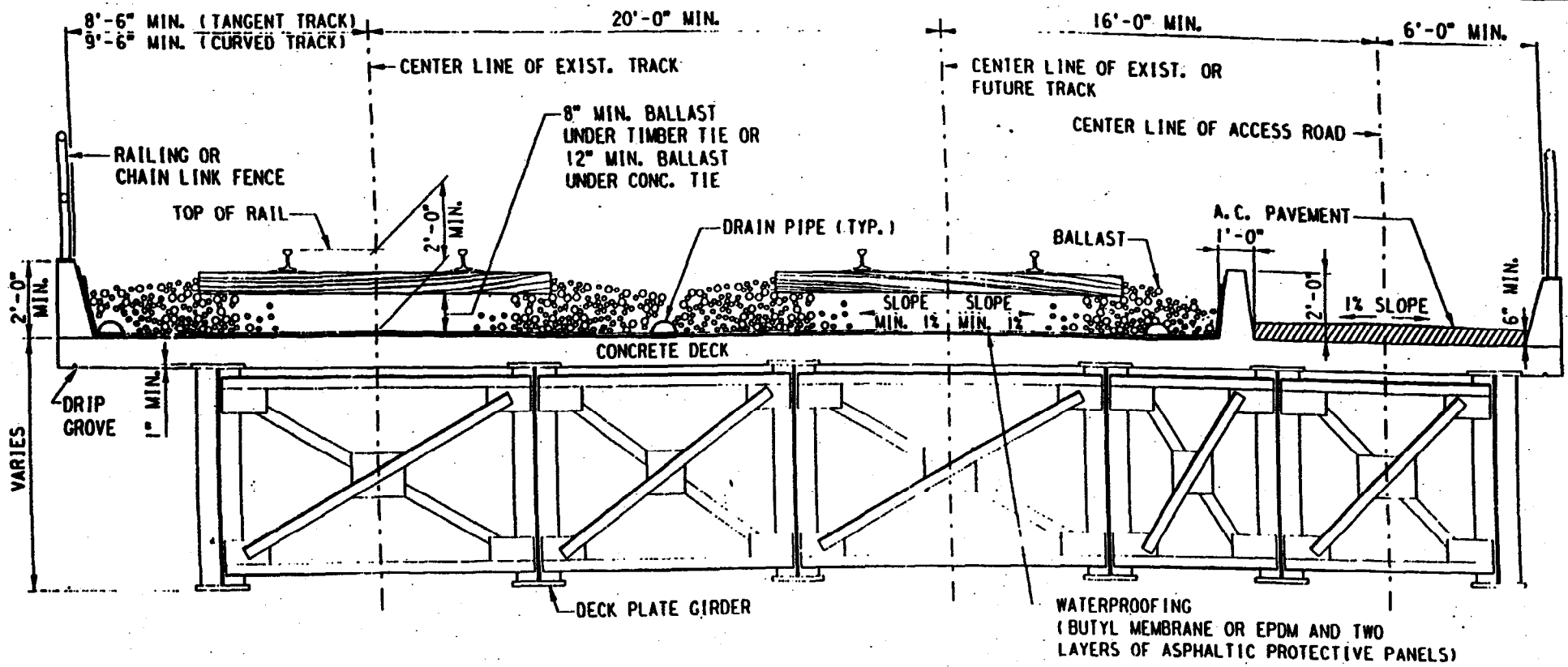


STEEL DECK PLATE GIRDERS WITH CONCRETE DECK

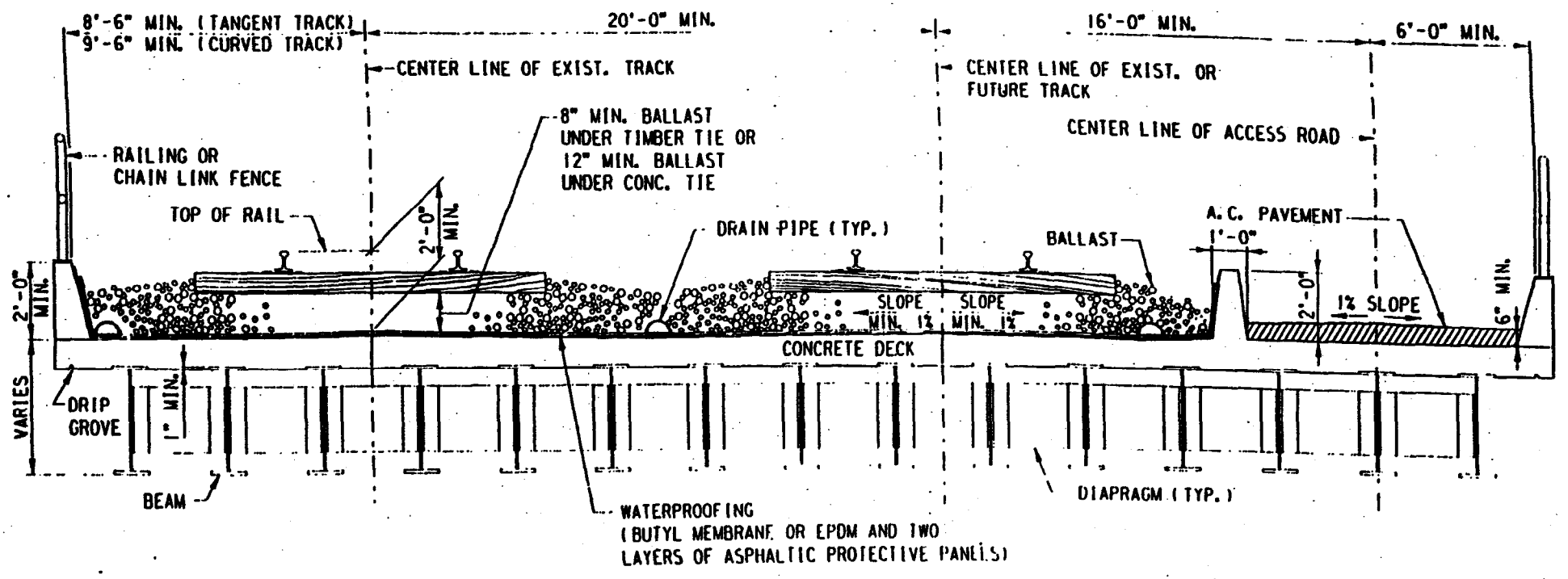
NO SCALE

UNION PACIFIC RAILROAD

STEEL DECK PLATE
GIRDER SPAN WITH CONCRETE DECK
OFFICE OF CHIEF ENGINEER DESIGN

DATE: 3-31-98

DRAWING UP1



STEEL BEAMS WITH CONCRETE DECK

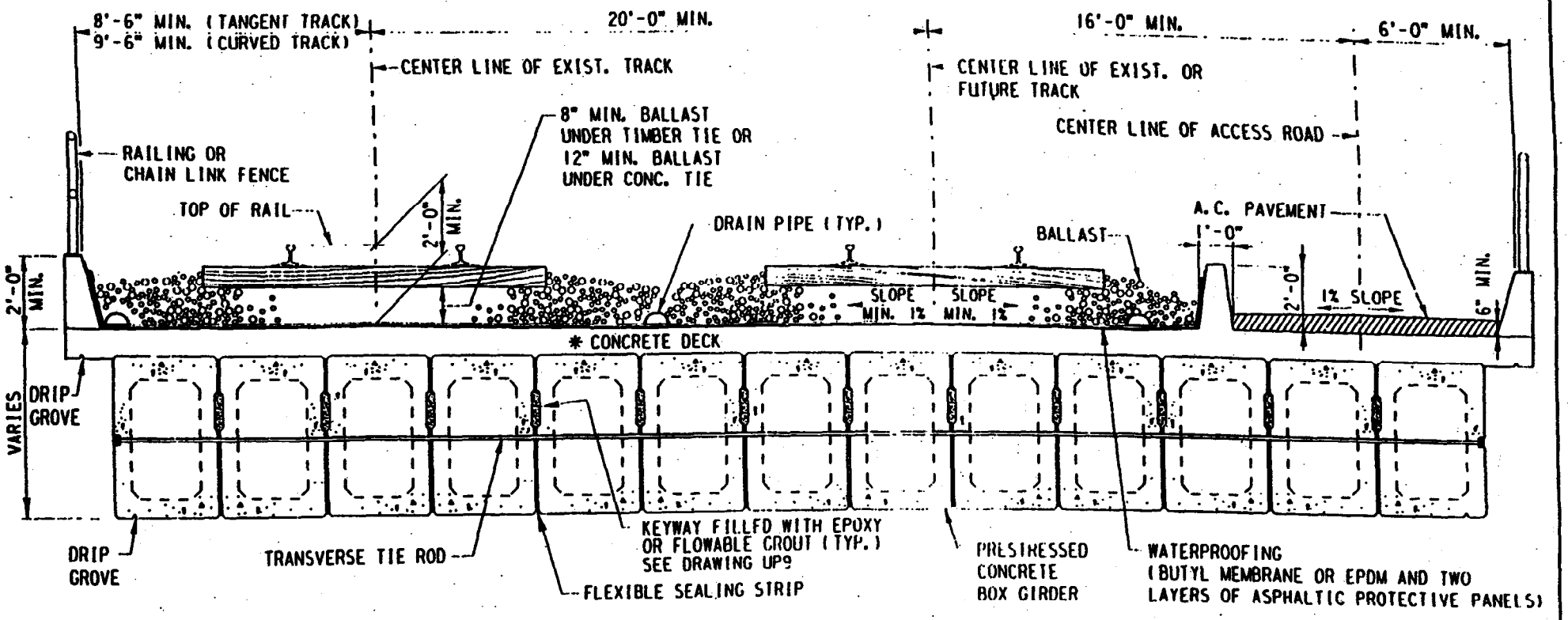
NO SCALE

UNION PACIFIC RAILROAD

STEEL BEAM
SPAN WITH CONCRETE DECK
OFFICE OF CHIEF ENGINEER DESIGN

DATE: 3-31-98

DRAWING UP2



PRECAST CONCRETE BOX GIRDERS WITH CAST IN PLACE CONCRETE DECK

NO SCALE

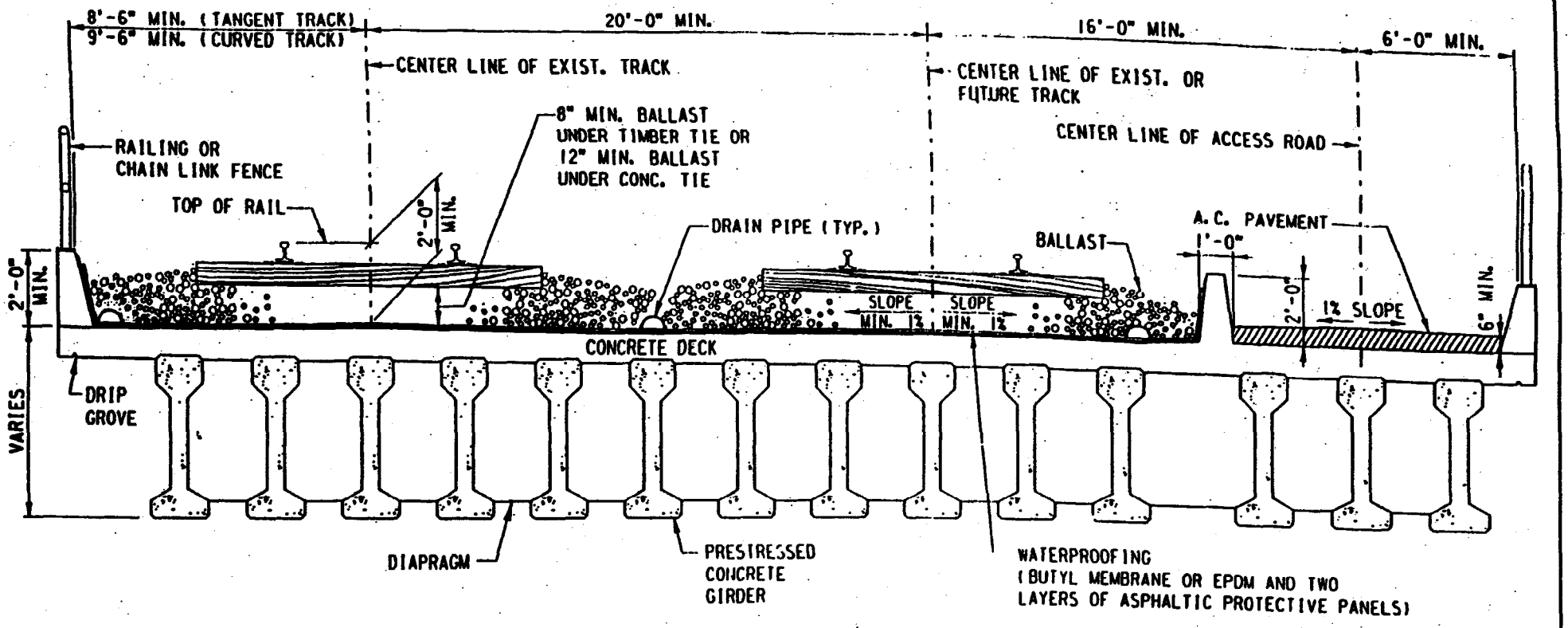
* CONCRETE DECK IS OPTIONAL

UNION PACIFIC RAILROAD

PRESTRESSED PRECAST CONCRETE BOX GIRDER SPAN WITH OR WITHOUT CONCRETE DECK
OFFICE OF CHIEF ENGINEER DESIGN

DATE: 3-31-98

DRAWING UP3



PRECAST CONCRETE BEAMS WITH CAST IN PLACE CONCRETE DECK

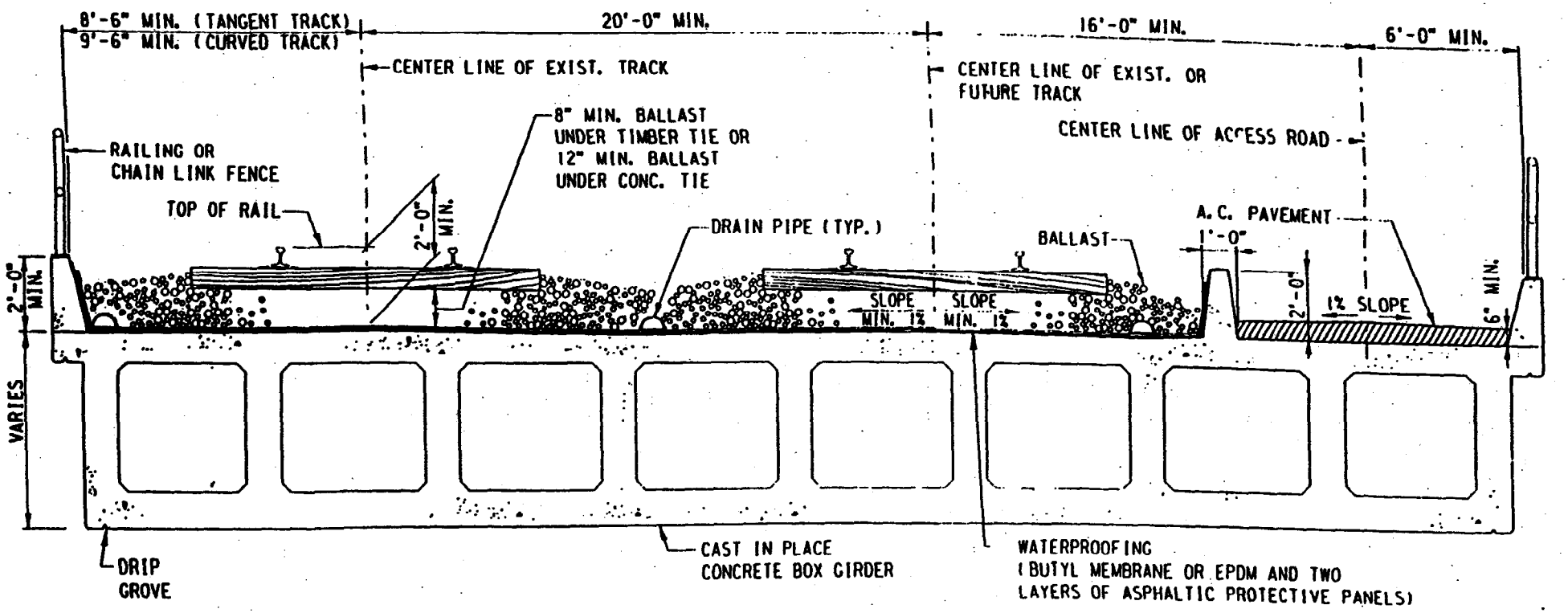
NO SCALE

UNION PACIFIC RAILROAD

PRESTRESSED PRECAST CONCRETE AASHTO TYPE BEAM SPAN WITH CONCRETE DECK
OFFICE OF CHIEF ENGINEER DESIGN

DATE: 3-31-98

DRAWING UP4



CONVENTIONAL REINFORCED CONCRETE BOX GIRDERS

NO SCALE

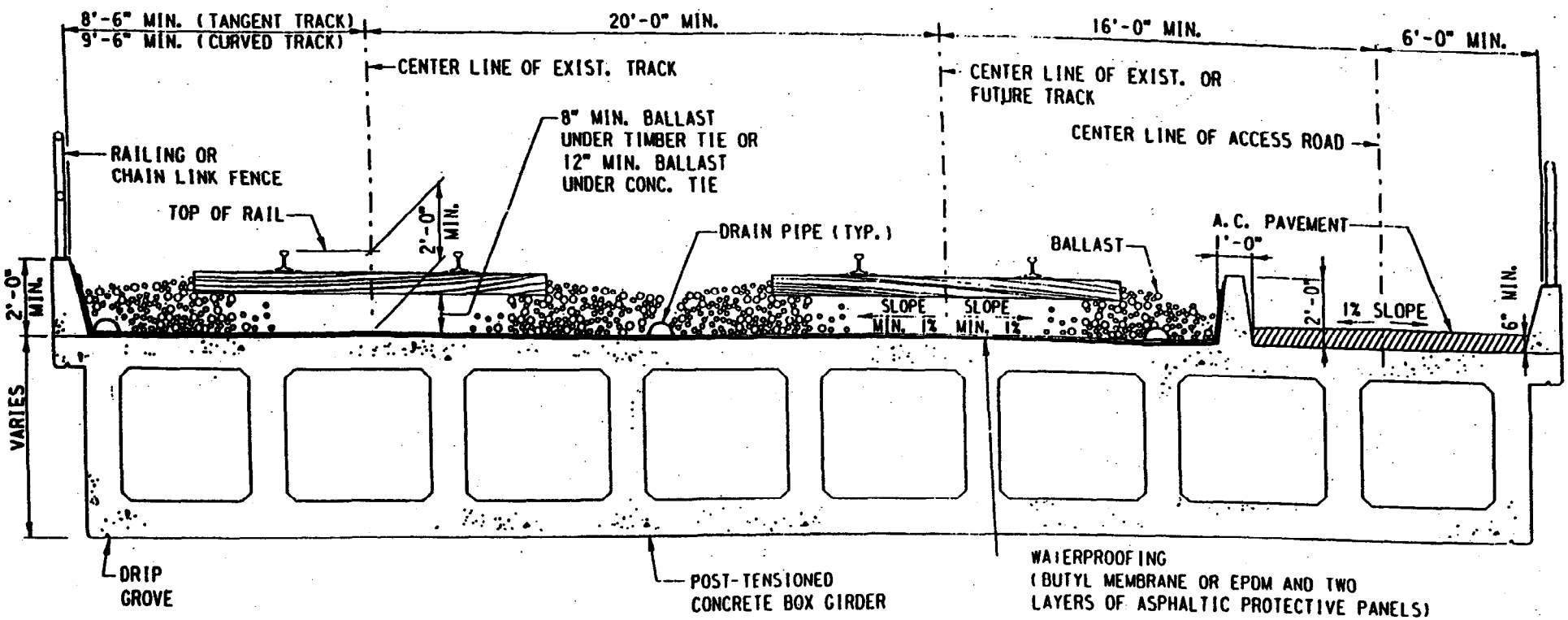
UNION PACIFIC RAILROAD

CAST-IN-PLACE CONCRETE BOX GIRDER SPAN CONVENTIONAL REINFORCED

OFFICE OF CHIEF ENGINEER DESIGN

DATE: 3-31-98

DRAWING UP5



POST-TENSIONED CONCRETE BOX GIRDERS

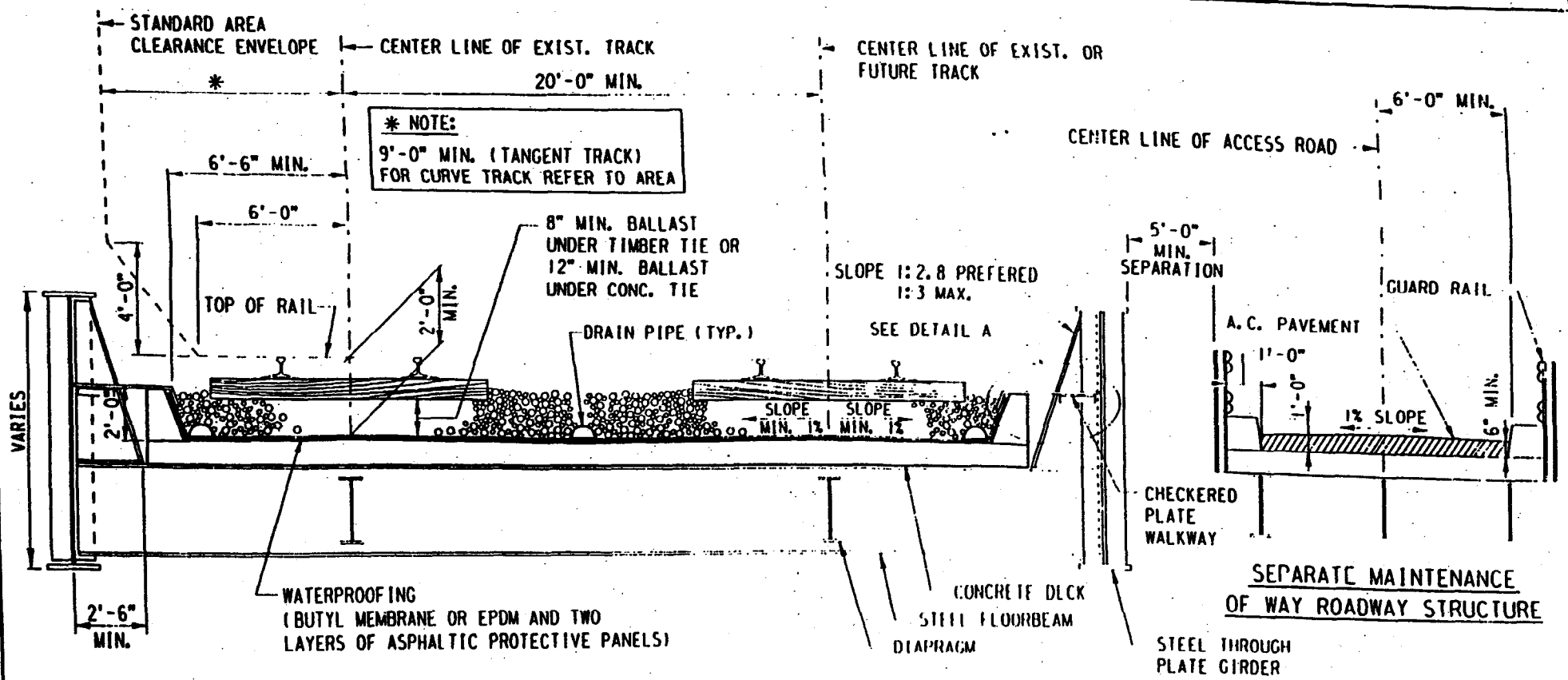
NO SCALE

UNION PACIFIC RAILROAD

CAST-IN-PLACE POST-TENSIONED CONCRETE BOX GIRDER SPAN
OFFICE OF CHIEF ENGINEER DESIGN

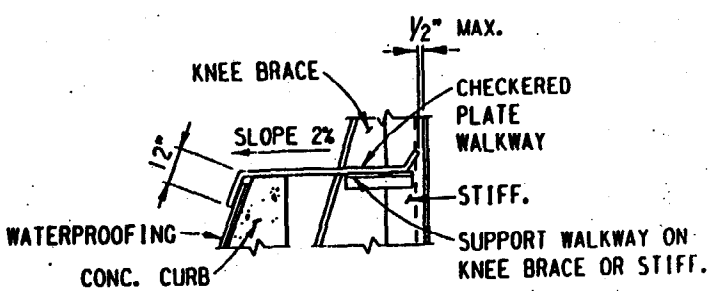
DATE: 3-31-98

DRAWING UP6



STEEL THROUGH PLATE GIRDERS WITH CONCRETE DECK

NO SCALE



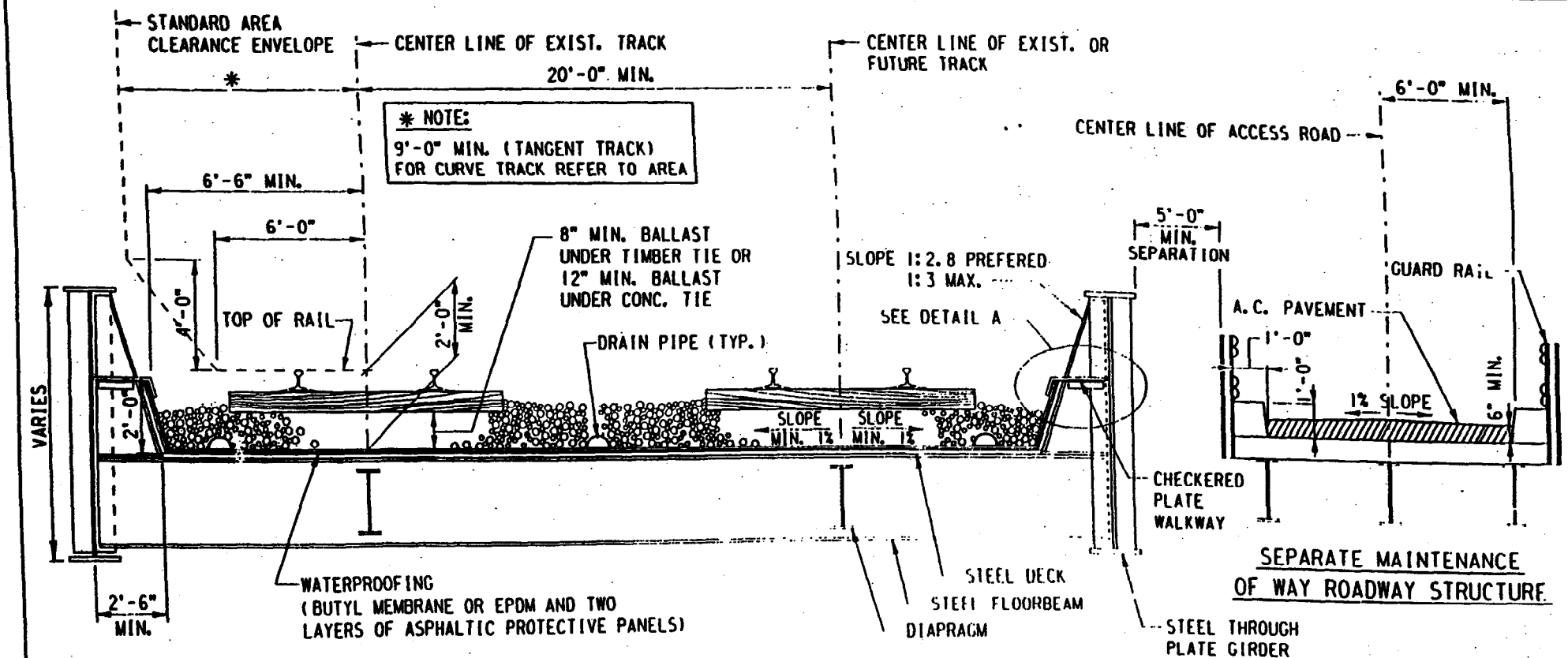
DETAIL A

UNION PACIFIC RAILROAD

STEEL THROUGH
PLATE GIRDER SPAN WITH CONC. DECK
OFFICE OF CHIEF ENGINEER DESIGN

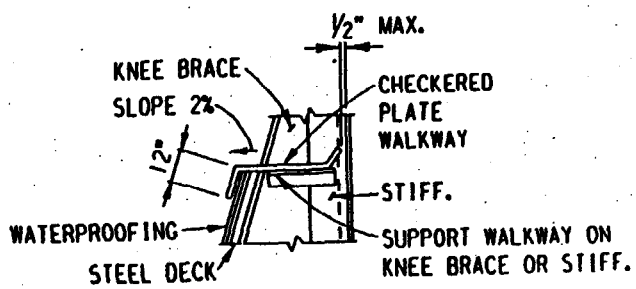
DATE: 3-31-98

DRAWING UP7



STEEL THROUGH PLATE GIRDERS WITH STEEL DECK

NO SCALE



DETAIL A

UNION PACIFIC RAILROAD

STEEL THROUGH
PLATE GIRDER SPAN WITH STEEL DECK
OFFICE OF CHIEF ENGINEER DESIGN

DATE: 3-31-98

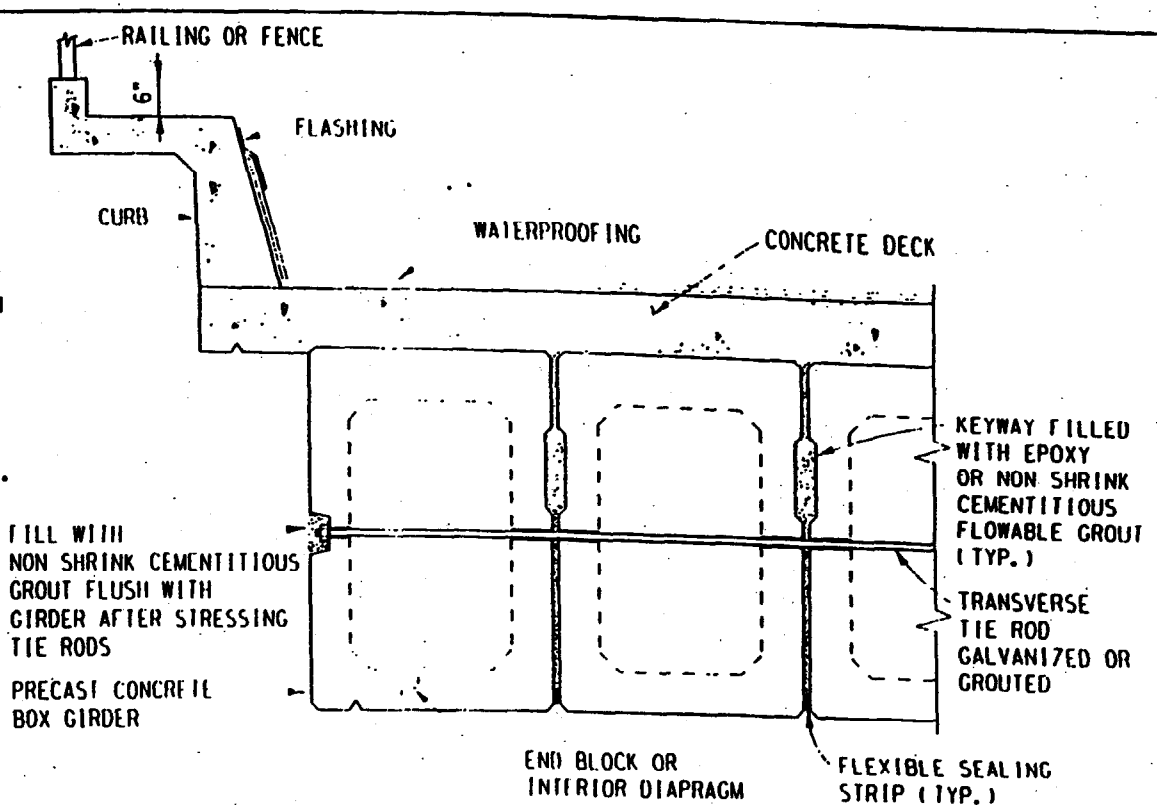
DRAWING UP8

PROCEDURE FOR GROUTING BETWEEN GIRDERS
(EPOXY GROUT)

1. BEFORE SETTING GIRDERS, THOROUGHLY WIRE BRUSH THE ENTIRE CONTACT SURFACES OF EACH GIRDER.
2. INSTALL 2 LAYERS OF 3"x4" FLEXIBLE SEALING STRIPS (POLY-URETHANE-ETHER TYPE DENSITY 1.5) AT THE BOTTOM OF THE GAP AND AROUND TIE ROD HOLES AND ENDS OF GIRDERS TO PREVENT GROUT LEAKAGE. THE MAXIMUM GAP BETWEEN GIRDERS SHOULD BE ¾".
3. INSTALL TIE RODS AND TENSION 50%.
4. PLACE 4" SAND ON TOP OF SEALING STRIPS TO PROTECT SEALING STRIPS FROM EPOXY HEAT.
5. FILL THE GAP WITH DRY CLEAN PEA GRAVEL (½" MAXIMUM SIZE). IN COLD WEATHER, HEAT THE PEA GRAVEL.
6. POUR EPOXY GROUT TO FILL ALL VOIDS IN GAP. THIS MAY TAKE 2 TO 3 SUCCESSIVE POURINGS.
7. TENSION TIE RODS 100%.

PROCEDURE FOR GROUTING BETWEEN GIRDERS
(NON SHRINK CEMENTITIOUS FLOWABLE GROUT)

1. BEFORE SETTING GIRDERS, THOROUGHLY WIRE BRUSH THE ENTIRE CONTACT SURFACES OF EACH GIRDER.
2. INSTALL 2 LAYERS OF 3"x4" FLEXIBLE SEALING STRIPS (POLY-URETHANE-ETHER TYPE DENSITY 1.5) AT THE BOTTOM OF THE GAP AND AROUND TIE ROD HOLES AND ENDS OF GIRDERS TO PREVENT GROUT LEAKAGE. THE MAXIMUM GAP BETWEEN GIRDERS SHOULD BE ¾".
3. INSTALL TIE RODS AND TENSION 50%.
4. PLACE FLOWABLE NON SHRINK CEMENTITIOUS GROUT BETWEEN GIRDERS. (GROUT TO BE MIXED TO A POURABLE CONSISTENCY. THE MATERIAL SHALL BE MIXED TO A COMBINATION BETWEEN FLOWABLE AND FLUID SO AS NOT TO FORM AIR POCKETS BETWEEN GIRDERS WHILE BEING POURED).
5. AFTER GROUT HAS REACHED A COMPRESSIVE STRENGTH OF 3000 P.S.I., TENSION TIE RODS 100%.



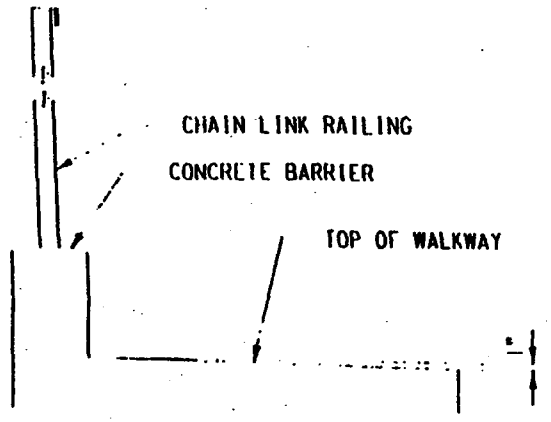
MULTIPLE PRESTRESSED CONCRETE GIRDER BONDING DETAIL
NO SCALE

UNION PACIFIC RAILROAD

BONDING DETAILS FOR MULTIPLE PRESTRESSED PRECAST CONCRETE GIRDERS
OFFICE OF CHIEF ENGINEER DESIGN

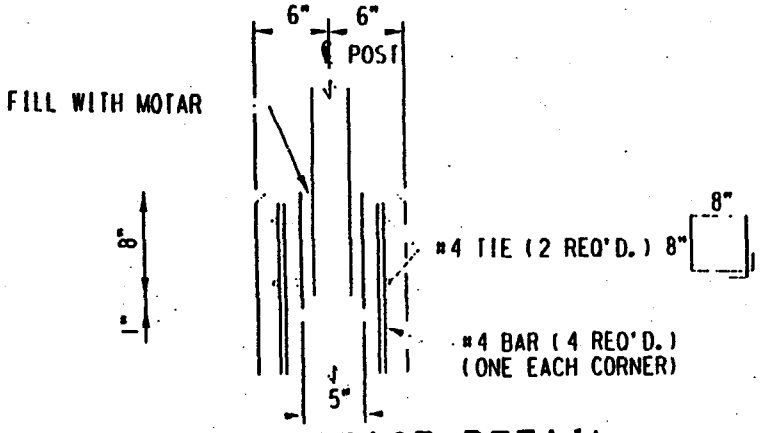
DATE: 3-31-98

DRAWING UP9



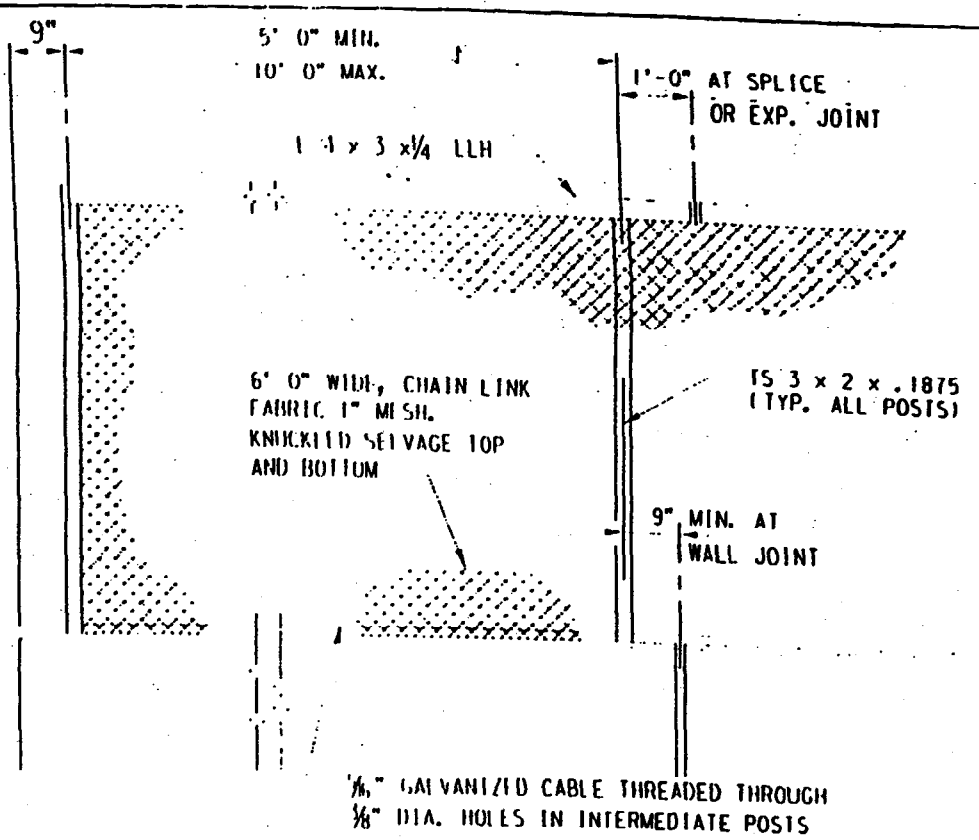
TYPICAL SECTION

NO SCALE



POST ANCHORAGE DETAIL

NO SCALE



RAILING ELEVATION

NO SCALE

NOTES:

1. RAILING ASSEMBLY EXCEPT CHAIN LINK FABRIC TO BE GALVANIZED AFTER FABRICATION.
2. POSTS SHALL BE VERTICAL.
3. PROVIDE HARDWARE AND DETAILS FOR ATTACHMENTS TO CABLE, POSTS, AND TOP RAILING.
4. PROVIDE SPLICE AND EXPANSION JOINT DETAILS.

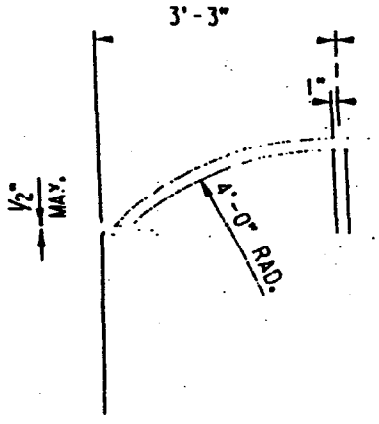
UNION PACIFIC RAILROAD

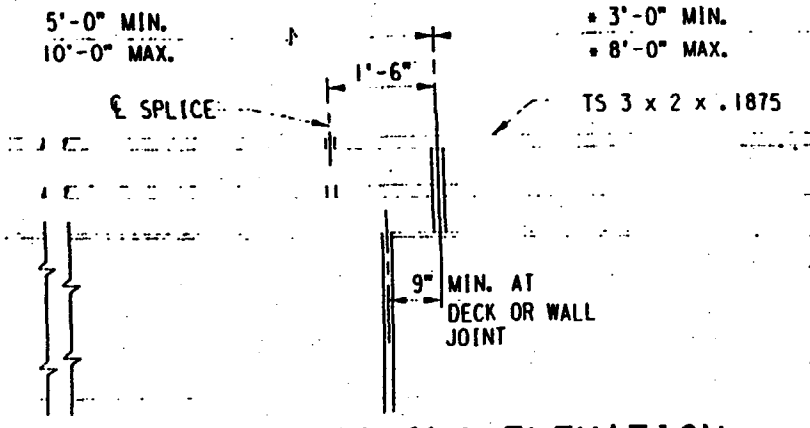
CHAIN LINK RAILING DETAILS

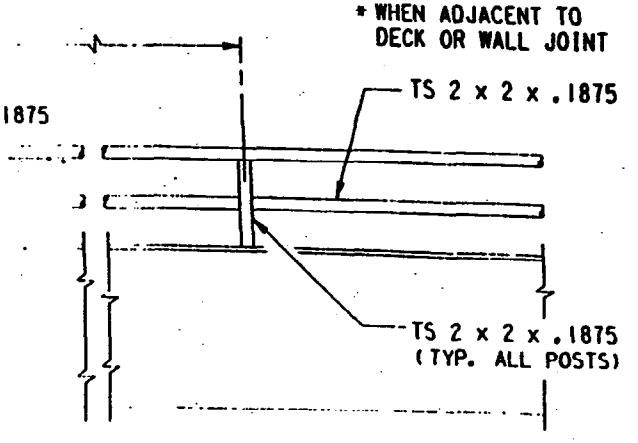
OFFICE OF CHIEF ENGINEER DESIGN

DATE: 3-31-98

DRAWING UP10

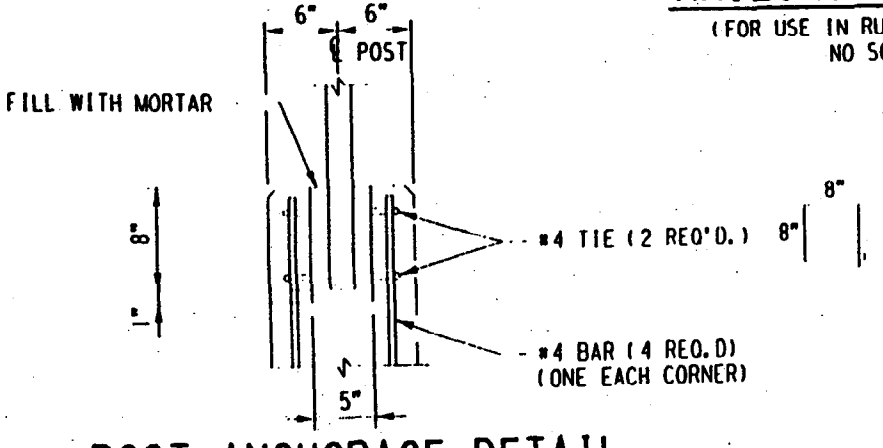






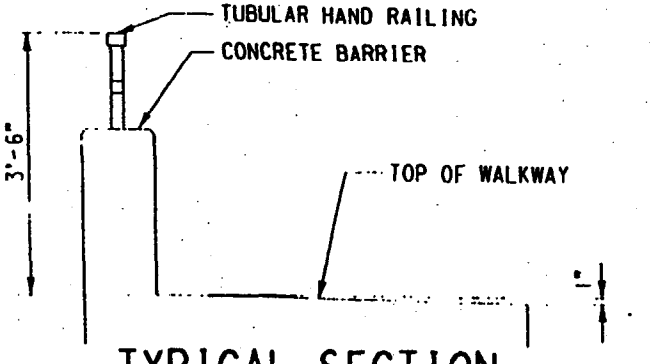
RAILING ELEVATION

(FOR USE IN RURAL LOCATIONS)
NO SCALE



POST ANCHORAGE DETAIL

NO SCALE



TYPICAL SECTION

NO SCALE

NOTES:

1. GALVANIZE RAIL ASSEMBLY AFTER FABRICATION.
2. POSTS SHALL BE VERTICAL.
3. PROVIDE RAILING CONNECTION DETAILS.
4. PROVIDE SPLICE AND EXPANSION JOINT DETAILS.

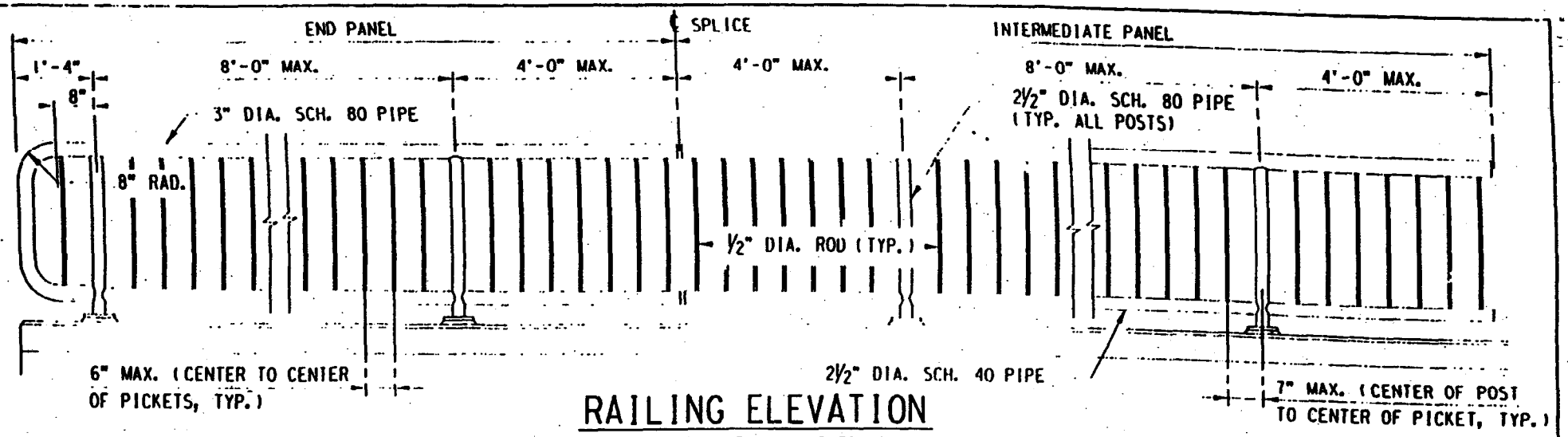
UNION PACIFIC RAILROAD

TUBULAR HAND RAILING DETAILS

OFFICE OF CHIEF ENGINEER DESIGN

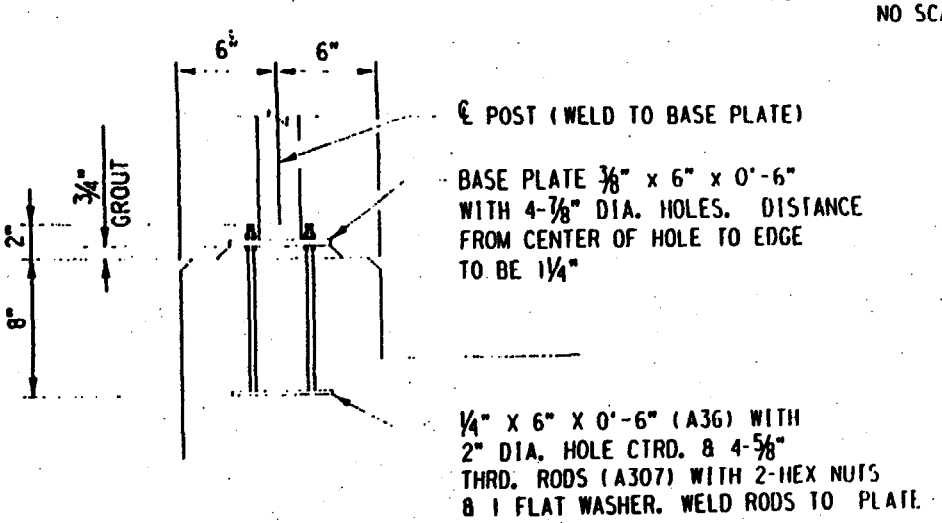
DATE: 3-31-98

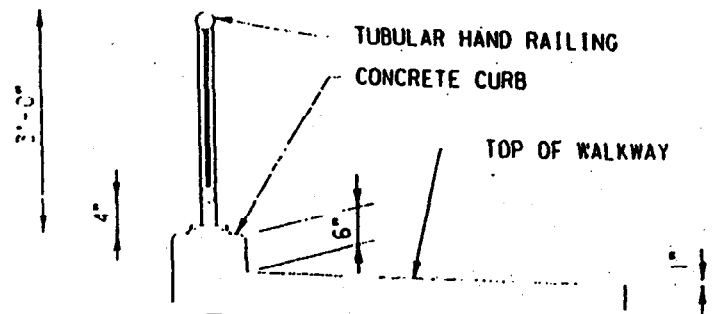
DRAWING UP11



RAILING ELEVATION

(FOR USE IN RURAL LOCATIONS)
NO SCALE





TYPICAL SECTION

NO SCALE

1. GALVANIZE RAIL ASSEMBLY AFTER FABRICATION.
2. POSTS SHALL BE VERTICAL.
3. PROVIDE RAILING CONNECTION DETAILS.
4. PROVIDE SPLICE AND EXPANSION JOINT DETAILS.

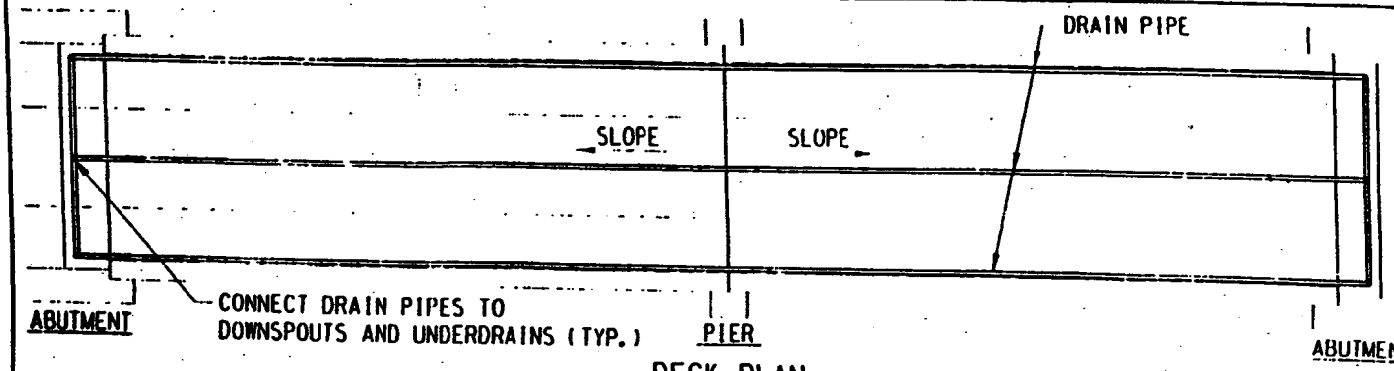
UNION PACIFIC RAILROAD

PICKET HAND RAILING DETAILS

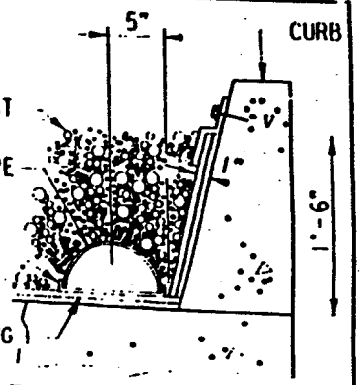
OFFICE OF CHIEF ENGINEER DESIGN

DATE: 3-31-98

DRAWING UP12

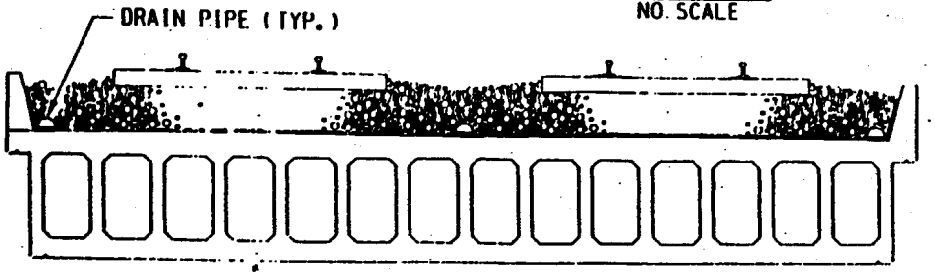


DECK PLAN
NO SCALE

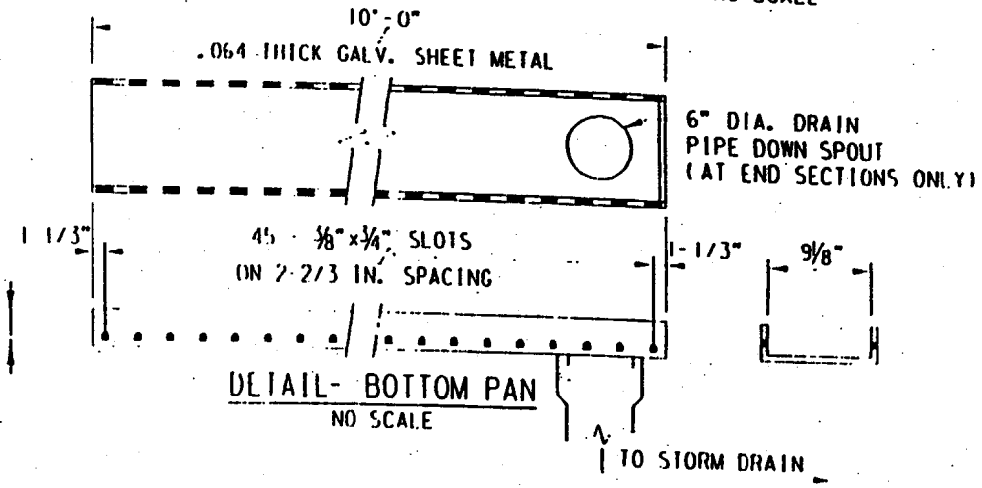


LOCATION OF DRAIN PIPE
NO SCALE

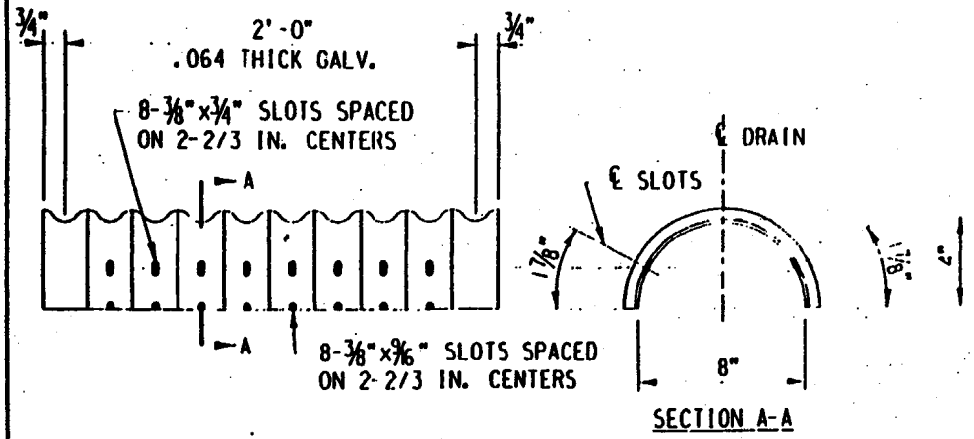
NOTE: LAP DRAIN PIPE ONE CORRUGATION AT EACH END.



TYPICAL DECK SECTION
NO SCALE



DETAIL- BOTTOM PAN
NO SCALE



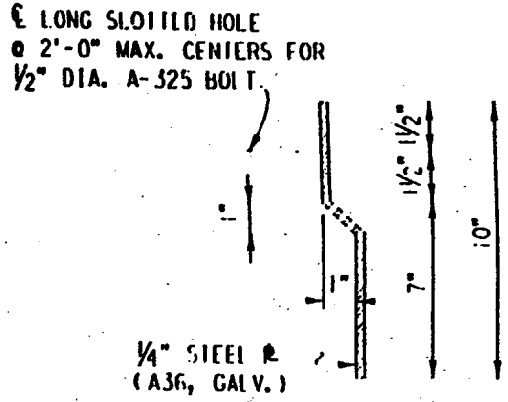
DETAIL- DRAIN PIPE
NO SCALE

UNION PACIFIC RAILROAD

DECK DRAIN DETAILS
OFFICE OF CHIEF ENGINEER DESIGN

DATE: 3-31-98

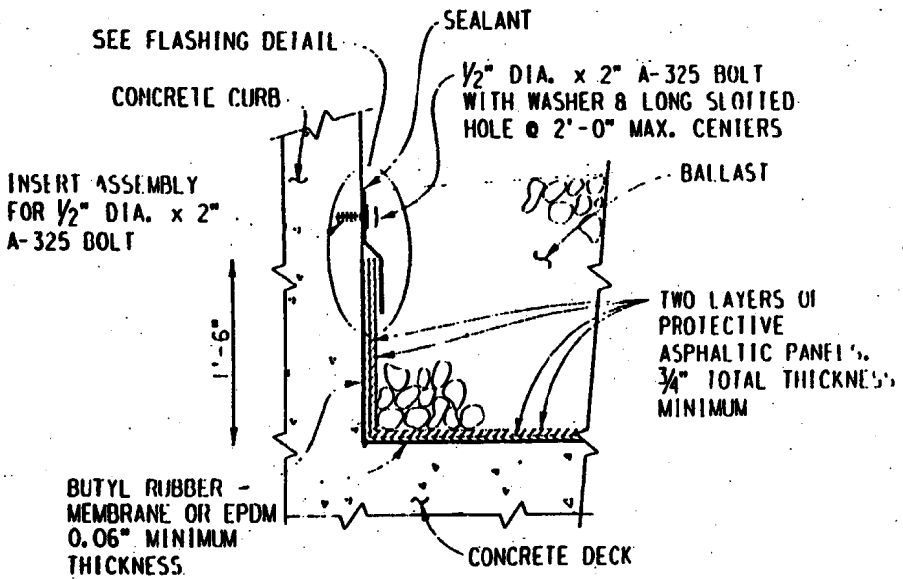
DRAWING UP13



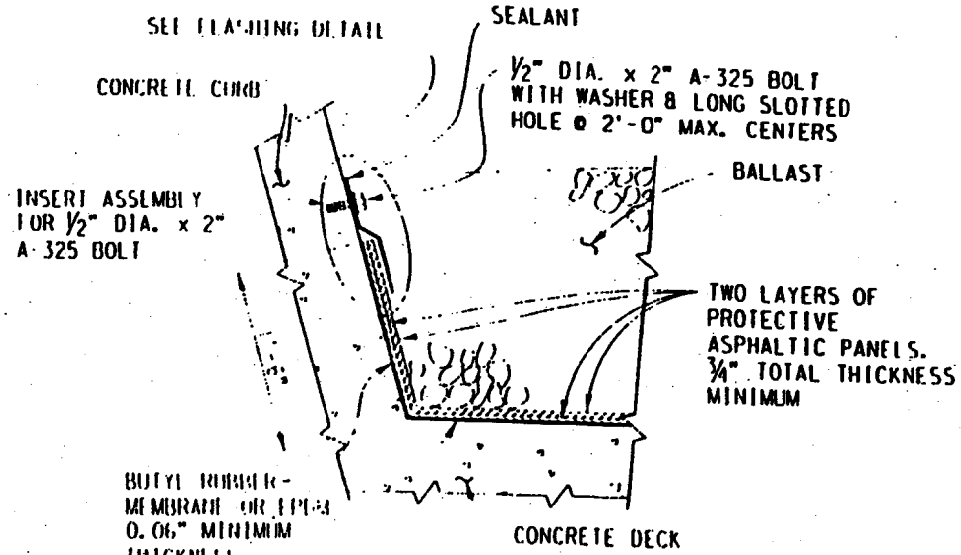
FLASHING DETAIL

NOTES:

1. ALL STRUCTURAL STEEL PLATES, BOLTS AND WASHERS SHALL BE GALVANIZED.
2. DISCONTINUE FLASHING OVER PIERS AND ABUTMENTS.



ALTERNATIVE 1



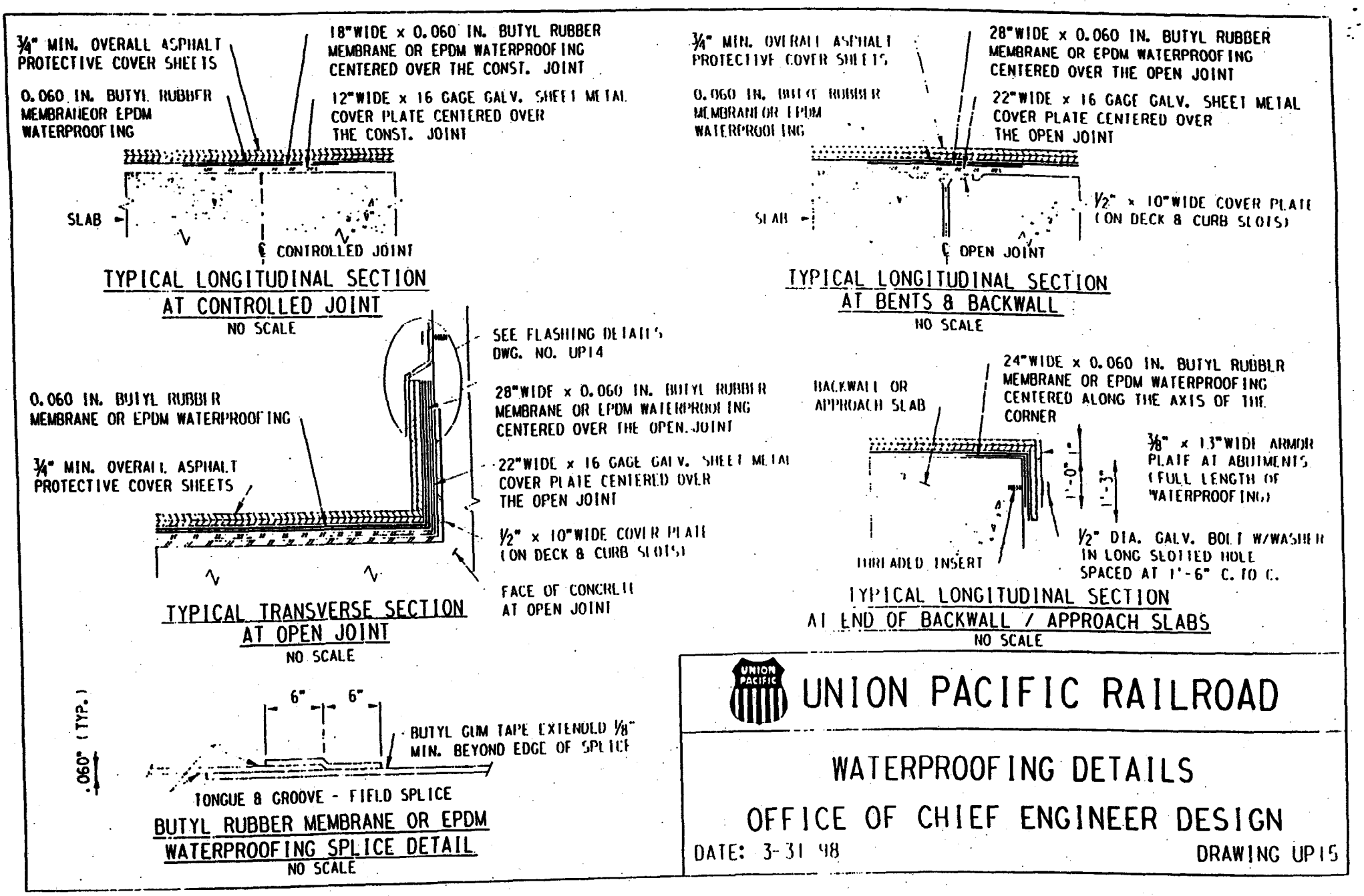
ALTERNATIVE 2

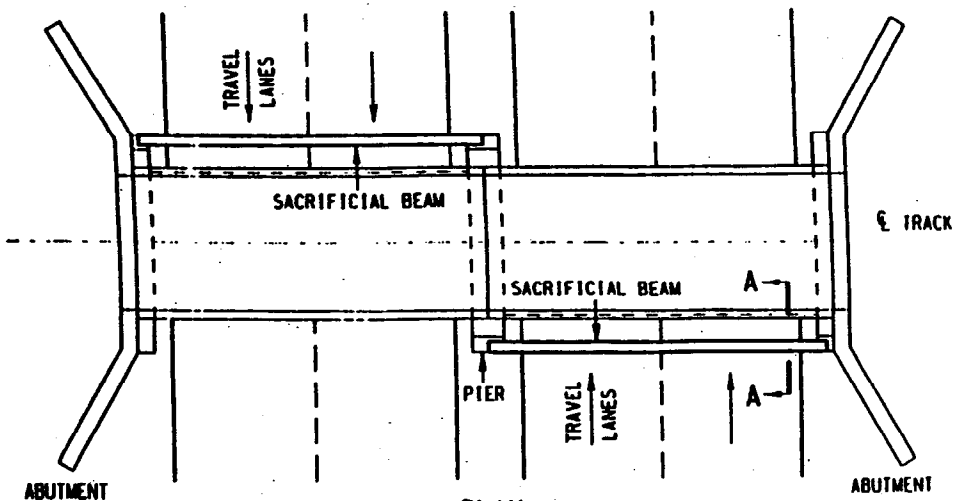
UNION PACIFIC RAILROAD

FLASHING DETAILS FOR
WATERPROOFING
OFFICE OF CHIEF ENGINEER DESIGN

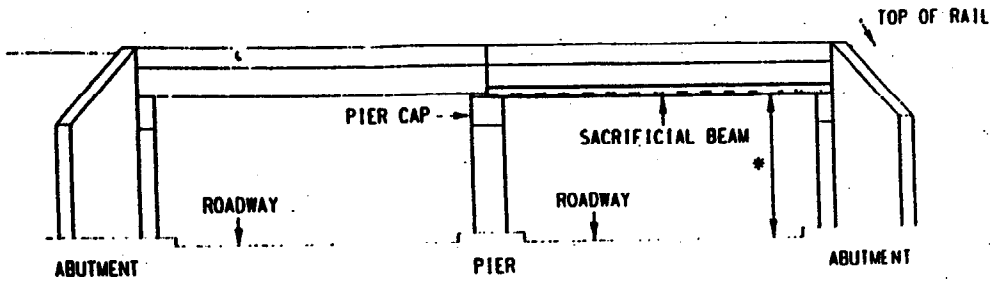
DATE: 3-31 '98

DRAWING UP14


¾" MIN. OVERALL ASPHALT PROTECTIVE COVER SHEETS
0.060 IN. BUTYL RUBBER MEMBRANE OR EPDM WATERPROOFING
18" WIDE x 0.060 IN. BUTYL RUBBER MEMBRANE OR EPDM WATERPROOFING CENTERED OVER THE CONST. JOINT
12" WIDE x 16 GAGE GALV. SHEET METAL COVER PLATE CENTERED OVER THE CONST. JOINT
SLAB
℄ CONTROLLED JOINT
TYPICAL LONGITUDINAL SECTION AT CONTROLLED JOINT
NO SCALE
¾" MIN. OVERALL ASPHALT PROTECTIVE COVER SHEETS
0.060 IN. BUTYL RUBBER MEMBRANE OR EPDM WATERPROOFING
28" WIDE x 0.060 IN. BUTYL RUBBER MEMBRANE OR EPDM WATERPROOFING CENTERED OVER THE OPEN JOINT
22" WIDE x 16 GAGE GALV. SHEET METAL COVER PLATE CENTERED OVER THE OPEN JOINT
½" x 10" WIDE COVER PLATE (ON DECK & CURB SLOTS)
SLAB
℄ OPEN JOINT
TYPICAL LONGITUDINAL SECTION AT BENTS & BACKWALL
NO SCALE
SEE FLASHING DETAILS DWG. NO. UP14
0.060 IN. BUTYL RUBBER MEMBRANE OR EPDM WATERPROOFING
28" WIDE x 0.060 IN. BUTYL RUBBER MEMBRANE OR EPDM WATERPROOFING CENTERED OVER THE OPEN JOINT
¾" MIN. OVERALL ASPHALT PROTECTIVE COVER SHEETS
22" WIDE x 16 GAGE GALV. SHEET METAL COVER PLATE CENTERED OVER THE OPEN JOINT
½" x 10" WIDE COVER PLATE (ON DECK & CURB SLOTS)
FACE OF CONCRETE AT OPEN JOINT
TYPICAL TRANSVERSE SECTION AT OPEN JOINT
NO SCALE
24" WIDE x 0.060 IN. BUTYL RUBBER MEMBRANE OR EPDM WATERPROOFING CENTERED ALONG THE AXIS OF THE CORNER
BACKWALL OR APPROACH SLAB
⅜" x 13" WIDE ARMOR PLATE AT ABUTMENTS (FULL LENGTH OF WATERPROOFING)
1'-0"
1'-3"
½" DIA. GALV. BOLT W/WASHER IN LONG SLOTTED HOLE SPACED AT 1'-6" C. TO C.
THREADED INSERT
TYPICAL LONGITUDINAL SECTION AT END OF BACKWALL / APPROACH SLABS
NO SCALE
6"
6"
.060" (TYP.)
BUTYL GUM TAPE EXTENDED ⅛" MIN. BEYOND EDGE OF SPLICE
TONGUE & GROOVE - FIELD SPLICE
BUTYL RUBBER MEMBRANE OR EPDM WATERPROOFING SPLICE DETAIL
NO SCALE
UNION PACIFIC RAILROAD
WATERPROOFING DETAILS
OFFICE OF CHIEF ENGINEER DESIGN
DATE: 3-31 98
DRAWING UP15



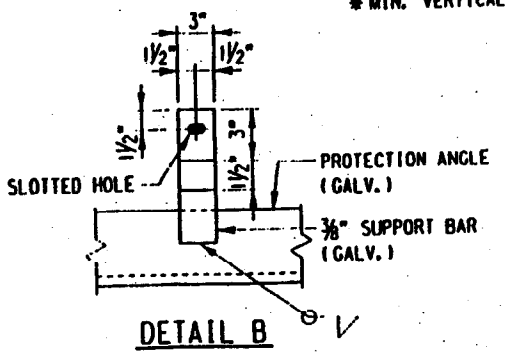
PLAN



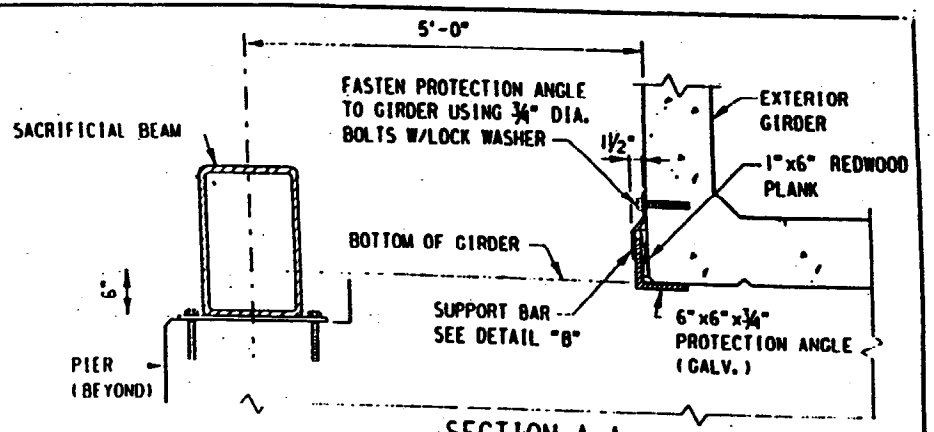
ELEVATION

LAYOUT OF COLLISION IMPACT DEVICES & SACRIFITIAL BEAM

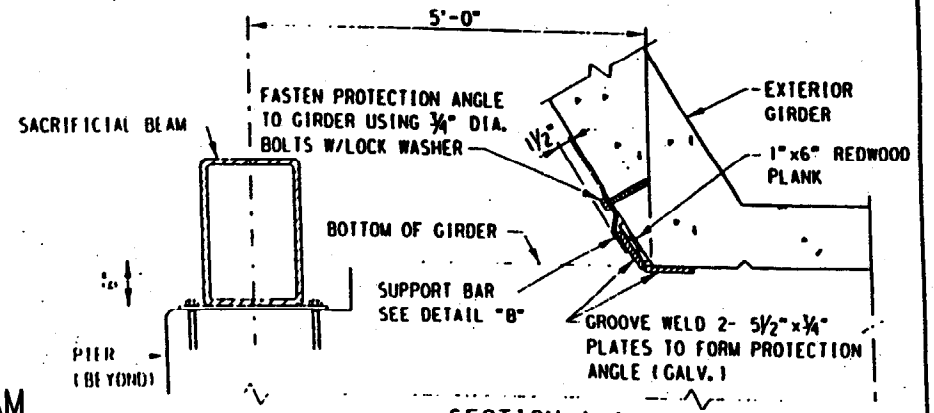
* MIN. VERTICAL CLEARANCE REFER TO TEXT



DETAIL B



SECTION A-A
(AT VERTICAL FACED GIRDER)



SECTION A-A
(AT SLOPED FACED GIRDER)

UNION PACIFIC RAILROAD

COLLISION IMPACT DEVICES
& SACRIFICIAL BEAM

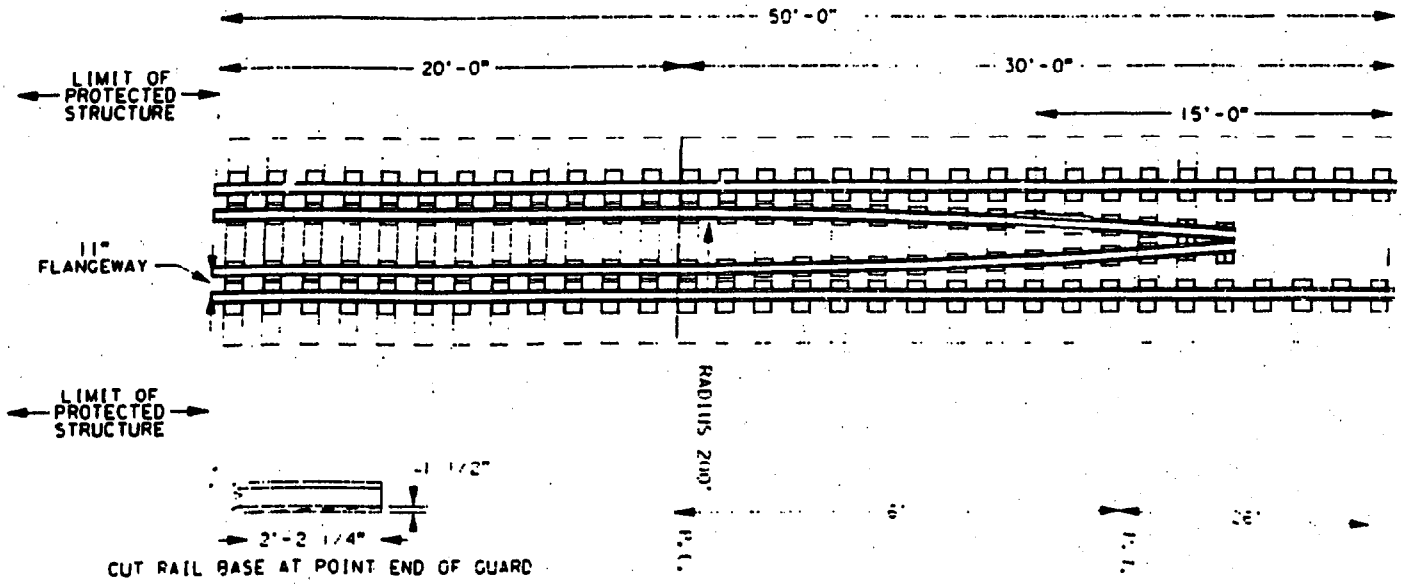
OFFICE OF CHIEF ENGINEER DESIGN

DATE: 3-31-98

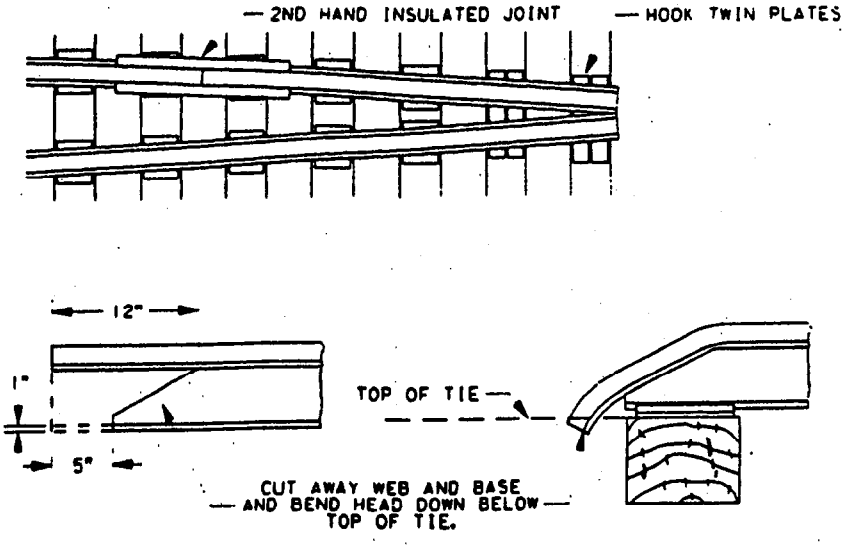
DRAWING UP16

STD DWG 4005

GENERAL ARRANGEMENT



CUT RAIL BASE AT POINT END OF GUARD



DEPRESSED RAIL HEAD DETAIL

INSTALLATION

GRADE SEPARATION STRUCTURES:
DOUBLE INSIDE GUARD RAILS ARE TO BE INSTALLED ON ALL F.R.A. CLASS 4 AND 5 TRACK WHERE HORIZONTAL CLEARANCES ON BOTH SIDES ARE LESS THAN 18 FEET FROM THE CENTERLINE OF TRACK TO A SUPPORTING MEMBER. CLASS 2 CARRYING MORE THAN 20 M.G.T. TRAFFIC AND ALL CLASS 3 TRACK SHALL HAVE DOUBLE INSIDE GUARD RAILS INSTALLED WHERE HORIZONTAL CLEARANCE ON BOTH SIDES IS LESS THAN 12'-6" FROM THE CENTERLINE OF TRACK TO A STRUCTURE SUPPORTING MEMBER.

BRIDGES LOCATED ON CLASS 3, 4, AND 5 TRACK, ALONG WITH BRIDGES LOCATED ON CLASS 2 TRACK WITH OVER 20 M.G.T.

DOUBLE INSIDE GUARD RAILS ARE TO BE INSTALLED ON:
ALL THROUGH OR DECK TRUSSES AND THROUGH PLATE GIRDER SPANS.
ALL BRIDGES THAT ARE 40 FEET OR HIGHER AND 150 FEET IN LENGTH, AND ON ALL BRIDGES 30 FEET OR MORE IN LENGTH WHERE CURVATURE EXCEEDS 5 DEGREES; UNLESS EXCEPTION IS APPROVED BY CHIEF ENGINEER.

TUNNELS:
[illegible]

NOTES:
INSIDE GUARD RAILS SHALL BE MADE FROM SECOND HAND RAIL AND MAY BE OF THE SAME RAIL SECTION AS THE RUNNING RAILS BUT MUST NOT BE MORE THAN 23 LBS. LIGHTER THAN THE RUNNING RAILS.

NO INSIDE GUARD RAIL LIGHTER THAN 70 LBS. SHALL BE USED.

INSIDE GUARD RAILS ARE TO BE FULLY TIE PLATED WITH SECOND-HAND TIE PLATES, WHERE CLEARANCE PREVENTS THE USE OF TIE PLATES, HOOK TWIN PLATES CAN BE USED IN GUARD RIAL CONVERGENCE AREA.

MINIMUM CLEARANCE BETWEEN THE RUNNING RAIL PLATES AND THE GUARD RAIL PLATES MUST NOT BE LESS THAN 1".

INSTALL GUARD RAIL PLATES SO AS TO CANT THE GUARD RAIL OUTWARD TOWARD THE RUNNING RAIL. WHEN SINGLE SHOULDER FLAT GUARD RAIL PLATES ARE USED, INSTALL THE PLATES WITH THE SHOULDERS ON THE INSIDE TOWARD THE CENTER OF THE TRACK.

SECOND-HAND INSULATED JOINTS TO BE INSTALLED IN GUARD RAILS IN ALL SIGNAL TERRITORIES 15 FEET FROM END OF GOOD RAIL ON ONE SIDE.

INSIDE GUARD RAILS TO BE SPIKED TO THEIR FULL LENGTH WITH 2 SPIKES PER TIE. WHERE NECESSARY, PARTICULARLY ON CURVES, DOUBLE SPIKE GUARD RAIL BOTH INSIDE AND OUT.

ALL GUARD RAIL JOINTS TO BE FULLY BOLTED AND WHEN AVAILABLE, SECOND HAND JOINTS SHOULD BE USED.

GUARD RAIL TO BE LAID WITH FULL RAIL (NO JOINTS) IN THE CURVED POSITION.

GRADE SEPARATION SUPPORTING MEMBER REFERS TO POSTS, COLUMNS, BENTS, PIERS, ABUTMENTS, ETC. SUPPORTING BRIDGES, VIADUCTS, ETC. OVER OR ADJACENT TO THE TRACK.

REF. PREVIOUS UP STD DWG PAGE 2503-A.

UNION PACIFIC RAILROAD
ENGINEERING STANDARDS

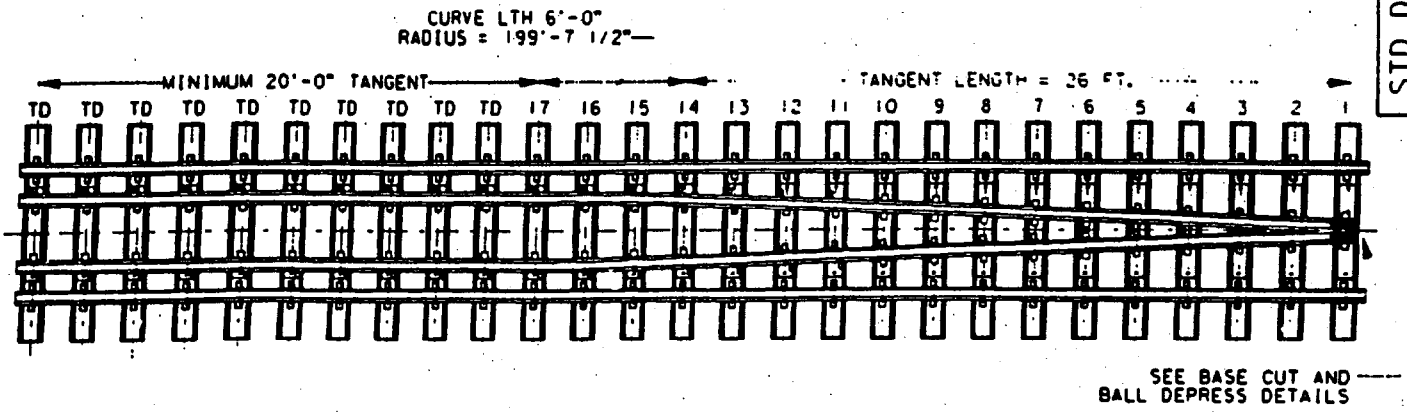
DOUBLE INSIDE GUARD RAIL

UNION PACIFIC

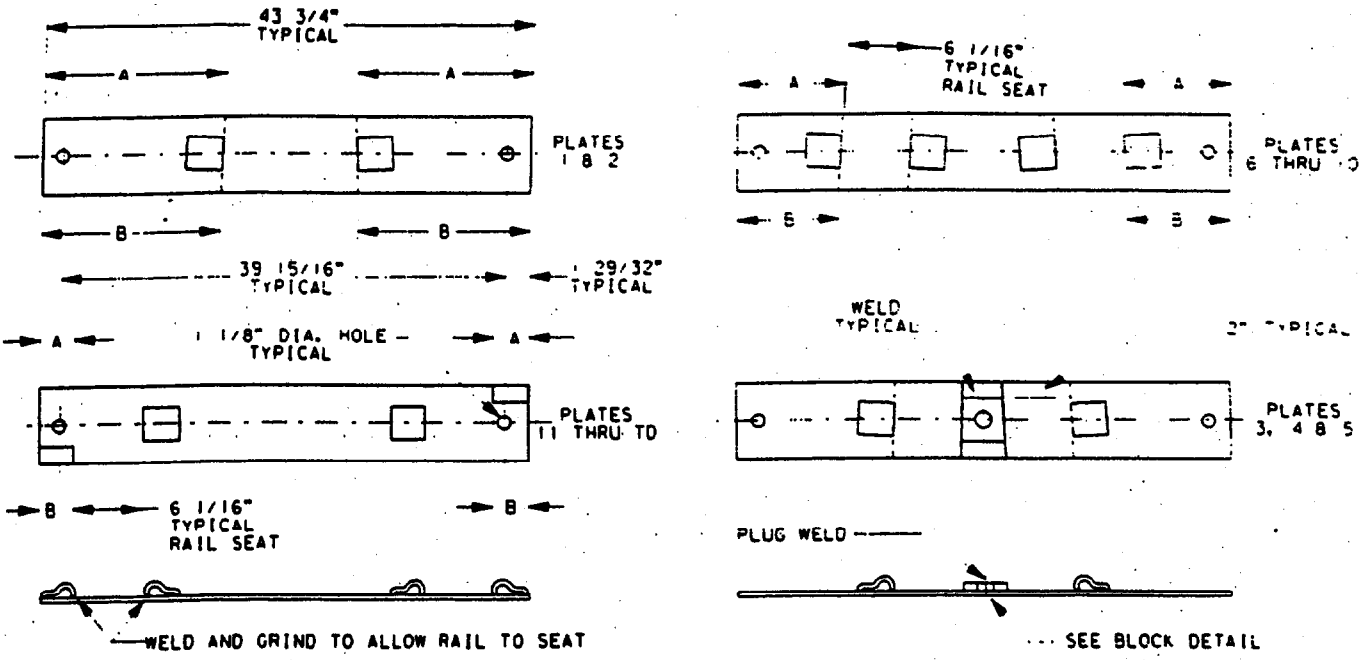
ADOPTED: OCT. 1905

STD DWG

STD DWG 4015

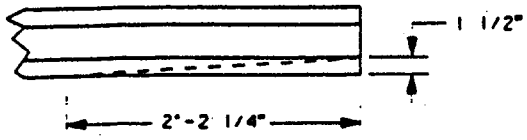


INSTRUCTIONS FOR USE OF DOUBLE INSIDE GUARD RAIL, SEE STD DWG 4005

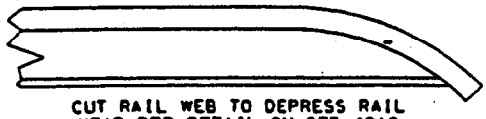


STEEL PLATE DETAILS

1/2" X 7" X 43 3/4" A36 STEEL PLATE



CUT RAIL BASE AT POINT END OF GUARD RAIL



CUT RAIL WEB TO DEPRESS RAIL HEAD PER DETAIL ON STD 4010

NOTES:
USE PANDROL #7299 WELD ON SHOULDERS.

FOR PLATES TD THRU NO. 11 TD, CUT PANDROL SHOULDERS TO 1 1/2" WIDE AND WELD TO PLATE AS SHOWN.

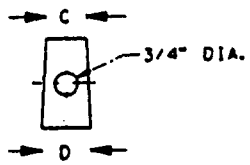
USE COACH SCREW	U.P.	ITEM NO.	503-8750
WASHER	U.P.	ITEM NO.	503-8700
PLATES 1-17	U.P.	ITEM NO.	940-5625
TD PLATES	U.P.	ITEM NO.	940-5620

PLATES 1-17 TWO SETS REQUIRED PER INSTALLATION.

FOR CONCRETE TIE, SEE STD DWG 0202

SHOULDER LOCATION DIMENSIONS

PLATE NO.	A (IN.)	B (IN.)
1	16.858	16.588
2	15.939	15.671
3	15.023	14.756
4	14.106	13.838
5	13.189	12.921
6	12.272	12.004
7	11.356	11.088
8	10.439	10.171
9	9.523	9.256
10	8.606	8.339
11	7.689	7.422
12	6.773	6.505
13	5.859	5.591
14	4.941	4.683
15	4.160	3.980
16	3.627	3.517
17	3.340	3.312



1/2" X 4" A36 STEEL BLOCK

1/2" X 4" STEEL BLOCK DIMENSIONS

PLATE	C (IN.)	D (IN.)
3	1.791	2.098
4	3.624	3.930
5	5.458	5.764

UNION PACIFIC RAILROAD ENGINEERING STANDARDS

DOUBLE INSIDE GUARD RAIL FOR CONCRETE TIES

UNION PACIFIC

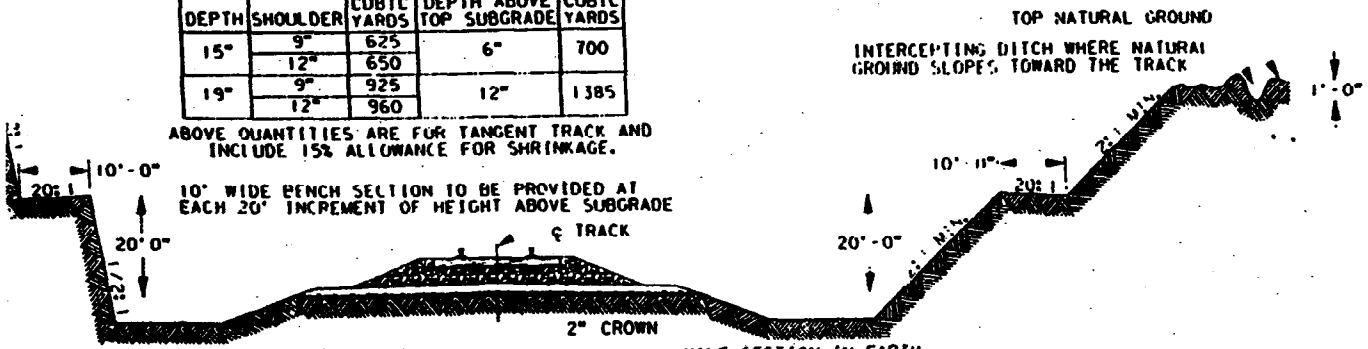
ADOPTED: DEC. 31, 1996

REVISED:

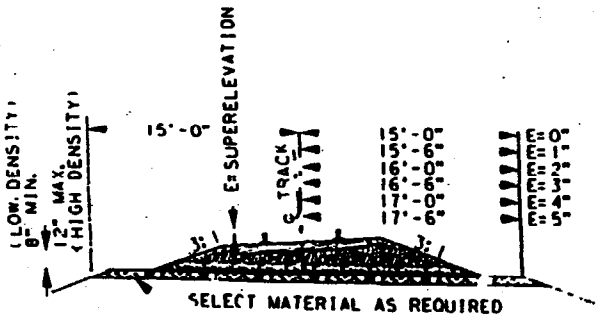
STD DWG

MATERIAL REQUIRED FOR 1000 FEET OF SINGLE TRACK				
BALLAST			SELECTED MATERIAL	
DEPTH	SHOULDER	CUBIC YARDS	DEPTH ABOVE TOP SUBGRADE	CUBIC YARDS
15"	9"	625	6"	700
	12"	650		
19"	9"	925	12"	1385
	12"	960		

ABOVE QUANTITIES ARE FOR TANGENT TRACK AND INCLUDE 15% ALLOWANCE FOR SHRINKAGE.

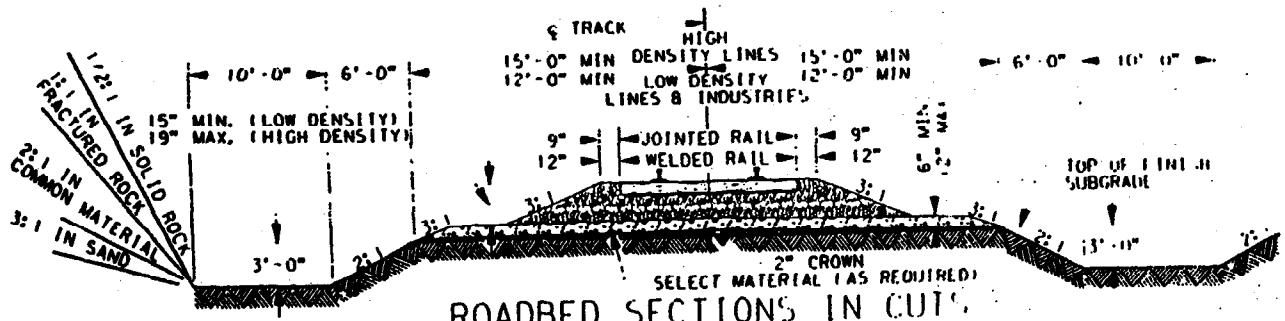


DEEP CUT SECTIONS

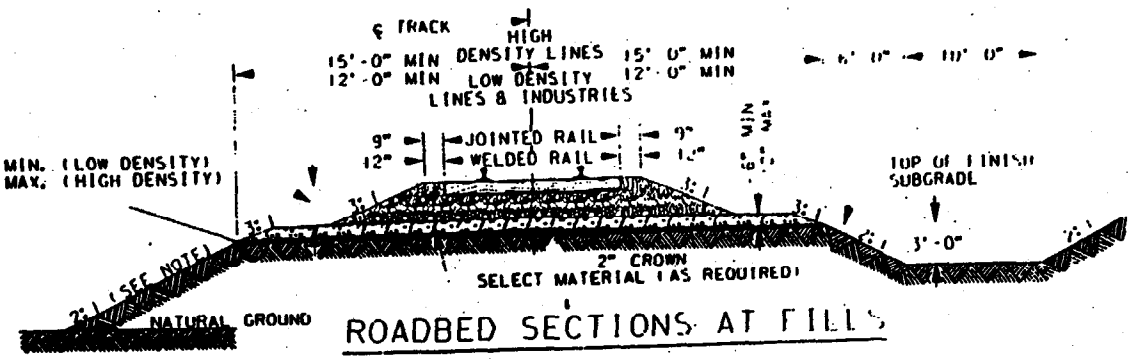


ROADBED SECTION AT CURVED TRACK

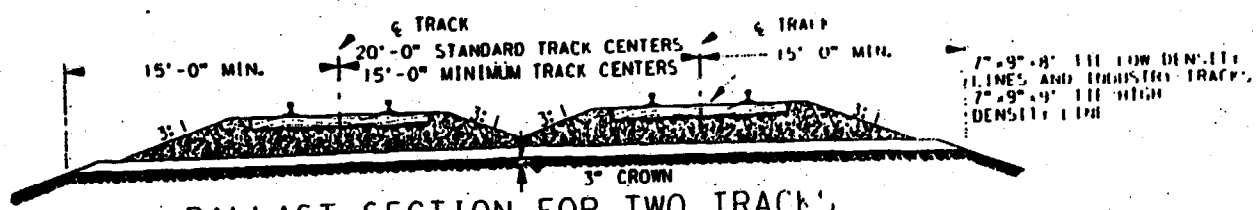
FOR DETAILS NOT SHOWN, SEE CUT AND FILL SECTIONS ELSEWHERE ON THIS SHEET



ROADBED SECTIONS IN CUTS



ROADBED SECTIONS AT FILLS



BALLAST SECTION FOR TWO TRACKS

NOTES:

THE DEPTH OF BALLAST AND DEPTH OF SELECTED MATERIAL SHALL BE DECIDED ON THE BASIS OF VOLUME OF TRAFFIC AND THE QUALITY OF SELECTED MATERIAL AND SUBGRADE DETERMINED BY THE RAILROAD'S ENGINEER SUBJECT TO THE APPROVAL OF THE CHIEF ENGINEER.

SLOPES SHOWN FOR BANKS IN CUTS AND ON FILLS SHALL BE CONSIDERED STANDARD AND GENERALLY USED, BUT MAY BE MODIFIED AS REQUIRED BY LOCAL CONDITIONS AND CHARACTER OF MATERIAL.

BALLAST MUST BE EQUALIZED IN ADVANCE OF DRESSING SO THAT FINAL SECTION WILL CONFORM TO SLOPE REQUIREMENTS AND CHARACTER OF MATERIAL.

WHERE OFF-TRACK ROADWAY IS TO BE PROVIDED, ADD 8'-0" ADDITIONAL WIDTH TO THE ROADBED SECTION AT TOP OF SUBGRADE ELEVATION.

ALL FILL SLOPES SHALL BE FACED WITH COVER OF MATERIAL SUITABLE FOR GROWING GRASS AND HAVING A THICKNESS OF APPROXIMATELY 6 INCHES. THE OUTER SURFACE OF THIS COVER SHALL COINCIDE WITH THE DESIGN SLOPE OF THE EMBANKMENT. MATERIAL FOR THIS COVER MAY BE OBTAINED FROM STRIPPING.

FLOW LINE ON 0.2% MINIMUM GRADE DITCHES AND BENCHES.

FLAT BOTTOM DITCHES ARE REQUIRED FOR HIGH DENSITY LINES, HOWEVER A "V" DITCH IS ACCEPTABLE FOR INDUSTRY TRACKS WHEN RIGHT-OF-WAY IS LIMITED AND WHERE LOCAL CONDITIONS AND CHARACTER OF MATERIAL SO REQUIRE.

REF U.P. STD DWG PAGE 0001.

UNION PACIFIC RAILROAD
ENGINEERING STANDARDS

ROADBED SECTION FOR WOOD TIE TRACK CONSTRUCTION

ADOPTED: JAN. 21, 1927
REVISED: DEC. 31, 1996
FILE NO.: 0001

STD DWG
0001

STD DWG

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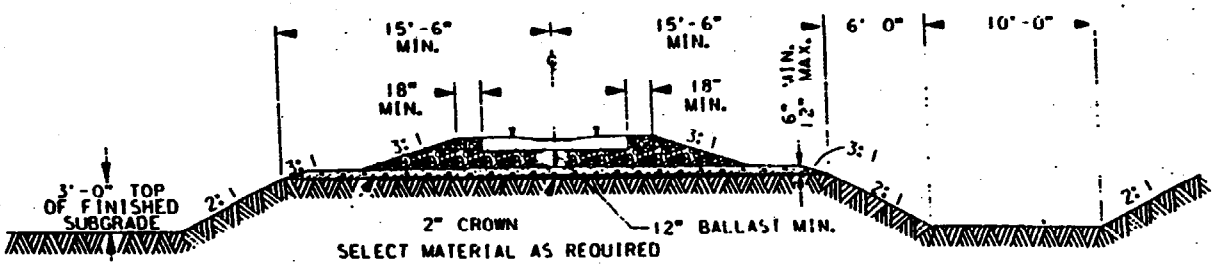
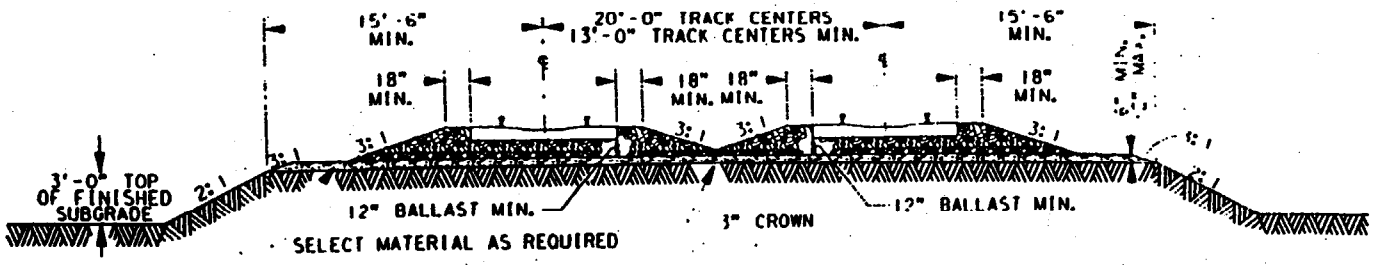
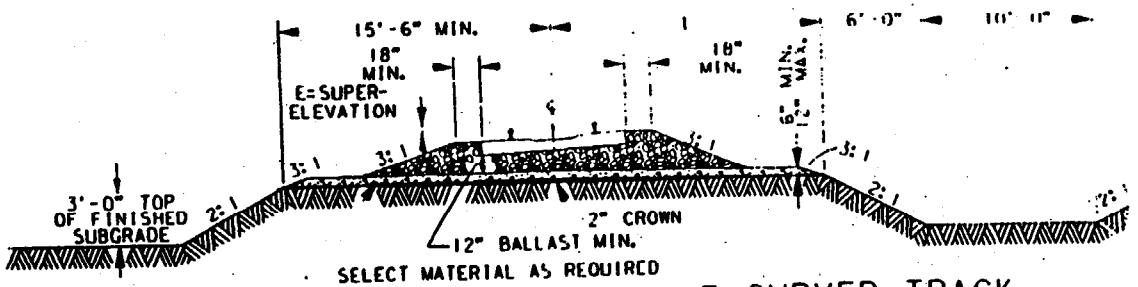


BALLAST SECTIONS FOR SINGLE TANGENT TRACK

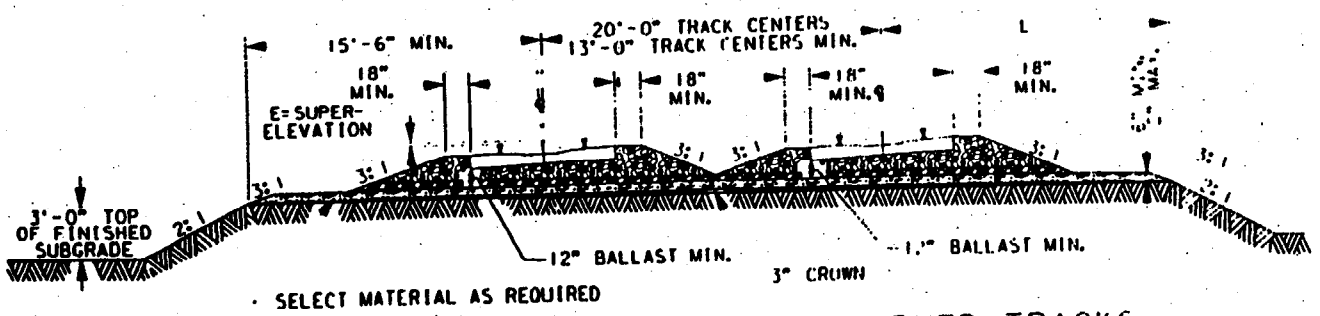


BALLAST SECTION FOR TWO TANGENT TRACKS

BALLAST REQUIRED FOR 1000 FEET OF SINGLE TRACK (CUBIC YARDS)		
E (IN.)	18"	L MIN.
0	1053	15'-6"
1	1125	16'-0"
2	1196	16'-6"
3	1274	17'-0"
4	1360	17'-6"
5	1442	18'-0"



BALLAST SECTIONS FOR SINGLE CURVED TRACK



BALLAST SECTION FOR TWO CURVED TRACKS

NOTES:
ACTUAL SUBBALLAST DEPTH TO BE DETERMINED BY CHIEF ENGINEER OF DESIGN

SUBGRADE EXTENSION TO 16'-6" WHEN SUPERELEVATION IS 5" OR GREATER.

TOP OF BALLAST TO BE FLAT ACROSS AT 1" UNDER BOTTOM OF RAIL.

FOR ROADBED DETAILS, SEE STD DWG 0001
FOR CONCRETE TIE DETAILS, SEE STD DWG 0201

SOURCES OF ACCEPTABLE BALLAST FOR CONCRETE TIE TRACK ARE:

U.P. RESOURCES	SMELTER, UT
OR	GADSHILL, MO
MERIDIAN	GRANITE, WY
HARNEY ROCK	HAINES, OR

UNION PACIFIC RAILROAD
ENGINEERING STANDARDS

ROADBED SECTIONS FOR CONCRETE TIE TRACK CONSTRUCTION

ADOPTED: DEC. 31, 1996
REVISED:
FILE NO.: 0002

STD DWG
0002

STD DWG

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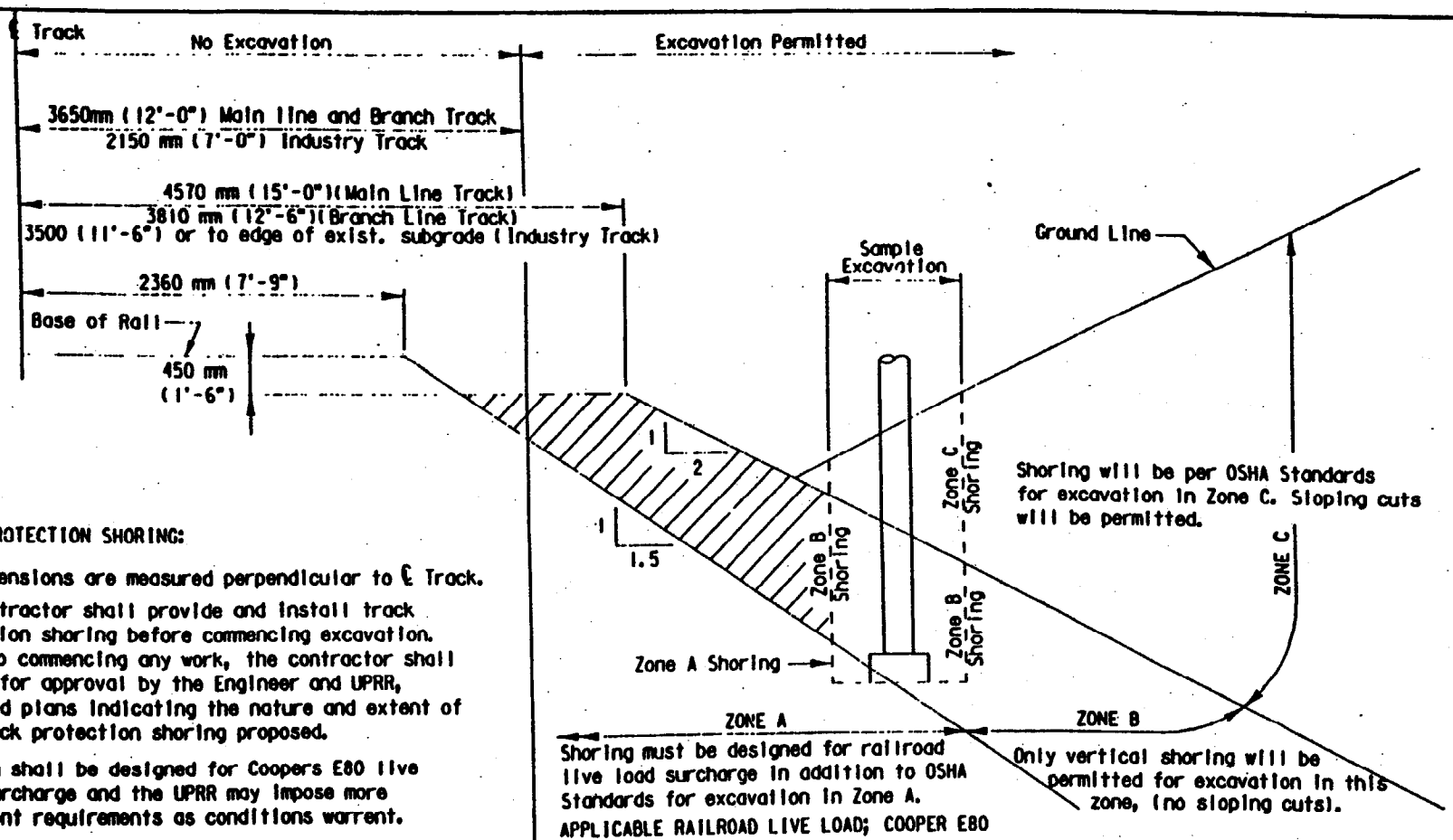

TRACK PROTECTION SHORING:

All dimensions are measured perpendicular to ℄ Track.

The contractor shall provide and install track protection shoring before commencing excavation. Prior to commencing any work, the contractor shall submit for approval by the Engineer and UPRR, detailed plans indicating the nature and extent of the track protection shoring proposed.

Shoring shall be designed for Coopers E80 live load surcharge and the UPRR may impose more stringent requirements as conditions warrent.

For excavations which encroach into railroad live load surcharge zone, shoring plans will be accompanied by a copy of the design calculations, and both must be stamped by a registered professional engineer.

Design of shoring shall comply with UPRR guidlines for design and construction of shoring adjacent to active railroad tracks.

TRACK PROTECTION SHORING REQUIREMENTS

UNION PACIFIC RAILROAD

GENERAL SHORING REQUIREMENTS

OFFICE OF CHIEF ENGINEER DESIGN

DATE: 3-31-98 REDRAWN

C.E. 106613