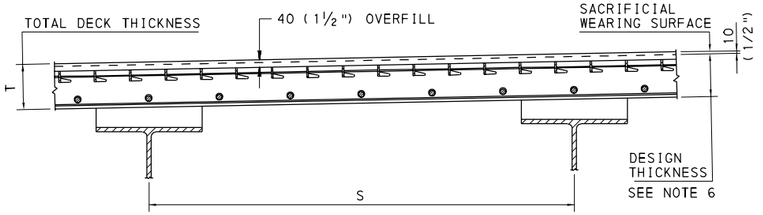
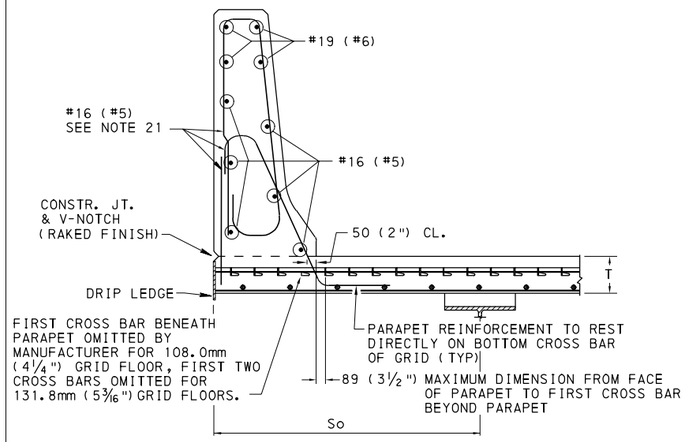
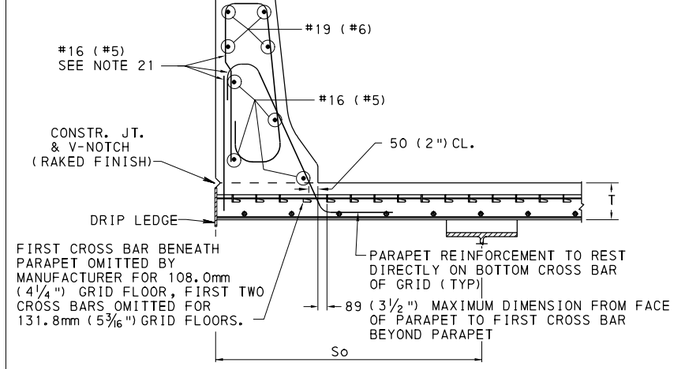


TYPICAL GRID REINFORCED CONCRETE DECK PANEL

DECK ATTACHMENT, PANEL SPLICE AND HAUNCH DETAILS SHOWN ON SHEET 2.
TYPICAL HAUNCH FOR GIRDERS SHOWN FOR ILLUSTRATION ONLY.

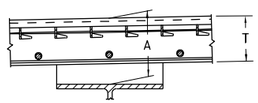


TYPICAL CONCRETE PARAPET DETAIL



ALTERNATE CONCRETE PARAPET DETAIL

TO BE USED ONLY IF AUTHORIZED BY CHIEF BRIDGE ENGINEER

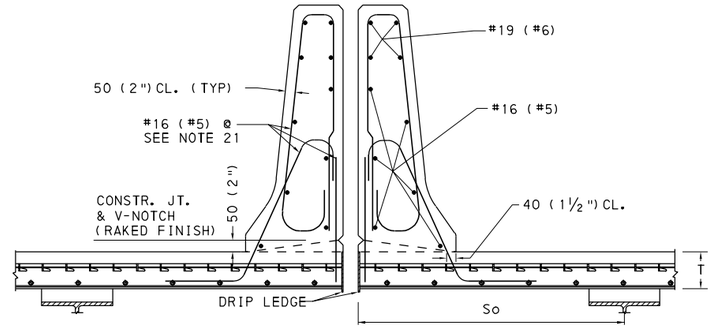


PLAN CAMBER (mm)	A (mm)
UP TO 40	T+15
OVER 40 TO 75	T+20
OVER 75	T+25

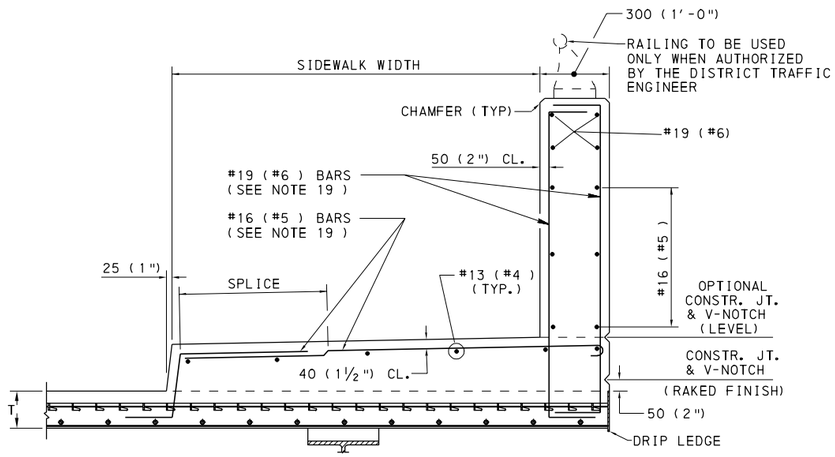
PLAN CAMBER (in)	A (in)
UP TO 1½ "	T+½ "
OVER 1½ "TO 3 "	T+¾ "
OVER 3 "	T+ 1 "

- VARIATION IN FLANGE THICKNESS IS NOT INCLUDED IN "A". MODIFY "A" FOR A CONCAVE (SAG) VERTICAL CURVE.
- ADD EFFECT OF DECK CROSS SLOPE TO "A" TO PROVIDE MINIMUM HAUNCH WIDTH ACROSS FULL WIDTH OF BEAM FLANGE.
- ADD THICKNESS OF TOP SPLICE PLATES TO "A" FOR GIRDERS WITH SPLICES, AS APPLICABLE.

HAUNCH DETAIL



SPLIT MEDIAN BARRIER



ALTERNATE SIDEWALK DETAIL

PARAPET NOTES

19. 108.0mm (4 ¼ ") FULL DEPTH GRID REINFORCED CONCRETE BRIDGE DECK SHOWN, DETAILS ARE APPROPRIATE FOR 131.8mm (5 3/16 ") FULL DEPTH DECK DESIGNS AS WELL.
20. FILL HALF DEPTH GRIDS FULL DEPTH FOR A MINIMUM DISTANCE OF 915mm (3'-0") FROM THE OUTSIDE EDGE OF THE DECK.
21. WITHIN 4200mm (14'-0") ON BOTH SIDES OF AN OPEN JOINT IN THE PARAPET, AND AT THE END OF THE BRIDGE, REDUCE MAXIMUM SPACING OF REINFORCEMENT TO HALF THE SHOWN SPACING.
22. CLEAN AND ROUGHEN TOP OF CONCRETE DECK WHICH LIES DIRECTLY BENEATH THE PARAPET PRIOR TO POURING THE PARAPET CONCRETE TO ENSURE ADEQUATE SHEAR TRANSFER.
23. ATTACHMENT DETAIL APPLICABLE FOR ALL OVERLAY TYPES.
24. FOR PARAPET SIDEWALK AND MEDIAN BARRIER DIMENSIONS SEE BD-601M. FOR PARAPET REINFORCEMENT DIMENSIONS NOT SHOWN, SEE BD-601M. FOR BRIDGE PARAPET DETAILS, SEE BC-739M.

NOTES:

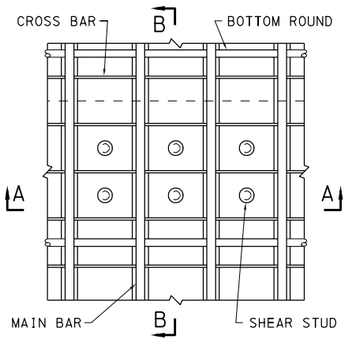
1. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES. FOR MAXIMUM ALLOWABLE SPAN LENGTHS, SEE DESIGN TABLES ON SHEET 3.
2. ALL REINFORCEMENT BARS SHOWN ARE SOFT CONVERTED METRIC SIZES THAT MEET THE REQUIREMENTS OF ASTM A615M, A616M, AND A706M.
3. DESIGN SPECIFICATIONS:
   - 1994 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND COMMENTARY
   - PADOT DESIGN MANUAL PART 4, VOLUME 1, PART B DESIGN SPECIFICATIONS.
4. MATERIAL STRENGTH:
   - STEEL BARS AND SHAPES:
     AASHTO M270, GRADE 250 (36), f_y= 250 MPA (36 ksi)
     AASHTO M270, GRADE 345 (50), f_y= 345 MPA (50 ksi)
   - REINFORCEMENT STEEL:
     f_y = 420 MPA (60 ksi)
   - CONCRETE:
     f_c= 28 MPA (4,000 psi) CLASS AAA CONCRETE
     MODULAR RATIO (E_s/E_c) N = 8
5. DEAD LOAD:
   - DENSITY OF NORMAL WEIGHT CONCRETE2400 kg/m^3 (150 lbs/ft^3)
   - DENSITY OF LIGHTWEIGHT CONCRETE 1840 kg/m^3 (115 lbs/ft^3)
   - DEAD LOAD OF VARIOUS GRID REINFORCED SYSTEMS, USING BOTH NORMAL AND LIGHTWEIGHT CONCRETE, AND INTEGRAL OVERFILL, ARE SHOWN IN THE TABLES ON SHEET 3.
6. PROVIDE 40mm (1½ ") CONCRETE COVER ON REINFORCEMENT BARS UNLESS OTHERWISE NOTED.
7. PROVIDE 40mm (1½ ") COVER OVER GRID. THE TOP 10mm (⅜ ") OF THE OVERFILL/OVERLAY IS CONSIDERED SACRIFICIAL.
8. SEE NOTES ON SHEET 3 FOR STEEL GRID COATING OPTIONS.
9. USE ONLY FUSION BONDED EPOXY COATED REINFORCEMENT. FOR PARAPET REINFORCEMENT, DO NOT USE RAIL STEEL (A616). SEE DESIGN MANUAL PART 4, SECTION 5.4.3.1.
10. DESIGN TABLES ARE VALID FOR BOTH NORMAL WEIGHT AND LIGHTWEIGHT CONCRETE.
11. WHEN THE HAUNCH HEIGHT (MEASURED FROM TOP OF BEAM TO BOTTOM OF SLAB) EXCEEDS 75mm (3 "), PROVIDE HAUNCH REINFORCEMENT.
12. DESIGN IS BASED ON DECKS SUPPORTED ON 3 OR MORE BEAMS.
13. THE TYPICAL PARAPET, THE ALTERNATE SIDEWALK DETAIL AND DECK SLABS, INCLUDING OVERHANGS, ARE DESIGNED TO RESIST A VEHICULAR COLLISION FORCE AT PERFORMANCE LEVEL 3. THE SPLIT MEDIAN BARRIERS AND THE ALTERNATE PARAPET ARE DESIGNED TO RESIST A VEHICULAR COLLISION AT PERFORMANCE LEVEL 2. WHEN NO LONGITUDINAL DECK JOINT IS PROVIDED, CONTINUE ROADWAY MEDIAN BARRIER ACROSS THE STRUCTURE (SEE STANDARD DRAWING RC-57M FOR ATTACHMENT DETAILS).
14. DECK DESIGN TABLES ARE BASED ON THE ORTHOTROPIC PLATE FORMULA AS PER 1994 AASHTO LRFD, ARTICLE 4.6.2.1.8.
15. FACTORED MOMENT = 1.25(SLAB & PARAPET MOMENT) + 1.5(FWS MOMENT) + 1.75(1+IM/100)(LL MOMENT)
16. DYNAMIC LOAD ALLOWANCE (IM) = 50%
17. DRAWING IS NOT TO SCALE.
18. FOR STANDARD TYPICAL WATERPROOFING AND EXPANSION DETAILS SEE BC-788M.

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

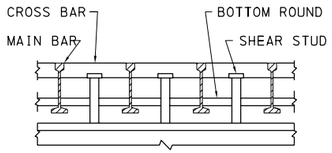
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD GRID REINFORCED CONCRETE BRIDGE DECK DESIGN & DETAILS FOR BEAM BRIDGES

RECOMMENDED JAN. 21, 2003	RECOMMENDED JAN. 21, 2003	RECOMMENDED JAN. 21, 2003	SHEET 1 OF 5
R. Scott Christ	Alan A. Schuman	Gary L. Hoffman	BD-604M
CHIEF BRIDGE ENGINEER	DIR., BUREAU OF DESIGN	CHIEF ENG., HWY. ADMIN.	

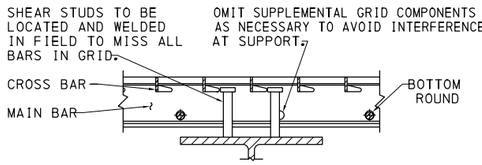


PLAN VIEW



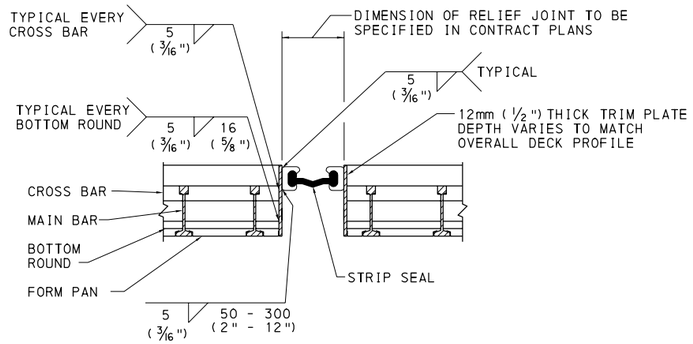
SECTION A-A

STEEL OR CONCRETE SUPPORT

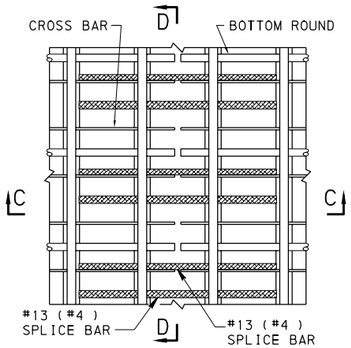


SECTION B-B

STEEL SUPPORT

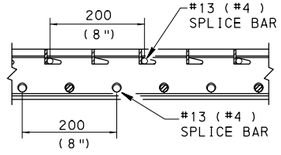


TYPICAL EXPANSION/RELIEF JOINT

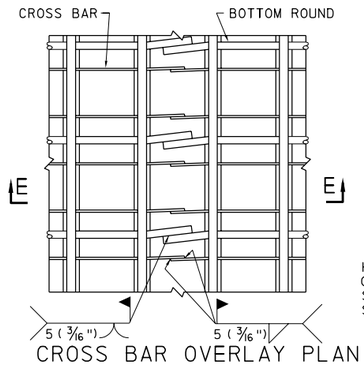


WELDLESS PLAN VIEW

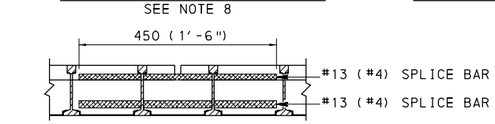
SEE NOTE 8



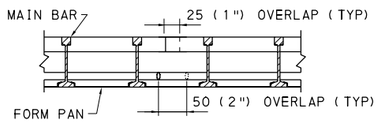
SECTION D-D



CROSS BAR OVERLAY PLAN

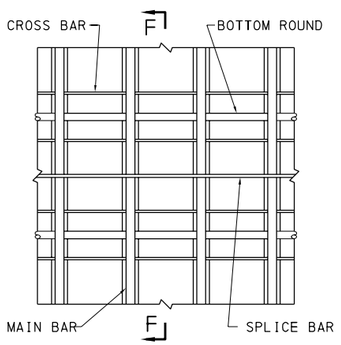


SECTION C-C

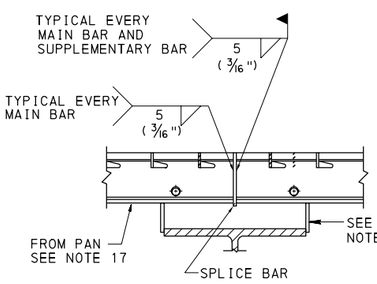


SECTION E-E

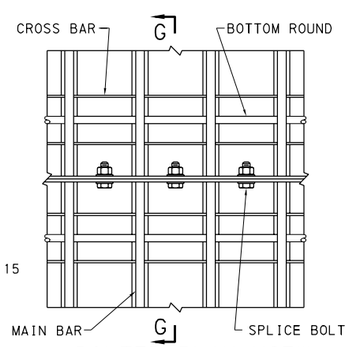
SPLICE BETWEEN PANELS



SPLICE BAR PLAN VIEW



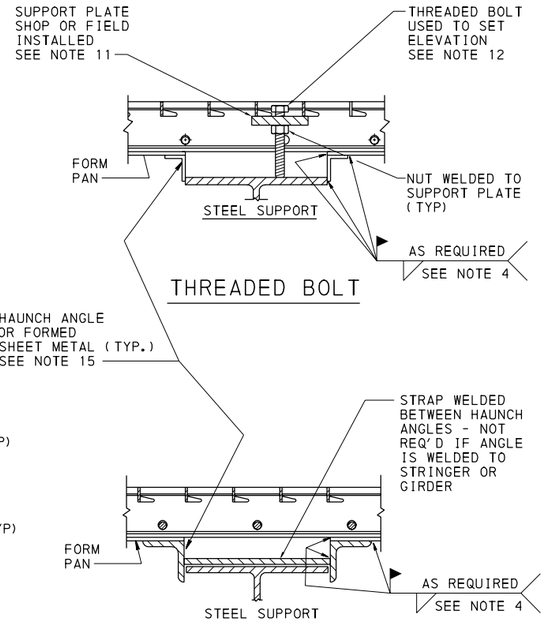
SECTION F-F



BOLTED PLAN VIEW

MAIN BAR SPLICE AT PANEL ENDS

SEE NOTES 17 & 18

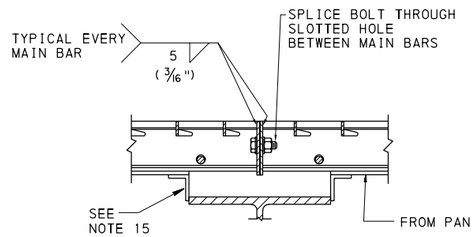


THREADED BOLT

FORMED ANGLE - WELDED STRAP

ELEVATION OPTIONS

SEE NOTES 9 THRU 17



SECTION G-G

NOTES:

DECK ATTACHMENT:

1. ATTACH GRID REINFORCED CONCRETE BRIDGE DECKS TO BRIDGE FRAMING ELEMENTS (STRINGER, GIRDERS) WITH HEADED SHEAR STUDS. DESIGNED ACCORDING TO AASHTO LRFD ARTICLE 9.7.1.2.
2. DESIGNER IS TO PROVIDE DESIGN FOR SHEAR STUDS. MAKE SHEAR STUD SPACINGS CONSISTENT WITH GRID MAIN BAR SPACING.
3. USE FULL DEPTH FILL FOR ALL GRID DESIGNS, INCLUDING HALF DEPTH FLOORS, OVER FRAMING MEMBERS.
4. IF GRID REINFORCED DECKS ARE TO BE WELDED TO SUPPORTS, A MINIMUM 6mm (1/4") x 75mm (3") FILLET WELD SHALL BE USED AT EACH GRID I-BEAM (OR TEE) INTERSECTION WITH EACH BRIDGE STRINGER OR GIRDER.
5. A VARIETY OF CONSTRUCTION METHODS HAVE BEEN USED TO SET THE PROPER ELEVATION OF A GRID REINFORCED DECK. SOME OF THE MORE COMMON METHODS ARE DESCRIBED IN A BRIDGE GRID FLOORING MANUFACTURER'S ASSOCIATION (BGFMA) PUBLICATION TITLED "GRID REINFORCED CONCRETE DECK ATTACHMENT", WHICH IS HEREBY INCORPORATED INTO THESE STANDARDS. SEE "ELEVATION OPTIONS" NOTES ON THIS SHEET FOR METHODS OF ACHIEVING PROPER DECK ELEVATION AND HAUNCH FORMING.
6. ALTERNATE DECK ELEVATION/HAUNCH FORMING METHODS MAY BE SUBMITTED BY THE CONTRACTOR FOR ENGINEER'S APPROVAL.
7. GRID OR SUPPORT MECHANISM MAY BE TACK WELDED INTERMITTENTLY TO PREVENT MOVEMENT DURING CONCRETE POURING OPERATION.

WELDLESS SPLICE BETWEEN PANELS:

8. SPLICE REBAR MAY BE INSERTED EITHER THROUGH SLOT IN GRID I-BEAM THROUGH WHICH CROSS BARS ARE PLACED, OR THROUGH A SEPARATE PUNCHED SLOT.

ELEVATION OPTIONS:

9. SUITABILITY OF ELEVATION OPTION DEPENDS ON LIVE LOAD PLACED ON GRID PRIOR TO FILLING WITH CONCRETE.
10. REGARDLESS OF ELEVATION OPTION USED, USE HEADED SHEAR STUDS FOR DECK ATTACHMENT TO BEAMS.
11. SUPPORT PLATE TO BE SHOP OR FIELD INSTALLED UNDER CROSS BARS AS SHOWN IN THREADED BOLT ELEVATION DETAIL, OR UNDER MAIN GRID BARS WHERE APPLICABLE.
12. TACK WELDING THREADED STUD TO SUPPORT IS PERMITTED TO ENABLE LEVELING OF PANEL.
13. ANY CONSTRUCTION LOADS PLACED ON THE GRID BEFORE CONCRETE IS POURED, AS WELL AS THE WEIGHT OF THE WET CONCRETE, MUST BE ACCOUNTED FOR IN THE DESIGN AND SPACING OF THE SUPPORT ASSEMBLY.
14. THREADED BOLT TO BE UNCOATED A307M STEEL.
15. HAUNCH ANGLE MAY BE WELDED TO STRINGER/GIRDER WHERE PERMITTED BY ENGINEER.
16. HEADED SHEAR STUDS NOT SHOWN IN ELEVATION DETAILS FOR CLARITY.
17. OMIT CONCRETE FORM PAN OVER SUPPORT MEMBERS.
18. CHOICE OF SPLICE OPTION DEPENDS ON PRESENCE OF TRAFFIC DURING CONSTRUCTION AND WIDTH BETWEEN STAGES. FOR ATYPICAL CONDITIONS (SPLICE BETWEEN STRINGERS, FOR EXAMPLE) CONTACT MANUFACTURER.

MISC. NOTES:

19. REFER TO BC-767M FOR JOINT DETAILS AT SIDEWALKS, ETC.
20. REFER TO BC-751M FOR SCUPPER DETAILS.

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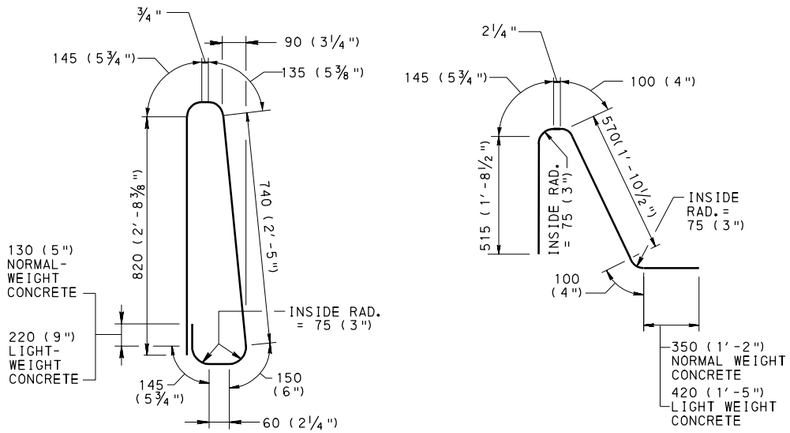
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

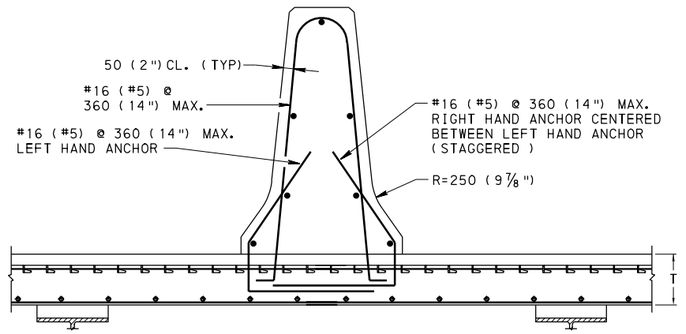
STANDARD
GRID REINFORCED CONCRETE BRIDGE DECK DESIGN & DETAILS FOR BEAM BRIDGES

RECOMMENDED JAN. 21, 2003	RECOMMENDED JAN. 21, 2003	RECOMMENDED JAN. 21, 2003	SHEET 2 OF 5
R. Scott Christie, CHIEF BRIDGE ENGINEER	Dean A. Sch..., DIR., BUREAU OF DESIGN	Gary R. Hoffman, CHIEF ENG., HWY. ADMIN.	BD-604M



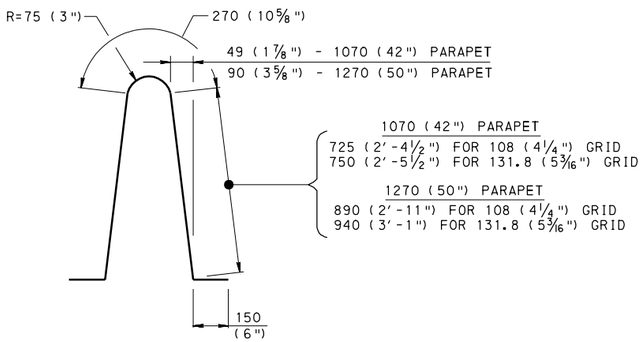
PARAPET REINFORCEMENT

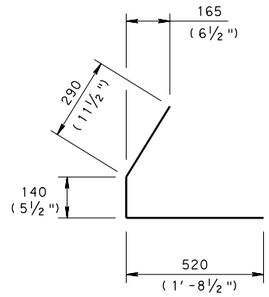
#16 (#5)



MODIFIED F-TYPE CONCRETE BARRIER DETAIL

SOME GRID CROSS BARS MAY BE OMITTED TO FACILITATE REBAR PLACEMENT





BARRIER REINFORCEMENT

#16 (#5)

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
GRID REINFORCED CONCRETE BRIDGE DECK DESIGN & DETAILS FOR BEAM BRIDGES

RECOMMENDED JAN. 21, 2003	RECOMMENDED JAN. 21, 2003	RECOMMENDED JAN. 21, 2003	SHEET 3 OF 5
R. Scott Christ CHIEF BRIDGE ENGINEER	Dean A. Sch DIR., BUREAU OF DESIGN	Gary L. Hoffman CHIEF ENG., HWY. ADMIN.	BD-604M

MAXIMUM SPAN FOR INFINITE FATIGUE LIFE

TABLE 1: FULL DEPTH FLOORING DESIGNS

BEARING BAR (mm)	BEARING BAR SPACING (mm)	NUMBER OF SUPPLEMENTAL BARS (SEE NOTE 3)	SIZE OF SUPPLEMENTAL BARS (mm)	MAXIMUM SPAN (mm) (SEE NOTE 2)	TYPE OF CONCRETE FILL	OVERALL DECK WEIGHT (STEEL AND CONCRETE)		CANTILEVER REBAR SIZE AND SPACING (SEE NOTE 1)	MAXIMUM OVERHANG BASED ON THE CAPACITY OF DECK STRENGTHENED TO RESIST PL3 CRASH LOAD (mm) (SEE NOTE 4)	MAXIMUM OVERHANG BASED ON 0.625 × INTERIOR SPAN (mm)
						NORMAL WEIGHT CONCRETE (kg/m^2)	LIGHT WEIGHT CONCRETE (kg/m^2)			
75	200	2	15.9x15.9	1300	OVERFILL	337	288	—	—	—
				1300	FLUSH FILL	235	205	—		
108.0	150	0	—	1900	OVERFILL	405	342	#13 @ 150	1200	1200
				1900	FLUSH FILL	303	259	#13 @ 150		
108.0	200	0	—	1200	OVERFILL	396	332	#16 @ 100	900	700
				1200	FLUSH FILL	293	249	#16 @ 100		
131.8	150	0	—	1500	OVERFILL	469	396	#13 @ 150	1300	900
				1500	FLUSH FILL	366	313	#13 @ 150		
131.8	200	0	—	1000	OVERFILL	459	386	#16 @ 200	1200	600
				1000	FLUSH FILL	357	303	#16 @ 200		
131.8	150	1	25.4x7.9	2500	OVERFILL	474	401	—	1300	1500
				2400	FLUSH FILL	371	318	—		
131.8	200	1	25.4x7.9	1800	OVERFILL	469	391	#13 @ 200	1300	1100
				1800	FLUSH FILL	366	308	#13 @ 200		
131.8	250	1	25.4x7.9	1500	OVERFILL	464	381	#16 @ 250	1100	900
				1500	FLUSH FILL	357	298	#16 @ 250		
131.8	150	2	25.4x7.9	3300	OVERFILL	489	415	—	1600	2000
				2400	FLUSH FILL	386	332	—		
131.8	200	2	25.4x7.9	2500	OVERFILL	474	401	—	1300	900
				1800	FLUSH FILL	371	318	—		
131.8	250	2	25.4x7.9	2100	OVERFILL	464	391	#13 @ 250	1100	1300
				1500	FLUSH FILL	362	308	#13 @ 250		

TABLE 2: HALF DEPTH FLOORING DESIGNS

BEARING BAR (mm)	BEARING BAR SPACING (mm)	NUMBER OF SUPPLEMENTAL BARS (SEE NOTE 3)	SIZE OF SUPPLEMENTAL BARS (mm)	MAXIMUM SPAN (mm) (SEE NOTE 2)	TYPE OF CONCRETE FILL	OVERALL DECK WEIGHT (STEEL AND CONCRETE)		CANTILEVER REBAR SIZE AND SPACING (SEE NOTE 1)	MAXIMUM OVERHANG BASED ON THE CAPACITY OF DECK STRENGTHENED TO RESIST PL3 CRASH LOAD (mm) (SEE NOTE 4)	MAXIMUM OVERHANG BASED ON 0.625 × INTERIOR SPAN (mm)
						NORMAL WEIGHT CONCRETE (kg/m^2)	LIGHT WEIGHT CONCRETE (kg/m^2)			
131.8	150	1	25.4x7.9	2200	OVERFILL	342	294	—	1300	1500
				2200	FLUSH FILL	239	210	—		
131.8	200	1	25.4x7.9	1800	OVERFILL	327	279	#13 @ 200	1300	1100
				1800	FLUSH FILL	225	195	#13 @ 200		
131.8	250	1	25.4x7.9	1300	OVERFILL	323	274	#16 @ 250	1100	900
				1300	FLUSH FILL	220	191	#16 @ 250		
131.8	150	2	25.4x7.9	3300	OVERFILL	352	308	—	1600	2000
				3300	FLUSH FILL	249	225	—		
131.8	200	2	25.4x7.9	2400	OVERFILL	337	288	—	1300	900
				2400	FLUSH FILL	235	205	—		
131.8	250	2	25.4x7.9	1900	OVERFILL	327	279	#13 @ 250	1100	1300
				1900	FLUSH FILL	225	195	#13 @ 250		

NOTES ON TABLES:

1. COLUMN LABELED "CANTILEVER REBAR" INDICATES SIZE AND SPACING OF REBAR WHICH MUST BE INSERTED FLUSH WITH TOP OF GRID INTO GRID REINFORCED DECK OVERHANG.
2. SPAN LENGTHS INDICATED ARE BASED BOTH ON HISTORICAL DATA AND FIELD TESTED INSTALLATIONS. IT IS ACKNOWLEDGED THAT THERE ARE DISCREPANCIES WHEN SPAN LENGTH OF VARIOUS DECK DESIGNS ARE COMPARED.
3. ALL LISTED DESIGNS REQUIRE THE USE OF STEEL GRADE 345 MPa EXCEPT DECK DESIGN 131.8mm I-BEAM @ 150 c/c WITH TWO (2) SUPPLEMENTARY BARS WHICH REQUIRES THE USE OF GRADE 250 MPa.
4. REFER TO LRFD AASHTO SECTION 13.2 FOR DEFINITION OF PL-3 LOADING.

NOTES

GRID SURFACES COATING:

1. SURFACES OF GRID IN CONTACT WITH CONCRETE NEED NOT BE COATED IF GRID IS TO RECEIVE AN OVERLAY. IF THIS OPTION IS USED, APPLY AN APPROVED COATING SYSTEM TO THE UNDERSIDE AND EXPOSED SURFACES OF THE GRID. FOR EXAMPLE THE UNDERSIDE OF THE GRID COULD BE PAINTED WITH THE SAME SYSTEM USED TO COAT BRIDGE SUPERSTRUCTURE.
2. THE STEEL GRID MAY BE FABRICATED FROM UNCOATED WEATHERING STEEL, IN WHICH CASE THE CONCRETE FORM PANS TO BE MADE FROM PRE-GALVANIZED SHEETS MEETING ASTM A653M, G-90.
3. FOR ADDITIONAL CORROSION PROTECTION, A COATING SYSTEM MAY BE APPLIED TO ALL GRID SURFACES (INCLUDING THOSE IN CONTACT WITH THE CONCRETE). FOR EXAMPLE, STEEL GRID PANELS MAY BE HOT DIP GALVANIZED, IN WHICH CASE NO ADDITIONAL COATING OF UNDERSIDE IS REQUIRED.

DECK OVERLAY:

1. UNLESS PROHIBITED DUE TO PROJECT DECK DEAD LOAD RESTRICTIONS, ALL GRID REINFORCED CONCRETE BRIDGE DECKS ARE TO RECEIVE AN OVERLAY WHEN INITIALLY INSTALLED. IF A PROJECT REQUIRES A FLUSH FILLED DECK, COAT ALL GRID SURFACES WITH AN APPROVED PAINT SYSTEM, OR HOT DIP GALVANIZE THEM.
2. INTEGRAL OVERLAYS (POURED MONOLITHICALLY WITH CONCRETE PLACED INTO GRID) IS A RECOMMENDED METHOD OF CONSTRUCTING AN OVERLAY. WEIGHTS SHOWN IN MAXIMUM SPAN TABLES FOR "OVERFILL" BASED ON 45mm THICKNESS OF CONCRETE ABOVE TOP OF STEEL GRID BARS.
3. BITUMINOUS OVERLAYS MAY BE APPLICABLE IN ACCORDANCE WITH PUB 408M, SECTION 420, 680, 1080.3(e), AND AS DIRECTED BY THE ENGINEER.
4. EXERCISE GREAT CARE WHEN USING SEPARATELY POURED RIGID OVERLAYS OF SPECIAL MIX DESIGNS (MICRO-SILICA, LMC, FOR EXAMPLE) TO INSURE ADEQUATE CLEANING OF THE TOP OF THE FLUSH FILLED GRID SURFACE PRIOR TO PLACEMENT OF THE OVERLAY. THE SAME PRECAUTIONS APPLIES FOR ANY SPECIAL POLYMER OVERLAY.

STANDARD SHOP PRACTICES, FABRICATION AND ERECTION TOLERANCES:

REFER TO BRIDGE GRID FLOORING MANUFACTURER'S ASSOCIATION (BGFMA) PUBLICATION "STANDARD SHOP PRACTICES AND FABRICATION TOLERANCES FOR GRID REINFORCED CONCRETE DECKS", FOR ADDITIONAL GUIDANCE.

EFFECTIVE FLANGE WIDTH:

DESIGN GRIDS TO BEHAVE COMPOSITE WITH SUPPORTS; SHEAR STUD DESIGN IS TO BE IN ACCORDANCE WITH AASHTO SPECIFICATIONS. STANDARD AASHTO CRITERIA FOR DETERMINING EFFECTIVE WIDTH OF FLANGE APPLY, IN WHICH T = OVERALL DEPTH OF DECK, INCLUDING INTEGRAL OVERFILL OR PROPERLY BONDED RIGID OVERLAY (LESS 10mm SACRIFICIAL WEARING COURSE). FOR EXAMPLE, FOR A HALF DEPTH 131.8mm GRID WITH A 45mm OVERFILL, T = 167mm (131.8mm + 45mm, - 10mm).

COMPOSITE GIRDER DESIGN:

FOR COMPUTATION OF COMPOSITE SECTION PROPERTY OF GIRDER IN POSITIVE MOMENT REGION, ALL GRID CROSS BARS PLUS ACTUAL CONCRETE THICKNESS ARE COUNTED. FOR EXAMPLE, FOR A HALF DEPTH 131.8mm GRID, (64mm OF CONCRETE WITHIN THE GRID AND A 45mm INTEGRAL OVERFILL OR 109mm TOTAL), DESIGN TO USE ALL CROSS BARS AND 99mm (109mm LESS 10mm SACRIFICIAL) OF CONCRETE ACROSS THE EFFECTIVE WIDTH. PRESENCE OF CONCRETE IS NEGLECTED IN NEGATIVE MOMENT REGION, AND FABRICATION NOTCHES IN CROSS BARS ARE DEDUCTED.

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
GRID REINFORCED CONCRETE BRIDGE DECK
DESIGN & DETAILS
FOR BEAM BRIDGES
METRIC UNITS

RECOMMENDED JAN. 21, 2003	RECOMMENDED JAN. 21, 2003	RECOMMENDED JAN. 21, 2003	SHEET 4 OF 5
R. Scott Christ (signature)	Alan A. Schuman (signature)	Gary L. Hoffman (signature)	BD-604M
CHIEF BRIDGE ENGINEER	DIR., BUREAU OF DESIGN	CHIEF ENG., HWY. ADMIN.	

MAXIMUM SPANS FOR INFINITE FATIGUE LIFE

TABLE 1: FULL DEPTH FLOORING DESIGNS

BEARING BAR (IN)	BEARING BAR SPACING (IN)	NUMBER OF SUPPLEMENTAL BARS (SEE NOTE 3)	SIZE OF SUPPLEMENTAL BARS (IN)	MAXIMUM SPAN (FT) (SEE NOTE 2)	TYPE OF CONCRETE FILL	OVERALL DECK WEIGHT (STEEL AND CONCRETE)		CANTILEVER REBAR SIZE AND SPACING (SEE NOTE 1)	MAXIMUM OVERHANG BASED ON THE CAPACITY OF DECK STRENGTHENED TO RESIST PL-3 CRASH LOAD (FT) (SEE NOTE 4)	MAXIMUM OVERHANG BASED ON 0.625 × INTERIOR SPAN (FT)
						NORMAL WEIGHT CONCRETE (LBS/FT²)	LIGHT WEIGHT CONCRETE (LBS/FT²)			
3	8	2	5/8×5/8	4.5	OVERFILL	69	59	——	——	——
				4.5	FLUSH FILL	48	42			
4 1/4	6	0	——	7.0	OVERFILL	83	70	#4 @ 6"	4.0	4.0
				7.0	FLUSH FILL	62	53			
4 1/4	8	0	——	4.0	OVERFILL	81	68	#5 @ 4"	3.5	2.5
				4.0	FLUSH FILL	60	51			
5 3/16	6	0	——	5.0	OVERFILL	96	81	#4 @ 6"	4.5	3.0
				5.0	FLUSH FILL	75	64			
5 3/16	8	0	——	3.5	OVERFILL	94	79	#4 @ 8"	4.0	2.0
				3.5	FLUSH FILL	73	62			
5 3/16	6	1	1 × 5/16	8.5	OVERFILL	97	82	N/A	4.5	5.0
				8.0	FLUSH FILL	76	65			
5 3/16	8	1	1 × 5/16	6.0	OVERFILL	96	80	#4 @ 8"	4.0	3.5
				6.0	FLUSH FILL	75	63			
5 3/16	10	1	1 × 5/16	5.0	OVERFILL	94	78	#5 @ 10"	3.5	3.0
				5.0	FLUSH FILL	73	61			
5 3/16	6	2	1 × 5/16	11.0	OVERFILL	100	85	N/A	5.0	6.5
				8.0	FLUSH FILL	76	68			
5 3/16	8	2	1 × 5/16	8.5	OVERFILL	97	82	N/A	4.0	5.0
				6.0	FLUSH FILL	76	65			
5 3/16	10	2	1 × 5/16	7.0	OVERFILL	95	80	#4 @ 10"	3.5	4.0
				5.0	FLUSH FILL	74	63			

TABLE 2: HALF DEPTH FLOORING DESIGNS

BEARING BAR (IN)	BEARING BAR SPACING (IN)	NUMBER OF SUPPLEMENTAL BARS (SEE NOTE 3)	SIZE OF SUPPLEMENTAL BARS (IN)	MAXIMUM SPAN (FT) (SEE NOTE 2)	TYPE OF CONCRETE FILL	OVERALL DECK WEIGHT (STEEL AND CONCRETE)		CANTILEVER REBAR SIZE AND SPACING (SEE NOTE 1)	MAXIMUM OVERHANG BASED ON THE CAPACITY OF DECK STRENGTHENED TO RESIST PL-3 CRASH LOAD (FT) (SEE NOTE 4)	MAXIMUM OVERHANG BASED ON 0.625 × INTERIOR SPAN (FT)
						NORMAL WEIGHT CONCRETE (LBS/FT²)	LIGHT WEIGHT CONCRETE (LBS/FT²)			
5 3/16	6	1	1 × 5/16	7.5	OVERFILL	70	60	N/A	4.5	5.0
				7.5	FLUSH FILL	49	43			
5 3/16	8	1	1 × 5/16	6.0	OVERFILL	67	57	#4 @ 8"	4.0	3.5
				6.0	FLUSH FILL	46	40			
5 3/16	10	1	1 × 5/16	4.5	OVERFILL	66	56	#5 @ 10"	3.5	3.0
				4.5	FLUSH FILL	45	39			
5 3/16	6	2	1 × 5/16	11.0	OVERFILL	72	63	N/A	5.0	6.5
				11.0	FLUSH FILL	51	46			
5 3/16	8	2	1 × 5/16	8.0	OVERFILL	69	59	N/A	4.0	5.0
				8.0	FLUSH FILL	48	42			
5 3/16	10	2	1 × 5/16	6.5	OVERFILL	67	57	#4 @ 10"	3.5	4.0
				6.5	FLUSH FILL	46	40			

NOTES ON TABLES:

1. COLUMN LABELED "CANTILEVER REBAR" INDICATES SIZE AND SPACING OF REBAR WHICH MUST BE INSERTED FLUSH WITH TOP OF GRID INTO GRID REINFORCED DECK OVERHANG.
2. SPAN LENGTHS INDICATED ARE BASED BOTH ON HISTORICAL DATA AND FIELD TESTED INSTALLATIONS. IT IS ACKNOWLEDGED THAT THERE ARE DISCREPANCIES WHEN SPAN LENGTH OF VARIOUS DECK DESIGNS ARE COMPARED.
3. ALL LISTED DESIGNS REQUIRE THE USE OF STEEL GRADE 50 EXCEPT DECK DESIGN 5 3/16" I-BEAM @ 6" c/c WITH TWO (2) SUPPLEMENTARY BARS WHICH REQUIRES THE USE OF GRADE 36.
4. REFER TO LRFD AASHTO SECTION 13.2 FOR DEFINITION OF PL-3 LOADING.

NOTES:

GRID SURFACES COATING:

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2. THE STEEL GRID MAY BE FABRICATED FROM UNCOATED WEATHERING STEEL, IN WHICH CASE THE CONCRETE FORM PANS TO BE MADE FROM PRE-GALVANIZED SHEETS MEETING ASTM A653, G-90.
3. FOR ADDITIONAL CORROSION PROTECTION, A COATING SYSTEM MAY BE APPLIED TO ALL GRID SURFACES (INCLUDING THOSE IN CONTACT WITH THE CONCRETE). FOR EXAMPLE, STEEL GRID PANELS MAY BE HOT DIP GALVANIZED, IN WHICH CASE NO ADDITIONAL COATING OF UNDERSIDE IS REQUIRED.

DECK OVERLAY:

1. UNLESS PROHIBITED DUE TO PROJECT DECK DEAD LOAD RESTRICTIONS, ALL GRID REINFORCED CONCRETE BRIDGE DECKS ARE TO RECEIVE AN OVERLAY WHEN INITIALLY INSTALLED. IF A PROJECT REQUIRES A FLUSH FILLED DECK, COAT ALL GRID SURFACES WITH AN APPROVED PAINT SYSTEM, OR HOT DIP GALVANIZE THEM.
2. INTEGRAL OVERLAYS (POURED MONOLITHICALLY WITH CONCRETE PLACED INTO GRID) IS A RECOMMENDED METHOD OF CONSTRUCTING AN OVERLAY. WEIGHTS SHOWN IN MAXIMUM SPAN TABLES FOR "OVERFILL" BASED ON 1 3/4" THICKNESS OF CONCRETE ABOVE TOP OF STEEL GRID BARS.
3. BITUMINOUS OVERLAYS MAY BE APPLICABLE IN ACCORDANCE WITH PUB 408, SECTION 420, 680, 1080.3(e), AND AS DIRECTED BY THE ENGINEER.
4. EXERCISE GREAT CARE WHEN USING SEPARATELY POURED RIGID OVERLAYS OF SPECIAL MIX DESIGNS (MICRO-SILICA, LMC, FOR EXAMPLE) TO INSURE ADEQUATE CLEANING OF THE TOP OF THE FLUSH FILLED GRID SURFACE PRIOR TO PLACEMENT OF THE OVERLAY. THE SAME PRECAUTIONS APPLIES FOR ANY SPECIAL POLYMER OVERLAY.

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EFFECTIVE FLANGE WIDTH:

DESIGN GRIDS TO BEHAVE COMPOSITE WITH SUPPORTS; SHEAR STUD DESIGN IS TO BE IN ACCORDANCE WITH AASHTO SPECIFICATIONS. STANDARD AASHTO CRITERIA FOR DETERMINING EFFECTIVE WIDTH OF FLANGE APPLY, IN WHICH T = OVERALL DEPTH OF DECK, INCLUDING INTEGRAL OVERFILL OR PROPERLY BONDED RIGID OVERLAY (LESS 1/2" SACRIFICIAL WEARING COURSE). FOR EXAMPLE, FOR A HALF DEPTH 5 3/16" GRID WITH A 1 3/4" OVERFILL, T = 6 7/16" (5 3/16" + 1 3/4" -1/2 ").

COMPOSITE GIRDER DESIGN:

FOR COMPUTATION OF COMPOSITE SECTION PROPERTY OF GIRDER IN POSITIVE MOMENT REGION, ALL GRID CROSS BARS PLUS ACTUAL CONCRETE THICKNESS ARE COUNTED. FOR EXAMPLE, FOR A HALF DEPTH 5 3/16" GRID, (2 1/2" OF CONCRETE WITHIN THE GRID AND A 1 3/4" INTEGRAL OVERFILL OR 4 1/4" TOTAL), DESIGN TO USE ALL CROSS BARS AND 3 3/4" (4 3/4" LESS 1/2" SACRIFICIAL) OF CONCRETE ACROSS THE EFFECTIVE WIDTH. PRESENCE OF CONCRETE IS NEGLECTED IN NEGATIVE MOMENT REGION, AND FABRICATION NOTCHES IN CROSS BARS ARE DEDUCTED.

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD
GRID REINFORCED CONCRETE BRIDGE DECK DESIGN & DETAILS FOR BEAM BRIDGES
U.S. CUSTOMARY UNITS

RECOMMENDED JAN. 21, 2003	RECOMMENDED JAN. 21, 2003	RECOMMENDED JAN. 21, 2003	SHEET 5 OF 5
R. Scott Christ (CHIEF BRIDGE ENGINEER)	(DIR., BUREAU OF DESIGN)	Gary F. Hoffman (CHIEF ENG., HWY. ADMIN.)	BD-604M