

DATE: March 31, 2010

SUBJECT: Summary of New Bridge and
Structure Products

TO: District Executives

FROM: Brian G. Thompson, P.E. /s/
Director
Bureau of Design

This Strike-off Letter updates the list of approved products, supersedes Strike-off Letter 431-09-10 and has a time neutral effect for Department Staff.

The Department has approved the attached standard drawing for the “Next Beam” precast concrete beam system. This beam is a prestressed concrete beam developed by the Precast/Prestressed Concrete Institute Northeast (PCINE) and resembles a “Double Tee” beam that has been used in parking garage construction for decades. Only the “Type F” beam details are being adapted for use in Pennsylvania as an “**as-designed**”, “**Design Build**” or “**alternate**” bridge beam. The maximum span for these beams with a typical 8” thick reinforced concrete deck is 75 feet.

There is no related standard special provision being provided for this item. Additional information can be found at www.PCINE.org/Resources under the “Resources” tab and then “Bridge Guidelines”.

The index has been updated to reflect the incorporation of the attached drawing as follows:

<u>Product No.</u>	<u>Product</u>
47	Next Beam Precast Concrete Beam System PennDOT Drawing # 09-602-BQAD

Please note that this letter, including the index, drawings and specifications for New Bridge and Structure Products is in electronic format and is available for your reference and access through ECMS.

The approved New Bridge and Structure Product drawing and cover letter are also accessible through the Internet website as follows:

<http://www.dot.state.pa.us/Internet/BQADStandards.nsf/newproducts?openform>

If you have any questions, please call Mr. Gary P. Gordon, P.E. at (717) 783-7551.

Attachments

4310/GPG/tb

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District Bridge Engineers
District Structural Control Engineers
Michael Baker Corporation
Attn: Mark Mlynarski, P.E. and Tom Ryan, P.E.
Mackin Engineering Company
Attn: Mr. Elmer Jarvis
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Product:

Next Beam - Precast Concrete Beam System
PennDOT Drawing # 09-602-BQAD

Approval Date:

March 31, 2010

Initiated By SOL:

431-10-05

Application/Use:

Next Beam is a Prestressed Concrete Beam developed by the **Precast/Prestressed Concrete Institute Northeast** and resembles a “Double Tee” beam that has been used in parking garage construction for decades. This beam type was approved by the committee on Feb. 7, 2008. As such, PennDOT is initiating the use of the Next Beam for use as an “**as-designed**”, “**Design Build**” or “**alternate**” bridge beam.

The beam is limited to the following applications as prototype installations are completed:

- Maximum span length: 75 feet
- Maximum T-Beam width: 8 feet (or as confirmed by PSLRFD)
- Minimum skew angle: 70 degrees
- Horizontal alignment: Tangent sections, no super-elevations

The Next Beam is to be designed/analyzed using PennDOT’s Prestressed Concrete Girder Design and Rating computer program, PSLRFD. The beam can be modeled as a spread box beam with larger than normal web thicknesses and an extremely thin bottom slab thickness of 0.01”. Contact the Bridge Quality Assurance Division for design analysis enquiries.

Specifications:

The beam is to be fabricated and constructed per Publication 408 Sections 1107 and 1080.

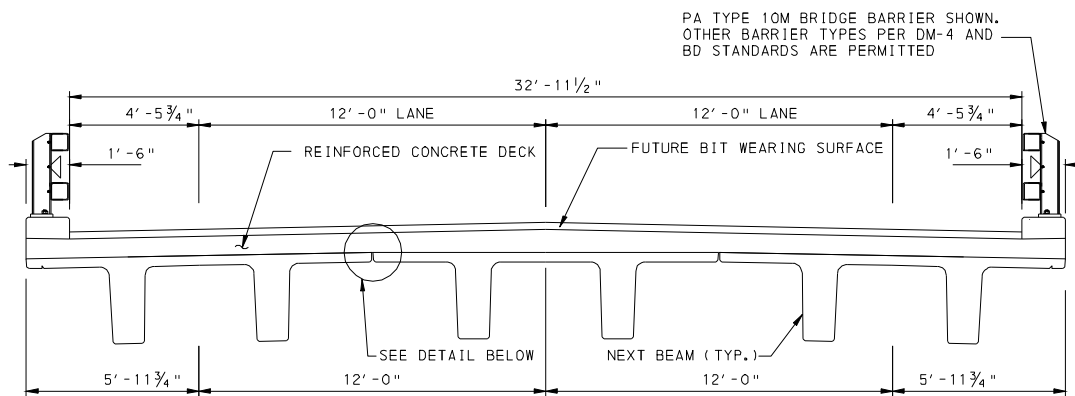
For projects that specify this as an acceptable alternate include in the contract a special provision indicating for a substitution of a Next Beam for a composite prestressed concrete spread or adjacent box beam, the Contractor's share of the Department's engineering costs to be limited to \$1,000.

Standard Drawing:

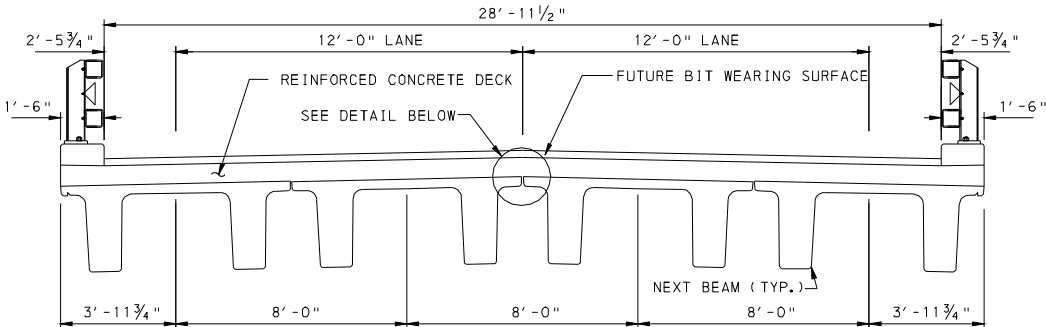
Attached is a copy of the Standard Detail Drawing # 09-602-BQAD.

Comment:

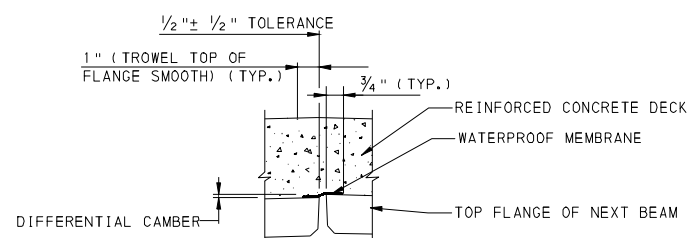
FHWA approval has been secured for Next Beam.
Code as structure type in BMS2 (6A26 – 6A29) as 42203: Prestressed simple composite concrete T-beam (multiple) structure type.



TYPICAL BRIDGE SECTION WITH MAXIMUM WIDTH BEAMS
(NEXT 36"x144" SHOWN)

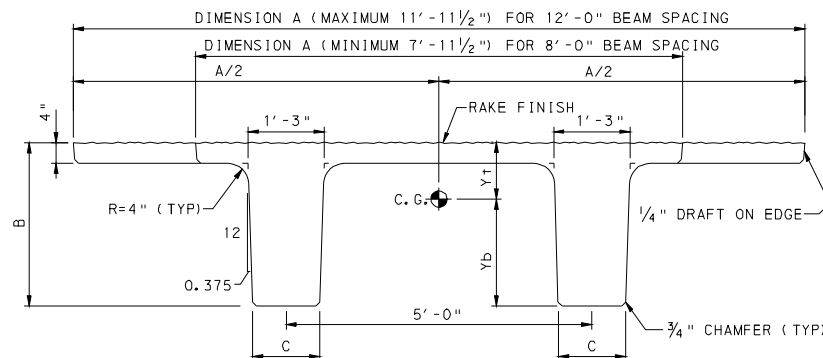


TYPICAL BRIDGE SECTION WITH MINIMUM WIDTH BEAMS
(NEXT 36"x96" SHOWN)



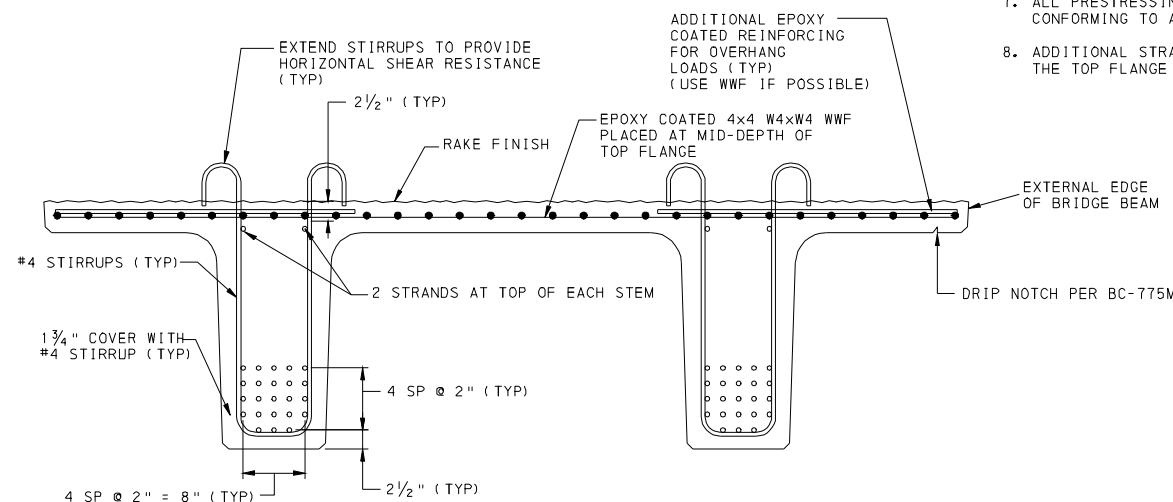
GAP FORM DETAIL

NOTE:
THE TWO BRIDGE SECTIONS DEPICTED REPRESENT THE TYPICAL USE OF THE MINIMUM WIDTH AND MAXIMUM WIDTH NEXT BEAMS.



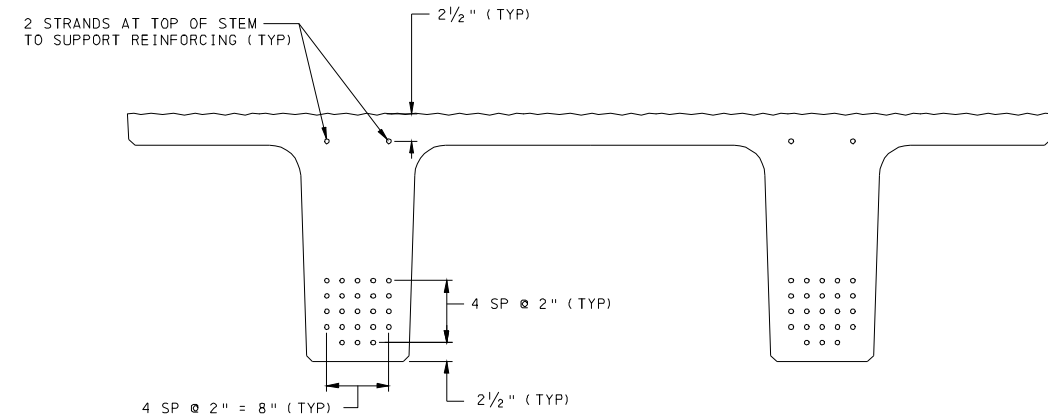
NEXT BEAM - SECTION PROPERTIES											
BEAM DESIGNATION	BEAM WIDTH INCHES	BEAM DEPTH INCHES	BASE WIDTH INCHES	STEM WIDTH INCHES	AREA IN ²	I IN ⁴	Y _b INCHES	Y _t INCHES	S _t IN ³	S _b IN ³	WEIGHT PLF
MINIMUM WIDTH BEAMS											
NEXT 36 F	95.50	36.00	13.00		1287	160240	21.77	14.23	11261	7361	1341
NEXT 32 F	95.50	32.00	13.25		1182	115813	19.51	12.49	9272	5936	1231
NEXT 28 F	95.50	28.00	13.50		1075	79901	17.24	10.76	7426	4635	1120
NEXT 24 F	95.50	24.00	13.75		966	51823	14.95	9.05	5726	3466	1006
MAXIMUM WIDTH BEAMS											
NEXT 36 F	143.50	36.00	13.00		1479	185525	23.36	12.64	14678	7942	1541
NEXT 32 F	143.50	32.00	13.25		1374	134258	20.98	11.02	12183	6399	1431
NEXT 28 F	143.50	28.00	13.50		1267	92661	18.57	9.43	9826	4990	1320
NEXT 24 F	143.50	24.00	13.75		1158	60045	16.12	7.88	7620	3725	1206

- NOTES:
- THE WIDTH OF BEAMS SHOWN ARE THE MINIMUM AND MAXIMUM WIDTH BEAMS. VARIATION BETWEEN THESE LIMITS IS ALLOWED IN ORDER TO CONSTRUCT A BRIDGE TO THE REQUIRED WIDTH. THE VARIATION IN WIDTH IS ACCOMPLISHED BY VARYING THE OVERHANG DIMENSIONS. THE DESIGNER WILL NEED TO CALCULATE BEAM PROPERTIES FOR BEAMS THAT ARE NOT EQUAL TO THE WIDTHS LISTED.
 - THE ACTUAL WIDTH OF THE BEAM TAKE INTO ACCOUNT A NOMINAL 1/2" WIDE GAP BETWEEN BEAMS TO ACCOUNT FOR TOLERANCES. THE SPACING OF BEAMS ON A TYPICAL BRIDGE SHALL BE AT THE NOMINAL SPACING (EX.: BEAM SPACING = 12 FEET FOR THE 11'-11 1/2" SECTION).
 - THE STEM WIDTH AND SPACING ARE FIXED.
 - THE ENDS OF THE BEAMS SHOULD BE SKEWED FOR SKEWED BRIDGES. THE ACUTE CORNERS OF THE FLANGE OVERHANGS SHOULD BE CHAMFERED 6"x6" IN ORDER TO MINIMIZE CASTING AND HANDLING DAMAGE.
 - DECK SLAB OVERHANG MUST BE DESIGNED TO HANDLE STANDARD IMPACT LOADS.



TYPICAL BEAM REINFORCING

- NOTES:
- THE TOP FLANGE IS INTENDED TO ACT AS A DECK FORM ONLY. A REINFORCED CAST-IN-PLACE CONCRETE DECK SHOULD BE DESIGNED TO SPAN BETWEEN STEMS. THE WELDED WIRE FABRIC SHOWN IS USED TO SUPPORT THE WET DECK CONCRETE ONLY.
 - THE ADDITIONAL TOP STEEL IN THE BEAM OVERHANGS SHOULD ONLY BE USED WHERE THE WELDED WIRE FABRIC CANNOT SUPPORT THE OVERHANG LOADS.
 - SHEAR REINFORCING SHOULD BE KEPT TO #4 BARS IN ORDER TO MAXIMIZE THE COVER ON THE SIDE OF THE STEM.
 - UTILITIES MAY BE PLACED BETWEEN THE BEAM STEMS OR BETWEEN ADJACENT BEAMS. IT IS PREFERABLE TO INSTALL CAST-IN-PLACE INSERTS OR THROUGH BOLTS FOR UTILITY SUPPORT ON THE UNDERSIDE OF THE TOP FLANGE.



TYPICAL STRAND LOCATIONS
(ENDS AND ALONG THE SPAN)

- NOTES:
- DRAPED STRANDS ARE NOT PERMITTED.
 - DEBONDING OF STRAND IS ALLOWED. NO MORE THAN 25% OF THE TOTAL NUMBER OF STRANDS SHALL BE DEBONDED. THE SPACING BETWEEN DEBONDED STRANDS SHALL BE AT LEAST 2.5 INCHES IN ANY DIRECTION. THE RESTRICTIONS OUTLINED IN THE AASHTO DESIGN SPECIFICATIONS AND PENNDOT DESIGN MANUAL, PART 4, SHALL ALSO BE FOLLOWED.
 - IT IS RECOMMENDED THAT APPROXIMATELY 50% OF ALL STRAND BE DEBONDED FOR THE FIRST 6" FROM THE END OF THE BEAM IN ORDER TO CONTROL END CRACKING. SPACING RESTRICTIONS OUTLINED IN NOTE 2 DO NOT APPLY TO THIS 6" AREA, BUT DO APPLY BEYOND THIS 6" AREA.
 - STRANDS SHALL BE PLACED WITHIN THE 2"x2" GRID. THE NUMBER AND LOCATION OF STRANDS SHALL BE AS REQUIRED BY DESIGN.
 - THE PATTERN SHOWN DEPICTS THE MAXIMUM NUMBER OF STRANDS ALLOWED. THIS IS BASED ON THE CAPACITY OF TYPICAL CASTING BEDS.
 - THE TWO BOTTOM CORNER STRAND IN EACH STEM ARE OMITTED TO PROVIDE ROOM FOR THE SHEAR REINFORCEMENT BAR BENDS.
 - ALL PRESTRESSING STRAND SHALL BE 1/2" DIA. SPECIAL UNCOATED SEVEN WIRE, LOW RELAXATION STRANDS CONFORMING TO AASHTO M203. THE ULTIMATE STRENGTH OF THE STRANDS SHALL BE 270 KSI.
 - ADDITIONAL STRAND TENSIONED TO A NOMINAL VALUE MAY BE ADDED TO THE TOP FLANGE TO SUPPORT THE TOP FLANGE REINFORCING.

Mark	Description	By	Chk'd.	Recm'd.	Date
REVISIONS					

PENNDOT DRAWING NO. 09-602-BQAD

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

NEXT BEAM
PRECAST CONCRETE BRIDGE BEAM SYSTEM

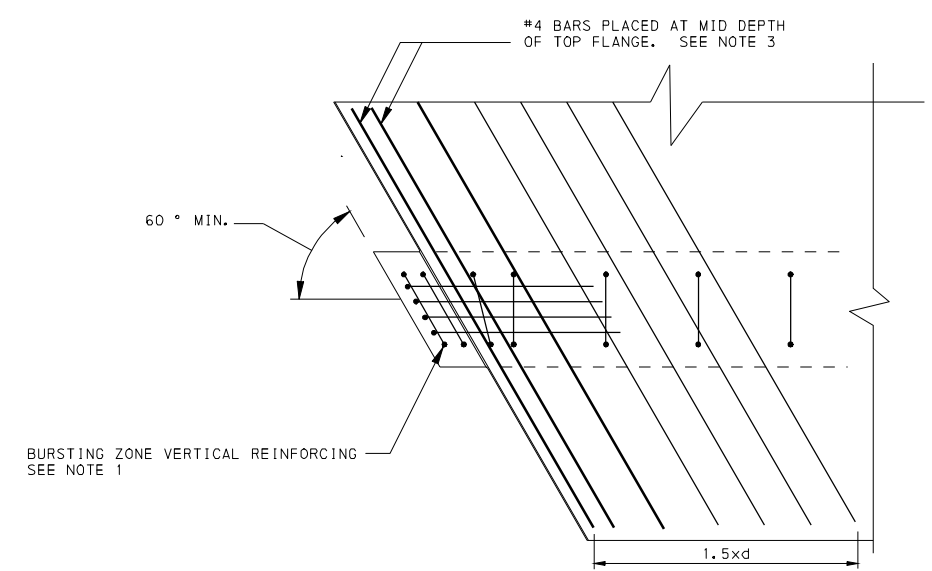
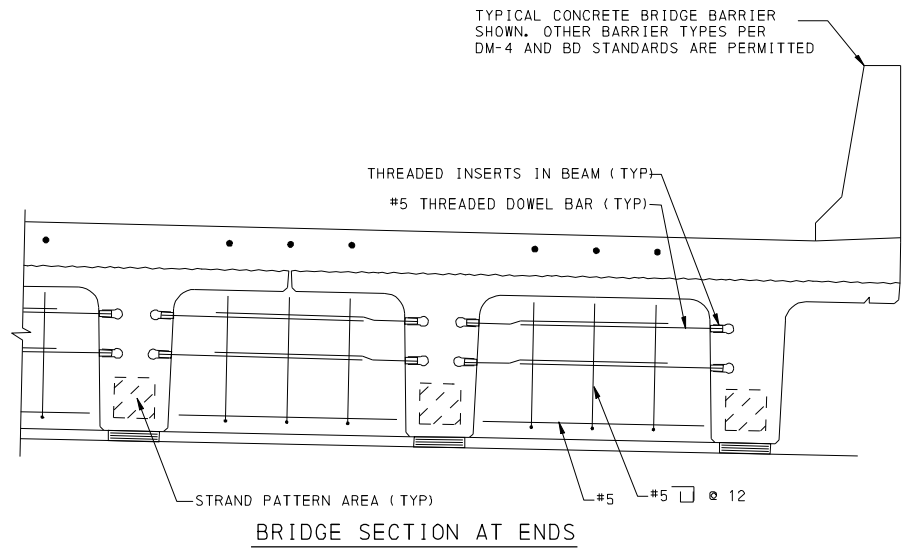
NEXT FORM BEAM
TYPICAL DETAILS

SHEET 1 OF 2

MAR 31 2010

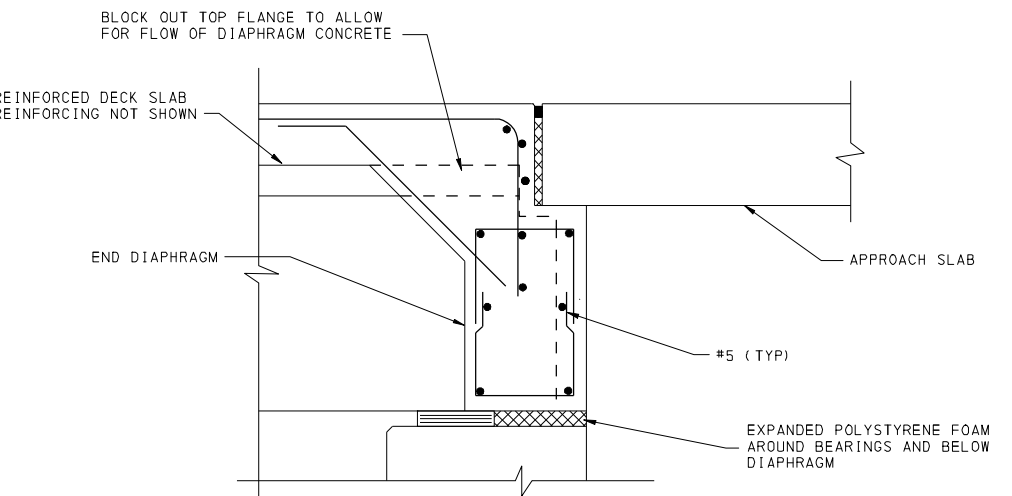
PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
RECOMMENDED
Thomas P. Macioce
CHIEF BRIDGE ENGINEER

BD-601M	CONCRETE DECK SLAB
BD-617M	PA TYPE 10M BRIDGE BARRIER
BD-628M	BRIDGE APPROACH SLABS
BD-667M	INTEGRAL ABUTMENT
BC-775M	PA BRIDGE BARRIER MISCELLANEOUS DETAILS
REFERENCE DRAWINGS	



TYPICAL BRIDGE SECTION WITH MAXIMUM WIDTH BEAMS

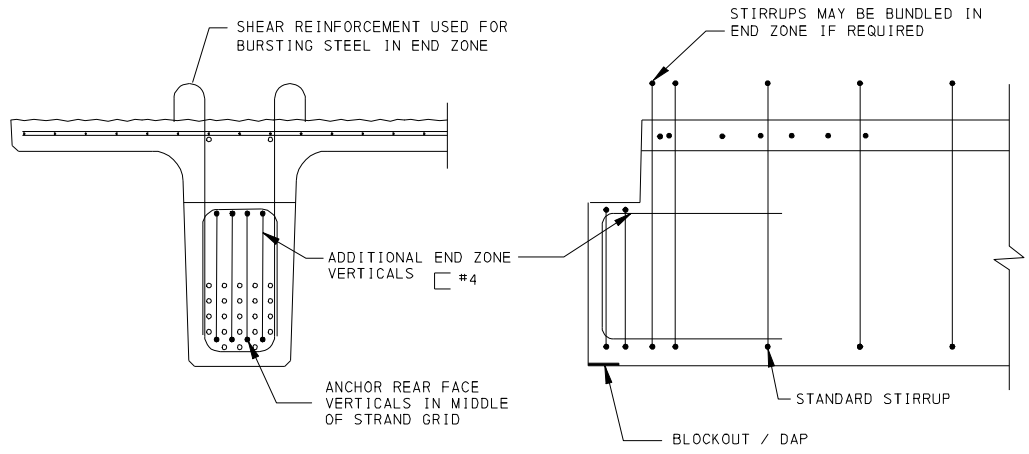
PLAN - SKEWED END



SECTION THROUGH DIAPHRAGM

END DIAPHRAGM DETAIL W/ APPROACH SLAB

- NOTES:
1. THE INSERTS FOR THE THREADED DOWELS IN THE STEMS SHALL BE PLACED SO THAT THEY DO NOT INTERFERE WITH THE PRESTRESSING STRAND PATTERN AND ARE LOCATED A MINIMUM OF 8" FROM THE ENDS OF THE BEAMS.
 2. INTERMEDIATE DIAPHRAGMS ARE NOT REQUIRED.
 3. IF THE TOP FLANGE IS BLOCKED OUT AS SHOWN, IT IS RECOMMENDED THAT UP TO 50% OF THE STRANDS BE DEBONDED OVER THE SAME LENGTH TO MINIMIZE CRACKING AT RELEASE.
 4. EXTEND EXTERIOR T-BEAM WEBS TO FULL WIDTH OF ABUTMENT.
 5. INTEGRAL ABUTMENT DETAIL(S) OF BD-667M ARE PERMITTED TO BE USED ON NEXT BEAM BRIDGES.
 6. ALTERNATE END DIAPHRAGM WITHOUT PAVING NOTCH AND WITH CORBEL ON ABUTMENT IS PERMITTED AS SHOWN ON BD-628M, SHT. 18.

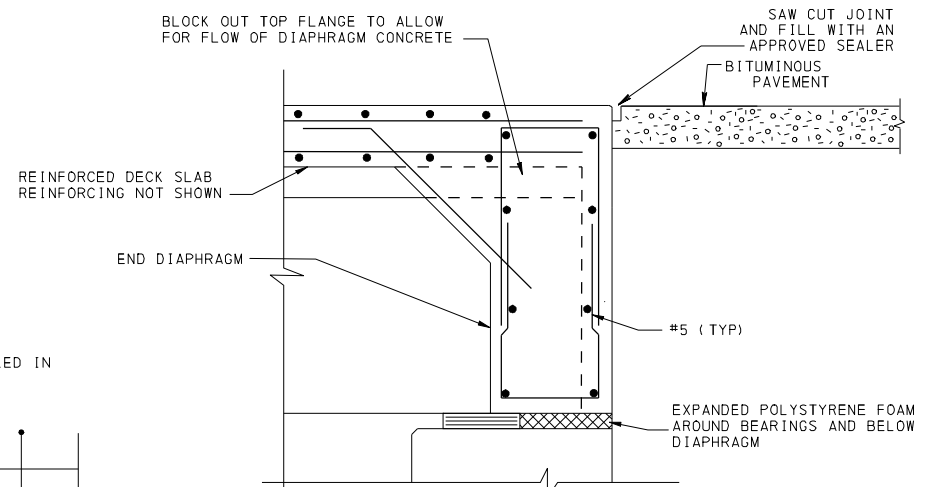


END ELEVATION - STEM END

ELEVATION - STEM END

BEAM END REINFORCEMENT DETAILS

- NOTES:
1. THE BARS SHOWN ARE APPROXIMATELY THE MAXIMUM NUMBER THAT CAN BE FIT WITHIN THE NEXT 24 BEAM. SOME OR ALL OF THESE ADDITIONAL END VERTICAL BARS MAY NOT BE NECESSARY DEPENDING ON THE DESIGN.
 2. THE AMOUNT OF SPLITTING REINFORCING MAY BE REDUCED BY DEBONDING STRAND IN THIS AREA. ADDITIONAL SPLITTING REINFORCING SHOULD BE PLACED IN AREAS WHERE DEBONDING IS TERMINATED.
 3. PLACE 2-#4 BARS AT THE BEAM END, THEN #4 @ 6 INCHES IN THE TOP FLANGE TO MINIMIZE THE POTENTIAL FOR TOP FLANGE END CRACKING DURING RELEASE AND HANDLING. THE MOST COMMON FORM OF POTENTIAL CRACKING IN THIS AREA IS A SERIES OF VERTICAL HAIRLINE CRACKS THROUGH THE INSIDE RADIUS OF THE TOP FLANGE / BEAM STEM INTERFACE RUNNING PARALLEL TO THE STEM.



SECTION THROUGH DIAPHRAGM

END DIAPHRAGM DETAIL W/O APPROACH SLAB

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DEPARTMENT OF TRANSPORTATION

NEXT BEAM
PRECAST CONCRETE BRIDGE BEAM SYSTEM

NEXT FORM BEAM
TYPICAL DETAILS