GENERAL: THIS STANDARD DRAWING PROVIDES DESIGN AND GENERAL CONSTRUCTION DETAILS FOR PRESTRESSED CONCRETE I-BEAM BRIDGES. THE DETAILS IN THIS STANDARD ARE APPLICABLE TO STRUCTURES WITH BEAM SPACINGS LESS THAN 14'-0" AND SKEWS LESS THAN 45°. THE PROJECT PLANS FOR EACH STRUCTURE SHALL INCLUDE THE FOLLOWING DETAILS:

1. THE DESIGNER SHALL CHOOSE A 28-DAY CONCRETE STRENGTH BETWEEN 5500 PSI AND 7000 PSI, A RELEASE STRENGTH BETWEEN 4000 PSI AND 5000 PSI AND A NOMINAL STRAND AREA OF 0.153 IN^2 OR 0.167 IN^2. THE VALUES CHOSEN BY THE DESIGNER SHALL BE LISTED IN THE STRUCTURE GENERAL NOTES.
2. A TRANSVERSE CROSS-SECTION THROUGH THE DECK, DETAILING (AT A MINIMUM) THE I-BEAM SPACING, DECK THICKNESS, HAUNCH DIMENSIONS, DECK REINFORCING AND COVER.
3. FRAMING PLAN SHOWING (AT A MINIMUM) SPAN LENGTHS, BEAM SPACINGS, SKEW ANGLE, DIAPHRAGM LOCATIONS, AND CENTERLINES OF BEARINGS.
4. BEAM ELEVATION AND SECTION VIEWS FOR EACH BEAM DETAILING BEAM LENGTHS, BEAM HEIGHT, STRAND LOCATIONS AND NUMBER, STRAND DEBONDING LENGTHS, CROSS SECTION OF I-BEAM ENDS SHOWING NUMBER AND LOCATION OF BENT UP ANCHOR STRANDS, REINFORCING STEEL, INSERT LOCATIONS AND EMBEDDED STEEL PLATES (IF ANY).
5. VARIABLE HAUNCH THICKNESSES AND SCREED ELEVATIONS.
6. LAMINATED ELASTOMERIC BEARING DETAILS, INCLUDING DIMENSIONS, DUROMETER AND LOAD PLATE (IF ANY).
7. DETAILS OF END AND PIER DIAPHRAGMS, INCLUDING DIMENSIONS, REINFORCING STEEL SIZE AND SPACING.
8. EXPANSION JOINT DETAILS.
9. DETAILS OF ABUTMENTS AND PIERS, INCLUDING DOWEL ROD POSITIONS, CENTERLINE OF BEAM BEARINGS, ORIENTATION OF BEARINGS AND FIXED DOWEL REQUIREMENTS.
10. ALL PLAN QUANTITY ITEMS REQUIRED TO PROPERLY COVER THE COST OF FABRICATION, ERECTION AND CONSTRUCTION OF THE BEAMS.
11. PLAN NOTES, INCLUDING BUT NOT LIMITED TO, CONCRETE PLACEMENT SEQUENCE.
12. ALL OTHER DETAILS AND INFORMATION NECESSARY TO COMPLETE THE PLANS.

IT IS NOT INTENDED THAT DETAILS SHOWN ON THIS STANDARD DRAWING BE REPEATED ON THE PROJECT PLANS EXCEPT AS MAY BE REQUIRED FOR CLARITY.

DESIGN CRITERIA:

DESIGN SPECIFICATIONS: THIS STANDARD DRAWING CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1996, INCLUDING THE 1997, 1998, 1999 AND 2000 INTERIM SPECIFICATIONS AND THE ODOT BRIDGE DESIGN MANUAL.

DESIGN LOADING:
DEAD LOAD - 60 LB/FT^2 (FUTURE WEARING SURFACE)
LIVE LOAD - HS-25 AND THE ALTERNATE MILITARY LOADING

DESIGN STRESSES:
PRESTRESSED CONCRETE - F'C = * (28-DAY)
F'CI = ** (RELEASE)

DIAPHRAGM CONCRETE - F'C = 4500 PSI

REINFORCING STEEL - MIN. YIELD STRENGTH = 60 KSI.

PRESTRESSING STRAND - FURNISH MATERIAL CONFORMING TO 711.27 (ASTM A416), GRADE 270, LOW RELAXATION, UNCOATED, SEVEN WIRE STRAND. STRANDS SHALL BE ½ INCH DIAMETER WITH A TOTAL CROSS-SECTIONAL AREA OF EITHER 0.153 IN^2 OR 0.167 IN^2.***

STRUCTURAL STEEL - ASTM A709, GRADE 36 OR 50

* - THE DESIGNER SHALL SPECIFY A 28-DAY COMPRESSIVE STRENGTH IN THE RANGE OF 5500 PSI MINIMUM TO 7000 PSI MAXIMUM AND LIST THE VALUE IN THE STRUCTURE'S GENERAL NOTES.

** - THE DESIGNER SHALL SPECIFY A RELEASE STRENGTH IN THE RANGE OF 4000 PSI MINIMUM TO 5000 PSI MAXIMUM AND LIST THE VALUE IN THE STRUCTURE'S GENERAL NOTES.

*** - THE DESIGNER SHALL SPECIFY ONLY THE STRAND AREA USED IN THE DESIGN IN THE STRUCTURE'S GENERAL NOTES.

THE DESIGNER SHALL NOT SPECIFY MORE THAN ONE STRAND SIZE, ONE RELEASE STRENGTH AND ONE 28-DAY STRENGTH IN A SINGLE STRUCTURE.

DECK REINFORCING: THE DESIGNER SHALL DESIGN THE DECK REINFORCING OVER THE PIERS TO RESIST THE NEGATIVE MOMENTS INDUCED BY ANY SUPERIMPOSED DEAD LOADS AND LIVE LOADS.

LAP SPLICES FOR REINFORCING STEEL IN I-BEAMS AND DIAPHRAGMS SHALL BE:
2'-0" IN LENGTH FOR #4 BARS
2'-6" IN LENGTH FOR #5 BARS
3'-0" IN LENGTH FOR #6 BARS
5'-0" IN LENGTH FOR #8 BARS

FABRICATION AND CONSTRUCTION REQUIREMENTS:

ERECTION PROCEDURE:THE CONTRACTOR SHALL SUBMIT PLANS FOR ERECTION AND HANDLING PROCEDURES ACCORDING TO 501.05.

ERECTION AND LIFTING DEVICES: THE GIRDER FABRICATOR IS RESPONSIBLE FOR THE DESIGN OF A LIFTING SYSTEM FOR HANDLING I-BEAMS. AS A MINIMUM, THE FABRICATOR SHALL USE TWO LIFT POINTS; ONE WITHIN 5 FEET OF EACH END. THE FABRICATOR SHALL SHOW THE LIFTING SYSTEM ON THE SHOP DRAWINGS AND USE A FACTOR OF SAFETY OF FOUR IN THE DESIGN. REFER TO PART 5 OF THE PCI HANDBOOK.

TEMPORARY STABILITY FOR DECK PLACEMENT: THE ERECTION PROCEDURE SHALL INCLUDE ANY ADDITIONAL TEMPORARY DIAPHRAGMS OR SUPPORTS NEEDED TO ASSURE THE I-BEAMS WILL REMAIN STABLE BEFORE, DURING AND THROUGH COMPLETION OF THE PLACEMENT OF THE CONCRETE DECK.

THE PLACEMENT OF DECK CONCRETE SHALL NOT PROCEED UNTIL ALL INTERMEDIATE DIAPHRAGMS HAVE BEEN PROPERLY INSTALLED. CONCRETE INTERMEDIATE DIAPHRAGMS SHALL BE COMPLETED AT LEAST 48 HOURS BEFORE DECK PLACEMENT BEGINS.

CAST-IN-PLACE DECK CONCRETE: THOROUGHLY CLEAN THE TOP SURFACE OF THE BEAMS OF ALL DIRT, DUST, LAITANCE OR OTHER FOREIGN MATERIALS WITH WATER, AIR UNDER PRESSURE OR ANY OTHER METHOD THAT PRODUCES SATISFACTORY RESULTS. THOROUGHLY DRENCH THE SURFACE WITH CLEAN WATER. BEFORE PLACING THE CONCRETE, ALLOW THE SURFACE TO DRY TO A DAMP CONDITION.

THE DESIGNER SHALL INCLUDE A DECK POUR SEQUENCE IN THE PLANS FOR MULTI-SPAN, CONTINUOUS BRIDGES. TWO CONSTRUCTION JOINTS SPACED AT 8'-0", PARALLEL TO AND CENTERED ABOUT THE PIERS ARE REQUIRED. DO NOT PLACE CONCRETE BETWEEN THESE CONSTRUCTION JOINTS PRIOR TO THE PLACEMENT OF CONCRETE IN EACH ADJACENT SPAN. UPON COMPLETION OF THE CONCRETE PLACEMENT IN THE ADJACENT SPANS, PLACE THE DIAPHRAGM AND DECK CONCRETE BETWEEN THE CONSTRUCTION JOINTS. SEAL THE JOINTS WITH A 2'-0" WIDE STRIP OF HIGH MOLECULAR WEIGHT METHACRYLATE RESIN ACCORDING TO 511.22.

CONTINUOUS DECK POUR PROCEDURES, WHICH PROCEED FROM END TO END OF THE BRIDGE AND PLACE THE PIER DIAPHRAGM CONCRETE CONCURRENTLY WITH THE DECK CONCRETE, MAYBE APPROVED BY THE DIRECTOR IF THE PLACEMENT SUBMITTAL CAN ASSURE THAT THE DECK CONCRETE IN ADJACENT SPANS WILL BE PLACED BEFORE THE PIER DIAPHRAGM CONCRETE HAS REACHED ITS INITIAL SET.

THE FABRICATOR SHALL INTENTIONALLY ROUGHEN THE SURFACE OF THE I-BEAM TOP FLANGES TO BE INCORPORATED INTO THE DECK CONCRETE TO A DEPTH OF APPROXIMATELY ¼" BEFORE THE CONCRETE HAS REACHED ITS INITIAL SET.

GALVANIZING: GALVANIZE ALL STRUCTURAL STEEL, DOWEL BARS, PIPE SLEEVES, BOLTS, STUDS, INSERTS, THREADED RODS, NUTS AND WASHERS, EMBEDDED SOLE PLATES AND BEARING LOAD PLATES (IF ANY) ACCORDING TO 711.02.

SEALING OF FASCIA BEAMS: SEAL THE FASCIA I-BEAM WITH AN EPOXY-URETHANE SEALER AS SHOWN ON SHEET 7 OF 8. THE DEPARTMENT WILL PAY FOR ACCEPTED QUANTITIES SEPARATELY UNDER SEALING OF CONCRETE SURFACES.

DIAPHRAGMS: ALL END AND PIER DIAPHRAGMS SHALL BE CAST-IN-PLACE. THE INTERMEDIATE DIAPHRAGMS MAY BE CAST-IN-PLACE AS SHOWN ON SHEET 5 OF 8 OR GALVANIZED STEEL AS SHOWN ON SHEET 6 OF 8. ONLY ONE TYPE OF INTERMEDIATE DIAPHRAGM MAY BE USED PER STRUCTURE. DIAPHRAGMS ARE NOT REQUIRED IN SPANS UP TO, AND INCLUDING, 40 FEET. DIAPHRAGMS ARE REQUIRED AT MID-SPAN FOR SPANS 40-80 FEET AND AT QUARTER POINTS FOR SPANS GREATER THAN 80 FEET. THE DESIGN PLANS SHALL SHOW THE CENTERLINE LOCATION OF EACH INTERMEDIATE DIAPHRAGM. THE FABRICATOR SHALL SHOW LOCATIONS OF INSERTS OR HOLES IN THE I-BEAMS FOR ALL DIAPHRAGM CONNECTIONS AND DETAILS FOR GALVANIZED STEEL DIAPHRAGMS IN THE SHOP DRAWINGS.

ALL STRUCTURAL STEEL, INCLUDING BOLTS, NUTS, WASHERS AND PLATE WASHERS FOR INTERMEDIATE DIAPHRAGMS SHALL CONFORM TO THE REQUIREMENTS OF 513.

CONCRETE FOR INTERMEDIATE DIAPHRAGMS SHALL CONFORM TO THE REQUIREMENTS OF 511. UNLESS OTHERWISE SPECIFIED, CONCRETE SHALL BE CLASS S.

ALTERNATE DESIGNS: AT NO EXPENSE TO THE PROJECT AND UPON WRITTEN ACCEPTANCE AND APPROVAL OF THE DIRECTOR, THE CONTRACTOR MAY SUBSTITUTE ALTERNATE DESIGNS FOR DETAILS AND I-BEAM SECTIONS TO THOSE SHOWN IN THE PLANS. IF AN ALTERNATE DESIGN IS APPROVED, THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR THE REVISION OF THE PROJECT PLANS. THE DEPARTMENT WILL NOT PAY FOR DESIGN COSTS OR COSTS ASSOCIATED WITH PLAN MODIFICATIONS. THE CONTRACTOR SHALL SUBMIT THE ALTERNATE DESIGN TO THE DIRECTOR FOR ACCEPTANCE AT LEAST 30 DAYS BEFORE CONSTRUCTION BEGINS.

SHIPPING STRANDS:
THE FABRICATOR MAY ADD SHIPPING STRANDS AT THE LOCATIONS SHOWN ON SHEET 1 OF 8. THESE SHIPPING STRANDS SHALL BE DEBONDED FOR THE ENTIRE LENGTH OF THE BEAM EXCEPT FOR THE LAST 10'-0" AT EACH END. THE STRANDS SHALL BE CUT AFTER ALL HANDLING OPERATIONS ARE COMPLETE.

BASIS OF PAYMENT: IN ADDITION TO THE ITEMS LISTED IN 515.18, THE DEPARTMENT WILL CONSIDER ALL COSTS ASSOCIATED WITH FOLLOWING ITEMS TO BE INCIDENTAL TO THE COST OF THE I-BEAMS: THREADED RODS; BEARING SOLE PLATES; TEMPORARY BRACING; AND FIXED ANCHOR DOWELS.

THE DEPARTMENT WILL PAY FOR PIER AND ABUTMENT DIAPHRAGMS SEPARATELY UNDER ITEM 511, CONCRETE FOR STRUCTURES.

DESIGN AGENCY
OFFICE OF
STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fogell — 09-07-99
ADMINISTRATOR — DATE

REVISIONS	DESIGNED	DRAWN	CHECKED	REVIEWED
10-20-00 04-20-07	SAM	SAM	JS/WTL	LMW
07-19-02 07-18-08				
07-18-03				

STANDARD
PRESTRESSED CONCRETE I-BEAM BRIDGE DETAILS

PSID-1-99

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