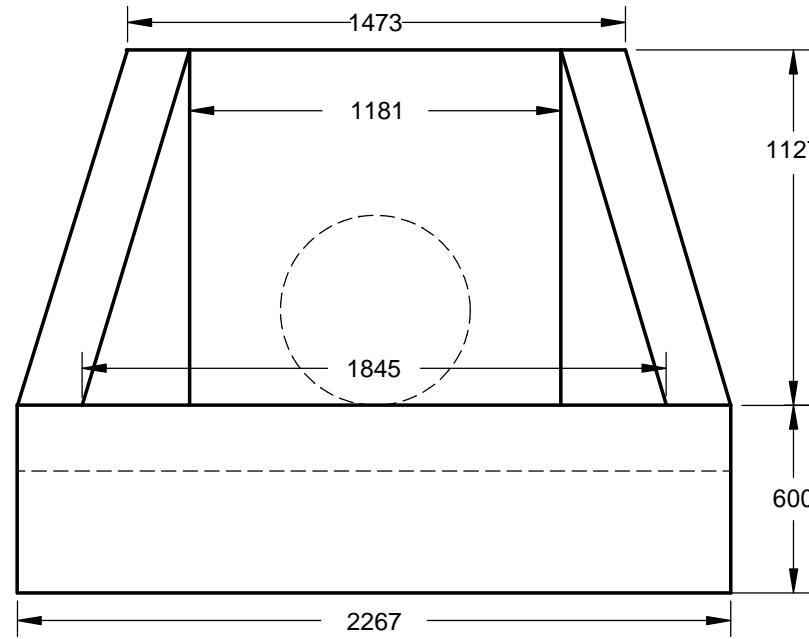


SIDE ELEVATION



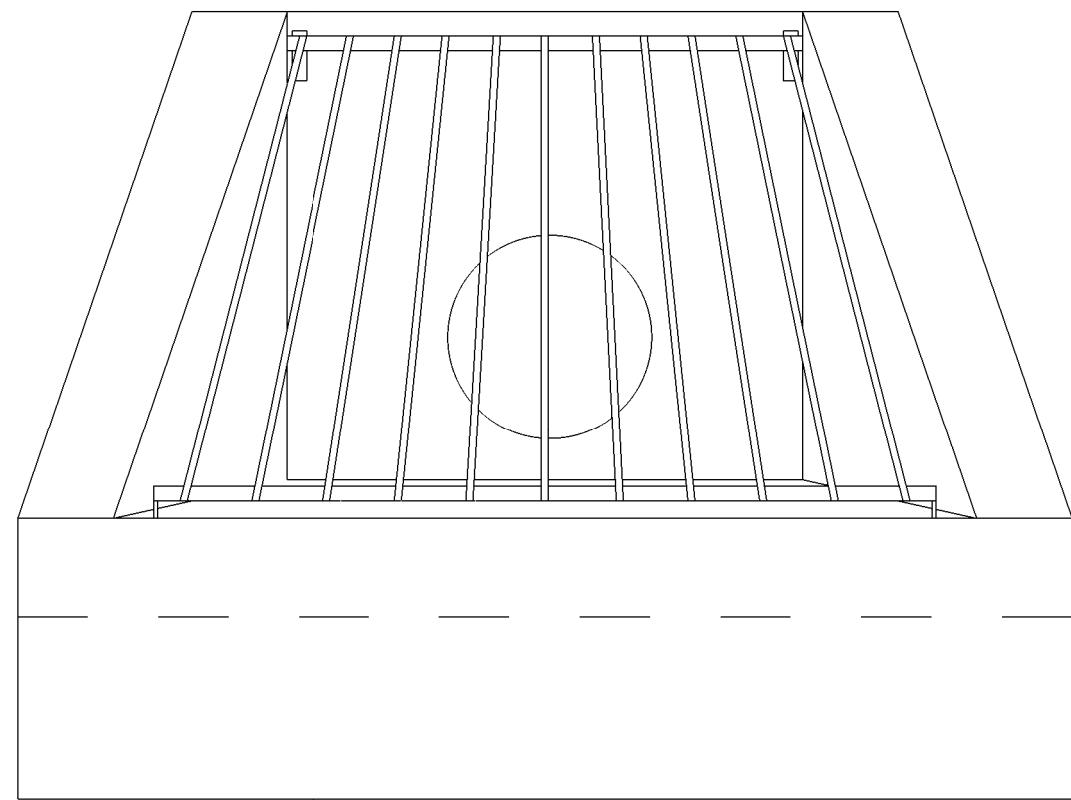
FRONT ELEVATION

REINFORCING

1. REINFORCING STEEL IS TO CONFORM TO CSA G30.12M - GRADE 400 MPa.
2. REINFORCING STEEL IS TO BE PLACED AS DETAILED TO 10mm TOLERANCE AND IS TO BE SUPPORTED BY METAL OR PLASTIC SUPPORTS AND/OR HANGERS IN ACCORDANCE WITH CAN/CSA A23.1.
3. LAP ALL REINFORCING BAR SPLICES 32 BAR DIAMETERS MINIMUM UNLESS INDICATED OTHERWISE ON THE DRAWINGS.
4. REINFORCING STEEL IS TO BE CLEAN, FREE OF CORROSION & UNDAMAGED.
5. DO NOT WELD BARS OR USE HEAT TO BEND REINFORCING STEEL.
6. CONCRETE COVER OVER REINFORCEMENT IS TO BE 50mm UNLESS OTHERWISE NOTED ON DRAWINGS

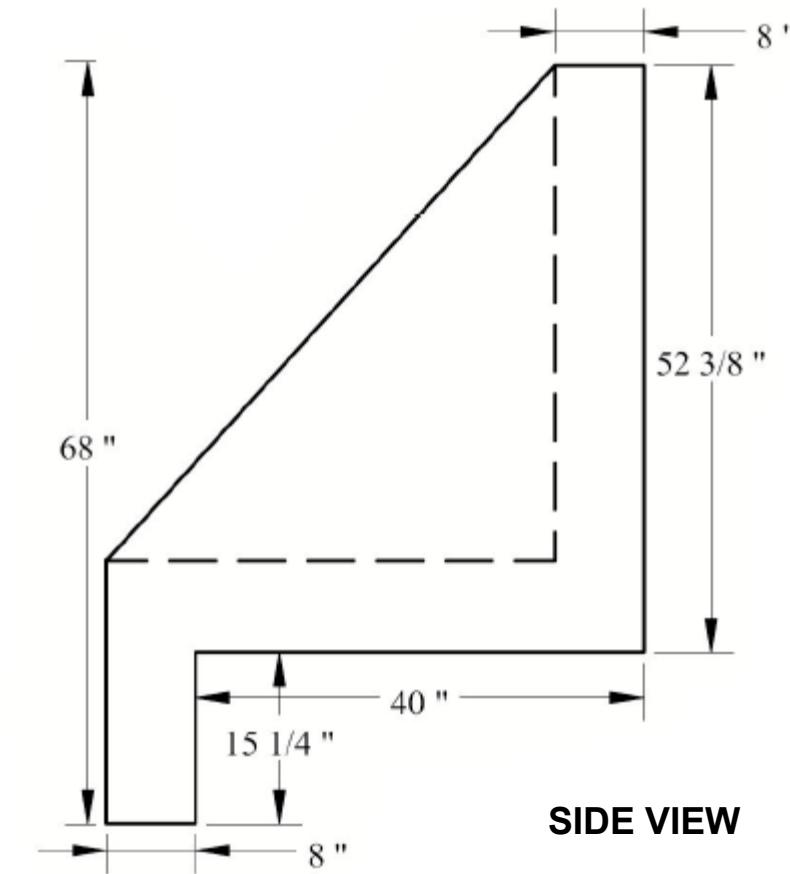
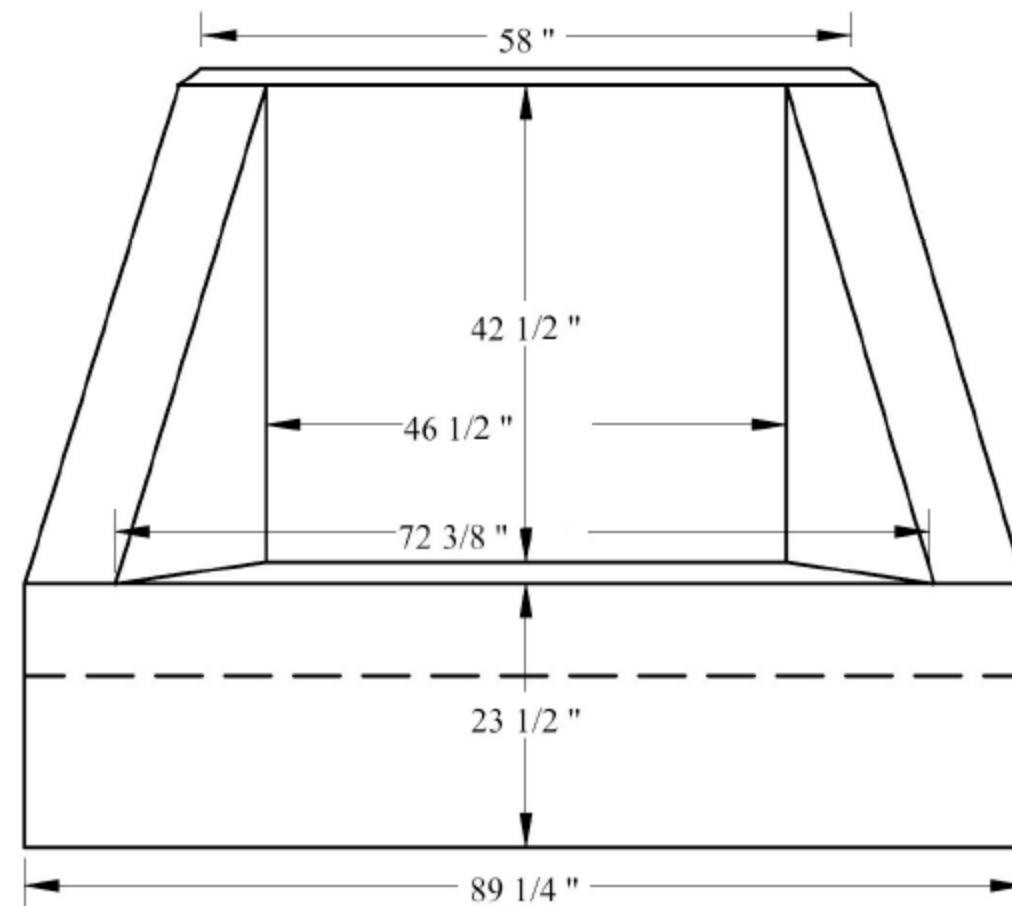
ITEM	AGG SIZE	STRENGTH	W/C	AIR %	CEMENT TYPE	EXPOSURE
HEADWALL	20mm	45Mpa	0.40	4-7	HS	F-2

11-13 HEADWALL



FRONT VIEW w/ GRATE

FRONT VIEW



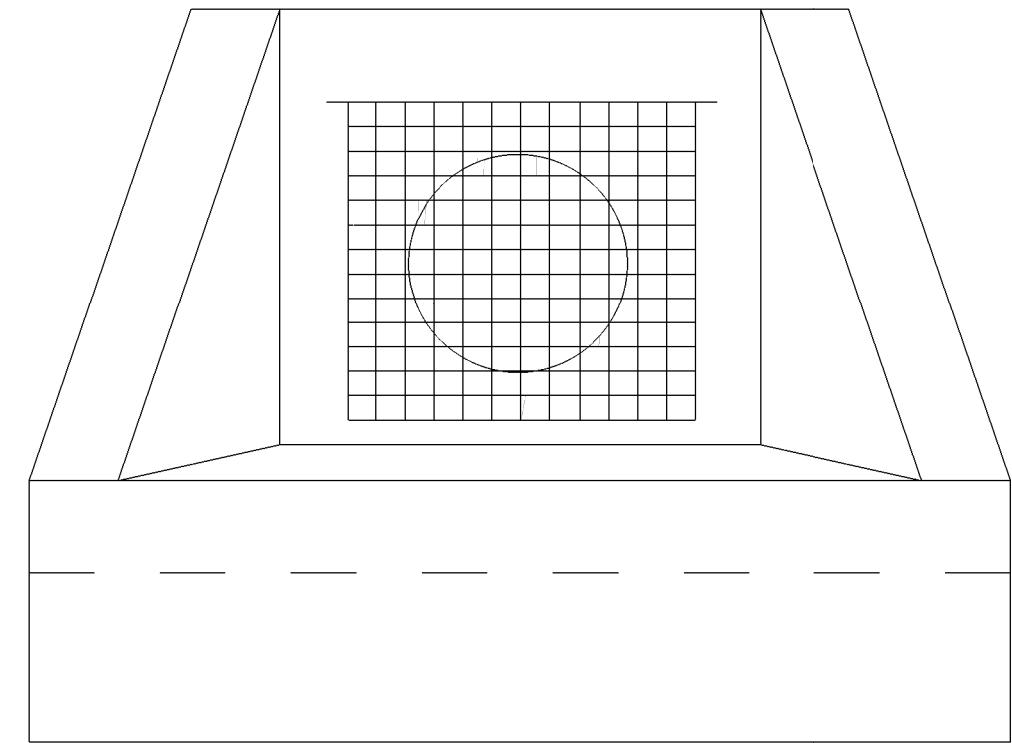
SIDE VIEW

REVISIONS		REMARKS
	MM/DD/YY	
1	/ /	..
2	/ /	..
3	/ /	..
4	/ /	..
5	/ /	..

RIKON
Precast Concrete Products

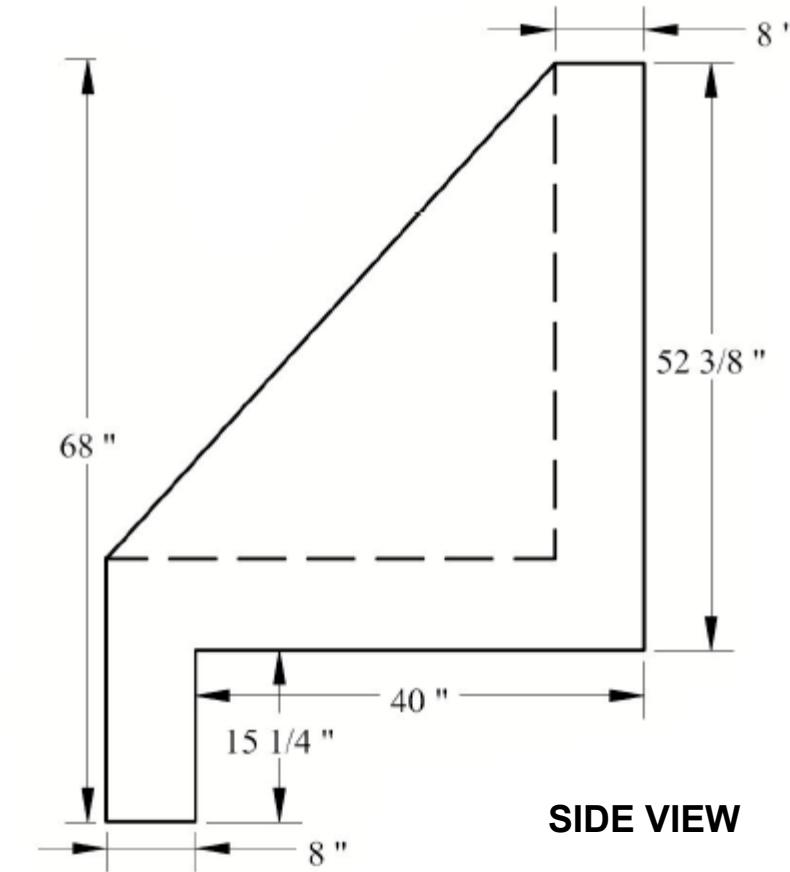
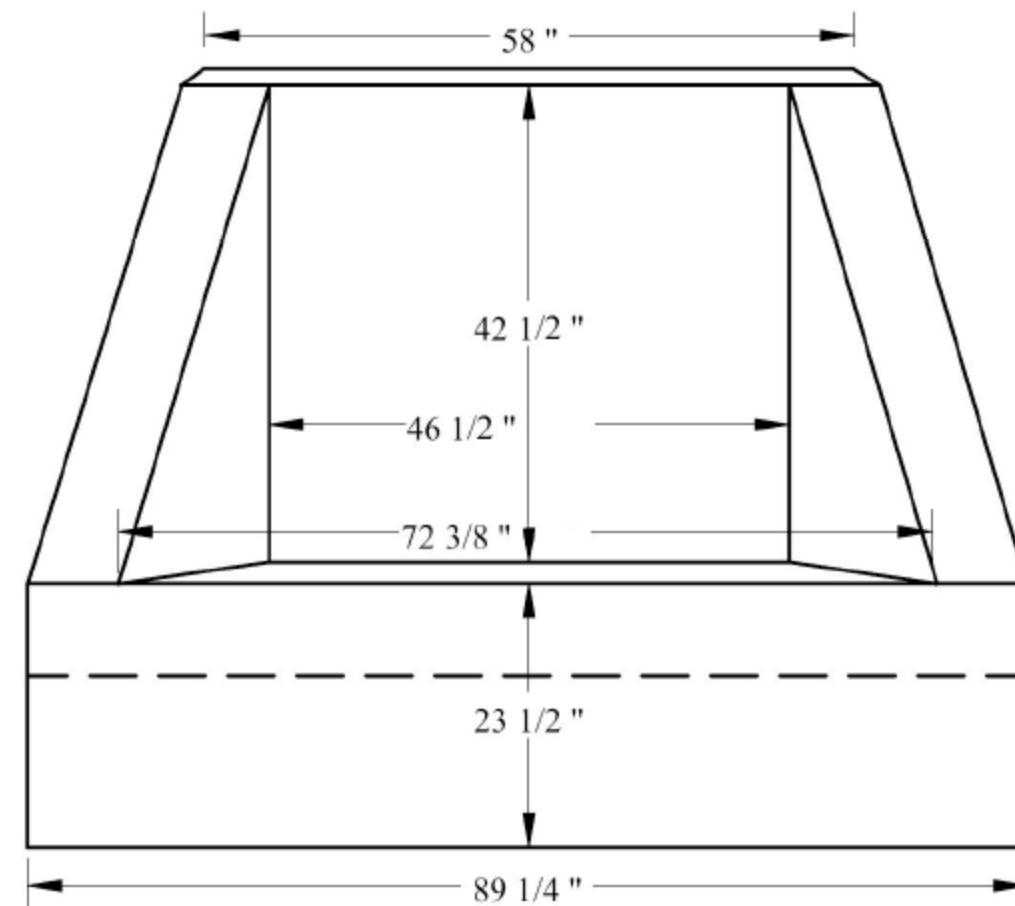
11-13
Headwall &
Inlet Grate

A 001



FRONT VIEW w/ HINGED GRATE

FRONT VIEW



SIDE VIEW

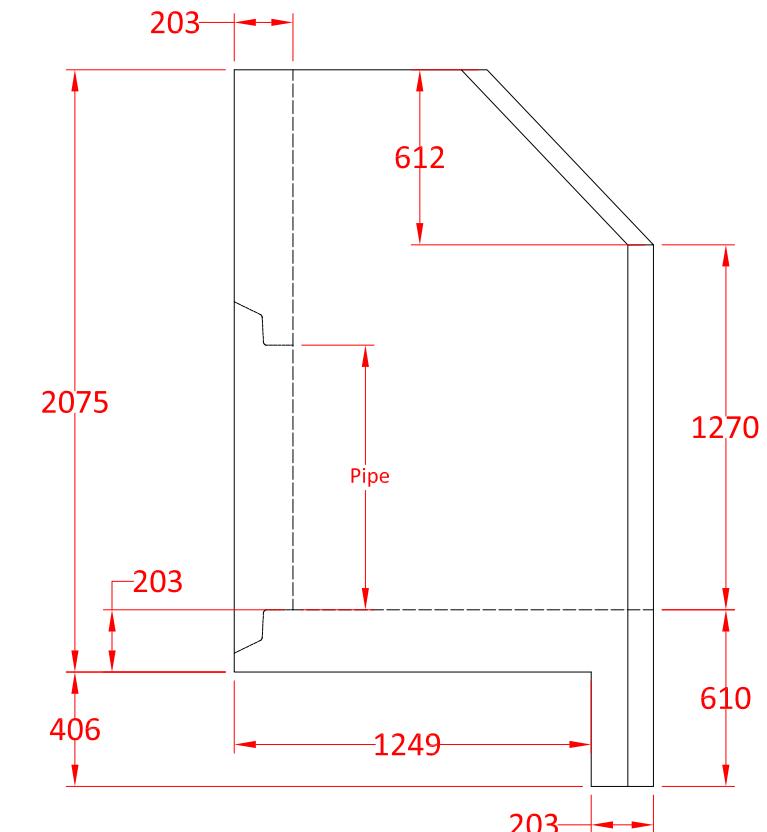
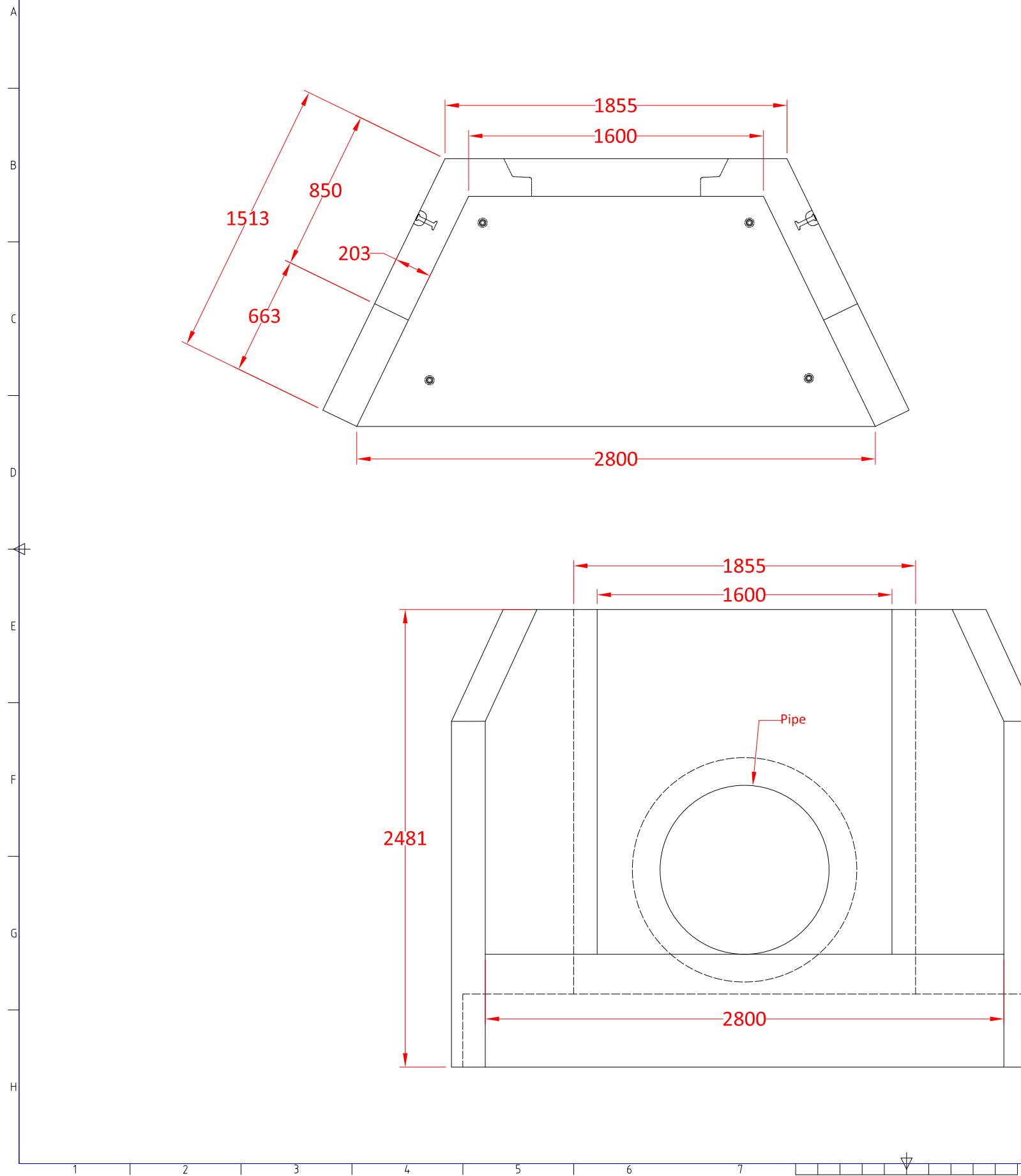
TRI-KON
Precast Concrete Products

11-13
Headwall &
Outlet Grate

A 001

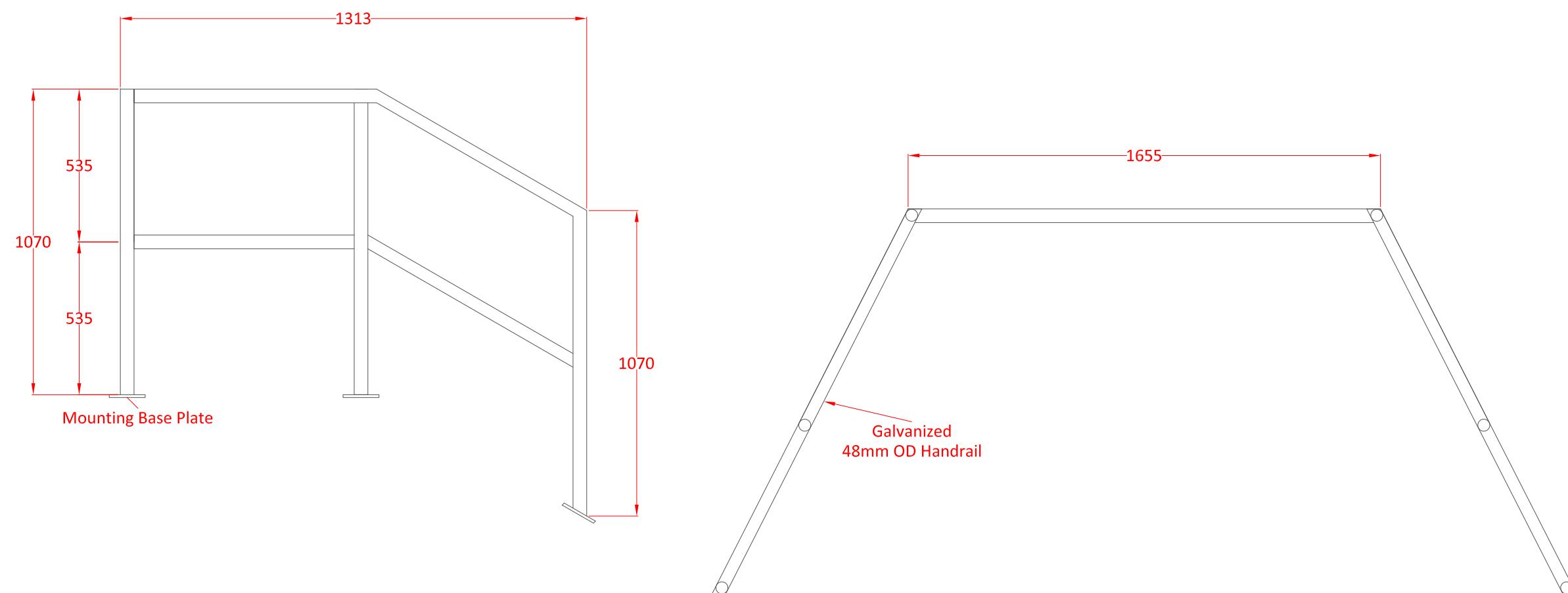
REVISIONS	
	MM/DD/YY
1	/ / ..
2	/ / ..
3	/ / ..
4	/ / ..
5	/ / ..

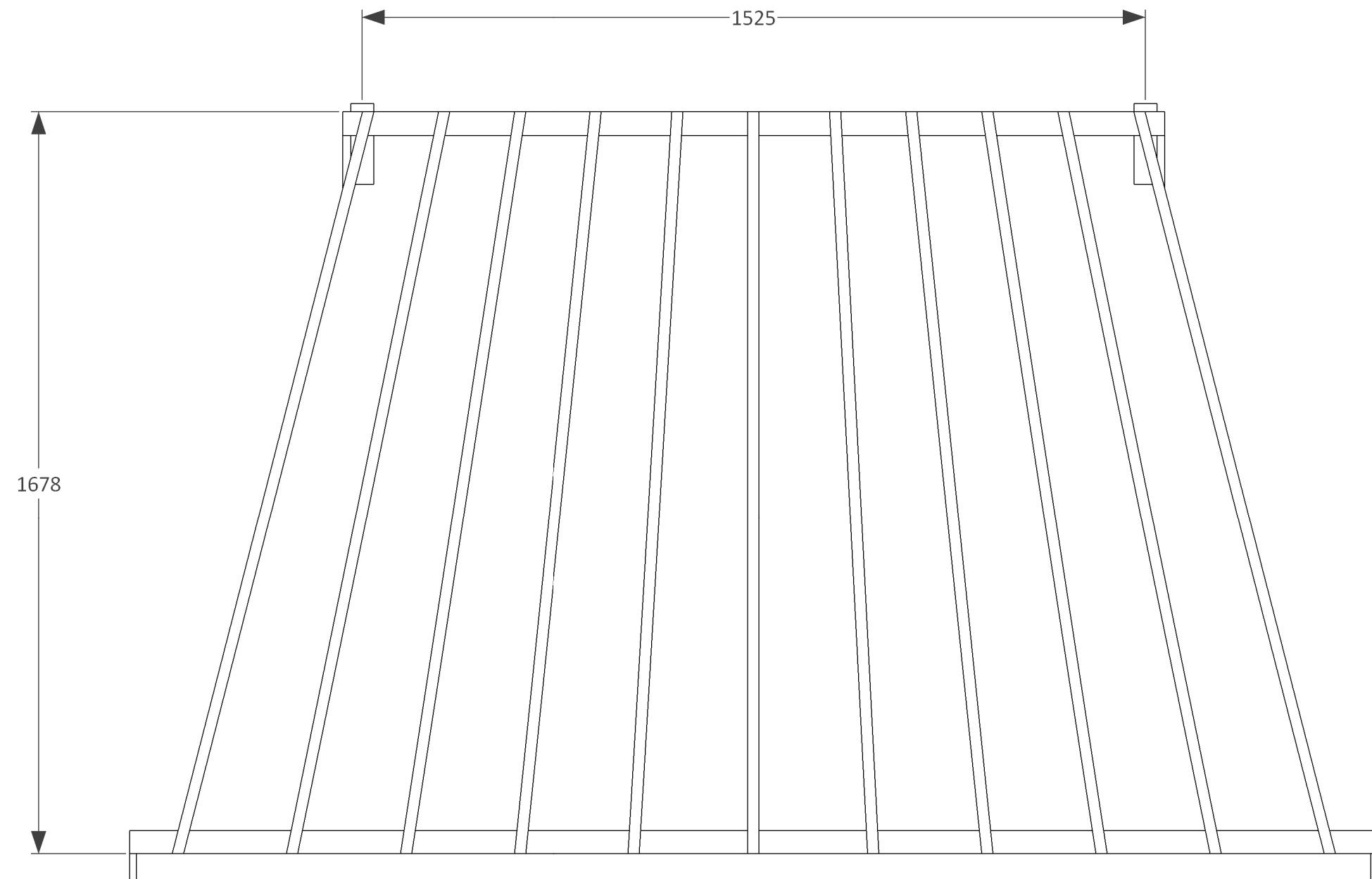
REVISIONS	REMARKS

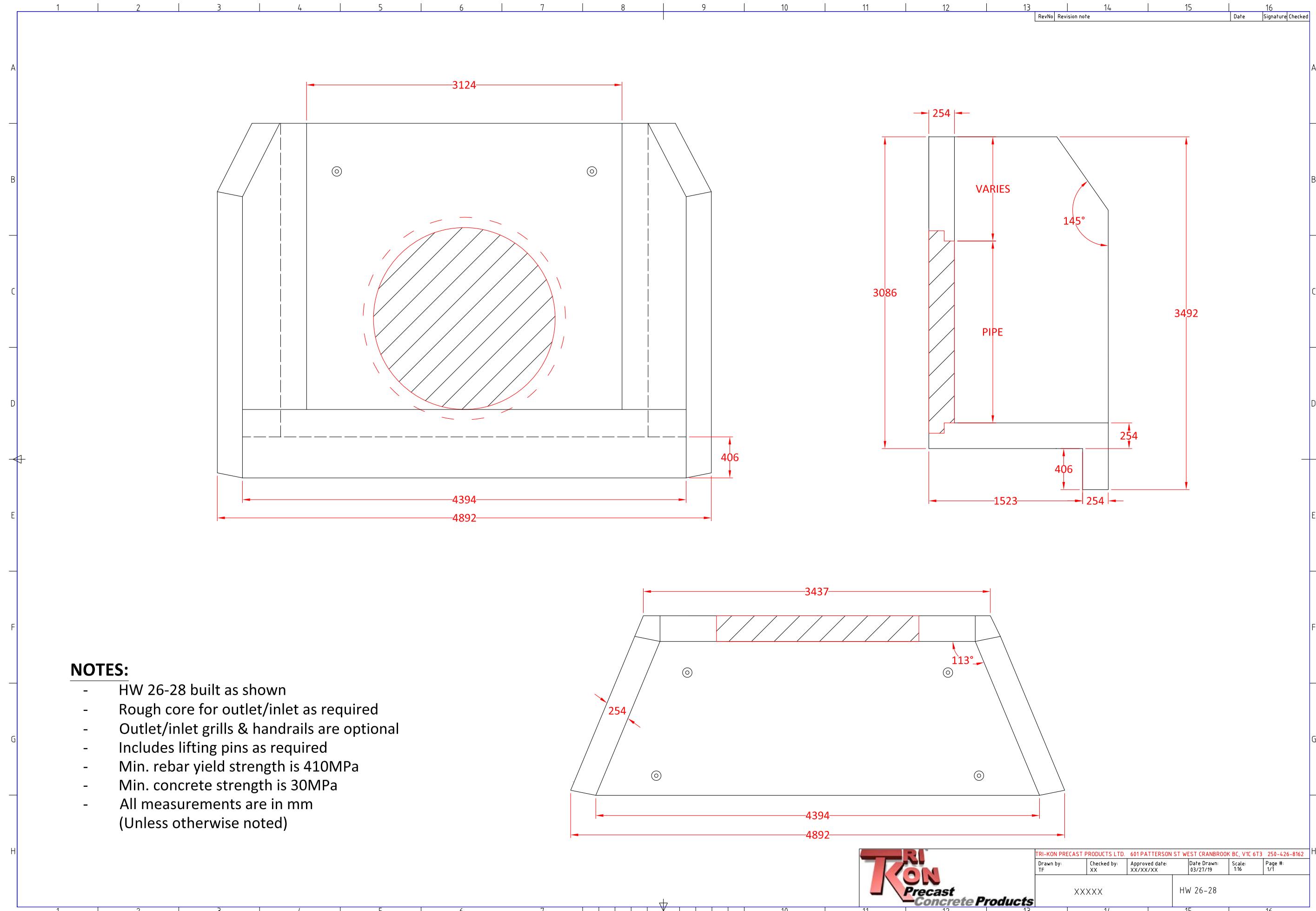


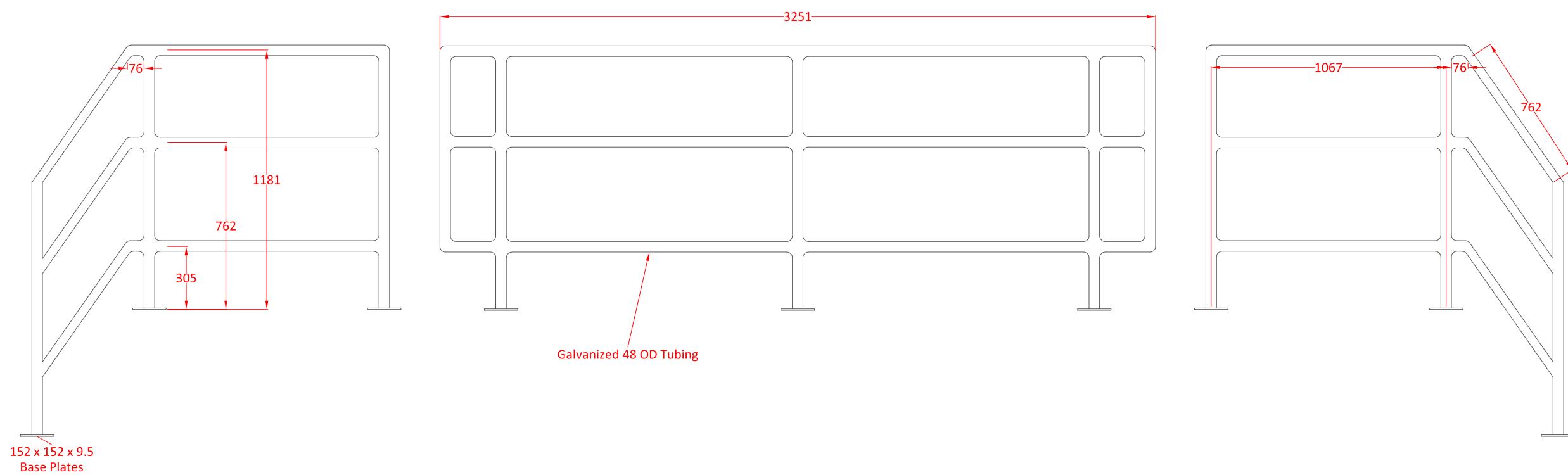
NOTES

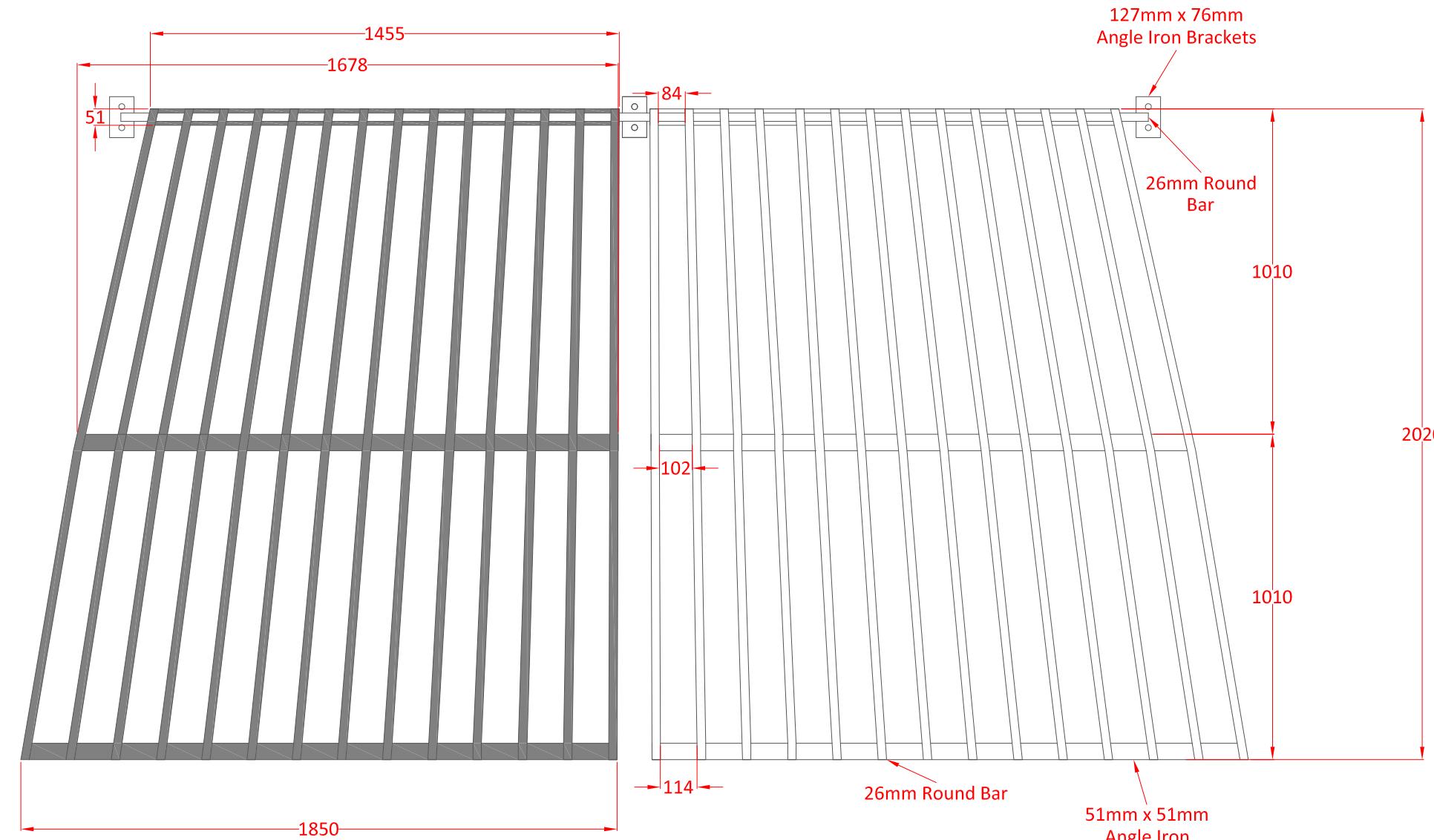
- HW 16-20 built as shown
- Rough core for outlet/inlet as required
- Recommended max hole core size is 1400mm
- Outlet/inlet grills & handrails are optional
- Includes lifting pins as required
- Min. rebar yield strength is 410MPa
- Min. concrete strength is 30MPa
- All measurements are in mm
(Unless otherwise noted)

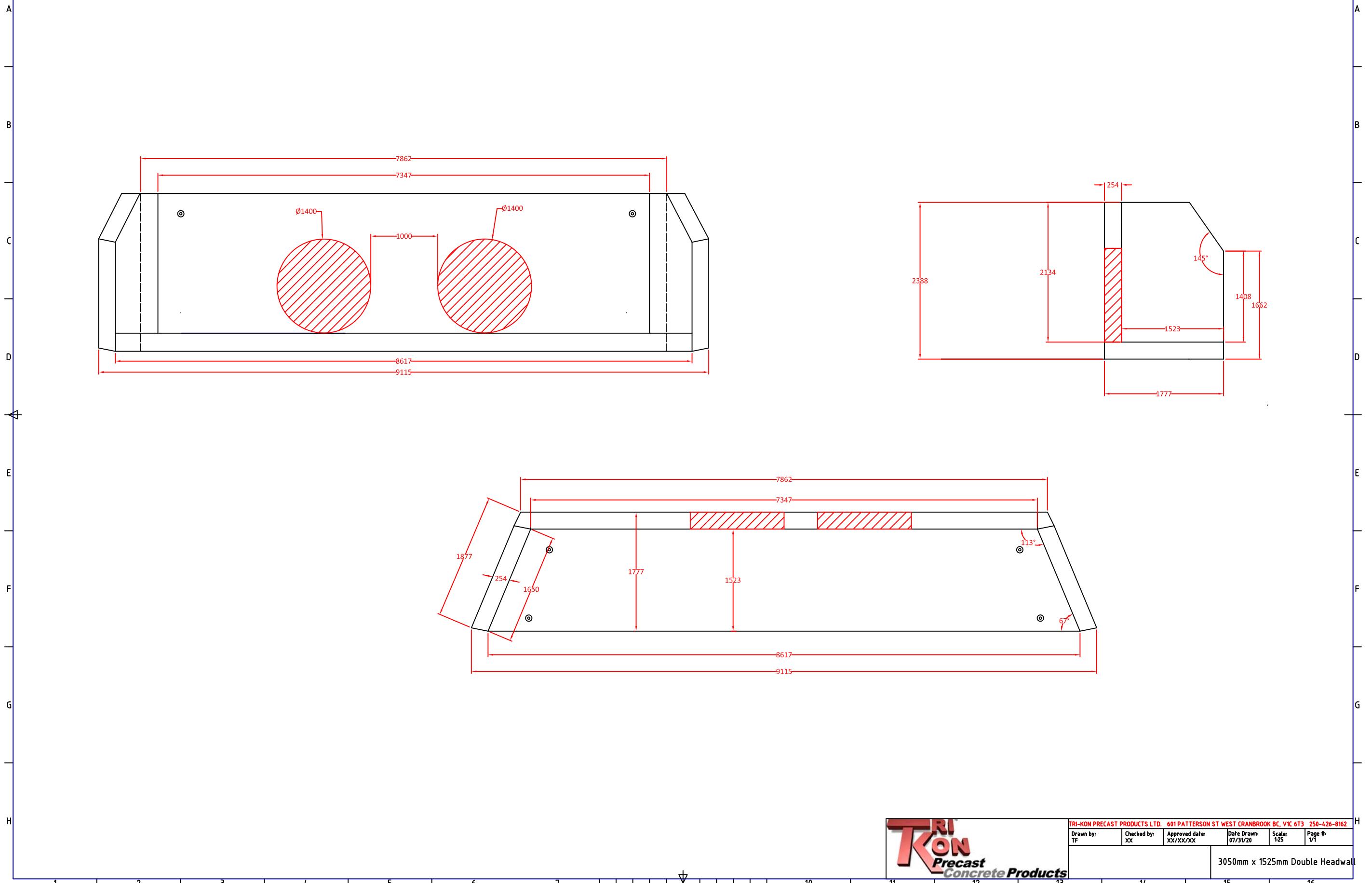












STRUCTURAL NOTES

GENERAL

- ALL CONSTRUCTION IS TO CONFORM TO THE BRITISH COLUMBIA BUILDING CODE (2012).
- ALL REFERENCES TO STANDARDS NOTED ON THESE DRAWINGS REFER TO THE LATEST REVISED ISSUE.
- THESE DRAWINGS PREPARED BY McELHANNEY CONSULTING SERVICES LTD. (MCELHANNEY) ARE INTENDED FOR STRUCTURAL REQUIREMENTS OF THIS PROJECT ONLY. ALL OTHER ASPECTS ASSOCIATED WITH THIS PROJECT WHICH INCLUDE, BUT ARE NOT LIMITED TO ARCHITECTURAL, HYDROLOGY, ENVIRONMENTAL, CIVIL, GEOTECHNICAL, MECHANICAL, ELECTRICAL, OCCUPANT SAFETY, ACCESSIBILITY AND BUILDING ENVELOPE ARE TO BE DESIGNED, SPECIFIED AND APPROVED BY OTHERS AND ARE CONSIDERED BEYOND MCELHANNEY SCOPE OF WORK.
- STRUCTURAL ELEMENTS PRESENTED ON THESE DRAWINGS ARE FOR PERMANENT STRUCTURE AND FOUNDATIONS ONLY. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY AND CONSTRUCTION BRACING AND SUPPORT INCLUDING GEOTECHNICAL REQUIREMENTS UNTIL THE PROJECT IS COMPLETED.
- REFER TO GENERAL ARRANGEMENT, ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR DIMENSIONAL, GRADES, ELEVATIONS AND FOR DIMENSIONS AND LOCATIONS OF RECESSES, SLEEVES, EQUIPMENT, SHAFTS, INSERTS, CHAMFERS, DIMENSIONS AND ELEVATIONS SHOWN ON STRUCTURAL DRAWINGS ARE FOR REFERENCE ONLY AND MUST BE CONFIRMED WITH GENERAL ARRANGEMENT DRAWINGS AND/OR SITE CONDITIONS PRIOR TO CONSTRUCTION.
- THE CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE JOB SITE FOR INFORMATION THAT PERTAINS SOLELY TO FABRICATION PROCESSES OR TO TECHNIQUES OF CONSTRUCTION AND INSTALLATION AND FOR COORDINATION OF THE WORK OF ALL SUB-TRADES.

REFERENCED DRAWINGS

- LAYOUT AND STRUCTURAL SIZING IS BASED ON DESIGN DRAWINGS SUPPLIED BY THE CLIENT.
- McELHANNEY HAS RELIED ON THE PROVIDED DRAWING SET AS ACCURATE AND TRUE. McELHANNEY IS NOT RESPONSIBLE FOR ANY ERROR/OMISSIONS ON THESE DRAWINGS AS A RESULT OF ERRORS OR SUBSEQUENT CHANGES TO THE PROVIDED DRAWING SET OR UNKNOWN SITE AND AS-BUILT CONDITIONS.
- IF CHANGES ARE MADE TO THE LAYOUT OF THE STRUCTURE, OR SITE CONDITIONS VARY FROM ASSUMED, OR THE ASSUMED LOAD PATHS ARE ALTERED (RELOCATED ELEMENTS, ETC), THE STRUCTURE DESIGNER SHOULD BE NOTIFIED SUCH THAT CHANGES CAN BE MADE TO THE DESIGN IF REQUIRED.

FIELD REVIEWS BY McELHANNEY CONSULTING SERVICES LTD.

- McELHANNEY ASSUMES NO RESPONSIBILITY FOR FIELD REVIEWS OF THE CONSTRUCTION OR VERIFICATION OF THE CONSTRUCTION UNLESS EXPRESSLY RETAINED TO DO SO.
- McELHANNEY CONSULTING SERVICES LTD. (MCELHANNEY) PROVIDE FIELD REVIEWS ONLY FOR THE WORK SHOWN ON THESE DRAWINGS. FIELD REVIEWS BY McELHANNEY ARE PERIODIC AND AT THE SOLE DISCRETION OF McELHANNEY IN ORDER TO ASCERTAIN THAT THE WORK IS IN GENERAL CONFORMANCE WITH THE DESIGN DRAWINGS AND SUPPORTING DOCUMENTS.
- FIELD REVIEWS BY McELHANNEY ARE NOT FOR THE CONTRACTORS BENEFIT NOR DOES IT MAKE McELHANNEY GUARANTORS OF THE CONTRACTOR'S WORK. IT REMAINS THE CONTRACTOR'S RESPONSIBILITY TO BUILD THE WORK IN CONFORMANCE WITH THE CONTRACT DOCUMENTS.
- McELHANNEY WILL NOT BE RESPONSIBLE FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR, SUB-CONTRACTOR, OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK OR FOR THE FAILURE OF ANY OF THEM TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
- IF McELHANNEY IS RETAINED FOR FIELD REVIEWS THEN THE CONTRACTOR IS TO PROVIDE 24 HOUR NOTICE PRIOR TO CONCRETE POURS AND BEFORE ENCLOSING FRAMING ELEMENTS. FIELD REVIEWS ARE TO BE SCHEDULED AND TO BE CARRIED OUT DURING NORMAL BUSINESS HOURS UNLESS SPECIAL ARRANGEMENTS ARE MADE WITH McELHANNEY.

DESIGN STANDARDS:

1) DESIGN METHODOLOGY: LIMIT STATES DESIGN

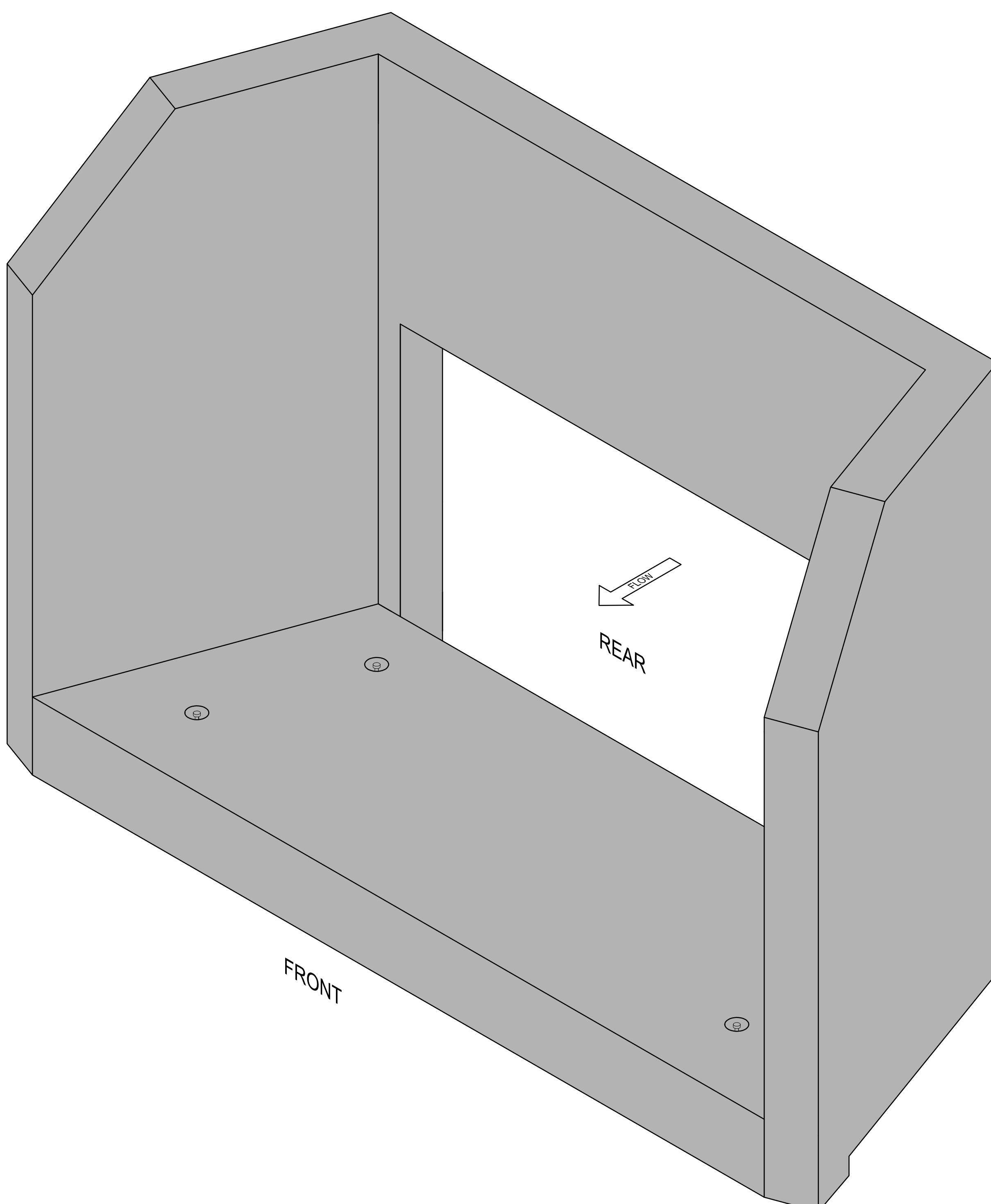
CONCRETE

- PREPARATION, PLACING AND FINISHING OF CONCRETE IS TO CONFORM TO CSA A23.1.
- TESTING OF CONCRETE IS TO CONFORM TO CSA A23.2. THE FREQUENCY AND NUMBER OF TESTS IS NOT TO BE LESS THAN ONE STRENGTH, SLUMP AND AIR TEST FOR PANELS.
- IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE THE TESTING SCHEDULE AND TIMING WITH THE TESTING AGENCY.
- CONCRETE PROPERTIES:

ITEM	AGG SIZE (mm)	28 DAY STRENGTH	W/C	AIR (%)	CEMENT TYPE	EXPOSURE
STRUCTURE	20	45 MPa	.40	4-7	HS	F-2

REINFORCING

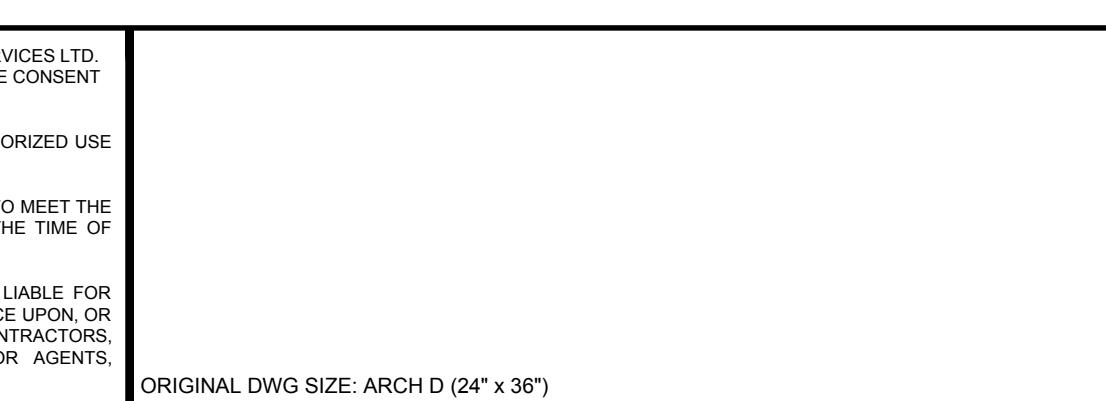
- REINFORCING STEEL IS TO CONFORM TO CSA G30.12M - GRADE 400 MPa.
- REINFORCING STEEL IS TO BE PLACED AS DETAILED TO 10mm TOLERANCE AND IS TO BE SUPPORTED BY METAL OR PLASTIC SUPPORTS AND/OR HANGERS IN ACCORDANCE WITH CAN/CSA A23.1
- LAP ALL REINFORCING BAR SPLICES 32 BAR DIAMETERS MINIMUM UNLESS INDICATED OTHERWISE ON THE DRAWINGS.
- REINFORCING STEEL IS TO BE CLEAN, FREE OF CORROSION AND UNDAMAGED.
- DO NOT WELD BARS OR USE HEAT TO BEND REINFORCING STEEL.
- CONCRETE COVER OVER REINFORCEMENT IS TO BE 50mm UNLESS OTHERWISE NOTED ON DRAWINGS



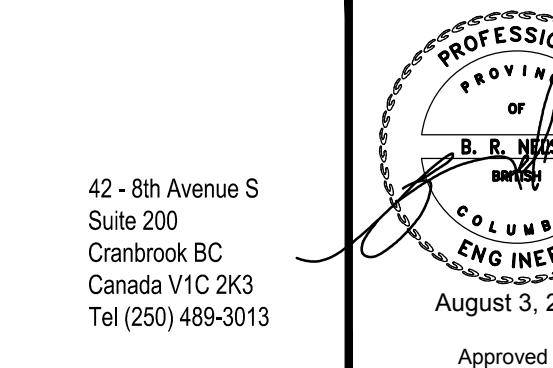
STRUCTURAL DRAWING LIST

S101	STRUCTURAL NOTES AND STRUCTURE ISOMETRIC VIEW
S102	LAYOUT DETAILS
S103	SECTIONS AND DETAILS
S104	REINFORCEMENT LAYOUT DETAILS

1	AUG 3, 2016	ISSUED FOR "CONSTRUCTION"	BRB	BRB	BRN	Drawn	Design	App'd
Rev.	Date	Description						



McElhanney
McElhanney Consulting Services Ltd.

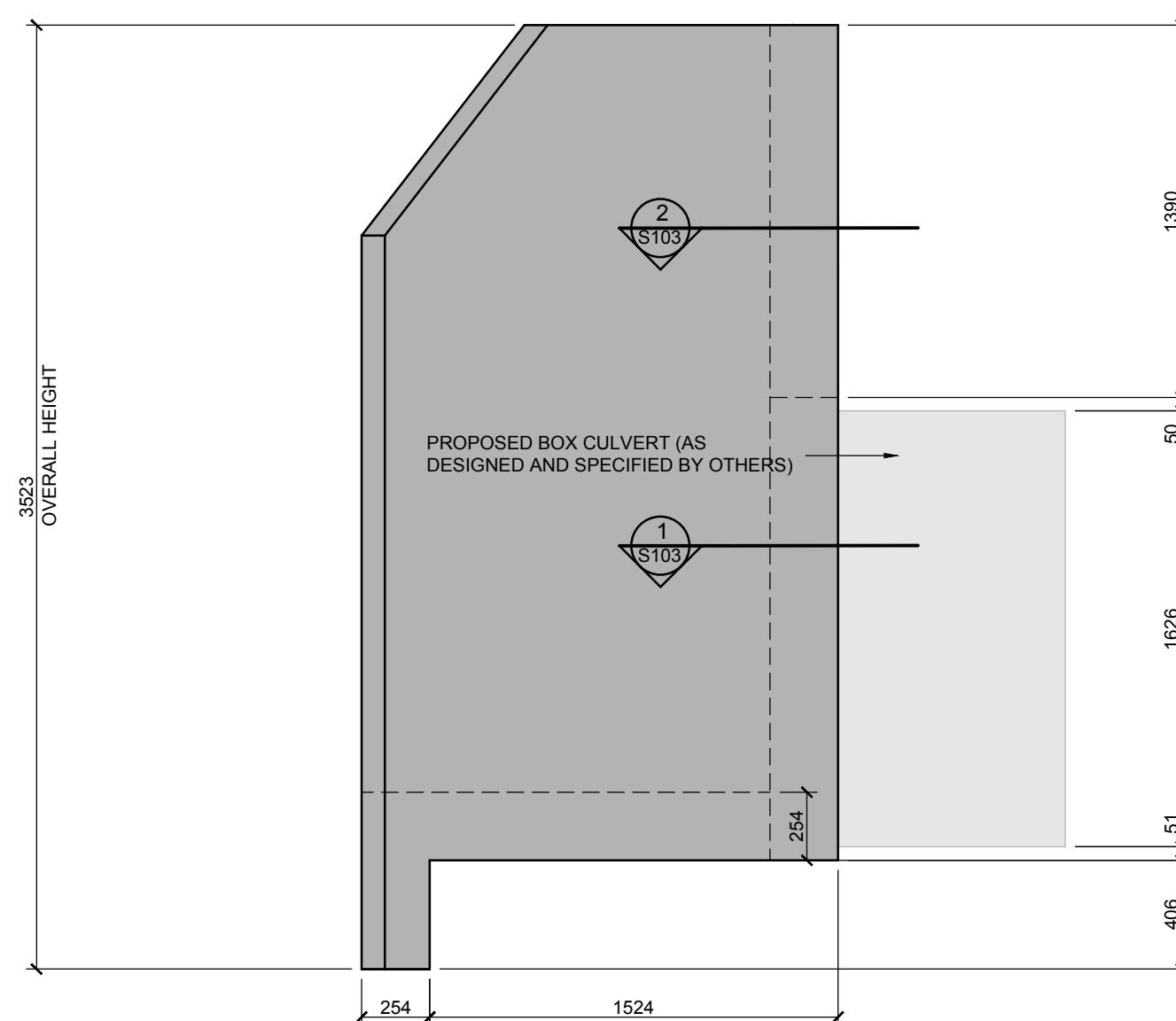


TRIKON PRECAST
601 PATTERSON STREET WEST, CRANBROOK, BC, V1C 6T3

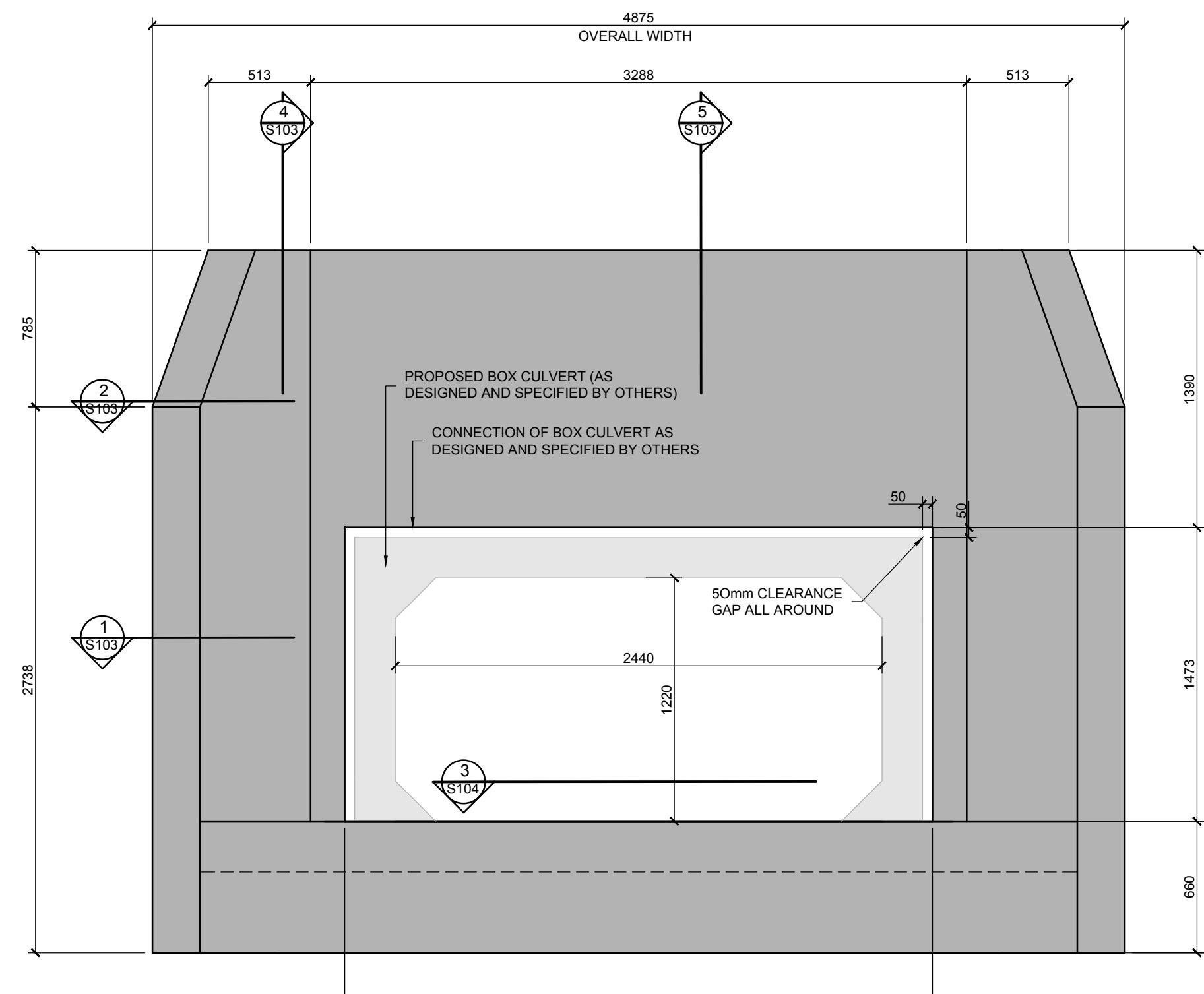
Approved Sealed

TRIKON PRECAST
601 PATTERSON STREET WEST, CRANBROOK, BC, V1C 6T3
FORT NELSON WWTP
HEAD WALL STRUCTURE
STRUCTURAL NOTES AND ISOMETRIC VIEW

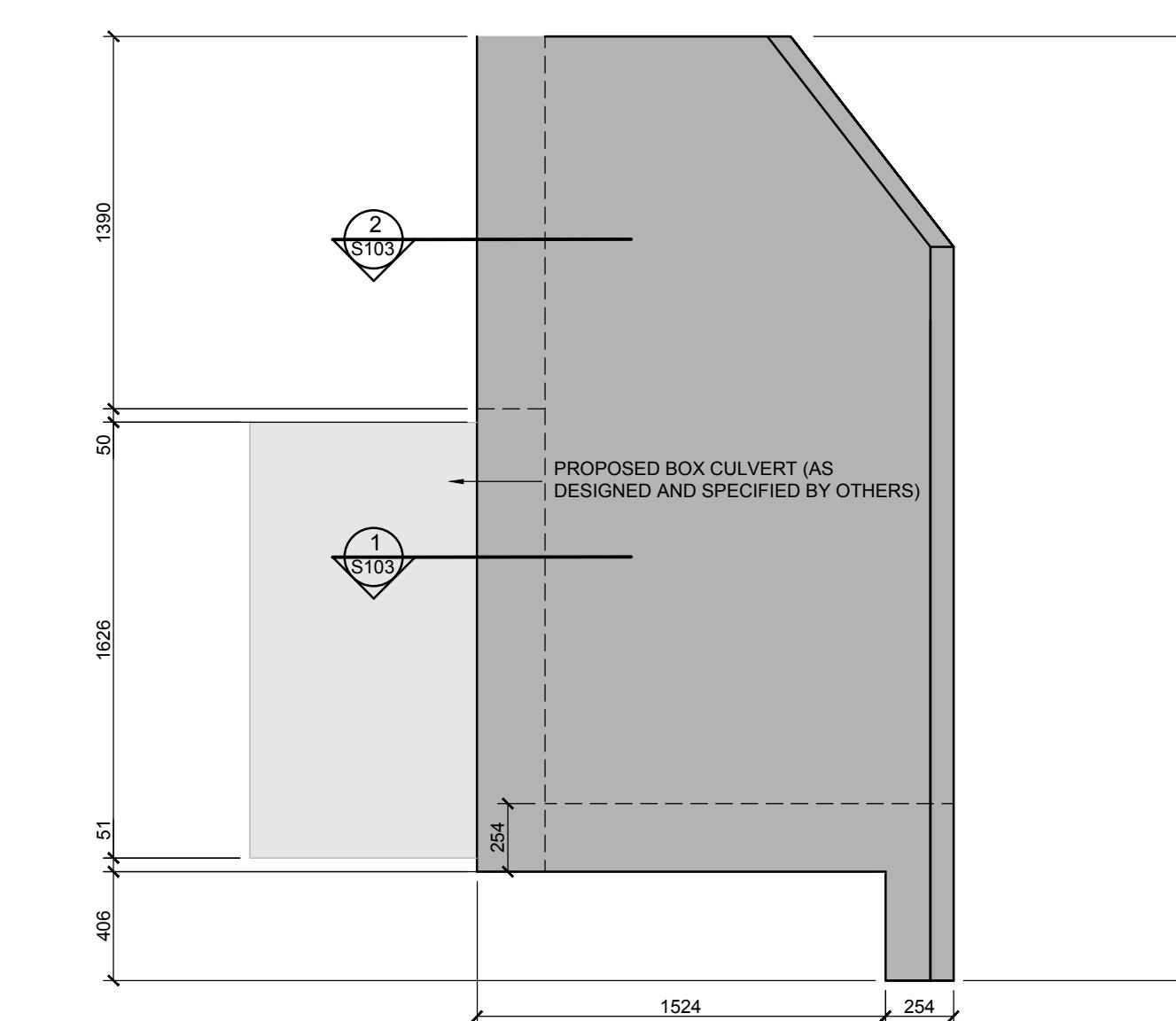
Drawing No.
S101
Project Number
2441-00428-00
Rev. 1
DESTROY ALL PRINTS BEING PREVIOUS EDITION



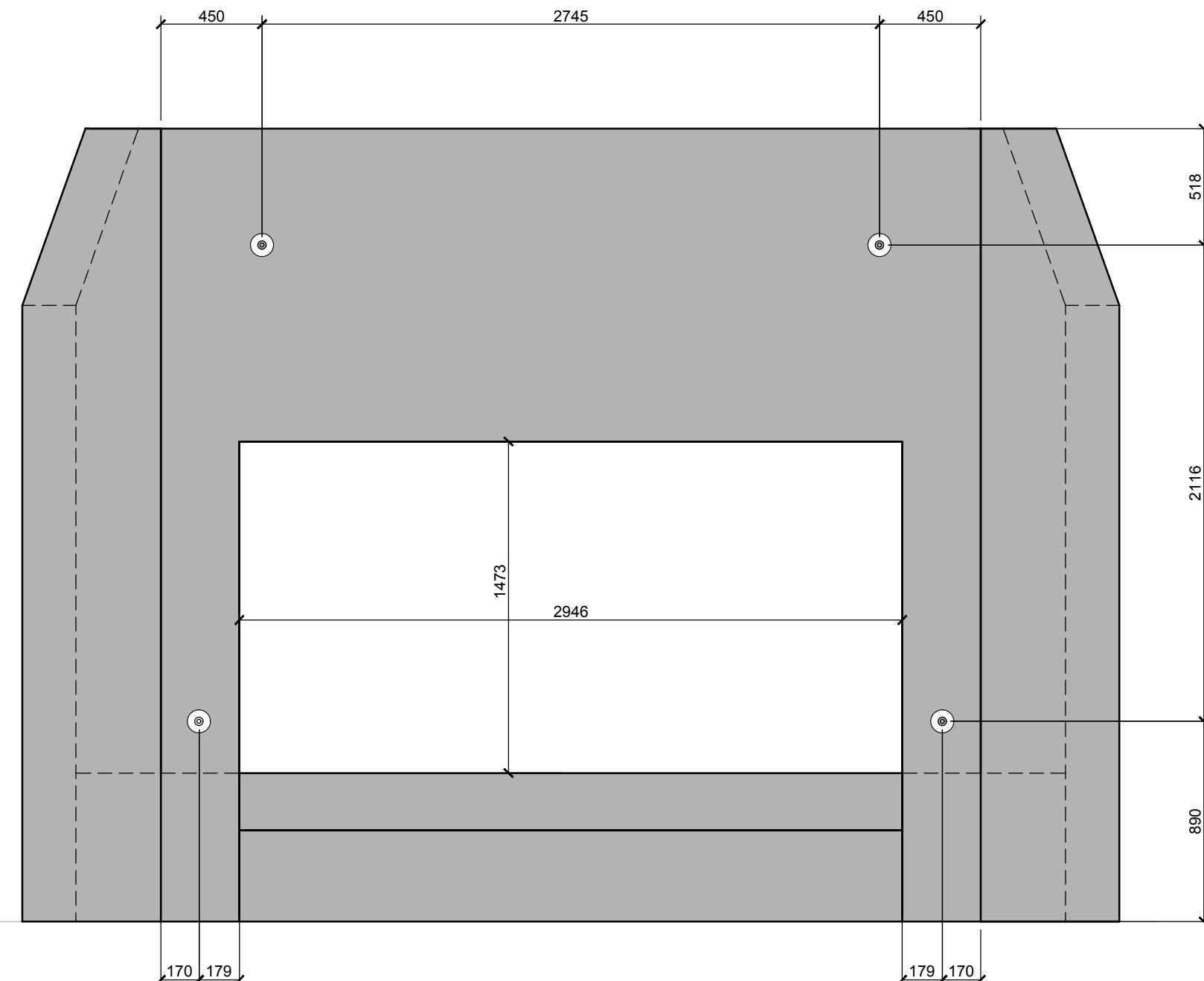
(A) SIDE ELEVATION VIEW
S102 SCALE: 1:25



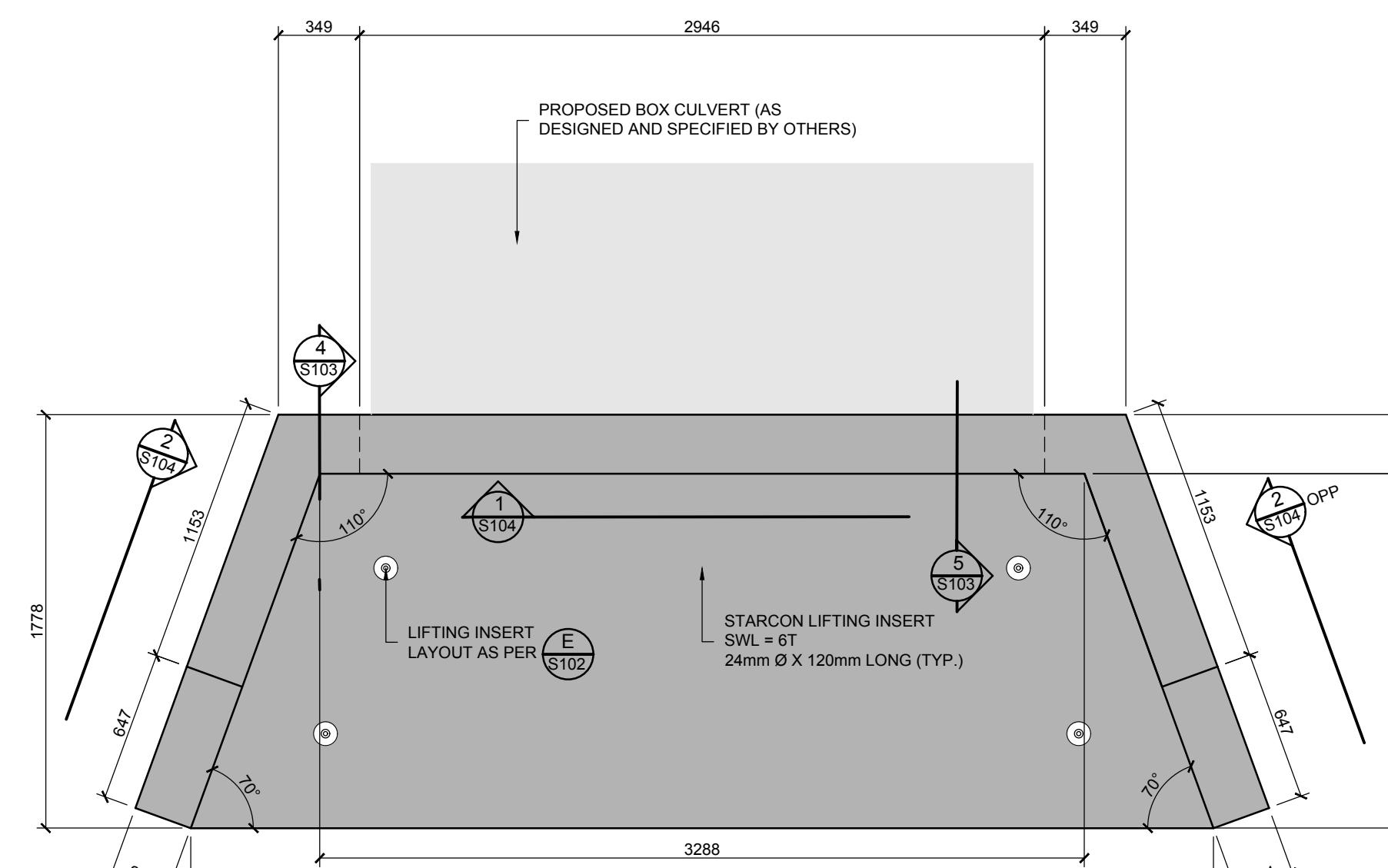
(B) FRONT ELEVATION VIEW
S102 SCALE: 1:25



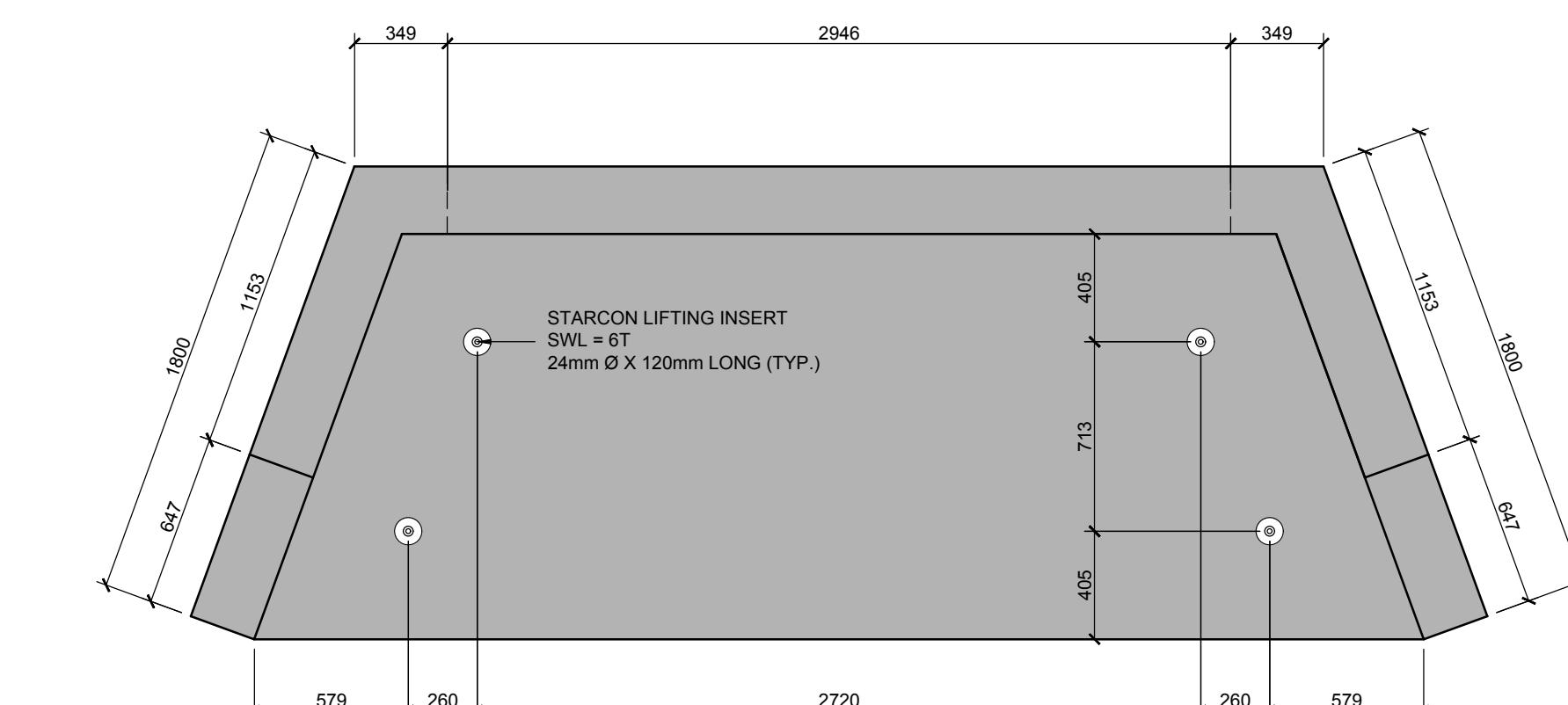
(C) SIDE ELEVATION VIEW
S102 SCALE: 1:25



(E) LIFTING INSERT LAYOUT - REAR ELEVATION
S102 SCALE: 1:25



(D) PLAN VIEW
S102 SCALE: 1:25



(E) LIFTING INSERT LAYOUT - PLAN
S102 SCALE: 1:25

1 AUG 3, 2016	ISSUED FOR "CONSTRUCTION"	BRB	BRB	BRN

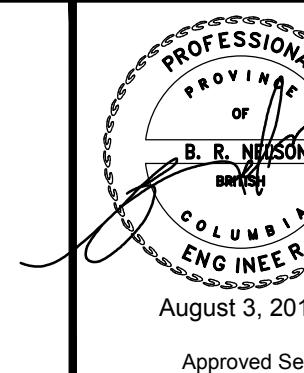
THIS DRAWING AND DESIGN IS THE PROPERTY OF McELHANNY CONSULTING SERVICES LTD. (MCELHANNY) AND SHALL NOT BE USED, REUSED OR REPRODUCED WITHOUT THE CONSENT OF MCELHANNY.
MCELHANNY WILL NOT BE HELD RESPONSIBLE FOR THE IMPROPER OR UNAUTHORIZED USE OF THIS DRAWING AND DESIGN.
THIS DRAWING AND DESIGN HAS BEEN PREPARED FOR THE CLIENT IDENTIFIED, TO MEET THE STANDARDS AND REQUIREMENTS OF THE APPLICABLE PUBLIC AGENCIES AT THE TIME OF PREPARATION.
MCELHANNY, ITS EMPLOYEES, SUBCONSULTANTS AND AGENTS WILL NOT BE LIABLE FOR ANY LOSSES OR OTHER CONSEQUENCES RESULTING FROM THE USE OR RELIANCE UPON, OR ANY CHANGES MADE TO, THIS DRAWING, BY ANY THIRD PARTY, INCLUDING CONTRACTORS, CONSULTANTS, SUBCONTRACTORS, AND STAKESHOLDERS, OR THEIR EMPLOYEES OR AGENTS, WITHOUT MCELHANNY'S PRIOR WRITTEN CONSENT.

ORIGINAL DWG SIZE: ARCH D (24" x 36")



McElhanney
McElhanney Consulting Services Ltd.

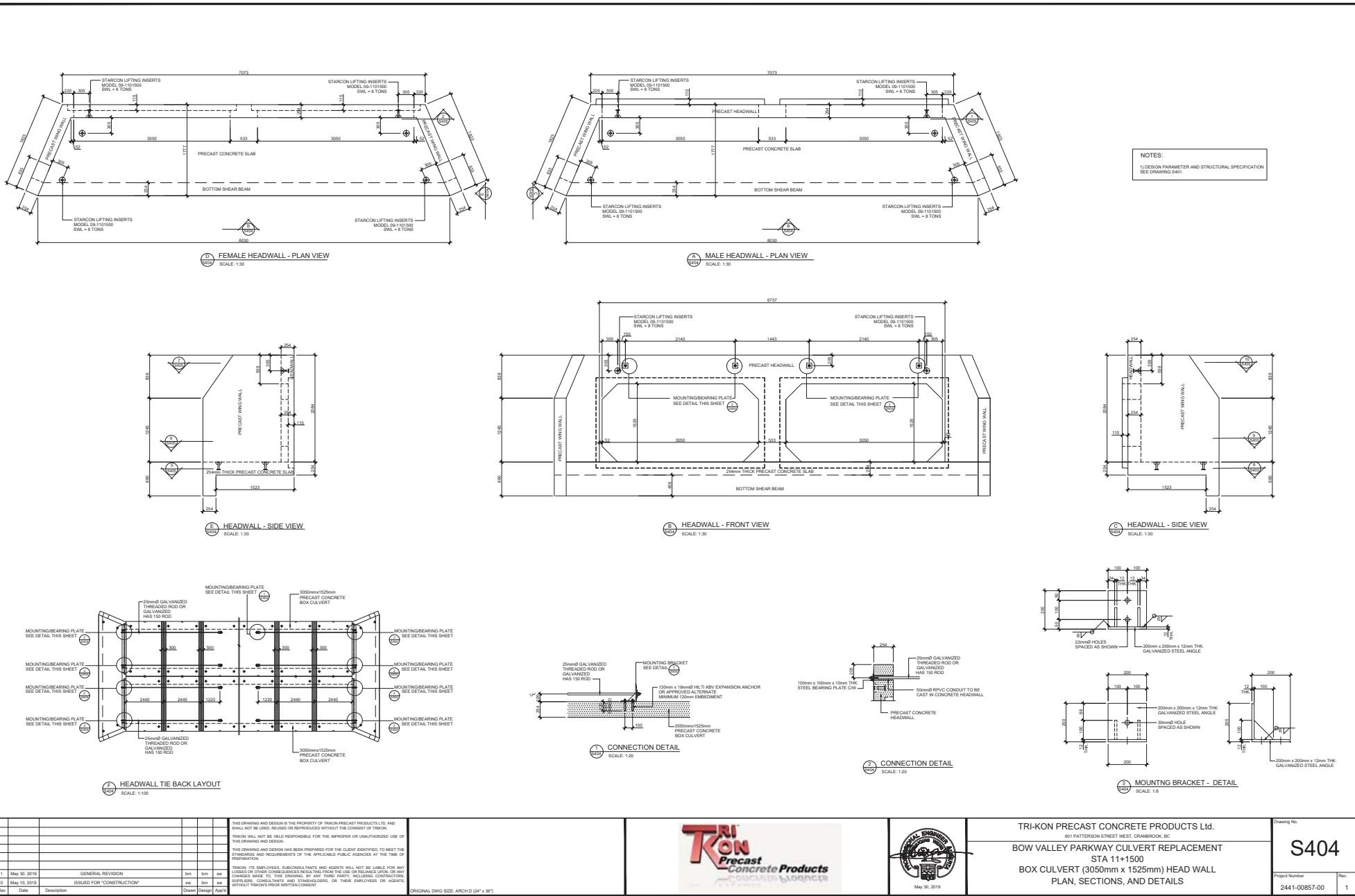
42 - 8th Avenue S
Suite 200
Cranbrook BC
Canada V1C 2K3
Tel (250) 489-3013



Approved Sealed

TRIKON PRECAST
601 PATTERSON STREET WEST, CRANBROOK, BC, V1C 6T3
FORT NELSON WWTP
HEAD WALL STRUCTURE
LAYOUT DETAILS

Drawing No.
S102
Project Number
2441-00428-00
Rev. 1
DESTROY ALL PRINTS BEARING PREVIOUS EDITION



STRUCTURAL SPECIFICATION

GENERAL

- 1) ALL CONSTRUCTION SHALL CONFORM TO ASTM C1433M STANDARDS AND SUBSEQUENT REVISIONS.
- 2) ALL REFERENCES TO STANDARDS SHALL REFER TO THE LATEST REVISED ISSUE.
- 3) THE STRUCTURAL ENGINEER ASSUMES NO RESPONSIBILITY FOR INSPECTION OF CONSTRUCTION OR VERIFICATION OF CONSTRUCTION UNLESS EXPRESSLY RETAINED TO DO SO.
- 4) INSTALLATION POSITIONING, BEDDING AND BACKFILL IS TO BE SPECIFIED BY OTHERS.

CONCRETE

- 1) ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH SPECIFICATIONS AND CSA STANDARD CAN/CSA-A23.1-09/CAN/CSA-A23.2-09
- 2) CONCRETE PROPERTIES:

ITEM	AGG. SIZE	STRENGTH	W/C RATIO	AIR	TYPE
ALL	20mm	45 MPa.	0.40	4%-7%	HS

3) BEFORE PLACING CONCRETE, THE CONTRACTOR SHALL CHECK ALL APPLICABLE DRAWINGS FOR ANCHOR BOLTS, INSERTS, EMBEDS, RECESSES AND BLOCKOUTS. THEIR LOCATIONS SHALL BE CONFIRMED BY THE VARIOUS SUBTRADES.

4) CONCRETE COVER OVER REINFORCEMENT IS TO BE:

- a. FORMED SURFACE EXPOSED TO GROUND OR WEATHER = 50mm

REINFORCING STEEL

- 1) STEEL REINFORCEMENT SHALL BE MINIMUM GRADE 400 MPa. DEFORMED BARS CONFORMING TO CAN/CSA G30.18M92 9R2002
- 2) WVM REINFORCEMENT SHALL BE MINIMUM GRADE 480 MPa. DEFORMED BARS CONFORMING TO CAN/CSA G30.18M92 9R2002. DIAMETER AS NOTED ON THE DRAWINGS (10mmØ AND 13mmØ)
- 3) REINFORCING STEEL IS TO BE PLACED AS DETAILED TO 10mm TOLERANCE AND IS TO BE SUPPORTED BY METAL OR PLASTIC SUPPORTS AND/OR HANGERS IN ACCORDANCE WITH CAN/CSA A23.1
- 4) LAP ALL REINFORCING BAR SPLICES 32 BAR DIAMETERS MINIMUM UNLESS INDICATED OTHERWISE ON THE DRAWINGS.
- 5) REINFORCING STEEL IS TO BE CLEAN, FREE OF CORROSION AND UNDAMAGED.
- 6) DO NOT WELD BARS OR USE HEAT TO BEND REINFORCING STEEL.

LIFTING INSERTS

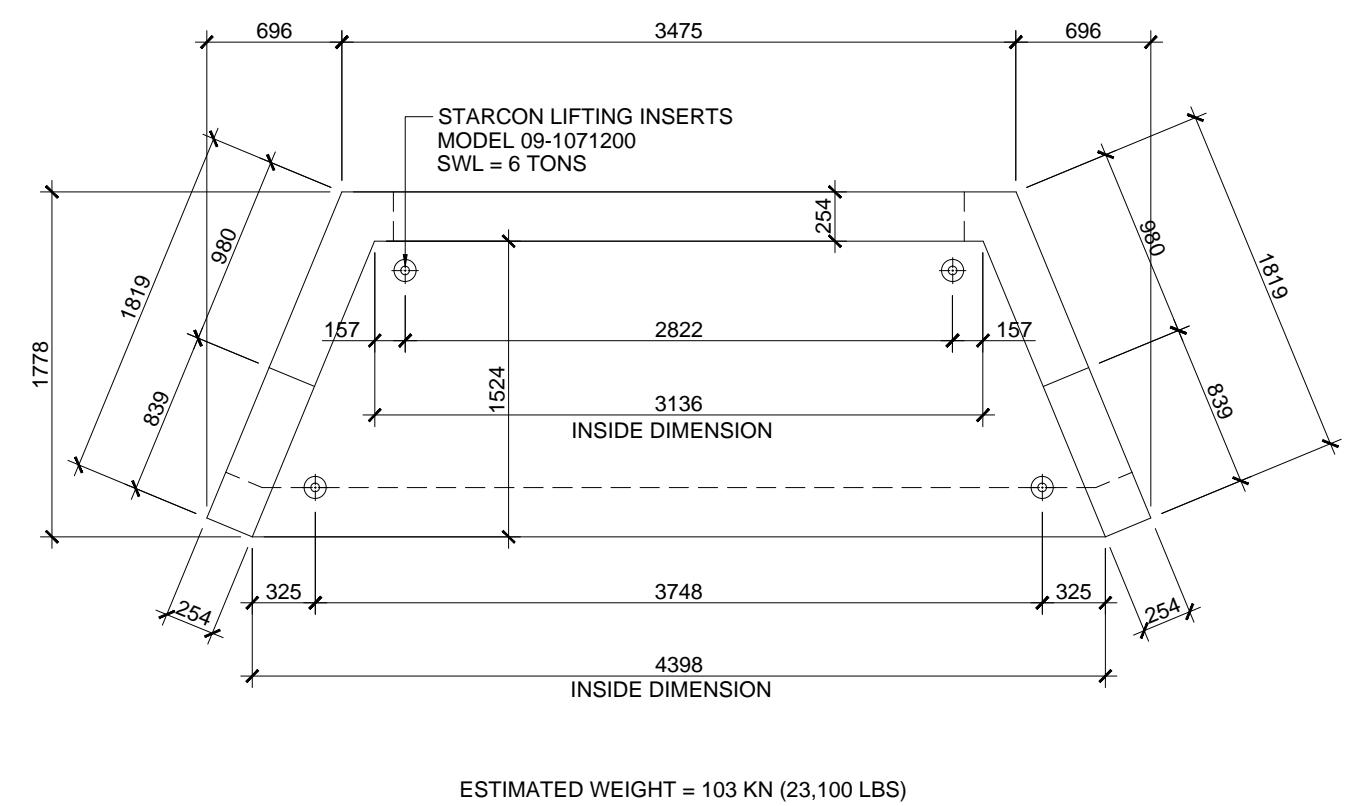
- 1) LIFTING INSERTS ARE TO BE AS MANUFACTURED BY STARCON MODEL 09-1071200 WITH RATED CAPACITY OF 6 TONS. CONTRACTOR IS TO GROUT ALL INSERT POCKETS PRIOR TO BACK FILLING THE BOX CULVERT.

REFERENCE DRAWINGS

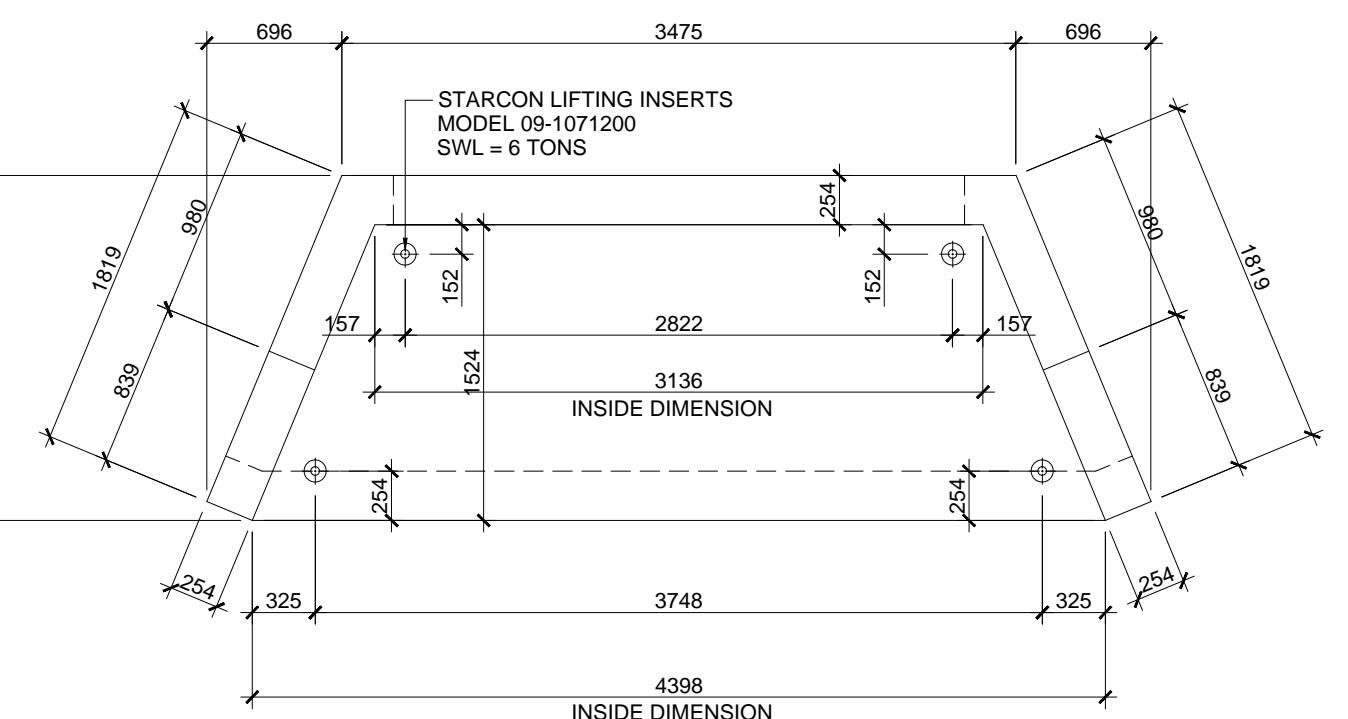
- 1) LAYOUT AND STRUCTURAL SIZING IS BASED ON DESIGN DRAWINGS PREPARED BY McELHANNAY DATED 16-05-24. (YOHO CULVERT REPLACEMENTS AND REPAIRS)
- 2) McELHANNAY HAS RELIED ON THE PROVIDED DRAWING SET AS ACCURATE AND TRUE. CONSULTANT IS NOT RESPONSIBLE FOR ANY ERROR/OMISSIONS ON THESE DRAWINGS AS A RESULT OF ERRORS OR SUBSEQUENT CHANGES TO THE PROVIDED DRAWING SET OR UNKNOWN SITE AND AS-BUILT CONDITIONS.
- 3) IF CHANGES ARE MADE TO THE LAYOUT OF THE STRUCTURE, OR SITE CONDITIONS VARY FROM ASSUMED, OR THE ASSUMED LOAD PATHS ARE ALTERED (RELOCATED ELEMENTS, ETC), THE STRUCTURAL ENGINEER SHOULD BE NOTIFIED SUCH THAT CHANGES CAN BE MADE TO THE DESIGN IF REQUIRED.

PRECAST COMPONENT LIFTING AND RIGGING

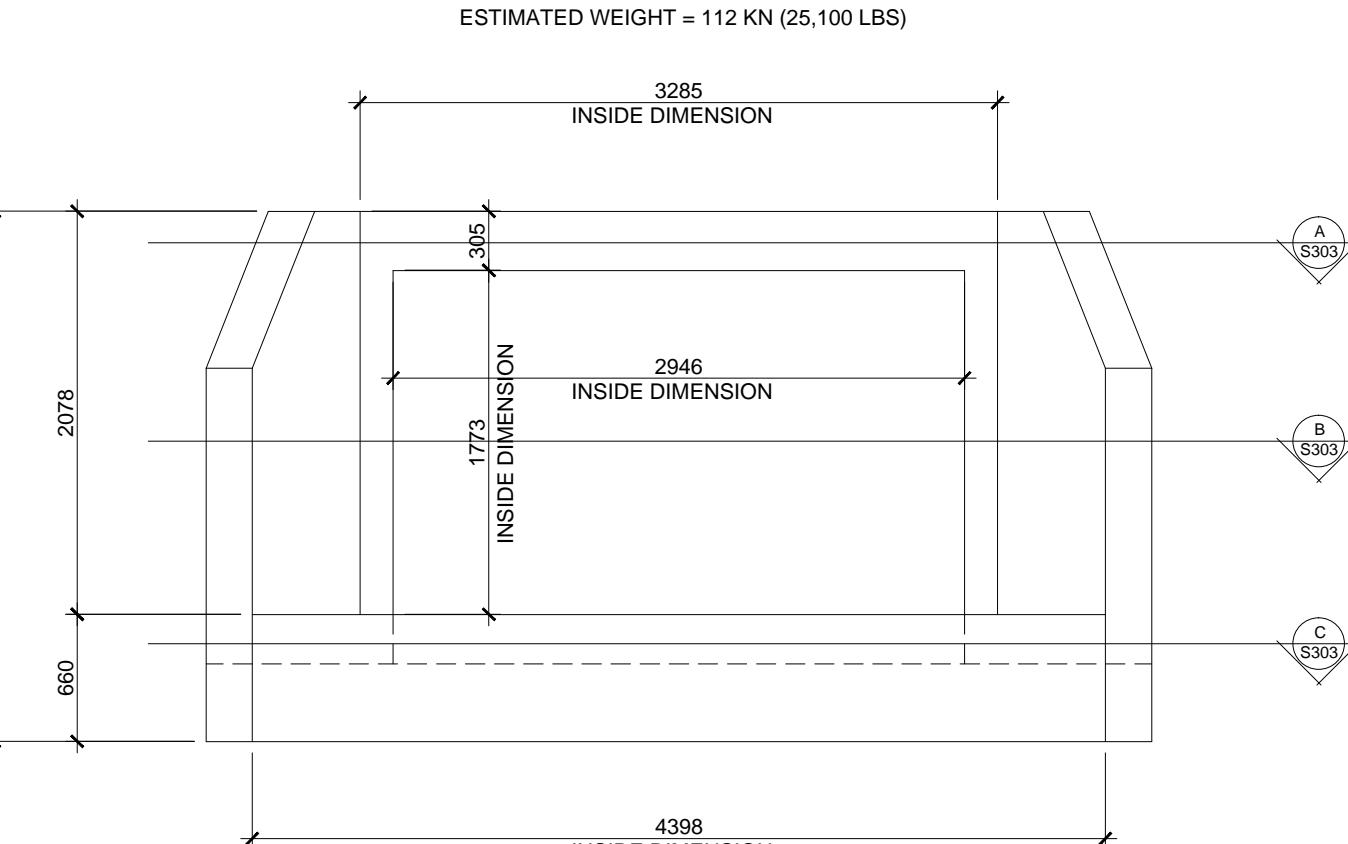
- 1) THE PRECAST CONTRACTOR IS RESPONSIBLE FOR ALL RIGGING AND LIFTING PROCEDURES REQUIRED TO ENSURE SAFE LIFTING AND PLACEMENT OF PRECAST CONCRETE COMPONENTS IN ACCORDANCE WITH INDUSTRY STANDARDS AND WORKSAFE BC REQUIREMENTS.
- 2) THE CONTRACTOR IS TO ENSURE THAT THE HOISTING DEVICES INCLUDING ALL ASSOCIATED ACCESSORIES (SHACKLES, SLINGS, PINS ETC.) ARE RATED TO THE APPLICABLE LOAD AND ARE IN GOOD WORKING CONDITION.
- 3) THE CONTRACTOR IS TO ENSURE THAT ALL PERSONNEL OPERATING OR WORKING WITH THE HOISTING DEVICES ARE PROPERLY TRAINED, EXPERIENCED AND CERTIFIED ON THE HOISTING DEVICE.



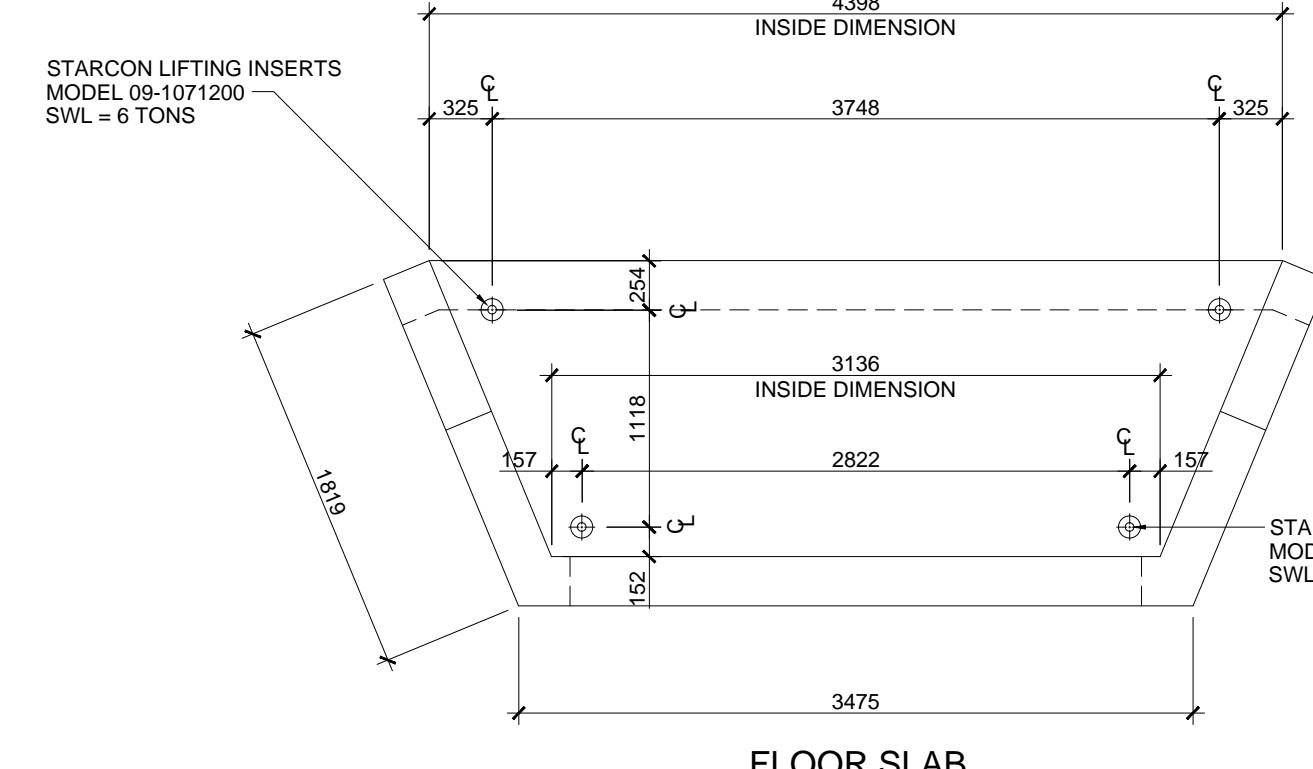
A HEADWALL TYPE "HW-1"
S301
SCALE: 1:40



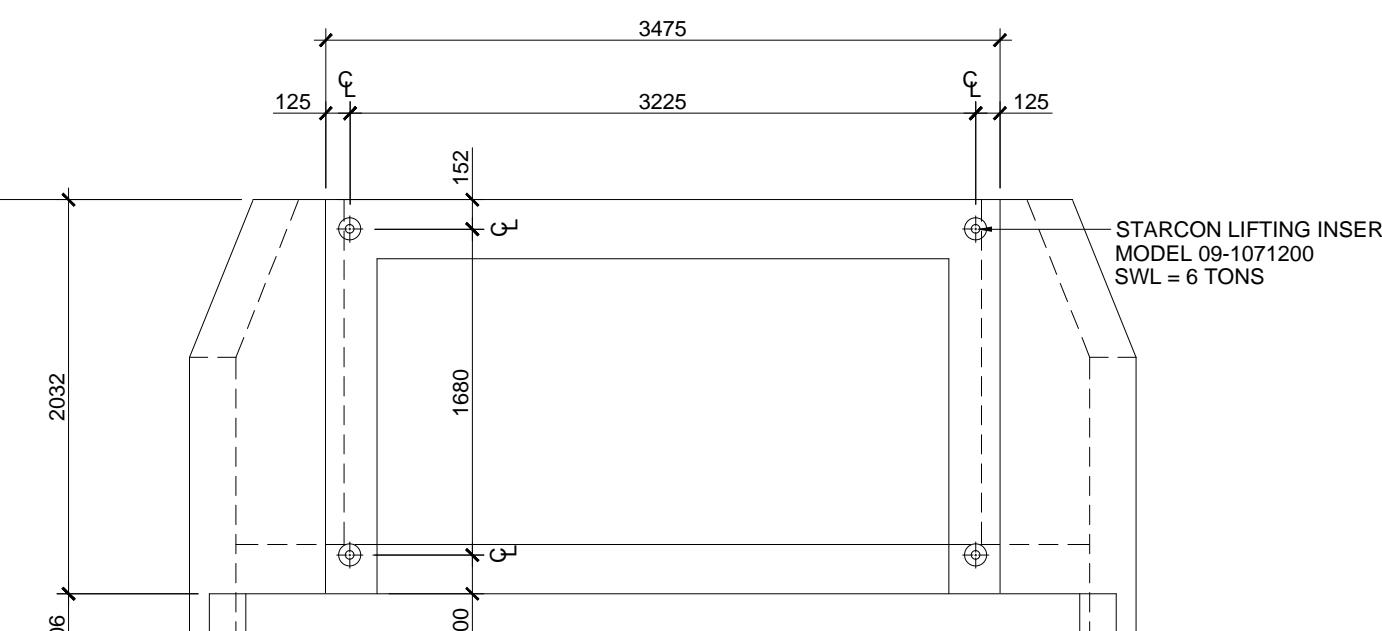
C HEADWALL TYPE "HW-2"
S301
SCALE: 1:40



C HEADWALL TYPE "HW-2"
S301
SCALE: 1:40

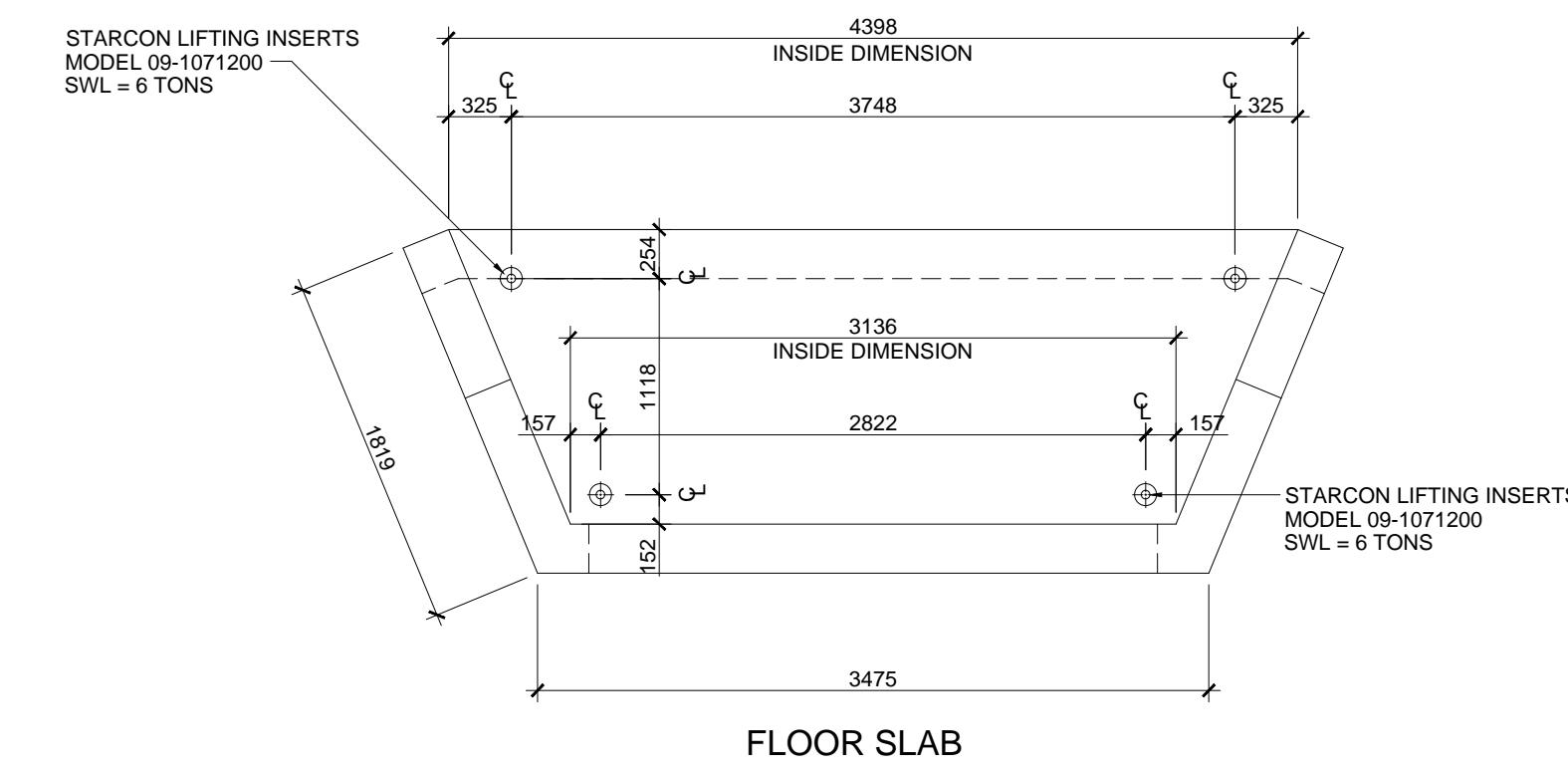


FLOOR SLAB

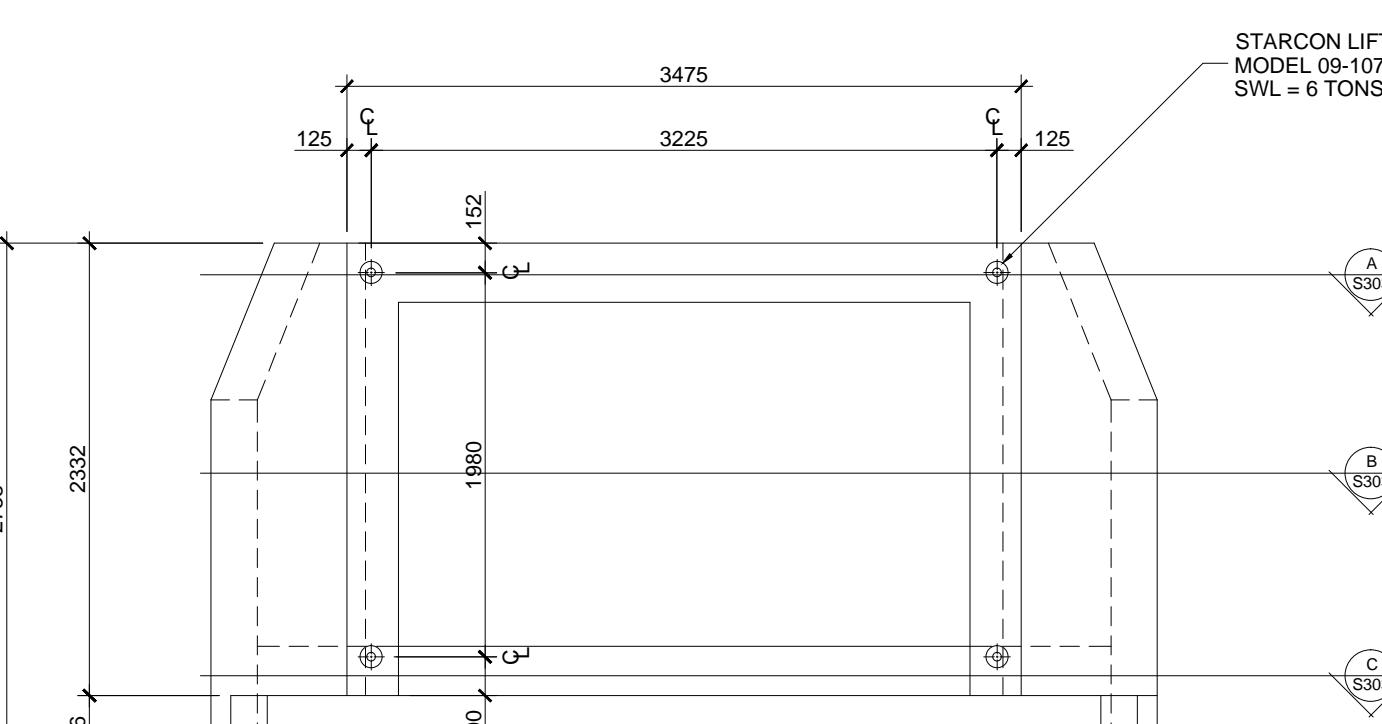


BACK WALL

B "HW-1" LIFTING INSERT LOCATIONS
S301
SCALE: 1:40



FLOOR SLAB



BACK WALL

D "HW-2" LIFTING INSERT LOCATIONS
S301
SCALE: 1:40

THIS DRAWING AND DESIGN IS THE PROPERTY OF McELHANNAY CONSULTING SERVICES LTD. (McELHANNAY) AND SHALL NOT BE USED, REUSED OR REPRODUCED WITHOUT THE CONSENT OF McELHANNAY.
McELHANNAY WILL NOT BE HELD RESPONSIBLE FOR THE IMPROPER OR UNAUTHORIZED USE OF THIS DRAWING AND DESIGN.
THIS DRAWING AND DESIGN HAS BEEN PREPARED FOR THE CLIENT IDENTIFIED, TO MEET THE STANDARDS AND REQUIREMENTS OF THE APPLICABLE PUBLIC AGENCIES AT THE TIME OF PREPARATION.

McELHANNAY, ITS EMPLOYEES, SUB-CONSULTANTS AND AGENTS, WILL NOT BE HELD FOR ANY LOSS OR OTHER CONSEQUENCES RESULTING FROM THE USE OR RELIANCE UPON, OR ANY CHANGES MADE TO THIS DRAWING, BY ANY THIRD PARTY, INCLUDING CONTRACTORS, SUPPLIERS, CONSULTANTS AND STAKEHOLDERS, OR THEIR EMPLOYEES OR AGENTS, WITHOUT McELHANNAY'S PRIOR WRITTEN CONSENT.

1 AUG.12, 2016 GENERAL REVISION
0 AUG.5, 2016 ISSUED FOR "CONSTRUCTION"

Rev. Date Description Drawn Design App'd



McElhanney
McElhanney Consulting Services Ltd.

42 - 8th Avenue S
Suite 200
Cranbrook BC
Canada V1C 2K3
Tel 250-489-3013

TRI-KON PRECAST PRODUCTS Ltd.
601 PATTERSON STREET WEST, CRANBROOK, BC

YOHO NATIONAL PARK, BRITISH COLUMBIA
CULVERT REPLACEMENTS AND REPAIRS
REINFORCED CONCRETE HEADWALL STRUCTURES
HEADWALL TYPE "HW-1" AND HEADWALL TYPE "HW-2"

Drawing No.

S301

Project Number
2441-00440-00

Rev. 1