

CHECKED DWB

MAINTENANCE OF TRAFFIC - SECTION 5.07
STA. 265+80.00 TO STA. 270+80.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

For Details not shown, See Standard Drawings MT-96.11M, MT-96.20M, MT-96.25M.

- Work Zone

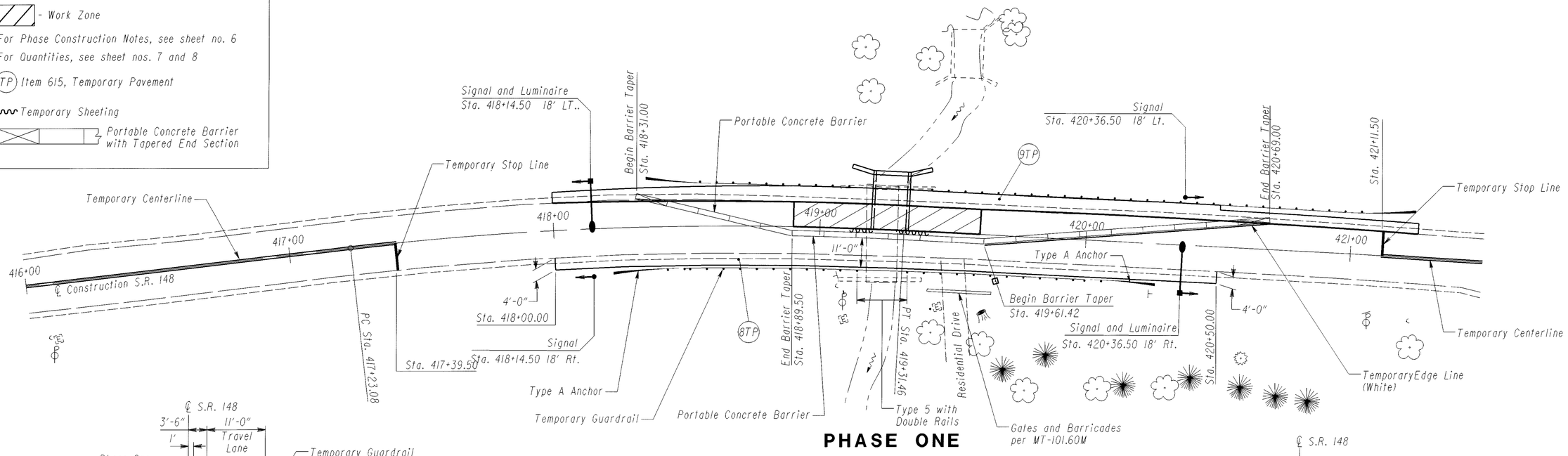
For Phase Construction Notes, see sheet no. 6

For Quantities, see sheet nos. 7 and 8

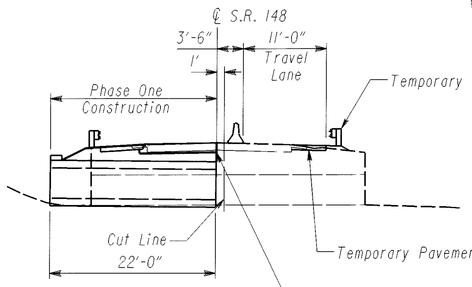
(TP) Item 615, Temporary Pavement

Temporary Sheeting

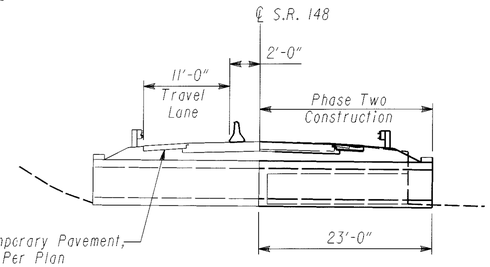
Portable Concrete Barrier with Tapered End Section



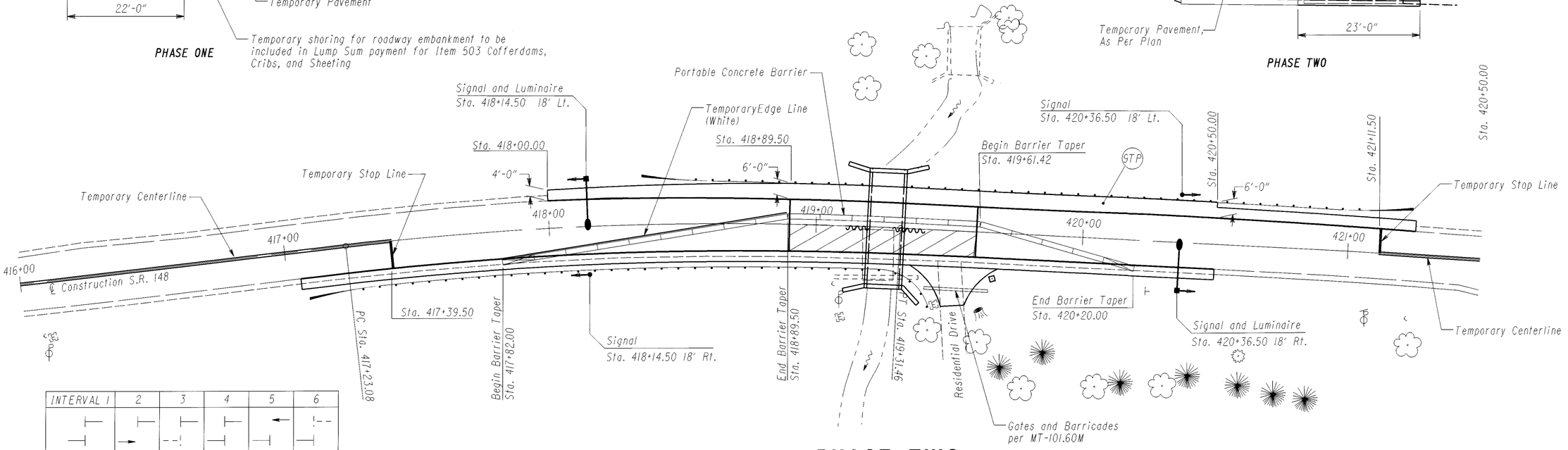
PHASE ONE



PHASE ONE



PHASE TWO



PHASE TWO

	INTERVAL 1	2	3	4	5	6
	⊢ ⊣	⊢ →	⊢ --!	⊢ ⊣	← ⊣	!-- ⊣
TIMING (Seconds)	13	13	4	13	13	4

N

HORIZONTAL SCALE IN FEET
0 10 20 40

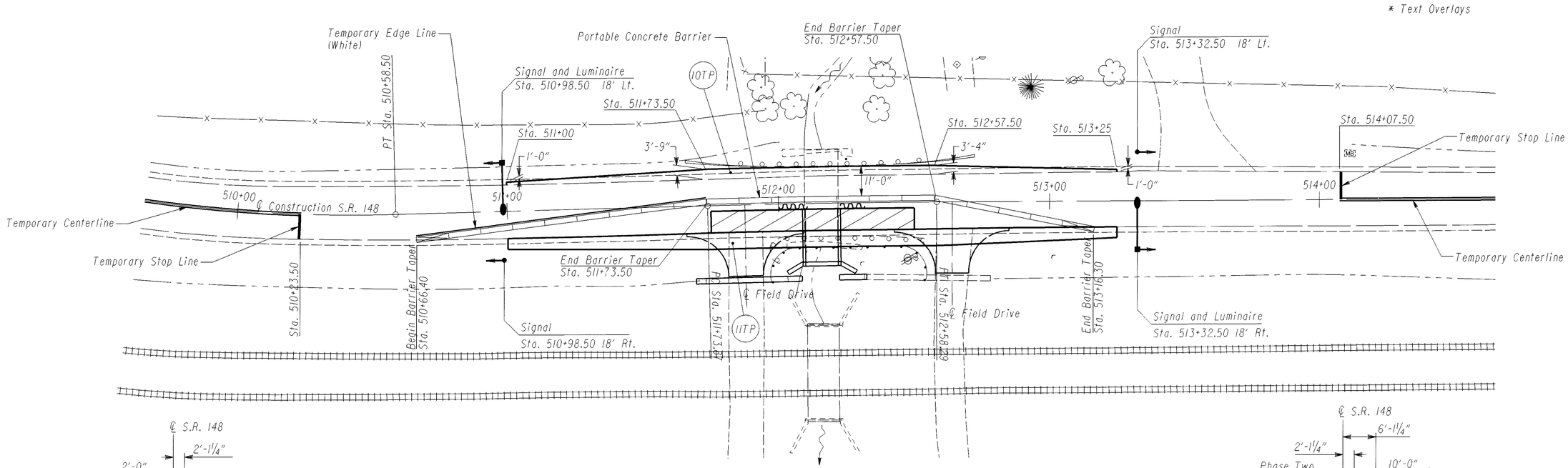
CALCULATED TES
CHECKED DMB

MAINTENANCE OF TRAFFIC - SECTION 7.93
STA. 416+00.00 TO STA. 421+50.00

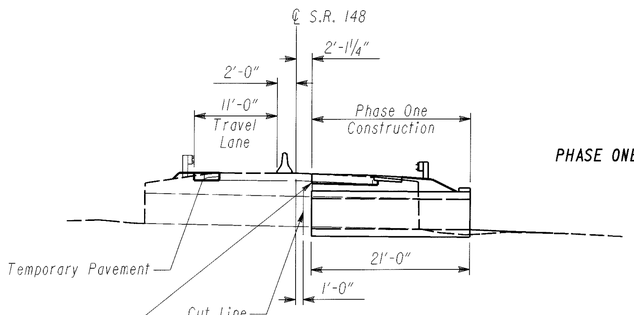
BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

12
111

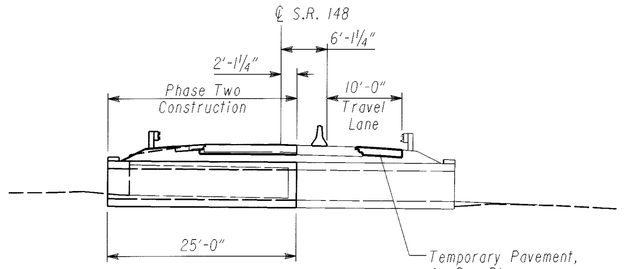
* Text Overlays



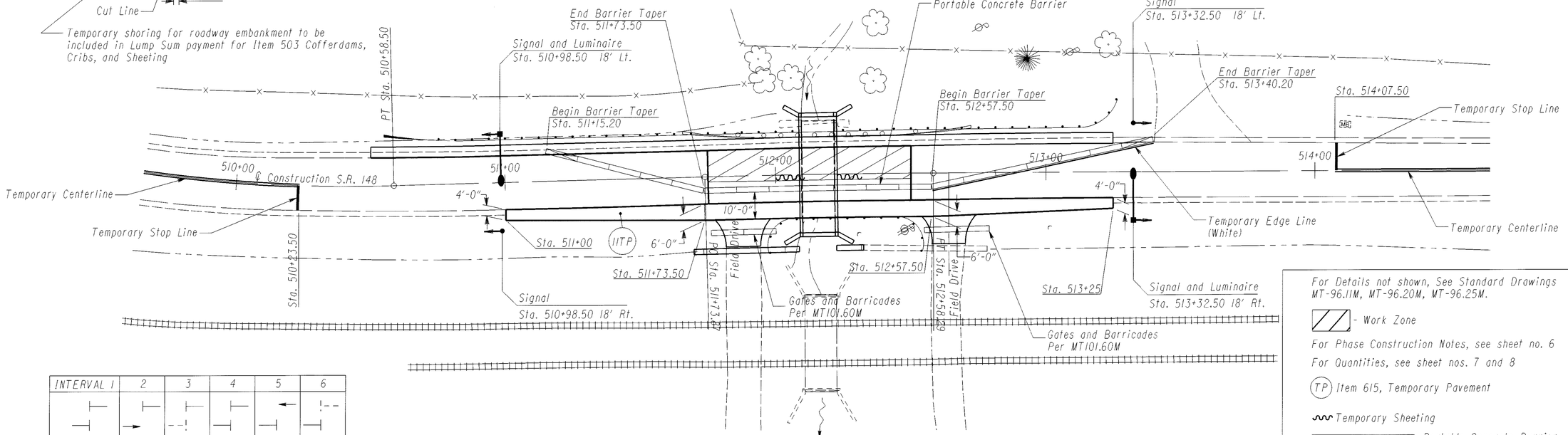
PHASE ONE



PHASE ONE



PHASE TWO



PHASE TWO

INTERVAL	1	2	3	4	5	6
TIMING (Seconds)	11	15	4	11	15	4

For Details not shown, See Standard Drawings MT-96.11M, MT-96.20M, MT-96.25M.

- Work Zone

For Phase Construction Notes, see sheet no. 6

For Quantities, see sheet nos. 7 and 8

(TP) Item 615, Temporary Pavement

Temporary Sheeting

Portable Concrete Barrier with Tapered End Section

HORIZONTAL SCALE IN FEET

CALCULATED TES

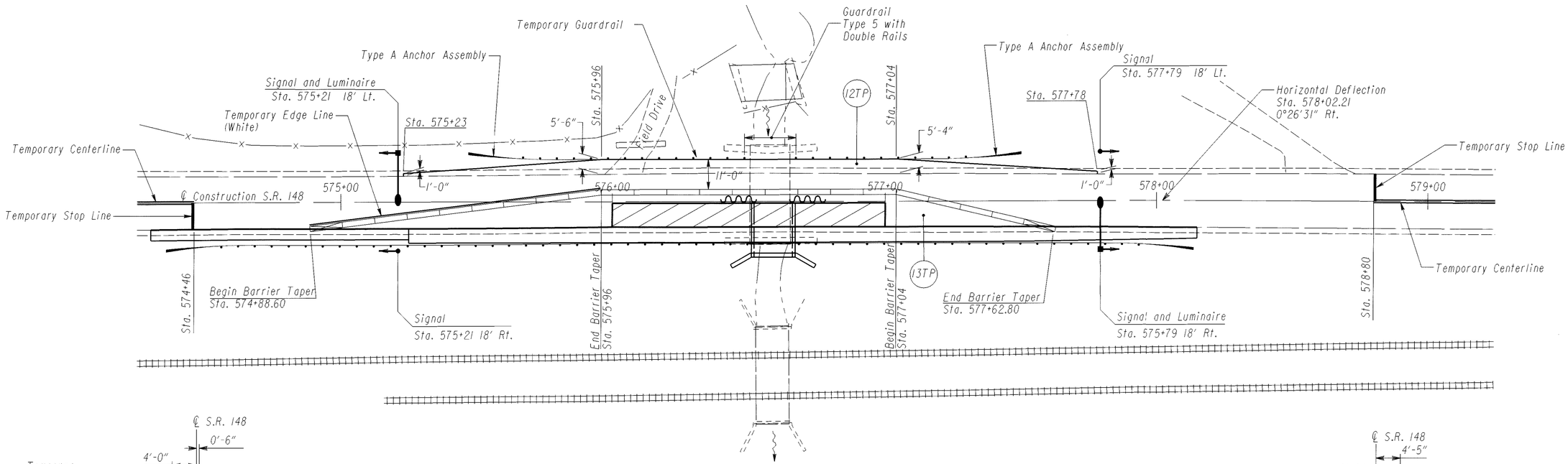
CHECKED DMB

MAINTENANCE OF TRAFFIC - SECTION 9.69

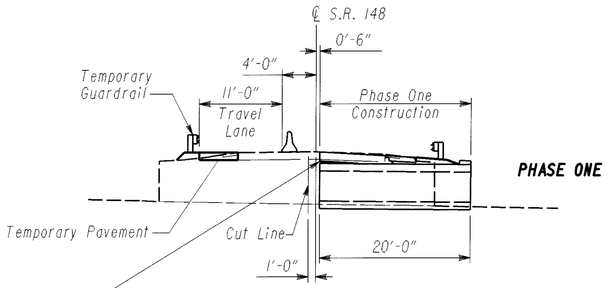
STA. 509+65.00 TO STA. 514+65.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

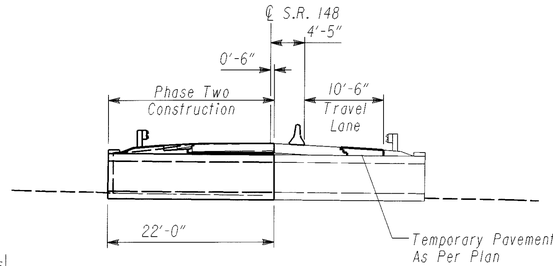
13
111



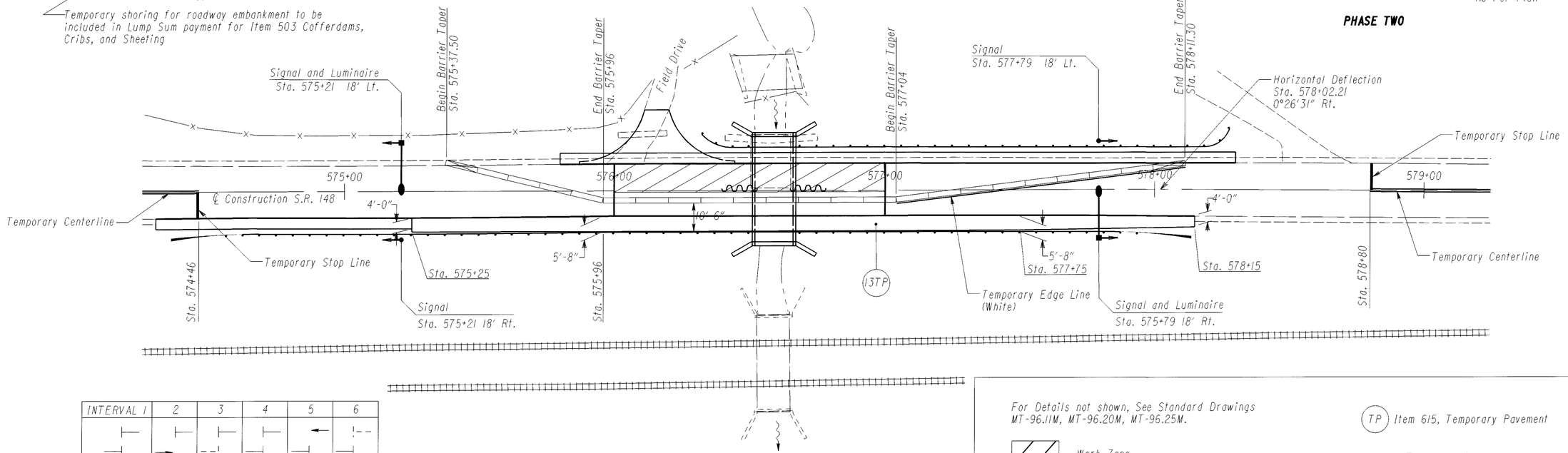
PHASE ONE



Temporary shoring for roadway embankment to be included in Lump Sum payment for Item 503 Cofferdams, Cribs, and Sheeting



PHASE TWO



PHASE TWO

	INTERVAL 1	2	3	4	5	6
	⊢ ⊣	⊢ →	⊢ --!	⊢ ⊣	← ⊣	!-- ⊣
TIMING (Seconds)	12	14	4	12	14	4

For Details not shown, See Standard Drawings MT-96.11M, MT-96.20M, MT-96.25M.

- Work Zone

For Phase Construction Notes, see sheet no. 6

For Quantities, see sheet nos. 7 and 8

(TP) Item 615, Temporary Pavement

Temporary Sheeting

Portable Concrete Barrier with Tapered End Section

HORIZONTAL SCALE IN FEET
0 10 20 40

CALCULATED TES
CHECKED DMB

MAINTENANCE OF TRAFFIC - SECTION 10.91
STA. 574+25.00 TO STA. 579+25.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

14
111

SHEET NUMBER																ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE PLAN SHEET NO.
5	6	7	8	18	19	20	21	22	23	59	67	75	83	91	99						
																				ROADWAY	
LUMP																201	11000	LUMP		CLEARING AND GRUBBING	
					37			30	18							202	35100	85	LIN FT	PIPE REMOVED, 24" AND UNDER	
				444	131	257		172								202	38000	1004	LIN FT	GUARDRAIL REMOVED	
21																202	54100	21	EACH	RAISED PAVEMENT MARKER REMOVED FOR STORAGE	
				173	345	151	167	126	167							203	12000	1129	CU YD	EXCAVATION NOT INCLUDING EMBANKMENT CONSTRUCTION	
				225	61	63	166	190	197							203	20000	902	CU YD	EMBANKMENT	
				292	270	107	149	166	181							203	50000	1165	SQ YD	SUBGRADE COMPACTION	
				650	262.5	475	387.5	243.75	437.50							606	13000	2456.25	LIN FT	GUARDRAIL, TYPE 5	
				50	37.50	62.50		18.75								606	13011	168.75	LIN FT	GUARDRAIL, TYPE 5 WITH TUBULAR BACKUP, AS PER PLAN	5
					37.50		37.50	37.50	75							606	13020	187.5	LIN FT	GUARDRAIL, TYPE 5 WITH DOUBLE RAILS	
							25									606	13021	25	LIN FT	GUARDRAIL, TYPE 5 WITH DOUBLE RAILS, AS PER PLAN	5
				4	2	4	3	1	2							606	25000	16	EACH	ANCHOR ASSEMBLY, TYPE A	
					1			2	1							606	26500	4	EACH	ANCHOR ASSEMBLY, TYPE T	
				4	2	4		1								606	35140	11	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 4	
																				EROSION CONTROL	
											14			48	54	601	11000	116	SQ YD	RIPRAP USING 6" REINFORCED CONCRETE SLAB	
										28	12		19			601	32100	59	CU YD	ROCK CHANNEL PROTECTION, TYPE B WITH FILTER	
												6				601	32200	6	CU YD	ROCK CHANNEL PROTECTION, TYPE C WITH FILTER	
12																870	00100	12	EACH	SOIL ANALYSIS TEST	
287																870	00200	287	CU YD	PLACING TOPSOIL	
				989	791	910	882	680	913							870	10000	5165	SQ YD	SEEDING AND MULCHING	
				0.13	0.11	0.12	0.12	0.09	0.12							870	20000	0.69	TON	COMMERCIAL FERTILIZER	
				0.41	0.33	0.38	0.36	0.28	0.38							870	30000	2.14	TON	AGRICULTURAL LIME	
16																870	35000	16	M GAL	WATER	
1200																877	30000	1200	LIN FT	TEMPORARY PERIMETER, DITCH CHECK OR INLET PROTECTION FILTER FABRIC FENCE	
																				DRAINAGE	
									56							603	06400	56	LIN FT	15" CONDUIT, TYPE D	
								49								603	10900	49	LIN FT	24" CONDUIT, TYPE D	
											44	40	45	46		603	95600	175	LIN FT	12' X 4' CONDUIT, TYPE A, 706.05, ASTM C850	
															42	603	96301	42	LIN FT	14' X 4' CONDUIT, TYPE A, 706.05, AS PER PLAN	100
										46						603	96401	46	LIN FT	16' X 5' CONDUIT, TYPE A, 706.05, AS PER PLAN	60
				50	50	30	30	30	50							605	31100	240	LIN FT	AGGREGATE DRAIN	
										45	35	32	35	36	33	613	41250	216	CU YD	LOW STRENGTH MORTAR BACKFILL, TYPE I	
										45	30	28	43	30	35	842	46000	211	CU YD	CLASS C CONCRETE	
																				PAVEMENT	
				51	50	29	26	29	37							301	46000	222	CU YD	BITUMINOUS AGGREGATE BASE, PG64-22	
				134	72	58	73	67	80							304	20000	484	CU YD	AGGREGATE BASE	
					1	5										407	10000	6	GALLON	TACK COAT	
				12	12	7	6	7	9							407	14000	53	GALLON	TACK COAT FOR INTERMEDIATE COURSE	
				121	112	44	62	69	89							408	10000	497	GALLON	BITUMINOUS PRIME COAT	

CALCULATED TES
CHECKED SKW

GENERAL SUMMARY

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SHEET NUMBER																ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE PLAN SHEET NO.
5	6	7	8	18	19	20	21	22	23	59	67	75	83	91	99						
				15	15	9	8	8	11							448	46050	66	CU YD	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG64-22	
				11	11	6	6	6	8							448	47021	48	CU YD	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64-22, AS PER	5
																				PLAN	
																				TRAFFIC CONTROL	
19																621	00100	19	EACH	RAISED PAVEMENT MARKER	
				11	9	8	8	7	8							626	00100	51	EACH	BARRIER REFLECTOR, TYPE A	
				4	2	1	1									630	84900	8	EACH	REMOVAL OF GROUND MOUNTED POST SUPPORT AND DISPOSAL	
				4	2	1	1									630	86002	8	EACH	REMOVAL OF GROUND MOUNTED SIGN AND DISPOSAL	
				0.16	0.10	0.13	0.13	0.10	0.12							642	00100	0.74	MILE	EDGE LINE, TYPE 1	
				0.02	0.02	0.01	0.01	0.01	0.02							642	00300	0.09	MILE	CENTER LINE, TYPE 1	
																				STRUCTURES	
										LUMP	LUMP	LUMP	LUMP	LUMP	LUMP	202	11000	LUMP		STRUCTURE REMOVED	
										LUMP	LUMP	LUMP	LUMP	LUMP	LUMP	503	11100	LUMP		COFFERDAMS, CRIBS AND SHEETING	
										LUMP	LUMP	LUMP	LUMP	LUMP	LUMP	503	21300	LUMP		UNCLASSIFIED EXCAVATION	
										173	62	56	140	143	59	512	33000	633	SQ YD	TYPE 2 WATERPROOFING	
											75	68			80	512	33010	223	SQ YD	TYPE 3 WATERPROOFING	
										36	27	26	32	26	28	SPECIAL	5126751O	175	SQ YD	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)	
										3	3	3	3	3	3	516	13600	18	SQ FT	1" PREFORMED EXPANSION JOINT FILLER	
																				MAINTENANCE OF TRAFFIC	
	5															410	10000	5	CU YD	TRAFFIC COMPACTED SURFACE, TYPE A	
		787														SPECIAL	61412200	787	LIN FT	TEMPORARY GUARDRAIL	
			2346													614	12800	2346	EACH	TEMPORARY RAISED PAVEMENT MARKER	
	12															614	13000	12	CU YD	BITUMINOUS CONCRETE FOR MAINTAINING TRAFFIC	
		40														614	13202	40	EACH	BARRIER REFLECTOR, TYPE A2	
		139														614	13302	139	EACH	BARRIER REFLECTOR, TYPE B2	
		278														614	13350	278	EACH	OBJECT MARKER	
	1															614	21100	1	MILE	TEMPORARY CENTER LINE, CLASS I, 642 PAINT	
		0.34														614	21200	0.34	MILE	TEMPORARY CENTER LINE, CLASS I, 740.06, TYPE I	
		0.23														614	22200	0.23	MILE	TEMPORARY EDGE LINE, CLASS I, 740.06, TYPE I	
		123														614	26400	123	LIN FT	TEMPORARY STOP LINE, CLASS I, 740.06, TYPE I	
		674														615	25000	674	SQ YD	TEMPORARY PAVEMENT, CLASS B	
		795														615	25001	795	SQ YD	TEMPORARY PAVEMENT, CLASS B, AS PER PLAN	6
	3084															622	40020	3084	LIN FT	PORTABLE CONCRETE BARRIER, 32"	
	48															622	40040	48	LIN FT	PORTABLE CONCRETE BARRIER, 32", BRIDGE MOUNTED	
	LUMP															614	11000	LUMP		MAINTAINING TRAFFIC	
																623	10000	LUMP		CONSTRUCTION LAYOUT STAKES	
																624	10000	LUMP		MOBILIZATION	
																806	16010	8	MONTH	FIELD OFFICE, TYPE B	

CALCULATED TES
CHECKED SKW

GENERAL SUMMARY

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

CALCULATED TES
CHECKED SKW

PAVEMENT TRANSITION TABLE

BEL-148-0.33

LEFT SIDE				CENTERLINE CONTROL		RIGHT SIDE				
ELEVATION	ELEVATION CORRECTION	CROSS SLOPE	WIDTH (ft)	STATION	PROFILE GRADE	WIDTH (ft)	CROSS SLOPE	ELEVATION CORRECTION	EDGE ELEVATION	REMARKS
1134.35	-0.282	-0.0256	11'	17+25.00	1134.63	10'	-0.0094	-0.094	1134.54	EXISTING
1133.84	-0.251	-0.0228	11'	17+50.00	1134.09	10'	-0.0075	-0.075	1134.02	
1133.42	-0.219	-0.0199	11'	17+75.00	1133.64	10'	-0.0056	-0.056	1133.58	
1133.07	-0.188	-0.0171	11'	18+00.00	1133.26	10'	-0.0038	-0.038	1133.22	
1132.80	-0.156	-0.0142	11'	18+25.00	1132.96	10'	-0.0019	-0.019	1132.94	
1132.55	-0.125	-0.0114	11'	18+50.00	1132.68	10'	0.0000	0.000	1132.68	EXISTING

BEL-148-4.54

LEFT SIDE				CENTERLINE CONTROL		RIGHT SIDE				
ELEVATION	ELEVATION CORRECTION	CROSS SLOPE	WIDTH (ft)	STATION	PROFILE GRADE	WIDTH (ft)	CROSS SLOPE	ELEVATION CORRECTION	EDGE ELEVATION	REMARKS
970.94	-0.882	-0.0882	10'	239+75.00	971.82	10'	0.0750	0.750	972.57	EXISTING
970.71	-0.882	-0.0882	10'	240+00.00	971.59	10'	0.0750	0.750	972.34	
970.54	-0.882	-0.0882	10'	240+25.00	971.42	10'	0.0750	0.750	972.17	
970.45	-0.882	-0.0882	10'	240+50.00	971.33	10'	0.0750	0.750	972.08	
970.44	-0.882	-0.0882	10'	240+75.00	971.32	10'	0.0750	0.750	972.07	
970.45	-0.882	-0.0882	10'	240+85.00	971.33	10'	0.0750	0.750	972.08	
970.42	-0.955	-0.0955	10'	241+00.00	971.38	10'	0.0790	0.790	972.17	EXISTING

BEL-148-5.08

LEFT SIDE				CENTERLINE CONTROL		RIGHT SIDE				
ELEVATION	ELEVATION CORRECTION	CROSS SLOPE	WIDTH (ft)	STATION	PROFILE GRADE	WIDTH (ft)	CROSS SLOPE	ELEVATION CORRECTION	EDGE ELEVATION	REMARKS
955.87	-0.071	0.0069	10'-3"	267+90.00	955.94	10'-7"	-0.0310	-0.328	955.61	EXISTING
955.86	-0.072	-0.0073	10'-3"	268+00.00	955.93	10'-7"	-0.0288	-0.305	955.62	
955.83	-0.082	-0.0084	10'-3"	268+25.00	955.92	10'-7"	-0.0234	-0.248	955.67	
955.80	-0.096	0.0094	10'-3"	268+50.00	955.90	10'-7"	-0.0179	-0.189	955.71	EXISTING

BEL-148-7.93

LEFT SIDE				CENTERLINE CONTROL		RIGHT SIDE				
ELEVATION	ELEVATION CORRECTION	CROSS SLOPE	WIDTH (ft)	STATION	PROFILE GRADE	WIDTH (ft)	CROSS SLOPE	ELEVATION CORRECTION	EDGE ELEVATION	REMARKS
890.85	-0.099	-0.0107	9'-4"	418+90.00	890.95	10'	-0.0317	-0.317	890.63	EXISTING
890.77	-0.117	-0.0125	9'-4"	419+00.00	890.89	9'-11"	-0.0331	-0.328	890.56	
890.60	-0.160	-0.0170	9'-5"	419+25.00	890.76	9'-8"	-0.0366	-0.354	890.41	
890.43	-0.202	-0.0215	9'-5"	419+50.00	890.63	9'-6"	-0.0400	-0.380	890.25	
890.28	-0.221	-0.0233	9'-6"	419+60.00	890.50	9'-5"	-0.0414	-0.390	890.11	EXISTING

BEL-148-9.69

LEFT SIDE				CENTERLINE CONTROL		RIGHT SIDE				
ELEVATION	ELEVATION CORRECTION	CROSS SLOPE	WIDTH (ft)	STATION	PROFILE GRADE	WIDTH (ft)	CROSS SLOPE	ELEVATION CORRECTION	EDGE ELEVATION	REMARKS
860.39	-0.070	-0.0072	9'-9"	511+75.00	860.46	10'	-0.0244	-0.244	860.22	EXISTING
860.36	0.017	0.0017	9'-10"	512+00.00	860.34	10'	-0.0273	-0.273	860.07	
860.34	0.106	0.0107	9'-11"	512+25.00	860.23	10'	-0.0301	-0.301	859.93	
860.43	0.196	0.0196	10'	512+50.00	860.23	10'	-0.0330	-0.330	859.90	EXISTING

BEL-148-10.91

LEFT SIDE				CENTERLINE CONTROL		RIGHT SIDE				
ELEVATION	ELEVATION CORRECTION	CROSS SLOPE	WIDTH (ft)	STATION	PROFILE GRADE	WIDTH (ft)	CROSS SLOPE	ELEVATION CORRECTION	EDGE ELEVATION	REMARKS
848.15	-0.141	-0.0141	10'	576+00.00	848.29	9'-4"	-0.0501	-0.468	847.82	EXISTING
848.24	-0.091	-0.0091	10'	576+25.00	848.33	9'-4"	-0.0532	-0.497	847.83	
848.42	-0.040	-0.0040	10'	576+50.00	848.46	9'-4"	-0.0563	-0.525	847.94	
848.69	0.011	0.0011	10'	576+75.00	848.68	9'-4"	-0.0594	-0.554	848.13	
849.05	0.061	0.0061	10'	577+00.00	848.99	9'-4"	-0.0625	-0.583	848.41	EXISTING

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

ITEM 448 - ASPHALT CONCRETE SURFACE COURSE TYPE I, PG 64-22, AS PER PLAN

Sta. 17+25.00 to Sta. 18+50.00 Lt.
125' x 11' x 1.25" ÷ 12 ÷ 27 = 5.30

Sta. 17+25.00 to Sta. 18+50.00 Rt.
125' x 10' x 1.25" ÷ 12 ÷ 27 = 4.82

Total = 10.12

(Use 11 Cu. Yd.)

ITEM 448 - ASPHALT CONCRETE INTERMEDIATE COURSE TYPE 2, PG 64-22

Sta. 17+25.00 to Sta. 18+50.00 Lt.
125' x 11' x 1.75" ÷ 12 ÷ 27 = 7.43

Sta. 17+25.00 to Sta. 18+50.00 Rt.
125' x 10' x 1.75" ÷ 12 ÷ 27 = 6.75

Total = 14.18

(Use 15 Cu. Yd.)

ITEM 301 - BITUMINOUS AGGREGATE BASE, PG 64-22

Sta. 17+25.00 to Sta. 18+50.00 Lt.
125' x 11.33' x 6" ÷ 12 ÷ 27 = 26.23

Sta. 17+25.00 to Sta. 18+50.00 Rt.
125' x 10.33' x 6" ÷ 12 ÷ 27 = 23.91

Total = 50.14

(Use 51 Cu. Yd.)

ITEM 304 - AGGREGATE BASE

Sta. 17+25.00 to Sta. 18+50.00 Lt.
125' x 11.83' x 6" ÷ 12 ÷ 27 = 27.38

Sta. 17+25.00 to Sta. 18+50.00 Rt.
125' x 10.83' x 6" ÷ 12 ÷ 27 = 25.07

(Shoulders)

Sta. 16+15.00 to Sta. 20+50.00 Lt.
435' x 4' x 8" ÷ 12 ÷27 = 42.96

Sta. 15+90.00 to Sta. 19+75.00 Rt.
385' x 4' x 8" ÷ 12 ÷27 = 38.02

Total = 133.43

(Use 134 Cu. Yd.)

ITEM 408 - BITUMINOUS PRIME COAT

Sta. 17+25.00 to Sta. 18+50.00 Lt.
125' x 11.33' ÷ 9 x 0.4 Gal/S.Y. = 62.94

Sta. 17+25.00 to Sta. 18+50.00 Rt.
125' x 10.33' ÷ 9 x 0.4 Gal/S.Y. = 57.39

Total = 120.33

(Use 121 Gal)

ITEM 203 - SUBGRADE COMPACTION

Sta. 17+25.00 to Sta. 18+50.00 Lt.
125' x 11' ÷ 9 = 152.78

Sta. 17+25.00 to Sta. 18+50.00 Rt.
125' x 10' ÷ 9 = 138.89

Total = 291.67

(Use 292 Sq. Yd.)

ITEM 642 - CENTERLINE, TYPE I (DOUBLE YELLOW)

Sta. 17+25.00 to Sta. 18+50.00 ℄.
125' ÷ 5280'/mile = 0.02 miles

(Use 0.02 miles)

ITEM 642 - EDGE LINE, TYPE I

Sta. 16+15.00 to Sta. 20+50.00 Lt.
435' ÷ 5280'/mile = 0.082

Sta. 15+90.00 to Sta. 19+75.00 Rt.
385' ÷ 5280'/mile = 0.073

Total = 0.155

(Use 0.16 miles)

ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE

Sta. 17+25.00 to Sta. 18+50.00 Lt.
125' x 11' ÷ 9 x 0.04 Gal/S.Y. = 6.11

Sta. 17+25.00 to Sta. 18+50.00 Rt.
125' x 10' ÷ 9 x 0.04 Gal/S.Y. = 5.56

Total = 11.67
(Use 12 Gal)

ITEM 605 - AGGREGATE DRAIN

Aggregate drains shall be placed as shown in the following table:

STATION	SIDE	LENGTH
17+25.00	Rt.	10'
17+50.00	Lt.	10'
17+75.00	Rt.	10'
18+25.00	Lt.	10'
18+50.00	Rt.	10'
TOTAL		50'

ITEM 870 - COMMERCIAL FERTILIZER
989 S.Y. x 9 x 30 lbs/1000 S.F. x 1/2000 = 0.13 Ton

ITEM 870 - AGRICULTURAL LIMING
989 S.Y. x 9 x 46 lbs/1000 S.F. x (1/2000) = 0.41 Ton

ITEM 870 - WATER
989 S.Y. x 9 x 300 Gal/1000/1000 = 2.67

(Use 3 M Gal) (Carried to General Notes)

SEEDING AND EARTHWORK TABLE

SHEET	870 SEEDING & MULCHING	203 EXCAVATION	203 EMBANKMENT
25	271	16	52
26	246	71	80
27	205	56	46
28	267	19	40
29	0	11	7
TOTAL	989	173	225

Totals Carried to General Summary

REF NO.	STATION TO STATION	SIDE	202		606					626		630					
			GUARDRAIL REMOVED		GUARDRAIL TYPE 5	GUARDRAIL TYPE 5 WITH TUBULAR BACKUP AS PER PLAN	ANCHOR ASSEMBLY TYPE A	BRIDGE TERMINAL ASSEMBLY TYPE 4		BARRIER REFLECTOR TYPE A		REMOVAL OF GROUND MOUNTED SIGN AND DISPOSAL	REMOVAL OF GROUND MOUNTED POST SUPPORT AND DISPOSAL				
			LIN. FT.		LIN. FT.	LIN. FT.	EACH	EACH		EACH		EACH	EACH				
1R	16+77.70 TO 18+93.13	RT.	215.63														
2R	16+84.55 TO 19+12.28	LT.	228.13														
3R	17+76.42	RT.										1	1				
4R	17+79.68	LT.										1	1				
5R	18+09.10	LT.										1	1				
6R	18+08.36	RT.										1	1				
1GR	15+99.26 TO 17+88.25	RT.			162.50		1	1									
2GR	17+88.25 TO 18+13.25	RT.				25.0				5							
3GR	18+13.25 TO 19+77.34	RT.			137.50		1	1									
4GR	16+24.30 TO 17+88.36	LT.			137.50		1	1									
5GR	17+88.36 TO 18+13.36	LT.				25.0				6							
6GR	18+13.36 TO 20+52.41	LT.			212.50		1	1									
TOTALS CARRIED TO GEN. SUMMARY			443.76		650	50	4	4		11		4	4				

CALCULATED SKW CHECKED TES

CALCULATIONS & ESTIMATED QUANTITIES (00.33)

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

CALCULATED SKW CHECKED TES

CALCULATIONS & ESTIMATED QUANTITIES (4.54)

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

ITEM 448 - ASPHALT CONCRETE SURFACE COURSE TYPE I, PG 64-22, AS PER PLAN

Sta. 239+75.00 to Sta. 241+00.00 Lt.
125' x 10' x 1.25" ÷ 12 ÷ 27 = 4.82

Sta. 239+75.00 to Sta. 241+00.00 Rt.
125' x 10' x 1.25" ÷ 12 ÷ 27 = 4.82

Sta. 240+18.00 to Sta. 240+32.00 Lt.
14' x 8.5' x 1.25" ÷ 12 ÷ 27 = 0.46

Total = 10.10

(Use 11 Cu. Yd.)

ITEM 448 - ASPHALT CONCRETE INTERMEDIATE COURSE TYPE 2, PG 64-22

Sta. 239+75.00 to Sta. 241+00.00 Lt.
125' x 10' x 1.75" ÷ 12 ÷ 27 = 6.75

Sta. 239+75.00 to Sta. 241+00.00 Rt.
125' x 10' x 1.75" ÷ 12 ÷ 27 = 6.75

Sta. 240+18.00 to Sta. 240+32.00 Lt
14' x 1.34 sq. ft. ÷ 27 = 0.69

Total = 14.19

(Use 15 Cu. Yd.)

ITEM 301 - BITUMINOUS AGGREGATE BASE, PG 64-22

Sta. 239+75.00 to Sta. 240+18.00 Lt. & Rt.
2 x 43' x 10.33' x 6" ÷ 12 ÷ 27 = 16.45

Sta. 240+32.00 to Sta. 241+00.00 Lt. & Rt.
2 x 68' x 10.33' x 6" ÷ 12 ÷ 27 = 26.02

Sta. 240+18.00 to Sta. 240+32.00 Lt
14' x 7.64* sq. ft. ÷ 27 = 3.96

Sta. 240+18.00 to Sta. 240+32.00 Rt
14' x 10.33' x 6" ÷ 12 ÷ 27 = 2.68

Total = 49.11

(Use 50 Cu. Yd.)

* PLANIMETERED BY COMPUTER

ITEM 304 - AGGREGATE BASE

Sta. 239+75.00 to Sta. 240+18.00 Lt. & Rt.
2 x 43' x 10.83' x 6" ÷ 12 ÷ 27 = 17.25

Sta. 240+32.00 to Sta. 241+00.00 Lt. & Rt.
2 x 68' x 10.83' x 6" ÷ 12 ÷ 27 = 27.28

Sta. 240+18.00 to Sta. 240+32.00 Rt.
14' x 10.83' x 6" ÷ 12 ÷ 27 = 2.81

Sta. 240+18.00 to Sta. 240+32.00 Lt.
14' x 4.86* sq. ft. ÷ 27 = 2.52

(Shoulders)

Sta. 239+00.00 to Sta. 240+18.00 Lt.
118' x 4' x 8" ÷ 12 ÷27 = 11.65

Sta. 240+32.00 to Sta. 241+40.00 Lt.
108' x 4' x 8" ÷ 12 ÷27 = 10.67

Total = 72.18

(Use 72 Cu. Yd.)

ITEM 203 - SUBGRADE COMPACTION

Sta. 239+75.00 to Sta. 240+18.00 Lt.
43' x 10' ÷ 9 = 47.78

Sta. 240+32.00 to Sta. 241+00.00 Lt.
68' x 10' ÷ 9 = 75.56

Sta. 240+18.00 to Sta. 240+32.00 Lt.
14' x 5.30' ÷ 9 = 8.24

Sta. 239+75.00 to Sta. 241+00.00 Rt.
125' x 10' ÷ 9 = 138.89

Total = 270.47

(Use 270 Sq. Yd.)

ITEM 407 - TACK COAT

Sta. 240+18.00 to Sta. 240+32.00 (OVER BOX)
14' x 7.9' ÷ 9 x 0.075 Gal/S.Y. = 0.92

Total = 0.92

(Use 1 Gal)

ITEM 408 - BITUMINOUS PRIME COAT

Sta. 239+75.00 to Sta. 240+18.00 Lt.
43' x 10.33' ÷ 9 x 0.4 Gal/S.Y. = 19.74

Sta. 240+32.00 to Sta. 241+00.00 Lt.
68' x 10.33' ÷ 9 x 0.4 Gl/S.Y. = 31.22

Sta. 240+18.00 to Sta. 240+32.00 Lt.
14' x 5.3' ÷ 9 x 0.4 Gl/S.Y. = 3.30

Sta. 239+75.00 to Sta. 241+00.00 Rt.
125' x 10.33' ÷ 9 x 0.4 Gl/S.Y. = 57.39

Total = 111.65

(Use 112 Gal)

ITEM 605 - AGGREGATE DRAIN

Aggregate drains shall be placed as shown in the following table:

STATION	SIDE	LENGTH
239+75.00	Lt.	10'
240+00.00	Lt.	10'
240+50.00	Lt.	10'
240+75.00	Lt.	10'
241+00.00	Lt.	10'
TOTAL		50'

ITEM 642 - CENTERLINE, TYPE I (DOUBLE YELLOW)

Sta. 239+75.00 to Sta. 241+00.00 ℄.
125' ÷ 5280'/mile = 0.02 miles

(Use 0.02 miles)

ITEM 642 - EDGE LINE, TYPE I

Sta. 239+00.00 to Sta. 241+40.00 Lt.
240' ÷ 5280'/mile = 0.045

Sta. 239+00.00 to Sta. 241+75.00 Rt.
275' ÷ 5280'/mile = 0.052

Total = 0.098

(Use 0.10 miles)

ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE

Sta. 239+75.00 to Sta. 241+00.00 Lt.
125' x 10' ÷ 9 x 0.04 Gal/S.Y. = 5.56

Sta. 239+75.00 to Sta. 241+00.00 Rt.
125' x 10' ÷ 9 x 0.04 Gal/S.Y. = 5.56

Sta. 240+18.00 to Sta. 240+32.00 Lt. (Shoulder)
14' x 8.5' ÷ 9 x 0.04 Gal/S.Y. = 0.53

Total = 11.64

(Use 12 Gal)

ITEM 870 - COMMERCIAL FERTILIZER

791 S.Y. x 9 x 30 lbs/1000 S.F. x 1/2000 = 0.11 Ton

ITEM 870 - AGRICULTURAL LIMING

791 S.Y. x 9 x 92 lbs/1000 S.F. x (1/2000) = 0.33 Ton

ITEM 870 - WATER

791 S.Y. x 9 x 300 Gal/1000/1000 = 2.136

(Use 2 M Gal) (Carried to General Notes)

SEEDING AND EARTHWORK TABLE

SHEET	870 SEEDING & MULCHING	203 EXCAVATION	203 EMBANKMENT
31	221	36	7
32	419	276	22
33	151	12	32
34	0	21	0
TOTAL	791	345	61

Totals Carried to General Summary

REF NO.	STATION TO STATION	SIDE	202 GUARDRAIL REMOVED	202 PIPE REMOVED 24" AND UNDER		606 GUARDRAIL TYPE 5	606 GUARDRAIL TYPE 5 WITH TUBULAR BACKUP AS PER PLAN	606 ANCHOR ASSEMBLY TYPE A	606 GUARDRAIL TYPE 5 WITH DOUBLE RAILS	606 BRIDGE TERMINAL ASSEMBLY TYPE 4	606 ANCHOR ASSEMBLY TYPE T		626 BARRIER REFLECTOR TYPE A		630 REMOVAL OF GROUND MOUNTED SIGN AND DISPOSAL	630 REMOVAL OF GROUND MOUNTED POST SUPPORT AND DISPOSAL	
			LIN. FT.	LIN. FT.		LIN. FT.	LIN. FT.	EACH		EACH	EACH		EACH		EACH	EACH	
1R	239+55.21 TO 240+84.34	RT.	131.25														
2R	240+08.31	RT.													1	1	
3R	240+39.66	LT.													1	1	
4R	241+36.88			37													
1GR	239+55.21 TO 240+03.75	RT.				50											
2GR	240+03.75 TO 240+40.44	RT.							37.5				4				
3GR	240+40.44 TO 241+15.42	RT.				50		1									
4GR	239+04.40 TO 240+09.04	LT.				75		1		1							
5GR	240+09+.04 TO 240+47.20	LT.					37.5						5				
6GR	240+47.20 TO 241+46.61	LT.				87.5**				1	1						
TOTALS CARRIED TO GEN. SUMMARY			131.25	37		262.50	37.5	2	37.5	2	1		9		2	2	

** 12.5' on 10' Radius

CALCULATED SKW CHECKED TES

CALCULATIONS & ESTIMATED QUANTITIES (5.07)

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

ITEM 448 - ASPHALT CONCRETE SURFACE COURSE TYPE I, PG 64-22, AS PER PLAN

Sta. 267+90.00 to Sta. 268+50.00 Lt.
60' x 10.25' x 1.25" ÷ 12 ÷ 27 = 2.37

Sta. 267+90.00 to Sta. 268+50.00 Rt.
60' x 10.58' x 1.25" ÷ 12 ÷ 27 = 2.45

Sta. 268+15.18 to Sta. 268+29.18 Lt.
14' x 8.5' x 1.25" ÷ 12 ÷ 27 = 0.46

Sta. 268+15.18 to Sta. 268+29.18 Rt.
14' x 8.6' x 1.25" ÷ 12 ÷ 27 = 0.46

Total = 5.74

(Use 6 Cu. Yd.)

ITEM 448 - ASPHALT CONCRETE INTERMEDIATE COURSE TYPE 2, PG 64-22

Sta. 267+90.00 to Sta. 268+50.00 Lt.
60' x 10.25' x 1.75" ÷ 12 ÷ 27 = 3.32

Sta. 267+90.00 to Sta. 268+50.00 Rt.
60' x 10.58' x 1.75" ÷ 12 ÷ 27 = 3.43

Sta. 268+15.18 to Sta. 268+29.18 Lt.
14' x 1.46* sq. ft. ÷ 27 = 0.76

Sta. 268+15.18 to Sta. 268+29.18 Rt.
14' x 8.6' x 1.75" ÷ 12 ÷ 27 = 0.65

Total = 8.16

(Use 9 Cu. Yd.)

ITEM 301 - BITUMINOUS AGGREGATE BASE, PG 64-22

Sta. 267+90.00 to Sta. 268+15.18 Lt.
25.18' x 10.58' x 6" ÷ 12 ÷ 27 = 4.93

Sta. 268+29.18 to Sta. 268+50.00 Lt.
20.82' x 10.58' x 6" ÷ 12 ÷ 27 = 4.08

Sta. 267+90.00 to Sta. 268+15.18 Rt.
25.18' x 10.91' x 6" ÷ 12 ÷ 27 = 5.09

Sta. 268+29.18 to Sta. 268+50.00 Rt.
20.82' x 10.91' x 6" ÷ 12 ÷ 27 = 4.21

Sta. 268+15.18 to Sta. 268+29.18 Lt.
(12.35 + 6.30) sq. ft. x 14' ÷ 27 = 4.49

Sta. 268+15.18 to Sta. 268+29.18 Rt.
(3.65 + 6.75) sq. ft. x 14' ÷ 27 = 5.39

Total = 28.19

(Use 29 Cu. Yd.)

ITEM 304 - AGGREGATE BASE

Sta. 267+90.00 to Sta. 268+15.18 Lt.
25.18' x 11.08' x 6" ÷ 12 ÷ 27 = 5.17

Sta. 268+29.18 to Sta. 268+50.00 Lt.
20.82' x 11.08' x 6" ÷ 12 ÷ 27 = 4.27

Sta. 267+90.00 to Sta. 268+15.18 Rt.
25.18' x 11.42' x 6" ÷ 12 ÷ 27 = 5.33

Sta. 268+29.18 to Sta. 268+50.00 Rt.
20.82' x 11.42' x 6" ÷ 12 ÷ 27 = 4.40

(Shoulders)

Sta. 266+95.00 to Sta. 268+15.18 Lt.
120.18' x 4' x 8" ÷ 12 ÷27 = 11.87

Sta. 268+29.18 to Sta. 270+05.00 Lt.
175.82' x 4' x 8" ÷ 12 ÷27 = 17.36

Sta. 266+10.00 to Sta. 267+00.00 Rt.
90' x 4' x 8" ÷ 12 ÷27 = 8.89

Total = 57.29

(Use 58 Cu. Yd.)

* PLANIMETERED BY COMPUTER

ITEM 203 - SUBGRADE COMPACTION

Sta. 267+90.00 to Sta. 268+15.18 Lt.
25.18' x 10.25' ÷ 9 = 28.68

Sta. 268+29.18 to Sta. 268+50.00 Lt.
20.82' x 10.25' ÷ 9 = 23.72

Sta. 267+90.00 to Sta. 268+15.18 Rt.
25.18' x 10.58' ÷ 9 = 29.60

Sta. 268+29.18 to Sta. 268+50.00 Rt.
20.82' x 10.58' ÷ 9 = 24.48

Total = 106.48

(Use 107 Sq. Yd.)

ITEM 407 - TACK COAT

Sta. 268+15.18 to Sta. 268+29.18 Lt. & Rt (Over Box)
14' x 38' ÷ 9 x 0.075 Gal/S.Y. = 4.43

Total = 4.43

(Use 5 Gal)

ITEM 409 - BITUMINOUS PRIME COAT

Sta. 267+90.00 to Sta. 268+15.18 Lt.
25.18' x 10.58' ÷ 9 x 0.4 Gal/S.Y. = 11.84

Sta. 268+29.18 to Sta. 268+50.00 Lt.
20.82' x 10.58' ÷ 9 x 0.4 Gl/S.Y. = 9.79

Sta. 267+90.00 to Sta. 268+15.18 Rt.
25.18 x 10.91' ÷ 9 x 0.4 Gl/S.Y. = 12.21

Sta. 268+29.18 to Sta. 268+50.00 Rt.
20.82' x 10.91' ÷ 9 x 0.4 Gl/S.Y. = 10.10

Total = 43.94

(Use 44 Gal)

ITEM 605 - AGGREGATE DRAIN

Aggregate drains shall be placed as shown in the following table:

STATION	SIDE	LENGTH
267+90.00	Rt.	10'
268+40.00	Lt.	10'
268+50.00	Rt.	10'
TOTAL		30'

ITEM 642 - CENTERLINE, TYPE I (DOUBLE YELLOW)

Sta. 267+90.00 to Sta. 268+50.00 ℄.
60' ÷ 5280'/mile = 0.01 miles

(Use 0.01 miles)

ITEM 642 - EDGE LINE, TYPE I

Sta. 266+95.00 to Sta. 270+05.00 Lt.
310' ÷ 5280'/mile = 0.059

Sta. 266+10.00 to Sta. 269+55.00 Rt.
345' ÷ 5280'/mile = 0.065

Total = 0.124

(Use 0.13 miles)

ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE

Sta. 267+90.00 to Sta. 268+50.00 Lt.
60' x 10.25' ÷ 9 x 0.04 Gal/S.Y. = 2.73

Sta. 267+90.00 to Sta. 268+50.00 Rt.
60' x 10.58' ÷ 9 x 0.04 Gal/S.Y. = 2.82

Sta. 268+15.18 to Sta. 268+29.18 Lt.
14' x 8.5' ÷ 9 x 0.04 Gal/S.Y. = 0.53

Sta. 268+15.18 to Sta. 268+29.18 Rt.
14' x 8.6' ÷ 9 x 0.04 Gal/S.Y. = 0.54

Total = 6.62
(Use 7 Gal)

ITEM 870 - COMMERCIAL FERTILIZER

910 S.Y. x 9 x 30 lbs/1000 S.F. x 1/2000 = 0.12 Ton

ITEM 870 - AGRICULTURAL LIMING

910 S.Y. x 9 x 92 lbs/1000 S.F. x (1/2000) = 0.38 Ton

ITEM 870 - WATER

910 S.Y. x 9 x 300 Gal/1000/1000 = 2.45

(Use 3 M Gal) (Carried to General Notes)

SEEDING AND EARTHWORK TABLE

SHEET	870 SEEDING & MULCHING	203 EXCAVATION	203 EMBANKMENT
36	300	27	20
37	179	49	6
38	316	49	27
39	115	11	10
40	0	15	0
TOTAL	910	151	63

Totals Carried to General Summary

REF NO.	STATION TO STATION	SIDE	202 GUARDRAIL REMOVED		606 GUARDRAIL TYPE 5	606 GUARDRAIL TYPE 5 WITH TUBULAR BACKUP AS PER PLAN	606 ANCHOR ASSEMBLY TYPE A	606 BRIDGE TERMINAL ASSEMBLY TYPE 4		626 BARRIER REFLECTOR TYPE A		630 REMOVAL OF GROUND MOUNTED SIGN AND DISPOSAL	630 REMOVAL OF GROUND MOUNTED POST SUPPORT AND DISPOSAL				
			LIN. FT.		LIN. FT.	LIN. FT.	EACH	EACH		EACH		EACH	EACH				
1R	267+54.23 TO 268+82.59	RT.	128.13														
2R	267+60.95 TO 268+89.50	LT.	128.13														
3R	268+05.44	RT.										1	1				
1GR	266+17.84 TO 268+06.91	RT.			162.5		1	1									
2GR	268+06.91 TO 268+38.16	RT.				31.25				4							
3GR	268+38.16 TO 269+52.54	RT.			87.5		1	1									
4GR	266+93.04 TO 268+07.12	LT.			87.5		1	1									
5GR	268+07.12 TO 268+38.37	LT.				31.25				4							
6GR	268+38.37 TO 270+02.01	LT.			137.5		1	1									
TOTALS CARRIED TO GEN. SUMMARY			256.26		475.00	62.5	4	4		8		1	1				

ITEM 448 - ASPHALT CONCRET SURFACE COURSE TYPE I, PG 64-22, AS PER PLAN

Sta. 418+90.00 to Sta. 419+60.00 Lt.
70' x 9.42' x 1.25" ÷ 12 ÷ 27 = 2.54

Sta. 418+90.00 to Sta. 419+60.00 Rt.
70' x 9.71' x 1.25" ÷ 12 ÷ 27 = 2.62

Total = 5.16

(Use 6 Cu. Yd.)

ITEM 448 - ASPHALT CONCRETE INTERMEDIATE COURSE TYPE 2, PG 64-22

Sta. 418+90.00 to Sta. 419+60.00 Lt.
70' x 9.42' x 1.75" ÷ 12 ÷ 27 = 3.56

Sta. 418+90.00 to Sta. 419+60.00 Rt.
70' x 9.71' x 1.75" ÷ 12 ÷ 27 = 3.67

Total = 7.23

(Use 8 Cu. Yd.)

ITEM 301 - BITUMINOUS AGGREGATE BASE, PG 64-22

Sta. 418+90.00 to Sta. 419+60.00 Lt.
70' x 9.75' x 6" ÷ 12 ÷ 27 = 12.64

Sta. 418+90.00 to Sta. 419+60.00 Rt.
70' x 10.04' x 6" ÷ 12 ÷ 27 = 13.01

Total = 25.65

(Use 26 Cu. Yd.)

ITEM 304 - AGGREGATE BASE

Sta. 418+90.00 to Sta. 419+60.00 Lt.
70' x 10.25' x 6" ÷ 12 ÷ 27 = 13.28

Sta. 418+90.00 to Sta. 419+60.00 Rt.
70' x 10.54' x 6" ÷ 12 ÷ 27 = 13.66

(Shoulders)

Sta. 420+50.00 to Sta. 421.25.00 Lt.
75' x 4' x 8" ÷ 12 ÷ 27 = 7.41

Sta. 417+05.00 to Sta. 420+50.00 Rt.
345' x 4' x 8" ÷ 12 ÷27 = 34.07

IDR:
256.82* S.F. x 6" ÷ 12 ÷ 27 = 4.76 Cu. Yd.

Total = 73.18

(Use 73 Cu. Yd.)

ITEM 408 - BITUMINOUS PRIME COAT

Sta. 418+90.00 to Sta. 419+60.00 Lt.
70' x 9.75' ÷ 9 x 0.4 Gal/S.Y. = 30.33

Sta. 418+90.00 to Sta. 419+60.00 Rt.
70' x 10.04' ÷ 9 x 0.4 Gal/S.Y. = 31.24

Total = 61.57

(Use 62 Gal)

ITEM 203 - SUBGRADE COMPACTION

Sta. 418+90.00 to Sta. 419+60.00 Lt.
70' x 9.42' ÷ 9 = 73.27

Sta. 418+90.00 to Sta. 419+60.00 Rt.
70' x 9.71' ÷ 9 = 75.52

Total = 148.79

(Use 149 Sq. Yd.)

ITEM 642 - CENTERLINE, TYPE I (DOUBLE YELLOW)

Sta. 418+90.00 to Sta. 419+60.00 ℄.
70' ÷ 5280'/mile = 0.013 miles

(Use 0.01 miles)

ITEM 642 - EDGE LINE, TYPE I

Sta. 418+00.00 to Sta. 421+25.00 Lt.
325' ÷ 5280'/mile = 0.062

Sta. 417+05.00 to Sta. 420+50.00 Rt.
345' ÷ 5280'/mile = 0.065

Total = 0.127

(Use 0.13 miles)

ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE

Sta. 418+90.00 to Sta. 419+60.00 Lt.
70' x 9.42' ÷ 9 x 0.04 Gal/S.Y. = 2.93

Sta. 418+90.00 to Sta. 419+60.00 Rt.
70' x 9.71' ÷ 9 x 0.04 Gal/S.Y. = 3.02

Total = 5.95

(Use 6 Gal)

* PLANIMETERED BY COMPUTER

ITEM 605 - AGGREGATE DRAIN

Aggregate drains shall be placed as shown in the following table:

STATION	SIDE	LENGTH
418+90.00	Rt.	10'
419+15.00	Lt.	10'
419+60.00	Lt.	10'
TOTAL		30'

ITEM 870 - COMMERCIAL FERTILIZER
882 S.Y. x 9 x 30 lbs/1000 S.F. x 1/2000 = 0.12 Ton

ITEM 870 - AGRICULTURAL LIMING
882 S.Y. x 9 x 92 lbs/1000 S.F. x (1/2000) = 0.36 Ton

ITEM 870 - WATER
882 S.Y. x 9 x 300 Gal/1000/1000 = 2.381

(Use 3 M Gal) (Carried to General Notes)

SEEDING AND EARTHWORK TABLE

SHEET	870 SEEDING & MULCHING	203 EXCAVATION	203 EMBANKMENT
42	363	19	67
43	154	69	60
44	178	34	13
45	187	23	24
46	0	22	2
TOTAL	882	167	166

Totals Carried to General Summary

REF NO.	STATION TO STATION	SIDE			606 GUARDRAIL TYPE 5 LIN. FT.	606 GUARDRAIL TYPE 5 WITH DOUBLE RAILS LIN. FT.	606 ANCHOR ASSEMBLY, TYPE A EACH	606 GUARDRAIL TYPE 5 WITH DOUBLE RAILS, AS PER PLAN LIN. FT.		626 BARRIER REFLECTOR TYPE A EACH		630 REMOVAL OF GROUND MOUNTED SIGN AND DISPOSAL EACH	630 REMOVAL OF GROUND MOUNTED POST SUPPORT AND DISPOSAL EACH				
1R	419+07.03	RT										1	1				
1GR	417+07.40 TO 419+11.56	RT			175		1										
2GR	419+11.56 TO 419+35.99	RT						25**		4							
3GR	419+35.99 TO 419+43.45	RT			12.5**												
4GR	418+34.97 TO 419+10.18	LT			50		1										
5GR	419+10.18 TO 419+47.41	LT				37.5				4							
6GR	419+47.41 TO 421+23.70	LT			150		1										
TOTALS CARRIED TO GEN. SUMMARY					387.5	37.5	3	25		8		1	1				

**12.5' on 20' Radius

CALCULATED SKW CHECKED TES

CALCULATIONS & ESTIMATED QUANTITIES (7.93)

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

ITEM 448 - ASPHALT CONCRETE SURFACE COURSE TYPE I, PG 64-22, AS PER PLAN

Sta. 511+75.00 to Sta. 512+50.00 Lt.
75' x 9.88' x 1.25" ÷ 12 ÷ 27 = 2.86

Sta. 511+75.00 to Sta. 512+50.00 Rt.
75' x 10' x 1.25" ÷ 12 ÷ 27 = 2.89

Total = 5.75

(Use 6 Cu. Yd.)

ITEM 448 - ASPHALT CONCRETE INTERMEDIATE COURSE TYPE 2, PG 64-22

Sta. 511+75.00 to Sta. 512+50.00 Lt.
75' x 9.88' x 1.75" ÷ 12 ÷ 27 = 4.00

Sta. 511+75.00 to Sta. 512+50.00 Rt.
75' x 10' x 1.75" ÷ 12 ÷ 27 = 4.05

Total = 8.05

(Use 8 Cu. Yd.)

ITEM 301 - BITUMINOUS AGGREGATE BASE, PG 64-22

Sta. 511+75.00 to Sta. 512+50.00 Lt.
75' x 10.21' x 6" ÷ 12 ÷ 27 = 14.18

Sta. 511+75.00 to Sta. 512+50.00 Rt.
75' x 10.33' x 6" ÷ 12 ÷ 27 = 14.35

Total = 28.53

(Use 29 Cu. Yd.)

ITEM 304 - AGGREGATE BASE

Sta. 511+75.00 to Sta. 512+50.00 Lt.
75' x 10.71' x 6" ÷ 12 ÷ 27 = 14.88

Sta. 511+75.00 to Sta. 512+50.00 Rt.
75' x 10.83' x 6" ÷ 12 ÷ 27 = 15.04

(Shoulders)

Sta. 510+50.00 to Sta. 513+25.00 Lt.
275' x 4' x 8" ÷ 12 ÷27 = 27.16

(FOR DRIVES)

1DR: (STA. 511+87.58)
309.44⊕ S.F. x 6" ÷ 12 ÷ 27 = 5.73 C.Y.

2DR: (STA. 512+67.97)
194.93⊕ S.F. x 6" ÷ 12 ÷ 27 = 3.61 C.Y.

Total = 66.42

(Use 67 Cu. Yd.)

⊕PLANIMETERED BY COMPUTER

ITEM 408 - BITUMINOUS PRIME COAT

Sta. 511+75.00 to Sta. 512+50.00 Lt.
75' x 10.21' ÷ 9 x 0.4 Gal/S.Y. = 34.03

Sta. 511+75.00 to Sta. 512+50.00 Rt.
75' x 10.33' ÷ 9 x 0.4 Gal/S.Y. = 34.43

Total = 68.46

(Use 69 Gal)

ITEM 203 - SUBGRADE COMPACTION

Sta. 511+75.00 to Sta. 512+50.00 Lt.
75' x 9.88' ÷ 9 = 82.33

Sta. 511+75.00 to Sta. 512+50.00 Rt.
75' x 10' ÷ 9 = 83.33

Total = 165.66

(Use 166 Sq. Yd.)

ITEM 642 - CENTERLINE, TYPE I (DOUBLE YELLOW)

Sta. 511+75.00 to Sta. 512+50.00 ℄.
75' ÷ 5280'/mile = 0.014 miles

(Use 0.01 miles)

ITEM 642 - EDGE LINE, TYPE I

Sta. 510+50.00 to Sta. 513+25.00 Lt.
275' ÷ 5280'/mile = 0.052

Sta. 511+00.00 to Sta. 513+25.00 Rt.
225' ÷ 5280'/mile = 0.042

Total = 0.094

(Use 0.10 miles)

ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE

Sta. 511+75.00 to Sta. 512+50.00 Lt.
75' x 9.88' ÷ 9 x 0.04 Gal/S.Y. = 3.29

Sta. 511+75.00 to Sta. 512+50.00 Rt.
75' x 10' ÷ 9 x 0.04 Gal/S.Y. = 3.33

Total = 6.62

(Use 7 Gal)

ITEM 605 - AGGREGATE DRAIN

Aggregate drains shall be placed as shown in the following table:

STATION	SIDE	LENGTH
511+75.00	Rt.	10'
512+00.00	Rt.	10'
512+50.00	Rt.	10'
TOTAL		30'

ITEM 870 - COMMERCIAL FERTILIZER
680 S.Y. x 9 x 30 lbs/1000 S.F. x 1/2000 = 0.09 Ton

ITEM 870 - AGRICULTURAL LIMING
680 S.Y. x 9 x 92 lbs/1000 S.F. x 1/2000) = 0.28 Ton

ITEM 870 - WATER
680 S.Y. x 9 x 300 Gal/1000/1000 = 1.84

(Use 2 M Gal) (Carried to General Notes)

SEEDING AND EARTHWORK TABLE

SHEET	870 SEEDING & MULCHING	203 EXCAVATION	203 EMBANKMENT
48	283	11	55
49	267	98	80
50	130	4	48
51	0	13	7
TOTAL	680	126	190

Totals Carried to General Summary

REF NO.	STATION TO STATION	SIDE	202 GUARDRAIL REMOVED	202 PIPE REMOVED 24" AND UNDER				603 24" CONDUIT, TYPE D		606 GUARDRAIL, TYPE 5	606 GUARDRAIL, TYPE 5 WITH TUBULAR BACKUP	606 GUARDRAIL, TYPE 5 WITH DOUBLE RAILS	606 ANCHOR ASSEMBLY, TYPE A	606 BRIDGE TERMINAL ASSEMBLY, TYPE 4	606 ANCHOR ASSEMBLY, TYPE T		626 BARRIER REFLECTOR, TYPE A
			LIN. FT.	LIN. FT.				CU. YD.		LIN. FT.	LIN. FT.	LIN. FT.	EACH	EACH	EACH		EACH
1P	511+96.71 TO 512+53.64	RT.	68.75														
2R	511+67.57 TO 512+70.70	LT.	103.13														
3R	511+72.81 TO 512+03.07	RT.		30.00													
1D	511+69.17 TO 512+08.42	RT.						39.0									
2D	512+22.31 TO 512+32.38	RT.						10.0									
1GR	511+97.13 TO 512+06.80	RT.								18.75*							
2GR	512+06.80 TO 512+25.64	RT.									18.75*						3
3GR	512+25.64 TO 512+54.17	RT.								25.0*				1	1		
4GR	510+54.96 TO 511+94.02	LT.								112.50			1				
5GR	511+94.02 TO 512+31.36	LT.										37.5					4
6GR	512+31.36 TO 513+26.66	LT.								87.5**					1		
TOTALS CARRIED TO GEN. SUMMARY			171.88	30.00				49.0		243.75	18.75	37.5	1	1	2		7

*18.75' on 10' Radius **18.75' on 15' Radius

CALCULATED SKW CHECKED TES

CALCULATIONS & ESTIMATED QUANTITIES (9.69)

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

ITEM 448 - ASPHALT CONCRETE SURFACE COURSE TYPE I, PG 64-22, AS PER PLAN

Sta. 576+00.00 to Sta. 577+00.00 Lt.
100' x 10' x 1.25" ÷ 12 ÷ 27 = 3.86

Sta. 576+00.00 to Sta. 577+00.00 Rt.
100' x 9.33' x 1.25" ÷ 12 ÷ 27 = 3.60

Total = 7.46

(Use 8 Cu. Yd.)

ITEM 448 - ASPHALT CONCRETE INTERMEDIATE COURSE TYPE 2, PG 64-22

Sta. 576+00.00 to Sta. 577+00.00 Lt.
100' x 10' x 1.75" ÷ 12 ÷ 27 = 5.40

Sta. 576+00.00 to Sta. 577+00.00 Rt.
100' x 9.33' x 1.75" ÷ 12 ÷ 27 = 5.04

Total = 10.44

(Use 11 Cu. Yd.)

ITEM 301 - BITUMINOUS AGGREGATE BASE, PG 64-22

Sta. 576+00.00 to Sta. 577+00.00 Lt.
100' x 10.33' x 6" ÷ 12 ÷ 27 = 19.13

Sta. 576+00.00 to Sta. 577+00.00 Rt.
100' x 9.66' x 6" ÷ 12 ÷ 27 = 17.89

Total = 37.02

(Use 37 Cu. Yd.)

ITEM 304 - AGGREGATE BASE

Sta. 576+00.00 to Sta. 576+51.00 Lt.
51' x 10.83' x 6" ÷ 12 ÷ 27 = 10.23

Sta. 576+00.00 to Sta. 576+51.00 Rt.
51' x 10.16' x 6" ÷ 12 ÷ 27 = 9.60

Sta. 576+67.00 to Sta. 577+00.00 Rt.
33' x 10.83' x 6" ÷ 12 ÷ 27 = 6.62

Sta. 576+67.00 to Sta. 577+00.00 Rt.
33' x 10.16' x 6" ÷ 12 ÷ 27 = 6.21

Sta. 576+51.00 to Sta. 576+67.00 Lt.
16' x 7.60'* ÷ 27 = 4.50

Sta. 576+51.00 to Sta. 576+67.00 Rt.
16' x 5.30'* ÷ 27 = 3.14

(Shoulders)

Sta. 575+75.00 to Sta. 578+30.00 Lt.
255' x 4' x 8" ÷ 12 ÷27 = 25.19

Sta. 574+30.00 to Sta. 575+25.00 Rt.
95' x 4' x 8" ÷ 12 ÷27 = 9.38

IDR: (STA. 576+07.71)
282.76* S.F. X 6" ÷ 12 ÷ 27 = 5.24

Total = 80.11

(Use 80 Cu. Yd.)

* PLANIMETERED BY COMPUTER

ITEM 203 - SUBGRADE COMPACTION

Sta. 576+00.00 to Sta. 576+51.00 Lt.
51' x 10' ÷ 9 = 56.67

Sta. 576+00.00 to Sta. 576+51.00 Rt.
51' x 9.33 ' ÷ 9 = 52.87

Sta. 576+67.00 to Sta. 577+00.00 Lt.
33' x 10' ÷ 9 = 36.67

Sta. 576+67.00 to Sta. 577+00.00 Rt.
33' x 9.33 ' ÷ 9 = 34.21

Total = 180.42

(Use 181 Sq. Yd.)

ITEM 408 - BITUMINOUS PRIME COAT

Sta. 576+00.00 to Sta. 577+00.00 Lt.
100' x 10.33' ÷ 9 x 0.4 Gal/S.Y. = 45.91

Sta. 576+00.00 to Sta. 577+00.00 Rt.
100' x 9.66' ÷ 9 x 0.4 Gal/S.Y. = 42.93

Total = 88.84

(Use 89 Gal)

ITEM 642 - CENTERLINE, TYPE I (DOUBLE YELLOW)

Sta. 576+00.00 to Sta. 577+00.00 ℄
100' ÷ 5280'/mile = 0.018 miles

(Use 0.02 miles)

ITEM 642 - EDGE LINE, TYPE I

Sta. 575+75.00 to Sta. 578+30.00 Lt.
255' ÷ 5280'/mile = 0.048

Sta. 574+30.00 to Sta. 578+15.00 Rt.
385' ÷ 5280'/mile = 0.073

Total = 0.120

(Use 0.12 miles)

ITEM 605 - AGGREGATE DRAIN

Aggregate drains shall be placed as shown in the following table:

STATION	SIDE	LENGTH
576+00.00	Rt.	10'
576+25.00	Rt.	10'
576+40.00	Rt.	10'
576+80.00	Rt.	10'
577+00.00	Lt.	10'
TOTAL		50'

SEEDING AND EARTHWORK TABLE

SHEET	870 SEEDING & MULCHING	203 EXCAVATION	203 EMBANKMENT
53	185	0	69
54	250	69	91
55	223	63	20
56	255	33	10
57	0	2	7
TOTAL	913	167	197

ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE

Sta. 576+00.00 to Sta. 577+00.00 Lt.
100' x 10' ÷ 9 x 0.04 Gal/S.Y. = 4.44

Sta. 576+00.00 to Sta. 577+00.00 Rt.
100' x 9.33' ÷ 9 x 0.04 Gal/S.Y. = 4.15

Total = 8.59

(Use 9 Gal)

ITEM 870 - COMMERCIAL FERTILIZER

913 S.Y. x 9 x 30 lbs/1000 S.F. x 1/2000 = 0.12 Ton

ITEM 870 - AGRICULTURAL LIMING

913 S.Y. x 9 x 92 lbs/1000 S.F. x (1/2000) = 0.38 Ton

ITEM 870 - WATER

913 S.Y. x 9 x 300 Gal/1000/1000 = 2.473

(Use 3 M Gal) (Carried to General Notes)

Totals Carried to General Summary

REF NO.	STATION TO STATION	SIDE		202 PIPE REMOVED 24" AND UNDER LIN. FT.				603 15" CONDUIT TYPE D LIN. FT.		606 GUARDRAIL TYPE 5 LIN. FT.	606 GUARDRAIL TYPE 5 WITH DOUBLE RAILS LIN. FT.	606 ANCHOR ASSEMBLY TYPE A EACH	606 ANCHOR ASSEMBLY TYPE T EACH		626 BARRIER REFLECTOR TYPE A EACH		
1R	576+01.50 TO 576+19.50	LT.		18													
1D	575+94.00 TO 576+49.35	LT.						56									
1GR	574+35.61 TO 576+37.12	RT.								175		1					
2GR	576+37.12 TO 576+74.62	RT.									37.5				5		
3GR	576+74.62 TO 578+13.82	RT.								112.5		1					
4GR	576+32.21 TO 576+43.37	LT.								12.5*							
5GR	576+43.37 TO 576+80.87	LT.									37.5				3		
6GR	576+80.87 TO 578+27.70	LT.								137.5**			1				
TOTALS CARRIED TO GEN. SUMMARY				18				56		437.50	75.0	2	1		8		

* 12.5' on 15' Radius ** 12.5' on 10' Radius

CALCULATED SKW CHECKED TES

CALCULATIONS & ESTIMATED QUANTITIES (10.91)

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

CURVE DATA
P.I. Sta = 13+40.14
D = 21° 32′ 00″ (LT)
Dc = 4° 00′ 00″
R = 1,432.39′
T = 272.38′
L = 538.33′
E = 25.67′

STA. 10+60.00 ℄ SR 148: 22.38′ I.P., 23.65′ P.K. Nail, 23.96′ I.P.
P.T. STA. 16+06.09 ℄ SR 148: 25.33′ I.P., 20.82′ P.K. Nail, 21.15′ I.P.
STA. 23+65.67 ℄ SR 148: 27.78′ I.P., 24.07′ P.K. Nail, 25.33′ I.P.

BEGIN WORK
STA. 15+75.00

PT Sta. 16+06.09

Type A Anchor Assembly

Ex. R/W

Sta. 16+50.86

2″ Plastic

Work Limits

Existing Structure
To Be Removed

Proposed 5′ x 16′
Precast Concrete Box Culvert

Type A Anchor Assembly
Sta. 20+25.85

Ex. R/W

16+00 17+00 18+00 19+00 20+00

4′-0″ ℄ Construction S.R. 148 11′-0″ 10′-0″ 90° S 75°26′ E

BEGIN PROJECT
STA. 17+25.00
SLM 0.33
TE21-G000(6)

SUSPEND PROJECT
STA. 18+50.00
SLM 0.35
TE21-G000(6)

SUSPEND WORK
STA. 20+75.00

Type A Anchor Assembly
Sta. 16+25.76

Type A Anchor Assembly
Sta. 19+50.75

Baseline 'A'
S 14°34′ W

Sta. 18+00 ℄ S.R. 148 =
Sta. 1+00 ℄ 'A'

1R 1GR 2R 2GR 3R 3GR 4R 4GR 5R 5GR 6R 6GR

B.M. Sta. 15+06.50
Concrete Monument
16.11′ Rt.
Elevation 1138.53

For structure details see sheet no. 58-65.
For estimated quantities see sheet no. 18.

B.M. Sta. 22+21.62
Concrete Monument
25.33′ Lt.
Elevation 1126.12

1165 1155 1145 1135 1125 1115 1105 1095

1138.41 1137.45 1136.42 1135.25 1134.04 1133.18 1132.68 1131.99 1131.27 1130.55 1129.94

1134.63 1134.09 1133.64 1133.26 1132.96 1132.68

96′ Vertical Curve
P.V.I. Sta. 17+73.00 Elev. = 1133.53

P.V.C. Sta. 17+25.00
Elev. 1134.63

P.V.T. Sta. 18+21.00
Elev. 1133.00

-2.42% -2.30% -1.10% -1.38%

Meet Existing
Sta. 17+25
Elev. 1134.63

Butt End Joint

Proposed 5′ x 16′
Precast Concrete Box Culvert

℄ Elev. = 1125.19

Butt End Joint

Meet Existing
Sta. 18+50
Elev. 1132.68

16+00 17+00 18+00 19+00 20+00

HORIZONTAL SCALE IN FEET
0 10 20 40

CALCULATED TES
CHECKED SKW

PLAN AND PROFILE (SECTION 0.33)
STA. 15+50.00 TO STA. 20+75.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

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III

SEEDING END WIDTH	SEEDING SQ. YDS.		END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		120 100 80 60 40 20 0 ℄ CONSTRUCTION 20 40 60 80 100 120				
	133				7	27
		1140 / 1130 — C=1, C=2, F=8, 2:1, 2:1, C=1, ℄ 1134.6, F=6				
23		16+50.00 1136.42	4	14		
	65	1140 / 1130 — C=1, C=2, F=5, 2:1, 2:1, C=1, ℄ 1135.2, F=7			4	12
24		16+25.00 1136.94	4	12		
27					2	5
24		BEGIN SEEDING LT. STA. 16+15	4	12		
	BEGIN EARTHWORK LT. STA. 16+15					
	28	1140 / 1130 — C=2, F=4, 2:1			2	5
9		16+00.00 1137.45	2	4		
	10				1	2
9			0	4		
	8				0	1
		1140 / 1130				
0		BEGIN SEEDING RT. STA. 15+75 — 15+75.00 1137.92 — BEGIN EARTHWORK RT. STA. 15+75	0	0		
		℄ CONSTRUCTION 120 100 80 60 40 20 0 20 40 60 80 100 120				
	271 SHEET TOTAL	SHEET TOTALS CARRIED TO SHEET NO. 18			16	52
			SHEET TOTAL			

CALCULATED ALF

CHECKED TES

CROSS SECTION SHEET
STA. 15+75.00 TO STA. 16+50.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SEEDING END WIDTH	SEEDING SQ. YDS.		END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		120 100 80 60 40 20 0 ℄ CONSTRUCTION 20 40 60 80 100 120				
	53				10	28
		1140				
		1130				
		F=16 2% C=3 F=3 2% ℄ 1129.6				
		1133.64				
		17+75.00				
		1133.55				
20			31	19		
	63	1140			29	19
		1130				
		C=3 F=16 ℄ 1129.8 F=5				
		1134.09				
		17+50.00				
		1134.04				
25			31	21		
	65	1140			28	18
		1130				
		C=30 AHEAD C=2 BACK F=13 2% F=5 ℄ 1130.9 C=2 BACK				
		1134.63				
		17+25.00				
		1134.63				
22			AHEAD 30	18		
			BACK 4	18		
	65	1140			4	15
		1130				
		C=1 C=2 F=6 2% 2% F=9 2% C=1 ℄ 1133.2				
		17+00.00				
		1135.25				
25			4	15		
		120 100 80 60 40 20 0 ℄ CONSTRUCTION 20 40 60 80 100 120				
	246	SHEET TOTAL	SHEET TOTALS CARRIED TO SHEET NO. 18		71	80
			SHEET TOTAL			

CALCULATED ALF

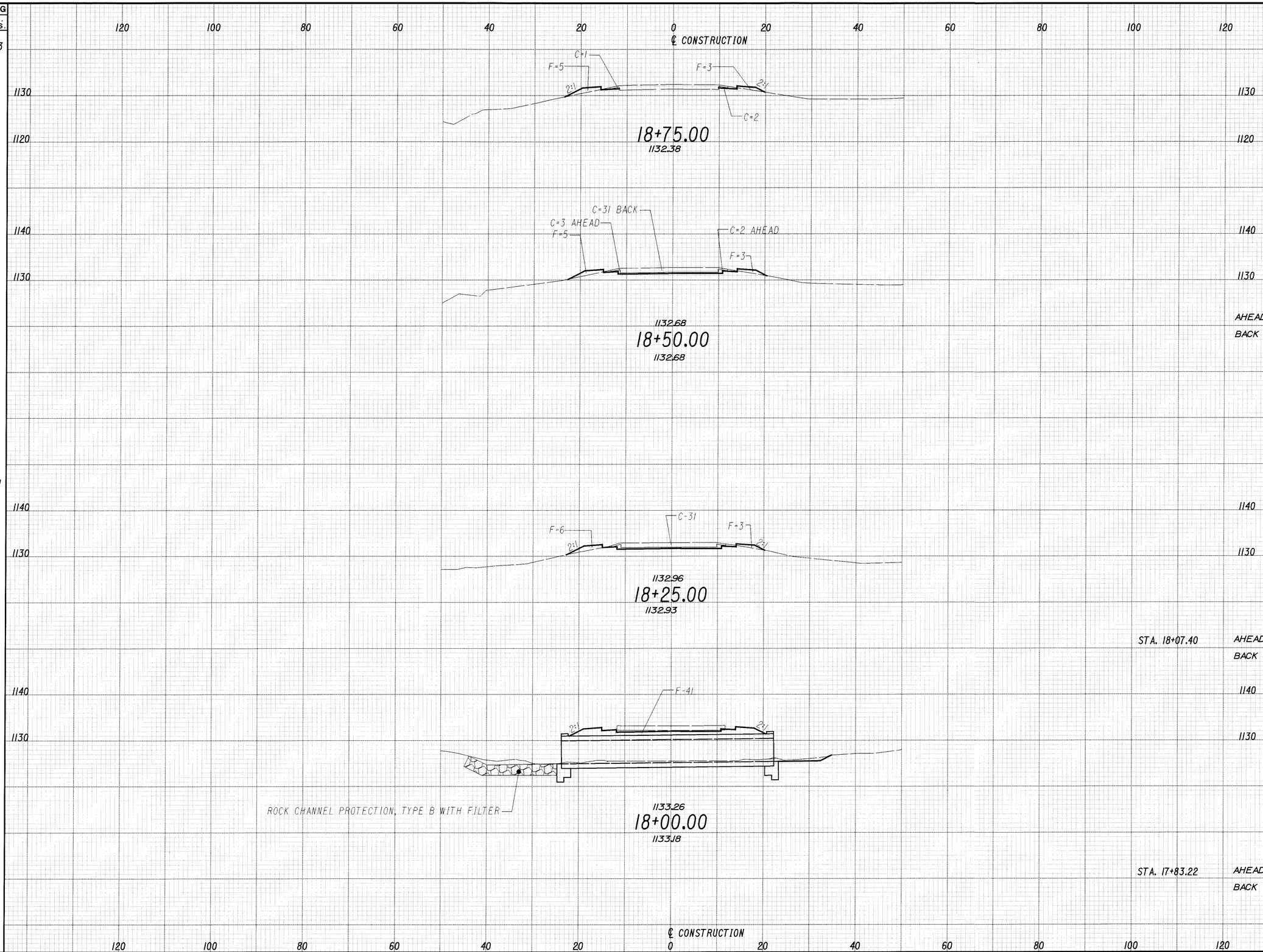
CHECKED TES

CROSS SECTION SHEET

STA. 17+00.00 TO STA. 17+75.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SEEDING END WIDTH	SEEDING SQ. YDS.
18	53
	51
19	
	51
18	
	50
18	
	205



	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
			3	7
18+75.00				
AHEAD	3	8		
			4	8
BACK	31	8		
18+50.00				
AHEAD	5	8		
			29	8
18+25.00				
	31	9		
STA. 18+07.40 AHEAD	31		20	
BACK	0			
			0	23
18+00.00				
		41		
STA. 17+83.22 AHEAD	0			
BACK	31			
SHEET TOTAL			56	46

SHEET TOTALS CARRIED TO SHEET NO. 18

CALCULATED ALF
CHECKED TES

CROSS SECTION SHEET
STA. 18+00.00 TO STA. 18+75.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

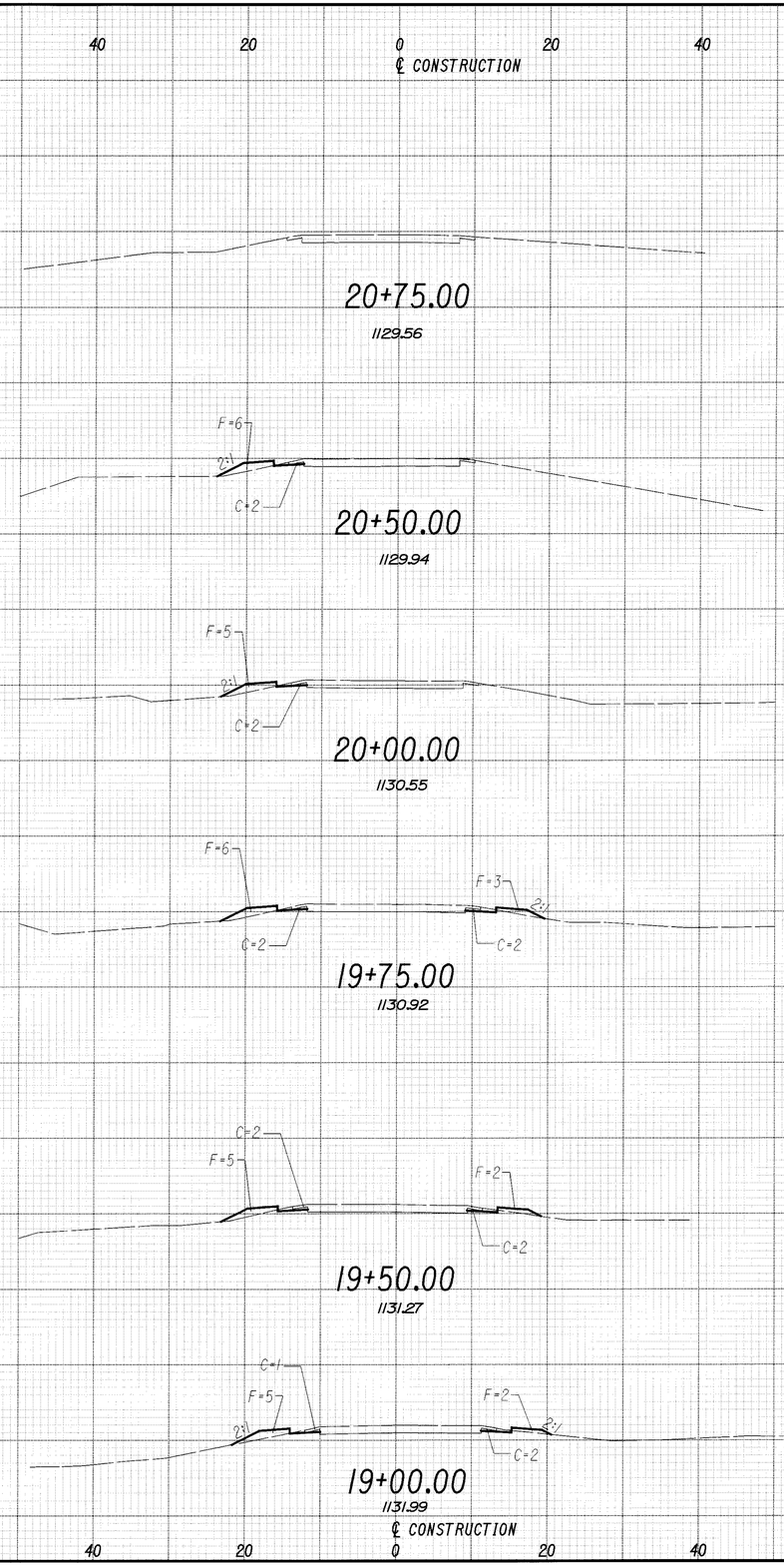
SEEDING END WIDTH	SEEDING SQ. YDS.
0	
	14
10	
	56
10	
	40
19	
	51
18	
	106
20	
	267 SHEET TOTAL

END SEEDING LT. STA. 20+75

END SEEDING RT. STA. 20+00

END EARTHWORK LT. STA. 20+75

END EARTHWORK RT. STA. 20+00



END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
0	0		
		1	3
2	6		
		4	10
2	5		
		3	7
4	9		
		4	7
4	7		
		7	13
3	7		
		19	40

SHEET TOTALS CARRIED TO SHEET NO. 18

SHEET TOTAL

CALCULATED ALF

CHECKED TES

CROSS SECTION SHEET

STA. 19+00.00 TO STA. 20+75.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

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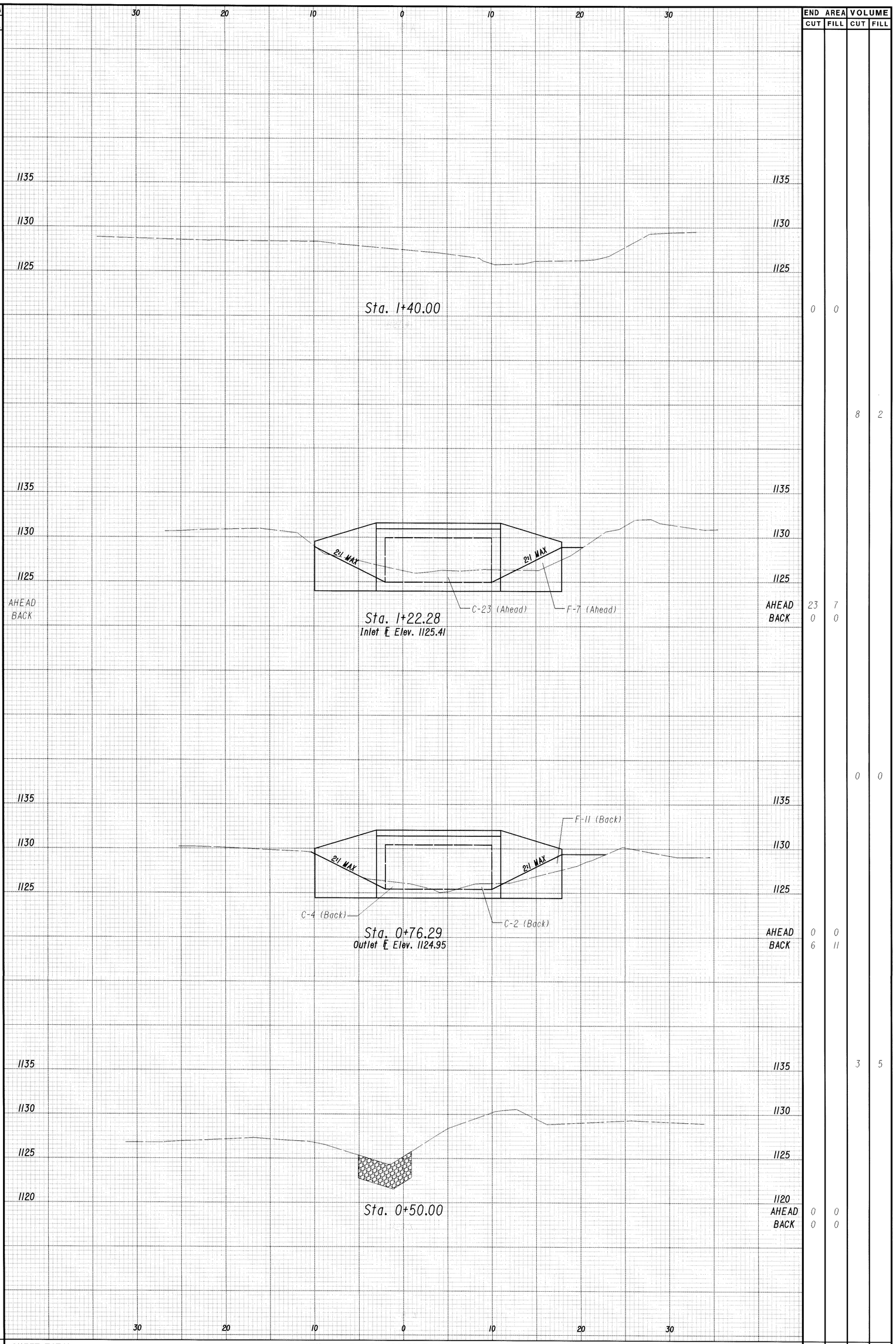
111

SEEDING END WIDTH	SEEDING SQ. YDS.	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		0	0		
				8	2
		AHEAD 23	7		
		BACK 0	0		
				0	0
		AHEAD 0	0		
		BACK 6	11		
				3	5
		AHEAD 0	0		
		BACK 0	0		
				11	7



SHEET TOTAL | SHEET TOTALS CARRIED TO SHEET NO. 18 | SHEET TOTAL

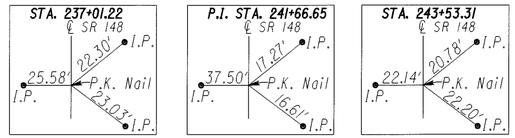
111 / 29

BEL-148-(0.33)(4.54)(5.07)(7.93)(9.69)(10.91)

CHANNEL CROSS SECTION SHEET
(SECTION 00.33)

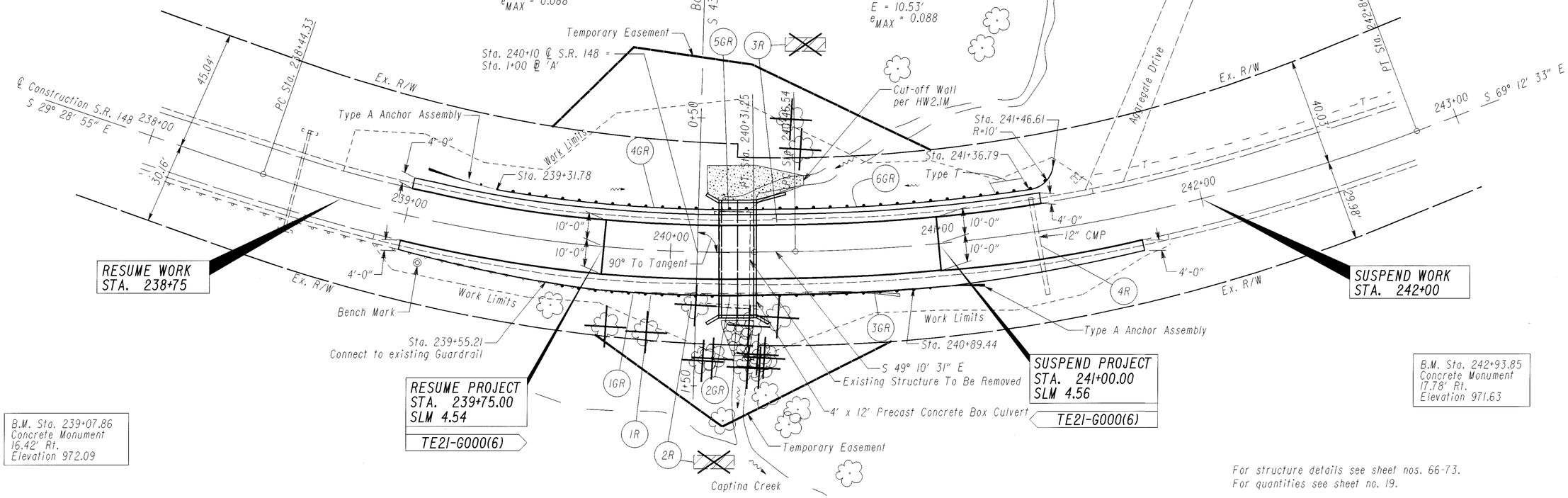
CALCULATED TES

CHECKED ALF



CURVE DATA
P.I. Sta = 239+38.72
Δ = 19° 41' 36" (LT)
Dc = 10° 32' 09" (NDC 6°00'00")
R = 543.82'
T = 94.39'
L = 186.92'
E = 8.13'
e_{MAX} = 0.088

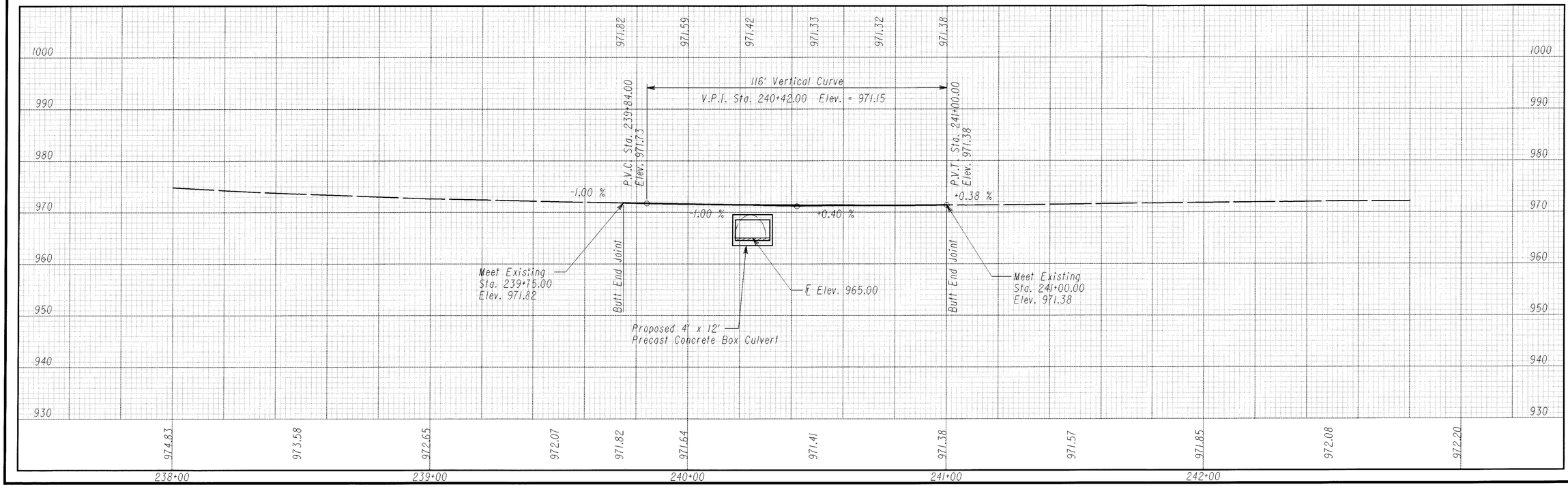
CURVE DATA
P.I. Sta = 241+66.65
Δ = 20° 02' 02" (LT)
Dc = 8° 25' 33" (NDC 6°00'00")
R = 680.00'
T = 120.11'
L = 237.77'
E = 10.53'
e_{MAX} = 0.088



B.M. Sta. 239+07.86
Concrete Monument
16.42' Rt.
Elevation 972.09

B.M. Sta. 242+93.85
Concrete Monument
17.78' Rt.
Elevation 971.63

For structure details see sheet nos. 66-73.
For quantities see sheet no. 19.



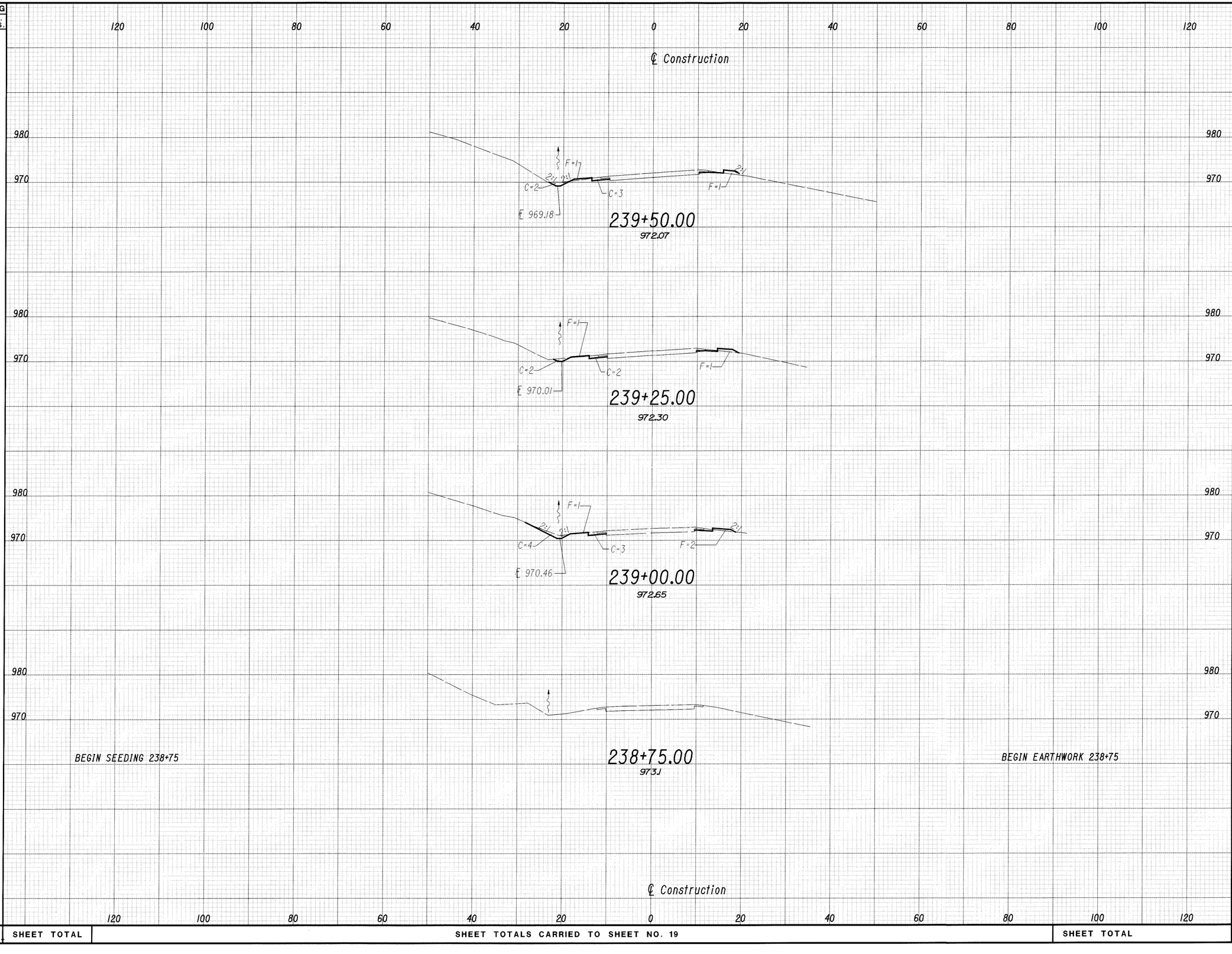
HORIZONTAL SCALE IN FEET
0 10 20 40
CALCULATED TES
CHECKED SKW

PLAN AND PROFILE (SECTION 4.54)
STA. 238+00.00 TO STA. 243+00.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

30

SEEDING END WIDTH	SEEDING SQ. YDS.	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
	85			24	2
18		5	2		
	47			4	2
16		4	2		
	56			5	2
24		7	3		
	33			3	1
0		0	0		
	221			36	7



SHEET TOTAL

SHEET TOTALS CARRIED TO SHEET NO. 19

SHEET TOTAL

CALCULATED ALF

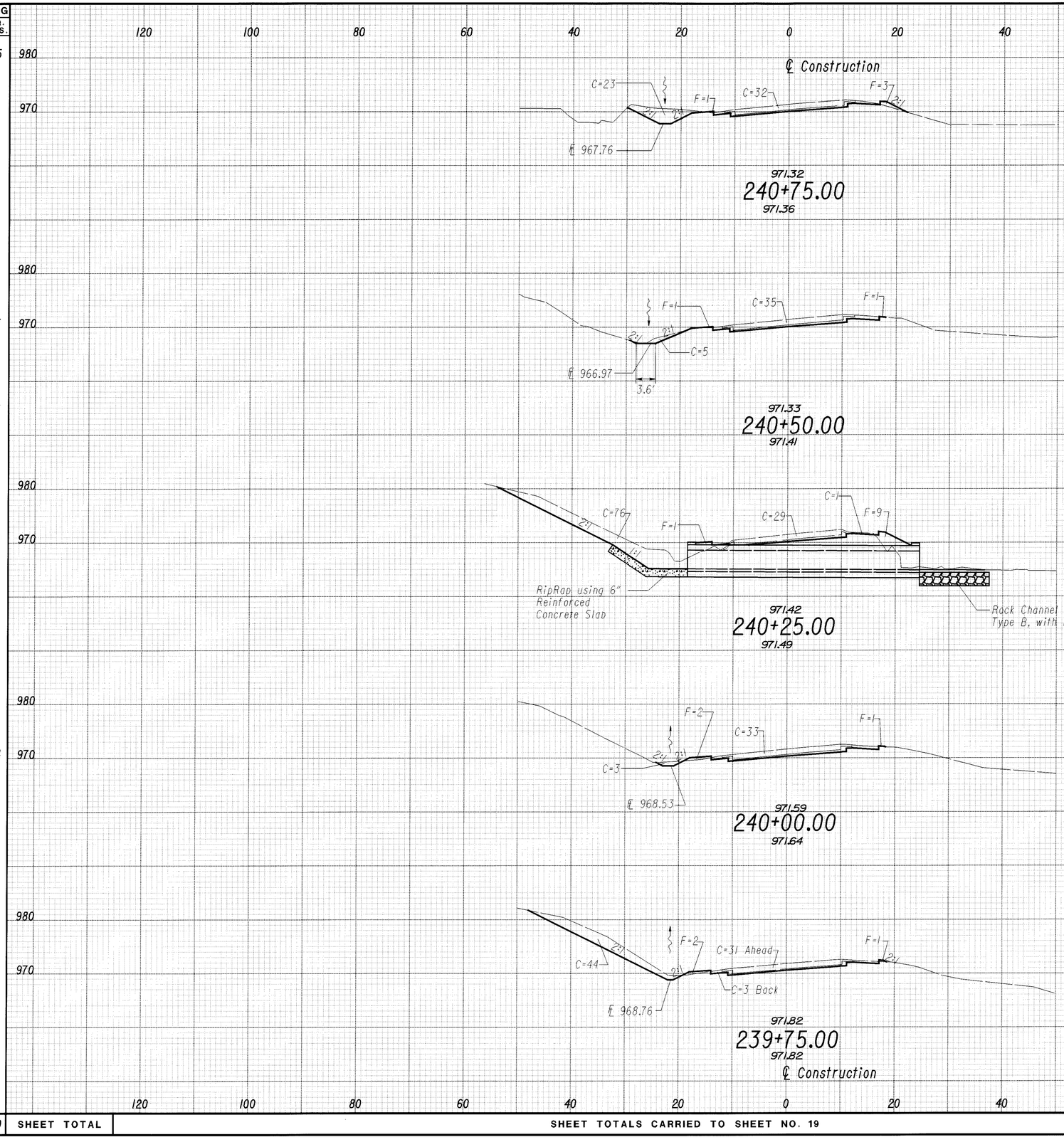
CHECKED TES

CROSS SECTION SHEET
STA. 238+75.00 TO STA. 239+50.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

31
///

SEEDING END WIDTH	SEEDING SQ. YDS.
	75
27	
	67
21	
	100
51	
	94
17	
	83
43	
	419



END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		47	4
55	4		
		44	3
40	2		
		68	6
106	10		
		66	6
36	3		
		51	3
AHEAD 75	3		
BACK 47	3		
		276	22

CALCULATED ALF
CHECKED TES

CROSS SECTION SHEET
STA. 239+75.00 TO STA. 240+75.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SHEET TOTAL

SHEET TOTALS CARRIED TO SHEET NO. 19

SHEET TOTAL

SEEDING END WIDTH	SEEDING SQ. YDS.		END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		242+00.00 971.85				
0		END SEEDING RT STA. 242+00	0	0		
	31				0	16
		241+50.00 971.57				
11		END SEEDING LT STA. 241+50	0	17		
	49				1	11
		241+25.00 971.44				
24			2	6		
	71				11	5
		241+00.00 971.38				
27			AHEAD 21	4		
			BACK 47	4		
	151	SHEET TOTAL			12	32

SHEET TOTALS CARRIED TO SHEET NO. 19

SHEET TOTAL

CALCULATED ALF

CHECKED TES

CROSS SECTION SHEET

STA. 241+00.00 TO STA. 242+00.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

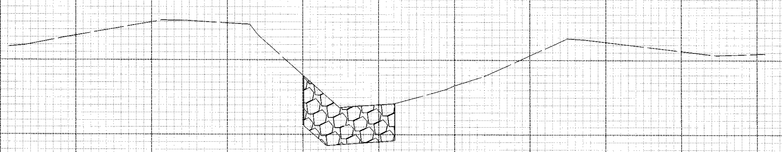
33
111

SEEDING END WIDTH	SEEDING SQ. YDS.	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL

40 30 20 10 0 10 20

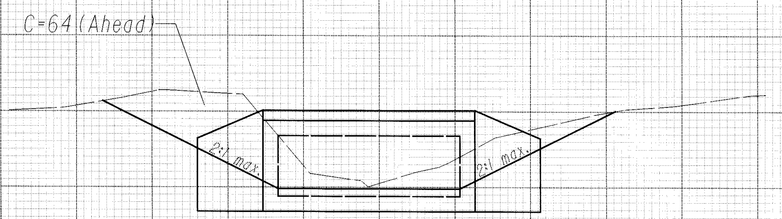
℄ A

975
970
965
960



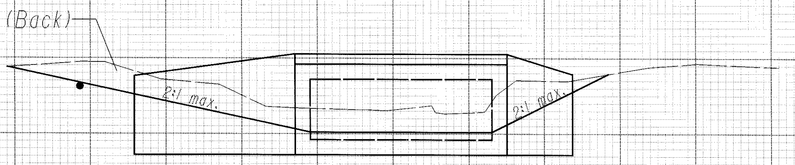
Sta. 1+35.00 End Earthwork
971.4

		0	0	
				13	0



Sta. 1+24.28
Outlet ℄ Elev. 964.89

Ahead	64	0		
Back	0	0		



Sta. 0+80.30 Begin Earthwork
Inlet ℄ Elev. 965.10

			0	0
Ahead	0	0		
Back	55	0		
			8	0
Sta. 0+72.30	0	0		

℄ A

40 30 20 10 0 10 20

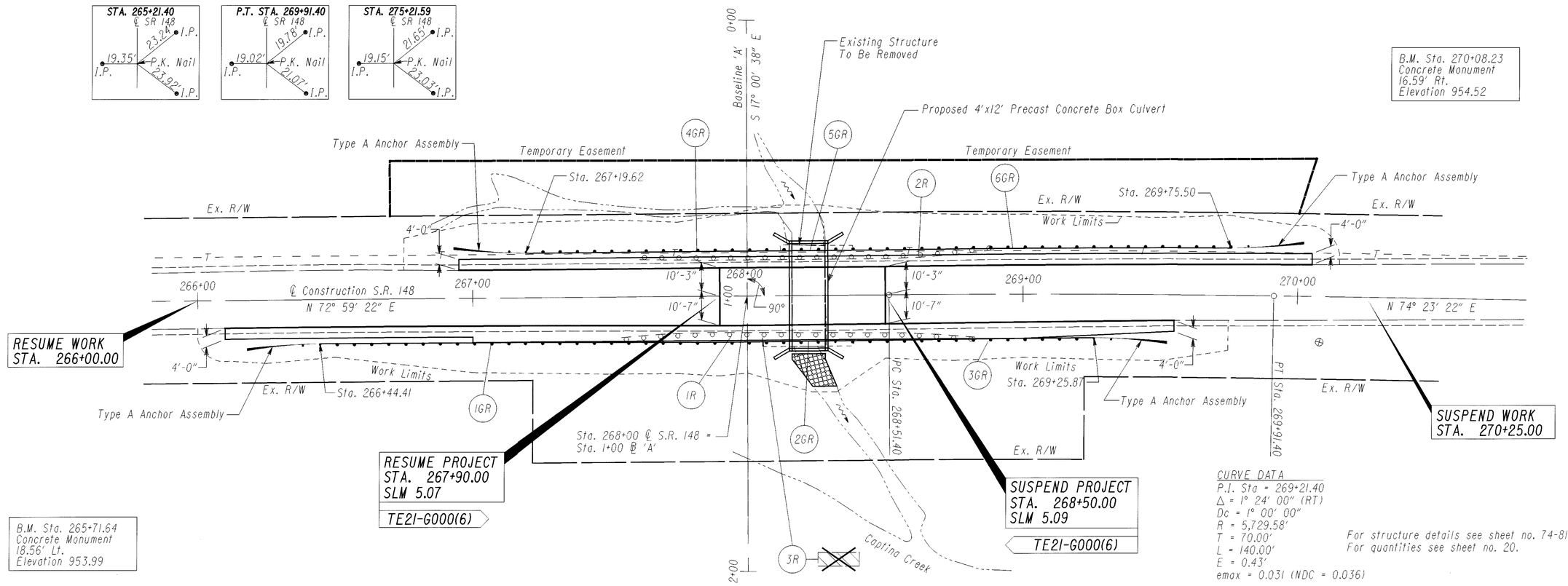
SHEET TOTAL	SHEET TOTALS CARRIED TO SHEET NO. 19	SHEET TOTAL		21	0

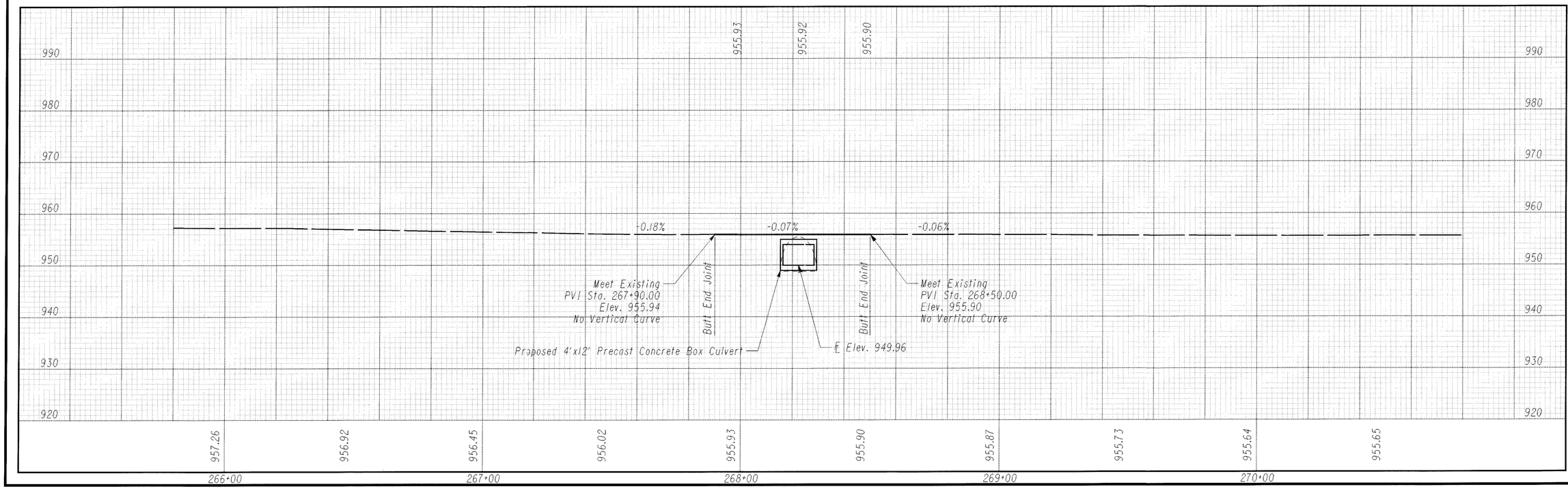
111 34

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

CROSS SECTION SHEET
(SECTION 4.54)

CALCULATED TES
CHECKED ALF





PLAN AND PROFILE (SECTION 5.07) STA. 265+80.00 TO STA. 270+80.00

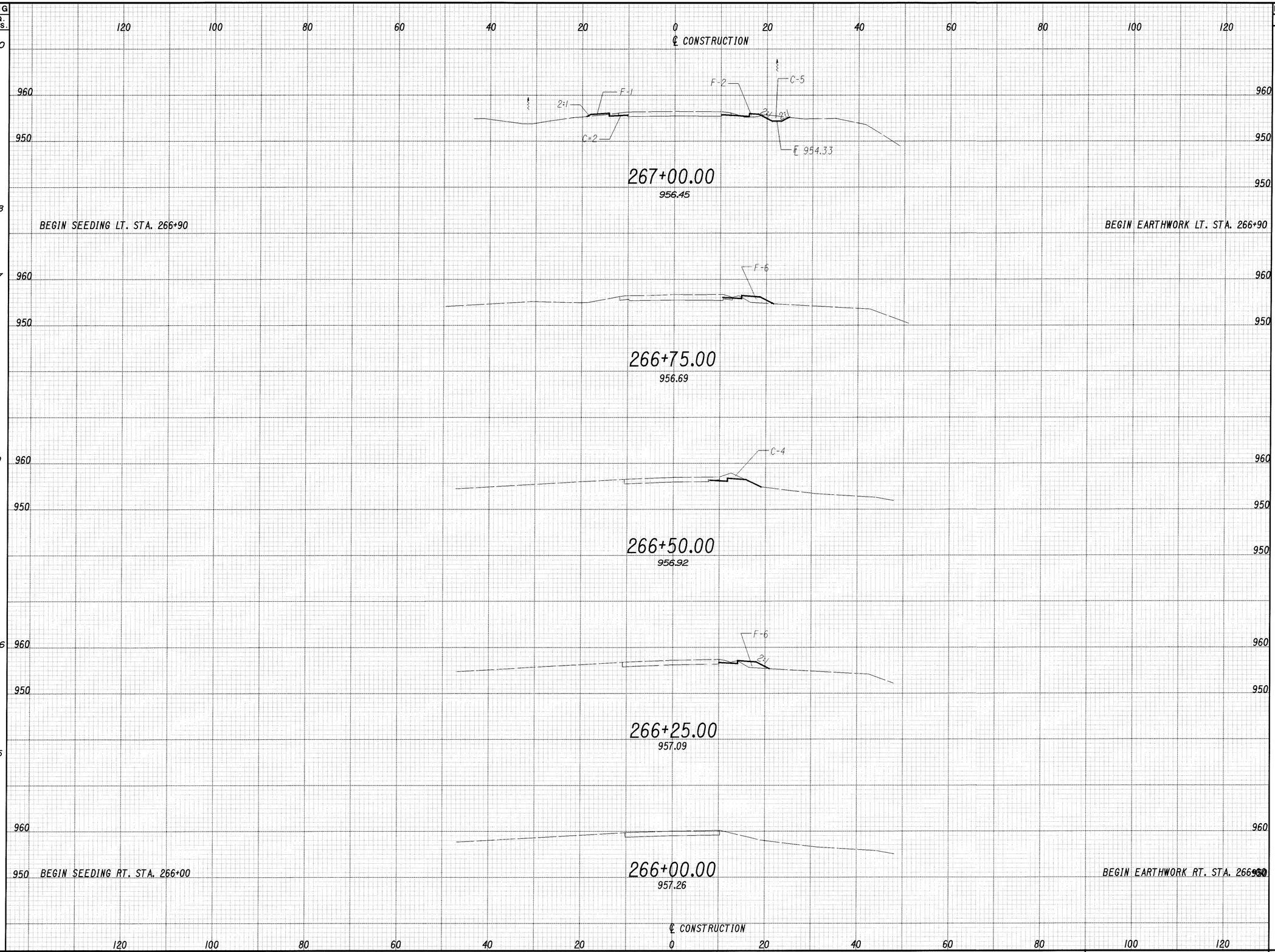
CALCULATED TES
CHECKED SKW

HORIZONTAL SCALE IN FEET
0 10 20 40

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

35
III

SEEDING END WIDTH	SEEDING SQ. YDS.	
	150	
26	28	BEGIN SEEDING LT. STA. 266+90
18	37	
	39	
10		
	26	
9	15	
9		
5		
0		BEGIN SEEDING RT. STA. 266+00
	300	SHEET TOTAL



BEGIN EARTHWORK LT. STA. 266+90

BEGIN EARTHWORK RT. STA. 266+00

END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		18	5
7	3		
		3	1
7	3		
		2	3
0	6		
4	0		
		2	3
0	6		
		0	4
0	6		
		0	1
0	0		
		27	20
SHEET TOTALS CARRIED TO SHEET NO. 20		SHEET TOTAL	

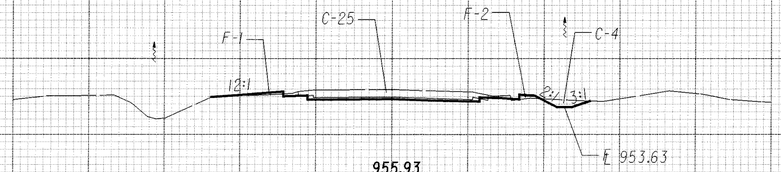
CALCULATED ALF

CHECKED TES

CROSS SECTION SHEET
STA. 266+00 TO STA. 267+00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

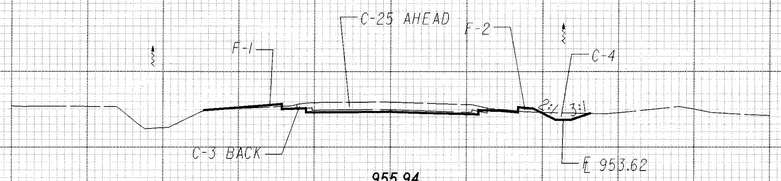
SEEDING END WIDTH	SEEDING SQ. YDS.
	40
21	
	23
21	
	40
27	
	76
28	
	179



955.93

268+00.00

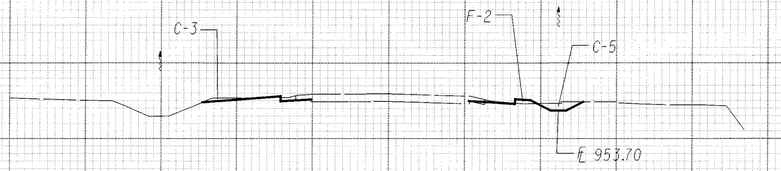
955.93



955.94

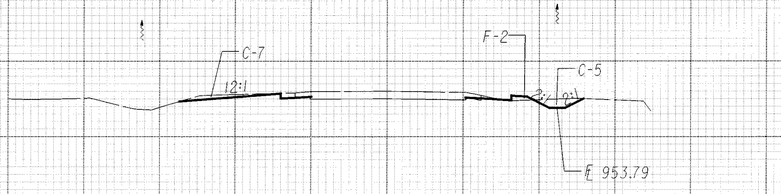
267+90.00

955.94



267+75.00

955.91



267+50.00

956.02

℄ CONSTRUCTION

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

END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		25	1
29	3		
		11	1
AHEAD 29 BACK 7	3 3		
		4	2
8	2		
		9	2
12	2		
		49	6

SHEET TOTAL

SHEET TOTALS CARRIED TO SHEET NO. 20

SHEET TOTAL

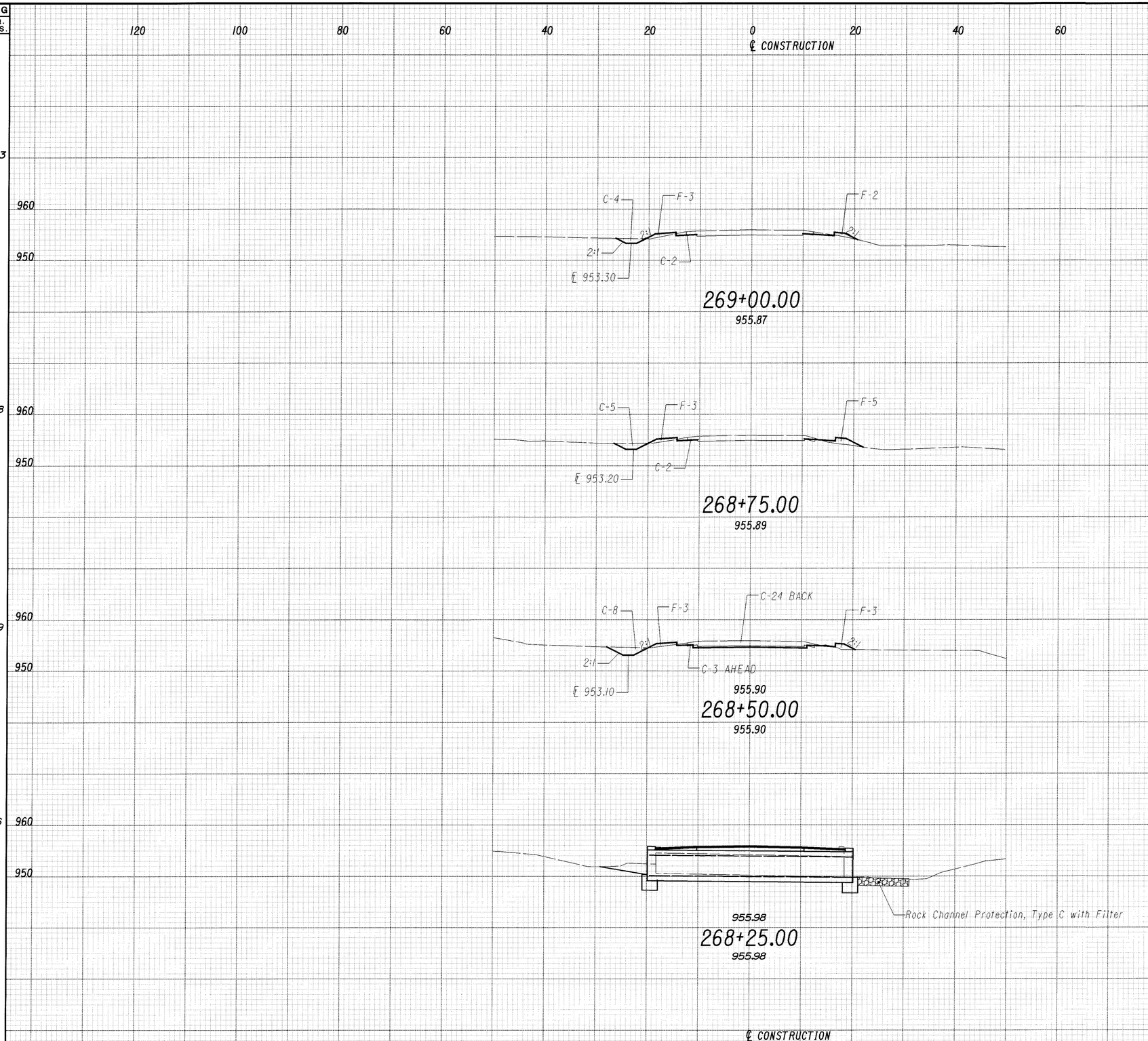
CALCULATED ALF

CHECKED TES

CROSS SECTION SHEET
STA. 267+00 TO STA. 268+00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SEEDING END WIDTH	SEEDING SQ. YDS.
	133
24	
	68
25	
	69
25	
	46
8	
	316



END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		9	12
6	5		
		6	6
7	8		
		8	6
AHEAD 11	6		
BACK 32	6		
		26	3
24	0		
SHEET TOTAL		49	27

CALCULATED ALF

CHECKED TES

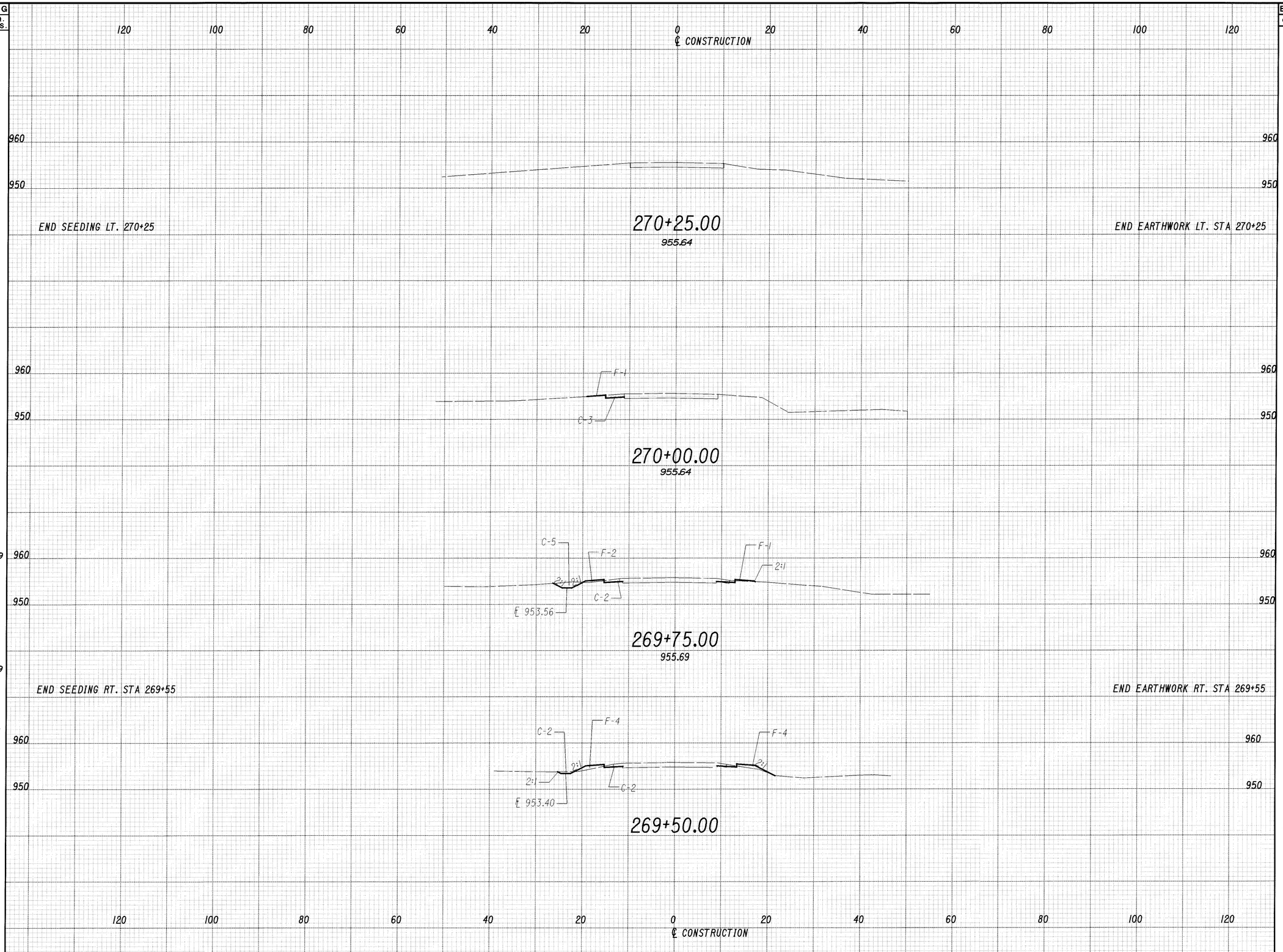
CROSS SECTION SHEET
STA. 268+25 TO STA. 269+00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

38
111

SHEET TOTALS CARRIED TO SHEET NO. 20

SEEDING END WIDTH	SEEDING SQ. YDS.	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
0		0	0		
	9			0	1
8		0	1		
	5			1	1
8		3	1		
	39			5	2
20		7	3		
	49			4	4
24		4	8		
	13			1	2
24		4	8		
	115			11	10



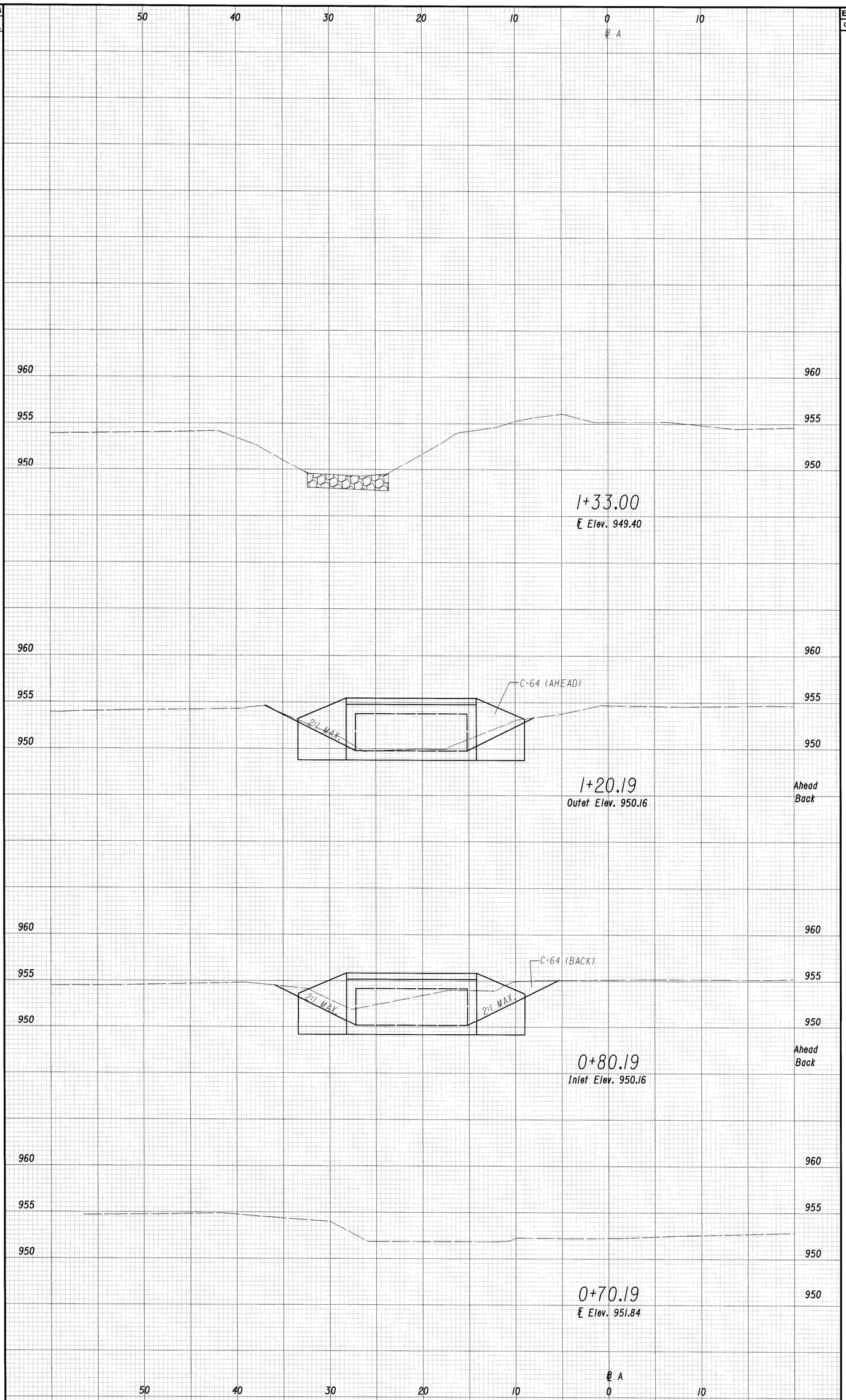
CALCULATED ALF
CHECKED TES

CROSS SECTION SHEET
STA. 269+50 TO STA. 270+25

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

39
111

SEEDING		END AREA		VOLUME	
END WIDTH	SQ. YDS.	CUT	FILL	CUT	FILL



		0+33.00	0 0
			3 0
Ahead		1+20.19	12 0
Back			0 0
			0 0
Ahead		0+80.19	0 0
Back			64 0
			12 0
		0+70.19	0 0
SHEET TOTAL			
SHEET TOTALS CARRIED TO SHEET NO. 20			
SHEET TOTAL			15 0

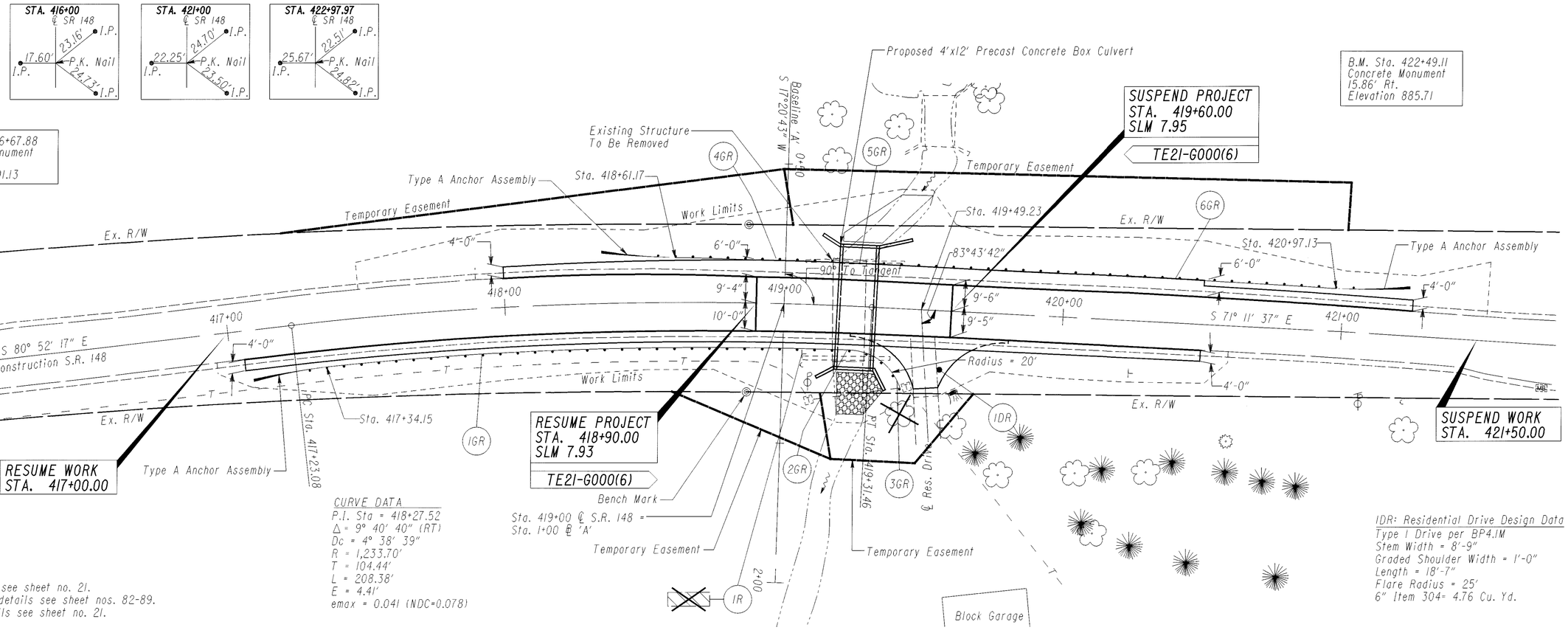
111 / 40

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

CHANNEL CROSS SECTION SHEET
(SECTION 5.07)

CALCULATED TES

CHECKED ALF



HORIZONTAL SCALE IN FEET
0 10 20 40

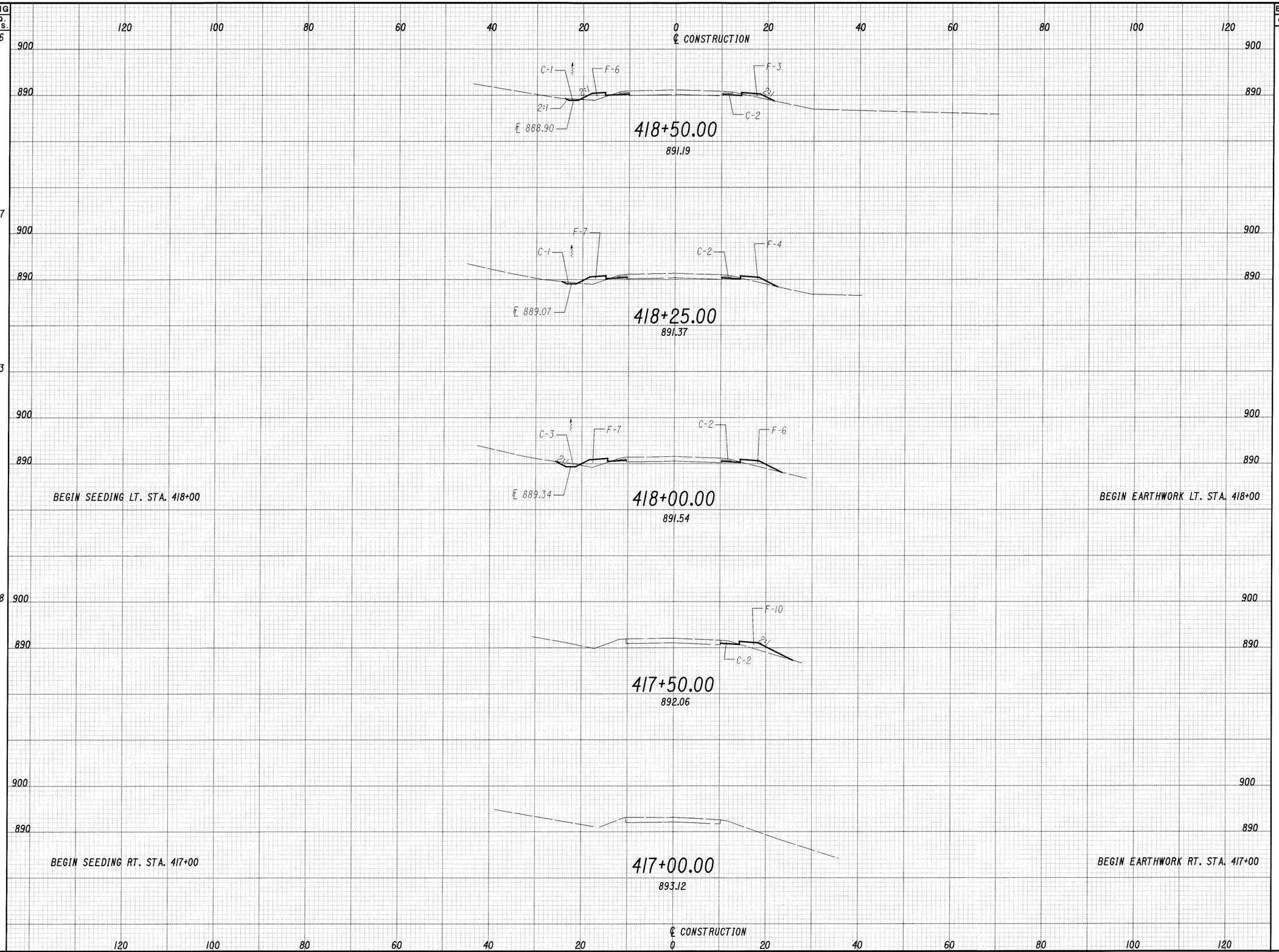
CALCULATED TES
CHECKED SKW

PLAN AND PROFILE (SECTION 7.93)
STA. 416+00.00 TO STA. 421+60.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

41
111

SEEDING END WIDTH	SEEDING SQ. YDS.	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
				2	8
20	56	3	9		
				3	9
21	57	3	11		
				4	11
24	63	5	13		
				6	21
15	108	2	10		
				3	17
15	75	2	10		
				1	1
0	4	0	0		
	363 SHEET TOTAL	SHEET TOTALS CARRIED TO SHEET NO. 21		19	67



CALCULATED ALF
CHECKED SKW

CROSS SECTION SHEET
STA. 417+00.00 to STA. 418+50.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SEEDING END WIDTH	SEEDING SQ. YDS.	
		120 100 80 60 40 20 0 20 40 60 80 100 120
		℄ CONSTRUCTION
	50	890
		880
		F-52 C-31 2:1 2%
18		890.73
		419+25.00
		890.73
		Rock Channel Protection, Type B with Filter
	50	900
		890
		F-4 C-30 F-3 2:1 2%
		890.89
18		419+00.00
		890.89
		900
	21	890
		F-4 C-30 AHEAD F-2 C-3 BACK
		890.95
19		418+90.00
		890.95
		900
	33	890
		F-5 C-2 F-3 2:1 2%
		418+75.00
20		891.05
		℄ CONSTRUCTION
		120 100 80 60 40 20 0 20 40 60 80 100 120
	154	SHEET TOTAL

SHEET TOTALS CARRIED TO SHEET NO. 21

END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		29	26
31	52		
		28	27
30	7		
		11	3
AHEAD 30 / BACK 3	6 / 6		
		1	4
2	8		
		69	60

SHEET TOTAL

CALCULATED ALF

CHECKED SKW

CROSS SECTION SHEET

STA. 418+75.00 TO STA. 419+25.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SEEDING END WIDTH	SEEDING SQ. YDS.
20	60
21	57
24	38
23	24
18	23
	178

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

℄ CONSTRUCTION

900 / 890

C-7, F-3, 2:1, 2:1, F-2, C-2, 2:1, ℄ 887.86

420+00.00
890.09

900 / 890

C-6, F-3, C-2, F-2, 2:1, 2:1, ℄ 888.13

419+75.00
890.39

900 / 890

C-5, F-1, C-30 BACK, F-2, 12:1, C-3 AHEAD

890.50
419+60.00
890.50

900 / 890

F-3, C-32, F-1, 2:1, -8.2%, 1DR

890.56
419+50.00
890.58

℄ CONSTRUCTION

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

	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
			9	5
	9	6		
			8	5
	8	5		
			4	2
AHEAD	8	3		
BACK	35	3		
			13	1
	32	4		
SHEET TOTAL			34	13

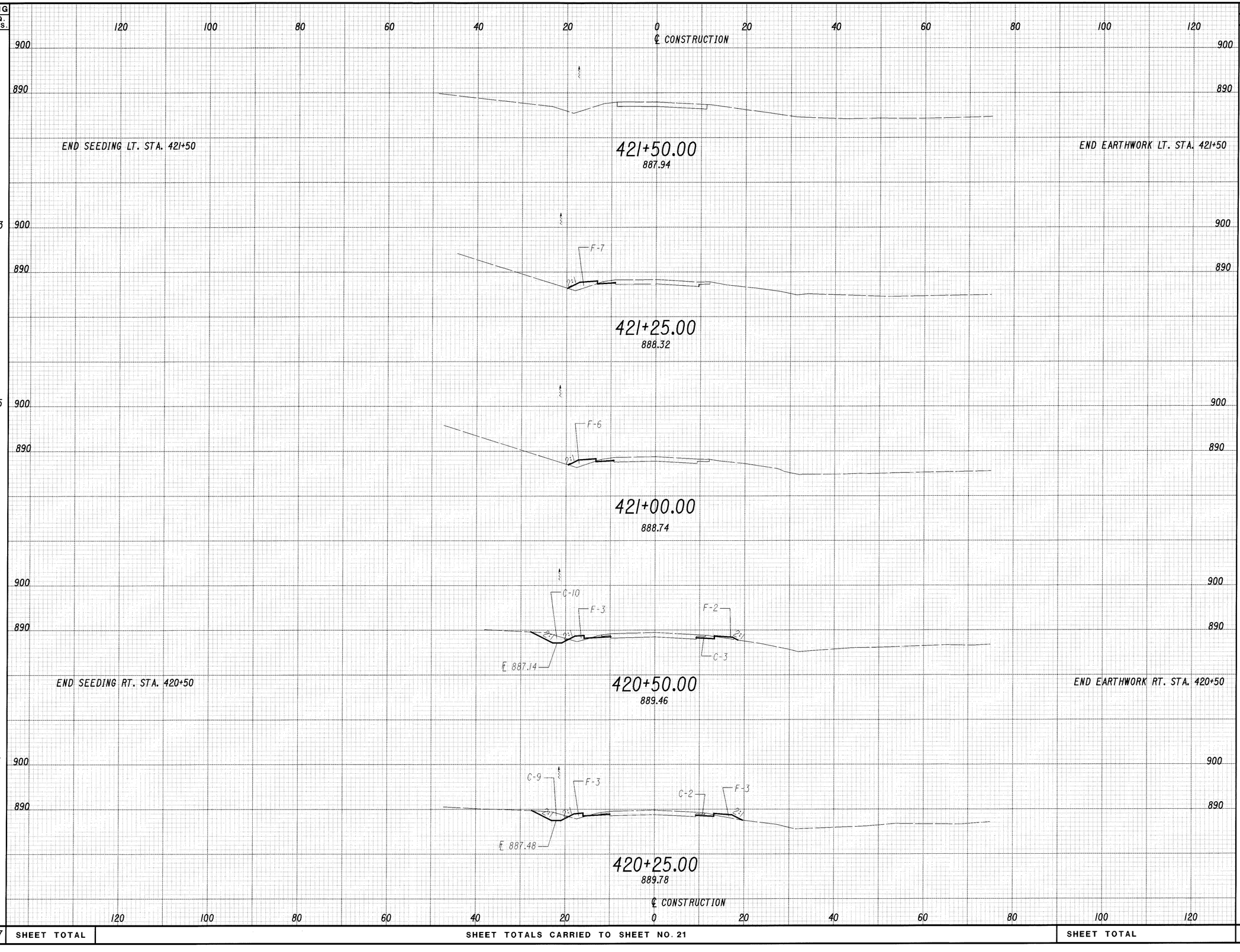
SHEET TOTALS CARRIED TO SHEET NO. 21

CALCULATED ALF
CHECKED SKW

CROSS SECTION SHEET
STA. 419+50.00 TO STA. 420+00.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SEEDING END WIDTH	SEEDING SQ. YDS.	
0		END SEEDING LT. STA. 421+50
9	13	
25		
9	86	
22		END SEEDING RT. STA. 420+50
23	63	
	187	SHEET TOTAL



END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL	
0	0			END EARTHWORK LT. STA. 421+50
0	7	0	3	
0	6	0	6	
0	6			
13	5	12	10	END EARTHWORK RT. STA. 420+50
11	6	11	5	
		23	24	SHEET TOTAL

SHEET TOTALS CARRIED TO SHEET NO. 21

CALCULATED ALF
CHECKED SKW

CROSS SECTION SHEET
STA. 420+25.00 TO STA. 421+50.00

BEL-148 - (0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SEEDING END WIDTH	SEEDING SQ. YDS.	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL

70 60 50 40 30 20 10 0 10

℄ A

895 890 885 880

1+39.00
℄ Elev. 881.70

	0	0

13	1	

C-35 (AHEAD)
C-11 (AHEAD)
2:1 MAX.
2:1 MAX.
F-1 (AHEAD)

1+23.21
OUTLET ℄ ELEV. 882.47

Ahead	46	1
Back	0	0

0	0	

C-17 (BACK)
C-10 BACK
2:1 MAX.
2:1 MAX.
F-3 (BACK)

0+78.22
INLET ℄ ELEV. 882.92

Ahead	0	0
Back	27	3

9	1	

0+60.00
℄ Elev. 883.80

0	0	

℄ A

70 60 50 40 30 20 10 0 10

SHEET TOTAL	SHEET TOTALS CARRIED TO SHEET NO. 21	SHEET TOTAL		22	2

111 / 46

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

CHANNEL CROSS SECTION SHEET
(SECTION 7.93)

CALCULATED TES
CHECKED ALF

STA. 509+47.36 ℄ SR 148 — I.P. 24.07′, I.P. 17.54′, P.K. Nail, 24.13′, I.P.

P.T. STA. 510+58.50 ℄ SR 148 — I.P. 24.70′, I.P. 20.63′, P.K. Nail, 23.35′, I.P.

STA. 515+44.17 ℄ SR 148 — I.P. 25.04′, I.P. 18.80′, P.K. Nail, 23.46′, I.P.

B.M. Sta. 514+91.71
Concrete Monument
17.34 Rt.
Elevation 860.72

CURVE DATA
P.I. Sta = 510+03.12
Δ = 11° 34′ 41″ (LT)
Dc = 10° 25′ 03″
R = 550.00′
T = 55.76′
L = 111.14′
E = 2.82′

RESUME PROJECT
STA. 511+75.00
SLM 9.69
TE21-G000(6)

SUSPEND PROJECT
STA. 512+50.00
SLM 9.71
TE21-G000(6)

SUSPEND WORK
STA. 513+50.00

RESUME WORK
STA. 510+25.00

Existing Structure To Be Removed

Temporary Easement

Baseline 'A' S 44°40′20″ E

Sta. 512+00 ℄ S.R. 148 = Sta. 1+00 ℄ 'A'

8″ Elm

Type A Anchor Assembly

Ex. R/W

PT Sta. 510+58.50

Sta. 510+81.61

Work Limits

Sta. 511+87.58

Sta. 513+12.48

Type T

R=15′

4′-0″

9′-9″

10′-0″

89.91°

90° to Tangent

Sta. 512+67.97

N 44° 54′ 51″ E

N 46° 15′ 03″ E

510+00 ℄ Construction S.R. 148

511+00

512+00

513+00

514+00

Bench Mark ⊕

R=10′

1DR

1D

2D

1R

2R

3R

1GR

2GR

3GR

4GR

5GR

6GR

2DR

℄ Field Drive

PC Sta. 511+73.87

PT Sta. 512+58.29

1:50

Temporary Easement

24″ Conduit, Type D
Sta. 511+68.85 27.74 PT
℄ Elev. 854.50

Match Existing
Sta. 512+32.39 27.43 RT
Connect using Masonry Collar per DM-1.1M

Sta. 512+22.31 27.47 RT
Elev. 852.77

24″ Conduit, Type D
Sta. 512+08.29 27.78 RT
Elev. 853.72

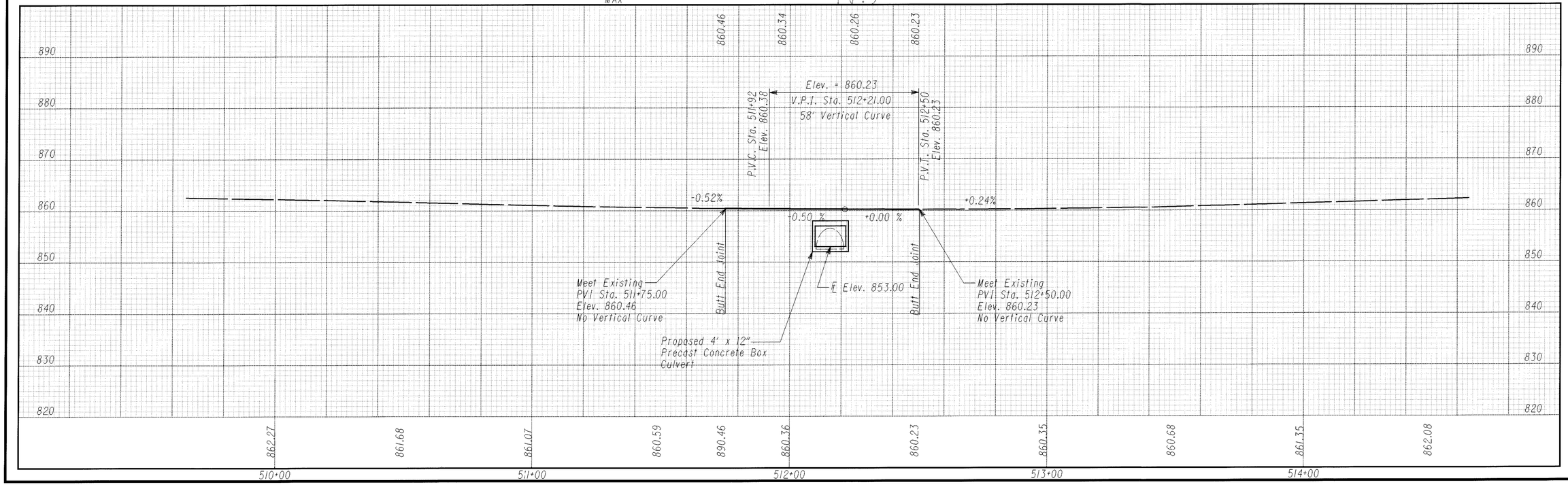
CURVE DATA
P.I. Sta = 512+16.08
Δ = 1° 20′ 12″ (RT)
Dc = 1° 35′ 00″
R = 3,618.68′
T = 42.21′
L = 84.42′
E = 0.25′
e_{MAX} = 0.033 (NDC = 0.036)

IDR: Field Drive Design Data
Type I Drive per BP4.1M
Stem Width = 12′-9″
Graded Shoulder Width = 1′-0″
Length = 24′-9″
Flare Radius = 15′
6″ Item 304= 5.73 Cu. Yd.

2DR: Field Drive Design Data
Type I Drive per BP4.1M
Stem Width = 12′-2″
Graded Shoulder Width = 1′-0″
Length = 16′-4″
Flare Radius = 15′
6″ Item 304= 3.61 Cu. Yd.

B.M. Sta. 510+73.69
Concrete Monument
15.92′ Rt.
Elevation 860.21

For quantities, see sheet no. 22.
For structure details, see sheet nos. 90-97.
For drive details, see sheet no. 22.



HORIZONTAL SCALE IN FEET
0 10 20 40

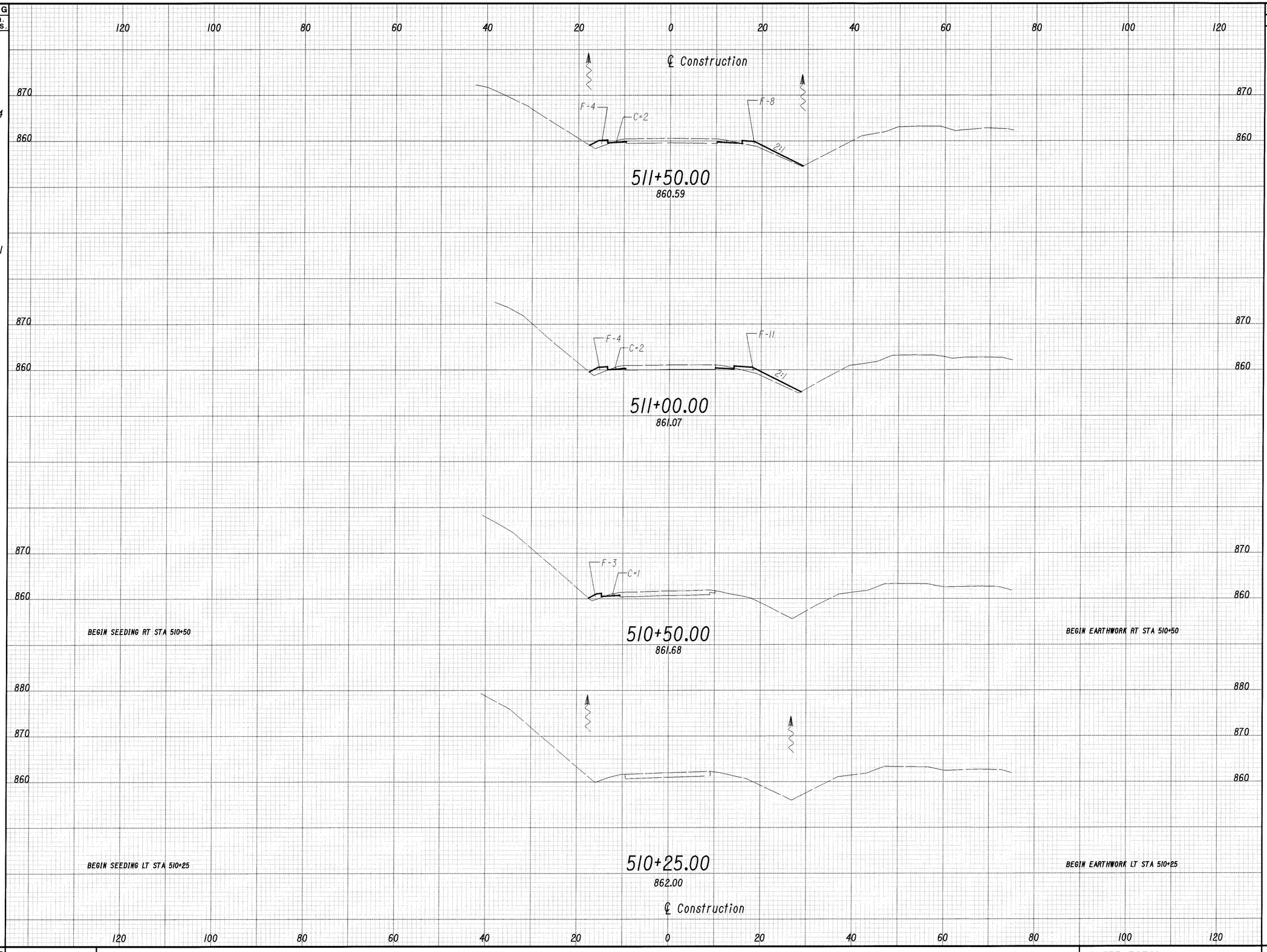
CALCULATED TES
CHECKED SKW

PLAN AND PROFILE (SECTION 9.69)
STA. 509+65.00 TO STA. 514+65.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

47
111

SEEDING END WIDTH	SEEDING SQ. YDS.
23	64
	131
24	81
5	7
0	



END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		3	12
2	12		
		4	25
2	15		
		3	17
1	3		
		1	1
0	0		

CALCULATED ALF
CHECKED TES

CROSS SECTION SHEET

STA. 510+25.00 TO STA. 511+50.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

48
111

283	SHEET TOTAL	SHEET TOTALS CARRIED TO SHEET NO. 22	SHEET TOTAL	11	55

SEEDING END WIDTH	SEEDING SQ. YDS.
	61
19	
	75
35	
	27
17	
	37
25	
	67
23	
	267

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

870 / 860 / 850

℄ Construction

F-4 C-2 Ahead C-31 Back C-6

2:1 2:1

860.23
512+50.00
860.23

F-13 C-29 F-22 6" RipRap

2:1 2:1

860.26
512+25.00
860.29

F-5 C-30 F-36 F-6 6" RipRap

2:1 2:1

860.28
512+15.80
860.31

C-7 F-11 C-30 F-1 F-15

2:1 3:1 4:1

℄ 857.01

Proposed 24" Conduit Type D

860.34
512+00.00
860.36

C=2 Back F-7 C-31 Ahead F-1 C=2 F=5

2:1 4:1

Proposed 24" Conduit Type D

860.46
511+75.00
860.46

℄ Construction

END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		5	7
AHEAD 8	4		
BACK 37	4		
		31	18
29	35		
		10	14
30	47		
		20	22
37	27		
		32	19
AHEAD 33	13		
BACK 4	13		
		98	80

SHEET TOTAL

SHEET TOTALS CARRIED TO SHEET NO. 22

SHEET TOTAL

CALCULATED ALF

CHECKED TES

CROSS SECTION SHEET

STA. 511+75.00 TO STA. 512+50.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SEEDING END WIDTH	SEEDING SQ. YDS.
0	
	13
9	
47	
25	
70	
25	
	130

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

℄ Construction

870
860

END SEEDING STA 513+50

513+50.00
860.68

END EARTHWORK STA 513+50

870
860

F-2 C-2 Back F-20
2:1 2:1

513+25.00
860.51

870
860

F-2 C-2 F-22
2:1 2:1

513+00.00
860.35

870
860
850

F-4 C-2 F-8
2:1 2:1

512+75.00
860.25

℄ Construction

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

	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
	0	0		
			0	10
AHEAD	0	22		
BACK	2	22		
			2	21
	2	24		
			2	17
	2	12		
			4	48

SHEET TOTAL

SHEET TOTALS CARRIED TO SHEET NO. 22

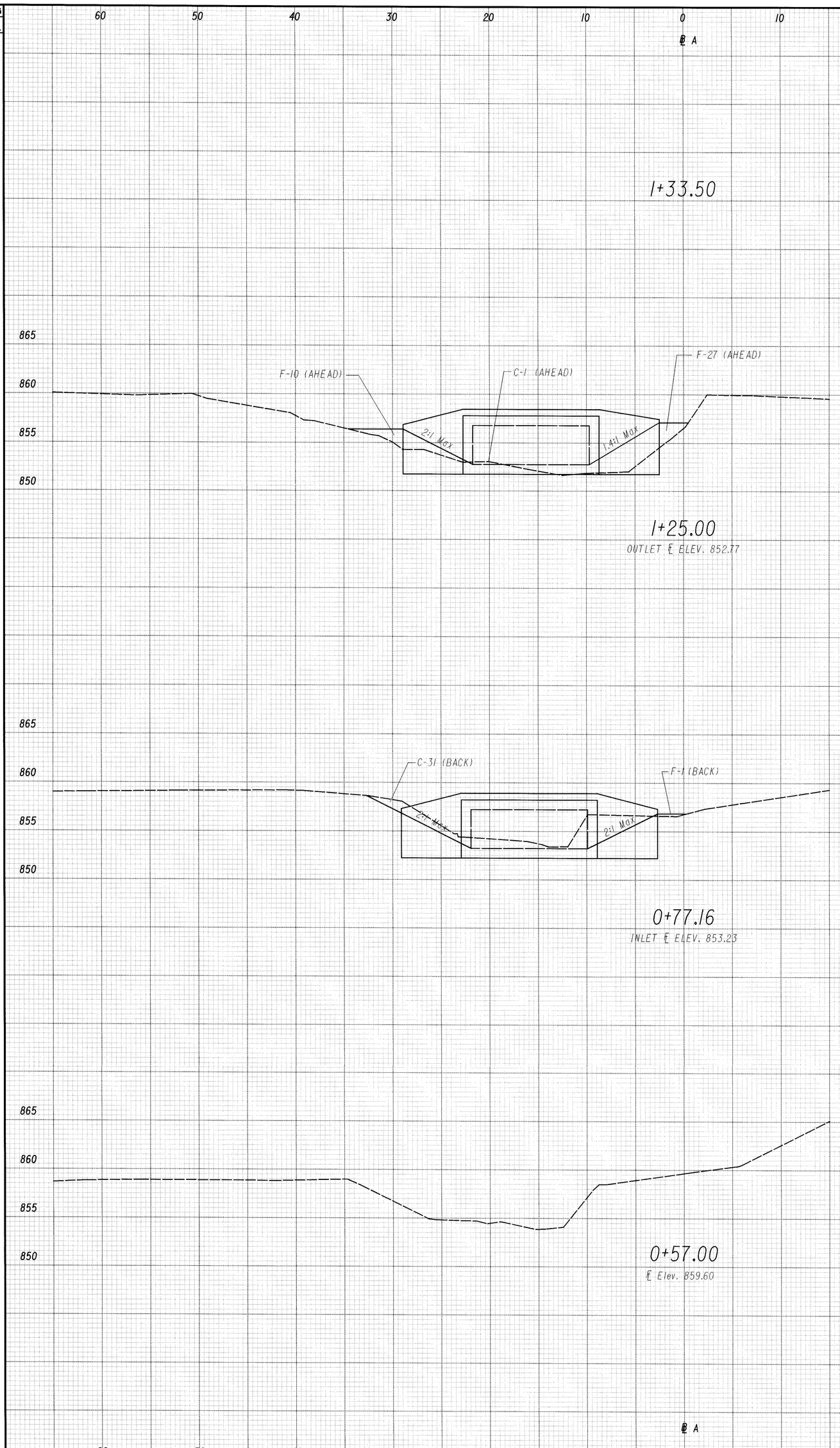
SHEET TOTAL

CALCULATED ALF
CHECKED TES

CROSS SECTION SHEET
STA. 512+75.00 TO STA. 513+50.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SEEDING END WIDTH	SEEDING SQ. YDS.



END AREA CUT	END AREA FILL		VOLUME CUT	VOLUME FILL
0	0			
			1	6
		Ahead		
1	37			
0	0	Back		
			0	0
		Ahead		
0	0			
31	1	Back		
			12	1
0	0			
SHEET TOTAL		SHEET TOTALS CARRIED TO SHEET NO. 22	SHEET TOTAL	
			13	7

111 / 151

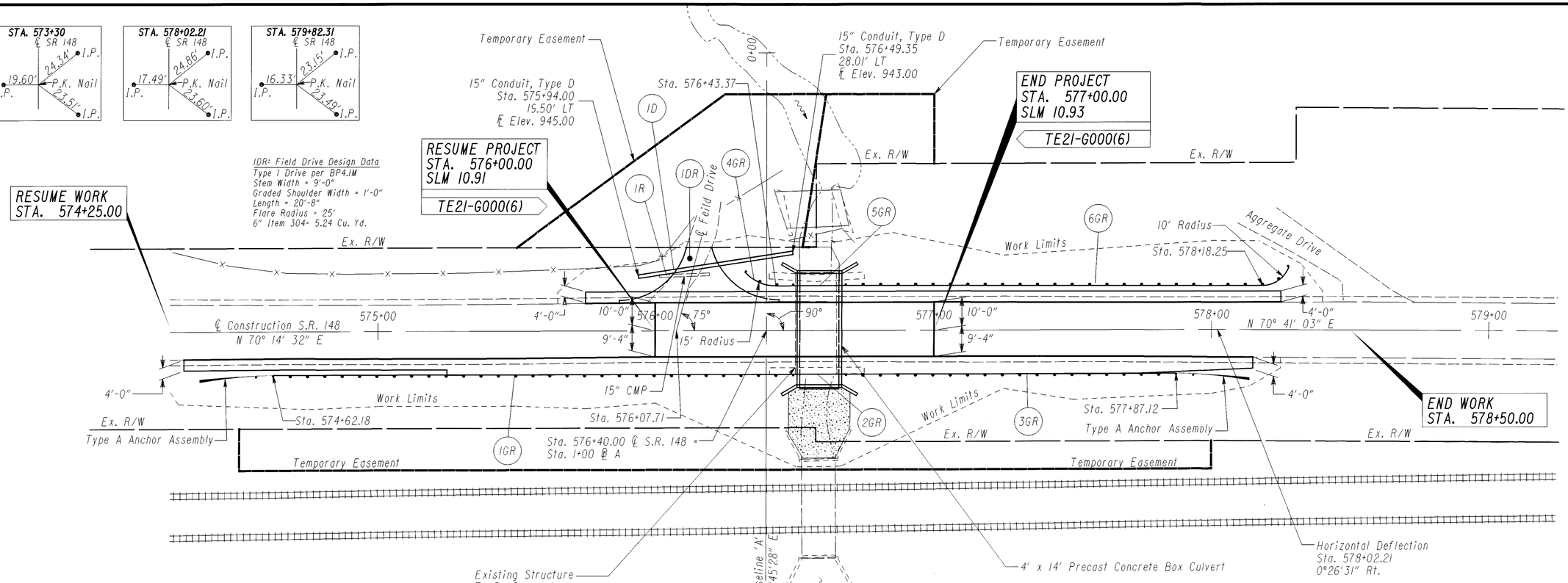
BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

CHANNEL CROSS SECTION SHEET
(SECTION 9.69)

CALCULATED TES

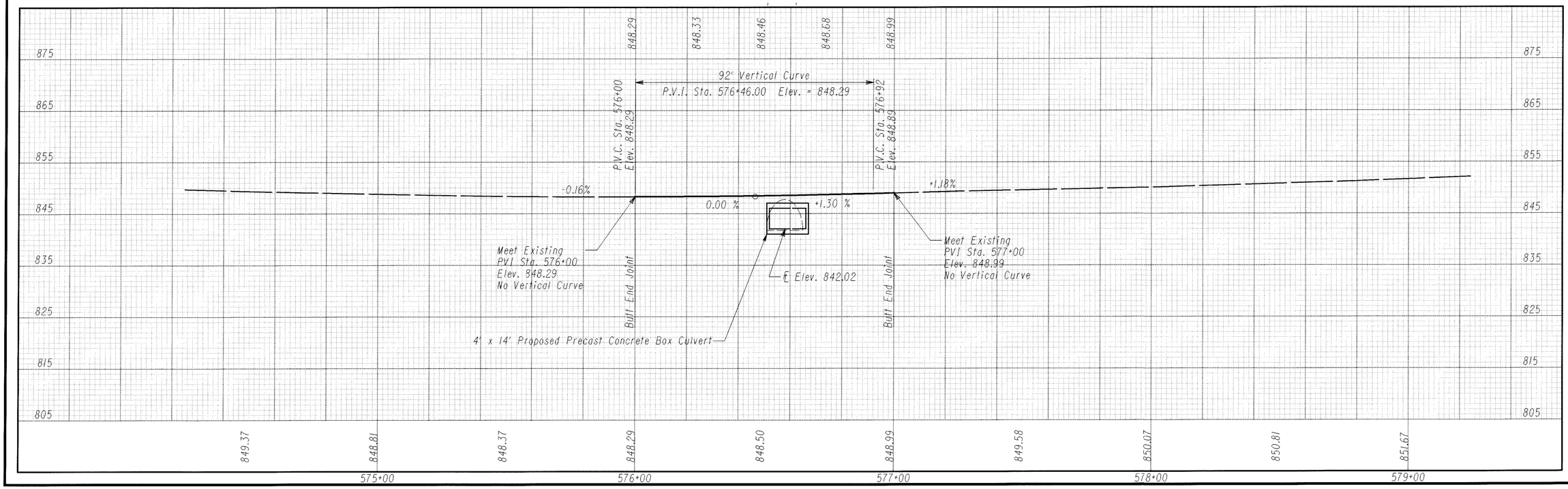
CHECKED ALF

IDR: Field Drive Design Data
Type I Drive per BP4.1M
Stem Width = 9'-0"
Graded Shoulder Width = 1'-0"
Length = 20'-8"
Flare Radius = 25'
6" Item 304= 5.24 Cu. Yd.



B.M. Sta. 564+80.71
Concrete Monument
21.40' Rt.
Elevation 846.54

For quantities see sheet no. 23.
For structure details see sheet nos. 98-105.



HORIZONTAL SCALE IN FEET
0 10 20 40

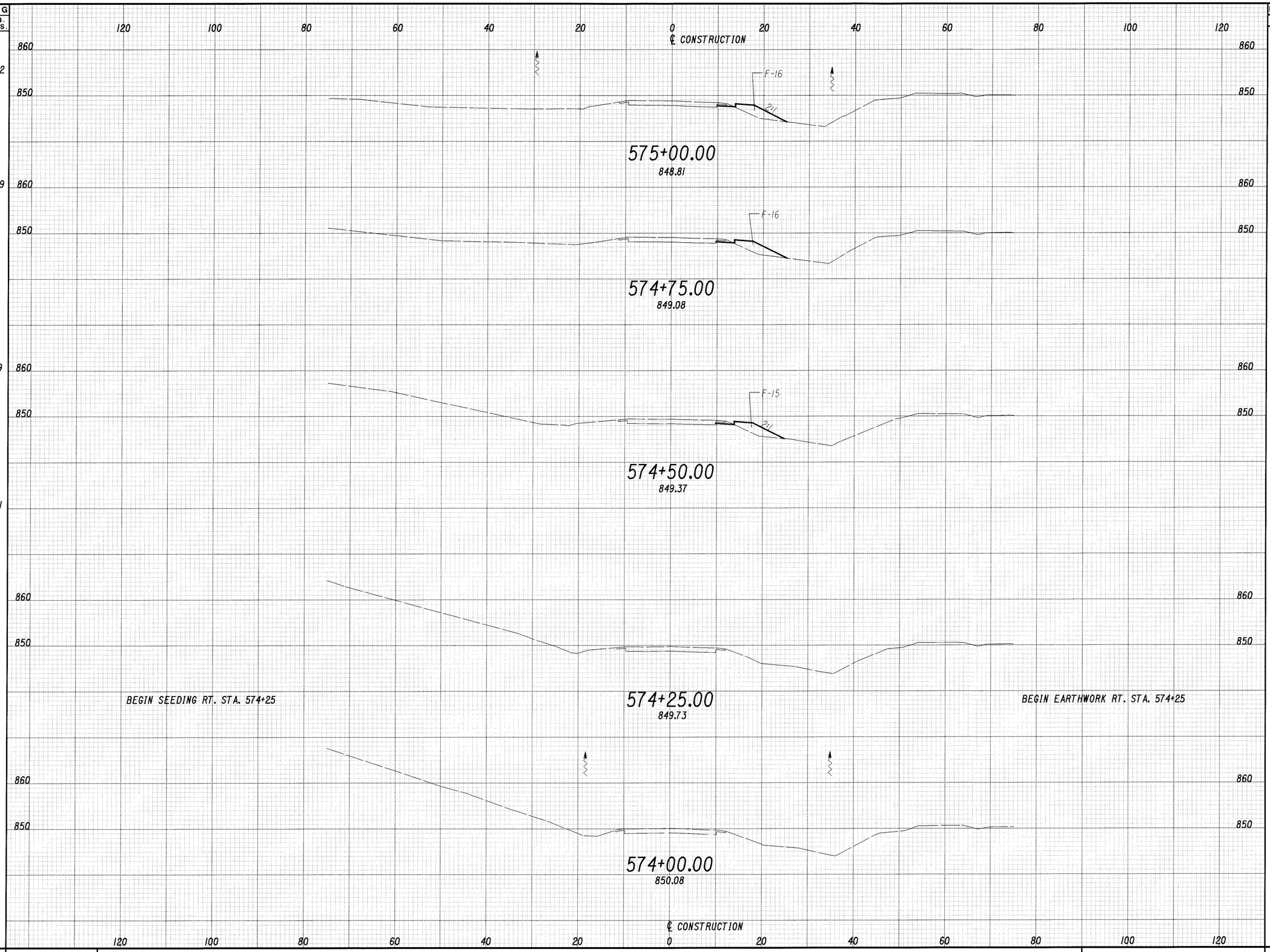
CALCULATED TES
CHECKED SKW

PLAN AND PROFILE (SECTION 10.91) STA. 574+25.00 TO STA. 579+25.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

52

SEEDING END WIDTH	SEEDING SQ. YDS.	END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
	72			0	27
14		0	16		
	39			0	15
14		0	16		
	39			0	14
14		0	15		
	31			0	11
14		0	15		
	4			0	2
0		0	0		
	0			0	0
0		0	0		
	185			0	69



SHEET TOTAL

SHEET TOTALS CARRIED TO SHEET NO. 23

SHEET TOTAL

CALCULATED ALF

CHECKED TES

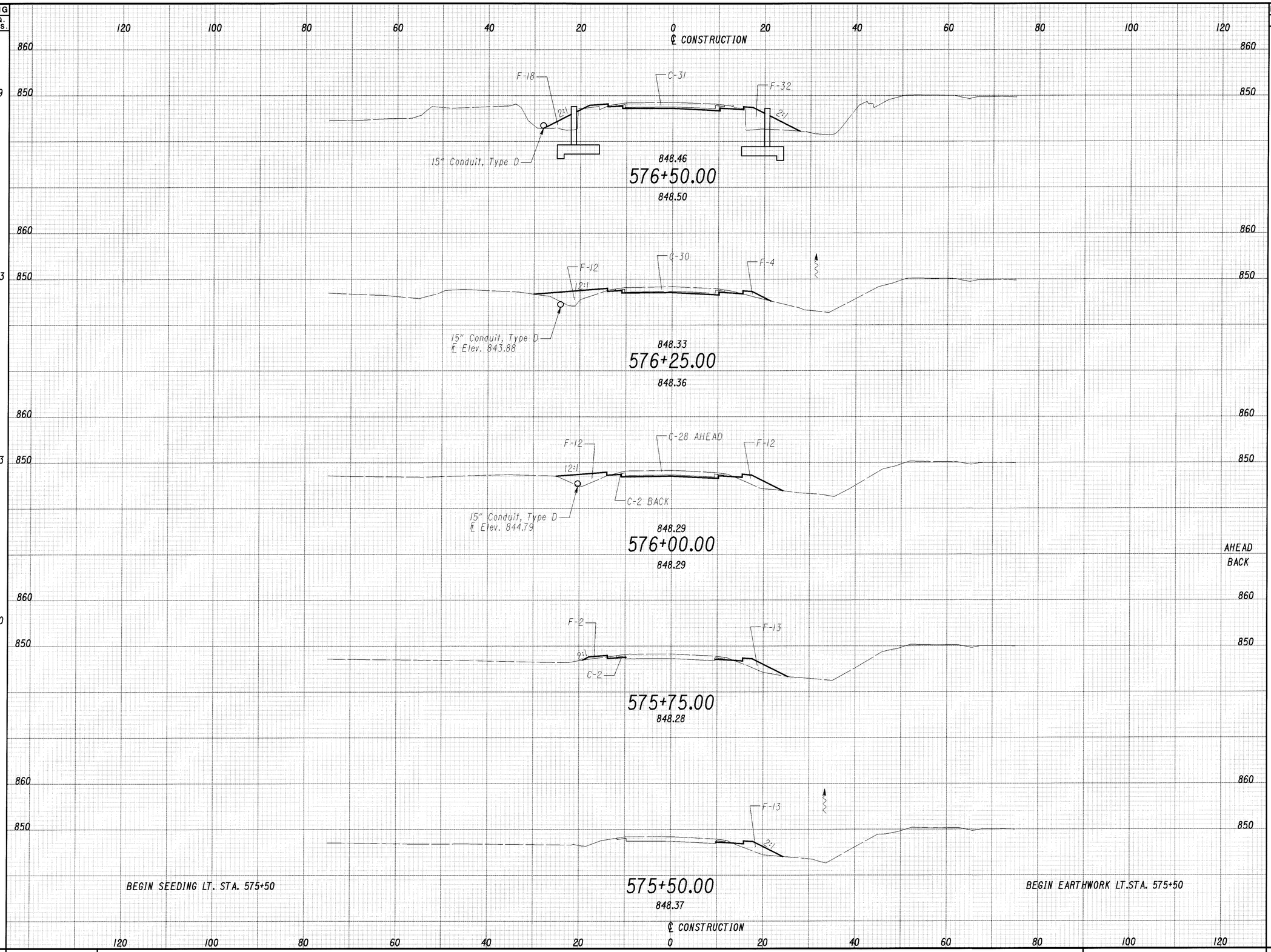
CROSS SECTION SHEET

STA. 574+00.00 TO STA. 575+00.00

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

53
111

SEEDING END WIDTH	SEEDING SQ. YDS.
	19
23	
	63
22	
	63
23	
	60
20	
	45
12	
	250



END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		11	10
31	50		
		28	31
30	16		
		27	19
AHEAD 28	24		
BACK 2	24		
		2	18
2	15		
		1	3
0	13		
		69	91

CALCULATED ALF

CHECKED TES

CROSS SECTION SHEET
STA. 575+50.00 TO STA. 576+50.00

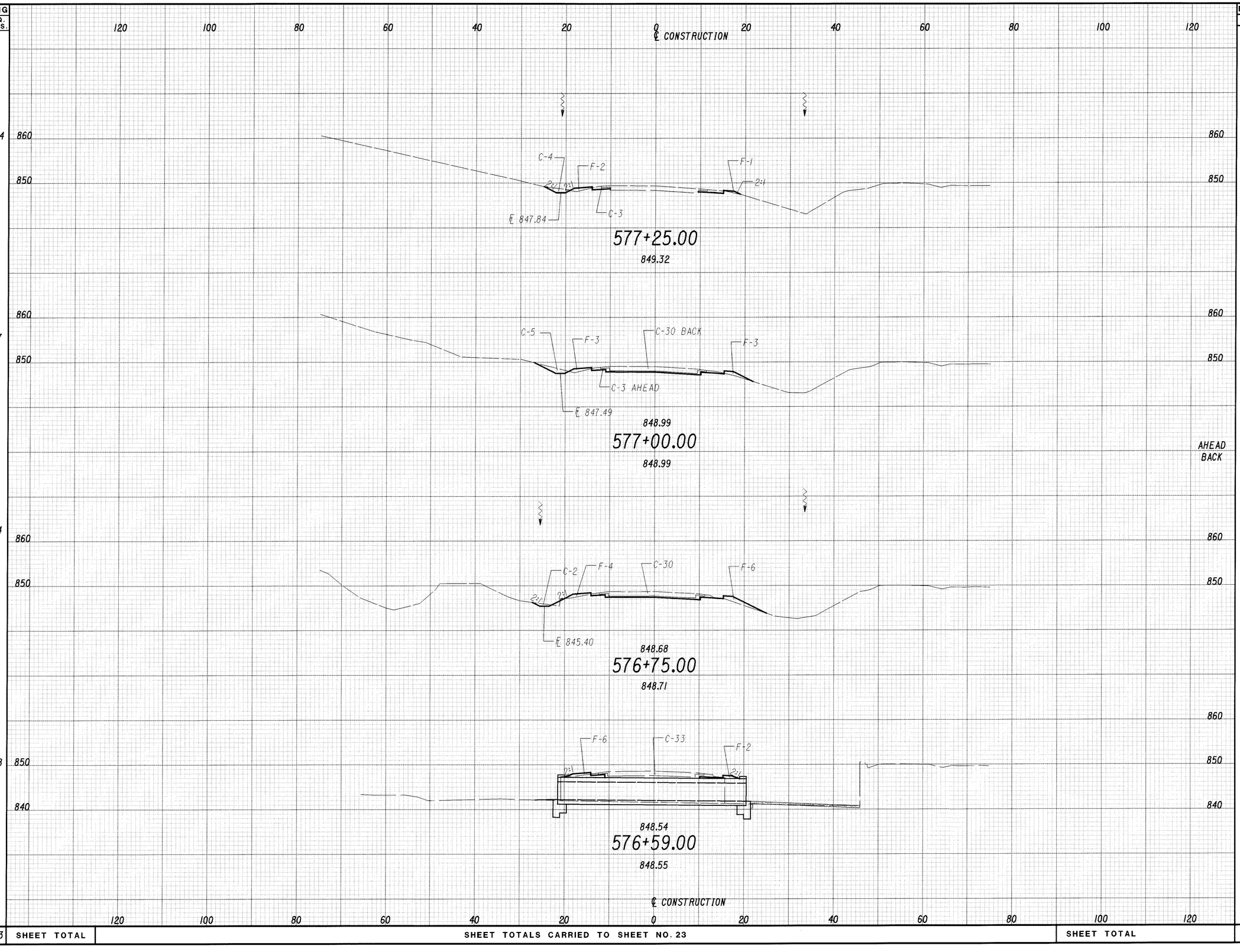
BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SHEET TOTAL

SHEET TOTALS CARRIED TO SHEET NO. 23

SHEET TOTAL

SEEDING END WIDTH	SEEDING SQ. YDS.
	54
17	
	57
24	
	74
29	
	38
14	
	223



END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
		6	3
7	3		
		7	4
AHEAD 8	6		
BACK 35	6		
		31	8
32	10		
		19	5
33	8		
		63	20

CALCULATED ALF
CHECKED TES

CROSS SECTION SHEET

STA. 576+59.00 TO STA. 577+25.00

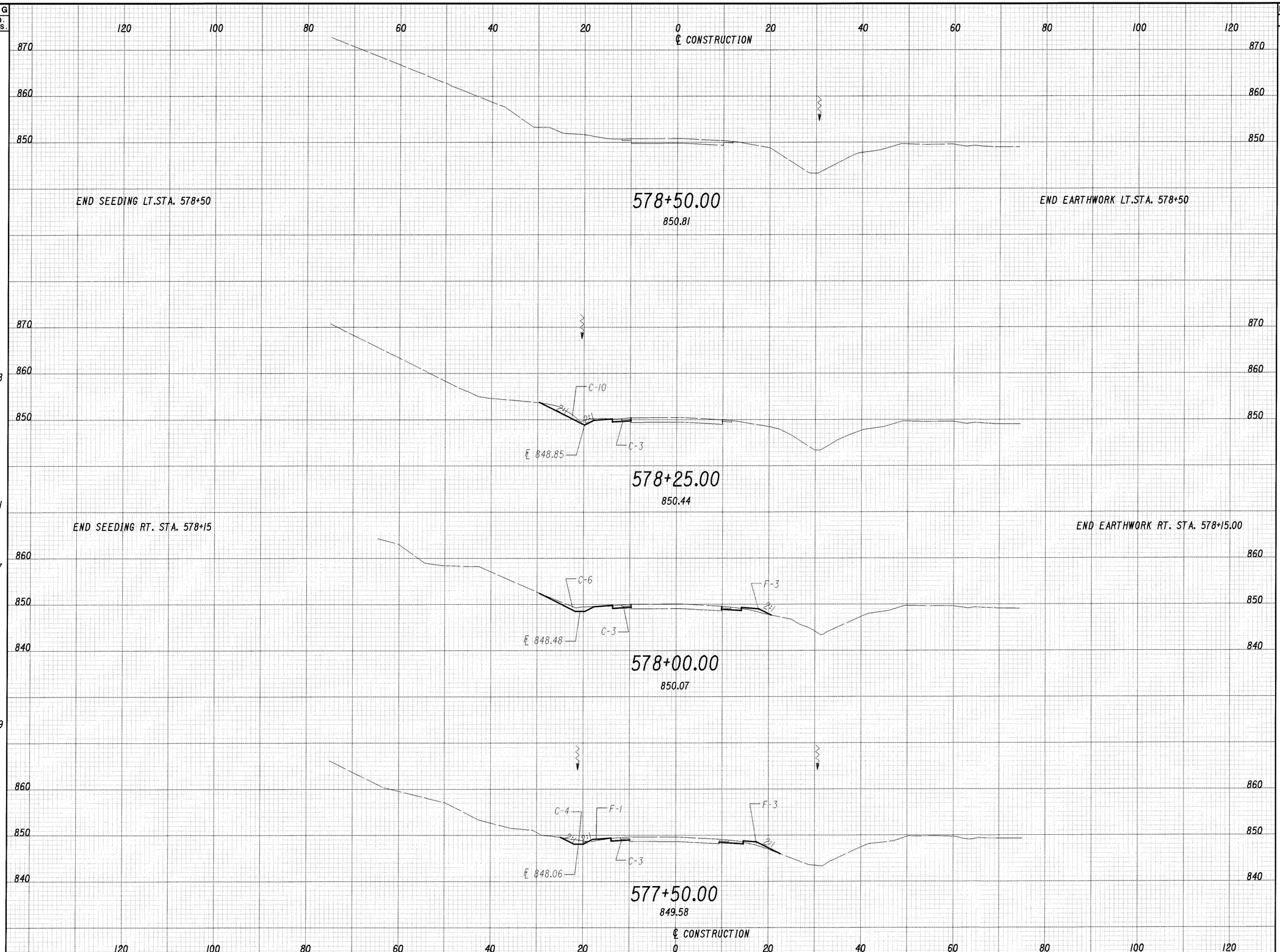
BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SHEET TOTAL

SHEET TOTALS CARRIED TO SHEET NO. 23

SHEET TOTAL

SEEDING END WIDTH	SEEDING SQ. YDS.	
0		END SEEDING LT.STA. 578+50
	38	
27		
	31	
28		END SEEDING RT. STA. 578+15
	47	
28		
	139	
22		
	255	SHEET TOTAL



END AREA CUT	END AREA FILL	VOLUME CUT	VOLUME FILL
0	0		
		6	0
13	0		
		4	1
9	3		
		5	2
9	3		
		15	7
7	4		
		33	10
		SHEET TOTAL	

SHEET TOTALS CARRIED TO SHEET NO. 23

CALCULATED ALF

CHECKED TES

CROSS SECTION SHEET
STA. 577+50.00 TO STA. 578+50.00

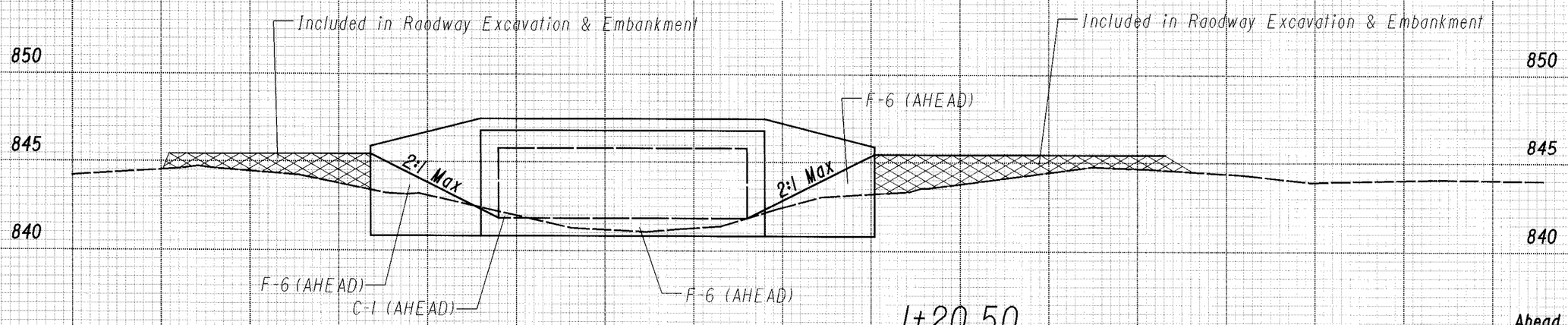
BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

SEEDING		END AREA		VOLUME	
END WIDTH	SQ. YDS.	CUT	FILL	CUT	FILL
		0	0		
				1	5
				0	0
				1	2

50 40 30 20 10 0 10 20 30

℄ A

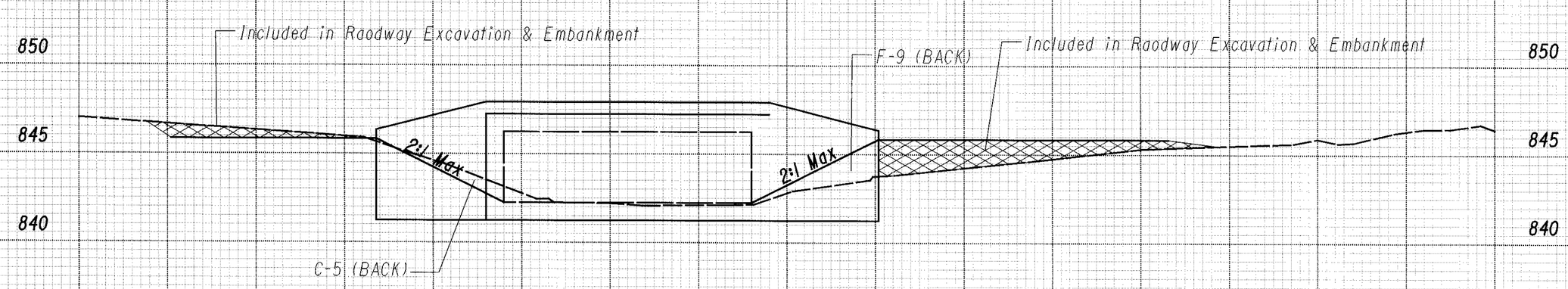
1+36.00



1+20.50

OUTLET ℄ ELEV. 841.82

Ahead	1	18
Back	0	0



0+78.50

INLET ℄ ELEV. 842.24

Ahead	0	0
Back	5	9

850
845
840

0+70.00

℄ Elev. 842.20

℄ A

50 40 30 20 10 0 10 20 30

SHEET TOTAL — SHEET TOTALS CARRIED TO SHEET NO. 23 — SHEET TOTAL

0	0
2	7

111 57

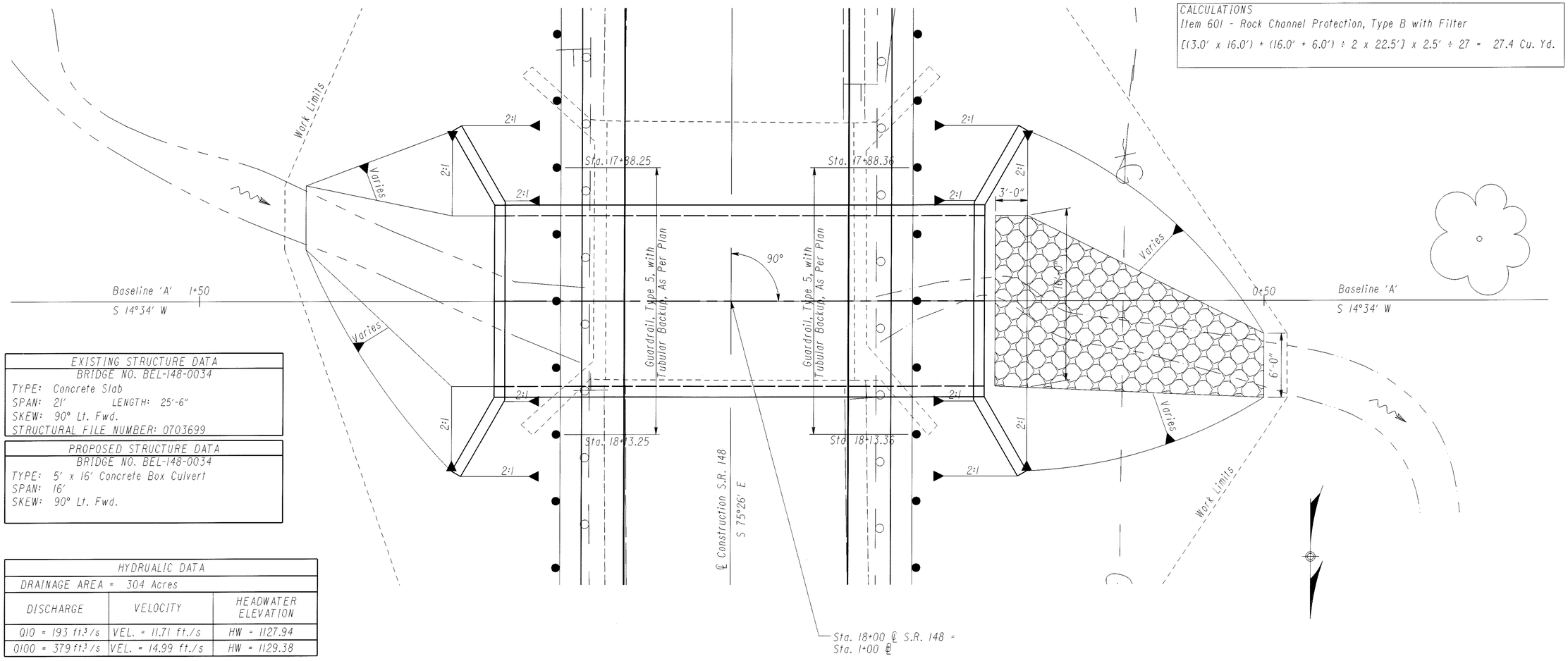
BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

CHANNEL CROSS SECTION SHEET
(SECTION 10.91)

CALCULATED TES

CHECKED ALF

CALCULATIONS
Item 601 - Rock Channel Protection, Type B with Filter
[(3.0' x 16.0') + (16.0' + 6.0') ÷ 2 x 22.5'] x 2.5' ÷ 27 = 27.4 Cu. Yd.

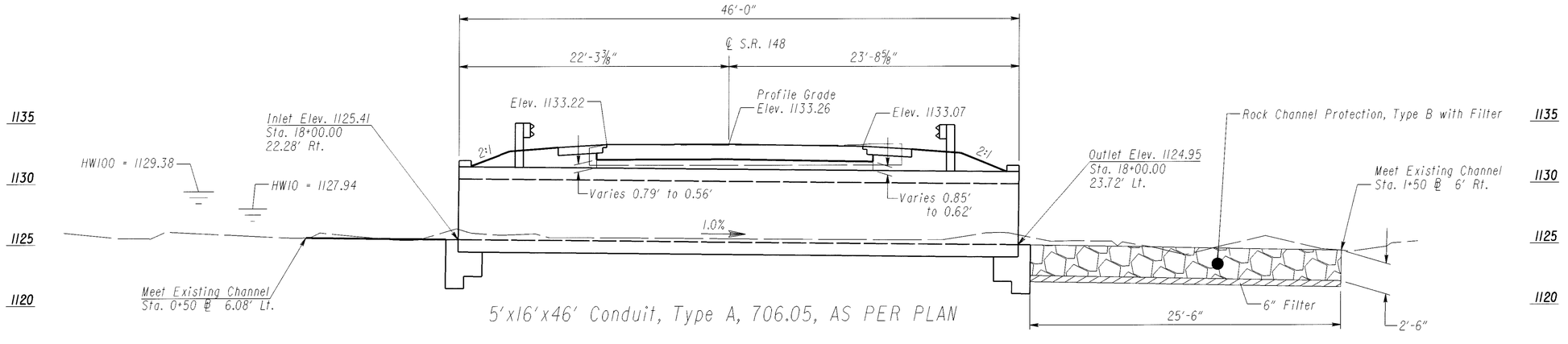


EXISTING STRUCTURE DATA
BRIDGE NO. BEL-148-0034
TYPE: Concrete Slab
SPAN: 21' LENGTH: 25'-6"
SKEW: 90° Lt. Fwd.
STRUCTURAL FILE NUMBER: 0703699

PROPOSED STRUCTURE DATA
BRIDGE NO. BEL-148-0034
TYPE: 5' x 16' Concrete Box Culvert
SPAN: 16'
SKEW: 90° Lt. Fwd.

HYDRUALIC DATA		
DRAINAGE AREA = 304 Acres		
DISCHARGE	VELOCITY	HEADWATER ELEVATION
Q10 = 193 ft³/s	VEL. = 11.71 ft./s	HW = 1127.94
Q100 = 379 ft³/s	VEL. = 14.99 ft./s	HW = 1129.38

For quantities see sheet no. 59.
For structure details see sheet nos. 60-65.



5'x16'x46' Conduit, Type A, 706.05, AS PER PLAN

CALCULATED TES
CHECKED SKW

0 2.5 5 10
HORIZONTAL SCALE IN FEET

CULVERT PLAN & PROFILE (0.33)
BRIDGE NO. BEL-148-0034

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)910.91)

1/8

58
111

GENERAL NOTES

DESIGN SPECIFICATIONS:

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

DESIGN LOADING:

HS20-44 AND THE ALTERNATE MILITARY LOADING.

DESIGN STRESSES:

CAST-IN-PLACE STRUCTURES
CONCRETE CLASS C - f'c = 4,000 psi SUBSTRUCTURE
REINFORCING STEEL - ASTM A615, A616, OR A617
Fy = 60,000 psi.

PRECAST STRUCTURES: FOR BOX AND PIPE CULVERTS SEE CMS SECTION 603.

COFFERDAMS, CRIBS, AND SHEETING:

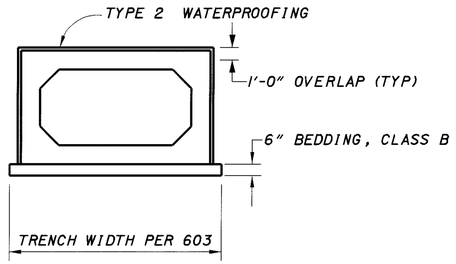
TEMPORARY SHORING SHALL BE USED TO ACCOMPLISH THE PROPOSED CONSTRUCTION IN STAGES. THE DESIGN OF THE TEMPORARY SHORING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER, AND CONFORM WITH 501.05.

UNCLASSIFIED EXCAVATION:

EXCAVATION LIMITS FOR THE PROPOSED STRUCTURE SHALL BE AS DEFINED IN 503.11. EXCAVATION OUTSIDE THESE LIMITS NECESSARY TO REMOVE THE EXISTING STRUCTURE SHALL BE INCLUDED IN 202 FOR PAYMENT.

ITEM 613 - LOW STRENGTH MORTAR BACKFILL, TYPE 1

LOW STRENGTH MORTAR BACKFILL SHALL BE PLACED AS SHOWN. PAYMENT FOR LOW STRENGTH MORTAR BACKFILL SHALL BE MADE ONLY FOR BACKFILL PLACED TO THE LIMITS SHOWN. THE EXCAVATION REQUIRED FOR THE PLACEMENT OF THE LSM SHALL BE INCLUDED IN ITEM 603 FOR PAYMENT.

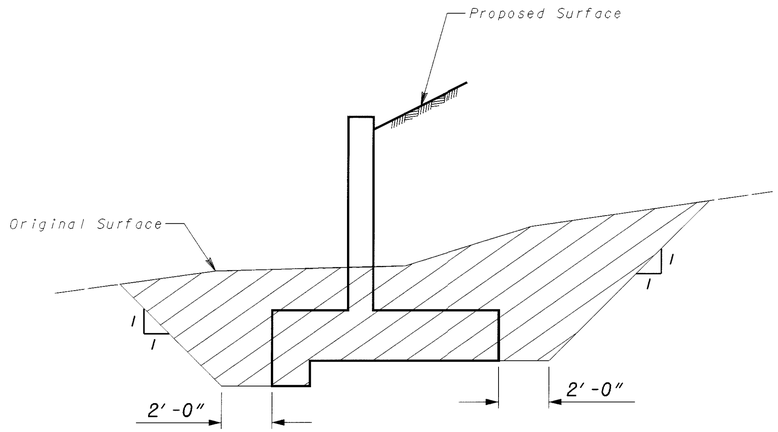


BOX CULVERT FOUNDATION

ESTIMATED QUANTITIES

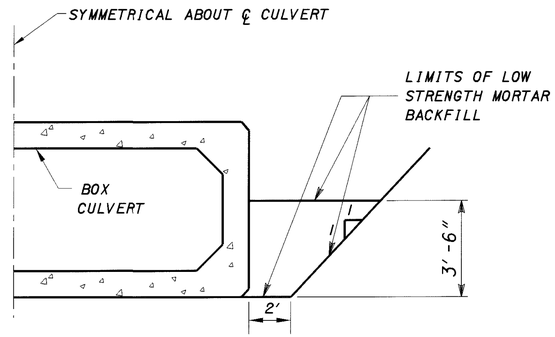
ITEM	ITEM EXT	TOTAL	UNIT	DESCRIPTION
202	11000	LUMP		STRUCTURE REMOVED
503	11100	LUMP		COFFERDAMS, CRIBS, AND SHEETING
503	21300	LUMP		UNCLASSIFIED EXCAVATION (WINGWALL FOOTING)
512	33000	173	SQ. YD.	TYPE 2 WATERPROOFING
SPECIAL	5126751O	36	SQ. YD.	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)
516	13600	3	SQ. FT.	1" PREFORMED EXPANSION JOINT FILLER
601	32100	28	CU. YD.	ROCK CHANNEL PROTECTION, TYPE B, WITH FILTER
603	96401	46	LIN. FT.	16'-0" SPAN X 5'-0" RISE CONDUIT, TYPE A, 706.05, AS PER PLAN
613	41250	45	CU. YD.	LOW STRENGH MORTAR BACKFILL, TYPE 1
842	46000	45	CU. YD.	CLASS C CONCRETE

NOTE: TOTALS CARRIED TO GENERAL SUMMARY.



LIMITS OF UNCLASSIFIED EXCAVATION
(WINGWALL AND CULVERT FOOTINGS)

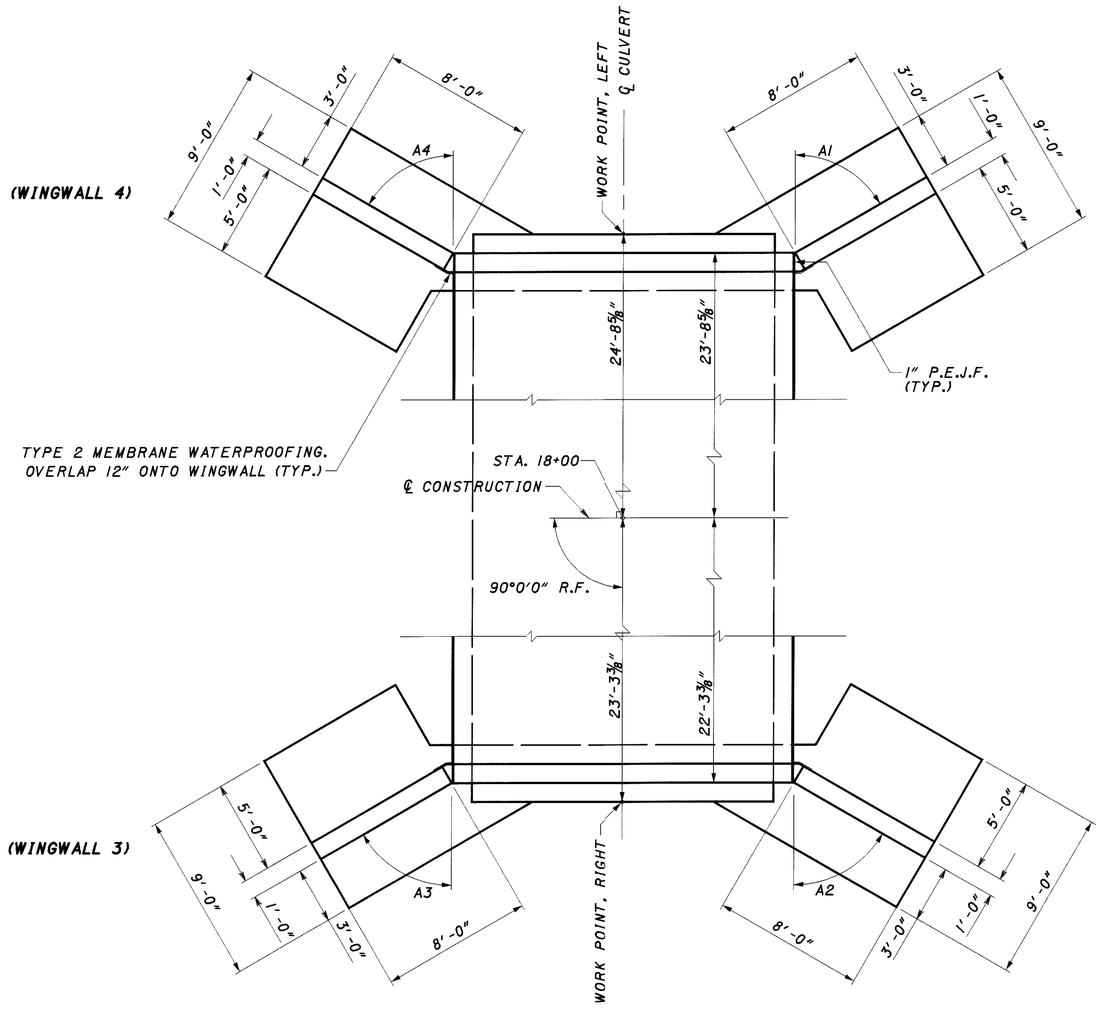
ITEM 503 UNCLASSIFIED EXCAVATION



Calculations
[(2 x 3.5) + (0.5 x 3.5 x 3.5)] x 46' ÷ 27 x 2 sides = 44.72 Sq. Yd.
(USE 45 Sq. Yd.)

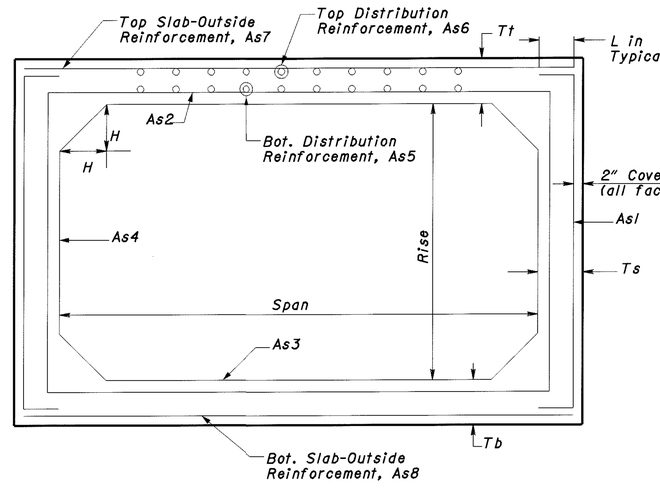
ITEM 613 - LOW STRENGTH MORTAR BACKFILL, TYPE 1

ODOT DISTRICT-11
0703699
TES
TES
SKW
GENERAL NOTES & ESTIMATED QUANTITIES
BEL-148-0034
BEL-148-(0.33)14.54)(5.07)
(7.93)(9.69)(10.91)
2 / 8
59
111



(WINGWALL 1)

Item 603 - 16' X 5' Conduit Type A, 706.05, As Per Plan
All Requirements of 706.05 and ASTM C850 Shall Be
Met Except As Detailed Herein:



Span	16'
Rise	5'
Tt	12"
Tb	12"
Ts	12"
H	12"
Asl	0.613
As2	0.569
As3	0.468
As4	0.288
As5	0.288
As6	0.288
As7	0.288
As8	0.288
L min	51"

Notes: Maximum spacing of reinforcing shall be 8".
The minimum concrete compressive strength shall be 5000 psi.
The minimum yield strength for reinforcing shall be 65 ksi.
As min = 0.002 X Gross Section Area

WINGWALL ANGLES	
A1	60°0'0"
A2	60°0'0"
A3	60°0'0"
A4	60°0'0"

WORK POINTS		
LOCATION	STATION	OFFSET
LEFT	18+00.00	24'-8⅝"
RIGHT	18+00.00	23'-3⅜"

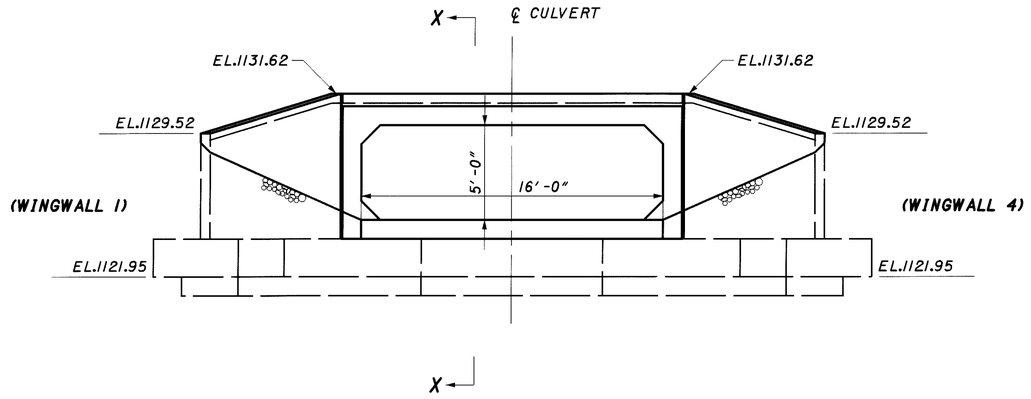
CULVERT & WINGWALL LAYOUT

ODOT DISTRICT-11

DESIGNED TES	DRAWN TES	PROJECT NUMBER 0703699
CHECKED SKW	QUANTITIES	DATE

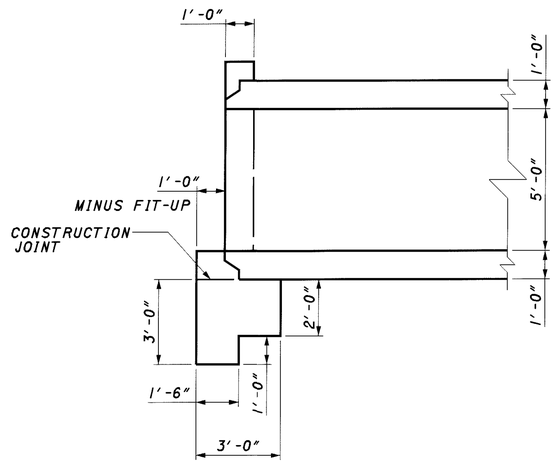
STRUCTURE DETAILS
BEL-148-0034

BEL-148-(0.33)(4.54)(5.07)
(7.53)(9.69)(10.91)

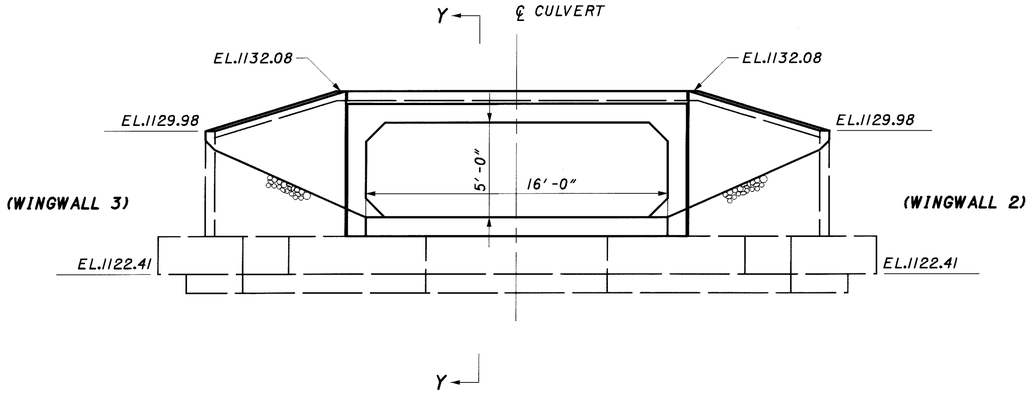


OUTLET ELEVATION

FLOWLINE ELEVATION: ELEV. 1124.95

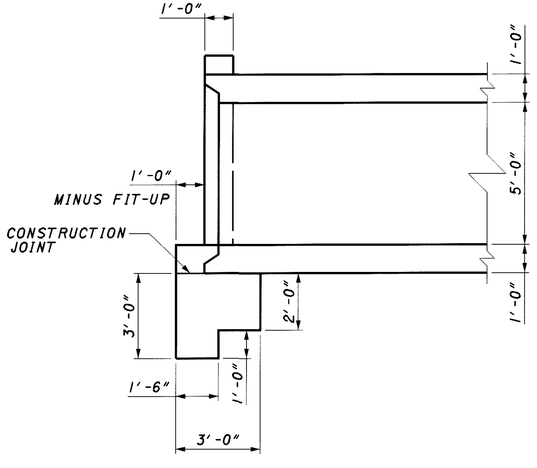


SECTION X-X



INLET ELEVATION

FLOWLINE ELEVATION: ELEV. 1125.41



SECTION Y-Y

ODOT DISTRICT-11

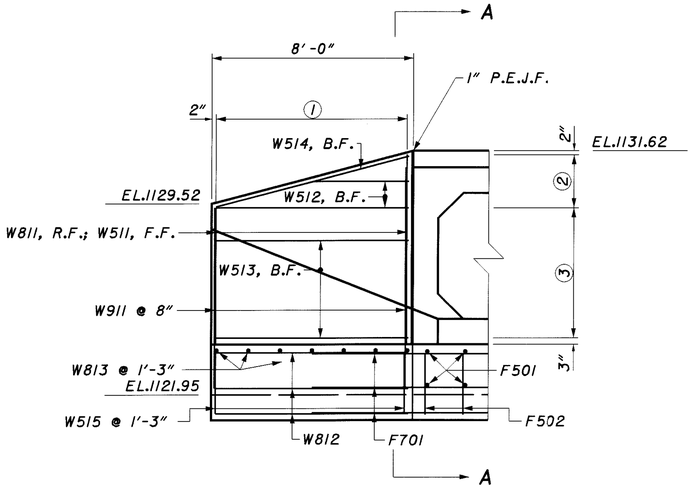
DESIGNED	DRAWN
TES	TES
CHECKED	QUANTITIES PREPARED
SKW	0703699

STRUCTURE DETAILS
BEL-148-0034

BEL-148-10.33\4.54\(5.07)
17.93\19.69\(10.91)

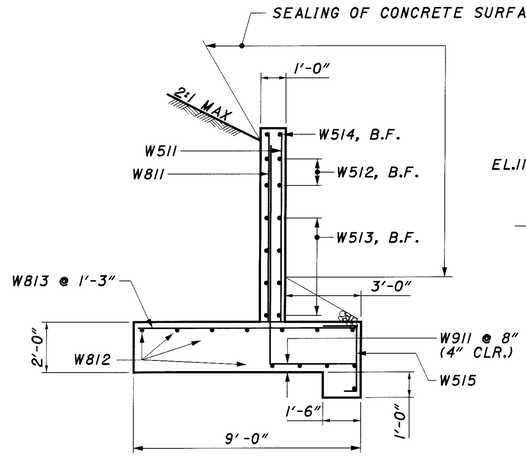
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

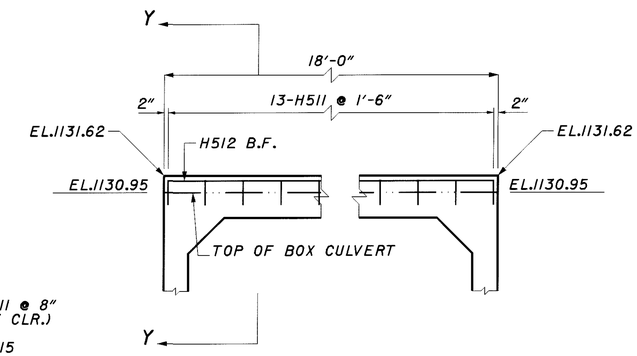


WINGWALL 1 ELEVATION

① SER. OF 7 @ 1'-3"
② 2 SPACES @ 1'-1"
③ 4 SPACES @ 1'-3"

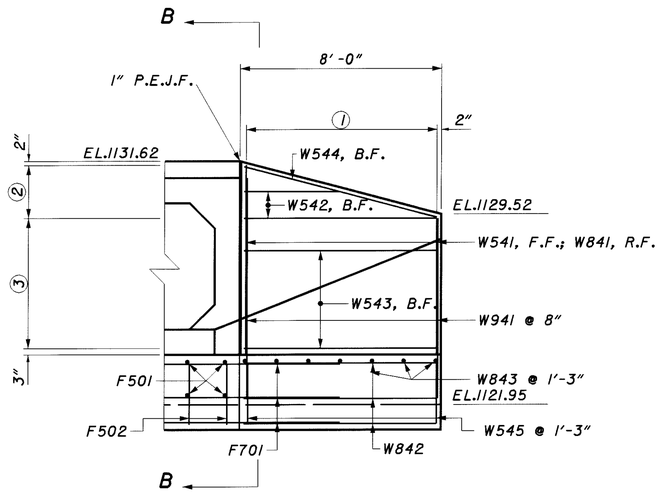


SECTION A-A



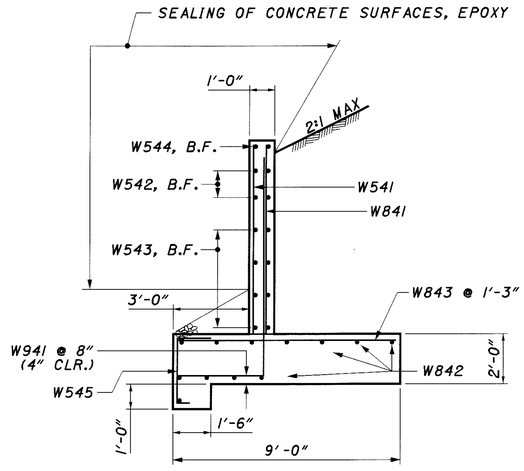
OUTLET HEADWALL REINFORCING DETAIL

SEE SHEET 63 FOR SECTION Y-Y

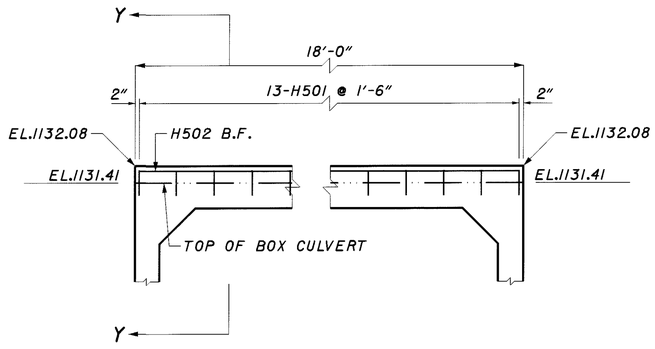


WINGWALL 4 ELEVATION

① SER. OF 7 @ 1'-3"
② 2 SPACES @ 1'-1"
③ 4 SPACES @ 1'-3"



SECTION B-B



INLET HEADWALL REINFORCING DETAIL

SEE SHEET 63 FOR SECTION Y-Y

NOTES:

1" PREFORMED EXPANSION JOINT FILLER SHALL BE EXTENDED FROM TOP OF FOOTING TO TOP OF WALL.

ODOT DISTRICT-11

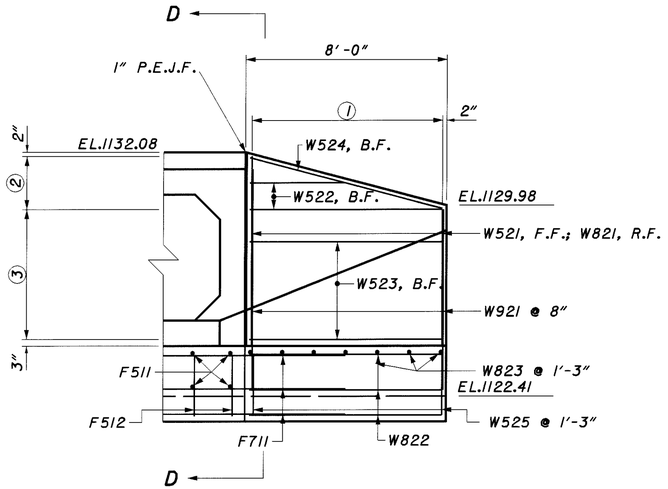
DESIGNED	DRAWN	CHECKED	QUANTITIES CHECKED
TES	TES	SKW	0703699

STRUCTURE DETAILS
BEL-148-0034

BEL-148-(0.33)14.54)(5.07)
(7.93)19.69)11(0.91)

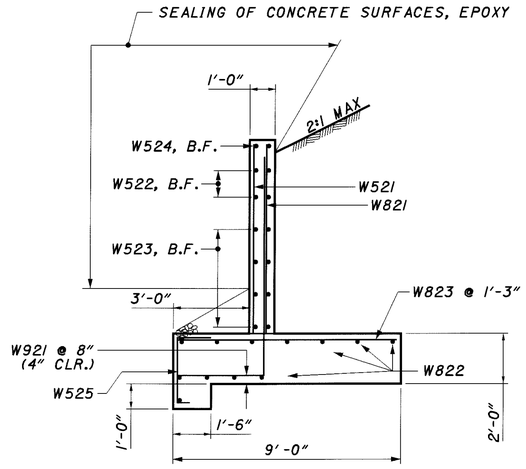
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

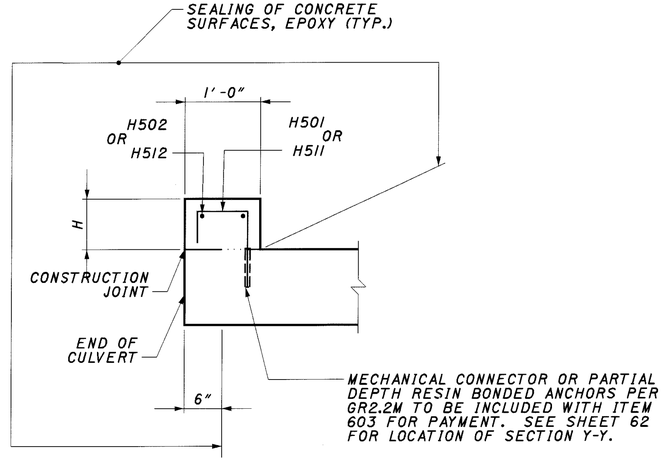


WINGWALL 2 ELEVATION

(1) SER. OF 7 @ 1'-3"
(2) 2 SPACES @ 1'-1"
(3) 4 SPACES @ 1'-3"

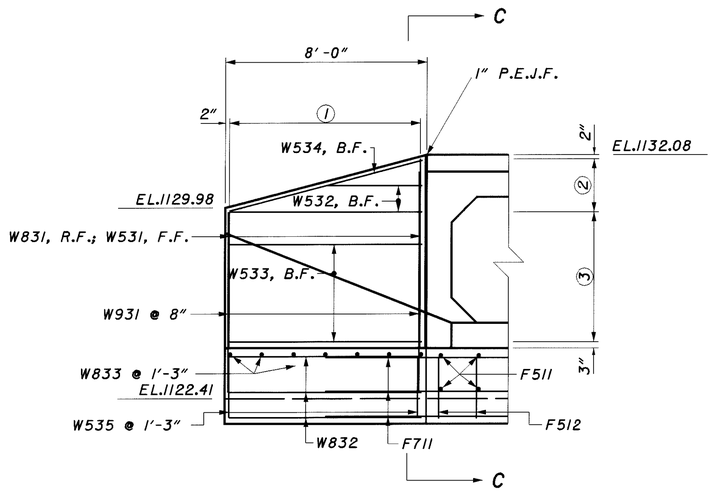


SECTION D-D



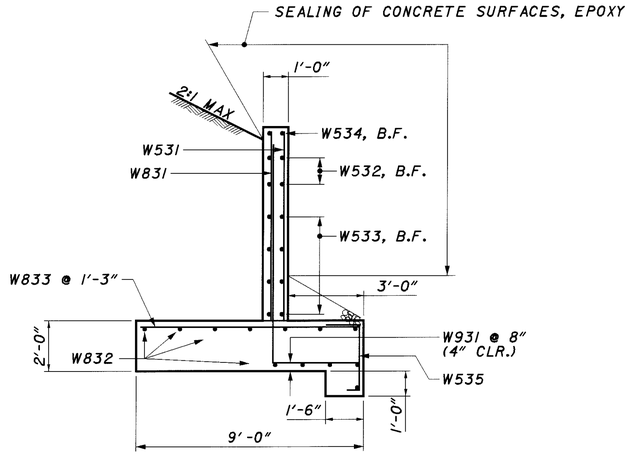
SECTION Y-Y

H -8" OUTLET HEADWALL
H -8" INLET HEADWALL



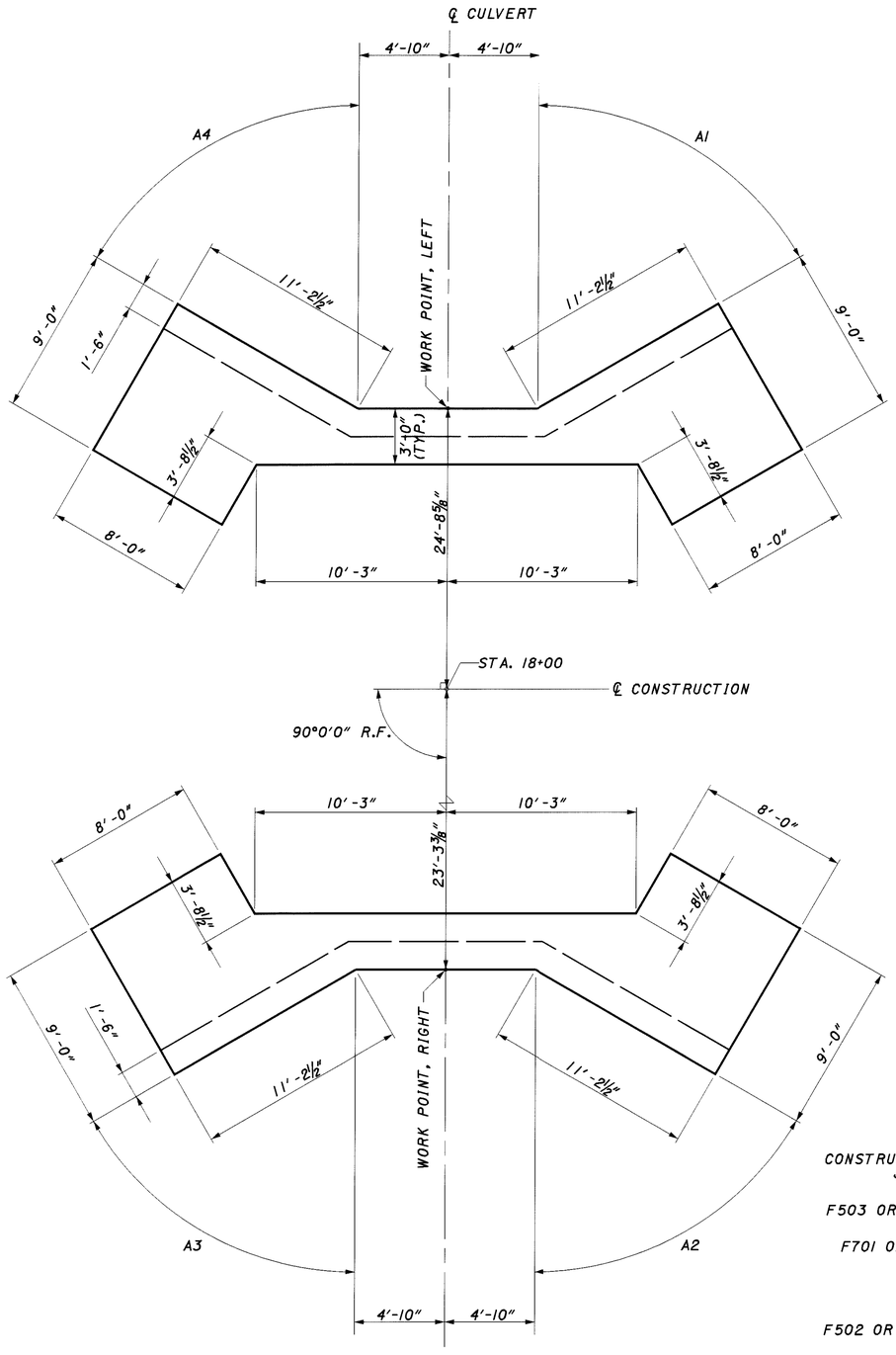
WINGWALL 3 ELEVATION

(1) SER. OF 7 @ 1'-3"
(2) 2 SPACES @ 1'-1"
(3) 4 SPACES @ 1'-3"



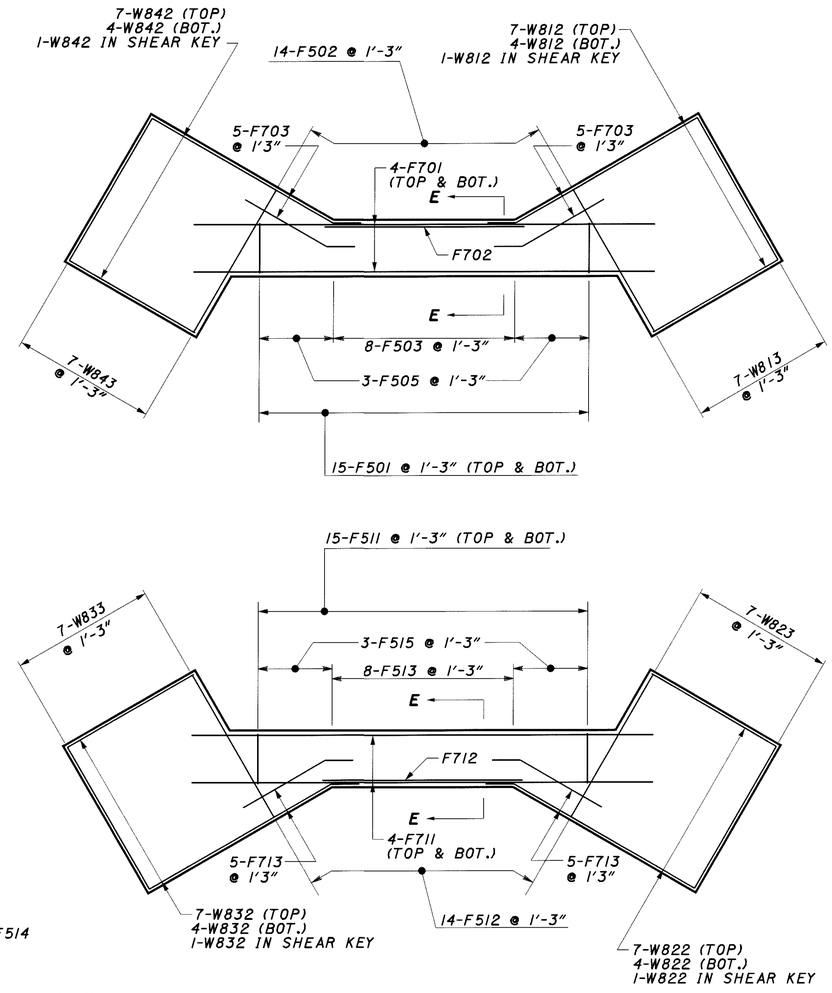
SECTION C-C

ODOT DISTRICT-11
0703699
DESIGNED TES
DRAWN TES
CHECKED SKW
STRUCTURE DETAILS
BEL-148-0034
BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)
6 / 8
63
111

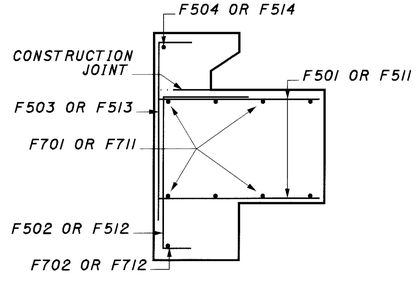


FOOTING LAYOUT

SEE TABLE ON SHEET 60 FOR VALUES OF A1 THRU A4
FOR WORKPOINT STATIONS AND OFFSETS SEE SHEET 60



FOOTING REINFORCING



FOOTING REINFORCING DETAIL SECTION E-E

ODOT DISTRICT-11

DESIGNED SKW	DRAWN TES	CHECKED TES
DATE	DATE	PROJECT NUMBER 0703699

STRUCTURE DETAILS
BEL-148-0034

BEL-148-(10.33)14.54(15.07)
(17.93)19.69(110.91)

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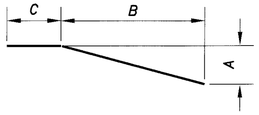
POST HEIGHT TABLE			
STA.	"A"	HEIGHT	L/R
17+94.61	1.3'	3.6'	L
18+00.86	1.2'	3.5'	L
18+07.11	1.1'	3.5'	L
17+94.50	1.8'	4.1'	R
18+00.75	1.7'	4.1'	R
18+07.00	1.6'	4.0'	R

NOTE:
THE POST HEIGHTS TABULATED ABOVE ARE CALCULATED HEIGHTS.

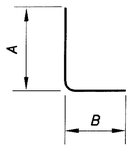
SEE STANDARD DRAWING GR-2.2M FOR ADDITIONAL DETAIL.

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, W601 IS A NO. 6 BAR. BAR DIMENSIONS SHOWN ARE OUT TO OUT UNLESS OTHERWISE INDICATED. R INDICATES INSIDE RADIUS, UNLESS OTHERWISE NOTED. "STD." WRITTEN IN PLACE OF A DIMENSION INDICATES A STANDARD BEND AT THE END OF THE BAR.

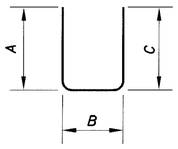
ALL REINFORCING STEEL TO BE EPOXY COATED.



TYPE 1



TYPE 2



TYPE 3

BENDING DIAGRAMS

S.O. - SERIES OF

EPOXY COATED REINFORCING STEEL LIST

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
				WINGWALL 1				
W511	1	5'-5"	47	STR				4 1/2"
.	S.O.	TO						
.	7	7'-6"						
W512	2	3'-9"	24	STR				3'-10"
.	S.O.	TO						
.	2	7'-7"						
W513	8	7'-7"	63	STR				
W514	2	7'-10"	16	STR				
W515	7	4'-2"	30	3	1'-4"	2'-7"	6"	
W811	1	5'-5"	121	STR				4 1/2"
.	S.O.	TO						
.	7	7'-6"						
W812	12	7'-8"	246	STR				
W813	7	8'-8"	162	STR				
W911	1	10'-3"	489	2	7'-0"	3'-6"		1½"
	S.O.	TO			TO			
	13	11'-11"			8'-8"			
	SUBTOTAL - 1198 LBS							
				WINGWALL 2				
W521	1	5'-5"	47	STR				4 1/2"
.	S.O.	TO						
.	7	7'-6"						
W522	2	3'-9"	24	STR				3'-10"
.	S.O.	TO						
.	2	7'-7"						
W523	8	7'-7"	63	STR				
W524	2	7'-10"	16	STR				
W525	7	4'-2"	30	3	1'-4"	2'-7"	6"	
W821	1	5'-5"	121	STR				4 1/2"
.	S.O.	TO						
.	7	7'-6"						
W822	12	7'-8"	246	STR				
W823	7	8'-8"	162	STR				
W921	1	10'-3"	498	2	7'-0"	3'-6"		1½"
	S.O.	TO			TO			
	13	11'-11"			8'-8"			
	SUBTOTAL - 1198 LBS							
				WINGWALL 3				
W531	1	5'-5"	47	STR				4 1/2"
.	S.O.	TO						
.	7	7'-6"						
W532	2	3'-9"	24	STR				3'-10"
.	S.O.	TO						
.	2	7'-7"						
W533	8	7'-7"	63	STR				
W534	2	7'-10"	16	STR				
W535	7	4'-2"	30	3	1'-4"	2'-7"	6"	
W831	1	5'-5"	121	STR				4 1/2"
.	S.O.	TO						
.	7	7'-6"						

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
W832	12	7'-8"	246	STR				
W833	7	8'-8"	162	STR				
W931	1	10'-3"	498	2	7'-0"	3'-6"		1½"
	S.O.	TO			TO			
	13	11'-11"			8'-8"			
	SUBTOTAL - 1198 LBS							
				WINGWALL 4				
W541	1	5'-5"	47	STR				4 1/2"
.	S.O.	TO						
.	7	7'-6"						
W542	2	3'-9"	24	STR				3'-10"
.	S.O.	TO						
.	2	7'-7"						
W543	8	7'-7"	63	STR				
W544	2	7'-10"	16	STR				
W545	7	4'-2"	30	3	1'-4"	2'-7"	6"	
W841	1	5'-5"	121	STR				4 1/2"
.	S.O.	TO						
.	7	7'-6"						
W842	12	7'-8"	246	STR				
W843	7	8'-8"	162	STR				
W941	1	10'-3"	498	2	7'-0"	3'-6"		1½"
	S.O.	TO			TO			
	13	11'-11"			8'-8"			
	SUBTOTAL - 1198 LBS							
				CULVERT FOOTING				
F501	30	2'-8"	83	STR				
F502	14	4'-5"	65	3	6"	2'-8"	1'-6"	
F503	8	3'-7"	30	2	3'-0"	9"		
F504	1	15'-8"	16	STR				
F505	6	3'-3"	21	2	2'-8"	9"		
F511	30	2'-8"	83	STR				
F512	14	4'-5"	65	3	6"	2'-8"	1'-6"	
F513	8	3'-7"	30	2	3'-0"	9"		
F514	1	15'-8"	16	STR				
F515	6	3'-3"	21	2	2'-8"	9"		
F701	8	24'-6"	400	STR				
F702	1	10'-8"	22	STR				
F703	10	6'-4"	130	1	2'-6"	5'-0"	1'-6"	
F711	8	24'-6"	400	STR				
F712	1	10'-8"	22	STR				
F713	10	6'-4"	130	1	2'-6"	5'-0"	1'-6"	
	SUBTOTAL - 1534 LBS							
				HEADWALL				
H501	13	1'-9"	24	3	1'-0"	8"	4"	
H502	2	17'-8"	37	STR				
H511	13	1'-9"	24	3	1'-0"	8"	4"	
H512	2	17'-8"	37	STR				
	SUBTOTAL - 122 LBS							

ODOT DISTRICT-11

DESIGNED	DRAWN	CHECKED	QUANTITIES
	TES	SKW	0703699

REINFORCING STEEL LIST
BEL-148-0034

BEL-148-(0.33)14.54)(15.07)
(17.93)19.69)(10.91)

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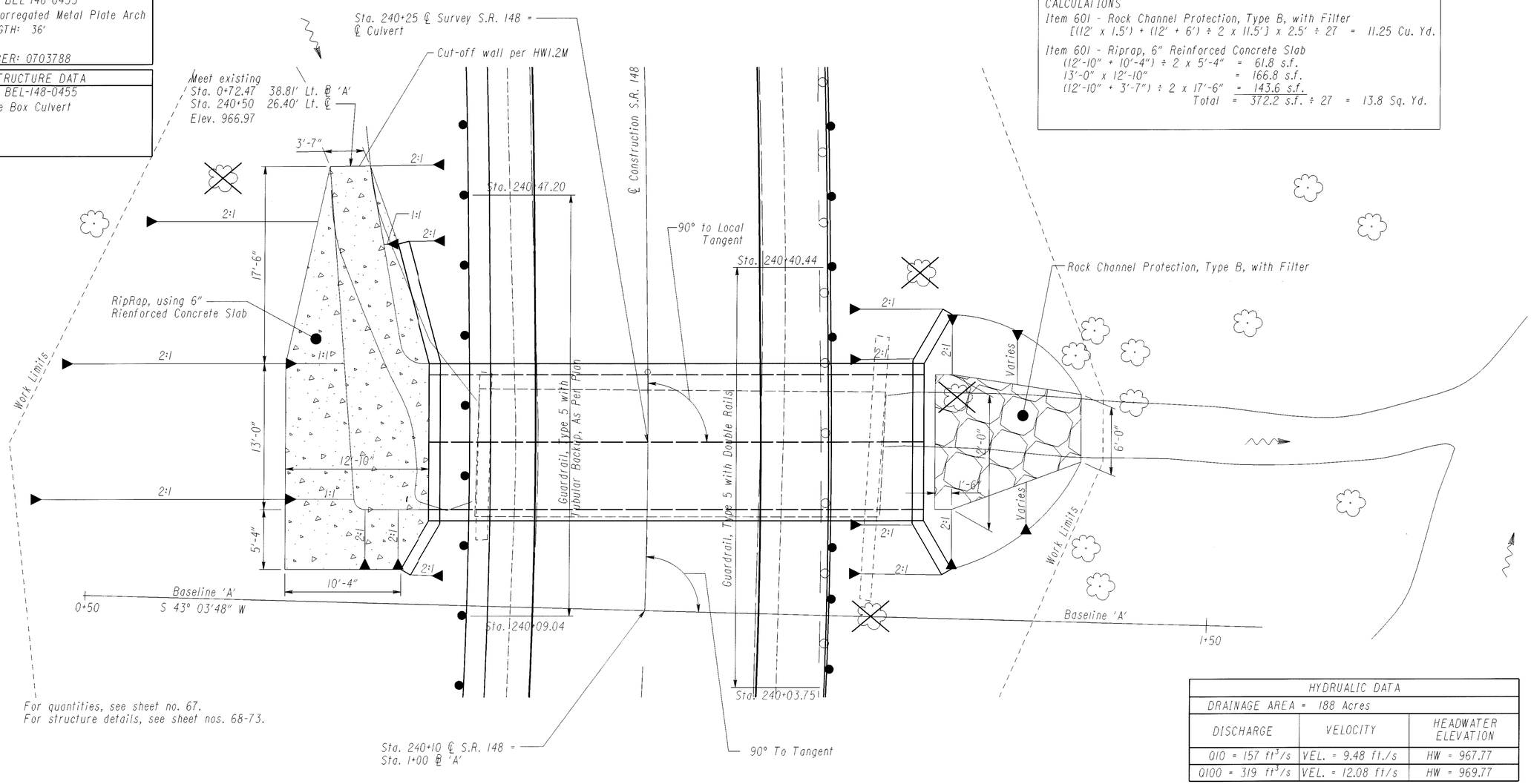
EXISTING STRUCTURE DATA
BRIDGE NO. BEL-148-0455
TYPE: 4'-6" x 12'-0" Corregated Metal Plate Arch
SPAN: 12' LENGTH: 36'
SKEW: 90° Lt. Fwd.
STRUCTURAL FILE NUMBER: 0703788

PROPOSED STRUCTURE DATA
BRIDGE NO. BEL-148-0455
TYPE: 4' x 12' Concrete Box Culvert
SPAN: 12'
SKEW: 90° Lt. Fwd.

CALCULATIONS

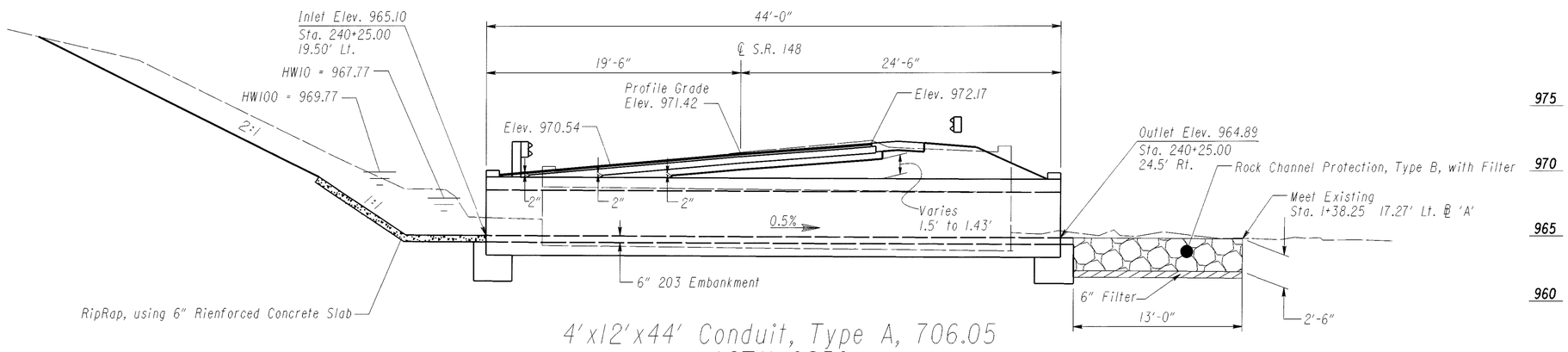
Item 601 - Rock Channel Protection, Type B, with Filter
[(12' x 1.5') + (12' + 6') ÷ 2 x 11.5'] x 2.5' ÷ 27 = 11.25 Cu. Yd.

Item 601 - Riprap, 6" Reinforced Concrete Slab
(12'-10" + 10'-4") ÷ 2 x 5'-4" = 61.8 s.f.
13'-0" x 12'-10" = 166.8 s.f.
(12'-10" + 3'-7") ÷ 2 x 17'-6" = 143.6 s.f.
Total = 372.2 s.f. ÷ 27 = 13.8 Sq. Yd.



For quantities, see sheet no. 67.
For structure details, see sheet nos. 68-73.

HYDRUALIC DATA		
DRAINAGE AREA = 188 Acres		
DISCHARGE	VELOCITY	HEADWATER ELEVATION
Q10 = 157 ft^3/s	VEL. = 9.48 ft./s	HW = 967.77
Q100 = 319 ft^3/s	VEL. = 12.08 ft/s	HW = 969.77



4'x12'x44' Conduit, Type A, 706.05
ASTM C850

CALCULATED TES
CHECKED SKW

0 2.5 5 10
HORIZONTAL SCALE IN FEET

CULVERT PLAN & PROFILE (4.54)
BRIDGE NO. BEL-148-0455

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)910.91)

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GENERAL NOTES

DESIGN SPECIFICATIONS:

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

DESIGN LOADING:

HS20-44 AND THE ALTERNATE MILITARY LOADING.

DESIGN STRESSES:

CAST-IN-PLACE STRUCTURES
CONCRETE CLASS C - f'c = 4,000 psi SUBSTRUCTURE
REINFORCING STEEL - ASTM A615, A616, OR A617
Fy = 60,000 psi.

PRECAST STRUCTURES: FOR BOX AND PIPE CULVERTS SEE CMS SECTION 603.

COFFERDAMS, CRIBS, AND SHEETING

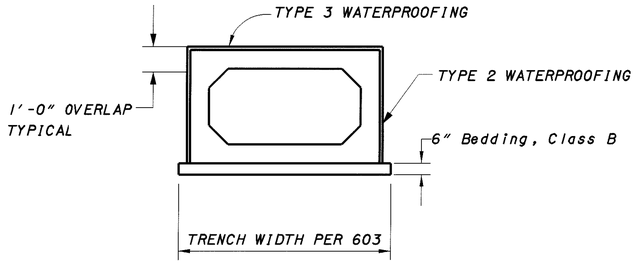
TEMPORARY SHORING SHALL BE USED TO ACCOMPLISH THE PROPOSED CONSTRUCTION IN STAGES. THE DESIGN OF THE TEMPORARY SHORING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER, AND CONFORM WITH 501.05.

UNCLASSIFIED EXCAVATION:

EXCAVATION LIMITS FOR THE PROPOSED STRUCTURE SHALL BE AS DEFINED IN 503.11. EXCAVATION OUTSIDE THESE LIMITS NECESSARY TO REMOVE THE EXISTING STRUCTURE SHALL BE INCLUDED IN 202 FOR PAYMENT.

ITEM 613 - LOW STRENGTH MORTAR BACKFILL, TYPE 1

LOW STRENGTH MORTAR BACKFILL SHALL BE PLACED AS SHOWN. PAYMENT FOR LOW STRENGTH MORTAR BACKFILL SHALL BE MADE ONLY FOR BACKFILL PLACED TO THE LIMITS SHOWN. THE EXCAVATION REQUIRED FOR THE PLACEMENT OF THE LSM SHALL BE INCLUDED IN ITEM 603 FOR PAYMENT.

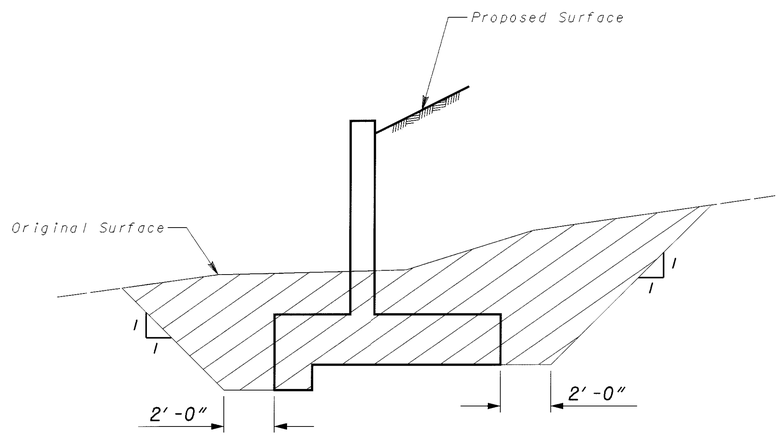


BOX CULVERT FOUNDATION

ESTIMATED QUANTITIES

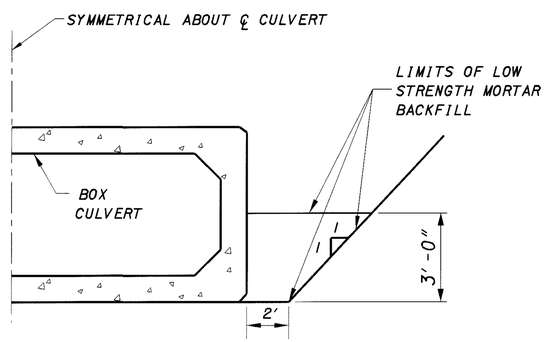
ITEM	ITEM EXT	TOTAL	UNIT	DESCRIPTION
202	11000	LUMP		STRUCTURE REMOVED
503	11100	LUMP		COFFERDAMS, CRIBS, AND SHEETING
503	21300	LUMP		UNCLASSIFIED EXCAVATION (WINGWALL FOOTING)
512	33000	62	SQ. YD.	TYPE 2 WATERPROOFING
512	33010	75	SQ. YD.	TYPE 3 WATERPROOFING
SPECIAL	51267510	27	SQ. YD.	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)
516	13600	3	SQ. FT.	1" PREFORMED EXPANSION JOINT FILLER
601	11000	14	SQ. YD.	RIPRAP, USING 6" REINFORCED CONCRETE SLAB
601	32100	12	CU. YD.	ROCK CHANNEL PROTECTION, TYPE B, WITH FILTER
603	95600	44'-0"	LIN. FT.	12'-0" SPAN X 4'-0" RISE CONDUIT, TYPE A, 706.05 ASTM C850
613	41250	35	CU. YD.	LOW STRENGH MORTAR BACKFILL, TYPE 1
842	46000	30	CU. YD.	CLASS C CONCRETE

NOTE: TOTALS CARRIED TO GENERAL SUMMARY SHEETS



LIMITS OF UNCLASSIFIED EXCAVATION
(WINGWALL AND CULVERT FOOTINGS)

ITEM 503 UNCLASSIFIED EXCAVATION



Calculations:
[(2 x 3) + (0.5 x 3 x 3)] x 44 ÷ 27 x 2 sides = 34.22 Cu. Yd.
(USE 35 Cu. Yd.)

ITEM 613 - LOW STRENGTH MORTAR BACKFILL, TYPE 1

ODOT DISTRICT-11

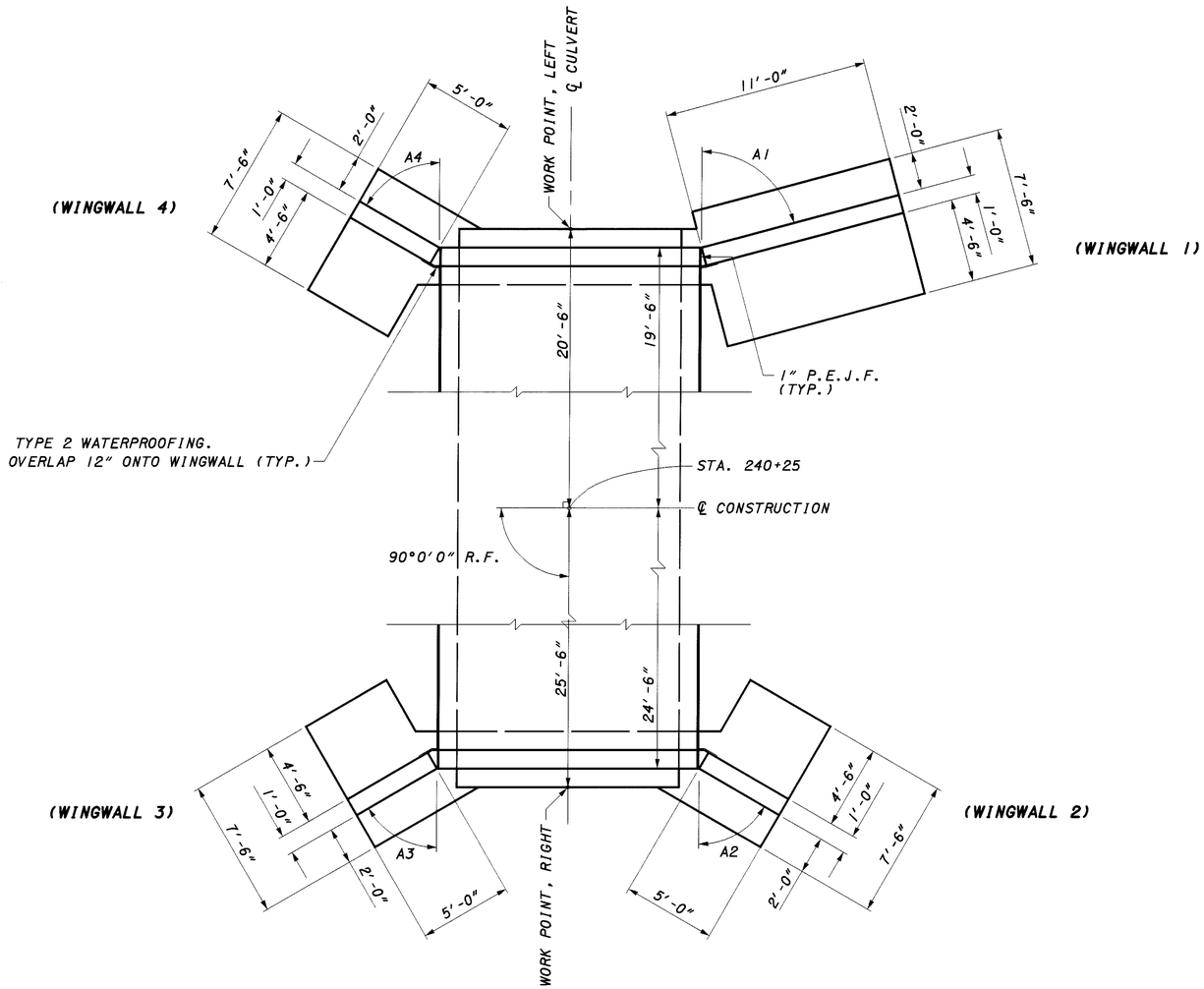
DRAWN TES	DATE	PROJECT NO. 0703788
CHECKED TES		
APPROVED SKW		

STRUCTURE DETAILS
BEL-148-0455

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

2 / 8

67
111



CULVERT & WINGWALL LAYOUT

WINGWALL ANGLES	
A1	75°0'0"
A2	60°0'0"
A3	60°0'0"
A4	60°0'0"

WORK POINTS		
LOCATION	STATION	OFFSET
LEFT	240+25.00	20'-6"
RIGHT	240+25.00	25'-6"

ODOT DISTRICT-11

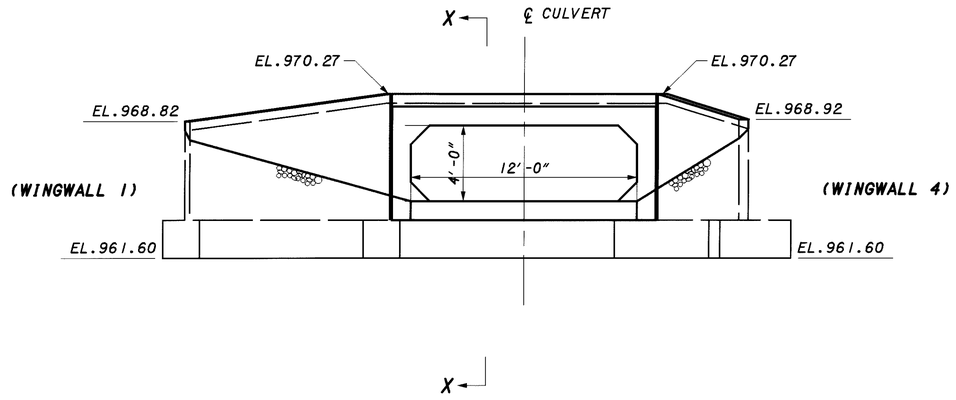
STRUCTURE DETAILS
BEL-148-0455

DESIGNED TES
DRAWN TES
CHECKED SKW
DATE
SUPERVISED
PROJECT NUMBER AND DESIGNATION 0703788
QUANTITY
SHEET

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

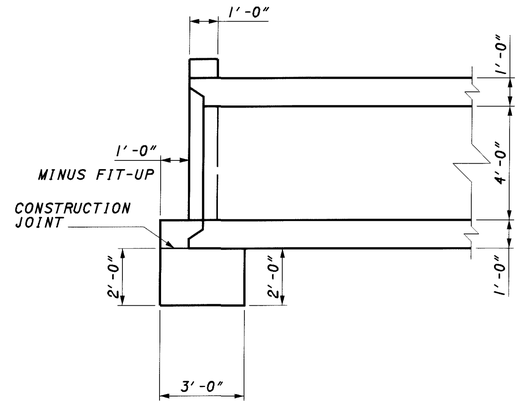
3 / 8

68
111

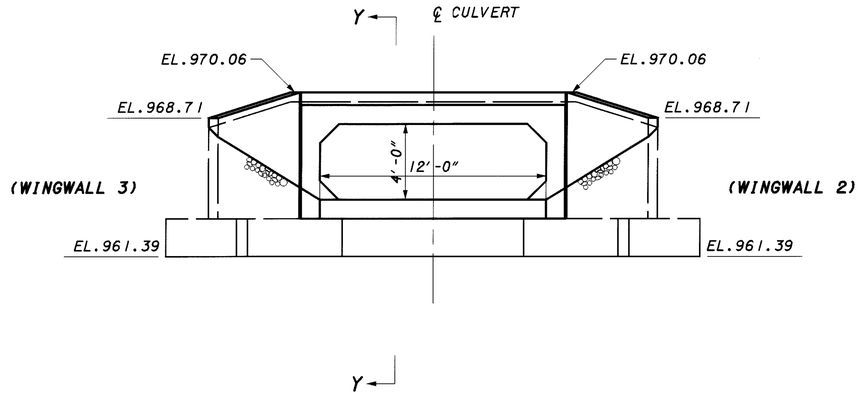


INLET ELEVATION

FLOWLINE ELEVATION: EL.965.10

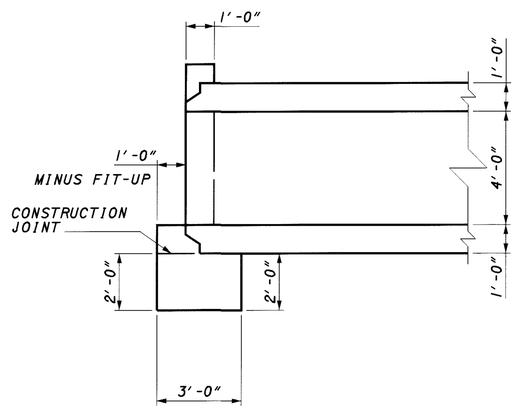


SECTION X-X



OUTLET ELEVATION

FLOWLINE ELEVATION: EL.964.89



SECTION Y-Y

ODOT DISTRICT-11

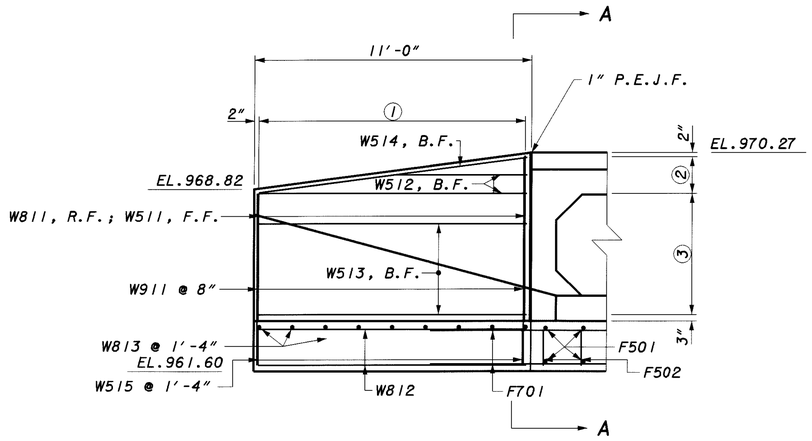
	DATE	PROJECT NO. 0703788
DESIGNED TES	DRAWN TES	
CHECKED SKW		

STRUCTURE DETAILS
BEL-148-0455

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

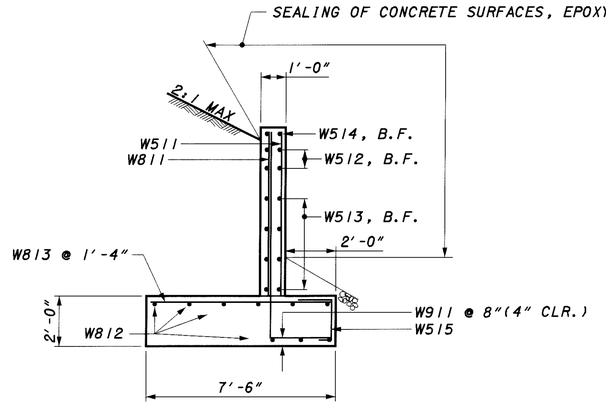
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

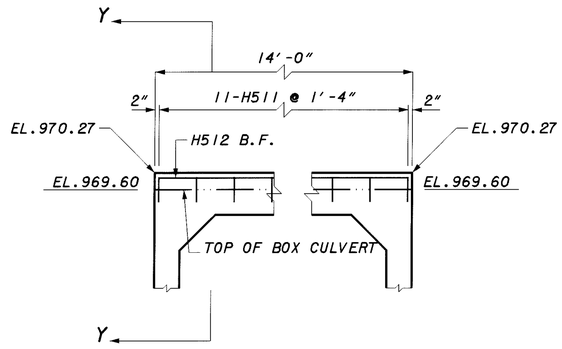


WINGWALL 1 ELEVATION

① SER. OF 9 @ 1'-4"
② 2 SPACES @ 9"
③ 4 SPACES @ 1'-2"

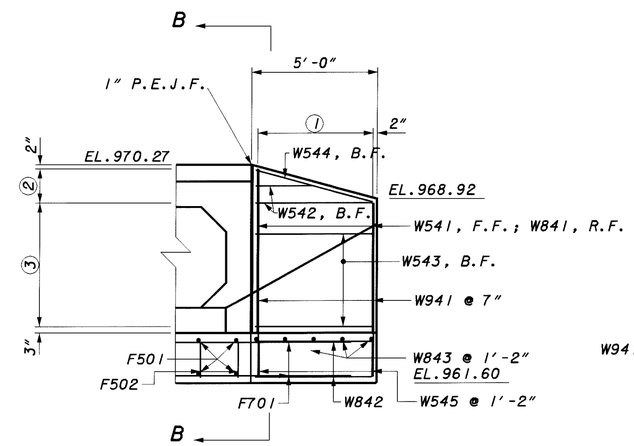


SECTION A-A



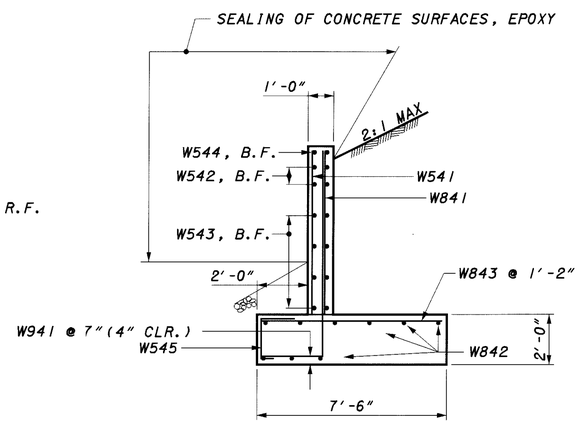
INLET HEADWALL REINFORCING DETAIL

SEE SHEET 71 FOR SECTION Y-Y

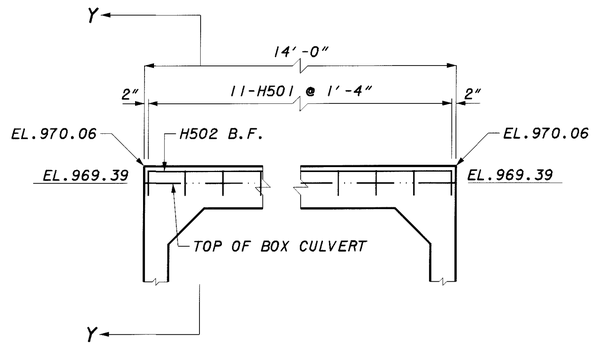


WINGWALL 4 ELEVATION

① SER. OF 5 @ 1'-2"
② 2 SPACES @ 8"
③ 4 SPACES @ 1'-3"



SECTION B-B



OUTLET HEADWALL REINFORCING DETAIL

SEE SHEET 71 FOR SECTION Y-Y

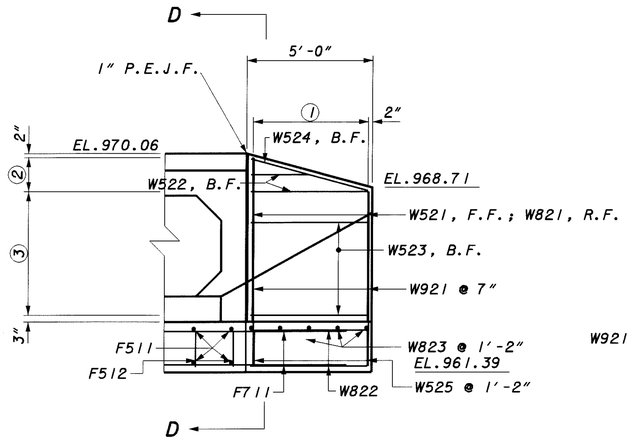
NOTES:

1" PREFORMED EXPANSION JOINT FILLER SHALL BE EXTENDED FROM TOP OF FOOTING TO TOP OF WALL.

ODOT DISTRICT-11
0703788
DESIGNED TES
DRAWN TES
CHECKED SKW
STRUCTURE DETAILS
BEL-148-0455
BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)
5 / 8
70
111

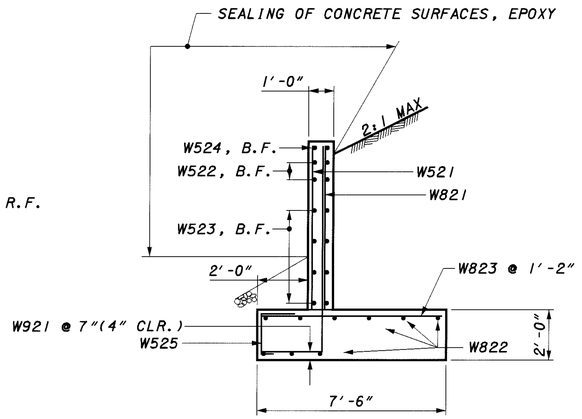
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

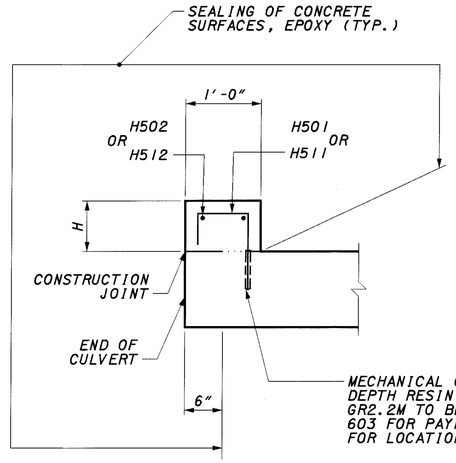


WINGWALL 2 ELEVATION

(1) SER. OF 5 @ 1'-2"
(2) 2 SPACES @ 8"
(3) 4 SPACES @ 1'-3"

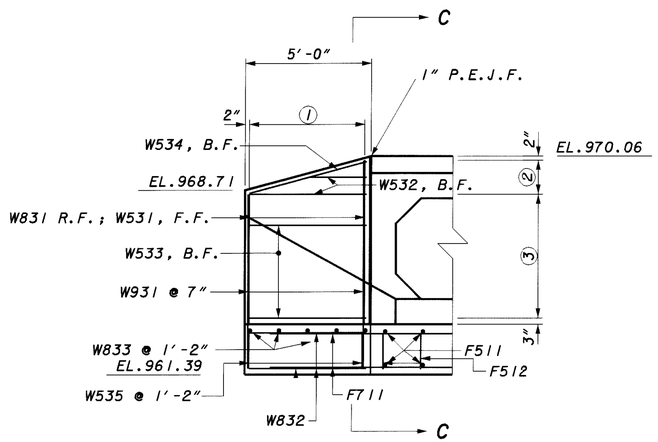


SECTION D-D



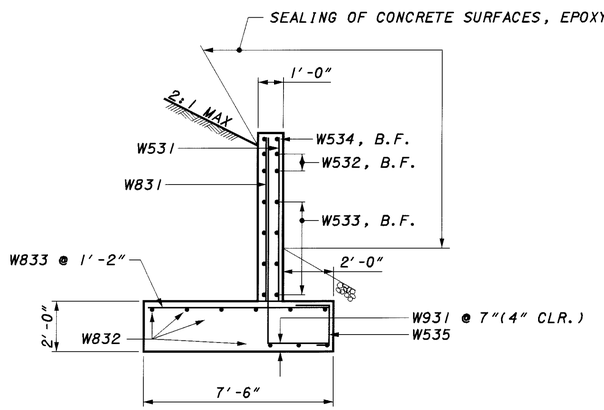
SECTION Y-Y

H -8" INLET HEADWALL
H -8" OUTLET HEADWALL



WINGWALL 3 ELEVATION

(1) SER. OF 5 @ 1'-2"
(2) 2 SPACES @ 8"
(3) 4 SPACES @ 1'-3"



SECTION C-C

ODOT DISTRICT-11

0703788

DESIGNED TES
DRAWN TES
CHECKED SKW

STRUCTURE DETAILS
BEL-148-0455

BEL-148-(0.33)(14.54)(5.07)
(7.93)(9.69)(10.91)

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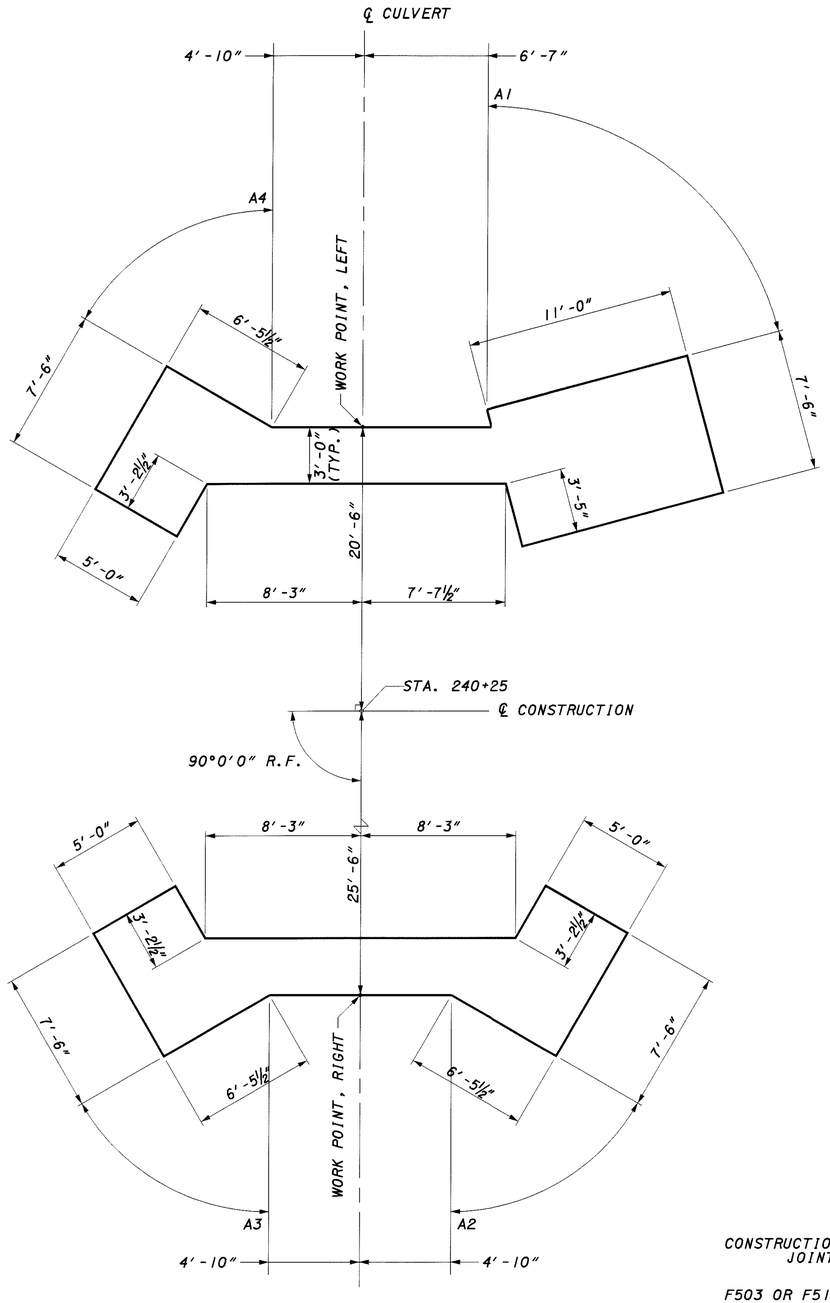
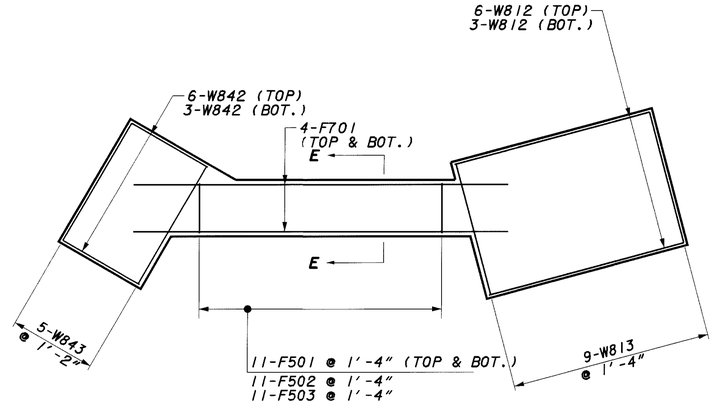
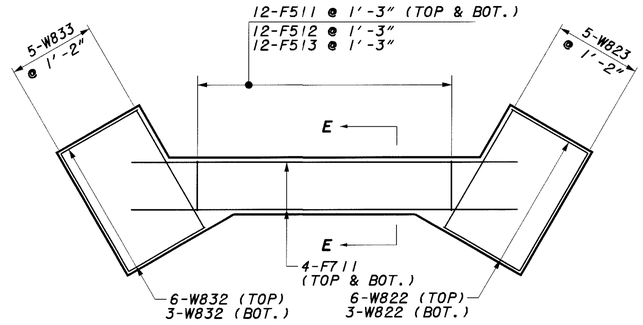


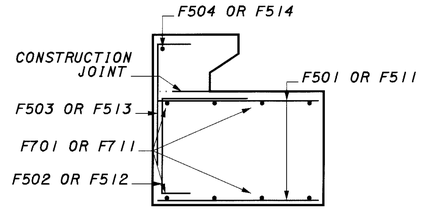
FOOTING LAYOUT

SEE TABLE ON SHEET 68 FOR VALUES OF A1 THRU A4
FOR WORKPOINT STATIONS AND OFFSETS SEE SHEET 3/8



FOOTING REINFORCING





FOOTING REINFORCING DETAIL SECTION E-E

ODOT DISTRICT-11

DESIGNED	DRAWN	CHECKED	QUANTITIES
TES	TES	SKW	07.03788

STRUCTURE DETAILS
BEL-148-0455

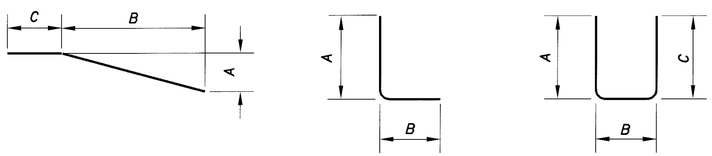
BEL-148-10.33/(4.54)/(5.07)
(7.93)/(9.69)/(10.91)

POST HEIGHT TABLE			
STA.	"A"	HEIGHT	L/R
240+21.91	0.4	2.7	L
240+28.35	0.3	2.6	L

NOTE:
THE POST HEIGHTS TABULATED ABOVE ARE CALCULATED HEIGHTS.
SEE STANDARD DRAWING GR-2.2M FOR ADDITIONAL DETAIL.

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, W601 IS A NO. 6 BAR. BAR DIMENSIONS SHOWN ARE OUT TO OUT UNLESS OTHERWISE INDICATED. R INDICATES INSIDE RADIUS, UNLESS OTHERWISE NOTED. "STD." WRITTEN IN PLACE OF A DIMENSION INDICATES A STANDARD BEND AT THE END OF THE BAR.

ALL REINFORCING STEEL TO BE EPOXY COATED.



TYPE 1 TYPE 2 TYPE 3

BENDING DIAGRAMS

S.O. - SERIES OF

EPOXY COATED REINFORCING STEEL LIST

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
				WINGWALL 1				
W511	1	5'-1"	55	STR				2"
.	S.O.	TO						
.	9	6'-6"						
W512	2	5'-3"	33	STR				5'-4"
.	S.O.	TO						
.	2	10'-7"						
W513	8	10'-7"	88	STR				
W514	2	10'-8"	22	STR				
W911	1	9'-4"	578	2	6'-10"	2'-6"		1"
	S.O.	TO			TO			
	17	10'-8"			8'-2"			
W812	9	10'-8"	256	STR				
W813	9	7'-2"	173	STR				
W811	1	5'-1"	139	STR				2"
	S.O.	TO						
	9	6'-6"						
W515	9	3'-2"	30	3	1'-4"	1'-7"	6"	
	SUBTOTAL = 1374 LBS							
				WINGWALL 2				
W521	1	5'-2"	31	STR				4"
.	S.O.	TO						
.	5	6'-6"						
W522	2	2'-3"	14	STR				2'-4"
.	S.O.	TO						
.	2	4'-7"						
W523	8	4'-7"	38	STR				
W524	2	4'-9"	10	STR				
W921	1	9'-4"	306	2	6'-10"	2'-6"		2"
	S.O.	TO			TO			
	9	10'-8"			8'-2"			
W822	9	4'-8"	112	STR				
W823	5	7'-2"	96	STR				
W821	1	5'-2"	78	STR				4"
	S.O.	TO						
	5	6'-6"						
W525	5	3'-2"	17	3	1'-4"	1'-7"	6"	
	SUBTOTAL = 702 LBS							
				WINGWALL 3				
W531	1	5'-2"	31	STR				4"
.	S.O.	TO						
.	5	6'-6"						
W532	2	2'-3"	14	STR				2'-4"
.	S.O.	TO						
.	2	4'-7"						
W533	8	4'-7"	38	STR				
W534	2	4'-9"	10	STR				
W931	1	9'-4"	306	2	6'-10"	2'-6"		2"
	S.O.	TO			TO			
	9	10'-8"			8'-2"			
W832	9	4'-8"	112	STR				
W833	5	7'-2"	96	STR				
W535	5	3'-2"	17	3	1'-4"	1'-7"	6"	

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
W831	1	5'-2"	78	STR				4"
	S.O.	TO						
	5	6'-6"						
	SUBTOTAL = 702 LBS							
				WINGWALL 4				
W541	1	5'-2"	31	STR				4"
.	S.O.	TO						
.	5	6'-6"						
W542	2	2'-3"	14	STR				2'-4"
.	S.O.	TO						
.	2	4'-7"						
W543	8	4'-7"	38	STR				
W544	2	4'-9"	10	STR				
W941	1	9'-4"	306	2	6'-10"	2'-6"		2"
	S.O.	TO			TO			
	9	10'-8"			8'-2"			
W842	9	4'-8"	112	STR				
W843	6	7'-2"	96	STR				
W841	1	5'-2"	78	STR				4"
	S.O.	TO						
	5	6'-6"						
W545	5	3'-2"	17	3	1'-4"	1'-7"	6"	
	SUBTOTAL = 702 LBS							
				CULVERT FOOTING				
F501	22	2'-8"	61	STR				
F502	11	3'-5"	39	3	6"	1'-8"	1'-6"	
F503	11	3'-3"	37	2	2'-8"	9"		
F504	1	11'-8"	12	STR				
F511	24	2'-8"	67	STR				
F512	12	3'-5"	43	3	6"	1'-8"	1'-6"	
F513	12	3'-3"	41	2	2'-8"	9"		
F514	1	11'-8"	12	STR				
F701	8	19'-10"	325	STR				
F711	8	20'-6"	335	STR				
	SUBTOTAL = 972 LBS							
				HEADWALL				
H501	11	1'-9"	20	3	1'-0"	8"	4"	
H502	2	13'-8"	29	STR				
H511	11	1'-9"	20	3	1'-0"	8"	4"	
H512	2	13'-8"	29	STR				
	SUBTOTAL = 98 LBS							

ODOT DISTRICT-11

		0703788
DESIGNED TES		
DRAWN SKW		

STRUCTURE DETAILS
BEL-148-0455

BEL-148-(0.33)(4.54)(5.07)
(17.93)(19.69)(10.91)

8 / 8

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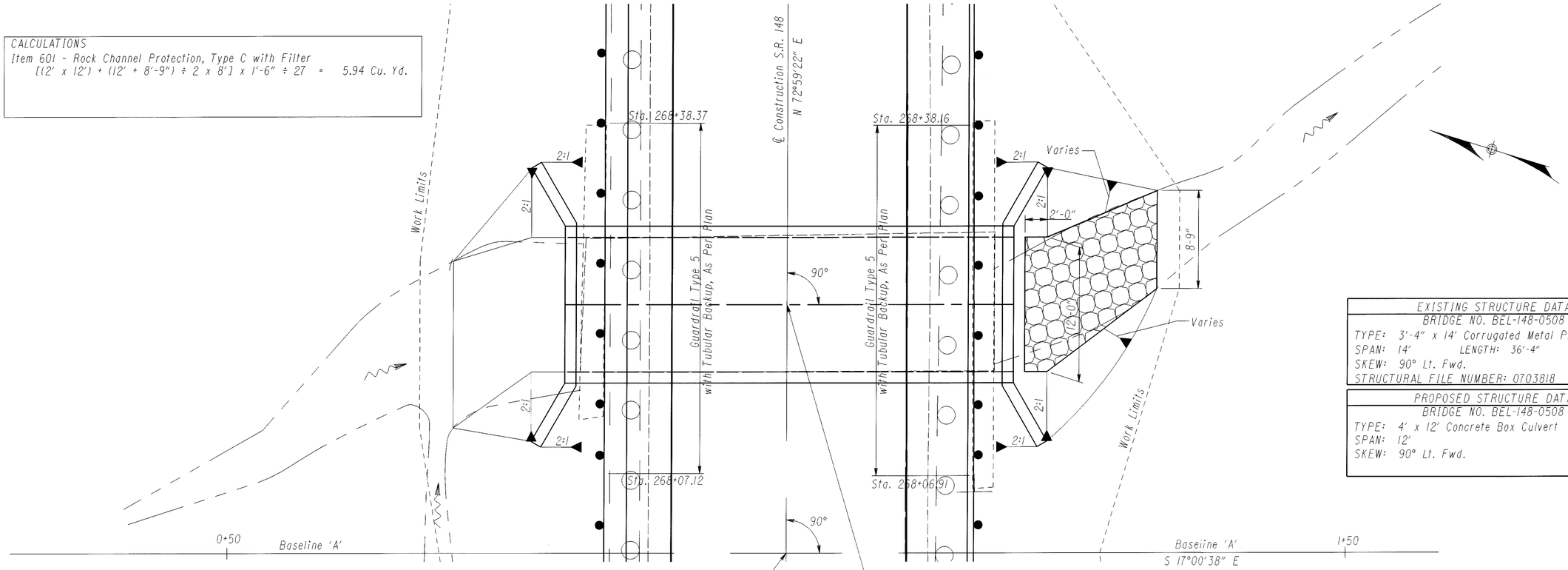
111

CALCULATIONS
Item 601 - Rock Channel Protection, Type C with Filter
[12' x 12') + (12' + 8'-9") ÷ 2 x 8'] x 1'-6" ÷ 27 = 5.94 Cu. Yd.

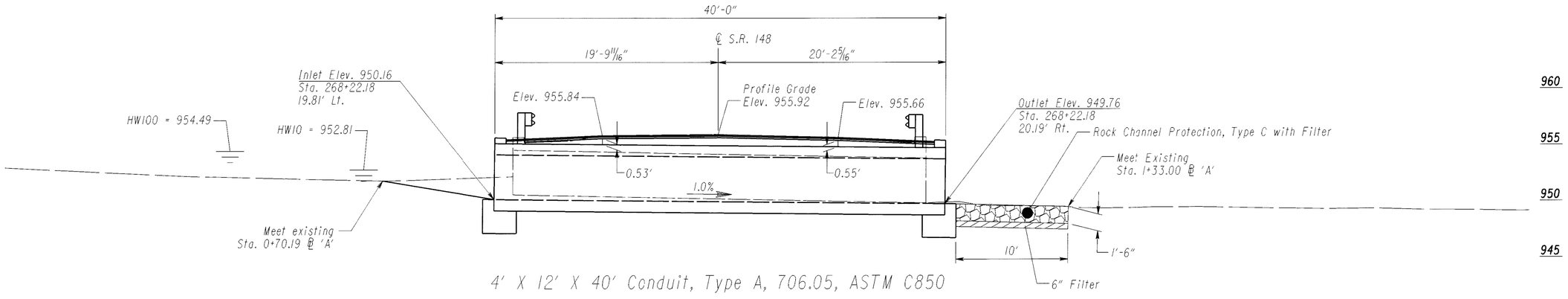


EXISTING STRUCTURE DATA
BRIDGE NO. BEL-148-0508
TYPE: 3'-4" x 14' Corrugated Metal Plate Arch
SPAN: 14' LENGTH: 36'-4"
SKEW: 90° Lt. Fwd.
STRUCTURAL FILE NUMBER: 0703818

PROPOSED STRUCTURE DATA
BRIDGE NO. BEL-148-0508
TYPE: 4' x 12' Concrete Box Culvert
SPAN: 12'
SKEW: 90° Lt. Fwd.

HYDRUALIC DATA		
DRAINAGE AREA = 142 Acres		
DISCHARGE	VELOCITY	HEADWATER ELEVATION
Q10 = 131 ft³/s	VEL. = 3.76 ft./s	HW = 952.81
Q100 = 268 ft³/s	VEL. = 5.58 ft./s	HW = 954.49

For quantities see sheet no. 75.
For structure details see sheet nos. 76-81.



4' X 12' X 40' Conduit, Type A, 706.05, ASTM C850

CALCULATED TES
CHECKED SKW

0 2.5 5 10
HORIZONTAL SCALE IN FEET

CULVERT PLAN & PROFILE (5.07)
BRIDGE NO. BEL-148-0508

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

1/8

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GENERAL NOTES

DESIGN SPECIFICATIONS:

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

DESIGN LOADING:

HS20-44 AND THE ALTERNATE MILITARY LOADING.

DESIGN STRESSES:

CAST-IN-PLACE STRUCTURES
CONCRETE CLASS C - f'c = 4,000 psi SUBSTRUCTURE
REINFORCING STEEL - ASTM A615, A616, OR A617
Fy = 60,000 psi.

PRECAST STRUCTURES: FOR BOX AND PIPE CULVERTS SEE CMS SECTION 603.

COFFERDAMS, CRIBS, AND SHEETING:

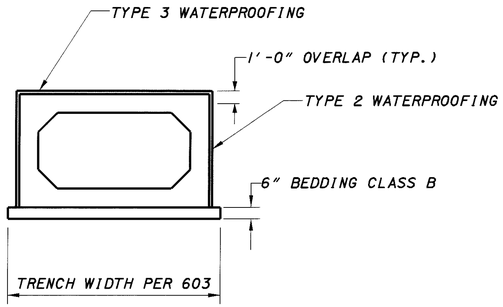
TEMPORARY SHORING SHALL BE USED TO ACCOMPLISH THE PROPOSED CONSTRUCTION IN STAGES. THE DESIGN OF THE TEMPORARY SHORING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER, AND CONFORM WITH 501.05.

UNCLASSIFIED EXCAVATION:

EXCAVATION LIMITS FOR THE PROPOSED STRUCTURE SHALL BE AS DEFINED IN 503.11. EXCAVATION OUTSIDE THESE LIMITS NECESSARY TO REMOVE THE EXISTING STRUCTURE SHALL BE INCLUDED IN 202 FOR PAYMENT.

ITEM 613 - LOW STRENGTH MORTAR BACKFILL, TYPE 1

LOW STRENGTH MORTAR BACKFILL SHALL BE PLACED AS SHOWN. PAYMENT FOR LOW STRENGTH MORTAR BACKFILL SHALL BE MADE ONLY FOR BACKFILL PLACED TO THE LIMITS SHOWN. THE EXCAVATION REQUIRED FOR THE PLACEMENT OF THE LSM SHALL BE INCLUDED IN ITEM 603 FOR PAYMENT.

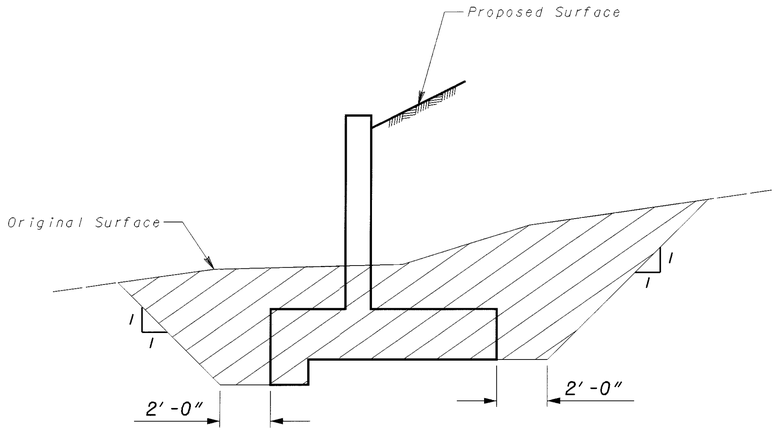


BOX CULVERT FOUNDATION

ESTIMATED QUANTITIES

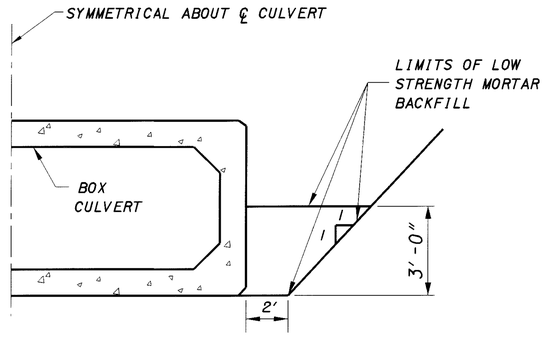
ITEM	ITEM EXT	TOTAL	UNIT	DESCRIPTION
202	11000	LUMP		STRUCTURE REMOVED
503	11100	LUMP		COFFERDAMS, CRIBS, AND SHEETING
503	21300	LUMP		UNCLASSIFIED EXCAVATION (WINGWALL FOOTING)
512	33000	56	SQ. YD.	TYPE 2 WATERPROOFING
512	33010	68	SQ. YD.	TYPE 3 WATERPROOFING
SPECIAL	51267510	26	SQ. YD.	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)
516	13600	3	SQ. FT.	1" PREFORMED EXPANSION JOINT FILLER
601	32200	6	CU. YD.	ROCK CHANNEL PROTECTION, TYPE C WITH FILTER
603	95600	40	LIN. FT.	12'-0" SPAN X 4'-0" RISE CONDUIT, TYPE A, 706.05, ASTM C850
613	41250	32	CU. YD.	LOW STRENGH MORTAR BACKFILL, TYPE 1
842	46000	28	CU. YD.	CLASS C CONCRETE

NOTE: TOTALS CARRIED TO GENERAL SUMMARY.



LIMITS OF UNCLASSIFIED EXCAVATION
(WINGWALL AND CULVERT FOOTINGS)

ITEM 503 UNCLASSIFIED EXCAVATION



Calculations:
[(2 x 3) + (0.5 x 3 x 3)] x 40 ÷ 27 x 2 sides = 31.11 Cu. Yd.
(USE 32 Cu. Yd.)

ITEM 613 - LOW STRENGTH MORTAR BACKFILL, TYPE 1

ODOT DISTRICT-11

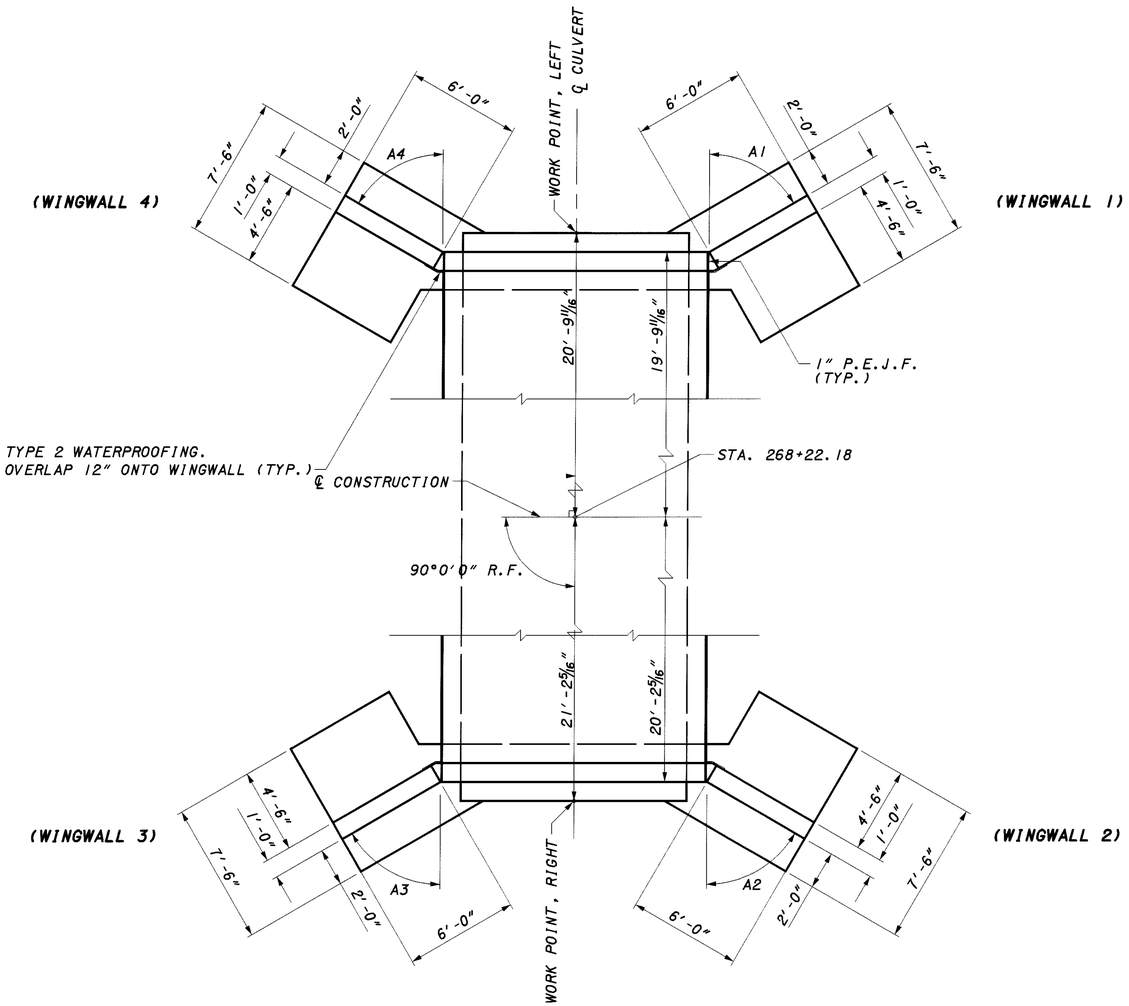
DESIGNED TES
DRAWN TES
CHECKED SKW
DATE
PROJECT NO. 07038.18

STRUCTURE DETAILS
BEL-148-0508

BEL-148-(0.33)(14.54)(5.07)
(7.93)(9.69)(10.91)

2 / 8

75 / 111



CULVERT & WINGWALL LAYOUT

WINGWALL ANGLES	
A1	60°0'0"
A2	60°0'0"
A3	60°0'0"
A4	60°0'0"

WORK POINTS		
LOCATION	STATION	OFFSET
LEFT	268+22.18	20'-9 11/16"
RIGHT	268+22.18	21'-2 5/16"

ODOT DISTRICT-11

DESIGN	DRAWN	CHECKED
TES	TES	SKW

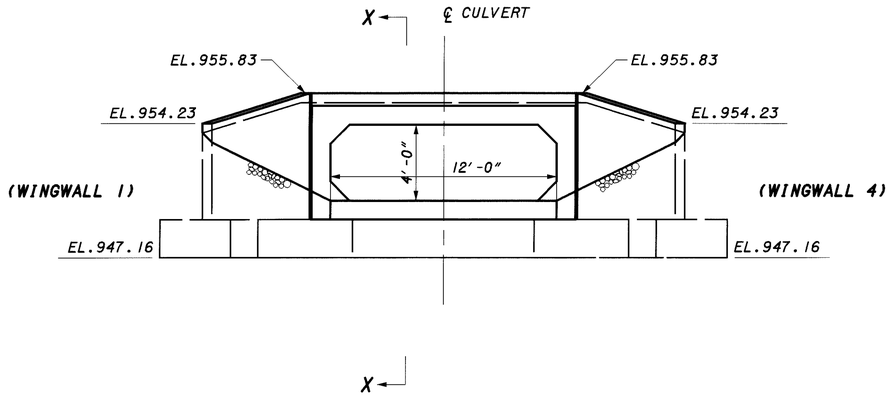
07038 18

STRUCTURE DETAILS
BEL-148-0508

BEL-148-(0.33)(4.54)(5.07)
(7.93)(19.69)(10.91)

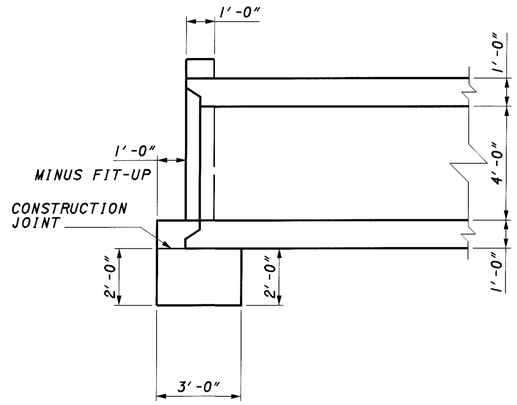
3 / 8

76
111

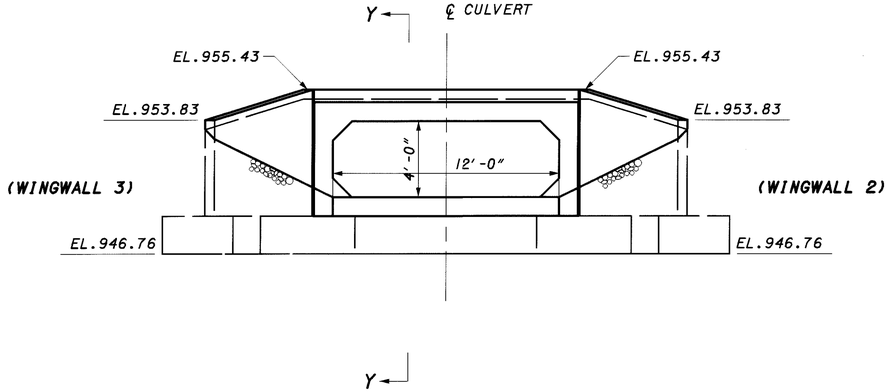


INLET ELEVATION

FLOWLINE ELEVATION: EL.950.16

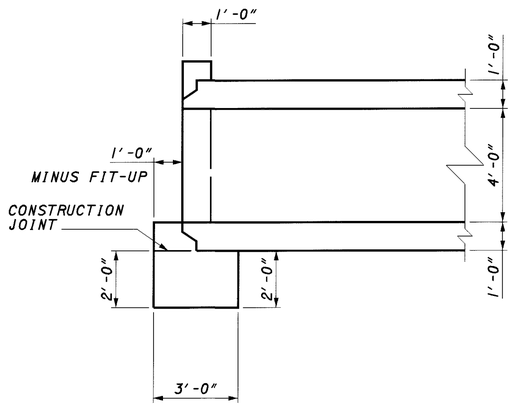


SECTION X-X



OUTLET ELEVATION

FLOWLINE ELEVATION: EL.949.76



SECTION Y-Y

ODOT DISTRICT-11

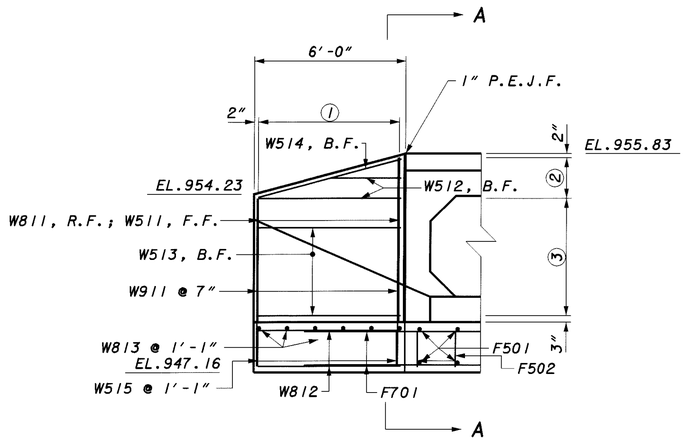
	DATE	PROJECT NO. & DESIGNATION 0703818
DESIGNED	DRAWN TES	
CHECKED TES	QUANTITIES SKW	

STRUCTURE DETAILS
BEL-148-0508

BEL-148-(0.33)(4.54)(5.07)
(17.93)(19.69)(10.91)

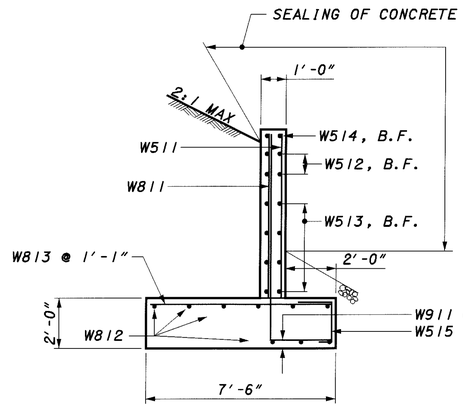
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

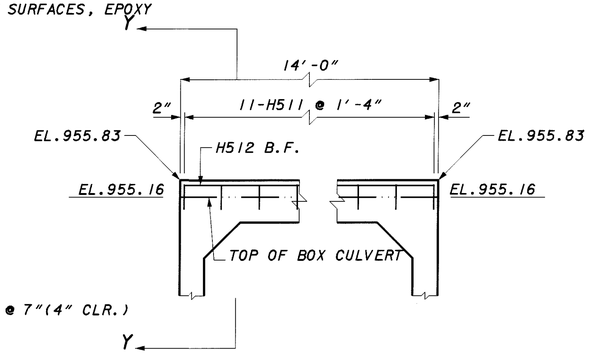


WINGWALL 1 ELEVATION

① SER. OF 6 @ 1'-1"
② 2 SPACES @ 10"
③ 4 SPACES @ 1'-2"

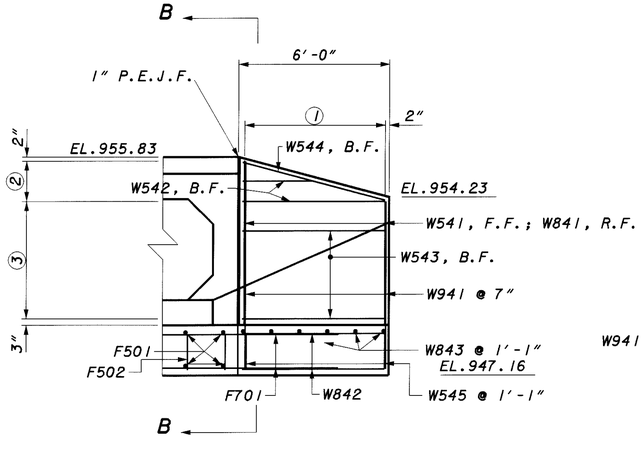


SECTION A-A



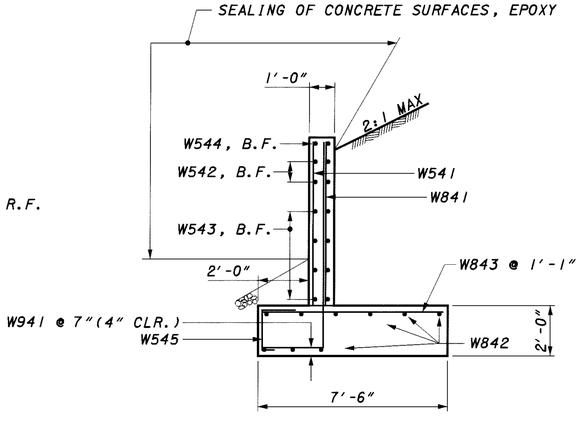
INLET HEADWALL REINFORCING DETAIL

SEE SHEET 79 FOR SECTION Y-Y

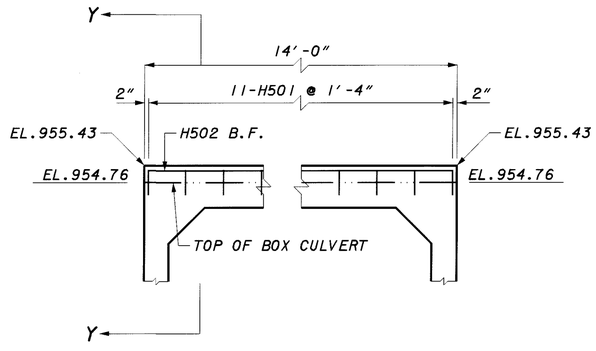


WINGWALL 4 ELEVATION

① SER. OF 6 @ 1'-1"
② 2 SPACES @ 10"
③ 4 SPACES @ 1'-2"



SECTION B-B



OUTLET HEADWALL REINFORCING DETAIL

SEE SHEET 79 FOR SECTION Y-Y

NOTES:

1" PREFORMED EXPANSION JOINT FILLER SHALL BE EXTENDED FROM TOP OF FOOTING TO TOP OF WALL.

ODOT DISTRICT-11

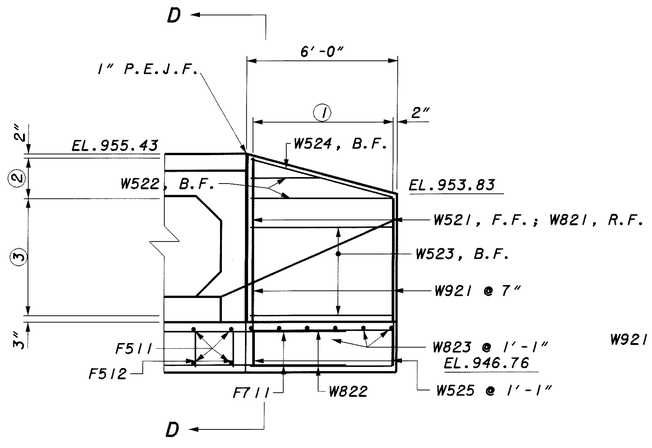
DESIGNED	DRAWN	CHECKED	QUANTITIES	CONSTRUCTION REVISIONS
TES	TES	SKW		0703818

STRUCTURE DETAILS
BEL-148-0508

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

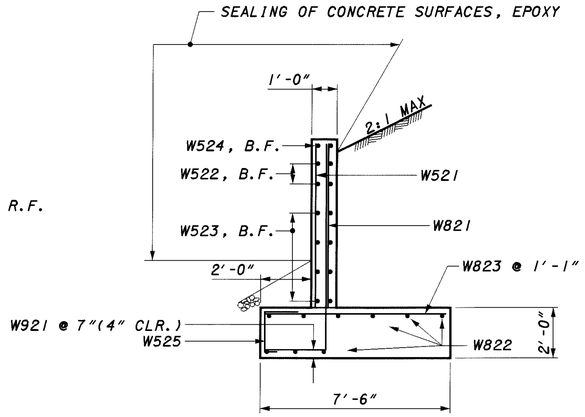
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

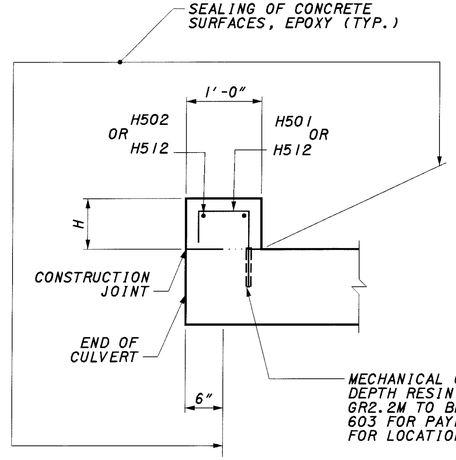


WINGWALL 2 ELEVATION

① SER. OF 6 @ 1'-1"
② 2 SPACES @ 10"
③ 4 SPACES @ 1'-2"

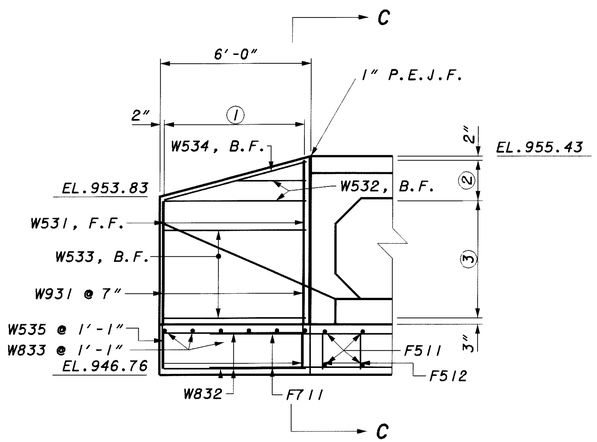


SECTION D-D



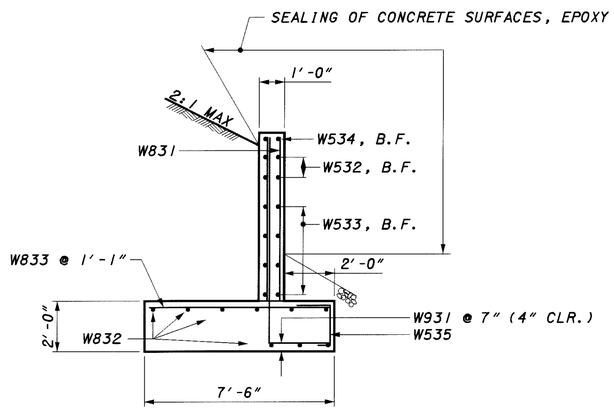
SECTION Y-Y

H -8" INLET HEADWALL
H -8" OUTLET HEADWALL



WINGWALL 3 ELEVATION

① SER. OF 6 @ 1'-1"
② 2 SPACES @ 10"
③ 4 SPACES @ 1'-2"



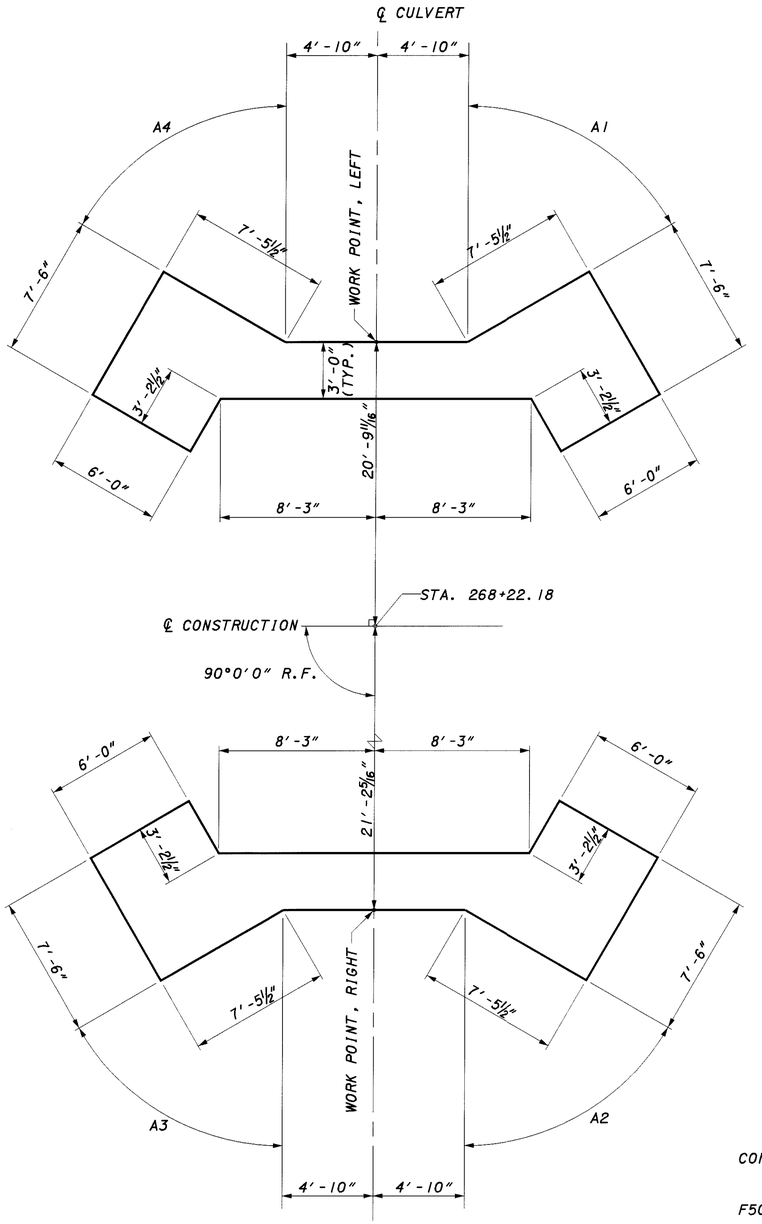
SECTION C-C

ODOT DISTRICT-11

DATE	DESIGNED	DRAWN	CHECKED
0703818	TES	TES	SKW

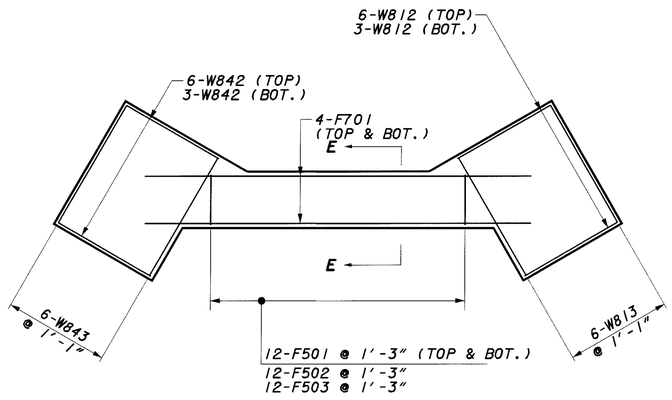
STRUCTURE DETAILS
BEL-148-0508

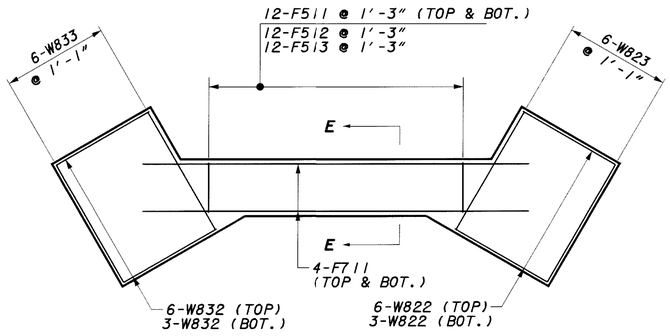
BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

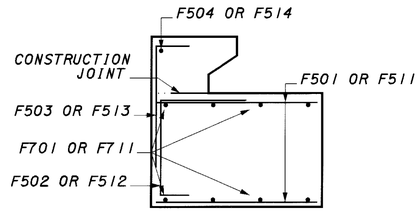


FOOTING LAYOUT

SEE TABLE ON SHEET 76 FOR VALUES OF A1 THRU A4
FOR WORKPOINT STATIONS AND OFFSETS SEE SHEET 76







FOOTING REINFORCING DETAIL SECTION E-E

FOOTING REINFORCING

ODOT DISTRICT-11

DESIGNED	DRAWN	CHECKED
TES	TES	SKW

DATE

QUADRANT FILE NUMBER 0703818

STRUCTURE DETAILS
BEL-148-0508

BEL-148-(0.33)(4.54)(5.07)
(7.33)(9.69)(10.91)

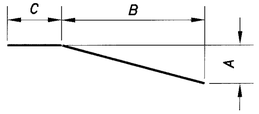
POST HEIGHT TABLE			
STA.	"A"	HEIGHT	L/R
268+19.62	0.4'	2.7'	L
268+25.87	0.4'	2.7'	L
268+19.41	0.6'	2.9'	R
268+25.66	0.6'	2.9'	R

NOTE:
THE POST HEIGHTS TABULATED ABOVE ARE CALCULATED HEIGHTS.

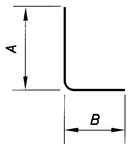
SEE STANDARD DRAWING GR-2.2M FOR ADDITIONAL DETAIL.

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, W601 IS A NO. 6 BAR. BAR DIMENSIONS SHOWN ARE OUT TO OUT UNLESS OTHERWISE INDICATED. R INDICATES INSIDE RADIUS, UNLESS OTHERWISE NOTED. "STD." WRITTEN IN PLACE OF A DIMENSION INDICATES A STANDARD BEND AT THE END OF THE BAR.

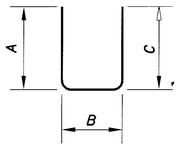
ALL REINFORCING STEEL TO BE EPOXY COATED.



TYPE 1



TYPE 2



TYPE 3

BENDING DIAGRAMS

S.O. - SERIES OF

EPOXY COATED REINFORCING STEEL LIST

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
				WINGWALL 1				
W511	1	4'-11"	36	STR				4"
.	S.O.	TO						
.	6	6'-6"						
W512	2	2'-9"	17	STR				2'-10"
.	S.O.	TO						
.	2	5'-7"						
W513	8	5'-7"	47	STR				
W514	2	5'-9"	12	STR				
W911	1	9'-1"	370	2	6'-7"	2'-6"		2"
	S.O.	TO			TO			
	11	10'-8"			8'-2"			
W812	9	5'-8"	136	STR				
W813	6	7'-2"	115	STR				
W811	1	4'-11"	92	STR				4"
	S.O.	TO						
	6	6'-6"						
W515	6	3'-2"	20	3	1'-4"	1'-7"	6"	
	SUBTOTAL = 845 LBS							
				WINGWALL 2				
W521	1	4'-11"	36	STR				4"
.	S.O.	TO						
.	6	6'-6"						
W522	2	2'-9"	17	STR				2'-10"
.	S.O.	TO						
.	2	5'-7"						
W523	8	5'-7"	47	STR				
W524	2	5'-9"	12	STR				
W921	1	9'-1"	370	2	6'-7"	2'-6"		2"
	S.O.	TO			TO			
	11	10'-8"			8'-2"			
W822	9	5'-8"	136	STR				
W823	6	7'-2"	115	STR				
W821	1	4'-11"	92	STR				4"
	S.O.	TO						
	6	6'-6"						
W525	6	3'-2"	20	3	1'-4"	1'-7"	6"	
	SUBTOTAL = 845 LBS							
				WINGWALL 3				
W531	1	4'-11"	36	STR				4"
	S.O.	TO						
	6	6'-6"						
W532	2	2'-9"	17	STR				2'-10"
.	S.O.	TO						
.	2	5'-7"						
W533	8	5'-7"	47	STR				
W534	2	5'-9"	12	STR				
W931	1	9'-1"	370	2	6'-7"	2'-6"		2"
	S.O.	TO			TO			
	11	10'-8"			8'-2"			
W832	9	5'-8"	136	STR				
W833	6	7'-2"	115	STR				
W831	1	4'-11"	92	STR				4"
	S.O.	TO						
	6	6'-6"						
W535	6	3'-2"	20	3	1'-4"	1'-7"	6"	
	SUBTOTAL = 845 LBS							

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
				WINGWALL 4				
W541	1	4'-11"	36	STR				4"
.	S.O.	TO						
.	6	6'-6"						
W542	2	2'-9"	17	STR				2'-10"
.	S.O.	TO						
.	2	5'-7"						
W543	8	5'-7"	47	STR				
W544	2	5'-9"	12	STR				
W941	1	9'-1"	370	2	6'-7"	2'-6"		2"
	S.O.	TO			TO			
	11	10'-8"			8'-2"			
W842	9	5'-8"	136	STR				
W843	6	7'-2"	115	STR				
W841	1	4'-11"	92	STR				4"
	S.O.	TO						
	6	6'-6"						
W545	6	3'-2"	20	3	1'-4"	1'-7"	6"	
	SUBTOTAL = 845 LBS							
				CULVERT FOOTING				
F501	24	2'-8"	67	STR				
F502	12	3'-5"	43	3	6"	1'-8"	1'-6"	
F503	12	3'-3"	41	2	2'-8"	9"		
F504	1	11'-8"	12	STR				
F511	24	2'-8"	67	STR				
F512	12	3'-5"	43	3	6"	1'-8"	1'-6"	
F513	12	3'-3"	41	2	2'-8"	9"		
F514	1	11'-8"	12	STR				
F701	8	20'-6"	335	STR				
F711	8	20'-6"	335	STR				
	SUBTOTAL = 996 LBS							
				HEADWALL				
H501	11	1'-9"	20	3	1'-0"	8"	4"	
H502	2	13'-8"	29	STR				
H511	11	1'-9"	20	3	1'-0"	8"	4"	
H512	2	13'-8"	29	STR				
	SUBTOTAL = 98 LBS							

ODOT DISTRICT-11

DESIGNED	0703818
DRAWN TES	
CHECKED SKW	

STRUCTURE DETAILS
BEL-148-0508

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

8 / 8

81 / 111

HYDRUALIC DATA		
DRAINAGE AREA = 406 Acres		
DISCHARGE	VELOCITY	HEADWATER ELEVATION
Q10 = 255 ft.³/s	VEL. = 14.07 ft./s	HW = 886.61
Q100 = 507 ft.³/s	VEL. = 17.75 ft./s	HW = 890.46

EXISTING STRUCTURE DATA
BRIDGE NO. BEL-148-0794
TYPE: 4'-0" x 12'-0" Corrugated Metal Plate Arch
SPAN: 12' LENGTH: 36'-2"
SKEW: 90° Lt. Fwd.
STRUCTURAL FILE NUMBER: 0703931

PROPOSED STRUCTURE DATA
BRIDGE NO. BEL-148-0794
TYPE: 4' x 12' Concrete Box Culvert
SPAN: 12'
SKEW: 90° From Tangent Lt. Fwd.

CALCULATED TES
CHECKED SKW

0 2.5 5 10
HORIZONTAL SCALE IN FEET

Varies
2:1
Sta. 419+47.41
℄ Construction S.R. 148
S 71°11'37" E
℄ Residential Drive
Sta. 419+35.99
PT Sta. 419+31.46
90° to Tangent
Guardrail Type 5 with Double Rails
Guardrail Type 5 with Double Rails As Per Plan
5'-7 7/8"
H
H/5-6
Work Limits
Varies
Sta. 419+11.56
Sta. 419+10.18
90° to Tangent
419+00
Baseline 'A'
0+50
Baseline 'A'
1+50
Baseline 'A'
S 17° 20'43" W
Sta. 419+26 ℄ S.R. 148 = ℄ Culvert
Sta. 419+00 ℄ S.R. 148= Sta. 1+00 ℄ A

For quantities see sheet no. 83.
For structure details see sheet nos. 84-89.

CALCULATIONS
Item 601 - Rock Channel Protection, Type B with Filter
204.84 s.f.* x 2'-6" ÷ 27 = 18.96 Cu. Yd.

* Measured by planimeter

45'-0"
℄ S.R. 148
22'-0 11/16"
22'-11 5/16"
895
890
885
880
HW100 = 889.96
HW10 = 886.61
Inlet Elev. 882.92
Sta. 419+26.00
22.06' Lt.
Profile Grade Elev. 890.74
Elev. 890.58
Elev. 890.38
Varies 1.6' to 1.4'
Varies 1.6' to 1.4'
1.0%
Outlet Elev. 882.47
Sta. 419+26.00
22. 94' Rt.
Rock Channel Protection, Type B with Filter
Meet Existing 1+39.00 24.84 LT ℄ 'A'
Meet existing 0+60.00 46.60 LT ℄ 'A'
4' X 12' X 45' Conduit, Type A, 706.05, ASTM C850
6" Filter
15'
2'-6"

CULVERT PLAN & PROFILE (7.93)
BRIDGE NO. BEL-148-0794

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

1/8

82/111

GENERAL NOTES

DESIGN SPECIFICATIONS:

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

DESIGN LOADING:

HS20-44 AND THE ALTERNATE MILITARY LOADING.

DESIGN STRESSES:

CAST-IN-PLACE STRUCTURES
CONCRETE CLASS C - f'c = 4,000 psi SUBSTRUCTURE
REINFORCING STEEL - ASTM A615, A616, OR A617
Fy = 60,000 psi.

PRECAST STRUCTURES: FOR BOX AND PIPE CULVERTS SEE CMS SECTION 603.

COFFERDAMS, CRIBS, AND SHEETING:

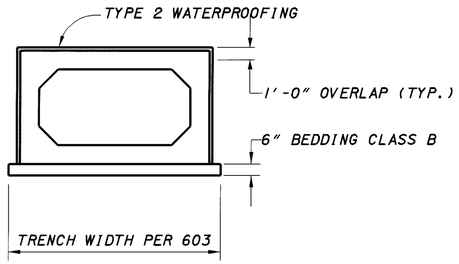
TEMPORARY SHORING SHALL BE USED TO ACCOMPLISH THE PROPOSED CONSTRUCTION IN STAGES. THE DESIGN OF THE TEMPORARY SHORING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER, AND CONFORM WITH 501.05.

UNCLASSIFIED EXCAVATION:

EXCAVATION LIMITS FOR THE PROPOSED STRUCTURE SHALL BE AS DEFINED IN 503.11. EXCAVATION OUTSIDE THESE LIMITS NECESSARY TO REMOVE THE EXISTING STRUCTURE SHALL BE INCLUDED IN 202 FOR PAYMENT.

ITEM 613 - LOW STRENGTH MORTAR BACKFILL, TYPE 1

LOW STRENGTH MORTAR BACKFILL SHALL BE PLACED AS SHOWN AND LATERALLY TO THE EDGE OF SHOULDER. PAYMENT FOR LOW STRENGTH MORTAR BACKFILL SHALL BE MADE ONLY FOR BACKFILL PLACED TO THE LIMITS SHOWN. THE EXCAVATION REQUIRED FOR THE PLACEMENT OF THE LSM SHALL BE INCLUDED IN ITEM 603 FOR PAYMENT.

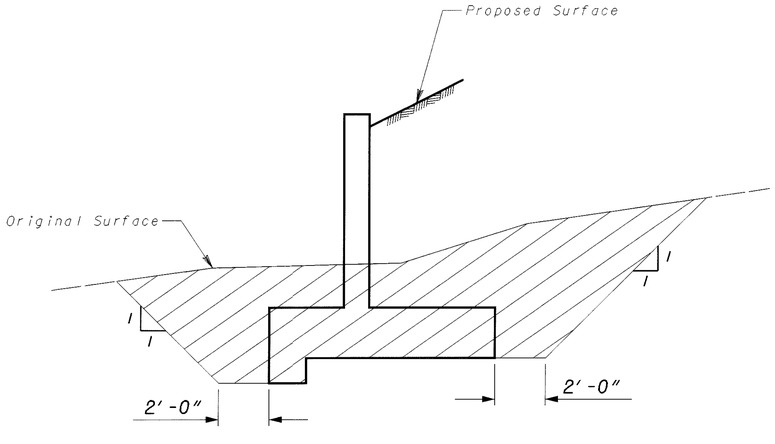


BOX CULVERT FOUNDATION

ESTIMATED QUANTITIES

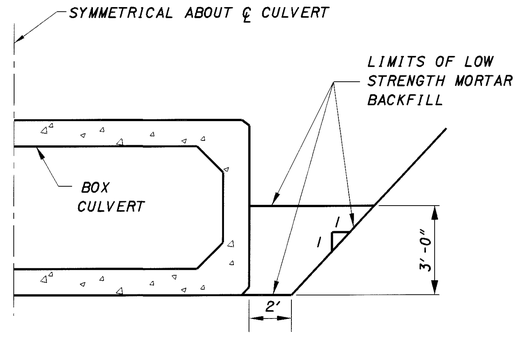
ITEM	ITEM EXT	TOTAL	UNIT	DESCRIPTION
202	11000	LUMP		STRUCTURE REMOVED
503	11100	LUMP		COFFERDAMS, CRIBS, AND SHEETING
503	21300	LUMP		UNCLASSIFIED EXCAVATION (WINGWALL FOOTING)
512	33000	140	SQ. YD.	TYPE 2 WATERPROOFING
SPECIAL	51267502	32	SQ. YD.	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)
516	13600	3	SQ. FT.	1" PREFORMED EXPANSION JOINT FILLER
601	32100	19	CU. YD.	ROCK CHANNEL PROTECTION, TYPE B WITH FILTER
603	95600	45	LIN. FT.	12'-0" SPAN X 4'-0" RISE CONDUIT, TYPE A, 706.05 ASTM C850
613	41250	35	CU. YD.	LOW STRENGH MORTAR BACKFILL, TYPE 1
842	46000	43	CU. YD.	CLASS C CONCRETE

NOTE: TOTALS CARRIED TO GENERAL SUMMARY



LIMITS OF UNCLASSIFIED EXCAVATION
(WINGWALL AND CULVERT FOOTINGS)

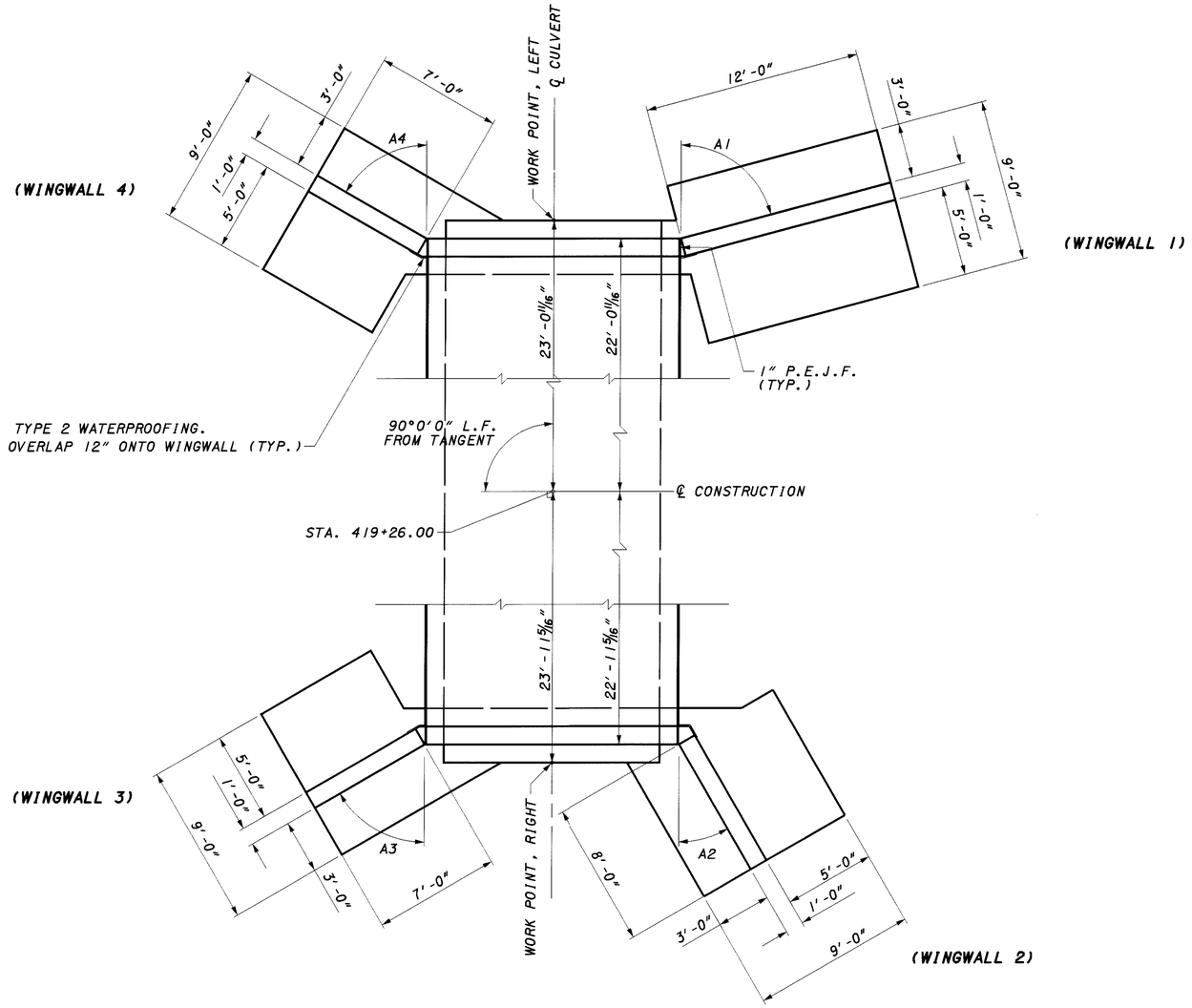
ITEM 503 UNCLASSIFIED EXCAVATION



ITEM 613 - LOW STRENGTH MORTAR BACKFILL, TYPE 1

Calculations:
[(2 x 3) + (0.5 x 3 x 3)] x 45 x 2 sides ÷ 27 = 35.0
(Use 35 Cu. Yd.)

ODOT DISTRICT-11
0703931
DRAWN TES
CHECKED TES
DESIGNED SKW
GENERAL NOTES & ESTIMATED QUANTITIES
BEL-148-0794
BEL-148-(0.33)(14.54)(17.93)
(7.93)(9.69)(10.91)
2 / 8
83
111



CULVERT & WINGWALL LAYOUT

WINGWALL ANGLES	
A1	75°0'0"
A2	30°0'0"
A3	60°0'0"
A4	60°0'0"

WORK POINTS		
LOCATION	STATION	OFFSET
LEFT	419+26.00	23'-0 11/16"
RIGHT	419+26.00	23'-11 5/16"

ODOT DISTRICT-11

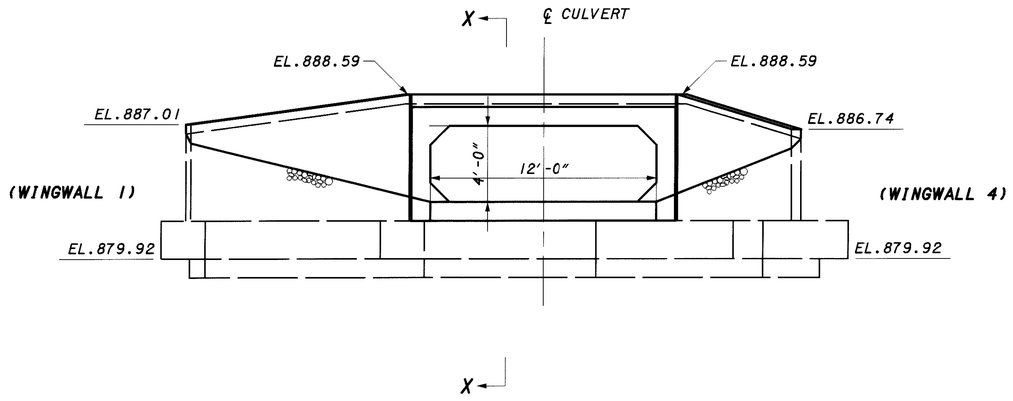
		0703931
DESIGNED TES		
DRAWN TES	CHECKED SKW	

STRUCTURE DETAILS
BEL-148-0794

BEL-148-10.33/14.54/15.07)
(17.93/19.69/10.91)

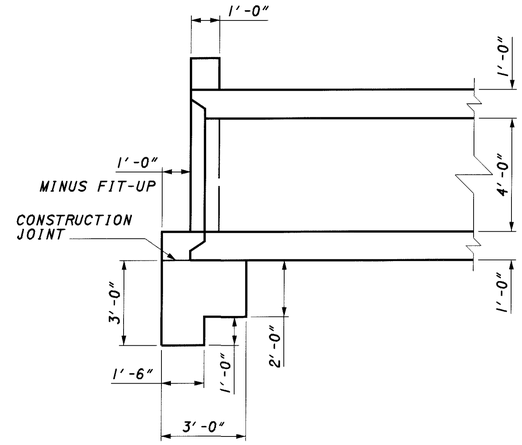
3 / 8

84
111

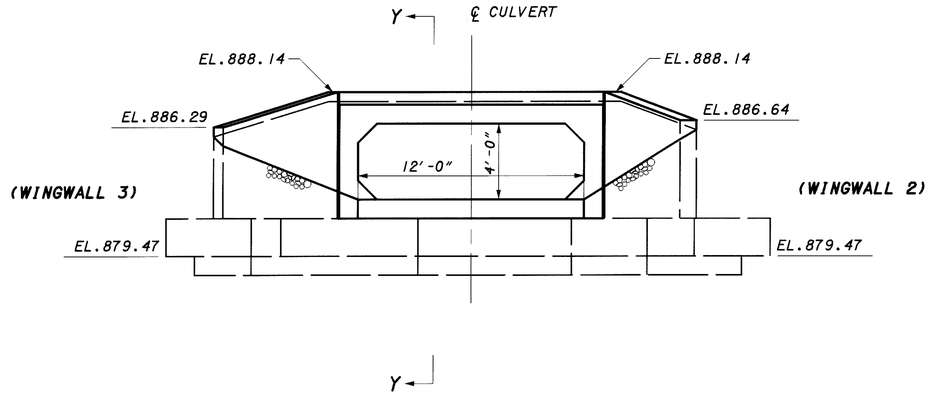


INLET ELEVATION

FLOWLINE ELEVATION: EL.882.92

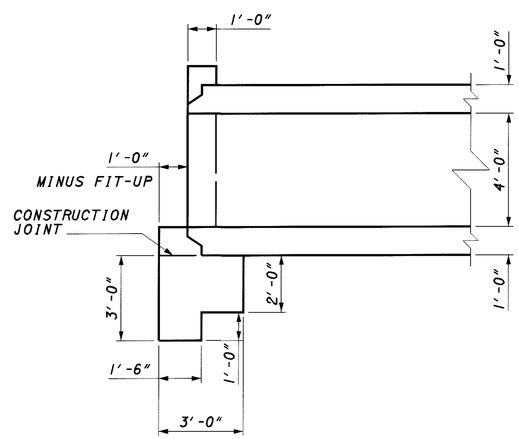


SECTION X-X



OUTLET ELEVATION

FLOWLINE ELEVATION: EL.882.47



SECTION Y-Y

ODOT DISTRICT-11

		0703931
DRAWN TES		
DESIGNED TES		CHECKED SKW

STRUCTURE DETAILS
BEL-148-0794

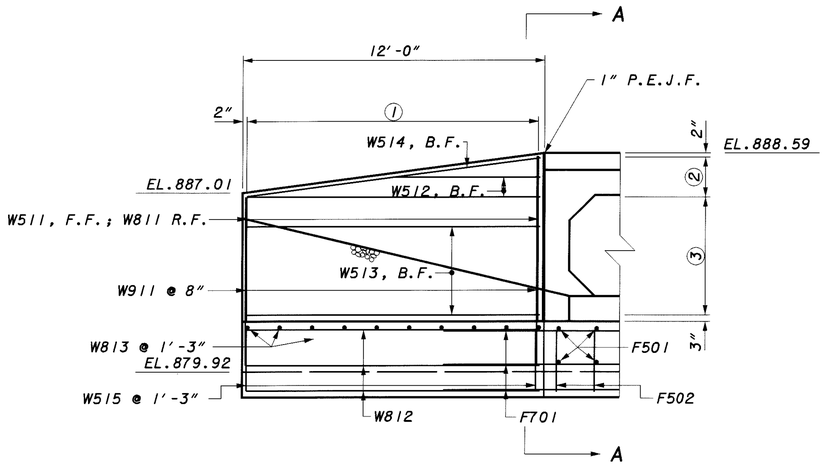
BEL-148-(10.33)(14.54)(15.07)
(17.93)(19.69)(10.91)

4 / 8

85
111

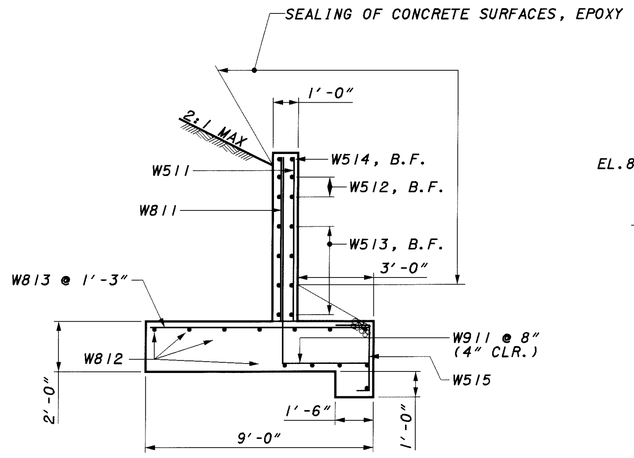
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

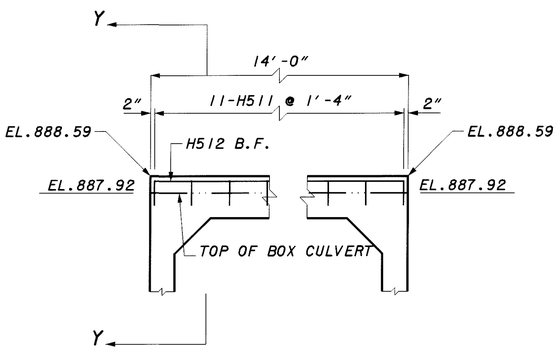


WINGWALL 1 ELEVATION

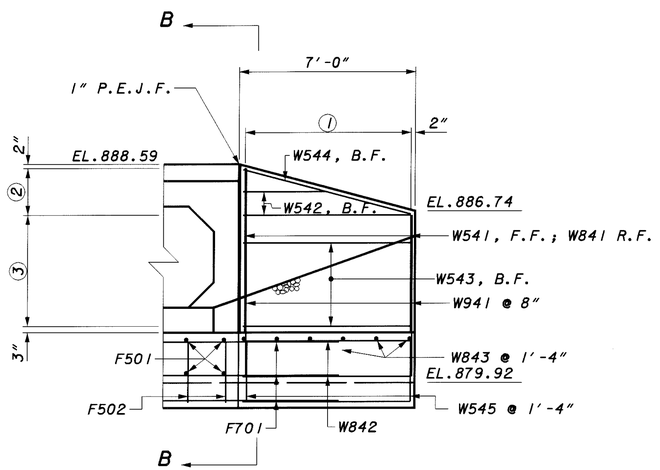
① SER. OF 10 @ 1′-3″
② 2 SPACES @ 9″
③ 4 SPACES @ 1′-2″



SECTION A-A

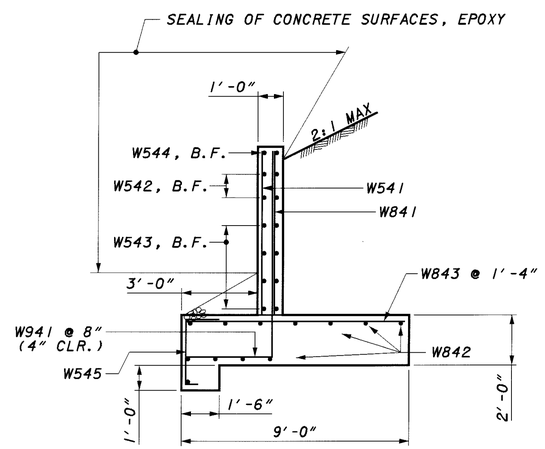


INLET HEADWALL REINFORCING DETAIL
SEE SHEET 87 FOR SECTION Y-Y

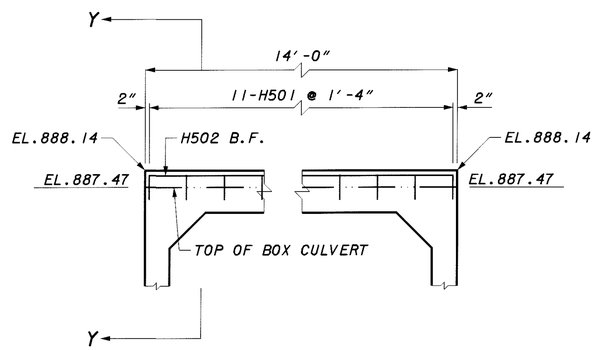


WINGWALL 4 ELEVATION

① SER. OF 6 @ 1′-3″
② 2 SPACES @ 11″
③ 4 SPACES @ 1′-1″



SECTION B-B



OUTLET HEADWALL REINFORCING DETAIL
SEE SHEET 87 FOR SECTION Y-Y

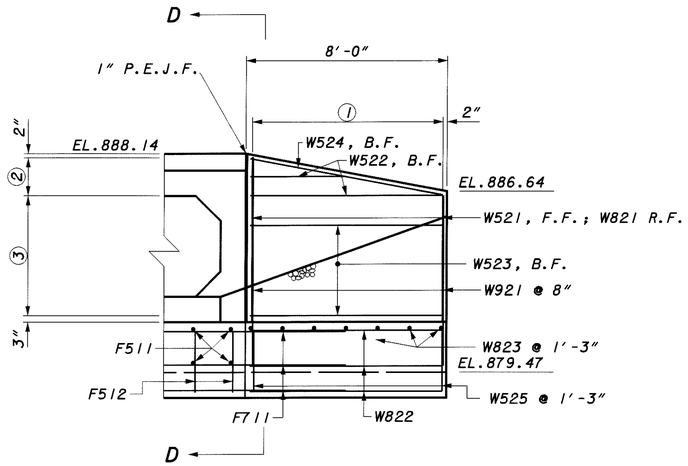
NOTES:

1″ PREFORMED EXPANSION JOINT FILLER SHALL BE EXTENDED FROM TOP OF FOOTING TO TOP OF WALL.

ODOT DISTRICT-11
0703931
TES
TES
SKW
STRUCTURE DETAILS
BEL-148-0794
BEL-148-(0.33)(4.54)(7.93)
(7.93)(9.69)(10.91)
5 / 8
86
111

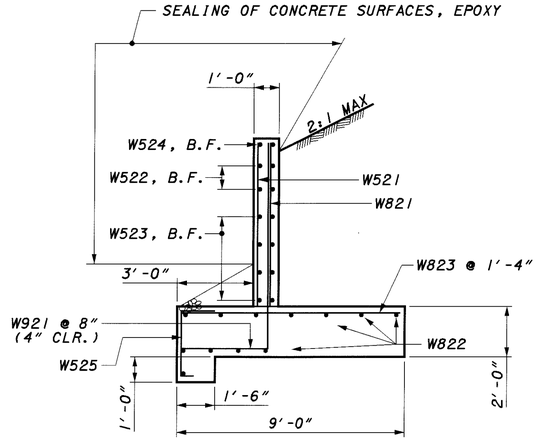
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

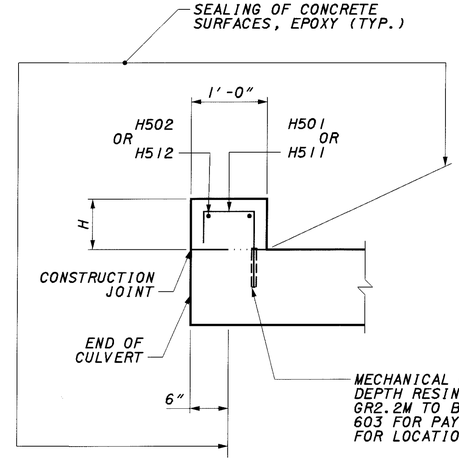


WINGWALL 2 ELEVATION

① SER. OF 7 @ 1'-3"
② 2 SPACES @ 9"
③ 4 SPACES @ 1'-2"

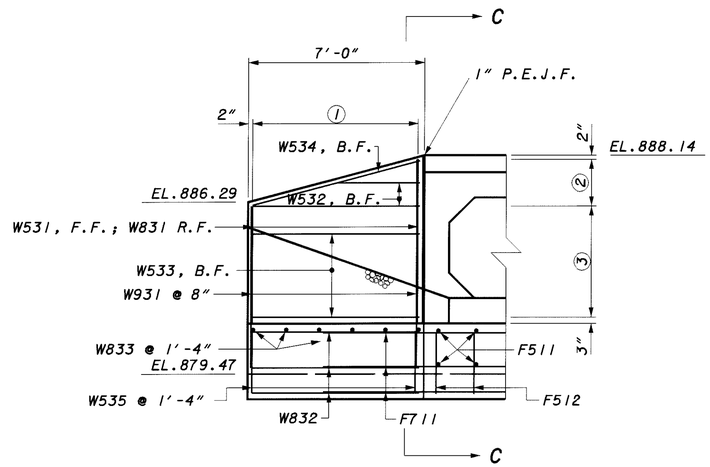


SECTION D-D



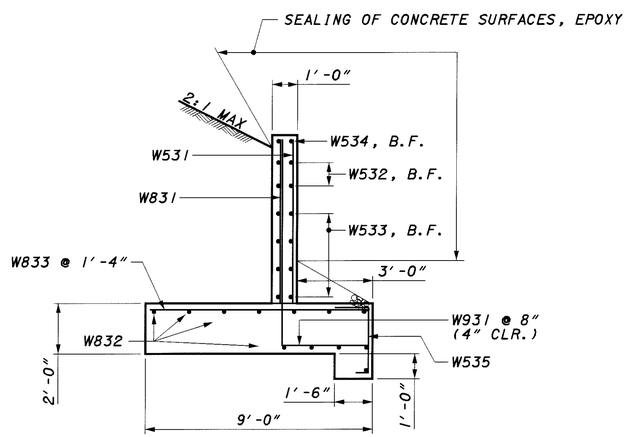
SECTION Y-Y

H -8" INLET HEADWALL
H -8" OUTLET HEADWALL



WINGWALL 3 ELEVATION

① SER. OF 6 @ 1'-4"
② 2 SPACES @ 11"
③ 4 SPACES @ 1'-1"



SECTION C-C

ODOT DISTRICT-11

0703931

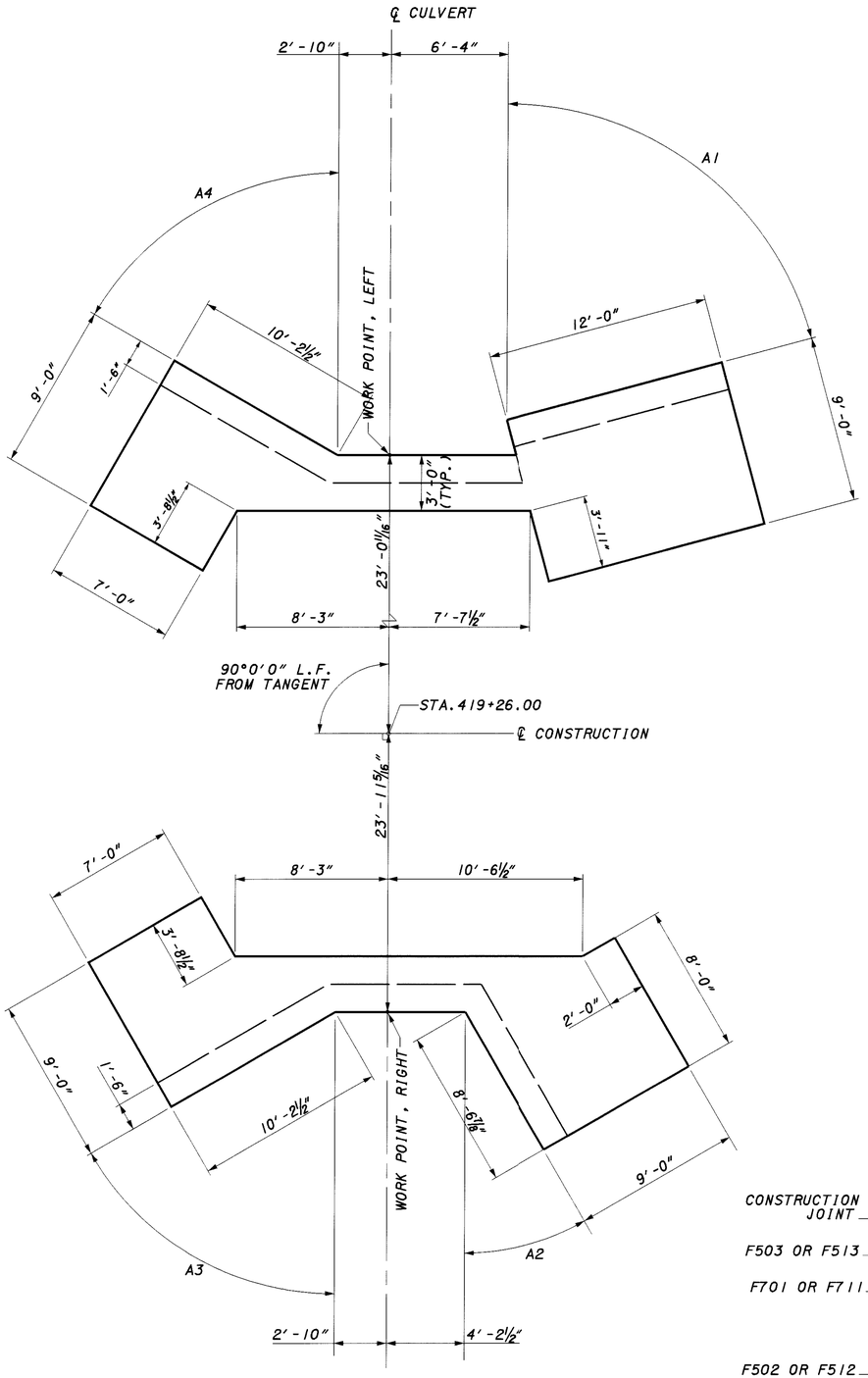
TES | SKW

STRUCTURE DETAILS
BEL-148-0794

BEL-148-(0.33)(4.54)(7.93)
(7.93)(9.69)(10.91)

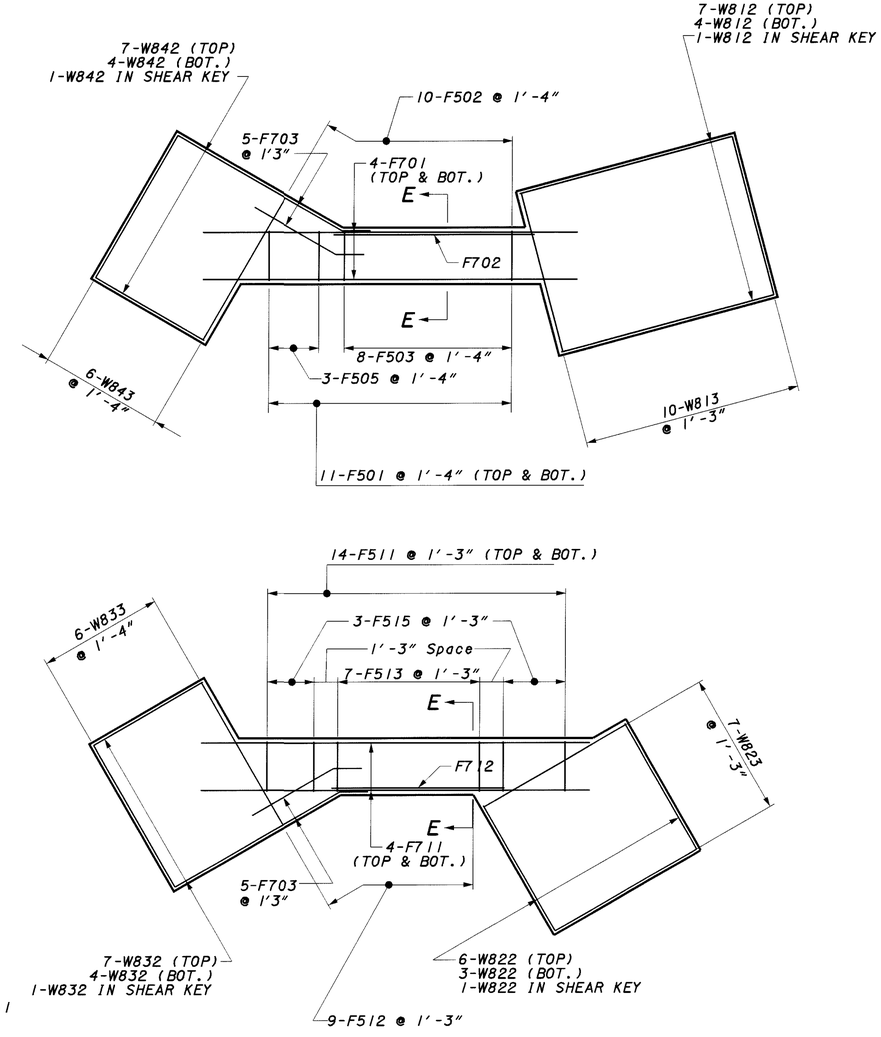
6 / 8

87 / 111

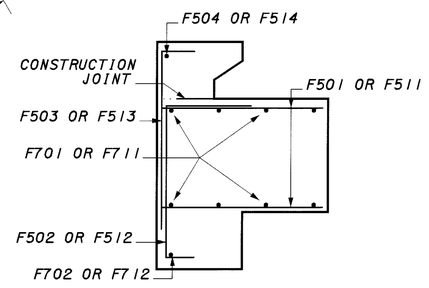


FOOTING LAYOUT

SEE TABLE ON SHEET 84 FOR VALUES OF A1 THRU A4
FOR WORKPOINT STATIONS AND OFFSETS SEE SHEET 84



FOOTING REINFORCING



FOOTING REINFORCING DETAIL SECTION E-E

ODOT DISTRICT-11

DESIGNED TES	DRAWN TES	CHECKED SKW
QUANTITIES		0703931

STRUCTURE DETAILS
BEL-148-0794

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

7 / 8

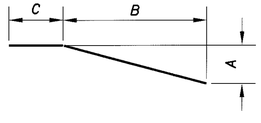
88 / 111

POST HEIGHT TABLE			
STA.	"A"	HEIGHT	L/R
419+24.12	2.3	4.6	R
419+30.37	2.3	4.6	R

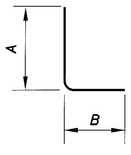
SEE STANDARD DRAWING GR-2.2M FOR ADDITIONAL DETAIL.

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, W601 IS A NO. 6 BAR. BAR DIMENSIONS SHOWN ARE OUT TO OUT UNLESS OTHERWISE INDICATED. R INDICATES INSIDE RADIUS, UNLESS OTHERWISE NOTED. "STD." WRITTEN IN PLACE OF A DIMENSION INDICATES A STANDARD BEND AT THE END OF THE BAR.

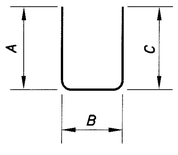
ALL REINFORCING STEEL TO BE EPOXY COATED.



TYPE 1



TYPE 2



TYPE 3

BENDING DIAGRAMS

S.O. - SERIES OF

EPOXY COATED REINFORCING STEEL LIST

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
				WINGWALL 1				
W511	1	4'-11"	59	STR				2"
.	S.O.	TO						
.	10	6'-6"						
W512	2	5'-9"	36	STR				5'-10"
.	S.O.	TO						
.	2	11'-7"						
W513	8	11'-7"	97	STR				
W514	2	11'-8"	24	STR				
W911	1	9'-11"	689	2	6'-8"	3'-6"		1"
	S.O.	TO			TO			
	19	11'-5"			8'-2"			
W811	1	4'-11"	153	STR				2"
	S.O.	TO						
	10	6'-6"						
W812	12	11'-8"	374	STR				
W813	10	8'-8"	231	STR				
W515	10	4'-2"	43	3	1'-4"	2'-7"	6"	
	SUBTOTAL - 1706 LBS							
				WINGWALL 2				
W521	1	5'-0"	42	STR				3"
.	S.O.	TO						
.	7	6'-6"						
W522	2	3'-9"	24	STR				3'-10"
.	S.O.	TO						
.	2	7'-7"						
W523	8	7'-7"	63	STR				
W524	2	7'-9"	16	STR				
W921	1	9'-11"	472	2	6'-8"	3'-6"		1½"
	S.O.	TO			TO			
	13	11'-5"			8'-2"			
W821	1	5'-0"	108	STR				3"
	S.O.	TO						
	7	6'-6"						
W822	12	7'-8"	246	STR				
W823	7	8'-8"	162	STR				
W525	7	4'-2"	30	3	1'-4"	2'-7"	6"	
	SUBTOTAL - 1163 LBS							
				WINGWALL 3				
W531	1	4'-8"	35	STR				4 1/2"
.	S.O.	TO						
.	6	6'-6"						
W532	2	3'-3"	21	STR				3'-4"
.	S.O.	TO						
.	2	6'-7"						
W533	8	6'-7"	55	STR				
W534	2	6'-10"	14	STR				
W931	1	9'-7"	393	2	6'-4"	3'-6"		2"
	S.O.	TO			TO			
	11	11'-5"			8'-2"			
W832	12	6'-8"	214	STR				
W833	6	8'-8"	139	STR				
W535	6	4'-2"	26	3	1'-4"	2'-7"	6"	

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
W831	1	4'-8"	89	STR				4 1/2"
	S.O.	TO						
	6	6'-6"						
	SUBTOTAL - 986 LBS							
				WINGWALL 4				
W541	1	4'-8"	35	STR				4 1/2"
.	S.O.	TO						
.	6	6'-6"						
W542	2	3'-3"	21	STR				3'-4"
.	S.O.	TO						
.	2	6'-7"						
W543	8	6'-7"	55	STR				
W544	2	6'-10"	14	STR				
W941	1	9'-7"	393	2	6'-4"	3'-6"		2"
	S.O.	TO			TO			
	11	11'-5"			8'-2"			
W841	1	4'-8"	89	STR				4 1/2"
	S.O.	TO						
	6	6'-6"						
W842	12	6'-8"	214	STR				
W843	6	8'-8"	139	STR				
W545	6	4'-2"	26	3	1'-4"	2'-7"	6"	
	SUBTOTAL - 986 LBS							
				CULVERT FOOTING				
F501	22	2'-8"	61	STR				
F502	10	4'-5"	46	3	6"	2'-8"	1'-6"	
F503	8	3'-7"	30	2	3'-0"	9"		
F504	1	11'-8"	12	STR				
F505	6	3'-3"	21	2	2'-8"	9"		
F511	28	2'-8"	78	STR				
F512	9	4'-5"	42	3	6"	2'-8"	1'-6"	
F513	7	3'-7"	26	2	3'-0"	9"		
F514	1	11'-8"	12	STR				
F515	6	3'-3"	21	2	2'-8"	9"		
F701	8	19'-10"	325	STR				
F702	1	10'-8"	22	STR				
F703	5	6'-5"	65	1	2'-6"	5'-0"	1'-6"	
F711	8	20'-7"	337	STR				
F712	1	9'-9"	20	STR				
F713	5	6'-5"	65	1	2'-6"	5'-0"	1'-6"	
	SUBTOTAL - 1183 LBS							
				HEADWALL				
H501	11	1'-9"	20	3	1'-0"	8"	4"	
H502	2	13'-8"	29	STR				
H511	11	1'-9"	20	3	1'-0"	8"	4"	
H512	2	13'-8"	29	STR				
	SUBTOTAL - 98 LBS							

ODOT DISTRICT-11

DESIGNED TES | DETAILED TES | CHECKED SKW | QUANTITIES | 0703931

REINFORCING STEEL LIST
BEL-148-0794

BEL-148-(0.33)/14.54)(5.07)
(7.93)(9.69)(10.91)

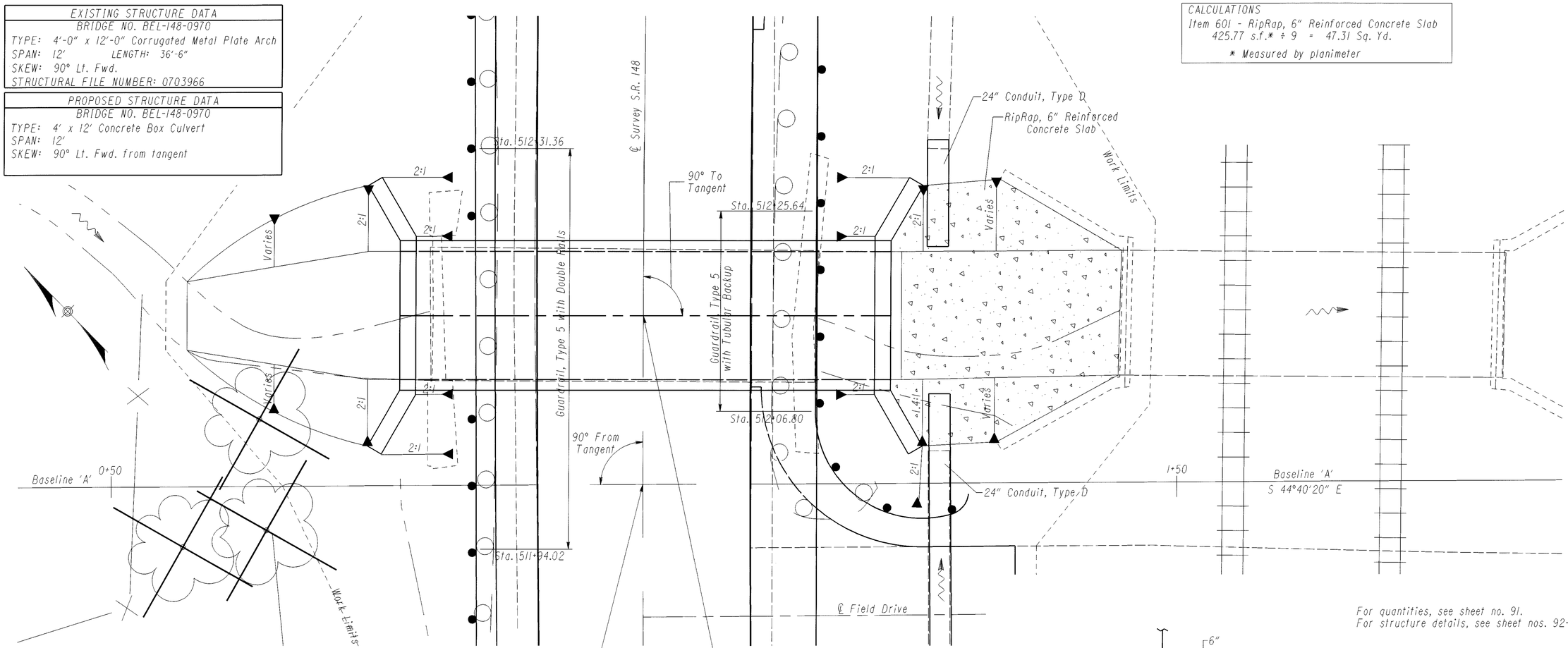
8 / 8

89
111

EXISTING STRUCTURE DATA
BRIDGE NO. BEL-148-0970
TYPE: 4'-0" x 12'-0" Corrugated Metal Plate Arch
SPAN: 12' LENGTH: 36'-6"
SKEW: 90° Lt. Fwd.
STRUCTURAL FILE NUMBER: 0703966

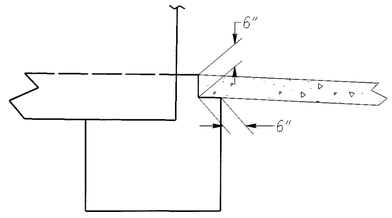
PROPOSED STRUCTURE DATA
BRIDGE NO. BEL-148-0970
TYPE: 4' x 12' Concrete Box Culvert
SPAN: 12'
SKEW: 90° Lt. Fwd. from tangent

CALCULATIONS
Item 601 - RipRap, 6" Reinforced Concrete Slab
425.77 s.f.* ÷ 9 = 47.31 Sq. Yd.
* Measured by planimeter

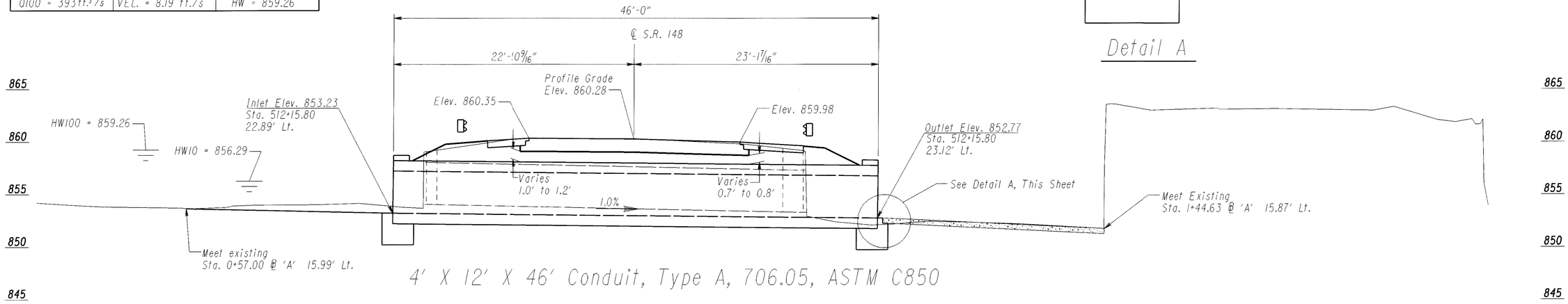


For quantities, see sheet no. 91.
For structure details, see sheet nos. 92-97.

HYDRUALIC DATA		
DRAINAGE AREA = 243 Acres		
DISCHARGE	VELOCITY	HEADWATER ELEVATION
Q10 = 193 ft.³/s	VEL. = 12.76 ft./s	HW = 856.29
Q100 = 393 ft.³/s	VEL. = 8.19 ft./s	HW = 859.26



Detail A



4' X 12' X 46' Conduit, Type A, 706.05, ASTM C850

CALCULATED TES
CHECKED SKW

HORIZONTAL SCALE IN FEET
0 2.5 5 10

CULVERT PLAN & PROFILE (9.69)
BRIDGE NO. BEL-148-0970

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

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GENERAL NOTES

DESIGN SPECIFICATIONS:

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

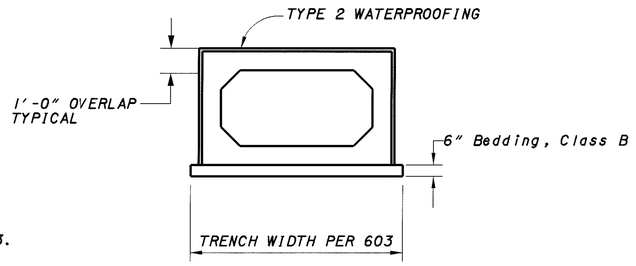
DESIGN LOADING:

HS20-44 AND THE ALTERNATE MILITARY LOADING.

DESIGN STRESSES:

CAST-IN-PLACE STRUCTURES
CONCRETE CLASS C - f'c = 4,000 psi SUBSTRUCTURE
REINFORCING STEEL - ASTM A615, A616, OR A617
Fy = 60,000 psi.

PRECAST STRUCTURES: FOR BOX AND PIPE CULVERTS SEE CMS SECTION 603.



BOX CULVERT FOUNDATION

COFFERDAMS, CRIBS, AND SHEETING:

TEMPORARY SHORING SHALL BE USED TO ACCOMPLISH THE PROPOSED CONSTRUCTION IN STAGES. THE DESIGN OF THE TEMPORARY SHORING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER, AND CONFORM WITH 501.05.

UNCLASSIFIED EXCAVATION:

EXCAVATION LIMITS FOR THE PROPOSED STRUCTURE SHALL BE AS DEFINED IN 503.11. EXCAVATION OUTSIDE THESE LIMITS NECESSARY TO REMOVE THE EXISTING STRUCTURE SHALL BE INCLUDED IN 202 FOR PAYMENT.

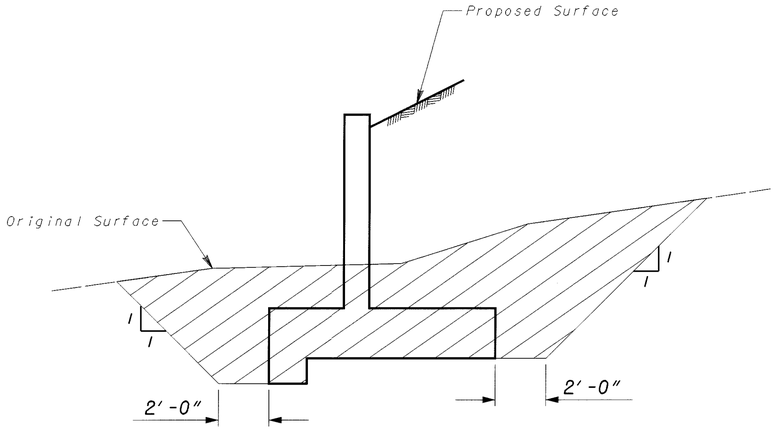
ITEM 613 - LOW STRENGTH MORTAR BACKFILL,TYPE I

LOW STRENGTH MORTAR BACKFILL SHALL BE PLACED AS SHOWN. PAYMENT FOR LOW STRENGTH MORTAR BACKFILL SHALL BE MADE ONLY FOR BACKFILL PLACED TO THE LIMITS SHOWN. THE EXCAVATION REQUIRED FOR THE PLACEMENT OF THE LSM SHALL BE INCLUDED IN ITEM 603 FOR PAYMENT.

ESTIMATED QUANTITIES

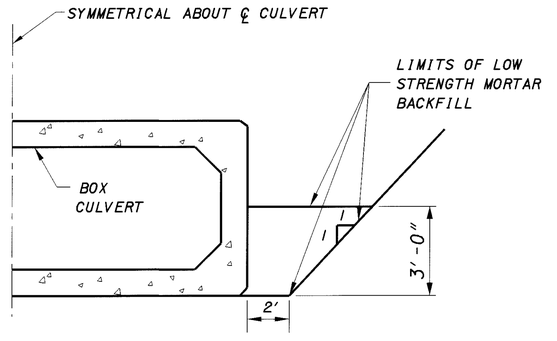
ITEM	ITEM EXT	TOTAL	UNIT	DESCRIPTION
202	11000	LUMP		STRUCTURE REMOVED
503	11100	LUMP		COFFERDAMS, CRIBS, AND SHEETING
503	21300	LUMP		UNCLASSIFIED EXCAVATION (WINGWALL FOOTING)
512	33000	143	SQ. YD.	TYPE 2 WATERPROOFING
SPECIAL	5126751O	26	SQ. YD.	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)
516	13600	3	SQ. FT.	1" PREFORMED EXPANSION JOINT FILLER
601	32200	48	SQ. YD.	RIPRAP, USING 6" REINFORCED CONCRETE SLAB
603	95600	46	LIN. FT.	12'-0" SPAN X 4'-0" RISE CONDUIT, TYPE A, 706.05, ASTM C850
613	41200	36	CU. YD.	LOW STRENGH MORTAR BACKFILL, TYPE I
842	46000	30	CU. YD.	CLASS C CONCRETE

NOTE: TOTALS CARRIED TO GENERAL SUMMARY



LIMITS OF UNCLASSIFIED EXCAVATION
(WINGWALL AND CULVERT FOOTINGS)

ITEM 503 UNCLASSIFIED EXCAVATION



Calculations:
[(2 x 3) + (0.5 x 3 x 3)] x 46 ÷ 27 x 2 sides = 35.78 Cu. Yd.
(USE 36 Cu. Yd.)

ITEM 613 - LOW STRENGTH MORTAR BACKFILL, TYPE I

ODOT DISTRICT-11

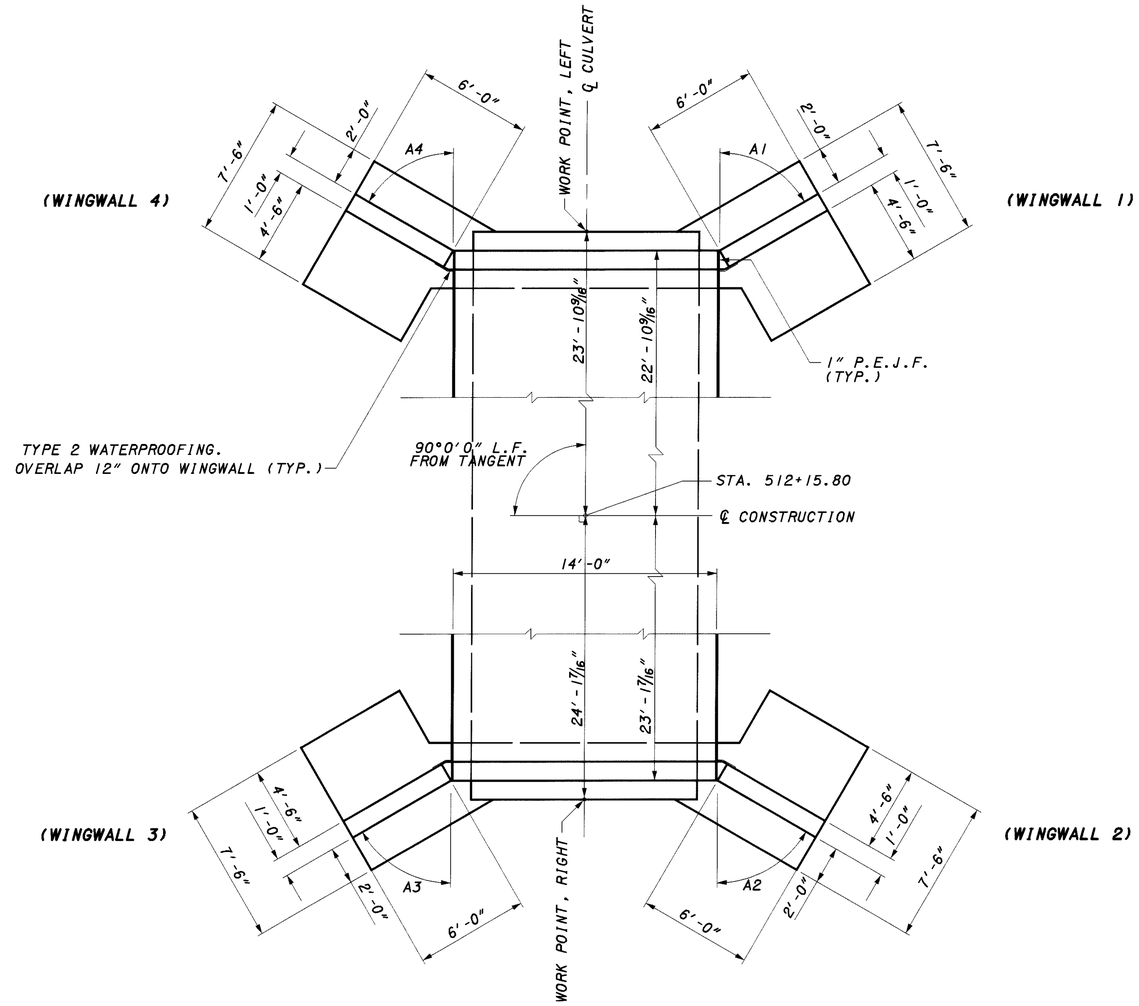
DESIGNED	DATE	0703966
DRAWN TES	CHECKED	
CHECKED TES	CHECKED SKW	

GENERAL NOTES & ESTIMATED QUANTITIES
BEL-148-0970

BEL-148-(0.33)(4.54)(5.07)
(17.93)(19.69)(10.91)

2 / 8

91
111



CULVERT & WINGWALL LAYOUT

WINGWALL ANGLES	
A1	60°0'0"
A2	60°0'0"
A3	60°0'0"
A4	60°0'0"

WORK POINTS		
LOCATION	STATION	OFFSET
LEFT	512+15.80	23'-10⅜"
RIGHT	512+15.80	24'-1⅞"

ODOT DISTRICT-11

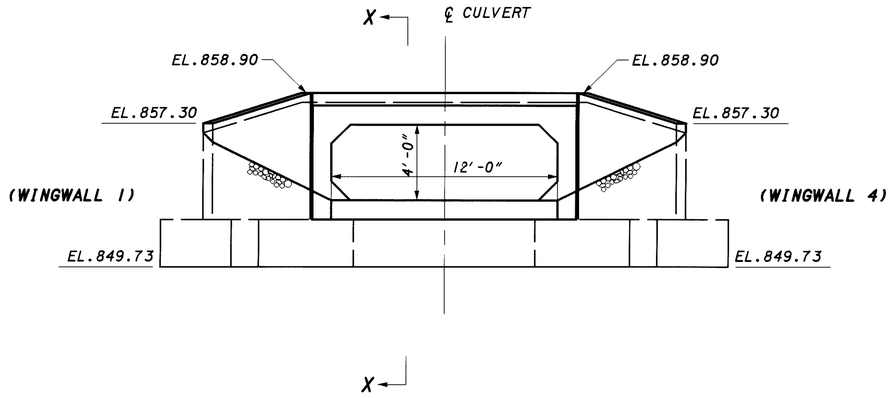
			0703966
DESIGNED	TES	DRAWN	
CHECKED	TES	QUANTITIES	SKW

STRUCTURE DETAILS
BEL-148-0970

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

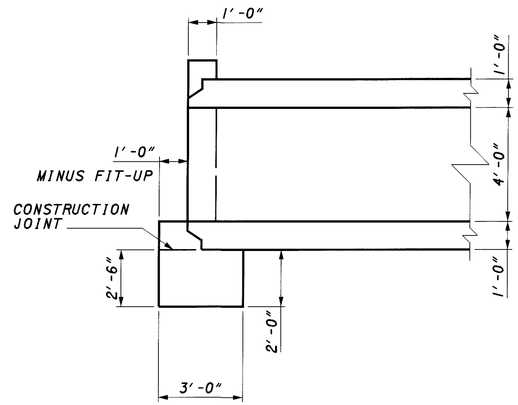
3 / 8

92
111

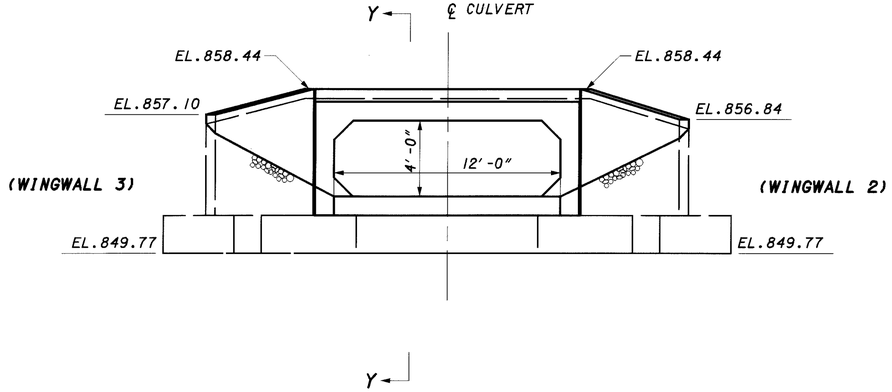


INLET ELEVATION

FLOWLINE ELEVATION: EL.853.23

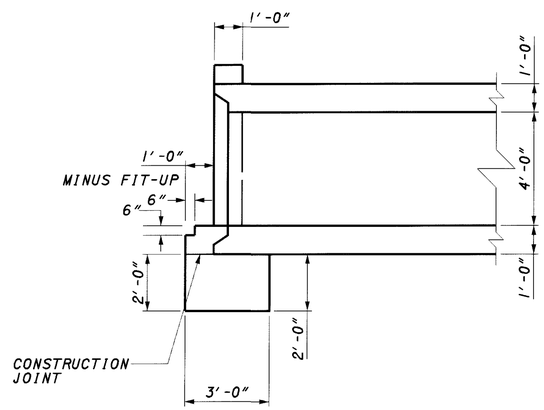


SECTION X-X



OUTLET ELEVATION

FLOWLINE ELEVATION: EL.852.77



SECTION Y-Y

ODOT DISTRICT-11

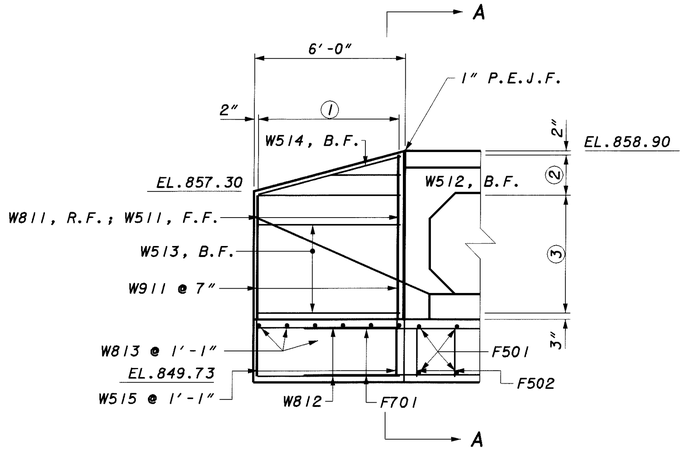
DESIGNED	STRUCTURE FILE NUMBER 0703966
DRAWN TES	
CHECKED TES	CHECKED SKW

STRUCTURE DETAILS
BEL-148-0970

BEL-148-(0.33)14.54)(5.07)
(7.93)19.69)(10.91)

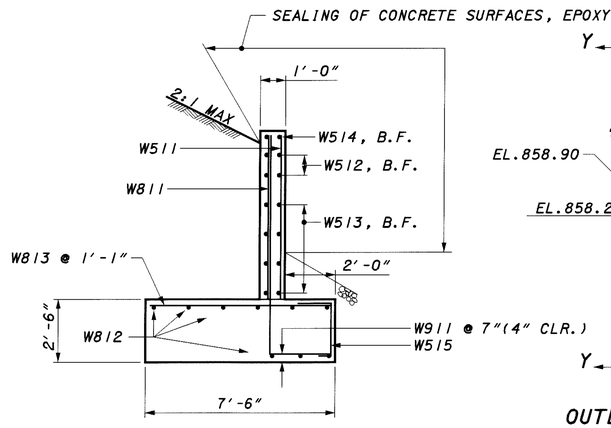
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

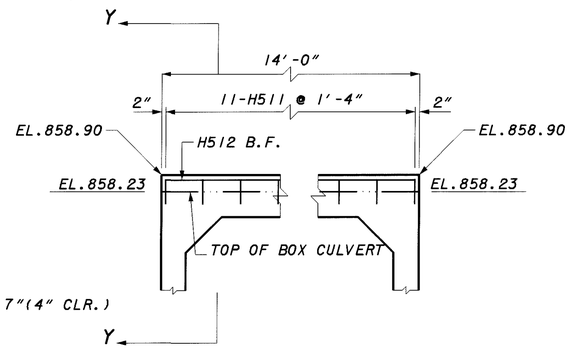


WINGWALL 1 ELEVATION

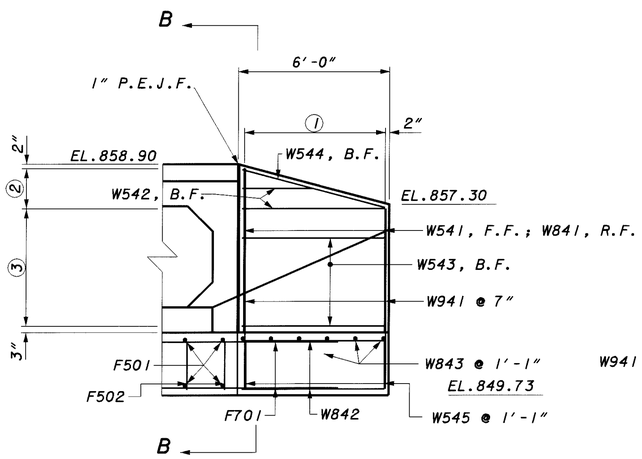
① SER. OF 6 @ 1'-1"
② 2 SPACES @ 10"
③ 4 SPACES @ 1'-2"



SECTION A-A

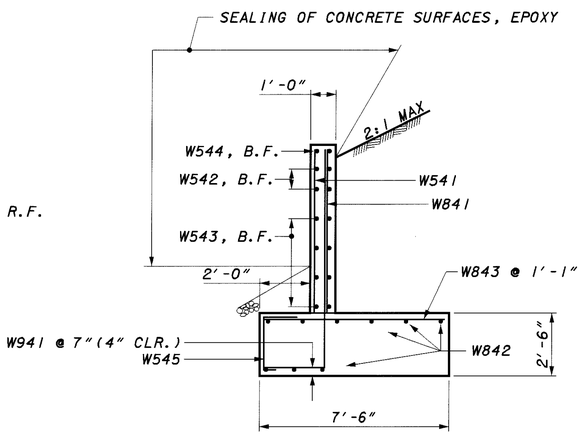


OUTLET HEADWALL REINFORCING DETAIL
SEE SHEET 95 FOR SECTION Y-Y

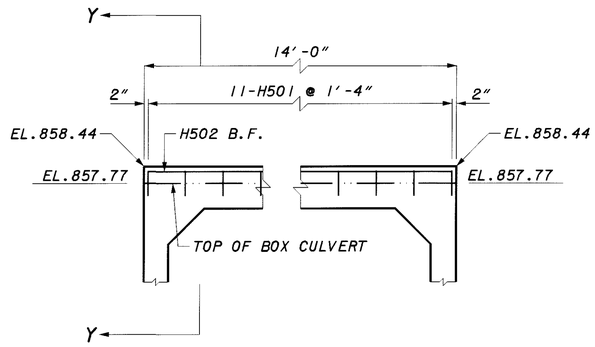


WINGWALL 4 ELEVATION

① SER. OF 6 @ 1'-1"
② 2 SPACES @ 10"
③ 4 SPACES @ 1'-2"



SECTION B-B



INLET HEADWALL REINFORCING DETAIL
SEE SHEET 95 FOR SECTION Y-Y

NOTES:

1" PREFORMED EXPANSION JOINT FILLER SHALL BE EXTENDED FROM TOP OF FOOTING TO TOP OF WALL.

ODOT DISTRICT-11

	0703966
TES	
TES	SKW

STRUCTURE DETAILS
BEL-148-0970

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

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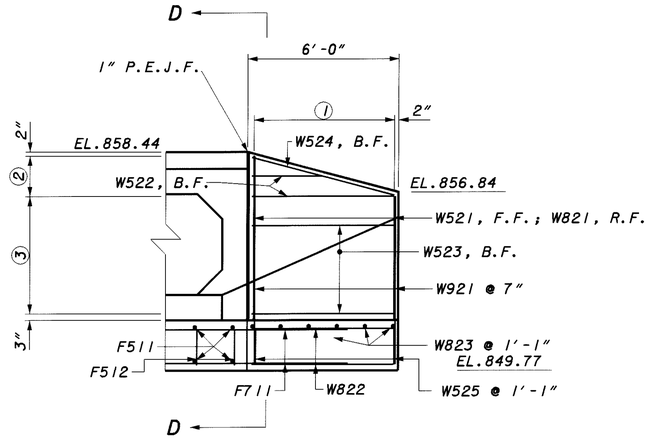
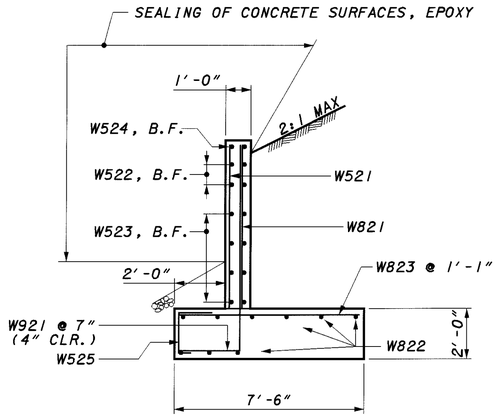
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

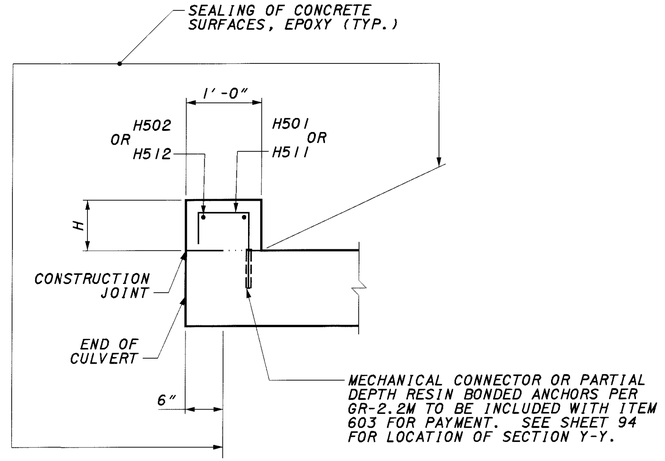


WINGWALL 2 ELEVATION

(1) SER. OF 6 @ 1'-1"
(2) 2 SPACES @ 10"
(3) 4 SPACES @ 1'-2"

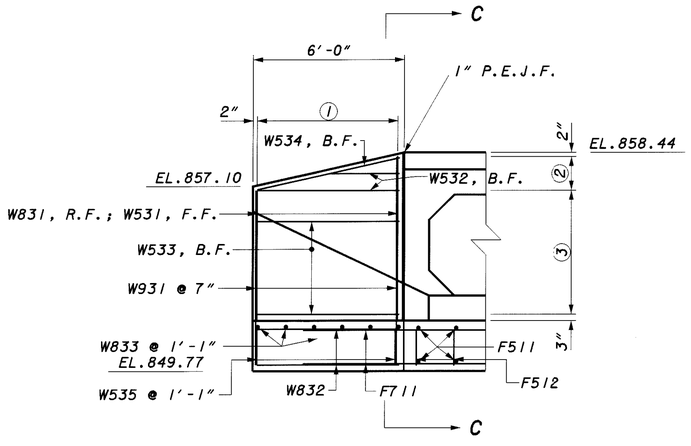


SECTION D-D



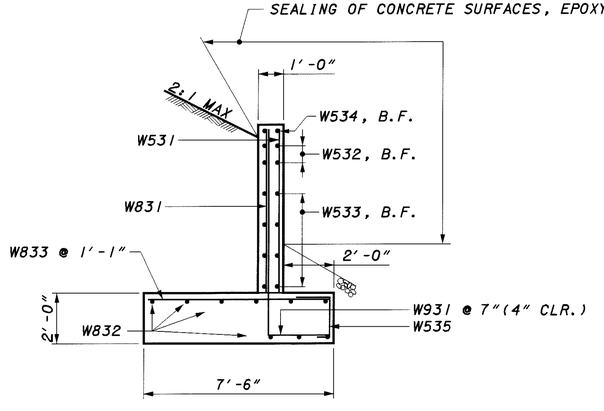
SECTION Y-Y

H -8" OUTLET HEADWALL
H -8" INLET HEADWALL



WINGWALL 3 ELEVATION

(1) SER. OF 6 @ 1'-1"
(2) 2 SPACES @ 8"
(3) 4 SPACES @ 1'-3"



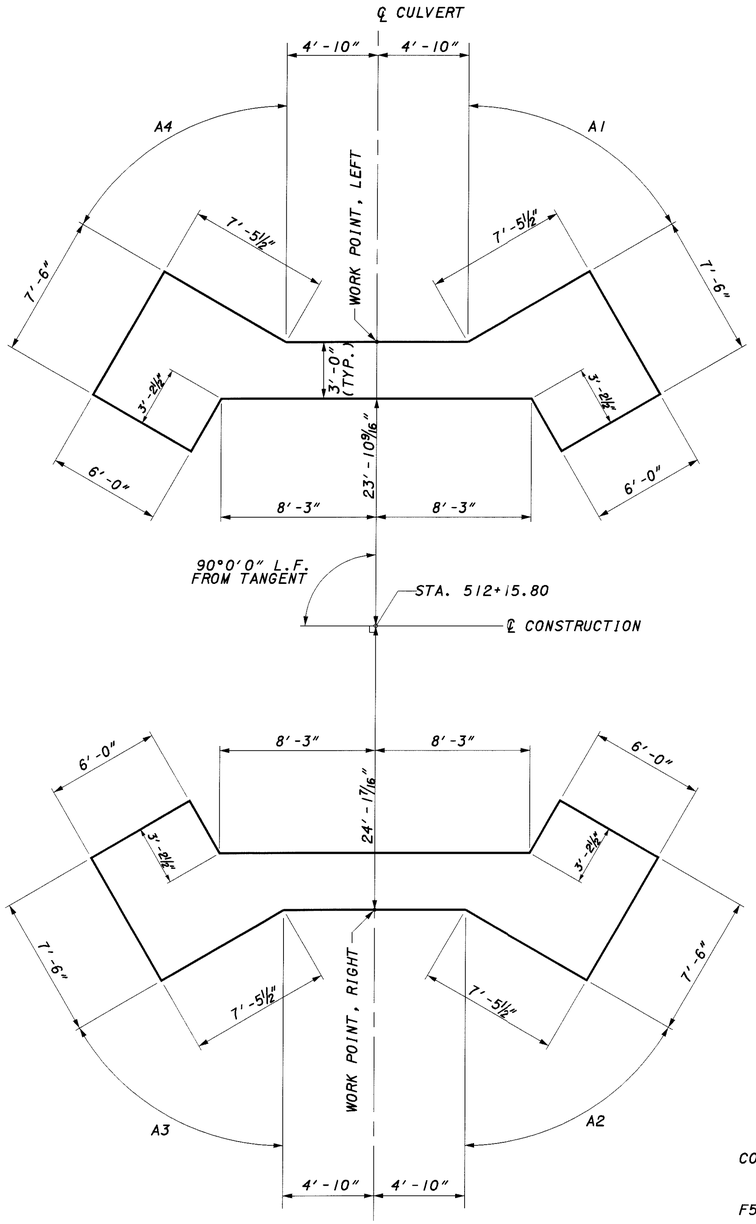
SECTION C-C

ODOT DISTRICT-11

DESIGNED	DRAWN	STRUCTURE NUMBER
	TES	0703966
CHECKED	CHECKED	
	SKW	

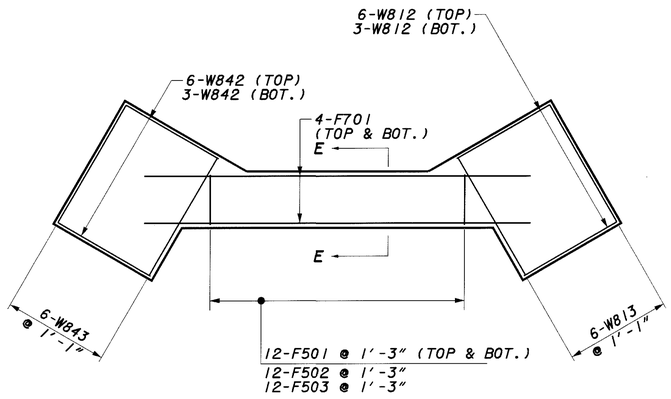
STRUCTURE DETAILS
BEL-148-0970

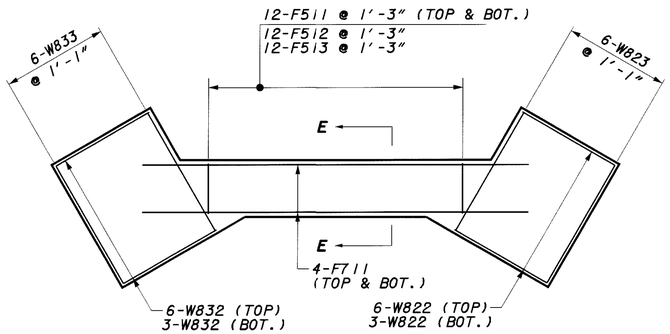
BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

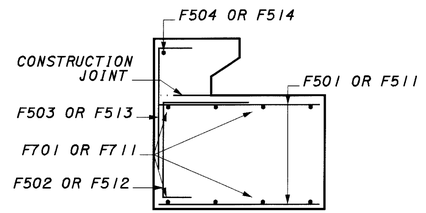


FOOTING LAYOUT

SEE TABLE ON SHEET 92 FOR VALUES OF A1 THRU A4
FOR WORKPOINT STATIONS AND OFFSETS SEE SHEET 92







FOOTING REINFORCING DETAIL SECTION E-E

FOOTING REINFORCING

ODOT DISTRICT-11

DESIGNED	DRAWN	CHECKED	QUANTITIES	STRUCTURE FILE NUMBER
TES	TES	SKW		0703966

STRUCTURE DETAILS
BEL-148-0970

BEL-148-(0.33)(4.54)(5.07)
(7.33)(9.69)(10.91)

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96
111

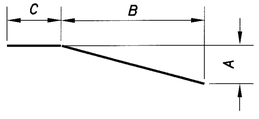
POST HEIGHT TABLE			
STA.	"A"	HEIGHT	L/R
512+13.08	1.7	4.0	R
512+19.36	1.7	4.0	R

NOTE:
THE POST HEIGHTS TABULATED ABOVE ARE CALCULATED HEIGHTS.

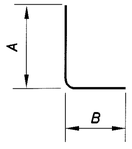
SEE STANDARD DRAWING GR-2.2M FOR ADDITIONAL DETAIL.

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, W601 IS A NO. 6 BAR. BAR DIMENSIONS SHOWN ARE OUT TO OUT UNLESS OTHERWISE INDICATED. R INDICATES INSIDE RADIUS, UNLESS OTHERWISE NOTED. "STD." WRITTEN IN PLACE OF A DIMENSION INDICATES A STANDARD BEND AT THE END OF THE BAR.

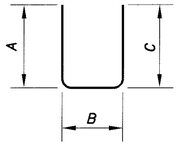
ALL REINFORCING STEEL TO BE EPOXY COATED.



TYPE 1



TYPE 2



TYPE 3

BENDING DIAGRAMS

S.O. - SERIES OF

EPOXY COATED REINFORCING STEEL LIST

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
				WINGWALL 1				
W511	1	4'-11"	36	STR				4"
.	S.O.	TO						
.	6	6'-6"						
W512	2	2'-9"	17	STR				2'-10"
.	S.O.	TO						
.	2	5'-7"						
W513	8	5'-7"	47	STR				
W514	2	5'-9"	12	STR				
W911	1	9'-1"	370	2	6'-7"	2'-6"		2"
	S.O.	TO			TO			
	11	10'-8"			8'-2"			
W812	9	5'-8"	136	STR				
W813	6	7'-2"	115	STR				
W811	1	4'-11"	91	STR				4"
	S.O.	TO						
	6	6'-6"						
W515	6	3'-8"	23	3	1'-4"	2'-1"	6"	
	SUBTOTAL = 847 LBS							
				WINGWALL 2				
W521	1	4'-11"	36	STR				4"
.	S.O.	TO						
.	6	6'-6"						
W522	2	2'-9"	17	STR				2'-10"
.	S.O.	TO						
.	2	5'-7"						
W523	8	5'-7"	47	STR				
W524	2	5'-9"	12	STR				
W921	1	9'-1"	370	2	6'-7"	2'-6"		2"
	S.O.	TO			TO			
	11	10'-8"			8'-2"			
W822	9	5'-8"	136	STR				
W823	6	7'-2"	115	STR				
W821	1	4'-11"	91	STR				4"
	S.O.	TO						
	6	6'-6"						
W525	6	3'-2"	20	3	1'-4"	1'-7"	6"	
	SUBTOTAL = 844 LBS							
				WINGWALL 3				
W531	1	4'-11"	36	STR				4"
.	S.O.	TO						
.	6	6'-6"						
W532	2	2'-9"	17	STR				2'-10"
.	S.O.	TO						
.	2	5'-7"						
W533	8	5'-7"	47	STR				
W534	2	5'-9"	12	STR				
W931	1	9'-1"	370	2	6'-7"	2'-6"		2"
	S.O.	TO			TO			
	11	10'-8"			8'-2"			
W832	9	5'-8"	136	STR				
W833	6	7'-2"	115	STR				
W831	1	4'-11"	91	STR				4"
	S.O.	TO						
	6	6'-6"						
W535	6	3'-2"	20	3	1'-4"	1'-7"	6"	
	SUBTOTAL = 844 LBS							

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
				WINGWALL 4				
W541	1	4'-11"	36	STR				4"
.	S.O.	TO						
.	6	6'-6"						
W542	2	2'-9"	17	STR				2'-10"
.	S.O.	TO						
.	2	5'-7"						
W543	8	5'-7"	47	STR				
W544	2	5'-9"	12	STR				
W941	1	9'-1"	370	2	6'-7"	2'-6"		2"
	S.O.	TO			TO			
	11	10'-8"			8'-2"			
W842	9	5'-8"	136	STR				
W843	6	7'-2"	115	STR				
W841	1	4'-11"	91	STR				4"
	S.O.	TO						
	6	6'-6"						
W545	6	3'-8"	23	3	1'-4"	2'-1"	6"	
	SUBTOTAL = 847 LBS							
				CULVERT FOOTING				
F501	24	2'-8"	67	STR				
F502	12	3'-11"	49	3	6"	2'-2"	1'-6"	
F503	12	3'-7"	45	2	3'-0"	9"		
F504	1	11'-8"	12	STR				
F511	24	2'-8"	67	STR				
F512	12	3'-5"	43	3	6"	1'-8"	1'-6"	
F513	12	2'-7"	33	2	2'-0"	9"		
F514	1	11'-8"	12	STR				
F701	8	20'-6"	335	STR				
F711	8	20'-6"	335	STR				
	SUBTOTAL = 998 LBS							
				HEADWALL				
H501	11	1'-9"	20	3	1'-0"	8"	4"	
H502	2	13'-8"	29	STR				
H511	11	1'-9"	20	3	1'-0"	8"	4"	
H512	2	13'-8"	29	STR				
	SUBTOTAL = 98 LBS							

ODOT DISTRICT-11

DESIGNED	DRAWN	CHECKED	QUANTITIES
	TES	SKW	

STRUCTURE FILE NUMBER 0703966

REINFORCING STEEL LIST
BEL-148-0970

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

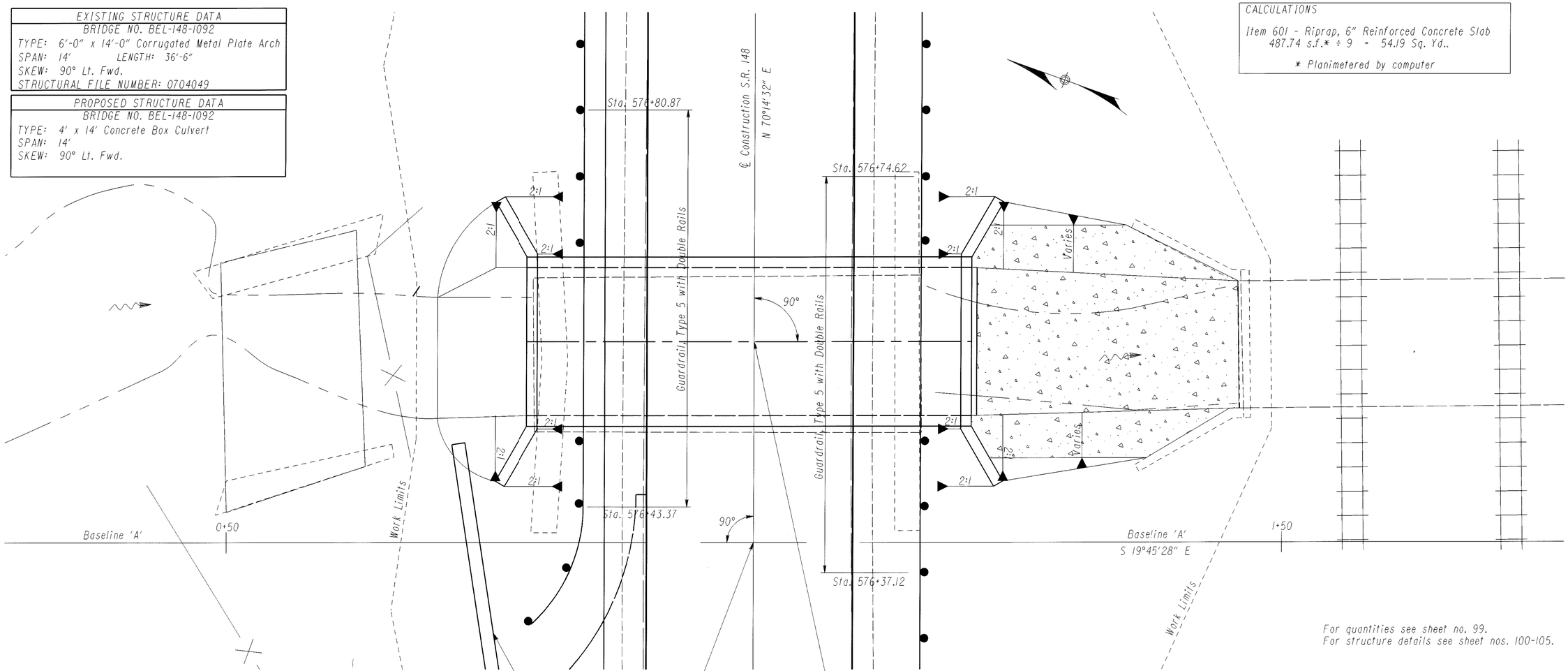
EXISTING STRUCTURE DATA
BRIDGE NO. BEL-148-1092
TYPE: 6'-0" x 14'-0" Corrugated Metal Plate Arch
SPAN: 14' LENGTH: 36'-6"
SKEW: 90° Lt. Fwd.
STRUCTURAL FILE NUMBER: 0704049

PROPOSED STRUCTURE DATA
BRIDGE NO. BEL-148-1092
TYPE: 4' x 14' Concrete Box Culvert
SPAN: 14'
SKEW: 90° Lt. Fwd.

CALCULATIONS

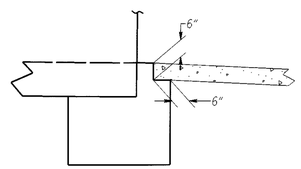
Item 601 - Riprap, 6" Reinforced Concrete Slab
487.74 s.f.* ÷ 9 = 54.19 Sq. Yd..

* Planimetered by computer

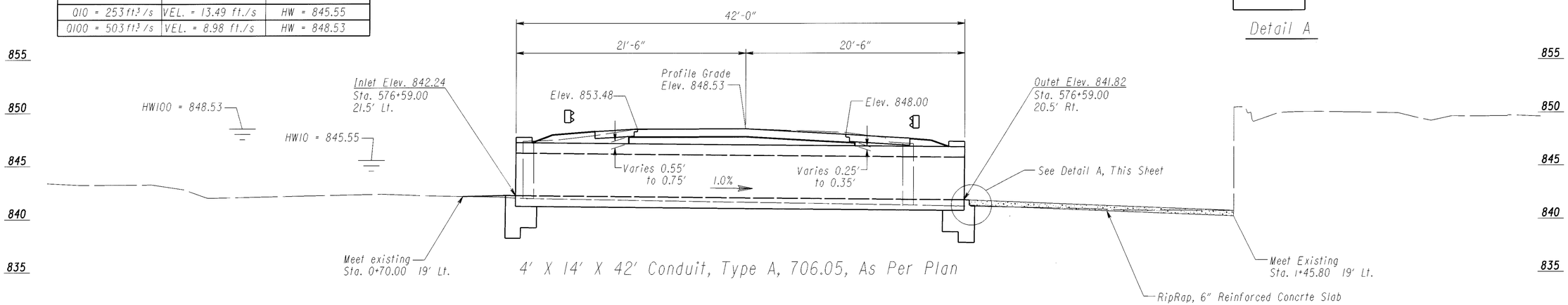


For quantities see sheet no. 99.
For structure details see sheet nos. 100-105.

HYDRUALIC DATA		
DRAINAGE AREA = 399 Acres		
DISCHARGE	VELOCITY	HEADWATER ELEVATION
Q10 = 253 ft³/s	VEL. = 13.49 ft./s	HW = 845.55
Q100 = 503 ft³/s	VEL. = 8.98 ft./s	HW = 848.53



Detail A



CALCULATED TES
CHECKED SKW

CULVERT PLAN & PROFILE (10.91)
BRIDGE NO. BEL-148-1092

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

1/8

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GENERAL NOTES

DESIGN SPECIFICATIONS:

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

DESIGN LOADING:

HS20-44 AND THE ALTERNATE MILITARY LOADING.

DESIGN STRESSES:

CAST-IN-PLACE STRUCTURES
CONCRETE CLASS C - f'c = 4,000 psi SUBSTRUCTURE
REINFORCING STEEL - ASTM A615, A616, OR A617
Fy = 60,000 psi.

PRECAST STRUCTURES: FOR BOX AND PIPE CULVERTS SEE CMS SECTION 603.

COFFERDAMS, CRIBS, AND SHEETING:

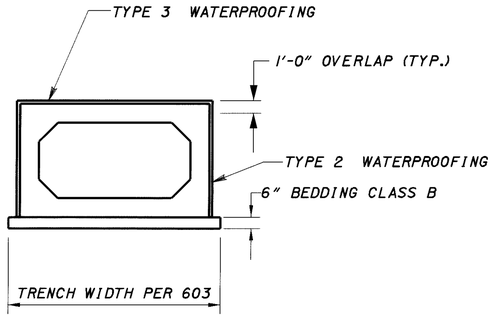
TEMPORARY SHORING SHALL BE USED TO ACCOMPLISH THE PROPOSED CONSTRUCTION IN STAGES. THE DESIGN OF THE TEMPORARY SHORING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER, AND CONFORM WITH 501.05.

UNCLASSIFIED EXCAVATION:

EXCAVATION LIMITS FOR THE PROPOSED STRUCTURE SHALL BE AS DEFINED IN 503.11. EXCAVATION OUTSIDE THESE LIMITS NECESSARY TO REMOVE THE EXISTING STRUCTURE SHALL BE INCLUDED IN 202 FOR PAYMENT.

ITEM 613 - LOW STRENGTH MORTAR BACKFILL, TYPE 1

LOW STRENGTH MORTAR BACKFILL SHALL BE PLACED AS SHOWN. PAYMENT FOR LOW STRENGTH MORTAR BACKFILL SHALL BE MADE ONLY FOR BACKFILL PLACED TO THE LIMITS SHOWN. THE EXCAVATION REQUIRED FOR THE PLACEMENT OF THE LSM SHALL BE INCLUDED IN ITEM 603 FOR PAYMENT.

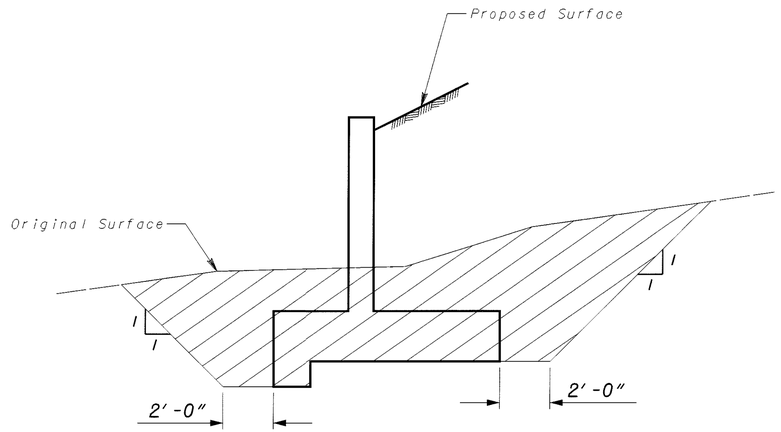


BOX CULVERT FOUNDATION

ESTIMATED QUANTITIES

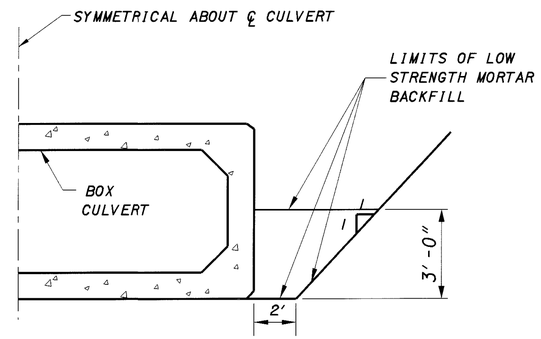
ITEM	ITEM EXT	TOTAL	UNIT	DESCRIPTION
202	11000	LUMP		STRUCTURE REMOVED
503	11100	LUMP		COFFERDAMS, CRIBS, AND SHEETING
503	21300	LUMP		UNCLASSIFIED EXCAVATION (WINGWALL FOOTING)
512	33000	59	SQ. YD.	TYPE 2 WATERPROOFING
512	33010	80	SQ. YD.	TYPE 3 WATERPROOFING
SPECIAL	51267510	28	SQ. YD.	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)
516	13600	3	SQ. FT.	1" PREFORMED EXPANSION JOINT FILLER
601	11000	54	SQ. YD.	RIPRAP USING 6" REINFORCED CONCRETE SLAB
603	96300	42	LIN. FT.	14'-0" SPAN X 4'-0" RISE CONDUIT, TYPE A, 706.05, AS PER PLAN
613	41250	33	CU. YD.	LOW STRENGH MORTAR BACKFILL, TYPE 1
842	46000	35	CU. YD.	CLASS C CONCRETE

NOTE: TOTALS CARRIED TO GENERAL SUMMARY



LIMITS OF UNCLASSIFIED EXCAVATION
(WINGWALL AND CULVERT FOOTINGS)

ITEM 503 UNCLASSIFIED EXCAVATION



Calculations:
[(2 x 3) + (0.5 x 3 x 3)] x 42 ÷ 27 x 2 sides = 32.67 Cu. Yd.
(USE 33 Cu. Yd.)

ITEM 613 - LOW STRENGTH MORTAR BACKFILL, TYPE 1

ODOT DISTRICT-11

DESIGNED	DATE	STRUCTURE NUMBER 0704059
DETAILED TES	CHECKED	
CHECKED TES	CHECKED SKW	

STRUCTURE DETAILS
BEL-148-1092

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

2 / 8

99
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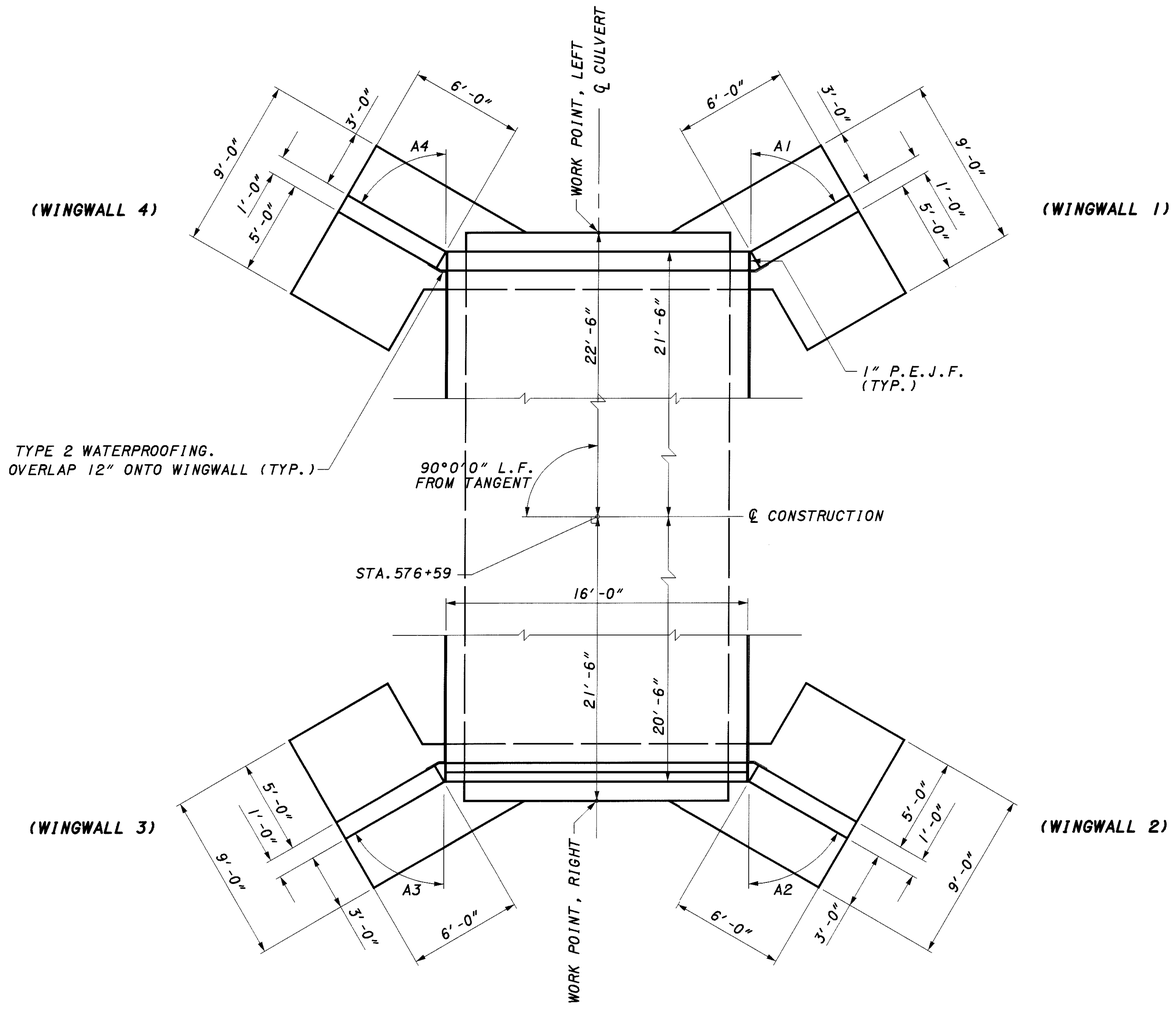
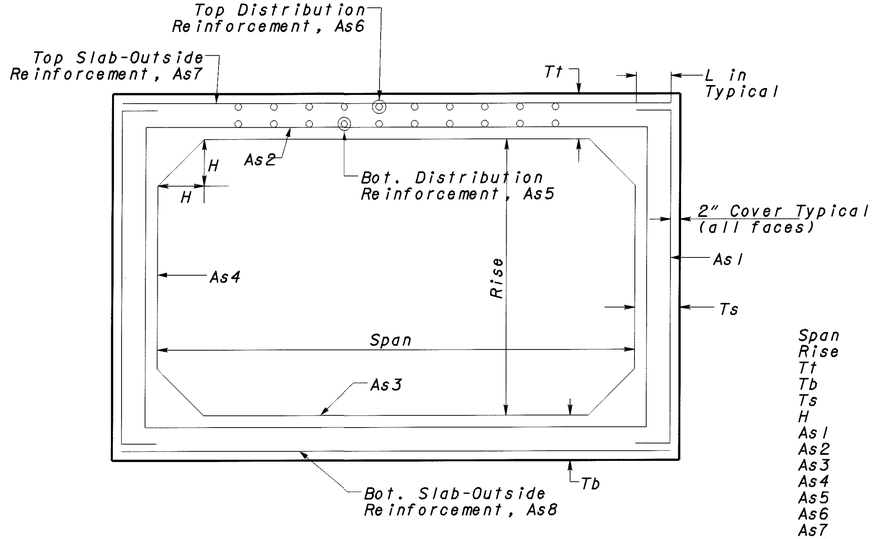


Item 603 - 14' X 4' Conduit Type A, 706.05, As Per Plan
All Requirements of 706.05 and ASTM C850 Shall Be
Met Except As Detailed Herein:



Span	14'
Rise	4'
Tt	12"
Tb	12"
Ts	12"
H	12"
As1	0.524
As2	0.472
As3	0.307
As4	0.288
As5	0.288
As6	0.288
As7	0.288
As8	0.288
L min	49"

Notes: Maximum spacing of reinforcing shall be 8".
The minimum concrete compressive strength shall be 5000 psi.
The minimum yield strength for reinforcing shall be 65 ksi.
As min = 0.002 X Gross Section Area

WINGWALL ANGLES	
A1	60°0'0"
A2	60°0'0"
A3	60°0'0"
A4	60°0'0"

WORK POINTS		
LOCATION	STATION	OFFSET
LEFT	576+59.00	22'-6"
RIGHT	576+59.00	21'-6"

CULVERT & WINGWALL LAYOUT

ODOT DISTRICT-11

0704059

DESIGNED TES
DRAWN TES
CHECKED SKW

STRUCTURE DETAILS
BEL-148-1092

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

3 / 8

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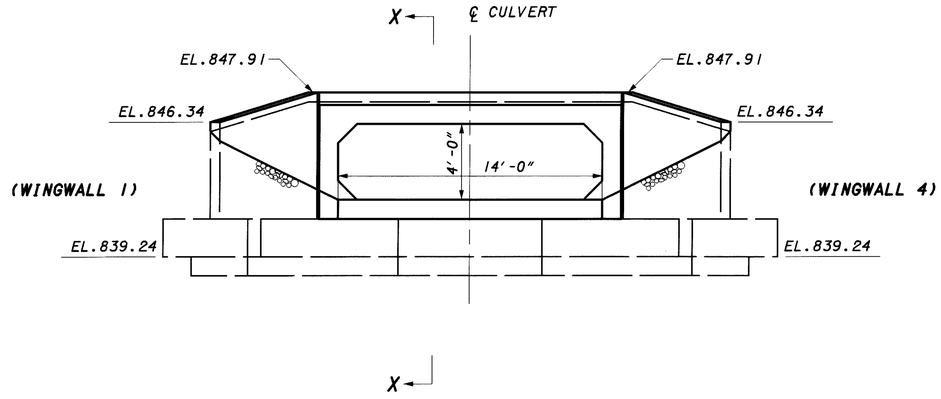
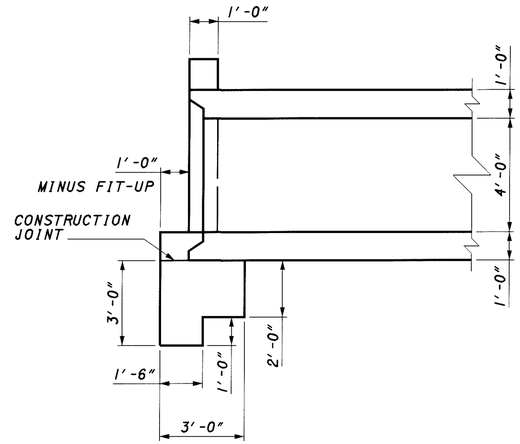
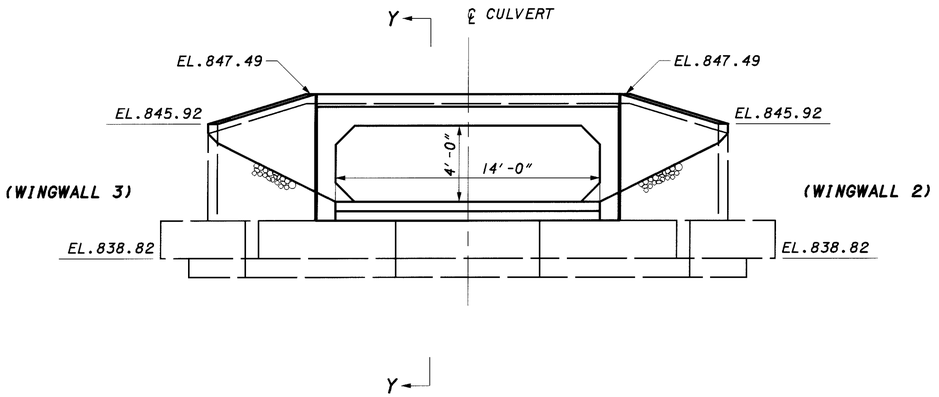


INLET ELEVATION

FLOWLINE ELEVATION: EL.842.24

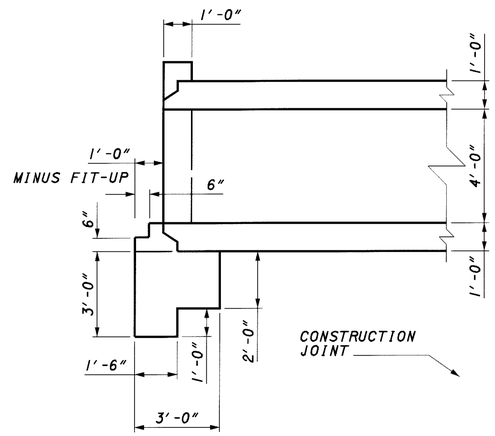


SECTION X-X



OUTLET ELEVATION

FLOWLINE ELEVATION: EL.841.82



SECTION Y-Y

ODOT DISTRICT-11

DESIGNED	DRAWN	CHECKED	STRUCTURE FILE NUMBER
TES	TES	SKW	0704059

STRUCTURE DETAILS
BEL-148-1092

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

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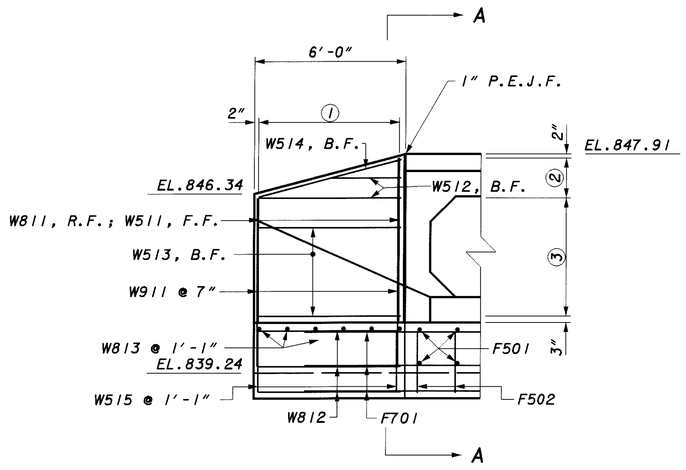
101
111

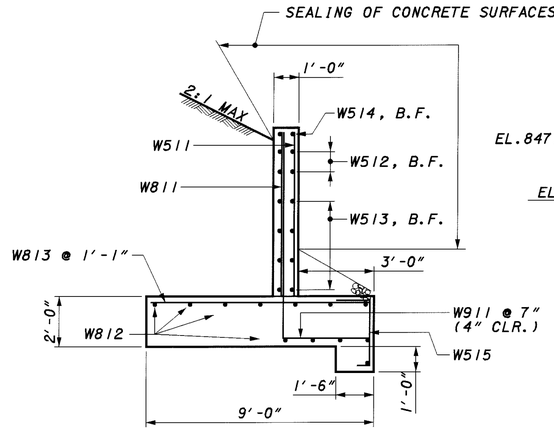
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

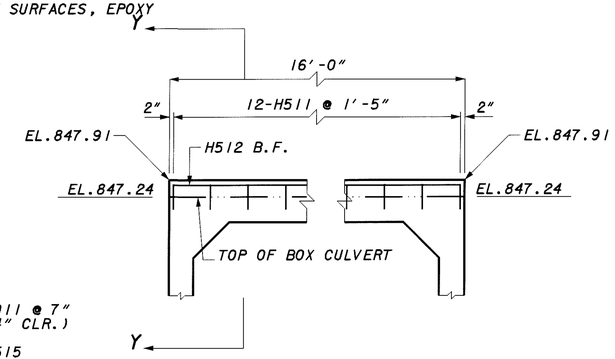


WINGWALL 1 ELEVATION

① SER. OF 6 @ 1'-1"
② 2 SPACES @ 9"
③ 4 SPACES @ 1'-2"

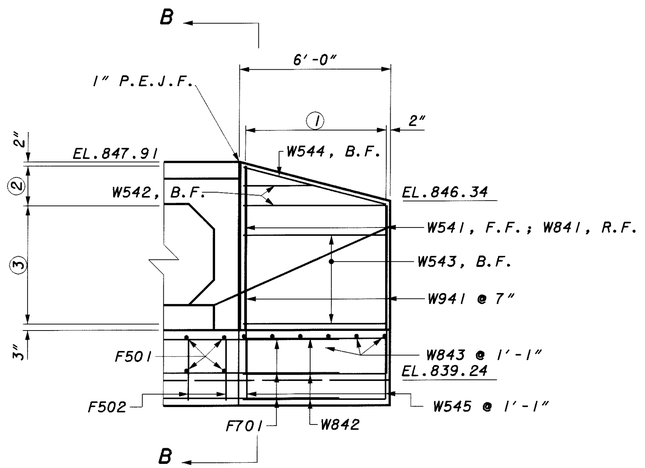


SECTION A-A



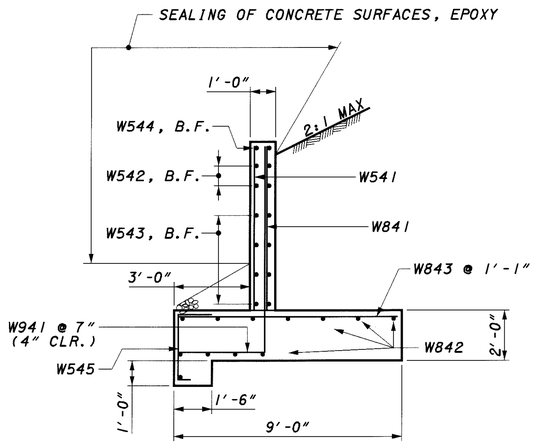
INLET HEADWALL REINFORCING DETAIL

SEE SHEET 103 FOR SECTION Y-Y

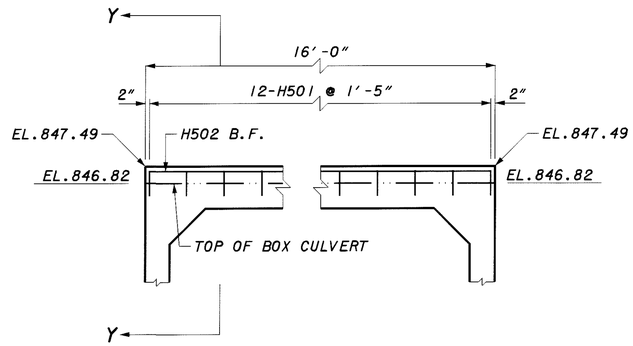


WINGWALL 4 ELEVATION

① SER. OF 6 @ 1'-1"
② 2 SPACES @ 9"
③ 4 SPACES @ 1'-2"



SECTION B-B



OUTLET HEADWALL REINFORCING DETAIL

SEE SHEET 103 FOR SECTION Y-Y

NOTES:

1" PREFORMED EXPANSION JOINT FILLER SHALL BE EXTENDED FROM TOP OF FOOTING TO TOP OF WALL.

ODOT DISTRICT-11

	0704059
TES	
TES	SKW

STRUCTURE DETAILS
BEL-148-1092

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

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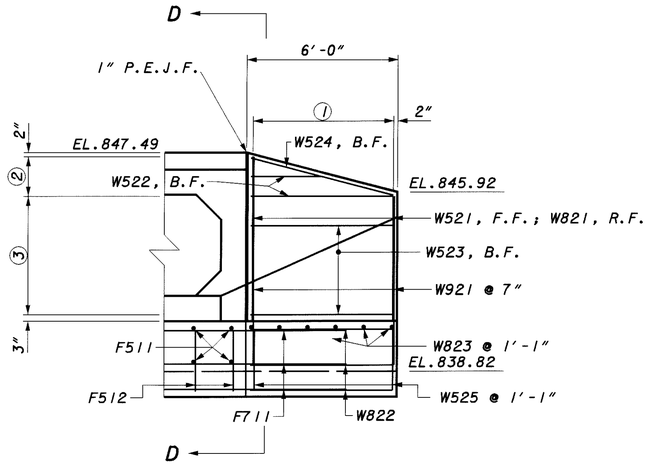
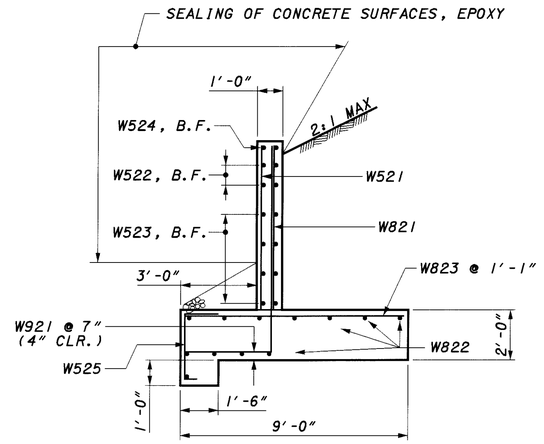
LEGEND

F.F. - FRONT FACE
R.F. - REAR FACE
B.F. - BOTH FACES

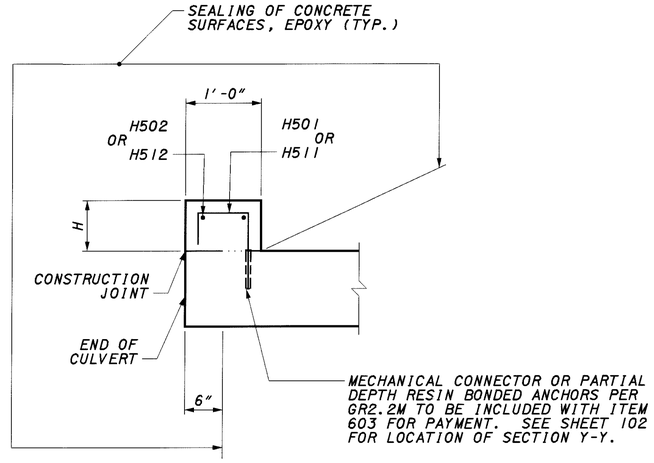


WINGWALL 2 ELEVATION

(1) SER. OF 6 @ 1'-1"
(2) 2 SPACES @ 9"
(3) 4 SPACES @ 1'-2"

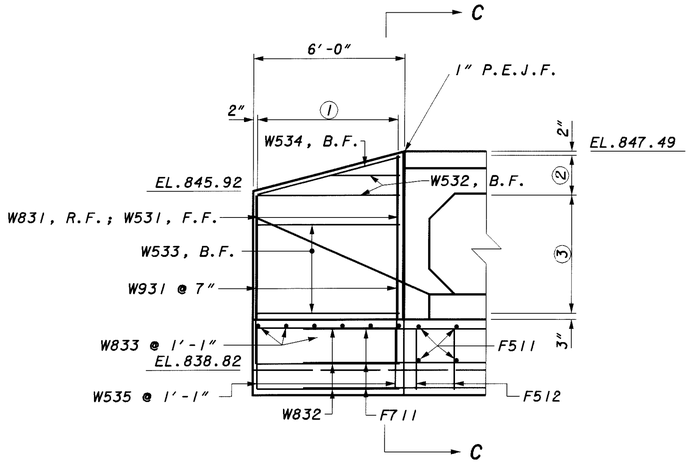


SECTION D-D



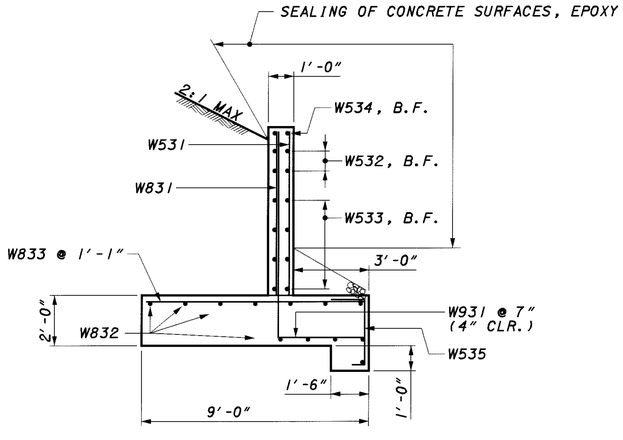
SECTION Y-Y

H -8" INLET HEADWALL
H -8" OUTLET HEADWALL



WINGWALL 3 ELEVATION

(1) SER. OF 6 @ 1'-1"
(2) 2 SPACES @ 9"
(3) 4 SPACES @ 1'-2"



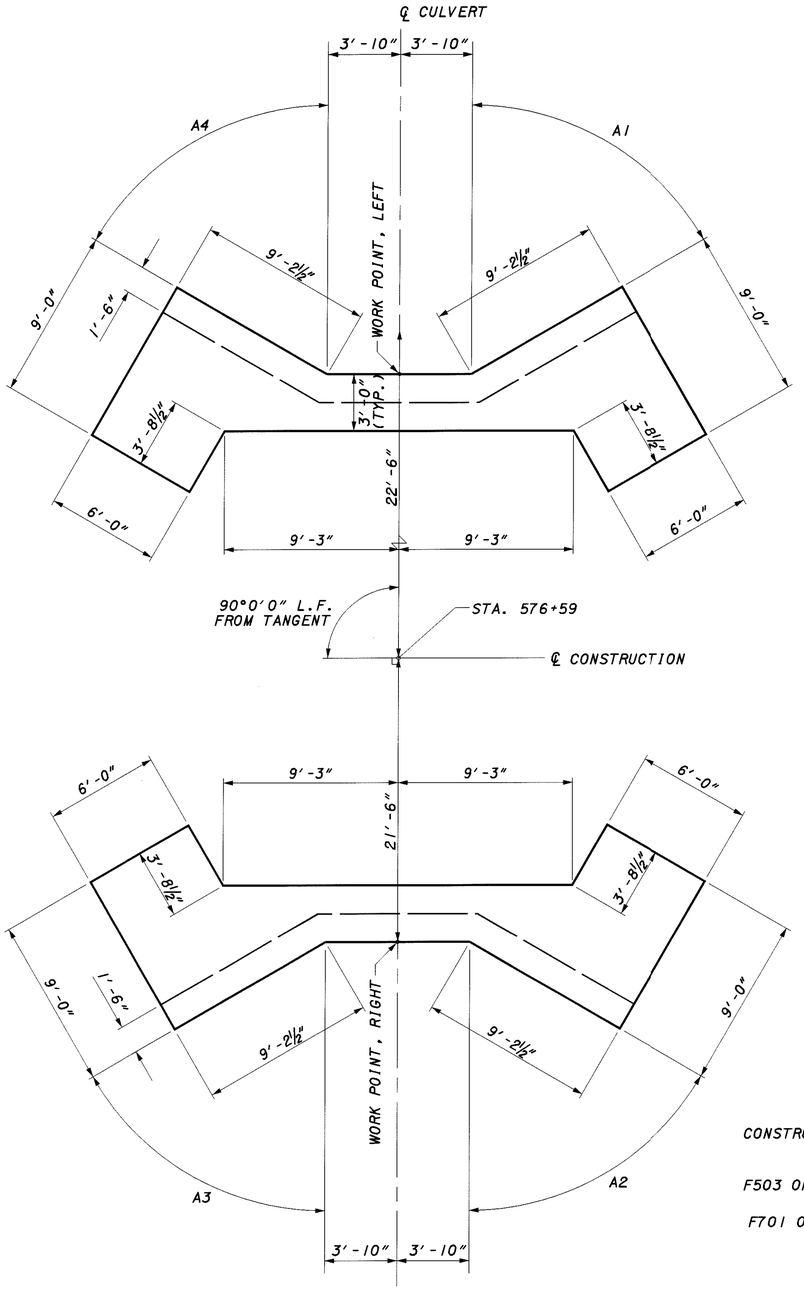
SECTION C-C

ODOT DISTRICT-11

DESIGNED	DRAWN	CHECKED	QUANTITIES	STRUCTURE FILE NUMBER
	TES	SKW		0704059

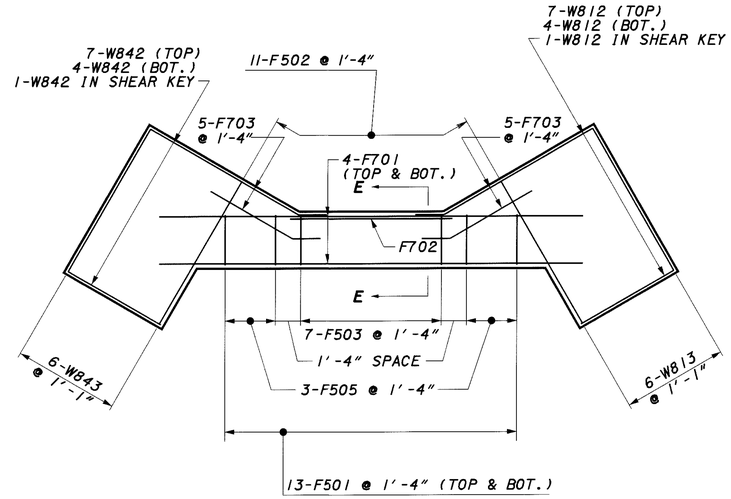
STRUCTURE DETAILS
BEL-148-1092

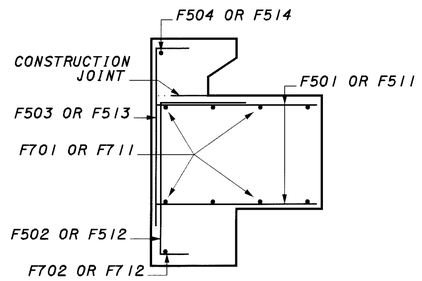
BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)



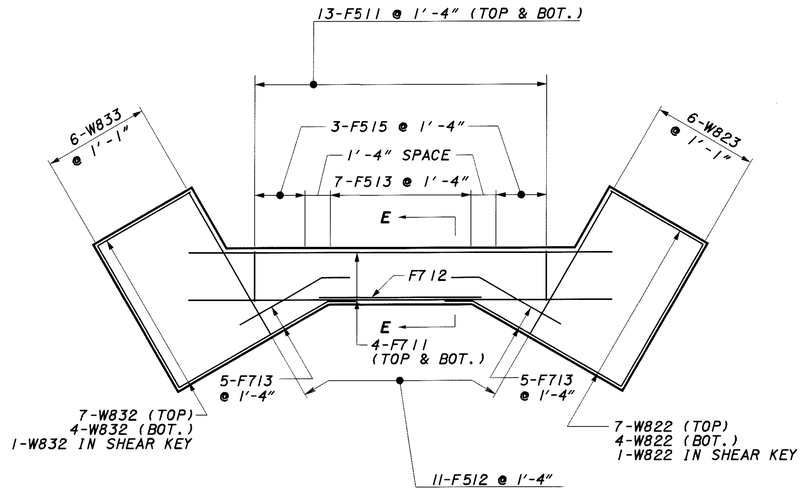
FOOTING LAYOUT

SEE TABLE ON SHEET 100 FOR VALUES OF A1 THRU A4
FOR WORKPOINT STATIONS AND OFFSETS SEE SHEET 100





FOOTING REINFORCING DETAIL SECTION E-E



FOOTING REINFORCING

ODOT DISTRICT-11

		0704059
TES	TES	
	SKW	

STRUCTURE DETAILS
BEL-148-1092

BEL-148-10.33/14.54/15.07)
(17.95/19.69/10.91)

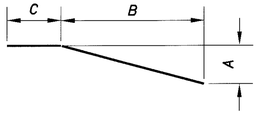
EPOXY COATED REINFORCING STEEL LIST

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
				WINGWALL 1				
W511	1	4'-11"	36	STR				4"
.	S.O.	TO						
.	6	6'-6"						
W512	2	2'-9"	17	STR				2'-10"
.	S.O.	TO						
.	2	5'-7"						
W513	8	5'-7"	47	STR				
W514	2	5'-9"	12	STR				
W911	1	9'-1"	370	2	6'-7"	3'-6"		2"
	S.O.	TO			TO			
	11	11'-8"			8'-2"			
W812	12	5'-8"	182	STR				
W813	6	8'-8"	139	STR				
W811	1	4'-11"	92	STR				4"
	S.O.	TO						
	6	6'-6"						
W515	6	4'-2"	26	3	1'-4"	2'-7"	6"	
	SUBTOTAL = 921 LBS							
				WINGWALL 2				
W521	1	4'-11"	36	STR				4"
.	S.O.	TO						
.	6	6'-6"						
W522	2	2'-9"	17	STR				2'-10"
.	S.O.	TO						
.	2	5'-7"						
W523	8	5'-7"	47	STR				
W524	2	5'-9"	12	STR				
W921	1	9'-1"	370	2	6'-7"	3'-6"		2"
	S.O.	TO			TO			
	11	11'-8"			8'-2"			
W822	12	5'-8"	182	STR				
W823	6	8'-8"	139	STR				
W821	1	4'-11"	92	STR				4"
	S.O.	TO						
	6	6'-6"						
W525	6	4'-2"	26	3	1'-4"	2'-7"	6"	
	SUBTOTAL = 921 LBS							
				WINGWALL 3				
W531	1	4'-11"	36	STR				4"
	S.O.	TO						
	6	6'-6"						
W532	2	2'-9"	17	STR				2'-10"
	S.O.	TO						
.	2	5'-7"						
W533	8	5'-7"	47	STR				
W534	2	5'-9"	12	STR				
W931	1	9'-1"	370	2	6'-7"	3'-6"		2"
.	S.O.	TO			TO			
	11	11'-8"			8'-2"			
W832	12	5'-8"	182	STR				
W833	6	8'-8"	139	STR				
W831	1	4'-11"	92	STR				4"
	S.O.	TO						
	6	6'-6"						
W535	6	4'-2"	26	3	1'-4"	2'-7"	6"	
	SUBTOTAL = 921 LBS							

MARK	NO.	LENGTH	WEIGHT	TYPE	A	B	C	INCR
				WINGWALL 4				
W541	1	4'-11"	36	STR				4"
.	S.O.	TO						
.	6	6'-6"						
W542	2	2'-9"	17	STR				
.	S.O.	TO						
.	2	5'-7"						
W543	8	5'-7"	47	STR				
W544	2	5'-9"	12	STR				
W941	1	9'-1"	370	2	6'-7"	3'-6"		2"
	S.O.	TO			TO			
	11	11'-8"			8'-2"			2'-10"
W842	12	5'-8"	182	STR				
W843	6	8'-8"	139	STR				
W841	1	4'-11"	92	STR				4"
	S.O.	TO						
	6	6'-6"						
W545	6	4'-2"	26	3	1'-4"	2'-7"	6"	
	SUBTOTAL = 921 LBS							
				CULVERT FOOTING				
F501	26	2'-8"	72	STR				
F502	11	4'-5"	51	3	6"	2'-8"	1'-6"	
F503	7	3'-7"	26	2	3'-0"	9"		
F504	1	13'-8"	14	STR				
F505	6	3'-3"	20	3	2'-8"	9"		
F511	26	2'-8"	72	STR				
F512	13	4'-5"	51	3	6"	2'-8"	1'-6"	
F513	13	3'-7"	26	2	3'-0"	9"		
F514	1	13'-8"	14	STR				
F515	6	3'-3"	20	3	2'-8"	9"		
F701	8	22'-6"	368	STR				
F702	1	8'-8"	18	STR				
F703	10	6'-4"	130	1	2'-6"	5'-0"	1'-6"	
F711	8	22'-6"	368	STR				
F712	1	8'-8"	18	STR				
F713	10	6'-4"	130	1	2'-6"	5'-0"	1'-6"	
	SUBTOTAL = 1398 LBS							
				HEADWALL				
H501	12	1'-9"	22	3	1'-0"	8"	4"	
H502	2	15'-8"	33	STR				
H511	12	1'-9"	22	3	1'-0"	8"	4"	
H512	2	15'-8"	33	STR				
	SUBTOTAL = 110 LBS							

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, W601 IS A NO. 6 BAR. BAR DIMENSIONS SHOWN ARE OUT TO OUT UNLESS OTHERWISE INDICATED. R INDICATES INSIDE RADIUS, UNLESS OTHERWISE NOTED. "STD." WRITTEN IN PLACE OF A DIMENSION INDICATES A STANDARD BEND AT THE END OF THE BAR.

ALL REINFORCING STEEL TO BE EPOXY COATED.



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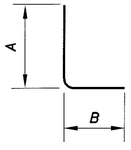

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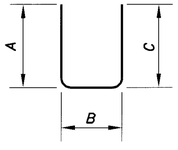


TYPE 3

BENDING DIAGRAMS

S.O. - SERIES OF

ODOT DISTRICT-11

0704059

DESIGNED TES
DRAWN TES
CHECKED SKW

STRUCTURE DETAILS
BEL-148-1092

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

8 / 8

105
111

TOTAL NUMBER OF
7 OWNERSHIPS
0 TOTAL TAKES
0 OWNERSHIPS WITH STRUCTURES INVOLVED
0 OWNERSHIPS WITH "P" ITEMS

SUMMARY OF ADDITIONAL RIGHT OF WAY

ALL AREAS IN ACRES UNLESS OTHERWISE NOTED.

PARCEL NO.	OWNER	SHEET NO.	OWNERS RECORD BOOK	OWNERS RECORD PAGE	AUDITOR'S PARCEL	RECORD AREA(AC.)	TOTAL P.R.O.	GROSS TAKE	P.R.O. IN TAKE	NET TAKE	STRUCTURE	NET RESIDUE LEFT	NET RESIDUE RIGHT	TYPE FUND	REMARKS AND PERSONALTY	AS ACQUIRED BOOK	AS ACQUIRED PAGE
1 T	CAPSTONE HOLDING COMPANY,	2	754	935	45-00112.000	100.00	1.81	0.072	----	0.072	------	56.18	42.01	STATE	TO PROVIDE WORK AREA AND DO NECESSARY GRADING		
	AN OHIO CORPORATION, fka		684	1													
1 T-1	R & F COAL COMPANY,	2						0.037	0	0.037	------			STATE	TO PROVIDE WORK AREA AND DO NECESSARY GRADING		
	AN OHIO CORPORATION																
1 T-2		3						0.148	0	0.148	------			STATE	TO PROVIDE WORK AREA AND DO NECESSARY GRADING		
2 T	BELMONT COAL, INC. AN OHIO CORPORATION	4	734	522	45-90007.000	59.65	4.44	0.038	0	0.038	------	25.53	29.68	STATE	TO PROVIDE WORK AREA AND DO NECESSARY GRADING		
2 T-1		4						0.014	0	0.014	------				TO PROVIDE WORK AREA AND DO NECESSARY GRADING		
3 CH	MARY J. GREENLEE	4	670	256	47-00003.000	3.93	1.12	0.024	0	0.024	------	0.28	2.53	STATE	TO CONSTRUCT AND MAINTAIN CHANNEL		
			571	549													
3 T		4						0.085	0	0.085	------			STATE	TO PROVIDE WORK AREA AND DO NECESSARY GRADING		
4 T	AMERICAN ENERGY CORPORATION,	5	708	225	46-00198.000	119.72	2.82	0.097	0	0.097	------	112.54	4.36	STATE	TO PROVIDE WORK AREA AND DO NECESSARY GRADING		
	AN OHIO CORPORATION																
4 T-1		5						0.016	0	0.016	------			STATE	TO PROVIDE WORK AREA AND DO NECESSARY GRADING		
4 T-2		6	730	725	43-00805.000	5.97	0.02	0.066	0	0.066	------	-----		STATE	TO PROVIDE WORK AREA AND DO NECESSARY GRADING		
						6.11		0.038		0.038							
	Total Parcel 4 T-2					12.08		0.104		0.104			12.06				
5 T	M. EUGENE MOORE	5	750	461	46-00028.000	2.27	0.15	0.018	0	0.018	------	2.12	-----	STATE	TO PROVIDE WORK AREA AND DO NECESSARY GRADING		
6 T	ROGER D. BUNTING AND WANDA L. BUNTING,	6	650	59	47-00007.000	43.63	0.01	0.088	0	0.088	------	43.62	-----	STATE	TO CONSTRUCT DRIVE & REMOVE ABANDONED BRIDGE		
	WANDA L. BUNTING AND WILMA L. ZELEK		631	913													
			631	915													
7 T	HAROLD KNIGHT & LORNA M. KNIGHT	6	647	221	43-00269.0	83.92	0.04	0.025	0	0.025	------	83.88	-----	STATE	TO REMOVE ABANDONED BRIDGE		
			463	358													

NOTES:

ALL TEMPORARY EASEMENTS TO BE OF A 12 MONTH DURATION. UNDER NO CIRCUMSTANCES ARE TEMPORARY EASEMENTS TO BE USED FOR STORAGE OF MATERIAL OR EQUIPMENT BY THE CONTRACTOR UNLESS OTHERWISE NOTED.

GRANTEE:

ALL RIGHT OF WAY ACQUIRED IN THE NAME OF STATE OF OHIO UNLESS OTHERWISE SHOWN.

REV.	DATE	DESCRIPTION
DIST. 11	10-2-00	ADD DEED REFERENCES PAR. 3 & 7 AND CHANGE OWNERSHIPS PAR. 1, 5 & 6
	7-5-00	DATE COMPLETED

FEDERAL PROJECT NO. TE21-G000(6)

PID NO. 13051

STATE PROJECT NO. 112590

SUMMARY OF ADDITIONAL RIGHT OF WAY

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

1 / 6

106 / 111

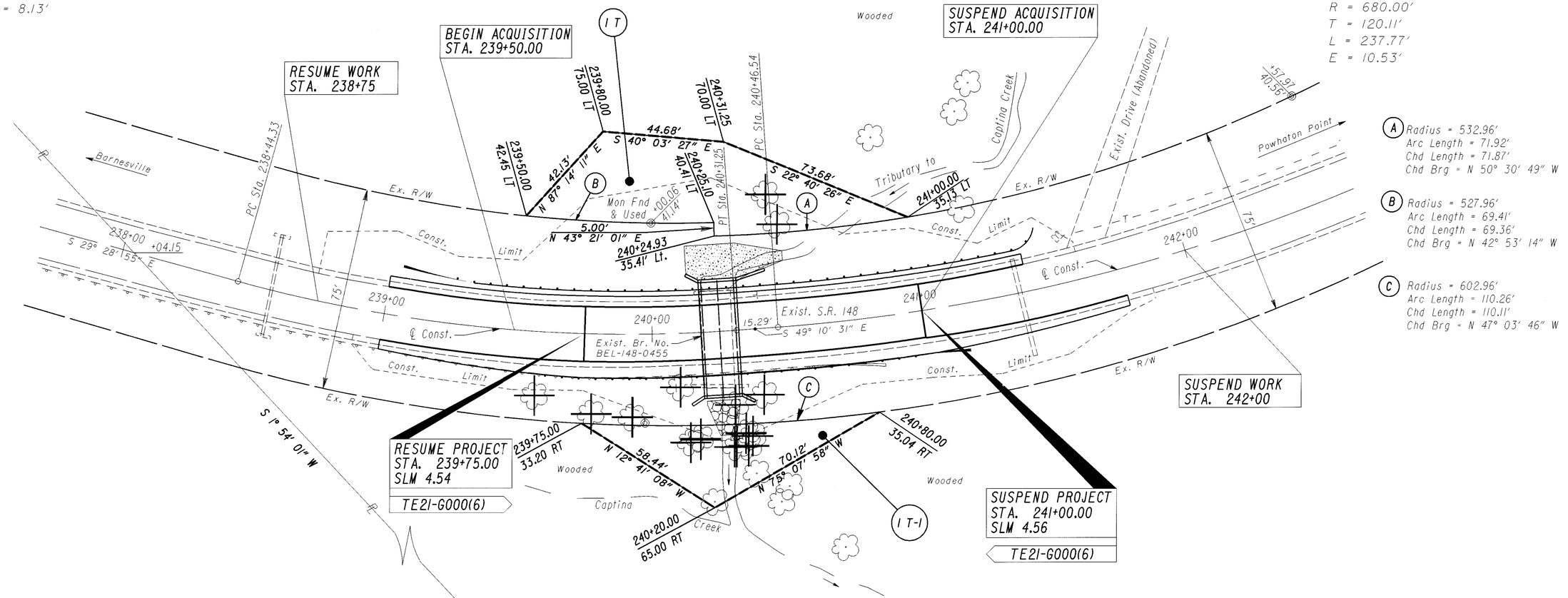
BEL-148-0454
Belmont County, Ohio
Wayne Township
Sec. 29, T-6, R-5

℄ Const.

P.C. Sta = 238+44.33
P.I. Sta = 239+38.72
P.T. Sta = 240+31.25
△ = 19° 41′ 36″ (LT)
Dc = 10° 32′ 09″
R = 543.82′
T = 94.39′
L = 186.92′
E = 8.13′

℄ Const.

P.C. Sta = 240+46.54
P.I. Sta = 241+66.65
P.T. Sta = 242+84.31
△ = 20° 02′ 02″ (LT)
Dc = 8° 25′ 33″
R = 680.00′
T = 120.11′
L = 237.77′
E = 10.53′



UTILITIES

Ameritech
160 North Sixth Street
Zanesville, Ohio 43701

National Gas and Oil
17167 Co. Rd. 40
Caldwell, Ohio 43724

Alltel
32699 National Road
Barnesville, Ohio 43713

South Central Power Company
37801 Barnesville-Bethesda Road
Barnesville, Ohio 43713-0270

Existing Right of Way Based on I.C.H.-105 SEC. E2 - F, 1930

REV.	DATE	DESCRIPTION
DIST. 11	10-2-00	CHANGE OWNERSHIP PARCEL 1
	7-5-00	DATE COMPLETED

HORIZONTAL SCALE IN FEET 0 10 20 40

PID NO. 13051

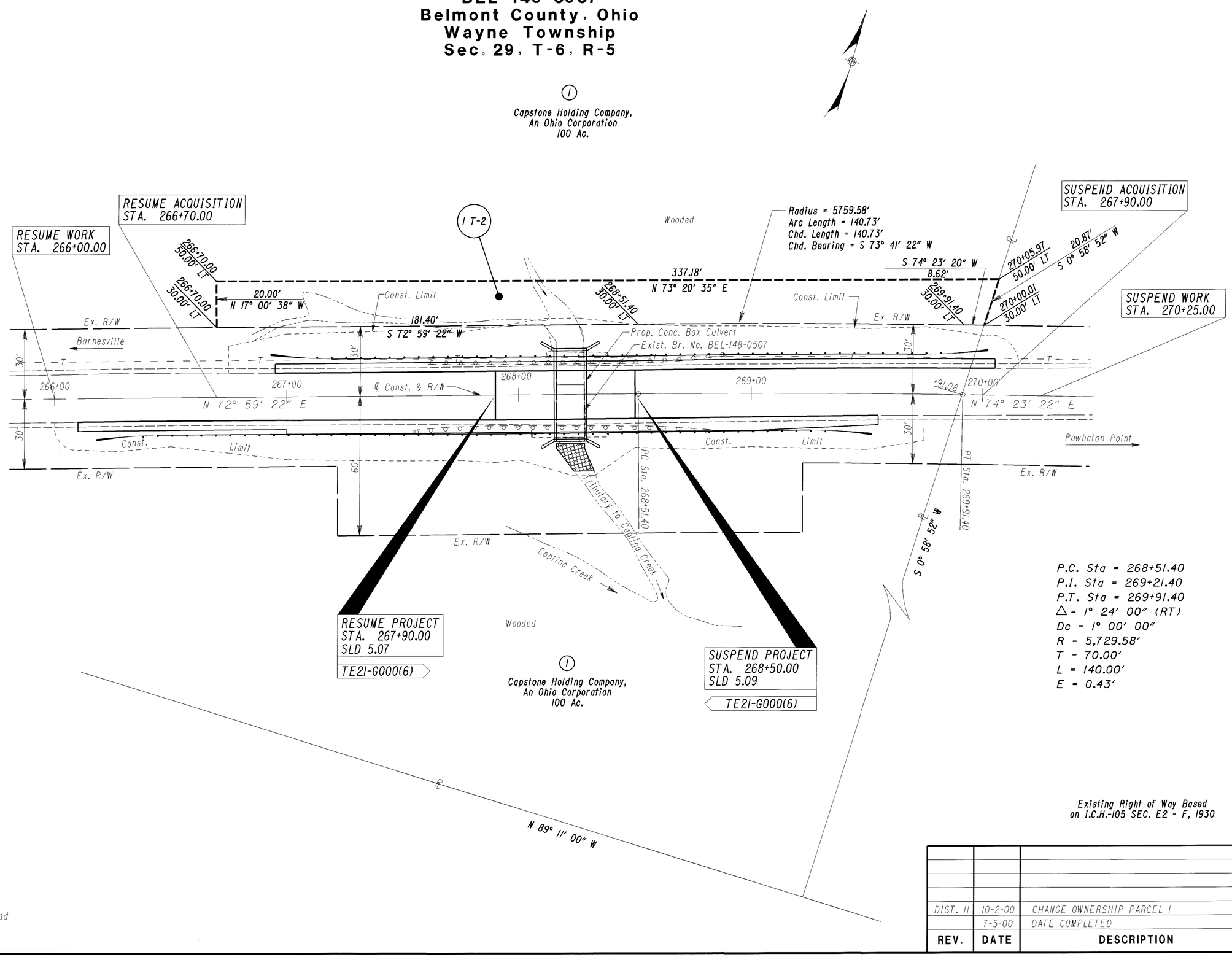
RIGHT OF WAY DETAILS
BRIDGE NO. BEL-148-0455

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

2/6

107/111

BEL-148-0507
Belmont County, Ohio
Wayne Township
Sec. 29, T-6, R-5



P.C. Sta = 268+51.40
P.I. Sta = 269+21.40
P.T. Sta = 269+91.40
△ = 1° 24' 00" (RT)
Dc = 1° 00' 00"
R = 5,729.58'
T = 70.00'
L = 140.00'
E = 0.43'

Existing Right of Way Based
on I.C.H.-105 SEC. E2 - F, 1930

UTILITIES

Ameritech
160 North Sixth Street
Zanesville, Ohio 43701

National Gas and Oil
17167 Co. Rd. 40
Caldwell, Ohio 43724

Alltel
32699 National Road
Barnesville, Ohio 43713

South Central Power Company
37801 Barnesville-Bethesda Road
Barnesville, Ohio 43713-0270

REV.	DATE	DESCRIPTION
DIST. 11	10-2-00	CHANGE OWNERSHIP PARCEL 1
	7-5-00	DATE COMPLETED

HORIZONTAL SCALE IN FEET
0 10 20 40

PID NO. 13051

RIGHT OF WAY DETAILS
BRIDGE NO. BEL-148-0507

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

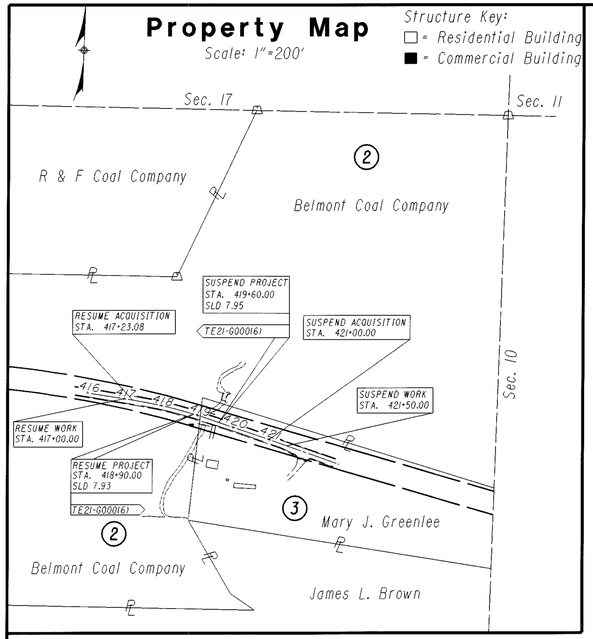
3/6

108/111

BEL-148-0793
Belmont County, Ohio
Wayne Township
Sec. 16, T-6, R-5

Property Map
Scale: 1"=200'

Structure Key:
□ = Residential Building
■ = Commercial Building



(A) S 6° 27′ 13″ W 20.26′

(B) N 73° 39′ 47″ W 15.83′

(C) Radius = 2834.79′
Arc Length = 26.32′
Chd Length = 26.32′
Chd Bearing = S 73° 55′ 54″ E

(D) S 73° 39′ 47″ E 26.28′

(E) S 6° 27′ 13″ W 24.08′

(F) S 73° 39′ 47″ E 54.97′

Stone Fnd
N.E. Corner
Section 16

Sec. 11
Sec. 10

Sec. 17
Sec. 16

S 88° 46′ 20″ E

S 47° 22′ 25″ W
1097.68′

N 1° 56′ 13″ E

(2)
Belmont Coal Company
55.84 Ac.

SUSPEND PROJECT
STA. 419+60.00
SLD 7.95
TE21-G000(6)

SUSPEND ACQUISITION
STA. 421+00.00

SUSPEND WORK
STA. 421+50.00

2 T

3 T

Wooded

Exist. Bridge
(Abandoned)

RESUME ACQUISITION
STA. 417+23.08

Radius = 2894.79′
Arc Length = 167.71′
Chd Length = 167.69′
Chd Bearing = N 75° 20′ 07″ W

418+98.50
48.20′ LT

181.67′
S 81° 31′ 27″ E

203.45′
S 72° 49′ 51″ E

421+00.00
53.67′ LT

17.02′
S 19° 25′ 43″ W

421+00.00
36.65′ LT

417+23.08
33.19′ LT

A
419+02.22
28.31′

B
418+86.88
28.05′

199.03′
N 73° 39′ 47″ W

RW Mon. (F&U)

Const. Limit

Barnesville

Exist. Br. No. 0793

Prop. Conc. Box Culvert

Powhatan Point

418+00

419+00

420+00

421+00

417+00

℄ Const.

60.88′

+07.12

Exist. S.R. 148

S 71° 11′ 37″ E

+89.25

S 70° 34′ 17″ E

60′

S 80° 52′ 17″ E

Gravel Drive

C

D

E

F

RW Mon Fnd

418+60.00
31.92′ RT

418+87.02
31.90′ RT

419+14.14
31.42′ RT

61.58′
N 51° 08′ 00″ W

30.27′
N 71° 18′ 15″ W

32.36′
S 51° 40′ 55″ W

419+69.50
29.17′ RT

419+19.18
55.00′ RT

419+50.00
55.00′ RT

P.I Sta. 420+89.25
Delta = 0°37′20″ Rt.
No Curve

RESUME WORK
STA. 417+00.00

P.C. Sta. 417+23.08

RESUME PROJECT
STA. 418+90.00
SLD 7.93

Field TE21-G000(6)

2 T-1

3 CH

36" Poplar

Pt Sta. 419+31.46

Tributary of North Fork Captina Creek

N 6° 27′ 13″ E

1 Sty Frame Garage

Exist. Mobile Home

3
Mary J. Greenlee
3.94 Ac.

2
Belmont Coal Company
55.84 Ac.

Existing Right of Way Based
on I.C.H.-105 SEC. A2 & E1, 1932

UTILITIES

Ameritech
160 North Sixth Street
Zanesville, Ohio 43701

National Gas and Oil
17167 Co. Rd. 40
Caldwell, Ohio 43724

Alltel
32699 National Road
Barnesville, Ohio 43713

South Central Power Company
37801 Barnesville-Bethesda Road
Barnesville, Ohio 43713-0270

℄ Const.
P.I. Sta = 418+27.52
P.C. Sta = 417+23.08
P.T. Sta = 419+31.46
△ = 9° 40′ 40″ (RT)
Dc = 4° 38′ 39″
R = 1,233.70′
T = 104.44′
L = 208.38′
E = 4.41′

REV.	DATE	DESCRIPTION
	7-5-00	DATE COMPLETED

HORIZONTAL SCALE IN FEET
0 10 20 40

PID NO. 13051

PROPERTY MAP & RIGHT OF WAY DETAIL
BRIDGE NO. BEL-148-0794

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

4/6

109/111

BEL-148-0970
Belmont County, Ohio
Wayne Township
Sec. 4, T-6, R-5

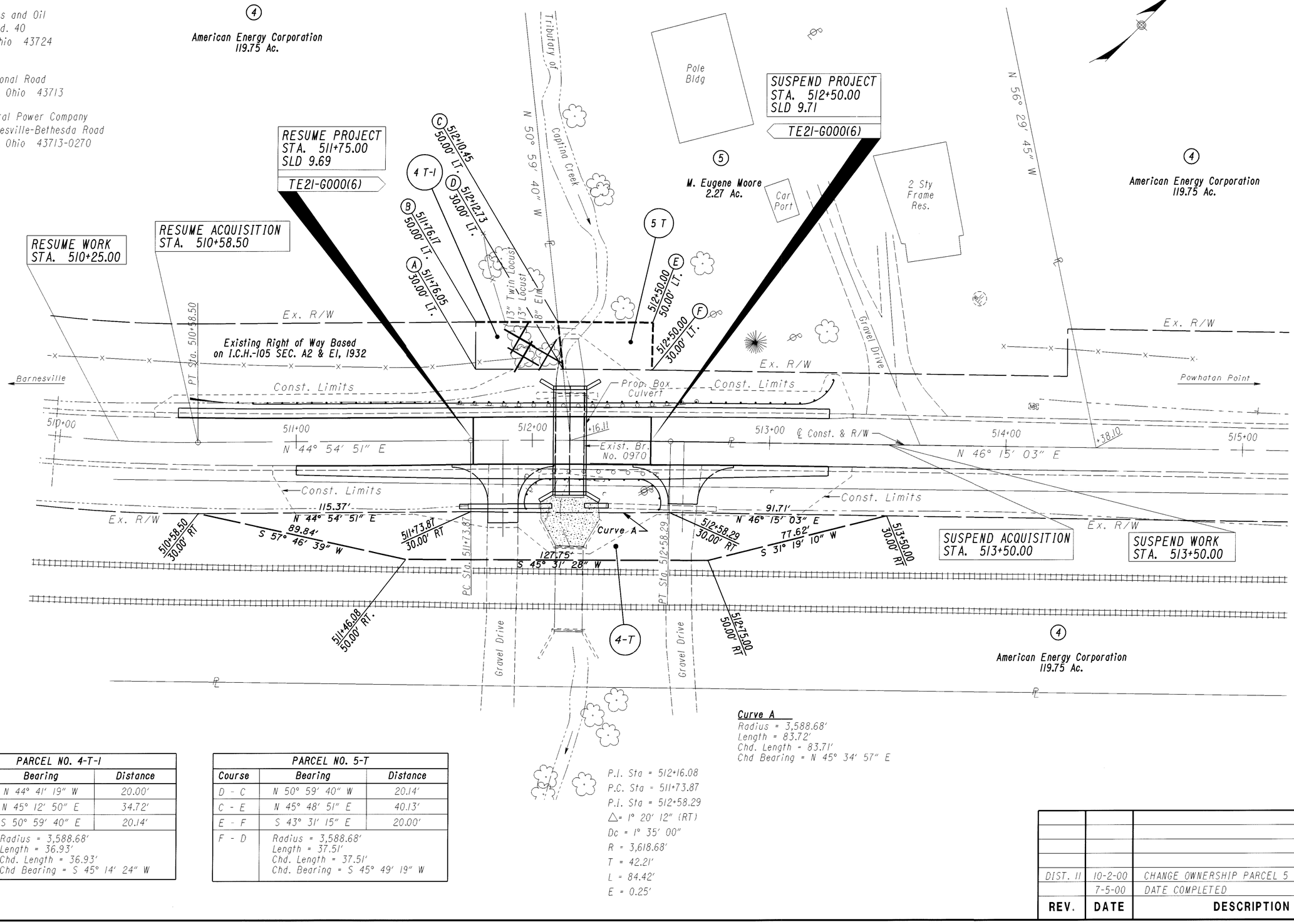
UTILITIES

Ameritech
160 North Sixth Street
Zanesville, Ohio 43701

National Gas and Oil
17167 Co. Rd. 40
Caldwell, Ohio 43724

Alltel
32699 National Road
Barnesville, Ohio 43713

South Central Power Company
37801 Barnesville-Bethesda Road
Barnesville, Ohio 43713-0270



PARCEL NO. 4-T-1		
Course	Bearing	Distance
A - B	N 44° 41' 19" W	20.00'
B - C	N 45° 12' 50" E	34.72'
C - D	S 50° 59' 40" E	20.14'
D - A	Radius = 3,588.68' Length = 36.93' Chd. Length = 36.93' Chd Bearing = S 45° 14' 24" W	

PARCEL NO. 5-T		
Course	Bearing	Distance
D - C	N 50° 59' 40" W	20.14'
C - E	N 45° 48' 51" E	40.13'
E - F	S 43° 31' 15" E	20.00'
F - D	Radius = 3,588.68' Length = 37.51' Chd. Length = 37.51' Chd. Bearing = S 45° 49' 19" W	

Curve A
Radius = 3,588.68'
Length = 83.72'
Chd. Length = 83.71'
Chd Bearing = N 45° 34' 57" E

P.I. Sta = 512+16.08
P.C. Sta = 511+73.87
P.I. Sta = 512+58.29
△= 1° 20' 12" (RT)
Dc = 1° 35' 00"
R = 3,618.68'
T = 42.21'
L = 84.42'
E = 0.25'

REV.	DATE	DESCRIPTION
DIST. 11	10-2-00	CHANGE OWNERSHIP PARCEL 5
	7-5-00	DATE COMPLETED

HORIZONTAL SCALE IN FEET
0 10 20 40

PID NO. 13051

RIGHT OF WAY DETAILS
BRIDGE NO. BEL-148-0970

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

5/6

110
111

BEL-148-1092
Belmont County, Ohio
Washington Township
Sec. 34, T-5, R-4

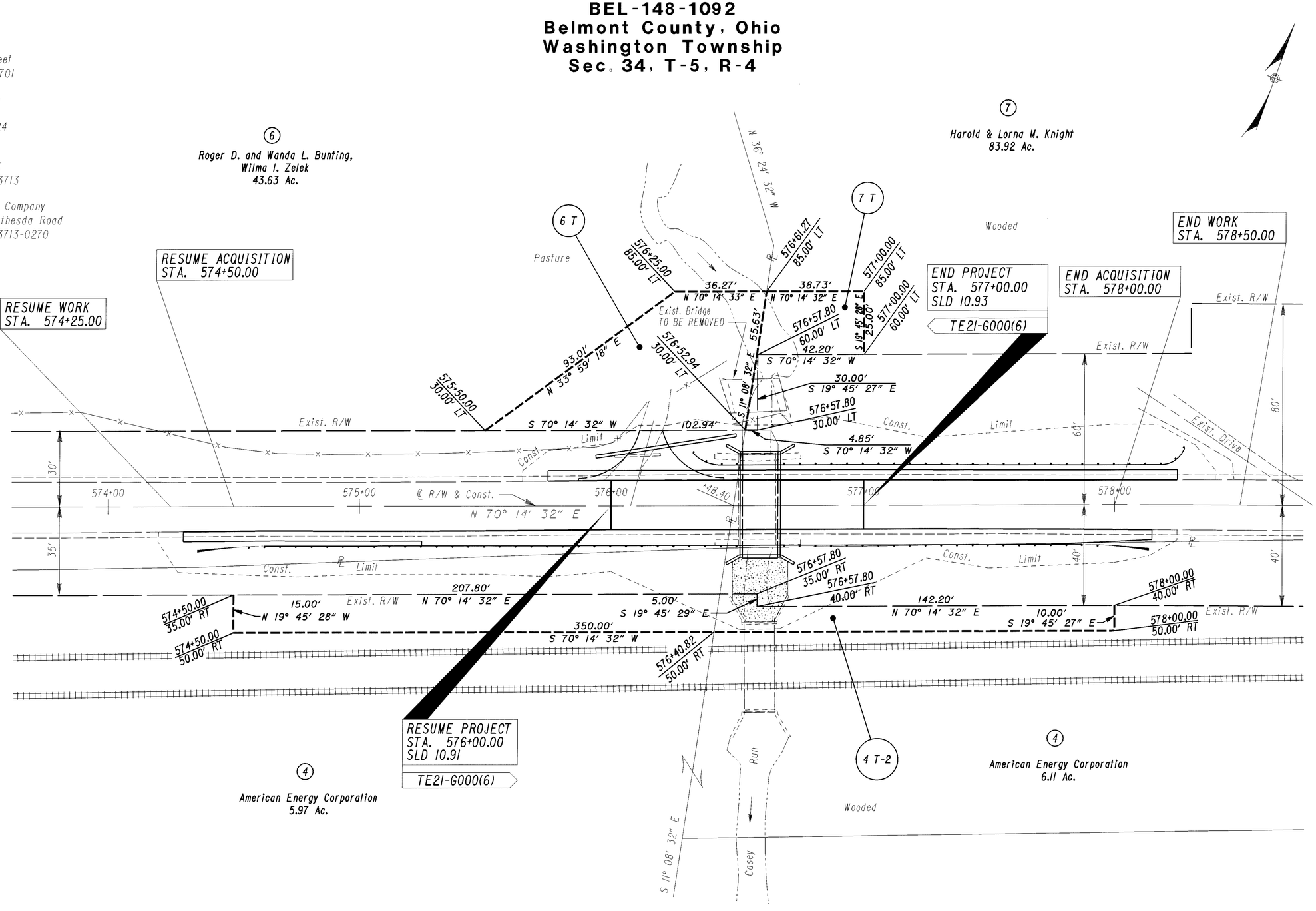
UTILITIES

Ameritech
160 North Sixth Street
Zanesville, Ohio 43701

National Gas and Oil
17167 Co. Rd. 40
Caldwell, Ohio 43724

Alltel
32699 National Road
Barnesville, Ohio 43713

South Central Power Company
37801 Barnesville-Bethesda Road
Barnesville, Ohio 43713-0270



Existing Right of Way Based on I.C.H.-105 SEC. A2, 1935

REV.	DATE	DESCRIPTION
DIST. 11	10-2-00	CHANGE OWNERSHIP PARCEL 6
	7-5-00	DATE COMPLETED

HORIZONTAL SCALE IN FEET
0 10 20 40

PID NO. 13051

RIGHT OF WAY DETAILS
BRIDGE NO. BEL-148-1092

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

6 / 6

111
111

SPECIAL PROVISIONS

WATERWAY PERMITS
FOR

BEL-148-0.33
PID: 13051

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

OHIO EPA
PERMIT NUMBER: _____

DATE: 12/2/99

NATIONWIDE PERMIT #3 - MAINTENANCE

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

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

(iii) Discharges of dredged or fill material, including excavation, into all waters of the United States for activities associated with the restoration of upland areas damaged by a storm, flood, or other discrete event, including the construction, placement, or installation of upland protection structures and minor dredging to remove obstructions in water of the United States. (Uplands lost as a result of a storm, flood, or other discrete event can be replaced without a Section 404 permit provided the uplands are restored to their original pre-event location. This NWP is for the activities in waters of the United States associated with the replacements of the uplands.) The permittee must notify the District Engineer, in accordance with General Condition 13, within 12 months of the date of the damage and the work must commence, or be under contract to commence, within two years of the date of the damage. The permittee should provide evidence, such as a recent topographic survey or

photographs, to justify the extent of the proposed restoration. The restoration of the damaged areas cannot exceed the contours, or ordinary high water mark, that existed prior to the damage. The District Engineer retains the right to determine the extent of the pre-existing conditions and the extent of any restoration work authorized by this permit. Minor dredging to remove obstructions for the adjacent waterbody is limited to 50 cubic yards below the plane of the ordinary high water mark, and is limited to the amount necessary to restore the pre-existing bottom contours of the waterbody. The dredging may not be done primarily to obtain fill for any restoration activities. The discharge of dredged or fill material and all related work needed to restore the upland must be part of a single and complete project. This permit cannot be used in conjunction with NWP 18 or NWP 19 to restore damaged upland areas. This permit does not authorize the replacement of lands lost through gradual erosion processes.

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

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

Nationwide 3 Specific Regional Conditions

i. (Maintenance) Notification required prior to the use of vertical sheet piling and closed structures in the special habitat waters of Lake Erie (See General Conditions, Critical Resource waters (1)).

ii. (Discharges of dredged or fill material associated with removal of accumulated sediment and debris in the vicinity of existing structure) Limited to 50 feet upstream and/or 50 feet downstream of structure.

Regional General Conditions apply to this Nationwide Permit.

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

Ohio State Certification Special Conditions and Limitations:

Total surface water and vegetation impacts on either side of the replacement structure shall be limited to the greater of 25 feet beyond the structure, or 25 feet beyond the toe of the slope of the structure's approach embankment. [Where the use of a crane is necessary to conduct a maintenance activity, total impacts shall not exceed 50 feet on either side of the structure or approach embankment]. In either case, total impacts, including the structure, shall not exceed 200 feet [except for stabilization project]. Width shall be measured at the structure's narrowest point as it crosses the waterbody, and be measured parallel to stream flow.

Culvert replacement:

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

Bridge Replacement:

This Certification shall only authorize minor deviations from the existing structure's centerline, unless these deviations are necessary to follow current safety standards. Bridge replacements shall not result in additional lanes unless necessary to follow current safety standards.

Maintenance or repair of existing fills (stabilization projects):

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

Removal of accumulated sediment:

Removal of accumulated sediment shall occur only once per year, except in cases of emergency situations which threaten life of property. Removal of accumulated sediments shall be limited to low-flow conditions whenever practicable, except in cases of emergency situations which threaten life or property.

NATIONWIDE PERMIT CONDITIONS

GENERAL CONDITIONS:

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

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

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

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

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

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

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

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

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

9. Water Quality.

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

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

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

11. Endangered Species.

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

District Engineer that the requirements of the Endangered Species Act have been satisfied and that the activity is authorized. For activities that may affect Federally-listed endangered or threatened species or designated critical habitat, the notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. As a result of formal or informal consultation with the FWS or NMFS, the District Engineer may add species-specific regional endangered species conditions to the NWPs.

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

12. Historic properties. No activity which may affect historic properties listed, or eligible for listing, in the National Register of Historic Places is authorized, until the DE has complied with the provisions of 33 CFR Part 325, Appendix C. The prospective permittee must notify the District Engineer if the authorized activity may affect any historic properties listed, determined to be eligible, or which the prospective permittee has reason to believe may be eligible for listing on the National

Register of Historic Places, and shall not begin the activity until notified by the District Engineer that the requirements of the National Historic Preservation Act have been satisfied and that the activity is authorized. Information on the location and existence of historic resources can be obtained from the State Historic Preservation Office and the National Register of Historic Places (see 33 CFR 330.4(g)). For activities that may affect historic properties listed in, or eligible for listing in, the National Register of Historic Places, the notification must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property.

13. Notification.

(a) Timing: Where required by the terms of the NWP, the prospective permittee must notify the District Engineer with a pre-construction notification (PCN) as early as possible. The District Engineer must determine if the PCN is complete within 30 days of the date of receipt and can request the additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the District Engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the District Engineer. The prospective permittee shall not begin the activity:

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

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

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

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

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

(2) Location of the proposed project;

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

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

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

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

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

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

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

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

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

(iii) A description of the entire parcel, including its size, and a delineation of wetlands. For the purpose of this NWP, parcels of land measuring 1/4 acre or less will not require a formal on-site delineation. However, the applicant shall provide an indication of where the wetlands are and the amount of

wetlands that exists on the property. For parcels greater than 1/4 acre in size, a formal wetland delineation must be prepared in accordance with the current method required by the Corps. (See paragraph 13(f));

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

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

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

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

(iii) Location of the dredged material disposal site.

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

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

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

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

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

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

(17) For activities that may adversely affect Federally-listed endangered or

threatened species, the PCN must include the name(s) of those endangered or threatened species that may be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work.

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

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

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

(d) District Engineer's Decision: In reviewing the PCN for the proposed activity, the District Engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. The prospective permittee may, optionally, submit a proposed mitigation plan with the PCN to expedite the process and the District Engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed work are minimal. If the District Engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, the District Engineer will notify the permittee and include any conditions the District Engineer deems necessary. Any compensatory mitigation proposal must be approved by the District Engineer prior to commencing work. If the prospective permittee is required to submit a compensatory mitigation proposal with the PCN, the proposal may be either conceptual or detailed. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the District Engineer will expeditiously review the proposed mitigation plan. The District Engineer must review the plan within 45 days of receiving a complete PCN and determine whether the conceptual or specific proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the District Engineer to be minimal, the District Engineer will provide a timely written response to the applicant stating that the project can proceed under the terms and conditions of the nationwide permit. If the District Engineer determines that the adverse effects of the proposed work are more than minimal, then he will notify the applicant either:

(1) That the project does not qualify for authorization under the NWP and instruct the

applicant on the procedures to seek authorization under an individual permit;

(2) that the project is authorized under the NWP subject to the applicant's submission of a mitigation proposal that would reduce the adverse effects on the aquatic environment to the minimal level; or

(3) that the project is authorized under the NWP with specific modifications or conditions.

Where the District Engineer determines that mitigation is required in order to ensure no more than minimal adverse effects on the aquatic environment, the activity will be authorized within the 45-day PCN period, including the necessary conceptual or specific mitigation or a requirement that the applicant submit a mitigation proposal that would reduce the adverse effects on the aquatic environment to the minimal level. When conceptual mitigation is included, or a mitgation plan is required under item (2) above, no work in waters of the United States will occur until the District Engineer has approved a specific mitigation plan.

(e) Agency Coordination: The District Engineer will consider any comments from Federal and State agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse effects on the aquatic environment to a minimal level. For activities requiring notification to the District Engineer that result in the loss of greater than ½ acre of waters of the United States, the District Engineer will, upon receipt of a notification, provide immediately (e.g., via facsimile transmission, overnight mail, or other expeditious manner), a copy to the appropriate offices of the Fish and Wildlife Service, State natural resource or water quality agency, EPA, State Historic Preservation Office (SHPO), and, if appropriate, the National Marine Fisheries Service. With the exception of NWP 37, these agencies will then have 10 calendar days from the date the material is transmitted to telephone or fax the District Engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the District Engineer will wait an additional 15 calendar days before making a decision on the notification. The District Engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency, except as provide below. The District Engineer will indicate in the administrative record associated with each NWP-Cond: 6/10
notification that the resource agencies' concerns were considered. As required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act, the District Engineer will provide a response to National Marine Fisheries Service within 30 days of receipt of any Essential Fish Habitat conservation recommendations. Applicants are encouraged to provide the Corps multiple copies of notifications to expedite agency notification.

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

14. Compliance Certification. Every permittee who has received a Nationwide permit verification

from the Corps will submit a signed certification regarding the completed work and any required mitigation. The certification will be forwarded by the Corps with the authorization letter. The certification will include:

(a) A statement that the authorized work was done in accordance with the Corps authorization, including any general or specific conditions;

(b) A statement that any required mitigation was completed in accordance with the permit conditions; and

(c) The signature of the permittee certifying the completion of the work and mitigation .

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

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

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

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

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

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

(b) To be practicable, the mitigation must be available and capable of being done considering

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

(c) The District Engineer will require restoration, creation, enhancement, or preservation of other aquatic resources in order to offset the authorized impacts to the extent necessary to ensure that the adverse effects on the aquatic environment are minimal. An important element of any compensatory mitigation plan for projects in or near streams or other open waters is the establishment and maintenance, to the maximum extent practicable, of vegetated buffers next to open waters on the project site. The vegetated buffer should consist of native species. The District Engineer will determine the appropriate width of the vegetated buffer and in which cases it will be required. Normally, the vegetated buffer will be 25 to 50 feet wide on each side of the stream, but the District Engineer may require wider vegetated buffers to address documented water quality concerns. If there are open waters on the project site and the District Engineer requires compensatory mitigation for wetland impacts to ensure that the net adverse effects on the aquatic environment are minimal, any vegetated buffer will comprise no more than 1/3 of the remaining compensatory mitigation acreage after the permanently filled wetlands have been replaced on a one-to-one acreage basis. In addition, compensatory mitigation must address adverse effects on wetland functions and values and cannot be used to offset the acreage of wetland losses that would occur in order to meet the acreage limits of some of the NWPs (e.g., for NWP 39, 1/4 acre of wetlands cannot be created to change a ½ acre loss of wetlands to a 1/4 acre loss; however, ½ acre of created wetlands can be used to reduce the impacts of a 1/3 acre loss of wetlands). If the prospective permittee is required to submit a compensatory mitigation proposal with the PCN, the proposal must be either conceptual or detailed.

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

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

authorized.

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

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

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

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

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

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

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

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

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

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

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

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

REGIONAL GENERAL CONDITIONS

1. Notifications for all Nationwide permits should include a location map (USGS topographical map) and project drawings on 8.5" x 11" paper.

2. Nationwide Permits shall not authorize any activity which impact bogs and/or fens.

3. No Nationwide permit may be used in Lake Erie for purposes of diverting water from the Great

Lakes.

4. In order to determine if a project meets the terms and conditions of the Ohio EPA's 401 water quality certification, the following information is necessary:

(a) All wetland delineations must include the latest approved version of the Ohio Rapid Assessment Method (ORAM) for wetland evaluation, long form. (This will assist OEPA in determining the category of wetland the applicant proposes to impact.)

(b) Photographs of the wetland.
NOTE: This information is in addition to the required information listed under General Condition 13 (Notification) of the NWP.

5. Notification is required for all work in Critical Resource Waters.

The following are designated as **Critical Resource Waters**:

(a) Special habitat waters of Lake Erie including the shoreline, off shore islands, rock outcrops, and adjacent waters within the boundaries defined as 82 22' 30" West Longitude, 83 07' 30" West Longitude, 41 33' 00" North Latitude and 42 00' 00" North Latitude.

(b) Big and Little Darby Creeks (National Wild and Scenic River System): Big Darby Creek from Champaign-Union County line downstream to the Conrail railroad trestle and from the confluence with the Little Darby Creek downstream to the Scioto River. Little Darby Creek from the Lafayette-Plain City Road Bridge downstream to within 0.8 mile from the confluence with Big Darby Creek. Total designation is approximately 82 miles.

(c) Little Beaver Creek (National Wild and Scenic River System): Little Beaver Creek main stem, from the confluence of West Fork with Middle Fork near Williamsport to mouth; North Fork from confluence of Brush Run and North Fork to confluence of North Fork with main stem at Fredericktown; Middle Fork from vicinity of Co. Rd. 901 (Elkton Road) bridge crossing to confluence of Middle Fork with West Fork near Williamsport; West Form from vicinity of Co. Rd. 914 (Y-Camp Road) bridge crossing east to confluence of West Fork with Middle Fork near Williamsport. Total designation is 33 miles

(d) Little Miami (Scenic component of the National System from Clifton to Foster) The portion from Foster to the Ohio River was designated a Recreational component of the National System. Total designation is 92 miles.

6. Notification is required for all activities in state Wild and Scenic Rivers (see list below).

The following are **State Wild and Scenic Rivers**:

(a) Little Miami River - Clermont County line at Loveland to headwaters, including North Fork, Clermont County line at Loveland to confluence with East Fork and from the confluence with East Fork to Ohio River. Miles designated (approximate): 105

(b) Sandusky River - US Rt. 30 in Upper Sandusky to Roger Young Memorial Park in Fremont. Miles designated (approximate): 65
(c) Olentangy River - Delaware Dam to Old Wilson Road in Worthington. Miles designated (approximate): 22

(d) Little Beaver Creek

Wild segments - West Fork from 1/4 mile downstream from Twp. Rd. 914 to confluence with Middle Fork. North Fork from Twp. Rd. 952 to confluence with Little Beaver Creek. Little Beaver Creek from confluence of West and Middle Forks downstream to 3/4 mile north of Grimm's Bridge.

Scenic segments - North Fork from Ohio-Pennsylvania line downstream to Jackman Road. Middle Fork from Elkton Rd. (Twp. Rd. 901) downstream to confluence with West Fork. Little Beaver Creek from 3/4 mile north of Grimm's Bridge downstream to the Ohio-Pennsylvania line. Miles designated (approximate): Wild 20, Scenic 16

(e) Grand River

Wild segment - from Harpersfield covered bridge downstream to Norfolk and Western Railroad trestle south of Painesville.

Scenic segment - from St. Rt. 322 bridge in Ashtabula County downstream to Harpersfield covered bridge. Miles designated (approximate): Scenic 33, Wild 23

(f) Upper Cuyagoga River - Troy-Burton Township line in Geauga County to US Rt. 14. Miles designated (approximate): 25

(g) Maumee River - Scenic segment - Ohio-Indiana line to St. Rt. 24 bridge west of Defiance.

Recreational segment - St. Rt. 24 bridge west of Defiance to US Rt. 25 bridge near Perrysburg. Miles designated (approximate): Scenic 43, Recreational 53

(h) Stillwater River System - Recreational segment - Englewood dam to confluence with Great Miami River.

Scenic segments - Stillwater River from Riffle Road bridge in Darke Co. to Englewood dam. Greenville Creek from the Ohio-Indiana state line to the confluence with the Stillwater.

Miles designated (approximate): Scenic 83, Recreational 10

(i) Chagrin River - Aurora Branch from St. Rt. 82 bridge downstream to confluence with Chagrin. Chagrin River from confluence with Aurora Branch downstream to St. Rt. 6 bridge. East Branch from Heath Road bridge downstream to confluence with Chagrin. Miles designated (approximate): 49

(j) Big and Little Darby Creeks - Big Darby Creek from the Champaign-Union County line downstream to the U.S. Rt. 40 Bridge, from the northern boundary of Battelle-Darby Creek Metro Park to the confluence with the Little Darby Creek downstream to the Scioto River. Little Darby Creek from the Lafayette-Plain City Road Bridge downstream to the confluence with Big Darby Creek. Miles designated (approximate): 84

(k) Kokosing River - Knox/Morrow County line to confluence with Mohican River. North Branch of Kokosing from confluence with East Branch downstream to confluence with main stem. Miles designated (approximate): 48

OHIO STATE CERTIFICATION GENERAL CONDITIONS FOR NATIONWIDE PERMITS.

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

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

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

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

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

The following general conditions apply to Nationwide Permits 3, 7, 12, 14, 27, 39, 40, 41, 42, and 43.

A) Stream limitations:

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

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

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

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

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

B) Wetland Limitations

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

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

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

C) General limitations:

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

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

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

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

feet of temporary or permanent impacts to streams.

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

D) Best Management Practices (BMPs)

1) Steps shall be taken, upon completion of the projects, to ensure bank stability. This may include, but is not limited to, the placement of riprap or bank seeding.
2) Vegetated buffer strips extending to the top of both stream banks and beyond as stipulated by the Corps or Ohio EPA, using native tree and shrub species with rapid growth characteristics shall be planted as soon as practicable after impacting stream channel slopes.

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

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

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

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

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

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

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

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

GEOLOGY OF THE SITE

THE CULVERT SITE IS LOCATED IN THE DISSECTED PORTION OF THE FLUSHING ESCARPMENT REGION, ON THE FLOODPLAIN OF AND OVER A TRIBUTARY OF NORTH FORK CAPTINA CREEK, NEAR A CONFLUENCE WITH ANOTHER TRIBUATARY AND IN AN AREA WHERE THIN ALLUVIAL DEPOSITS OVERLIE LIMESTONE BEDROCK OF PENNSYLVANIAN AGE.

EXPLORATION

THE EXPLORATION CONSISTED OF TWO DRIVE SAMPLE-CORE BORINGS MADE BY MEANS OF A MECHANICALLY-POWERED HOLLOW STEM ROTARY AUGER MOUNTED ON A MOBILE PLATFORM, PERFORMED ON JUNE 14, 15, 1999.

INVESTIGATIONAL FINDINGS AND OBSERVATIONS

THE TEST BORINGS DISCLOSED THAT INTERVALS OF LOOSE TO DENSE UNSTRATIFIED BASIC SILT MODIFIED WITH SAND, CLAY AND STONE FRAGMENTS THAT INCREASE IN DENSITY WITH INCREASE IN DEPTH OVERLIE RELATIVELY FLAT-LYING BEDROCK SURFACE. TEST BORING B-1 ENCOUNTERED BEDROCK SURFACE AT 17.5 FOOT DEPTH, ELEVATION 1116.3 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 7.5 FEET FOR A TOTAL DEPTH OF 25.0 FEET, ELEVATION 1108.8 FEET. A TRACE OF ORGANIC MATERIAL WAS ENCOUNTERED IN BORING B-1 AT 10.0 FOOT DEPTH, ELEVATION 1123.8 FEET. TEST BORING B-2 ENCOUNTERED BEDROCK SURFACE AT 16.0 FOOT DEPTH, ELEVATION 1116.6 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 4.0 FEET FOR A TOTAL DEPTH OF 20.0 FEET, ELEVATION 1112.6 FEET.

NO FREE WATER OBSERVATIONS WERE MADE IN EITHER OF THE TEST BORINGS PERFORMED. HOWEVER, MATERIALS WITH A WATER CONTENT NEARLY EQUAL TO THE LIQUID LIMIT WERE ENCOUNTERED IN BORING B-1 AT 5.0 FOOT DEPTH, ELEVATION 1128.8 FEET AND IN BORING B-2 AT 5.0 AND 10.0 FOOT DEPTHS, ELEVATIONS 1127.6 AND 1122.6 FEET.

LEGEND

- Roadway or Auger Boring Location - Plan View.
- Press and/or Drive Sample and/or Core Boring Location - Plan View.
- TR — Top of Rock
- W — Indicates Free Water Elevation.
- ▼ — Indicates Static Water Elevation.
- Horizontal Bar on Boring Log in the profile view indicates the Depth the Sample was taken
- X/Y/Z — Figures Beside the Boring Log in the Profile view indicate the Number of Blows for Standard Penetration Test.
  - X = Number of Blows for First 6 in
  - Y = Number of Blows for Second 6 in
  - Z = Number of Blows for Third 6 in

SYMBOLS OF ROCK TYPES

- Coal
- Fire Clay or Underclay
- Weathered Mudstone
- Mudstone
- Weathered Shale
- Shale
- Weathered Clay-Shale
- Clay-Shale
- Weathered Siltstone
- Siltstone
- Weathered Sandstone
- Sandstone
- Leached Dolomite
- Dolomite
- Leached Limestone
- Limestone
- Boulders or Cobbles

GENERAL INFORMATION

Drive Sample/Press Sample/Core Borings

Drive sample borings are made by means of a mechanically-powered rotary-type drillrig employing a 2" O.D., 1-3/8" I.D. split spoon sampler, at 2.5 ft and/or 5.0 ft depth intervals, driven by means of a 140 lbs hammer with a free fall of 2.5 ft. The number of blows required to drive the sampler three 0.5 ft increments is considered the standard penetration test.

Drive/press sample borings are made by means of a mechanically-powered rotary-type drillrig, employing a 2 in O.D., 1⅜in I.D. split spoon sampler, and a 3 in O.D. thin wall press sampling tube. The press sampling tube is advanced by continuous uniform pressure, applied by the drillrig.

Core borings are made by means of a mechanically-powered rotary-type drillrig, employing an NW-PAM core barrel with an industrial diamond cutting head.

The boring log sheets show a graphic plot of the information obtained, including depth and elevation of the sample, type of sample, number of blows for the standard penetration test in three 0.15 m increments, sample description based on laboratory test results utilizing the Casagrande AC classification system, sample number; and gradation, plasticity and moisture content determinations. Results of strength and consolidation testing, if performed on undisturbed samples, will appear graphically on separate enclosures. Rock samples are displayed on the log sheets including depth and elevation of the sample, amount of recovery and a visual classification based on type, color, degree of hardness, grain size, deterioration, bedding, acid reaction and other qualifying factors.

At depths where materials are bouldery or gravelly to the extent that a sampler cannot be utilized, a wash sample is procured and visually classified, in order to determine the general characteristics of the material. These samples are not considered sufficiently representative to warrant laboratory testing.

Particle Size Definitions

Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	12" / 3"	2.0 mm (No. 10 sieve)	0.42 mm (No. 40 sieve)	0.074 mm (No. 200 sieve)		0.005 mm

NOTE: ALL AVAILABLE SOIL AND BEDROCK INFORMATION THAT CAN BE CONVENIENTLY SHOWN ON THE STRUCTURE FOUNDATION INVESTIGATION SHEETS HAS BEEN SO REPORTED. ADDITIONAL SUBSURFACE INVESTIGATIONS MAY HAVE BEEN MADE TO STUDY SOME SPECIAL ASPECT OF THE PROJECT. COPIES OF THIS DATA, IF ANY MAY BE INSPECTED IN THE DISTRICT DEPUTY DIRECTOR'S OFFICE, THE OFFICE OF MATERIALS MANAGEMENT AT 1600 WEST BROAD STREET, THE PAVEMENT AND SOILS SECTION OF THE BUREAU OF LOCATION AND DESIGN OR IN THE BRIDGE BUREAU AT 1980 WEST BROAD STREET.

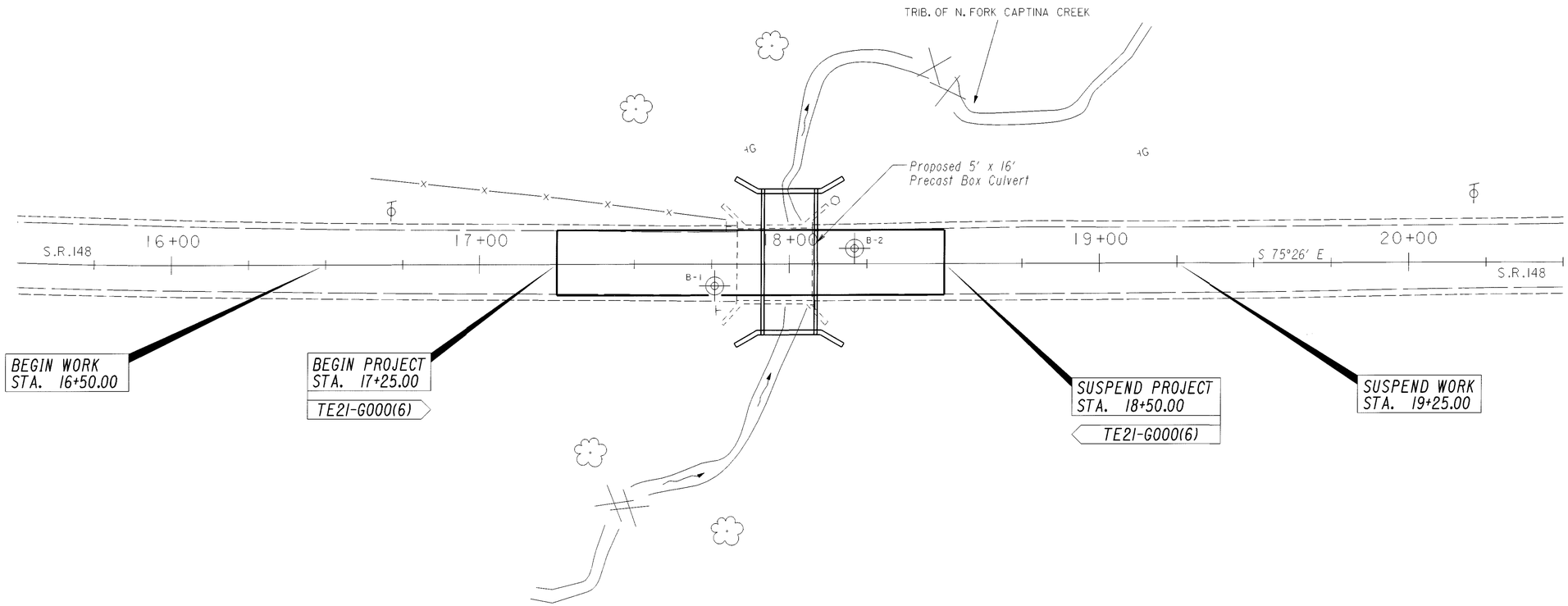
OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

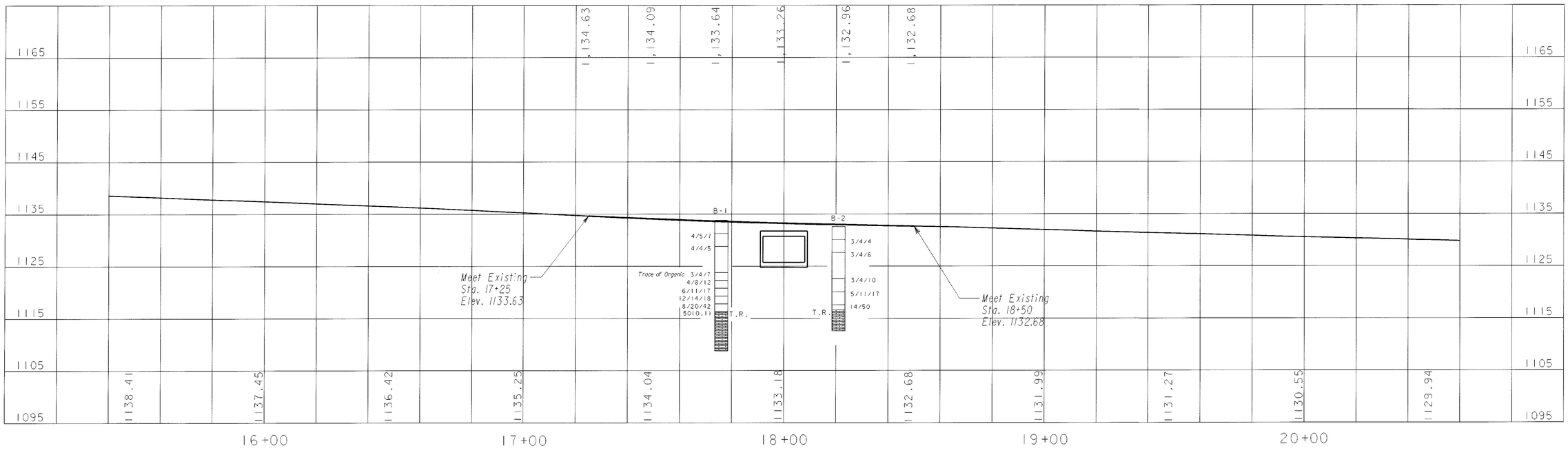
DATE 8/30/99
REVIEWED M.R.S.
CHECKED J.B.H.

STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO. BEL-148-0034
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)





HORIZONTAL
SCALE IN FEET
0 20 40

DRAWN	CHECKED	REVIEWED	DATE
J.B.H.	J.B.H.	M.R.S.	8/30/99

STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO. BEL-148-0034
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

2/3

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/14/99 Sampler: Type SS Dia. 1 3/8" Water Elev. -
Date completed 6/14/99
Boring No. B-1 Station & Offset 17+76, 7.0' RT. Surface Elev. 1133.8'

Elev.	Depth	Std. Pen./ R.O.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics: % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	ODOT Class
1133.8	0	AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
1131.30	2														
	4	4/5/7			GRAY SANDY SILT	1	0	5	25	38	32	30	9	26	A-4a
1128.80	6	4/4/5			GRAY SANDY SILT W/STONE FRAGMENTS	2	0	4	30	37	29	26	7	25	A-4a
	8				TOP OF ROCK										
1123.80	10														
1122.30	12	3/4/7			GRAY SANDY SILT W/STONE FRAGMENTS & TRACE OF ORGANIC	3	0	4	22	37	37	28	10	21	A-4a
1120.80	14	4/8/12			GRAY CLAYEY SILT W/STONE FRAGMENTS	4	0	3	16	39	42	29	10	18	A-4a
1119.30		6/11/17			GRAY SANDY SILT W/STONE FRAGMENTS	5	0	7	22	26	45	25	8	13	A-4a
1117.80	16	12/14/18			GRAY SANDY SILT W/STONE FRAGMENTS	6	0	15	15	30	40	25	7	15	A-4a
1116.30	18	8/20/42			GRAY SANDY SILT W/STONE FRAGMENTS	7	0	21	20	27	32	24	6	9	A-4a
1116.29		50(0.1')			BLACK BROKEN AND JOINTED LIMESTONE	8	-	-	-	-	-	-	-	-	VISUAL
	20		2.2	0.4	LIMESTONE, GRAY, BLACK AND CARBONACEOUS IN PLACES, FIRM, WITH SCATTERED THIN CLAY SEAMS, MOSTLY JOINTED, BROKEN AND JOINTED IN PLACES; INTERBEDDED IN THE UPPER PORTION WITH A 1.3' THICK LIGHT BROWN, MEDIUM-FIRM, HIGHLY ARGILLACEOUS, BROKEN AND JOINTED LIMESTONE INTERVAL CONTAINING CLAY SEAMS. CORE LOSS 3 % R.Q.D. IS 25									
	22	25													
			5.0	0.0											
	24														
1108.8															

BOTTOM OF BORING

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-151 Revised 9/95

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/15/99 Sampler: Type SS Dia. 1 3/8" Water Elev. -
Date completed 6/15/99
Boring No. B-2 Station & Offset 18+21, 5.0' LT. Surface Elev. 1132.6'

Elev.	Depth	Std. Pen./ R.O.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics: % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	ODOT Class
1131.8	0	AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
1130.1	2														
	4	3/4/4			BROWN SILT AND CLAY	9	0	2	13	50	35	35	11	28	A-6a
1127.6	6	3/4/6			BROWN SANDY SILT	10	0	5	22	47	26	27	5	25	A-4a
	8														
1122.6	10														
	12	3/4/10			BROWN AND GRAY SANDY SILT W/STONE FRAGS.	11	0	10	31	34	25	25	6	24	A-4a
1120.1					TOP OF ROCK										
	14	5/11/17			BROWN AND GRAY SILTY SAND W/STONE FRAGS.	12	0	18	47	18	17	NP	NP	14	A-3a
1117.6															
1116.6	16	14/50			GRAY SANDY SILT	13	0	17	23	29	31	26	7	20	A-4a
	18		2.8	1.2	LIMESTONE, OLIVE GRAY, HARD, CARBONACEOUS NEAR THE BOTTOM, WITH LITHIC CLAY SEAMS, MOSTLY JOINTED, BROKEN AND JOINTED IN PART; INTERBEDDED WITH A 1.4' THICK LIGHT BROWN, MEDIUM-FIRM, HIGHLY ARGILLACEOUS, BROKEN AND JOINTED LIMESTONE INTERVAL CONTAINING CLAY SEAMS. CORE LOSS 30 %. R.Q.D. IS 0									
1112.6	20														

BOTTOM OF BORING

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-151 Revised 9/95

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

DATE 8/30/99
REVIEWED M.R.S.
DRAWN J.B.H.
CHECKED J.B.H.

STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO. BEL-148-0034
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

3 / 3

GEOLOGY OF THE SITE

THE CULVERT SITE IS LOCATED IN THE DISSECTED PORTION OF THE FLUSHING ESCARPMENT REGION, ON THE FLOODPLAIN OF NORTH FORK CAPTINA CREEK AND OVER A TRIBUTARY THEREOF, IN AN AREA WHERE SHALLOW ALLUVIAL DEPOSITS OVERLIE LIMESTONE BEDROCK OF PENNSYLVANIAN AGE.

EXPLORATION

THE EXPLORATION CONSISTED OF TWO DRIVE SAMPLE-CORE BORINGS MADE BY MEANS OF A MECHANICALLY-POWERED HOLLOW STEM ROTARY AUGER MOUNTED ON A MOBILE PLATFORM, PERFORMED ON JUNE 15, 16, 1999.

INVESTIGATIONAL FINDINGS AND OBSERVATIONS

THE TEST BORINGS DISCLOSED THAT INTERVALS OF LOOSE TO MEDIUM-DENSE UNSTRATIFIED BASIC SILT, CLAY AND SAND MODIFIED WITH GRAVEL, STONE FRAGMENTS AND VARYING AMOUNTS OF EACH OTHER OVERLIE GENTLY SLOPING BEDROCK SURFACE. TEST BORING B-1 ENCOUNTERED BEDROCK SURFACE AT 10.0 FOOT DEPTH, ELEVATION 961.9 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 10.0 FEET FOR A TOTAL DEPTH OF 20.0 FEET, ELEVATION 951.9 FEET. TEST BORING B-2 ENCOUNTERED BEDROCK SURFACE AT 8.0 FOOT DEPTH, ELEVATION 963.2 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 12.0 FEET FOR A TOTAL DEPTH OF 20.0 FEET, ELEVATION 951.2 FEET.

NO FREE WATER OBSERVATIONS WERE MADE IN EITHER OF THE TEST BORINGS PERFORMED, HOWEVER, NON PLASTIC MATERIAL WITH A HIGH WATER CONTENT WAS ENCOUNTERED IN BORING B-1 AT 2.5 FOOT DEPTH, ELEVATION 969.4 FEET. FURTHERMORE, MOST OF THE MATERIAL ENCOUNTERED IN BORING B-1 WAS MOIST OR WET IN NATURE.

LEGEND

Roadway or Auger Boring Location - Plan View.

Press and/or Drive Sample and/or Core Boring Location - Plan View.

TR — Top of Rock

W — Indicates Free Water Elevation.

Indicates Static Water Elevation.

Horizontal Bar on Boring Log in the profile view indicates the Depth the Sample was taken

X/Y/Z — Figures Beside the Boring Log in the Profile view indicate the Number of Blows for Standard Penetration Test.
X = Number of Blows for First 6 in
Y = Number of Blows for Second 6 in
Z = Number of Blows for Third 6 in

SYMBOLS OF ROCK TYPES

- Coal
- Fire Clay or Underclay
- Weathered Mudstone
- Mudstone
- Weathered Shale
- Shale
- Weathered Clay-Shale
- Clay-Shale
- Weathered Siltstone
- Siltstone
- Weathered Sandstone
- Sandstone
- Leached Dolomite
- Dolomite
- Leached Limestone
- Limestone
- Boulders or Cobbles

GENERAL INFORMATION

Drive Sample/Press Sample/Core Borings

Drive sample borings are made by means of a mechanically-powered rotary-type drill rig employing a 2" O.D., 1-3/8" I.D. split spoon sampler, at 2.5 ft and/or 5.0 ft depth intervals, driven by means of a 140 lbs hammer with a free fall of 2.5 ft. The number of blows required to drive the sampler three 0.5 ft increments is considered the standard penetration test.

Drive/press sample borings are made by means of a mechanically-powered rotary-type drill rig, employing a 2 in O.D., 1⅜in I.D. split spoon sampler, and a 3 in O.D. thin wall press sampling tube. The press sampling tube is advanced by continuous uniform pressure, applied by the drill rig.

Core borings are made by means of a mechanically-powered rotary-type drill rig, employing an NW-PAM core barrel with an industrial diamond cutting head.

The boring log sheets show a graphic plot of the information obtained, including depth and elevation of the sample, type of sample, number of blows for the standard penetration test in three 0.15 m increments, sample description based on laboratory test results utilizing the Casagrande AC classification system, sample number; and gradation, plasticity and moisture content determinations. Results of strength and consolidation testing, if performed on undisturbed samples, will appear graphically on separate enclosures. Rock samples are displayed on the log sheets including depth and elevation of the sample, amount of recovery and a visual classification based on type, color, degree of hardness, grain size, deterioration, bedding, acid reaction and other qualifying factors.

At depths where materials are bouldery or gravelly to the extent that a sampler cannot be utilized, a wash sample is procured and visually classified, in order to determine the general characteristics of the material. These samples are not considered sufficiently representative to warrant laboratory testing.

Particle Size Definitions

Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	12"	3"	2.0 mm	0.42 mm	0.074 mm	0.005 mm
			No. 10 sieve	No. 40 sieve	No. 200 sieve	

NOTE: ALL AVAILABLE SOIL AND BEDROCK INFORMATION THAT CAN BE CONVENIENTLY SHOWN ON THE STRUCTURE FOUNDATION INVESTIGATION SHEETS HAS BEEN SO REPORTED. ADDITIONAL SUBSURFACE INVESTIGATIONS MAY HAVE BEEN MADE TO STUDY SOME SPECIAL ASPECT OF THE PROJECT. COPIES OF THIS DATA, IF ANY MAY BE INSPECTED IN THE DISTRICT DEPUTY DIRECTOR'S OFFICE, THE OFFICE OF MATERIALS MANAGEMENT AT 1600 WEST BROAD STREET, THE PAVEMENT AND SOILS SECTION OF THE BUREAU OF LOCATION AND DESIGN OR IN THE BRIDGE BUREAU AT 1980 WEST BROAD STREET.

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

DATE 8/31/99
REVIEWED M.R.S.
CHECKED J.B.H.

STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO. BEL-148-0455
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

CURVE DATA
P.I. Sta = 239+38.72
Δ = 19° 41' 36" (LT)
Dc = 10° 32' 09"
R = 543.82'
T = 94.39'
L = 186.92'
E = 8.13'

CURVE DATA
P.I. Sta = 241+66.65
Δ = 20° 02' 02" (LT)
Dc = 8° 25' 33"
R = 680.00'
T = 120.11'
L = 237.77'
E = 10.53'

S 29° 28' 55" E

238+00

239+00

240+00

241+00

242+00

243+00

S 69° 12' 33" E

TRIB. OF N. FORK CAPTINA CREEK

Aggregate Drive

B-1

B-2

RESUME WORK
STA. 239+00.00

RESUME PROJECT
STA. 239+75.00

TE21-G000(6)

S 49° 10' 31" E

4' x 12' Precast Box Culvert

SUSPEND PROJECT
STA. 241+00.00

TE21-G000(6)

4'-0"

SUSPEND WORK
STA. 242+00.00

116' Vertical Curve

3/3/3
9/6/6
3/5/5
5/7/14
50(0.5')
T.R.

3/4/8
4/4/4
50(0.5')
T.R.

Meet Existing
Sta. 240+00.00
Elev. 971.64

Butt End Joint

℄ Elev. 965.02

Butt End Joint

Meet Existing
Sta. 240+50.00
Elev. 971.39

	238+00	239+00	240+00	241+00	242+00	243+00
1000			971.82	971.59	971.42	971.33	971.32	971.38												1000
990																				990
980																				980
970																				970
960																				960
950																				950
940																				940
930	974.83	974.13	973.58	973.08	972.65	972.36	972.07	971.82	971.64	971.49	971.41	971.36	971.38	971.44	971.57	971.72	971.85	971.94	972.08	972.13	972.20	930

HORIZONTAL
SCALE IN FEET
0 10 20 40

DRAWN J.B.H.
CHECKED J.B.H.
REVIEWED M.R.S.
DATE 8/31/99

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. BEL-148-0455
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

2/3

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/15/99 Sampler: Type SS Dia. 1 3/8"
Date completed 6/15/99
Boring No. B-1 Station & Offset 240+05, 5' RT.

Water Elev. -
Surface Elev. 971.9'

Elev.	Depth	Std. Pen./ R.O.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics: % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	ODOT Class
971.9	0														
970.9	2	AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
969.4	4	3/3/3			BROWN SILTY GRAVELLY SAND	1	31	9	24	17	19	NP	NP	20	A-4a
966.9	6	9/6/6			BROWN SANDY SILT WITH STONE FRAGS.	2	0	11	27	29	33	28	9	21	A-4a
965.4	8	3/5/5			BROWN SANDY CLAY TOP OF ROCK	3	0	5	35	25	35	32	13	22	A-6a
963.9	10	5/7/14			BROWN SANDY SILT WITH STONE FRAGS.	4	0	8	45	19	28	27	9	21	A-4a
962.4		50(0.5')			BROWN SANDY CLAY W/STONE FRAGS.	5	-	-	-	-	-	-	-	16	VISUAL
961.9	12	79	5.0	0.0	LIMESTONE, GRAY, BLACK, HARD, CARBONACEOUS IN PLACES, WITH SCATTERED THIN CLAY SEAMS, WITH A 0.6' THICK JOINTED INTERVAL IN THE UPPER PORTION; WITH A THICK WEATHERED CLAY-SHALE SEAM IN THE UPPER PORTION. NO CORE LOSS. R.O.D. IS 79										
	14														
	16														
953.5	18		5.0	0.0											
952.4	20	0 / 0			(A) / (B)										
951.9					BOTTOM OF BORING										

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-151 Revised 9/95

(A) SILTSTONE, DARK GRAY, FIRM, CARBONACEOUS, MICACEOUS, WITH THIN CLAY SEAMS, JOINTED IN PLACES. NO CORE LOSS. R.O.D. IS 0

(B) SLIGHTLY WEATHERED SHALE, BLACK, FIRM, CARBONACEOUS, WITH THIN CLAY SEAMS, BROKEN AND JOINTED. NO CORE LOSS. R.O.D. IS 0

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/15/99 Sampler: Type SS Dia. 1 3/8"
Date completed 6/16/99
Boring No. B-2 Station & Offset 240+37, 7' LT.

Water Elev. -
Surface Elev. 971.2'

Elev.	Depth	Std. Pen./ R.O.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics: % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	ODOT Class
971.2	0														
970.4	2	AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
968.7	4	3/4/8			BROWN AND GRAY SANDY SILT	6	0	11	39	26	24	NP	NP	20	A-4a
966.2	6	4/4/4			TOP OF ROCK / GRAY SANDY SILT W/STONE FRAGS.	7	0	8	35	27	30	28	9	21	A-4a
963.7	8	50(0.5')			BROWN SANDY SILT	8	-	-	-	-	-	-	-	20	VISUAL
963.2	10	66	2.0	0.0	LIMESTONE, GRAY, BLACK, HARD, CARBONACEOUS IN PLACES, WITH SCATTERED THIN TO MEDIUM-THICK CLAY SEAMS, JOINTED IN PART. NO CORE LOSS. R.O.D. IS 66										
	12		5.0	0.0											
	14														
	16														
954.5	18	0	5.0	0.0	(A)										
953.9		63			SILTSTONE, GRAY, FIRM, MICACEOUS. NO CORE LOSS. R.O.D. IS 63										
952.7	20	0			SLIGHTLY WEATHERED SHALE, GRAY, FIRM, W/NUMEROUS THIN CLAY SEAMS, JOINTED. NO CORE LOSS. R.O.D. IS 0										
951.2					BOTTOM OF BORING										

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-151 Revised 9/95

(A) WEATHERED SHALE, DARK GRAY, FIRM, CARBONACEOUS, WITH NUMEROUS THIN CLAY SEAMS, JOINTED. NO CORE LOSS. R.O.D. IS 0

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

DRAWN J.B.H. | CHECKED J.B.H. | REVIEWED M.R.S. | DATE 8/31/99

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. BEL-148-0455
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.97)
(7.93)(9.69)(10.91)

3 / 3

GEOLOGY OF THE SITE

THE CULVERT SITE IS LOCATED IN THE DISSECTED PORTION OF THE FLUSHING ESCARPMENT REGION, ON THE FLOODPLAIN OF NORTH FORK CAPTINA CREEK AND OVER A TRIBUTARY THEREOF, IN AN AREA WHERE SHALLOW ALLUVIAL DEPOSITS OVERLIE LIMESTONE, CLAY-SHALE AND WEATHERED SHALE BEDROCK OF PENNSYLVANIAN AGE.

EXPLORATION

THE EXPLORATION CONSISTED OF TWO DRIVE SAMPLE-CORE BORINGS MADE BY MEANS OF A MECHANICALLY-POWERED HOLLOW STEM ROTARY AUGER MOUNTED ON A MOBILE PLATFORM, PERFORMED ON JUNE 16, 17, 1999.

INVESTIGATIONAL FINDINGS AND OBSERVATIONS

THE TEST BORINGS DISCLOSED THAT INTERVALS OF LOOSE UNSTRATIFIED BASIC SILT AND CLAY MODIFIED WITH SAND, WOOD FRAGMENTS AND VARYING AMOUNTS OF EACH OTHER OVERLIE RELATIVELY FLAT-LYING BEDROCK SURFACE. TEST BORING B-1 ENCOUNTERED BEDROCK SURFACE AT 7.5 FOOT DEPTH, ELEVATION 948.2 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 12.5 FEET FOR A TOTAL DEPTH OF 20.0 FEET, ELEVATION 935.7 FEET. TEST BORING B-2 ENCOUNTERED BEDROCK SURFACE AT 7.5 FOOT DEPTH, ELEVATION 948.3 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 12.5 FEET FOR A TOTAL DEPTH OF 20.0 FEET, ELEVATION 935.8 FEET. SOME ORGANIC MATERIAL WAS ENCOUNTERED IN BORING B-2 AT 5.0 FOOT DEPTH, ELEVATION 950.8 FEET.

NO FREE WATER OBSERVATIONS WERE MADE IN BORING B-1. FREE WATER WAS HOWEVER OBSERVED IN BORING B-2 AT 6.5 FOOT DEPTH, ELEVATION 949.3 FEET. IN ADDITION, WET MATERIALS WERE ENCOUNTERED IN BORING B-2 ABOVE THE FREE WATER LEVEL AT 2.5 AND 5.0 FOOT DEPTHS, ELEVATIONS 953.3 AND 950.8 FEET.

LEGEND

Roadway or Auger Boring Location - Plan View.

Press and/or Drive Sample and/or Core Boring Location - Plan View.

TR — Top of Rock

W — Indicates Free Water Elevation.

▼ — Indicates Static Water Elevation.

Horizontal Bar on Boring Log in the profile view indicates the Depth the Sample was taken

X/Y/Z — Figures Beside the Boring Log in the Profile view Indicate the Number of Blows for Standard Penetration Test.
X = Number of Blows for First 6 in
Y = Number of Blows for Second 6 in
Z = Number of Blows for Third 6 in

SYMBOLS OF ROCK TYPES

- Coal
- Fire Clay or Underclay
- Weathered Mudstone
- Mudstone
- Weathered Shale
- Shale
- Weathered Clay-Shale
- Clay-Shale
- Weathered Siltstone
- Siltstone
- Weathered Sandstone
- Sandstone
- Leached Dolomite
- Dolomite
- Leached Limestone
- Limestone
- Boulders or Cobbles

GENERAL INFORMATION

Drive Sample/Press Sample/Core Borings

Drive sample borings are made by means of a mechanically-powered rotary-type drill rig employing a 2" O.D., 1-3/8" I.D. split spoon sampler, at 2.5 ft and/or 5.0 ft depth intervals, driven by means of a 140 lbs hammer with a free fall of 2.5 ft. The number of blows required to drive the sampler three 0.5 ft increments is considered the standard penetration test.

Drive/press sample borings are made by means of a mechanically-powered rotary-type drill rig, employing a 2 in O.D., 1⅜in I.D. split spoon sampler, and a 3 in O.D. thin wall press sampling tube. The press sampling tube is advanced by continuous uniform pressure, applied by the drill rig.

Core borings are made by means of a mechanically-powered rotary-type drill rig, employing an NW-PAM core barrel with an industrial diamond cutting head.

The boring log sheets show a graphic plot of the information obtained, including depth and elevation of the sample, type of sample, number of blows for the standard penetration test in three 0.15 m increments, sample description based on laboratory test results utilizing the Casagrande AC classification system, sample number; and gradation, plasticity and moisture content determinations. Results of strength and consolidation testing, if performed on undisturbed samples, will appear graphically on separate enclosures. Rock samples are displayed on the log sheets including depth and elevation of the sample, amount of recovery and a visual classification based on type, color, degree of hardness, grain size, deterioration, bedding, acid reaction and other qualifying factors.

At depths where materials are bouldery or gravelly to the extent that a sampler cannot be utilized, a wash sample is procured and visually classified, in order to determine the general characteristics of the material. These samples are not considered sufficiently representative to warrant laboratory testing.

Particle Size Definitions

Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	12"	3"	2.0 mm	0.42 mm	0.074 mm	0.005 mm
			No. 10 sieve	No. 40 sieve	No. 200 sieve	

NOTE: ALL AVAILABLE SOIL AND BEDROCK INFORMATION THAT CAN BE CONVENIENTLY SHOWN ON THE STRUCTURE FOUNDATION INVESTIGATION SHEETS HAS BEEN SO REPORTED. ADDITIONAL SUBSURFACE INVESTIGATIONS MAY HAVE BEEN MADE TO STUDY SOME SPECIAL ASPECT OF THE PROJECT. COPIES OF THIS DATA, IF ANY MAY BE INSPECTED IN THE DISTRICT DEPUTY DIRECTOR'S OFFICE, THE OFFICE OF MATERIALS MANAGEMENT AT 1600 WEST BROAD STREET, THE PAVEMENT AND SOILS SECTION OF THE BUREAU OF LOCATION AND DESIGN OR IN THE BRIDGE BUREAU AT 1980 WEST BROAD STREET.

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

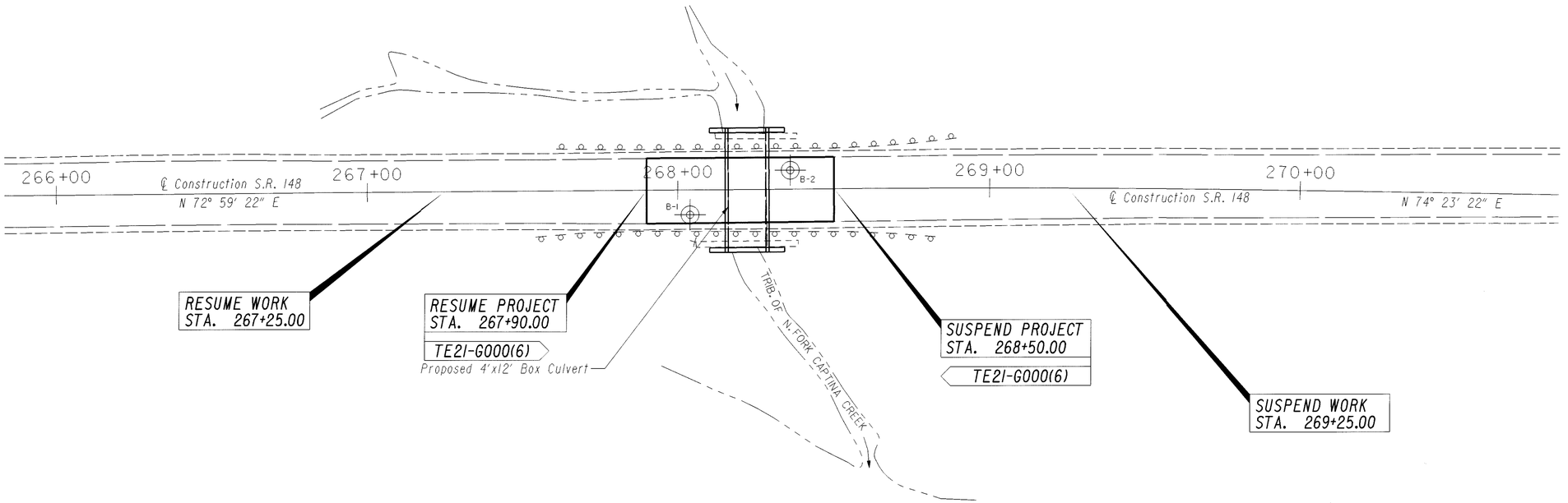
DATE 8/31/99
REVIEWED M.R.S.
CHECKED J.B.H.

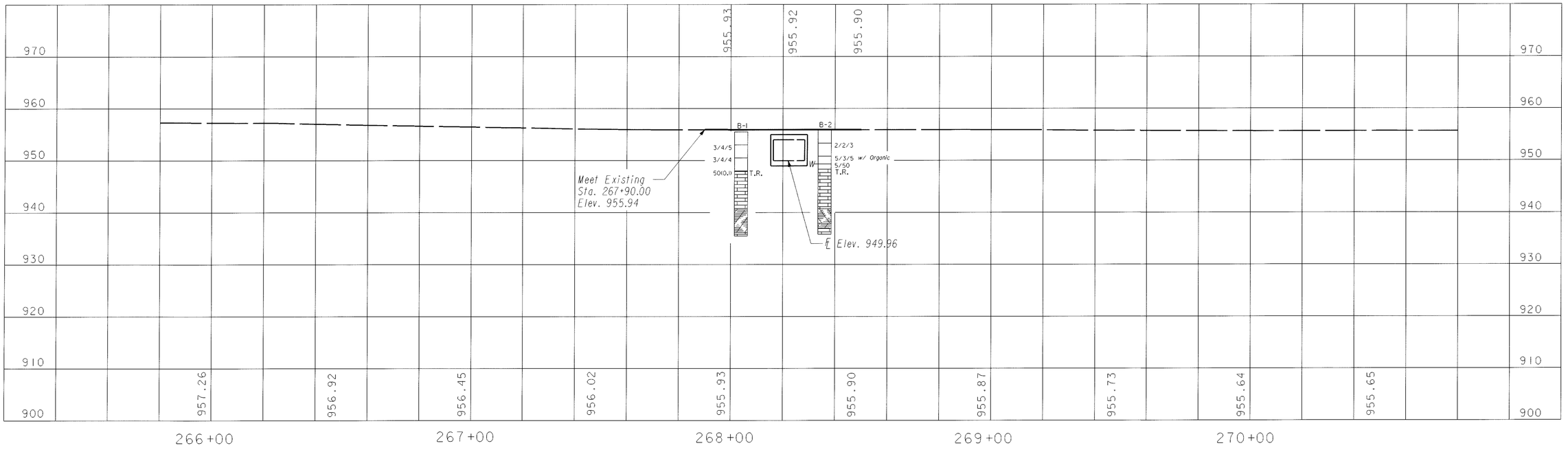
STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO. BEL-148-0508 OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

1 / 3





HORIZONTAL SCALE IN FEET
0 10 20 40

DRAWN	CHECKED	REVIEWED	DATE
J.B.H.	J.B.H.	M.R.S.	8/31/99

STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO. BEL-148-0508
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/16/99 Sampler: Type SS Dia. 1 3/4"
Date completed 6/16/99
Boring No. B-1 Station & Offset 268+04, 8.0' RT.

Water Elev. -
Surface Elev. 955.7'

Elev.	Depth	Std. Pen./ R.O.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	ODOT Class
955.7	0	AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
954.9	2														
953.2	4	3/4/5			BROWN SILT AND CLAY	1	0	7	11	38	44	37	13	23	A-6a
950.7	6	3/4/4			BROWN SILT AND CLAY TOP OF ROCK	2	0	6	7	37	50	40	15	22	A-6a
948.2	8	50(0.1)			GRAY JOINTED LIMESTONE	3	-	-	-	-	-	-	-	14	VISUAL
948.1	10		2.4	0.0											
	12	59			LIMESTONE, GRAY, HARD, BLACK AND CARBONACEOUS IN PLACES, WITH SCATTERED CLAY SEAMS, JOINTED IN PART. CORE LOSS 4 % R.O.D. IS 59										
	14		4.8	0.2											
940.7	16														
	18	0	5.0	0.0	WEATHERED SHALE, BLACK, FIRM, CARBONACEOUS, SLIGHTLY ARENACEOUS, WITH CALCAREOUS NODULES, WITH THIN TO MEDIUM-THICK CLAY SEAMS, JOINTED, WITH THE BEDDING PLANES SLIGHTLY FOLDED AT THE BOTTOM; WITH MEDIUM TO THICK FIRM SILTSTONE SEAMS. NO CORE LOSS. R.O.D. IS 0										
936.4															
935.7	20	0			(A)										

BOTTOM OF BORING

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-151 Revised 9/95

(A) LIMESTONE, LIGHT GRAY, HARD, BLACK AND CARBONACEOUS IN PLACES, WITH A THIN CLAY SEAM NEAR THE TOP , JOINTED AT THE BOTTOM. NO CORE LOSS.

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/16/99 Sampler: Type SS Dia. 1 3/4"
Date completed 6/16/99
Boring No. B-2 Station & Offset 268+36, 6.0' LT.

Water Elev. 949.3'
Surface Elev. 955.8'

Elev.	Depth	Std. Pen./ R.O.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	ODOT Class
955.8	0	AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
955.0	2														
953.3	4	2/2/3			GRAY SANDY SILT TOP OF ROCK	4	0	8	39	26	27	26	8	24	A-4a
950.8	6	5/3/5			GRAY SANDY SILT WITH WOOD FRAGS. & ORGANIC	5	0	10	36	27	27	NP	NP	25	A-4a
949.3	8	5/50			GRAY SANDY SILT WITH WOOD FRAGS.	6	0	22	34	22	22	NP	NP	37	A-4a
948.3	10		2.3	0.1											
	12	29			LIMESTONE, GRAY, HARD, BLACK AND CARBONACEOUS IN PLACES, WITH SCATTERED CLAY SEAMS, BROKEN AND JOINTED IN PART; WITH A THICK LIGHT BROWN, HIGHLY ARGILLACEOUS SEAM IN THE TOP HALF. CORE LOSS 3 % R.O.D. IS 29										
	14		5.0	0.0											
940.7	16														
	18	0	5.0	0.0	CLAY-SHALE, GRAY, SOFT, CALCAREOUS, WITH CALCAREOUS NODULES, WITH LITHIC CLAY SEAMS, JOINTED, BROKEN AND JOINTED IN THE LOWER PORTION, SLICKENSIDED AT THE BOTTOM. NO CORE LOSS. R.O.D. IS 0										
937.9		0			WEATHERED SHALE, BLACK, FIRM, CARBONACEOUS, WITH SLICKENSIDES, BROKEN AND JOINTED. NO CORE LOSS.										
935.8	20	76			LIMESTONE, GRAY, HARD, JOINTED IN THE MIDDLE, SLICKENSIDED AT THE BOTTOM. NO CORE LOSS. R.O.S. IS 76										

BOTTOM OF BORING

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-151 Revised 9/95

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

DRAWN J.B.H. | CHECKED J.B.H. | REVIEWED M.R.S. | DATE 8/31/99

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. BEL-148-0508 *OVER* TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

3 / 3

GEOLOGY OF THE SITE

THE CULVERT SITE IS LOCATED IN THE DISSECTED UNGLACIATED PORTION OF THE FLUSHING ESCARPMENT REGION, ON THE FLOODPLAIN OF NORTH FORK CAPTINA CREEK AND OVER A TRIBUTARY THEREOF, IN AN AREA WHERE THIN ALLUVIAL DEPOSITS, FILL MATERIALS AND VALLEY FILL OVERLIE COAL, WEATHERED CLAY-SHALE, WEATHERED SHALE, SILTSTONE, SHALE AND SANDSTONE BEDROCK OF PENNSYLVANIAN AGE.

EXPLORATION

THE EXPLORATION CONSISTED OF TWO DRIVE SAMPLE-CORE BORINGS MADE BY MEANS OF A MECHANICALLY-POWERED HOLLOW STEM ROTARY AUGER MOUNTED ON A MOBILE PLATFORM, PERFORMED ON JUNE 17 AND 21, 1999.

INVESTIGATIONAL FINDINGS AND OBSERVATIONS

THE TEST BORINGS DISCLOSED THAT INTERVALS OF MEDIUM TO HARD UNSTRATIFIED BASIC CLAY, SAND, FILL MATERIALS AND STONE FRAGMENTS MODIFIED WITH GRAVEL, COAL BLOSSOM, COAL FRAGMENTS, ASPHALT FRAGMENTS AND VARYING AMOUNTS OF EACH OTHER THAT RAPIDLY INCREASE IN DENSITY (JUST BEFORE BEDROCK SURFACE) OVERLIE RELATIVELY GENTLY SLOPING BEDROCK SURFACE. TEST BORING B-1 ENCOUNTERED BEDROCK SURFACE AT 14.5 FOOT DEPTH, ELEVATION 876.4 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 5.5 FEET FOR A TOTAL DEPTH OF 20.0 FEET, ELEVATION 870.9 FEET. TEST BORING B-2 ENCOUNTERED BEDROCK SURFACE AT 15.0 FOOT DEPTH, ELEVATION 875.6 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 10.0 FEET FOR A TOTAL DEPTH OF 25.0 FEET, ELEVATION 865.6 FEET.

FREE WATER WAS OBSERVED AND MEASURED IN TEST BORING B-1 AT 12.0 FOOT DEPTH, ELEVATION 878.9 FEET. NO FREE WATER OBSERVATIONS WERE MADE IN TEST BORING B-2.

LEGEND

Roadway or Auger Boring Location - Plan View.

Press and/or Drive Sample and/or Core Boring Location - Plan View.

TR — Top of Rock

W — Indicates Free Water Elevation.

Indicates Static Water Elevation.

Horizontal Bar on Boring Log in the profile view indicates the Depth the Sample was taken

X/Y/Z — Figures Beside the Boring Log in the Profile view indicate the Number of Blows for Standard Penetration Test.
X = Number of Blows for First 6 in
Y = Number of Blows for Second 6 in
Z = Number of Blows for Third 6 in

SYMBOLS OF ROCK TYPES

- Coal
- Fire Clay or Underclay
- Weathered Mudstone
- Mudstone
- Weathered Shale
- Shale
- Weathered Clay-Shale
- Clay-Shale
- Weathered Siltstone
- Siltstone
- Weathered Sandstone
- Sandstone
- Leached Dolomite
- Dolomite
- Leached Limestone
- Limestone
- Boulders or Cobbles

GENERAL INFORMATION

Drive Sample/Press Sample/Core Borings

Drive sample borings are made by means of a mechanically-powered rotary-type drill rig employing a 2" O.D., 1-3/8" I.D. split spoon sampler, at 2.5 ft and/or 5.0 ft depth intervals, driven by means of a 140 lbs hammer with a free fall of 2.5 ft. The number of blows required to drive the sampler three 0.5 ft increments is considered the standard penetration test.

Drive/press sample borings are made by means of a mechanically-powered rotary-type drill rig, employing a 2 in O.D., 1⅜in I.D. split spoon sampler, and a 3 in O.D. thin wall press sampling tube. The press sampling tube is advanced by continuous uniform pressure, applied by the drill rig.

Core borings are made by means of a mechanically-powered rotary-type drill rig, employing an NW-PAM core barrel with an industrial diamond cutting head.

The boring log sheets show a graphic plot of the information obtained, including depth and elevation of the sample, type of sample, number of blows for the standard penetration test in three 0.15 m increments, sample description based on laboratory test results utilizing the Casagrande AC classification system, sample number; and gradation, plasticity and moisture content determinations. Results of strength and consolidation testing, if performed on undisturbed samples, will appear graphically on separate enclosures. Rock samples are displayed on the log sheets including depth and elevation of the sample, amount of recovery and a visual classification based on type, color, degree of hardness, grain size, deterioration, bedding, acid reaction and other qualifying factors.

At depths where materials are bouldery or gravelly to the extent that a sampler cannot be utilized, a wash sample is procured and visually classified, in order to determine the general characteristics of the material. These samples are not considered sufficiently representative to warrant laboratory testing.

Particle Size Definitions

Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	12" 3"	2.0 mm No. 10 sieve	0.42 mm No. 40 sieve	0.074 mm No. 200 sieve		0.005 mm

NOTE: ALL AVAILABLE SOIL AND BEDROCK INFORMATION THAT CAN BE CONVENIENTLY SHOWN ON THE STRUCTURE FOUNDATION INVESTIGATION SHEETS HAS BEEN SO REPORTED. ADDITIONAL SUBSURFACE INVESTIGATIONS MAY HAVE BEEN MADE TO STUDY SOME SPECIAL ASPECT OF THE PROJECT. COPIES OF THIS DATA, IF ANY MAY BE INSPECTED IN THE DISTRICT DEPUTY DIRECTOR'S OFFICE, THE OFFICE OF MATERIALS MANAGEMENT AT 1600 WEST BROAD STREET, THE PAVEMENT AND SOILS SECTION OF THE BUREAU OF LOCATION AND DESIGN OR IN THE BRIDGE BUREAU AT 1980 WEST BROAD STREET.

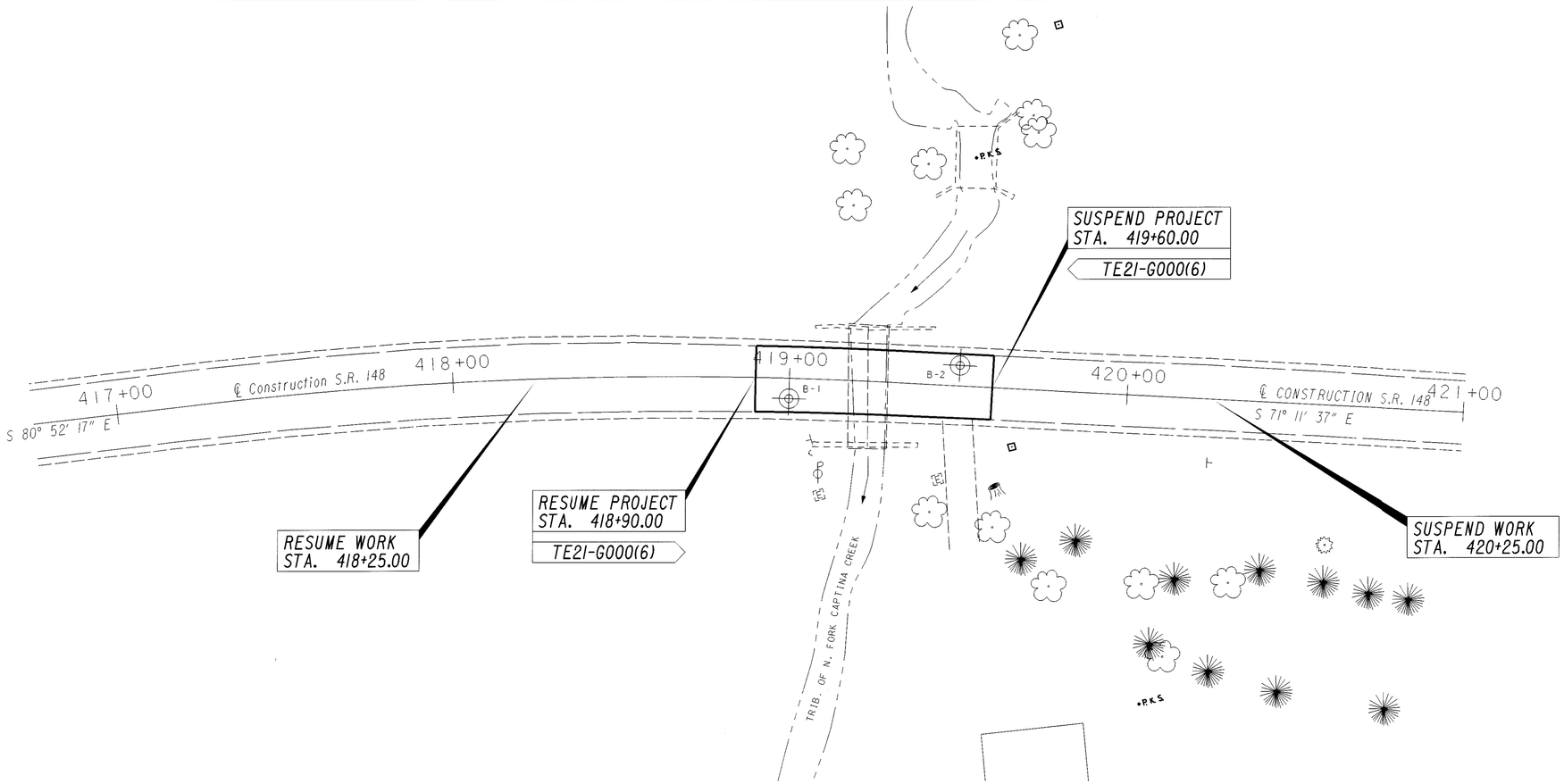
OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

DATE 9/14/99
REVIEWED M.R.S.
CHECKED J.B.H.

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. BEL-148-0794
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

1 / 3



HORIZONTAL SCALE IN FEET
0 10 20 40

DRAWN	CHECKED	REVIEWED	DATE
J.B.H.	J.B.H.	M.R.S.	9/14/99

STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO. BEL-148-0794
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

2 / 3

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/17/99 Sampler: Type SS Dia. 1 3/8"
Date completed 6/17/99
Boring No. B-1 Station & Offset 419+00, 6' RT.

Water Elev. 878.9'
Surface Elev. 890.9'

Elev.	Depth	Std. Pen./ R.Q.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics								ODOT Class
							% Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	
890.9	0	AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
890.1	2														
888.4	4	5/4/4			BROWN SANDY CLAY WITH STONE FRAGS.	1	0	17	24	28	31	31	11	13	A-6a
885.9	6	3/6/9			BROWN SANDY CLAY WITH STONE FRAGS.	2	0	12	25	31	32	34	11	26	A-6a
883.4	8				TOP OF ROCK										
881.9	10	3/5/8			BROWN SANDY CLAY WITH STONE FRAGS.	3	0	6	31	30	33	33	12	23	A-6a
880.4	12	4/8/7			BROWN SANDY CLAY WITH STONE FRAGS.	4	0	5	36	26	33	30	11	22	A-6a
878.9	14	3/4/5			BROWN SANDY CLAY WITH STONE FRAGS.	5	0	17	37	18	28	32	13	23	A-6a
877.4		2/3/5			BROWN SANDY CLAY WITH STONE FRAGS.	6	0	18	30	21	31	33	12	31	A-6a
876.4		8/56			BROWN ST. FRAGS. W/COAL FRAGS. AND SANDY CLAY	7	-	-	-	-	-	-	-	12	VISUAL
875.9					*										
875.2	16	0			(A)										
874.1		0			(B)										
872.6	18	44	5.0	0.0	SILTSTONE, DARK GRAY, FIRM, CARBONACEOUS, SLIGHTLY FERRUGINOUS, JOINTED IN PART. NO CORE LOSS. R.Q.D. IS 44										
870.9	20	59			(C)										

BOTTOM OF BORING

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm, Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-151 Revised 9/95

* COAL (DRILLER'S DESCRIPTION)

(A) COAL, BLACK, VITREOUS, BROKEN AND JOINTED. NO CORE LOSS. R.Q.D. IS 0

(B) WEATHERED SHALE, BLACK, FIRM, CARBONACEOUS, ARENACEOUS, WITH CLAY SEAMS, HIGHLY BROKEN AND JOINTED NO CORE LOSS. R.Q.D. IS 0

(C) SHALE, BLACK, FIRM, CARBONACEOUS, ARENACEOUS, WITH CALCAREOUS NODULES, WITH THIN CLAY SEAMS, WEATHERED AND JOINTED NEAR THE BOTTOM; WITH THIN GRAY SANDSTONE SEAMS AT THE BOTTOM. NO CORE LOSS. R.Q.D. IS 59

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/21/99 Sampler: Type SS Dia. 1 3/8"
Date completed 6/21/99
Boring No. B-2 Station & Offset 419+50, 6' LT.

Water Elev. -
Surface Elev. 890.6'

Elev.	Depth	Std. Pen./ R.Q.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics								ODOT Class
							% Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	
890.6	0	AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
889.8	2	AUGERED			FILL MATERIAL TO BROWN CLAY (DRILLER'S DESC.)	-	-	-	-	-	-	-	-	-	VISUAL
888.1	4	3/4/5			BROWN SANDY CLAY W/ASPHALT FRAGS. AT THE TOP	8	-	-	-	-	-	-	-	19	VISUAL
887.3	6	5/6/7			BROWN CLAYEY GRAVELLY SAND	9	-	-	-	-	-	-	-	17	VISUAL
885.6	8	3/4/6			BROWN GRAVELLY SANDY CLAY	10	30	15	15	16	24	13	18	18	A-6b
883.1	10	2/2/7			BROWN CLAYEY GRAVELLY SAND W/COAL BLOSSOM	11	31	14	18	16	21	35	13	20	A-6a
880.6	12				TOP OF ROCK										
878.1	14	15/27/60			BROWN AND GRAY GRAVELLY CLAY	12	28	4	7	32	29	35	11	9	A-6a
875.6	16	0			WEATHERED CLAY-SHALE, BLACK, SOFT, CRUMBLY, JOINTED IN THE UPPER PORTION, SLICKEN-SIDED NEAR THE BOTTOM. CORE LOSS 10%. R.Q.D. IS 0										
873.6		0													
872.9	18	0	4.8	0.2	(A)										
870.8	20	75			SILTSTONE, BLACK, FIRM, CARBONACEOUS, JOINTED IN PART. NO CORE LOSS. R.Q.D. IS 75										
	22	0	5.0	0.0	SHALE, BLACK, FIRM, CARBONACEOUS, ARENACEOUS, WITH SCATTERED THIN CLAY SEAMS, JOINTED IN PLACES; WITH A 0.4' THICK LITHIC CLAY SEAM IN THE MIDDLE. NO CORE LOSS. R.Q.D. IS 0										
866.8	24														
865.6		100			(B)										

BOTTOM OF BORING

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm, Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-151 Revised 9/95

(A) WEATHERED SHALE, BLACK, FIRM, CARBONACEOUS, ARENACEOUS, JOINTED IN PART. NO CORE LOSS. R.Q.D. IS 0

(B) SANDSTONE, DARK GRAY, FIRM, MICACEOUS, CARBONACEOUS, VERY FINE-GRAINED, MEDIUM-BEDDED. NO CORE LOSS. R.Q.D. IS 100

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

DATE 9/4/99
REVIEWED W.R.S.
DRAWN J.B.H.
CHECKED J.B.H.

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. BEL-148-0794
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

3 / 3

GEOLOGY OF THE SITE

THE CULVERT SITE IS LOCATED IN THE DISSECTED UNGLACIATED PORTION OF THE FLUSHING ESCARPMENT REGION, ON THE FLOODPLAIN OF NORTH FORK CAPTINA CREEK AND OVER A TRIBUTARY THEREOF, IN AN AREA WHERE SHALLOW TO THIN ALLUVIAL DEPOSITS AND FILL MATERIALS OVERLIE COAL, WEATHERED CLAY-SHALE, LIMESTONE, WEATHERED SHALE, SILTSTONE AND SHALE BEDROCK OF PENNSYLVANIAN AGE.

EXPLORATION

THE EXPLORATION CONSISTED OF TWO DRIVE SAMPLE-CORE BORINGS MADE BY MEANS OF A MECHANICALLY-POWERED HOLLOW STEM ROTARY AUGER MOUNTED ON A MOBILE PLATFORM, PERFORMED ON JUNE 22 AND 23, 1999.

INVESTIGATIONAL FINDINGS AND OBSERVATIONS

THE TEST BORINGS DISCLOSED THAT INTERVALS OF MEDIUM TO HARD UNSTRATIFIED BASIC CLAY, FILL MATERIALS, SAND AND GRAVEL MODIFIED WITH SAND, STONE FRAGMENTS AND VARYING AMOUNTS OF EACH OTHER THAT RAPIDLY INCREASE IN DENSITY (JUST BEFORE BEDROCK SURFACE) OVERLIE SLOPING BEDROCK SURFACE. TEST BORING B-1 ENCOUNTERED BEDROCK SURFACE AT 7.5 FOOT DEPTH, ELEVATION 882.8 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 12.5 FEET FOR A TOTAL DEPTH OF 20.0 FEET, ELEVATION 870.3 FEET. TEST BORING B-2 ENCOUNTERED BEDROCK SURFACE AT 12.5 FOOT DEPTH, ELEVATION 877.7 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 12.5 FEET FOR A TOTAL DEPTH OF 25.0 FEET, ELEVATION 865.2 FEET.

NO FREE WATER OBSERVATIONS WERE MADE IN EITHER OF THE TEST BORINGS PERFORMED.

LEGEND

- Roadway or Auger Boring Location - Plan View.
- Press and/or Drive Sample and/or Core Boring Location - Plan View.
- TR — Top of Rock
- W — Indicates Free Water Elevation.
- ▼ — Indicates Static Water Elevation.
- Horizontal Bar on Boring Log in the profile view indicates the Depth the Sample was taken
- X/Y/Z — Figures Beside the Boring Log in the Profile view indicate the Number of Blows for Standard Penetration Test.
  - X = Number of Blows for First 6 in
  - Y = Number of Blows for Second 6 in
  - Z = Number of Blows for Third 6 in

SYMBOLS OF ROCK TYPES

- Coal
- Fire Clay or Underclay
- Weathered Mudstone
- Mudstone
- Weathered Shale
- Shale
- Weathered Clay-Shale
- Clay-Shale
- Weathered Siltstone
- Siltstone
- Weathered Sandstone
- Sandstone
- Leached Dolomite
- Dolomite
- Leached Limestone
- Limestone
- Boulders or Cobbles

GENERAL INFORMATION

Drive Sample/Press Sample/Core Borings

Drive sample borings are made by means of a mechanically-powered rotary-type drill rig employing a 2" O.D., 1-3/8" I.D. split spoon sampler, at 2.5 ft and/or 5.0 ft depth intervals, driven by means of a 140 lbs hammer with a free fall of 2.5 ft. The number of blows required to drive the sampler three 0.5 ft increments is considered the standard penetration test.

Drive/press sample borings are made by means of a mechanically-powered rotary-type drill rig, employing a 2 in O.D., 1⅜in I.D. split spoon sampler, and a 3 in O.D. thin wall press sampling tube. The press sampling tube is advanced by continuous uniform pressure, applied by the drill rig.

Core borings are made by means of a mechanically-powered rotary-type drill rig, employing an NW-PAM core barrel with an industrial diamond cutting head.

The boring log sheets show a graphic plot of the information obtained, including depth and elevation of the sample, type of sample, number of blows for the standard penetration test in three 0.15 m increments, sample description based on laboratory test results utilizing the Casagrande AC classification system, sample number; and gradation, plasticity and moisture content determinations. Results of strength and consolidation testing, if performed on undisturbed samples, will appear graphically on separate enclosures. Rock samples are displayed on the log sheets including depth and elevation of the sample, amount of recovery and a visual classification based on type, color, degree of hardness, grain size, deterioration, bedding, acid reaction and other qualifying factors.

At depths where materials are bouldery or gravelly to the extent that a sampler cannot be utilized, a wash sample is procured and visually classified, in order to determine the general characteristics of the material. These samples are not considered sufficiently representative to warrant laboratory testing.

Particle Size Definitions

Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	12"	3"	2.0 mm	0.42 mm	0.074 mm	0.005 mm
			No. 10 sieve	No. 40 sieve	No. 200 sieve	

NOTE: ALL AVAILABLE SOIL AND BEDROCK INFORMATION THAT CAN BE CONVENIENTLY SHOWN ON THE STRUCTURE FOUNDATION INVESTIGATION SHEETS HAS BEEN SO REPORTED. ADDITIONAL SUBSURFACE INVESTIGATIONS MAY HAVE BEEN MADE TO STUDY SOME SPECIAL ASPECT OF THE PROJECT. COPIES OF THIS DATA, IF ANY MAY BE INSPECTED IN THE DISTRICT DEPUTY DIRECTOR'S OFFICE, THE OFFICE OF MATERIALS MANAGEMENT AT 1600 WEST BROAD STREET. THE PAVEMENT AND SOILS SECTION OF THE BUREAU OF LOCATION AND DESIGN OR IN THE BRIDGE BUREAU AT 1980 WEST BROAD STREET.

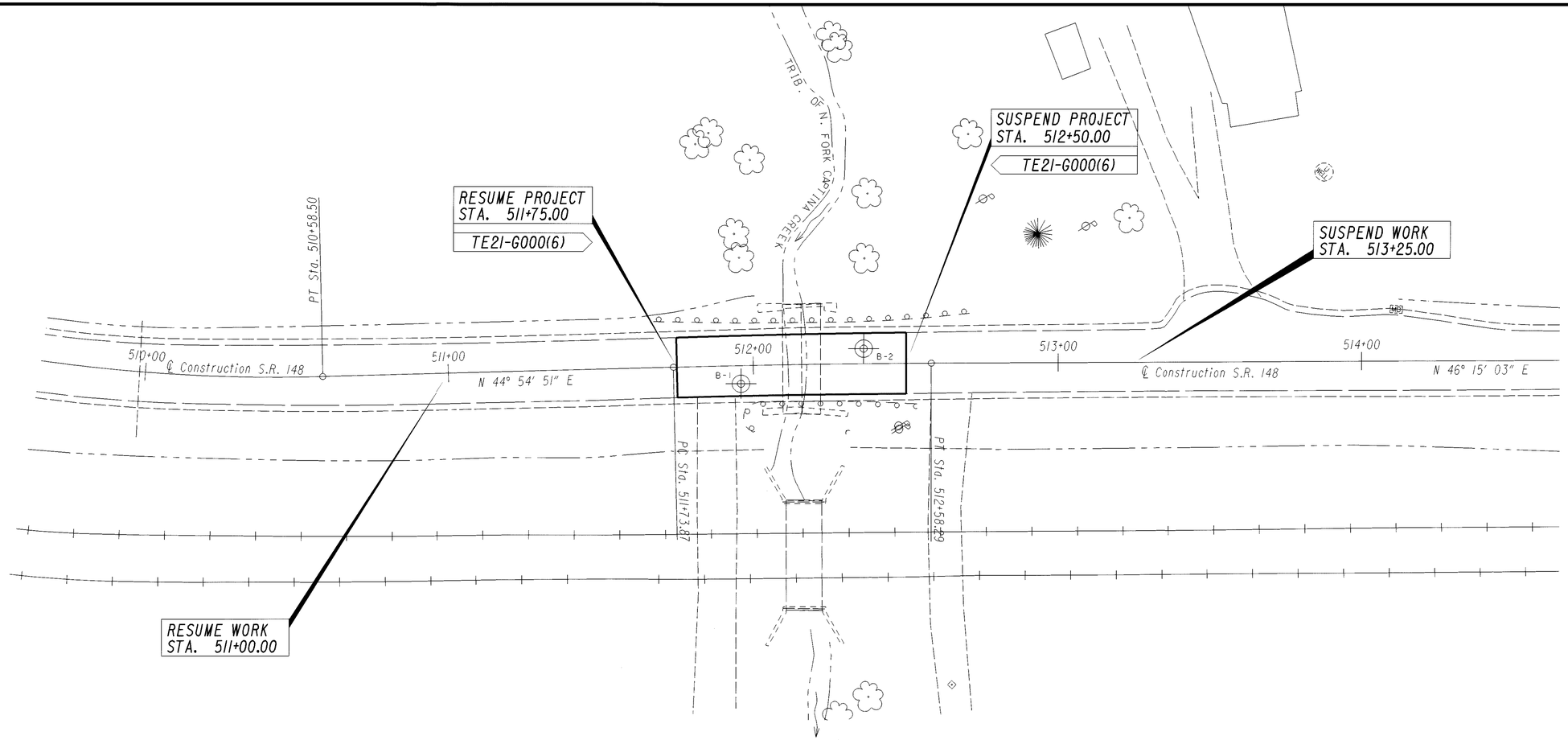
OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

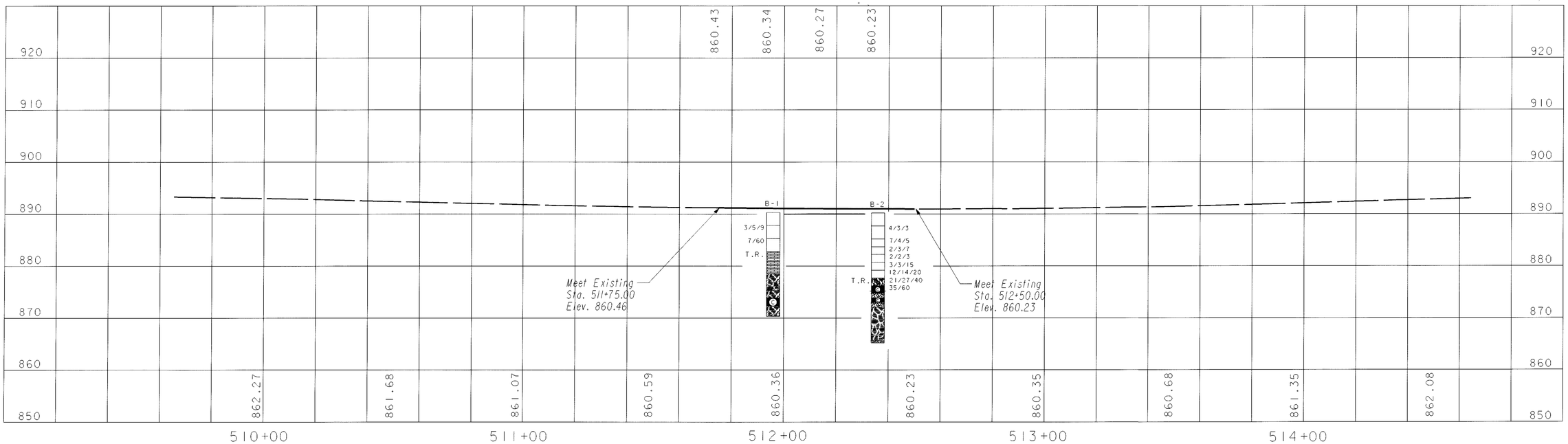
	DATE	REVIEWED	CHECKED
	9/15/99	M.R.S.	J.B.H.

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. BEL-148-0970
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

1/3





HORIZONTAL SCALE IN FEET
0 10 20 40

DATE	REVIEWED	CHECKED	CHECKED
9/15/99	M.R.S.	J.B.H.	J.B.H.

STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO. BEL-148-0970
OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

2/3

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/22/99 Sampler: Type SS Dia. 1 3/8" Water Elev. -
Date completed 6/22/99
Boring No. B-1 Station & Offset 511+96, 6.0' RT. Surface Elev. 890.3'

Elev.	Depth	Std. Pen./ R.O.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics: % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	ODOT Class
890.3	0	AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
889.7	2	AUGERED			FILL MATERIAL TO BROWN CLAY	-	-	-	-	-	-	-	-	-	VISUAL
887.8	4	3/5/9			BROWN SILTY CLAY	1	0	6	9	29	56	41	18	22	A-7-6
885.3	6	7/60			BROWN SILTY CLAY — TOP OF ROCK	2	-	-	-	-	-	-	-	18	VISUAL
882.8	8		1.0	1.5	LIMESTONE, GRAY, BLACK, AND CARBONACEOUS IN PLACES, FIRM TO HARD, WITH CLAY SEAMS, MOSTLY JOINTED, WITH A THICK BROKEN AND JOINTED SEAM IN THE LOWER PORION. CORE LOSS 35%. R.O.D. IS 16										
	10	16													
878.5	12		5.0	0.0	WEATHERED SHALE, BLACK, SOFT, CARBONACEOUS, WITH THIN CLAY SEAMS, SLICKENSIDED, JOINTED TO BROKEN AND JOINTED, RUBBLEIZED AT THE TOP; INTERBEDDED IN THE UPPER PORTION WITH A 0.3' THICK BLACK, HARD, JOINTED LIMESTONE INTERVAL. NO CORE LOSS. R.O.D. IS 0										
875.3	14	0													
873.9	16	0			WEATHERED SHALE, BLACK, FIRM, CARBONACEOUS, ARENACEOUS, WITH CLAY SEAMS, WITH SLICKENSIDES, CORE LOSS 7 %. R.O.D. IS 0										
872.3	18	0	4.5	0.5	COAL, BLACK, VITREOUS, BROKEN AND JOINTED IN THE TOP HALF, JOINTED IN THE BOTTOM HALF, CORE LOSS 25 %. R.O.D. IS 0										
870.3	20	0			WEATHERED SHALE, BLACK, FIRM, CARBONACEOUS, ARENACEOUS AT THE TOP, WITH A THICK CLAY SEAM NEAR THE TOP, WITH SLICKENSIDES. CORE LOSS 5 %. R.O.D. IS 0										

BOTTOM OF BORING

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-15L Revised 9/95

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/22/99 Sampler: Type SS Dia. 1 3/8" Water Elev. -
Date completed 6/23/99
Boring No. B-2 Station & Offset 512+36, 5' LT. Surface Elev. 890.2'

Elev.	Depth	Std. Pen./ R.O.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics: % Agg	% C.S.	% F.S.	% Silt	% Clay	L.L.	P.I.	W.C.	ODOT Class
890.2	0	AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
889.6	2	AUGERED			FILL MATERIAL TO BROWN CLAY	-	-	-	-	-	-	-	-	-	VISUAL
887.7	4	4/3/3			BROWN SANDY GRAVELLY CLAY	3	35	9	14	20	22	31	11	14	A-6a
885.2	6	7/4/5			BROWN SILTY SANDY GRAVEL	4	39	11	20	17	13	NP	NP	15	A-2-4
883.7	8	2/3/7			BROWN SANDY GRAVELLY SILT	5	32	8	18	22	20	32	10	18	A-4a
882.2	10	2/2/3			BROWN SANDY GRAVELLY CLAY	6	28	11	15	20	26	37	14	17	A-6a
880.7	12	3/3/15			BROWN AND GRAY SANDY GRAVELLY CLAY — TOP OF ROCK	7	26	9	8	24	33	36	13	-	A-6a
879.2	14	12/14/20			BROWN CLAYEY SAND AND STONE FRAGS.	8	-	-	-	-	-	-	-	9	VISUAL
877.7	16	21/27/40 35/60			GRAY SOFT WEATHERED CLAY-SHALE	9	-	-	-	-	-	-	-	8	VISUAL
876.2					BLACK COAL	10	-	-	-	-	-	-	-	5	VISUAL
875.2		0			(A)										
874.8		0			SILTSTONE, BLACK, FIRM, CARBONACEOUS. NO CORE LOSS.										
873.9		0	4.3	0.7	COAL, BLACK, VITREOUS, WITH THIN CLAY SEAMS, HIGHLY JOINTED. CORE LOSS 22 %. R.O.D. IS 0										
873.0	18	0			(B)										
872.1	20	0			SHALE, BLACK, FIRM, CARBONACEOUS, SLIGHTLY ARENACEOUS, WITH THIN CLAY SEAMS, HIGHLY SLICKENSIDED BROKEN AND JOINTED NEAR THE TOP WITH SCATTERED THICK WEATHERED SEAMS. CORE LOSS 19% R.O.D.IS 0										
867.9	22	0			(C)										
866.7	24	0	4.5	0.5	(D)										
865.7		0			(E)										
865.2															

BOTTOM OF BORING

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-15L Revised 9/95

(A) COAL, BLACK, VITREOUS, WITH THIN CLAY SEAMS, BROKEN AND JOINTED. CORE LOSS 25 %. R.O.D. IS 0

(B) SILTSTONE, BLACK, FIRM, CARBONACEOUS, WITH THIN CLAY SEAMS, WEATHERED AND JOINTED IN THE MIDDLE. NO CORE LOSS. R.O.D. IS 0

(C) SHALE, DARK OLIVE, FIRM, ARENACEOUS IN PART, SLIGHTLY MICACEOUS, JOINTED, SLICKENSIDED AT THE TOP. NO CORE LOSS. R.O.D. IS 0

(D) SHALE, BLACK, FIRM, CARBONACEOUS, ARENACEOUS WITH THIN CLAY SEAMS, JOINTED IN PART. CORE LOSS 10 % R.O.D. IS 0

(E) SILTSTONE, BLACK, FIRM, CARBONACEOUS. NO CORE LOSS. R.O.D. IS 0

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

DATE 9/15/99
REVIEWED M.R.S.
DRAWN J.B.H.
CHECKED J.B.H.

STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO. BEL-148-0970 OVER TRIB. OF N. FORK CAPTINA CREEK

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

3 / 3

GEOLOGY OF THE SITE

THE CULVERT SITE IS LOCATED IN THE DISSECTED UNGLACIATED PORTION OF THE FLUSHING ESCARPMENT REGION, ON THE FLOODPLAIN OF NORTH FORK CAPTINA CREEK AND OVER CASEY RUN, IN AN AREA WHERE THIN ALLUVIAL DEPOSITS, FILL MATERIALS AND VALLEY FILL OVERLIE LIMESTONE BEDROCK OF PENNSYLVANIAN AGE.

EXPLORATION

THE EXPLORATION CONSISTED OF TWO DRIVE SAMPLE-CORE BORINGS MADE BY MEANS OF A MECHANICALLY-POWERED HOLLOW STEM ROTARY AUGER MOUNTED ON A MOBILE PLATFORM, PERFORMED ON JUNE 23 AND 24, 1999.

INVESTIGATIONAL FINDINGS AND OBSERVATIONS

THE TEST BORINGS DISCLOSED THAT INTERVALS OF EXTREMELY-LOOSE TO MEDIUM-DENSE UNSTRATIFIED BASIC SILT, GRAVEL, SAND, CLAY AND FILL MATERIALS MODIFIED WITH STONE FRAGMENTS, ASPHALT FRAGMENTS AND VARYING AMOUNTS OF EACH OTHER THAT FLUCTUATE IN DENSITY WITH INCREASE IN DEPTH OVERLIE RELATIVELY FLAT-LYING BEDROCK SURFACE. TEST BORING B-1 ENCOUNTERED BEDROCK SURFACE AT 14.5 FOOT DEPTH, ELEVATION 833.9 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 5.5 FEET FOR A TOTAL DEPTH OF 20.0 FEET, ELEVATION 828.4 FEET. BOULDERS WERE ENCOUNTERED IN BORING B-1 AT 9.5 FOOT DEPTH, ELEVATION 838.9 FEET. TEST BORING B-2 ENCOUNTERED BEDROCK SURFACE AT 14.5 FOOT DEPTH, ELEVATION 834.2 FEET AND CONTINUED TO ADVANCE AN ADDITIONAL 5.5 FEET FOR A TOTAL DEPTH OF 20.0 FEET, ELEVATION 828.7 FEET. BOULDERS WERE ENCOUNTERED IN BORING B-2 AT 7.5 FOOT DEPTH, ELEVATION 841.2 FEET.

FREE WATER WAS OBSERVED AND MEASURED IN TEST BORING B-1 AT 12.5 FOOT DEPTH, ELEVATION 835.9 FEET AND IN TEST BORING B-2 AT 12.5 FOOT DEPTH, ELEVATION 836.2 FEET.

LEGEND

Roadway or Auger Boring Location - Plan View.

Press and/or Drive Sample and/or Core Boring Location - Plan View.

TR — Top of Rock

W — Indicates Free Water Elevation.

Indicates Static Water Elevation.

Horizontal Bar on Boring Log in the profile view indicates the Depth the Sample was taken

X/Y/Z — Figures Beside the Boring Log in the Profile view Indicate the Number of Blows for Standard Penetration Test.
X = Number of Blows for First 6 in
Y = Number of Blows for Second 6 in
Z = Number of Blows for Third 6 in

SYMBOLS OF ROCK TYPES

- Coal
- Fire Clay or Underclay
- Weathered Mudstone
- Mudstone
- Weathered Shale
- Shale
- Weathered Clay-Shale
- Clay-Shale
- Weathered Siltstone
- Siltstone
- Weathered Sandstone
- Sandstone
- Leached Dolomite
- Dolomite
- Leached Limestone
- Limestone
- Boulders or Cobbles

GENERAL INFORMATION

Drive Sample/Press Sample/Core Borings

Drive sample borings are made by means of a mechanically-powered rotary-type drill rig employing a 2" O.D., 1-3/8" I.D. split spoon sampler, at 2.5 ft and/or 5.0 ft depth intervals, driven by means of a 140 lbs hammer with a free fall of 2.5 ft. The number of blows required to drive the sampler three 0.5 ft increments is considered the standard penetration test.

Drive/press sample borings are made by means of a mechanically-powered rotary-type drill rig, employing a 2 in O.D., 1⅜in I.D. split spoon sampler, and a 3 in O.D. thin wall press sampling tube. The press sampling tube is advanced by continuous uniform pressure, applied by the drill rig.

Core borings are made by means of a mechanically-powered rotary-type drill rig, employing an NW-PAM core barrel with an industrial diamond cutting head.

The boring log sheets show a graphic plot of the information obtained, including depth and elevation of the sample, type of sample, number of blows for the standard penetration test in three 0.15 m increments, sample description based on laboratory test results utilizing the Casagrande AC classification system, sample number; and gradation, plasticity and moisture content determinations. Results of strength and consolidation testing, if performed on undisturbed samples, will appear graphically on separate enclosures. Rock samples are displayed on the log sheets including depth and elevation of the sample, amount of recovery and a visual classification based on type, color, degree of hardness, grain size, deterioration, bedding, acid reaction and other qualifying factors.

At depths where materials are bouldery or gravelly to the extent that a sampler cannot be utilized, a wash sample is procured and visually classified, in order to determine the general characteristics of the material. These samples are not considered sufficiently representative to warrant laboratory testing.

Particle Size Definitions

Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt	Clay
	12"	3"	2.0 mm	0.42 mm	0.074 mm	0.005 mm
			No. 10 sieve	No. 40 sieve	No. 200 sieve	

NOTE: ALL AVAILABLE SOIL AND BEDROCK INFORMATION THAT CAN BE CONVENIENTLY SHOWN ON THE STRUCTURE FOUNDATION INVESTIGATION SHEETS HAS BEEN SO REPORTED. ADDITIONAL SUBSURFACE INVESTIGATIONS MAY HAVE BEEN MADE TO STUDY SOME SPECIAL ASPECT OF THE PROJECT. COPIES OF THIS DATA, IF ANY MAY BE INSPECTED IN THE DISTRICT DEPUTY DIRECTOR'S OFFICE, THE OFFICE OF MATERIALS MANAGEMENT AT 1600 WEST BROAD STREET, THE PAVEMENT AND SOILS SECTION OF THE BUREAU OF LOCATION AND DESIGN OR IN THE BRIDGE BUREAU AT 1980 WEST BROAD STREET.

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

DATE 9/15/99
REVIEWED M.R.S.
CHECKED J.B.H.

STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO. BEL-148-1092
OVER CASEY RUN

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

HORIZONTAL SCALE IN FEET
0 10 20 40

REVISED DATE	DATE 9/15/99
	REVIEWED M.R.S.
	CHECKED J.B.H.
	DRAWN J.B.H.

STRUCTURE FOUNDATION INVESTIGATION

BRIDGE NO. BEL-148-1092
OVER CASEY RUN

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

2 / 3

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/23/99 Sampler: Type SS Dia. 1⅜"
Date completed 6/23/99
Boring No. B-1 Station & Offset 576+41, 6' RT.

Water Elev. 835.9'
Surface Elev. 848.4'

Elev.	Depth	Std. Pen./ R.O.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics Agg %	C.S. %	F.S. %	Silt %	Clay %	L.L.	P.I.	W.C.	ODOT Class
848.4	0														
847.8		AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
845.9	2	AUGERED			FILL MATERIAL TO BROWN CLAY	-	-	-	-	-	-	-	-	-	VISUAL
843.4	4	7/9/8			BROWN SANDY SILT W/STONE FRAGS. & ASPHALT FRAGS.	1	0	13	25	27	35	30	10	14	A-4a
	6	4/6/7			BROWN SANDY SILT	2	0	8	18	41	33	36	10	21	A-4a
840.4	8	7/7/8			BROWN SANDY SILT W/STONE FRAGS.	3	0	17	26	25	32	30	9	22	A-4a
838.9	10	5/7/9			BROWN SANDY GRAVELLY SILT W/STONE FRAGS.	4	36	12	12	15	25	34	10	23	A-4a
837.4		7/9/11			BROWN SILTY GRAVELLY SAND W/BOULDERS	5	31	12	19	16	22	30	9	17	A-4a
	12	4/6/7			BROWN CLAYEY GRAVELLY SAND	6	23	13	28	14	22	31	11	23	A-6a
835.9					TOP OF ROCK										
834.4	14	3/2/8			BROWN SANDY SILT (DRILLER'S DESC.)	7	0	14	44	18	24	NP	NP	21	A-4a
833.9		60/(0.5')			BROWNISH-GRAY SANDY CLAY	8	-	-	-	-	-	-	-	15	VISUAL
833.4	16														
	18	17	5.0	0.0	LIMESTONE, GRAY, BLACK, HARD, CARBONACEOUS IN PLACES, WITH CLAY SEAMS, MOSTLY JOINTED; WITH A BLACK WEATHERED SHALE SEAM IN THE LOWER PORTION. NO CORE LOSS. R.O.D. IS 17										
828.4	20														

BOTTOM OF BORING

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm, Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-151 Revised 9/95

State of Ohio
Department of Transportation
Office of Materials Management

LOG OF BORING

Date Started 6/23/99 Sampler: Type SS Dia. ____
Date completed 6/23/99
Boring No. B-2 Station & Offset 576+77, 6' LT.

Water Elev. 836.2'
Surface Elev. 848.7'

Elev.	Depth	Std. Pen./ R.O.D.	Rec. ft	Loss ft	Description	Sample No.	Physical Characteristics Agg %	C.S. %	F.S. %	Silt %	Clay %	L.L.	P.I.	W.C.	ODOT Class
848.7	0														
848.1		AUGERED			ASPHALT	-	-	-	-	-	-	-	-	-	VISUAL
846.2	2	AUGERED			FILL MATERIAL TO BROWN CLAY	-	-	-	-	-	-	-	-	-	VISUAL
843.7	4	3/5/7			BROWN SANDY CLAY W/STONE RFAGS.	9	0	5	31	28	36	30	13	15	A-6a
	6	3/5/6			BROWN CLAYEY SAND W/STONE FRAGS.	10	-	-	-	-	-	-	-	17	VISUAL
841.2	8														
838.7	10	11/8/10			BROWN SILTY SANDY GRAVEL W/BOULDERS	11	42	12	13	16	17	28	7	9	A-2-4
	12	7/7/8			BROWN CLAYEY SANDY GRAVEL	12	37	12	15	14	22	34	13	15	A-6a
836.2					TOP OF ROCK										
834.2	14	4/3/3			BROWN CLAYEY SANDY GRAVEL (DRILLER'S DESC.)	13	35	9	21	15	20	35	16	15	A-2-6
833.7	16														
	18	19	5.0	0.0	LIMESTONE, GRAY, BLACK, HARD, CARBONACEOUS IN PART, WITH THIN CLAY SEAMS, MOSTLY JOINTED; INTERBEDDED IN THE BOTTOM HALF WITH A BLACK BROKEN AND JOINTED SHALE SEAM AND A GRAY CLAY-SHALE SEAM. NO CORE LOSS. R.O.D. IS 19										
828.7	20														

BOTTOM OF BORING

Particle Sizes: Agg= >2.00mm, Coarse Sand= 2.00-0.42mm, Fine Sand= 0.42-0.074mm, Silt= 0.074-0.005mm, Clay= <0.005mm

Form TE-151 Revised 9/95

OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT
1600 WEST BROAD ST. COLUMBUS, OH 43223

DATE 9/15/99
REVIEWED M.R.S.
CHECKED J.B.H.
TYPED J.B.H.

STRUCTURE FOUNDATION INVESTIGATION
BRIDGE NO. BEL-148-1092
OVER CASEY RUN

BEL-148-(0.33)(4.54)(5.07)
(7.93)(9.69)(10.91)

3/3

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENT 1049
REFLECTIVE SIGN SHEETING PREQUALIFICATION PROCEDURE
(730.18, 730.19, 730.191, 730.192)

February 3, 1998

1049.01 Description
1049.02 Definitions
1049.03 Approval
1049.04 Removal from the Prequalified List
1049.05 Reapproval
1049.06 Modifications to Prequalified Reflective Sheetings
1049.07 Guarantee for Reflective Sheeting
1049.08 Restitution

1049.01 Description. This supplement describes the prequalification procedure by which ODOT will establish and maintain a List of Prequalified Reflective Sign Sheeting Materials meeting the requirements of 730.18, 730.19, 730.191 and 730.192 for use by the Ohio Department of Transportation and on contracts administered by ODOT.

1049.02 Definitions. The following definitions shall apply.

a. Item numbers (e.g. 730.18) correspond to sections in the ODOT Construction and Material Specifications.

b. "ODOT" means the Ohio Department of Transportation.

c. "Prequalified List" means the List of Prequalified Reflective Sign Sheeting Materials.

d. "Sheeting" and "Reflective Sheeting" refer to retroreflective materials for use on signs.

e. "Sign" refers to a traffic control device, including a highway sign, construction sign, barricade, vertical panel, drum or delineator.

f. "NTPEP" means the American Association of State Highway and Transportation Officials' National Transportation Product Evaluation Program.

g. "Satisfactory Performance" means that the reflective sheeting has not deteriorated due to natural causes, to the extent that the sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions, and does not show evidence of failure for reasons stated in Section 1049.07 of this supplement.

1049.03 Approval. For a reflective sheeting to be included on the prequalified list, all of the following must be satisfied.

a. Certification has been received by ODOT indicating that the sheeting manufacturer agrees to abide by the provisions contained in Section 1049.07 of this supplement for sheeting purchased by ODOT and for sheeting obtained by ODOT through contracts administered by ODOT.
b. ODOT has received NTPEP test data indicating that the sheeting has performed satisfactorily in the judgement of ODOT in the laboratory and one year outdoor exposure tests. (NTPEP test data are not required for reflective sheetings contained on the June 1, 1997 prequalified list which have not been modified, and for which ODOT has not experienced a substantial or recurrent failure in the last three years.)
c. The certification and NTPEP test reports have been reviewed and approved by ODOT.
d. Opaque and transparent process color inks appropriate for the sheeting are available, as recommended by the sheeting manufacturer. The sheeting manufacturer agrees to abide by the provisions contained in Section 1049.07 of this supplement for areas where recommended inks have been silk-screened onto the manufacturer's reflective sheeting.

1049.04 Removal from the Prequalified List. A reflective sheeting will be removed from the prequalified list if the sheeting manufacturer withdraws the test panel on which the one year test results are based from NTPEP prior to the completion of the three year outdoor exposure tests, or the NTPEP two or three year outdoor exposure tests indicate that the sheeting has not performed satisfactorily in the judgement of ODOT. ODOT also may remove a sheeting from the prequalified list if, in ODOT's sole discretion, the sheeting has substantially or recurrently failed to perform satisfactorily in the field.

1049.05 Reapproval. A reflective sheeting removed from the prequalified list due to unsatisfactory field performance shall not be returned to the list until the manufacturer identifies the reason for the failure, the problem has been corrected to the satisfaction of ODOT, and restitution has been made to ODOT in accordance with Section 1049.08 of this supplement. Experiences of other States or governmental agencies may be considered in this action.

A reflective sheeting removed from the prequalified list due to unsatisfactory performance in the NTPEP two or three year outdoor exposure tests, or the withdrawal by the

manufacturer of a test panel from NTPEP prior to the completion of the three year outdoor exposure tests, shall not be returned to the list until the requirements of Section 1049.03 of this supplement are met.

Use of reflective sheetings returned to the prequalified list may be limited in quantity until field performance can be assured.

1049.06 Modifications to Prequalified Reflective Sheetings. It is recognized that manufacturers will occasionally modify certain aspects of their products in an effort to enhance performance, improve durability, reduce costs, or for other similar reasons. Sheeting manufacturers shall notify ODOT whenever modifications are made to products contained on the prequalified list. ODOT will review the changes being made to the material, and, at its sole discretion, decide what action, if any, is appropriate. Appropriate action includes limitation of usage or removal from the prequalified list.

1049.07 Guarantee for Reflective Sheeting. The reflective sheeting shall be guaranteed by the manufacturer to be of the best quality and shall be fully fit for the purposes for which it is used, provided that the sheeting is applied by the sign fabricator according to the recommendations of the sheeting manufacturer within one year of the date of delivery, and the process color inks used are appropriate for the sheeting. The reflective sheeting, and silk screened areas on the reflective sheeting, shall be guaranteed for the effective performance life as specified below.

During the effective performance life, the sheeting shall retain the minimum specific intensity per unit area as described below, and must be free from wrinkles, blisters, alligatoring, peeling, cracking, fading, shrinking, discoloring and delamination, and any other failure which in the opinion of ODOT renders the sheeting or sign fabricated with the sheeting unsuitable for use. The effective performance life begins when the sheeting is used in the fabrication of a sign.

For 730.18 Type F, the sheeting shall retain at least 50 percent of the initial minimum coefficients of retroreflection for the effective performance life of seven years for white, yellow, green, blue, red and brown sheeting, and the effective performance life of five years for orange sheeting.

For 730.19 Type G, the sheeting shall retain at least 85 percent of the initial minimum coefficients of retroreflection for seven years, and 80 percent of the initial minimum coefficients of retroreflection for the effective performance life of ten years, for white, yellow, blue, red, green and brown sheeting. For orange 730.19 Type G, the sheeting shall retain at least 80 percent of the initial minimum coefficients of retroreflection for the effective performance life of three years.

For 730.191 Type G, Reboundable, the sheeting shall retain at least 80 percent of the initial minimum coefficients of retroreflection for the effective performance life of three years.

For 730.192 Type H, the sheeting shall retain at least 50 percent of the initial minimum coefficients of retroreflection for the effective performance life of seven years.

All measurements of specific intensity per unit area shall be made in accordance with ASTM E 810, except that a portable retroreflectometer shall be used. Measurements shall be taken at observation and entrance angles of 0.2 degrees and - 4 degrees respectively. Measurements shall be made after the sign is cleaned in accordance with the sheeting manufacturer's recommendations.

For screenprinted transparent colored areas on white Type F sheeting, the coefficients of retroreflection shall not be less than 50 percent of the values for the corresponding colors for Type F sheeting. For screenprinted transparent colored areas on white Type G sheeting, the coefficients of retroreflection shall not be less than 70 percent of the values for the corresponding colors for Type G sheeting. For screenprinted transparent colored areas on white Type H sheeting, the ratios of the coefficient of retroreflection for the color to the coefficient of retroreflection for the white shall be 5:1 to 15:1 for red and not less than 5:1 for green and blue.

1049.08 Restitution. In the event of defect or failure of the reflective sheeting within its effective performance life, restitution shall be made by the sheeting manufacturer to ODOT within 90 days after receipt of official notice from ODOT, in accordance with the requirements contained herein.

For 730.18 Type F, if the failure occurs during the effective performance life, new sheeting shall be furnished as restitution in an amount equal to that of the failed sheeting.

For white, yellow, blue, red, green and brown 730.19 Type G, if the failure occurs during the effective performance life, new sheeting shall be furnished as restitution in an amount equal to that of the failed sheeting. In addition, if failure occurs within the first seven years of the effective performance life, the sheeting manufacturer shall replace the sign in the field with a new sign at no cost to ODOT for materials and labor. For orange 730.19 Type G, during the effective performance life, new sheeting shall be furnished as restitution in an amount equal to that of the failed sheeting.

For 730.191 Type G, Reboundable, if the failure occurs during the effective performance life, new sheeting shall be furnished as restitution in an amount equal to that of the failed sheeting.

For 730.192 Type H, if the failure occurs during the effective performance life, new sheeting shall be furnished as restitution in an amount equal to that of the failed sheeting. In addition, if failure occurs within the first five years of the effective performance life, the sheeting manufacturer shall replace the sign in the field with a new sign at no cost to ODOT for materials and labor.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 806

FIELD OFFICE
September 9, 1997

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

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

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

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

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

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

FIELD OFFICE

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

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

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

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

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

Computer Hardware

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

a. 2.1 Gigabyte hard disk
b. 32 Megabytes RAM

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

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

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

Computer Software

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

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

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

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

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

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 842

CONCRETE FOR STRUCTURES

January 6, 1999

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

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

For prestressed concrete, see Supplemental Specification 865.

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

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

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

Reinforcing materials; 509.02.

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

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

Seals; preformed elastomeric compression joint seals, 705.11.

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

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

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

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

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

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

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

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

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

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

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

during the concrete placement regardless of the surface evaporation rate.

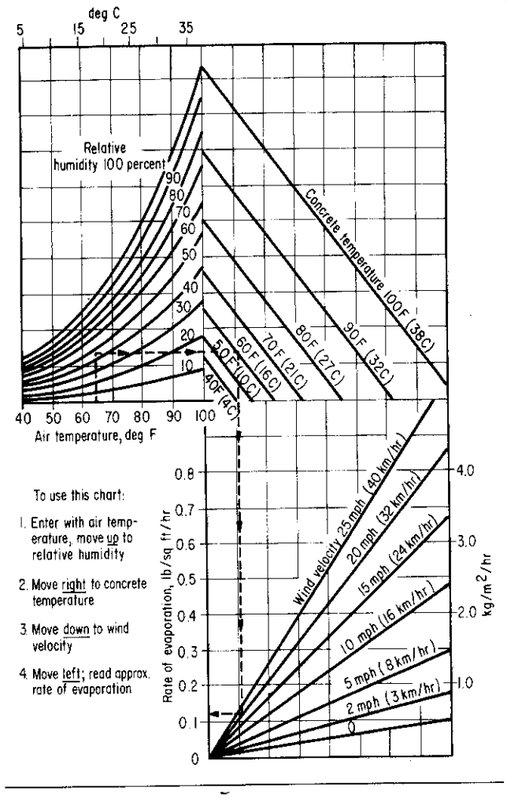
When a concrete deck is to be placed on continuous steel beams or girders, the placing of the concrete deck in any span shall not be started until all of the main beam or girder splices have been completed at least two piers beyond the pier or piers supporting the span in question.

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

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

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

Figure1 ACI 308-81



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Joints in cantilevered members shall be avoided.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 870
SEEDING AND MULCHING

August 10, 1999

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

870.01 Description. This work shall consist of placing topsoil, preparing the seed bed, furnishing all seed, agricultural lime, commercial fertilizer, mulching material and placing and incorporating as specified. Seeding and mulching shall be performed in stages as per Supplemental Specification 877.

The Contractor shall place the seed and mulch within 7 days of obtaining final grade. If it is anticipated that the areas will be disturbed by future work, the area shall be temporary seeded (Class 7) and mulched as per Supplemental Specification 877.

Areas to be seeded shall include all areas within the right of way and as described in the plans. All areas outside the specified limits where the vegetation has been disturbed or destroyed by the Contractor including those defined in CMS 104.06 shall be restored and seeded in accordance with these specifications by the Contractor at no additional cost to the Department.

870.02 Testing of Soil. Contractor shall have a Standard Test performed of the soil. This test measures soil acidity or alkalinity and will indicate if additional lime is required above the standard. The tests should be taken near final grade but prior to seeding. There shall be at least one test per 20 acres (8.1 hectares).

How to Take a Soil Sample: In a random pattern, 15-20 cores should be taken at a depth of 6 to 7 inches (150 to 180 mm). Cores should be mixed together with one pint retained for testing. Large sites having different soil conditions may require more than one test. Test results shall be made available to the Engineer. Corrections to any deficiencies in nutrients or pH shall be made by following the test report recommendations.

Ohio County Extension offices can provide the Contractor with a soil sample kit and testing locations.

870.03 Agricultural Lime. Agricultural lime shall be obtained by the Contractor from a dealer or manufacturer whose brands and grades are registered or licensed by the State of Ohio, Department of Agriculture.

870.04 Testing of Agricultural Liming Materials. Liming materials shall be tested in accordance with Supplement 1007.

870.05 Lime Application Rates. For the basis of quality control agricultural ground limestone, having a minimum total neutralizing power (TNP) of 90+ percent, at least 40 percent passing a No. 100 (150 μm)sieve and 95 percent passing a No. 8 (2.36 mm) sieve, 100 percent of Ag-ground shall be applied. Application shall be at 92 pounds per 1000 sq ft (2 ton/acre). This rate shall be standard grade.

Other available forms of liming materials may be applied depending on their potential to neutralize soil acidity. An increase or decrease in the application rates, depending on the form used, are determined from the Table 7-2 "Equivalent Amounts of Liming Materials" found in Bulletin 472, "Ohio Agronomy Guide", published by the Cooperative Extension Service, The Ohio State University.

Changes to the lime requirements will be determined by the pH test, as indicated on the soil analysis results. A slightly acid soil (pH 6.5) is recommended. Agricultural lime shall be applied to the surface.

870.06 Commercial Fertilizer. Commercial fertilizer shall be obtained by the Contractor from a dealer or manufacturer whose brands and grades are registered or licensed by the State of Ohio, Department of Agriculture.

Fertilizer may be dry or liquid in analysis specified or in the same ratio as specified. The standard application rate shall be 20 pounds per 1000 sq ft (0.1 kg/m^2) of 10-20-10. Another analysis in the same ratio (1:2:1) may be used by varying the application rate. The soil test results will recommend corrective fertilizer application rates if needed above and beyond the standard. Fertilizer shall be

applied in an even pattern over all areas.

870.07 Topsoil. Topsoil shall consist of loose, friable, loamy topsoil without admixture of subsoil or refuse. For topsoil to be considered loamy, Topsoil should be screened through a 3/4 inch to 1½ inch (19.0 to 37.5 mm) harp screen and shall contain no more than 40 percent clay.

Acceptable topsoil shall contain not less than 3 percent or more than 20 percent organic matter as determined by loss on ignition of samples oven dried to constant weight at 212^0 F (100^0 C).

870.08 Compost. Acceptable compost shall include Ohio EPA rated Class IV compost, EQS biosolids compost or approved equal. Compost shall have a Nitrogen content of 1.4 percent or above. Compost shall be obtained from an Ohio EPA approved facility. Contractor shall provide the Engineer with the facility name and location prior to delivery.

870.09 Seeds. All grass seed shall be obtained by the Contractor from a dealer or grower who is registered or licensed by the State of Ohio, Department of Agriculture.

All grass seed specified shall meet the current specifications on file with the Department as to percentage purity, weed seed and germination. All grass seed to be used under this item shall be on an approved list kept on file at the Laboratory, and shall meet the requirements of these specifications. Minimum germination rates for cool season turfgrass species are listed in Table 1.

GERMINATION RATES: TABLE 1

Species	Minimum Percent	High Quality Percent
Kentucky Bluegrass	80	85
Fine Fescue	85	90
Perennial Ryegrass	85	90
Annual Ryegrass	85	90
Tall Fescue	85	90
Creeping Red Fescue	85	90

Seed shall be dated within the last 9 months of testing. No seed will be accepted with a date of test exceeding 9 months prior to the date of sowing. The Department reserves the right to test, reject or approve all seed after delivery. All seeds are to be furnished as separate species and cultivars, packaged or bagged separately, and labeled, tagged or marked in accordance with ORC 907.03.

Cool season turf Classes 1, 2, and 3 as listed in Table 2 shall be composed of no less than two and no more than four cultivars of the same species. Newer improved cultivars should be used when possible.

870.10 Legumes. All leguminous seeds shall be inoculated or treated with the proper amount of pure nitrogen-fixing bacteria selected for maximum vitality, not more than one year old, and mixed with sufficient water to thoroughly wet the seed. All culture shall be subject to approval.

If sown hydraulically, the inoculant shall be 4 times the rate specified by the inoculant manufacturer. Inoculant and sticking agent shall be placed directly into the slurry and thoroughly mixed immediately before seeding. Seed shall be sown as soon as possible after inoculation. Seed left standing more than 24 hours shall be re-inoculated before sowing. All seed shall be mixed on the project.

Preinoculated seed will be considered as inoculated at not more than one time the rate specified by the inoculant manufacturer. Additional inoculation will be required on preinoculated seed to comply with the above specifications.

870.11 Native Grasses and Wildflowers. The seed quantities indicated per 1000 square feet (m^2) as listed in Table 2, Classes 4, 5 and 6 shall be the amounts of pure live seed (PLS) for each species listed. Seed which has actual pure live seed (PLS) yield according to tests less than the intended yield, will have the specified quantity adjusted to meet the intended PLS yields.

All seed supplied under Classes 4, 5 and 6 shall only be that which is grown from an approved midwest or northern grower. The states where seed may be obtained from are Ohio, Michigan, Illinois, Wisconsin, Indiana, Minnesota, Iowa, North Dakota or South Dakota. Native seed may be obtained outside this area with the Engineer's approval. Annual seed listed in Class 5A may be obtained from any commercial grower or dealer and shall have been produced within the continental US. If the listed varieties are not available, other varieties may be substituted only with prior approval from the Engineer.

Sixty days prior to seeding, the Contractor shall provide for approval, a written description for the Class 4, 5 and 6 mixtures showing the percentage by weight (mass) of each kind of seed. This description shall also include the following:

a. Name and location of the seed supplier.
b. Origin and date of harvest of each kind of seed.
c. A statement of the purity and germination of the seed.

SEED MIXTURES: TABLE 2

CLASS - TYPE	SEEDS	Lbs/1000 Sq Ft	Kg/1000 m²
1 Lawn Mixture	Kentucky Bluegrass (Poa pratensis) Creeping Red Fescue (Festuca rubra) Annual Ryegrass (Lolium multiflorum) Perennial Ryegrass, turf type (Lolium perenne)	1.5 1.5 1.0 1.0	7.32 7.32 4.88 4.88
2 Roadside Mixture	Kentucky Bluegrass (Poa pratensis) Kentucky 31 Fescue (Festuca arundinacea var. KY 31) Perennial Ryegrass (Lolium perenne)	1.5 2.0 1.5	7.32 9.76 7.32
3A Slope Mixture (flatter than or equal to 3:1)	Use Mixtures 2, 3B, 3C or 4B.		
3B Low Growing Slope Mixture (steeper than 3:1)	Hard Fescue (Festuca longifolia) Creeping Red Fescue (Festuca rubra) Annual Ryegrass (Lolium multiflorum)	1.3 0.8 0.23	6.35 3.90 1.12
3C Crown Vetch Mixture (steeper than 3:1)	Crown Vetch (Coronilla varia) Perennial Ryegrass (Lolium perenne) Annual Ryegrass (Lolium multiflorum)	0.9 1.8 0.3	4.39 8.79 1.46
4A Native Grass Mixture	Big Blue Stem (Andropogon gernadi) Indian Grass (Sorghastrum nutans) Switch Grass (Panicum virgatum) Annual Ryegrass (Lolium multiflorum)	0.07 0.09 0.02 0.11 (spring) 0.34 (fall)	0.34 0.44 0.097 0.54 (spring) 1.66 (fall)
4B Low Growing Native Grass	Little Blue Stem (Andropogon scoparius) Side-Oats Gramma (Boutelova curtipendula) Prairie Dropseed (Sporobolus heterolepsis) Annual Ryegrass (Lolium multiflorum)	0.18 0.04 0.04 0.11 (spring) 0.34 (fall)	0.88 0.19 0.19 0.54 (spring) 1.66 (fall)
5A Annual and Perennial Wildflower Mixture	Annual Mixture (below) Perennial Wildflower Mixture (below) Annuals Mixture - not exceeding 25% by weight of any one species of the following: Corn Poppy (Papaver rhoeas) Cosmos (Cosmos bipinnatus) Yellow Cosmos (Cosmos sulphureus) Cornflower (Centaurea cyanus) Rocket Larkspur (Delphinium ajacis) Indian Blanket (Gaillardia pulchella) Perennial Wildflower Mixture - not exceeding 5% by weight PLS of any one species of the following: Black-eyed Susan (Rudbeckia hirta) Purple Coneflower (Echinacea purpurea) Lance-leaved Coreopsis (Coreopsis lanceolata)	0.07 0.28	0.34 1.37

CLASS - TYPE	SEEDS	Lbs/1000 Sq Ft	Kg/1000 m²
5B Native Wildflower and Grass Mixture	Native Wildflower Mixture - not exceeding 5% by weight PLS of any one species of the following: Butterflyweed (Asclepias tuberosa) New England Aster (Aster novae-angliae) Partridge Pea (Cassia fasciculata) Purple Coneflower (Echinacea purpurea) Rattlesnake Master (Eryngium yuccifolium) Ox-eye Sunflower (Heliopsis helianthoides) Bergamot (Monarda fistulosa) Grey-headed Coneflower (Ratibida pinnata) Orange Coneflower (Rudbeckia fulgida) Prairie Dock (Silphium terebinthin) Whorled Rosinweed (Silphium trifolium) Stiff Goldenrod (Solidago rigida) Grass Mixture Big Blue Stem (Andropogan gerardii) Little Blue Stem (Schizachyrium scoparium) Indian Grass (Sorghastrum nutans) Annual Ryegrass (Lolium multiflorum)	0.34 0.046 0.069 0.023 0.92	1.66 0.224 0.337 0.112 4.49
6 Wildlife Mixture	Big Blue Stem (Andropogon gernadi) Little Blue Stem (Andropogon scoparius) Indian Grass (Sorghastrum nutans) Ox-eye Sunflower (Heliopsis helianthoides) Prairie Dock (Silphium terebinthinaceum) Purple Coneflower (Echinacea purpurea) Whorled Rosinweed (Silphium trifolium) Downy Sunflower (Hellanthus mollis) New England Aster (Aster novae-angliae) Annual Ryegrass (Lolium multiflorum)	0.13 0.18 0.13 0.18 0.18 0.18 0.11 0.07 0.07 0.11 (spring) 0.34 (fall)	0.63 0.88 0.63 0.88 0.88 0.88 0.54 0.34 0.34 0.54 (spring) 1.66 (fall)
7 Temporary Erosion Control Mixture	Annual Ryegrass (Lolium multiflorum)	2.02	9.86

870.12 Site Preparation. The Contractor shall complete all grading within the areas to be covered with the topsoil under this item necessary to bring the surface of the proposed grade to the lines indicated on the plans, and parallel to the proposed finished grade. These areas are to be free from rock or other foreign material of 3 inches (75 mm) or greater in any dimension, except for shale cuts.

870.13 Placing Topsoil. Topsoil shall be placed and spread over all the areas to a minimum depth of 2 inches. It should be incorporated into the existing soil at a depth of 2 to 4 inches (50 to 100 mm). Staging areas, temporary roads or heavily compacted areas are be disked to a depth of 4 to 6 inches (100 to 150 mm). The area shall be made smooth and uniform and shall be in accordance with the finished grade and cross section shown in the plans or otherwise designated. Such loosening will be required to ensure a bond of the topsoil with the surface on which it is put and to form a uniform blend. Soil shall not be tilled if wet or overtilled to achieve desired seed bed.

Fertilizer, lime or other soil amendments shall be applied separately to the site after the soil test results have been forwarded to the Engineer. Amendments may be incorporated by disk, harrow or rake, at a depth of 2 to 4 inches, in the same operation.

The prepared surface of topsoil and soil shall be free of gullies, rivulets, crusting, caking and satisfactorily shaped and finished as provided in 203. This work shall be performed prior to seeding.

All seed bed areas, including slopes flatter than 2 to 1 shall be free of rock and other foreign material 2 inches (50 mm) or greater in any dimension. All seed bed areas with 2 to 1 slopes or steeper shall be free of rock and other foreign material 3 inches (75 mm) or greater in any dimension but shall not be fine graded. After topsoil is placed, the area shall be tracked back and forth to achieve good contact between soil and slope surface. Surface shall be raked smooth prior to seeding.

All seed bed areas in front of residences, commercial properties, etc. between curb and sidewalks or as indicated on the plans, shall be free of all stones 1 inch (25 mm) or greater in any dimension. Seed bed shall have a smooth surface. Hand raking will be required if site is inaccessible to machines or if machines do not provide results equivalent to hand raking.

Topsoil is not required for shale cuts steeper than 2:1. Shale cuts steeper than 2:1 shall be allowed to deteriorate to a soil type surface texture prior to seeding.

870.14 Seeding Methods. Seeding operation shall not be performed unless the area is properly prepared. Except with permission of the Engineer, the Contractor shall seed cool season grasses between August 15 to October 30. If permanent seeding is necessary prior to these months, seeding rates shall be increased by 10 percent. All seeding performed between October 15 and March 15 shall be temporary seeding in accordance with Supplemental Specification 877. Permanent seeding may be performed with permission for projects completed within the same calendar year.

Seeding shall be done prior to or concurrently with 660, 667, 668 or 670.

Crown vetch seeding shall not be permitted during September or October.

Wildflower classes 5 and 6 shall be seeded in the fall (September - October). Spring seeding may be allowed with approval. Class 4 shall be seeded during the spring (March - May) when possible.

Seeding native grasses and wildflowers in Classes 4, 5 and 6 shall be done with a rangeland type or native seed grass drill. Seeding natives shall be performed as a split rate application with no less than two passes in different directions. Broadcast seeding shall only be allowed with approval of the Engineer. Cultipacking or rolling will be required when broadcast seeding.

All seed shall be thoroughly mixed and then evenly sown over the prepared areas at the rates listed in Table 2. No seed shall be sown during high winds. Equipment shall be operated in a manner to ensure complete coverage of the entire area to be seeded. Immediately after sowing, the area shall receive a light raking followed by rolling on flat surfaces or tracking by dozer on slopes to

insure good seed soil-contact.

Seed and fertilizer mixtures in Classes 1, 2, 3 and 7 shall be applied with a hydraulic seeder between March 1 and October 15.

870.15 Mulching Operation. Materials used for mulching shall be straw, wood fiber, organic compost, or biosolids compost. Materials shall be reasonably free of weed seed, foreign materials, or other injurious materials that would prohibit seed germination.

Within 24 hours after any given area is seeded, straw mulch shall be evenly placed over all seeded areas at the following rates:

Seeding from March 15 to October 15:	2 tons per acre (0.5 t/1000 m^2)
Seeding from October 15 to March 15:	3 tons per acre (0.7 t/1000 m^2)

Mulching materials shall be kept in place with asphalt emulsion applied at a minimum rate of 60 gallons per ton (250 L/t) of mulch or with tackifiers per the manufacturer's recommendations. An additional application at a rate of 30 gallons per ton (125 L/t) of mulch shall be applied to the shoulder area, starting at the berm edge and extending out for a distance of 10 feet (3m). Asphalt emulsion for vegetative mulch shall conform to 702.04. Emulsion shall be nontoxic to plants and shall be so prepared that will not change in transportation or storage.

Displaced mulch shall be replaced at once but only after all work proceeding the seeding operation or that which was damaged during the mulching operation has been acceptably repaired.

870.16 Wood Fiber Mulch. Fiber mulch shall consist of pure wood fibers manufactured expressly from clean wood chips. The chips shall be processed in such a manner as to contain no lead paint, varnish, printing ink, petroleum based compounds or seed germination inhibitors. Fiber shall not be produced from unknown origin recycled material such as sawdust, paper, cardboard or residue from chlorine bleached pulp and paper mills.

The cellulose wood fiber mulch must maintain uniform suspension in water under agitation and shall blend with grass seed, fertilizer and other additives to form a homogeneous slurry. Tackifiers shall be manufacturer approved.

Using standard hydraulic mulching equipment, pure wood fiber mulch, tackifier, seed and fertilizer slurry shall be applied evenly over the soil surface in a one-step operation. Hydraulic application shall occur from March 1 to October 15 only. Applications rates are as follows:

Flat surfaces:	35 pounds per 1000 sq ft (170 kg/1000 m^2)
Slopes 3:1 or less:	46 pounds per 1000 sq ft (225 kg/1000 m^2)

All slopes subject to windy conditions shall be seeded and mulched by hydraulic methods only.

870.17 Compost. Compost may be applied as a mulch instead of straw or wood fiber. Grass seed shall be thoroughly mixed with the compost and distributed over the prepared seed bed area using pneumatic equipment. Compost/seed mixture shall be applied to a minimum 1/4 inch (6 mm)

depth. Mulch covering with tackifier is not needed when using compost in this method. No additional compensation will be made for this substitutuion.

870.18 Watering. For permanent seeded areas (Classes 1 to 6) and all sodded areas, they shall be throughly watered, after seed has germinated, at the rate of 300 gallons per 1000 square feet (12.2 m^3/1000 m^2). The water shall be applied by means of a hydro-seeder or a water tank under pressure with a nozzle that will produce a spray that will not dislodge the mulch material. A second water application shall be made between 7 and 10 days after the first application, providing ½ inch (13 mm) or greater rainfall has not occurred within 7 days after the first application. When ½ inch (13 mm) or greater of rainfall has occurred within the first 7 day period, the second application may be delayed or omitted entirely, depending on weather conditions. Water shall be paid for and measured separately.

870.19 Maintenance. The Contractor shall maintain all seeded and mulched areas until final inspection. Damaged areas shall be repaired to the original condition and grade.

870.20 Mowing. Mowing may be required prior to permanent seeding and any time during the growing season following permanent seeding. The Contractor will be notified by the Engineer to begin mowing.

The Contractor shall use suitable equipment for mowing. Mowers shall be of the rotary, flail, disk or sickle type. Bunching or wind-rowing of mowed vegetation will not be permitted. The final cutting height shall be no less than 6 inches (150 mm). More than one pass may be required for each mowing.

870.21 Fertilization: 2nd Application. Permanently seeded areas shall be fertilized with an application of 12-12-12 no less than 3 months after installation. Fertilizer shall be broadcast evenly over the surface without incorporation at a rate of 10 pounds per 1000 sq ft (0.05 kg/m^2). This shall be performed after all repair seeding and mulching or inter-seeding has been completed.

870.22 Repair Seeding and Mulching. The Contractor shall repair all damage or erosion of the seeded and mulched areas. The Department will pay for these repairs.

The repairs shall be made prior to completion of the project by reworking or reshaping to grade. Reworking or reshaping of the slopes shall include bringing in additional material, if necessary and using whatever equipment that is necessary to restore slopes to grade. Area shall then be fertilized, seeded, and mulched as per the specifications. Such work will be measured and paid for as "Repair Seeding and Mulching."

When damage or erosion of these areas occurs as a result of fault or negligence of the Contractor, the areas shall be satisfactorily repaired, fertilized, seeded and mulched at no additional cost to the Department.

870.23 Inter-seeding. Inter-seeding is the practice of seeding existing thin and spotty growing turf with a slit or drill type seeder. This work shall only be performed from March 15 to May 15 and

September 1 to October 15. Mowing may be required prior to seeding to achieve good seed soil contact. Cut material shall not be wind-rowed or left in a bunched condition.

A slit or drill type seeder shall be used. Exceptions may be when seeding steep slopes or inaccessible areas. Broadcast or hydraulic seeding methods may be used in these instances. Commercial fertilizer of 12-12-12 shall be broadcast over affected areas as specified. Water shall be applied at the rate specified in these areas to aid in seed/soil contact.

870.24 Method of Measurement. Topsoil, organic compost or other approved equal required to meet the specification shall be paid for by the number of cubic yards (cubic meters) furnished and placed. The quantity will be paid based on the amount shown in the plans. In the measurement of topsoil, organic compost, etc., no adjustment of the plan quantities or recalculation of the volumes shall be made for any volumes found different by less than five percent from the plan quantity. The Contractor shall accept the plan quantity with authorized changes as payment in full unless revised by the Engineer. The burden of proof of a plan discrepancy greater than five percent is on the Contractor. The Contractor shall submit supporting documentation concerning the possible changes.

The quantity of commercial fertilizer and agricultural lime will be the number of tons (kilograms) of each quantity of furnished, spread and incorporated.

Seeding and mulching will be the number of square yards (square meters) of the area seeded and mulched in accordance with these specifications. In the measurement of seeding and mulching, no adjustment of the plan quantities or recalculation of the areas shall be made for any areas found different by less than five percent from the plan quantity. The Contractor shall accept the plan quantity with authorized changes as payment in full unless revised by the Engineer. The burden of proof of a plan discrepancy greater than five percent is on the Contractor. The Contractor shall submit supporting documentation concerning the possible changes.

The quantity of repair seeding and mulching will be the number of square yards (square meters) of damaged or eroded areas reshaped, seeded and mulched.

The quantity of water shall be the amount in thousands of gallons (cubic meters) applied in accordance with the requirements of this item and measured in tanks, tank wagons or trucks of predetermined capacity, or by means of meters of a type satisfactory to the Engineer and furnished and installed by the contractor at his own expense, or determined by weight conversion.

The quantity of inter-seeding will be the number of square yards (square meters) of the seeded area.

Mowing satisfactorily performed will be measured in 1000 square foot units (square meters).

The quantity of soil analysis tests will be the number of tests submitted to the Engineer.

870.25 Performance. The Department will inspect all seeded areas no earlier than six months and no later than 12 months after final seeding. The Contractor shall repair, regrade, overseed, and

fertilize any area this inspection identifies without a uniform density of at least 70 percent grass cover.

Seeded areas damaged by traffic or erosion, due to no fault or negligence of the Contractor, shall also be regraded, refertilized, reseeded and remulched.

The Contractor shall be compensated for the above work and mobilization and demobilization by supplemental agreement.

870.26 Basis of Payment. Payment for accepted quantities will be made at contract prices for:

Item	Unit	Description
870	Each	Soil analysis test
870	Cubic yard (cubic meter)	Placing topsoil
870	Ton (kilogram)	Commercial fertilizer
870	Ton (kilogram)	Agricultural lime
870	Square yard (square meter)	Seeding and mulching
870	Square yard (square meter)	Repair seeding and mulching
870	M Gallons (cubic meters)	Water
870	Square yard (square meter)	Inter-seeding
870	M Square feet (square meter)	Mowing

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

April 13, 1999

877.01 Description
877.02 Materials
877.03 Construction Requirements
877.04 Maintenance
877.05 Performance
877.06 Method of Measurement
877.07 Basis of Payment

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

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

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

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

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

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

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

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

Temporary dikes shall consist of suitable 203 material.

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

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

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

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

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

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

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

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

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

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

the clearing and grubbing operations.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

It is used to collect sediment for a maximum of:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

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

April 1, 1998

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

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

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

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

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

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

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

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

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

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

No crushing of OH or BOF slag shall be allowed.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 906

ANTISTRIP ADDITIVE FOR ASPHALT CONCRETE

May 5, 1998

On this project, if any gravel coarse aggregate or more than 25 percent natural sand or more than 20 percent reclaimed materials containing gravel coarse aggregate is used in any bituminous aggregate base designed in accordance with Supplement 1044 or any asphalt concrete designed in accordance with 441, then the Contractor shall perform the following additional tests:

1. Moisture damage potential test in accordance with Supplement 1051.
2. Washed gradation in accordance with AASHTO T 11 as modified by Supplement 1004.
3. Adherent fines test for each component in accordance with ASTM D 5711.

If the results of the moisture damage potential test show the Tensile Strength Ratio (TSR) of the bituminous aggregate base mix or asphalt concrete mix to be less than 0.70, then the mix shall be modified by one of the following antistrip additives:

Liquid Antistrip Material - The mix shall include liquid antistrip material at a rate of 0.50 to 1.00 percent by weight of the asphalt cement. The TSR of the bituminous aggregate base mix or asphalt concrete mix shall be greater than or equal to 0.80 after the addition of the liquid antistrip material.

Hydrated Lime - The mix shall include hydrated lime in the dry form at a rate of 1.0 percent by the dry weight of aggregate for asphalt concrete and 0.75 percent by the dry weight of aggregate for bituminous aggregate base. The hydrated lime shall meet the requirements of AASHTO M 303, Type 1. A list of approved sources of hydrated lime will be maintained by the Laboratory. To become an approved source, a source shall submit certified test data to the Laboratory showing their hydrated lime meets the requirements of AASHTO M 303, Type 1. Annual submittal of certified test data by January 1 each year will be necessary to maintain approval. The following information shall be provided to the Engineer for each shipment of hydrated lime: (1.) letter of certification; (2.) production date; (3.) shipment date; (4.) shipment destination; (5.) batch or lot number (6.) net weight.

The antistrip additive shall be included in the Contractors' mix design established in accordance with 441 or Supplement 1044. The following shall be submitted to the Laboratory with the proposed JMF:

1. All TSR data (before and after the addition of the antistrip additive).
2. Rate of addition of the liquid antistrip material, if used.
3. Product information, recent supplier State project information using the liquid antistrip material, and letter of certification (only for liquid antistrip material, if used).
4. Results of the washed gradation test of the individual components of the mix used in determining the combined gradation.
5. Results of the adherent fines testing for each component.

The Laboratory may perform additional tests in accordance with Supplements 1051, 1052, and 1004. These tests may be performed on material conforming to a proposed JMF or on material obtained during production of an approved JMF. If a change in the aggregate production is suspected, the District/ Laboratory may require the Contractor to perform washed gradations on components and calculate adherent fines to determine the need for additional TSR review. The Laboratory may obtain samples of the hydrated lime at any time to verify quality. If the quality of the hydrated lime is in question, the Laboratory may require independent laboratory testing for the hydrated lime supplier.

Antistrip additives shall be stored and introduced into the mix in accordance with Supplement 1053. Prior to the start of production,. the Laboratory shall approve the antistrip additive storage and feed systems. During production, if the antistrip additive is not being properly dispersed into the mix, the Laboratory may require modifications in the method of introducing the antistrip additive into the mix.

At the end of the project and at the end of each construction year on a multiple year project, the Contractor shall provide delivery tickets to the Engineer verifying the number of pounds of antistrip additive used is within 10 percent of the calculated amount of antistrip additive required for the total pounds of bitumen, based on the JMF, used in the bituminous aggregate base or asphalt concrete.

The cost of this additional testing and the addition of any antistrip additive shall be included in the contract price for the bituminous aggregate base or asphalt concrete.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 907

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

October 21, 1998

907.01 Description
907.02 Sampling Procedure
907.03 Sulphur Leachate Test Procedure and Criteria

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

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

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

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

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

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

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

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

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

1. Equipment Needed:

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

2. Test Procedures.

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

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

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

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

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

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

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

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 908

PERFORMANCE GRADE (PG) BINDER REQUIREMENTS

March 28, 2000

908.01 Performance Grade Binder Specifications.
908.02 Contractor Storage Requirements
908.03 Contractor Sampling Requirements

908.01 Performance Grade Binder Specifications. The requirements of 702.01 shall be replaced with AASHTO Provisional Standard MP1-93, 1997 AASHTO Provisional Standard version for Performance Graded (PG) binders as modified below:

PG 64-22 shall meet: Penetration, 77°F (25°C), 3.53 oz (100g), 5s -	55 - 75
PG 58-28 shall meet: Viscosity, poise, 140°F (60°C)-	800 min

The Materials and Manufacture section 5 shall be modified for all performance grades (PG) as follows:

5.1 The performance grade binder shall be an asphalt cement from the refining of crude petroleum, or combination of asphalt cements from the refining of crude petroleum, or asphalt cements and suitable liquid from the refining of crude petroleum, and possible organic modifiers for performance enhancement. Material from the crude refining stream will be considered neat. Liquid from crude refining may be used for adjustments but shall not be used for the purpose of substitution of crude refined asphalt cement in a performance grade asphalt binder. In the event of a failure investigation where binders exhibit unusual properties a supplier may be requested by the Office of Materials Management to supply information about the makeup of a PG binder. Failure to cooperate will mean removal from certification.

5.2 A modifier may be any organic material of suitable manufacture that is proven compatible with asphalt cement (does not separate appreciably in routine storage), and that is dissolved, dispersed or reacted in asphalt cement to improve its performance. Performance enhancement is defined as a decrease in the temperature susceptibility of the asphalt cement while maintaining or improving desirable properties in a neat asphalt cement such as coatability, adhesiveness and cohesiveness. The use of modifiers shall be limited to 6.0 percent by performance grade binder weight.

5.3 The use of previously used materials must be approved by the Department. Since no standard test procedures exist for reprocessed materials (and original tests were not developed with the use of such materials in mind), appropriate test methods may be chosen by the Department for review. Department approval does not relieve the performance grade binder supplier from full responsibility for content and use of any previously used material nor guarantee suitable performance enhancement as defined above. The detected presence in a performance grade binder sample of any unapproved previously used material will mean immediate removal from certification. Approved reprocessed materials will be limited to 6.0 percent by performance grade binder weight.

5.4 The performance grade asphalt binder shall be homogeneous, free from water and deleterious materials, and shall not foam when heated to 350°F (175°C). The asphalt binder (before modification or after modification if liquid modifier used) shall be proven fully compatible with a negative result by means of the Spot Test per AASHTO T 102 using standard naphtha solvent. If standard naphtha shows a positive result, a retest using 35 percent Xylene/ 65 percent Heptane (volume) may be used.

5.5 The performance grade asphalt binder shall be at least 99.0 percent soluble as determined by ASTM D 5546 or D 2042. Any insoluble component shall be substantially free of fibers and have discrete particles less than 75μm.

908.02 Contractor Storage Requirements. Storage of a performance grade binder shall be in accordance with 750.01, with the following additions:

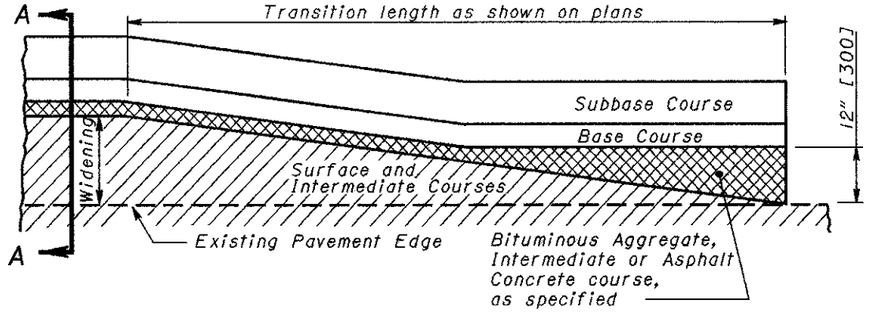
1. If a Contractor is providing a binder other than a performance grade binder to customers other than the Department (excepting winter carryover work), a separate storage tank shall be used.

2. When the Contractor switches between different performance grade binders because of alternating mix types, a separate storage tank shall be used.

3. When the Contractor switches from any asphalt cement or other performance grade binder to a different performance grade binder using the same storage tank, the storage tank shall be at least 90 percent empty by tank height.

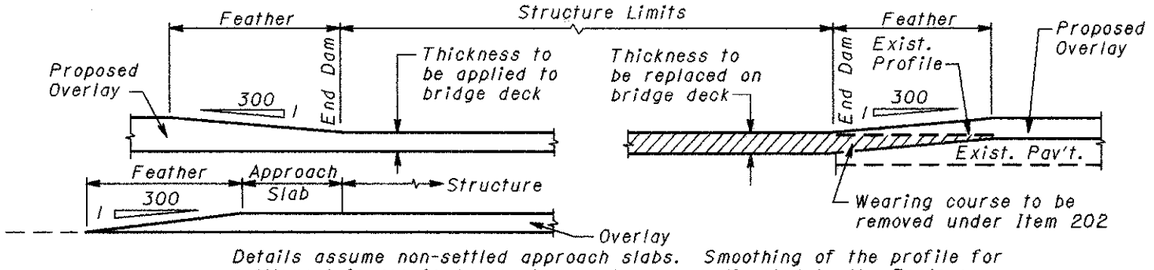
The Monitoring Team shall be notified before the delivery of the first load of each type of performance grade binder, with sufficient lead time to allow for verification of the condition of the storage tank. The Monitoring Team may sample the first storage tank load or give the Contractor permission to proceed with no tank verification, at their discretion.

908.03 Contractor Sampling Requirements. The Contractor shall take two 1 quart (1 liter) samples from the first transport truck load of performance grade binder before incorporation into the storage tank. The Contractor will label and date the samples and retain them in the plant laboratory for future reference by the Department, if necessary.



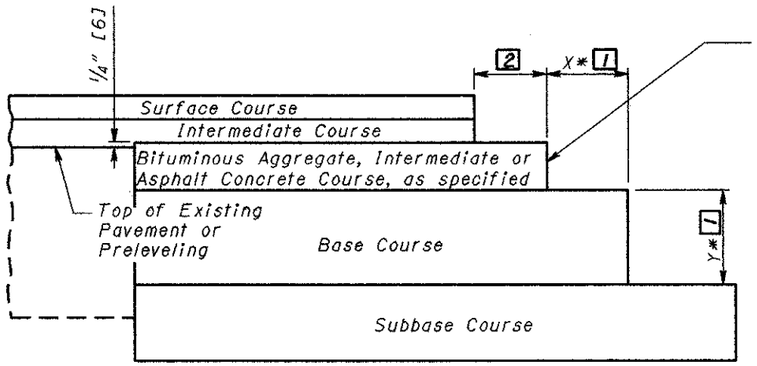
PLAN

MERGING EDGE OF PAVEMENT WIDENING WITH EDGE OF EXISTING PAVEMENT



Details assume non-settled approach slabs. Smoothing of the profile for settlement is required per plan grades or as directed by the Engineer.

FEATHERING AT STRUCTURES



The Bituminous Aggregate in the upper part of the base widening shall finish approximately 1/4" [6] above the edge of the existing pavement where no preleveling is used. Where a preleveling (using intermediate course material) is specified it shall be placed prior to excavation of the widening trench and the upper course of the base widening shall finish approximately 1/4" [6] above the preleveling.

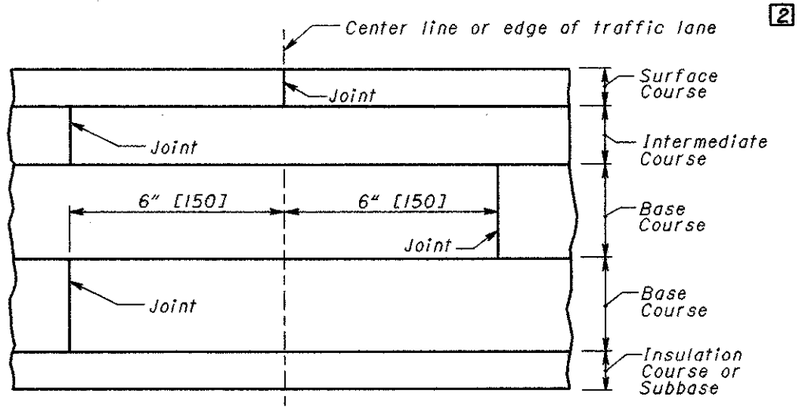
SECTION A-A

COURSE DETAIL FOR WIDENING

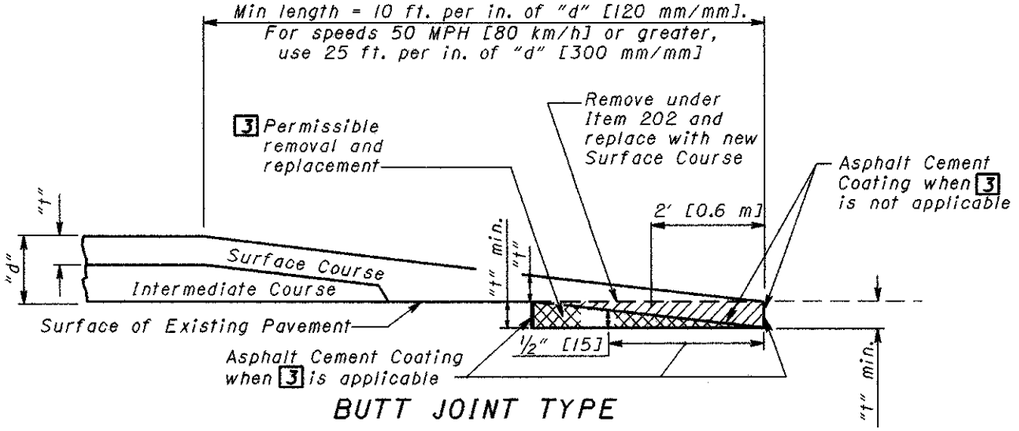
LEGEND

1 The extended width (X) of a base or subbase course shall be equal to the depth (Y) of that particular course, unless otherwise specified in the plans.

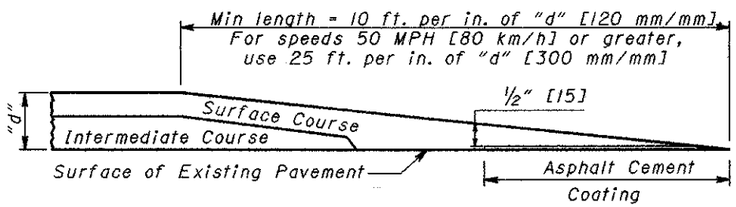
2 The extended width shall be equal to the thickness of the surface course plus the intermediate course, or 4 inches [100], whichever is greater.



LAPPING LONGITUDINAL JOINTS



BUTT JOINT TYPE



TAPER EDGE TYPE

NOTE: Either butt or taper type may be used unless type is specified by the plan.

PLACING FEATHERED AREAS

Values for "t" and "d" are obtained from the plan.

THIS DRAWING REPLACES BP-3.1M DATED 10-28-94.

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

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

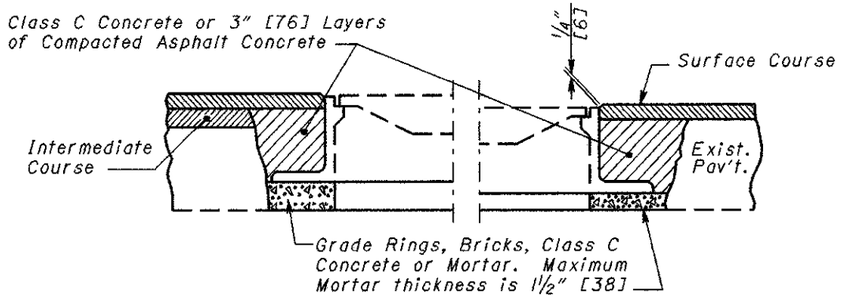
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

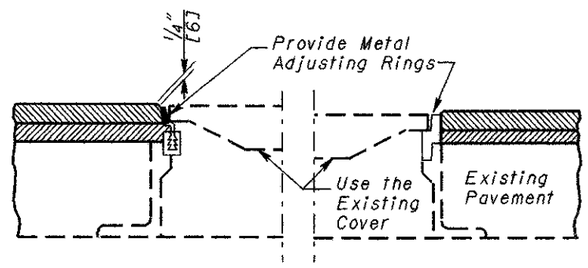
STANDARD ROADWAY CONSTRUCTION DRAWING

RESURFACING

NUMBER BP-3.1



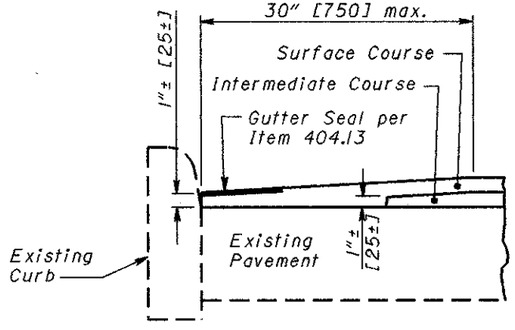
USING CONCRETE OR MORTAR



USING METAL ADJUSTING RINGS

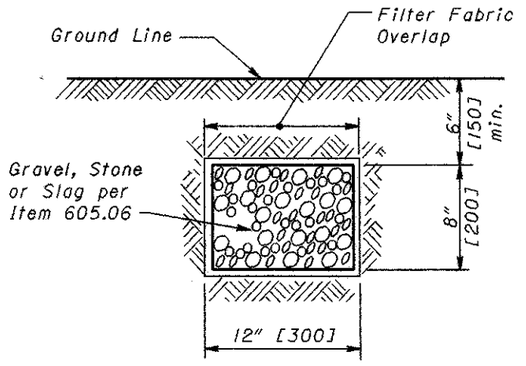
Metal adjusting rings shall:
(a) attach securely to the existing frame by welding or mechanical devices;
(b) consist either of cast metal having an integral rim and seat, or be fabricated metal with a sturdy connection between the seat and rim; and
(c) provide an even seat for the manhole cover.
In addition, the adjusting ring type shall be a design acceptable to the local governmental agency responsible for street and sewer maintenance. Any installation unacceptable to the Engineer shall be replaced by the Contractor at his expense.

MANHOLES ADJUSTED TO GRADE



Special care shall be taken during construction to obtain maximum compaction of bituminous concrete in gutters.

GUTTER FINISH



Aggregate drains to be placed where and as directed by Engineer. Provide Filter Fabric when specified as a separate pay item.

AGGREGATE DRAIN

THIS DRAWING REPLACES BP-3.1M DATED 10-28-94.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER — DATE 1-28-00

REVISIONS

STDS. ENGR. M. Evans
DRAWN D. Focke

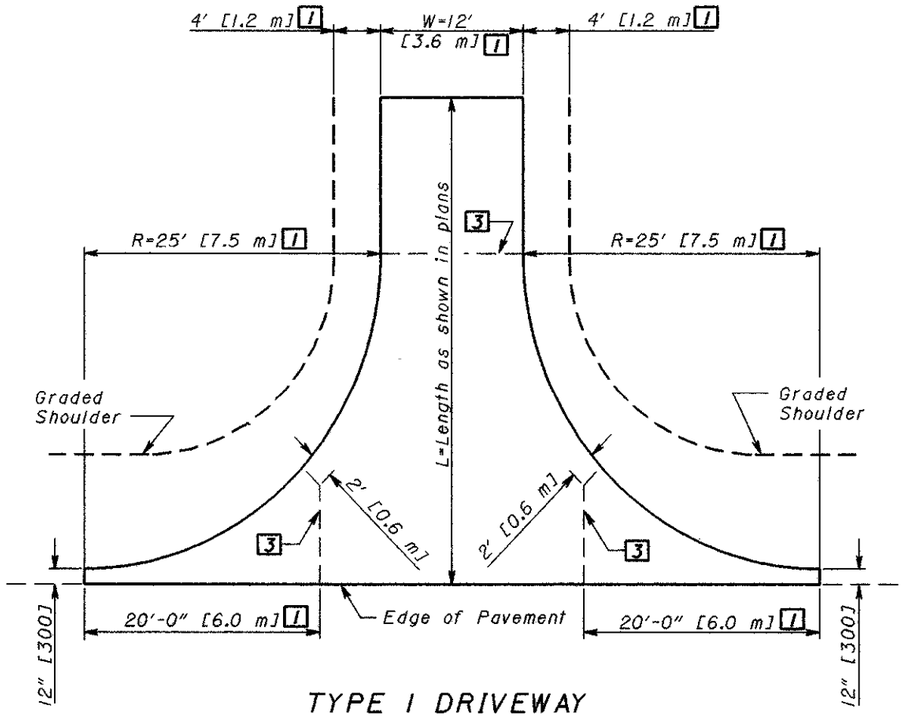
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

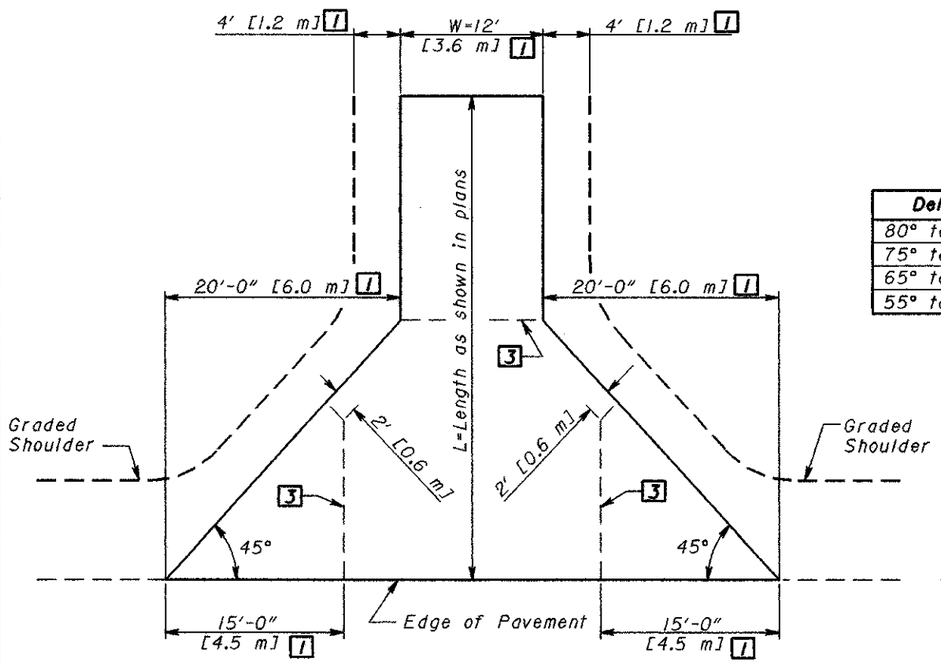
STANDARD ROADWAY CONSTRUCTION DRAWING
RESURFACING

NUMBER BP-3.1

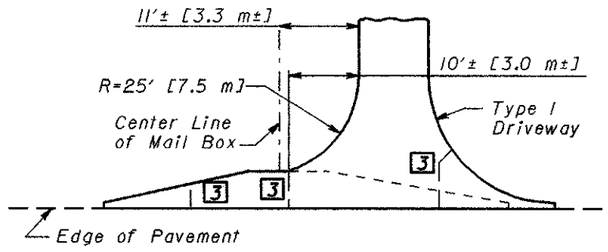
2/2

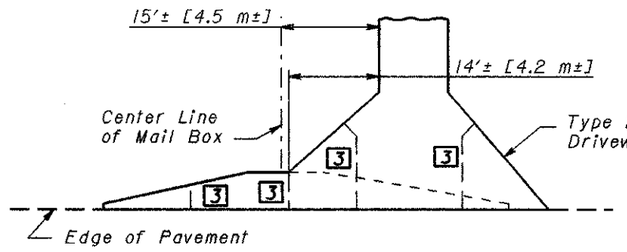


TYPE 1 DRIVEWAY

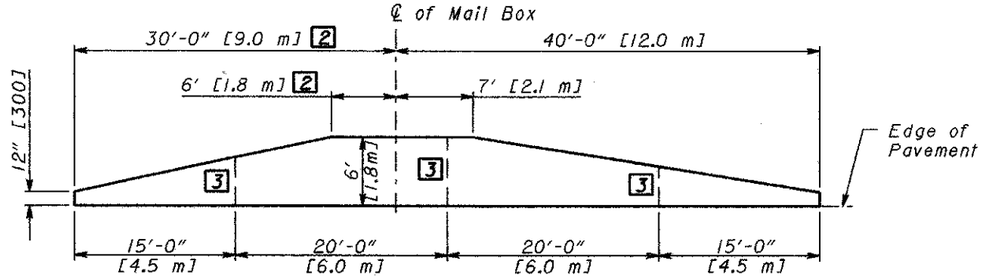


TYPE 2 DRIVEWAY

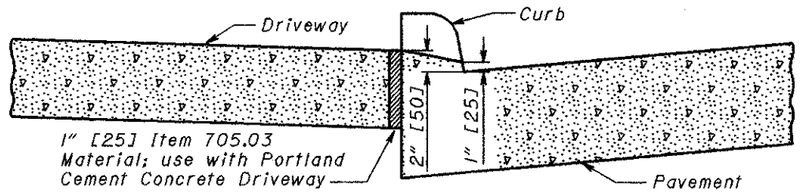




COMBINED DRIVEWAY & MAIL BOX APPROACH

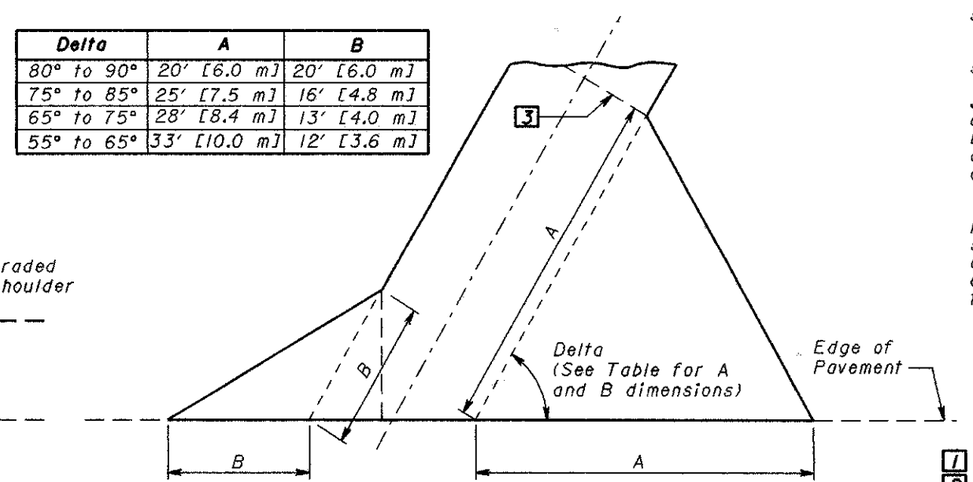


TYPICAL MAIL BOX APPROACH



DROP CURB DETAILS AT DRIVEWAYS

Delta	A	B
80° to 90°	20' [6.0 m]	20' [6.0 m]
75° to 85°	25' [7.5 m]	16' [4.8 m]
65° to 75°	28' [8.4 m]	13' [4.0 m]
55° to 65°	33' [10.0 m]	12' [3.6 m]



TYPE 2 SKEWED DRIVEWAY

Transition from Standard Curb Section to Drop Curb Section to be made in 18" [450] distance from Driveway

NOTES

GENERAL: The design details shown here shall govern the construction of driveways unless otherwise shown in the project plans.

The pavement type and thickness shall be specified in the project plans.

Driveway and mail box approaches shall be combined when feasible.

JOINTS: Impressed joints for portland cement concrete driveways shall be 1/4" [6] minimum width by 3"± [75±] depth and shall be sealed with Item 705.04 or ASTM D 1850.

In addition to the joints shown here, impressed joints without tie bars shall be placed in portland cement concrete driveways at intervals not to exceed 17' [5.2 m] in the portion of the driveway beyond the flare.

LEGEND

1 Unless otherwise shown in the plans.
2 Add 3' [0.9 m] for each additional Mail Box
3 Impressed Joint without Tie Bars for Portland Cement Surface

THIS DRAWING REPLACES BP-4.1M DATED 10-28-94.

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

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

REVISIONS

STDS. ENGR. M. Evans
DRAWN D. Focke

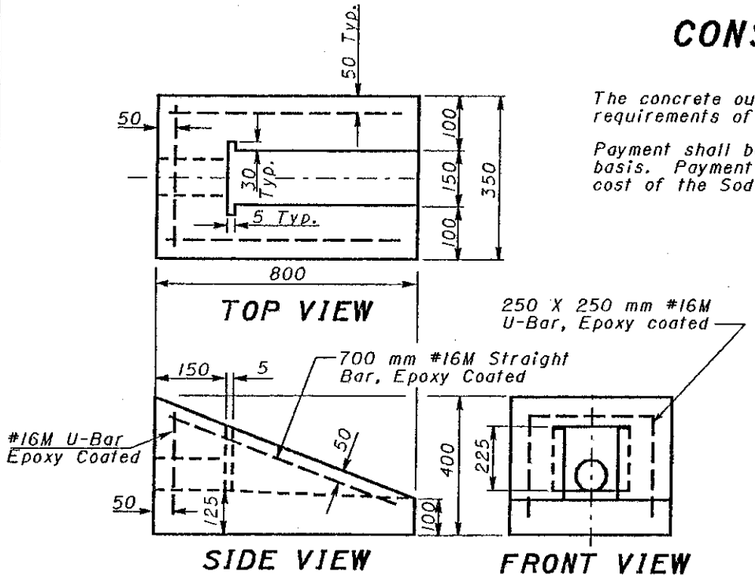
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING
DRIVEWAYS

NUMBER BP-4.1

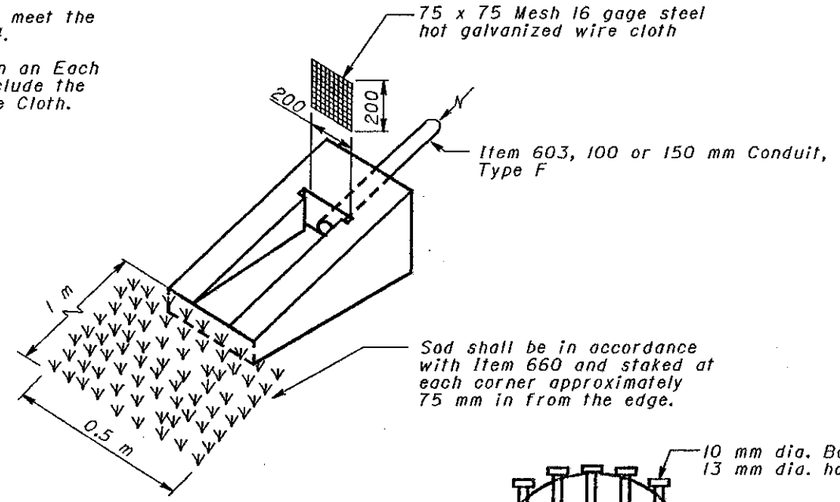
1 / 1

CONSTRUCTION METHODS



The concrete outlet shall meet the requirements of CMS 604.

Payment shall be made on an Each basis. Payment shall include the cost of the Sod and Wire Cloth.

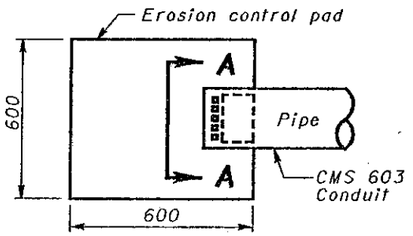


PRECAST REINFORCED CONCRETE OUTLET

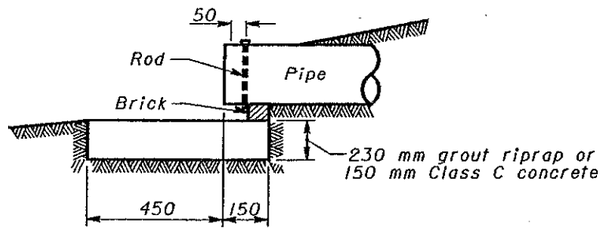
NOTES

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

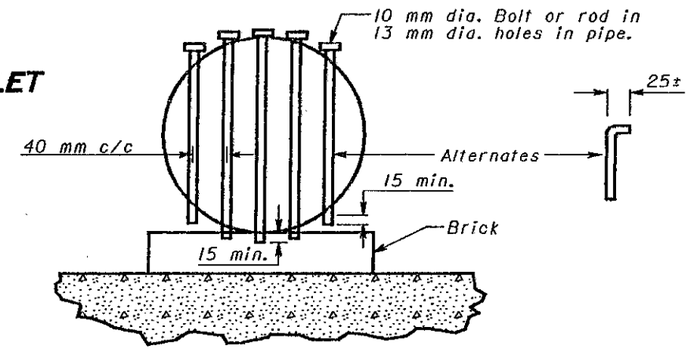
EROSION CONTROL PAD AND ANIMAL GUARDS: These items shall be provided at the outlet end of all farm drains except where they outlet into a drainage structure.
The steel bolts or rods for the animal guard shall be galvanized per CMS 710.06.
In lieu of drilling or punching the 13 mm diameter holes into the pipe, a metal collar meeting all of the above requirements may be clamped onto the pipe if approved by the Engineer.
Payment for the erosion control pads and animal guards shall be included in the unit price bid for Item 603 __ mm Conduit, Type __ .



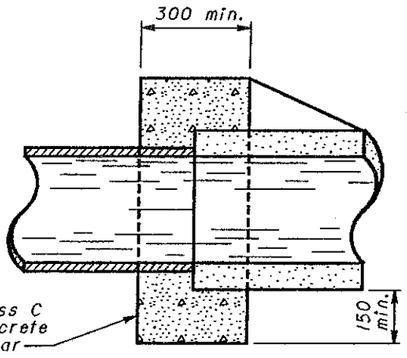
PLAN



PROFILE



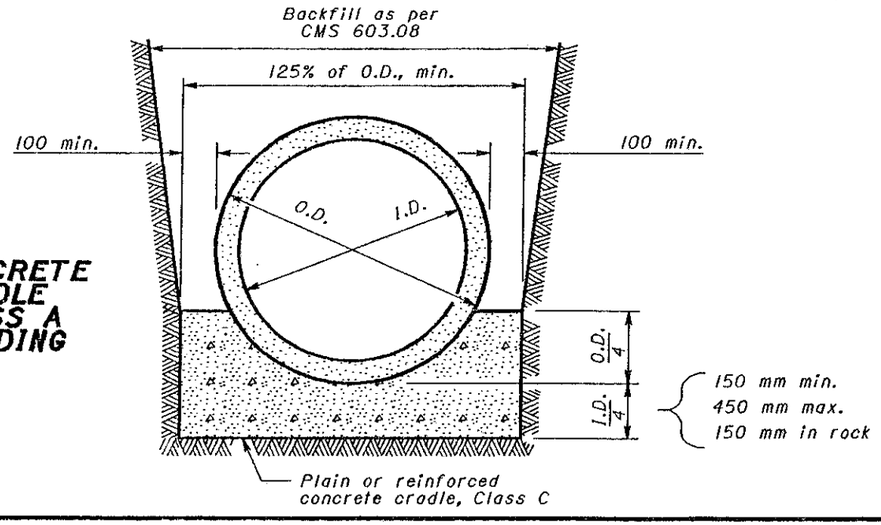
SECTION A-A



MASONRY COLLAR

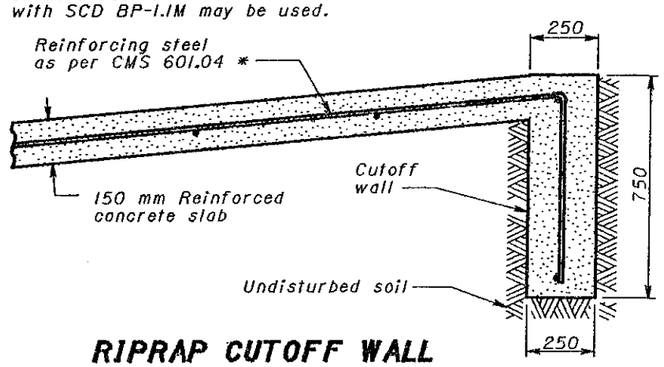
EROSION CONTROL PAD AND ANIMAL GUARD FOR OUTLET PIPE

Conduit Size (mm)	100	150	200	250	300	375	450
No. of Bolts	2	3	5	6	7	9	11



CONCRETE CRADLE CLASS A BEDDING

* If wire fabric is used in the slab, #10M bars at 600 mm overlapping the fabric. 300 mm, or wire fabric in accordance with SCD BP-1.1M may be used.



RIPRAP CUTOFF WALL

The cost of the cutoff wall shall be included in the unit price bid for Item 601 Riprap using 150 mm reinforced concrete slab

All dimensions are in millimeters unless otherwise noted.

metric units

This Drawing Replaces MC-4.

OHIO DEPARTMENT OF TRANSPORTATION

OUTLETS, DRAINS AND SEWERS

DATE: 6-30-95, 10-21-97

STANDARD CONSTRUCTION DRAWING **DM-1.1M**

APPROVED Larry F. Sutherland

STRAW OR HAY BALES

BALE PLACEMENT: Bales shall be tightly placed adjacently and entrenched 2" [50] to 3" [75] before staking; or a small amount of loose soil shall be lightly compacted along the upstream edge of the bales.

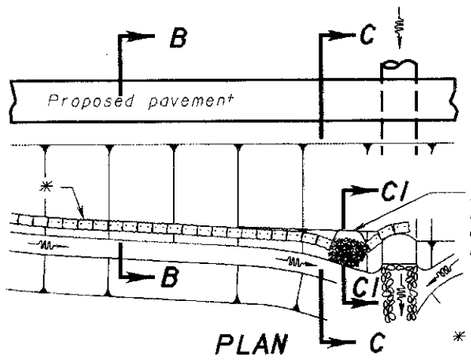
Each bale shall be firmly staked with a minimum of two stakes at least 3' [1 m] in length. Stakes shall be wooden 2"x2" [50x50], reinforcing bars or fence posts.

Loose straw or hay shall be wedged between and under staked bales.

PITS: Sediment pits shall be provided and their cost included in the unit price bid for the adjacent SS 877 items.

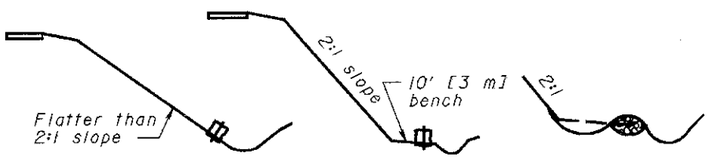
MAINTENANCE: The maintenance or replacement will be paid for by the Department under unit bid prices, agreed unit price, or under 109.04.

BASIS OF PAYMENT: Straw or hay bale installation shall be paid for under **Item 877 - Temporary Perimeter Filter Fabric Fence.** Cost will include placing, staking and removing.



PLAN

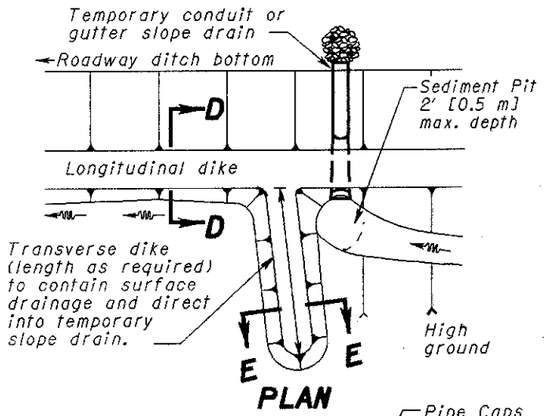
*Use Bales or Temporary Perimeter Filter Fabric Fence constructed per **SCD DM-4.4**



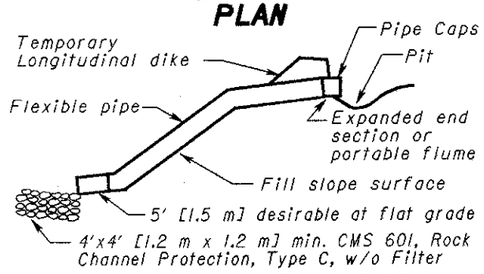
SECTION B-B SECTION C-C SECTION C1-C1

BALE FILTER DIKE

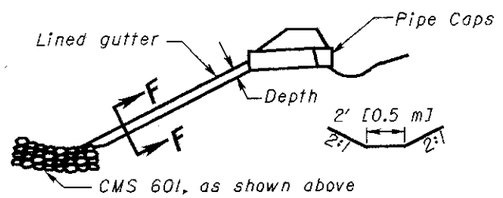
DIKES AND SLOPE PROTECTION



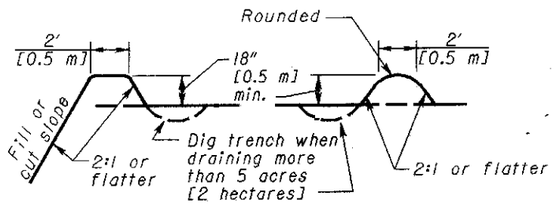
PLAN



CONDUIT SLOPE DRAIN



SECTION F-F
GUTTER SLOPE DRAIN



SECTION D-D SECTION E-E

TEMPORARY SLOPE DRAINS RECOMMENDED SIZES				
Area in acres [hectares]	Pipe Sizes			Gutter depth
	Smooth	Corrugated	Half-round	
0-4 [0-1.6]	6" [150]	6" [150]	18" [450]	8" [200]
4-8 [1.6-3.2]	8" [200]	12" [300]	18" [450]	8" [200]
8-12 [3.2-4.9]	10" [250]	15" [375]	21" [525]	12" [300]

GENERAL: Dikes & drains shown shall be used when earthwork operations on slopes are higher than 8' [2.5 m] and fill operations are suspended for three weeks or more. Smaller dikes used at the end of a day's operation shall be considered as part of the earthwork. Temporary slope drains shall be suitably positioned and anchored to prevent movement or undermining.

LONGITUDINAL DIKES: Longitudinal dikes shall be constructed of suitable material as per CMS 203 and compacted to 85% of maximum density.

CONDUITS: Conduits for slope drains shall be corrugated steel pipe, corrugated or smooth plastic pipe, rubber conduit, or an approved equal.

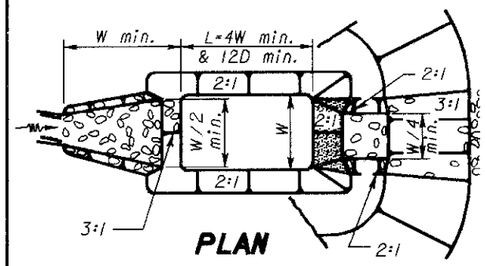
GUTTERS: Gutters for slope drains shall be lined with Type C rock channel protection, crushed aggregate slope protection, portland cement concrete, bituminous concrete, plastic sheeting (on slopes 4:1 max.), partial pipe sections or approved equal.

PITS: Sediment pits shall be provided and their cost included in the unit price bid for the adjacent items.

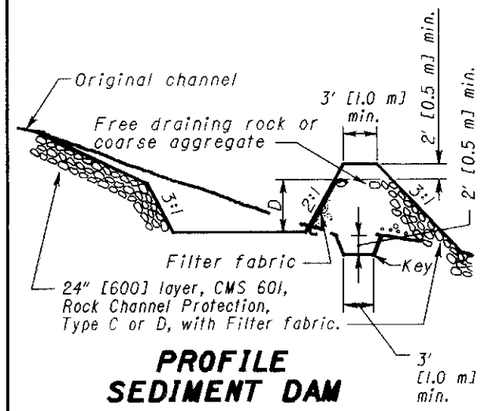
MAINTENANCE: Dikes and slope protection shall be acceptably maintained. The maintenance or replacement cost will be paid for by the Department under unit bid prices, agreed unit prices, or CMS 109.04.

BASIS OF PAYMENT: Temporary dikes shall be paid for under **Item 877-Temporary Dikes.** Temporary slope drains shall be paid for under **Item 877-Temporary Slope Drains.** Rock required shall be paid for under **Item 601, Rock Channel protection, Type C, w/o Filter.**

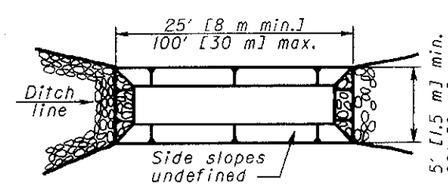
SEDIMENT BASINS & DAMS



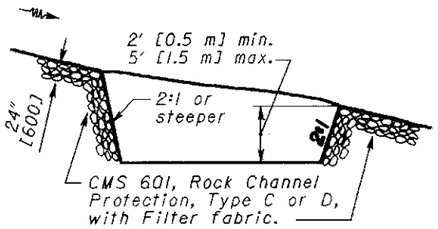
PLAN



PROFILE SEDIMENT DAM



PLAN



PROFILE SEDIMENT BASIN

EMBANKMENT: Sediment basin embankment construction shall be as per CMS 203.

FILTERS: Filter fabric shall be per CMS 601.02 and installed per CMS 601.08 or as detailed here. Such fabrics may be cleaned in lieu of replacement. The cost of all filter fabric required to construct the sediment basin or dam shall be included in the cost of the Item 601, Rock Channel Protection, with Filter Fabric.

SIZE: The volume shown on the plans is the total storage volume required for the sediment basin or dam (67 cubic yards per acre [127 cubic meters per hectare]). A series of smaller basins or dams may be substituted for a larger basin or dam.

MAINTENANCE: Sediment pits, dams and basins shall be acceptably maintained. The maintenance or replacement cost will be paid for by the Department under unit bid prices, agreed unit prices, or CMS 109.04.

BASIS OF PAYMENT: Sediment Dams and Basins shall be paid for under **Item 877-Sediment Basin and Dams.** The pay quantity shall be the actual number of cubic yards [cubic meters] of excavation and embankment required to construct the basin or dam. Rock required shall be paid for under **Item 601, Rock Channel Protection, Type C or D, with Filter.**

THIS DRAWING REPLACES DM-4.3M DATED 6-30-95.

BY	REVISIONS		DATE	OHIO DEPARTMENT OF TRANSPORTATION	
STDS. ENGR. W. EVANS		DESIGN AGENCY	4-29-99	Randy Cunningham	
DRAWN D. FOCKE				ROADWAY DESIGN ENGINEER	

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

DESIGN AGENCY: OFFICE OF PLANNING

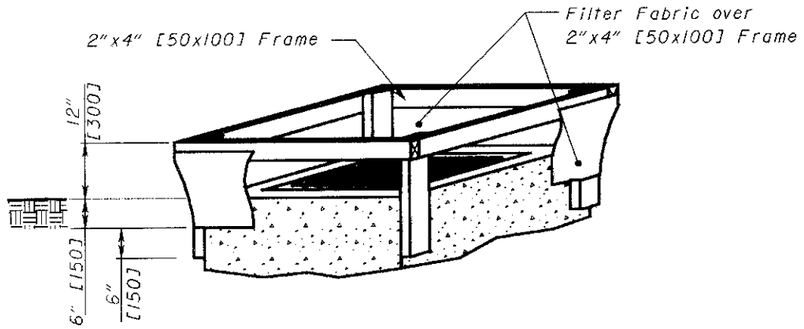
STANDARD ROADWAY CONSTRUCTION DRAWING

TEMPORARY EROSION CONTROL

NUMBER DM-4.3

1 / 1

TEMPORARY INLET PROTECTION FILTER FABRIC FENCE



MATERIALS: Filter Fabric shall meet the requirements of CMS 712.09, Type C. The framing wood shall be construction grade 2"x4" [50x100] lumber.

CONSTRUCTION: Excavate a 6" [150] deep trench around the inlet, then drive the 2"x4" [50x100] posts 6" [150] below the excavated trench. Construct the wooden frame using the overlap joint detail shown above. The filter fabric shall be stretched around the wooden frame and securely fastened. The filter fabric shall overlap across one side of the inlet such that the ends of the filter fabric are not attached to the same post. Backfill and compact the excavated soil. Other devices may be used with the approval of the Director.

MAINTENANCE: The filter fabric shall be maintained to be functional, This shall include removal of trapped sediment and required cleaning, repair, and/or replacement of the filter fabric. The maintenance or replacement cost will be paid for by the Department under unit bid prices, agreed unit prices, or under CMS 109.04.

PAYMENT: The cost of all materials, construction and removal shall be paid for under **Item 877 - Temporary Inlet Protection Filter Fabric Fence, Linear Foot [Meter].**

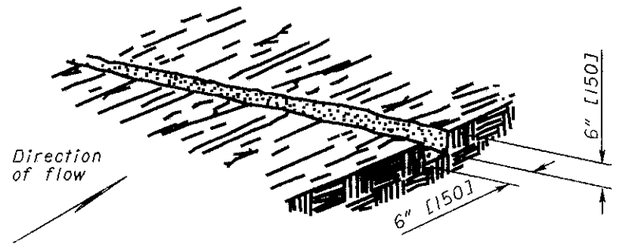
NOTES

MATERIALS: Filter fabric shall meet the requirements of CMS 712.09, Type C. Support stakes shall be a minimum of 1.5"x1.5" [38x38], nominal, and shall be hardwood of sound quality. The stakes shall be driven a minimum of 6" [150] below the bottom of the filter fabric. The maximum spacing between support stakes shall be 10' [3 m].

CONSTRUCTION: The bottom of the fabric shall be buried 6" [150] below the ground. The ends of adjacent sections of fence shall be overlapped with the end stake of each section wrapped together prior to installation. The ground elevation of the fence shall be held constant except that the end elevations shall be raised upslope to prevent flow around the end of the fence.

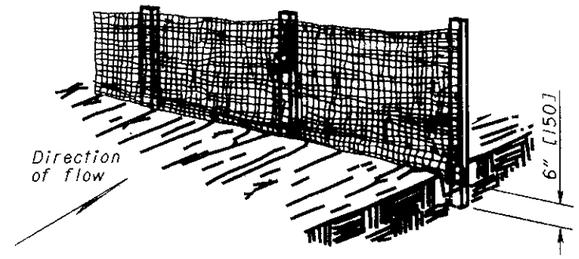
MAINTENANCE: The filter fabric fence shall be maintained to be functional. This shall include removal of trapped sediment and required cleaning, repair, and replacement of the filter fabric. The maintenance or replacement cost will be paid for by the Department under unit bid prices, agreed unit prices, or CMS 109.04.

PAYMENT: The cost of all materials, construction and removal shall be paid for under **Item 877 - Temporary Perimeter Filter Fabric Fence or Temporary Ditch Check Filter Fabric Fence, Linear Foot [Meter].**



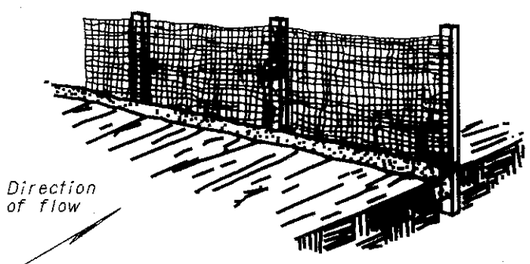
Excavate a 6"x6" [150x150] trench along the proposed fence line.

STEP 1



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

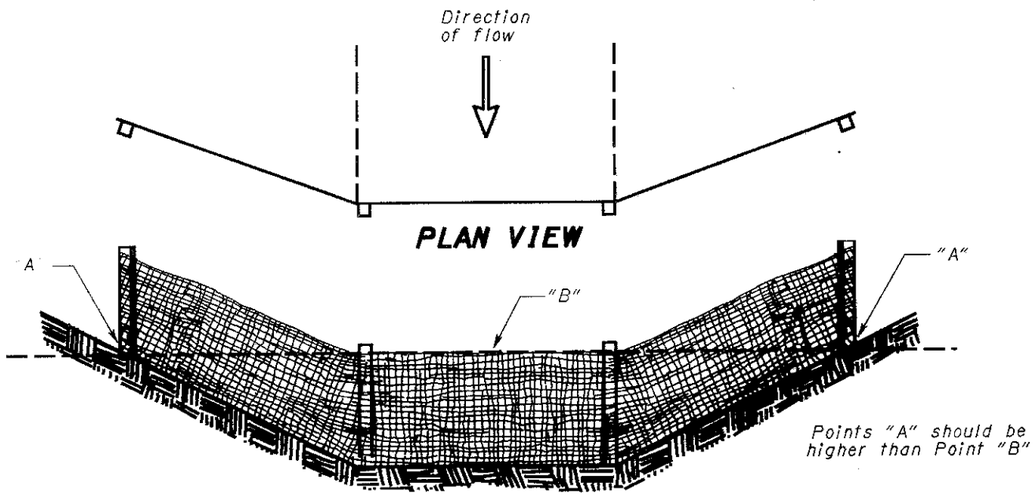
STEP 2



Backfill and compact the excavated soil.

STEP 3

PLACEMENT AND CONSTRUCTION OF PERIMETER FILTER FABRIC FENCE



PLACEMENT AND CONSTRUCTION OF DITCH CHECK FILTER FABRIC FENCE

THIS DRAWING REPLACES DM-4.4M DATED 6-30-95.

OHIO DEPARTMENT OF TRANSPORTATION — DATE 4-29-99
ROADWAY DESIGN ENGINEER

REVISIONS

STDS. ENGR. W. EVANS
DRAWN D. FOCKE

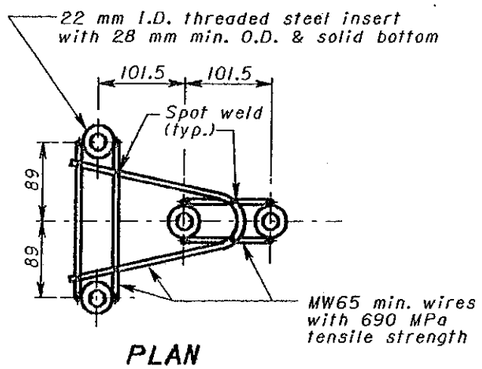
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

DESIGN AGENCY
OFFICE OF PLANNING

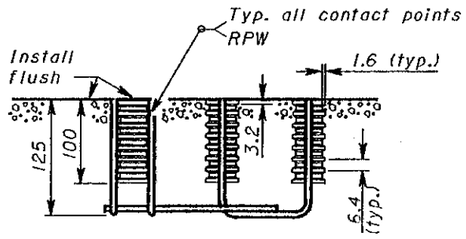
STANDARD ROADWAY CONSTRUCTION DRAWING
TEMPORARY EROSION CONTROL

NUMBER DM-4.4

1 / 1



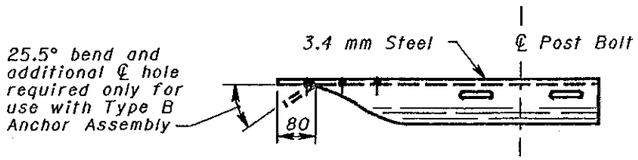
PLAN



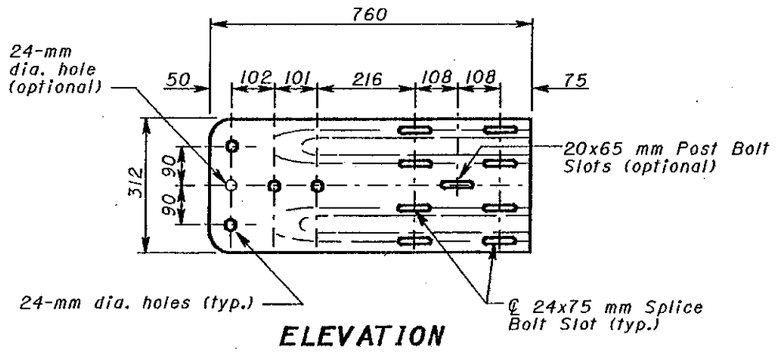
Four 22-mm bolts required

ELEVATION

CONCRETE INSERT ANCHOR ASSEMBLY (W-BEAM ONLY)

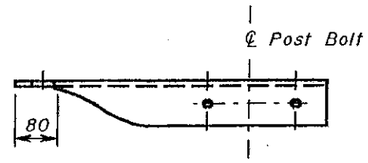


PLAN

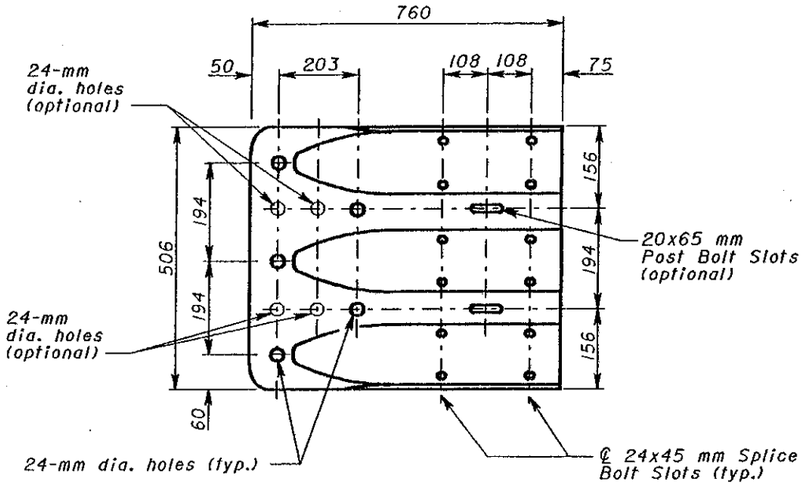


ELEVATION

W-BEAM TERMINAL CONNECTOR

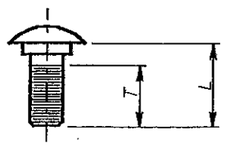


PLAN



ELEVATION

THRIE-BEAM TERMINAL CONNECTOR



L (mm)	T min. (mm)	Bolt Use
455 (Standard Rail)	85	Type 5: WP/WB, PB
660 (Barrier Rail)		
255	60	Type 4: WP Type 5: SP/WB, PB
50	35	Type 4: SP
32	Full	Splice Bolt

WP- wood post WB- wood blockout
SP- steel post PB- plastic blockout
Longer bolt may be needed for round WP larger than 200 mm dia.

BUTTON HEAD BOLT

(For post and splice bolts)

NOTE

Refer to AASHTO M 180 for dimensional details of W-Beam and Thrie-Beam rail elements, related buffer and end sections, beam splices, post and splice bolts and nuts, and Type 1 W-Beam to Thrie-Beam Transition section.

All dimensions are in millimeters unless otherwise noted.

metric units

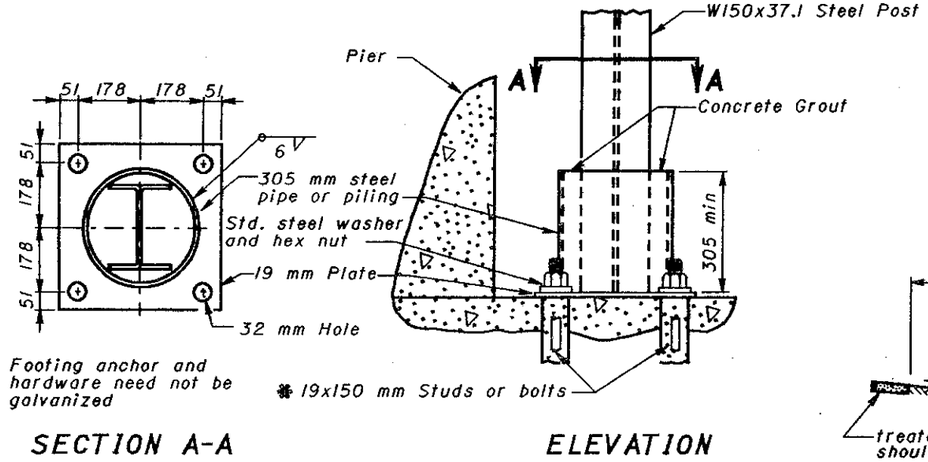
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL DETAILS

DATE
11-30-94
10-21-97

STANDARD CONSTRUCTION DRAWING GR-1.1M

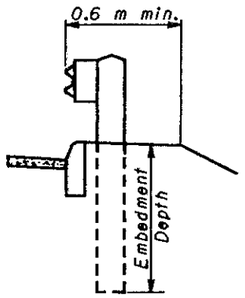
APPROVED Gary F. Sutherland



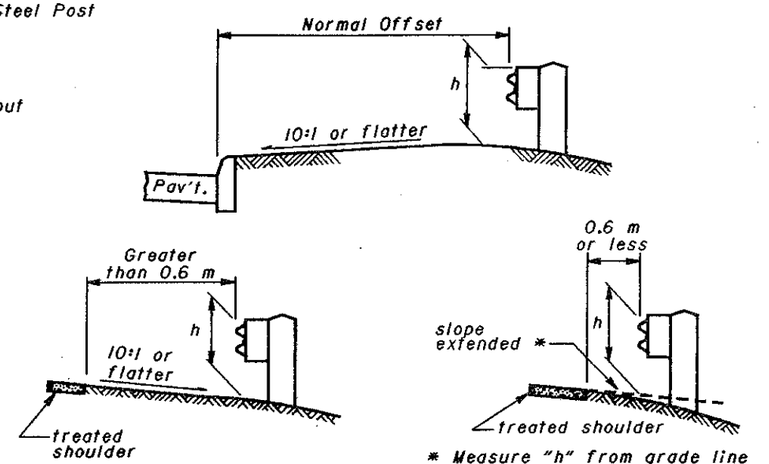
Footing anchor and hardware need not be galvanized

SECTION A-A ELEVATION

FOOTING ANCHOR

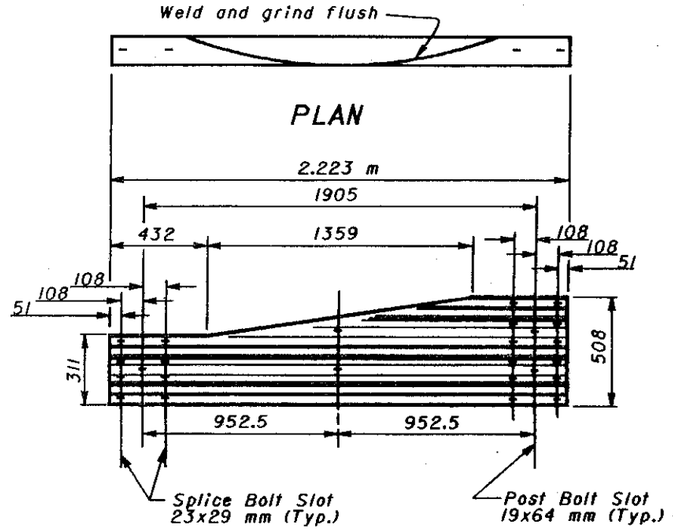


DETAIL A



h = Standard height (Tolerance ±25 mm)

MEASURING GUARDRAIL HEIGHT



ELEVATION

TYPE 2 TRANSITION SECTION *

(W-Beam to Thrie-Beam)

* For details of Type 1 Transition Section, refer to AASHTO M 180, Figure 4.

NOTES

BEAM RAIL ELEMENTS: Elements shall be 3.81 m effective length, unless otherwise specified, with 19x64 mm post bolt slots on 1.905 m centers regardless of post spacing. Field punching or drilling of bolt holes or slots for irregularly spaced posts shall be according to CMS 606.05.

BEAM RAIL SPLICE between two rail elements or between a rail and terminal connector shall be lapped in the direction of traffic. The buffer or flared end sections shall lap on the traffic face. A 305 mm length of beam rail (Back-up Plate), with a 19 mm diameter bolt hole or a 19x64 mm slot, shall be provided at steel posts not having a rail splice.

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

PROTECTIVE COATING: In lieu of the requirements of CMS 710.06, expansion shields, anchors and insert anchor assemblies installed (embedded) in concrete shall be coated in accordance with ASTM A 153 or be of stainless steel. Any bolts screwed into these embedded devices shall meet CMS 710.06.

SPECIAL POST MOUNTINGS:

Posts located over a drainage inlet or structure shall be encased or anchored per the details shown on Standard Construction Drawing GR-2.2M.

Posts located over a footing with a cover of less than 0.75 m shall be installed with a footing anchor as detailed hereon. (A plate, as detailed on Section B-B of Standard Construction Drawing GR-2.2M, may be used as an alternate attachment method.) Where the cover is between 0.75 m and 1.04 m, the footing anchor may be omitted and the post encased instead with 100 mm (min.) of concrete.

Posts located over a culvert with less than 1.3 m of cover shall not be driven, but shall be set in drilled or dug holes. Where the available post embedment depth is less than 1.04 m, the post shall be encased with 100 mm (min.) of concrete.

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

*** ANCHORS:** Holes and grouting shall comply with CMS 510. Either cement or nonshrink, nonmetallic grout may be used.

Expansion shield anchors conforming to CMS 712.01 may be substituted except where concrete deterioration has occurred, as determined by the Engineer. The same bolt diameter specified shall be required. Where self-drilling anchors are used, the holes shall be drilled with the expansion shield (not by a drill bit) and the shield installed flush with the concrete surface.

All dimensions are in millimeters unless otherwise noted.

metric units

This Drawing Replaces GR-1.2.

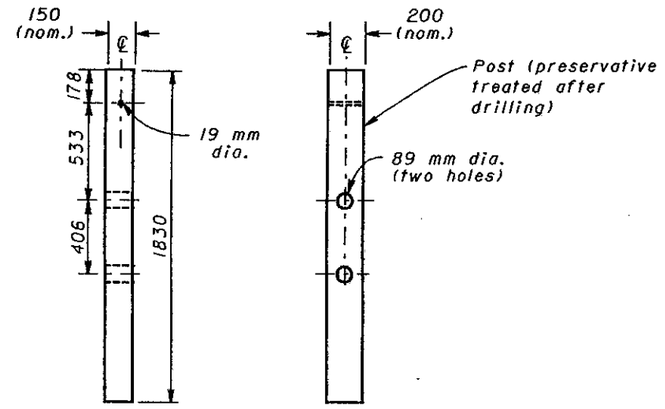
OFFICE OF ROADWAY ENGINEERING
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL DETAILS

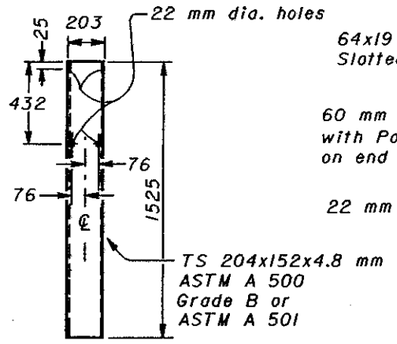
DATE 1-3-96

STANDARD CONSTRUCTION DRAWING **GR-1.2M**

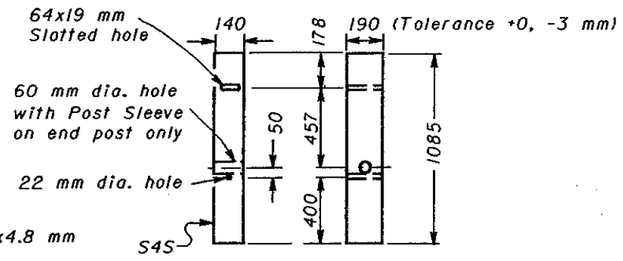
APPROVED R.K. Huelman, P.E.
ADMINISTRATOR



TYPE 1 BREAKAWAY POST



STEEL TUBE



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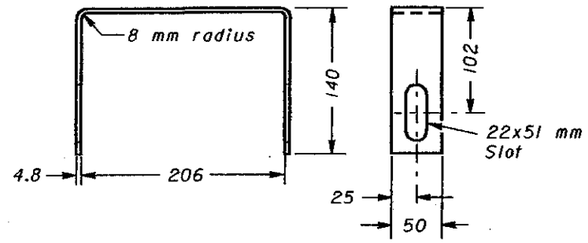
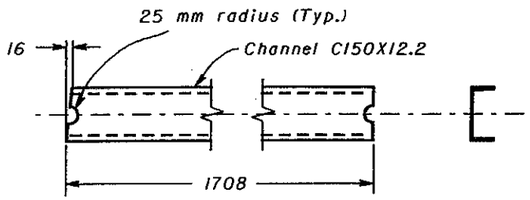
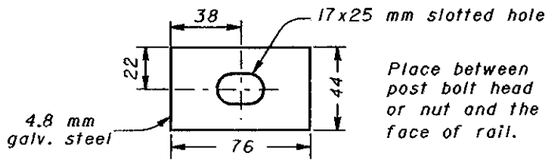


YOKE DETAILS

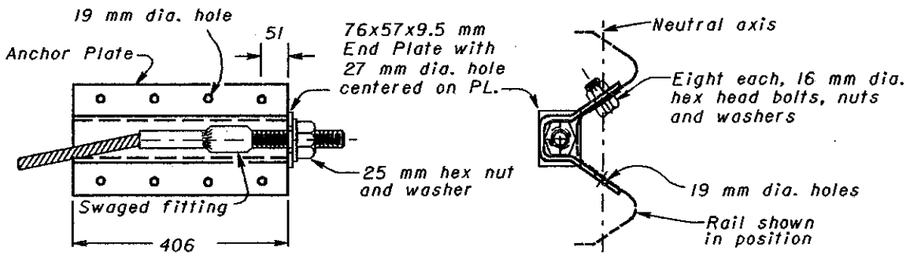


STRUT DETAILS

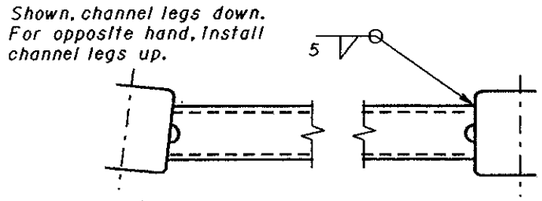


RECTANGULAR WASHER

(Not to be used in typical Type 4, 5 or 5A guardrail installations. Use only where specified.)



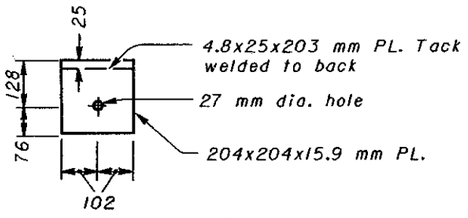
ANCHOR PLATE ASSEMBLY DETAILS



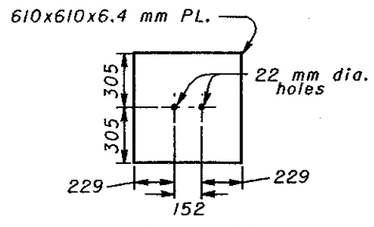
STRUT AND YOKE ASSEMBLY

All dimensions are in millimeters unless otherwise noted.

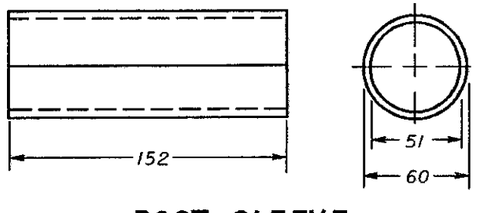
metric units



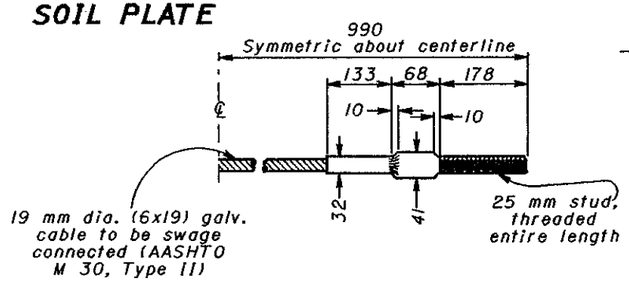
BEARING PLATE



SOIL PLATE

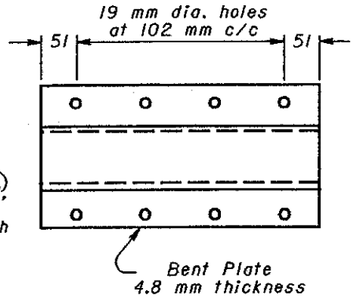


POST SLEEVE

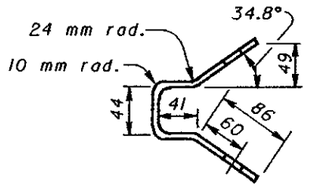


STANDARD SWAGED FITTING AND STUD

CABLE ASSEMBLY



ANCHOR PLATE



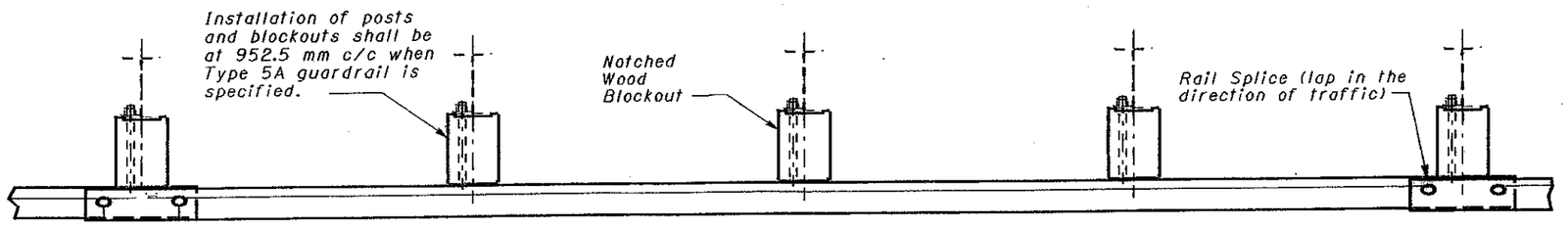
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL DETAILS

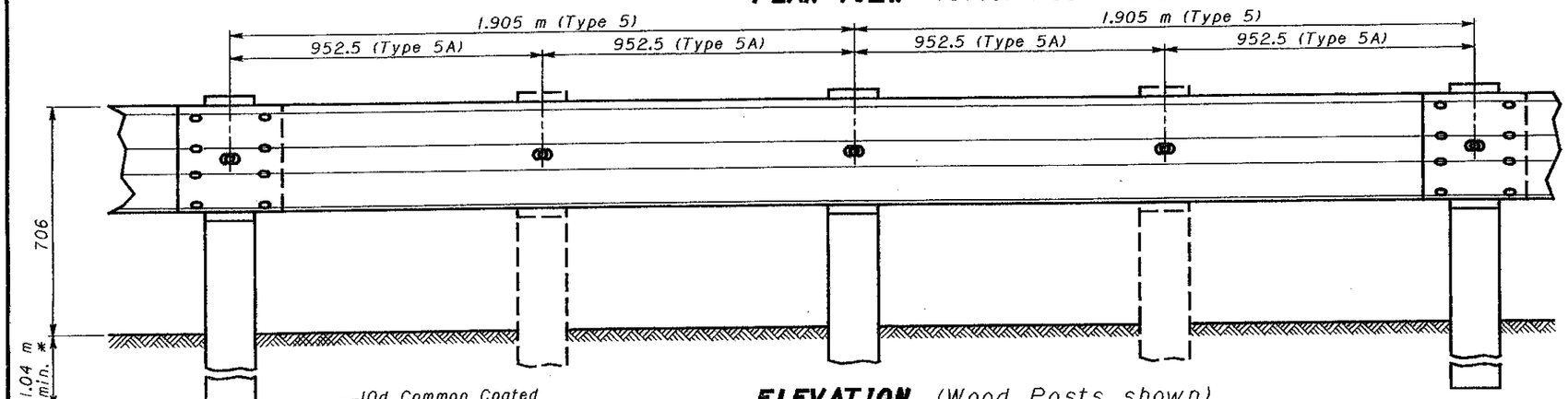
DATE 11-30-94

STANDARD CONSTRUCTION DRAWING **GR-1.3M**

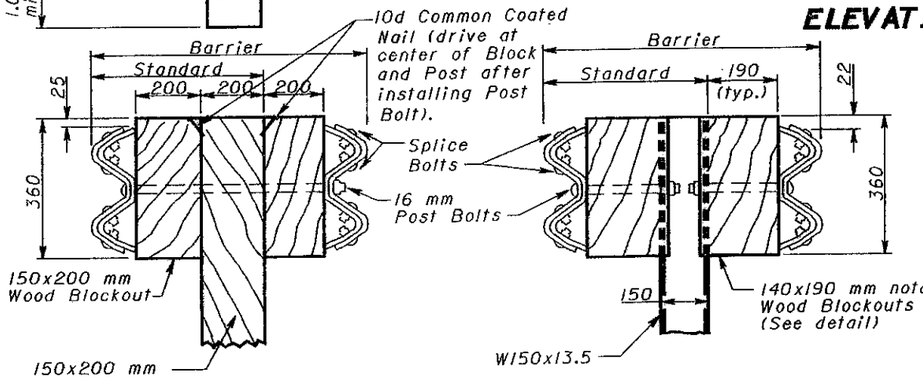
APPROVED R. K. Huhman
ENGR., L & D



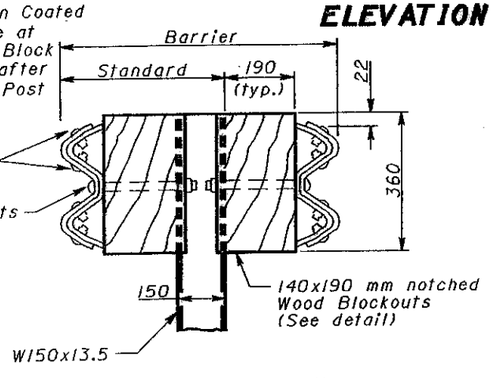
PLAN VIEW (Steel Posts shown)



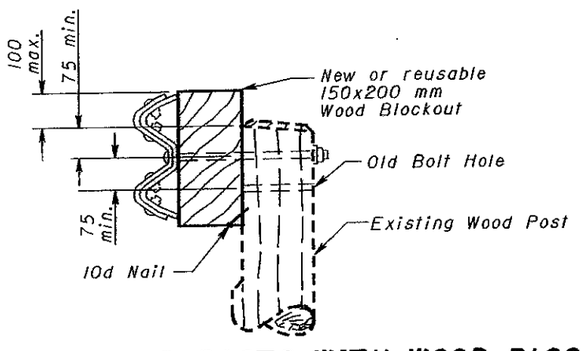
ELEVATION (Wood Posts shown)



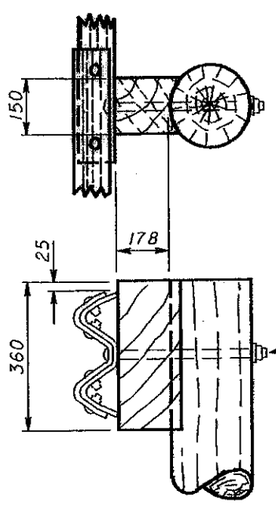
SQUARE WOOD POST



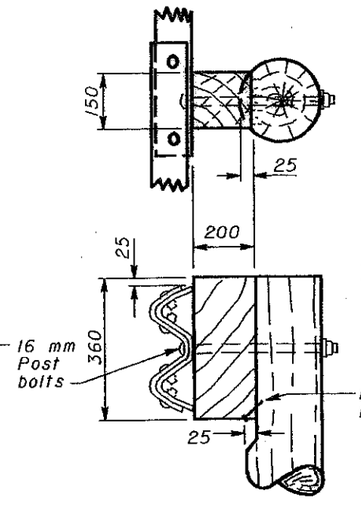
STEEL POST



WOOD POSTS WITH WOOD BLOCK RAISING EXISTING GUARDRAIL HEIGHT



METHOD 1



METHOD 2

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

ROUND WOOD POSTS

All dimensions are in millimeters unless otherwise noted.

metric units

NOTES

POSTS: Posts may be round (standard single rail only) or 150x200 mm square-sawed pressure-treated wood or W150x13.5 galvanized steel. The same type post shall be used throughout the length of the project unless otherwise required by the plans or permitted by the Engineer. Round posts shall be 200 mm ± 25 mm in diameter at the top and not more than 75 mm larger at the butt with a uniform taper. Post may be set in drilled holes or may be driven to grade.

Wood posts shall be fabricated with square ends. Posts and blockouts shall be pressure-treated per CMS 710.14. Bolt holes shall be bored and the tops of posts shall be trimmed as shown, if required, after posts are set.

ALTERNATE BLOCKOUTS: Approved plastic blockouts may be used in lieu of the wood blockouts shown. The approved list is maintained by the Office of Materials Management.

WASHERS: Standard galvanized steel washers of the appropriate size shall be installed on the nut side of bolts through wood posts.

WELDED BEAMS: Welded beam guardrail posts may be used for Item 606, Guardrail, provided the web and flange sizes are as shown hereon. Welding of the web to the flanges shall conform to ASTM A 769M, Class I using Grade 36 steel (250 MPa yield point) with the following exceptions:

Sec. 7.2 Test reports of tensile properties for each lot shall accompany each shipment.

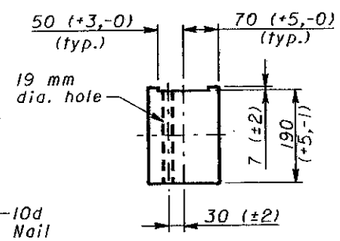
Sec. 12 Beams that have imperfections repaired by welding shall not be accepted for use in Item 606.

Sec. 13 Random samples shall be tested by the Department from materials delivered to the project site or other locations designated by the Laboratory.

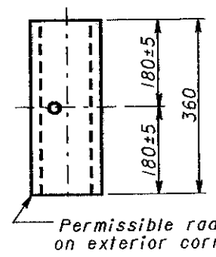
* **POST EMBEDMENT DEPTH:** For specific depth requirements, see SCD GR-1.2M.

STEEL BEAM POSTS				
Size	Beam depth	Flange width	Flange thickness	Web thickness
Rolled W150x12.6	148 mm	100 mm	4.9 mm	4.3 mm
Rolled W150x13.5	150 mm	100 mm	5.5 mm	4.3 mm
Welded 150x12.6	152 mm	100 mm	4.9 mm	4.3 mm
Welded 150x13.5	152 mm	100 mm	5.5 mm	4.3 mm

MISCELLANEOUS: For details not shown see SCD's GR-1.1M and GR-1.2M.



PLAN



ELEVATION

NOTCHED BLOCKOUTS FOR STEEL POSTS

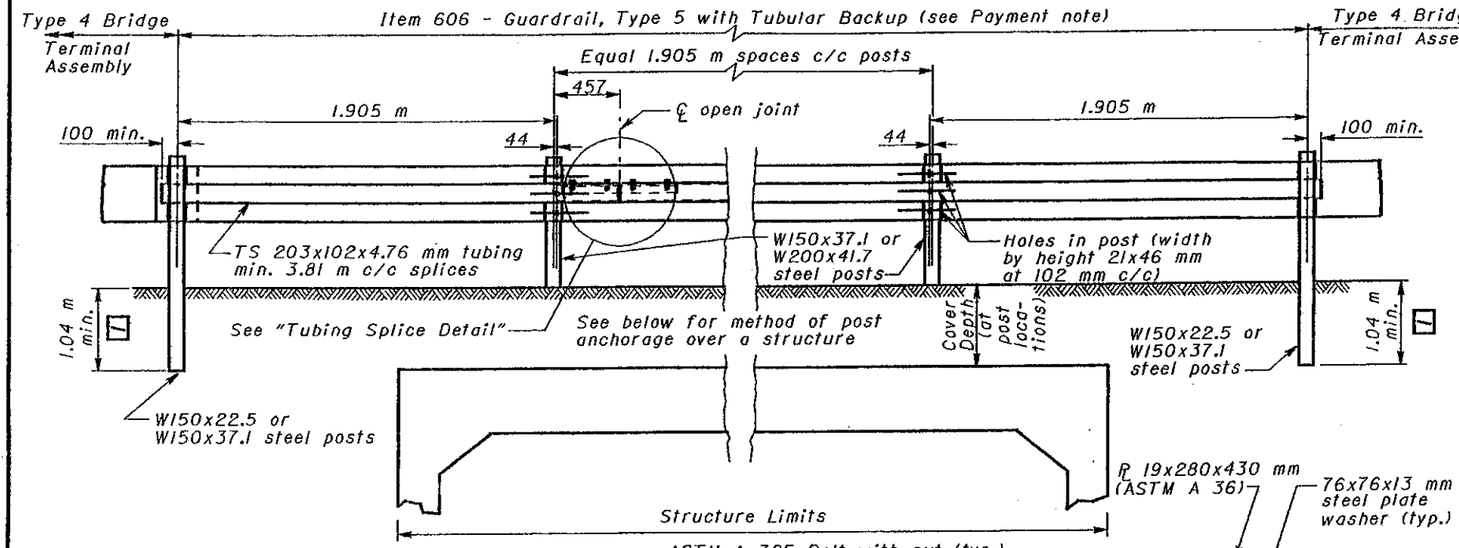
OHIO DEPARTMENT OF TRANSPORTATION

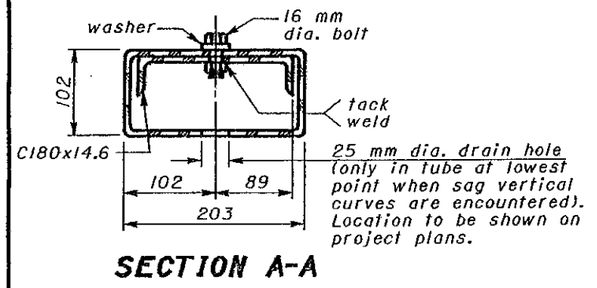
GUARDRAIL TYPE 5 & 5A

DATE
11-30-94
10-21-97
4-14-98

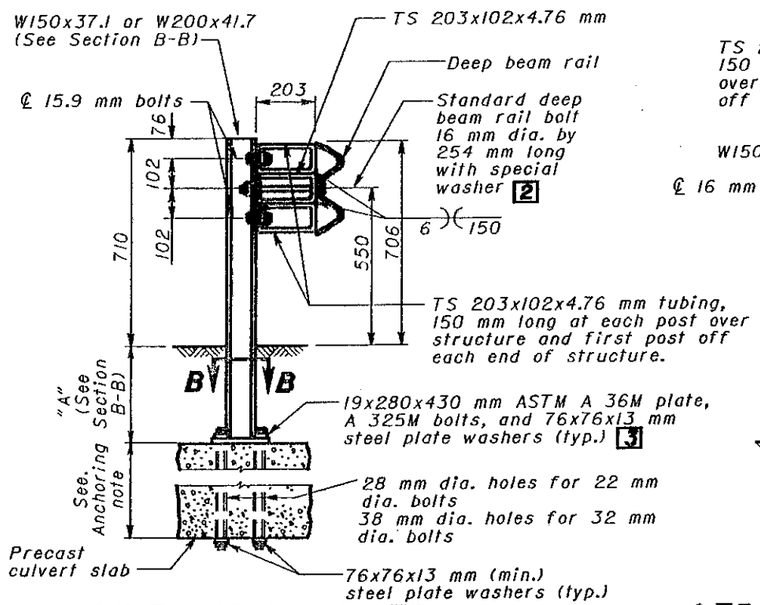
STANDARD CONSTRUCTION DRAWING **GR-2.1M**

APPROVED Larry F. Sutherland

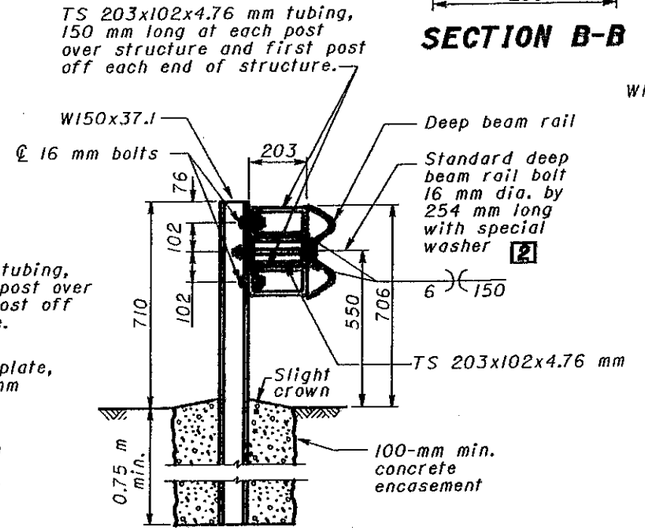




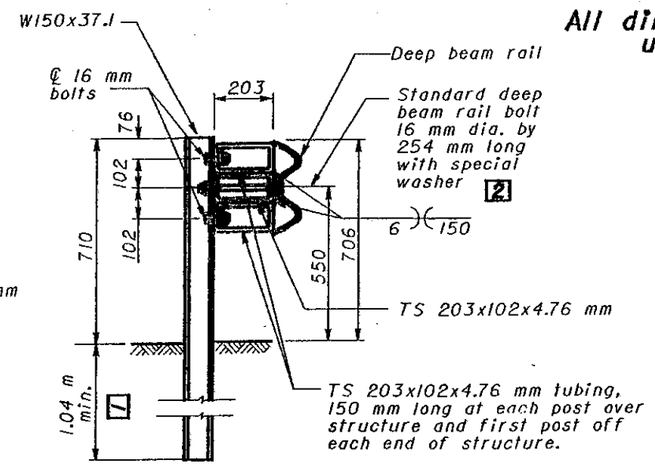
SECTION A-A



COVER DEPTH < 0.75 m



0.75 m ≤ COVER DEPTH < 1.04 m



COVER DEPTH ≥ 1.04 m

NOTES

PAYMENT: Item 606, Guardrail, Type 5 with Tubular Backup shall be in Meters for the length specified in the plans and shall include tubular backup as per Item 707.10, rails, posts and all other hardware, materials and labor required to construct the guardrail as shown. The specified lengths should be for full panels, i.e. evenly divisible by 3.81 m.

GALVANIZING: Rails, posts, baseplates, bolts, nuts, washers and tubular backup shall be galvanized as per Item 711.02.

ANCHORING: Partial-depth anchoring is preferred to through-bolting.

Partial depth anchoring shall use nonshrink, non-metallic grout per 705.20. Minimum embedment depths shall be 230 mm for 22 mm bolts and 250 mm for 32 mm bolts.

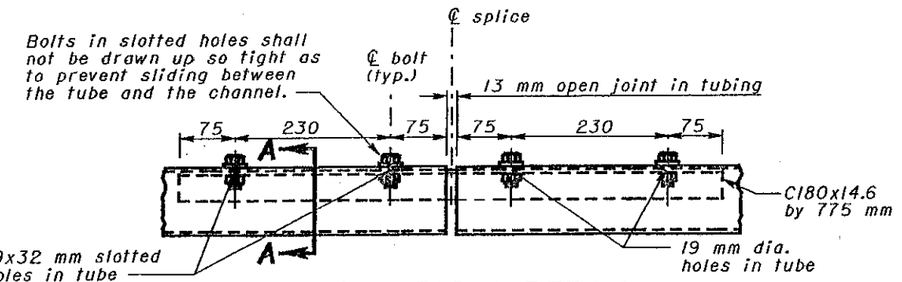
Through-bolting: Drilling methods that cause spalling of the concrete where the bit passes through the underside of the slab shall not be permitted. In haunches 6:1 or flatter, beveled plate washers shall be used on the bottom surface to compensate for the slope. Through-bolting shall not be permitted in haunch areas with a slope greater than 6:1.

SIDE-MOUNTED POST ANCHORAGES TO STRUCTURES: Anchorages shall be installed according to the Office of Structural Engineering's Standard Drawing DBR-2-73M and shall be paid for under Item 517, Railing.

[1] **FOR DETAILS NOT SHOWN:** See SCD's GR-1.1M and GR-1.2M. See GR-1.2M regarding post embedment depth.

[2] For details of special washer, see AASHTO M 180.

[3] Embed plate in sealant as per Federal Specification TT-S-00230C, Type II.



TUBING SPLICE DETAIL

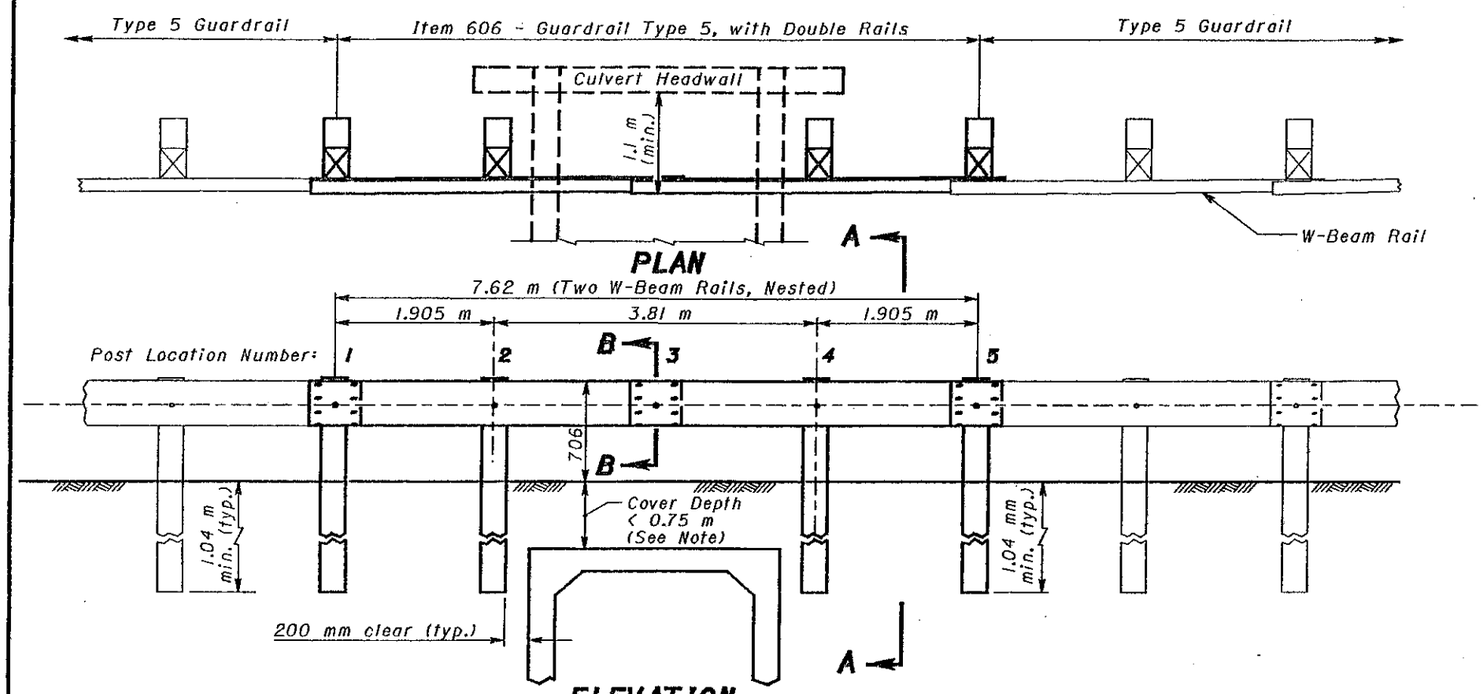
All dimensions are in millimeters unless otherwise noted.

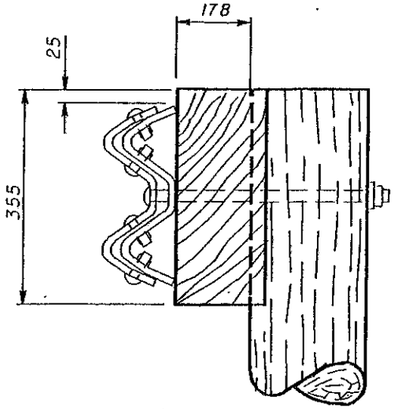
metric units

This Drawing Replaces GR-2.2.

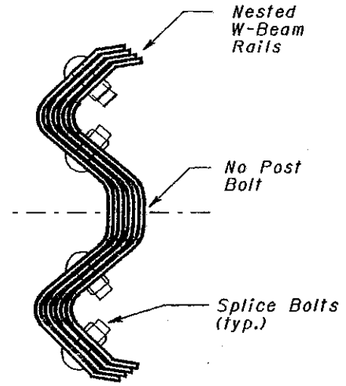
OHIO DEPARTMENT OF TRANSPORTATION

GUARDRAIL TYPE 5 WITH TUBULAR BACKUP	DATE 1-3-96 10-21-97
STANDARD CONSTRUCTION DRAWING GR-2.2M	
APPROVED Gayle F. Sutherland	

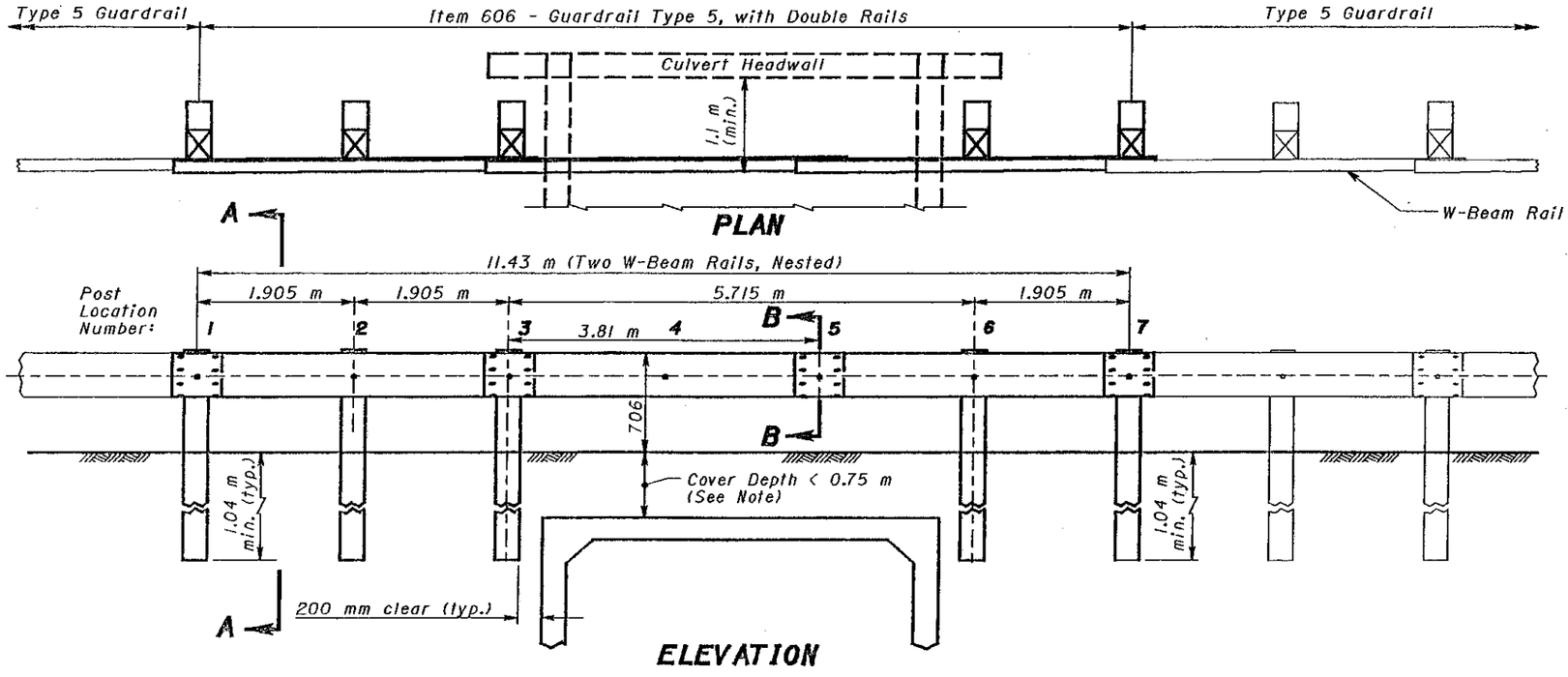




SECTION A-A



RAIL SPLICE
SECTION B-B



NOTES

3.81 METER SPAN: The post to be eliminated must be at a rail splice location, as shown at Post Location 3. If conditions are such that the post to be eliminated would occur at a non-splice location, then the 5.715 m span design should be used, eliminating the post at Location 4.

5.715 METER SPAN: The posts to be eliminated may be at Post Locations 4 and 5 (as shown) or at Post Locations 3 and 4.

COVER DEPTH: This depth is measured at the locations of the missing posts. For cover depths greater than or equal to 0.75 m, see SCD GR-1.2M.

MATERIALS: All posts, blockouts, rails, and hardware shall comply with Item 606, Guardrail Type 5 as detailed on SCD GR-2.1M.

DETAILS: For other details not shown, see SCD's GR-1.1M, GR-1.2M and GR-2.1M.

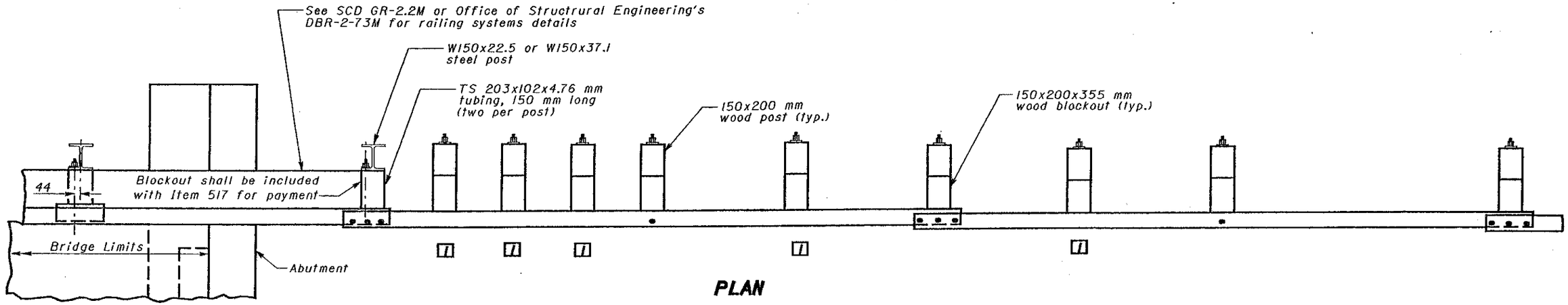
PAYMENT: Item 606, Guardrail, Type 5 with Double Rails shall be in meters for the length specified in the plans and shall include the double rail elements, posts, and the other hardware, materials and labor required to construct the guardrail as shown.

All dimensions are in millimeters unless otherwise noted.

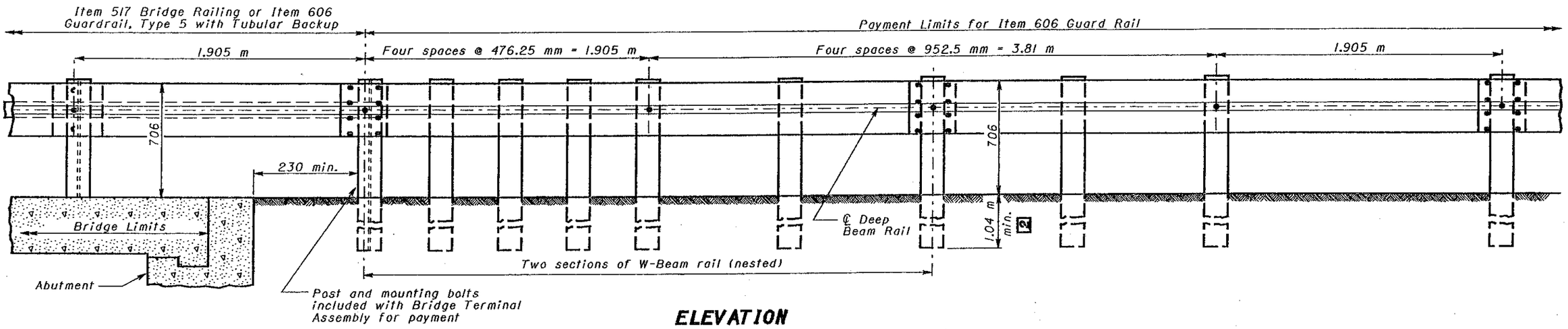
metric units

OHIO DEPARTMENT OF TRANSPORTATION

LONG SPAN GUARDRAIL ACROSS CULVERT	DATE: 4-8-97, 10-21-97
STANDARD CONSTRUCTION DRAWING: GR-2.4M	
APPROVED: Gary F. Sutherland	



PLAN



ELEVATION

All dimensions are in millimeters unless otherwise noted.

[1] Guardrail not attached to posts. Blockout fastened to post with standard post bolt.

[2] See SCD GR-1.2M for additional post embedment details.

NOTES

GENERAL: For additional details, see SCD's GR-1.1M, GR-1.2M and other Drawings pertaining to the design of specific guardrail types.

APPLICATION: The Type 4 Bridge Terminal Assembly shall be used to connect guardrail runs to bridges having W-Beam railing with Tubular Backup.

DETAIL INFORMATION: The first post off the bridge shall be steel (W150x22.5 or W150x37.1). All holes in the off-structure end of the approach panel W-Beam rail section that spans the abutment shall be slotted 19x64 mm and the bolts shall be tightened as specified for expansion joints in Item 606.05.

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

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

Steel Posts and Blockouts for Type 4 Bridge Terminal Assemblies may be furnished as an alternate. The steel alternate for the 150 mm by 200 mm wood posts and blockouts shall be W150x13.5.

PAYMENT: Payment for Item 606 - Each, Bridge Terminal Assembly, Type 4, shall include the extra cost, in excess of normal guardrail costs, for additional posts and other hardware. The TS 203x102 mm spacers and tubular back-up rail extending to the first post off the bridge shall be included with Item 517 - Railing, or Item 606 - Guardrail, Type 5, with Tubular Backup, for payment.

metric units

This Drawing Replaces GR-3.4.

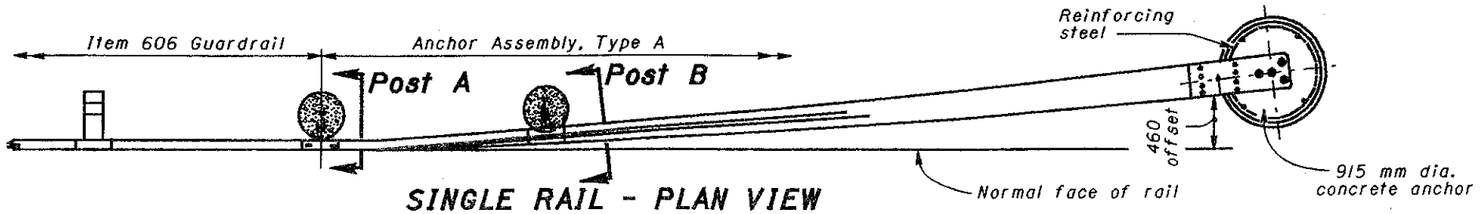
OHIO DEPARTMENT OF TRANSPORTATION

BRIDGE TERMINAL ASSEMBLY, TYPE 4

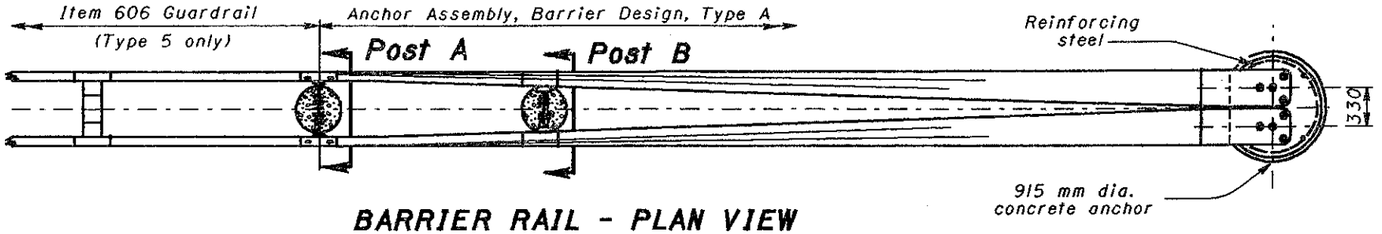
DATE
1-3-96
10-21-97

STANDARD CONSTRUCTION DRAWING **GR-3.4M**

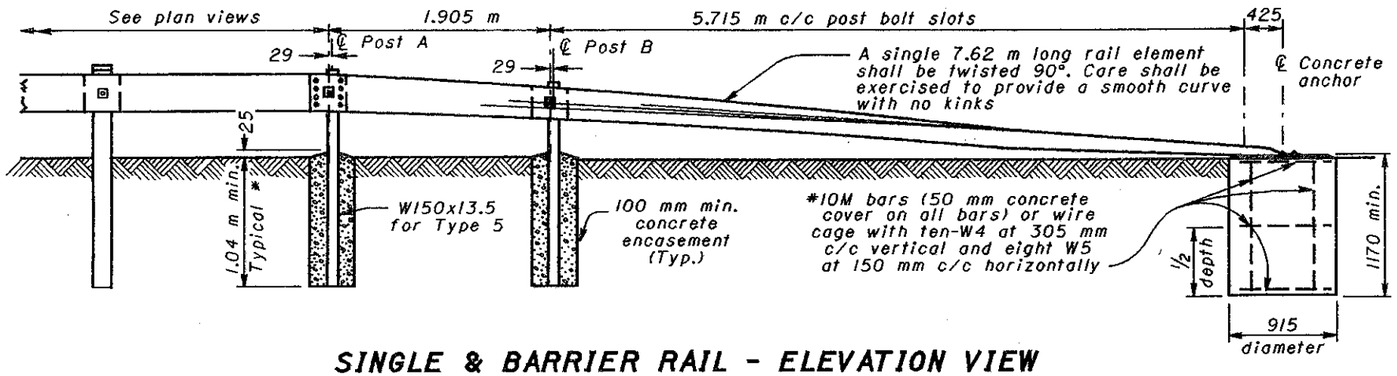
APPROVED Gary F. Sutherland



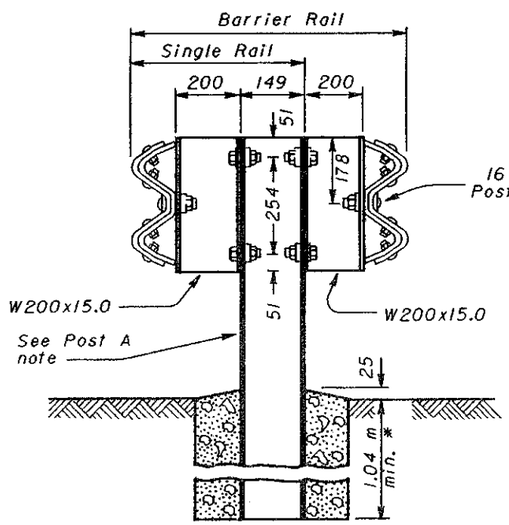
SINGLE RAIL - PLAN VIEW



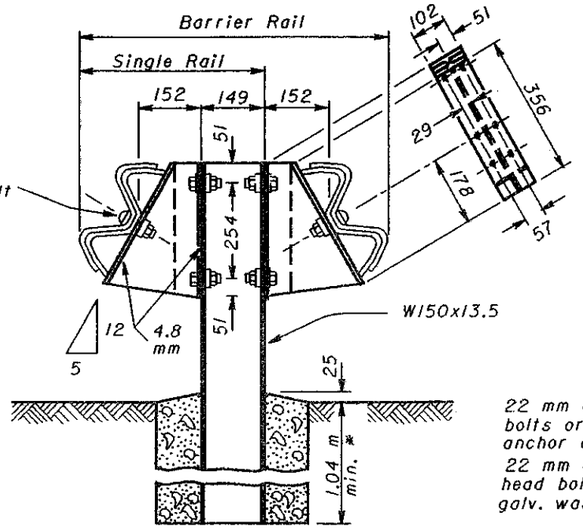
BARRIER RAIL - PLAN VIEW



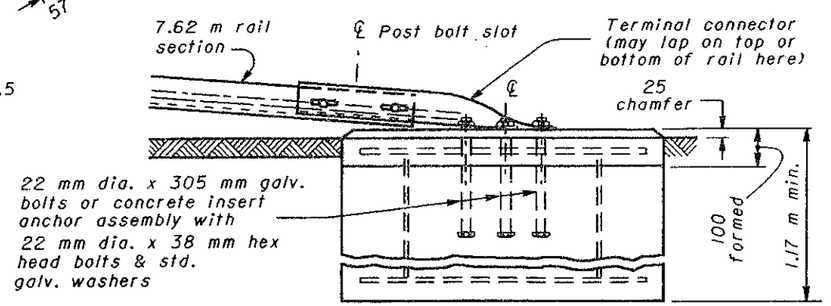
SINGLE & BARRIER RAIL - ELEVATION VIEW



POST A



POST B



CONCRETE ANCHOR

NOTES

GENERAL: For details not shown, see Std. Constr. Dwgs. GR-1.1M, GR-1.2M and other Drawings pertaining to specific guardrail type. All steel parts shall be galvanized.

The 460 mm flare offset from normal face of rail, shown in the plan view (for single rail installations), will be utilized only where shoulder width is insufficient for providing standard offsets.

SPACERS: Post B spacers shall be made of 4.8 mm steel plate as per CMS 710.15 or two sections of W150x13.5 or W200x15.0 cut in the web (see dashed line) and welded together on both sides.

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

Spacers shall be fastened to their posts with two 16 mm hexhead bolts and nuts with standard washers on both sides.

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

CONCRETE ANCHOR: Form top 100 mm of anchor and slope the top to conform to slope of the adjacent ground. The 915 mm diameter anchor may be replaced by a 760 mm square anchor at the contractor's option.

POST A: Rail details are shown for Type 5 guardrail. Where anchor assembly is attached to Type 4 guardrail, Post A shall be a standard Type 4 line post set in concrete, and the spacer block shall be omitted. Post bolt shall be 16 mm in diameter.

* **SINGLE RAIL INSTALLATIONS:** See GR-1.2M for additional post embedment details.

All dimensions are in millimeters unless otherwise noted.

metric units

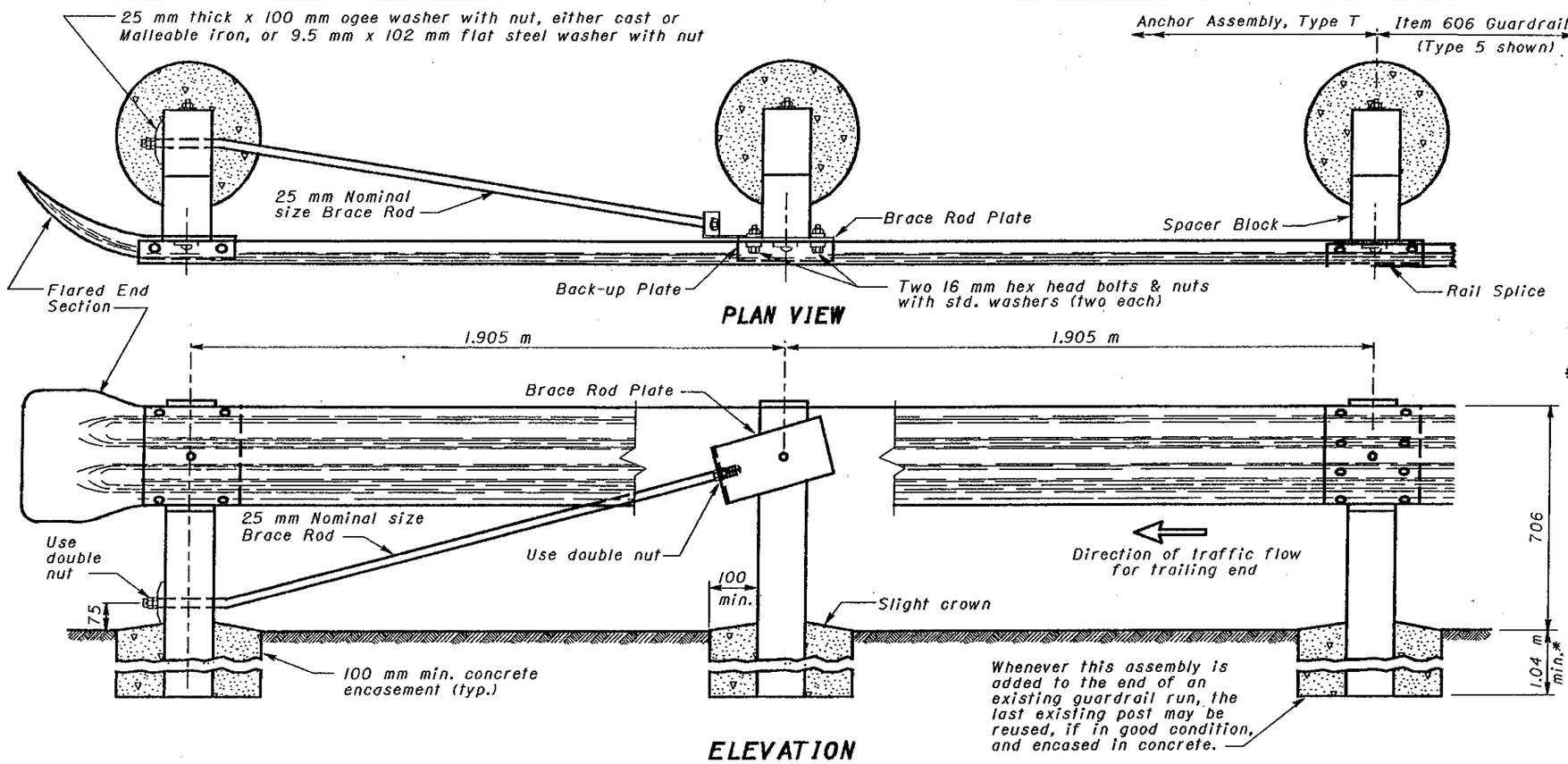
BUREAU OF LOCATION AND DESIGN
OHIO DEPARTMENT OF TRANSPORTATION

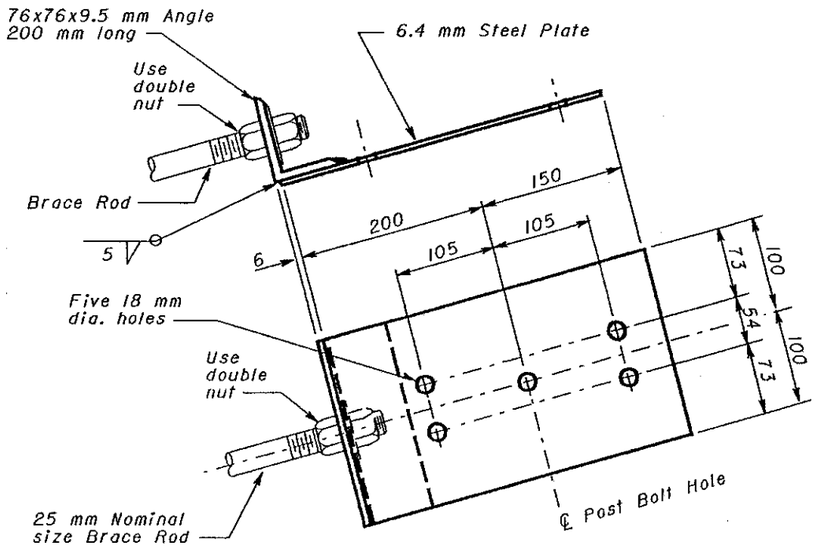
TYPE A ANCHOR ASSEMBLY

DATE 11-30-94

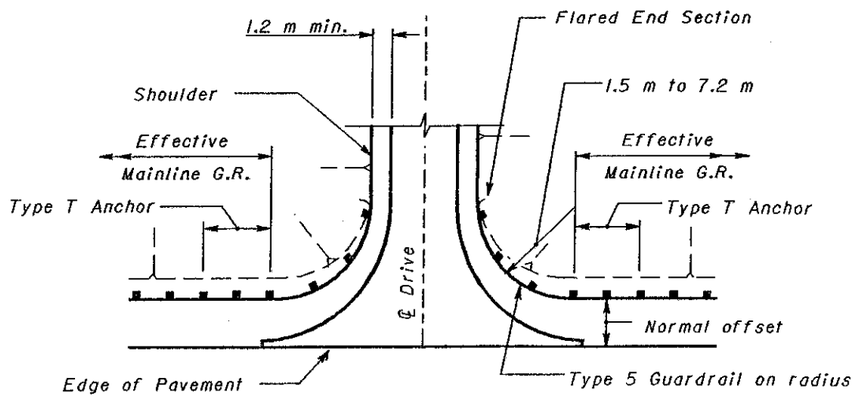
STANDARD CONSTRUCTION DRAWING **GR-4.1M**

APPROVED D.K. Hulman
ENGR., L & D





BRACE ROD PLATE



DRIVEWAY OPENING

NOTES

FOR DETAILS NOT SHOWN: See SCD's GR-1.1M, GR-1.2M and other Drawings pertaining to design of specific guardrail types.

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

POSTS: Posts shall be the same as used on the adjacent guardrail, with 100 mm minimim concrete encasement.

SPACER BLOCKS: Blocks may be notched in the field, in a manner satisfactory to the Engineer, to accommodate the installation of the brace rod plate 16 mm attachment bolts.

BRACE ROD ASSEMBLY: Rods shall be galvanized and develop a tensile strength of at least 178 kN.

* **FOR SPECIFIC POST EMBEDMENT:** See SCD GR-1.2M for depth requirements.

All dimensions are in millimeters unless otherwise noted.

metric units

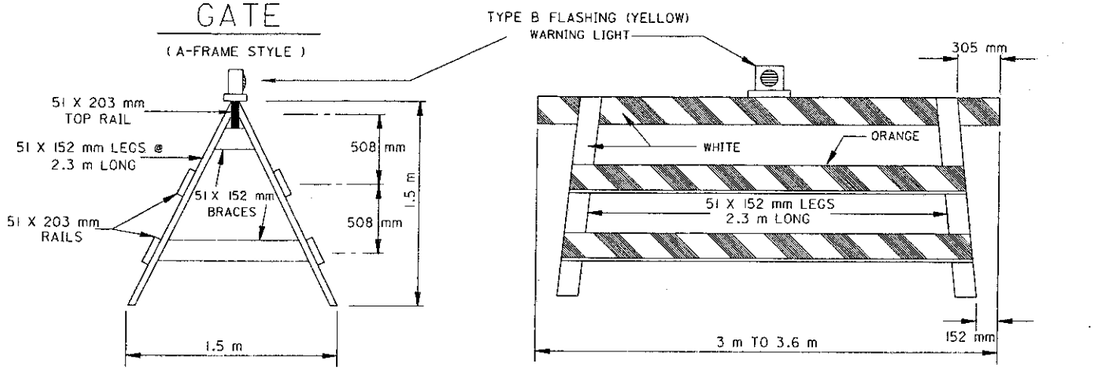
OHIO DEPARTMENT OF TRANSPORTATION

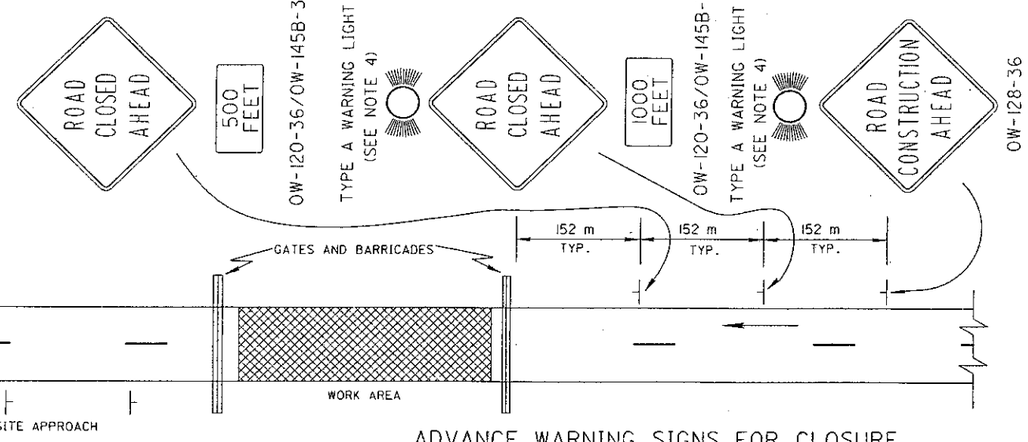
TYPE T ANCHOR ASSEMBLY

DATE
4-21-95
10-21-97

STANDARD CONSTRUCTION DRAWING **GR-4.2M**

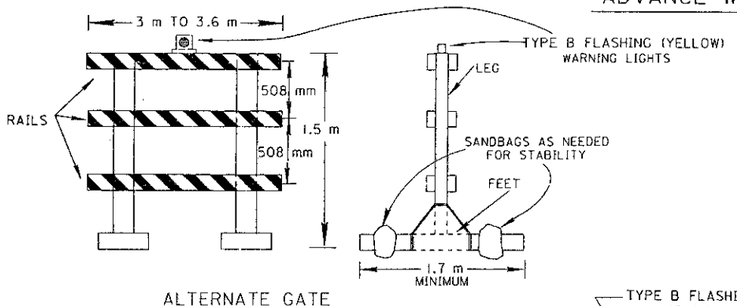
APPROVED Dwight F. Sutherland



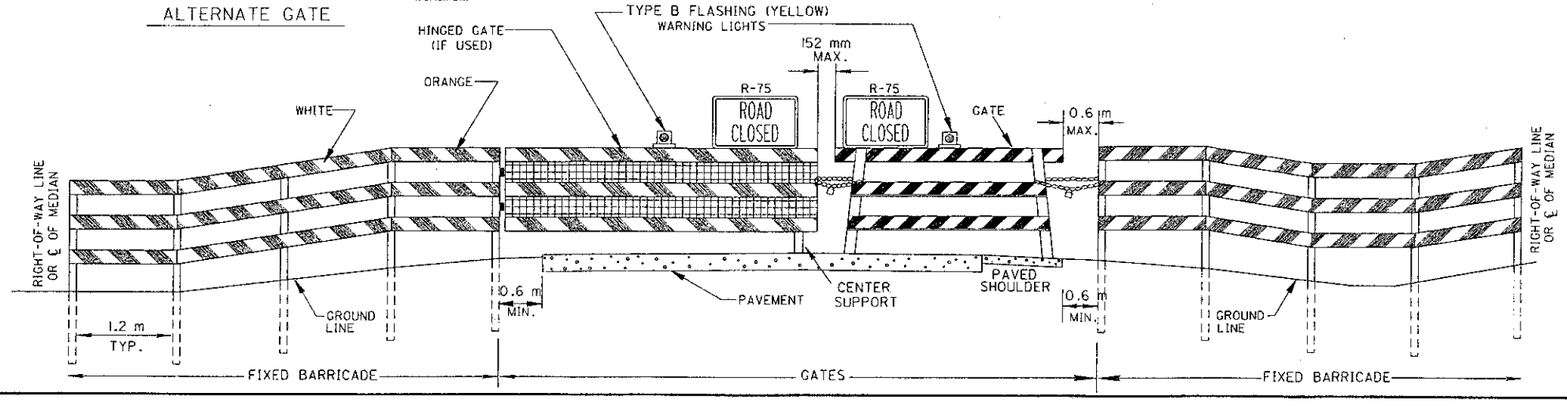


ADVANCE WARNING SIGNS FOR CLOSURE

(SEE NOTE 6)



ALTERNATE GATE



GENERAL NOTES

1. BARRICADES: BARRICADES SHALL BE CONSTRUCTED ACCORDING TO DETAILS SHOWN. WHEN THE ROAD IS CLOSED TO TRAFFIC, BARRICADES AND GATES SHALL BE USED TO EFFECTIVELY CLOSE THE ENTIRE ROADWAY INCLUDING THE MEDIAN OF DIVIDED HIGHWAYS. IN URBAN AREAS AND AT LOCATIONS WHERE IT IS IMPRACTICAL TO EXTEND THE BARRICADE TO THE RIGHT-OF-WAY LINE BECAUSE OF A SIDEWALK WHICH IS TO REMAIN OPEN OR OTHER OBSTRUCTION, THE ENDS OF THE BARRICADE SHALL BE LOCATED AS DIRECTED BY THE ENGINEER TO EFFECT THE DESIRED CLOSING OF THE HIGHWAY.

2. PAINTING AND REFLECTORIZATION: IN CONSTRUCTION OR MAINTENANCE AREAS ALL RAILS OF THE BARRICADES AND GATES SHALL BE REFLECTORIZED WITH ORANGE AND WHITE REFLECTORIZED TYPE G SHEETING IN 152 mm WIDE ALTERNATE STRIPES WHICH SLOPE DOWNWARD TOWARD THE CENTER LINE OF THE ROAD AT AN ANGLE OF 45°. THE TOP RAIL OF THE A-FRAME AND ALL THREE RAILS OF THE HINGED GATE SHALL BE STRIPED ON BOTH SIDES. ALL POST, BRACES, GATE LEGS, AND ANY UNSTRIPED RAILS SHALL BE PAINTED WHITE. (GATES AND BARRICADES USED IN PERMANENT OR SEMIPERMANENT APPLICATION SHALL DIFFER ONLY IN THAT THEY SHALL USE RED AND WHITE STRIPES).

3. GATES: ONE GATE SHALL BE ERECTED FOR EACH TRAFFIC LANE. GATES SHALL BE CHAINED AND PADLOCKED TO ONE ANOTHER AND TO ADJACENT POST OF THE BARRICADES. CHAINS SHALL BE 6.4 mm STOCK OR LARGER WITH WELDED LINKS. A HINGED GATE MAY BE USED AND SHALL BE SUPPORTED AT THE CENTER IN AN APPROVED MANNER.

4. TYPE A FLASHING WARNING LIGHTS:
TYPE A FLASHING WARNING LIGHTS ARE REQUIRED ON THE OW-128 AND THE FIRST OW-120 SIGNS.

5. TYPE B FLASHING WARNING LIGHTS:
EACH GATE SHALL BE EQUIPPED WITH A TYPE B FLASHING WARNING LIGHT, CONSPICUOUSLY VISIBLE AT ALL DISTANCES UP TO 305 m UNDER NORMAL ATMOSPHERIC CONDITIONS. THE LIGHT SHALL BE IN OPERATION AT ALL TIMES DURING THE PERIOD THE HIGHWAY IS CLOSED.

6. SIGNS: WHERE THE ROAD IS CLOSED TO TRAFFIC BY THE ERECTION OF GATES AND BARRICADES, R-75 SIGNS SIGNS SHALL BE MOUNTED ON THE GATES AS SHOWN. THE ADVANCE WARNING SIGNS SHOWN ON THIS DRAWING WILL NOT BE REQUIRED WHEN ALL TRAFFIC HAS BEEN DIRECTED FROM THE ROADWAY AT OR JUST IN ADVANCE OF THE GATES AND BARRICADES SUCH AS ON A LIMITED ACCESS HIGHWAY OR WHEN A TEMPORARY RUNAROUND SIMILAR TO FIGURE C-24 OF THE OHIO MANUAL IS USED. ADVANCE WARNING SIGNS SHALL BE REQUIRED IN ALL OTHER SITUATIONS AND WHEN REQUIRED IN THE PLANS. ADVANCE WARNING SIGNS ON AN APPROACH SHALL CONSIST OF TWO OW-120 SIGNS WITH DISTANCE PLAQUES PLACED ABOUT 152 m AND 305 m FROM THE CLOSURE AND A OW-128 PLACED ABOUT 457 m FROM CLOSURE, THE SIGNS SHALL BE PLACED ON BOTH SIDES OF THE ROAD (DUALLED) FOR 4-LANE DIVIDED HIGHWAYS OR WHEN REQUIRED BY THE PLANS.

7. OPERATION: ON A 2-LANE 2-WAY ROADWAY THE CONTRACTOR WILL NORMALLY OPEN ONLY THE LEFT HAND GATE AS NECESSARY TO ALLOW VEHICLES TO ENTER AND IMMEDIATELY CLOSE IT. BOTH GATES WILL NOT NORMALLY BE OPENED AT THE SAME TIME. THE CONTRACTOR SHALL ASSIGN AN EMPLOYEE TO ASSURE THAT GATES ARE CLOSED AND CHAINED SHUT AT THE END OF EACH WORKDAY.

8. MATERIALS: GATES OR BARRICADES SHALL BE FABRICATED OF THE FOLLOWING MATERIALS:

FIXED BARRICADE:

POST: - 102 X 102 mm SQUARE OR 127 mm DIA. (MAXIMUM) WOOD (MAY BE TREATED)
- NO. 3, DRIVE POST (712.20)
- UP TO 51 mm SQUARE, 14 GAUGE PUNCHED STEEL TUBING

RAILS: - 25 X 203 mm OR 51 X 203 mm COMMON LUMBER
- 203 X (16 TO 25 mm) THICK EXTERIOR PLYWOOD
- EXTRUDED PLASTIC OR FORMED SHEET METAL WITH A 203 mm WIDE SURFACE AND OF SUFFICIENT STIFFNESS TO RESIST TYPICAL WIND LOADS OF UP TO 1436 pascals, BUT HAVING A WEIGHT OF NOT MORE THAN 7.5 kg/m.

FASTENERS: - SPIKES (OF SUFFICIENT LENGTH TO CLINCH)
- SCREWS/BOLTS (8 mm MIN. DIA.) METAL GUSSETT PLATES AND FORMED OR WELDED METAL JOINTS OF SUFFICIENT SIZE AND QUANTITY TO RESIST THE WIND LOAD SPECIFIED ABOVE. ALL SLIPFIT CONNECTIONS SHALL ALSO BE BOLTED TO PREVENT UNAUTHORIZED DISASSEMBLY

GATES:

LEGS: - 51 X 152 mm COMMON LUMBER ("A FRAME" ONLY)
- 102 X 102 mm WOOD
- UP TO 51 mm SQUARE, 14 GAUGE PUNCHED STEEL TUBING
- NO. 3 DRIVE POST (712.20)

RAILS - 51 X 203 mm COMMON LUMBER

FASTENERS: (SAME AS BARRICADES ABOVE)

FEET: - 152 X 152 mm WOOD
- NO. 3 DRIVE POST (712.20)
- UP TO 57 mm SQUARE, 12 GAUGE PUNCHED STEEL TUBING

BRACES: - 51 X 152 mm (MAXIMUM) COMMON LUMBER
- 102 mm WIDE X 19 mm THICK PLYWOOD STRIPS
- NO. 2 DRIVE POST (712.20)

HINGED GATE:

GATE: - 3.6 m X 1.2 m STEEL FRAME, FARM GATE

RAILS: (SAME AS FIXED BARRICADES ABOVE)

HARDWARE: - HINGED SCREWHOOKS FOR HANGING GATE TO POST

9. LUMBER: LUMBER USED IN THE CONSTRUCTION OF GATES AND BARRICADES SHALL BE COMMON YELLOW PINE OR COMMON DOUGLAS FIR, SURFACED ON FOUR SIDES STANDARD, ALL SIZES ARE NOMINAL.

METRIC

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

DATE 04/25/94

GATES AND BARRICADES IN POSITION

STANDARD CONSTRUCTION DRAWING MT-101.60M

APPROVED _____ ENGR. OF DESIGN SERVICES

WCC

614 TEMPORARY RAISED PAVEMENT MARKERS

GENERAL

THIS ITEM OF WORK SHALL CONSIST OF FURNISHING, INSTALLING, MAINTAINING AND SUBSEQUENTLY REMOVING TEMPORARY RAISED PAVEMENT MARKERS (TRPM'S). 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 2043 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 225 SQUARE MILLIMETERS FOR TYPE A OR 1935 SQUARE MILLIMETERS 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 EVERY 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 9030 SQUARE MILLIMETERS.

3) WHEN VIEWED FROM THE FRONT, PARALLEL TO THE PAVEMENT, AS FROM APPROACHING TRAFFIC, THE MARKER SHALL HAVE A WIDTH OF APPROXIMATELY 100 MILLIMETERS AND A VISIBLE AREA OF NOT LESS THAN 970 SQUARE MILLIMETERS.

TYPE B MARKERS ARE INTENDED TO PROVIDE HIGH VISIBILITY AT NIGHT BY RETROREFLECTING LIGHT FROM AUTOMOTIVE HEADLIGHTS BACK TO THE DRIVER.

INSTALLATION

TEMPORARY RAISED PAVEMENT MARKERS 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 TRPM'S 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 TEMPORARY PAVEMENT MARKINGS, THEY SHALL BE PLACED ON OR IMMEDIATELY ADJACENT TO THE PAVEMENT MARKING. LOCATIONS SHALL BE ADJUSTED UP TO 300 MILLIMETERS LONGITUDINALLY OR 150 MILLIMETERS 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, TEMPORARY RAISED PAVEMENT MARKERS SHALL BE PLACED AS FOLLOWS:

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

* CENTERED IN GAP

2) WHEN USED TO SUBSTITUTE FOR (REPLACE) PAVEMENT MARKING, TEMPORARY RAISED PAVEMENT MARKERS SHALL BE PLACED AS FOLLOWS:

LINE	TYPE	SPACING
EDGE LINE	A	1.5 m C/C
LANE LINE	A	4 @ 0.75 m C/C 9 m GAP (12 m CYCLE)
CHANNELIZING LINE (INCLUDES EXIT GORE NOSE)	A	1.5 m C/C
EDGE LINE (TWO COLOR) (WHITE/YELLOW)	A	BACK TO BACK 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 TEMPORARY 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	TEMPORARY RAISED PAVEMENT MARKER

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

metric units

OFFICE OF TRAFFIC ENGINEERING
DIVISION OF ENGINEERING POLICY
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

DATE 03/01/96

TEMPORARY RAISED PAVEMENT MARKERS

STANDARD CONSTRUCTION DRAWING MT-101.20M

APPROVED [signature] ADMINISTRATOR

WCC

TEMPORARY SIGN SUPPORT REQUIREMENTS

A. PLACEMENT OF SIGNS WHICH WILL REMAIN MORE THAN ONE DAY:

1) LATERAL PLACEMENT TO NEAREST EDGE OF SIGNS SHALL BE AS FOLLOWS:

   a) ON THE RIGHT SIDE OF THE ROAD FOR APPROACHING TRAFFIC (EXCEPT FOR DUAL MOUNTED SIGNS AND SIGNS DESIGNATED IN THE PLANS FOR LEFT SIDE MOUNTING).

   b) CURBED ROADWAY - MINIMUM 0.6 m BEHIND FACE OF CURB.

   c) UNCURBED ROADWAY- 3.7 m FROM EDGE OF TRAFFIC LANE OR 1.8 m FROM EDGE OF PAVED OR USEABLE SHOULDER, WHICHEVER IS GREATER.

   d) BEHIND GUARDRAIL OR BARRIER - PREFERABLY 0.6 m BEHIND FACE OF GUARDRAIL (MINIMUM 0.3 m) FOR SIGNS ON CLASS A SUPPORTS: 1.2 m FOR CLASS B OR C SUPPORTS: 0.3 m BEHIND FACE OF CONCRETE BARRIER UNLESS BARRIER TOP MOUNTING IS REQUIRED BY THE PLAN.

2) VERTICAL CLEARANCE OF SIGNS, MEASURED ABOVE ROADWAY ELEVATION; SHALL BE AS FOLLOWS:

   a) RURAL - 1.5 m WHEN PARKED CARS, CONSTRUCTION EQUIPMENT, ETC WILL NOT OBSCURE SIGN VISIBILITY.

   b) RURAL AREAS WITH PARKED CARS OR CONSTRUCTION EQUIPMENT - 2.1 m

   c) URBAN - 2.1 m

   d) CARE SHALL BE TAKEN TO ASSURE THAT SIGNS WILL NOT BE OBSCURED BY CONSTRUCTION EQUIPMENT, TREES, WEEDS OR OTHER OBSTACLES. BRUSH, WEEDS OR GRASS WITHIN THE RIGHT OF WAY SHALL BE TRIMMED AS NECESSARY. SIGNS SHALL NORMALLY BE VISIBLE TO TRAFFIC 122 m TO 183 m IN ADVANCE OF THE SIGN.

3) SUPPORTS FOR SIGNS WHICH WILL REMAIN IN PLACE MORE THAN ONE DAY SHALL BE FIXED RATHER THAN PORTABLE EXCEPT IN SITUATIONS WHERE THE SIGN MUST REST ON PERMANENT PAVEMENT OR OTHER SURFACE WHICH WOULD BE DAMAGED BY INSERTION OF POST TYPE SUPPORTS.

B. PLACEMENT OF SIGNS WHICH WILL REMAIN FOR ONE DAY OR LESS:

1) SAME AS A-1 ABOVE EXCEPT THAT SIGNS MAY BE PLACED ON THE ROADWAY ONLY IF THEY DO NOT INTRUDE INTO A TRAFFIC LANE IN USE.

2) MINIMUM OF 0.3 m ABOVE ROADWAY

C. CLASSES OF SUPPORTS:

ALL TEMPORARY SIGN SUPPORTS SHALL BE OF THE FOLLOWING TYPES:

1) CLASS A:

SUPPORTS SHALL BE USED FOR EXPOSED LOCATIONS ON HIGHWAYS WHERE TRAFFIC APPROACH SPEEDS OF 40 MPH AND HIGHER ARE ENCOUNTERED. THEY ARE ALSO SUITABLE FOR USE IN ALL OTHER LOCATIONS.

2) CLASS B:

SUPPORTS SHALL BE USED FOR EXPOSED LOCATIONS ON HIGHWAYS WHERE TRAFFIC APPROACH SPEEDS OF LESS THAN 40 MPH ARE ENCOUNTERED. THEY ARE ALSO SUITABLE FOR USE IN ALL APPLICATIONS DEFINED FOR CLASS C SUPPORTS.

3) CLASS C:

SUPPORTS MAY ONLY BE USED WHERE FULLY PROTECTED BY GUARDRAIL, CONCRETE BARRIER AND IN LOCATIONS POSITIVELY PROTECTED FROM TRAFFIC SUCH AS ON RETAINING WALLS OR WHERE TRAFFIC APPROACH SPEEDS ARE LESS THAN 25 MPH.

D. TRAFFIC APPROACH SPEEDS:

TRAFFIC APPROACH SPEEDS SHALL BE THE LOCALLY POSTED SPEED (NOT ADVISORY SPEED SIGNS) OR THE MEASURED ACTUAL (85TH PERCENTILE) SPEED (IF AVAILABLE) OF APPROACHING TRAFFIC, WHICHEVER IS HIGHER, ADJACENT TO THE SIGN LOCATION.

TABLE

APPROACH SPEED (MPH)	COMPLETELY PROTECTED BY GUARDRAIL OR BARRIER	PARTLY PROTECTED BY GUARDRAIL OR BARRIER *	GREATER THAN 9 m FROM EDGE OF PAVEMENT	WITHIN 9 m FROM EDGE OF PAVEMENT
40 AND HIGHER	A, B OR C	A OR B	A OR B **	A ONLY
26 TO 39	A, B OR C	A OR B	A OR B	A OR B
0 TO 25	A, B OR C	A, B OR C	A, B OR C	A, B OR C

* IF SUPPORTS ARE BEHIND GUARDRAIL BUT NOT FULLY 1.7 m BEHIND FACE OF RAIL OR IF SIGN IS NOT 0.3 m BEHIND FACE OF CONCRETE BARRIER.

** 9 m CRITERION IS BASED UPON STRAIGHT ROADWAY AND A SLOPE OF 6 to 1 OR FLATTER. SUPPORTS ON THE OUTSIDE OF CURVES OR LOCATED DOWN A SLOPE (STEEPER THAN 6 : 1) WILL REQUIRE USE OF CLASS A SUPPORTS.

E. BALLASTING

BALLASTING OF PORTABLE SUPPORTS SHALL BE WITH SANDBAGS PLACED WITHIN 0.3 m OF THE GROUND. IN NO CASE SHALL HARD OBJECTS BE USED FOR BALLAST.

F. STRENGTH OF SIGN SUPPORTS

THE CONTRACTOR SHALL CHOOSE SIGN SUPPORTS OF ADEQUATE STRENGTH AND WITH ADEQUATE FOUNDATIONS AND ANCHORAGE TO SUPPORT THE SIGN SIZES ERECTED. PROPRIETARY DEVICES SHALL NOT BE LOADED BEYOND THE LIMITS RECOMMENDED BY THE MANUFACTURER. SLIP BASE TYPE BREAKAWAY BEAM CONNECTIONS SHALL BE AT LEAST PARTIALLY EMBEDDED IN CONCRETE CONSISTING OF A 0.3 m DEEP BY 0.3 m DIAMETER COLLAR. SIGN SUPPORTS WHICH FAIL UNDER TYPICAL WIND LOAD CONDITIONS SHALL BE IMMEDIATELY MODIFIED OR REPLACED WITH A SUPPORT OF ADEQUATE STRENGTH.

G. PROHIBITED SUPPORTS

THE FOLLOWING SUPPORT TYPES SHALL NOT BE PERMITTED ON PROJECTS:

1) SUPPORTS FABRICATED FROM AUTOMOTIVE AXLE DIFFERENTIAL ASSEMBLIES AND SIMILARLY HEAVY ASSEMBLIES WHICH CANNOT BE CONSIDERED BREAKAWAY TYPE.

2) SUPPORTS CONSISTING OF VERTICAL POSTS WITH ANGLED BRACES MADE FROM DRIVEPOST OR OTHER RIGID ELEMENTS.

CLASS A SUPPORTS

FIXED SUPPORTS

1) ALL #2 AND #3 POST WHEN INSTALLED SINGLY OR IN PAIRS (SIDE BY SIDE) ACCORDING TO THE DETAILS OF TC-41.20M. THE NUMBER OF SUPPORTS SHALL BE AS SHOWN ON TC-52.10M AND TC-52.20M.

2) THE FOLLOWING POST TYPES, WHEN INSTALLED SINGLY, BY IMBEDMENT OR DRIVING INTO EARTH TO A DEPTH OF ABOUT 1.1 m.

   a) - UP TO 102 X 102 mm WOOD.

   b) - UP TO 51 mm DIAMETER SCHEDULE 40 STEEL PIPE.

   c) - UP TO 76 mm DIAMETER SCHEDULE 40 ALUMINUM PIPE.

   d) - UP TO 56.4 mm SQUARE, 12 GAUGE WALL, PUNCHED STEEL POST.

   e) - UP TO 152 X 203 mm WOOD WITH BREAKAWAY HOLES SHOWN BELOW.

3) THE FOLLOWING POST TYPES WHEN INSTALLED IN PAIRS (SIDE BY SIDE) WITH LESS THAN 2 m BETWEEN POSTS, BY IMBEDMENT OR DRIVING INTO EARTH TO A DEPTH OF ABOUT 1.1 m :

   a) - UP TO 102 X 102 mm WOOD.

   b) - UP TO 51 mm DIAMETER SCHEDULE 40 STEEL PIPE.

   c) - UP TO 76 mm DIAMETER SCHEDULE 40 ALUMINUM PIPE.

   d) - UP TO 51 mm SQUARE, 14 GAUGE WALL, PUNCHED STEEL POST.

4) FIXED TYPE III BARRICADES:

5) ALL BREAKAWAY CONNECTION BEAM SUPPORTS, WHEN INSTALLED ACCORDING TO THE PROPER DETAILS SHOWN ON TC-41.10M WITH A MINIMUM CLEAR DISTANCE BETWEEN SUPPORTS OF 2.1 m FOR SUPPORTS LARGER THAN W6 X 9.

6) ANY BREAKAWAY POST OR POST AND CONNECTION WHICH HAS BEEN CRASH TESTED AND APPROVED BY THE FHWA AS SATISFYING THE BREAKAWAY CRITERIA DESCRIBED IN 630.06.

(CONTINUED ON MT-105.11M)

M E T R I C

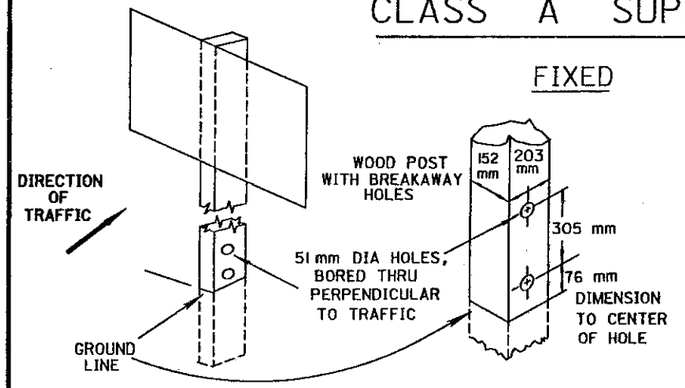
BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

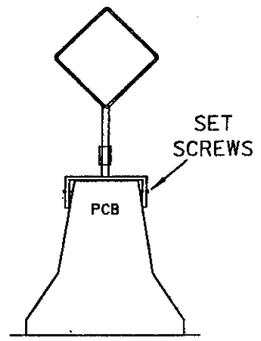
MAINTENANCE OF TRAFFIC	DATE
TEMPORARY SIGN SUPPORT	04/25/94
STANDARD CONSTRUCTION DRAWING MT-105.10M	
APPROVED Jay Ortage ENGR. OF DESIGN SERVICES	

WCC

CLASS A SUPPORTS

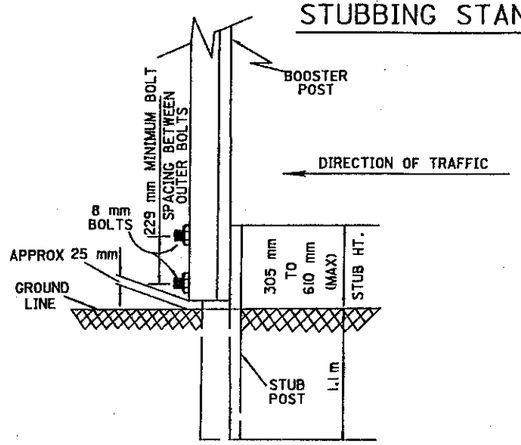
FIXED





CLASS A SUPPORTS

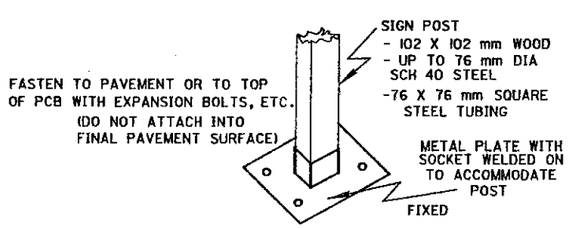
STUBBING STANDARD

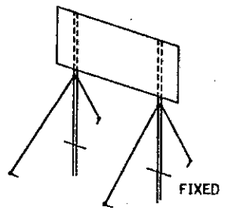


NOTES

1. FOR USE WITH #3 POST OR SMALLER ONLY
2. BOLTS SHALL BE STEEL OR ALUMINUM
3. A MINIMUM OF TWO FASTENERS SHALL BE USED PER ASSEMBLY
4. BOOSTER POST SHALL BE MOUNTED BEHIND STUB POST
5. BOOSTER POST SHALL BE THE SAME OR 1.5 kg/m LESS THAN STUB POST

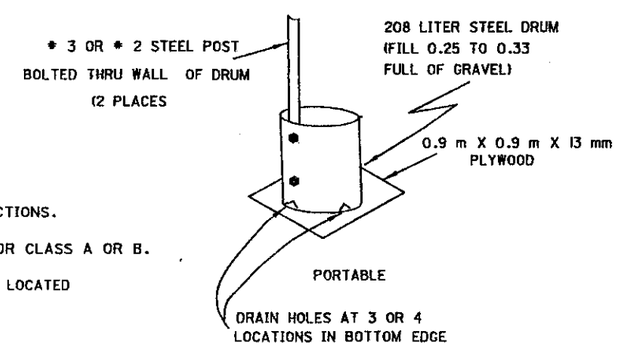
CLASS B SUPPORTS





ANY CLASS A SIGN POST WITH GUY WIRES ADDED TO INCREASE SIGN CARRYING ABILITY. (GUY WIRES SHALL NOT BE HEAVIER THAN 3.2 mm DIA. BRAIDED CABLE. GUY ANCHORS SHALL NOT EXTEND MORE THAN 152 mm ABOVE GROUND SURFACE).

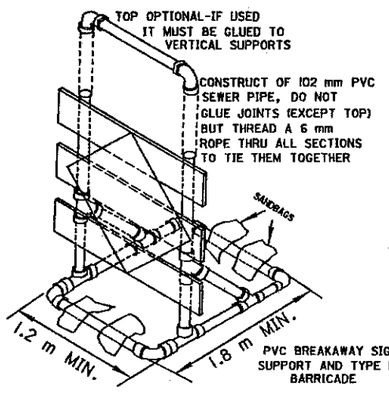
CLASS C SUPPORTS

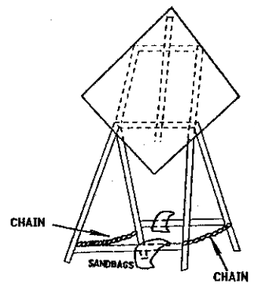


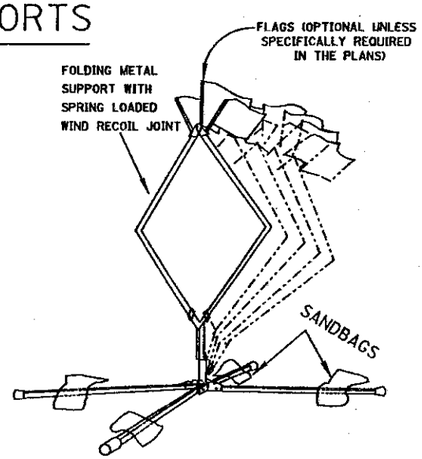
1. ALL BEAM TYPE SUPPORTS WITHOUT BREAKAWAY CONNECTIONS.
2. SUPPORTS SIMILAR TO BUT LARGER THAN PERMITTED FOR CLASS A OR B.
3. THE STEEL DRUM(S) SHOWN BELOW MAY BE USED ONLY WHEN LOCATED BEHIND GUARDRAIL OR BARRIER.

CLASS A SUPPORTS

PORTABLE







NOTES

RAIL MATERIALS:
25 X 203 mm OR 51 X 203 mm COMMON LUMBER
203 mm X (16 mm TO 25 mm) THICK EXTERIOR PLYWOOD
EXTRUDED PLASTIC OR FORMED SHEET METAL WITH A 203 mm WIDE SURFACE AND OF SUFFICENT STIFFNESS TO RESIST TYPICAL WIND LOADS OF UP TO 147 kg/m², BUT HAVING A WEIGHT OF NOT MORE THAN 7.5 kg/m.

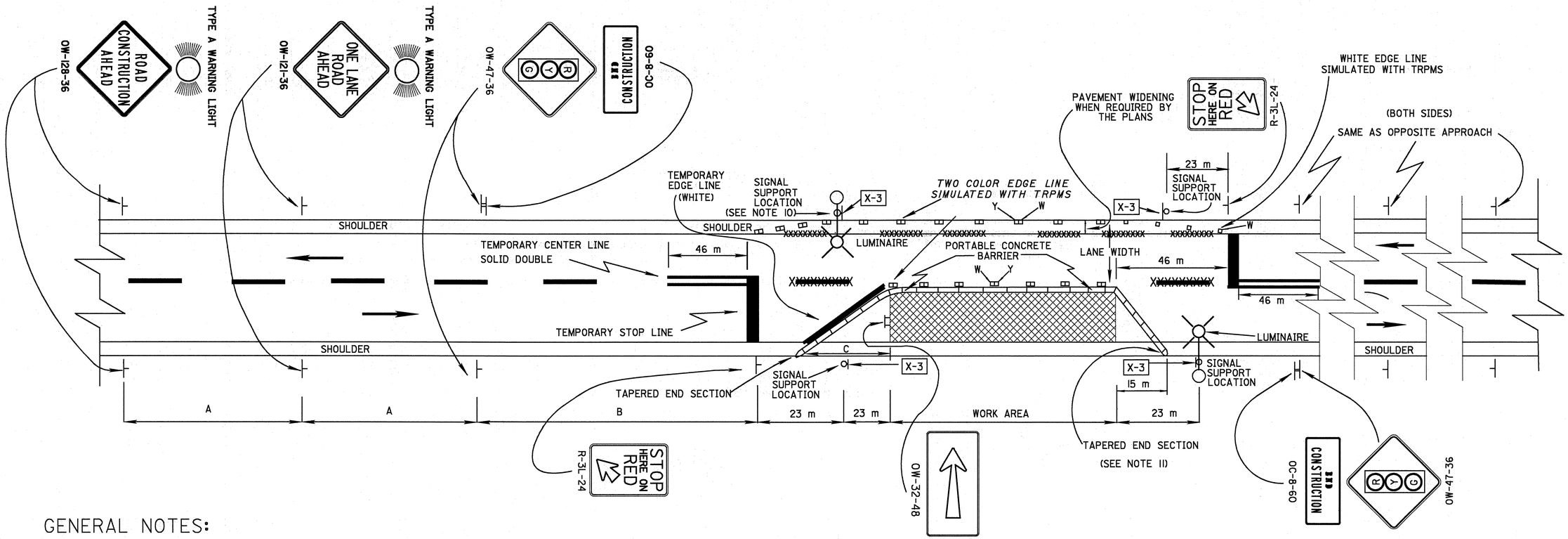
ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF THE OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC	DATE 04/25/94
TEMPORARY SIGN SUPPORT	
STANDARD CONSTRUCTION DRAWING MT-105.11M	

APPROVED Daryl Cuyo ENGR. OF DESIGN SERVICES



GENERAL NOTES:

1. INITIAL SIGNAL TIMING AND PHASING SHALL BE AS SHOWN IN THE PLANS. CHANGES SHALL BE APPROVED BY THE ENGINEER.

2. SIGNALS SHALL BE INSTALLED AND OPERATED IN ACCORDANCE WITH THE REQUIREMENTS OF PART 6 OF THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

3. TEMPORARY CENTER LINE, SOLID, DOUBLE, SHALL BE INSTALLED AND MAINTAINED WHEN EXISTING CENTER LINE , SOLID DOUBLE IS NOT IN PLACE. 305 mm STOP LINES SHALL BE INSTALLED. TEMPORARY RAISED PAVEMENT MARKERS (TRPMS) TO SIMULATE A TWO COLOR EDGE LINE SHALL BE PROVIDED. EXISTING CONFLICTING PAVEMENT MARKINGS AND RAISED PAVEMENT MARKER REFLECTORS SHALL BE REMOVED. TEMPORARY EDGE LINES WHICH WOULD CONFLICT WITH FINAL TRAFFIC LANES SHALL BE REMOVABLE (740.05 TYPE C) TAPE UNLESS THE AREA WILL BE RESURFACED IN THE NEXT WORK PHASE. AFTER COMPLETION OF THE WORK, PAVEMENT MARKINGS OTHER THAN 740.05 TYPE C SHALL BE REMOVED IN ACCORDANCE WITH 641.10. THE ORIGINAL MARKINGS AND PAVEMENT MARKER REFLECTORS SHALL BE RESTORED AT NO ADDITIONAL COST.

4. PCB SHALL BE DELINEATED AS FOLLOWS:

PCB TYPE	DELINEATION
813 mm HIGH WITHOUT GLARE SCREEN	BARRIER REFLECTORS AT 7.6 m C-C (MAX.) ALTERNATED WITH TOP MOUNTED OBJECT MARKERS (229 X 381 mm) AT 7.6 m C-C (MAX.)
813 mm HIGH WITH GLARE SCREEN	BARRIER REFLECTORS AT 7.6 m C-C VERTICAL ORANGE REFLECTORIZED STRIPES ON PADDLES (305 X 305 mm) AT 3.8 m C-C (MAX.)
1270 mm HIGH	BARRIER REFLECTORS AT 3.8 m C-C (MAX.)
TAPERED END SECTION AND EXPOSED END	OBJECT MARKERS (229 X 381 mm) TOP MOUNTED AT EACH END

5. THE HORIZONTAL OR VERTICAL ALIGNMENT OF THE ROADWAY MAY REQUIRE ADJUSTMENTS IN THE LOCATION OF THE ADVANCE WARNING SIGNS OR THE SIGNAL HEADS. TREE OR BRUSH TRIMMING TO PROVIDE ADEQUATE SIGHT DISTANCE TO SIGN AND SIGNALS SHALL BE PROVIDED AS DIRECTED BY THE ENGINEER. THE DISTANCES SHOWN FOR ADVANCE WARNING SIGN SPACINGS ARE MINIMUM.

6. THE SPACING BETWEEN PROPOSED SIGNS SHOULD BE ADJUSTED TO NOT CONFLICT WITH AND TO PROVIDE A MINIMUM OF 61 m CLEARANCE TO EXISTING SIGNS.

7. ALL TRAFFIC SIGNAL AND LIGHTING EQUIPMENT USED IN THIS INSTALLATION, SUCH AS SIGNAL OR LIGHTING CABLE, SIGNAL HEADS, LUMINAIRES OR SIGNAL CONTROLLER SHALL BE IN CONFORMANCE WITH SPECIFICATION ITEMS 625, 632, 633, 713, 732 AND 733. HOWEVER, THE PERFORMANCE TESTS OF 625.22E AND 632.27(6), THE WORKING DRAWING REQUIREMENTS OF 625.04, 632.03 AND 633.03, THE WIRING DIAGRAM AND SERVICE MANUAL REQUIREMENT OF 633.04 AND THE TESTING AND PREQUALIFICATION REQUIREMENT OF 633.05 ARE WAIVED. ALSO THE REQUIREMENTS OF 733.01 CONCERNING EXPANSIBLE 3-DIAL UNITS AND TWELVE SIGNAL CIRCUITS ARE WAIVED. USED EQUIPMENT IS ACCEPTABLE. CONFLICT MONITORS SHALL BE USED EXCEPT WITH ELECTROMECHANICAL PRETIMED CONTROLLERS WITH CAMSHAFT.

8. IF THE SIGNAL IS CHANGED TO FLASHING OPERATION, RED SHALL BE FLASHED TO ALL APPROACHES ON ALL SIGNAL HEADS.

9. EXISTING BARRIER BETWEEN TEMPORARY STOP LINES SHALL BE DELINEATED WITH ITEM 614-BARRIER REFLECTORS.

10. FOR SIDE MOUNTED SIGNALS, SEE MT-96.20M. FOR OVERHEAD MOUNTED SIGNALS, SEE MT-96.21M.

11. DURING WORKING HOURS ONLY A LENGTH OF BARRIER SUFFICIENT TO PROVIDE A 3.0 m ACCESS ON THE SHOULDER AND PART OF ROADWAY, MAY BE REMOVED FOR ACCESS. A SIMILAR BARRIER REMOVAL AT THE OPPOSITE END OF THE WORK AREA MAY ALSO BE PERMITTED ONLY WHEN NECESSARY.

DISTANCE (METERS)	A	B
URBAN	61	107
RURAL	152	229

XXXXXXXXX —— EXISTING MARKINGS REMOVED

W —— TRPM, WHITE, 1-WAY

Y —— TRPM, YELLOW, 1-WAY

Y Y —— TRPM, YELLOW, 2-WAY

Y W —— TWO TRPM'S BACK TO BACK

METRIC

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCLUDED IN THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

SIGNALIZED CLOSING
1 LANE OF A 2 LANE
HIGHWAY WITH PCB

DATE 01/30/95

STANDARD CONSTRUCTION DRAWING **MT-96.11M**

APPROVED Gary L Craig ENGR. OF DESIGN SERVICES

WCC

AREA ILLUMINATION SHALL BE PROVIDED BY USING 150 WATT MINIMUM HIGH PRESSURE SODIUM LUMINAIRES OR 250 WATT MINIMUM MERCURY LUMINAIRES

SUPPORT POLE

MINIMUM MOUNTING HEIGHT 8.2 m. LUMINAIRE TO EXTEND TO AT LEAST THE EDGE OF PAVEMENT.

ON BRIDGE PROJECT CABLE MAY ALSO BE ROUTED UNDER BRIDGE IF PROPERLY SUPPORTED. SEE DETAIL "C"

POWER IN SHALL BE AN INDIVIDUAL CIRCUIT DIRECTLY FROM POWER TRANSFORMER

4.6 m MINIMUM

ALL 305 mm LENSES

R Y G

0.6 m TO 3.0 m

STEEL STRAP OR BANDING (TYPICAL)

MINIMUM CLEARANCE 5.5 m

102 X 102 mm SQUARE OR 114 mm DIA. NO. 1 TREATED YELLOW PINE OR DOUGLAS FIR.

0.6 m TO 3.1 m

R Y G

METER (IF REQUIRED)

3.6 m MINIMUM W/O GUARDRAIL

2.4 m TO 4.6 m ABOVE PAVEMENT GRADE AT CENTERLINE

3.6 m MINIMUM

30 AMP DISCONNECT SWITCH SEE DETAIL "A"

CONTROLLER CABINET

1.5 m NOMINAL

NO. 4 GROUND WIRE

0.8 m MIN. 1.2 m MAX.

2.0 m MIN.

SHOULDER

EXISTING GUARDRAIL

GROUND ROD

EDGE OF PAVEMENT

SHOULDER

1.1 m

LOCATE POLES BEHIND DITCH WHERE POSSIBLE

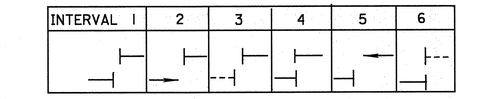
38.1 mm CONDUIT
WEATHERPROOF CONNECTOR
METER BASE (IF REQUIRED)
WEATHERPROOF CONNECTOR
2-15A SINGLE POLE CIRCUIT BREAKERS
DISCONNECT SWITCH ENCLOSURE
LIGHTING CIRCUIT
SIGNAL CIRCUIT
TO GROUND ROD

DETAIL "A"

CABLES WITHIN REACH OF PEDESTRIANS SHALL BE PLACED IN CONDUIT. CABLE RUNS WITHOUT CONDUIT SHALL BE SUPPORTED AT 3.0 m INTERVALS.

ALTERNATE CABLE ROUTING

DETAIL "C"



USING A PRETIMED CONTROL

OR

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

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

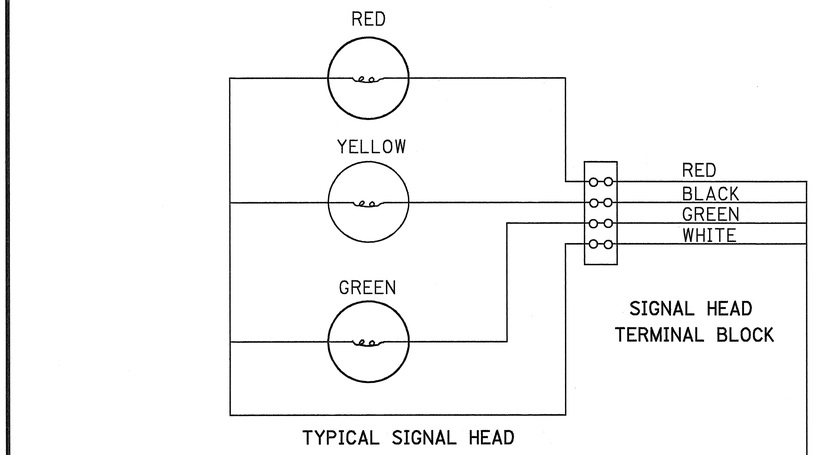
DETAILS FOR SIGNALIZED CLOSING 1 LANE OF A 2 LANE HIGHWAY -SIDE MOUNTED

DATE 01/30/95

STANDARD CONSTRUCTION DRAWING MT-96.20M

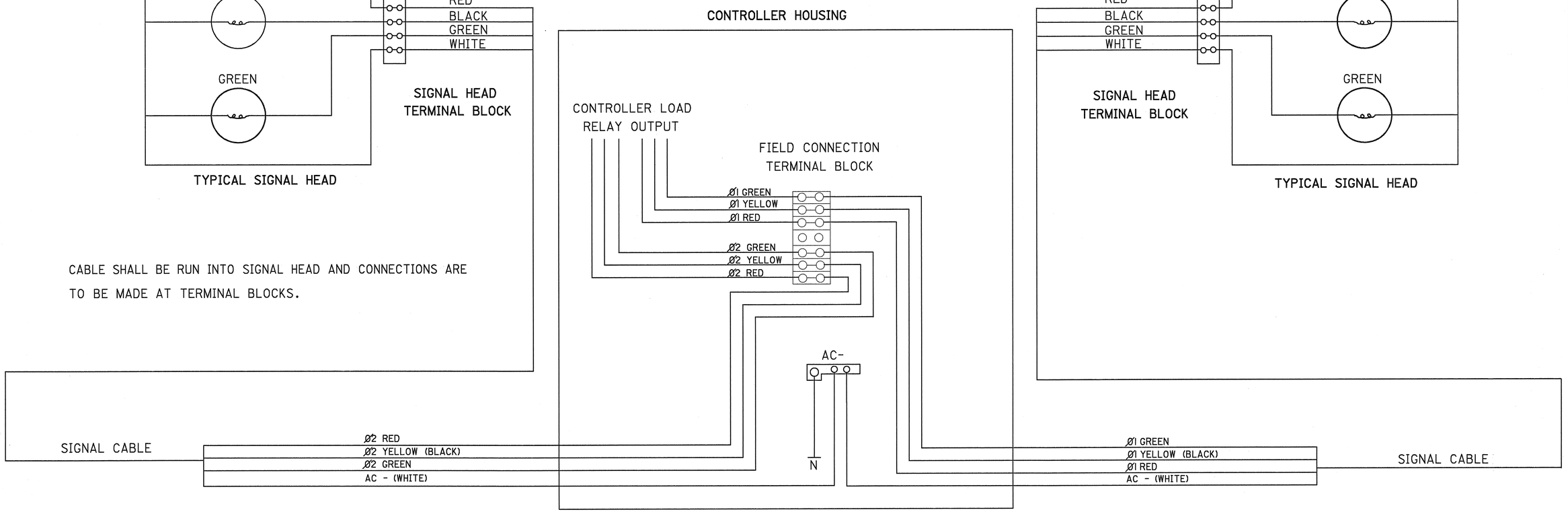
APPROVED Daryl Cuzzo ENGR. OF DESIGN SERVICES

WCC

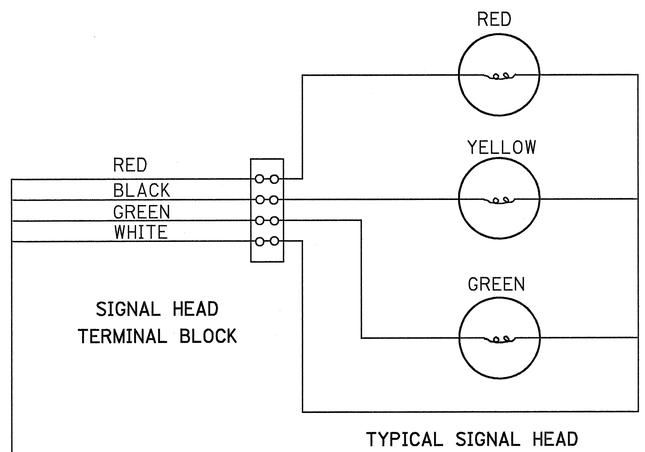


TYPICAL SIGNAL HEAD

CABLE SHALL BE RUN INTO SIGNAL HEAD AND CONNECTIONS ARE TO BE MADE AT TERMINAL BLOCKS.



TYPICAL SIGNAL HEAD HOOK-UP



TYPICAL SIGNAL HEAD

GENERAL NOTES:

1. LIGHTNING PROTECTION, AS REQUIRED IN 733.04 SHALL BE PROVIDED FOR SOLID STATE ELECTRONIC CONTROLLERS AND DETECTORS.

2. 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.

3. 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, CONFLICTIONG DISPLAYS) SHALL RESULT IN THE CONTRACTOR 2-WAY RADIOS, TO CONTROL TRAFFIC THROUGH THE WORK AREA UNTILL 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 UNTILL THE CHANGES ARE COMPLETED.

METRIC

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

DATE 01/30/95

PRE-TIMED-WIRING DIAGRAM
FOR SIGNALIZED CLOSING I LANE
OF A 2 LANE HIGHWAY

STANDARD CONSTRUCTION DRAWING **MT-96.25M**

APPROVED _____ ENGR. OF DESIGN SERVICES

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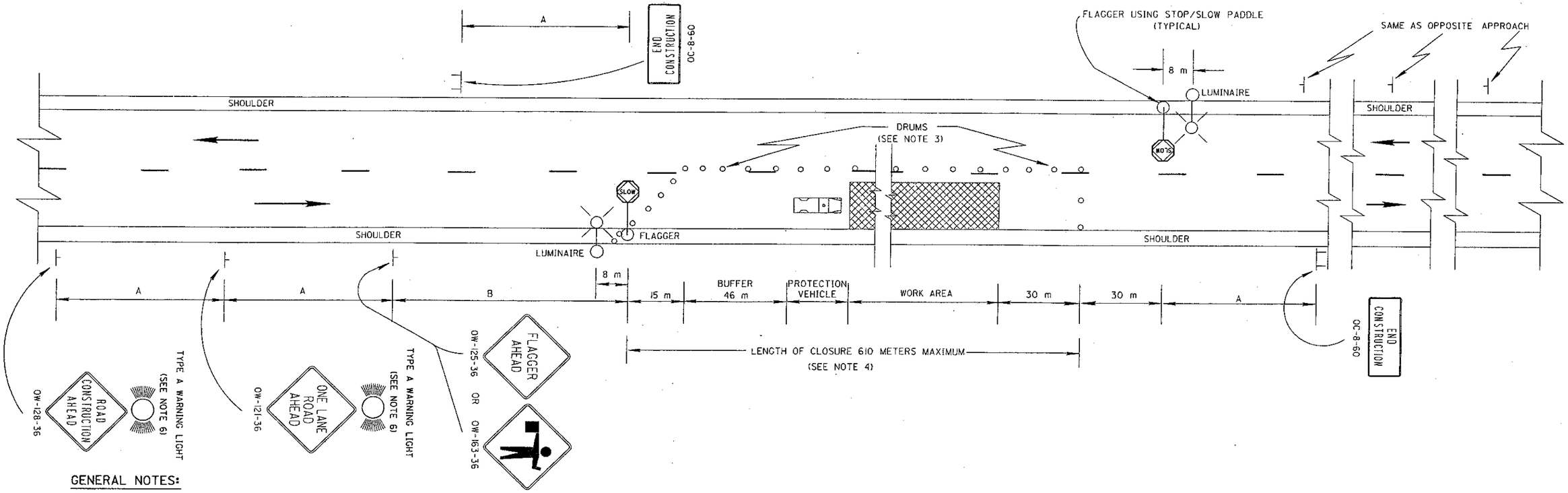


GENERAL NOTES:

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. DISTANCE B MAY ALSO BE INCREASED, PRIOR TO IMPLEMENTATION OF THE CLOSURE OR AFTER IT IS IN EFFECT, AS DIRECTED BY THE ENGINEER FOR SUCH OCCURENCES AS LONG TRAFFIC BACKUPS.

2. FLAGGERS, ONE FOR EACH DIRECTION SHALL BE USED TO CONTROL TRAFFIC CONTINUOUSLY FOR AS LONG AS A ONE LANE OPERATION IS IN EFFECT. THE FLAGGERS SHALL BE ABLE TO COMMUNICATE WITH EACH OTHER AT ALL TIMES.

3. DRUMS SHALL BE SPACED AT 15 m CENTER TO CENTER ALONG THE CLOSURE. DRUMS ON THE ADVANCE TAPER SHALL BE SPACED AT 3 m CENTER TO CENTER. CONES HAVING A MINIMUM HEIGHT OF 0.7 m MAY BE SUBSTITUTED FOR DRUMS FOR DAYTIME LANE CLOSURES. PROVISIONS SHALL BE MADE TO STABILIZE THE CONES TO PREVENT THEM FROM BLOWING OVER.

4. SEVERAL SMALL WORK AREAS CLOSE TOGETHER SHALL BE COMBINED INTO ONE WORK ZONE. HOWEVER, THE CLOSURE SHALL NOT BE MORE THAN 610 m LONG UNLESS APPROVED BY THE ENGINEER. THE MINIMUM LENGTH BETWEEN CLOSURES SHALL BE 610 m ONLY ONE SIDE OF THE ROAD SHALL BE CLOSED IN ANY ONE WORK ZONE.

5. THE PROTECTION VEHICLE SHOWN AT THE BEGINNING OF THE WORK AREA SHALL BE IN PLACE AND UNOCCUPIED WHENEVER WORKERS ARE IN THE WORK AREA. THIS PROTECTION VEHICLE SHALL BE REMOVED FROM THE PAVEMENT WHEN WORKERS ARE NOT IN THE WORK AREA. OTHER PROTECTIVE DEVICES MAY BE USED IN LIEU OF THE PROTECTION VEHICLE SHOWN WHEN APPROVED BY THE ENGINEER. THE VEHICLE SHALL BE EQUIPPED WITH A 360° ROTATION OR FLASHING AMBER BEACON CLEARLY VISIBLE A MINIMUM OF 402 m.

6. THE TYPE A FLASHING WARNING LIGHTS SHOWN ON THE OW-128 AND THE OW-121 SIGNS ARE REQUIRED WHENEVER A NIGHT LANE CLOSURE IS NECESSARY.

7. ADEQUATE AREA ILLUMINATION OF EACH FLAGGER STATION SHALL BE PROVIDED AT NIGHT BY USING 150 WATT MINIMUM HIGH PRESSURE SODIUM LUMINAIRES OR 250 WATT MINIMUM MERCURY LUMINAIRES. LUMINAIRES SHALL BE LOCATED ADJACENT TO ONE FLAGGER STATION FOR EACH DIRECTION OF TRAFFIC AS SHOWN ABOVE. THE MOUNTING HEIGHT FOR LUMINAIRES SHALL BE A MINIMUM OF 8.2 m ABOVE THE PAVEMENT AND MOUNTED ON A SUPPORT OF ADEQUATE STRENGTH TO PROVIDE A SATISFACTORY INSTALLATION. THE OVERHEAD CONDUCTOR CLEARANCE SHALL BE A MINIMUM OF 5.5 m ABOVE THE PAVEMENT. THE LUMINAIRE ARM SHALL BE OF SUFFICIENT LENGTH TO EXTEND TO THE EDGE OF THE PAVEMENT. POLES SHALL BE ERECTED A MINIMUM OF 1.7 m BEHIND FACE OF GUARDRAIL WHERE EXISTING, OR 3.6 m FROM THE EDGE OF PAVEMENT. WHERE POSSIBLE LOCATE BEHIND DITCH. LIGHTING MATERIAL SHALL COMPLY WITH SPECIFICATION 713.

8. WITHIN THE LENGTH OF CLOSURE, PROVISION SHALL BE MADE TO CONTROL TRAFFIC ENTERING FROM INTERSECTING STREETS AND MAJOR DRIVES AS NECESSARY TO PREVENT WRONG WAY MOVEMENTS AND TO KEEP VEHICLES OFF OF NEW PAVEMENT NOT READY FOR TRAFFIC. THE METHOD OF CONTROL SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

MINIMUM DISTANCE (METERS)	A	B
URBAN	61	61
RURAL	152	152

METRIC

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE C & M SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH PART 7 OF OMUTCD. PAYMENT FOR ALL LABOR, EQUIPMENT AND MATERIALS TO PROVIDE THIS METHOD OF TRAFFIC CONTROL SHALL BE INCIDENTAL TO THE LUMP SUM BID FOR 614 MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLAN.

BUREAU OF DESIGN SERVICES
DIVISION OF HIGHWAYS
OHIO DEPARTMENT OF TRANSPORTATION

MAINTENANCE OF TRAFFIC

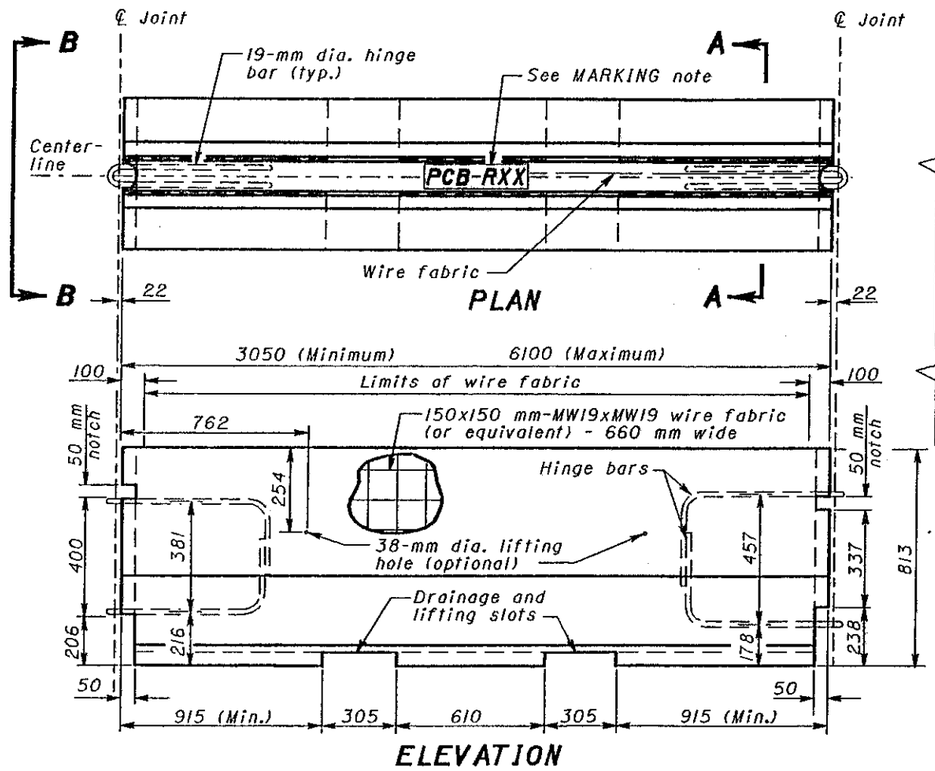
DATE 04/25/94

FLAGGERS CLOSING
1 LANE OF A 2 LANE HIGHWAY
STATIONARY OPERATION

STANDARD CONSTRUCTION DRAWING MT-97.10M

APPROVED _____ ENGR. OF DESIGN SERVICES

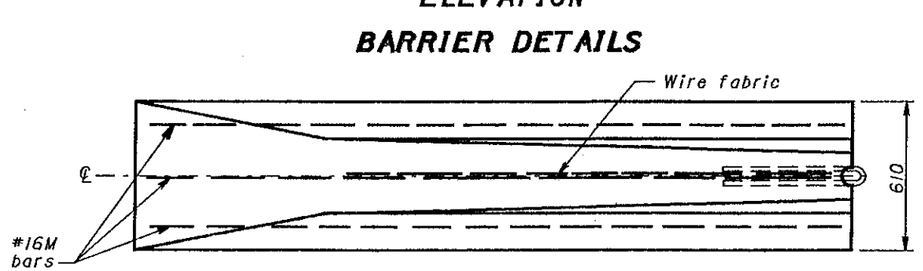
WCC



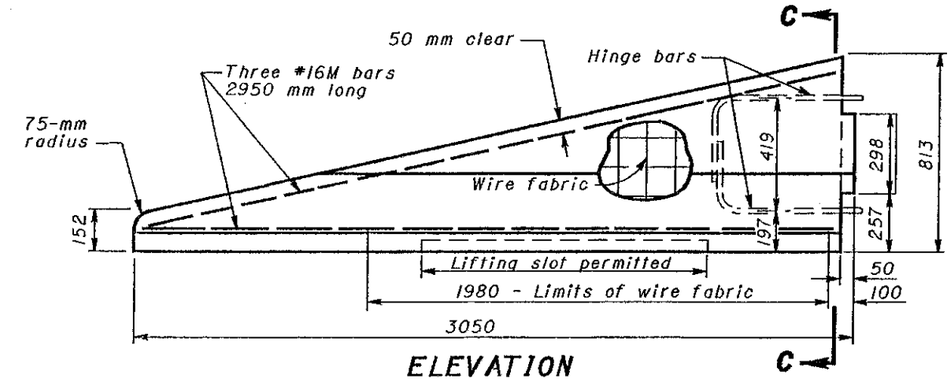
PLAN

ELEVATION

BARRIER DETAILS

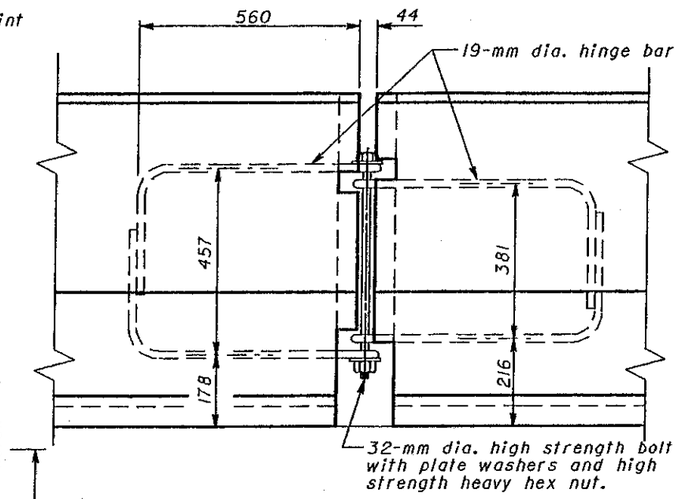


PLAN

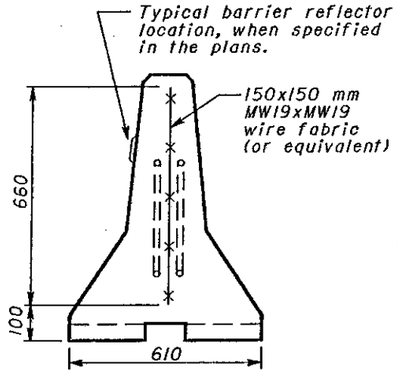


ELEVATION

TAPERED END SECTION DETAILS

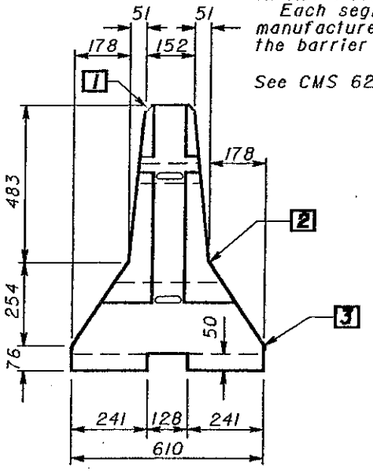


DETAIL AT HINGED CONNECTION

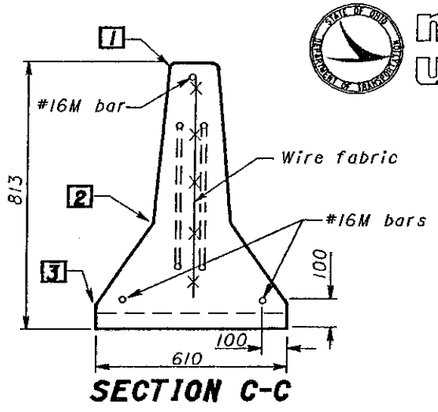


Vertical edges on keyway and drainage slots may be battered. Depth 50±6 mm.

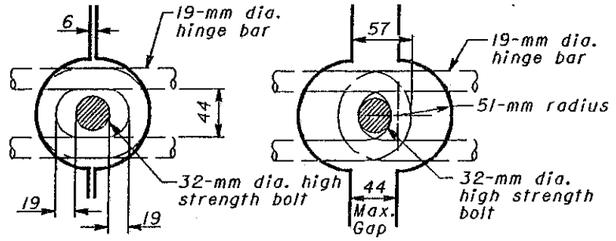
SECTION A-A



VIEW B-B



SECTION C-C



CLOSED JOINT

Barriers shall initially be placed close together so that bolts can be easily inserted through hinge bar loop.

OPEN JOINT

Barrier joints shall be fully open before the nut is tightened onto bolt.

JOINT CONNECTION DETAILS

NOTES

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

WIRE FABRIC: Shall meet the requirements of CMS 709.10.

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

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

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

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

HINGE AND REINFORCING BARS: The 19-mm hinge bars and #16M reinforcing bars shall meet the requirements of CMS 509.

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

MARKING: All barrier segments shall be marked as shown, where XX indicates the year cast. These markings shall be permanently impressed in the barrier using a minimum of 50-mm high lettering.

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

See CMS 622 for additional information.

metric units

LEGEND

1. 25-mm radius or 19-mm chamfer, all top and end corners.
2. Permissible 250-mm radius.
3. Permissible 25-mm radius.

All dimensions are in millimeters unless otherwise noted.

This Drawing Replaces MC-9.2.

OHIO DEPARTMENT OF TRANSPORTATION

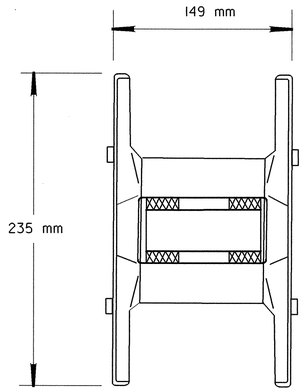
813-mm PORTABLE CONCRETE BARRIER

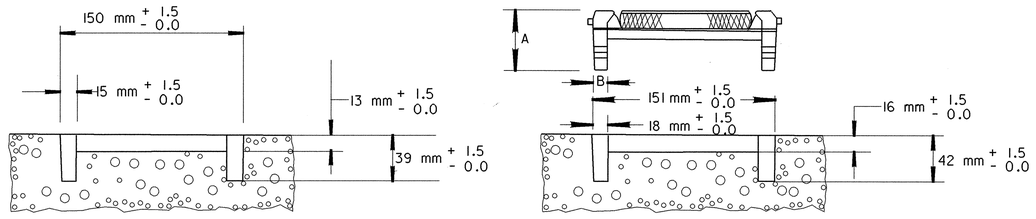
DATE: 6-30-95, 10-21-97

STANDARD CONSTRUCTION DRAWING **RM-4.2M**

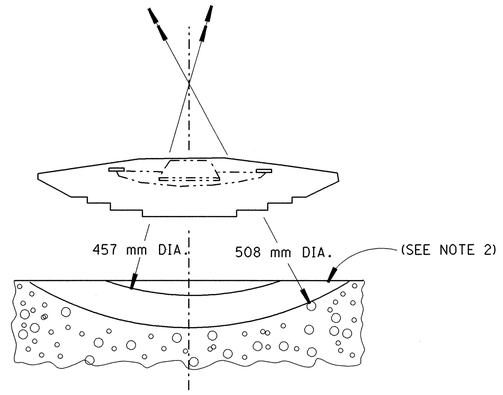
APPROVED: Roger F. Sutherland

	CONVENTIONAL TYPE	LOW PROFILE TYPE
A	44 mm	43 mm
B	12 mm	15 mm





OPTIONAL FOR CONVENTIONAL TYPE



NOTES

1. CENTER LINE MARKERS SHALL BE PLACED BETWEEN THE TWO LINES. MARKERS INSTALLED ALONG AN EDGE LINE OR CHANNELIZING LINE SHALL BE PLACED SO THAT THE CASTING IS NO MORE THAN 25 mm FROM THE NEAR EDGE OF THE LINE. MARKERS INSTALLED ALONG A LANE LINE OR DASHED YELLOW CENTER LINE SHALL BE PLACED BETWEEN AND IN LINE WITH THE DASHES. MARKERS SHALL NOT BE PLACED OVER THE LINES EXCEPT WHERE THE LINES DEVIATE VISIBLY FROM THEIR CORRECT ALIGNMENT, AND THEN ONLY WITH THE APPROVAL OF THE ENGINEER.

2. TO FACILITATE THE CUTTING OF THE TWO PARALLEL SLOTS AND INTERVENING CONCAVED SURFACE SIMULTANEOUSLY, IT IS RECOMMENDED THAT AN ARBOR AND SAW BLADES ASSEMBLY BE USED. FOR ADDITIONAL DETAILS AND TOLERANCES OF THE CASTING AND ARBOR-SAW ASSEMBLY CONTACT THE CASTING MANUFACTURE.

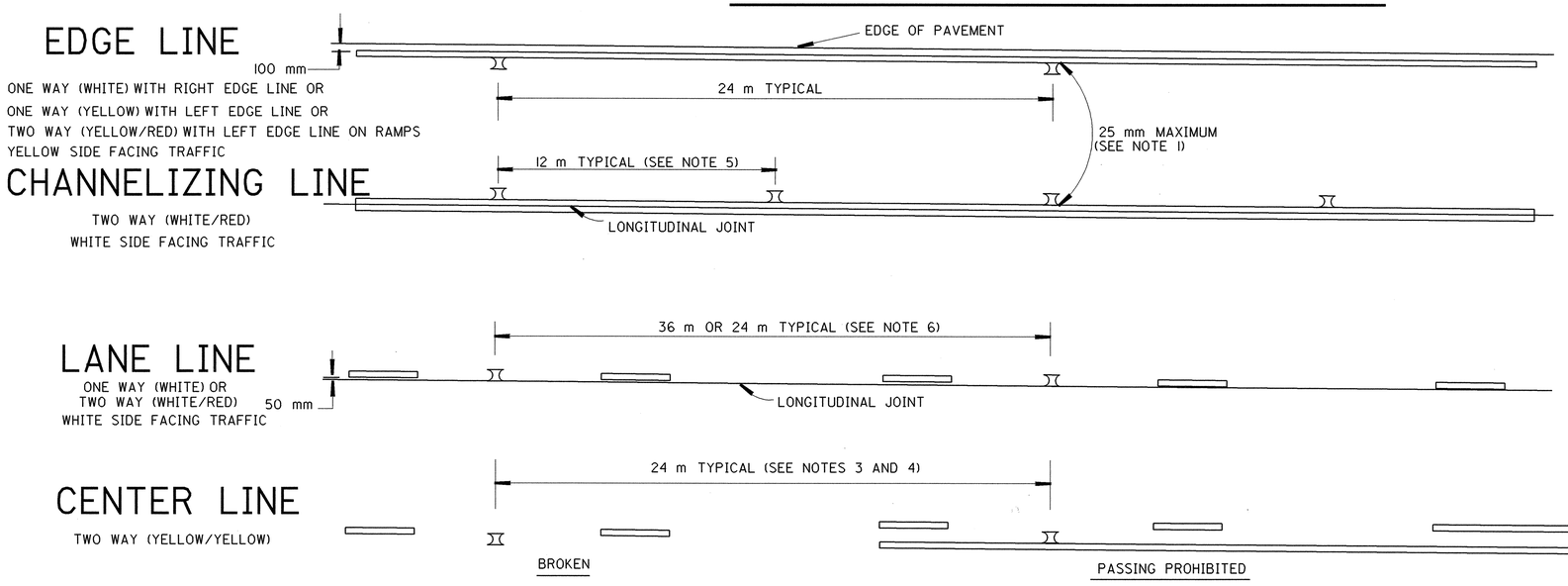
3. FOR HORIZONTAL CURVE RADIUS OF 380 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS SHALL BE REDUCED TO 12 m BETWEEN P.C. OR T.S. AND P.T. OR S.T.

4. FOR HORIZONTAL CURVE RADIUS OF 250 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS MAY BE REDUCED TO 6 m BETWEEN P.C. OR T.S. AND P.T. OR S.T. WHEN USING 6m SPACING, 12 RAISED PAVEMENT MARKERS AT 12 m SPACING SHALL BE INSTALLED ON EACH END OF THE 6 m SPACING.

5. WHEN A CHANNELIZING LINE IS LESS THAN 24 m IN LENGTH, ONE RAISED PAVEMENT MARKER SHALL BE PLACED AT EACH END OF THE LINE AND ONE SHALL BE PLACED IN THE CENTER OF THE LINE.

6. RAISED PAVEMENT MARKERS ON LANE LINES ON FREEWAYS SHALL BE ONE WAY WHITE SPACED AT 36 METERS. ALL OTHER RAISED PAVEMENT MARKERS ON LANE LINES ON MULTILANE OR DIVIDED ROADWAYS SHALL BE TWO WAY RED/WHITE SPACED AT 24 METERS.

CASTING AND SAW CUT DETAILS



TYPICAL RAISED PAVEMENT MARKER PLACEMENT WITH LONGITUDINAL PAVEMENT MARKINGS

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

metric units

OFFICE OF TRAFFIC ENGINEERING
DIVISION OF ENGINEERING POLICY
OHIO DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL

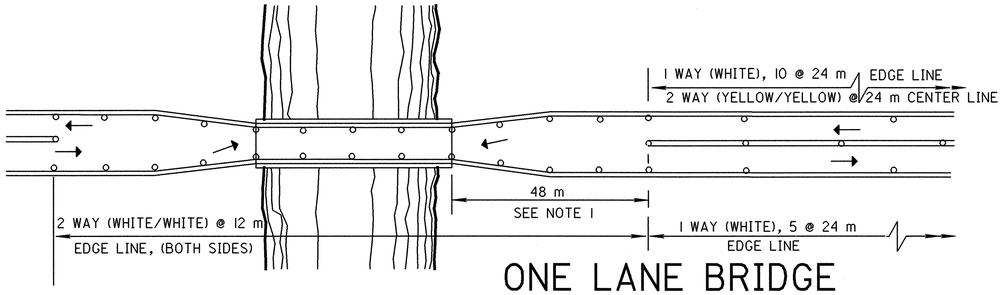
RAISED PAVEMENT MARKER INSTALLATION DETAILS

STANDARD CONSTRUCTION DRAWING TC-65.10M

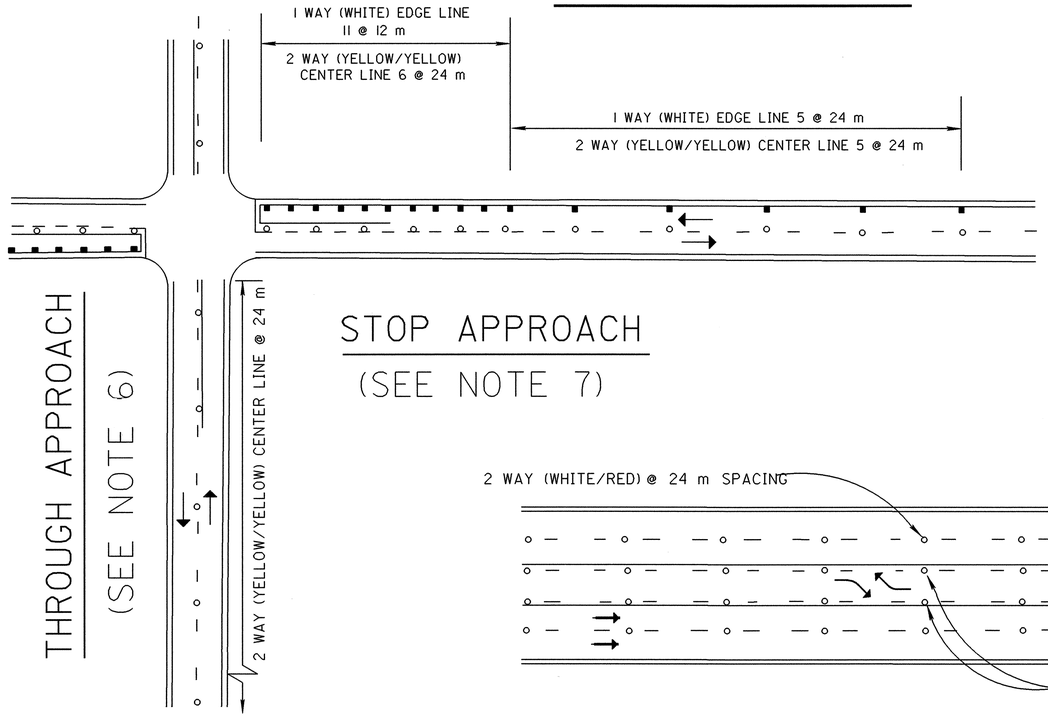
APPROVED _____ ADMINISTRATOR

DATE
11/03/93
11/01/95

WCC



ONE LANE BRIDGE

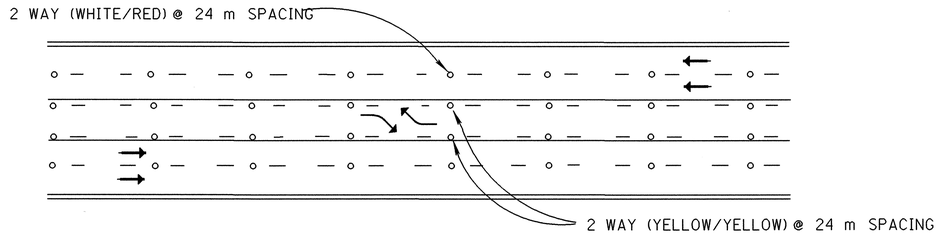


STOP APPROACH

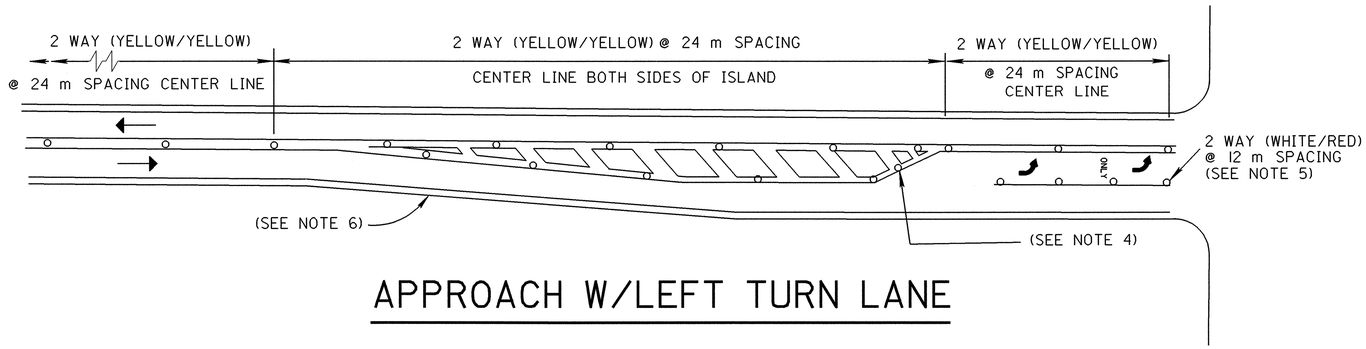
(SEE NOTE 7)

THROUGH APPROACH

(SEE NOTE 6)



TWO WAY LEFT TURN LANE



APPROACH W/LEFT TURN LANE

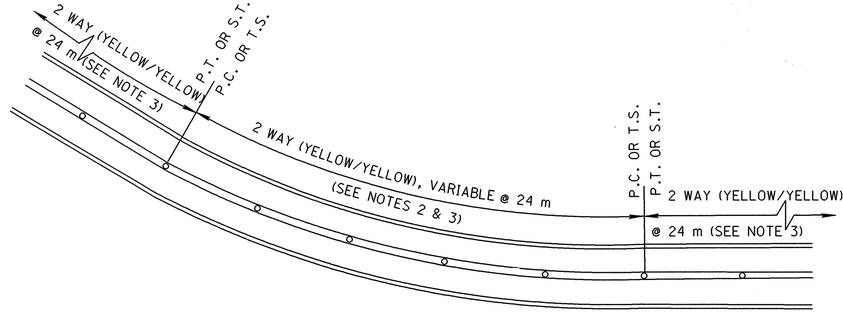
LEGEND

■ 1 WAY REFLECTORS

○ 2 WAY REFLECTORS

NOTES

1. FOR ONE LANE BRIDGES, PAINTED CENTER LINE AND CENTER LINE MARKERS SHALL BE OMITTED 48 METERS ON EACH SIDE AND ACROSS THE BRIDGE.
2. FOR HORIZONTAL CURVE RADIUS OF 380 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS SHALL BE REDUCED TO 12 m BETWEEN P.C. OR T.S. AND P.T. OR S.T.
3. FOR HORIZONTAL CURVE RADIUS OF 250 METERS OR LESS, THE SPACING OF THE CENTER LINE MARKERS MAY BE REDUCED TO 6 m BETWEEN P.C. OR T.S. AND P.T. OR S.T. WHEN USING 6 m SPACING, 12 RAISED PAVEMENT MARKERS AT 12 m SPACING SHALL BE INSTALLED ON EACH END OF THE 6 m SPACING.
4. A MINIMUM OF 3 EQUALLY SPACED RAISED PAVEMENT MARKERS SHALL BE INSTALLED ON THE BACK TAPER.
5. WHEN A CHANNELIZING LINE IS LESS THAN 24 m LONG, ONE RAISED PAVEMENT MARKER SHALL BE PLACED AT EACH END OF THE LINE AND ONE SHALL BE PLACED IN THE CENTER OF THE LINE.
6. RAISED PAVEMENT MARKERS SHALL NOT BE PLACED ON EDGE LINES ON A THROUGH APPROACH.
7. ALL APPROACHES AT A SIGNALIZED INTERSECTION SHALL BE TREATED AS SHOWN IN THE STOP APPROACH DETAIL.



HORIZONTAL CURVE

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

metric units

OFFICE OF TRAFFIC ENGINEERING DIVISION OF ENGINEERING POLICY OHIO DEPARTMENT OF TRANSPORTATION	
TRAFFIC CONTROL	DATE 11/03/93 11/01/95
RAISED PAVEMENT MARKER DETAILS II	
STANDARD CONSTRUCTION DRAWING TC-65.12M APPROVED _____ ADMINISTRATOR	

WCC