GENERAL: THIS STANDARD DRAWING PROVIDES DESIGN AND GENERAL CONSTRUCTION DETAILS FOR PRESTRESSED CONCRETE I-BEAM BRIDGES. THE PROJECT PLANS FOR EACH STRUCTURE SHALL INCLUDE THE FOLLOWING DETAILS:

1. A TRANSVERSE CROSS-SECTION THROUGH THE DECK, DETAILING AT A MINIMUM THE I-BEAM SPACING, DECK THICKNESS, HAUNCH DIMENSIONS, DECK REINFORCING AND COVER .
2. FRAMING PLAN SHOWING AT A MINIMUM SPAN LENGTHS, BEAM SPACINGS, SKEW ANGLE AND DIAPHRAGM LOCATIONS, CENTERLINE OF BEARINGS.
3. 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).
4. LAMINATED ELASTOMERIC BEARING DETAILS, INCLUDING DIMENSIONS, DUROMETER AND LOAD PLATE (IF ANY).
5. DETAILS OF END, PIER AND INTERMEDIATE DIAPHRAGMS, INCLUDING DIMENSIONS, REINFORCING STEEL SIZE AND SPACING .
6. EXPANSION JOINT DETAILS.
7. DETAILS OF ABUTMENTS AND PIERS, INCLUDING DOWEL ROD POSITIONS, CENTERLINE OF BEAM BEARINGS, ORIENTATION OF BEARINGS, FIXED DOWEL REQUIREMENTS.
8. ALL PLAN QUANTITY ITEMS REQUIRED TO PROPERLY COVER THE COST OF FABRICATION, ERECTION AND CONSTRUCTION OF THE BEAMS.
9. PLAN NOTES, INCLUDING BUT NOT LIMITED TO, CONCRETE PLACEMENT SEQUENCE,
10. ALL OTHER DETAILS AND INFORMATION NECESSARY TO COMPLETE THE PLANS.

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, 1992, INCLUDING THE 1993 AND 1994 INTERIM SPECIFICATIONS AND THE ODOT BRIDGE DESIGN MANUAL.

DESIGN LOADING: MS18 AND THE ALTERNATE MILITARY LOAD

DESIGN STRESSES:

PRESTRESSED CONCRETE - f'c = 38 MPa (28-DAY)
f'ci = 27.5 MPa (RELEASE)
DIAPHRAGM CONCRETE - CLASS S CONCRETE (SUPERSTRUCTURE)
f'c = 31 MPA
REINFORCING STEEL-ASTM A615M A616M OR A617M GRADE 400 WITH A MINIMUM YIELD STRENGTH OF 400 MPa, AND SHALL BE EPOXY COATED
PRESTRESSING STRAND - ASTM A416 GRADE 270, 12.7 mm DIAMETER SEVEN-WIRE, UNCOATED, LOW-RELAXATION STRANDS
NOMINAL STRAND AREA = 99 mm^2

ANCHORAGE ZONE REINFORCEMENT: VERTICAL STIRRUPS ACTING AT A UNIT STRESS OF 138 MPA SHALL RESIST AT LEAST 4 PERCENT OF THE TOTAL PRESTRESSING FORCE AND SHALL BE PLACED WITHIN A DISTANCE OF 0.25 TIMES THE BEAM DEPTH FROM THE END OF THE BEAM. THESE STIRRUPS SHALL BE PROVIDED IN ADDITION TO THOSE REQUIRED FOR SHEAR REINFORCEMENT.

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

DIAPHRAGMS SHALL BE CAST IN PLACE. DIAPHRAGMS SHALL BE REQUIRED AT BEAM ENDS. INTERMEDIATE DIAPHRAGMS ARE NOT REQUIRED IN SPANS UP TO 12 m, DIAPHRAGMS ARE REQUIRED, AT MIDSPAN FOR SPANS GREATER THAN 12 m TO 24 m, AND AT QUARTER POINTS FOR SPANS GREATER THAN 24 m TO 48 m.

LAP SPLICES FOR REINFORCING STEEL IN I-BEAMS AND DIAPHRAGMS SHALL BE:
1400 mm IN LENGTH FOR #25M BARS
880 mm IN LENGTH FOR #20M BARS
720 mm IN LENGTH FOR #15M BARS

SEISMIC RESTRAINTS SHALL BE DESIGNED TO MEET THE CRITERIA FOR ZONE "A" AS DEFINED IN AASHTO SPECIFICATIONS.

SKEW LIMITATION: I-BEAMS MAXIMUM ALLOWABLE SKEW ANGLE SHALL BE 45°.

SPAN LIMITS: THE SPAN LENGTH LIMITS SHOWN ARE APPROXIMATE. THE LENGTH LIMITS ARE BASED ON SIMPLE SPAN DESIGN OF THE I-BEAM FOR BEAM, DIAPHRAGM AND CONCRETE DECK DEADLOAD STRESSES. SUPERIMPOSED DEADLOAD AND LIVELOAD STRESSES ARE ANALYZED BASED ON THE COMPOSITE SECTION DEVELOPED BY THE I-BEAM AND CAST-IN-PLACE CONCRETE DECK AND ASSUMING CONTINUITY OVER THE PIERS FOR DISTRIBUTION OF THE STRESSES. CONCRETE WEIGHTS ARE BASED ON A NOMINAL WEIGHT CONCRETE OF 2400 kg/m^3.

DEBONDED STRANDS: DEBONDING OF A MAXIMUM OF ONE HALF OF THE NUMBER OF STRANDS IN THE BEAM, WITH AN APPROVED PLASTIC SHEATH, MAY BE DONE TO RELIEVE EXCESSIVE STRESSES. THE DEBONDED LENGTHS SHALL BE SYMMETRICAL ABOUT THE VERTICAL CENTER LINE OF THE BEAM. THE DEBONDING LENGTH SHALL BE LIMITED TO 1/5 THE TOTAL BEAM LENGTH.

DRAPED STRANDS: USE OF DRAPED STRANDS WILL NOT BE PERMITTED WITHOUT PRIOR APPROVAL OF THE DIRECTOR.

FABRICATION AND CONSTRUCTION REQUIREMENTS:

ERECTION PROCEDURE: THE CONTRACTOR SHALL SUBMIT FOR APPROVAL TO THE DIRECTOR PLANS DETAILING THE ERECTION AND HANDLING OF THE I-BEAMS. THE ERECTION PROCEDURE SHALL BE PREPARED BY A REGISTERED PROFESSIONAL ENGINEER AND SUBMITTED AT LEAST 30 DAYS BEFORE THE ACTUAL ERECTION. ERECTION SHALL NOT BEGIN UNTIL THE ERECTION PROCEDURE HAS BEEN APPROVED.

ERECTION AND LIFTING DEVICES: THE GIRDER FABRICATOR IS RESPONSIBLE FOR THE DESIGN OF A LIFTING SYSTEM FOR HANDLING I-BEAMS AT THE PLANT. TWO LIFT POINTS SHALL BE USED; ONE WITHIN 1500 mm OF EACH END. THE LIFTING SYSTEM SHALL BE SHOWN ON THE SHOP DRAWINGS AND A FACTOR OF SAFETY OF FOUR USED IN THE DESIGN. THE FABRICATOR IS REFERRED TO PART 5 OF THE PCI HANDBOOK.

THE GIRDERS MUST BE MAINTAINED IN AN UPRIGHT POSITION AT ALL TIMES.

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.

INTERMEDIATE DIAPHRAGMS SHALL BE COMPLETED NOT LESS THAN 48 HOURS BEFORE DECK PLACEMENT BEGINS.

PLACEMENT OF CAST-IN PLACE DECK CONCRETE. BEFORE PLACEMENT OF DECK CONCRETE, THE TOP OF ALL BEAMS SHALL BE THOROUGHLY CLEANED OF ALL DIRT, DUST, LAITANCE AND OTHER DEBRIS. THE SURFACE SHALL BE FLUSHED WITH CLEAN WATER AND SHALL BE DAMP WHEN THE CONCRETE IS PLACED. ANY STANDING WATER SHALL BE REMOVED.

ON MULTI-SPAN CONTINUOUS BRIDGES A DECK POUR SEQUENCE SHALL BE REQUIRED. THE DESIGN PLANS SHALL SHOW CONSTRUCTION JOINTS IN THE DECK, 1.2 m FROM THE CENTERLINE OF THE PIER, PARALLEL TO THE CENTERLINE OF THE PIER.

THE CONCRETE WITHIN THE CONSTRUCTION JOINTS ON EITHER SIDE OF THE PIER, INCLUDING THE PIER DIAPHRAGM CONCRETE, SHALL NOT BE PLACED UNTIL THE CONCRETE IN THE ADJACENT SPANS OF THE PIER HAVE BEEN PLACED. UPON COMPLETION OF THE CONCRETE PLACEMENT IN THE ADJACENT PIER SPANS, THE DIAPHRAGM AND DECK CONCRETE BETWEEN THE CONSTRUCTION JOINTS CAN BE PLACED.

CONTINUOUS DECK POUR PROCEDURES, WHICH PROCEED FROM END TO END OF THE BRIDGE AND PLACE THE PIER DIAPHRAGM CONCRETE CONCURRENTLY WITH THE DECK CONCRETE MAY BE 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.

SURFACE FINISH OF I-BEAM TOP FLANGES TO BE INCORPORATED INTO THE DECK CONCRETE SHALL BE INTENTIONALLY ROUGHENED TO AN AMPLITUDE OF APPROXIMATELY 6 mm BEFORE THE CONCRETE HAS REACHED INITIAL SET. ALL LAITENCE SHALL BE REMOVED.

SEALING OF FASCIA BEAMS: THE FASCIA I-BEAM SHALL BE SEALED WITH EITHER AN EPOXY-URETHANE, EPOXY OR NON-EPOXY SEALER. THE SEALER SELECTED SHOULD BE THE SAME AS FOR THE REST OF THE BRIDGE SUPERSTRUCTURE (SEE DETAILS IN THIS STANDARD).

GALVANIZING: ALL ANCHOR BOLTS, STUDS, INSERTS, THREADED RODS, NUTS AND WASHERS, INSERT PLATES AND BEARING LOAD PLATES (IF ANY) SHALL BE GALVANIZED AS PER 711.02.

DIMENSIONS: ALL DIMENSIONS GIVEN IN THIS STANDARD ARE MILLIMETERS UNLESS OTHERWISE NOTED.

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

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 BE RESPONSIBLE FOR THE REVISION OF THE PROJECT PLANS. DESIGN AND PLAN MODIFICATIONS SHALL BE DONE AT THE CONTRACTOR'S EXPENSE. THE DEPARTMENT SHALL HAVE 30 DAYS TO APPROVE ANY PROPOSED ALTERNATE DESIGNS AND REVISIONS.

ITEMS INCLUDED WITH ITEM 515, PRESTRESSED I-BEAM, FOR PAYMENT:
1. THREADED INSERTS AND RODS FOR, ABUTMENT, PIER AND INTERMEDIATE DIAPHRAGMS.
2. GALVANIZED INSERT PLATES TO ACCEPT BEAM BEARINGS
3. TEMPORARY DIAPHRAGMS FOR I-BEAM AND DECK POUR STABILITY.
4. ALL OTHER MATERIALS & LABOR REQUIRED FOR FABRICATION AND ERECTION.

QUANTITIES TO BE INCLUDED BY THE DESIGNER WITH ITEM 511 SUPERSTRUCTURE CONCRETE:
1. CUBIC METERS OF CONCRETE FOR INTERMEDIATE, PIER AND ABUTMENT DIAPHRAGMS.

QUANTITIES TO BE INCLUDED BY THE DESIGNER WITH ITEM 509, REINFORCING STEEL:
1. KILOGRAMS OF EPOXY COATED REINFORCING STEEL REQUIRED IN INTERMEDIATE, PIER AND ABUTMENT DIAPHRAGMS.

QUANTITIES TO BE INCLUDED BY THE DESIGNER WITH ITEM SPECIAL, SEALING OF CONCRETE SURFACES:
1. SQUARE METERS OF FACIA I-BEAM TO BE SEALED.

DESIGN AGENCY
BUREAU OF BRIDGES AND STRUCTURAL DESIGN

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Richard L. Engel 9-18-95
ENGINEER OF BRIDGES DATE

REVISIONS	DESIGNED	DRAWN	CHECKED	REVIEWED
	SAM/FO	SAM	JS	LMW

PSID-1-95M

STANDARD
PRESTRESSED CONCRETE I-BEAM BRIDGE DETAILS