WAITAHA HYDRO – INSTREAM STRUCTURES – PRELIMINARY DESIGN INFORMATION

BOX CULVERT STRUCTURES

WAITAHA RIVER PROPOSED NEW HYDRO POWER SCHEME WAITAHA RIVER

ACCESS ROAD DESIGN FROM WAITAHA ROAD TO THE Mac GREGOR CREEK STAGING AREA DESIGN PLAN 3

12d Model

Scale 1:1200

Mon Jun 23 14:44:44 2025

WAITAHA POWER SCHEME

POWERHOUSE ACCESS THIRD CREEK CROSSING BY A 4M WIDE X 2M HIGH X 12M LONG CONCRETE BOX CULVERT (ALPHA CRK)

12d Model
Scale 1:750
Fri Jan 10 12:45:11 2025

Hynds Box Underpass

Technical Guide R4.5

Hynds precast concrete box culvert units simplify the construction process, providing a fast and cost-effective solution that is often more economical than the in-situ construction option.

Applications

- Stock underpass for rural highway crossings
- Pedestrian tunnels
- Stormwater culverts
- Vertical chambers

Product Attributes

- Large range of strengths and opening sizes
- Customisable for special conditions or shapes
- Simplifies preparation of site plans for council approval
- Design options available for high-water table installation issues
- Fast and cost effective installation method

Approvals/Standards

- Traffic loading is to HN-HO-72 NZTA load criteria

Quality

- ISO 9001:2008 Quality Management Standard

We are the supply partner of choice for New Zealand's rural industry, specialising in water and infrastructure based solutions.

HYNDS RURAL

Hynds precast concrete box culvert units simplify the construction process, providing a fast and cost-effective solution that is often more economical than the in-situ construction option.

Design Specifications

- Hynds precast reinforced box culverts are made to order.
- A variety of opening sizes are available which suit most farm types and stock quantities.
- Stock underpasses for rural crossings: The size of stock underpasses is normally determined by the size of the herd that will use the underpass or the machinery that will be moved through the underpass.
- Stormwater culverts: Opening width and height is determined by the hydraulic requirements of the specific site. Hydraulic calculations can be performed by referring to the CPAA "Hydraulics of Precast Concrete Conduits Manual".
- Pedestrian tunnels: Opening size is to be determined by the tunnel space desired. For Pedestrian Tunnels, this is usually dependant on the NZ Building Code.

TABLE 1 **Underpass Sizes**

Width (mm)	**Height** (mm)		
	2000	**2500**	**3000**
2000	✓	✓	✓
2500	✓	✓	✓
3000	✓*	✓*	✓
3500	✓*	✓*	✓
4000	✓*	✓*	✓

Note: Standard unit length is 1550 mm
****Common installed sizes. Refer to Technical Guide D8.1 Box Culverts for full range.***

Wingwall Options

- Hynds supply wingwall panels with fixing holes, and bolt sets so that the panels can be fixed to the box culvert.
- These wingwall panels have reinforcing starter bars protruding out the bottom of the front face so they can be cast into a reinforced concrete apron that is poured on site by installing contractor.

Headwall Options

- Hynds will supply the end units of the underpass structure with suitable headwalls as part of the box culvert unit if requested to do so.

Culvert Strength

- Culvert strength is dependent on earth loads, highway loads and cover to the finished culvert.
- Hynds Technical Services Department will design the precast concrete box culverts to suit the specified highway loading and cover.

Concrete Surface Finishes

- Hynds Box Culverts are generally manufactured to F3/ F4 finish as detailed in NZS3114:1987 – Specification for Concrete Surface Finishes. This finish is typical of structures which will not be seen or are only going to be observed from a distance.
- Higher classes of finish may be required in elements subject to frequent observation (F4), subject to frequent close scrutiny (F5) or elements with painted surfaces. In these instances the finish required must be advised at time of quotation.
- Units are designed to corrosion protection exposure classification B2 (refer to NZS:3101).
- Consult engineer where exposure classification C or U is required (seawater tidal/splash zone or similar aggressive environment).

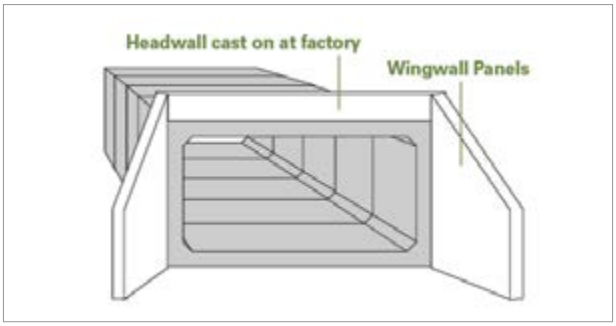


FIG. 1 Standard Culvert or Rural Stock Underpass

Installation

As per NZ Building Code, please check with your local council for building resource consent requirements.

Culvert and wingwall units are delivered to site by our trucks. Off-loading can be arranged if required. Culvert installation should be done by an experienced contractor who understands the necessity of jointing, bedding and backfilling the structure properly as well as the highway safety requirements applicable to such an installation.

Handling

- Box culvert units are normally supplied with swiftlift anchors cast into the top of each unit. Appropriately rated chains and lifting beam must be used when handling the units.
- Lifting anchor positioning and lifting equipment specifications can be supplied upon request.
- All Hynds Box Underpass units incorporate Swiftlift lifting anchors for safe lifting and must be used with the correct lifting clutch.
- Hynds Pipe Systems has designed and manufactured Box Underpass units with a minimum dynamic factor of 1.2. This dynamic factor requires that all the following conditions are observed when lifting, moving or placing the units:
  a. Lifting with mobile plant (such as an excavator or similar) where equipment is specifically exempt from the requirements of the PECPR Regulations 1999, subject to the conditions outlined in the New Zealand Gazette, No. 104, September 2015 and
  b. Lifting, travelling and placing over rough or uneven ground where anchor failure is not anticipated to cause harm or injury, by adopting procedures such as:
     I. Transporting the element as close as practical to ground level (300mm recommended)
     II. Establishing and maintaining exclusion zones
     III. Transporting only precast concrete elements that are unlikely to topple if they were to hit the ground
     IV. Inspecting lifting anchors both after transportation and before final lifting into place

Refer to "Safe work with precast concrete - Handling, transportation and erection of precast concrete elements" published by Worksafe New Zealand (October 2018)

Shock loads resulting from travelling with suspended Box Underpass units over rough terrain and uneven ground may exceed design, dynamic and safety factors of the lifting systems. It is essential that care is taken during lifting and transporting as additional stresses could result in anchor failure.

Basic Bedding Preparation

- Sufficient foundation support and backfill compaction is required to prevent settlement of the imported layers conduit after installation.
- The bedding must be able to support the full load of the installed culvert, its contents, and the loads above the culvert. For this reason the box culvert should be laid on compacted granular hardfill to the specified line and gradient.
- Bedding design for a box culvert conduit should be undertaken by a local consulting engineer as local knowledge of ground conditions is important to ensure a successful installation.
- As a general guide, the compacted thickness of a basic bedding over the full width of the trench can vary between 150 to 250 mm (depending on culvert bearing loads) with compacted layers not exceeding 150 mm thick.
- Trench width for most installations should be equal to the external width of the culvert plus 600 mm.
- Local soft spots in the trench must be excavated and the voids filled with well compacted hardfill to provide uniform support under the entire structure. This must provide a bearing capacity of a minimum of 100kPa. Failure to do so could result in settlement of the units at a later stage.

Jointing

- Hynds Box Culverts are manufactured with the quatro joint which together with the dog bone connector locates and locks adjacent units together.
- Joint gaps will vary from 5 to 20 mm and in most cases can be left open.
- Joint sealing can be formed with the use of butyl mastic sealing strips, epoxy, sand-mortar mix, or silicone sealant. Contact your local Hynds Sales Branch for these products.

Laying

- A box culvert line is usually laid from the downstream end with the sockets facing upstream to receive the next culvert to be laid.
- The box culvert units should be inspected before laying to ensure that the jointing surfaces are clean.
- The unit is then lowered carefully onto the prepared base, aligning the spigot with the socket of the unit already laid.
- Loose surface bedding material must not enter the joint space between the units – particularly along the bottom – during positioning of the unit.
- If any adjustment of level is necessary, remove the box culvert, adjust the surface layer of the bedding and place again. Do not use local packers to adjust the level.
- Hynds Box Culverts are manufactured with our exclusive Dog Bone Connector System. The units can then be tied together on site by a specialist contractor once the units have been installed. Recommended practise is as follow:
  - Place first box culvert into required position.
  - Using the crane, position the second culvert as close as possible to the previously installed culvert, and whilst being supported by the crane pull the culverts together with come-alongs attached to the internal swiftlifts.

    Note: *DO NOT use the dog-bone connectors to pull the culverts together.*

  - Line up two half dog-bone connector recesses.
  - Place threaded rod connecting set in groove.
  - Tighten nuts equally at each end using a socket wrench and an ø 16 set to a maximum torque of 100Nm (standard use).
  - Fill recess with Sikagrout 212 or equivalent.
  - See Figures 1-4 for visual steps.

- Alternatively Hynds Box Culverts can be manufactured with a duct in each corner. The units can then be bolted together or post-tensioned on site. Recommended practise is to insert the tie rods as the first unit is placed and push through subsequent units as they are installed.

Dog Bone Connector Jointing System:

Hynds Box Culverts are manufactured with our exclusive Dog Bone Connector System, the ideal solution for tying together culvert sections. This system combined with the preformed Quatro joint allows a fast and accurate lock of adjacent units.

Backfilling

- Backfilling should commence as soon as possible after the box culverts have been laid.
- Fill the trench to the level of the top of the culvert working evenly on each side.
- Use selected backfill material well compacted in layers not exceeding 200 mm thickness.
- Do not use heavy vibratory equipment.
- Continue to fill the culvert conduit in well compacted layers
- Do not run heavy rollers or construction equipment over the culvert conduit without checking beforehand that the units are designed to withstand these loads.

Also see

Technical Guide D8.1 Hynds Precast Box Culvert for additional information.

Installation:

FIG. 5 Place first culvert into required position

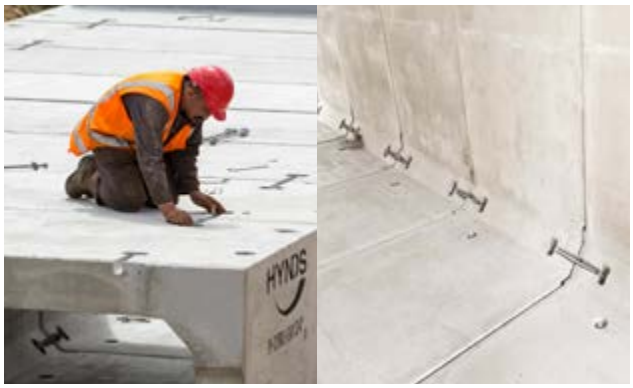


FIG. 7 Place threaded rod connecting set in groove. Tighten nuts equally at each end, using a socket wrench to a maximum torque of:
Ø16 set: 100 Nm; Ø20 set: 125 Nm; Ø24 set: 150 Nm

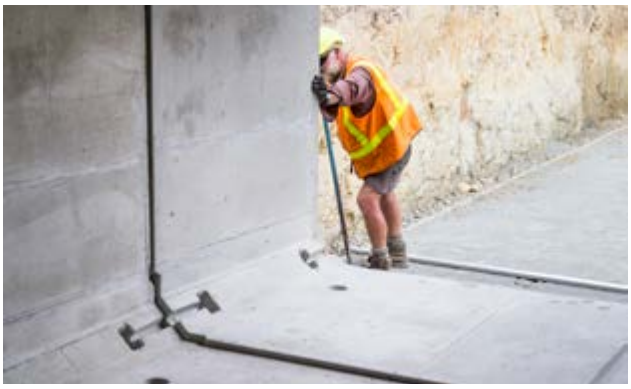
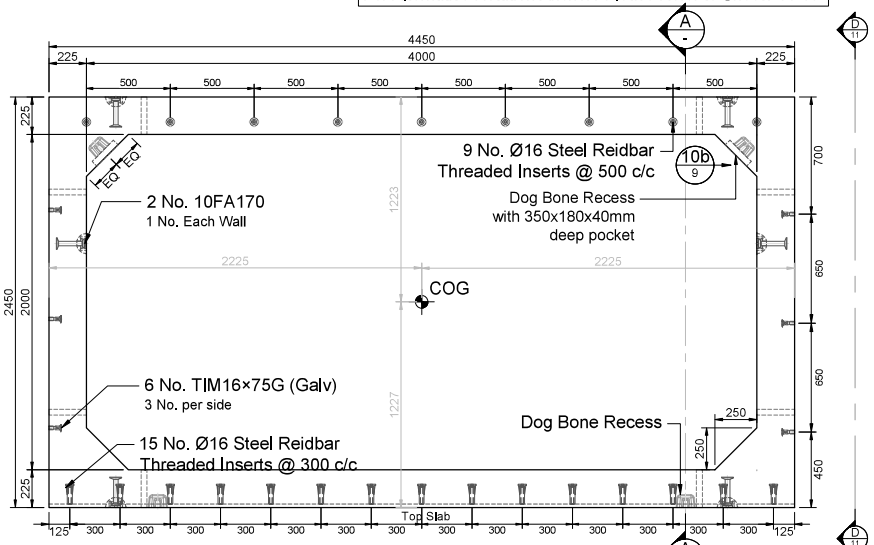


FIG. 6 Place the next culvert as close as possible to desired position and then pull into correct position with a come-along, connected to the swiftlifts in the culvert. Line up two half dog-bone connector recesses.

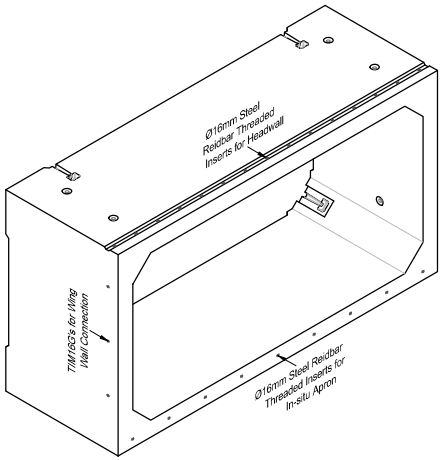
FIG. 8 Fill recess with Sikagrout 212 or equivalent.

ISSUED FOR CONSTRUCTION
NAME: Zeyn Shahadat
SIGNED:
DATE: 12 Jul 2025

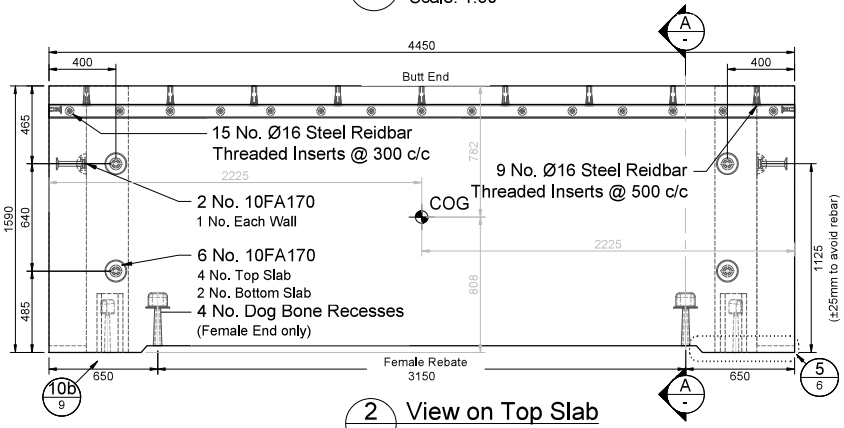
For Alternative Rotation Anchors Please Refer to Sheets 11-13



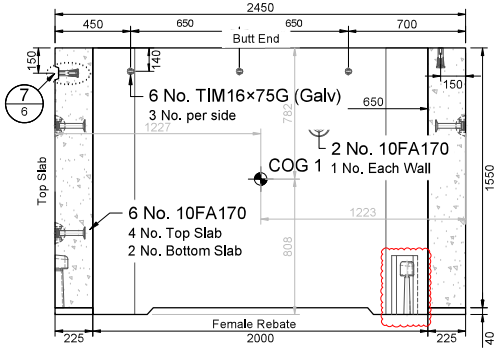
1 - Plan on Butt End
Scale: 1:30



3 - Isometric View
Scale: N.T.S



2 - View on Top Slab
Scale: 1:30



A - Section
Scale: 1:30

NOTES:

1. Concrete: f'c = 50MPa, 10mm Aggregate (SCC)
2. Reo: fy = Grade 500E MA
3. Reo Cover: 40mm Min
4. Min Lap Length: 40 x Bar Dia
5. Tolerances for Precast Components:Table 5.1-NZS3109:1997
6. Tolerances for Reinforcement: As per NZS3109:1997 Clause3.9, and reproduced in DRG no T6910 for reference.
7. Do not re-bend reinforcing steel
8. Design Load: HN-HO-72 (NZTA Load Criteria)
9. Design Life: 100 Years
10. Exposure Classification: Internal = B2, External = B2
11. Finish: F3 as per NZS3114.
12. Demoulding at 15 MPa min concrete strength.
13. Lifting & Rotating of Unit at 30 MPa min concrete strength.

MATERIALS	
VOL (m^3/unit) =	4.73 m^3
WT (ton/unit) =	12.21 t
CODE =	BX4020L1ND

REVISIONS

REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
8	Dogbone Recess, Fatigue Reo And Shear Links Added	08 Mar 2023	O.B.
9	Bar 4A Dimensions Corrected	17 Mar 2023	O.B.
10	FA And Rotation Anchor Update - Issued For Construction	12 Jul 2025	Z.S
4	Re-Issued For Construction	04 May 2020	Z.S
5	Updated Bars 2, 3 & 4	19 Aug 2020	R.C.
6	Bending Schedule	15-June-2021	S.P
7	Alternative Rotation Anchors Added.Issued For Construction.	12 Aug 2022	W.D.

PO Box 58142, Botany, Auckland, 2163
Tel: 09-274 0316
Fax: 09-272 7485
email: technicalservices@hynds.co.nz

ISO 9001 CERTIFIED MANAGEMENT SYSTEM

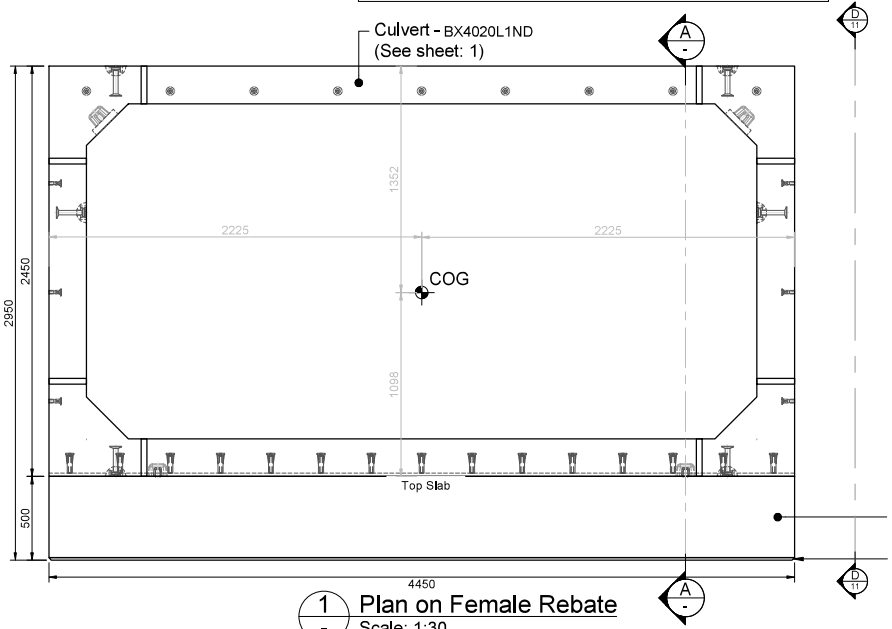
PROJECT DESCRIPTION:
Hynds Standard Drawing
Box Culvert 4000×2000×1550mm
(150 - 1000mm Soil Cover)

SERVICE DETAIL:
Box Culvert 4000×2000×1550mm
with 225mm Walls
Type A - Quattro Version
Downstream End Unit

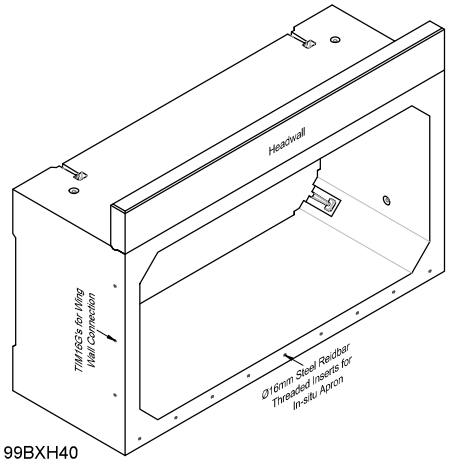
REFERENCE/QUOTE NUMBER:	25454	
DRAWN: R.P. SIGNATURE:	DESIGN: P.L. SIGNATURE:	CHECKED: P.L. SIGNATURE:
SCALE: As Shown PAPER SIZE: A3	Note: Do not scale drawing if in doubt ASK!!!	DATE: 6 Dec 2018
DRAWING NUMBER: T6993- 1	SHEET NUMBER: 1 of 15	REVISION NUMBER: 10

ISSUED FOR CONSTRUCTION
NAME: Zeyn Shahadat
SIGNED:
DATE: 12 Jul 2025

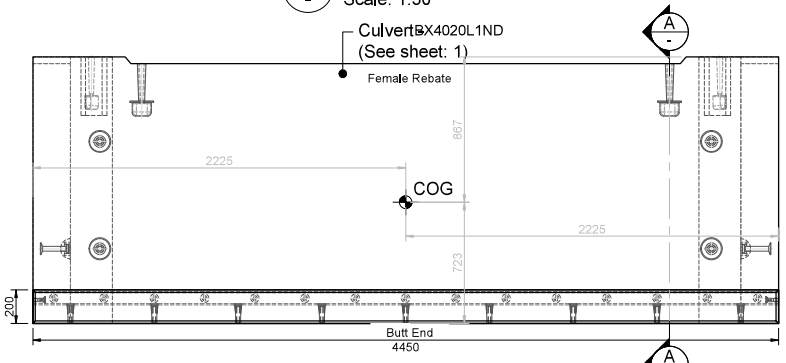
For Alternative Rotation Anchors Please Refer to Sheets 11-13



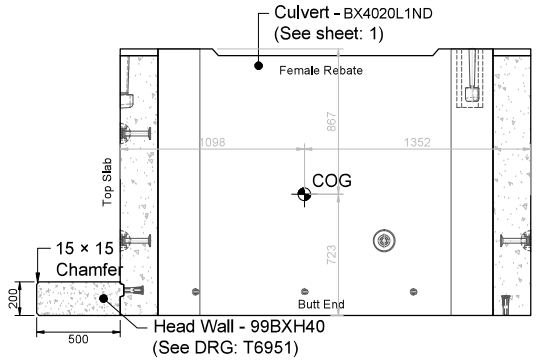
1 - Plan on Female Rebate
Scale: 1:30



3 - Isometric View
Scale: N.T.S



2 - View on Top Slab
Scale: 1:30



A - Section
Scale: 1:30

NOTES:

1. Concrete: f'c = 50MPa, 10mm Aggregate (SCC)
2. Reo: fy = Grade 500E MA
3. Reo Cover: 40mm Min
4. Min Lap Length: 40 x Bar Dia
5. Tolerances for Precast Components:Table 5.1-NZS3109:1997
6. Tolerances for Reinforcement: As per NZS3109:1997 Clause3.9, and reproduced in DRG no T6910 for reference.
7. Do not re-bend reinforcing steel
8. Design Load: HN-HO-72 (NZTA Load Criteria)
9. Design Life: 100 Years
10. Exposure Classification: Internal = B2, External = B2
11. Finish: F3 as per NZS3114.
12. Demoulding at 15 MPa min concrete strength.
13. Lifting & Rotating of Unit at 30 MPa min concrete strength.

MATERIALS

VOL (m^3/unit) =	0.45 m^3 (Headwall only)
WT (ton/unit) =	13.38 t (Total)
CODE =	BX4020L1NDH

REVISIONS

REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
8	Dogbone Recess, Fatigue Reo And Shear Links Added	08 Mar 2023	O.B.
9	Bar 4A Dimensions Corrected	17 Mar 2023	O.B.
10	FA And Rotation Anchor Update - Issued For Construction	12 Jul 2025	Z.S
4	Re-Issued For Construction	04 May 2020	Z.S
5	Updated Bars 2, 3 & 4	19 Aug 2020	R.C.
6	Bending Schedule	15-June-2021	S.P
7	Alternative Rotation Anchors Added.Issued For Construction.	12 Aug 2022	W.D.

PO Box 58142, Botany, Auckland, 2163
Tel: 09-274 0316
Fax: 09-272 7485
email: technicalservices@hynds.co.nz

ISO 9001 CERTIFIED MANAGEMENT SYSTEM

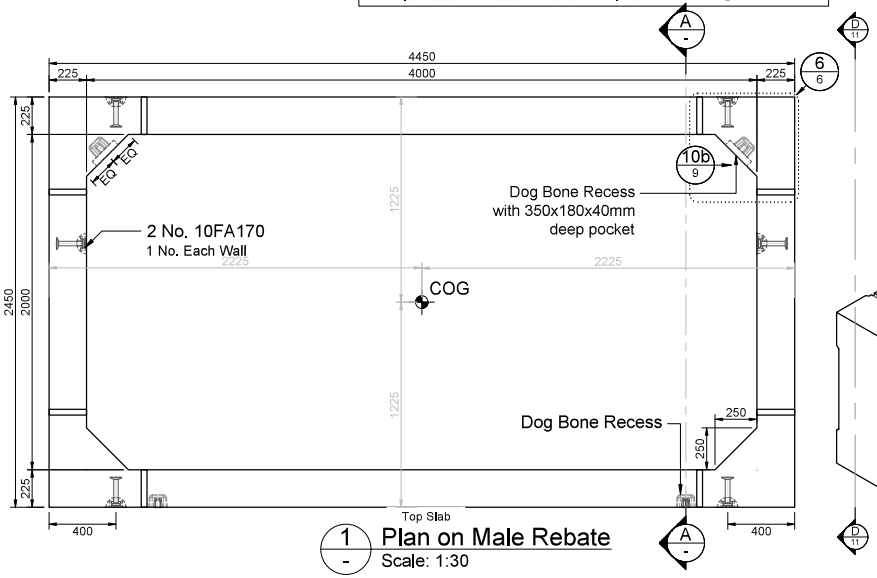
PROJECT DESCRIPTION:
Hynds Standard Drawing
Box Culvert 4000×2000×1550mm
(150 - 1000mm Soil Cover)

SERVICE DETAIL:
Box Culvert 4000×2000×1550mm
with 225mm Walls
Type A - Quattro Version - With Headwall
Downstream End Unit Details

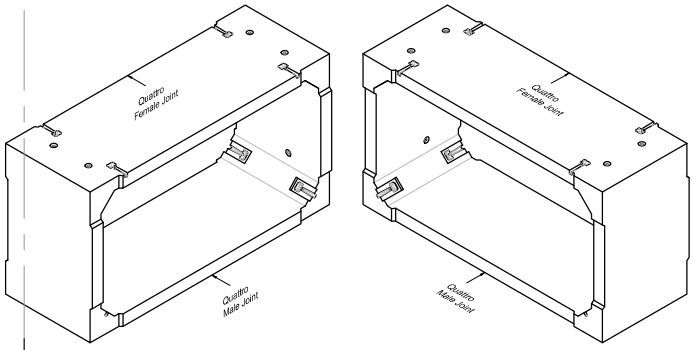
REFERENCE/QUOTE NUMBER:	25454	
DRAWN: R.P. SIGNATURE:	DESIGN: P.L. SIGNATURE:	CHECKED: P.L. SIGNATURE:
SCALE: As Shown PAPER SIZE: A3	Note: Do not scale drawing if in doubt **ASK!!!**	DATE: 6 Dec 2018
DRAWING NUMBER: T6993-2	SHEET NUMBER: 2 of 15	REVISION NUMBER: 10

ISSUED FOR CONSTRUCTION
NAME: Zeyn Shahadat
SIGNED:
DATE: 12 Jul 2025

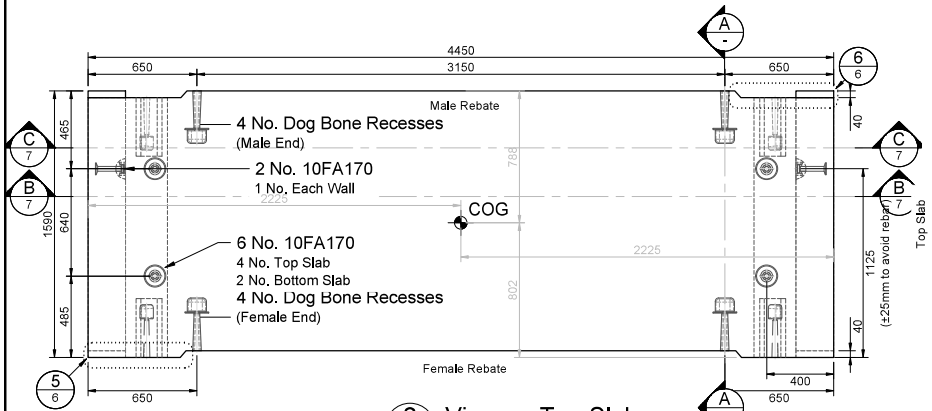
For Alternative Rotation Anchors Please Refer to Sheets 11-13



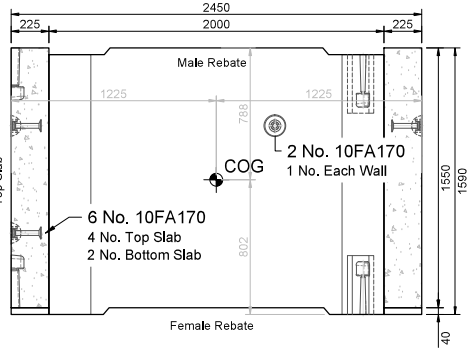
1 - Plan on Male Rebate
Scale: 1:30



3 - Isometric View
Scale: N.T.S



2 - View on Top Slab
Scale: 1:30



A - Section
Scale: 1:30

NOTES:

1. Concrete: f'c = 50MPa, 10mm Aggregate (SCC)
2. Reo: fy = Grade 500E MA
3. Reo Cover: 40mm Min
4. Min Lap Length: 40 x Bar Dia
5. Tolerances for Precast Components:Table 5.1-NZS3109:1997
6. Tolerances for Reinforcement: As per NZS3109:1997 Clause3.9, and reproduced in DRG no T6910 for reference.
7. Do not re-bend reinforcing steel
8. Design Load: HN-HO-72 (NZTA Load Criteria)
9. Design Life: 100 Years
10. Exposure Classification: Internal = B2, External = B2
11. Finish: F3 as per NZS3114.
12. Demoulding at 15 MPa min concrete strength.
13. Lifting & Rotating of Unit at 30 MPa min concrete strength.

MATERIALS	
VOL (m^3/unit) =	4.69 m^3
WT (ton/unit) =	12.11 t
CODE =	BX4020L1NM

REVISIONS

REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
8	Dogbone Recess, Fatigue Reo And Shear Links Added	08 Mar 2023	O.B.
9	Bar 4A Dimensions Corrected	17 Mar 2023	O.B.
10	FA And Rotation Anchor Update - Issued For Construction	12 Jul 2025	Z.S
4	Re-Issued For Construction	04 May 2020	Z.S
5	Updated Bars 2, 3 & 4	19 Aug 2020	R.C.
6	Bending Schedule	15-June-2021	S.P
7	Alternative Rotation Anchors Added.Issued For Construction.	12 Aug 2022	W.D.

PO Box 58142, Botany, Auckland, 2163
Tel: 09-274 0316
Fax: 09-272 7485
email: technicalservices@hynds.co.nz

ISO 9001 CERTIFIED MANAGEMENT SYSTEM

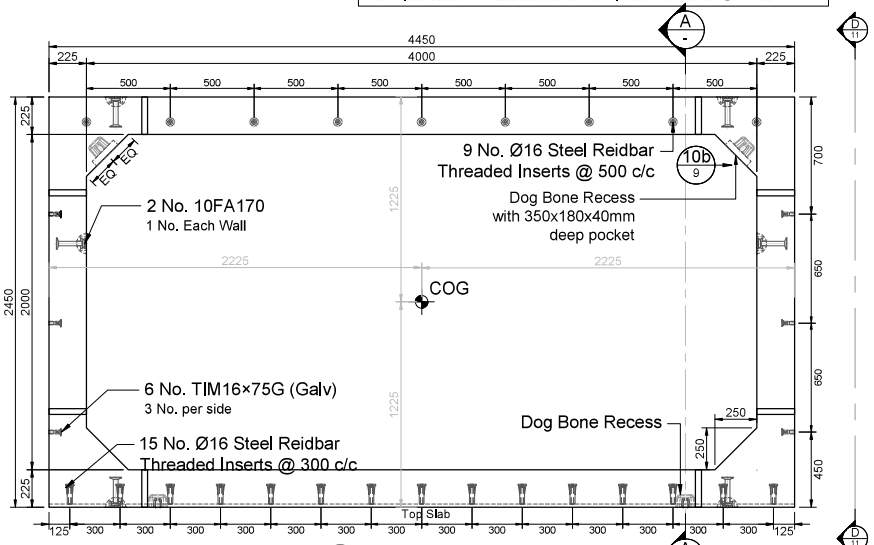
PROJECT DESCRIPTION:
Hynds Standard Drawing
Box Culvert 4000×2000×1550mm
(150 - 1000mm Soil Cover)

SERVICE DETAIL:
Box Culvert 4000×2000×1550mm
with 225mm Walls
Type B - Quattro Version
Intermediate Unit

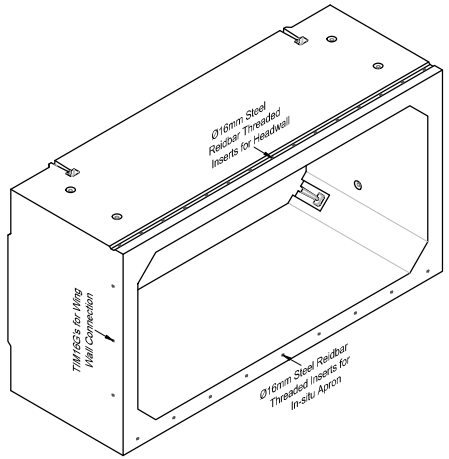
REFERENCE/QUOTE NUMBER:	25454	
DRAWN: R.P. SIGNATURE:	DESIGN: P.L. SIGNATURE:	CHECKED: P.L. SIGNATURE:
SCALE: As Shown PAPER SIZE: A3	Note: Do not scale drawing if in doubt **ASK!!!**	DATE: 6 Dec 2018
DRAWING NUMBER: T6993- 3	SHEET NUMBER: 3 of 15	REVISION NUMBER: 10

ISSUED FOR CONSTRUCTION
NAME: Zeyn Shahadat
SIGNED:
DATE: 12 Jul 2025

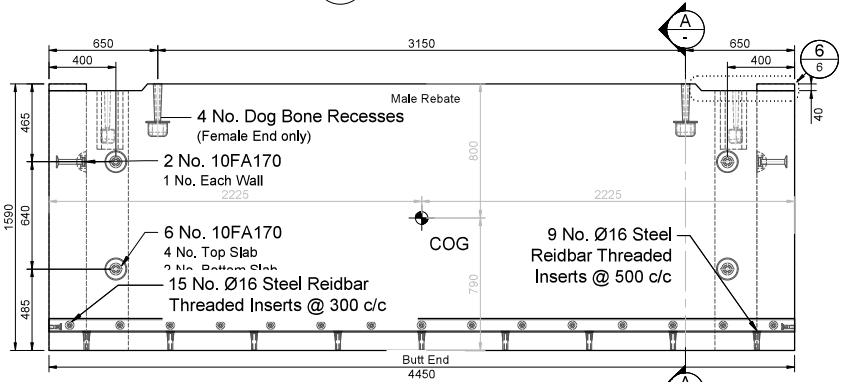
For Alternative Rotation Anchors Please Refer to Sheets 11-13



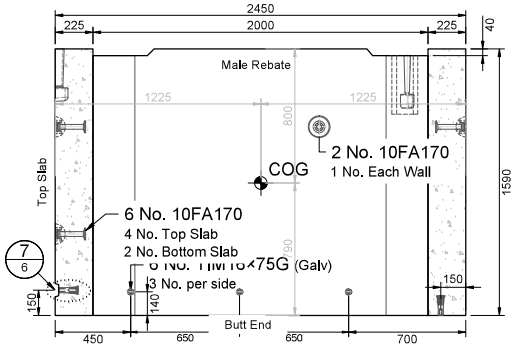
1 - Plan on Male Rebate
Scale: 1:30



3 - Isometric View
Scale: N.T.S



2 - View on Top Slab
Scale: 1:30



A - Section
Scale: 1:30

NOTES:

1. Concrete: f'c = 50MPa, 10mm Aggregate (SCC)
2. Reo: fy = Grade 500E MA
3. Reo Cover: 40mm Min
4. Min Lap Length: 40 x Bar Dia
5. Tolerances for Precast Components:Table 5.1-NZS3109:1997
6. Tolerances for Reinforcement: As per NZS3109:1997 Clause3.9, and reproduced in DRG no T6910 for reference.
7. Do not re-bend reinforcing steel
8. Design Load: HN-HO-72 (NZTA Load Criteria)
9. Design Life: 100 Years
10. Exposure Classification: Internal = B2, External = B2
11. Finish: F3 as per NZS3114.
12. Demoulding at 15 MPa min concrete strength.
13. Lifting & Rotating of Unit at 30 MPa min concrete strength.

MATERIALS	
VOL (m^3/unit) =	4.77 m^3
WT (ton/unit) =	12.32 t
CODE =	BX4020L1NU

REVISIONS

REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
8	Dogbone Recess, Fatigue Reo And Shear Links Added	08 Mar 2023	O.B.
9	Bar 4A Dimensions Corrected	17 Mar 2023	O.B.
10	FA And Rotation Anchor Update - Issued For Construction	12 Jul 2025	Z.S
4	Re-Issued For Construction	04 May 2020	Z.S
5	Updated Bars 2, 3 & 4	19 Aug 2020	R.C.
6	Bending Schedule	15-June-2021	S.P
7	Alternative Rotation Anchors Added.Issued For Construction.	12 Aug 2022	W.D.

PO Box 58142, Botany, Auckland, 2163
Tel: 09-274 0316
Fax: 09-272 7485
email: technicalservices@hynds.co.nz

ISO 9001 CERTIFIED MANAGEMENT SYSTEM

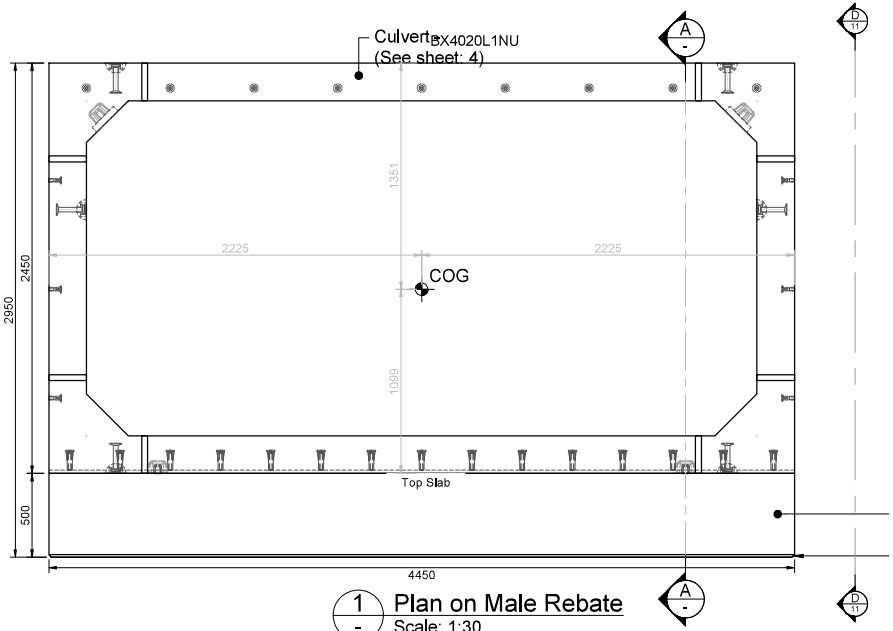
PROJECT DESCRIPTION:
Hynds Standard Drawing
Box Culvert 4000×2000×1550mm
(150 - 1000mm Soil Cover)

SERVICE DETAIL:
Box Culvert 4000×2000×1590mm
with 225mm Walls
Type C - Quattro Version
Upstream End Unit

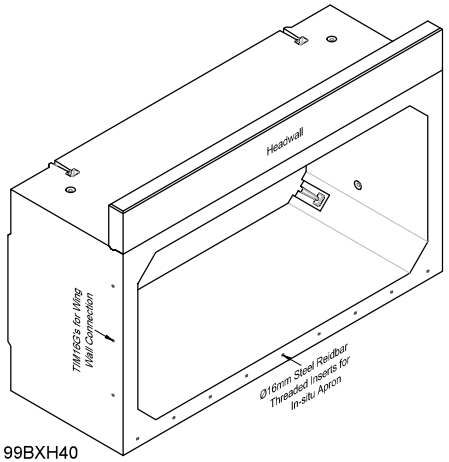
REFERENCE/QUOTE NUMBER:	25454	
DRAWN: R.P. SIGNATURE:	DESIGN: P.L. SIGNATURE:	CHECKED: P.L. SIGNATURE:
SCALE: As Shown PAPER SIZE: A3	Note: Do not scale drawing if in doubt ASK!!!	DATE: 6 Dec 2018
DRAWING NUMBER: T6993- 4	SHEET NUMBER: 4 of 15	REVISION NUMBER: 10

ISSUED FOR CONSTRUCTION
NAME: Zeyn Shahadat
SIGNED:
DATE: 12 Jul 2025

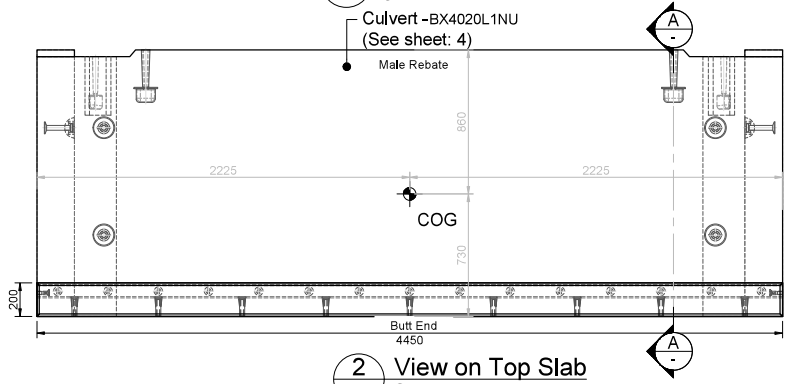
For Alternative Rotation Anchors Please Refer to Sheets 11-13



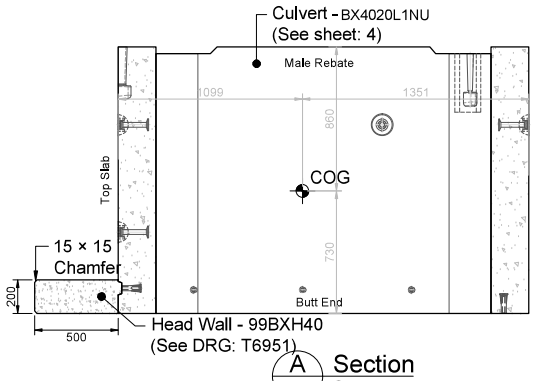
1 Plan on Male Rebate
Scale: 1:30



3 Isometric View
Scale: N.T.S



2 View on Top Slab
Scale: 1:30



A Section
Scale: 1:30

NOTES:

1. Concrete: f'c = 50MPa, 10mm Aggregate (SCC)
2. Reo: fy = Grade 500E MA
3. Reo Cover: 40mm Min
4. Min Lap Length: 40 x Bar Dia
5. Tolerances for Precast Components:Table 5.1-NZS3109:1997
6. Tolerances for Reinforcement: As per NZS3109:1997 Clause3.9, and reproduced in DRG no T6910 for reference.
7. Do not re-bend reinforcing steel
8. Design Load: HN-HO-72 (NZTA Load Criteria)
9. Design Life: 100 Years
10. Exposure Classification: Internal = B2, External = B2
11. Finish: F3 as per NZS3114.
12. Demoulding at 15 MPa min concrete strength.
13. Lifting & Rotating of Unit at 30 MPa min concrete strength.

MATERIALS	
VOL (m^3/unit) =	0.45 m^3 (Headwall only)
WT (ton/unit) =	13.48 t (Total)
CODE =	BX4020L1NUH

REVISIONS

REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
8	Dogbone Recess, Fatigue Reo And Shear Links Added	08 Mar 2023	O.B.
9	Bar 4A Dimensions Corrected	17 Mar 2023	O.B.
10	FA And Rotation Anchor Update - Issued For Construction	12 Jul 2025	Z.S
4	Re-Issued For Construction	04 May 2020	Z.S
5	Updated Bars 2, 3 & 4	19 Aug 2020	R.C.
6	Bending Schedule	15-June-2021	S.P
7	Alternative Rotation Anchors Added.Issued For Construction.	12 Aug 2022	W.D.

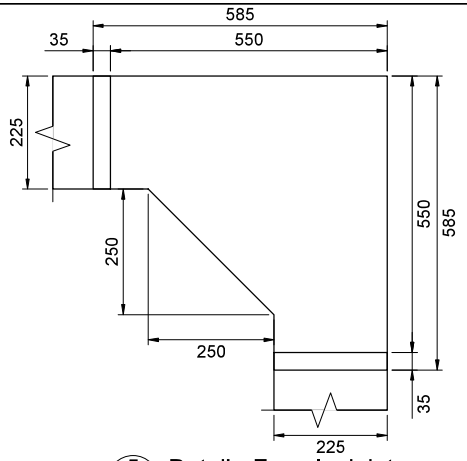
PO Box 58142, Botany, Auckland, 2163
Tel: 09-274 0316
Fax: 09-272 7485
email: technicalservices@hynds.co.nz

ISO 9001 CERTIFIED MANAGEMENT SYSTEM

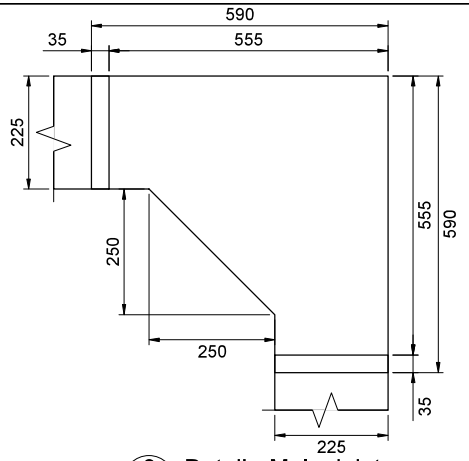
PROJECT DESCRIPTION:
Hynds Standard Drawing
Box Culvert 4000×2000×1550mm
(150 - 1000mm Soil Cover)

SERVICE DETAIL:
Box Culvert 4000×2000×1590mm
with 225mm Walls
Type C - Quattro Version - With Headwall
Upstream End Unit Details

REFERENCE/QUOTE NUMBER:	25454	
DRAWN: R.P. SIGNATURE:	DESIGN: P.L. SIGNATURE:	CHECKED: P.L. SIGNATURE:
SCALE: As Shown PAPER SIZE: A3	Note: Do not scale drawing if in doubt **ASK!!!**	DATE: 6 Dec 2018
DRAWING NUMBER: T6993-5	SHEET NUMBER: 5 of 15	REVISION NUMBER: 10

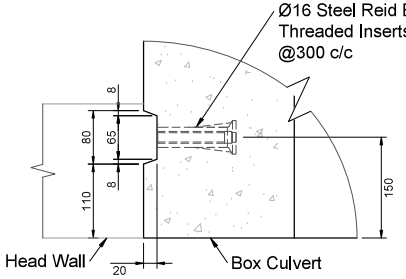


5 Detail - Female Joint
- Scale: 1:10

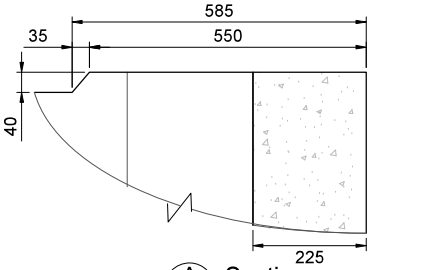


6 Detail - Male Joint
- Scale: 1:10

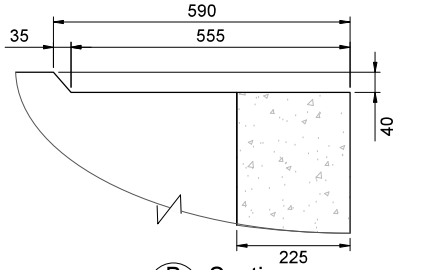
ISSUED FOR CONSTRUCTION
NAME: Zeyn Shahadat
SIGNED:
DATE: 12 Jul 2025



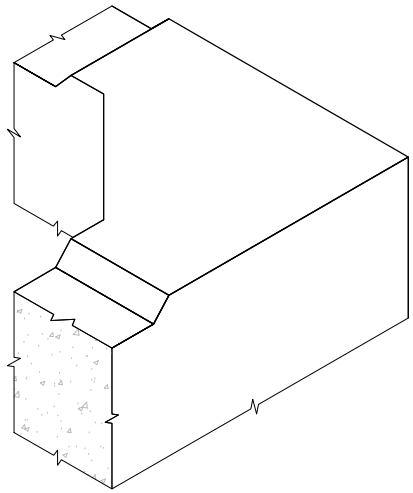
7 Detail
1 & 4 Scale: 1:7.5



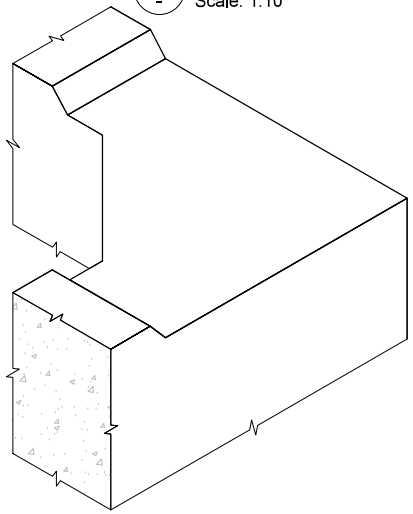
A Section
- Scale: 1:10



B Section
- Scale: 1:10



8 Isometric - Female Joint
- Scale: 1:10



9 Isometric - Male Joint
- Scale: 1:10

NOTES:

1. Concrete: f'c = 50MPa, 10mm Aggregate (SCC)
2. Reo: fy = Grade 500E MA
3. Reo Cover: 40mm Min
4. Min Lap Length: 40 x Bar Dia
5. Tolerances for Precast Components:Table 5.1-NZS3109:1997
6. Tolerances for Reinforcement: As per NZS3109:1997 Clause3.9, and reproduced in DRG no T6910 for reference.
7. Do not re-bend reinforcing steel
8. Design Load: HN-HO-72 (NZTA Load Criteria)
9. Design Life: 100 Years
10. Exposure Classification: Internal = B2, External = B2
11. Finish: F3 as per NZS3114.
12. Demoulding at 15 MPa min concrete strength.
13. Lifting & Rotating of Unit at 30 MPa min concrete strength.

MATERIALS	
VOL (m^3/unit) =	N/A
WT (ton/unit) =	N/A
CODE =	N/A

REVISIONS

REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
8	Dogbone Recess, Fatigue Reo And Shear Links Added	08 Mar 2023	O.B.
9	Bar 4A Dimensions Corrected	17 Mar 2023	O.B.
10	FA And Rotation Anchor Update - Issued For Construction	12 Jul 2025	Z.S
4	Re-Issued For Construction	04 May 2020	Z.S
5	Updated Bars 2, 3 & 4	19 Aug 2020	R.C.
6	Bending Schedule	15-June-2021	S.P
7	Alternative Rotation Anchors Added.Issued For Construction.	12 Aug 2022	W.D.

PO Box 58142, Botany, Auckland, 2163
Tel: 09-274 0316
Fax: 09-272 7485
email: technicalservices@hynds.co.nz

ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT DESCRIPTION:
Hynds Standard Drawing
Box Culvert 4000×2000×1550mm
(150 - 1000mm Soil Cover)

SERVICE DETAIL:
Box Culvert 4000×2000mm
with 225mm Walls
Quattro Version
Quattro Joint Details

REFERENCE/QUOTE NUMBER:	25454	
DRAWN: R.P. SIGNATURE:	DESIGN: P.L. SIGNATURE:	CHECKED: P.L. SIGNATURE:
SCALE: As Shown PAPER SIZE: A3	Note: Do not scale drawing if in doubt **ASK!!!**	DATE: 6 Dec 2018
DRAWING NUMBER: T6993-6	SHEET NUMBER: 6 of 15	REVISION NUMBER: 10

General Notes:

1. Concrete : $f'c$ = 50MPa compressive strength at 28 days, 20mm Aggregate, or 50MPa Self-compacting concrete 10mm Aggregate.
2. Reinforcing Steel : fy = Grade 500E MA, complying with AS/ NZS 4671.
   : Cover = 40mm min. to all steel, unless otherwise specified.
3. Min Lap Length : 46 x Bar Diameter.
4. Dimensional tolerances : Table 5.1-NZS3109:1997.
5. Do not re-bend reinforcing steel.

Culvert Design Notes:

1. Traffic loading to HN-HO-72 New Zealand Transport Agency (NZTA) load criteria.
2. Fill depth (soil cover) over culvert 150mm minimum - 1000mm maximum.
3. Consult Engineer where ground water table is above the base of the culvert.
4. 100kPa minimum required allowable soil bearing capacity typical. Confirm on site by Site Engineer or Geotechnical Engineer.
5. Culvert is designed to exposure classification B2 as per NZS 3101 for a minimum 100-Year Design Life. Consult Engineer where exposure classification C or U is required (Saltwater Tidal / Splash Zone or other aggressive environment).
6. For areas susceptible to Seismic or Liquefaction activity, specific design of suitable foundation is required and is to be carried out by the Site Engineer to provide a uniform 100kPa safe soil bearing capacity.Ground improvement may be required, such as geotextile raft or piled foundation.
7. Finish: F3 as per NZS3114.
8. Seismic design with the following design assumptions:
   a. Hazard factor = 0.38, Near-fault factor =1.
   b. Return Period Factor = 1.3
   c. Max. PGA = 0.55g for DCLS. Max. PGA = 0.83g for CALS.
   d. Site subsoil Class D and Class E
   e. Dynamic shear modulus of surrounding soil = 15000 kN/m^2 with soil Poisson ratio =0.35. Soil density = $19kN/m^3$
9. External water pressure and internal water pressure are balanced. Drainage design at the back of wall by others.
10. No allowance for differential settlement along the box culvert line.

Wingwall Panel Design Notes:

1. Design load = 12kPa surcharge live load at back of wall with level back slope
2. Design life = 100 years
3. Active pressure coefficient Ka= 0.333
4. External water pressure and internal water pressure are balanced. Drainage design at the back of wall by others.
5. In-situ apron slab and shear key are to be designed by others to undertake the bending moments from wingwalls. Designer to check the overall stability of the wingwalls and apron structure.

Site Installation Notes:

1. Place first box culvert (Type A - downstream unit) into required position.
2. Using the crane, position the second culvert (Type B) as close as possible to the previously installed culvert, and whilst being supported by the crane, pull the culverts together with come-alongs attached to the internal swiftlifts. Note: DO NOT use the dog-bone connectors to pull the culverts together.
3. Line up two half 'dog-bone' connector recesses.
4. Place threaded rod connecting set in groove.
5. Tighten nuts equally at each end, using a socket wrench to a snug tight fit. DO NOT exceed the maximum torque of:
   - Ø16 set: 100Nm (standard use).
6. Fill recess of dog-bone and all swiftlift recesses with Fosroc Conbextra GP, Sikagrout 212 or equivalent.
7. Contractor to ensure joints are suitably sealed to Engineer's/ Site specified requirements.

NOTES:

This drawing is to be read in conjunction with project specific general arrangement drawings, project related M-Special shop drawings and DRG's: T5911 (Wingwall Details) & T6951 (Headwall Details), if all components are required.

FOR INFORMATION

MATERIALS	
VOL (m^3/unit) =	See Table
WT (ton/unit) =	See Table
CODE =	See Table

REVISIONS

REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
A	Issued For Information	04 May 2020	Z.S
B	Revised Design Notes	19 Aug 2020	R.C.
C	Chamfer Dimensions Updated	22 Feb 2021	P.L
D	Dogbone And Wingwall Detail Updated.	9 Nov 2022	W.D.
E	Details A And 7 Updated	10 May 2023	O.B.
F	Lifter, Grout, & Notes Update	19 Nov 2024	S.A
----	----	----	----

PO Box 58142, Botany, Auckland, 2163
Tel: 09-274 0316
Fax: 09-272 7485
email: technicalservices@hynds.co.nz

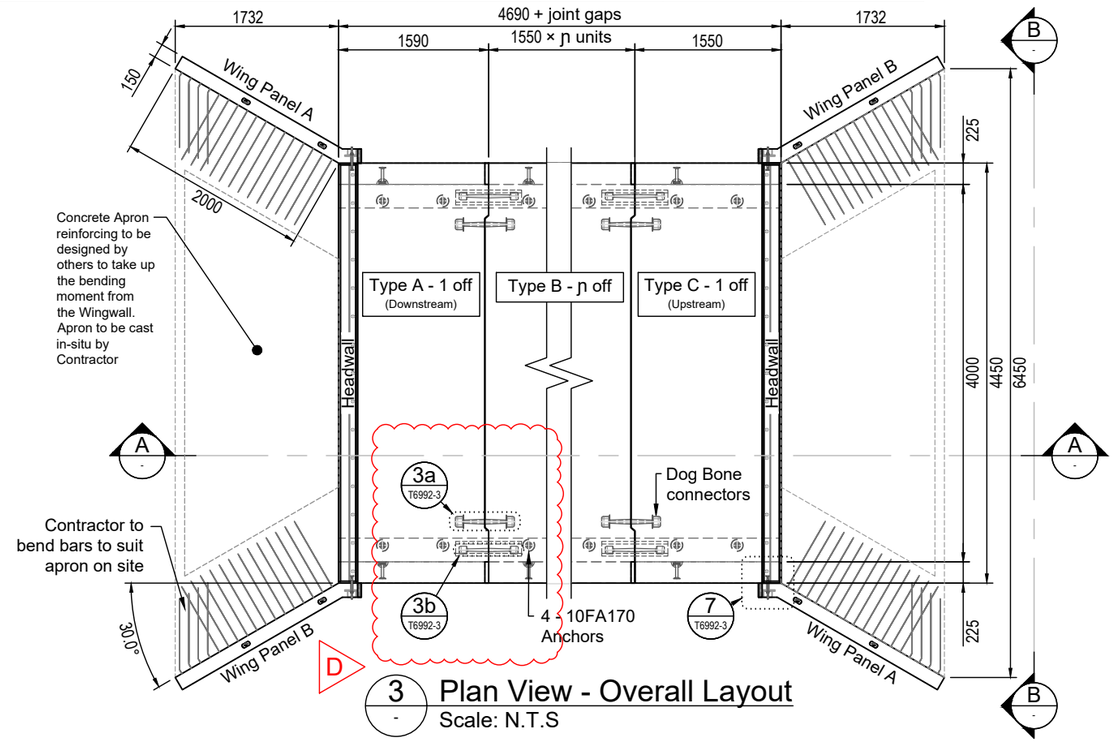
PROJECT DESCRIPTION:
***** Enter Client Details Here *****
***** Enter Client Details Here *****
***** Enter Client Details Here *****
***** Enter Client Details Here *****

SERVICE DETAIL:
Box Culvert 4000×2000×1550mm
with 225mm Thick Walls
(150 - 1000mm Soil Cover)
General Arrangement

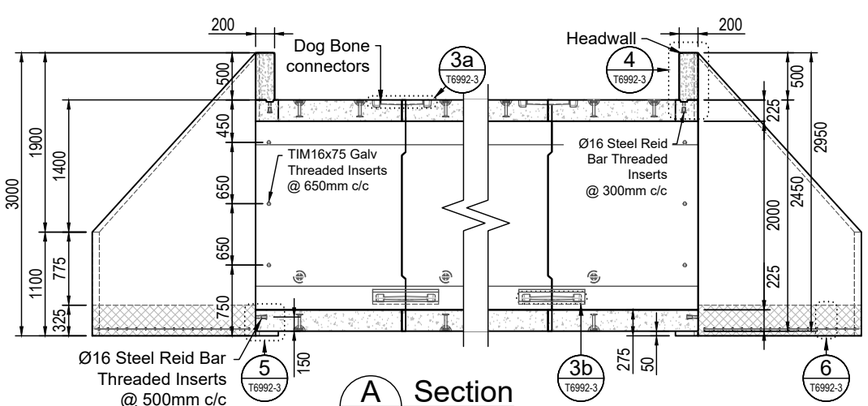
REFERENCE/QUOTE NUMBER:	*****	
DRAWN: R.P. SIGNATURE:	DESIGN: P.L. SIGNATURE:	CHECKED: P.L. SIGNATURE:
SCALE: As Shown PAPER SIZE: A3	Note: Do not scale drawing if in doubt **ASK!!!**	DATE: 06-Dec-18
DRAWING NUMBER: T6992- 1	SHEET NUMBER: 1 of 3	REVISION NUMBER: F

Project Quantities - Table T6992-1

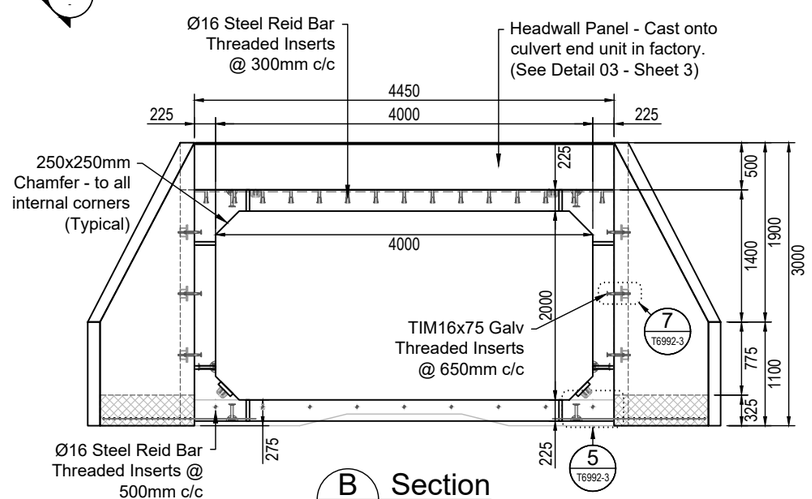
Culvert Type / Description	Quantity	Volume (m³)	Weights (tonnes)	Code	Drawing Number
Type A - Downstream End Culvert 4.0m × 2.0m	1	4.73m³	12.21T	BX4020L1ND	T6993-1
Type A - Downstream End Culvert 4.0m × 2.0m c/w Headwall	1	5.18m³	13.38 T	BX4020L1NDH	T6993-2
Type B - Middle Culvert 4.0m × 2.0m	N	4.69m³	12.11 T	BX4020L1NM	T6993-3
Type C - Upstream End Culvert 4.0m × 2.0m c/w Headwall	1	4.77m³	12.32 T	BX4020L1NU	T6993-4
Type C - Upstream End Culvert 4.0m × 2.0m c/w Headwall	1	5.22m³	13.48 T	BX4020L1NUH	T6993-5
Threaded Rod, Nut, Washer M16×550G8.8	XX			GTRHNM16550G8.8	
Left Wingwall Panel A - 2.0m × 3.0m/1.1m	2	0.71m³	1.87 T	BXWW2000L	T5911-1 & 2
Right Wingwall Panel B - 2.0m × 3.0m/1.1m	2	0.71m³	1.87 T	BXWW2000R	T5911-1 & 3
Threaded Rod, Nut, Washer M16×200G8.8	XX			GTRHNM16200G8.8	



3 - Plan View - Overall Layout
Scale: N.T.S



A - Section
Scale: N.T.S



B - Section
Scale: N.T.S

NOTES:

This drawing is to be read in conjunction with project specific general arrangement drawings, project related M-Special shop drawings and DRG's: T5911 (Wingwall Details) & T6951 (Headwall Details), if all components are required.

FOR INFORMATION

MATERIALS

VOL (m³/unit) =	See Table
WT (ton/unit) =	See Table
CODE =	See Table

REVISIONS

REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
A	Issued For Information	04 May 2020	Z.S
B	Revised Design Notes	19 Aug 2020	R.C.
C	Chamfer Dimensions Updated	22 Feb 2021	P.L
D	Dogbone And Wingwall Detail Updated.	9 Nov 2022	W.D.
E	Details A And 7 Updated	10 May 2023	O.B.
F	Lifter, Grout, & Notes Update	19 Nov 2024	S.A
----	----	----	----

PO Box 58142, Botany, Auckland, 2163
Tel: 09-274 0316
Fax: 09-272 7485
email: technicalservices@hynds.co.nz

ISO 9001 CERTIFIED MANAGEMENT SYSTEM

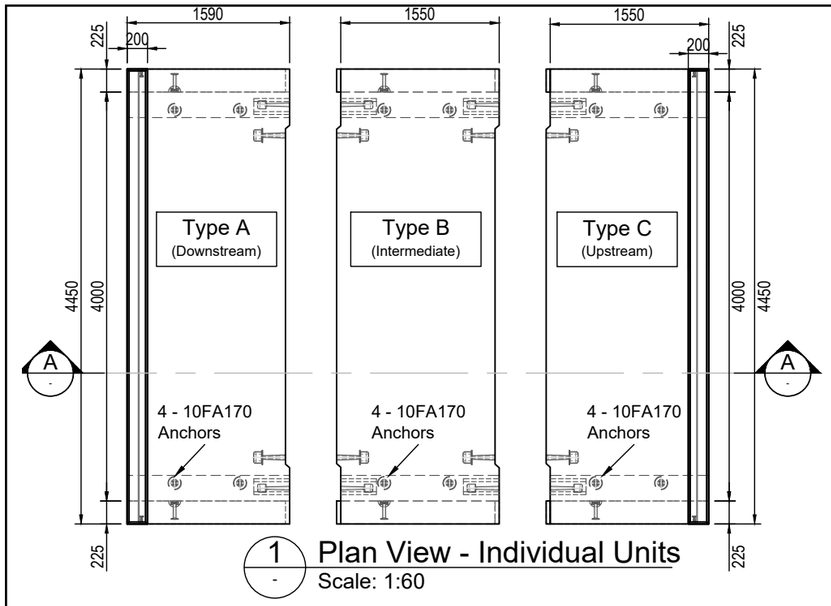
PROJECT DESCRIPTION:

***** Enter Client Details Here *****
***** Enter Client Details Here *****
***** Enter Client Details Here *****
***** Enter Client Details Here *****

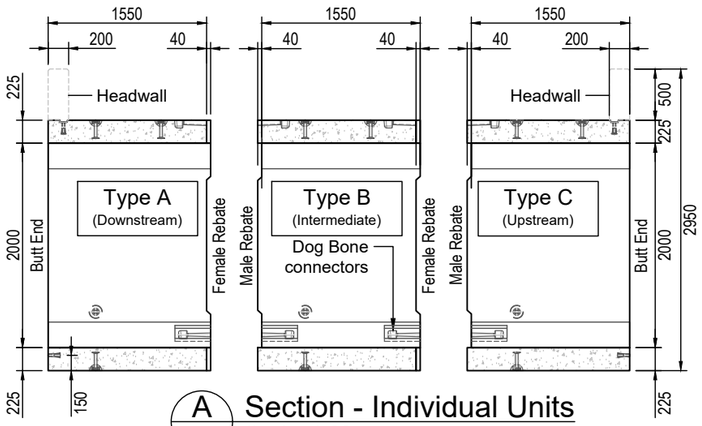
SERVICE DETAIL:

Box Culvert 4000×2000×1550mm
with 225mm Thick Walls
(150 - 1000mm Soil Cover)
General Arrangement

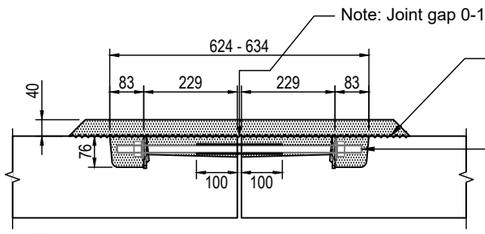
REFERENCE/QUOTE NUMBER:	*****		
DRAWN: R.P. SIGNATURE:	DESIGN: P.L. SIGNATURE:	CHECKED: P.L. SIGNATURE:	
SCALE: As Shown PAPER SIZE: A3	Note: Do not scale drawing if in doubt **ASK!!!**	DATE: 06-Dec-18	
DRAWING NUMBER: T6992- 2	SHEET NUMBER: 2 of 3	REVISION NUMBER: F	



1 - Plan View - Individual Units
Scale: 1:60



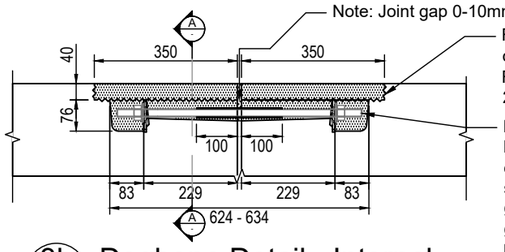
A - Section - Individual Units
Scale: 1:60



Contractor to overfill the recess for 40mm with Fosroc Conbextra GP, SikaGrout 212 or equivalent.

M16x550mm HT Galv Threaded Rod HDG Grade 8.8 wrapped with double Denso Tape 100mm each side, c/w M16 Washers HDG 4no. Ø48x3mm (2 each end) or 2no. Ø48x6mm (1 each end) , 2xM16 HSFG Hex Nuts (1each end)

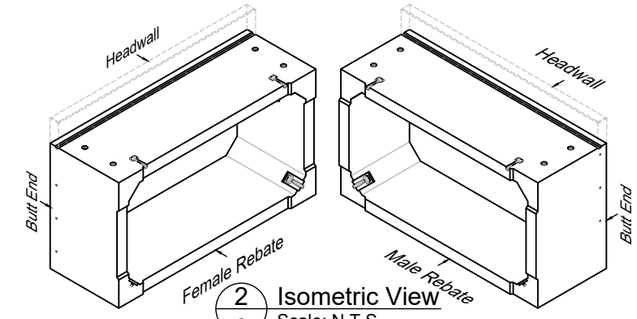
3a - 1 - Dogbone Detail - External
Scale: 1:15



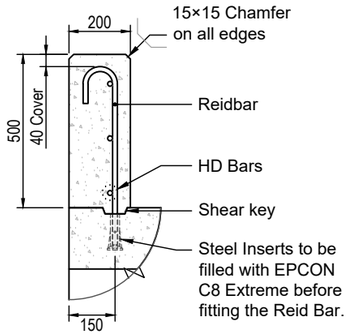
Recess roughened to full amplitude of 2mm, contractor to fill with Fosroc Conbextra GP, SikaGrout 212/Epoxy or equivalent

M16x550mm HT Galv Threaded Rod HDG Grade 8.8 wrapped with double Denso Tape 100mm each side, c/w M16 Washers HDG 4no. Ø48x3mm (2 each end) or 2no. Ø48x6mm (1 each end) , 2xM16 HSFG Hex Nuts (1each end)

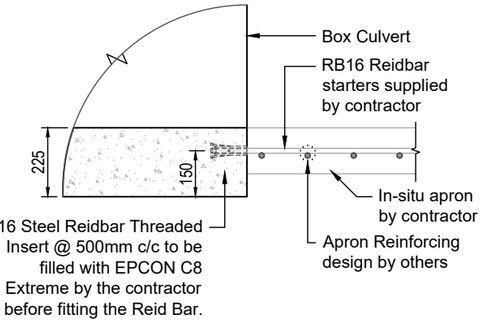
3b - 1 - Dogbone Detail - Internal
Scale: 1:15



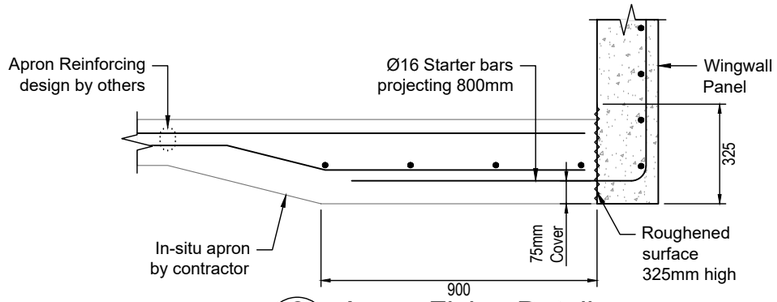
2 - Isometric View
Scale: N.T.S



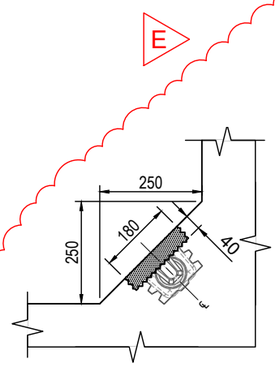
4 - T6992-1 - Headwall Fixing Detail
Scale: 1:20



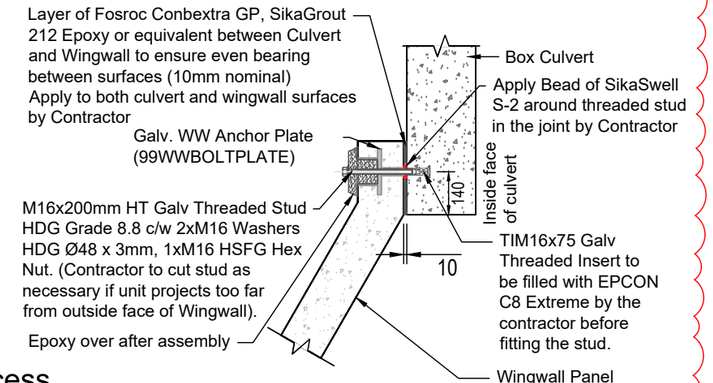
5 - T6992-1 - Apron Fixing Detail
Scale: 1:20
(Culvert to Apron)



6 - T6992-1 - Apron Fixing Detail
Scale: 1:20
(Wingwall to Apron)



A - Section - Dogbone Recess
Scale: 1:15



7 - 1 - Wingwall Fixing Detail
Scale: 1:20

NOTES:

1. Concrete: $f'c$ = 50MPa, 10mm Aggregate min.
2. Reo: $f y$ = Grade 500E
3. Reo Cover: 40mm min. to all steel
4. Min Lap Length: 40 x Bar Dia
5. Dimensional tolerances: Table 5.1-NZS3109:1997
6. Do not re-bend reinforcing steel
7. B2 Exposure Classification
8. Finish: F3 as per NZS3114.
9. Design Load: HN-HO-72 (NZTA Load Criteria)
10. Design Life: 100 Years

This drawing is to be read in conjunction with project specific general arrangement drawings, project related M-Special shop drawings and DRG's: T5911 (Wingwall Details) & T6951 (Headwall Details), if all components are required.

FOR INFORMATION

MATERIALS	
VOL (m^3/unit) =	See Table T6992 on sheet 2
WT (ton/unit) =	See Table T6992 on sheet 2
CODE =	See Table T6992 on sheet 2

REVISIONS

REV #:	REVISION DESCRIPTION:	DATE:	DRAWN:
A	Issued For Information	04 May 2020	Z.S
B	Revised Design Notes	19 Aug 2020	R.C.
C	Chamfer Dimensions Updated	22 Feb 2021	P.L
D	Dogbone And Wingwall Detail Updated.	9 Nov 2022	W.D.
E	Details A And 7 Updated	10 May 2023	O.B.
F	Lifter, Grout, & Notes Update	19 Nov 2024	S.A
----	----	----	----

PO Box 58142, Botany, Auckland, 2163
Tel: 09-274 0316
Fax: 09-272 7485
email: technicalservices@hynds.co.nz

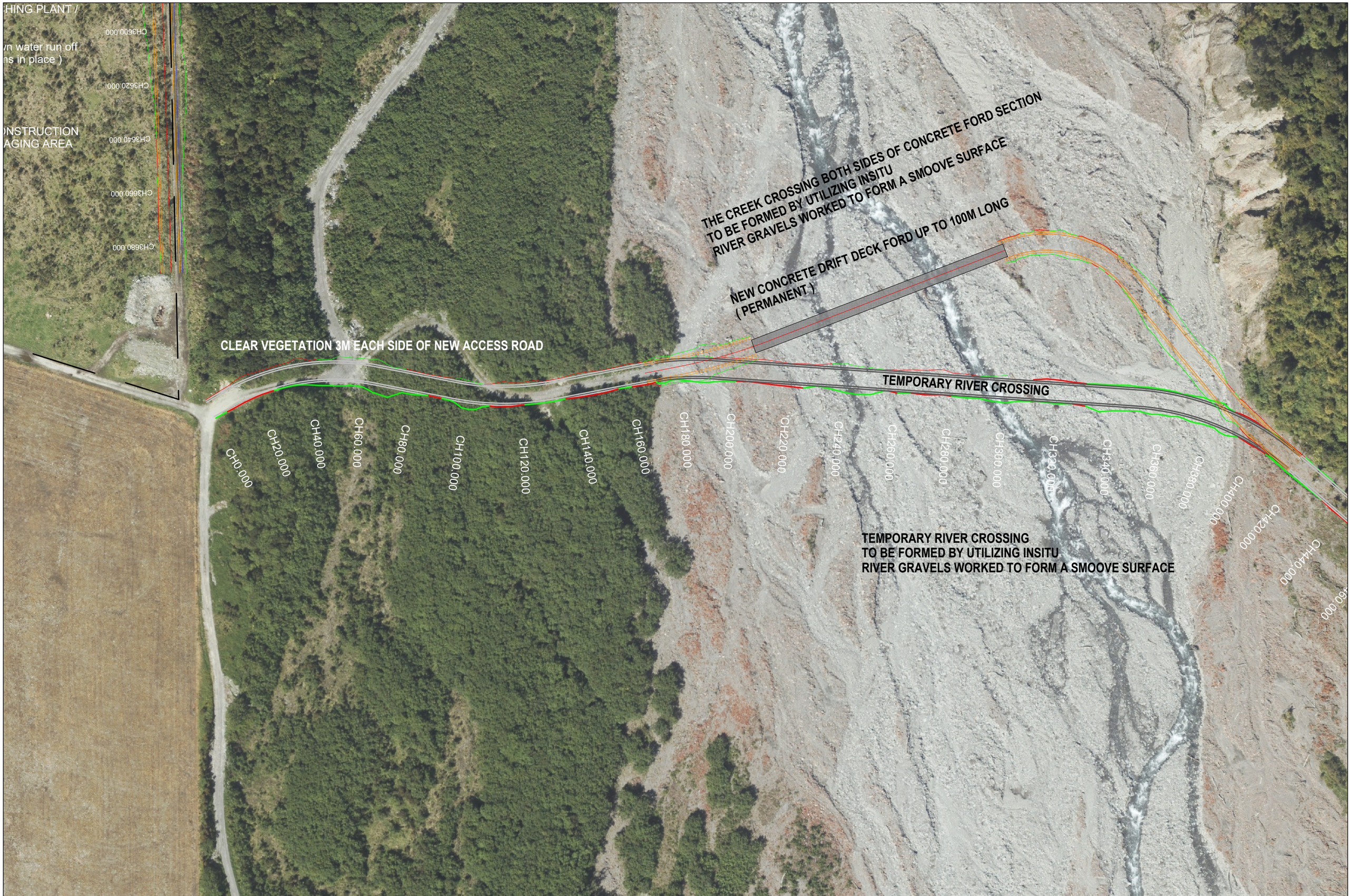
ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT DESCRIPTION:
***** Enter Client Details Here *****
***** Enter Client Details Here *****
***** Enter Client Details Here *****
***** Enter Client Details Here *****

SERVICE DETAIL:
Box Culvert 4000×2000×1550mm
with 225mm Thick Walls
(150 - 1000mm Soil Cover)
Typical Installation Layout and Details

REFERENCE/QUOTE NUMBER:	*****	
DRAWN: R.P. SIGNATURE:	DESIGN: P.L. SIGNATURE:	CHECKED: P.L. SIGNATURE:
SCALE: As Shown PAPER SIZE: A3	Note: Do not scale drawing if in doubt **ASK!!!**	DATE: 06-Dec-18
DRAWING NUMBER: T6992- 3	SHEET NUMBER: 3 of 3	REVISION NUMBER: F

MACGREGOR CREEK CROSSING STRUCTURE



WAITAHA RIVER PROPOSED NEW HYDRO POWER SCHEME WAITAHA RIVER

ACCESS ROAD DESIGN FROM Mac GREGOR CREEK STAGING AREA TO THE NEW POWER HOUSE AREA DESIGN PLAN 1

12d Model

Scale 1:1200

Mon Jun 23 15:03:44 2025

Hynds Driftdeck system

Technical Guide R4.2

Low traffic volumes in forestry areas, national parks etc, often do not warrant expensive bridge structures such as box culverts or large diameter pipes at small river crossings.

Applications

- Low level stream crossings
- Provides raised carriageway access
- Wide shallow opening

Product Attributes

- Durability
- Economical solution to low level crossing
- Minimum interference with low flows
- Large openings allow easy passage of debris at low flows
- Large openings are friendly to the passage of fish

Quality

- ISO 9001:2008 Quality Management

We are the supply partner of choice for New Zealand's rural industry, specialising in water and infrastructure based solutions.

HYNDS RURAL

Low traffic volumes in forestry areas, national parks etc, often do not warrant expensive bridge structures such as box culverts or large diameter pipes at small river crossings.

Often the crossing is a concrete slab which follows the profile of the stream, and provides a running surface for the traffic. Even at low flows these fiords usually have water flowing over the road surface, and safety requirements often do not permit traffic across them.

Raising the running surface by approximately 600mm will considerably reduce the period of time the crossing is closed. The use of a large number of small diameter pipes is not desirable as it obstructs the flow of water and is likely to trap even small debris.

Features

- Durability
- Strength
- Economical solution to low level crossing
- Robust
- Minimum interference with low flows
- Simple to install
- Reduced on-site work
- Large openings allow easy passage of debris at low flows
- Large openings are friendly to the passage of fish

Drift Decks

Drift decks are a simple economical solution to this problem.

The surface is raised typically by 600mm to provide generous openings to allow the passage of water at low flows.

The drift deck comprises a series of inverted “u” shaped precast concrete elements, bearing on a concrete slab. The units extend the full width of a single carriageway, and butt together longitudinally across the stream bed, providing the running surface for the traffic.

Design Considerations

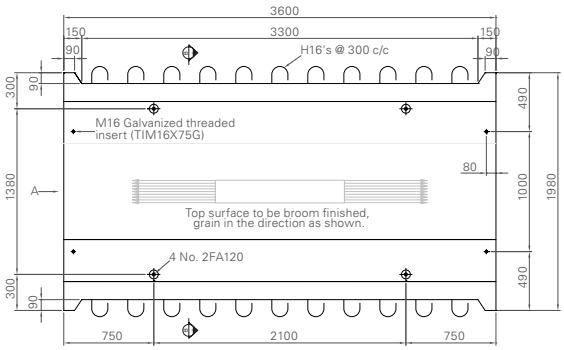
- Units sit on new or existing foundation slab.
- Designed for HN-HO-72 loading configuration.
- Units are designed to be overtopped during periods of high flow.
- Simple joint ensures structural integrity.
- Joint links units longitudinally and to the foundation.
- Castellated ends add to the shear capacity of the joint.
- No in-situ topping is required.
- Geometry of the units eliminates the need for shuttering at the joints.
- The units are held together and fixed to the foundation by means of a simple joint.
- Unit tops have a textured finish for better traction.
- Low mass for easy installation.
- Can be installed to a vertical catenary.

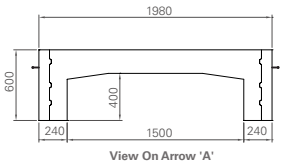
Construction

Construction of a stream crossing using drift deck units is simple.

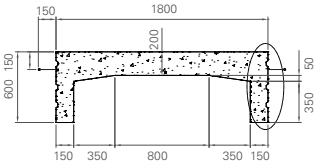
- It is necessary to have a suitable foundation slab, either existing or new.
- Level bearing pads are constructed at the appropriate locations to suit the drift deck units and dowel holes are drilled at each joint location (note: it is important that the units sit on the bearing pads without any twist).
- Drift deck units are placed at the correct centres, by Hiab truck.
- The edges of the units are aligned, dowel bars are inserted into the pre-drilled holes and grouted.
- Dowel bars fit into the 'U' shaped bars at the ends of the units and are bent over prior to concreting of the joint.
- Joint is concreted (shuttering is not required for concreting the joint).
- Deck is completed by the fixing of timber kerbing.
- Once the joint concrete is cured, the crossing is ready for traffic.

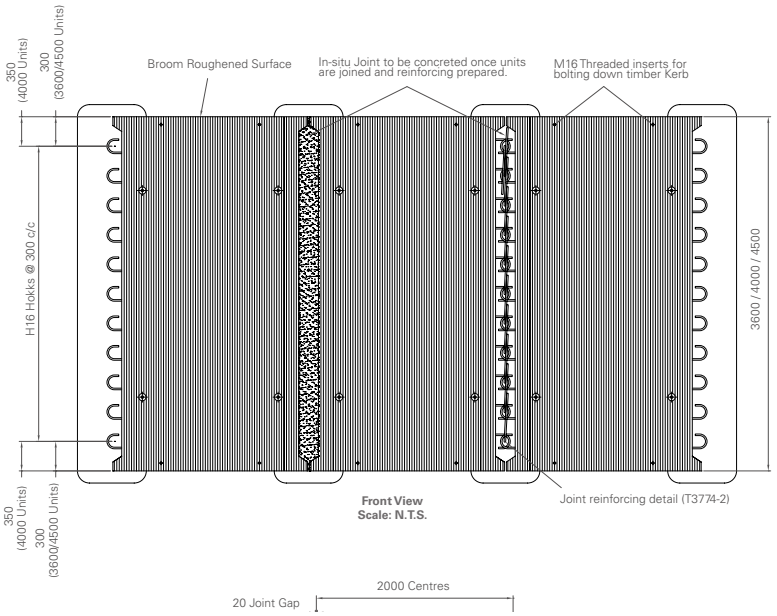
Product Code	Overall Width	Clearing Between Kerbs	Weight
DRIFTDECK3600	3600mm	3270mm	4600kg
DRIFTDECK4000	4000mm	3670mm	5200kg
DRIFTDECK4500	4500mm	4170mm	5800kg

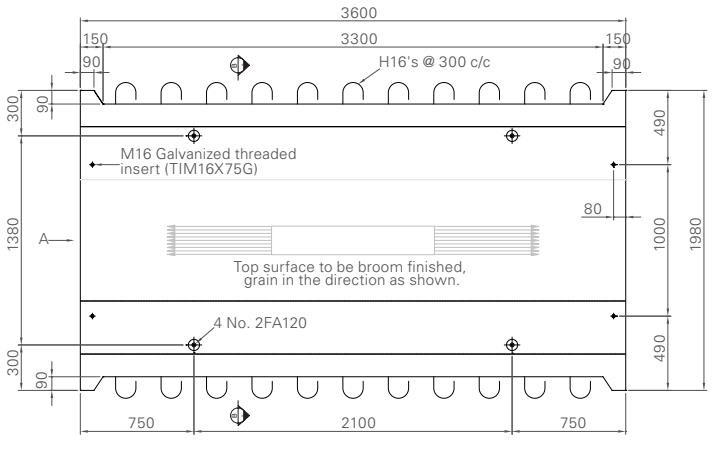


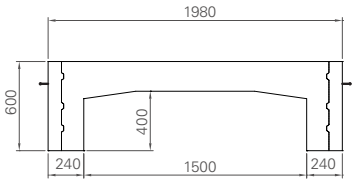


View On Arrow 'A'

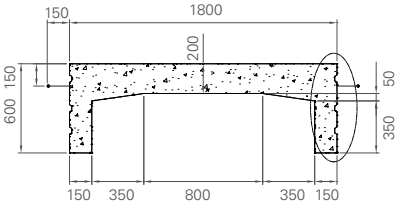


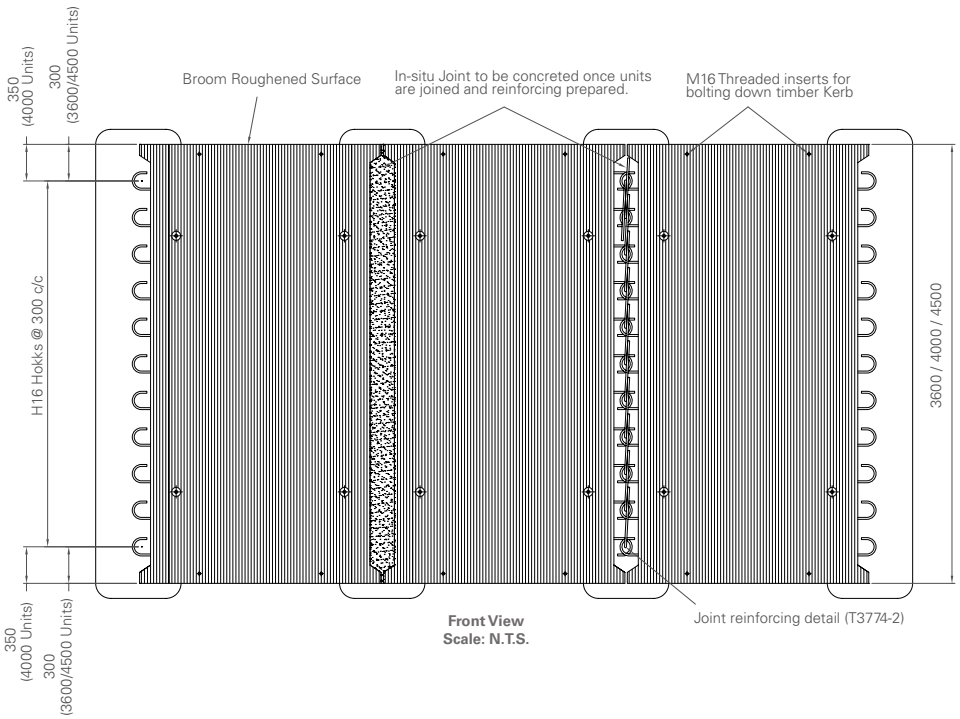




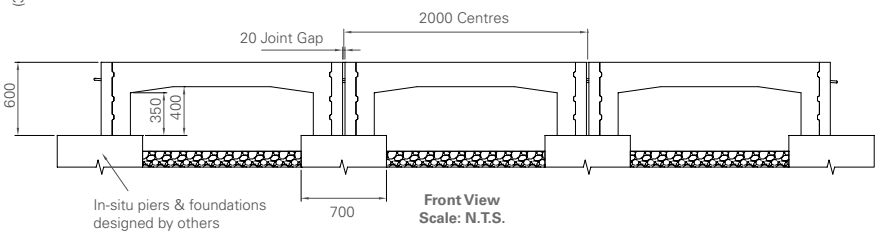


View On Arrow 'A'

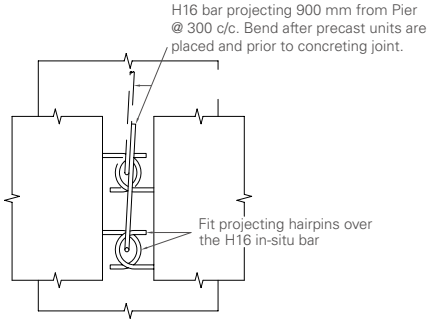




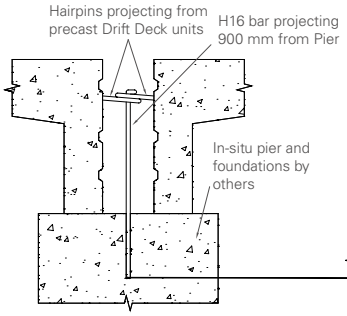
Front View
Scale: N.T.S.



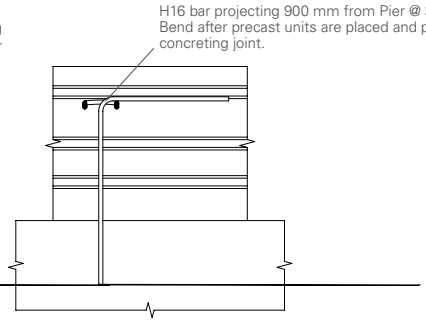
Front View
Scale: N.T.S.



Joint Reinforcing Plan
Scale: NTS



Joint Reinforcing Detail
Scale: NTS



Joint Reinforcing Section
Scale: NTS

Lifting and Handling

All Hynds Driftdeck systems incorporate Swiftlift lifting anchors for safe lifting and must be used with the correct lifting clutch.

Hynds Pipe Systems has designed and manufactured Driftdeck systems with a minimum dynamic factor of 1.2. This dynamic factor requires that all the following conditions are observed when lifting, moving or placing the units:

1. Lifting with mobile plant *(such as an excavator or similar)* where equipment is specifically exempt from the requirements of the PECPR Regulations 1999, subject to the conditions outlined in the New Zealand Gazette, No. 104, September 2015 and
2. Lifting, travelling and placing over rough or uneven ground where anchor failure is not anticipated to cause harm or injury, by adopting procedures such as:
   a. Transporting the element as close as practical to ground level (300mm recommended)
   b. Establishing and maintaining exclusion zones
   c. Transporting only precast concrete elements that are unlikely to topple if they were to hit the ground
   d. Inspecting lifting anchors both after transportation and before final lifting into place

Refer to "Safe work with precast concrete - Handling, transportation and erection of precast concrete elements" published by Worksafe New Zealand (October 2018)

Shock loads resulting from travelling with suspended Driftdeck systems over rough terrain and uneven ground may exceed design, dynamic and safety factors of the lifting systems. It is essential that care is taken during lifting and transporting as additional stresses could result in anchor failure.

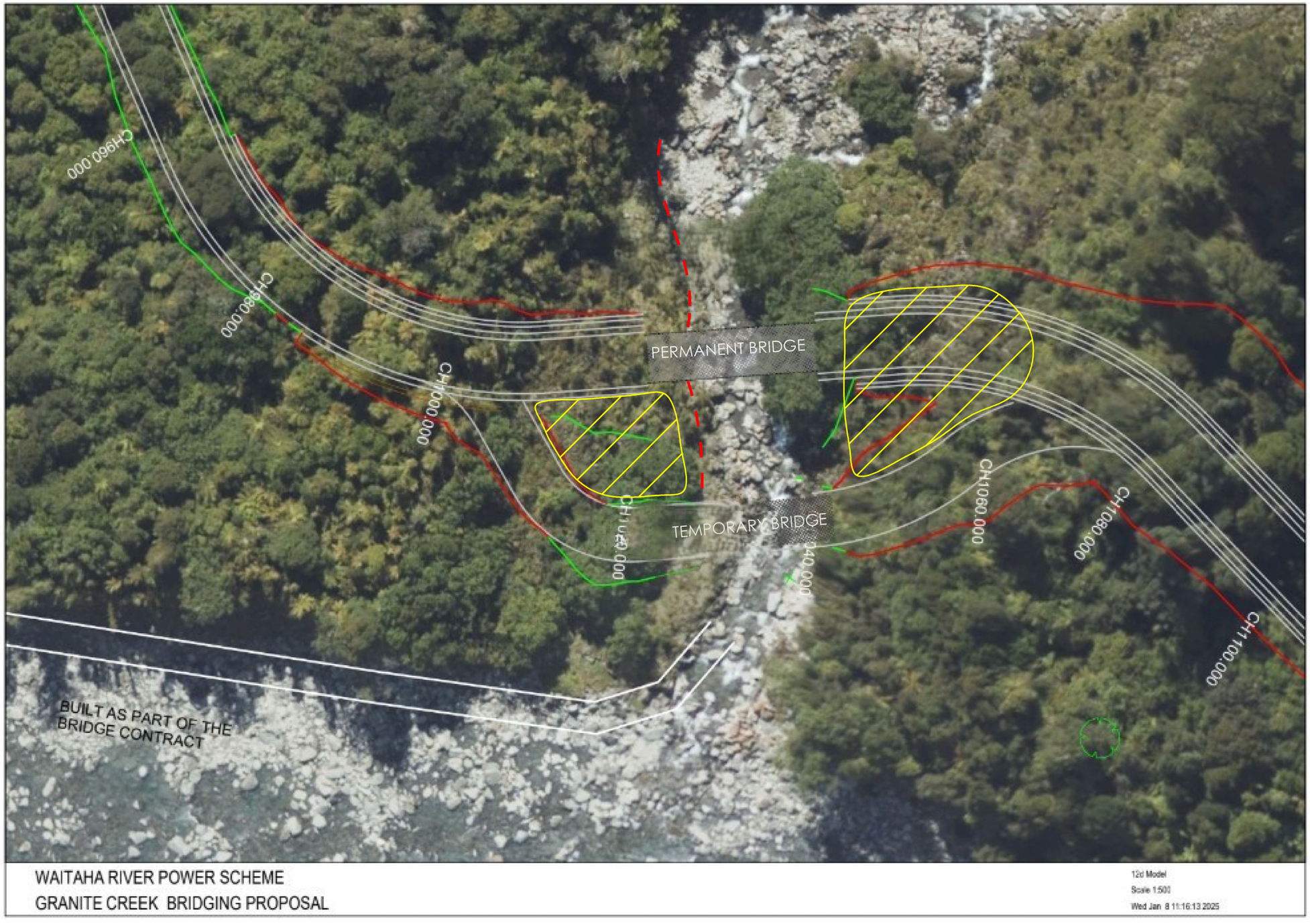
Branches Nationwide *Support Office & Technical Services 09 274 0316*

GRANITE CREEK BRIDGE STRUCTURE

Area map and approximate bridge location

CONCEPT ONLY

SBH				TITLE:	Proposed Bridge (Concept)
				PROJECT:	Waitaha Hydro Project
REVISION		DATE	23/01/2025		
DESIGNED		DRAWN	MS	MATERIAL:	DWG NO. 842-1 A3
JOB No.	1842			FINISH:	
CHECKED		ALL DIMENSIONS IN MILLIMETERS		WEIGHT: Kg	DO NOT SCALE DRAWING
CLIENT	Westpower				SHEET 1 OF 10



Temporary laydown areas.
To be removed, along with the temporary bridge on completion of the main bridge.

Rock armour - Source from existing creek bed

CONCEPT ONLY

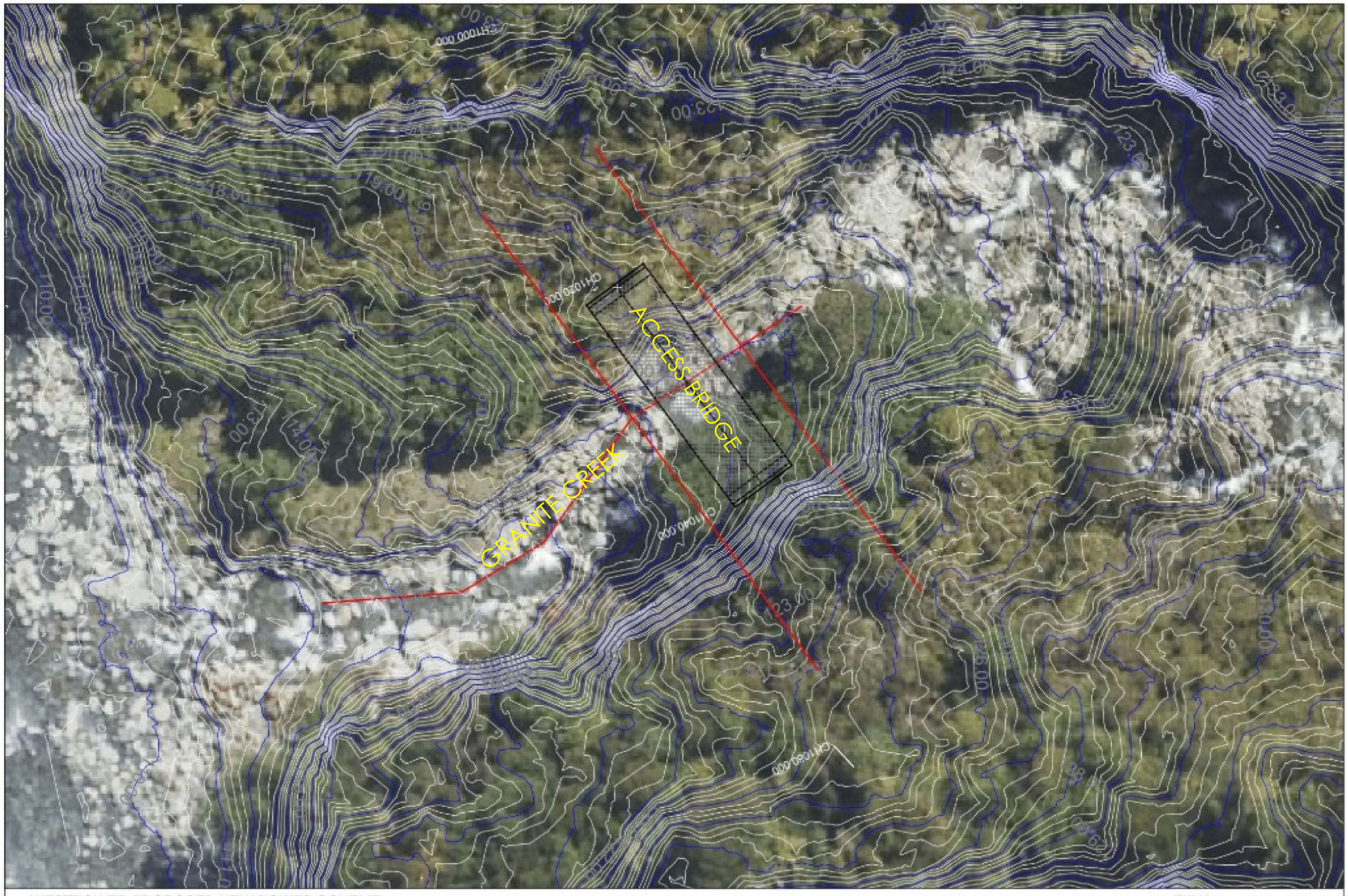
SBH				TITLE:	Proposed Bridge (Concept)
				PROJECT:	Waitaha Hydro Project
REVISION		DATE	23/01/2025	MATERIAL:	DWG NO. -2 A3
DESIGNED		DRAWN	MS	FINISH:	
JOB No.	1842				
CHECKED		ALL DIMENSIONS IN MILLIMETERS		WEIGHT: Kg	DO NOT SCALE DRAWING
CLIENT	Westpower				SHEET 2 OF 10

Upstream side of Granite Creek at confluence with Waitata River

Downstream side of Granite Creek at confluence with Waitaha River

CONCEPT ONLY

SBH				TITLE:	Proposed Bridge (Concept)
				PROJECT:	Waitaha Hydro Project
REVISION		DATE	23/01/2025		
DESIGNED		DRAWN	MS	MATERIAL:	DWG NO. -3 A3
JOB No.	1842			FINISH:	
CHECKED		ALL DIMENSIONS IN MILLIMETERS		WEIGHT: Kg	DO NOT SCALE DRAWING
CLIENT	Westpower				SHEET 3 OF 10



WESTPOWER PROPOSED NEW POWER SCHEME

WAITAHA RIVER GRANITE CREEK NEW BRIDGE SITE CONTOUR PLAN

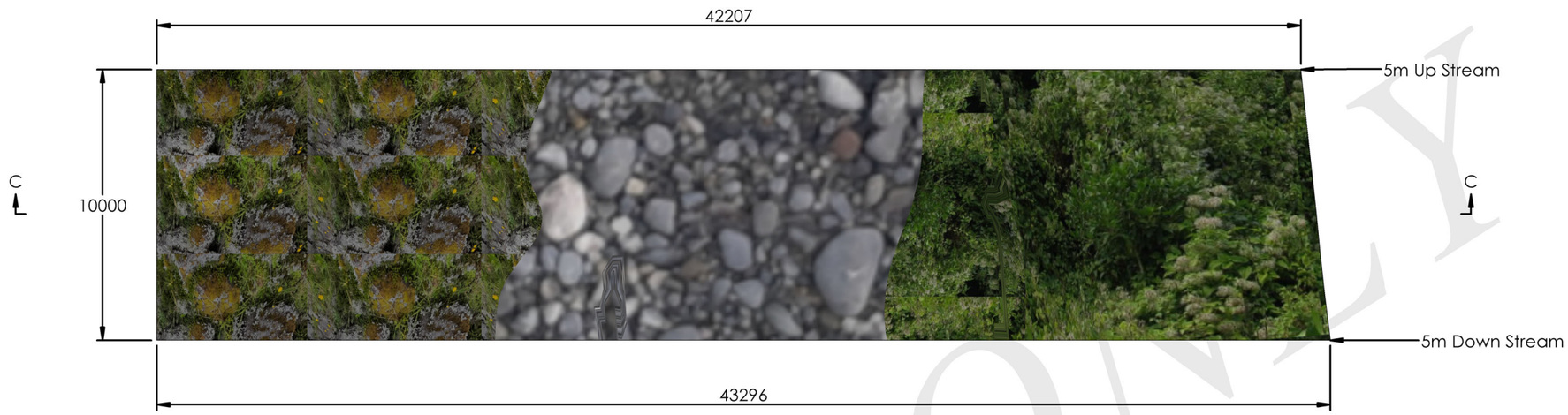
12d Model
Scale 1:250
Tue Dec 31 11:04:49 2024

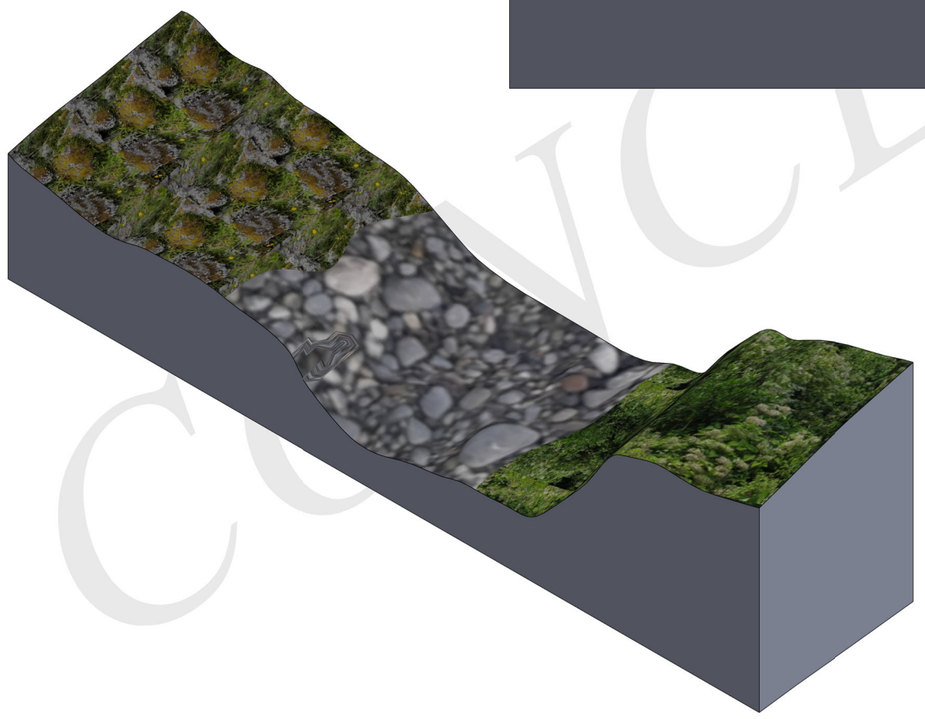
Note. Temporary bridge to be constructed downstream of Access Bridge location.
Design of which is to be confirmed

EPT ONLY

SBH				TITLE:	Proposed Bridge (Concept)	
				PROJECT:	Waitaha Hydro Project	
REVISION		DATE	23/01/2025			
DESIGNED		DRAWN	MS	MATERIAL:	DWG NO. 842-4	A3
JOB No.	1842			FINISH:		
CHECKED		ALL DIMENSIONS IN MILLIMETERS		WEIGHT: Kg	DO NOT SCALE DRAWING	
CLIENT	Westpower					SHEET 4 OF 10

C:\Users\msherrat\Desktop\Waitaha Hydro Project\5 span Bridge (1138x900x18m)



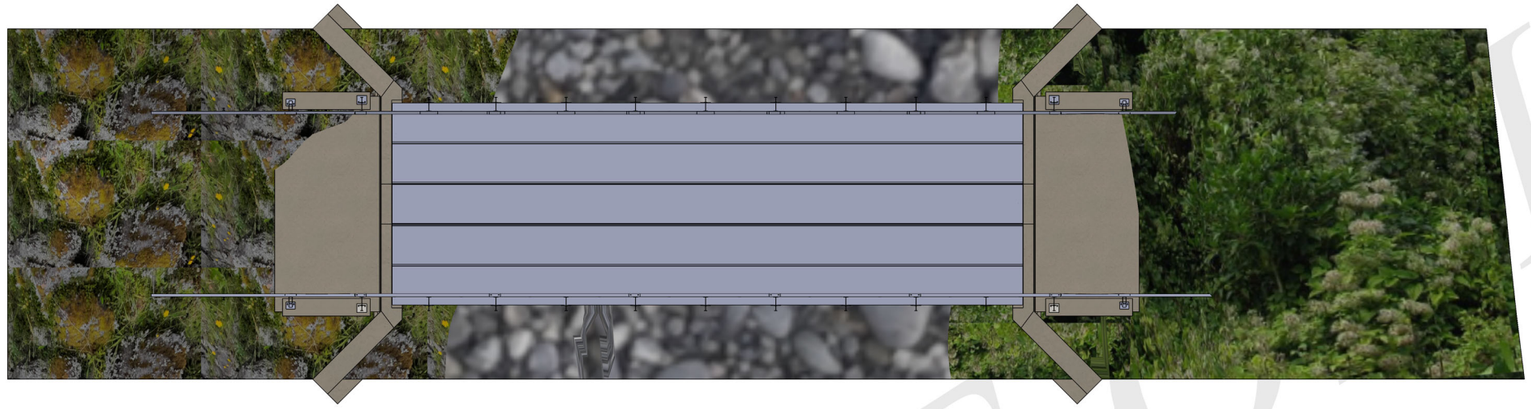


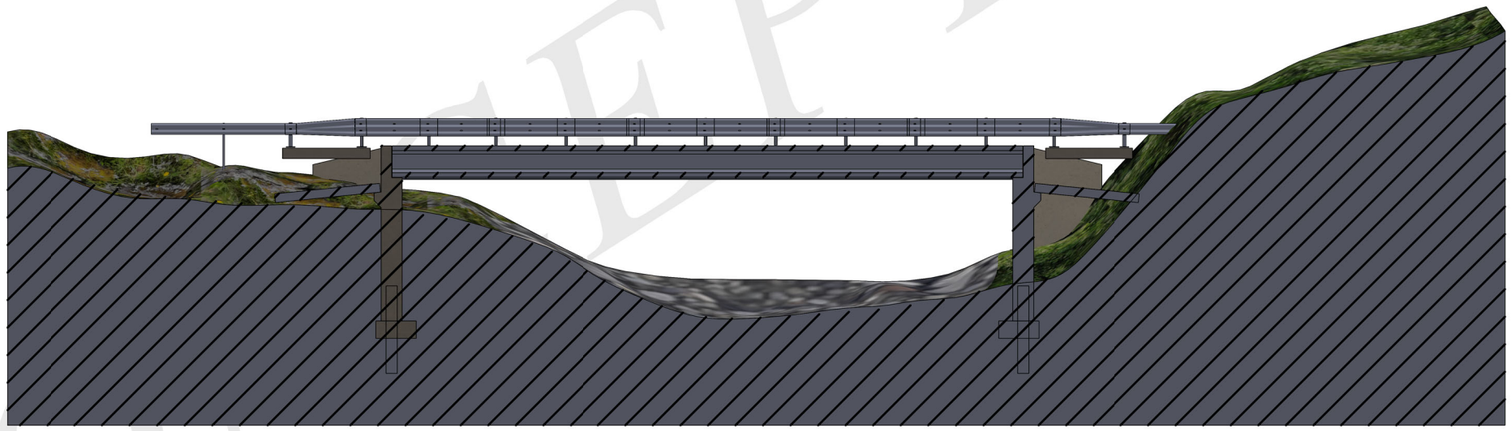
SECTION C-C
(Bridge Centre Line as per G.Whylde survey)

CONCEPT ONLY

SBH				TITLE:	Proposed Bridge (Concept)
				PROJECT:	Waitaha Hydro Project
REVISION		DATE	23/01/2025		
DESIGNED		DRAWN	MS	MATERIAL:	DWG NO. 842-5 A3
JOB No.	1842			FINISH:	
CHECKED		ALL DIMENSIONS IN MILLIMETERS		WEIGHT: Kg	DO NOT SCALE DRAWING
CLIENT	Westpower				SHEET 5 OF 10

Note.
Bridge is situated on the centre line of the supplied survey. Final location TBC.
Height, Length and location along the Centre line TBC.



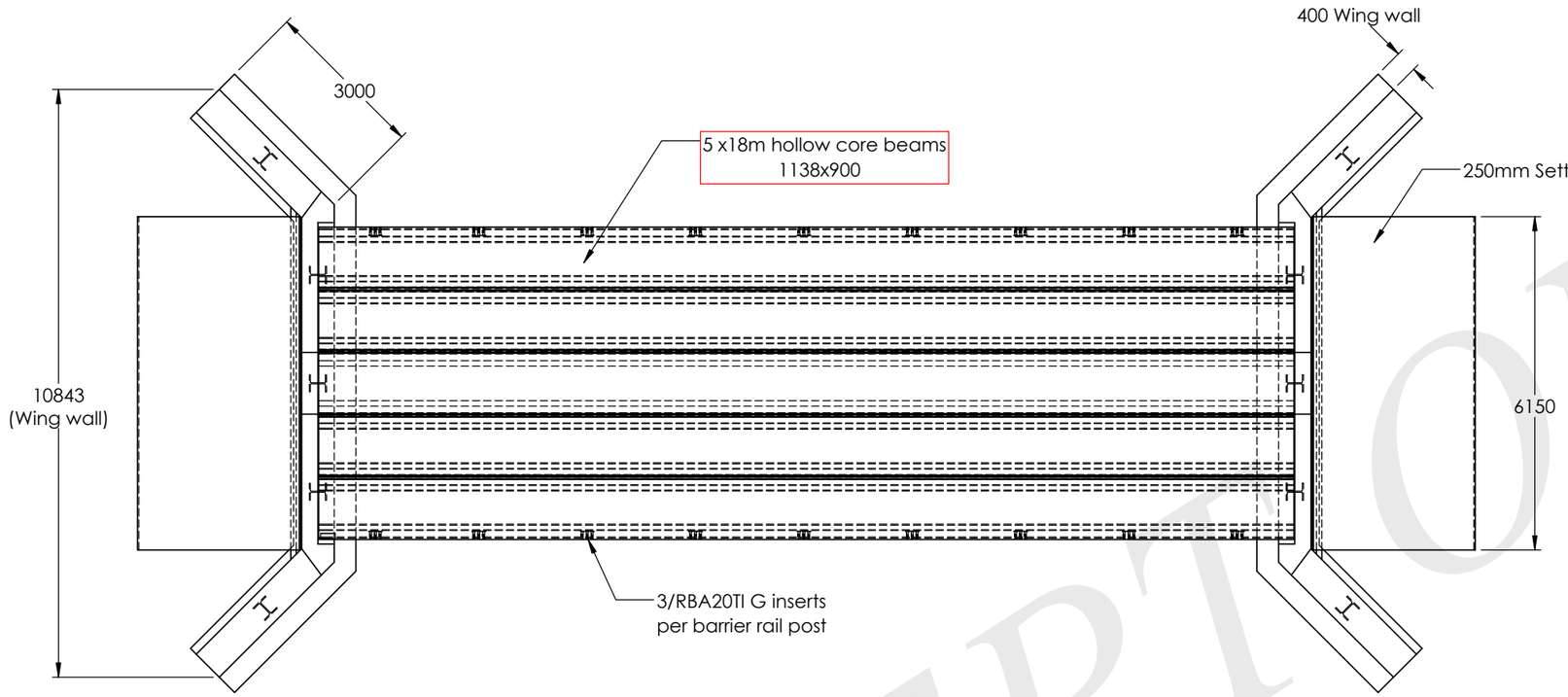


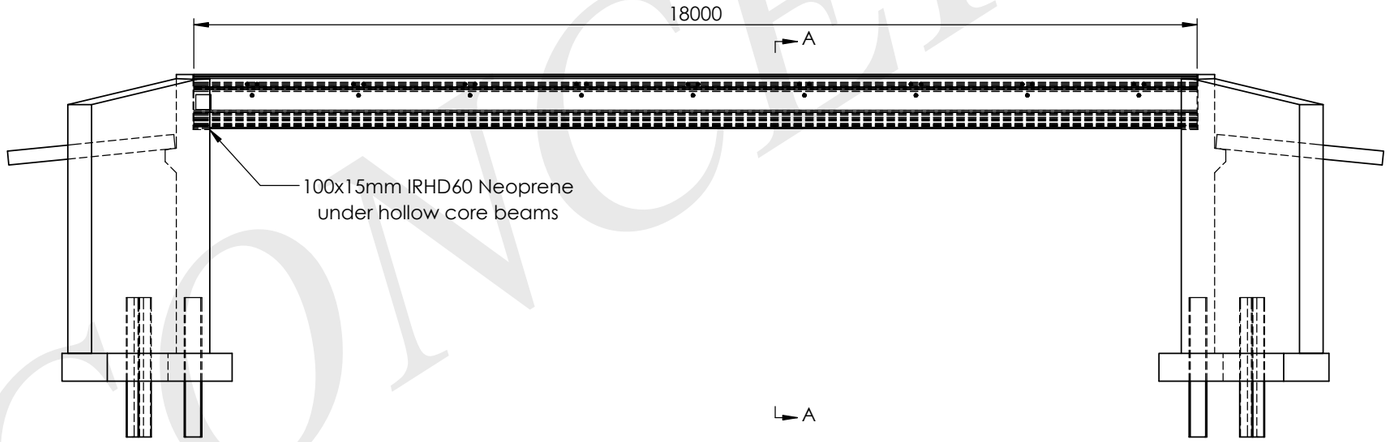
SECTION F-F

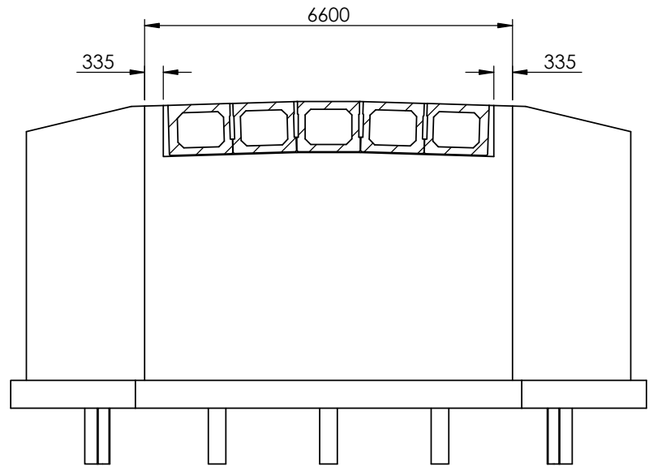
CONCEPT ONLY

SBH				TITLE:	Proposed Bridge (Concept)
				PROJECT:	Waitaha Hydro Project
REVISION		DATE	23/01/2025		
DESIGNED		DRAWN	MS	MATERIAL:	DWG NO. 842-6 A3
JOB No.	1842			FINISH:	
CHECKED		ALL DIMENSIONS IN MILLIMETERS		WEIGHT: Kg	DO NOT SCALE DRAWING
CLIENT	Westpower				SHEET 6 OF 10

HN/NO Loading



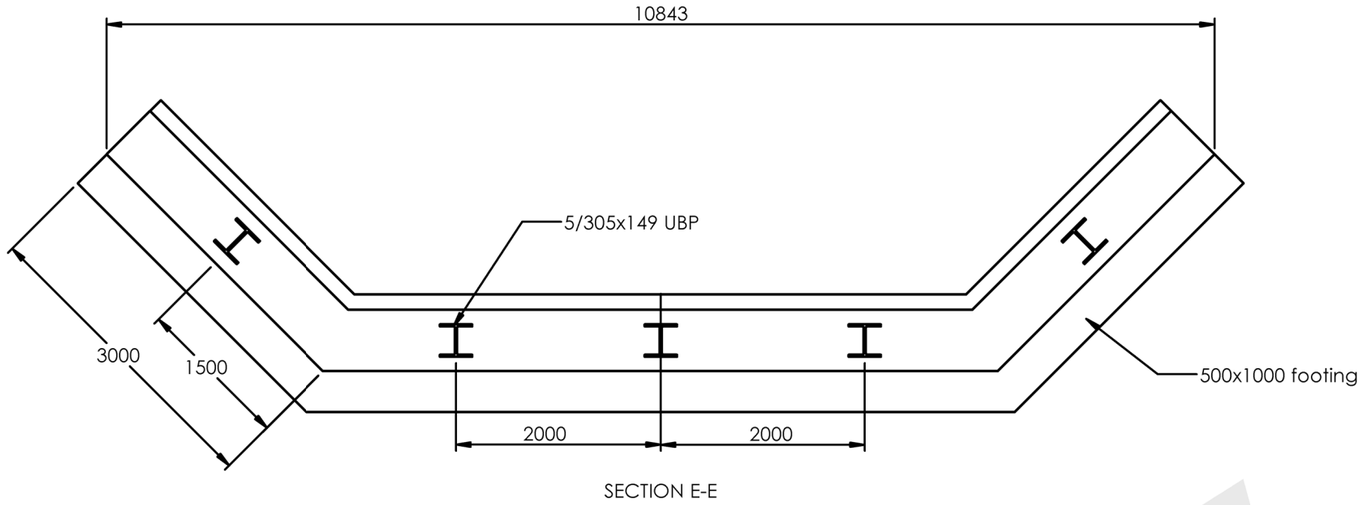




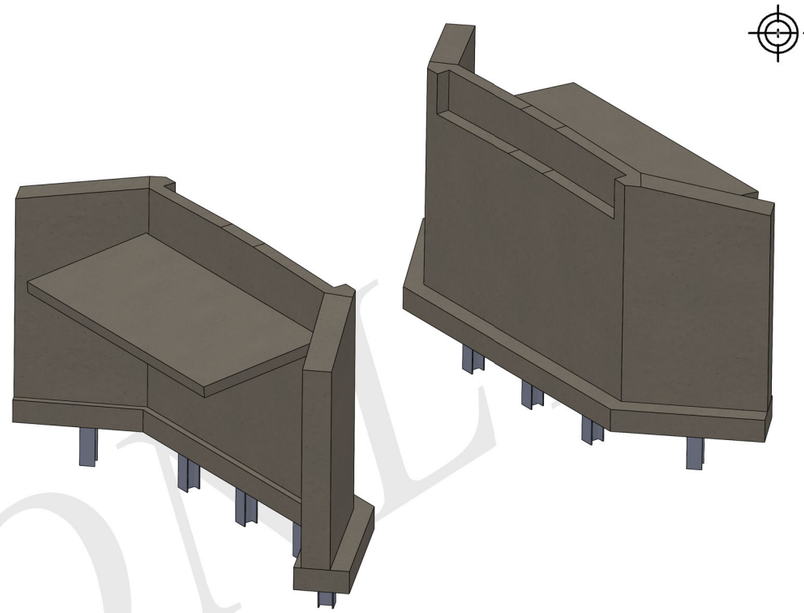
SECTION A-A

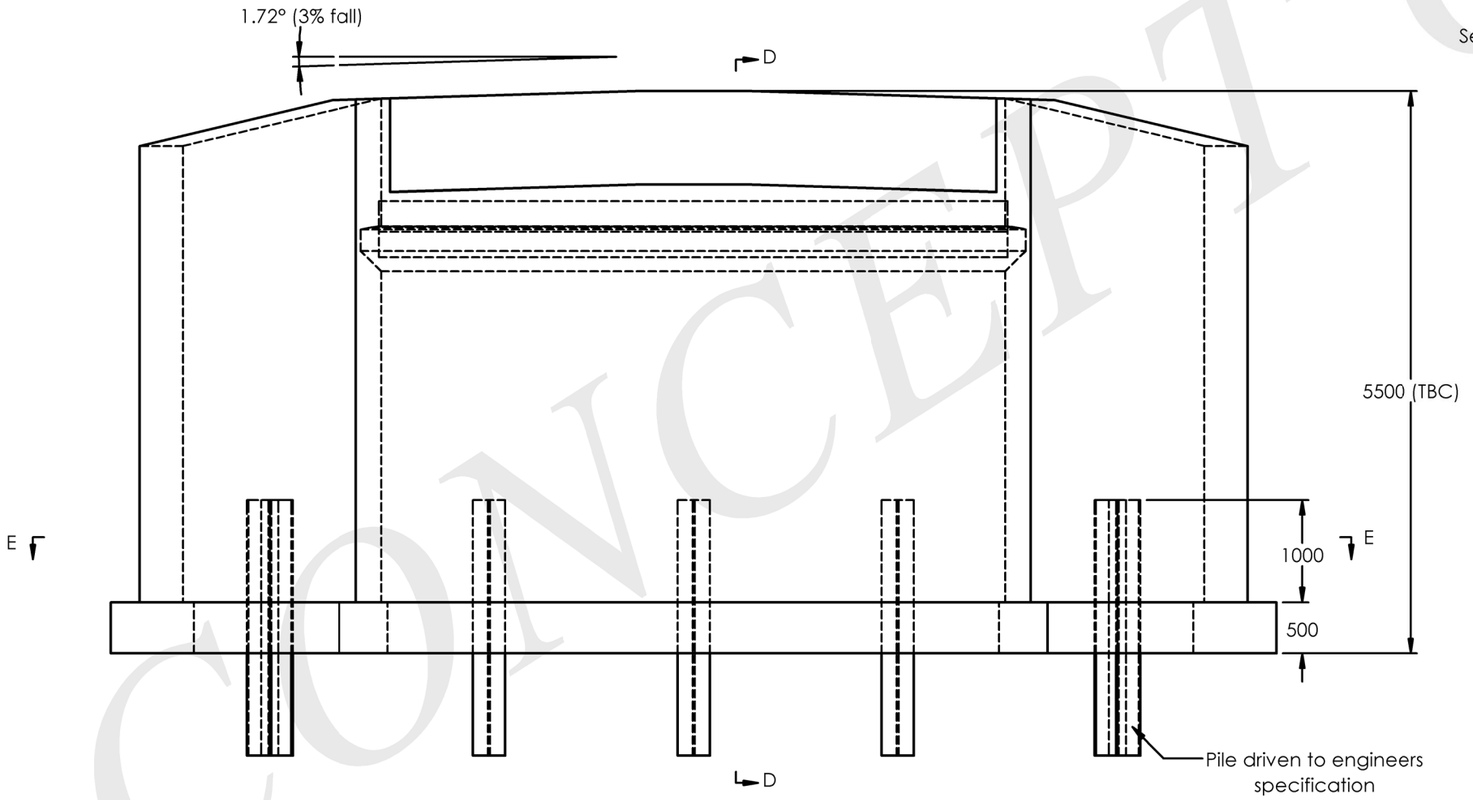
CONCEPT ONLY

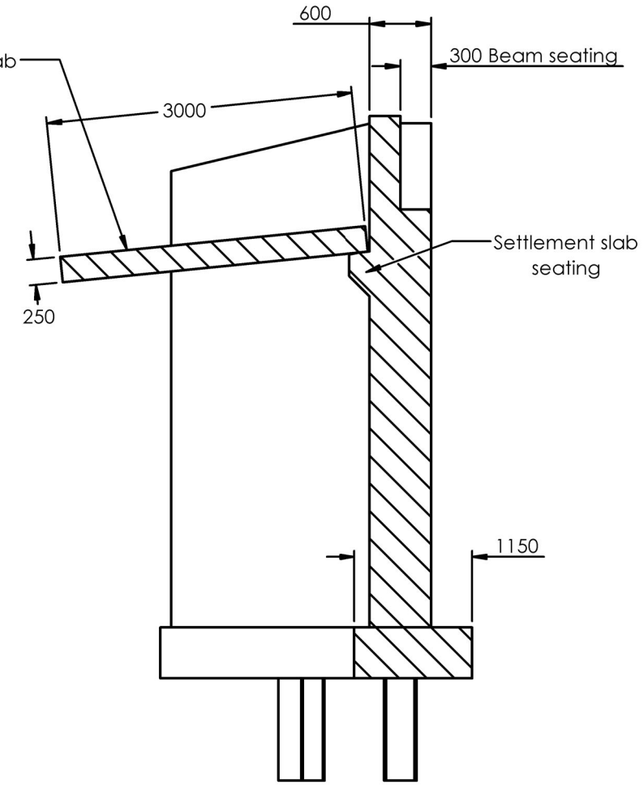
SBH				TITLE:	Proposed Bridge (Concept)
				PROJECT:	Waitaha Hydro Project
REVISION		DATE	23/01/2025	MATERIAL:	DWG NO. 842-7 A3
DESIGNED		DRAWN	MS	FINISH:	
JOB No.	1842			WEIGHT: Kg	DO NOT SCALE DRAWING
CHECKED		ALL DIMENSIONS IN MILLIMETERS			
CLIENT	Westpower				SHEET 7 OF 10



SECTION E-E







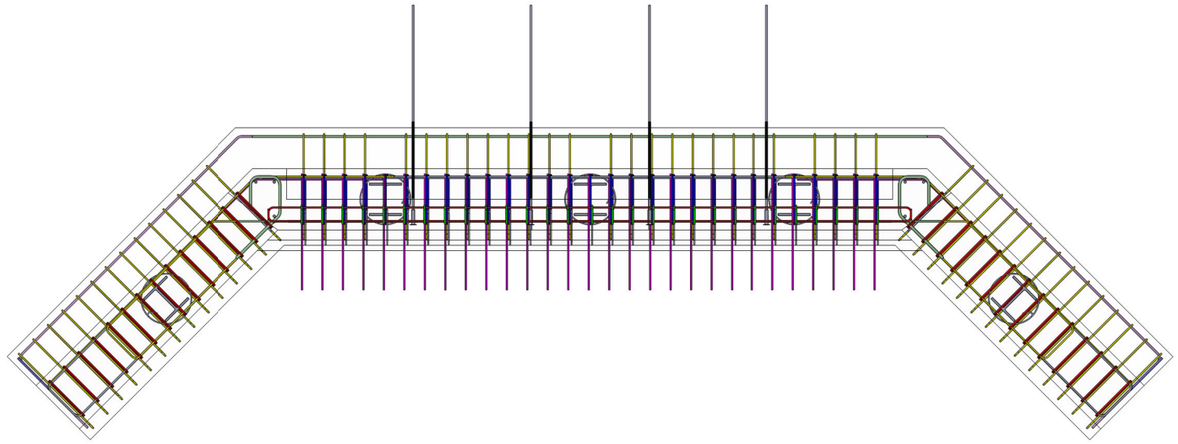
SECTION D-D

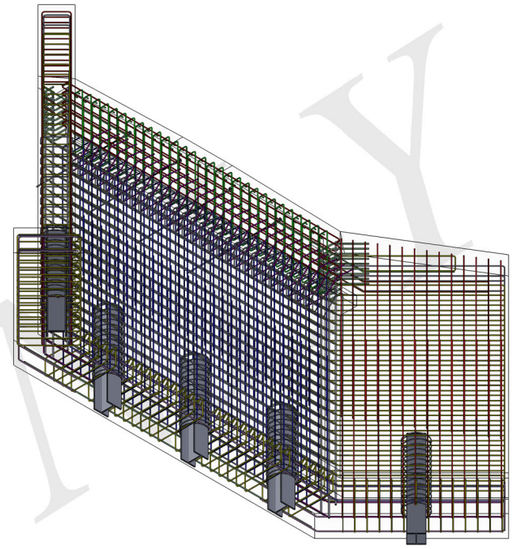
CONCEPT ONLY

SBH				TITLE:	Proposed Bridge (Concept)
				PROJECT:	Waitaha Hydro Project
REVISION		DATE	23/01/2025	MATERIAL:	DWG NO. 842-8 A3
DESIGNED		DRAWN	MS	FINISH:	
JOB No.	1842			WEIGHT: Kg	DO NOT SCALE DRAWING
CHECKED		ALL DIMENSIONS IN MILLIMETERS			
CLIENT	Westpower				SHEET 8 OF 10

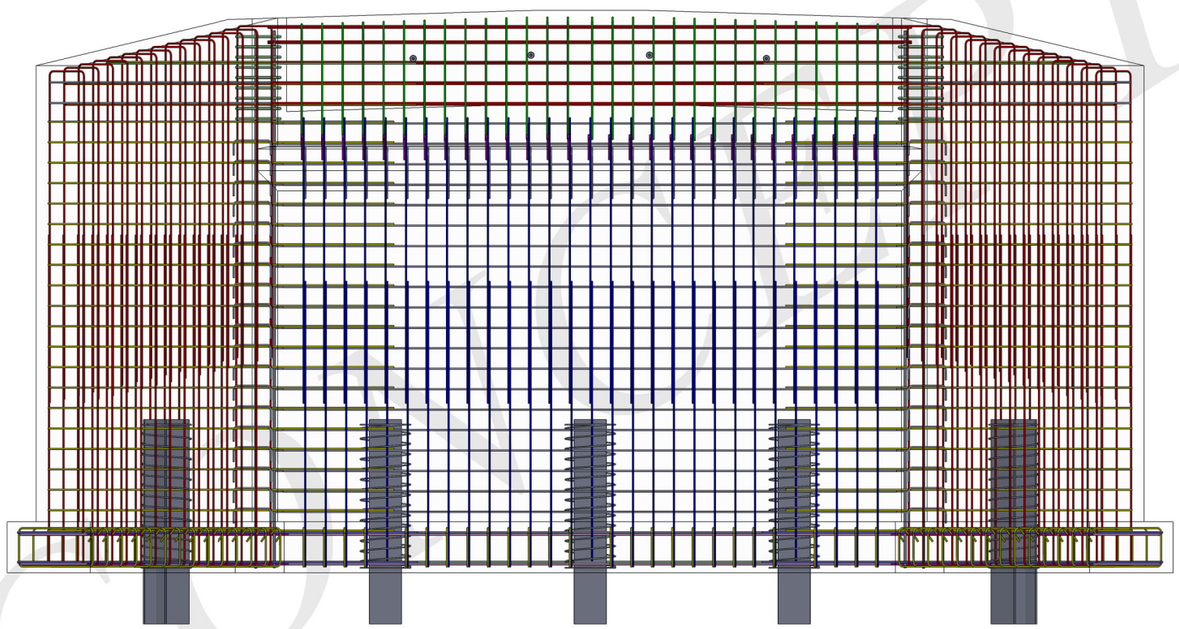
PRELIMINARY REINFORCING

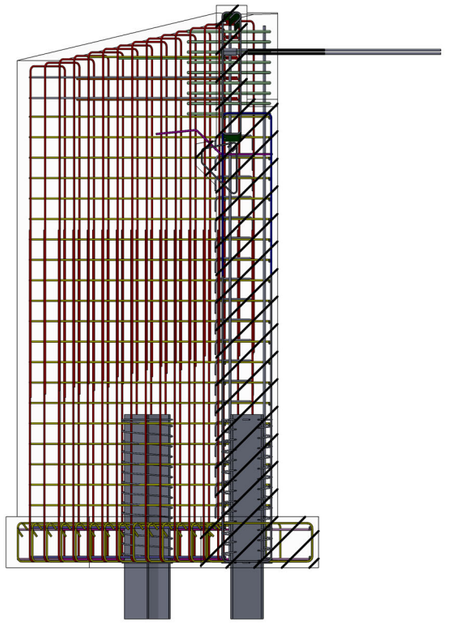
Note. Reinforcing design will be completed after dimensions are confirmed.





G





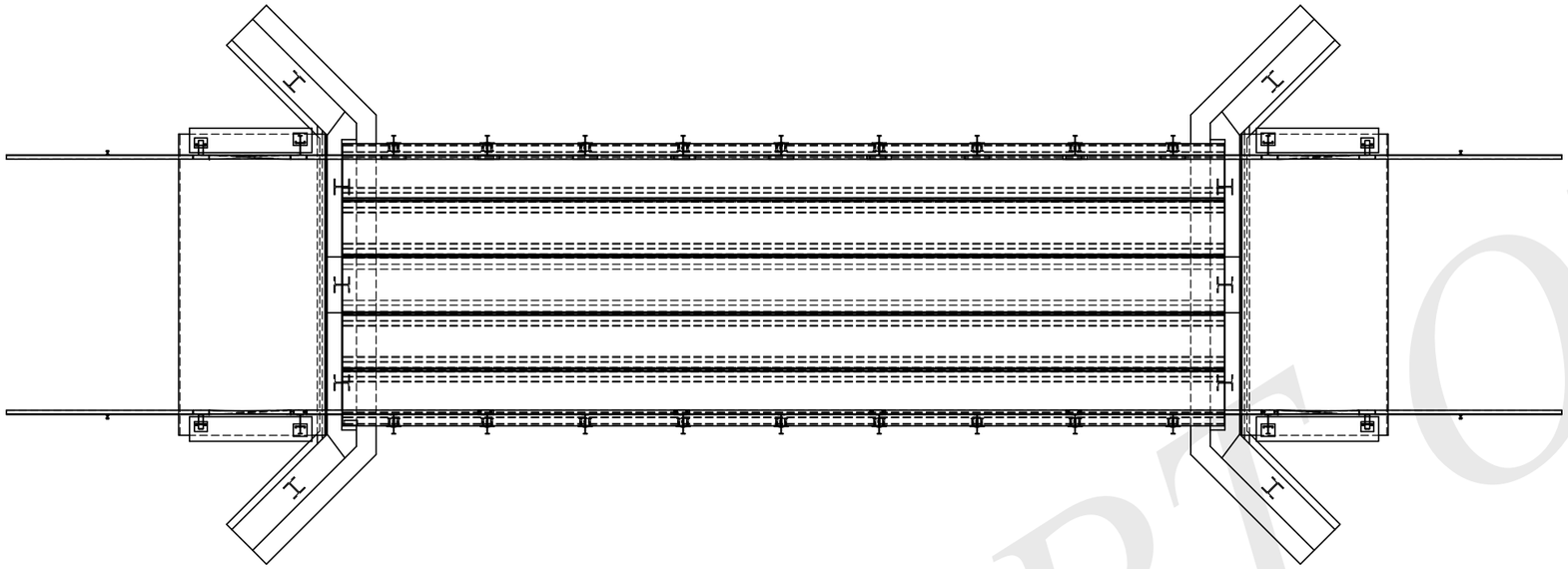
G

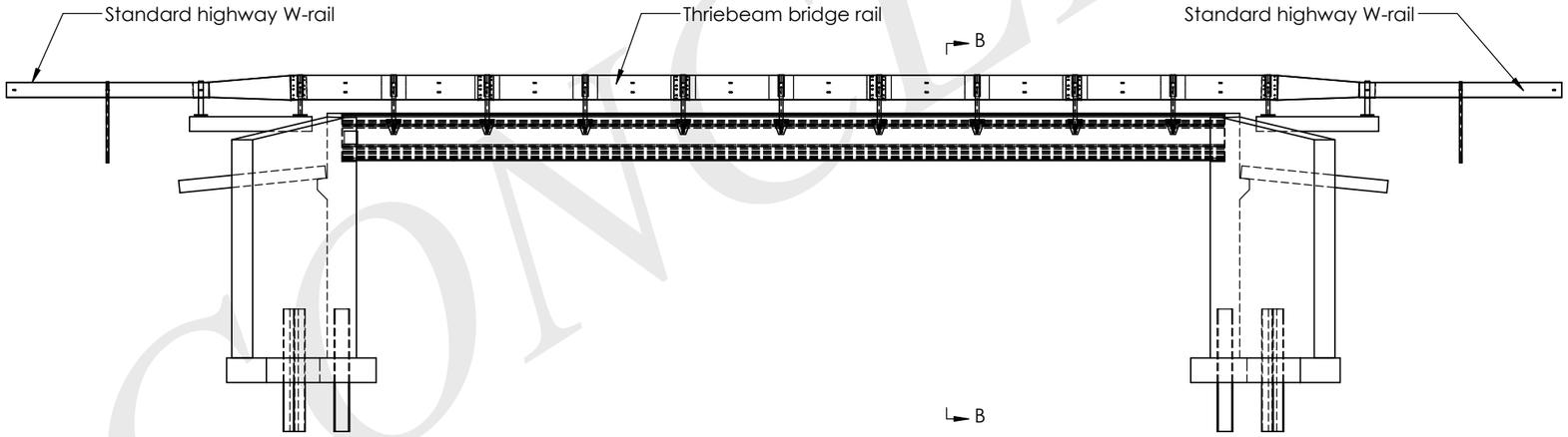
SECTION G-G

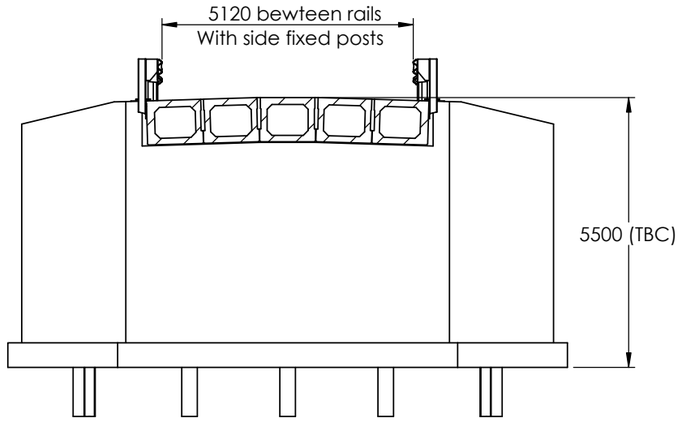
CONCEPT ONLY

SBH				TITLE:	Proposed Bridge (Concept)
				PROJECT:	Waitaha Hydro Project
REVISION		DATE	23/01/2025	MATERIAL:	DWG NO. -9 A3
DESIGNED		DRAWN	MS	FINISH:	
JOB No.	1842			WEIGHT: Kg	DO NOT SCALE DRAWING
CHECKED		ALL DIMENSIONS IN MILLIMETERS			
CLIENT	Westpower				SHEET 9 OF 10

HN/NO Loading





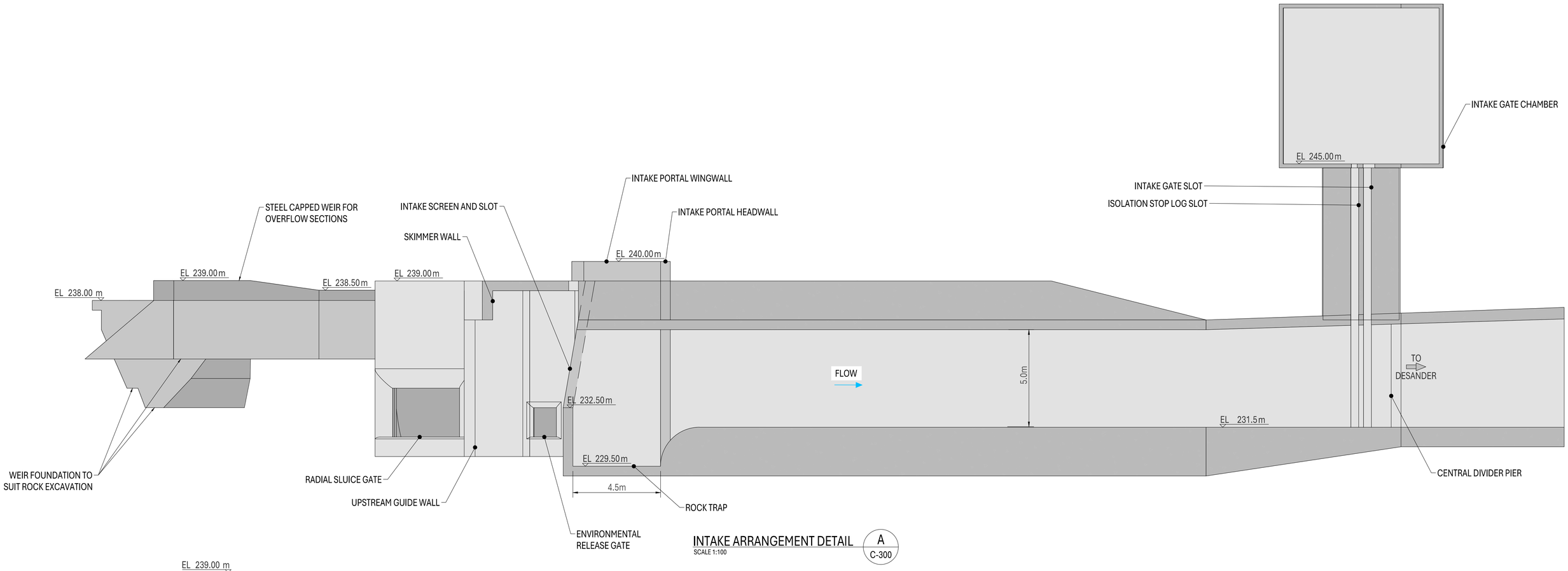


SECTION B-B

CONCEPT ONLY

SBH				TITLE:	Proposed Bridge (Concept)
				PROJECT:	Waitaha Hydro Project
REVISION		DATE	23/01/2025	MATERIAL:	DWG NO. 842-10 A3
DESIGNED		DRAWN	MS	FINISH:	
JOB No.	1842			WEIGHT: Kg	DO NOT SCALE DRAWING
CHECKED		ALL DIMENSIONS IN MILLIMETERS			
CLIENT	Westpower				SHEET 10 OF 10

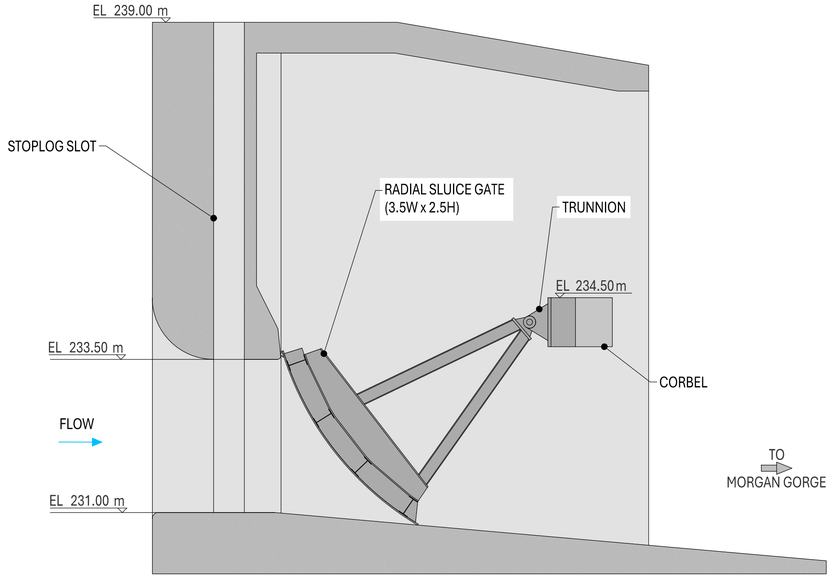
HEADWORKS DIVERSION WEIR STRUCTURE



INTAKE ARRANGEMENT DETAIL

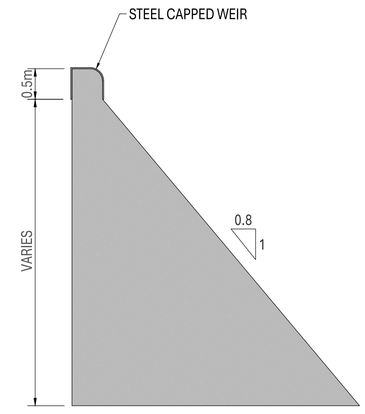
SCALE 1:100

A
C-300



SECTION THROUGH SLUICE GATE CHAMBER

SCALE 1:50



TYPICAL WEIR SECTION

SCALE 1:50

Drawing File Location: D:\Australian Hydropower\PROJECT - External - Documents\General\Waitaha\02_Drawings\WHP-LS-DETAILS.dwg

DESIGNER: AusHydro

CLIENT: Westpower

DATE PLOTTED	Thursday, 24 July 2025
DRAWN BY	KBA
DESIGN ENGINEER	WWW
LEAD ENGINEER	DC
PROJECT MANAGER	JKJ

WAITAHA HYDROPOWER PROJECT
PRELIMINARY DESIGN
HEADWORKS GENERAL ARRANGEMENT
SECTION AND DETAILS

DRAWING NUMBER WP-WTH-C-310 REVISION E

SCALE BARS @ A1

0 0.5 1 1.5 2 2.5
1:50
0 1.0 2.0 3.0 4.0 5.0
1:100

REV	REVISION DESCRIPTION	APPROVED	DATE
A	FOR CLIENT REVIEW	JKJ	4/11/2024
B	UPDATED DESIGN FOR CLIENT REVIEW	JKJ	20/12/2024
C	CONCEPT DESIGN - PREFERRED ARRANGEMENT	JKJ	17/01/2024
D	PRELIMINARY DESIGN - FOR INFORMATION	JKJ	02/05/2025
E	PRELIMINARY DESIGN - MINOR CORRECTION	JKJ	24/07/2025