

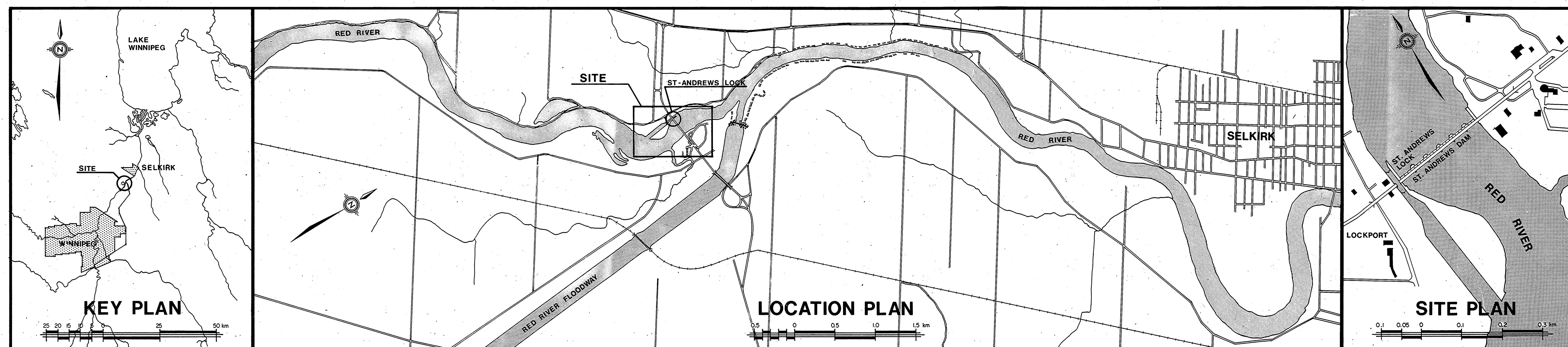


Public Works
Canada

Travaux publics
Canada

ST-ANDREWS LOCK & DAM

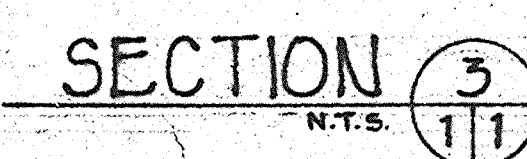
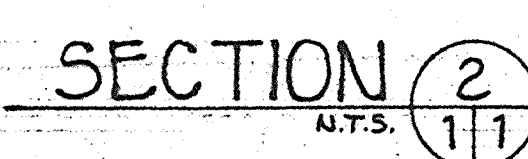
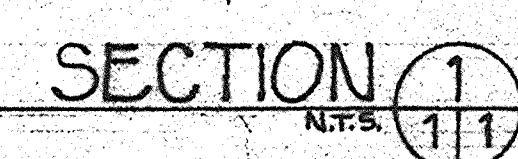
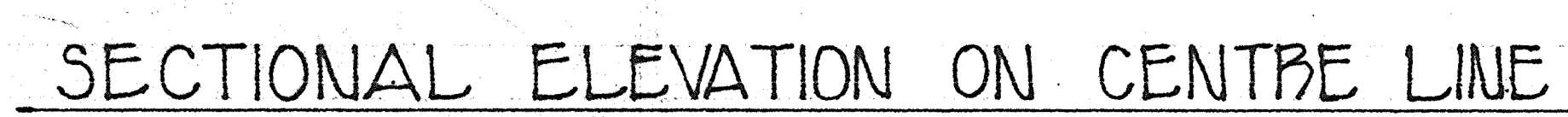
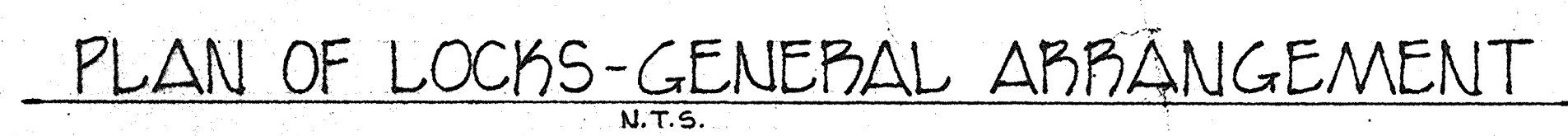
LOCK GATES RENEWAL



DRAWING TITLES:

1. PLAN OF LOCKS - GENERAL ARRANGEMENT & SECTIONS
2. UPPER GATES - GENERAL ARRANGEMENT & GENERAL NOTES
3. LOWER GATES - GENERAL ARRANGEMENT, UPPER & LOWER GATES LIFTING LUGS DETAILS
4. UPPER GATE UPSTREAM & DOWNSTREAM ELEVATIONS
5. LOWER GATE UPSTREAM & DOWNSTREAM ELEVATIONS
6. UPPER GATE SECTIONS, UPPER & LOWER GATES VERTICAL CHANNEL DETAILS
7. LOWER GATE SECTIONS, UPPER & LOWER GATES EYE BAR DETAILS
8. UPPER & LOWER GATES FABRICATED BEAMS - PLANS, ELEVATIONS & SECTIONS
9. UPPER & LOWER GATES STEEL JACKETS, STEP SOCKETS - PLANS, ELEVATIONS, SECTIONS & DETAILS
10. UPPER & LOWER GATES HEEL PLATES, PIVOTS - PLANS, ELEVATIONS & SECTIONS
11. UPPER & LOWER GATES WALKWAY - PLAN, ELEVATIONS, SECTIONS & DETAILS; UPPER GATES BALLAST RETAINER DETAILS
12. UPPER & LOWER GATES - GENERAL ARRANGEMENT, CONCRETE SECTIONS & DETAILS
13. GENERAL REINFORCING SECTIONS & DETAILS
14. PLAN - REINFORCING AT MITRE SILL & BAR LIST

PROJECT NO. 037538



designated	E. DeCURTIS	conqu
date	21/09/81	
drawn	F. DAIGLE	designé
		21/09/81
reviewed		examiné
date		approved
approved		
date		
Tender	A.W. Geins	Soumission
PWG Project Manager	Administrateur des projets PWG	
project number	037538	no. du projet
drawing no.		no. du dessin

GENERAL NOTES:

- A. ALL TIMBER TO BE USED FOR THE CONSTRUCTION OF THE GATES TO BE GRADED AND STAMPED IN ACCORDANCE WITH:
1. NATIONAL LUMBER GRADES AUTHORITY STANDARD GRADING RULES FOR CANADIAN LUMBER, DEC. 1980.
 2. SPECIES: DOUGLAS FIR.
 3. GRADE: DENSE SELECT STRUCTURAL.
 4. SQUARE EGGED, FREE FROM WANE AND WITHOUT EASED EDGES.
 5. ALL TIMBERS TO BE SINGLE SOLID PIECES, BUILT UP MEMBERS OR, SPLICES NOT PERMITTED.
 6. 100% OF MATERIAL TO GRADE SPECIFIED.
 7. HORIZONTAL GATE TIMBERS TO BE CUT FROM SOLID PIECES OF 9.2 metres MINIMUM LENGTH.
 8. PLANE MATING SURFACES OF HORIZONTAL GATE TIMBERS TO UNIFORM PARALLEL THICKNESS OVER ENTIRE LENGTH SO AS TO MAKE CLOSE WATER-TIGHT JOINTS THROUGHOUT. JOINT SURFACES BETWEEN MEMBERS TO BE DRESSED TO PERFECT PLANE.
- B. STRUCTURAL AND MISCELLANEOUS STEEL:
1. STEEL PLATES, CHANNELS AND ANGLES: TO C.S.A. G40.21-M187B, GRADE 300W.
 2. TIE BOLTS: 50mm ϕ TIE BOLTS, (UPPER & LOWER GATES), 38mm ϕ TIE BOLTS, (LOWER GATES ONLY) TO C.S.A. G40.21-M187B, GRADE 300T.
 3. EYE BAR PINS: A.1.1.1. GRADE 100S, NORMALIZED OR EQUIVALENT.
 4. STEEL JACKET SPLICE PLATE BOLTS: TO ASTM A-325M-M7S.
 5. OTHER BOLTS: SQUARE HEAD TO ASTM A-307-70B.
 6. NUTS AND WASHERS: HEXAGON NUTS, WASHERS TO ASTM A307-70B.
 7. STEEL PLATE WASHERS: TO C.S.A. G40.21-M187B, GRADE 300W.
 8. PIPE HANDRAIL: TO ASTM A53, GRADE 240.
 9. WELDING MATERIALS: TO C.S.A. W53-77.
 10. STEEL DOWELS: 75mm ϕ x 80mm LG. TO C.S.A. G40.21-M187B, GRADE 227C.
 11. PINS: TO C.S.A. G28-196S.
 12. PIVOT AND HEEL PLATE CASTINGS: TO ASTM 148-197S, GRADE 90-100.
 13. TOP HINGE PINS: COLD DRAWN PINS - TO A.1.1.1. GRADE 104S NORMALIZED OR EQUIVALENT.
 14. GRATING: TYPE - WELDED.
BEARING CAPS - 25.4mm x 52mm.
BEARING BAR SPACING - 50mm ϕ .
CROSS BAR SPACING - 100mm ϕ .
MATERIAL - C.S.A. G40.21 GRADE 300W.
 15. LIFTING LUGS: TO C.S.A. G40.21 GRADE 300W.

- C. STRUCTURAL CONCRETE:
1. COMPRESSIVE STRENGTH AT 28 DAYS: 30 MPa.
 2. MINIMUM CEMENT: 370 kg/m 3 .
 3. CLASS OF EXPOSURE, A.
 4. MAXIMUM SIZE COARSE AGGREGATE, 20 mm.
 5. SLUMP AT POINT OF DISCHARGE, 55 TO 75 mm.
 6. AIR CONTENT 5 TO 7%.
 7. AD MIXTURE, WATER REDUCING: QUANTITY TO MANUFACTURER'S RECOMMENDATION.

- D. REINFORCING STEEL:
1. STEEL: TO C.S.A. G30.12-M187T BILLET STEEL GRADE 400, DEFORMED BARS.
 2. DO CONCRETE REINFORCEMENT WORK TO CAN'S A-23.1M77 EXCEPT WHERE SPECIFIED OTHERWISE.

- E. ANCHORS:
1. SUPPLY ROCK BOLTS AS MANUFACTURED BY:
- WILLIAMS FORM HARDWARE & ROCK BOLT CANADA LTD.
OR
- STEEL COMPANY OF CANADA LTD.
OR
- EQUIVALENT APPROVED BY ENGINEER.
 2. GROUT:
- FAST SETTING, EXPANDING TYPE GROUT WITH MINIMUM COMPRESSIVE STRENGTH OF 35 MPa AT 28 DAYS.
- GROUT TO BE COMPATIBLE FOR USE WITH ANCHORS SUPPLIED AND SUITABLE FOR COLD WEATHER CONDITIONS.
- OBTAIN ENGINEER'S APPROVAL FOR PRODUCT BEFORE ORDERING GROUT FOR ANCHORS.

- F. DIMENSIONS:
1. BEFORE COMMENCING REMOVAL OF EXISTING CONCRETE IN QUOINS AND SILLS: MEASURE CURVATURE OF QUOINS AND COMPARE WITH DIMENSIONS ON DRAWINGS.
 2. REPORT ANY DISCREPANCIES ON DRAWINGS.
 3. ESTABLISH SURVEY CONTROL POINTS THAT WILL PERMIT ESTABLISHMENT OF NEW CONCRETE FACES TO EXACTLY MATCH THE EXISTING CONCRETE.
 4. CHECK SITE DIMENSIONS AND REPORT DISCREPANCIES TO ENGINEER.
 5. BE RESPONSIBLE FOR CORRECTIVE MEASURES NECESSARY TO ENSURE THAT FINISHED GATES WILL FIT THE QUOINS AND SILLS WHEN CLOSED.
 6. ANY CORRECTIVE MEASURES TO ENSURE FIT OF GATES, TO BE APPROVED BY ENGINEER.

- G. BEARINGS:
1. GUN-METAL CAPS: USE SELF LUBRICATING BEARING, LUBRITE, ALLOY No. 196 WITH G-10 LUBRICANT AS MANUFACTURED BY MEPPHMAN INC. OR EQUIVALENT APPROVED BY THE ENGINEER.
GUN-METAL CAPS WILL BE MANUFACTURED IN ACCORDANCE WITH ASTM-B22-73, COPPER ALLOY UNS No. 91100.
 2. TOP HINGE BEARING PINS: CAST EPONIZE TO ASTM-B22-73, COPPER ALLOY UNS No. 91100.
 3. TOP HINGE STEP BEARING: CAST EPONIZE TO ASTM-B22-73, COPPER ALLOY UNS No. 91100.
 4. HEEL PLATE, BEARING PINS: USE SELF LUBRICATING BEARING, LUBRITE, ALLOY No. 196 WITH G-10 LUBRICANT AS MANUFACTURED BY MEPPHMAN INC. OR EQUIVALENT APPROVED BY THE ENGINEER.
HEEL PLATE, BEARING PINS WILL BE MANUFACTURED IN ACCORDANCE WITH ASTM-B22-73, COPPER ALLOY UNS No. 91100.

NOTE:
WALKWAYS & DETAILS REMOVED FOR CLARITY
FOR DETAILS SEE DWG. No. 11

GENERAL ARRANGEMENT - UPPER GATES

0.5m 1.0 2.0m

NOTE: WALKWAY NOT SHOWN FOR CLARITY

revision date

A detail no. to detail
B location drawing no. or detail no.
C drawing no. design no.

project project

ST-ANDREWS
LOCK & DAM
LOCK GATES RENEWAL

drawing design

UPPER GATES
GENERAL ARRANGEMENT
& GENERAL NOTES

designed E. DePurris 21/09/81

drawn J. A. McDONALD 21/09/81

checked J. A. McDONALD 21/09/81

approved J. A. McDONALD 21/09/81

approved J. A. McDONALD 21/09/81

approved J. A. McDONALD 21/09/81

approved J. A. McDONALD 21/09/81

approved J. A. McDONALD 21/09/81

approved J. A. McDONALD 21/09/81

approved J. A. McDONALD 21/09/81

approved J. A. McDONALD 21/09/81

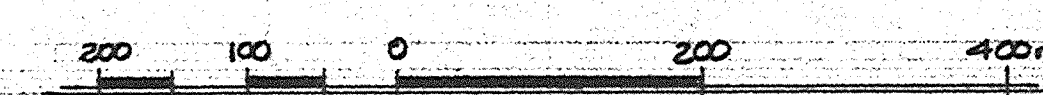
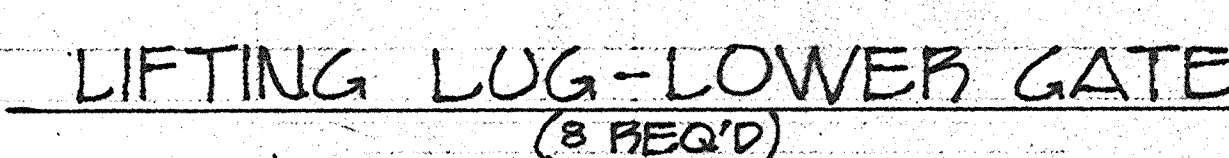
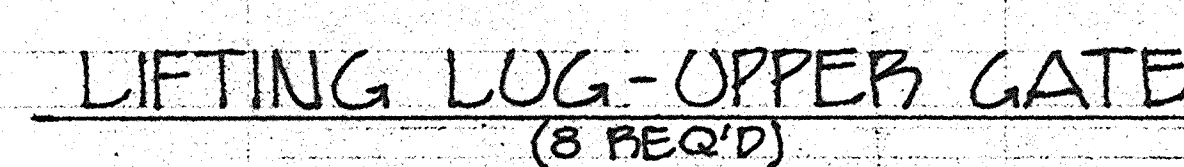
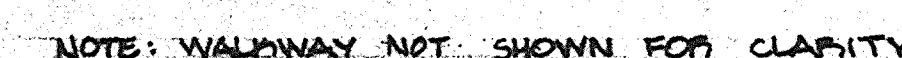
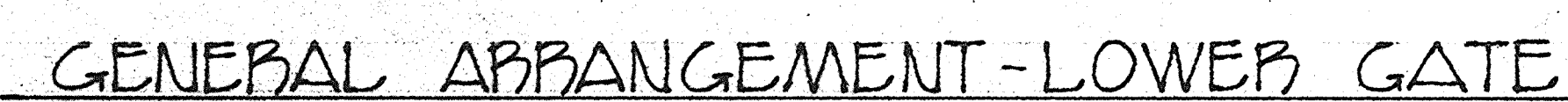
approved J. A. McDONALD 21/09/81



approved J. A. McDONALD 21/09/81

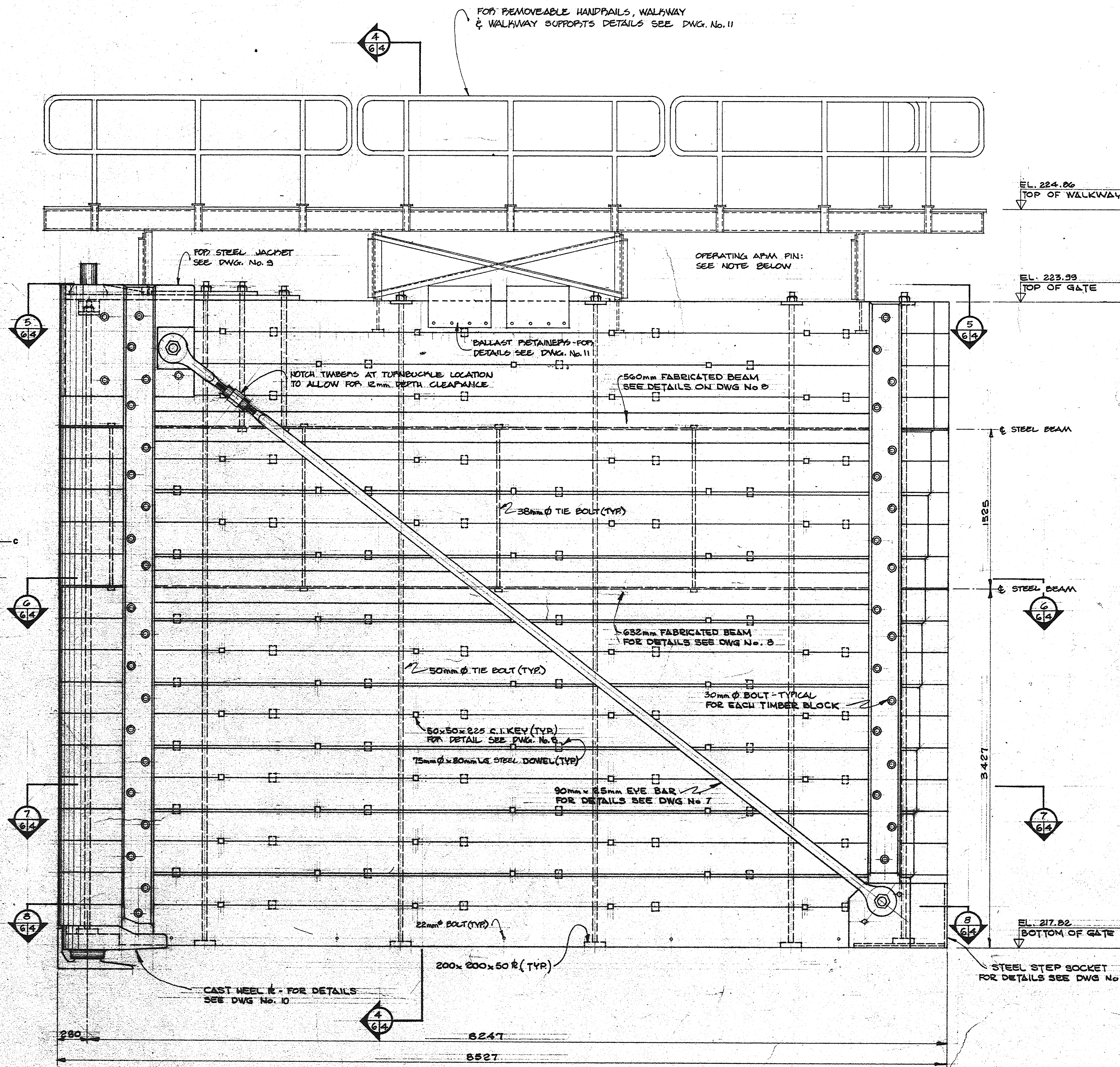
approved J. A. McDONALD 21/09/81

approved J. A. McDONALD 21/09/81

approved J. A. McDONALD 21/09/81



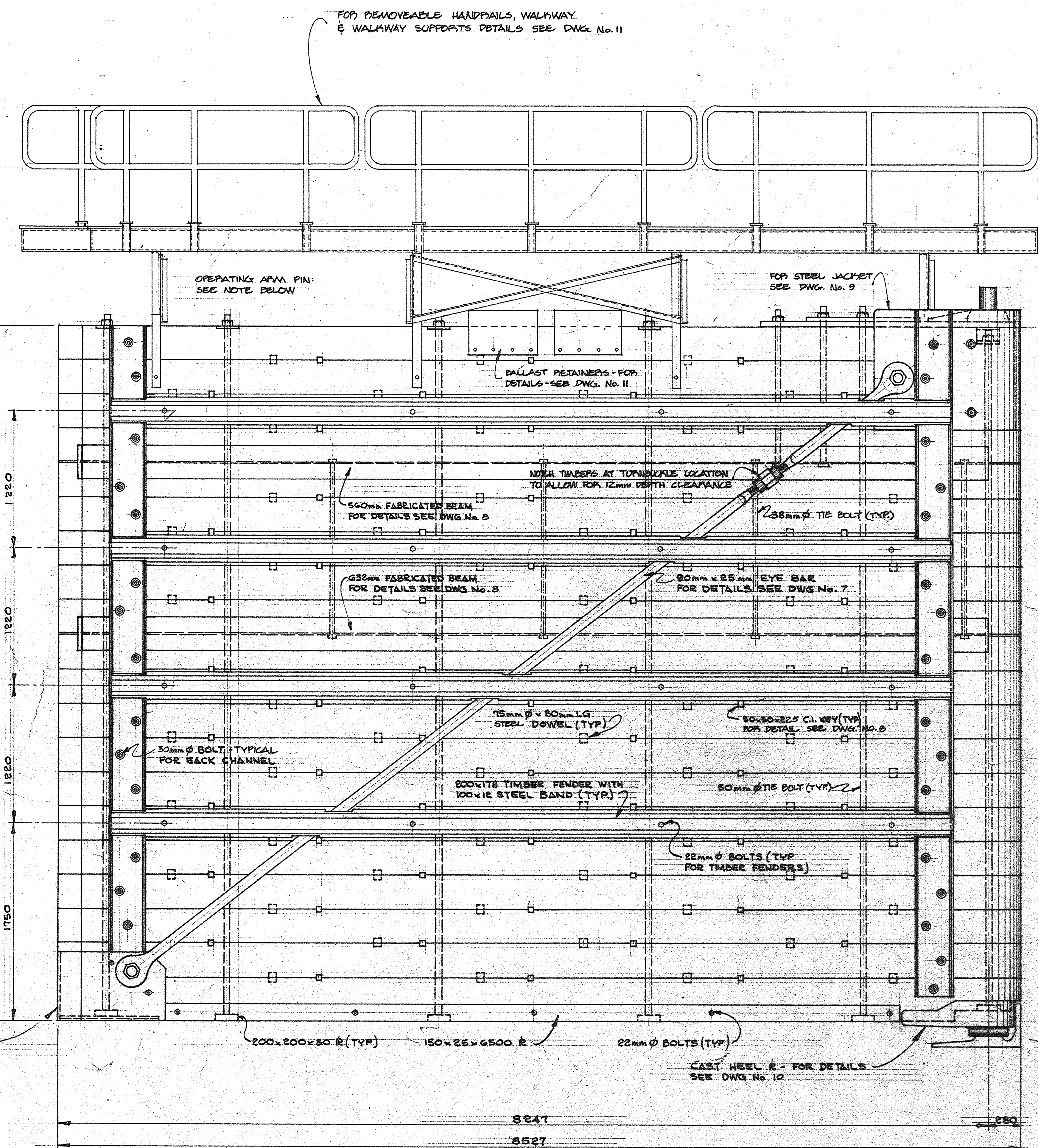
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project		project
<p>ST-ANDREWS LOCK & DAM LOCK GATES RENEWAL</p>		
drawing		dessin
<p>LOWER GATES GENERAL ARRANGEMENT UPPER & LOWER GATES LIFTING LUGS DETAILS</p>		
designed		conçu
date	E. de CURIUS	21/09/81
drawn		dessiné
	F. DAIGLE	21/09/81
reviewed		examined
date	<i>E. de Curius</i>	
approved	<i>A. Leduc</i>	approved
date	<i>81-09-25</i>	
Tender	A. W. Gossens	Submission
PWIC Project Manager	Administrateur du projet	TTC
project number		no. du projet
	037538	
drawing no.		no. du dessin
	3 of 14	



UPPER GATE ELEVATION - UPSTREAM SIDE

0.5m 0 1.0 2.0m

OPERATING ARM PIN ASSEMBLY:
SALVAGE OPERATING ARM PIN ASSEMBLY FROM
EXISTING GATES AND INSTALL ON NEW GATES.
EXACT LOCATION TO BE DETERMINED IN FIELD.



UPPER GATE ELEVATION - DOWNSTREAM SIDE

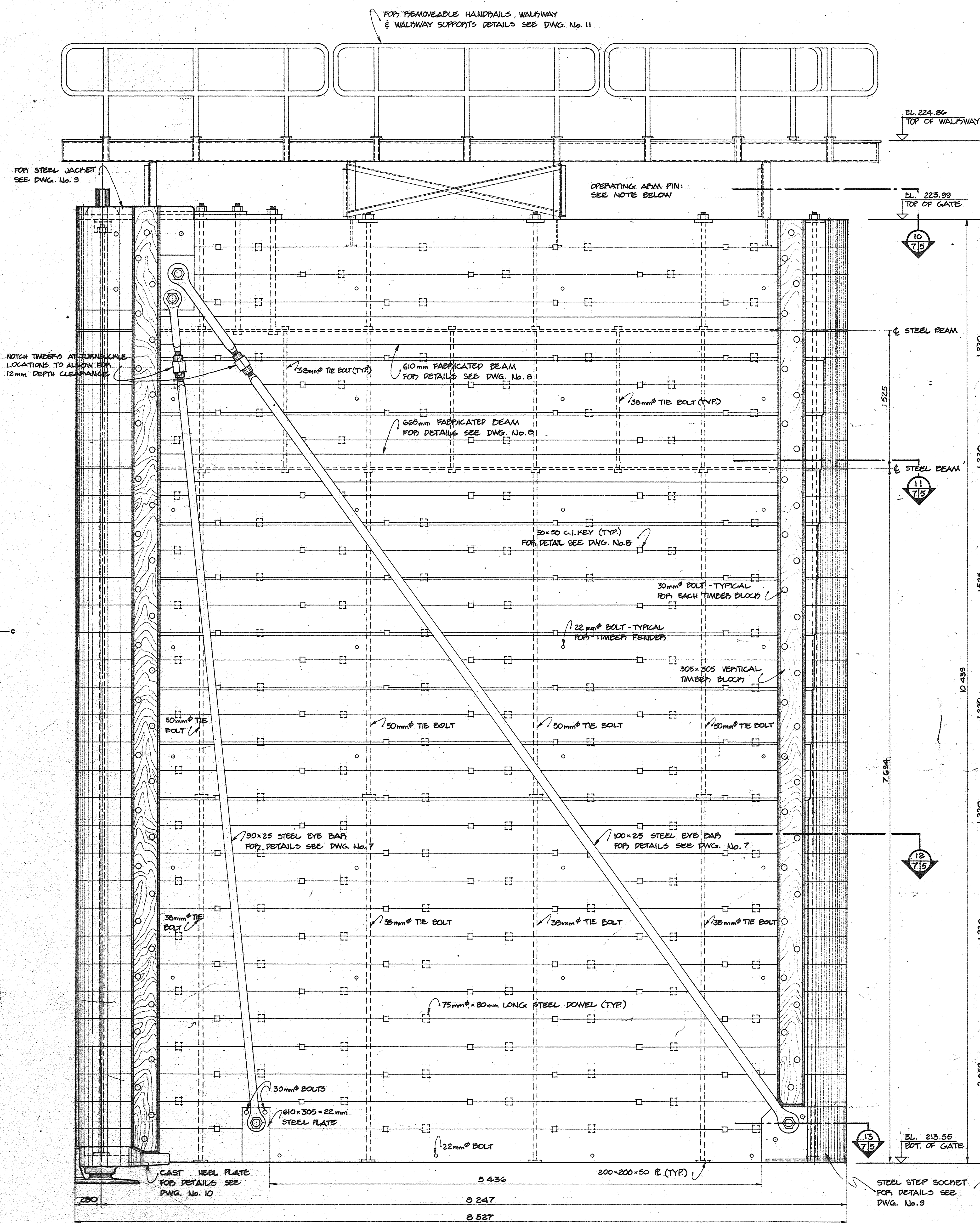
0.5m 0 1.0 2.0m

revision	date
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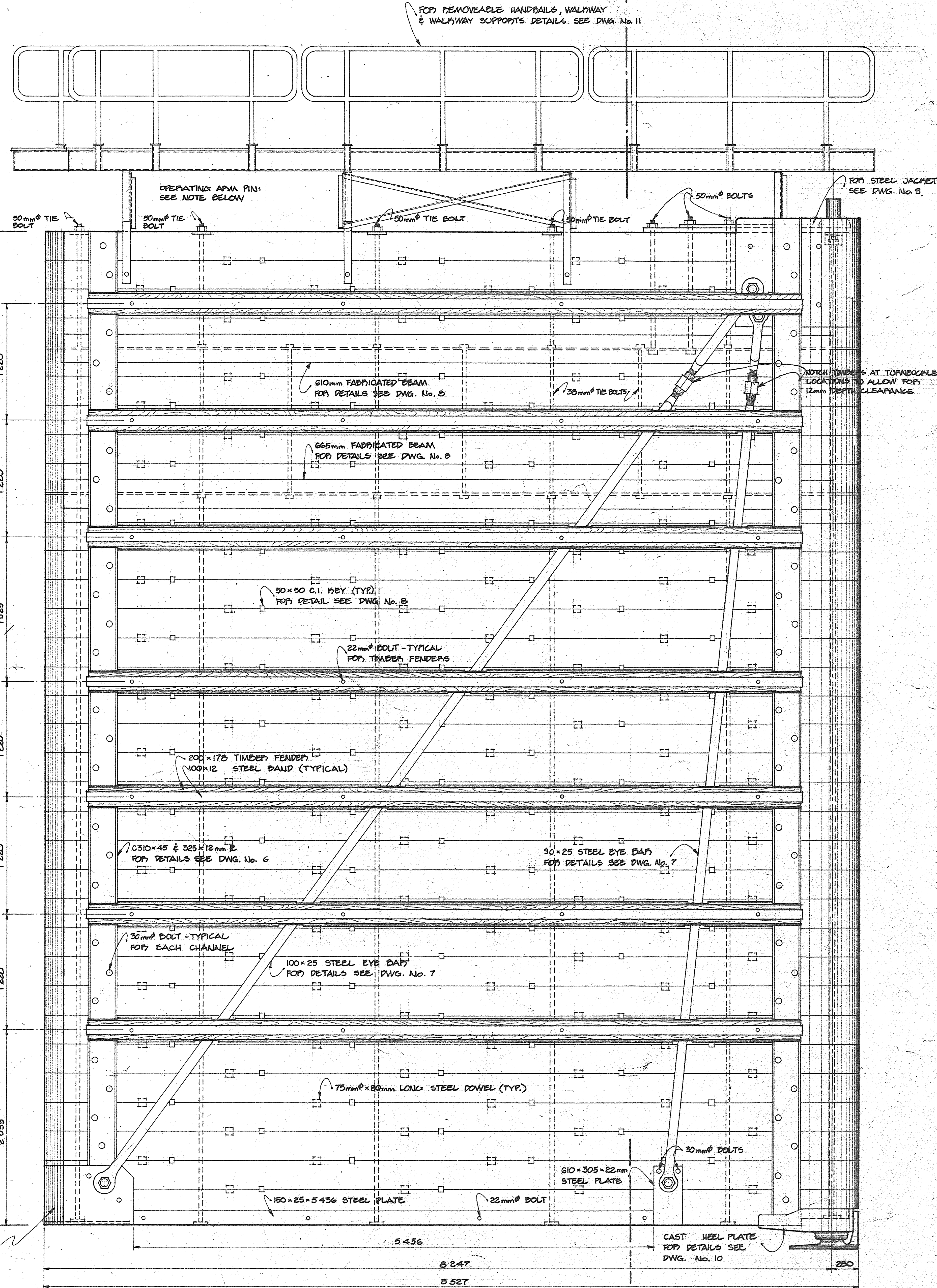
ST-ANDREWS
LOCK & DAM
LOCK GATES RENEWAL

UPPER GATE
UPSTREAM & DOWNSTREAM
ELEVATIONS

designed	E. RUDS	21/09/81
drawn	J.A. McDONALD	21/09/81
checked	to R. R. R.	
approved	A. R. R.	
date	81-09-15	
Project Manager	Adm. Services	
Project Number	037538	
Drawing No.	4 of 14	



LOWER GATE ELEVATION-UPSTREAM SIDE



LOWER GATE ELEVATION-DOWNSTREAM SIDE

revision	date
A	A detail no. 10 to detail
B	B location drawing no. 10 to detail
C	C drawing no. 10 to detail

project
**ST-ANDREWS
LOCK & DAM
LOCK GATES RENEWAL**

drawing
**LOWER GATE
UPSTREAM & DOWNSTREAM
ELEVATIONS**

designed
E. ROBERTS 21/09/81

drawn
F. DAIGLE 21/09/81

reviewed
to Rolberg

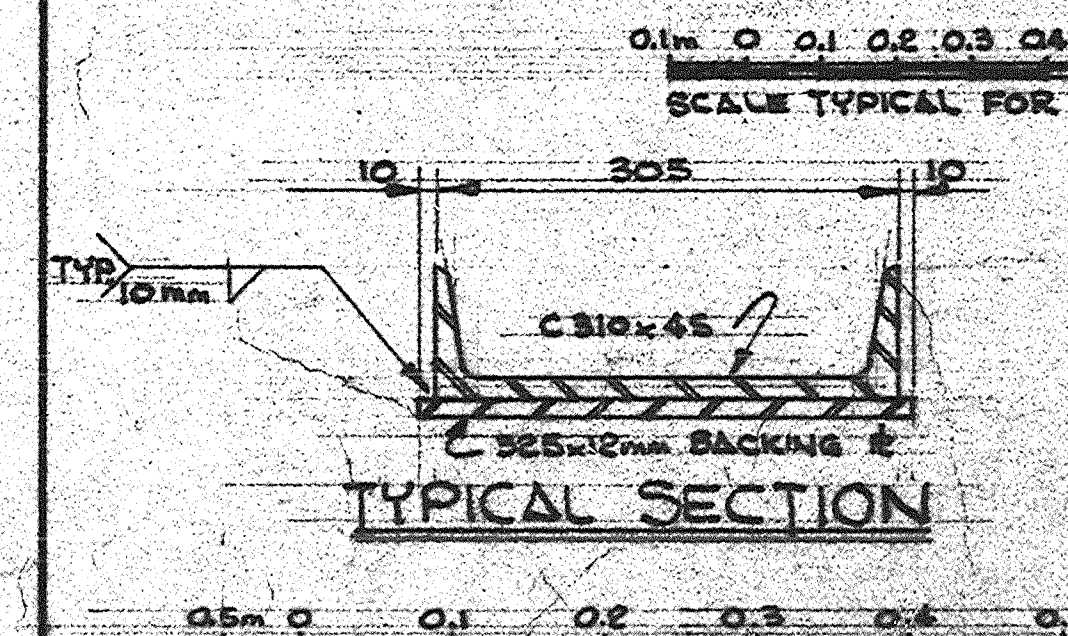
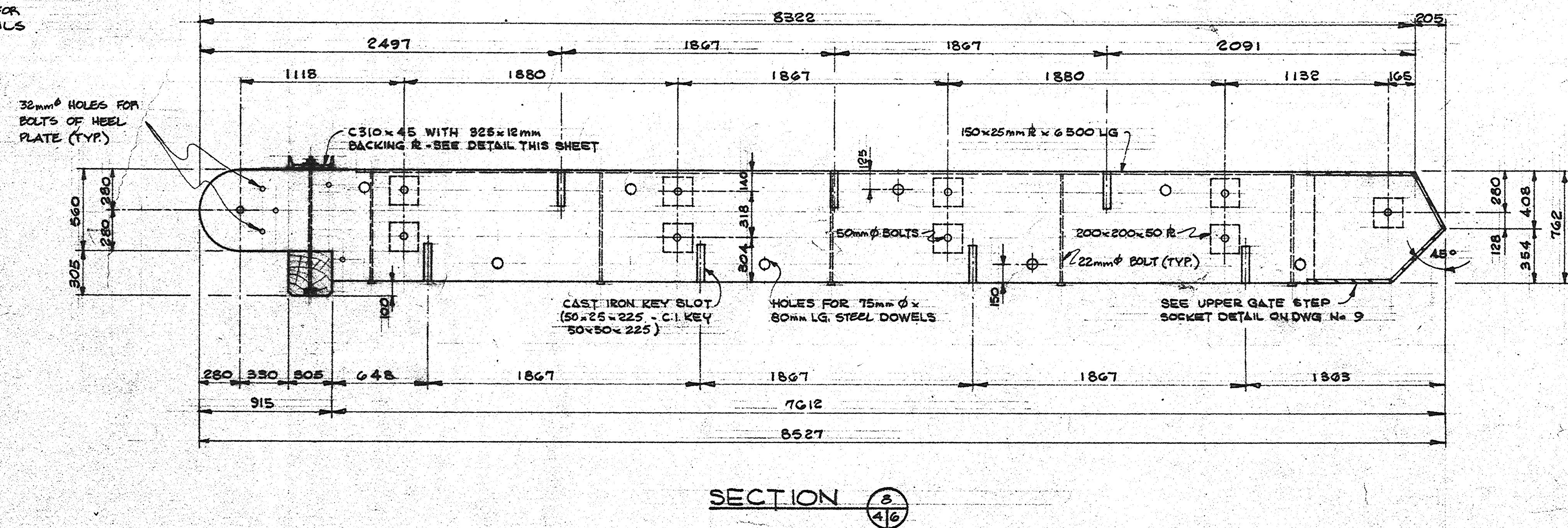
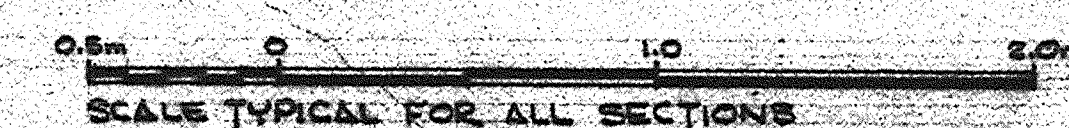
approved
to Rolberg

Tender
A.W. Cairns 21/09/81

PWC Project Manager
Administrateur de projets TPC

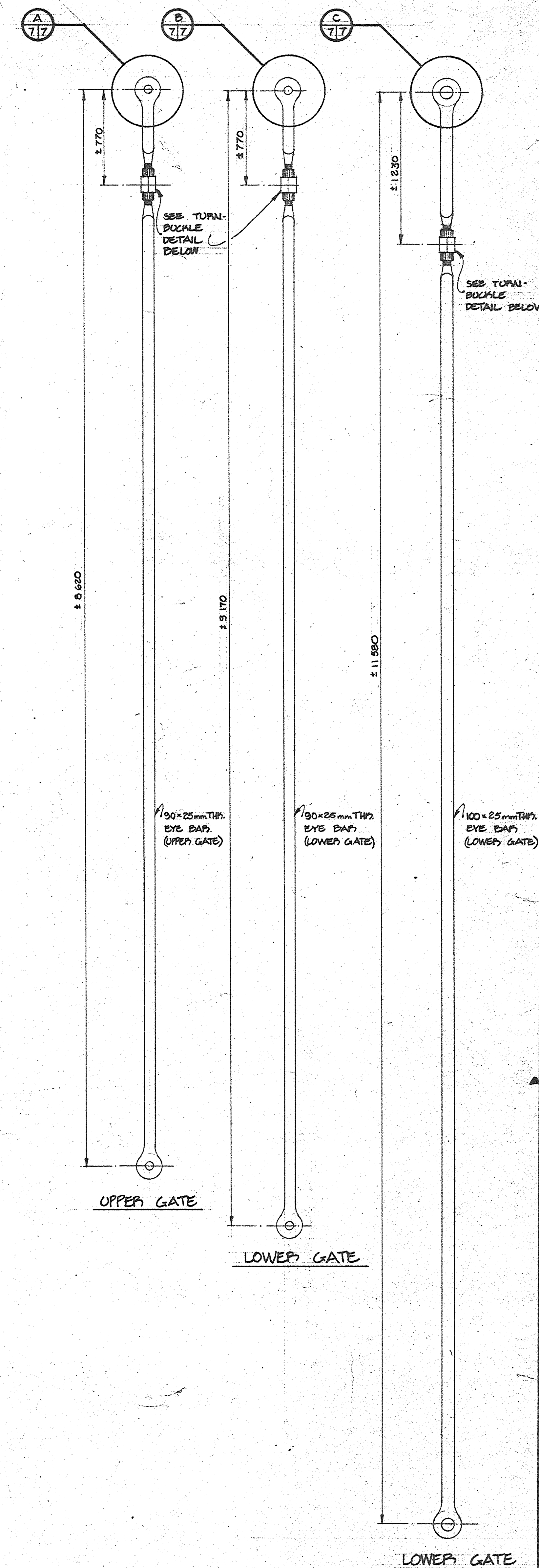
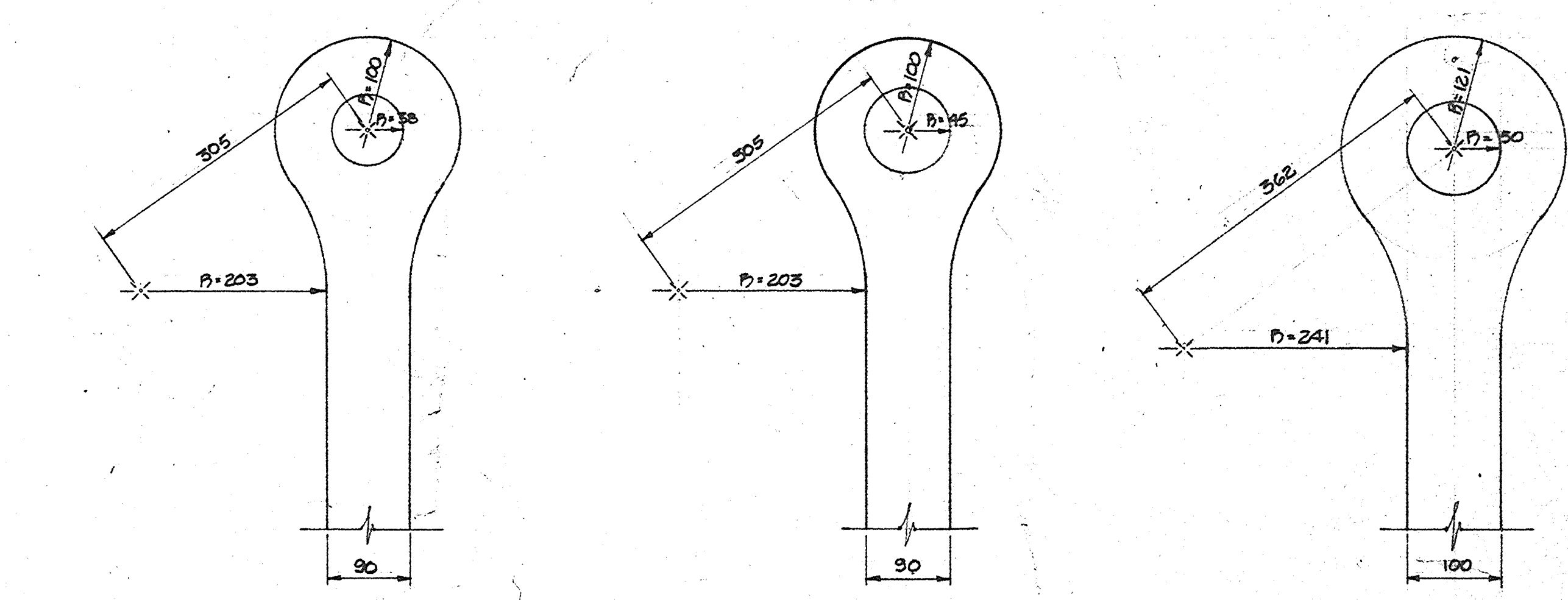
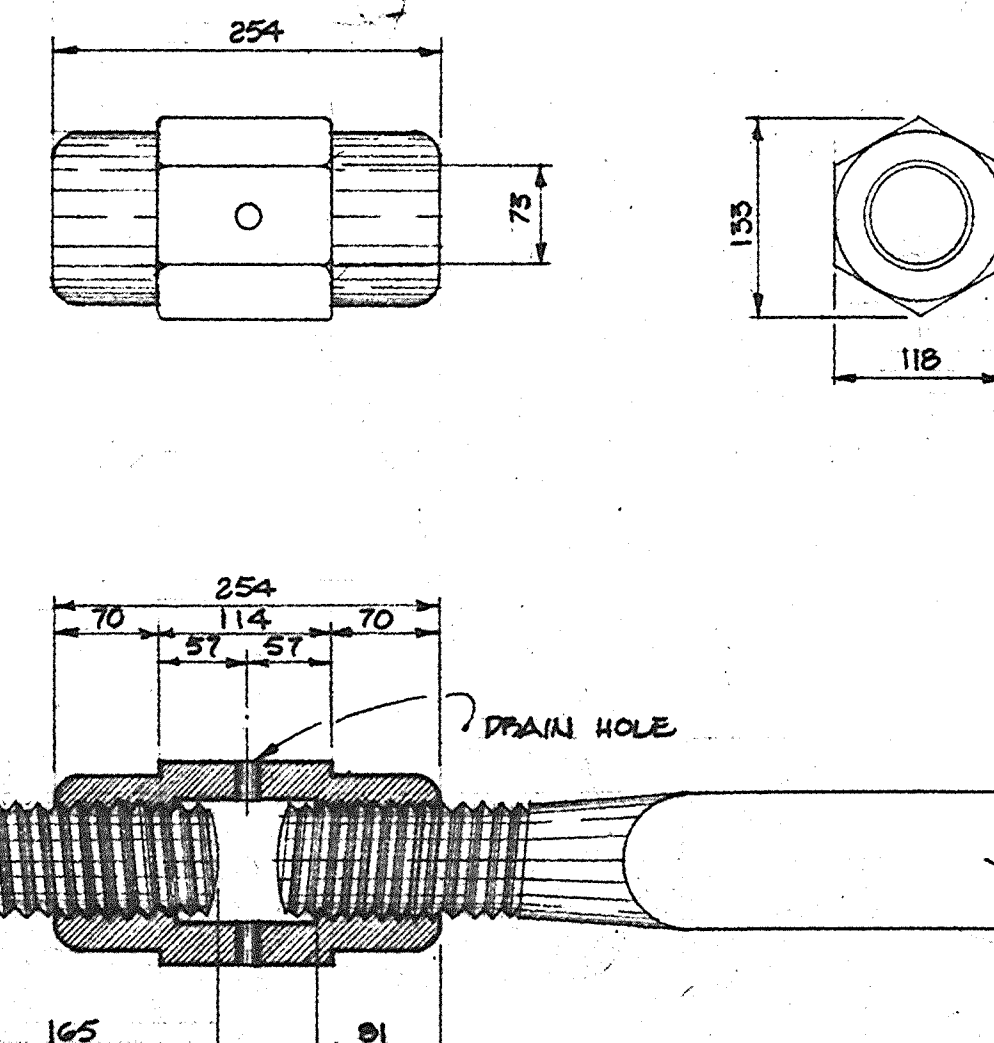
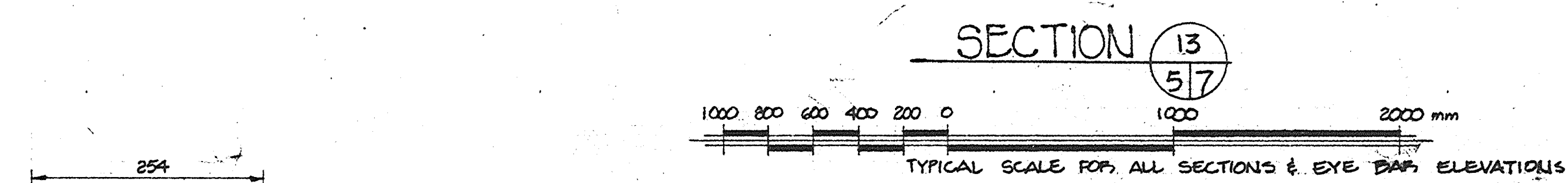
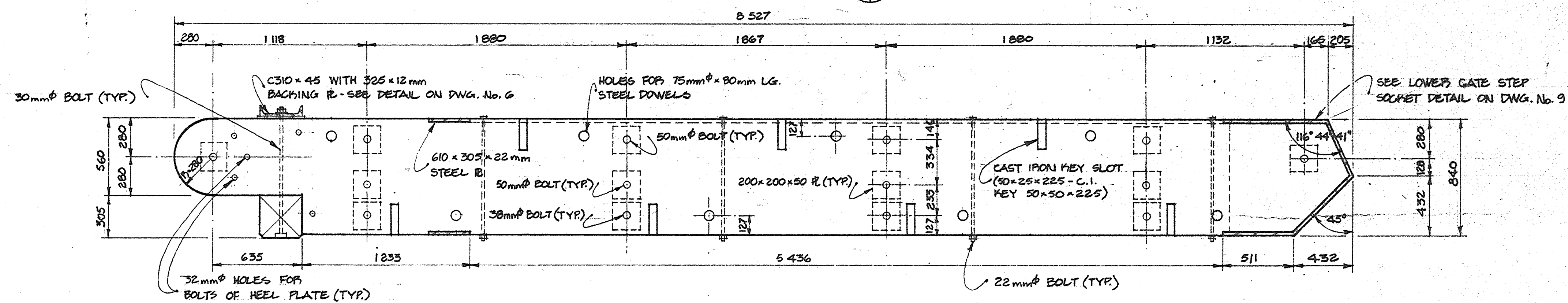
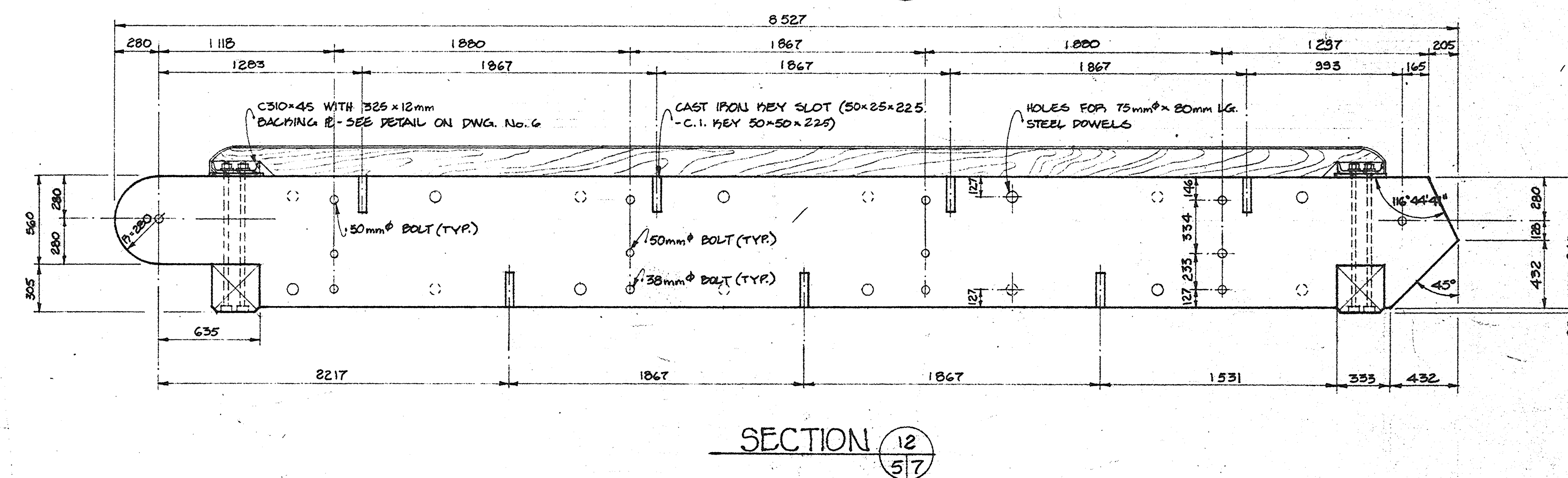
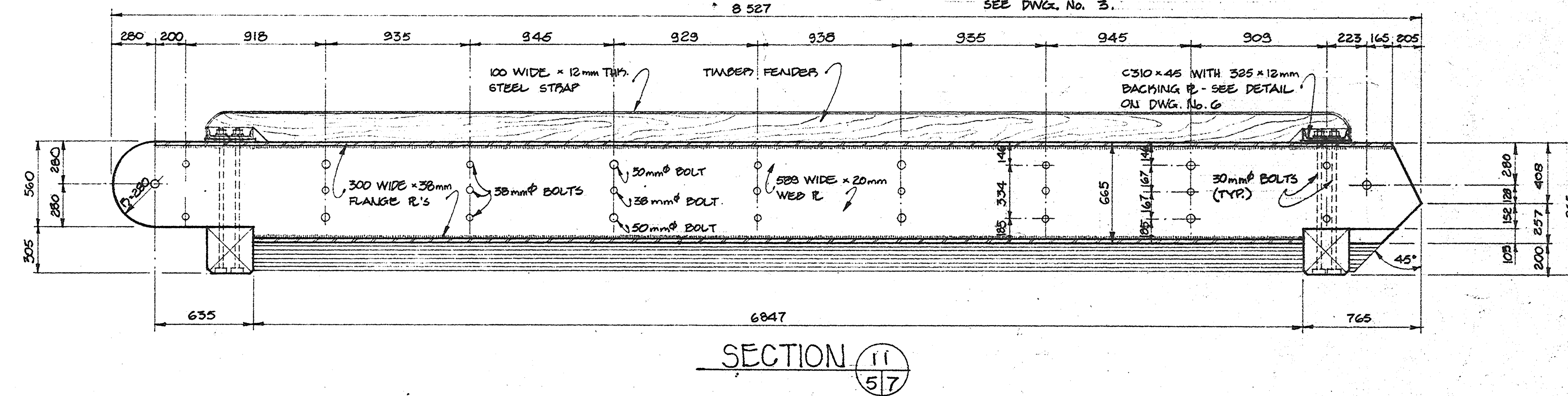
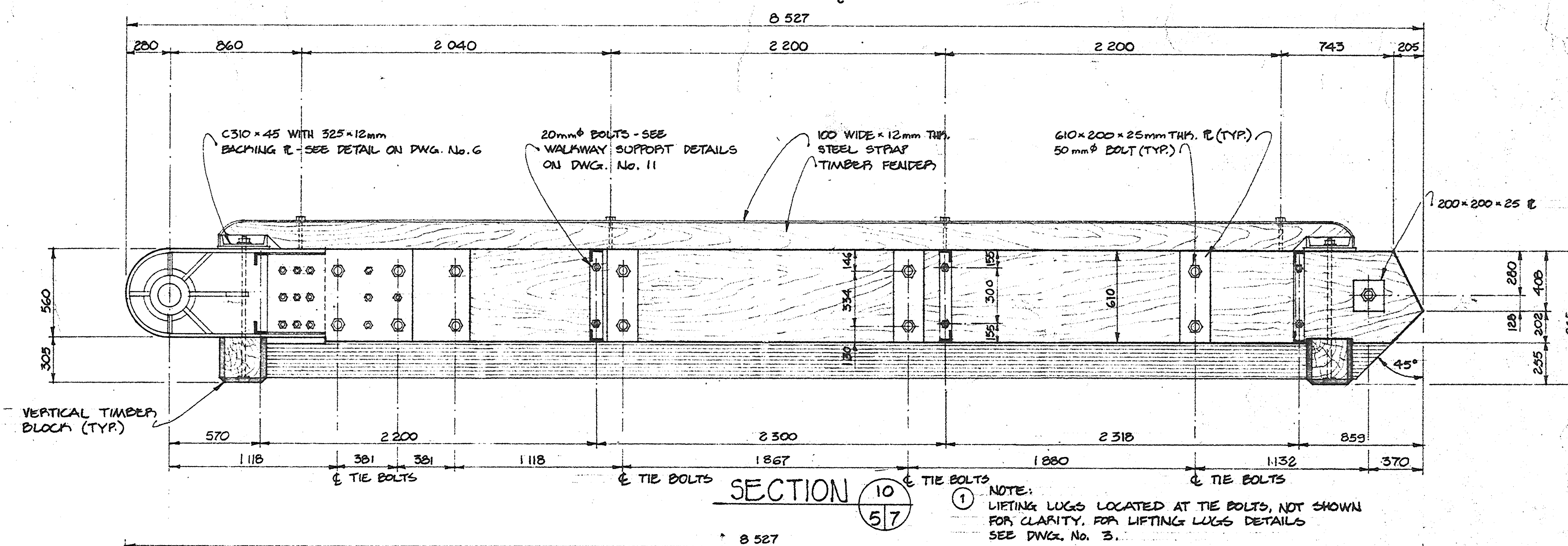
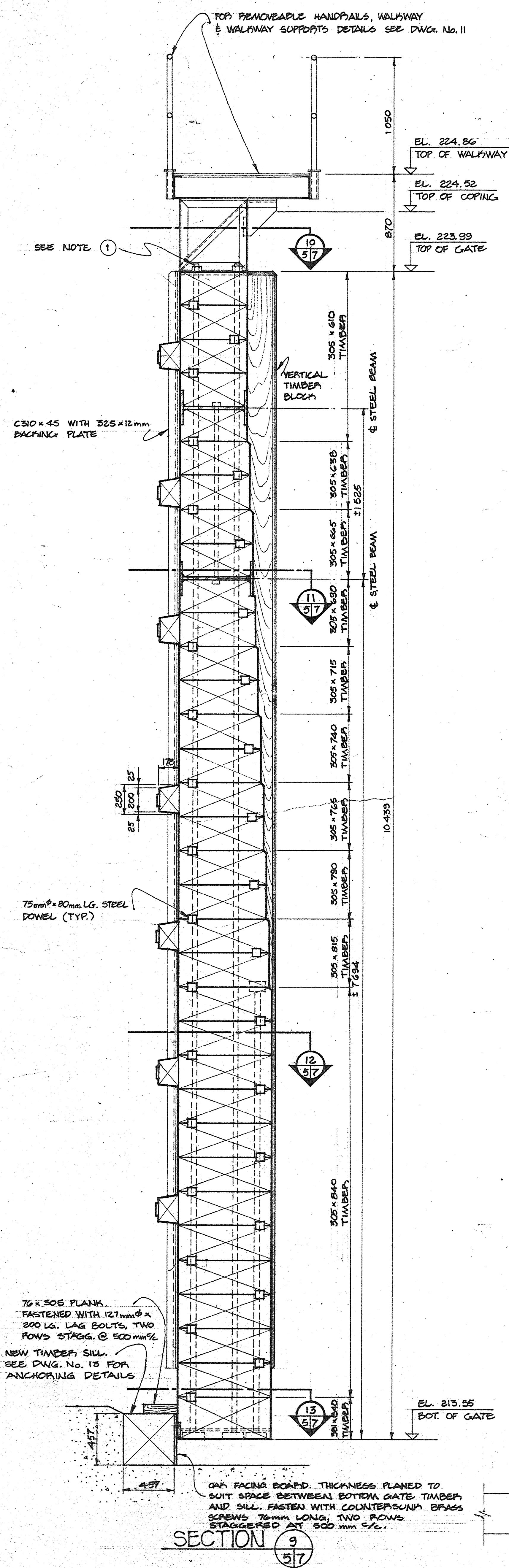
project number
037538

drawing no.
5 of 14





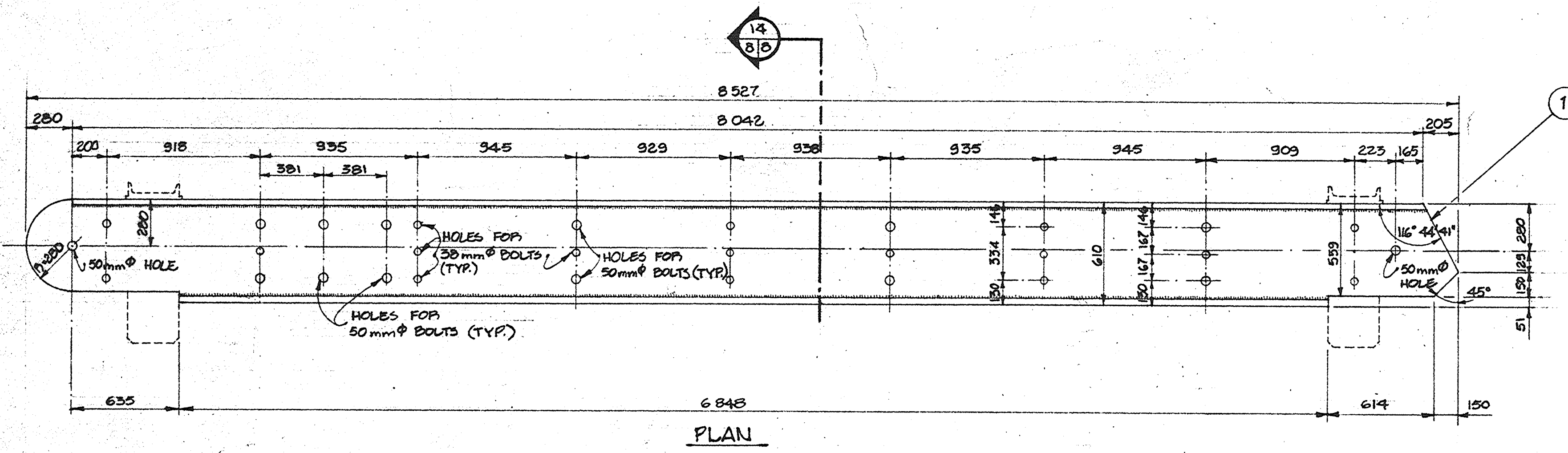
NOTE: DRILL HOLES TO SUIT 30mm BOL

WESTERN REGION
N.M. HOYT
DIRECTOR GENERAL

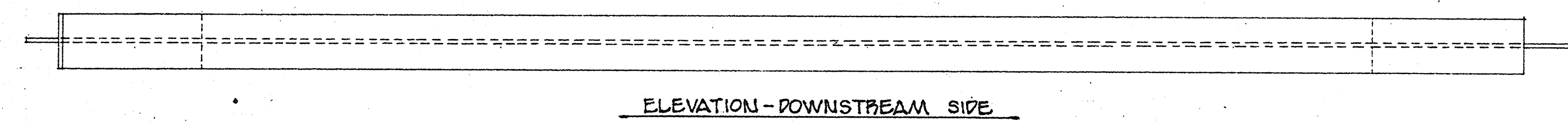


EYE BARS ELEVATIONS (UPPER & LOWER GATES)

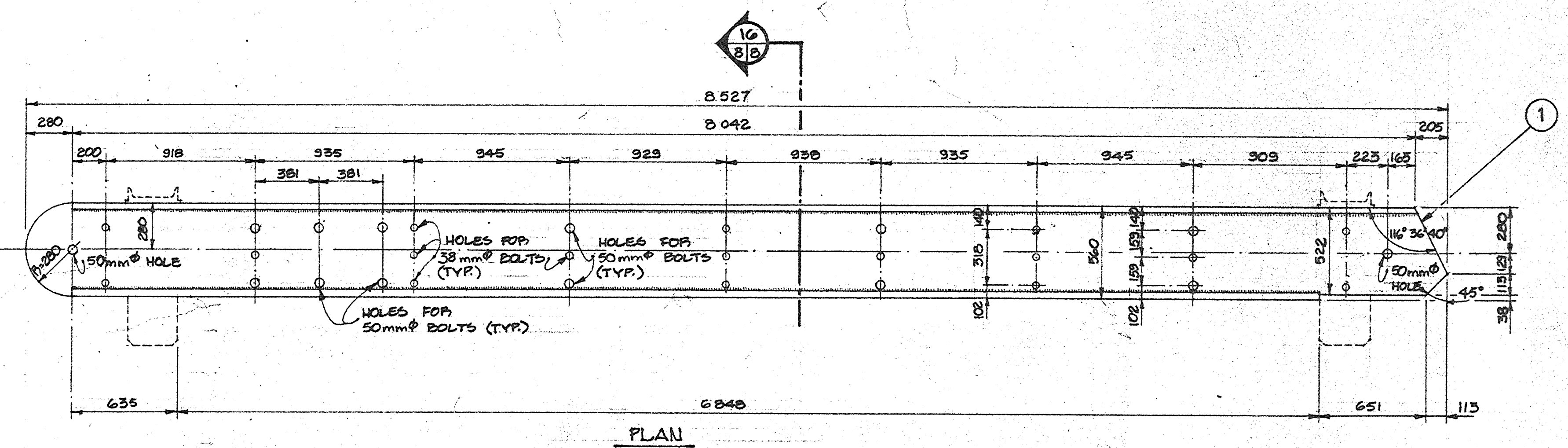
revisions			date
	A detail no. 10, of detail no. 10 location drawing no. 10, on design no. 10		
project			project
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drawing	detail		
<h2>LOWER GATE SECTIONS UPPER & LOWER GATES EYE BAR DETAILS</h2>			
designed	21/09/87		
date	E. RECURTS		
drawn	21/09/87		
date	F. DAIGLE		
reviewed	examined		
date	D. Holberg		
approved	approved		
date	81-09-25		
Tender	Administration de projets TPC		Soumission
PWC Project Manager	Administrateur de projets TPC		
project number	no. of the project		
037538			
drawing no.	no. of the detail		
7 of 14			



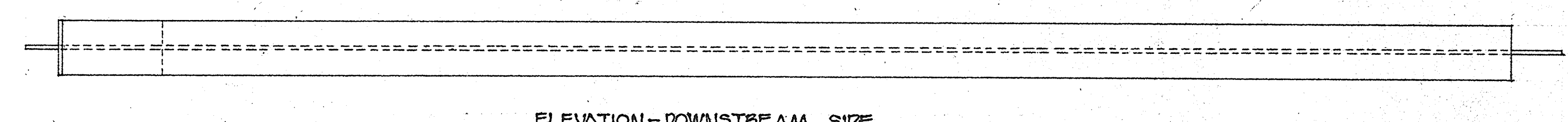
ELEVATION-UPSTREAM SIDE



610mm FABRICATED BEAM (LOWER GATE)

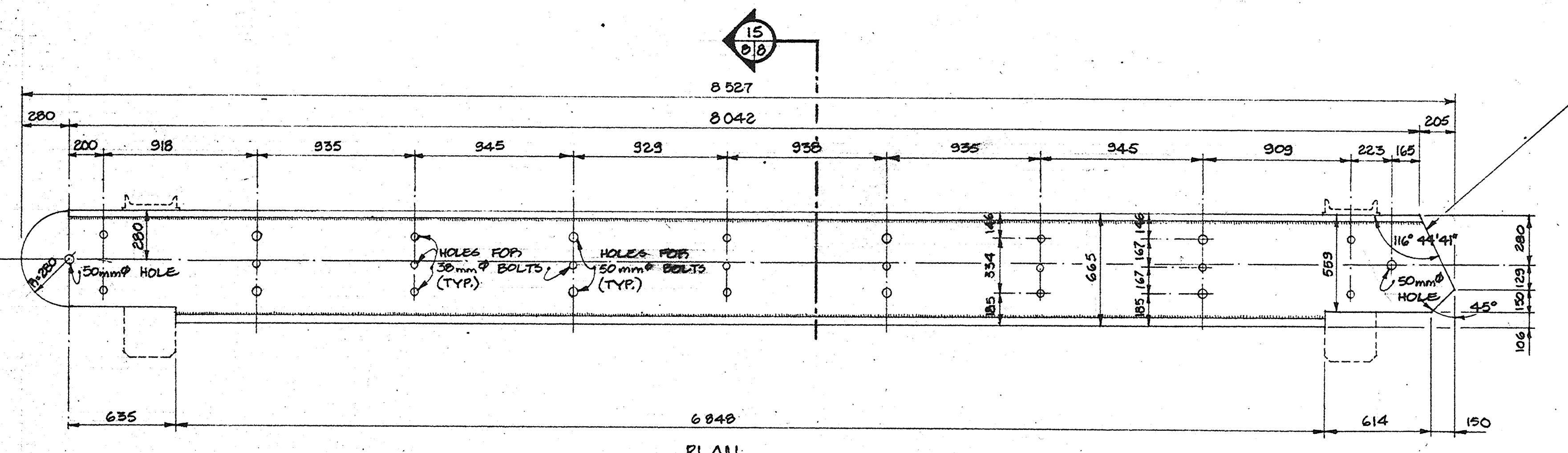


ELEVATION-UPSTREAM SIDE

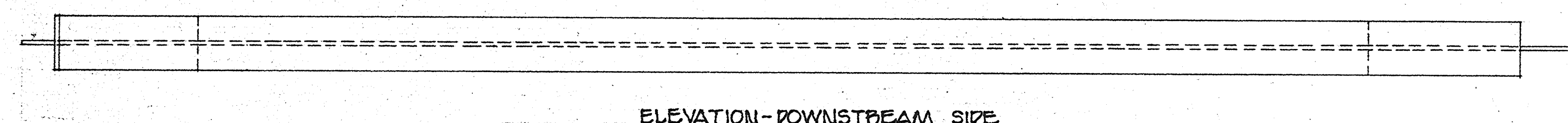


560mm FABRICATED BEAM (UPPER GATE)

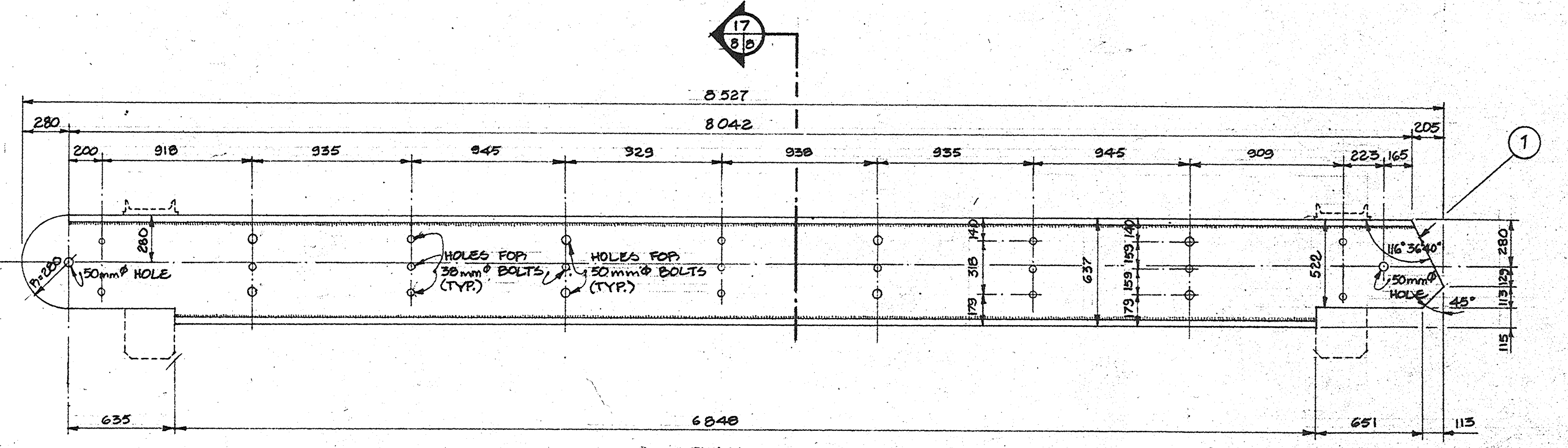
SEE NOTE ON SHEET No. 3
DETAIL OF STEP SOCKET



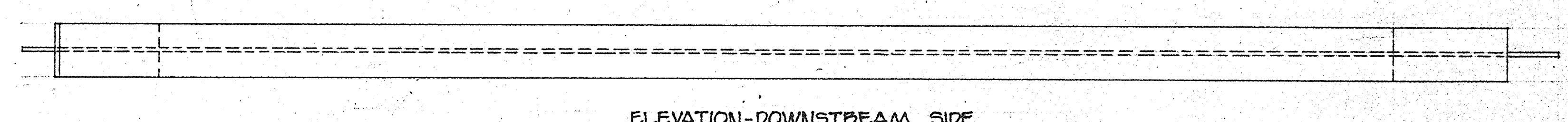
ELEVATION-UPSTREAM SIDE



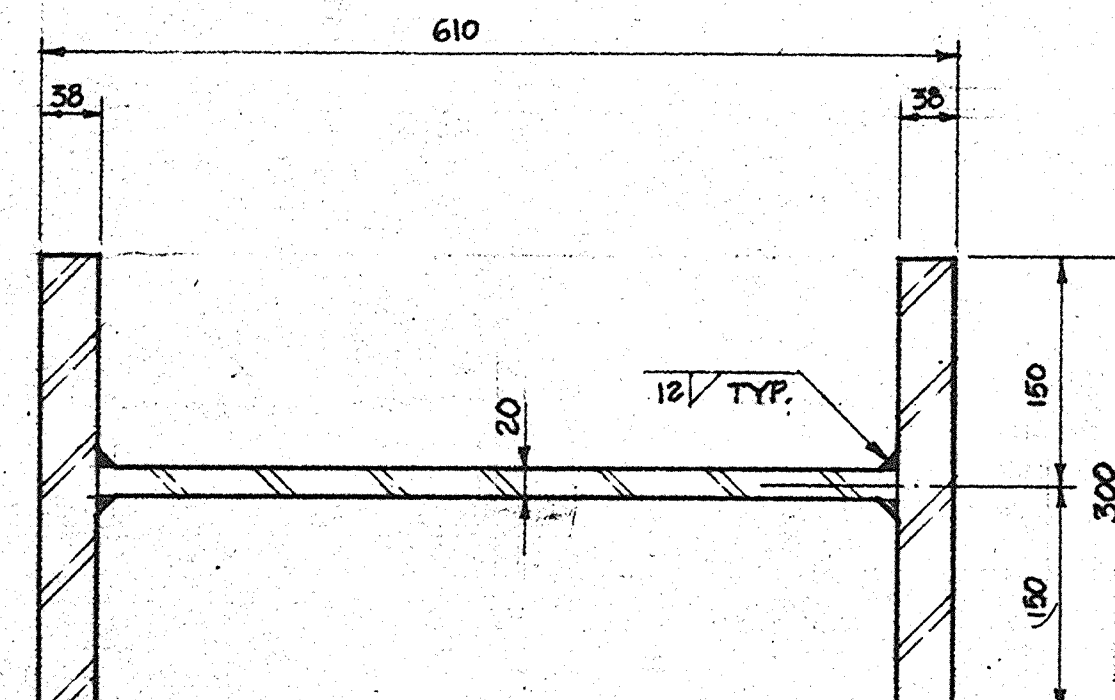
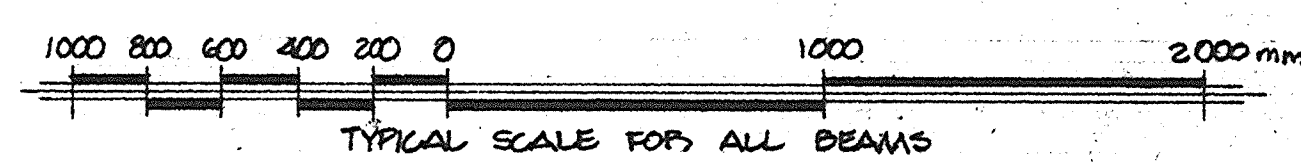
665mm FABRICATED BEAM (LOWER GATE)



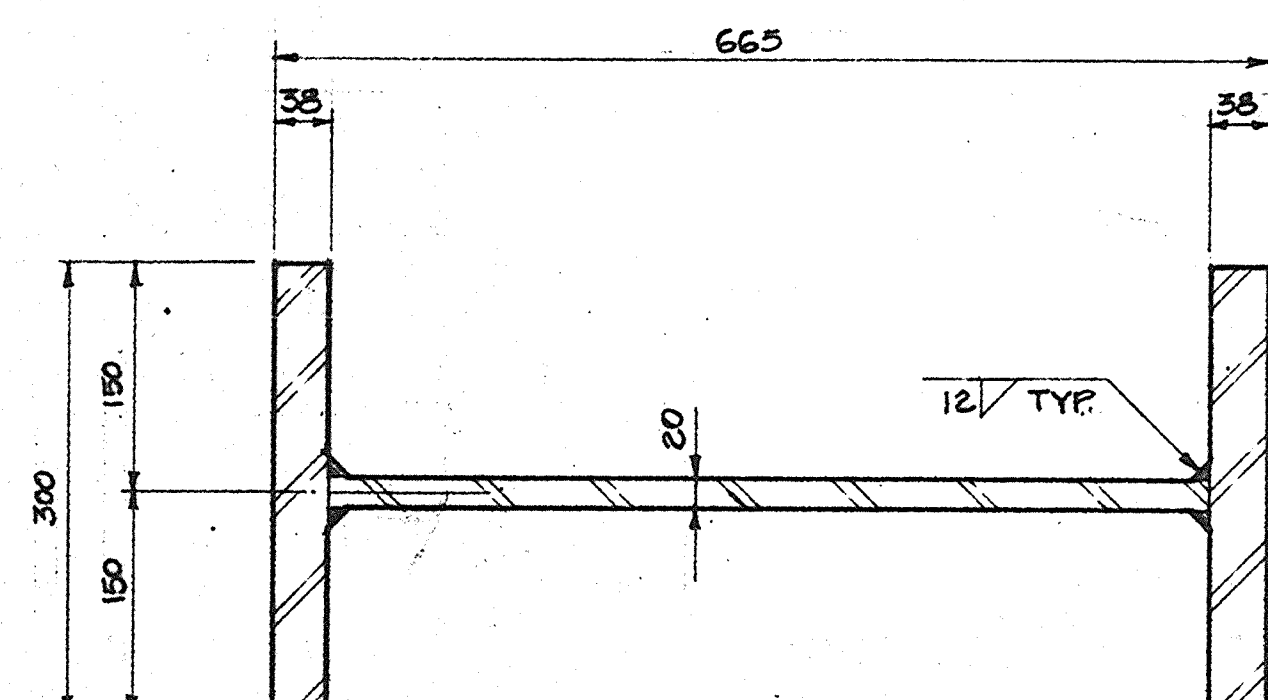
ELEVATION-UPSTREAM SIDE



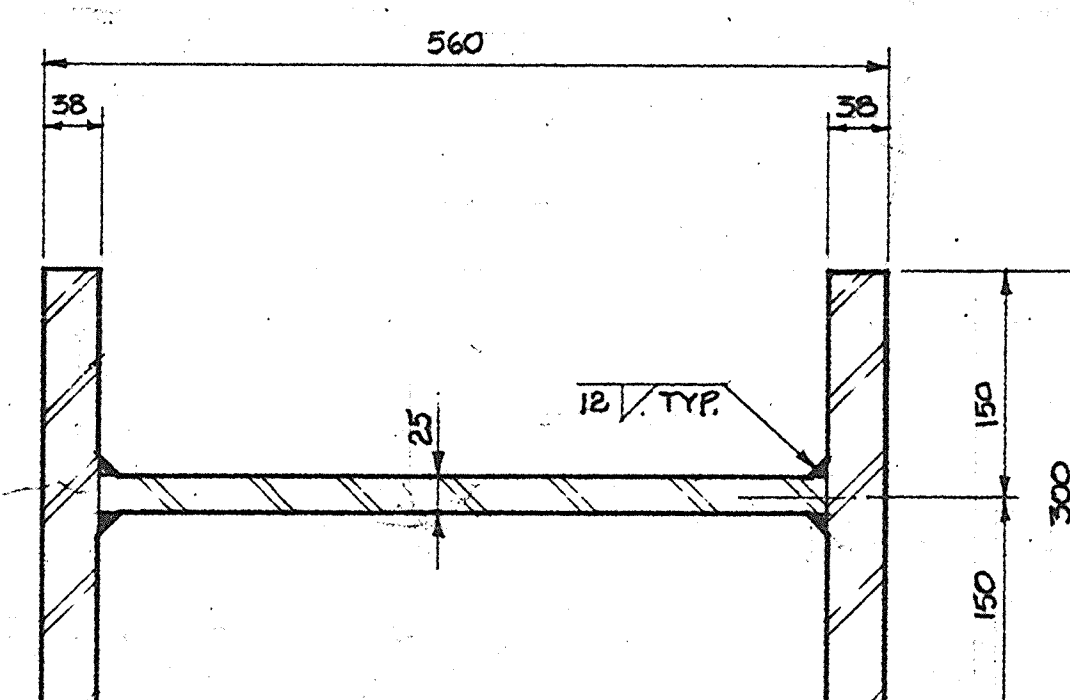
637mm FABRICATED BEAM (UPPER GATE)



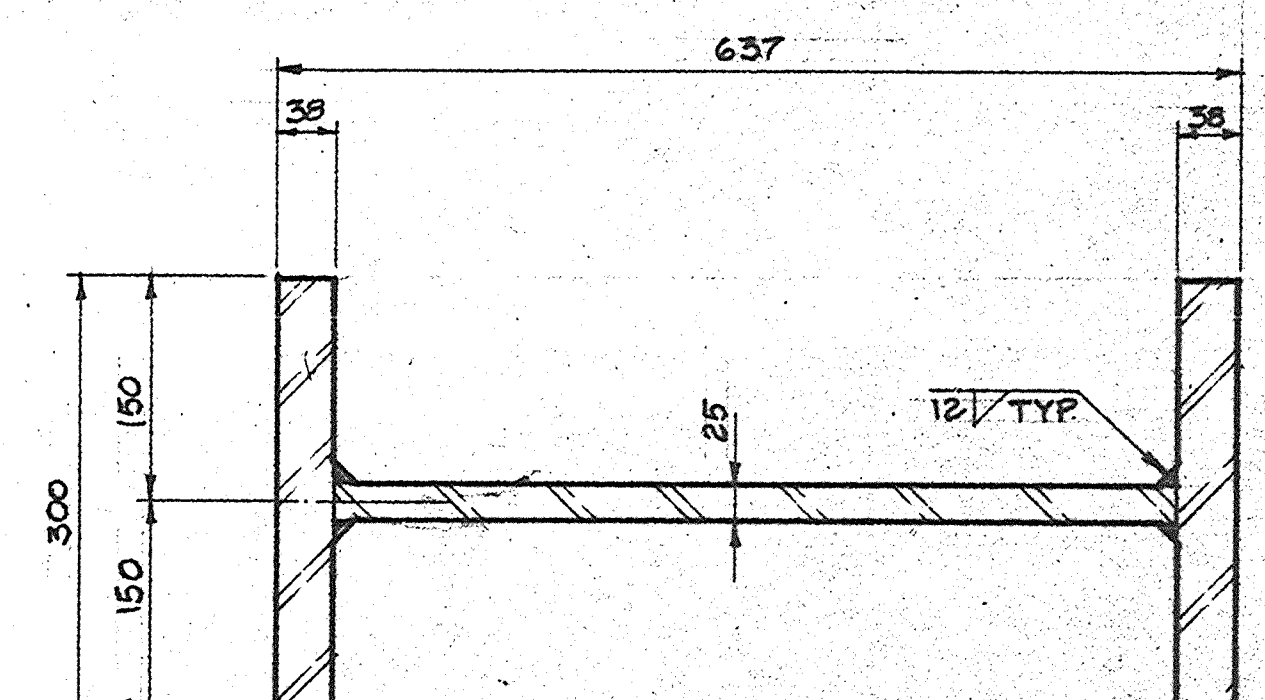
SECTION 14
8/8



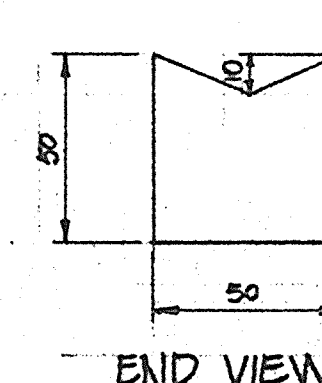
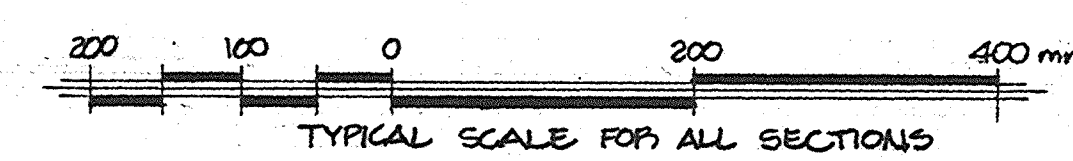
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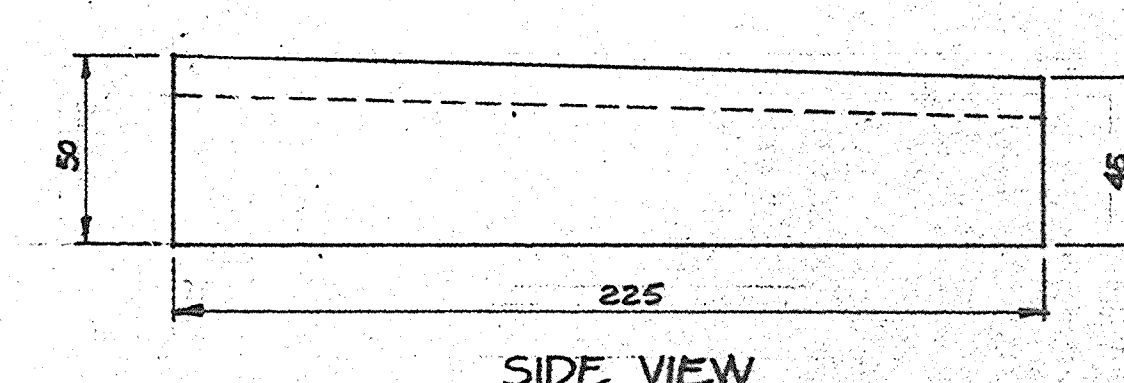
SECTION 16
8/8



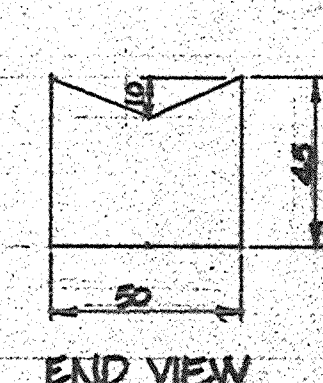
SECTION 17
8/8



END VIEW

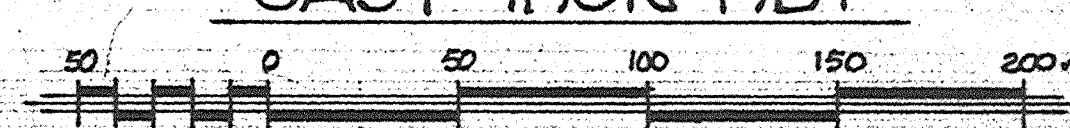


SIDE VIEW

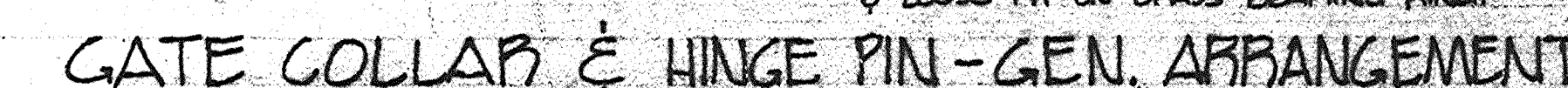
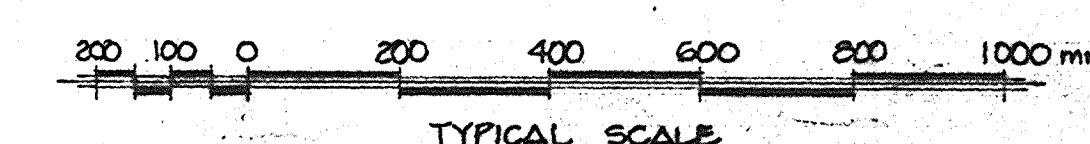
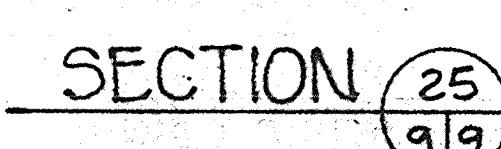
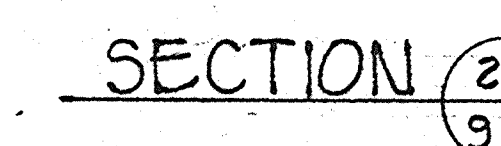
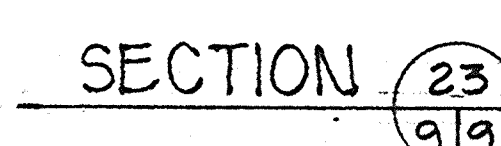
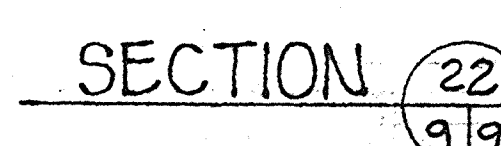
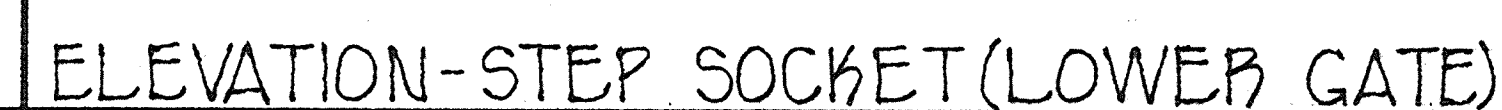
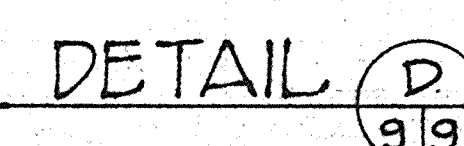
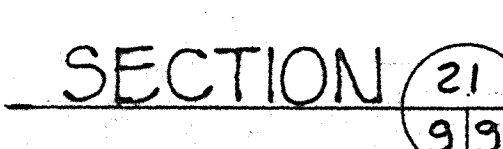
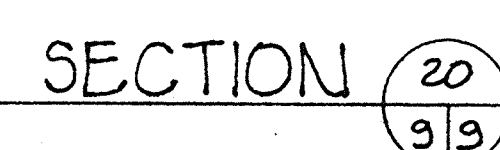
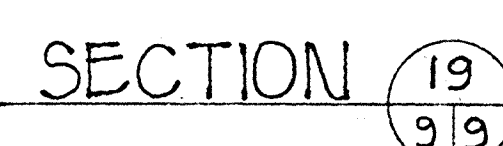
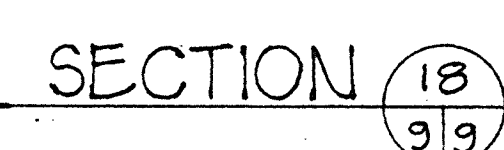
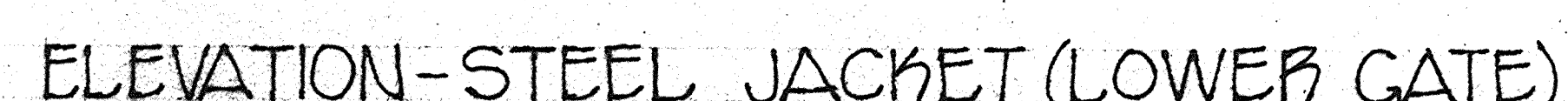
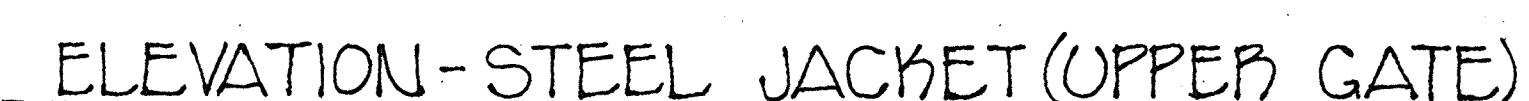


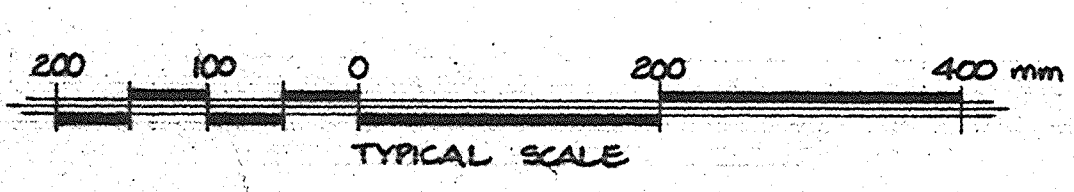
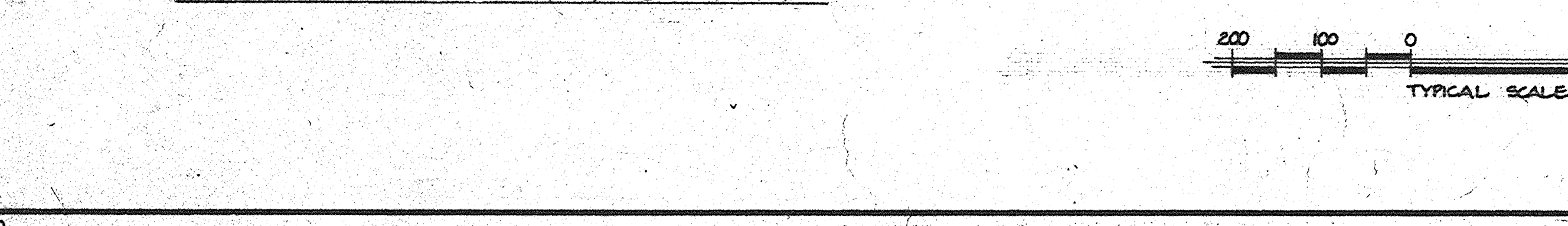
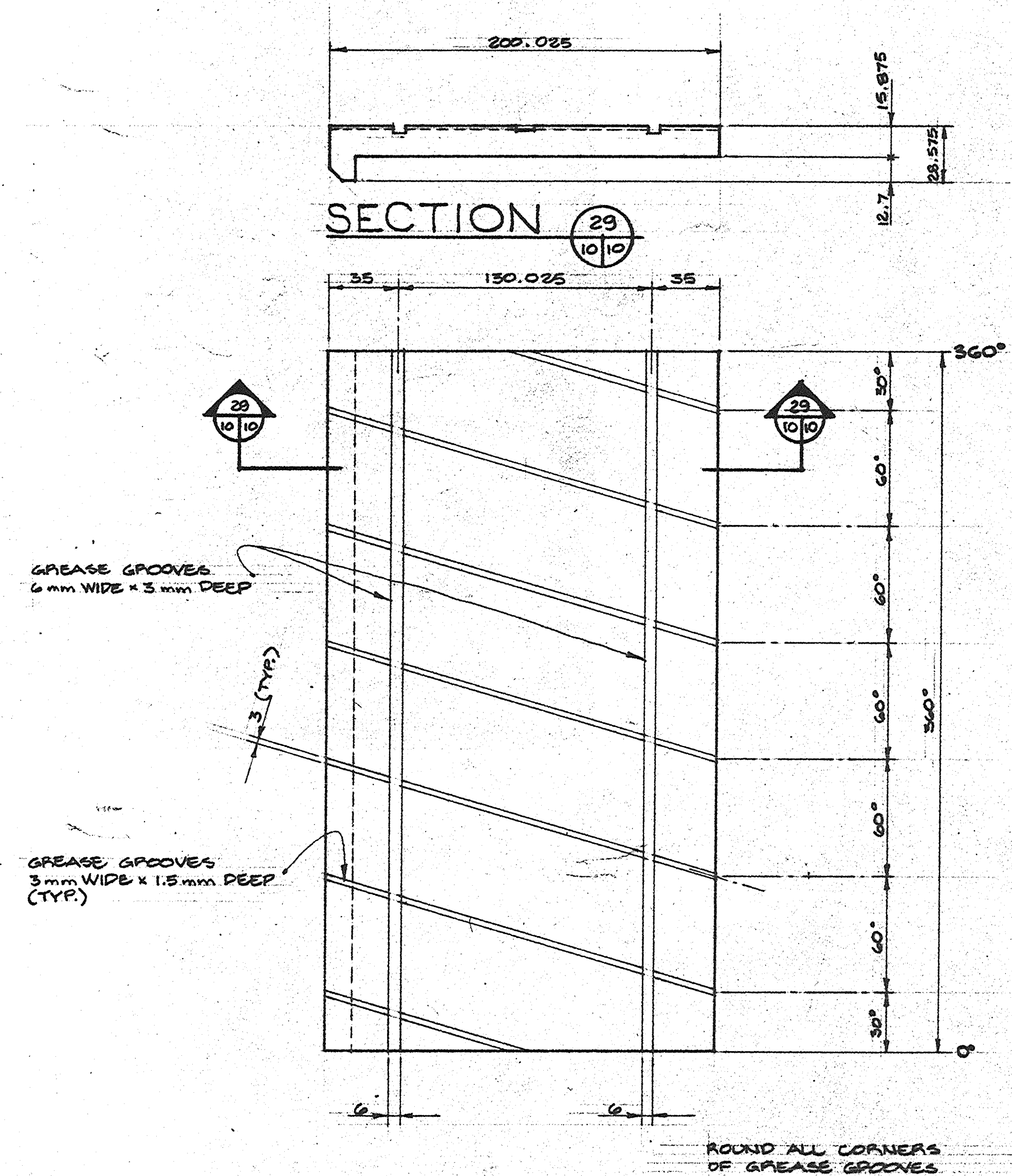
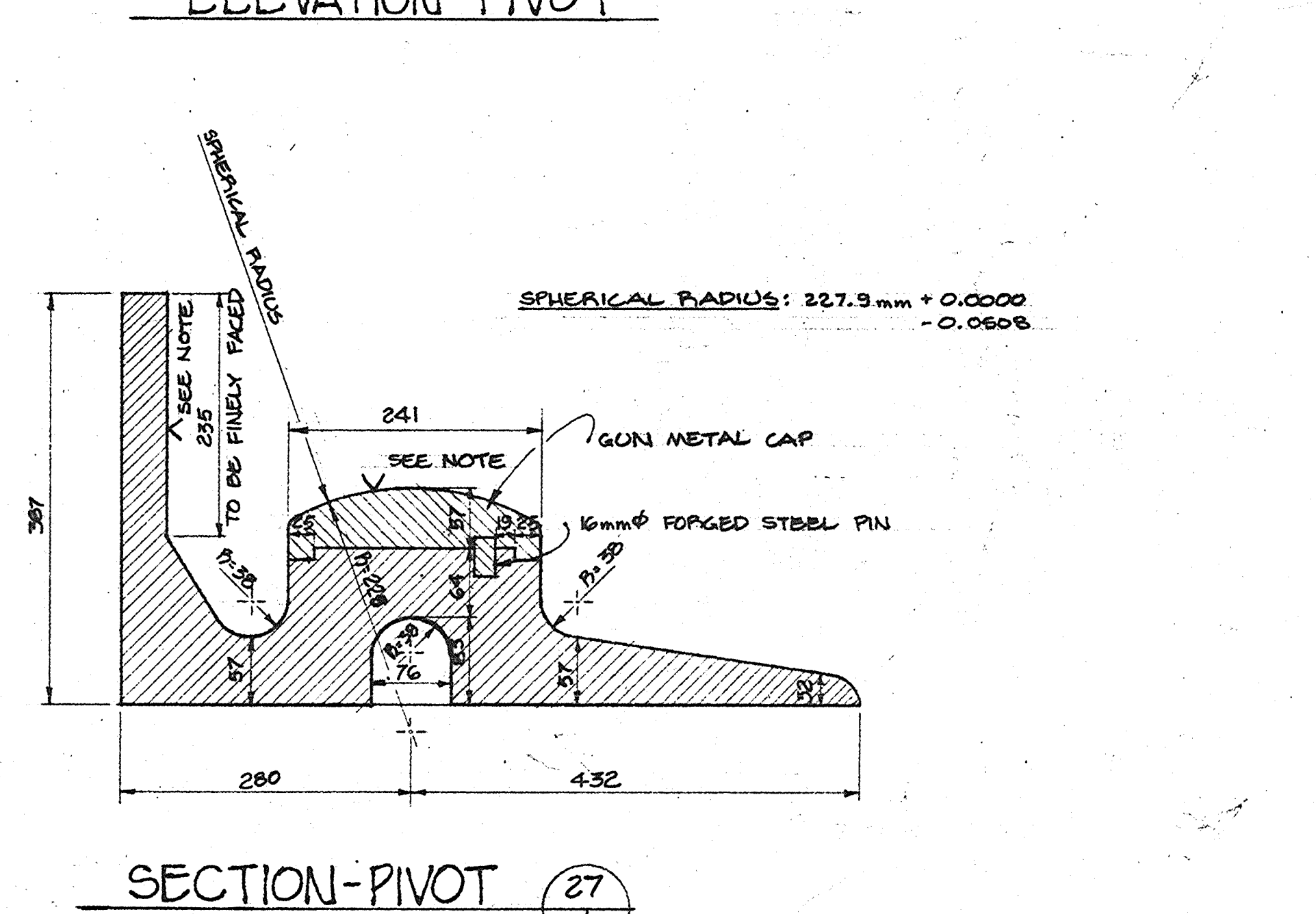
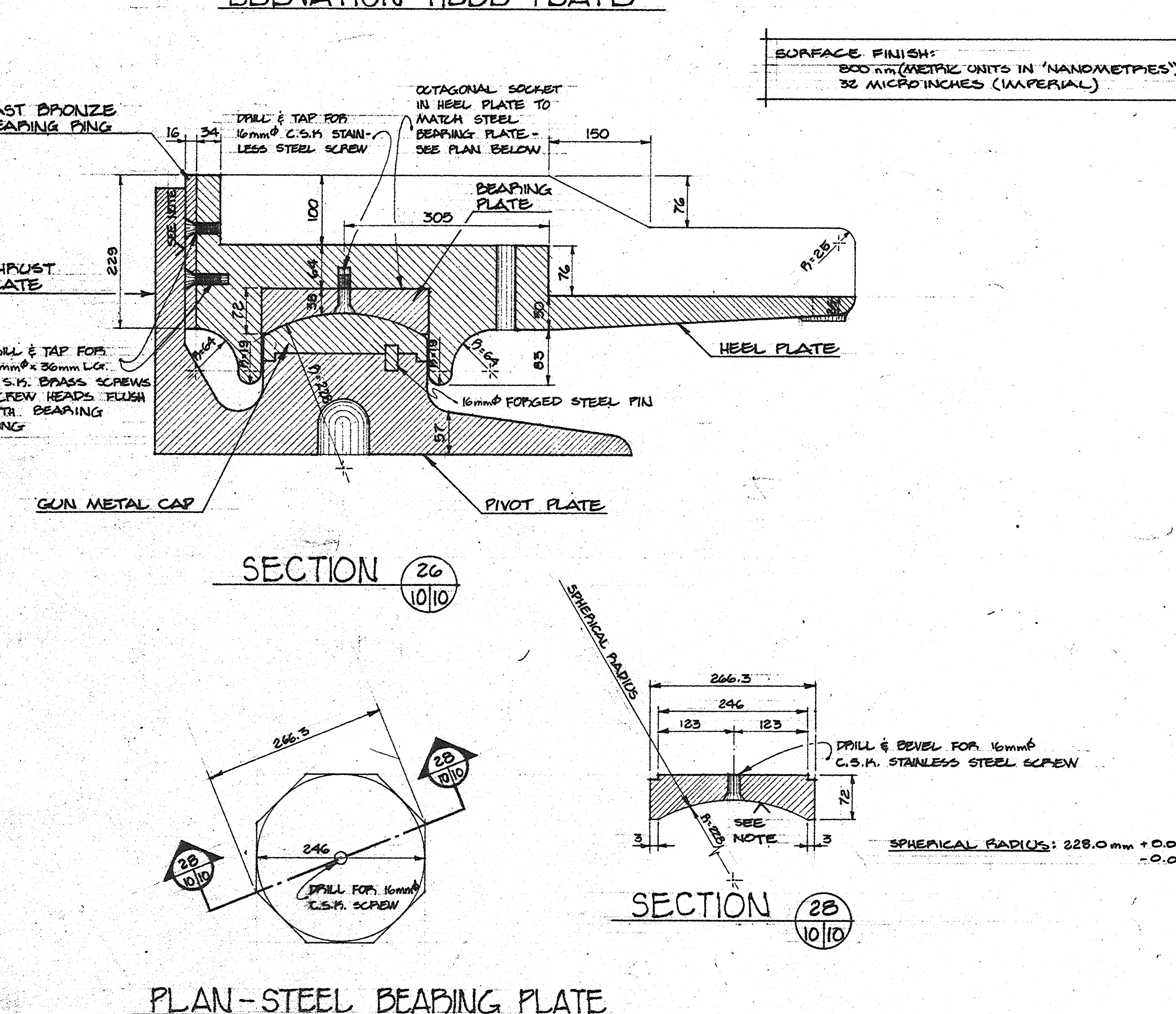
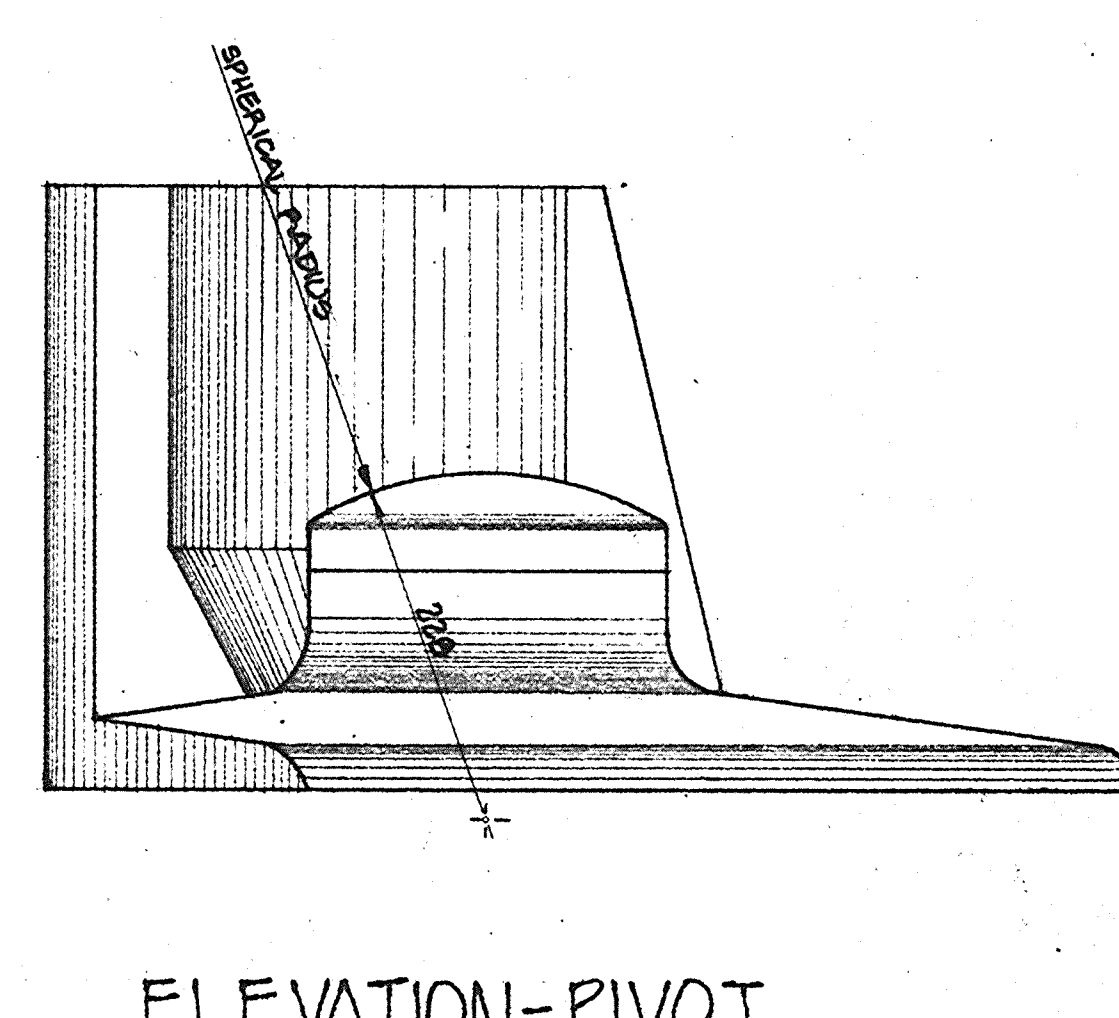
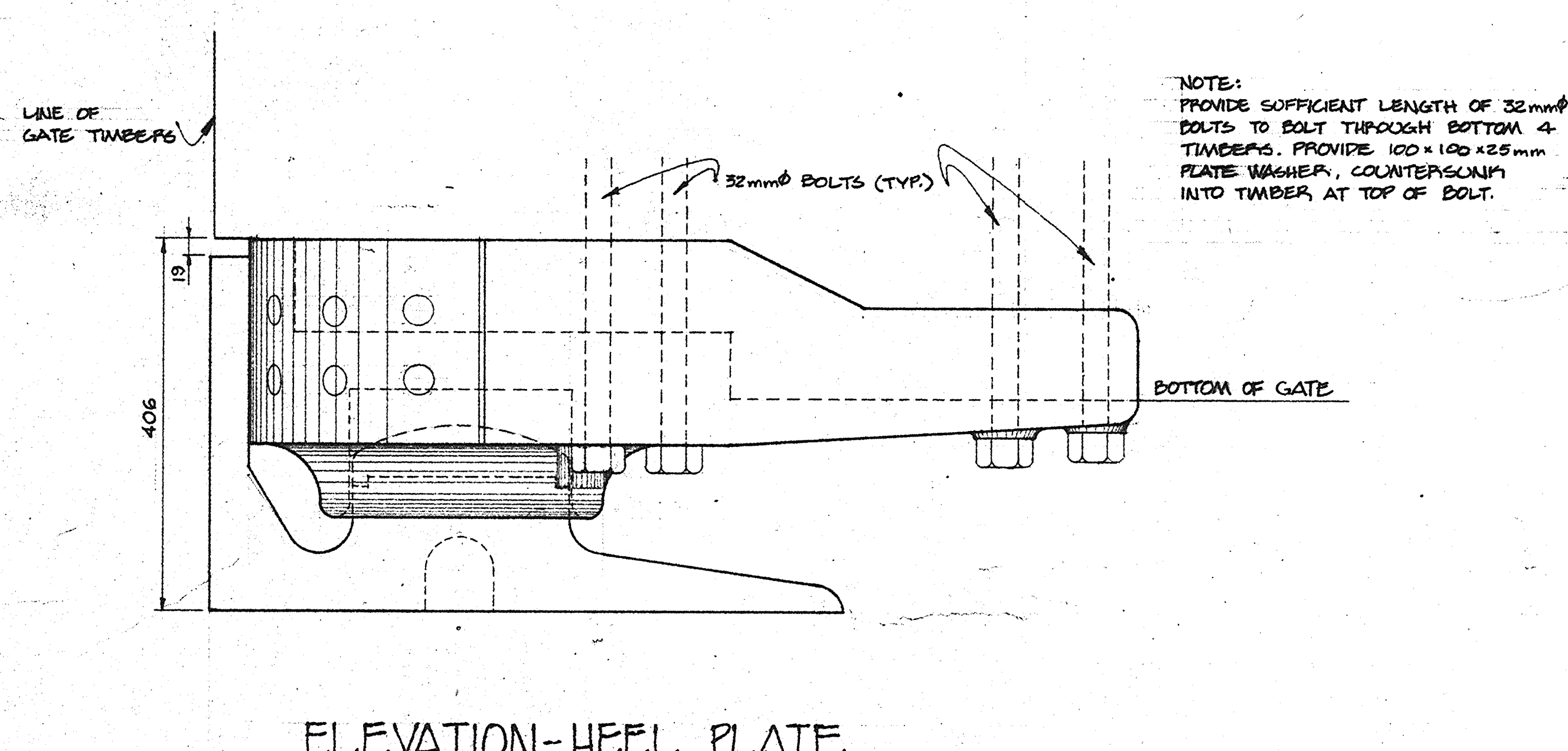
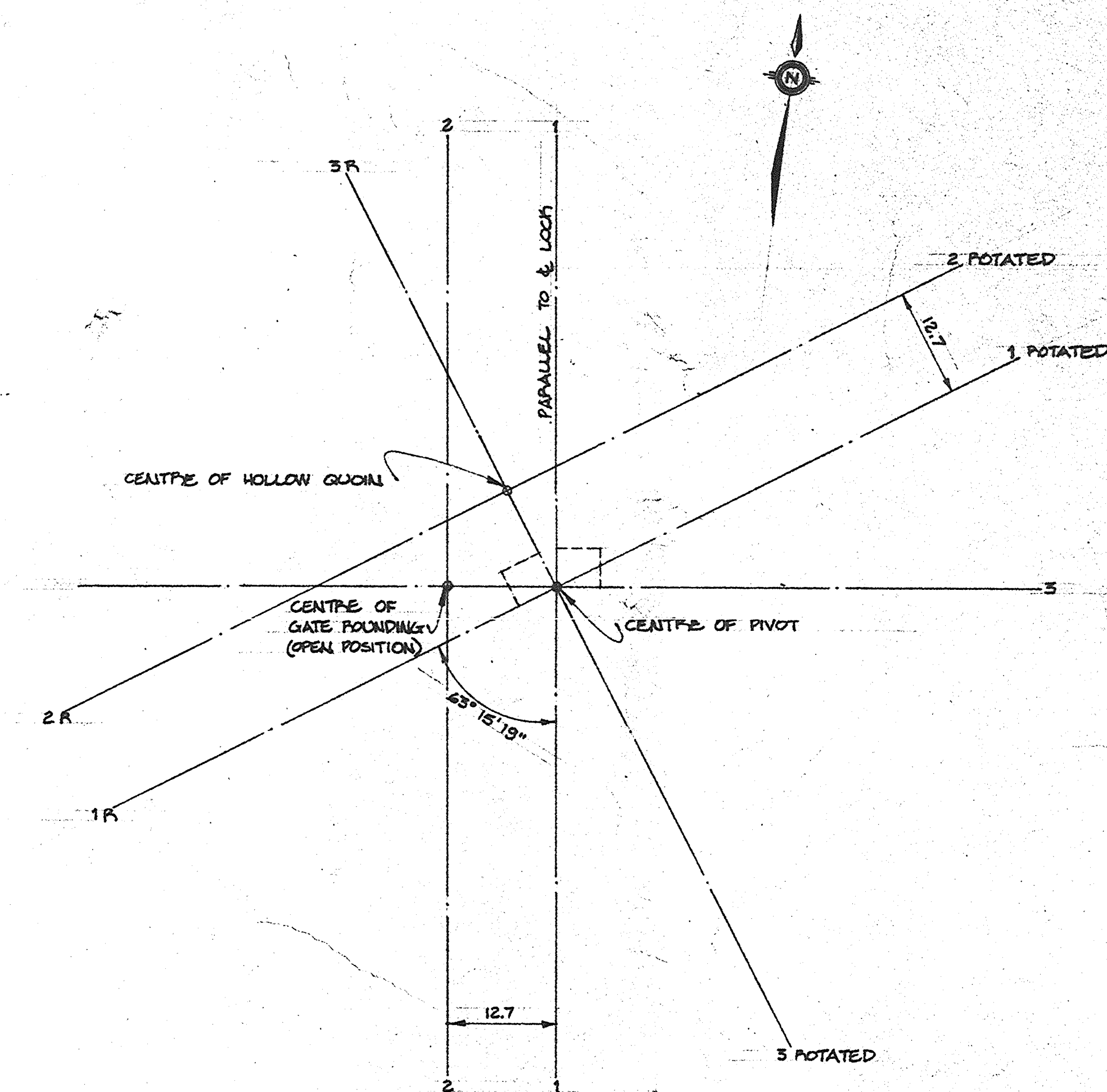
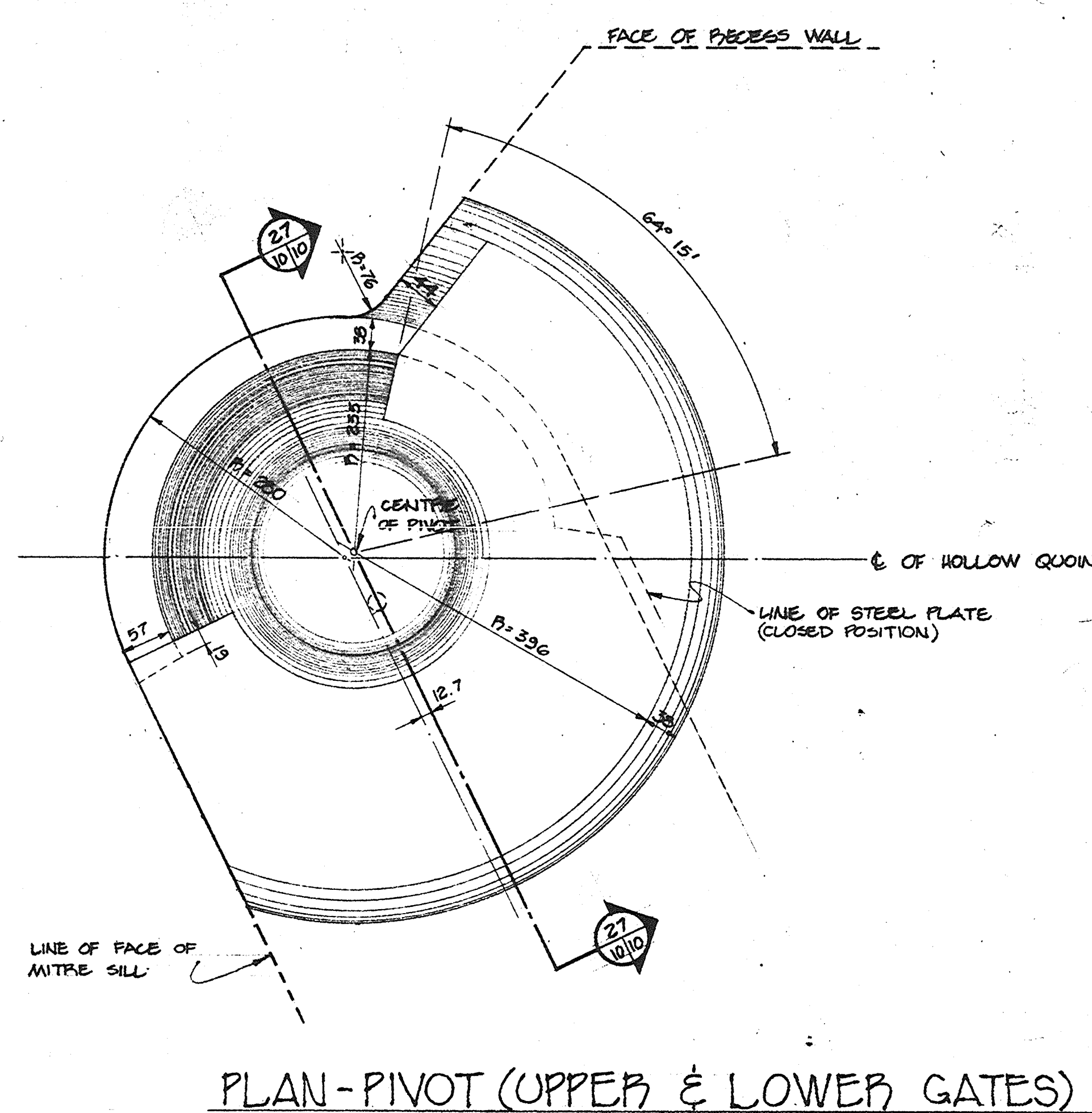
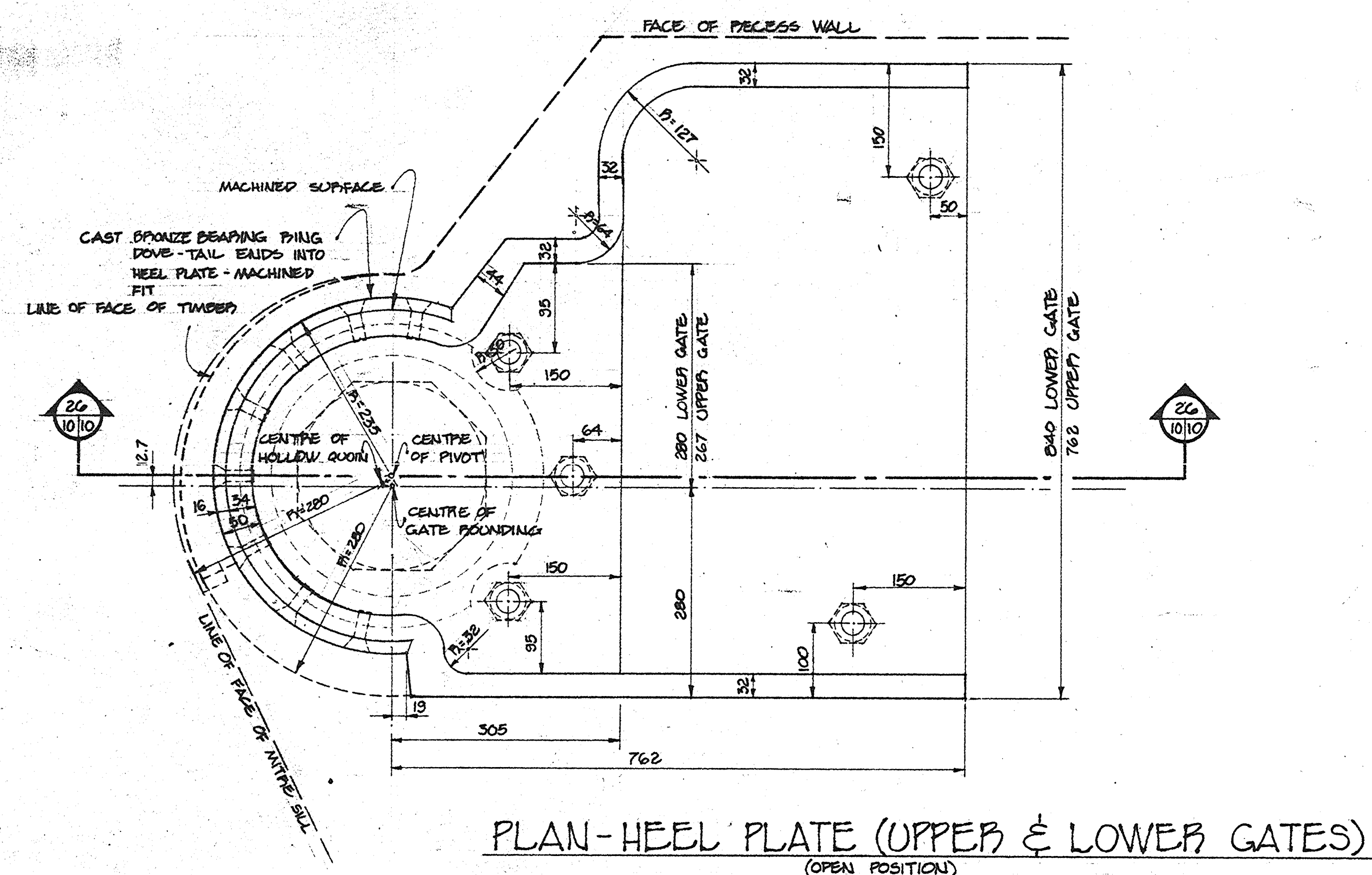
END VIEW

CAST IRON KEY



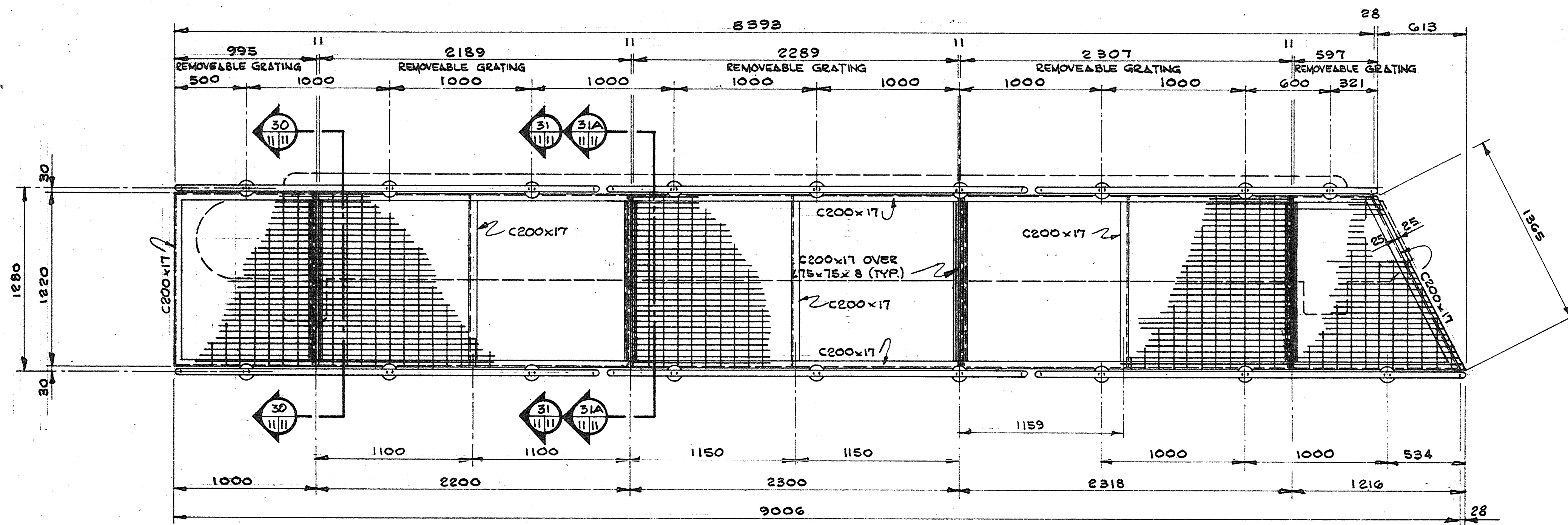
revisions	date
A	A detail no. of detail
B	B location drawing no. of detail
C	C drawing no. of detail
project	project
ST-ANDREWS LOCK & DAM LOCK GATES RENEWAL	
drawing	designed
date	2/09/81
drawn	designed
date	2/09/81
reviewed	examined
date	8/10/81
approved	approved
date	8/10/81
Project Manager	Administrateur de projet
project number	no. du projet
037538	
drawing no.	no. du dessin
8 of 14	





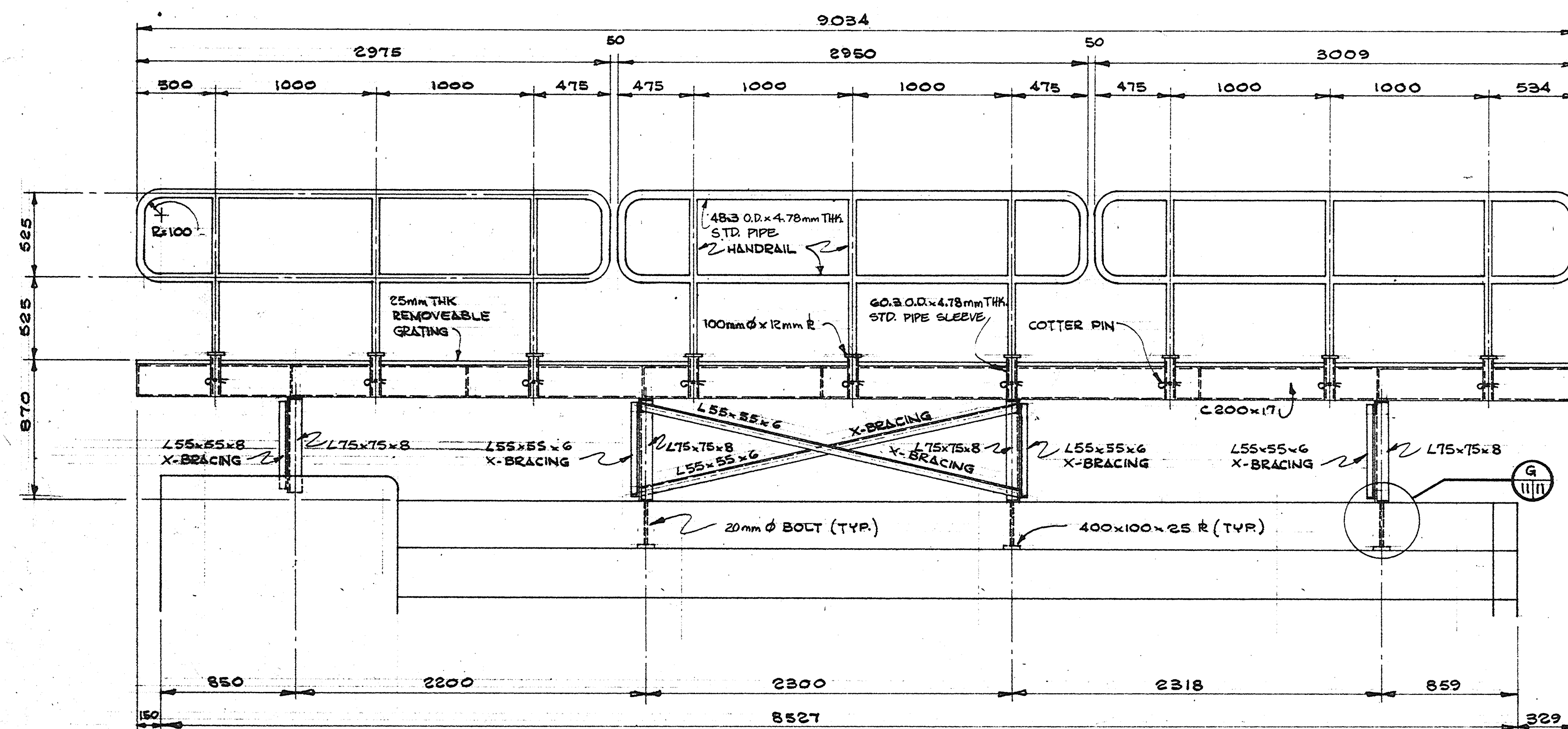
revision	date
A	21/09/81
B	21/09/81
C	21/09/81

designed	by N.O. KOLBERG	21/09/81
drawn	by F. DANGLE	21/09/81
checked	by	
approved	by	
Project Manager	Administrateur de projets	TTC
Project number	no. du projet	037538
drawing no.	no. du dessin	10 of 14

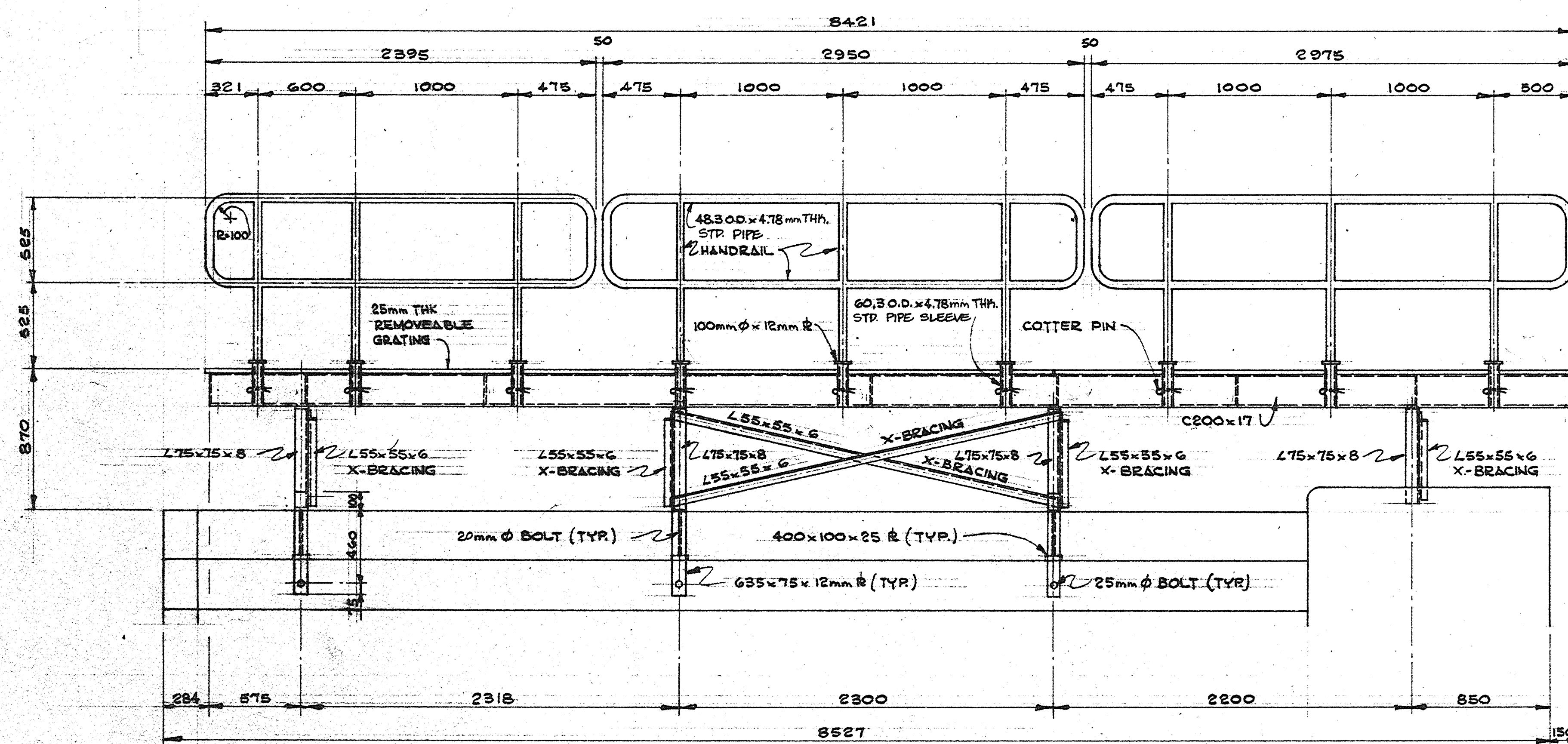


UPPER & LOWER GATES - WALKWAY PLAN

NOTE:
ALL WALKWAY GRATING TO HAVE
25mm x 3.2mm BEARING BARS
@ 30mm c/c BRACING

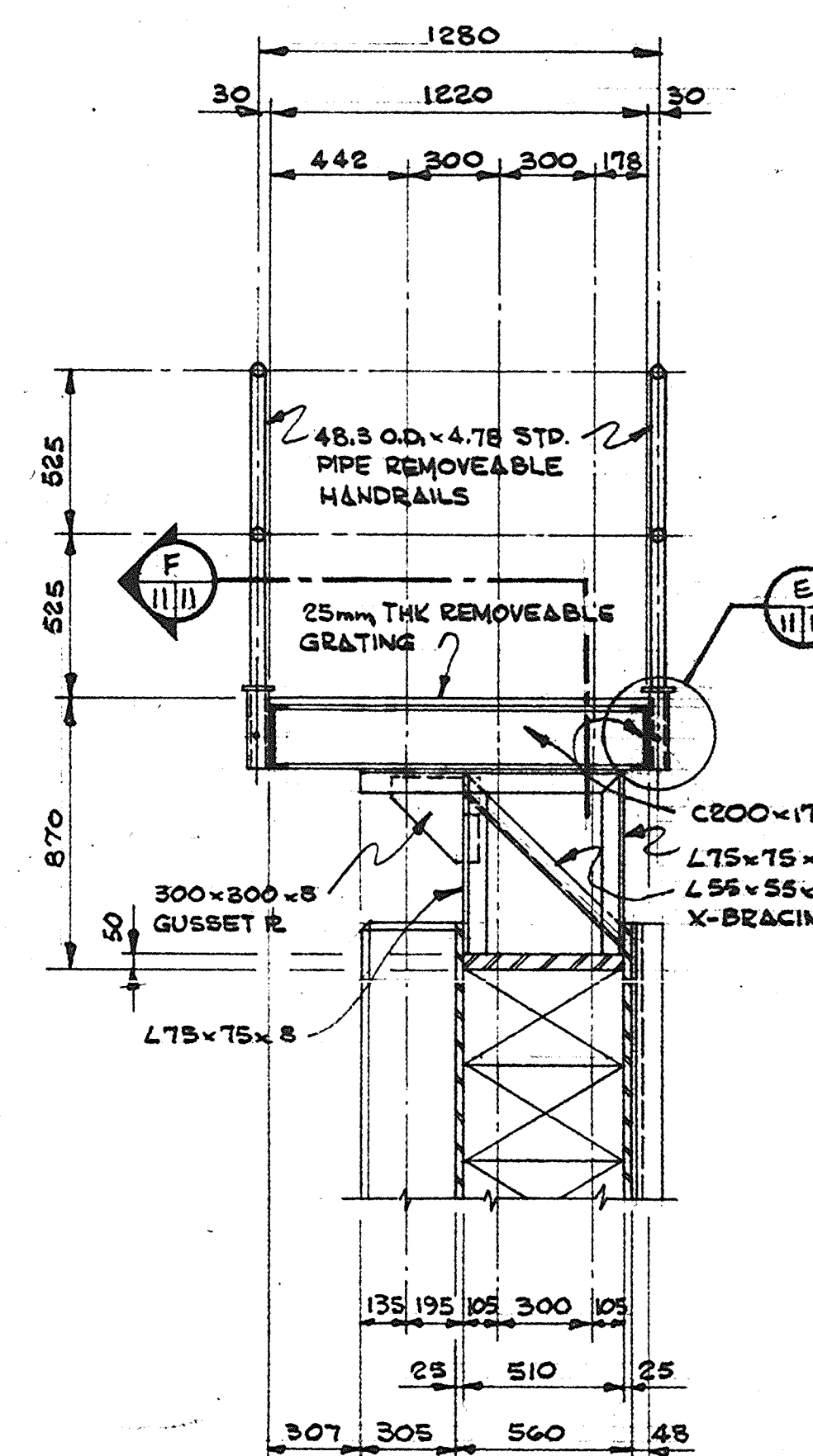


UPPER & LOWER GATES - WALKWAY UPSTREAM ELEVATION

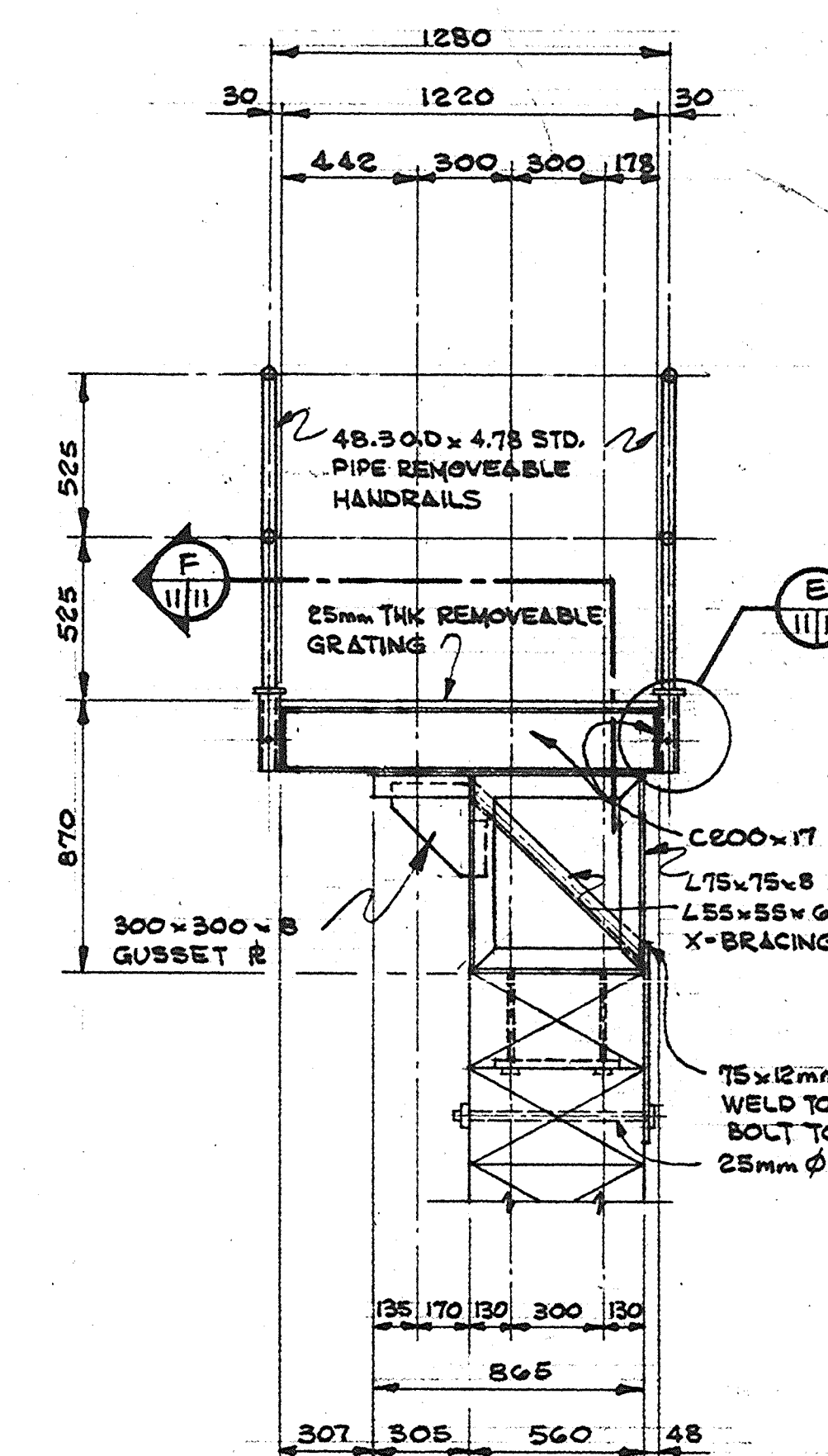


UPPER & LOWER GATES - WALKWAY DOWNSTREAM ELEVATION

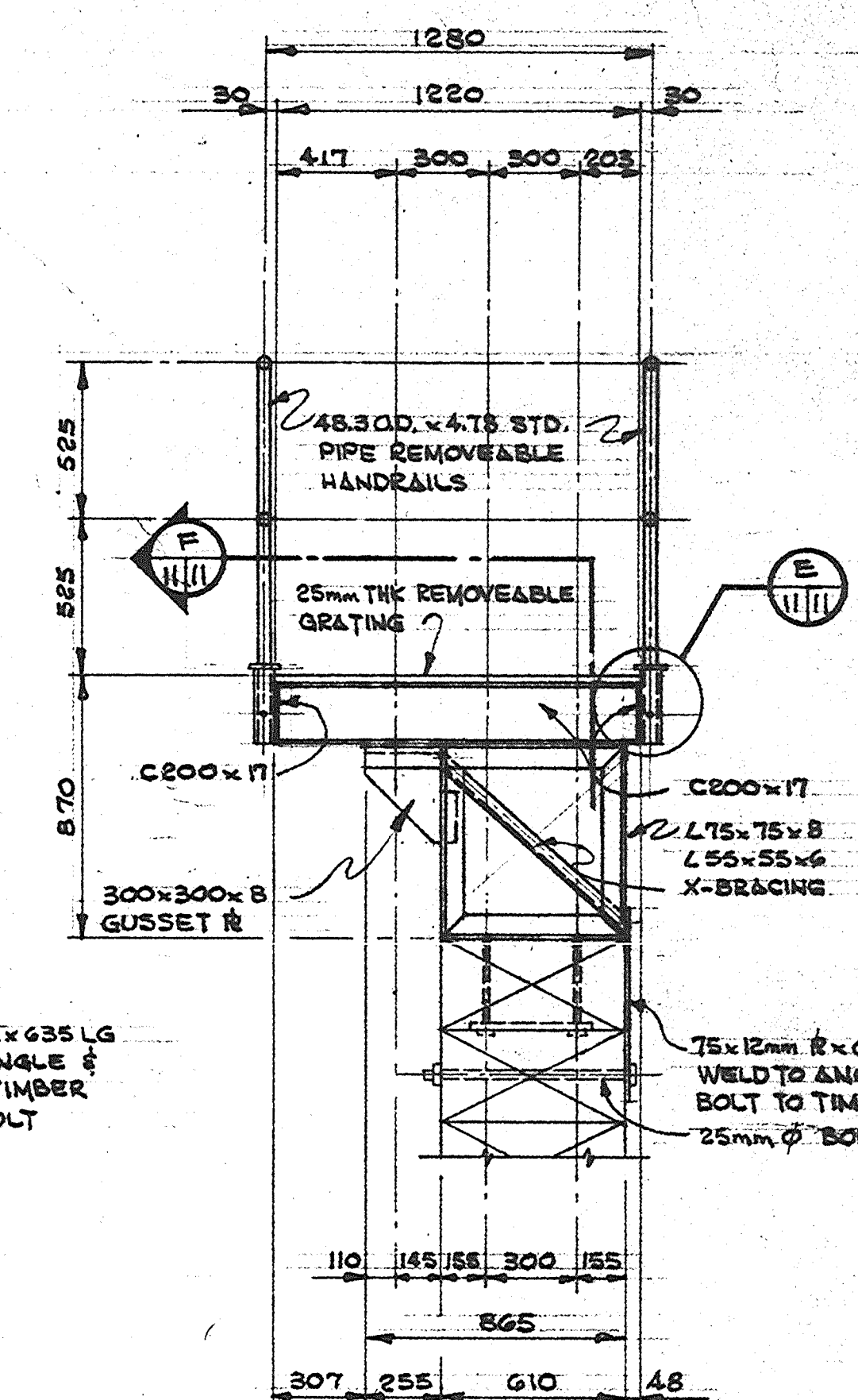
1000 600 400 200 0 1000 2000mm
TYPICAL SCALE FOR PLAN, ELEVATIONS & SECTIONS



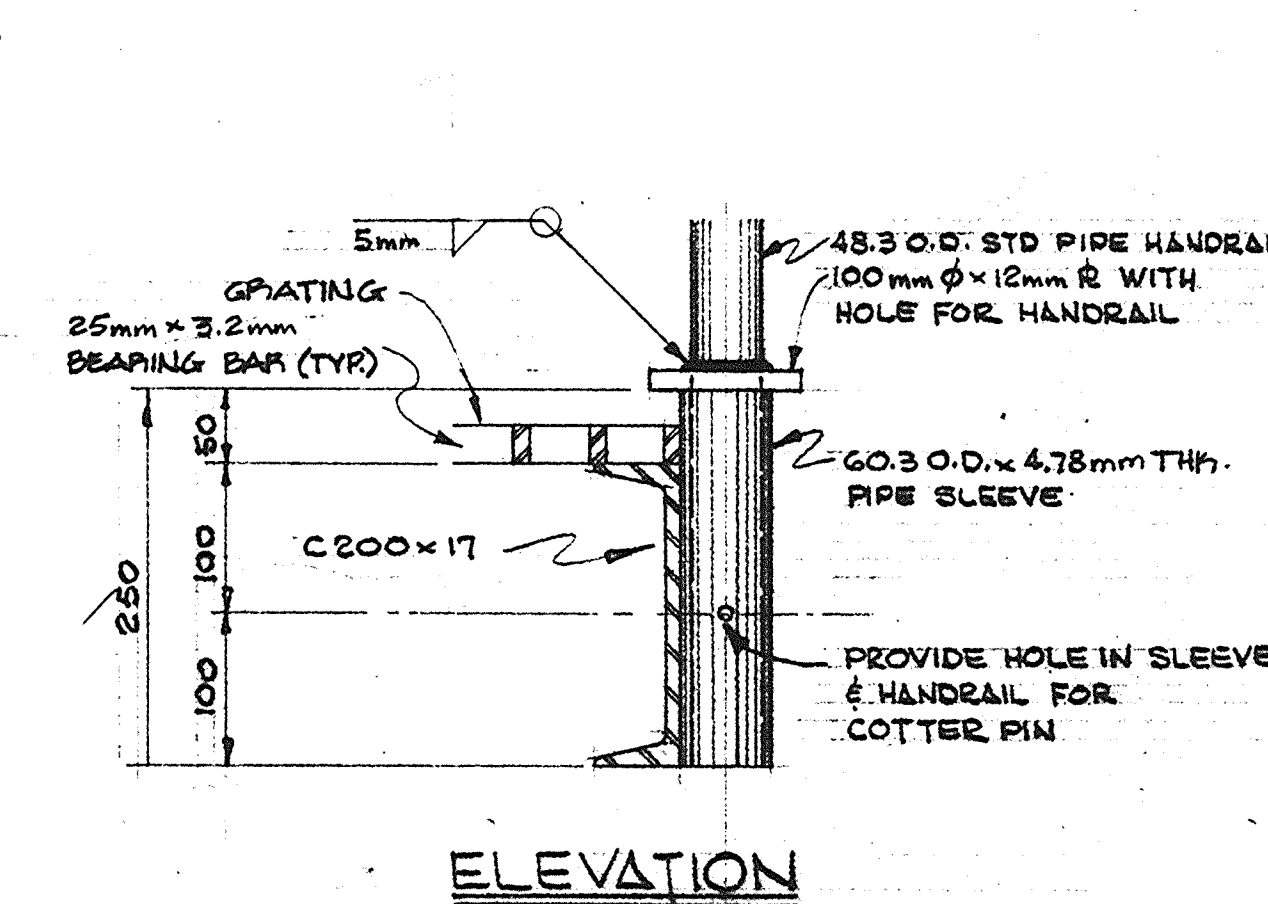
SECTION 50
UPPER & LOWER
GATES



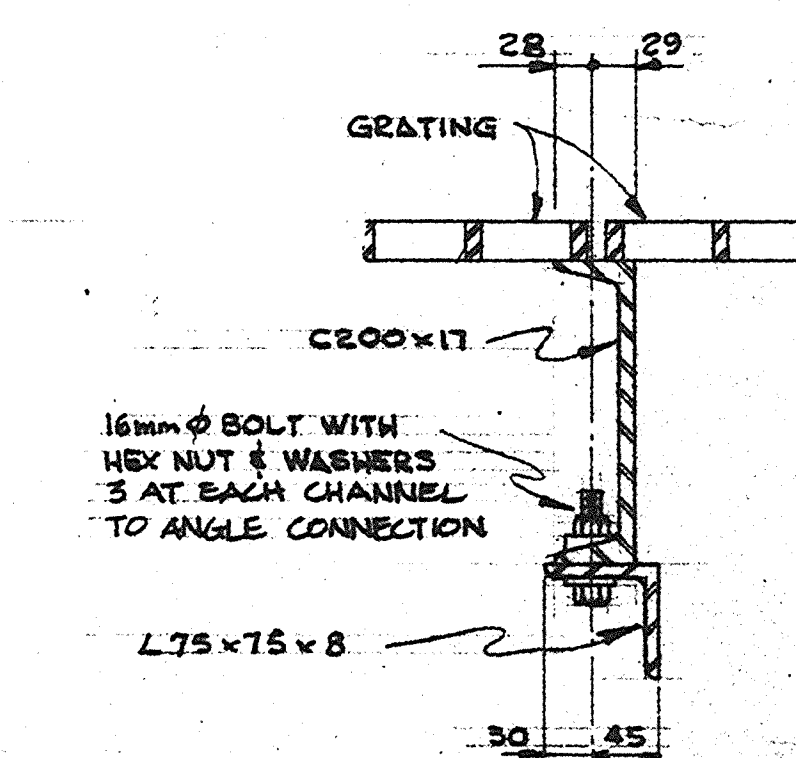
SECTION 51
UPPER GATE ONLY



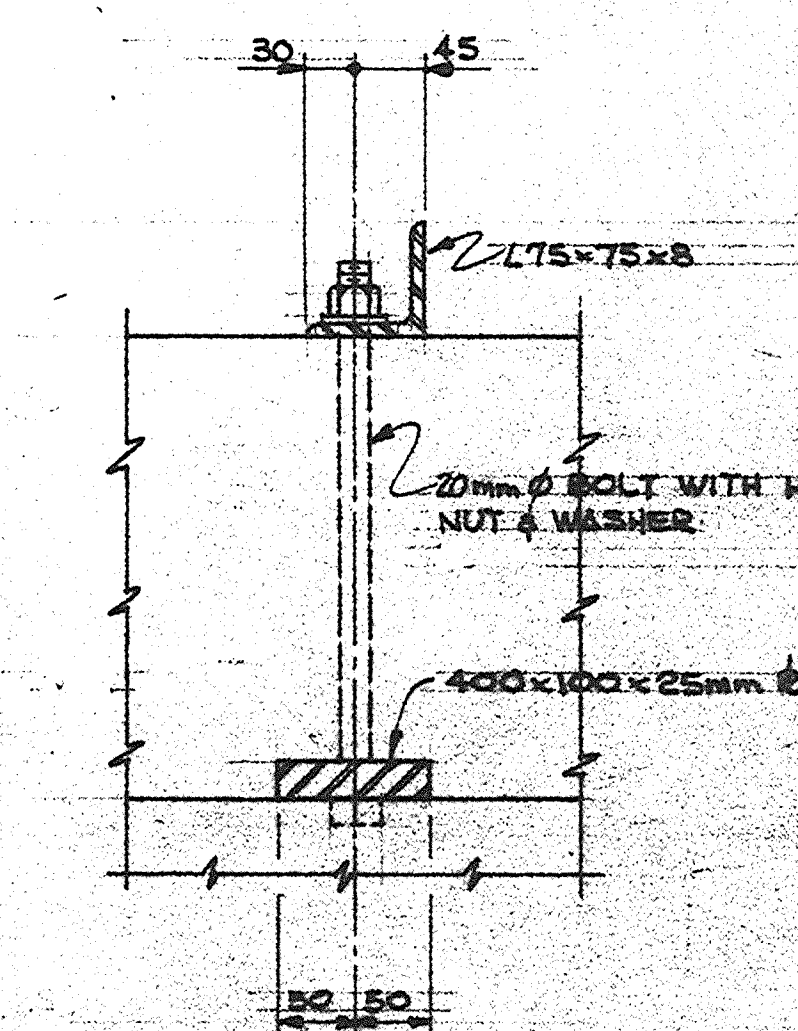
SECTION 51A
LOWER GATE ONLY



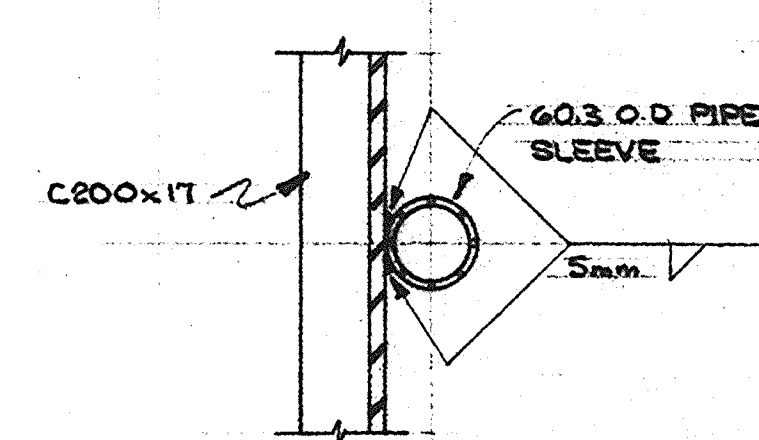
ELEVATION



WALKWAY BOLTING DETAIL

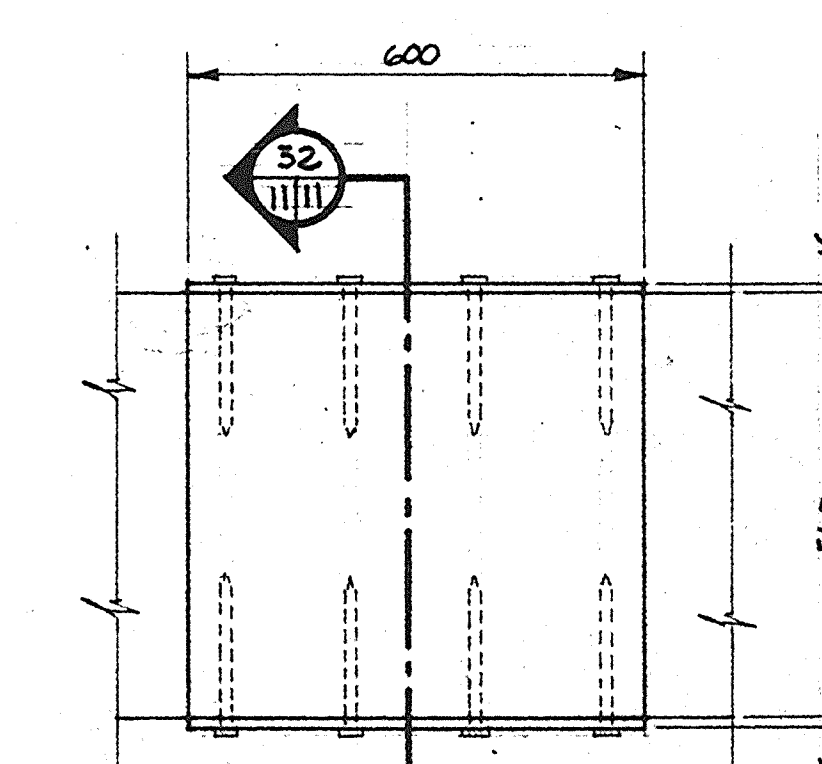


WALKWAY SUPPORT
BOLTING DETAIL

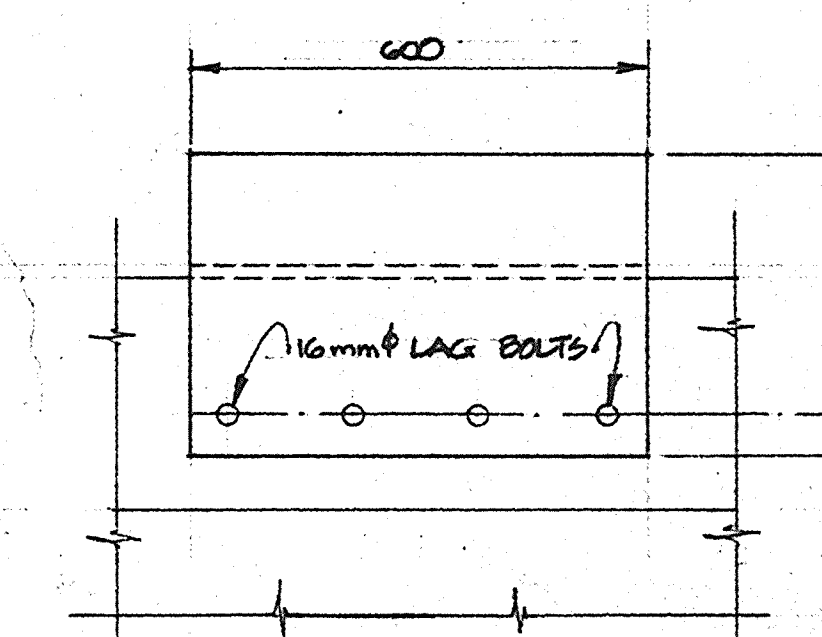


SECTION

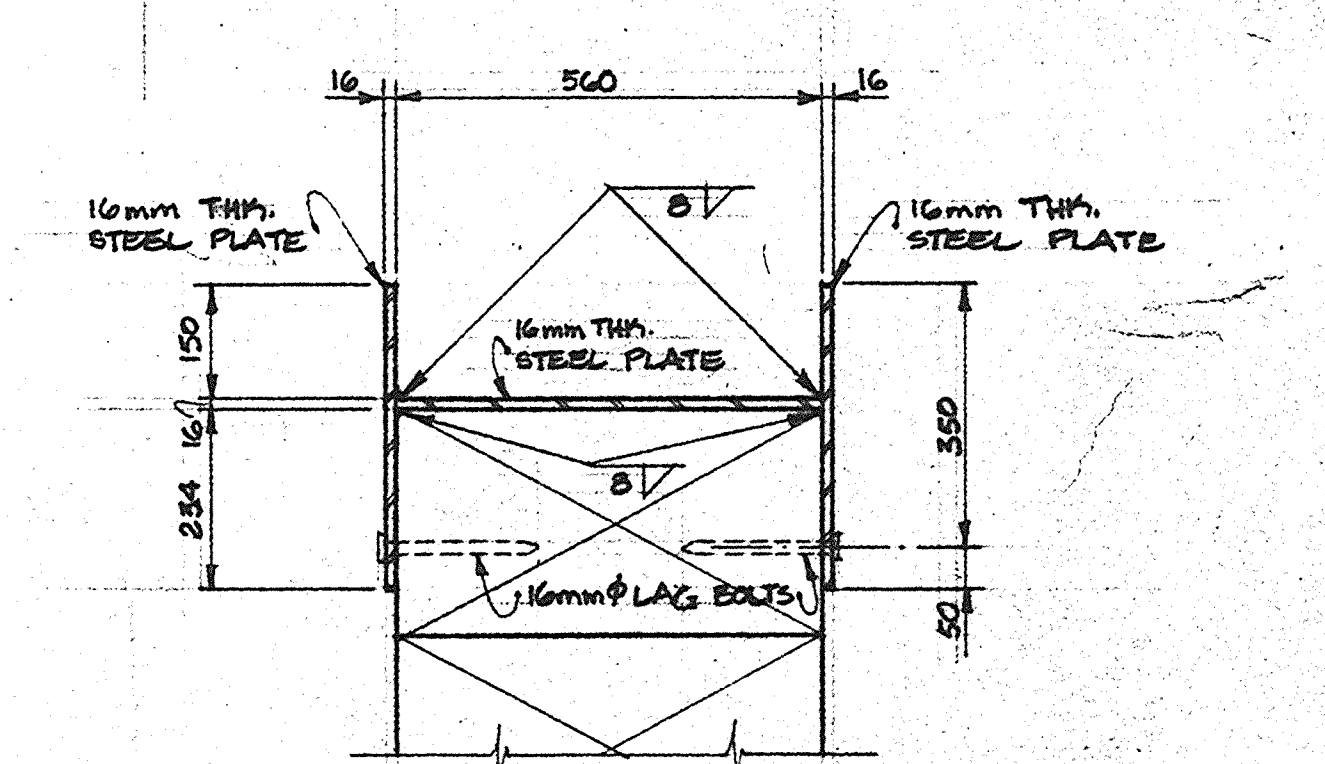
PIPE SLEEVE DETAIL



PLAN

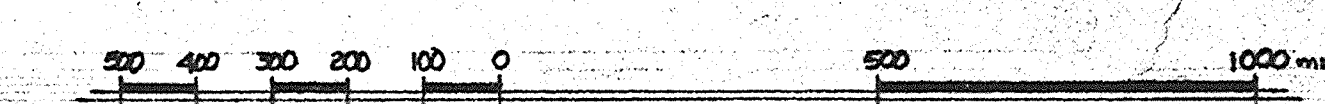


ELEVATION



SECTION 52

BALLAST RETAINER



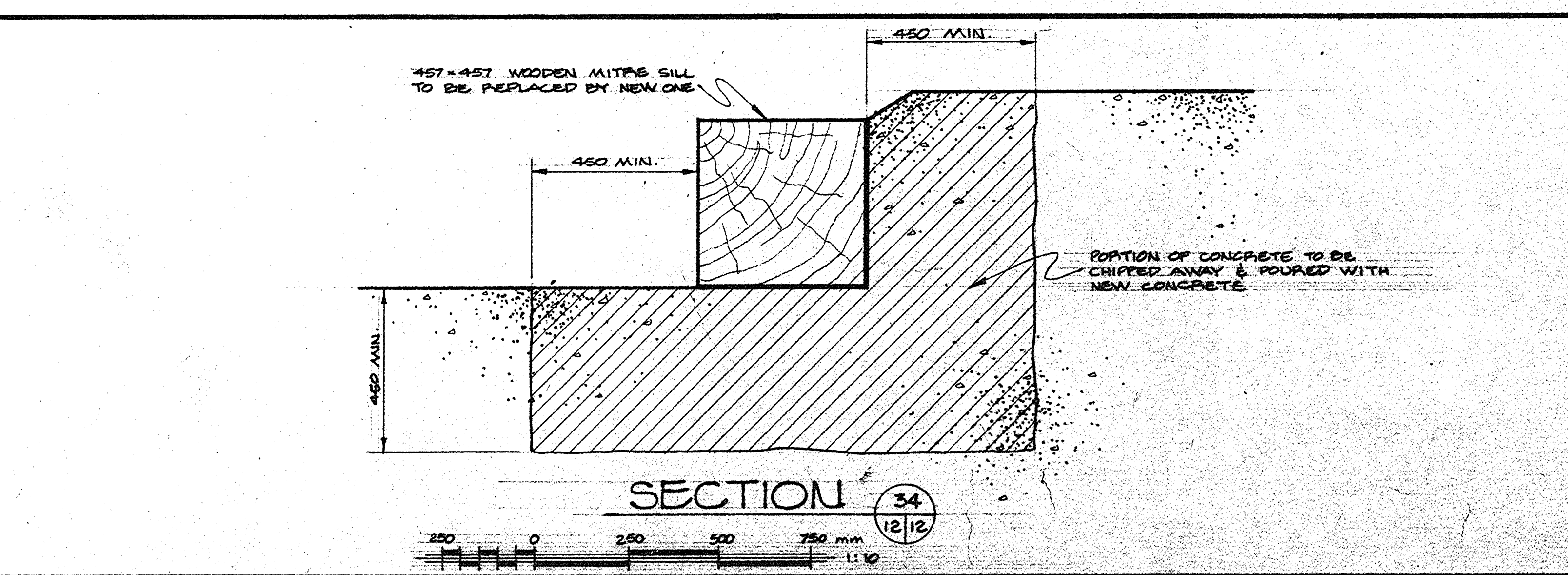
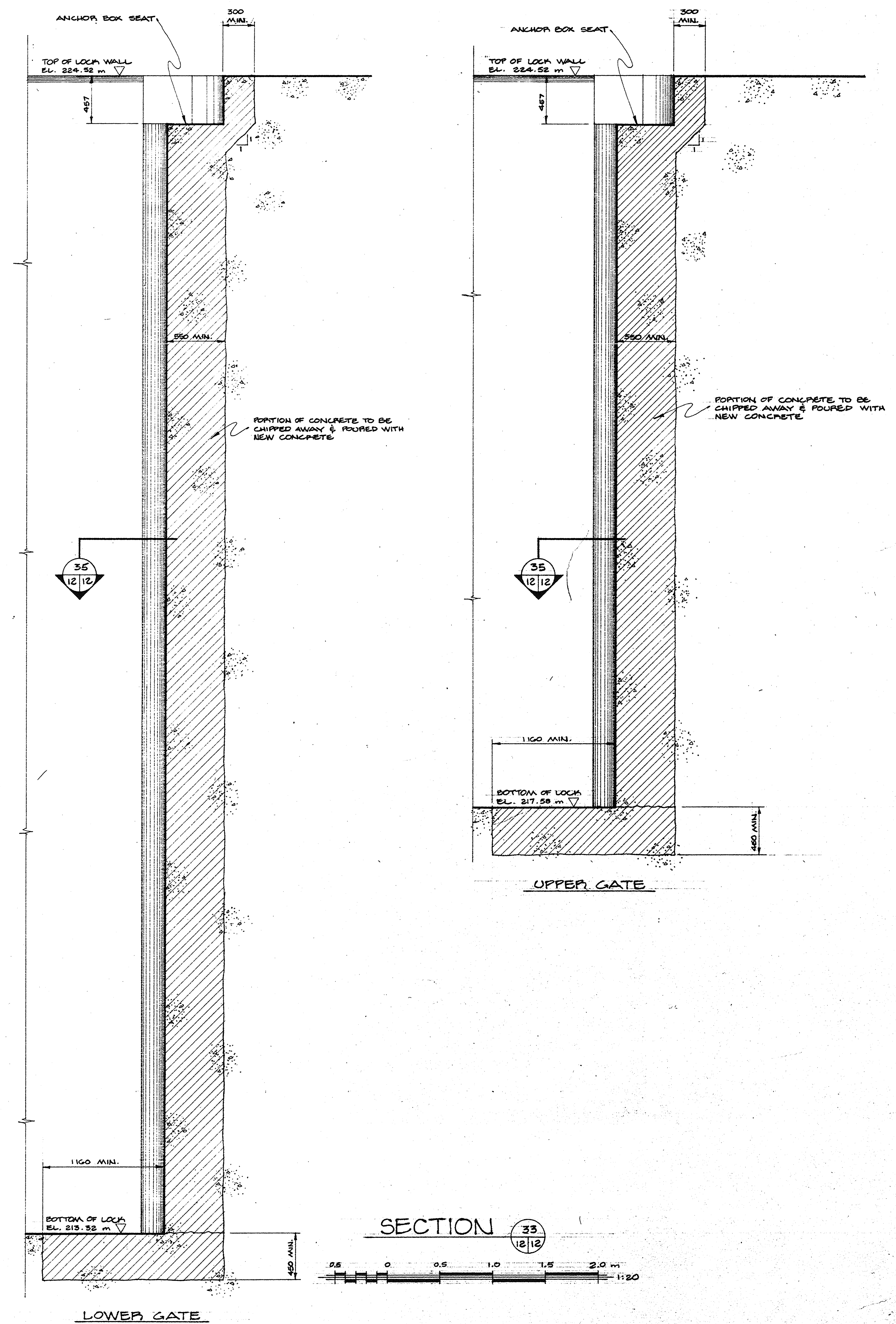
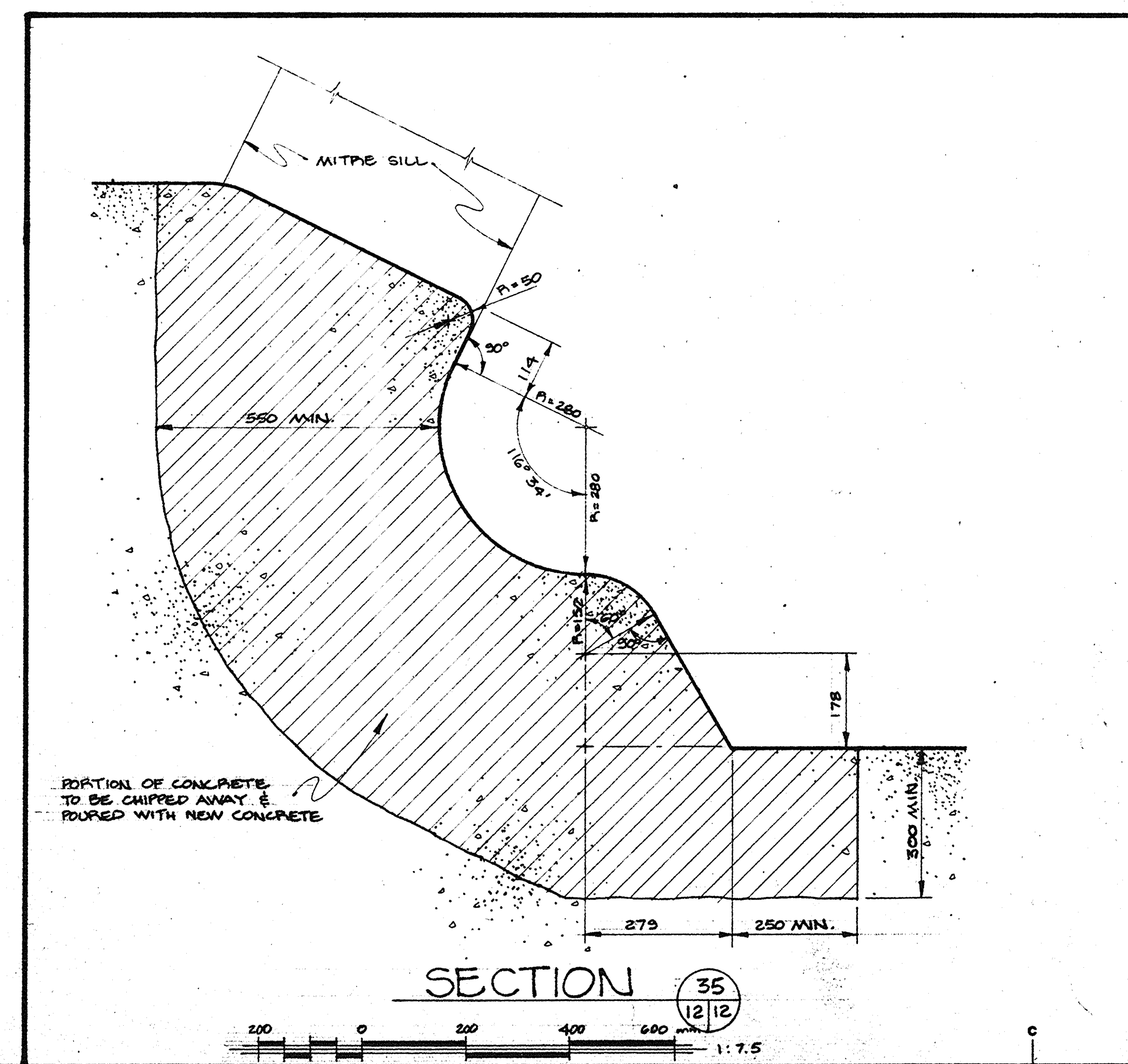
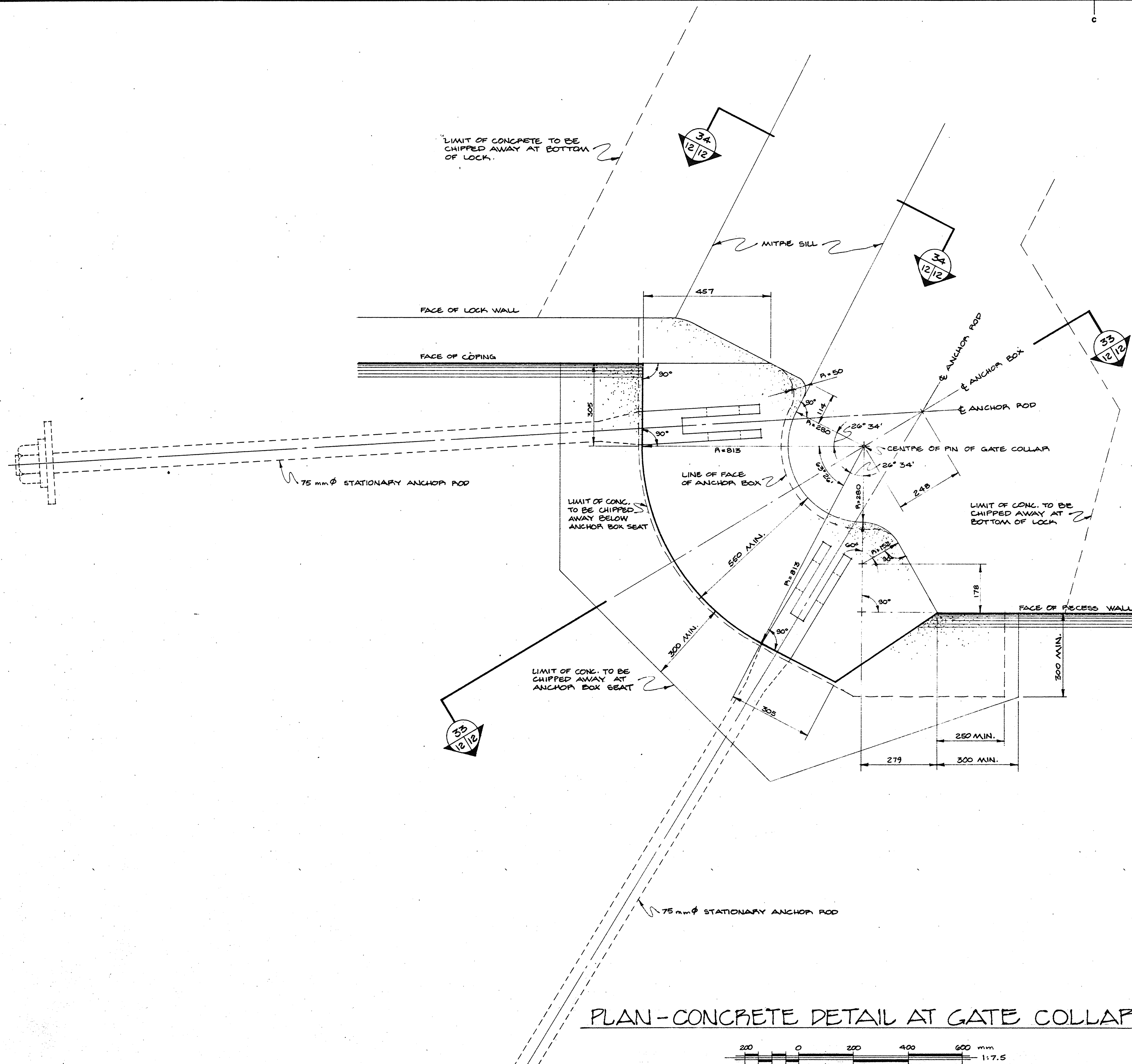
revision	date
A	A detail no. no. detail
B	B location drawing no. for design no.
C	C drawing no. design no.

ST-ANDREWS
LOCK & DAM
LOCK GATES RENEWAL

UPPER & LOWER GATES
WALKWAY - PLAN, ELEVATIONS
SECTIONS & DETAILS
UPPER GATES BALLAST
RETAINER DETAILS

designed by E. De CURTIS 21/09/81
drawn by J.A. McDONALD 21/09/81
checked by J. Kolbe
approved by J.A. McDonald
Tender: A-100-81-10
PWC Project Manager: Administration des projets TPC
project number: 037538
drawing no.: 11 of 14

WESTERN REGION
N.M. HOYT
DIRECTOR GENERAL

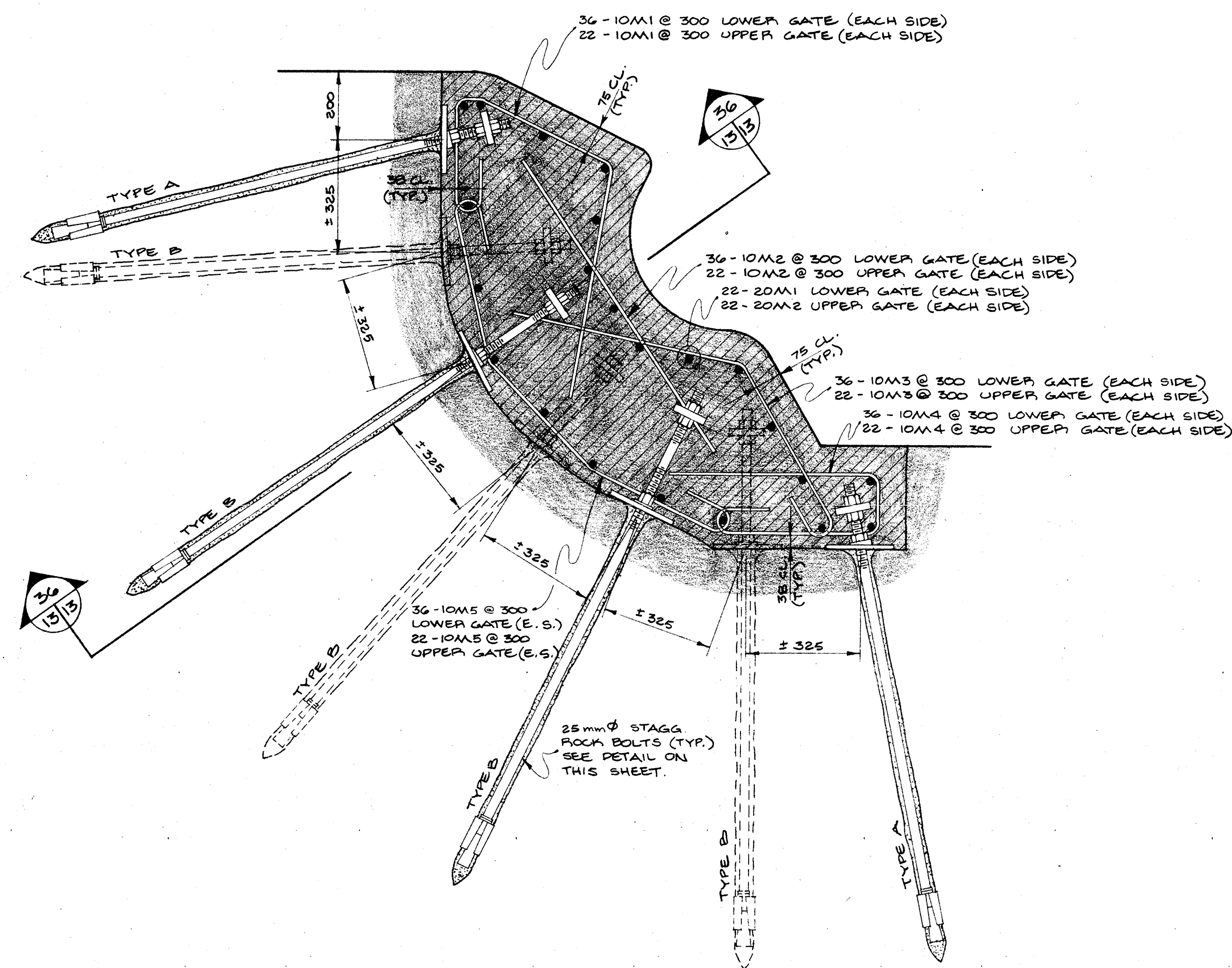


revision	date
A	
C	

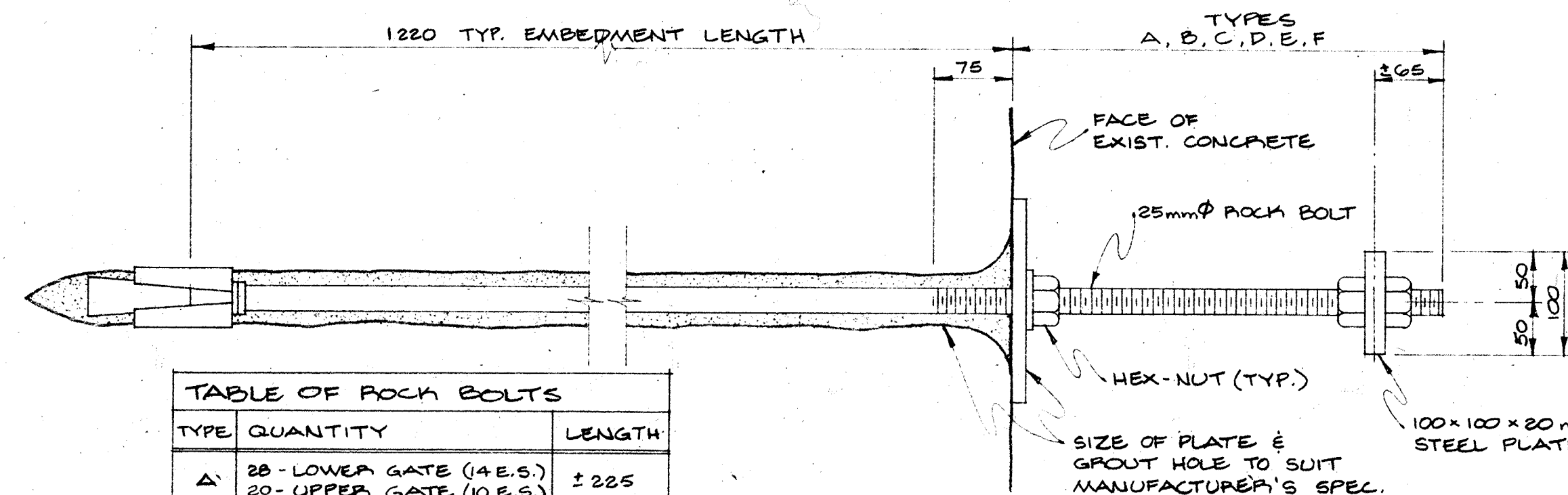
ST-ANDREWS
LOCK & DAM
LOCK GATES RENEWAL

UPPER & LOWER GATES
GENERAL ARRANGEMENT
CONCRETE SECTIONS
& DETAILS

designed	E. De Curtis	13/10/92
drawn	F. DAIGLE	13/10/92
reviewed	T. Roberson	13/10/92
approved	A.W. Cairns	03-01-20
Tender	PWC Project Manager	Administrateur de projets TPC
project number	037538	no. du projet
drawing no.	12 of 14	no. du dessin

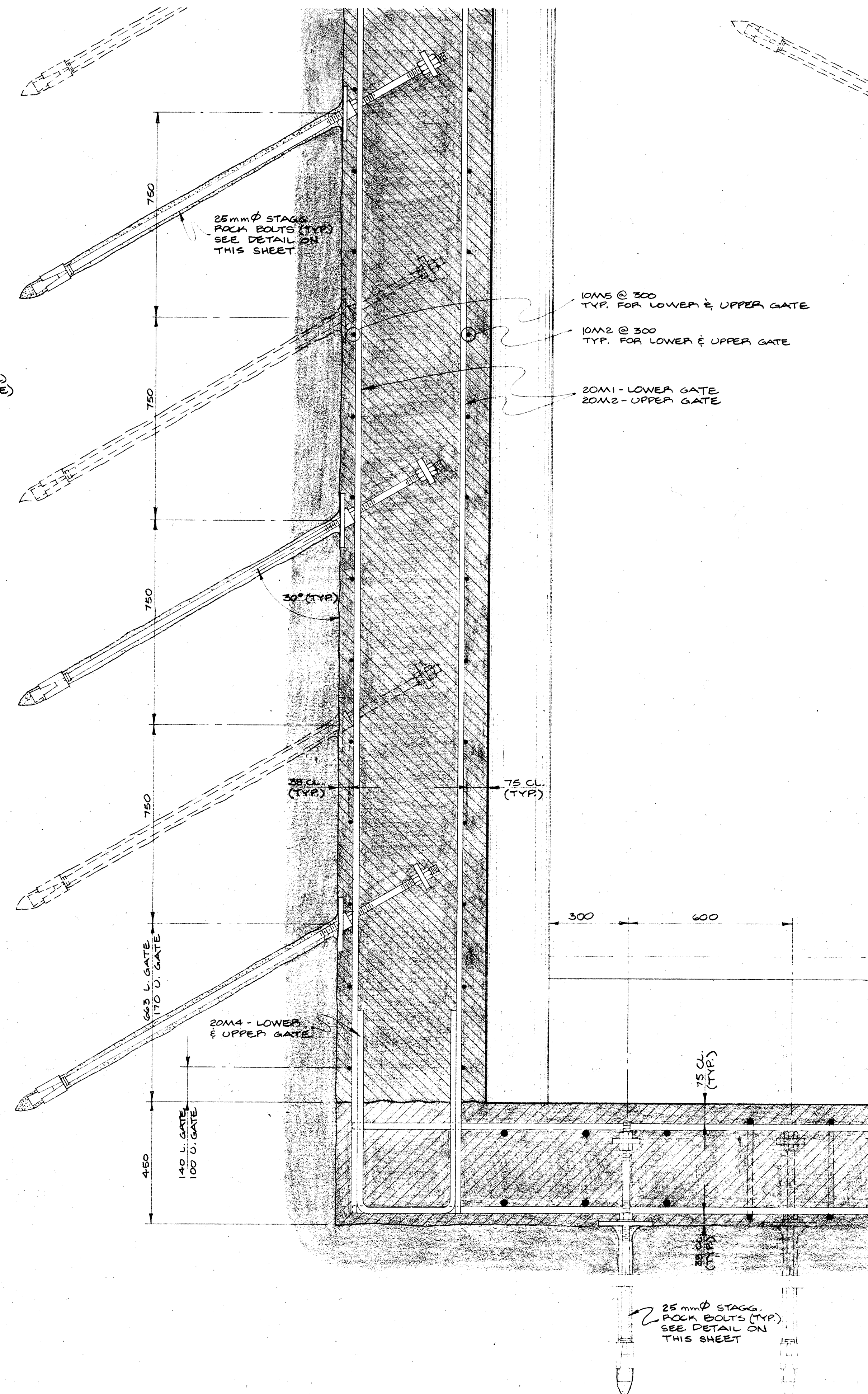
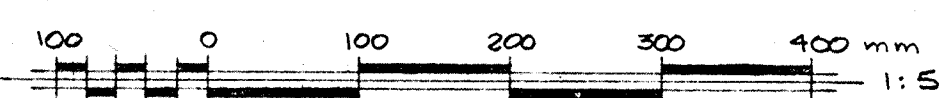


TYPICAL SECTION AT CONCRETE QUOIN

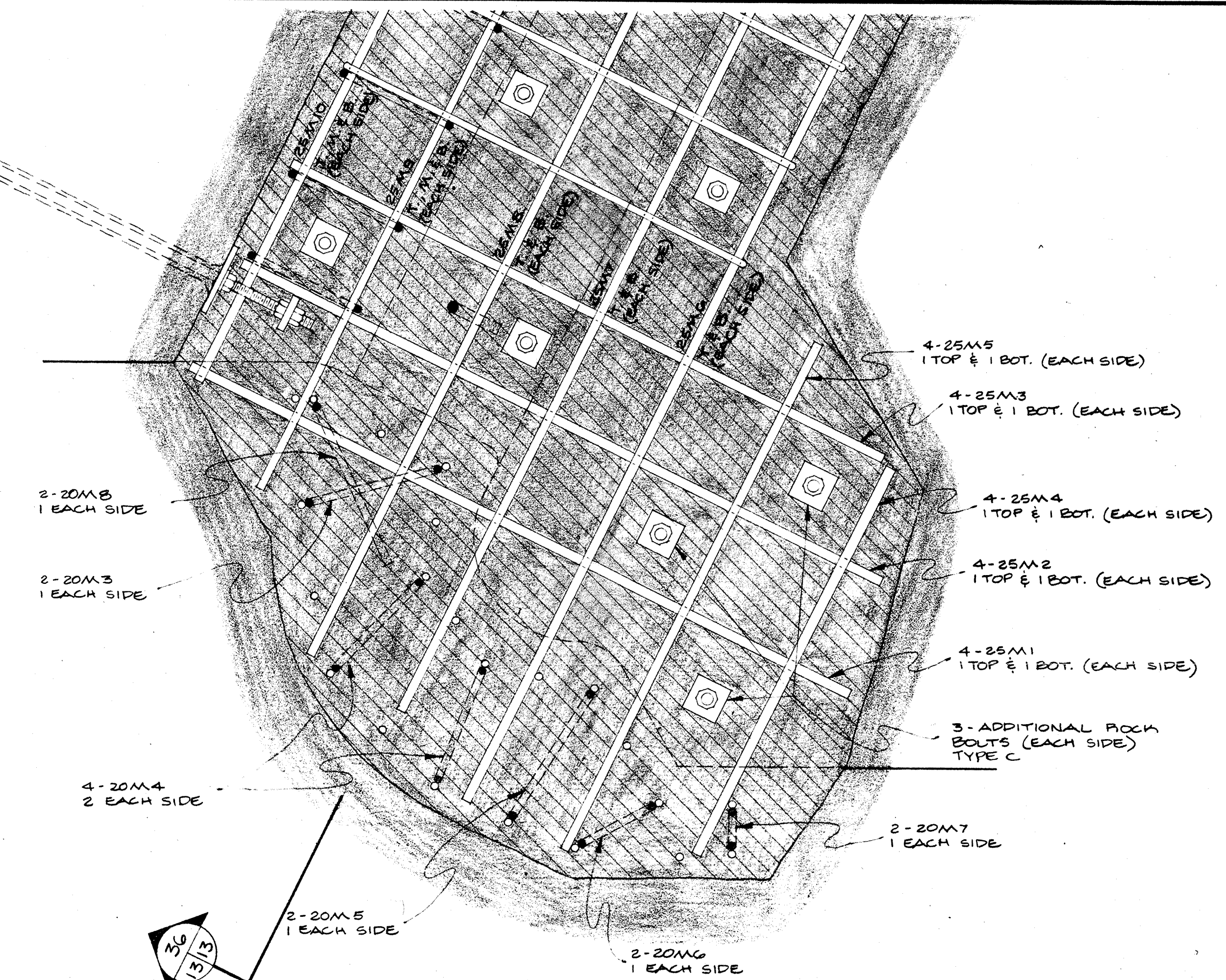
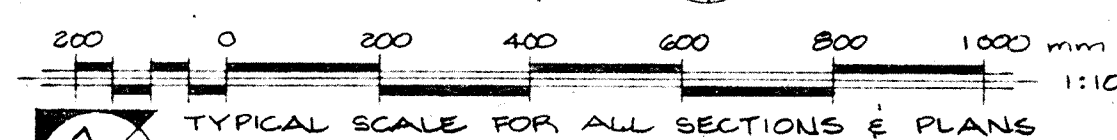


TYPE	QUANTITY	LENGTH
A	20- LOWER GATE (4 E.S.) 20- UPPER GATE (4 E.S.)	± 285
B	66- LOWER GATE (33 E.S.) 40- UPPER GATE (20 E.S.)	± 425
C	58- LOWER GATE 58- UPPER GATE	± 305
D	11- LOWER GATE 11- UPPER GATE	± 325
E	10- LOWER GATE (5 E.S.) 10- UPPER GATE (5 E.S.)	± 300
F	4- LOWER GATE (2 E.S.) 4- UPPER GATE (2 E.S.)	± 550

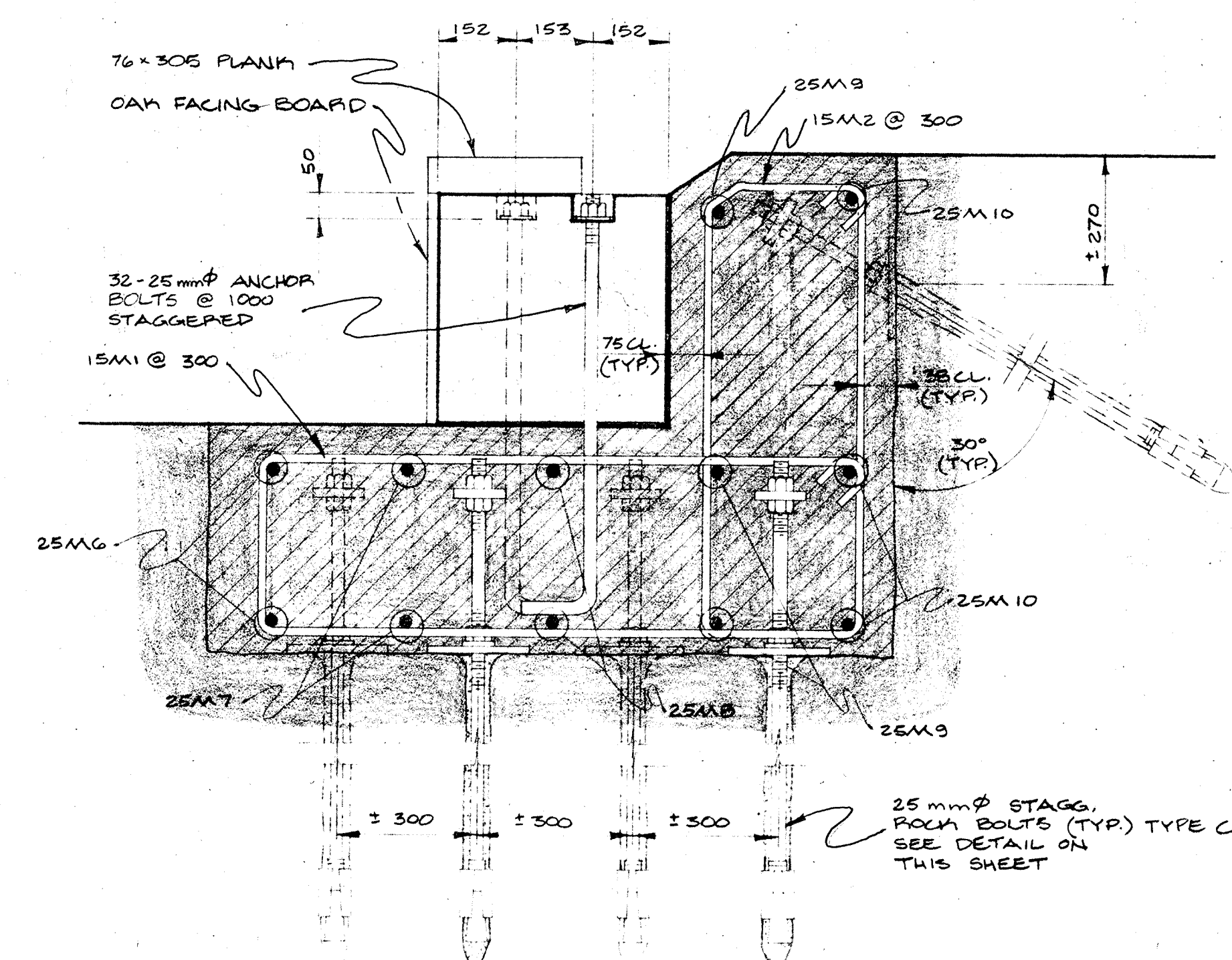
ROCK BOLT DETAIL



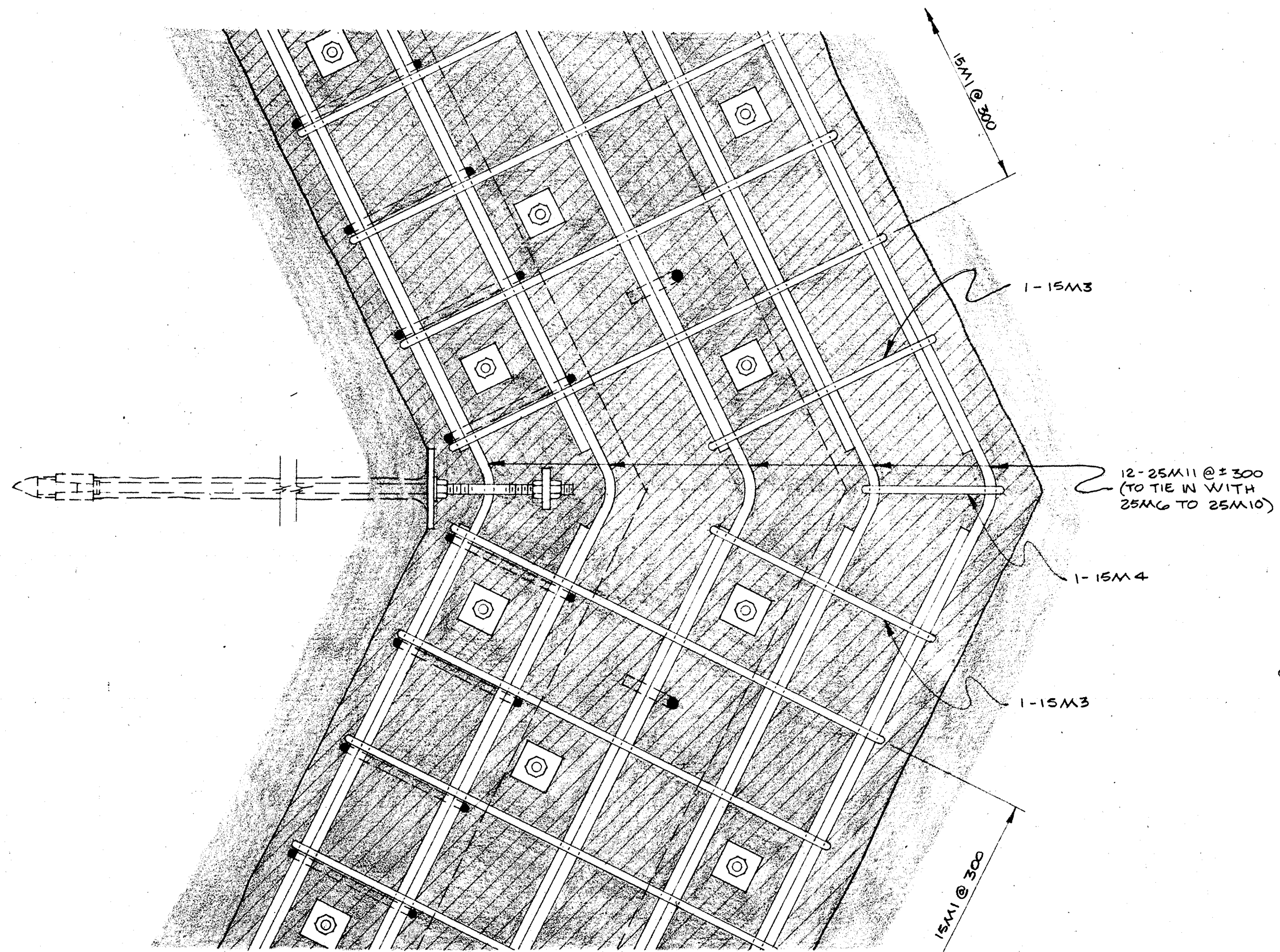
SECTION 36



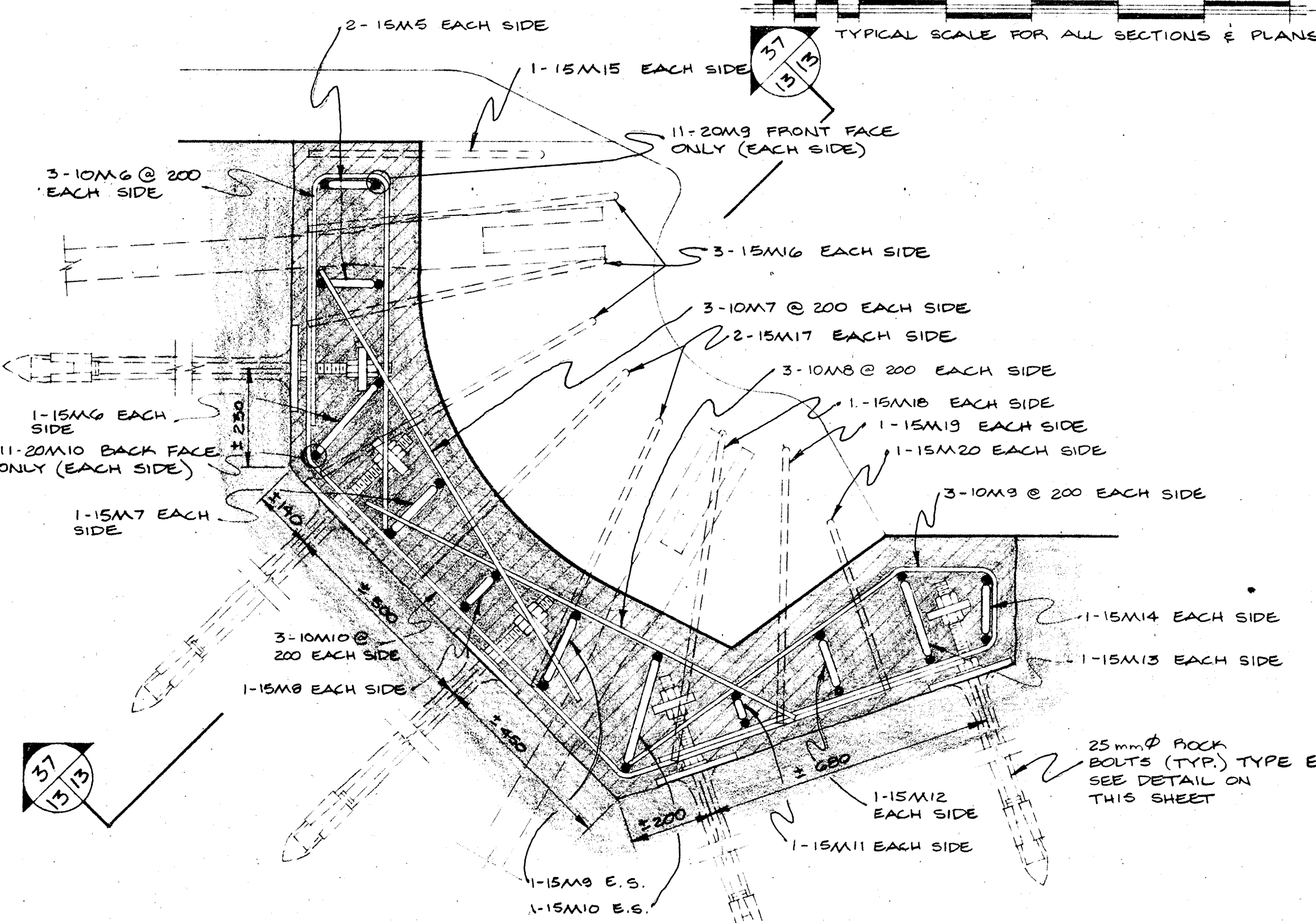
PLAN-REINFORCING AT BOT. SLAB LOWER GATE
UPPER GATE SIMILAR



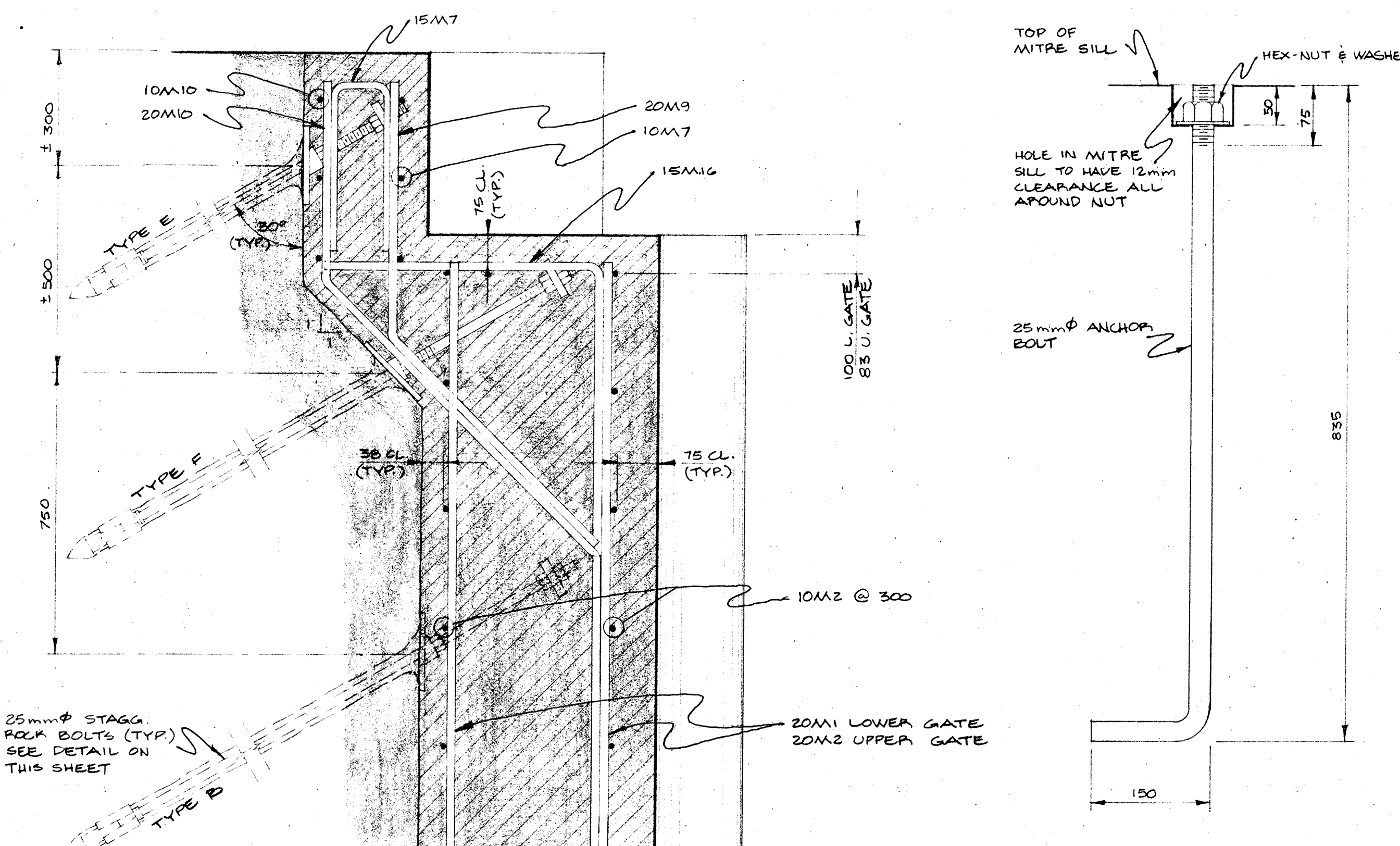
TYPICAL SECTION THROUGH MITRE SILL



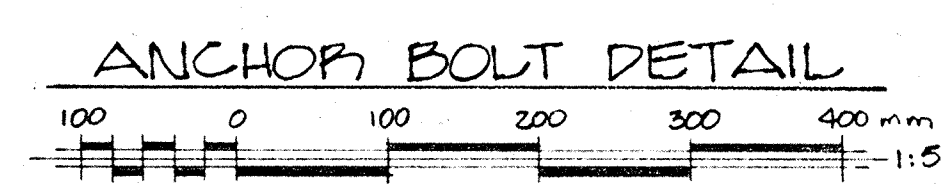
PLAN-REINFORCING AT CENTRE OF MITRE SILL LOWER GATE
UPPER GATE SIMILAR



PLAN-REINFORCING AT ANCHOR BOX LOWER GATE
UPPER GATE SIMILAR

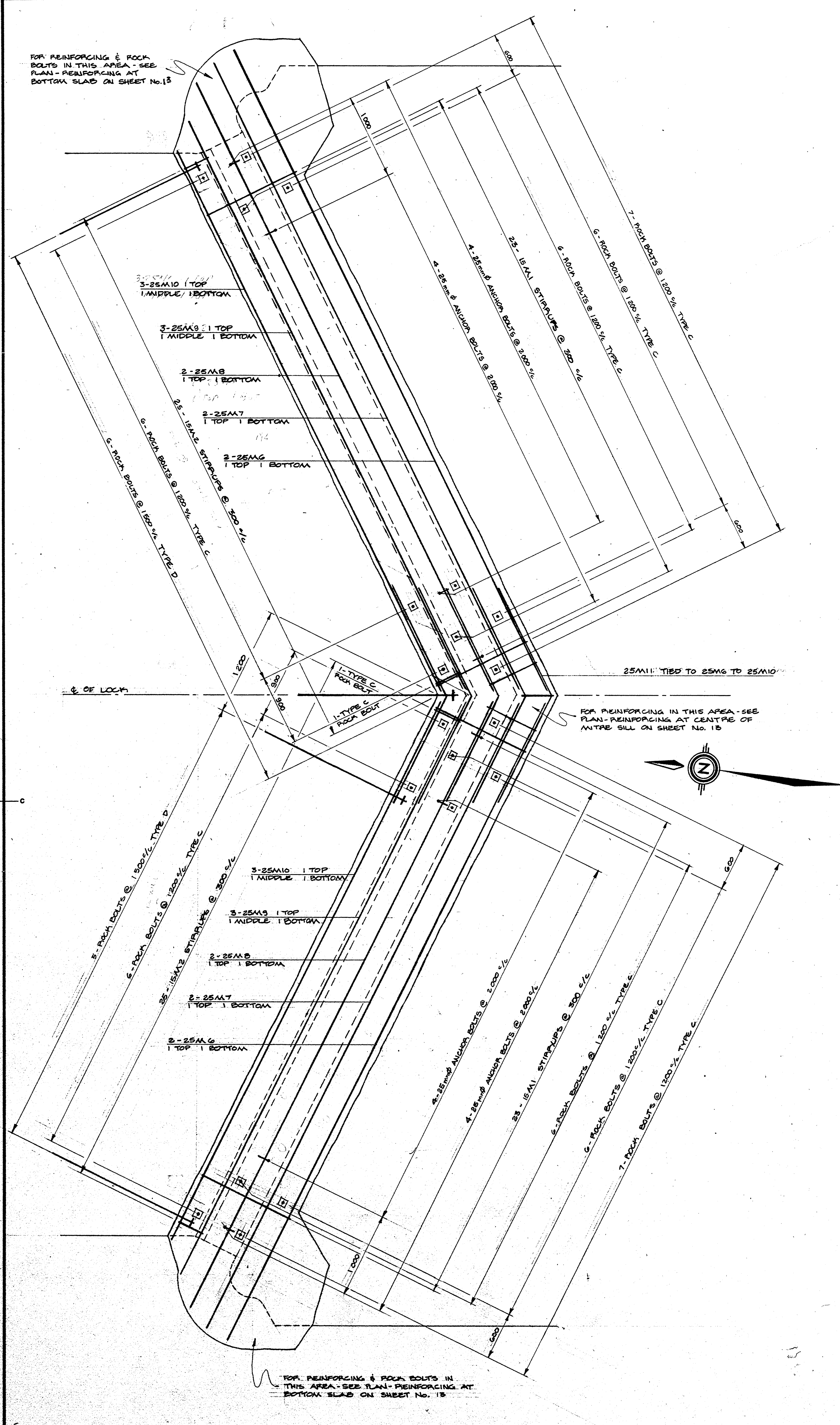


SECTION 37

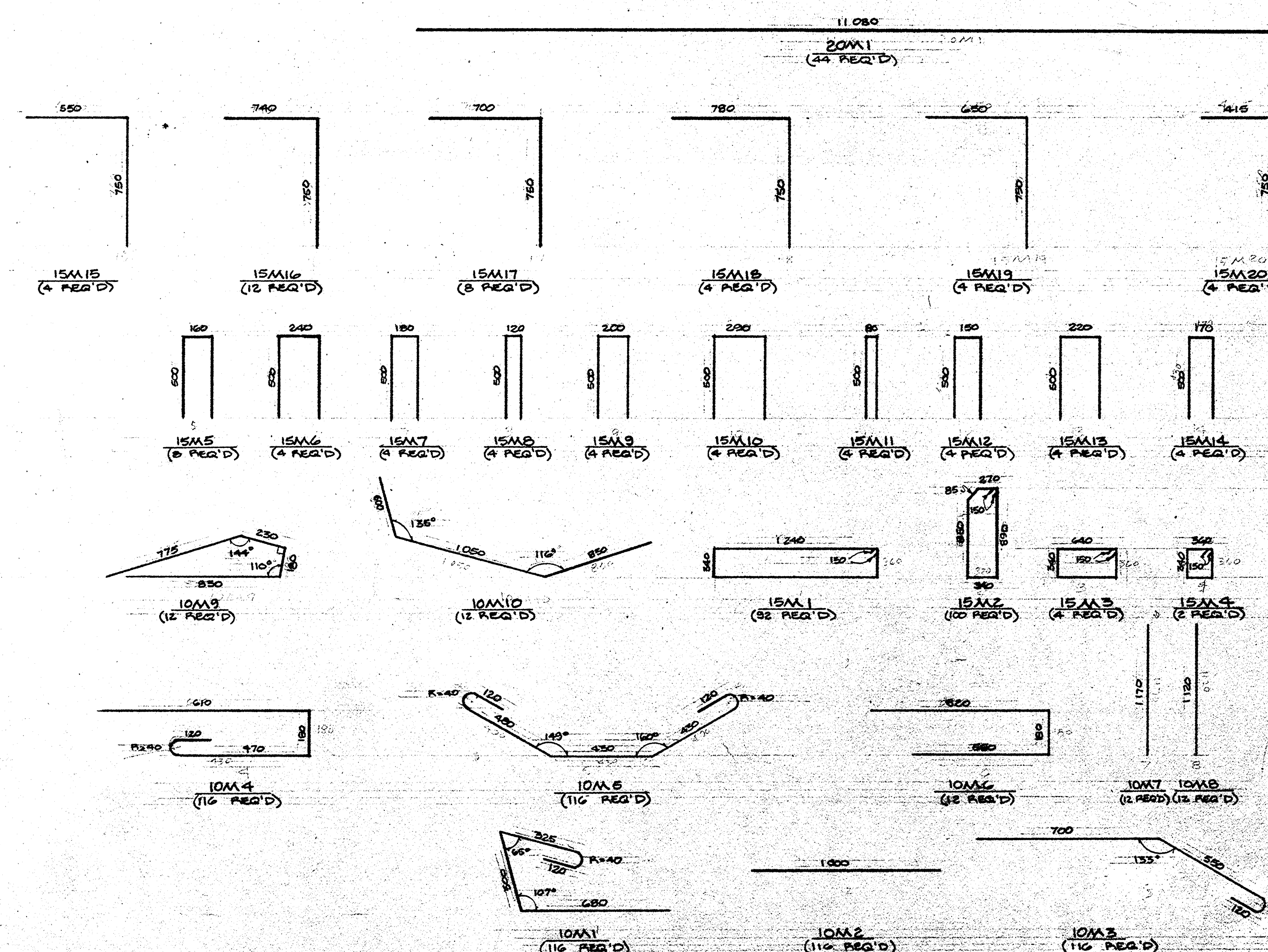
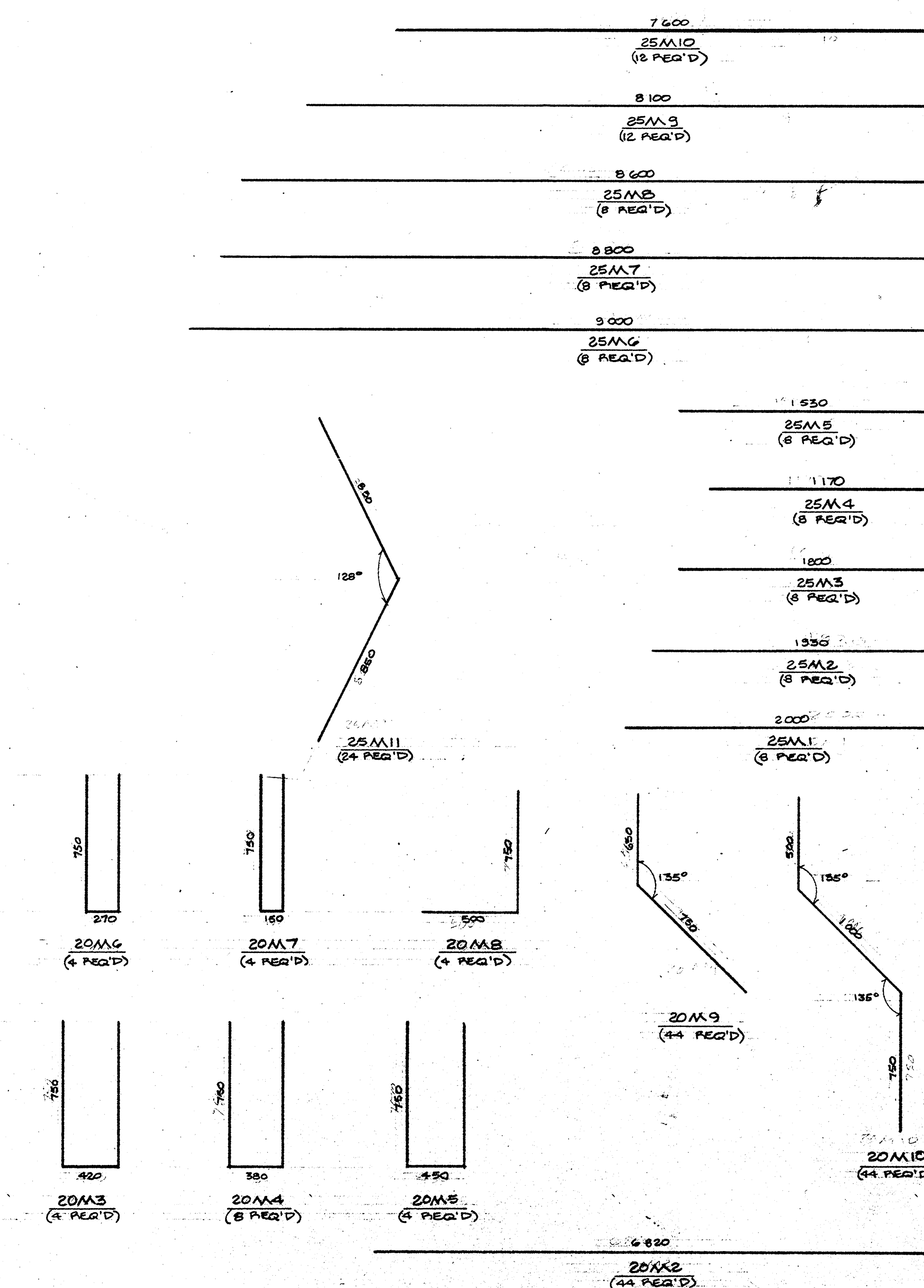


revisions	date
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project	project
<p>ST-ANDREWS LOCK & DAM LOCK GATES RENEWAL</p>	
drawing	dessin
<p>GENERAL REINFORCING SECTIONS & DETAILS</p>	
designed date	E. De CURTIS 13/10/82
drawn date	F. DAIGLE 13/10/82
reviewed date	E. Kolberg 11.25
approved date	E. Cairns 8.5-11.5
TENDER project number	A.W. Cairns no du projet
037538	
drawing no	no du dessin
13 of 14	

WESTERN REGION
N.M. HOYT
DIRECTOR GENERAL



PLAN - REINFORCING AT MITRE SILL LOWER GATE
UPPER GATE SIMILAR



BAR LIST

revision	date
A	13/10/02
B	13/10/02
C	13/10/02
D	13/10/02
E	13/10/02
F	13/10/02
G	13/10/02
H	13/10/02
I	13/10/02
J	13/10/02
K	13/10/02
L	13/10/02
M	13/10/02
N	13/10/02
O	13/10/02
P	13/10/02
Q	13/10/02
R	13/10/02
S	13/10/02
T	13/10/02
U	13/10/02
V	13/10/02
W	13/10/02
X	13/10/02
Y	13/10/02
Z	13/10/02

ST-ANDREWS
LOCK & DAM
LOCK GATES RENEWAL

PLAN-REINFORCING AT
MITRE SILL & BAR LIST

designed: E. De Curtis
date: 13/10/02
drawn: F. Daible
date: 13/10/02
checked: A. Rolberg
date: 13/10/02
approved: A. Rolberg
date: 13/10/02
PWC Project Manager: A. Rolberg
no. du projet: 037538
drawing no.: 14 of 14