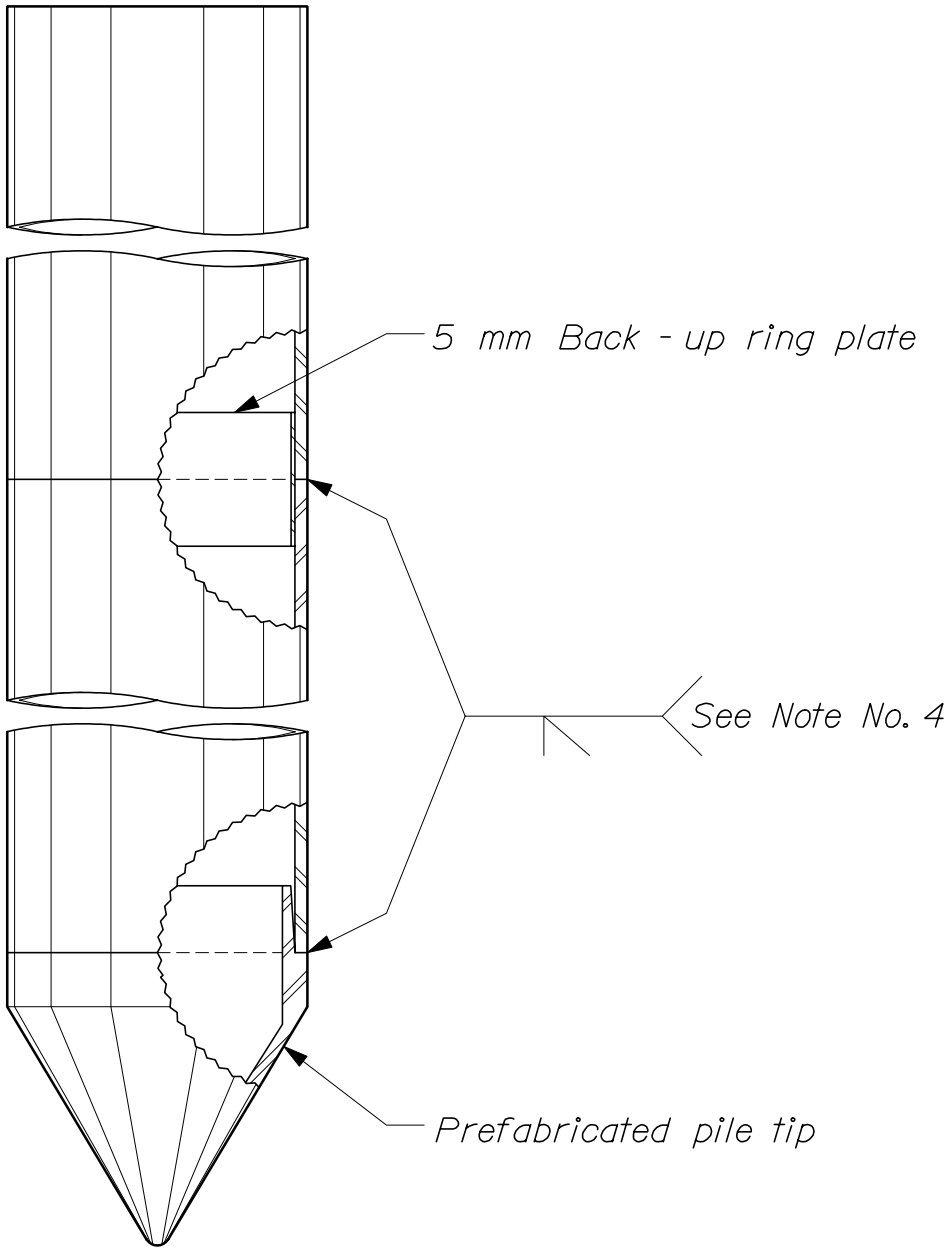
STATE OF MAINE

Department of Transportation

Standard Details

Revision of December 2002

DIVISION 500
STRUCTURES



-- PIPE PILE DETAIL --

NOTES:

1. Pile diameter and wall thickness shall be as indicated on the Design Drawings.

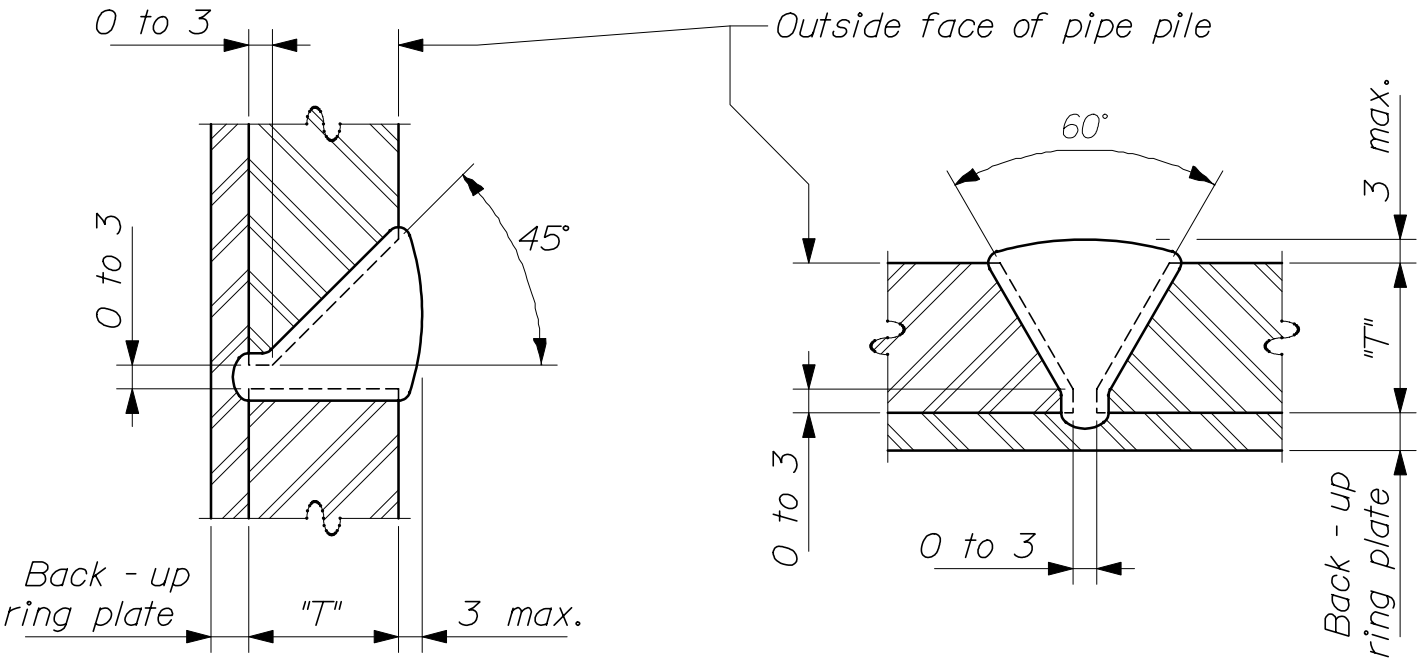
2. Pile tips shall be prefabricated cast steel tips with 60° conical points and internal flanges. Pile tips shall be approved by the Engineer.

3. Prefabricated internal splicer sleeves may be used if approved by the Engineer.

4. Refer to "Pipe Pile Splice" details for welding procedures.

PIPE PILES

501(01)



-- VERTICAL POSTION --

-- HORIZONTAL POSITION --

TABLE OF WELD SIZES	
Base Metal Thickness "T" (mm)	Minimum Number of Passes
10, 11	3
13, 14, 16	4
17, 19, 21	5

NOTES:

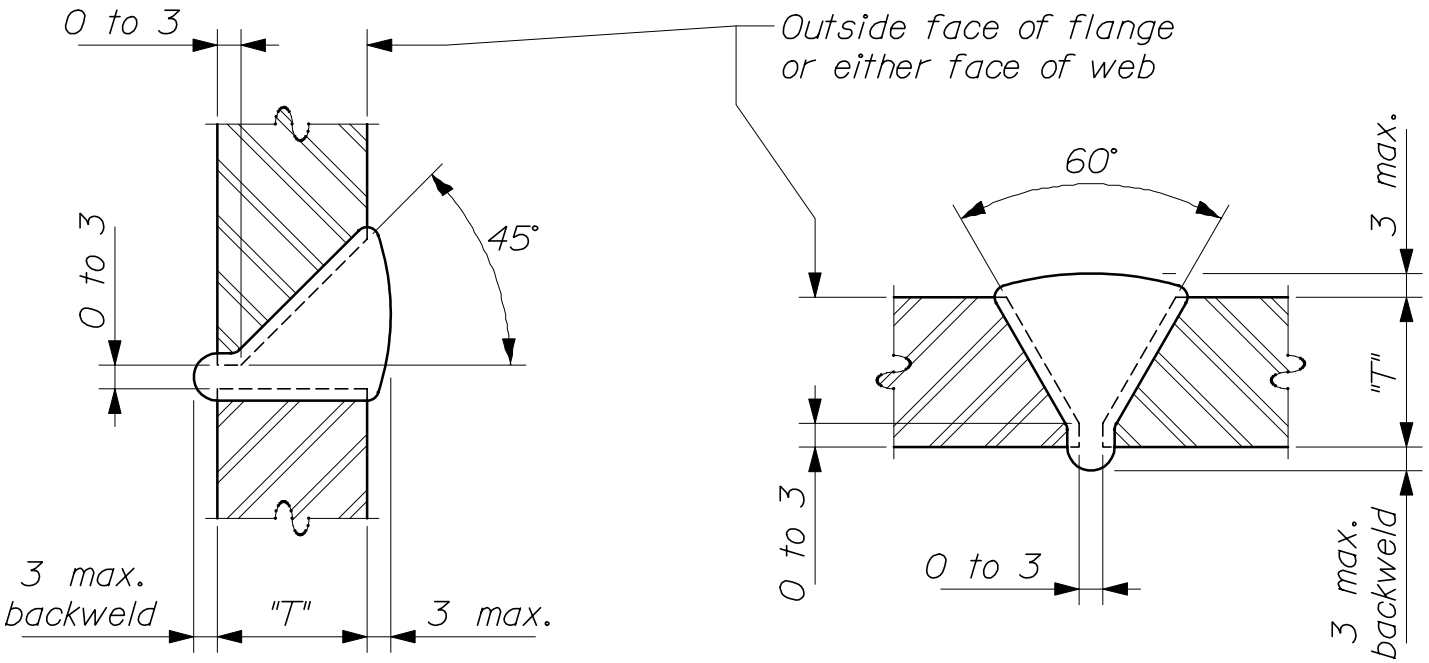
1. All cutting shall be done with the use of a mechanical guide.

2. Use Manual Shielded - Arc Process and 6010 or 6011 electrodes, unless a different process has been approved by the Engineer.

3. Electrodes shall be dry when used, in accordance with A.W.S. Specification D1.5, as amended by AASHTO.

PIPE PILE SPLICE

501(02)



-- VERTICAL POSTION --

-- HORIZONTAL POSITION --

TABLE OF WELD SIZES	
Base Metal Thickness "T" (mm)	Minimum Number of Passes
10, 11	3
13, 14, 16	4
17, 19, 21	5

NOTES:

1. All cutting shall be done with the use of a mechanical guide.

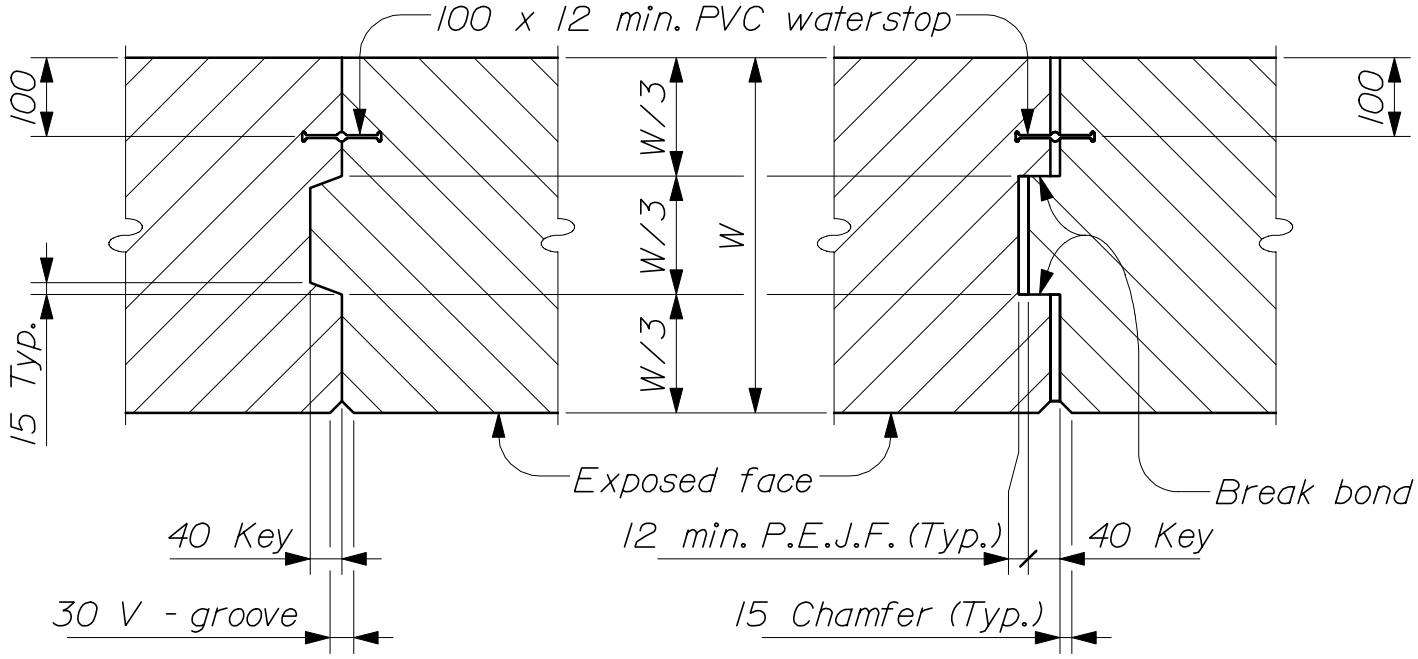
2. Use Manual Shielded - Arc Process and 6010 or 6011 electrodes, unless a different process has been approved by the Engineer.

3. Electrodes shall be dry when used, in accordance with A.W.S. Specification D1.5, as amended by AASHTO.

4. Gouge root before welding the second side.

H - PILE SPLICE

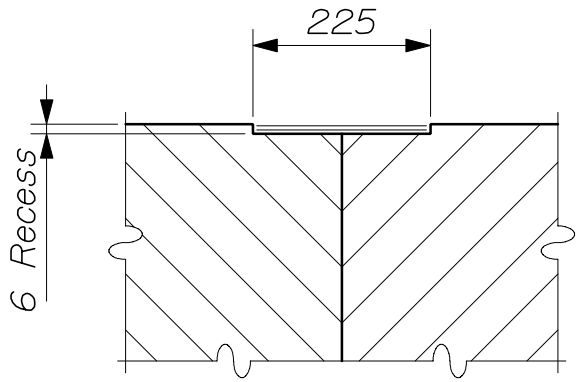
501(03)



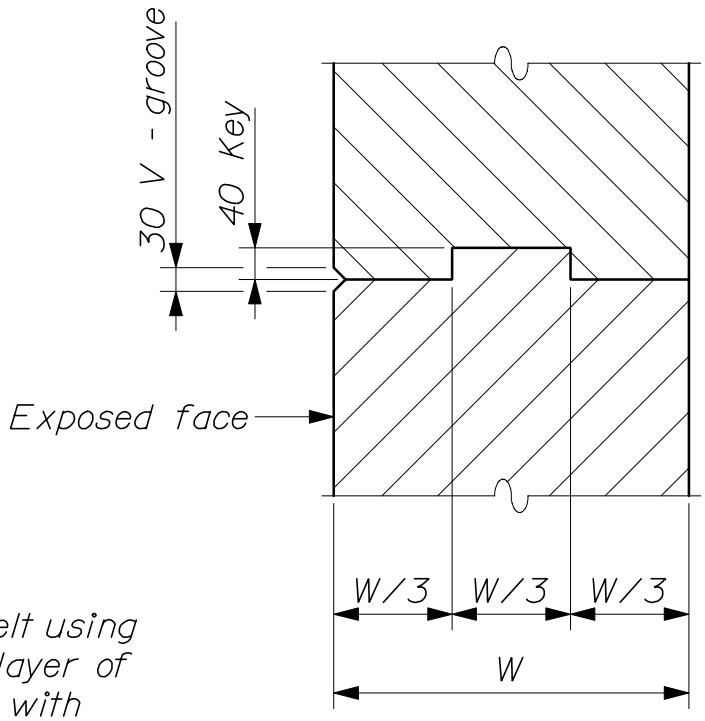
-- VERTICAL CONSTRUCTION OR CONTRACTION JOINT --

-- VERTICAL EXPANSION JOINT --

P.E.J.F = Preformed Expansion Joint Filler



-- JOINT COVER --

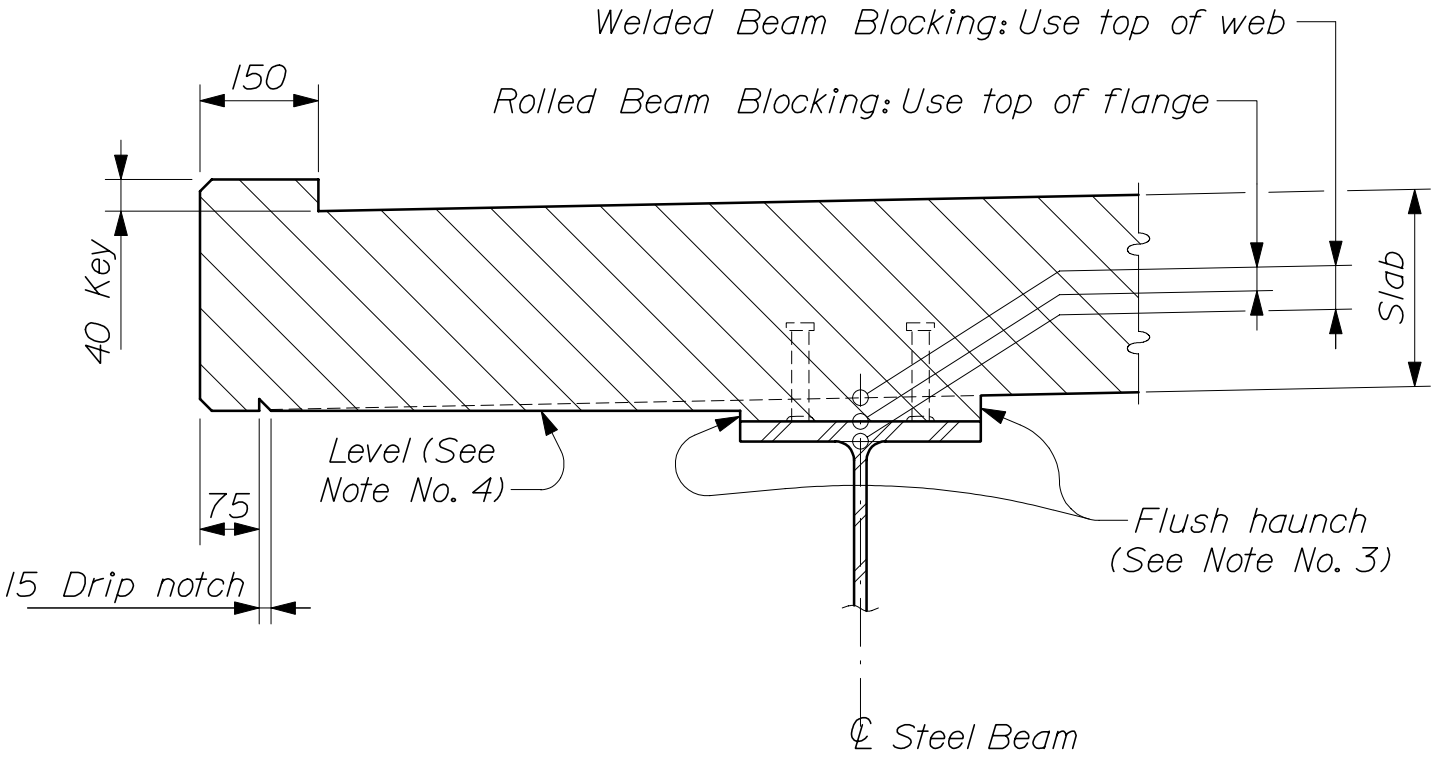


-- HORIZONTAL CONSTRUCTION JOINT --

Apply two (2) layers of heavy roofing felt using plastic roofing cement, or apply one (1) layer of membrane waterproofing in accordance with Section 508 of the Standard Specifications. Recess the covered area unless otherwise indicated. To be used on vertical joints where PVC waterstops cannot be used and on Horiz. joints where there is potential leakage thru wall.

CONCRETE JOINTS

502(01)



-- SLAB DETAILS --

NOTES:

1. Shear key and drip notch details are typical for all superstructure designs.

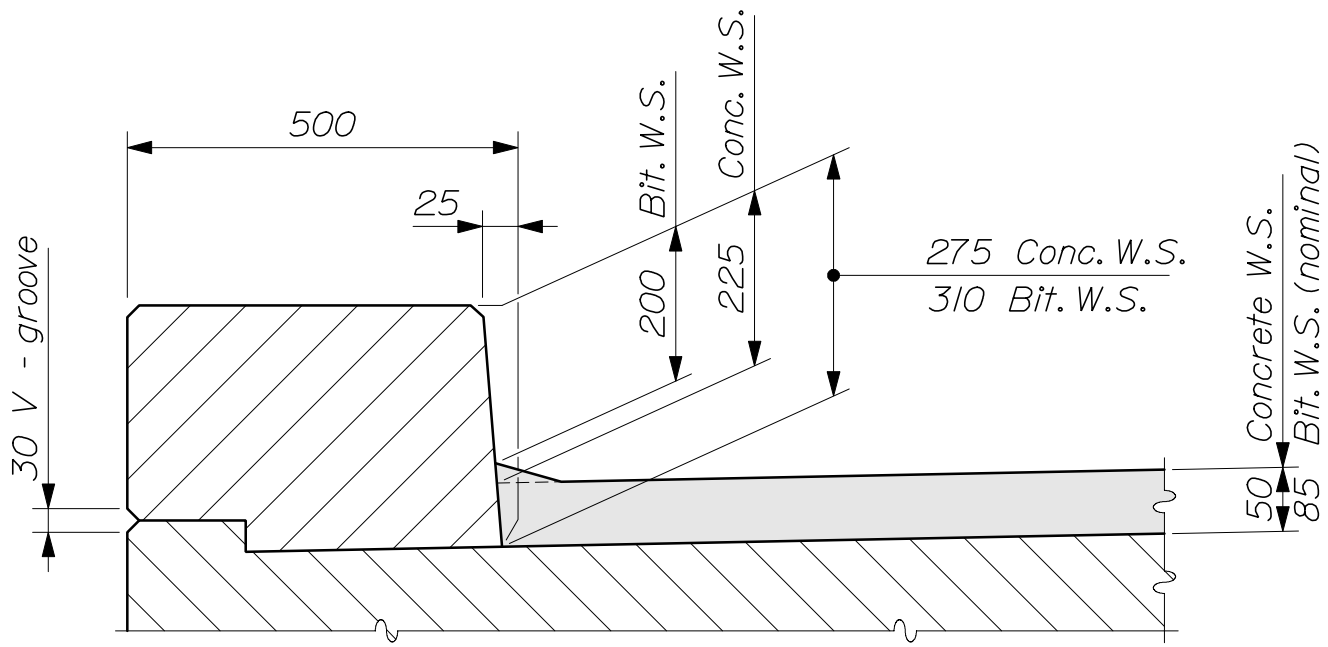
2. Blocking dimensions for construction shall be determined using the "Bottom of Slab Elevations" table shown on the Design Drawings. Theoretical Blocking will be given for reference purposes only. Do not use Theoretical Blocking for setting formwork.

3. Blocking on all beams shall be formed using the flush haunch detail shown.

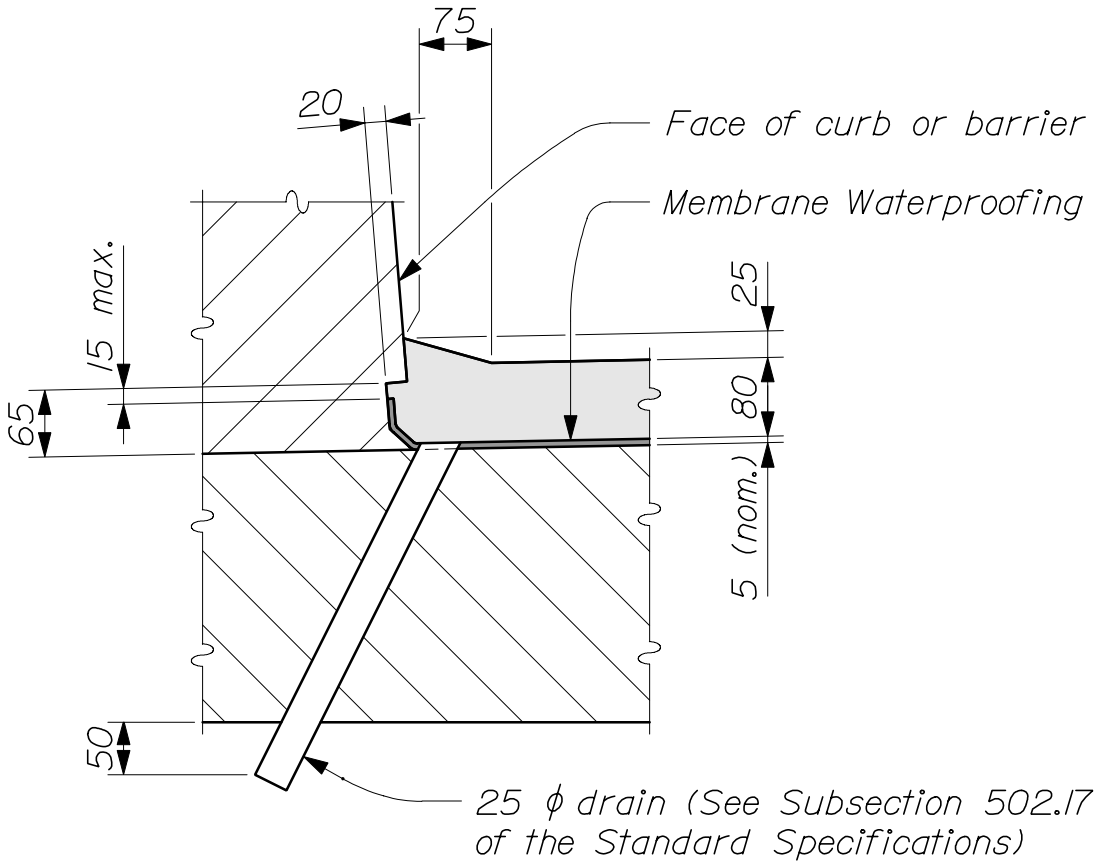
4. On curved superelevated structures, where the distance between the exterior beam and the fascia varies over the length of the deck, the bottom of the slab overhang shall follow the superelevation cross - slope.

COMPOSITE CONCRETE SUPERSTRUCTURE SLAB

502(02)



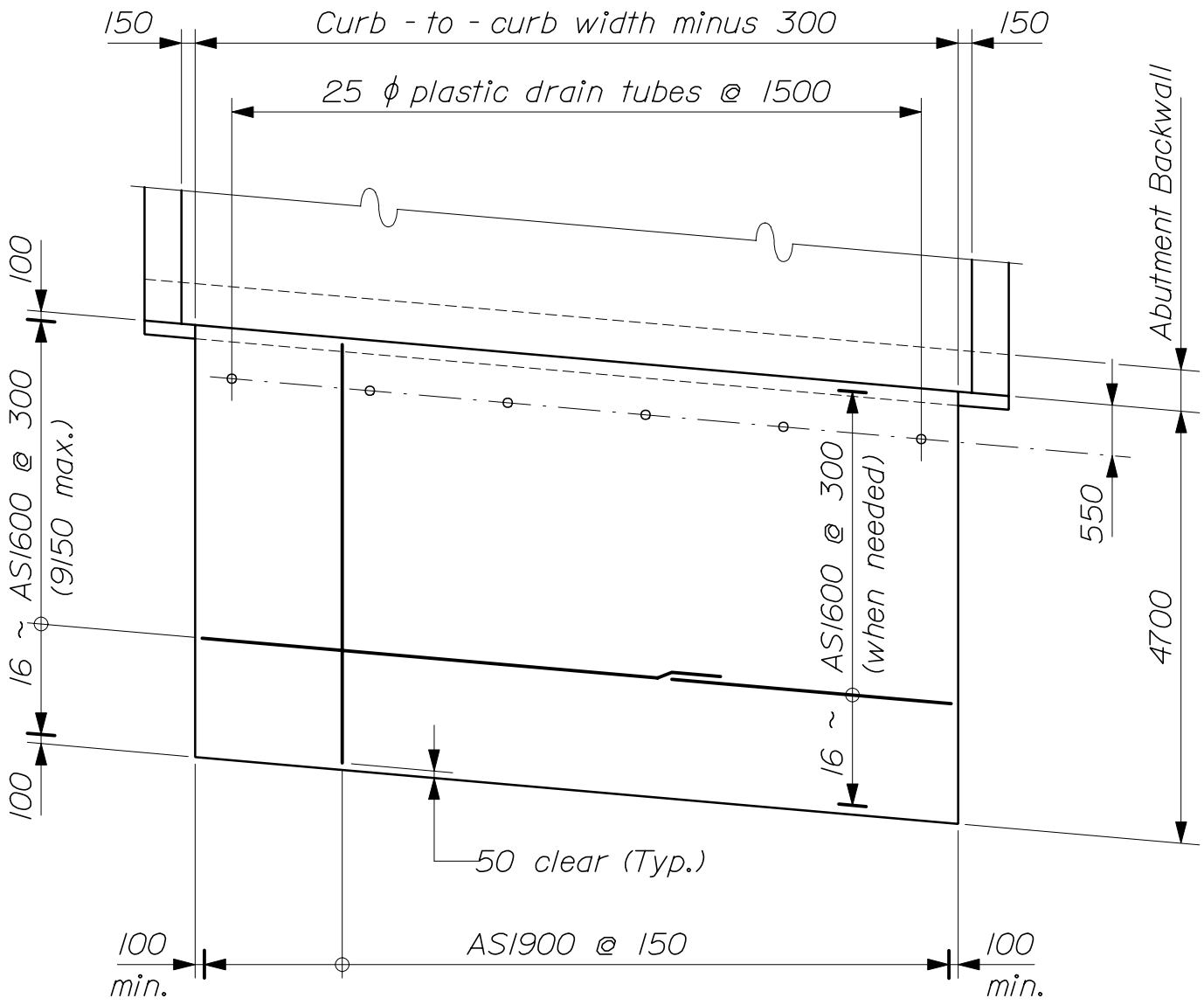
-- CONCRETE CURB WITH WEARING SURFACE --



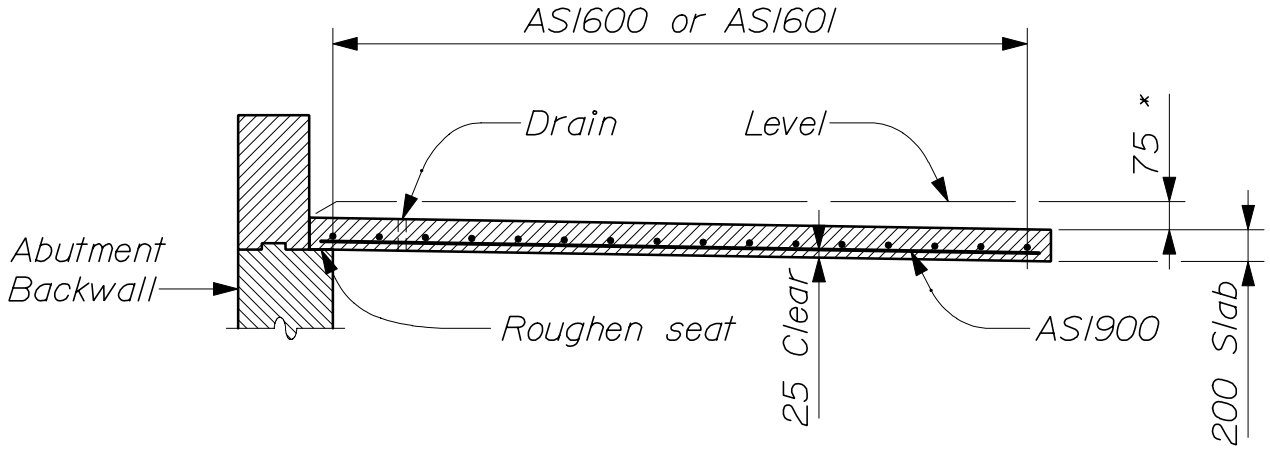
-- BITUMINOUS WEARING SURFACE DETAILS --

CONCRETE CURB WITH WEARING SURFACES

502(03)



-- PLAN --

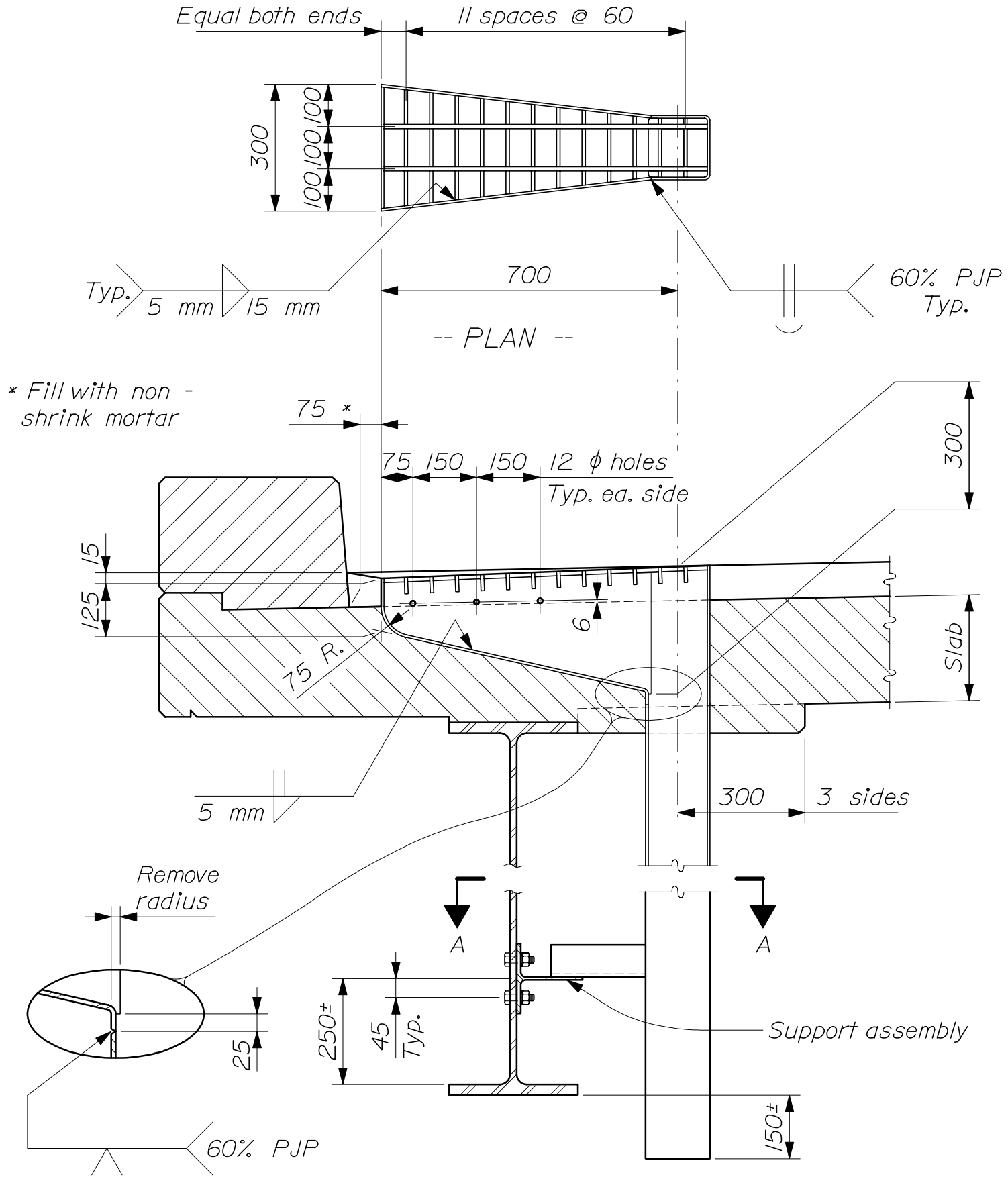


* or match roadway grade, whichever is greater

-- SECTION --

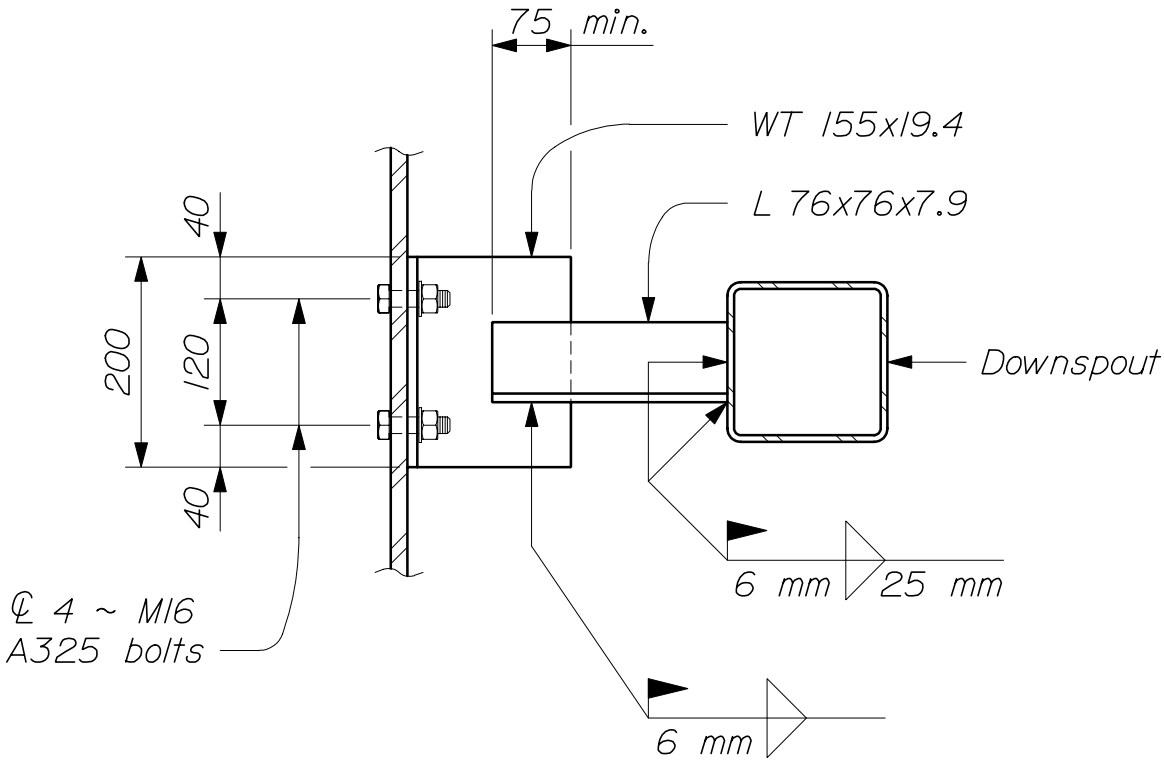
CONCRETE APPROACH SLAB

502(04)



STANDARD BRIDGE DRAIN

502(05)



-- SECTION A - A --

NOTES:

1. All plates shall be 6 mm thick and shall conform to AASHTO M183M/M183 (ASTM A 36/ A36M).

2. The downspout shall be a TS 152x152x6.4 conforming to ASTM A500.

3. At the option of the Contractor, a 150 mm ϕ Schedule 40 steel pipe may be substituted for the TS 152x152x6.4 downspout.

4. Grating shall be a commercial heavy - duty grating with 38 x 8 mm bearing bars and 10 mm ϕ cross bars.

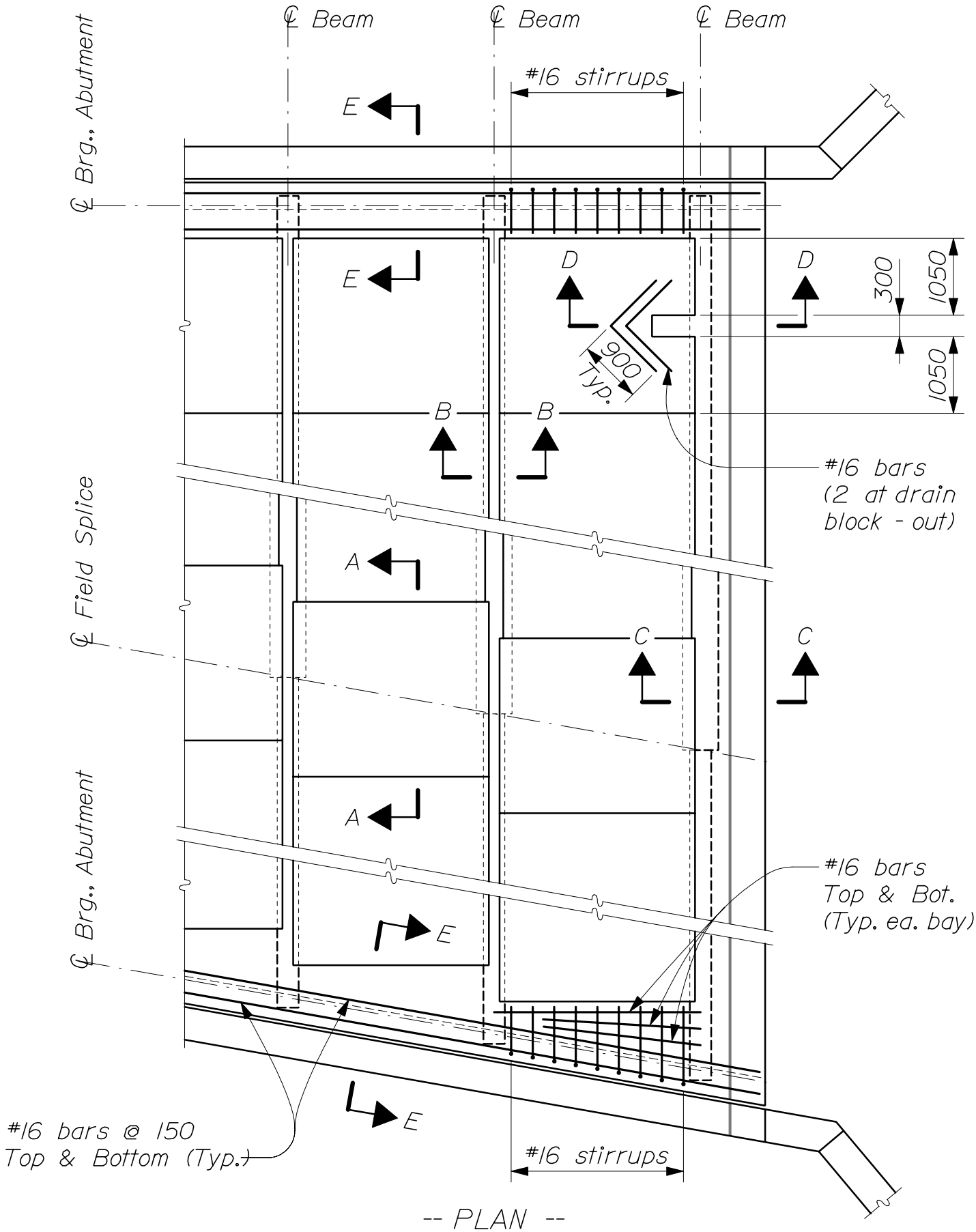
5. The 12 mm ϕ holes are not required when a concrete wearing surface is specified.

6. If the minimum thickness of concrete below the drain is 50 mm or less, the concrete haunch shall be extended as shown.

7. Payment for bridge drains will be as specified under Subsection 502.19 of the Standard Specifications.

STANDARD BRIDGE DRAIN

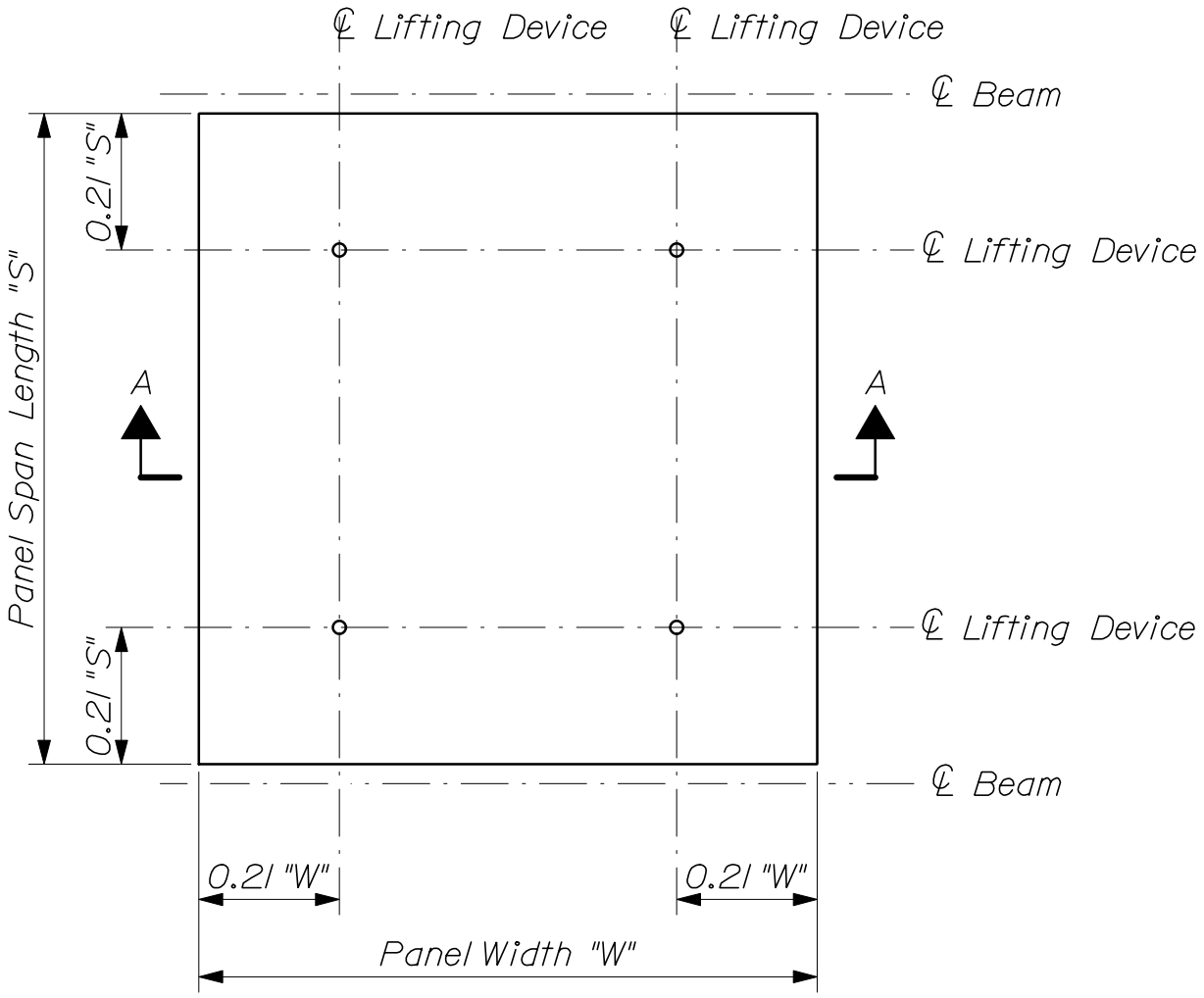
502(06)



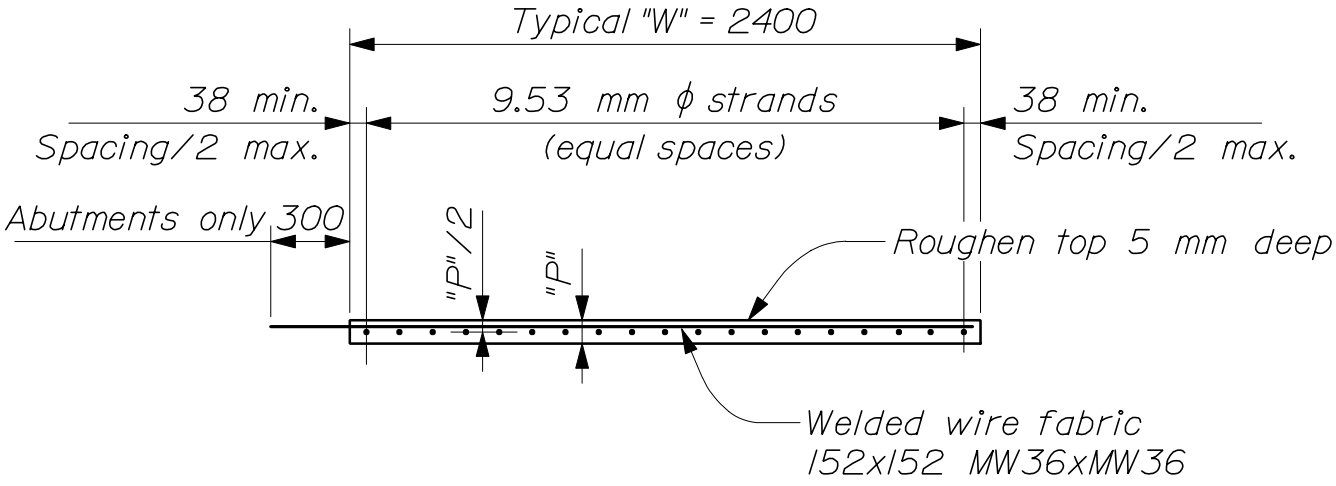
-- PLAN --

PRECAST CONCRETE DECK PANELS

502(07)



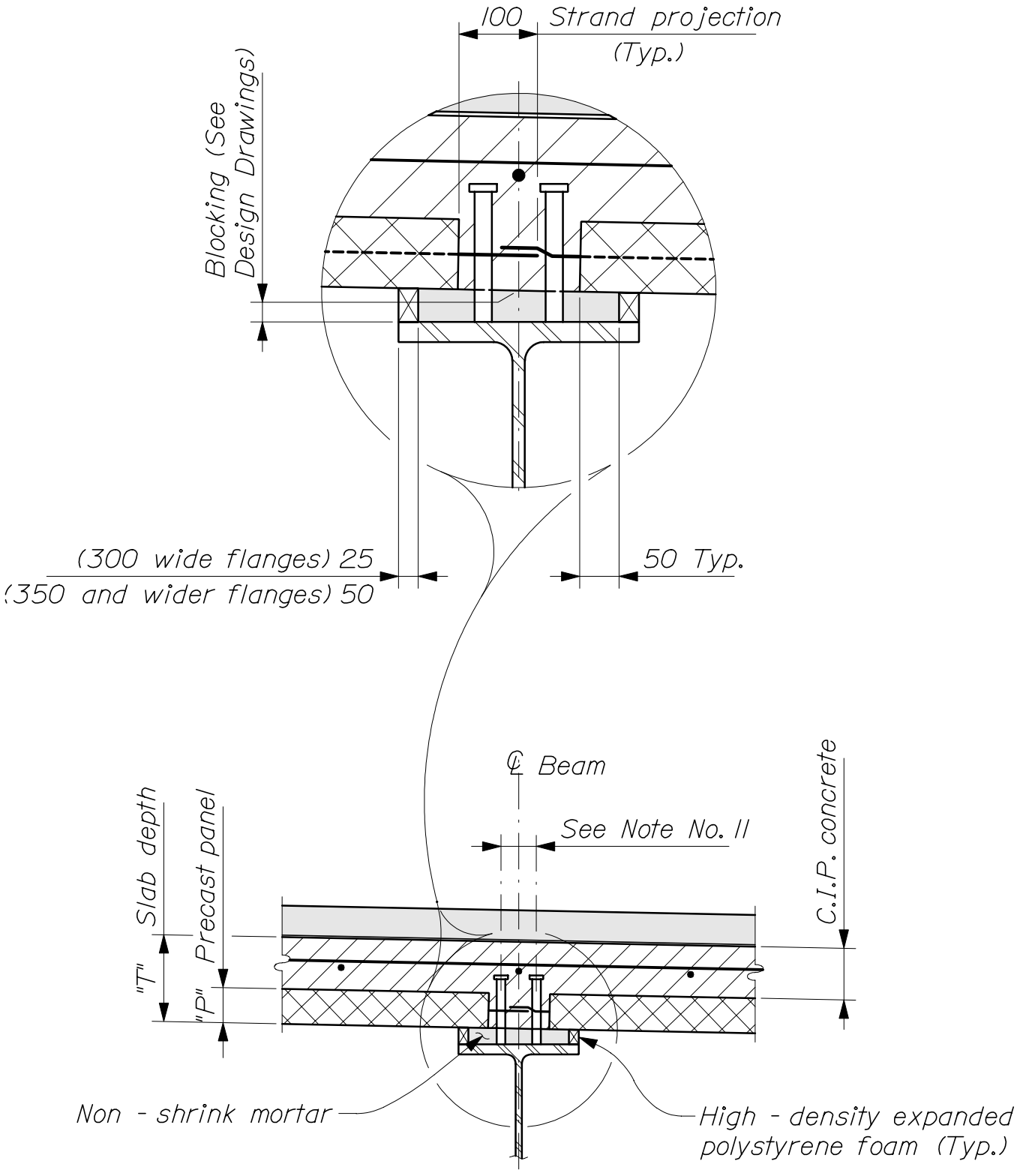
-- PANEL PLAN --



-- SECTION A-A --

PRECAST CONCRETE DECK PANELS

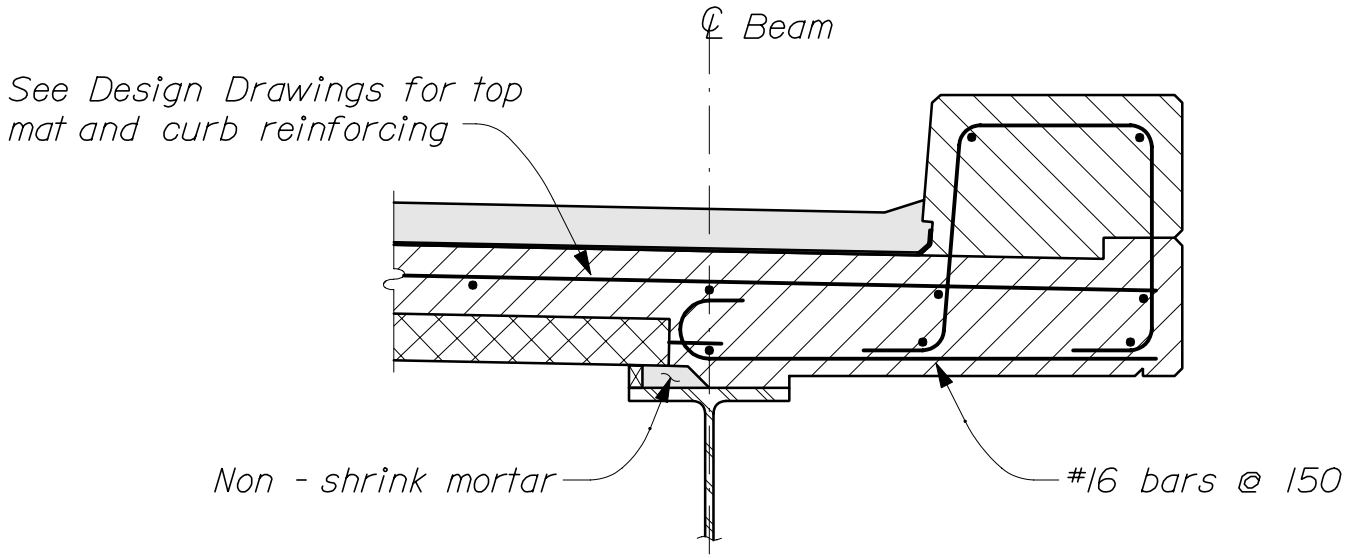
502(08)



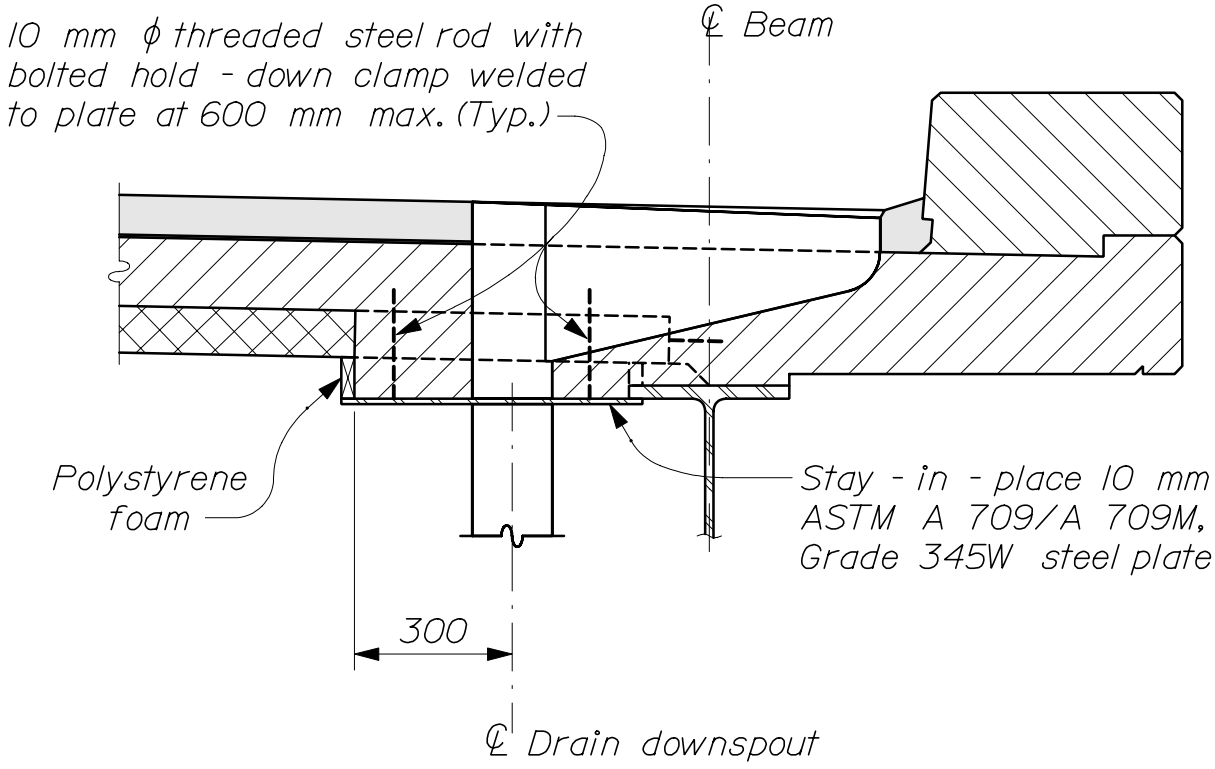
-- SECTION B-B --

PRECAST CONCRETE DECK PANELS

502(09)



-- SECTION C-C --

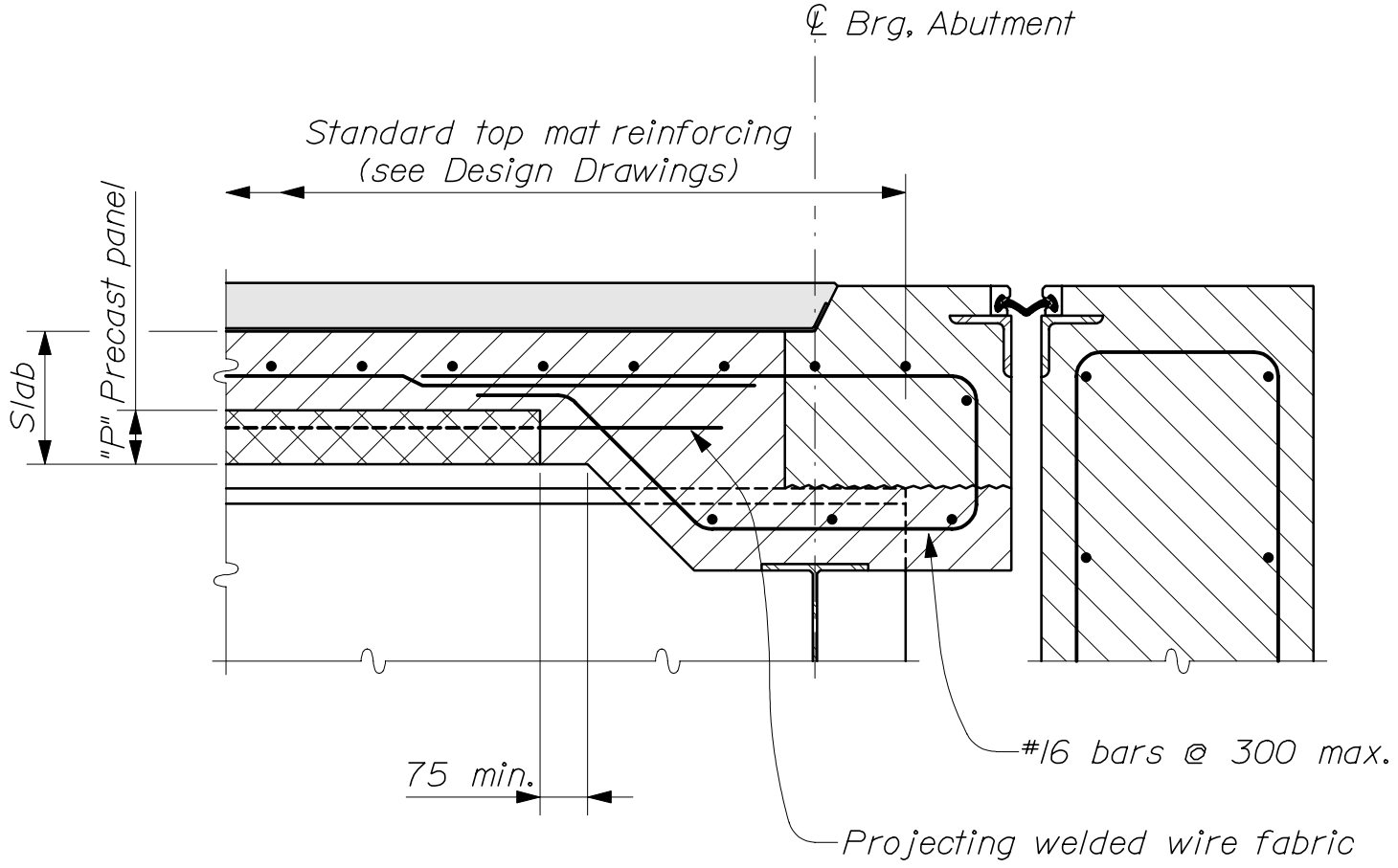


-- SECTION D-D --

PRECAST CONCRETE DECK PANELS

502(10)

DESIGN DIMENSIONS				
Panel Type	Max. "S"	Slab "T"	Panel "P"	Strands Required
MA1	1800	200	90	12
MA2	2000	200	90	14
MA	2175	200	90	16
MB	2350	210	90	17
MC	2525	220	90	19
MD	2700	230	90	20
ME	2875	240	90	22



-- SECTION E-E --

PRECAST CONCRETE DECK PANELS

502(11)

NOTES:

1. Concrete for panels shall have a minimum 28 day compressive strength of 34.5 MPa and a minimum release strength of 27.6 MPa.

2. Prestressing strands shall be 9.53 mm diameter Grade 270 seven - wire low relaxation strands conforming to the requirements of ASTM A 416. Initial tension shall be 76.5 kN per strand.

3. Welded wire fabric shall conform to the requirements of ASTM A 497. A mat of #10 reinforcing bars spaced at 150 mm O.C. in each direction may be substituted for welded wire fabric.

4. Mortar to be used for support under the deck panels shall have an approved high range water reducing additive.

5. High - density expanded polystyrene foam shall be cut in the field to the required thickness.

6. When flange thicknesses differ or flange cover plates are used, the temporay blocking thickness shall vary. Precast panels shall align vertically to within 6 mm.

7. Panel widths of less than 2400 mm may be used. Provide strands in the ratio of the smaller panel width to 2400, multiplied by the number of strands given in the table, rounding up to the next even number of strands. The minimum panel with is 925 mm.

8. Refer to the Design Drawings for structures with curved beams or angled splices.

9. The contractor shall submit working drawings showing the exact layout of panel types and sizes.

10. Joints at expansion piers shall be treated similarly to the abutment joint details.

11. Where 300 mm wide girder flanges are specified on the Design Drawings, the transverse shear connector spacing shall be 90 mm rather than the standard 150 mm spacing.

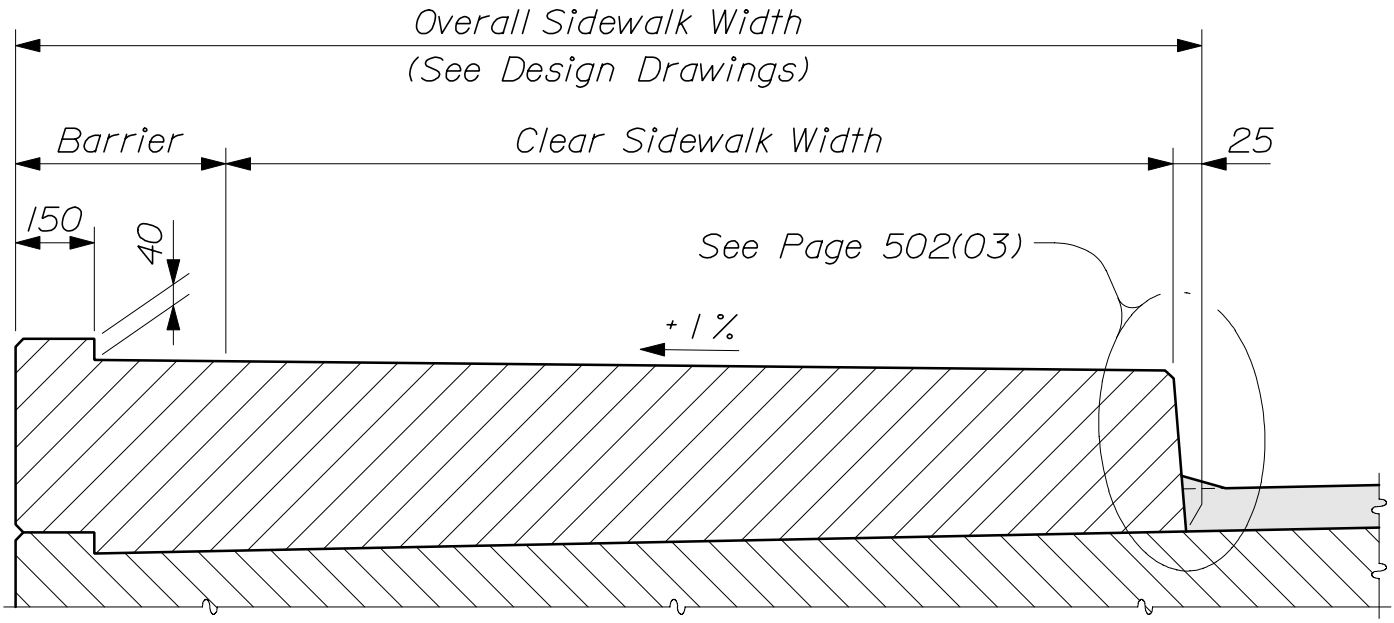
12. Precast deck panels require the use of 175 mm long shear connectors rather than the standard 125 mm length. Payment for any additional costs will be considered incidental to the precast deck panel pay item.

13. The specific reinforcing steel layout for the cast - in - place portions of the slab shall be as shown on the Design Drawings.

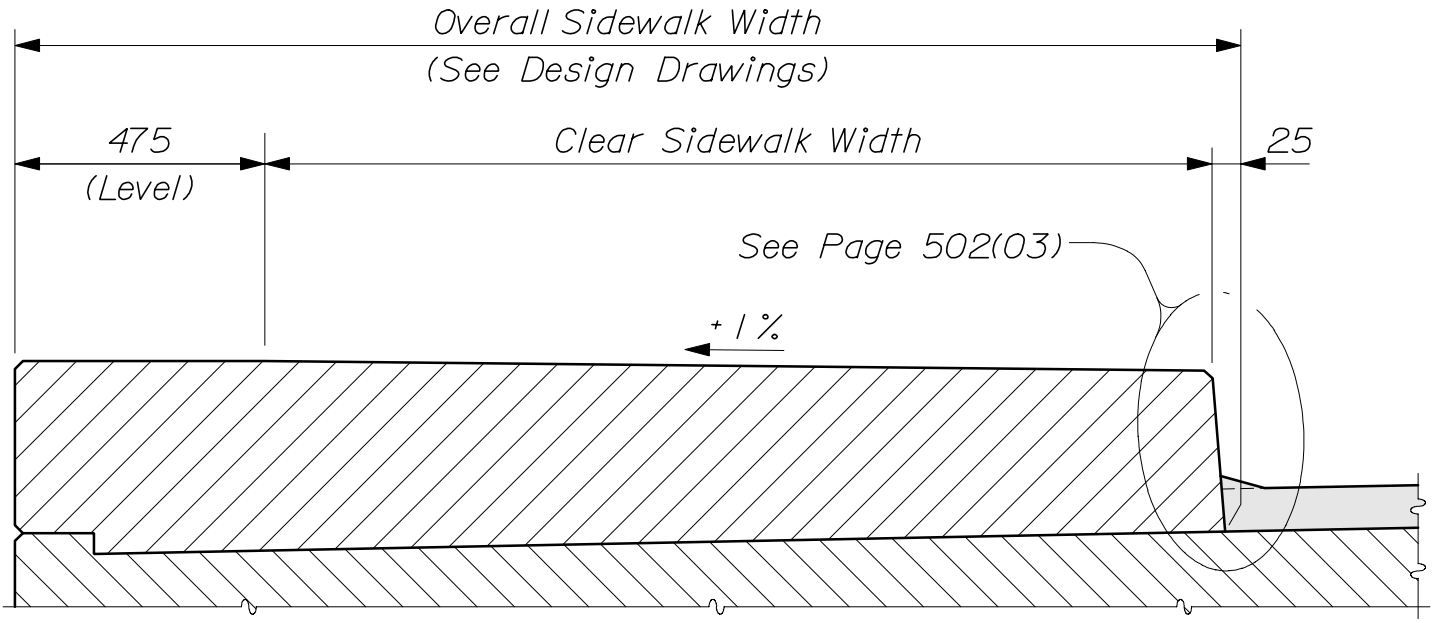
14. If there is a conflict between these Standard Details and the Design Drawings, the requirements of the Design Drawings shall be followed.

PRECAST CONCRETE DECK PANELS

502(12)



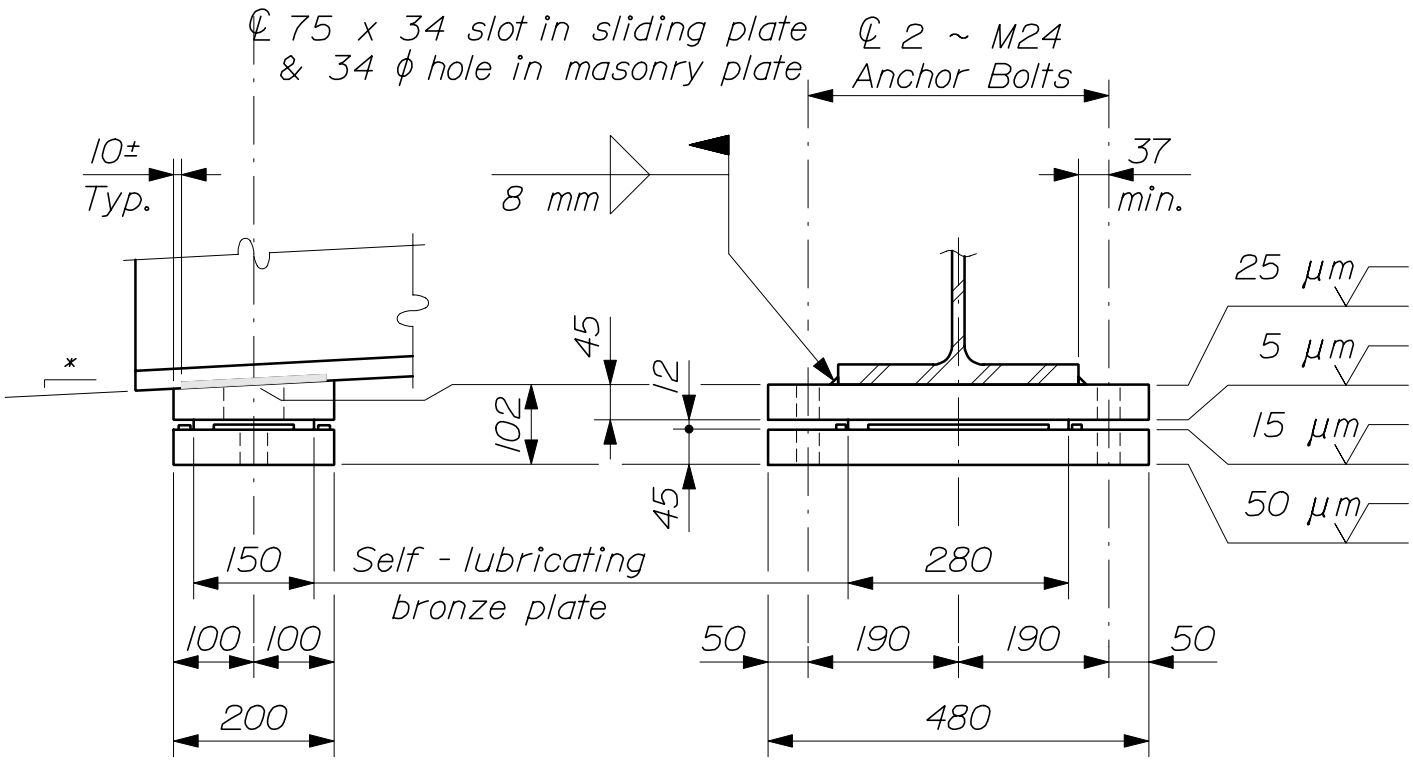
-- WITH PERMANENT CONCRETE BARRIER --



-- WITH STEEL BRIDGE RAILING --

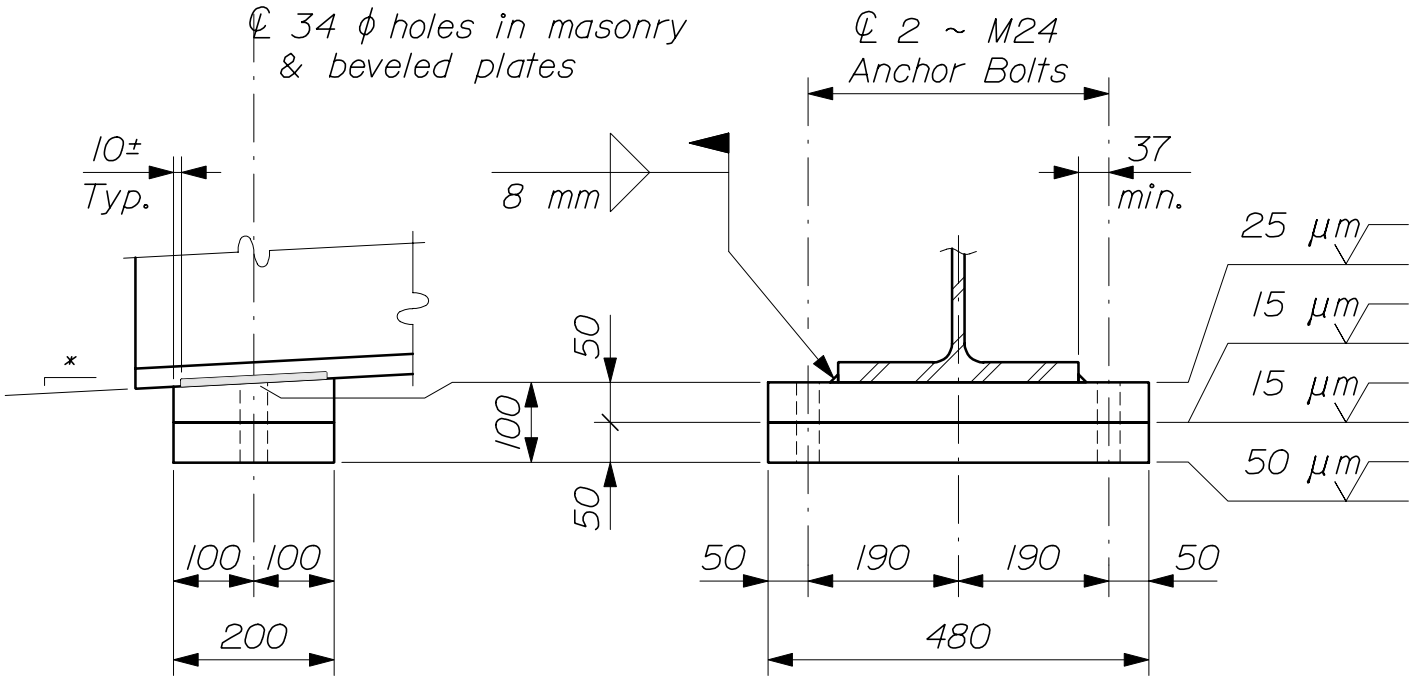
CONCRETE SIDEWALK ON BRIDGES

502(13)



-- EXPANSION PEDESTAL ~ M-EPA --

* Match Profile grade
(See Design Drawings)



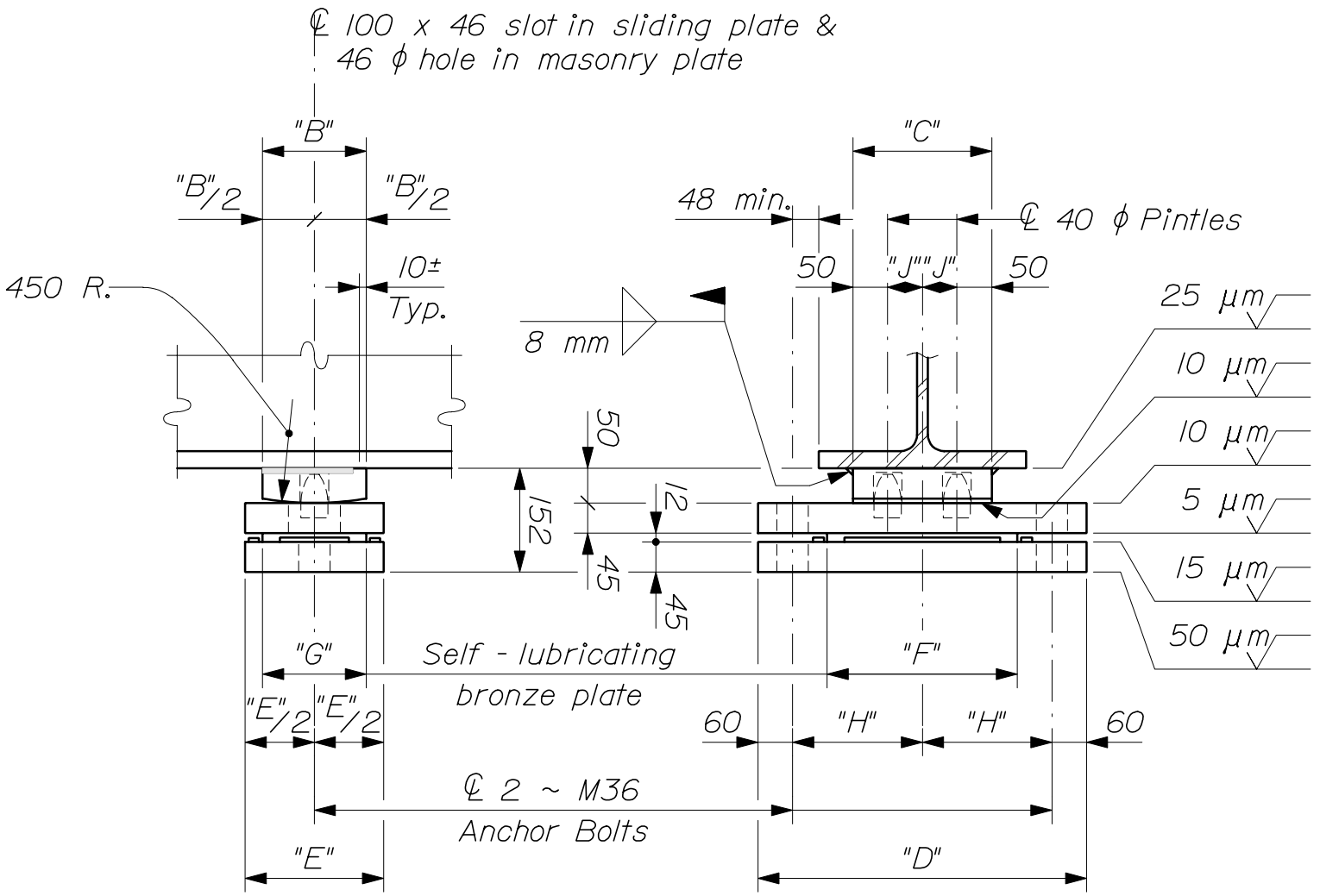
-- FIXED PEDESTAL ~ M-FPA --

SLIDING BEARING PEDESTALS

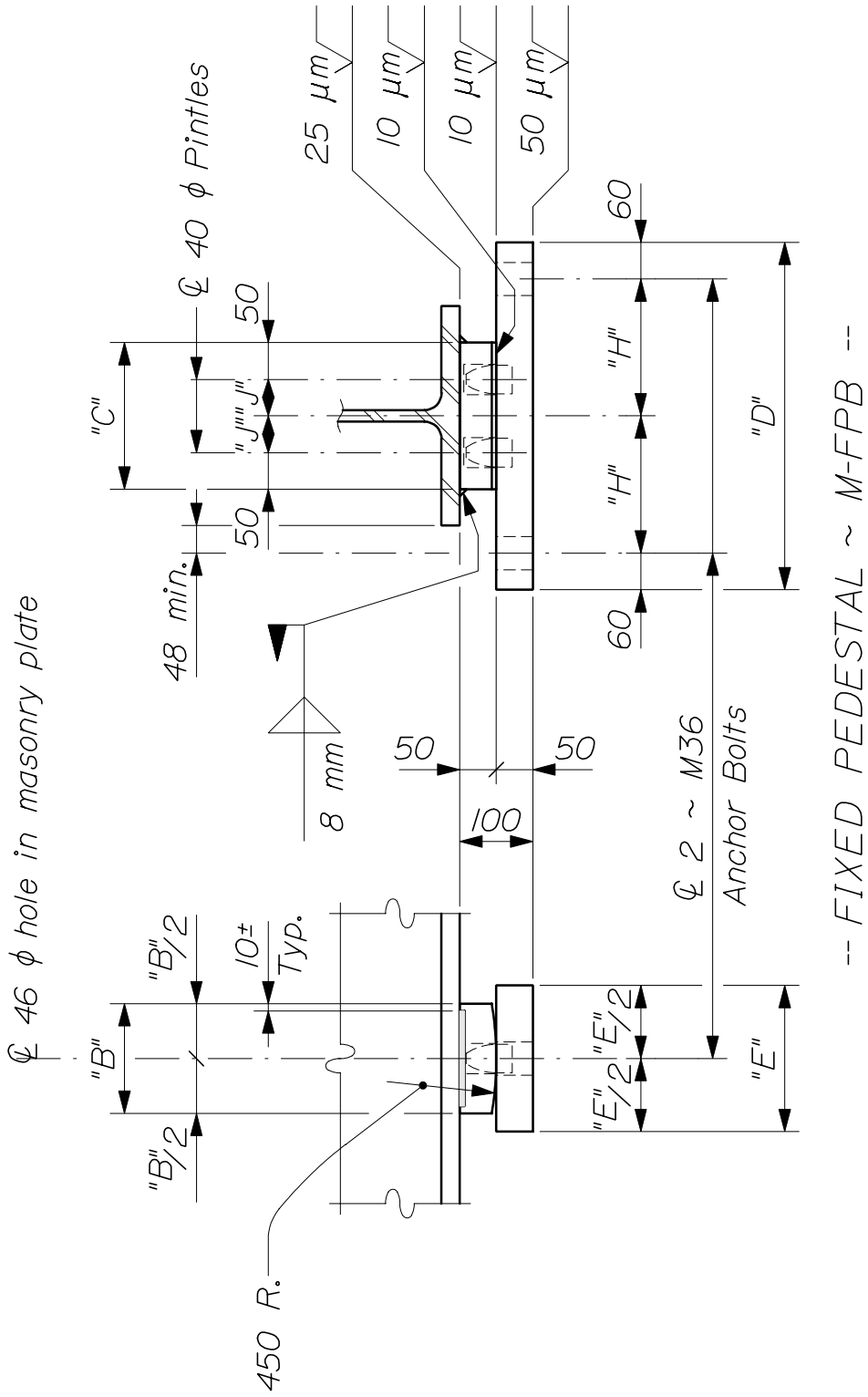
504(01)

SLIDING BEARING PEDESTALS

504(02)

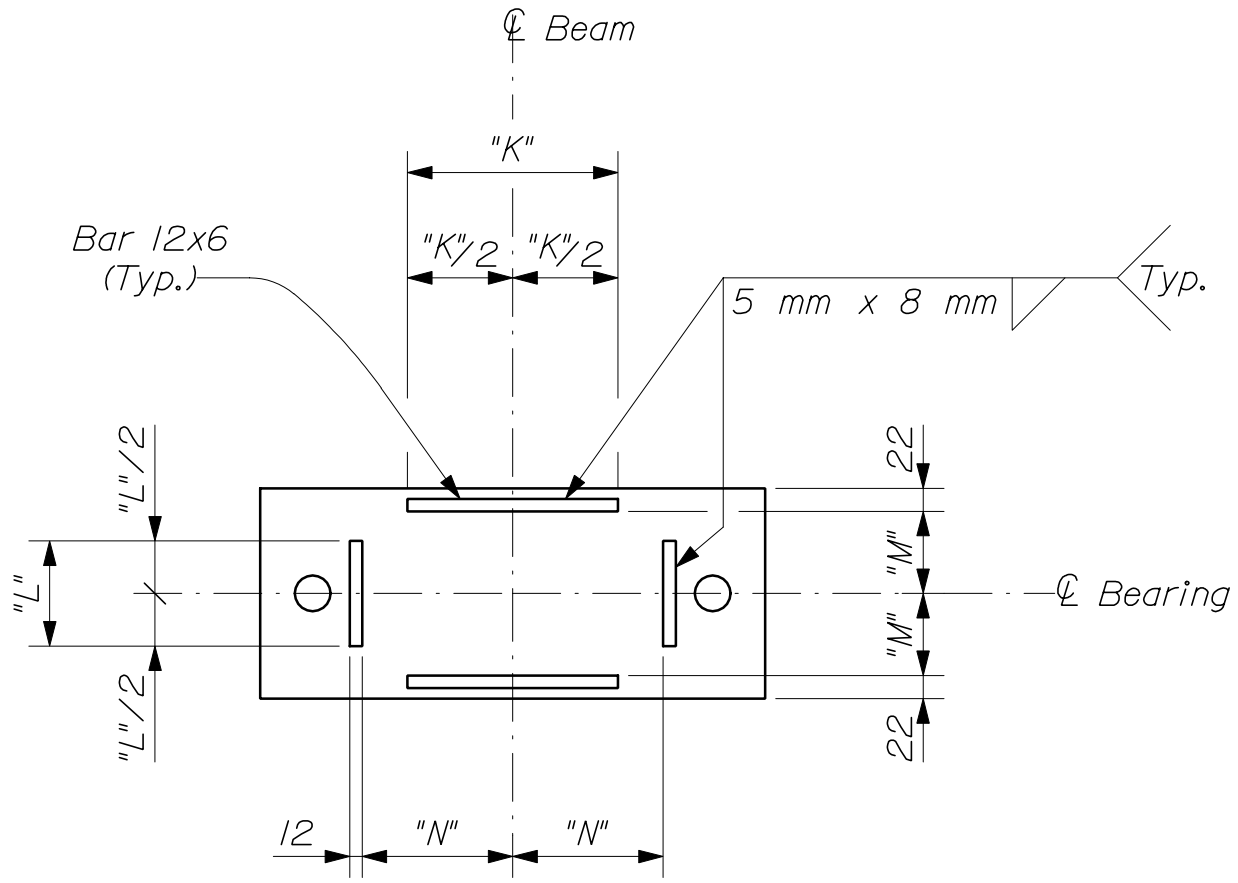


-- EXPANSION PEDESTAL ~ M-EPB --

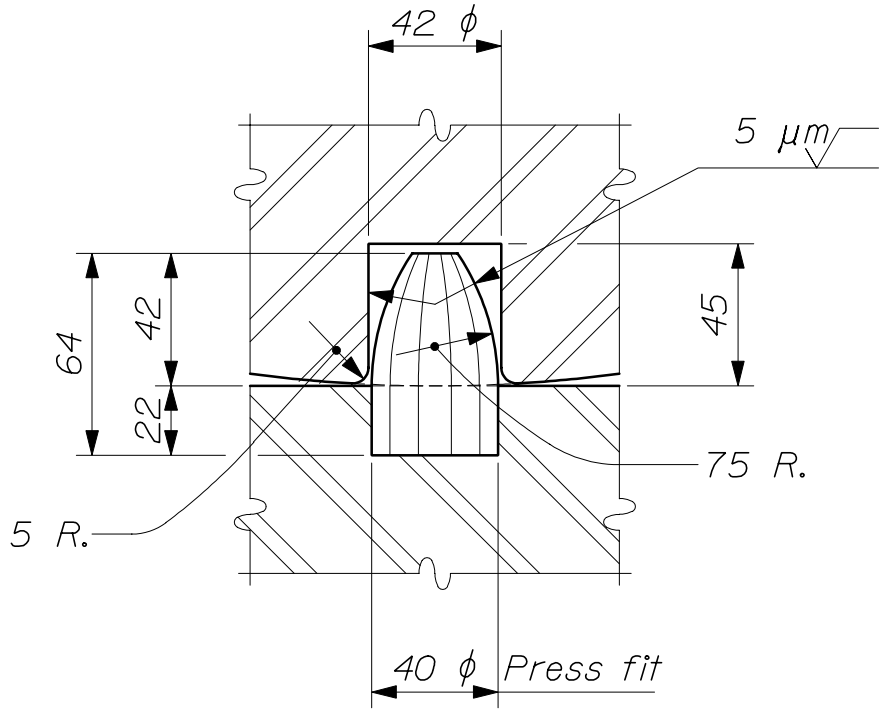


SLIDING BEARING PEDESTALS

504(03)



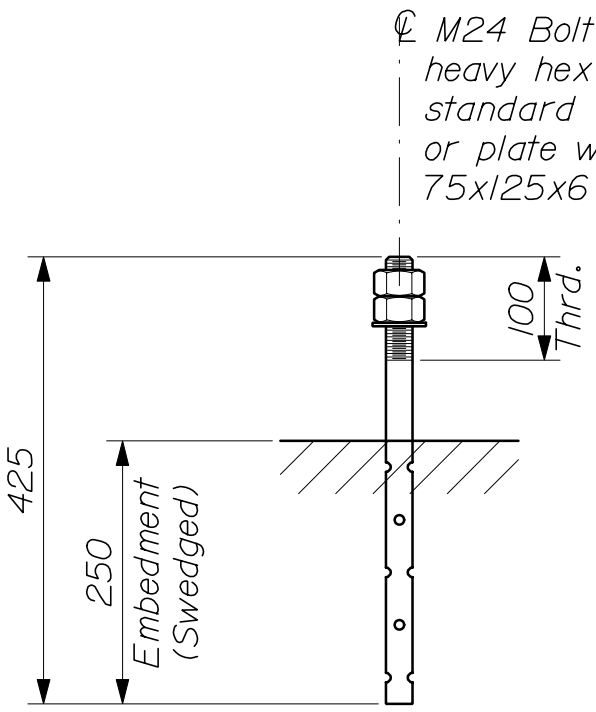
-- MASONRY PLATE --
(for M-EPA & M-EPB)



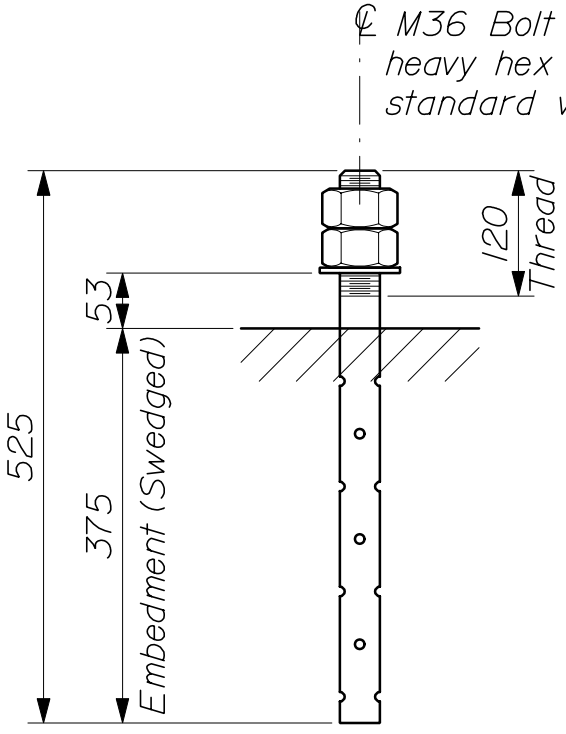
-- 40 ϕ PINTLE --

SLIDING BEARING PEDESTALS

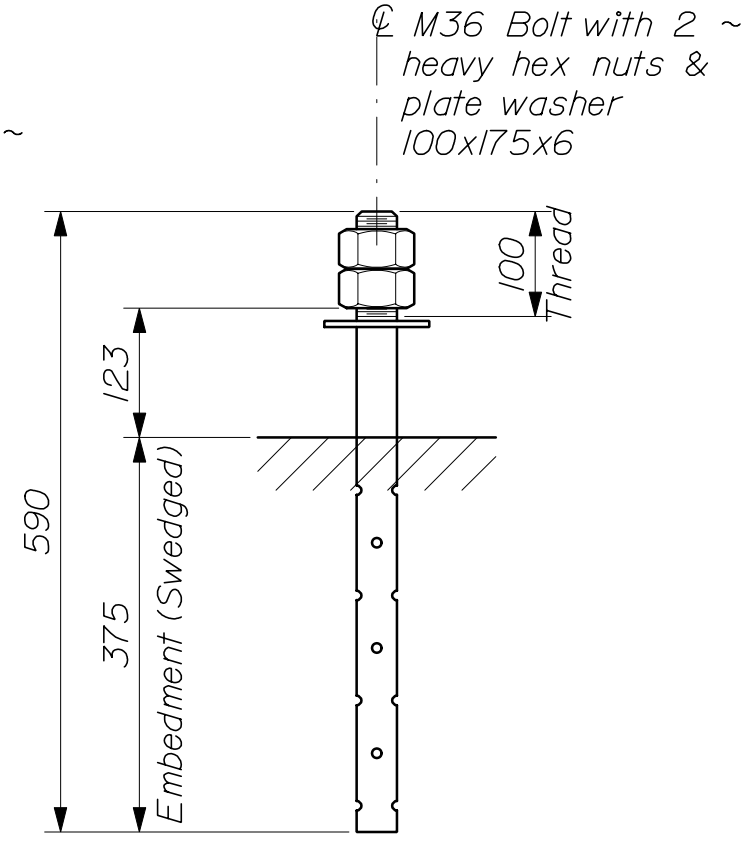
504(04)



-- M-EPA & M-FPA ANCHOR BOLT --



-- M-FPB ANCHOR BOLT --



-- M-EPB ANCHOR BOLT --

SLIDING BEARING PEDESTALS

504(05)

TABLE OF DIMENSIONS												
Mark	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"J"	"K"	"L"	"M"	"N"
M-EPA	--	--	--	--	--	--	--	--	200	100	78	143
M-FPA	--	--	--	--	--	--	--	--	--	--	--	--
M-EPB-1	150	200	500	200	250	150	190	50	200	100	78	128
M-EPB-2	176	250	520	226	300	175	200	75	250	126	91	153
M-EPB-3	200	330	620	250	400	200	250	115	350	126	103	203
M-FPB-1	150	200	500	200	--	--	190	50	--	--	--	--
M-FPB-2	176	250	520	226	--	--	200	75	--	--	--	--
M-FPB-3	200	350	620	250	--	--	250	125	--	--	--	--

ALLOWABLE LOADS					
Mark	Load	Mark	Load	Mark	Load
M-EPA	585 kN	M-EPB-1	535 kN	M-FPB-1	535 kN
M-FPA	665 kN	M-EPB-2	735 kN	M-FPB-2	735 kN
		M-EPB-3	1110 kN	M-FPB-3	1110 kN

NOTES:

1. Charpy V - notch tests are not required for steel used in bearing pedestals.

2. Bearing pedestals for use with painted structural steel shall be painted to conform to Subsection 504.36 of the Standard Specifications.

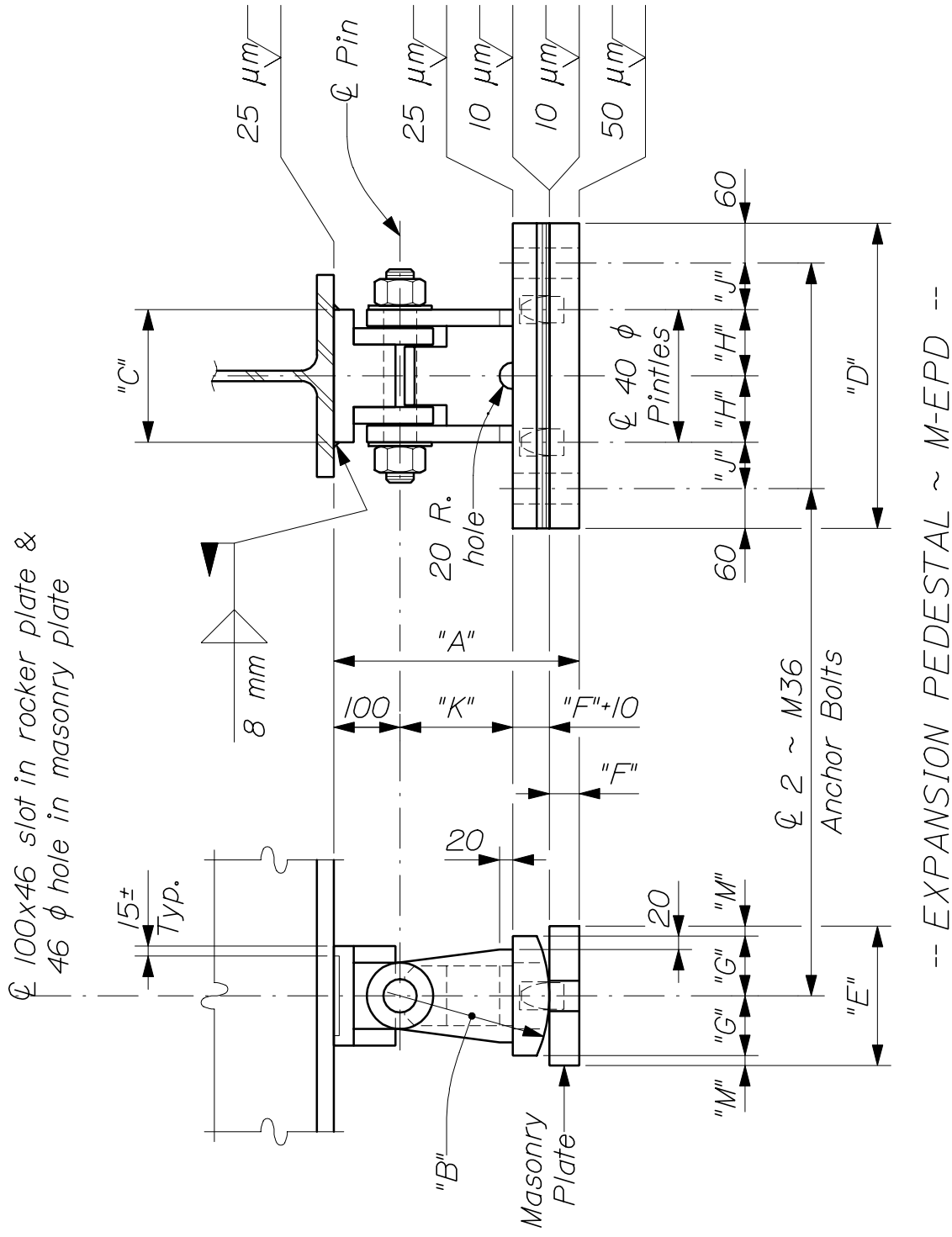
3. Upset the threads on the anchor bolts after assembly.

MATERIALS:

With unpainted structural steel -
All steel (including anchor bolts)..... ASTM A709/A709M, Grade 345W
Heavy hex nuts for anchor bolts..... ASTM A563M, Class 8S3 or 10S3

With painted structural steel -
All steel (including anchor bolts)..... ASTM A709/A709M, Grade 345 or
ASTM A709/A709M, Grade 345W
Heavy hex nuts for anchor bolts..... ASTM A563M, Class 5

# SLIDING BEARING PEDESTALS
504(06)

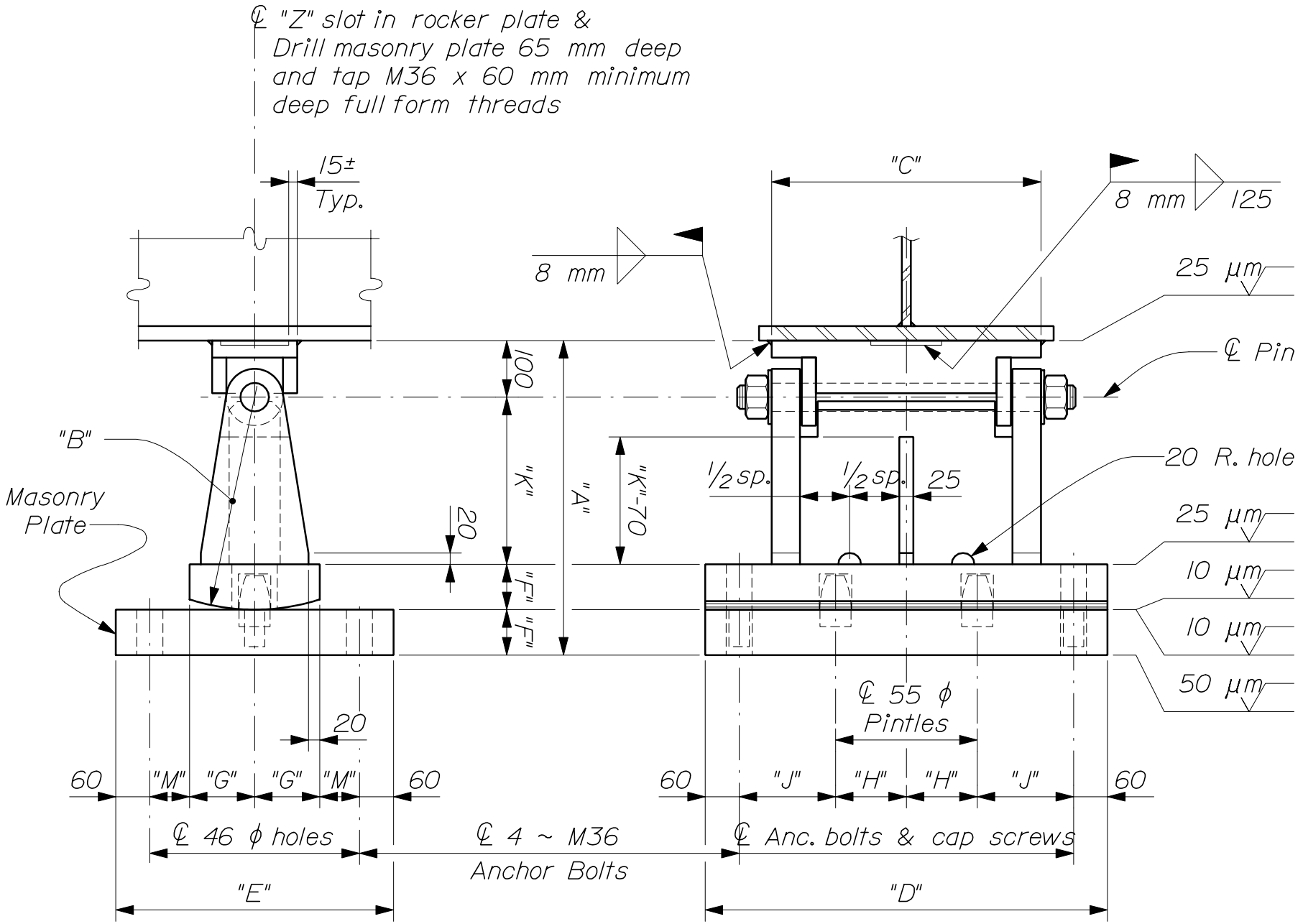


ROCKER BEARING PEDESTALS

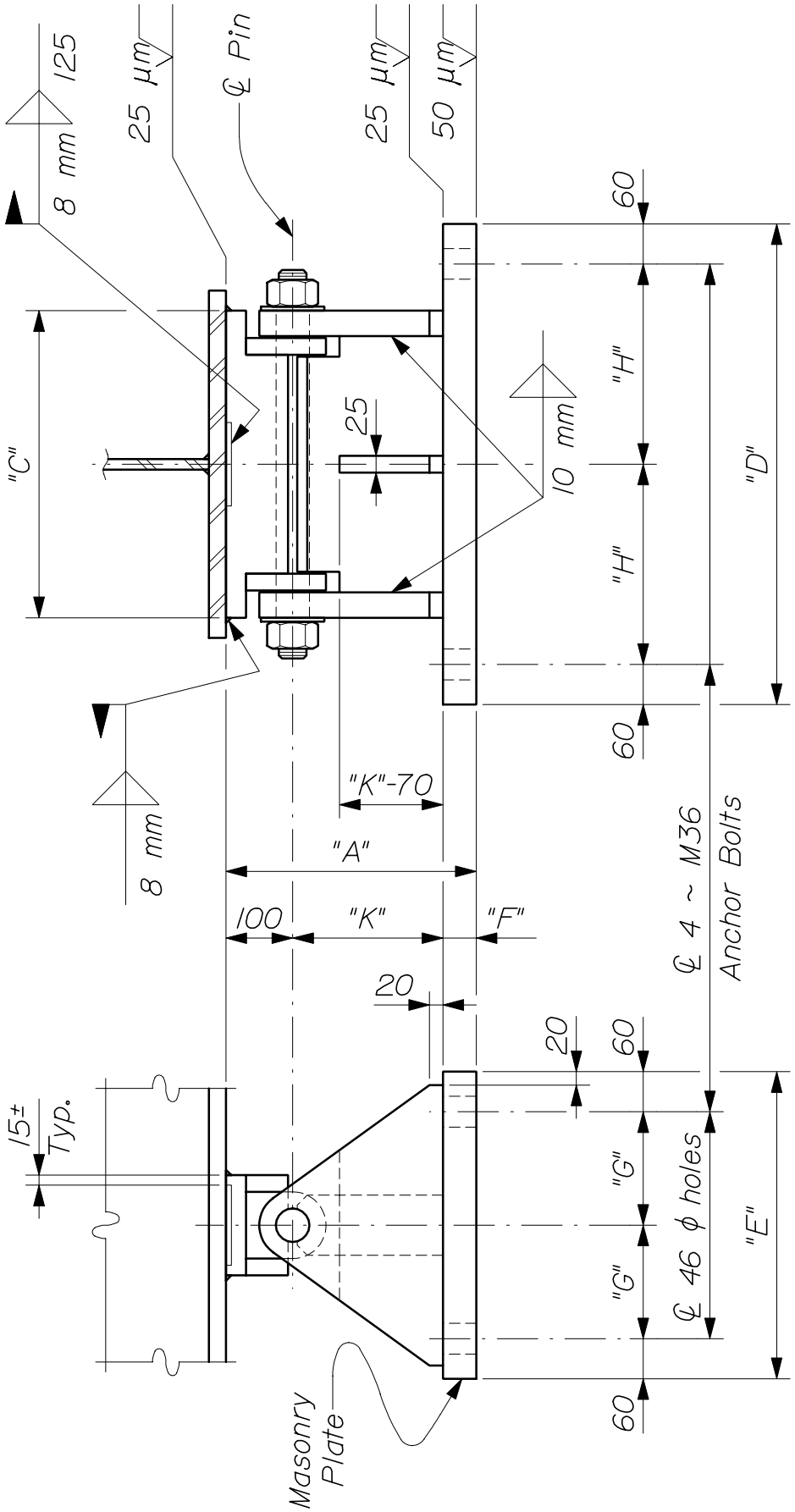
504(07)

ROCKER BEARING PEDESTALS

504(08)

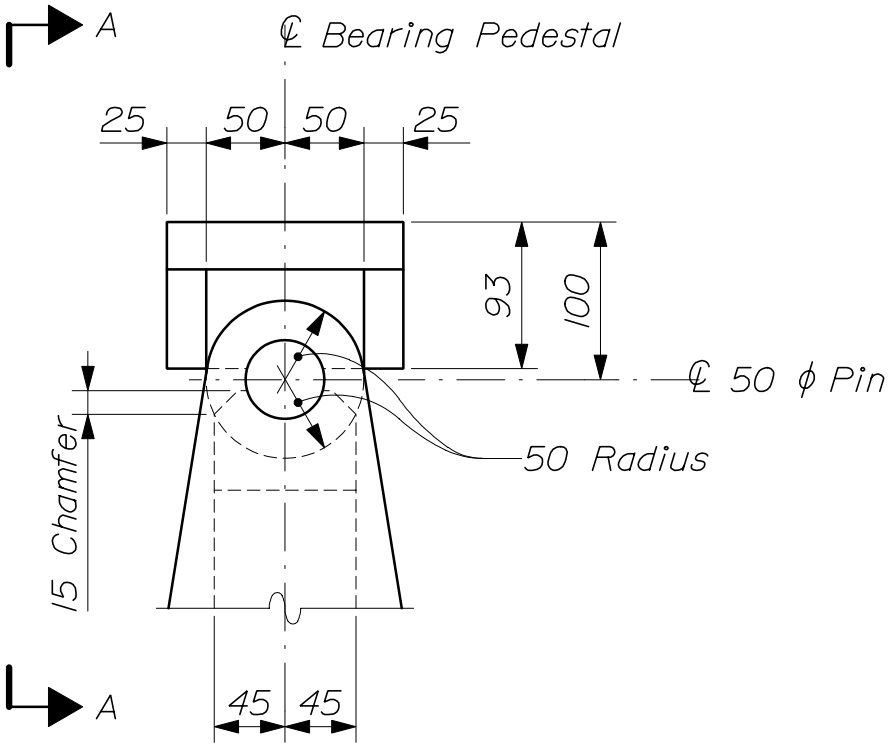


-- EXPANSION PEDESTAL ~ M-EPE --

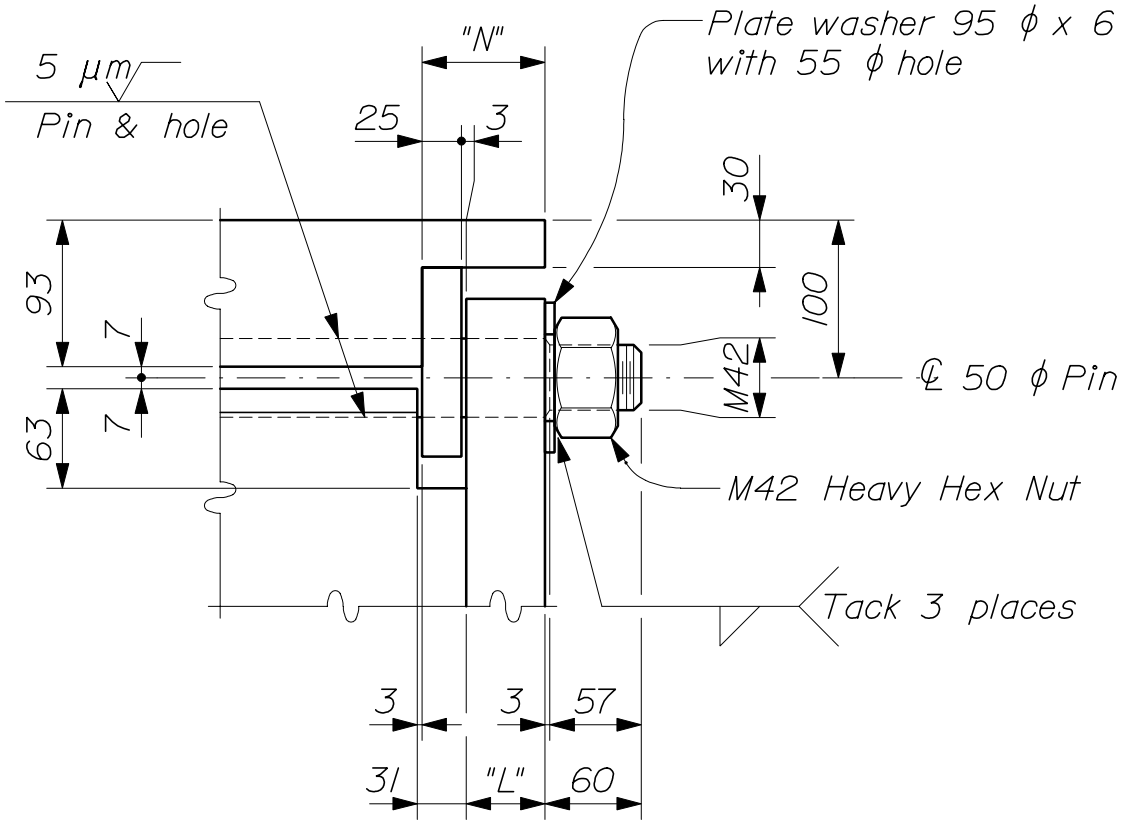


ROCKER BEARING PEDESTALS

504(09)



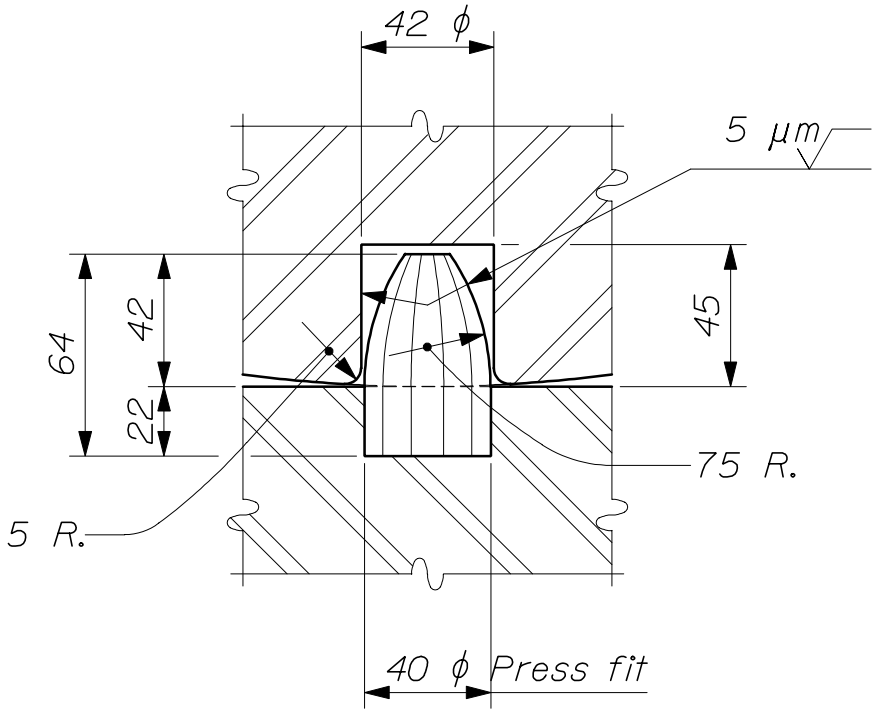
-- SOLE PLATE DETAIL --



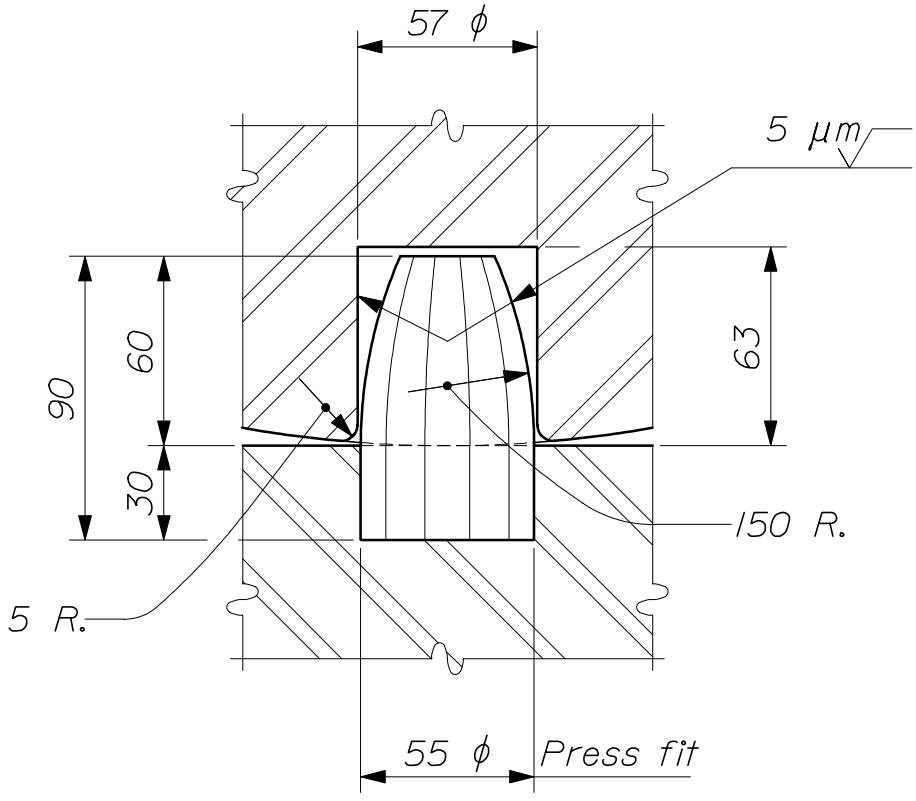
-- VIEW A - A --

ROCKER BEARING PEDESTALS

504(10)



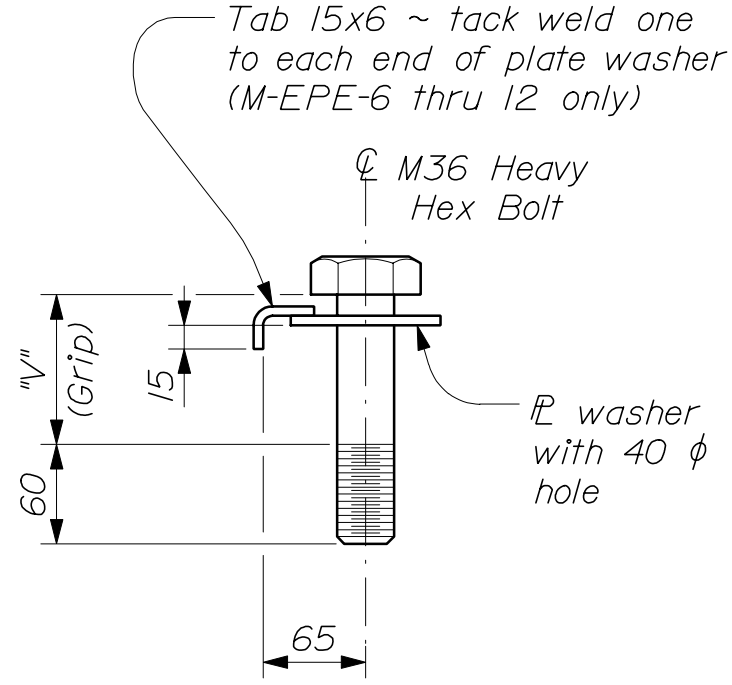
-- 40 ϕ PINTLE --



-- 55 ϕ PINTLE --

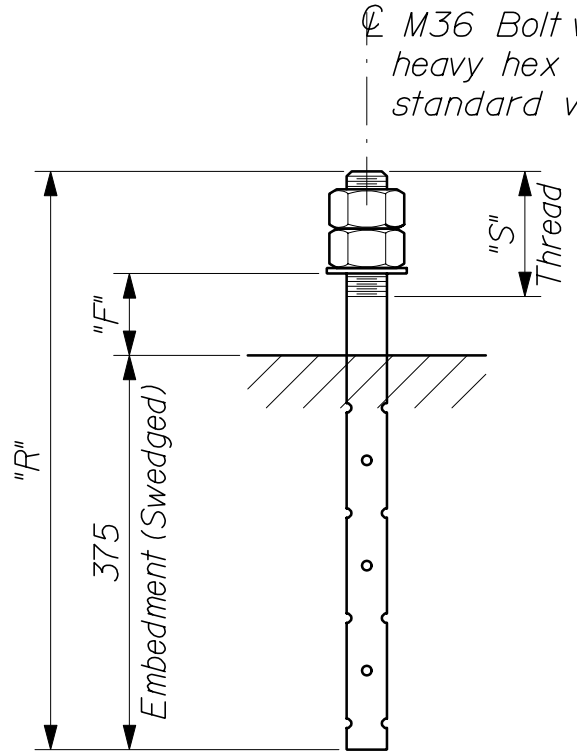
ROCKER BEARING PEDESTALS

504(11)

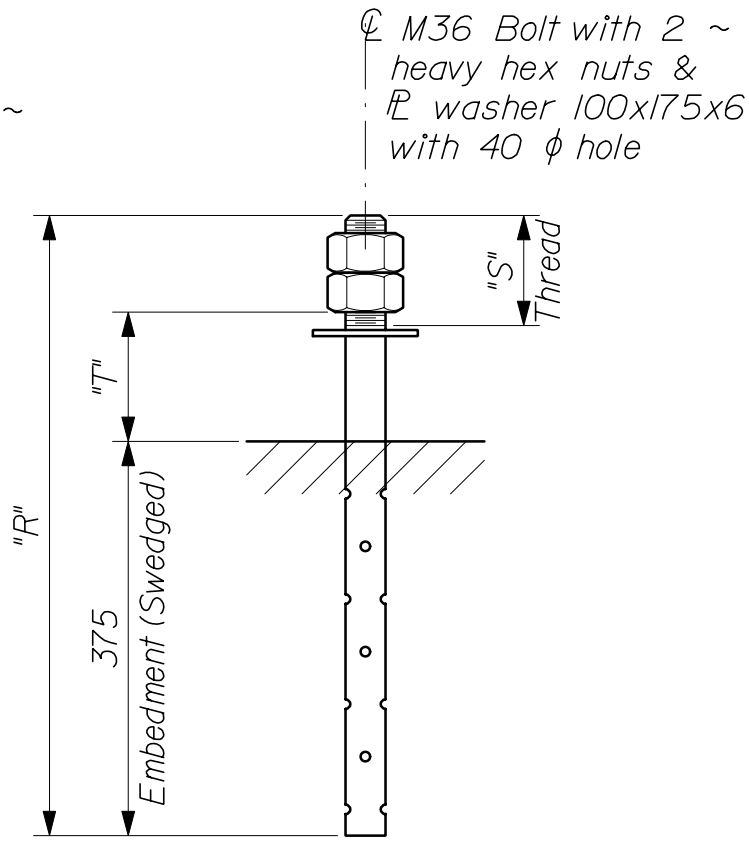


-- M-EPE CAP SCREW DETAIL --

CAP SCREW, "Z" SLOT & PLATE WASHER DIMENSIONS			
Mark	"V"	"Z" slot	℗ washer
M-EPE-1	95	80x40	95x105x6
M-EPE-2	100	80x40	95x120x6
M-EPE-3	125	105x40	95x155x6
M-EPE-4	135	120x40	95x170x6
M-EPE-5	160	145x40	95x220x6
M-EPE-6	100	80x40	95x105x6
M-EPE-7	135	120x40	95x170x6
M-EPE-8	170	155x40	95x245x6
M-EPE-9	125	105x40	105x145x6
M-EPE-10	170	155x40	105x245x6
M-EPE-11	130	115x40	105x165x6
M-EPE-12	170	155x40	105x245x6



-- M-EPE & M-FPD ANCHOR BOLT --



-- M-EPD ANCHOR BOLT --

ROCKER BEARING PEDESTALS

504(12)

ROCKER BEARING PEDESTALS

504(13)

TABLE OF DIMENSIONS														ANC. BOLTS		
Mark	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"J"	"K"	"L"	"M"	"N"	"R"	"S"	"T"
M-EPD-1	370	225	200	460	210	45	90	100	70	170	25	15	53	590	110	125
M-EPD-2	370	225	200	460	240	45	105	100	70	170	25	15	53	590	110	125
M-EPD-3	370	225	200	460	260	45	115	100	70	170	25	15	53	590	110	125
M-EPD-4	445	300	200	460	290	45	130	100	70	245	25	15	53	590	110	125
M-EPD-5	535	375	275	540	290	60	130	115	95	305	32	15	60	620	120	150
M-EPD-6	535	375	275	540	310	60	140	115	95	305	32	15	60	630	120	160
M-EPD-7	535	375	275	540	340	60	155	115	95	305	32	15	60	630	120	160
M-EPD-8	535	375	275	540	360	60	165	115	95	305	32	15	60	630	110	165
M-EPD-9	535	375	275	540	390	60	180	115	95	305	32	15	60	640	110	175
M-EPE-1	555	375	350	590	470	80	105	125	110	295	45	70	73	550	120	--
M-EPE-2	555	375	350	590	520	80	130	125	110	295	45	70	73	550	120	--
M-EPE-3	565	375	350	590	570	90	155	125	110	285	45	70	73	560	120	--
M-EPE-4	565	375	350	590	620	90	180	125	110	285	45	70	73	560	120	--
M-EPE-5	575	375	350	590	700	100	205	125	110	275	45	85	73	570	120	--
M-EPE-6	555	375	475	710	490	80	115	125	170	295	50	70	78	550	120	--
M-EPE-7	575	375	475	710	590	100	165	125	170	275	45	70	73	570	120	--
M-EPE-8	575	375	475	710	730	100	220	125	170	275	45	85	73	570	120	--
M-EPE-9	650	450	575	920	570	100	155	175	225	350	55	70	83	570	120	--
M-EPE-10	660	450	575	920	750	110	230	175	225	340	50	85	78	580	120	--
M-EPE-11	650	450	750	1170	590	100	165	250	275	350	60	70	88	570	120	--
M-EPE-12	660	450	750	1170	750	110	230	250	275	340	55	85	83	580	120	--
M-FPD-1	300	--	200	460	230	50	55	170	--	150	25	--	53	525	120	--
M-FPD-2	300	--	250	510	360	50	120	195	--	150	25	--	53	525	120	--
M-FPD-3	300	--	360	620	410	50	145	250	--	150	32	--	60	525	120	--
M-FPD-4	375	--	460	720	460	50	170	300	--	225	38	--	66	525	120	--
M-FPD-5	375	--	585	920	560	75	220	400	--	200	38	--	66	550	120	--
M-FPD-6	375	--	760	1170	590	75	235	525	--	200	50	--	78	560	120	--

ALLOWABLE LOADS					
Mark	Load	Mark	Load	Mark	Load
M-EPD-1	780 kN	M-EPE-1		M-EPE-11	4450 kN
M-EPD-2	890 kN	thru	2000 kN	M-EPE-12	4450 kN
M-EPD-3	890 kN	M-EPE-5		M-FPD-1	890 kN
M-EPD-4	890 kN	M-EPE-6	2670 kN	M-FPD-2	1340 kN
M-EPD-5	1340 kN	M-EPE-7	2670 kN	M-FPD-3	2000 kN
M-EPD-6		M-EPE-8	2670 kN	M-FPD-4	2670 kN
thru	1450 kN	M-EPE-9	3560 kN	M-FPD-5	3560 kN
M-EPD-9		M-EPE-10	3560 kN	M-FPD-6	4450 kN

NOTES:

1. Charpy V - notch tests are not required for steel used in bearing pedestals.

2. Fabricate bearing pedestals with 8 mm fillet welds unless otherwise incicated.

3. The diameter of the pin - holes and grooves shall be 50 mm with a tolerance of +0.25 mm and -0.00 mm. The pin diameter shall be 50 mm with a tolerance of +0.00 mm and -0.25 mm.

4. Pedestals M-EPE without center stiffeners have only one drainage hole. Pedestals M-FPD have no drainage holes.

5. Bearing pedestals for use with painted structural steel shall be painted to conform to Section 506 of the Standard Specifications.

6. Upset the threads on the bearing pins and anchor bolts after assembly.

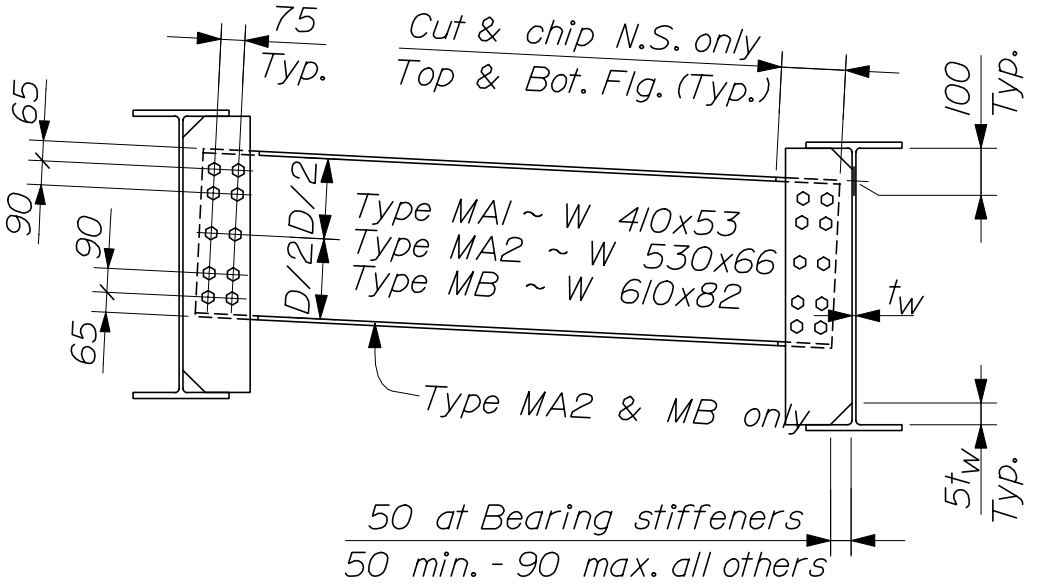
MATERIALS:

With unpainted structural steel -
All steel (including anchor bolts)..... ASTM A709/A709M, Grade 345W
Heavy hex cap screws ..... ASTM F568, Class 8.8.3
Heavy hex nuts for bearing pins ..... ASTM A563M, Class 8S3 or 10S3 and anchor bolts

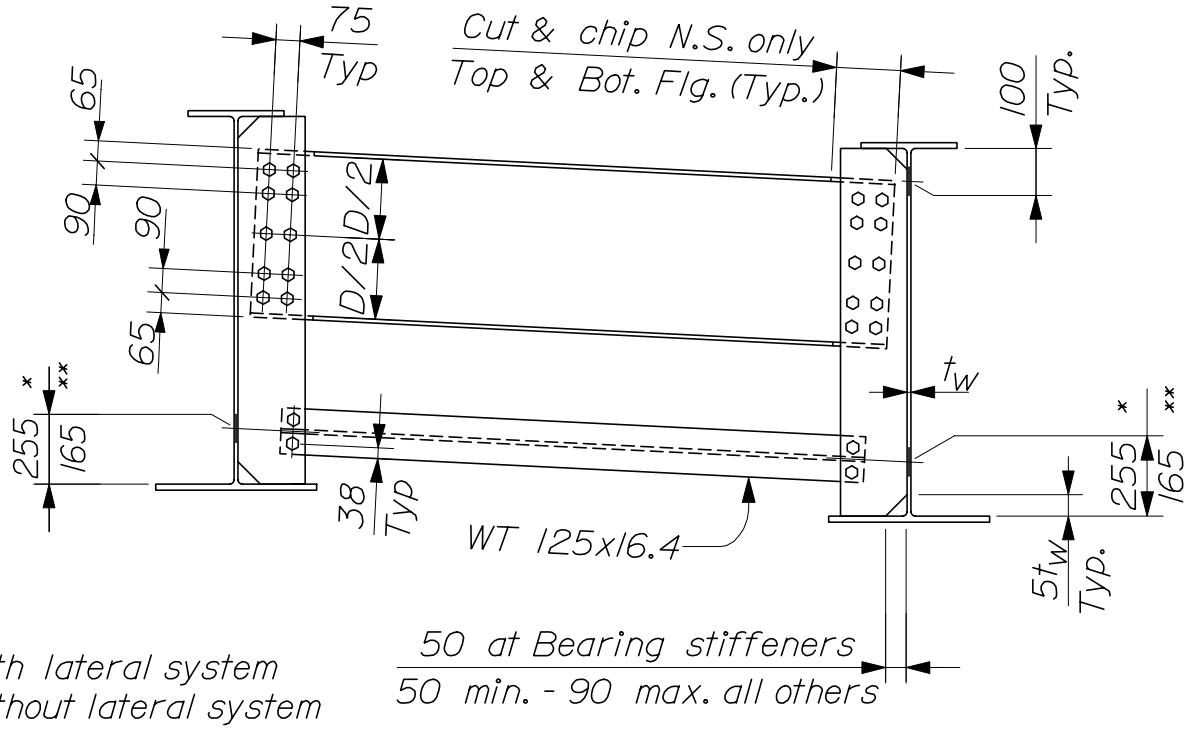
With painted structural steel -
All steel (including anchor bolts)..... ASTM A709/A709M, Grade 345 or ASTM A709/A709M, Grade 345W
Heavy hex cap screws ..... ASTM F568, Class 8.8
Heavy hex nuts for bearing pins and anchor bolts..... ASTM A563M, Class 5

Stainless Steel alternate for bearing pins..... ASTM A582, Type 416, Condition T

ROCKER BEARING PEDESTALS



-- TYPE MA1, MA2, & MB --

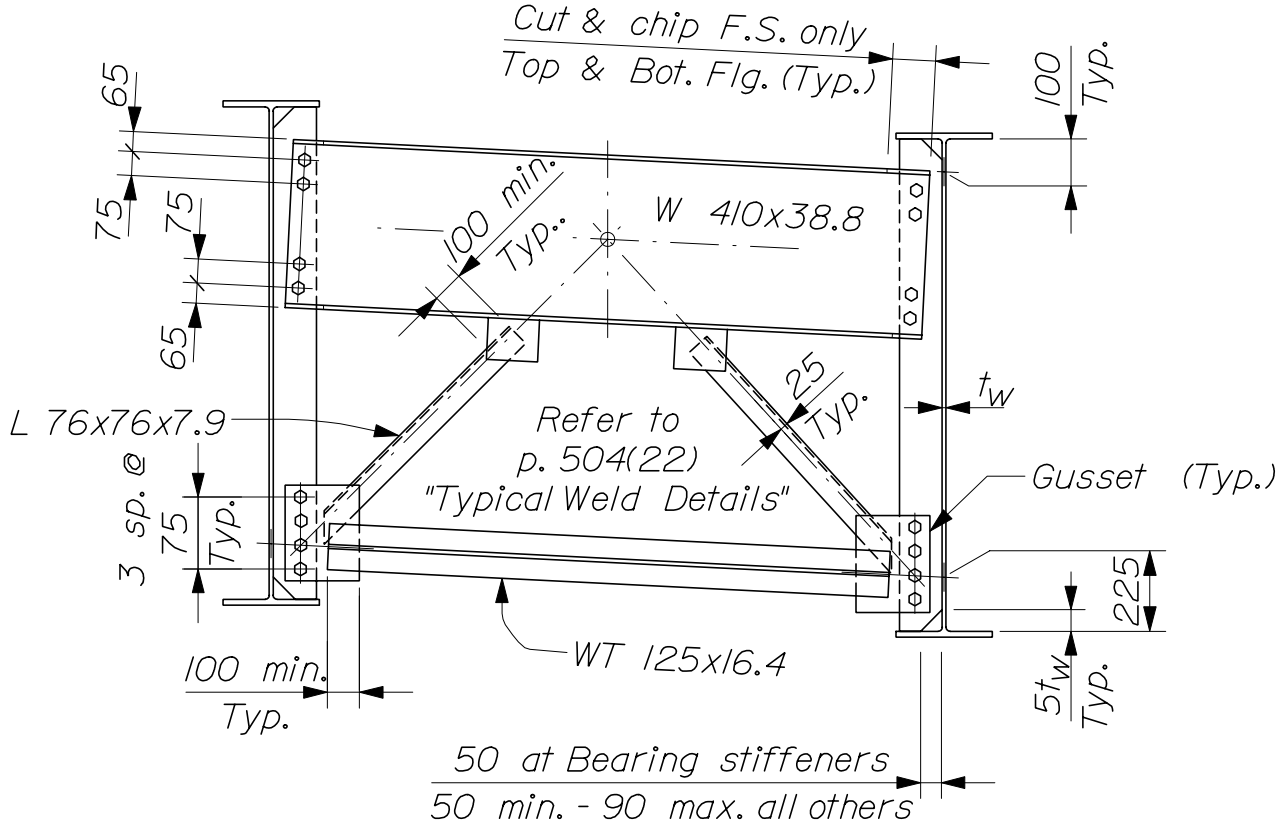


* with lateral system
** without lateral system

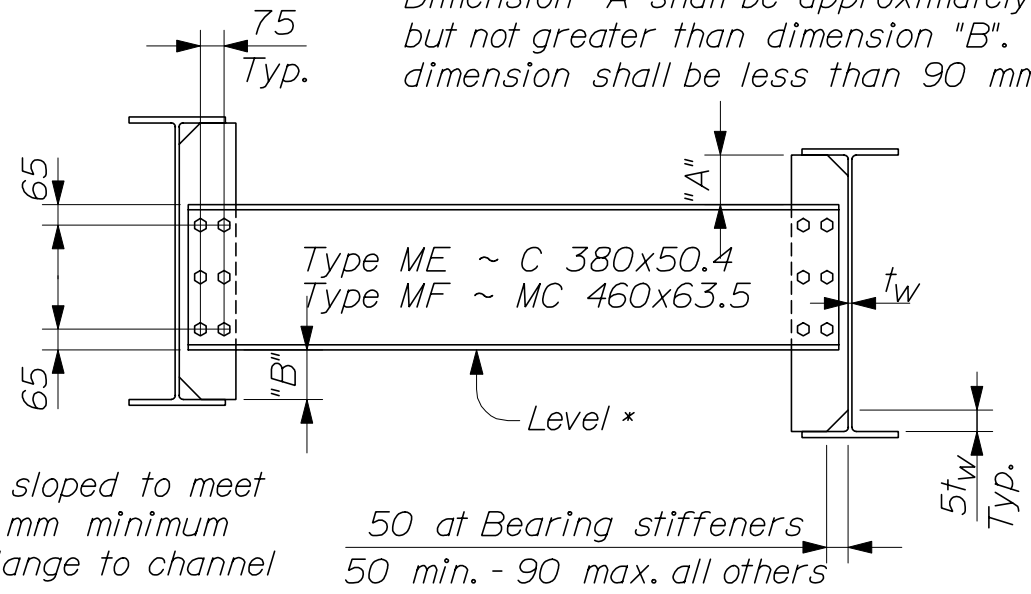
-- TYPE MC1 & MC2 --

DIAPHRAGMS

504(15)

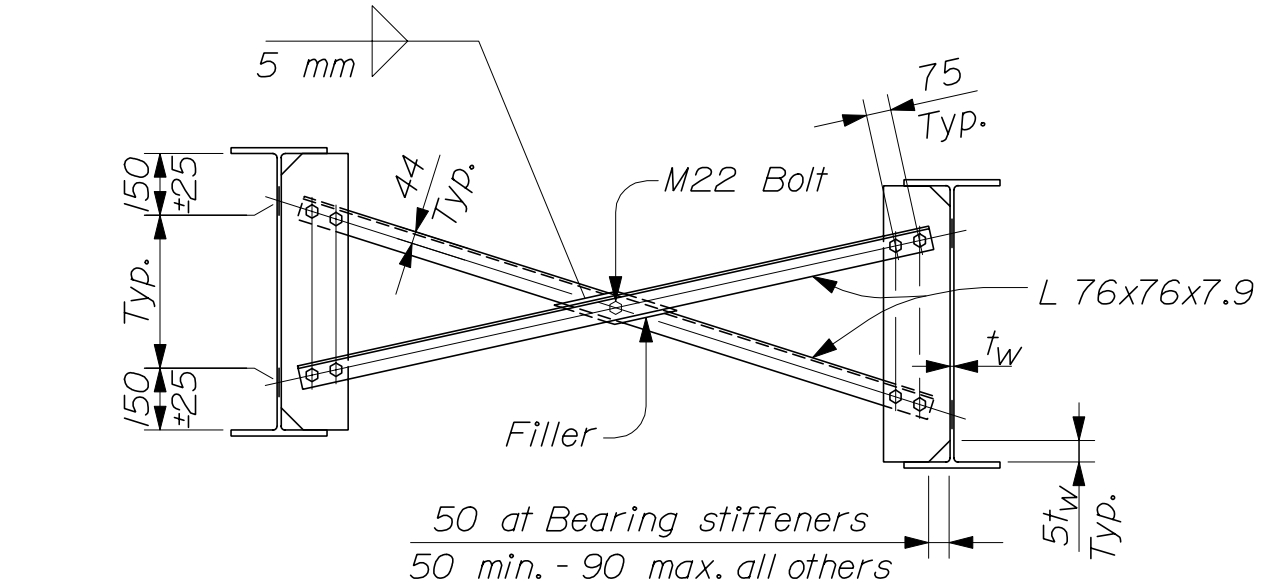


-- TYPE MD --



* May be sloped to meet the 90 mm minimum from flange to channel

-- TYPE ME & MF --



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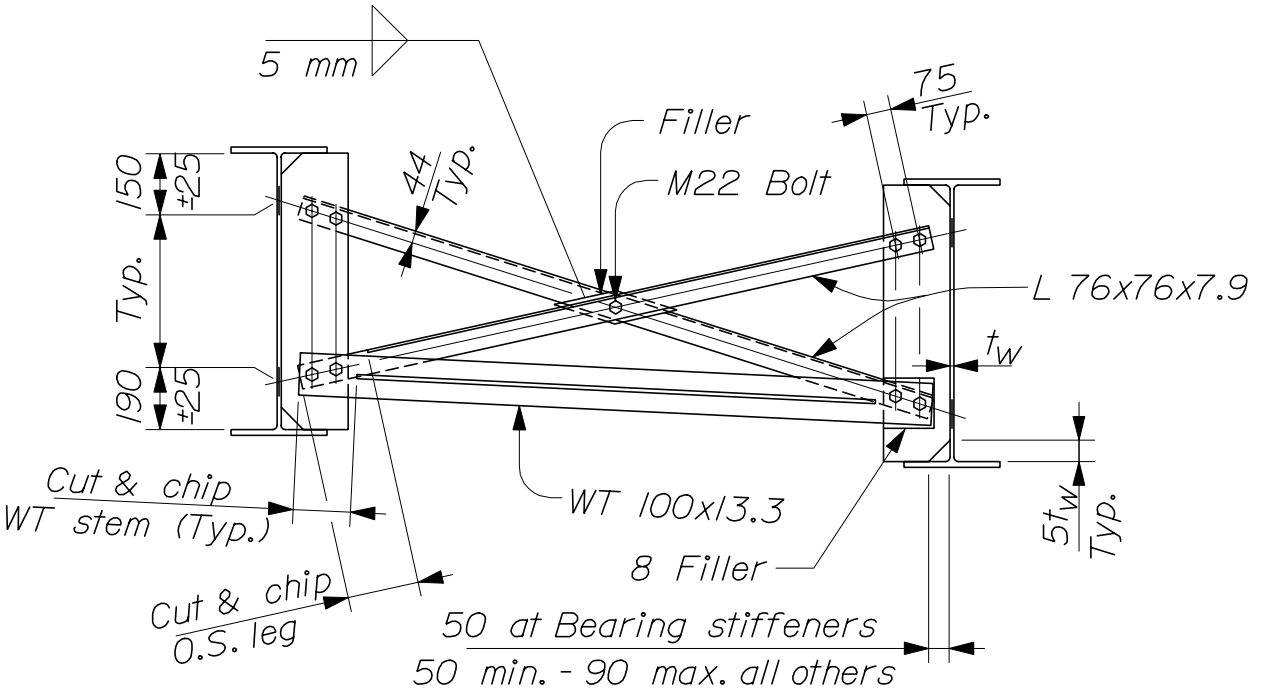

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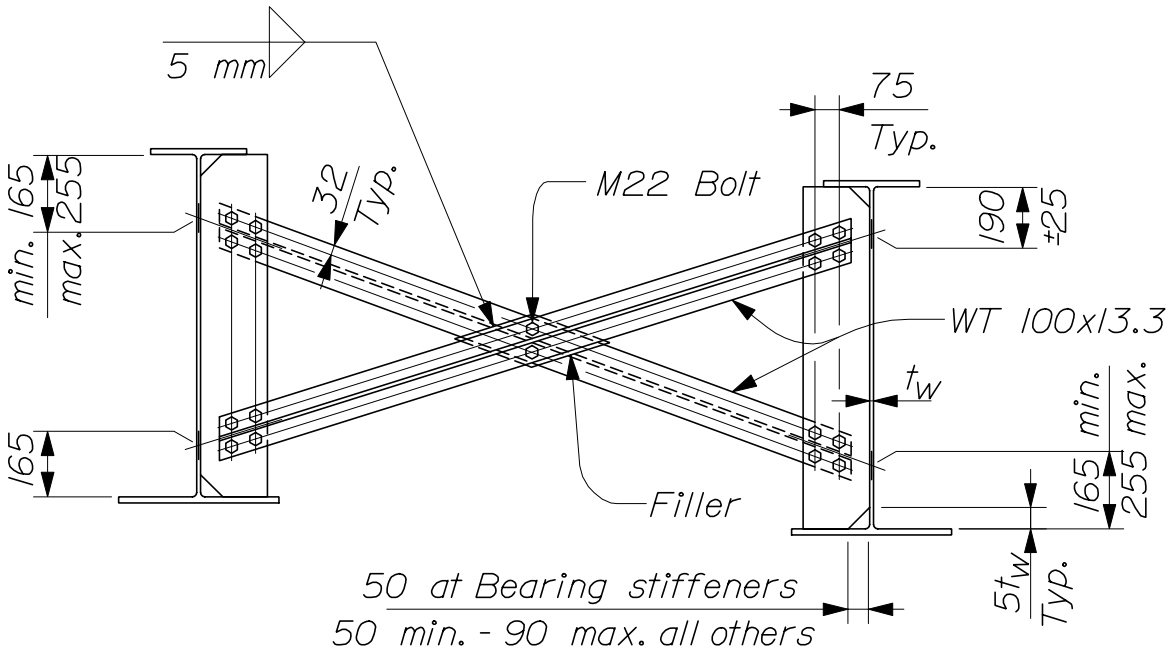

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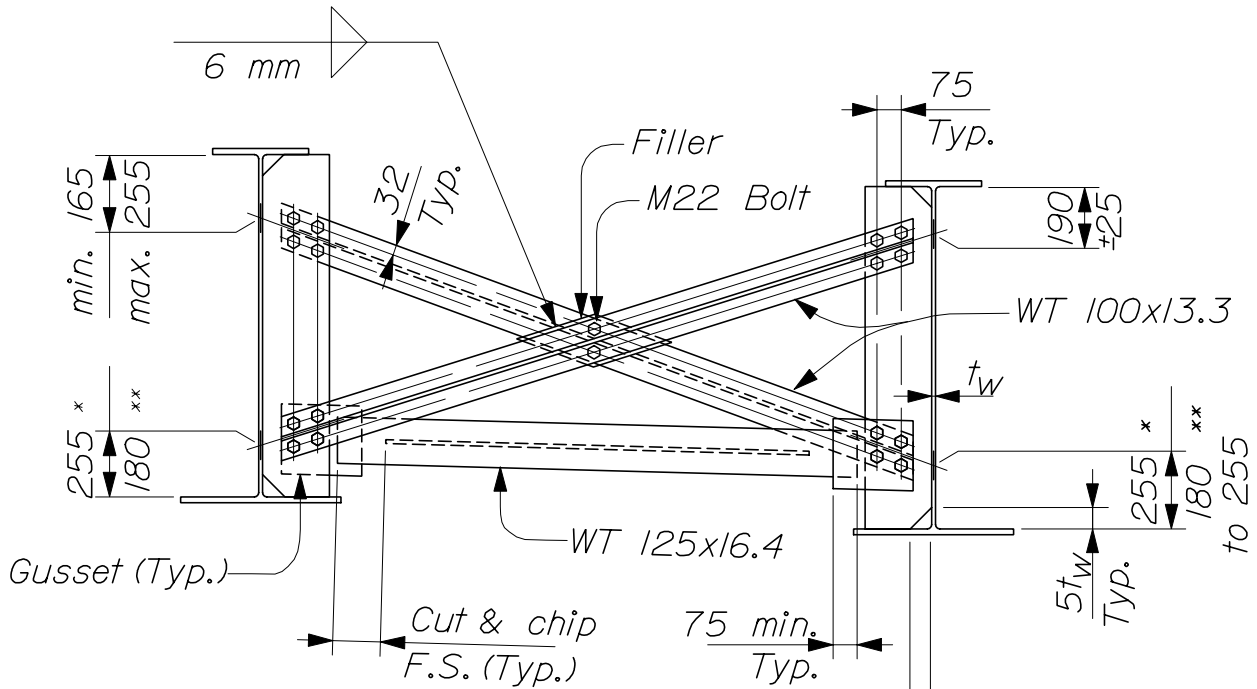
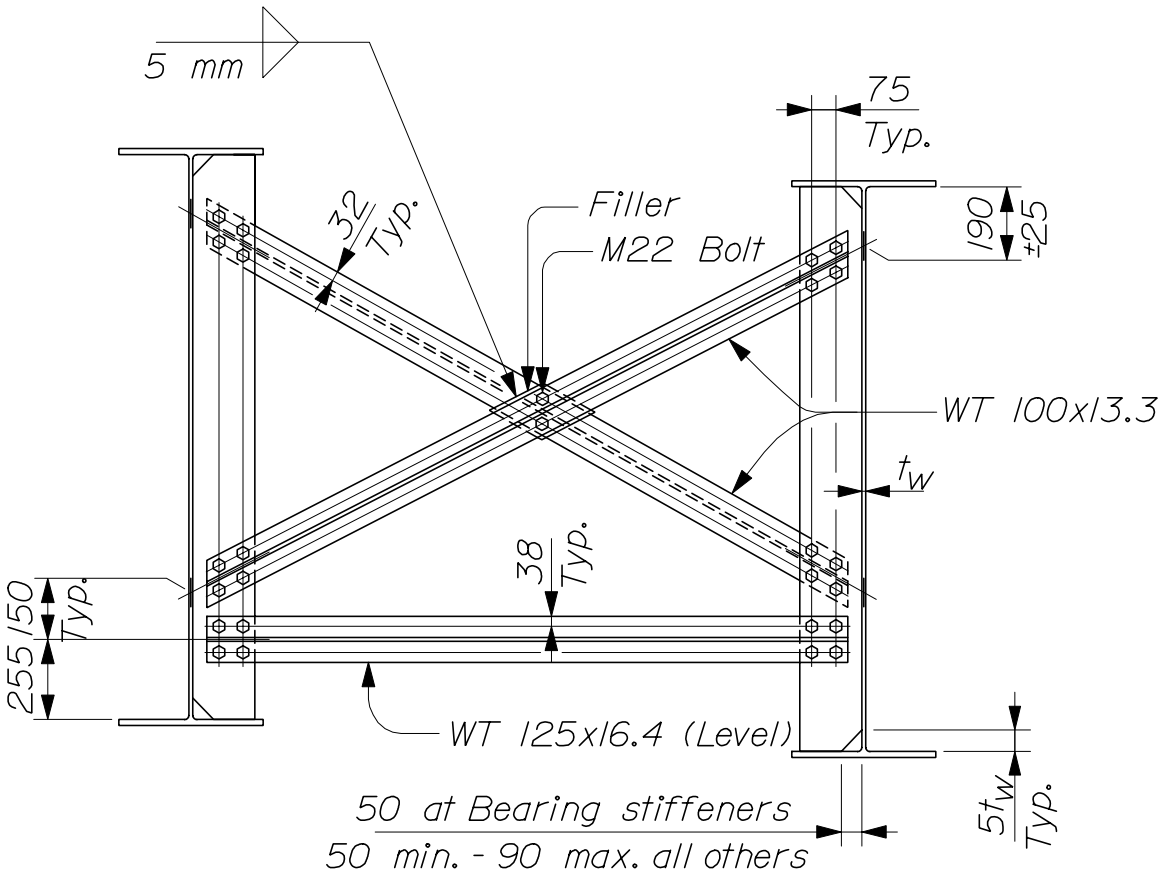


Refer to p. 504(22)
"Typical Weld Details"

* with lateral system
** without lateral system

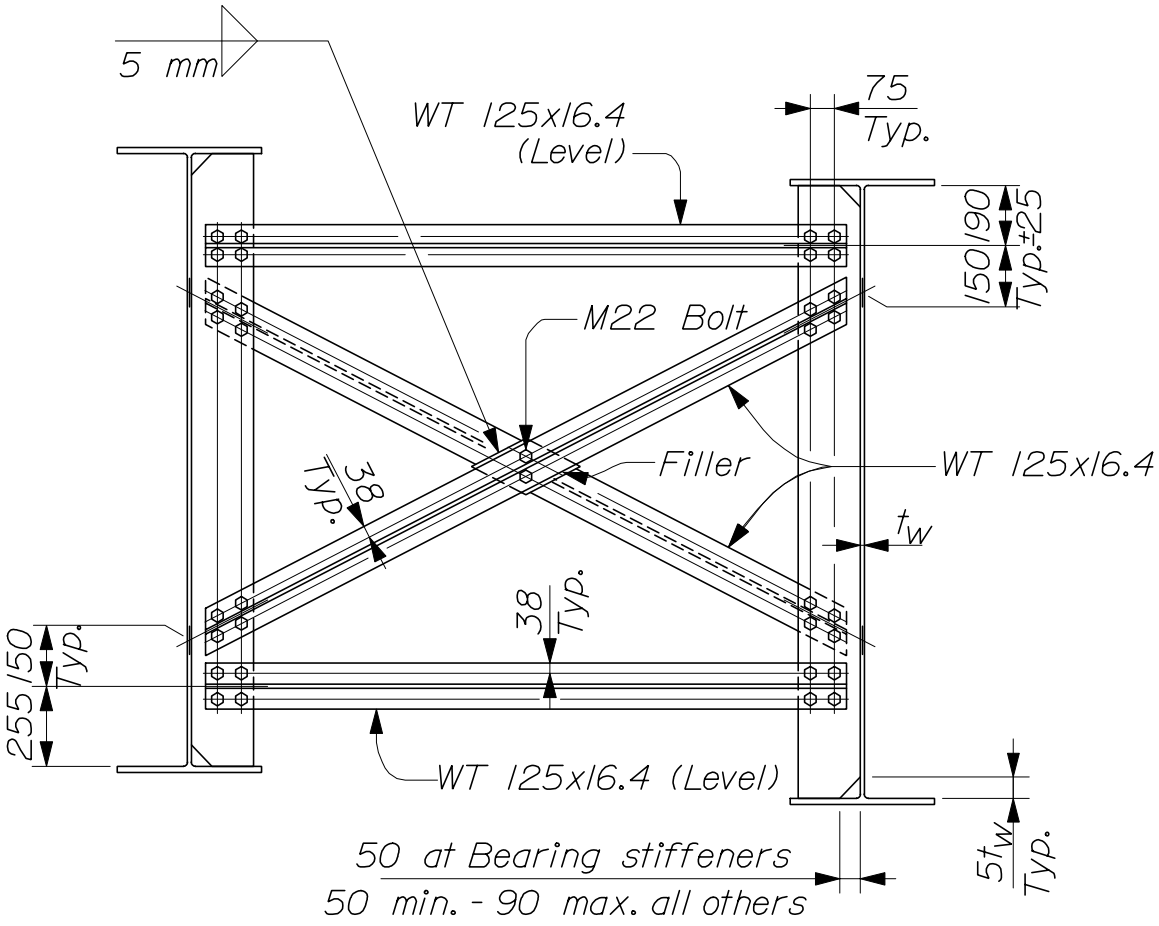
-- TYPE MK --



-- TYPE ML --

CROSSFRAMES

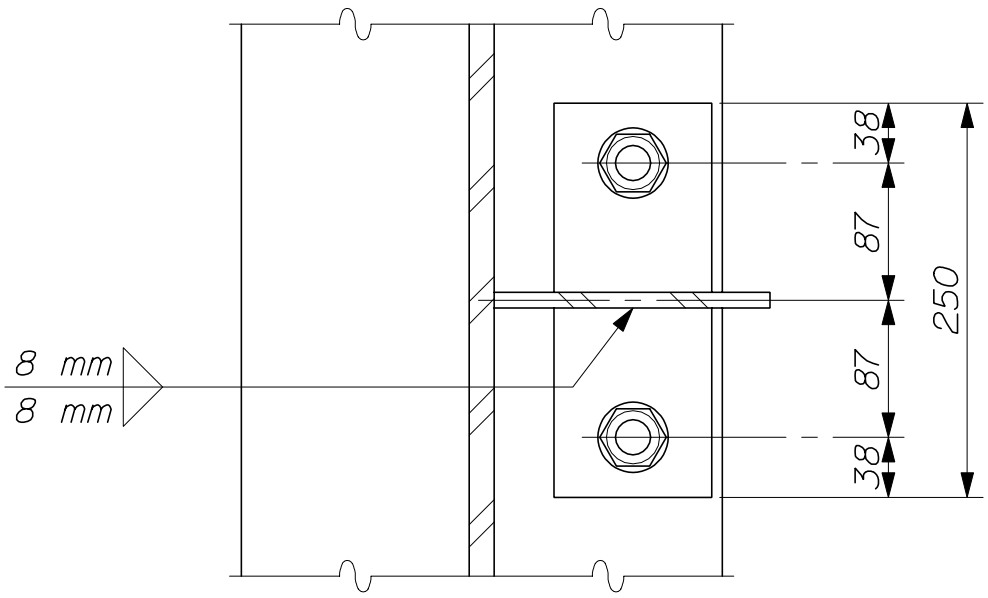
504(19)



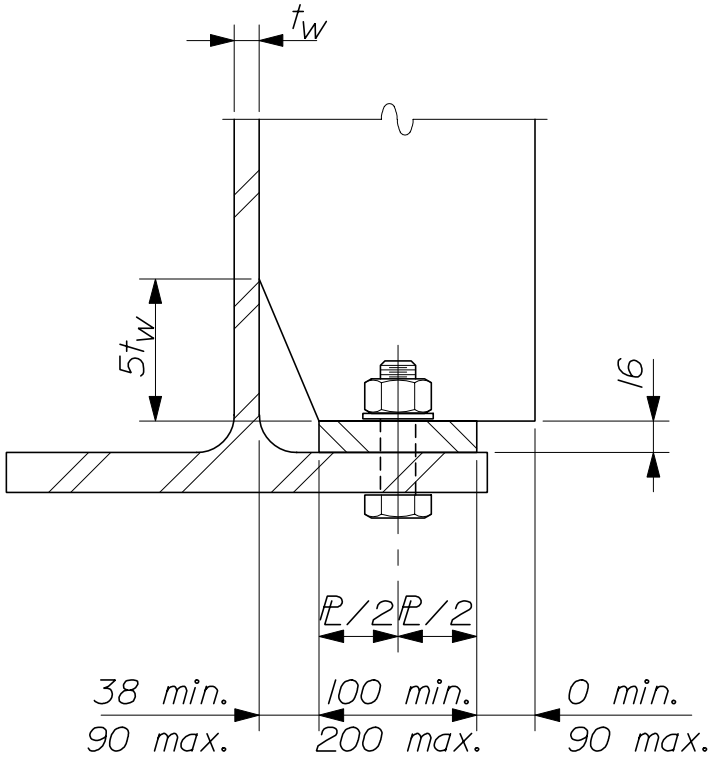
-- TYPE MM --

CROSSFRAMES

504(20)



-- PLAN --



-- SECTION --

TENSION FLANGE CONNECTION FOR DIAPHRAGMS & CROSSFRAMES

504(21)

NOTES:

1. Steel for diaphragms, crossframes, connection plates, gussets and stiffeners shall be as designated on the Design Drawings.

2. Bolt holes shall be 24 mm (15/16 in.). The minimum edge distance shall be 38 mm (1 1/2 in.) unless otherwise shown on the Design Drawings. Oversized holes may be used with the permission of the Resident.

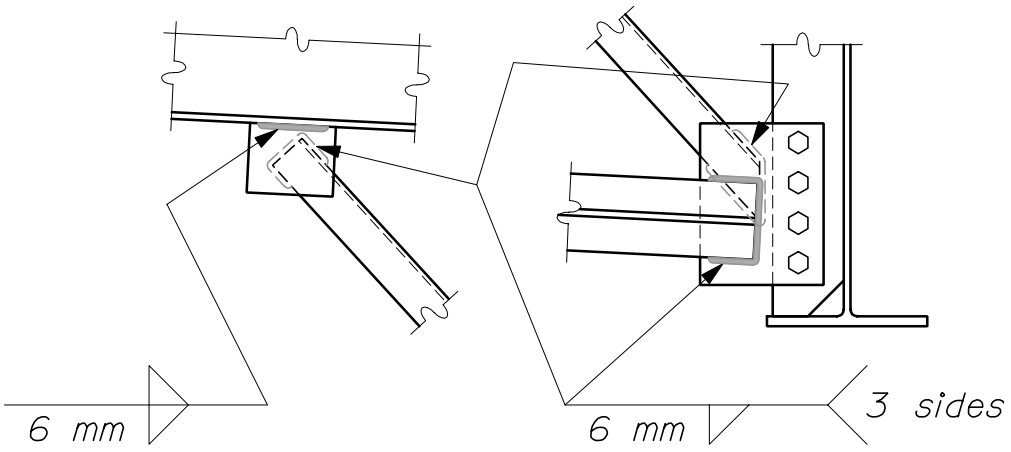
3. Connection plates and gussets shall be 10 mm (3/8 in.) minimum thickness. Connection plates shall be 175 mm (7 in.) minimum width. The plate thickness for stiffeners and bent connection plates shall be as shown on the Design Drawings.

4. Connection plates shall be full web depth except that connection plates shall be connected to flanges in tension and stress reversal using the "Tension Flange Connection" detail.

5. Bearing stiffeners shall be mill - to - bear on the bottom flange and tight fit to the top flange. Bearing stiffeners used as connection plates shall be connected to flanges in tension and stress reversal using the "Tension Flange Connection" detail.

6. Intermediate stiffeners not intended to carry concentrated loads shall be tight fit to both flanges. Intermediate stiffeners used as connection plates shall be detailed as connection plates.

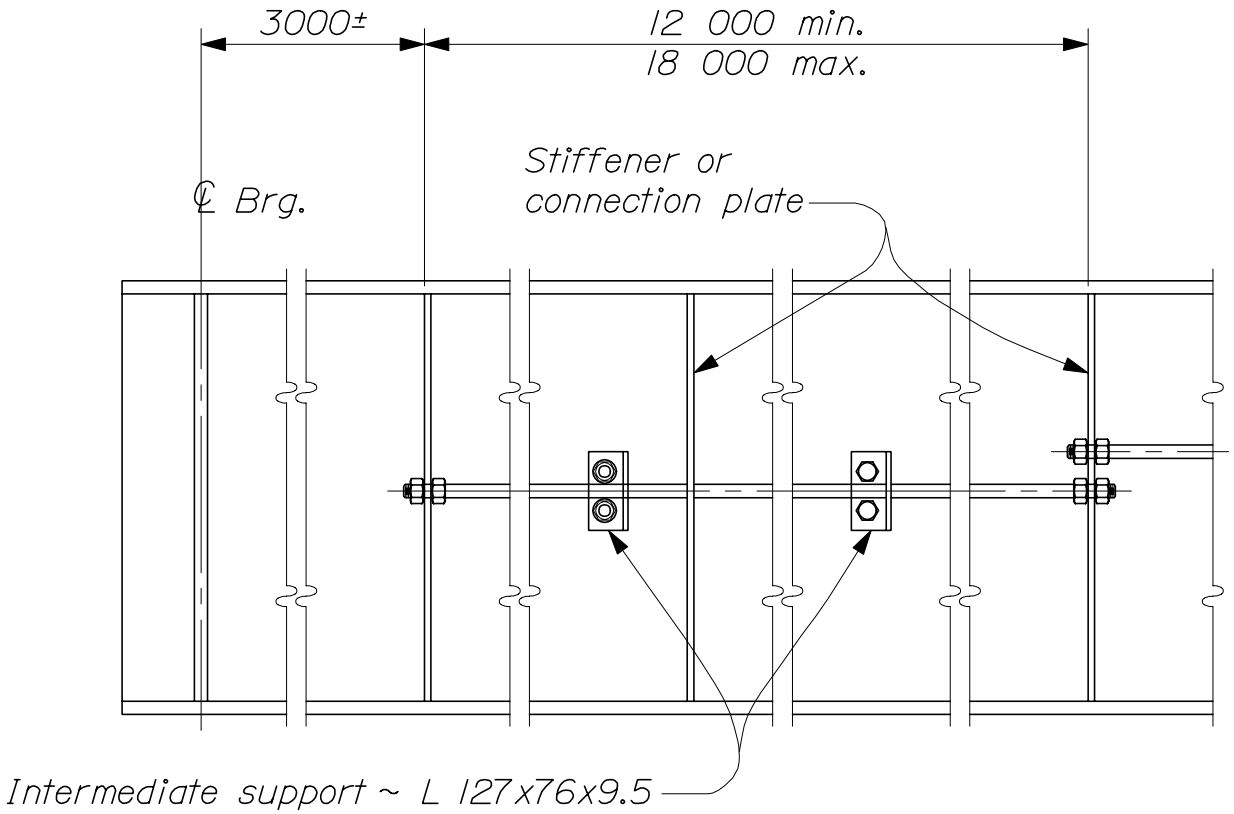
7. Stiffeners not used as connection plates shall be welded to the web only. Connection plates and stiffeners used as connection plates shall be welded to the web and flanges (or "Tension Flange Connection" detail) on both sides of the plates. The welds shall terminate 15 mm ± 3 mm (5/8 in. ± 1/8 in.) from the ends of the plates.



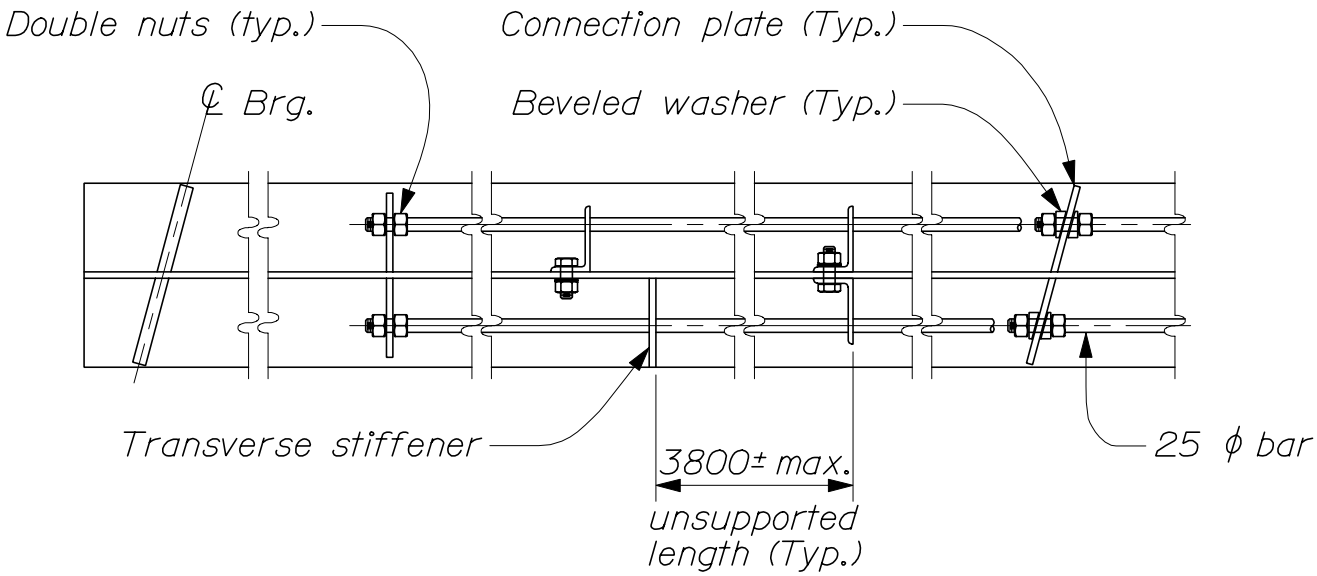
-- TYPICAL WELD DETAILS --

DIAPHRAGM & CROSSFRAME NOTES

504(22)



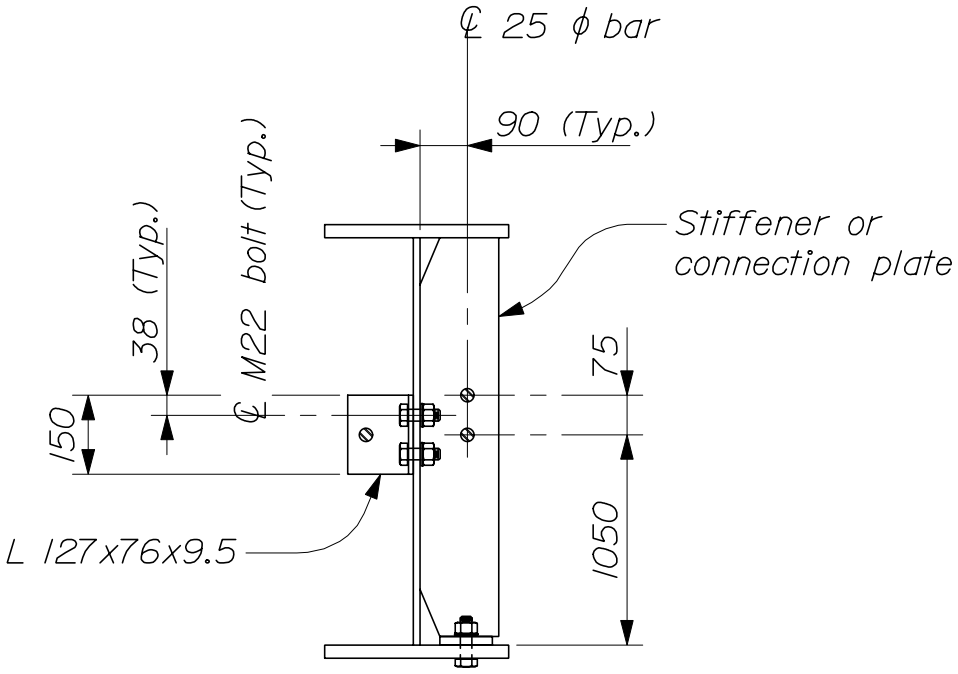
-- ELEVATION --



-- PLAN --

HAND - HOLD DETAILS

504(23)



-- TYPICAL SECTION --

NOTES:

1. Hand - hold bars shall be installed on the inside of exterior beams and on both sides of interior beams when called for on the Design Drawings.

2. Termination and splicing of hand - hold bars shall occur at stiffeners or connection plates. Angle supports shall be used at intermediate locations only. All termination and splice plates shall be a minimum of 12 mm thick. Additional stiffeners shall be provided where necessary to meet the described requirements.

3. Hole sizes for bolts and hand - hold bars shall be 2 mm larger than the bolt / bar size. Edge distances for holes shall be 38 mm unless other wise shown.

4. For unpainted applications, the hand - hold bar and nuts shall be galvanized to con- form to ASTM A123.

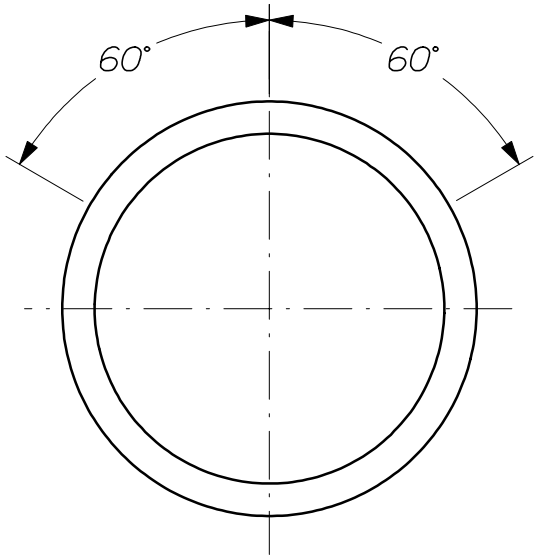
MATERIALS:

With unpainted structural steel - All steel----------ASTM A709/A709M, Grade 345W
Heavy hex nuts for 25 ϕ bar----------ASTM A563M, Class 8S3 or 10S3

With painted structural steel - All steel----------ASTM A709/A709M, Grade 250
Heavy hex nuts for 25 ϕ bar----------ASTM A 563M, Class 5

HAND - HOLD DETAILS

504(24)



~ PLACEMENT OF ANCHORS ~

Anchors shall be installed 400 mm from centerline of joint.

Holes for anchors shall be drilled larger than the anchor bolt diameter specified in the table below to allow for anchoring materials.

PIPE SIZE (I.D.)	THREAD ϕ
300 - 685	16 mm (5/8")
760 - 1675	19 mm (3/4")
1828 - 3 352	24 mm (1")

GENERAL NOTES

1. For new concrete pipe or pipe designated to be removed and reset, ties shall be used at all pipe inlets and outlets as specified in the construction notes.

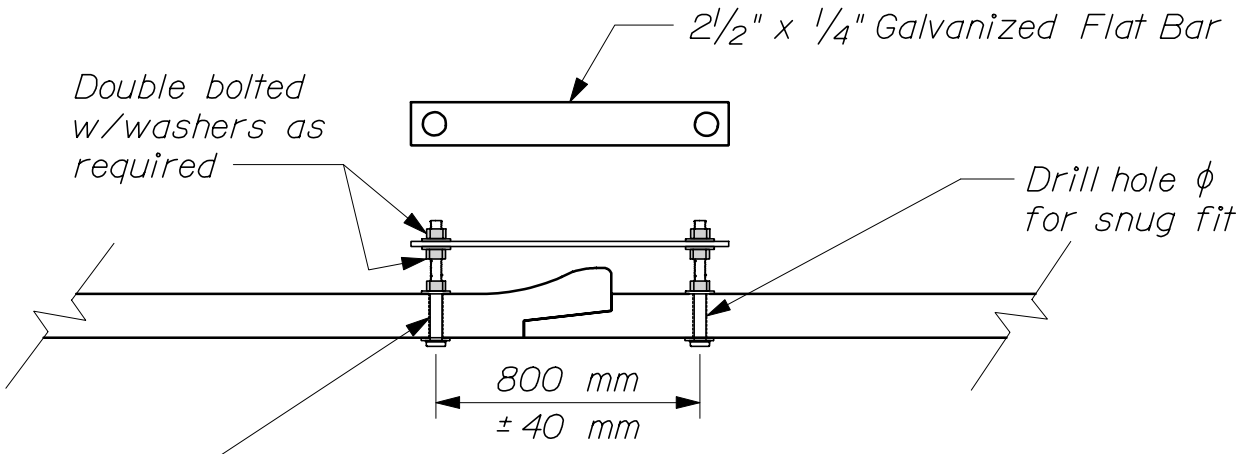
2. Ties shall be used only to hold pipe sections laterally together, not for pulling the pipe section together.

3. Tie rods and connections shall be placed on the outside of all pipe sections unless otherwise directed.

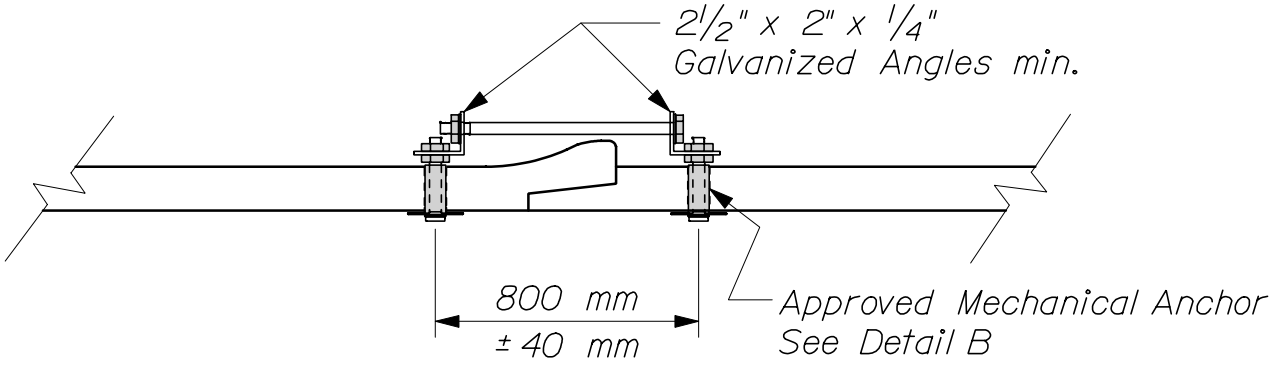
4. Tie rod shall be galvanized steel, including all hardware required. Any welded areas shall be treated with an approved galvanized paint. All welding shall meet current MDOT Specifications. Steel shall conform to ASTM - 8307 or equivalent.

CONCRETE PIPE TIES

504(25)

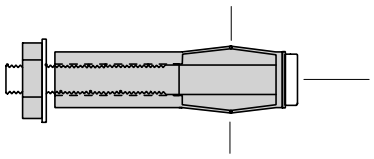


GALVANIZED BOLTED ANCHOR
~ W/GALVANIZED FLATBAR CONNECTION ~



~ MECHANICAL ANCHOR W/ GALVANIZED PLATE ~
CORE DRILL HOLES

TABLE A	
THREAD ϕ	PIPE I.D.
16 mm	19 mm
19 mm	25 mm
25 mm	32 mm

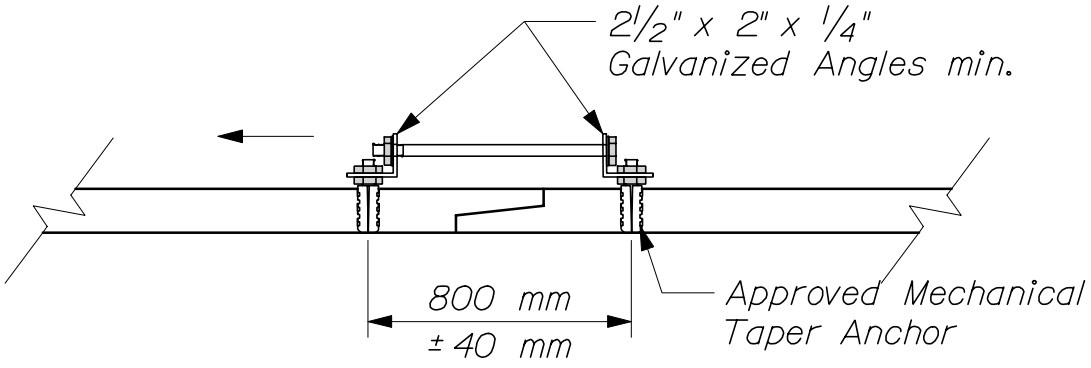


Compression/Expansion Type
Mechanical Anchor

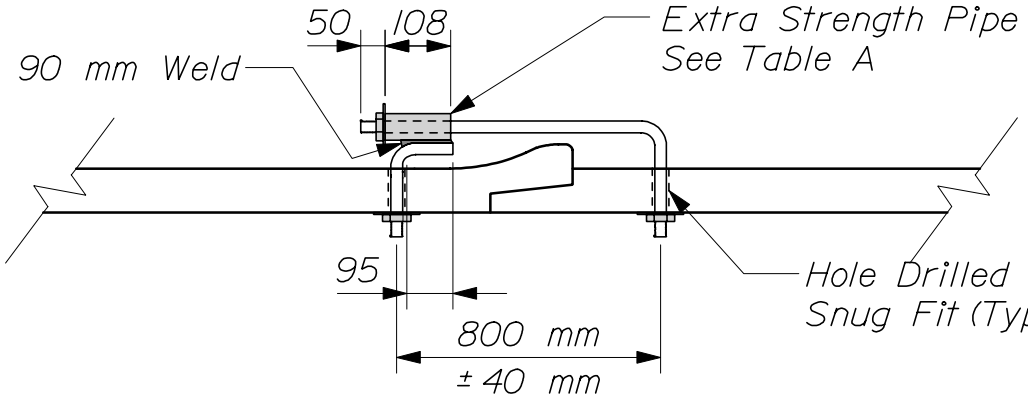
~ DETAIL B ~

CONCRETE PIPE TIES

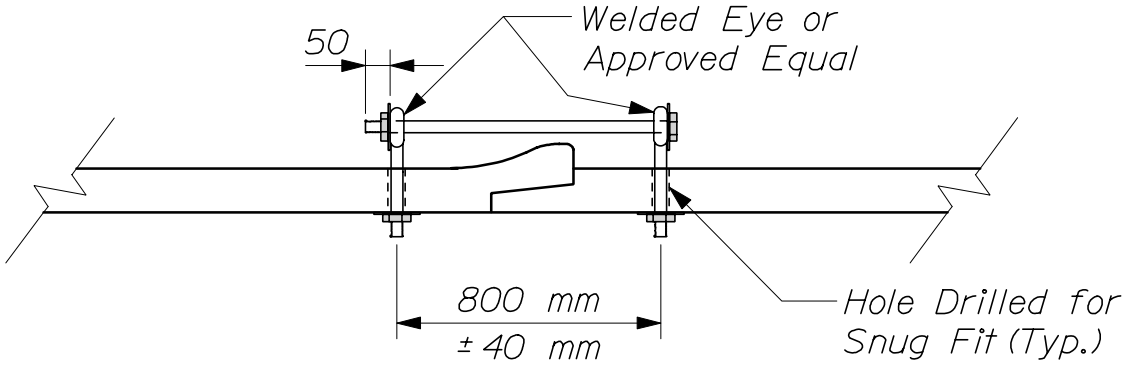
504(26)



~ MECHANICAL ANCHOR W/GALVANIZED ANGLE PLATE ~



~ WELDED PIPE TIE ~

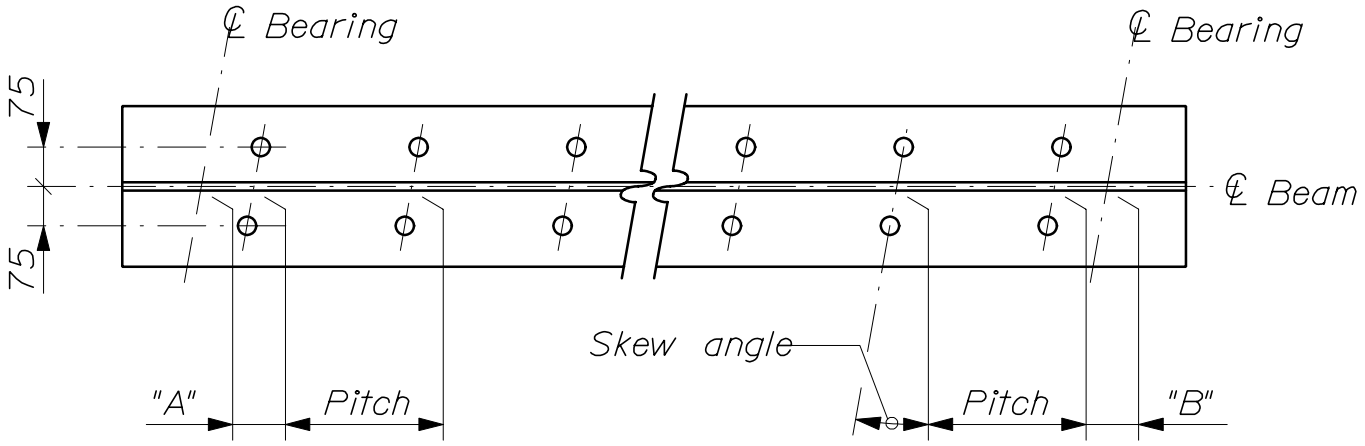


~ EYE BOLT TIE ~

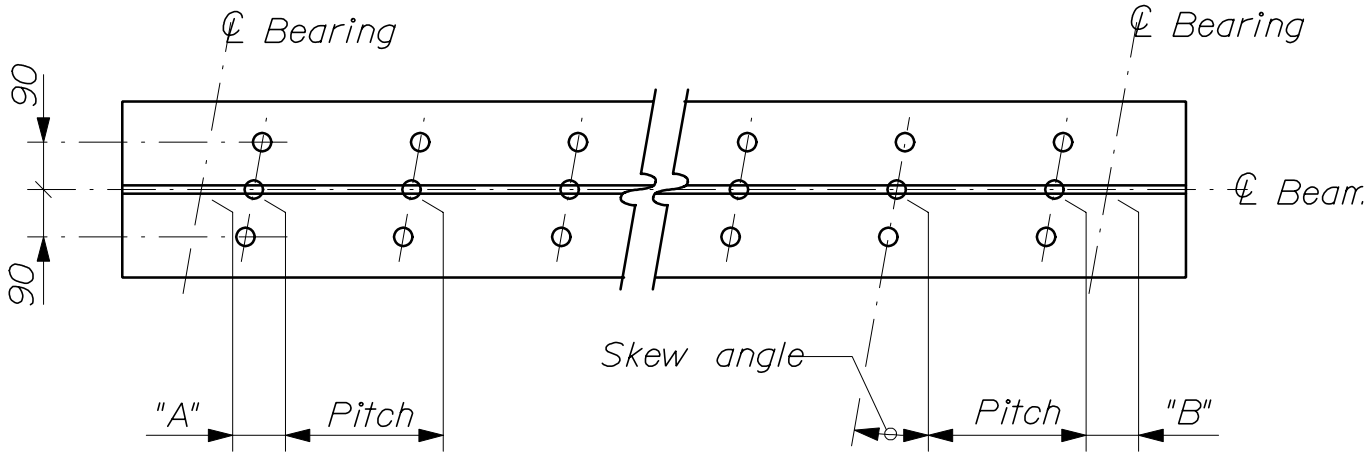
TABLE A	
THREAD ϕ	PIPE I.D.
16 mm 19 mm 25 mm	19 mm 25 mm 32 mm

CONCRETE PIPE TIES

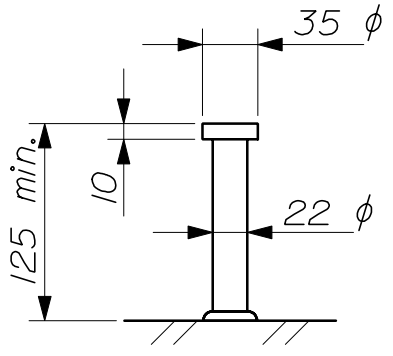
504(27)



-- DOUBLE STUD LAYOUT --



-- TRIPLE STUD LAYOUT -1:15



1:5

-- STUD DETAIL --

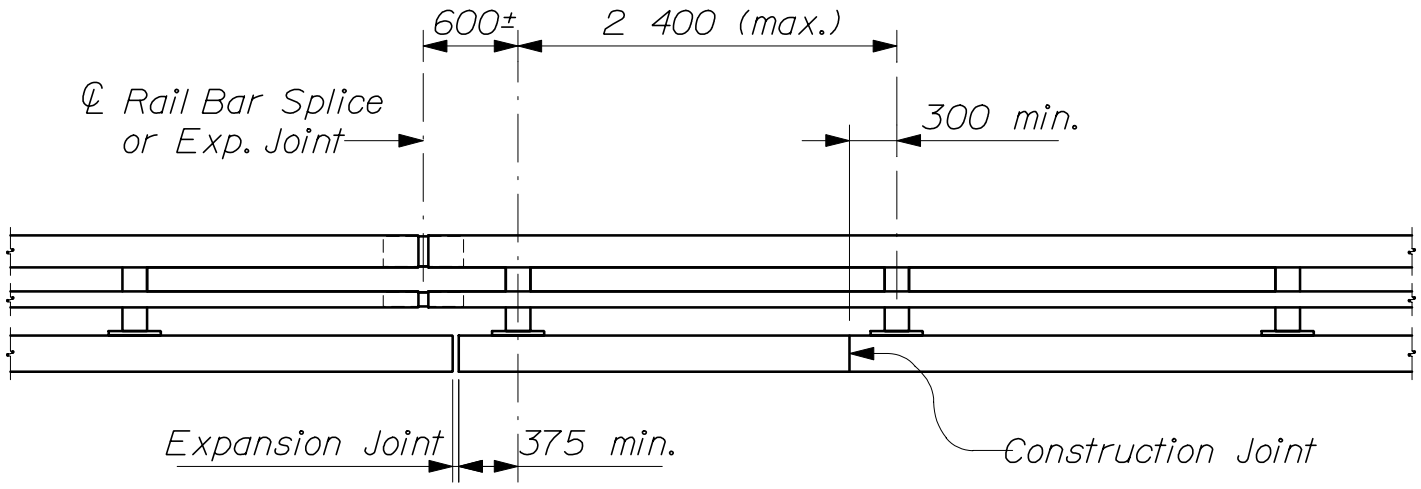
NOTES;

1. Refer to Design Drawings for dimensions "A" and "B", stud pitch and skew angle.

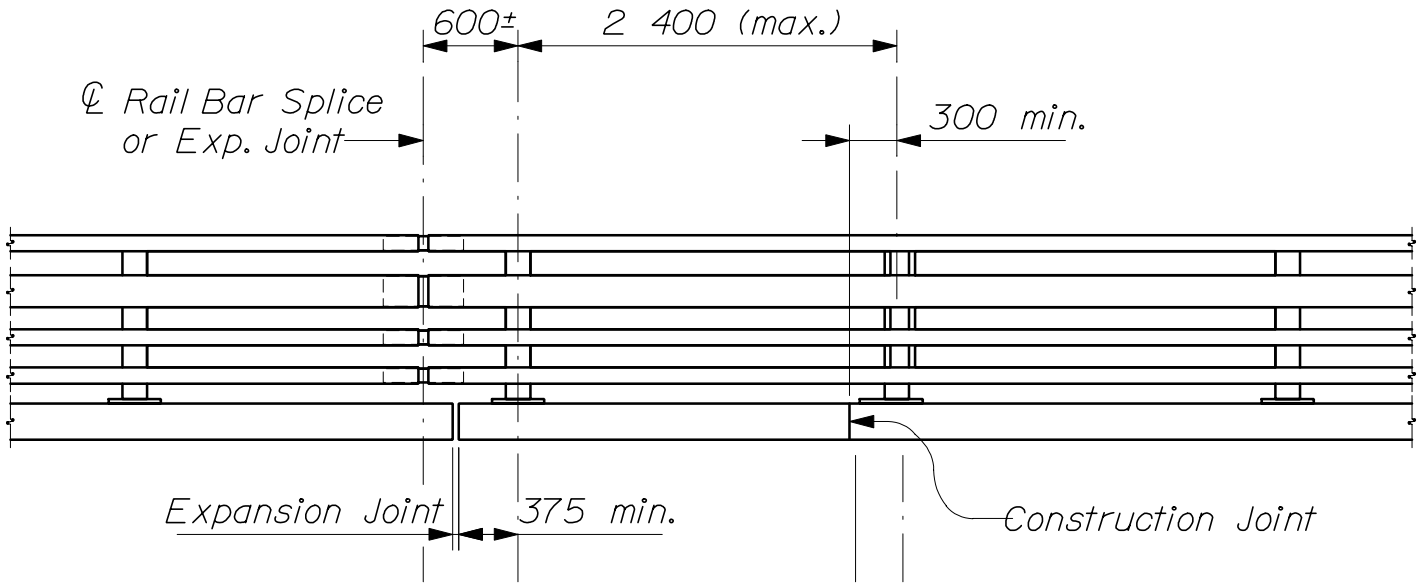
2. Studs shall project a minimum of 50 mm above the bottom of the slab.

SHEAR CONNECTORS

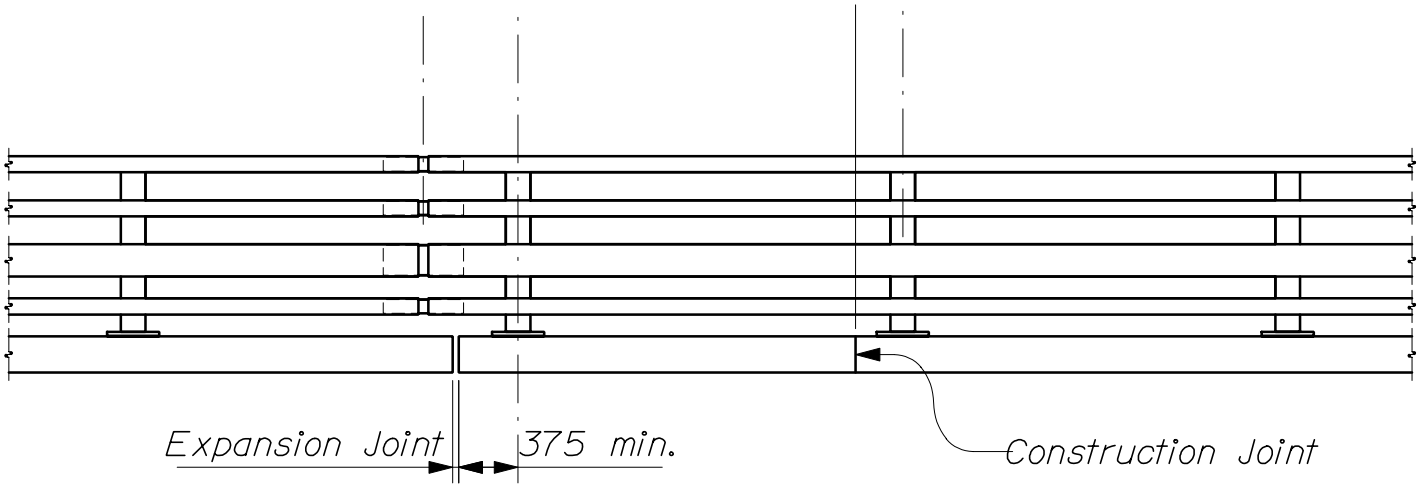
505(01)



-- 2 - BAR TRAFFIC RAILING --



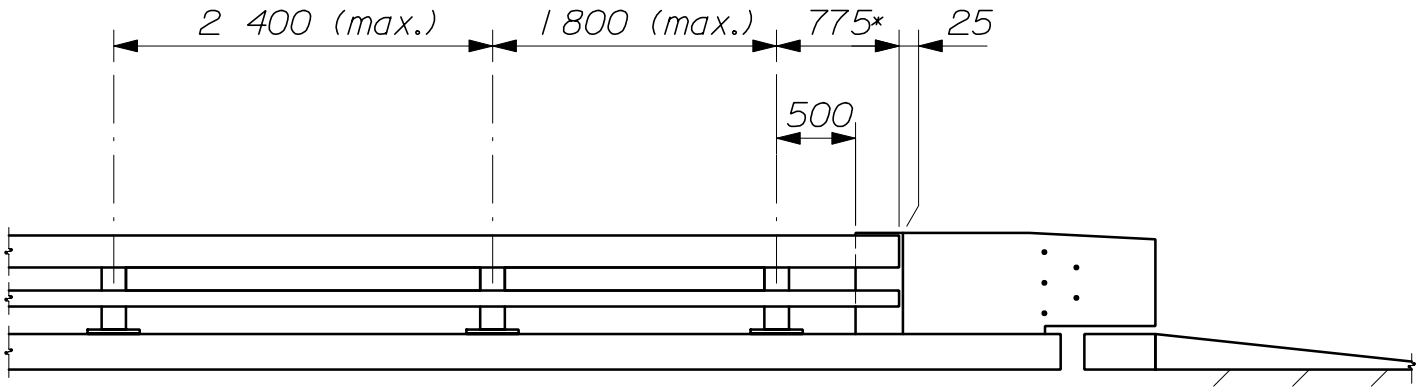
-- 4 - BAR TRAFFIC / PEDESTRIAN RAILING --



-- 4 - BAR TRAFFIC / BICYCLE RAILING --

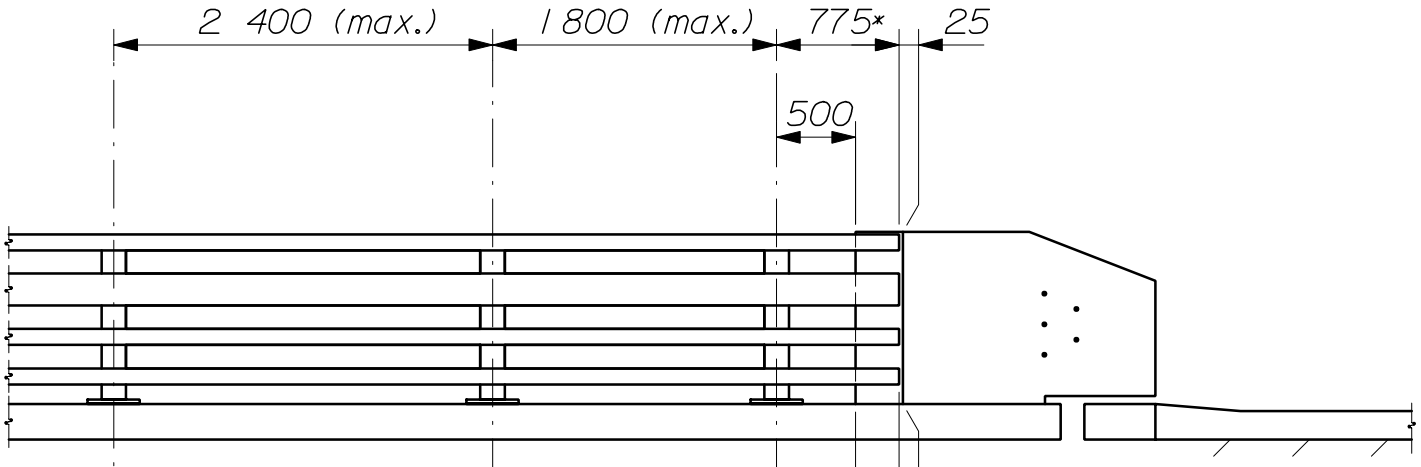
STEEL BRIDGE RAILING

507(01)

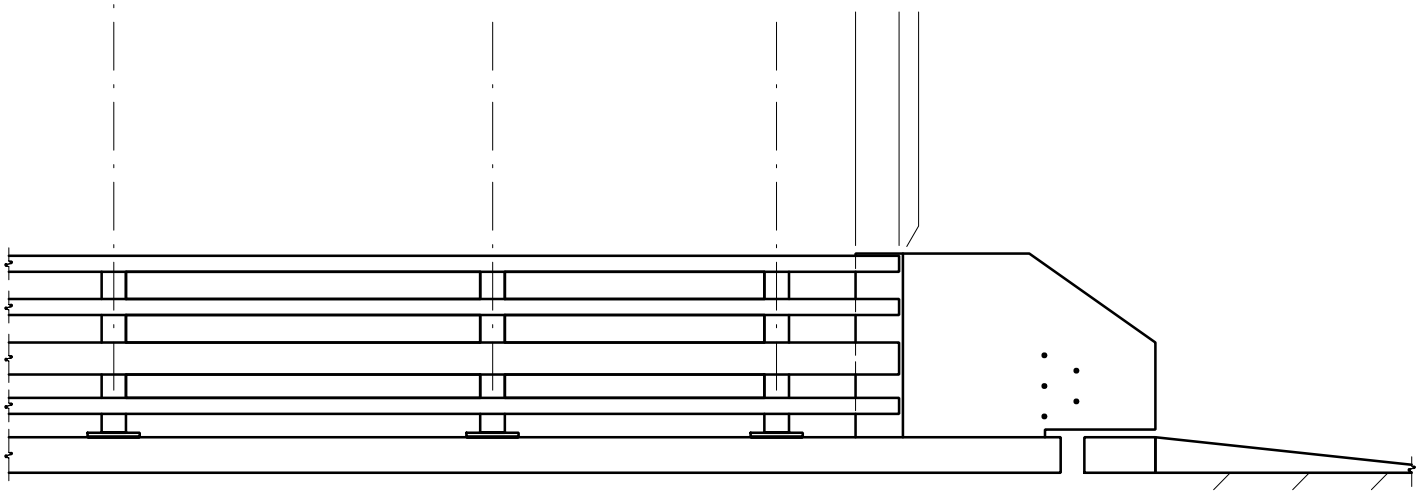


-- 2 - BAR TRAFFIC RAILING --

* Including rail bar cap



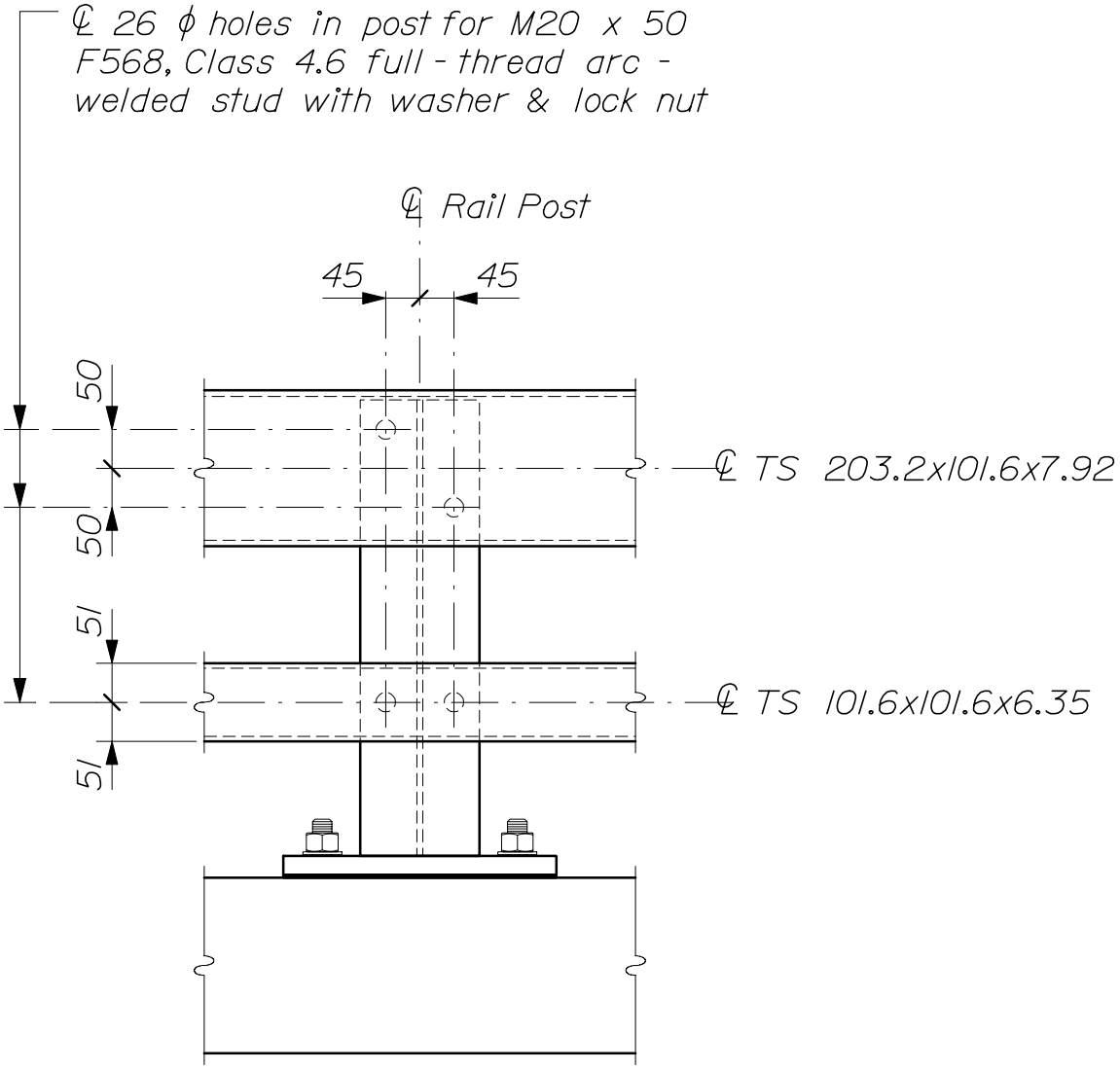
-- 4 - BAR TRAFFIC / PEDESTRIAN RAILING --



-- 4 - BAR TRAFFIC / BICYCLE RAILING --

STEEL BRIDGE RAILING

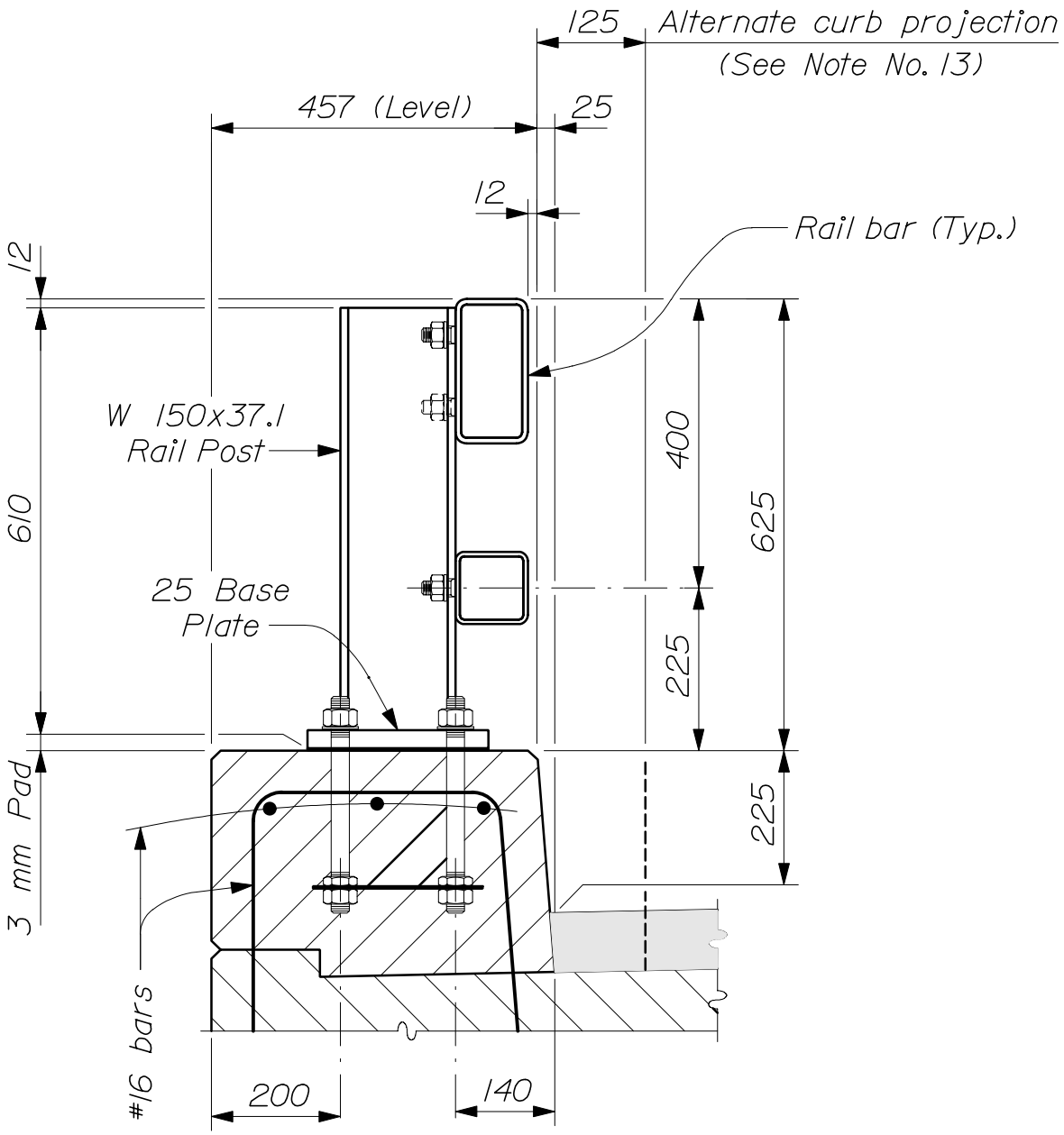
507(02)



-- TYPICAL ELEVATION --
2 - Bar Traffic Railing is shown
Other railing configurations are similar

# STEEL BRIDGE RAILING
507(03)

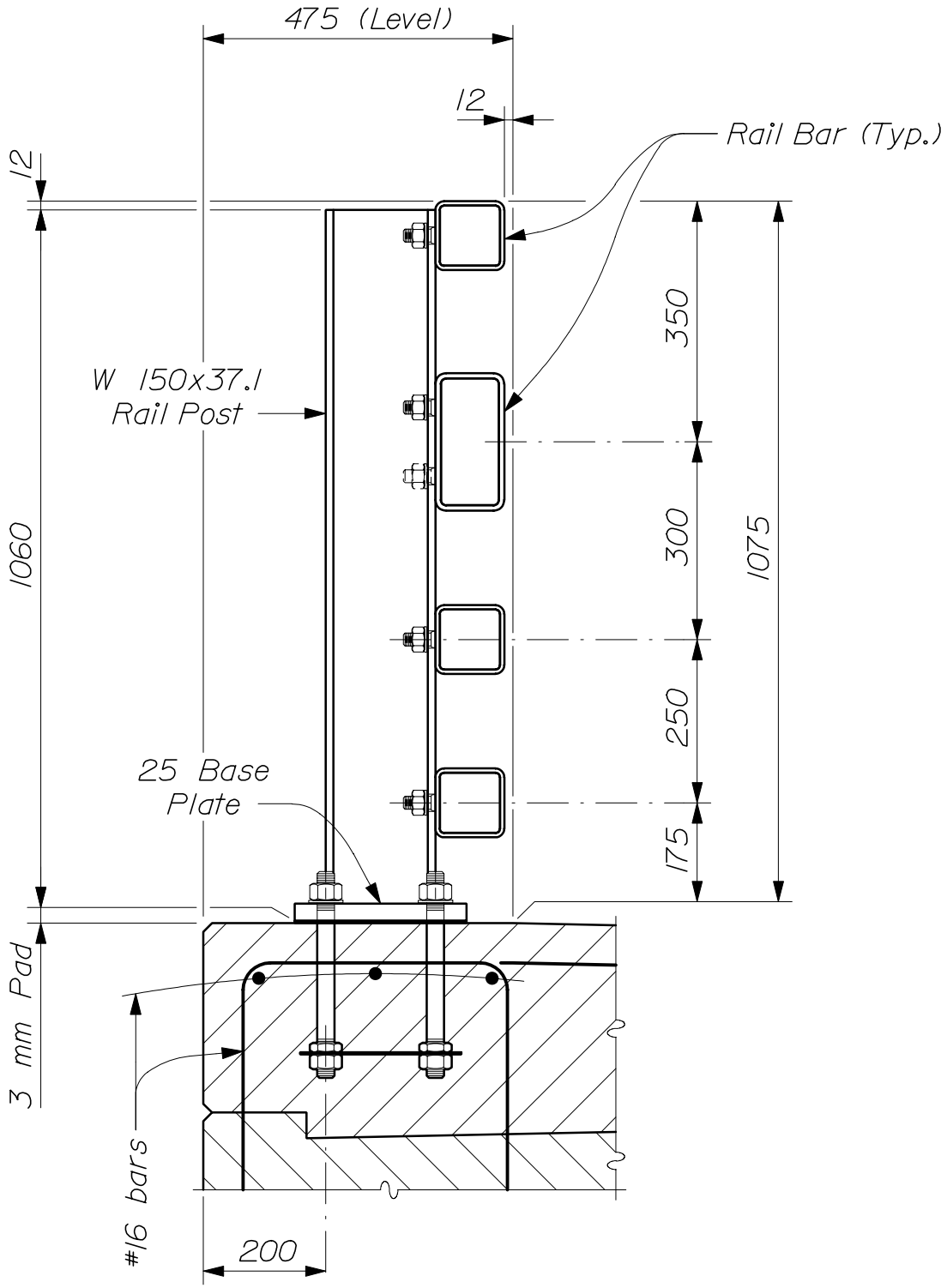
Rail Bars ~
TS 203.2x101.6x7.92 (1)
TS 101.6x101.6x6.35 (1)



-- TYPICAL SECTION --
(2 - Bar Traffic Railing)

# STEEL BRIDGE RAILING
507(04)

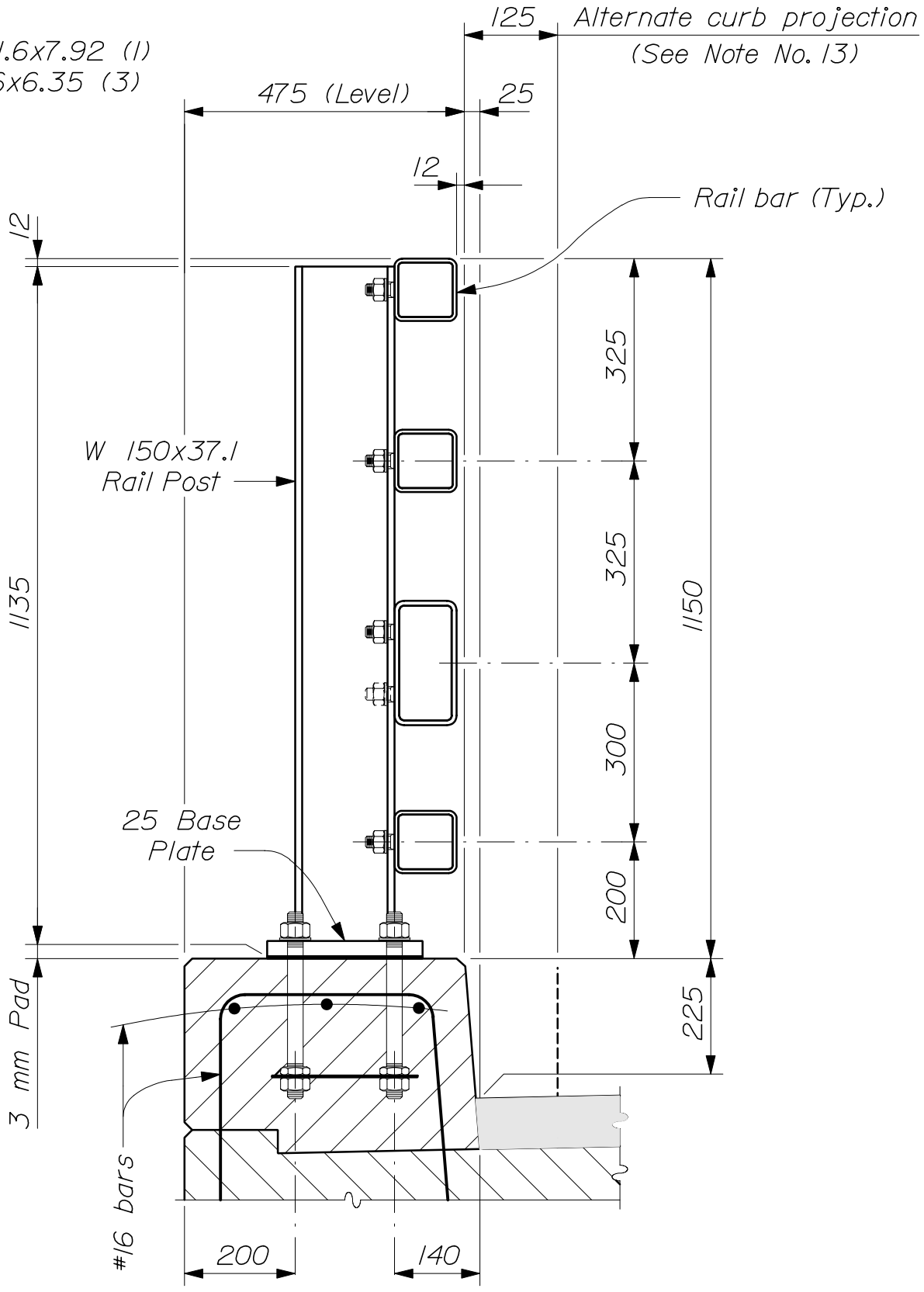
Rail Bars ~
TS 203.2x101.6x7.92 (1)
TS 101.6x101.6x6.35 (3)



-- TYPICAL SECTION --
(4 - Bar Traffic / Pedestrian Railing)

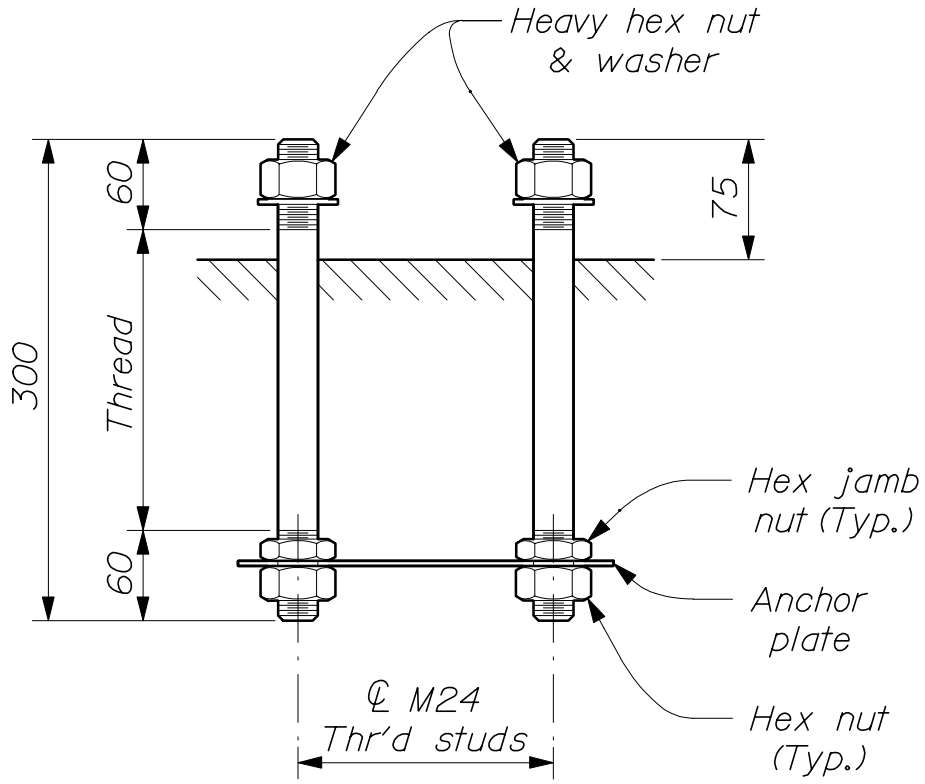
# STEEL BRIDGE RAILING
507(05)

Rail Bars ~
TS 203.2x101.6x7.92 (1)
TS 101.6x101.6x6.35 (3)

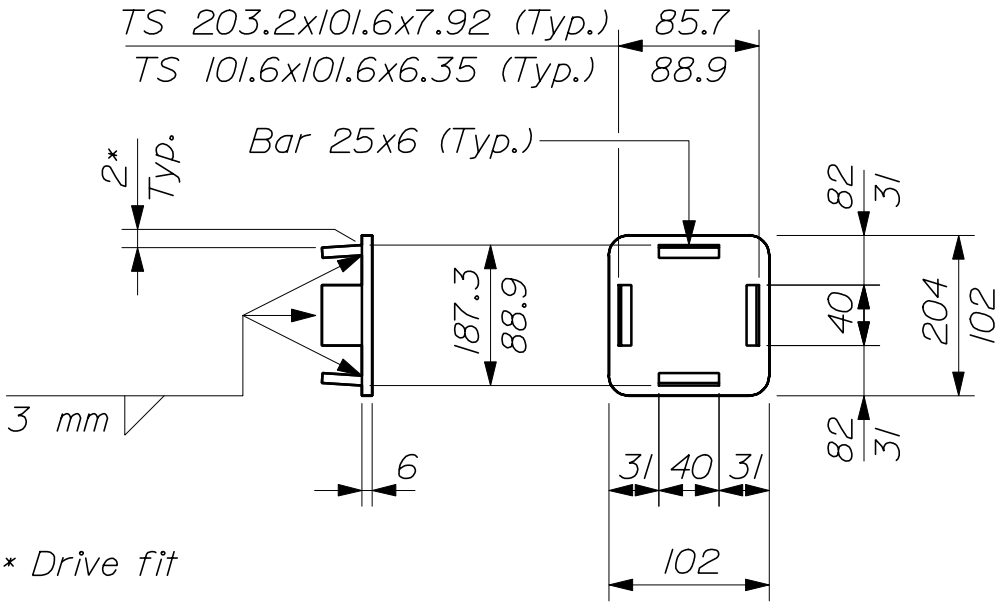


-- TYPICAL SECTION --
(4 - Bar Traffic / Bicycle Railing)

# STEEL BRIDGE RAILING
507(06)



-- RAIL POST ANCHORAGE --

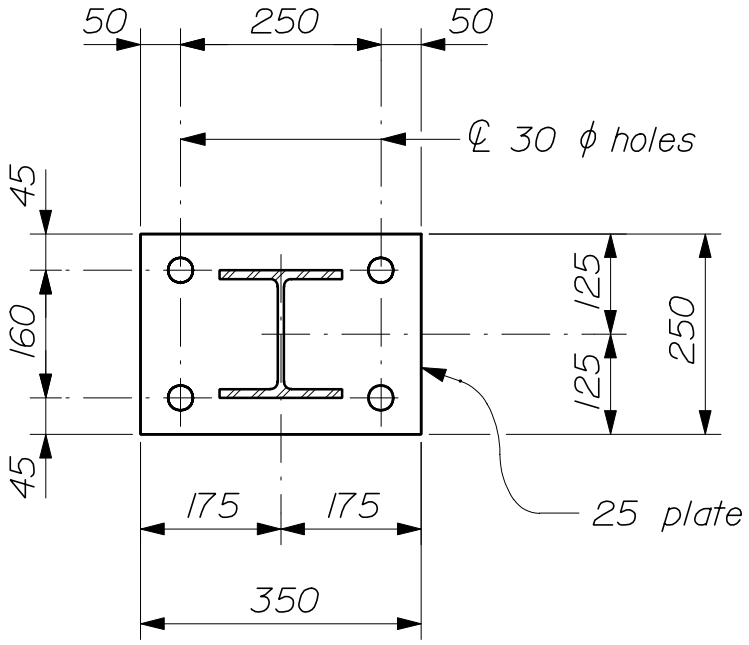


-- RAIL BAR CAP --

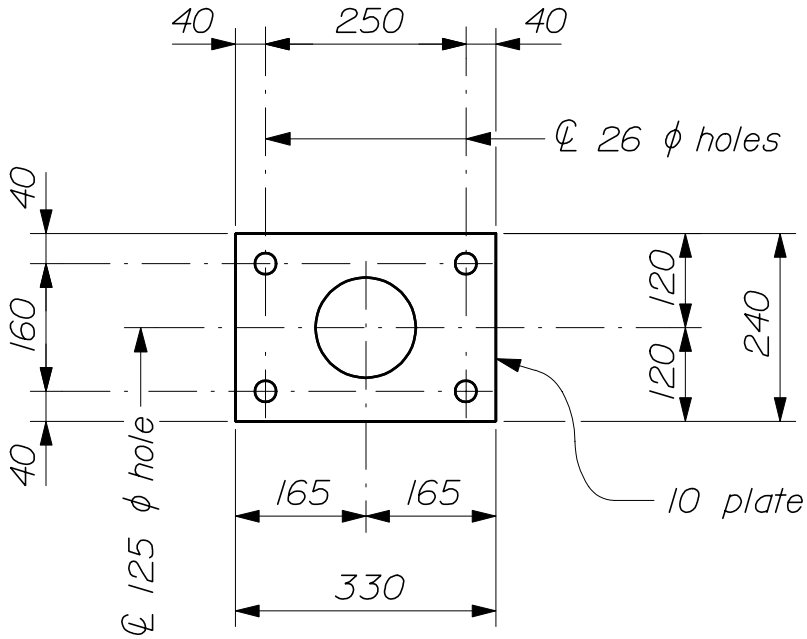
Note: Corner radius shall match rail bar

STEEL BRIDGE RAILING

507(07)



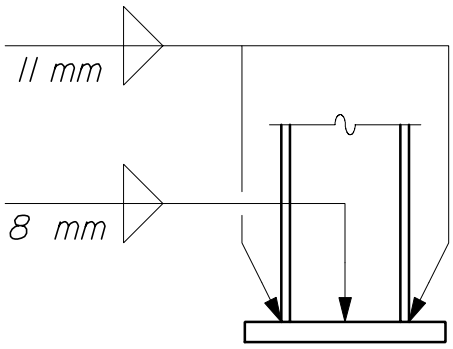
-- POST & BASE PLATE PLAN --



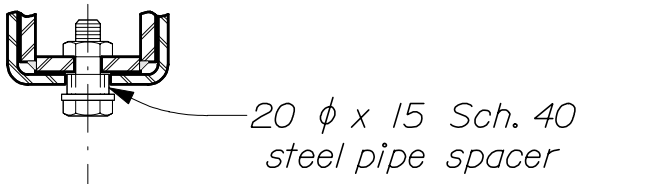
-- ANCHOR PLATE PLAN --

STEEL BRIDGE RAILING

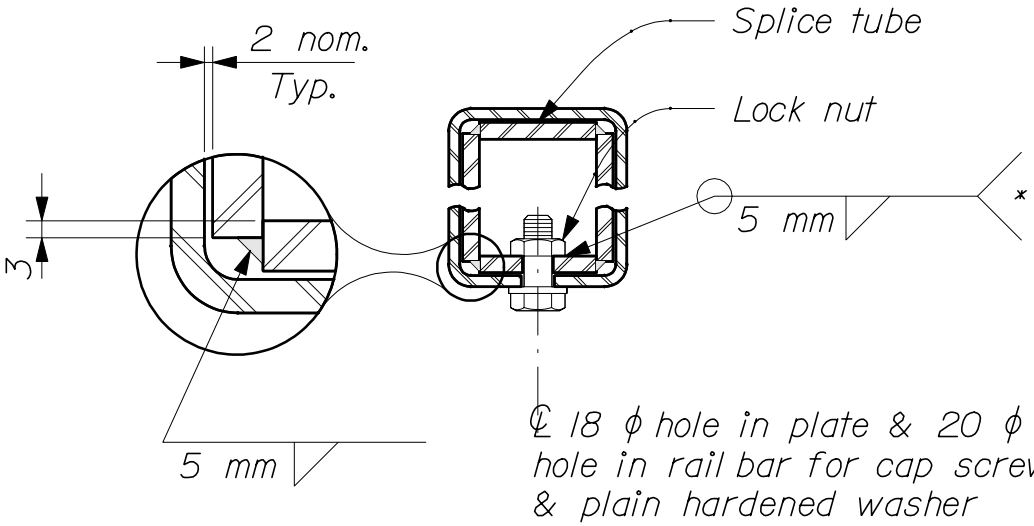
507(08)



-- BASE WELD DETAIL --

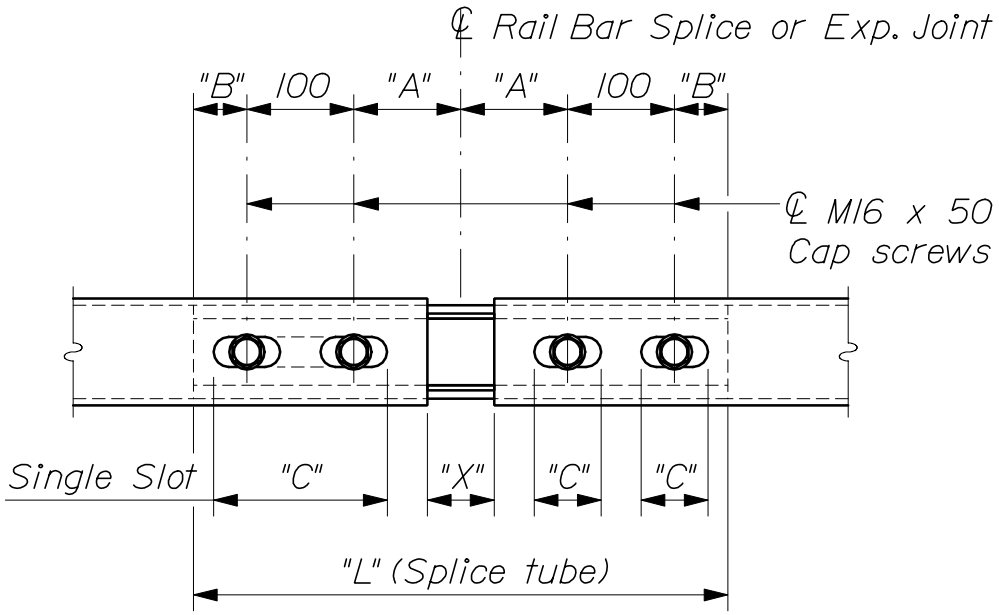


-- EXPANSION JOINT SECTION --
For details not shown, see
"Rail Bar Splice Section"



-- RAIL BAR SPLICE SECTION --
* Weld nuts to plate before assembling splice tube

# STEEL BRIDGE RAILING
507(09)



-- RAIL BAR SPLICE & EXPANSION JOINT DETAIL --
(Bottom View)

SPLICE TUBE DIMENSIONS		
	TS 203.2x101.6	TS 101.6x101.6
Top & Bot. Plates	62x10 x "L"	65x10 x "L"
Side Plates	170x10 X "L"	71x10 x "L"

SPLICE & EXPANSION JOINT TABLE					
"T"	"A"	"B"	"C"	"L"	"X"
Splice	100	50	--	500	20
≤100	100	50	65	500	65
>100≤165	140	60	90	600	100
>165≤225	165	85	225 *	700	125
>225≤330	215	110	275 *	850	175

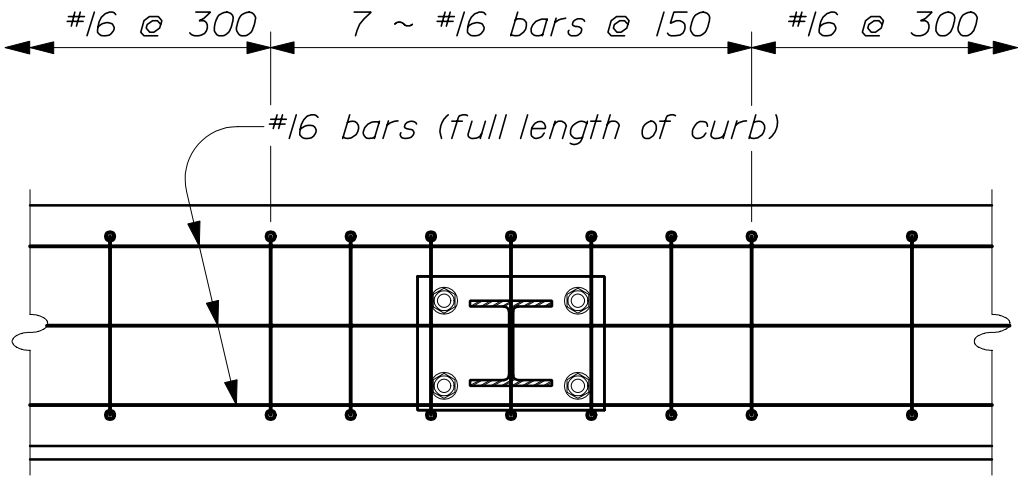
T = Total Movement * = Single Slot

MATERIALS:

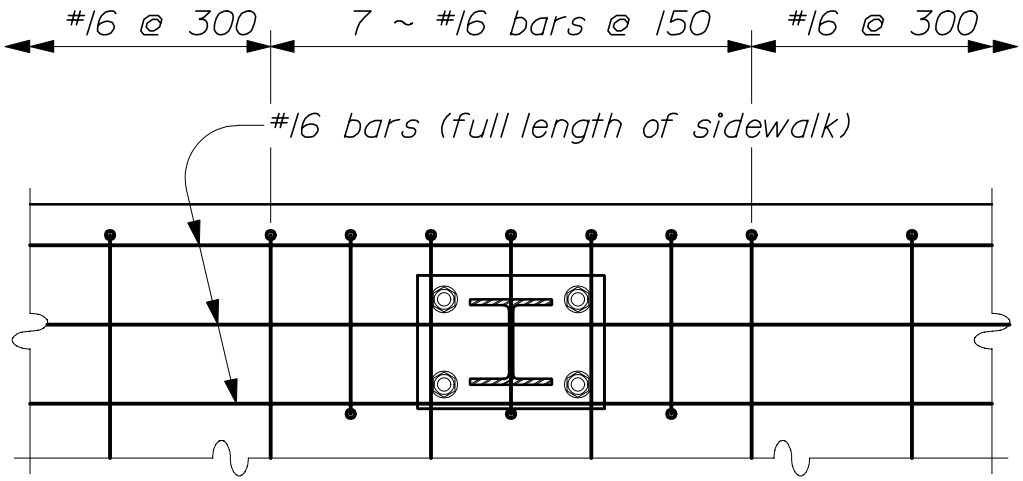
Rail bars----------ASTM A 500, Grade B
Rail posts----------AASHTO M 223M/M 223, Grade 345/50
(ASTM A 572/A 572M, Grade 50/345)
All other shapes & plates---------AASHTO M 183M/M 183 (ASTM A 36/A 36M)
Anchor studs, washers & nuts----------ASTM F 568, Class 8.8
All other bolts & nuts (unless noted)----------ASTM F 568, Class 4.6

STEEL BRIDGE RAILING

507(10)



-- CURB REINFORCING PLAN --



-- SIDEWALK REINFORCING PLAN --

NOTES:

1.) All work and materials shall conform to the provisions of Section 507 - Railings of the Standard Specifications.

2.) Tubing shall meet the longitudinal CVN minimum requirements of 20 Joules at -18° C or proportional values of sub - size specimens. Testing shall be done in accordance with ASTM A 673. The H frequency shall be used and the material shall be as - rolled.

3.) Twenty - five percent of the post - to - base welds in a production lot shall be tested by the Magnetic Particle Method. If rejectable discontinuities are found, another twenty - five percent of that production lot shall be tested. If rejectable discontinuities are found in the second twenty - five percent, all post - to - base welds in that lot shall be tested. Acceptance criteria shall be in accordance with the latest edition of the AWS D1.5 Bridge Welding Code.

STEEL BRIDGE RAILING

507(11)

NOTES (Continued):

4. All exposed cut or sheared edges shall be broken and free of burrs. The inside weld flash of tubing shall be removed at splices and expansion joints.

5. Rail posts shall be set normal to grade unless otherwise shown.

6. Lengths of rail bar shall be attached to a minimum of two (2) rail posts and to at least four (4) posts whenever possible.

7. Rail bar expansion joints shall be provided in any rail bay spanning a superstructure expansion joint. Expansion joint width shall be "X" at 7° C and will be adjusted in the field as directed by the Resident. Refer to detail and table on page 507(10) for dimension "X".

8. All parts shall be galvanized after fabrication in accordance with ASTM A 123, except that hardware shall meet the requirements of either ASTM A 153 or ASTM B 695, Class 50, Type I. Parts except hardware shall be blast - cleaned prior to galvanizing in accordance with SSPC - SP6.

9. Anchor bolts shall be set with a template. Nuts securing the post base plate shall be tightened to a snug fit and given an additional 1/8 turn.

10. Rail bars shall be attached to posts using M20 ~ ASTM F 568, Class 4.6 bolts (M16 ~ ASTM A 325M bolts may be substituted) inserted through the face of the rail bar. Bolts shall be round or dome head and may be rib neck, slotted, wrench head or tension control (TC or twist - off). Holes in posts shall be two (2) mm larger than the diameter of the bolt. Holes in rail bars shall be drilled to size as follows:

Slotted, wrench head or TC bolts---------Two (2) mm larger than bolt diameter
Rib neck bolts----------Size appropriate to accomodate an interference fit

All bolts for fastening the rail bars to the posts shall be 150 mm in length and shall include a flat washer under nut.

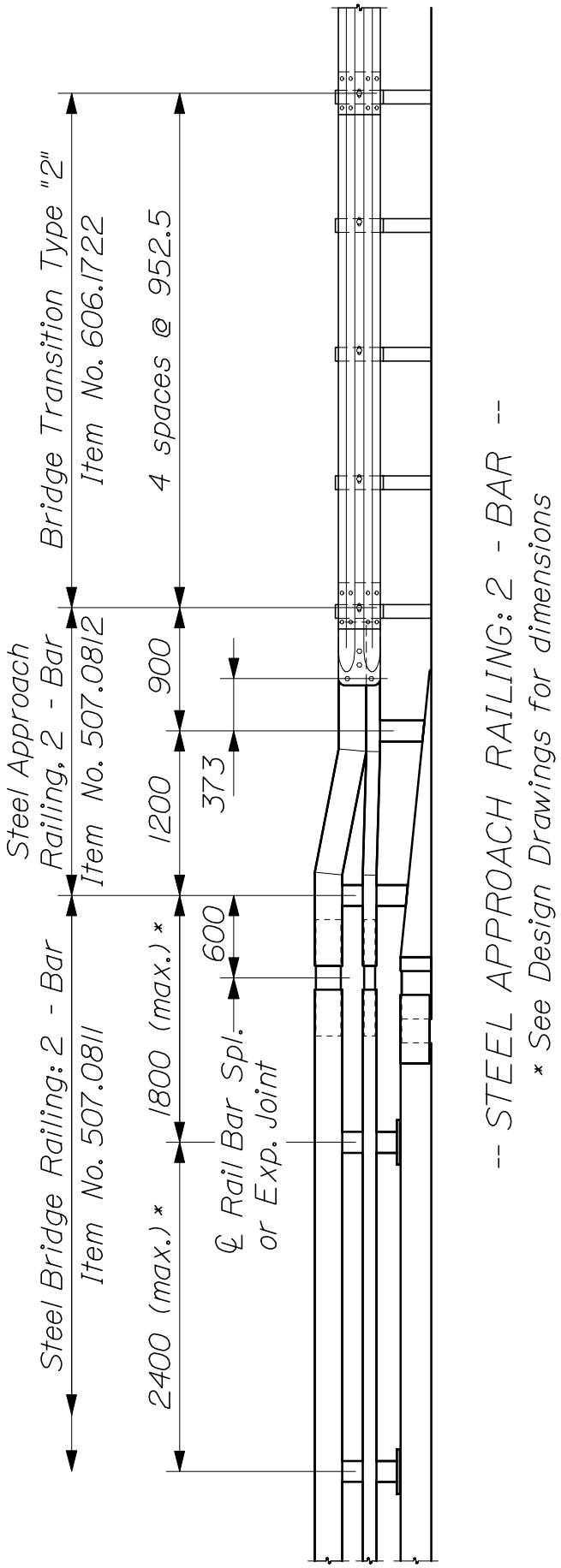
11. Holes in rail bars shall be field - drilled and shall be coated with an approved zinc - rich paint prior to erection.

12. Bolts in expansion joints shall be tightened only to a point that will allow rail movement.

13. The alternate curb projection shown for the curb - mounted railings is intended for use with granite bridge curb.

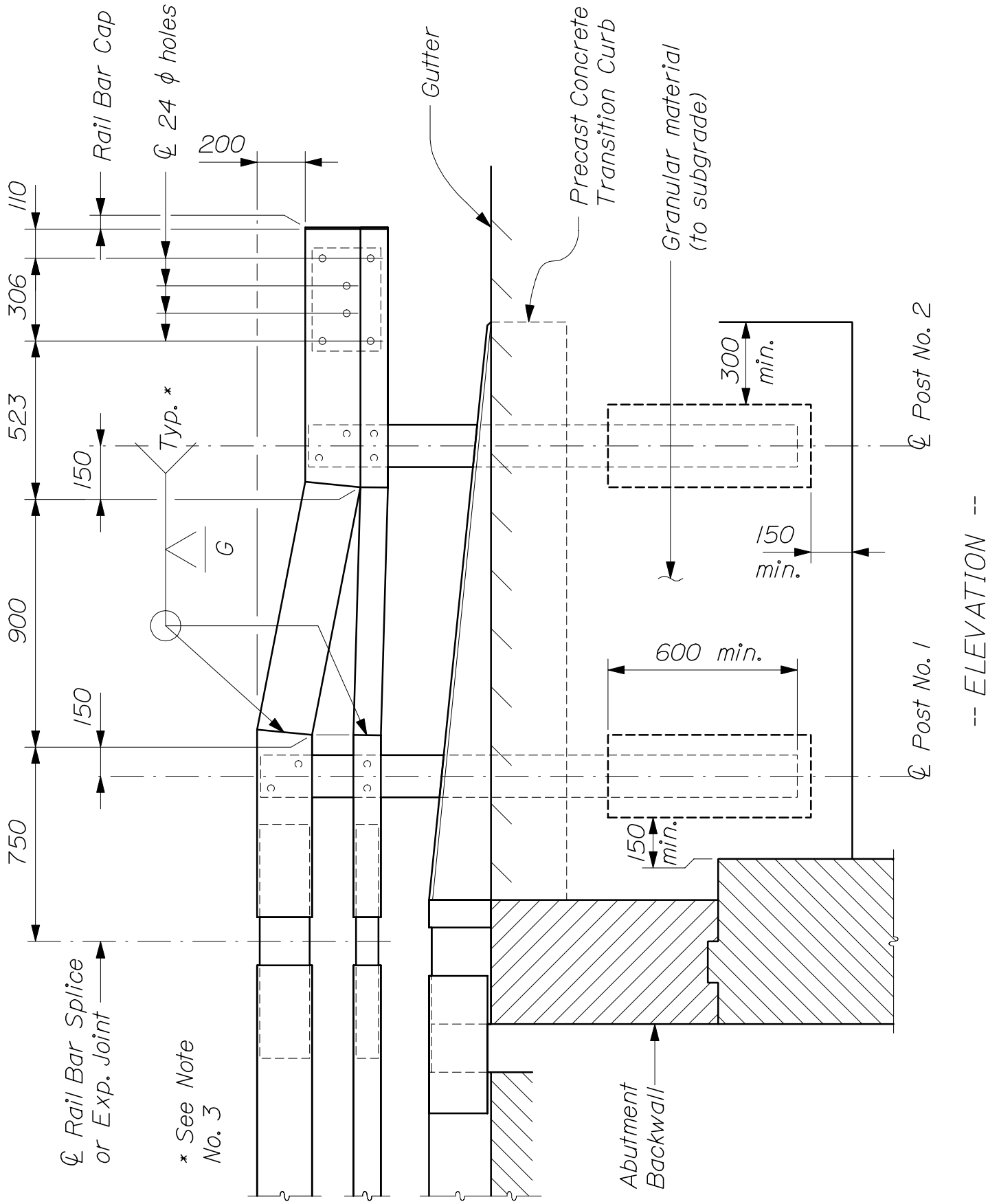
14. If there is a conflict between these Standard Details and the Design Drawings, the Contractor shall notify the Resident immediately.

STEEL BRIDGE RAILING



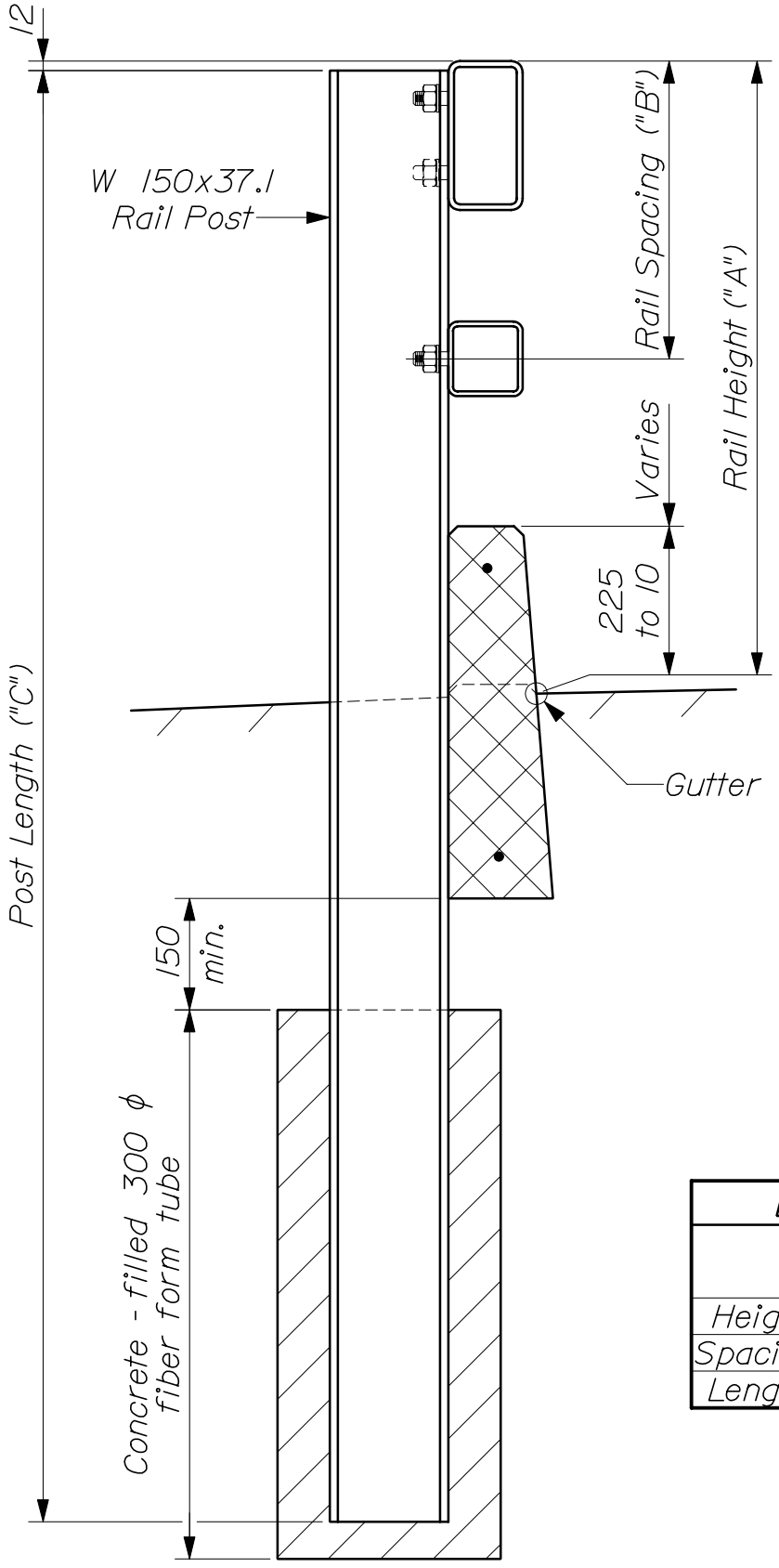
STEEL APPROACH RAILING

507(13)



STEEL APPROACH RAILING

507(14)

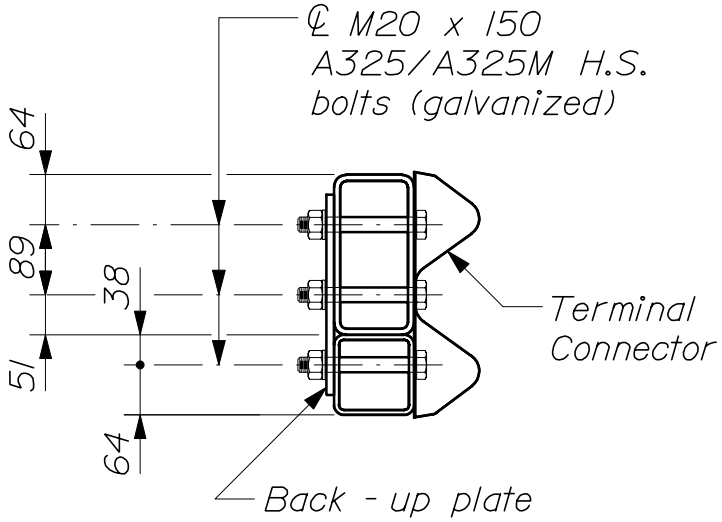


DIMENSIONS		
	Post No. 1	Post No. 2
Height "A"	850	650
Spacing "B"	400	255
Length "C"	2000	1800

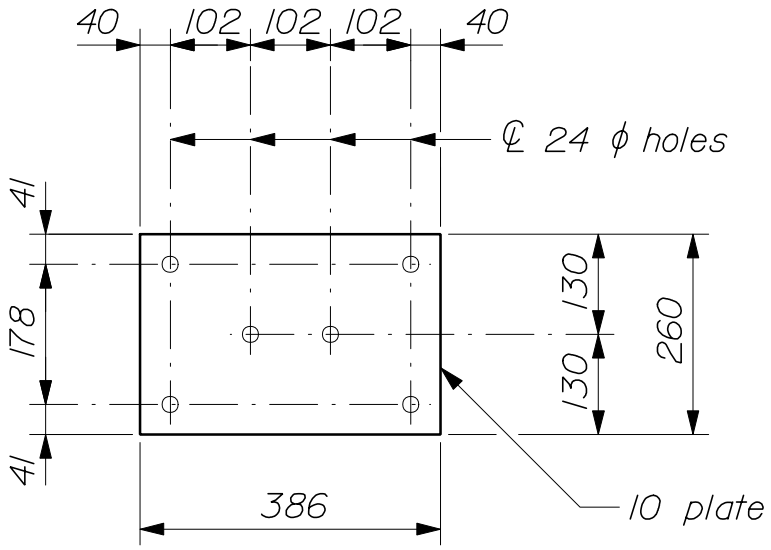
-- TYPICAL SECTION --

STEEL APPROACH RAILING

507(15)

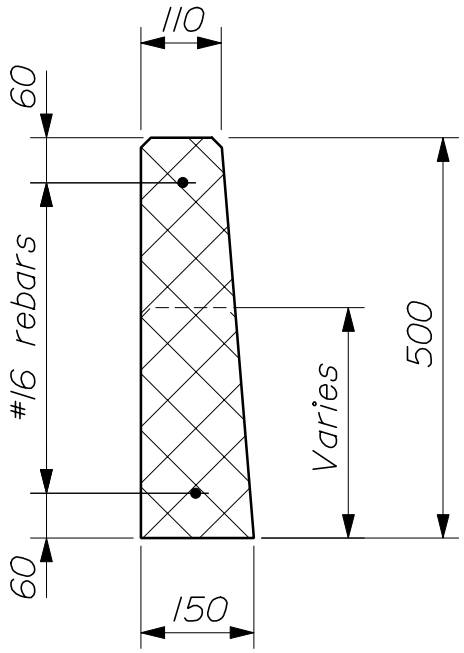


-- SECTION THROUGH
TERMINAL CONNECTOR --

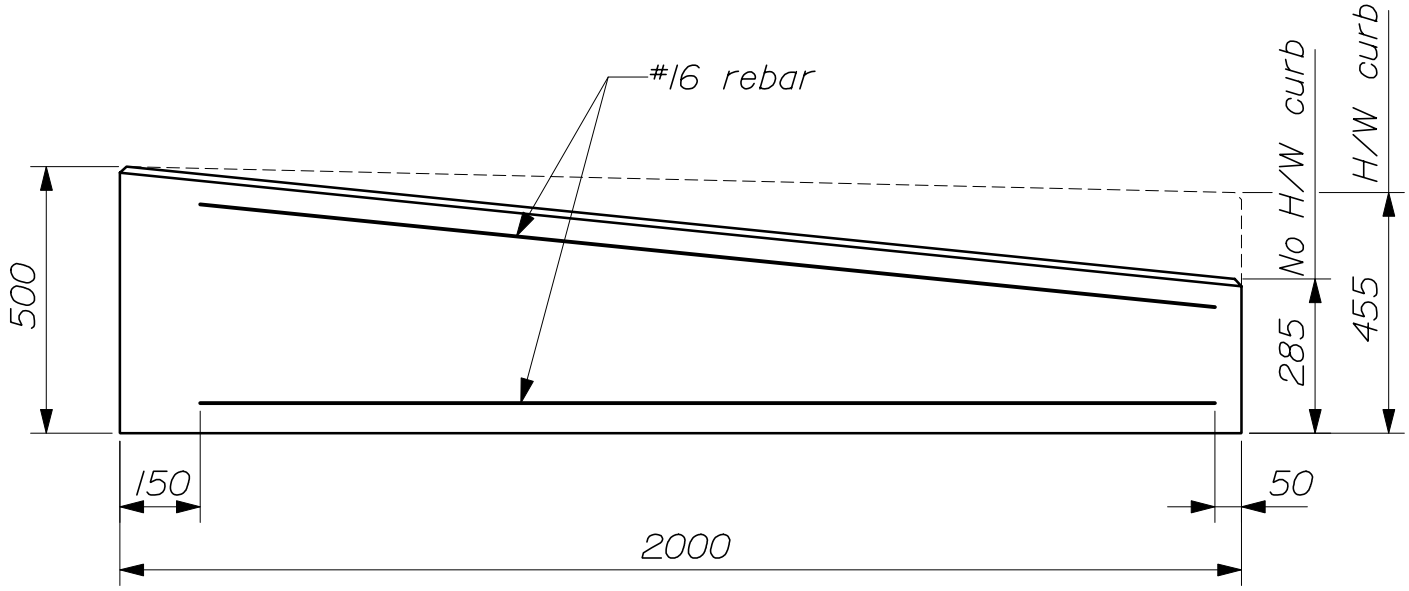


-- BACK - UP PLATE --

# STEEL APPROACH RAILING
507(16)



-- CURB SECTION --



-- PRECAST CONCRETE TRANSITION CURB --

STEEL APPROACH RAILING

507(17)

NOTES:

1. Refer to Steel Bridge Railing pages for additional details, notes and materials specifications.

2. The bottom rail bar may be bent to shape from one continuous length of stock provided that the fabricator can achieve the required geometry without deforming the tube.

3. Rail bar welds shall have a minimum penetration of 80% as demonstrated by a test weld performed by the fabricator.

4. To facilitate field fit - up of the approach railing, posts shall be set loosely into fiber form tubes while parts are being assembled. Post holes shall be backfilled with Class "S" or other concrete mix approved by the Resident. Payment will be considered incidental to the Steel Approach Railing pay item.

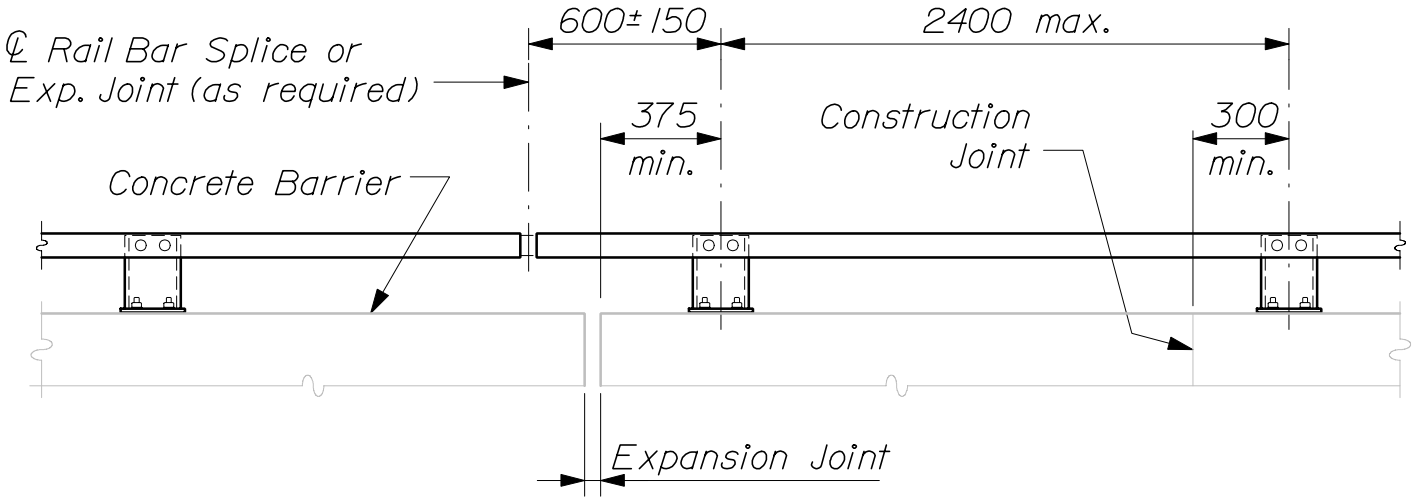
5. Granular material shall meet or exceed the requirements of Subsection 703.19, Granular Borrow. Payment for granular material and for any excavation necessary to install the rail posts will be considered incidental to the Steel Approach Railing pay item.

6. The precast concrete transition curb shall meet the provisions of Section 609 - Curbing of the Standard Specifications. The bridge end of the curb shall be saw - cut in the field to fit flush against the backwall, as dictated by the bridge skew angle and the profile grade. Where curbing is specified on the adjacent highway, the transition shall be modified accordingly. Payment for transition curb will be considered incidental to the Steel Approach Railing pay item.

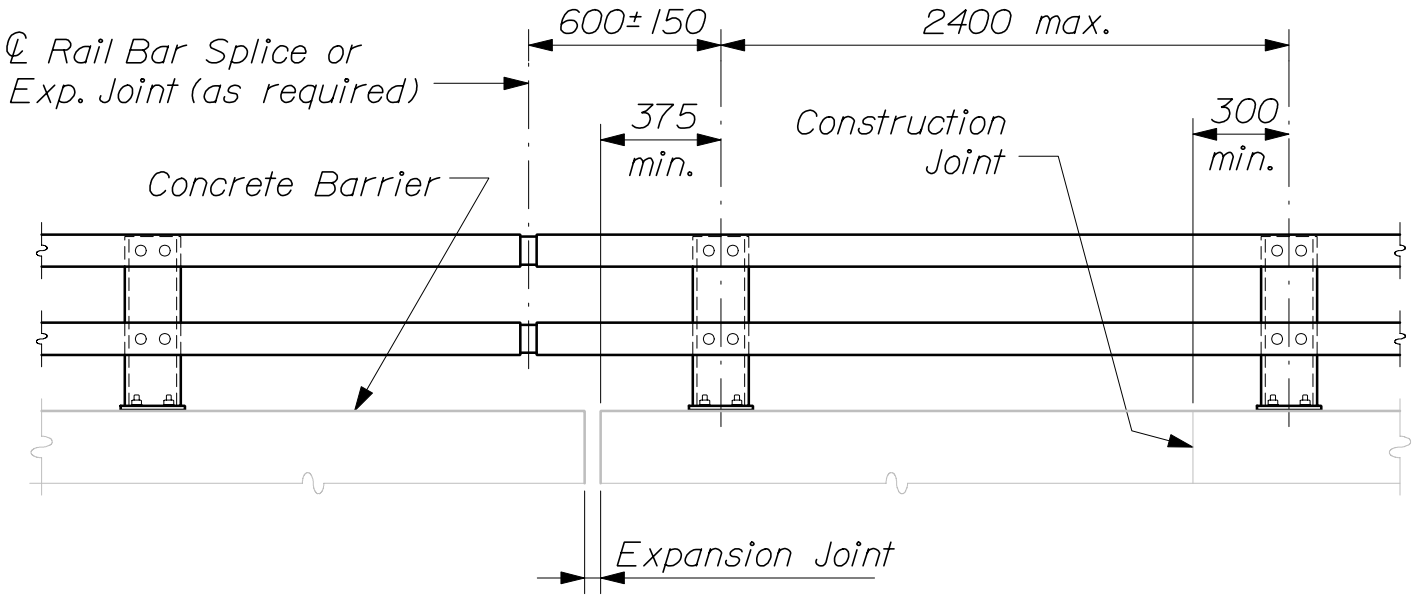
7. The Bridge Transition Type "2" as shown is a slight modification of the standard Type "2" detail shown in Section 606. The M20 bolts and back - up plate will be considered as part of the Steel Approach Railing pay item.

8. After installation of the guard rail is complete, upset the threads on the anchor bolts in three (3) places around each bolt, at the junction of the nut and the exposed thread, with a center punch or similar tool.

9. If there is a conflict between these Standard Details and the Design Drawings, the requirements of the Design Drawings shall be followed.



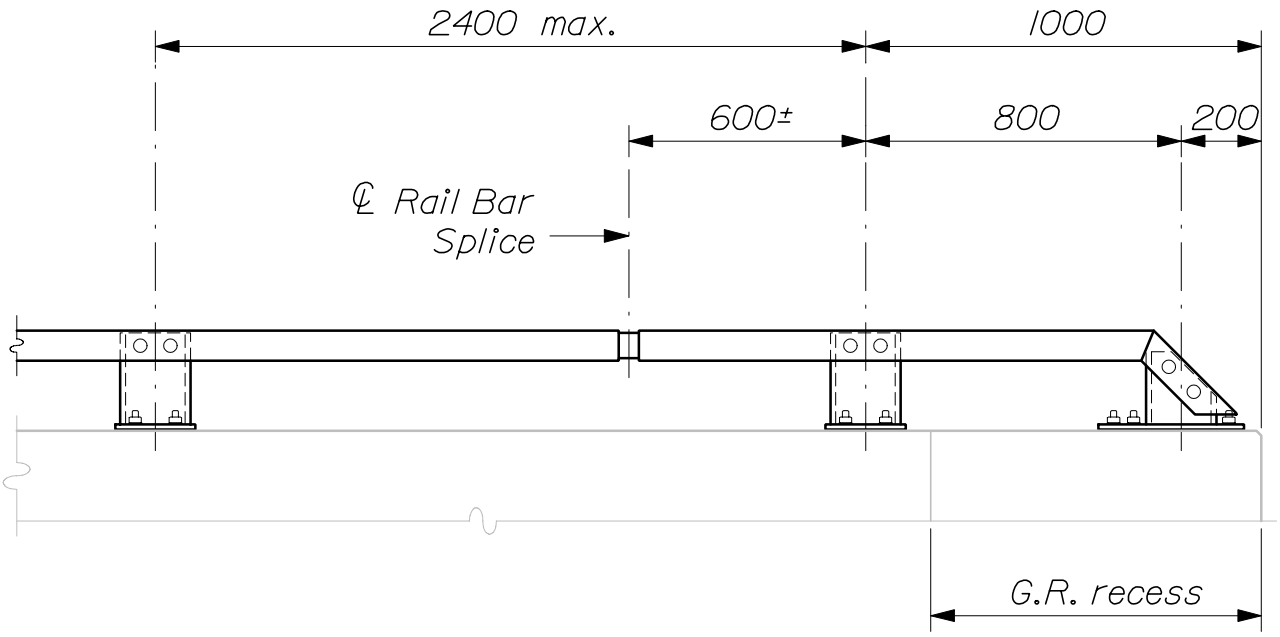
-- 1 - BAR PEDESTRIAN RAILING --



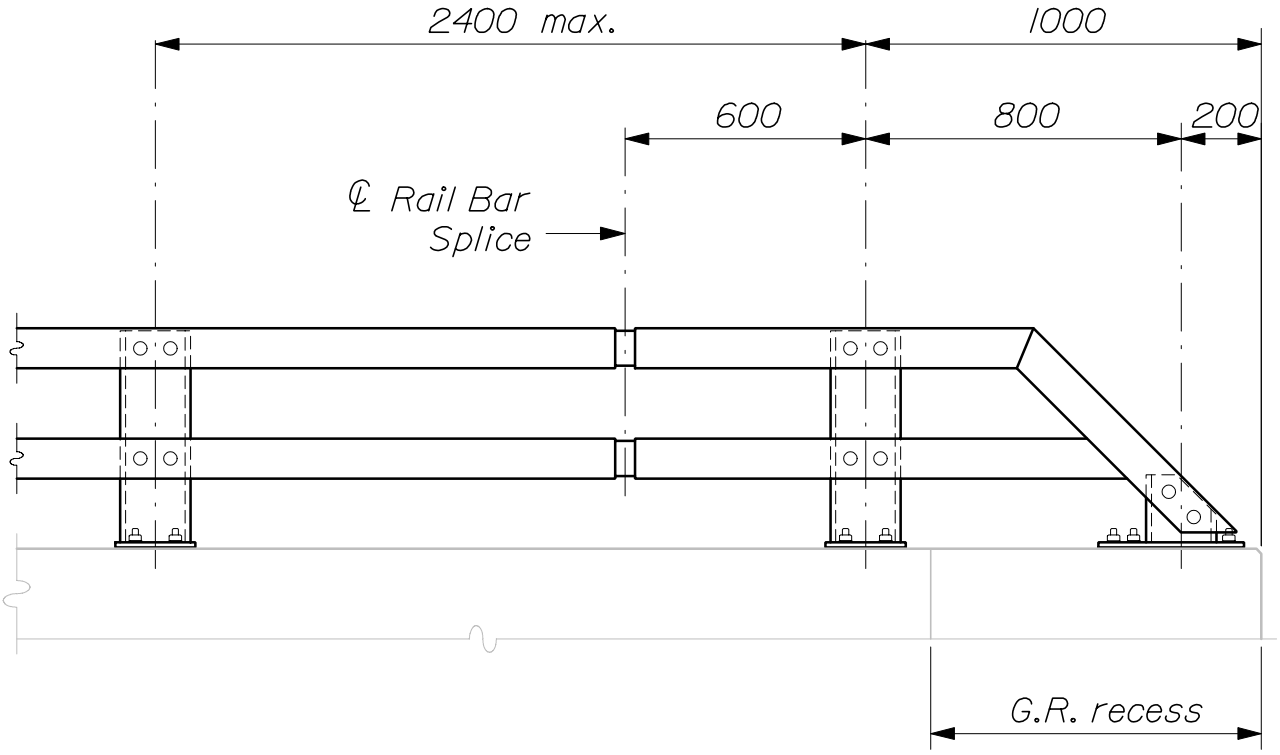
-- 2 - BAR BICYCLE RAILING --

BARRIER - MOUNTED STEEL BRIDGE RAILING

507(19)



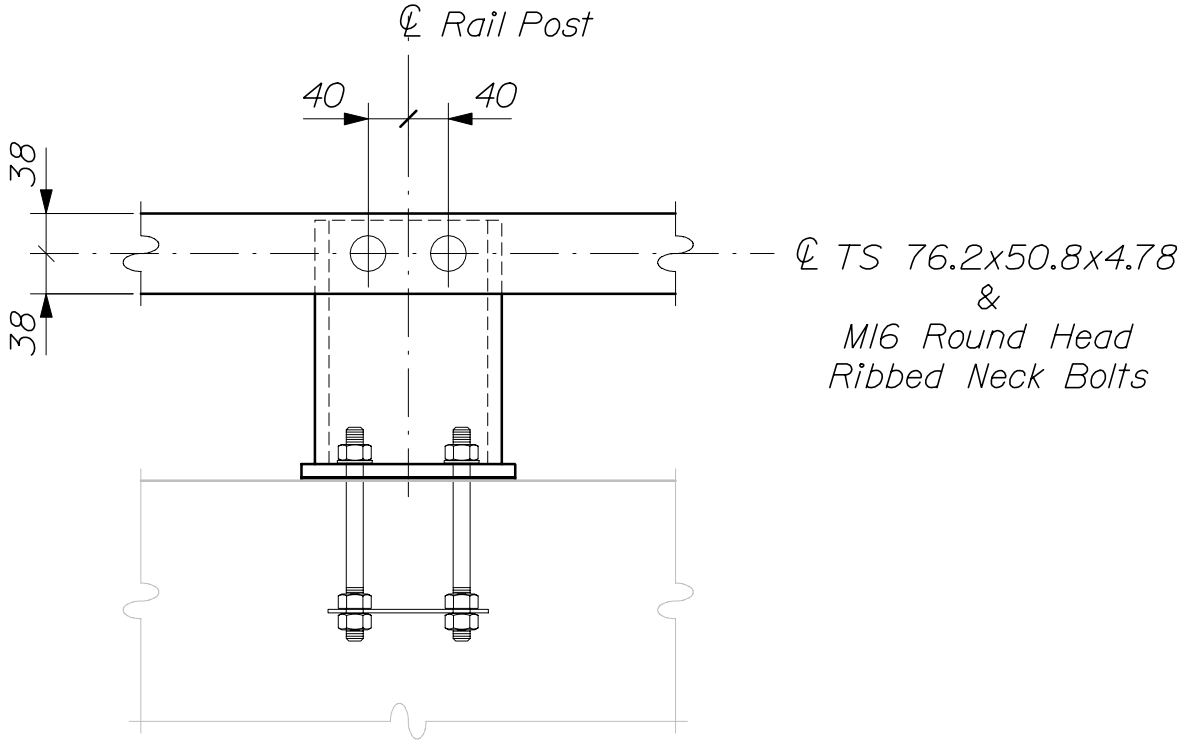
-- 1 - BAR PEDESTRIAN RAILING --
(Showing End Treatment)



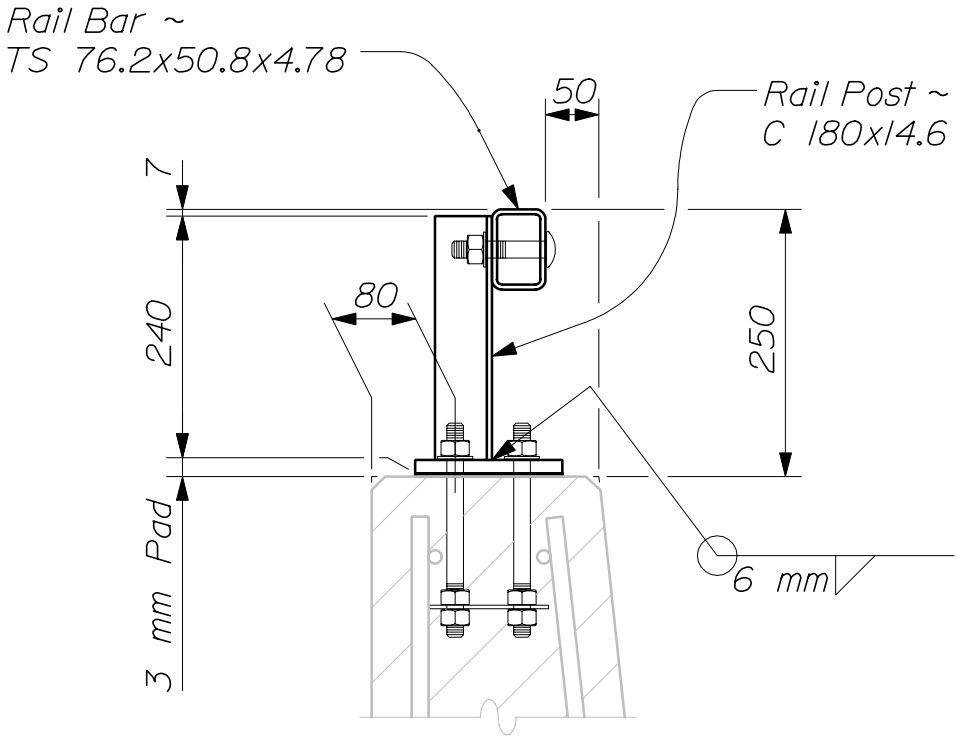
-- 2 - BAR BICYCLE RAILING --
(Showing End Treatment)

BARRIER - MOUNTED STEEL BRIDGE RAILING

507(20)



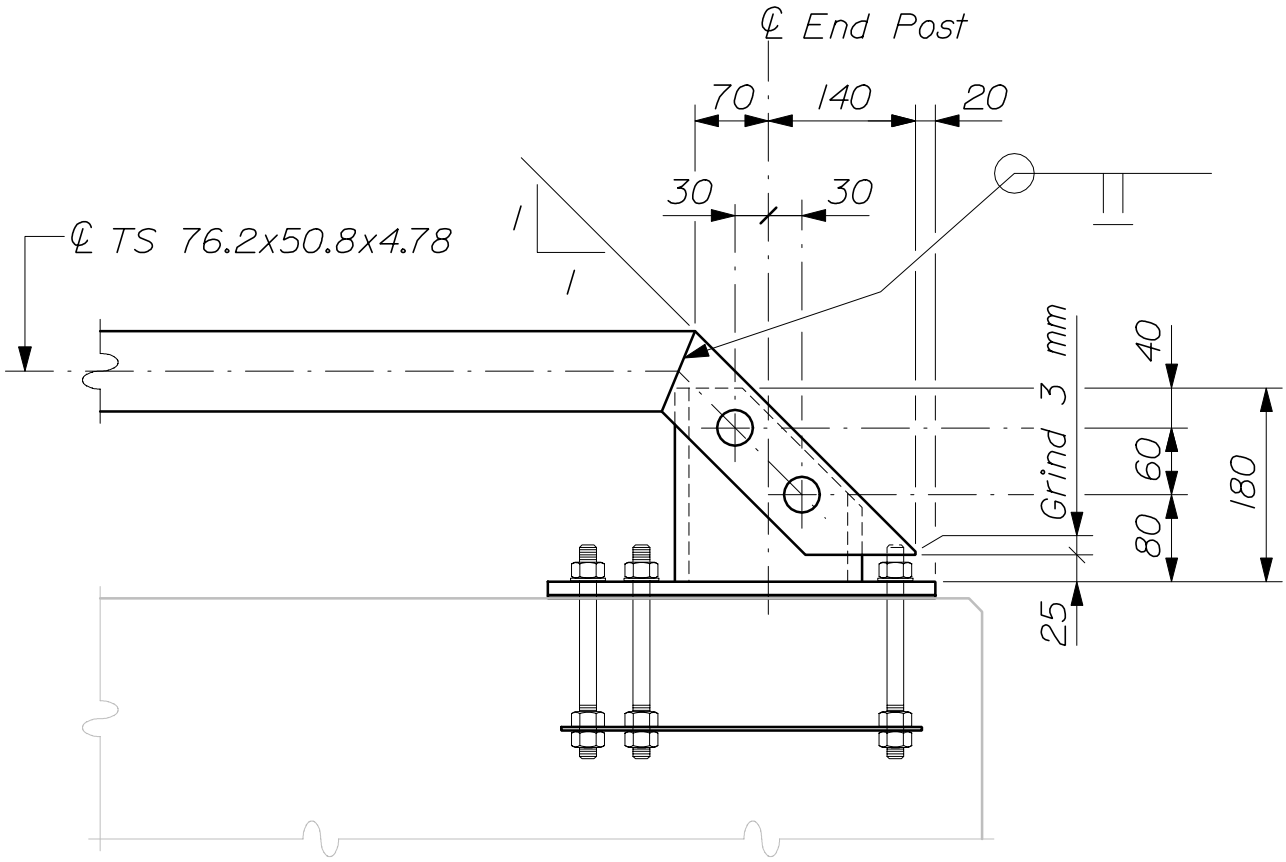
-- RAIL & POST ELEVATION --
(1 - Bar Pedestrian Railing)



-- TYPICAL RAIL SECTION --
(1 - Bar Pedestrian Railing)

BARRIER - MOUNTED STEEL BRIDGE RAILING

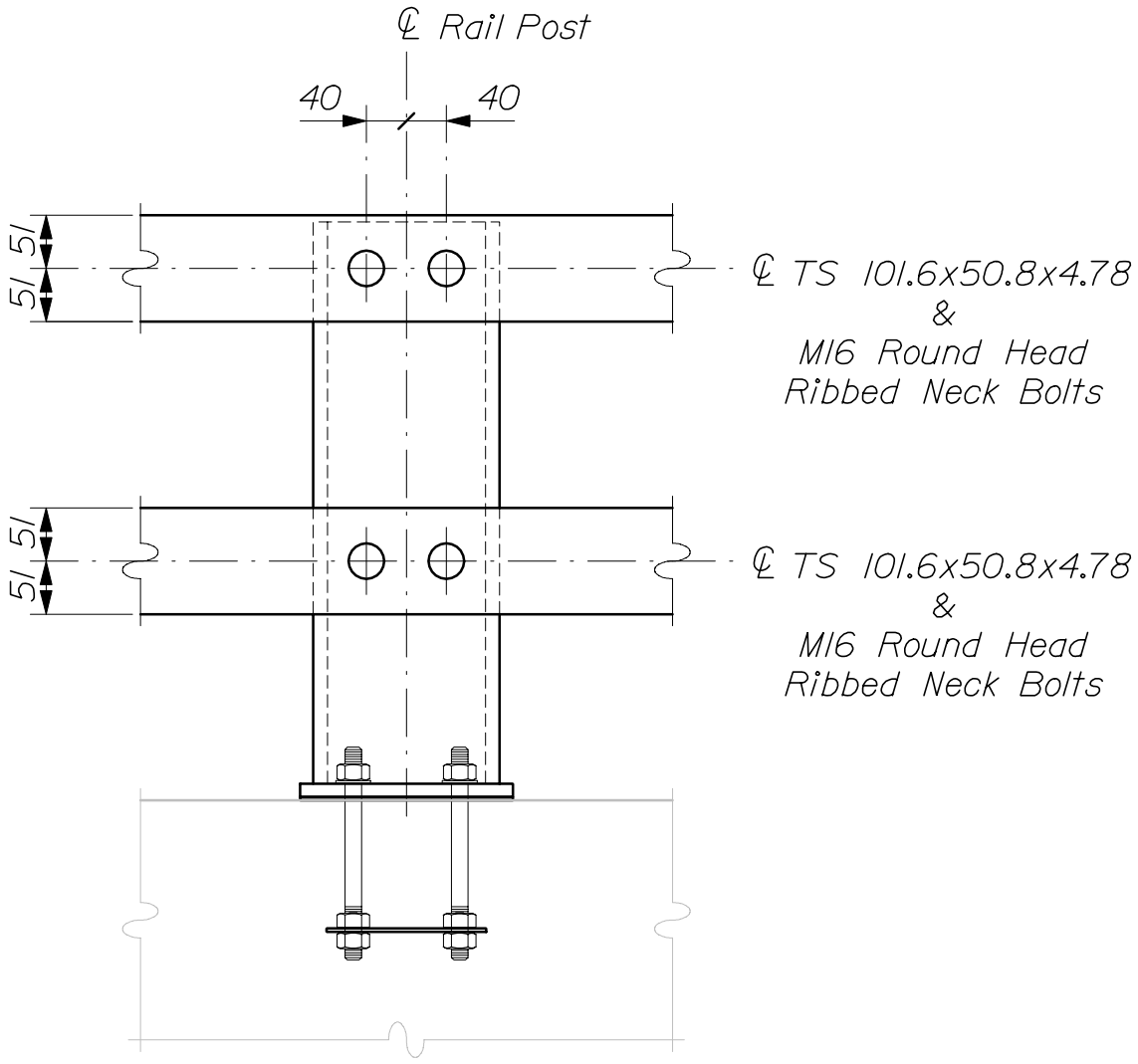
507(21)



-- RAIL END TREATMENT --
(1 - Bar Pedestrian Railing)

BARRIER - MOUNTED STEEL BRIDGE RAILING

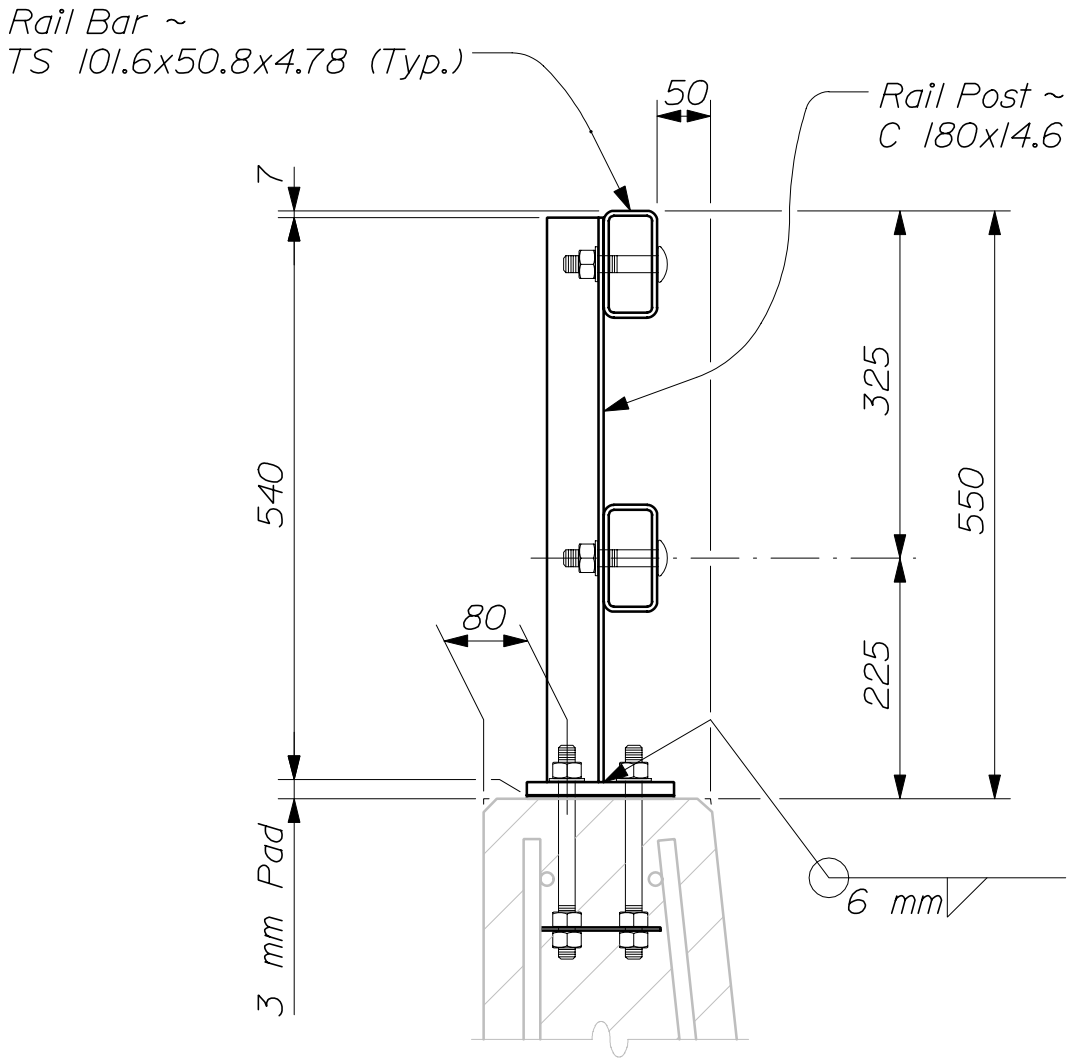
507(22)



-- RAIL & POST ELEVATION --
(2 - Bar Bicycle Railing)

BARRIER - MOUNTED STEEL BRIDGE RAILING

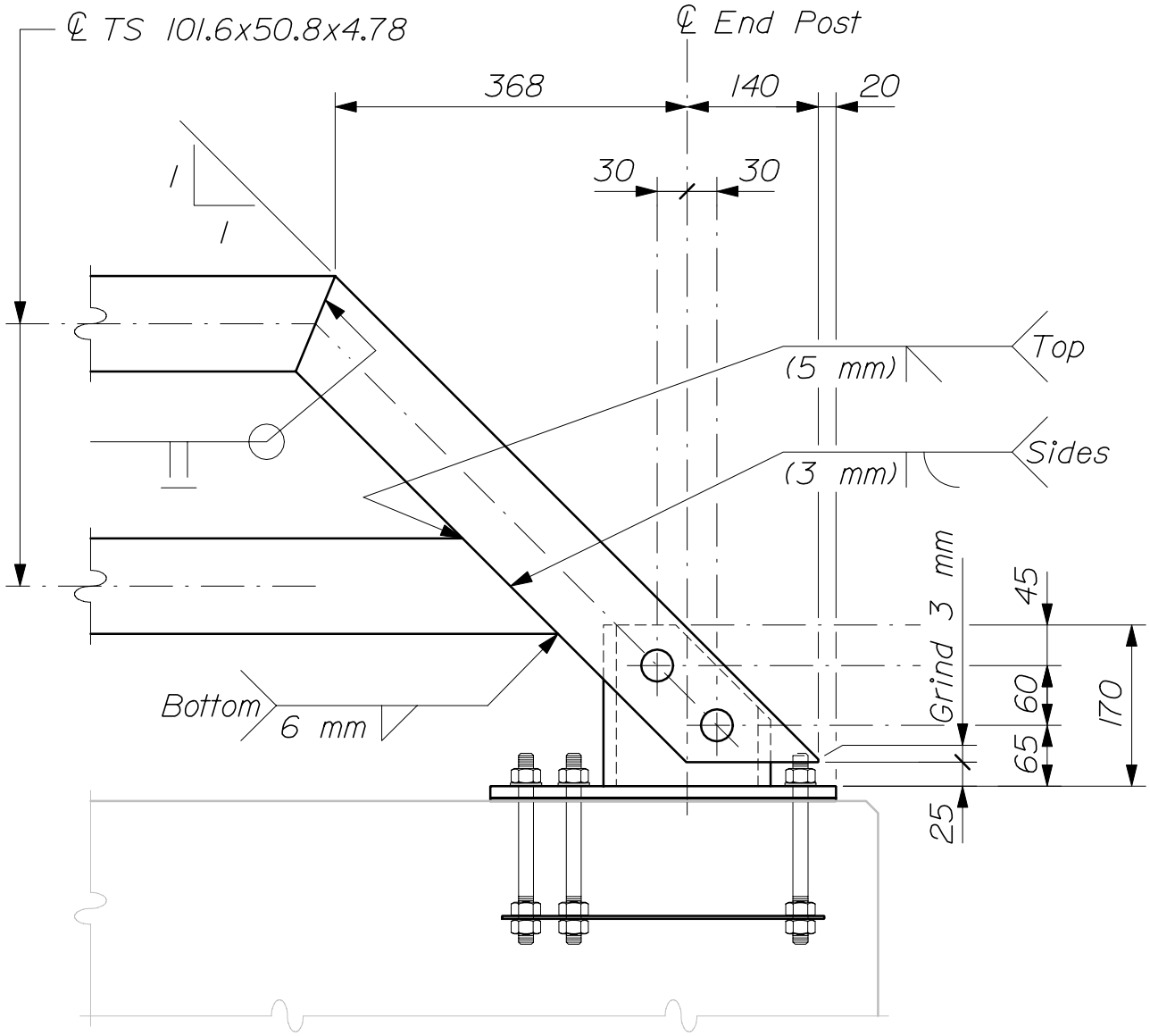
507(23)



-- TYPICAL RAIL SECTION --
(2 - Bar Bicycle Railing)

BARRIER - MOUNTED STEEL BRIDGE RAILING

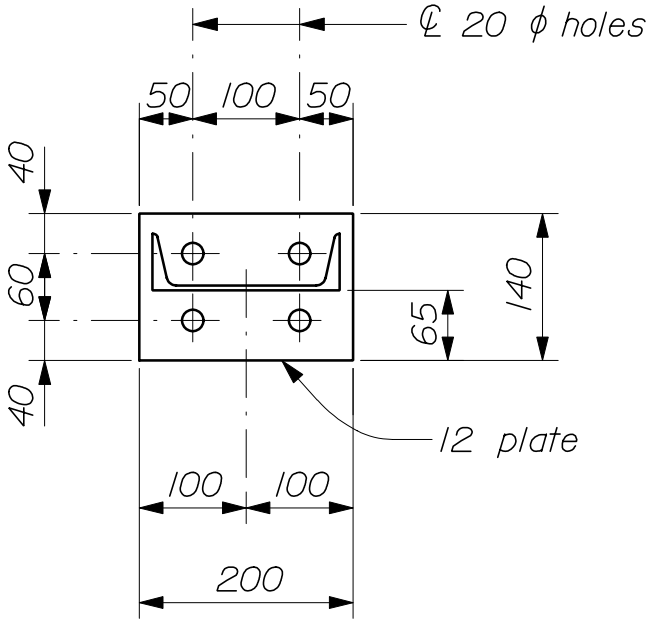
507(24)



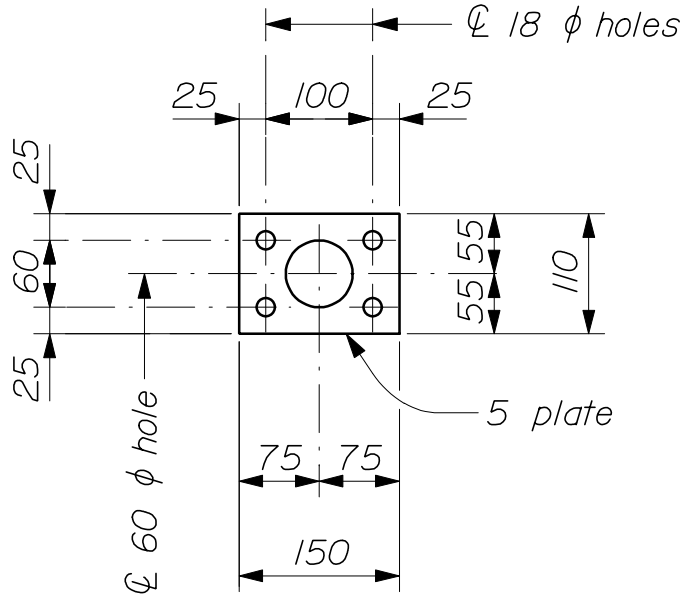
-- RAIL END TREATMENT --
(2 - Bar Bicycle Railing)

BARRIER - MOUNTED STEEL BRIDGE RAILING

507(25)



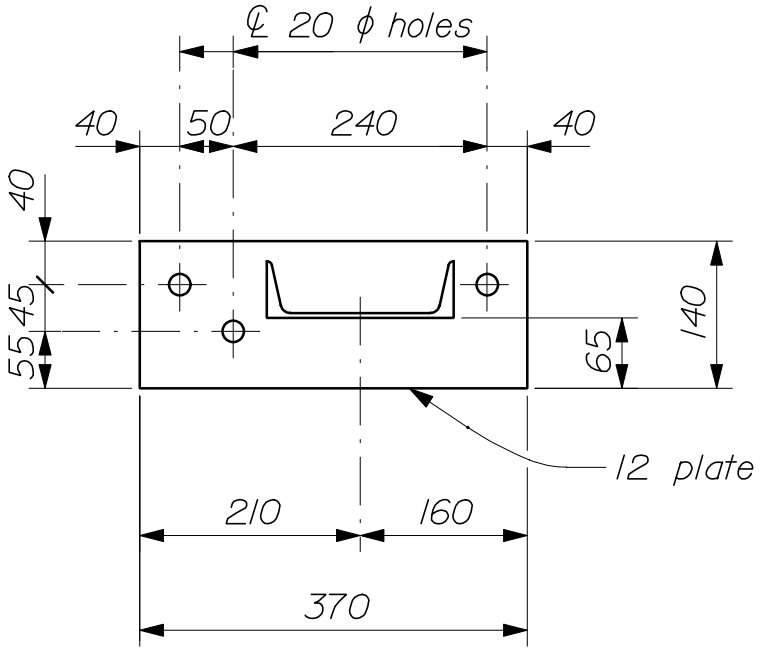
-- POST & BASE PLATE PLAN --



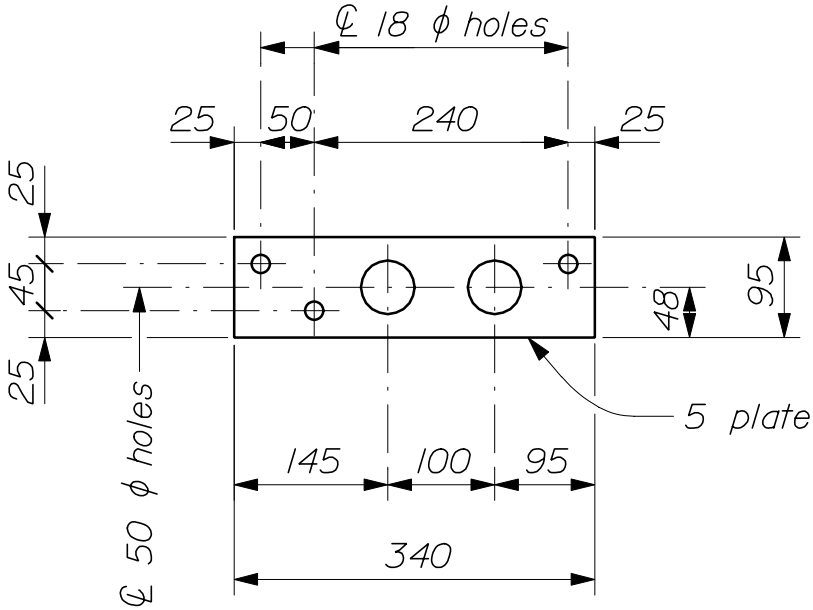
-- SPACER PLATE PLAN --

BARRIER - MOUNTED STEEL BRIDGE RAILING

507(26)



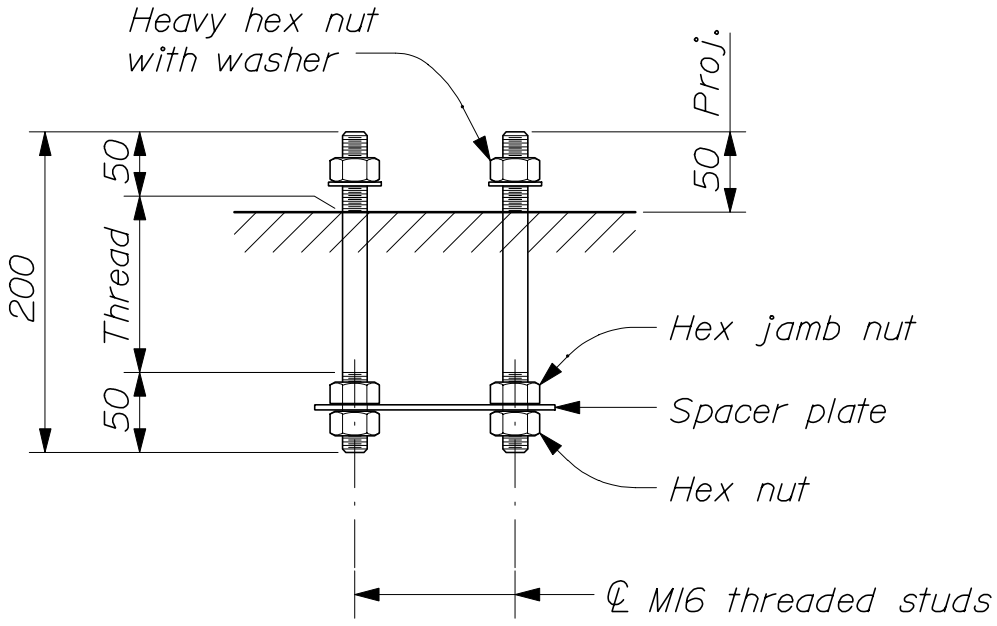
-- END POST & BASE PLATE PLAN --



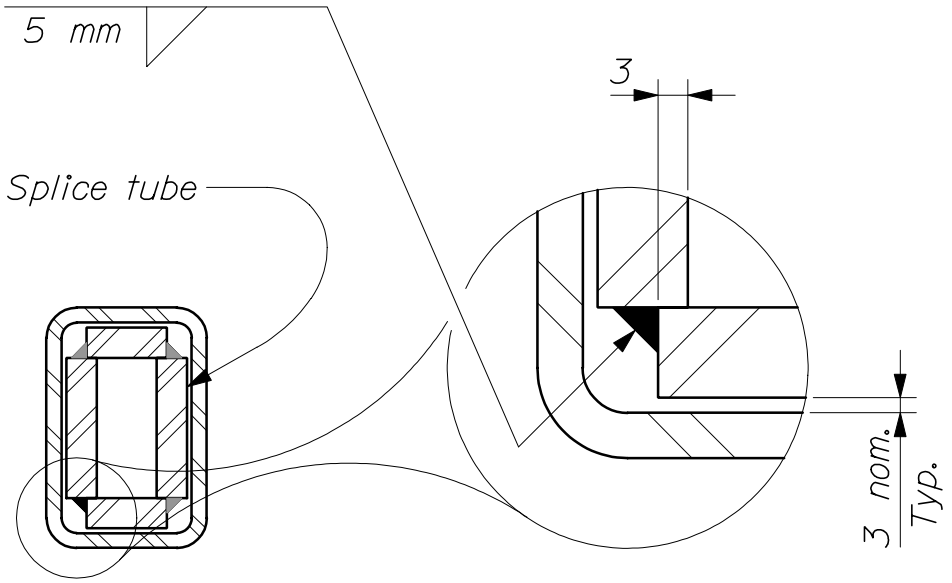
-- END SPACER PLATE PLAN --

BARRIER - MOUNTED STEEL BRIDGE RAILING

507(27)



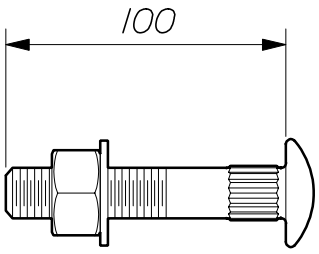
-- ANCHOR BOLT DETAIL --



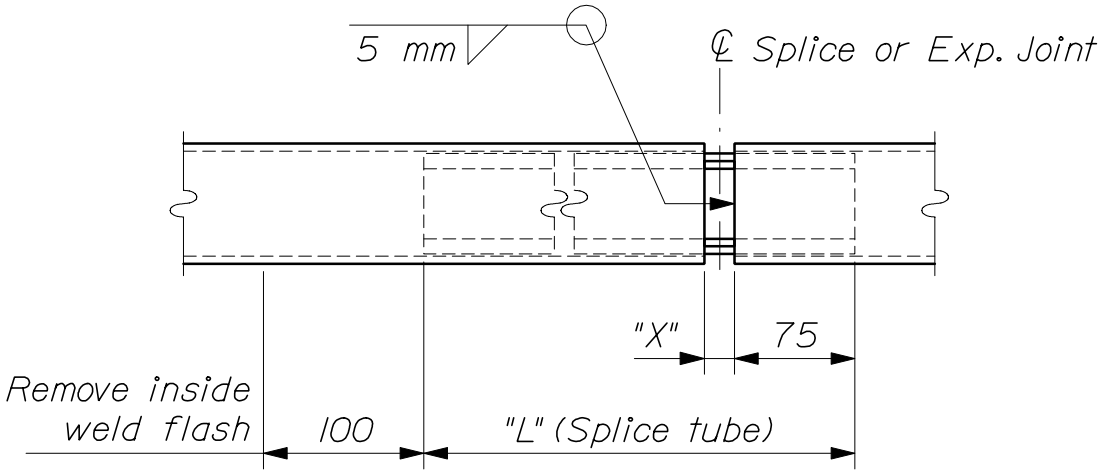
-- RAIL SPLICE SECTION --

BARRIER - MOUNTED STEEL BRIDGE RAILING

507(28)



-- RIBBED NECK BOLT --
(with washer & lock nut)



-- RAIL BAR SPLICE / EXPANSION JOINT --

RAIL BAR SPLICE & EXPANSION JOINT TABLE		
"T"	"L"	"X"
Splice	500	20
≤100	500	65
>100≤165	600	100
>165≤225	700	125
>225≤330	850	175

"T" = Total Movement

SPLICE TUBE (1 - Bar Railing)	
Top & Bot. Plates	Bar 21x10 x "L"
Side Plates	Bar 40x10 x "L"

SPLICE TUBE (2 - Bar Railing)	
Top & Bot. Plates	Bar 21x10 x "L"
Side Plates	Bar 66x10 x "L"

BARRIER - MOUNTED STEEL BRIDGE RAILING

507(29)

NOTES:

1. All work and materials shall conform to the provisions of Section 507 - Railings of the Standard Specifications.

2. All exposed cut or sheared edges shall be rounded and free of burrs.

3. All parts shall be galvanized after fabrication in accordance with ASTM A123, except that hardware shall meet the requirements of ASTM A153. Parts shall be blast - cleaned prior to galvanizing in accordance with SSPC - SP6.

4. Rail posts shall be set normal to grade unless otherwise indicated.

5. Lengths of rail bar shall be attached to a minimum of two (2) rail posts and to at least four (4) posts whenever possible.

6. Rail bar expansion joints shall be provided in any rail bay spanning a superstructure expansion joint. Expansion joint width shall be "X" at 7 °C and will be adjusted as directed by the Resident.

7. Holes for ribbed - neck bolts shall be field - drilled to an appropriate size to produce an interference fit with the bolts.

8. Rail post anchoring nuts shall be tightened to a snug fit and given an additional 1/8 turn.

9. Ten percent of the post - to - base welds in a production lot shall be tested by the Magnetic Particle Method. If rejectable discontuities are found, another ten percent of that lot shall be tested. If rejectable discontuties are found in the second ten percent, all post-to-base welds shall be be tested. Acceptable criteria shall be in accordance with the in edition of the AWS D1.5 Bridge Welding Code.

10. All butt joint welds shall have a minimum penetration of 60 percent.

11. If there is a conflict between these Standard Details and the Design Drawings, the requirements of the Design Drawings shall be followed.

MATERIALS:

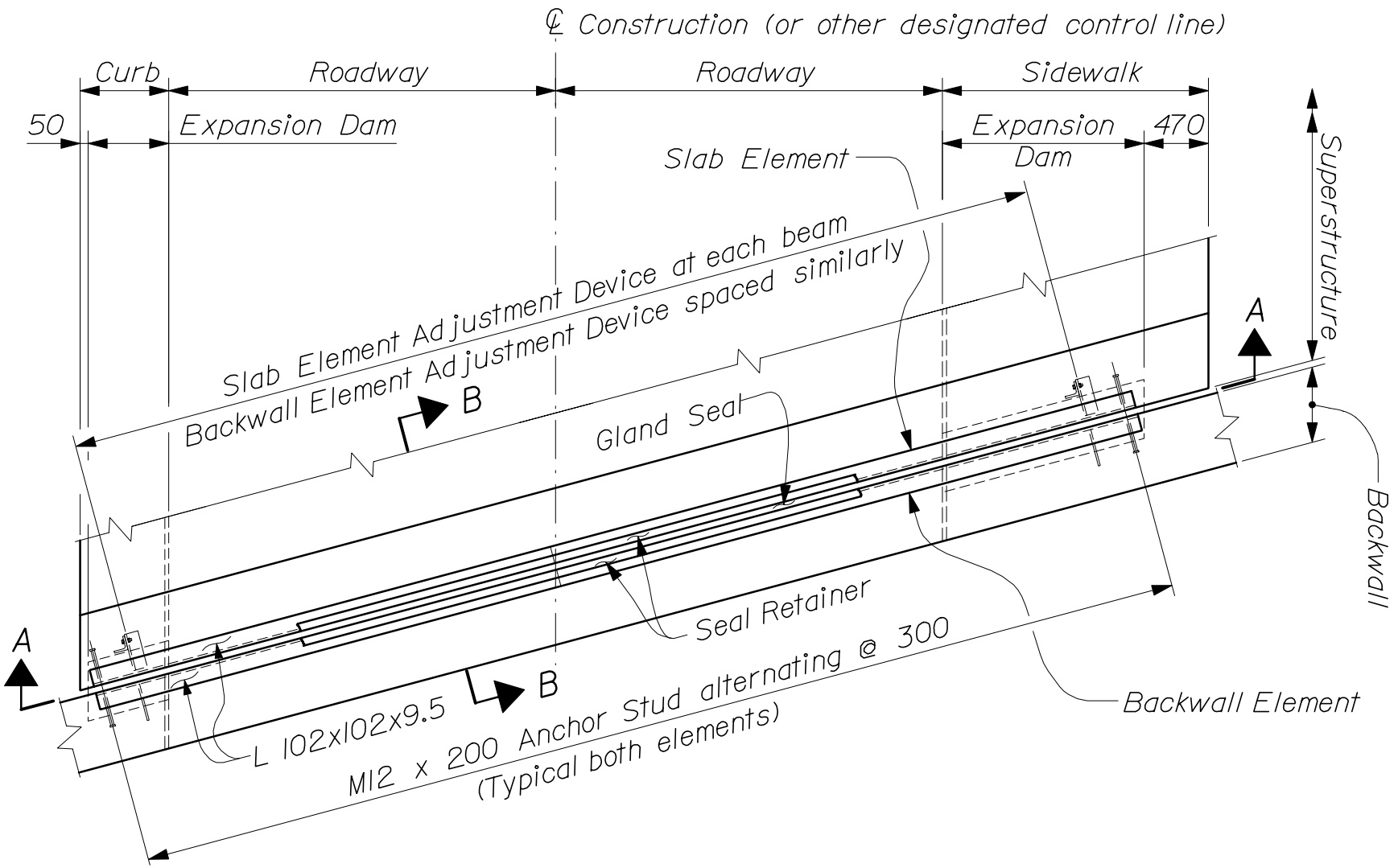
Rail bars	ASTM A500
All other shapes & plates	AASHTO M183/M183 (ASTM A36/A36M)
Threaded studs, washers & exposed nuts	ASTM F568, Class 8.8
All other bolts & nuts	ASTM F568, Class 4.6

BARRIER - MOUNTED STEEL BRIDGE RAILING

507(30)

EXPANSION DEVICE - GLAND SEAL

520(01)

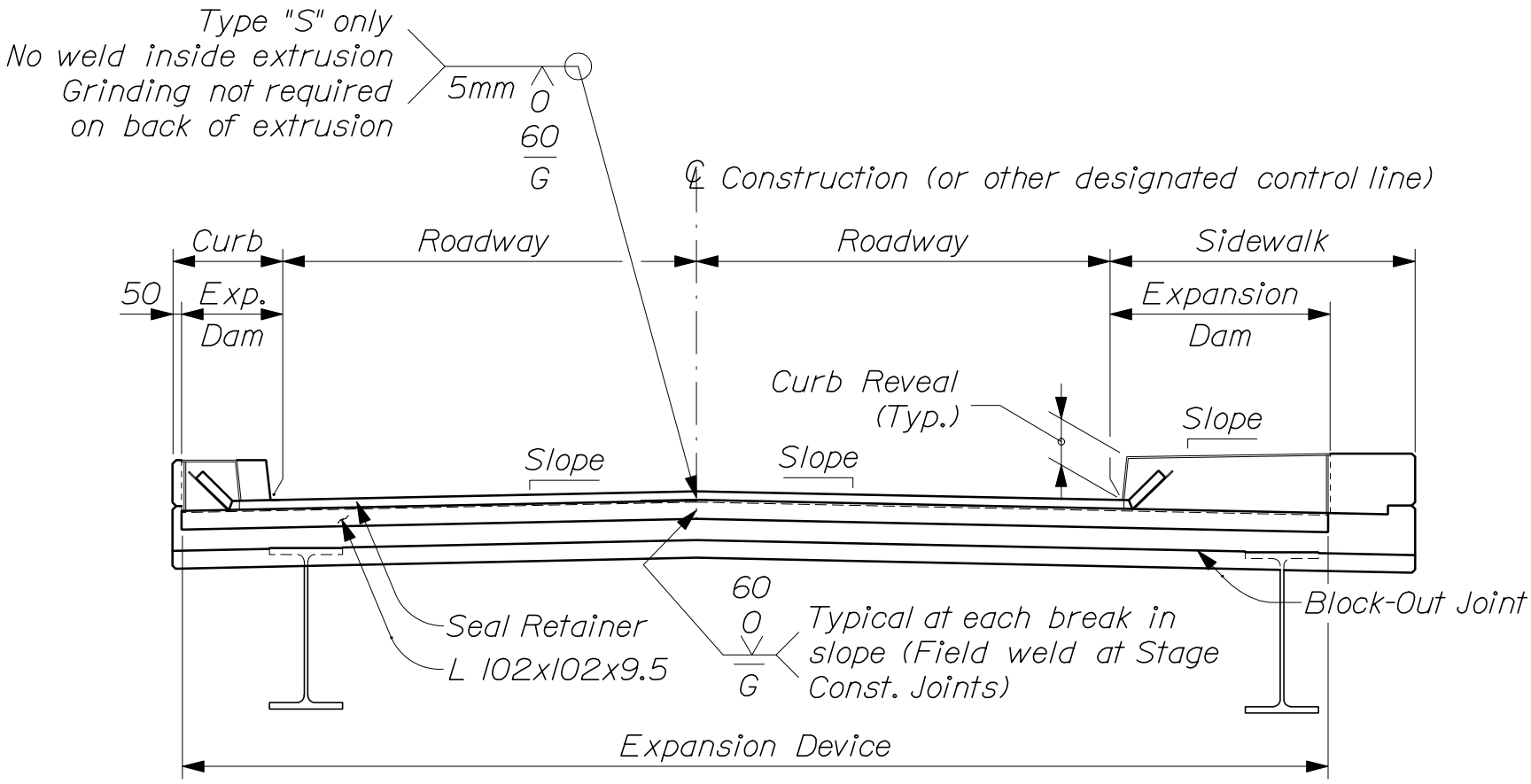


-- PLAN ~ TYPICAL INSTALLATION --

(Expansion Dams not shown for clarity)

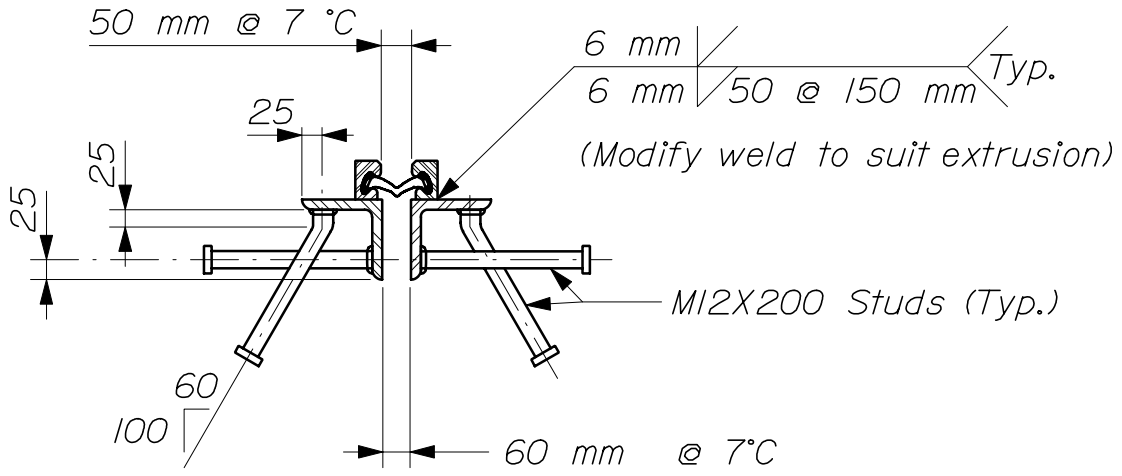
EXPANSION DEVICE - GLAND SEAL

520(02)

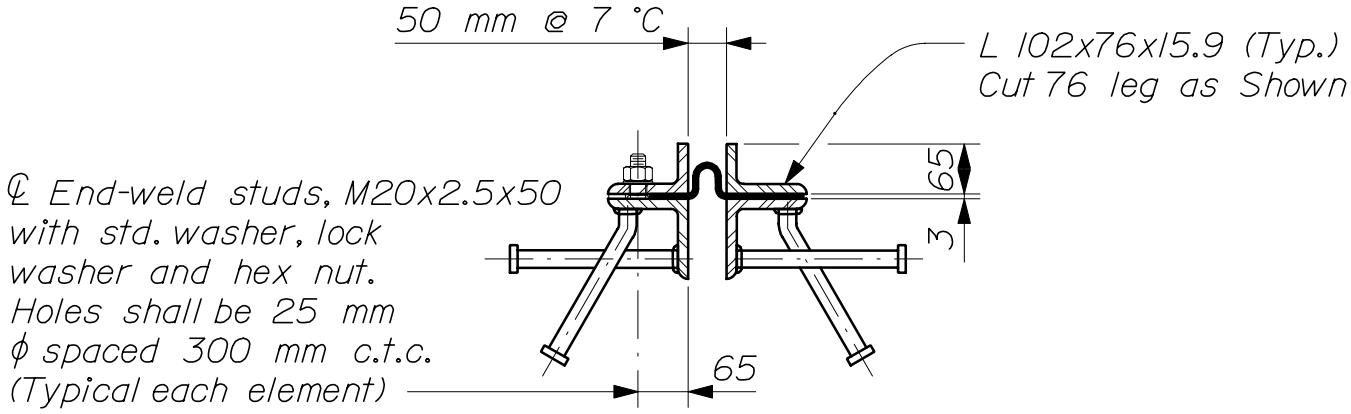


Section B-B / 520(01)

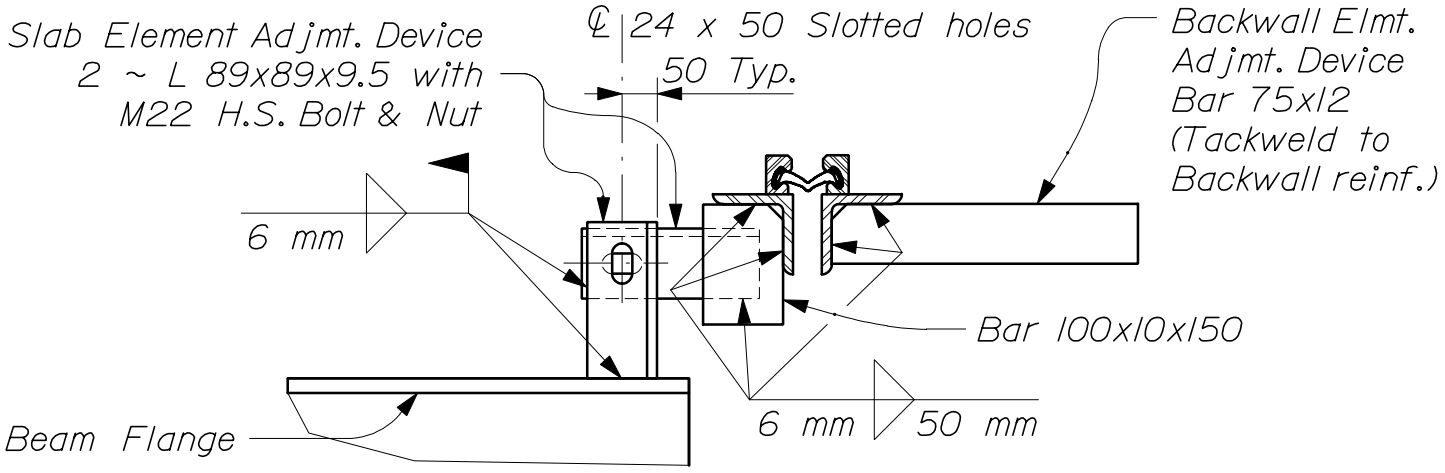
-- ELEVATION ~ TYPICAL INSTALLATION --



-- TYPICAL SECTION ~ TYPE "S" --
(Strip Seal & Extrusion Seal Retainer)



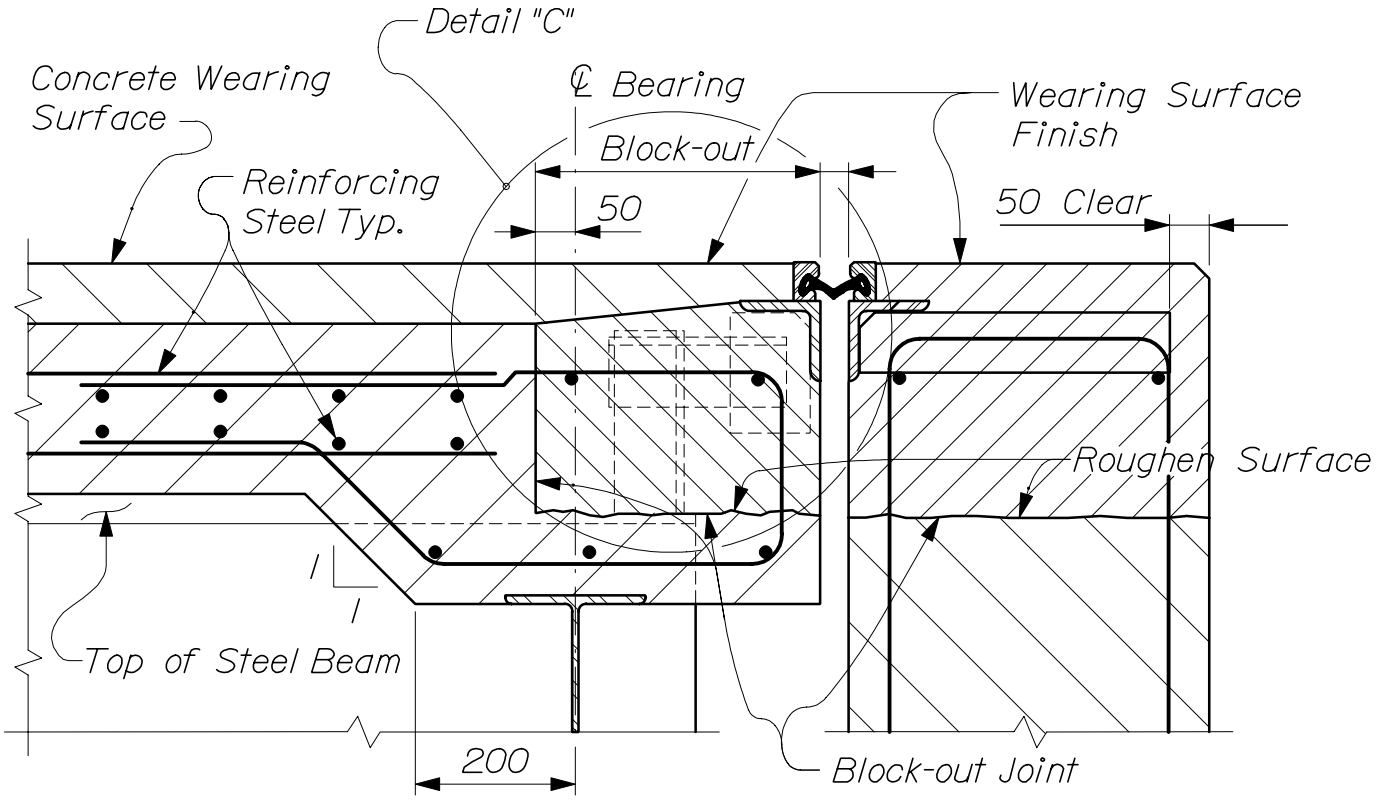
-- TYPICAL SECTION ~ TYPE "M" --
(Membrane Seal & Angle Seal Retainer)



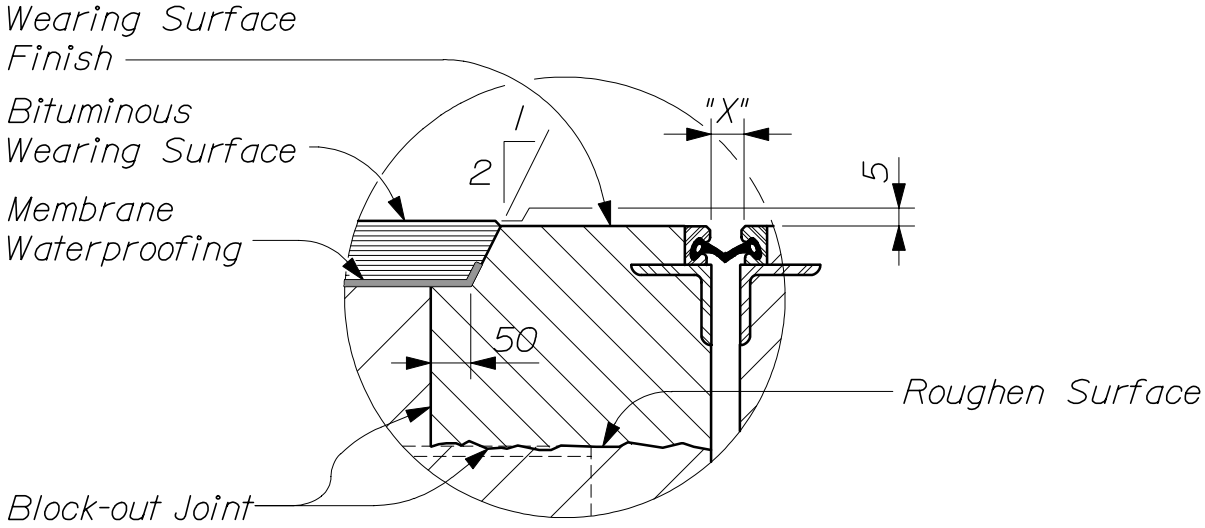
-- ADJUSTMENT DEVICE ~ DETAILS --

EXPANSION DEVICE - GLAND SEAL

520(03)



Section B-B / 520(01)
(Showing Concrete Wearing Surface)

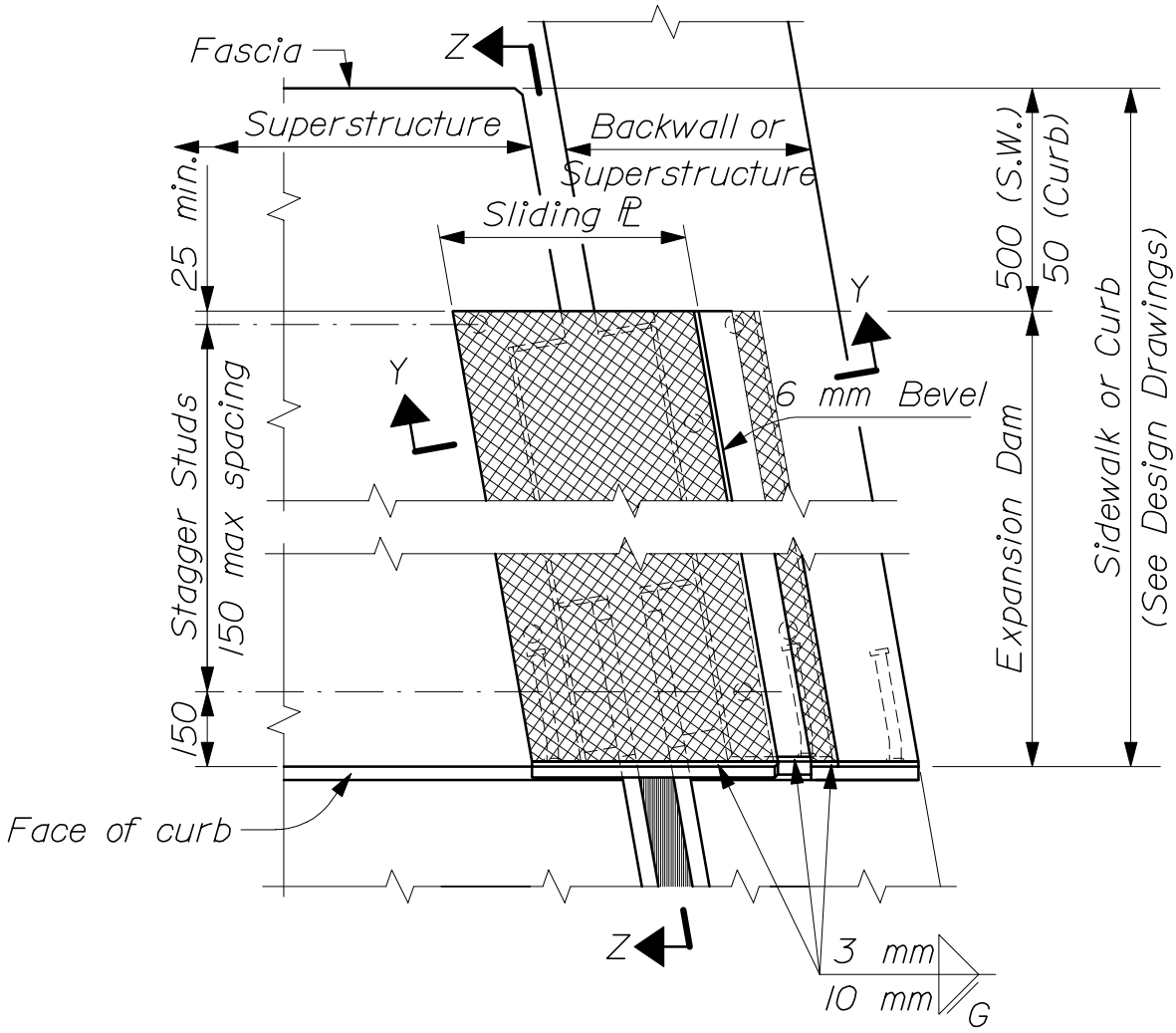


Detail "C"
(Showing Bituminous Wearing Surface)

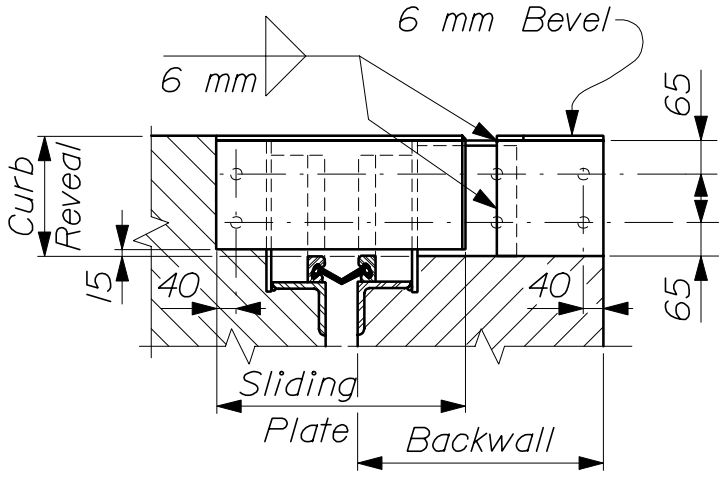
-- CONCRETE BLOCK - OUT --

EXPANSION DEVICE - GLAND SEAL

520(04)



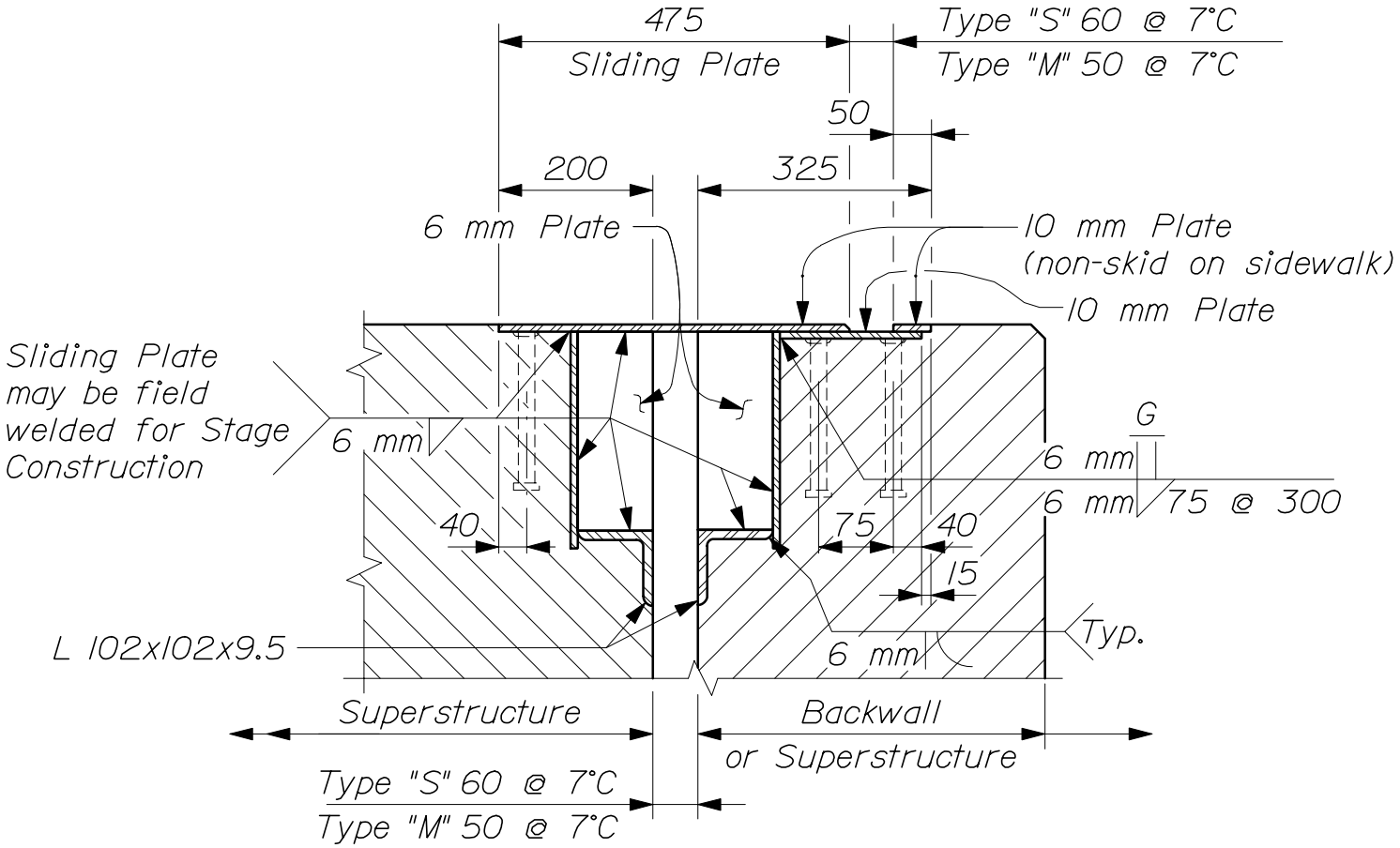
-- PLAN SIDEWALK / CURB EXPANSION DAM --



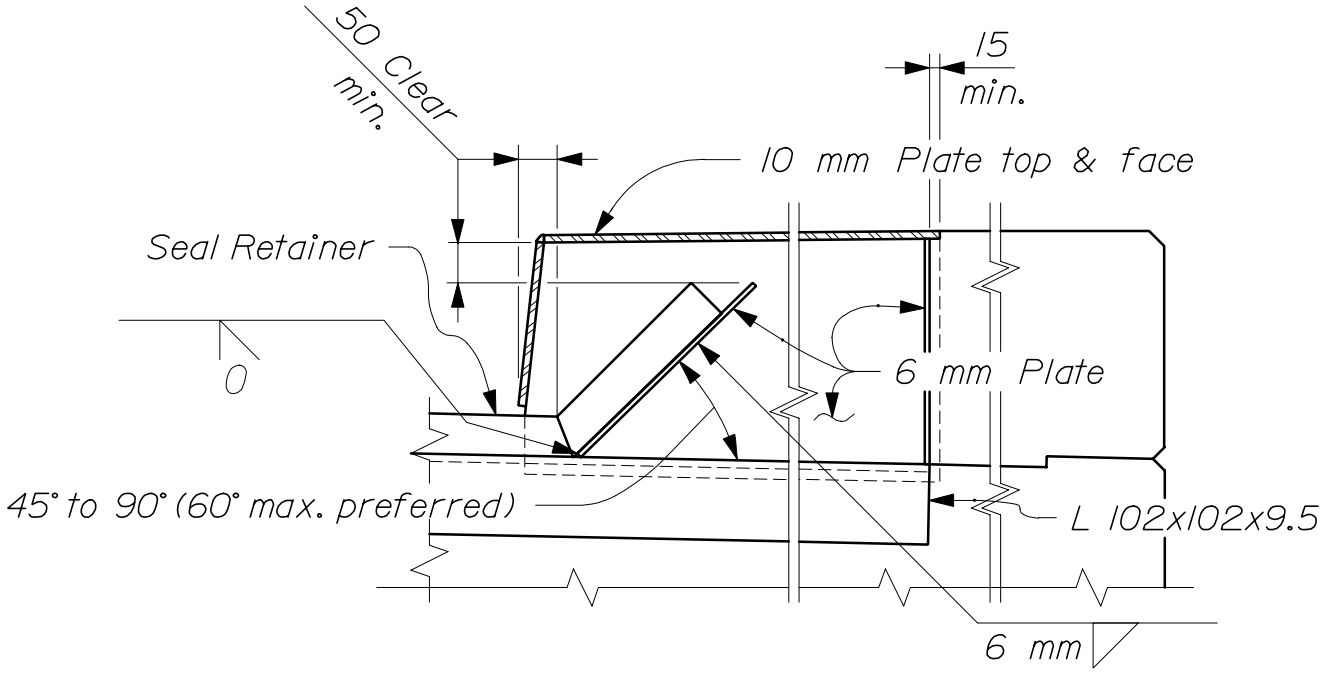
-- ELEVATION SIDEWALK / CURB EXPANSION DAM --

EXPANSION DEVICE - GLAND SEAL

520(05)



Section Y-Y / 520(05)



Section Z-Z / 520(05)

-- SIDEWALK / CURB EXPANSION DAM SECTIONS --

EXPANSION DEVICE - GLAND SEAL

520(06)

NOTES:

1. Each "Expansion Device - Gland Seal" consists of one backwall element and one superstructure element (or two superstructure elements over piers) with expansion dams as required.

2. Refer to Design Drawings for dimensions, slopes, skew and all other information necessary to fabricate and install each Expansion Device.

3. The Expansion Device shall be fabricated to be installed normal to grade.

4. The Expansion Device shall be set to an opening of 50 mm in the fabrication shop. The joint opening shall be adjusted for temperature in the field at the time of installation using the following formula:

0.012 x "L" x "T" = Adjustment (in mm)

"L" is the distance in meters between the backwall and the nearest fixed bearings (for joints at abutments) or between the fixed bearings at either side of the expansion joint (for joints at piers). "T" is the difference between the temperature of the structure and 7 °C.

A structure temperature above 7 °C will result in a smaller joint opening.

5. Welding to reinforcing steel will be allowed in the top of the abutment backwall above the block - out joint.

6. The slab and backwall concrete shall be in place before the Expansion Device is fixed in position. No allowance for movement due to dead load deflection is necessary.

7. The concrete in the block - out may be placed with the curb / sidewalk concrete. An approved epoxy bonding agent shall be applied to all vertical surfaces of the block - out before making the final concrete placement.

8. If there is a conflict between these Standard Details and the Design Drawings, the requirements of the Design Drawings shall be followed.

MATERIALS:

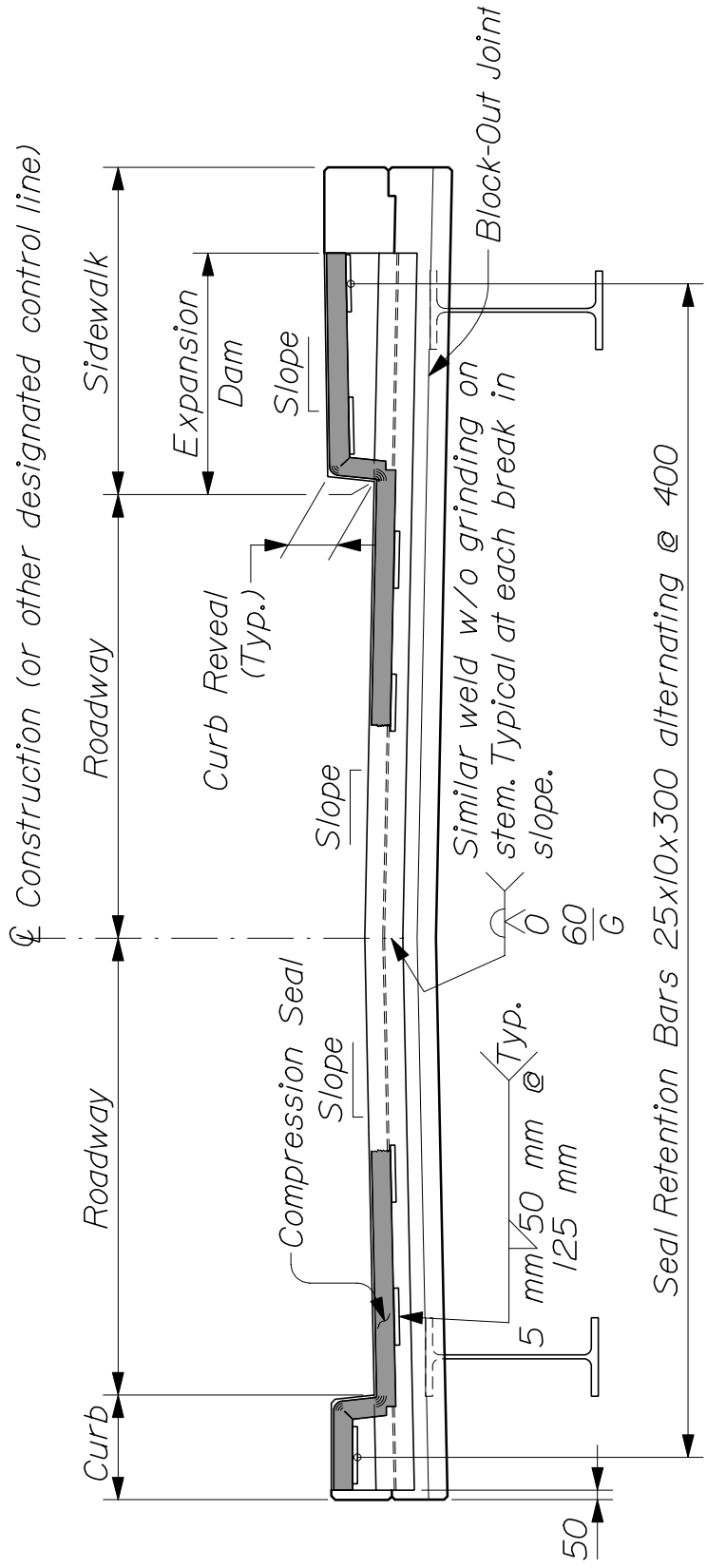
All shapes and plates----------AASHTO M 183M/M 183 (ASTM A 36/A 36M)

EXPANSION DEVICE - GLAND SEAL

520(07)

EXPANSION DEVICE - COMPRESSION SEAL

520(08)

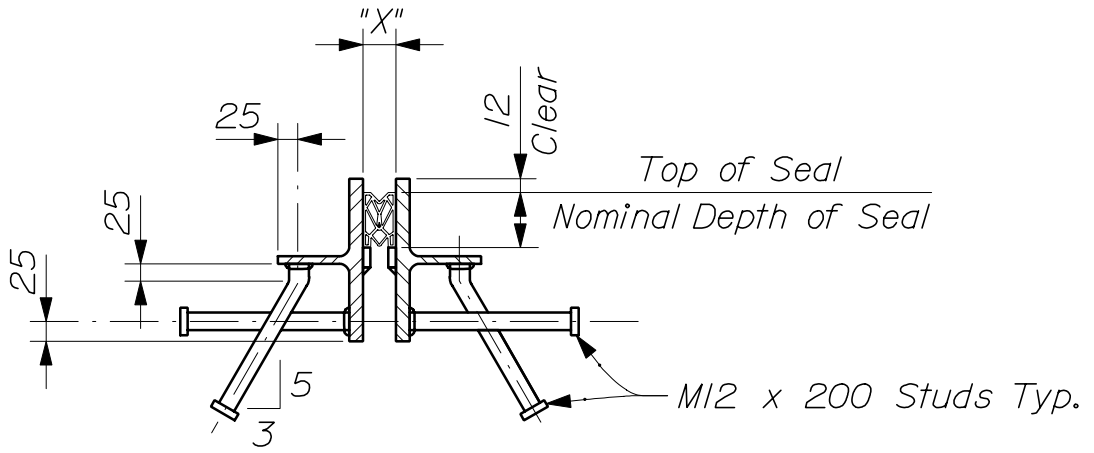


Section A-A / 520(08)

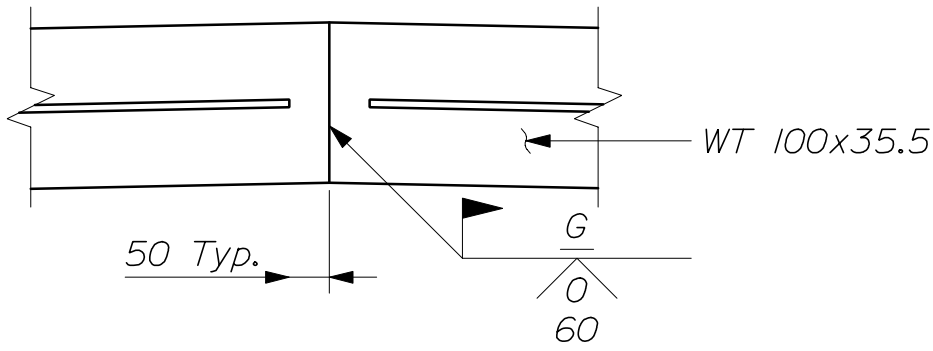
-- ELEVATION ~ TYPICAL INSTALLATION --

EXPANSION DEVICE - COMPRESSION SEAL

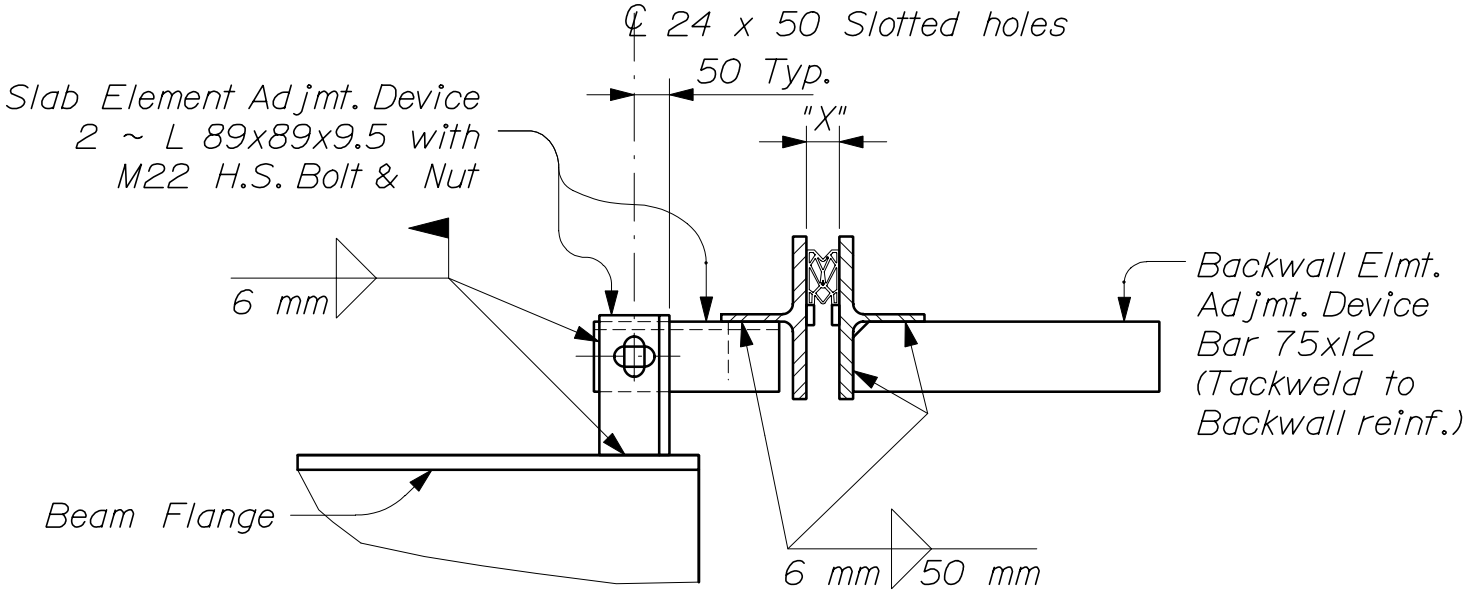
520(09)



-- TYPICAL SECTION --



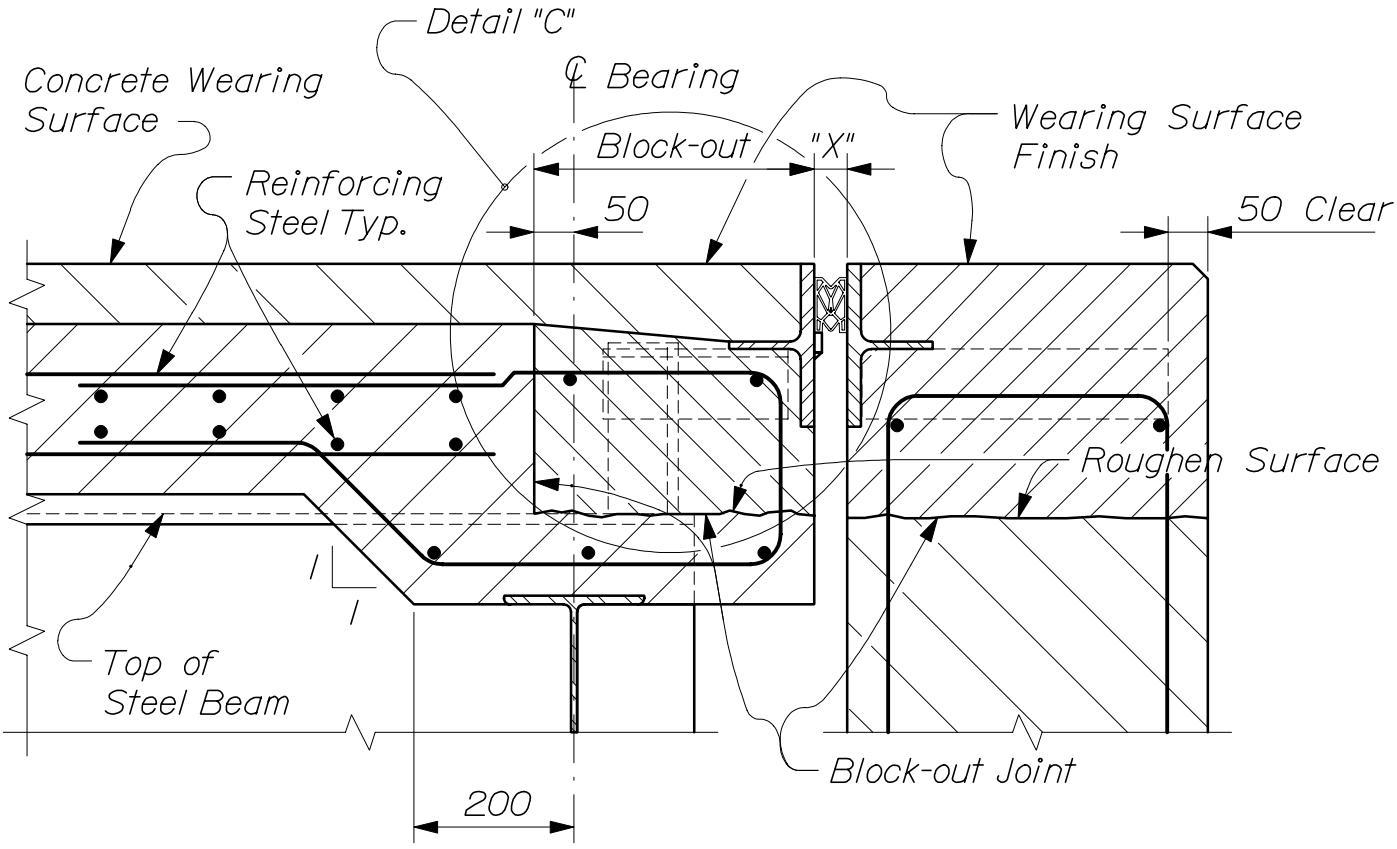
-- JOINT ARMOR FIELD SPLICE --
(for Stage Construction)



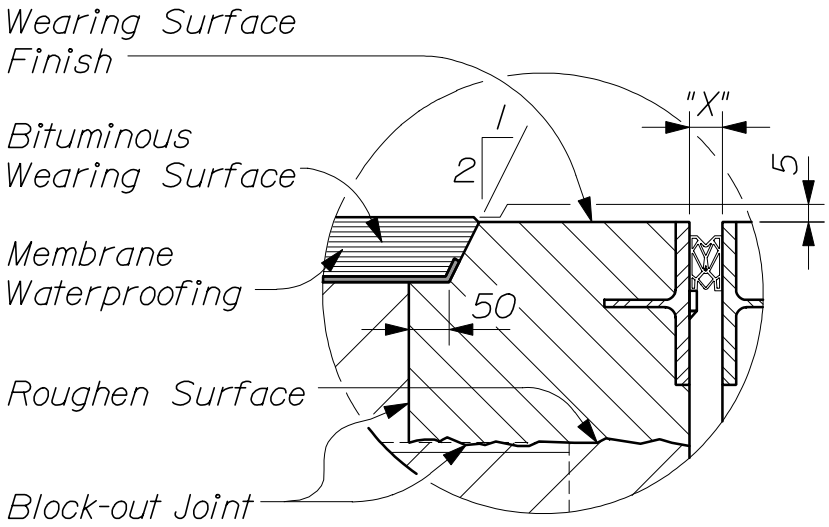
-- ADJUSTMENT DEVICE --

EXPANSION DEVICE - COMPRESSION SEAL

520(10)



Section B-B / 520(08)
(Showing Concrete Wearing Surface)

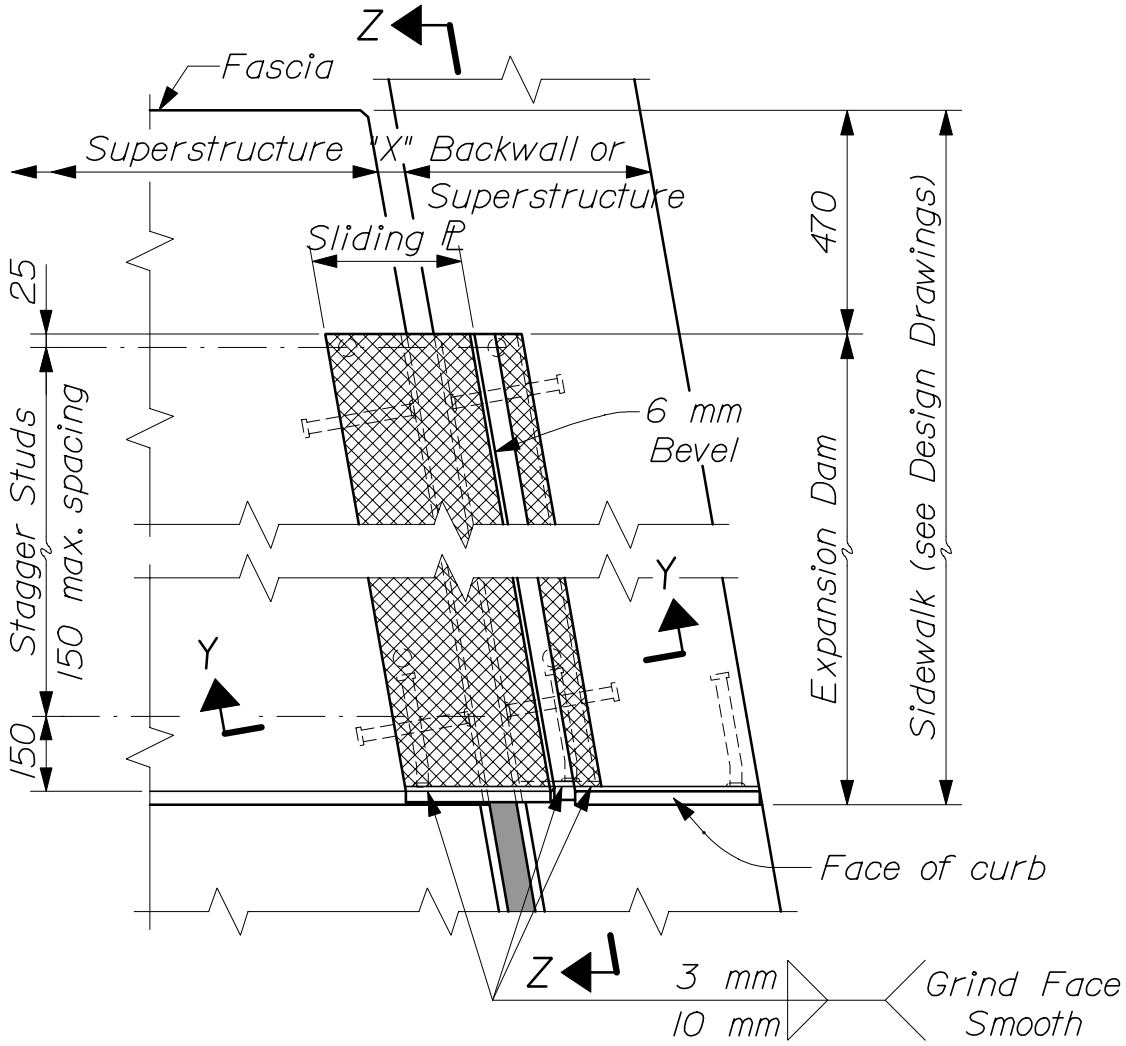


Detail "C"
(Showing Bituminous Wearing Surface)

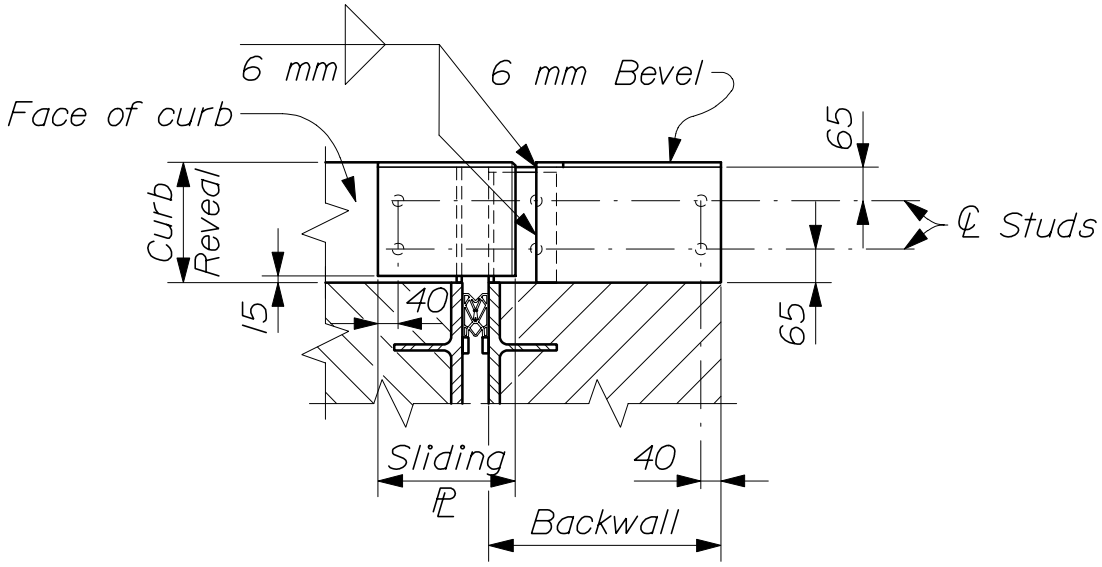
-- CONCRETE BLOCK - OUT --

EXPANSION DEVICE - COMPRESSION SEAL

520(11)



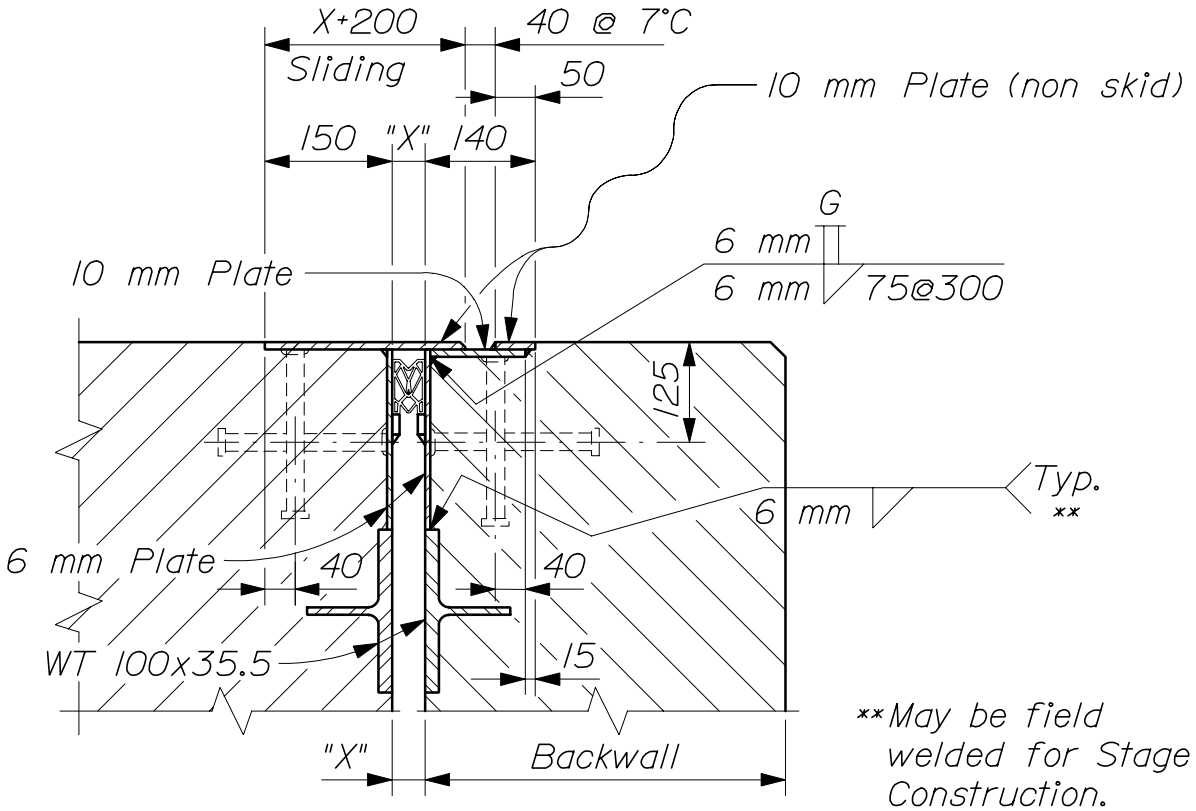
-- PLAN ~ SIDEWALK EXPANSION DAM --



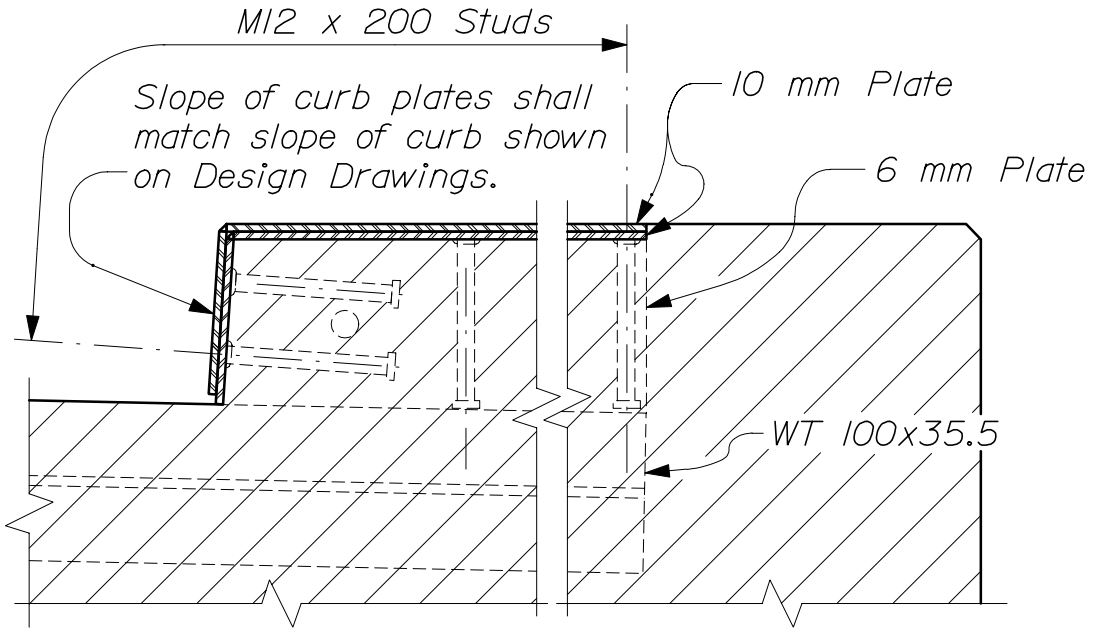
-- ELEVATION ~ SIDEWALK EXPANSION DAM --

EXPANSION DEVICE - COMPRESSION SEAL

520(12)



Section Y-Y / 520(12)



Section Z-Z / 520(12)

-- SIDEWALK EXPANSION DAM SECTIONS --

EXPANSION DEVICE - COMPRESSION SEAL

520(13)

NOTES:

1. Each "Expansion Device - Compression Seal" consists of one backwall element and one superstructure element (or two superstructure elements over piers) with expansion dams as required.

2. Refer to Design Drawings for dimensions, slopes, skew and all other information necessary to fabricate and install each Expansion Device.

3. The Expansion Device shall be fabricated to be installed normal to grade.

4. Dimension "X" at 7 °C shall be determined as follows:

(0.85 x nominal seal width) - 1/2 MR

The Movement Rating (MR) for each seal shall be as determined by MDOT for the make and type of seal to be provided. Dimension "X" at 7 °C and the make and type of seal shall be shown on the Shop Detail Drawings.

5. Final adjustment for temperature shall be made in the field according to the "Compression Seal Adjustment Chart" shown on the Design Drawings. The adjustment shall be measured parallel to the centerline of construction.

6. Welding to reinforcing steel will be allowed in the top of the abutment backwall above the block - out joint.

7. The slab and backwall concrete shall be in place before the Expansion Device is fixed in position. No allowance for movement due to dead load deflection is necessary.

8. The concrete in the block - out may be placed with the curb / sidewalk concrete. An approved epoxy bonding agent shall be applied to all vertical surfaces of the block - out before making the final concrete placement.

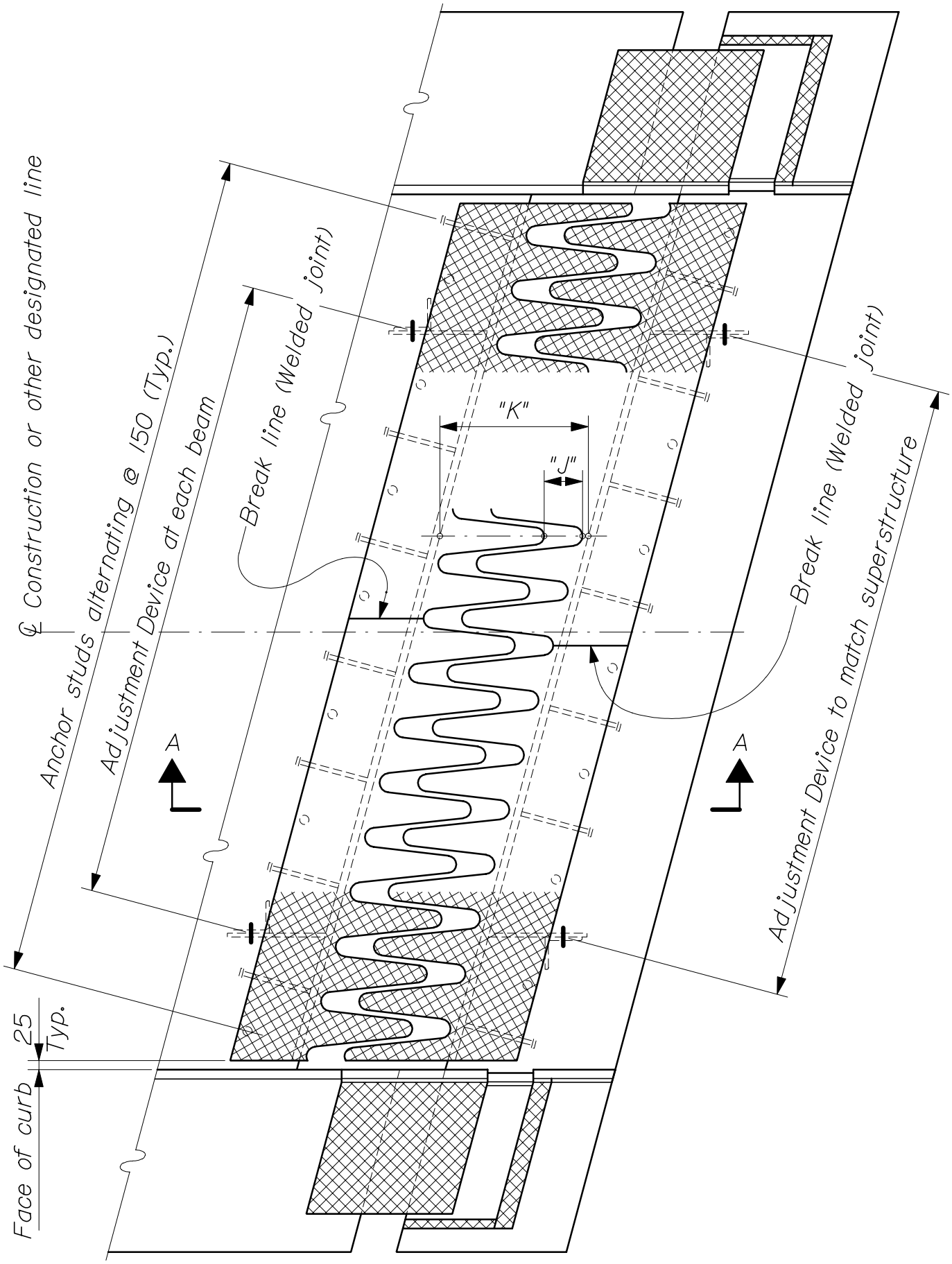
9. If there is a conflict between these Standard Details and the Design Drawings, the requirements of the Design Drawings shall be followed.

MATERIALS:

All shapes and plates----------AASHTO M 183M/M 183 (ASTM A 36/A 36M)

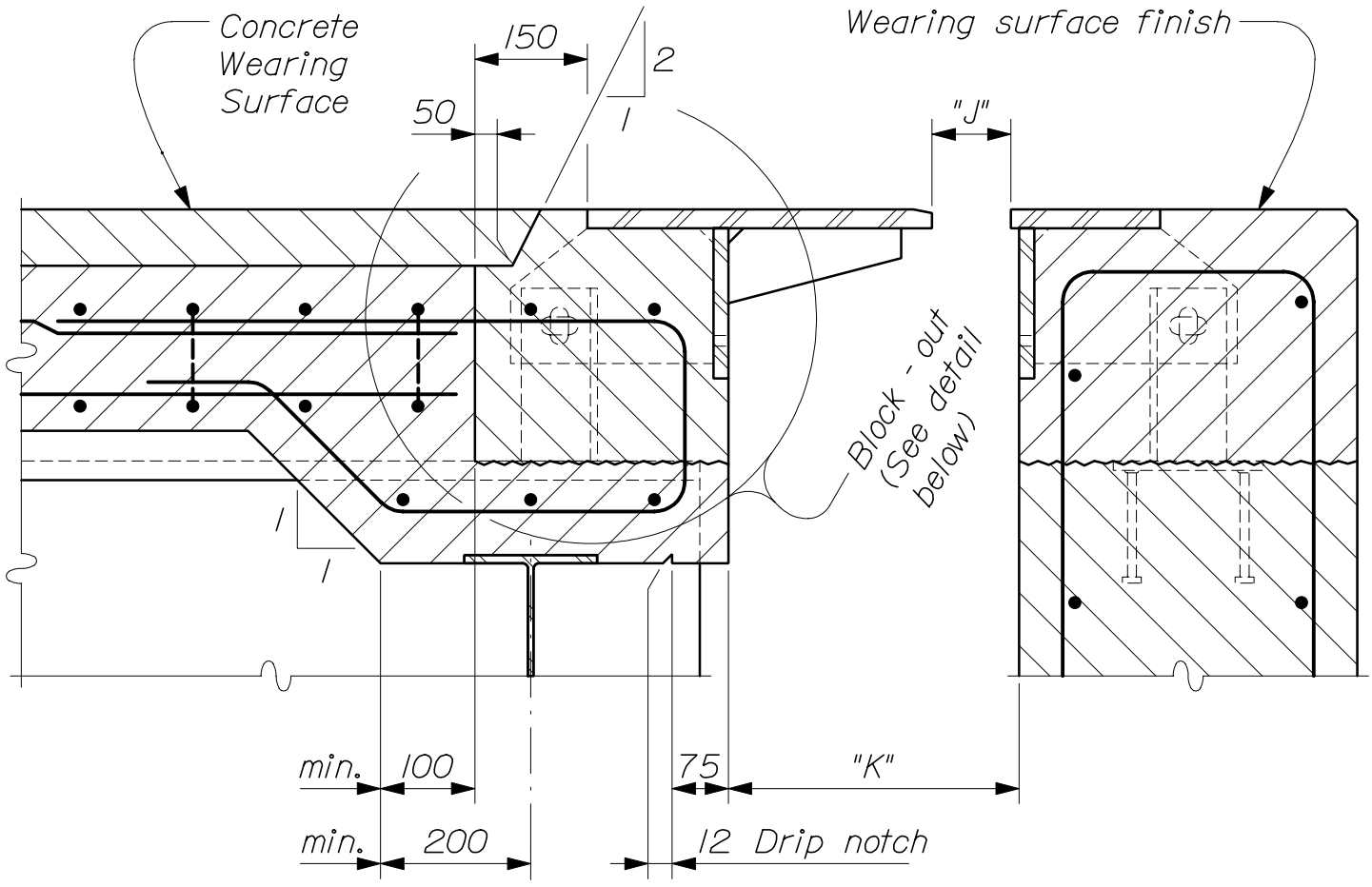
EXPANSION DEVICE - COMPRESSION SEAL

520(14)

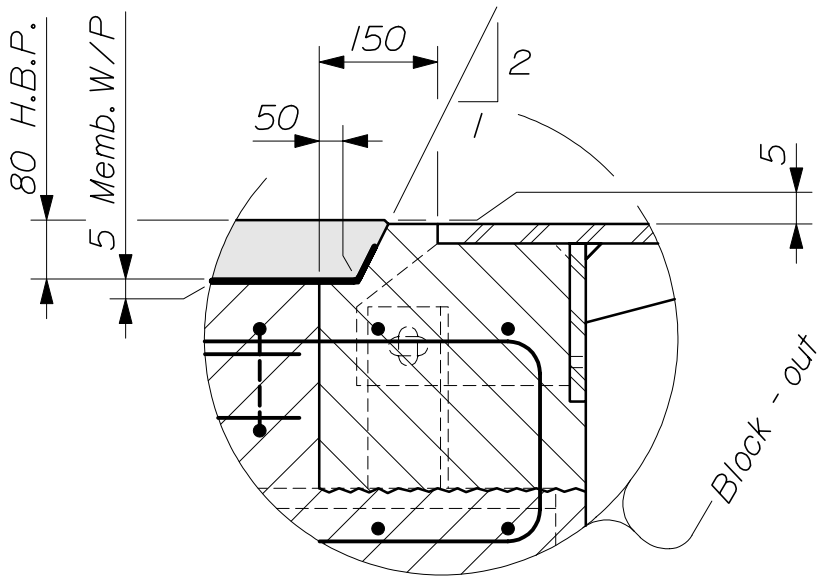


EXPANSION DEVICE - FINGER JOINT

521(01)



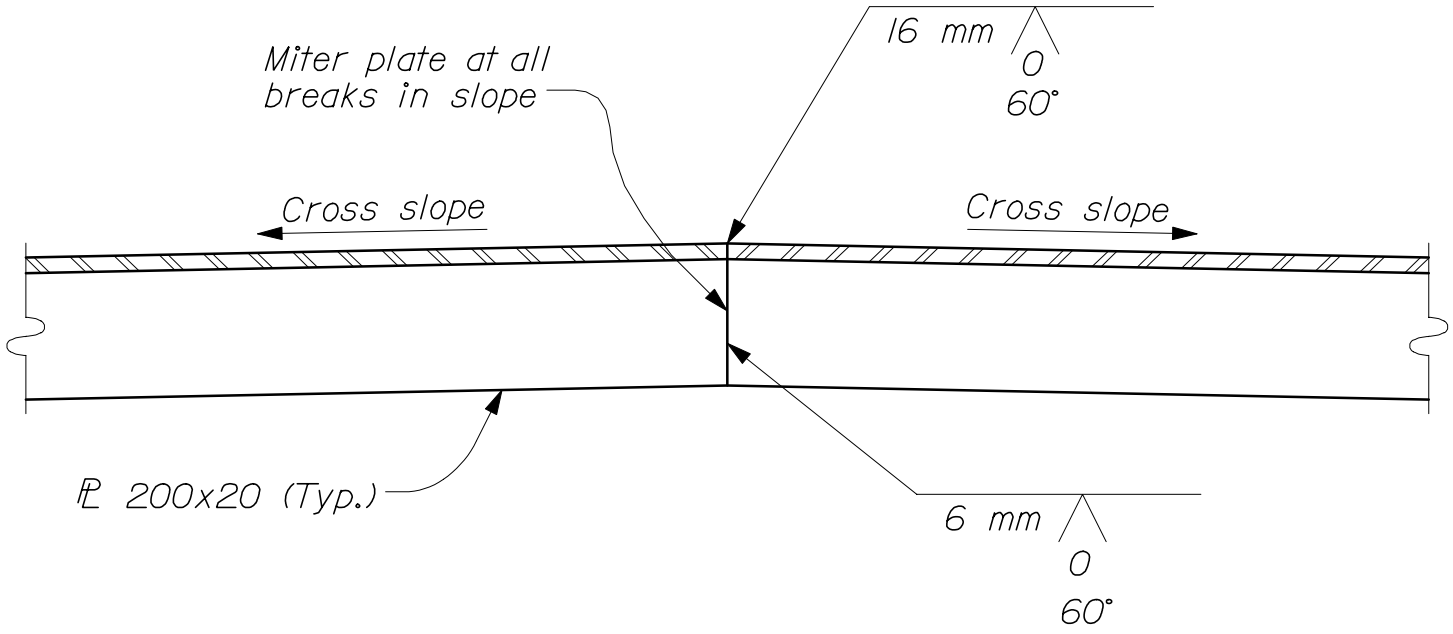
-- SECTION A-A --



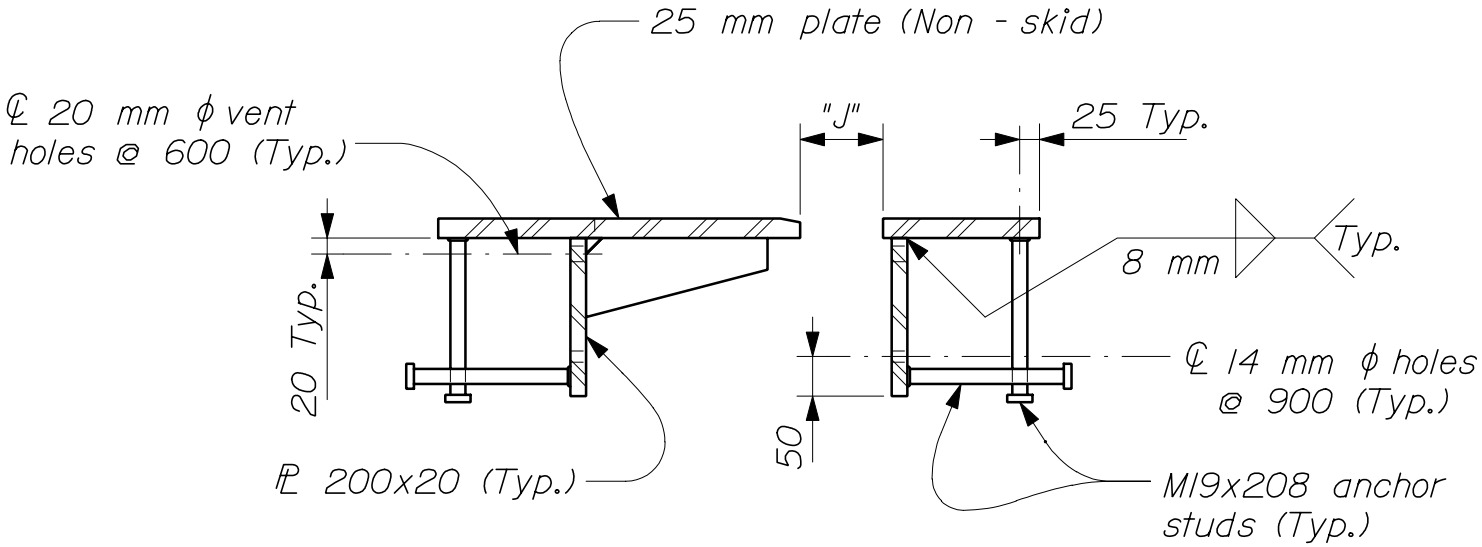
-- BITUMINOUS WEARING SURFACE DETAIL --

EXPANSION DEVICE - FINGER JOINT

521(02)



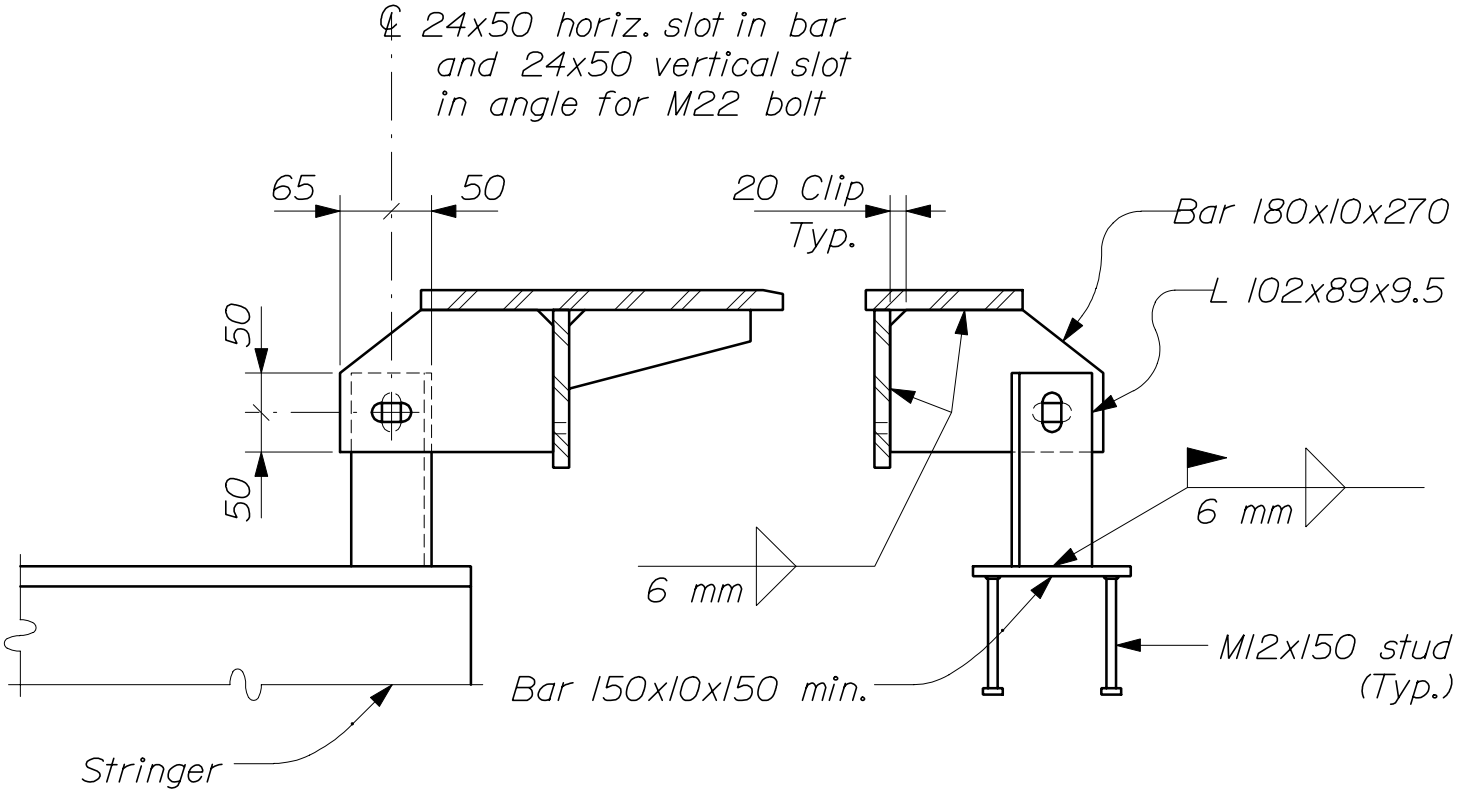
-- PART FINGER JOINT ELEVATION --



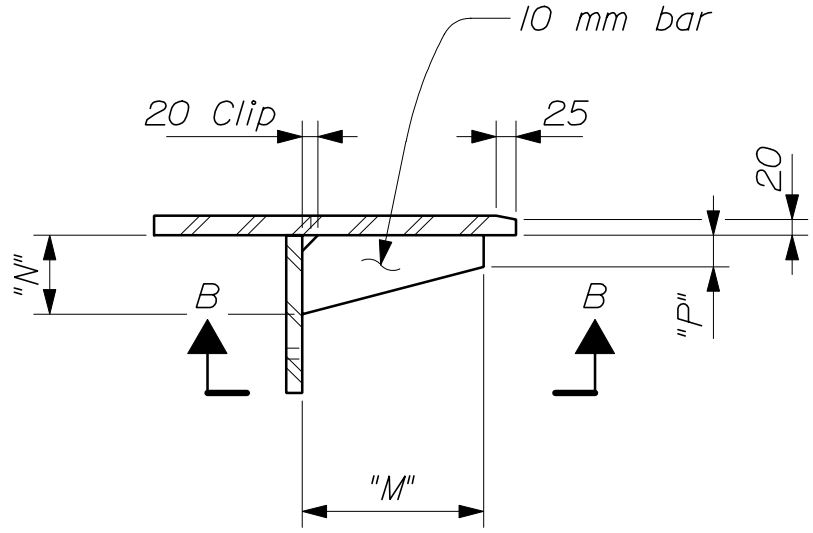
-- TYPICAL FINGER JOINT SECTION --

EXPANSION DEVICE - FINGER JOINT

521(03)



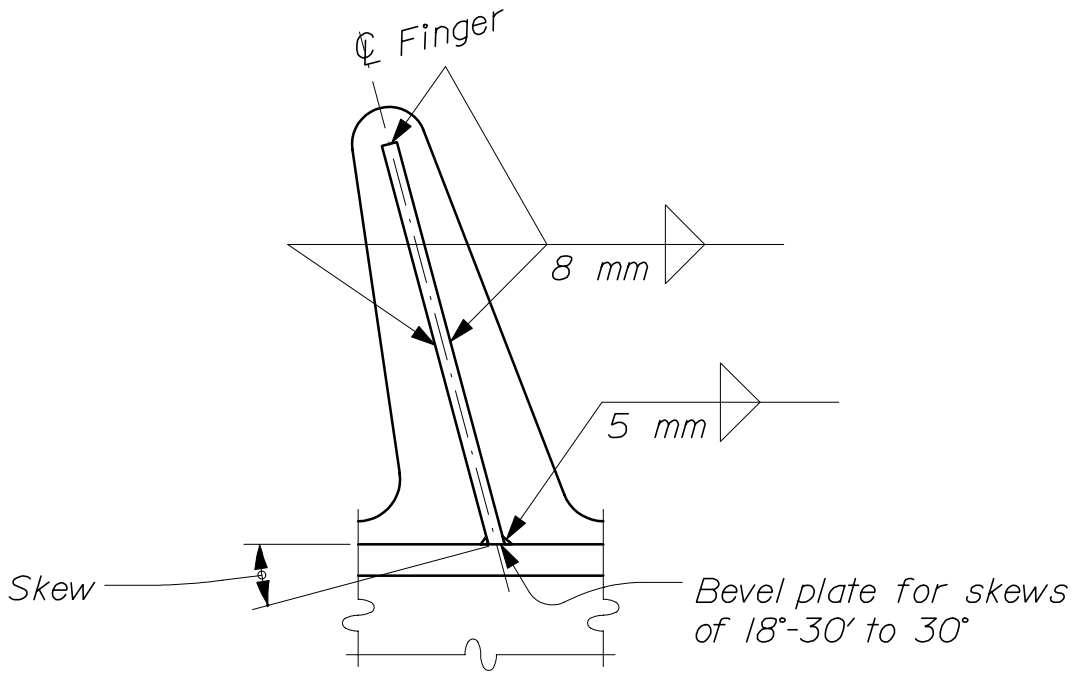
-- ADJUSTMENT DEVICES --
Symmetical both sides of joint except as shown



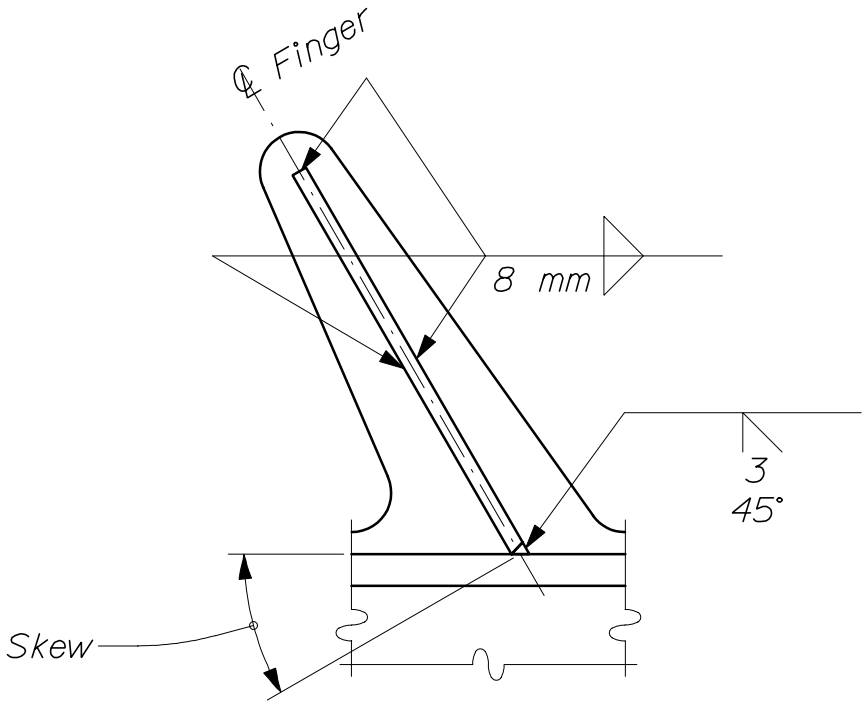
-- FINGER DETAIL --

EXPANSION DEVICE - FINGER JOINT

521(04)



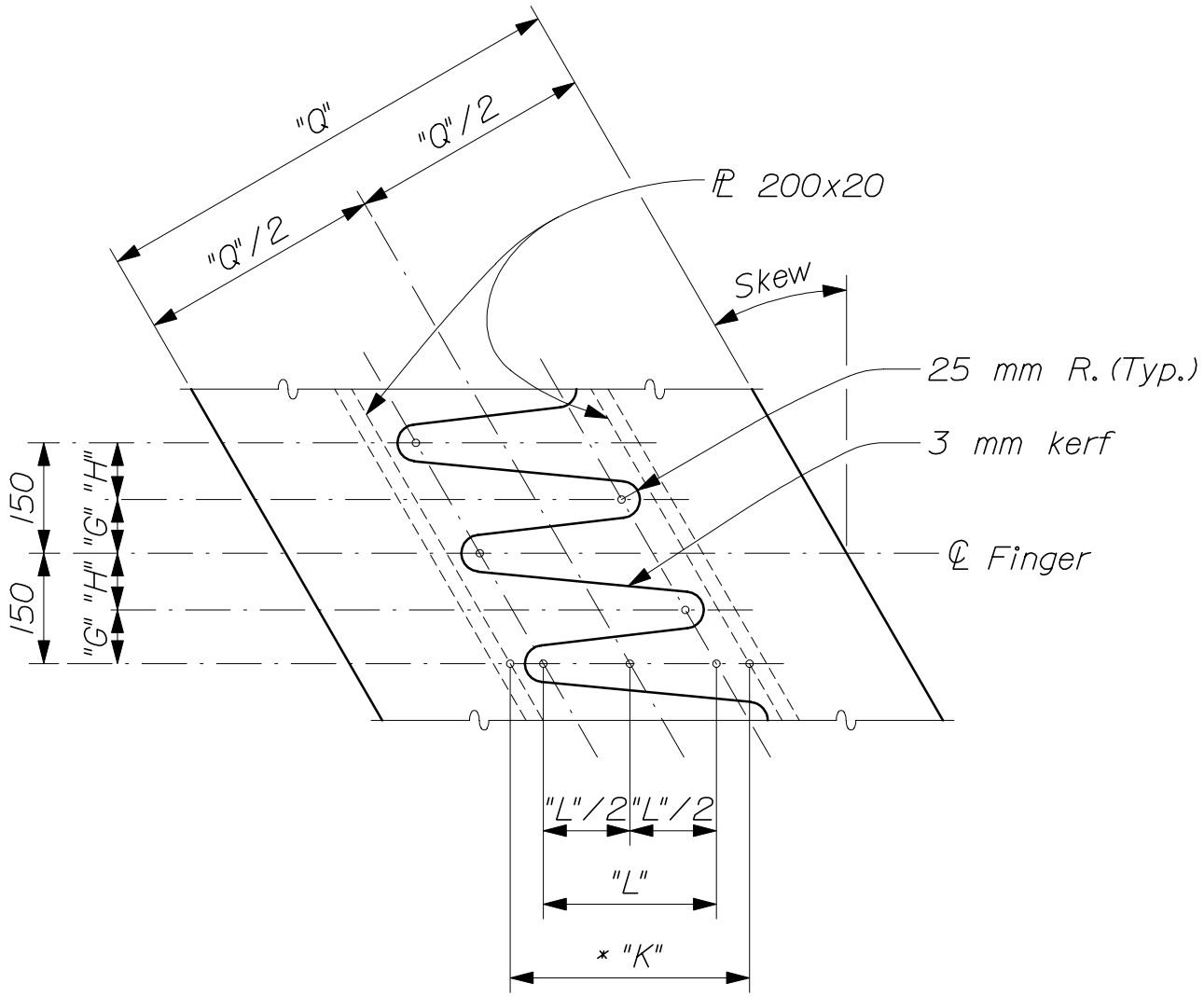
-- VIEW B-B --
Skew 0° to 30°



-- VIEW B-B --
Skew over 30°

EXPANSION DEVICE - FINGER JOINT

521(05)

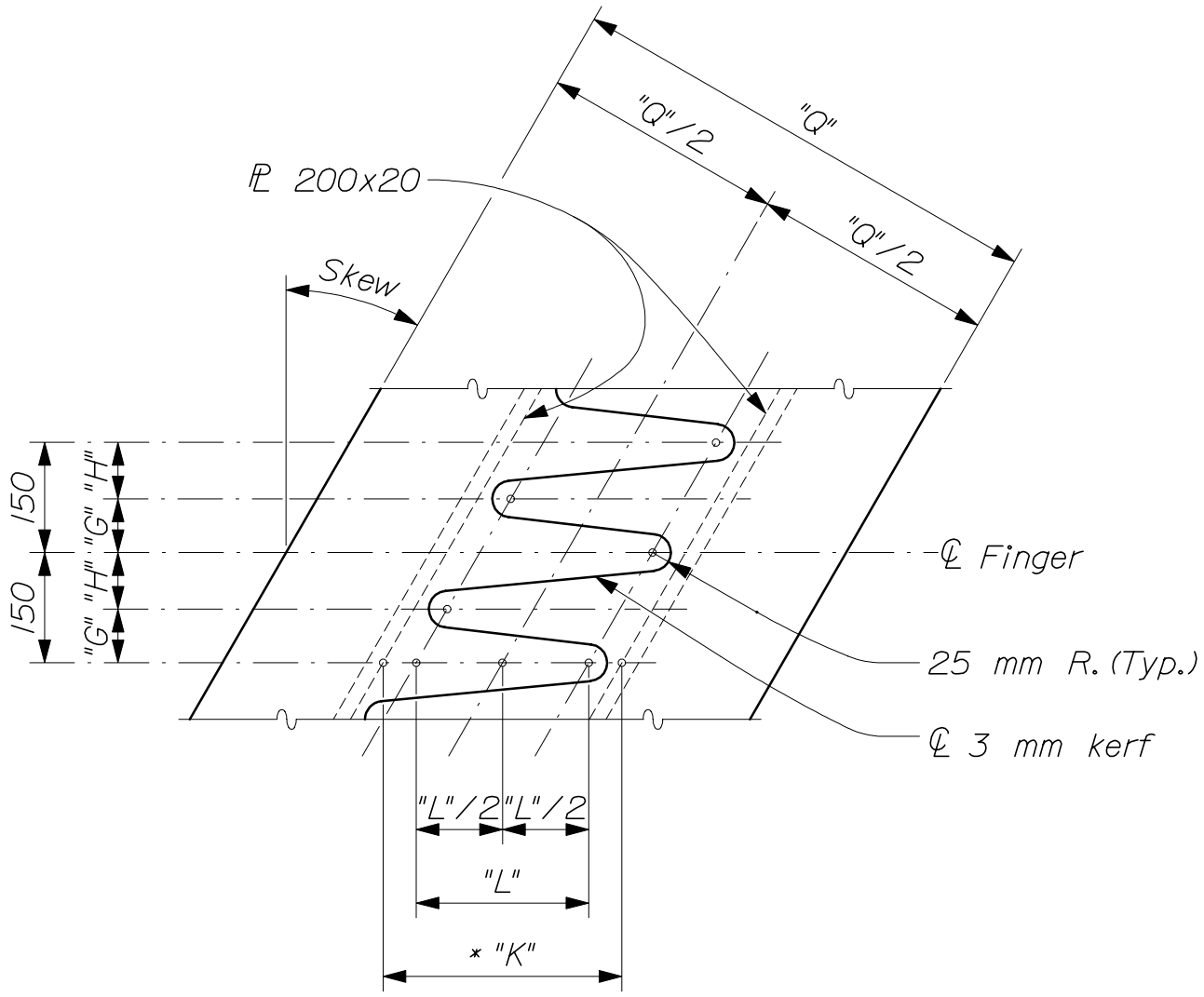


-- FINGER CUTTING DETAIL --
(Skew back on left)

Note; Cut from one plate and match mark
* "K" is "K" dimension prior to cutting plate

EXPANSION DEVICE - FINGER JOINT

521(06)

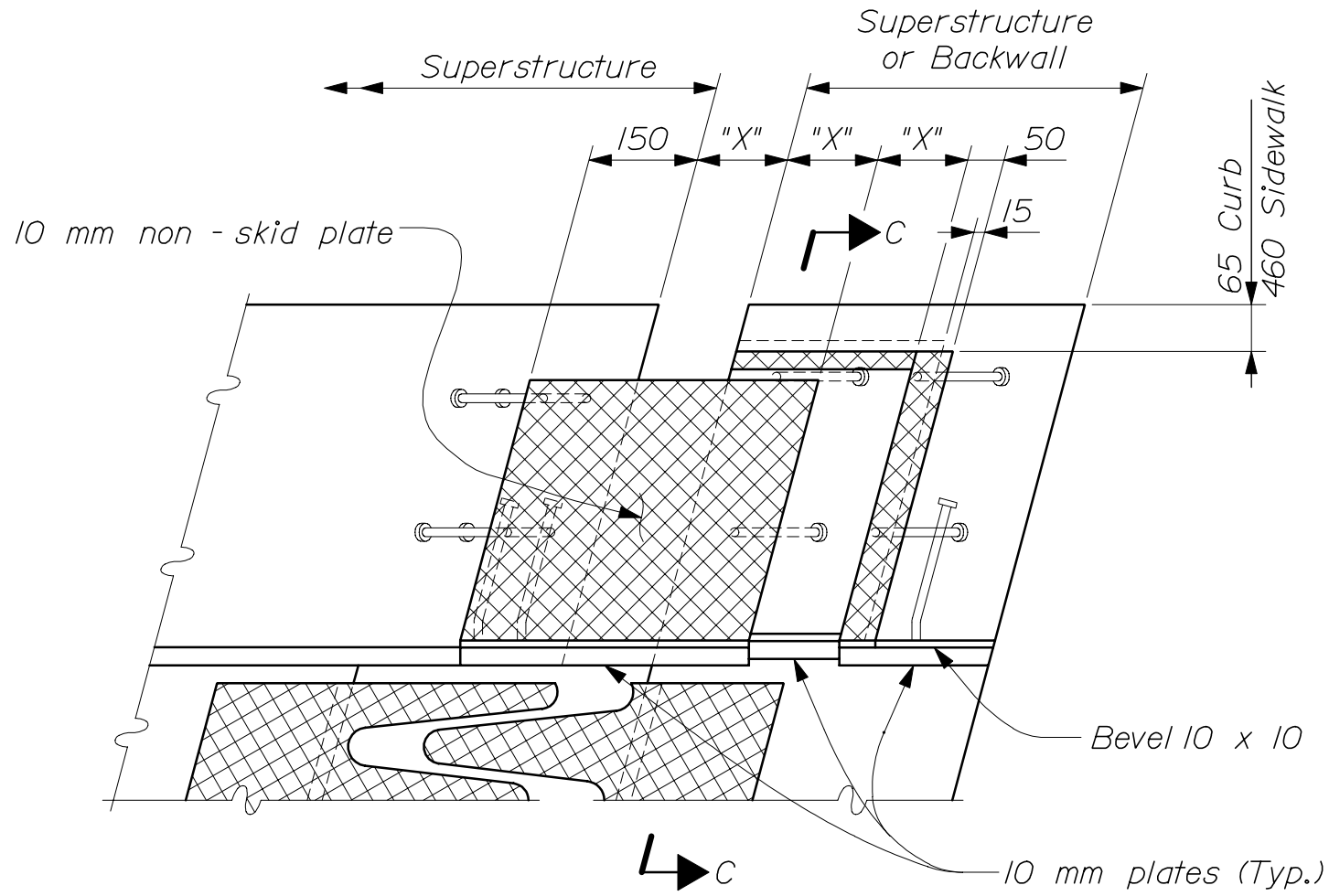


-- FINGER CUTTING DETAIL --
(Skew ahead on left)

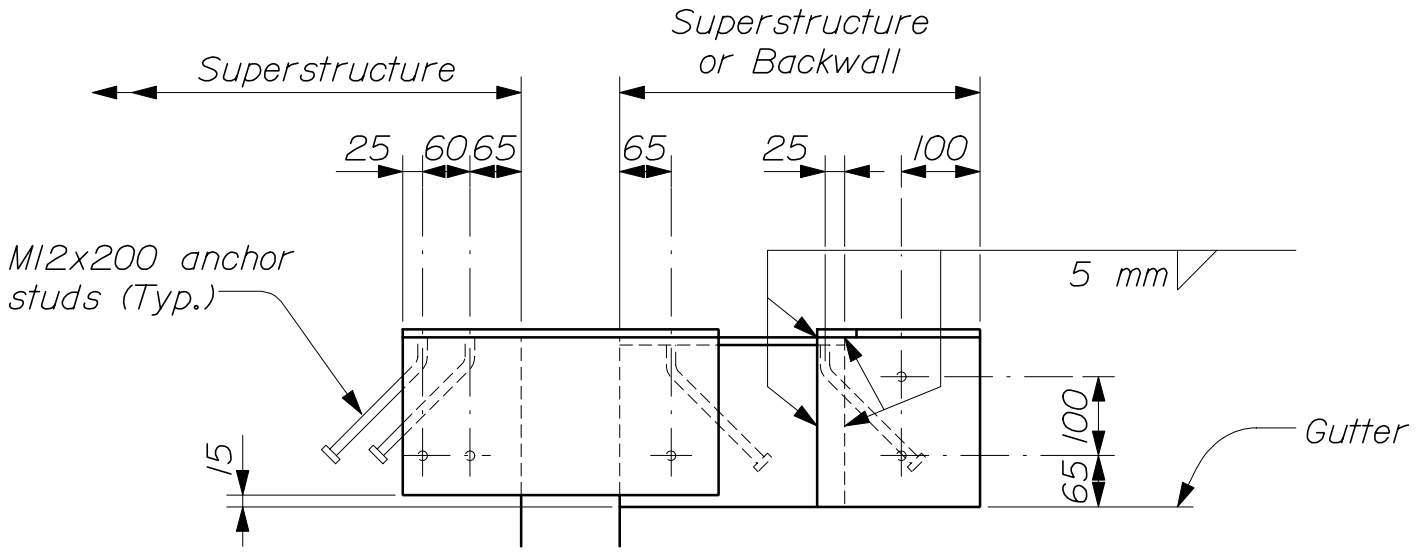
Note; Cut from one plate and match mark
* "K" is "K" dimension prior to cutting plate

EXPANSION DEVICE - FINGER JOINT

521(07)



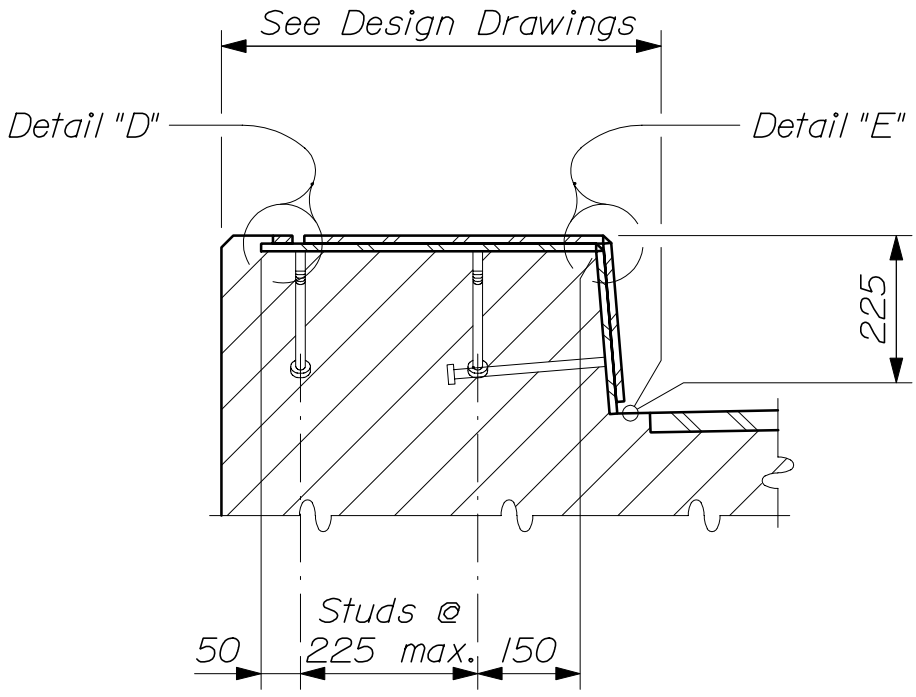
-- EXPANSION DAM PLAN --



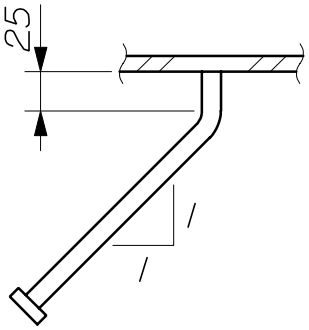
-- EXPANSION DAM ELEVATION --

EXPANSION DEVICE - FINGER JOINT

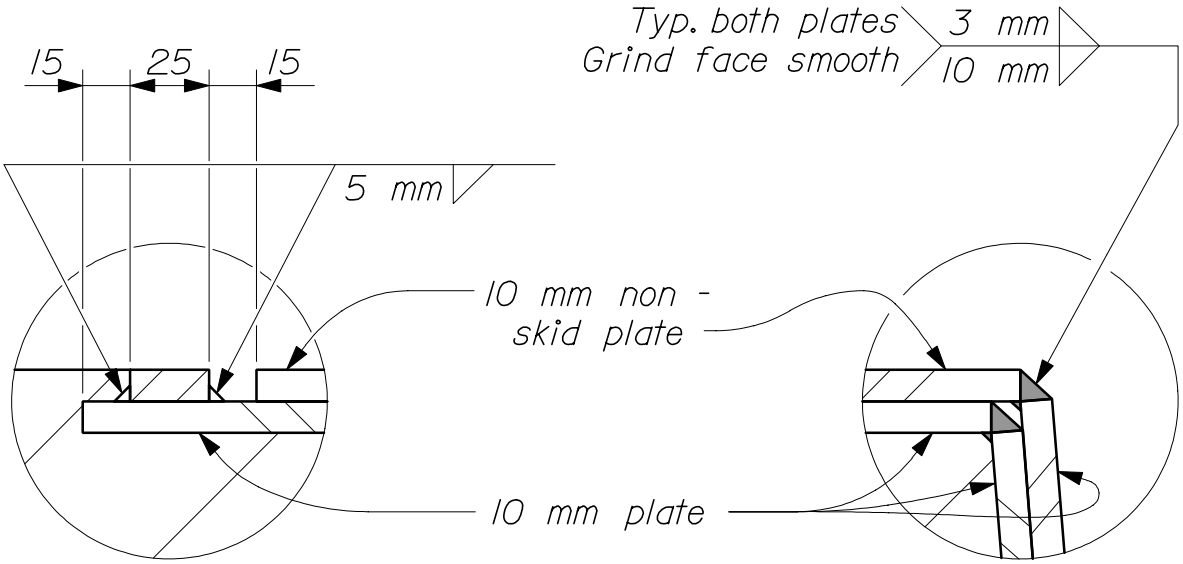
52I(08)



-- SECTION C-C --



-- BENT STUD DETAIL --



-- DETAIL "D" --

-- DETAIL "E" --

EXPANSION DEVICE - FINGER JOINT

521(09)

EXPANSION DEVICE - FINGER JOINT

52(10)

TABLE OF DIMENSIONS

Type	Exp. Length	Skew	* "K"	"L"	"G"	"H"	"K"@7°	"J"@7°	"M"	"N"	"P"	"Q"	"X"@7°
A	30 000 to 85 000	0° to 5°	180	100	75	75	232	55	--	--	--	530	75
		> 5° to 10°	185	110	73	77	237	55	--	--	--	560	75
		> 10° to 20°	205	120	71	79	257	55	--	--	--	560	75
		> 20° to 30°	225	135	69	81	277	55	--	--	--	580	75
		> 30° to 40°	250	150	67	83	302	55	--	--	--	580	75
		> 40° to 50°	285	165	65	85	337	55	--	--	--	580	75
B	85 000 to 130 000	0° to 5°	230	150	75	75	307	80	--	--	--	580	100
		> 5° to 10°	235	160	73	77	312	80	--	--	--	610	100
		> 10° to 20°	255	170	71	79	332	80	--	--	--	610	100
		> 20° to 30°	275	185	69	81	352	80	--	--	--	640	100
		> 30° to 40°	305	205	67	83	382	80	--	--	--	640	100
		> 40° to 50°	345	225	65	85	422	80	--	--	--	640	100
C	130 000 to 180 000	0° to 10°	285	210	75	75	387	105	230	100	40	660	125
		> 10° to 20°	305	220	74	76	407	105	250	100	40	660	125
		> 20° to 30°	325	235	73	77	427	105	280	100	40	660	125
		> 30° to 40°	355	255	72	78	457	105	280	100	40	660	125
		> 40° to 50°	395	275	70	80	497	105	300	100	40	660	125
D	180 000 to 230 000	0° to 10°	335	260	75	75	462	130	280	125	50	760	150
		> 10° to 20°	355	270	74	76	482	130	300	125	50	760	150
		> 20° to 30°	375	285	73	77	502	130	330	125	50	760	150
		> 30° to 40°	405	305	72	78	532	130	330	125	50	760	150
		> 40° to 50°	450	330	70	80	577	130	380	125	50	760	150
E	230 000 to 280 000	0° to 10°	385	310	75	75	537	155	330	150	65	910	175
		> 10° to 20°	405	320	74	76	557	155	360	150	65	910	175
		> 20° to 30°	425	335	73	77	577	155	380	150	65	910	175
		> 30° to 40°	455	355	72	78	607	155	380	150	65	910	175
		> 40° to 50°	500	380	70	80	652	155	430	150	65	910	175

NOTES:

1. Each "Expansion Device - Finger Joint" consists of one backwall element and one superstructure element (or two superstructure elements over piers) with expansion dams as required.

2. Refer to Design Drawings for dimensions, slopes, skew and all other information necessary to fabricate and install each Expansion Device.

3. The Expansion Device shall be fabricated to be installed normal to grade.

4. The Expansion Device shall be installed with a joint opening of "J" at 7 °C. The joint opening shall be adjusted for temperature in the field at the time of installation using the following formula:

0.012 x "L" x "T" = Adjustment (in mm)

"L" is the distance in meters between the backwall and the nearest fixed bearings (for joints at abutments) or between the fixed bearings at either side of the expansion joint (for joints at piers). "T" is the difference between the temperature of the structure and 7 °C.

A structure temperature above 7 °C will result in a smaller joint opening.

5. Welding to reinforcing steel will be allowed in the top of the abutment backwall above the block - out joint.

6. After the Expansion Device is in final position, weld the bar and angle of the adjustment devices together with a 6 mm fillet weld.

7. The slab and backwall concrete shall be in place before the Expansion Device is fixed in position. No allowance for movement due to dead load deflection is necessary.

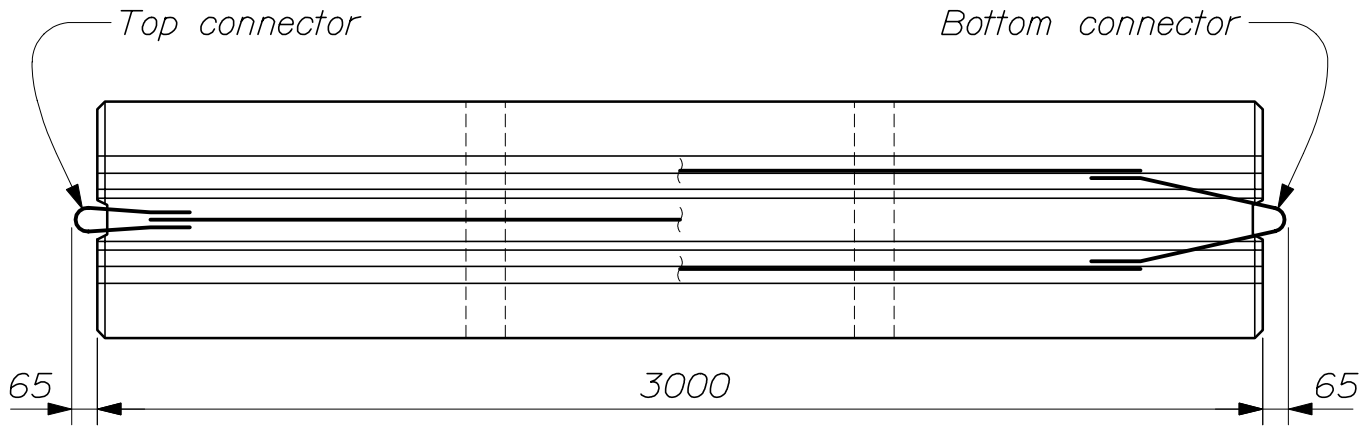
8. The concrete in the block - out may be placed with the curb / sidewalk concrete. An approved epoxy bonding agent shall be applied to all vertical surfaces of the block - out before making the final concrete placement.

9. If there is a conflict between these Standard Details and the Design Drawings, the requirements of the Design Drawings shall be followed.

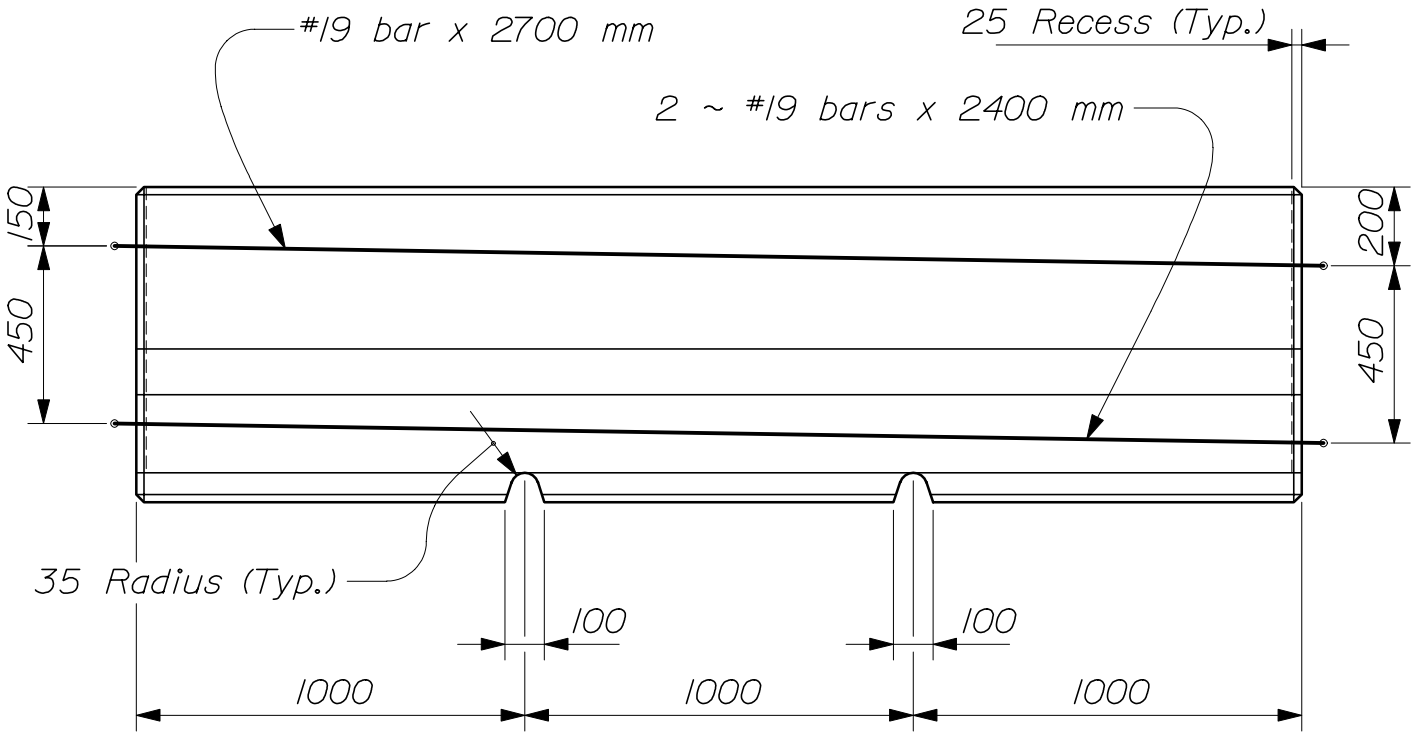
MATERIALS:

All shapes and plates----------AASHTO M 183M/M 183 (ASTM A 36/A 36M)

EXPANSION DEVICE - FINGER JOINT



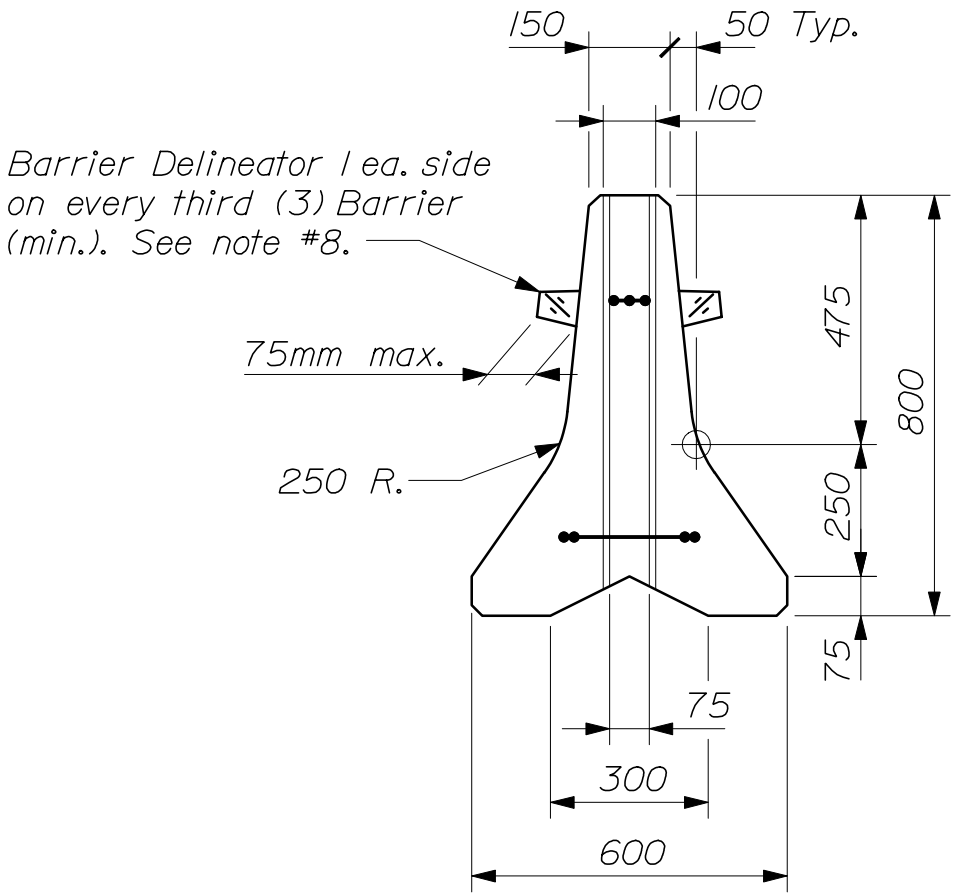
-- PLAN --



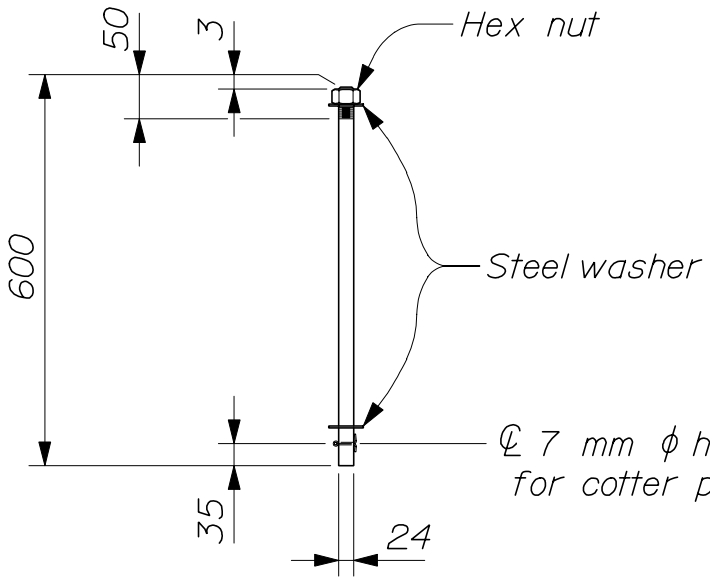
-- ELEVATION --

TEMPORARY CONCRETE BARRIER

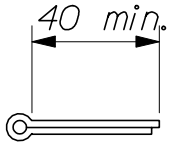
526(01)



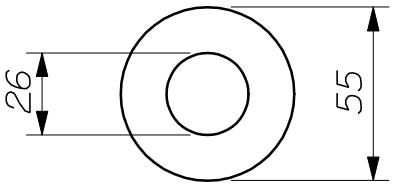
-- END VIEW --



-- CONNECTING PIN --

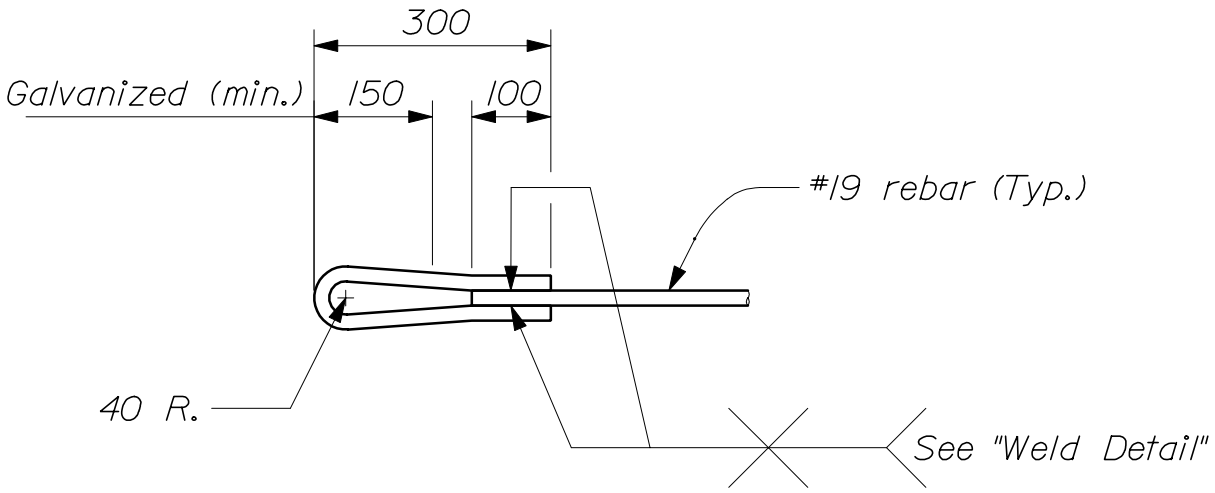


-- COTTER PIN DETAIL --
4.76 mm SAE Standard

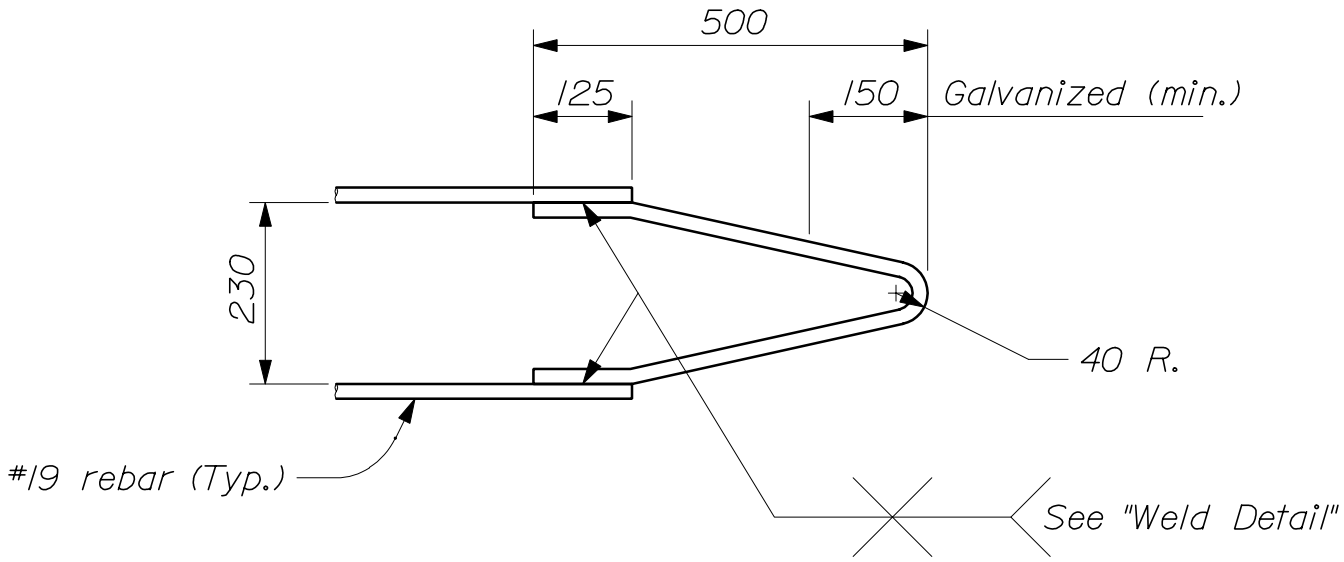


-- WASHER DETAIL --
4 mm thick galvanized steel

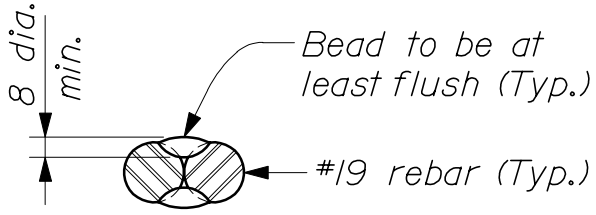
# TEMPORARY CONCRETE BARRIER
526(02)



-- TOP CONNECTOR --



-- BOTTOM CONNECTOR --



-- WELD DETAIL --

TEMPORARY CONCRETE BARRIER

526(03)

NOTES:

1. Alternate barrier designs may be submitted for approval by the Engineer.

2. Form a 20 mm chamfer or radius on all exposed edges.

3. Hardware shall be furnished in the metric sizes shown, except that equivalent imperial sizes may be substituted if metric sizes are not available.

4. Galvanize connectors after forming. Connectors may be completely galvanized.

5. Galvanize the connector pin assembly after fabrication. Burr the threads on the pin after installing the nut.

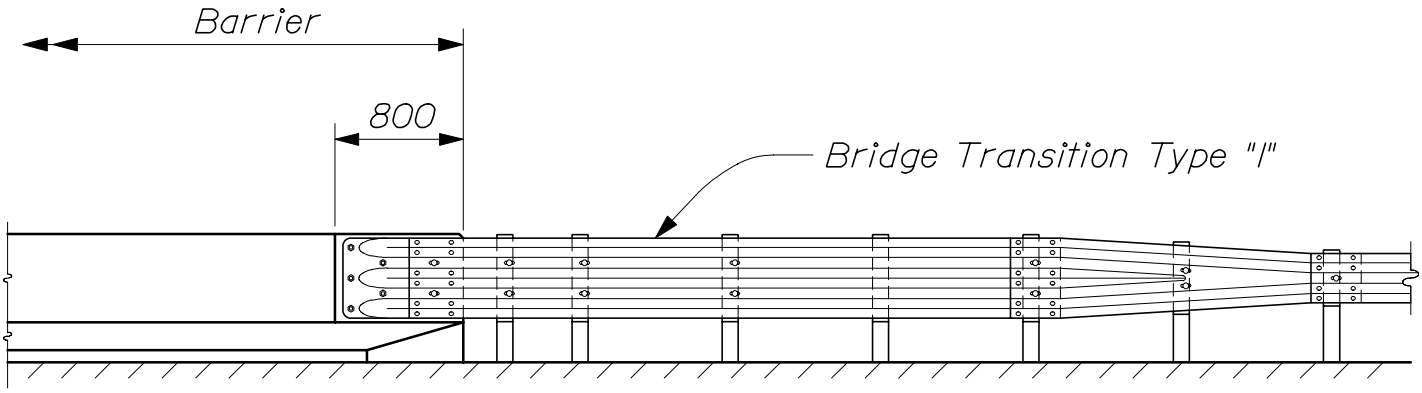
6. The reinforcement shown is primarily for the impact performance of the barrier. Additional reinforcement may be advisable for handling the barrier and for ensuring its integrity over its service life.

7. When serving the additional function of channelizing traffic, the barrier shall be supplemented by standard delineators, channelizing devices or pavement markings.

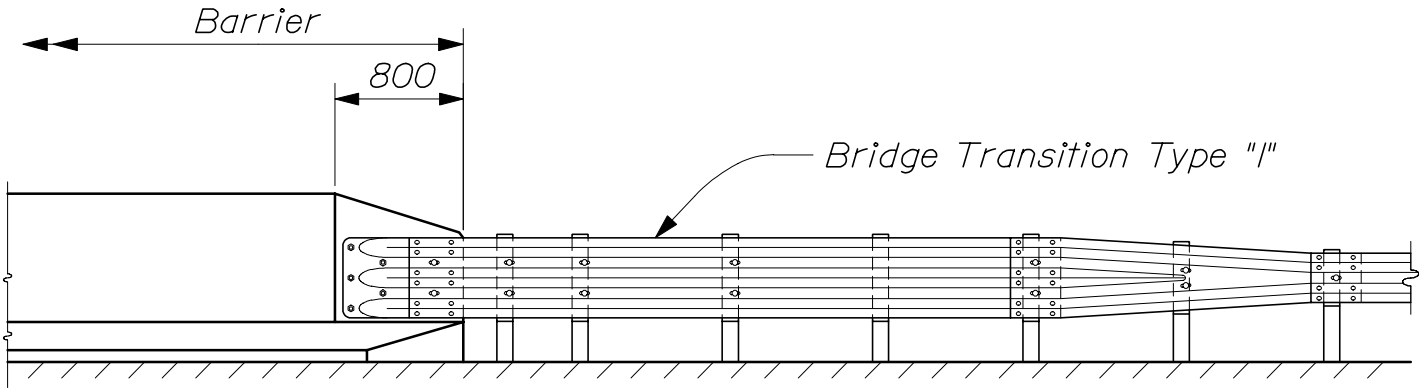
8. Barrier Deliniators shall be Bi-Directional with a minimum effective reflective area of 8.0 square inches as approved by the Resident. The reflector shall preferably be of Methyl Methacrylate, and the housing of Acrylonitaile Butadiene Styrene. As an alternative reflectors may be mounted on the top of the barrier.

TEMPORARY CONCRETE BARRIER

526(04)



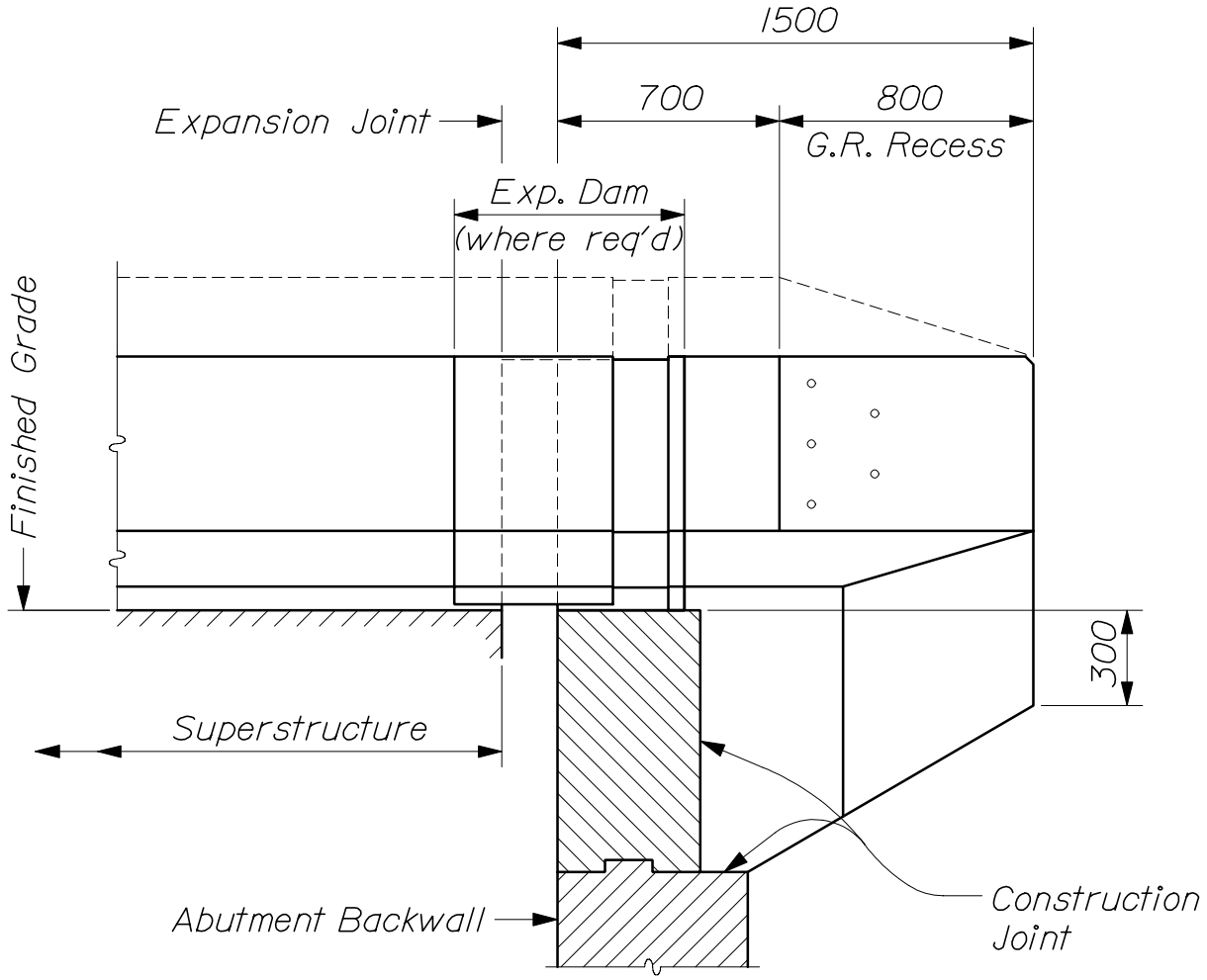
-- PERMANENT CONCRETE BARRIER TYPE IIIA --



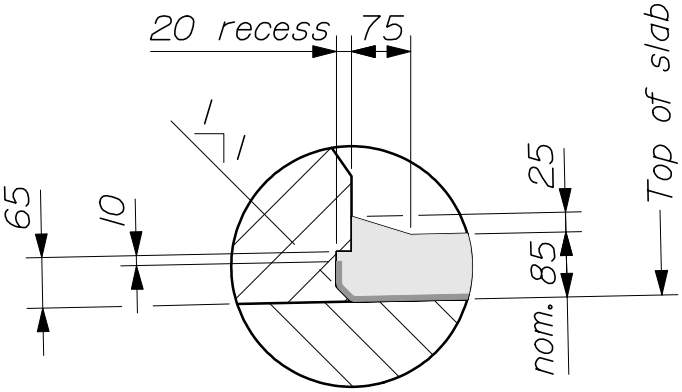
-- PERMANENT CONCRETE BARRIER TYPE IIIB --

PERMANENT CONCRETE BARRIER

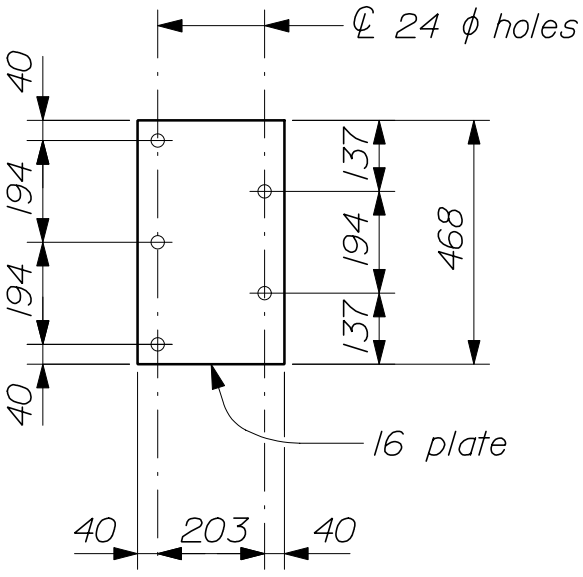
526(05)



-- CANTILEVERED END AT EXPANSION JOINT --



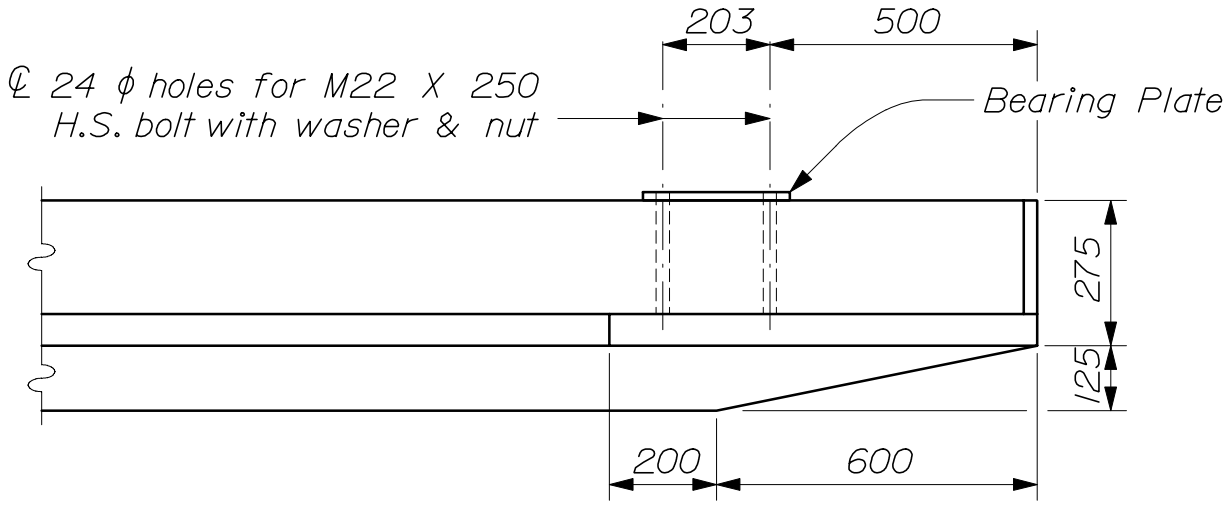
-- DETAIL AT GUTTER --
(showing membrane recess for bituminous wearing surface)



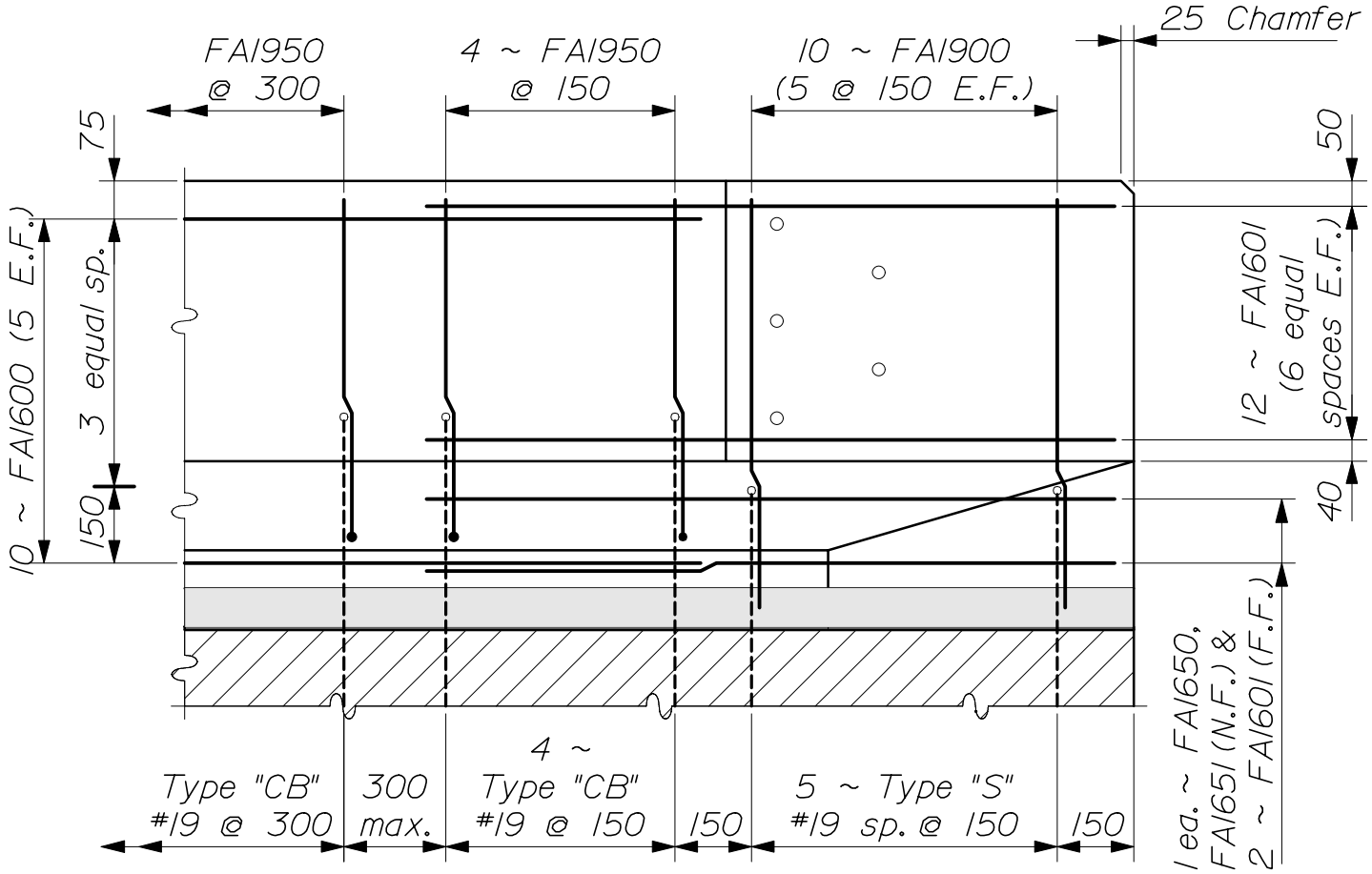
-- BEARING PLATE --

PERMANENT CONCRETE BARRIER

526(06)



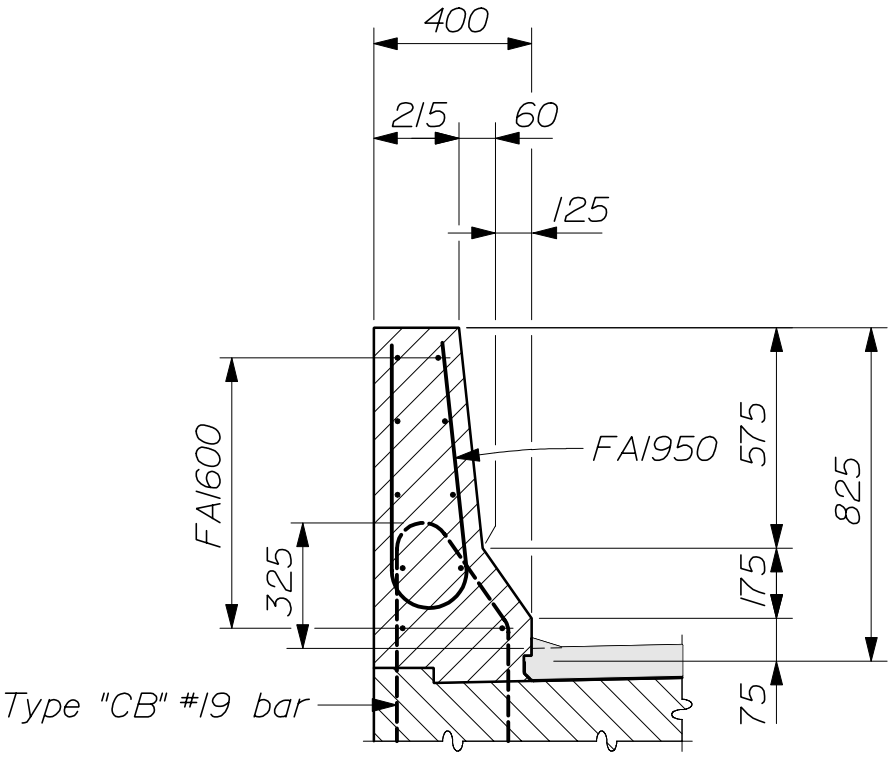
-- PLAN --
(Type IIIA)



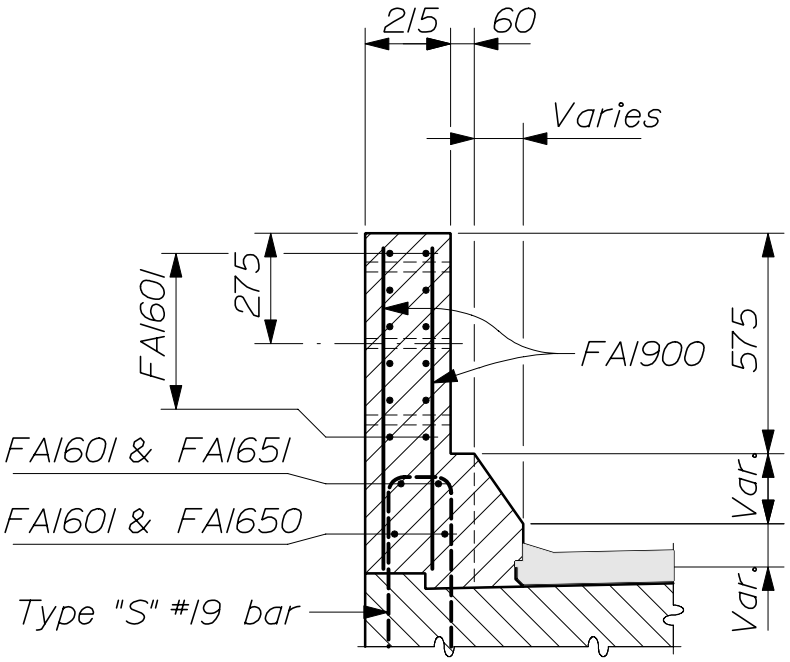
-- ELEVATION --
(Type IIIA)

PERMANENT CONCRETE BARRIER

526(07)



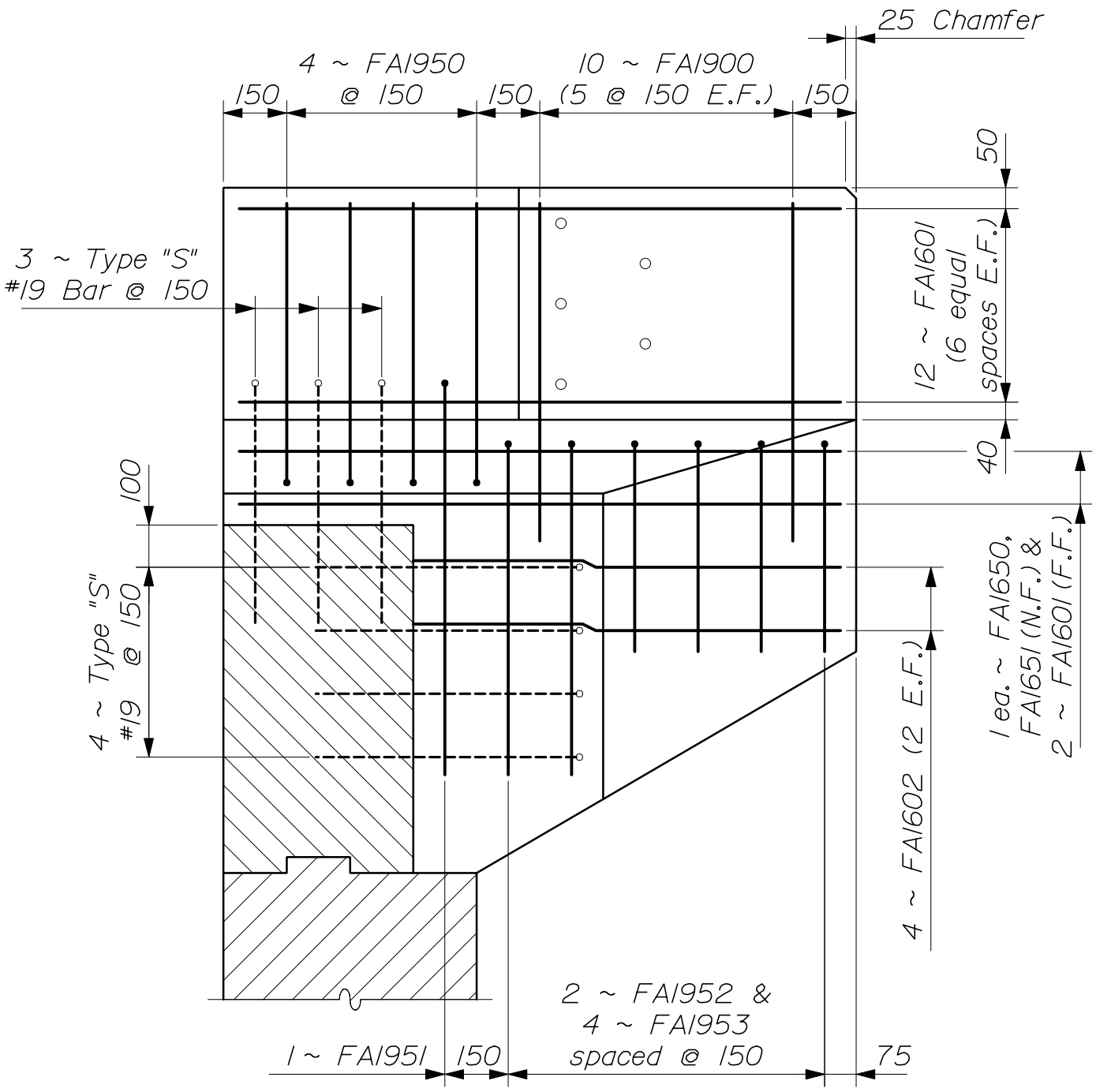
-- TYPICAL BARRIER SECTION --
(Type IIIA)



-- BARRIER RECESS SECTION --
(Type IIIA)

PERMANENT CONCRETE BARRIER

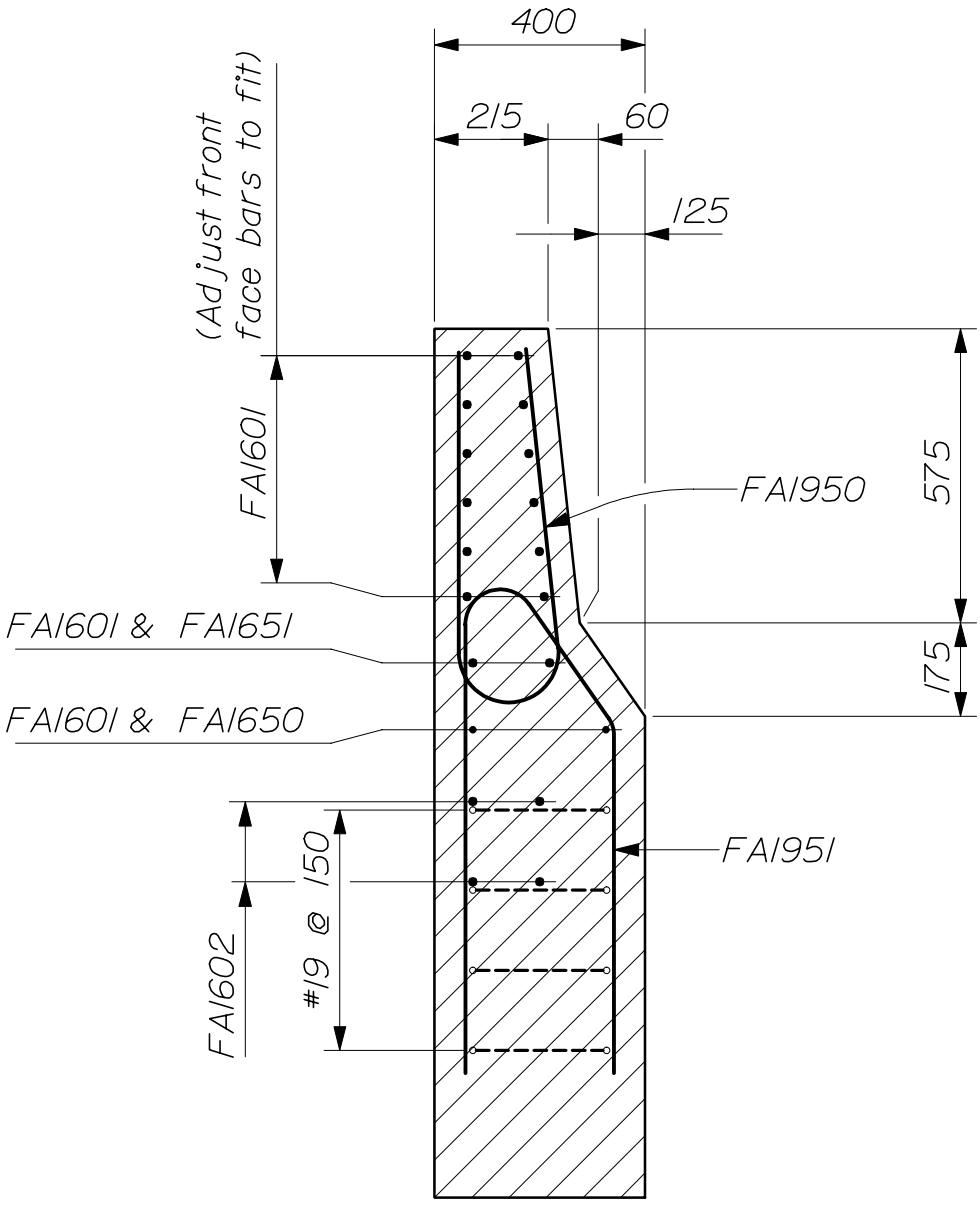
526(08)



-- CANTILEVERED REINFORCING ELEVATION --
(Type IIIA)

PERMANENT CONCRETE BARRIER

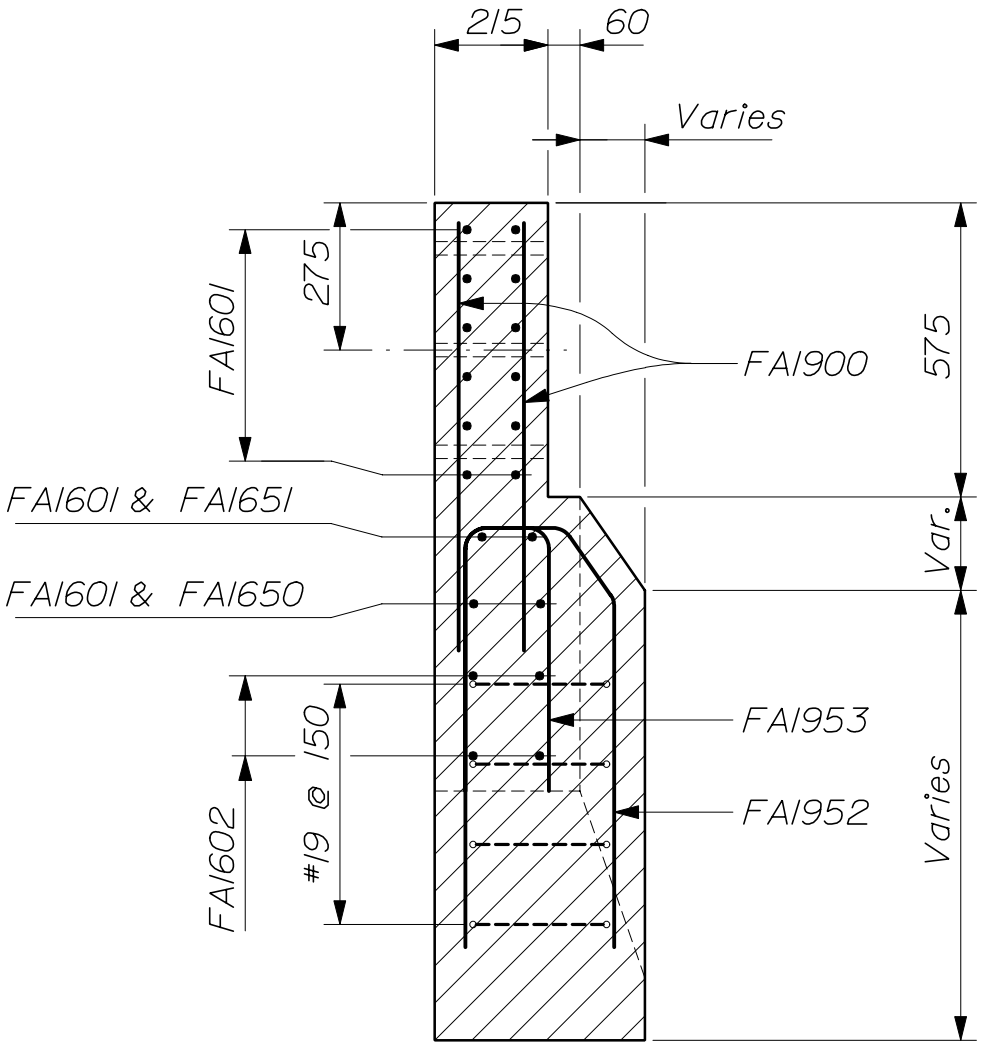
526(09)



-- CANTILEVERED SECTION --
(Type IIIA)

PERMANENT CONCRETE BARRIER

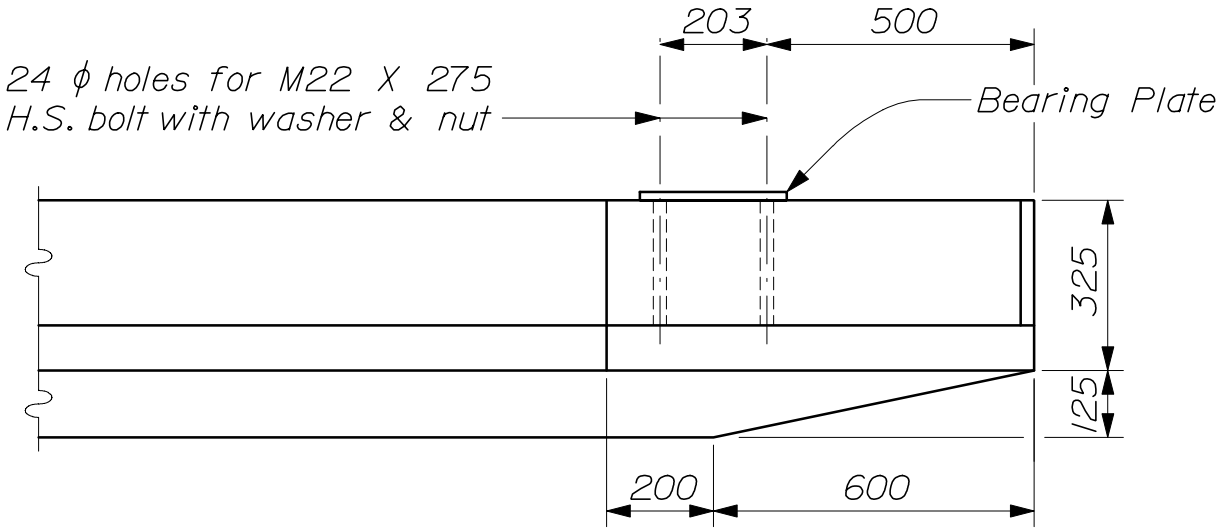
526(10)



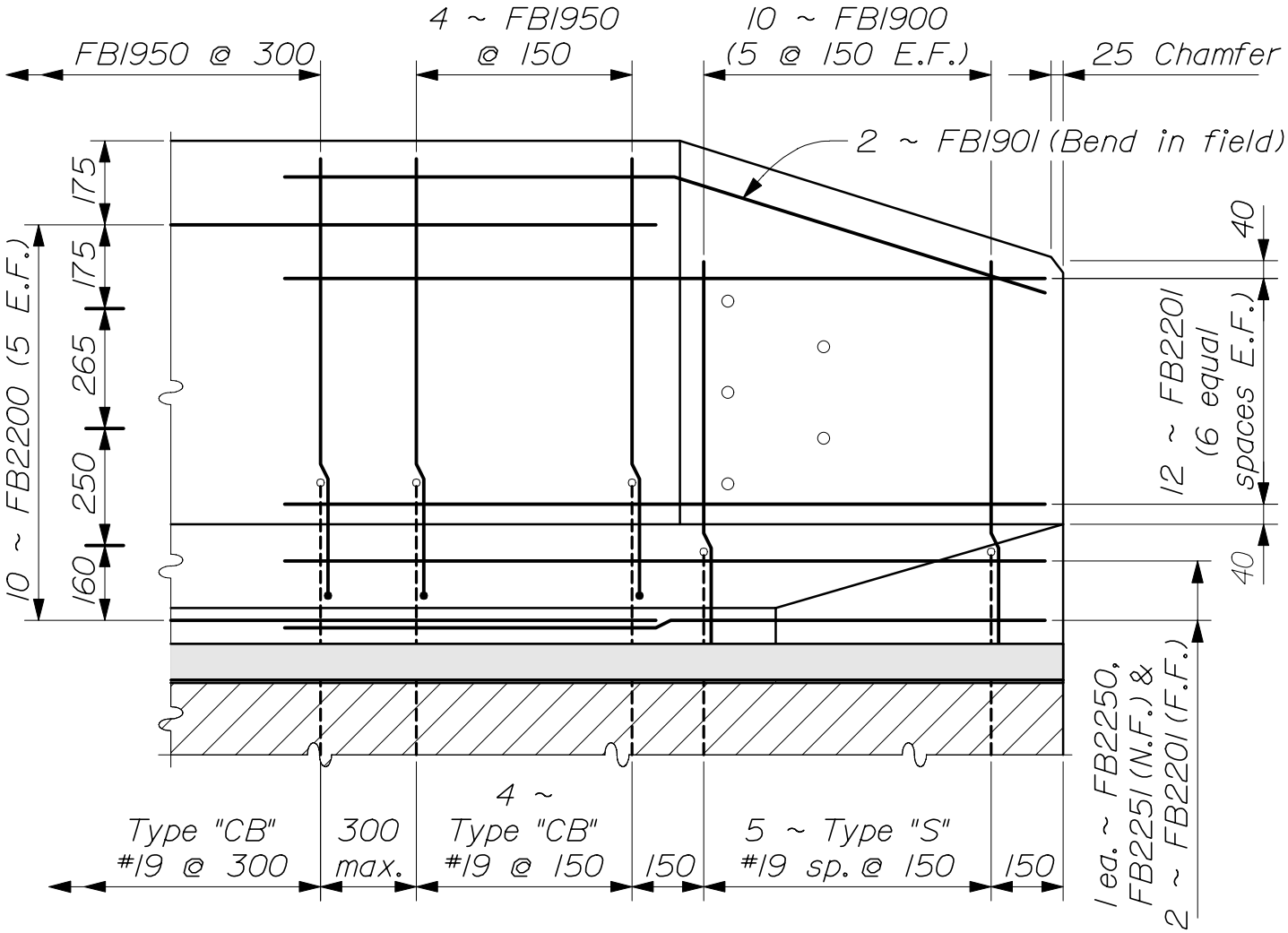
-- CANTILEVERED RECESS SECTION --
(Type IIIA)

PERMANENT CONCRETE BARRIER

526(11)



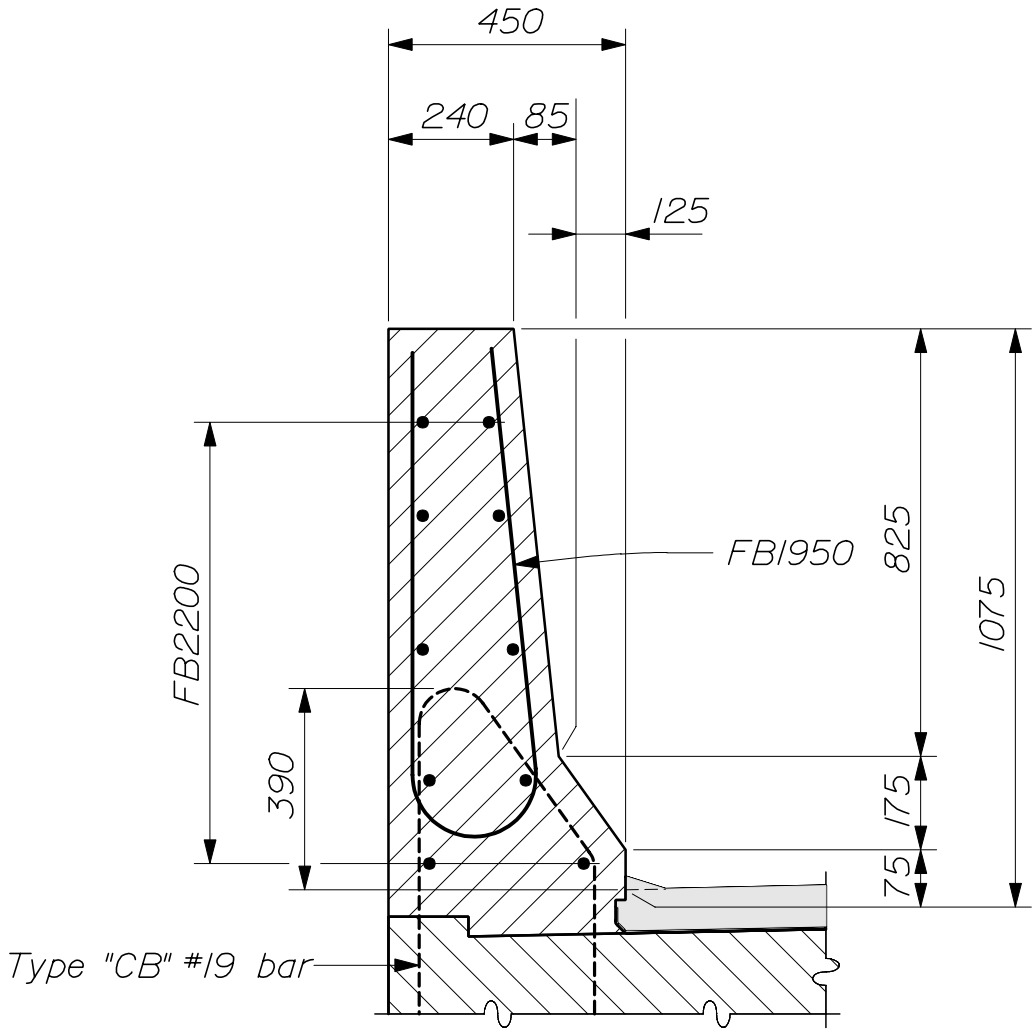
-- PLAN --
(Type IIIB)



-- ELEVATION --
(Type IIIB)

PERMANENT CONCRETE BARRIER

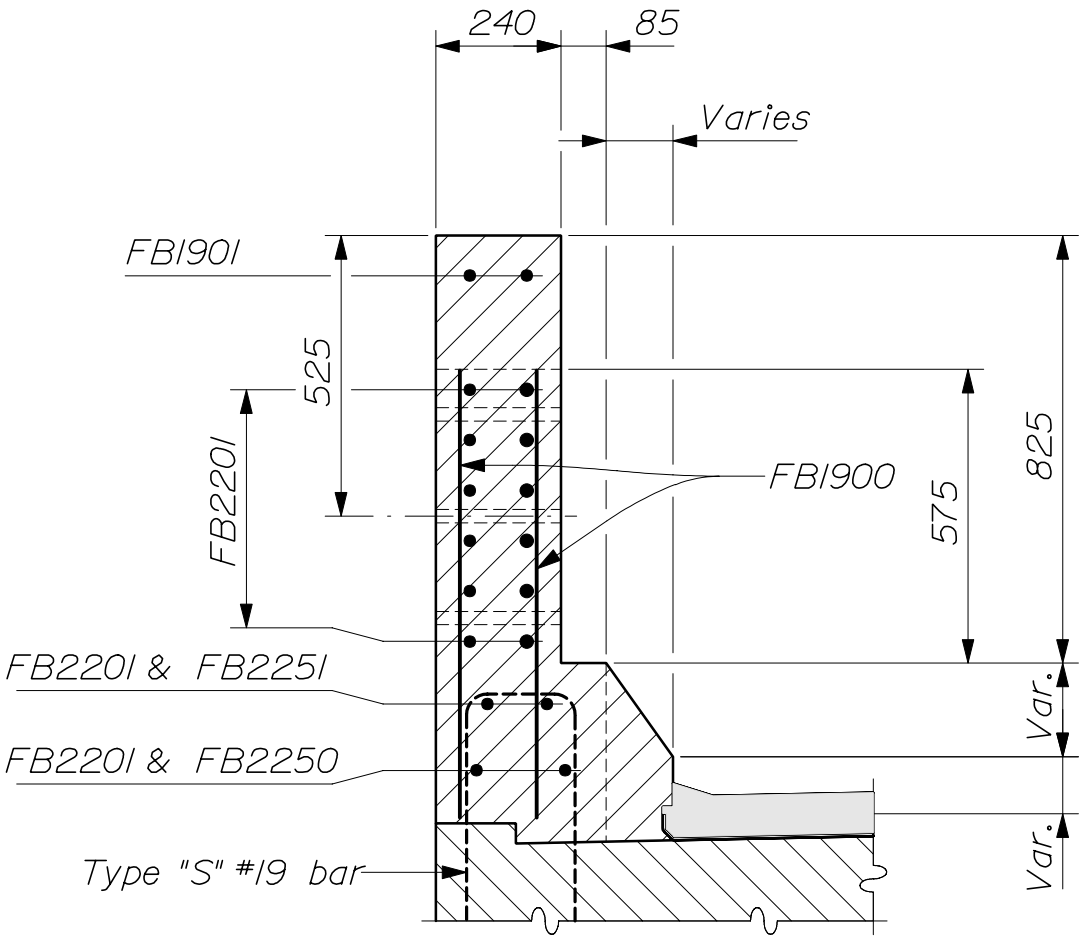
526(12)



-- BARRIER SECTION --
(Type IIIB)

PERMANENT CONCRETE BARRIER

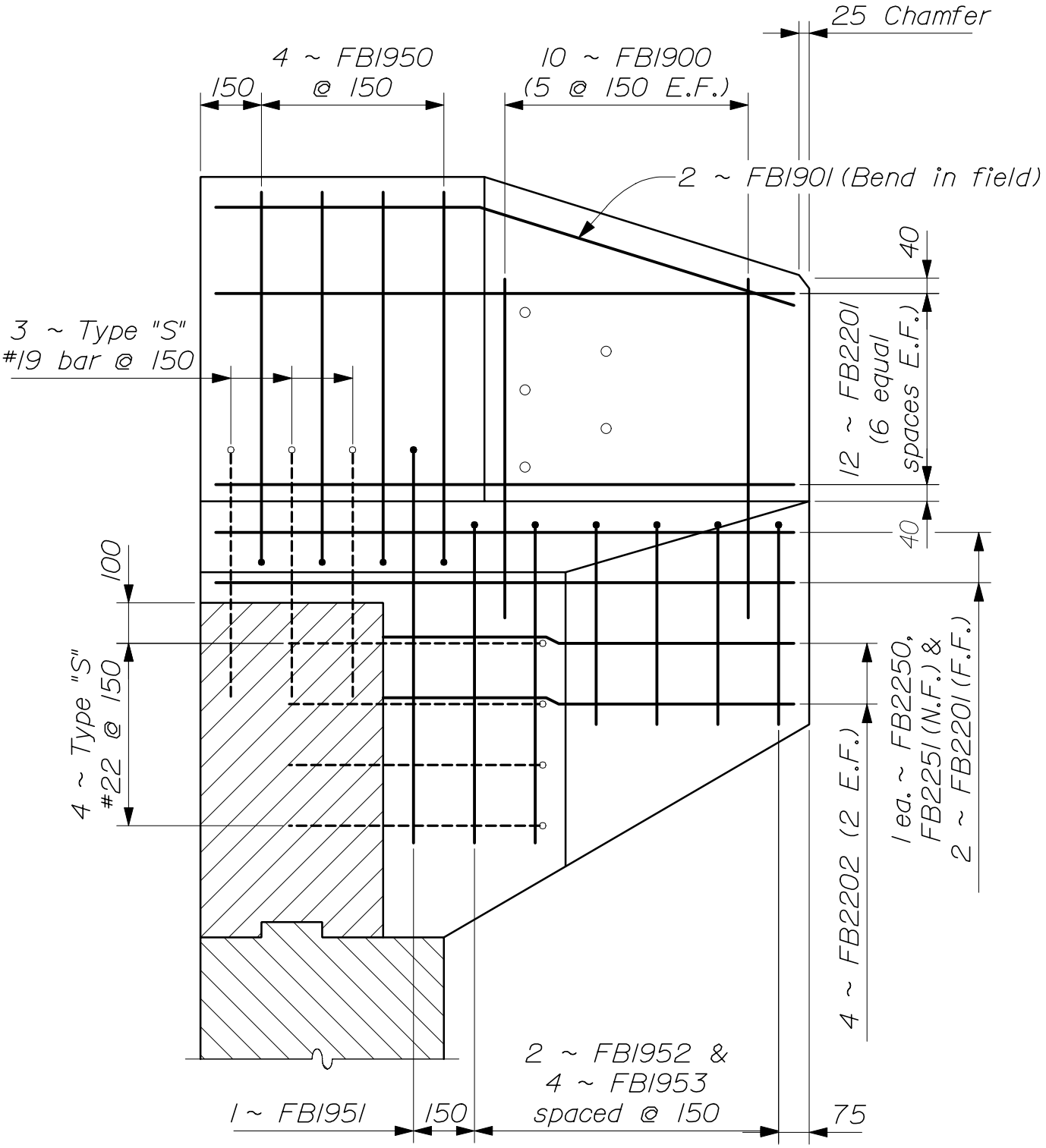
526(13)



-- BARRIER END SECTION --
(Type IIIB)

PERMANENT CONCRETE BARRIER

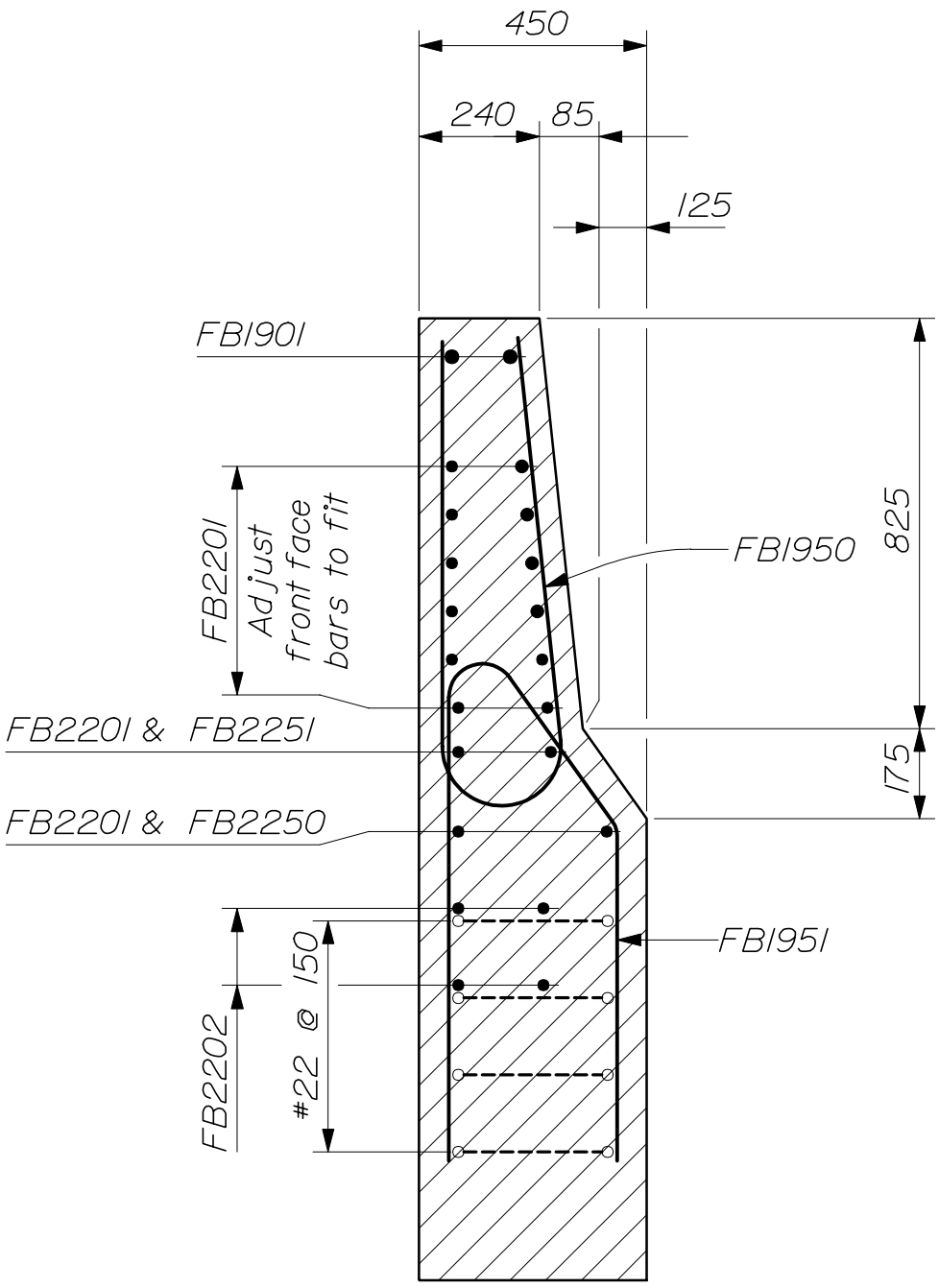
526(14)



-- CANTILEVER REINFORCING ELEVATION --
(Type IIIB)

PERMANENT CONCRETE BARRIER

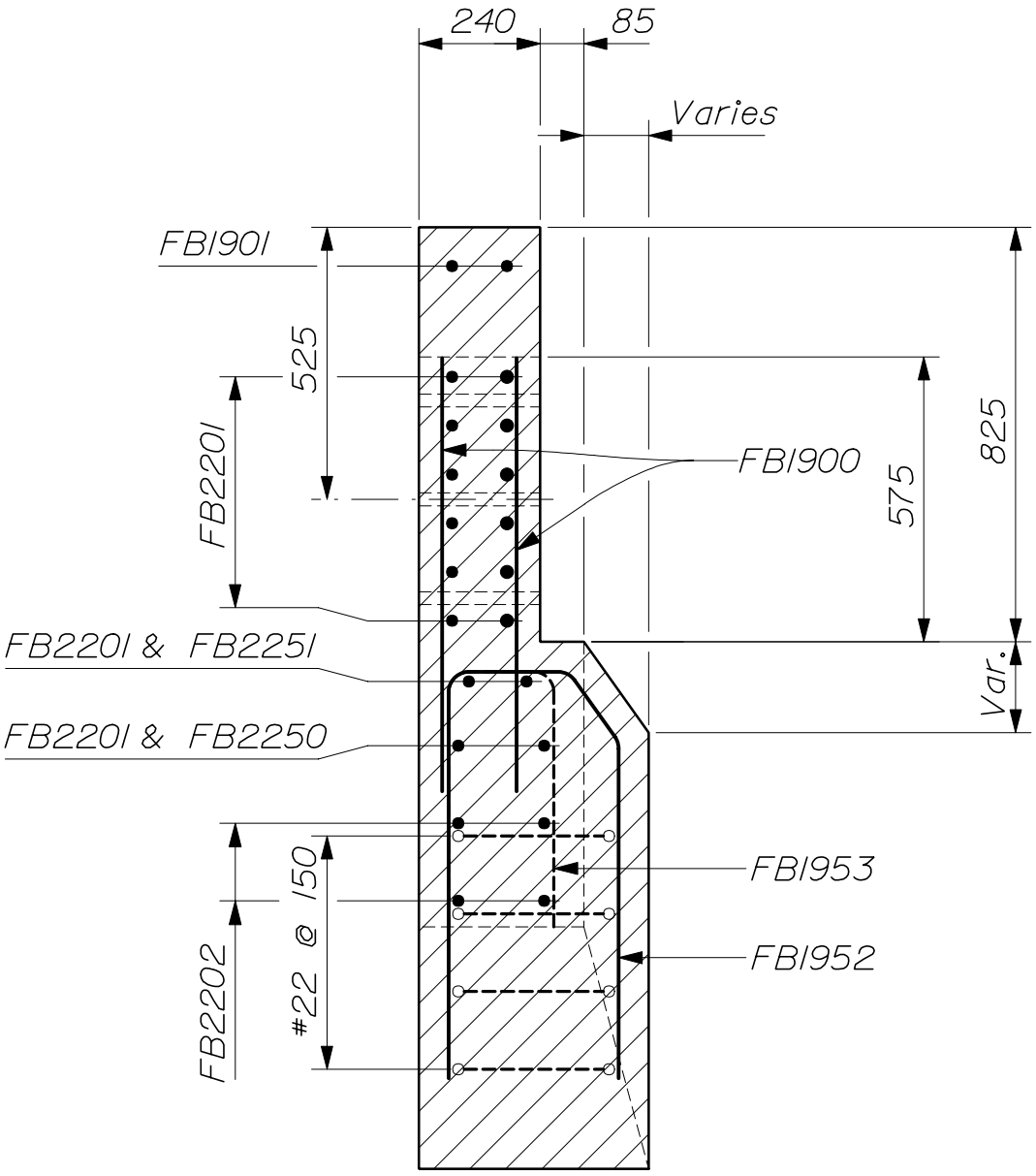
526(15)



-- CANTILEVERED SECTION --
(Type IIIB)

PERMANENT CONCRETE BARRIER

526(16)



-- CANTILEVERED END SECTION --
(Type IIIB)

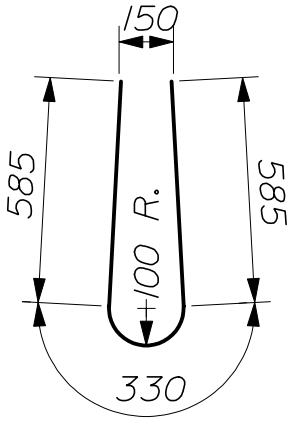
PERMANENT CONCRETE BARRIER

526(17)

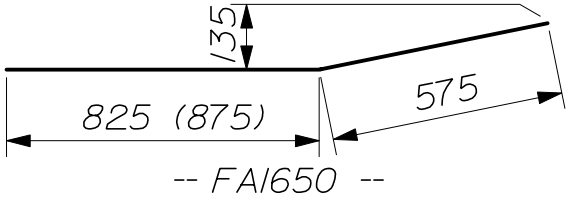
BARRIER TYPE IIIA REINFORCING STEEL

Mark	With Normal End		With Cantilevered End	
	Quantity	Length	Quantity	Length
FA1600	As req'd	9150 max.	As req'd	9150 max.
FA1601	14	1375	14	1420
FA1650	1	1400	1	1450
FA1651	1	1400	1	1450
FA1900	10	825	10	825
FA1950	As req'd	1500	As req'd	1500
FA1951	--	--	1	1985
FA1952	--	--	2	1840
FA1953	--	--	4	1175

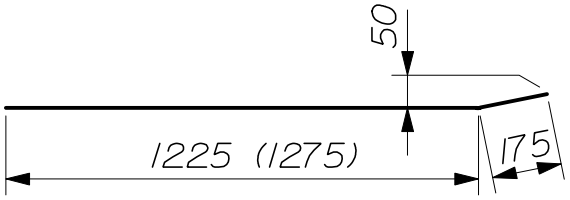
(X) denotes cantilevered end dimension



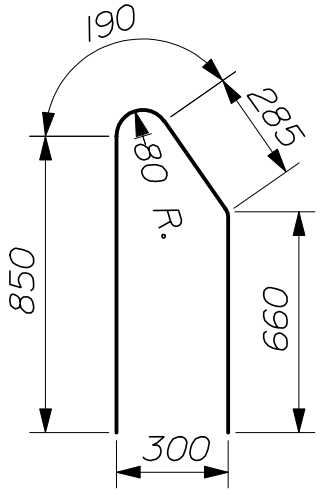
-- FA1950 --



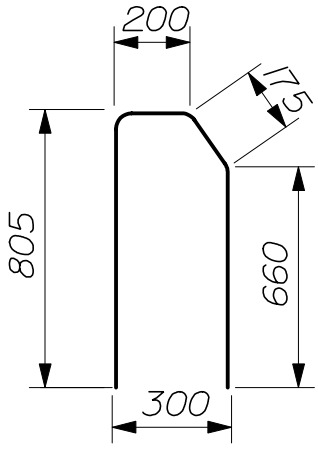
-- FA1650 --



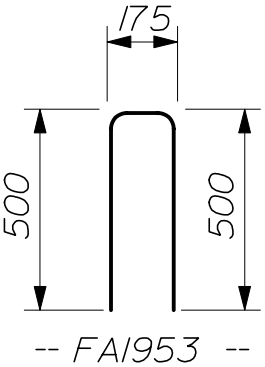
-- FA1651 --



-- FA1951 --



-- FA1952 --



-- FA1953 --

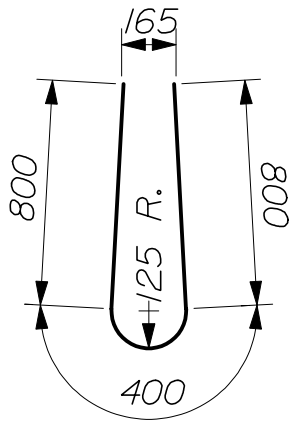
PERMANENT CONCRETE BARRIER

526(18)

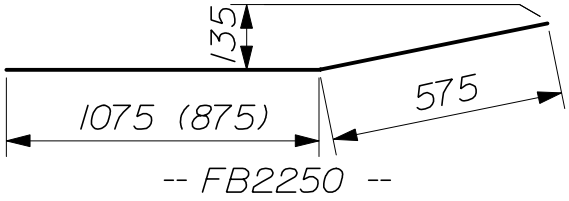
BARRIER TYPE IIIB REINFORCING STEEL

Mark	With Normal End		With Cantilevered End	
	Quantity	Length	Quantity	Length
FB1900	10	850	10	850
FB1901	2	1650	2	1450
FB1950	As req'd	2000	As req'd	2000
FB1951	--	--	1	2125
FB1952	--	--	2	1880
FB1953	--	--	4	1220
FB2200	As req'd	18 300 max.	As req'd	18 300 max.
FB2201	16	1625	16	1420
FB2202	--	--	4	1000
FB2250	1	1650	1	1450
FB2251	1	1650	1	1450

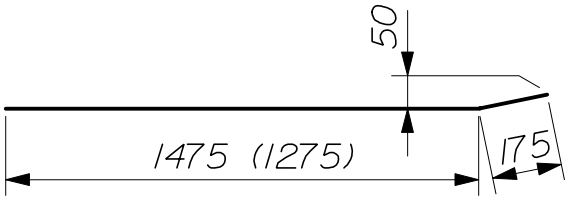
(X) denotes cantilevered end dimension



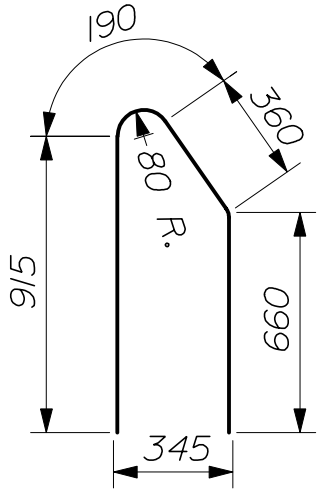
-- FB1950 --



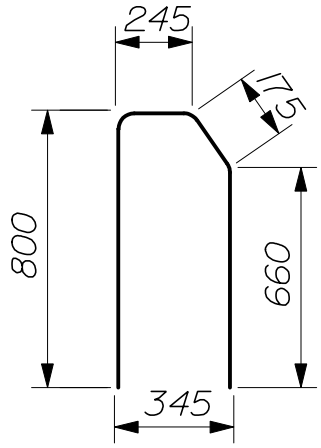
-- FB2250 --



-- FB2251 --



-- FB1951 --



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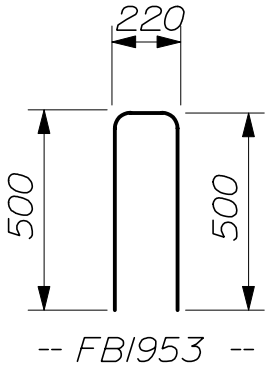


-- FB1953 --

PERMANENT CONCRETE BARRIER

526(19)

NOTES:

1. All work and materials shall conform to the provisions of Standard Specifications Section 526 - Concrete Barrier (Permanent Concrete Barrier).

2. Reinforcing bar designations Type "S" and "CB" refer to type - bending diagrams as shown on the main Reinforcing Steel Schedule. These bars are detailed on the Design Drawings and are included for payment in the Reinforcing Steel pay items.

3. Reinforcing steel shall have 40 mm minimum concrete cover, except that stirrups Type "S" and "CB" shall have 50 mm minimum concrete cover.

4. The first two digits following the letters of the mark indicate the size of the reinforcing bar. (FA1600 = bar size #16.) All dimensions are out - to - out of bar.

5. The minimum lap splice length for FA1500 bars is 550 mm. The minimum lap splice length for FB2200 bars is 1050 mm.

6. The quantities of reinforcing bars shown are for one barrier end only.

7. Bolt holes in concrete shall be formed by a method approved by the Engineer.

8. Payment for anchor bolts and bearing plates will be considered incidental to the concrete barrier pay item. Class 8.8.3 bolts shall be used when corrosion - resistant steel guardrail is specified on the approach roadway.

9. Permanent Concrete Barrier is designed for attachment of Bridge Transition Type "I" unless otherwise indicated on the Design Drawings. Refer to Section606 for details.

10. After installation of the guardrail is complete, upset the threads on the anchor bolts in three (3) places around each bolt, at the junction of the nut and the exposed thread, with a center punch or similar tool.

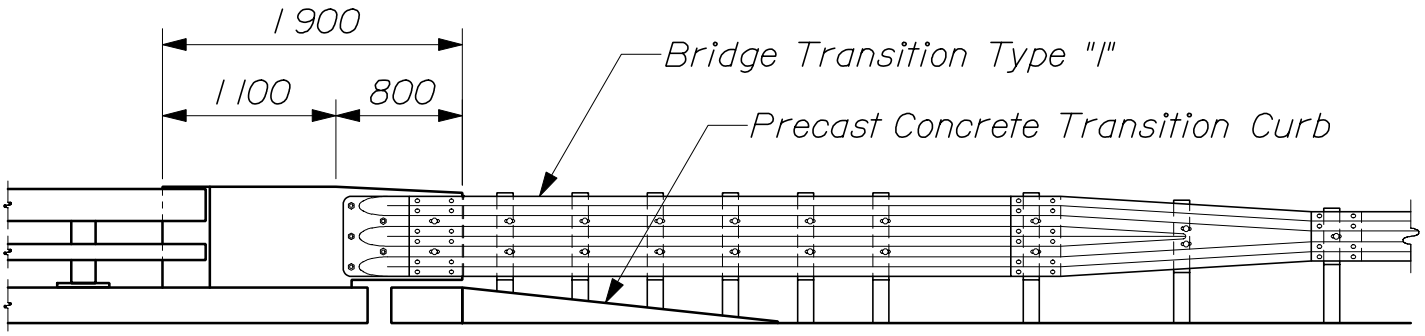
11. If there is a conflict between these Standard Details and the Design Drawings, the requirements of the Design Drawings shall be followed.

MATERIALS:

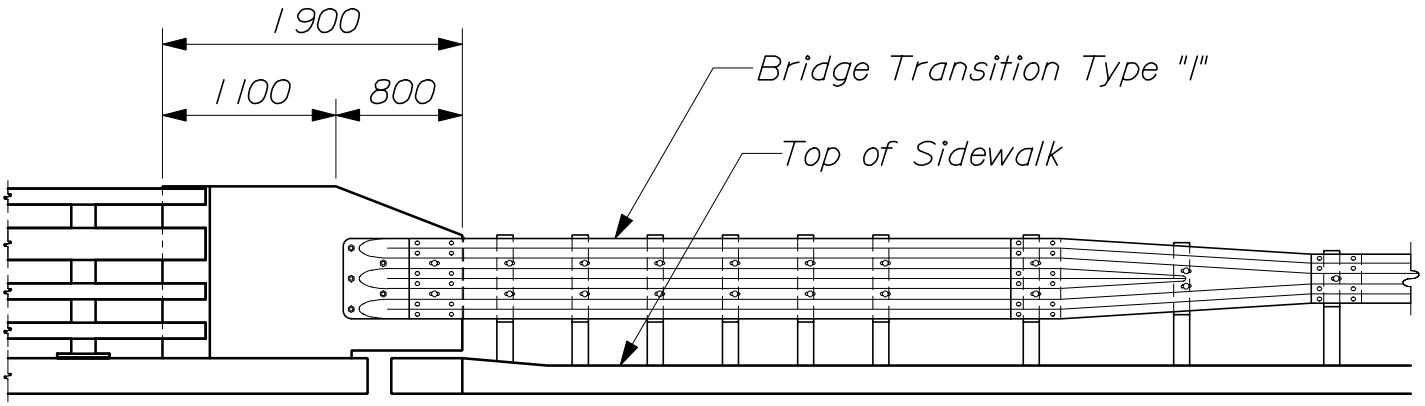
Concrete---------- Class "LP"
Reinforcing Steel---------- ASTM A615/A615M, Grade 420
Bearing Plate--------AASHTO M 183M/M 183 (ASTM A 36/A 36M) (Galvanized)
Bolts----------ASTM F 568, Class 8.8 (Galvanized)

PERMANENT CONCRETE BARRIER

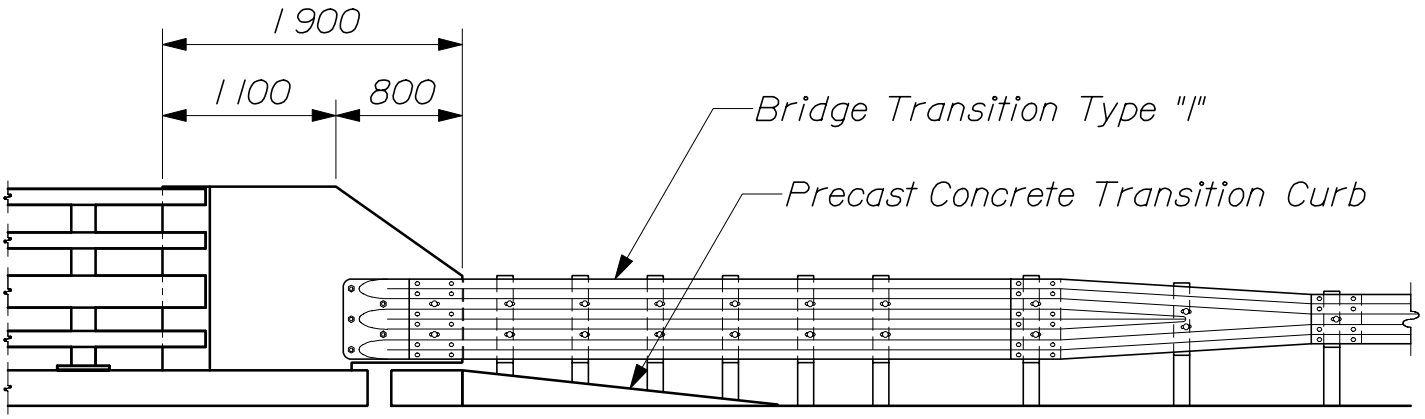
526(20)



-- CONCRETE TRANSITION BARRIER --
(TRAFFIC RAILING)



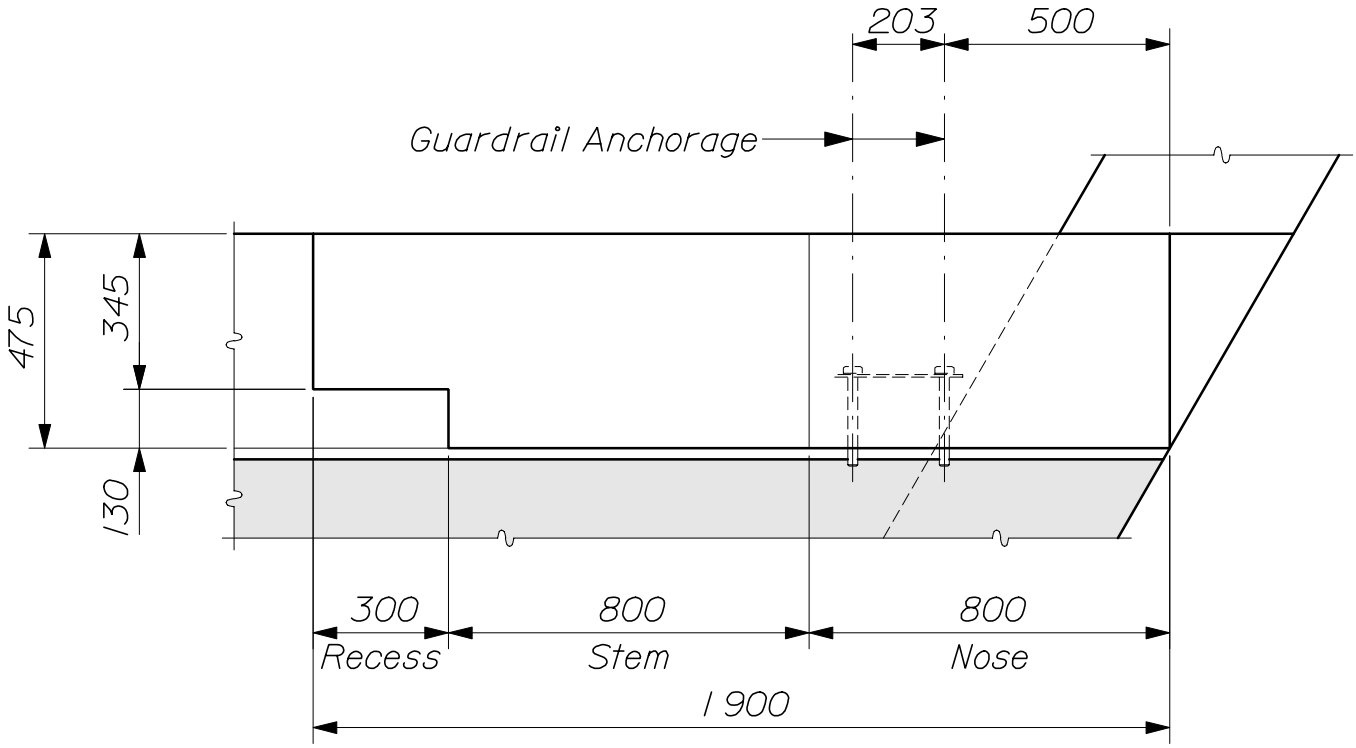
-- CONCRETE TRANSITION BARRIER --
(TRAFFIC/PEDESTRIAN RAILING)



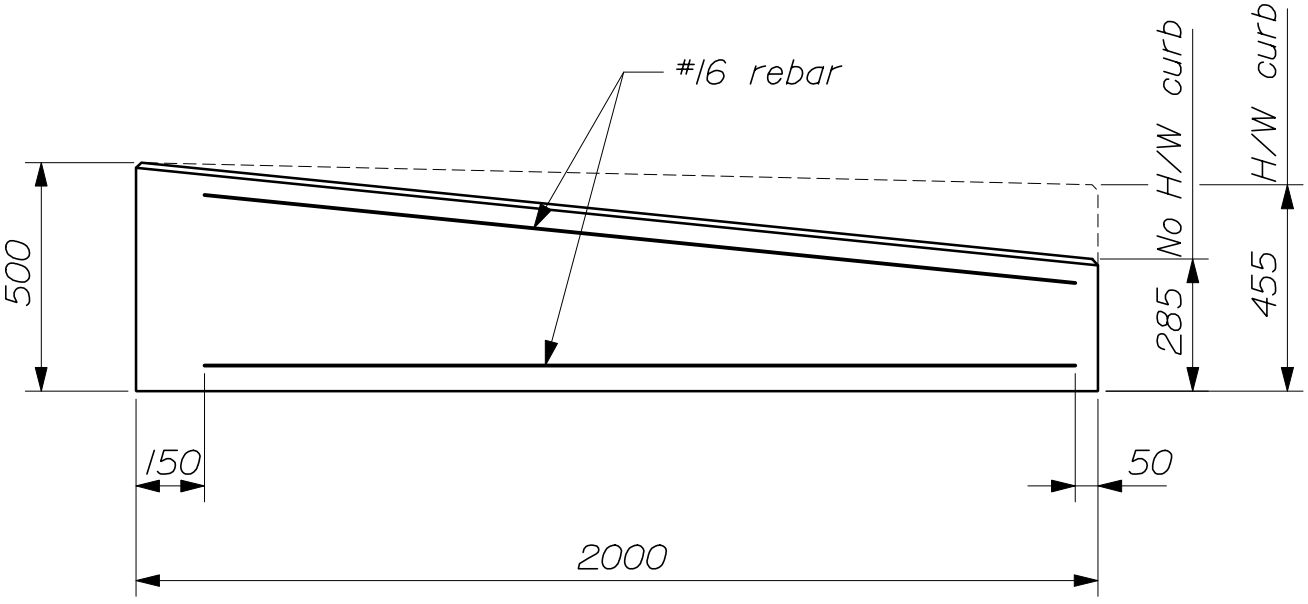
-- CONCRETE TRANSITION BARRIER --
(TRAFFIC/BICYCLE RAILING)

CONCRETE TRANSITION BARRIER

526(21)



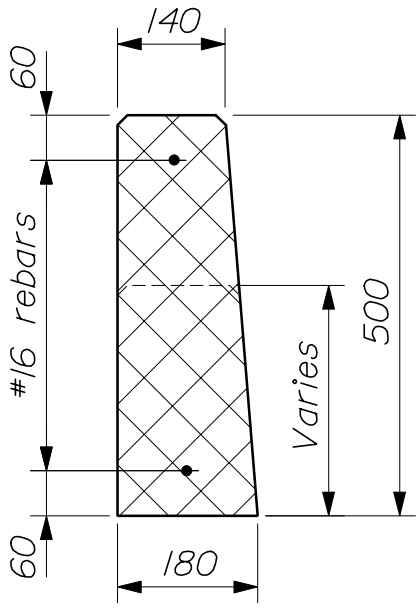
-- TRANSITION BARRIER PLAN --
(Typical all transition barrier types)



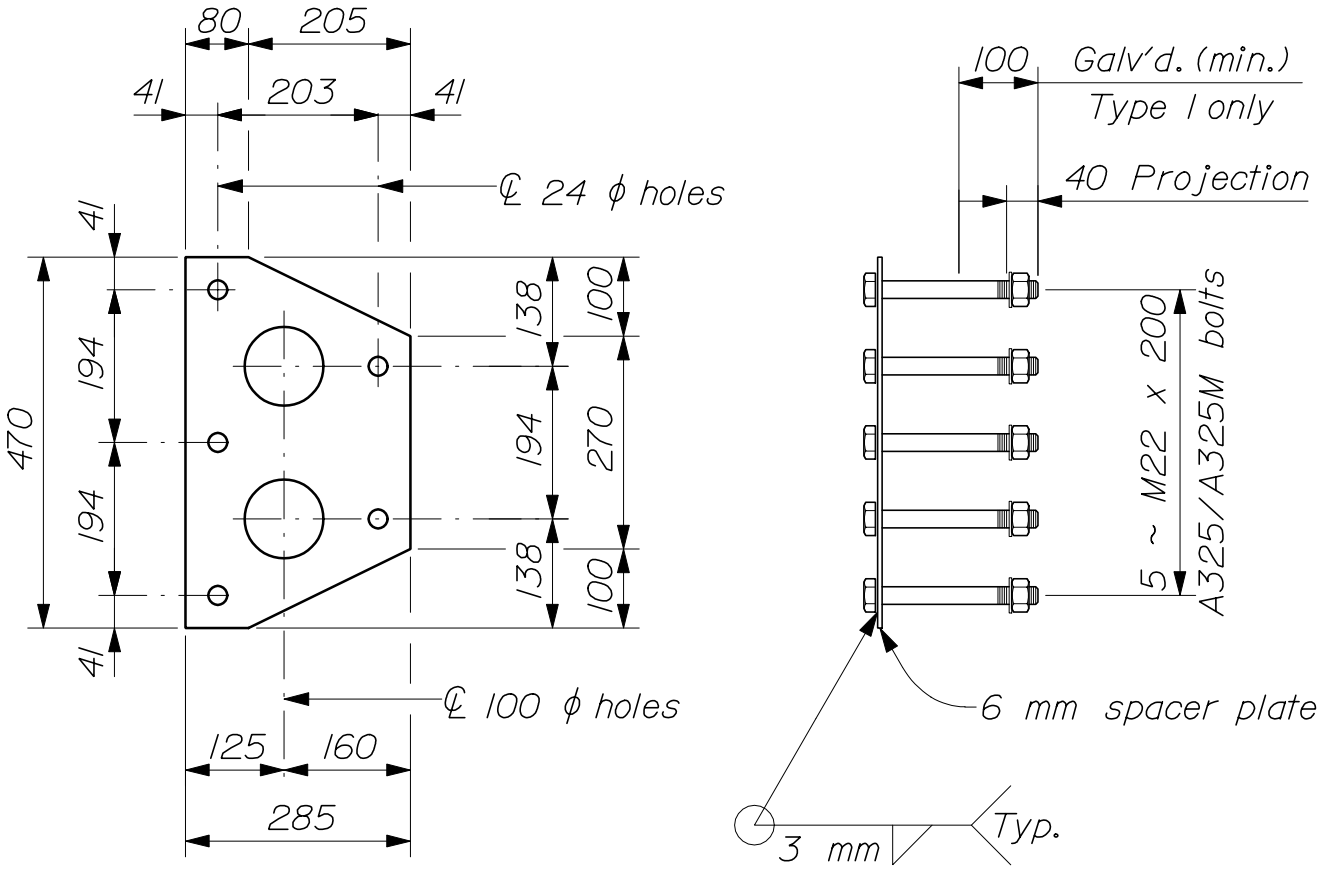
-- PRECAST CONCRETE TRANSITION CURB --

CONCRETE TRANSITION BARRIER

526(22)



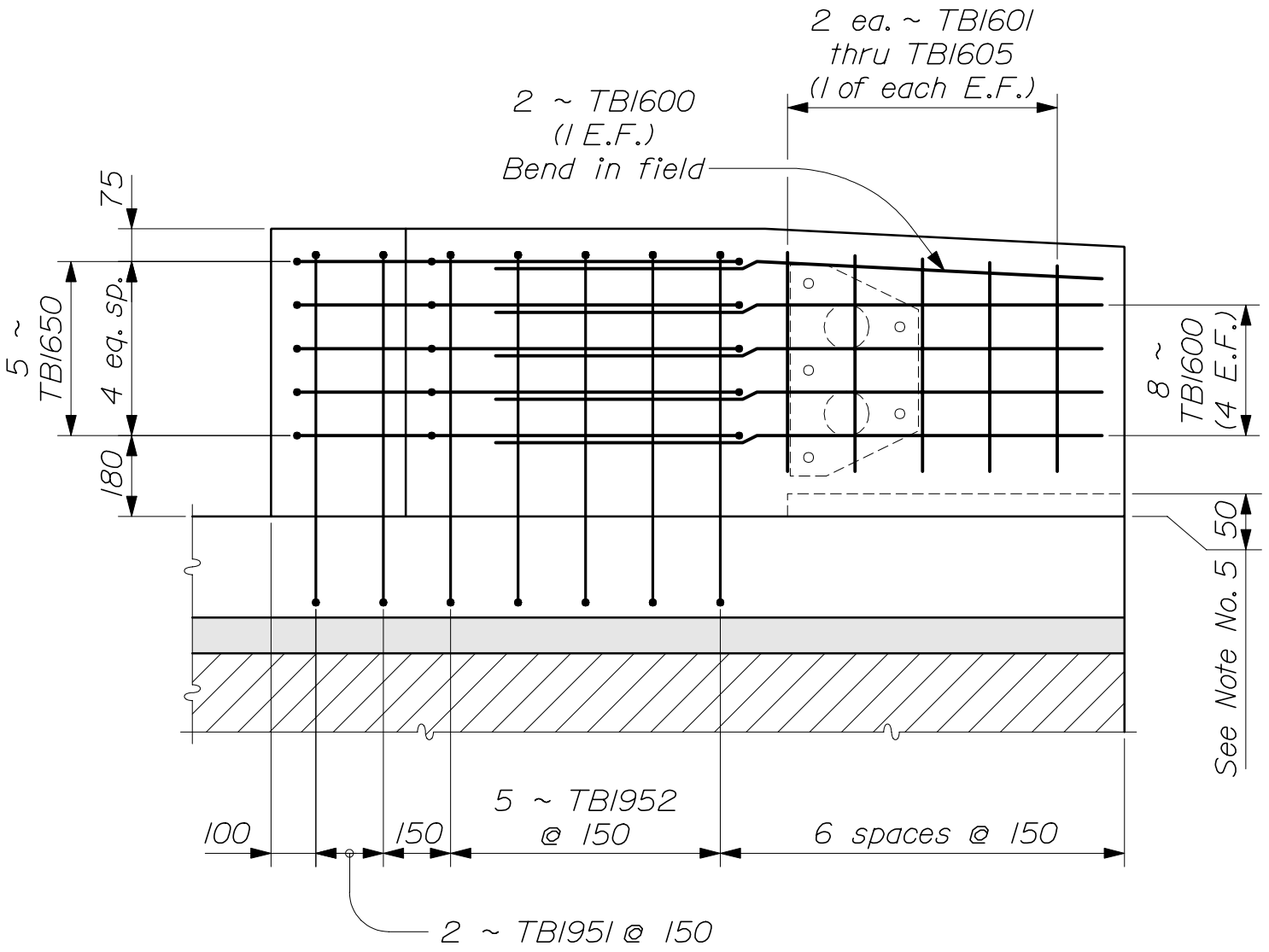
-- CURB SECTION --



-- GUARD RAIL ANCHORAGE --

CONCRETE TRANSITION BARRIER

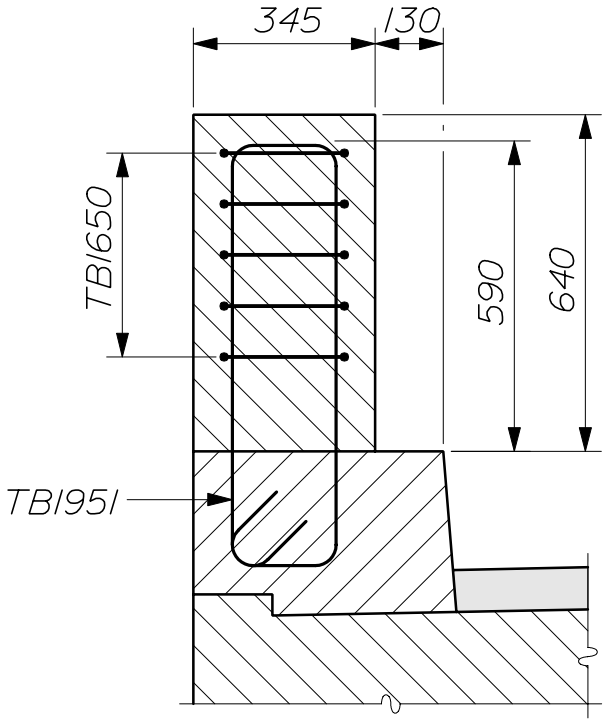
526(23)



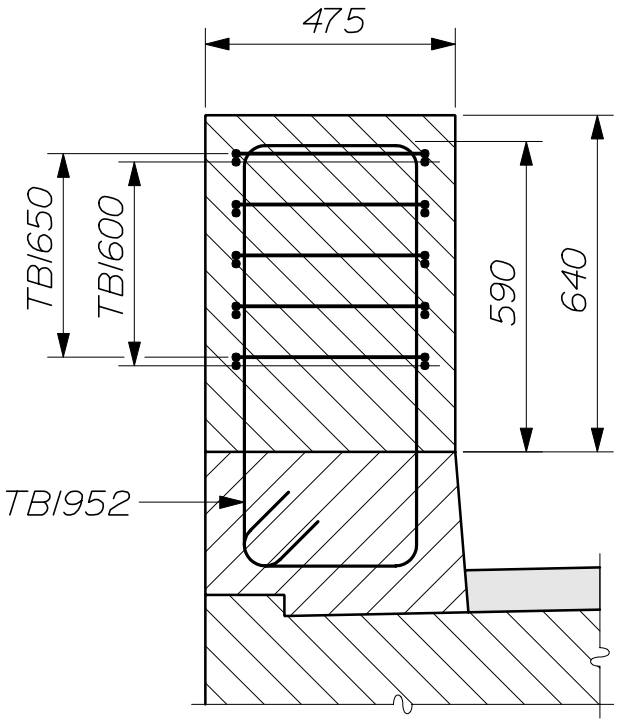
-- TRANSITION BARRIER ELEVATION --
(Traffic Railing)

Note: Curb reinforcing steel not shown

# CONCRETE TRANSITION BARRIER
526(24)



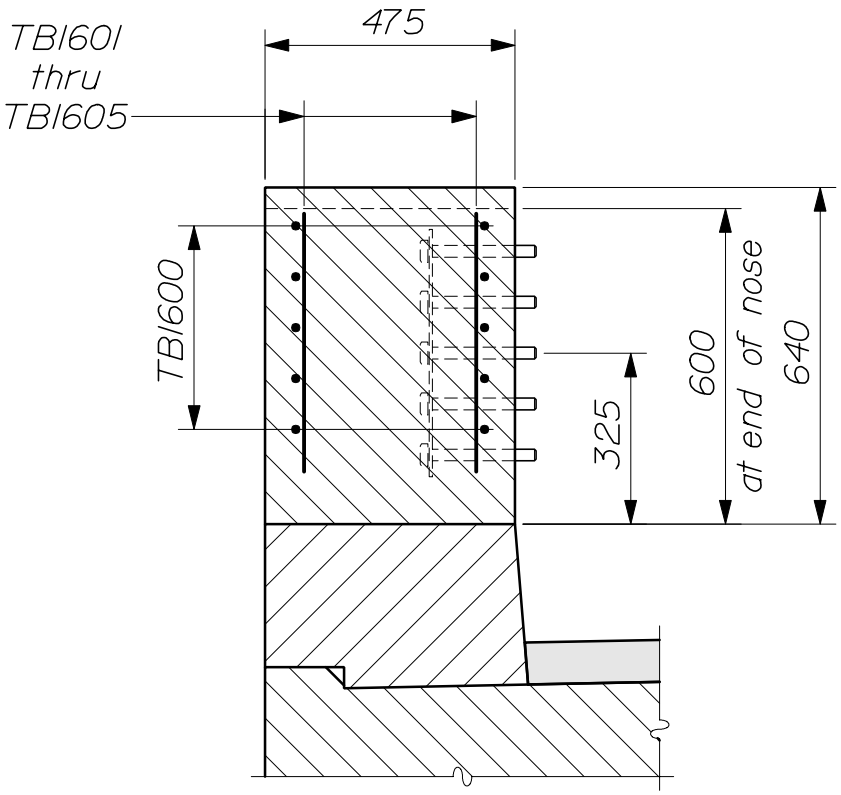
-- SECTION THRU RECESS --
(Traffic Railing)



-- SECTION THRU STEM --
(Traffic Railing)

CONCRETE TRANSITION BARRIER

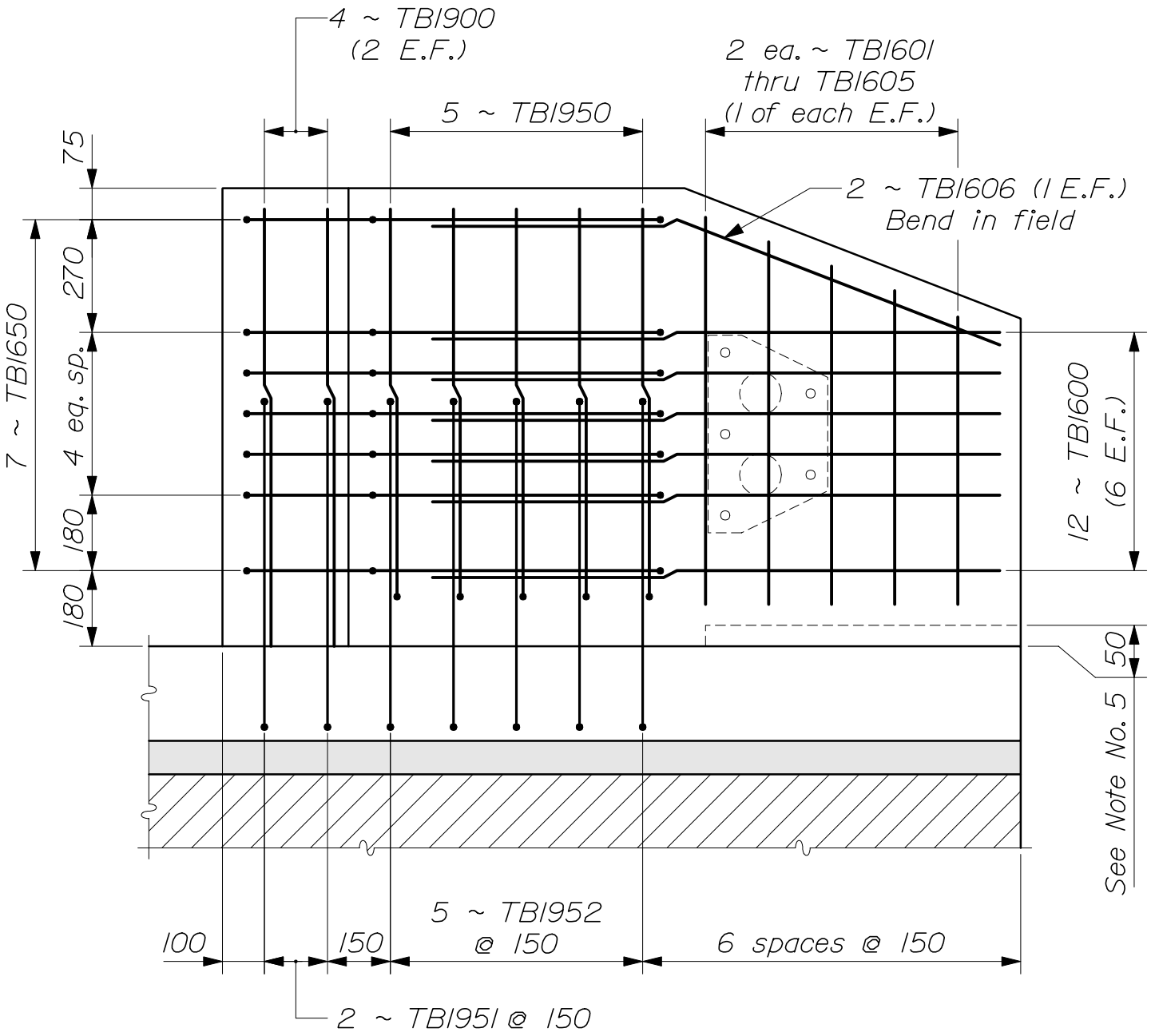
526(25)



-- SECTION THRU NOSE --
(Traffic Railing)

CONCRETE TRANSITION BARRIER

526(26)

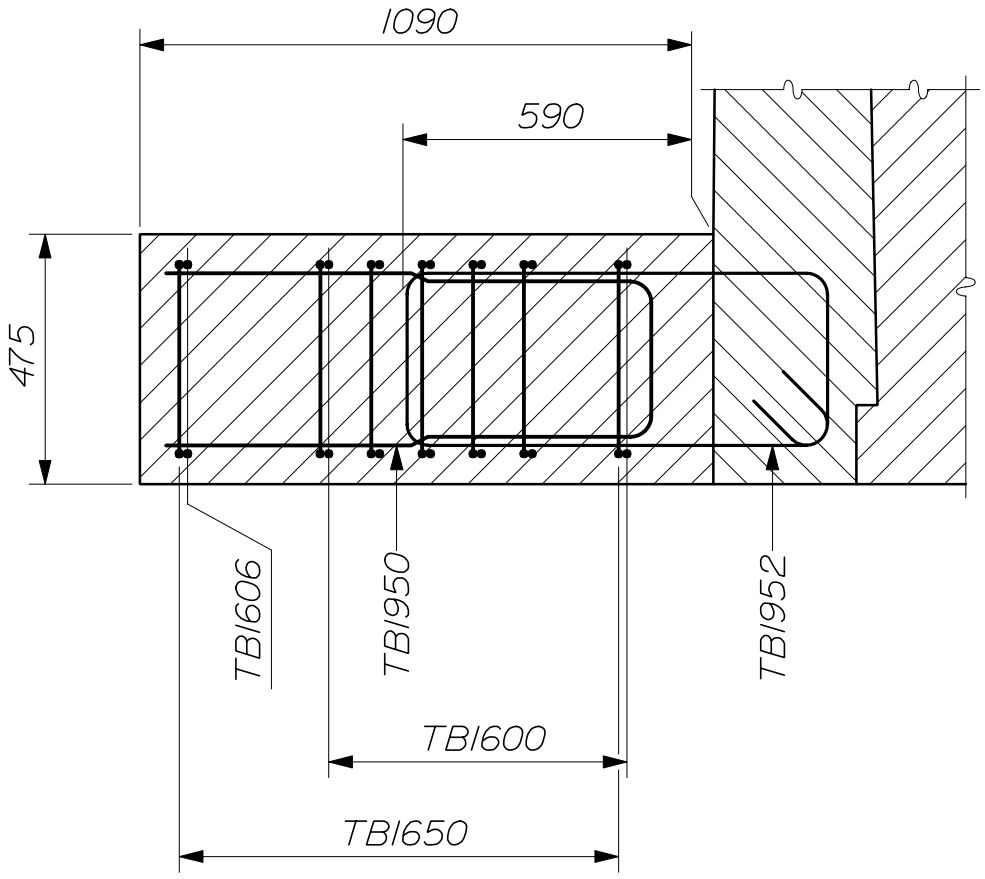


-- TRANSITION BARRIER ELEVATION --
(Traffic / Pedestrian Railing)

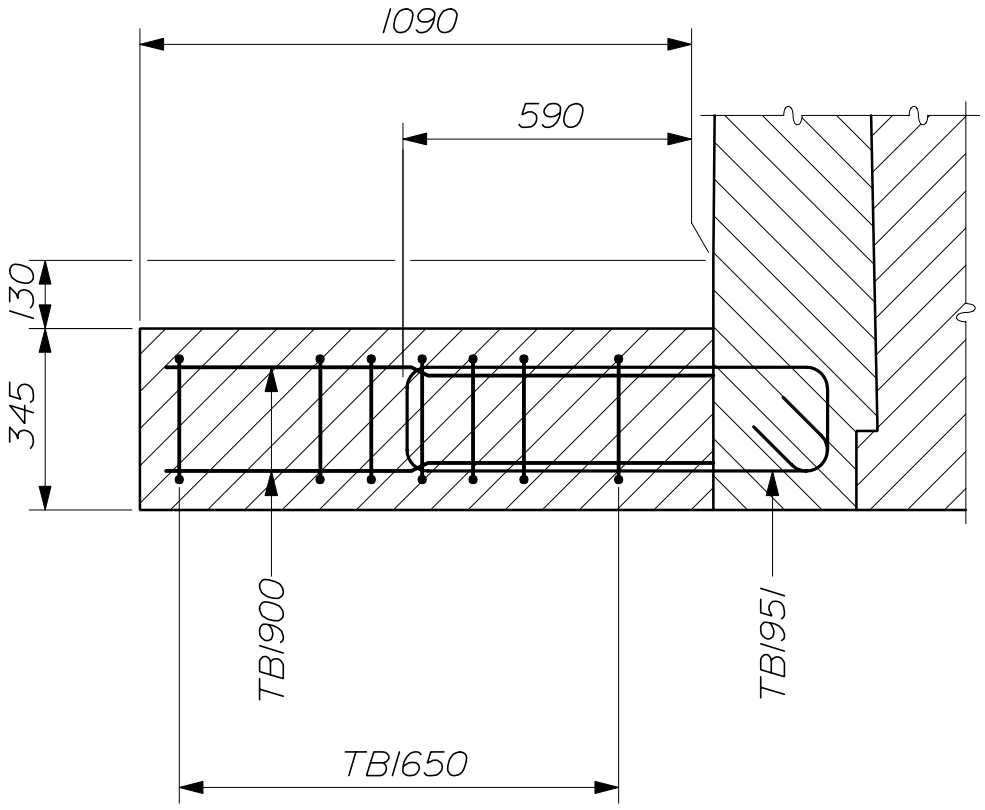
Note: Curb reinforcing steel not shown

CONCRETE TRANSITION BARRIER

526(27)



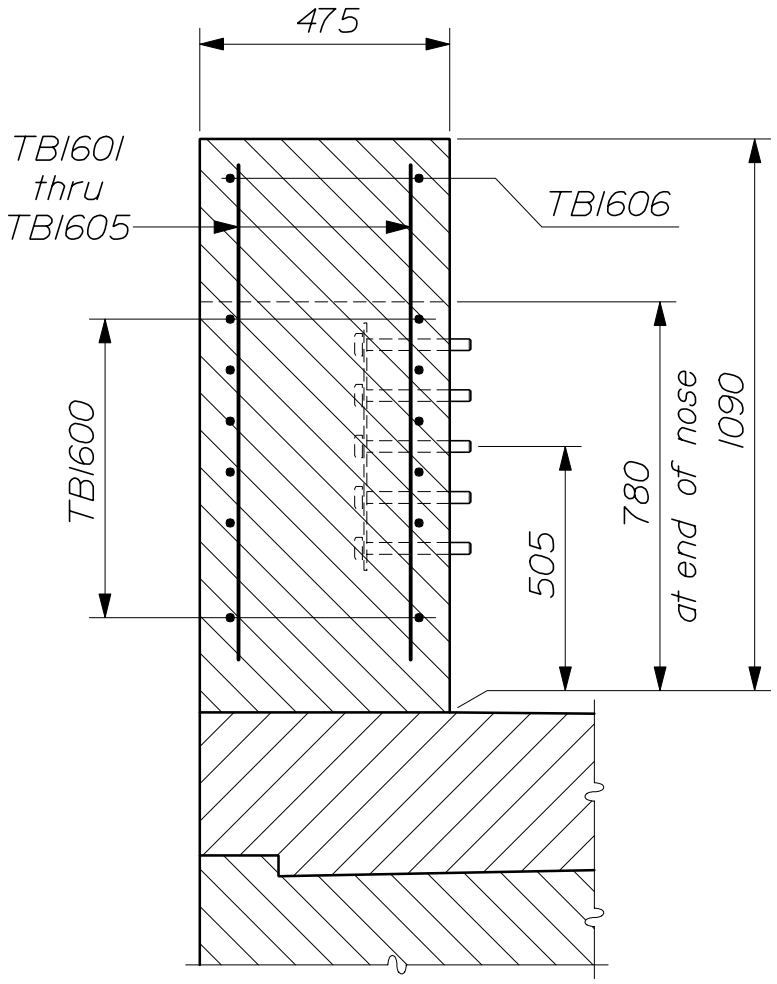
-- SECTION THRU STEM --
(Traffic / Pedestrian Railing)



-- SECTION THRU RECESS --
(Traffic / Pedestrian Railing)

CONCRETE TRANSITION BARRIER

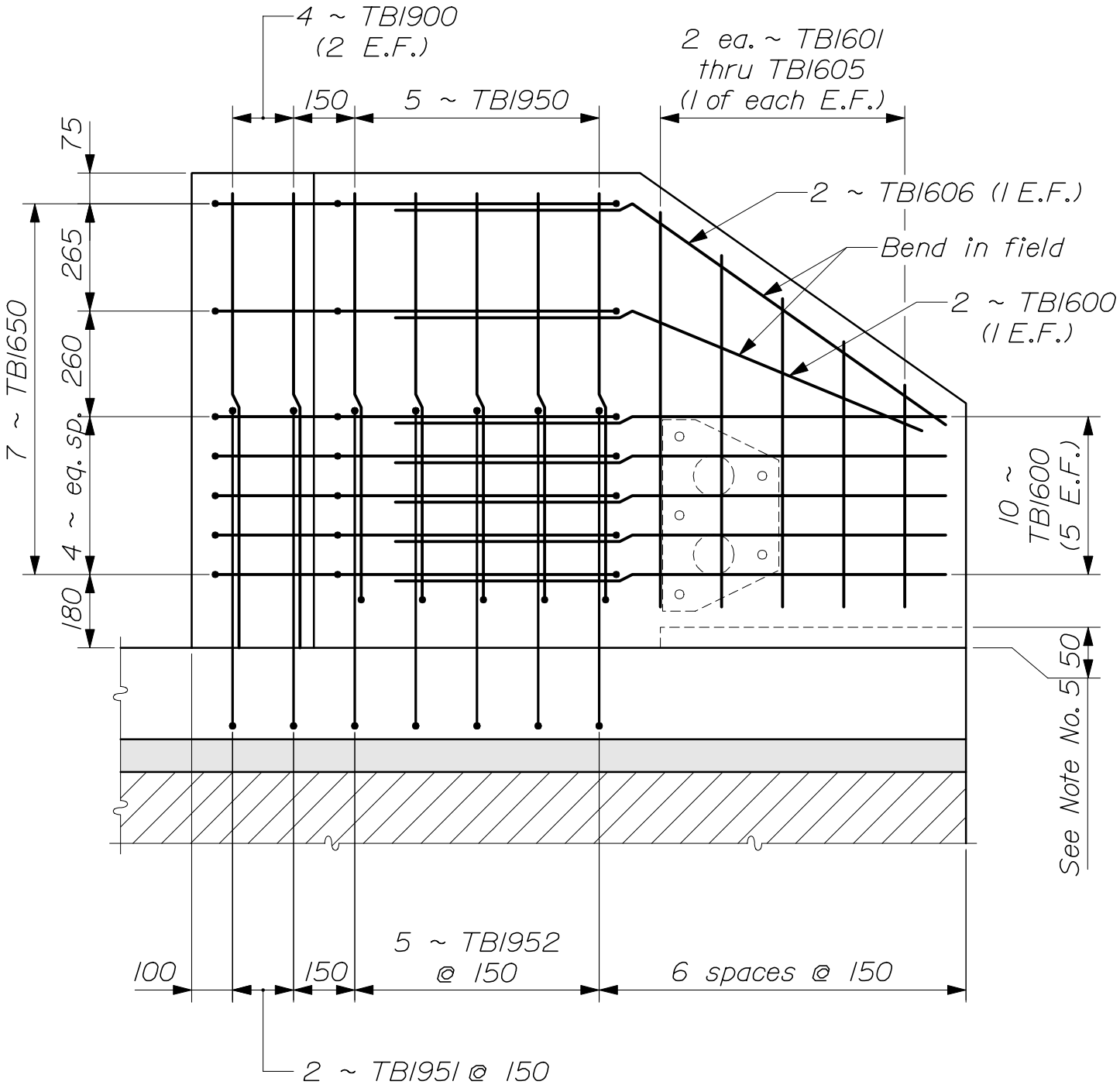
526(28)



-- SECTION THRU NOSE --
(Traffic / Pedestrian Railing)

CONCRETE TRANSITION BARRIER

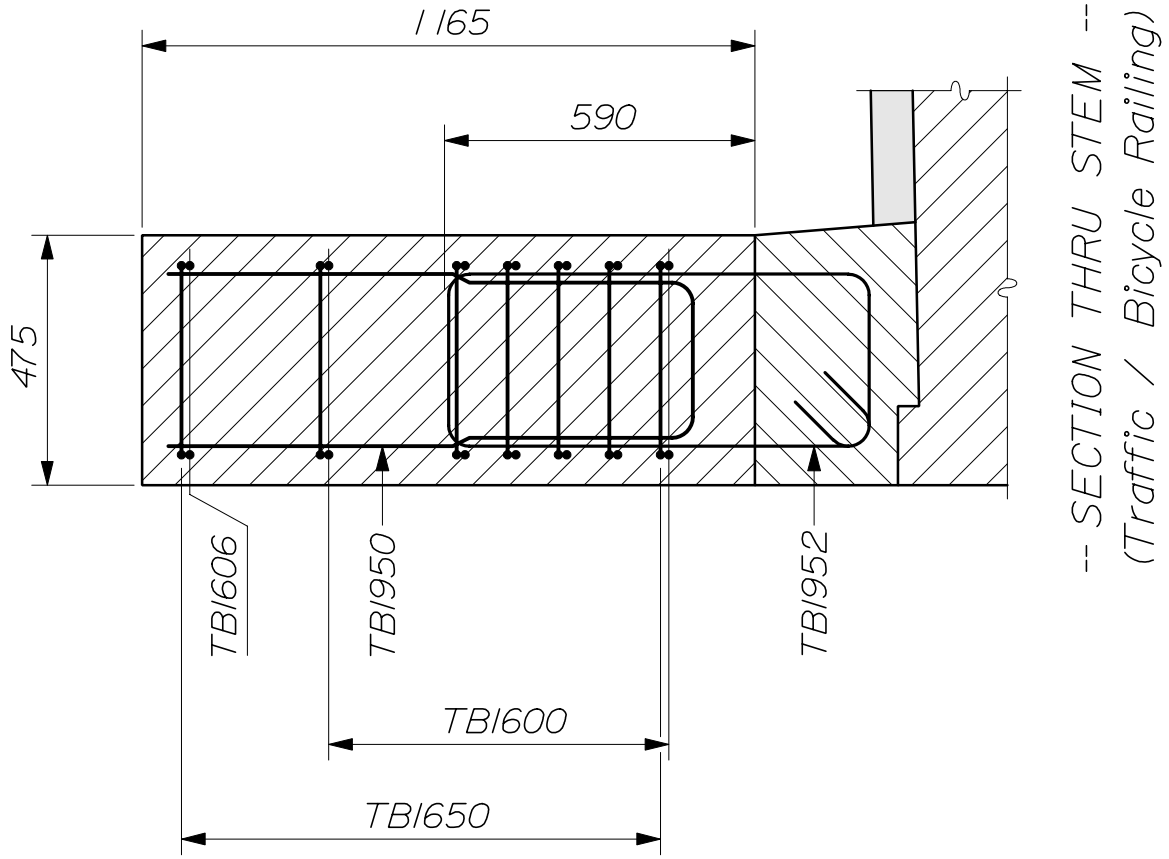
526(29)

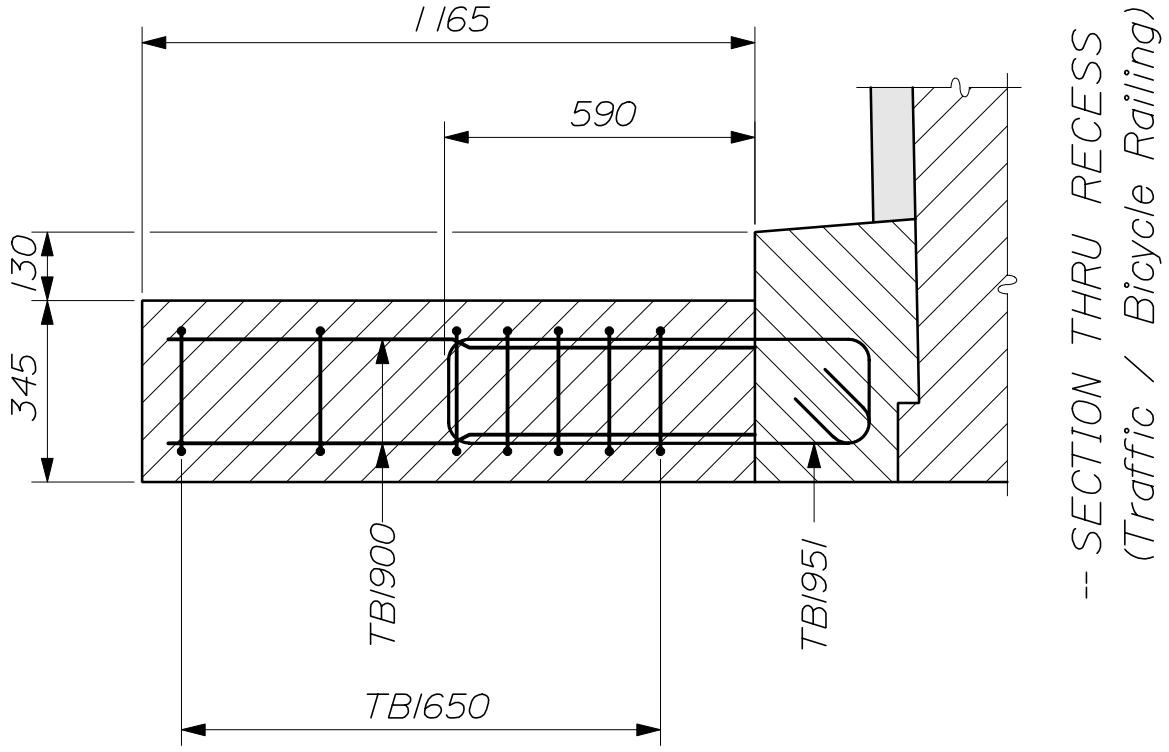


-- TRANSITION BARRIER ELEVATION --
(Traffic / Bicycle Railing)

Note: Curb reinforcing steel not shown

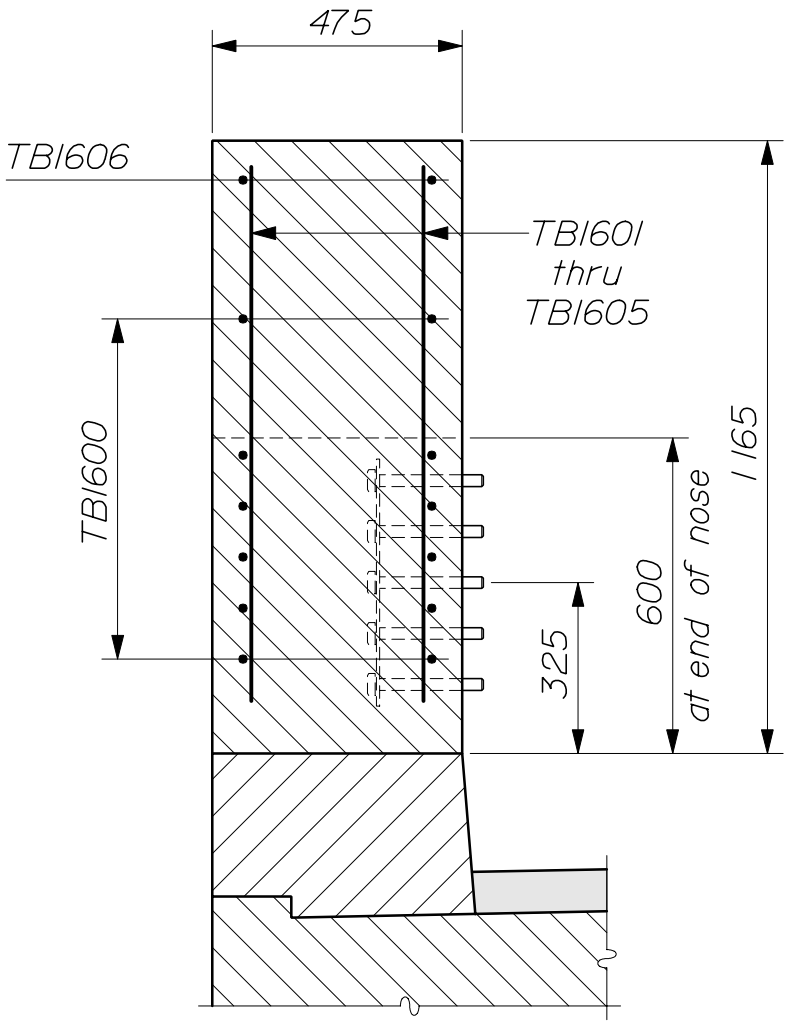
# CONCRETE TRANSITION BARRIER
526(30)





CONCRETE TRANSITION BARRIER

526(31)



-- SECTION THRU NOSE --
(Traffic / Bicycle Railing)

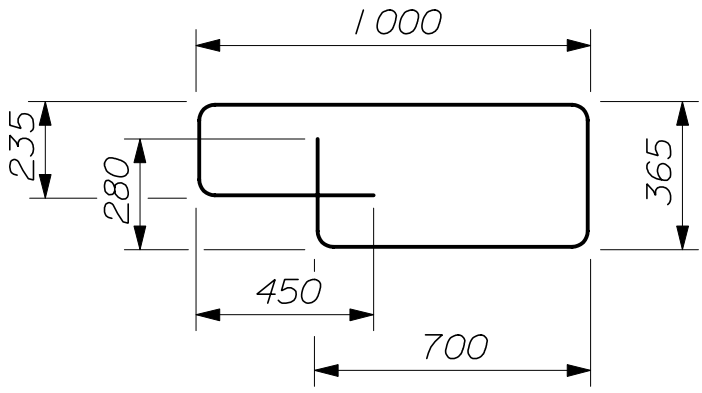
CONCRETE TRANSITION BARRIER

526(32)

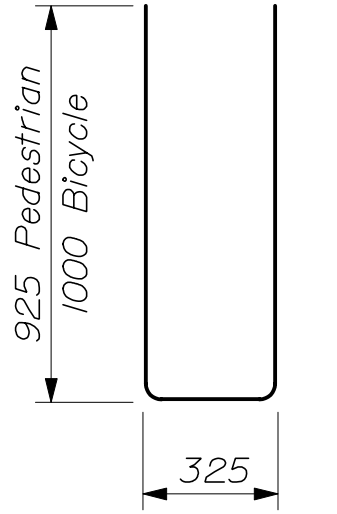
REINFORCING STEEL SCHEDULE

Bar Mark	Traffic		Traffic / Pedestrian		Traffic / Bicycle	
	Qty.	Length	Qty.	Length	Qty.	Length
TB1600	10	1350	12	1350	12	1350
TB1601	2	490	2	920	2	965
TB1602	2	480	2	860	2	860
TB1603	2	470	2	800	2	755
TB1604	2	460	2	740	2	650
TB1605	2	450	2	680	2	545
TB1606	--	--	2	1400	2	1525
TB1650	5	3030	7	3030	7	3030
TB1900	--	--	4	1040	4	1145
TB1950	--	--	5	2175	5	2325
TB1951	2	2300	5	2300	5	2300
TB1952	2	2570	5	2570	5	2570

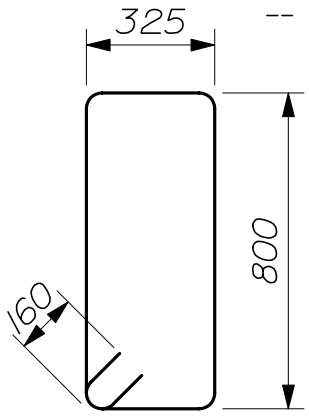
Note: The first two digits following the letters of the mark indicate the size of the reinforcing bar. (TB1600 = bar size #16.) All dimensions are out - to - out of bar.



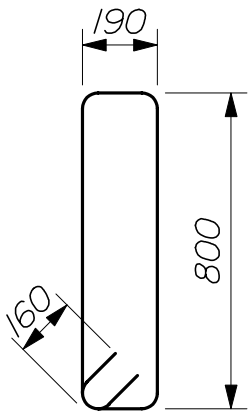
-- TB1650 --



-- TB1950 --



-- TB1952 --



-- TB1951 --

CONCRETE TRANSITION BARRIER

526(33)

NOTES:

1. All work and materials shall conform to the provisions of Standard Specifications Section 526 - Concrete Barrier (Permanent Concrete Transition Barrier).

2. Reinforcing bars designated TB1951 and TB1952 are to be placed when the curb or sidewalk is placed. It is the Contractors responsibility to place these items at the proper time. Compensation for these bars will not be made separately and is considered to be paid for under item 526.34, Permanent Concrete Transition Barrier.

3. Reinforcing steel shall have 50 mm minimum concrete cover.

4. The quantities of reinforcing bars shown are for one transition barrier only.

5. When the Concrete Transition Barrier is cantilevered over an expansion joint, the nose shall be blocked out as shown.

6. Payment for guardrail anchorage will be considered incidental to the transition barrier pay item. Class 8.8.3 bolts shall be used when corrosion - resistant steel guardrail is specified on the approach roadway

7. The precast concrete transition curb shall meet the provisions of Section 609 - Curb, of the Standard Specifications. The bridge end of the curb shall be saw - cut in the field to fit flush against the backwall, as dictated by the bridge skew angle and the profile grade. Where curbing is specified on the adjacent highway, the transition shall be modified accordingly. Payment for transition curb will be considered incidental to the Concrete Transition Barrier pay item.

8. Concrete Transition Barrier is designed for attachment of Bridge Transition Type "I" unless otherwise indicated on the Design Drawings. Refer to Section 606 for details.

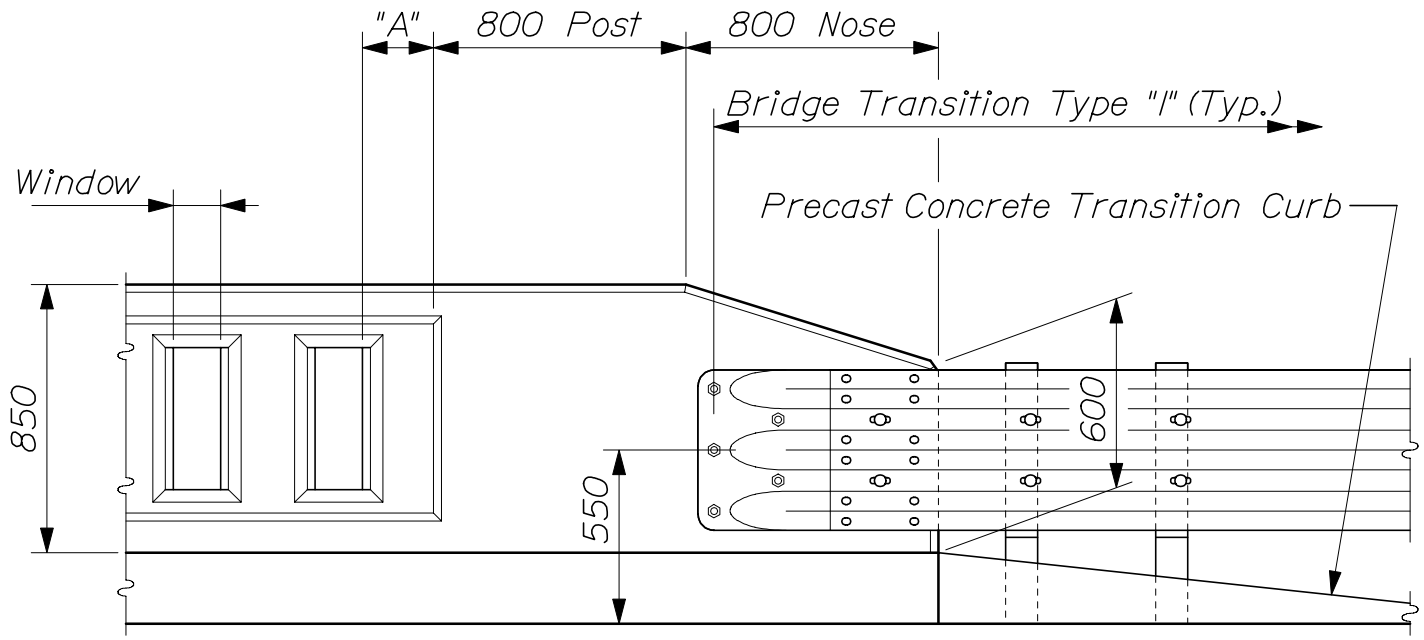
9. After installation of the guardrail is complete, upset the threads on the anchor bolts in three (3) places around each bolt, at the junction of the nut and the exposed thread, with a center punch or similar tool.

10. If there is a conflict between these Standard Details and the Design Drawings, the requirements of the Design Drawings shall be followed.

MATERIALS:

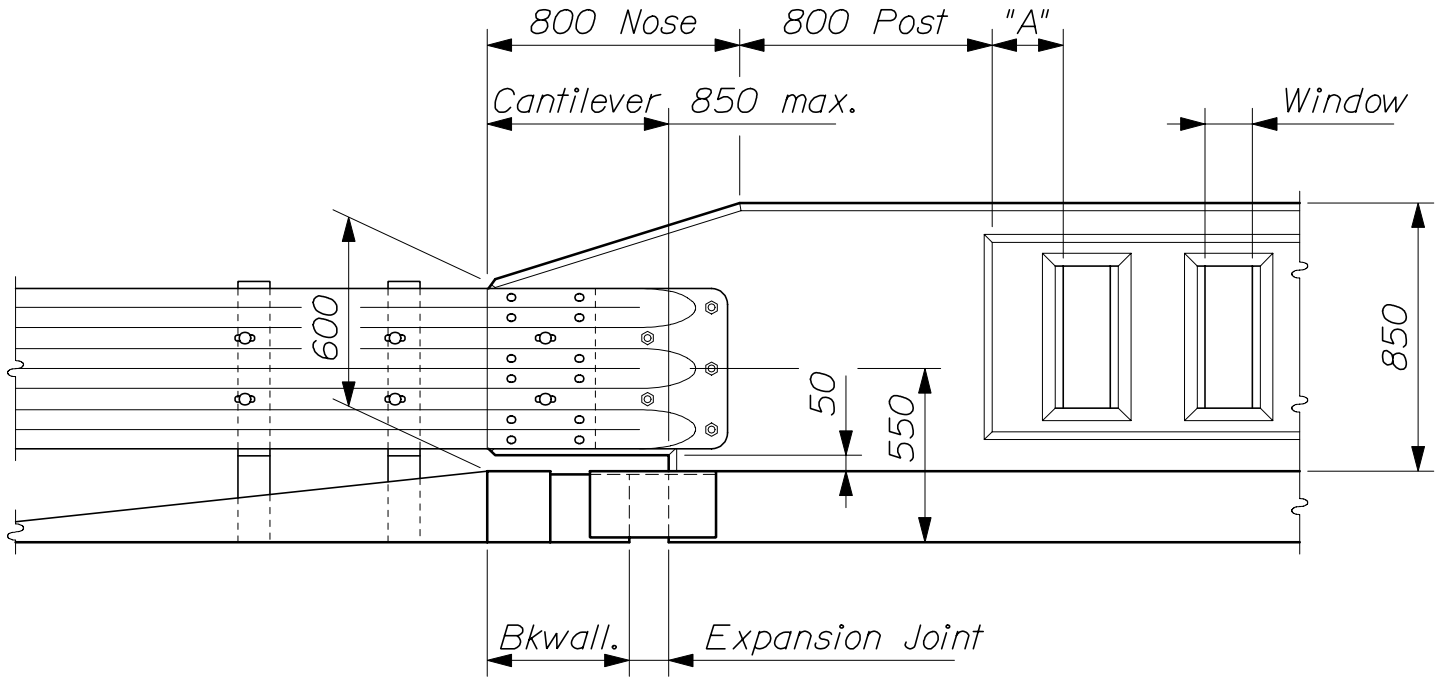
Concrete ---------- Class "LP"
Reinforcing Steel ---------- ASTM A615/A615M, Grade 420
Spacer plate ---------- AASHTO M 183M/M 183 (ASTM A 36/A 36M) (Galvanized)
Bolts ---------- ASTM F 568, Class 8.8 (Galvanized)

# CONCRETE TRANSITION BARRIER
526(34)



Dim. "A" = 150 min., 375 max.

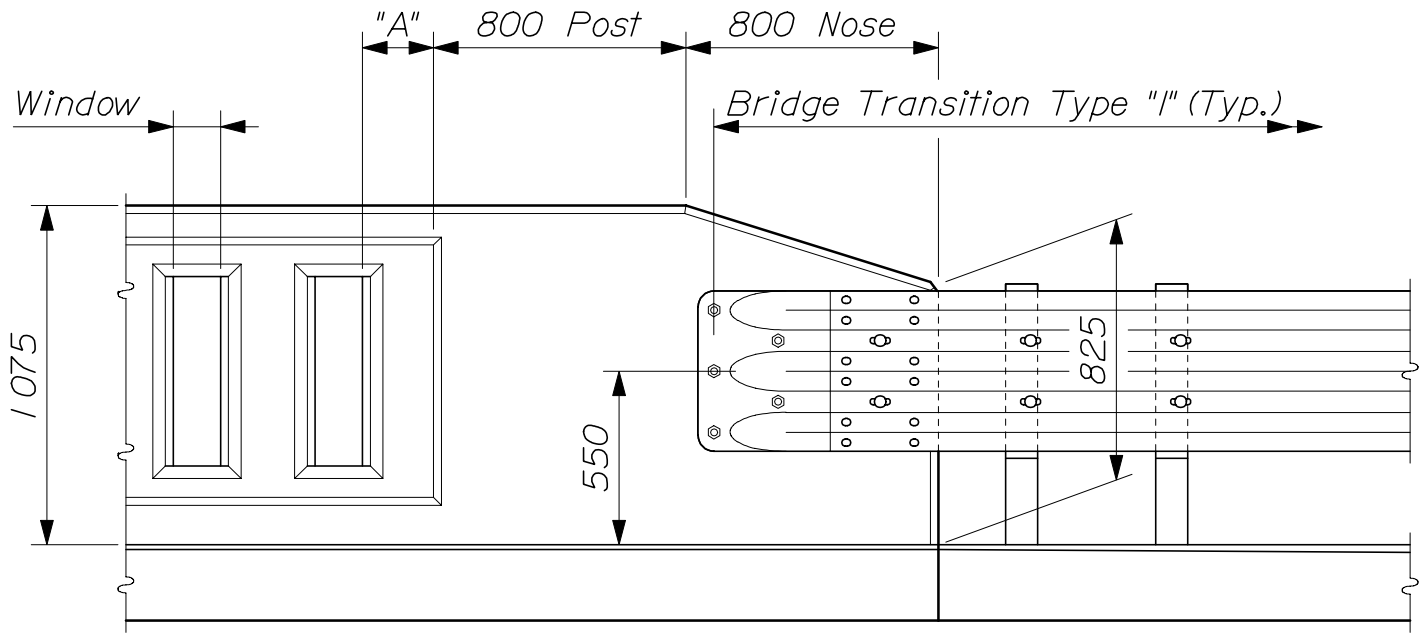
-- TRAFFIC RAIL END ELEVATION --
(Typical)



-- TRAFFIC RAIL END ELEVATION --
(Cantilevered)

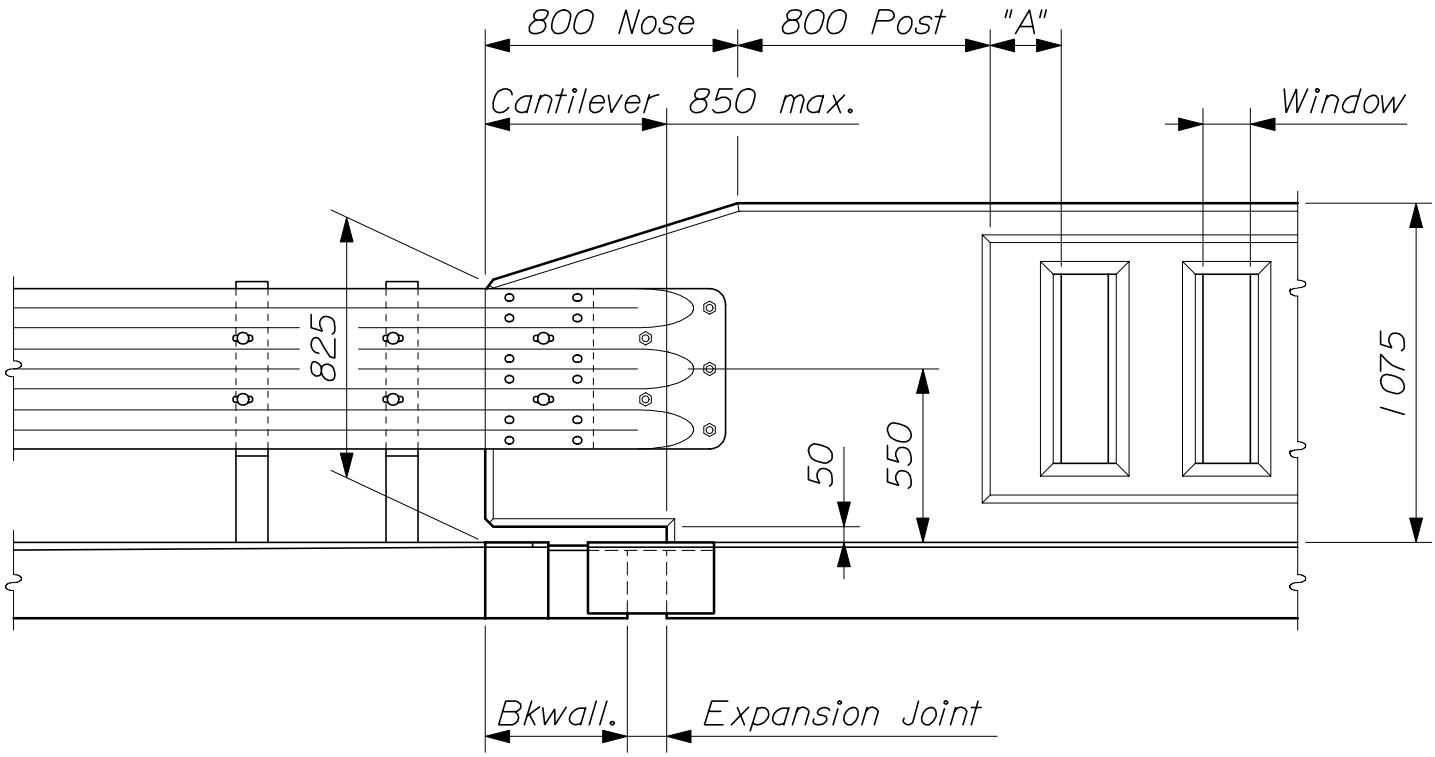
TEXAS CLASSIC RAIL

526(35)



Dim. "A" = 150 min., 375 max.

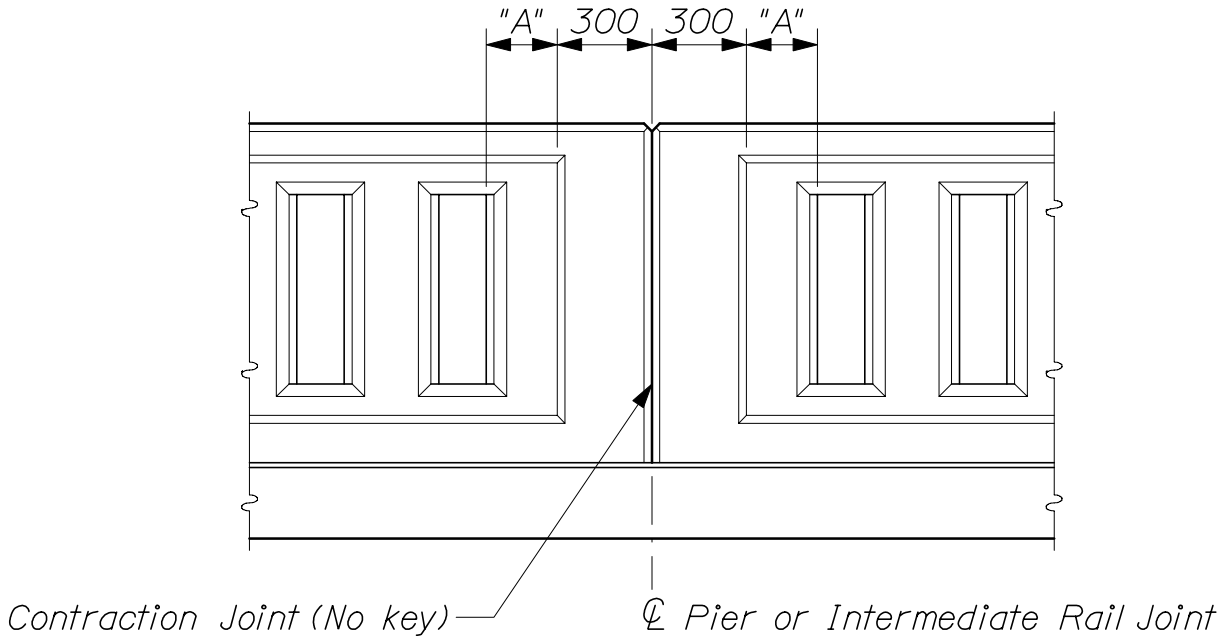
-- SIDEWALK RAIL END ELEVATION --
(Typical)



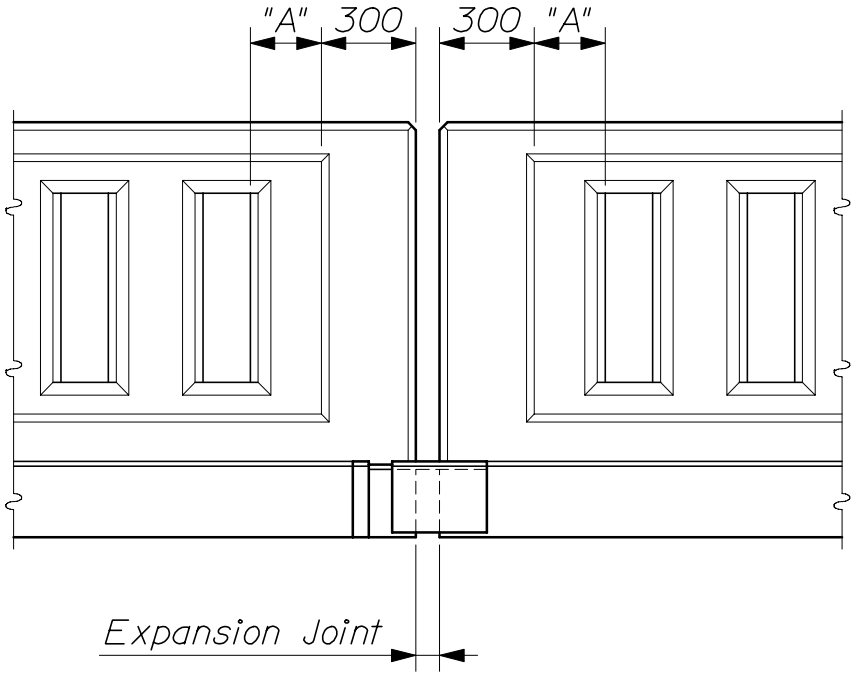
-- SIDEWALK RAIL END ELEVATION --
(Cantilevered)

TEXAS CLASSIC RAIL

526(36)



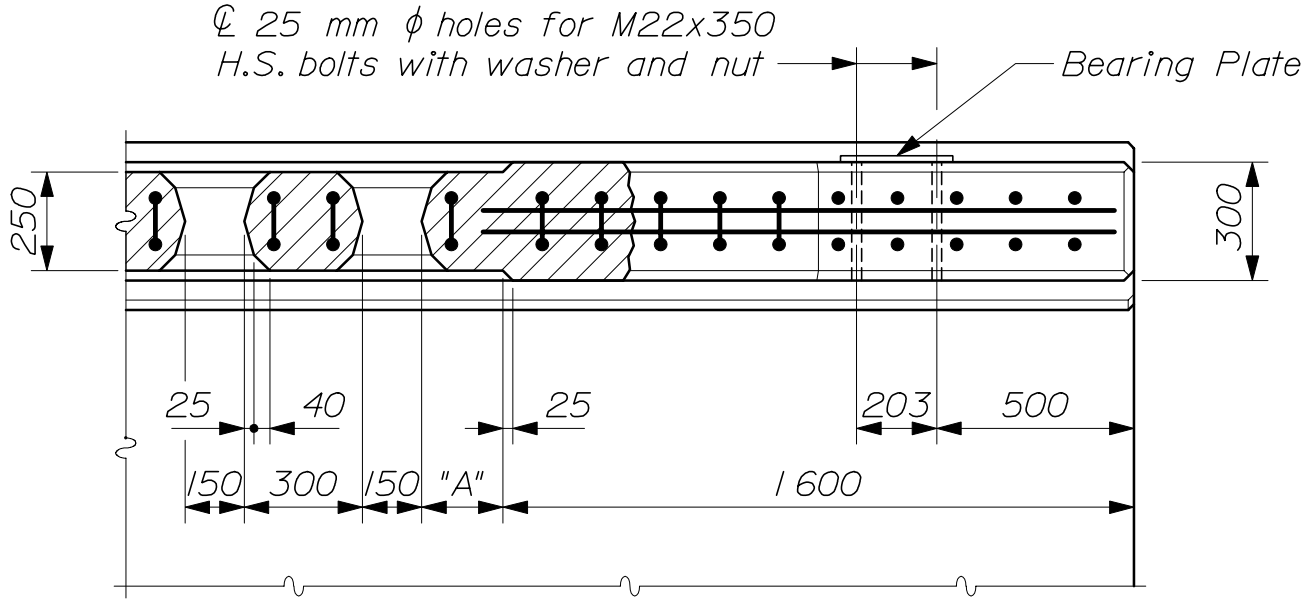
-- CONTRACTION JOINT ELEVATION --
(Sidewalk Rail shown)



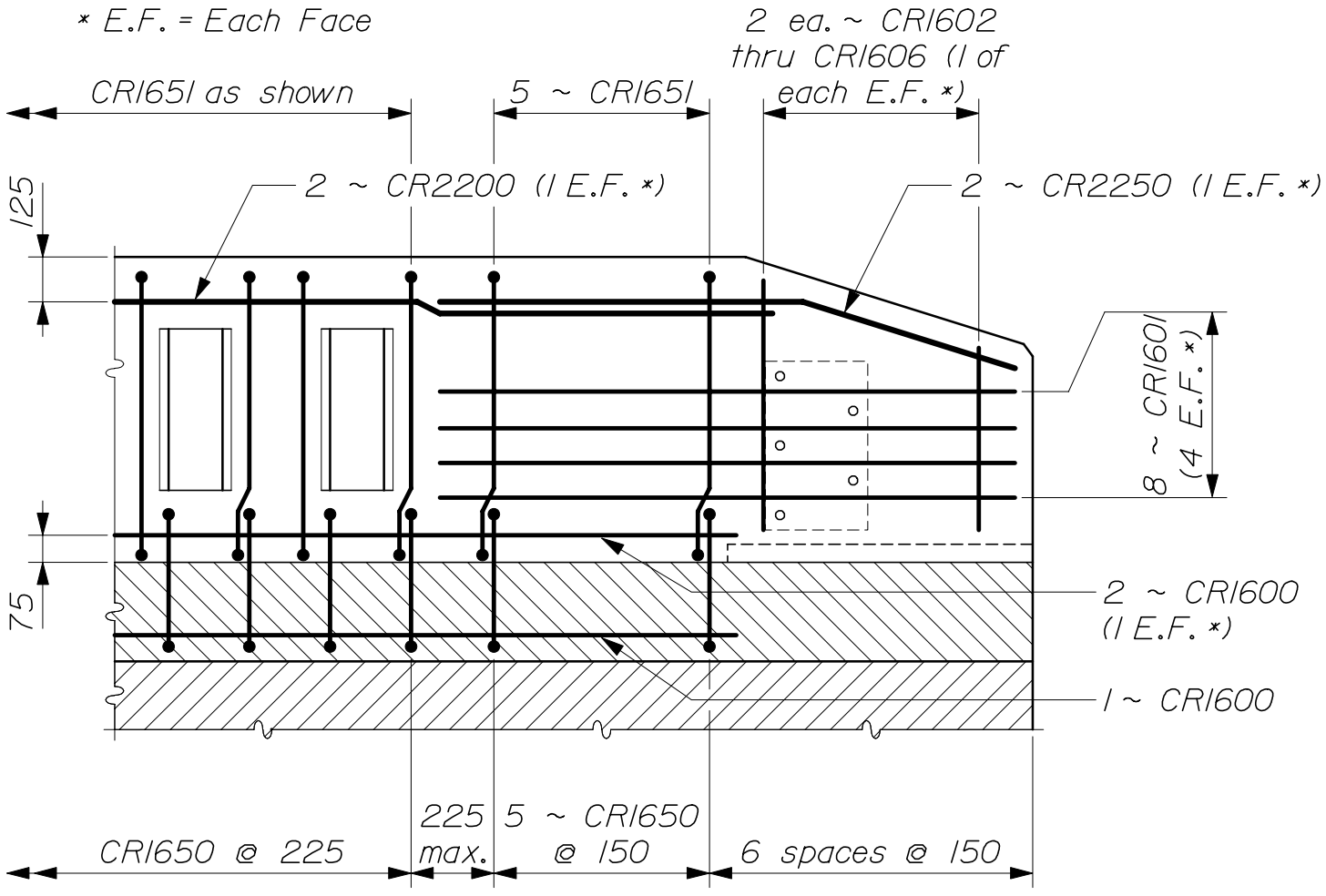
-- EXPANSION JOINT ELEVATION --
(Sidewalk Rail shown)

TEXAS CLASSIC RAIL

526(37)



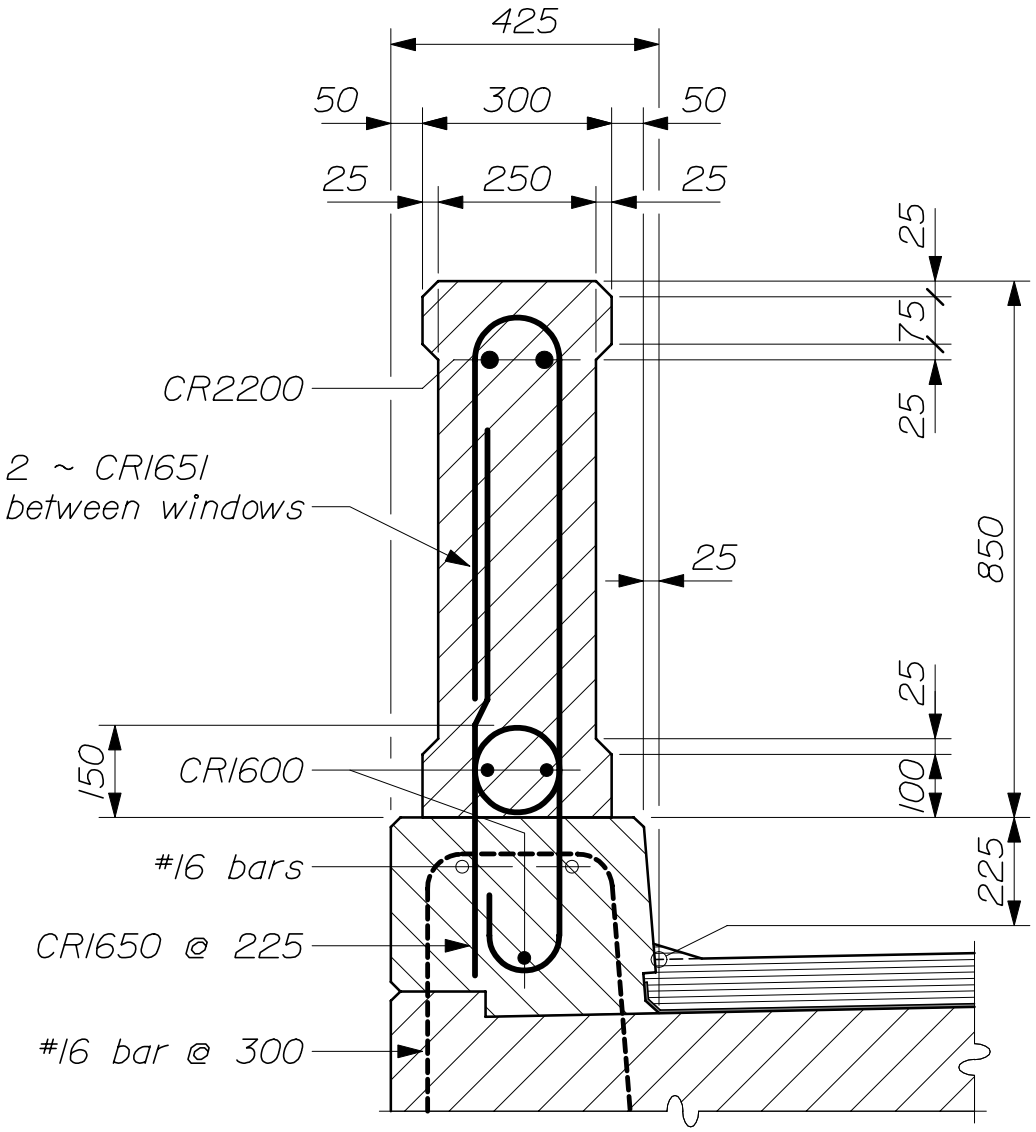
-- TRAFFIC RAIL PLAN --



-- TRAFFIC RAIL ELEVATION --

TEXAS CLASSIC RAIL

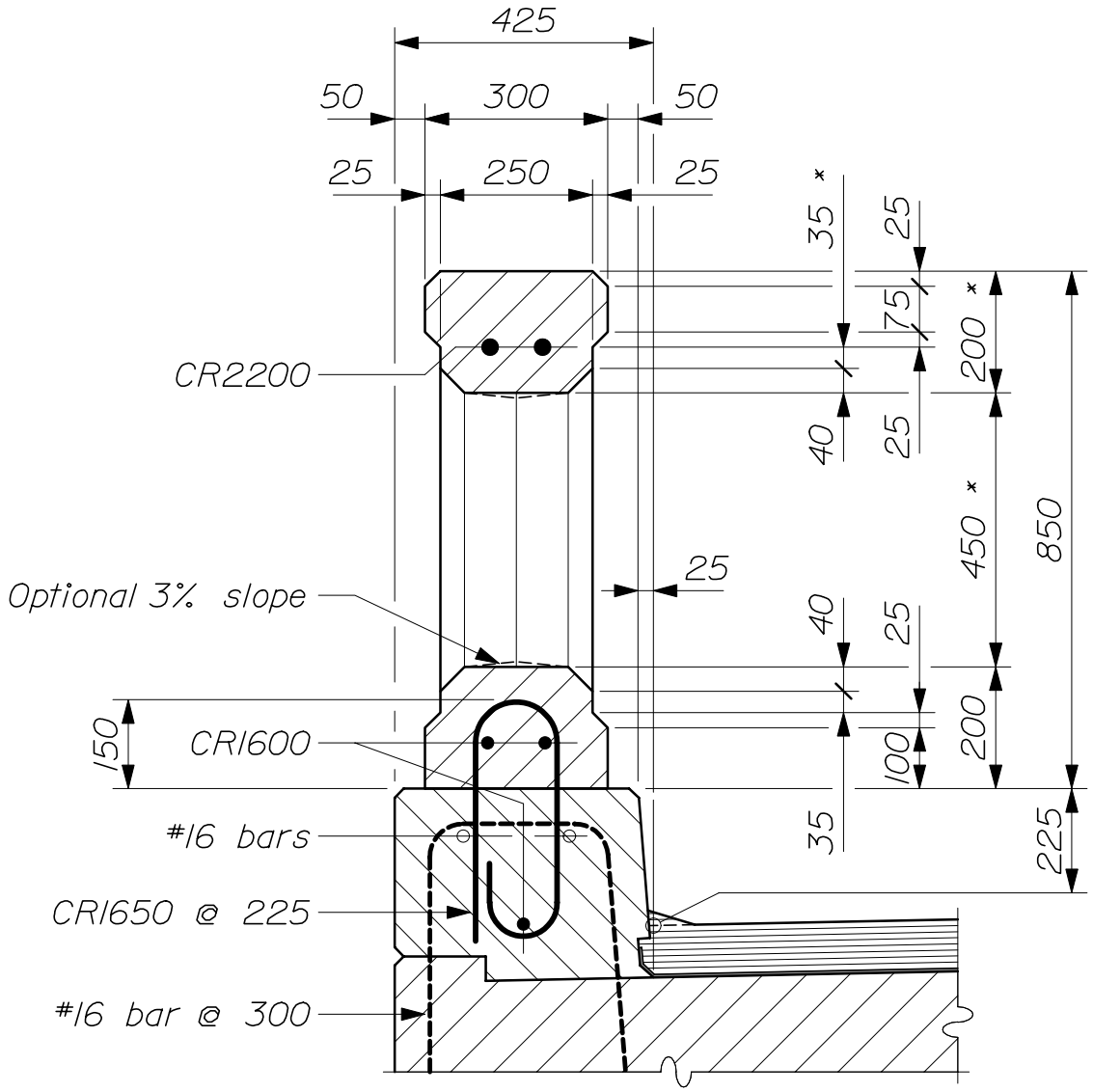
526(38)



-- SECTION BETWEEN WINDOWS --
(Traffic Rail)

TEXAS CLASSIC RAIL

526(39)

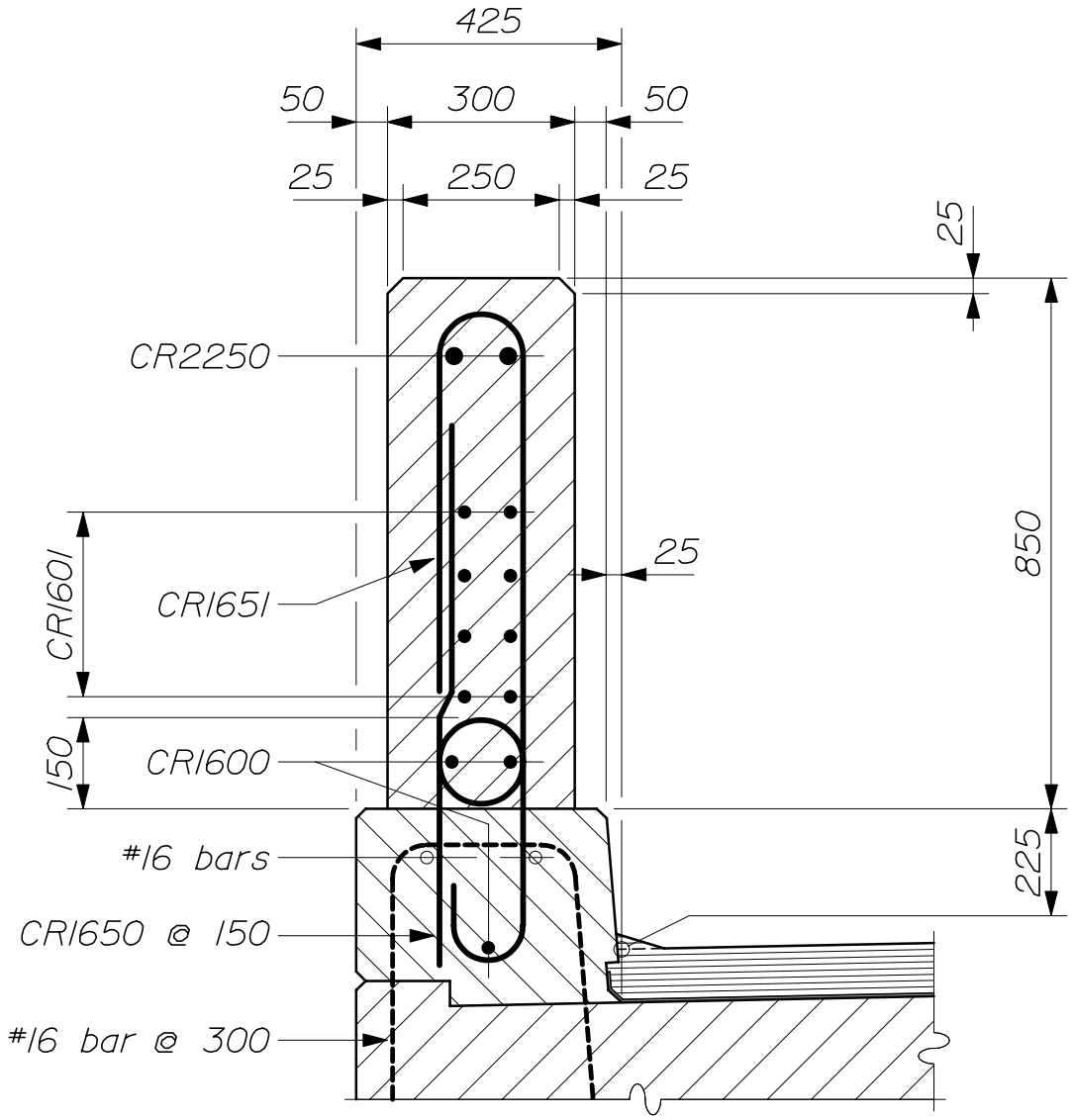


-- SECTION THROUGH WINDOW --
(Traffic Rail)

* Alter these dimensions if necessary to accommodate prefabricated window forms using Imperial units.

TEXAS CLASSIC RAIL

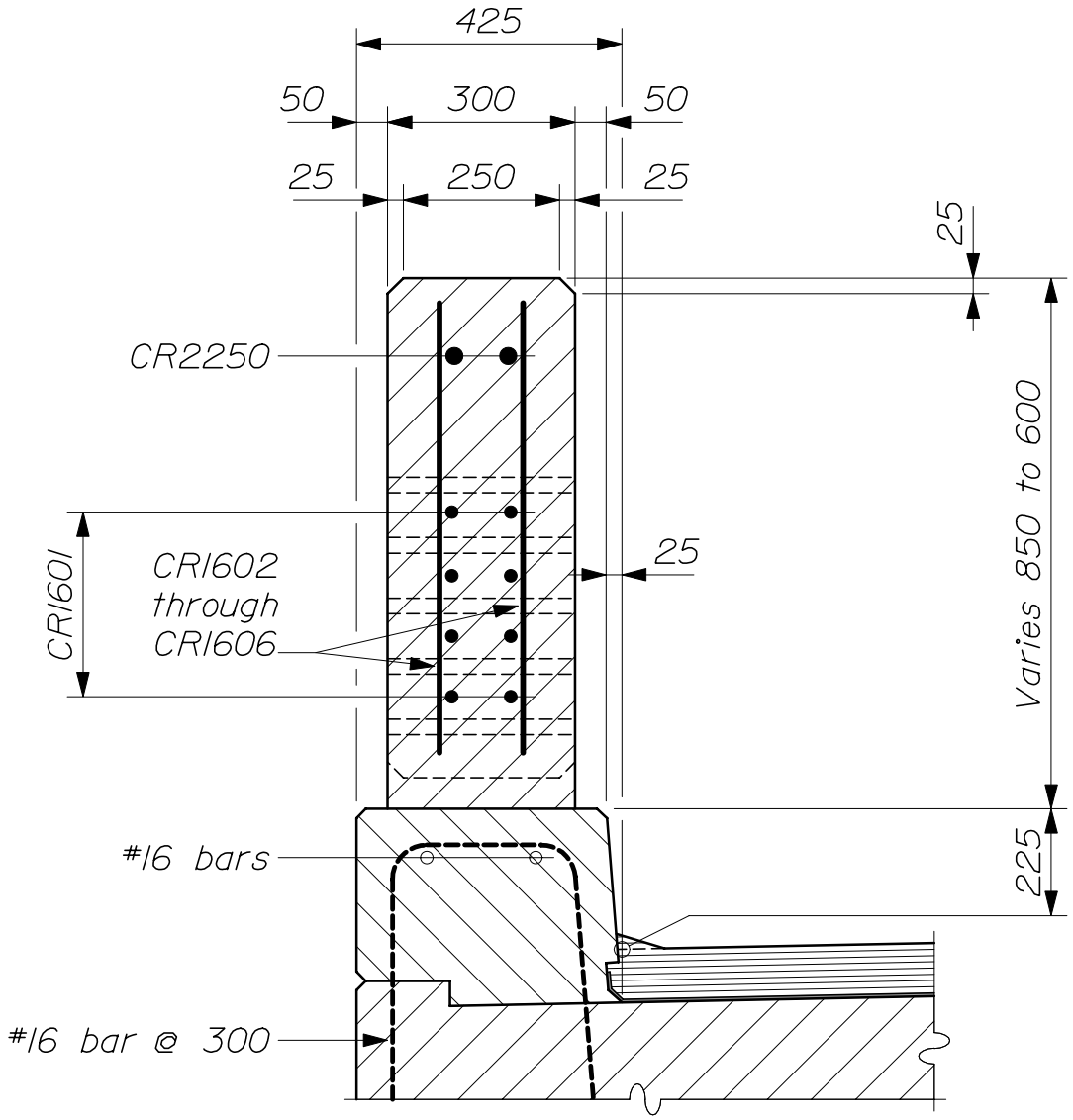
526(40)



-- SECTION THROUGH POST --
(Traffic Rail)

TEXAS CLASSIC RAIL

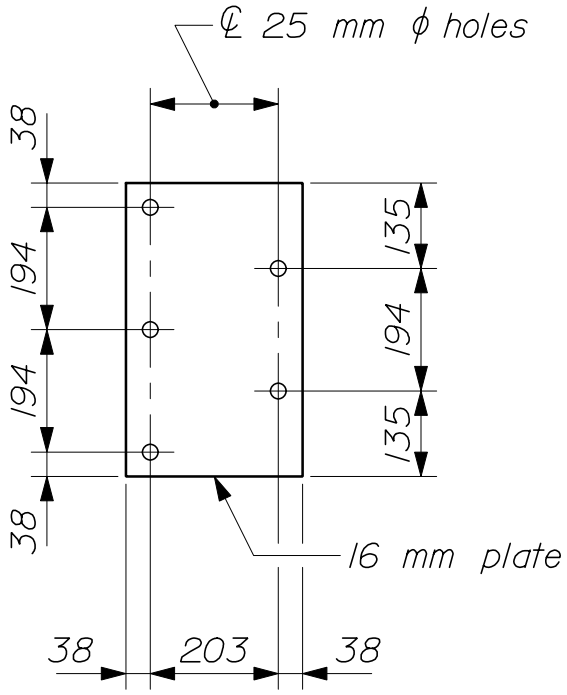
526(41)



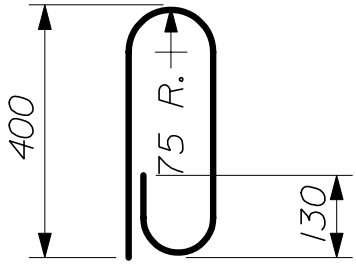
-- SECTION THROUGH NOSE --
(Traffic Rail)

TEXAS CLASSIC RAIL

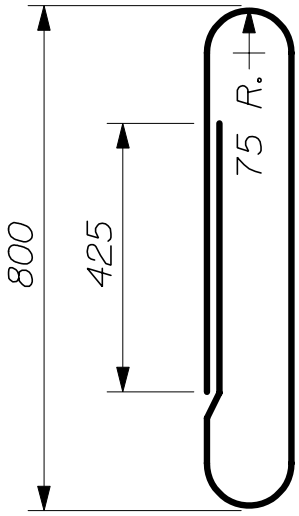
526(42)



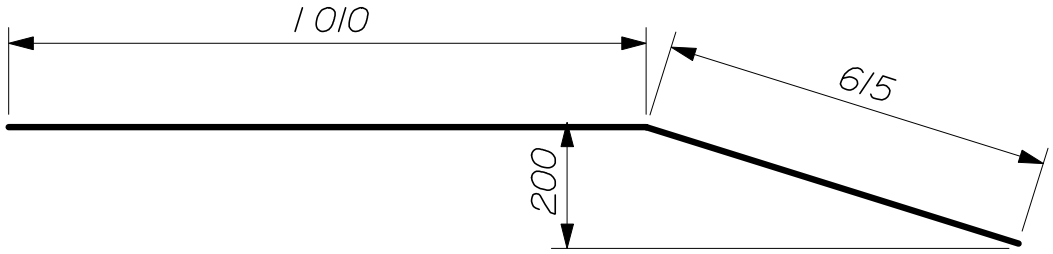
-- BEARING PLATE --



-- CRI650 --



-- CRI65I --

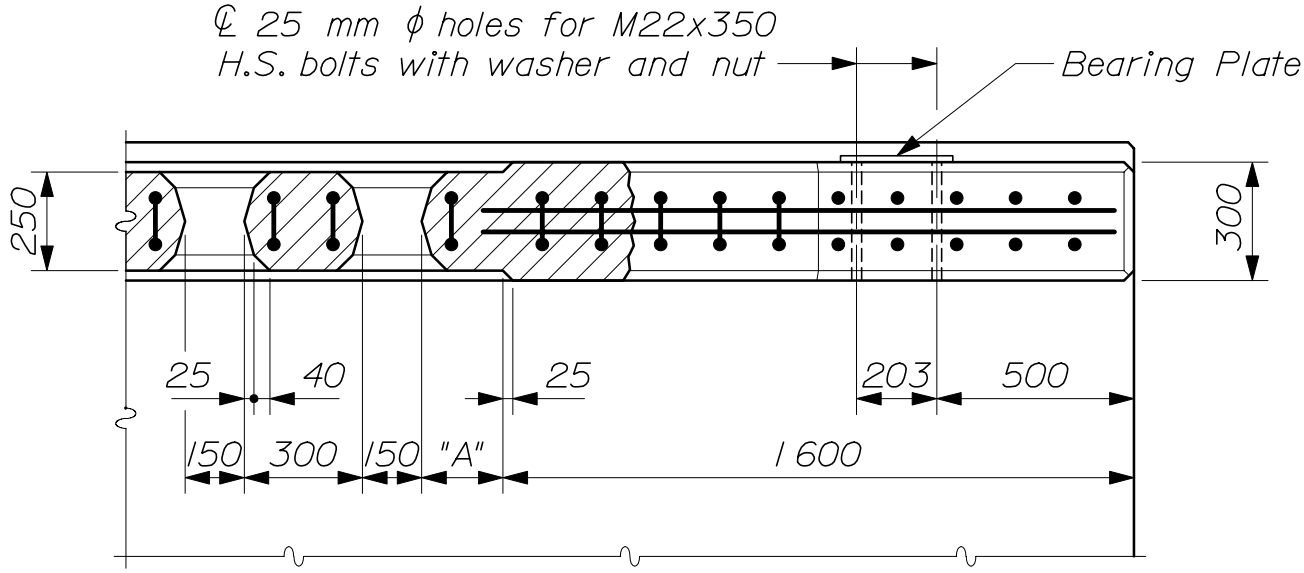


-- CR2250 --

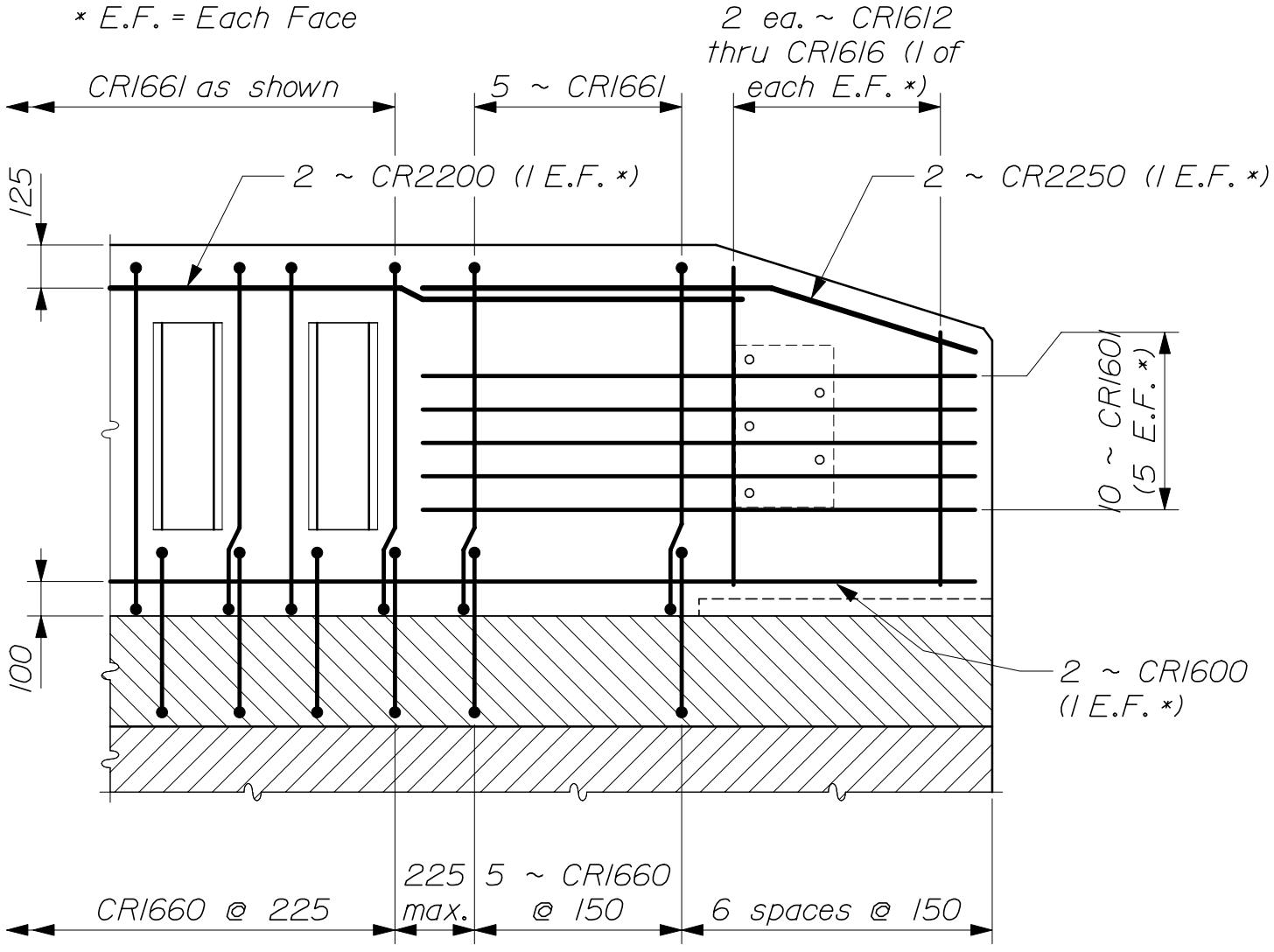
TRAFFIC RAIL REINFORCING STEEL SCHEDULE		
Mark	Length	Location
CRI600	9 150 max.	Rail Bottom & Curb (Horizontal)
CRI60I	1 600	Nose/Post (Horizontal)
CRI602	700	Nose (Vertical)
CRI603	650	Nose (Vertical)
CRI604	600	Nose (Vertical)
CRI605	550	Nose (Vertical)
CRI606	500	Nose (Vertical)
CRI650	1 100	Rail & Post (Vertical)
CRI65I	2 200	Rail & Post (Vertical)
CR2200	9 150 max.	Rail Top (Horizontal)
CR2250	1 625	Nose (Horizontal)

TEXAS CLASSIC RAIL

526(43)



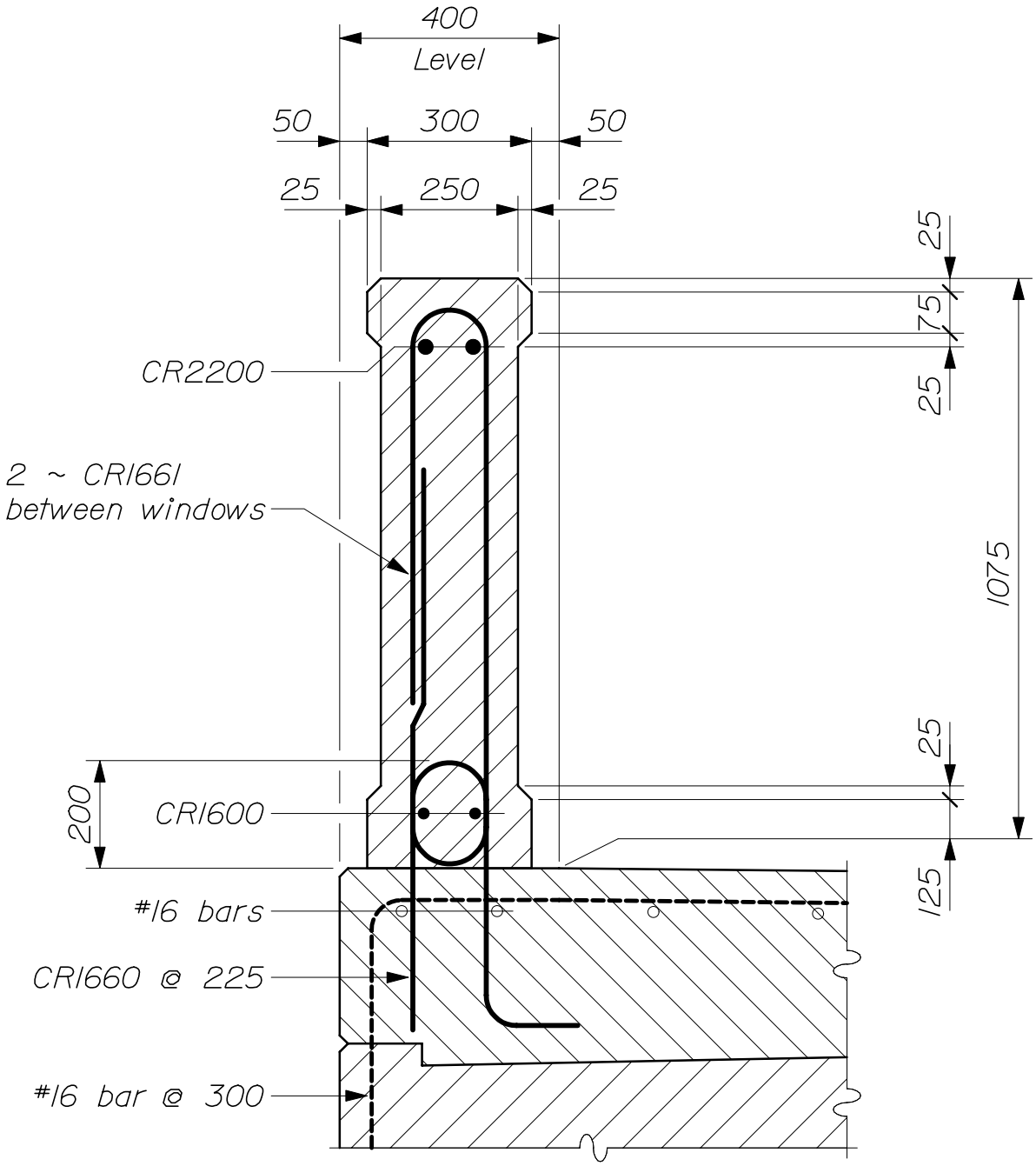
-- SIDEWALK RAIL PLAN --



-- SIDEWALK RAIL ELEVATION --

TEXAS CLASSIC RAIL

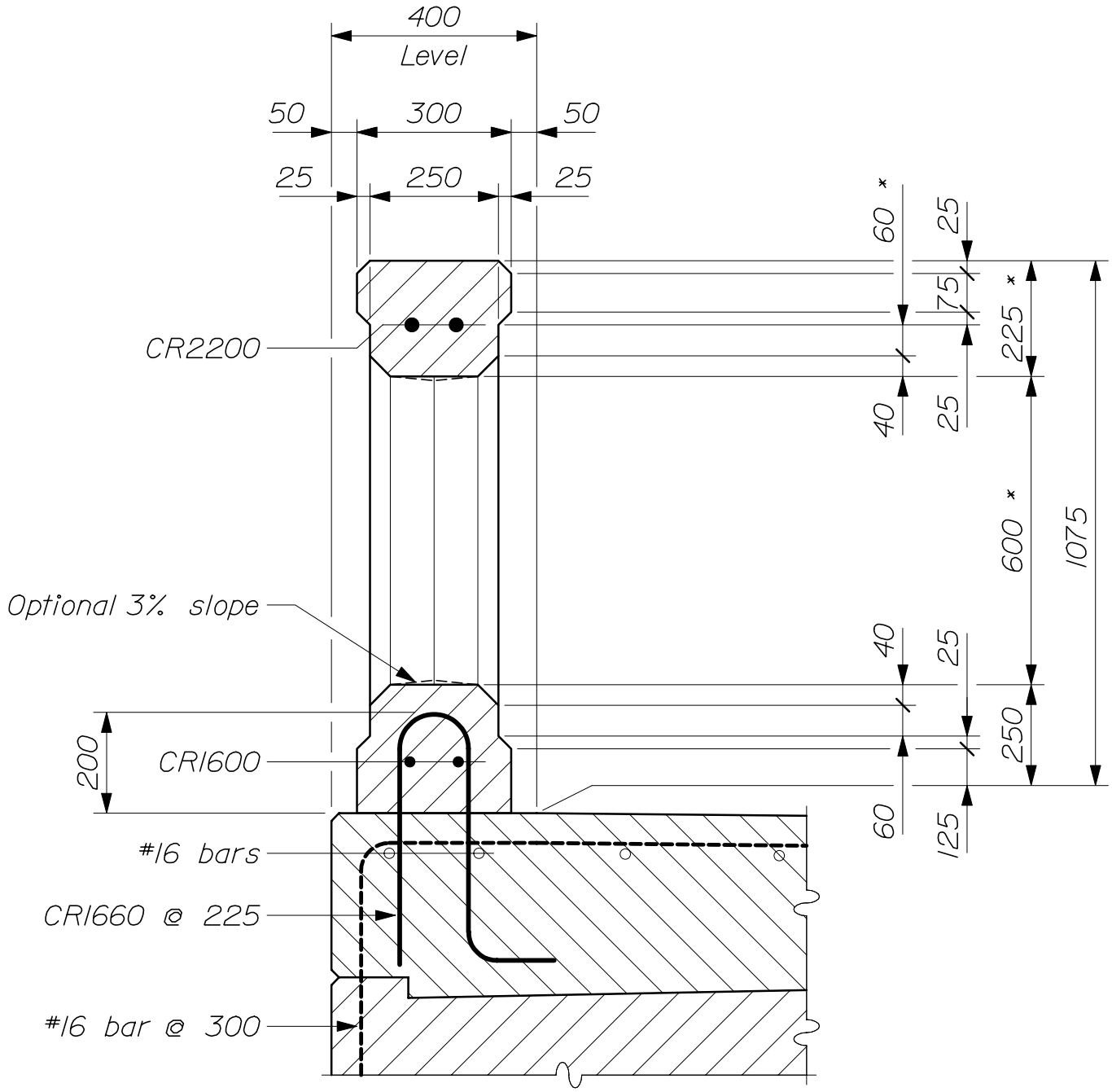
526(44)



-- SECTION BETWEEN WINDOWS --
(Sidewalk Rail)

TEXAS CLASSIC RAIL

526(45)

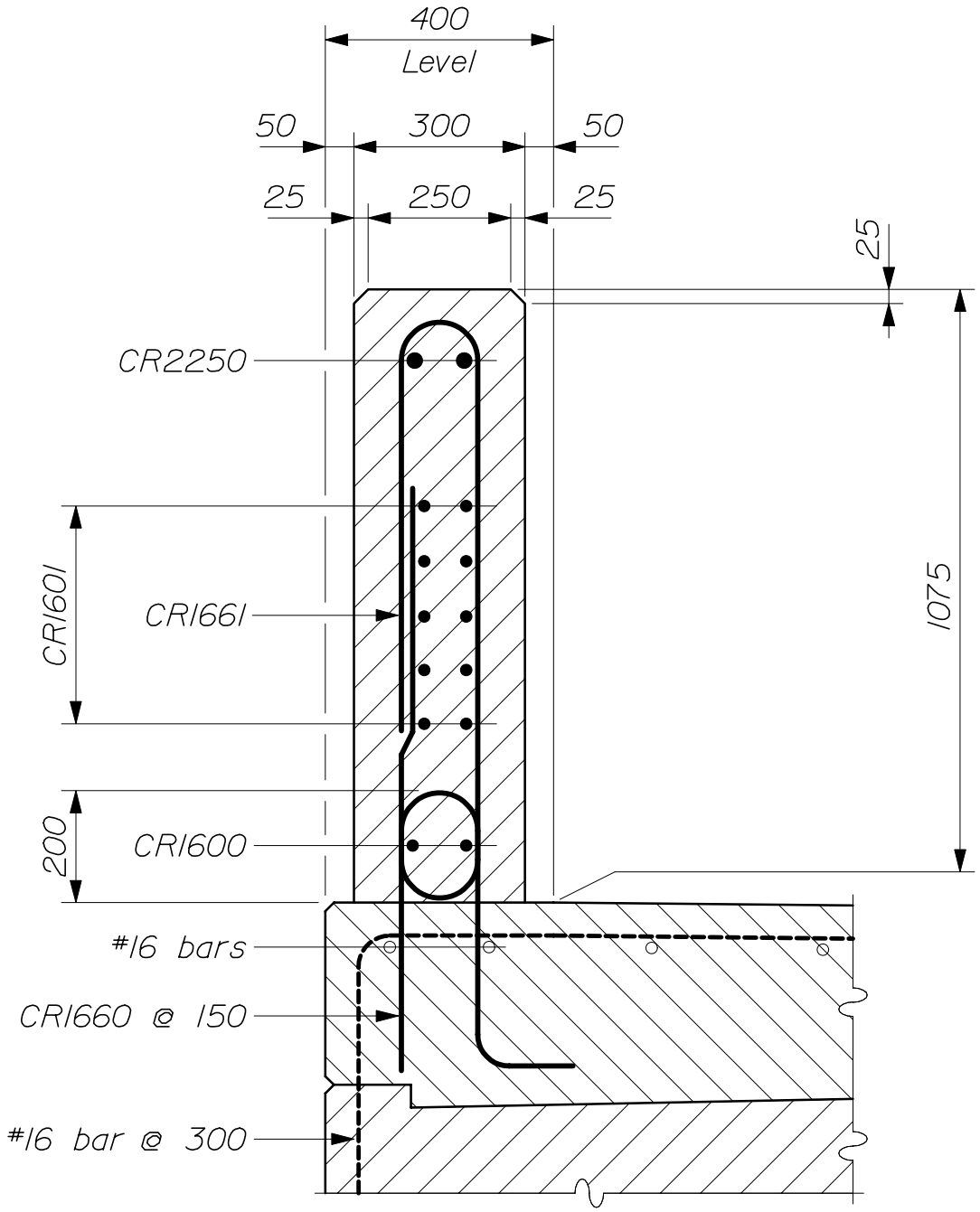


-- SECTION THROUGH WINDOW --
(Sidewalk Rail)

* Alter these dimensions if necessary to accommodate prefabricated window forms using Imperial units.

TEXAS CLASSIC RAIL

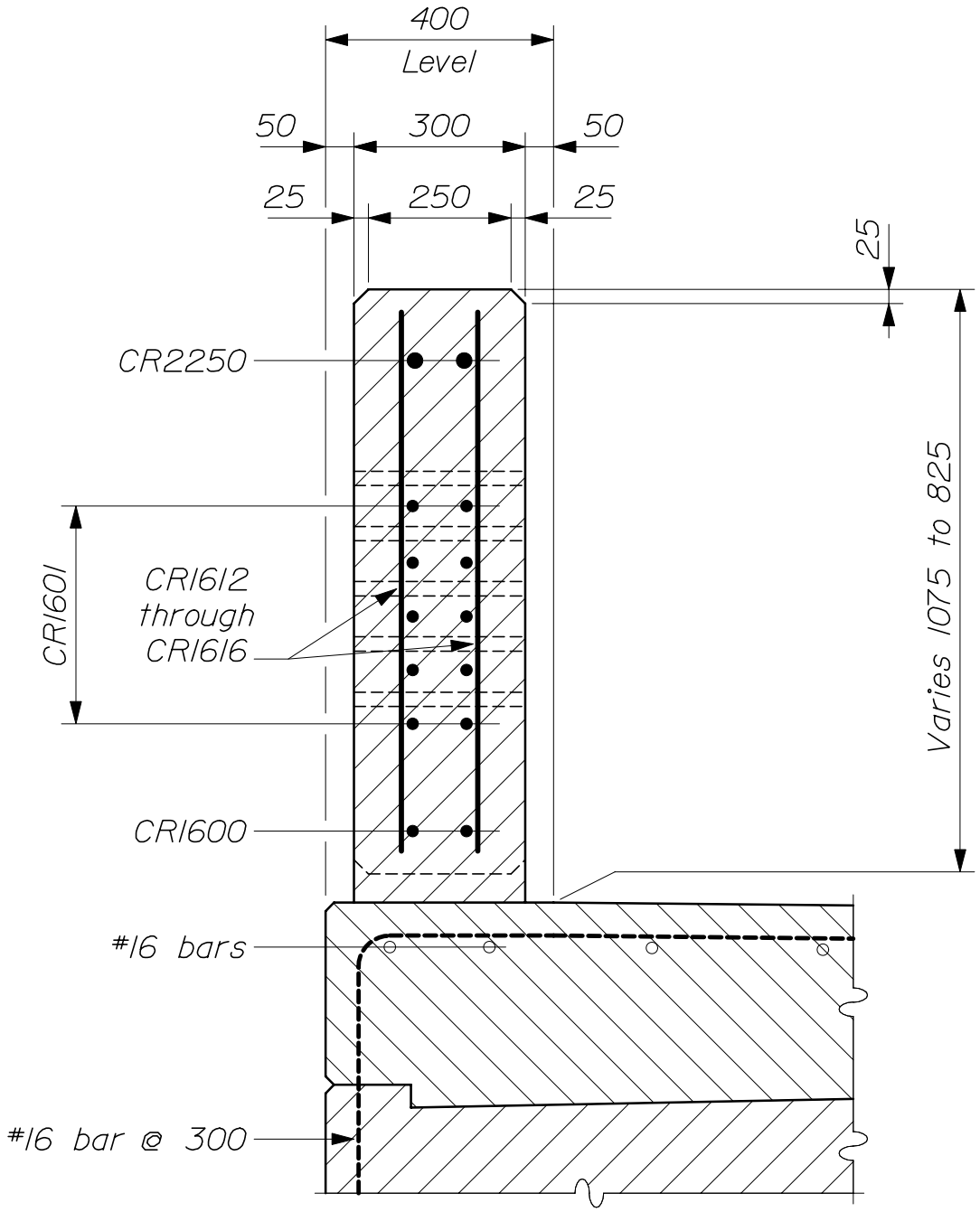
526(46)



-- SECTION THROUGH POST --
(Sidewalk Rail)

TEXAS CLASSIC RAIL

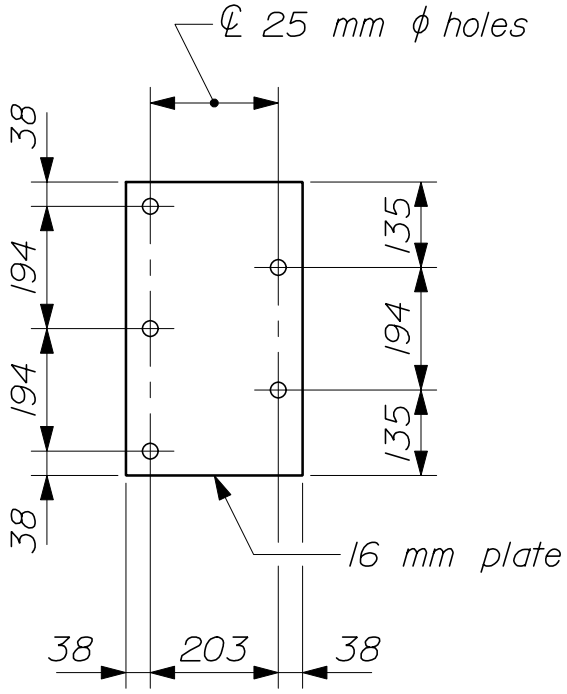
526(47)



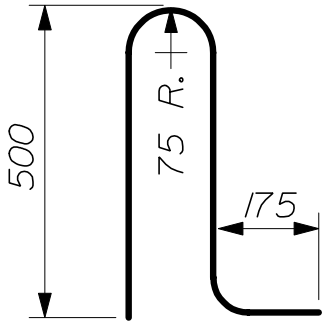
-- SECTION THROUGH NOSE --
(Sidewalk Rail)

TEXAS CLASSIC RAIL

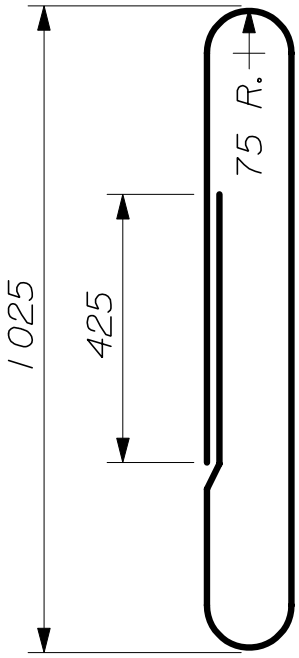
526(48)



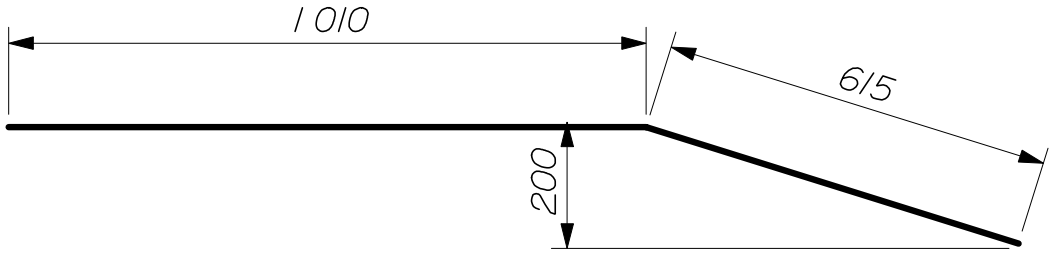
-- BEARING PLATE --



-- CR1660 --



-- CR1661 --



-- CR2250 --

SIDEWALK RAIL REINFORCING STEEL SCHEDULE		
Mark	Length	Location
CR1600	9 150 max.	Rail Bottom (Horizontal)
CR1601	1 600	Nose/Post (Horizontal)
CR1612	925	Nose (Vertical)
CR1613	875	Nose (Vertical)
CR1614	825	Nose (Vertical)
CR1615	775	Nose (Vertical)
CR1616	725	Nose (Vertical)
CR1660	1 200	Rail & Post (Vertical)
CR1661	2 650	Rail & Post (Vertical)
CR2200	9 150 max.	Rail Top (Horizontal)
CR2250	1 625	Nose (Horizontal)

TEXAS CLASSIC RAIL

526(49)

NOTES:

1. All work and materials shall conform to the requirements of Standard Specifications Section 526 - Concrete Barrier.

2. Vertical surfaces and recesses shall be plumb. Tops and bottoms of window openings may be level or parallel to the grade of the rail.

3. Dimension "A" shall be approximately equal at all locations in any length of railing.

4. Contraction joints shall be located over piers on continuous structures and at 10± m intervals along the length of all bridges. Do not extend reinforcing steel through the contraction joints.

5. Reinforcing steel shall have 50 mm minimum concrete cover.

6. The first digits following the letters of the bar mark indicate the size of the reinforcing bar. (CR1600 = bar size #16.) All dimensions are out - to - out of bar.

7. The minimum lap splice for CR1600 bars is 550 mm and for CR2200 bars is 925 mm.

8. When the end post is cantilevered over an expansion joint, provide a block - out as shown.

9. For details of curb / sidewalk expansion dams where necessary, refer to the Standard Detail for the appropriate Expansion Device.

10. Bolt holes in concrete shall be formed by a method approved by the Engineer.

11. Payment for anchor bolts and bearing plates will be considered incidental to theTexas Classic Rail pay item.

12. For details of the Concrete Transition Curb, refer to Standard Details Section 526, Concrete Transition Barrier. Payment for the transition curb will be considered incidental to the Texas Classic Rail pay item.

13. If there is a conflict between these Standard Details and the Design Drawings, the requirements of the Design Drawings shall be followed.

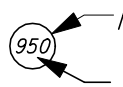
MATERIALS:

Concrete ---------- Class "LP"
Reinforcing Steel ---------- ASTM A 615/A 615M, Grade 420
Bearing Plate ------- AASHTO M 183M/M 183 (ASTM A 36/A 36M) (Galvanized)
Anchor Bolts ---------- ASTM F 568, Class 8.8 (Galvanized)

TEXAS CLASSIC RAIL

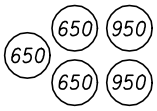
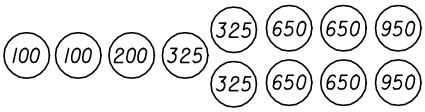
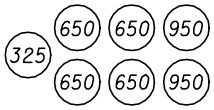
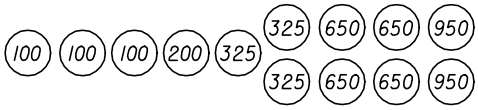
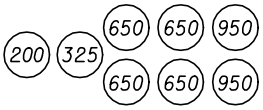
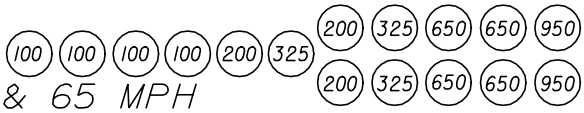
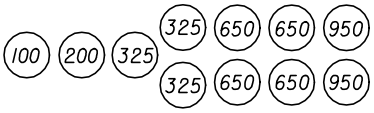
526(50)

KEY



Plastic Crash Barrel

Weight of sand in kilograms

20 & 25 MPH 	50 MPH 
30 & 35 MPH 	55 MPH 
40 MPH 	60 & 65 MPH 
45 MPH 	

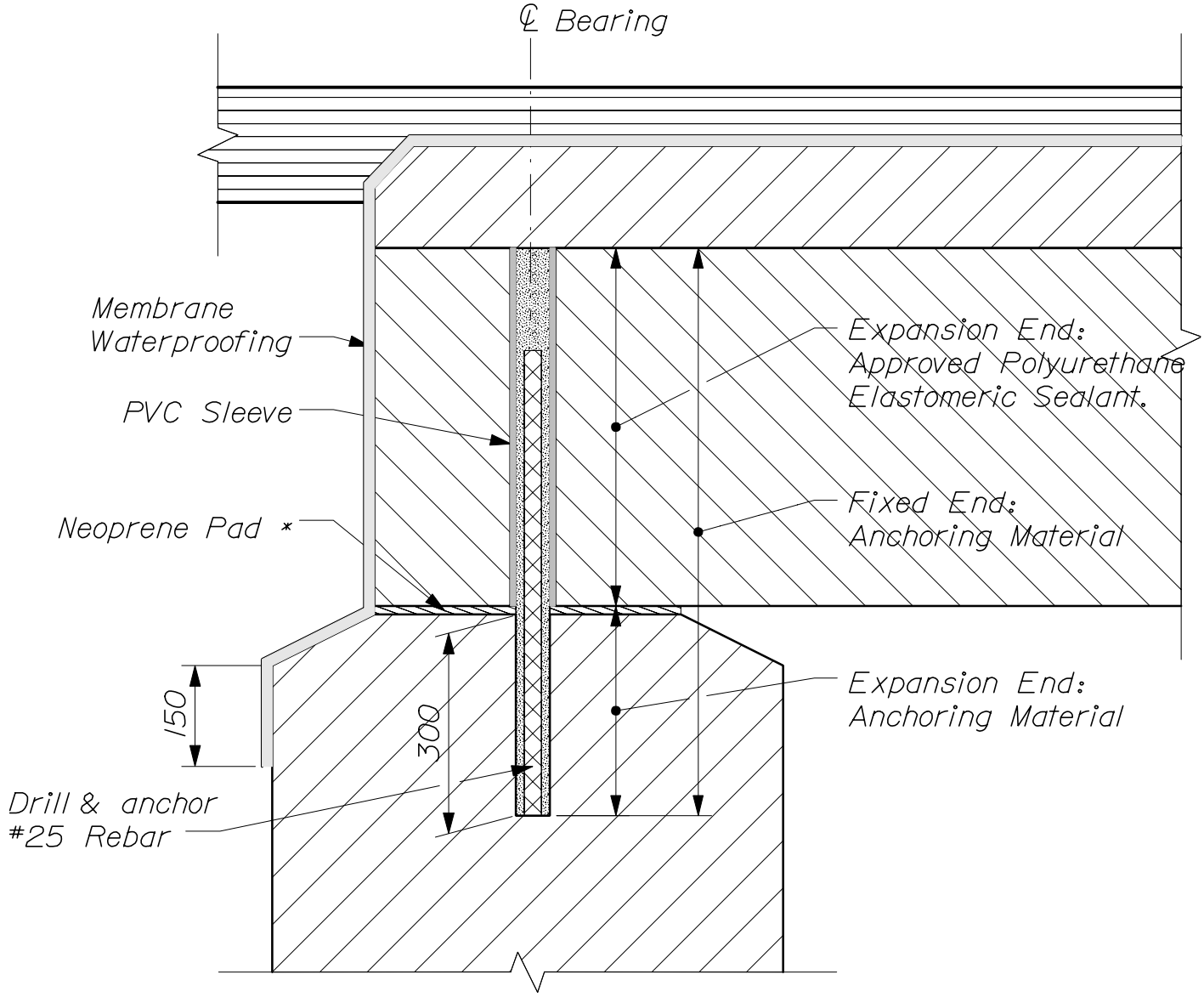
Maximum Deceleration = 6 - 7 G's

TEMPORARY IMPACT ATTENUATORS ARRAYS FOR SPEEDS OF 20 TO 65 MPH

Note -
Other arrangements are acceptable; arrangements other than those shown shall be approved by the Resident.

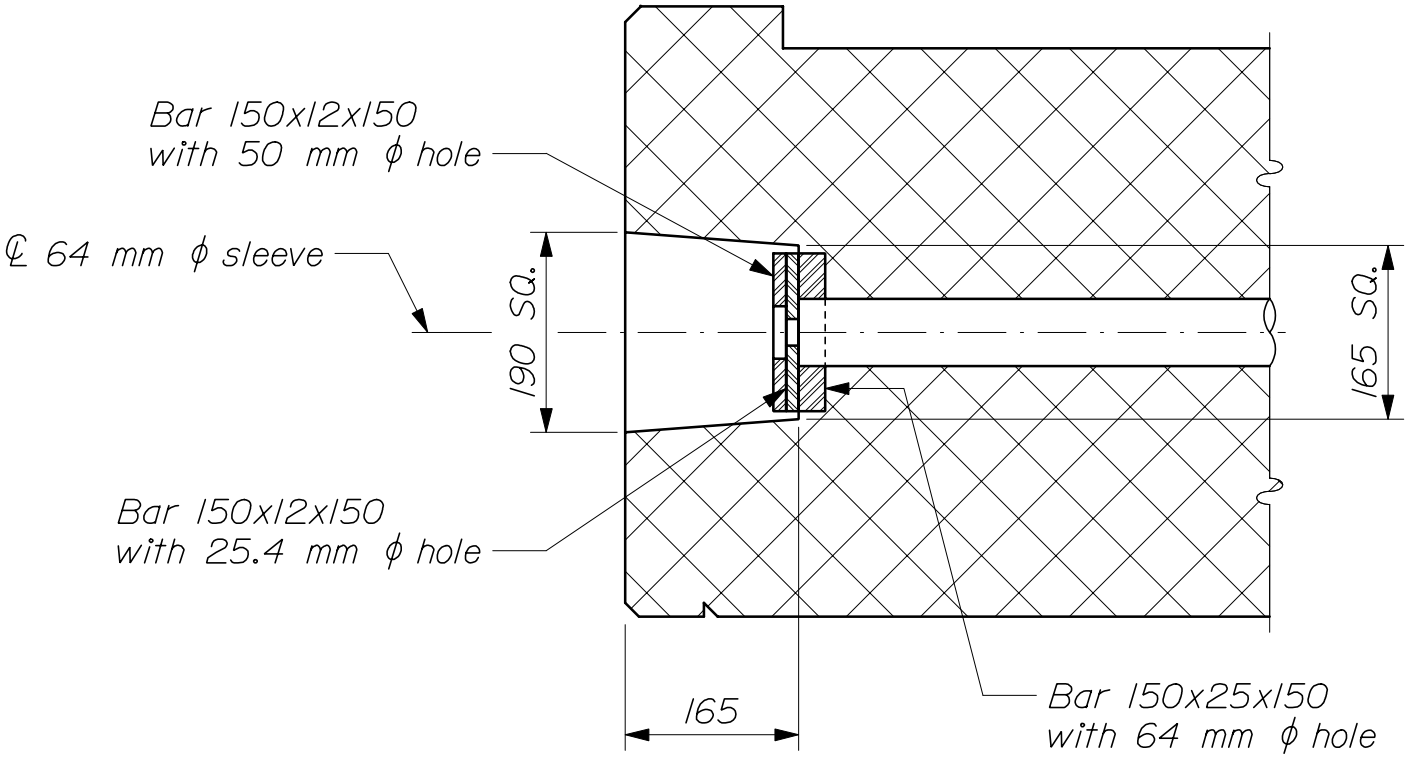
PORTABLE ENERGY ABSORPTION UNIT

527(01)

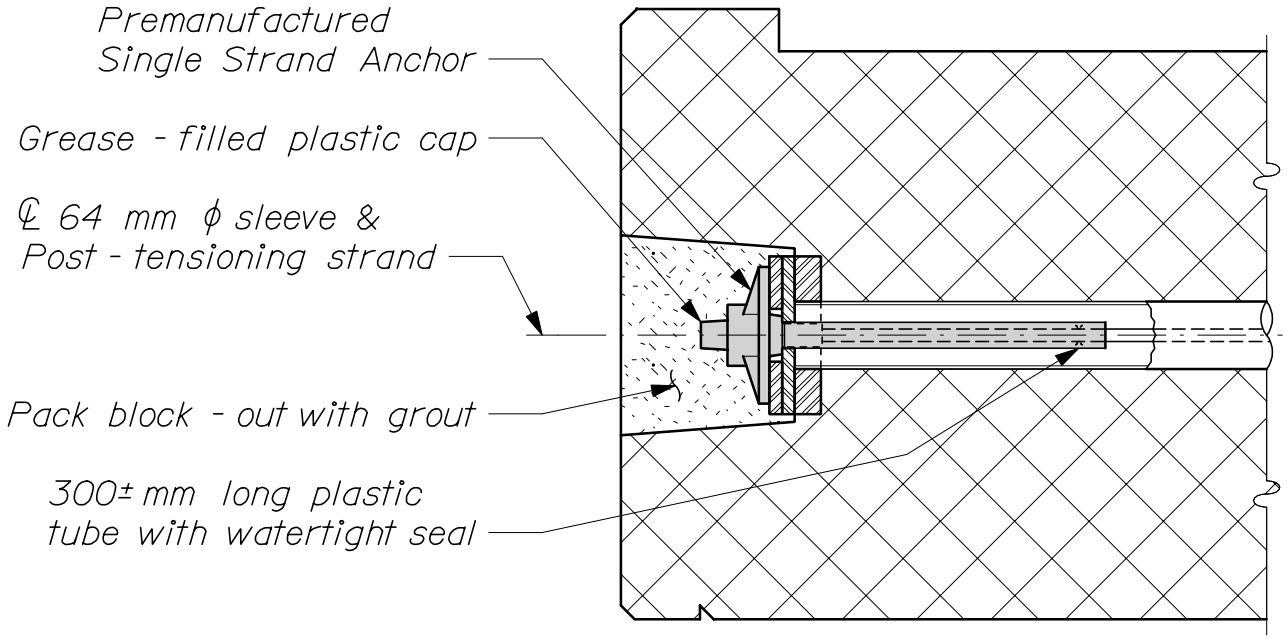


-- TYPICAL LONGITUDINAL SECTION --

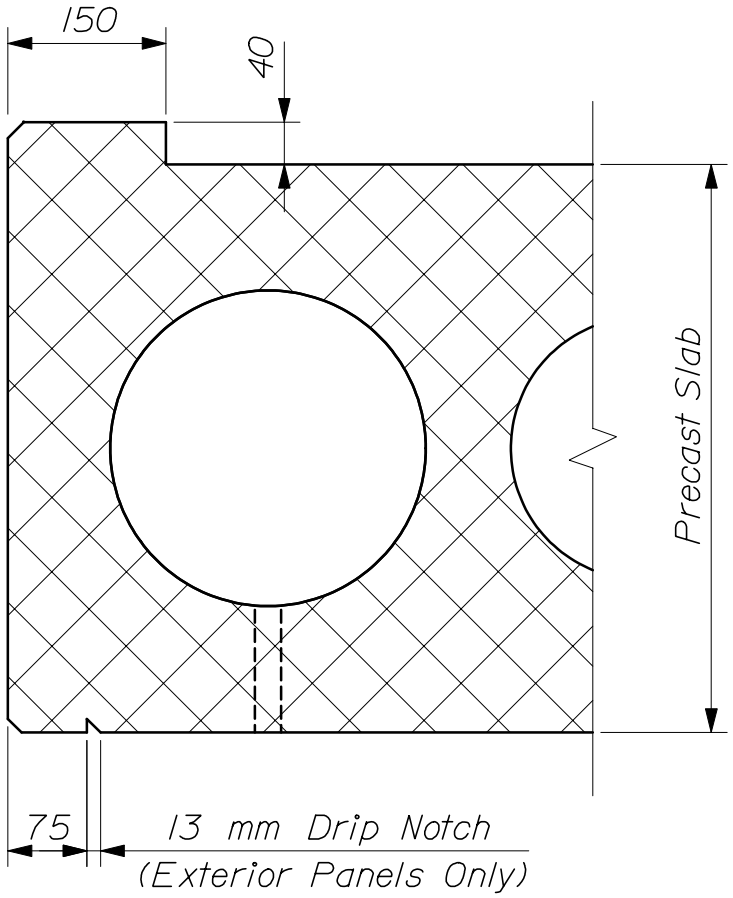
* NOTE:
The Neoprene Pad thickness shall be 13 mm for solid or voided slabs and 25 mm for box beams. The pad shall be one piece 450 mm wide centered about the ℄ Bearing unless otherwise shown on the plans. Ends of individual pads shall be within 75 mm and parallel to the edge of the precast unit. As an option, the pad may cover the entire length of the bridge seat.



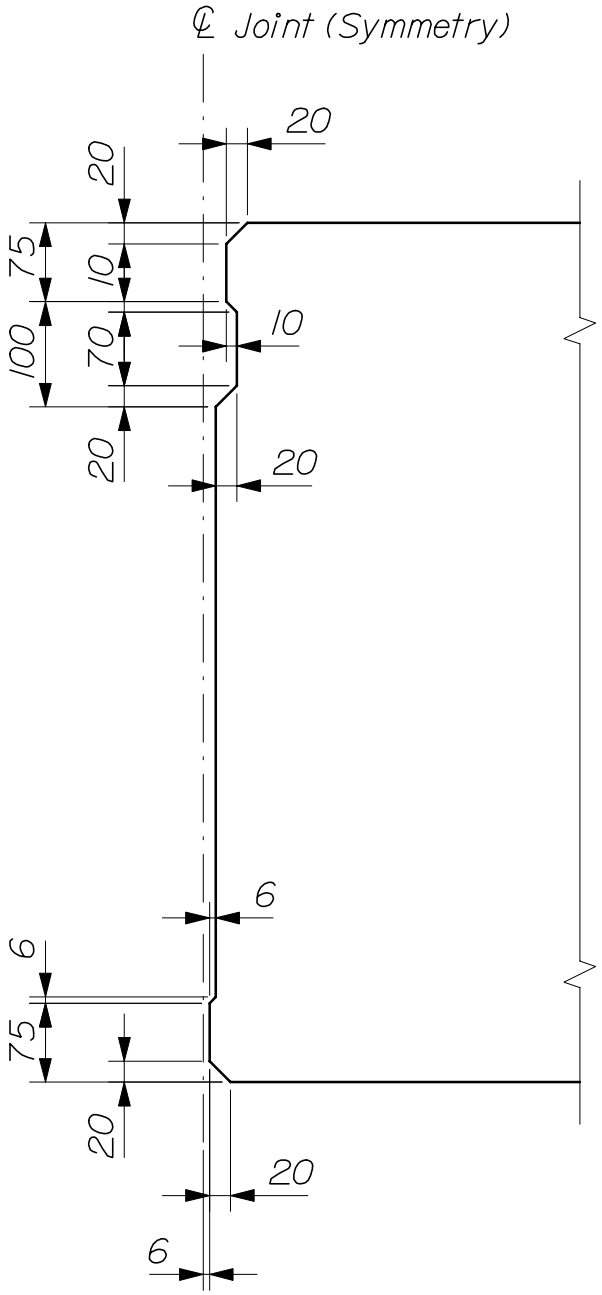
-- BLOCK - OUT & PLATE DETAIL --



-- POST - TENSIONING ANCHORAGE DETAIL --

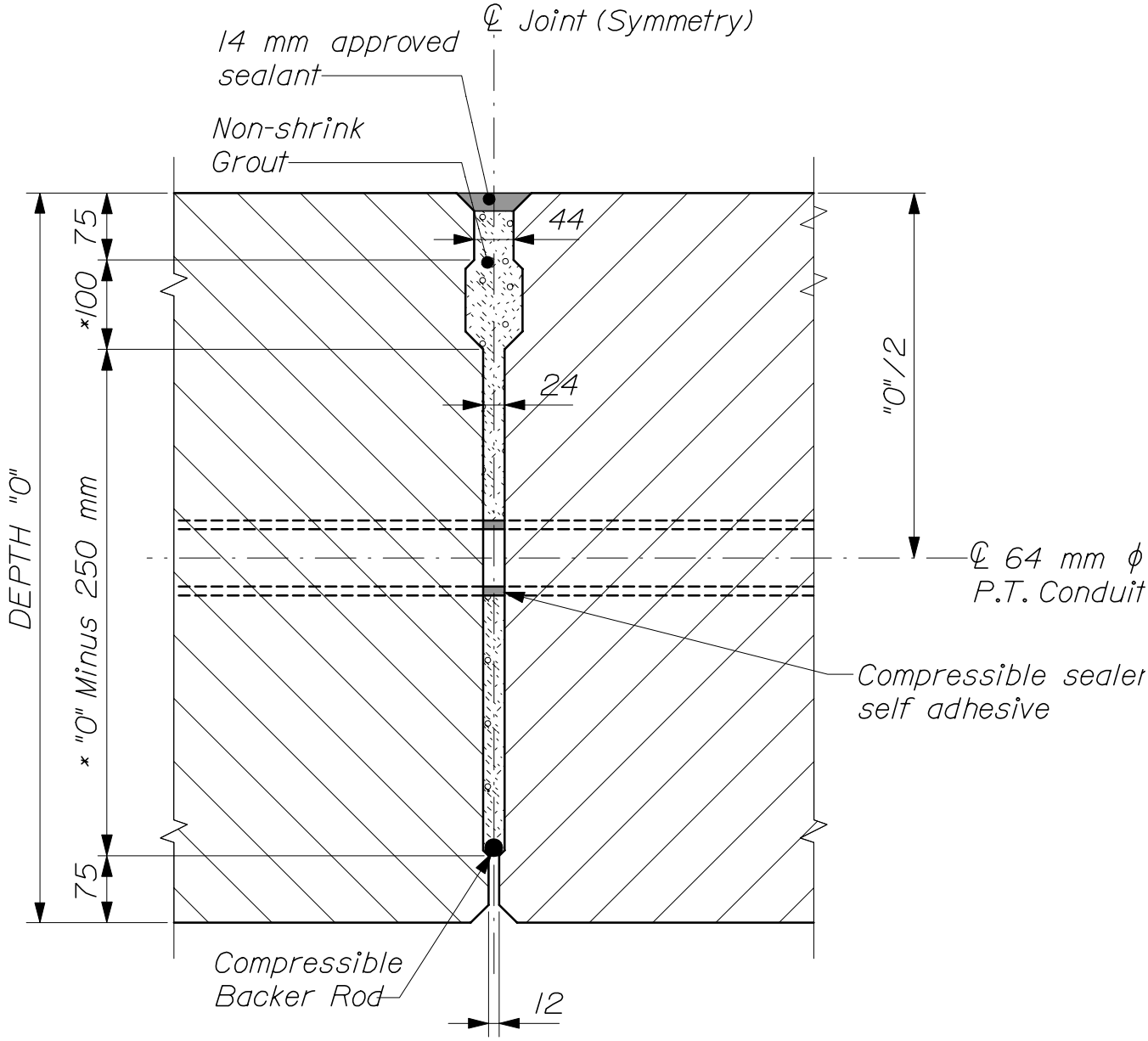


-- KEY & DRIP NOTCH DETAIL --



-- PRECAST SLAB SHEAR KEY DIMENSIONS --

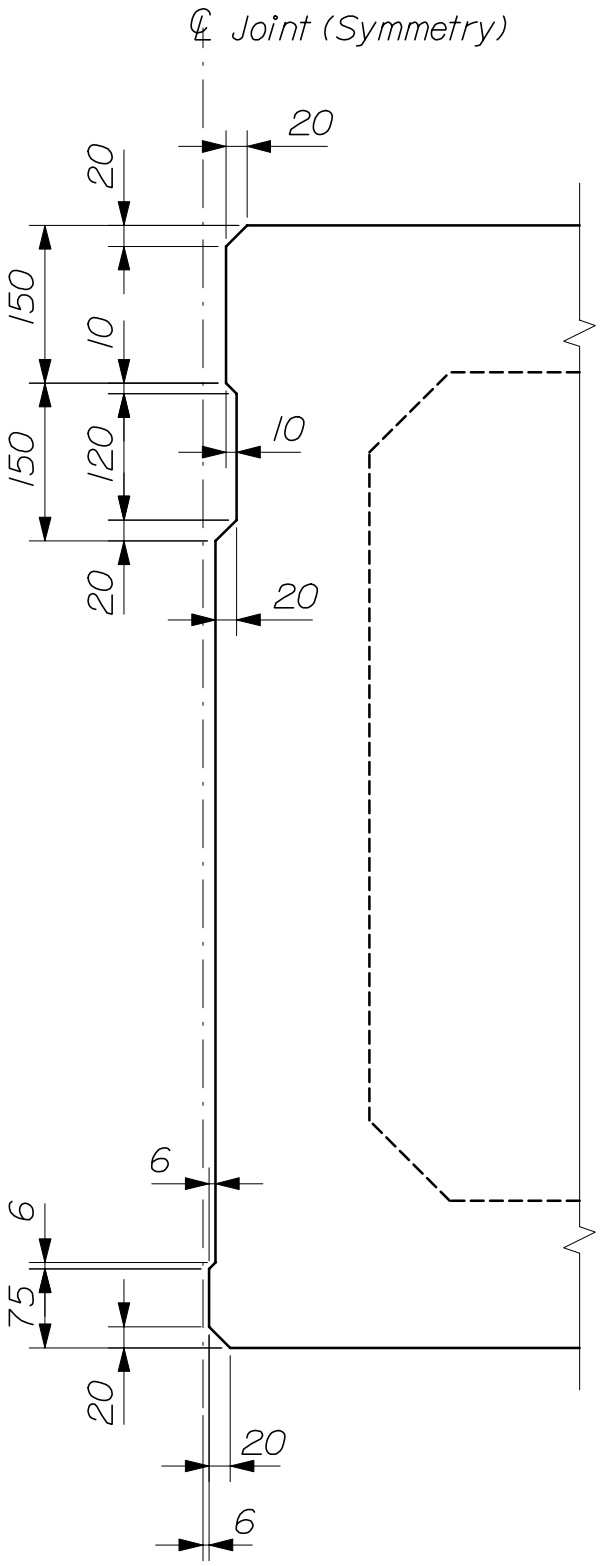
# PRECAST SLAB
535(04)



-- PRECAST SLAB SHEAR KEY DETAIL --

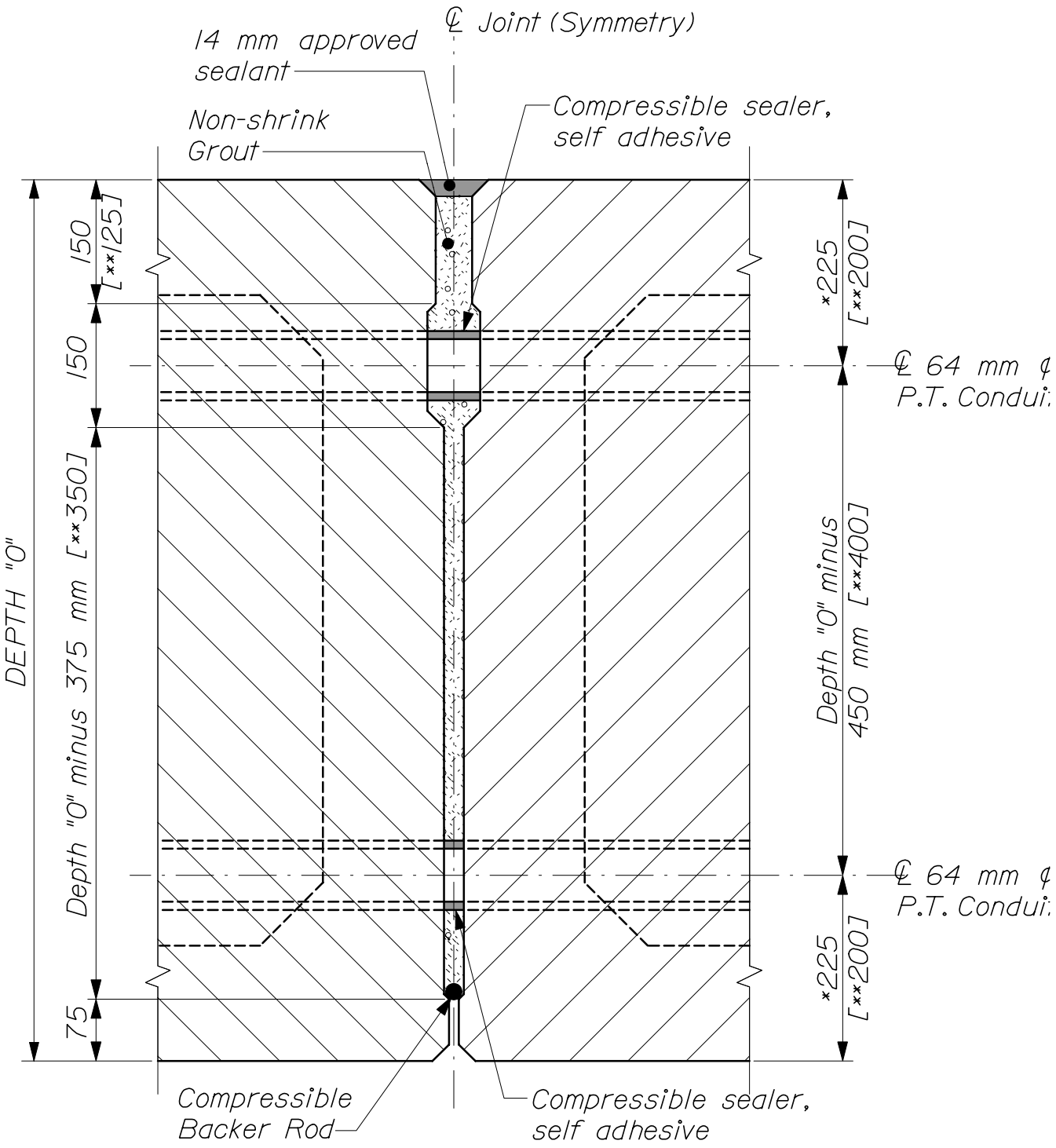
To provide parallel surfaces for the installation of the compressible sealer on precast slabs with a depth less than 450 mm the key dimensions (*) shall be adjusted by the fabricator. The surfaces shall extend a minimum 50 mm radius from the ℄ of the Post Tensioning (P.T.) Conduit.

# PRECAST SLAB
535(05)



-- SHEAR KEY DIMENSIONS --

# PRECAST BOX BEAM
535(06)



[*] Adjust to clear prestressing strands.
[**] Dimension for 600 mm depth box only.
P. T. = Post tensioning

-- SHEAR KEY DETAIL --

# PRECAST BOX BEAM
535(07)