

SECTION I - BARRIER

SHEET NO.	NAME
B-L (2001)	- BARRIER LEGEND
B-1	- GUARDRAIL APPLICATIONS
	(2004) - 1 PLANS - (TYPE 1, TYPE 2, AND TYPE 3)
	(2004) - 2 ELEVATIONS AND SPLICE DETAIL
	(2002) - 3 SECTION VIEWS
	(2002) - 4 GRADING FOR GUARDRAIL END TREATMENT, TYPE 1
	(2002) - 5 GRADING FOR GUARDRAIL END TREATMENT, TYPE 2
	(2002) - 6 GRADING FOR GUARDRAIL END TREATMENT, TYPE 3
B-2 (2004)	- GUARDRAIL OVER CULVERTS, TYPE 1
B-3 (2004)	- GUARDRAIL OVER CULVERTS, TYPE 2
B-4 (2004)	- CURVED GUARDRAIL SECTION
B-5 (2002)	- END ANCHORAGE
B-6	- BURIED END SECTION
	(2002) - 1 BURIED END SECTION
	(2002) - 2 BURIED END SECTION
	(2002) - 3 POST, CONCRETE BLOCK, & RUBRAIL ANCHOR DETAILS
B-7	- GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1
	(2005) - 1 PLAN, ELEVATION, AND SECTIONS
	(2001) - 2 WOOD BLOCKOUT, RUB RAIL WOOD BLOCKS, BEARING PLATE, RUB RAIL TO BARRIER CONNECTION DETAILS
	(2001) - 3 BENT PLATE RUB RAIL DETAILS
B-8	- GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2
	(2005) - 1 PLAN, ELEVATION, AND SECTIONS
	(2001) - 2 NOTES, BENT RAIL DETAILS, BLOCK SCHEDULE
B-9 (2002)	- GUARDRAIL TO BARRIER CONNECTION, EXIT TYPE
B-10 (2004)	- BRIDGE RAIL RETROFIT, TYPE 1
B-11	- BRIDGE RAIL RETROFIT, TYPE 2
	(2004) - 1 PLAN, SECTION A-A, BASE PLATE DETAIL
	(2001) - 2 BASE PLATE DETAIL AND STEEL GUARDRAIL POST
B-12 (2001)	- BRIDGE RAIL RETROFIT, TYPE 3
B-13	- HARDWARE
	(2004) - 1 W-BEAM DETAILS
	(2004) - 2 W-BEAM STEEL POST AND OFFSET BLOCK
	(2004) - 3 W-BEAM TERMINAL CONNECTOR
	(2004) - 4 THRIE BEAM DETAILS
	(2004) - 5 THRIE BEAM STEEL POST AND OFFSET BLOCK
	(2004) - 6 W-THRIE BEAM TRANSITION SECTION
	(2004) - 7 WOOD BLOCK, SOIL PLATE, SHORT WOOD BREAKAWAY POST, STEEL TUBE, LONG WOOD BREAKAWAY POST
	(2004) - 8 SWAGED CABLE AND RELATED HARDWARE ASSEMBLY
	(2004) - 9 REFLECTORIZED WASHER AND BEARING PLATE DETAIL
	(2004) - 10 GUARDRAIL BOLT & RECESSED NUT
	(2004) - 11 5/8" (16) HEX BOLT, HEX NUT, & STEEL WASHER, HIGH-STRENGTH STRUCTURAL HEX BOLT & HEX NUT
	(2004) - 12 15/16" (24) HEX NUT & STEEL WASHER, 5/8" (16) CARRIAGE BOLT, HEX NUT, & STEEL WASHER
	(2005) - 13 GUARDRAIL MOUNTED RAIL •DETAIL ON HOLD•
B-14	- CONCRETE SAFETY BARRIER (F SHAPE)
	(2001) - 1 TYPICAL CAST IN PLACE OR SLIP FORM CONSTRUCTION
	(2001) - 2 TYPICAL PRE-CAST CONSTRUCTION
	(2001) - 3 SLOTTED PLATE CONNECTION DETAILS

SECTION I - BARRIER (CONT'D)

SHEET NO.	NAME
B-15	— PORTABLE CONCRETE SAFETY BARRIER (F SHAPE)
(2001) - 1	PLAN, ELEVATION, AND SECTION VIEW •DETAIL DELETED - SEE SPECIFICATIONS•
(2001) - 2	CURVE SECTION •DETAIL DELETED - SEE SPECIFICATIONS•
(2001) - 3	TAPERED END SECTION •DETAIL DELETED - SEE SPECIFICATIONS•
(2001) - 4	TYPICAL REINFORCEMENT DETAILS •DETAIL DELETED - SEE SPECIFICATIONS•
(2001) - 4	JOINT CONNECTION DETAILS •DETAIL DELETED - SEE SPECIFICATIONS•

SECTION II - CURB & GUTTER

SHEET NO.	NAME
C-1 (2005)	— P.C.C. CURB, P.C.C. CURB & GUTTER, AND HOT-MIX CURB
C-2	— CURB RAMPS
(2004) - 1	TYPE 1
(2004) - 2	TYPES 2, 3, & 4
(2004) - 3	SECTIONS FOR TYPES 2, 3, & 4
(2004) - 4	TYPE 5
C-3 (2005)	— ENTRANCES
C-4	— CURB OPENINGS
(2001) - 1	TYPES A, B, & C
(2001) - 2	TYPES D & E
(2001) - 3	TYPES F & G

SECTION III - DRAINAGE

SHEET NO.	NAME
D-1	— 6:1 SAFETY END STRUCTURE
(2001) - 1	DETAIL VIEWS
(2001) - 2	SCHEDULES
D-2	— 10:1 SAFETY END STRUCTURE
(2001) - 1	DETAIL VIEWS
(2001) - 2	SCHEDULES
D-3	— SAFETY GRATES
(2005) - 1	SAFETY END STRUCTURE GRATE & ASSEMBLY DETAIL
(2005) - 2	PERSONNEL SAFETY GRATE FOR PIPE INLET DETAIL
D-4 (2002)	— INLET BOX DETAILS
D-5	— DRAINAGE INLET DETAILS
(2002) - 1	DRAINAGE INLET ASSEMBLY
(2002) - 2	DRAINAGE INLET FRAME AND GRATES
(2004) - 3	DRAINAGE INLET TOP UNITS
(2002) - 4	DRAINAGE INLET COVER SLAB DETAILS
(2002) - 5	DOUBLE INLET COVER SLAB DETAILS
(2004) - 6	DRAINAGE INLET 34" (865) x 24" (610) DETAILS
(2002) - 7	DRAINAGE INLET 34" (865) x 18" (455) DETAILS
(2002) - 8	LAWN INLET DETAIL

SECTION III - DRAINAGE (CONT'D)

SHEET NO.	NAME
D-6	— MANHOLE DETAILS
	(2001) - 1 BOX MANHOLE ASSEMBLY
	(2001) - 2 ROUND MANHOLE ASSEMBLY
	(2001) - 3 MANHOLE FRAME AND COVER
	(2002) - 4 BOX MANHOLE COVER SLAB
D-7	— JUNCTION BOX DETAILS
	(2002) - 1 JUNCTION BOX ASSEMBLY
	(2002) - 2 JUNCTION BOX COVER SLAB
D-8 (2001)	— PIPE BEDDING
D-9 (2004)	— PERFORATED PIPE UNDERDRAIN

SECTION IV - EROSION

SHEET NO.	NAME
E-1 (2001)	— INCREMENTAL STABILIZATION
E-2 (2001)	— SILT FENCE
E-3 (2005)	— DRAINAGE INLET SEDIMENT CONTROL
E-4 (2001)	— CURB INLET SEDIMENT CONTROL
E-5 (2001)	— STONE CHECK DAM
E-6 (2005)	— SEDIMENT TRAP
E-7 (2005)	— SEDIMENT TRAP, USING DRAINAGE INLET AS OUTLET
E-8	— RISER PIPE ASSEMBLY FOR SEDIMENT TRAP
	(2001) - 1 ELEVATION
	(2001) - 2 TRASH HOOD DETAILS
E-9 (2005)	— EROSION CONTROL BLANKET APPLICATIONS
E-10 (2005)	— RIPRAP DITCH
E-11 (2005)	— TEMPORARY SWALE
E-12 (2005)	— PERIMETER DIKE/SWALE
E-13 (2005)	— EARTH DIKE
E-14 (2005)	— TEMPORARY SLOPE DRAIN
E-15 (2005)	— STILLING WELL
E-16 (2005)	— SUMP PIT, TYPE 1 & 2
E-17 (2005)	— DEWATERING BASIN
E-18 (2005)	— GEOTEXTILE-LINED CHANNEL DIVERSION
E-19 (2005)	— SANDBAG DIVERSION
E-20 (2005)	— SANDBAG DIKE
E-21 (2005)	— STABILIZED CONSTRUCTION ENTRANCE
E-22 (2001)	— SKIMMER DEWATERING DEVICE
E-23	— TURBIDITY CURTAIN
	(2005) - 1 FLOATING TURBIDITY CURTAIN
	(2005) - 2 STAKED TURBIDITY CURTAIN
E-24 (2005)	— PORTABLE SEDIMENT TANK
E-25 (2005)	— TURF REINFORCEMENT MAT APPLICATIONS



SECTION V - MISCELLANEOUS

SHEET NO.	NAME
M-1 (2001)	— RIGHT-OF-WAY FENCE
M-2 (2001)	— CONCRETE MONUMENT
M-3 (2005)	— REMOVABLE BOLLARD
M-4 (2004)	— BIKE RACK
M-5 (2004)	— WOOD RAIL FENCE
M-6 (2004)	— PATTERNED HOT-MIX OR CONCRETE & BRICK PAVER

SECTION VI - PAVEMENT

SHEET NO.	NAME
P-1	— P.C.C. PAVEMENT
(2001) - 1	SLAB PLAN (WITH DOWEL AND TIE LOCATIONS)
(2004) - 2	JOINT AND SEALANT DETAILS
(2001) - 3	W BOLT, HOOK BOLT, DOWEL & TIE BAR
(2001) - 4	DOWEL SUPPORT BASKET
(2001) - 5	DOWEL & TIE BAR PLACEMENT TOLERANCES
P-2	— P.C.C. PAVEMENT PATCHING
(2001) - 1	FULL DEPTH PATCH, PLAN VIEW
(2004) - 2	FULL DEPTH PATCH, SECTION VIEWS
(2004) - 3	FULL DEPTH PATCH, SEALANT DETAILS, GROUT RETENTION DISK, AND DOWEL BAR
(2001) - 4	FULL DEPTH PATCH, DOWEL BAR PLACEMENT TOLERANCES
(2001) - 5	PARTIAL DEPTH PATCH, PLAN AND SECTION VIEWS

SECTION VII - TRAFFIC

SHEET NO.	NAME
T-1 (2005)	— CONDUIT JUNCTION WELL, TYPES 1,2, AND 3
T-2 (2005)	— CONDUIT JUNCTION WELL, TYPE 4
T-3 (2005)	— CONDUIT JUNCTION WELL, TYPE 5
T-4 (2005)	— CABINET BASES (TYPES "M" AND "P")
T-5	— POLE BASES
(2005) - 1	ROUND BASE, SQUARE BASE
(2005) - 2	TYPICAL SECTION (BASES 1, 2, 2A, 2B, 3, 3A, 3B, AND 7), TYPICAL SECTION (BASE 4), TYPICAL INSTALLATION (BASES 1, 2, 2A, 2B, 3, 3A, 3B, 4, AND 7)
(2005) - 3	TYPICAL SECTION (BASES 5 AND 6), ANCHOR BOLT DATA CHART AND DETAILS
T-6 (2005)	— SPECIAL POLE BASE
T-7 (2005)	— SIGN FOUNDATION
T-8 (2005)	— LOOP DETECTOR TO CONDUIT JUNCTION WELL CONNECTION
T-9 (2005)	— TYPE #1 LOOP DETECTOR
T-10 (2005)	— TYPE #2 LOOP DETECTOR



SECTION VII - TRAFFIC (CONT'D)

SHEET NO.	NAME
T-11	— MESSENGER WIRE ATTACHMENT
	(2005) - 1 INTERMEDIATE MESSENGER WIRE ATTACHMENT ON WOOD POLES
	(2005) - 2 ANGULAR INTERMEDIATE MESSENGER WIRE ATTACHMENT
T-12	— MESSENGER WIRE ATTACHMENT
	(2005) - 1 SPAN WIRE ATTACHMENT BETWEEN POLES
	(2005) - 2 DEAD END MESSENGER WIRE ATTACHMENT
T-13	— CONDUIT JUNCTION WELLS
	(2005) - 1 TYPE 6
	(2004) - 2 TYPE 7
	(2004) - 3 TYPES 8 & 10
T-14	— EMERGENCY PREEMPTION RECEIVER
	(2004) - 1 UPRIGHT MOUNT
	(2005) - 2 INVERTED MOUNT



BARRIER LEGEND	
ITEM NO.	DESCRIPTION
①	W-BEAM
②	W6 X 9 (W150 x 13.5) STEEL POST
③	WOOD OFFSET BLOCK
④	SPLICE - REQUIRES EIGHT(8) 5/8" (16) GUARDRAIL BOLTS (L=1 1/4" (35)) WITH RECESS NUTS, AND ONE(1) 5/8" (16) GUARDRAIL BOLT (L=10" (255)) WITH RECESS NUT.
⑤	W-BEAM TERMINAL CONNECTOR
⑥	5/8" (16) GUARDRAIL BOLT (L=1 1/4" (35)) AND RECESS NUT
⑦	5/8" (16) GUARDRAIL BOLT (L=10" (255)) AND RECESS NUT
⑧	5/8" (16) GUARDRAIL BOLT (L=10" (255)), STEEL WASHER, 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 (2001)

SHT. 1

OF 1

APPROVED

Ryan M. Harkness
CHIEF ENGINEER

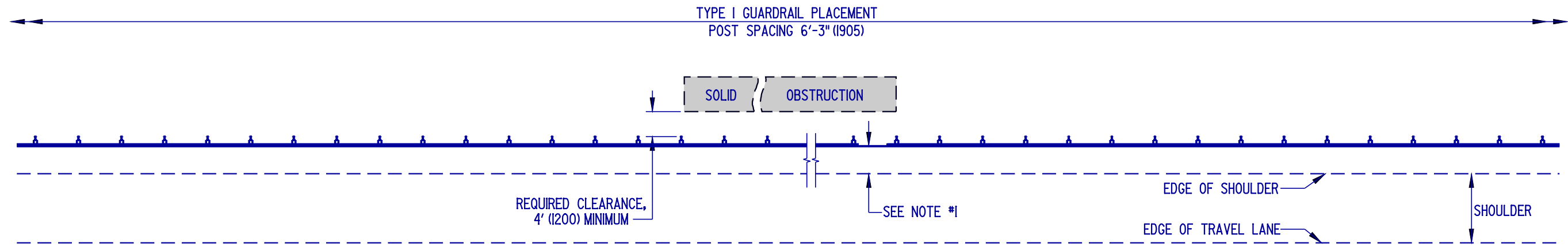
6/18/01
DATE

RECOMMENDED

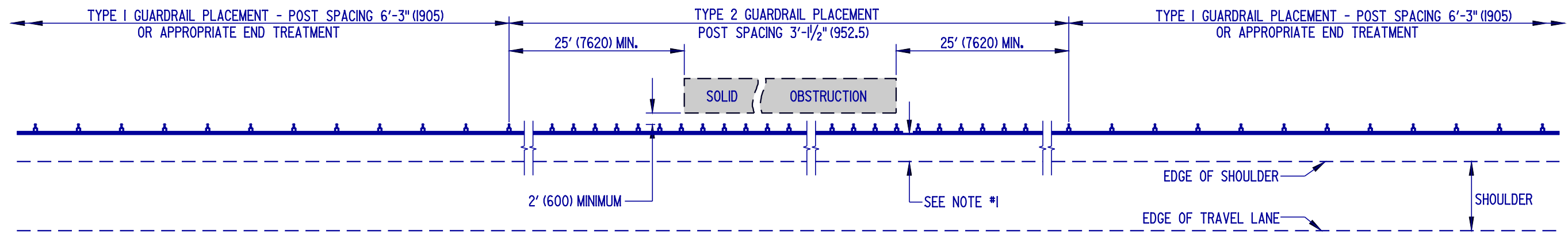
Muhammad Alghamdi
DESIGN ENGINEER

6/18/01
DATE

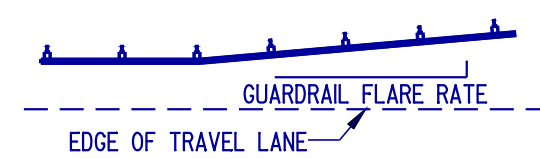
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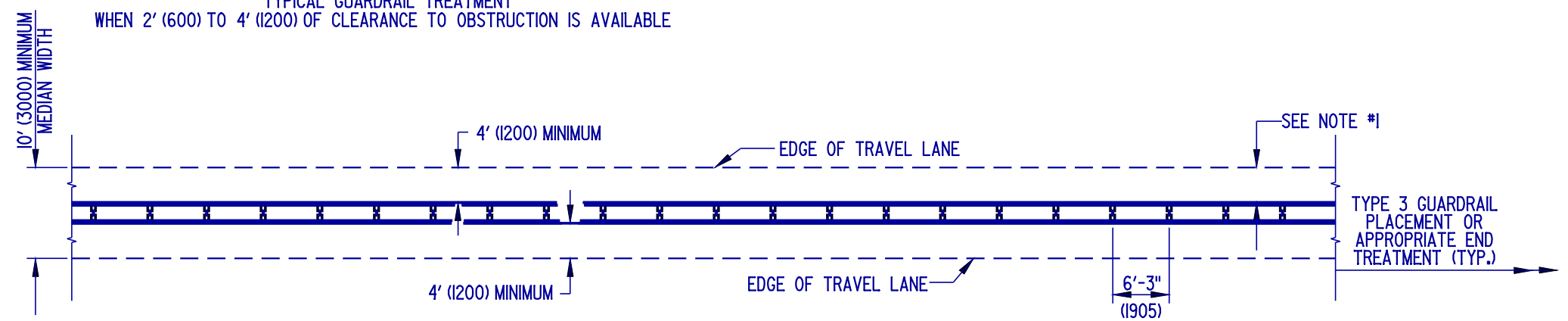
TYPE 1 GUARDRAIL
TYPICAL GUARDRAIL TREATMENT
WHEN THE REQUIRED 4' (1200) CLEARANCE TO OBSTRUCTION IS AVAILABLE



TYPE 2 GUARDRAIL
TYPICAL GUARDRAIL TREATMENT
WHEN 2' (600) TO 4' (1200) OF CLEARANCE TO OBSTRUCTION IS AVAILABLE



FLARE RATES	
DESIGN SPEED	FLARE RATE
70 MPH (110 km/h)	15:1
60 MPH (100 km/h)	14:1
55 MPH (90 km/h)	12:1
50 MPH (80 km/h)	11:1
45 MPH (70 km/h)	10:1
40 MPH (60 km/h)	9:1
30 MPH (50 km/h)	7:1



TYPE 3 GUARDRAIL
TYPICAL GUARDRAIL TREATMENT WHEN A MINIMUM OF 10' (3000) IS AVAILABLE FOR MEDIAN

NOTES : 1). THE DISTANCE FROM THE EDGE OF THE TRAVEL LANE OR SHOULDER TO THE FACE OF GUARDRAIL SHOULD BE MAXIMIZED. THIS AREA SHALL BE GRADED 10:1 OR FLATTER.
2). PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.

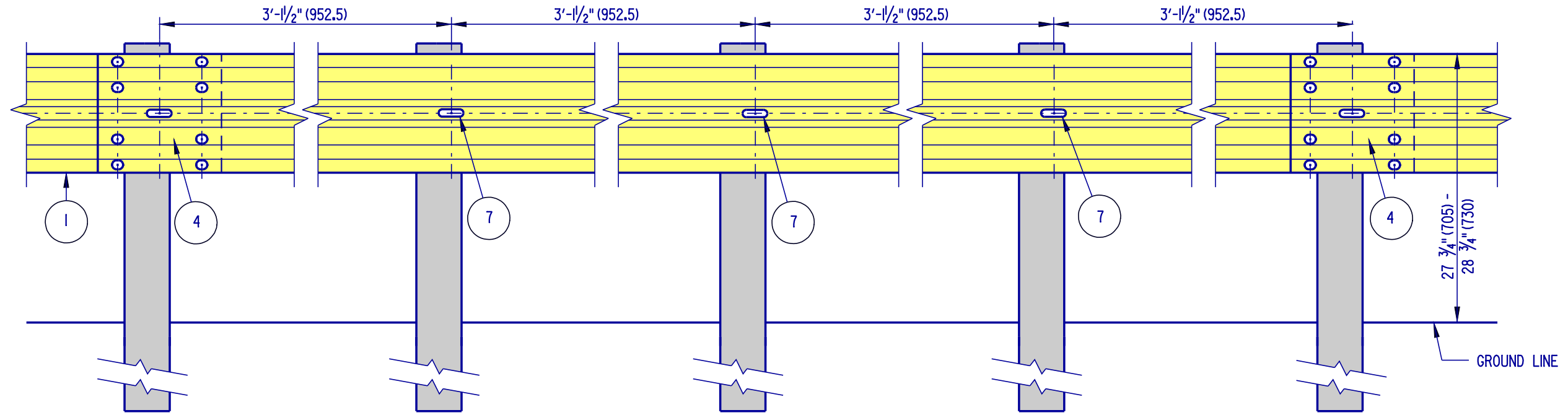


DELAWARE
DEPARTMENT OF TRANSPORTATION

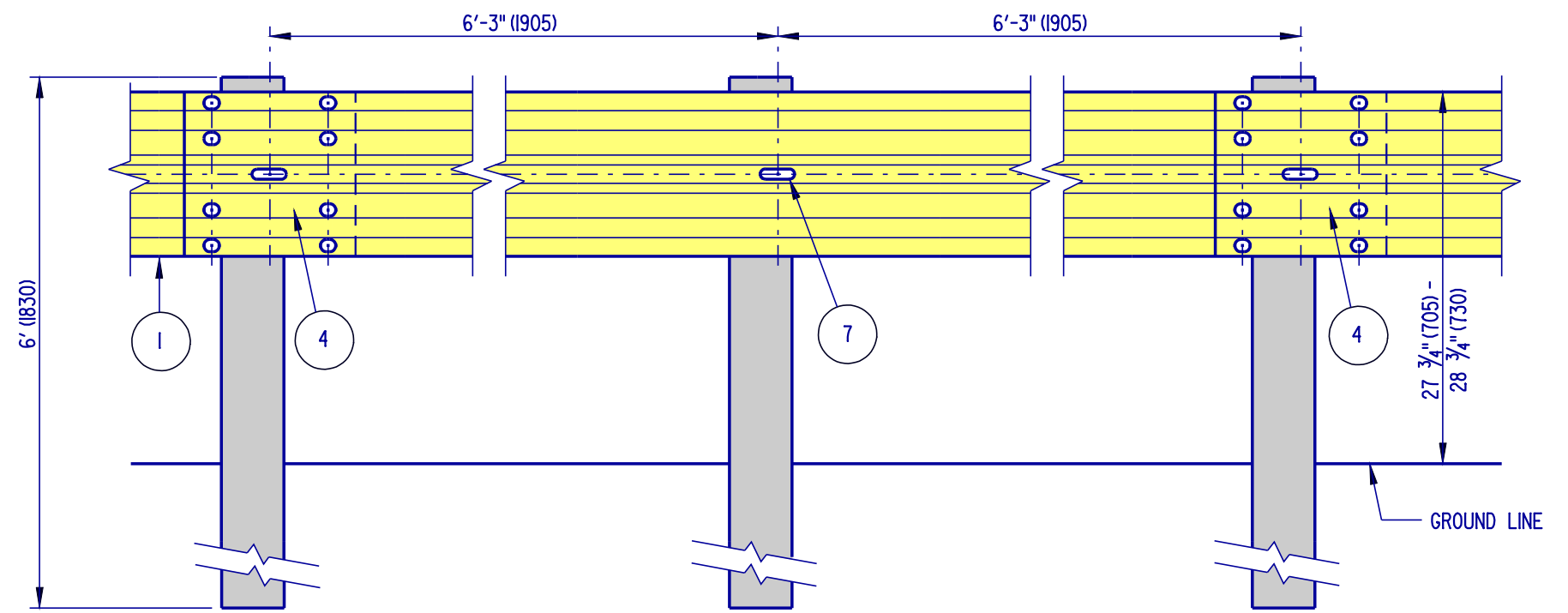
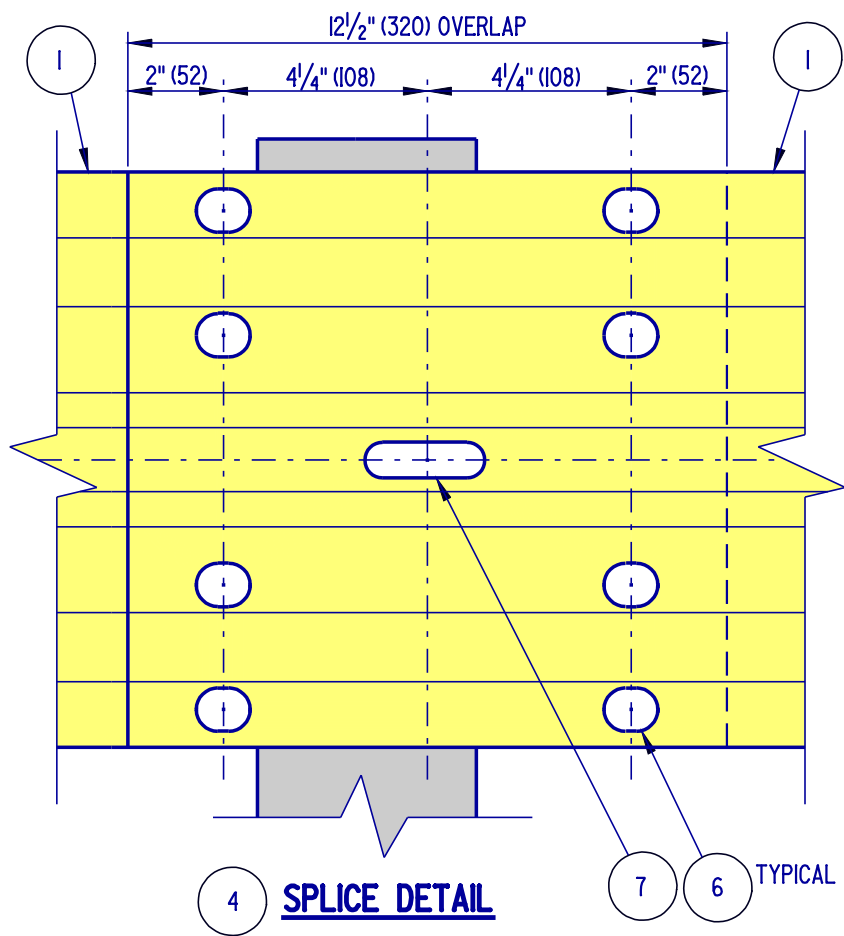
GUARDRAIL APPLICATIONS				
STANDARD NO.	B-1 (2004)	SHT.	1	OF 6

APPROVED *Carolann Wick* 1/10/05
CHIEF ENGINEER DATE
RECOMMENDED *Dennis M. O'Fl* 1/13/05
DESIGN ENGINEER DATE

SCALE : N.T.S.

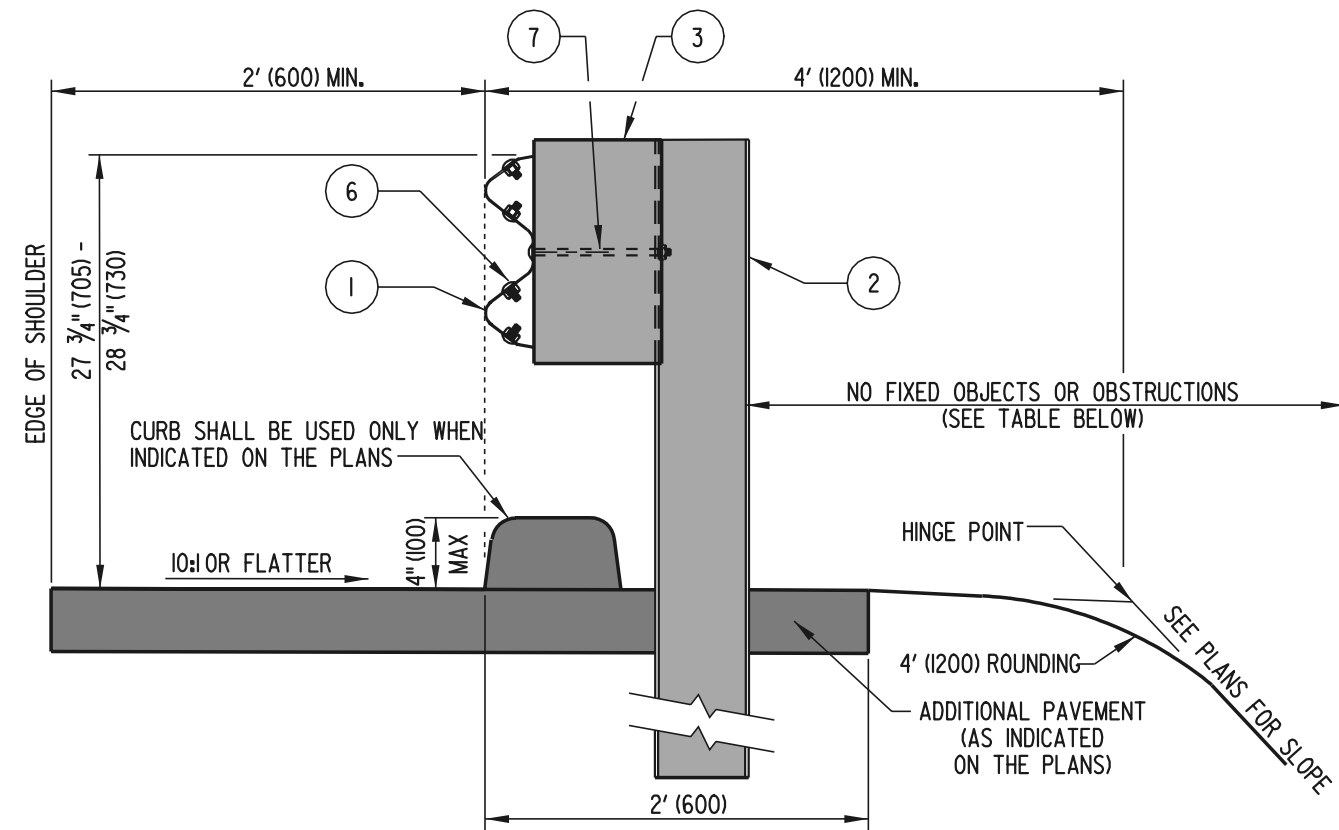


TYPE 2



TYPE 10R 3

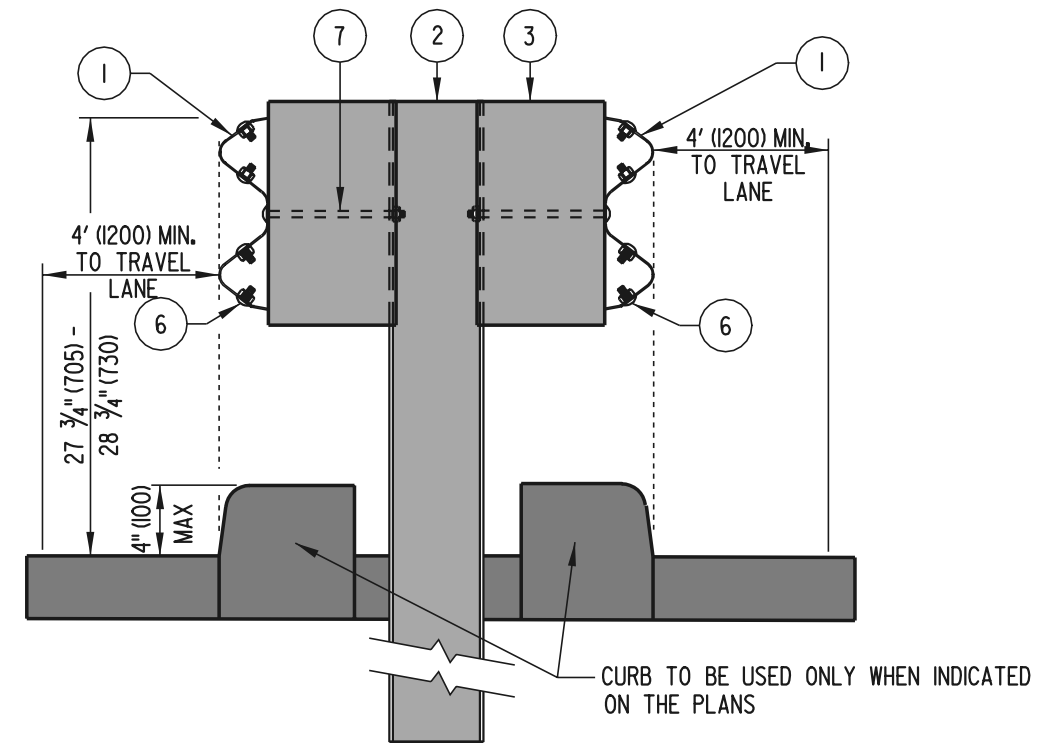
NOTE : OVERLAP W-BEAMS IN DIRECTION OF TRAVEL.



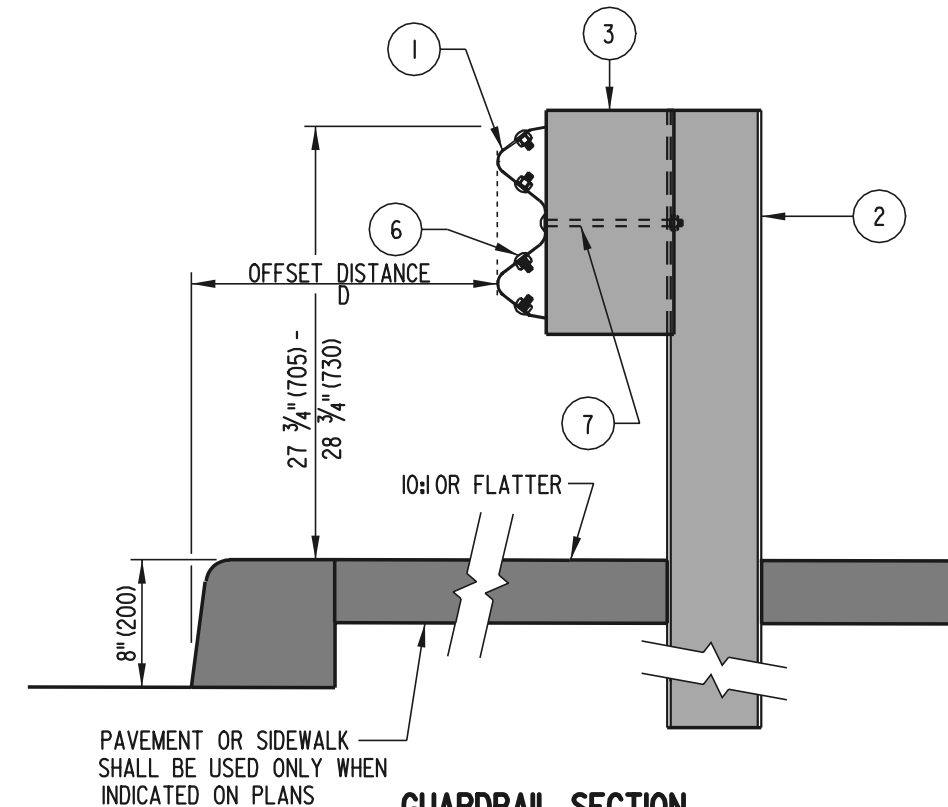
GUARDRAIL SECTION
(RURAL SHOULDER APPLICATION)

TYPE	POST SPACING	CLEAR AREA BEHIND POST
1	6' 3" (1905)	4' (1200) MIN
2	3' 1 1/2" (952.5)	2' (600) MIN

DESIGN SPEED	D
< 50 MPH (80 km/h)	6' (1800)
≥ 50 MPH (80 km/h)	10' (3000)



GUARDRAIL SECTION
(MEDIAN APPLICATION)



GUARDRAIL SECTION
(URBAN SHOULDER APPLICATION)



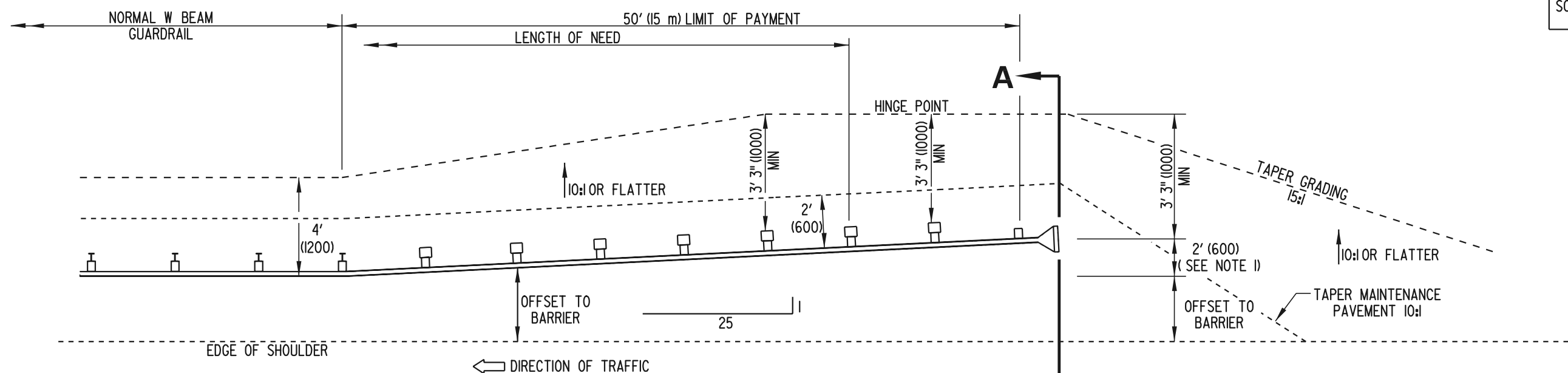
DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL APPLICATIONS

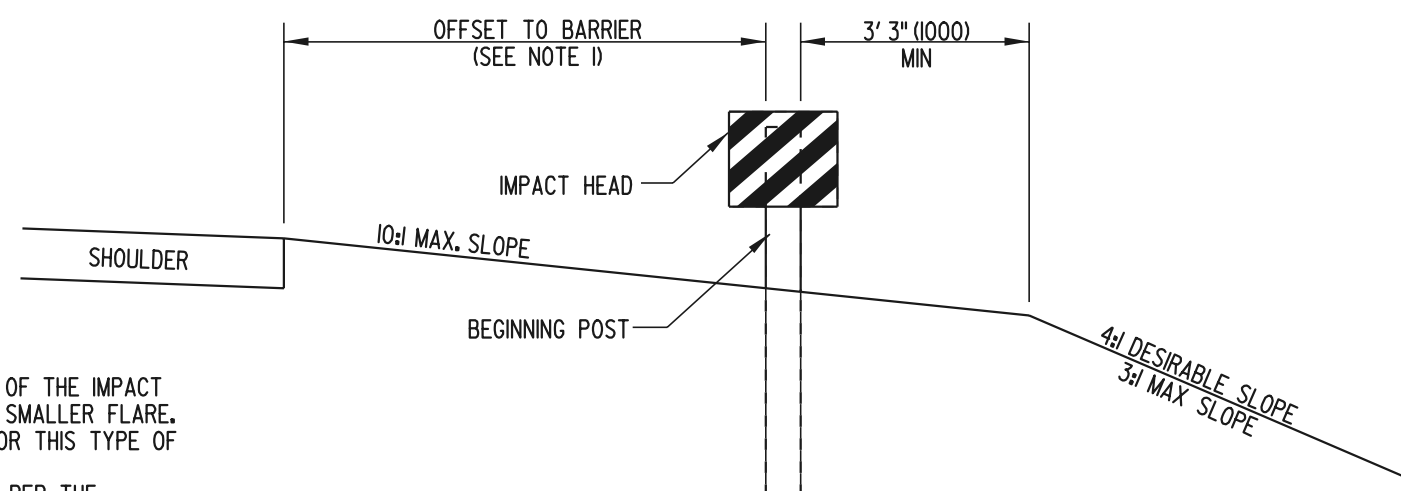
STANDARD NO. B-1 (2002)

SHT. 3 OF 6

APPROVED *Caution Wicks* 9/6/02
CHIEF ENGINEER DATE
RECOMMENDED *Theresa Delph* 8/19/02
DESIGN ENGINEER DATE



PLAN VIEW



SECTION A-A

GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE I

NOTES:

1. FLARE THE END TREATMENT AT 25:1 BEGINNING 50' (15 m) FROM THE END OF THE IMPACT HEAD, UNLESS THE CONSTRUCTION PLANS OR SPECIFICATIONS SPECIFY A SMALLER FLARE.
2. THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR.
3. THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER'S AND THE DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS.



**DELAWARE
DEPARTMENT OF TRANSPORTATION**

GUARDRAIL APPLICATIONS

STANDARD NO. B-1 (2002)

SHT. 4 OF 6

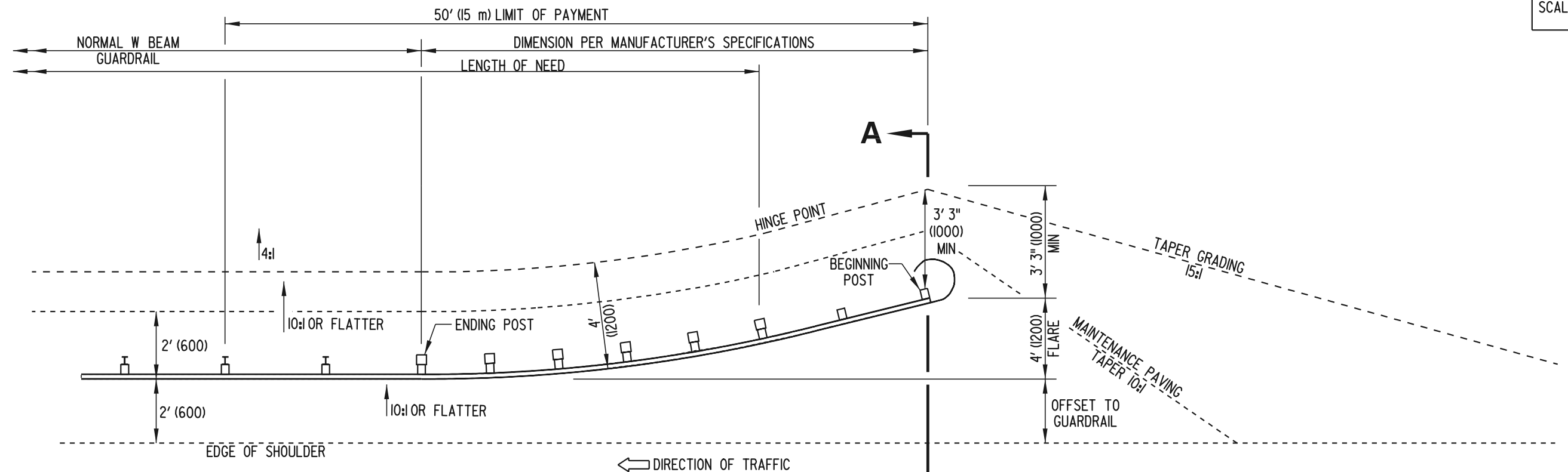
APPROVED

Caroleen Wicks 9/6/02
CHIEF ENGINEER DATE

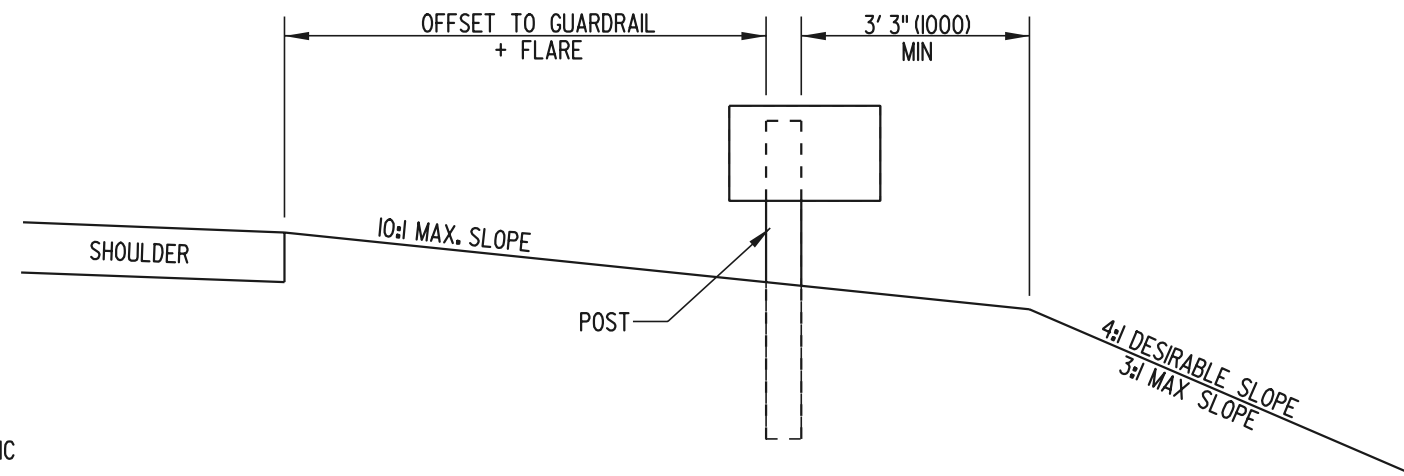
RECOMMENDED

Theresa Delph 8/19/02
DESIGN ENGINEER DATE

SCALE :



PLAN VIEW



SECTION A-A

GRADING FOR GUARDRAIL END TREATMENT ATTENUATOR, TYPE 2

NOTES:

1. FLARE SHALL BE 4' (1200) UNLESS THE CONSTRUCTION PLANS OR SPECIFICATIONS SPECIFY A SMALLER FLARE. FLARE MAY BE PARABOLIC OR STRAIGHT BASED ON MANUFACTURE'S SPECIFICATIONS.
2. THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR. THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER'S AND THE DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL APPLICATIONS

STANDARD NO.

B-1 (2002)

SHT. 5

OF 6

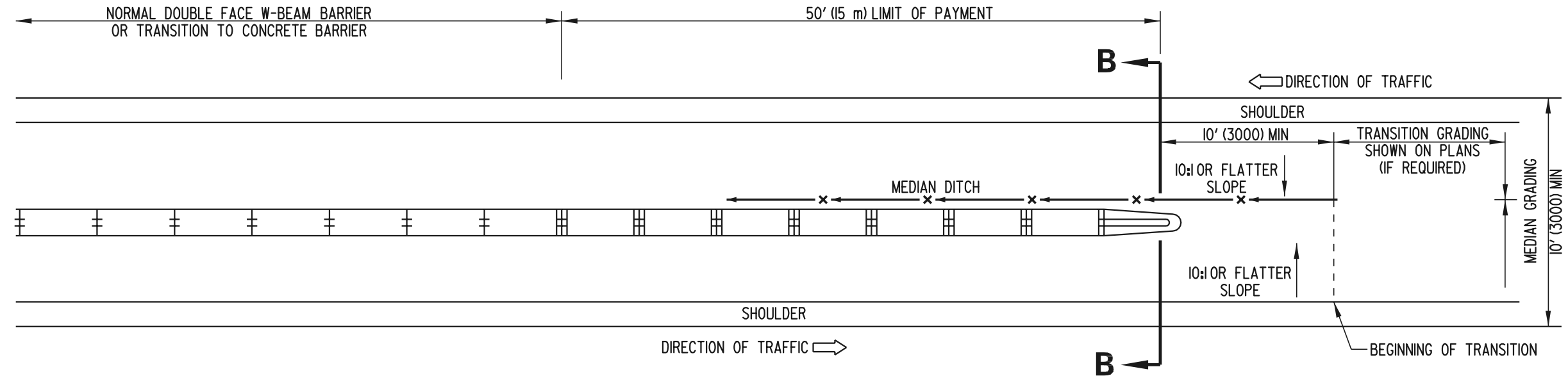
APPROVED

Caution Wicks 9/6/02
CHIEF ENGINEER DATE

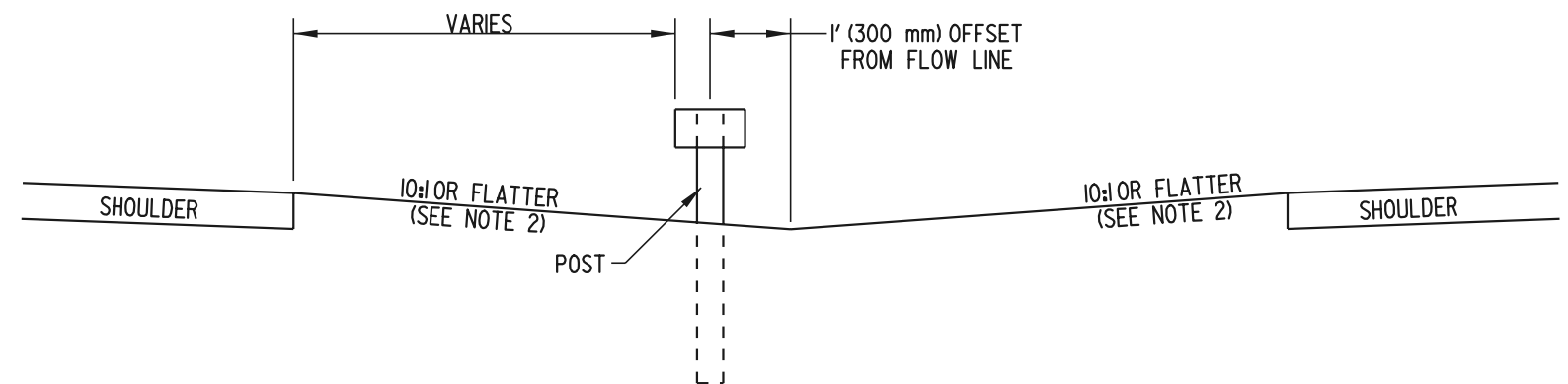
RECOMMENDED

Theresa Delph 8/19/02
DESIGN ENGINEER DATE

SCALE :



PLAN VIEW



SECTION B-B

GRADING FOR END TREATMENT ATTENUATOR, TYPE 3

NOTES:

1. THIS DETAIL WAS SOLELY CREATED TO SHOW THE GRADING REQUIRED FOR THIS TYPE OF ATTENUATOR.
2. 6:1 OR FLATTER GRADING IS ALLOWABLE WHEN THE BARRIER IS LOCATED 12' (3650 mm) OR MORE FROM THE OUTSIDE EDGE OF THE SHOULDER.
3. THIS END TREATMENT CAN ALSO BE USED IN RAMP GOES OR OTHER AREAS WHERE 2 RAILS OF W-BEAM COME TOGETHER AND TERMINATE WITH ONE END TREATMENT.
4. WHEN OPPOSING ROADWAYS HAVE EQUAL ELEVATIONS THE TRAFFIC BARRIER SYSTEM SHOULD BE PLACED ON THE OPPOSITE SIDE OF THE DITCH LINE FROM APPROACHING TRAFFIC.
5. THE GUARDRAIL END TREATMENT ATTENUATOR SHALL BE INSTALLED AS PER THE MANUFACTURER'S AND THE DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL APPLICATIONS

STANDARD NO.

B-1 (2002)

SHT. 6

OF 6

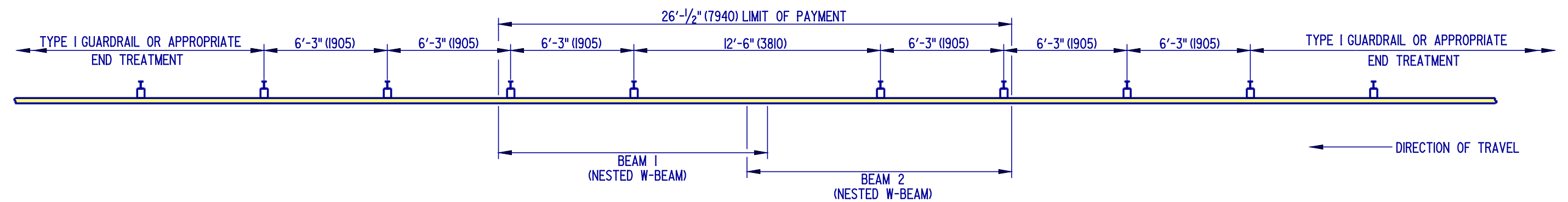
APPROVED

Caution Wicks 9/6/02
CHIEF ENGINEER DATE

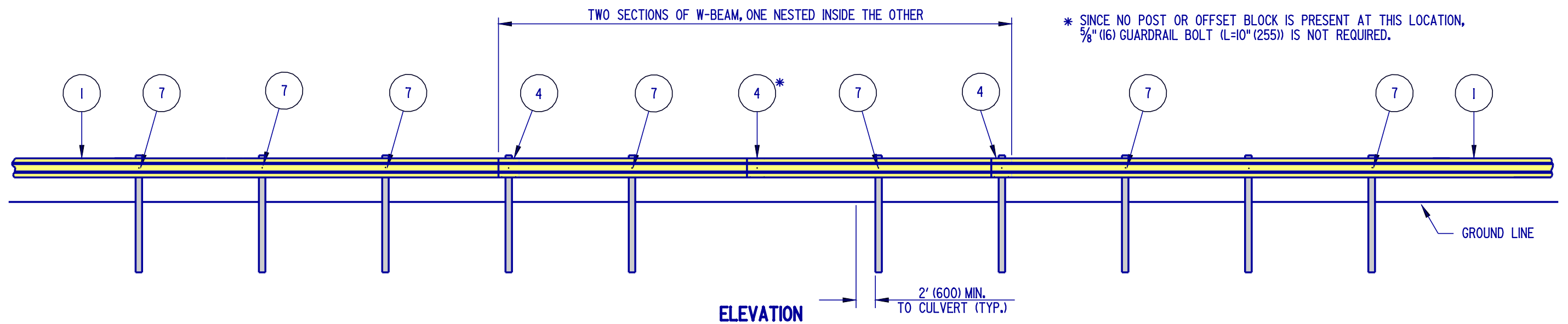
RECOMMENDED

Theresa Delph 8/19/02
DESIGN ENGINEER DATE

SCALE : N.T.S.



PLAN



ELEVATION

NOTES :1). ALL W-BEAMS ARE 13'-6 1/2" (4130) IN LENGTH.
2). PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERTS, TYPE 1

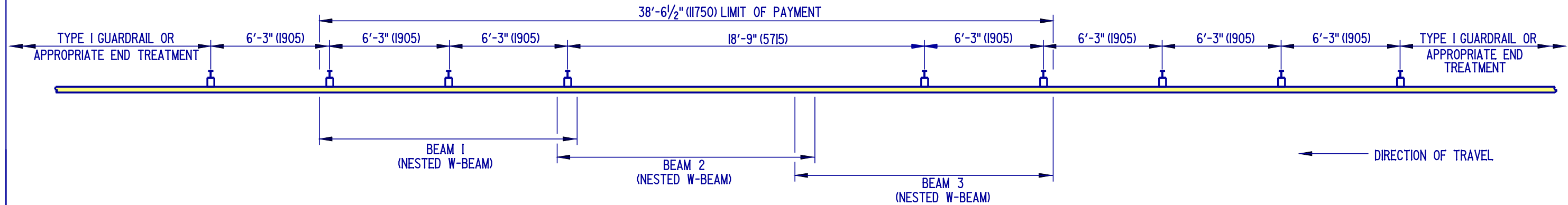
STANDARD NO. B-2 (2004)

SHT. 1 OF 1

APPROVED *Carolann Wick* 1/10/05
CHIEF ENGINEER DATE

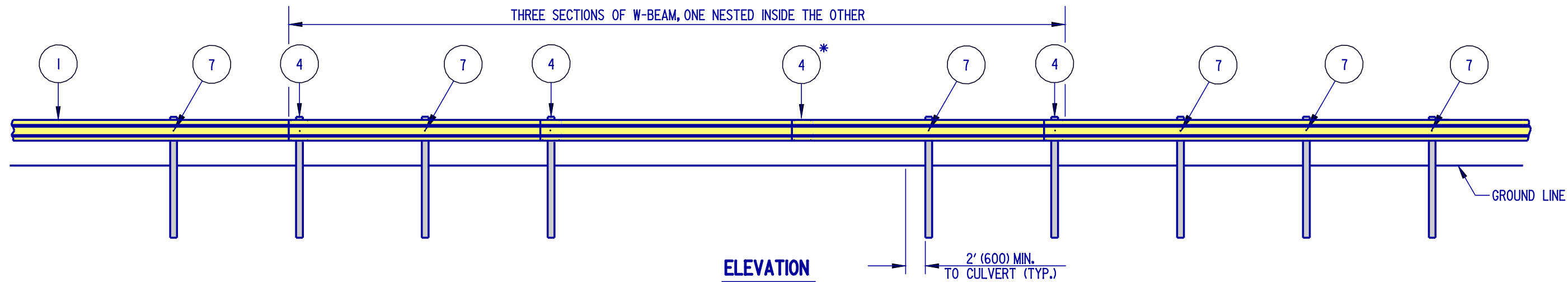
RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE

SCALE : N.T.S.



PLAN

* SINCE NO POST OR OFFSET BLOCK IS PRESENT AT THIS LOCATION, 5/8" (16) GUARDRAIL BOLT (L=10" (255)) IS NOT REQUIRED.



ELEVATION

NOTES : 1). ALL W-BEAMS ARE 13'-6 1/2" (4130) IN LENGTH.
2). PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL OVER CULVERTS, TYPE 2

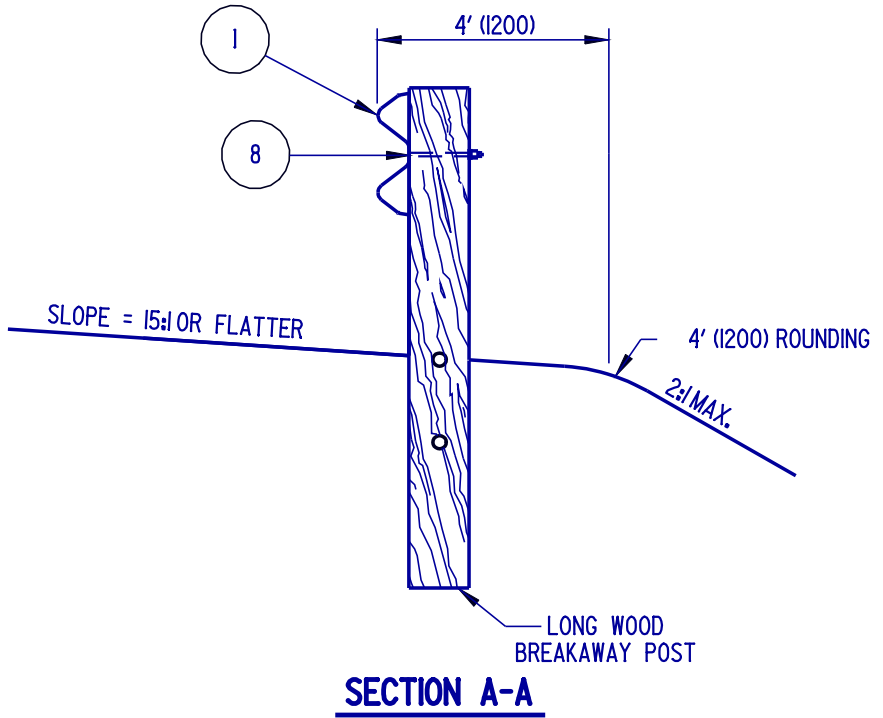
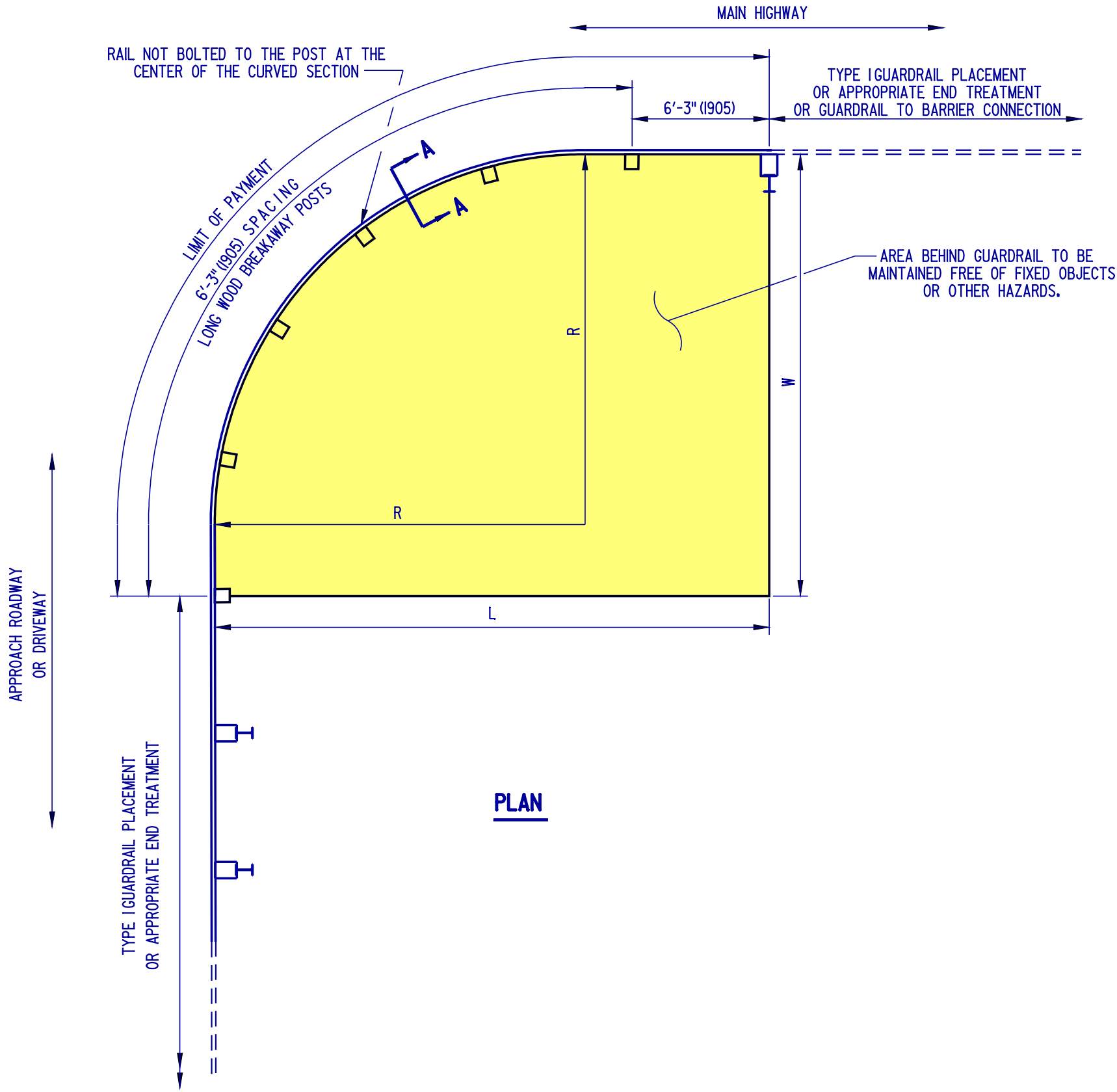
STANDARD NO. B-3 (2004)

SHT. 1 OF 1

APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE
RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE

SCALE : N.T.S.

RADIUS	MIN. REQUIRED AREA FREE OF FIXED OBJECTS
	L x W
8'-6" (2600)	25' x 15' (7600 x 4500)
17'-0" (5200)	30' x 15' (9144 x 4500)
25'-6" (7800)	40' x 20' (1200 x 6000)
35'-0" (10700)	50' x 20' (15200 x 6000)



- NOTES:
- 1). NO WASHERS ARE USED ON THE RAIL SIDE OF THE LONG WOOD BREAKAWAY POSTS.
 - 2). THE CURVED GUARDRAIL SECTION SHALL BE SHOP BENT.
 - 3). PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.



DELAWARE
DEPARTMENT OF TRANSPORTATION

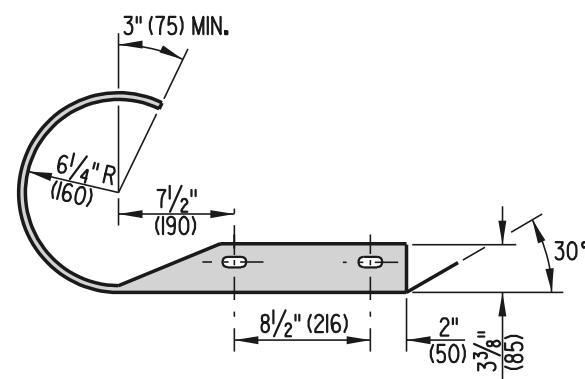
CURVED GUARDRAIL SECTION

STANDARD NO. B-4 (2004)

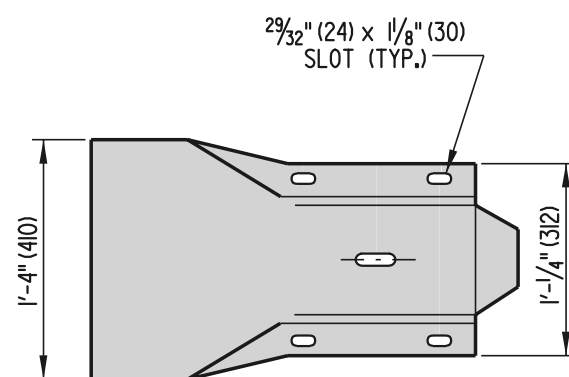
SHT. 1 OF 1

APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE

RECOMMENDED *Dennis M. O'Flaherty* 1/3/05
DESIGN ENGINEER DATE



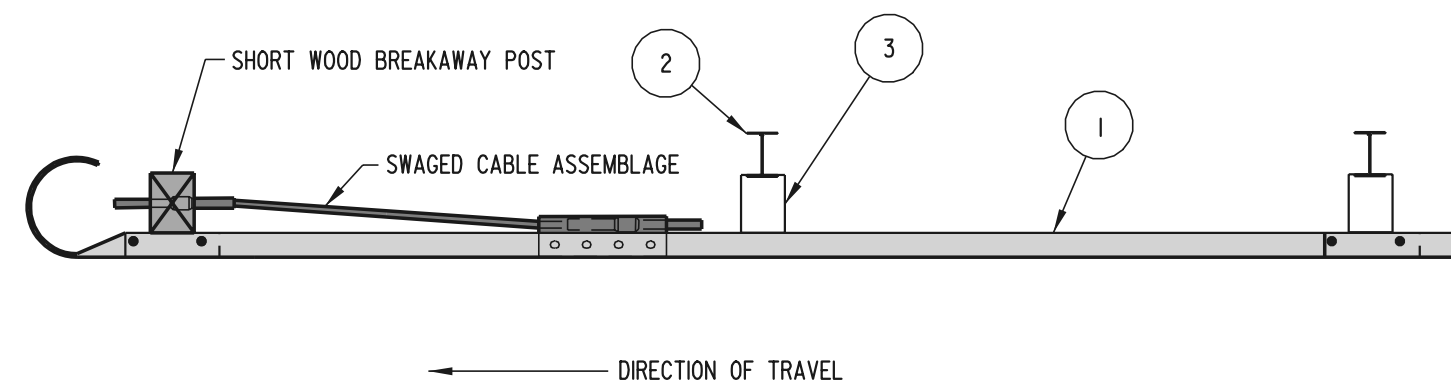
END SECTION PLAN



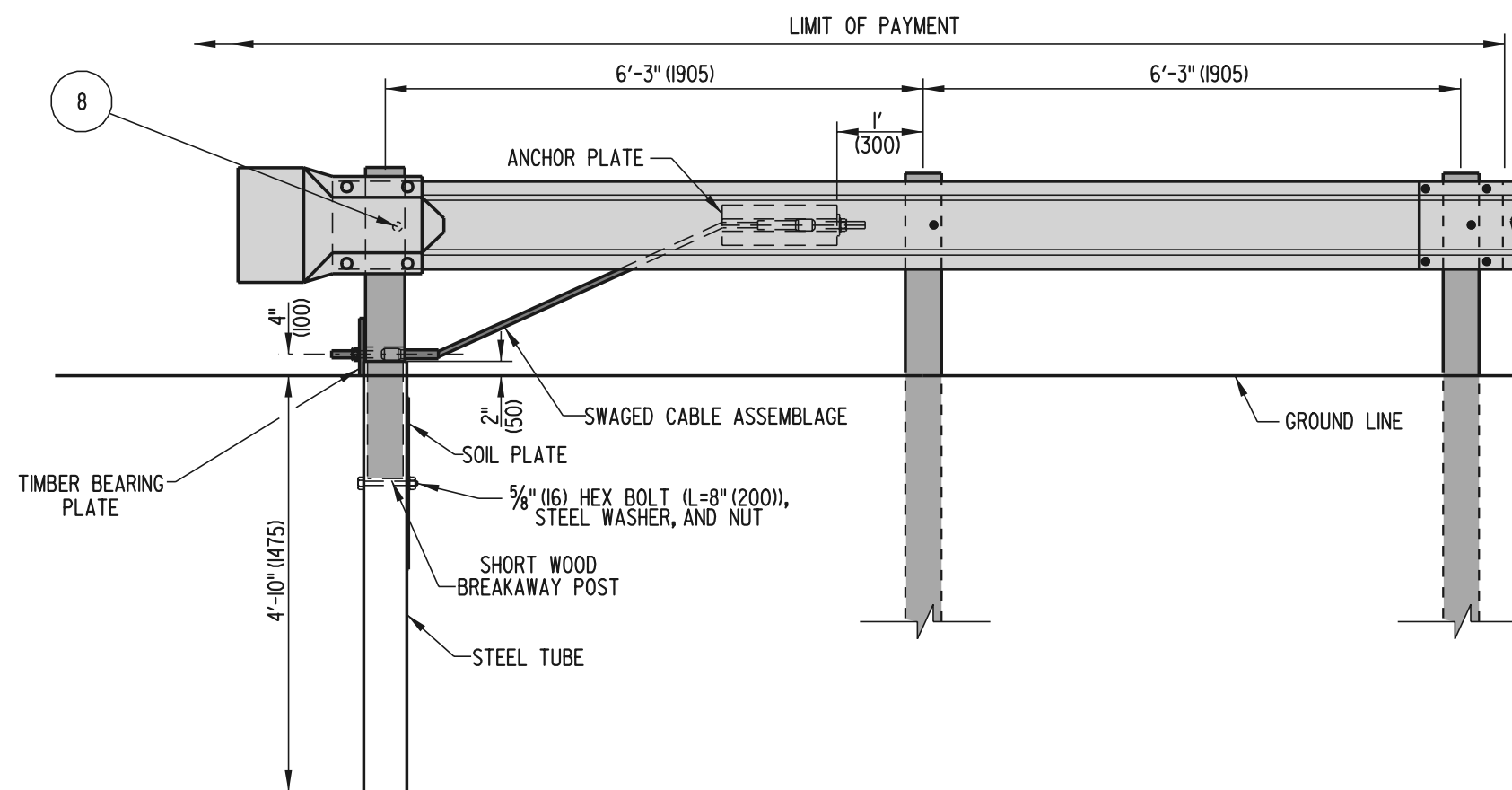
END SECTION ELEVATION

NOTES:

1. ADDITIONAL HOLES FOR ANCHOR PLATE SHALL BE DRILLED PRIOR TO GALVANIZING. (SEE STANDARD HARDWARE SHEET FOR HOLE SPACING INFORMATION).
2. CONTRACTOR HAS THE OPTION OF USING A 6' (1830) STEEL TUBE WITHOUT A SOIL PLATE OR A 5' (1525) STEEL TUBE WITH A SOIL PLATE.



PLAN



ELEVATION



DELAWARE
DEPARTMENT OF TRANSPORTATION

END ANCHORAGE

STANDARD NO.

B-5 (2002)

SHT.

1

OF

1

APPROVED

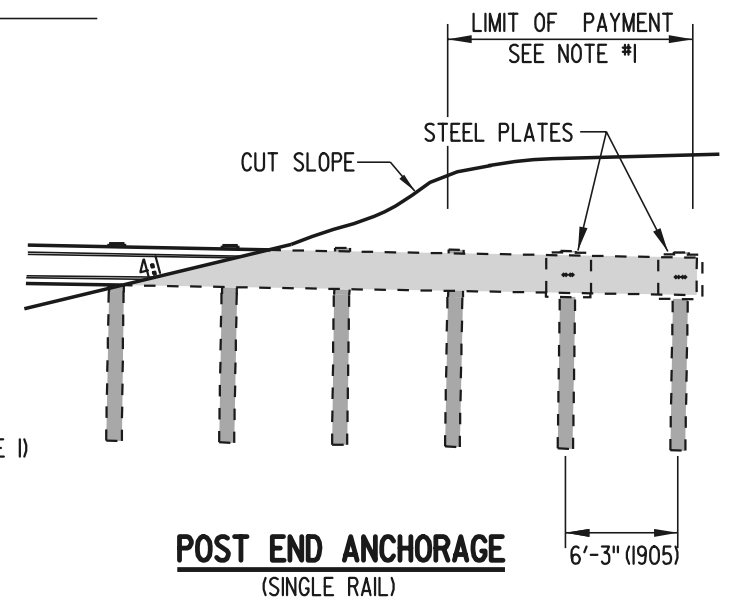
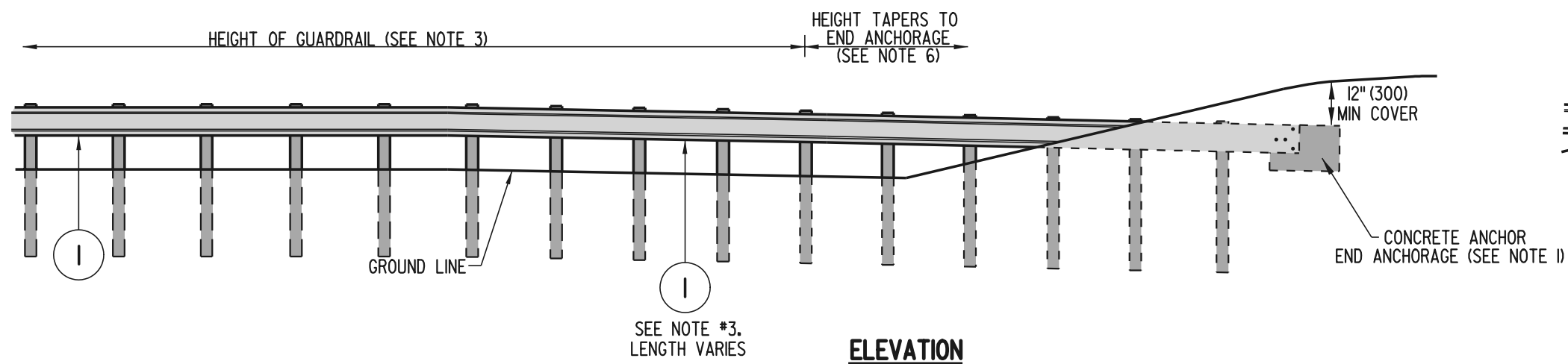
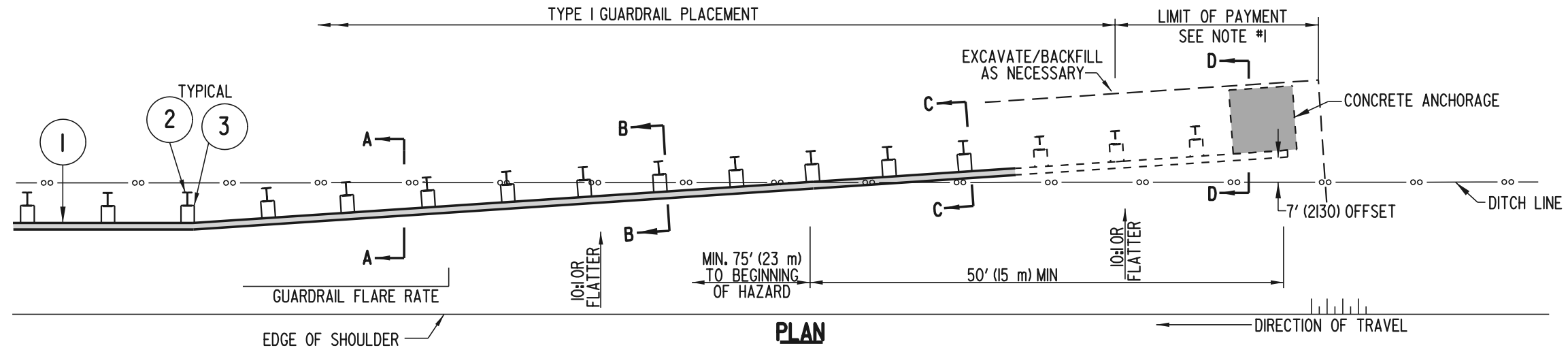
Carole Wicks
CHIEF ENGINEER

DATE 9/6/02

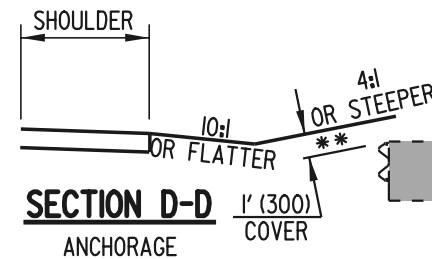
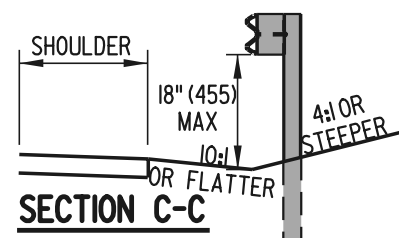
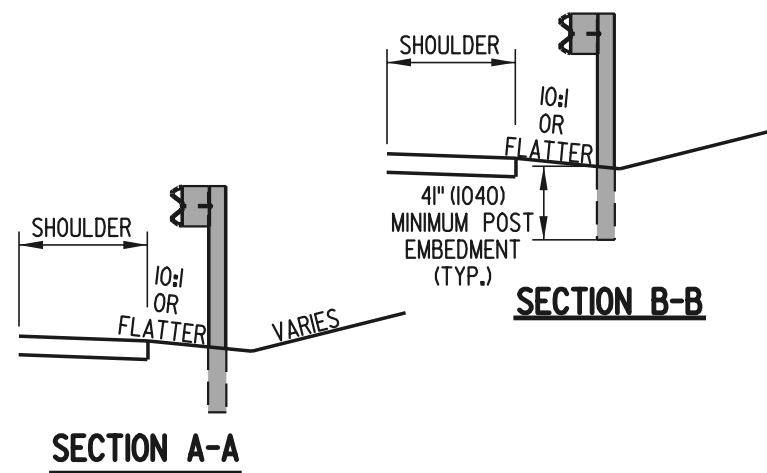
RECOMMENDED

DESIGN ENGINEER

DATE 8/19/02



FLARE RATES	
DESIGN SPEED	FLARE RATE
70 MPH (110 km/h)	15:1
60 MPH (100 km/h)	14:1
55 MPH (90 km/h)	12:1
50 MPH (80 km/h)	11:1
45 MPH (70 km/h)	10:1
40 MPH (60 km/h)	9:1
30 MPH (50 km/h)	7:1



** 1' (300) BURIAL IS NOT REQUIRED WHEN ANCHORING IN ROCK.

NOTES:

- 1). BURIED END SECTION PAYMENT INCLUDES THE CONCRETE OR POST ANCHORAGE, EXCAVATION, BACKFILL, AND ALL APPLICABLE ITEMS INCLUDING LABOR NECESSARY TO COMPLETE END ANCHORAGE.
- 2). THE CONTRACTOR HAS THE OPTION OF USING EITHER A CONCRETE BLOCK ANCHOR OR A POST ANCHOR TO TERMINATE THE BURIED END SECTION.
- 3). WHEN PLACING GUARDRAIL ON A 10:1 OR FLATTER SLOPE, THE HEIGHT OF THE GUARDRAIL SHALL BE HELD CONSTANT RELATIVE TO THE GROUND DIRECTLY UNDER THE FACE OF THE GUARDRAIL.
- 4). ALL POSTS SHALL BE 6' (1800) FOR SINGLE RAIL INSTALLATION.
- 5). WHEN USING THE BURIED END SECTION, THE DESIGN MUST PROVIDE A MINIMUM OF 75' (23 m) FROM WHERE THE GUARDRAIL CROSSES THE DITCH LINE TO THE BEGINNING OF THE HAZARD.
- 6). MAINTAIN THE FLARE OF THE GUARDRAIL UNTIL THE 12" (300) COVER HAS BEEN ATTAINED. IF THE 12" (300) COVER CANNOT BE ATTAINED BEFORE THE RAIL IS 7' (2100) BEHIND THE BOTTOM OF THE DITCH, THEN SLOPE THE GUARDRAIL FROM THE POINT WHERE IT CROSSES THE DITCH TO WHERE IT IS 7' (2100) BEHIND THE DITCH, SO THAT IT HAS 12" (300) OF COVER.



DELAWARE
DEPARTMENT OF TRANSPORTATION

BURIED END SECTION

STANDARD NO.

B-6 (2002)

SHT. 1

OF 3

APPROVED

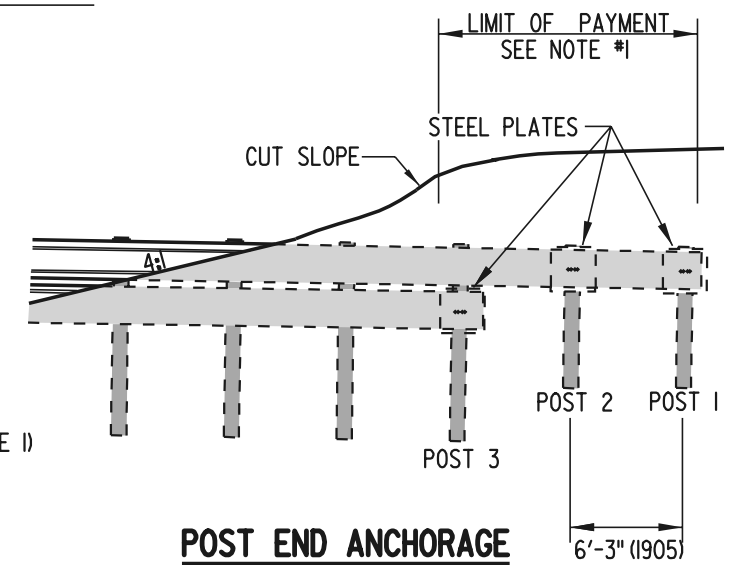
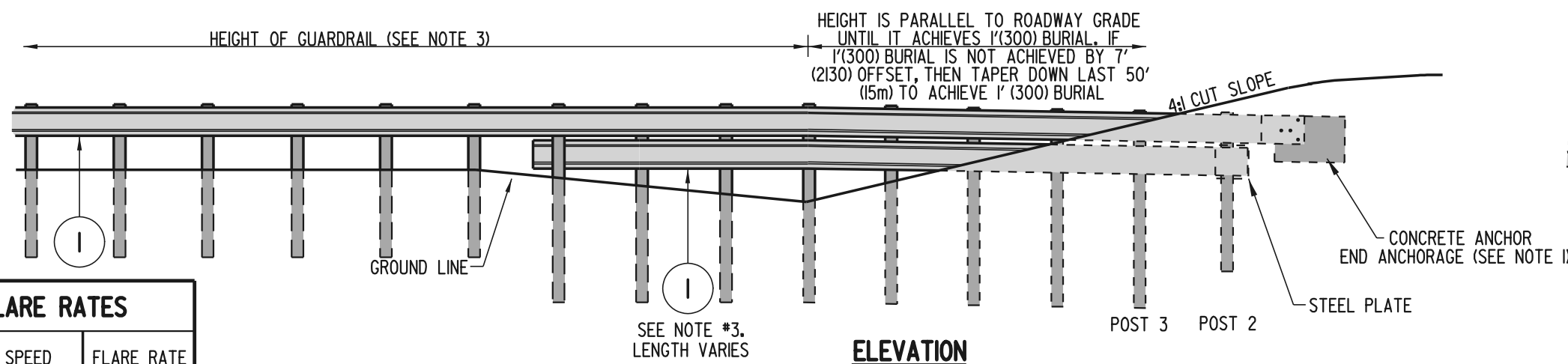
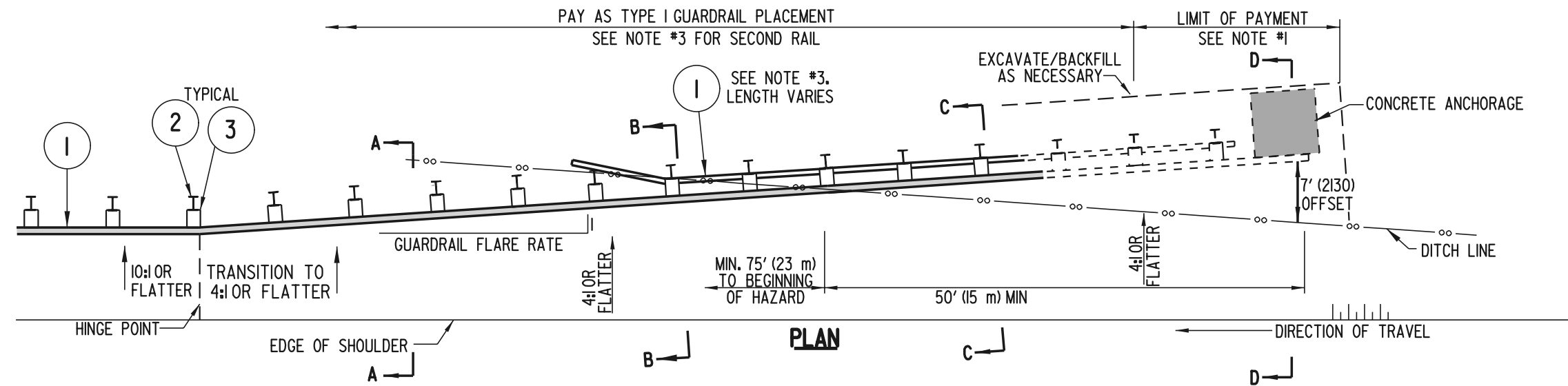
Caroleen Wilcox
CHIEF ENGINEER

9/6/02
DATE

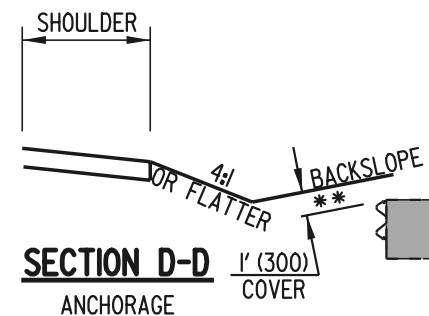
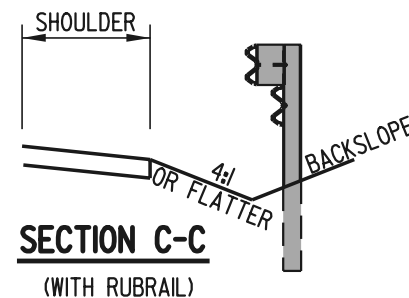
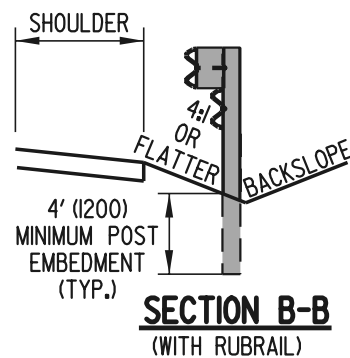
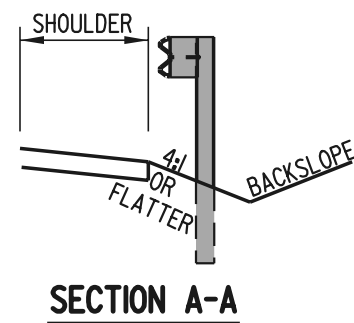
RECOMMENDED

Theresa Delph
DESIGN ENGINEER

8/19/02
DATE



FLARE RATES	
DESIGN SPEED	FLARE RATE
70 MPH (110 km/h)	15:1
60 MPH (100 km/h)	14:1
55 MPH (90 km/h)	12:1
50 MPH (80 km/h)	11:1
45 MPH (70 km/h)	10:1
40 MPH (60 km/h)	9:1
30 MPH (50 km/h)	7:1



** 1' (300) BURIAL IS NOT REQUIRED WHEN ANCHORING IN ROCK.

- NOTES:**
- 1). BURIED END SECTION PAYMENT INCLUDES THE CONCRETE OR POST ANCHORAGE, EXCAVATION, BACKFILL, AND ALL APPLICABLE ITEMS, INCLUDING LABOR NECESSARY TO COMPLETE END ANCHORAGE.
 - 2). THE CONTRACTOR HAS THE OPTION OF USING EITHER A CONCRETE BLOCK ANCHOR OR A POST ANCHOR TO TERMINATE THE BURIED END SECTION.
 - 3). THE TOP OF THE W-BEAM SHALL BE HELD CONSTANT RELATIVE TO THE ROADWAY PROFILE GRADE UNTIL IT CROSSES THE DITCH FLOW LINE. A SECOND W-BEAM RAIL IS REQUIRED WHEN THE DISTANCE BETWEEN THE GROUND AND THE BOTTOM OF THE TOP RAIL EXCEEDS 18" (450). THE MAXIMUM HEIGHT OF THE DOUBLE RAIL SYSTEM IS 45" (1150). IF NECESSARY, TAPER BOTH RAILS DOWN TO MAINTAIN MAXIMUM HEIGHT. SECOND RAIL SHALL BE PAID FOR AS ADDITIONAL LINEAR FEET (LINEAR METERS) OF TYPE I GUARDRAIL.
 - 4). WHEN USING A SECOND RAIL, 8' (2400) LONG POSTS ARE REQUIRED. BEHIND THE DITCHLINE, POSTS MUST PROVIDE 4' (1200) MINIMUM EMBEDMENT (20" (510) WHEN ROCK IS ENCOUNTERED). POSTS FOR THE POST ANCHOR SHALL BE 6' (1800) LONG.
 - 5). WHEN USING THE BURIED END SECTION, THE DESIGN MUST PROVIDE A MINIMUM OF 75' (23 m) FROM WHERE THE GUARDRAIL CROSSES THE DITCH LINE TO THE BEGINNING OF THE HAZARD.
 - 6). MAINTAIN THE FLARE OF THE GUARDRAIL UNTIL THE 12" (300) COVER HAS BEEN ATTAINED. IF THE 12" (300) COVER CANNOT BE ATTAINED BEFORE THE RAIL IS 7' (2100) BEHIND THE BOTTOM OF THE DITCH, THEN SLOPE THE GUARDRAIL FROM THE POINT WHERE IT CROSSES THE DITCH TO WHERE IT IS 7' (2100) BEHIND THE DITCH, SO THAT IT HAS 12" (300) OF COVER.



DELAWARE
DEPARTMENT OF TRANSPORTATION

BURIED END SECTION

STANDARD NO.

B-6 (2002)

SHT. 2

OF 3

APPROVED

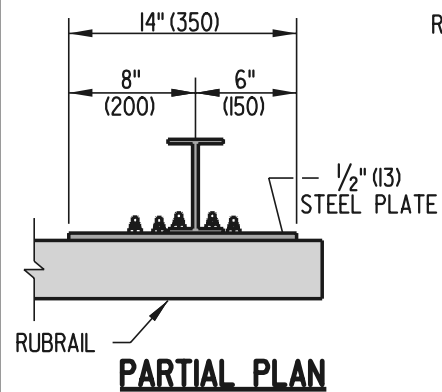
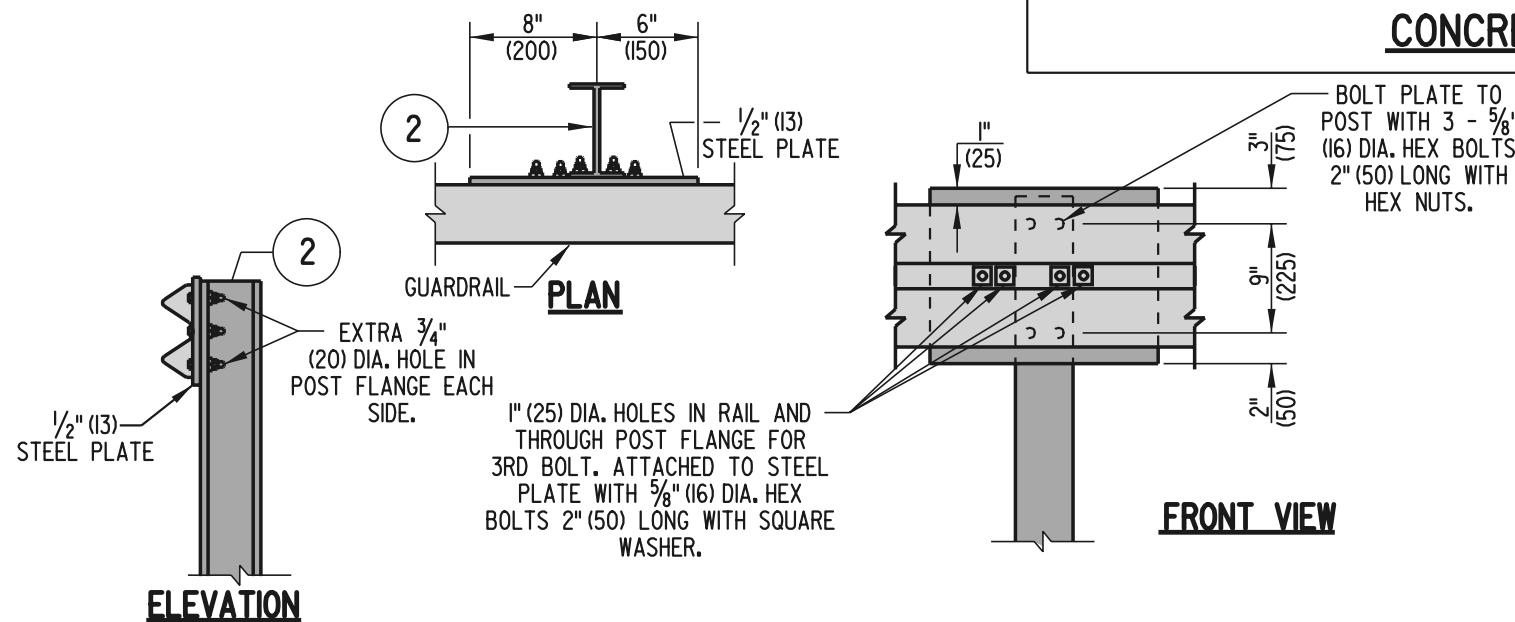
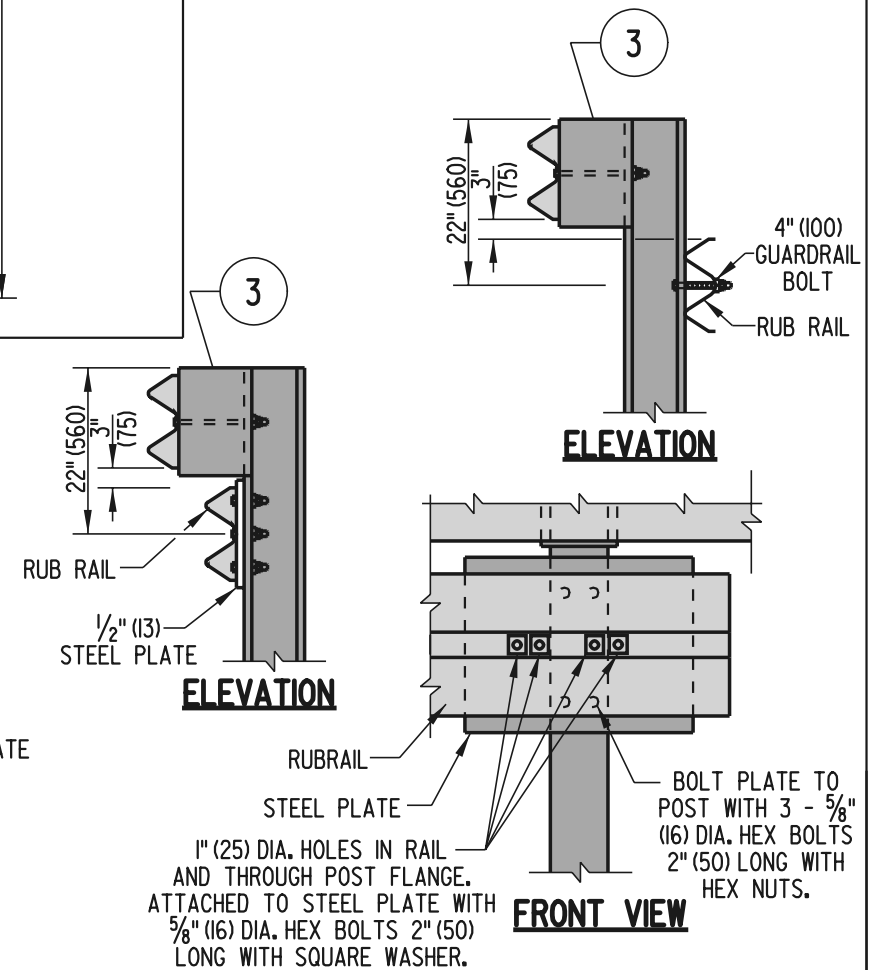
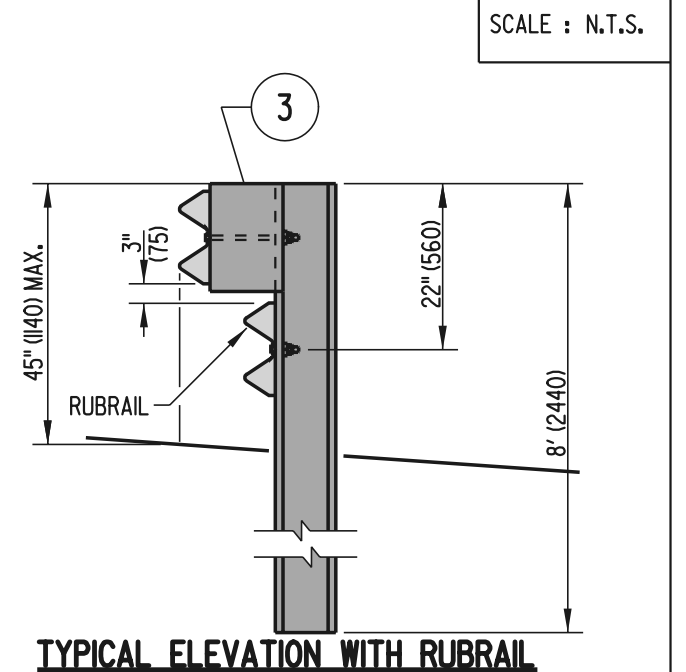
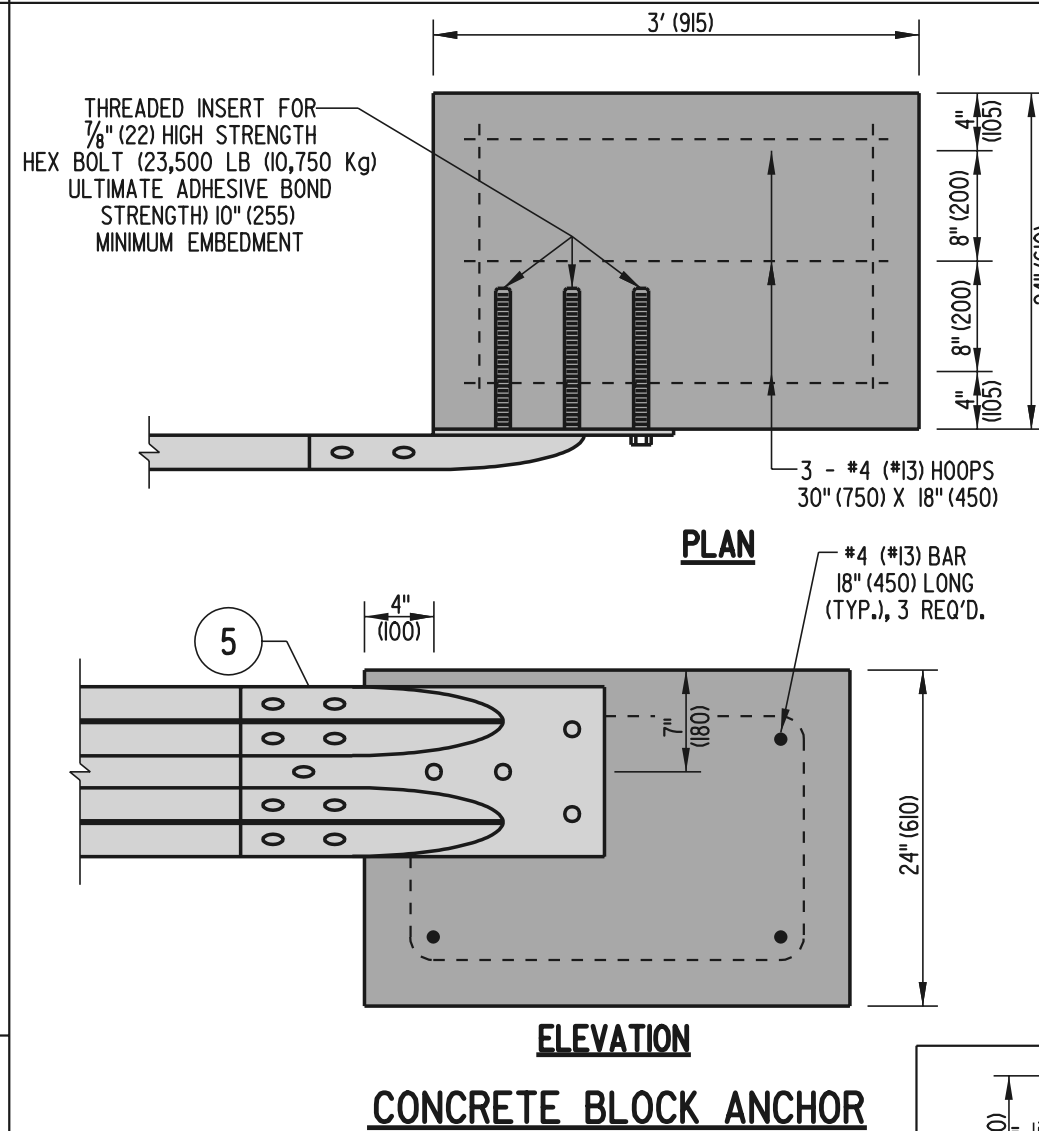
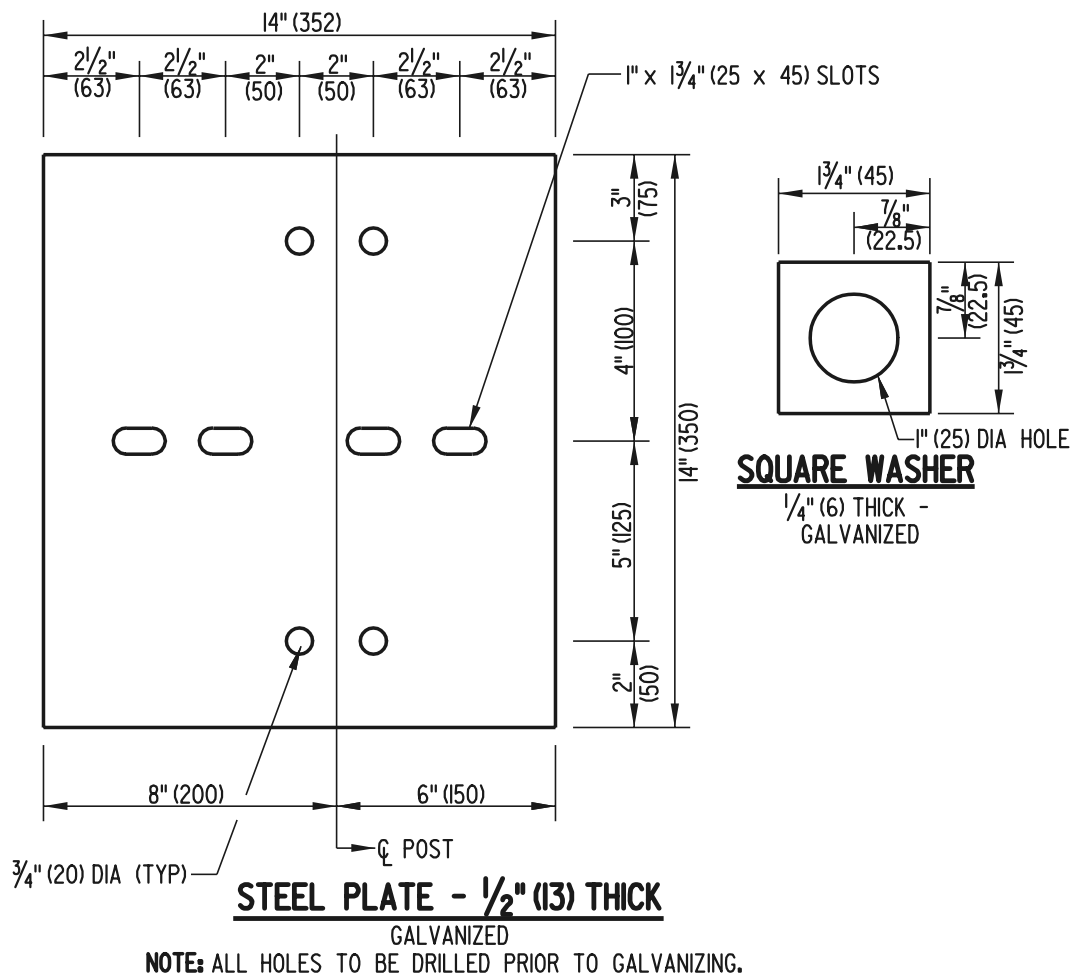
Caution Wicks
CHIEF ENGINEER

9/6/02
DATE

RECOMMENDED

Thurman Delph
DESIGN ENGINEER

8/19/02
DATE



DELAWARE
DEPARTMENT OF TRANSPORTATION

BURIED END SECTION

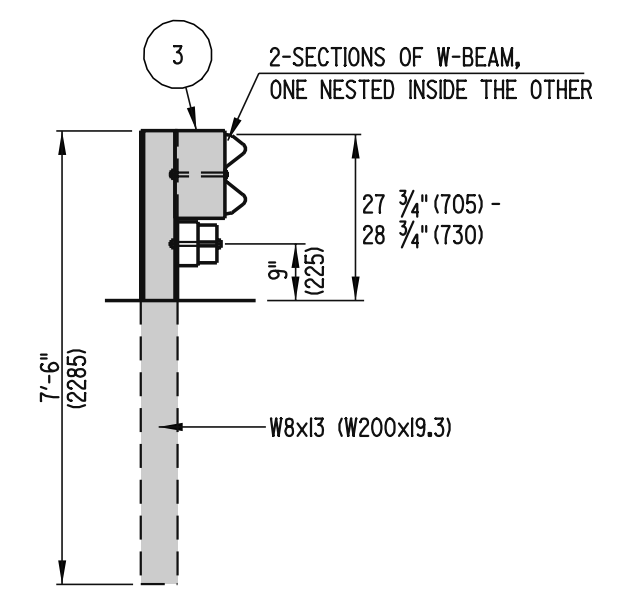
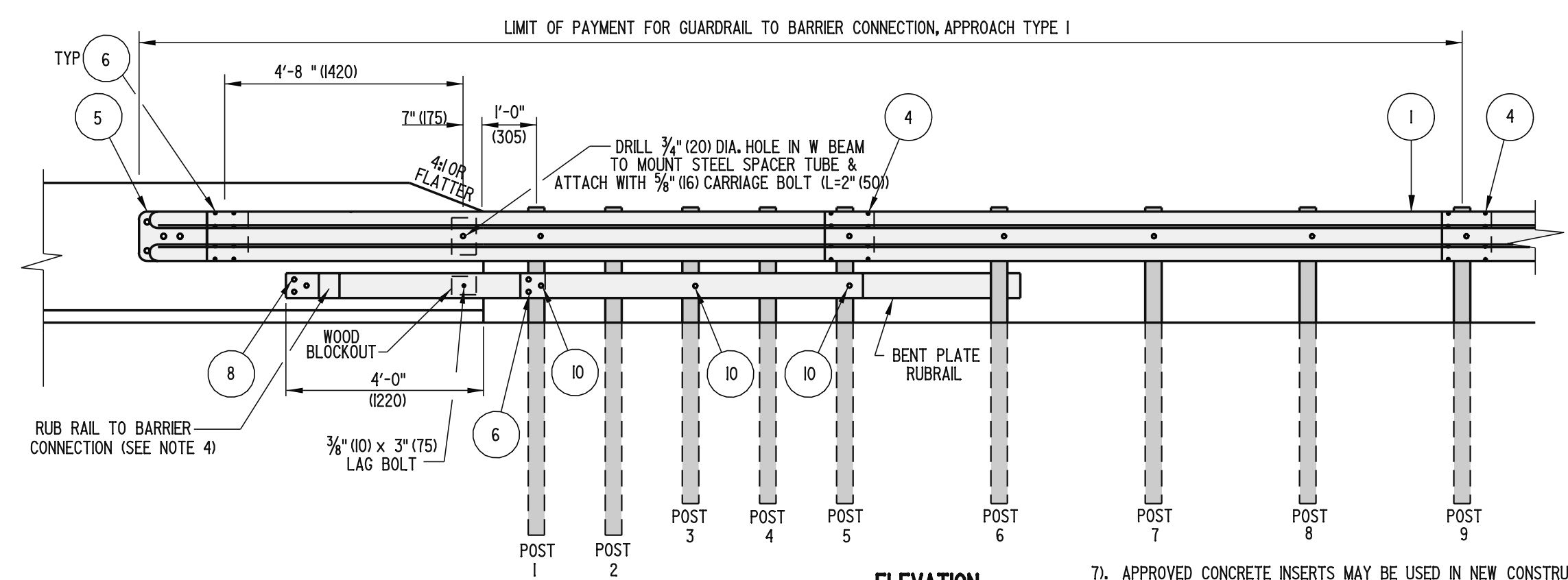
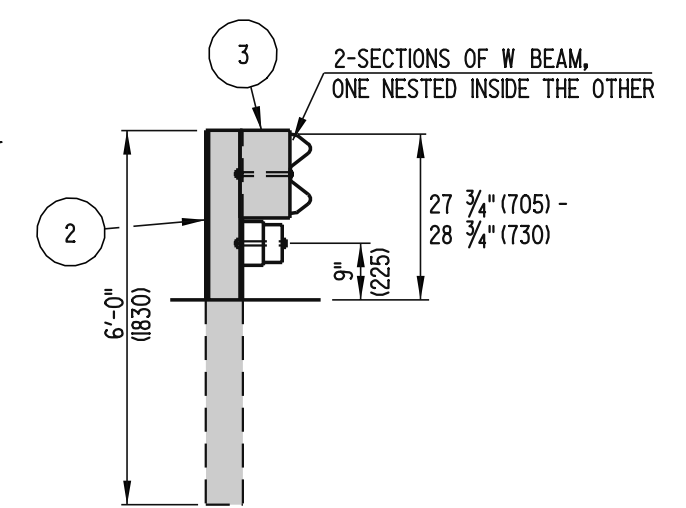
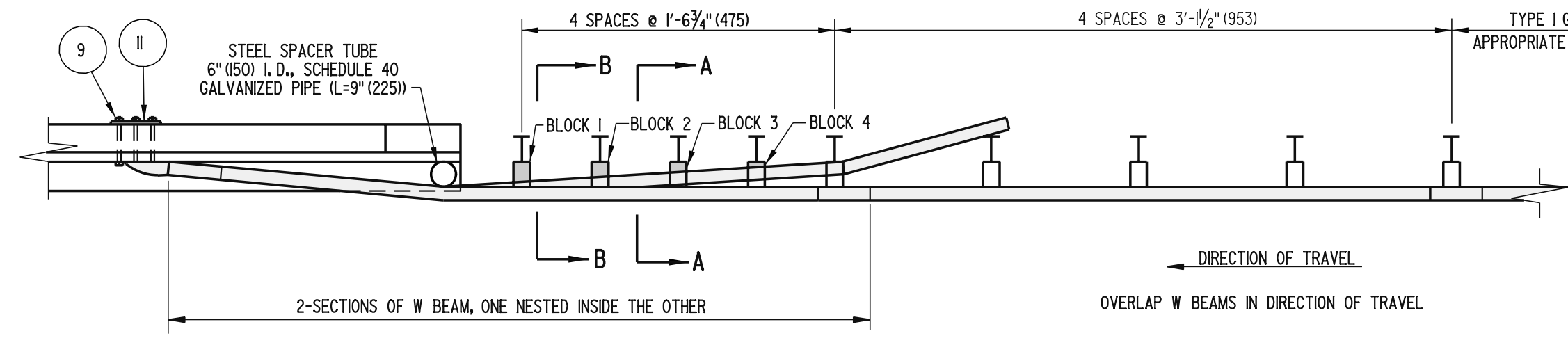
STANDARD NO.

B-6 (2002)


SHT. 3

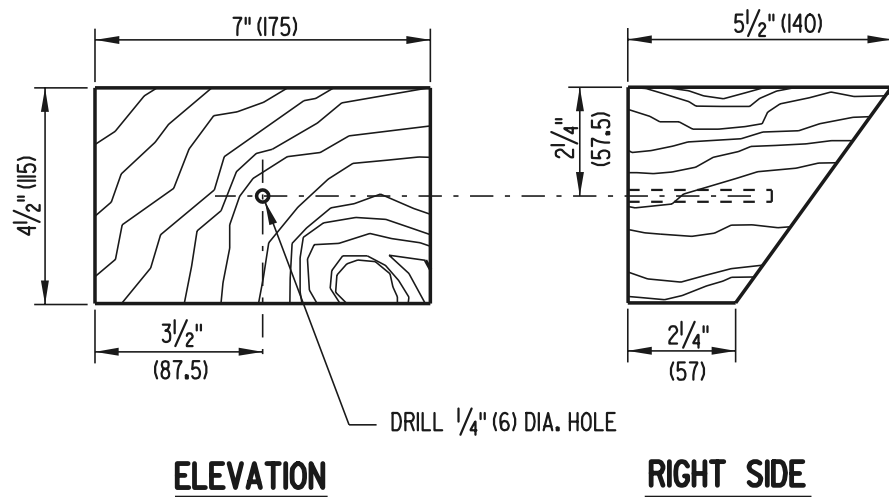
OF 3

APPROVED *Caution Wicks* 9/6/02
CHIEF ENGINEER DATE
RECOMMENDED *Theresa Delph* 8/19/02
DESIGN ENGINEER DATE



- NOTES: 1). W BEAM IS NOT BOLTED TO POSTS AT POSTS 2 THROUGH 4.
2). RUB RAIL IS NOT BOLTED AT POSTS 2 AND 4.
3). POSTS 1 THROUGH 6 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER WOOD BLOCKS AND/OR RUBRAIL AND WOOD BLOCK.
4). USE APPROPRIATE EPOXY BOLT ANCHORS TO REDUCE THE CHANCE OF SPLITTING THE CONCRETE. PLACE STEEL WASHERS (FOR 5/8" (16) BOLT) BETWEEN BOLT HEADS AND RUB RAIL.
5). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
6). PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
7). APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET.
8). POSTS 1 & 2 ARE W8x13 (W200x19.3). ALL OTHER POSTS IN TRANSITION ARE W6x9 (W150x13.5).
7). APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION

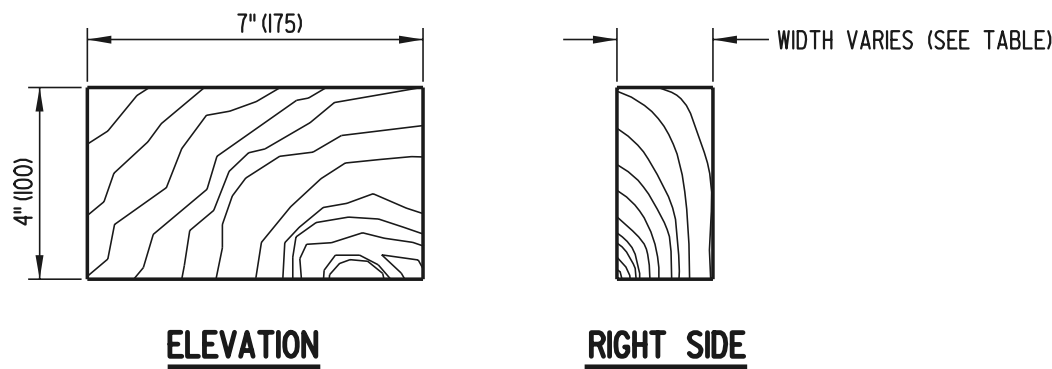
 DELAWARE DEPARTMENT OF TRANSPORTATION	GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1			APPROVED <i>Carolyn Wick</i> 12/15/05 CHIEF ENGINEER DATE
	STANDARD NO. B-7 (2004)	SHT. 1	OF 3	RECOMMENDED <i>James M. O'Brien</i> 11/29/05 DESIGN ENGINEER DATE



ELEVATION

RIGHT SIDE

WOOD BLOCKOUT DETAIL

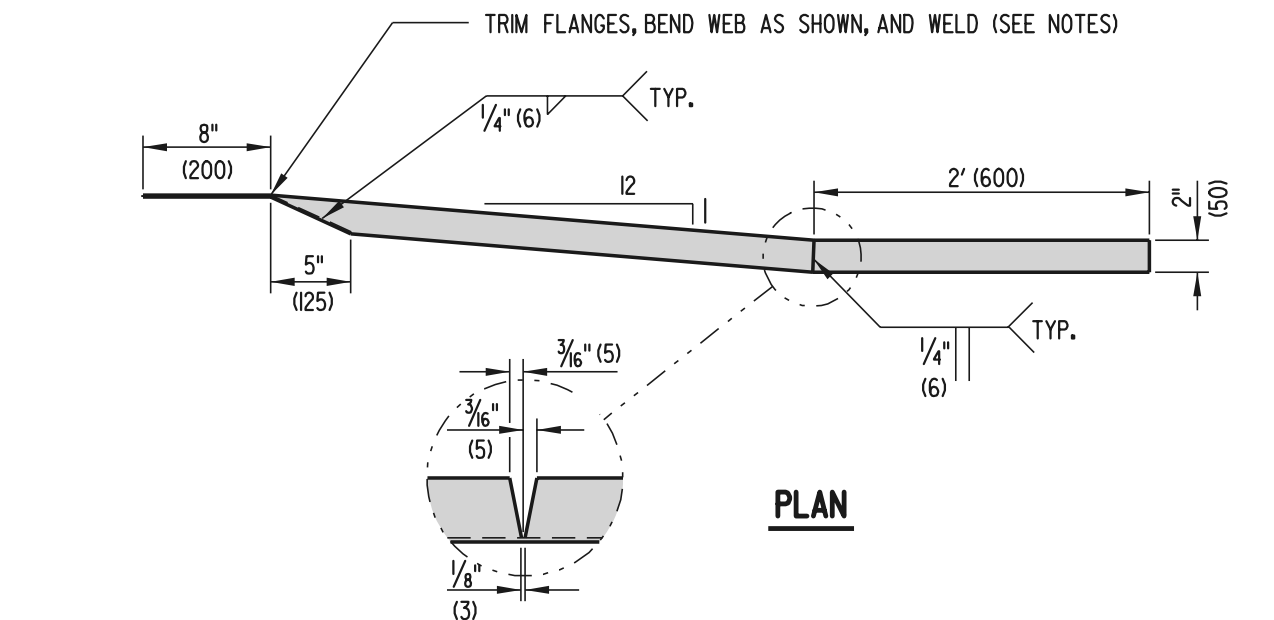


ELEVATION

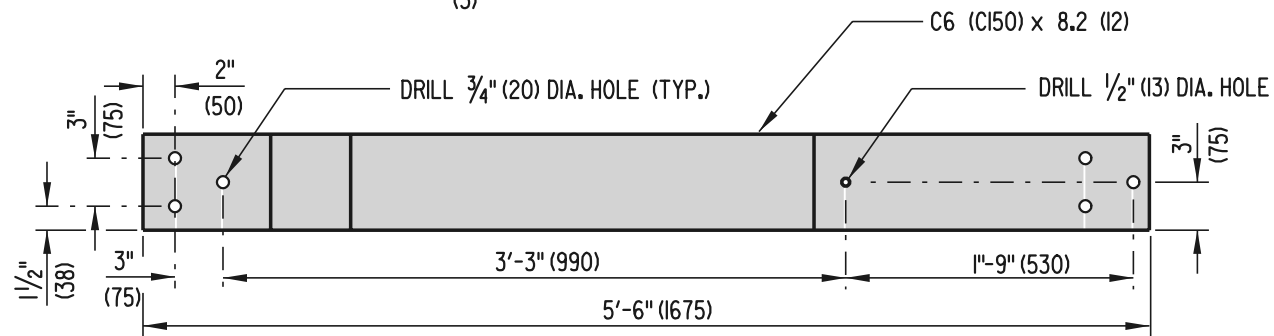
RIGHT SIDE

RUB RAIL WOOD BLOCKS

RUB RAIL WOOD BLOCKS (7" (175) x 4" (100))		
POST NO.	WIDTH	BOLT LENGTH
1	4 1/4" (108)	6" (150)
2	3 1/4" (83)	4" (100)
3	2" (50)	4" (100)
4	1" (25)	2" (50)



PLAN



ELEVATION

RUB RAIL TO BARRIER CONNECTION

- NOTES:**
- 1). THE RUB RAIL TO BARRIER CONNECTION END MUST BE ATTACHED FLUSH WITH THE SLOPED TOE OF THE SAFETY BARRIER. INSTALLATION CAN BE SIMPLIFIED BY FABRICATING OR SHOP TWISTING THE RUB RAIL END TO BE CONSISTENT WITH THE SLOPE OF THE BARRIER, HOWEVER, FIELD BENDING USING HEAT IS PERMITTED.
 - 2). STEEL SPACER TUBE IS SCHEDULE 40 GALVANIZED PIPE, 6" (152) (I.D.) x 9" (229)



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1

STANDARD NO. B-7 (2001)

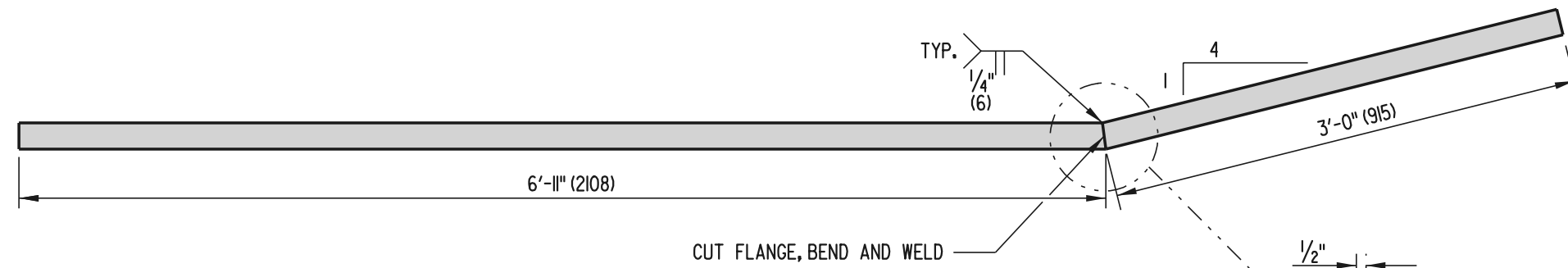
SHT. 2 OF 3

APPROVED

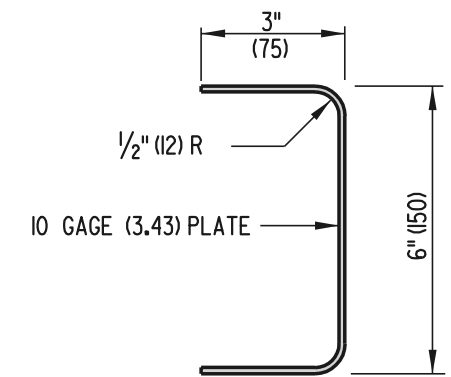
Ryan M. Hershman
CHIEF ENGINEER
DATE 6/18/01

RECOMMENDED

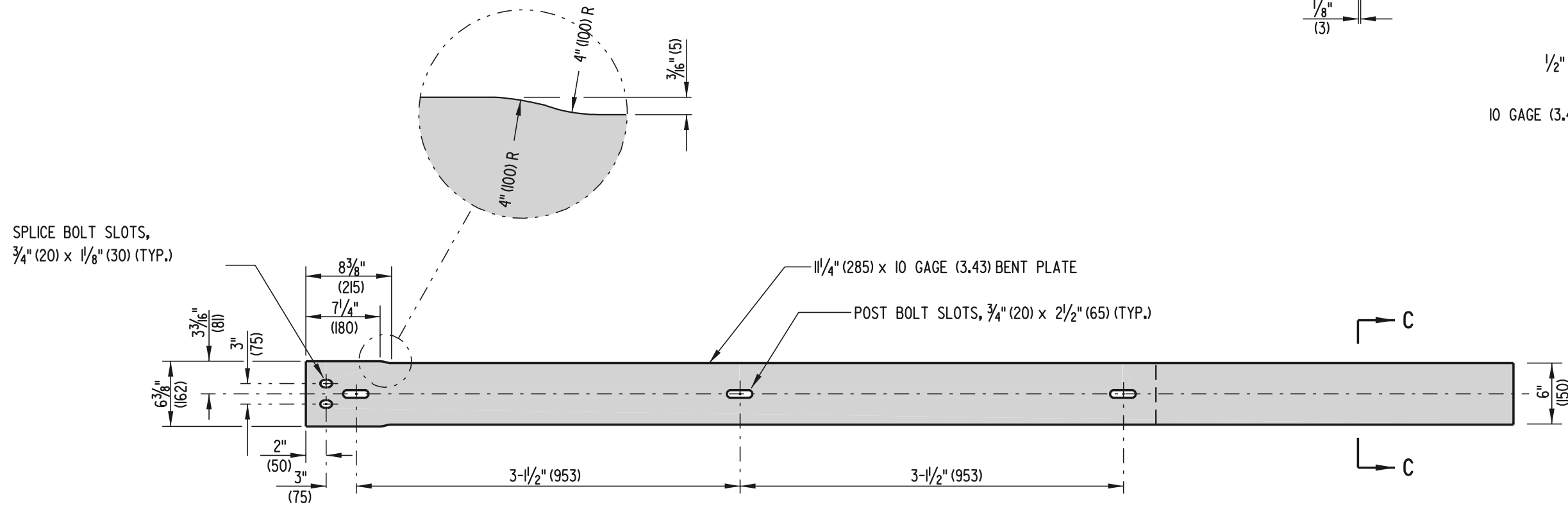
Michael P. Gotsch
DESIGN ENGINEER
DATE 6/18/01



PLAN



SECTION C-C



ELEVATION

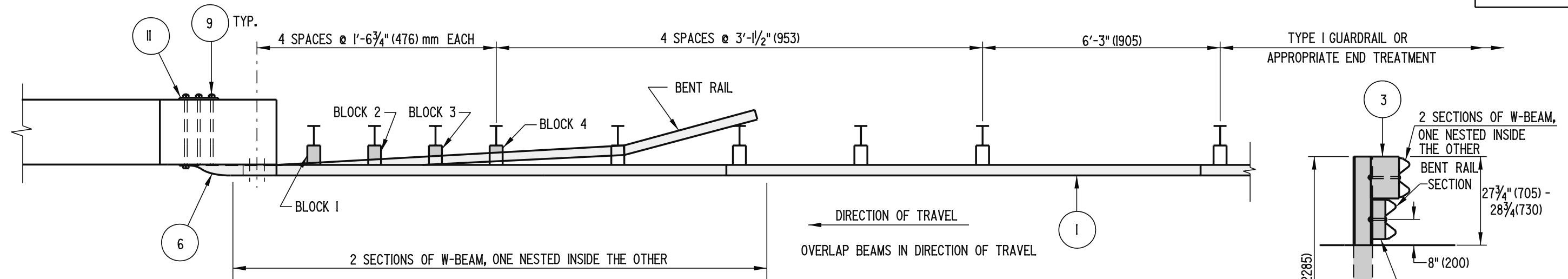
BENT PLATE RUB RAIL



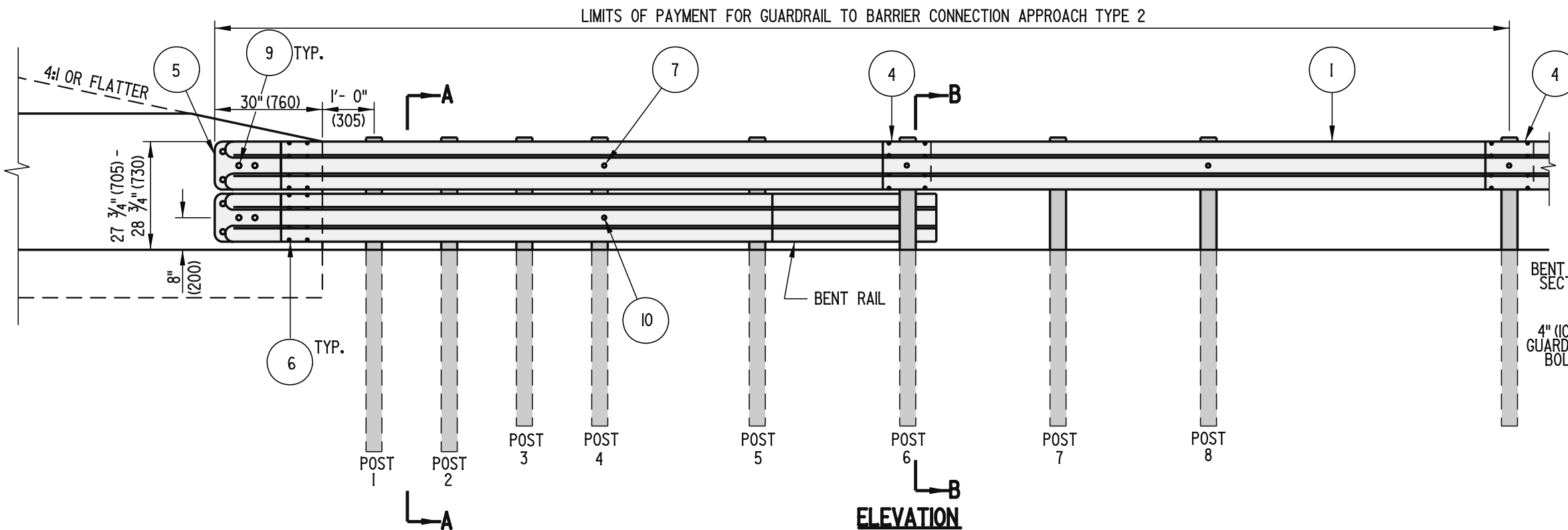
DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 1
STANDARD NO. B-7 (2001) SHT. 3 OF 3

APPROVED *Ryan M. Harkins* 6/18/01
CHIEF ENGINEER DATE
RECOMMENDED *Michael P. Gotsch* 6/15/01
DESIGN ENGINEER DATE

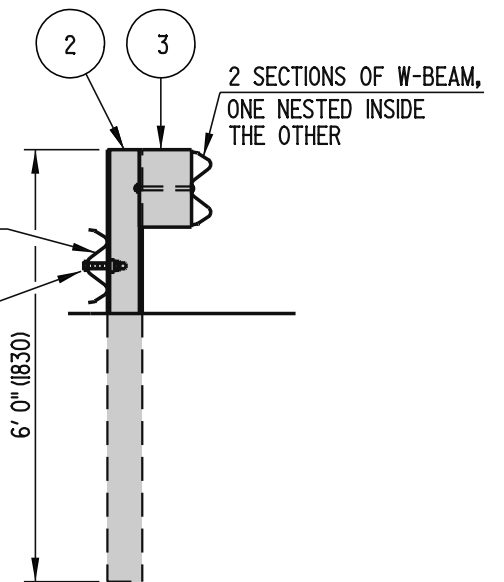


PLAN



ELEVATION

SECTION A-A



SECTION B-B

NOTES :

- 1). CURB SHALL NOT BE USED AT THE FACE OF RAIL WITHIN THE LIMITS OF THIS INSTALLATION.
- 2). POSTS 1, 2, 3, 4, AND 6 REQUIRE AN ADDITIONAL HOLE TO ATTACH WOOD BLOCKS AND/OR BENT RAIL.
- 3). DO NOT ATTACH RAILS TO POSTS 1, 2, 3, 5, OR 7.
- 4). POSTS 1 AND 2 ARE W8x13 (W200x19.3). ALL OTHER POSTS IN TRANSITION ARE W6x9 (w150x13.5).
- 5). ALL HOLES SHALL BE DRILLED PRIOR TO GALVANIZING.
- 6). BENT RAIL MAY BE SHOP BENT TO FACILITATE INSTALLATION OR MAY BE FIELD BENT USING HEAT.
- 7). APPROVED CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTORS TO PARAPET.
- 8). PLACE GUARDRAIL REFLECTOR EVERY FIFTH POST.
- 9). FOR INSTALLATIONS WHERE CURB EXISTS, IF THE EXISTING CURB IS 8" (200) OR HIGHER AND CANNOT BE REMOVED, THE BOTTOM RAIL CAN BE ELIMINATED.



DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRER CONNECTION, APPROACH TYPE 2

STANDARD NO. B-8 (2005)

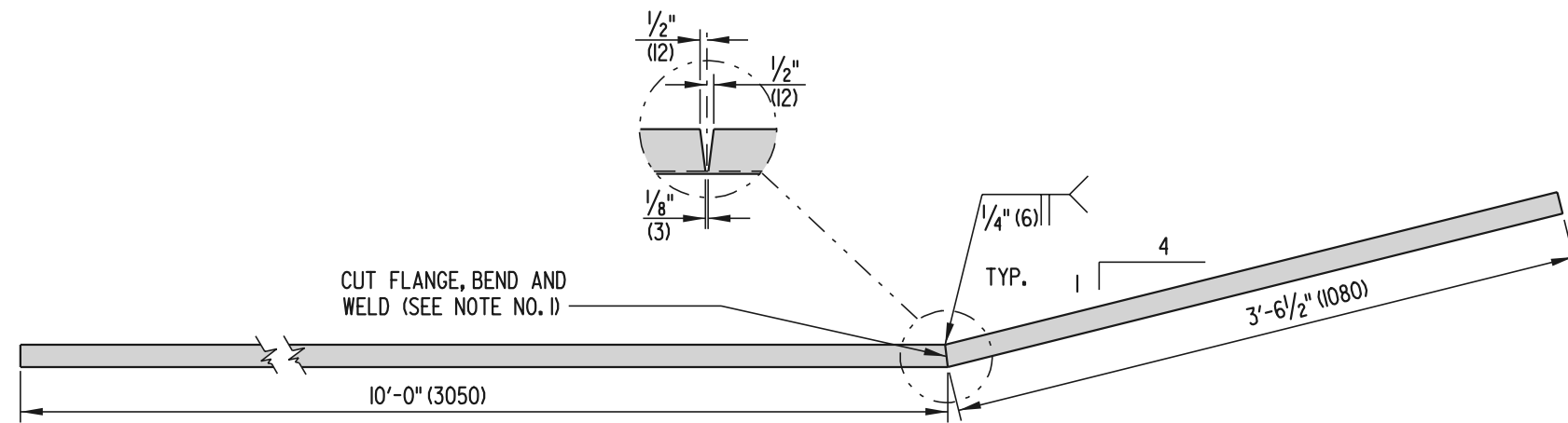
SHT. 1 OF 2

APPROVED *Carolann Wick*
CHIEF ENGINEER

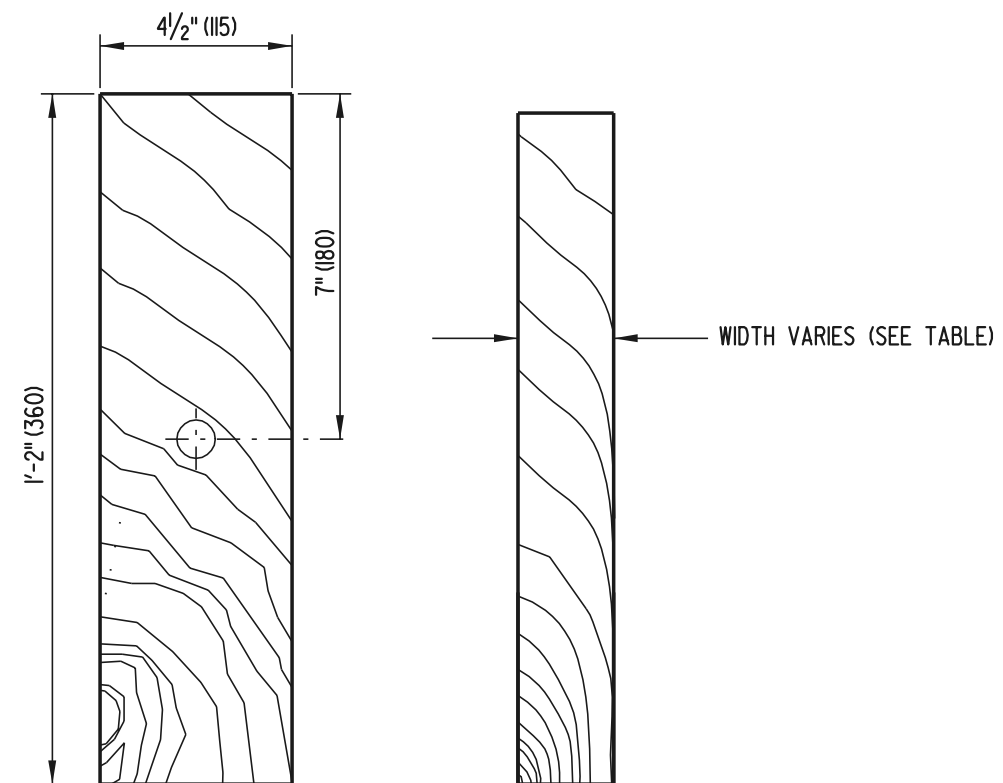
12/5/05
DATE

RECOMMENDED *James M. O'Brien*
DESIGN ENGINEER

11/29/05
DATE



BENT RAIL



ELEVATION

RIGHT SIDE

BENT RAIL WOOD BLOCKS

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

NOTE: BOTTOM WOOD BLOCKS LOCATED ON POSTS 1-4 ARE OFFSET DRILLED TO SIT SQUARELY ON THE POST FLANGE AND SECURED WITH 5/8" (16) CARRIAGE BOLTS (L VARIES), SEE BENT RAIL WOOD BLOCKS TABLE.



DELAWARE
DEPARTMENT OF TRANSPORTATION

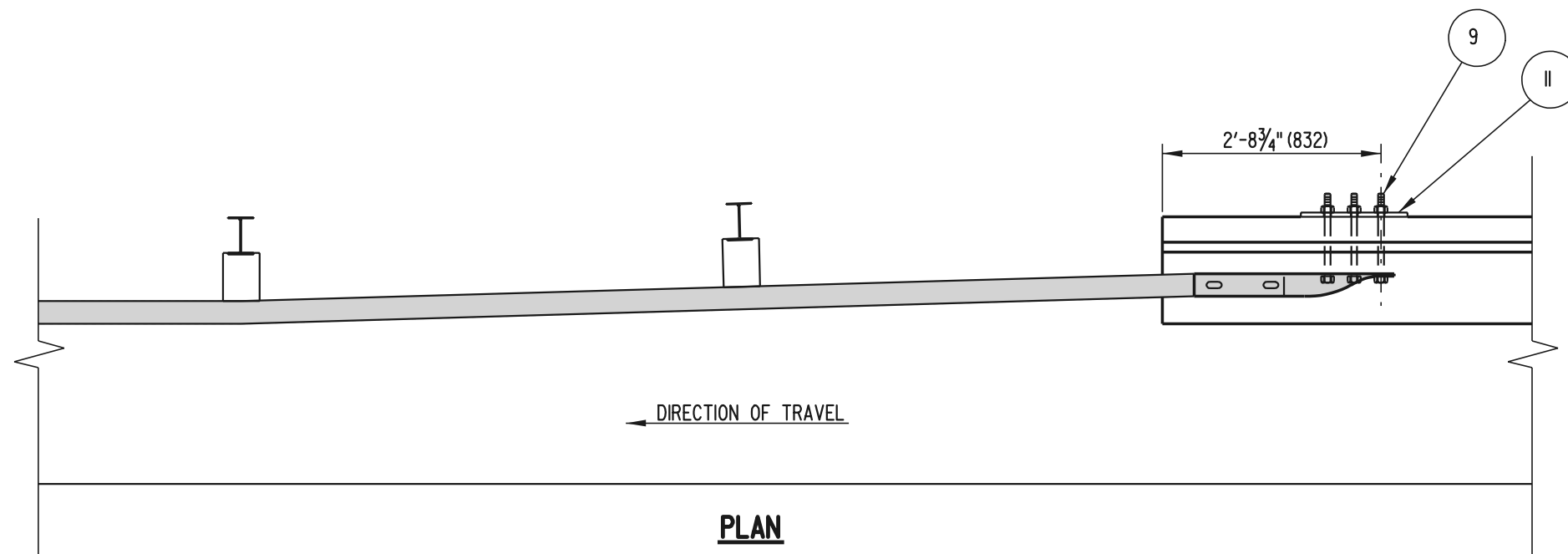
GUARDRAIL TO BARRIER CONNECTION, APPROACH TYPE 2

STANDARD NO. B-8 (2001)

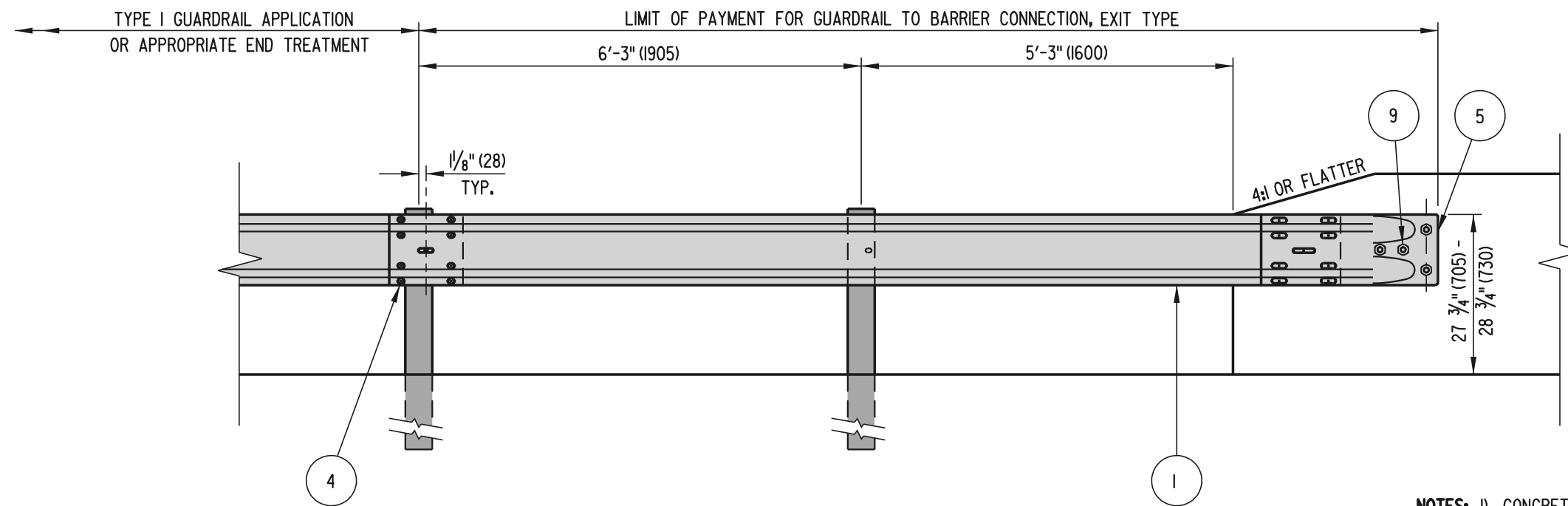
SHT. 2 OF 2

APPROVED *Ryan M. Harkins* 6/18/01
CHIEF ENGINEER DATE

RECOMMENDED *Michael P. Gotsch* 6/18/01
DESIGN ENGINEER DATE



PLAN



ELEVATION

- NOTES:**
- 1). CONCRETE INSERTS MAY BE USED IN NEW CONSTRUCTION TO ATTACH TERMINAL CONNECTOR TO PARAPET,
 - 2). GUARDRAIL SECTION AND TERMINAL CONNECTORS SHALL BE OVERLAPPED IN THE DIRECTION OF TRAVEL.
 - 3). INSTALLATION SHOWN ABOVE WITH AN 'F-TYPE' BARRIER FACE. GUARDRAIL SECTION OF BARRIER CONNECTION SHALL BE ADJUSTED HORIZONTALLY IN ORDER TO MEET FLUSH AGAINST VARIOUS TYPES OF WALLS AND BARRIERS.



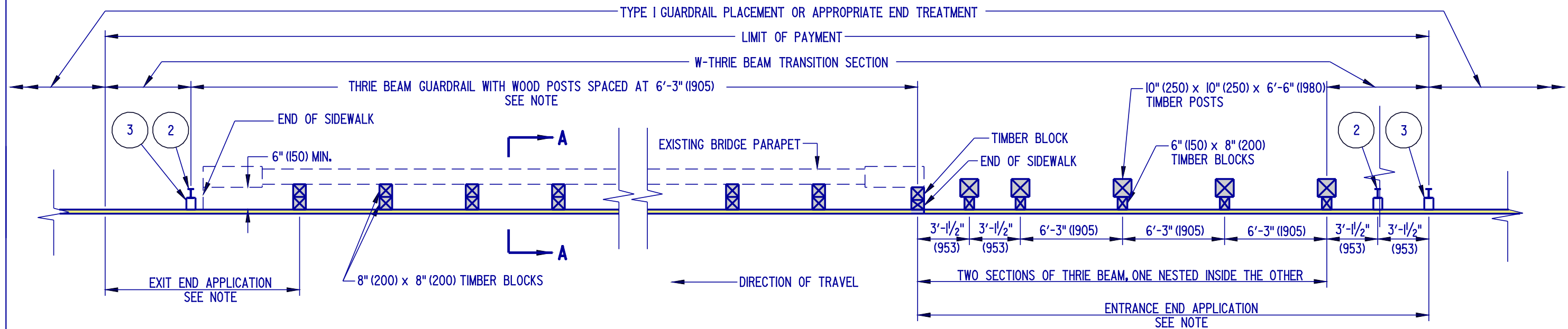
DELAWARE
DEPARTMENT OF TRANSPORTATION

GUARDRAIL TO BARRIER CONNECTION, EXIT TYPE

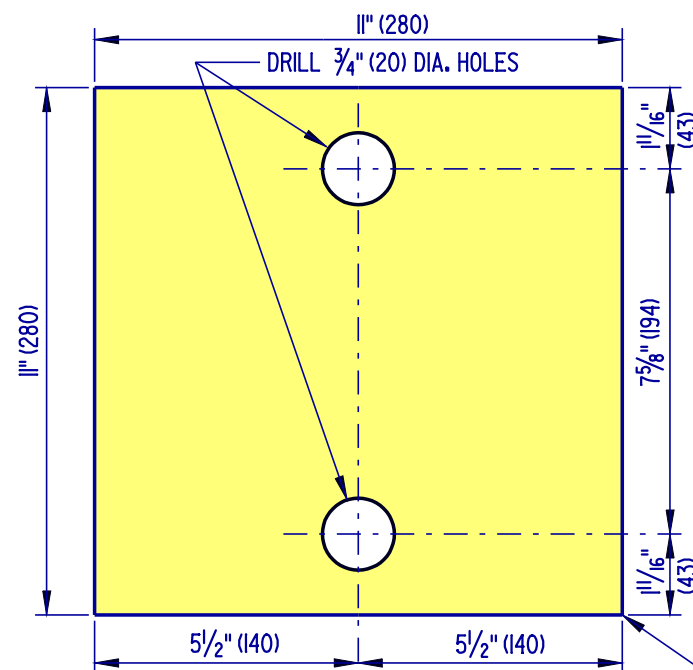
STANDARD NO. B-9 (2002)

SHT. 1 OF 1

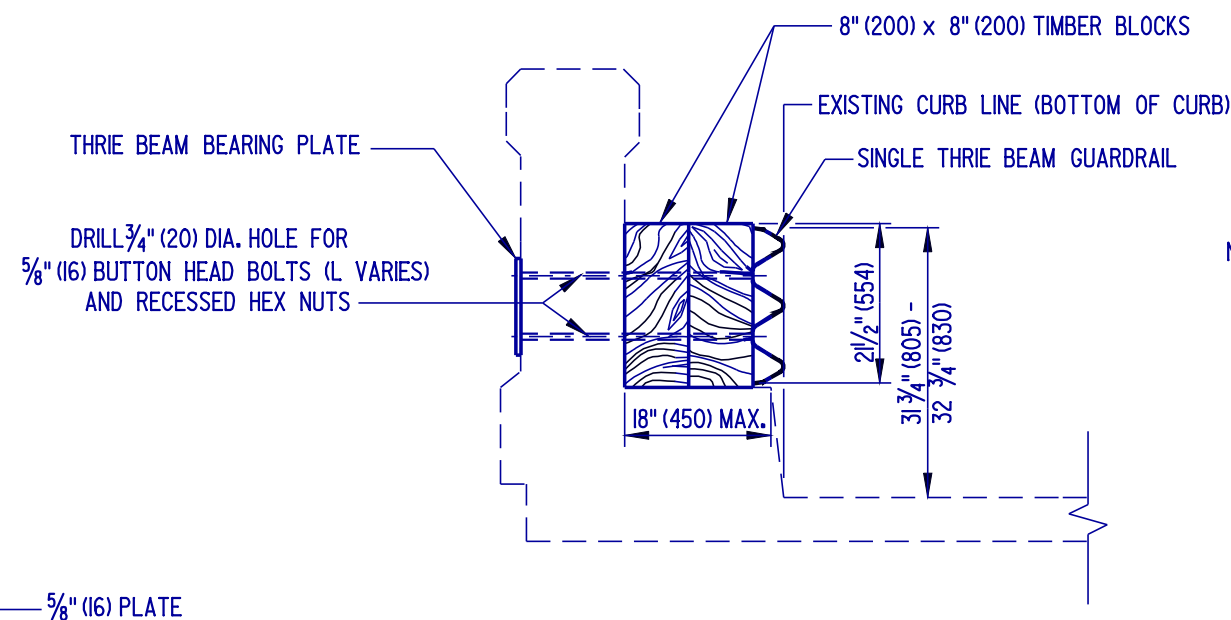
APPROVED *Caudam Wicks* 9/6/02
CHIEF ENGINEER DATE
RECOMMENDED *Theresa Delph* 8/19/02
DESIGN ENGINEER DATE



PLAN



THRIE BEAM BEARING PLATE DETAIL



SECTION A-A

- NOTES: 1). THIS INSTALLATION SHALL BE USED WHEN THE EXISTING SIDEWALK IS 18" (450) OR LESS.
- 2). USE A THRIE BEAM EXPANSION SECTION AT BRIDGE EXPANSION JOINTS.
- 3). PLACE GUARDRAIL REFLECTOR IN THE UPPER VALLEY OF THE THRIE BEAM EVERY FIFTH POST.
- 4). TIMBER BLOCK THICKNESS SHALL BE ADJUSTED TO ALLOW FACE OF THE THRIE BEAM TO BE FLUSH WITH BOTTOM OF CURB (MINIMUM THICKNESS SHALL BE 4" (100)).
- 5). THE EXIT END APPLICATION SHALL BE USED ONLY ON DIVIDED HIGHWAYS. FOR ALL OTHER SITUATIONS, THE ENTRANCE END APPLICATION SHALL BE USED ON BOTH ENDS OF THE BRIDGE PARAPET.
- 6). SPACING OF WOOD POSTS MAY NEED TO BE REDUCED TO ACCOMMODATE LINING UP POSTS AT THE END OF THE PARAPET.



DELAWARE
DEPARTMENT OF TRANSPORTATION

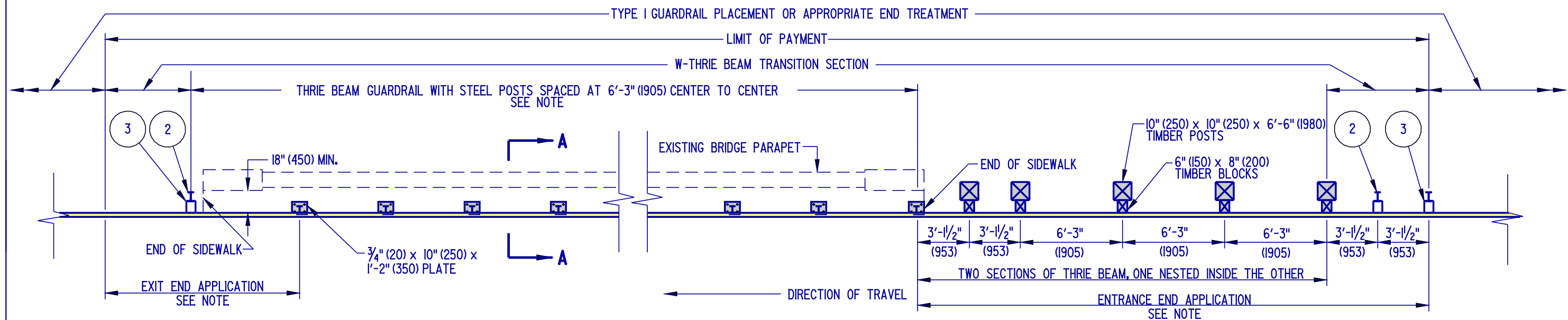
BRIDGE RAIL RETROFIT, TYPE 1

STANDARD NO. B-10 (2004)

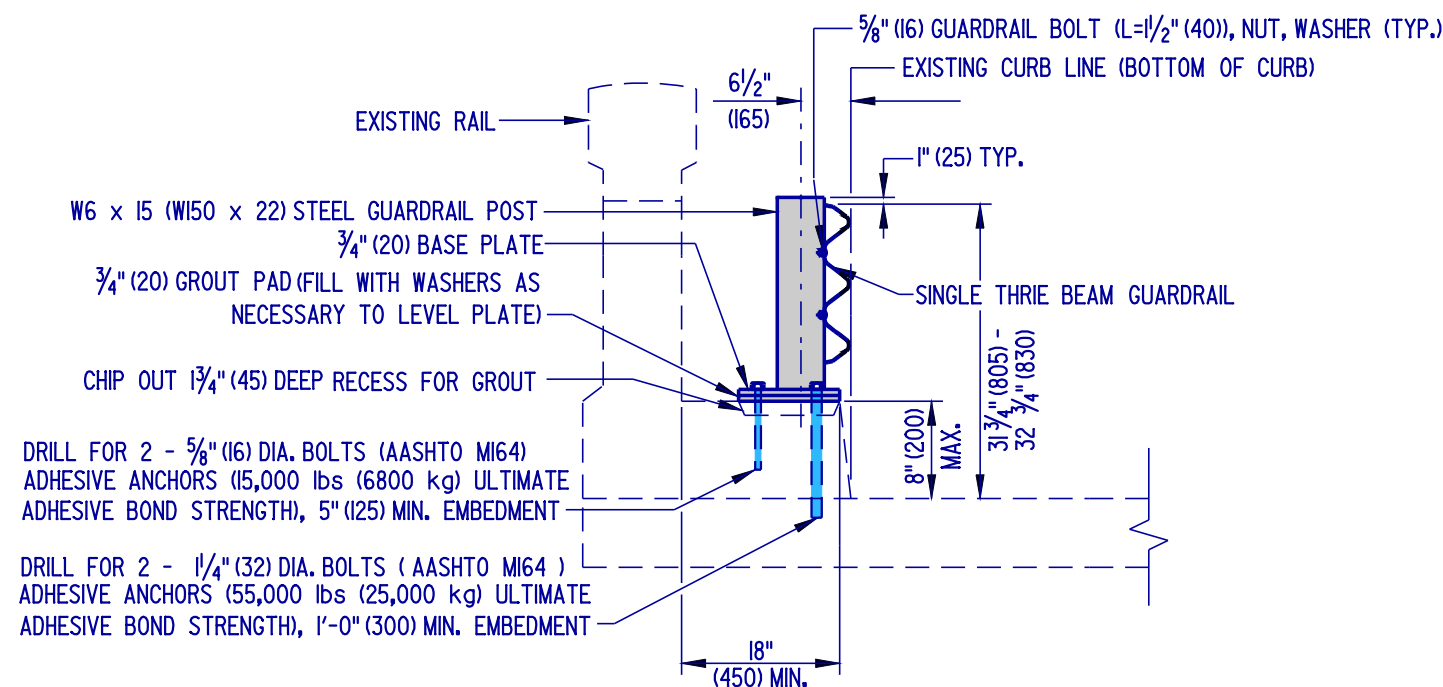
SHT. 1 OF 1

APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE

RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE



PLAN



SECTION A-A

- NOTES: 1). THIS INSTALLATION SHALL BE USED WHEN THE EXISTING SIDEWALK IS 18" (450) OR WIDER, AND DEAD LOAD CONSIDERATIONS ARE A CONCERN WHEN USING BRIDGE RAIL RETROFIT, TYPE 3.
- 2). ADHESIVE ANCHORS SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS AND SHALL BE GALVANIZED.
- 3). USE A THRIE BEAM EXPANSION SECTION AT BRIDGE EXPANSION JOINTS.
- 4). PLACE GUARDRAIL REFLECTOR IN THE UPPER VALLEY OF THE THRIE BEAM EVERY FIFTH POST.
- 5). THE EXIT END APPLICATION SHALL BE USED ONLY ON DIVIDED HIGHWAYS. FOR ALL OTHER SITUATIONS, THE ENTRANCE END APPLICATION SHALL BE USED ON BOTH ENDS OF THE BRIDGE PARAPET.
- 6). SPACING OF STEEL POSTS MAY NEED TO BE REDUCED TO ACCOMMODATE LINING UP POSTS AT THE END OF THE PARAPET.



DELAWARE
DEPARTMENT OF TRANSPORTATION

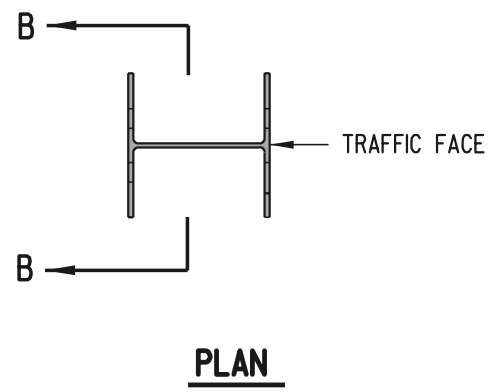
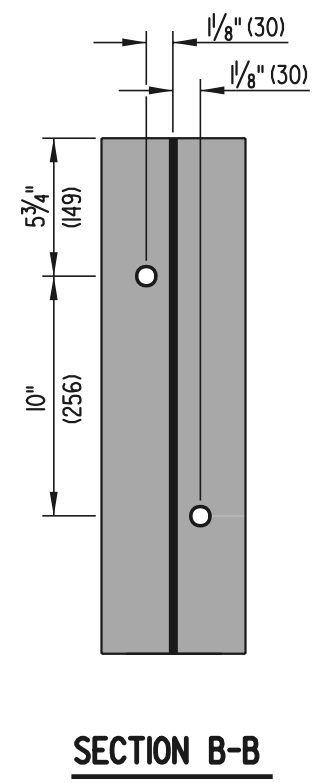
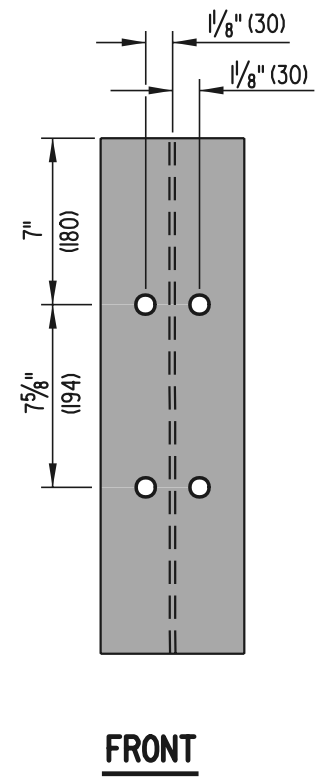
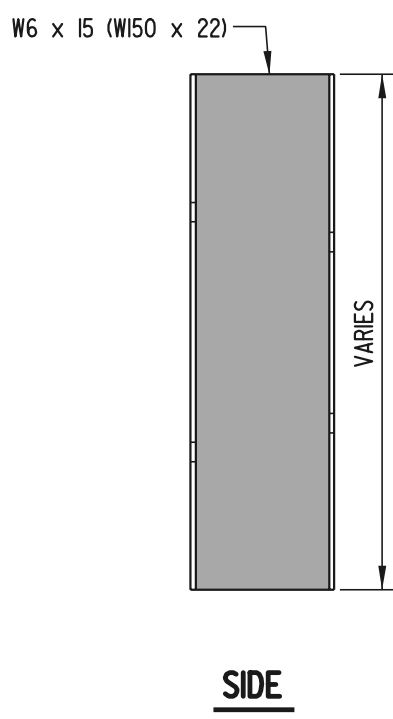
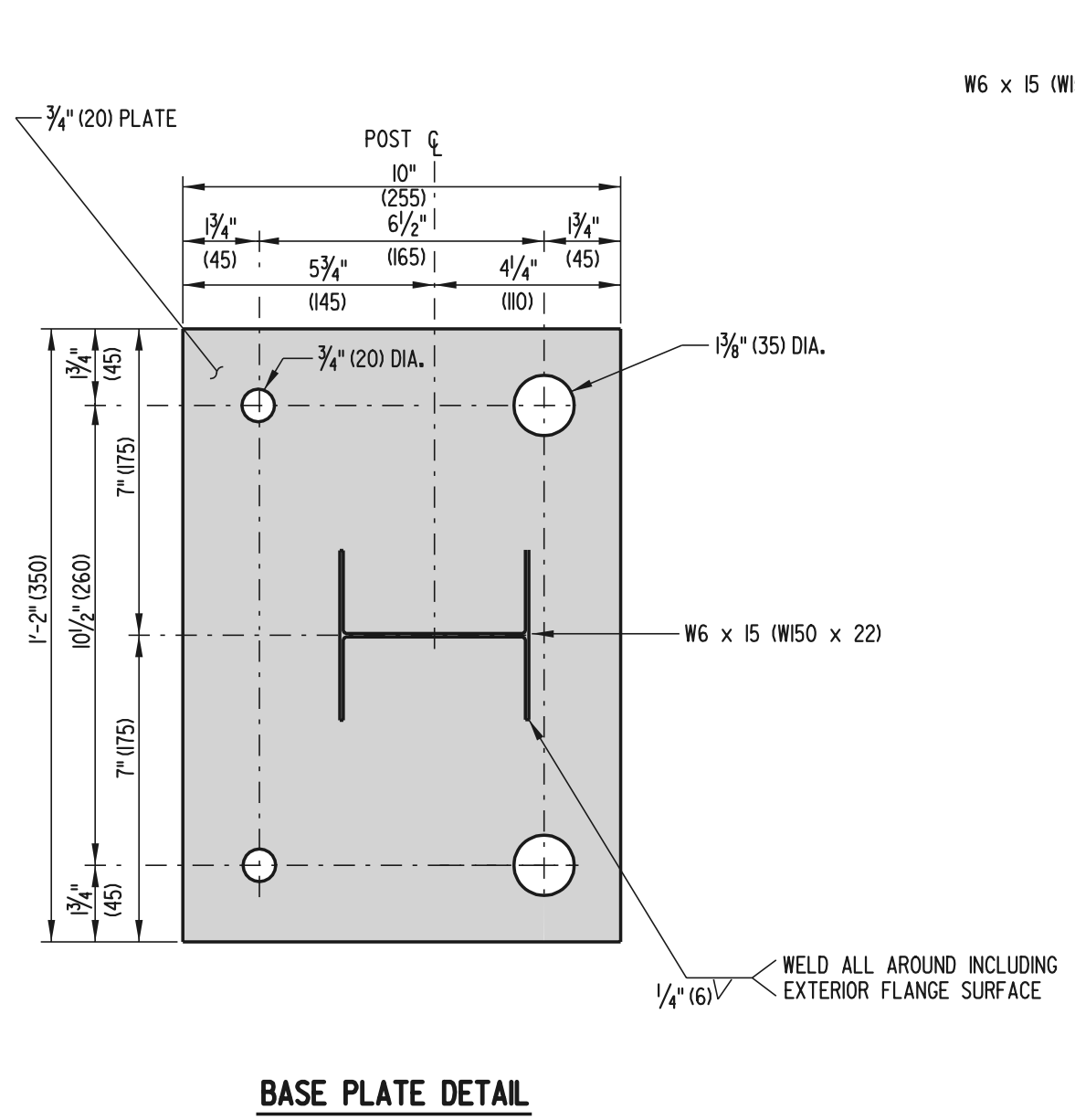
BRIDGE RAIL RETROFIT, TYPE 2

STANDARD NO. B-11 (2004)


SHT. 1 OF 4

APPROVED *Carolann Wicks* 1/10/05
CHIEF ENGINEER DATE

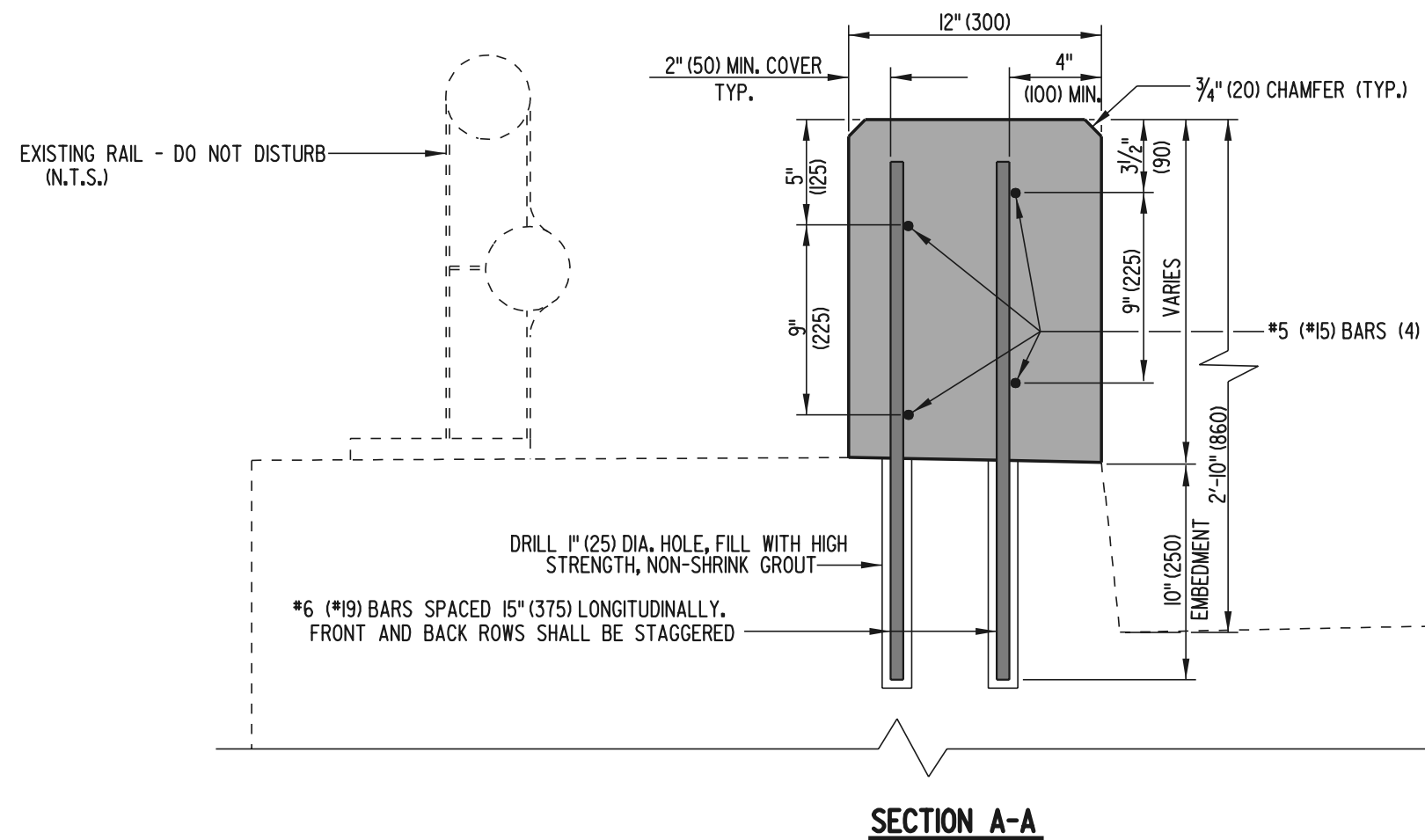
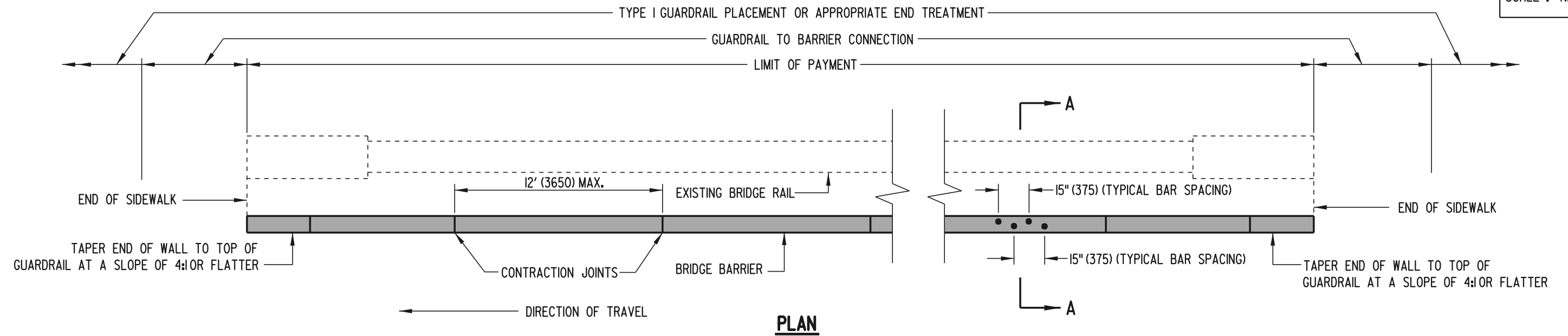
RECOMMENDED *Dennis M. O'Flaherty* 1/13/05
DESIGN ENGINEER DATE



W6 x 15 (W150 x 22) STEEL GUARDRAIL POST

 DELAWARE DEPARTMENT OF TRANSPORTATION	BRIDGE RAIL RETROFIT, TYPE 2			APPROVED <i>Ryan M. Harkins</i> 6/18/01 CHIEF ENGINEER DATE
	STANDARD NO. B-11 (2001)	SHT. 2	OF 2	RECOMMENDED <i>Michael P. Gotsch</i> 6/18/01 DESIGN ENGINEER DATE

SCALE : N.T.S.



NOTE: STANDARD GUARDRAIL TO BARRIER CONNECTIONS SHALL BE CONNECTED TO THE ENDS OF THE NEW BRIDGE BARRIER AND TRANSITIONED TO THE EXISTING GUARDRAIL.



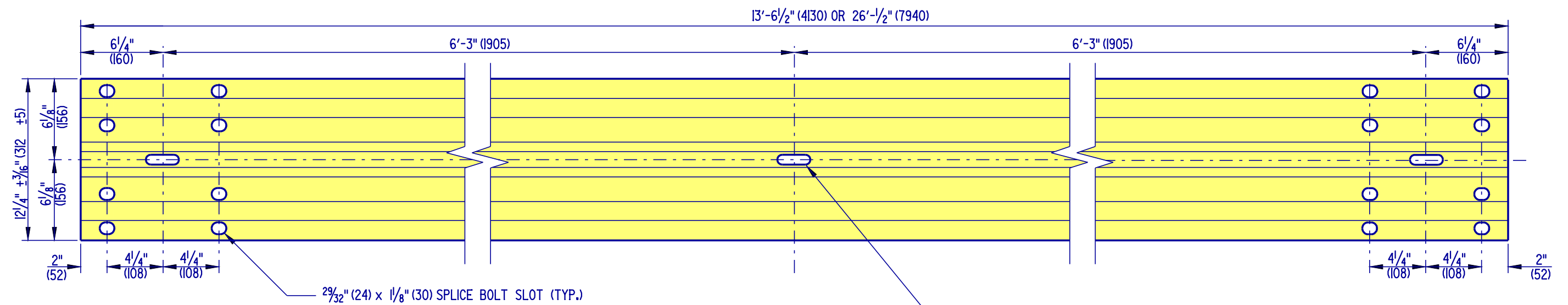
DELAWARE
DEPARTMENT OF TRANSPORTATION

BRIDGE RAIL RETROFIT, TYPE 3

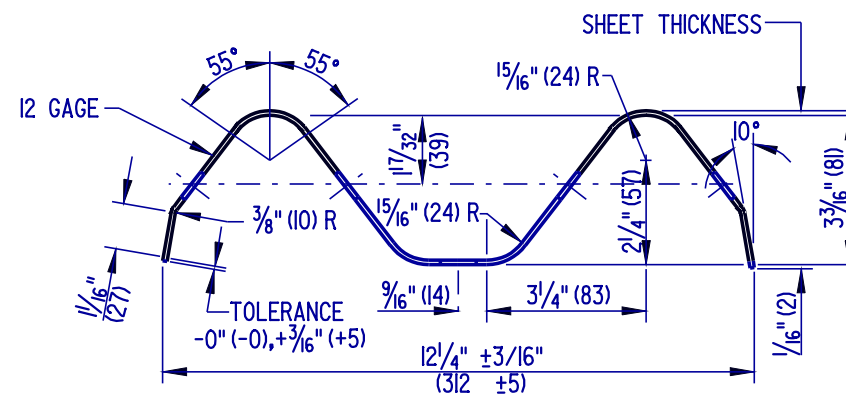
STANDARD NO. B-12 (2001)

SHT. 1 OF 1

APPROVED *Ryan M. Harkness* 6/18/01
CHIEF ENGINEER DATE
RECOMMENDED *Mehal P. Goh* 6/18/01
DESIGN ENGINEER DATE



W-BEAM ELEVATION



W-BEAM SECTION

NOTES: 1). TWO ADDITIONAL 3/4" (20) x 2 1/2" (65) SLOTS SHALL BE PROVIDED AT 6'-3" (1905) SPACING FOR BEAM LENGTH OF 26'-1 1/2" (7940).



DELAWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE

STANDARD NO. B-13 (2004)

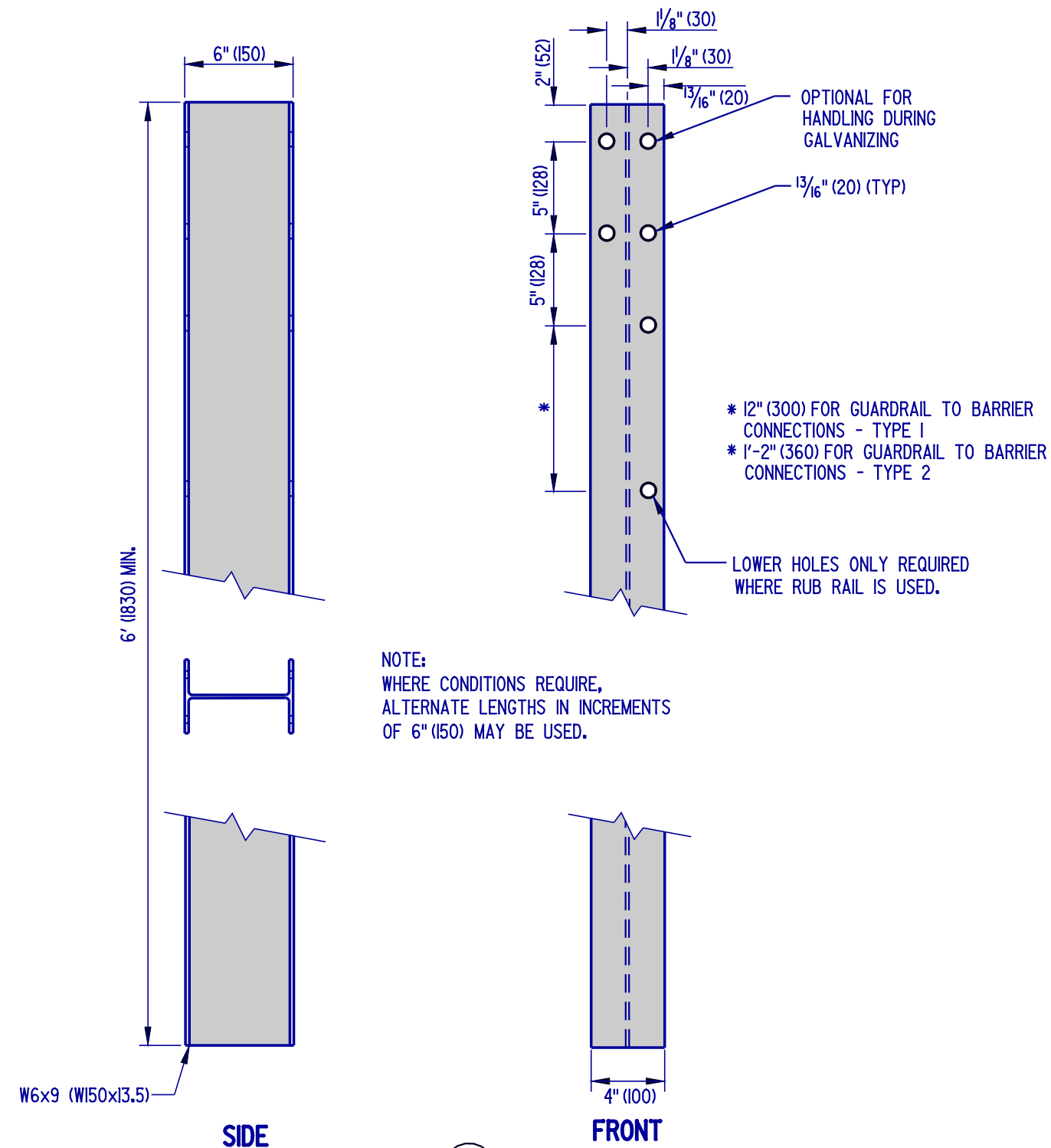
SHT. 1 OF 13

APPROVED

Carolann Wicks
CHIEF ENGINEER
DATE 1/10/05

RECOMMENDED

Dennis M. O'Flaherty
DESIGN ENGINEER
DATE 1/13/05



OFFSET BLOCK

3

NOTE : ALL HOLES SHALL BE 13/16" (20) DIA. BOLT
HOLE PATTERN IS SYMMETRICAL WITH RESPECT
TO THE VERTICAL AXIS OF THE POST.



DELAWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE

STANDARD NO. B-13 (2004)

SHT. 2 OF 13

APPROVED

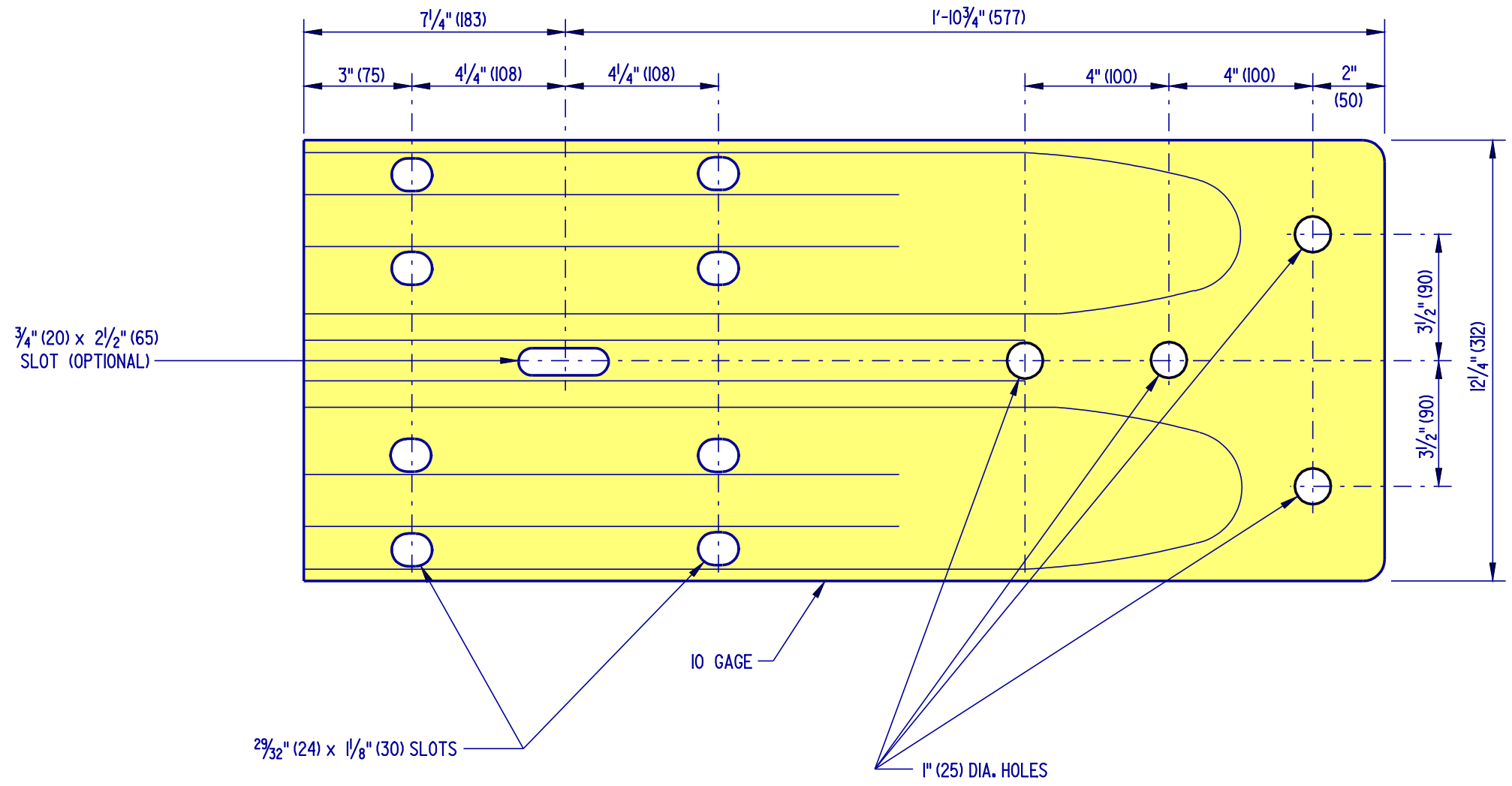
Carolann Wicks
CHIEF ENGINEER

1/10/05
DATE

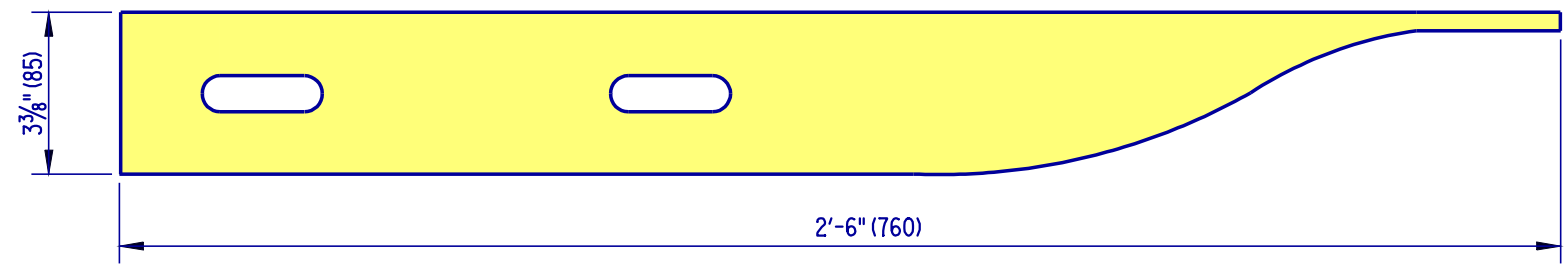
RECOMMENDED

Dennis M. O'Flaherty
DESIGN ENGINEER

1/13/05
DATE



ELEVATION

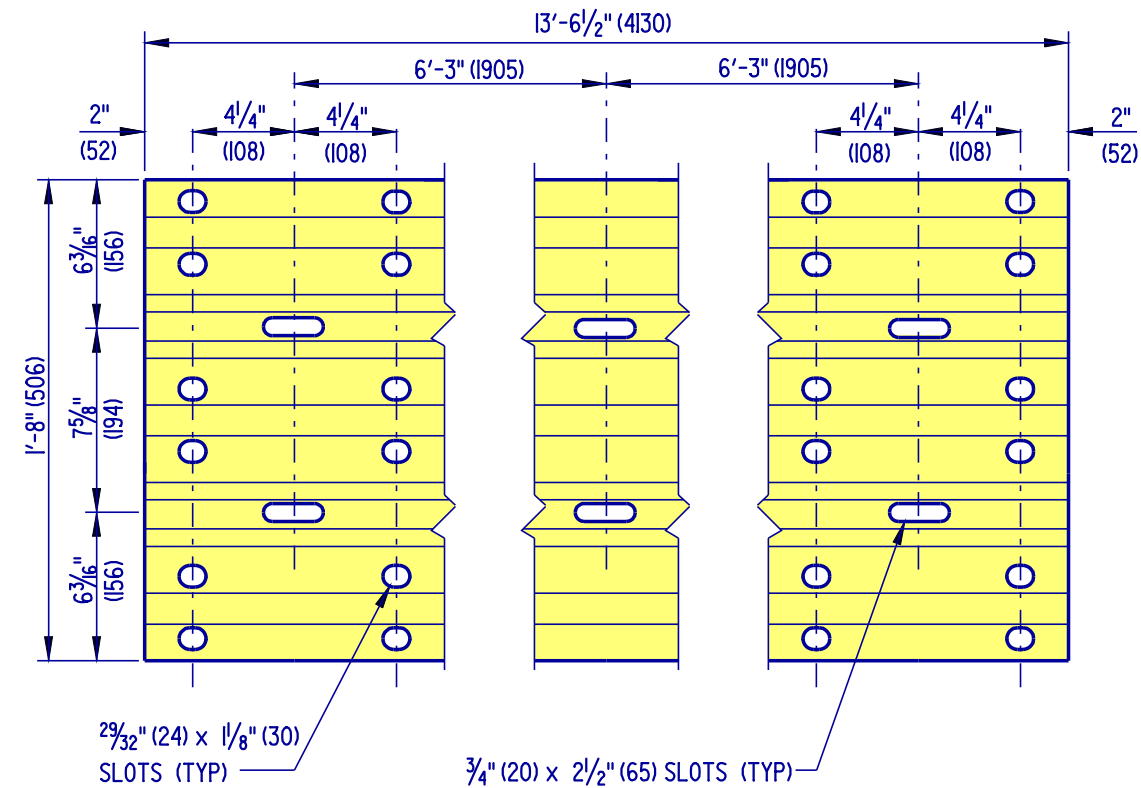


PLAN

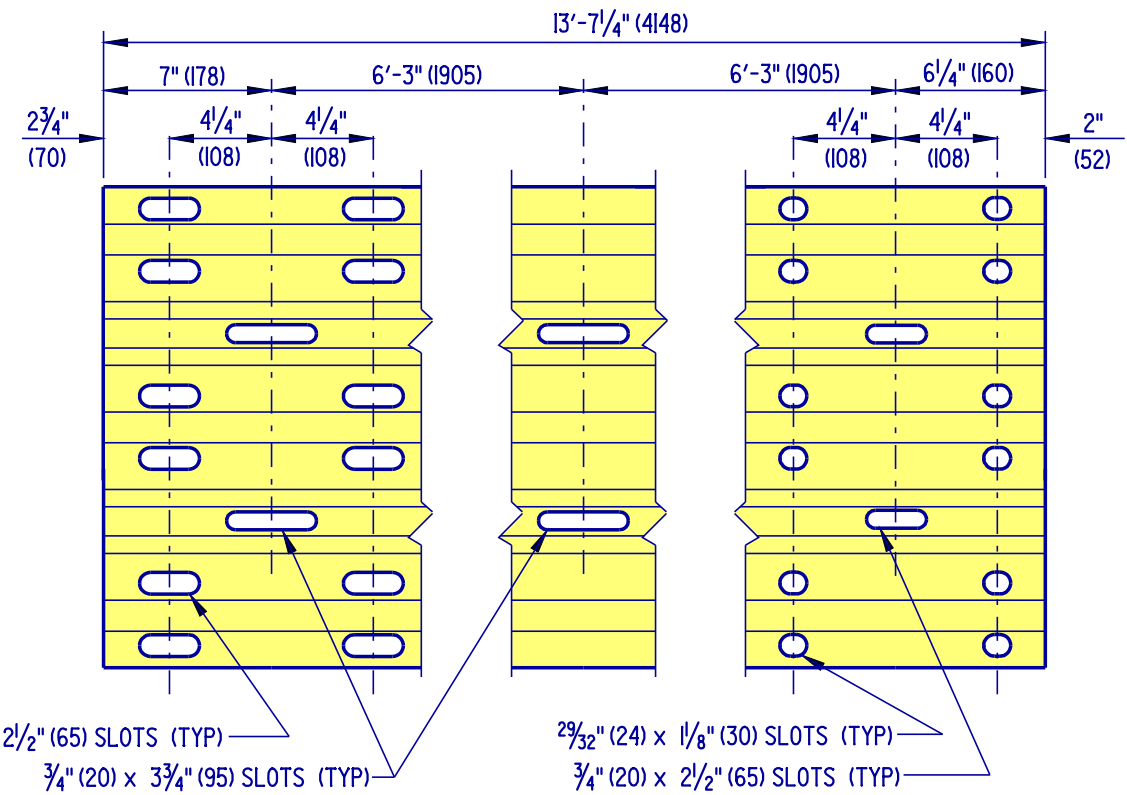
W-BEAM TERMINAL CONNECTOR

5

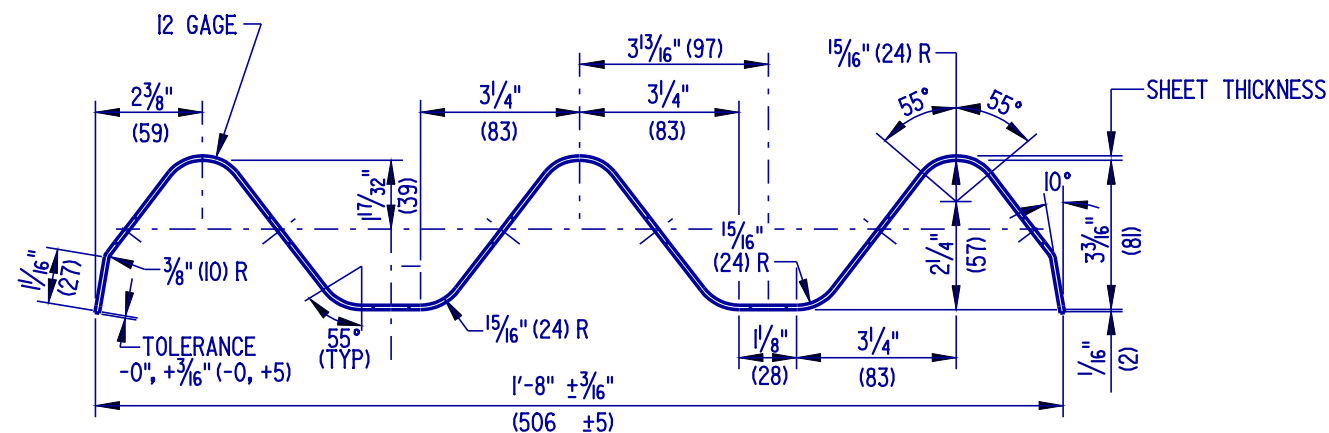
 DELAWARE DEPARTMENT OF TRANSPORTATION	HARDWARE			APPROVED <i>Carolann Wicks</i> 1/10/05 CHIEF ENGINEER DATE
	STANDARD NO. B-13 (2004)	SHT. 3	OF 13	RECOMMENDED <i>Dennis M. O'Flaherty</i> 1/3/05 DESIGN ENGINEER DATE



THRIE BEAM ELEVATION



THRIE BEAM EXPANSION ELEMENT



THRIE BEAM SECTION



DELAWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE

STANDARD NO. B-13 (2004)

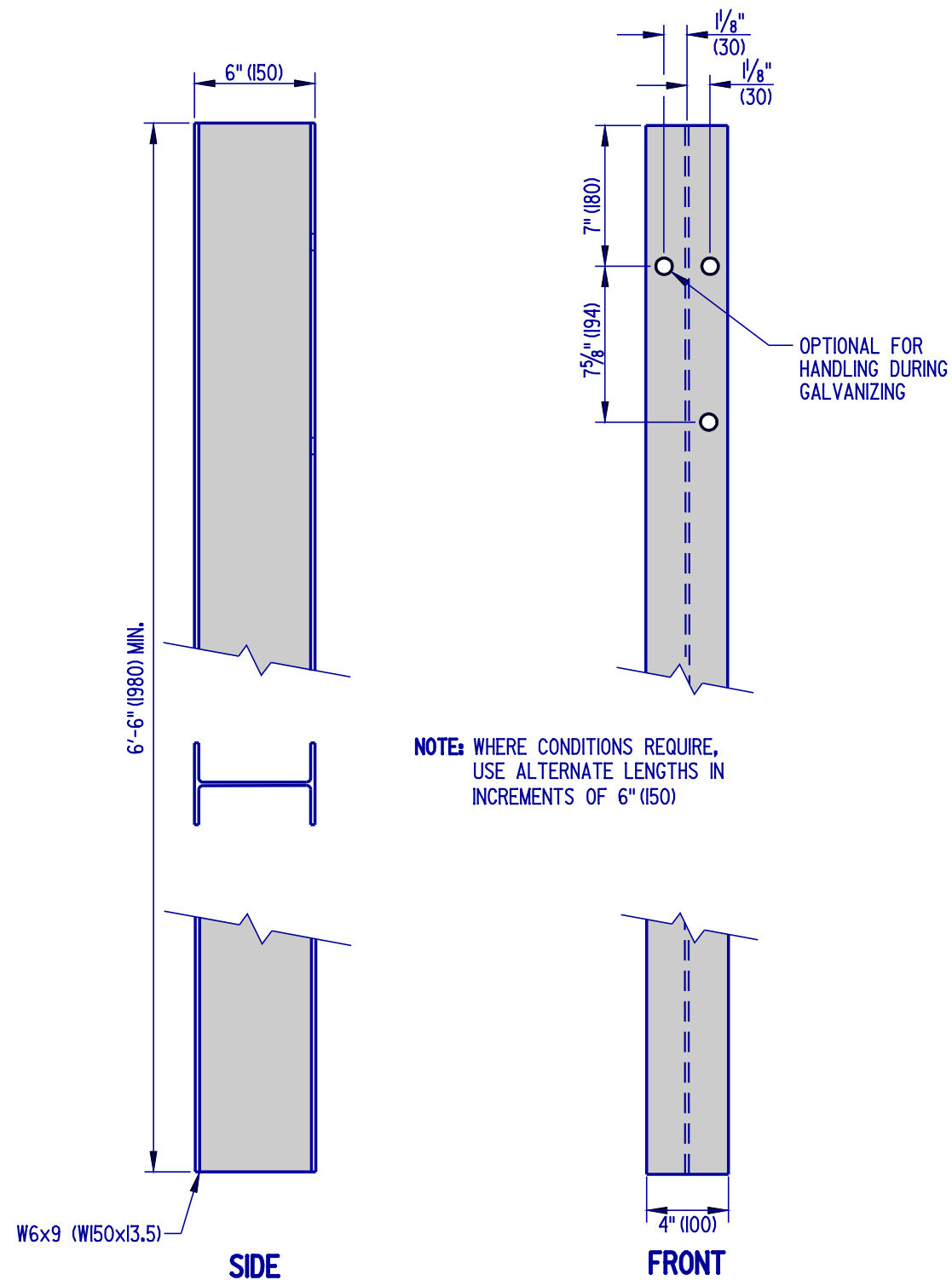
SHT. 4 OF 13

APPROVED

Carolann Wicks 1/10/05
CHIEF ENGINEER DATE

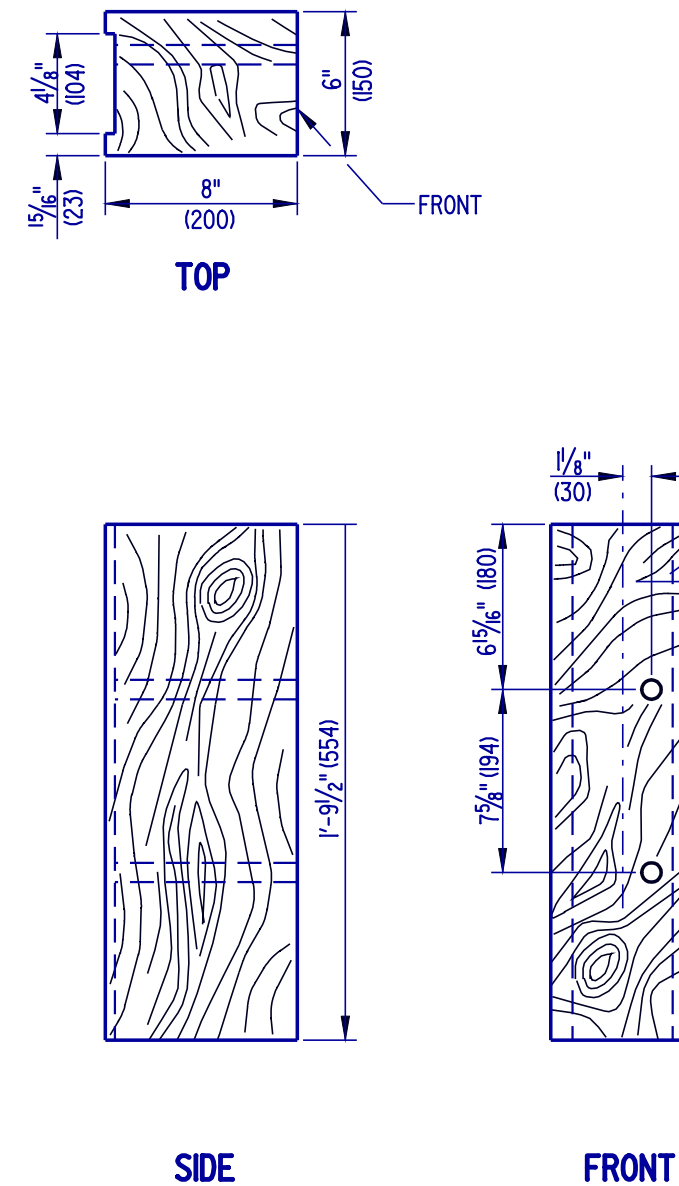
RECOMMENDED

Dennis M. O'Flaherty 1/13/05
DESIGN ENGINEER DATE



POST 2

THRIE BEAM STEEL POST AND WOOD OFFSET BLOCK



OFFSET BLOCK

3

NOTE :
ALL HOLES SHALL BE 13/16" (20) DIA. BOLT HOLE
PATTERN IS SYMMETRICAL WITH RESPECT TO THE
VERTICAL AXIS OF THE POST.



DELAWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE

STANDARD NO. B-13 (2004)

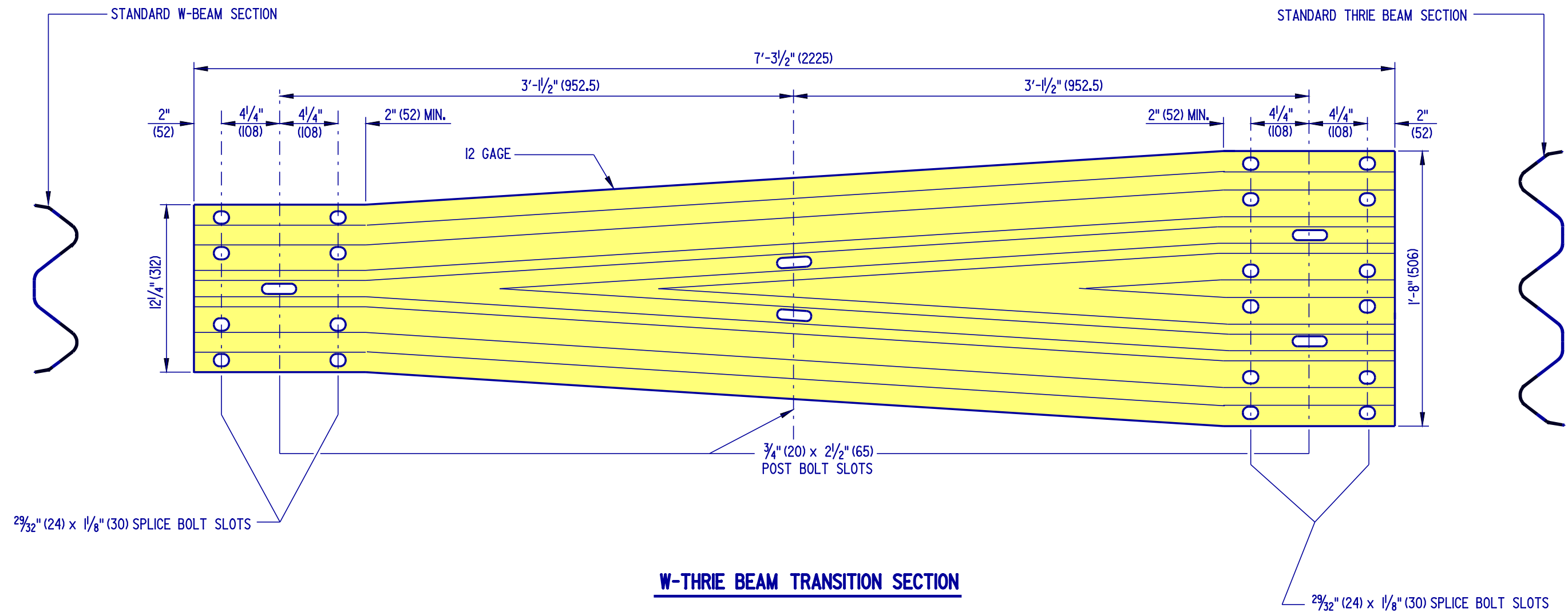
SHT. 5 OF 13

APPROVED

Carolann Wicks 1/10/05
CHIEF ENGINEER DATE

RECOMMENDED

Dennis M. O'Flaherty 1/13/05
DESIGN ENGINEER DATE



DELAWARE
DEPARTMENT OF TRANSPORTATION

HARDWARE

STANDARD NO. B-13 (2004)

SHT. 6 OF 13

APPROVED

Carolann Wicks
CHIEF ENGINEER
DATE 1/10/05

RECOMMENDED

Dennis M. O'Flaherty
DESIGN ENGINEER
DATE 1/3/05