

APPENDIX F

DRAWINGS OF FULL-DEPTH DECK PANELS FROM UTAH DOT

Note: These are direct extract from <<http://www.udot.utah.gov/main/uconowner.gf?n=5440222707642218>>
(Last accessed June 25, 2012)

FULL DEPTH PRECAST CONCRETE DECK PANELS GENERAL NOTES

GUIDELINES

USE THESE GUIDELINE DRAWINGS FOR BRIDGES WHICH HAVE ALL OF THE FOLLOWING CHARACTERISTICS:

TANGENTIAL (NO HORIZONTAL CURVATURE) PANELS PLACED ORTHOGONALLY TO THE BEAM/GIRDERS.

SKREW : 0 TO 45 DEGREES

PARALLEL STEEL GIRDERS WITH A MINIMUM TOP FLANGE WIDTH OF 16"; AASHTO GIRDERS (TYPE II, III, IV, V AND VI); OR PRESTRESSED BULB TEE GIRDER.

FOR PRECAST PANELS:
MAX. BEAM/GIRDER SPACING = 10'-0"

FOR PRESTRESSED PANELS:
MAX. BEAM/GIRDER SPACING = 12'-0"

MAX. OVERHANG = 4'-0"

MIN. OVERHANG = 1'-0"

DEAD LOADS:

40 PSF FUTURE OVERLAY

NO MORE THAN 2 EXTERIOR TRAFFIC PARAPETS PER PANEL

MAX. DEAD LOAD PER PARAPET = 569 PLF

PANEL-TO-PANEL CONNECTIONS:

ALL PANELS TO BE CONNECTED WITH LONGITUDINAL POST-TENSIONING COMBINED WITH A TRANSVERSE GROUTED KEYWAY JOINT.

DEFINITIONS

PRECAST PANEL: CONCRETE PANEL REINFORCED WITH DEFORMED STEEL BARS.

PRESTRESSED PANEL: CONCRETE PANEL REINFORCED WITH PRESTRESSING STEEL AND DEFORMED STEEL BARS.

OPTIONAL DETAILS

THESE DRAWINGS ARE BASED ON THE USE OF BLIND BLOCKOUTS FOR SHEAR CONNECTIONS FORMED WITH REMAIN IN PLACE STEEL BOXES.

OPTIONAL BLOCKOUT DETAILS SHOWN ON DRAWING NUMBER PDP-9 ARE ALSO ACCEPTABLE.

IMPLEMENTATION

IT IS THE DESIGNER'S RESPONSIBILITY TO:

DESIGN AND CHECK THE REQUIRED SHEAR STUDS AND/OR REINFORCING STEEL CONNECTING THE GIRDERS/BEAMS TO THE DECK TO ENSURE ADEQUATE COMPOSITE ACTION BETWEEN THE FRAMING MEMBERS AND PANELS IN ACCORDANCE WITH ALL APPLICABLE CODES.

CREATE THE CONCRETE DECK PANEL LAYOUT SHEET SHOWING TYPE AND NUMBER OF PANELS TO BE USED AS WELL AS NUMBER AND SPACING OF SHEAR BLOCKOUTS REQUIRED.

CALCULATE FINAL DECK ELEVATIONS AND CREATE TOP OF PANEL ELEVATIONS SHEET(S).

DESIGN AND CHECK ALL CHARACTERISTICS RELATED TO REQUIRED CLOSURE POURS.

CHECK THE STRUCTURAL CAPACITY OF THE EXISTING GIRDERS/BEAMS AND/OR NEW GIRDERS/BEAMS FOR THE INSTALLATION OF THE PANELS (INCLUDING EFFECTS OF PANEL INSTALLATION SEQUENCING). USE OF THESE GUIDELINE DRAWINGS IMPLIES NO ASSERTION AS TO THE STRUCTURAL CAPACITY OF ANY GIRDERS OR BEAMS SHOWN. DEVELOP LOAD RATINGS AS DIRECTED BY UDOT. VERIFY ADEQUATE CAPACITY IN GIRDERS FOR THE EFFECTS OF LONG TERM POST-TENSIONING WHEN APPLICABLE.

DESIGN ALL POST-TENSIONING. SHOW SIZE AND LAYOUT OF DUCTS. SPECIFY JACKING FORCES, SEQUENCE OF JACKING, DUCT WOBBLE COEFFICIENTS, AND DUCT COEFFICIENT OF FRICTION.

PROVIDE POSITIVE DRAINAGE DETAILS PER UDOT STANDARD PRACTICE. DRAINAGE HOLES THROUGH THE PANELS ARE PROHIBITED.

DESIGN AND ACCOMMODATE APPLICABLE REINFORCEMENT FOR A HAUNCH GREATER THAN 3".

INCLUDE APPLICABLE GENERAL NOTES IN THE PLAN SET.

VERIFY SIZE AND SPACING OF REINFORCEMENT CONNECTING PARAPET TO PANEL IF PARAPET OTHER THAN TYPE SPECIFICALLY SHOWN IN THESE STANDARD DRAWINGS IS USED.

AT A MINIMUM EXTEND CONTINUOUS REINFORCEMENT FROM PRECAST PANEL, #6 AT 6" SPACING TOP AND BOTTOM, INTO CLOSURE POUR. CLOSURE POUR DETAILS SHOWN FOR MAXIMUM BEAM SPACING OF 10'-0". FOR BEAM SPACINGS GREATER THAN 10'-0", DESIGN AND DETAIL CLOSURE POUR AND APPROPRIATE POST-TENSIONING AS REQUIRED.

INCLUDE A TABLE OF ESTIMATED QUANTITIES OF PRECAST CONCRETE DECK PANELS. TABLE TO INCLUDE THE FOLLOWING:
- PANEL TYPE (BASED ON PANEL LAYOUT)
- NUMBER OF EACH PANEL TYPE REQUIRED
- SQUARE FOOTAGE OF AREA PER PANEL
- TOTAL SQUARE FOOTAGE OF DECK PANELS

GENERAL NOTES

PRECAST CONCRETE PANELS DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 4TH EDITION WITH ALL INTERIM PROVISIONS.

PANELS DESIGNED FOR AN HL-93 LOAD INCLUDING A 40 PSF LOAD FOR FUTURE OVERLAY.

PRECAST PANEL CONCRETE: $f'c = 4,000$ PSI CLASS AA(AE)

PRESTRESSED PANEL CONCRETE: $f'ci = 4,000$ PSI $f'c = 5,000$ PSI

CLOSURE POUR CONCRETE: $f'c =$ MATCH PRECAST ELEMENTS

NON-SHRINK GROUT: $f'c = 5,000$ PSI @ 24 HRS

REINFORCING STEEL (COATED) $fy = 60,000$ PSI

PRESTRESSED LOW RELAXATION STRAND: $fpb + = 202.5$ KSI $fpu = 270.0$ KSI

STRUCTURAL STEEL: $fy = 50,000$ PSI AASHTO M270 GR 50

USE UTAH DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (THE LATEST EDITION AND SUPPLEMENTS THERETO WHICH ARE IN EFFECT AT THE DATE OF REQUEST FOR BIDS) ALONG WITH SPECIAL PROVISIONS SECTION 03339S-FULL DEPTH STANDARD PRECAST CONCRETE DECK PANELS FOR MATERIALS, CONSTRUCTION AND WORKMANSHIP.

WELD ACCORDING TO AASHTO/AWS D1.5 BRIDGE WELDING CODE.

USE THE PCI DESIGN HANDBOOK, PRECAST AND PRESTRESSED CONCRETE, FIFTH EDITION WITH ALL INTERIMS AND ERRATA FOR THE DESIGN AND DETAIL OF LIFTING SUPPORTS AND HANDLING CONSIDERATIONS (NO CRACKING CRITERIA).

USE A HEAVY BROOM FINISH FOR TOP SURFACE OF PANELS AND ALL JOINT SURFACES.

CHAMFER ALL EXPOSED CORNERS $3/4"$. PRECAST PANELS ADJACENT TO CLOSURE POURS OR OTHER PANELS ARE NOT CONSIDERED EXPOSED CORNERS.

THE PRECAST PANELS HAVE A $1/4"$ CONCRETE GRINDING ALLOWANCE FOR CORRECTING UNEVEN ROADWAY SURFACES AT TRANSVERSE JOINTS BETWEEN PRECAST CONCRETE DECK PANELS AND END OF BRIDGE DECK OR EDGE OF ADJACENT PHASE(S). DECK THICKNESS SHOWN AS NOMINAL OR FINAL THICKNESS AFTER GRINDING. ACCOUNT FOR $1/4"$ GRINDING ALLOWANCE.

APPLY CONCRETE POLYMER OVERLAY ON BRIDGE DECK AFTER CONCRETE GRINDING OR STEEL SHOT IS COMPLETE. SEE SECTION 03372 IN THE STANDARD SPECIFICATIONS FOR SURFACE PREPARATION REQUIREMENTS.

SEE "GENERAL LAYOUTS" AND "TYPICAL DECK PANEL PLANS AND SECTIONS" SHEETS FOR PANEL TYPES AND LOCATIONS.

SEE TOP OF PANEL ELEVATION SHEETS AND/OR CONCRETE UNIT SHEETS FOR SIZE, TYPE, ORIENTATION, NUMBER AND SPACING OF SHEAR STUDS/BLOCKOUTS.

COAT ALL MILD REINFORCEMENT PER UDOT SPECIFICATIONS UNLESS OTHERWISE NOTED.

USE A CORROSION INHIBITOR ADMIXTURE FOR ALL STRUCTURAL GROUT.

USE A CORROSION INHIBITOR ADMIXTURE FOR ALL PANEL AND CLOSURE POUR CONCRETE.

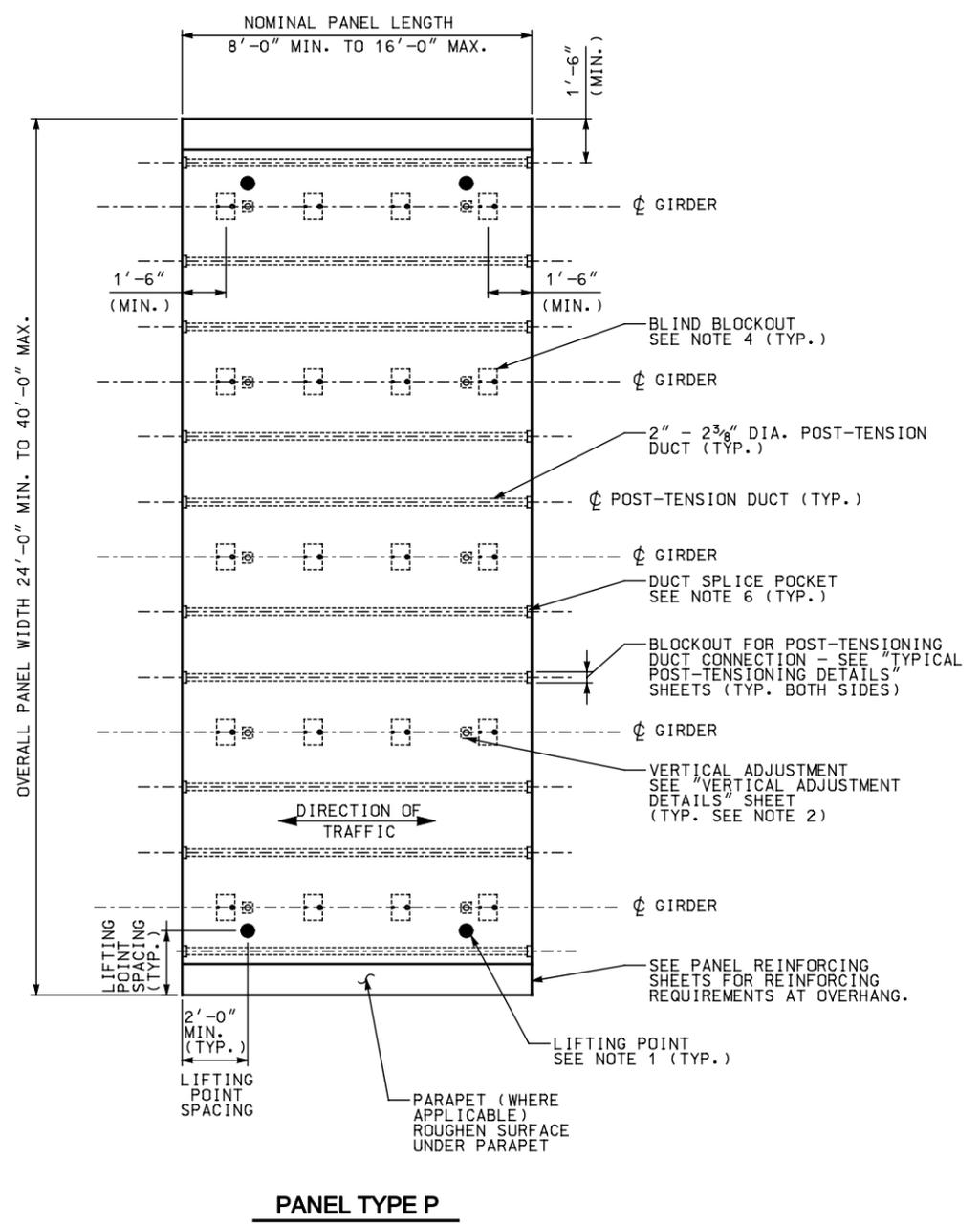
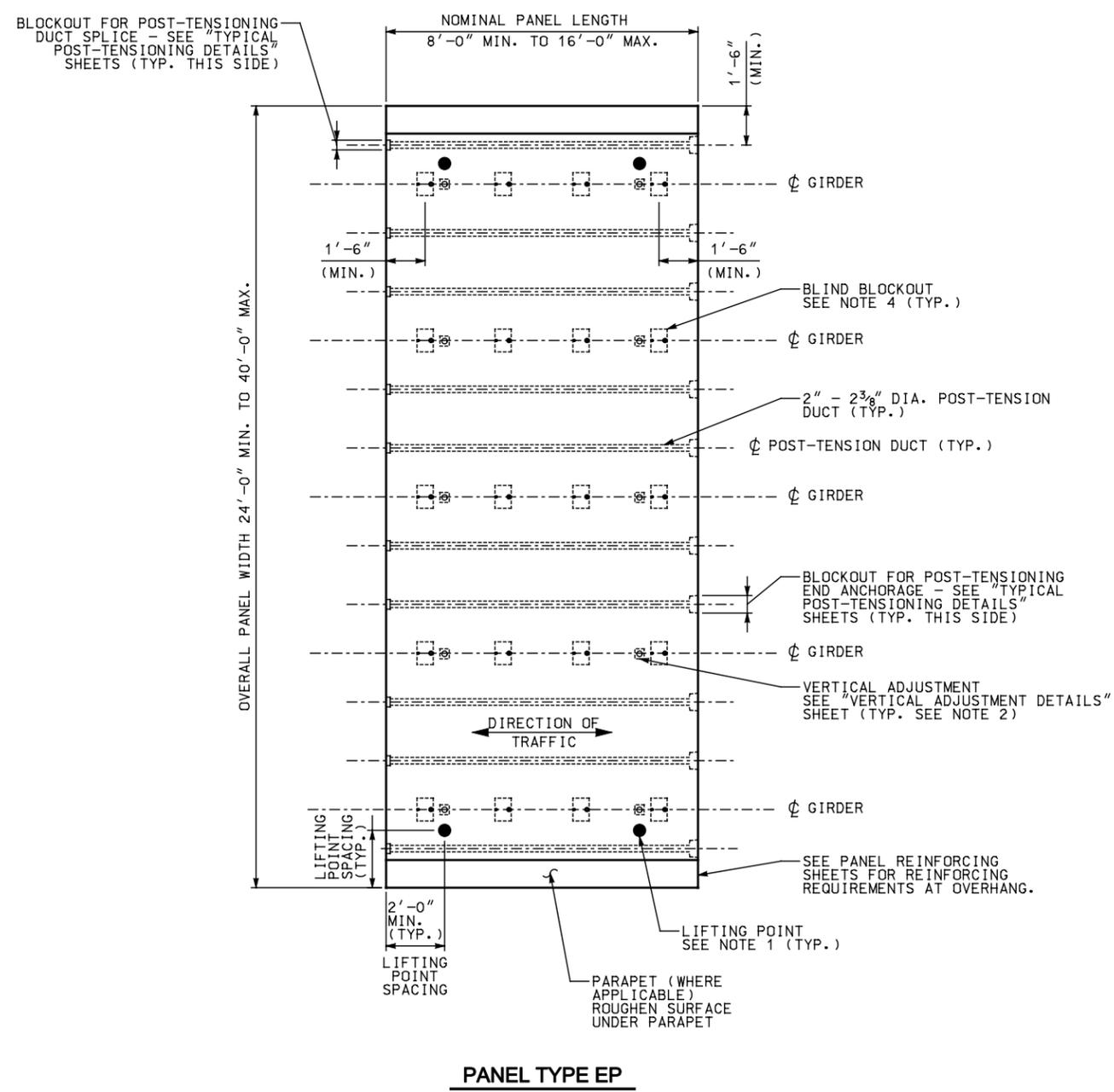
INDEX OF SHEETS

PDP-1	GENERAL NOTES
PDP-2	GENERAL LAYOUTS
PDP-3	TYPICAL DECK PANEL PLANS AND SECTIONS
PDP-4	PANEL PLANS - NON-SKEWED
PDP-5	PANEL PLANS - SKEWED
PDP-6	PRECAST PANEL REINFORCING
PDP-7	PRESTRESSED PANEL REINFORCING
PDP-8	CLOSURE POUR DETAILS
PDP-9	SHEAR CONNECTOR BLOCKOUT DETAILS
PDP-10	SHEAR CONNECTOR DETAILS NEW GIRDERS
PDP-11	SHEAR CONNECTOR DETAILS EXISTING GIRDERS
PDP-12	VERTICAL ADJUSTMENT DETAILS
PDP-13	TYPICAL POST-TENSIONING DETAILS 1
PDP-14	TYPICAL POST-TENSIONING DETAILS 2
PDP-15	PARAPET DETAILS 1
PDP-16	PARAPET DETAILS 2
PDP-17	DECK PANEL TOLERANCES

UTAH DEPARTMENT OF TRANSPORTATION	NO.	DATE	BY	REVISION REMARKS
	APPROVAL RECOMM.	DATE	DATE	DESIGN
	APPROVED BY UDOT	DATE	DATE	DRAWN
	BY UDOT	DATE	DATE	QUANT.
TYPICAL DETAIL SHEET	GENERAL NOTES			
FULL DEPTH PRECAST CONCRETE DECK PANELS	STRUCTURES DIVISION			
GENERAL NOTES	PROJECT NUMBER			
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SHT.	OF			

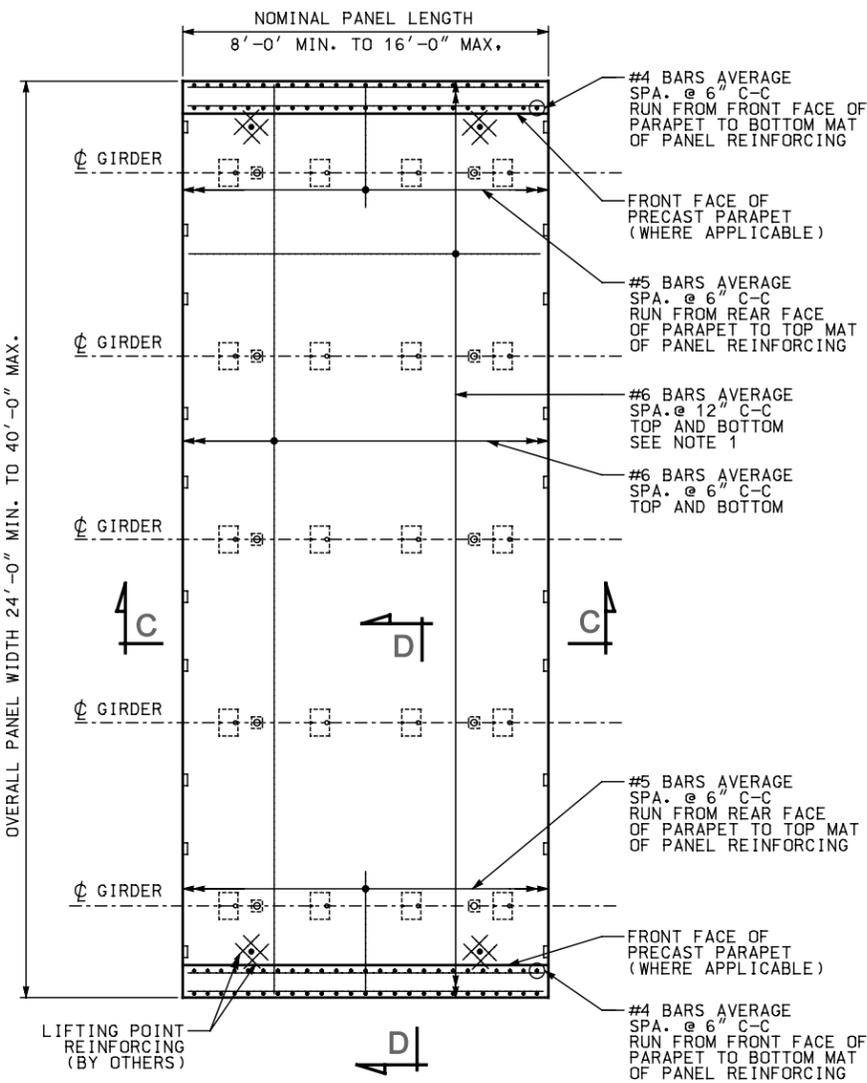
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PDP-04.TYPICAL_PANEL_PLANS.dwg
7/19/2010

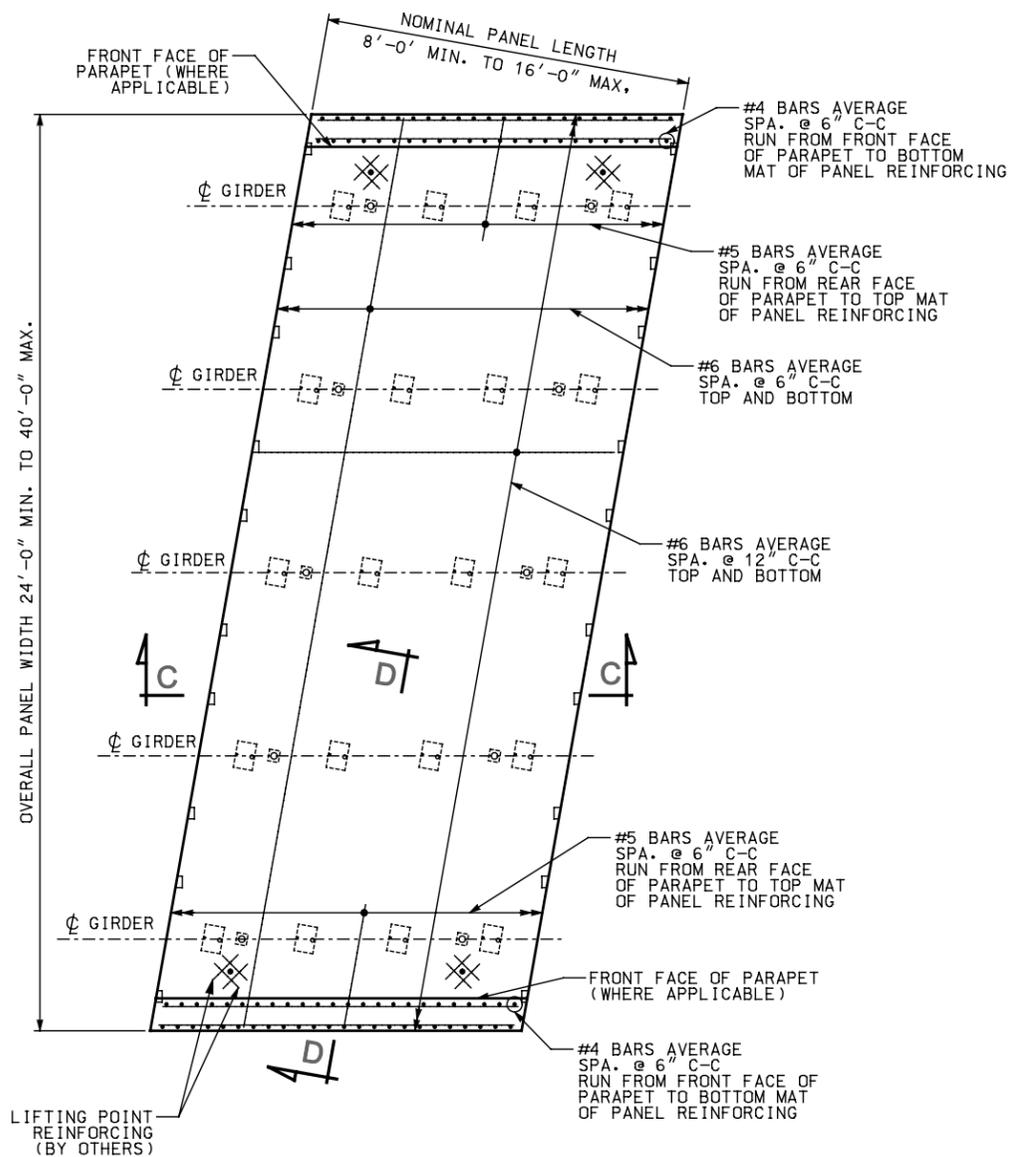


- NOTES**
1. DESIGNER WILL DETERMINE NUMBER AND LOCATION OF LIFTING POINTS.
 2. A MINIMUM OF 2 VERTICAL ADJUSTMENT ASSEMBLIES ARE REQUIRED AT EACH Ø GIRDER.
 3. FOR VERTICAL ADJUSTMENT DEVICES SEE "VERTICAL ADJUSTMENT DETAILS" SHEET.
 4. FOR DETAILS OF BLIND BLOCKOUT SEE "SHEAR CONNECTOR BLOCKOUT DETAILS" SHEET.
 5. SEE "PRECAST PANEL REINFORCING" AND "PRESTRESSED PANEL REINFORCING" SHEETS FOR REQUIRED REINFORCING.
 6. SEE "TYPICAL POST-TENSIONING DETAILS 2" SHEET FOR CONNECTION DETAILS.

UTAH DEPARTMENT OF TRANSPORTATION		STRUCTURES DIVISION	
TYPICAL DETAIL SHEET			
FULL DEPTH PRECAST CONCRETE DECK PANELS			
PANEL PLANS - NON-SKEWED			
PROJECT NUMBER		PIN	
COUNTY			
PDP - 4			
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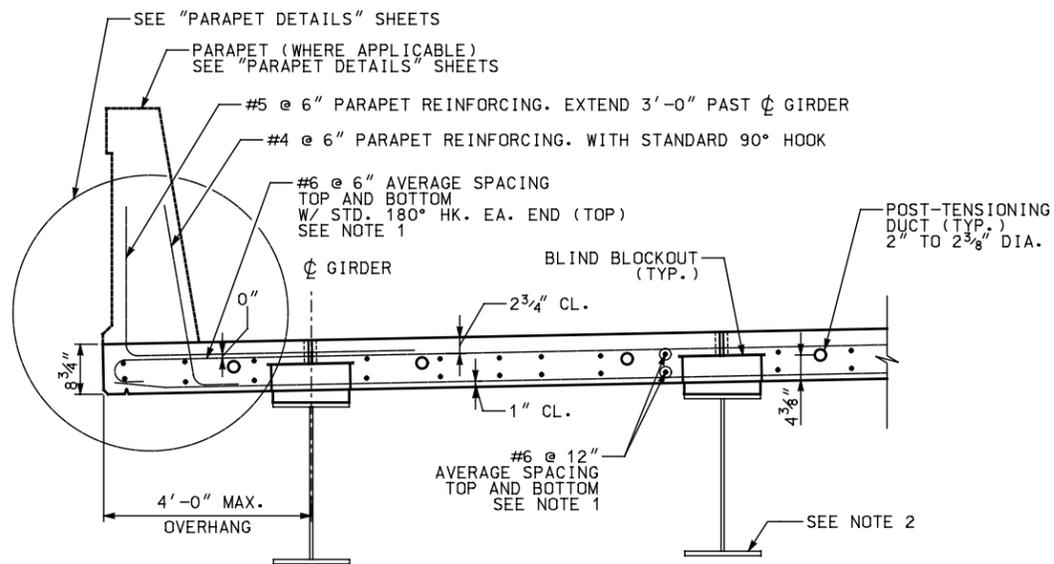
INTERIOR PANEL REINFORCING PLAN



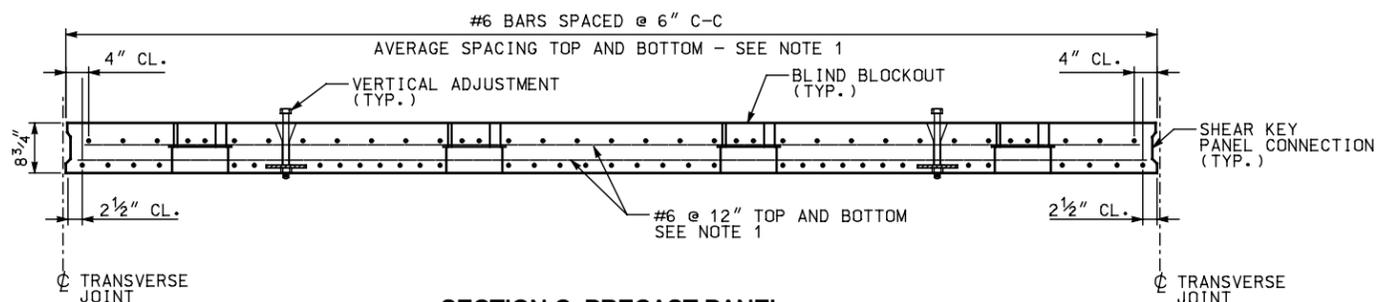
SKewed INTERIOR MILD REINFORCED PANEL

NOTES

1. ADJUST LOCATION OF BARS TO AVOID CONFLICTS WITH BLOCKOUTS AS APPROVED BY DESIGNER. ROTATE #6 HOOKS TOP BARS TO PROVIDE ADEQUATE COVER.
2. STEEL GIRDER SHOWN, PRESTRESSED BULB TEE GIRDERS ALLOWED.
3. HOOK TOP BARS STD 180° EACH END.
4. CROWNED ROADWAYS REQUIRE A CLOSURE POUR AT THE CROWN. THIS WILL REQUIRE MULTIPLE PANELS IN A CROSS SECTION. SEE CROWN CLOSURE POUR DETAILS.



SECTION D: PRECAST PANEL



SECTION C: PRECAST PANEL

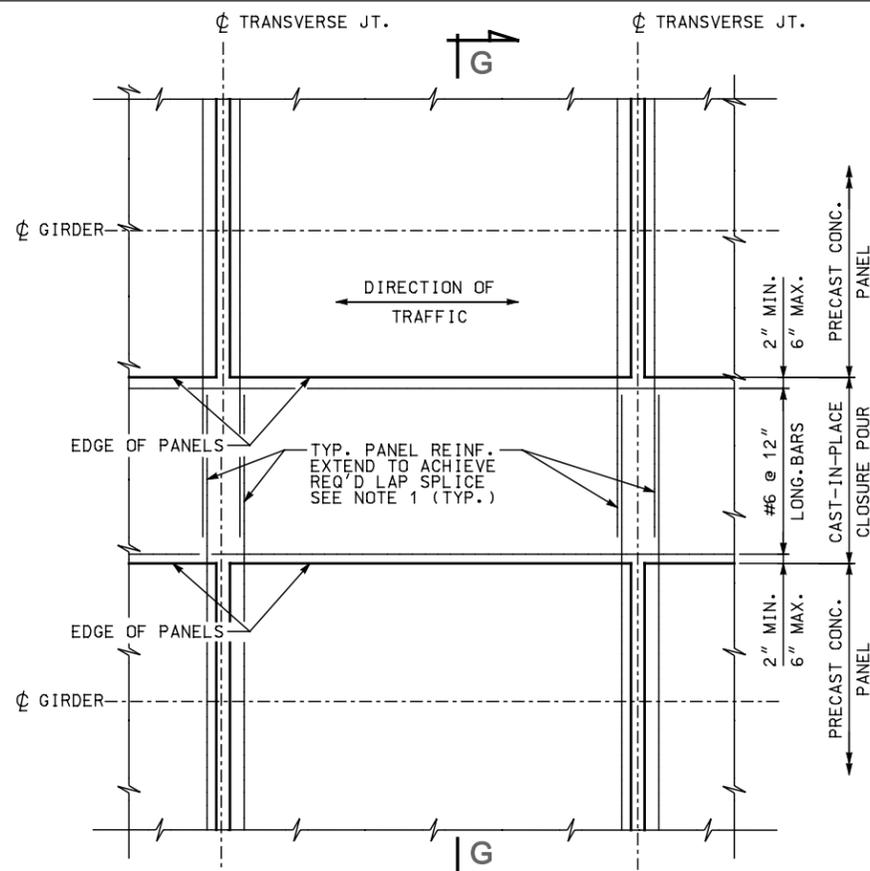
UTAH DEPARTMENT OF TRANSPORTATION
STRUCTURES DIVISION

TYPICAL DETAIL SHEET
FULL DEPTH PRECAST CONCRETE DECK PANELS
PRECAST PANEL REINFORCING

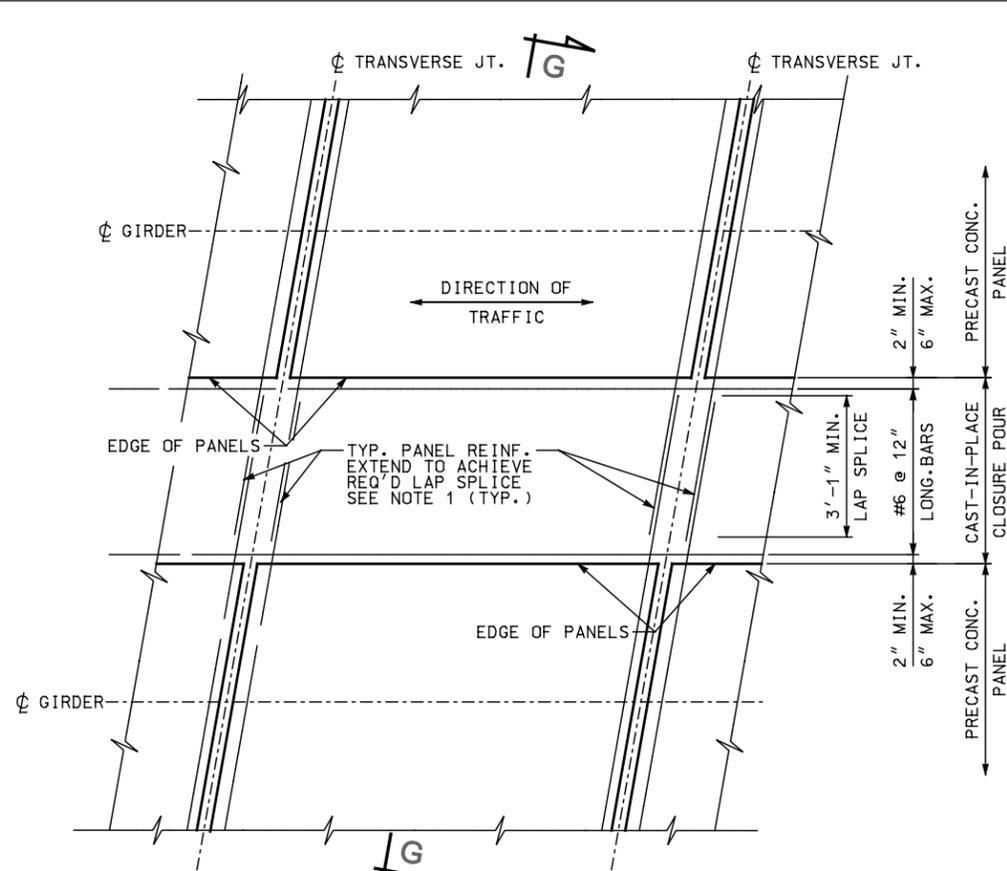
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SHT. OF

7/19/2010 PDP-06 PRECAST PANEL REINFORCING

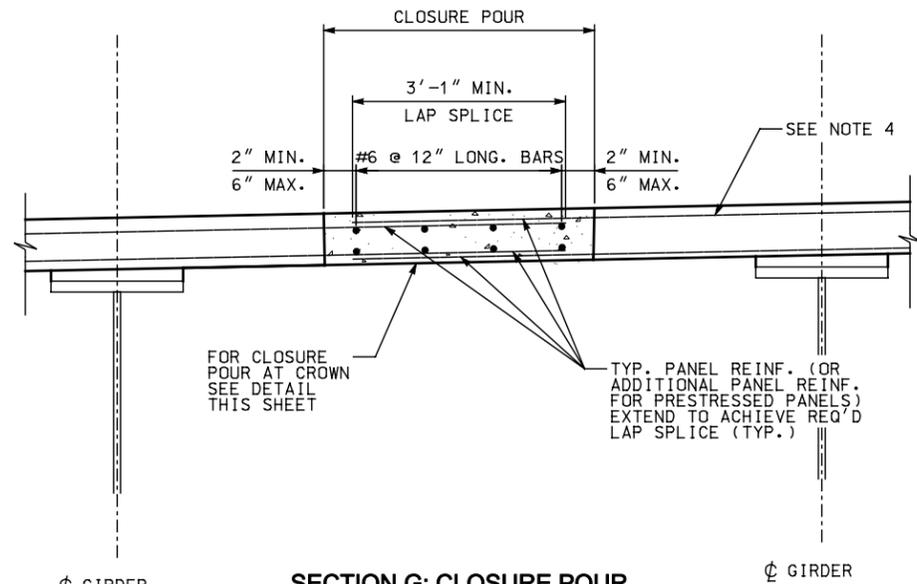


CLOSURE POUR PLAN



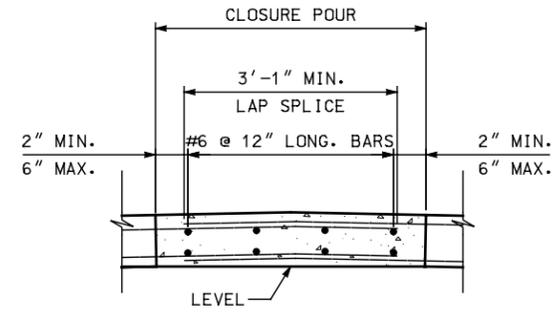
CLOSURE POUR PLAN

- NOTES**
1. MINIMUM REINFORCEMENT SHOWN. IT IS THE RESPONSIBILITY OF THE DESIGNER TO DETERMINE THE ACTUAL REINFORCEMENT REQUIRED. DESIGN AND DETAIL CLOSURE POUR FOR BEAM SPACINGS GREATER THAN 10'-0", AND APPROPRIATE POST-TENSIONING AS REQUIRED.
 2. PRECAST PANELS SHOWN, FOR PRESTRESSED PANELS, ADD DOWEL BARS EMBEDDED IN THE PANELS EXTENDING INTO THE CLOSURE POUR. THE LENGTH OF EMBEDMENT AND EXTENSION INTO THE CLOSURE POUR TO BE BASED ON THE LENGTH REQUIRED TO ACHIEVE A LAP SPLICE.
 3. AS AN ALTERNATIVE TO EMBEDDING BARS IN PRESTRESSED PANELS, THREADED INSERTS MAY BE ALLOWED AS DIRECTED BY THE DESIGNER. IN PRECAST PANELS WITHOUT PRESTRESSING, PANEL REINFORCEMENT, TOP AND BOTTOM, WILL BE CONTINUED INTO THE CLOSURE POUR.
 4. DESIGNER TO CHECK OVERHANG REINFORCING FOR ANTICIPATED LOADS.
 5. CLOSURE POURS CAN BE USED FOR:
 - ROADWAY CROWNS
 - STAGE CONSTRUCTION JOINTS
 - BRIDGES GREATER THAN 40 FT WIDE
 - BRIDGE WIDENING PROJECTS
 6. THE MINIMUM LAP SPLICE LENGTH SHOWN IS BASED ON THE FOLLOWING PARAMETERS:
 - #6 @ 6"
 - $f_c = 4$ KSI
 - 2" CLEAR COVER
 - TENSION LAP WITH 100% OF BAR SPLICED
 - CLASS C SPLICE
 - AASHTO LRFD SPECIFICATIONS
 - COATED BARS
 FOR BOTTOM BARS WITH 1" CLEAR COVER, INCREASE THIS SPLICE LENGTH TO 3'-10". DESIGNER TO ADJUST LENGTH OF SPLICE FOR DESIGNS BEYOND THESE PARAMETERS.
 7. FOR STAGE CONSTRUCTION CLOSURE POURS, PLACE CONCRETE AFTER LONGITUDINAL POST-TENSIONING.
 8. FOR NON-STAGE CONSTRUCTION LONGITUDINAL CLOSURE POURS, CONCRETE MAY BE PLACED AFTER POST-TENSIONING.

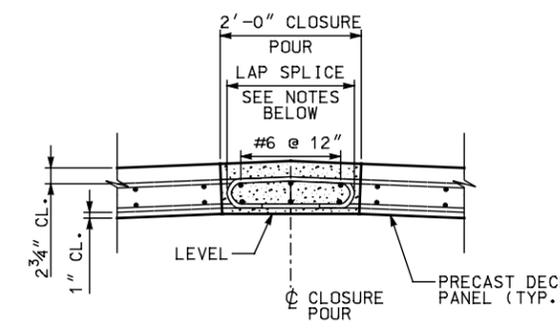


SECTION G: CLOSURE POUR SUPERELEVATED SECTION

(SHOWING STEEL GIRDERS)



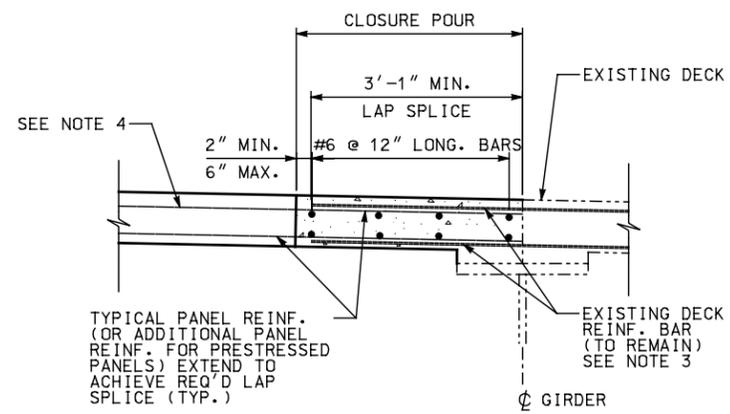
SECTION G: CLOSURE POUR SECTION AT CROWN



SECTION G: OPTIONAL CLOSURE POUR

SHOWING SECTION AT CROWN - SECTION AT OTHER LOCATIONS SIMILAR

- NOTES:**
1. HOOKED BARS ARE REQUIRED IN TENSILE ZONES (TOP NEAR GIRDERS, BOTTOM NEAR MID-BAY).
 2. HOOKED BARS ARE NOT REQUIRED IN COMPRESSION ZONES (BOTTOM NEAR GIRDERS, TOP NEAR MID-BAY).
 3. ROTATE HOOKS TO PROVIDE REQUIRED COVER.
 4. LAP SPLICE IN COMPRESSION ZONES TO BE 22 1/2 IN.



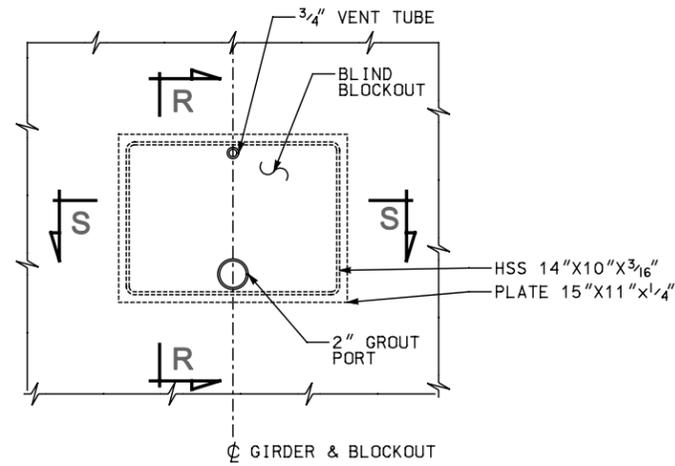
CLOSURE POUR TO EXISTING DECK SECTION

(SHOWING STEEL GIRDERS)

PROTECT EXISTING REINFORCING BARS WHEN REMOVING THE PORTION OF EXISTING DECK. BEFORE MAKING THE CLOSURE POUR, ALL EXISTING REINFORCING IS TO BE CLEANED OF RUST AND FOREIGN MATERIAL. RECOAT BAR IF ORIGINAL WAS EPOXY COATED AND DAMAGED. REPAIR OR REPLACE ANY EXISTING REBAR DAMAGED DURING THE REMOVAL OF CONCRETE.

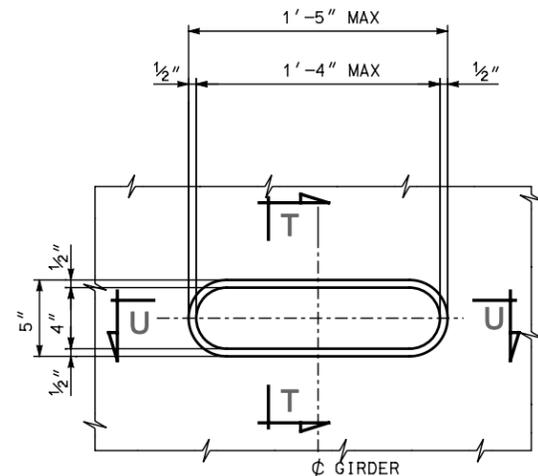
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FULL DEPTH PRECAST CONCRETE DECK PANELS		APPROVED BY	DATE	DRAWN	CHECK
CLOSURE POUR DETAILS		PROJECT NUMBER	BY	QUANT.	CHECK
COUNTY		SHT. OF			
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DRG. NO.					

7/19/2010 PDP-08.CLOSURE POUR.dgn

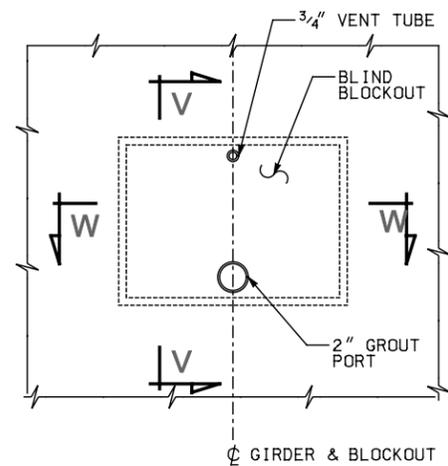


TYPICAL BLIND BLOCKOUT PLAN

- NOTES: 1. REINFORCEMENT NOT SHOWN FOR CLARITY.
 2. GALVANIZE STEEL FOR BLOCKOUTS
 3. USE PLASTIC PIPE FOR PORTS AND VENT TUBES.

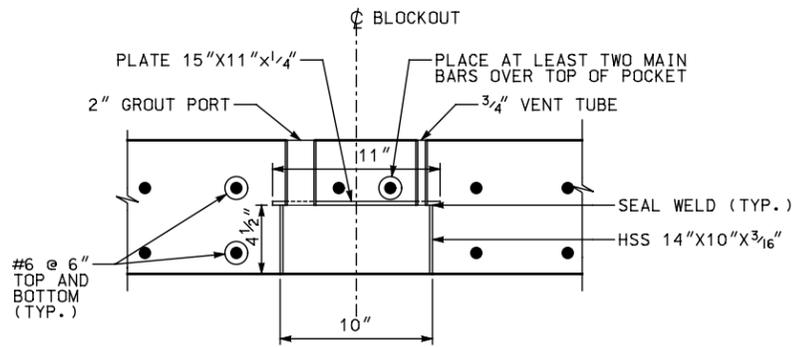


OPTIONAL SHEAR STUD BLOCKOUT PLAN WITH SHEAR STUDS

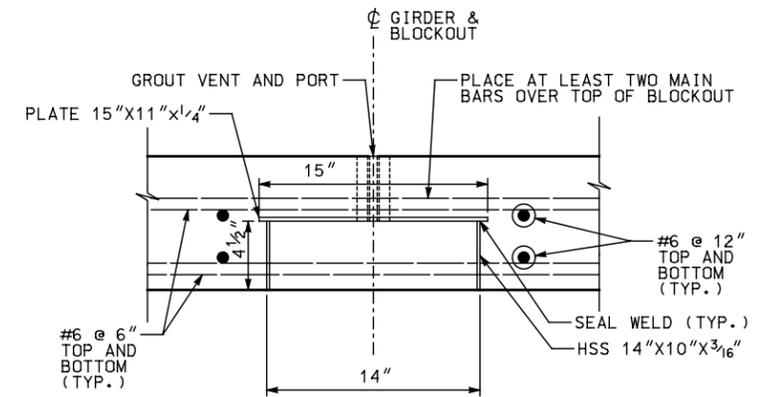


OPTIONAL BLIND BLOCKOUT PLAN

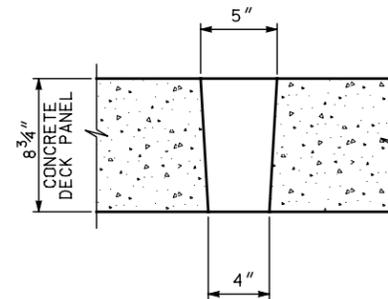
- NOTES: 1. REINFORCEMENT NOT SHOWN FOR CLARITY.
 2. METHOD OF FORMING BLOCKOUT AND PORTS BY FABRICATOR.
 3. USE PLASTIC PIPE FOR PORTS AND VENT TUBES.



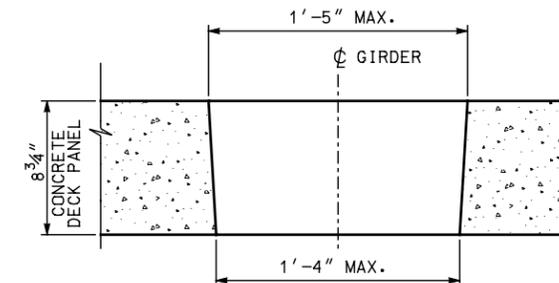
SECTION R



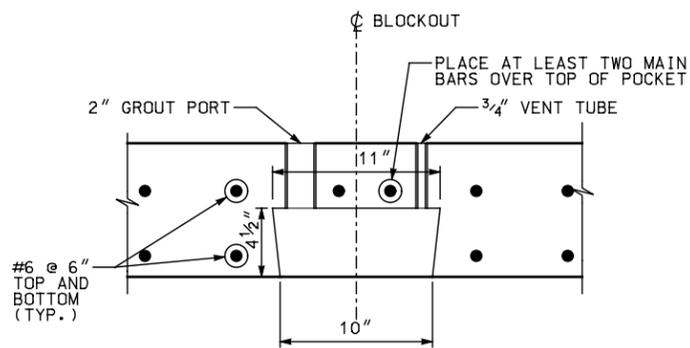
SECTION S



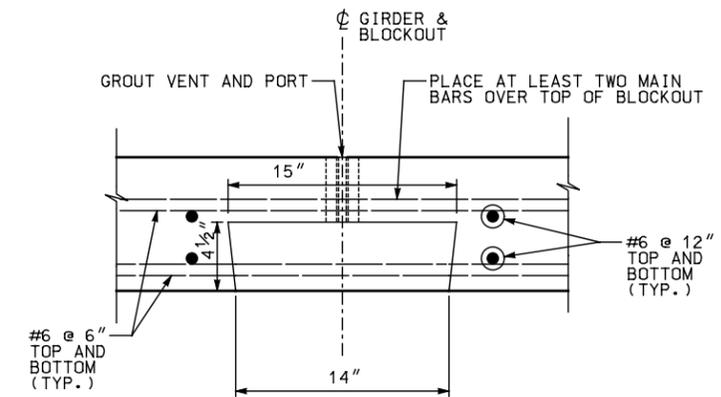
SECTION T



SECTION U



SECTION V



SECTION W

UTAH DEPARTMENT
 OF
 TRANSPORTATION
 STRUCTURES DIVISION

TYPICAL DETAIL SHEET
 FULL DEPTH PRECAST CONCRETE DECK PANELS
 SHEAR CONNECTOR BLOCKOUT DETAILS

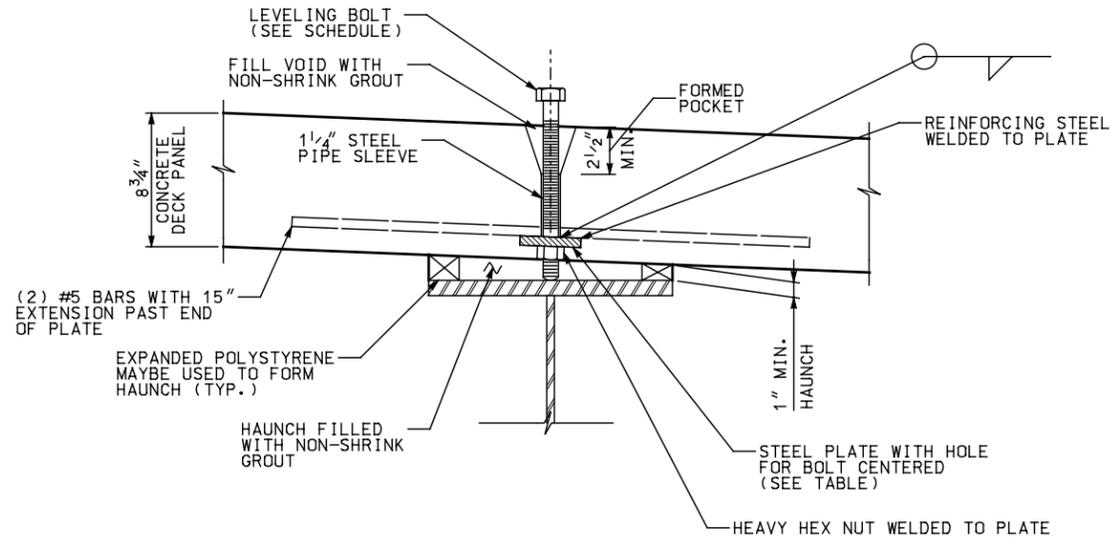
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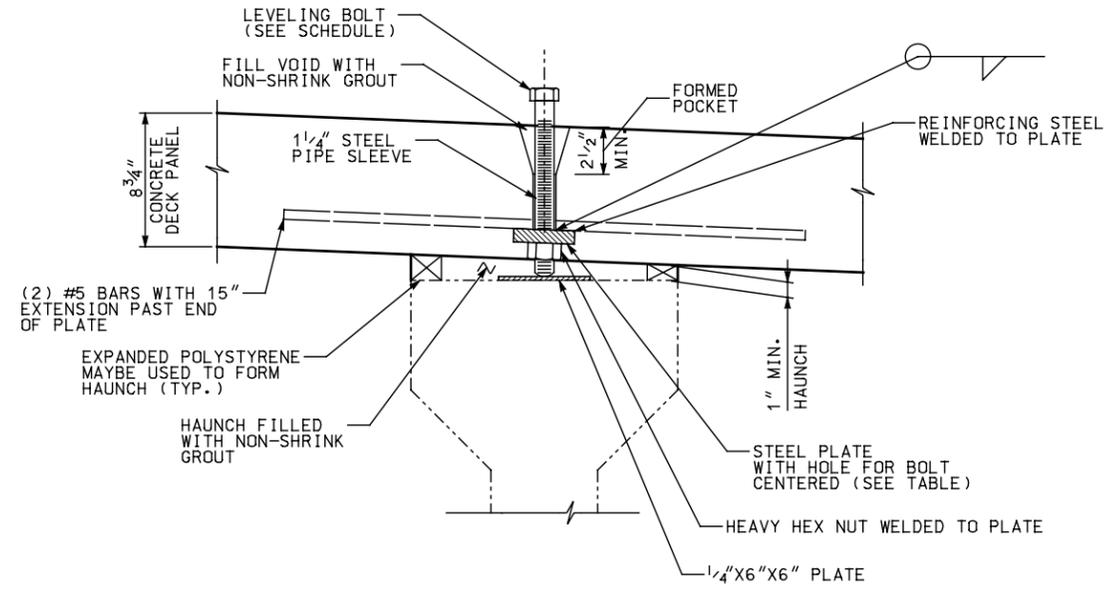
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 DRAWN _____ CHECK _____
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 SENIOR DESIGN ENGINEER
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 APPROVED BY: _____
 UDOT DESIGN MANAGER
 DATE _____

7/19/2010 PDP-09 BLOCKOUT DETAILS.dgn



**VERTICAL ADJUSTMENT DETAIL
ON STEEL GIRDER**



**VERTICAL ADJUSTMENT DETAIL
ON CONCRETE GIRDER**

VERTICAL ADJUSTMENT SCHEDULE

SERVICE LOAD	BOLT DIA.	STEEL PLATE WITH HOLE FOR BOLT CENTERED
10 K	1"	4" x 4" x 5/8"
20 K	1 1/4"	4" x 4" x 1/2"

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OF
TRANSPORTATION
STRUCTURES DIVISION

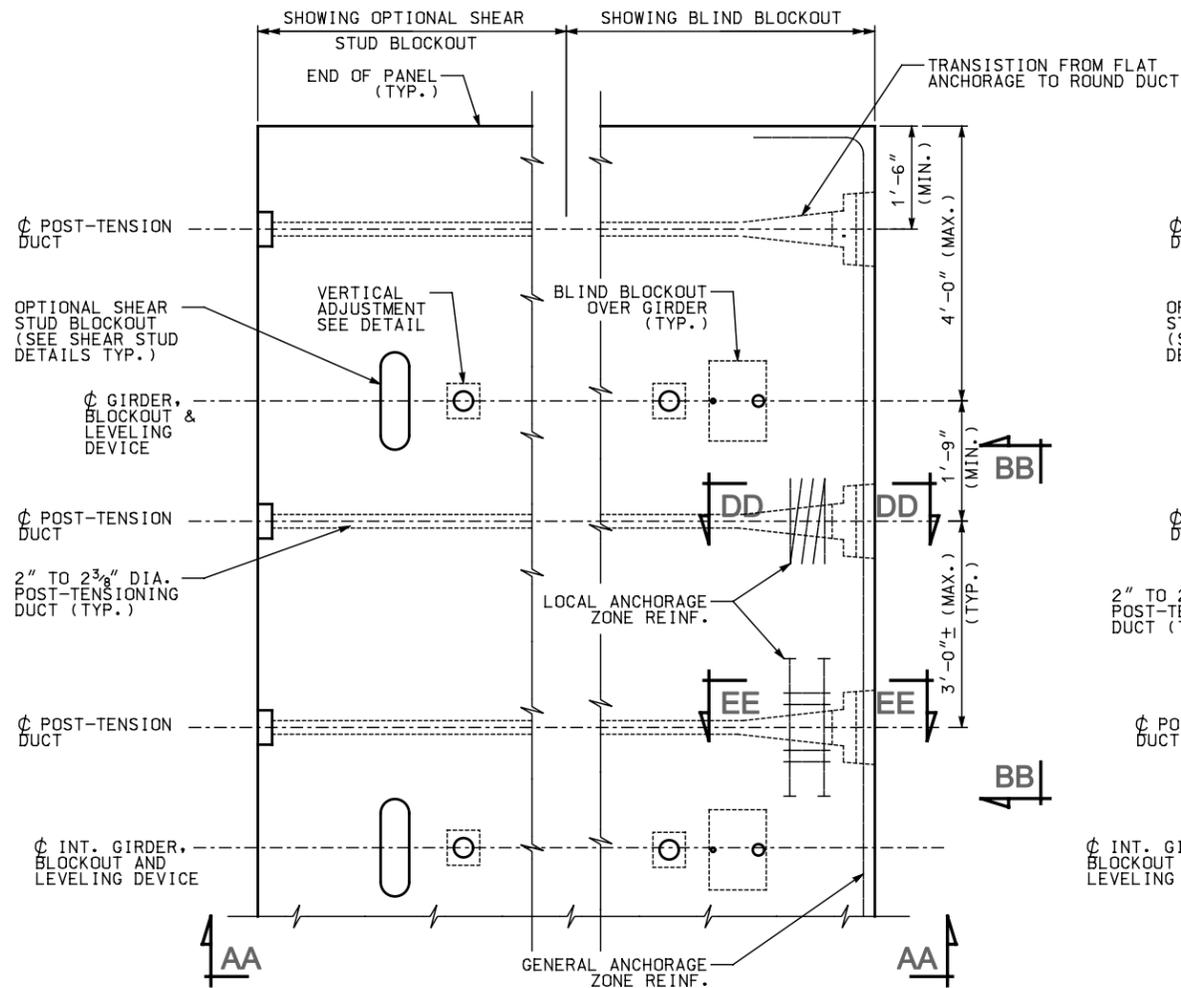
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FULL DEPTH PRECAST CONCRETE DECK PANELS
VERTICAL ADJUSTMENT DETAILS

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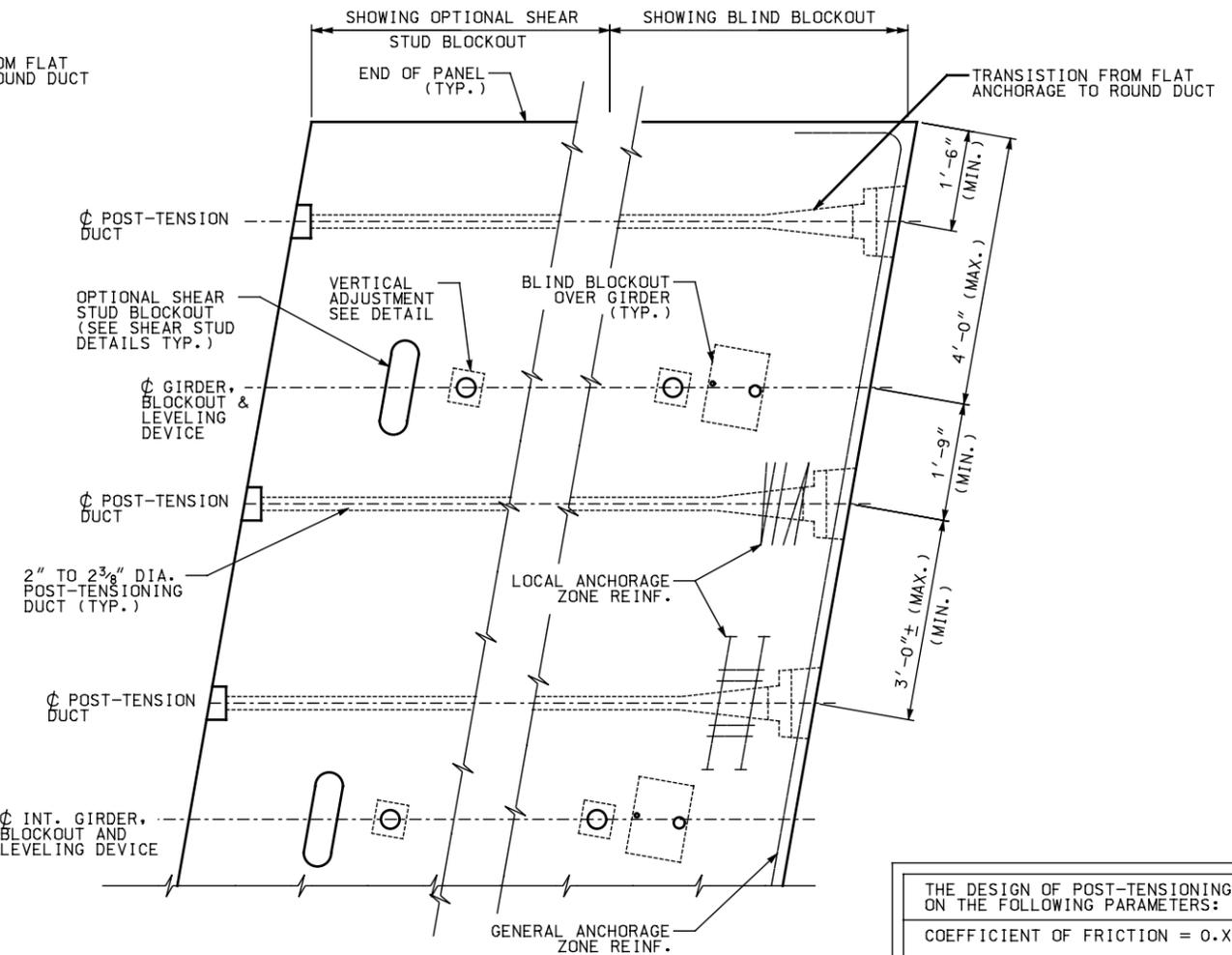
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APPROVAL RECORD
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SENIOR DESIGN ENGINEER
DATE
UDOT DESIGN MANAGER
DATE

PROJECT NUMBER
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POST-TENSION END ANCHORAGE DETAIL

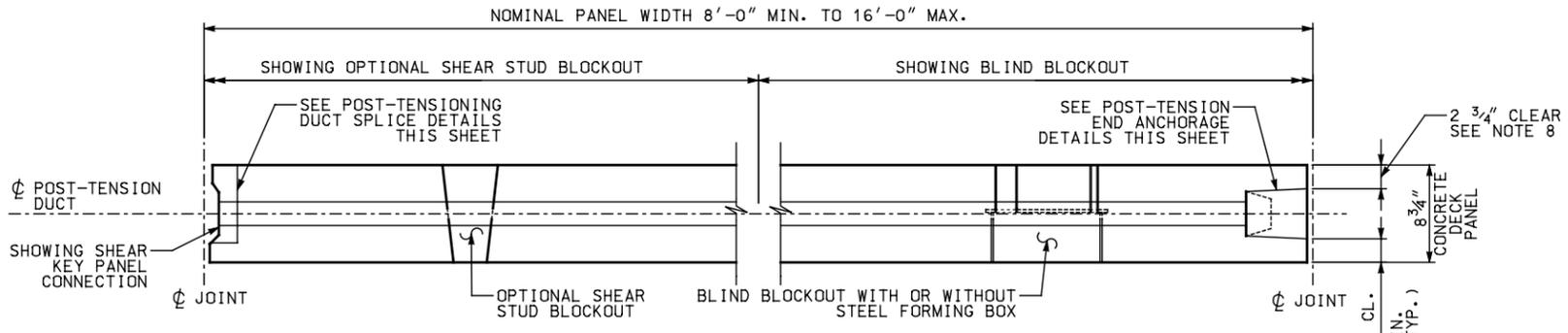


SKEWED POST-TENSION END ANCHORAGE DETAIL

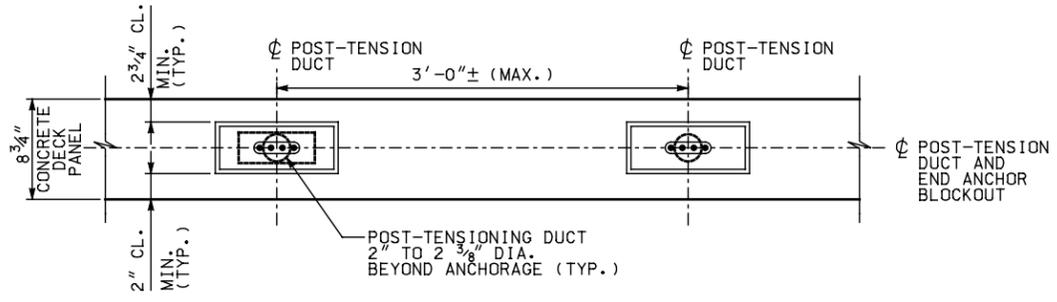
THE DESIGN OF POST-TENSIONING IS BASED ON THE FOLLOWING PARAMETERS:

COEFFICIENT OF FRICTION = 0.XX
 WOBBLE FRICTION COEFFICIENT = 0.000X
 P-JACKING PER STRAND = XX.X KIPS.
 P-FINAL PER STRAND = XX.X KIPS (AFTER LOSSES DUE TO FRICTION, ANCHORAGE SET, AND ELASTIC SHORTENING).

IF THE PROPOSED DUCT DOES NOT MEET THESE VALUES, THEN THE CONTRACTOR TO ADJUST THE JACKING FORCE TO PRODUCE THE FINAL POST-TENSIONING FORCE LISTED.



SECTION AA: TYPICAL TRANSVERSE PANEL SECTION



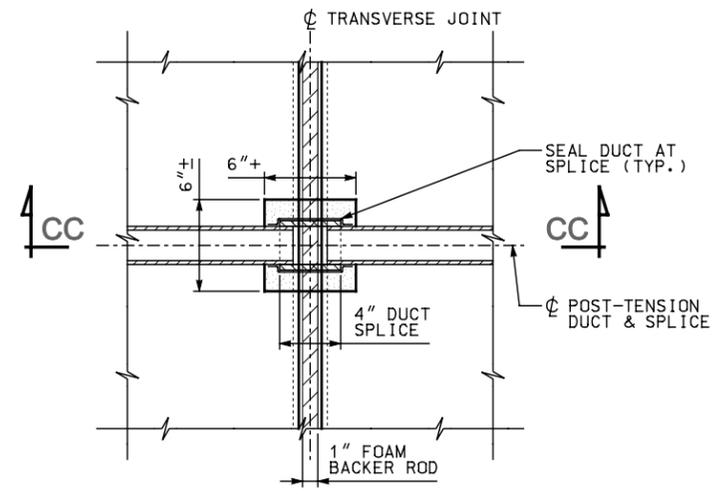
SECTION BB: TYPICAL LONGITUDINAL PANEL SECTION

POST-TENSIONING NOTES:

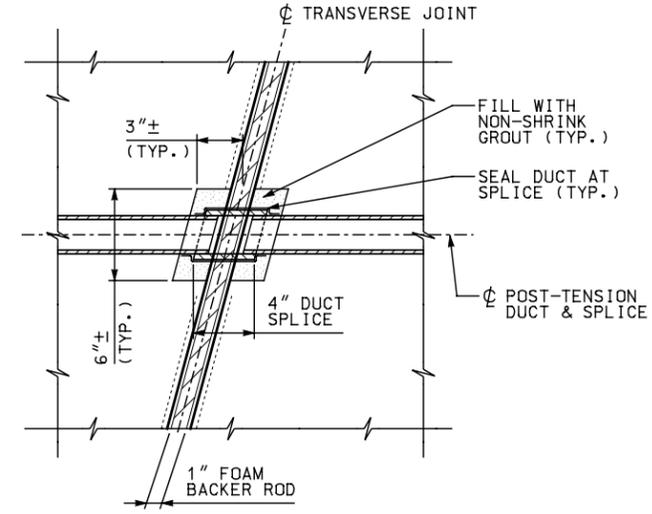
- USE 0.5" DIA. GRADE 270 LOW RELAXATION STRANDS CONFORMING TO ASTM A416.
- USE 4 STRANDS PER DUCT MAXIMUM.
- GALVANIZE BEARING PLATE ANCHOR HEADS AND METAL TRUMPETS AT ANCHORAGES. DO NOT GALVANIZE STRAND GRIPPING WEDGES.
- BEGIN STRESSING AT CENTER OF PANELS. DO NOT ALLOW MORE THAN 12.5% OF THE PRESTRESSING FORCE TO BE ECCENTRIC AT ANY TIME. SUBMIT STRESSING SEQUENCE TO ENGINEER FOR APPROVAL PRIOR TO WORK.
- DECK PANELS MUST BE ALLOWED TO SLIDE ON GIRDERS DURING POST-TENSIONING.
- THE CONTRACTOR IS RESPONSIBLE FOR DESIGN OF ALL POST-TENSIONING ELEMENTS AND ANCHORAGE ZONE REINFORCEMENT (REQUIRED FOR SPLITTING, BURSTING, SPALLING, ETC.). DESIGN MUST CONFORM WITH AASHTO LRFD SPECIFICATIONS. TYPICAL REINFORCING FOR TWO DIFFERENT MANUFACTURERS ARE SHOWN.
- SEQUENCE OF CONSTRUCTION:
 - ERECT DECK PANELS.
 - ADJUST PANELS TO GRADE USING LEVELING DEVICES.
 - INSTALL POST-TENSIONING STRAND LOOSE IN DUCTS.
 - PLACE GROUT IN TRANSVERSE JOINTS ONLY. CURE TO 500 PSI.
 - STRESS POST-TENSIONING STRAND AFTER GROUT ATTAINS A STRENGTH OF 500 PSI.
 - GROUT POST-TENSIONING DUCTS.
 - GROUT SHEAR CONNECTOR POCKETS AND CAMBER STRIPS.
 - LEVELING BOLTS MAY BE REMOVED. GROUT BOLT RECESS.
 - PLACE CLOSURE POURS.
- ANCHORAGE ASSEMBLY AND DUCTS MAY BE LOWERED UP TO 1/2" FROM CENTER OF SLAB IN ORDER TO PROVIDE 2 3/4" TOP COVER FOR REINFORCING ABOVE THE DUCT.

UTAH DEPARTMENT OF TRANSPORTATION		STRUCTURES DIVISION	
TYPICAL DETAIL SHEET		FULL DEPTH PRECAST CONCRETE DECK PANELS	
TYPICAL POST-TENSIONING DETAILS 1		PROJECT NUMBER	
NO.	DATE	BY	REVISION REMARKS
APPROVAL RECORD	DATE	SENIOR DESIGN ENGINEER	CHECK
APPROVED BY	DATE	UDOT DESIGN MANAGER	CHECK
COUNTY		PDP - 13	
DRG. NO.		SHT. OF	

7/19/2010 PDP-13 POST-TENSIONING DETAILS 1.dgn



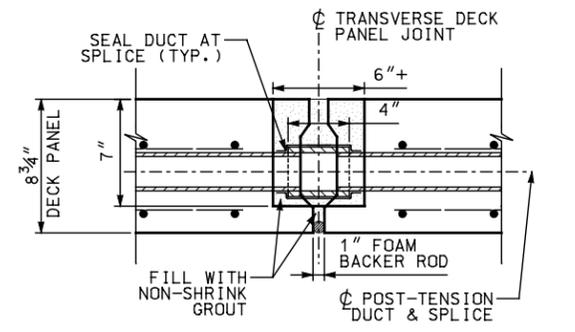
DETAIL AT DUCT CONNECTION



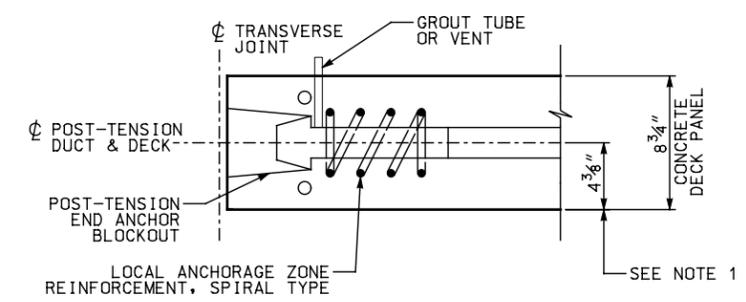
SKEWED DETAIL AT DUCT CONNECTION

POST-TENSIONING NOTES:

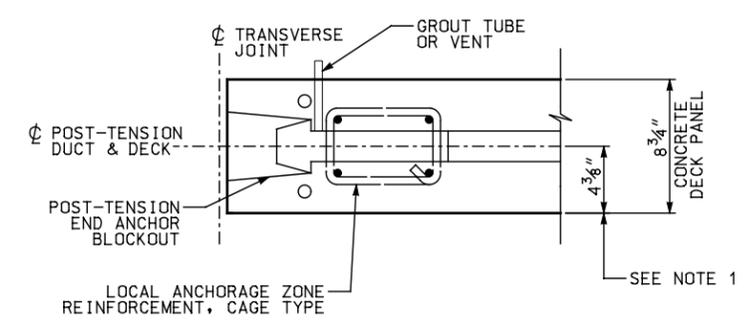
- ANCHORAGE ASSEMBLY AND DUCTS MAY BE LOWERED UP TO 1/2" FROM MID-DEPTH OF SLAB IN ORDER TO PROVIDE 2 3/4" TOP COVER FOR REINFORCING ABOVE THE DUCT.



SECTION CC: POST-TENSION DUCT SPLICE



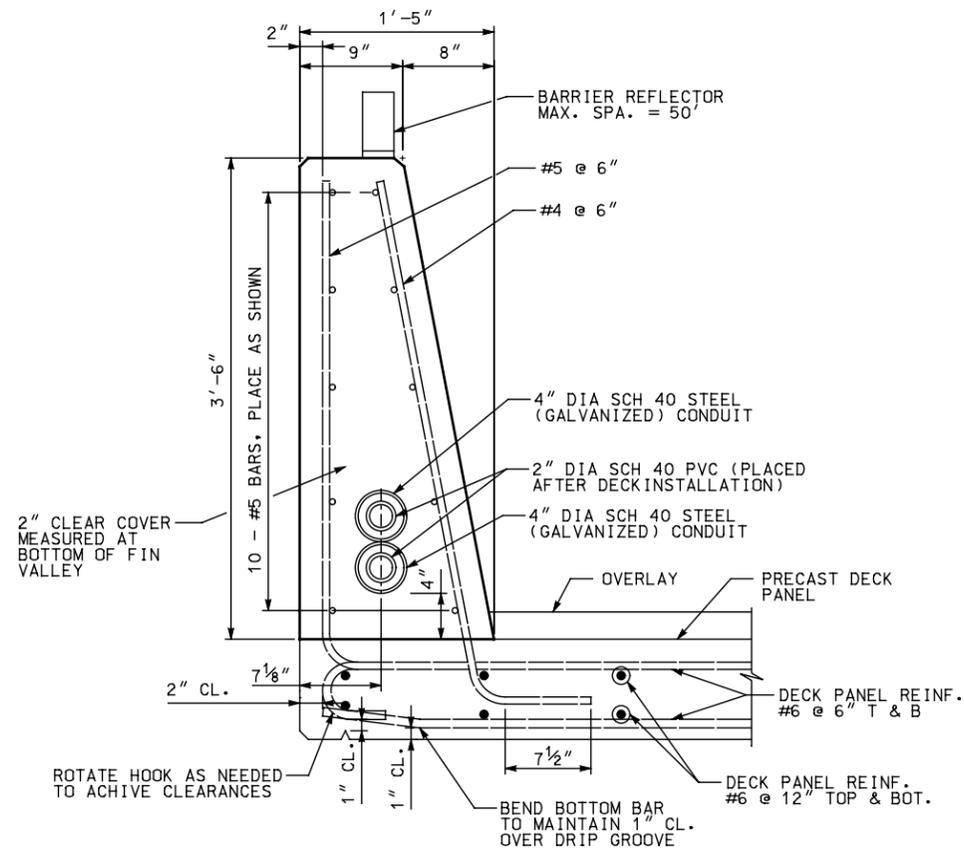
SECTION DD: LOCAL ANCHORAGE ZONE REINFORCEMENT OPTION 1



SECTION EE: LOCAL ANCHORAGE ZONE REINFORCEMENT OPTION 2

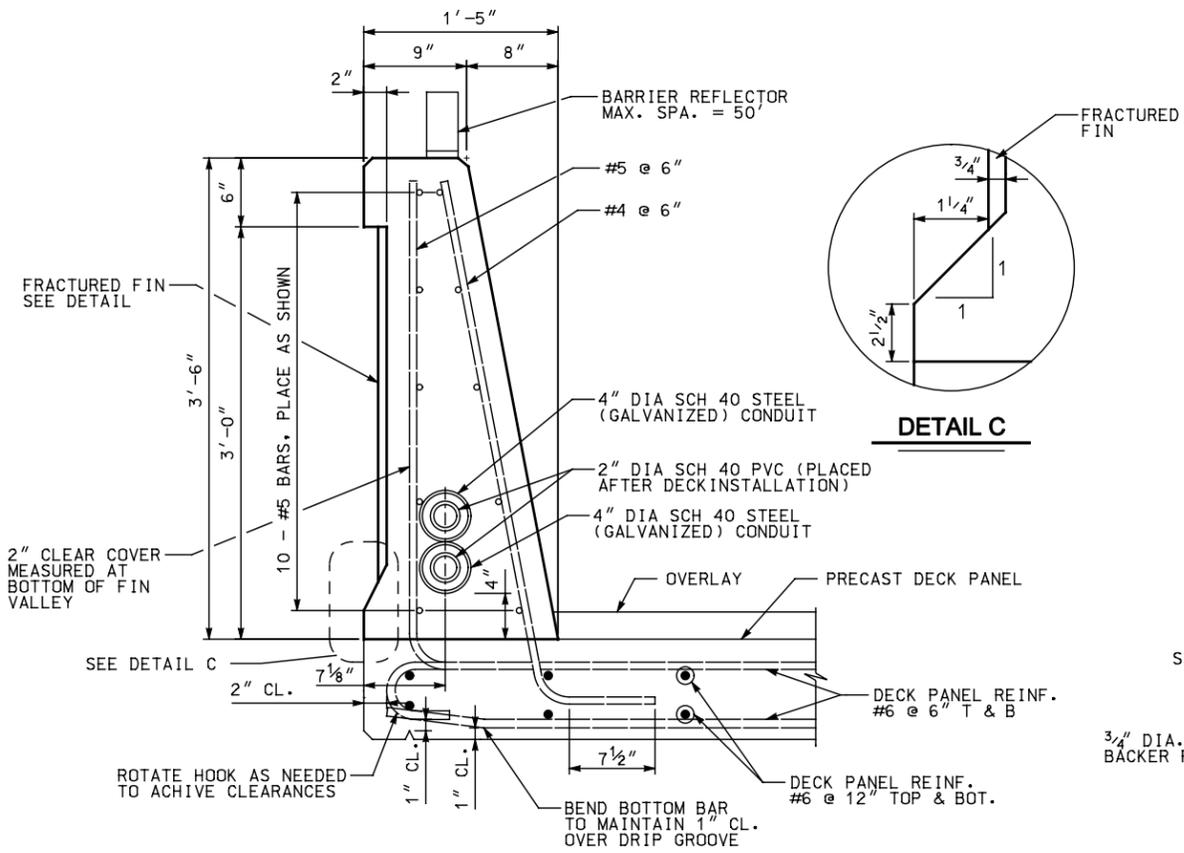
UTAH DEPARTMENT OF TRANSPORTATION		STRUCTURES DIVISION	
TYPICAL DETAIL SHEET			
FULL DEPTH PRECAST CONCRETE DECK PANELS			
TYPICAL POST-TENSIONING DETAILS 2			
PROJECT NUMBER	PIN	DESIGN	CHECK
APPROVED BY	DATE	DESIGN	CHECK
BY	DATE	DRAWN	CHECK
UDOT DESIGN MANAGER	DATE	QUANT.	CHECK
NO.	DATE	BY	REVISION REMARKS

7/19/2010 PDP-14 POST-TENSIONING DETAILS 2.dgn



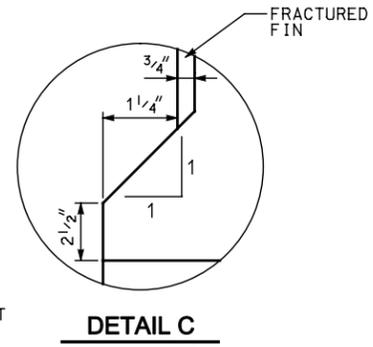
SECTION Y - SMOOTH REAR FACE

NOTE: PRECAST PANEL SHOWN, PRESTRESSED PANEL SIMILAR

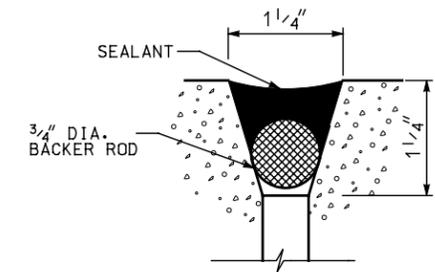


SECTION Y - FRACTURED FIN REAR FACE

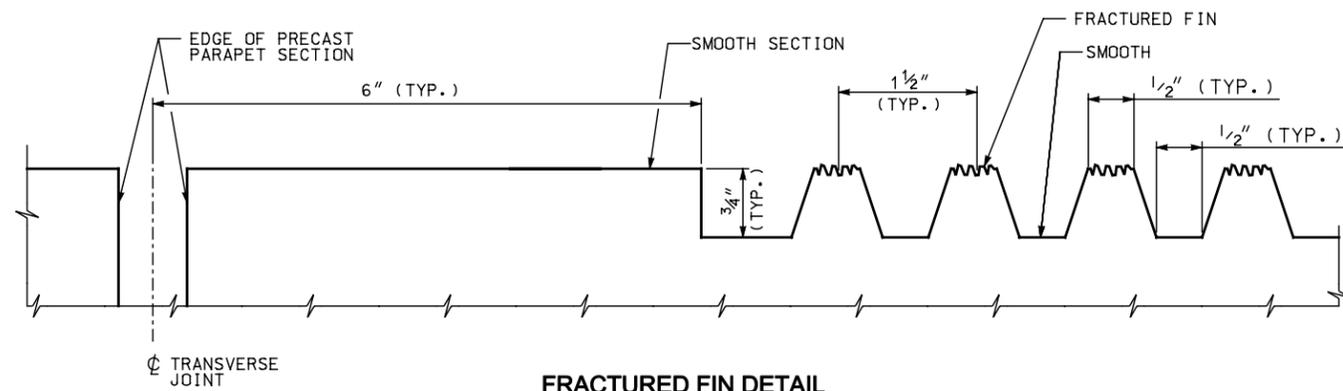
NOTE: PRECAST PANEL SHOWN, PRESTRESSED PANEL SIMILAR



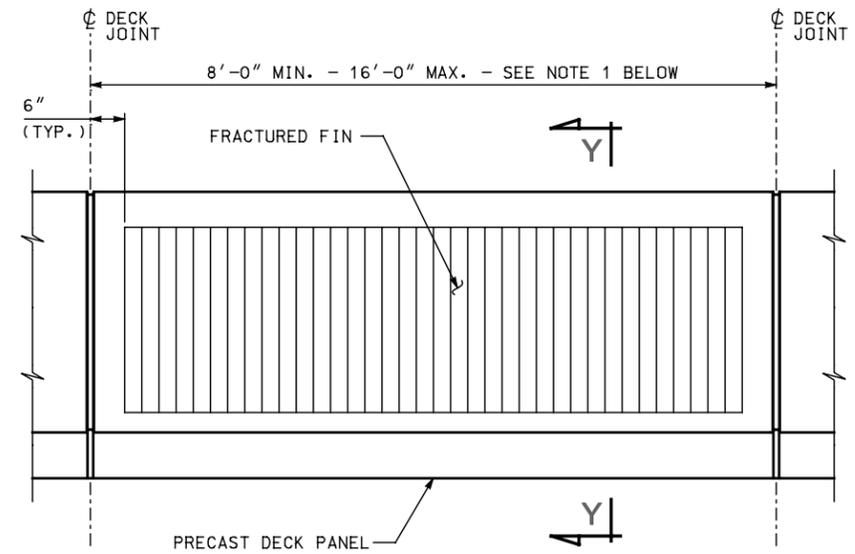
DETAIL C



PARAPET JOINT DETAIL



FRACTURED FIN DETAIL



ELEVATION

NOTES:
1. LENGTH BASED ON PRECAST DECK PANEL.
LENGTH AS DETERMINED BY DESIGNER.

NOTES

1. EXTEND SEALANT AND FOAM BACKER ROD FROM DECK TOP TO TOP OF PARAPET ON THE INSIDE PARAPET FACE, AND ACROSS TOP OF PARAPET.
2. ADJUST BAR SPACING AS REQUIRED TO NOT EXCEED MAXIMUM SPACING SHOWN.
3. FRACTURED FIN PARAPETS AND CONSTANT SLOPE ARE SHOWN, OTHERS MAY BE USED.
4. VALID FOR TL-4.

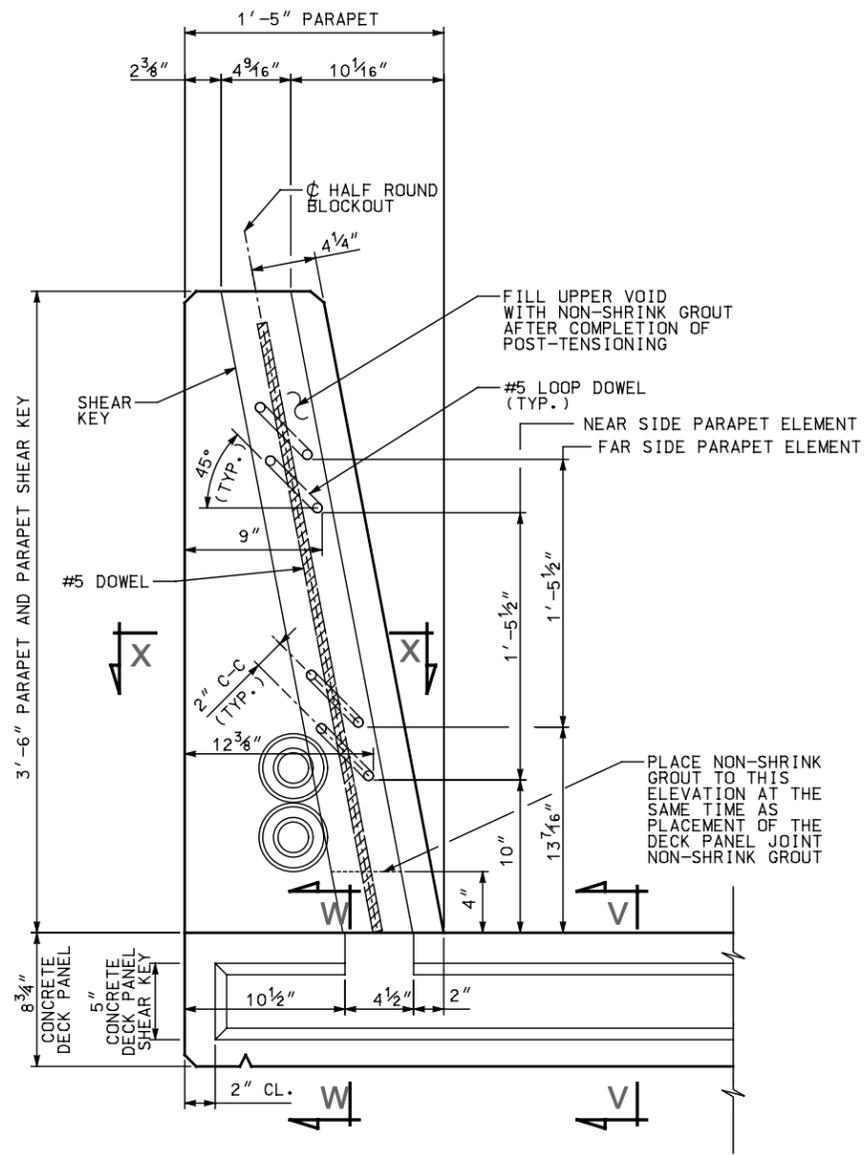
REVISION REMARKS		CHECK

NO.	DATE	BY	APPROVAL

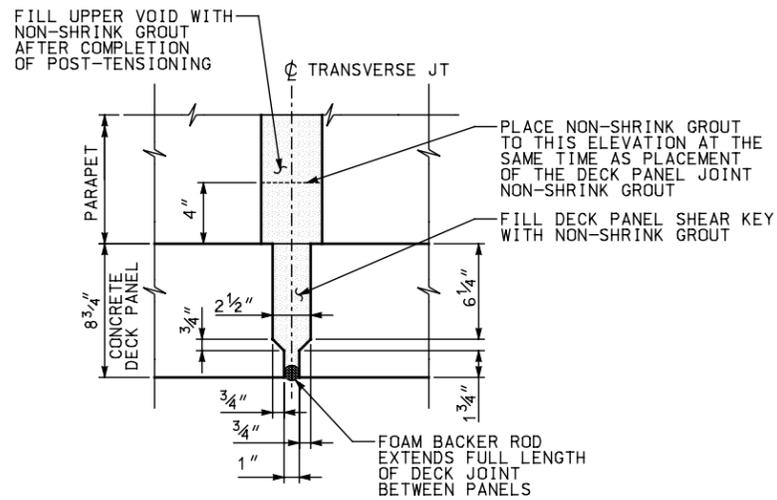
UTAH DEPARTMENT OF TRANSPORTATION	
STRUCTURES DIVISION	
TYPICAL DETAIL SHEET	PROJECT NUMBER
FULL DEPTH PRECAST CONCRETE DECK PANELS	PIN
PARAPET DETAILS 1	

COUNTY	
PDP - 15	
DRG. NO.	
SHT.	OF

7/19/2010 PDF-15-PARAPET DETAILS 1.dgn

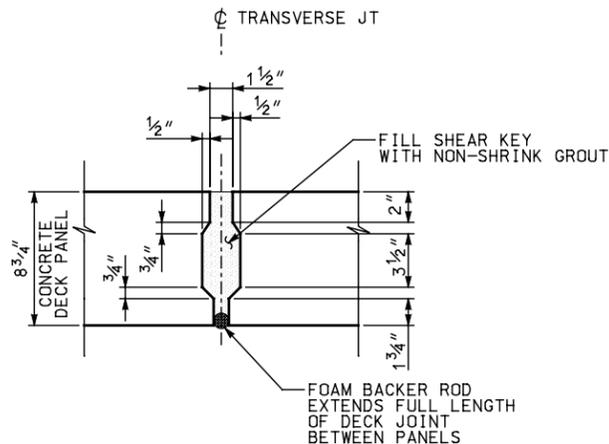


SHEAR KEY SECTION THROUGH PARAPET AND DECK PANEL

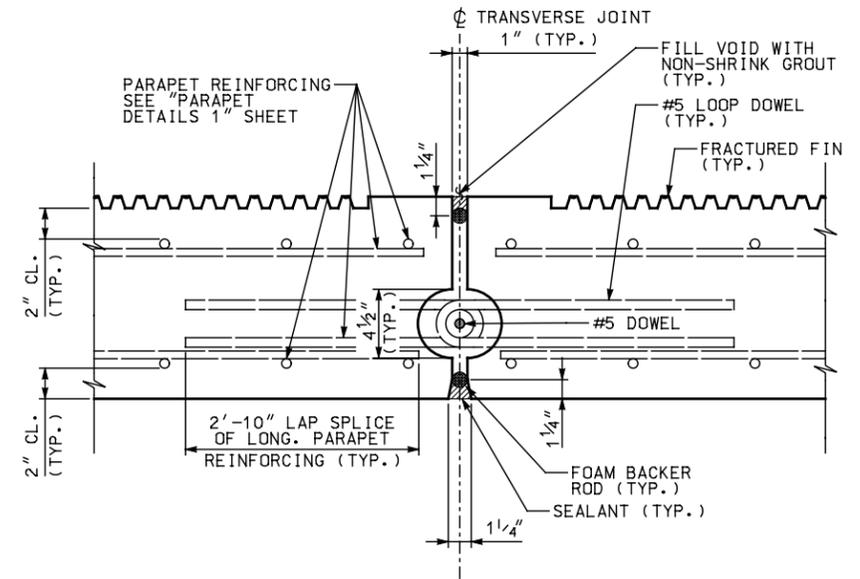


SECTION W: SHEAR KEY THROUGH DECK PANEL AND PARAPET

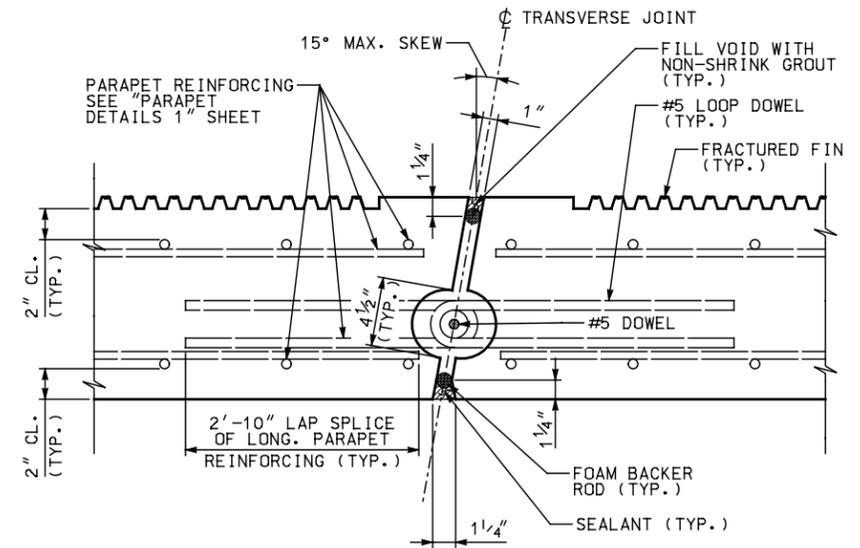
NOTE: PARAPET AND SHEAR KEY REINFORCING NOT SHOWN FOR CLARITY.



SECTION V: SHEAR KEY THROUGH DECK PANEL



SECTION X: PRECAST PARAPET THROUGH SHEAR KEY



SKEWED SECTION X: PRECAST PARAPET THROUGH SHEAR KEY

7/19/2010 PDP-16-PARAPET DETAILS 2.dgn

UTAH DEPARTMENT OF TRANSPORTATION		STRUCTURES DIVISION	
TYPICAL DETAIL SHEET		PARAPET DETAILS 2	
FULL DEPTH PRECAST CONCRETE DECK PANELS		PROJECT NUMBER	
COUNTY		PIN	
PDP - 16		DRG. NO.	
SHT. OF		APPROVAL RECORD	
NO.	DATE	BY	REVISION REMARKS
			CHECK
			CHECK
			CHECK
			DESIGN
			DRAWN
			QUANT.
			SENIOR DESIGN ENGINEER
			DATE
			UDOT DESIGN MANAGER
			DATE

APPENDIX G

DRAWINGS OF BULB-TEE GIRDERS FROM UTAH DOT

Note: These are direct extract from <<http://www.udot.utah.gov/main/uconowner.gf?n=14493404283799689>>
(Last accessed June 25, 2012)

PRECAST BULB TEE GIRDERS GENERAL NOTES

GUIDELINES

THESE GUIDELINE DRAWINGS CAN BE USED ONLY FOR BRIDGES WHICH HAVE ALL OF THE FOLLOWING CHARACTERISTICS:

SKREW ANGLE: 0 TO 45 DEGREES

SPECIAL CONSIDERATIONS WITH PRECAST/PRESTRESSED PANELS:

FOR USE WITH PRECAST PANELS - MAXIMUM BEAM/GIRDER SPACING = 10'-0"

FOR USE WITH PRESTRESSED PANELS - MAXIMUM BEAM/GIRDER SPACING = 12'-0"

MAXIMUM OVERHANG = 4'-0"

MINIMUM OVERHANG = 1'-0"

INTERMEDIATE DIAPHRAGMS:

- 1/5 POINTS OF SPAN FOR SPAN LENGTHS GREATER THAN 160'-0"
- 1/4 POINTS OF SPAN FOR SPAN LENGTHS 120'-0" TO 160'-0"
- 1/3 POINTS OF SPAN FOR SPAN LENGTHS 80'-0" TO 120'-0"
- 1/2 POINTS OF SPAN FOR SPAN LENGTHS LESS THAN 80'-0".

DO NOT USE TRANSFORMED SECTION PROPERTIES FOR GIRDER DESIGN.

IMPLEMENTATION

IT IS THE DESIGNER'S RESPONSIBILITY TO:

FILL IN TABLE FOR EACH GIRDER TYPE ON A PROJECT.

CREATE A FRAMING PLAN OF EACH SPAN. SEE PRECAST BULB TEE GIRDER MANUAL SECTION 4.

CREATE TYPICAL TRANSVERSE SECTIONS AS NEEDED. SEE PRECAST BULB TEE GIRDER MANUAL SECTION 4.

CREATE SPECIAL GIRDER END DETAILS AS NEEDED, SUCH AS, VARYING GEOMETRIC END TREATMENTS, EXTENSIONS OF PRESTRESSING STRAND FOR GIRDER ENDS FOR CONTINUITY OF LIVE LOAD.

DESIGN AND CHECK WEB SHEAR REINFORCEMENT ALONG GIRDER SPAN.

DESIGN AND CHECK THAT END REINFORCEMENT DETAILED SATISFIES ALL APPLICABLE CODE PROVISIONS.

DESIGN AND CHECK ALL CHARACTERISTICS RELATED TO REQUIRED CLOSURE POURS.

ACCOUNT FOR THE HAUNCH LOAD CALCULATIONS, BUT DO NOT CONSIDER IT IN THE COMPOSITE SECTIONS PROPERTIES.

ENSURE APPLICABLE GENERAL NOTES ARE INCLUDED IN THE PLAN SET.

GENERAL NOTES

USE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 4TH EDITION WITH ALL INTERIM PROVISIONS EXCEPT AS NOTED OTHERWISE, FOR ALL BULB TEE GIRDER DESIGNS

USE AN HL-93 LOAD INCLUDING A 35 PSF LOAD FOR FUTURE OVERLAY FOR GIRDER DESIGNS.

PRESTRESSED GIRDER CONCRETE: $f'c = 8,500$ PSI

CONCRETE STRENGTH UP TO 10,000 PSI MAY BE USED WITH PRIOR APPROVAL FROM THE DEPARTMENT.

SPECIFY CONCRETE RELEASE STRENGTH FOR EACH GIRDER BASED ON DESIGN.

CLOSURE POUR CONCRETE FOR POST TENSIONED GIRDERS: $f'c =$ MATCH GIRDER STRENGTH

REINFORCING STEEL (COATED) $f_y = 60,000$ PSI (WELDED WIRE REINFORCEMENT IS NOT ALLOWED)

PRESTRESSED LOW RELAXATION STRAND: 0.6" DIAMETER AASHTO M 203 GRADE 270

USE UTAH DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (THE LATEST EDITION AND SUPPLEMENTS THERETO WHICH ARE IN EFFECT AT THE DATE OF REQUEST FOR BIDS) ALONG WITH SPECIAL PROVISIONS SECTION 03339S - FULL DEPTH STANDARD PRECAST CONCRETE DECK PANELS FOR MATERIALS, CONSTRUCTION AND WORKMANSHIP.

DESIGN AND DETAIL LIFTING SUPPORTS AND HANDLING CONSIDERATIONS IN ACCORDANCE WITH THE PCI DESIGN HANDBOOK, PRECAST AND PRESTRESSED CONCRETE, FIFTH EDITION WITH ALL INTERIMS AND ERRATA (NO CRACKING CRITERIA).

FOR TOP SURFACE OF BULB TEE AND POST TENSIONED BULB TEE, USE A ROUGHENED SURFACE (1/4" AMPLITUDE). FOR DECK BULB TEE USE A HEAVY BROOM FINISH ON RIDING SURFACE OF TOP FLANGE.

DECK BULB TEES HAVE A 1/4" CONCRETE GRINDING ALLOWANCE FOR CORRECTING UNEVEN ROADWAY SURFACES AT LONGITUDINAL JOINTS. LOSS OF 1/4" OF TOP FLANGE TO BE ACCOUNTED FOR IN DESIGN.

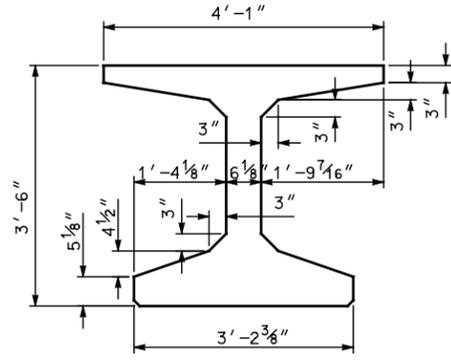
APPLY CONCRETE POLYMER OVERLAY ON BRIDGE DECK AFTER CONCRETE GRINDING OR STEEL SHOT IS COMPLETE. SEE SECTION 03372 IN THE STANDARD SPECIFICATIONS FOR SURFACE PREPARATION REQUIREMENTS.

COAT ALL MILD REINFORCEMENT PER UDOT SPECIFICATIONS UNLESS OTHERWISE NOTED.

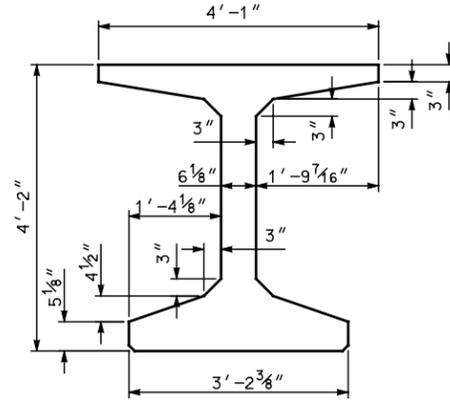
INDEX OF SHEETS

GNBT-1	BULB TEE GIRDER GENERAL NOTES
BT-1	PRECAST BULB TEE GIRDER STANDARD GIRDER SIZES
BT-2	PRECAST DECK BULB TEE GIRDER STANDARD GIRDER SIZES
BT-3	PRECAST POST-TENSIONED BULB TEE GIRDER STANDARD GIRDER SIZES
BT-4	PRECAST BULB TEE GIRDER DIAPHRAGM DETAILS
BT-5	PRECAST DECK BULB TEE GIRDER WELDED STUD OPTION
UBT42-(1,2)	PRECAST BULB TEE GIRDER UBT42 DETAILS
UBT50-(1,2)	PRECAST BULB TEE GIRDER UBT50 DETAILS
UBT58-(1,2)	PRECAST BULB TEE GIRDER UBT58 DETAILS
UBT66-(1,2)	PRECAST BULB TEE GIRDER UBT66 DETAILS
UBT74-(1,2)	PRECAST BULB TEE GIRDER UBT74 DETAILS
UBT82-(1,2)	PRECAST BULB TEE GIRDER UBT82 DETAILS
UBT90-(1,2)	PRECAST BULB TEE GIRDER UBT90 DETAILS
UBT98-(1,2)	PRECAST BULB TEE GIRDER UBT98 DETAILS
UDBT42-(1,2)	PRECAST DECK BULB TEE GIRDER UDBT42 DETAILS
UDBT50-(1,2)	PRECAST DECK BULB TEE GIRDER UDBT50 DETAILS
UDBT58-(1,2)	PRECAST DECK BULB TEE GIRDER UDBT58 DETAILS
UDBT66-(1,2)	PRECAST DECK BULB TEE GIRDER UDBT66 DETAILS
UDBT74-(1,2)	PRECAST DECK BULB TEE GIRDER UDBT74 DETAILS
UDBT82-(1,2)	PRECAST DECK BULB TEE GIRDER UDBT82 DETAILS
UDBT90-(1,2)	PRECAST DECK BULB TEE GIRDER UDBT90 DETAILS
UDBT98-(1,2)	PRECAST DECK BULB TEE GIRDER UDBT98 DETAILS
UBT66PT-(1-4)	PRECAST POST-TENSIONED BULB TEE GIRDER DETAILS
UBT74PT-(1-4)	PRECAST POST-TENSIONED BULB TEE GIRDER DETAILS
UBT82PT-(1-4)	PRECAST POST-TENSIONED BULB TEE GIRDER DETAILS
UBT90PT-(1-4)	PRECAST POST-TENSIONED BULB TEE GIRDER DETAILS
UBT98PT-(1-4)	PRECAST POST-TENSIONED BULB TEE GIRDER DETAILS

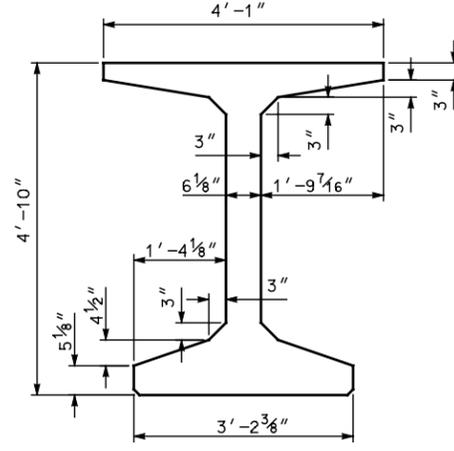
TYPICAL DETAIL SHEET BULB TEE GIRDER GENERAL NOTES	UTAH DEPARTMENT OF TRANSPORTATION SALT LAKE CITY, UTAH STRUCTURES DIVISION		DESIGN _____ DRAWN _____ QUANT. _____	CHECK _____ CHECK _____ CHECK _____	NO. _____ DATE _____ BY _____	REVISIONS _____ _____ _____	REMARKS _____ _____ _____	
	APPROVAL RECORD _____ DATE _____	SENIOR DESIGN ENGR. _____ DATE _____	APPROVED FOR USE BY UDOT _____ DATE _____	UDOT BRIDGE ENGR. _____ DATE _____				
								COUNTY _____
								GNBT-1 DRG. NO. _____
							SHT. _____ OF _____	



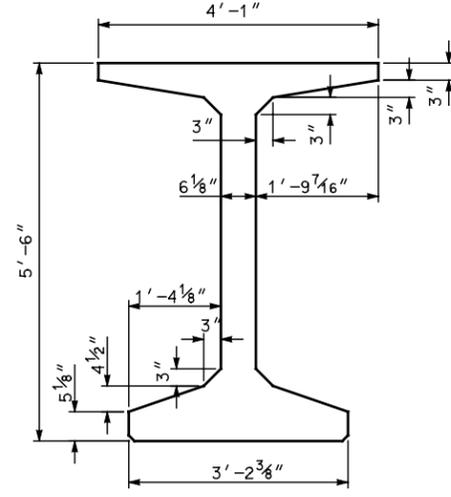
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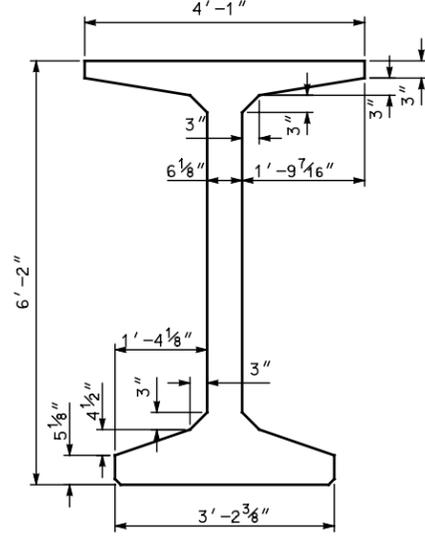
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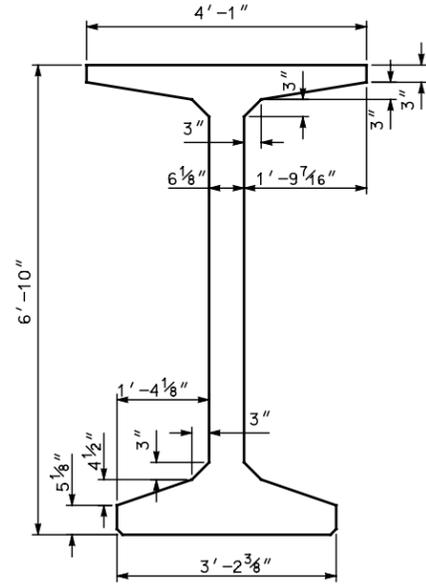
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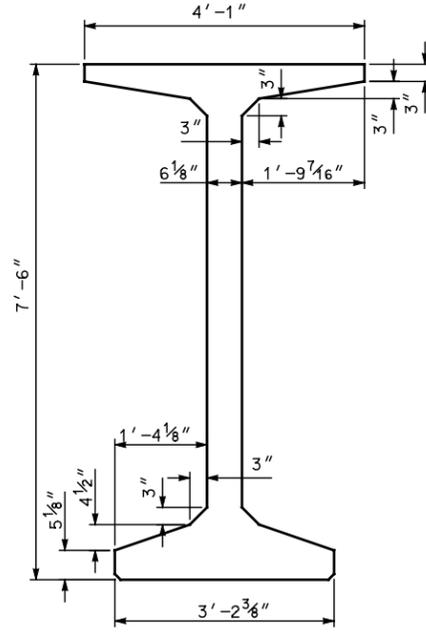
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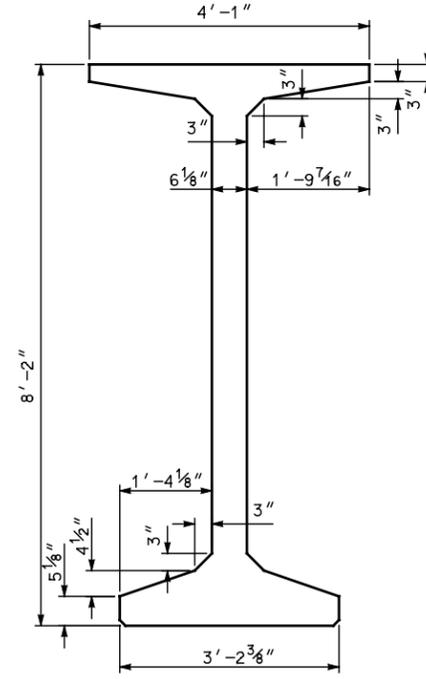
UBT74



UBT82



UBT90



UBT98

GIRDER TYPE	DEPTH (in)	WEIGHT (Lbs/Ft)	AREA (in ²)	I _x c _g (in ⁴)	I _y c _g (in ⁴)	Y _t (in)	Y _b (in)	S _t (in ³)	S _b (in ³)
UBT42	42	759	729	184042	71761	21.67	20.33	8494	9052
UBT50	50	810	778	283124	71914	25.88	24.12	10940	11738
UBT58	58	861	827	407026	72067	30.07	27.93	13538	14571
UBT66	66	912	876	557326	72221	34.23	31.77	16281	17544
UBT74	74	963	925	735599	72374	38.38	35.62	19166	20652
UBT82	82	1014	974	943421	72527	42.51	39.49	22191	23893
UBT90	90	1065	1023	1182360	72680	46.64	43.36	25353	27265
UBT98	98	1116	1072	1454000	72833	50.74	47.26	28653	30769

UTAH DEPARTMENT OF TRANSPORTATION
SALT LAKE CITY, UTAH
STRUCTURES DIVISION

TYPICAL DETAIL SHEET
PRECAST BULB TEE GIRDER
STANDARD GIRDER SIZES

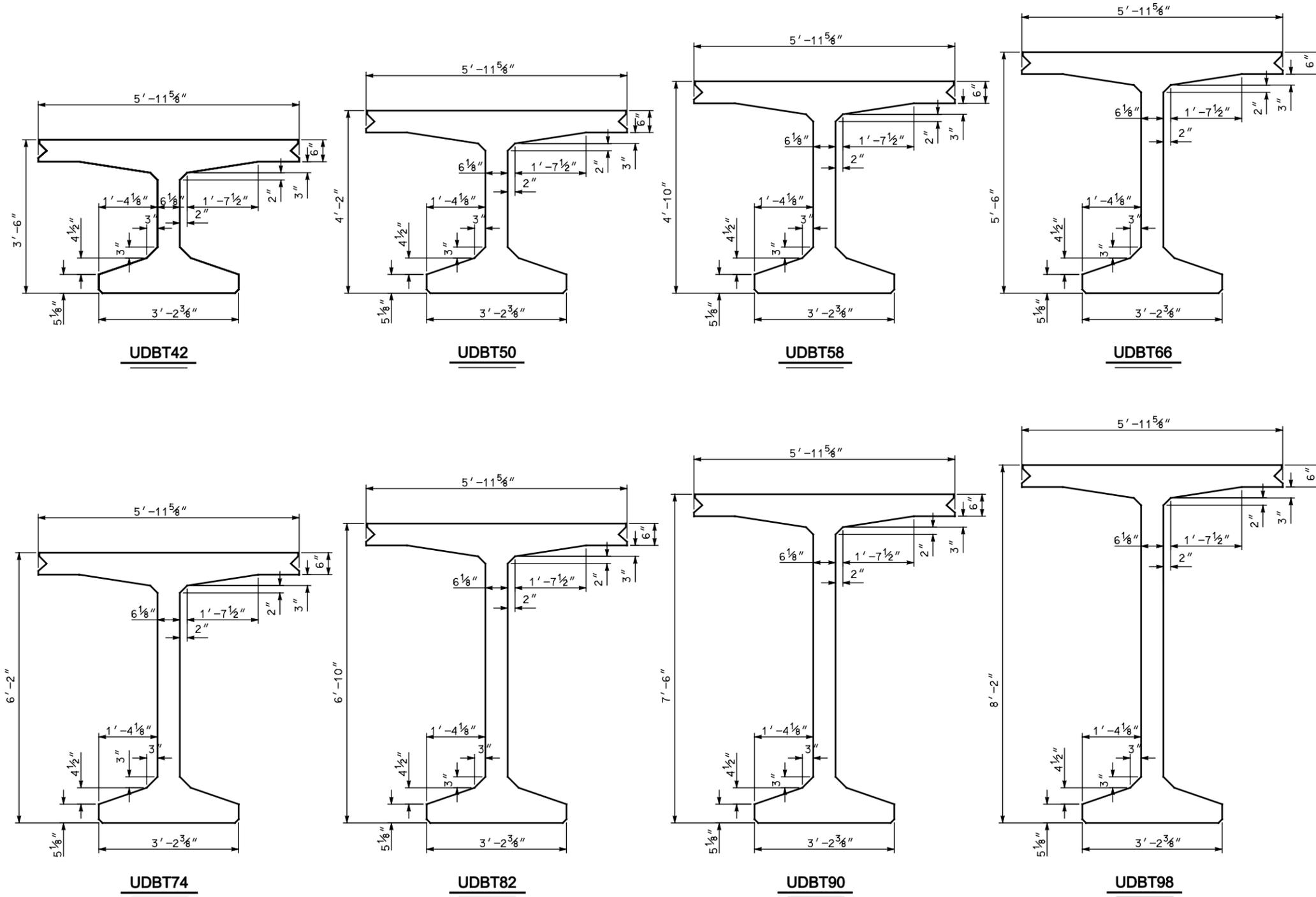
COUNTY
BT - 1
DRG. NO.

SHT. OF

APPROVAL RECOMM.	DATE	SENIOR DESIGN ENGR.	DESIGN	CHECK
APPROVED FOR USE	DATE	UDOT BRIDGE ENGR.	DRAWN	CHECK
BY UDOT	DATE	UDOT	QUANT.	CHECK

NO.	DATE	BY	REVISIONS

PROJECT NUMBER



GIRDER TYPE	DEPTH (in)	WEIGHT (Lbs/Ft)	AREA (in ²)	I _x c _g (in ⁴)	I _y c _g (in ⁴)	Y _t (in)	Y _b (in)	S _t (in ³)	S _b (in ³)
UDBT42	42	1015	974	238350	212226	17.33	24.67	13754	9662
UDBT50	50	1066	1023	368258	212379	20.74	29.26	17756	12586
UDBT58	58	1117	1072	530226	212532	24.19	33.81	21919	15683
UDBT66	66	1168	1121	725908	212685	27.70	38.30	26206	18953
UDBT74	74	1219	1170	956946	212839	31.24	42.76	30632	22379
UDBT82	82	1270	1219	1224970	212992	34.82	47.18	35180	25964
UDBT90	90	1321	1268	1531590	213148	38.44	51.56	39844	29705
UDBT98	98	1372	1317	1878430	213298	42.08	55.92	44639	33591

UTAH DEPARTMENT OF TRANSPORTATION
SALT LAKE CITY, UTAH
STRUCTURES DIVISION

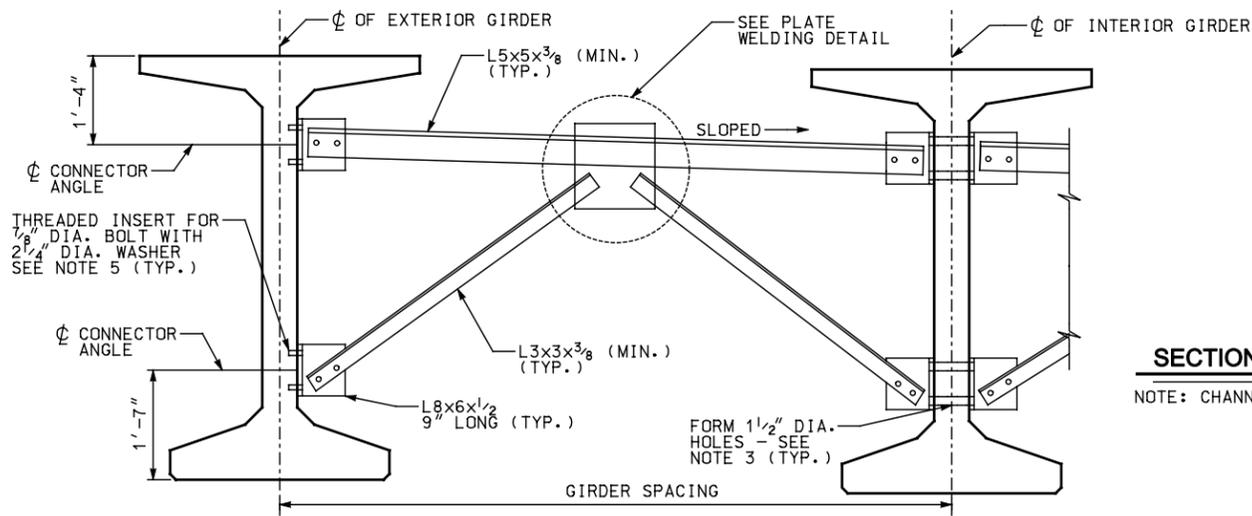
TYPICAL DETAIL SHEET
PRECAST DECK BULB TEE GIRDER
STANDARD GIRDER SIZES

COUNTY
BT - 2
DRG. NO.

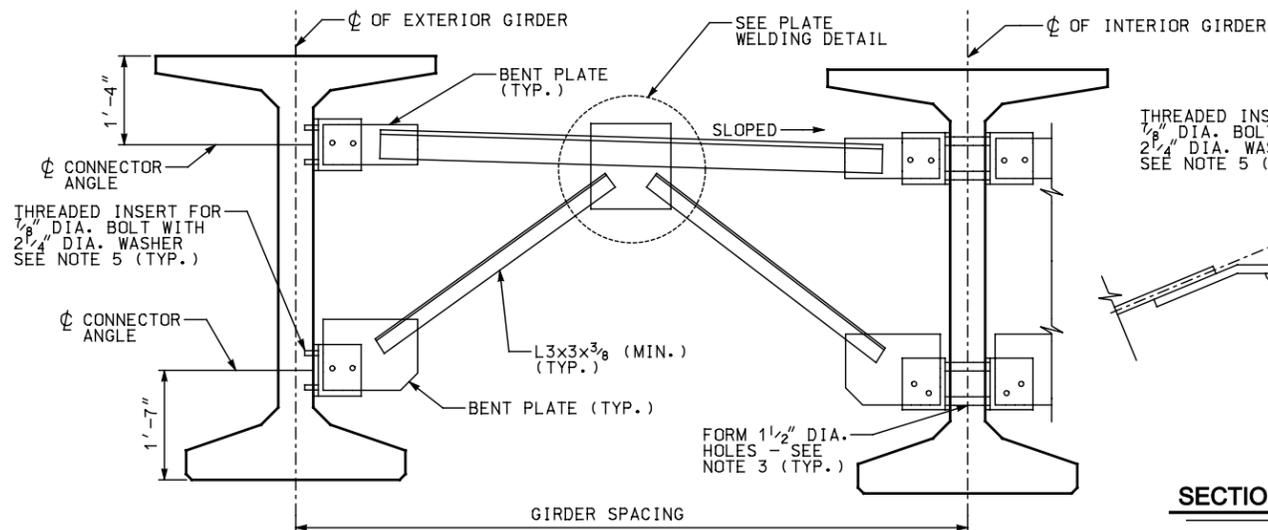
SHT. OF

APPROVAL RECOMM.	DATE	SENIOR DESIGN ENGR.	DESIGN	CHECK
APPROVED FOR USE	DATE	UDOT BRIDGE ENGR.	DRAWN	CHECK
BY UDOT	DATE		QUANT.	CHECK

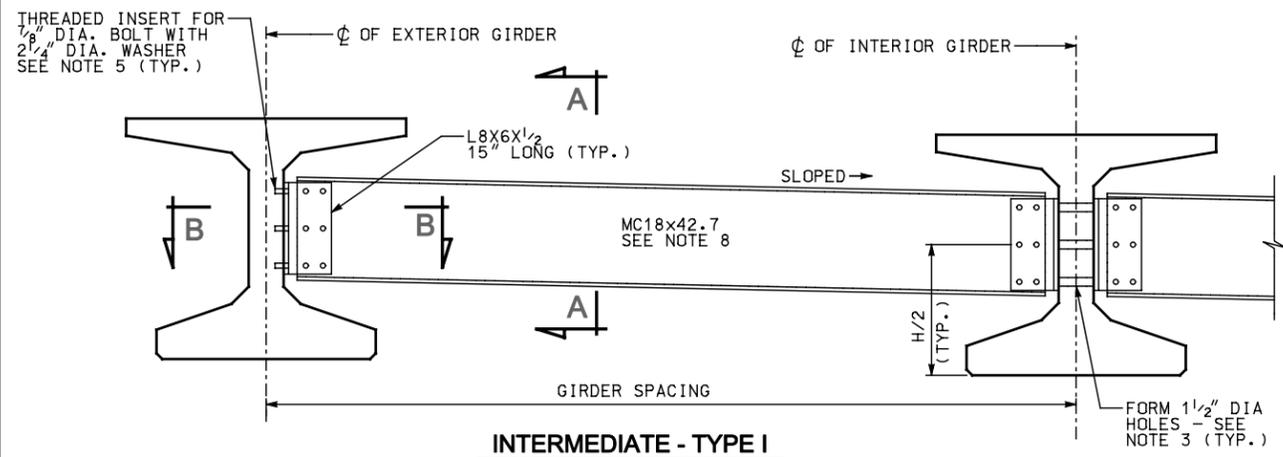
NO.	DATE	BY	REVISIONS



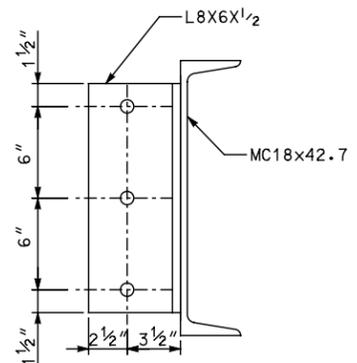
INTERMEDIATE DIAPHRAGM - TYPE II



SKewed INTERMEDIATE DIAPHRAGM - TYPE II

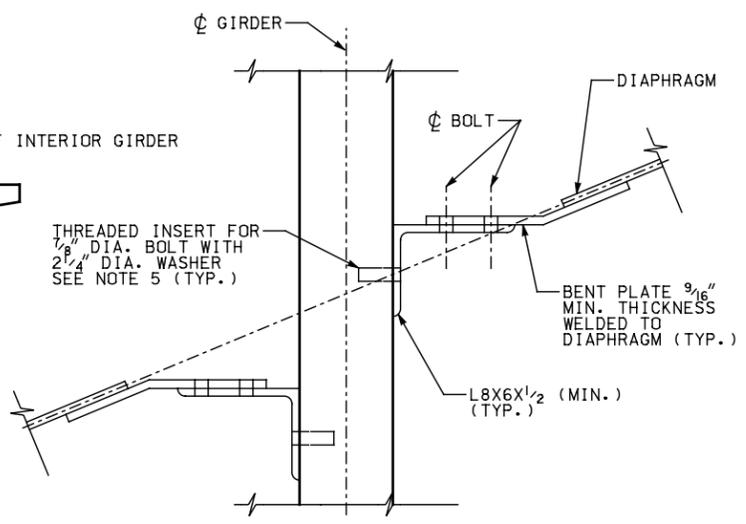


INTERMEDIATE - TYPE I



SECTION A-A: INTERMEDIATE DIAPHRAGM

NOTE: CHANNEL SHOWN, K-FRAME DIAPHRAGM SIMILAR.



SECTION B-B: INTERMEDIATE DIAPHRAGMS

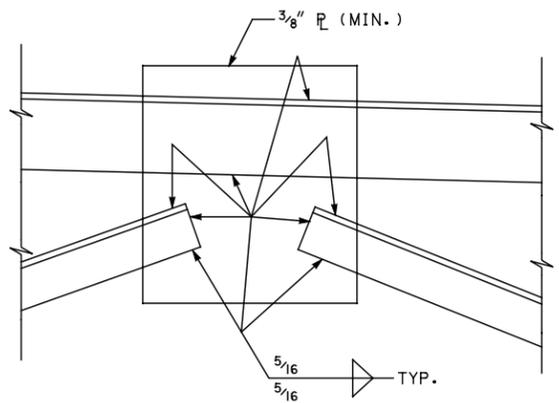


PLATE WELDING DETAIL

NOTE: STOP WELDS 1/4" SHORT OF ALL PLATE ELEMENTS

DIAPHRAGM CONNECTIONS TO BE LOCATED ON THE GIRDER WEB. DESIGNER SHALL VERIFY THREAD INSERT CAPACITIES SPECIFIED AND MODIFY THEM WHERE APPLICABLE.
THE BENT R SHOWN IN SECTION B IS NOT NECESSARY FOR 0° SKEWS.

NOTES

1. INCLUDE ALL STEEL FOR DIAPHRAGMS IN THE COST OF THE PRESTRESSED CONCRETE GIRDER.
2. ALL STEEL TO BE ASTM A709 GRADE 50 AND GALVANIZED IN ACCORDANCE WITH ASTM A 123.
3. FABRICATE INTERMEDIATE AND END DIAPHRAGMS WITH VERTICAL ENDS.
4. STEEL TO STEEL CONNECTIONS TO BE MADE USING 7/8" DIA. GALVANIZED HIGH-STRENGTH BOLTS.
5. STEEL TO CONCRETE CONNECTIONS TO BE MADE USING ASTM A307 GRADE A BOLTS.
6. WASHERS TO BE ASTM F436. ALL BOLTS, NUTS, AND WASHERS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A 153.
7. FIELD DRILLED HOLES IN DIAPHRAGM CONNECTION ANGLES TO BE PERMITTED AT NO ADDITIONAL EXPENSE. ALL OTHER HOLES TO BE SHOP DRILLED.
8. 1/2" BENT PLATE OF EQUAL DIMENSIONS MAY BE SUBSTITUTED FOR MC18x42.7.
9. FOR SQUARE SUPERSTRUCTURES, FORM 1 1/2" DIA. HOLES IN INTERIOR GIRDERS FOR THRU-BOLTING OF DIAPHRAGM ANGLE. FOR FASCIA GIRDERS AND SKEWED STRUCTURES, THREADED INSERTS ARE REQUIRED. PLACE HOLES AND THREADED INSERTS PERPENDICULAR TO GIRDER WEB.
10. SEE GIRDER DRAWINGS FOR GIRDER CONNECTION REQUIREMENTS

INTERMEDIATE DIAPHRAGM SIZING TABLE

GIRDER DEPTH	DIAPHRAGM	CHANNEL SIZE (SEE NOTE 11)
42	TYPE I	MC18x42.7
50	TYPE I	MC18x42.7
58	TYPE I	MC18x42.7
66	TYPE II	N/A
74	TYPE II	N/A
82	TYPE II	N/A
90	TYPE II	N/A
98	TYPE II	N/A

INTERMEDIATE DIAPHRAGM LOCATION TABLE

SPAN LENGTH	DIAPHRAGM LOCATION ALONG GIRDER
< 80 FT	1/2 SPAN PTS.
80 FT TO 120 FT	1/3 SPAN PTS.
120 FT TO 160 FT	1/4 SPAN PTS.
> 160 FT	1/6 SPAN PTS.

NOTE TO DESIGNER:
INSERT SHEET AS NEEDED INTO DESIGN DRAWINGS AND NUMBER AS FOLLOWS:
UBTXX-X, UDBTXX-X, OR UBTXXPT-X

UTAH DEPARTMENT OF TRANSPORTATION
SALT LAKE CITY, UTAH
STRUCTURES DIVISION

DESIGN: _____ CHECK: _____
DRAWN: _____ CHECK: _____
DATE: _____ QUANT.: _____

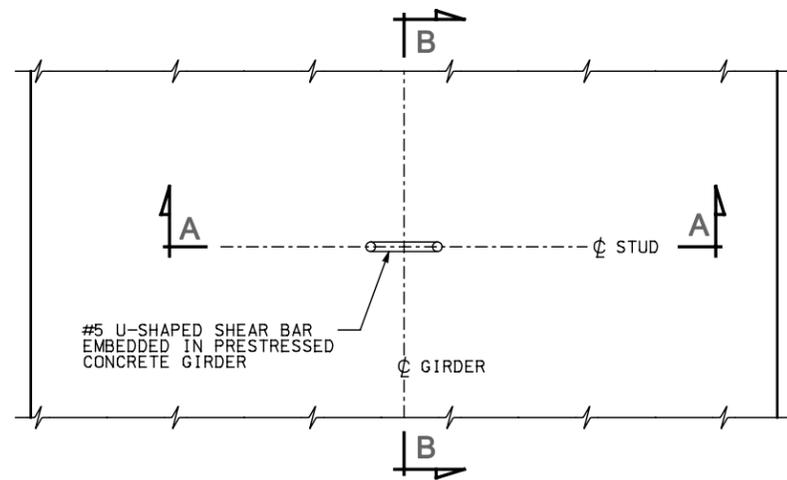
APPROVAL: _____ SENIOR DESIGN ENGR. DATE: _____
FOR USE BY UDOT DATE: _____ UDOT BRIDGE ENGR.

TYPICAL DETAIL SHEET
PRECAST BULB TEE GIRDER
DIAPHRAGM DETAILS

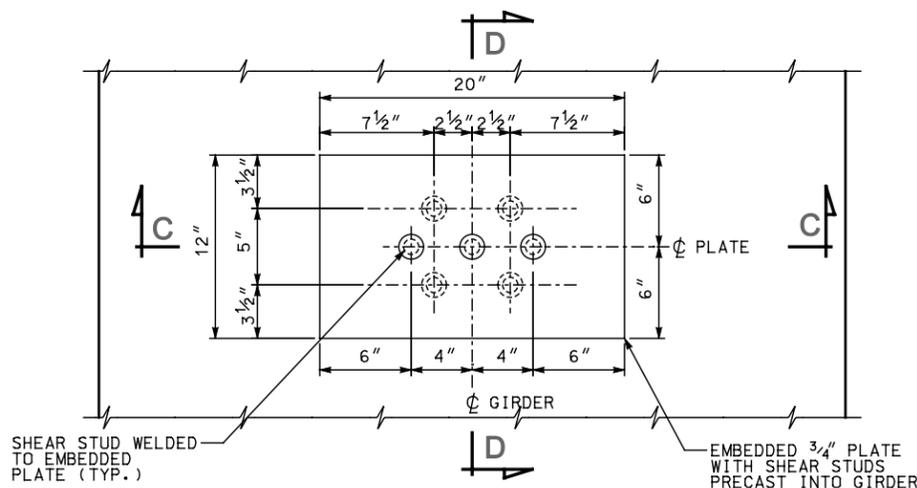
COUNTY: _____
BT - 4
DRG. NO.

SHT. OF

BT-4 DIAPHRAGM DETAILS.dgn 7/19/2010



**U-SHAPED SHEAR BAR
PLAN ON BULB TEE GIRDER**

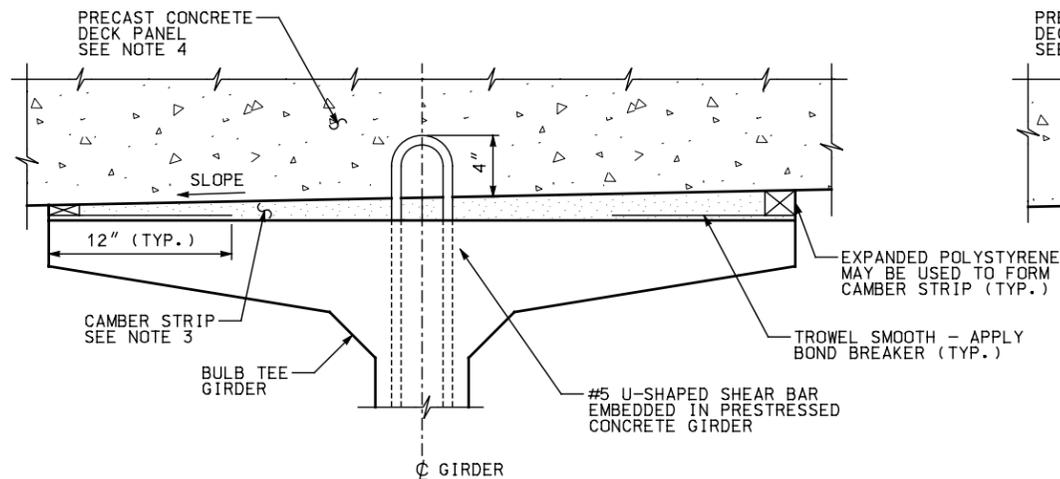


**OPTIONAL SHEAR STUD
PLAN ON BULB TEE GIRDER**

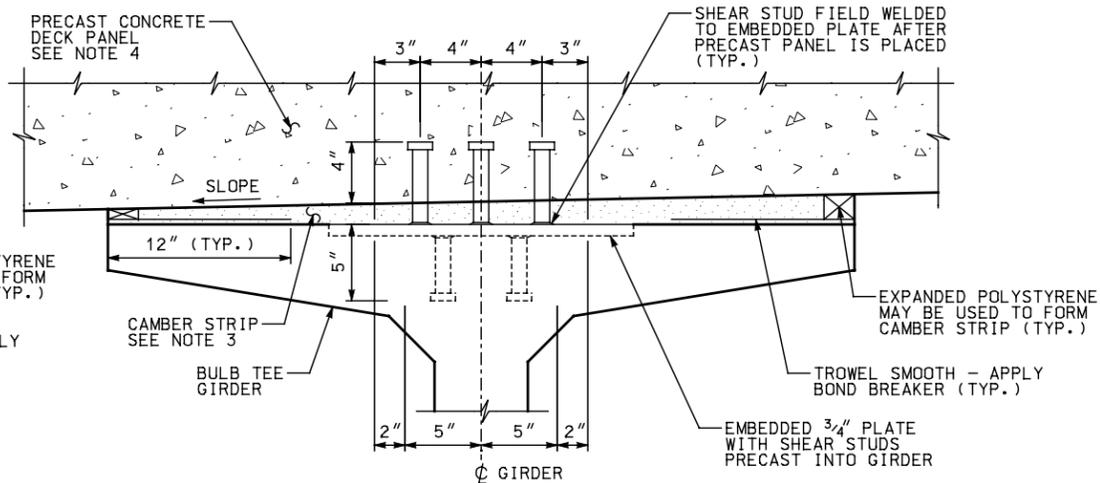
NOTE: ONE ROW OF STUDS SHOWN ON TOP.
MULTIPLE ROWS MAY BE USED.

NOTES

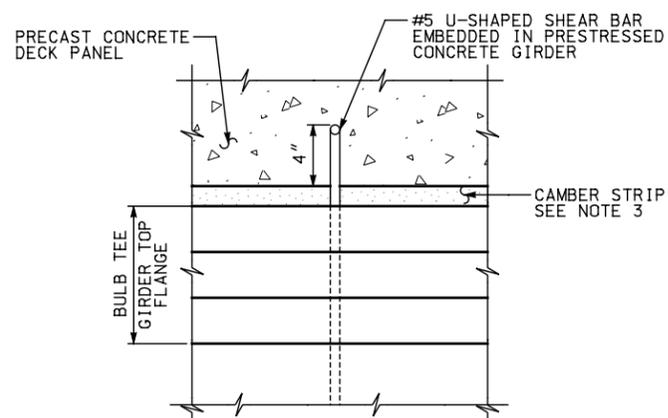
1. DETAILS DRAWN FOR 1" DIA. SHEAR STUDS.
2. CONTRACTOR TO DETERMINE METHOD FOR ACHIEVING WELDING GROUND FOR ATTACHMENT OF SHEAR STUDS. A WELDED GROUND LUG IS ACCEPTABLE PROVIDED THERE IS NO INTERFERENCE WITH PLACEMENT OF STUDS OR PLACEMENT OF PRECAST PANEL.
3. FORM CAMBER STRIP AND FILL WITH NON-SHRINK GROUT. METHOD OF FORMING CAMBER STRIP TO BE DETERMINED BY THE CONTRACTOR. REMOVE FORMS AFTER NON-SHRINK GROUT OBTAINS A COMPRESSIVE STRENGTH OF 3000 PSI.
4. FOR BLOCKOUT IN PRECAST PANELS SEE OPTIONS IN PRECAST PANEL DRAWINGS.



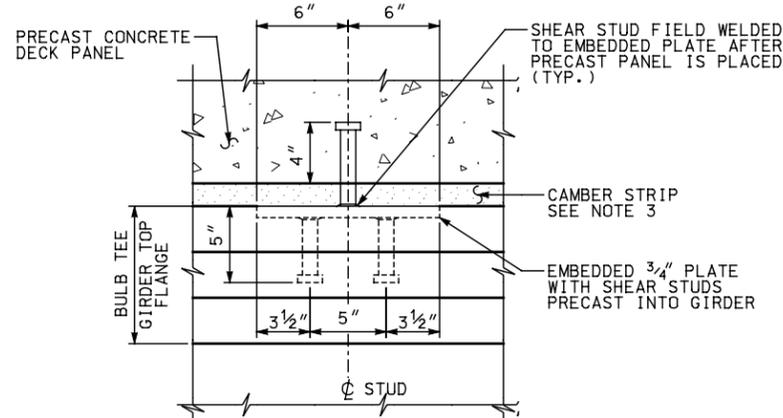
SECTION A-A: U-SHAPED SHEAR BAR



SECTION C-C: OPTIONAL SHEAR STUDS



SECTION B-B: U-SHAPED SHEAR BAR



SECTION D-D: OPTIONAL SHEAR STUDS

NOTE: ONE ROW OF STUDS SHOWN ON TOP.
MULTIPLE ROWS MAY BE USED.

NOTE TO DESIGNER:
INSERT SHEET AS NEEDED INTO DESIGN
DRAWINGS AND NUMBER AS FOLLOWS:
UBTXX-X, UDBTXX-X, OR UBTXXPT-X

UTAH DEPARTMENT OF TRANSPORTATION SALT LAKE CITY, UTAH STRUCTURES DIVISION		DESIGN	CHECK	REMARKS
		DRAWN	CHECK	REVISIONS
APPROVAL RECOMM.	DATE	SENIOR DESIGN ENGR.	DATE	BY
APPROVED FOR USE	DATE	UDOT BRIDGE ENGR.	DATE	NO.
TYPICAL DETAIL SHEET		PROJECT NUMBER		
PRECAST DECKS ON BULB TEE GIRDER WELDED STUD OPTION		COUNTY		
		BT - 5		
		DRG. NO.		
SHT.	OF			

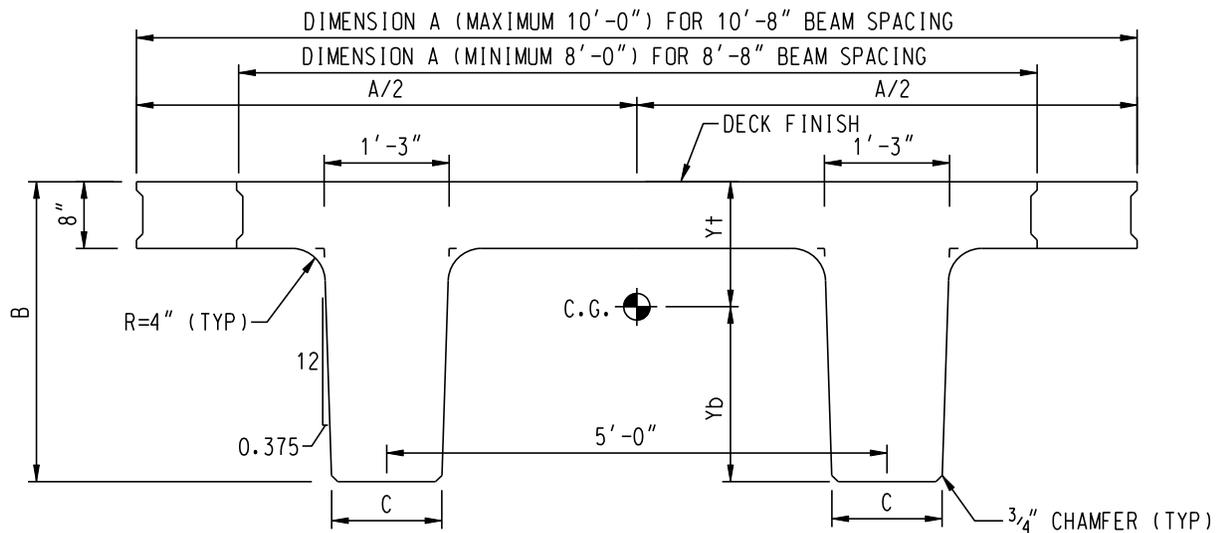
BT-5 WELDED STUD DETAILS.dgn

7/19/2010

APPENDIX H

DETAILS OF NEXT D BEAM FROM PCI-NE

Note: These are direct extract from
<<http://www.pcine.org/index.cfm/resources/bridge>>
(Last accessed June 25, 2012)



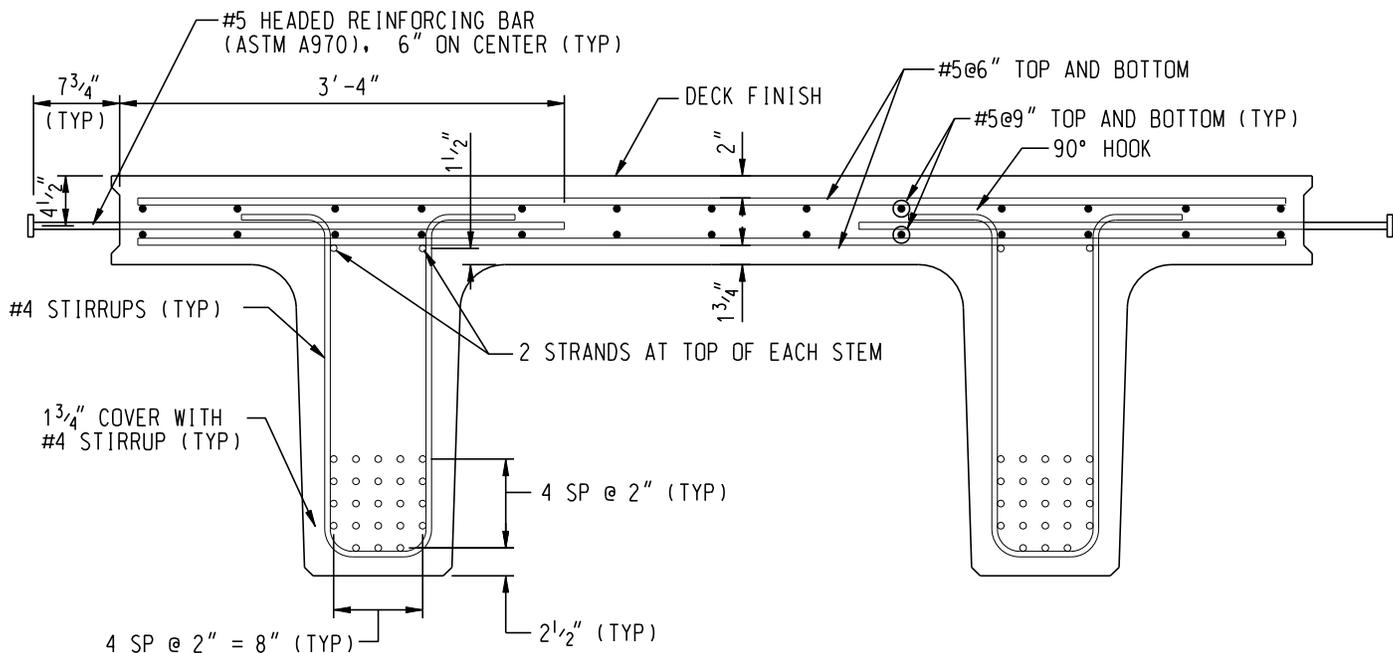
NEXT BEAM - SECTION PROPERTIES

BEAM DESIGNATION	BEAM WIDTH INCHES	BEAM DEPTH INCHES	BASE WIDTH INCHES	STEM WIDTH INCHES	AREA IN ²	I IN ⁴	Yb INCHES	Yt INCHES	S _t IN ³	S _b IN ³	WEIGHT PLF
	A	B	C				D	E			
MINIMUM WIDTH BEAMS											
NEXT 40 D	96.00	40.00	13.00		1666	238059	25.47	14.54	16378	9348	1735
NEXT 36 D	96.00	36.00	13.25		1562	176674	23.03	12.97	13624	7671	1627
NEXT 32 D	96.00	32.00	13.50		1455	126111	20.57	11.43	11033	6131	1516
NEXT 28 D	96.00	28.00	13.75		1346	85651	18.06	9.94	8620	4742	1402
MAXIMUM WIDTH BEAMS											
NEXT 40 D	120.00	40.00	13.00		1858	258171	26.55	13.45	19201	9722	1935
NEXT 36 D	120.00	36.00	13.25		1754	191453	24.01	11.99	15973	7973	1827
NEXT 32 D	120.00	32.00	13.50		1647	136502	21.44	10.57	12920	6368	1716
NEXT 28 D	120.00	28.00	13.75		1538	92597	18.80	9.20	10069	4924	1602

NOTES:

1. 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.
2. THE SPACING OF BEAMS ON A TYPICAL BRIDGE SHALL BE THE WIDTH OF THE BEAM PLUS 8" (EX.: BEAM SPACING = 10'-8" FOR THE 10'-0" SECTION).
3. BRIDGES WITH SMALL CURVATURE CAN BE BUILT USING THESE SECTIONS BY VARYING THE OVERHANG OF THE FASCIA BEAMS ALONG THE LENGTH. INTERIOR BEAMS SHOULD ALWAYS BE SYMMETRICAL ABOUT THE VERTICAL AXIS. NON-SYMMETRICAL SECTIONS ARE POSSIBLE, HOWEVER THE BEAM MAY REQUIRE A SPECIAL DESIGN WITH A NON-SYMMETRICAL STRAND PATTERN.
4. MODIFY THE FASCIA BEAM TO MATCH STATE STANDARDS.
5. THE STEM WIDTH AND SPACING ARE FIXED.
6. 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.

REVISIONS			NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS		PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST	
NO.	DATE	DESCRIPTION				
			BEAM PROPERTIES		 PCI WWW.PCINE.ORG	
			ISSUE DATE: 01-04-10	SHEET: NEXT D -01		



TYPICAL BEAM REINFORCING

DESIGN NOTES:

1. THE REINFORCING SHOWN IS BASED ON A PRELIMINARY DESIGN OF A 10 FOOT WIDE NEXT BEAM. DESIGNERS SHOULD VERIFY THIS REINFORCING FOR EACH DESIGN BASED ON THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS OR STATE STANDARDS.
2. THE STRIP METHOD SPECIFIED IN AASHTO LRFD ARTICLE 4.6.2.1 IS RECOMMENDED FOR THE DESIGN.
3. THE HEADED REINFORCING BARS SHOWN SHOULD BE DESIGNED TO RESIST THE POSITIVE BENDING MOMENT AT THE CENTER OF THE JOINT AS SPECIFIED BY AASHTO. THE NESTED HEADED BARS CAN BE CONSIDERED A LAP SPLICE WITH THE BARS FULLY DEVELOPED.
5. THE CRACK CONTROL PROVISIONS OF AASHTO ARTICLE 5.7.3.4. SHOULD ALSO BE CHECKED.
6. ADDITIONAL REINFORCEMENT MAY BE REQUIRED FOR DECK OVERHANGS AND BARRIERS.

NOTES:

1. THE TOP FLANGE IS INTENDED TO ACT AS A STRUCTURAL DECK.
2. SHEAR REINFORCING SHOULD BE KEPT TO #4 BARS IN ORDER TO MAXIMIZE THE COVER ON THE SIDE OF THE STEM.
3. SEE SHEET D-11 FOR UTILITY SUPPORT DETAILS.
4. MINOR ADJUSTMENT OF THE SPACING OF THE TOP LONGITUDINAL REINFORCEMENT IS ALLOWABLE TO FACILITATE THE INSTALLATION OF THE STIRRUPS.

REVISIONS		
NO.	DATE	DESCRIPTION
1	4 / 11	ADDED DESIGN NOTES

NORTHEAST EXTREME BRIDGE TEE
NEXT D BEAMS

PRECAST/PRESTRESSED CONCRETE
INSTITUTE NORTHEAST

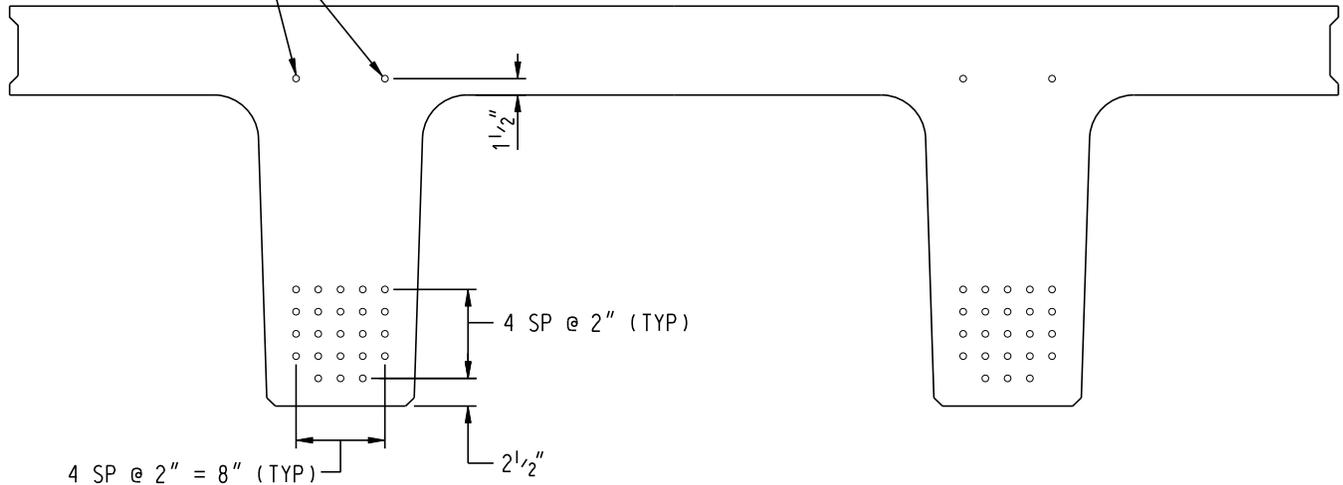
TYPICAL BEAM SECTION

ISSUE DATE: 01-04-10

SHEET: NEXT D -02

 **PCI** WWW.PCINE.ORG

2 STRANDS AT TOP OF STEM TO
SUPPORT REINFORCING (TYP)



TYPICAL STRAND LOCATIONS

(ENDS AND ALONG THE SPAN)

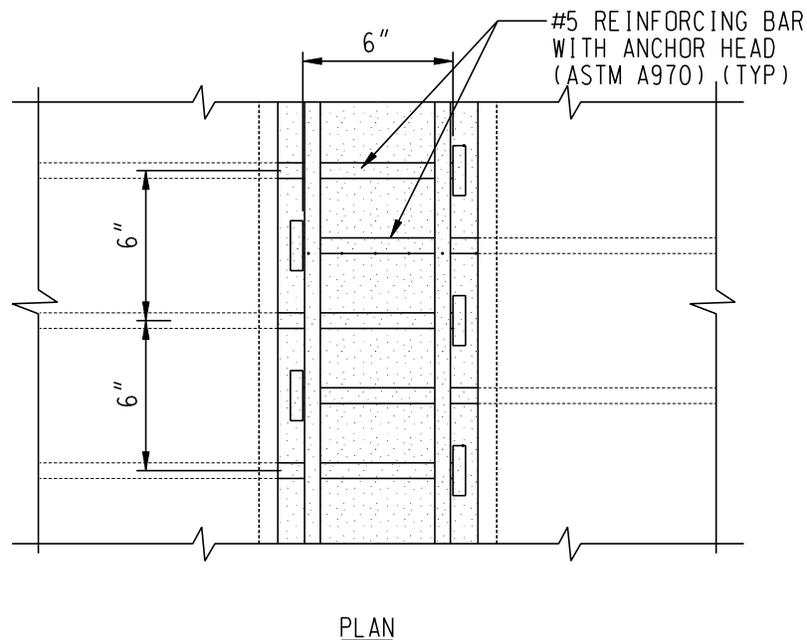
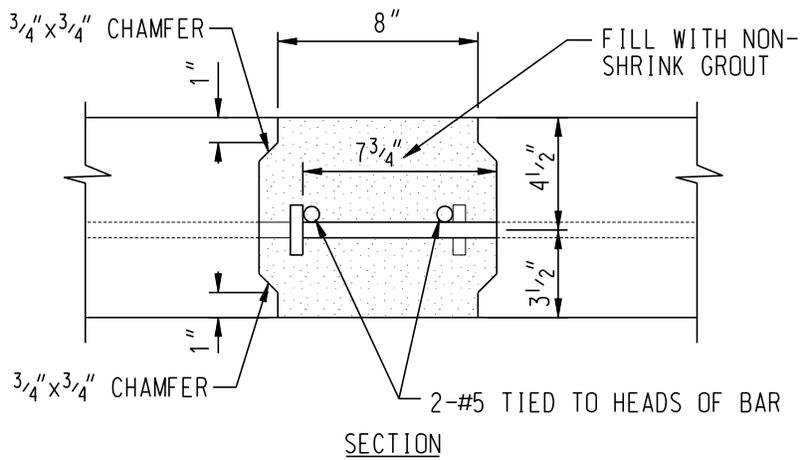
NOTES:

1. ◦ DENOTES STRAIGHT STRAND. DRAPED STRANDS ARE NOT PERMITTED.
2. 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 LRFD BRIDGE DESIGN SPECIFICATIONS SHALL ALSO BE FOLLOWED.
3. 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.
4. STRANDS SHALL BE PLACED WITHIN THE 2"x2" GRID. THE PATTERN MAY BE RAISED IN 2" INCREMENTS FOR DESIGNS THAT REQUIRE PRESTRESS AT A HIGHER ELEVATION. THE NUMBER AND LOCATION OF STRANDS SHALL BE AS REQUIRED BY DESIGN.
5. THE PATTERN SHOWN DEPICTS THE MAXIMUM NUMBER OF STRANDS ALLOWED (50 STRAND INCLUDING THE TOP STRAND). THIS IS BASED ON THE CAPACITY OF TYPICAL CASTING BEDS.
6. THE TWO BOTTOM CORNER STRAND IN EACH STEM ARE OMITTED TO PROVIDE ROOM FOR THE SHEAR REINFORCEMENT BAR BENDS.
7. ALL PRESTRESSING STRAND SHALL BE 0.6" DIAMETER, UNCOATED SEVEN WIRE, LOW RELAXATION STRANDS CONFORMING TO AASHTO M203. THE ULTIMATE STRENGTH OF THE STRANDS SHALL BE 270 KSI.
8. ADDITIONAL STRAND TENSIONED TO A NOMINAL VALUE MAY BE ADDED TO THE TOP FLANGE TO SUPPORT THE TOP FLANGE REINFORCING.

REVISIONS		
NO.	DATE	DESCRIPTION

NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS	
TYPICAL STRAND LOCATIONS	
ISSUE DATE: 01-04-10	SHEET: NEXT D - 03

PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST  PCI WWW.PCINE.ORG
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FLANGE CONNECTOR DETAILS

- NOTES:
- CONNECTOR REINFORCING TO BE PLACED ALONG THE ENTIRE SPAN WITH 6" SPACING.
 - FOR SKEWED BRIDGES, PLACE CONNECTOR REINFORCING PERPENDICULAR TO BEAM EDGE. BEND CONNECTOR REINFORCING WITHIN THE FLANGE IN ACUTE CORNERS TO PRODUCE A SQUARE PROJECTION.
 - METHOD OF FORMING CLOSURE POUR TO BE DETERMINED BY THE CONTRACTOR. THE FORMS NEEDS TO BE REMOVABLE AND ABLE TO ACCOMMODATE DIFFERENTIAL CAMBER. FORM SUPPORTS SHOULD NOT PENETRATE THROUGH TOP OF POUR UNLESS APPROVED BY THE ENGINEER.
 - CLOSURE POUR MATERIAL TO BE A NON SHRINK MIX THAT HAS A MINIMUM COMPRESSIVE STRENGTH OF 7000 PSI. THE GROUT MAY BE EXTENDED WITH AGGREGATE.
 - SAND BLASTING OF THE FACES OF THE KEYS JUST PRIOR TO INSTALLATION IS RECOMMENDED TO IMPROVE GROUT BOND.
 - DESIGNERS ARE RESPONSIBLE FOR THE VERIFICATION OF THE DESIGN OF THIS JOINT. THIS DETAIL CAN BE CONSIDERED EQUIVALENT TO A TENSION LAP SPILCE. IF MORE MOMENT CAPACITY IS REQUIRED, THE LOCATION OF THE BAR MAY BE LOWERED. SEE SHEET 02 FOR INFORMATION ON THE DESIGN OF THIS JOINT.

REVISIONS		
NO.	DATE	DESCRIPTION
1	4 / 11	ADDED NOTE 6

NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS	
BEAM CONNECTOR DETAILS	
ISSUE DATE: 01-04-10	SHEET: NEXT D - 04

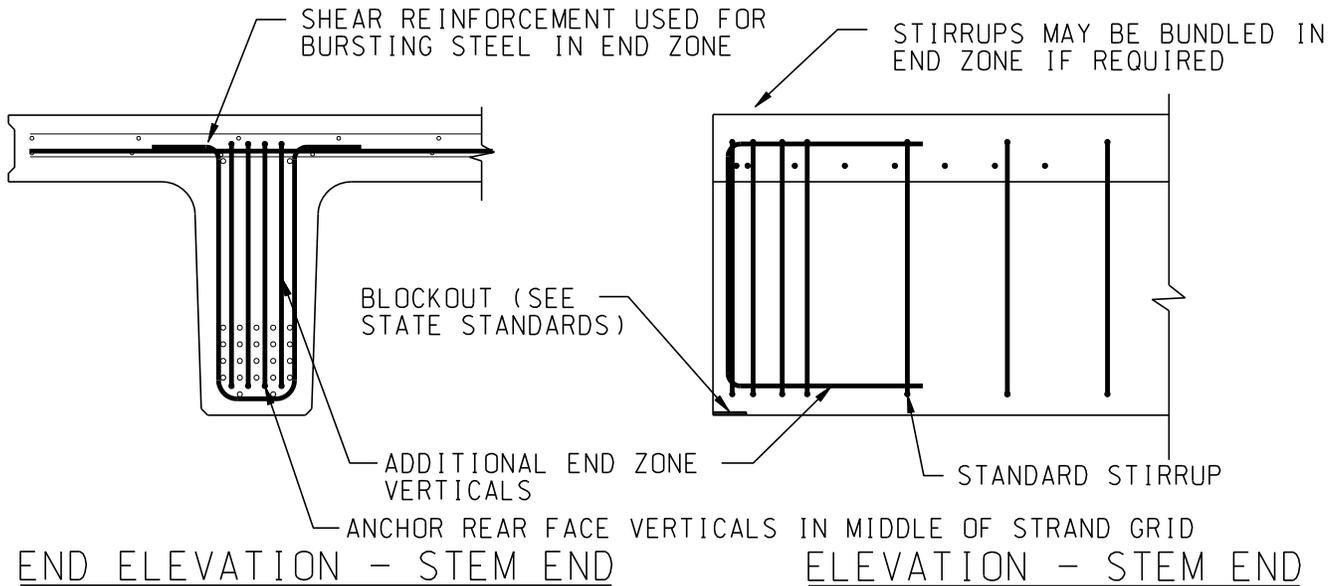
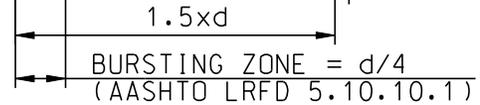
PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST  PCI WWW.PCINE.ORG
--

#4 BARS PLACED AT BOTTOM OF TOP FLANGE. SEE NOTE 3

RECOMMENDED 30 DEGREES MAX. BEAMS MAY BE FABRICATED WITH HIGHER SKEWS, HOWEVER ADDITIONAL CRACKING IN THE TOP FLANGE MAY OCCUR

BURSTING ZONE VERTICAL REINFORCING SEE NOTE 1

PLAN - SKEWED END



BEAM END REINFORCING DETAILS

NOTES:

1. THE BARS SHOWN ARE APPROXIMATELY THE MAXIMUM NUMBER THAT CAN BE FIT WITHIN THE NEXT 28 D 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.

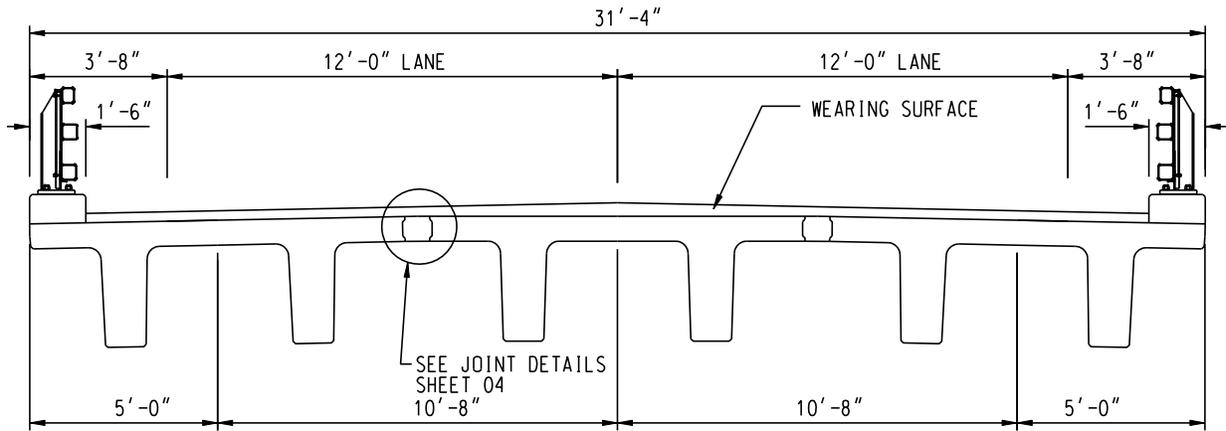
REVISIONS		
NO.	DATE	DESCRIPTION

NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS	
BEAM END DETAILS	
ISSUE DATE: 01-04-10	SHEET: NEXT D - 05

PRECAST/PRESTRESSED CONCRETE
INSTITUTE NORTHEAST

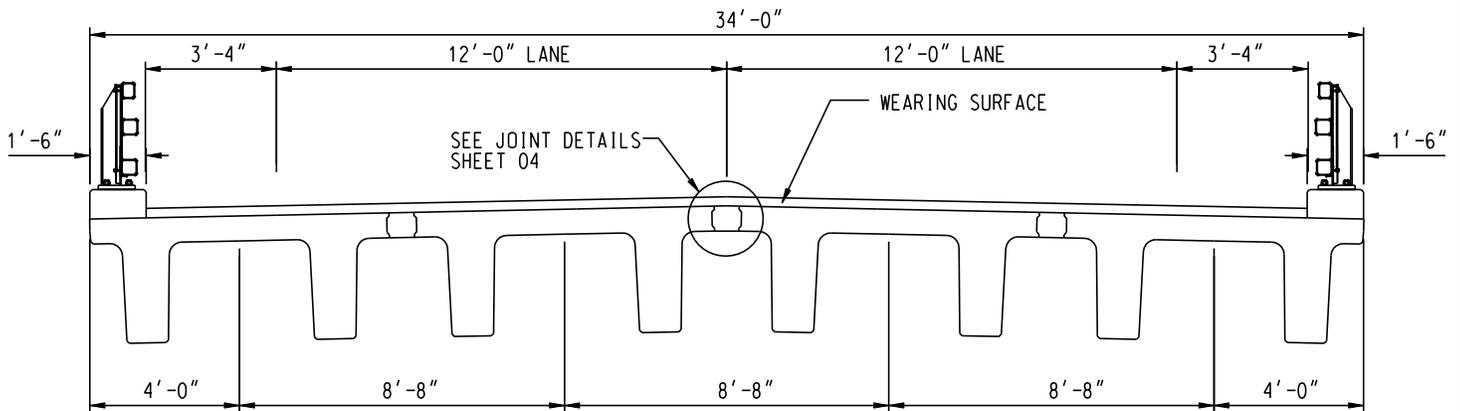


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BRIDGE SECTION WITH MAXIMUM WIDTH BEAMS

TRIAL MAXIMUM SPAN DESIGN - NEXT 40 D x 120"
 MAXIMUM SPAN = APPROX. XX FEET (f'c = 8 KSI)



BRIDGE SECTION WITH MINIMUM WIDTH BEAMS

TRIAL MAXIMUM SPAN DESIGN - NEXT 40 D x 96"
 MAXIMUM SPAN = APPROX. XX FEET (f'c = 8 KSI)

NOTES:

1. THE TWO BRIDGE SECTIONS DEPICTED REPRESENT THE TYPICAL USE OF THE MINIMUM WIDTH AND MAXIMUM WIDTH NEXT BEAMS.
2. THESE SECTIONS WERE USED TO DEVELOP THE BEAM SPAN TABLES DEPICTED ON SHEETS 08 THROUGH 10. THE SPAN TABLES ARE FOR THREE DIFFERENT CONCRETE STRENGTHS: f'c = 10 KSI, 8 KSI, AND 6 KSI. THE SPAN TABLES ARE FOR REFERENCE ONLY. ALTERNATE BRIDGE CONFIGURATIONS WITH DIFFERENT PARAPETS AND OVERLAYS WILL RESULT IN DIFFERENT MAXIMUM SPAN LENGTHS AND STRANDS.
3. THE ABUTMENT SEATS SHOULD BE CAST TO FOLLOW THE PROFILE OF THE BOTTOM STEM OF THE NEXT BEAMS. SKEWED SUBSTRUCTURES MAY REQUIRE ADJUSTABLE BEAM SEATS UNDER THE STEM BEARINGS.

REVISIONS		
NO.	DATE	DESCRIPTION
1	05/01/08	MODIFIED NOTE 1 TEXT TO CLARIFY USE OF SECTIONS

NORTHEAST EXTREME BRIDGE TEE
 NEXT D BEAMS

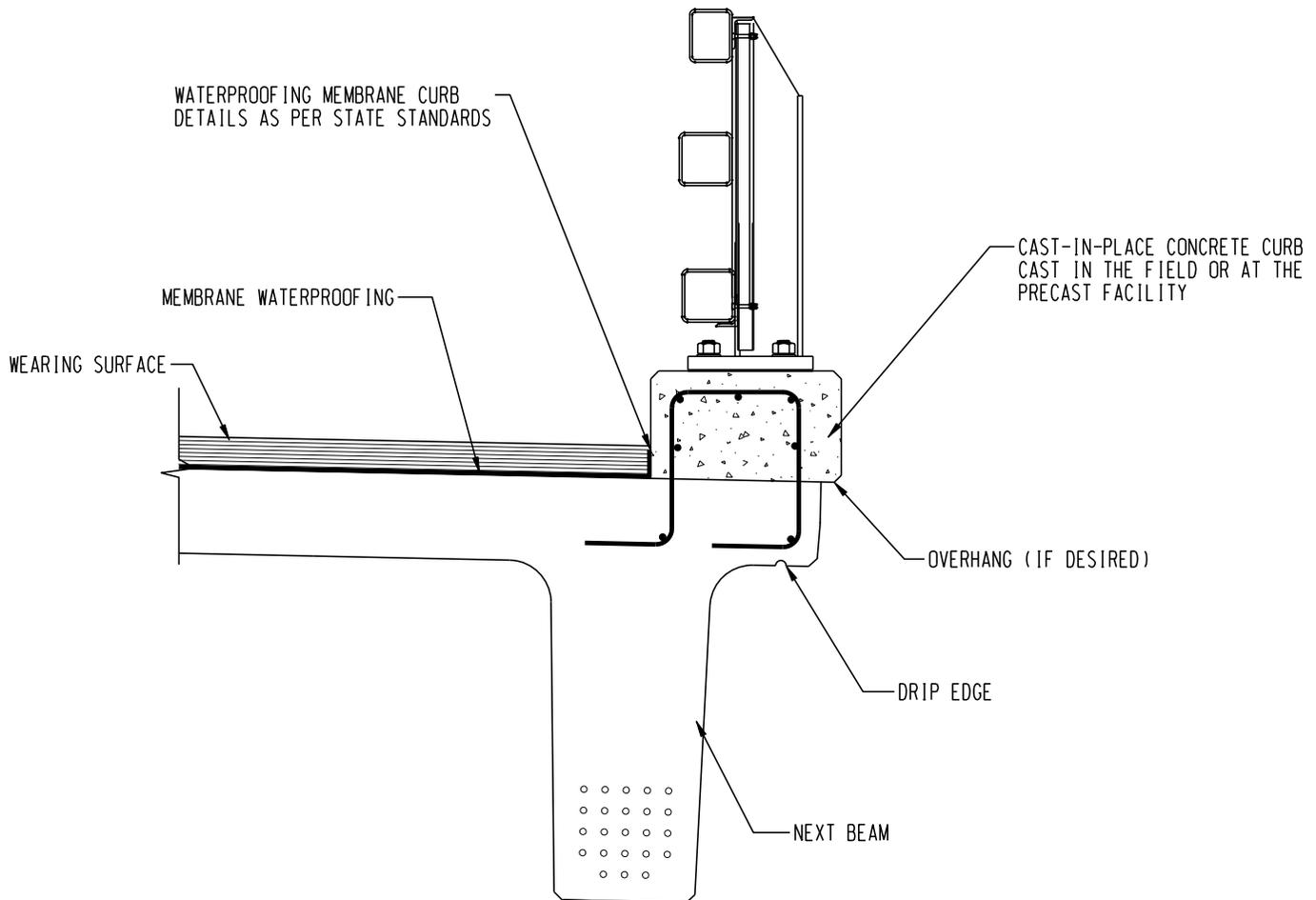
TYPICAL BRIDGE SECTIONS

ISSUE DATE: 01-04-10 SHEET: NEXT D - 06

PRECAST/PRESTRESSED CONCRETE
 INSTITUTE NORTHEAST



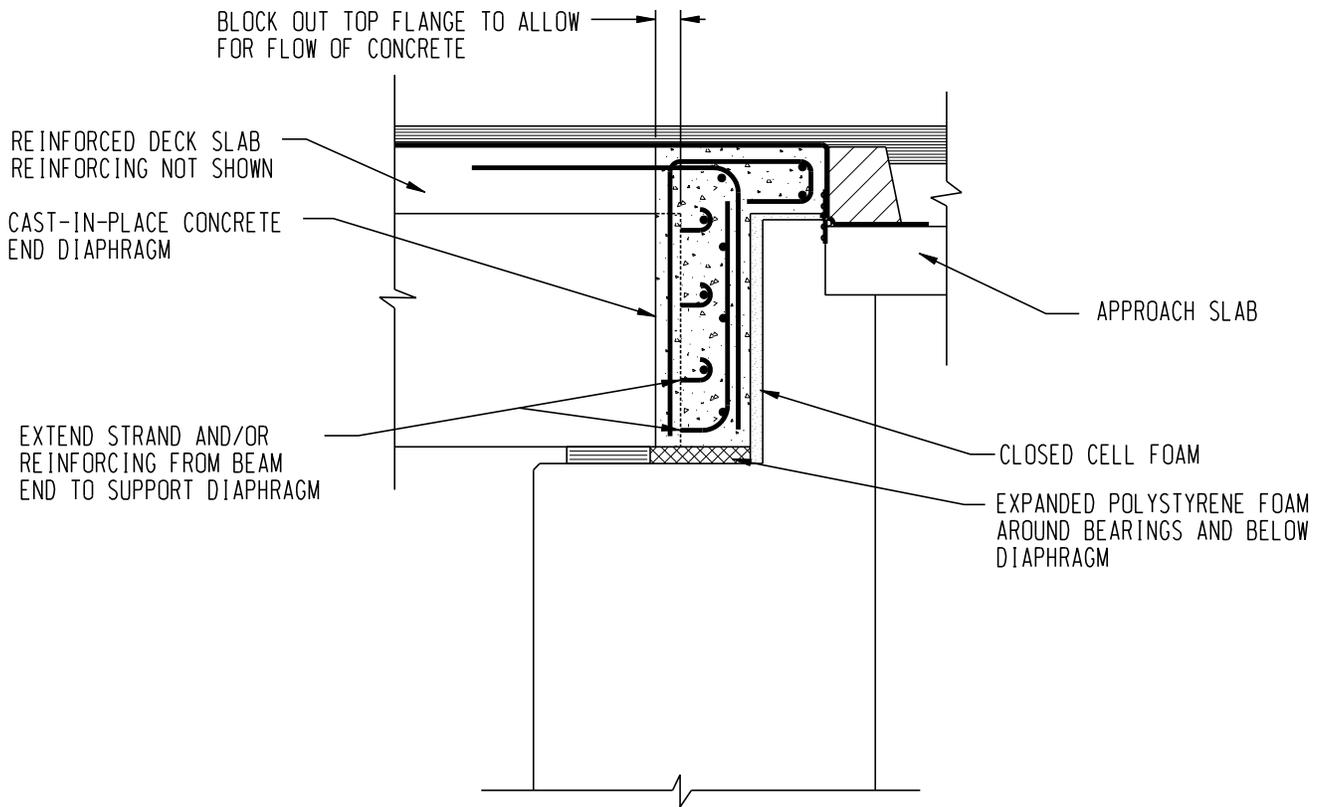
PCI WWW.PCINE.ORG



NOTES: THIS DETAIL IS SCHEMATIC. ACTUAL DETAIL WOULD NEED TO BE FULLY DESIGNED.
 STEEL RAIL IN CURB SHOWN, OTHER PARAPETS SIMILAR.
 THIS DETAIL CAN BE MODIFIED FOR ANY TYPICAL PARAPET SHAPE INCLUDING F SHAPE PARAPETS.
 ANCHOR BOLTS NOT SHOWN IN CURB.
 ALL REINFORCING IN BEAM NOT SHOWN.

TYPICAL SECTION PARAPET ATTACHMENT

REVISIONS			NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS		PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST			
NO.	DATE	DESCRIPTION	PRECAST PARAPET OPTION		 PCI WWW.PCINE.ORG			
			ISSUE DATE: 01-04-10				SHEET: NEXT D - 07	



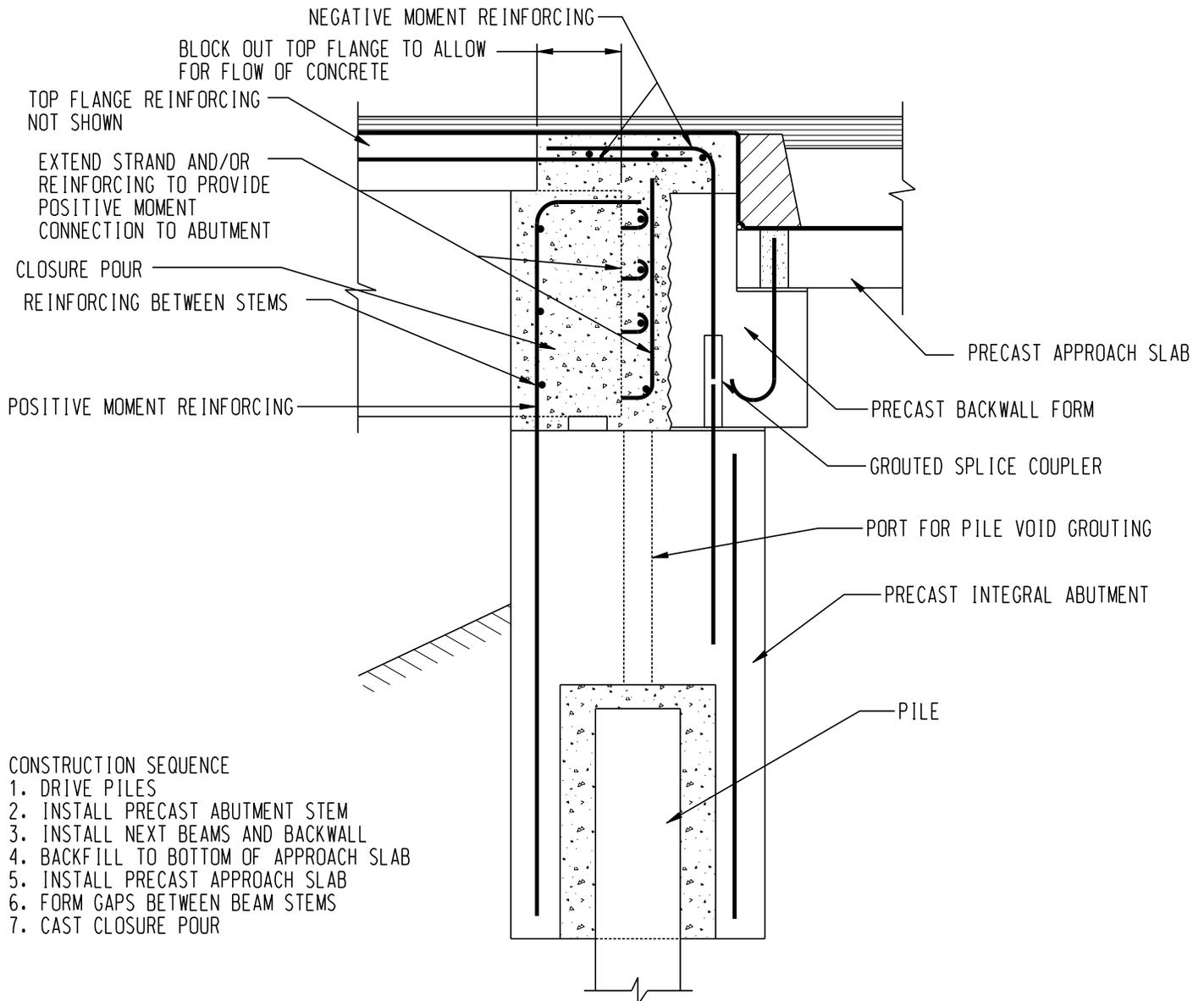
SECTION THROUGH DIAPHRAGM

SAMPLE END DIAPHRAGM DETAIL CANTILEVER ABUTMENT

NOTES:

1. THE DETAILS SHOWN DO NOT REQUIRE THE USE OF INSERTS OR HOLES IN THE BEAM STEMS. THIS METHOD FACILITATE FABRICATION AND IS PREFERRED.
2. THESE DETAILS ARE SIMILAR TO MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARDS. DETAILS FOR OTHER STATES WILL VARY.
3. 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.
4. INTERMEDIATE DIAPHRAGMS ARE NOT REQUIRED.
5. IF THE TOP FLANGE IS BLOCKED OUT AS SHOWN, IT IS RECOMMENDED THAT THE SOME OR ALL OF THE STRANDS BE DEBONDED OVER THE SAME LENGTH TO MINIMIZE CRACKING AT RELEASE.

REVISIONS			NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS		PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST	
NO.	DATE	DESCRIPTION				
			SAMPLE DIAPHRAGM DETAILS		 PCI WWW.PCINE.ORG	
			ISSUE DATE: 01-04-10	SHEET: NEXT D - 08		

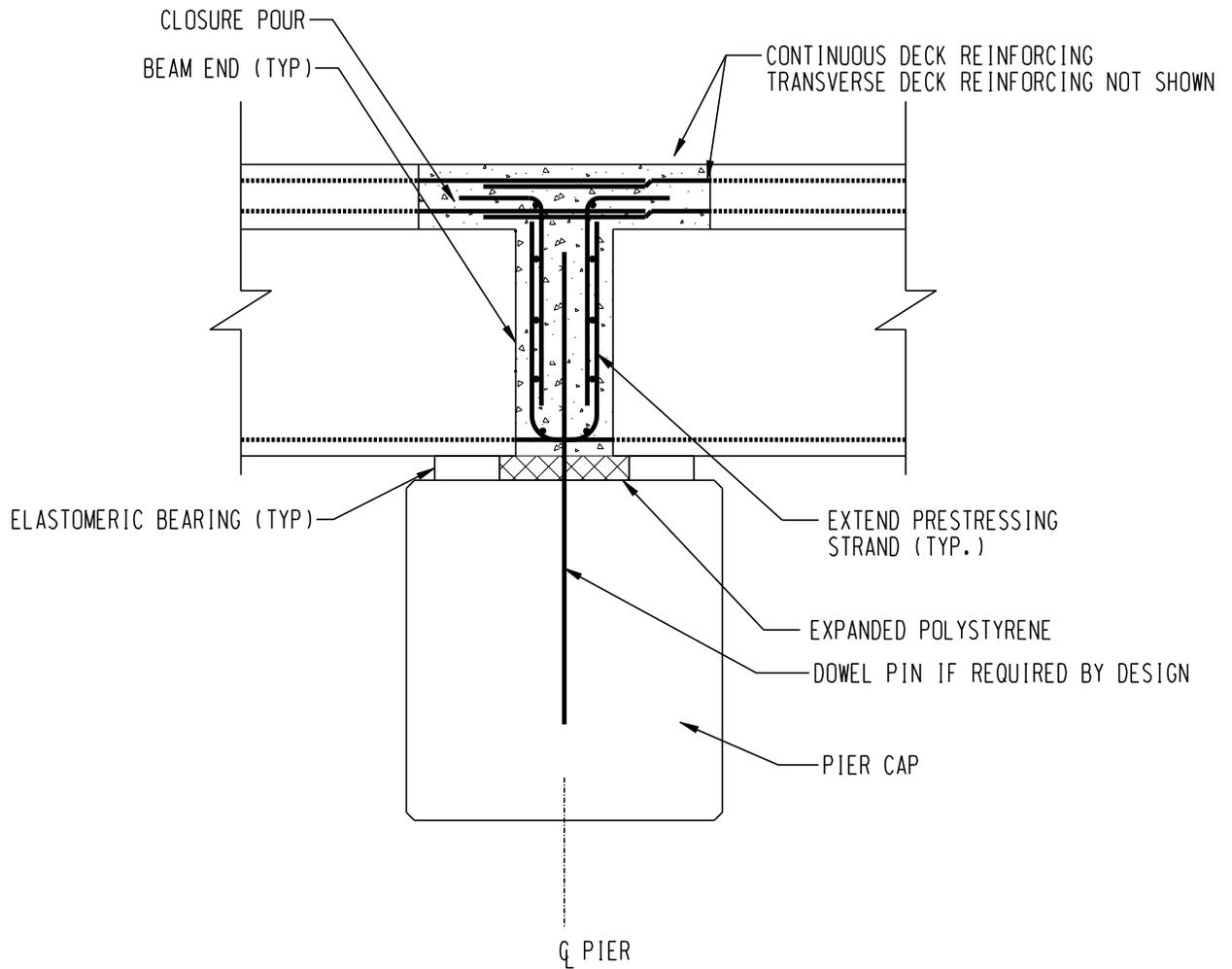


CONCEPTUAL INTEGRAL ABUTMENT SECTION

NOTES:

1. THESE DETAILS ARE BASED ON MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARDS. DETAILS FOR OTHER STATES WILL VARY.
2. A PRECAST PIECE SIMILAR TO THE BACKWALL PIECE CAN BE USED AT THE ENDS OF THE ABUTMENT ALSO.

REVISIONS			NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS		PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST
NO.	DATE	DESCRIPTION	SAMPLE DIAPHRAGM DETAILS		
			ISSUE DATE: 01-04-10		PCI WWW.PCINE.ORG
			SHEET: NEXT D - 09		



SAMPLE PIER CONTINUITY DETAIL

NOTES:

1. THE DETAILS SHOWN ARE SCHEMATIC. REFER TO STATE STANDARDS FOR SPECIFIC DETAILS.

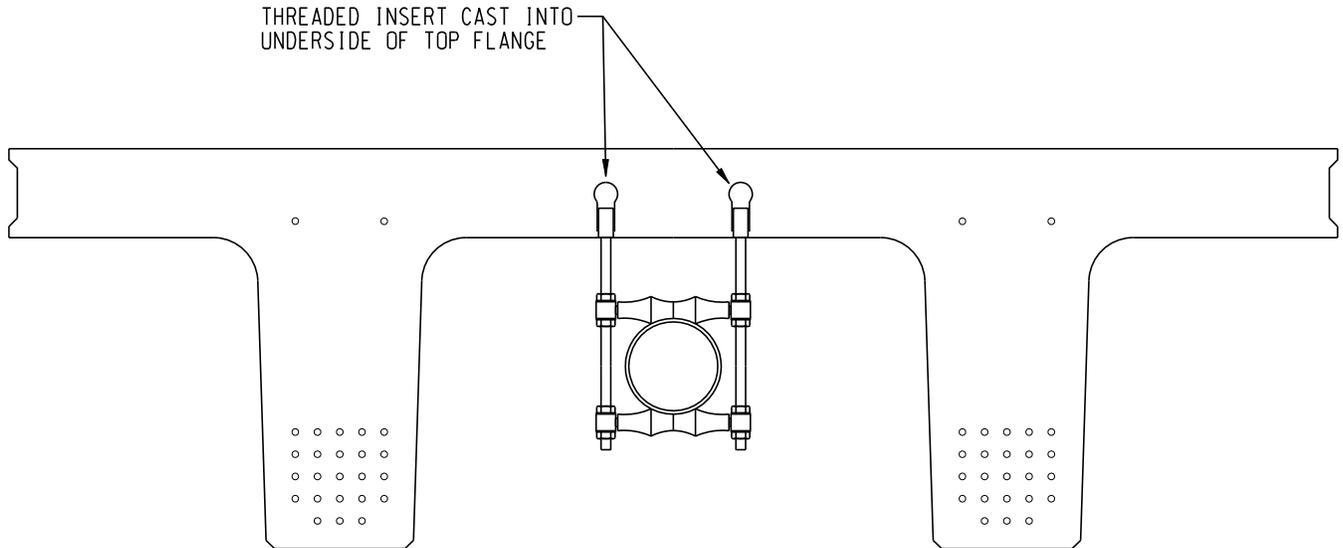
REVISIONS		
NO.	DATE	DESCRIPTION

NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS	
PIER CONTINUITY DETAIL	
ISSUE DATE: 01-04-10	SHEET: NEXT D - 10

PRECAST/PRESTRESSED CONCRETE
INSTITUTE NORTHEAST



PCI WWW.PCINE.ORG

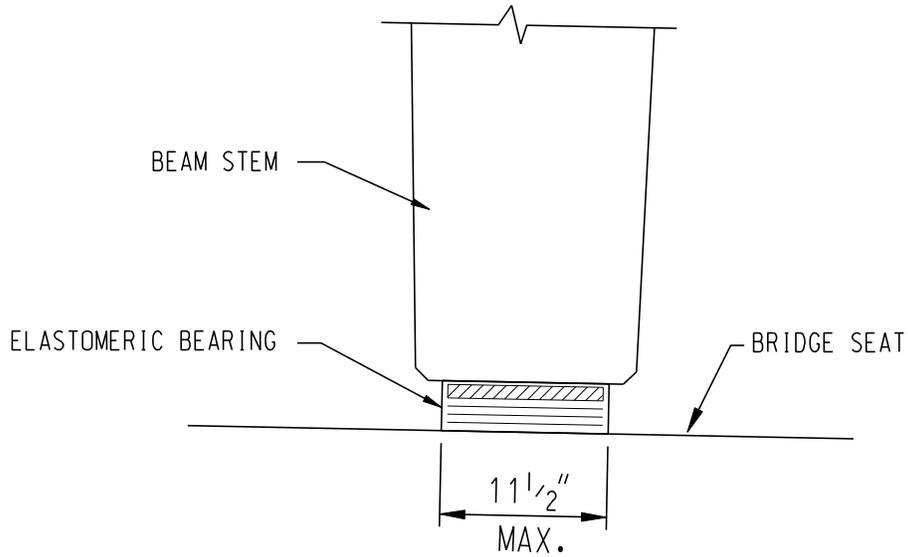


SAMPLE UTILITY SUPPORT DETAILS

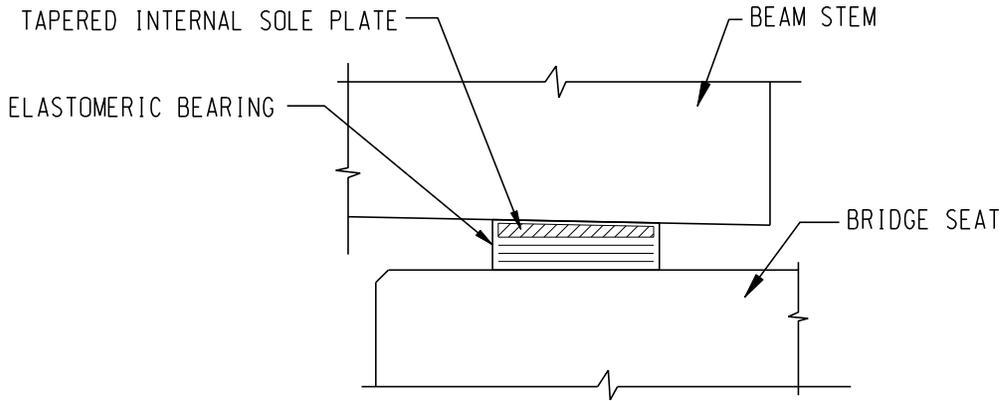
NOTES:

1. HANGER RODS FOR UTILITIES SHOULD BE ATTACHED TO THE BEAM BY MEANS OF CAST-IN-PLACE INSERTS. OVERHEAD DRILLED-IN ANCHORS SHOULD NOT BE USED. REFER TO STATE POLICIES FOR OVERHEAD ANCHORING.
2. PLACEMENT OF THE ANCHORS IN THE FLANGE IS PREFERRED. PLACEMENT OF ANCHORS IN THE STEM MAY BE CONSIDERED, HOWEVER THE POTENTIAL FOR INTERFERENCE WITH THE STEM REINFORCING AND STRAND SHOULD BE INVESTIGATED.
3. ONE TYPE OF UTILITY SHOWN, OTHER UTILITIES SIMILAR. REFER TO INDIVIDUAL UTILITY COMPANY DETAILS.

REVISIONS			NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS		PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST PCI WWW.PCINE.ORG
NO.	DATE	DESCRIPTION	UTILITY SUPPORT DETAIL		
			ISSUE DATE: 01-04-10	SHEET: NEXT D -11	



FRONT ELEVATION



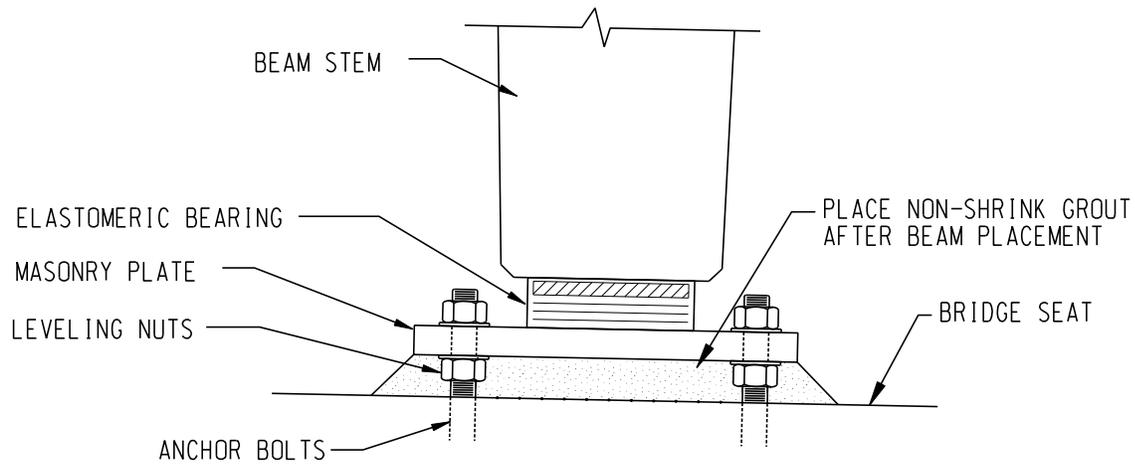
SIDE ELEVATION

TAPERED ELASTOMERIC BEARING DETAILS

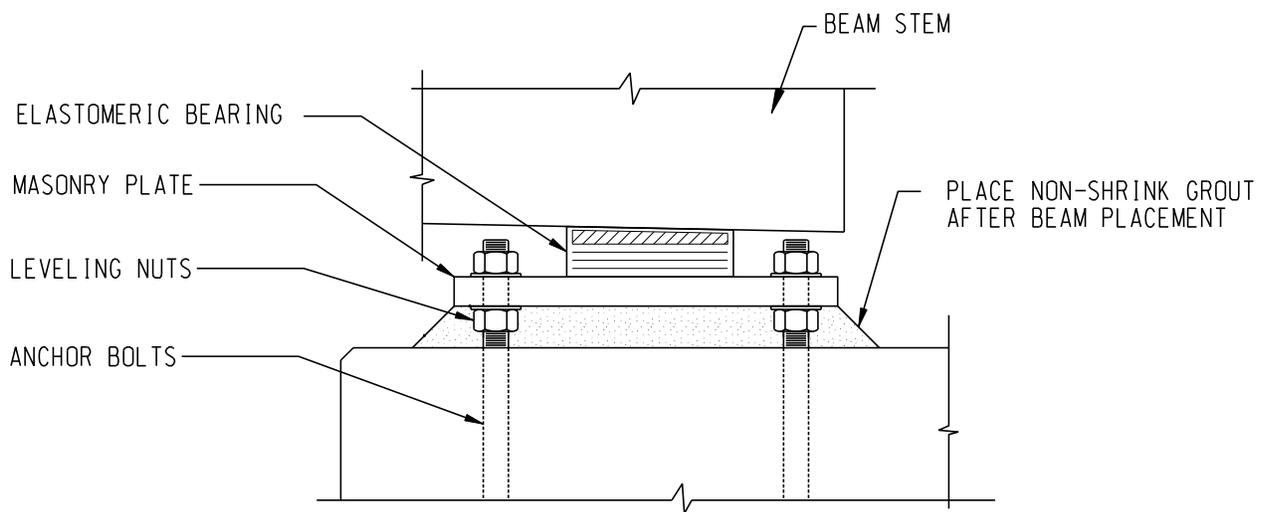
NOTES:

1. THESE DETAILS ARE SIMILAR TO MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARDS INCLUDING THE USE OF AN EMBEDDED TAPERED STEEL SOLE PLATE. DETAILS FOR OTHER STATES WILL VARY.
2. BRIDGE SEAT AND BEARING MAY BE SLOPED TO MATCH THE CROSS SLOPE OF THE ROADWAY ABOVE.

REVISIONS			NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS		PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST	
NO.	DATE	DESCRIPTION				
			BEARING DETAILS 1		 PCI WWW.PCINE.ORG	
			ISSUE DATE: 01-04-10	SHEET: NEXT D -12		



FRONT ELEVATION



SIDE ELEVATION

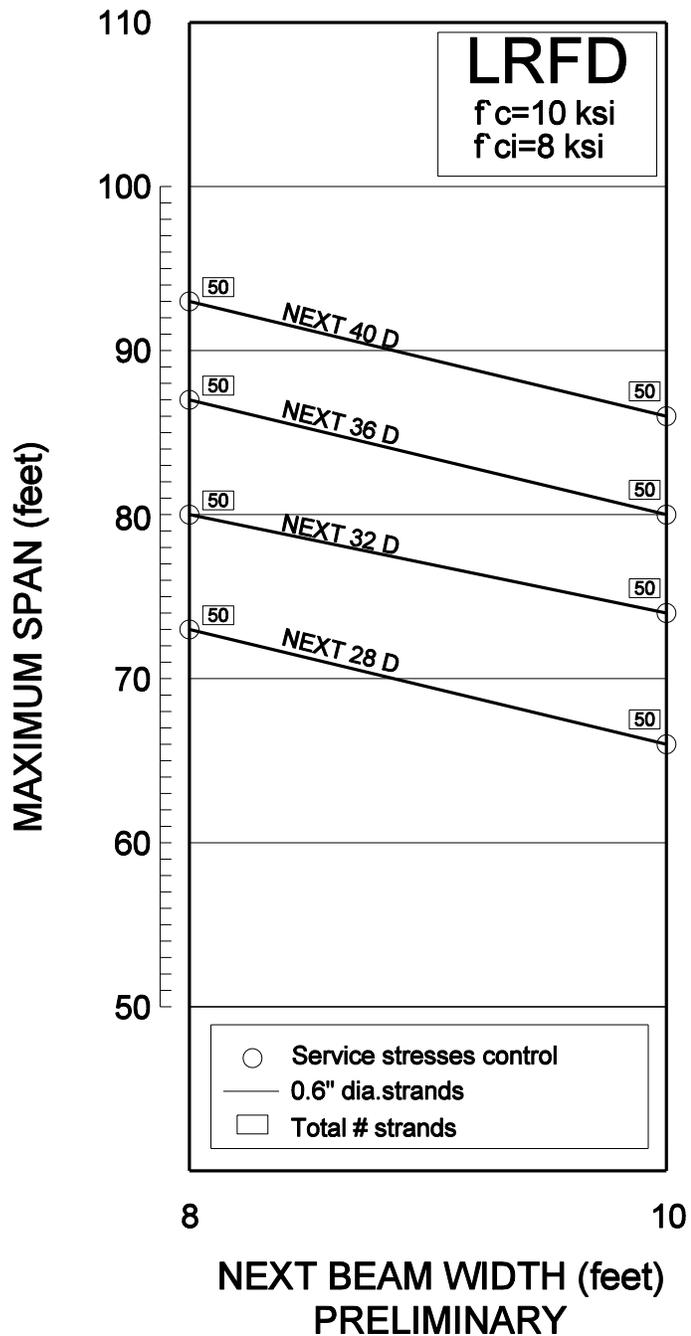
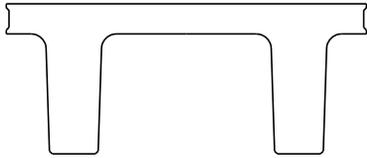
OPTIONAL ADJUSTABLE MASONRY PLATE DETAILS

NOTES:

1. THESE DETAILS ARE ONLY REQUIRED FOR NON-INTEGRAL SUBSTRUCTURES.
2. GRADE ADJUSTMENT PLATES CAN BE USED WITH NARROW OR WIDE BEARING DETAILS.
3. SIZE THE SOLE PLATE TO SUPPORT THE SELF WEIGHT OF THE BEAMS. PLACE GROUT PRIOR TO PLACING ADDITIONAL LOAD ON THE BEARING.
4. BRIDGE SEAT AND MASONRY PLATE MAY BE SLOPED TO MATCH THE CROSS SLOPE OF THE ROADWAY ABOVE.
5. IT IS RECOMMENDED THAT THE LEVELING BOLTS BE SET PRIOR TO RELEASE OF THE BEAM FROM THE CRANE.

REVISIONS			NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS		PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST	
NO.	DATE	DESCRIPTION				
			BEARING DETAILS 2		 PCI WWW.PCINE.ORG	
			ISSUE DATE: 01-04-10	SHEET: NEXT D -13		

Chart NEXT-1
Northeast Extreme Tee - NEXT



DESIGN PARAMETERS	
1.	18 inch wide concrete curbs with steel rail
2.	3 inch thick bituminous concrete overlay
3.	Beam $f'c = 10000$ psi
4.	Beam $f'ci = 8000$ psi
5.	Debond up to 25% of strand
6.	AASHTO LRFD design with allowable tensile stresses for extreme exposure
7.	Straight strand only
8.	No utility loads
9.	Design for interior beam
10.	Live load distribution factor based on composite deck stringer bridge, AASHTO cross section Type I

NOTE: EACH BEAM HAS 4 FULLY TENSIONED STRANDS LOCATED 7.5 INCHES FROM THE TOP OF THE BEAM

REVISIONS		
NO.	DATE	DESCRIPTION

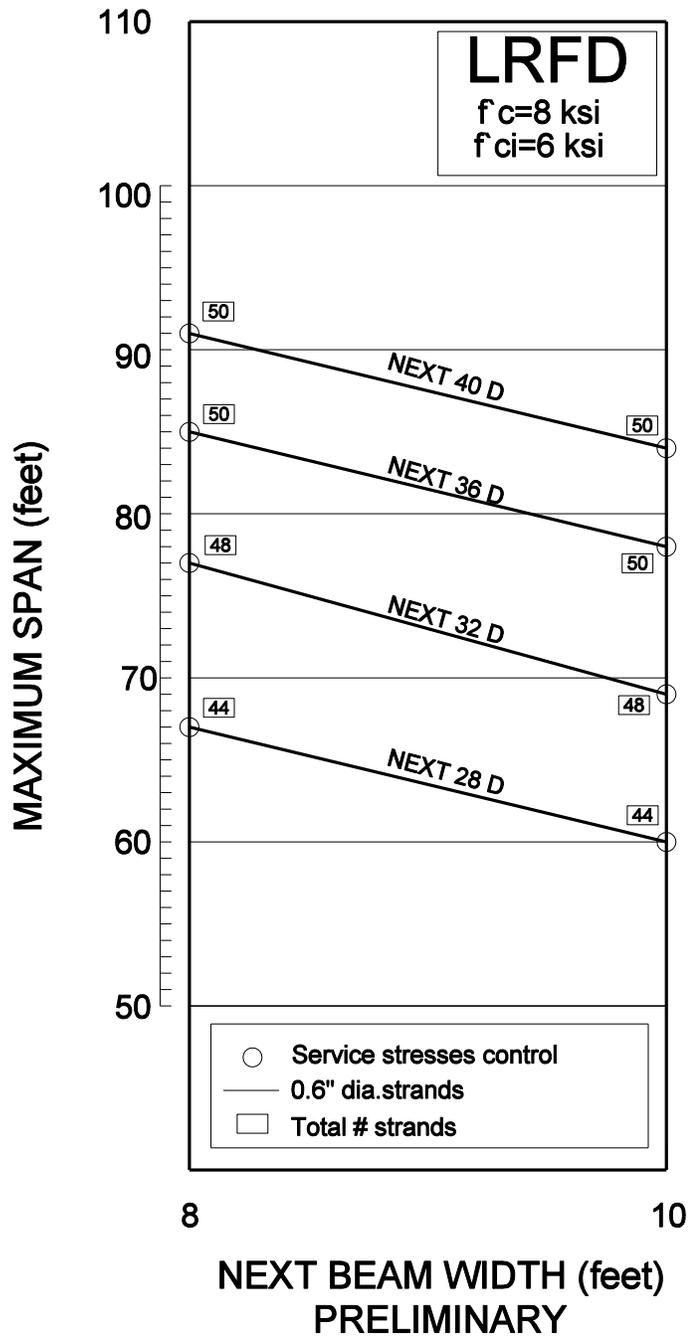
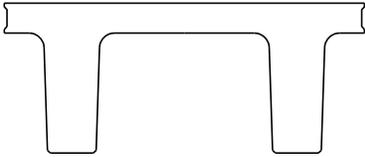
NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS	
SPAN CHART ($f'c = 10$ KSI)	
ISSUE DATE: 01-04-10	SHEET: NEXT D - 14

PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST



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Chart NEXT-2
Northeast Extreme Tee - NEXT



DESIGN PARAMETERS	
1.	18 inch wide concrete curbs with steel rail
2.	3 inch thick bituminous concrete overlay
3.	Beam $f'_c = 8000$ psi
4.	Beam $f'_{ci} = 6000$ psi
5.	Debond up to 25% of strand
6.	AASHTO LRFD design with allowable tensile stresses for extreme exposure
7.	Straight strand only
8.	No utility loads
9.	Design for interior beam
10.	Live load distribution factor based on composite deck stringer bridge, AASHTO cross section Type I

NOTE: EACH BEAM HAS 4 FULLY TENSIONED STRANDS LOCATED 7.5 INCHES FROM THE TOP OF THE BEAM

REVISIONS		
NO.	DATE	DESCRIPTION

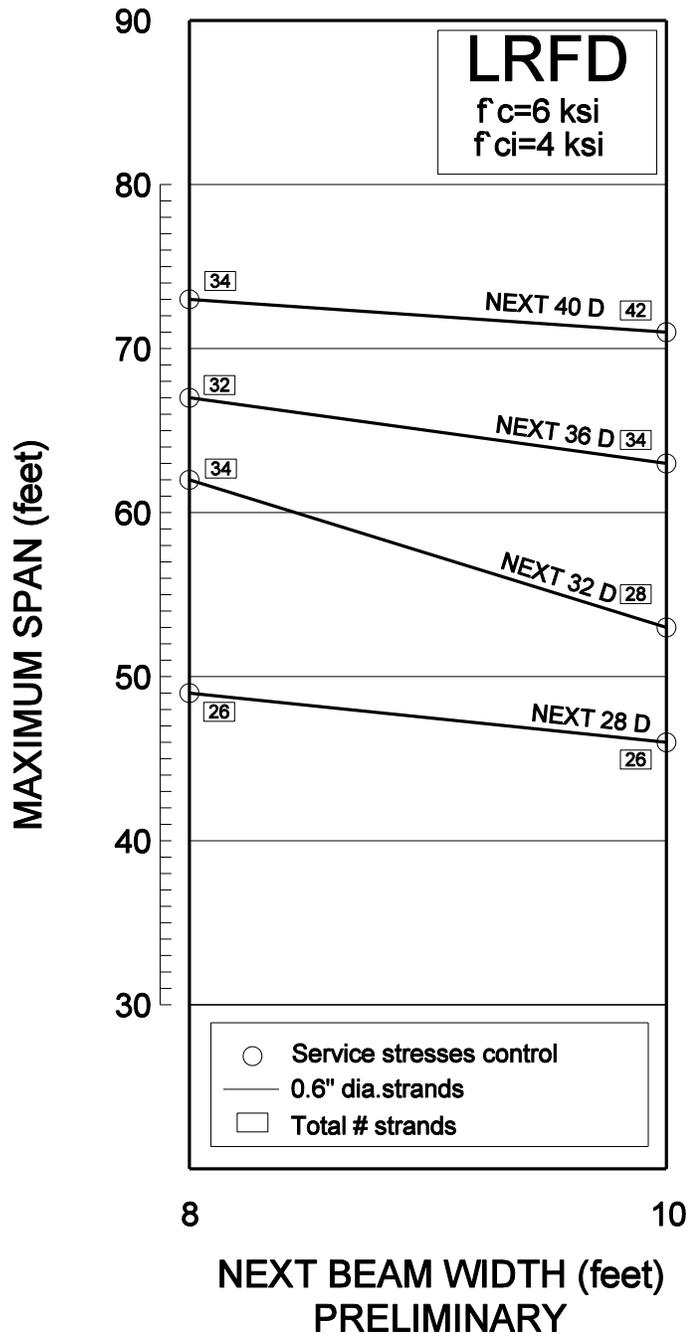
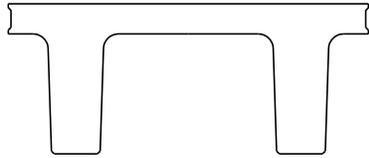
NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS	
SPAN CHART ($f'_c = 8$ KSI)	
ISSUE DATE: 01-04-10	SHEET: NEXT D - 15

PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST



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Chart NEXT-3
Northeast Extreme Tee - NEXT



DESIGN PARAMETERS	
1.	18 inch wide concrete curbs with steel rail
2.	3 inch thick bituminous concrete overlay
3.	Beam $f'_c = 6000$ psi
4.	Beam $f'_{ci} = 4000$ psi
5.	Debond up to 25% of strand
6.	AASHTO LRFD design with allowable tensile stresses for extreme exposure
7.	Straight strand only
8.	No utility loads
9.	Design for interior beam
10.	Live load distribution factor based on composite deck stringer bridge, AASHTO cross section Type I

NOTE: EACH BEAM HAS 4 FULLY TENSIONED STRANDS LOCATED 7.5 INCHES FROM THE TOP OF THE BEAM

REVISIONS		
NO.	DATE	DESCRIPTION

NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS	
SPAN CHART ($f'_c = 6$ KSI)	
ISSUE DATE: 01-04-10	SHEET: NEXT D - 16

PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTHEAST



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LIGHTWEIGHT CONCRETE

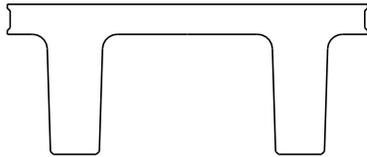
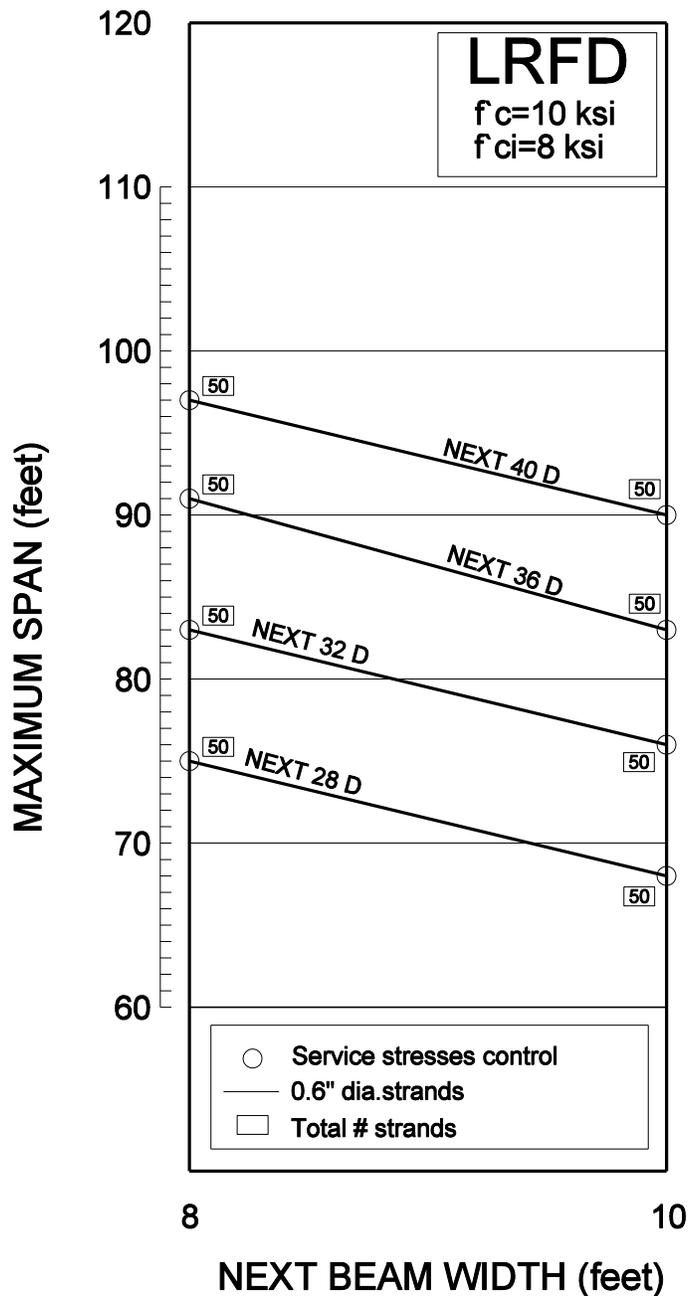


Chart NEXT-1-LW
Northeast Extreme Tee - NEXT



DESIGN PARAMETERS	
1.	18 inch wide concrete curbs with steel rail
2.	3 inch thick bituminous concrete overlay
3.	Lightweight concrete beams (120 pcf)
4.	Beam $f_c = 10000$ psi
5.	Beam $f_{ci} = 8000$ psi
6.	Debond up to 25% of strand
7.	AASHTO LRFD design with allowable tensile stresses for extreme exposure
8.	Straight strand only
9.	No utility loads
10.	Design for interior beam
11.	Live load distribution factor based on composite deck stringer bridge, AASHTO cross section Type I

NOTE: EACH BEAM HAS 4 FULLY TENSIONED STRANDS LOCATED 7.5 INCHES FROM THE TOP OF THE BEAM

REVISIONS		
NO.	DATE	DESCRIPTION

NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS	
SPAN CHART ($f_c = 10$ KSI)	
ISSUE DATE: 01-04-10	SHEET: NEXT D - 17

PRECAST/PRESTRESSED CONCRETE
INSTITUTE NORTHEAST

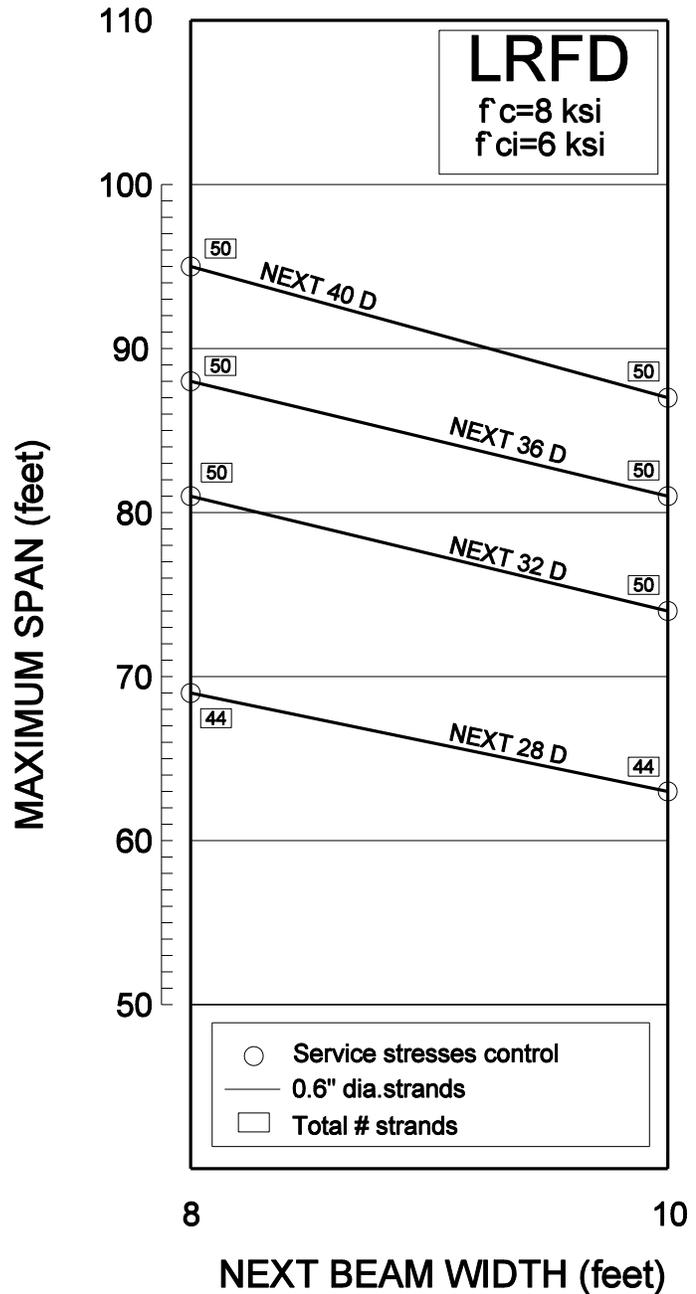


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LIGHTWEIGHT CONCRETE



Chart NEXT-2-LW
Northeast Extreme Tee - NEXT



DESIGN PARAMETERS	
1.	18 inch wide concrete curbs with steel rail
2.	3 inch thick bituminous concrete overlay
3.	Lightweight concrete beams (120 pcf)
4.	Beam $f'c = 8000$ psi
5.	Beam $f'ci = 6000$ psi
6.	Debond up to 25% of strand
7.	AASHTO LRFD design with allowable tensile stresses for extreme exposure
8.	Straight strand only
9.	No utility loads
10.	Design for interior beam
11.	Live load distribution factor based on composite deck stringer bridge, AASHTO cross section Type I

NOTE: EACH BEAM HAS 4 FULLY TENSIONED STRANDS LOCATED 7.5 INCHES FROM THE TOP OF THE BEAM

REVISIONS		
NO.	DATE	DESCRIPTION

NORTHEAST EXTREME BRIDGE TEE NEXT D BEAMS	
SPAN CHART ($f'c = 8$ KSI)	
ISSUE DATE: 01-04-10	SHEET: NEXT D - 18

PRECAST/PRESTRESSED CONCRETE
INSTITUTE NORTHEAST



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LIGHTWEIGHT CONCRETE

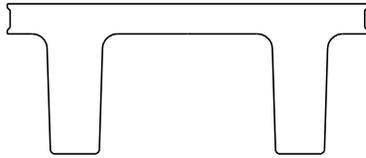
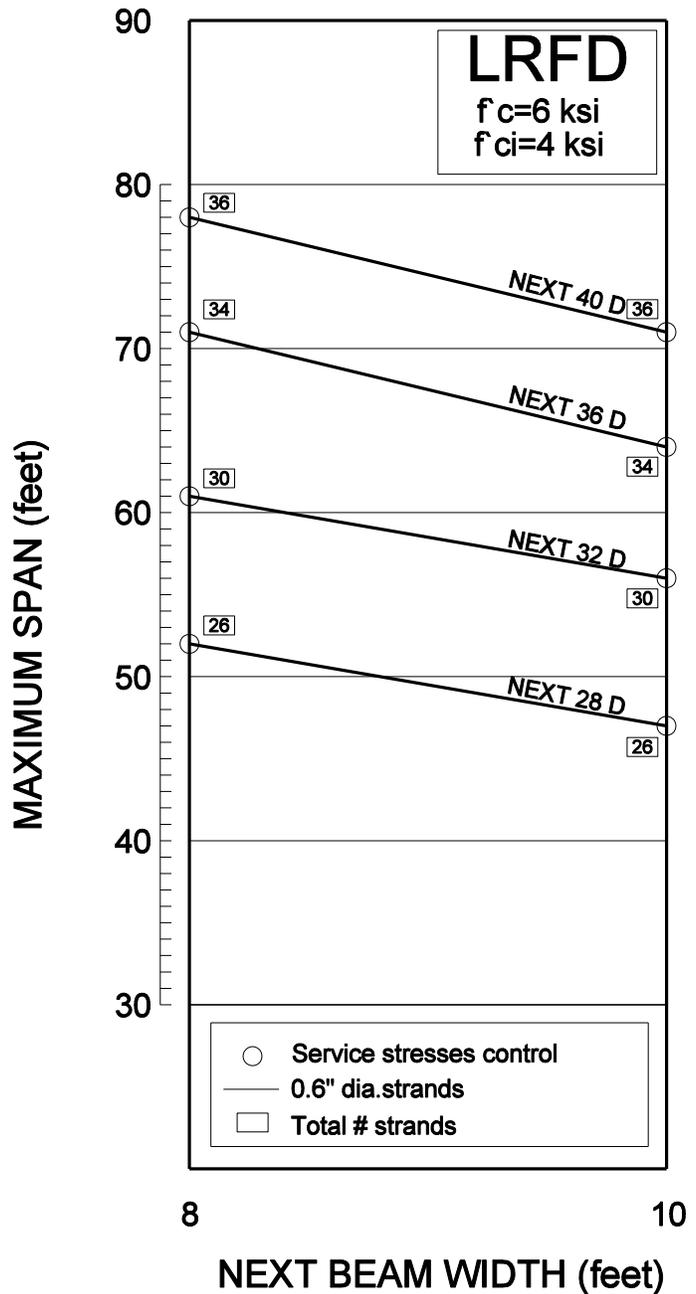


Chart NEXT-3-LW
Northeast Extreme Tee - NEXT



DESIGN PARAMETERS

1. 18 inch wide concrete curbs with steel rail
2. 3 inch thick bituminous concrete overlay
3. Lightweight concrete beams (120 pcf)
4. Beam $f'c = 6000$ psi
5. Beam $f'ci = 4000$ psi
6. Debond up to 25% of strand
7. AASHTO LRFD design with allowable tensile stresses for extreme exposure
8. Straight strand only
9. No utility loads
10. Design for interior beam
11. Live load distribution factor based on composite deck stringer bridge, AASHTO cross section Type I

NOTE: EACH BEAM HAS 4 FULLY TENSIONED STRANDS
LOCATED 7.5 INCHES FROM THE TOP OF THE BEAM

REVISIONS		
NO.	DATE	DESCRIPTION

NORTHEAST EXTREME BRIDGE TEE
NEXT D BEAMS

SPAN CHART ($f'c = 6$ KSI)

ISSUE DATE: 01-04-10

SHEET: NEXT D - 19

PRECAST/PRESTRESSED CONCRETE
INSTITUTE NORTHEAST



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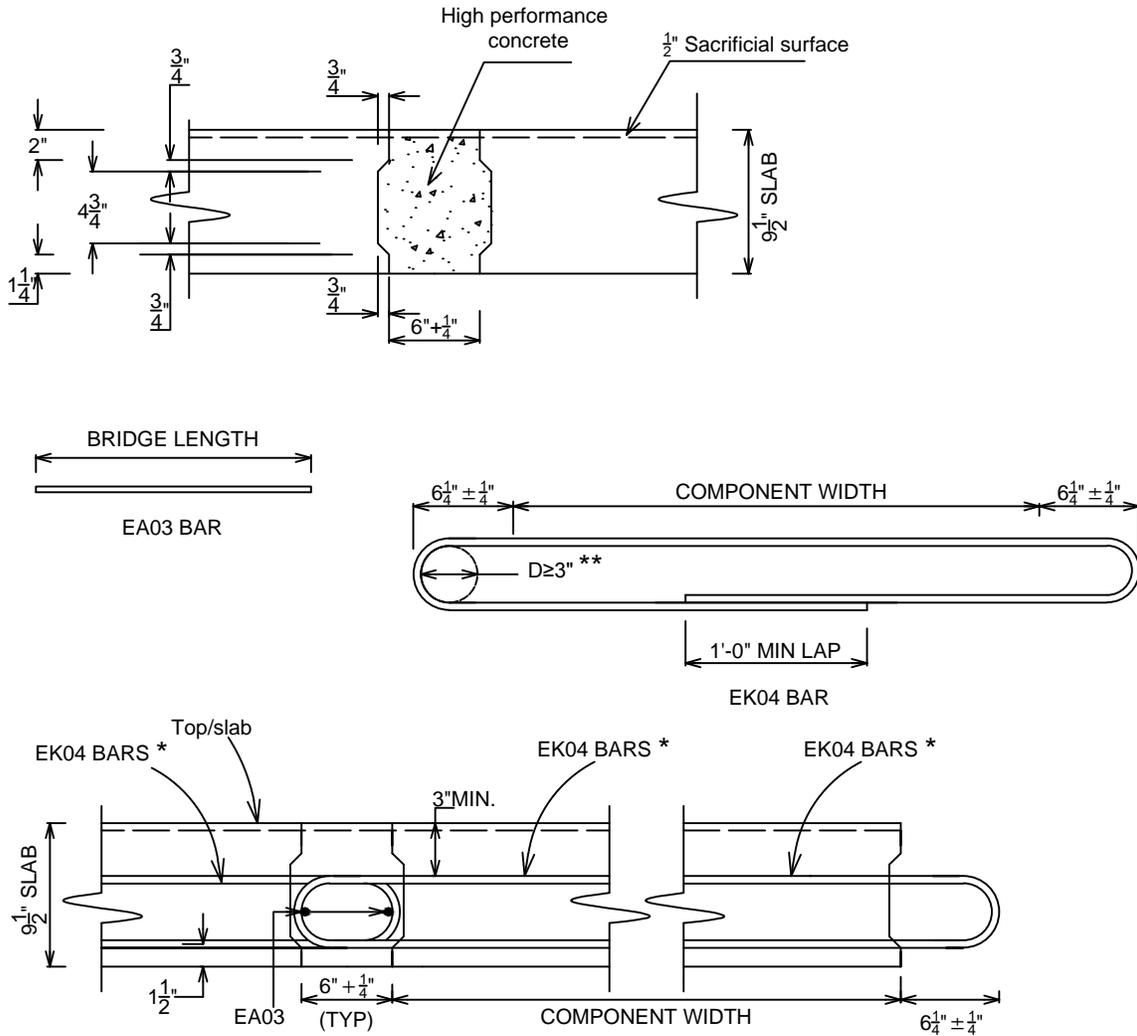
APPENDIX I

STANDARD LONGITUDINAL CONNECTION DETAILS

DRAWN BY:
 CHECKED BY:
 APPROVED BY:

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAY DEVELOPMENT
 STANDARDIZED LONGITUDINAL
 CONNECTION DETAILS

ISSUED:
 SUPERSEDES:



NOTES:

HIGH PERFORMANCE CONCRETE COMPRESSIVE STRENGTH IS NOT LESS THAN 7 KSI

YIELD STRENGTH OF THE STEEL IS 60 KSI

TEMPERATURE GRADIENT ZONE 3 AND HL-93 MOD LOADS WERE CONSIDERED.

* EK04 BAR SPACING IS : 11" FOR DECKED BOX-BEAM.

7" FOR OTHER DECKED PRECAST PRESTRESSED CONCRETE GIRDERS.

** DIAMETER OF BEND (D) SHALL NOT BE LESS THAN 3 IN.

PREPARED BY
 DESIGN DIVISION

6.41.xx

APPENDIX J
SPECIAL PROVISION FOR GROUTING PBES
CONNECTIONS

(Template)

SPECIAL PROVISION FOR GROUTING PBES CONNECTIONS

1. **General.** This work shall consist of furnishing material, equipment, and manpower for grouting prefabricated component connections (or referred as joints in this section) in accordance with the details shown on the plans and the requirements of these Specification.

The work shall also include the furnishing and installing of any appurtenant items necessary for completing the grouting operations, including but not limited to, inlets, vents, outlets, and grout and any material used for mixing and curing and protecting grout during the required period.

2. **Contractor Proposed Options:** The contractor may propose for consideration certain changes to the connection details (including but not limited to, the shape, size, reinforcement details), material for filling the voids, application procedures, and curing and protection methods than what is shown in the plans and given in this Specification.

3. **Restrictions to Contractor Proposed Options:** Any changes proposed by the contractor shall comply with the following:

- a. Any changes proposed to the connection details to enhance the grout application procedures shall be demonstrated through mock-up testing or contractors own experience with a previous project.
- b. The ultimate strength of the structure with the proposed changes to the connection details shall meet the requirement of Section xx of the AASHTO XXXX, YY edition, 20XX, and all applicable interims and shall be equivalent or greater than the ultimate strength provided by the original design.
- c. The contractor fully redesigns and details of all the connections and associated components where the alternate details are proposed, as required.
- d. The contractor submits complete shop drawings indicating the locations of the connections and including revised connection and component details, design calculations, and a summary of the specific changes and justification for the changes for Engineer's review.

4. Working Drawings: The contractor shall submit detailed working drawings in accordance with Section XX of the Standard Specification for Construction that include, but are not limited to:

1. Connection detail with multiple views (a minimum of two cross-sections with respect to two perpendicular axes and a plan view)
2. Name (if manufactured grout) or the mix design for each connection in a format similar to Table E-1.
3. Equipment for mixing and placement
4. Formwork, if needed (process of forming and removal; potential challenges such as grout leakage and remedial measures)
5. Surface preparation procedures
6. Grouting procedure and sequence
7. Grout curing, if applicable, and/or protection methods
8. Mock-up testing plan (void if contractor demonstrates prior experience with the specific detail, material, and equipment)
9. QA/QC plan based on the requirements listed in Table E-2

Table E-1. Connection and the grout/special mix

<i>No</i>	<i>Connection</i>	<i>Grout/special mix</i>
1	Pier column to pier cap	ABC grout extended
2	Transverse connection between deck panels	ABC grout
3	Longitudinal closure	Mix 1
4		
5		
6		

Mix 1: *(example)*

- Cement
- Supplementary cementitious material
- Aggregate
- Water
- Admixtures

5. Material: The materials to be incorporated into work covered by this section shall conform to the requirements set out herein.

a. Grout/Special mixes

Contractor shall identify a non-shrink grout/concrete mixes based on size, shape, and detailing of the connection, and exposure conditions during mixing, placing, and in-service. Contractor shall submit laboratory test results obtained from an independent testing lab on the following properties as per the specifications listed;

Table E-2. Grout properties, requirements and test methods

Property		Requirement	Test Method
Strength	1 day		
	3 days		
	7 days		
	28 days		
Slump/flow			
Setting time			
Early age height change			ASTM C827/C1107
Height change of hardened grout			ASTM C1090/C1107
Shrinkage			
Air content			
Freeze/thaw durability			
Modulus of elasticity			
Thermal expansion coefficient			

b. Curing

The contractor shall furnish required grout curing material as per the manufacturer requirement or the Section XX of theStandard Specification for Construction.

c. Grout protection

The contractor shall furnish required grout protection material as per the manufacturer requirement or the Section XX of theStandard Specification for Construction.

6. Grouting plan and qualifications: At least XX weeks before grouting commences, the contractor shall submit to the Engineer for review and approval a "Grouting Operation Plan for Precast Component Connections". Written approval of the plan is required before grouting occurs.

- Names of grouting crew and supervisor
- Experience of crewmembers and supervisor
- Training to be provided or undertaken prior to operations
- Type of equipment to be used, including capacity in relation to demand
- Working condition of equipment, back-up and spare parts
- Types, brands, and certifications of materials
- Identity of independent testing laboratory for certification of materials
- General grouting procedure
- Production of grout, on-site testing, adjustments and controls
- Estimate of grout required amount of each type of grout/special mixes
- Method of controlling consistency of grout
- Grout mixing and placement procedures
- Procedure for controlling w/c ratio, and for ensuring that the water used is acceptable
- Contractor's QC forms that are to be signed daily by grout supervisor

The contractor shall, throughout the duration of the grouting, coordinate his work and cooperate with the engineer. The contractor shall also provide at least one person who shall be present at the all times during formwork installation and grouting who is familiar with the operations involved and will direct the work.

7. Contribution to knowledge base (Report): The engineer will determine the locations to sample grout and the number and type of samples collected for field and laboratory testing based on the test methods and applicable standards listed in Table E-2. Report should include at least the followings: (the following includes extracts from ASTM C1107 and presented in *italics*)

- *Source, type and name of grout tested.*
- *Details of any variations and options practiced by the tester that are recommended or allowed by the manufacturer or others. Also, designate by whom exceptions are allowed or recommended.*
- *Number and size of each kind of grout specimen and the date molded.*

- *Consistency at the time the specimens were molded and the water to dry solids ratio.*
- *Mixing temperature and curing temperature.*
- *Identity of specimens as being from (a) freshly mixed grout or (b) grout from end of maximum allowed usable working time. State the mixing age of grout when the specimens were prepared.*
- *Height change from placement to time of final setting, %.*
- *Height change of hardened, moist-cured grout at specimen age of 1, 3, 14, and 28 days, %.*
- *Height change of hardened grout at 56 days of age when exposed to air drying for 28 days after 28 days of moist-curing, %.*
- *Compressive strength of cubes at 1, 3, 7, and 28 days.*
- *Yield of the grout.*
- *Equipment used for grouting or method of grouting.*
- *Challenges and lessons learned.*
- *Recommendations for enhancing performance and construction practices of similar details.*