2010 STANDARD CONSTRUCTION DETAILS REVISION

By: Billy Sweeney
DelDOT – Quality Section

SECTION I – BARRIER

- THE DEPARTMENT HAS DECIDED TO ADOPT THE MIDWEST GUARDRAIL SYSTEM (MGS).
  - THIS CHANGE COMES FROM A RECOMMENDATION BY FHWA TO ADOPT A GUARDRAIL SYSTEM THAT PERFORMED BETTER WITH OUR LARGER, TALLER VEHICLE FLEET.
  - THE MAJOR DIFFERENCES BETWEEN OUR CURRENT SYSTEM AND THE NEW MGS:
    - THE MGS IS 31” TO 32” TALL AS OPPOSED TO 27 ¾” TO 28 ¾” TALL.
    - THE MGS UTILIZES A 12” OFFSET BLOCK AS OPPOSED TO AN 8” OFFSET BLOCK.
    - ALL RAIL SPLICES OCCUR BETWEEN POSTS (MID SPAN) AS OPPOSED TO ON A POST.
    - OFFSET DISTANCE BETWEEN THE BACK OF POST AND AN OBSTRUCTION FOR A TYPE 1-31 (6’-3” POST SPACING) INSTALLATION IS 3’ AS OPPOSED TO 4’.
    - FOR AN 8” CURB, THE DISTANCE BETWEEN THE FACE OF THE GUARDRAIL AND THE FACE OF CURB IS NOW 8’ FOR LESS THAN 50MPH AND 13’ FOR GREATER THAN 50MPH, AS OPPOSED TO 6’ AND 10’ RESPECTIVELY.

DETAIL B-L, SHEET 1 OF 1
BARRIER LEGEND

SCALE : N.T.S.

BARRIER LEGEND

ITEM NO.	DESCRIPTION
1	W-BEAM
3A 3B	3A - 6" (150) x 12" (300) x 14" (350) OFFSET BLOCK 3B - 6" (150) x 8" (200) x 14" (350) OFFSET BLOCK
5	W-BEAM TERMINAL CONNECTOR
7A 7B	7A - 5/8" (16) GUARDRAIL BOLT (L=14" (455)) AND RECESS NUT 7B - 5/8" (16) GUARDRAIL BOLT (L=10" (255)) AND RECESS NUT
9	7/8" (22) HIGH STRENGTH STRUCTURAL HEX BOLT (L=VARIES) AND HEX NUT
10	5/8" (16) CARRIAGE BOLT (L=VARIES), STEEL WASHER, AND HEX NUT
11	BEARING PLATE

DELAWARE
DEPARTMENT OF TRANSPORTATION

BARRIER LEGEND

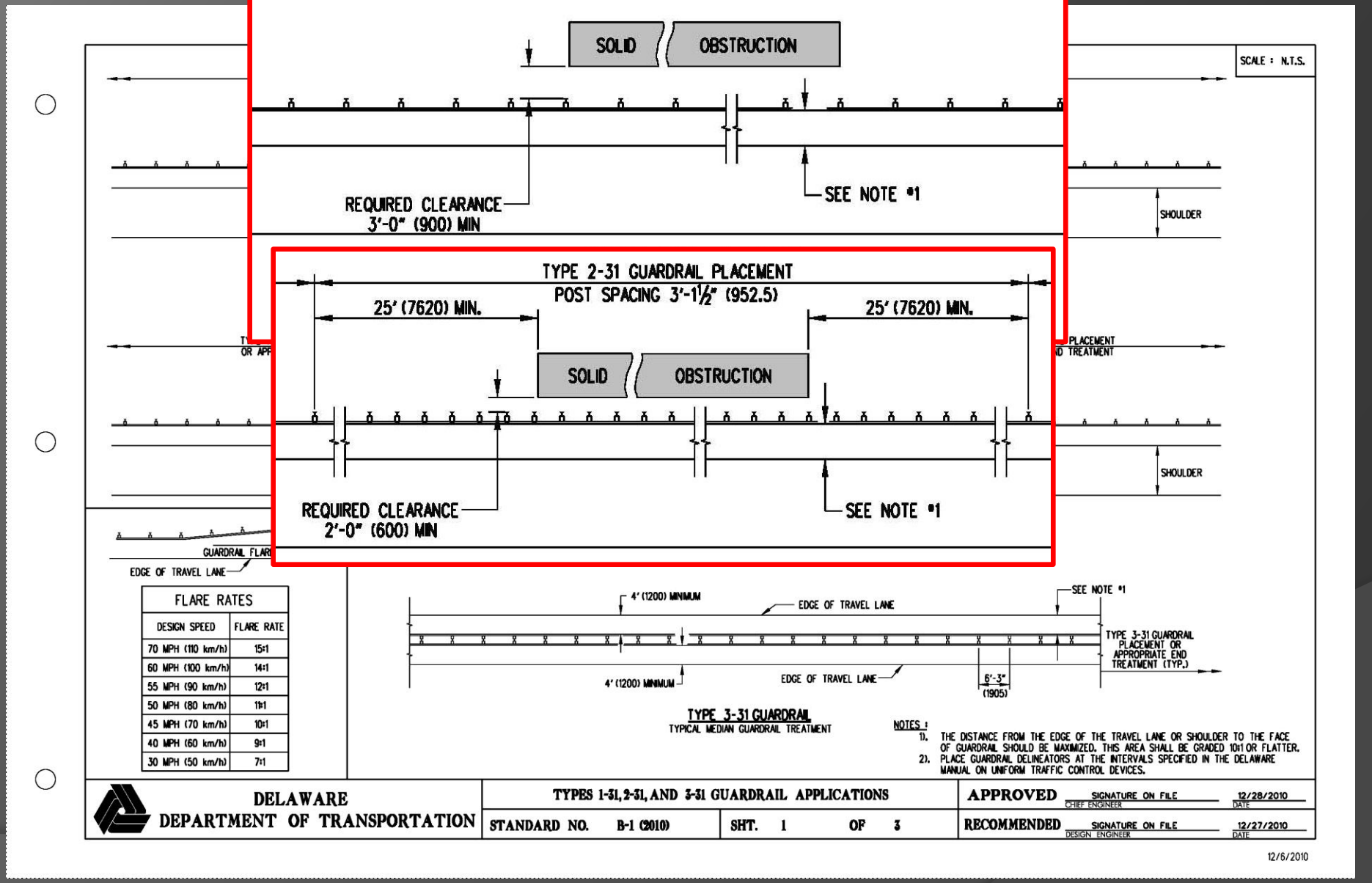
STANDARD NO. B-L (2010) SHT. 1 OF 1

APPROVED SIGNATURE ON FILE CHIEF ENGINEER 12/28/2010 DATE

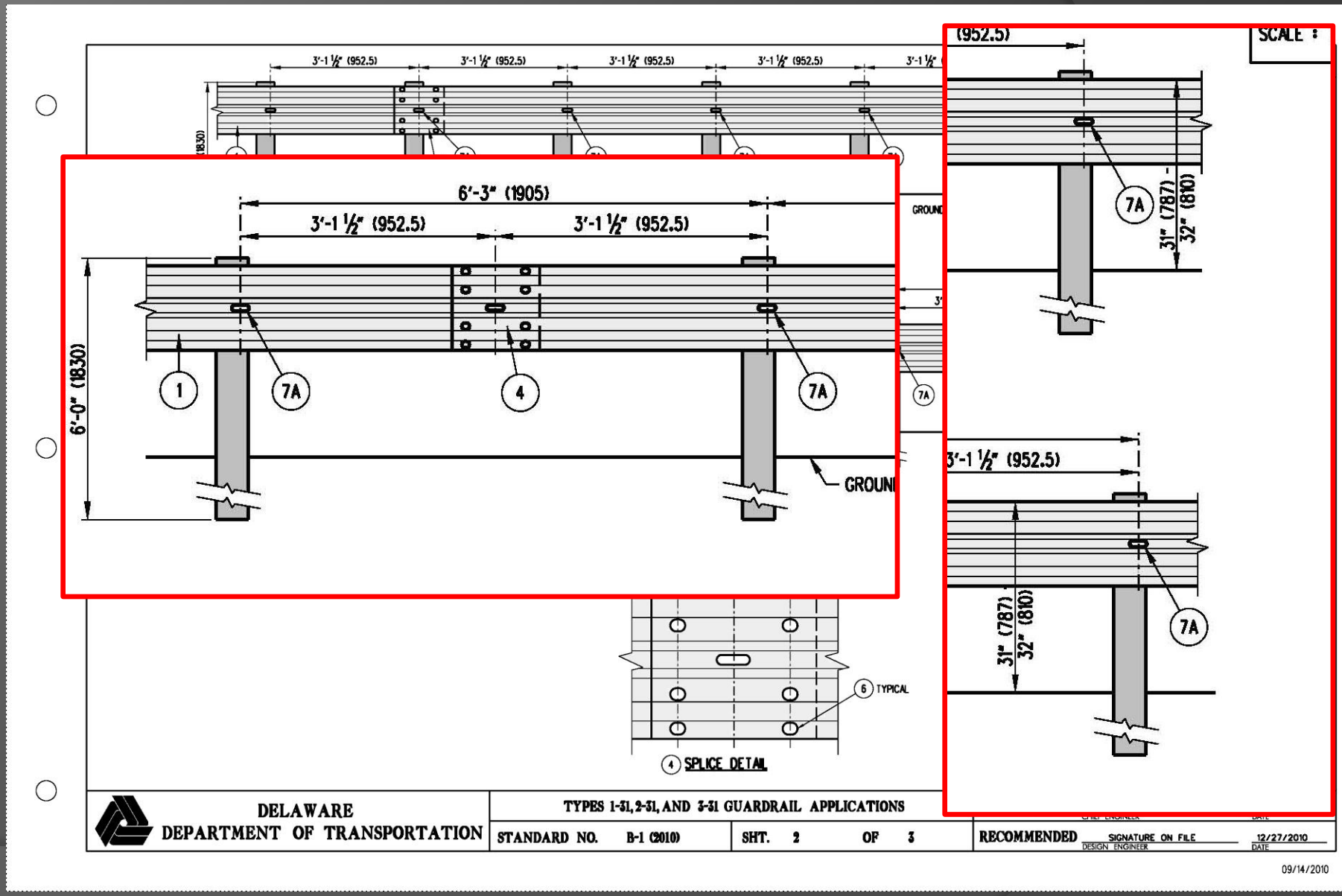
RECOMMENDED SIGNATURE ON FILE DESIGN ENGINEER 12/27/2010 DATE

12/6/2010

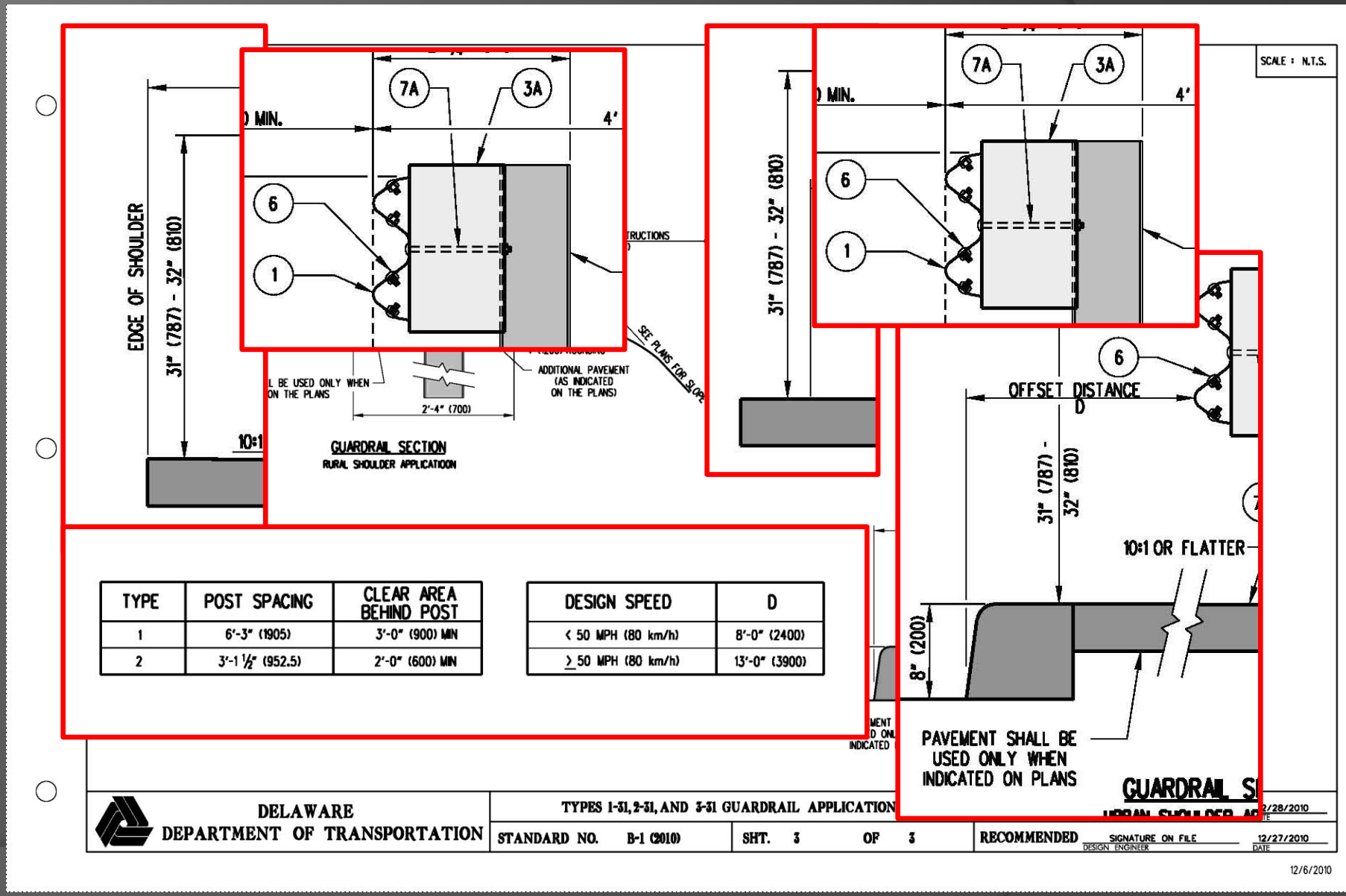
DETAIL B-1, SHEET 1 OF 3
GUARDRAIL APPLICATIONS (TYPES 1-31, 2-31, & 3-31)



DETAIL B-1, SHEET 2 OF 3
GUARDRAIL APPLICATIONS (TYPES 1-31, 2-31, & 3-31)



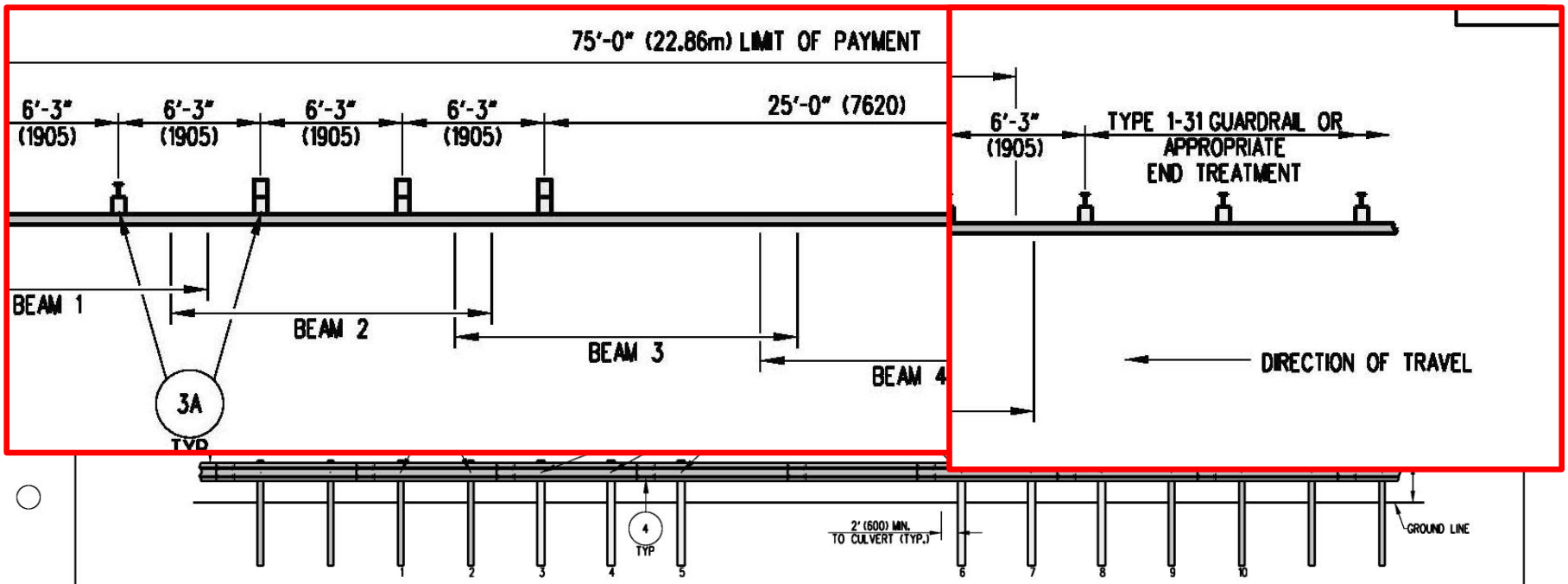
DETAIL B-1, SHEET 3 OF 3
GUARDRAIL APPLICATIONS (TYPES 1-31, 2-31, & 3-31)



TYPE	POST SPACING	CLEAR AREA BEHIND POST
1	6'-3" (1905)	3'-0" (900) MIN
2	3'-1 ½" (952.5)	2'-0" (600) MIN

DESIGN SPEED	D
< 50 MPH (80 km/h)	8'-0" (2400)
≥ 50 MPH (80 km/h)	13'-0" (3900)

DETAIL B-3, SHEETS 1, 2, & 3 OF 3
GUARDRAIL OVER CULVERTS (TYPES 1-31, 2-31, & 3-31)



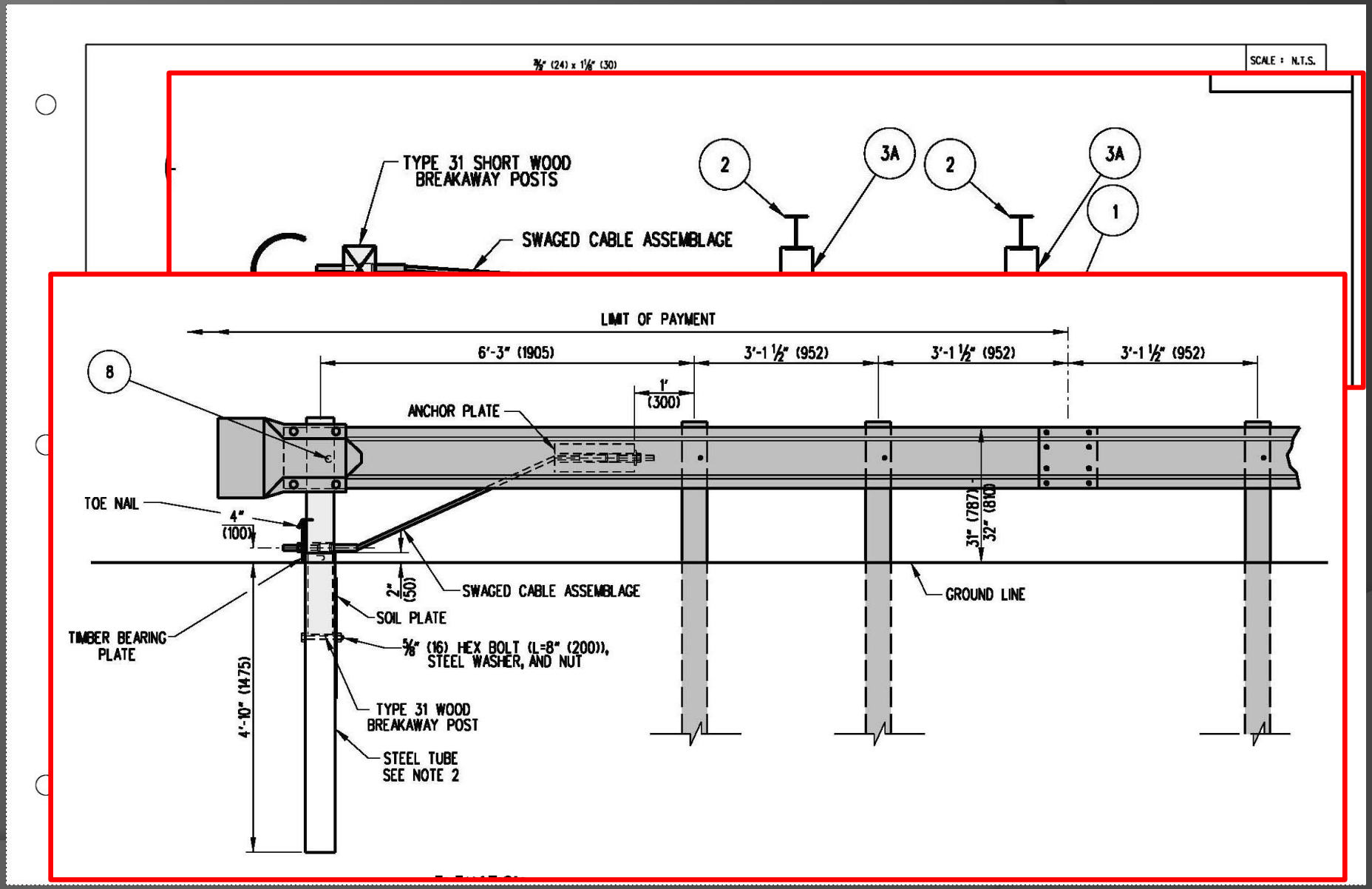
ELEVATION

NOTES:
1). ALL W-BEAMS ARE 13'-6½" (4130) IN LENGTH.
2). PLACE GUARDRAIL DELINEATORS AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
3). POSTS 1, 2, 9, & 10 ARE TO BE W6x9 (W15x13.5) STEEL POSTS. POSTS 3 THROUGH 8 ARE TO BE TYPE 31 LONG WOOD BREAKAWAY POSTS.
4). THE RAIL SHALL BE ATTACHED AT POSTS 3 THROUGH 8 WITH A ⅝" (16) x 22" (560) GUARDRAIL BOLT, STEEL WASHER, AND RECESS NUT.

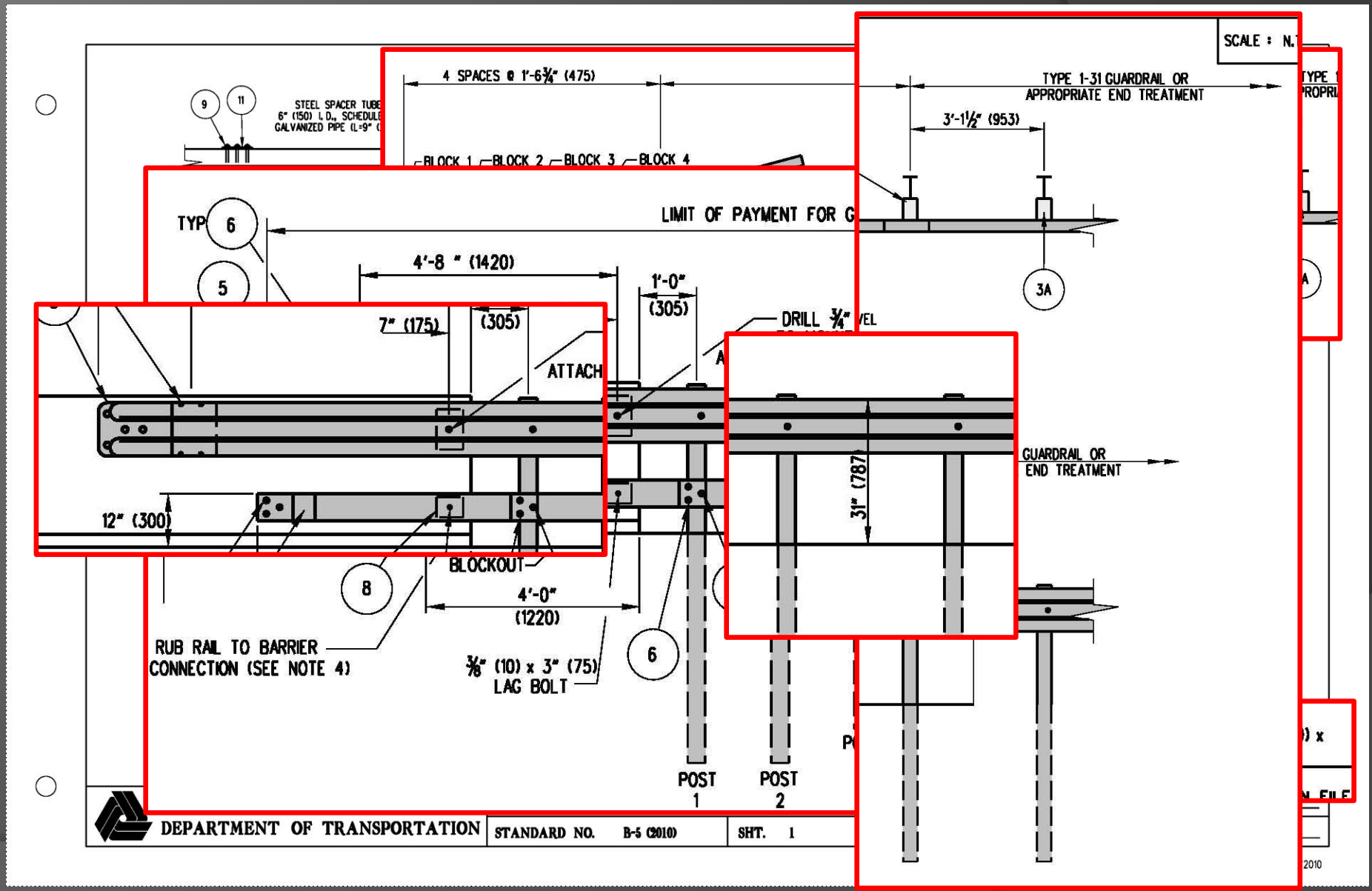
DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL OVER CULVERTS, TYPE 3-31	APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-3 (2010) SHT. 3 OF 3	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

10/14/2010

DETAIL B-4, SHEET 1 OF 1
END ANCHORAGE, TYPE 31

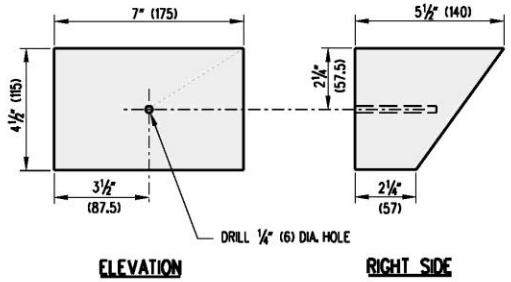


DETAIL B-5, SHEET 1 OF 6
GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1-31

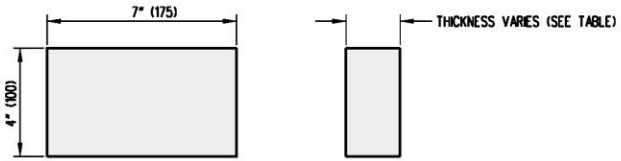


DETAIL B-5, SHEET 2 OF 6
GUARDRAIL TO BARRIER CONNECTION, TYPE 1 HARDWARE

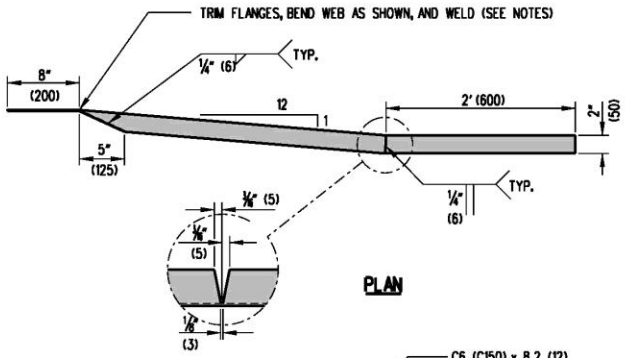
SCALE : N.T.S.



OFFSET BLOCK DETAIL



RUB RAIL OFFSET BLOCKS



RUB RAIL TO BARRIER CONNECTION

RUB RAIL OFFSET BLOCKS (7" (175) x 4" (100))		
POST NO.	THICKNESS	BOLT LENGTH
1	4¼" (108)	6" (15
2	3¼" (83)	4" (10
3	2" (50)	4" (10
4	1" (25)	2" (5

FIELD BENDING USING HEAT IS PERMITTED.

2). STEEL SPACER TUBE IS SCHEDULE 40 GALVANIZED PIPE, 6" (150) x 9" (225)

3). ALL HARDWARE ON THIS DETAIL IS COMPATIBLE WITH GUARDRAIL TO BARRIER CONNECTION, TYPES 1-31 AND 1-27.

DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, TYPE 1 HARDWARE

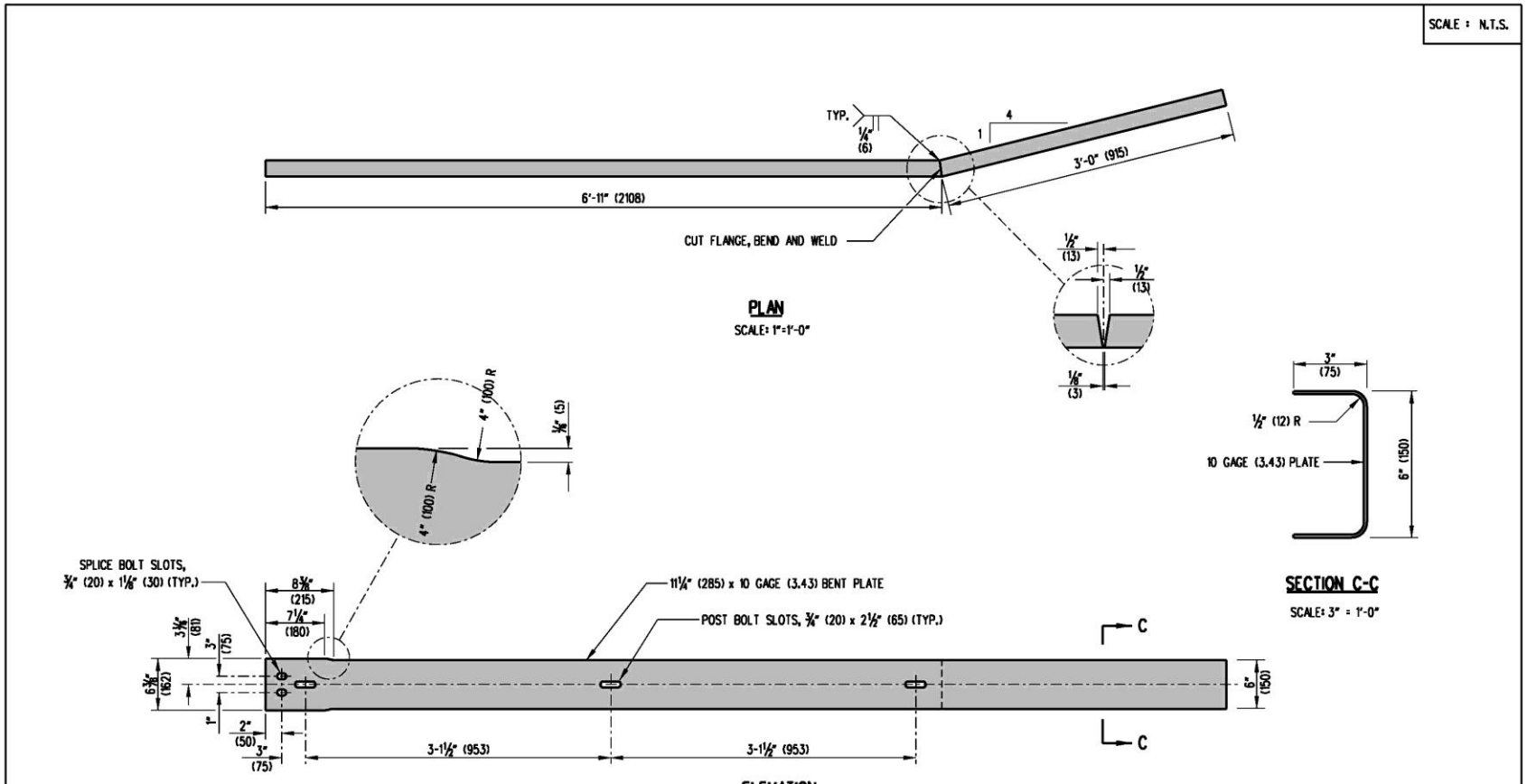
STANDARD NO. B-5 (2010) SHT. 2 OF 6

APPROVED SIGNATURE ON FILE CHIEF ENGINEER 12/28/2010 DATE

RECOMMENDED SIGNATURE ON FILE DESIGN ENGINEER 12/27/2010 DATE

12/06/2010

DETAIL B-5, SHEET 3 OF 6
GUARDRAIL TO BARRIER CONNECTION,



NOTE:
ALL HARDWARE ON THIS DETAIL IS COMPATIBLE WITH GUARDRAIL TO BARRIER CONNECTION, TYPES 1-31 AND 1-27.

DELAWARE
DEPARTMENT OF TRANSPORTATION

GU

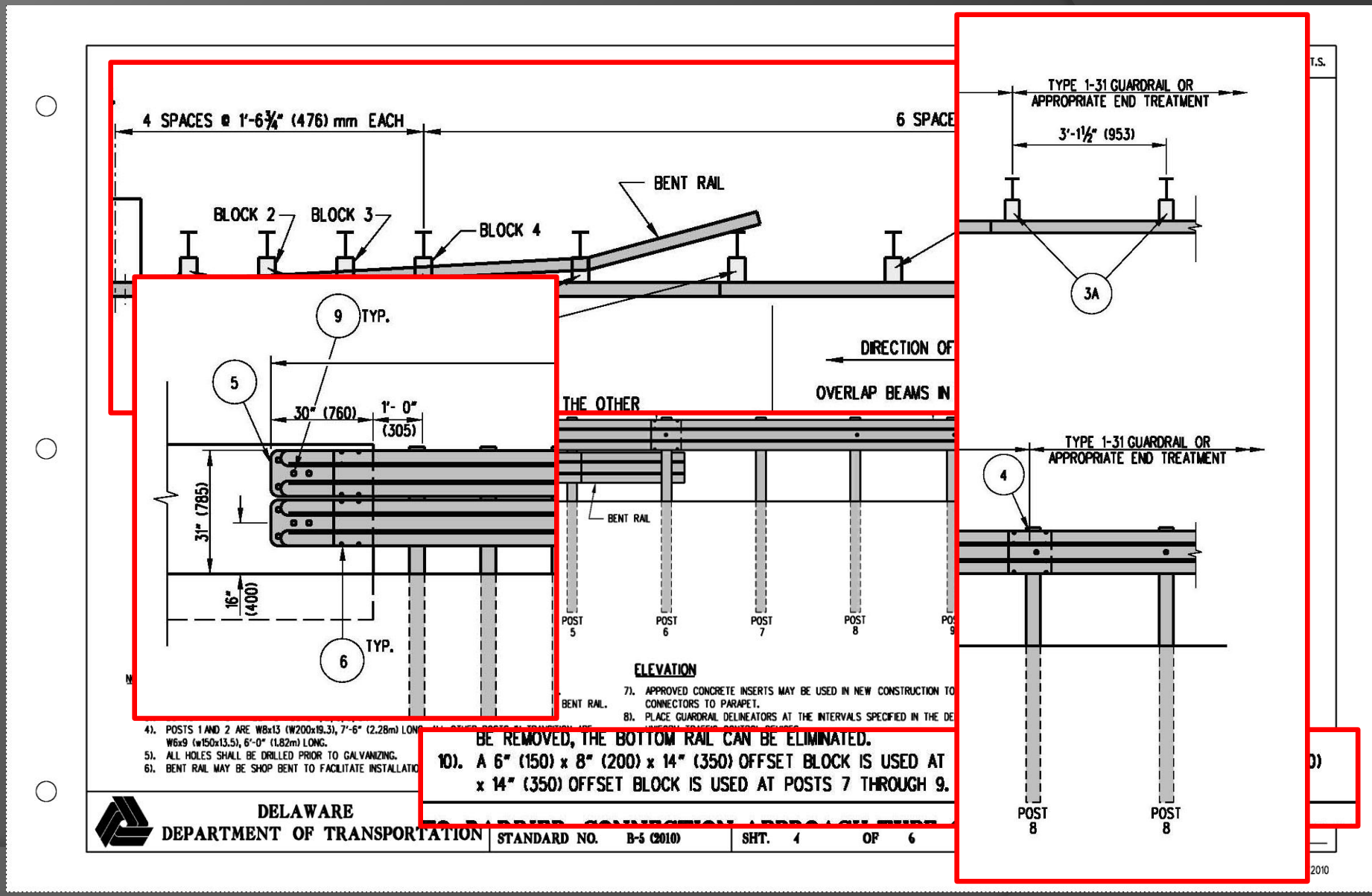
STANDARD NO. B-5 (2010)

SHT. 3 OF 6

RECOMMENDED SIGNATURE ON FILE 12/27/2010
DESIGN ENGINEER DATE

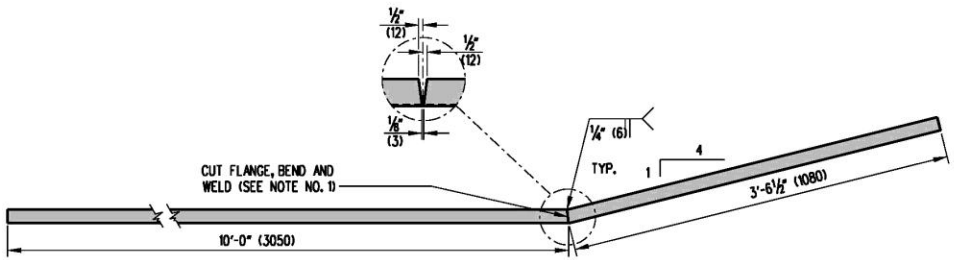
09/03/2010

DETAIL B-5, SHEET 4 OF 6
GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2-31



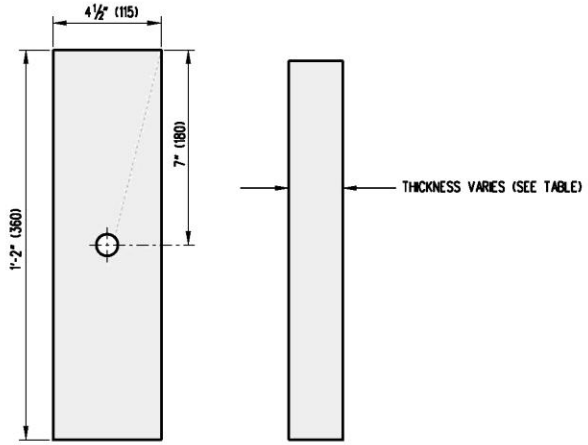
DETAIL B-5, SHEET 5 OF 6
GUARDRAIL TO BARRIER CONNECTION, TYPE 2 HARDWARE

SCALE : N.T.S.



BENT RAIL

SCALE:1"=1'-0"



BENT RAIL OFFSET BLOCKS

SCALE: 3"=1'-0"

BENT RAIL OFFSET BLOCKS 1'-2" (360) x 4½" (115)		
BLOCK	THICKNESS	BOLT LENGTH
1	5" (125)	8" (200)
2	4" (100)	6" (150)
3	3" (75)	6" (150)
4	2" (50)	4" (100)

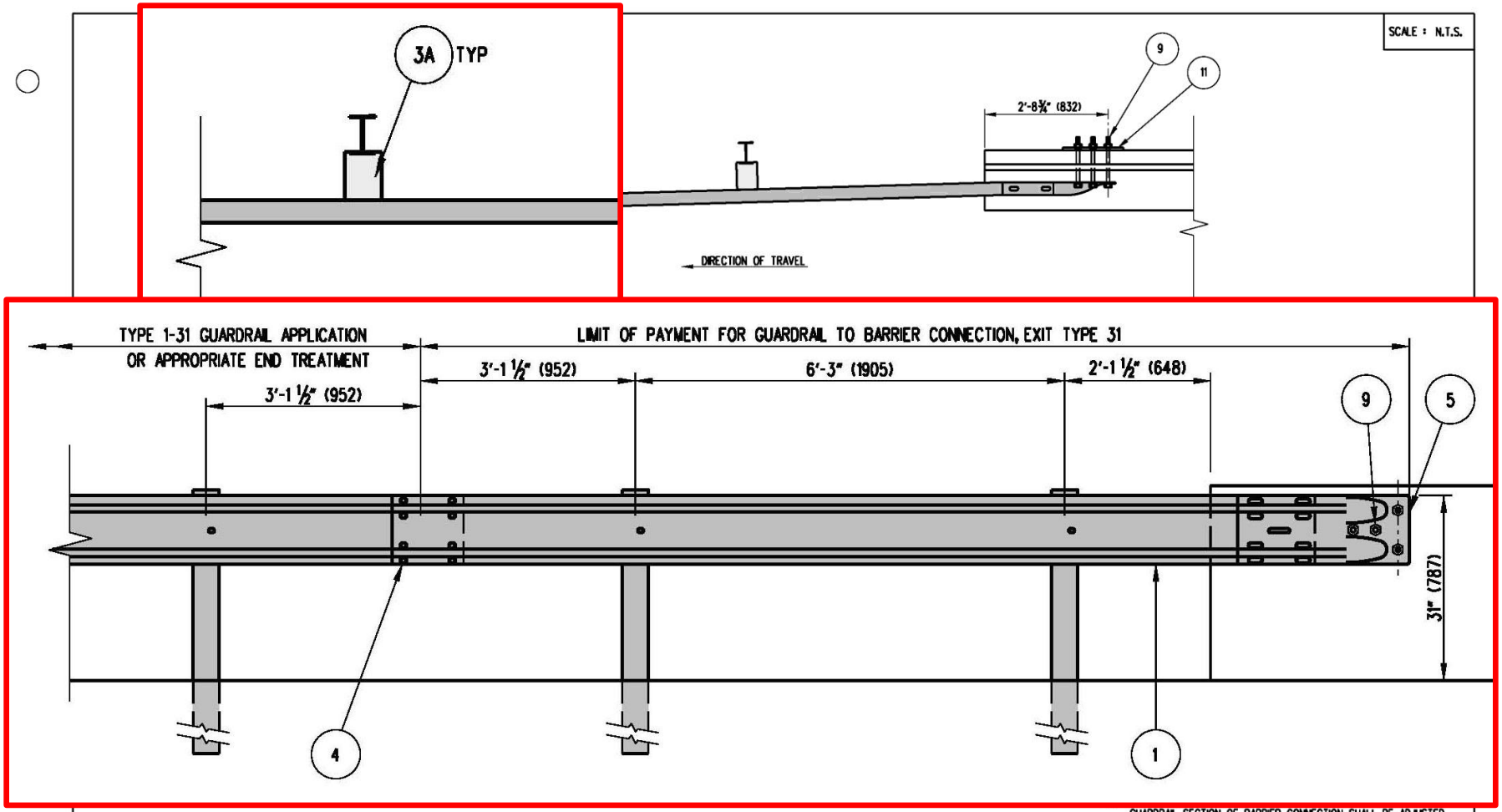
BOLTS. SEE BENT RAIL OFFSET BLOCK TABLE FOR BOLT LENGTH.

2). ALL HARDWARE ON THIS DETAIL IS COMPATIBLE WITH GUARDRAIL TO BARRIER CONNECTION, TYPES 2-31 AND 2-27.

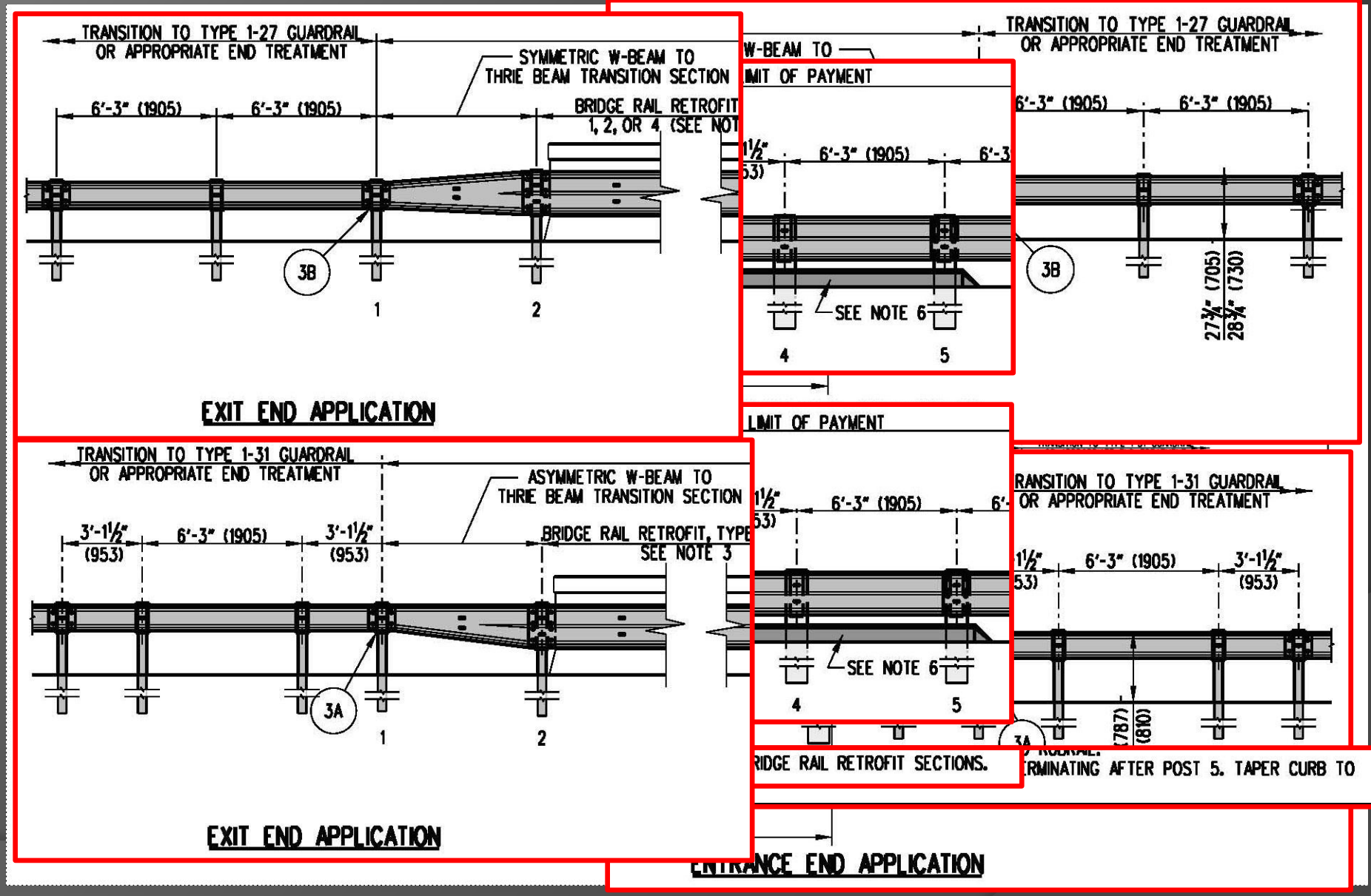
DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL TO BARRIER CONNECTION, TYPE 2 HARDWARE			APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-5 (2010)	SHT. 5	OF 6	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

09/15/2010

DETAIL B-5, SHEET 6 OF 6
GUARDRAIL TO BARRIER CONNECTION, EXIT TYPE 31

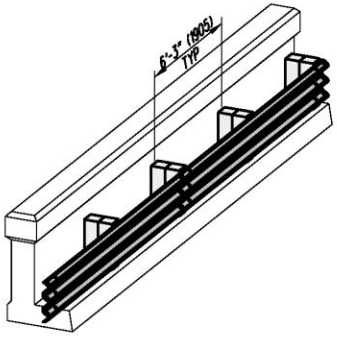


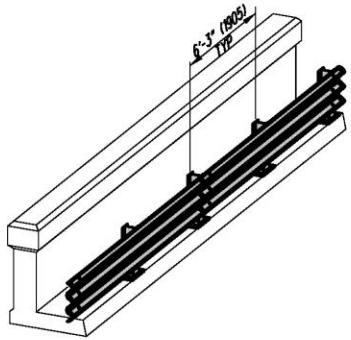
DETAIL B-6, SHEET 1 OF 5
BRIDGE RAIL RETROFIT, ENTRANCE AND END APPLICATIONS

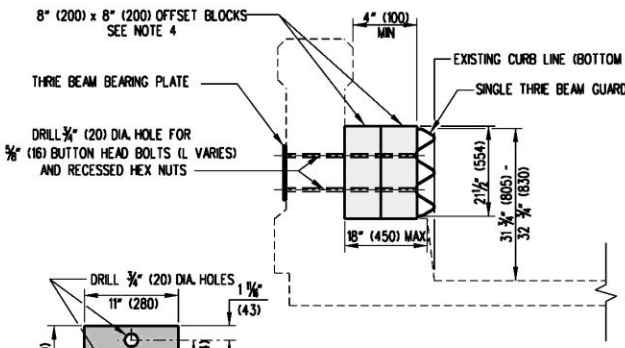


DETAIL B-6, SHEET 2 OF 5
BRIDGE RAIL RETROFITS, TYPES 1 & 2

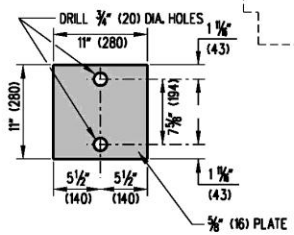
SCALE : N.T.S.



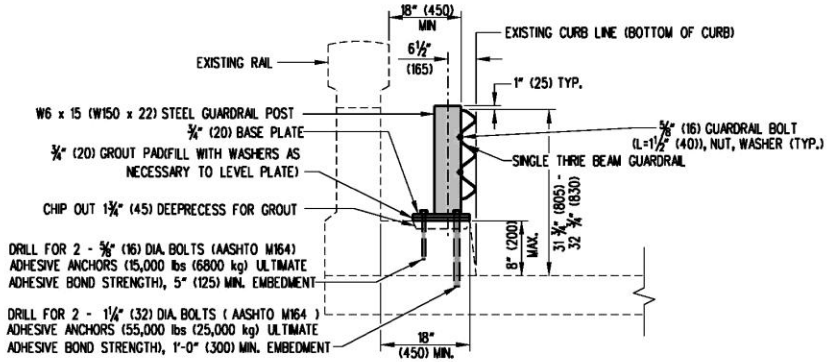




BRIDGE RAIL RETROFIT, TYPE 1
SEE NOTE 1



THRIE BEAM BEARING PLATE DETAIL



BRIDGE RAIL RETROFIT, TYPE 2
SEE NOTE 2

NOTES:

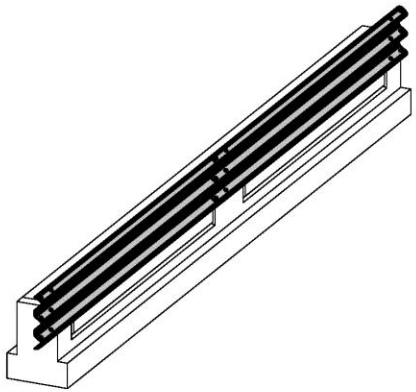
1). BRIDGE RAIL RETROFIT, TYPE 1 SHALL BE USED WHEN THE PARAPET MONOLITHIC CURB IS 18" (450) OR LESS.
2). BRIDGE RAIL RETROFIT, TYPE 2 SHALL BE USED WHEN THE PARAPET MONOLITHIC CURB IS 18" (450) OR WIDER, AND DEAD LOAD CONSIDERATIONS ARE A CONCERN WHEN USING BRIDGE RAIL RETROFIT, TYPE 3 (SEE DETAIL B-6, SHEET 4 OF 5 FOR DETAILS).
3). ADHESIVE ANCHORS SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS AND SHALL BE GALVANIZED.
4). OFFSET BLOCK THICKNESS SHALL BE ADJUSTED TO ALLOW THE FACE OF THE THRIE BEAM TO BE FLUSH WITH THE BOTTOM OF THE CURB (MINIMUM THICKNESS SHALL BE 4" (100).
5). SEE DETAIL B-6, SHEET 3 OF 5 FOR BRIDGE RAIL RETROFIT, TYPE 2 HARDWARE DETAILS.
6). TYPICAL LATERAL SPACING OF OFFSET BLOCKS OR STEEL POSTS THROUGHOUT THE BRIDGE RAIL SECTION SHALL BE 6'-3" (1905). HOWEVER, SPACING MAY NEED TO BE REDUCED TO ACCOMODATE LINING UP BLOCKS OR POSTS AT THE END OF THE PARAPET.
7). USE A THRIE BEAM EXPANSION SECTION AT BRIDGE EXPANSION JOINTS.
8). PLACE GUARDRAIL DELINEATORS IN THE UPPER VALLEY OF THE THRIE BEAM AT THE INTERVALS SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
9). SEE DETAIL B-6, SHEET 1 OF 5 FOR ENTRANCE AND END APPLICATION DETAILS.

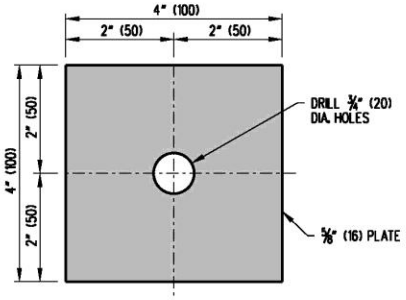
DELAWARE DEPARTMENT OF TRANSPORTATION	BRIDGE RAIL RETROFIT, TYPES 1 & 2	APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-6 (2010) SHT. 2 OF 5	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

12/06/2010

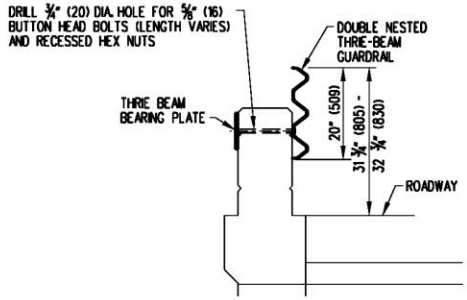
DETAIL B-6, SHEET 5 OF 5
BRIDGE RAIL RETROFIT, TYPE 4

SCALE : N.T.S.





THRIE-BEAM BEARING PLATE DETAIL



SECTION VIEW

NOTES:

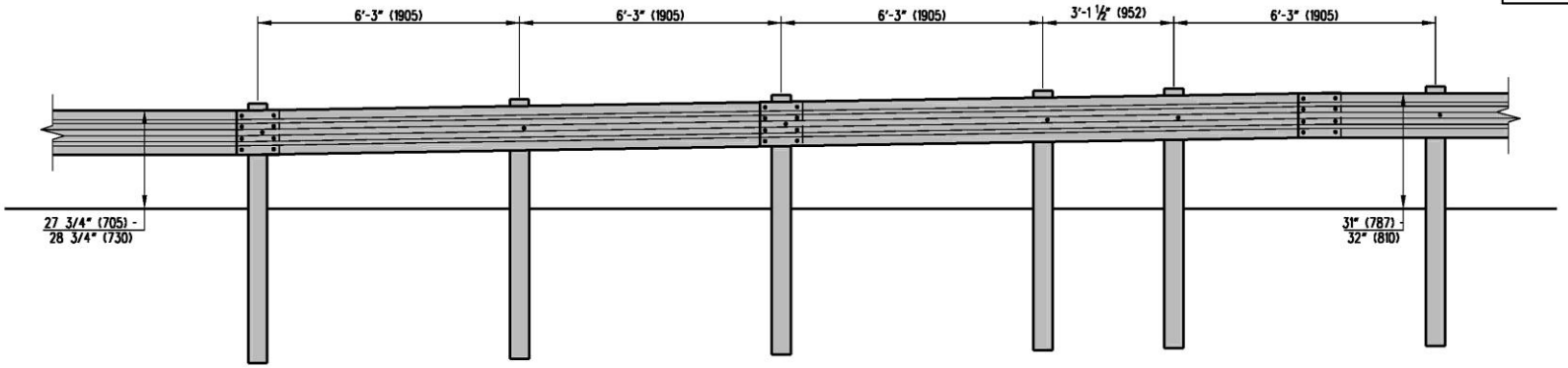
1). BRIDGE RAIL RETROFIT, TYPE 4 SHALL BE USED WHEN THE EXISTING PARAPET HEIGHT IS BETWEEN 22" (559) AND 26" (660).
2). USE A THRIE-BEAM EXPANSION ELEMENT AT BRIDGE EXPANSION JOINTS.
3). PLACE GUARDRAIL DELINEATORS IN THE UPPER VALLEY OF THE THRIE-BEAM AT THE INTERVAL SPECIFIED IN THE DELAWARE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
4). SEE DETAIL B-6, SHEET 1 OF 5 FOR ENTRANCE AND EXIT APPLICATION DETAILS AND NOTES.
5). SPACING OF WOOD POSTS MAY NEED TO BE REDUCED TO ACCOMMODATE LINING UP POSTS AT THE END OF THE PARAPET.
6). USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE. PLACE STEEL WASHERS (FOR ⅝" (16) BOLT) BETWEEN BOLT HEADS AND RUBRAIL.
7). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.

DELAWARE DEPARTMENT OF TRANSPORTATION	BRIDGE RAIL RETROFIT, TYPE 4		APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-6 (2010)	SHT. 5 OF 5	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

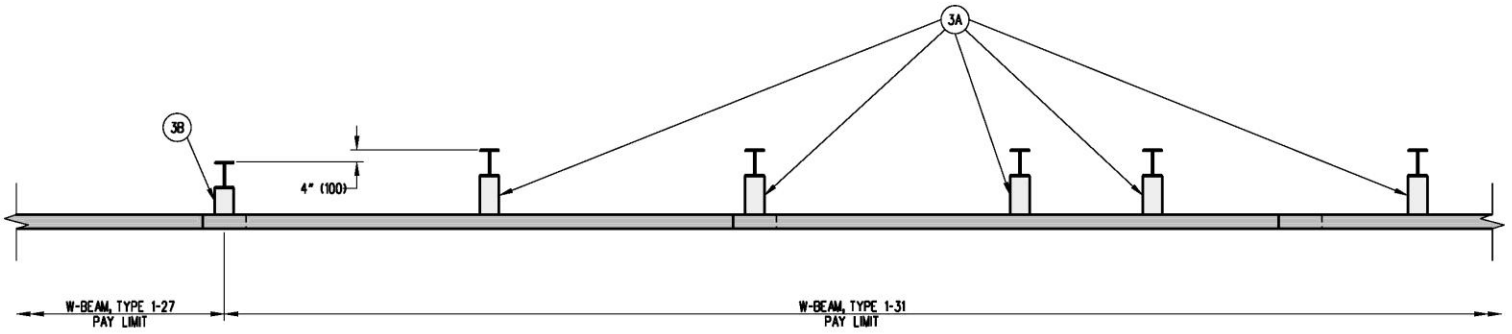
12/06/2010

DETAIL B-7, SHEET 1 OF 1
W-BEAM, TYPE 1-27 TO TYPE 1-31 TRANSITION SECTION

SCALE : N.T.S.



ELEVATION

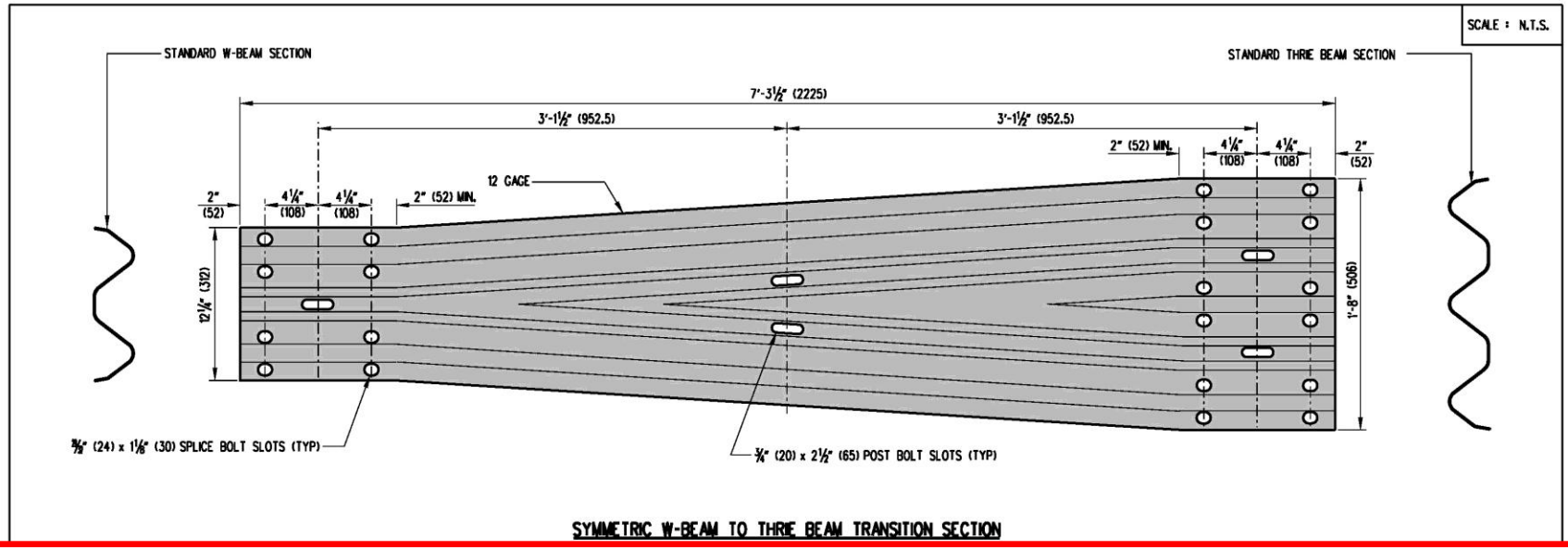


PLAN

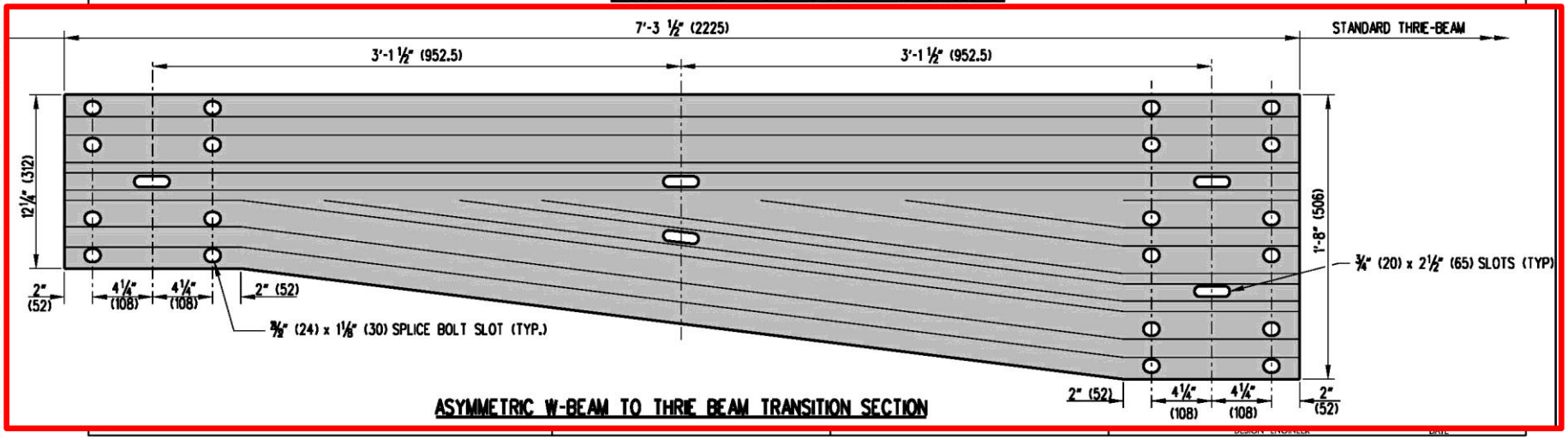
DELAWARE DEPARTMENT OF TRANSPORTATION	W-BEAM, TYPE 1-27 TO TYPE 1-31 TRANSITION SECTION		APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-7 (2010)	SHT. 1 OF 1	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

09/16/2010

DETAIL B-13, SHEET 6 OF 10
HARDWARE



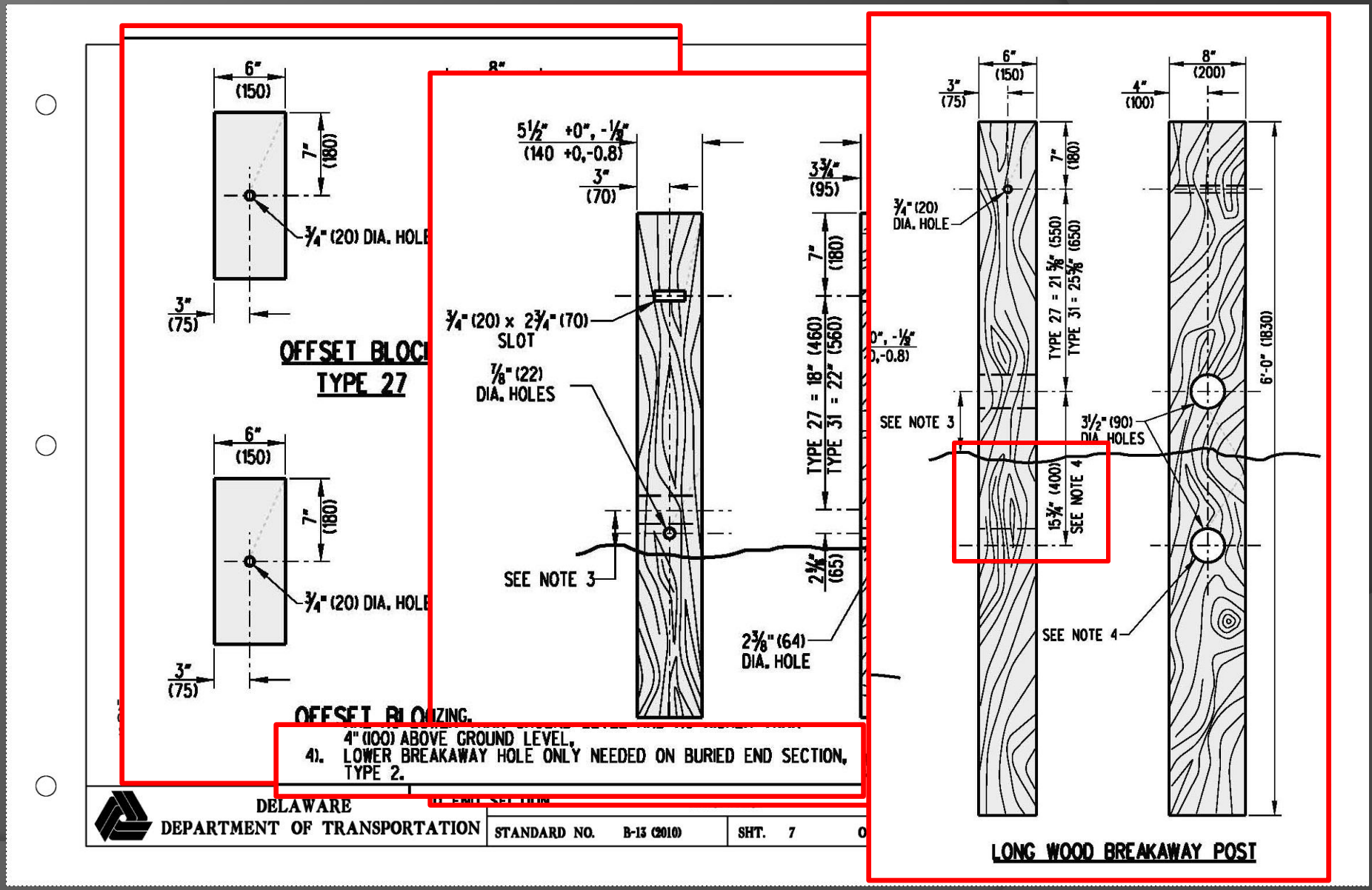
SYMMETRIC W-BEAM TO THRIE BEAM TRANSITION SECTION



ASYMMETRIC W-BEAM TO THRIE BEAM TRANSITION SECTION

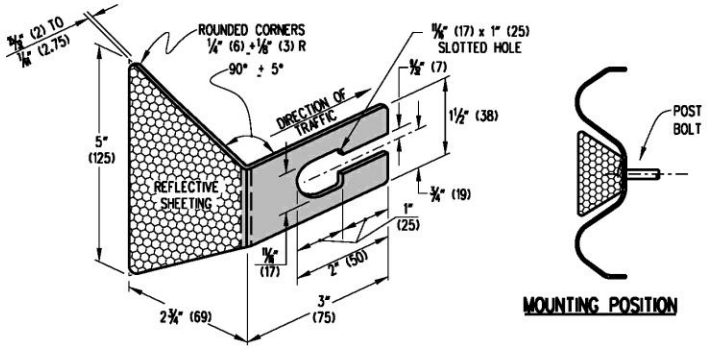
09/17/2010

DETAIL B-13, SHEET 7 OF 10
HARDWARE

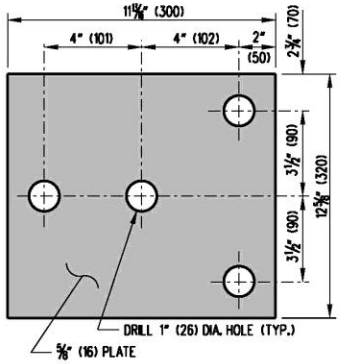


DETAIL B-13, SHEET 9 OF 10
HARDWARE

SCALE : N.T.S.



GUARDRAIL DELINEATOR



W-BEAM BEARING PLATE DETAIL (11)

DELAWARE DEPARTMENT OF TRANSPORTATION	HARDWARE			APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. B-13 (2010)	SHT. 9	OF 10	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

10/14/2010

27” GUARDRAIL DETAILS (PREVIOUSLY DETAILS B-1 THROUGH B-12)

- ALL 27” GUARDRAIL DETAILS CAN NOW BE FOUND ON DETAILS B-15 THRU B-21.

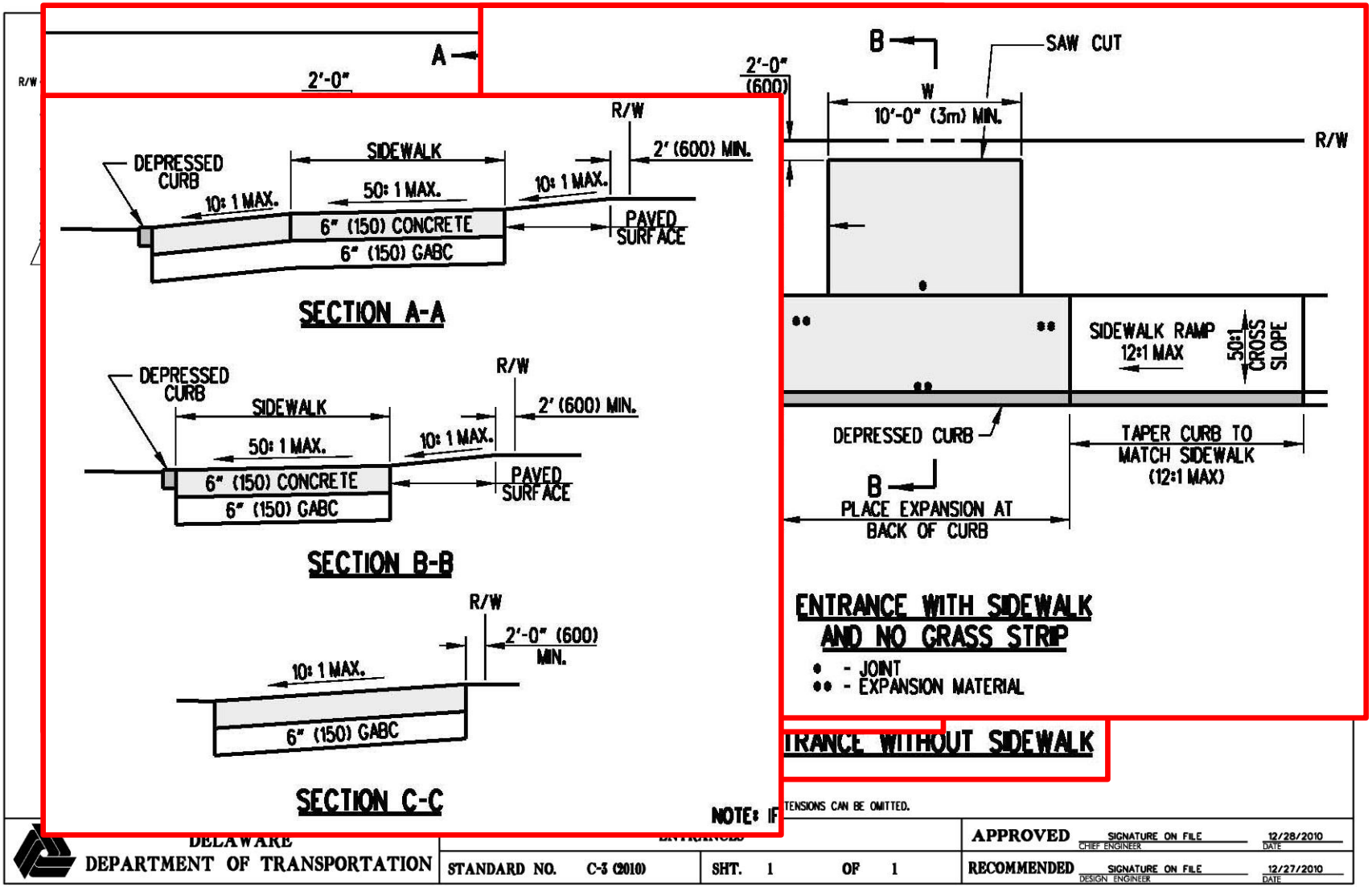
- ONLY CHANGES MADE WERE TO THE SHEET NUMBERS AND ADDING A TYPE 1-27, 2-27, 3-27 OR TYPE 27 DESIGNATION TO THE APPROPRIATE DETAILS AND/OR NOTES OR ITEMS ON THOSE DETAILS.

- WE CURRENTLY DO NOT HAVE A 31” EQUIVALENT FOR THE FOLLOWING DETAILS:
  - GUARDRAIL END TREATMENT, TYPE 4-27 (DETAIL B-17, SHEET 1 OF 1)
  - CURVED GUARDRAIL SECTION (DETAIL B-18, SHEET 1 OF 1)
  - ENTRANCE SPECIAL END ANCHORAGE (DETAIL B-18, SHEET 1 OF 1)

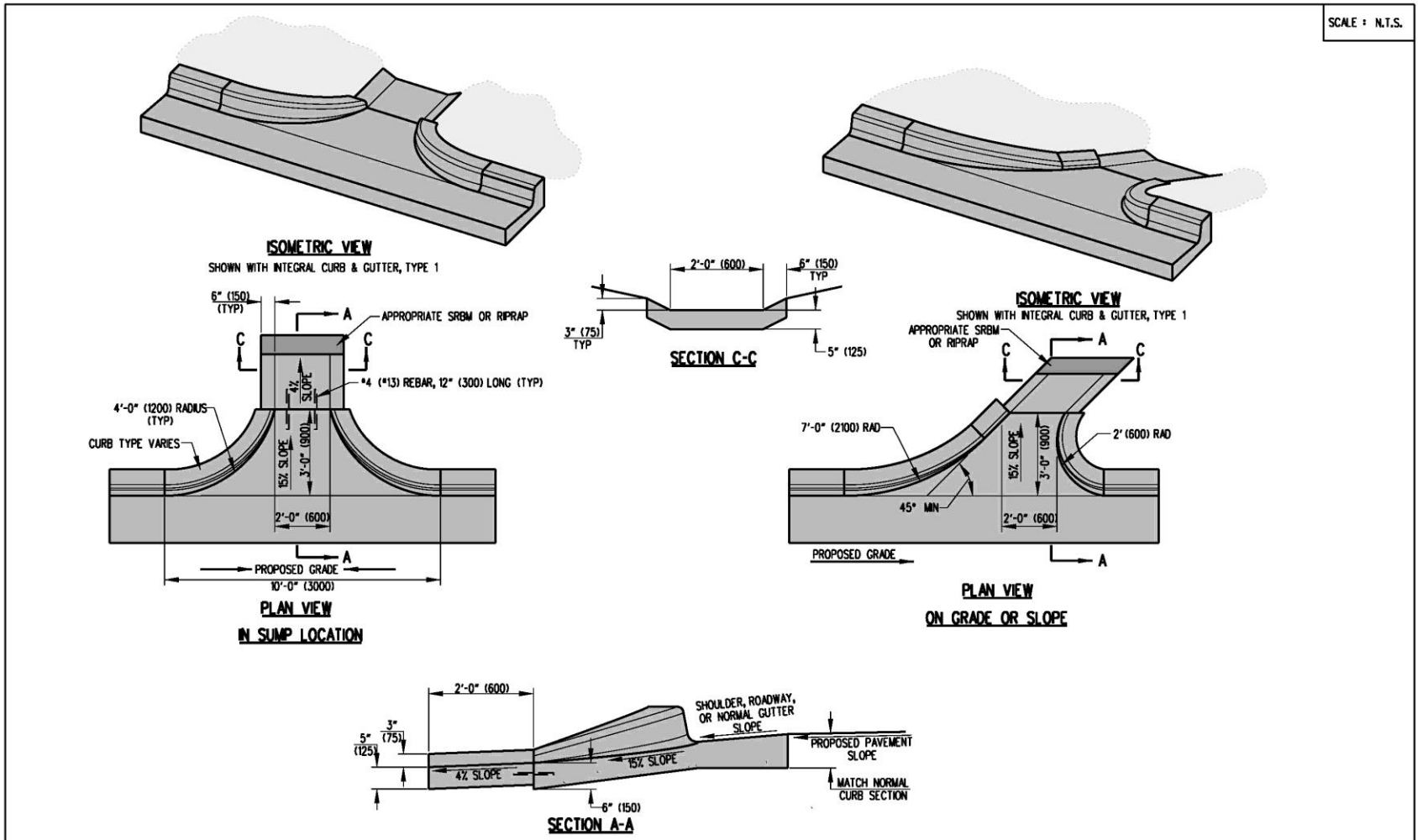
SECTION II – CURB & GUTTER

- DETAIL C-3, SHEET 1 OF 1 – ENTRANCES
  - ADDED A DETAIL FOR ENTRANCES WITH SIDEWALK AND NO GRASS STRIP
  - MINOR CHANGE TO DETAIL FOR ENTRANCES WITH SIDEWALK AND GRASS STRIP
- DETAIL C-4, SHEET 1 OF 1 – CURB OPENING DETAILS
  - CONSOLIDATED PREVIOUS YEARS 4 SHEETS INTO 1 SHEET AND HAD STORMWATER APPROVE 2 DESIGNS TO BE USED REGARDLESS OF THE TYPE OF CURB.

DETAIL C-3, SHEET 1 OF 1 ENTRANCES



DETAIL C-4, SHEET 1 OF 1
CURB OPENING DETAILS



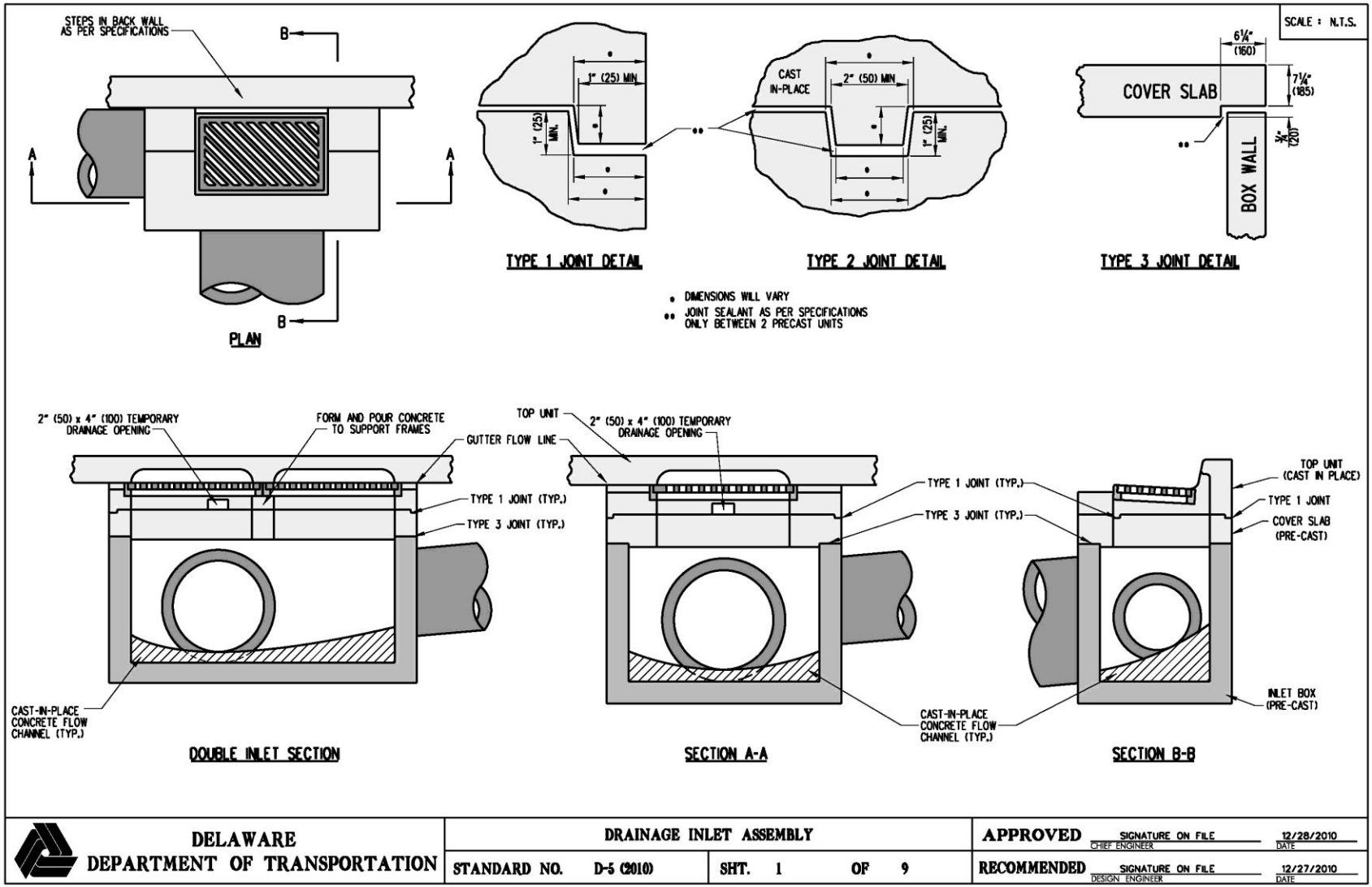
SECTION III – DRAINAGE

- RENUMBERED THE D-5 DETAILS OF THE DRAINAGE SECTION WITH THE ADDITION OF THE 9TH SHEET.
- DETAIL D-5, SHEET 1 OF 9 – DRAINAGE INLET ASSEMBLY
  - NOW SHOWING THE CURB IN THE TOP UNIT TO EXTEND PAST THE EDGES OF THE BOX.
- DETAIL D-5, SHEET 3 OF 9 – DRAINAGE INLET TOP UNITS
  - ADDED A LIMIT OF PAYMENT DIMENSION TO THE ISOMETRIC VIEWS.
  - ADDED A NOTE TO CLARIFY THE LENGTH OF THE REBAR IN THE TYPE B, C, AND E TOP UNITS.
- DETAIL D-5, SHEET 6 OF 9 – 34” X 24” DRAINAGE INLET AND COVER SLAB DETAILS
  - CHANGED THE NOTE IN THE COVER SLAB DETAIL SECTION TO SHOW THE NEED FOR A COVER SLAB ON A TYPE C TOP UNIT.
  - CHANGED THE LENGTH OF THE REBAR IN TYPE B AND C TOP UNITS.
  - NOW SHOWING THE CURB IN THE TOP UNIT TO EXTEND PAST THE EDGES OF THE BOX.
- DETAIL D-5, SHEET 7 OF 9 – 34” X 18” DRAINAGE INLET DETAILS
  - CHANGED THE LENGTH OF THE REBAR IN THE TYPE B AND C TOP UNITS.
  - NOW SHOWING THE CURB IN THE TOP UNIT TO EXTEND PAST THE EDGES OF THE BOX.

SECTION III – DRAINAGE (CONT'D)

- DETAIL D-5, SHEET 9 OF 9 – DOGHOUSE INLET BOX
  - THIS IS A BRAND NEW DETAIL.
- DETAIL D-8, SHEET 1 OF 1 – PIPE BEDDING
  - CHANGED THE PIPE TRENCH WIDTH TO 18" ON EACH SIDE OF THE PIPE.
  - CLARIFIED AND SIMPLIFIED THE DIMENSIONING ON THE BEDDING FOR CLASS A BEDDING.
  - CLARIFIED AND SIMPLIFIED THE DIMENSION ON THE EARTH CUSHION ON THE CLASS C BEDDING.

DETAIL D-5, SHEET 1 OF 9
DRAINAGE INLET ASSEMBLY



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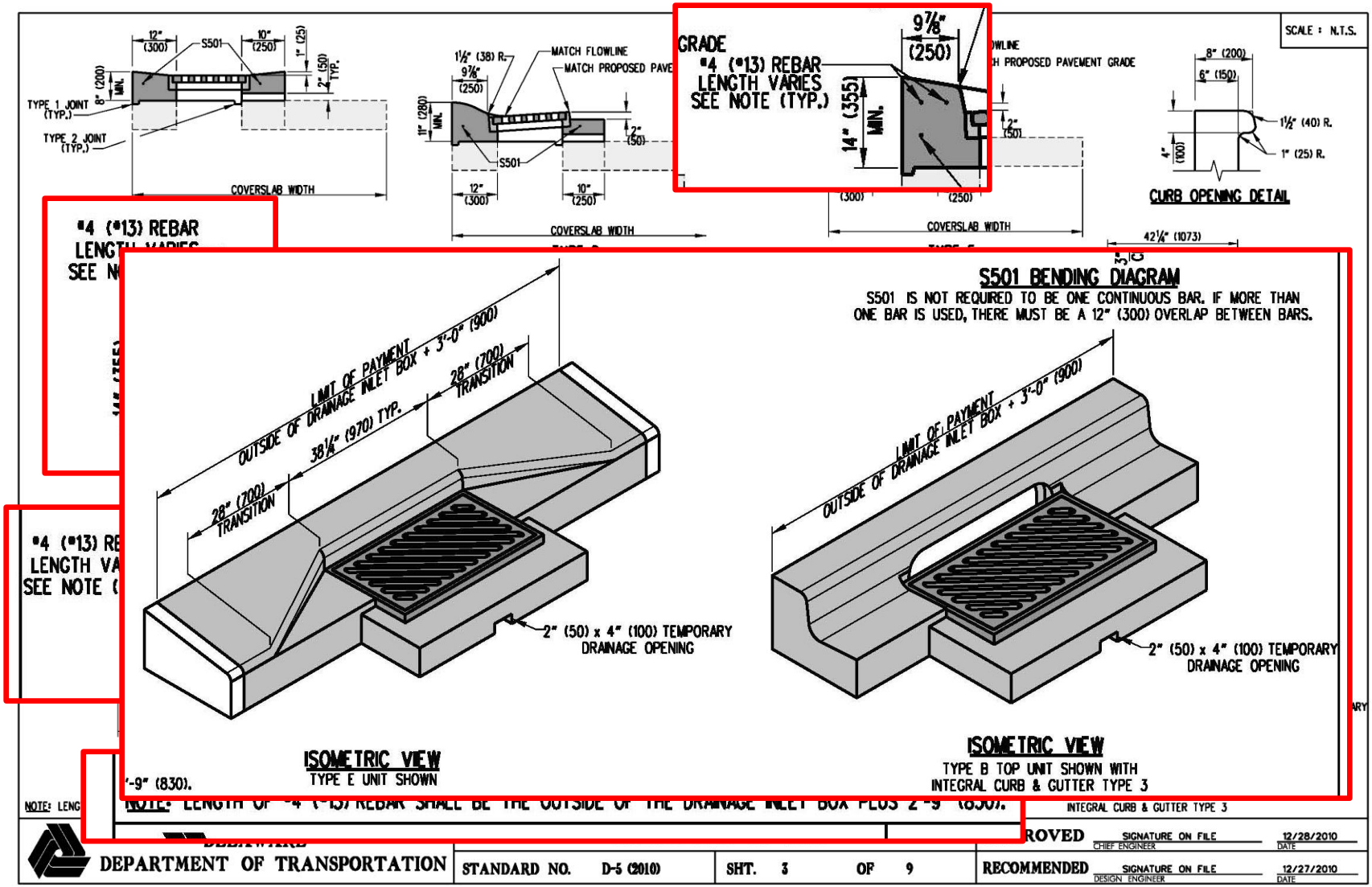
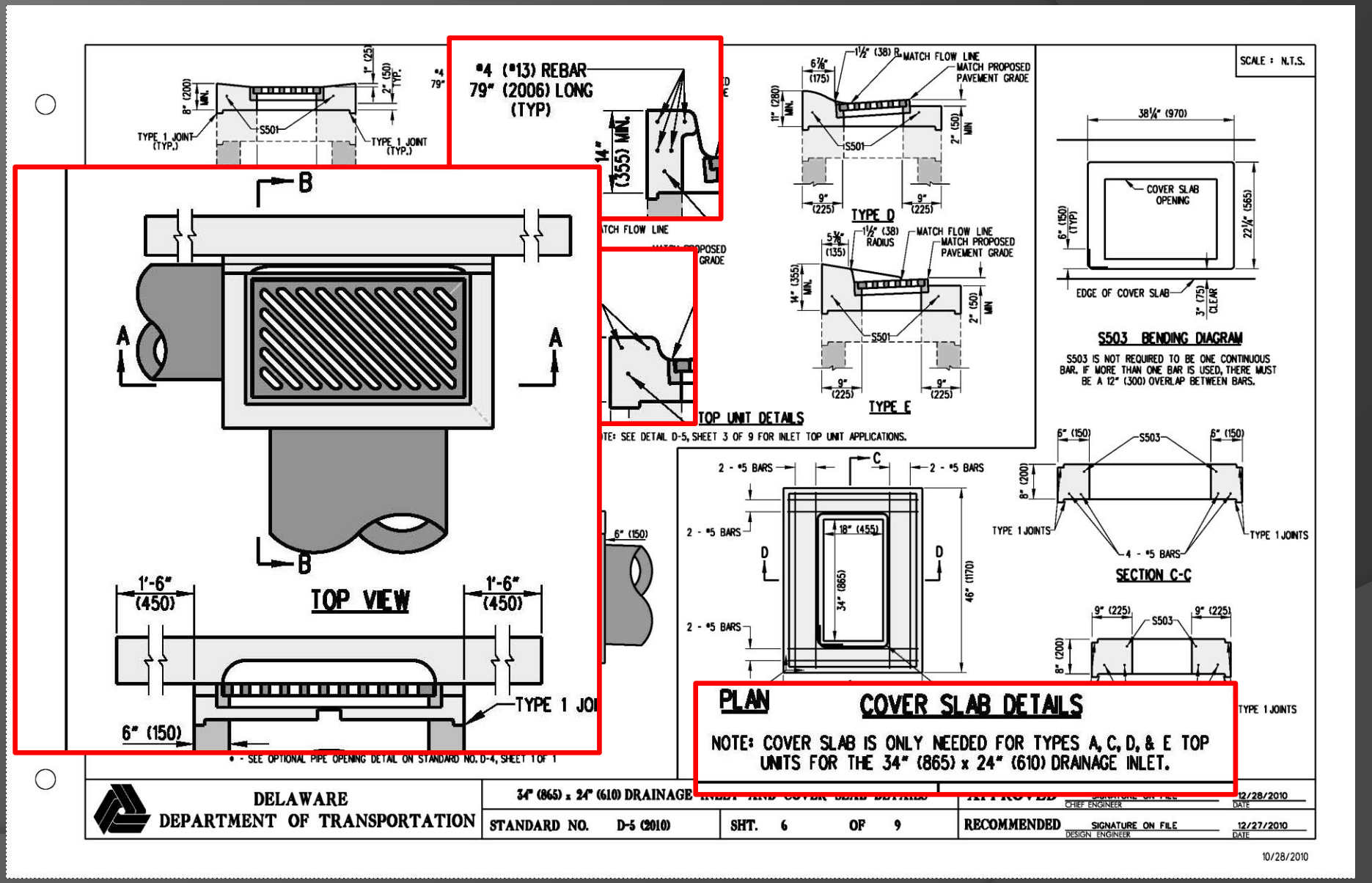
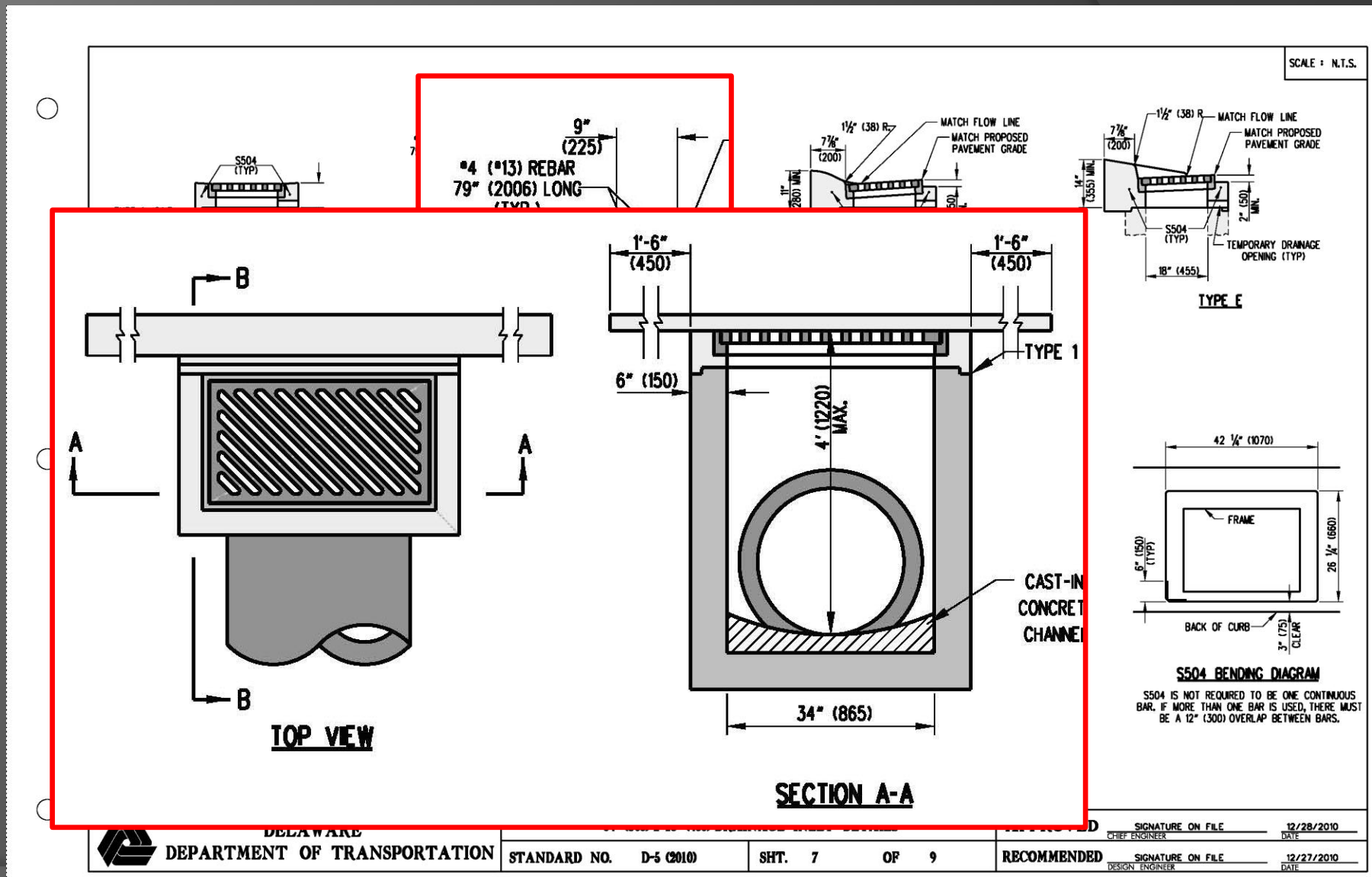
DETAIL D-5, SHEET 3 OF 9
DRAINAGE INLET TOP UNITS



DETAIL D-5, SHEET 6 OF 9
34” (865) X 24” (610) DRAINAGE INLET AND COVER SLAB DETAILS



DETAIL D-5, SHEET 7 OF 9
34" (865) X 18" (455) DRAINAGE INLET DETAILS



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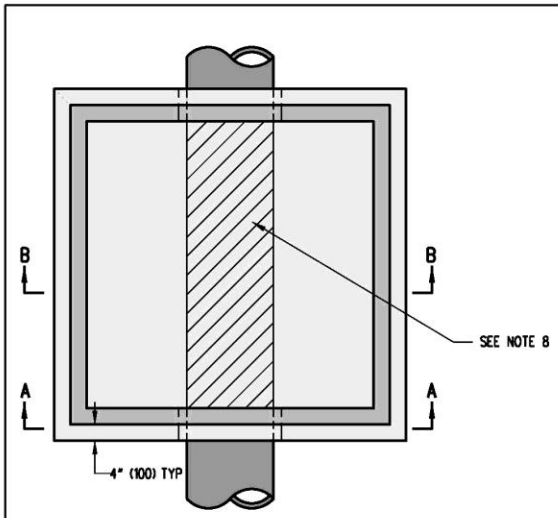
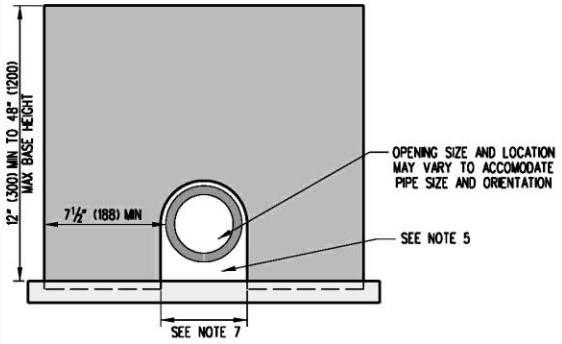
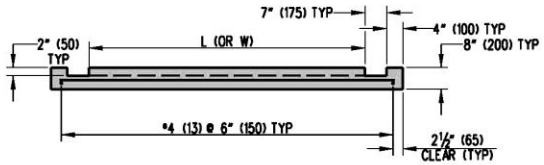
DETAIL D-5, SHEET 9 OF 9
DOGHOUSE INLET BOX



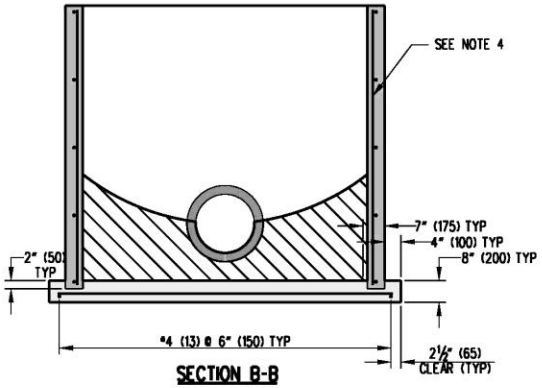
PLAN VIEW



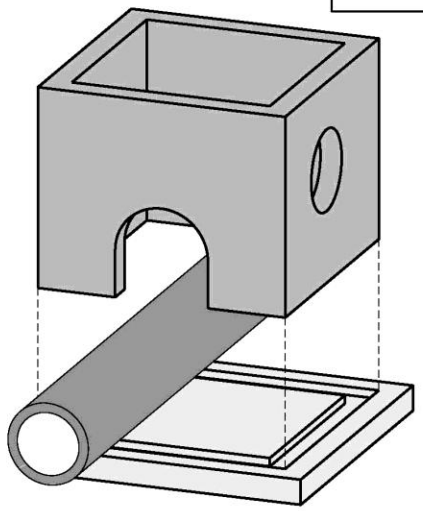
SECTION A-A



CAST-IN-PLACE BOTTOM SECTION VIEW



SECTION B-B



ISOMETRIC VIEW

SCALE : N.T.S.

NOTES:
1). SEE DETAIL D-4, SHEET 1 OF 1 FOR BOX DETAILS AND NOTES.
2). ALL REINFORCEMENT SHALL HAVE A MINIMUM COVER OF 1 ½" (38) UNLESS NOTED OTHERWISE.
3). PIPE SHALL BE SUPPORTED ON BOTH ENDS DURING THE CONSTRUCTION OF THE BASE.
4). VERTICAL WALL REINFORCEMENT SHALL COMPLY WITH A.S.T.M. A615, 0.12 IN/FT IN EACH DIRECTION, VERTICALLY AND HORIZONTALLY.
5). DOGHOUSE OPENING SHALL BE FILLED WITH HIGH STRENGTH, NON-SHRINK GROUT MIXED WITH COARSE AGGREGATE IN A 1:1 RATION BY WEIGHT.
6). THE TOP OF THE DOGHOUSE OPENING SHALL, IN NO CIRCUMSTANCES, BE LESS THAN 4" (100) FROM THE TOP OF THE BOX.
7). DOGHOUSE OPENING WIDTH SHALL BE BETWEEN 3" (75) AND 4" (100) LARGER THAN THE OUTSIDE DIAMETER OF THE PIPE AND SHALL NOT ENCROACH ON THE ADJACENT WALL.
8). EXISTING PIPE IS TO EITHER BE COMPLETELY REMOVED BY SAWCUTTING AS CLOSE TO THE INSIDE BOX WALL AS POSSIBLE, OR BY REMOVING THE TOP PORTION OF THE PIPE AND USING THE REMAINING PIPE SECTION AS THE BOTTOM OF THE FLOW CHANNEL, AS SHOWN IN SECTION B-B.

DELAWARE DEPARTMENT OF TRANSPORTATION	DOGHOUSE INLET BOX		APPROVED SIGNATURE ON FILE (CHIEF ENGINEER) 12/28/2010 (DATE)
	STANDARD NO. D-5 (2010)	SHT. 9 OF 9	RECOMMENDED SIGNATURE ON FILE (DESIGN ENGINEER) 12/27/2010 (DATE)

08/08/2010

SECTION VIII – TRAFFIC

- DETAIL T-16, SHEET 1 OF 1 – WOOD BARRICADE DETAILS
  - BRAND NEW DETAIL

Any questions or comments??

If you have any questions or comments in the future, please contact me by email: Billy.Sweeney@state.de.us or by telephone: (302) 760-2350