

DESIGN AND DETAILING OF ANCHORAGES FOR EXTERNALLY BONDED CFRP

Deliverable 2 - Design and Detailing Guidance for CFRP Anchorage

Contract No. BEA 90

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PRIME CONTRACTOR

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CARBON FIBER REINFORCED POLYMER REPAIR NOTES—SPIKE ANCHORS

1. NUMBER OF CFRP SPIKE ANCHORS AND AMOUNT OF CFRP LAMINATE DETERMINED BASED ON MOST CURRENT RESEARCH.
2. THE EXTENT OF REPAIR WILL DICTATE THE NUMBER OF VERTICAL STRIPS USED.
3. VERTICAL STRIP WIDTH VARIES BASED ON MEMBER GEOMETRY AND ANCHOR TYPE.
4. HORIZONTAL STRIP WIDTH VARIES BASED ON MEMBER GEOMETRY.
5. FAN ANGLE (60 DEG.) REMAINS CONSTANT AMONG ALL MEMBERS.
6. ANCHORS SHOULD ALWAYS BE PLACED WITHIN THE VOLUME OF CONCRETE ENCLOSED BY THE TRANSVERSE REINFORCEMENT.
7. IF A STEEL BAR/REINFORCEMENT IS ENCOUNTERED DURING INSTALLATIONS, THE HOLE MAY BE USED BUT INCLINED 10 DEG. TO EITHER SIDE OF THE OBSTRUCTION.
8. IT IS RECOMMENDED THAT EACH ANCHOR HOLE AREA EQUAL 1.4 TIMES THE AREA OF THE CFRP ANCHOR.
9. AN ANCHOR HOLE CHAMFER RADIUS OF 0.5" IS RECOMMENDED (WHERE APPLICABLE).
10. ANCHOR FAN LENGTH OF AT LEAST 6" IS RECOMMENDED FOR ALL APPLICATIONS.
11. ALL HORIZONTAL AND VERTICAL CFRP STRIPS SERVE AS "PATCHING" (A PRACTICE COMMONLY UTILIZED FOR CFRP ANCHORAGE); HENCE, NO INDIVIDUAL PATCHES ARE NECESSARY.
12. SURFACE MUST BE CLEAN, SOUND AND DRY. REMOVE DUST, LAITANCE, GREASE, CURING COMPOUNDS, IMPREGNATIONS, WAXES, FOREIGN ARTICLES, DISINTEGRATED MATERIALS, AND OTHER BOND INHIBITING MATERIALS.
13. EXISTING UNEVEN SURFACES MUST BE FILLED WITH AN APPROPRIATE REPAIR MORTAR.
14. CRACKS WITH A WIDTH GREATER THAN OR EQUAL TO 0.008" MUST BE STABILIZED USING EPOXY INJECTION METHODS, PRIOR TO APPLICATION OF CFRP.
15. A UV PROTECTIVE COATING IS RECOMMENDED TO BE APPLIED TO ALL ANCHOR AREAS WITHIN 24 HOURS OF ANCHOR INSTALLATION.
16. THE RECOMMENDATIONS PROVIDED HEREIN SHOULD BE EVALUATED EXPERIMENTALLY PRIOR TO ADOPTION.

CFRP SPIKE ANCHOR INSTALLATION SEQUENCE

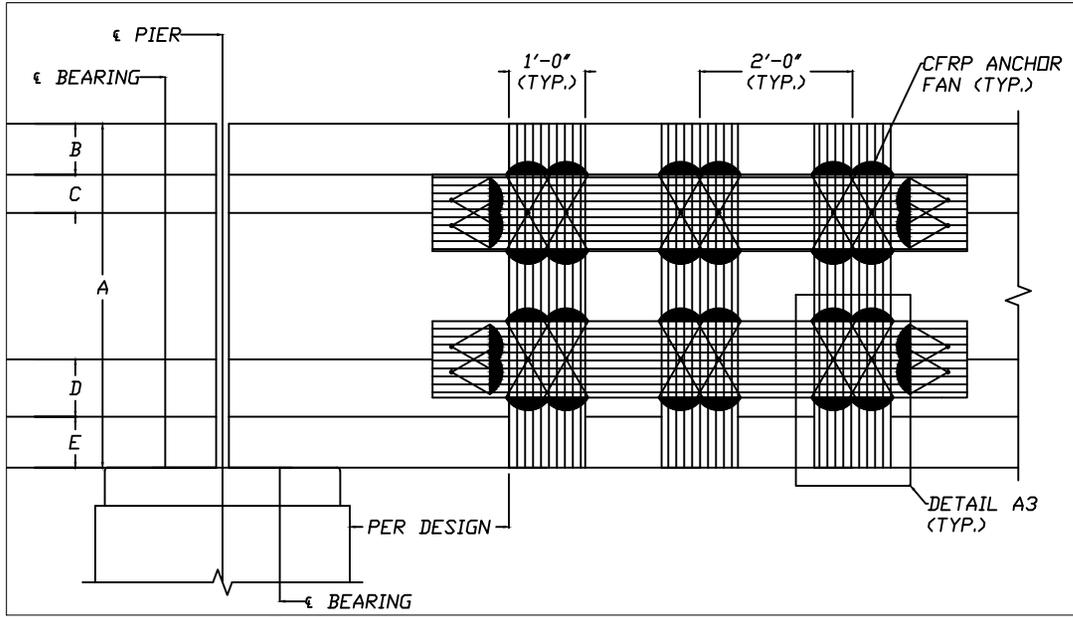
1. USE A NON-DESTRUCTIVE METHOD TO DETERMINE LOCATION OF REINFORCEMENT IN THE BEAMS. THE CONTRACTOR MAY ADJUST THE LOCATION OF THE CFRP ANCHORS UP TO 1" IN THE BOTH THE VERTICAL AND HORIZONTAL DIRECTIONS TO AVOID REINFORCEMENT. NOTIFY THE ENGINEER IF GREATER ADJUSTMENT IS REQUIRED.
2. THE ENGINEER MUST BE NOTIFIED IF ANCHOR HOLES MUST BE ANGLED.
3. DRILL A HOLE IN THE BEAM AT THE LOCATIONS AND DEPTH SHOWN IN THE PLANS.
4. ROUND THE EDGES AROUND THE LIP OF THE DRILLED HOLE. THE CHAMFER RADIUS SHALL NOT BE SMALLER THAN SPECIFIED.
5. CLEAN AND REMOVE ALL DEBRIS FROM THE ANCHORAGE HOLE USING NEGATIVE VACUUM PRESSURE.
6. INSTALL MAIN CFRP STRIPS IN ACCORDANCE WITH THESE PLANS AND TECHNICAL AND MANUFACTURER SPECIAL PROVISIONS.
7. MAIN CFRP STRIPS SHOULD COMPLETELY COVER THE ANCHOR HOLES. THE INDIVIDUAL FIBERS OF THE SATURATED CARBON FABRIC SHOULD BE SEPARATED TO ALLOW FOR INSTALLATION OF THE ANCHORS.
8. APPLY A COAT OF HIGH STRENGTH STRUCTURAL EPOXY TO THE INNER SURFACE OF THE ANCHOR HOLE.
9. FAN THE ENDS OF THE ANCHOR STRIPS TO ACHIEVE THE 60 DEG. FAN PROFILE.
10. COMPLETELY IMPREGNATE THE ANCHORS WITH THE HIGH STRENGTH STRUCTURAL EPOXY.
11. PUSH THE SATURATED ANCHORS INTO THE PRE-DRILLED HOLES.
12. SPREAD THE ANCHOR FAN AS SHOWN IN THE PLANS. THE FAN SHALL EXTEND 1/2" BEYOND THE EDGES OF THE CFRP STRIPS.
13. APPLY THE UV PROTECTIVE COATING AT ALL ANCHOR LOCATIONS.

CARBON FIBER REINFORCED POLYMER SPIKE ANCHORS

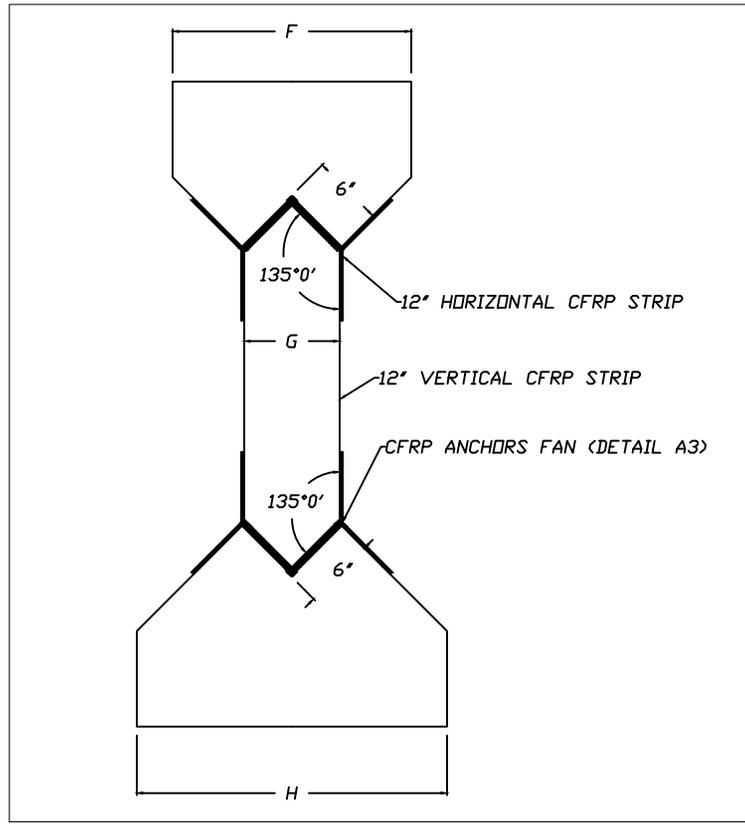


AASHTO TYPE I THROUGH IV CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

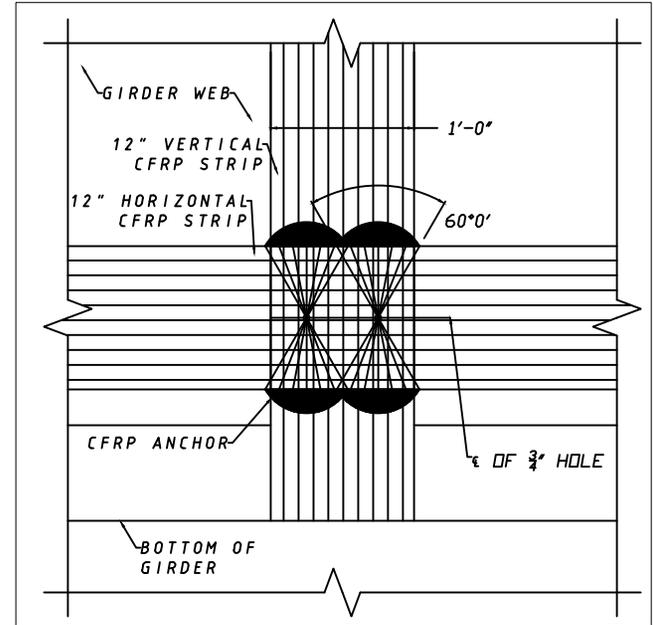
DOT-RP 21-9033-CA	PJR
10/26/21	NS
NOTED	PJR



A1 AASHTO GIRDER I-IV SPIKE ANCHORS-ELEVATION



A2 AASHTO GIRDER I-IV SPIKE ANCHORS-SECTION



A3 AASHTO GIRDER I-IV SPIKE ANCHORS-DETAILS

TABLE OF DIMENSIONS

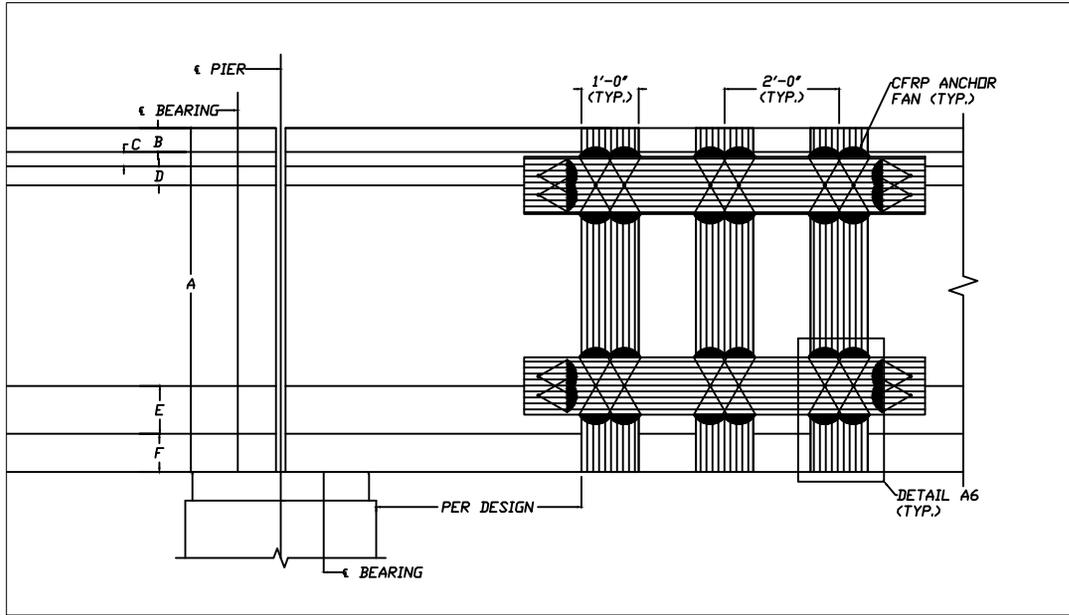
BEAM	A	B	C	D	E	F	G	H
AASHTO I	2'-4"	0'-4"	0'-3"	0'-5"	0'-5"	1'-0"	0'-6"	1'-4"
AASHTO II	3'-0"	0'-6"	0'-3"	0'-6"	0'-6"	1'-0"	0'-6"	1'-6"
AASHTO III	3'-9"	0'-7"	0'-5"	0'-8"	0'-7"	1'-4"	0'-7"	1'-10"
AASHTO IV	4'-6"	0'-8"	0'-6"	0'-9"	0'-8"	1'-8"	0'-8"	2'-2"

CARBON FIBER REINFORCED POLYMER SPIKE ANCHORS

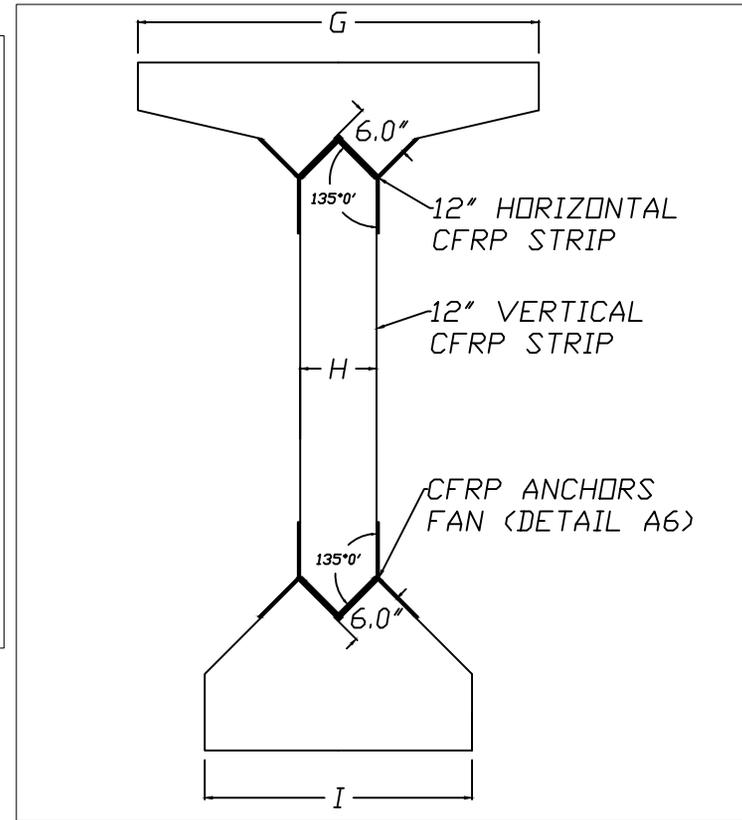


AASHTO TYPE I, THROUGH IV, CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

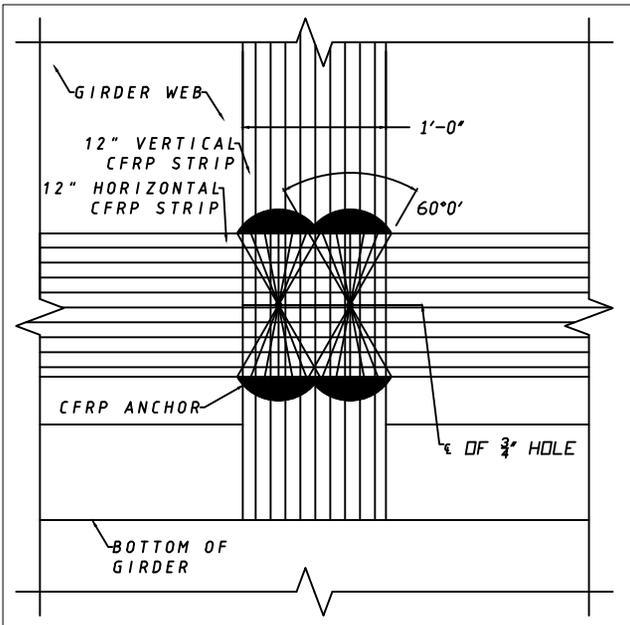
DOT-RFP 21-9033-CA P.J.R.
10/26/21 NS
NOTED P.J.R.



A4 AASHTO GIRDER V-VI SPIKE ANCHORS-ELEVATION



A5 AASHTO GIRDER V-VI SPIKE ANCHORS-SECTION



A6 AASHTO GIRDER V-VI SPIKE ANCHORS-DETAILS

TABLE OF DIMENSIONS

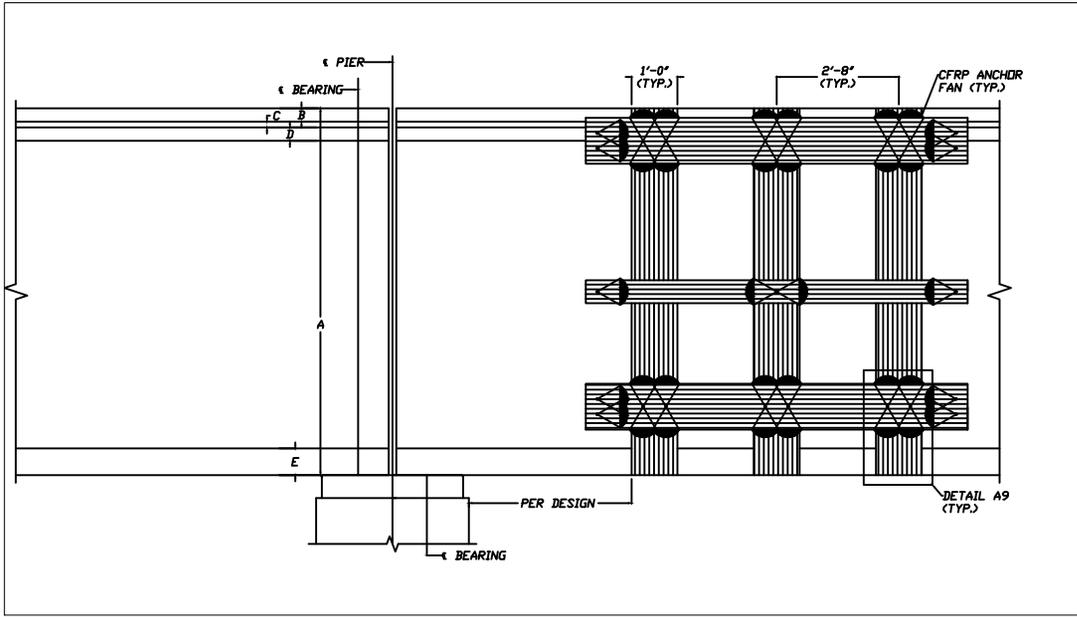
BEAM	A	B	C	D	E	F	G	H	I
AASHTO V	5'-3"	0'-5"	0'-3"	0'-4"	0'-10"	0'-8"	3'-6"	0'-8"	2'-4"
AASHTO VI	6'-0"	0'-5"	0'-3"	0'-4"	0'-10"	0'-8"	3'-6"	0'-8"	2'-4"

CARBON FIBER REINFORCED POLYMER SPIKE ANCHORS

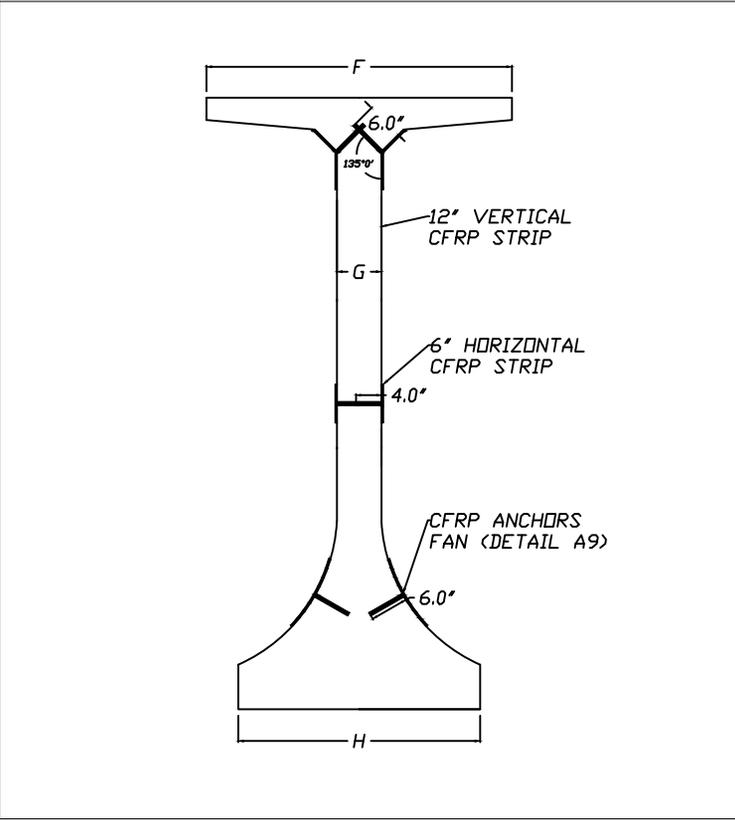


AASHTO TYPE V THROUGH VI CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

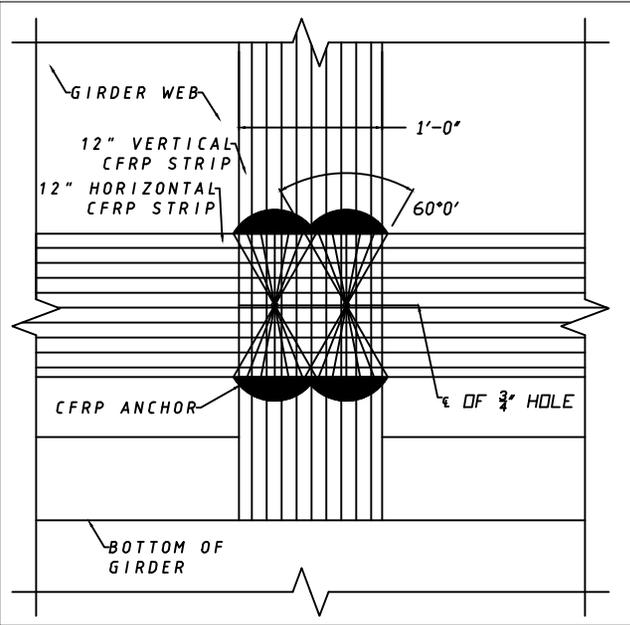
DOT-RFP 21-8033-0A PJR
10/26/21 NS
NOTED PJR



A7 FLORIDA I-BEAM SPIKE ANCHORS-ELEVATION



A8 FLORIDA I-BEAM SPIKE ANCHORS-SECTION



A9 FLORIDA I-BEAM SPIKE ANCHORS-DETAILS

TABLE OF DIMENSIONS

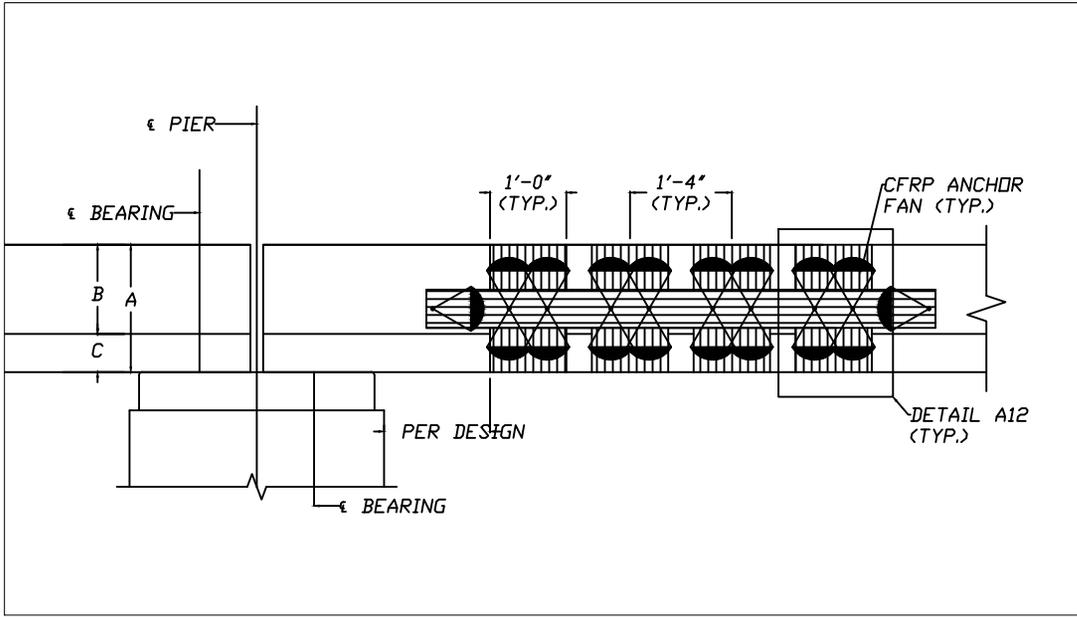
BEAM	A	B	C	D	E	F	G	H
BULB T-78	6'-6"	0'-3"	0'-4"	0'-3"	0'-8"	5'-0"	0'-7"	2'-4"
F I-96	8'-0"	0'-3 1/2"	0'-1 1/2"	0'-3 1/2"	0'-6"	4'-0"	0'-7"	3'-2"

CARBON FIBER REINFORCED POLYMER SPIKE ANCHORS

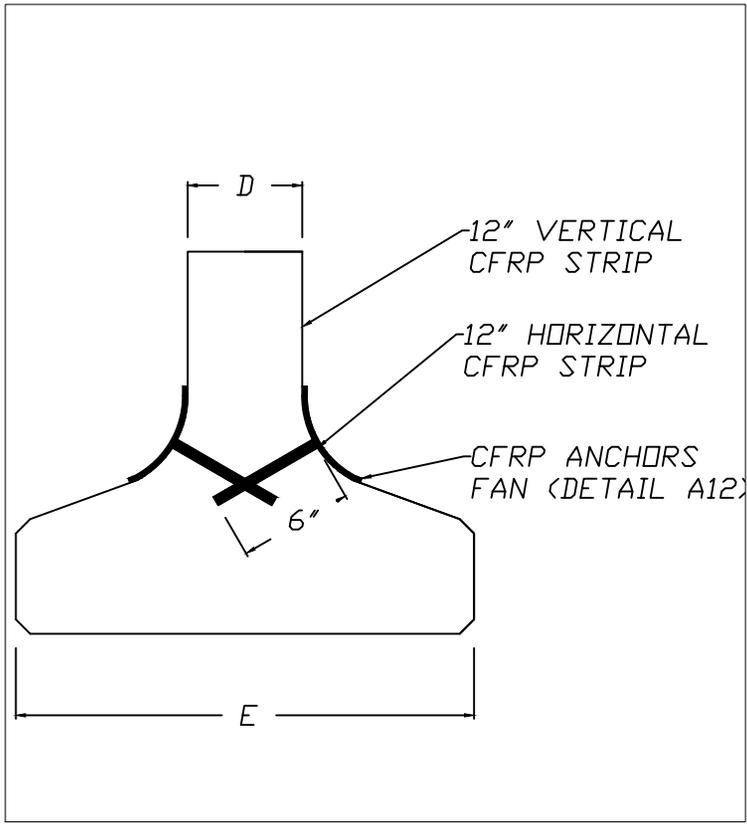


FLORIDA I-BEAM CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

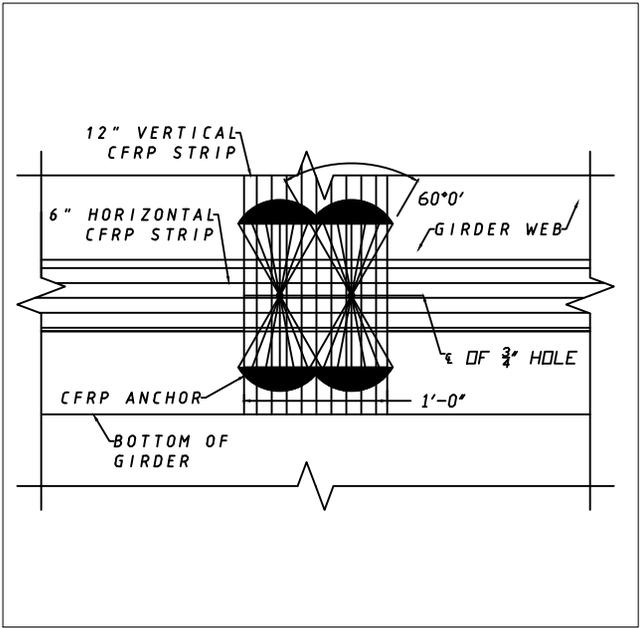
DOT-RFP 21-903-CA	PJR
10/26/21	NS
NOTED	PJR



A10 INVERTED T-BEAM SPIKE ANCHORS—ELEVATION



A11 INVERTED T-BEAM SPIKE ANCHORS—SECTION



A12 INVERTED T-BEAM SPIKE ANCHORS—DETAILS

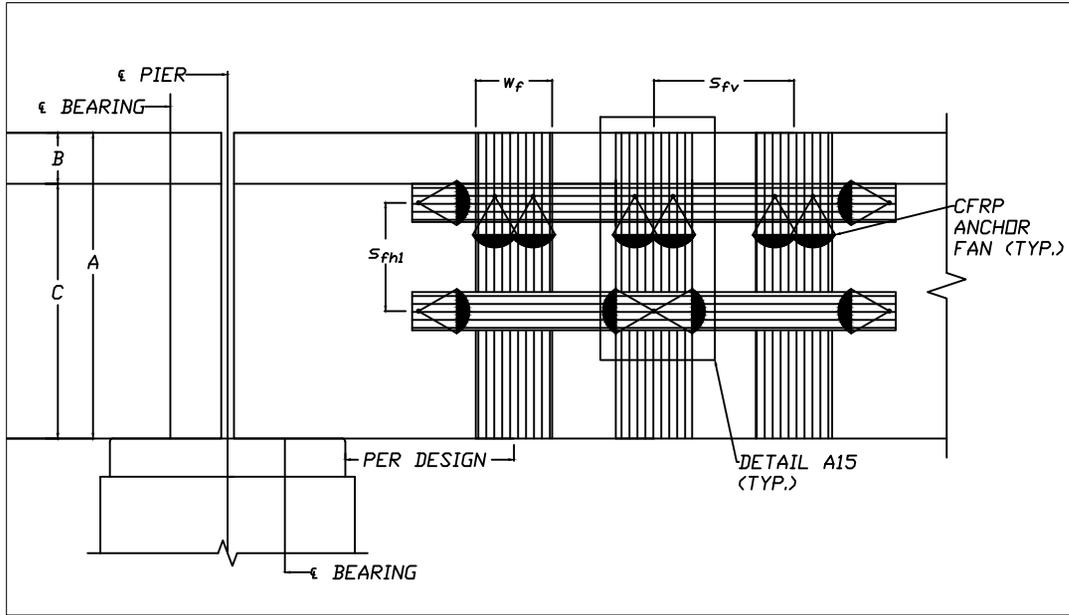
TABLE OF DIMENSIONS					
BEAM	A	B	C	D	E
INVERTED T-BEAM	1'-8"	1'-2"	0'-6"	0'-6"	2'-0"

CARBON FIBER REINFORCED POLYMER SPIKE ANCHORS

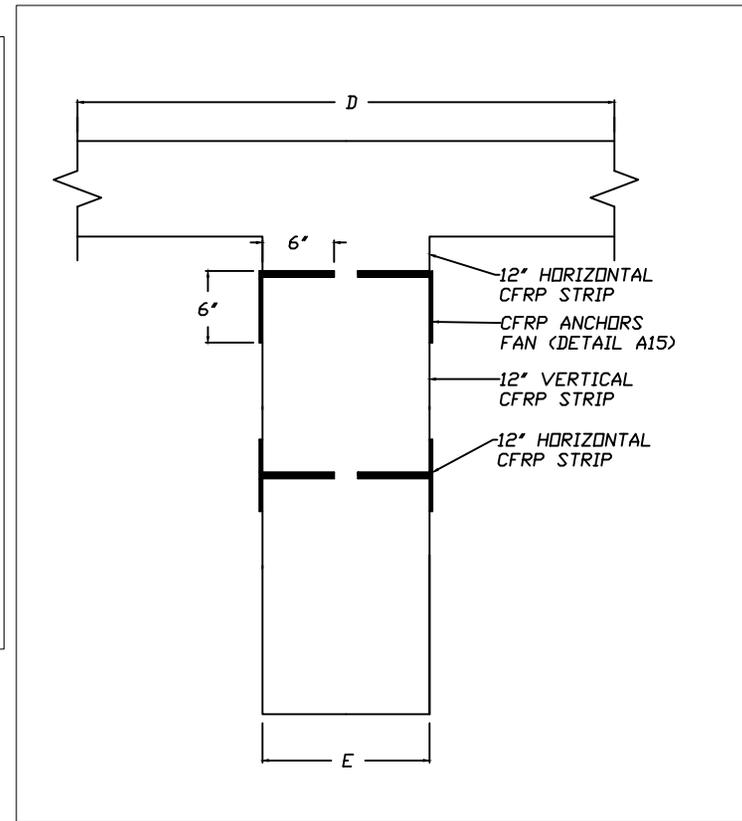


INVERTED T-BEAM CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

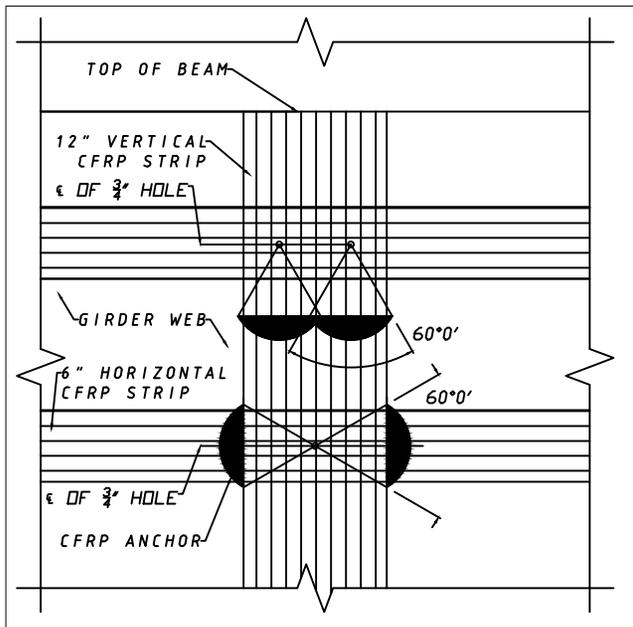
DOT-RFP 21-9033-CA	PJR
10/26/21	NS
NOTED	PJR



A13 RC BEAM (GENERIC) SPIKE ANCHORS-ELEVATION



A14 RC BEAM (GENERIC) SPIKE ANCHORS-SECTION



A15 RC BEAM (GENERIC) SPIKE ANCHORS-DETAILS

TABLE OF DIMENSIONS

BEAM	A	B	C	D	E	F	S_{fv}	S_{fh1}
RC T-BEAM	VARIES	VARIES						

NOTES

1. THE DETAILS SHOWN FOR THE "RC BEAM" ARE GENERIC AND WILL VARY BASED ON BEAM GEOMETRY.
2. THE TOP FLANGE OF THE RC BEAM IS REPRESENTATIVE OF A SLAB AND SHOULD NOT BE WRAPPED OR ANCHORED.
3. SPACING OF HORIZONTAL AND VERTICAL CFRP STRIPS SHALL BE DETERMINED BY BEAM DEPTH.
4. SPACING OF VERTICAL STRIPS SHOULD BE UNIFORM ALONG THE ENTIRE LENGTH OF THE REPAIRED ZONE.

CARBON FIBER REINFORCED POLYMER SPIKE ANCHORS



REINFORCED CONCRETE BEAM (GENERIC) CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

DOT-RFP 21-9033-CA	PJR
10/26/21	NS
NOTED	PJR
A-6	

CARBON FIBER REINFORCED POLYMER REPAIR NOTES—MECHANICAL ANCHORS

1. NUMBER OF MECHANICAL ANCHORS AND AMOUNT OF CFRP LAMINATE DETERMINED BASED ON MOST CURRENT RESEARCH.
2. THE EXTENT OF REPAIR WILL DICTATE THE NUMBER OF VERTICAL STRIPS AND MECHANICAL ANCHORS USED.
3. VERTICAL STRIP WIDTH MAY VARY BASED ON MEMBER GEOMETRY AND ANCHOR TYPE.
4. NO HORIZONTAL STRIPS ARE NECESSARY IF MECHANICAL ANCHORS ARE UTILIZED.
5. ANCHORS SHOULD ALWAYS BE PLACED WITHIN THE VOLUME OF CONCRETE ENCLOSED BY THE TRANSVERSE REINFORCEMENT.
6. IF A STEEL BAR/REINFORCEMENT IS ENCOUNTERED DURING INSTALLATIONS, THE ENGINEER MUST BE CONSULTED TO DETERMINE PROPER MITIGATION TECHNIQUES.
7. SURFACE MUST BE CLEAN, SOUND AND DRY. REMOVE DUST, LAITANCE, GREASE, CURING COMPOUNDS, IMPREGNATIONS, WAXES, FOREIGN ARTICLES, DISINTEGRATED MATERIALS, AND OTHER BOND INHIBITING MATERIALS.
8. EXISTING UNEVEN SURFACES MUST BE FILLED WITH AN APPROPRIATE REPAIR MORTAR.
9. CRACKS WITH A WIDTH GREATER THAN OR EQUAL TO 0.008" MUST BE STABILIZED USING EPOXY INJECTION METHODS, PRIOR TO APPLICATION OF CFRP.
10. A UV PROTECTIVE COATING IS RECOMMENDED TO BE APPLIED TO ALL ANCHOR AREAS WITHIN 24 HOURS OF ANCHOR INSTALLATION.
11. THE RECOMMENDATIONS PROVIDED HEREIN SHOULD BE EVALUATED EXPERIMENTALLY PRIOR TO ADOPTION.

CFRP MECHANICAL ANCHOR INSTALLATION SEQUENCE

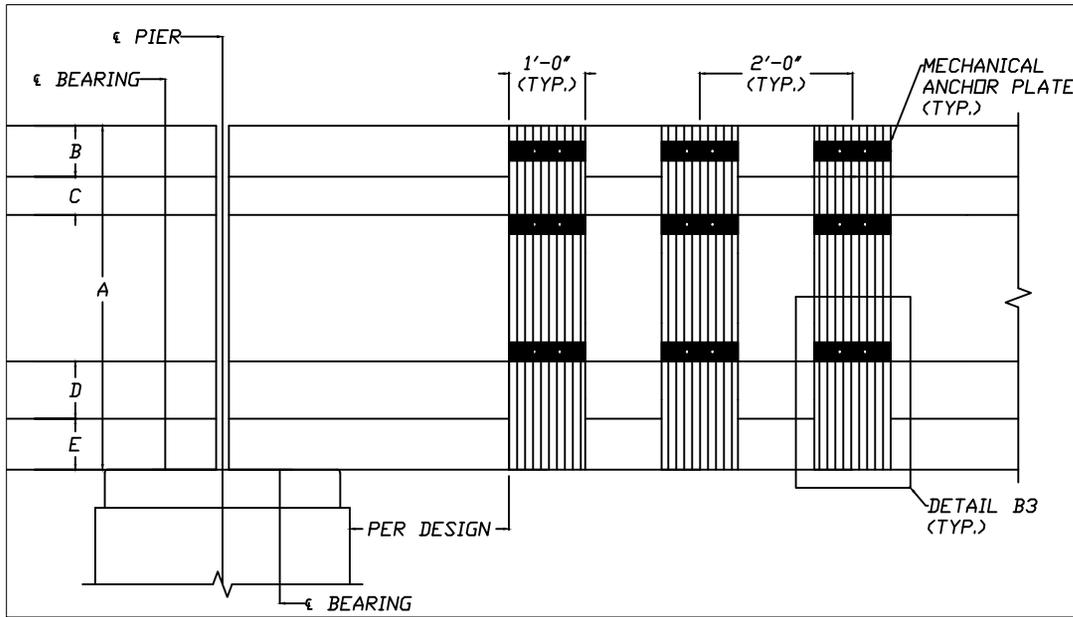
1. USE A NON-DESTRUCTIVE METHOD TO DETERMINE LOCATION OF REINFORCEMENT IN THE BEAMS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IF ADJUSTMENT IS REQUIRED DUE TO CONFLICT WITH REINFORCEMENT.
2. DRILL A HOLE IN THE BEAM AT THE LOCATIONS AND DEPTH SHOWN IN THE PLANS.
3. CLEAN AND REMOVE ALL DEBRIS FROM THE ANCHORAGE HOLE USING NEGATIVE VACUUM PRESSURE.
4. INSTALL VERTICAL CFRP STRIPS IN ACCORDANCE WITH THESE PLANS AND TECHNICAL AND MANUFACTURER SPECIAL PROVISIONS.
5. APPLY A COAT OF HIGH STRENGTH STRUCTURAL EPOXY TO THE INNER SURFACE OF THE ANCHOR HOLE.
7. COMPLETELY IMPREGNATE THE ADHESIVE ANCHORS WITH THE HIGH STRENGTH STRUCTURAL EPOXY.
7. COMPLETELY IMPREGNATE MECHANICAL ANCHOR HARDWARE (STEEL PLATE) WITH THE HIGH STRENGTH STRUCTURAL EPOXY.
8. PUSH THE SATURATED PLATE ONTO THE VERTICAL STRIPS, ALIGNING THE ANCHOR HOLE IN THE PLATE TO THE DRILLED HOLE IN THE BEAM.
9. PUSH THE ANCHORS THROUGH THE HOLES IN THE ANCHOR PLATES AND INTO THE PRE-DRILLED HOLES IN THE BEAM.
10. APPLY THE UV PROTECTIVE COATING AT ALL ANCHOR LOCATIONS.

CARBON FIBER REINFORCED POLYMER
MECHANICAL ANCHORS

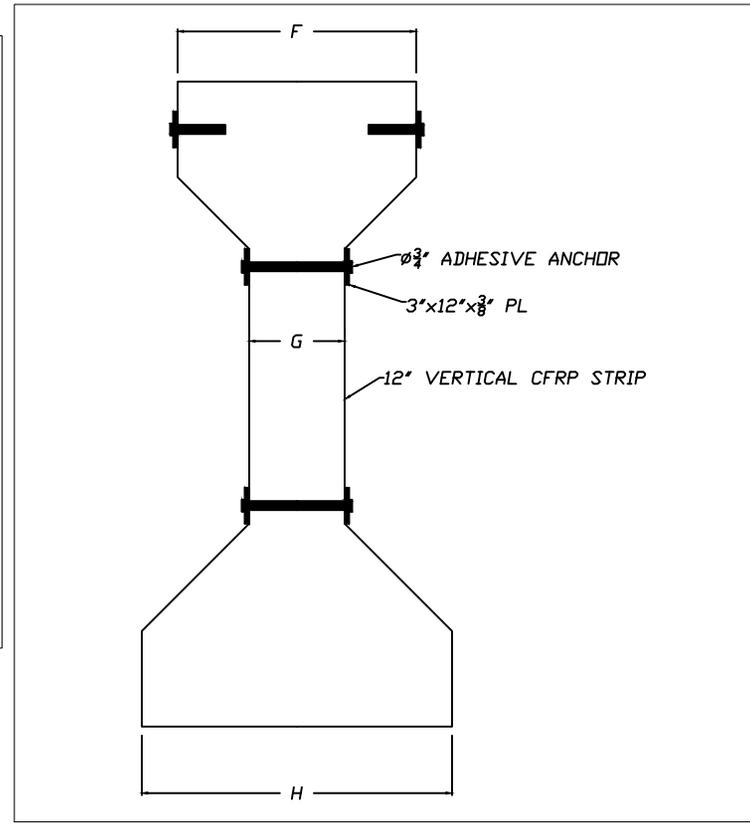


AASHTO TYPE I THROUGH IV CFRP
REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF
TRANSPORTATION

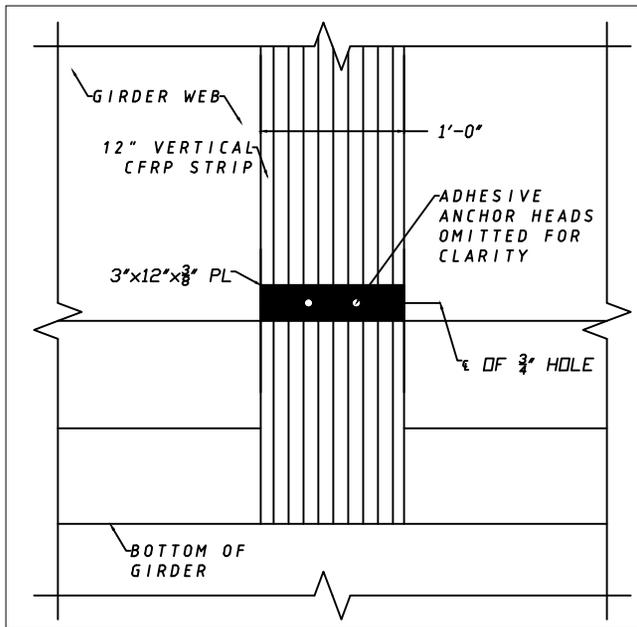
DOT-RFP 21-8033-CA	PJR
10/26/21	NS
NOTED	PJR



B1 AASHTO GIRDER I-IV MECHANICAL ANCHORS-ELEVATION



B2 AASHTO GIRDER I-IV MECHANICAL ANCHORS-SECTION



B1 AASHTO GIRDER I-IV MECHANICAL ANCHORS-DETAILS

TABLE OF DIMENSIONS

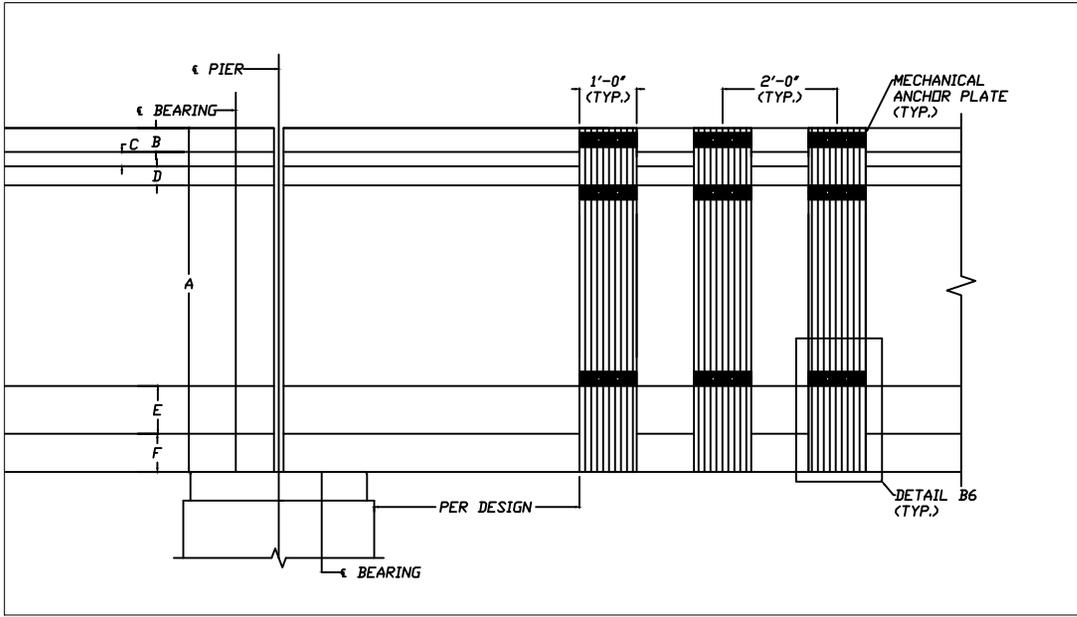
BEAM	A	B	C	D	E	F	G	H
AASHTO I	2'-4"	0'-4"	0'-3"	0'-5"	0'-5"	1'-0"	0'-6"	1'-4"
AASHTO II	3'-0"	0'-6"	0'-3"	0'-6"	0'-6"	1'-0"	0'-6"	1'-6"
AASHTO III	3'-9"	0'-7"	0'-5"	0'-8"	0'-7"	1'-4"	0'-7"	1'-10"
AASHTO IV	4'-6"	0'-8"	0'-6"	0'-9"	0'-8"	1'-8"	0'-8"	2'-2"

CARBON FIBER REINFORCED POLYMER MECHANICAL ANCHORS

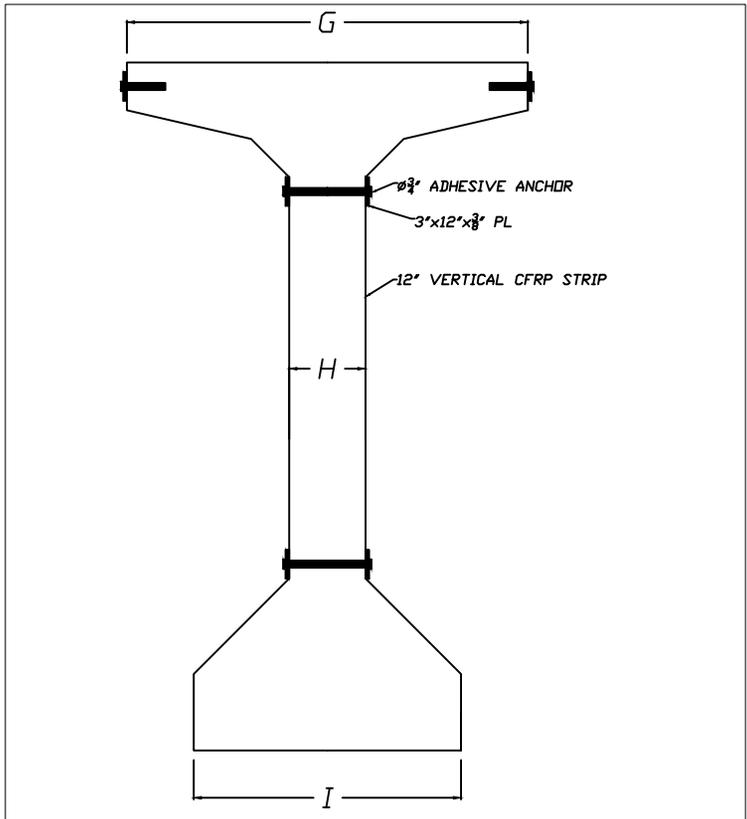


AASHTO TYPE I THROUGH IV CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

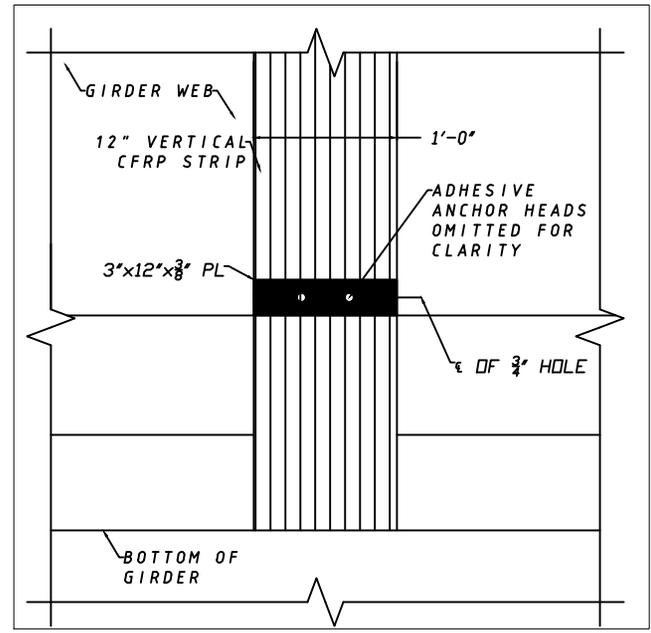
DOT-RFP 21-003-CA P.J.R.
10/26/21 NS
NOTED P.J.R.



B4 AASHTO GIRDER V-VI MECHANICAL ANCHORS-ELEVATION



B5 AASHTO GIRDER V-VI MECHANICAL ANCHORS-SECTION



B6 AASHTO GIRDER V-VI MECHANICAL ANCHORS-DETAILS

TABLE OF DIMENSIONS

BEAM	A	B	C	D	E	F	G	H	I
AASHTO V	5'-3"	0'-5"	0'-3"	0'-4"	0'-10"	0'-8"	3'-6"	0'-8"	2'-4"
AASHTO VI	6'-0"	0'-5"	0'-3"	0'-4"	0'-10"	0'-8"	3'-6"	0'-8"	2'-4"

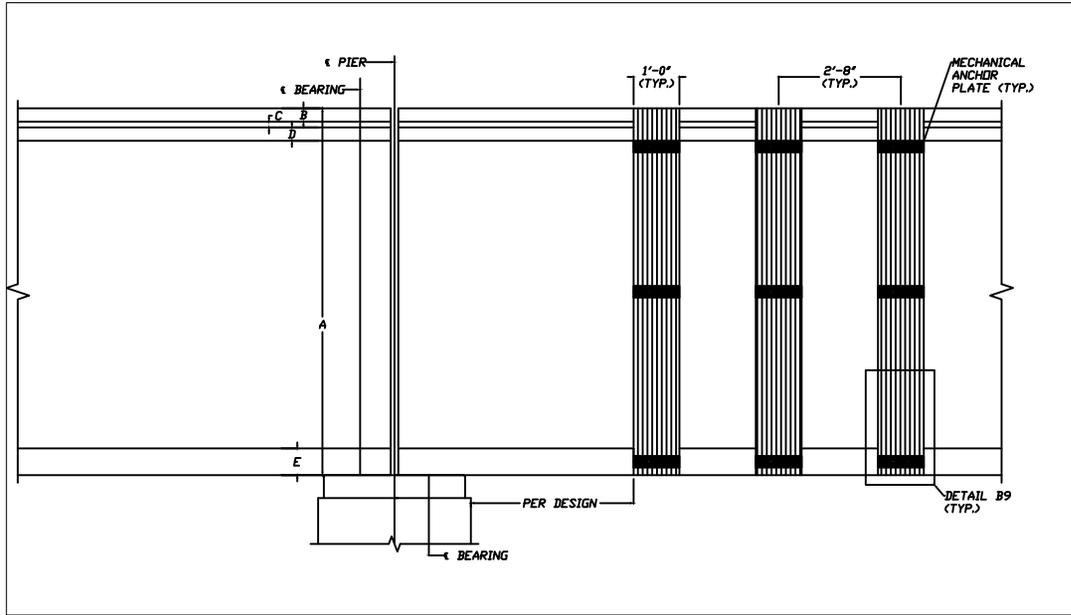
CARBON FIBER REINFORCED POLYMER MECHANICAL ANCHORS



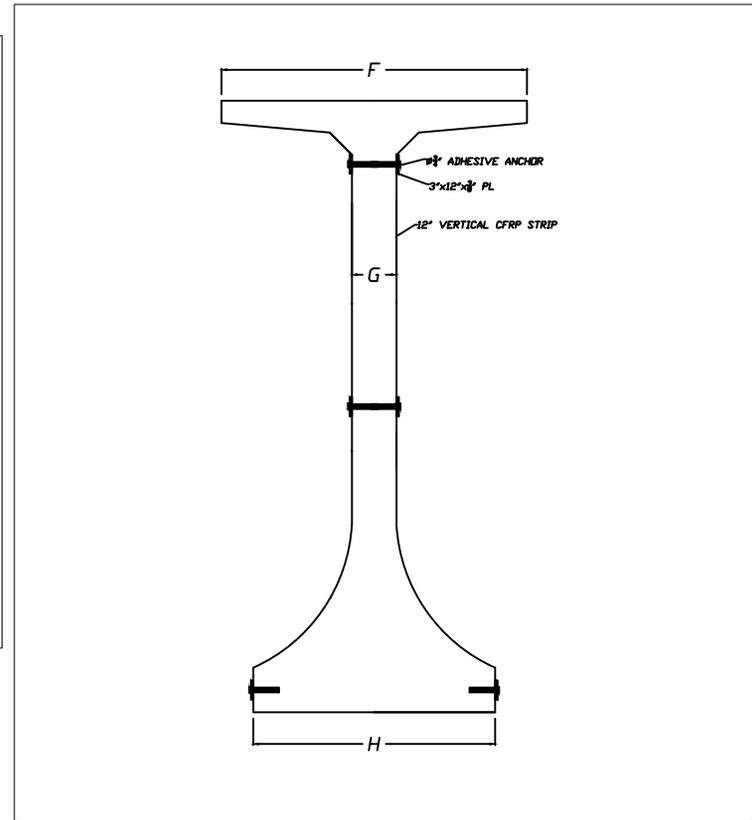
AASHTO TYPE V THROUGH VI CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

DOT-RFP
21-9033-CA
10/26/21
NOTED

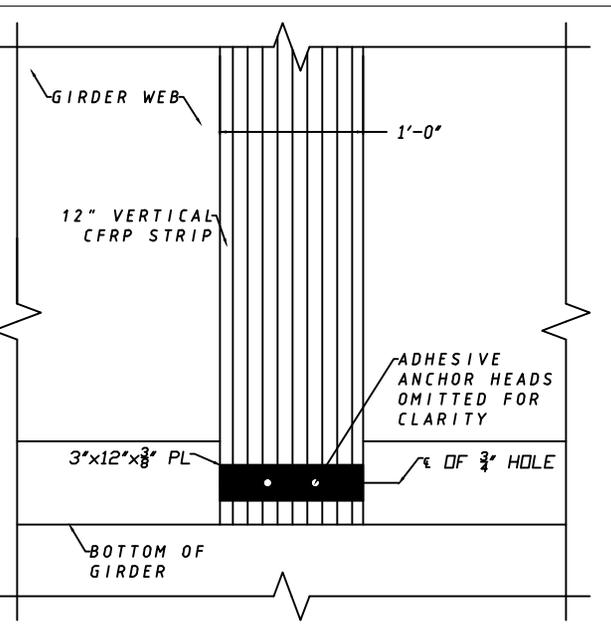
PJR
NS
PJR



B7 FLORIDA I-BEAM MECHANICAL ANCHORS-ELEVATION



B8 FLORIDA I-BEAM MECHANICAL ANCHORS-SECTION



B9 FLORIDA I-BEAM MECHANICAL ANCHORS-DETAILS

TABLE OF DIMENSIONS

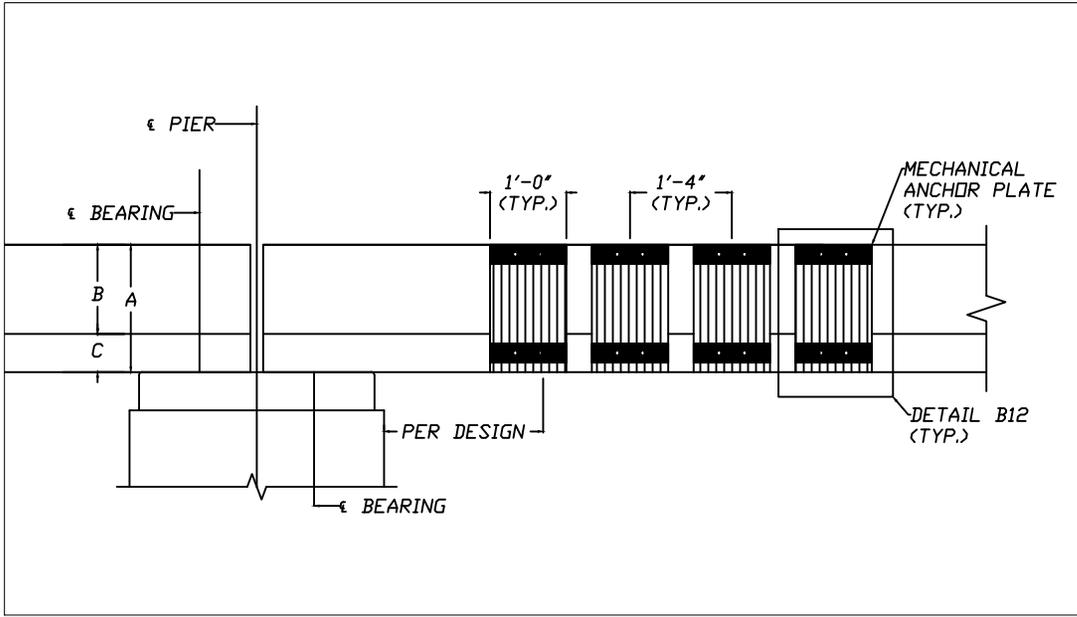
BEAM	A	B	C	D	E	F	G	H
BULB T-78	6'-6"	0'-3"	0'-4"	0'-3"	0'-8"	5'-0"	0'-7"	2'-4"
F I-96	8'-0"	0'-3 1/2"	0'-1 1/2"	0'-3 1/2"	0'-6"	4'-0"	0'-7"	3'-2"

CARBON FIBER REINFORCED POLYMER MECHANICAL ANCHORS

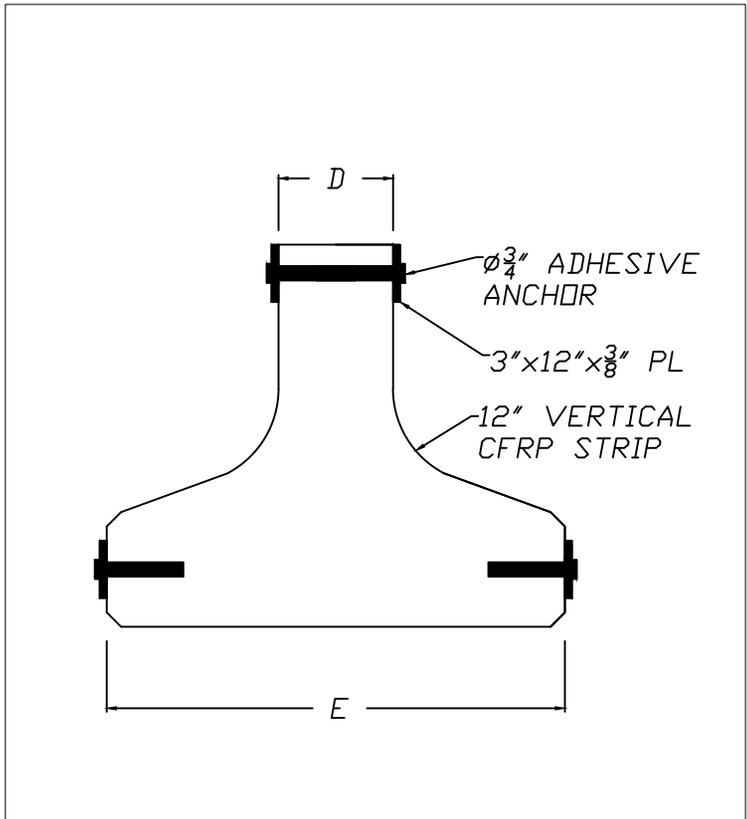


FLORIDA I-BEAM CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

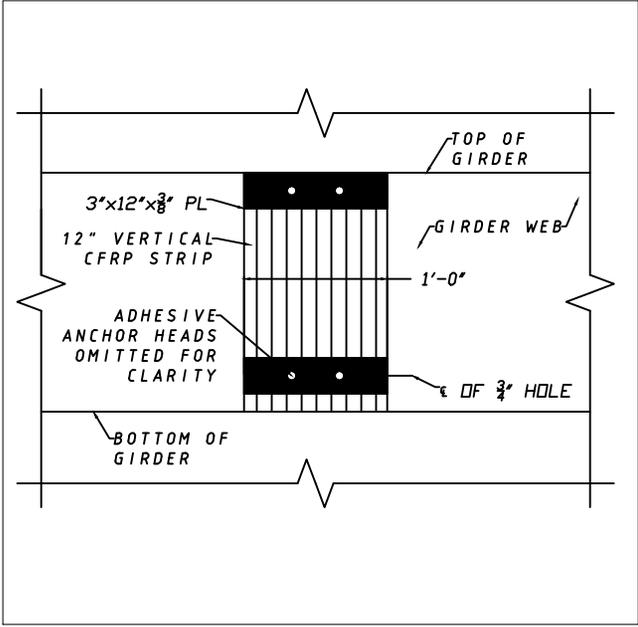
DOT-RFP 21-8033-CA	PJR
10/26/21	NS
NOTED	PJR



B10 INVERTED T-BEAM MECHANICAL ANCHORS-ELEVATION



B11 INVERTED T-BEAM MECHANICAL ANCHORS-SECTION



B12 INVERTED T-BEAM MECHANICAL ANCHORS-DETAILS

TABLE OF DIMENSIONS

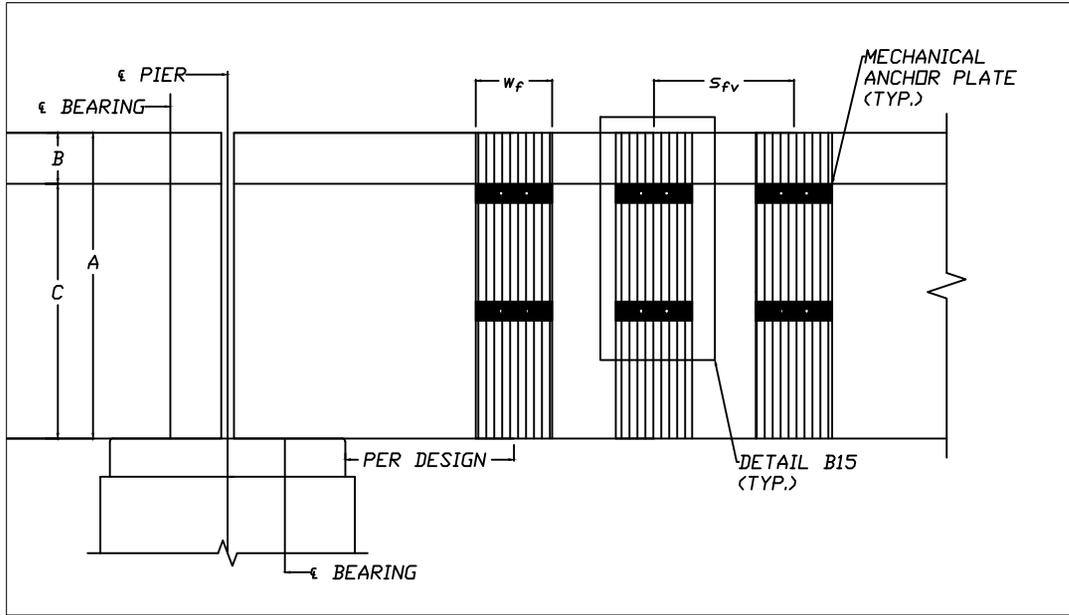
BEAM	A	B	C	D	E
INVERTED T-BEAM	1'-8"	1'-2"	0'-6"	0'-6"	2'-0"

CARBON FIBER REINFORCED POLYMER MECHANICAL ANCHORS

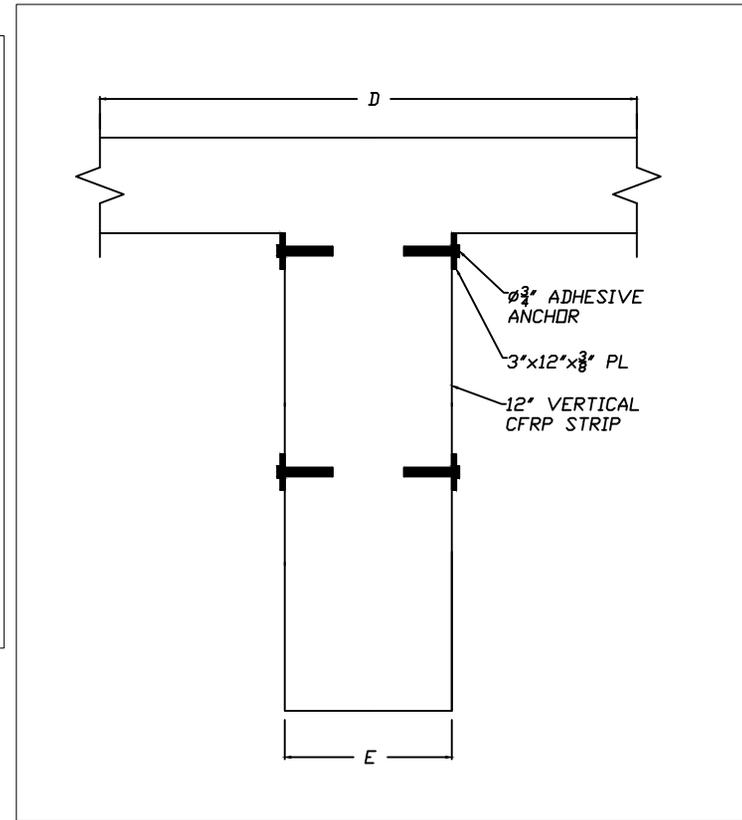


INVERTED T-BEAM CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

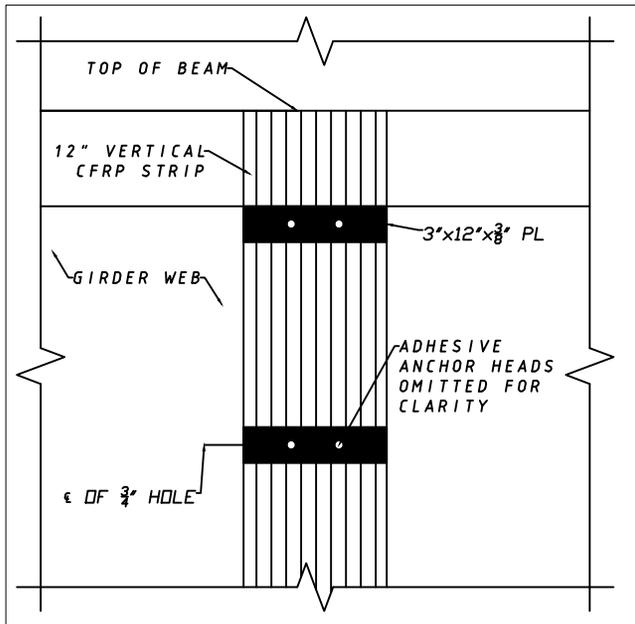
DOT-RFP 21-8033-CA	PJR
10/26/21	NS
NOTED	PJR



B13 RC BEAM (GENERIC) MECHANICAL ANCHORS-ELEVATION



B14 RC BEAM (GENERIC) MECHANICAL ANCHORS-SECTION



B15 RC BEAM (GENERIC) MECHANICAL ANCHORS-DETAILS

TABLE OF DIMENSIONS								
BEAM	A	B	C	D	E	F	S_{fv}	S_{fh1}
RC T-BEAM	VARIES	VARIES						

NOTES

1. THE DETAILS SHOWN FOR THE "RC BEAM" ARE GENERIC AND WILL VARY BASED ON BEAM GEOMETRY.
2. THE TOP FLANGE OF THE RC BEAM IS REPRESENTATIVE OF A SLAB AND SHOULD NOT BE WRAPPED OR ANCHORED.
3. SPACING OF HORIZONTAL AND VERTICAL CFRP STRIPS SHALL BE DETERMINED BY BEAM DEPTH.
4. SPACING OF VERTICAL STRIPS SHOULD BE UNIFORM ALONG THE ENTIRE LENGTH OF THE REPAIRED ZONE.

CARBON FIBER REINFORCED POLYMER MECHANICAL ANCHORS



REINFORCED CONCRETE BEAM (GENERIC) CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

DOT-RFP 21-9033-CA	PJR
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NOTED	PJR
B-6	

CARBON FIBER REINFORCED POLYMER REPAIR NOTES--LAMINATES ONLY

1. SPACED FRP STRIPS USED FOR SHEAR STRENGTHENING SHOULD BE INVESTIGATED TO EVALUATE THEIR CONTRIBUTION TO THE SHEAR STRENGTH.
2. SPACING SHOULD ADHERE TO THE LIMITS PRESCRIBED BY ACI 318 FOR INTERNAL STEEL SHEAR REINFORCEMENT.
3. THE SPACING OF FRP STRIPS IS DEFINED AS THE DISTANCE BETWEEN THE CENTERLINE OF THE STRIPS.
4. SURFACE MUST BE CLEAN, SOUND AND DRY. REMOVE DUST, LAITANCE, GREASE, CURING COMPOUNDS, IMPREGNATIONS, WAXES, FOREIGN ARTICLES, DISINTEGRATED MATERIALS, AND OTHER BOND INHIBITING MATERIALS.
5. EXISTING UNEVEN SURFACES MUST BE FILLED WITH AN APPROPRIATE REPAIR MORTAR.
6. CRACKS WITH A WIDTH GREATER THAN OR EQUAL TO 0.008" MUST BE STABILIZED USING EPOXY INJECTION METHODS, PRIOR TO APPLICATION OF CFRP.
7. A UV PROTECTIVE COATING IS RECOMMENDED TO BE APPLIED TO ALL ANCHOR AREAS WITHIN 24 HOURS OF ANCHOR INSTALLATION.
8. THE RECOMMENDATIONS PROVIDED HEREIN SHOULD BE EVALUATED EXPERIMENTALLY PRIOR TO ADOPTION.

CFRP LAMINATES INSTALLATION SEQUENCE

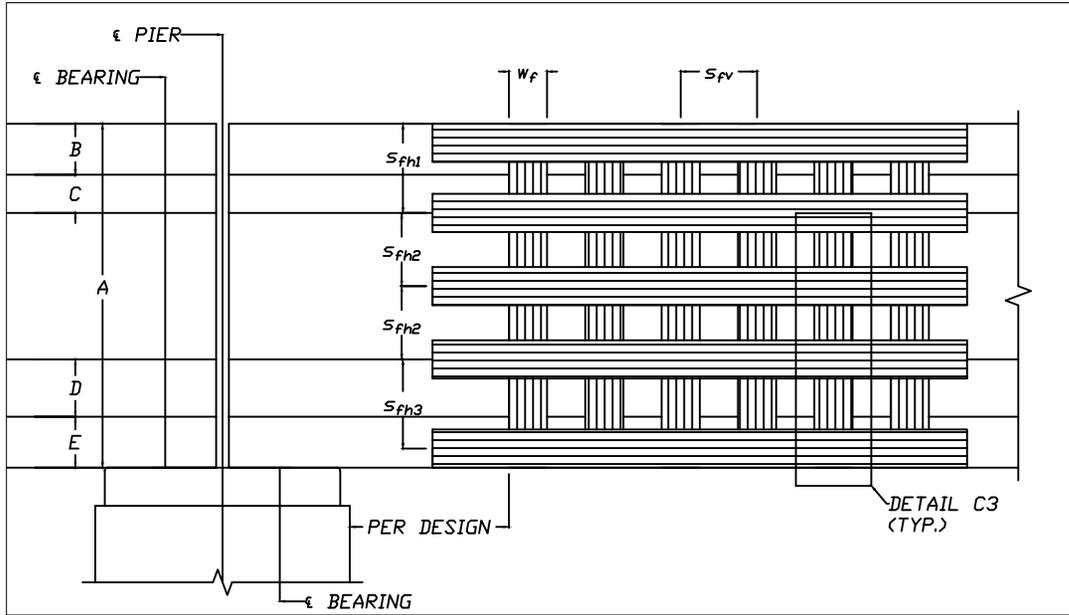
1. THE ENGINEER MUST BE NOTIFIED IF SPACING AND/OR STRIP GEOMETRY MUST BE MODIFIED.
2. CLEAN AND REMOVE ALL DEBRIS FROM THE LAMINATE APPLICATION SITE.
3. INSTALL VERTICAL CFRP STRIPS IN ACCORDANCE WITH THESE PLANS AND TECHNICAL AND MANUFACTURER SPECIAL PROVISIONS.
3. INSTALL HORIZONTAL CFRP STRIPS IN ACCORDANCE WITH THESE PLANS AND TECHNICAL AND MANUFACTURER SPECIAL PROVISIONS.
4. APPLY A UV PROTECTIVE COATING AT ALL LAMINATE LOCATIONS.

CARBON FIBER REINFORCED POLYMER LAMINATES ONLY

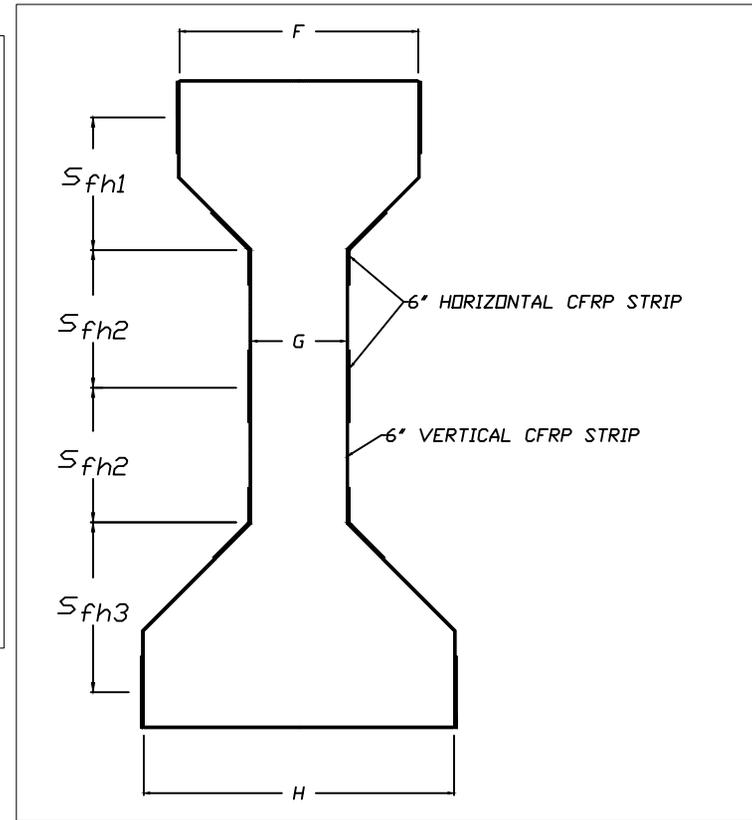


GENERAL NOTES-CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

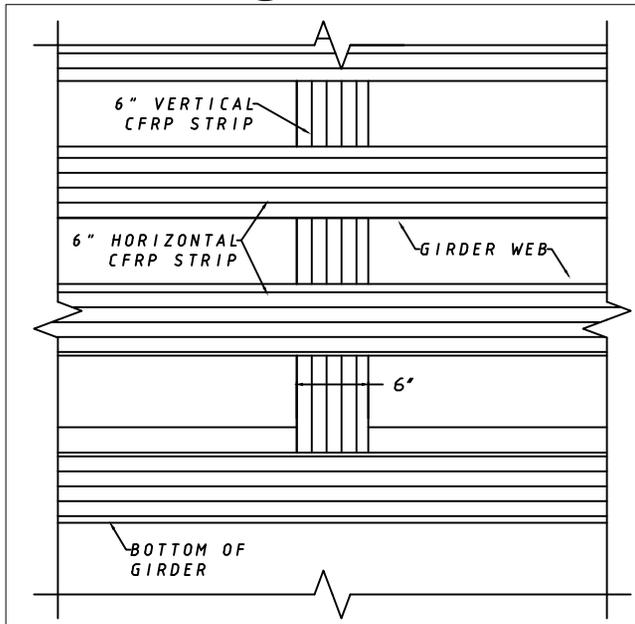
DOT-RFP 21-8033-CA	PJR
10/26/21	NS
NOTED	PJR



C1 AASHTO GIRDER I-IV LAMINATES-ELEVATION



C2 AASHTO GIRDER I-IV LAMINATES-SECTION



C3 AASHTO GIRDER I-IV LAMINATES-DETAILS

TABLE OF DIMENSIONS

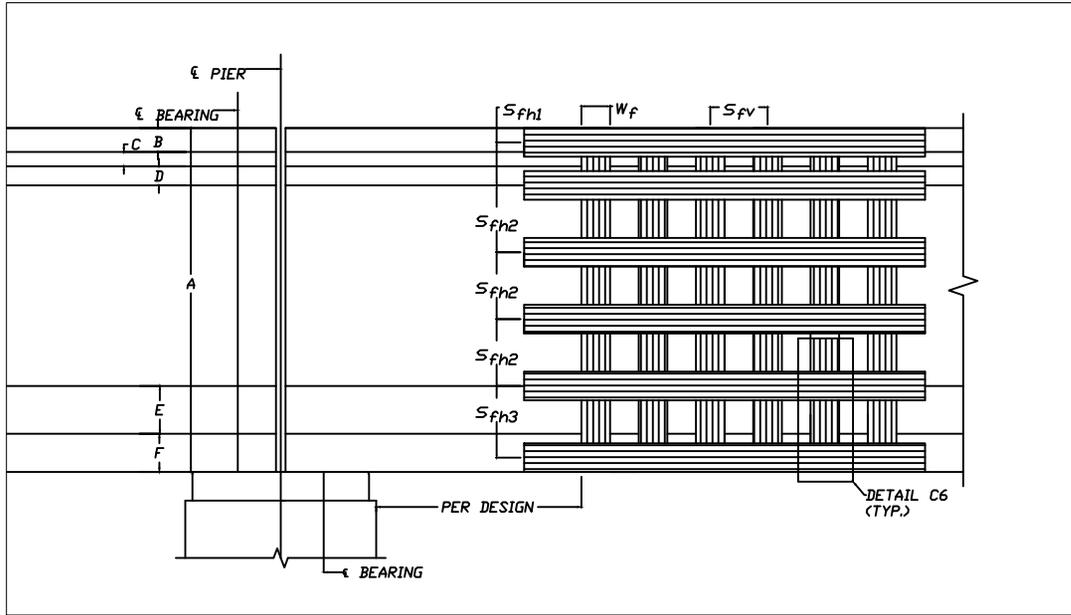
BEAM	A	B	C	D	E	F	G	H	S _{fh1}	S _{fh2}	S _{fh3}
AASHTO I	2'-4"	0'-4"	0'-3"	0'-5"	0'-5"	1'-0"	0'-6"	1'-4"	0'-11"	-	-
AASHTO II	3'-0"	0'-6"	0'-3"	0'-6"	0'-6"	1'-0"	0'-6"	1'-6"	0'-6"	1'-3"	0'-9"
AASHTO III	3'-9"	0'-7"	0'-5"	0'-8"	0'-7"	1'-4"	0'-7"	1'-10"	0'-8"	0'-9 1/2"	0'-11"
AASHTO IV	4'-6"	0'-8"	0'-6"	0'-9"	0'-8"	1'-8"	0'-8"	2'-2"	0'-11"	0'-11 1/2"	1'-2"

CARBON FIBER REINFORCED POLYMER LAMINATES ONLY

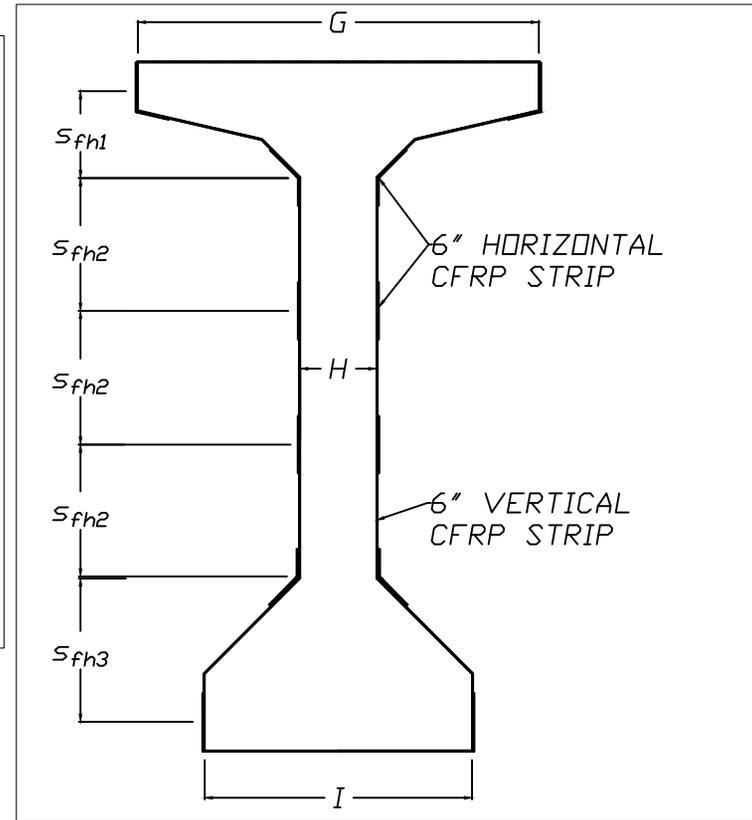


AASHTO TYPE I THROUGH IV CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

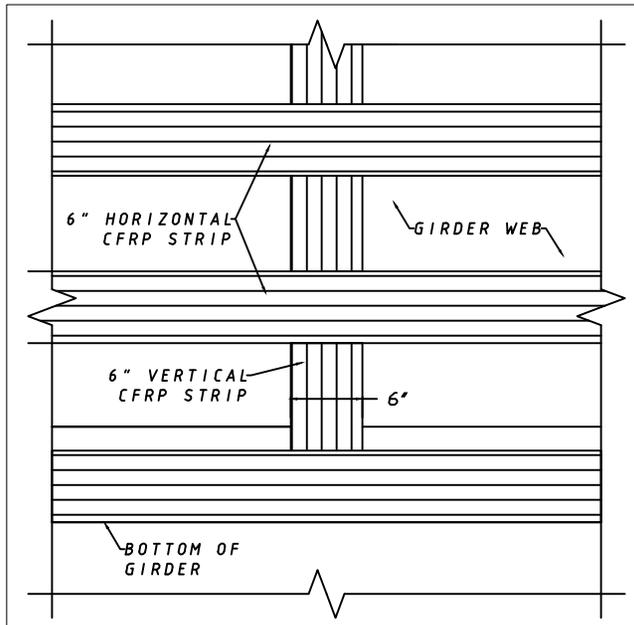
DOT-RFP 21-903-CA P.J.R.
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NOTED P.J.R.



C4 AASHTO GIRDER V-VI LAMINATES-ELEVATION



C5 AASHTO GIRDER V-VI LAMINATES-SECTION



C6 AASHTO GIRDER V-VI LAMINATES-DETAILS

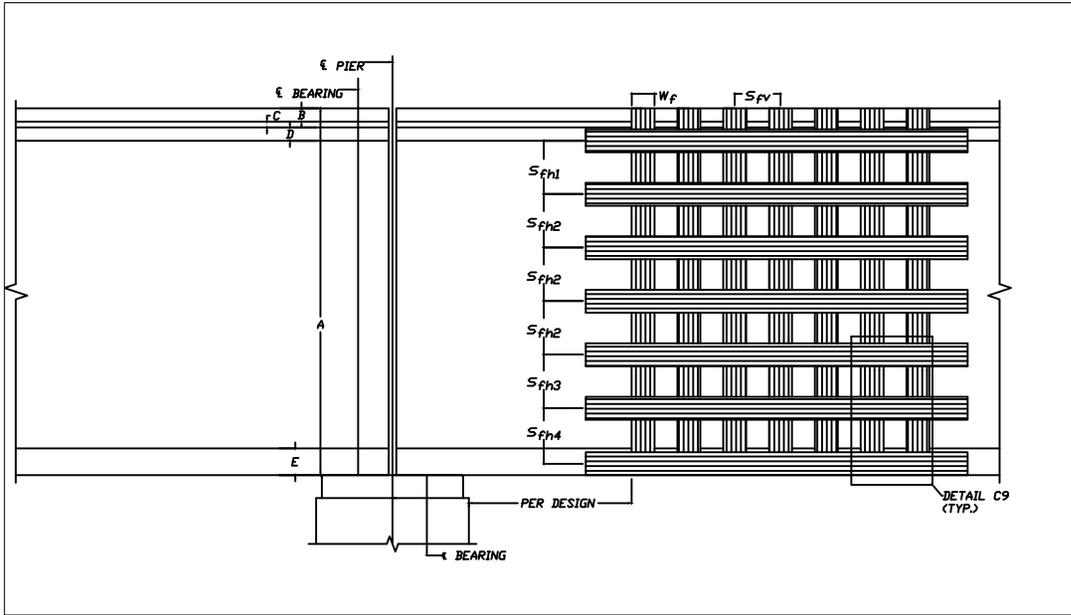
TABLE OF DIMENSIONS												
BEAM	A	B	C	D	E	F	G	H	I	S _{fh1}	S _{fh2}	S _{fh3}
AASHTO V	5'-3"	0'-5"	0'-3"	0'-4"	0'-10"	0'-8"	3'-6"	0'-8"	2'-4"	0'-9"	0'-11"	1'-2"
AASHTO VI	6'-0"	0'-5"	0'-3"	0'-4"	0'-10"	0'-8"	3'-6"	0'-8"	2'-4"	0'-9"	1'-2"	1'-3"

CARBON FIBER REINFORCED POLYMER LAMINATES ONLY

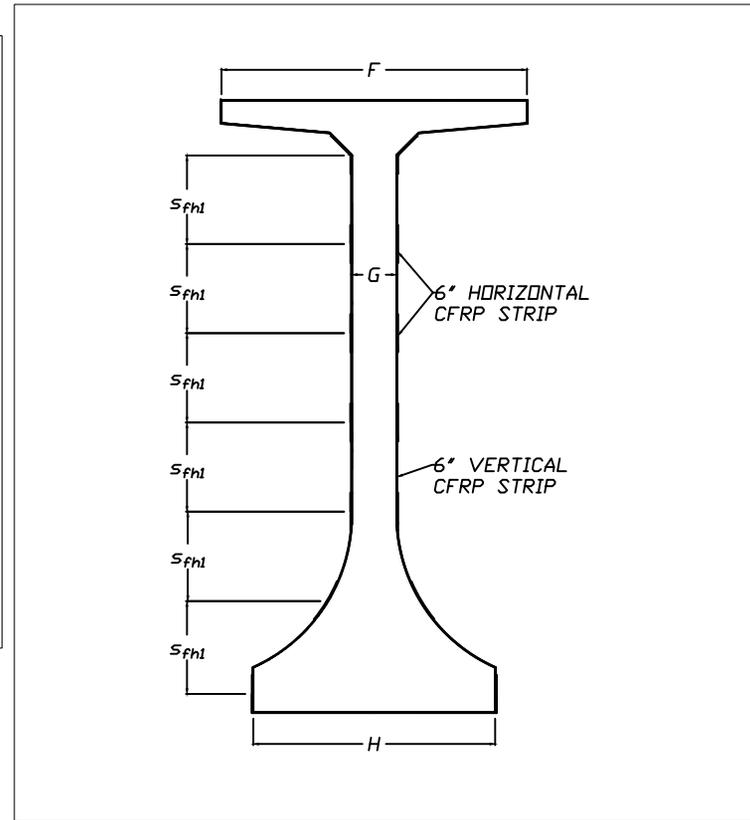


AASHTO TYPE V THROUGH VI CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

DOT-RFP
21-9033-CA P.J.R.
10/26/21 NS
NOTED P.J.R.



C7 FLORIDA I-BEAM LAMINATES-ELEVATION

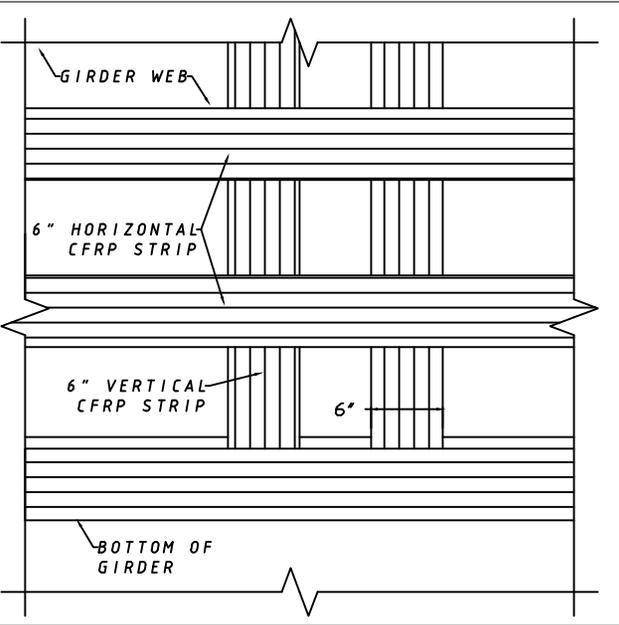


C8 FLORIDA I-BEAM LAMINATES-SECTION

CARBON FIBER REINFORCED POLYMER LAMINATES ONLY



FLORIDA I-BEAM CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

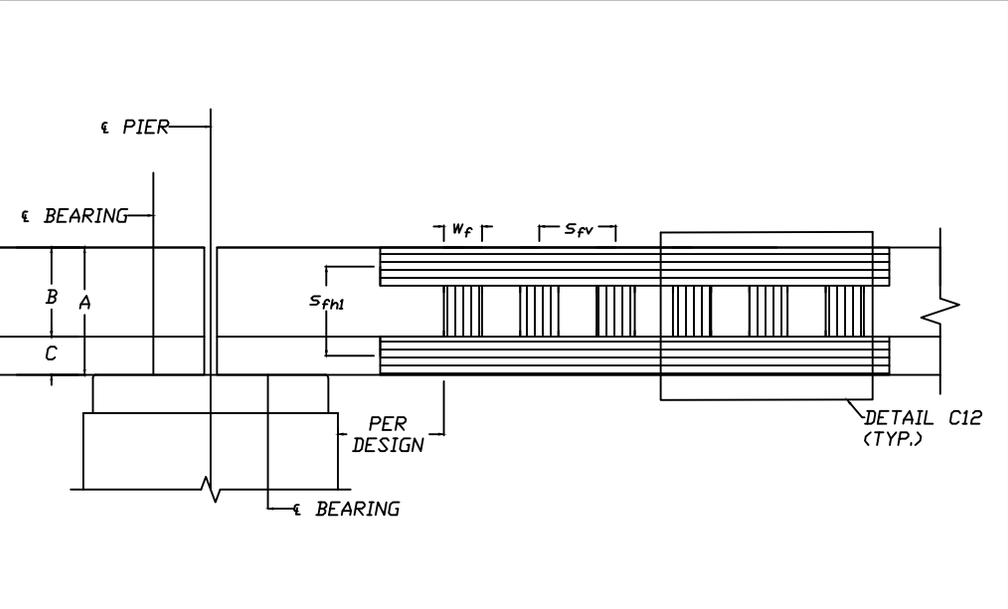


C9 FLORIDA I-BEAM LAMINATES-DETAILS

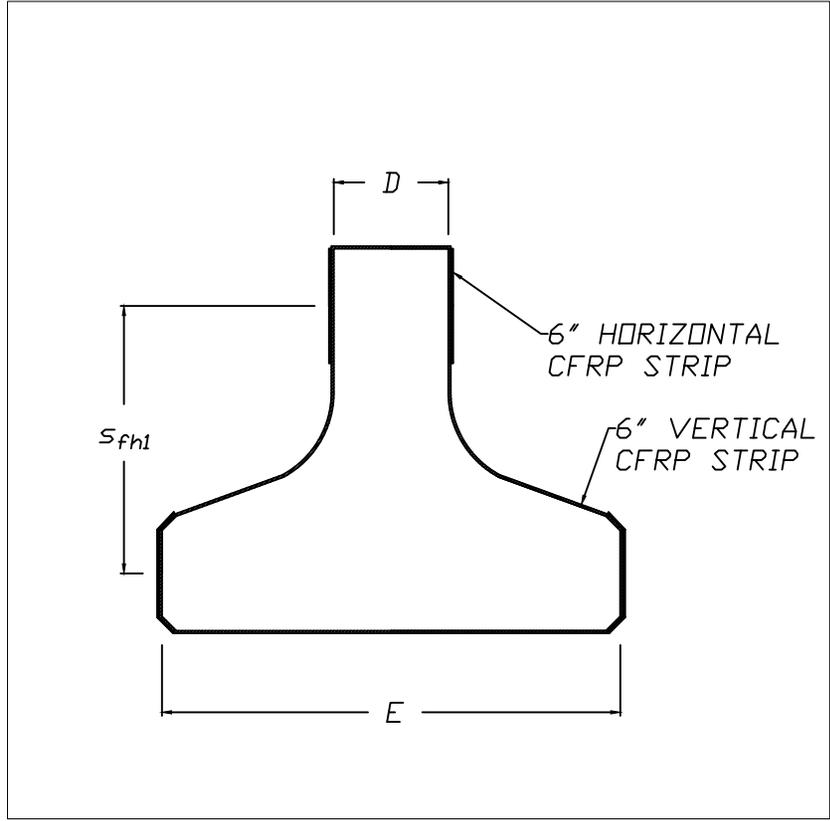
TABLE OF DIMENSIONS

BEAM	A	B	C	D	E	F	G	H	S _{fh1}	S _{fh2}	S _{fh3}
BULB T-78	6'-6"	0'-3"	0'-4"	0'-3"	0'-8"	5'-0"	0'-7"	2'-4"	0'-7"	1'-0 1/2"	1'-2"
F I-96	8'-0"	0'-3 1/2"	0'-1 1/2"	0'-3 1/2"	0'-6"	4'-0"	0'-7"	3'-2"	1'-2"	1'-2"	1'-2 1/2"

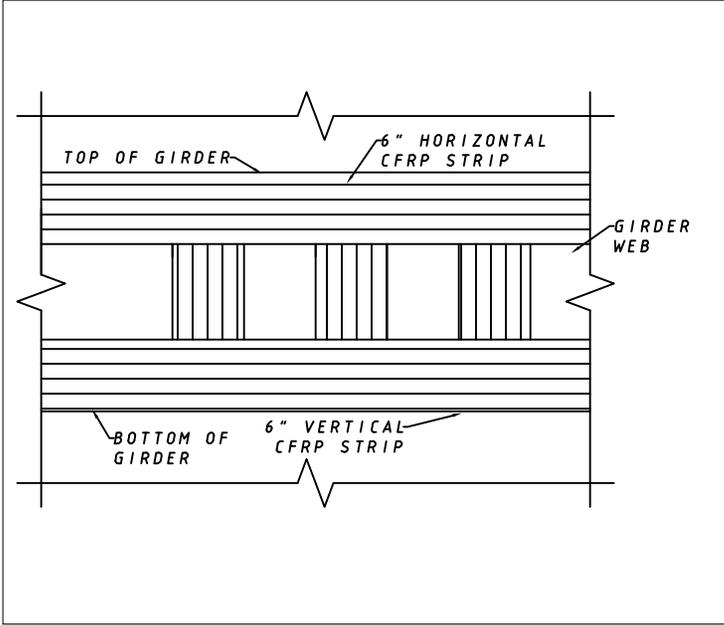
DOT-RFP 21-9033-CA	PJR
10/26/21	NS
NOTED	PJR



C10 INVERTED T-BEAM LAMINATES-ELEVATION



C11 INVERTED T-BEAM LAMINATES-SECTION



C12 INVERTED T-BEAM LAMINATES-DETAILS

TABLE OF DIMENSIONS

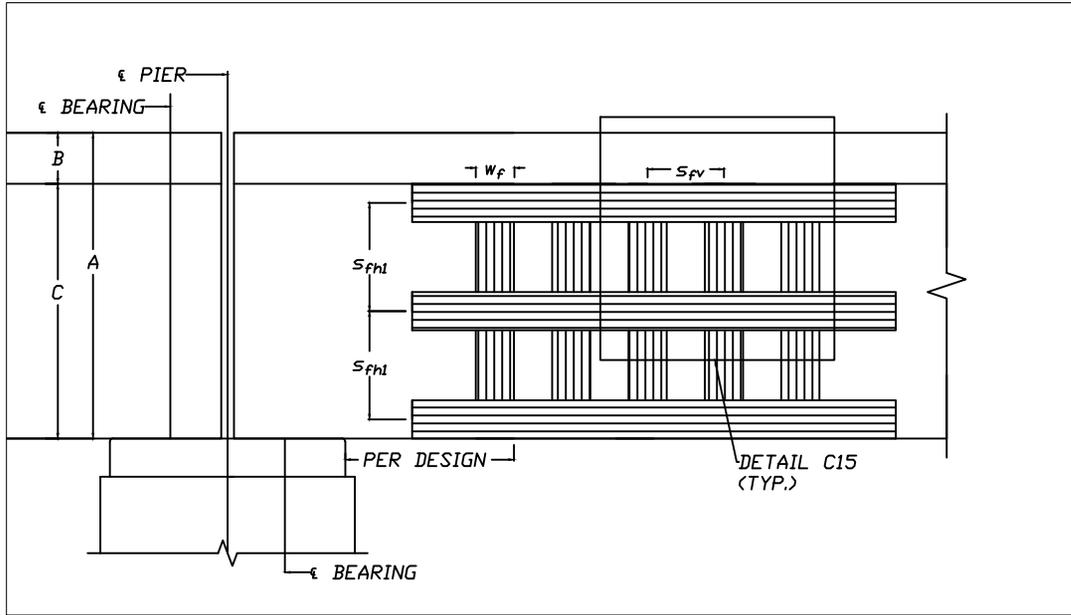
BEAM	A	B	C	D	E	S_{fh1}	S_{fh2}	S_{fh3}
INVERTED T-BEAM	1'-8"	1'-2"	0'-6"	0'-6"	2'-0"	1'-2"	-	-

CARBON FIBER REINFORCED POLYMER LAMINATES ONLY

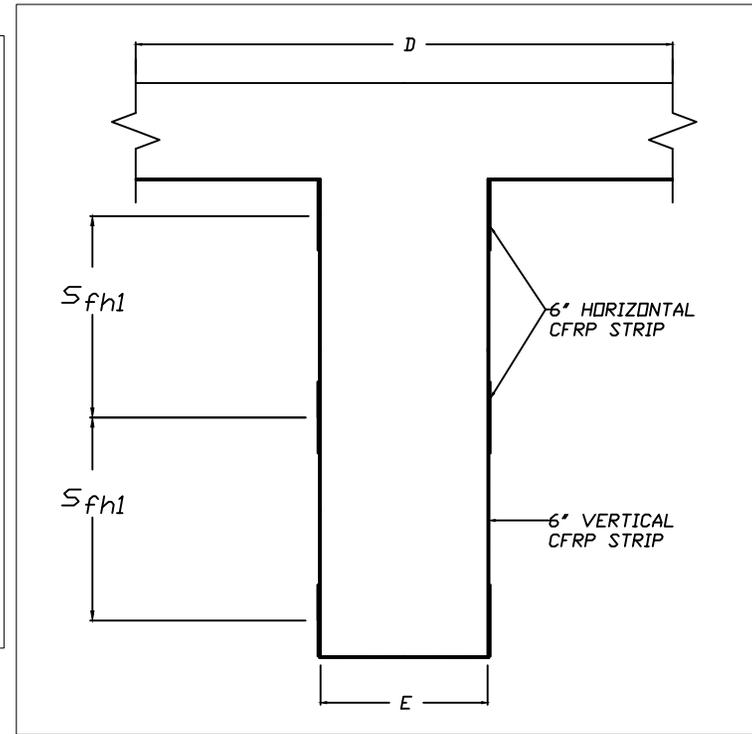


INVERTED T-BEAM CFRP REINFORCEMENT DETAILS
 FLORIDA DEPARTMENT OF TRANSPORTATION

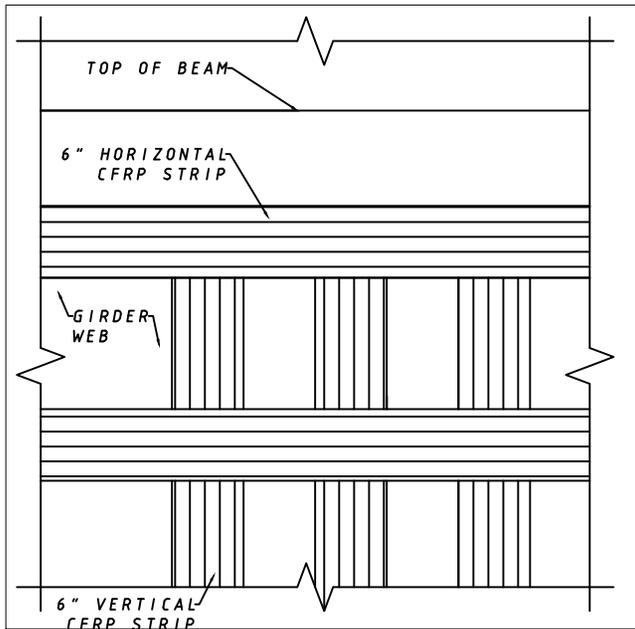
DOT-RFP 21-9033-0A	PJR
10/26/21	NS
NOTED	PJR



C13 RC BEAM (GENERIC) LAMINATES-ELEVATION



C14 RC BEAM (GENERIC) LAMINATES-SECTION



C15 RC BEAM (GENERIC) LAMINATES-DETAILS

TABLE OF DIMENSIONS								
BEAM	A	B	C	D	E	F	S_{fv}	S_{fh1}
RC T-BEAM	VARIES	VARIES						

NOTES

1. THE DETAILS SHOWN FOR THE "RC BEAM" ARE GENERIC AND WILL VARY BASED ON BEAM GEOMETRY.
2. THE TOP FLANGE OF THE RC BEAM IS REPRESENTATIVE OF A SLAB AND SHOULD NOT BE WRAPPED OR ANCHORED.
3. SPACING OF HORIZONTAL AND VERTICAL CFRP STRIPS SHALL BE DETERMINED BY BEAM DEPTH.
4. SPACING OF VERTICAL STRIPS SHOULD BE UNIFORM ALONG THE ENTIRE LENGTH OF THE REPAIRED ZONE.
5. SPACING OF HORIZONTAL STRIPS SHALL BE BETWEEN 12" AND 18".

CARBON FIBER REINFORCED POLYMER LAMINATES ONLY



REINFORCED CONCRETE BEAM (GENERIC) CFRP REINFORCEMENT DETAILS
FLORIDA DEPARTMENT OF TRANSPORTATION

DOT-RFP 21-9033-CA P.J.R.
10/26/21 NS
NOTED P.J.R.