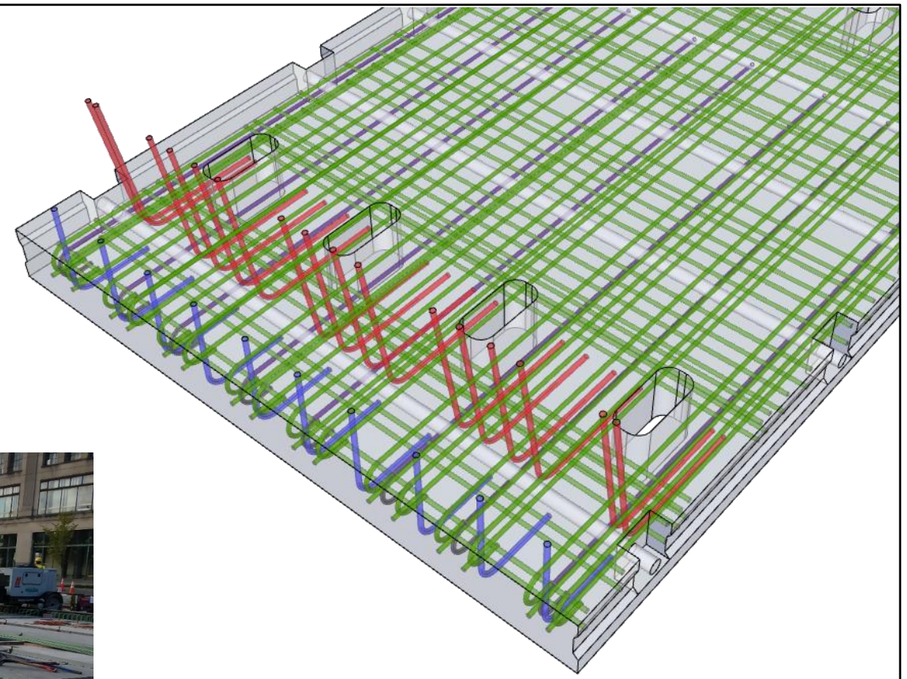
FULL DEPTH DECK PANEL GUIDELINES



These guidelines and guide details have been developed for the purpose of promoting a greater degree of uniformity among owners, engineers and industry of the Northeast, with respect to planning, designing, fabricating and constructing Full-Depth Deck Panels (FDDP) for bridge deck replacements or new construction.

In response to needs determined by Northeast Transportation Agencies, and Prestressed Concrete Producers, the PCI Northeast Bridge Technical Committee prepared these guidelines and guide details to promote uniformity of design and details throughout the region.

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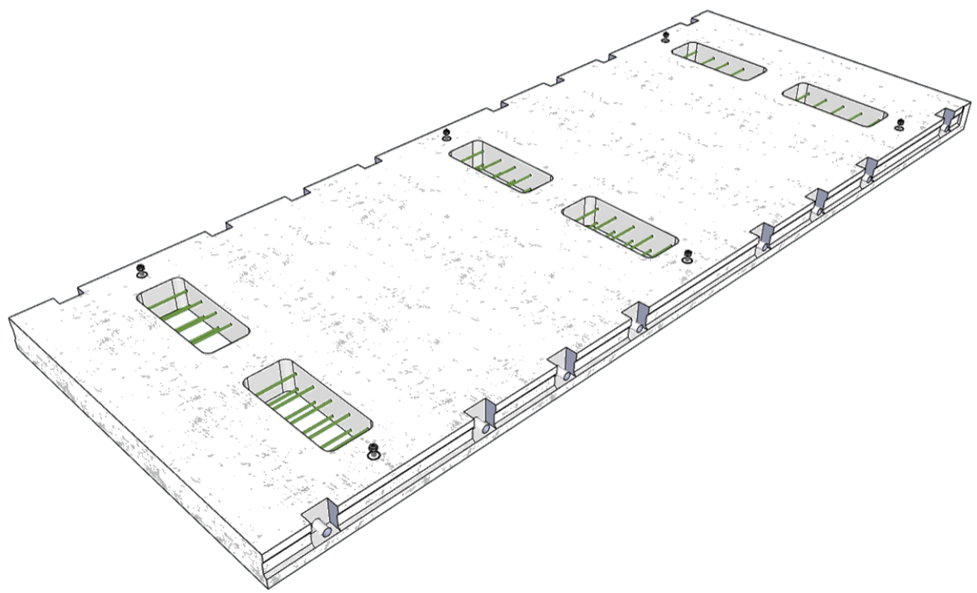

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Precast/Prestressed Concrete Institute Northeast Covering New England and New York

Report Number:
PCINER-20-FDDP

By: Precast/Prestressed Concrete Institute Northeast

Full Depth Deck Panel Guidelines
Third Edition 2020
Issue Date: 5/16/20

DESIGN AND IMPLEMENTATION GUIDELINES:

THE DESIGN OF PRECAST FULL DEPTH DECK PANELS (FDDP) SHOULD CONFORM TO THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND THE AASHTO LRFD GUIDE SPECIFICATIONS FOR ACCELERATED BRIDGE CONSTRUCTION.

PRECAST FDDP MAY BE USED FOR NEW CONSTRUCTION OR FOR REPLACEMENT OF EXISTING DECKS.

PRECAST FDDP CAN BE USED ON VIRTUALLY ANY STRUCTURE THAT CAN BE DESIGNED WITH A CAST-IN-PLACE CONCRETE DECK.
TYPICAL STRUCTURES INCLUDE:

- PRESTRESSED CONCRETE GIRDERS
- STEEL GIRDERS
- STEEL GIRDER/FLOORBEAM SYSTEMS
- STEEL TRUSS SYSTEMS
- LONG-SPAN SUSPENSION AND CABLE STAYED SYSTEMS

THE MINIMUM PANEL THICKNESS SHOULD BE BASED ON THE STRENGTH REQUIREMENTS AND THE DETAILS SELECTED. SEE NOTES ON SHEETS FDDP 5 AND 8.

IT IS THE DESIGNER'S RESPONSIBILITY TO:

DESIGN THE DECK PANELS ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND THE REQUIREMENTS OF THE OWNER, INCLUDING:

- DECK REINFORCING IN THE PANELS AND CLOSURE JOINTS (USE THE SAME METHODS AS CAST-IN-PLACE DECKS)
- SIZE AND LAYOUT OF SHEAR CONNECTORS OR SHEAR REINFORCEMENT
- DECK OVERHANG AND BARRIER REINFORCING

CREATE AND DESIGN SPECIAL DETAILS AS NEEDED, SUCH AS SKEWED END PANELS OR SPECIAL GEOMETRY

DETAIL DECK ENDS AND EXPANSION JOINTS ACCORDING TO OWNER'S STANDARDS.

SPECIFY THE REQUIRED CONCRETE STRENGTHS:

- FINAL STRENGTH OF FDDP
- STRENGTH OF CONCRETE IN CLOSURE JOINTS
- REQUIRED TIME FOR CONCRETE STRENGTH GAIN FOR CLOSURE JOINTS

THE RECOMMENDED MAXIMUM LENGTH OF PANEL REINFORCED WITHOUT PRESTRESSING IS 30 FEET. THE RECOMMENDED MAXIMUM LENGTH OF PANEL WITH PRESTRESSING FOR HANDLING IS 45 FEET. THE CONTRACTOR/FABRICATOR SHALL BE RESPONSIBLE FOR THE DESIGN OF PRESTRESSING FOR HANDLING. THE DESIGNER SHOULD SPECIFY THE ALLOWABLE TENSILE STRESS FOR HANDLING. THE RECOMMENDED STRESS LIMIT FOR "NO DISCERNABLE CRACKING" IS THE MODULUS OF RUPTURE OF THE CONCRETE AS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS DIVIDED BY A SAFETY FACTOR OF 1.5. THE FABRICATOR SHOULD DETERMINE THE RELEASE STRENGTH OF THE CONCRETE BASED ON THE LIFTING METHODS CHOSEN.

THE RECOMMENDED MAXIMUM WIDTH OF PANEL SHOULD BE BASED ON SHIPPING REQUIREMENTS. IN GENERAL, THE MAXIMUM WIDTH SHOULD BE LESS THAN 12 FEET INCLUDING PROJECTING REINFORCING.

ASPHALTIC DECK OVERLAYS COMBINED WITH WATERPROOFING MEMBRANES ARE PREFERRED BY MOST NORTHEAST STATES FOR THE FOLLOWING REASONS:
- ELIMINATES THE NEED FOR DECK GRINDING
- ACCOUNTS FOR PANEL ERECTION TOLERANCES
- PROVIDES ADDITIONAL DECK PROTECTION

OTHER SURFACE TREATMENTS CAN BE USED (BARE DECK, CONCRETE OVERLAYS, ETC.) FOLLOW OWNER REQUIREMENTS.
REFER TO OWNER STANDARDS FOR OTHER TREATMENTS.

USE OWNER STANDARDS FOR DECK OVERHANGS AND BARRIERS. ADJUST REINFORCING BAR SPACING TO ACCOMMODATE SHEAR CONNECTOR POCKETS. REDESIGN MAY BE REQUIRED IF THE PANEL THICKNESS IS DIFFERENT THAN THE OWNER STANDARDS.

MAXIMUM RECOMMENDED PANEL SKEW ANGLES:
15 DEGREES FOR PANELS WITH POST-TENSIONED JOINTS
25 DEGREES FOR PANELS WITH REINFORCED CLOSURE JOINTS

A 1/2" CONCRETE GRINDING ALLOWANCE FOR CORRECTING UNEVEN ROADWAY SURFACES AT JOINTS MAY BE USED. TO ACCOUNT FOR THIS IN DESIGN, ASSUME LOSS OF 1/2" OF THE PANEL THICKNESS WHEN CALCULATING ITS STRUCTURAL PROPERTIES, BUT ASSUME NO LOSS IN THICKNESS WHEN CALCULATING PANEL WEIGHT.

CONSTRUCTION AND MATERIAL GUIDELINES:

CONSTRUCTION SPECIFICATIONS FOR PRECAST FDDP SHOULD CONFORM TO THE REQUIREMENTS OF THE AASHTO LRFD GUIDE SPECIFICATIONS FOR ACCELERATED BRIDGE CONSTRUCTION.

IT IS RECOMMENDED THAT STATE APPROVED, PLANT PRODUCED CONCRETE MIXES BE USED FOR FDDP. A MINIMUM CONCRETE DESIGN STRENGTH OF 5 KSI IS RECOMMENDED.

GROUT, HIGH EARLY STRENGTH CONCRETE, AND ULTRA-HIGH PERFORMANCE CONCRETE (UHPC) SHOULD BE SPECIFIED IN ACCORDANCE WITH THE AASHTO LRFD GUIDE SPECIFICATIONS FOR ACCELERATED BRIDGE CONSTRUCTION

REINFORCING STEEL: AS PER OWNER STANDARDS

POST-TENSIONING STRAND: LOW RELAXATION STRAND, 0.6" DIAMETER, AASHTO M 203 GRADE 270

POST-TENSIONING DUCT: ROUND DUCT IS RECOMMENDED OVER OVAL DUCT. A MINIMUM 2" DIAMETER DUCT IS RECOMMENDED.

POST-TENSIONING ANCHORAGE DEVICES: USE ANCHORAGES DESIGNED FOR THIN DECK APPLICATIONS. SELECT ANCHORAGE DEVICES THAT CAN PROVIDE THE REQUIRED CONCRETE COVER.

THE PLANS SHOULD INCLUDE THE ELEVATIONS OF EACH PANEL (GENERALLY AT THE CORNERS OF EACH PANEL) BASED ON THE REQUIRED ELEVATION OF THE PANELS AFTER ALL PANELS ARE PLACED ON THE SPAN. THE FOLLOWING EQUATION CAN BE USED TO DETERMINE THE DECK ELEVATIONS:

A = B - W + C

WHERE:
A = DECK ELEVATION SHOWN ON THE PLANS
B = FINISHED ELEVATION OF THE DECK
W = THICKNESS OF WEARING SURFACE AND MEMBRANE WATERPROOFING
C = DEFLECTION DUE TO COMPOSITE LOADS

LEVELING DEVICES OR OTHER GRADE ADJUSTMENT METHODS SHOULD BE USED TO SET THE FINAL GRADES AND TO PROVIDE EQUAL PANEL LOAD DISTRIBUTION TO THE SUPPORTING GIRDERS. THESE DEVICES SHOULD BE DESIGNED BY THE CONTRACTOR (MEANS AND METHODS). IF LEVELING BOLTS ARE USED, THE TORQUE OF EACH BOLT SHOULD BE ADJUSTED TO APPROXIMATELY THE SAME VALUE.

INDEX OF DETAIL SHEETS

ISSUE DATE: 5/16/2020 | SHEET FDDP 01

DESIGN, IMPLEMENTATION, AND CONSTRUCTION GUIDELINES

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PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST

PRECAST FULL-DEPTH DECK PANEL GUIDE DETAILS

REVISIONS

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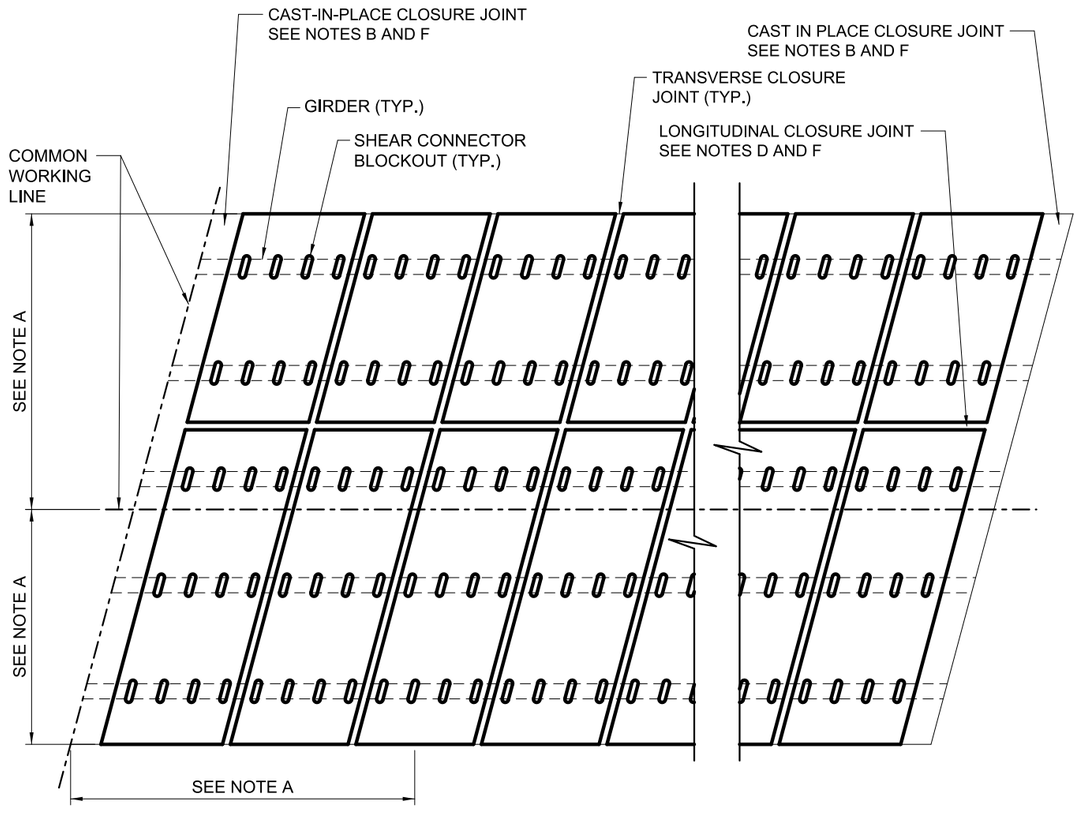
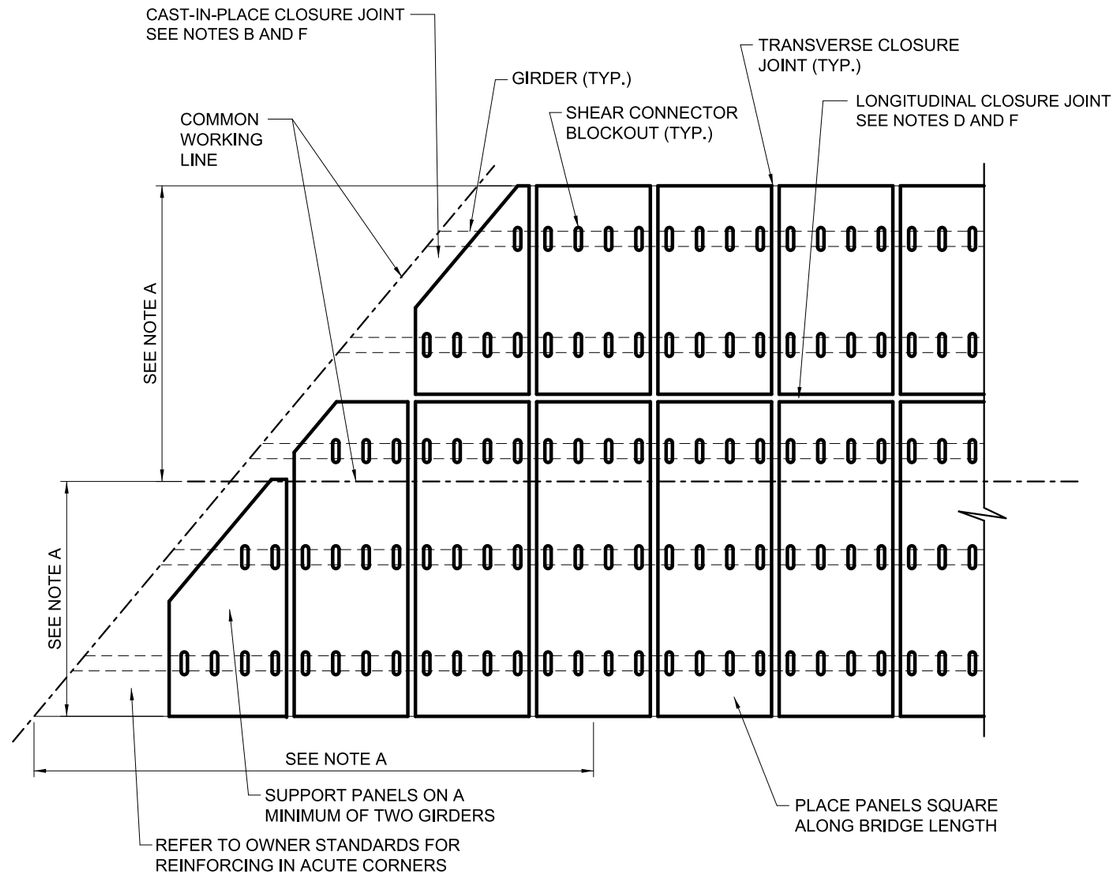


TYPICAL LAYOUT PLAN
SKEW BETWEEN 0 AND 25 DEGREES



TYPICAL LAYOUT PLAN
SKEW GREATER THAN 25 DEGREES

NOTE A: PANEL LAYOUT SHOULD BE DIMENSIONED BETWEEN A COMMON WORKING LINE AND AN EDGE OR CENTERLINE OF EACH PANEL. CENTERLINE METHOD SHOWN FOR LONGITUDINAL DIRECTION, EDGE METHOD SHOWN FOR TRANSVERSE DIRECTION. THE DIMENSIONS SHOULD BE BASED ON THE SPECIFIED PANEL WIDTH/LENGTH, THE SPECIFIED JOINT WIDTH, AND THE SKEW OF THE PANELS. THE WIDTH OF THE JOINTS WILL VARY BASED ON THE FABRICATION AND ERECTION TOLERANCES SPECIFIED. SEE SHEET FDDP 11 FOR RECOMMENDED FABRICATION AND ERECTION TOLERANCES. SEE SHEET FDDP 05 FOR JOINT DETAILS WITH REINFORCING.

NOTE B: CAST-IN-PLACE CLOSURE JOINTS SHALL BE USED TO PROVIDE ATTACHMENT TO END DIAPHRAGMS, CURTAIN WALLS, INTEGRAL ABUTMENTS, ETC. SEE SHEET FDDP 10 FOR DETAILS.

NOTE C: THIS LAYOUT IS CONCEPTUAL AND SHOWN FOR INFORMATION ONLY. THE LAYOUT WILL VARY WITH DIFFERENT SKEWS, PANEL WIDTHS, JOINT WIDTHS, AND BEAM SPACINGS.

NOTE D: THE DESIGNER SHOULD LOCATE LONGITUDINAL CLOSURE JOINTS AS NECESSARY FOR CONSTRUCTION STAGING. LONGITUDINAL CLOSURE JOINTS MAY ALSO BE USED TO CREATE DECK CROWNS, AS FABRICATION OF CROWNED PANELS CAN INCREASE COSTS. LONGITUDINAL JOINTS ALSO PROVIDE ADDED ADJUSTABILITY FOR DECK GEOMETRY. JOINT SHOWN BETWEEN BEAMS. THE JOINT MAY ALSO BE LOCATED AT A BEAM LINE. SEE SHEET FDDP 05 FOR DETAILS.

NOTE E: NARROW UHPC JOINTS ARE SHOWN. WIDER JOINTS WILL BE REQUIRED FOR JOINTS WITH NORMAL CONCRETE. IN ORDER TO CONTROL THE MAXIMUM SPACING OF SHEAR CONNECTORS, SHEAR CONNECTORS MAY BE PLACED WITHIN THE CLOSURE JOINT.

NOTE F: PROJECTING REINFORCING BARS REQUIRED AT CLOSURE JOINTS AND AT DECK ENDS. NOT SHOWN FOR CLARITY.

ISSUE DATE: 5/16/2020	SHEET FDDP 02
TYPICAL LAYOUTS- TRANSVERSE PANELS WITH REINFORCED CONCRETE CLOSURE JOINTS	

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PRECAST FULL-DEPTH DECK PANEL GUIDE DETAILS

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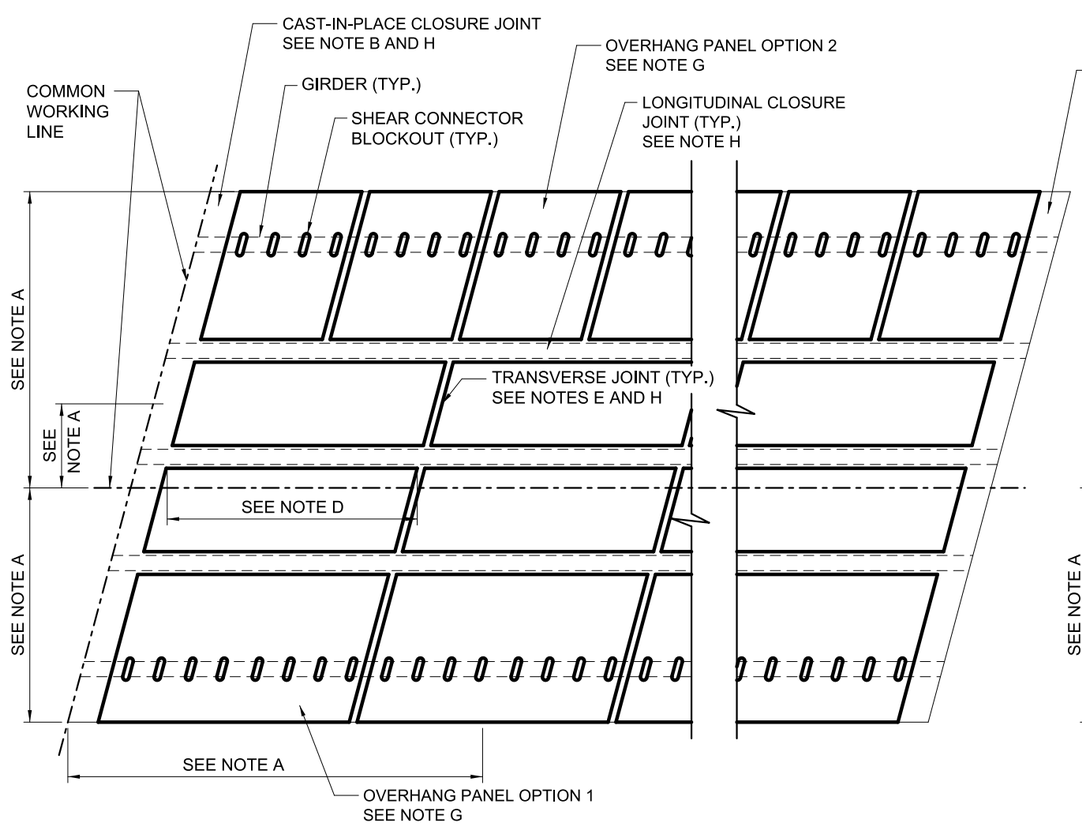
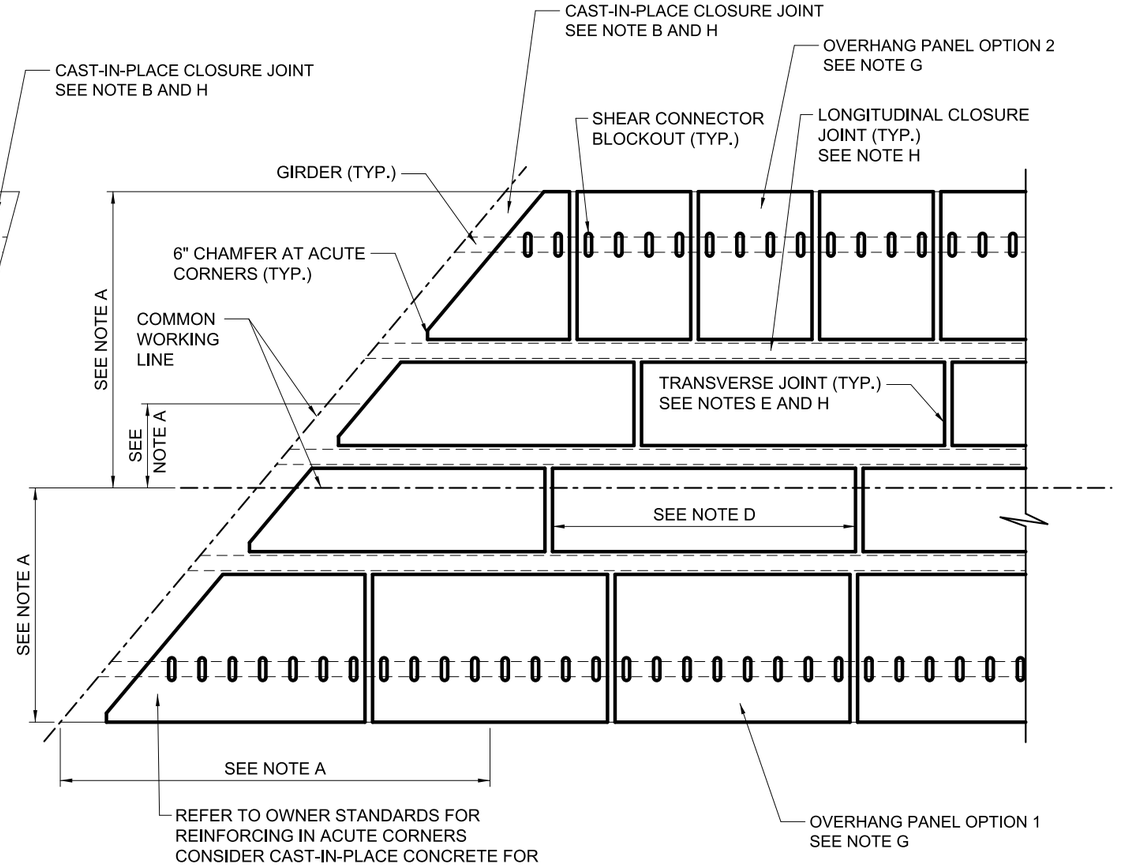


TYPICAL LAYOUT PLAN
SKEW BETWEEN 0 AND 25 DEGREES



TYPICAL LAYOUT PLAN
SKEW GREATER THAN 25 DEGREES

NOTE A: PANEL LAYOUT SHOULD BE DIMENSIONED BETWEEN A COMMON WORKING LINE AND AN EDGE OR CENTERLINE OF EACH PANEL. CENTERLINE METHOD SHOWN FOR LONGITUDINAL DIRECTION, EDGE METHOD SHOWN FOR THE FASCIA PANELS IN THE TRANSVERSE DIRECTION. THE DIMENSIONS SHOULD BE BASED ON THE SPECIFIED PANEL WIDTH/LENGTH, THE SPECIFIED JOINT WIDTH, AND THE SKEW OF THE PANELS.THE TRANSVERSE WIDTH OF THE JOINT WILL VARY BASED ON THE FABRICATION AND ERECTION TOLERANCES SPECIFIED. SEE SHEET FDDP 11 FOR RECOMMENDED FABRICATION AND ERECTION TOLERANCES. SEE SHEET FDDP 05 FOR JOINT DETAILS WITH REINFORCING.

NOTE B: CAST-IN-PLACE CLOSURE JOINTS SHALL BE USED TO PROVIDE ATTACHMENT TO END DIAPHRAGMS, CURTAIN WALLS, INTEGRAL ABUTMENTS, ETC. SEE SHEET FDDP 10 FOR DETAILS.

NOTE C: THIS LAYOUT IS CONCEPTUAL AND SHOWN FOR INFORMATION ONLY. THE LAYOUT WILL VARY WITH DIFFERENT SKEWS, PANEL WIDTHS, JOINT WIDTHS, AND BEAM SPACINGS.

NOTE D: THE SPECIFIED LENGTH OF INTERIOR PANELS SHOULD NORMALLY NOT EXCEED 30 FEET. FOR BRIDGES WITH VERTICAL CURVES, USE SHORTER PANELS OR CONSIDER PROFILE GRINDING AFTER INSTALLATION.

NOTE E: THE LOCATION OF THE TRANSVERSE JOINTS BETWEEN THE INTERIOR PANELS DO NOT NEED TO ALIGN.

NOTE F: NARROW TRANSVERSE UHPC JOINTS ARE SHOWN. WIDER JOINTS WILL BE REQUIRED FOR JOINTS WITH NORMAL CONCRETE. IN ORDER TO CONTROL THE MAXIMUM SPACING OF SHEAR CONNECTORS, PLACE SHEAR CONNECTORS WITHIN THE CLOSURE JOINT.

NOTE G: OPTION 1 SHOULD BE USED WHERE THE WIDTH OF THE LONGITUDINAL PANEL IS WITHIN ALLOWABLE SHIPPING DIMENSIONS. IF THE PANEL WIDTH IS EXCESSIVE, OPTION 2 CAN BE USED. THE SPACING OF THE TRANSVERSE JOINTS SHOULD BE SET TO ACCOMMODATE SHIPPING REQUIREMENTS.

NOTE H: PROJECTING REINFORCING BARS ARE REQUIRED AT CLOSURE JOINTS AND AT DECK ENDS. NOT SHOWN FOR CLARITY.

ISSUE DATE: 5/16/2020	SHEET FDDP 03
TYPICAL LAYOUTS- LONGITUDINAL PANELS WITH REINFORCED CONCRETE CLOSURE JOINTS	

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PRECAST FULL-DEPTH DECK PANEL GUIDE DETAILS

REVISIONS

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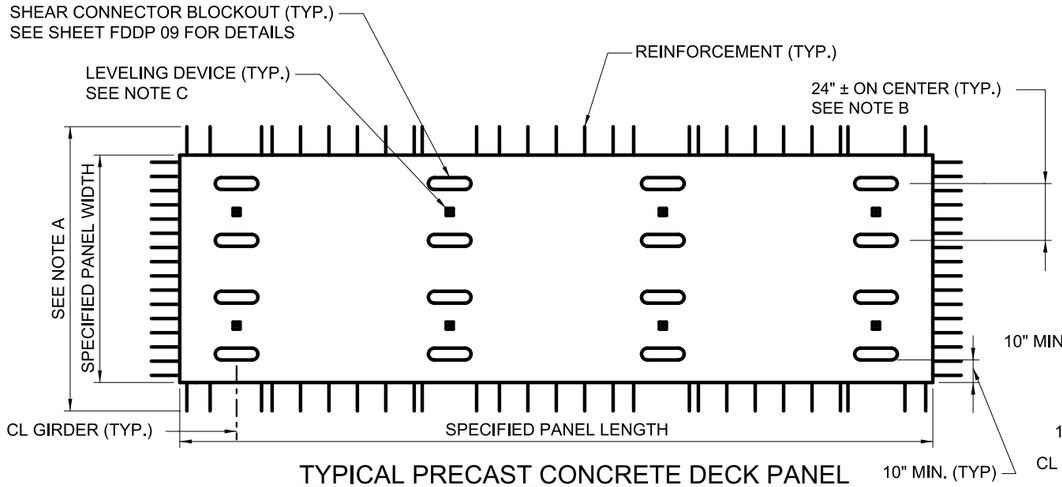
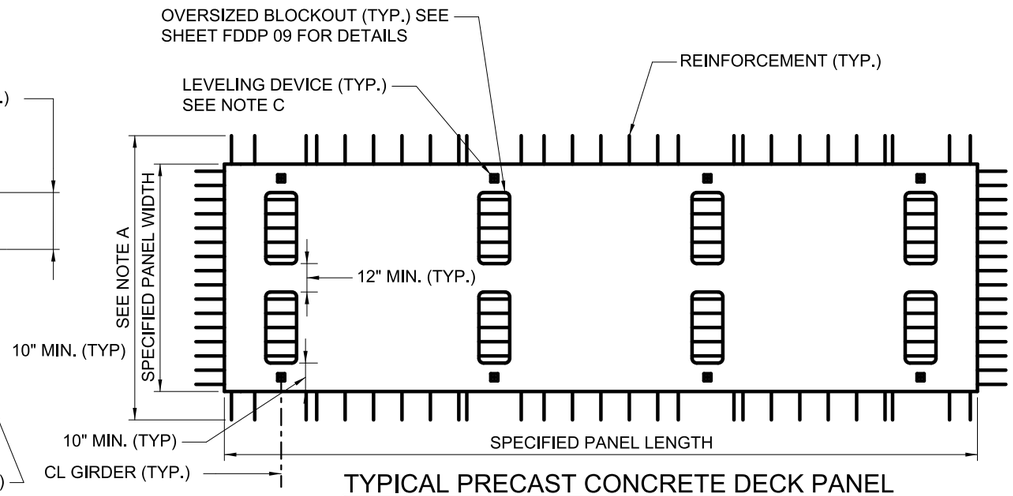
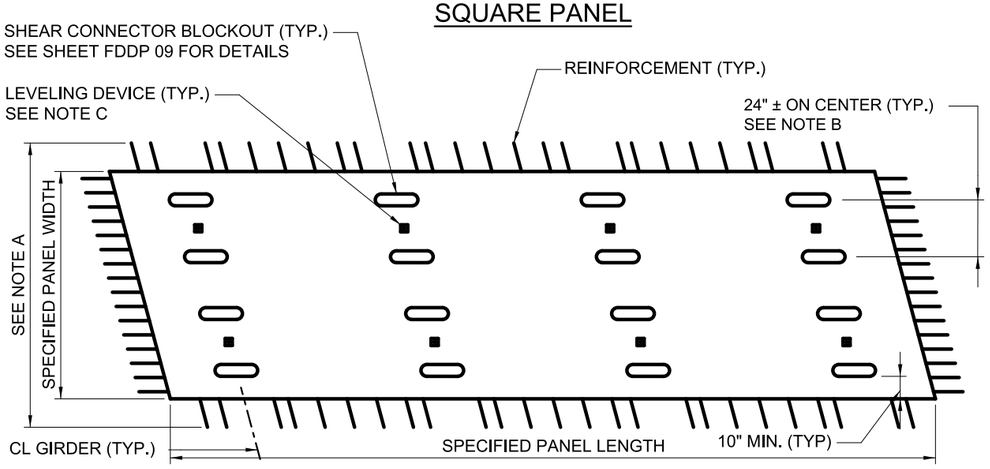


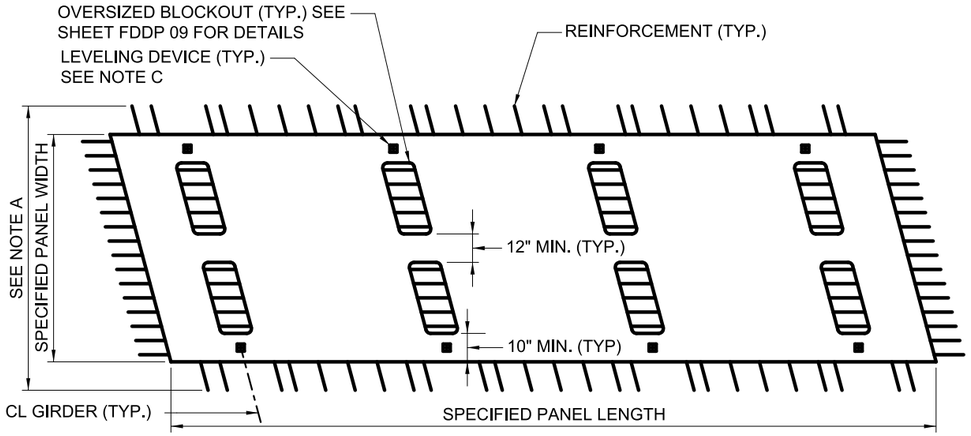
TYPICAL PRECAST CONCRETE DECK PANEL
SQUARE PANEL



TYPICAL PRECAST CONCRETE DECK PANEL
SQUARE PANEL



TYPICAL PRECAST CONCRETE DECK PANEL
SKEWED PANEL



TYPICAL PRECAST CONCRETE DECK PANEL
SKEWED PANEL

TYPICAL PANEL PLAN - STANDARD BLOCKOUTS

NOTE A: THE MAXIMUM WIDTH INCLUDING PROJECTING REINFORCEMENT SHOULD BE 12 FEET IN ORDER TO FACILITATE SHIPPING.

NOTE B: BLOCKOUTS FOR SHEAR CONNECTORS SHALL GENERALLY BE SPACED AT TWO FEET ON CENTER. FOR SPECIAL DESIGNS, THIS DIMENSION MAY BE CHANGED. BLOCKOUTS MAY BE PLACED FARTHER FROM THE PANEL EDGE IF SHEAR CONNECTORS ARE PLACED IN THE REINFORCED CLOSURE JOINT.

NOTE C: LEVELING DEVICES OR OTHER GRADE ADJUSTING METHODS SHOULD BE USED AT EACH GIRDER TO PRODUCE TRIBUTARY DEAD LOAD DISTRIBUTION SIMILAR TO CAST-IN-PLACE CONCRETE. SEE SHEET FDDP 10 FOR DETAILS.

NOTE D: THE WIDTH OF THE STANDARD BLOCKOUTS AND OTHER DEVICES SHOULD BE KEPT TO A MINIMUM TO FACILITATE THE LAYOUT OF PANEL REINFORCING STEEL.

NOTE E: MINOR CRACKING PROJECTING FROM THE CORNERS OF THE BLOCKOUTS MAY OCCUR. IT IS RECOMMENDED TO USE ROUND CORNERS TO MINIMIZE THE POTENTIAL FOR CRACKING.

TYPICAL PANEL PLAN - OVERSIZED BLOCKOUTS

NOTE F: LARGE POCKETS MAY REQUIRE SPECIAL HANDLING RIGGING (I.E. 8 POINT PICK WITH SLINGS OR SPREADER BEAMS) IN ORDER TO CONTROL CRACKING DURING HANDLING. SEE NOTES ON SHEET FDDP 01.

NOTE G: ADJUST THE SPACING OF REINFORCING TO AVOID INTERFERENCE WITH BLOCKOUTS. THE EXCEPTION TO THIS IS THE MAIN REINFORCING FOR OVERSIZED BLOCKOUTS, WHICH CAN PASS THROUGH THE BLOCKOUT.

NOTE H: TRANSVERSE PANELS SHOWN. LONGITUDINAL PANELS SIMILAR, BUT WITH THE FOLLOWING DIFFERENCES:
OVERHANG PANELS SIMILAR TO TRANSVERSE PANELS
INTERIOR PANELS SIMILAR BUT WITHOUT BLOCKOUTS

ISSUE DATE: 5/16/2020 | SHEET FDDP 04

TYPICAL PANEL PLANS - REINFORCED CONCRETE CLOSURE JOINTS

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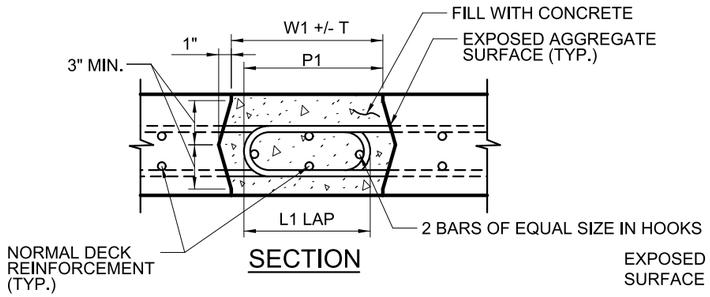
PRECAST FULL-DEPTH DECK PANEL GUIDE DETAILS

REVISIONS

NO.	DATE	DESCRIPTION

T = RECOMMENDED TOLERANCE = 0.5" (SEE NOTE 7)
W1 = SPECIFIED JOINT WIDTH, MINIMUM=L1+T+1.5
P1 = HOOK BAR PROJECTION FROM PANEL EDGE = 0.5(W1+L1)+T
L1 = AASHTO HOOK DEVELOPMENT LENGTH



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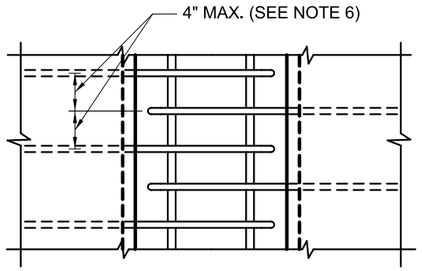
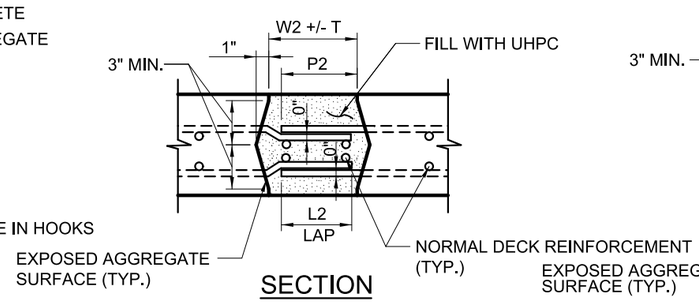


PLAN

HOOKED BARS WITH NORMAL STRENGTH CONCRETE

T = RECOMMENDED TOLERANCE = 0.5" (SEE NOTE 7)
W2 = SPECIFIED JOINT WIDTH, MINIMUM=L2+T+1.5
P2 = BAR PROJECTION FROM PANEL EDGE = 0.5(W2+L2)+T
L2 = AASHTO LRFD GUIDE SPEC FOR ABC UHPC SPLICE LENGTH



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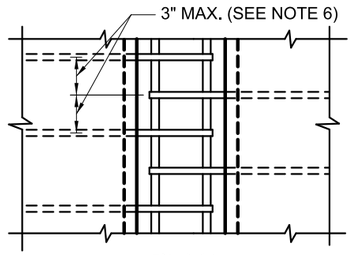
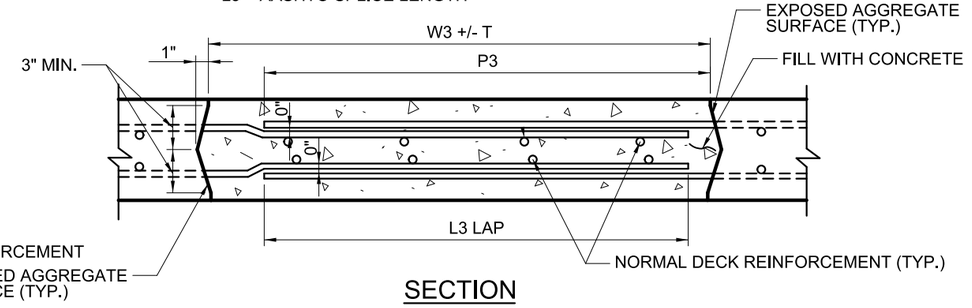


PLAN

STRAIGHT BARS WITH UHPC

T = RECOMMENDED TOLERANCE = 0.5" (SEE NOTE 7)
W3 = SPECIFIED JOINT WIDTH, MINIMUM=L3+T+1.5
P3 = BAR PROJECTION FROM PANEL EDGE = 0.5(W3+L3)+T
L3 = AASHTO SPLICE LENGTH



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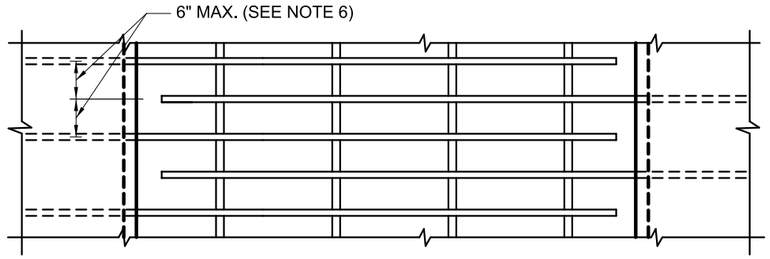


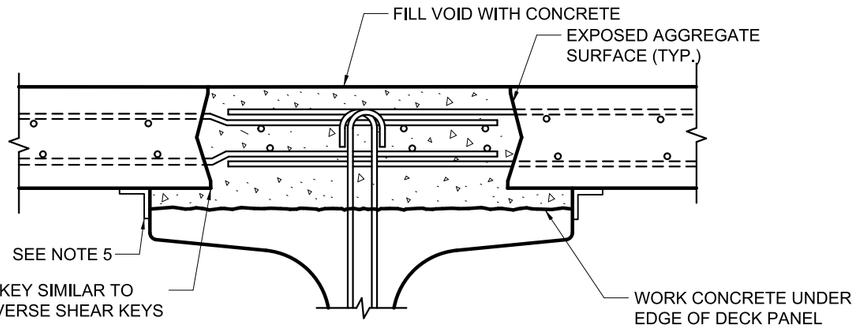
PLAN

STRAIGHT BARS WITH NORMAL STRENGTH CONCRETE

DECK CONNECTION NOTES

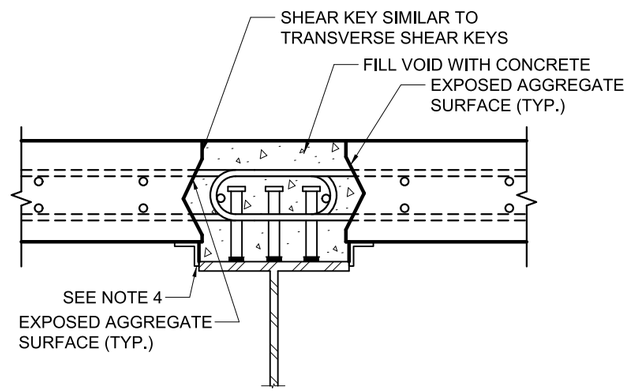
1. THE MINIMUM THICKNESS OF THE PANEL SHOULD ACCOMODATE THE STRENGTH REQUIREMENTS AND THE REQUIRED BAR SIZES (INCLUDING HOOKS).
2. METHOD OF FORMING CLOSURE JOINT TO BE DETERMINED BY THE CONTRACTOR. THE FORMS NEED TO BE REMOVABLE. FORM SUPPORTS SHOULD NOT PENETRATE THROUGH TOP OF POUR UNLESS APPROVED BY THE ENGINEER.
3. EXPOSED AGGREGATE SURFACE OF THE FACES OF THE KEYS IS RECOMMENDED TO IMPROVE BOND AND PREVENT LEAKAGE.
4. THE DESIGNER IS RESPONSIBLE FOR THE DESIGN OF THE JOINT. SEE AASHTO LRFD GUIDE SPECIFICATION FOR ABC FOR DETAILS.
5. THE DESIGNER SHOULD ALLOW THE FABRICATOR TO MAKE MINOR CHANGES TO THE DIMENSIONS OF THE SHEAR KEYS TO ACCOMMODATE VARIATIONS IN EXISTING FORMS.
6. DETAIL THE SPACING OF THESE BARS WITH EQUAL DISTANCES BETWEEN ADJACENT BARS. THE ACTUAL SPACING WILL VARY DUE TO FABRICATION AND ERECTION TOLERANCES. THE FOLLOWING NOTE SHOULD BE INCLUDED ON THE PLANS: "THE SPACING OF ADJACENT BARS SHOULD BE ONE HALF THE SPECIFIED BAR SPACING IN THE PANELS. THE ACTUAL SPACING WILL VARY BASED ON FABRICATION AND ERECTION TOLERANCES. THE MAXIMUM DIMENSION SHOWN APPLIES TO THE NEAREST ADJACENT BAR."
7. THE JOINT WIDTH TOLERANCE IS USED TO ACCOMMODATE THE FABRICATION AND ERECTION TOLERANCES NOTED ON SHEET FDDP 11.

UHPC NOTES: UHPC MATERIAL SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFD GUIDE SPECIFICATIONS FOR ABC



CLOSURE JOINT OVER WIDE FLANGED CONCRETE BEAM

NOTES:
1. NORMAL STRENGTH CONCRETE JOINT SHOWN. UHPC JOINT SIMILAR.
2. COORDINATE LOCATION OF PROJECTING BARS FROM GIRDER TO AVOID CONFLICTS WITH LAPPED BARS IN DECK PANELS.
3. THIS DETAIL MAY BE USED AT A ROADWAY CROWN.
4. BULB TEE SHOWN. SIMILAR DETAILS CAN BE USED WITH A VOIDED SLAB OR BOX BEAM
5. THE CONTRACTOR TO DETERMINE SYSTEM FOR PANEL SUPPORT ALONG GIRDER.



HOOK CLOSURE JOINT OVER STEEL BEAM

NOTES:
1. HOOKED BAR DETAILS SHOWN. UHPC DETAILS SIMILAR.
2. INSTALL SHEAR CONNECTORS AFTER PANEL PLACEMENT.
3. THIS DETAIL MAY BE USED AT A ROADWAY CROWN.
4. THE CONTRACTOR TO DETERMINE SYSTEM FOR PANEL SUPPORT ALONG GIRDER.

OPTIONS FOR LONGITUDINAL JOINTS OVER BEAMS

ISSUE DATE: 5/16/2020 | SHEET FDDP 05

REINFORCED CONCRETE CLOSURE JOINT DETAILS

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PRECAST FULL-DEPTH DECK PANEL GUIDE DETAILS

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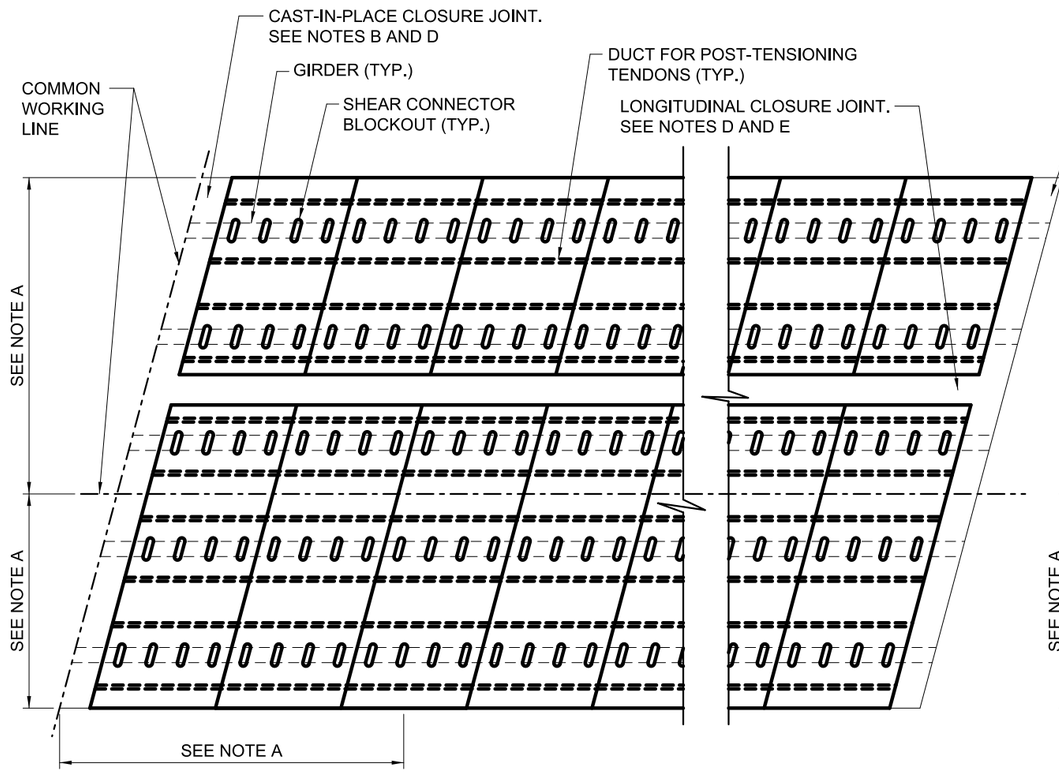


TYPICAL LAYOUT PLAN
SKEW BETWEEN 0 AND 15 DEGREES

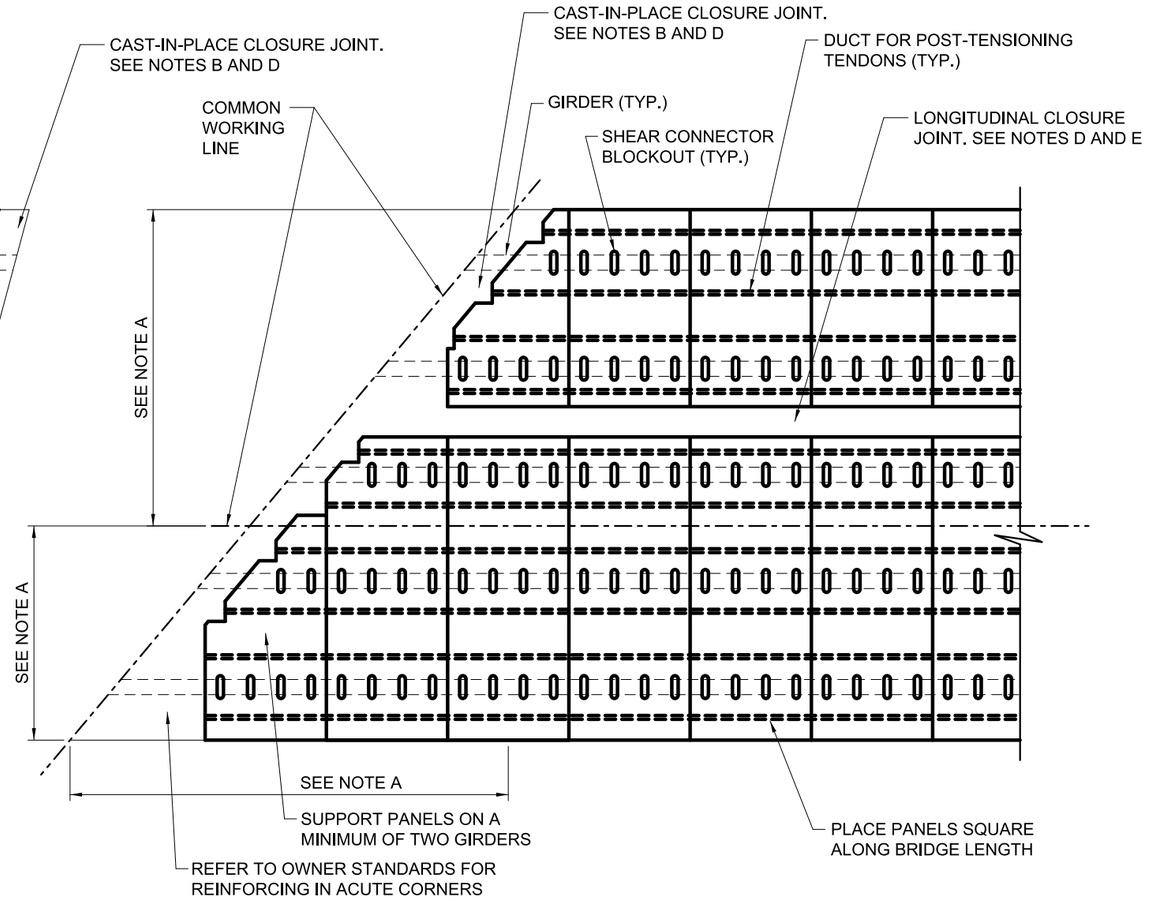
NOTE A: PANEL LAYOUT SHOULD BE DIMENSIONED BETWEEN A COMMON WORKING LINE AND AN EDGE OR CENTERLINE OF EACH PANEL. CENTERLINE METHOD SHOWN FOR LONGITUDINAL DIRECTION, EDGE METHOD SHOWN FOR TRANSVERSE DIRECTION. THE DIMENSIONS SHOULD BE BASED ON THE SPECIFIED PANEL WIDTH/LENGTH, THE SPECIFIED JOINT WIDTH, AND THE SKEW OF THE PANELS. THE TRANSVERSE WIDTH OF THE JOINT WILL VARY BASED ON THE FABRICATION AND ERECTION TOLERANCES SPECIFIED. SEE SHEET FDDP 11 FOR RECOMMENDED FABRICATION AND ERECTION TOLERANCES. SEE SHEET FDDP 08 FOR JOINT DETAILS.

NOTE B: CAST-IN-PLACE CLOSURE JOINTS SHALL BE USED TO PROVIDE ATTACHMENT TO END DIAPHRAGMS, CURTAIN WALLS, INTEGRAL ABUTMENTS, ETC. SEE SHEET FDDP 10 FOR DETAILS.

NOTE C: THE LAYOUT SHOWN IS CONCEPTUAL AND FOR INFORMATION ONLY. THE LAYOUT WILL VARY WITH DIFFERENT SKEWS, PANEL WIDTHS, AND BEAM SPACINGS.

NOTE D: PROJECTING REINFORCING BARS ARE REQUIRED AT CLOSURE JOINTS AND AT DECK ENDS. NOT SHOWN FOR CLARITY.

NOTE E: THE DESIGNER SHOULD LOCATE LONGITUDINAL CLOSURE JOINTS AS NECESSARY FOR CONSTRUCTION STAGING. LONGITUDINAL CLOSURE JOINTS MAY ALSO BE USED TO CREATE DECK CROWNS. JOINT SHOWN BETWEEN BEAMS. THE JOINT MAY ALSO BE LOCATED AT A BEAM LINE. SEE SHEET FDDP-05 FOR DETAILS.



TYPICAL LAYOUT PLAN
SKEW GREATER THAN 15 DEGREES

CURVED BRIDGE LAYOUTS:

CURVED BRIDGES REQUIRE SPECIAL DETAILING.

THE FOLLOWING GENERAL APPROACH MAY BE USED:
- PANELS MAY BE DETAILED AS TRAPEZOIDAL
- POST-TENSIONING DUCTS SHOULD FOLLOW THE CURVATURE OF THE ROADWAY
- THE DUCTS CAN BE CURVED OR STRAIGHT WITHIN THE PANEL WITH MINOR ANGLE POINTS AT THE JOINTS.
- THE DESIGN FOR LOSSES IN TENDONS SHOULD ACCOUNT FOR FRICTION DUE TO CURVATURE.

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TYPICAL LAYOUTS- POST-TENSIONED CLOSURE JOINTS

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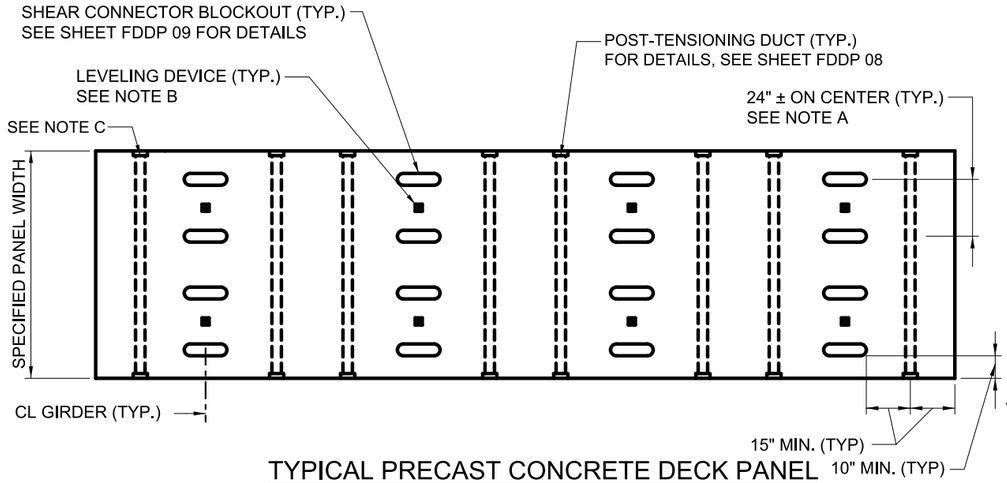
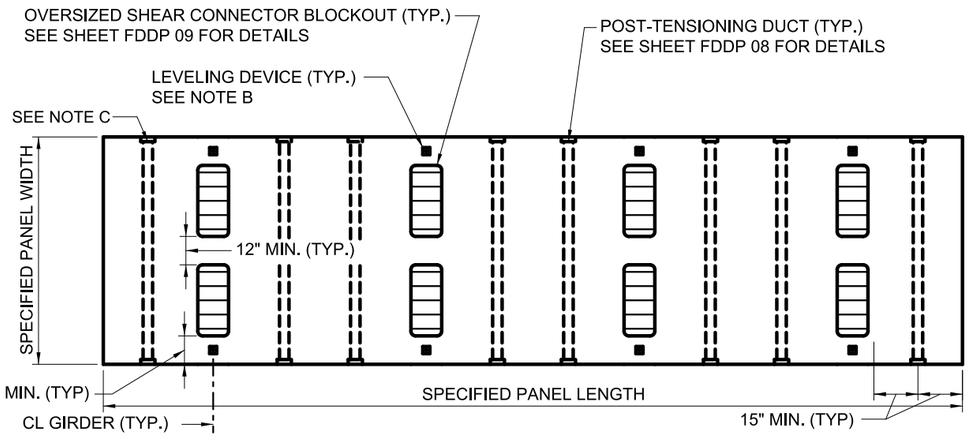
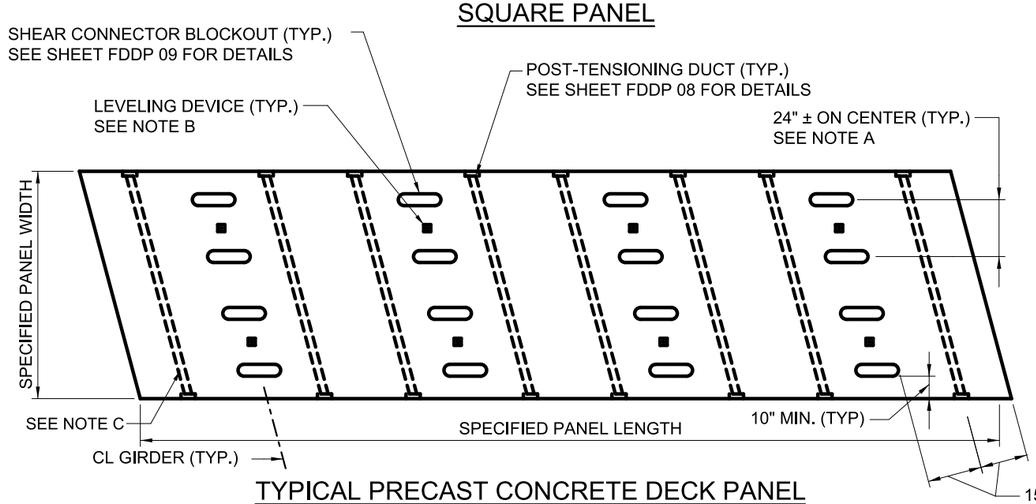


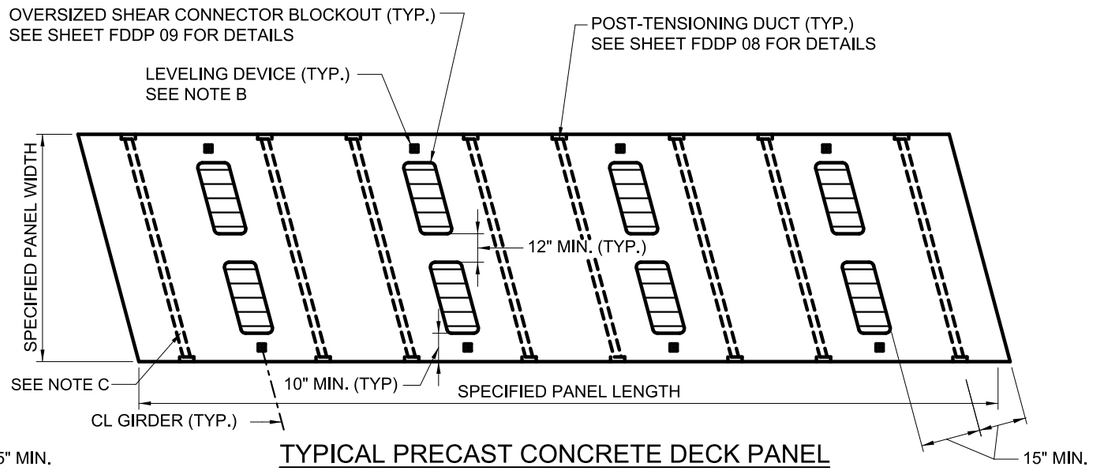
TYPICAL PRECAST CONCRETE DECK PANEL
SQUARE PANEL



TYPICAL PRECAST CONCRETE DECK PANEL
SQUARE PANEL



TYPICAL PRECAST CONCRETE DECK PANEL
SKEWED PANEL



TYPICAL PRECAST CONCRETE DECK PANEL
SKEWED PANEL

TYPICAL PANEL PLAN - STANDARD BLOCKOUTS

NOTE A: BLOCKOUTS FOR SHEAR CONNECTORS SHALL GENERALLY BE SPACED AT TWO FEET ON CENTER. FOR SPECIAL DESIGNS, THIS DIMENSION MAY BE CHANGED.

NOTE B: AT LEAST TWO LEVELING DEVICES OR OTHER GRADE ADJUSTING METHODS SHALL BE USED AT EACH GIRDER TO PRODUCE TRIBUTARY DEAD LOAD DISTRIBUTION SIMILAR TO CAST-IN-PLACE CONCRETE. SEE SHEET FDDP 10 FOR DETAILS.

NOTE C: POST-TENSIONING MAY BE PLACED IN LARGE OVERHANG REGIONS (IN EXCESS OF ±3.0 FEET). VERIFY THAT DUCT AND ANCHORAGES CAN FIT WITHIN THE OVERHANG ALONG WITH THE REQUIRED REINFORCING.

NOTE D: THE WIDTH OF THE STANDARD BLOCKOUTS SHOULD BE KEPT TO A MINIMUM TO FACILITATE THE LAYOUT OF PANEL REINFORCING STEEL.

TYPICAL PANEL PLAN - OVERSIZED BLOCKOUTS

NOTE E: MINOR CRACKING PROJECTING FROM THE CORNERS OF THE BLOCKOUTS MAY OCCUR. USE ROUND CORNERS TO MINIMIZE THE POTENTIAL.

NOTE F: OVERSIZED POCKETS MAY REQUIRE SPECIAL HANDLING RIGGING (I.E. 8 POINT PICK WITH SLINGS OR SPREADER BEAMS) IN ORDER TO CONTROL CRACKING DURING HANDLING.

NOTE G: PROJECTING REINFORCING BARS REQUIRED AT CLOSURE JOINTS AND AT DECK ENDS. NOT SHOWN FOR CLARITY.

NOTE H: INTERIOR PANELS SHOWN. END PANELS SIMILAR, WHICH WILL INCLUDE ANCHORAGE DEVICES AND PROJECTING REINFORCING BARS.

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TYPICAL PANEL PLANS - POST-TENSIONED CLOSURE JOINTS	

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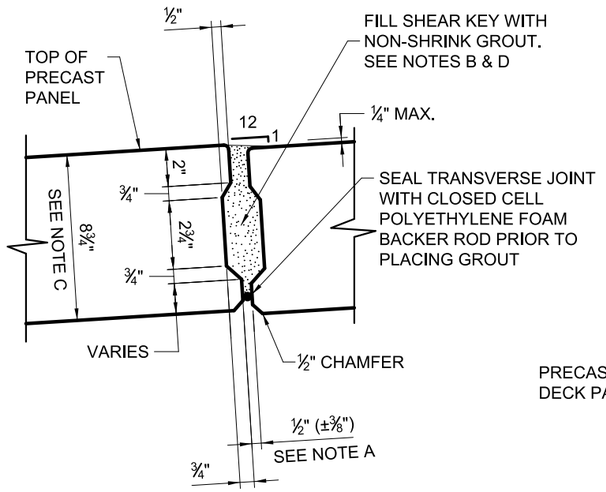


TYPICAL SECTION

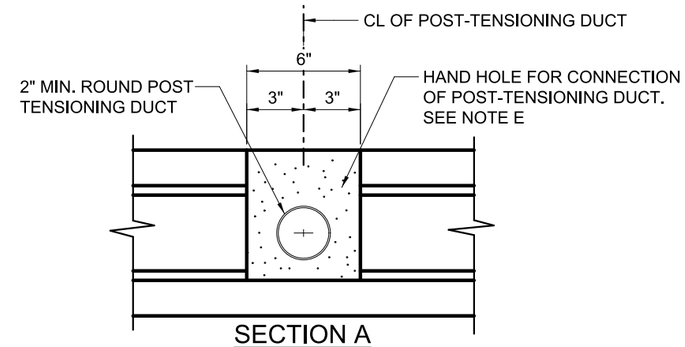
TRANSVERSE SHEAR KEY DETAILS

NOTE A: THE VARIATION INDICATED IS DUE TO FABRICATION AND ERECTION TOLERANCES. THE DESIGNER SHOULD ADD THE FOLLOWING NOTE TO THE PLANS: " THE PANEL SHALL BE PLACED AT THE NOMINAL SPACING SHOWN ON THE PLANS. THE WIDTH OF THIS GAP CAN VARY DUE TO FABRICATION AND ERECTION TOLERANCES OF THE PANELS." SEE SHEET FDDP 11 FOR DETAILS.

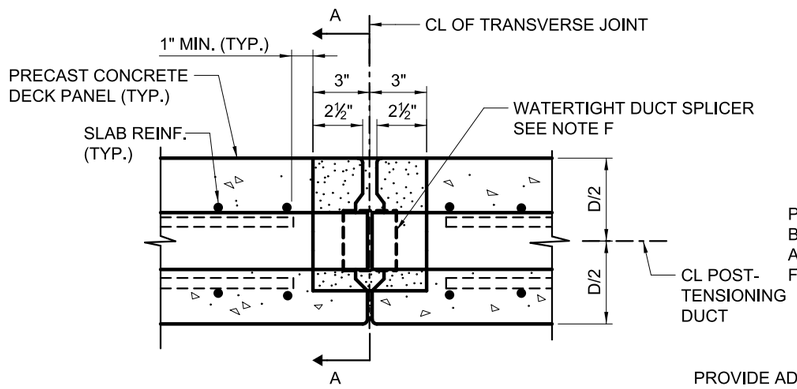
NOTE B: THE DESIGNER SHOULD ADD THE FOLLOWING NOTE TO THE PLANS: "GROUT FOR SHEAR KEYS SHALL BE RODDED OR VIBRATED TO ENSURE THAT ALL VOIDS IN THE SHEAR KEYS ARE FILLED."

NOTE C: THE MINIMUM RECOMMENDED POST-TENSIONED PANEL THICKNESS IS 8.75". DIFFERENT PANEL THICKNESSES ARE PERMITTED. THICKNESS SHOWN IS BASED ON PROVIDING TYPICAL CONCRETE COVER AROUND A TYPICAL 4 STRAND TENDON FLAT ANCHORAGE. COORDINATE VERTICAL LOCATION OF PT DUCTS WITH SLAB REINFORCING TO AVOID CONFLICTS. THICKER PANELS CAN BE USED TO ACCOMMODATE INCREASED REINFORCING COVER AROUND ANCHORAGES, LARGER ANCHORAGES, AND THE REQUIRED DESIGN STRENGTH (LARGE BEAM SPACING OR LARGE OVERHANGS).

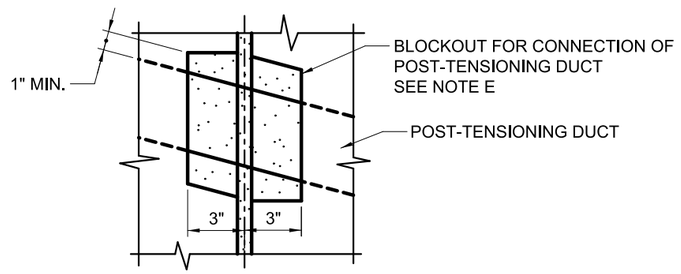
NOTE D: THE FACE OF THE SHEAR KEYS SHOULD BE FABRICATED WITH AN EXPOSED AGGREGATE FINISH. NO SPECIFIC AMPLITUDE OF SURFACE PROFILE IS REQUIRED.



SECTION A



TYPICAL SECTION - TRANSVERSE DECK JOINT AT POST-TENSIONING DUCT



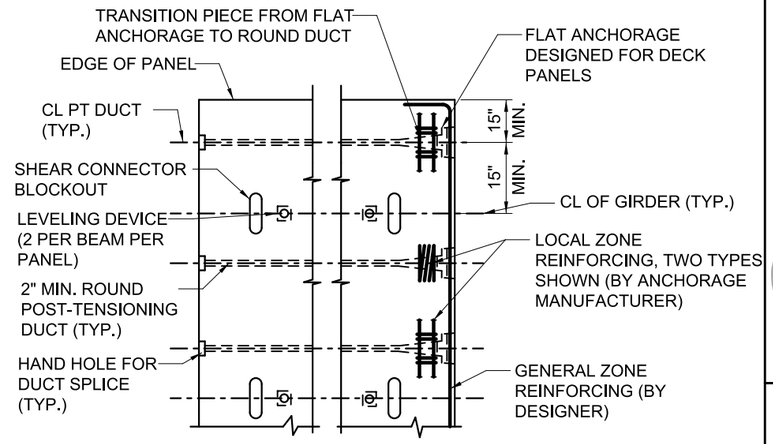
PLAN - BLOCKOUT FOR POST-TENSIONING DUCT

POST-TENSIONING DUCT CONNECTIONS

NOTE E: FILL HAND HOLE WITH NON-SHRINK GROUT SIMULTANEOUSLY WITH THE TRANSVERSE SHEAR KEYS.

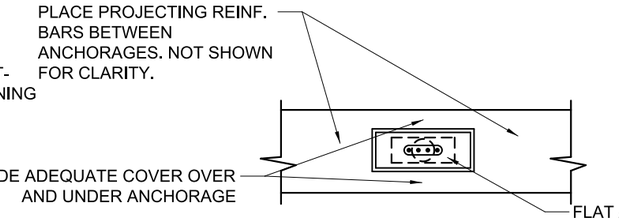
NOTE F: ADD THE FOLLOWING NOTE TO THE PLANS: "IT IS OF EXTREME IMPORTANCE TO MAKE THESE CONNECTIONS 100% WATERTIGHT IN ORDER TO PREVENT MORTAR ENTERING INTO POST-TENSIONING DUCTS WHEN IT IS PLACED IN THE TRANSVERSE JOINTS AS WELL AS TO PREVENT POST-TENSIONING GROUT FROM ESCAPING THE DUCTS DURING THEIR SUBSEQUENT DUCT GROUTING.

NOTE: FOR SHORT OVERHANGS, THE EXTERIOR DUCT MAY BE OMITTED.



PLAN - POST-TENSIONING ANCHORAGE DETAILS

NOTE: PLACE PROJECTING REINFORCING FROM PANEL INTO END OF DECK CLOSURE JOINT. NOT SHOWN FOR CLARITY.



END ELEVATION - POST-TENSIONING ANCHORAGE DETAILS

POST-TENSIONING ANCHORAGE DETAILS

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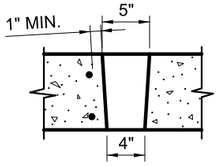
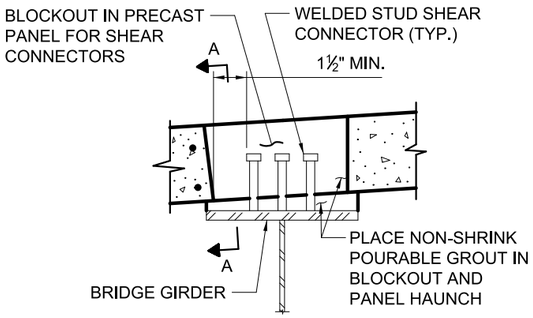
POST-TENSIONED CLOSURE JOINT DETAILS

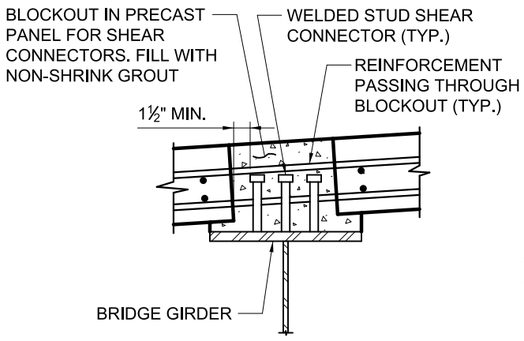


SECTION A-A

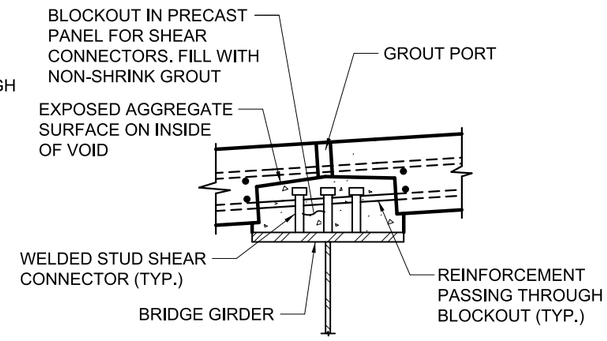
NOTE: FLANGE NOT SHOWN



TYPICAL SECTION
STANDARD BLOCKOUTS



TYPICAL SECTION
OVERSIZE BLOCKOUTS

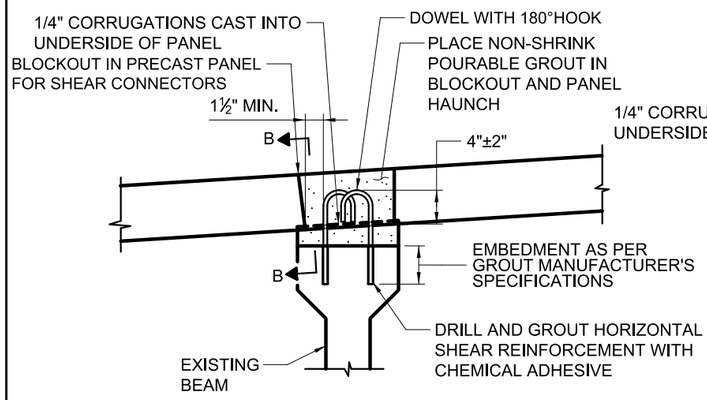


TYPICAL SECTION
OPTIONAL CONTINUOUS BLIND BLOCKOUT

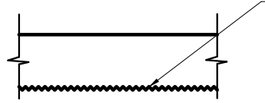
FULL THICKNESS BLOCKOUT NOTES:
1. STANDARD SHEAR CONNECTOR BLOCKOUTS ARE INTENDED TO ACCOMMODATE A SINGLE ROW OF SHEAR CONNECTORS. THE SHAPE MAY HAVE SQUARED OR ROUNDED CORNERS.
2. LARGER BLOCKOUTS SHOULD BE USED TO ACCOMMODATE MULTIPLE ROWS OF SHEAR CONNECTORS.

NOTES:
1. THE SHEAR CONNECTOR MUST BE INSTALLED PRIOR TO DECK PANEL ERECTION. THE LOCATION OF THE STUDS MUST BE CAREFULLY DETERMINED TO AVOID CONFLICTS BETWEEN THE STUDS AND THE DECK PANEL REINFORCING IN THE CONTINUOUS VOID.
2. THE SIZE AND SPACING OF FILL PORTS SHOULD BE DETERMINED BY THE CONTRACTOR BASED ON THE FLUIDITY OF THE GROUT USED.
3. TAPER TOP OF VOID TO A SLOPE OF 1:12 TO PREVENT FORMATION OF AIR POCKETS.
4. THIS DETAIL IS PREFERRED FOR BRIDGE DECKS WITHOUT OVERLAYS.

SHEAR CONNECTOR BLOCKOUT DETAILS



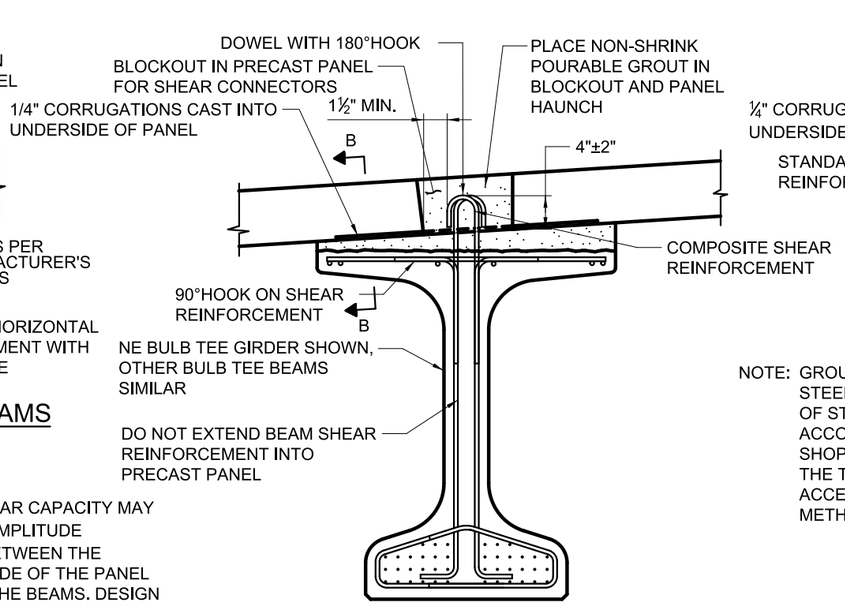
TYPICAL SECTION - EXISTING AASHTO BEAMS
DECK REPLACEMENT



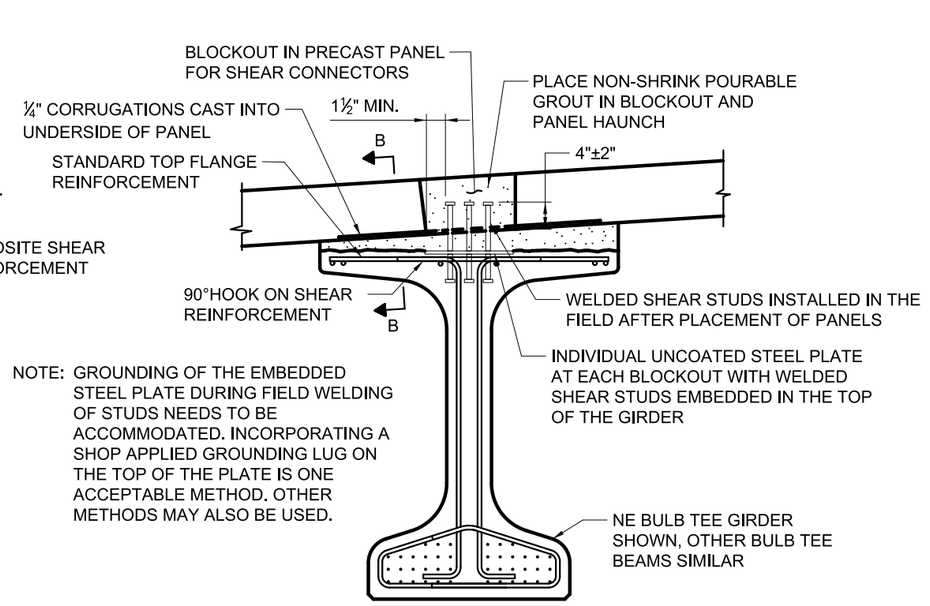
SECTION B-B

NOTE: FLANGE NOT SHOWN

ADDITIONAL HORIZONTAL SHEAR CAPACITY MAY BE OBTAINED BY ADDING ¼" AMPLITUDE CORRUGATED FORM LINER BETWEEN THE BLOCKOUTS ON THE UNDERSIDE OF THE PANEL ALONG THE CENTERLINE OF THE BEAMS. DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS



TYPICAL SECTION - BULB TEE BEAM
NEW CONSTRUCTION WITH PROJECTING REINFORCING CONNECTION



NOTE: GROUNDING OF THE EMBEDDED STEEL PLATE DURING FIELD WELDING OF STUDS NEEDS TO BE ACCOMMODATED. INCORPORATING A SHOP APPLIED GROUNDING LUG ON THE TOP OF THE PLATE IS ONE ACCEPTABLE METHOD. OTHER METHODS MAY ALSO BE USED.

TYPICAL SECTION - BULB TEE BEAM
NEW CONSTRUCTION WITH WELDED STUD SHEAR CONNECTION

PRESTRESSED CONCRETE BEAM ATTACHMENT OPTIONS

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SHEAR CONNECTOR BLOCKOUTS

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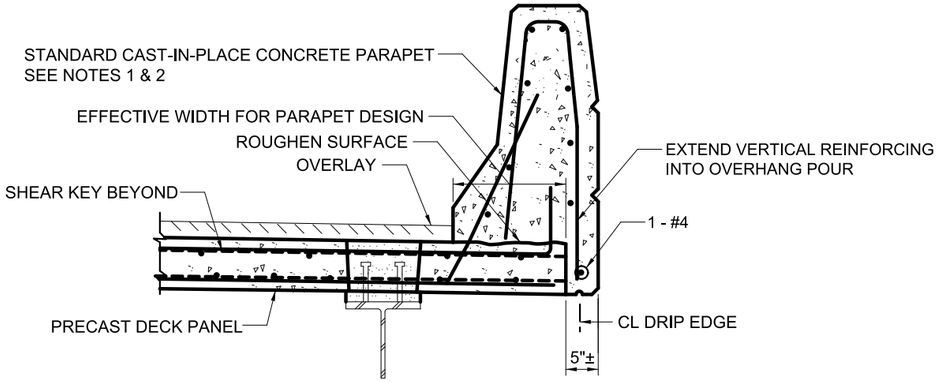
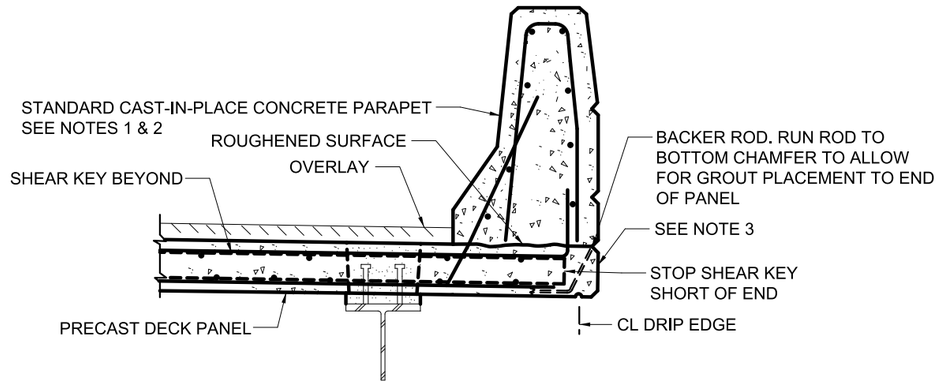


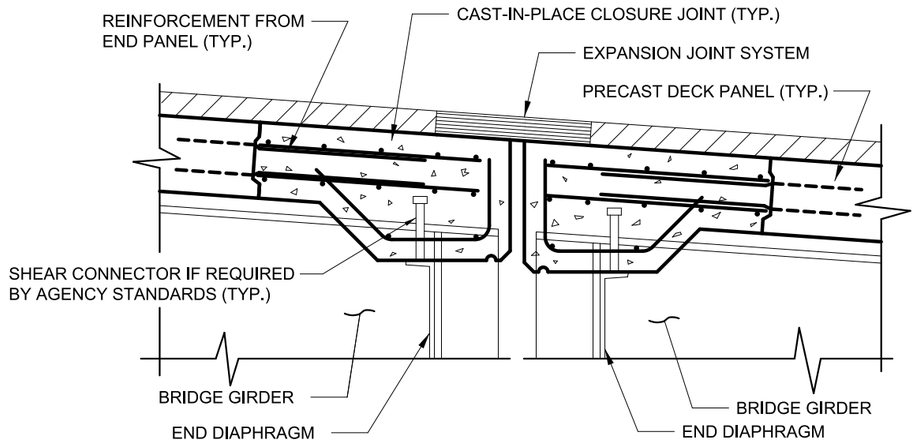
TYPICAL SECTION - PARAPET DETAILS WITH COVERED EDGE

NOTES:
1. CONCRETE PARAPET SHOWN, REINFORCED CURBS FOR RAILINGS SIMILAR.
2. CAST PARAPET OR CURB OVER AND BEYOND THE END OF THE PRECAST DECK PANEL IN ORDER TO PROVIDE A SMOOTH EDGE, AND TO PROTECT END CUT-OFF OF PRESTRESSING STRAND IF PANELS ARE PRETENSIONED.
3. REFER TO STATE STANDARD FOR ACTUAL PARAPET REINFORCING AND LAYOUT.



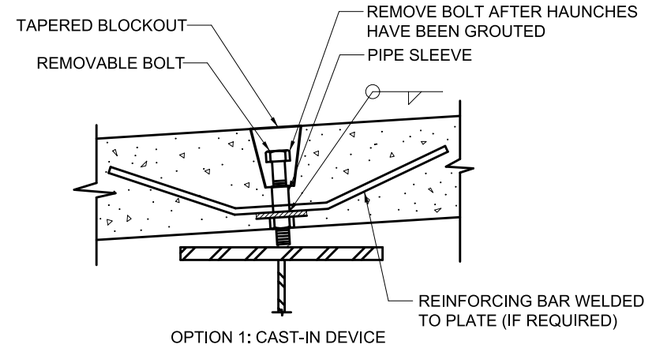
TYPICAL SECTION - PARAPET DETAILS WITH EXPOSED EDGE

NOTES:
1. CONCRETE PARAPET SHOWN, REINFORCED CURBS FOR RAILINGS SIMILAR
2. REFER TO STATE STANDARD FOR ACTUAL PARAPET OR CURB REINFORCING AND LAYOUT.
3. USE EDGE OF PANEL TOLERANCE LAYOUT FOR TRANSVERSE DIRECTION OF FASCIA PANELS TO PROVIDE A SMOOTH EXPOSED EDGE. SEE SHEET FDDP 11 FOR DETAILS.

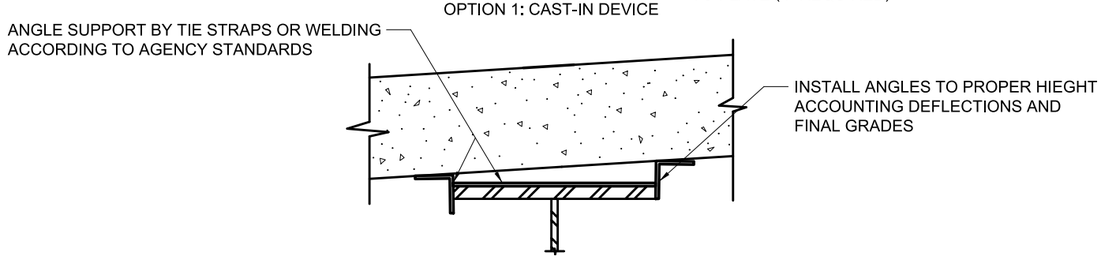


TYPICAL SECTION - CLOSURE JOINT AT DECK ENDS

NOTES:
1. CLOSURE JOINT SHOWN AT A PIER, CLOSURE JOINTS AT ABUTMENTS SIMILAR.
2. CLOSURE JOINT DETAILS MAY VARY BASED ON DESIGN OF BRIDGE JOINT.
3. REINFORCEMENT FOR CLOSURE JOINT SHALL BE DESIGNED BY THE ENGINEER.



OPTION 1: CAST-IN DEVICE



OPTION2: SIP FORM SUPPORT ANGLES

LEVELING DEVICE OPTIONS

NOTE: THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF THE LEVELING DEVICE. ALTERNATIVE DEVICES MAY BE SUBSTITUTED WITH APPROVAL FROM THE ENGINEER PROVIDED THAT THEY ARE ADJUSTABLE AND CAN PROVIDE EQUAL LOAD DISTRIBUTION TO THE BEAMS.

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MISCELLANEOUS DETAILS

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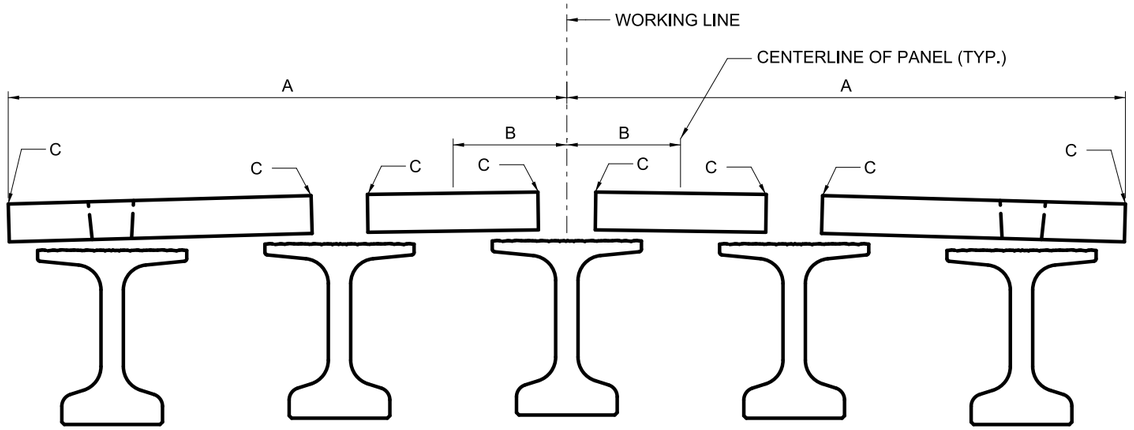
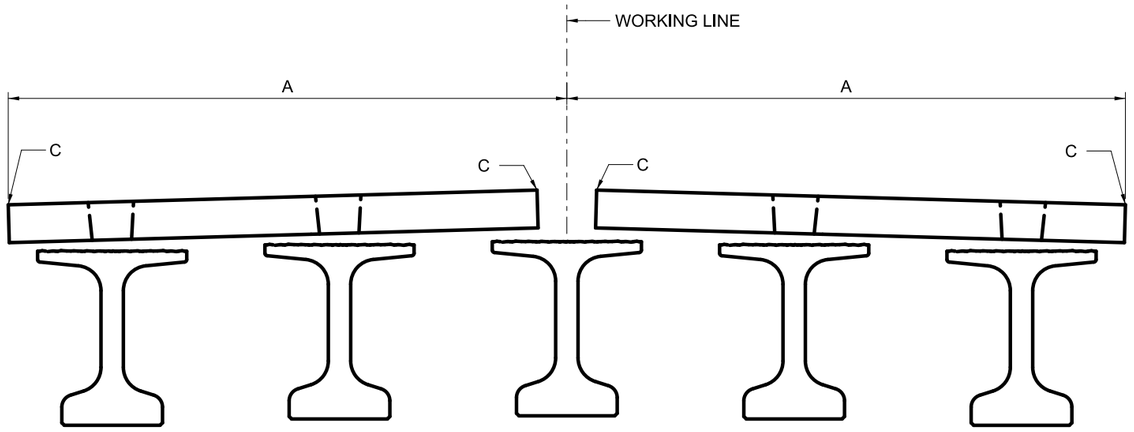
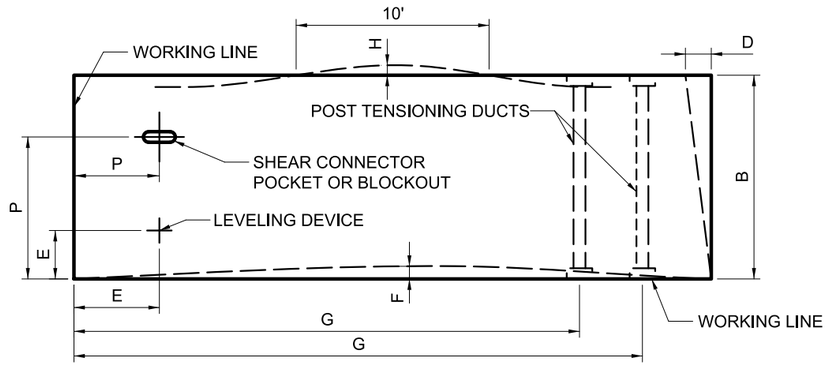


ERECTION TOLERANCES
LONGITUDINAL PANEL CROSS SECTION

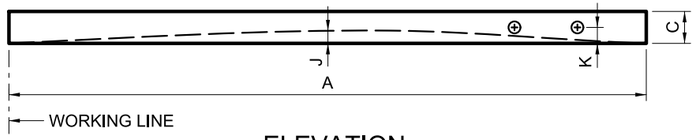


ERECTION TOLERANCES
TRANSVERSE PANEL CROSS SECTION

ERECTION TOLERANCES		
ITEM	DESCRIPTION	RECOMMENDED TOLERANCES
A	HORIZONTAL SETTING TOLERANCE MEASURED FROM A COMMON REFERENCE POINT TO EDGE OF PANEL	±¼"
B	HORIZONTAL SETTING TOLERANCE MEASURED FROM A COMMON REFERENCE POINT TO CENTERLINE OF PANEL	±¼"
C	ERECTION ELEVATION TOLERANCE	±¼"



PLAN



ELEVATION

NOTE: THE WORKING LINE USED FOR FABRICATION SHOULD MATCH THE PANEL LAYOUT DIMENSIONING LINES (EDGE OF PANEL OR CENTERLINE OF PANEL).

FABRICATION TOLERANCES		
ITEM	DESCRIPTION	RECOMMENDED TOLERANCES
A	LENGTH	±⅜"
B	WIDTH	±¼"
C	DEPTH	±¼"
D	VARIATION FROM SPECIFIED PLAN END SQUARENESS OR SKEW	±¼"
E	LOCATION OF LEVELING DEVICE	±1"
F	SWEEP	±¼"
G	DISTANCE FROM COMMON WORKING POINT TO CL OF ANY PT DUCT	±⅛"
H	LOCAL SMOOTHNESS OF ANY SURFACE	¼" IN 10 FEET
J	CAMBER VARIATION FROM DESIGN CAMBER SEE NOTE 2	±¼"
K	CL OF PT DUCT FROM EDGE OF SLAB	±⅛"
P	LOCATION OF SHEAR CONNECTOR POCKET OR BLOCKOUT	±½"

NOTES:
1. OWNERS MAY ALLOW CONTRACTORS TO DEVIATE FROM THE RECOMMENDED TOLERANCES PROVIDED THAT THE CONTRACTOR CAN PROPERLY INSTALL THE PANELS WITHIN THE OVERALL BRIDGE LIMITS.
2. CAMBER TOLERANCE ONLY APPLIES TO PANELS WITH ECCENTRIC PRESTRESSING.

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RECOMMENDED FABRICATION AND ERECTION TOLERANCES

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PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST

PRECAST FULL-DEPTH DECK PANEL GUIDE DETAILS

REVISIONS

NO.	DATE	DESCRIPTION