

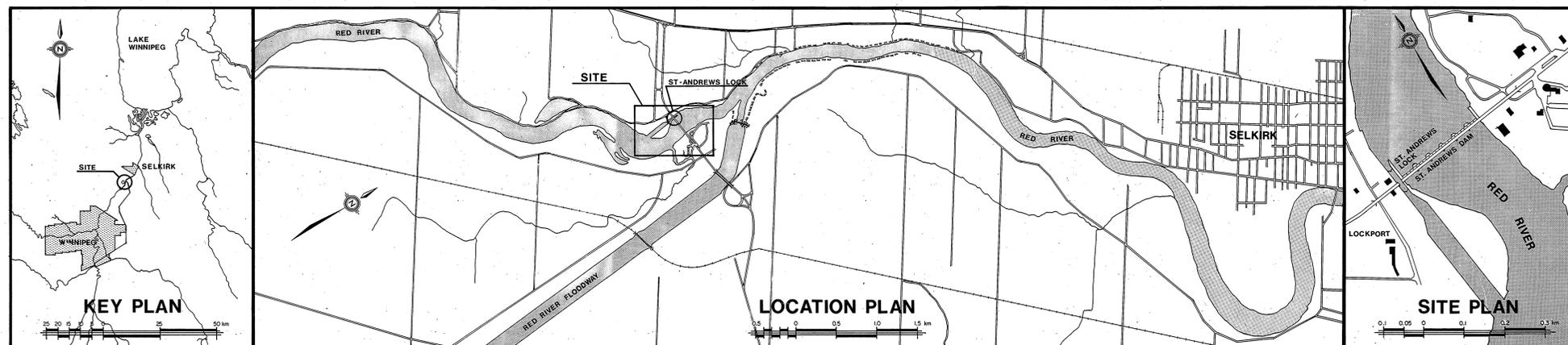


Public Works  
Canada

Travaux publics  
Canada

# ST-ANDREWS LOCK & DAM

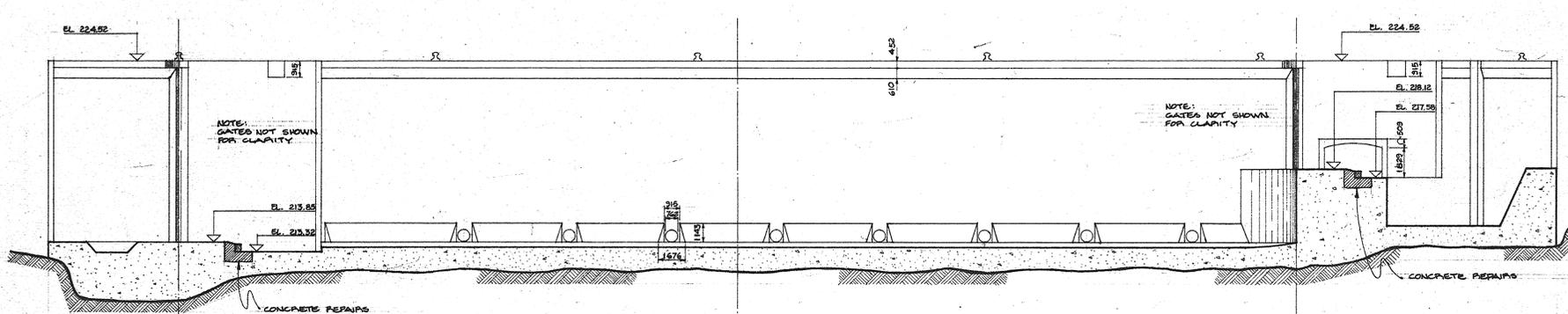
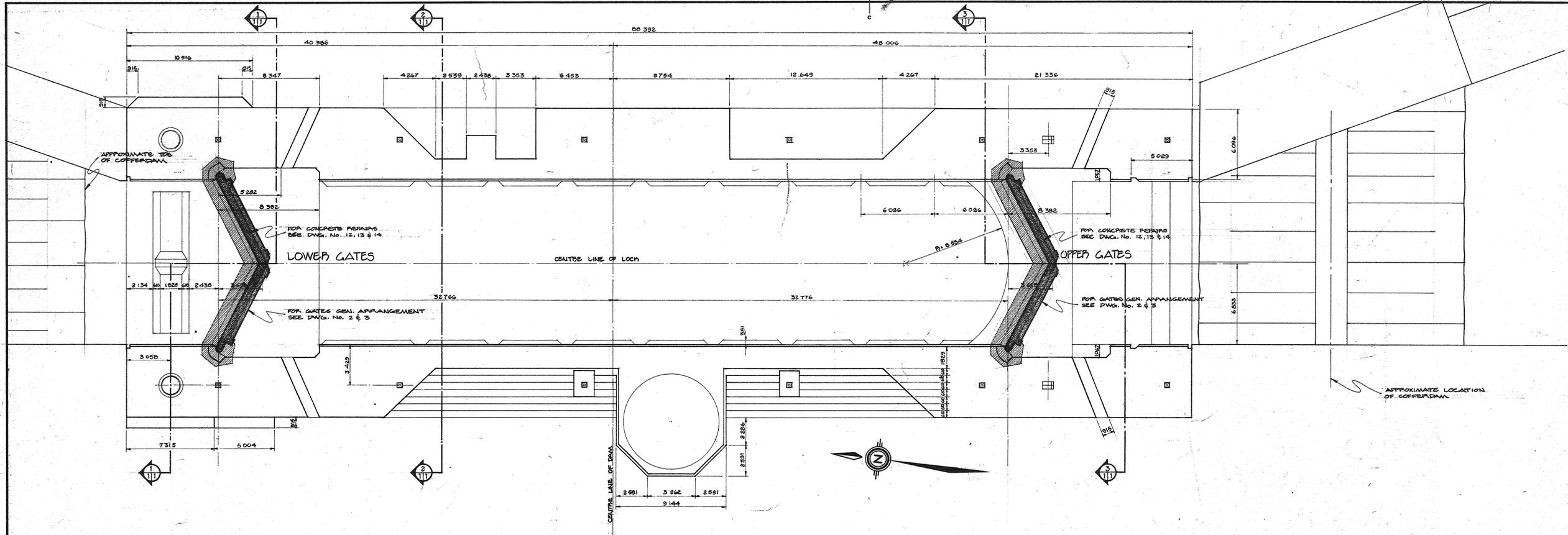
## LOCK GATES RENEWAL



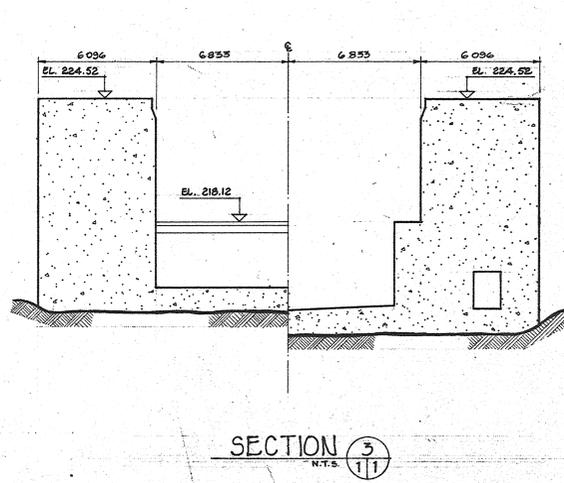
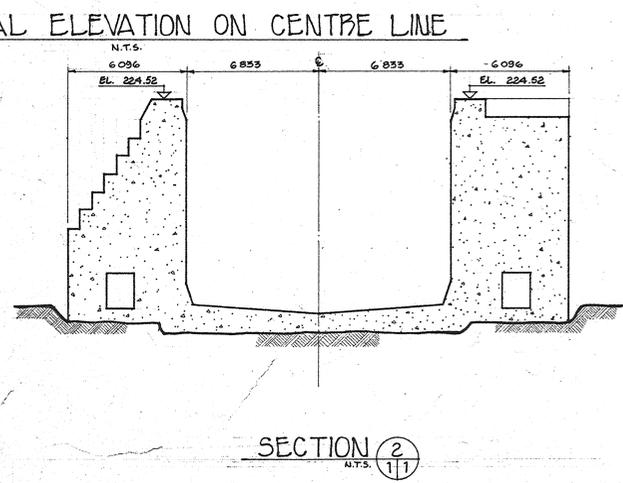
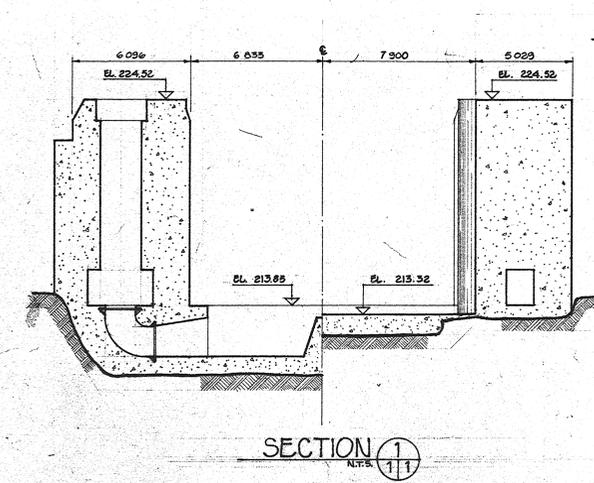
### DRAWING TITLES:

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**



NOTE: ALL DIMENSIONS TO BE VERIFIED IN FIELD.



revisions	date
A detail no. no. du détail	
B location drawing no. sur dessin no.	
C drawing no. dessin no.	
<p>project</p> <p><b>ST-ANDREWS LOCK &amp; DAM LOCK GATES RENEWAL</b></p> <p>drawing</p> <p><b>PLAN OF LOCKS GENERAL ARRANGEMENT AND SECTIONS</b></p>	
designed E. DeCURTIS	onpu 21/09/01
drawn F. DAGLE	dessiné 21/09/01
revised <i>to Rebus</i>	examiné
approved <i>to Rebus</i>	approuvé
date 01-09-25	
Tender A.W. Cairns	Submission
PWC Project Manager	Administrateur de projets TPC
project number 037538	no. du projet
drawing no. 1 of 14	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: PENSB SELECT STRUCTURAL.
  - 4-SQUARE EGGED, FREE FROM WANE AND WITHOUT EASSED 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 $\phi$  TIE BOLTS, (UPPER & LOWER GATES), 38mm $\phi$  TIE BOLTS, (LOWER GATE ONLY) TO C.S.A. G40.21-M187B GRADE 300T.
  - 3-EYE BAR PINS: A.1.1.1. GRADE 1045, NORMALIZED OR EQUIVALENT.
  - 4-STEEL JACKET SPLICE PLATE BOLTS: TO ASTM A-325M-M73.
  - 5-OTHER BOLTS: SQUARE HEAD TO ASTM A-307-76B.
  - 6-NUTS AND WASHERS: HEXAGON NUTS, WASHERS TO ASTM A307-76B.
  - 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. W59-77.
  - 10-STEEL DOWELS: 75mm $\phi$  x 80mm LG. TO C.S.A. G40.21-M187B GRADE 227C.
  - 11-PIPS: TO C.S.A. G28-1968.
  - 12-PIVOT AND HEEL PLATE CASTINGS: TO ASTM 148-1975 GRADE 90-100.
  - 13-TOP HINGE PINS: COLD DRAWN POUND - TO A.1.1.1. GRADE 1045 NORMALIZED OR EQUIVALENT.
  - 14-GRATING: TYPE - WELDED.  
BEARING BARS - 25.4mm x 52mm.  
BEARING BAR SPACING - 50mm $\phi$ .  
GROSS BAR SPACING - 100mm $\phi$ .  
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-NOMINAL SIZE COARSE AGGREGATE, 25-5.
  - 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. G30.13-M1977 BILLET STEEL GRADE 405, DEFORMED BARS.
  - 2-DO CONCRETE REINFORCEMENT WORK TO CAN 3-A23.1M77 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-MEASURE CURVATURE OF EXISTING CONCRETE IN QUOINS AND SILLS.
  - 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 MERRIMAN 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 PIN: CAST BRONZE TO ASTM-B22-73, COPPER ALLOY UNS No. 91100.
  - 3-TOP HINGE STEP BEARING: CAST BRONZE TO ASTM-B22-73, COPPER ALLOY UNS No. 91100.
  - 4-HEEL PLATE, BEARING PING: USE SELF LUBRICATING BEARING, LUBRITE, ALLOY No. 196 WITH G-10 LUBRICANT AS MANUFACTURED BY MERRIMAN INC. OR EQUIVALENT APPROVED BY THE ENGINEER.  
HEEL PLATE, BEARING PING 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



NOTE: WALKWAY NOT SHOWN FOR CLARITY

revisions

A	A detail no. or detail	A
C	B location drawing no. or detail no.	BC
	C drawing no. or detail no.	

project

ST-ANDREWS  
LOCK & DAM  
LOCK GATES RENEWAL

drawing

UPPER GATES  
GENERAL ARRANGEMENT  
& GENERAL NOTES

designed

E. DEPURIS 21/09/81

drawn

J. A. McDONALD 21/09/81

checked

To Roberson

approved

81-07-25

Tender

A.W. Cairns

P&C Project Manager

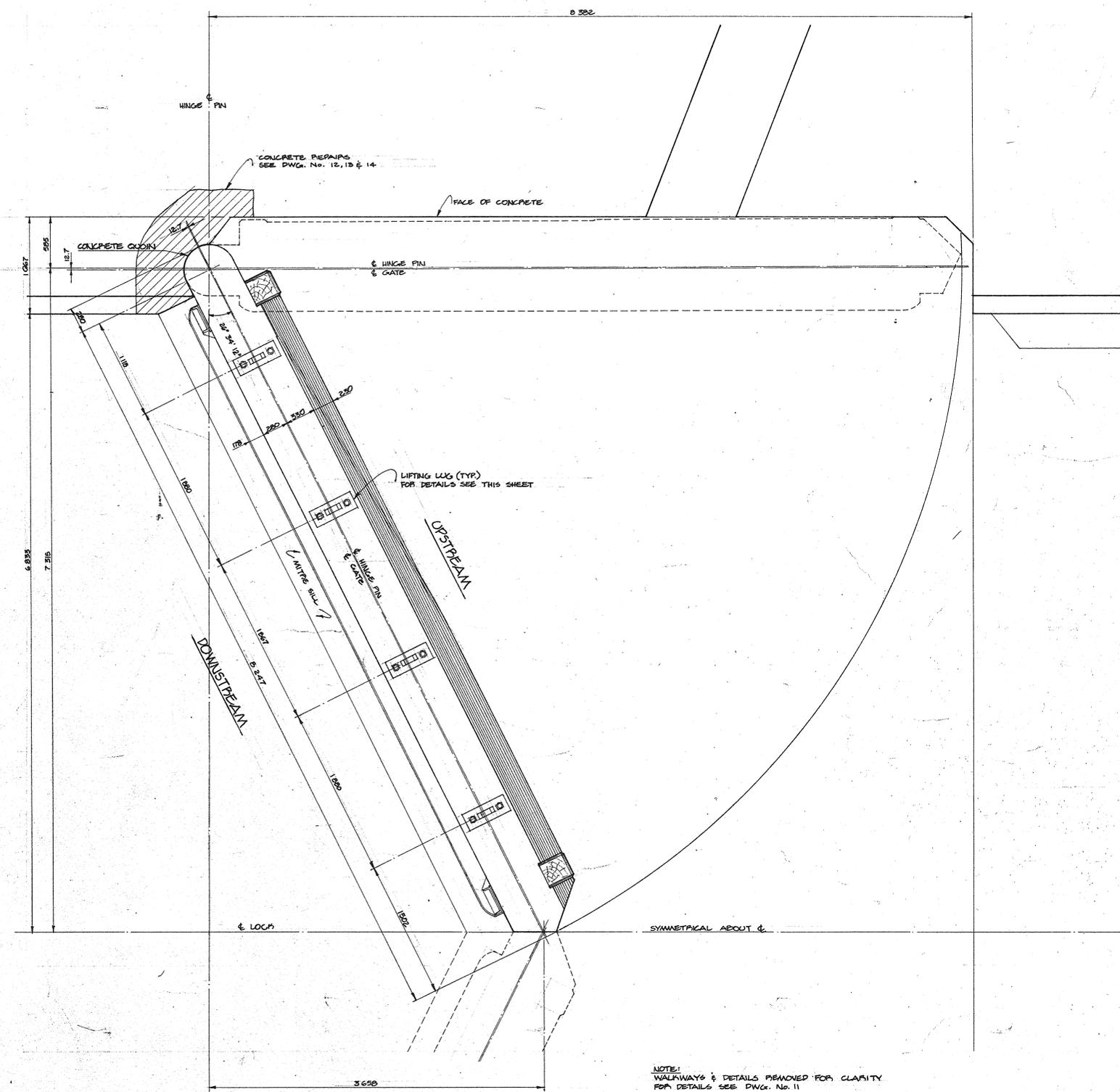
Administrateur de projets P&C

project number

037538

drawing no.

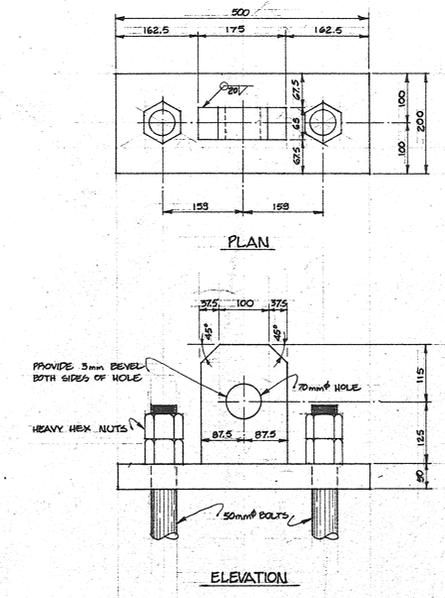
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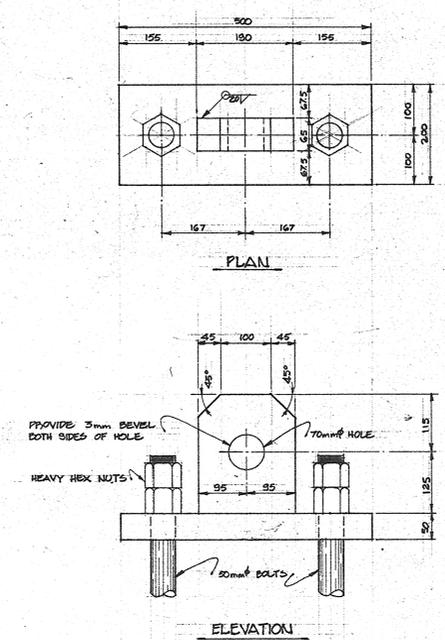
GENERAL ARRANGEMENT-LOWER GATE



NOTE: WALKWAY NOT SHOWN FOR CLARITY.



LIFTING LUG-UPPER GATE  
(8 REQ'D)



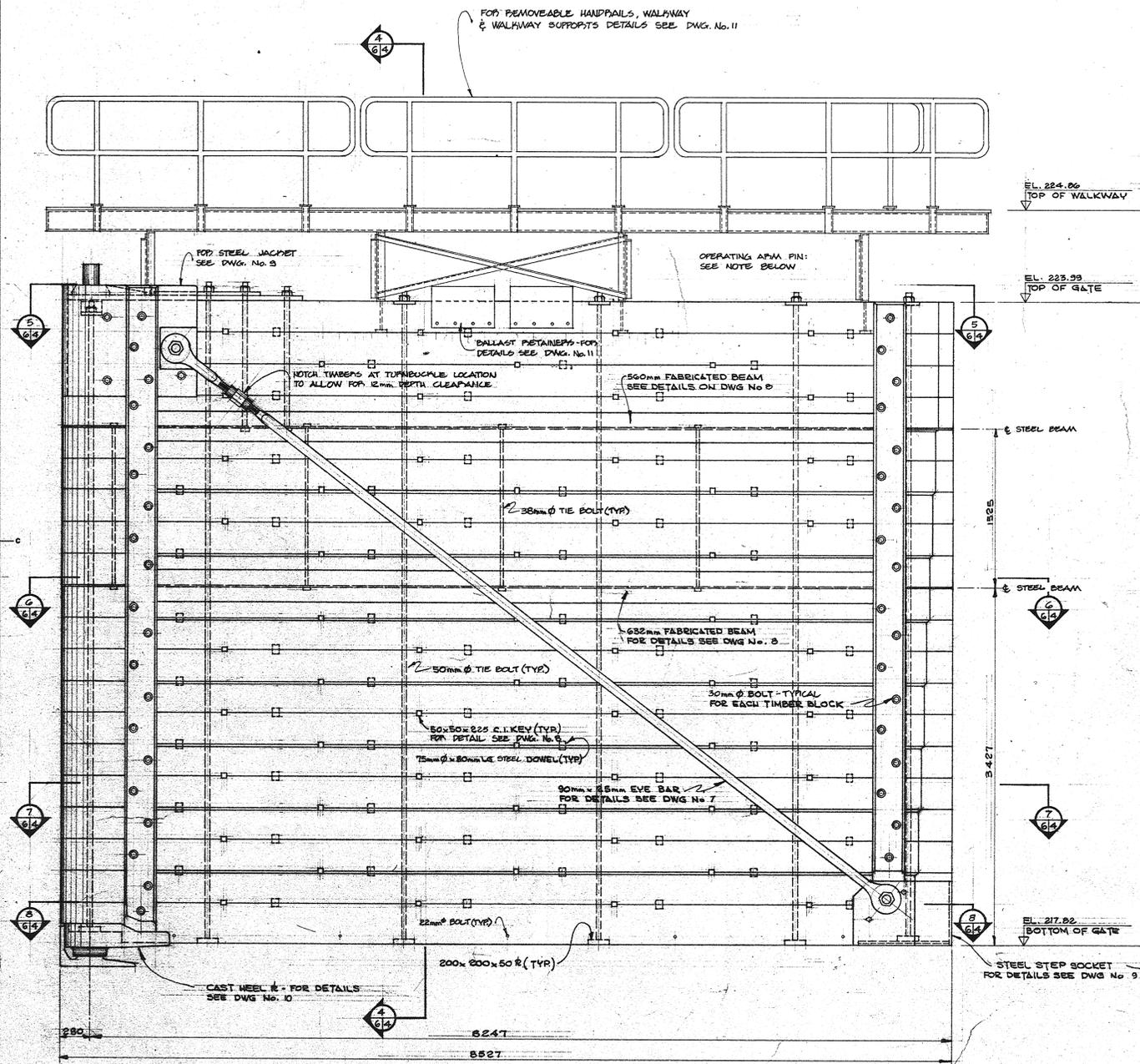
LIFTING LUG-LOWER GATE  
(8 REQ'D)

revision	date
A	A detail no. no. du détail
B	B location drawing no. for detail no.
C	C drawing no. dessin no.

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

drawing  
**LOWER GATES GENERAL ARRANGEMENT UPPER & LOWER GATES LIFTING LUGS DETAILS**

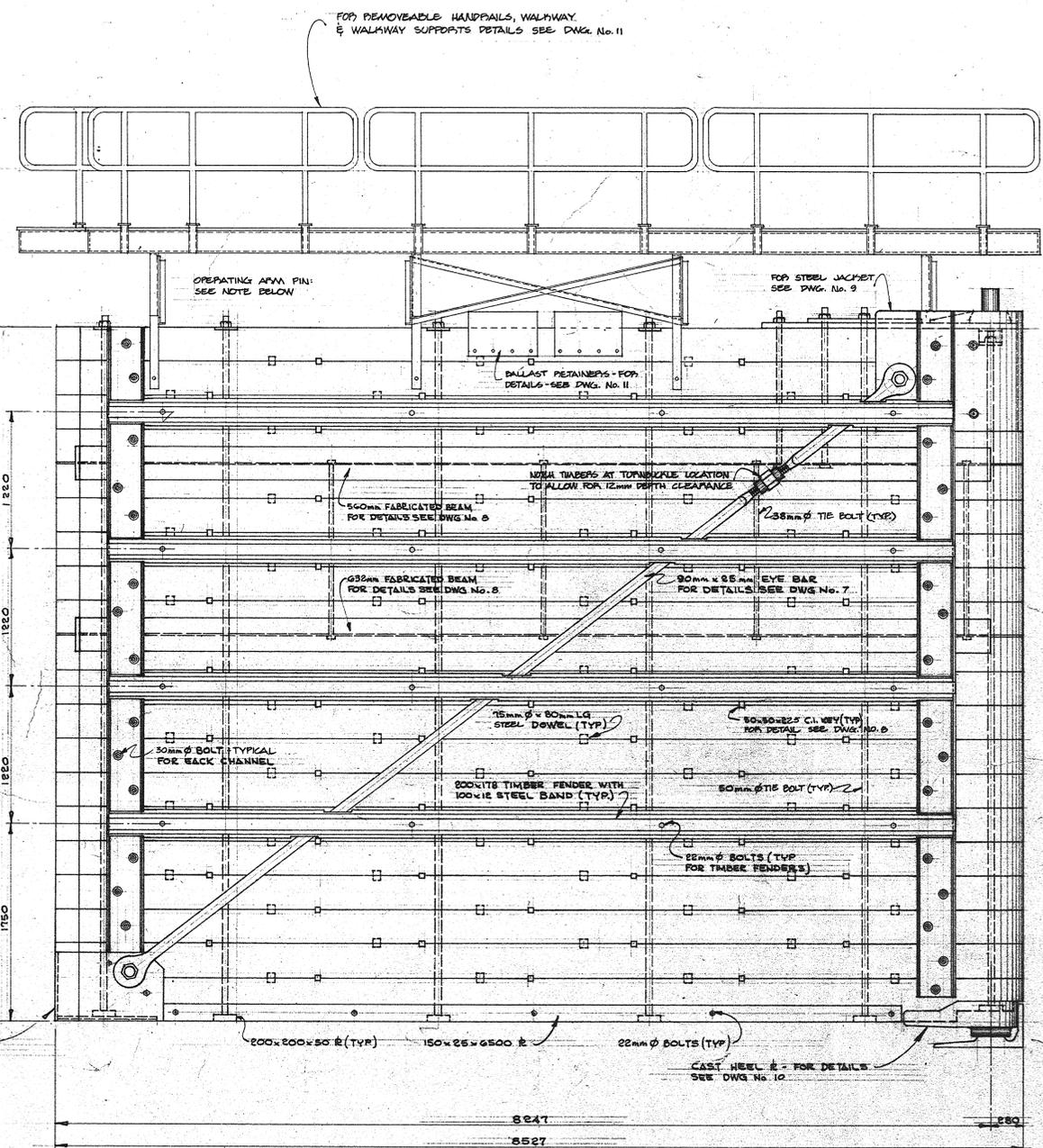
designed	E. DeCOURTIS	conçu	21/09/81
drawn	F. DAIGLE	dessiné	21/09/81
reviewed	<i>[Signature]</i>	examiné	
approved	<i>[Signature]</i>	approuvé	
date	81-09-25		
Tender	A. W. Collins	Submission	
PWC Project Manager	Administrateur de projets TPC		
project number	037538	no. du projet	
drawing no.	3 of 14	no. du dessin	



UPPER GATE ELEVATION - UPSTREAM SIDE



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



UPPER GATE ELEVATION - DOWNSTREAM SIDE

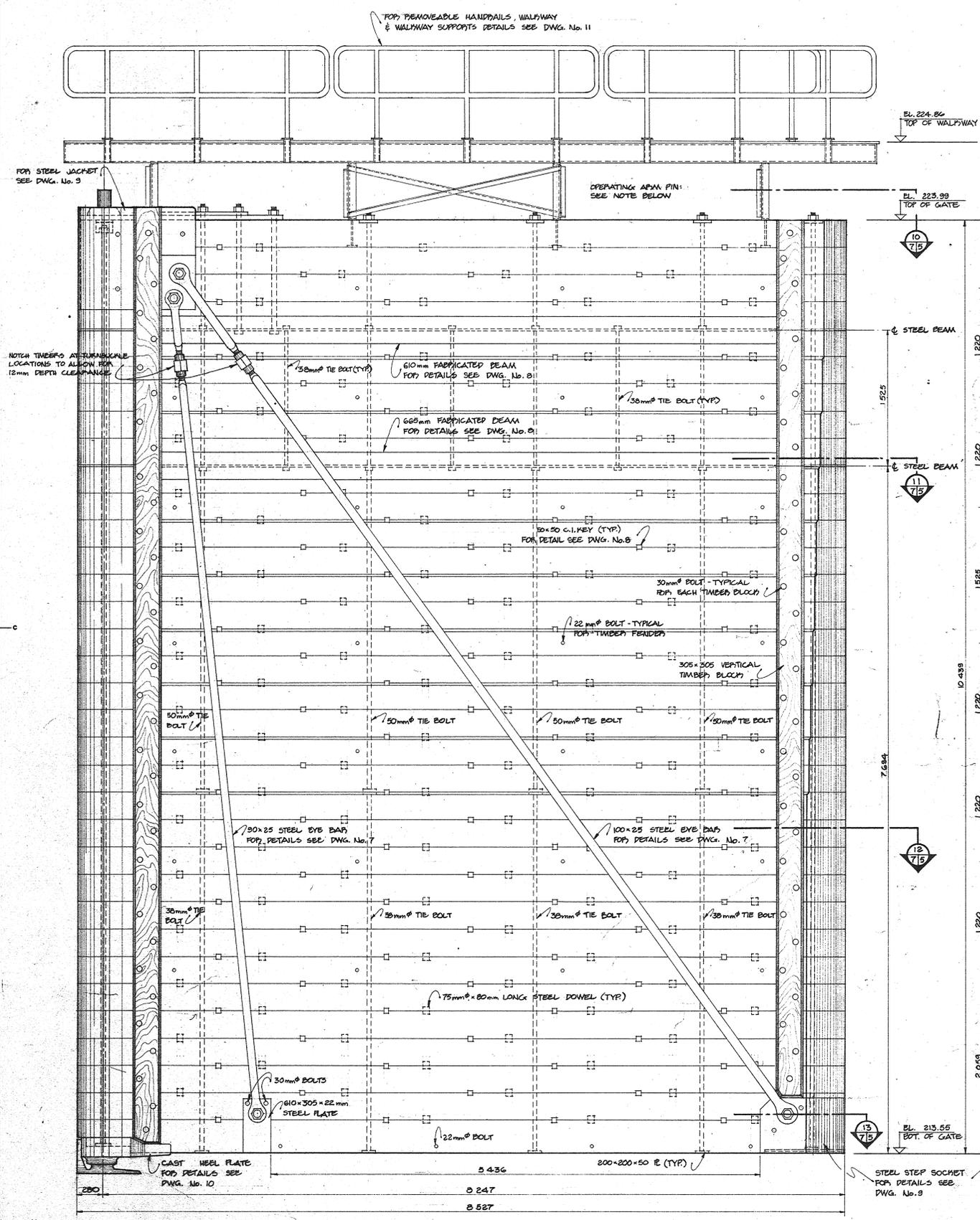


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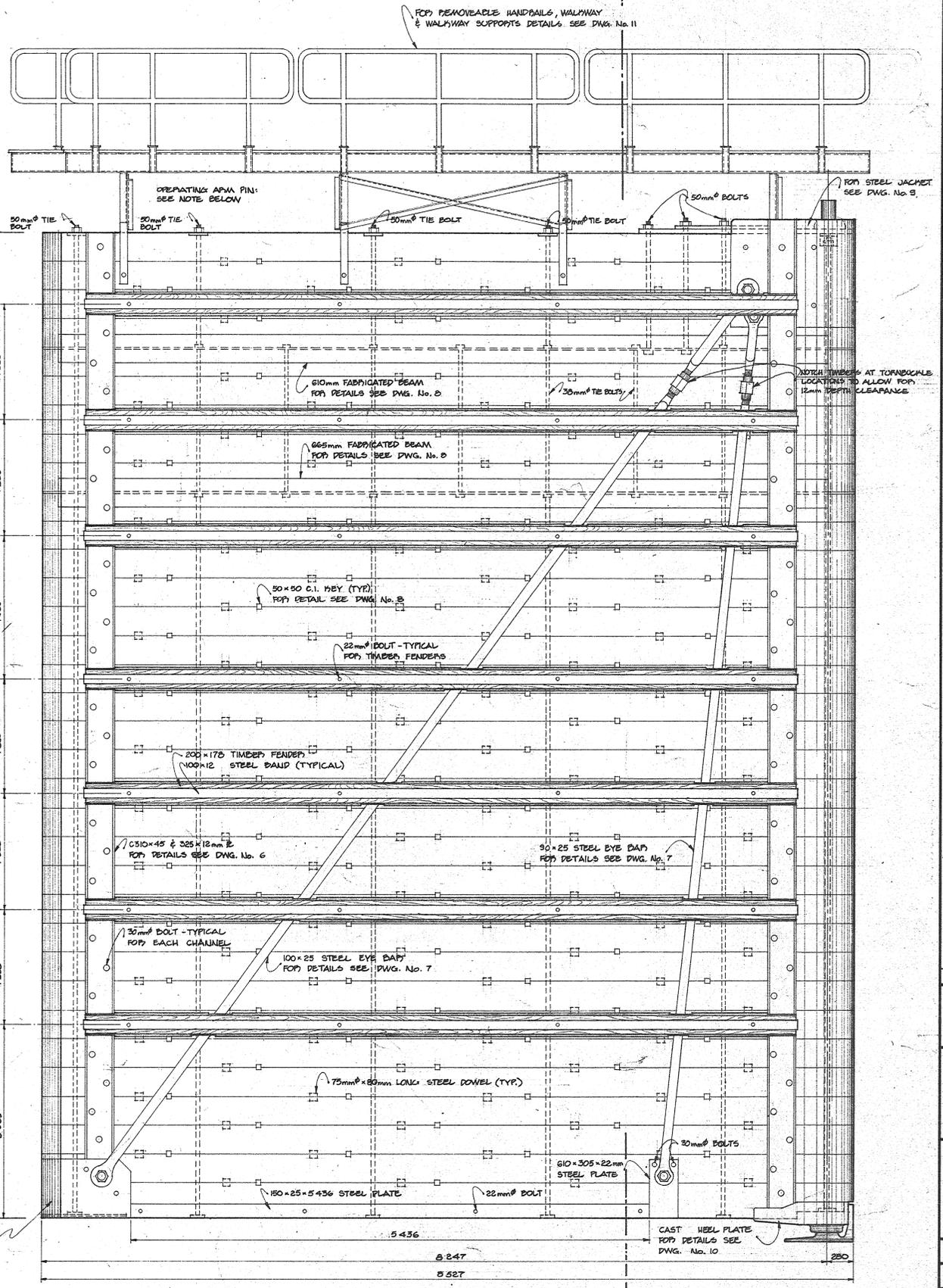
ST-ANDREWS  
LOCK & DAM  
LOCK GATES RENEWAL

UPPER GATE  
UPSTREAM & DOWNSTREAM  
ELEVATIONS

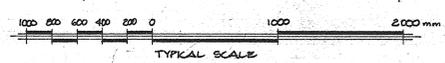
Designed	E. DeCours	21/09/81
Drawn	J.A. McDonald	21/09/81
Reviewed	To Rullens	
Approved	A. G. Cairns	
Project Manager	Administrateur de projets TPC	
Project Number	037538	
Drawing No.	4 of 14	



LOWER GATE ELEVATION-UPSTREAM SIDE



LOWER GATE ELEVATION-DOWNSTREAM SIDE



revision	date
A	
B	
C	

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

drawing  
**LOWER GATE UPSTREAM & DOWNSTREAM ELEVATIONS**

designed  
**E. ROBERTS** 21/09/81

drawn  
**F. DINGLE** 21/09/81

checked  
*to Rolben*

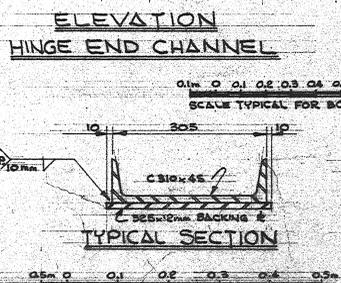
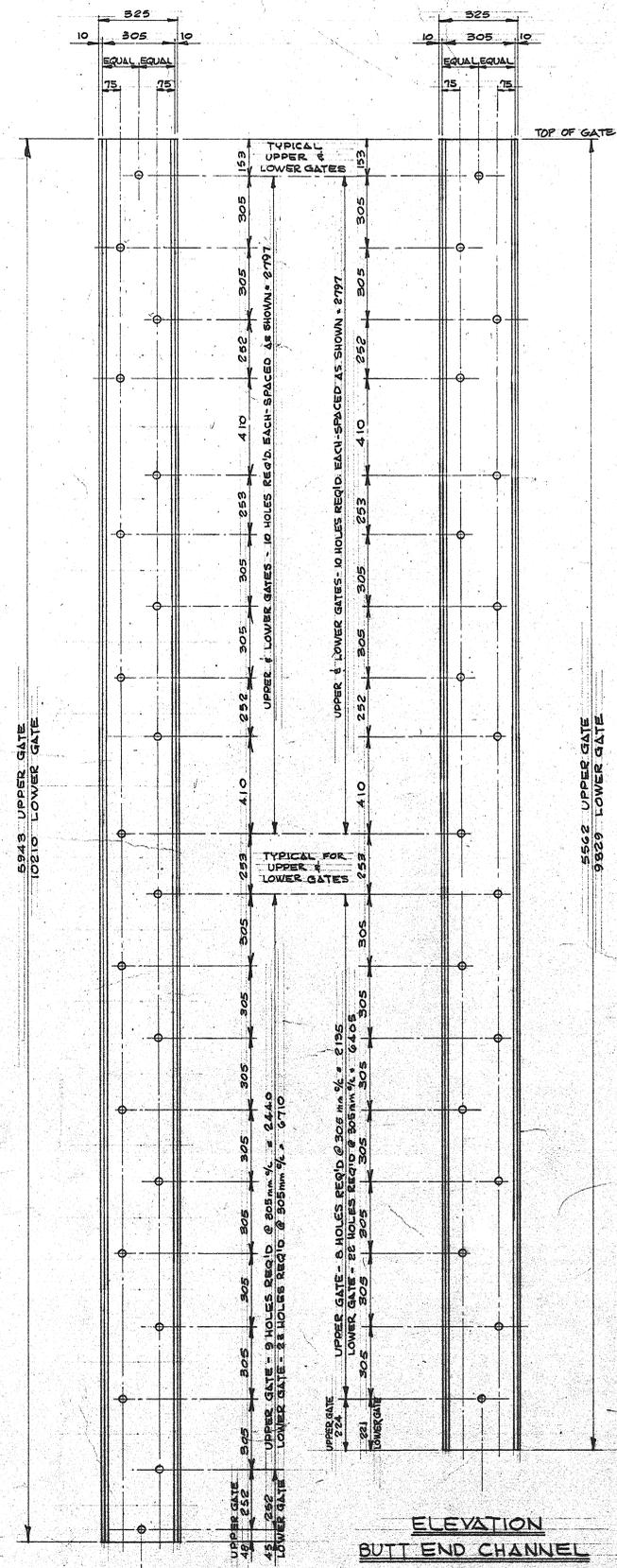
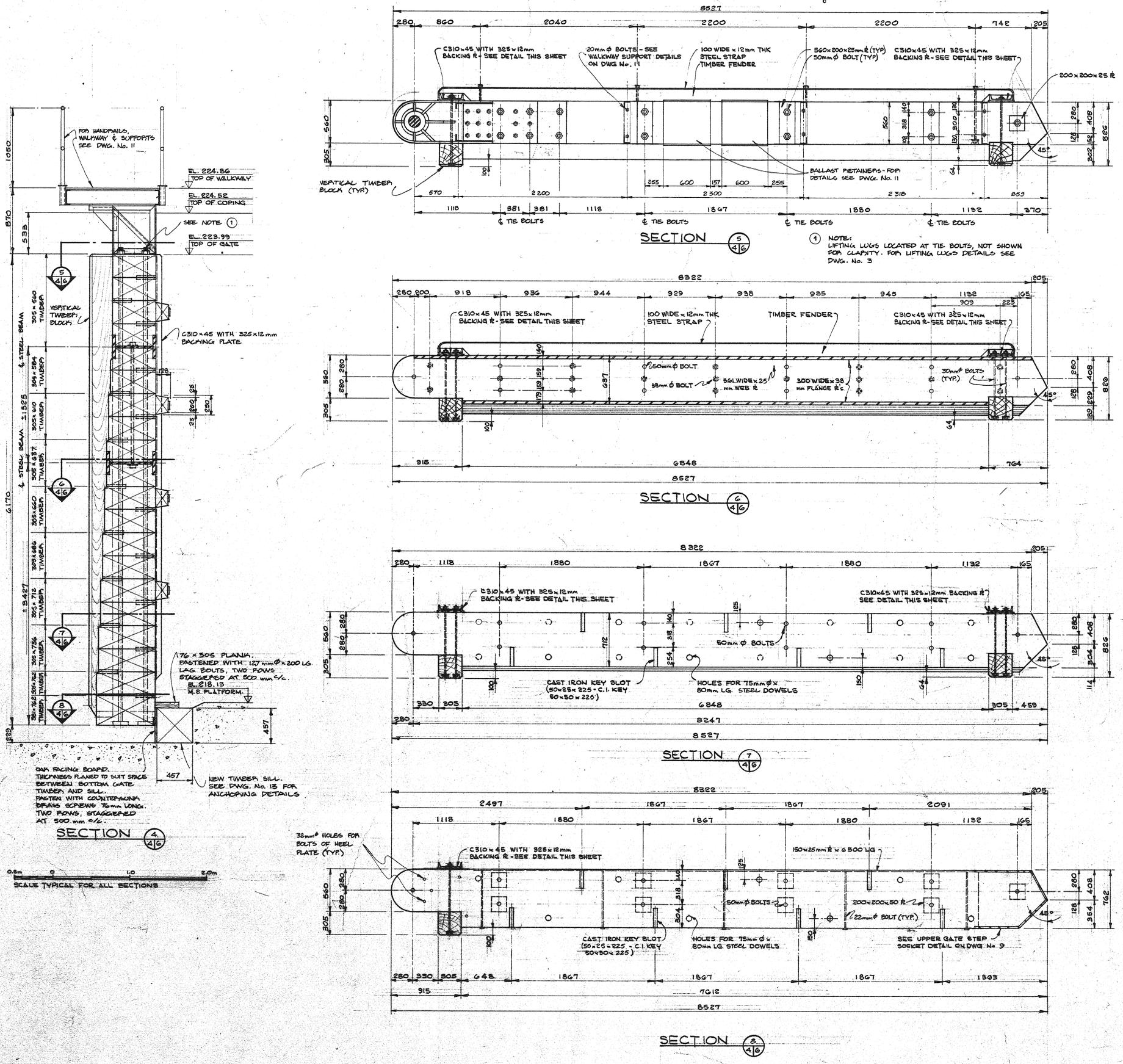
approved  
*[Signature]*

Project Manager  
**A.W. Cairns**

project number  
**037538**

drawing no.  
**5 of 14**

WESTERN REGION  
N.M. HOYT  
DIRECTOR GENERAL



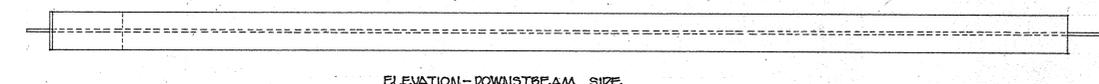
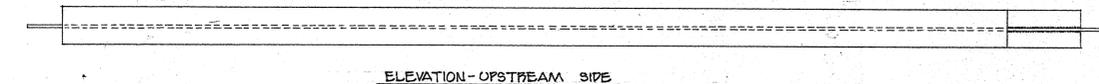
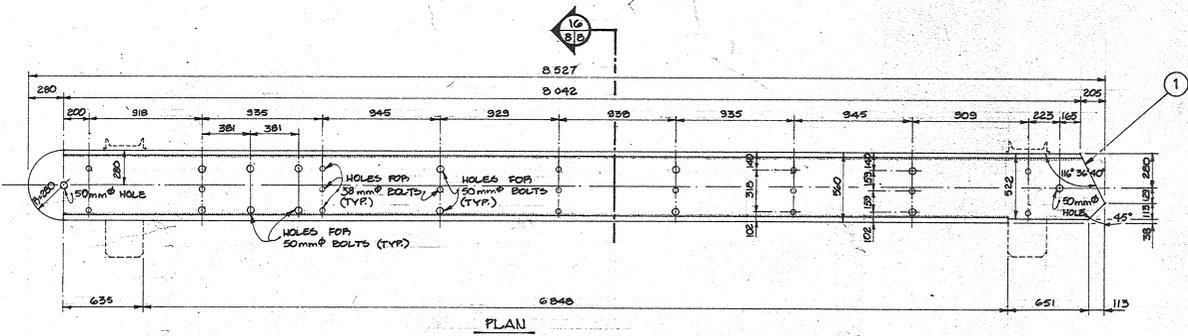
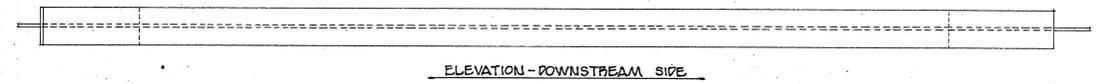
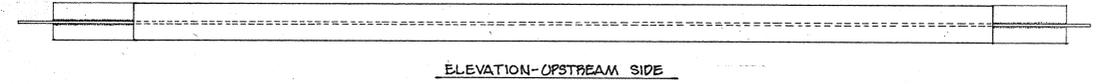
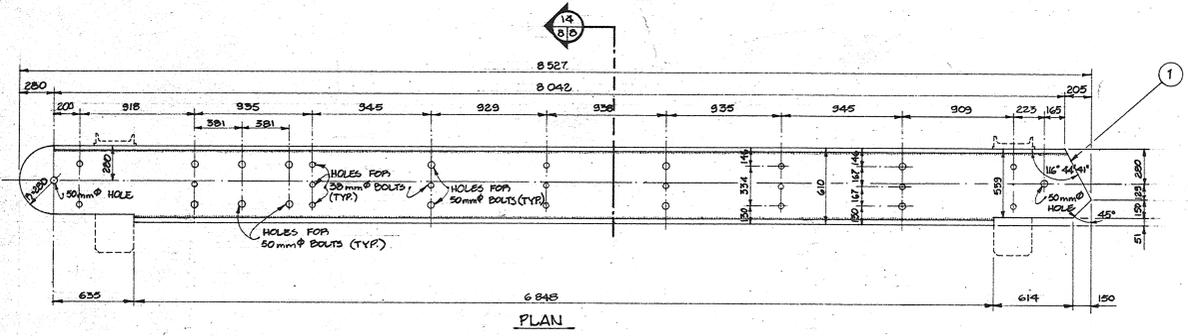
revision	date
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B	
C	

ST-ANDREWS  
LOCK & DAM  
LOCK GATES RENEWAL

UPPER GATE SECTIONS  
UPPER & LOWER GATES  
VERTICAL CHANNEL DETAILS

designed	E. DOORIS	2/09/81
drawn	J.A. McDONALD	2/09/81
checked		
approved		
title	UPPER & LOWER GATES VERTICAL CHANNEL DETAILS	
project number	037538	

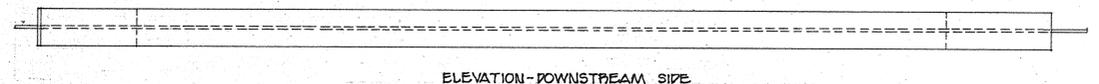
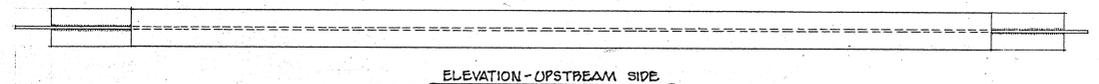
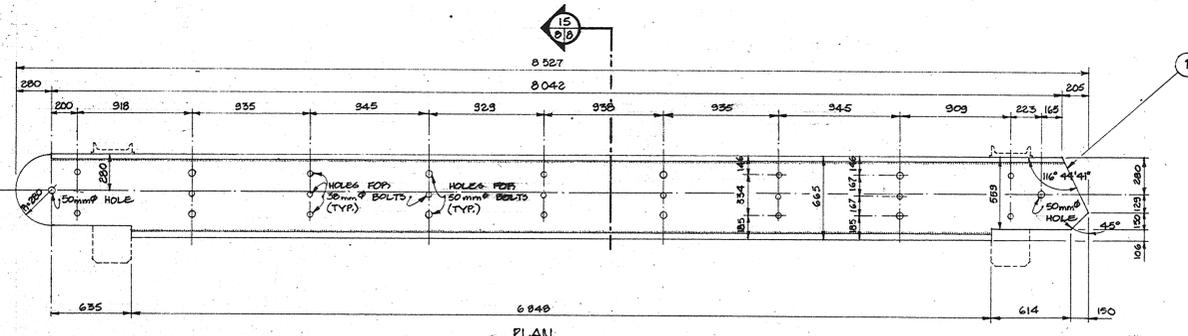




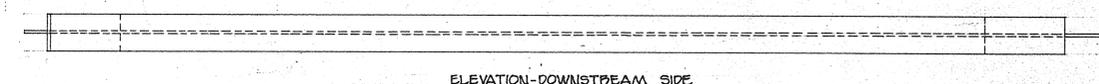
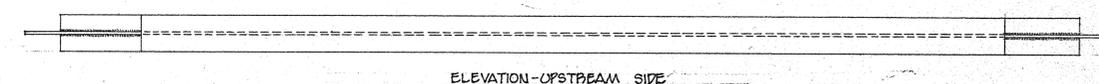
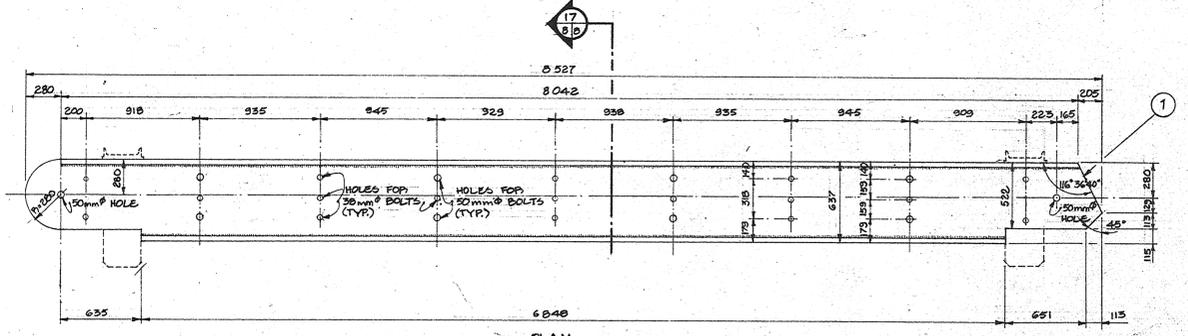
610mm FABRICATED BEAM (LOWER GATE)

560mm FABRICATED BEAM (UPPER GATE)

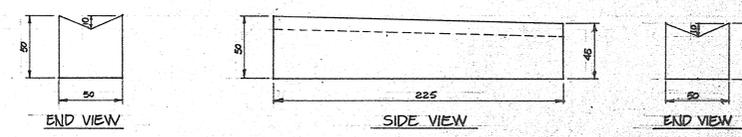
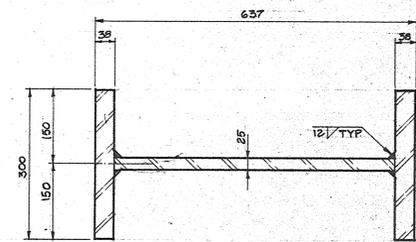
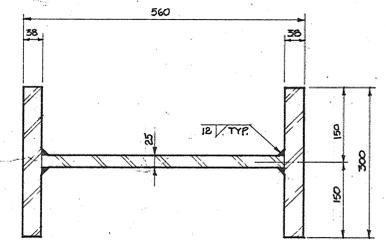
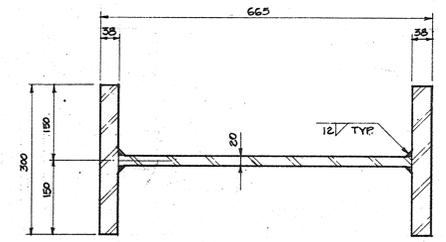
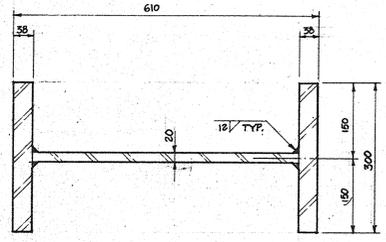
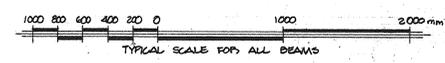
1 SEE NOTE ON SHEET No. 3  
DETAIL OF STEP SOCKET



665mm FABRICATED BEAM (LOWER GATE)



637mm FABRICATED BEAM (UPPER GATE)



CAST IRON KEY

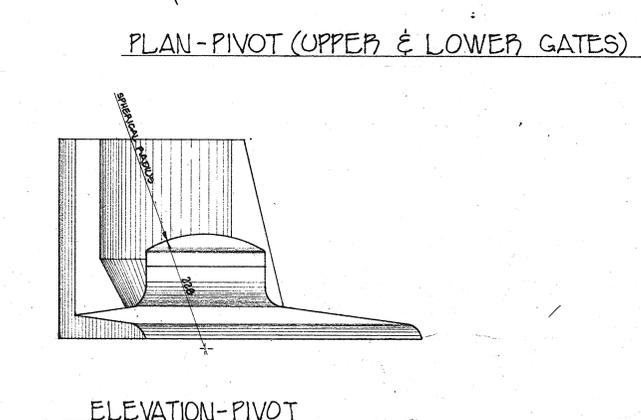
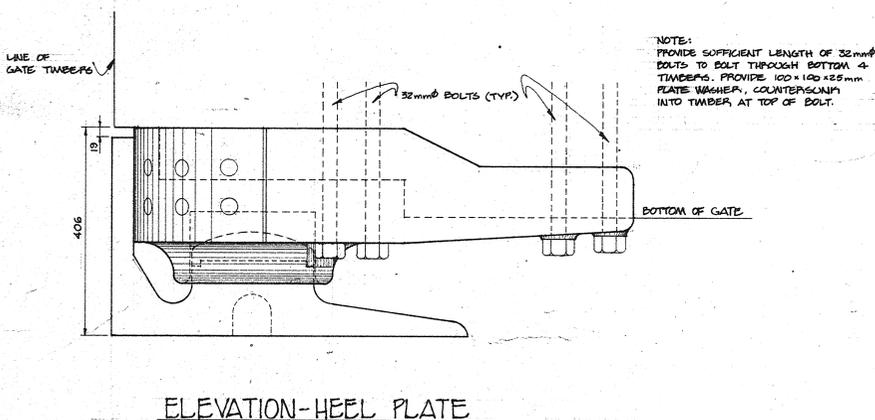
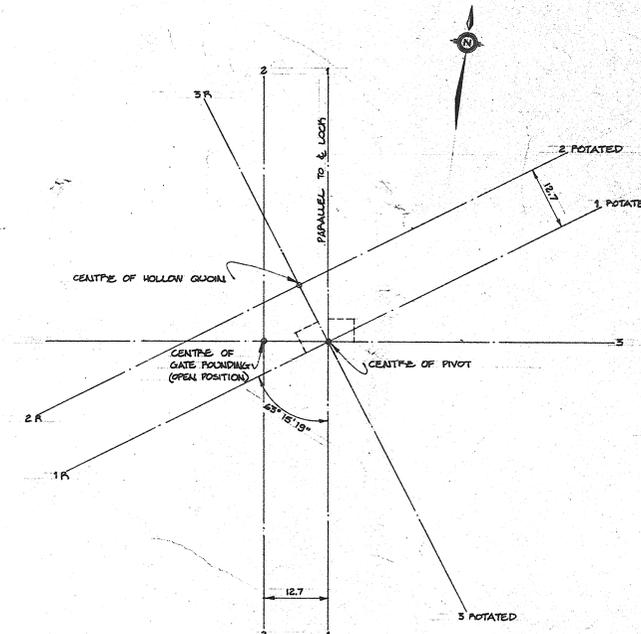
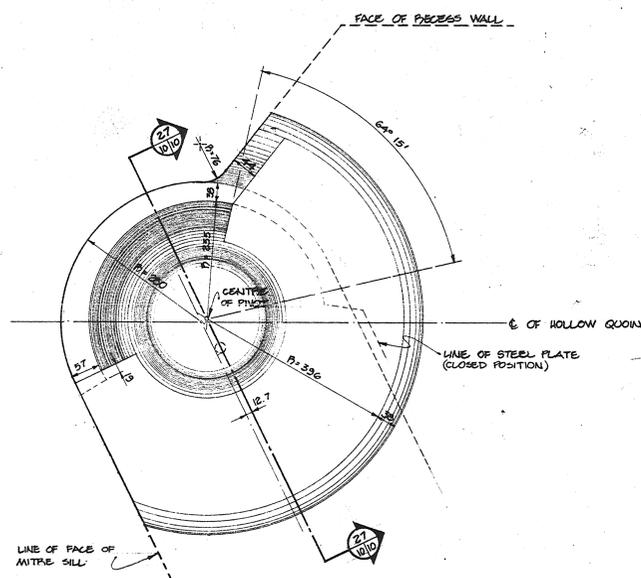
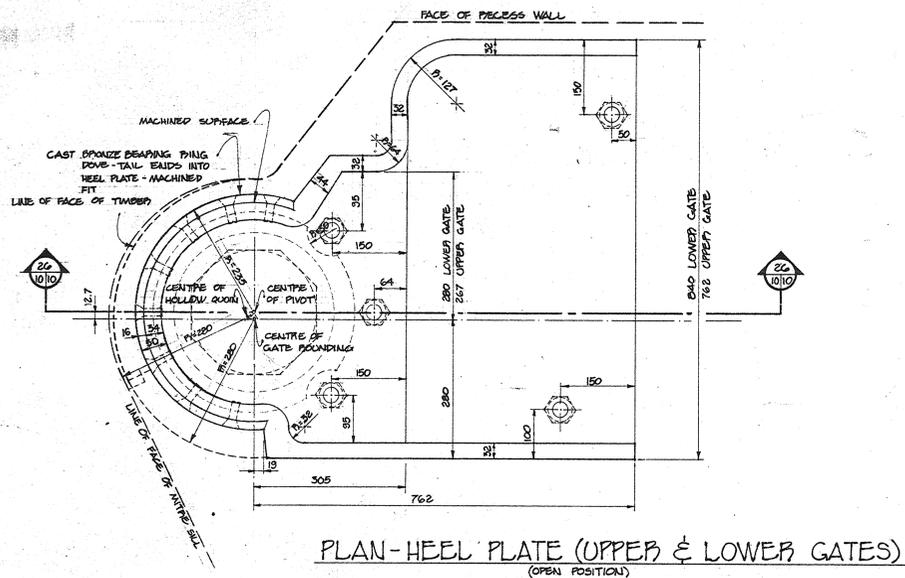


revisions	date
A	
B	
C	

A detail no. of detail  
 B location drawing no. of detail no.  
 C drawing no. of detail no.

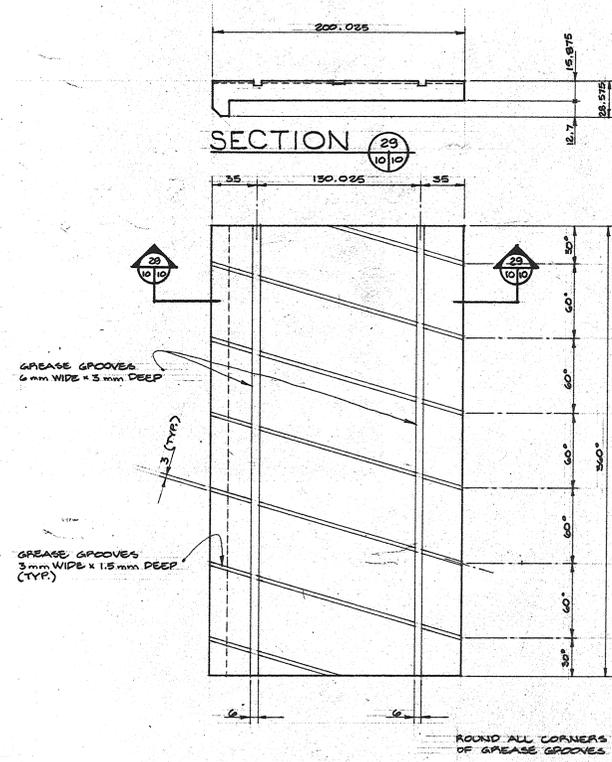
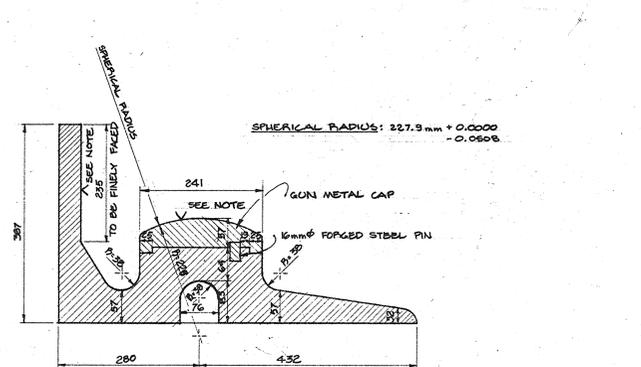
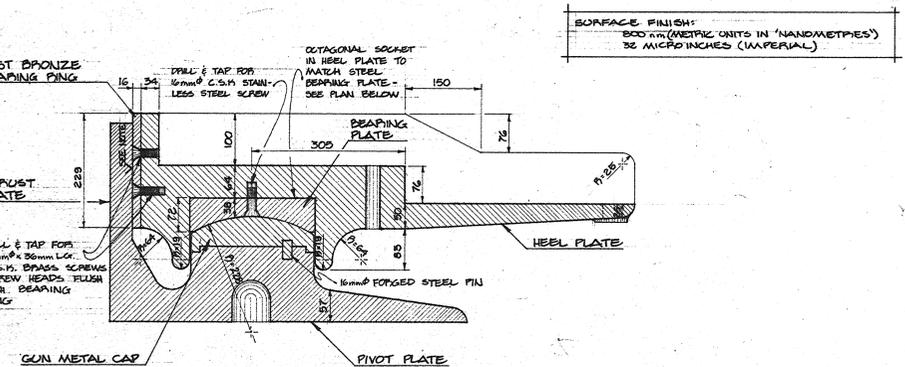
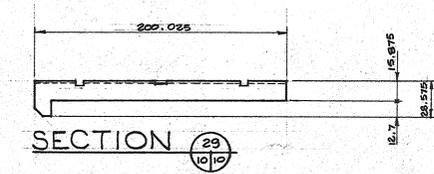
project: **ST-ANDREWS LOCK & DAM LOCK GATES RENEWAL**  
 drawing: **UPPER & LOWER GATES FABRICATED BEAMS PLANS, ELEVATIONS AND SECTIONS**  
 designed: **E. De CURTIS** 21/09/81  
 drawn: **F. DANGLE** 21/09/81  
 reviewed: **T. Rollens**  
 approved: **M. G. ...**  
 Funder: **A.W. Co. ...**  
 PWC Project Manager: **Administrateur de projets TRC**  
 project number: **037538**  
 drawing no.: **8 of 14**





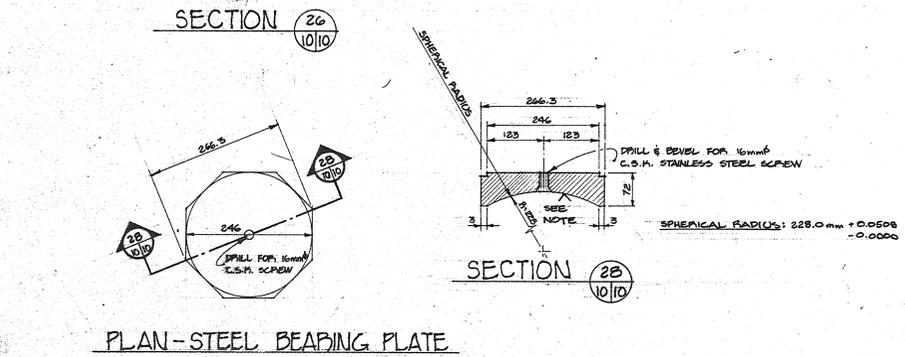
RELATIVE POSITION OF CENTRE OF PIVOT, CENTRE OF GATE BOUNDING & CENTRE OF HOLLOW QUIIN EAST GATES (WEST GATES - OPPOSITE HAND)

NOTE: CENTRE OF GATE BOUNDING COINCIDES EXACTLY WITH CENTRE OF HOLLOW QUIIN WHEN GATE IS IN MITRED (CLOSED) POSITION.



DETAIL-DEVELOPMENT OF NEW BEARING RING

N.T.S.



revision	date
A	
B	
C	

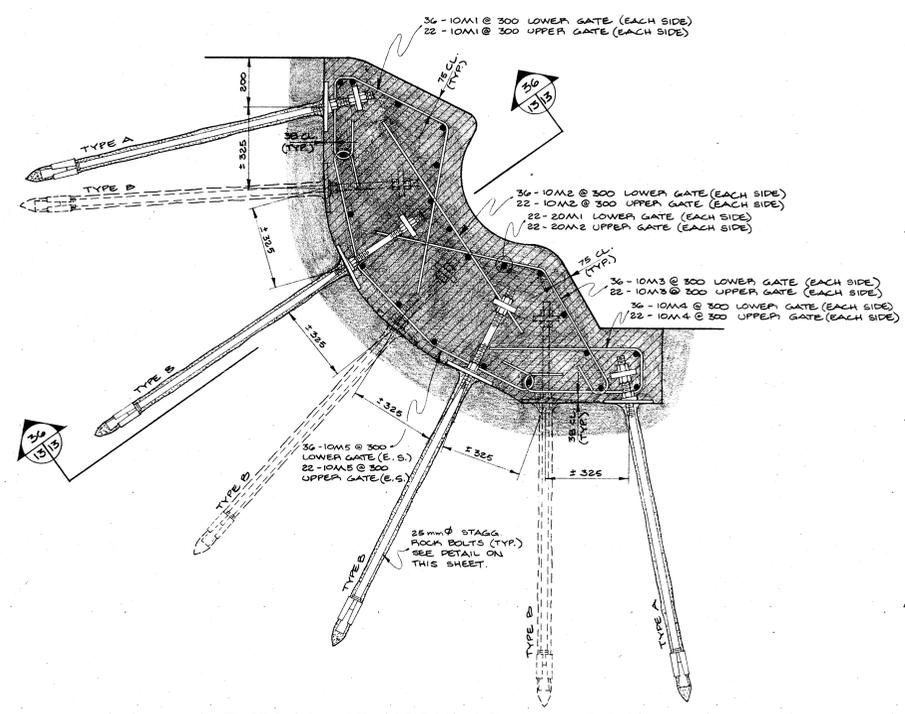
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 B location drawing no. sur dessin no.  
 C drawing no. dessin no.

project: ST-ANDREWS LOCK & DAM LOCK GATES RENEWAL  
 drawing: UPPER & LOWER GATES HEEL PLATES, PIVOTS  
 plans, elevations and sections

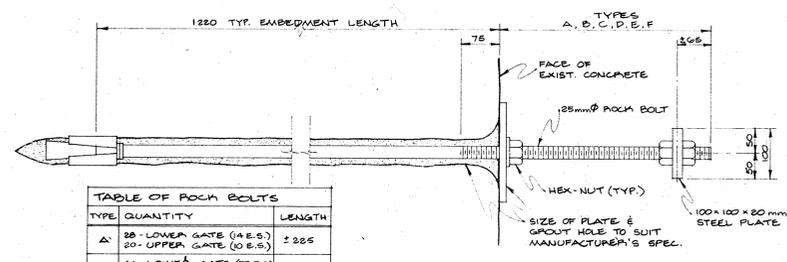
designed: K.O. KOLBERG 21/03/81  
 date: 21/03/81  
 drawn: F. DANGLE 21/03/81  
 date: 21/03/81  
 reviewed: S. [Signature] examiné  
 date: 21/03/81  
 approved: [Signature] approuvé  
 date: 21-9-85  
 Tender: A. U. Gagnon Soumission  
 PWC Project Manager Administrateur de projets TTC  
 project number no. du projet: 037538  
 drawing no. no. du dessin: 10 of 14





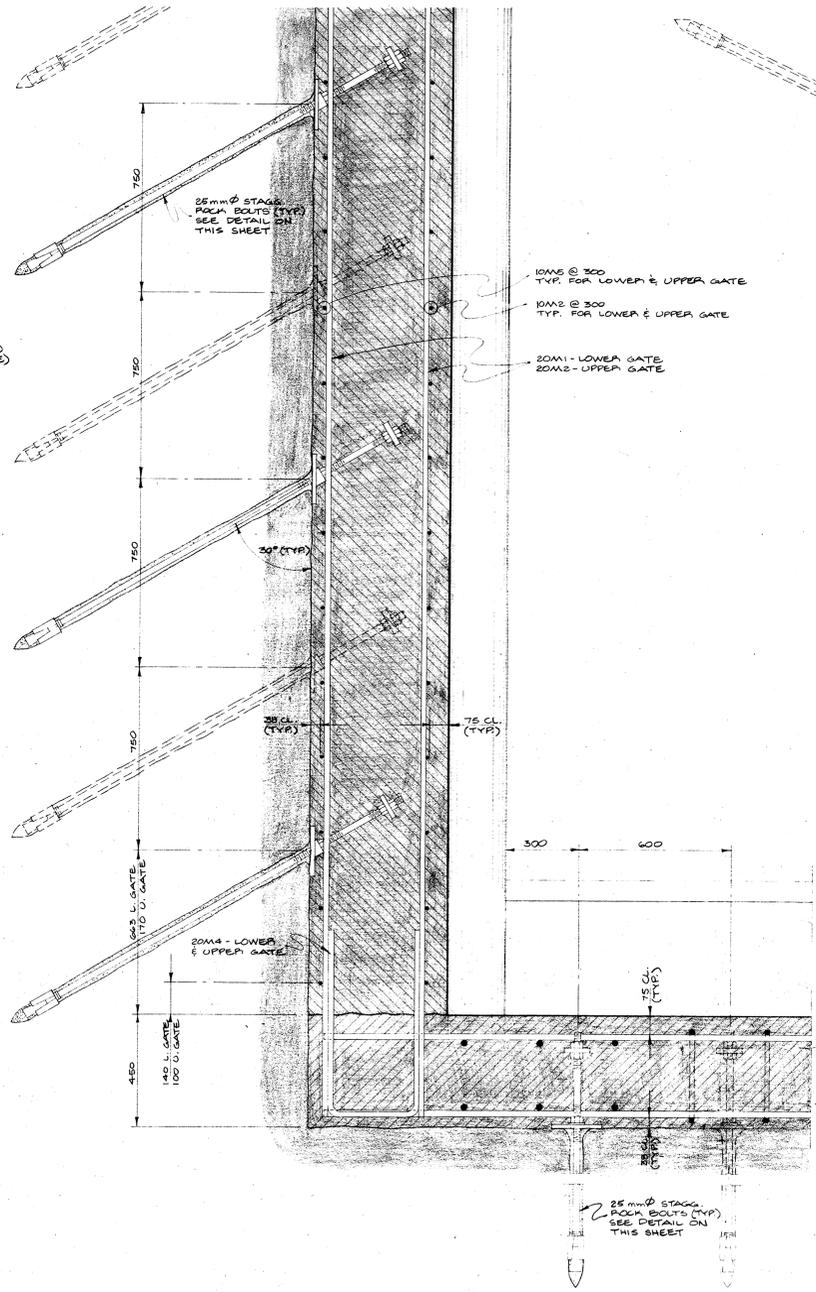


TYPICAL SECTION AT CONCRETE QUOIN

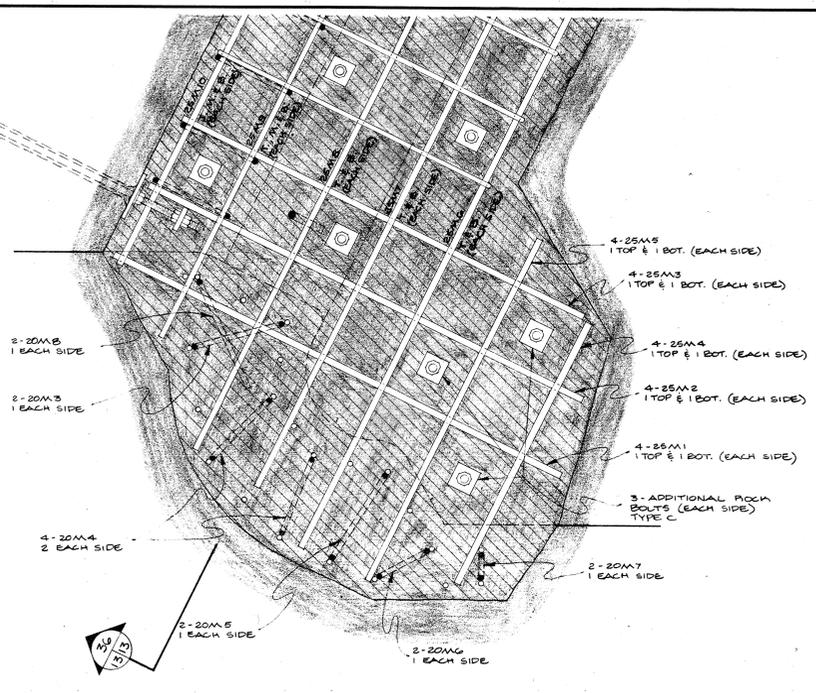


ROCK BOLT DETAIL

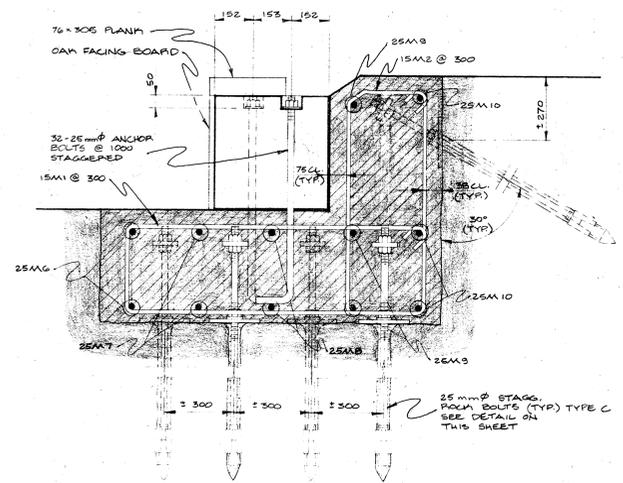
TYPE	QUANTITY	LENGTH
A	30 - LOWER GATE (4 E.S.) 20 - UPPER GATE (10 E.S.)	± 285
B	66 - LOWER GATE (33 E.S.) 40 - UPPER GATE (20 E.S.)	± 425
C	58 - LOWER GATE 58 - UPPER GATE	± 305
D	11 - LOWER GATE 11 - UPPER GATE	± 325
E	10 - LOWER GATE (5 E.S.) 10 - UPPER GATE (5 E.S.)	± 300
F	4 - LOWER GATE (2 E.S.) 4 - UPPER GATE (2 E.S.)	± 550



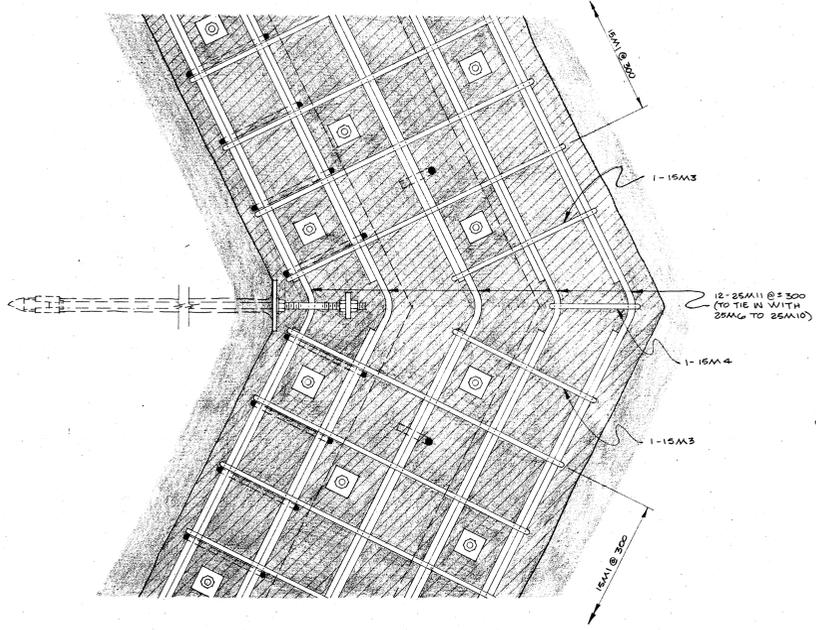
SECTION 36



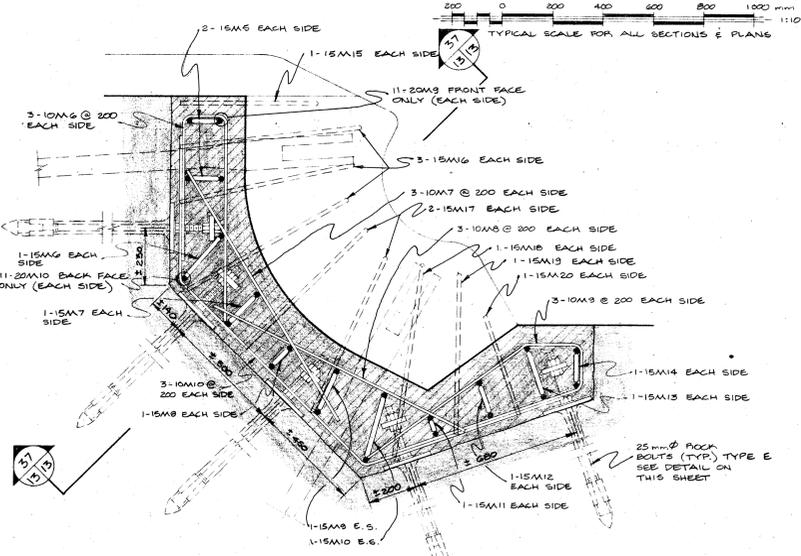
PLAN-REINFORCING AT BOT. SLAB LOWER GATE  
UPPER GATE SIMILAR



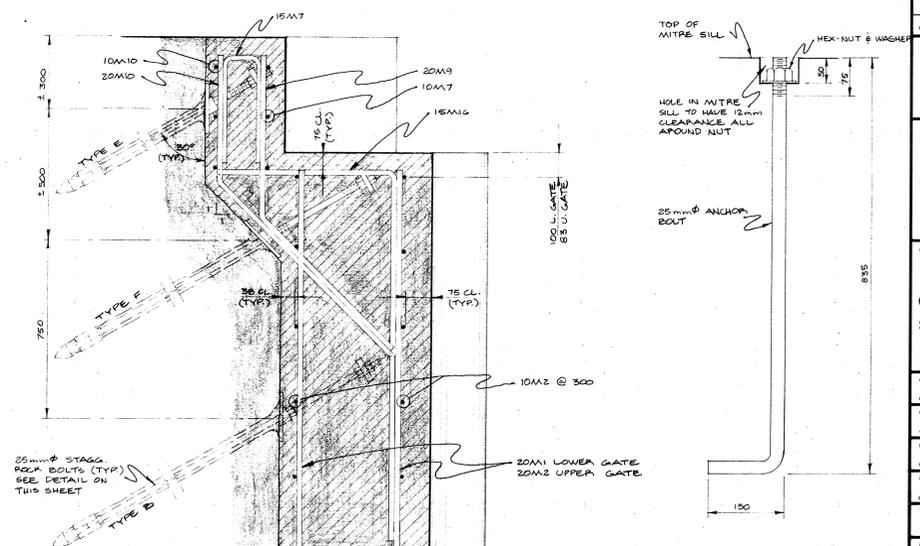
TYPICAL SECTION THROUGH MITRE SILL



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



PLAN-REINFORCING AT ANCHOR BOX LOWER GATE  
UPPER GATE SIMILAR



SECTION 37



ANCHOR BOLT DETAIL

revisions	date
A	A detail no
B	no du detail
C	location drawing no
	sur dessin no
	C drawing no
	dessein no

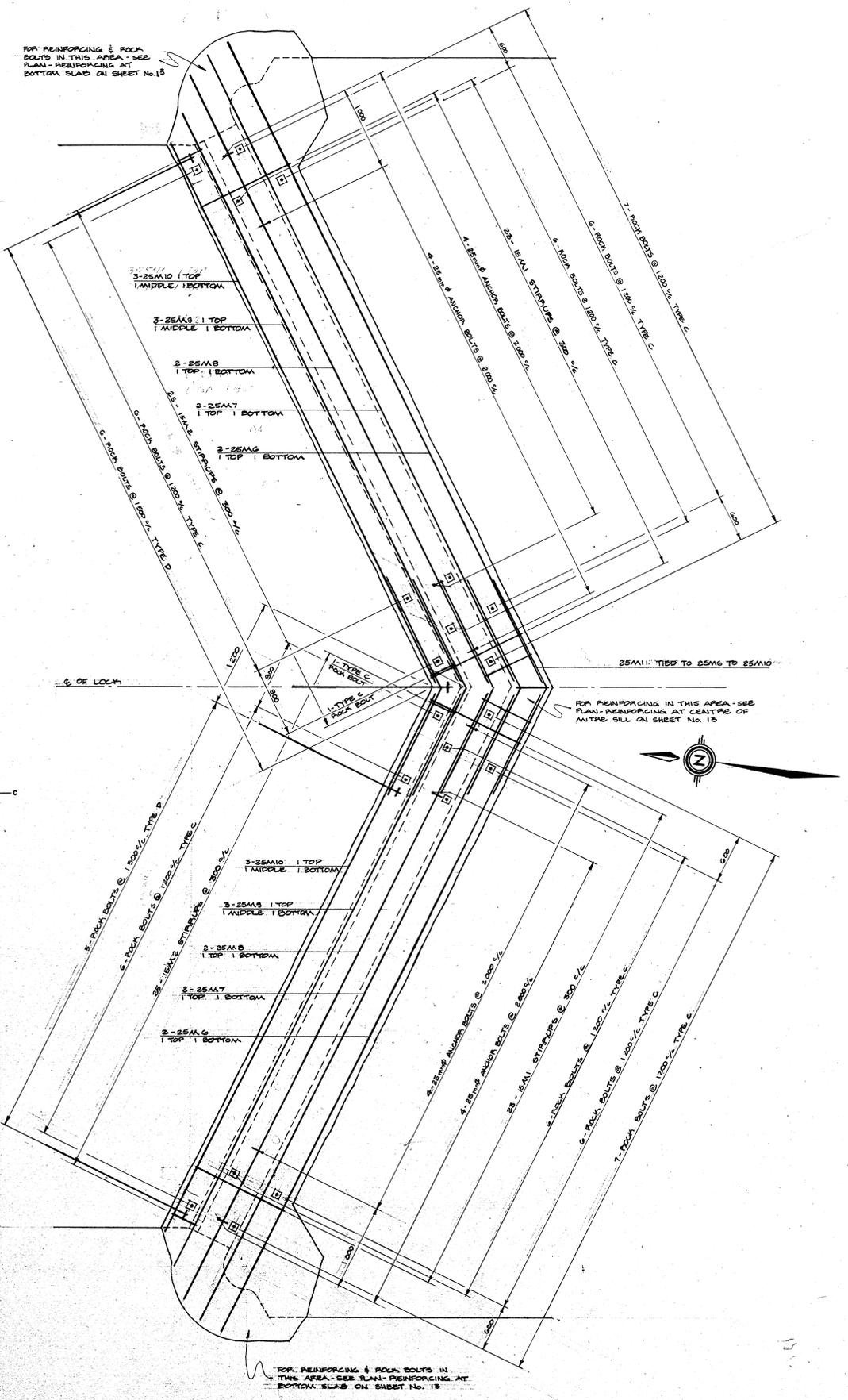
ST-ANDREWS  
LOCK & DAM  
LOCK GATES RENEWAL

GENERAL REINFORCING  
SECTIONS & DETAILS

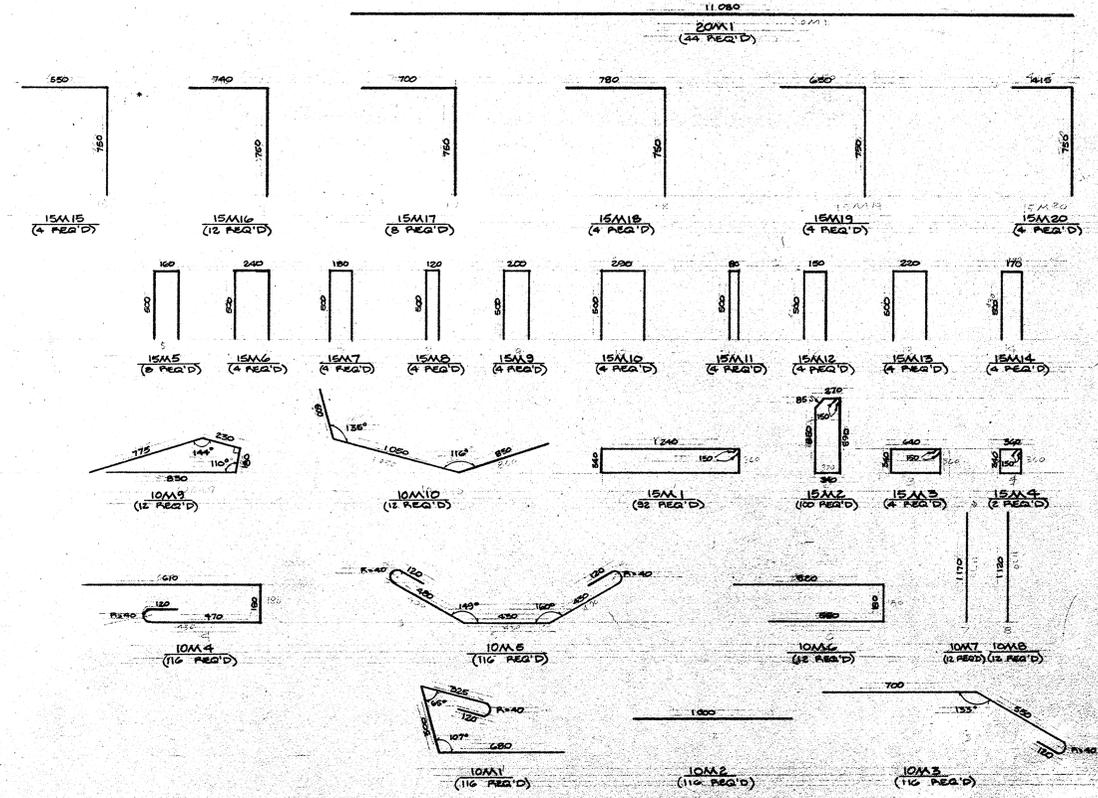
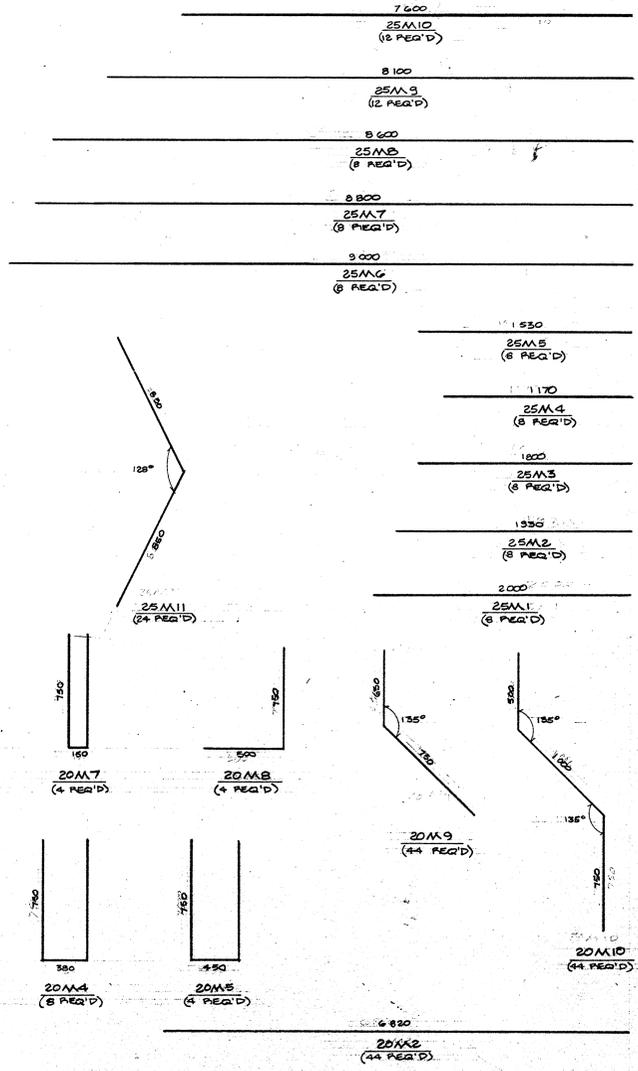
designed E. De CURTIS 13/10/82  
drawn F. DANGLE 13/10/82  
date 13/10/82  
reviewed To Robberg  
approved A. Williams 83-07-20  
Tender B.W. Cairns & Co. Submission  
PWC Project Manager Administrateur de projets TPC  
project number no. du projet

037538

13 of 14



PLAN - REINFORCING AT MITRE SILL LOWER GATE  
UPPER GATE SIMILAR



BAR LIST

revision	date
A	
B	
C	

A detail no. of detail  
 B location drawing no. of detail no.  
 C drawing no. of detail no.

project: ST-ANDREWS LOCK & DAM LOCK GATES RENEWAL  
 drawing: PLAN-REINFORCING AT MITRE SILL & BAR LIST  
 design:

designed: E. De CURTIS 13/10/82  
 date: E. De CURTIS  
 drawn: F. DAIGLE 13/10/82  
 date:  
 reviewed: A. Rolberg 22/11/85  
 date:  
 approved: A. Rolberg 23-01-86  
 date:  
 leader: A.W. GIBSON  
 PWC Project Manager / Administrateur de projets PWC  
 project number: 037538  
 drawing no.: 14 of 14