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Bridge Footing Design Emm Brook Restoration

Footbridge Approval in Principle

South East Rivers Trust

Document no: A120099-TGEE-M0-XX-RP-C-0001

Revision: P01 Date: 17/06/2022

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Document Issue Record

Project:	Bridge Footing Design Emm Brook Restoration
Report Title:	Footbridge Approval in Principle
Client:	South East Rivers Trust
Document No:	A120099-TGEE-M0-XX-RP-C-0001
Revision:	P01
Status	S0 - Initial status / work in progress
Date:	17/06/2022
Filename:	A120099-TGEE-ZZ-XX-RP-C-0001 Rev01

Rev	Date	Description and Purpose of Issue	Prepared	Reviewed	Approved

Issuing Office: **Tel:** **Email:**	

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Introduction

Tony Gee and Partners (TG) has been appointed by South East Rivers Trust (SERT) to undertake the design of the foundations associated with the proposed 2No. new footbridges and flood control structure over the channel reinstatement at Emm Brook, Woosehill, Wokingham. The new channel aims to reinstate a historic channel east of the current water course to improve fish passage and restore the watercourse to its original natural state. Two new footbridges are required to maintain public access along existing rights of way for pedestrian traffic. In addition, a flow control device shall be affixed to the southern bridge foundation.

This AIP is based on DMRB CG300 Appendix A. Model form of Approval in Principle for the design of bridges and other highway structures where UK National Standards (Eurocodes) are used.

1. Highway Details

1.1. Type of Highway

Not applicable.

1.2. Permitted traffic speed

Not applicable.

1.3. Existing restrictions

The new bridges and footings are to be installed across a newly dug bypass channel. Access for the bridge footing construction will be via land from the north.

Existing restrictions:

- A 15m root protection zone around the existing oak located south of southern bridge.
- No works within 500mm exclusion zone around the foul sewer located to the north of the southern bridge.

2. Site Details

The location of the two bridges is indicated in Figure 1.

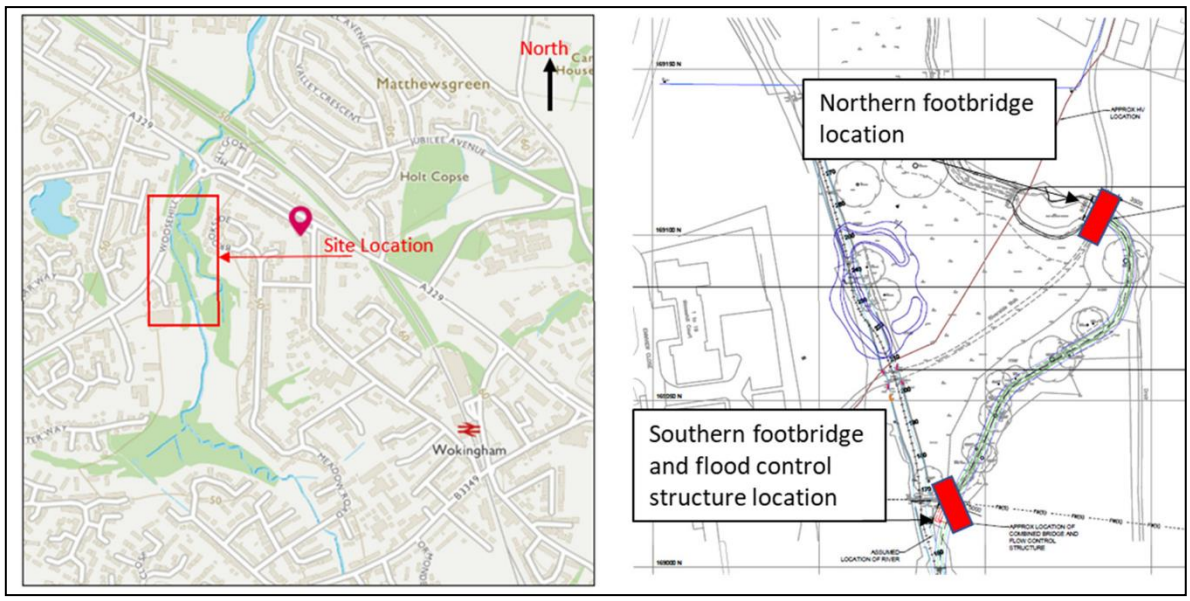

Figure 1. Approximate location of bridges

The northern bridge is proposed to replace an existing piped culvert crossing of the former channel located at NGR: SU 7993769107.

The southern bridge and flood control structure are proposed to cross the new section of bypass channel located at NGR: SU 79891 68998.

2.1. Obstacles crossed

The northern and southern bridges and flood control structure will cross the newly dug bypass channel.

The regrade of the footpath to the north of the south bridge shall require interfacing with the existing foul sewer and levels shall be such that there is no reduction in cover to the existing pipe.

3. Proposed Structure

3.1. Description of structure and design working life

The northern bridge consists of a steel/timber composite footbridge with a 6.8m span and clear width of 3.5m. The foundations shall be a reinforced concrete L-wall with associated wing walls.

The southern bridge consists of a steel/timber composite structure with an approx. 9.7m skew span and clear width of 3.5m. The bridge structure shall have skew ends to minimise the span across the channel with the foundations, orientated to suit, formed of a reinforced concrete L-wall with associated wing walls. A steel beam shall be affixed to the western face of the foundations to serve as a flow control device.

The bridges shall be integrated with the existing footpaths through local regrading of the adjacent paths with access ramps constructed from imported or site won fill as required.

Table 1. Structure design working life

Element	Design Working Life	Period to First Routine Maintenance	Routine Maintenance by Employer	Unacceptable Repair / Replacement
Hardwood timber (Bridge components)	50 years	1 year (less depending on season)	For first few seasons regular wetting of structure during hot weather should be undertaken to limit cracks and warping during the initial drying out process.	Replacement of defective items (i.e. deck plank, parapet posts, parapet rails)
Bridge fixtures, fittings & finishes	12-15 years	12 years (min)	Visual inspection. Re-coat of localised affected areas as required.	Replacement of defective/corroded fittings
Reinforced concrete footings	50 years	50 years	None	Cutting out / replacement of defective / spalled concrete and corroded reinforcement

Steelwork of flood control structure	50 years	15 years	Re-coating of protective treatment systems and/or renovation of CP system every 15 years.	Cutting out / replacement of defective / corroded steel or their fixings; welding of steel plates onto existing steel structure / elements.
Bridge bearings	25 years	5 years	Clear/clean debris from bearing plinth	Bearing failure requiring premature replacement

Other non-structural parts will require replacement on a more frequent basis.

3.2. Structural type

3.2.1. North Footbridge

The north footbridge shall consist of steel primary beams with hardwood timber decking members spanning between longitudinal steel beams that transmit the load towards the bearings. Bearings to be elastomeric provided at each beam locations along the bearing shelf.

Handrailing and stanchion to be formed of timber, stanchion affixed directly to the external longitudinal beams.

3.2.2. South Bridge

The south bride shall cross the new bypass channel at a skew angle with an effective span of 13m. Construction to be formed of steel longitudinal beams. Timber decking shall span between the longitudinal steel beams.

Handrailing and stanchion to be formed of timber, stanchion affixed directly to the external longitudinal beams. Timber cladding shall be provided to the sides to provide an “all timber” appearance.

3.2.3. Flow control structure

The flow control structure will be a steel member immediately upstream of the southern bridge structure supported on the western face of the southern bridge footings.

The structure will consist of a steel beam laid horizontally. Beam to be confirmed at detailed design but likely to be either a rectangular hollow section or a universal beam.

3.3. Foundation type

The bridge foundations consist of a reinforce concrete L-wall with integrated wingwalls. A bearing shelf shall be incorporated into the L-wall including a drainage channel.

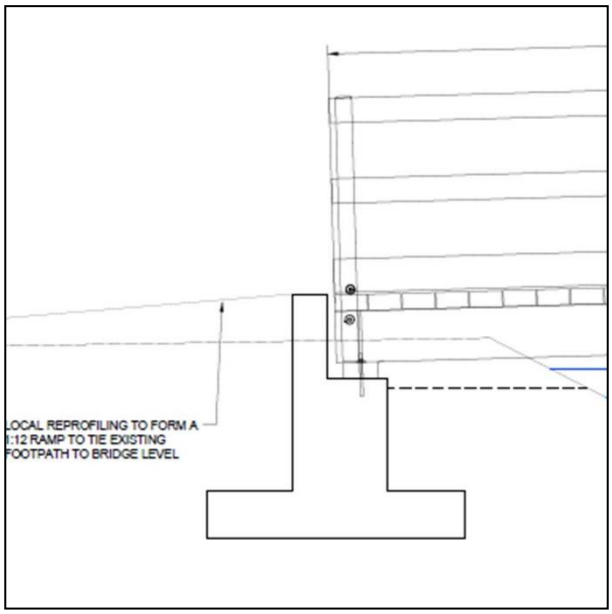

Figure 2. Section of proposed bridge footing

3.4. Span arrangements

The northern bridge shall have a 6.8m clear span (7m total length) and the southern bridge and flood control structure shall have an approximate clear span of 9.7m (skew). Indicative plan layouts are shown below.

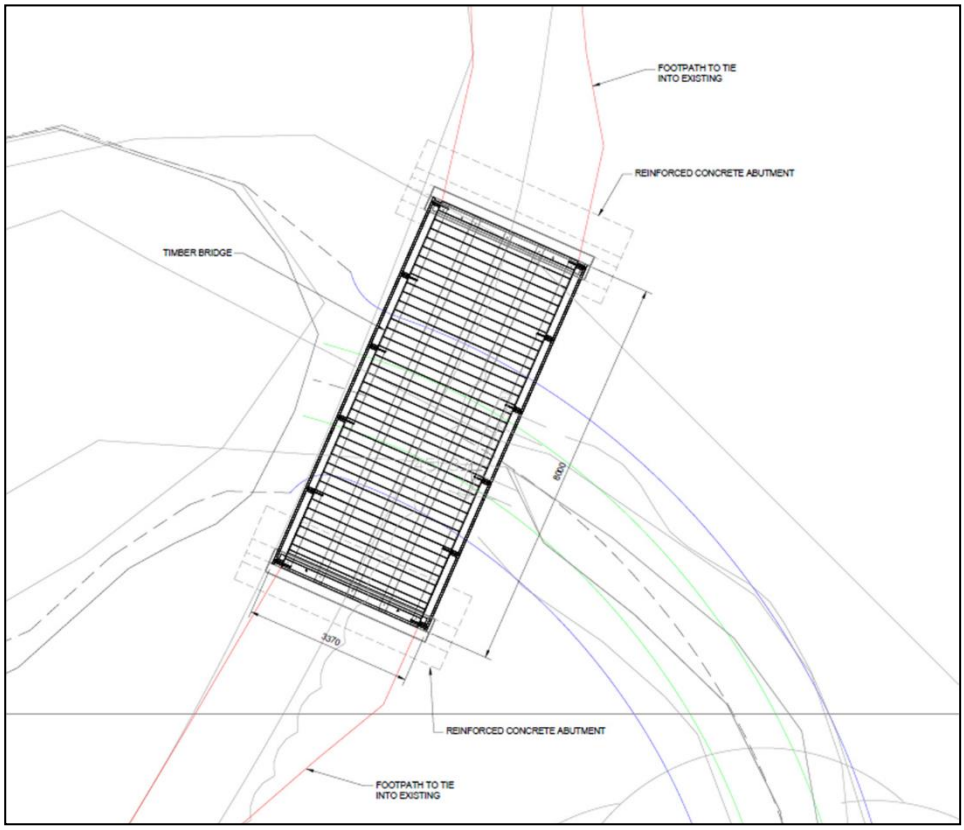

Figure 3. Plan view of the northern bridge (extract from drawing A119099-TGEE-ZZ-XX-DR-C-0011)

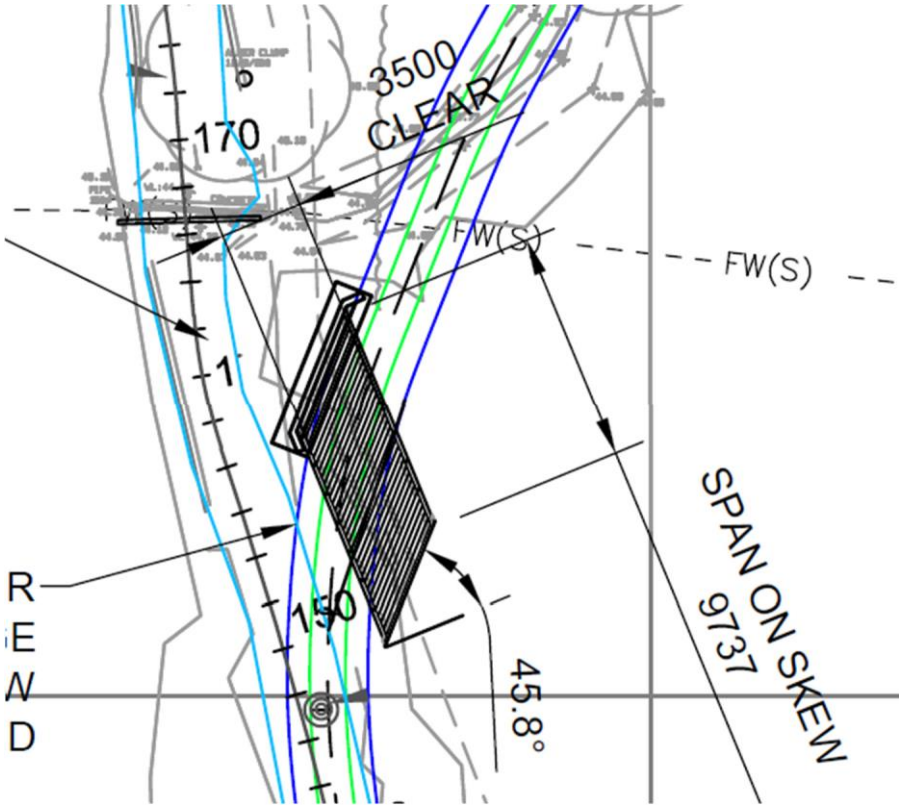

Figure 4. Plan view of southern bridge (extract from drawing A120099-TGEE-ZZ-XX-DR-C-0002)

The typical section of the northern and southern bridges is shown in Appendix B

3.5. Articulation arrangements

North Bridge: The steel beams are susceptible to thermal movement and elastomeric bearings shall be provided. Lateral restraint shall be provided at chosen bearing location to secure the bridge during flood events.

South Bridge: The steel beams are susceptible to thermal movement and elastomeric bearings shall be provided. Lateral restraint shall be provided at chosen bearing location to secure the bridge during flood events.

Flow control structure: The flow control structure shall have adequate tolerance in the connections at one end to cater for the movement from the expected thermal range.

3.6. Classes and levels

3.6.1. Consequence Class

Consequence Class- CC2 (medium as defined by Table B1 of BS EN 1990:2002.)

3.6.2. Reliability Class

Reliability Class- RC2 (in accordance with Table A.2 of Highways Agency Interim Advice Note (IAN) 124/11)

3.6.3. Inspection Level

Inspection Level-IL2 (in accordance with table B4 of BS EN 1990:2002 and Table A.2 of IAN 124/11)

3.7. Road restraint systems requirements

Handrail to be designed to resist pedestrian loads in accordance with BS EN 1991-1-1 + NA. No allowance for vehicle restraint systems. Refer to section 4.

3.8. Proposals for water management

The southern bridge is to act as a flow control structure with water levels within the channel as follows:

- Mean water level: +44.283m AOD
- 1:2 year flood level: 44.942m AOD, which will be restricted by the flood control structure with a soffit at 44.550m OAD and top level at 45.000m OAD
- 1:100 year flood level: +45.218m AOD

The footbridge will be positioned below the 1:100 year flood level.

3.9. Proposed arrangements for future maintenance and inspection

3.9.1. Traffic management

No traffic management is envisaged.

3.9.2. Arrangements for future maintenance and inspection of structure.

Inspections of the bridge structures and flood control structure will be undertaken during periods of low flow with access from the channel bank. In river working will be required to inspect the bearing shelf.

3.9.3. Access arrangements to structure

The structure can be accessed from the adjacent channel banks and footpath.

3.10. Environment and sustainability

A structurally efficient solution will be designed to minimise the amount of material used.

At the end of the working life of the structure, the reinforced concrete can be crushed and reused as aggregate. The steel from the flood control structure can be recycled.

Timbers shall be sustainably sourced FSC certified.

3.10.1. Special environmental considerations

The works will be taking place adjacent to the Emm Brook. Concrete works are planned as part of the footing construction. Care is to be taken to ensure no materials enter the watercourse during construction.

3.11. Durability, material and finishes

3.11.1. Concrete

Specification

Reinforced concrete works shall generally be C40/50 meeting the requirements in Table 1.

Table 1. Concrete specification

Strength	C40/50
Maximum w/c ratio	0.40
Maximum aggregate size:	20mm
Min cement/combination content:	380 kg/m3
Permitted combination types:	CEM 1 IIA IIB-M IIB-S CEM 1-SR0, CEM 1-SR3

All concrete mixes shall be in accordance with the relevant clauses of BS 8500-1, BS 8500-2 and BS EN 206 and MCHW Series 1700. Exposure classes shall be in accordance with BS 8500-1.

Crack widths where relevant will be limited to 0.3mm in accordance with Table NA.2 of UK NA to BS EN 1992-2.

Exposure class and cover

Table 2. Element Exposure Class and Cover

Structural Element	Compressive strength class	Exposure Class			Cover
		XC	XD	XF	
Concrete footing	C40/50	XC3	XD3	XF2	45+Δc

The minimum allowance for deviation, Δc shall be taken as 15mm for concrete cast against formwork or blinding. Casting of reinforced concrete directly against soil shall not be permitted.

Reinforcement

Reinforcement grade - 500N/mm2 to BS 4449 Grade B500B or B500C in accordance with BS EN 10080, BS8666 and supplied by UK CARES accredited supplier where material is fully traceable.

Proposed finishes

Concrete finishes, shall be in accordance with MCHW 1708:

- Exposed faces generally – F3
- Hidden formed surfaces – F1
- Buried unformed surfaces – U2

Class F1. A dense finish with no grout or mortar loss with the specified cover to embedded metal and achieving the specified dimensional tolerances.

Class F3. As the requirements of F1 and the resulting finish shall be smooth and of uniform texture and appearance. The formwork lining shall leave no stain on the concrete and shall be so joined and fixed to its backing that it imparts no blemishes. It shall be of the same type and obtained from only one source throughout any one structure. The Contractor shall make good any imperfections in the finish. Internal ties and embedded metal parts shall not be used.

Class U1 finish. The concrete shall be levelled and screeded to produce a uniform surface to the profile shown on the drawings. No further work shall be applied to the surface unless it is used as a first stage for another class of finish.

Class U2 finish. After the concrete has hardened sufficiently, the Class U1 finish shall be floated by hand or machine sufficiently only to produce a uniform surface free from screed marks.

3.11.2. Steel

Steel grade

Structural steel grades for various structure components are shown in Table 3.

Table 3. Structural steel grade requirements

Structural Element	Structural Steel Grade
Structural steel elements – flood control structure	S355 J2H*

*A reduction to steelwork grade S235JR or S355JR may be utilised subject to explicit numerical validation to BS EN 1993-1-10:2005 to confirm suitability.

All steel will comply with the relevant BS EN standards and executed in accordance with BS EN 1090 and be CE marked.

Mild steel products shall be in accordance with MCHW Series 1800.

Mild steelwork to be hot dip galvanised to EN ISO 1461 (in accordance with EN ISO 14713 corrosivity category C3).

All enclosed sections shall be sealed against the ingress of moisture.

3.12. Risks and hazards considered for design, execution, maintenance and demolition. Consultation with and/or agreement from Overseeing Organisation

Refer to CDM designers risk assessment included in Appendix A. The design philosophy is in accordance with the CDM regulations and best practice guidance.

3.13. Estimated cost of proposed structure together with other structural forms considered (including where appropriate proprietary manufactured structure), and the reasons for their rejections (including comparative whole life costs with dates of estimates)

Approximate cost of the foundation and footings, inclusive of temporary works and mobilisation: £102,000.

Approximate costing of bridge structure: £57550.

3.14. Proposed arrangements for construction

3.14.1. Construction of structure

The following construction sequence is proposed:

1. Closure of footpath.
2. Set up site/mobilisation
3. Establish ecological mitigation and complete devegetation works
4. Construction of working platforms and haul roads for access as required
5. Excavation works and construction of footings
6. Installation of bridges and control structure
7. Profile ramp to tie into existing footpath
8. Finishing works
9. Landscaping as required
10. Remove site compound

3.14.2. Traffic management

Pedestrian foot traffic along the footpath will be temporarily closed during the installation of the footings and bridges.

3.14.3. Service diversions

Not applicable.

3.14.4. Interface with existing structures

Existing foul water sewer to be isolated during works and 500mm exclusion zone to be adhered to. No direct loading on existing pipe to be permitted.

Note: works on the adjacent pipe bridge may occur at the same time as the bridge foundation works. Contractor may be able to relax the exclusion zone in this instance.

3.15. Resilience and security

Construction works to be carried out within site boundary protected with fencing where possible.

4. Design Criteria

4.1. Actions

4.1.1. Permanent actions

All permanent actions are as outlined in BS EN 1991-1-1 and its UK National Annex.

- Plain concrete: 24kN/m^3
- Reinforced concrete: 25kN/m^3
- Steel: 78.5 kN/m^3
- Timber 10.8kN/m^3 (Ekki)

Permanent actions acting on the footbridge and footbridge foundations shall be determined in accordance with the relevant documents set out in the TAS list.

Permanent actions shall be derived in accordance with BS EN 1997 utilising soil properties outlined in Section 6.

Loading will be applied and combined in accordance with BS EN 1990 and BS EN 1991 as amended by the relevant national annex for both ULS and SLS.

4.1.2. Snow, wind and thermal actions

Snow loading will be ignored in accordance with BS EN 1991-1-3 Clause NA 4.1.1, as on ordinary bridges the accumulation of any material quantity of snow will effectively reduce the traffic loads such that the combined mass of snow and traffic loading will not exceed the nominal live load.

Wind loading to be calculated in accordance with BS EN 1991-1-4 (including national annex) for a return period of 50 years. The basic wind data is to be based on the wind velocity for Emm Brook, England assuming an altitude of A = 40m. Base wind speed, vb = 22.4m/s.

Thermal actions will be determined in accordance with BS EN 1991-1-5 and its UK National Annex with the appropriate modifications to suit the bridge structural form.

Minimum shade air temperature to be -15 degrees Celsius.

Maximum shade air temperature to be 35 degrees Celsius.

Elastomeric bearings shall be designed to incorporate an additional +/- 20degrees Celsius in accordance with NA to BS EN 1991-1-5:2003 clause NA.2.6.

4.1.3. Actions relating to normal traffic under AW regulations and C&U regulations

Not applicable.

4.1.4. Actions relating to General Order traffic under STGO regulations

Not applicable.

4.1.5. Footway or footbridge variable actions

Pedestrian Loads

Two load models will be considered, these are as follows:

- In accordance with BS EN 1991-2:2003 cl 5.3.2.1, the footbridge will be designed for a vertical uniformly distributed live load of 5kN/m^2. This is to be applied over the entire footbridge.
- In accordance with BS EN 1991-2:2003 cl 5.3.2.2, the footbridge will be designed for a point load of 10kN acting on a 100mm x 100mm square.

Parapet Loads

Horizontal parapet loads to be 1.6kN/m in accordance with table NA.8 to BS EN 1991-1-1-2002 noting crowding unlikely.

Vehicle Loads

The footings will be designed for vehicle access up to 5 tonnes. Allowance shall be made for one axle to be loaded to 60% of the total vehicular load with a dynamic factor of 1.1 applied. Note load combinations to be as per table 5.1 to BS EN 1991-2.

A demountable bollard shall be placed at grid location SU 79874 69058 and on the adjacent Greenways structures sufficient to prohibit unauthorised vehicles accessing the footbridge.

4.1.6. Actions relating to Special Order traffic, provision for exceptional abnormal indivisible loads including location of vehicle track on deck cross section

Not applicable.

4.1.7. Accidental actions

No allowance has been made for debris impact during flood events, as the dominant direction of water flow is understood to encourage debris down the existing channel (as per Clients advice).

4.1.8. Action during construction

Not applicable.

4.1.9. Any special action not considered above

Water Load

The considered water load model is a follows:

- In accordance with BS 6349-1-2:2016 Annex E.1, steady current drag forces will be determined on the flood control structure based on a water velocity corresponding to the flow of 10.48m/s at 1:100 year.

4.2. Heavy or high load route requirements and arrangements being made to preserve the route, including any provision for future heavier loads or future widening

Not applicable.

4.3. Proposed minimum headroom to be provided

The northern bridge soffit will be an average of 44.892mOD.

The southern bridge soffit shall be +44.75mOD.

The soffit of the flow control structure will located at +44.55mOD.

4.4. Authorities consulted, and any special conditions required

The following organisations shall be consulted with regards to special conditions and requirements during the detailed design stage:

- South East River Trust
- Wokingham Borough Council
- Environmental Agency

4.5. Standards and documents listed in the technical approval schedule (TAS)

Principal design standards to be adopted	Eurocodes BS EN 1990 BS EN 1991	Shall be adopted as the principal standard for the design of structures incorporating the requirements of the UK National Annexes where required
	BS 6349-1-2	Maritime works. General. Code of practice for assessment of actions
Geotechnical	BS EN 1997-1	Eurocode 7: Geotechnical Design – General Rules and National Annex
Health & Safety	HSE 2015	Construction (Design and Management) Regulations
Temperature	BS EN 1990	Eurocode 0: Basis of structural design

	BS EN 1991-1-5	Eurocode 1-5: General actions – Thermal actions
Wind Loads	BS EN 1991-1-4	Actions on structures – General actions – Wind actions
Soils - General	BS EN 1997-1	Geotechnical design – General Rules
Timber – Principal standards	BS EN 1995-1	Design of timber structures – Part 1 General
	BS EN 1995-2	Design of timber structures – Part 2 Bridges

Concrete

Specification	BS EN 206-1	Specification, performance, production and conformity
	BS 6349-1- 4	Maritime Works: General - Code of practice for materials
	BS 8500	Concrete - Complementary British Standard
Principal standards	BS EN 1992	Eurocode 2: Design of concrete structures
Execution	BS EN 13670	Execution of concrete structures

Steels and other materials

Principal standards	BS EN 1993	Eurocode 3: Design of steel structures
Execution	BS EN 1090	Execution of steel structures and aluminium structures
Specification	BS EN 10219-1	Cold formed welded structural hollow sections of non-allow and fine grain steels. Technical
	BS EN 10248	Hot rolled sheet piling of non-alloy steels. Technical delivery conditions.
	BS EN 10025	Hot rolled structural steels

4.5.2. Additional relevant Standards

None proposed.

4.6. Proposed Departures from standards given in 4.5

None proposed.

4.7. Proposed Departures from standards concerning methods for dealing with aspects not covered by standards in 4.5

None proposed.

5. Structural Analysis

5.1. Methods of analysis proposed for superstructure, substructure and foundations

Foundations

The bridge footings are which will be analysed by means of hand calculations and in-house spreadsheets software.

Flood control structure

The steel beam shall be assessed utilising closed form hand calculations and in-house design spreadsheets.

5.2. Description and diagram of idealised structure to be used for analysis

Figures 3 below demonstrate a simplified idealised structure that will be used for analysis of the bridge footings.

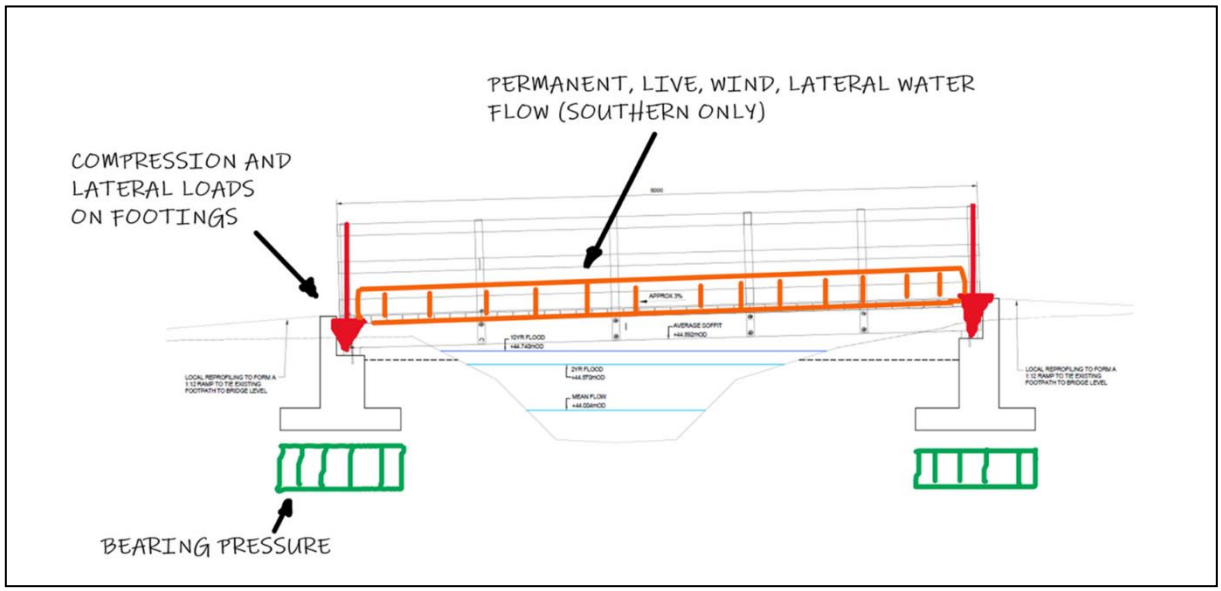

Figure 1. Idealised load diagram for bridge structure, flow control structure and foundation loading

5.3. Assumptions intended for calculation of structural element stiffness

The stiffness of concrete sections shall be considered based on cracked section properties where the section is behaving under tension and/or bending. Uncracked section properties shall be utilised when under direct compression only.

The stiffness of structural steel elements shall be based on the elastic section properties.

5.4. Proposed range of soil parameters to be used in the design of earth retaining elements

See Section 6.

6. Geotechnical Conditions

6.1. Acceptance of recommendations of the ground investigation report (reference/dates) to be used in the design and reasons for any proposed changes

A Ground Investigation Report (GIR) has not been produced for this project.

Soil properties have been derived from the results included within the geotechnical factual report ref '1921661 R01 (01)' which summarises the geotechnical investigation undertaken by RSK.

Stratigraphy and design ground model

The ground investigation locations are shown in Figure 5.

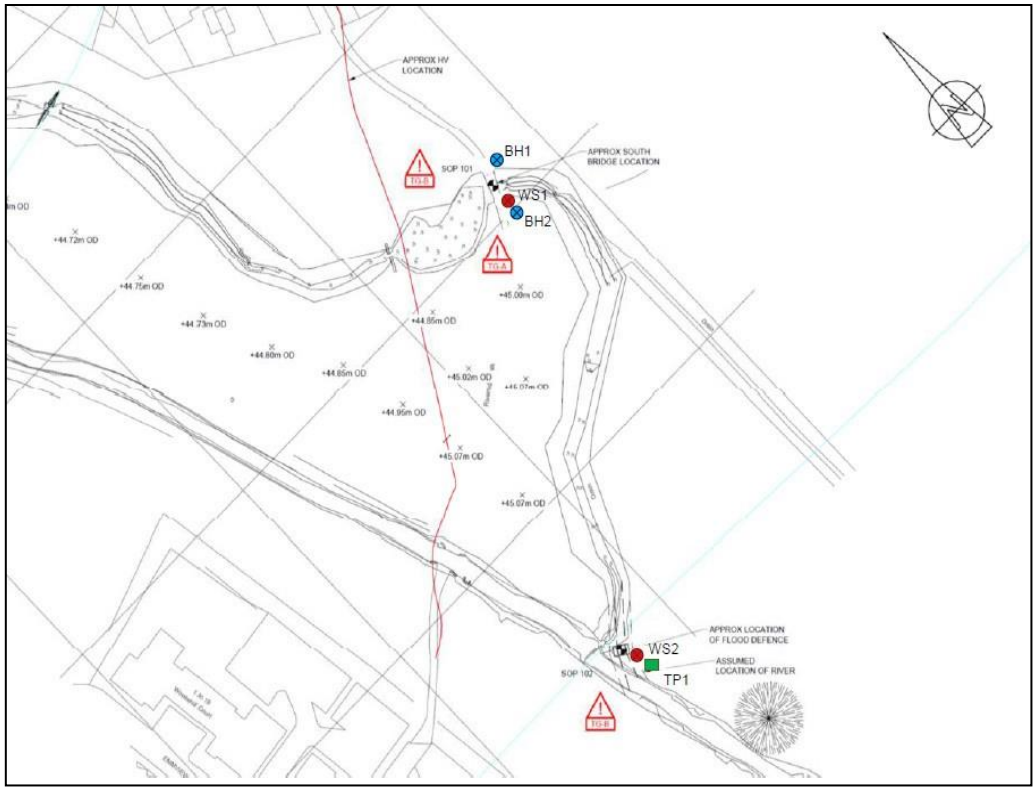

Figure 5. Ground investigation locations (from Ground Investigation Factual Report by RSK)

The ground model to be used for the design is as below:

Table 4. Ground model adopted for design

Strata	Top Level (mBGL)	Layer Thickness (m)
Top Soil	0	0.5
Alluvium	0.5	4
London Clay Formation	4.5	Unknown

Existing ground levels vary across the site from approx. 45.5mOD to 44.7mOD with a relatively consistent depth of topsoil to 500mm thoughout.

The top of London clay varies between +42.37mOD to +40.99mOD and a level of +41.00mOD shall be adopted within design.

Characteristic geotechnical parameters

The ground properties to be used in the design is as below:

Table 5. Characteristic geotechnical properties adopted for design

Stratum	γ kN/m^3	c', k kPa	ϕ'cv, k °	$c_{u,k}$ kPa	E_u' MPa	E MPa
Top Soil	18	0	20	5	1.75	1.5
Alluvium	18	0	25	40	15.75	12.6
London Clay Formation	20	0	23	75	26.25	21

Earth pressure coefficients for the design of the footings will be calculated in accordance with Appendix C of BS EN 1997-1 using Design Approach 1.

6.2. Summary of design for highway structure in the ground investigation report

The information included in Factual Report – Ground Investigation Report ref '1921661 R01 (01)' is to be used.

6.3. Differential settlement to be allowed for in the design of the structure

Significant differential settlement not envisaged to occur.

6.4. If the ground investigation report is not yet available, state when the results are expected and list the sources of information used to justify the preliminary choice of foundations

A review of the raw data has been undertake and design properties derived sufficient to inform the design process. Completion of a GIR and GDR shall not be undertaken to reflect the relative low complexity of the project.

7. Check

7.1. Proposed Category and Design Supervision Level

Structure Category 1 (structures with a single simply supported span of 5m or greater but less than 20m) and Design Supervision Level 2.

The detailed design of the bridge foundations will be carried out by Tony Gee and Partners.

The detailed design and check of the bridge structure will be carried out by Sarum Hardwood Structures Ltd.

7.2. If Category 3, name of proposed Independent Checker

Not applicable.

7.3. Erection proposals or temporary works for which Type S and P Proposals will be required, listing structural parts of the permanent structure affected with reasons

Not applicable.

8. Drawings and Documents

8.1. List of drawings (including numbers) and documents accompanying the submission

Refer to Appendix B for the following General Arrangement Drawings

A120099-TGEE-ZZ-XX-DR-C-0001 P01	Existing Location Plan
A120099-TGEE-ZZ-XX-DR-C-0002 P05	New Bridge Locations
A120099-TGEE-ZZ-XX-DR-C-0005 P05	Proposed bridge sections
A120099-TGEE-ZZ-XX-DR-C-00020 P02	North Bridge Footings
A120099-TGEE-ZZ-XX-DR-C-00021 P02	South Bridge Footings
A120099-TGEE-ZZ-XX-SPE-DRG-ECV-0000001 P03	Ground Investigation Locations Plan

Appendix A - CDM Review

Activity/ Element Item No.	Design item giving rise to risk	Consequence of item giving rise to risk	Persons at risk		Design action to eliminate risk or reduce risk	Residual risk – risks that cannot be designed out and required control action by others	Status (live / Closed)	COMDE
			Site works area	Others				
Bridge Footings								
1.	Unexploded Ordnance UXO	Explosion, contamination and fatalities	✓	✓		Contractor to use the mitigation measures developed in conjunction with UXO consultant.	Live	C
2	High channel levels during flooding	Risk of drowning	✓			Contractor to monitor weather conditions.		
3	Activities adjacent to water and / or over water and excavations.	Chance of personnel or plant falling into the water resulting in drowning and / or injury. Risk of drowning.	✓		Edge protection systems (pedestrian and/or vehicle as appropriate) to be provided where possible.	The works will be undertaken by an experienced contractor who will apply appropriate risk assessment and safety measures. Training of site operatives.	Live	C O M
4.	Manual handling and ergonomics associated with heavy components.	Falling personnel or objects.	✓		Minimise size / weight of elements with efficient design as far as possible.	Automated mechanical methodology to be employed where practical. Residual manual handling and ergonomics to be considered at detailed design.	Live	C

Activity/ Element Item No.	Design item giving rise to risk	Consequence of item giving rise to risk	Persons at risk		Design action to eliminate risk or reduce risk	Residual risk – risks that cannot be designed out and required control action by others	Status (live / Closed)	COMDE
			Site works area	Others				
5.	Lifting operations – new bridges, steelwork, prefabricated rebar cages and shutters.	Falling Objects Crane located to close to the new footings causing settlement, cracking or failure	✓		Efficient design to reduce size of elements and therefore number of lifts. Bridge designer to agree with the Contractor the acceptable crane loads and support locations.	Experienced contractor to plan lifts and provide suitable briefing and PPE to staff. Temporary works designs to consider lift operations. Contractor to ensure that crane supports are situated a sufficient distance from the footings.	Live	C
6.	Contaminated land	Working with locally present contaminated soil/water during excavation work. Health hazard.	✓		Review ground investigation data on contamination. Assist contractor for mitigation.	Contractor to use the mitigation measures. Use suitable PPE	Live	C
7.	Striking of live services Striking foul sewer line	Electric shocks, water leaks etc. Health Hazard	✓	✓	As-built records of existing services to be provided by Client at detailed design stage	Striking of unknown services, Striking live services. Carry out a subsurface investigation (CAT scan or similar) so that works can be planned to avoid services where possible.	Live	C

Activity/ Element Item No.	Design item giving rise to risk	Consequence of item giving rise to risk	Persons at risk		Design action to eliminate risk or reduce risk	Residual risk – risks that cannot be designed out and required control action by others	Status (live / Closed)	COMDE
			Site works area	Others				
8.	Pedestrian areas, risk of members of the public entering the water.	Members of the public injured or drowning.		✓		Communicate to the contractor and client the safety equipment needed. Inform the client of the need to maintain safety equipment.	Live	M O

Appendix B - Drawing

DO NOT SCALE FROM THIS DRAWING

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES AOD UNLESS NOTED OTHERWISE.
3. FOR GENERAL NOTES REFER TO DRAWING A120099-TGEE-ZZ-XX-DR-C-0002
4. UTILITIES SHOWN BASED ON UTILITY DRAWINGS PROVIDED BY THE CLIENT. REFER TO:
   SOUTH EAST WATER REF: NRSWA/17/06/17
   HV REF: su79886919
   su79886903
   LV REF: su79886919
   FOUL SEWER LOCATION APPROXIMATED FROM MARK-UPS

LEGEND:

- LOW VOLTAGE
- HIGH VOLTAGE
- POTABLE WATER
- FOUL SEWER

10m 0 10m 20m 30m 40m

REV.	BY	CHK'D	APP'D	DATE	DESCRIPTION
P01	DHM	JJF	APM	15/12/20	FIRST ISSUE

CODE DRAWING STATUS

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TN23 1HU
Tel: 01233 639787

www.tonygee.com
Consulting Engineers

ON BEHALF OF

SOUTH EAST RIVER TRUST

BRIDGE FOOTING DESIGN EMM BROOK RESTORATION

EXISTING LOCATION PLAN

DRAWING. No. A120099-TGEE-ZZ-XX-DR-C-0001

SCALE 1:50

50m

DRAWN : DHM SCALE : 1:500

DESIGNED : JJF ORIGINAL SIZE : A1

REVISION
P01

DO NOT SCALE FROM THIS DRAWING

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES AOD UNLESS NOTED OTHERWISE.
3. LOCATIONS SHOWN ON PLAN ARE INDICATIVE ONLY. FINAL LOCATION TO BE AGREED WITH ENGINEER ON SITE.
4. THIS DRAWING TO BE READ IN CONJUNCTION WITH GI SPECIFICATIONS A120099-TGEE-ZZ-XX-DR-C-0001-000001.
5. ALL BURIED SERVICES ARE INDICATIVE ONLY AND CONTRACTOR TO VERIFY THE LOCATION OF SERVICES IN THE VICINITY OF THE PROPOSED WORKS.
6. TOPOGRAPHY AS PER RECEIVED SURVEYS DATED SEPTEMBER 2017 AND FEBRUARY 2019 (REF "EMM BROOK - EXISTING CONDITIONS - UPDATED CBEC -FEBRUARY 2019").
7. CHANNEL DRAWING UPDATED TO REPRESENT THE DESIGN CHANNEL DEFINED ON CBEC DRAWING "EMM BROOK - DESIGN - 11 - DETAIL SECTIONS - 10052019 - JI". NOTE THIS ENVELOPE IS EXCEEDED IN THE 1 IN 2 YEAR FLOOD EVENT

LEGEND:

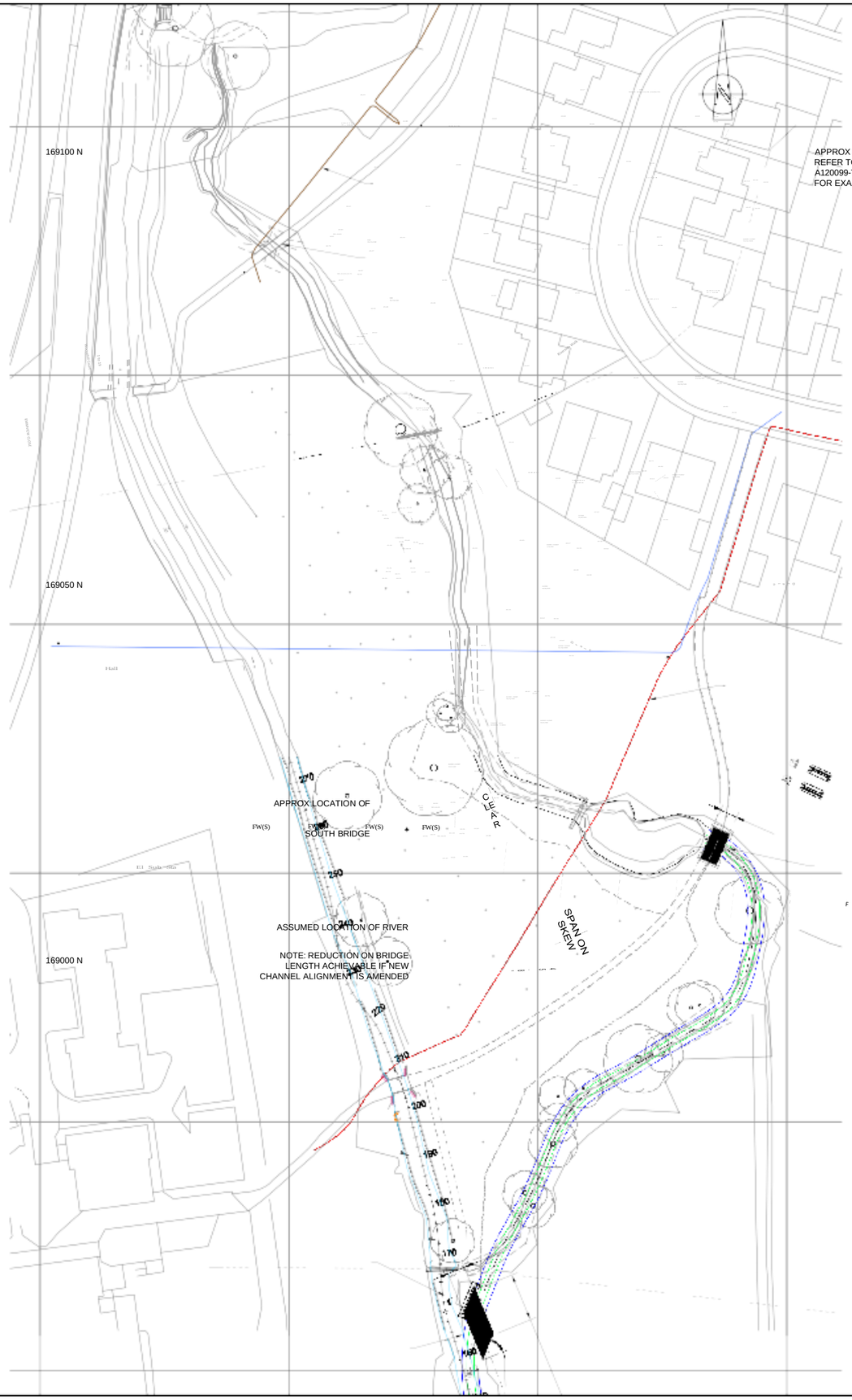
LOW VOLTAGE

HIGH VOLTAGE

POTABLE WATER

FW(S) FOUL SEWER

P05	JJF	JJF	APM	08/12/21	BRIDGE GEOMETRY UPDATED
P04	JJF	JJF	APM	21/12/20	WETLANDS REMOVED
P03	JJF	JJF	MHY	17/12/20	SOUTH BRIDGE UPDATED
P02	JJF	JJF	APM	15/12/20	BRIDGES RENAMED
P01		DHM	JJF	APM	15/12/20 FIRST ISSUE



10m 0 10m 20m 30m 40m 50m

SCALE 1:500

REV.	DATE	DESCRIPTION

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ON BEHALF OF

SOUTH EAST
RIVER TRUST

BRIDGE FOOTING DESIGN

EMM BROOK
RESTORATION

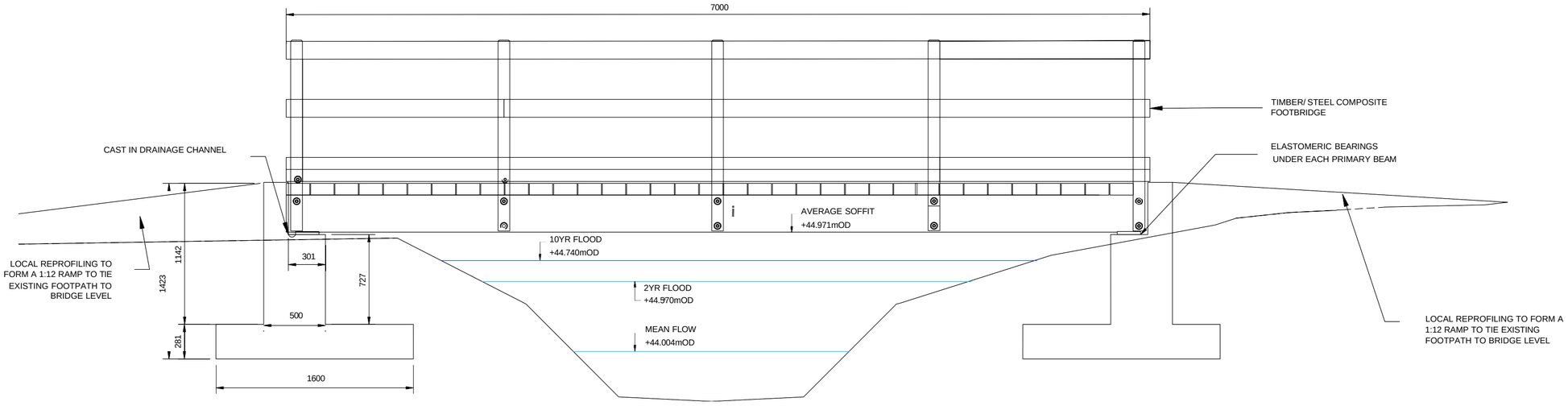
PROPOSED
NEW BRIDGE LOCATIONS

DRAWING No.
A120099-TGEE-ZZ-XX-DR-C-0002

DRAWN : DHM DESIGNED : JJF REVISION

SCALE : 1:500 ORIGINAL SIZE : A1 P05

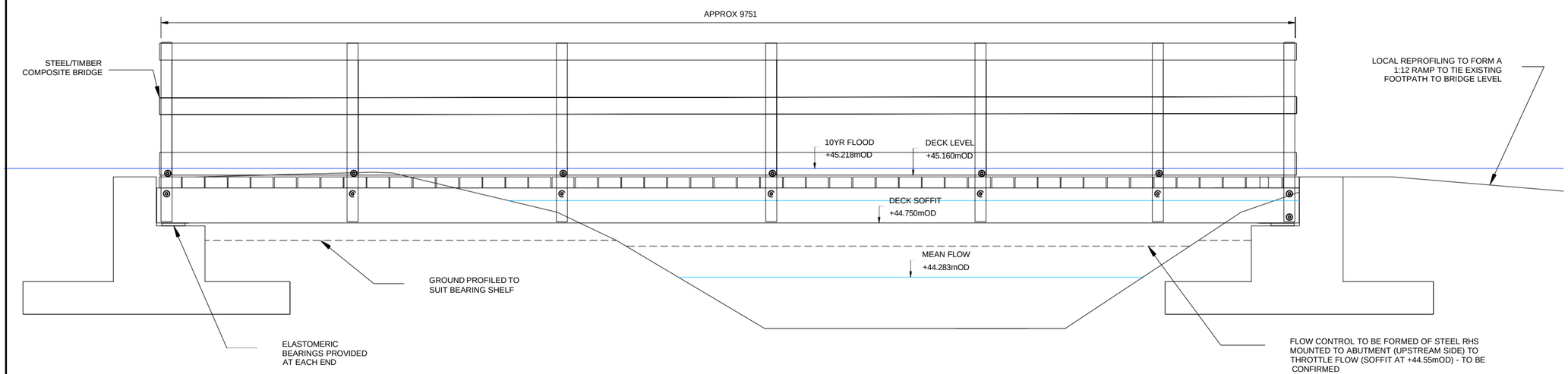
356



SECTION THROUGH NORTH BRIDGE

SCALE 1:20

SECTION DRAWN BASED ON SKEW ARRANGEMENT FOR APPROX 9.6m LONG BRIDGE. SECTION TAKEN THROUGH CENTRELINE OF PROPOSED BRIDGE (I.E BRIDGE SHOWN AT TRUE LENGTH, FOUNDATION LENGTH EXAGERATED AS SECTION TAKEN ON SKEW)



SECTION THROUGH SOUTH BRIDGE

SCALE 1:20
NOTE: DIMENSIONS TAKEN ON SKEW

400mm 0 400mm 800mm 1200mm 1600mm 2000mm
SCALE 1:20

DO NOT SCALE FROM THIS DRAWING

NOTES:

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2. ALL LEVELS ARE IN METRES AOD UNLESS NOTED OTHERWISE.
3. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRG No. A120099-TGEE-ZZ-XX-DR-C-0002.
4. DRAWING FOR OUTLINE DESIGN PURPOSES ONLY. EXACT GEOMETRY TBC FOLLOWING CONFIRMATION OF BRIDGE DESIGN AND COMPLETION OF DETAILED DESIGN.

REV.	BY	CHK'D	APP'D	DATE	DESCRIPTION
P05	JJF	JJF	APM	17/06/22	NORTH BRIDGE AMENDED TO 7m TOTAL LENGTH AND AMENDED TO STEEL/TIMBER COMPOSITE
P04	JJF	JJF	APM	08/12/21	SECTION UPDATED FOR REVISED SKEW
P03	JJF	JJF	APM	16/12/20	SECTION UPDATED FOR SKEW
P02	JJF	JJF	APM	15/12/20	MINOR AMENDMENTS
P01	DHM	JJF	APM	15/12/20	FIRST ISSUE

CODE | DRAWING STATUS

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ON BEHALF OF

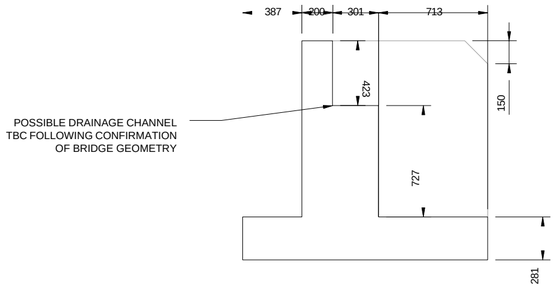
SOUTH EAST RIVER TRUST

BRIDGE FOOTING DESIGN EMM BROOK RESTORATION

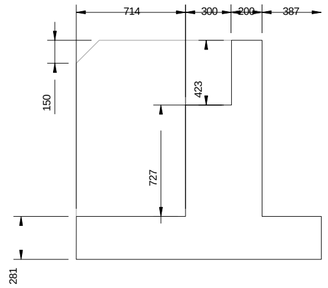
PROPOSED BRIDGE SECTIONS

DRAWING. No.
A120099-TGEE-ZZ-XX-DR-C-0002

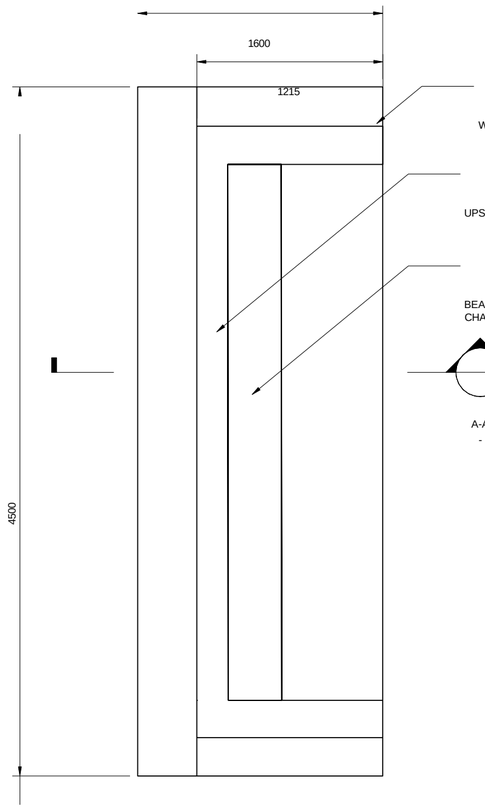
DRAWN : DHM	DESIGNED : JJF	REVISION
SCALE : 1:20	ORIGINAL SIZE : A1	P05



SECTION A-A

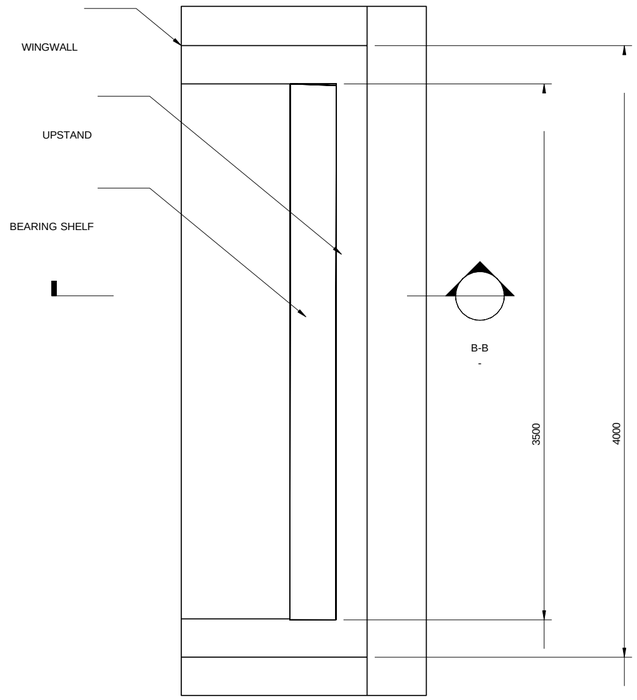


SECTION B-B



A-A
-

NORTH BRIDGE LEFT FOOTING



B-B
-

NORTH BRIDGE RIGHT FOOTING

DO NOT SCALE FROM THIS DRAWING

NOTES

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4. DRAWING FOR OUTLINE DESIGN PURPOSES ONLY. EXACT GEOMETRY TBC FOLLOWING CONFIRMATION OF BRIDGE DESIGN AND SUITABILITY OF FOUNDATION FOR BRIDGE DESIGN LOADS

REV	BY	CHK'D	APP'D	DATE	DESCRIPTION
P02	JJF	JJF	APM	17/06/22	MINOR DIMENSIONAL AMENDMENTS TO BEARING SHELF
P01	NPA	JJF	APM	08/12/21	FIRST ISSUE

CODE

DRAWING STATUS

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Consulting Engineers

ON BEHALF OF

SOUTH EAST
RIVER TRUST

BRIDGE FOOTING DESIGN
EMM BROOK
RESTORATION

PROPOSED
NORTH BRIDGE
FOOTINGS

DRAWING No.

A120099-TGEE-ZZ-XX-DR-C-0020

358

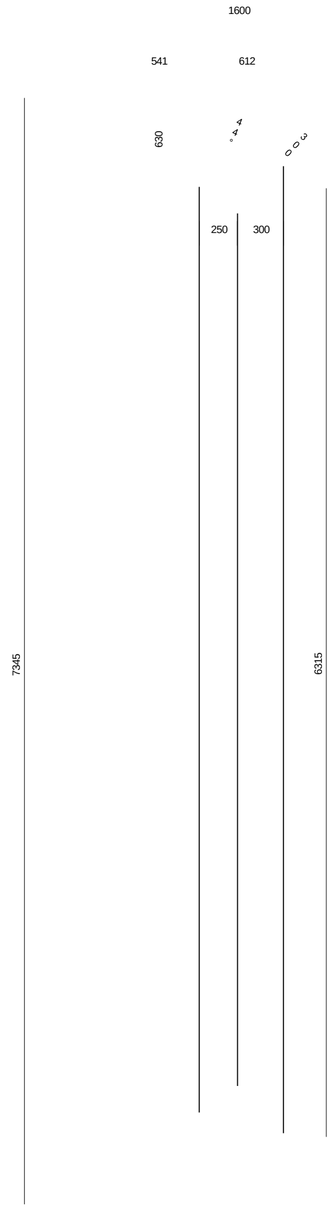
400mm 0 400mm 800mm 1200mm 1600mm 2000mm
SCALE 1:20

DRAWN : DHM
SCALE : 1:20

DESIGNED : JJF
ORIGINAL SIZE : A1

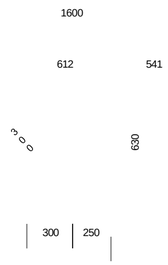
REVISION
P02

Private: Information that contains a small amount of sensitive data which is essential to communicate with an individual but doesn’t require to be sent via secure methods.

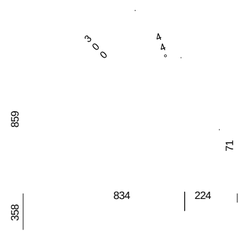


A-A
-

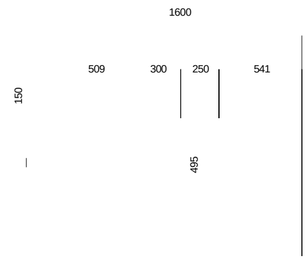
SOUTH BRIDGE
SOUTH FOOTING



B-B
-



SOUTH BRIDGE
SOUTH FOOTING



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REV.	BY	CHK'D	APP'D	DATE	DESCRIPTION
P01	NPA	JJF	APM	08/12/21	FIRST ISSUE

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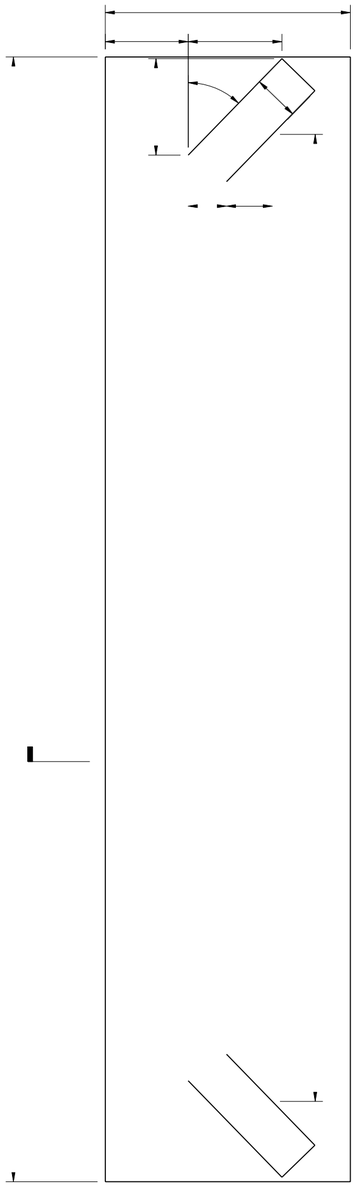
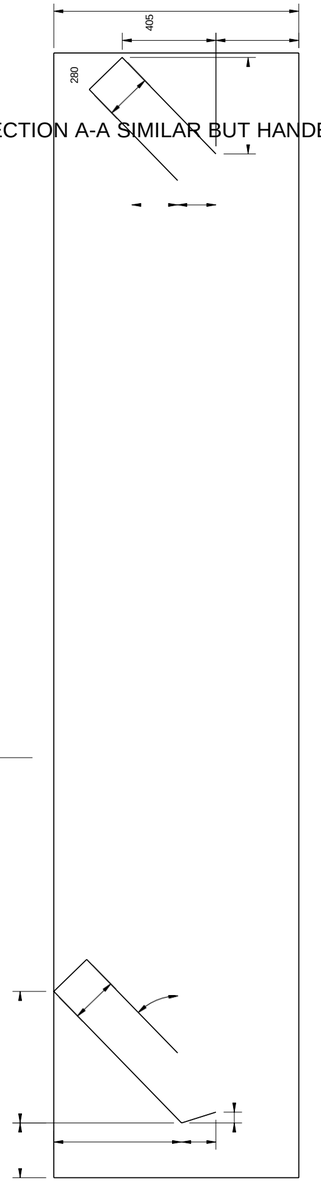
SOUTH EAST
RIVER TRUST

BRIDGE FOOTING DESIGN
EMM BROOK
RESTORATION

PROPOSED
SOUTH BRIDGE
FOOTINGS

SECTION B-B



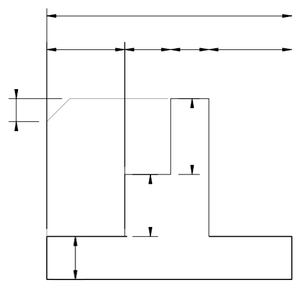


DRAWING. No.

SECTION A-A SIMILAR BUT HANDED

400mm 0 400mm 800mm 1200mm 1600mm 2000mm

SCALE 1:20



A120099-TGEE-ZZ-XX-DR-C-0020

DRAWN : DHM DESIGNED : JJF REVISION

SCALE : 1:20 ORIGINAL SIZE : A1 P01

Tony Gee

361

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