

This e-Notification deleted by Pub. 218M, Change # 2, issued on July 29, 2005

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PennDOT BQAD Publications e-Notification
Bureau of Design
Bridge Quality Assurance Division
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Publication No. 219M
Standard: BC-762M
RE: Sheet 1
No. 1
Date: 6-18-03
=====

Delete "(L/10'-0")" for the Δ (delta) equation under the Design Information.

Please direct any questions to:

Tony McCloskey, P.E.
PENNDOT Bureau of Design
Bridge Quality Assurance Division
Phone: 717-705-1495
Fax: 717-787-2882
email: amccloskey@state.pa.us

For more information, please visit the PENNDOT BQAD Publications
support web site at www.dot.state.pa.us/bridge/standards

PENNDOT e-Notification No. 2

Bureau of Design
Bridge Quality Assurance Division



Interim Revision to Bridge Standard Drawing(s)	BD-612M, Shts. 2 & 3
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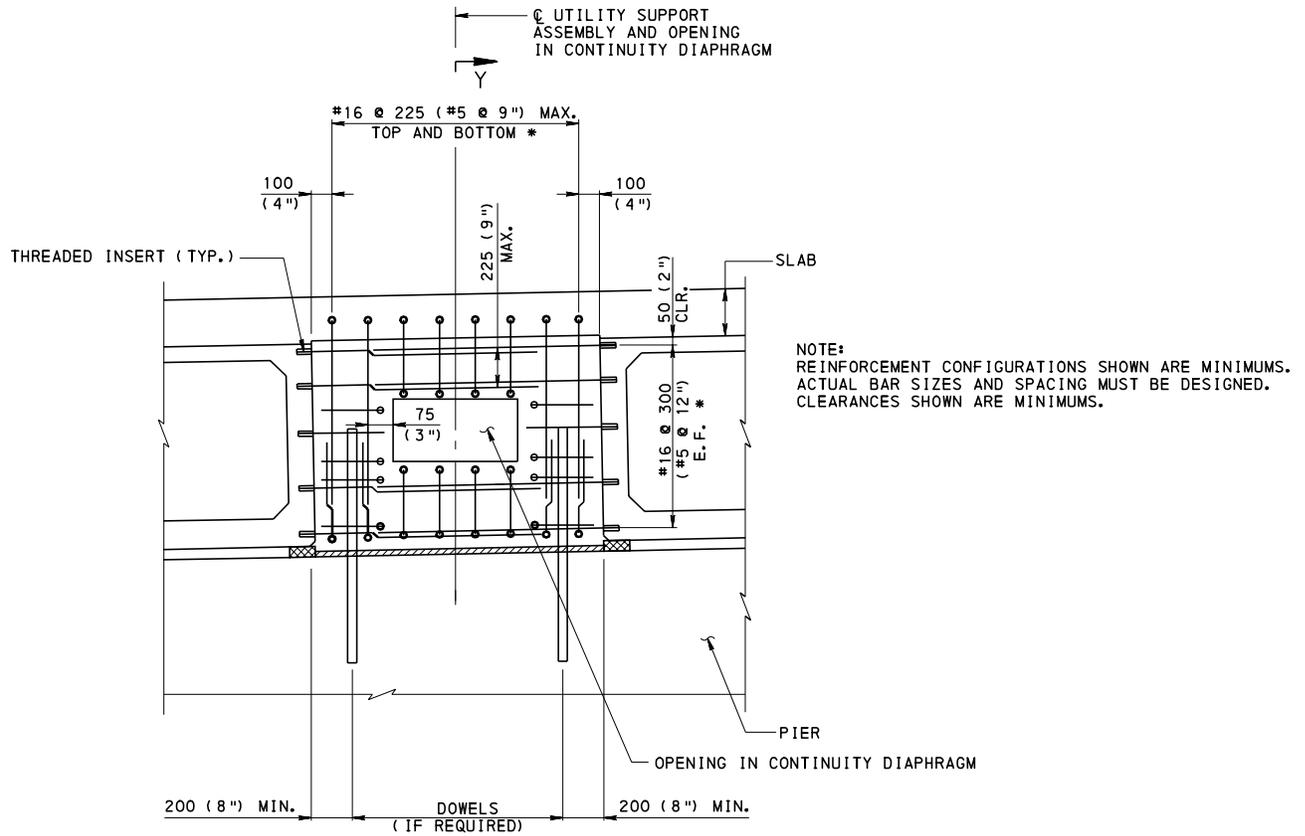
See the following two sheets for revised details from Sheets 2 & 3 which have the special confinement reinforcement around the dowel bars removed per Seismic Strike-off Letter 431-02-05, dated May 23, 2002.

Direct any questions concerning the above issue to:

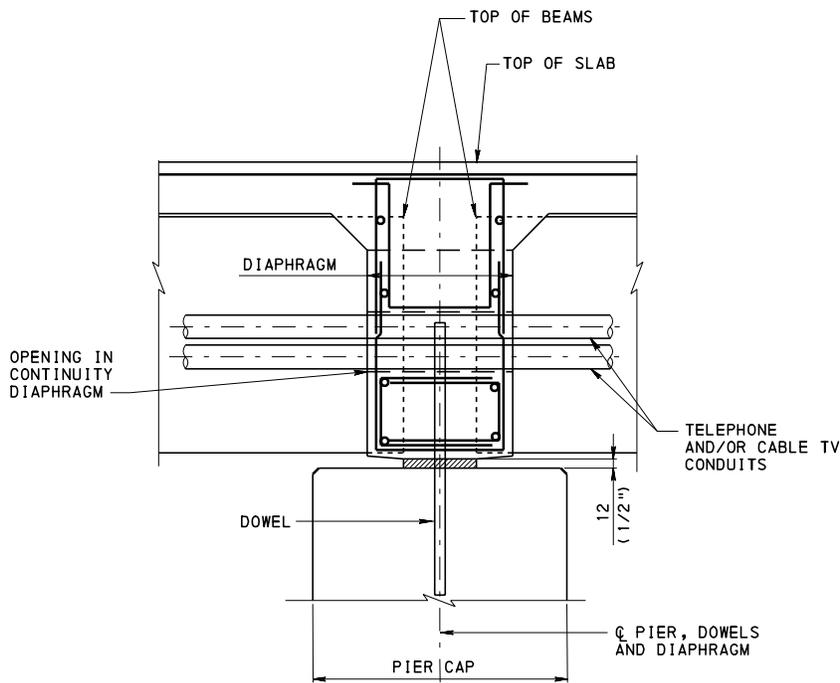
Gary P. Gordon, P.E.
Phone: (717) 783-7551
Fax: (717) 787-2882
gagordon@state.pa.us

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PIER DIAPHRAGM OPENING FOR
TELEPHONE AND/OR CABLE TV UTILITY
(SLAB REINFORCEMENT NOT SHOWN FOR CLARITY)



SECTION Y-Y

This e-Notification deleted by Pub. 218M, Change # 1, issued on April 15, 2004

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PennDOT BQAD Publications e-Notification
Bureau of Design
Bridge Quality Assurance Division
=====

Publication No. 218M
Standard: BD-621M
RE: Sheet 1
No. 3
Date: 6-18-03
=====

Please make the following minor correction to this standard:

Under Note 10, replace "BD-625M" with "BC-751M".

Please direct any questions to:

Tony McCloskey, P.E.
PENNDOT Bureau of Design
Bridge Quality Assurance Division
Phone: 717-705-1495
Fax: 717-787-2882
email: amccloskey@state.pa.us

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This e-Notification deleted by Pub. 218M, Change # 1, issued on April 15, 2004

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PennDOT BQAD Publications e-Notification
Bureau of Design
Bridge Quality Assurance Division
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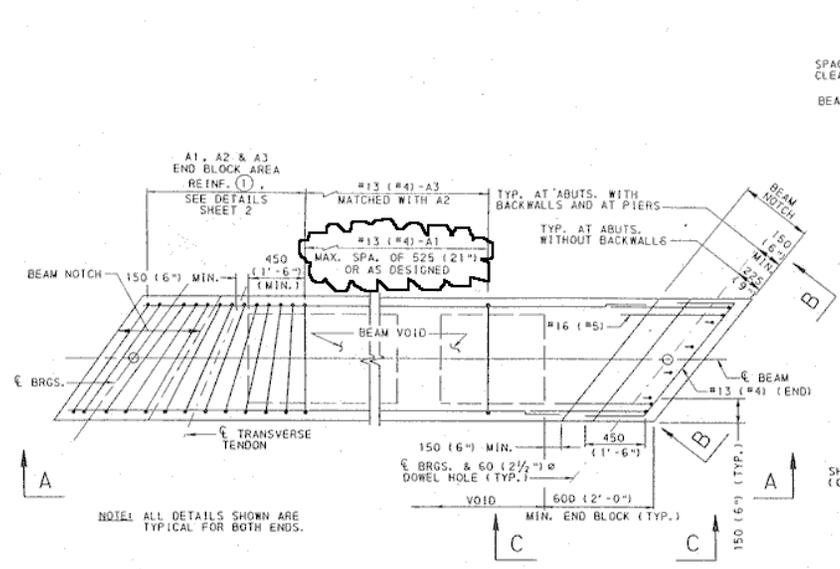
Publication No. 218M
Standard: BD-661M
RE: Sheets 1, 2, and 6
No. 4
Date: 6-20-03
=====

Revise the stirrup spacing from 525 (21") to 530 (21") as indicated on the attached Adobe Acrobat PDF File.

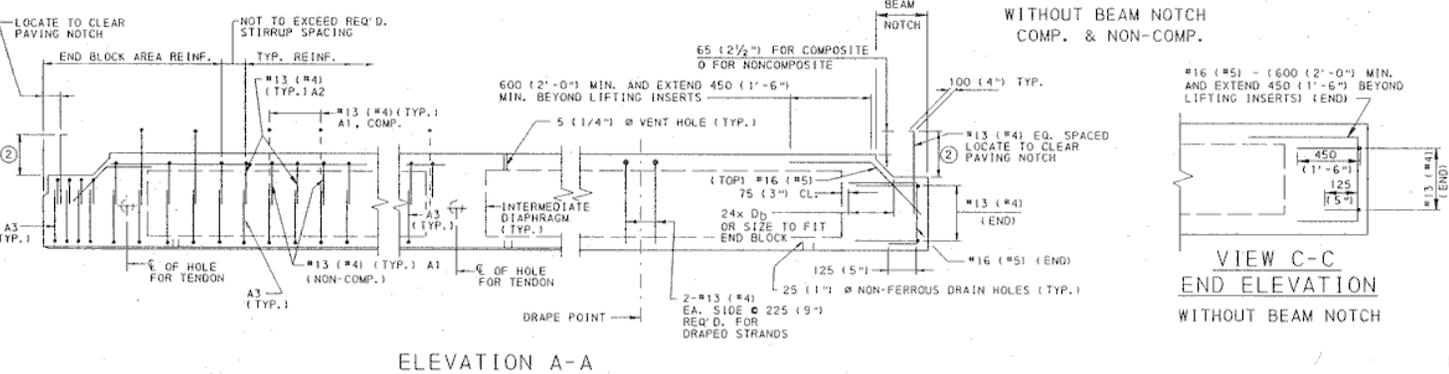
Please direct any questions to:

Tony McCloskey, P.E.
PENNDOT Bureau of Design
Bridge Quality Assurance Division
Phone: 717-705-1495
Fax: 717-787-2882
email: amccloskey@state.pa.us

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ADJACENT BOX BEAMS
PLAN-TYPICAL BEAM
(COMP. & NON-COMP.)



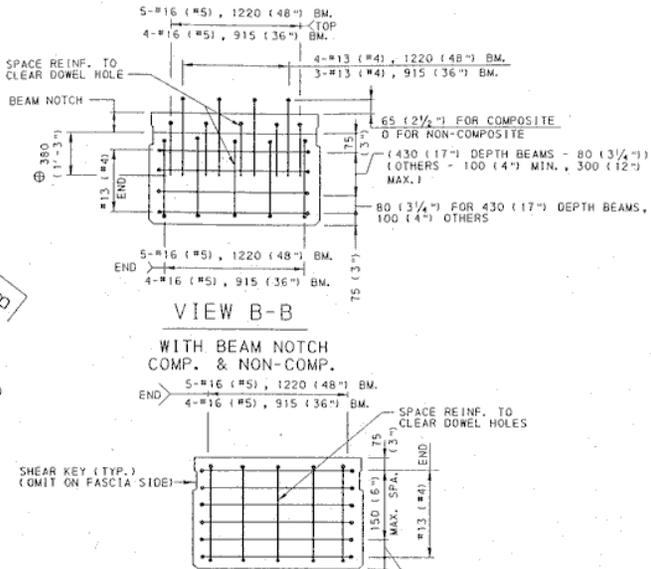
ELEVATION A-A

LEGEND:

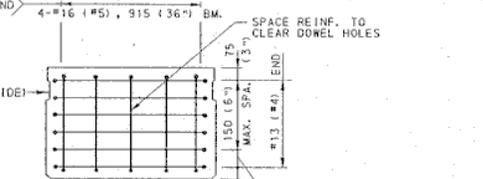
⊕ #13 (#4) BARS MAY TERMINATE 6 (1/4") ABOVE THE TOP OF THE BOTTOM SLAB OR 380 (1'-3") WHICHEVER IS LESS.

① A1 MATCHED WITH A3 IS CONSIDERED A STIRRUP ONLY IN THE END BLOCK AREA. A2 MATCHED WITH A3 IS CONSIDERED A STIRRUP ALONG THE ENTIRE LENGTH OF THE BEAM. A1 IS SPACED AT 525 (21") OR AS DESIGNED INDEPENDENTLY OF A2 AND A3 OUTSIDE THE END BLOCK AREA.

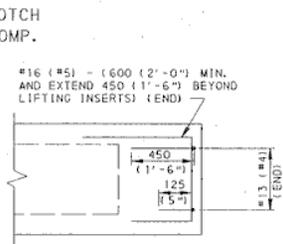
② TO BE DETAILED ON THE SHOP DRAWINGS.



VIEW B-B
WITH BEAM NOTCH
COMP. & NON-COMP.



VIEW B-B
WITHOUT BEAM NOTCH
COMP. & NON-COMP.



VIEW C-C
END ELEVATION
WITHOUT BEAM NOTCH

- GENERAL NOTES:**
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
 - SHOW DESIGN LENGTH AND CASTING LENGTH ON SHOP DRAWINGS.
 - DESIGNER TO SPECIFY STEEL CORROSION PROTECTION AS PER DESIGN MANUAL PART 4, DS-4.3.5F
 - SHOW PLAN, ELEVATION, SECTIONS AND ALL REINFORCEMENT DETAILS ON SHOP DRAWINGS.
 - SHOW ANY MODIFICATIONS TO REINFORCEMENT SPLICE AND BENDING DETAILS ON SHOP DRAWINGS.
 - CALCULATE BEARING SEAT ELEVATION, DAPPING DIMENSIONS, SLOPE AND HAUNCH DEPTH USING THE FINAL NET CAMBER - "C".
 - FOR BEAM CAMBER DIAGRAM, SEE BD-662M.
 - SHOW THE FOLLOWING DATA ON THE SHOP DRAWINGS:
 - THE SIZE AND LOCATION OF THE TEMPORARY STORAGE SUPPORTS.
 - THE TYPE AND LOCATION OF THE BRACING AND TEMPORARY SUPPORTS USED FOR THE TRANSPORTATION ERECTION OF THE BEAMS.
 - END ZONE REINFORCEMENT MAY BE INCREASED BY FABRICATOR TO REFLECT FABRICATOR'S EXPERIENCE AND/OR TO CONTROL CRACKING. WIRE MESH OF EQUIVALENT AREA IS PERMISSIBLE FOR CRACK CONTROL REINFORCEMENT.
 - FABRICATOR TO CHECK STABILITY FOR HANDLING AND TRANSPORTING OF THE MEMBERS.
 - END REINFORCEMENT SPACING MAY BE REDUCED AS REQUIRED TO SATISFY SHEAR REINF. REQUIREMENTS, BUT DO NOT REDUCE THE MINIMUM AREA TO BE REINFORCED.
 - MINIMUM COVER ON REINFORCEMENT BARS:
 - TOP SLAB - 25 (1") (COMP.)
 - TOP SLAB - 40 (1 1/2") (NON-COMP.)
 - INSIDE VOID - 25 (1")
 - ELSEWHERE - 50 (2") UNLESS OTHERWISE NOTED.
 - EPOXY COAT ALL REBARS FOR A DISTANCE OF 2700 (9'-0") FROM BEAM ENDS ADJACENT TO DECK JOINTS.
 - THE VERTICAL MILD-STEEL REINFORCEMENT (BARS A1, A2, AND A3) SHOWN ARE MINIMUMS. THE DESIGN MAY REQUIRE ADDITIONAL VERTICAL MILD-STEEL REINFORCEMENT.
 - INTERFACE SHEAR REINFORCEMENT SHOWN ARE #13 (#4) BARS, A1 WITH 525 (21") MAXIMUM SPACING. FOR #16 (#5) BARS, THE MAXIMUM SPACING IS 525 (21").
 - ALL REINFORCEMENT STEEL BARS SHOWN ARE SOFT CONVERTED METRIC SIZES THAT MEET THE REQUIREMENTS OF ASTM A 615M, A 616M AND A 706M.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

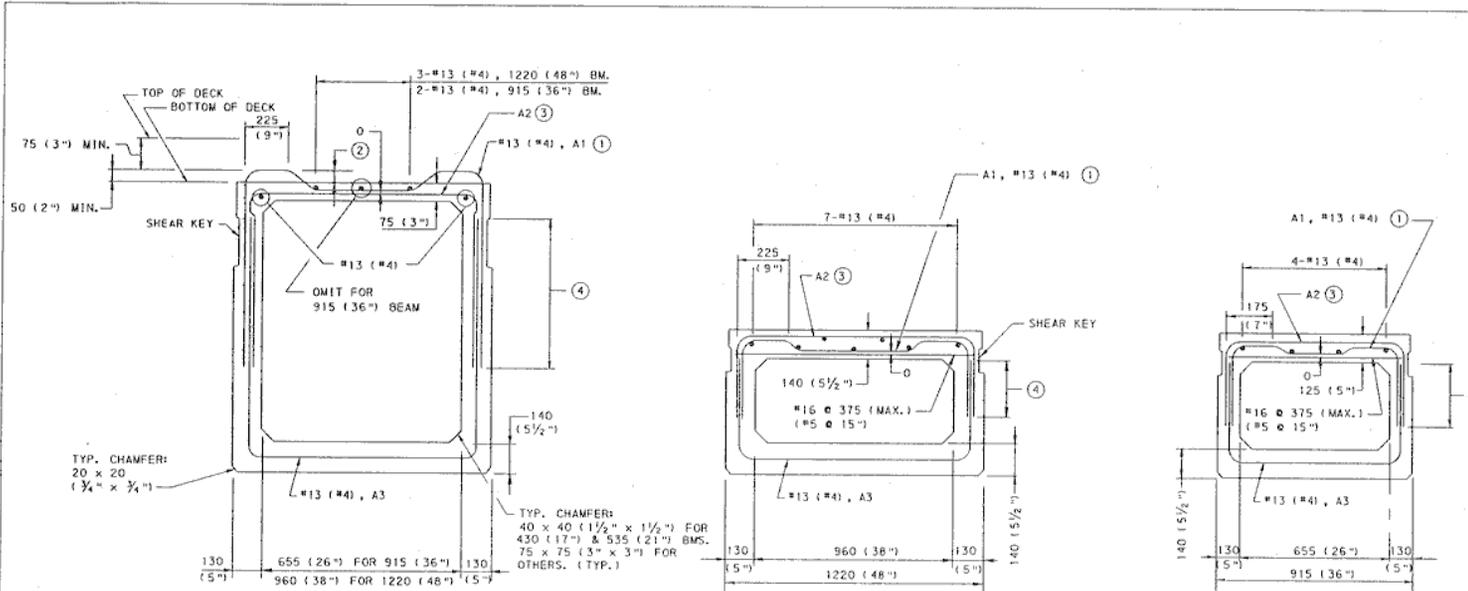
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD
BOX BEAM REINFORCEMENT DETAILS
ADJACENT BOX BEAM

BD-601M	CONCRETE DECK SLAB
BD-662M	I-BEAM REINFORCEMENT DETAILS
BC-701M	PROTECTIVE FENCE
BC-711M	ALUMINUM PROTECTIVE BARRIER
BC-716M	ALUMINUM PEDESTRIAN RAILING
BC-720M	ALUMINUM OR STEEL BRIDGE HAND RAILING
BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
BC-755M	BEARINGS
BC-775M	MISCELLANEOUS PRESTRESS DETAILS

REFERENCE DRAWINGS

RECOMMENDED JAN 21, 2003 Robert Christie CHIEF BRIDGE ENGINEER	RECOMMENDED JAN 21, 2003 Dan A. Smith DIR., BUREAU OF DESIGN	RECOMMENDED JAN 21, 2003 Joseph Hoffman CHIEF CLERK, INT. ADMIN.	SHEET 1 OF 6 BD-661M
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ADJACENT BOX BEAM NOTES:

1. FOR ALTERNATE END BLOCK REINFORCEMENT DETAIL, SEE SHEET 5.
2. #13 (#4) BARS, A1, WITH 525 (#2) MAXIMUM SPACING ARE SHOWN AS INTERFACE SHEAR REINFORCEMENT. THE DESIGN REQUIRES A GREATER SHEAR REINFORCEMENT, #16 (#5) WITH A 525 (#2) MAXIMUM SPACING BARS MAY BE USED INDICATING THE APPROPRIATE MINIMUM LAP SPLICE LENGTH.
3. OMIT SHEAR KEY ON THE FASCIA SIDE OF BEAMS.
4. FOR TYPICAL CORNER BLOCKOUT DETAIL, SEE BC-775M.
5. IF THE 75 (3") SPACING OF THE STIRRUPS IN THE END BLOCK AREA IS REQUIRED BY DESIGN TO GO BEYOND THE DEFINED END BLOCK, CONTINUE TO ALTERNATE A1 AND A2 WITH A3 TO THE END OF THE 75 (3") STIRRUP SPACING.

915 (36") & 1220 (48") ADJACENT BOX BEAM COMPOSITE DESIGN 1220 (48") ADJACENT BOX BEAM NON-COMPOSITE 915 (36") ADJACENT BOX BEAM NON-COMPOSITE

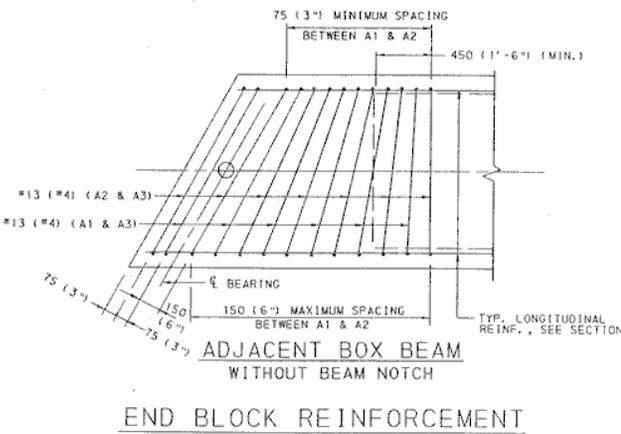
TYPICAL REINFORCEMENT, ADJACENT BOX BEAM DETAILS, COMPOSITE AND NON-COMPOSITE

(FOR ADJACENT BOX BEAMS SUPPORTING BARRIERS, SEE SHEETS 4 AND 5)

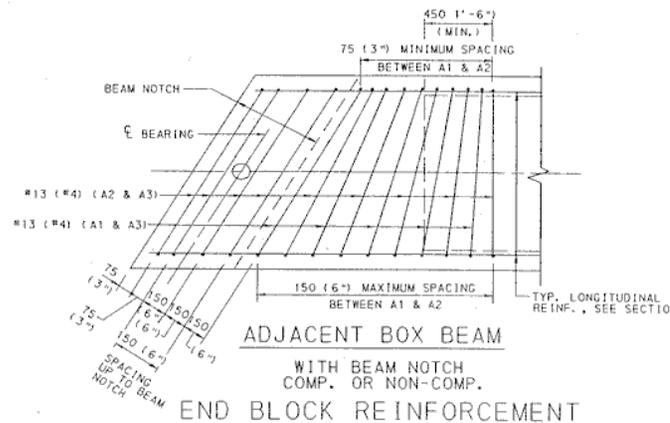
LEGEND:

- ① A1 MATCHED WITH A3 IS CONSIDERED A STIRRUP ONLY IN THE END BLOCK AREA OR UP TO WHERE THE BEAM DESIGN REQUIRES 75 (3") SPACING OF STIRRUPS. A2 MATCHED WITH A3 IS CONSIDERED A STIRRUP ALONG THE ENTIRE LENGTH OF THE BEAM. A1 IS SPACED AT 525 (21") AS DESIGNED INDEPENDENTLY OF A2 AND A3 OUTSIDE THE END BLOCK.
- ② TO BE DETAILED ON THE SHOP DRAWINGS
- ③ DENOTES MAX. SPACING FOR #13 (#4), A2 (300 (12") SPA. FOR 430 (17") BMS.) (375 (15") SPA. FOR 535 (21") BMS.) (425 (17") SPA. FOR 610 (24") BMS.) (500 (20") SPA. FOR 685 (27") BMS.) (525 (21") SPA. FOR OTHERS)
- ④ DENOTES MIN. LAP SPLICE FOR THE VERTICAL LEG OF A1 AND A2 WITH A3. A1 AND A2 WILL TERMINATE 6 (1/4") ABOVE THE TOP OF THE BOTTOM SLAB, 525 (21") OR 525 (21") MULTIPLIED BY 1.2 FOR EPOXY COATED REINFORCEMENT BARS, WHICHEVER IS LESS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



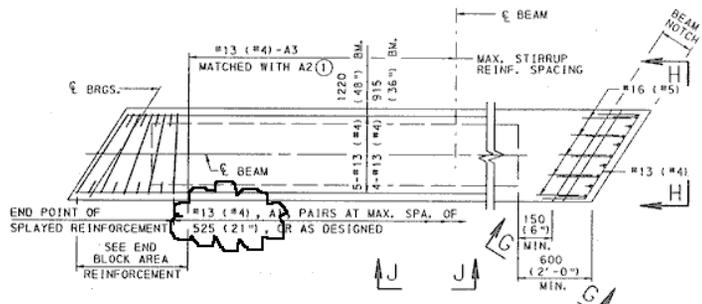
END BLOCK REINFORCEMENT



END BLOCK REINFORCEMENT

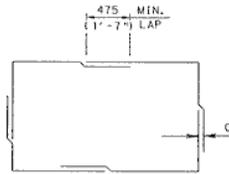
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD
BOX BEAM REINFORCEMENT DETAILS
ADJACENT BOX BEAM



PLAN - SPREAD BOX BEAM BEAM REINFORCEMENT

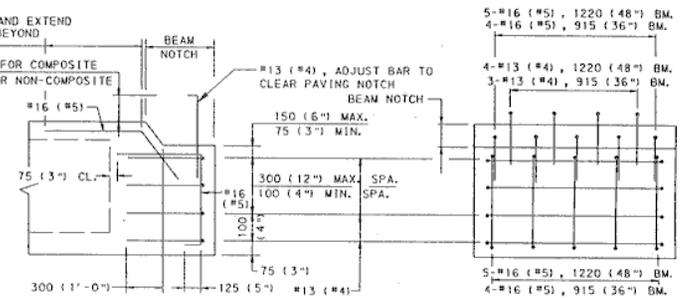
ALTERNATE END BLOCK REINFORCEMENT SPLICING DETAIL



SPREAD BOX BEAM NOTES:

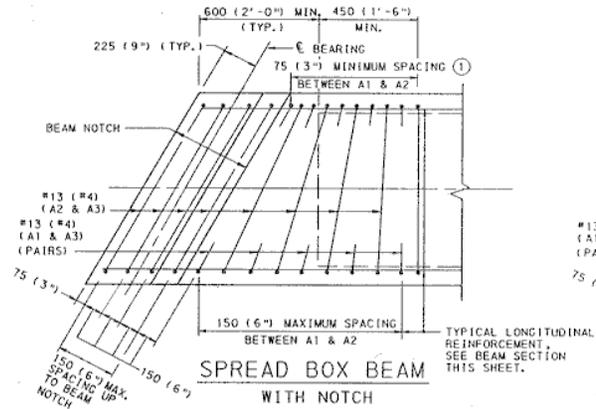
- SEE THIS SHEET FOR ALTERNATE END BLOCK REINFORCEMENT DETAIL.
- #13 (#4) BARS, WITH 525 (21") MAXIMUM SPACING ARE SHOWN AS INTERFACE SHEAR REINFORCEMENT. IF THE DESIGN REQUIRES A GREATER SHEAR REINFORCEMENT, #16 (#5) WITH A 525 (21") MAXIMUM SPACING MAY BE USED INDICATING THE APPROPRIATE MINIMUM LAP SPLICE LENGTH.
- FOR TYPICAL CORNER BLOCKOUT DETAIL, SEE BC-775M.
- IF THE 75 (3") SPACING OF THE STIRRUPS IN THE END BLOCK AREA IS REQUIRED BY DESIGN TO GO BEYOND THE DEFINED END BLOCK, CONTINUE TO ALTERNATE A1 AND A2 WITH A3 TO THE END OF THE 75 (3") STIRRUP SPACING.
- FOR NOTES (1), (2), (3) AND (4), SEE LEGEND ON SHEET 2.

600 (2'-0") MIN. AND EXTEND 450 (1'-6") MIN. BEYOND LIFTING INSERTS

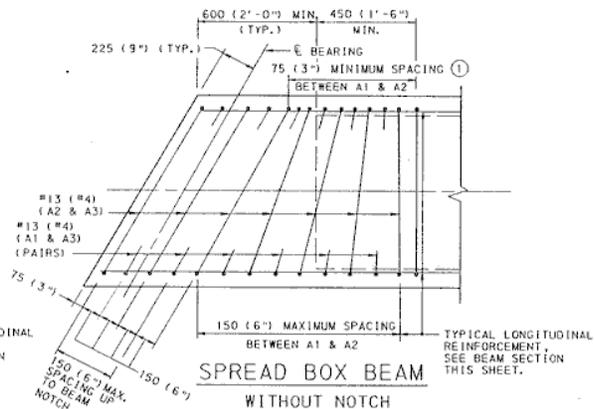


VIEW G-G WITH BEAM NOTCH

VIEW H-H WITH BEAM NOTCH

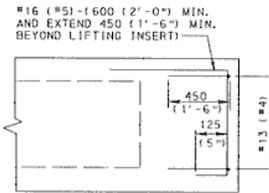


SPREAD BOX BEAM WITH NOTCH

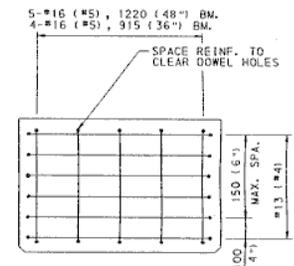


SPREAD BOX BEAM WITHOUT NOTCH

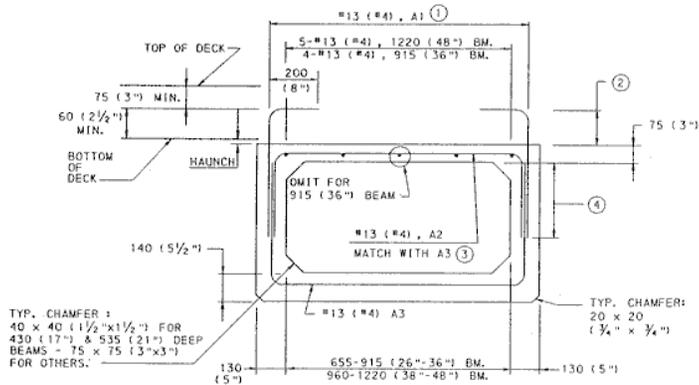
END BLOCK COMP. REINFORCEMENT



VIEW G-G WITHOUT BEAM NOTCH

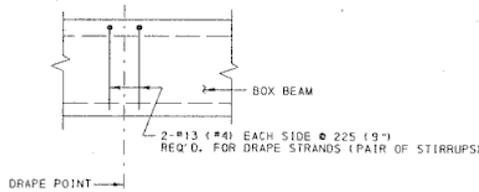


VIEW H-H WITHOUT BEAM NOTCH



SPREAD BOX BEAM SECTION

TYP. CHAMFER: 40 x 40 (1 1/2" x 1 1/2") FOR 430 (17") & 535 (21") DEEP BEAMS - 75 x 75 (3" x 3") FOR OTHERS.



BEAM ELEVATION SECTION J-J

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD
BOX BEAM REINFORCEMENT DETAILS
SPREAD BOX BEAM

This e-Notification deleted by Pub. 218M, Change # 2, issued on July 29, 2005

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PennDOT BQAD Publications e-Notification
Bureau of Design
Bridge Quality Assurance Division
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Publication No. 218M
Standard: BD-667M
RE: Sheets 1
No. 5
Date: 6-26-03
=====

For General Note 21, add the following sentence:

“Add the following sentence to Note 21: “THE BEAM SEAT MUST BE PARALLEL TO THE ROADWAY GRADE.”

Please direct any questions to:

Tony McCloskey, P.E.
PENNDOT Bureau of Design
Bridge Quality Assurance Division
Phone: 717-705-1495
Fax: 717-787-2882
email: amccloskey@state.pa.us

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PennDOT BQAD Publications e-Notification
Bureau of Design
Bridge Quality Assurance Division
=====

Publication No. 219M
Standard: BC-755M
RE: Sheets 1
No. 6
Date: 6-26-03
=====

Please make the following minor correction to this standard:

Under Elastomeric Bearing Pad Note 2, replace Section 1107.02(N) with Section 1113.02.

Please direct any questions to:

Tony McCloskey, P.E.
PENNDOT Bureau of Design
Bridge Quality Assurance Division
Phone: 717-705-1495
Fax: 717-787-2882
email: amccloskey@state.pa.us

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This e-Notification deleted by Pub. 218M, Change # 1, issued on April 15, 2004

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PennDOT BQAD Publications e-Notification
Bureau of Design
Bridge Quality Assurance Division
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Publication No. 219M
Standard: BC-732M
RE: Sheet 4
No. 7
Date: 10-22-03
=====

Attached is an Adobe Acrobat PDF File which shows the correction of a typographical error in the Section Modulus Table on this sheet.

Please direct any questions to:

William P. Longstreet
PENNDOT Bureau of Design
Bridge Quality Assurance Division
Phone: 717-783-7476
Fax: 717-787-2882
email: wlongstree@state.pa.us

For more information, please visit the PENNDOT BQAD Publications support web site at www.dot.state.pa.us/bridge/standards

This e-Notification deleted by Pub. 218M, Change # 1, issued on April 15, 2004

PENNDOT e-Notification No. 7

Bureau of Design
Bridge Quality Assurance Division



Interim Revision to Bridge Standard Drawing(s)	BC-732M, Sheet 4 of 4
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Correction to the typographical error in Required Section Modulus Value for a 9.5" slab thickness and Design Span of 6'-11" listed in table on page 4. Please manually mark the **.3674** instead of .4674 onto your Standard. Thank you.

Direct any questions concerning the above issue to:

William P. Longstreet
Phone: (717) 783-7476
Fax: (717) 787-2882
wlongstreet@state.pa.us

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REQUIRED SECTION MODULUS AND MOMENT OF INERTIA OF FORMS

S, SECTION MODULUS IN. ³ /FT. * ▲							ℓ, DESIGN SPAN	I, MOMENT OF INERTIA IN. ⁴ /FT. ▲				
T, SLAB THICKNESS, INCHES								T, SLAB THICKNESS, INCHES				
7	7½	8	8½	9	9½	10	≤ 8	8½	9	9½	10	
.0574	.0597	.0621	.0644	.0667	.0691	.0714	3'-0"	.0371	.0376	.0395	.0415	.0434
.0607	.0632	.0656	.0681	.0706	.0730	.0755	3'-1"	.0404	.0410	.0431	.0452	.0473
.0640	.0666	.0693	.0719	.0745	.0771	.0797	3'-2"	.0438	.0444	.0467	.0490	.0512
.0673	.0701	.0728	.0756	.0784	.0811	.0838	3'-3"	.0471	.0478	.0502	.0527	.0551
.0709	.0738	.0767	.0796	.0825	.0854	.0883	3'-4"	.0510	.0518	.0544	.0571	.0597
.0744	.0775	.0805	.0836	.0866	.0897	.0927	3'-5"	.0550	.0558	.0587	.0615	.0644
.0780	.0812	.0844	.0876	.0908	.0940	.0972	3'-6"	.0589	.0598	.0629	.0659	.0690
.0819	.0853	.0886	.0919	.0953	.0986	.1020	3'-7"	.0634	.0644	.0677	.0710	.0743
.0858	.0893	.0928	.0963	.0998	.1033	.1068	3'-8"	.0679	.0689	.0725	.0760	.0795
.0897	.0934	.0970	.1006	.1043	.1080	.1116	3'-9"	.0724	.0735	.0773	.0810	.0848
.0938	.0976	.1014	.1053	.1091	.1129	.1167	3'-10"	.0776	.0787	.0828	.0868	.0908
.0979	.1019	.1059	.1099	.1139	.1179	.1219	3'-11"	.0827	.0840	.0883	.0926	.0969
.1020	.1062	.1103	.1145	.1187	.1228	.1270	4'-0"	.0879	.0892	.0938	.0983	.1029
.1064	.1108	.1151	.1194	.1238	.1282	.1325	4'-1"	.0937	.0951	.1000	.1048	.1097
.1108	.1153	.1198	.1244	.1289	.1335	.1380	4'-2"	.0996	.1010	.1062	.1114	.1166
.1152	.1199	.1246	.1293	.1340	.1387	.1434	4'-3"	.1054	.1069	.1124	.1179	.1234
.1198	.1247	.1296	.1345	.1394	.1443	.1492	4'-4"	.1120	.1136	.1194	.1253	.1311
.1245	.1296	.1346	.1397	.1448	.1498	.1549	4'-5"	.1185	.1202	.1264	.1326	.1388
.1291	.1344	.1396	.1449	.1502	.1554	.1607	4'-6"	.1251	.1269	.1334	.1400	.1465
.1340	.1395	.1449	.1504	.1559	.1613	.1668	4'-7"	.1324	.1343	.1412	.1482	.1551
.1390	.1447	.1503	.1560	.1616	.1673	.1730	4'-8"	.1398	.1418	.1491	.1563	.1636
.1439	.1498	.1556	.1615	.1673	.1732	.1791	4'-9"	.1471	.1492	.1569	.1645	.1722
.1491	.1552	.1612	.1673	.1733	.1794	.1855	4'-10"	.1553	.1575	.1656	.1737	.1818
.1542	.1605	.1668	.1731	.1794	.1857	.1920	4'-11"	.1634	.1652	.1743	.1828	.1913
.1594	.1659	.1724	.1789	.1854	.1919	.1984	5'-0"	.1716	.1741	.1830	.1920	.2009
.1648	.1716	.1783	.1851	.1917	.1985	.2052	5'-1"	.1806	.1833	.1926	.2021	.2115
.1702	.1772	.1842	.1912	.1981	.2051	.2120	5'-2"	.1897	.1924	.2023	.2122	.2220
.1757	.1829	.1901	.1972	.2044	.2116	.2188	5'-3"	.1987	.2016	.2119	.2223	.2326
.1814	.1888	.1963	.2036	.2111	.2185	.2259	5'-4"	.2086	.2116	.2225	.2334	.2442
.1871	.1947	.2024	.2100	.2177	.2254	.2330	5'-5"	.2185	.2217	.2330	.2444	.2558
.1928	.2007	.2086	.2164	.2243	.2323	.2401	5'-6"	.2284	.2317	.2436	.2555	.2674
.1988	.2072	.2156	.2240	.2324	.2408	.2492	5'-7"	.2393	.2427	.2552	.2677	.2801
.2048	.2137	.2226	.2315	.2404	.2494	.2583	5'-8"	.2501	.2538	.2668	.2798	.2929
.2108	.2202	.2297	.2391	.2485	.2580	.2674	5'-9"	.2610	.2648	.2784	.2920	.3056
.2170	.2264	.2359	.2453	.2547	.2641	.2735	5'-10"	.2729	.2768	.2911	.3053	.3195
.2232	.2326	.2420	.2514	.2608	.2703	.2797	5'-11"	.2847	.2889	.3037	.3185	.3334
.2294	.2388	.2482	.2576	.2670	.2764	.2858	6'-0"	.2966	.3009	.3164	.3318	.3473
.2359	.2456	.2553	.2649	.2746	.2842	.2939	6'-1"	.3095	.3140	.3301	.3462	.3624
.2425	.2524	.2623	.2722	.2821	.2921	.3020	6'-2"	.3223	.3270	.3439	.3606	.3774
.2490	.2592	.2694	.2795	.2897	.2999	.3101	6'-3"	.3352	.3401	.3576	.3750	.3925
.2558	.2663	.2767	.2871	.2976	.3081	.3185	6'-4"	.3481	.3542	.3724	.3906	.4088
.2626	.2733	.2841	.2948	.3055	.3161	.3270	6'-5"	.3611	.3684	.3873	.4062	.4251
.2694	.2804	.2914	.3024	.3134	.3244	.3354	6'-6"	.3740	.3825	.4021	.4218	.4414
.2764	.2877	.2990	.3103	.3216	.3329	.3442	6'-7"	.3871	.3968	.4182	.4386	.4590
.2834	.2950	.3066	.3181	.3297	.3413	.3529	6'-8"	.4001	.4101	.4334	.4555	.4767
.2904	.3023	.3142	.3260	.3379	.3499	.3617	6'-9"	.4132	.4244	.4504	.4723	.4943
.2977	.3099	.3221	.3342	.3464	.3588	.3708	6'-10"	.4264	.4384	.4677	.4905	.5133
.3051	.3176	.3300	.3425	.3549	.3674	.3798	6'-11"	.4406	.4546	.4850	.5086	.5323
.3124	.3252	.3379	.3507	.3634	.3762	.3889	7'-0"	.4549	.4709	.5023	.5268	.5513
.3200	.3331	.3461	.3592	.3722	.3853	.3983	7'-1"	.4693	.4855	.5209	.5463	.5717
.3275	.3409	.3543	.3676	.3810	.3944	.4078	7'-2"	.4838	.5011	.5395	.5658	.5922
.3351	.3488	.3625	.3761	.3898	.4035	.4172	7'-3"	.4984	.5168	.5581	.5853	.6126
.3429	.3570	.3710	.3849	.3989	.4130	.4270	7'-4"	.5131	.5326	.5780	.6062	.6344
.3508	.3651	.3794	.3938	.4081	.4224	.4367	7'-5"	.5279	.5484	.5979	.6270	.6563
.3586	.3733	.3879	.4026	.4172	.4319	.4465	7'-6"	.5428	.5643	.6178	.6479	.6781
.3667	.3817	.3966	.4117	.4266	.4416	.4566	7'-7"	.5578	.5803	.6381	.6692	.7008
.3747	.3901	.4053	.4207	.4360	.4514	.4666	7'-8"	.5729	.5964	.6584	.6905	.7231
.3828	.3985	.4141	.4298	.4454	.4611	.4767	7'-9"	.5881	.6126	.6786	.7117	.7453
.3912	.4072	.4232	.4392	.4551	.4711	.4871	7'-10"	.6034	.6289	.6989	.7329	.7675
.3996	.4159	.4322	.4486	.4649	.4813	.4976	7'-11"	.6188	.6453	.7193	.7543	.7899
.4080	.4247	.4413	.4580	.4746	.4913	.5080	8'-0"	.6343	.6618	.7393	.7753	.8119
.4166	.4336	.4506	.4677	.4847	.5017	.5187	8'-1"	.6499	.6784	.7604	.7974	.8349
.4253	.4427	.4600	.4774	.4948	.5121	.5295	8'-2"	.6656	.6951	.7811	.8191	.8576
.4339	.4516	.4693	.4871	.5048	.5225	.5402	8'-3"	.6814	.7129	.8029	.8419	.8814
.4428	.4609	.4790	.4971	.5151	.5332	.5513	8'-4"	.6973	.7308	.8248	.8658	.9073
.4517	.4702	.4886	.5071	.5255	.5440	.5624	8'-5"	.7134	.7489	.8469	.8899	.9334
.4606	.4794	.4982	.5171	.5359	.5547	.5735	8'-6"	.7296	.7671	.8691	.9141	.9596
.4698	.4890	.5082	.5274	.5465	.5657	.5849	8'-7"	.7459	.7854	.8914	.9384	.9859
.4789	.4985	.5180	.5376	.5572	.5767	.5963	8'-8"	.7623	.8038	.9138	.9628	.10123
.4881	.5080	.5280	.5479	.5678	.5878	.6077	8'-9"	.7788	.8223	.9363	.9873	.10368
.4975	.5178	.5381	.5585	.5788	.5991	.6194	8'-10"	.7954	.8409	.9589	.10129	.10794
.5070	.5277	.5484	.5691	.5898	.6105	.6312	8'-11"	.8121	.8596	.9816	.10386	.11091
.5164	.5375	.5586	.5797	.6007	.6218	.6429	9'-0"	.8289	.8784	.10044	.10664	.11409
.5261	.5476	.5691	.5906	.6120	.6335	.6550	9'-1"	.8458	.8973	.10279	.10919	.11694
.5358	.5577	.5796	.6015	.6233	.6452	.6671	9'-2"	.8628	.9163	.10709	.11369	.12174
.5455	.5678	.5901	.6124	.6346	.6569	.6792	9'-3"	.8799	.9354	.10980	.11660	.12515
.5555	.5782	.6009	.6236	.6462	.6689	.6916	9'-4"	.8971	.9546	.11226	.11926	.12811
.5654	.5885	.6116	.6347	.6578	.6809	.7040	9'-5"	.9144	.9739	.11411	.12131	.13056
.5754	.5989	.6224	.6459	.6694	.6929	.7164	9'-6"	.9318	.9933	.11611	.12351	.13316
.5856	.6095	.6334	.6574	.6813	.7052	.7291	9'-7"	.9493	.10128	.11848	.12608	.13613
.5958	.6202	.6445	.6689	.6932	.7176	.7419	9'-8"	.9669	.10284	.12044	.12824	.13879
.6060	.6308	.6555	.6803	.7051	.7298	.7546	9'-9"	.9846	.10491	.12301	.13101	.14206
.6165	.6417	.6669	.6921	.7173	.7425	.7677	9'-10"	.10024	.10679	.12529	.13349	.14504
.6270	.6526	.6782	.7039	.7295	.7551	.7807	9'-11"	.10191	.10866	.12756	.13596	.14791
.6375	.6636	.6896	.7157	.7417	.7678	.7938	10'-0"	.10360	.11055	.12985	.13845	.15090

NOTE: COMPUTATIONS ARE REQUIRED FOR SPANS IN EXCESS OF TEN FEET ALONG WITH SHOP DRAWINGS.

BC 732M, SHT. 4 OF 4

REQUIRED SECTION MODULUS AND MOMENT OF INERTIA OF FORMS TABLE

PENNDOT e-Notification No. 8

Bureau of Design
Bridge Quality Assurance Division



Feb. 23, 2004

Interim Revision to Bridge Standard Drawing(s)
--

BC-707M, Sht. 1 - PA HT Post Radius correction

ELEVATION – POST DETAIL has the following revisions and clarifications:

- A. REVISE THE EXISTING OUTER EDGE POST RADIUS OF 250 (10") R TO INDICATE 240 (9 1/2 ") R. CENTER POINT TO BE LOCATED AT 75 (3") FROM INSIDE EDGE OF POST PLATE AND 190 (7 5/8") FROM BOTTOM EDGE OF POST PLATE.
- B. REVISE THE POST PLATE DIMENSION IN THE TOP RIGHT BLOW-UP VIEW FROM 6 (1/4") TO 10 (3/8").
- C. CLARIFY THE CENTER POINT OF THE 4 1/2 INCH INSIDE RADIUS OF POST PLATE.

THIS DETAIL IS INCLUDED ON THE NEXT SHEET AND THE REVISIONS ARE CLOUDED.

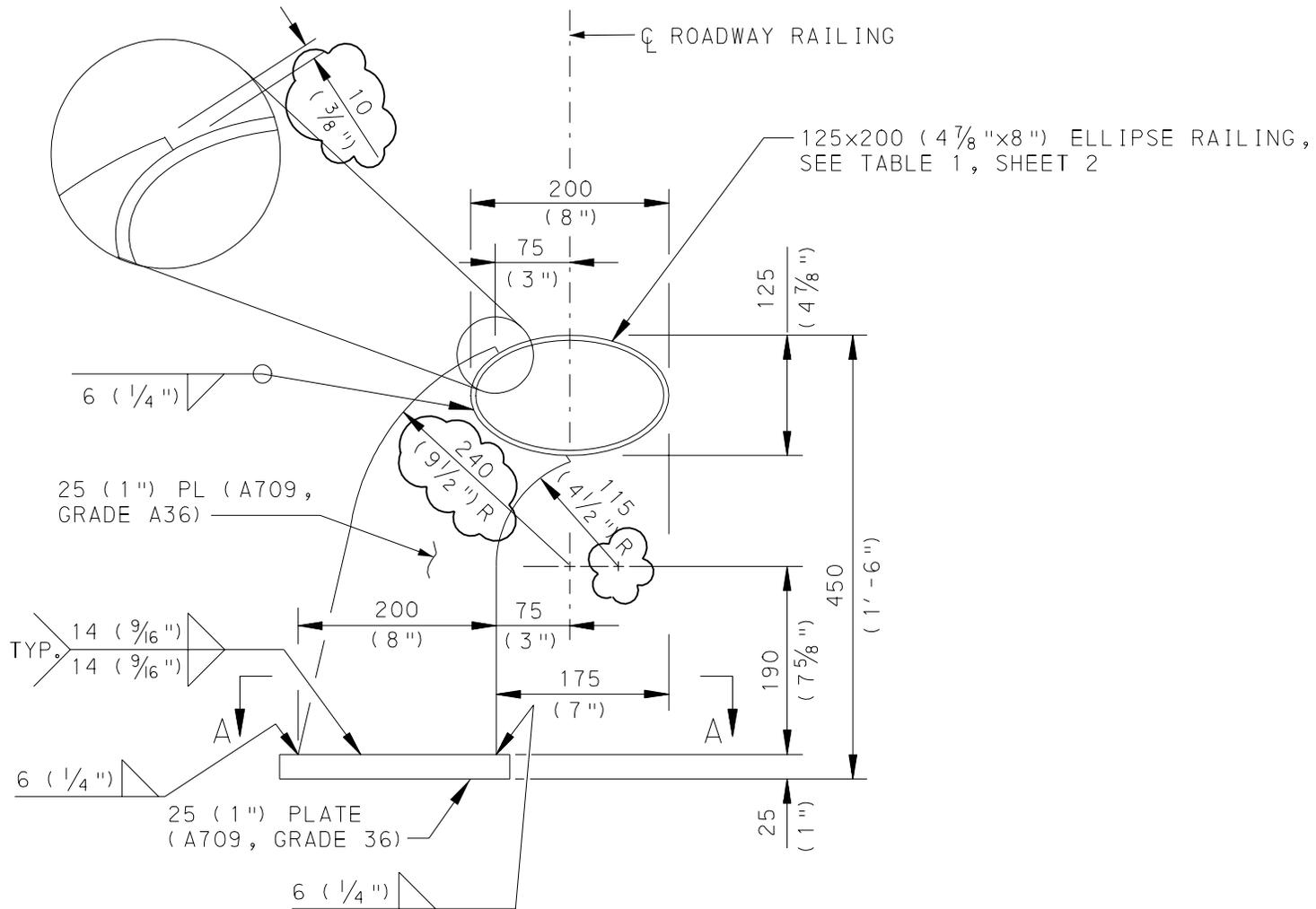
Please note implementation of these revisions is immediate. For projects already in construction, please contact BQAD's Bryan Spangler, at (717) 783-5347, if fabrication has already commenced.

Direct any questions concerning the above issue to:

William P. Longstreet
Phone: (717) 783-7476
Fax: (717) 787-2882
wlongstree@state.pa.us

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This e-Notification deleted by Pub. 218M, Change # 2, issued on July 29, 2005



ELEVATION-POST
(TYPICAL)

PENNDOT e-Notification

Bureau of Design
Bridge Quality Assurance Division



May 19, 2004

Interim Revision to Bridge Standard Drawing(s) – No. 9	BD-632M, Sht. 5 - Revised Joint Detail
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JOINT DETAIL has the following revisions and clarifications:

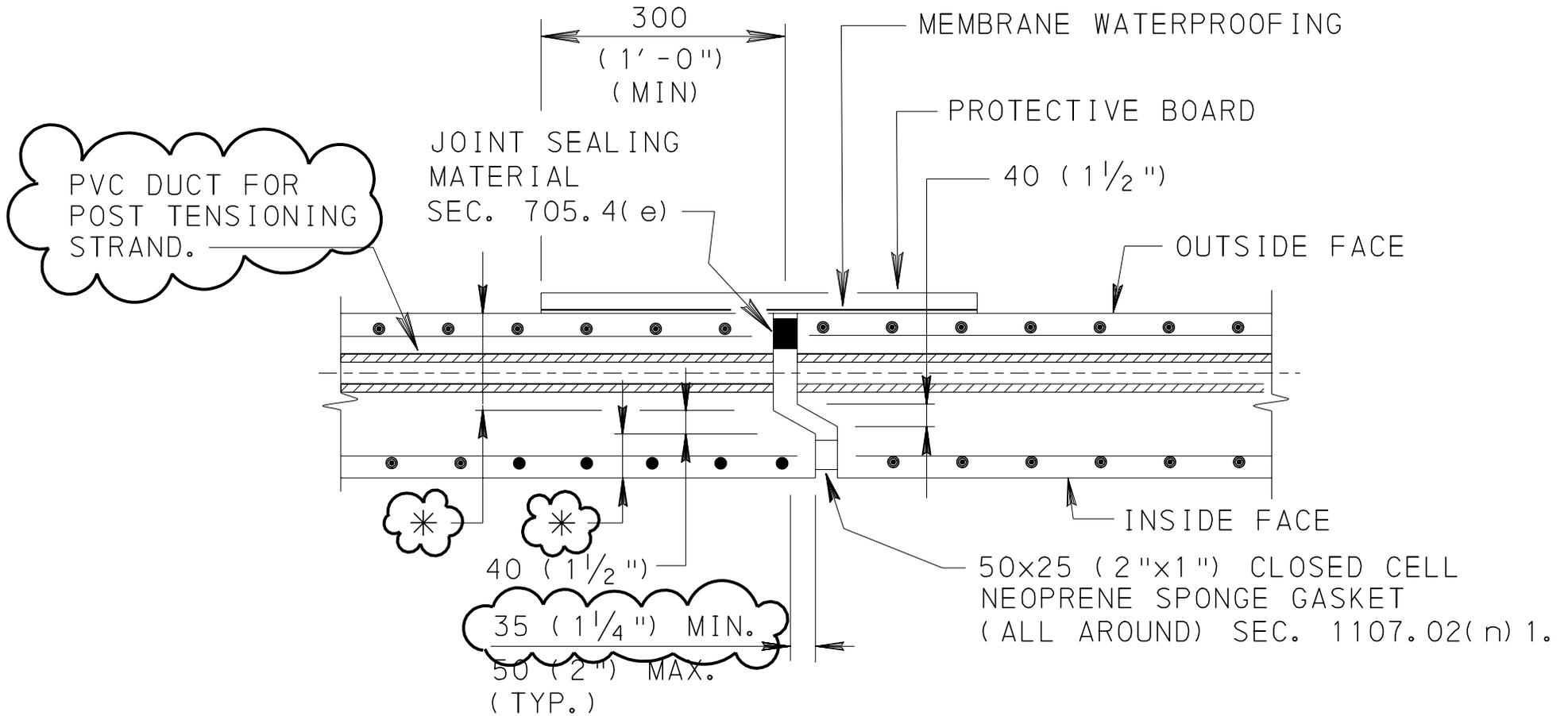
- A. Added PVC Duct for Post Tensioning Strand detail to drawing.
- B. Changed 40 min. / 50 max. dimension to 35 min. / 50 max.
- C. Removed SEE NOTE 24 SHEET 4 references and added note (*) beneath Details title. Increased thickness break point used to determine perpendicular surface width of joint from 300 (1'-0") to 350 (1'-2").

Please note implementation of these revisions is immediate. For projects already in construction, please contact BQAD's Bryan Spangler, at (717) 783-5347, if fabrication has already commenced.

Direct any questions concerning the above issue to:

William P. Longstreet
Phone: (717) 783-7476
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wlongstreet@state.pa.us

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JOINT DETAIL

SEAL AROUND EACH DUCT JOINT WITH A NEOPRENE SPONGE DONUT.

* ≥ 125 (5") WHEN WALL OR SLAB ≥ 350 (1'-2")
 * ≥ 75 (3") WHEN WALL OR SLAB < 350 (1'-2")

This e-Notification deleted by Pub. 218M, Change # 5, issued on July 20, 2007

PENNDOT e-Notification No. 11

Bureau of Design
Bridge Quality Assurance Division



Interim Revision to Bridge Standard Drawing(s)	July 29, 2005 Revised Standards issued and all e- notifications discontinued on Aug. 18, 2005
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All previous e-Notifications are discontinued with the release of Pub. 218M, Change 2 & Pub. 219M, Change 3 which were issued by Strike-off Letter 431-05-03, dated August 18, 2005.

PENNDOT e-Notification No. 12

Bureau of Design
Bridge Quality Assurance Division



Dec. 29, 2005

Interim Revision to Bridge Standard Drawing(s)
--

BD-613M, dated Jan. 21, 2003, Shts. 1, 3, 4, 7 & 9 - Metric Unit Tables' corrections and 3 Note corrections
--

Corrections are provided for the Vertical Loads and their corresponding Horizontal Loads listed in the Metric Tables located on Shts. 3, 4, 7 and 9 of this standard. The last four Vertical loads in the English units Tables were not correctly converted over to Metric units.

In addition, three (3) minor corrections are included to Notes contained on Sht. 1.

Please note implementation of these revisions is immediate.

Direct any questions concerning the above issue to:

Patricia L. Kiehl, P. E.
PENNDOT Bureau of Design
Bridge Quality Assurance Division
Phone: (717) 772-0568
Fax: (717) 787-2882
pkiehl@state.pa.us

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e-Notification No. 12 - BD-613M corrections

Sheet 1:

INSTRUCTIONS FOR USING DESIGN TABLES:

- Note 3 - revise the metric load in the 3rd sentence from 5293kN to 6672kN.
- Note 9, line 5 – add “TO” after “EQUAL”.

DESIGN METHODOLOGY – SOLE PLATE DESIGN:

- Note 1 – revise “THOUGH” to read “THROUGH”.

Sheets 3 & 7:

Metric Tables contains four (4) incorrect Vertical Loads and their corresponding “10% Horizontal Loads” as shown below in shaded portion of table:

4003	400	0.03
4226	423	0.03
4448	445	0.03
4893	489	0.03
4993	499	0.03
5093	509	0.03
5193	519	0.03
5293	529	0.03

Corrected Loads are shown below in shaded portion of table:

4003	400	0.03
4226	423	0.03
4448	445	0.03
4893	489	0.03
5338	534	0.03
5782	578	0.03
6227	623	0.03
6672	667	0.03

e-Notification No. 12 - BD-613M corrections

Sheets 4 & 9:

Metric Tables contains four (4) incorrect Vertical Loads and their corresponding “30% Horizontal Loads” as shown below in shaded portion of table:

4003	1201	0.03
4226	1268	0.03
4448	1334	0.03
4893	1468	0.03
4993	1498	0.03
5093	1528	0.03
5193	1558	0.03
5293	1588	0.03

Corrected Loads are shown below in shaded portion of table:

4003	1201	0.03
4226	1268	0.03
4448	1334	0.03
4893	1468	0.03
5338	1601	0.03
5782	1735	0.03
6227	1868	0.03
6672	2002	0.03

This e-Notification deleted by Sept. 2010 Edition, issued on Sept. 29, 2010

e-Notification No. 17 (this number was not included in distributed message):

On BD-662M, sheet 2, on "TYPICAL CLIPPED FLANGE REINFORCEMENT DETAILS", the Beam End View has a typo. The word "VEIW" should be "VIEW".

PENNDOT e-Notification No. 18

Bureau of Design
Bridge Quality Assurance Division



Nov. 20, 2007

Interim Revision to Bridge Standard Drawing(s)	BD-664M, dated July 20, 2007, Sheet 4 – Addition of 200 (8”) Maximum Difference of Depth for Adjacent Span PA Bulb-Tee prestressed concrete beams.
--	---

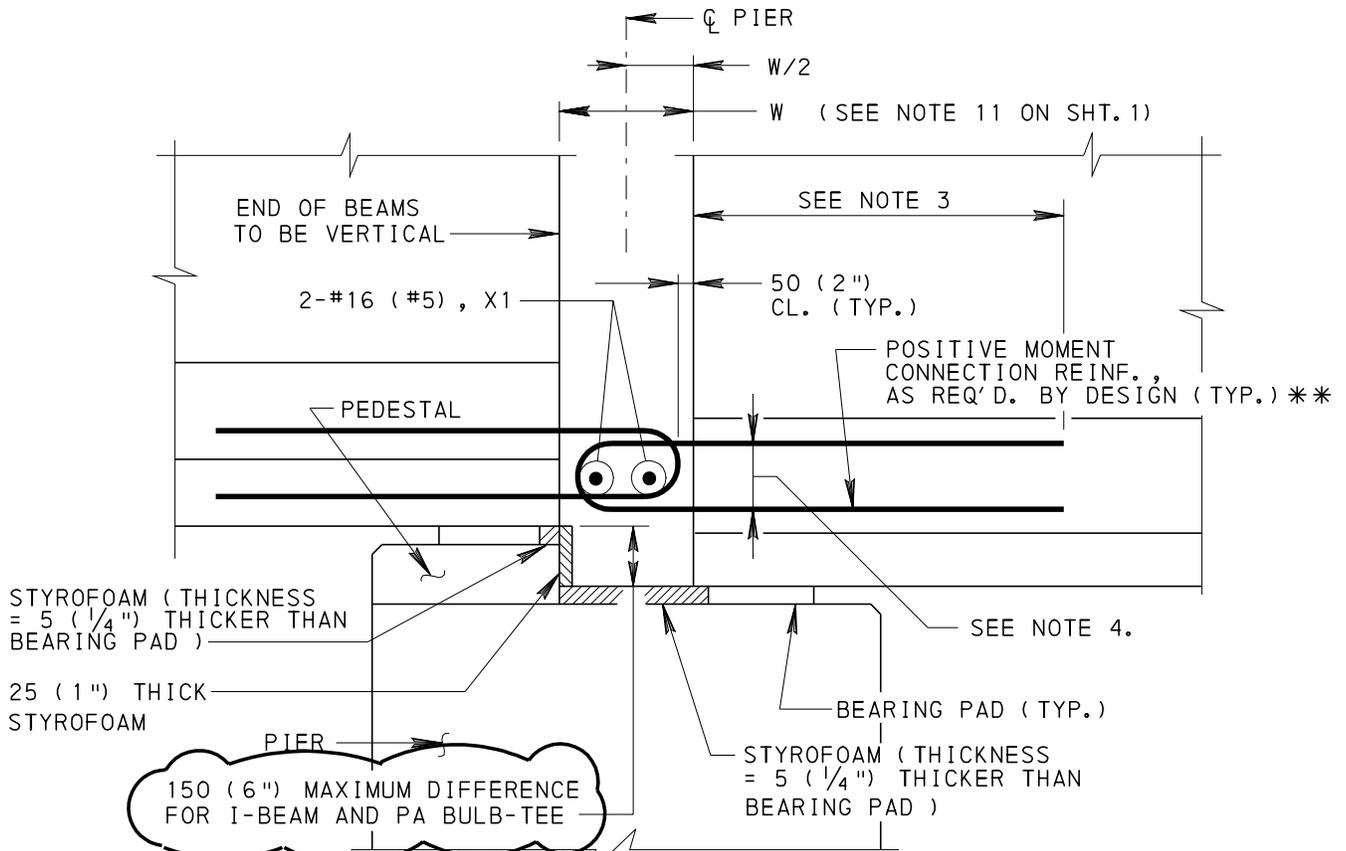
In OPTIONAL POSITIVE MOMENT CONNECTION DETAIL AT PIER: Added maximum height difference of 200 (8”) for adjacent span PA Bulb-Tee prestressed concrete beams. This correction is shown in the attached 8.5”x11” page.

Please note that implementation of this revision is immediate.

Direct any questions concerning the above issue to:

Gary P. Gordon, P.E.
PENNDOT Bureau of Design
Bridge Quality Assurance Division
Phone: (717) 783-7551
Fax: (717) 787-2882
gagordon@state.pa.us

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OPTIONAL POSITIVE MOMENT CONNECTION
DETAIL AT PIER

(DIFFERENT BEAM DEPTH-FIXED)

150 (6") MAXIMUM DIFFERENCE
FOR I-BEAM AND 200 (8") FOR
PA BULB-TEE

e-Notification No. 18

BD-664M, SHT.4 OF 4
(JULY 20, 2007)

MAXIMUM BEAM DEPTH DIFFERENCE
FOR PA BULB-TEE

PENNDOT e-Notification No. 19

Bureau of Design
Bridge Quality Assurance Division



Nov. 27, 2007

Interim Revision to Bridge Standard Drawing(s)
--

BD-632M, dated July 20, 2007, Sheet 7 – SECTION A-A: Revision of Anchor Bolt Bar Size embedded in slab, railing tube size and number of longitudinal rebars required in parapet.

In Section A-A of BD-632M, Sheet 7:

- Revise size of anchor bolt bar embedded in the slab from #22 (#7) to #19 (#6).
- Add "x 3/16" to thickness of top railing tube.
- Add the following call-out for longitudinal reinforcement in barrier's concrete parapet:

REQUIRED ADDITIONAL REINFORCEMENT IF CURB HEIGHT IS GREATER THAN 200 (8")

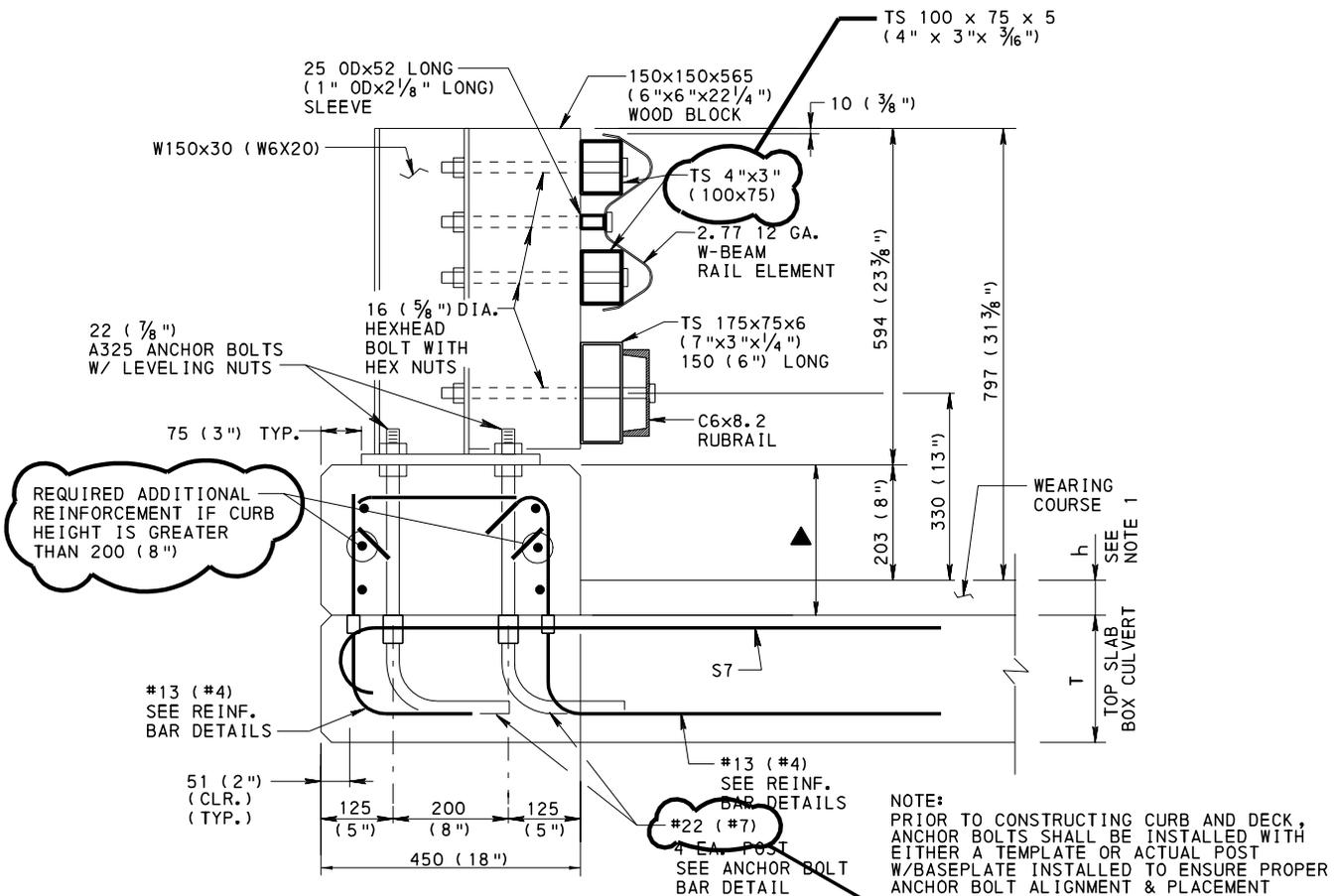
These revisions are shown in the attached 8.5"x11" page.

Please note that implementation of this revision is immediate.

Direct any questions concerning the above issue to:

William P. Longstreet
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Phone: (717) 783-7476
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wlongstree@state.pa.us

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SECTION A-A

(SLAB BRIDGES & LIKE STRUCTURES)

- CURB REINFORCEMENT SHOWN FOR CLARITY, SEE BD-609M.
- SEE RC-52M FOR TYPE 2 STRONG POST GUIDE RAIL DETAILS
- S7 REINFORCEMENT REQUIRED AT POST LOCATIONS ONLY. SEE SHEET 7 FOR S7 REINFORCEMENT DETAIL.

e-Notification No. 19

BD-632M, SHT.7 OF 11
(JULY 20, 2007)

REVISION OF ANCHOR BOLT
BAR SIZE

This e-Notification rescinded by e-Notification No. 22

PENNDOT e-Notification No. 20

Bureau of Design
Bridge Quality Assurance Division



Dec. 7, 2007

Interim Revision to Bridge Standard Drawing(s)	BD-667M, dated July 20, 2007, Sheet 6 – APPROACH SLAB CONNECTION DETAILS: Replacing “BOND BREAKER” with “circled Note 12 - COAT WITH EPOXY BONDING COMPOUND...”.
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In the two (2) Approach Slab Connection details of BD-667M, Sheet 6:

- Replace “BOND BREAKER” with circled Note 12 which is explained below.

Add circled Note 12 to LEGEND and make it read as follows:

COAT WITH AN APPROVED EPOXY BONDING COMPOUND PRIOR TO PLACING APPROACH SLAB CONCRETE.

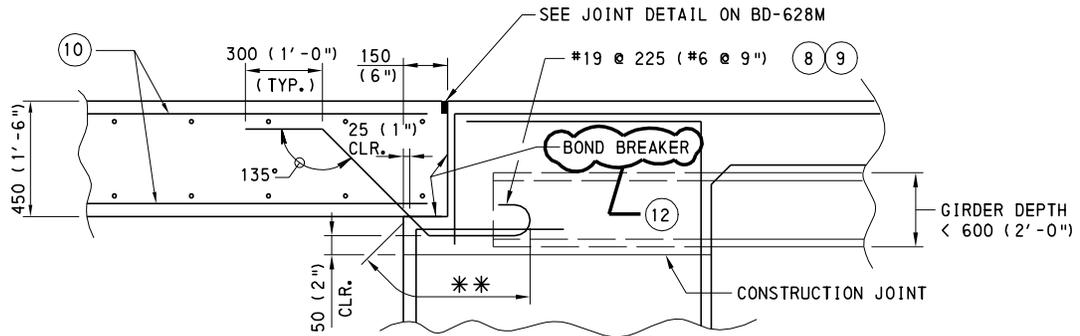
These revisions are shown in the attached 8.5”x11” page.

Please note that implementation of this revision is immediate.

Direct any questions concerning the above issue to:

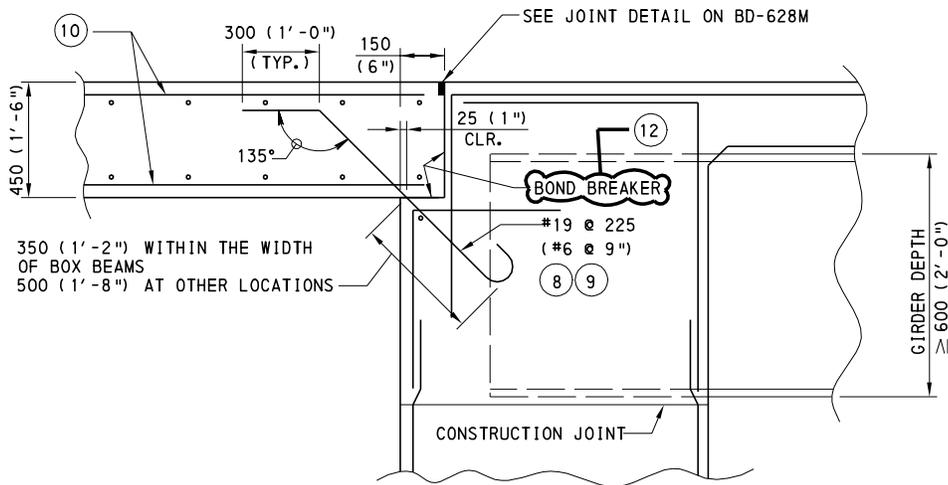
Gary P. Gordon, P.E.
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Phone: (717) 783-7551
Fax: (717) 787-2882
gagordon@state.pa.us

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APPROACH SLAB CONNECTION DETAIL
GIRDER DEPTH < 600 (2'-0")

** 350 (1'-2") WITHIN THE WIDTH OF BOX BEAMS
500 (1'-8") AT OTHER LOCATIONS



APPROACH SLAB CONNECTION DETAIL
GIRDER DEPTH ≥ 600 (2'-0")

LEGEND:

- ⑧ FOR STEEL AND CONCRETE GIRDERS, ADJUST SPACING TO CLEAR GIRDERS.
- ⑨ FOR 180° HOOK DIMENSIONS, REFER TO BC-736M.
- ⑩ FOR DIMENSIONS AND REINFORCEMENT OF APPROACH SLAB, SEE STANDARD DRAWING BD-628M.
- ⑪ POUR BRIDGE DECK BEFORE POURING THE END DIAPHRAGM EXCEPT THE PORTION OF THE DECK WITHIN 1200 mm (4'-0") FROM THE FRONT FACE OF THE ABUTMENT WHICH WILL BE POURED 2 HOURS AFTER PLACING THE END DIAPHRAGM.
- ⑫ COAT WITH AN APPROVED EPOXY BONDING COMPOUND PRIOR TO PLACING APPROACH SLAB CONCRETE.

**This e-Notification rescinded by
e-Notification No. 22**

e-Notification No. 20

BD-667M, SHT.6 OF 6
(JULY 20, 2007)

ADDING EPOXY BONDING COMPOUND
BETWEEN APPROACH SLAB
AND ABUTMENT

This e-Notification deleted by Sept. 2010 Edition, issued on Sept. 29, 2010

=====
PennDOT BQAD Publications e-Notification
Bureau of Design
Bridge Quality Assurance Division
=====

Publication No. 218M
Standard: BD-661M
RE: Sheet 8
No. 21
Date: 2-4-08
=====

In BEAM NOTCH NOTES No. 5 for Table B: Correct beam depth to be **990 (39")** instead of 1065 (42").

This correction makes Note 5 agree with the statement contained with DETAIL 20 on Sheet 29 of the Bridge Approach Slab standard, BD-628M. It lists the minimum beam depth required to use Type 3 & 4 Approach Slabs for Prestressed Concrete Spread Box Beam Bridges that have abutment with backwalls.

Please note that implementation of this revision is immediate.
Direct any questions concerning the above issue to:

Gary P. Gordon, P.E.
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Bridge Quality Assurance Division
Phone: (717) 783-7551
Fax: (717) 787-2882
email: gagordon@state.pa.us

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This e-Notification deleted by Sept. 2010 Edition, issued on Sept. 29, 2010

=====
PennDOT BQAD Publications e-Notification
Bureau of Design
Bridge Quality Assurance Division
=====

Publication No. 218M
Standard: BD-667M
RE: Sheet 6
No. 22
Date: 3-11-08
=====

e-Notification No.20 is hereby rescinded by this e-Notification, No. 22. The bridge approach slab connection to the integral abutment is to be permitted to have rotation; hence a bond breaker is the correct coating to be applied to the mating concrete surfaces. Therefore, BD-667M, Note 12 will be removed. Also, e-Notification No. 23 will correct a similar note on a corresponding detail on Sht. 35 of the Bridge Approach Slab, BD-628M.

Please note that implementation of this revision is immediate.
Direct any questions concerning the above issue to:

Gary P. Gordon, P.E.
PENNDOT Bureau of Design
Bridge Quality Assurance Division
Phone: (717) 783-7551
Fax: (717) 787-2882
email: gagordon@state.pa.us

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PENNDOT e-Notification No. 23

Bureau of Design
Bridge Quality Assurance Division



March 11, 2008

Interim Revision to Bridge Standard Drawing(s)	BD-628M, dated July 20, 2007, Sheet 35 – BRIDGE APPROACH SLAB CONNECTION DETAILS: Replacing “AN APPROVED EPOXY BONDING COMPOUND” with “BOND BREAKER”
--	---

The intent is to permit rotation of the end of the Bridge Approach Slab Type 5 for integral abutments. To assure that this is possible, the following revision is needed to be made to SECTION X-X on BD-628M, Sheet 35:

- In ** Note, replace “AN APPROVED EPOXY BOUNDING COMPOUND” with “BOND BREAKER”.

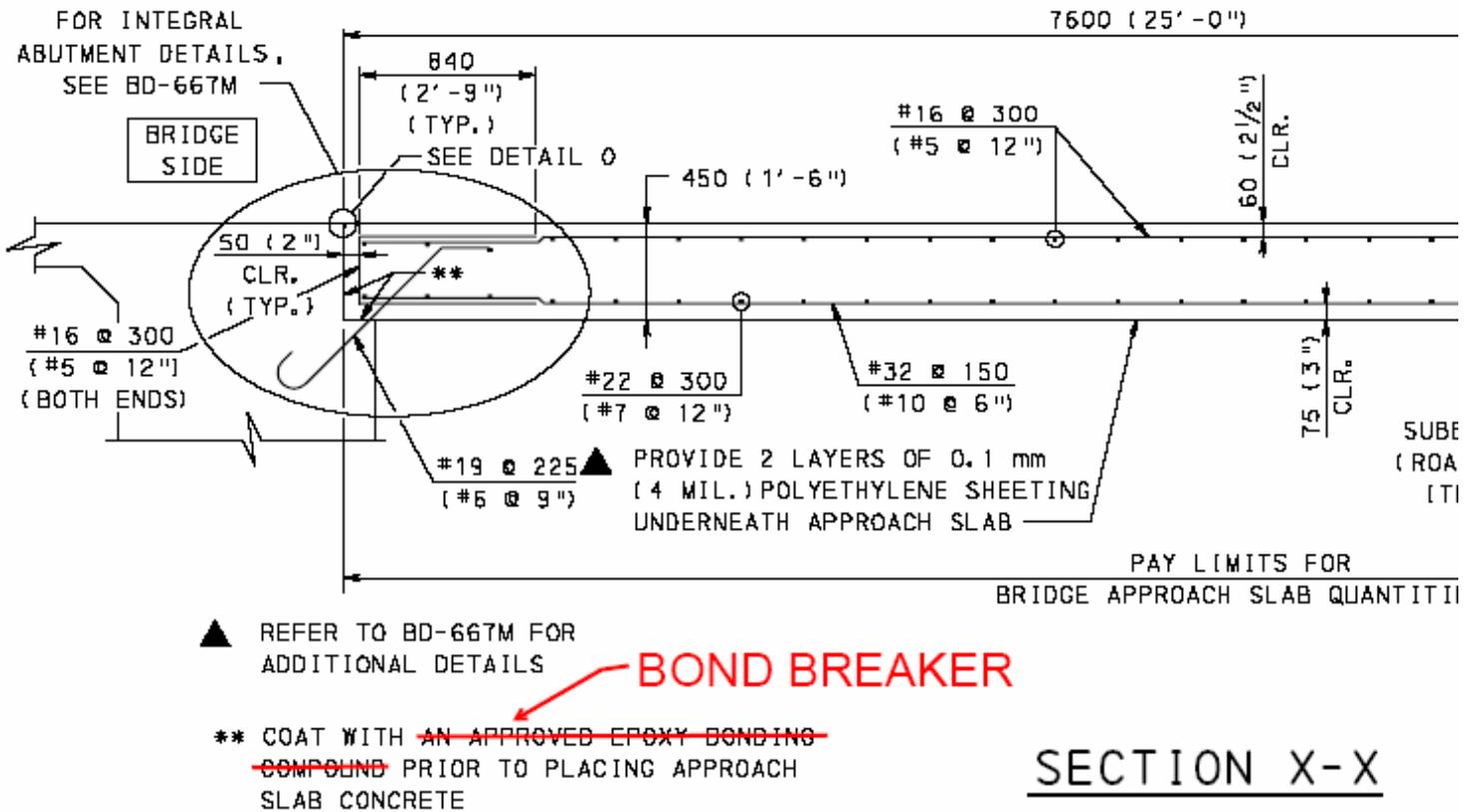
This revision is shown in mark-up on the attached 8.5”x11” page.

Please note that implementation of this revision is immediate.
Direct any questions concerning the above issue to:

Gary P. Gordon, P.E.
PENNDOT Bureau of Design
Bridge Quality Assurance Division
Phone: (717) 783-7551
Fax: (717) 787-2882
gagordon@state.pa.us

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e-Notification No. 23



BD-628M, Sht. 35 - e-Notification No. 23, Mar. 11, 2008

This e-Notification deleted by Sept. 2010 Edition, issued on Sept. 29, 2010

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PennDOT BQAD Publications e-Notification
Bureau of Design
Bridge Quality Assurance Division
=====

Publication No. 218M
Standard: BD-601M
RE: Sheets 1 & 4
No. 24
Date: 7-2-08
=====

Sheet 1 –

NOTES:

- #2.) Remove “1998”
- #3.) Move the (‘c) text from the D in “AND” to the right of “f” in “f = 24 MPa.”
- #5.) – Under the 2nd bullet point, change “DETAIL A” to “ALTERNATE CONTINUITY REINFORCEMENT DETAIL” and change “SHEET 7” to read “SHEET 8”
 - Under DECK THICKNESS, move the “>” symbol from on top of (1/2) to in front of (8”)
- #11.) Change “SHEET 7” to read “SHEET 8”
- #18.) Remove “1998” and “LRFD”
- #28.) Under DECK DESIGN PROCEDURE, change “SHEETS 8 and 9” to read “SHEETS 9 and 10”

Sheet 4 –

RAISED SIDEWALK DETAIL: add “2% slope with arrow” to surface of sidewalk. Arrow points towards bridge barrier.

Please note that implementation of this revision is immediate.
Direct any questions concerning the above issue to:

Gary P. Gordon, P.E.
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Fax: (717) 787-2882
email: gagordon@state.pa.us

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Bureau of Design
Bridge Quality Assurance Division

PennDOT e-Notification No. 25

July 10, 2008

Interim Revision to Bridge Standard Drawing(s)
--

BD-601M, dated July 20, 2007, Sheet 4 – RAISED SIDEWALK DETAIL: Clarification of 2% slope indication given in e-Notification No. 24
--

In RAISED SIDEWALK DETAIL of BD-601M, Sheet 4:

- The direction of the raised sidewalk's slope given in e-Notification No. 24 requires further clarification:
 - “2% slope with arrow” needs to be linked to the existing two call-outs located in the upper portion of this detail as shown on the attached 8.5”x11” page.
- Remove the Note 7 reference from the top call-out for sidewalk slope.

Please note that implementation of this revision is immediate.
Direct any questions concerning the above issue to:

William P. Longstreet
PennDOT, Bureau of Design
Bridge Quality Assurance Division
Phone: (717) 783-7476
Fax: (717) 787-2882
wlongstreet@state.pa.us

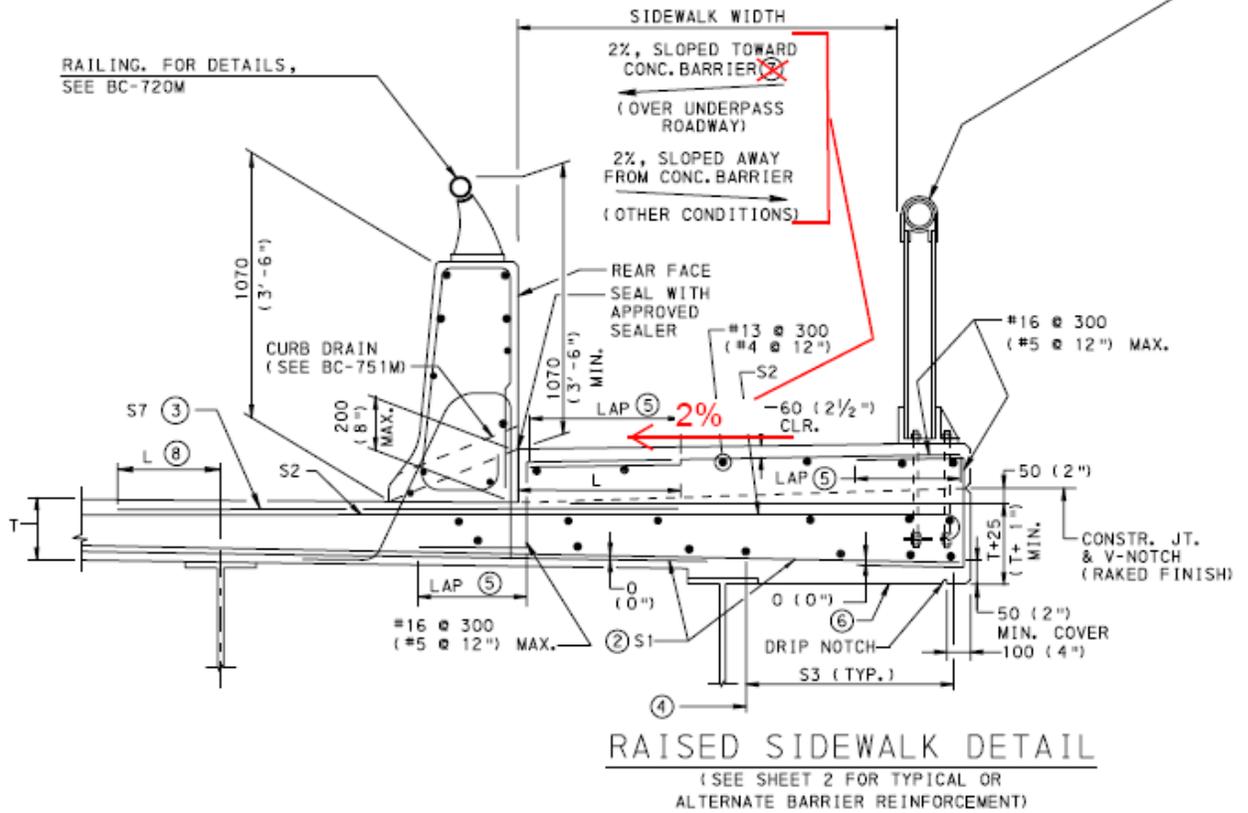
Archived copies of all previously distributed e-Notifications can be obtained from the PennDOT Bridge Standards website at <http://www.dot.state.pa.us/Bridge/Standards> and clicking on “Subscribe to E-mail Notification System” and then “Previous E-Mail Notifications

e-Notification No. 25

BD-601M, Sht. 4

e-Notifications No. 24 & 25

PEDESTRIAN RAILING, SIDEWALK
PROTECTIVE FENCE OR BARRIER
FOR ADDITIONAL DETAILS,
SEE BC-701M, BC-711M OR BC-716M



NOTE:
ALTERNATE BARRIER REQUIRES
ALTERNATE RAILING, BC-718M

This e-Notification deleted by Sept. 2010 Edition, issued on Sept. 29, 2010

=====
PennDOT BQAD Publications e-Notification
Bureau of Design
Bridge Quality Assurance Division
=====

Publication No. 218M
Standard: BD-601M
RE: Sheets 1 & 11
No. 26
Date: 3-20-09
=====

Sheet 1 –

NOTE 22: add “BD-660M AND” before “BD-661M”

Sheet 11 –

Lighting Pole Anchorage Dimensions Table: swap table values listed for dimension “A” with those listed for dimension “B”.

Please note that implementation of this revision is immediate and that these corrections are in addition to those of e-Notification Nos. 24 & 25 which were also for this same standard.

Direct any questions concerning the above issue to:

Gary P. Gordon, P.E.
PENNDOT Bureau of Design
Bridge Quality Assurance Division
Phone: (717) 783-7551
Fax: (717) 787-2882
email: gagordon@state.pa.us

Bureau of Design
Bridge Quality Assurance Division



PennDOT e-Notification No. 27

July 6, 2009

Interim Revision to Bridge Standard Drawing(s)	BD-655M, "TYPICAL SUPERSTRUCTURE SECTIONS", Sheet 1, dated December 29, 2008 INTERMEDIATE DIAPHRAGM - Elimination of Threaded Inserts from Prestressed Concrete I-Beam's bottom flange
--	---

For the INTERMEDIATE DIAPHRAGM detail with vertical clearance less than 4880 (16'-0"): removed lower inserts in beam flange, added rebar at bottom of diaphragm with 180° hooks, and added #5 rebar with insert at 6" spacing.

Please note that implementation of this revision is immediate.
Direct any questions concerning the above issue to:

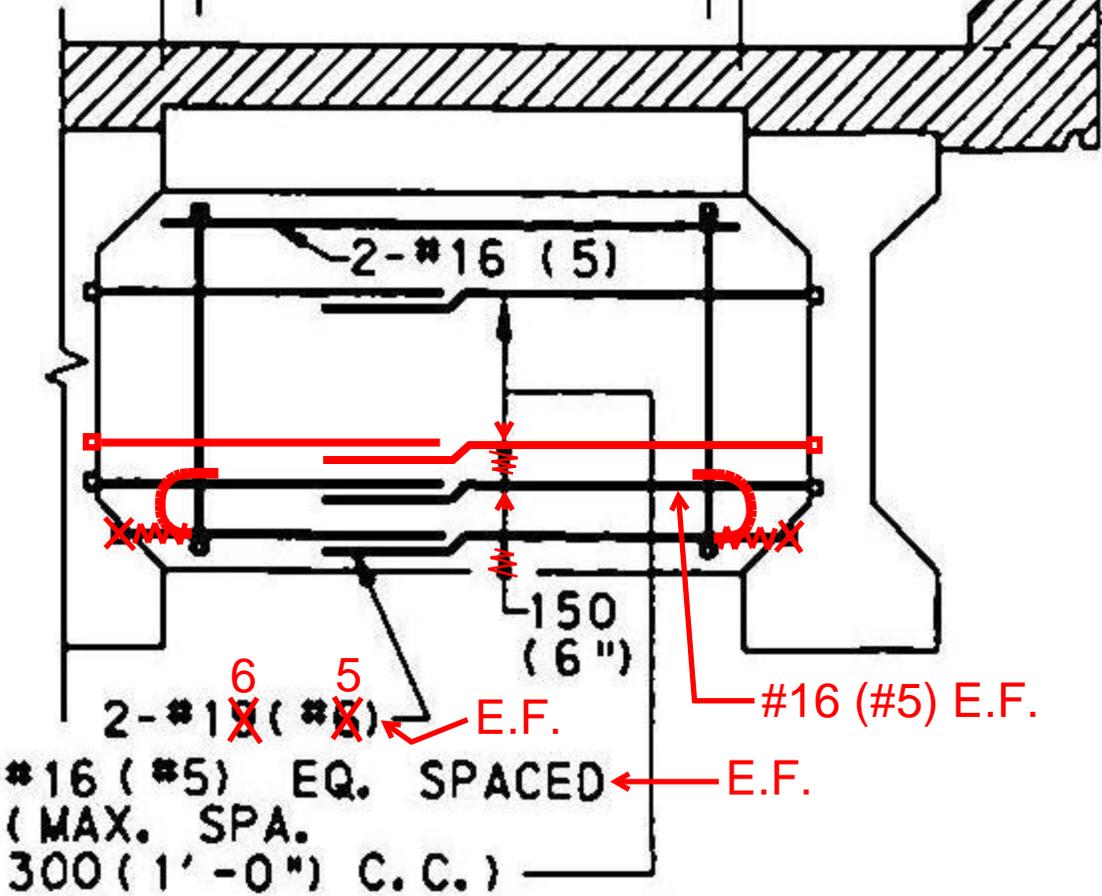
Gary P. Gordon, P.E.
PennDOT, Bureau of Design
Bridge Quality Assurance Division
Phone: (717) 783-7551
Fax: (717) 787-2882
gagordon@state.pa.us

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#13 (#4) EQ. SPACED
(MAX. SPA. 225 (9") C.C.)

100 (4")

100 (4")



VERTICAL CLEARANCE

< 4880 (16' - 0")

INTERMEDIATE
DIAPHRAGM

This e-Notification
deleted by Sept.
2010 Edition, issued
on Sept. 29, 2010

BD-655M, Sht. 1
(part of e-Notification
No. 27, July 6, 2009)

Bureau of Design
Bridge Quality Assurance Division



PennDOT e-Notification No. 28

August 2, 2010

Interim Revision to Bridge Standard Drawing(s)	BD-632M, "R.C. Box Culvert", sheets 1, 3, 5, 9 and 10, dated 12/29/2008. Deeper Inlet Apron Cutoff Walls, Impervious Wingwall Backfill and Multiple Opposing Apron Baffles.
--	---

Three (3) issues are addressed by these revisions:

1. Inlet apron cutoff walls must be extended to the bottom of the wing wall footing or the bottom of the rock lining whichever is deeper (3'-6" min.). Note 18 is revised to require waterstop to be used at bottom slab in addition to top slab and walls. The purpose of this is to ensure that the stream flow does not pass beneath the culvert, thereby, reducing structural stability and reducing aquatic organism passage.
2. Flowable backfill must be placed on the outside of the wing walls to 2'-0" minimum elevation above the normal stream elevation. Also, flowable backfill must be placed along the entire length of the culvert and wing walls for the same purpose as mentioned above.
3. If an apron is greater than 8 feet long, a second set of opposing baffles is required to be $\frac{1}{2}$ the distance from the end baffles to the face of the box. For longer aprons, baffles are not to exceed 8-foot spacing. The purpose of this is to improved aquatic organism passage by reducing sheet flow and promoting sediment buildup to the baffle height on the aprons.

Attached drawing sheets indicate revisions with yellowing highlighting within red clouding:

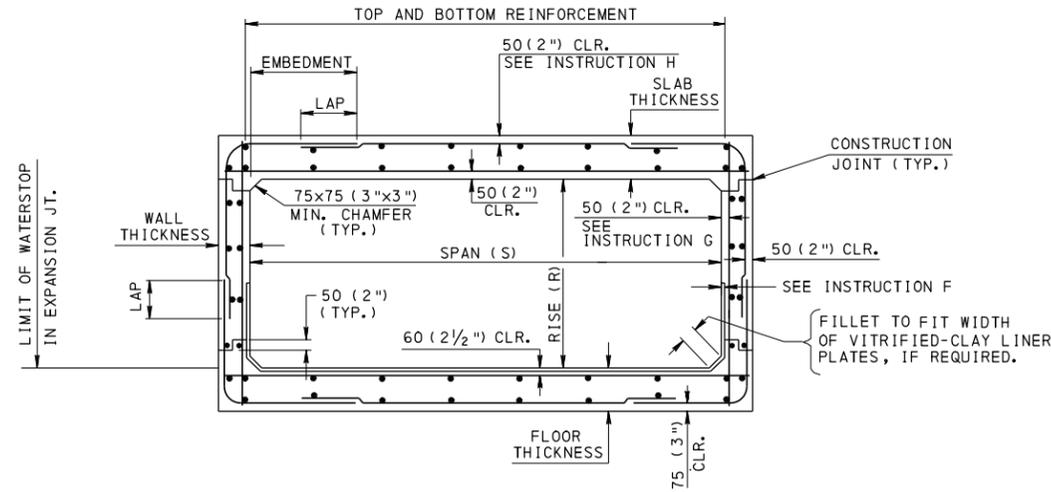
- Sheet 1 - Section along Centerline Culvert, Apron Section, and Note 18 revised
- Sheet 3 - Typical Headwall Section revised
- Sheet 5 - Precast End Section and Cast-In-Place Wingwalls revised
- Sheet 9 - Plan Views and Notes 2 & 7 revised
- Sheet 10 - Plan Views and Notes 2 & 7 revised

Please note that implementation of this revision is effective for all projects currently advertised and all future projects.

Direct any questions concerning the above issue to:

Gary P. Gordon, P.E.
PennDOT, Bureau of Design, Bridge Quality Assurance Division
Phone: (717) 783-7551 / Fax: (717) 787-2882
gagordon@state.pa.us

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TYPICAL BOX SECTION
NO SCALE

**DESIGN DATA FOR
CAST-IN-PLACE BOX CULVERT**

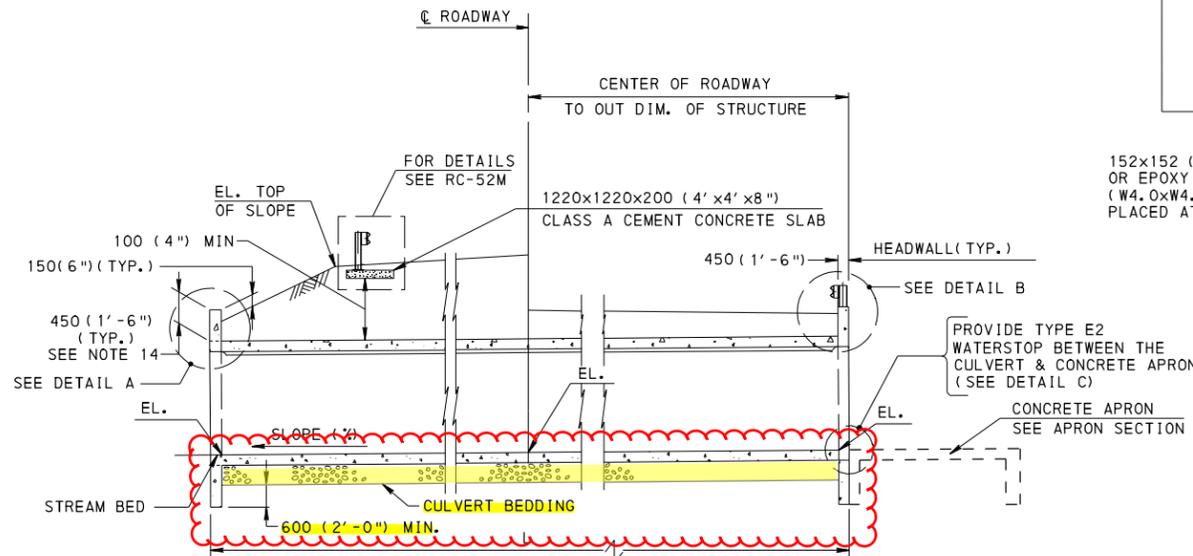
- $f'c = 21 \text{ MPa}$ (3000 P.S.I.) FOR CLASS A CEMENT CONCRETE
- $f'c = 28 \text{ MPa}$ (4000 P.S.I.) FOR TOP SLAB AT GRADE (CLASS AAA CEMENT CONCRETE)
- $f_y = 420 \text{ MPa}$ (60,000 P.S.I.) FOR REINFORCEMENT BARS
- $f_y = 450 \text{ MPa}$ (65,000 P.S.I.) FOR WELDED WIRE FABRIC

INSTRUCTIONS

- MINIMUM SLAB THICKNESS = 250 (10")
- MINIMUM WALL THICKNESS = 250 (10") FOR RISE < 1500 (5'-0")
- MINIMUM WALL THICKNESS = 300 (1'-0") FOR RISE > 1500 (5'-0")
- ADD 35 (1 1/2"), (10 (1/2") AT THE TOP AND 25 (1") AT BOTTOM), TO THE EFFECTIVE DESIGN THICKNESS OF BOTTOM SLAB OF BOX CULVERTS, FOR THE TOTAL (PROVIDED) THICKNESS.
- FOR BOX CULVERTS AT GRADE, ADD 10 (1/2") INTEGRAL WEARING SURFACE TO THE TOP DECK SLAB THICKNESS.
- IF SPECIFIED, VITRIFIED-CLAY LINER PLATES WITH TYPE B POINTING (INCLUDE COST IN THE PRICE OF CONCRETE TO WHICH ATTACHED.)
- 75 (3") CLEAR IF LINER PLATES ARE USED
- 60 (2 1/2") CLEAR IF AT GRADE
- PLACE MAIN CIRCUMFERENTIAL REINFORCEMENT NORMAL TO THE CENTERLINE OF THE CULVERT.
- PROVIDE EXPANSION JOINTS AT APPROXIMATELY 27 000 (90') INTERVALS AND CONSTRUCTION JOINTS AT APPROXIMATELY 9 000 (30') INTERVALS. PROVIDE EXPANSION JOINTS IN BOTTOM SLAB.

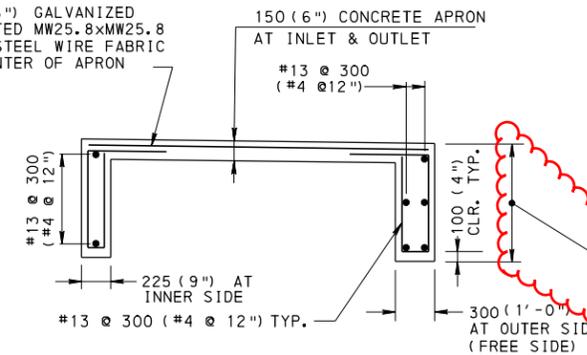
NOTES

- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
- ALL REINFORCEMENT BARS SHOWN ARE SOFT CONVERTED METRIC SIZES THAT MEET THE REQUIREMENTS OF ASTM A 615M, A 996M OR A 706M.
- DESIGN SPECIFICATIONS: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND AS SUPPLEMENTED BY THE DESIGN MANUAL, PART 4, STRUCTURES.
- PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATIONS AS OUTLINED IN THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION PUBLICATION 408.
- DEAD LOADS: INCLUDES SURFACE AREA DENSITY OF 150 kg/m² (30 P.S.F.) FOR FUTURE WEARING SURFACE FOR BOXES AT GRADE.
- USE EPOXY COATED REINFORCEMENT BARS IN THE FOLLOWING CONDITIONS:
 - TOP SLAB AND HEADWALL WITHIN 2 FEET OF GRADE.
 - ALL CURBS AND BARRIERS.
 - THROUGHOUT THE CULVERT WHEN VITRIFIED CLAY LINER PLATES ARE USED.
 - IN ALL APRON SLABS.
- PROVIDE 50 mm (2") CONCRETE COVER ON REINFORCEMENT BARS EXCEPT AS NOTED.
- FOR HYDRAULIC DESIGN REFER TO DESIGN MANUAL, PART 2.
- FOR LOW FLOW FISH PASSAGE DESIGN COMMENTARY REFER TO DESIGN MANUAL, PART 2.
- INDICATE ALLOWABLE AND MAXIMUM DESIGN FOUNDATION PRESSURE ON THE PLANS.
- PLACE HEADWALLS, APRON WALLS AND WINGWALL FOOTINGS BELOW FROST DEPTH OR 1050 (3'-6") WHICH EVER IS GREATER.
- USE 102 mm (4") ϕ FORMED WEEP HOLES AT 4600 mm (15'-0") MAXIMUM CENTERS PLACED AT A MINIMUM 525 mm (1'-9") ABOVE THE BOTTOM SLAB OR 150 mm (6") ABOVE NORMAL FLOW LINE. FOR DETAILS SEE BC-751M.
- SPECIFY MINIMUM SEGMENT LENGTH ON CONTRACT DRAWINGS.
- CONCRETE HEAD WALL REINFORCEMENT WILL REQUIRE A SEPARATE DESIGN IF HEIGHT IS GREATER THAN 600 (2'-0").
- USE THIS STANDARD DRAWING IN CONJUNCTION WITH THE APPLICABLE ROADWAY CONSTRUCTION STANDARDS FOR GUIDE RAIL.
- REFER TO DESIGN DRAWINGS FOR SPACING OF POSTS.
- THOROUGHLY COAT ALL SURFACES OF THE BASE PLATES IN CONTACT WITH CONCRETE WITH CAULKING COMPOUNDS PRIOR TO ERECTION. AFTER ERECTION AND ALIGNMENT, SEAL OPENINGS BETWEEN THE METAL SURFACES AND THE CONCRETE WITH CAULKING COMPOUND MEETING THE REQUIREMENTS OF SECTION 705, PUB. 408.
- FOR JOINT DETAILS SEE BC-735M. WHEN EXPANSION JOINTS ARE USED, WATERSTOPS ARE REQUIRED IN THE TOP AND BOTTOM SLABS AND THE WALLS.
- FOR SAFETY WING DETAILS, SEE SHEET 3.
- MODIFIED STRUCTURE MOUNTED GUIDE RAIL BARRIER GRANTED TL3 DESIGNATION BY FHWA.

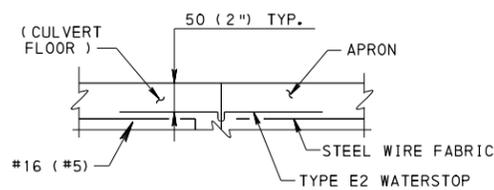


SECTION ALONG CULVERT
NO SCALE

152x152 (6"x6'') GALVANIZED OR EPOXY COATED MW25.8xMW25.8 (W4.0xW4.0) STEEL WIRE FABRIC PLACED AT CENTER OF APRON



APRON SECTION
NO SCALE



DETAIL C
NO SCALE

e-Notification No. 28
Aug. 2, 2010

NOTE:
USE APRON AT INLET AND OUTLET IF WARRANTED. SEE APRON SECTION THIS SHEET. FOR ALTERNATE DESIGN BY CONTRACTOR, PROVIDE THE APRONS ON THE PLANS.

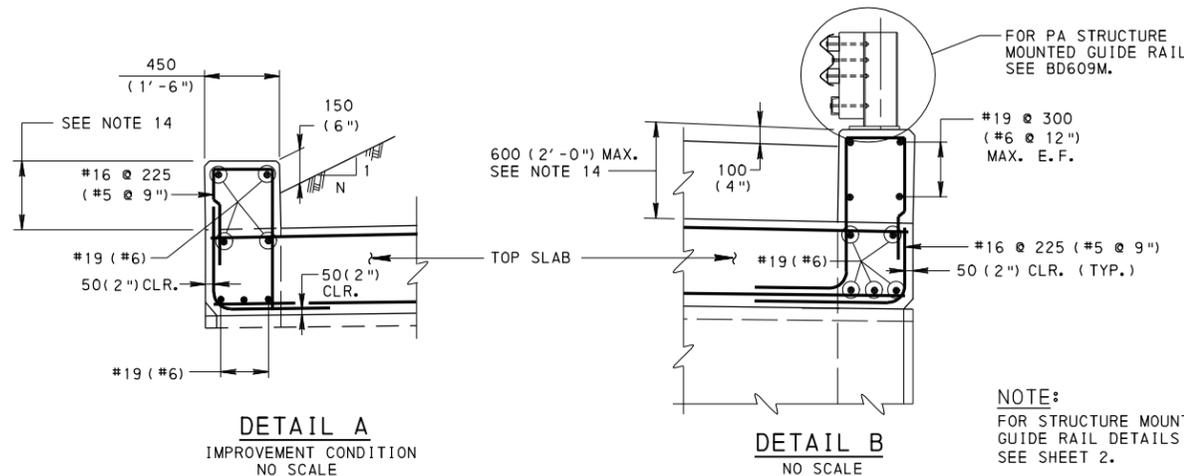
e-Notification No. 28
Aug. 2, 2010

e-Notification No. 28
Aug. 2, 2010

LEGEND

- E.F. : DENOTES EACH FACE
- F.F. : DENOTES FRONT FACE
- R.F. : DENOTES REAR FACE
- EL. : DENOTES ELEVATION
- C. I. P. : DENOTES CAST IN PLACE
- B.B. : DENOTES BACK BATTER

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



DETAIL A
IMPROVEMENT CONDITION
NO SCALE

DETAIL B
NO SCALE

NOTE:
FOR STRUCTURE MOUNTED GUIDE RAIL DETAILS SEE SHEET 2.

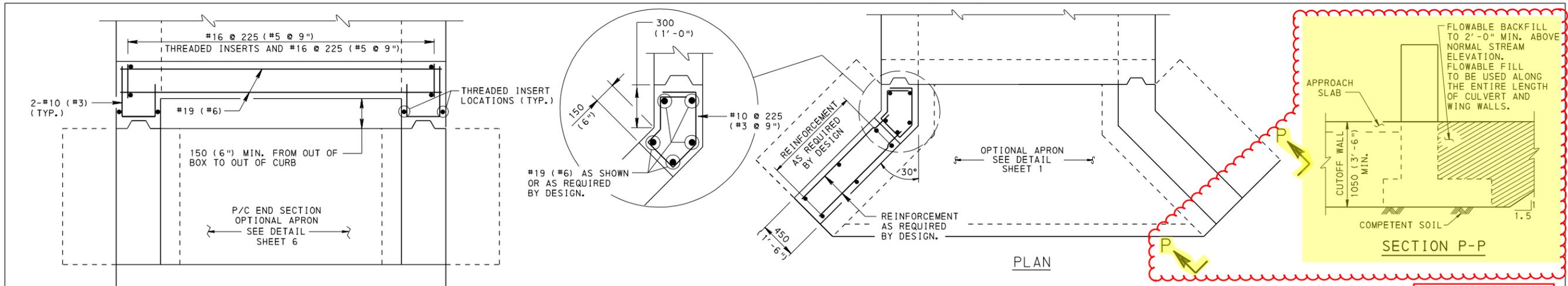
RC-52M	TYPE 2 STRONG POST GUIDE RAIL
BD-601M	CONCRETE DECK SLAB DESIGN & DETAILS
BD-609M	PA STRUCTURE MOUNTED GUIDE RAIL
BD-621M	STANDARD REINFORCED CONCRETE ABUTMENTS TYPICAL SECTIONS AND DETAILS
BD-625M	WINGWALL LENGTH
BD-631M	END WALL DETAILS FOR METAL CULVERTS
BC-734M	ANCHOR SYSTEMS
BC-735M	WALL CONSTR. AND EXPANSION JOINT DETAILS
BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
BC-739M	BRIDGE BARRIER TO GUIDE RAIL TRANSITION
BC-751M	BRIDGE DRAINAGE
BC-788M	TYPICAL WATERPROOFING AND EXPANSION DETAILS
BC-798M	PRECAST R.C. BOX CULVERT MECHANICAL CONNECTION DETAILS

REFERENCE DRAWINGS

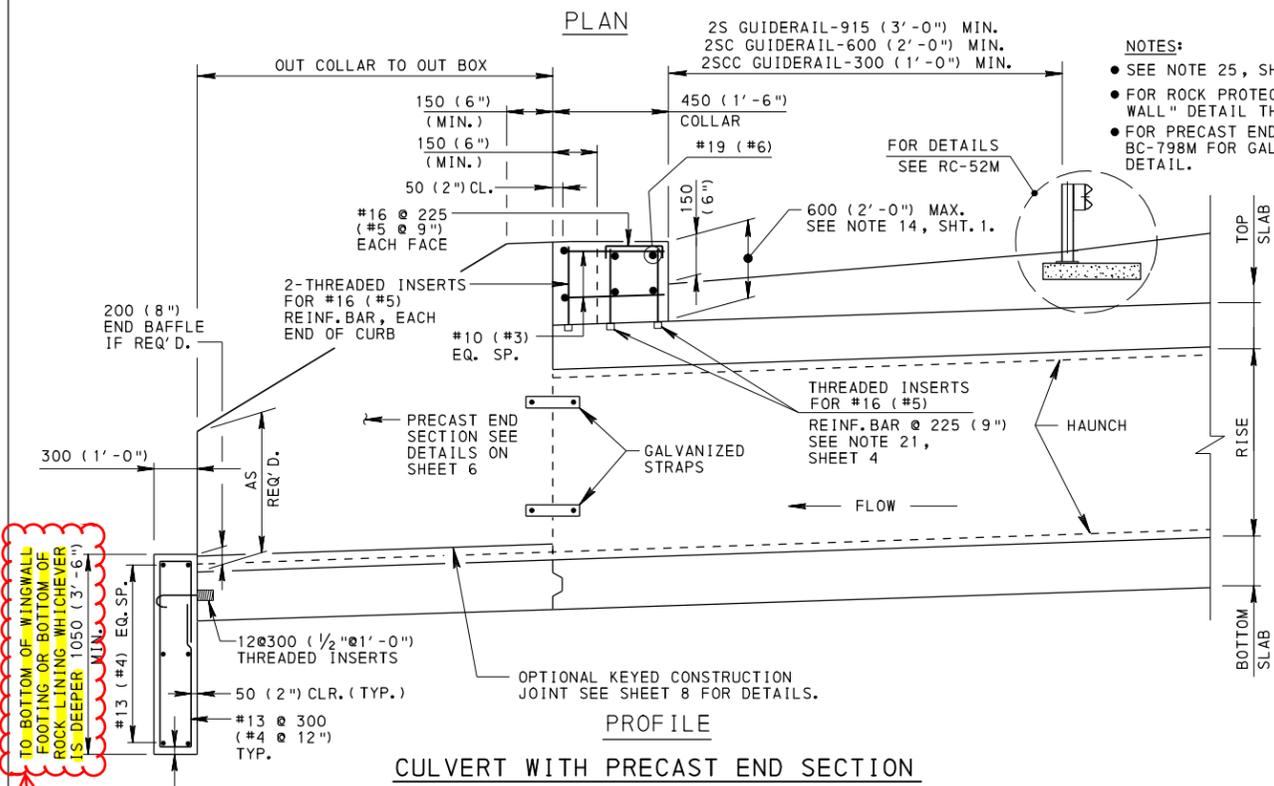
**COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN**

STANDARD
R. C. BOX CULVERT
CAST-IN-PLACE

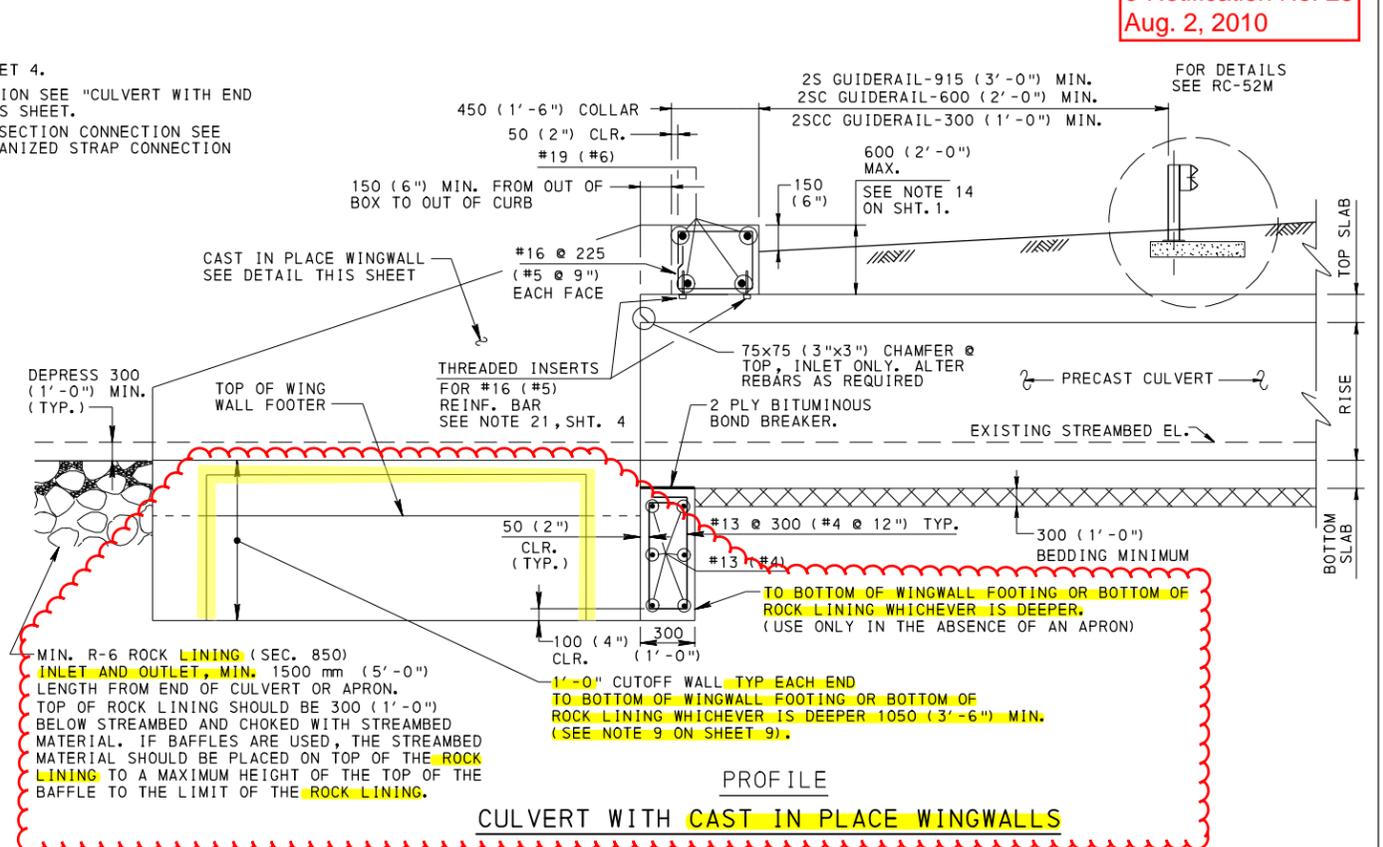
RECOMMENDED JULY 9, 2010	RECOMMENDED JULY 9, 2010	SHEET 1 OF 11
CHIEF BRIDGE ENGINEER	DIRECTOR, BUREAU OF DESIGN	BD-632M



e-Notification No. 28
Aug. 2, 2010



- NOTES:
- SEE NOTE 25, SHEET 4.
 - FOR ROCK PROTECTION SEE "CULVERT WITH END WALL" DETAIL THIS SHEET.
 - FOR PRECAST END SECTION CONNECTION SEE BC-798M FOR GALVANIZED STRAP CONNECTION DETAIL.



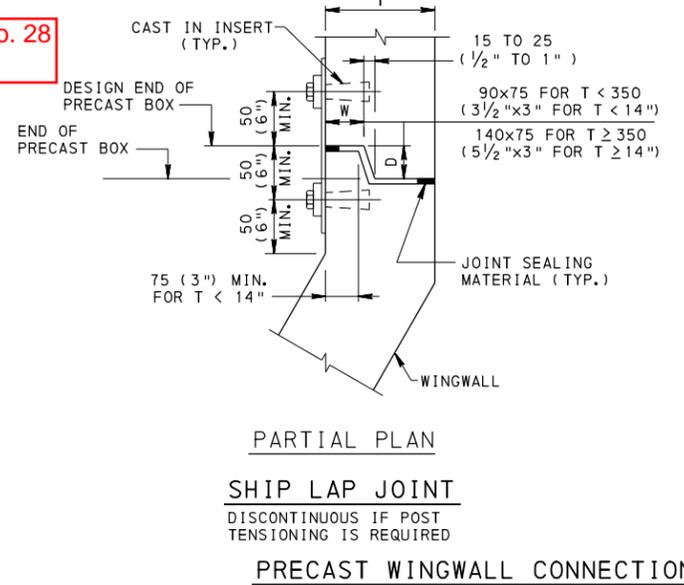
e-Notification No. 28
Aug. 2, 2010

TO BOTTOM OF WINGWALL FOOTING OR BOTTOM OF ROCK LINING WHICHEVER IS DEEPER 1050 (3'-6") MIN.

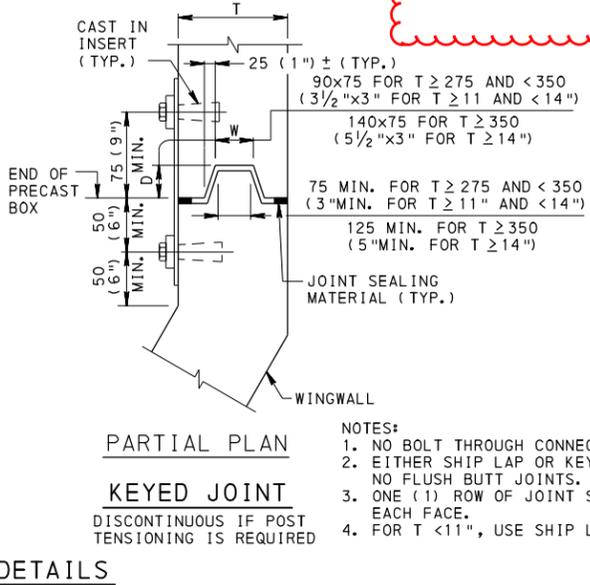
MIN. R-6 ROCK LINING (SEC. 850) INLET AND OUTLET, MIN. 1500 mm (5'-0") LENGTH FROM END OF CULVERT OR APRON. TOP OF ROCK LINING SHOULD BE 300 (1'-0") BELOW STREAMBED AND CHOKED WITH STREAMBED MATERIAL. IF BAFFLES ARE USED, THE STREAMBED MATERIAL SHOULD BE PLACED ON TOP OF THE ROCK LINING TO A MAXIMUM HEIGHT OF THE TOP OF THE BAFFLE TO THE LIMIT OF THE ROCK LINING.

1'-0" CUTOFF WALL TYP EACH END TO BOTTOM OF WINGWALL FOOTING OR BOTTOM OF ROCK LINING WHICHEVER IS DEEPER 1050 (3'-6") MIN. (SEE NOTE 9 ON SHEET 9).

e-Notification No. 28
Aug. 2, 2010



PARTIAL PLAN
SHIP LAP JOINT
DISCONTINUOUS IF POST TENSIONING IS REQUIRED
PRECAST WINGWALL CONNECTION DETAILS



PARTIAL PLAN
KEYED JOINT
DISCONTINUOUS IF POST TENSIONING IS REQUIRED

NOTES:

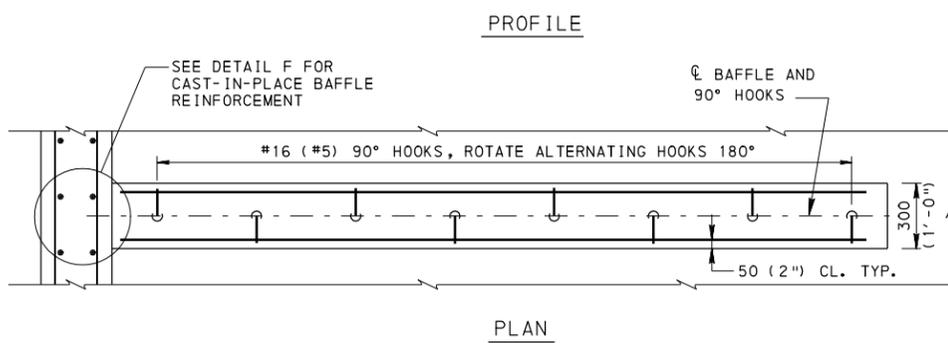
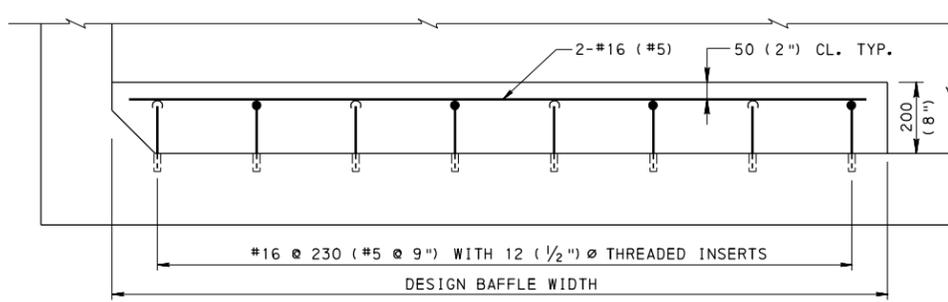
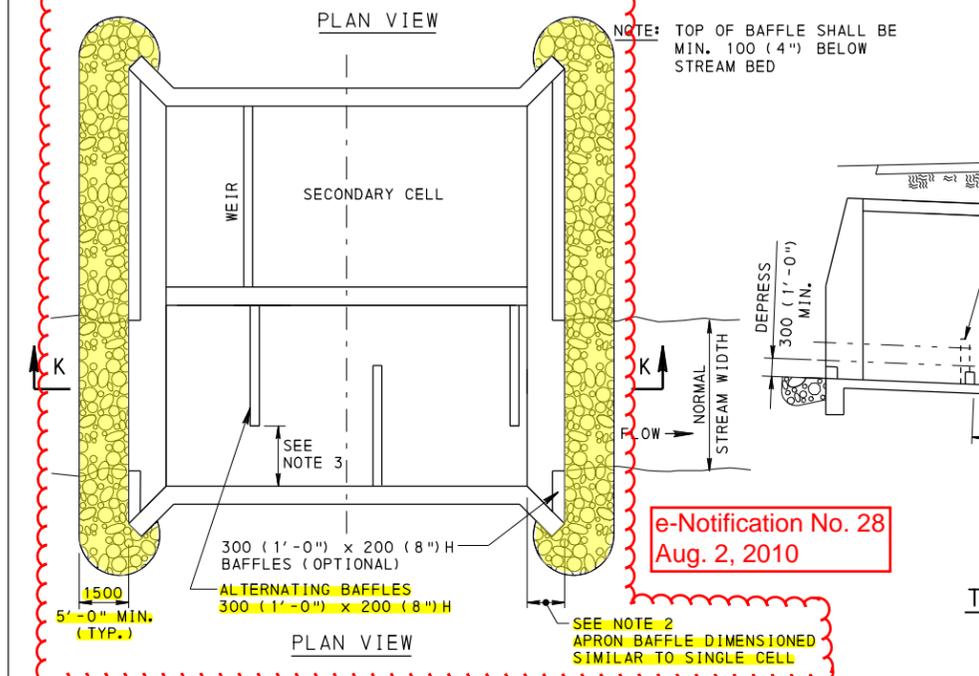
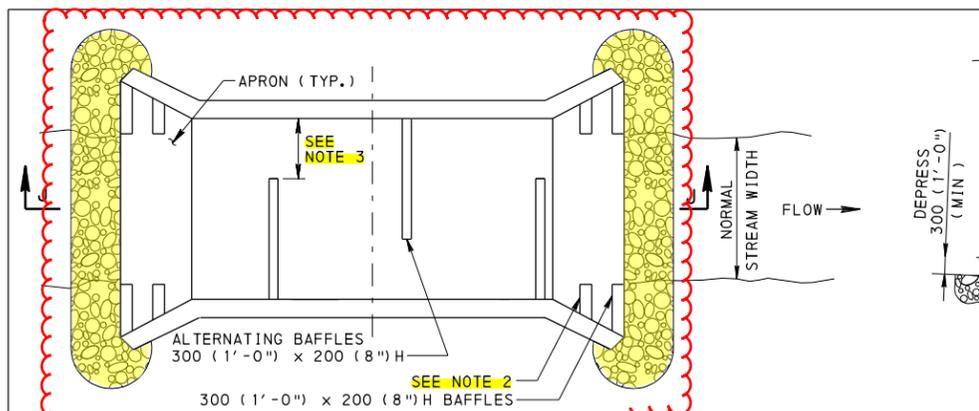
1. NO BOLT THROUGH CONNECTIONS CAN BE USED.
2. EITHER SHIP LAP OR KEYWAY JOINTS CAN BE USED. NO FLUSH BUTT JOINTS.
3. ONE (1) ROW OF JOINT SEALING FLEXIBLE FOAM MATERIAL EACH FACE.
4. FOR T < 11", USE SHIP LAP DETAIL.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

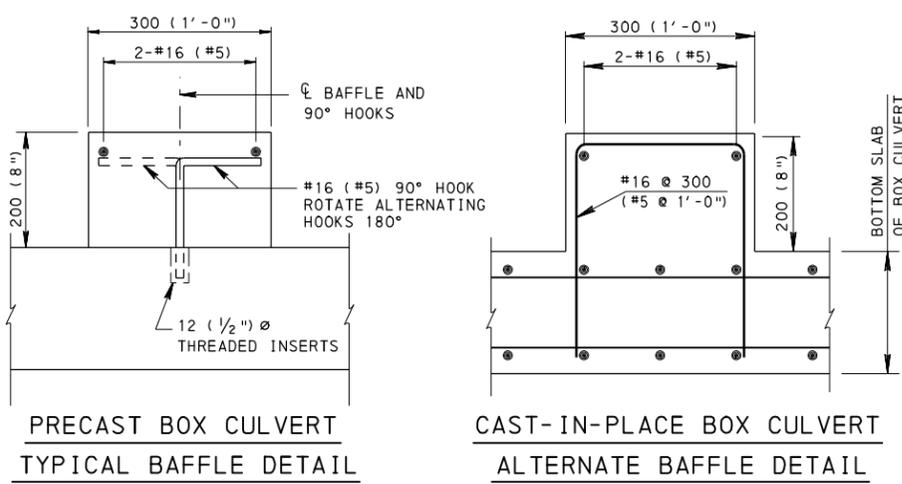
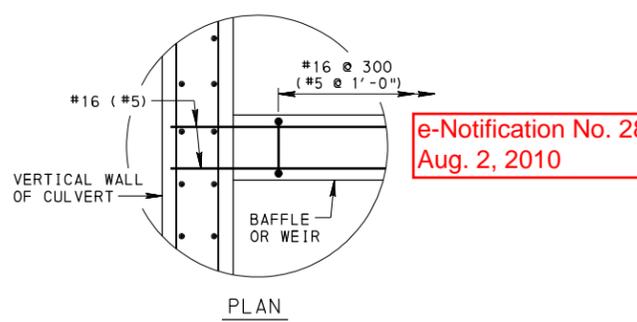
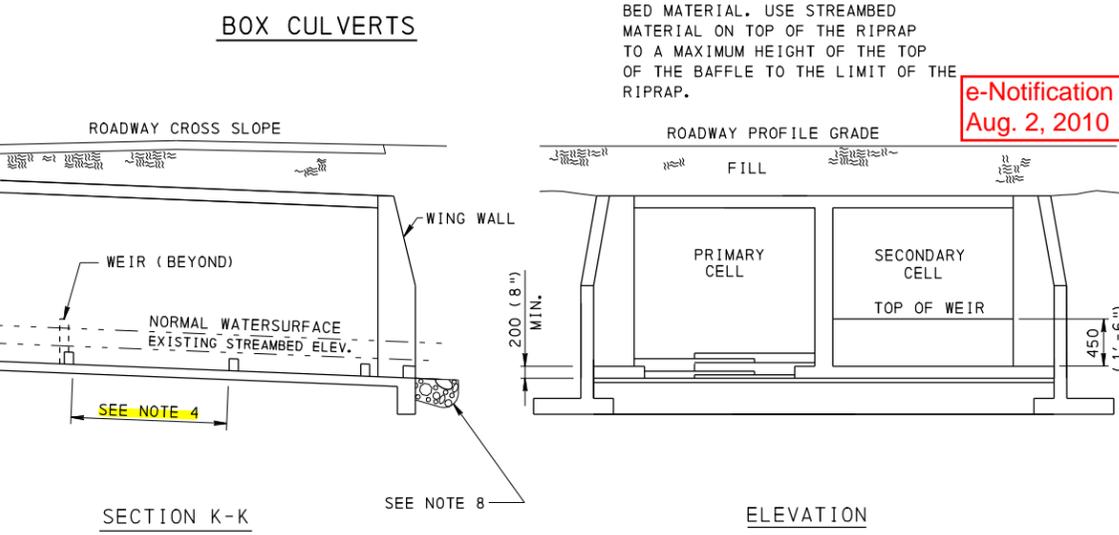
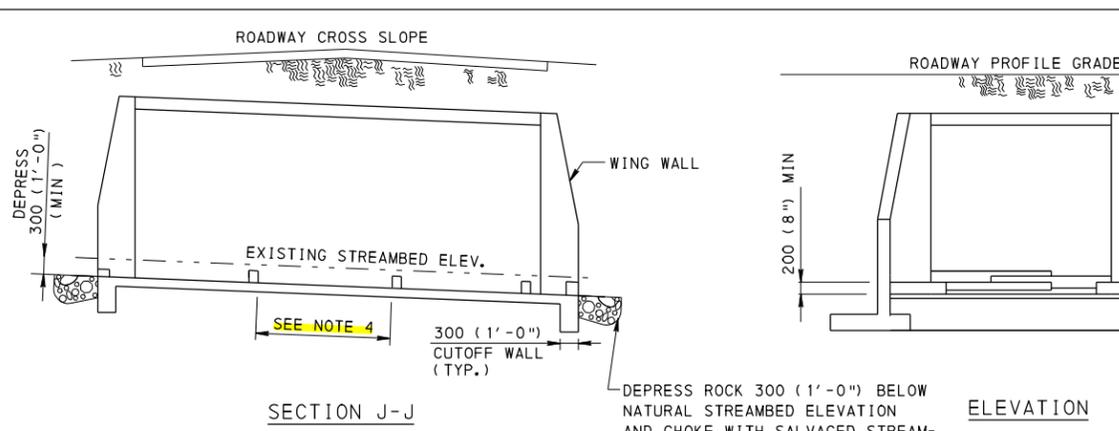
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD
R. C. BOX CULVERT
PRECAST

RECOMMENDED JULY 9, 2010	RECOMMENDED JULY 9, 2010	SHEET 5 OF 11
CHIEF BRIDGE ENGINEER	DIRECTOR, BUREAU OF DESIGN	BD-632M



TYPICAL BAFFLE
 PRECAST REINFORCEMENT SHOWN, CAST-IN-PLACE REINFORCEMENT SIMILAR EXCEPT AS NOTED ON THIS STANDARD.



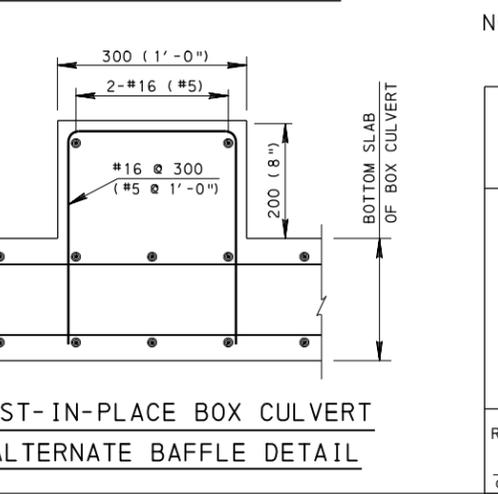
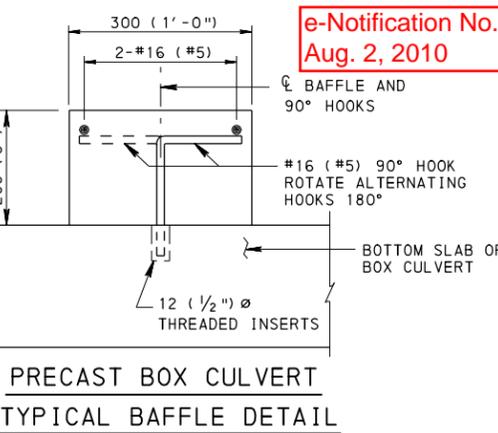
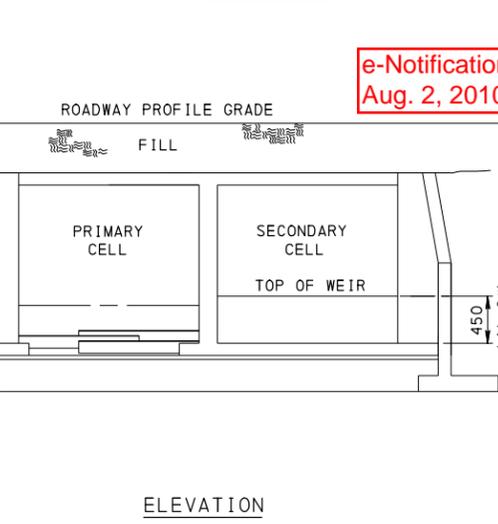
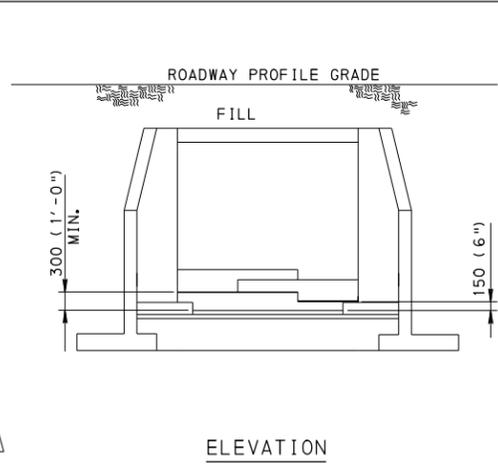
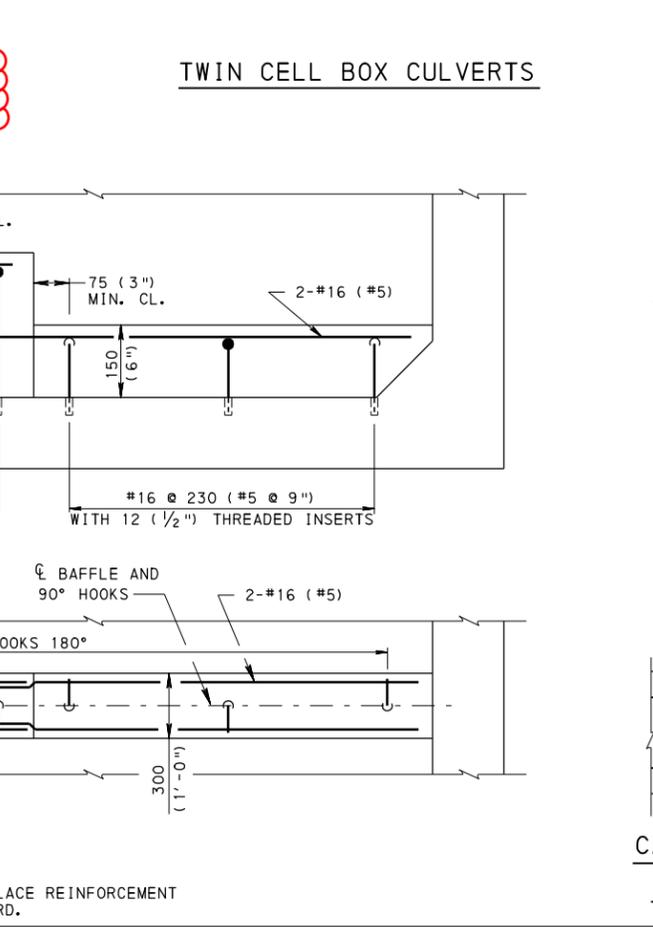
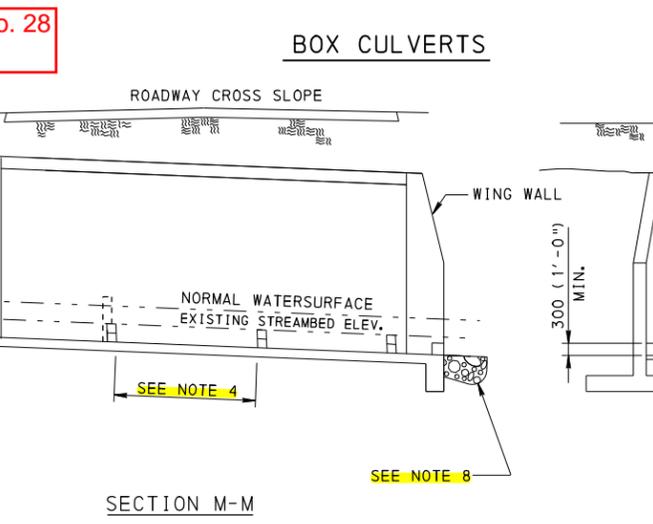
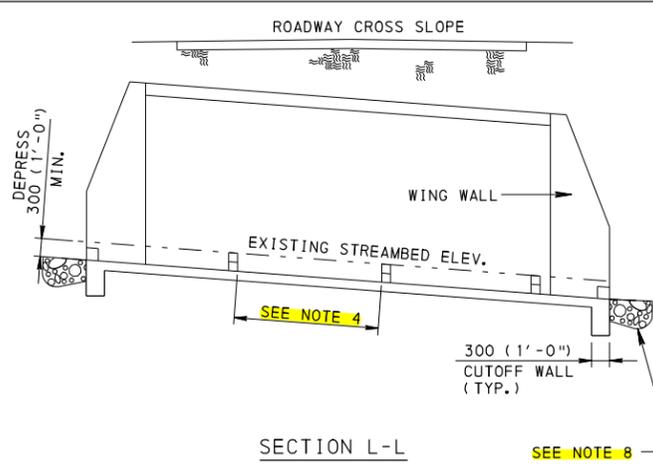
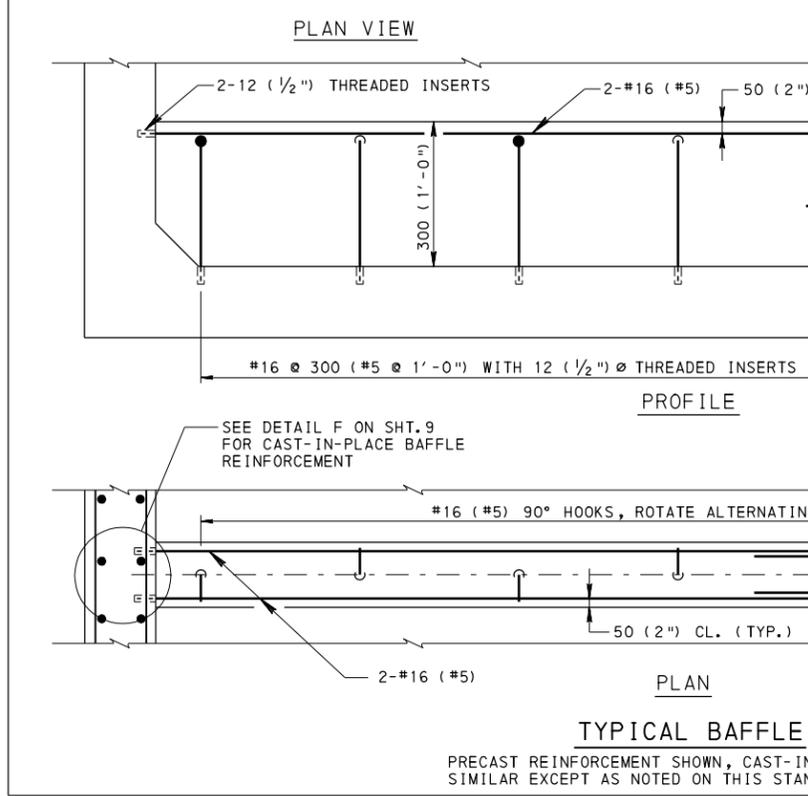
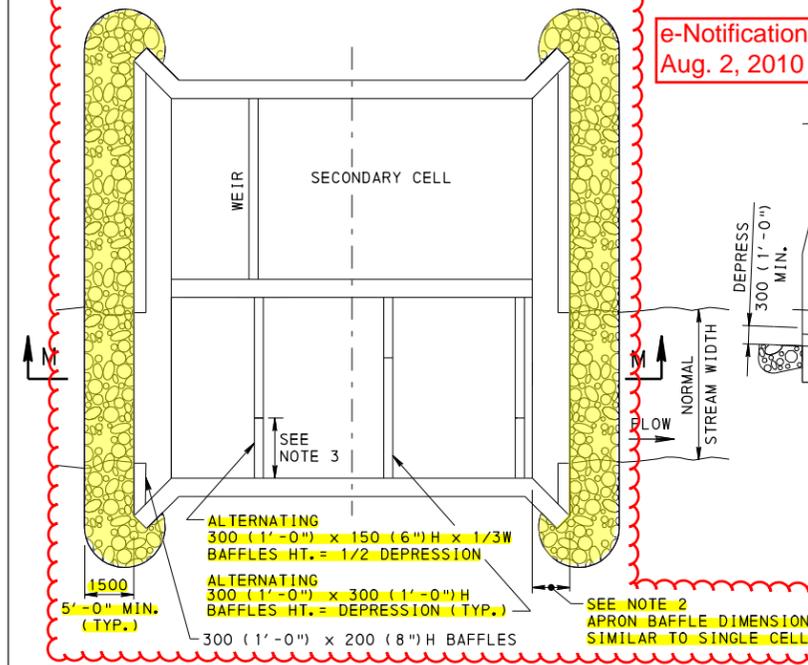
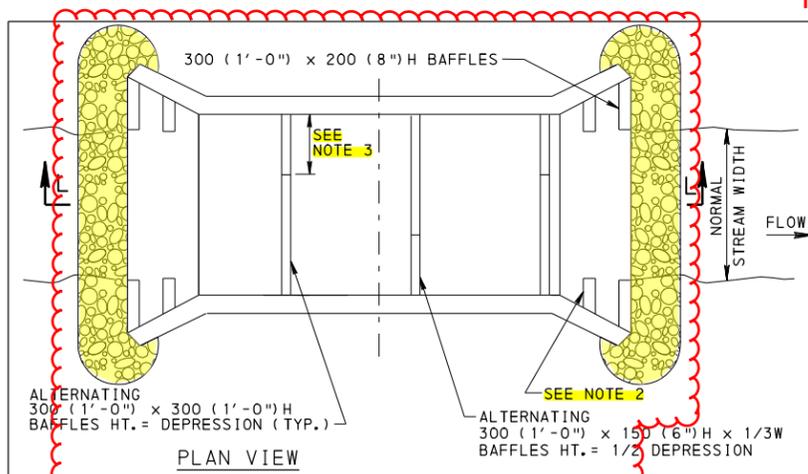
- DESIGN NOTES:
1. THE BAFFLE SPACING AND OPENINGS SHOULD BE BASED ON THE NORMAL CHANNEL WIDTH UPSTREAM AND DOWNSTREAM OF THE STRUCTURE (I.E. EDGE OF WATER TO EDGE OF WATER DURING NORMAL FLOW). AT LEAST THREE (3) MEASUREMENTS SHOULD BE TAKEN UPSTREAM AND DOWNSTREAM OF THE STRUCTURE WHERE THE STREAM EXHIBITS NORMAL, STABLE CONDITIONS. AN AVERAGE OF THOSE SIX (6) MEASUREMENTS SHOULD THEN BE USED FOR THE BAFFLE CONFIGURATIONS. MEASUREMENTS SHOULD NOT BE TAKEN WHERE THE CHANNEL HAS BEEN AFFECTED BY THE STRUCTURE OR SHOW SIGNS OF EROSION. BAFFLE CONFIGURATIONS SHOULD BE BASED ON NORMAL STREAM WIDTH (NOT TOP OF BANK TO TOP OF BANK OR WIDTH OF THE CULVERT).
 2. THE OPENING IN THE APRON BAFFLES SHOULD BE EQUAL TO AVERAGE NORMAL WIDTH OF THE STREAM. THE APRON BAFFLES SHOULD CONNECT TO THE WINGWALLS AT EACH SIDE OF THE CULVERT. PLACE THE FIRST SET OF BAFFLES AT THE END OF THE APRON. IF THE APRON IS GREATER THAN 2400 mm (8'-0") LONG, A SECOND SET OF OPPOSING BAFFLES ARE REQUIRED TO BE SET AT 1/2 THE DISTANCE FROM THE END BAFFLE TO THE FACE OF THE BOX. FOR LONGER APRONS, BAFFLES NOT TO EXCEED 2400 mm (8'-0") SPACING.
 3. THE OPENING IN THE INTERIOR BAFFLES SHOULD BE EQUAL TO 1/3 THE AVERAGE NORMAL WIDTH OF THE STREAM.
 4. BAFFLES SHOULD BE SPACED AT THE AVERAGE NORMAL STREAM WIDTH OR 2.44 m (8'), WHICHEVER IS GREATER. THE FIRST INTERIOR BAFFLE AT THE OUTLET SHOULD BE LOCATED AS CLOSE TO THE DOWNSTREAM END OF CULVERT AS POSSIBLE AND SPACED ACCORDINGLY FROM THAT POINT TO THE INLET.
 5. IF BAFFLE SPACING NEEDS ADJUSTED DUE TO BOX SEGMENTS, THE SPACING SHOULD BE SHORTER NOT LONGER THAN CALCULATED SPACING.
 6. THERE MAY BE UNUSUAL CIRCUMSTANCES IN WHICH THE STANDARD LAYOUT FOR BAFFLES WILL NOT ADEQUATELY ACCOMMODATE FISH PASSAGE. IN THESE CASES, THE PENNSYLVANIA FISH AND BOAT COMMISSION MUST PROVIDE SPECIFIC DESIGN GUIDANCE DURING PRELIMINARY DESIGN.
 7. CUTOFF WALL IS TO ENSURE STREAMFLOW DOES NOT PASS BENEATH THE CULVERT. BOTTOM OF CUTOFF WALL IS TO EQUAL WING WALL FOOTINGS OR ROCK LINING WHICHEVER IS DEEPER 1050 mm (3'-6") MIN.
 8. ROCK PROTECTION AT THE INLET AND OUTLET SHOULD BE DEPRESSED THE ENTIRE LENGTH AND CHOKED WITH NATURAL STREAMBED MATERIAL. THE ROCK SHOULD BE FLUSH WITH THE CULVERT BOTTOM, NOT THE TOP OF THE BAFFLES. STREAMBED MATERIAL SALVAGED FROM EXCAVATION FOR THE BOX CULVERT SHOULD BE PLACED ON TOP OF THE ROCK PROTECTION AND APRON TO THE MAXIMUM HEIGHT OF THE TOP OF THE BAFFLE TO THE LIMIT OF THE ROCK PROTECTION TO FACILITATE THE DEVELOPEMENT OF A NATURAL STREAM BOTTOM IF FEASIBLE.
 9. THE SLOPE OF THE NEW STRUCTURE SHOULD MATCH THE NATURAL STREAM SLOPE.
 10. ADDITIONAL TWIN CELL DETAILS ARE SHOWN ON SHEET 11.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

STANDARD
 R.C. BOX CULVERT
 MISCELLANEOUS DETAILS
 STREAM GRADES ≤ 4%

RECOMMENDED JULY 9, 2010	RECOMMENDED JULY 9, 2010	SHEET 9 OF 11
CHIEF BRIDGE ENGINEER	DIRECTOR, BUREAU OF DESIGN	BD-632M



- DESIGN NOTES:**
1. THE BAFFLE SPACING AND OPENINGS SHOULD BE BASED ON THE NORMAL CHANNEL WIDTH UPSTREAM AND DOWNSTREAM OF THE STRUCTURE (I.E. EDGE OF WATER TO EDGE OF WATER DURING NORMAL FLOW). AT LEAST THREE (3) MEASUREMENTS SHOULD BE TAKEN UPSTREAM AND DOWNSTREAM OF THE STRUCTURE WHERE THE STREAM EXHIBITS NORMAL, STABLE CONDITIONS. AN AVERAGE OF THOSE SIX (6) MEASUREMENTS SHOULD THEN BE USED FOR THE BAFFLE CONFIGURATIONS.
 - MEASUREMENTS SHOULD NOT BE TAKEN WHERE THE CHANNEL HAS BEEN AFFECTED BY THE STRUCTURE OR SHOW SIGNS OF EROSION. BAFFLE CONFIGURATIONS SHOULD BE BASED ON NORMAL STREAM WIDTH (NOT TOP OF BANK TO TOP OF BANK OR WIDTH OF THE CULVERT).
 2. THE OPENING IN THE APRON BAFFLES SHOULD BE EQUAL TO AVERAGE NORMAL WIDTH OF THE STREAM. THE APRON BAFFLES SHOULD CONNECT TO THE WINGWALLS AT EACH SIDE OF THE CULVERT. PLACE THE FIRST SET OF BAFFLES AT THE END OF THE APRON. IF THE APRON IS GREATER THAN 2400 mm (8'-0") LONG, A SECOND SET OF OPPOSING BAFFLES ARE REQUIRED TO BE SET AT 1/2 THE DISTANCE FROM THE END BAFFLE TO THE FACE OF THE BOX. FOR LONGER APRONS, BAFFLES NOT TO EXCEED 2400 mm (8'-0") SPACING.
 3. THE OPENING IN THE INTERIOR BAFFLES SHOULD BE EQUAL TO 1/3 THE AVERAGE NORMAL WIDTH OF THE STREAM.
 4. BAFFLES SHOULD BE SPACED AT THE AVERAGE NORMAL STREAM WIDTH OR 2.44 m (8'), WHICHEVER IS GREATER. THE FIRST INTERIOR BAFFLE AT THE OUTLET SHOULD BE LOCATED AS CLOSE TO THE DOWNSTREAM END OF CULVERT AS POSSIBLE AND SPACED ACCORDINGLY FROM THAT POINT TO THE INLET.
 5. IF BAFFLE SPACING NEEDS ADJUSTED DUE TO BOX SEGMENTS, THE SPACING SHOULD BE SHORTER NOT LONGER THAN CALCULATED SPACING.
 6. THERE MAY BE UNUSUAL CIRCUMSTANCES IN WHICH THE STANDARD LAYOUT FOR BAFFLES WILL NOT ADEQUATELY ACCOMMODATE FISH PASSAGE. IN THESE CASES, THE PENNSYLVANIA FISH AND BOAT COMMISSION MUST PROVIDE SPECIFIC DESIGN GUIDANCE DURING PRELIMINARY DESIGN.
 7. CUTOFF WALL IS TO ENSURE STREAMFLOW DOES NOT PASS BENEATH THE CULVERT. BOTTOM OF CUTOFF WALL IS TO EQUAL WING WALL FOOTINGS OR ROCK LINING WHICHEVER IS DEEPER 1050 mm (3'-6") MIN.
 8. ROCK PROTECTION AT THE INLET AND OUTLET SHOULD BE DEPRESSED THE ENTIRE LENGTH AND CHOKED WITH NATURAL STREAMBED MATERIAL. THE ROCK SHOULD BE FLUSH WITH THE CULVERT BOTTOM, NOT THE TOP OF THE BAFFLES. STREAMBED MATERIAL SALVAGED FROM EXCAVATION FOR THE BOX CULVERT SHOULD BE PLACED ON TOP OF THE ROCK PROTECTION AND APRON TO THE MAXIMUM HEIGHT OF THE TOP OF THE BAFFLE TO THE LIMIT OF THE ROCK PROTECTION TO FACILITATE THE DEVELOPEMENT OF A NATURAL STREAM BOTTOM IF FEASIBLE.
 9. THE SLOPE OF THE NEW STRUCTURE SHOULD MATCH THE NATURAL STREAM SLOPE.
 10. ADDITIONAL TWIN CELL DETAILS ARE SHOWN ON SHEET 11.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

STANDARD
 R.C. BOX CULVERT
 MISCELLANEOUS DETAILS
 STREAM GRADES > 4%

RECOMMENDED JULY 9, 2010	RECOMMENDED JULY 9, 2010	SHEET 10 OF 11
CHIEF BRIDGE ENGINEER	DIRECTOR, BUREAU OF DESIGN	BD-632M

Bureau of Design
Bridge Quality Assurance Division



PennDOT e-Notification No. 29

Sept. 20, 2010

Interim Revision to Bridge Standard Drawing(s)	BD-632M, "R.C. Box Culvert", sheets 1, 4, 5, 9 and 10, dated 12/29/2008. Clarification of Backfill Material - Type, Placement Limits and Preformed Drain at Weep Holes.
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Background:

Problems have been observed that the stream flow is initially piping through granular fill and bedding around some box culverts. As a result, the inlet end cut-off wall depth was set deeper to in-situ material (e-Notification No. 28) and an imperious type of backfill is to be used at the inlet end of the box culvert. Details were added to BD-632M to address this issue and the revisions were included in the Bridge Standards Feb. 5, 2010 Clearance Transmittal. Afterwards, the revisions were sent out as e-Notification No. 28. This current e-Notification provides clarification to the revisions of e-Notification No. 28.

The following four (4) changes are being included:

1. Compacted No. 2 Coarse Aggregate or Flowable Backfill must be placed behind inlet end wing walls and for a minimum length of 10'-0" along the sides of the box culvert instead of the entire length as indicated in Section P-P of e-Notification No. 28. This backfill is to be placed a minimum of 2'-0" above the normal stream elevation. The placement limits of this backfill material has been added to the box culvert Elevation on Sheet 1 along with new Note 21.
2. Note 12 is revised to include a statement on use of preformed drain at weep holes that are within this backfill. PREFORMED DRAIN detail added to show proper placement of preformed drain at weep hole locations that are within the compacted No. 2 Coarse Aggregate or Flowable Backfill (See Sheet 5).
3. Rock Lining placement modified to not indicate it extending behind the wing walls on plan views.
4. New Note 28 was added to Sheet 4 to reference Notes 12 and 21 on Sheet 1.

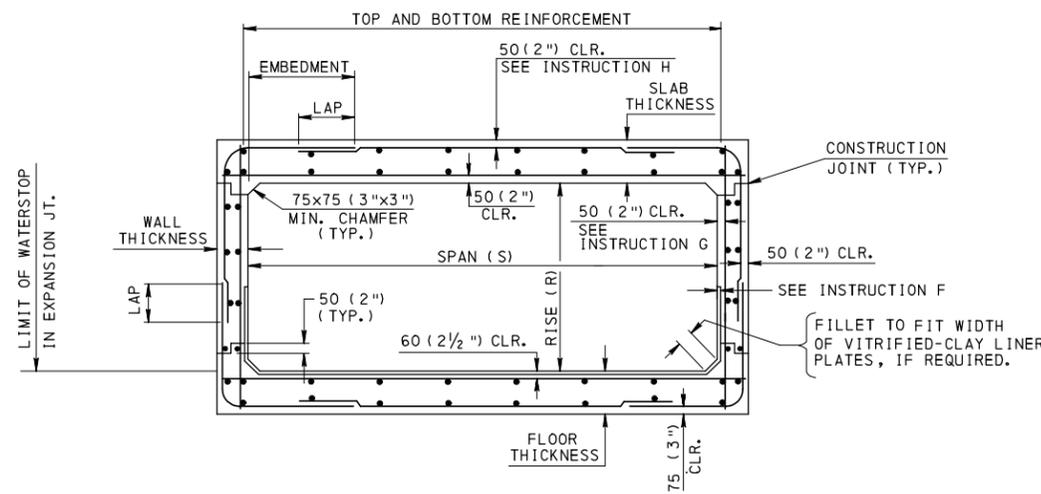
Attached drawing sheets 1, 4, 5, 9 and 10 indicate revisions with yellow highlighting within red clouding or boxes.

Please note that implementation of this revision is effective for all projects currently advertised for bids and all future projects.

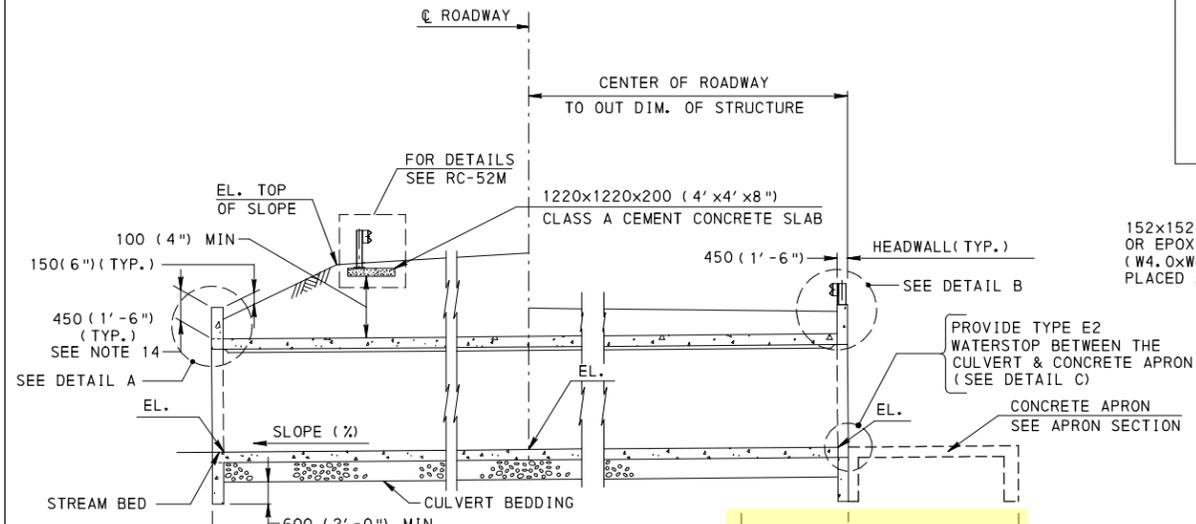
Direct any questions concerning the above issue to:

Gary P. Gordon, P.E.
PennDOT, Bureau of Design, Bridge Quality Assurance Division
Phone: (717) 783-7551 / Fax: (717) 787-2882
gagordon@state.pa.us

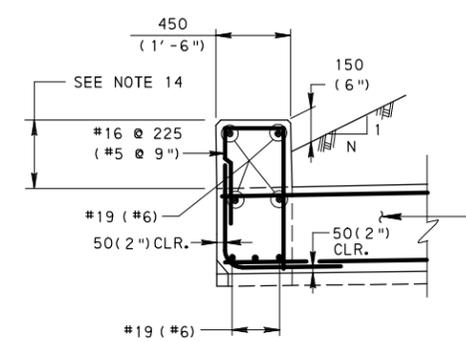
Archived copies of all previously distributed e-Notifications can be obtained from the PennDOT Bridge Standards website at <http://www.dot.state.pa.us/Bridge/Standards> and clicking on “Subscribe to E-mail Notification System” and then “Previous E-Mail Notifications



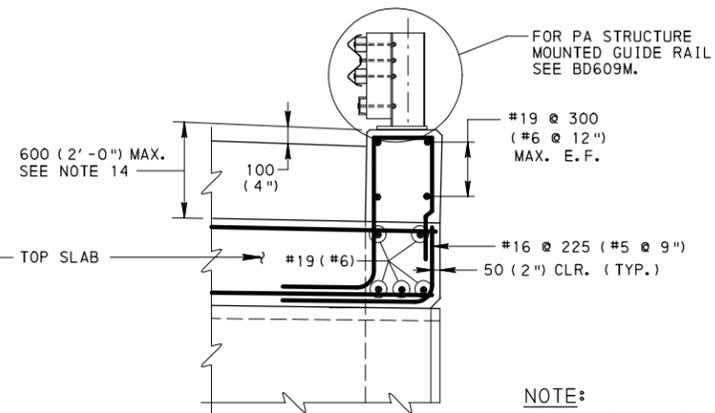
TYPICAL BOX SECTION
NO SCALE



SECTION ALONG Q CULVERT
NO SCALE



DETAIL A
IMPROVEMENT CONDITION
NO SCALE



DETAIL B
NO SCALE

NOTE:
USE APRON AT INLET AND OUTLET IF WARRANTED. SEE APRON SECTION THIS SHEET. FOR ALTERNATE DESIGN BY CONTRACTOR, PROVIDE THE APRONS ON THE PLANS.

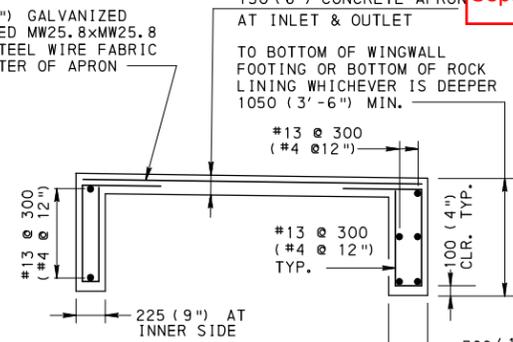
NOTE:
FOR STRUCTURE MOUNTED GUIDE RAIL DETAILS SEE SHEET 2.

DESIGN DATA FOR
CAST-IN-PLACE BOX CULVERT

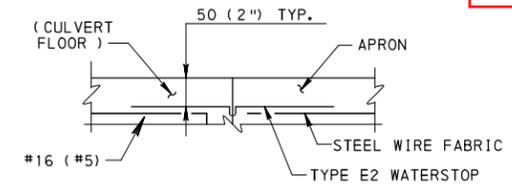
1. $f'c = 21 \text{ MPa}$ (3000 P.S.I.) FOR CLASS A CEMENT CONCRETE
2. $f'c = 28 \text{ MPa}$ (4000 P.S.I.) FOR TOP SLAB AT GRADE (CLASS AAA CEMENT CONCRETE)
3. $f_y = 420 \text{ MPa}$ (60,000 P.S.I.) FOR REINFORCEMENT BARS
4. $f_y = 450 \text{ MPa}$ (65,000 P.S.I.) FOR WELDED WIRE FABRIC

INSTRUCTIONS

- A. MINIMUM SLAB THICKNESS = 250 (10")
- B. MINIMUM WALL THICKNESS = 250 (10") FOR RISE < 1500 (5'-0")
- C. MINIMUM WALL THICKNESS = 300 (1'-0") FOR RISE > 1500 (5'-0")
- D. ADD 35 (1 1/2"), (10 (1/2")) AT THE TOP AND 25 (1") AT BOTTOM, TO THE EFFECTIVE DESIGN THICKNESS OF BOTTOM SLAB OF BOX CULVERTS, FOR THE TOTAL (PROVIDED) THICKNESS.
- E. FOR BOX CULVERTS AT GRADE, ADD 10 (1/2") INTEGRAL WEARING SURFACE TO THE TOP DECK SLAB THICKNESS.
- F. IF SPECIFIED, VITRIFIED-CLAY LINER PLATES WITH TYPE B POINTING (INCLUDE COST IN THE PRICE OF CONCRETE TO WHICH ATTACHED.)
- G. 75 (3'') CLEAR IF LINER PLATES ARE USED
- H. 60 (2 1/2'') CLEAR IF AT GRADE
- I. PLACE MAIN CIRCUMFERENTIAL REINFORCEMENT NORMAL TO THE CENTERLINE OF THE CULVERT.
- J. PROVIDE EXPANSION JOINTS AT APPROXIMATELY 27 000 (90') INTERVALS AND CONSTRUCTION JOINTS AT APPROXIMATELY 9 000 (30') INTERVALS. PROVIDE EXPANSION JOINTS IN BOTTOM SLAB.



APRON SECTION
NO SCALE



DETAIL C
NO SCALE

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
2. ALL REINFORCEMENT BARS SHOWN ARE SOFT CONVERTED METRIC SIZES THAT MEET THE REQUIREMENTS OF ASTM A 615M, A 996M OR A 706M.
3. DESIGN SPECIFICATIONS: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND AS SUPPLEMENTED BY THE DESIGN MANUAL, PART 4, STRUCTURES.
4. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATIONS AS OUTLINED IN THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION PUBLICATION 408.
5. DEAD LOADS: INCLUDES SURFACE AREA DENSITY OF 150 kg/m (30 P.S.F.) FOR FUTURE WEARING SURFACE FOR BOXES AT GRADE.
6. USE EPOXY COATED REINFORCEMENT BARS IN THE FOLLOWING CONDITIONS:
 - TOP SLAB AND HEADWALL WITHIN 600 (2'-0") OF GRADE.
 - ALL CURBS AND BARRIERS.
 - THROUGHOUT THE CULVERT WHEN VITRIFIED CLAY LINER PLATES ARE USED.
 - IN ALL APRON SLABS.
7. PROVIDE 50 mm (2'') CONCRETE COVER ON REINFORCEMENT BARS EXCEPT AS NOTED.
8. FOR HYDRAULIC DESIGN REFER TO DESIGN MANUAL, PART 2.
9. FOR LOW FLOW FISH PASSAGE DESIGN COMMENTARY REFER TO DESIGN MANUAL, PART 2.
10. INDICATE ALLOWABLE AND MAXIMUM DESIGN FOUNDATION PRESSURE ON THE PLANS.
11. PLACE HEADWALLS, APRON WALLS AND WINGWALL FOOTINGS BELOW FROST DEPTH OR 1050 (3'-6'') WHICHEVER IS GREATER.
12. USE 102 mm (4'') Ø FORMED WEEP HOLES AT 4600 mm (15'-0'') MAXIMUM CENTERS PLACED AT A MINIMUM 525 mm (1'-9'') ABOVE BOTTOM OF SLAB OR 150 mm (6'') ABOVE NORMAL FLOW LINE, FOR DETAILS SEE BC-751M. FOR WEEP HOLES LOCATED IN THE COMPACTED NO. 2 COARSE AGGREGATE AREAS OR FLOWABLE BACKFILL AREAS, PROVIDE PREFORMED DRAIN CONFORMING TO PUB. 408 SECTION 623.2(c), WHICH IS 50 mm (2'') MINIMUM THICK x 1220 mm (4'-0'') WIDE CENTERED HORIZONTALLY ON WEEP HOLE, SEE PREFORMED DRAIN DETAIL ON SHEET 5.
13. SPECIFY MINIMUM SEGMENT LENGTH ON CONTRACT DRAWINGS.
14. CONCRETE HEAD WALL REINFORCEMENT WILL REQUIRE A SEPARATE DESIGN IF HEIGHT IS GREATER THAN 600 (2'-0").
15. USE THIS STANDARD DRAWING IN CONJUNCTION WITH THE APPLICABLE ROADWAY CONSTRUCTION STANDARDS FOR GUIDE RAIL. REFER TO DESIGN DRAWINGS FOR SPACING OF POSTS.
16. THOROUGHLY COAT ALL SURFACES OF THE BASE PLATES IN CONTACT WITH CONCRETE WITH CAULKING COMPOUNDS PRIOR TO ERECTION. AFTER ERECTION AND ALIGNMENT, SEAL OPENINGS BETWEEN THE METAL SURFACES AND THE CONCRETE WITH CAULKING COMPOUND MEETING THE REQUIREMENTS OF SECTION 705, PUB. 408.
- 17.
18. FOR JOINT DETAILS SEE BC-735M. WHEN EXPANSION JOINTS ARE USED, WATERSTOPS ARE REQUIRED IN THE TOP AND BOTTOM SLABS AND THE WALLS.
19. FOR SAFETY WING DETAILS, SEE SHEET 3.
20. MODIFIED STRUCTURE MOUNTED GUIDE RAIL BARRIER GRANTED TL3 DESIGNATION BY FHWA.
21. PROVIDE COMPACTED NO. 2A COARSE AGGREGATE BACKFILL OR TYPE B FLOWABLE BACKFILL AT INLET END OF CULVERTS FOR A MINIMUM LENGTH OF 3050 (10'-0'') PLUS WINGWALLS. HEIGHT OF COMPACTED NO. 2A COARSE AGGREGATE IS A MINIMUM OF 600 (2'-0'') ABOVE NORMAL STREAM ELEVATION EXTENDING TO THE BOTTOM OF WINGWALL FOOTING OR BOTTOM OF ROCK LINING WHICHEVER IS DEEPER, 1050 (3'-6'') MINIMUM.

e-Notification No. 29
Sept. 20, 2010

e-Notification No. 29
Sept. 20, 2010

LEGEND

E.F. :	DENOTES EACH FACE
F.F. :	DENOTES FRONT FACE
R.F. :	DENOTES REAR FACE
EL. :	DENOTES ELEVATION
C. I. P. :	DENOTES CAST IN PLACE
B. B. :	DENOTES BACK BATTER

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

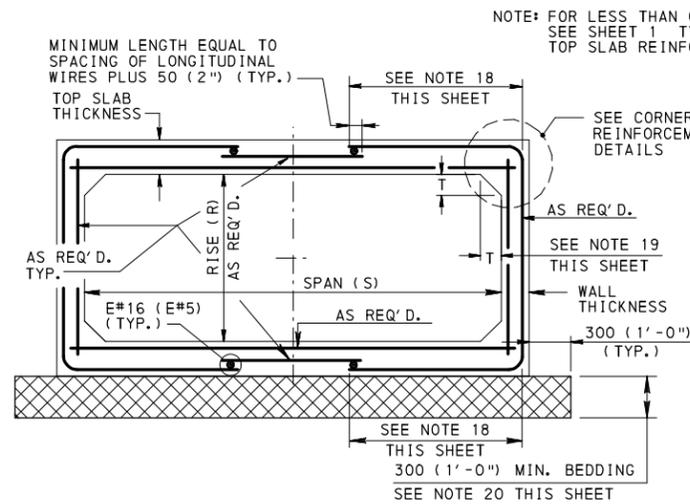
RC-52M	TYPE 2 STRONG POST GUIDE RAIL
BD-601M	CONCRETE DECK SLAB DESIGN & DETAILS
BD-609M	PA STRUCTURE MOUNTED GUIDE RAIL
BD-621M	STANDARD REINFORCED CONCRETE ABUTMENTS TYPICAL SECTIONS AND DETAILS
BD-625M	WINGWALL LENGTH
BD-631M	END WALL DETAILS FOR METAL CULVERTS
BC-734M	ANCHOR SYSTEMS
BC-735M	WALL CONSTR. AND EXPANSION JOINT DETAILS
BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
BC-739M	BRIDGE BARRIER TO GUIDE RAIL TRANSITION
BC-751M	BRIDGE DRAINAGE
BC-788M	TYPICAL WATERPROOFING AND EXPANSION DETAILS
BC-798M	PRECAST R.C. BOX CULVERT MECHANICAL CONNECTION DETAILS

REFERENCE DRAWINGS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

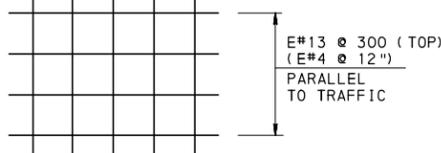
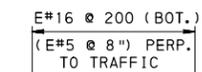
STANDARD
R. C. BOX CULVERT
CAST-IN-PLACE

RECOMMENDED JULY 9, 2010	RECOMMENDED JULY 9, 2010	SHEET 1 OF 11
CHIEF BRIDGE ENGINEER	DIRECTOR, BUREAU OF DESIGN	BD-632M

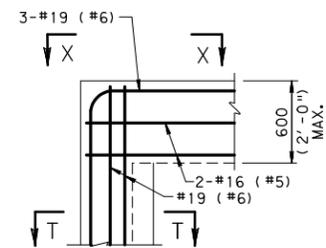


BOX DETAILS - WELDED WIRE FABRIC

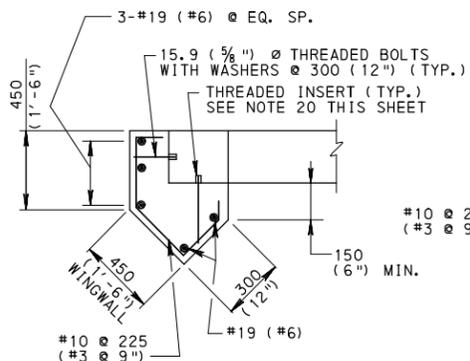
(FOR 600 mm (2'-0") OR MORE OF COVER) SEE BC-798M FOR POST TENSION STRAND DETAILS NO SCALE



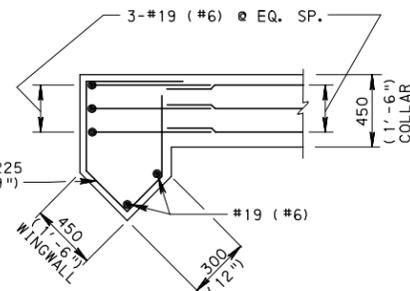
TYPICAL DECK REINFORCEMENT



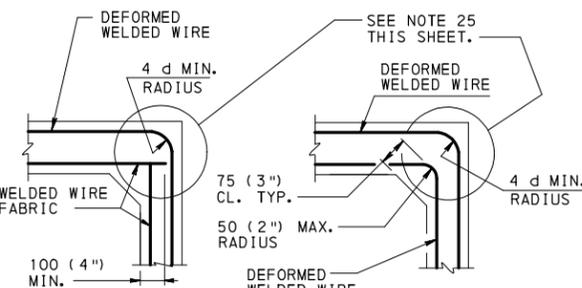
COLLAR CORNER DETAILS



SECTION T-T



SECTION X-X



DETAIL OPTION

CORNER REINFORCEMENT DETAILS

WELDED WIRE FABRIC

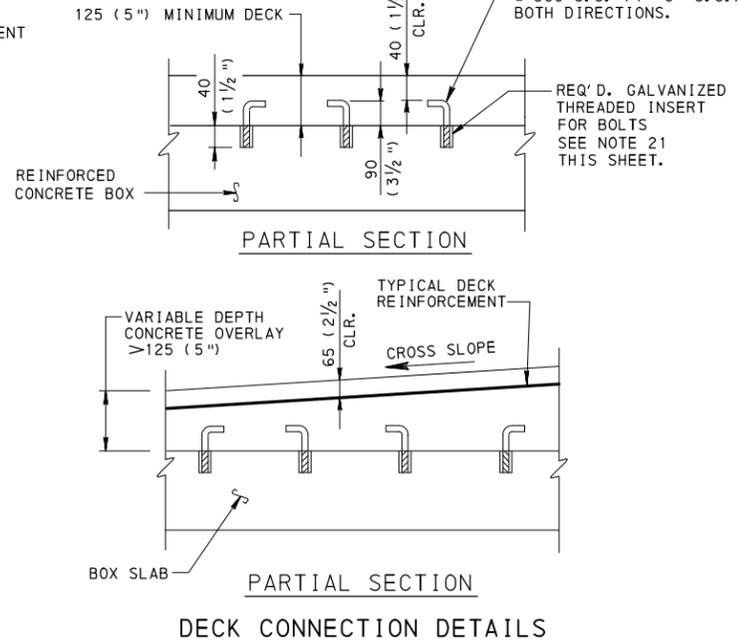
- NOTES:
- FOR LESS THAN 600 mm (2'-0") OF COVER SEE SHEET 1 TYPICAL BOX SECTION FOR TOP SLAB REINFORCEMENT.
 - FOR POST TENSIONING DETAILS, SEE BC-798M.

DESIGN DATA:

- f'c = 35 MPa (5000 P.S.I.) MINIMUM FOR CONCRETE
- fy = 420 MPa (60,000 P.S.I.) FOR STEEL REINFORCING BARS
- fy = 450 MPa (65,000 P.S.I.) FOR WELDED WIRE FABRIC (IN FLAT SHEET)

INSTRUCTIONS:

- MINIMUM WALL THICKNESS = 0.08S (S/12) FOR S=2400 mm (8') TO 3600 mm (12'); 300 mm (12") FOR S > 3600 mm (12')
- MINIMUM SLAB THICKNESS = 0.08S (S/12) FOR S=2400 mm (8') TO 3600 mm (12'); 300 mm (12") FOR S > 3600 mm (12')
- MINIMUM COVER FOR WELDED WIRE FABRIC:
 - PROVIDE 40 mm (1 1/2"), EXCEPT 50 mm (2") FOR THE TOP WIRES OF THE TOP SLAB WHERE BOX FILL HEIGHT IS LESS THAN 600 mm (2'-0").
 - USE 12 mm (1/2") MORE COVER FOR THE TOP WIRES OF THE BOTTOM SLAB.
- MINIMUM COVER FOR CONVENTIONAL REINFORCEMENT BARS: PROVIDE 50 mm (2") FOR THE TOP BARS OF TOP AND BOTTOM SLABS, AND 40 mm (1 1/2") FOR ALL OTHER BARS, EXCEPT USE 60 mm (2 1/2") FOR TOP BARS WHEN SLAB IS AT GRADE.
- FOR WELDED WIRE FABRIC, SPACE CIRCUMFERENTIAL WIRES CENTER TO CENTER NOT LESS THAN 50 mm (2") OR MORE THAN 100 mm (4"), AND SPACE LONGITUDINAL WIRES CENTER TO CENTER NOT MORE THAN 200 mm (8")



NOTES

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- ALL REINFORCEMENT BARS SHOWN ARE SOFT CONVERTED METRIC SIZES THAT MEET THE REQUIREMENTS OF ASTM A 615M, A 996M OR A 706M.
- WELDED WIRE FABRIC WILL MEET THE REQUIREMENTS OF AASHTO M55 ASTM (A185), AND DEFORMED WELDED WIRE FABRIC WILL MEET THE REQUIREMENTS OF AASHTO M221 ASTM (A497).
- USE EPOXY COATED REINFORCEMENT AND EPOXY OR GALVANIZED WELDED WIRE FABRIC IN THE FOLLOWING CONDITIONS:
 - IN THE CAST IN PLACE DECK AND HEADWALLS IF A DECK IS USED.
 - IN THE TOP SLAB AND HEADWALL WITHIN 600 (2'-0") OF GRADE IF A CAST IN PLACE DECK IS NOT USED.
 - ALL CURBS AND BARRIERS.
 - THROUGHOUT THE CULVERT WHEN VITRIFIED CLAY LINER PLATES ARE USED.
 - IN ALL CAST-IN-PLACE APRON SLABS (SEE SHEET 1)
 IF EPOXY COATED WELDED WIRE FABRIC IS USED IT MUST MEET THE REQUIREMENTS OF ASTM A 884M, TYPE 1, CLASS A.
- DESIGN SPECIFICATIONS: AASHTO LRFD "BRIDGE DESIGN SPECIFICATION" AND AS SUPPLEMENTED BY THE DESIGN MANUAL, PART 4, STRUCTURES.
- PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATIONS AS OUTLINED IN THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION PUBLICATION 408.
- DEAD LOADS: INCLUDES SURFACE AREA DENSITY OF 150 kg/m² (WEIGHT OF 30 P.S.F.) FOR FUTURE WEARING SURFACE FOR BOXES AT GRADE.
- PROVIDE MINIMUM LAP AND EMBEDMENT LENGTH OF REINFORCEMENT IN ACCORDANCE WITH LRFD SPECIFICATIONS; SEE BC-736M.
- PROVIDE 50 mm (2") CONCRETE COVER ON REINFORCEMENT BARS EXCEPT AS NOTED IN INSTRUCTIONS BELOW.
- FOR HYDRAULIC DESIGN REFER TO DESIGN MANUAL, PART 2.
- FOR LOW FLOW FISH PASSAGE DESIGN REFER TO DESIGN MANUAL, PART 2, AND SEE SHEETS 9 AND 10.
- INDICATE ALLOWABLE AND MAXIMUM DESIGN FOUNDATION PRESSURE ON PLANS.
- PLACE HEADWALL AND WINGWALL FOOTINGS BELOW FROST DEPTH OR 1050 (3'-6") MINIMUM, WHICH EVER IS GREATER.
- PROVIDE 600 mm (2'-0") WIDTH + MEMBRANE WATERPROOFING AS PER SECTION 680.2(b) MEMBRANE ADHESIVE-BACKED PREFORMED MEMBRANE ALONG THE SIDE JOINTS AND JOINTS IN THE TOP SLAB OF BOX FOR FILLS > 600 mm (2'-0").
- USE 102 mm (4") Ø FORMED WEEPHOLES AT EVERY OTHER SEGMENT PLACED AT A MINIMUM 525 mm (1'-9") ABOVE THE BOTTOM SLAB OR 150 mm (6") ABOVE NORMAL FLOW LINE. FOR WEEPHOLE PLACEMENT, THE WEEPHOLE LOCATION MAY BE ADJUSTED BY A MAXIMUM OF 50 mm (2") IN ANY DIRECTION, OR RELOCATE REINFORCEMENT BY A MAXIMUM OF 10 mm (1/2"). DO NOT CUT REINFORCEMENT BARS. NO ADDITIONAL WEEPHOLE REINFORCEMENT WILL BE REQUIRED. IF WIRE MESH IS USED, MAY CUT THE MESH TO FIT WEEPHOLE CONDUIT BUT REPLACE EQUIVALENT STEEL WITH ADDITIONAL WIRE MESH PLACED ON EACH SIDE OF WIRE MESH MAT.
- PRECAST BOX CULVERTS AT GRADE (I.E. ≤ 600 mm (2'-0") OF FILL) REQUIRE AN ADDITIONAL 125 mm (5") MINIMUM REINFORCED CONCRETE DECK. THIS 125 mm (5") DECK WILL BE MAINTAINED FOR ENTIRE BOX CULVERT. REFER TO TYPICAL DECK REINFORCEMENT (THIS SHT.) FOR DETAILS. FOR ADT ≤ 750 AND A.D.T.T. ≤ 25, A BITUMINOUS OVERLAY MAY BE UTILIZED IN LIEU OF A CONCRETE DECK.
- DESIGN PRECAST REINFORCED CONCRETE BOXES TO HAVE OPENINGS IN 150 mm (6") INCREMENTS WITH MINIMUM RISE OF 900 mm (3'-0").
- REQUIRED DIMENSION FOR BAR LENGTH IS THE TOTAL OF THE THEORETICAL CUT-OFF LENGTH PLUS THE REQUIRED ANCHORAGE.
- HAUNCH SIZE SHOWN (T) IS BASED ON AASHTO M273M. HAUNCH MAY BE MODIFIED IF THE BOX IS CUSTOM DESIGNED TO SATISFY DESIGN, TRANSPORTATION AND CONSTRUCTION REQUIREMENTS, BUT NOT LESS THAN 150 mm x 150 mm (6"x6").
- INDICATES ADDITIONAL EXCAVATION FOR BEDDING MATERIAL BELOW THE BOTTOM OF PRECAST R.C. BOX CULVERT WITH LIMITS AS SHOWN. BACKFILL SPACE WITH 2A OR #8 COARSE AGGREGATE.
- THREADED INSERTS TO BE INCORPORATED IN PRECAST BOX BY THE FABRICATOR, SEE SPECIAL PROVISIONS.
- CONCRETE HEADWALL REINFORCEMENT WILL REQUIRE A SEPARATE DESIGN IF HEIGHT IS GREATER THAN 600 (2'-0").
- IF APPROACH ROADWAY UTILIZES CURB, ADJUST DIMENSION TO MATCH CURB HEIGHT.
- USE EPOXY BONDING COMPOUND WHERE EVER CAST-IN-PLACE CEMENT CONCRETE COMES IN CONTACT WITH PRECAST CEMENT CONCRETE. THE EPOXY BONDING COMPOUND IS TYPE 2, GRADE 2, AS DESCRIBED IN ASTM-C881-90.
- THE USE OF PRECAST END SECTION IS NOT PRECLUDED BUT WILL BE REVIEWED ON AN INDIVIDUAL BASIS BY THE DISTRICT BRIDGE ENGINEER.
- POST-TENSIONING DUCTS MAY BE PLACED AT EITHER CORNER OR HAUNCH TO SATISFY DESIGN AND CONSTRUCTION REQUIREMENTS. PROVIDE A 75 (3") CONCRETE CLEARANCE. HAUNCH DUCT MUST BE TIED TO INSIDE REINFORCEMENT. SEE SHEETS 6 AND 8.
- FOR DECK CONNECTION DETAIL FOR VARIABLE DEPTH CONCRETE DECKS, THE DECK REINFORCEMENT WILL BE INDEPENDENT OF ANCHOR BOLT AND MUST MAINTAIN CLEARANCE AND FOLLOW CROSS SLOPE.
- SEE NOTE 21 ON SHEET 1 FOR BACKFILL REQUIREMENTS AT INLET END OF CULVERT AND NOTE 12 ON SHEET 1 FOR TREATMENT OF WEEP HOLES IN BACKFILL AREAS AT INLET END OF CULVERT.

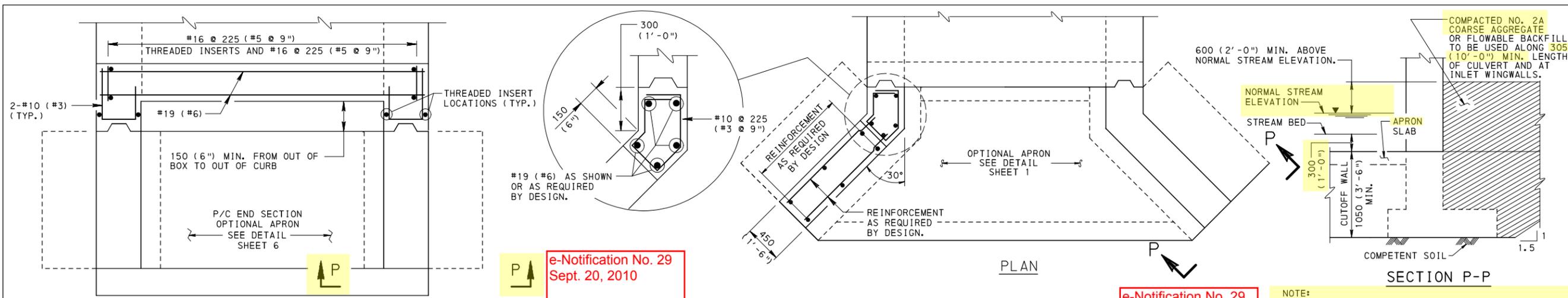
e-Notification No. 29
Sept. 20, 2010

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD
R.C. BOX CULVERT
PRECAST

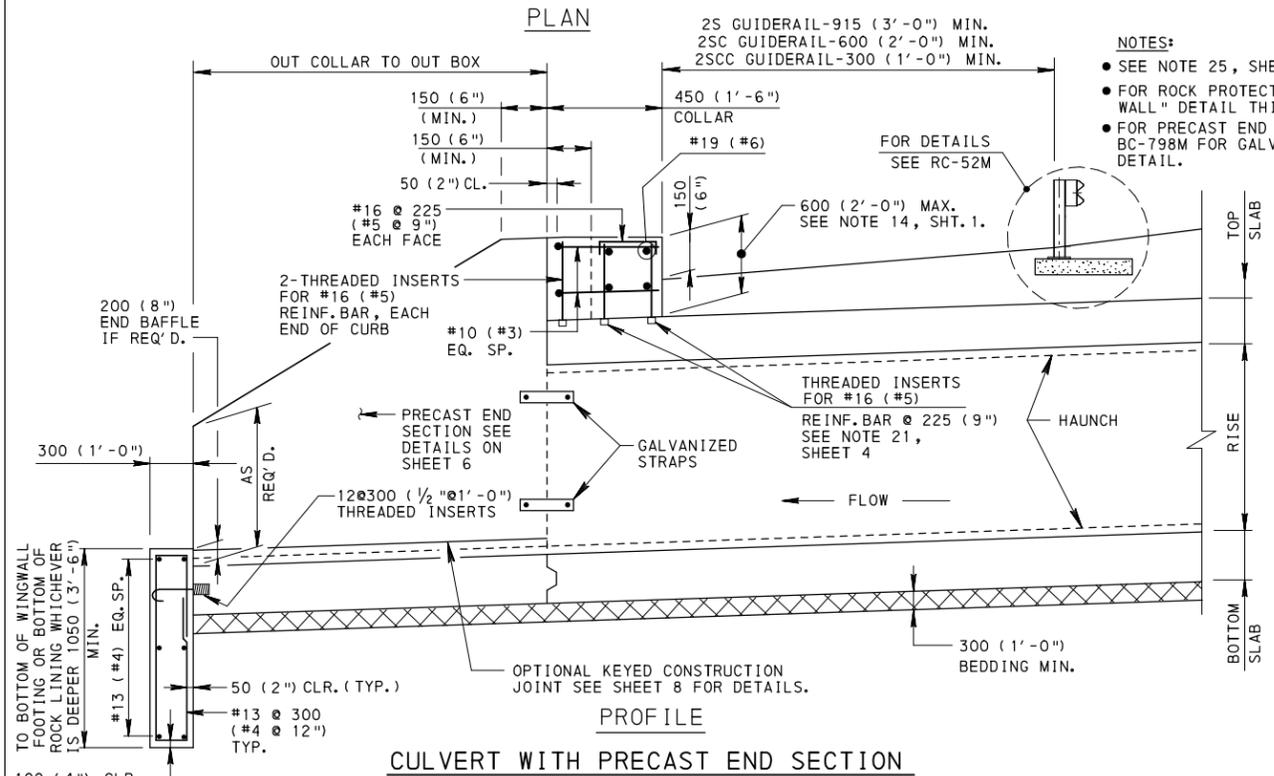
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CHIEF BRIDGE ENGINEER	DIRECTOR, BUREAU OF DESIGN	BD-632M



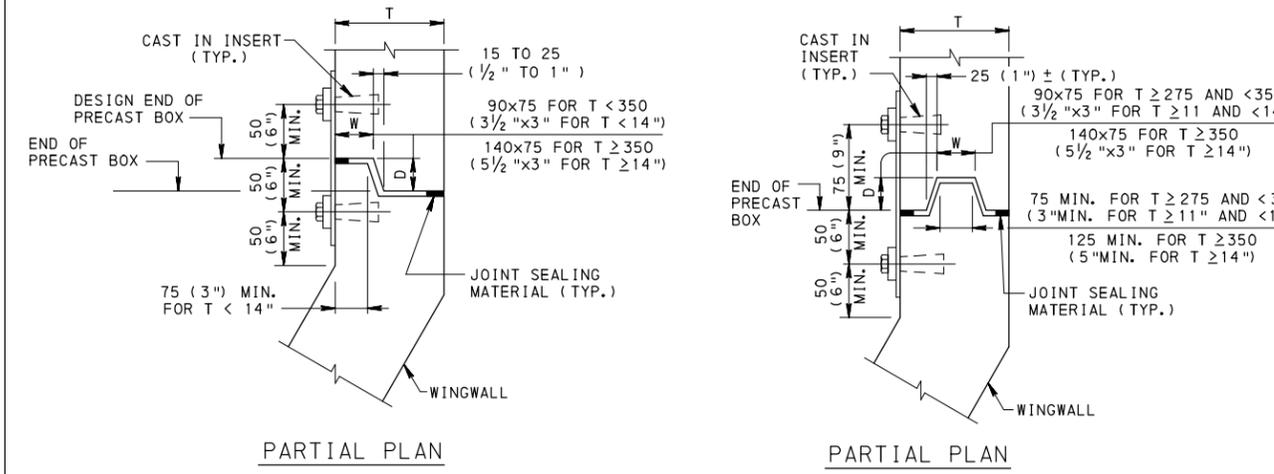
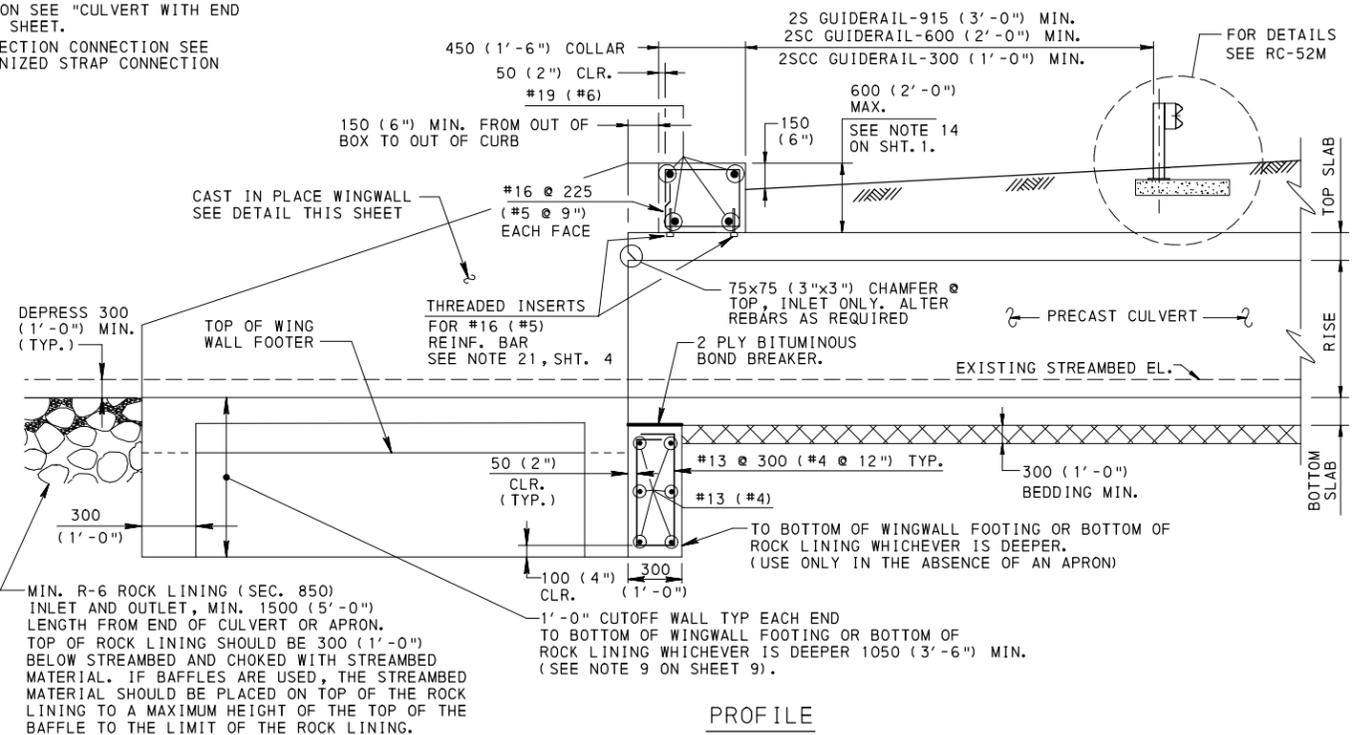
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NOTE: DESIGNER TO MODIFY AMOUNT OF COMPACTED NO. 2A COARSE AGGREGATE OR FLOWABLE BACKFILL TO PROVIDE ADEQUATE PROTECTION AGAINST PIPING OF STREAM FLOW THROUGH FILL AT INLET END OF CULVERT.



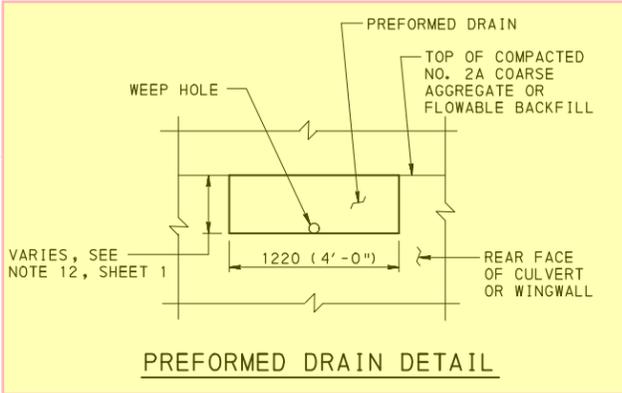
- NOTES:
- SEE NOTE 25, SHEET 4.
 - FOR ROCK PROTECTION SEE "CULVERT WITH END WALL" DETAIL THIS SHEET.
 - FOR PRECAST END SECTION CONNECTION SEE BC-798M FOR GALVANIZED STRAP CONNECTION DETAIL.



SHIP LAP JOINT
DISCONTINUOUS IF POST TENSIONING IS REQUIRED

KEYED JOINT
DISCONTINUOUS IF POST TENSIONING IS REQUIRED

- NOTES:
1. NO BOLT THROUGH CONNECTIONS CAN BE USED.
 2. EITHER SHIP LAP OR KEYWAY JOINTS CAN BE USED. NO FLUSH BUTT JOINTS.
 3. ONE (1) ROW OF JOINT SEALING FLEXIBLE FOAM MATERIAL EACH FACE.
 4. FOR T < 11", USE SHIP LAP DETAIL.



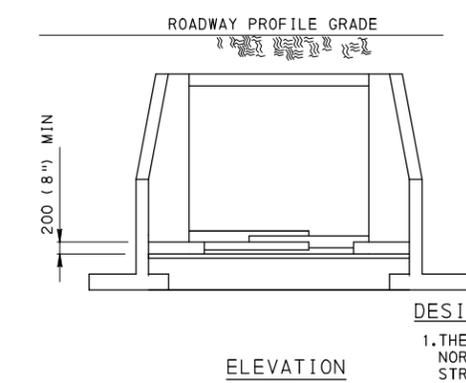
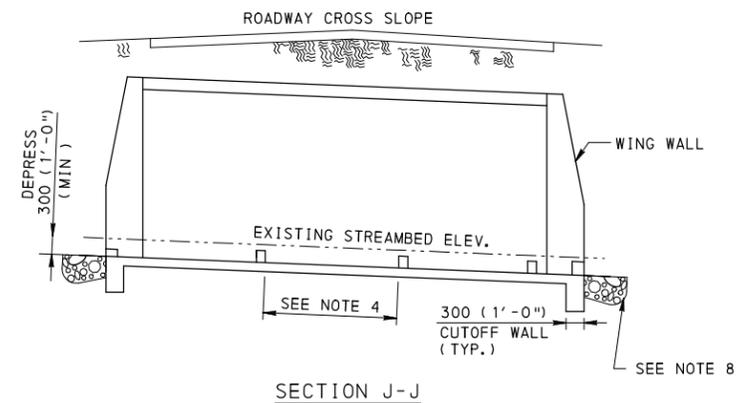
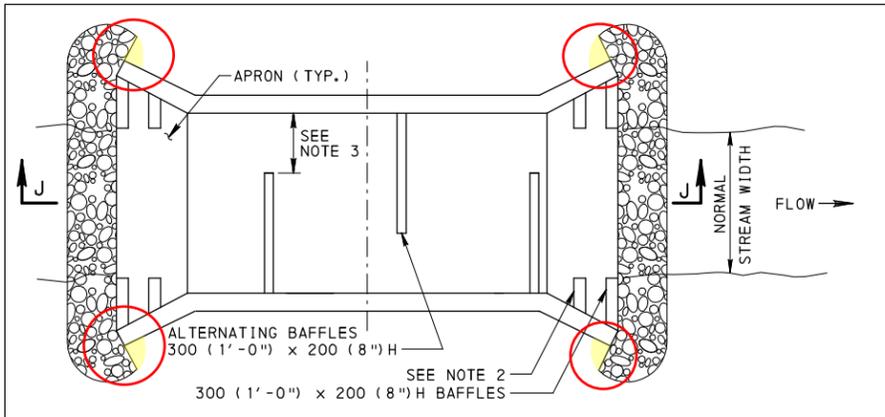
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD
R. C. BOX CULVERT
PRECAST

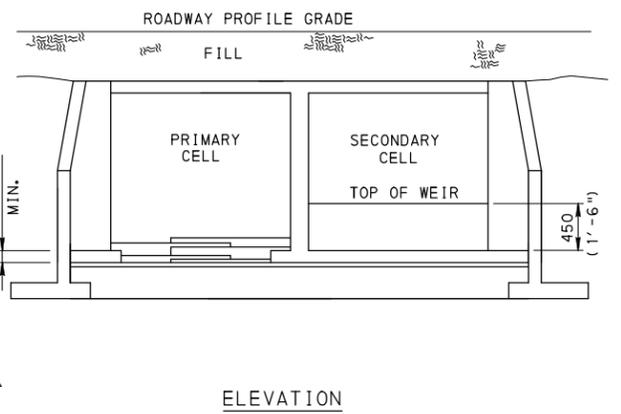
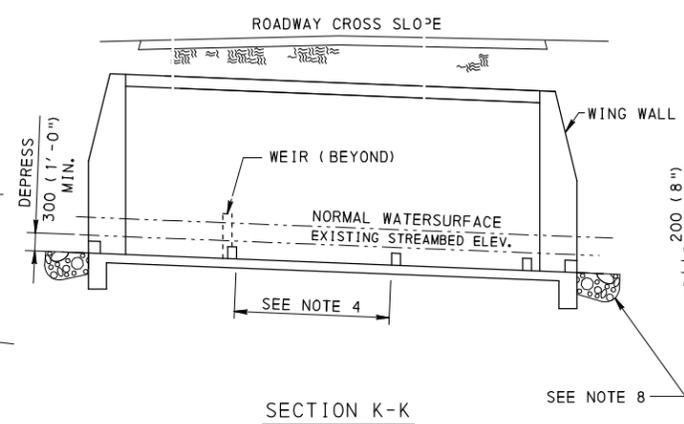
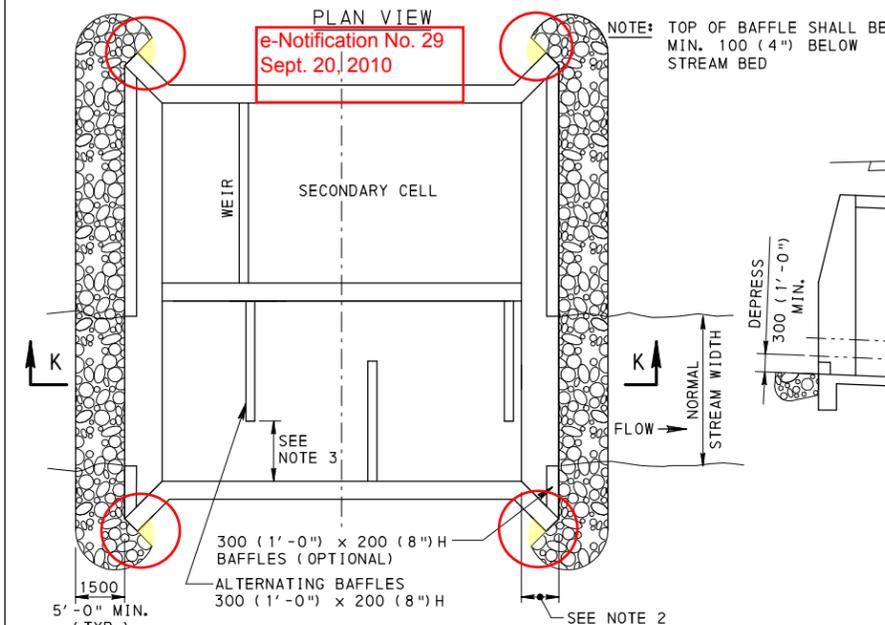
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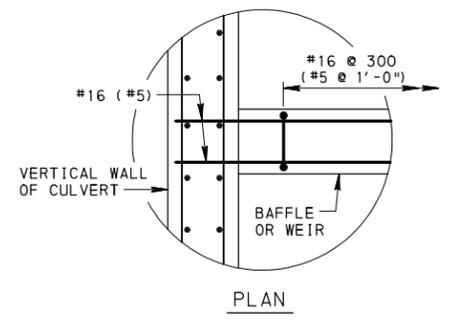
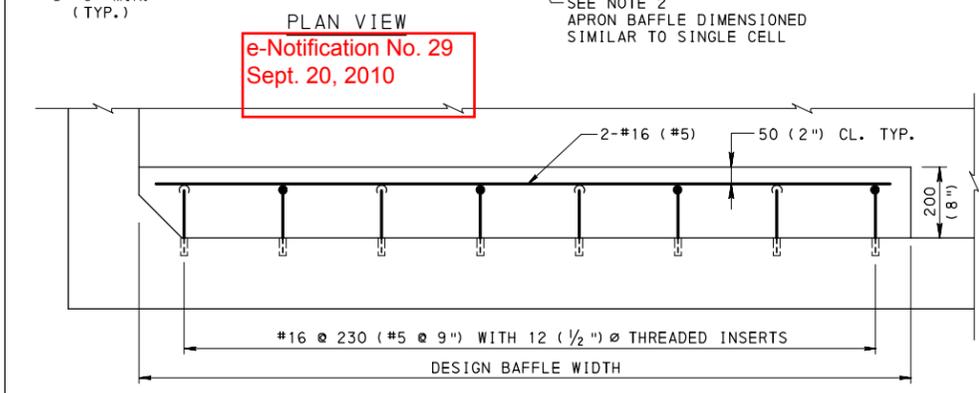
DESIGN NOTES:

1. THE BAFFLE SPACING AND OPENINGS SHOULD BE BASED ON THE NORMAL CHANNEL WIDTH UPSTREAM AND DOWNSTREAM OF THE STRUCTURE (I.E. EDGE OF WATER TO EDGE OF WATER DURING NORMAL FLOW). AT LEAST THREE (3) MEASUREMENTS SHOULD BE TAKEN UPSTREAM AND DOWNSTREAM OF THE STRUCTURE WHERE THE STREAM EXHIBITS NORMAL, STABLE CONDITIONS. AN AVERAGE OF THOSE SIX (6) MEASUREMENTS SHOULD THEN BE USED FOR THE BAFFLE CONFIGURATIONS.
● MEASUREMENTS SHOULD NOT BE TAKEN WHERE THE CHANNEL HAS BEEN AFFECTED BY THE STRUCTURE OR SHOW SIGNS OF EROSION. BAFFLE CONFIGURATIONS SHOULD BE BASED ON NORMAL STREAM WIDTH (NOT TOP OF BANK TO TOP OF BANK OR WIDTH OF THE CULVERT).
2. THE OPENING IN THE APRON BAFFLES SHOULD BE EQUAL TO AVERAGE NORMAL WIDTH OF THE STREAM. THE APRON BAFFLES SHOULD CONNECT TO THE WINGWALLS AT EACH SIDE OF THE CULVERT. PLACE THE FIRST SET OF BAFFLES AT THE END OF THE APRON. IF THE APRON IS GREATER THAN 2400 mm (8'-0") LONG, A SECOND SET OF OPPOSING BAFFLES ARE REQUIRED TO BE SET AT 1/2 THE DISTANCE FROM THE END BAFFLE TO THE FACE OF THE BOX. FOR LONGER APRONS, BAFFLES NOT TO EXCEED 2400 mm (8'-0") SPACING.
3. THE OPENING IN THE INTERIOR BAFFLES SHOULD BE EQUAL TO 1/3 THE AVERAGE NORMAL WIDTH OF THE STREAM.
4. BAFFLES SHOULD BE SPACED AT THE AVERAGE NORMAL STREAM WIDTH OR 2.44 m (8'), WHICHEVER IS GREATER. THE FIRST INTERIOR BAFFLE AT THE OUTLET SHOULD BE LOCATED AS CLOSE TO THE DOWNSTREAM END OF CULVERT AS POSSIBLE AND SPACED ACCORDINGLY FROM THAT POINT TO THE INLET.
5. IF BAFFLE SPACING NEEDS ADJUSTED DUE TO BOX SEGMENTS, THE SPACING SHOULD BE SHORTER NOT LONGER THAN CALCULATED SPACING.
6. THERE MAY BE UNUSUAL CIRCUMSTANCES IN WHICH THE STANDARD LAYOUT FOR BAFFLES WILL NOT ADEQUATELY ACCOMMODATE FISH PASSAGE. IN THESE CASES, THE PENNSYLVANIA FISH AND BOAT COMMISSION MUST PROVIDE SPECIFIC DESIGN GUIDANCE DURING PRELIMINARY DESIGN.
7. CUTOFF WALL IS TO ENSURE STREAMFLOW DOES NOT PASS BENEATH THE CULVERT. BOTTOM OF CUTOFF WALL IS TO EQUAL WING WALL FOOTINGS OR ROCK LINING WHICHEVER IS DEEPER 1050 mm (3'-6") MIN.
8. ROCK LINING AT THE INLET AND OUTLET SHOULD BE DEPRESSED THE ENTIRE LENGTH AND CHOKED WITH NATURAL STREAMBED MATERIAL. THE ROCK SHOULD BE FLUSH WITH THE CULVERT BOTTOM, NOT THE TOP OF THE BAFFLES. STREAMBED MATERIAL SALVAGED FROM EXCAVATION FOR THE BOX CULVERT SHOULD BE PLACED ON TOP OF THE ROCK LINING AND APRON TO THE MAXIMUM HEIGHT OF THE TOP OF THE BAFFLE TO THE LIMIT OF THE ROCK LINING TO FACILITATE THE DEVELOPEMENT OF A NATURAL STREAM BOTTOM IF FEASIBLE.
9. THE SLOPE OF THE NEW STRUCTURE SHOULD MATCH THE NATURAL STREAM SLOPE.
10. ADDITIONAL TWIN CELL DETAILS ARE SHOWN ON SHEET 11.

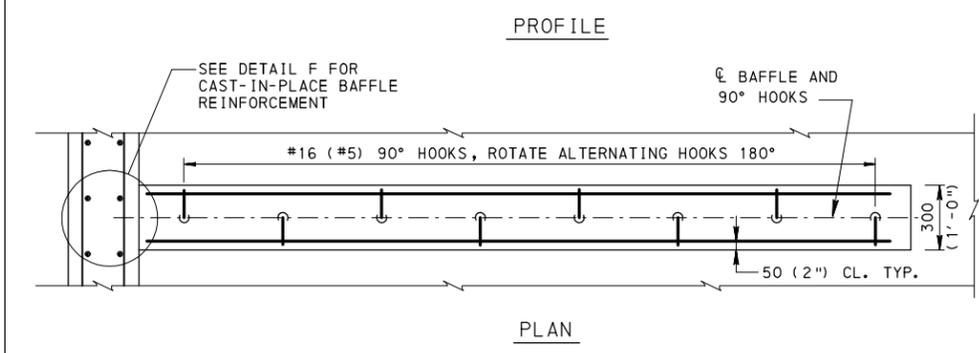
SECTION J-J
BOX CULVERTS



SECTION K-K
TWIN CELL BOX CULVERTS

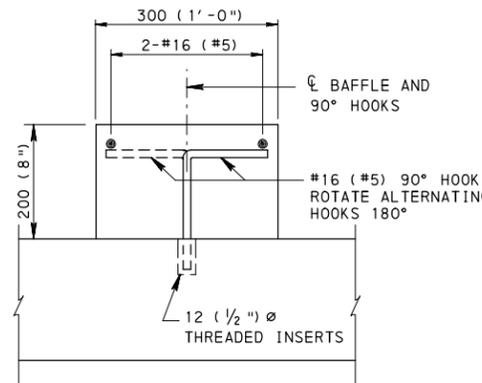


DETAIL F
CAST-IN-PLACE BAFFLE/WEIR REINFORCEMENT

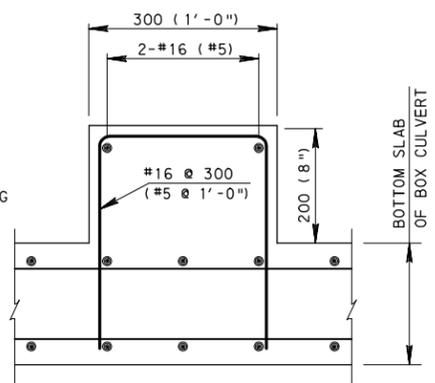


TYPICAL BAFFLE

PRECAST REINFORCEMENT SHOWN, CAST-IN-PLACE REINFORCEMENT SIMILAR EXCEPT AS NOTED ON THIS STANDARD.



PRECAST BOX CULVERT
TYPICAL BAFFLE DETAIL



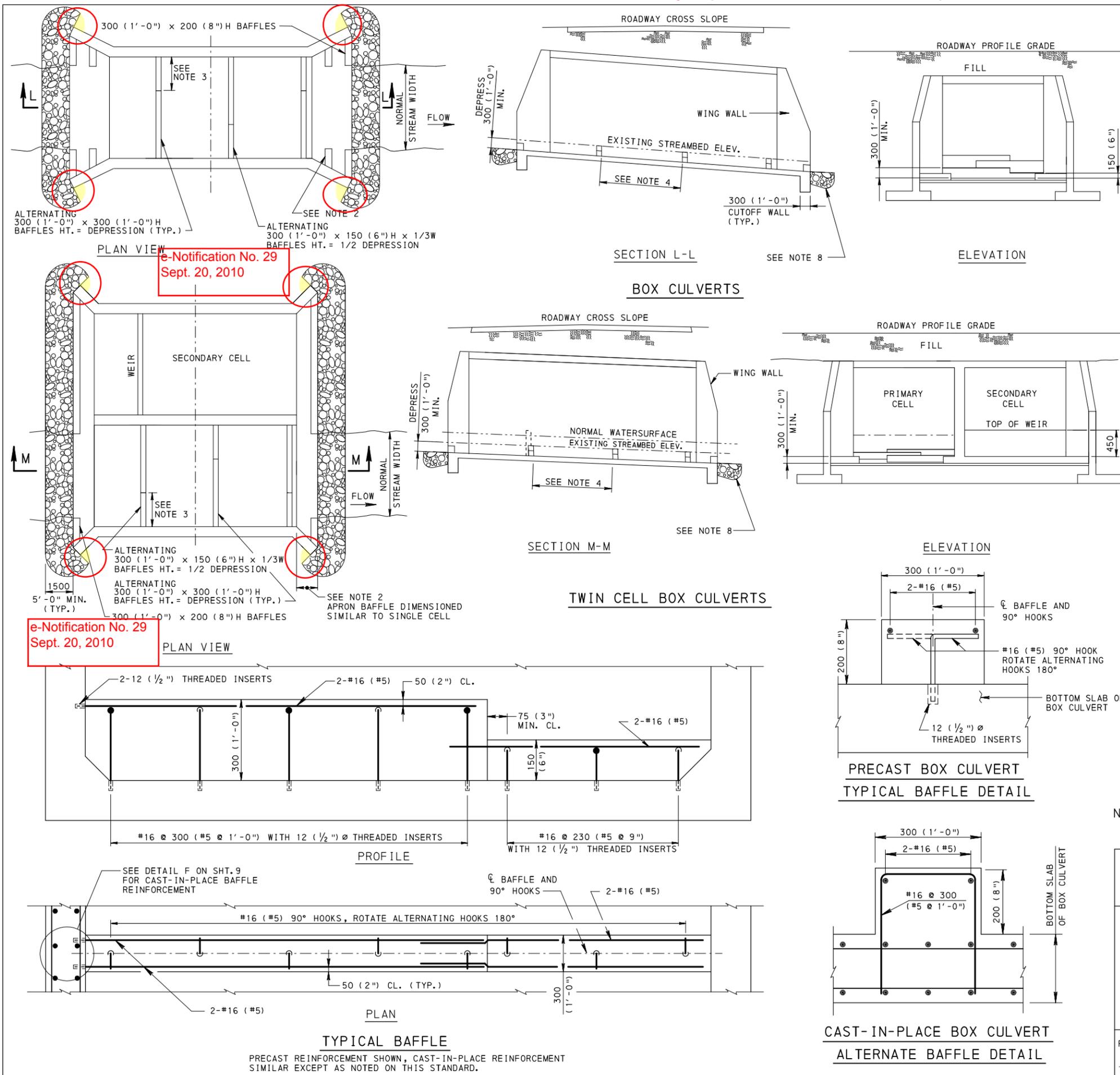
CAST-IN-PLACE BOX CULVERT
ALTERNATE BAFFLE DETAIL

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD
R.C. BOX CULVERT
MISCELLANEOUS DETAILS
STREAM GRADES ≤ 4%

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COMMONWEALTH OF PENNSYLVANIA
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STANDARD
R. C. BOX CULVERT
MISCELLANEOUS DETAILS
STREAM GRADES > 4%

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