



STAR RADCLIFFE ACADEMY
APPROVAL IN PRINCIPLE

**New Retaining Wall at Junction
with Access Road**

Project No: 2303-02

May 2024

Rev: P01

FS1013-REN-XX-XX-T-C-6001

This report has been prepared for the sole benefit, use and information of the Client, **Department for Education** for the purposes set out in the report or instructions commissioning it. The liability of **renaissance** in respect of the information contained in this report will not extend to any third party. This document should not be used in whole or part by any third parties without the express written permission of **renaissance**.

author	Vanneth Ny BEng (Hons), MSc
date	29.05.2024
approved	Philip Whitesmith MEng, CEng, MIStructE
date	29.05.2024

Contact Details: -

Philip Whitesmith

MEng, CEng, MIStructE

Carvers Warhouse, 77 Dale Street

Manchester M1 2HG

e: philipwhitesmith@renaissance-ltd.com

m: 0161 393 6509

Revision	Description	Issued by	Date	Checked
P01	First Issue	V. Ny	29.05.24	P. Whitesmith

Contents

0	APPROVAL IN PRINCIPLE	1
1	HIGHWAY DETAILS	2
1.1	<i>Type of Highway</i>	2
1.2	<i>Permitted Traffic Speed</i>	2
1.3	<i>Existing Restrictions</i>	2
2	SITE DETAILS	3
2.1	<i>Obstacles Crossed</i>	3
3	PROPOSED STRUCTURE	4
3.1	<i>Description of Structure and Design Working Life</i>	4
3.2	<i>Structural Type</i>	5
3.3	<i>Foundation Type</i>	5
3.4	<i>Span Arrangements</i>	5
3.5	<i>Articulation Arrangements</i>	5
3.6	<i>Road Restraint System Requirements</i>	5
3.7	<i>Proposed Arrangements for Future Maintenance and Inspection</i>	5
3.8	<i>Environment and Sustainability</i>	6
3.9	<i>Durability, Material and Finishes</i>	7
3.10	<i>Risks and Hazards Considered for Design, Execution, Maintenance, and Demolition</i>	8
3.11	<i>Estimated Cost of Proposed Structure Together with Other Structural Forms Considered, and the Reasons for Their Rejection.</i>	9
3.12	<i>Proposed arrangements for construction</i>	9
	Construction of structure	9
	Traffic management	10
	Service diversions	10
	Interface with existing structures	10
4	DESIGN CRITERIA	11
4.1	<i>Actions</i>	11
4.1.1	<i>Permanent Actions</i>	11
4.1.2	<i>Snow, Wind and Thermal Actions</i>	11
4.1.3	<i>Actions Relating to Normal Traffic Under AW Regulations and C&U Regulations</i>	11
4.1.4	<i>Loading Relating to General Order Traffic Under STGO Regulations</i>	11
4.1.5	<i>Actions Relating to Special Order Traffic</i>	11
4.1.6	<i>Accidental Actions</i>	11
4.1.7	<i>Actions During Construction</i>	11
4.1.8	<i>Any Special Action Not Covered Above</i>	11
4.2	<i>Heavy or High Load Route Requirements</i>	11
4.3	<i>Minimum Headroom Provided</i>	11
4.4	<i>Authorities Consulted and Any Special Conditions Required</i>	11
4.5	<i>Standards and Documents Listed in the Technical Approval Schedule</i>	12
4.6	<i>Proposed Departures from Standards Given in 4.6</i>	12
5	STRUCTURAL ANALYSIS	13

5.1	<i>Methods of Analysis Proposed for Superstructure, Substructure and Foundations</i>	13
5.2	<i>Description and Diagram of Idealised Structure to be Used for Analysis</i>	13
5.3	<i>Assumptions Intended for Calculation of Structural Element Stiffness</i>	13
5.4	<i>Proposed Range of Soil Parameters to Be Used in the Design of Earth Retaining Elements</i>	14
6	GEOTECHNICAL CONDITIONS	15
6.1	<i>Acceptance of Recommendation of the Geotechnical Investigation Report to be used in the Design and Reasons for Any Proposed Changes</i>	15
6.2	<i>Summary of Design for Highway Structure in Geotechnical Design Report</i>	15
6.3	<i>Differential Settlement to be Allowed for in the Design of the Structure</i>	15
6.4	<i>If Geotechnical 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</i>	15
7	CHECKING	16
7.1	<i>Proposed Category</i>	16
8	DRAWINGS AND DOCUMENTS	17
8.1	<i>List of drawings and documents accompanying the submission</i>	17
11.1	<i>Appendix A Technical Approval Schedule (TAS)</i>	
11.2	<i>Appendix B Renaissance Drawings</i>	

0 APPROVAL IN PRINCIPLE

Name of Project: Star Radcliffe Academy

Name of Structure: New Retaining Wall at Junction with Access Road off Spring Lane, Radcliffe

1 HIGHWAY DETAILS

1.1 Type of Highway

Adjacent to A6053 Spring Lane, single carriageway with footways on both sides.

1.2 Permitted Traffic Speed

The maximum permitted speed limit of the highway is 30mph (48kph).

1.3 Existing Restrictions

None.

2 SITE DETAILS

2.1 Obstacles Crossed

Not applicable.

3 PROPOSED STRUCTURE

3.1 Description of Structure and Design Working Life

The Star Radcliffe Academy development comprises the construction of a new 3-storey secondary school building, external play/games areas and all-weather pitches, as well as associated car parking and pick-up/drop-off areas.

The proposed development site is located on Spring Lane in Radcliffe as described below:

- Post Code M26 2SZ
- OS Reference 378700, 407630
- National Grid Reference SD 787076

The site is currently occupied by a leisure centre and a secondary pupil referral unit which are due to be demolished as part of the proposed development.



Figure 3.1 – Sitewide Location Plan



Figure 3.2 – New Retaining Wall Location Plan

As part of the development, a new access road is to be constructed linking the site to the A6053 Spring Lane. This which will require the re-alignment of an existing retaining wall as indicated in Figure 3.2. The existing masonry retaining wall will need to be demolished with a new reinforced concrete wall constructed to retain the soft landscaping adjacent to the new junction. A stone facing will be used to replicate the aesthetic of the existing wall. The new structure would have a 100-year design working life.

3.2 Structural Type

The new retaining wall will be of cantilevered in-situ reinforced concrete construction with a stone facing to replicate the aesthetic of the existing wall. The thickness for the stem of the wall will be 250mm. Reference should be made to Renaissance drawings FS1013-REN-EX-XX-D-C-6000 and FS1013-REN-EX-XX-D-C-6010 for further details of the structural arrangement of the new retaining wall.

3.3 Foundation Type

The base for the retaining wall will be in-situ reinforced concrete cast with the stem. The base will be 2.05m wide by 0.6m deep along the length of the wall to spread the loads down to an allowable bearing pressure of 75 kN/m².

3.4 Span Arrangements

The wall will be designed as an unpropped cantilever with a maximum retained height of approximately 1.7m.

3.5 Articulation Arrangements

The overall length of the wall will be approximately 22m. A single separation joint will be provided along the length of the wall to allow for thermal movement. A separation joint will also be provided with the section of existing retaining wall where this returns along the Banana Path adjacent to the new access road. Reference should be made to Renaissance drawing FS1013-REN-EX-XX-D-C-6010 for further details of the separation joint.

3.6 Road Restraint System Requirements

Not Applicable.

3.7 Proposed Arrangements for Future Maintenance and Inspection

No traffic management measures are considered necessary for inspection or maintenance of the retaining wall. A reduced highway pedestrian path width may be required temporarily for periodic inspection of the visible face of the wall. In the most part, any maintenance and inspection is expected to be possible from pavement level.

The reinforced concrete highway retaining wall is recommended to be inspected annually and after any major climatic or seismic event. It is also recommended to keep a photo record, showing the structure from similar viewpoints for year-to-year comparisons. Annual inspection reports should ideally include structural and aesthetic components, along with any additional criteria recommended by the Engineer or Designer.

An inspection checklist should be compiled and developed over the maintenance period. Structural

Inspections should include (but are not limited to): -

- **Bulging:** Is there any observable bulging of the structure.
- **Rotation:** Is there any observable rotation of the structure and is it progressing. The vertical wall is expected to displace laterally by up to 25mm under serviceability limit state loading.
- **Settlement:** Is there any observable vertical settlement of the structure. The base is expected to settle vertically by up to 25mm over the long-term life of the structure.
- **Differential Settlement:** Is there any observable differential settlement. Differential settlement is likely to occur as the retained heights / wall heights and retaining wall sections vary. It is expected to be in the region of 10mm.
- **Sliding:** Is there any observable sliding movement of the structure and is this sliding active.
- **Fill:** The fill material to the rear of the wall should be clear of fine particulates which may prevent free draining water.
- **Back of Wall Drainage:** Check for blockages and clear any debris/obstructions from any weep holes.
- **Cracks:** Surface cracks are expected and the design limits cracks to a maximum of 0.3-0.4mm. Any cracks greater than 0.3-0.4mm should be reviewed/recorded.
- The engineer of record should be notified of any significant irregularities, so they may evaluate the cause and record any remedial action.

3.8 Environment and Sustainability

During design, unsustainable and high embodied energy materials will not be used, and repeated details are proposed which allows for re-use of formwork. Any recyclable materials shall be prioritised during the detailed design phase. Transport of plant and materials is proposed from a haul road which will be established within the site boundary throughout the construction period to reduce the adverse impact of construction work on neighbouring communities.

The proposed design addresses the environment and sustainability as follows: -

- The appointed concrete contractor will be certified under the BES 6001 Responsible Sourcing Scheme of an equivalent Environmental Management System (EMS) Certification Scheme. This ensures the supply chain is responsibly sourcing their raw materials and products.
- Retaining wall cross sections will be standardised where possible.
- Steps in the retaining wall will be kept to a minimum to simplify the working platforms across the length.

- Adopting cement replacements for use in concrete mixes where possible. For example, GGBS re-uses a waste by-product from iron blast furnaces. GGBS also improves durability of concrete by reducing its permeability and increasing its resistance to chloride ingress and chemical attack.
- Deleterious materials not used.
- Standard prescribed concrete mixes will be specified to simplify the concrete mix and make them more reliable. This in turn speeds up the concrete procurement.

3.9 Durability, Material and Finishes

Concrete Mixes

All concrete mixes shall be to the relevant clauses of BS 8500-1 and to conform to BS EN 206-1 and BS 8500-2.

Component	Strength Class	Exposure Class
Retaining wall stem	RC32/40	XC3-4, XD3, XF2
Retaining wall base	RC32/40	XC3-4, XD3, XF2
Blinding or mass fill	FND2	X0

Table 3.1 Retaining Wall - Concrete Mixes Summary

The cover to reinforcement will be selected to comply with the requirements of BS8500-1 and the UK National Annex to BS EN 1992-1-1:2014 clause 4.4.1.3 (1) P where: -

- $\Delta C_{dev} = 10\text{mm}$
- Concrete Working Life = 100 Years

The above exposure classes account for the potential for de-icing salts from overspray and, where the concrete is exposed, frost resistance. Where multiple uses are present for a single element which could justify the use of different exposure classes, the most onerous class is used.

Design Sulphate Classification

Ground investigations show that all concrete in contact with the ground should achieve an ACEC classification of AC-3Z.

Surface Finish

All finishes are in accordance with the National Structural Concrete Specification for Building Construction 4th Edition: -

- Concealed / Buried concrete = Plain Finish
- Exposed / Visible concrete = Ordinary Finish but subject to agreement with the client/LPA.

10x10mm chamfers will be provided to the top edges of any reinforced concrete elements.

Reinforcement

All reinforcement will be high tensile deformed bars Grade 500B or 500C conforming to BS 4449:2005. The characteristic yield strength of the reinforcement will be $f_{yk} = 500\text{N/mm}^2$.

Reinforcement shall be obtained from CARES (or equivalent scheme) accredited suppliers.

Stainless steel reinforcement dowels at RC retaining wall joints will comply with BS6744:2020 and have the 'S' notation on the project drawings.

Back of Retaining Wall Filter Drain Material

Backfill to the rear of the Concrete Retaining Wall to be engineered granular fill class 6H in accordance with the *Specification for Highway Works Vol 1 – Series 600 Earth works*, T6/1 (classification and compaction) and T6/2 (grading).

Permeable Backfill Material to be Type A (class 6H) in accordance with the *Specification for Highways Works Vol 1 - Series 500 Drainage and Service Ducts*, Clause 513 (material) and Clause 505 (placing). Grading requirements to be in accordance with *Specification for Highways Work, Series 500*, T5/5 and BS EN 13242.

No in-situ testing required. No over compaction permitted.

Backfill from Formation Level to Underside of Foundation

All loose/made ground/soft spots to be removed off site.

The soils at the base of the resultant excavation shall be cut flat and proof-rolled prior to the importation and placement of suitable granular fill.

Granular Backfill to be Class 6N granular/well graded structural fill in accordance with the *Specification for Highway Works Vol 1 - Series 600 Earthworks*, T6/1 (classification) and T6/2 (grading) and T6/4 (placement & compaction), Clause 610 and Clause 611.

Class 6N granular structural fill to terminate 300mm below the proposed underside of foundation.

The final 300mm of fill is to be M.O.T Type 1 graded structural fill in accordance with *Specification for Highway Works Vol 1 – Series 800 Road Pavements*, Clause 803 (Grading) and clause 802 and T8/4 (Placing and Compaction)

Refer to Renaissance drawing FS1013-REN-EX-XX-D-C-6000 for in-situ testing requirements.

Waterproofing

All buried concrete will be waterproofed with two coats of bitumen paint applied vertically and horizontally in accordance with the specification for Highway Works 2000 series, Clause 2004.

3.10 Risks and Hazards Considered for Design, Execution, Maintenance, and Demolition

The following risks and hazards have been considered within the design, execution, maintenance and demolition involved with the new retaining wall:

Risk	Risk Mitigation	Action Required
Damage/collapse of adjacent structures or services during construction.	Risks associated with existing services and remaining wall foundation identified on drawings.	Main Contractor to manage risk during construction and ensure that suitable temporary works are implemented where necessary to reduce effect of works on adjacent structures and services.
Instability of excavations during construction.	Design has been carried out to minimise excavations and allow for 1:3 batters wherever possible.	Main Contractor to implement suitable methodology and temporary works to ensure that excavations are stable throughout the demolition and construction works.
Over-stressing of structure from increased water pressure behind wall.	Weep holes and drainage specified behind wall to prevent groundwater build-up.	Main Contractor to ensure fill behind wall is installed in line with specification to ensure free-draining.

		Client to ensure regular maintenance is carried out to prevent weep holes becoming blocked.
Over-stressing of structure due to excessive surcharge from maintenance plant.	An imposed surcharge of 5kN/m ² has been allowed for at the top of the wall to allow for maintenance of the soft landscaping and trees.	Client to ensure that design loads on final construction information are available to maintenance teams to allow for any unusual loads to be reviewed by a competent structural engineer.

3.11 Estimated Cost of Proposed Structure Together with Other Structural Forms Considered, and the Reasons for Their Rejection.

The estimated cost of the demolition of the existing wall and the construction of the new retaining wall is estimated to be approximately £104,000.

To replicate the aesthetic of the existing wall, alternatives to the in-situ reinforced concrete option that has been developed would be a cavity reinforced masonry wall and a pre-cast concrete wall. Both options would be suitable. However, the scale of the wall lends itself to an in-situ solution with the reinforced concrete option being preferable to masonry due to the limited maintenance requirements over the life of the structure and the efficiency of construction on site.

3.12 Proposed arrangements for construction

Construction of structure

The construction will follow the indicative sequence below: -

- Establish site boundary/compound and install traffic management on site. Install pedestrian diversions as appropriate.
- Demolish and excavate the existing retaining walls and foundation.
- Excavate any unused/disconnected buried services and reconfigure in line with MEP requirements.
- Install engineered fill in line with the MCHW Volume 1 where the reduced level needs to be built up to the underside of the foundation.
- Undertake CBR testing to the engineered fill to confirm the design soil parameters and bearing pressure are achieved.
- Main Contractor to obtain the relevant permits and permissions where local excavation is required outside of the site (i.e. local to the Highways Authority). This includes formal agreements.
- Excavate local to the reinforced concrete wall using open cuts to provide a working area for its construction. Safe batters deemed to be 1:3 slopes. Supplementary excavation support is to be installed where a 1:3 batter is not possible.
- Blind local to the base of the excavation.
- Fix the reinforcement for the base of the retaining wall.
- Shutter and cast the base and heel of the retaining wall with an appropriate kicker.

- Compact fill material to the heel of the retaining wall to ensure passive resistance can be mobilised.
- Fix the reinforcement for the stem of the retaining wall.
- Shutter the vertical wall face, including the required enhanced finish and chamfers as agreed with the Client Team. Ensure the weep holes are installed.
- Pour the concrete for the vertical stem and allow it to reach the required design strength.
- Install blinding to the rear of the wall to the required invert for the perforated pipe.
- Paint all buried concrete with two coats of bitumen paint. The coating should be applied vertically and horizontally.
- Install the perforated pipe providing falls and connections to the weep holes.
- Backfill earth to the rear of the retaining wall. Porous fill material is required immediately to the rear of the retaining wall to provide free drainage. Earth to be replaced to the proposed landscaping levels (within the site) and to the existing levels (outside the site). All in accordance with the MCHW.
- Install the stone facing to the retaining wall to the Landscape Architect's details.

Traffic management

No road closures are anticipated during the construction works specifically for the retaining wall. Refer to Highway Engineer's information for full details of construction works required for construction of new access road junction.

Service diversions

Refer to MEP/Highway Engineer's information for details of any service diversions required as part of the works.

Interface with existing structures

Existing masonry wall to remain at the return adjacent to the Banana Path at the eastern end of the wall.

Site boundary with residential property at the western end of the wall to be considered during the construction works.

4 DESIGN CRITERIA

4.1 Actions

4.1.1 Permanent Actions

The new structure will be designed in accordance with BS EN 1991-1-1 and the UK National Annex.

4.1.2 Snow, Wind and Thermal Actions

The new structure will be designed in accordance with BS EN 1991-1-3, BS EN 1991-1-4 and BS EN 1991-1-5, as well as the associated UK National Annexes.

4.1.3 Actions Relating to Normal Traffic Under AW Regulations and C&U Regulations

Highway sufficiently offset as not to surcharge the retaining wall.

A minimum characteristic surcharge of 5kN/m² will be applied on the retained surface behind the retaining wall to allow for maintenance of the soft landscaping.

4.1.4 Loading Relating to General Order Traffic Under STGO Regulations

No SOV actions are considered applicable.

4.1.5 Actions Relating to Special Order Traffic

No SOV actions are considered applicable.

4.1.6 Accidental Actions

The new structure will be designed in accordance with BS EN 1991-1-7 and the UK National Annex.

4.1.7 Actions During Construction

Actions during construction shall be in accordance with BS EN 1991-1-6 and the UK National Annex. This includes for temporary conditions and loading scenarios. Surcharge from construction plant to be assessed on a case-by-case basis once the specific methodology has been developed by the Main Contractor.

4.1.8 Any Special Action Not Covered Above

None.

4.2 Heavy or High Load Route Requirements

None.

4.3 Minimum Headroom Provided

Not Applicable

4.4 Authorities Consulted and Any Special Conditions Required

Utility companies to be consulted regarding cost, feasibility, and programme of any service diversions required.

4.5 Standards and Documents Listed in the Technical Approval Schedule

Refer to Appendix A.

4.6 Proposed Departures from Standards Given in 4.6

None.

5 STRUCTURAL ANALYSIS

5.1 Methods of Analysis Proposed for Superstructure, Substructure and Foundations

The reinforced concrete retaining wall will be designed using the Tekla Tedds design package, based on the performance specification provided in this document. Retained heights will be based on the on those present in the proposed landscaping and discussed in section 3.4.

The maximum lateral deflection will be governed and limited to the relevant span/effective depth ratio defined in the Building Codes for the temporary and permanent conditions.

The concrete elements will be designed to withstand the maximum axial, bending and shear at the Ultimate Limit State in accordance with BS EN 1992:2004 & the GEO related design in accordance with BS EN 1997:2013.

5.2 Description and Diagram of Idealised Structure to be Used for Analysis

Idealised diagrams are provided below for the key point in the indicative sequence.

The permanent condition will govern the design for the reinforced concrete retaining wall which will be designed acting as a free cantilever from the RC base (unpropped).

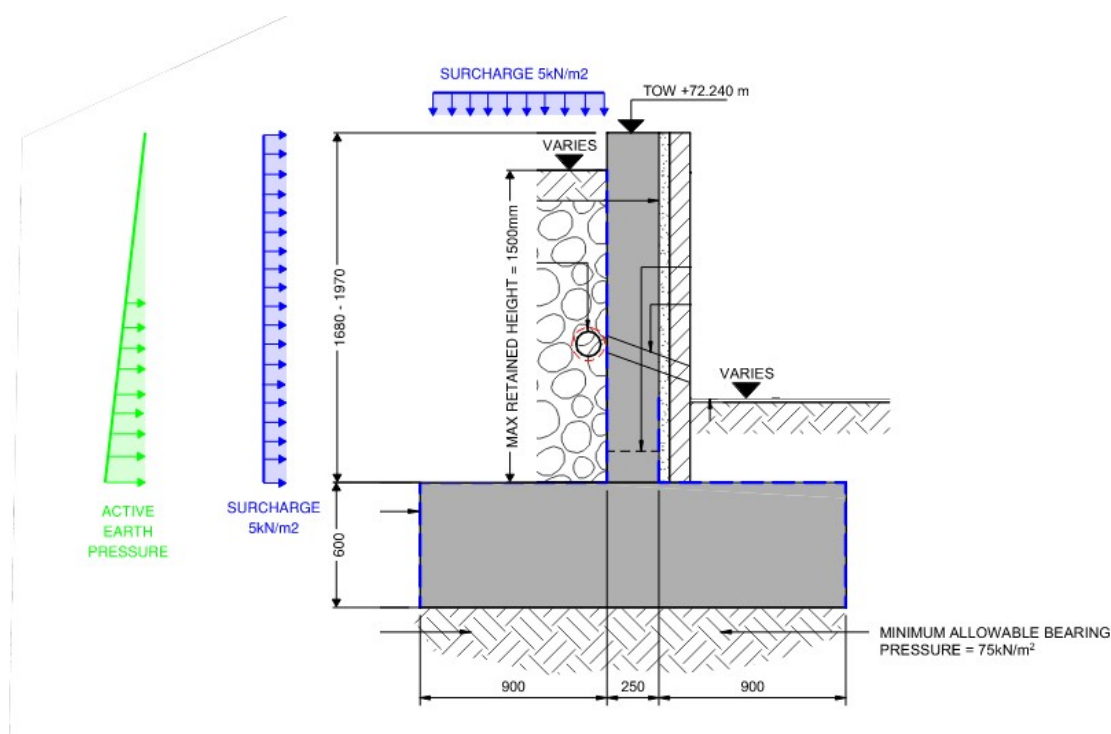


Figure 5.1 Permanent Works Unpropped RC Retaining Wall

5.3 Assumptions Intended for Calculation of Structural Element Stiffness

Not applicable.

Calculations will be based upon a maximum vertical settlement of 25mm under working loads.

5.4 Proposed Range of Soil Parameters to Be Used in the Design of Earth Retaining Elements

Soil parameters to be based on the ground investigation information provided by the Client and Main Contractor with a minimum allowable bearing capacity of 75kN/m^2 to be adopted subject to validation through testing.

6 GEOTECHNICAL CONDITIONS

6.1 Acceptance of Recommendation of the Geotechnical Investigation Report to be used in the Design and Reasons for Any Proposed Changes

Refer to the ground investigation reports produced by Geotechnics and Brownfield Solutions.

6.2 Summary of Design for Highway Structure in Geotechnical Design Report

Refer to the ground investigation reports produced by Geotechnics and Brownfield Solutions.

6.3 Differential Settlement to be Allowed for in the Design of the Structure

Design of the structure shall assume a differential settlement along the retaining wall of up to 25mm.

6.4 If Geotechnical 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

Not applicable.

7 CHECKING

7.1 Proposed Category

The structure is a category 0 structure. Clause 3.6 (4) notes category 0 for '*earth retaining structures with an effective height of greater than 1.5m but less than 2.5m*'.

The design will be independently checked internally by Renaissance in line with CG300 clause 2.67.

Design Supervision Level to be 2, as specified in Table B4 of BS EN 1990:2005 and IAN 124/11 Table A.2.

8 DRAWINGS AND DOCUMENTS

8.1 List of drawings and documents accompanying the submission

Drawing No. / Report Reference	Drawing Title / Report	Status	Revision
FS1013-REN-EX-XX-D-C-6000	Cyclops Junction Retaining Wall	Preliminary	P01
FS1013-REN-EX-XX-D-C-6010	Cyclops Junction Retaining Wall Details	Preliminary	P01

9 THE ABOVE IS SUBMITTED FOR ACCEPTANCE

Signed: _____

Name: _____ Philip Whitesmith _____

Senior Engineer

Engineering Qualifications: _____ MEng, CEng, MStructE _____

Name of Organisation: _____ Renaissance Associates Limited _____

Date: _____ 29th May 2024 _____

**10 THE ABOVE IS REJECTED/AGREED* SUBJECT TO THE AMENDMENTS AND
CONDITIONS SHOWN BELOW**

Signed:

Name:

Position Held:

Engineering Qualifications:

TAA:

Date:

Conditions:

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

11 APPENDICES

11.1 Appendix A Technical Approval Schedule (TAS)

The below standards will be used in the design of the highway structure. For each standard the most recent revision is used, including the latest amendments and corrigenda. For each Eurocode, the relevant UK National Annex will also be applicable.

Eurocodes and associated UK National Annexes

The following Eurocodes have been used along with the associated National Annexes

Eurocode Part	Title	Applicable
Eurocode 0	Basis of structural design	
BS EN 1990:2002 +A1:2005	Eurocode 0: Basis of structural design	✓
Eurocode 1	Actions on structures	
BS EN 1991-1:2002 +A1:2005	Eurocode 1: Actions on structures. General Actions – Densities, self-weight, imposed load for buildings	✓
BS EN 1991-1-2:2002	Eurocode 1: Actions on structures. General Actions – Actions on structures exposed to fire	✓
BS EN 1991-1-3:2003 +A1:2005	Eurocode 1: Actions on structures. General Actions – Snow loads	✓
BS EN 1991-1-4:2005 +A1:2010	Eurocode 1: Actions on structures. General Actions – Wind actions	✓
BS EN 1991-1-5:2003	Eurocode 1: Actions on structures. General Actions – Thermal actions	✓
BS EN 1991-1-6:2005	Eurocode 1: Actions on structures. General Actions – Actions during execution	✓
BS EN 1991-1-7:2006 +A1:2014	Eurocode 1: Actions on structures. General Actions – Accidental actions	✓
BS EN 1991-1-2:2003	Eurocode 1: Actions on structures. Traffic loads on bridges	
Eurocode 2	Design of concrete structures	
BS EN 1992-1-1:2004 +A1:2014	Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings	✓
BS EN 1992-1-2:2004	Eurocode 2: Design of concrete structures – Part 1-2: General rules – Structural fire design	✓
BS EN 1992-2:2005	Eurocode 2: Design of concrete structures – Part 2: Concrete bridges – Design and detailing rules	✓
BS EN 1992-3:2006	Eurocode 2: Design of concrete structures – Part 3: Liquid retaining and containment structures	✓
BS EN 1992-4:2018	Eurocode 2: Design of concrete structures – Part 4: Design of fastenings for use in concrete	
Eurocode 3	Design of steel structures	
BS EN 1993-1-1:2005 +A1:2014	Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings	

BS EN 1993-1-2:2005	Eurocode 3: Design of steel structures – Part 1-2: General rules – Structural fire design	
BS EN 1993-1-3:2006	Eurocode 3: Design of steel structures – Part 1-3: General rules – Supplementary rules for cold-formed members and sheeting	
BS EN 1993-1-4:2006	Eurocode 3: Design of steel structures – Part 1-4: General rules – Supplementary rules for stainless steels	
BS EN 1993-1-5:2006	Eurocode 3: Design of steel structures – Part 1-5: Plated structural elements	
BS EN 1993-1-6:2007 +A1:2017	Eurocode 3: Design of steel structures – Part 1-6: Strength and stability of shell structures	
BS EN 1993-1-7:2007	Eurocode 3: Design of steel structures – Part 1-7: Plated structures subject to out of plane loading	
BS EN 1993-1-8:2005	Eurocode 3: Design of steel structures – Part 1-8: Design of joints	
BS EN 1993-1-9:2005	Eurocode 3: Design of steel structures – Part 1-9: Fatigue	
BS EN 1993-1-10:2005	Eurocode 3: Design of steel structures – Part 1-10: Material toughness and through-thickness properties	
BS EN 1993-1-11:2006	Eurocode 3: Design of steel structures – Part 1-11: Design of structures with tension components	
BS EN 1993-1-12:2007	Eurocode 3: Design of steel structures – Part 1-12: Additional rules for the extension of EN 1993 up to steel grades S700	
BS EN 1993-5:2007	Eurocode 3: Design of steel structures – Part 5: Piling	
Eurocode 4	Design of composite steel and concrete structures	
BS EN 1994-1-1:2004	Eurocode 4: Design of composite steel and concrete structures – Part 1-1: General rules and rules for buildings	
BS EN 1994-1-2:2005	Eurocode 4: Design of composite steel and concrete structures – Part 1-2: General rules – Structural fire design	
BS EN 1994-2:2005	Eurocode 4: Design of composite steel and concrete structures – Part 2: General rules and rules for bridges	
Eurocode 5	Design of timber structures	
BS EN 1995-1-1:2004 +A2:2014	Eurocode 5: Design of timber structures – Part 1-1 General – Common rules and rules for buildings	
BS EN 1995-1-2:2004	Eurocode 5: Design of timber structures – Part 1-2 General – Structural fire design	
BS EN 1995-2:2004	Eurocode 5: Design of timber structures – Part 2 Bridges	
Eurocode 6	Actions on masonry structures	
BS EN 1996-1-1:2005 +A1:2012	Eurocode 6: Design of masonry structures – Part 1-1: General rules for reinforced and unreinforced masonry structures	
BS EN 1996-1-2:2005	Eurocode 6: Design of masonry structures – Part 1-2: General rules – Structural fire design	

BS EN 1996-2:2006	Eurocode 6: Design of masonry structures – Part 2: Design considerations, selection of materials and execution of masonry	
BS EN 1996-3:2006	Eurocode 6: Design of masonry structures – Part 3: Simplified calculation methods for unreinforced masonry structures	
Eurocode 7	Geotechnical design	
BS EN 1997-1:2004 +A1:2013	Eurocode 7: Geotechnical design – Part 1: General rules	✓
BS EN 1997-2:2007	Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing	✓
Eurocode 8	Design of structures for earthquake resistance	
BS EN 1998-1:2004 +A1:2013	Eurocode 8: Design of structures for earthquake resistance – Part 1: General rules, seismic actions and rules for buildings	
BS EN 1998-2:2005 +A2:2011	Eurocode 8: Design of structures for earthquake resistance – Part 2: Bridges	
BS EN 1998-5:2004	Eurocode 8: Design of structures for earthquake resistance – Part 5: Foundations, retaining structures and geotechnical aspects	
Eurocode 9	Design of aluminium structures	
BS EN 1999-1-1:2007 +A2:2013	Eurocode 9: Design of aluminium structures – Part 1-1: General structural rules	
BS EN 1999-1-1:2007	Eurocode 9: Design of aluminium structures – Part 1-2: Structural fire design	
BS EN 1999-1-3:2007 +A1:2011	Eurocode 9: Design of aluminium structures – Part 1-3: Structures susceptible to fatigue	
BS EN 1999-1-4:2007 +A1:2011	Eurocode 9: Design of aluminium structures – Part 1-4: Cold formed structural sheeting	

BSI Published Documents

The following documents have been used for guidance only unless clauses are otherwise specified in BD 100/16 Annex B and relate to the above applicable Eurocodes and National Annexes and below Execution Standards referenced in British Standards or Eurocodes.

Published Document Reference	Title
PD 6688-1-1:2011	Recommendations for the design of structures to BS EN 1991-1-1
PD 6688-1-2:2007	Background paper to the UK National Annex to BS EN 1991-1-2
PD 6688-1-4:2015	Background paper to the UK National Annex to BS EN 1991-1-4
PD 6688-1-7:2009 +A1:2014	Recommendations for the design of structures to BS EN 1991-1-7
PD 6688-2:2011	Recommendations for the design of structures to BS EN 1991-2
PD 6687-1:2010	Background paper to the UK National Annexes to BS EN 1992-and BS EN 1992-3
PD 6687-2:2008	Recommendations for the design of structures to BS EN 1992-2:2005
PD 6694-1:2011 +A1:2020	Recommendations for the design of structures subject to traffic loading

	to BS EN 1997-1
--	-----------------

Execution Standards referenced in British Standards or Eurocodes

Execution Standard Reference	Title	Applicable
BS EN 1090-1:2009 +A1:2011	Execution of steel structures and aluminium structures – Part 1: Requirements for conformity assessment of structural components	
BS EN 1090-2:2018	Execution of steel structures and aluminium structures – Part 2: Technical requirements for the execution of steel structures	
BS EN 1090-3:2019	Execution of steel structures and aluminium structures – Part 3: Technical requirements for aluminium structures	
BS EN 13670:2009	Execution of concrete structures	✓

Product Standards referenced in the British Standards or Eurocodes

Product Standard Reference	Title	Applicable
BS EN 206:2013	Concrete – Specification, performance, production and conformity	✓
BS EN 1317-1:2010	Road Restraint Systems – Part 1: Terminology and general criteria for test methods	✓
BS EN 1317-2:2010	Road Restraint Systems – Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers	✓
BS EN 1317-3:2010	Road Restraint Systems – Part 3: Performance classes, impact test acceptance criteria and test methods for safety cushions	✓
DD ENV 1317-4:2002	Road Restraint Systems – Part 4: Performance classes, impact test acceptance criteria and test methods for terminals and transitions of safety barriers	✓
BS EN 1317-5:2007 +A2:2012	Road Restraint Systems – Part 5: Product requirements and evaluation of conformity for vehicle restraint systems	✓
PD CEN/TR 17081:2018	Design of fastenings for use in concrete – Plastic design of fastenings with headed and post-installed fasteners	
BS EN 1337-1:2000	Structural bearings – Part 1: General Design Rules	
BS EN 1337-2:2004	Structural bearings – Part 2: Sliding elements	
BS EN 1337-3:2005	Structural bearings – Part 3: Elastomeric bearings	
BS EN 1337-4:2004	Structural bearings – Part 4: Roller bearings	
BS EN 1337-5:2005	Structural bearings – Part 5: Pot bearings	
BS EN 1337-6:2004	Structural bearings – Part 6: Rocker bearings	
BS EN 1337-7:2004	Structural bearings – Part 7: Spherical and cylindrical PTFE bearings	
BS EN 1337-8:2007	Structural bearings – Part 8: Guide bearings and restraint bearings	

BS EN 1337-9:1998	Structural bearings – Part 9: Protection	
BS EN 1337-10:2003	Structural bearings – Part 10: Inspection and maintenance	
BS EN 1337-11:1998	Structural bearings – Part 11: Transport, Storage and Installation	
BS EN 10025-1:2004	Hot rolled products of structural steels Part 1: General technical delivery conditions	
BS EN 10025-2:2019	Hot rolled products of structural steels Part 2: Technical delivery conditions for non-alloy structural steels	
BS EN 10025-3:2019	Hot rolled products of structural steels Part 3: Technical delivery conditions for normalised/normalised rolled weldable fine grain structural steels	
BS EN 10025-4:2019	Hot rolled products of structural steels Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels	
BS EN 10025-5:2019	Hot rolled products of structural steels Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance	
BS EN 10025-6:2019	Hot rolled products of structural steels Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition	
BS EN 10080:2005	Steel for the reinforcement of concrete – Weldable reinforcing steel – General	
BS EN 10210-1:2006	Hot finished structural hollow sections of non-alloy and fine grain steels – Part 1: Technical delivery conditions	
BS EN 10210-2:2019	Hot finished structural hollow sections of non-alloy and fine grain steels – Part 2: Tolerances, dimensions and sectional properties	
BS EN 10248-1:1996	Hot rolled sheet piling of non-alloy steels – Part 1: Technical delivery conditions	
BS EN 10248-2:1996	Hot rolled sheet piling of non-alloy steels – Part 2: Tolerances, dimensions and sectional properties	
BS EN 12063:1999	Execution of special geotechnical work – Sheet pile walls	
BS EN 14388:2005	Road traffic noise reducing devices	
BS EN 15050:2007 +A1:2012	Precast concrete products – Bridge elements	

British Standards

British Standard Reference	Title	Applicable
BS 4449:2005 +A3:2016	Steel for the reinforcement of concrete	✓
BS 5896:2012	Specification for high tensile steel wire and strand for the prestressing of concrete	
BS 7818:1995	Specification for pedestrian restraint systems in metal	

BS 8002:2015	Code of practice for earth retaining structures	✓
BS 8004:2015 +A1:2020	Code of practice for foundations	✓
BS 8006-1:2010 +A1:2016	Code of practice for strengthened/reinforced soils and other fills	
BS 8102:2009	Code of practice for protection of below ground structures against water from the ground	✓
BS 8500-1:2015 +A2:2019	Concrete – Complementary British Standard to BS EN 206: Method of specifying and guidance for the specifier	✓
BS 8500-2:2015 +A2:2019	Concrete – Complementary British Standard to BS EN 206: Specification for the constituent materials and concrete	✓
BS 8666:2005	Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete	✓

The Manual Contract Document for Highway Works (MCHW)

MCHW Reference	Title	Applicable
MCHW Volume 1: April 2022	Specification for Highway Works	✓
MCHW Volume 2: November 2021	Notes for guidance on the Specification for Highway Works	✓
MCHW Volume 3: February 2017	Highway Construction Details	

The Design Manual for Roads and Bridges (DMRB)

DMRB Reference	Title	Applicable
GG 101	Introduction to the Design Manual for Roads and Bridges	✓
GG 102	Quality Management Systems for Highway Design	✓
GG 103	Introduction and general requirements for sustainable development and design	✓
GG 104	Requirements for Safety Risk Assessment	✓
CG 300	Technical approval of highway structures	✓
CG 302	As-built, operational and maintenance records for highway structures	✓
CG 303	Quality assurance scheme for paints and similar protective coatings	
CG 305	Identification marking of highway structures	
GG 184	Specification for the use of Computer Aided Design	
CD 127	Cross-sections and headrooms	
CD 350	The design of highway structures	✓
CD 351	The design and appearance of highway structures	

CD 352	Design of road tunnels	
CD 353	Design criteria for footbridges	
CD 354	Design of minor structures	
CD 355	Application of whole-life costs for design and maintenance of highway structures	✓
CD 356	Design of highway structures for hydraulic action	
CD 357	Bridge expansion joints	
CD 358	Waterproofing and surfacing of concrete bridge decks	
CD 359	Design requirements for permanent soffit formwork	✓
CD 361	Weathering steel for highway structures	
CD 362	Enclosure of bridges	
CD 363	Design rules for aerodynamic effects on bridges	
CD 364	Formation of continuity joints in bridge decks	
CD 365	Portal and cantilever signs/signals gantries	
CD 366	Design criteria for collision protection beams	
CD 368	Design of fibre reinforced polymer bridges and highway structures	
CD 369	Surface protection for concrete highway structures	
CD 372	Design of post-installed anchors and reinforcing bar connections in concrete	
CD 373	Impregnation of reinforced and prestressed concrete highway structures using hydrophobic pore-lining impregnants	
CD 374	The use of recycled aggregates in structural concrete	✓
CD 375	Design of corrugated steel buried structures	
CD 377	Requirements for road restraint systems	✓
CD 622	Managing geotechnical risk	✓
CS 450	Inspection of highway structures	✓
CS 461	Assessment and upgrading of in-service parapets	
GD 304	Designing health and safety into maintenance	✓
LD 119	Roadside environmental mitigation and enhancement	✓

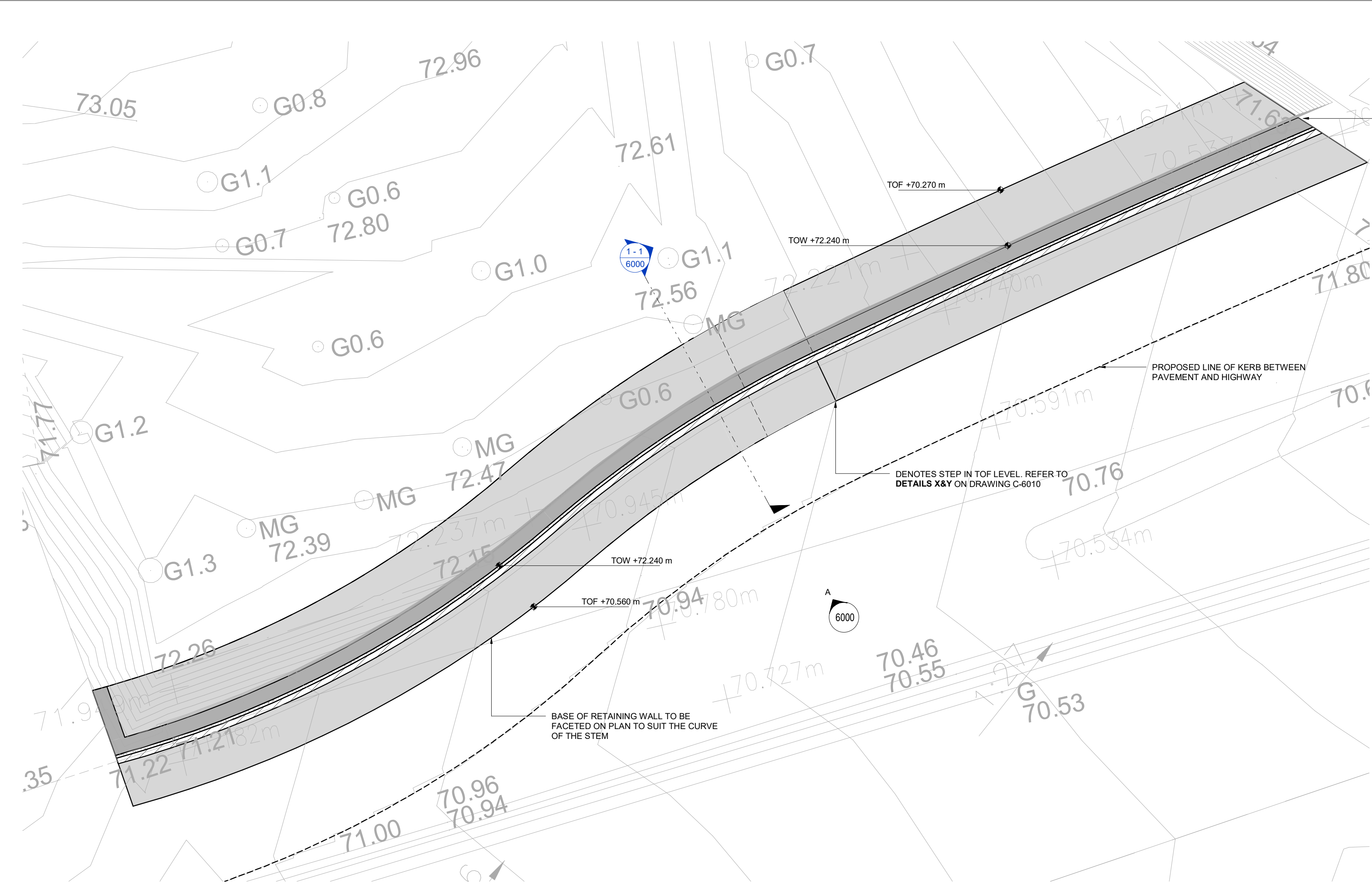
Interim Advice Notes

IAN Reference	Title	Applicable
IAN 105/08	Implementation of construction (Design and management) 2007 and the withdrawal of SD 10 and SD 11	
UAN 161/15	Smart Motorways	

Miscellaneous

Standard Reference	Title	Applicable
CHE Memorandum 227/08	The impregnation of Reinforced and Prestressed Concrete Highway Structures using Hydrophobic Pore Lining Impregnates	
CIRIA C543	Bridge Detailing Guide	
CIRIA C766	Control of cracking caused by restrained deformation in concrete	✓
CIRIA C686	Safe Access for Maintenance and Repair	✓
CIRIA C760	Guidance on embedded retaining wall design	✓

11.2 Appendix B Renaissance Drawings



PROPOSED RETAINING WALL PLAN

SCALE: 1 : 50

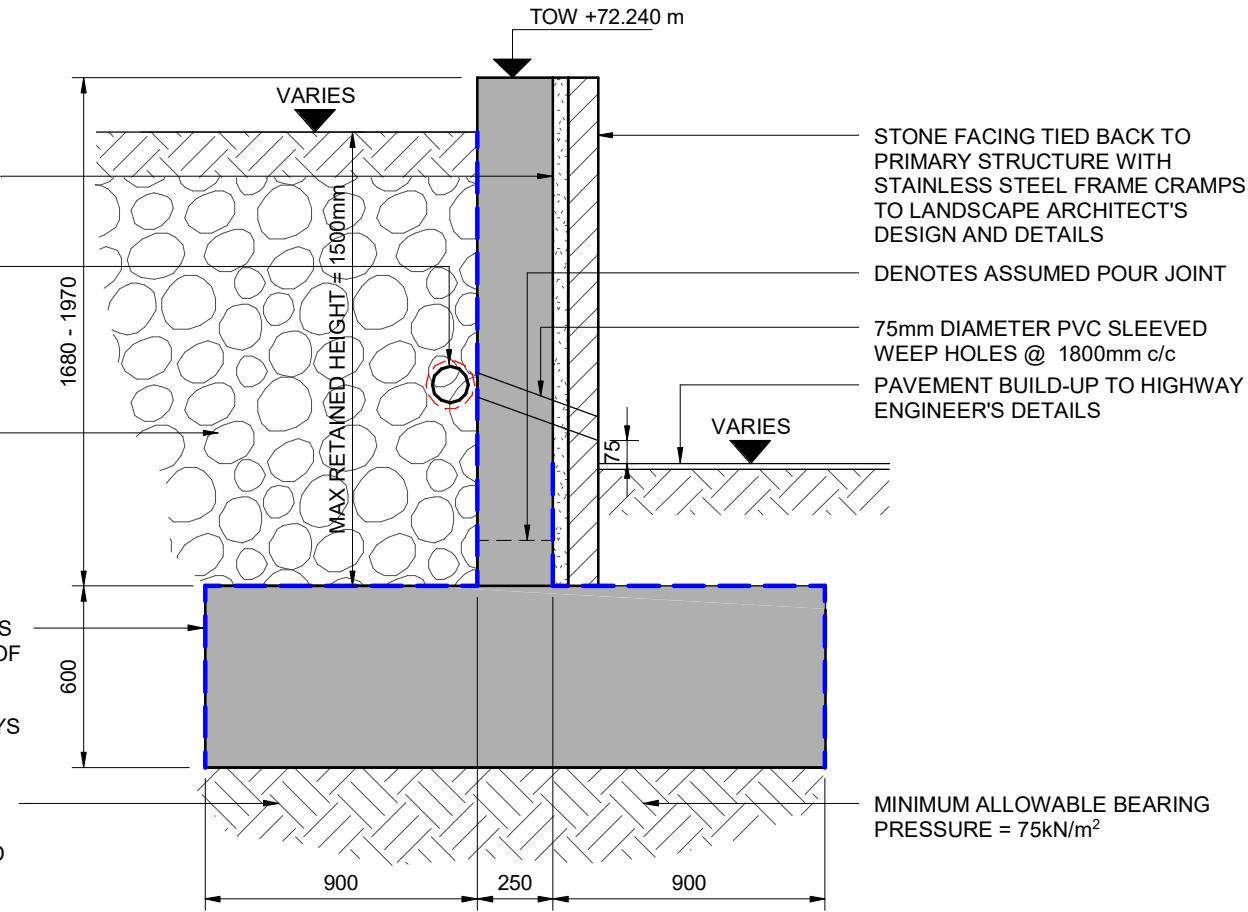
UNDERPINNING OF EXISTING RETAINING WALL FOUNDATION MAY BE REQUIRED TO AVOID UNDERMINING. DETAILS TO BE CONFIRMED ON SITE

ALLOW 50mm GAP BETWEEN PRIMARY STRUCTURE AND STONE FACING FILLED WITH LEAN MIX GROUT
PERFORATED CARRIER DRAINAGE TO REAR OF WALL WRAPPED IN GEOTEXTILE MEMBRANE

DENOTES ENGINEERED GRANULAR FILL BEHIND RETAINING WALL STEM. FOR SPECIFICATION, REFER TO ENGINEERED FILL NOTE

DENOTES BURIED CONCRETE SURFACES TO BE WATERPROOFED WITH 2 COATS OF BITUMEN PAINT APPLIED VERTICALLY AND HORIZONTALLY IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAYS WORKS 2000 SERIES, CLAUSE 2004

DENOTES ENGINEERED GRANULAR FILL UNDER RETAINING WALL BASE. FOR SPECIFICATION, REFER TO ENGINEERED FILL NOTE



RETAINING WALL SECTION 1-1

SCALE: 1 : 25

NOTES:

- THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWING AND SPECIFICATIONS.
- DO NOT SCALE FROM THIS DRAWING. ANY AMBIGUITIES OR ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS TO BE CHECKED / VERIFIED ON SITE.
- ALL LEVELS ARE IN METRES. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
- FOR GENERAL NOTES REFER TO DRAWING FS1013-REN-01-XX-D-S-2010
- SOIL ALLOWABLE BEARING PRESSURE TO BE VERIFIED BY PLATE LOAD TEST PRIOR TO CONSTRUCTION
- BURIED CONCRETE SURFACES TO BE COATED WITH 2 LAYERS OF BITUMEN PAINT APPLIED VERTICALLY AND HORIZONTALLY IN ACCORDANCE WITH SPECIFICATION FOR HIGHWAYS WORKS SERIES 2000, CLAUSE 2004

CONCRETE NOTES:

- CONCRETE MIX FOR RETAINING WALL TO BE GRADE C32/40 WITH MAXIMUM W/C RATIO OF 0.40 AND MINIMUM CEMENT CONTENT OF 380kg/m³.
- COVER TO REINFORCEMENT TO BE 55mm GENERALLY WITH 95mm TO BASE OF RETAINING WALL.

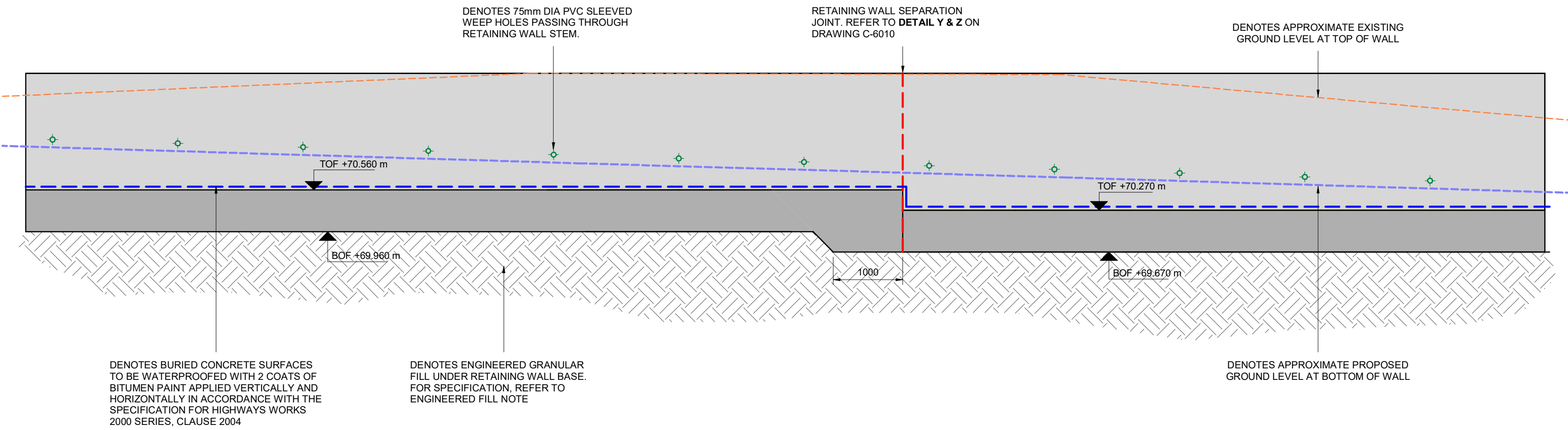
ENGINEERED FILL/TESTING SPECIFICATION:-

- BACK OF RETAINING WALL FILTER DRAIN MATERIAL:-**
- FILL**
 - GRANULAR BACKFILL TO BE CLASS 6H IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS VOL1 - SERIES 600 (EARTHWORKS, T6/1 (CLASSIFICATION AND COMPACTION) AND T6/2 (GRADING)).
 - PERMEABLE BACKFILL MATERIAL TO BE TYPE A (CLASS 6H) IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAYS WORKS VOL1 - SERIES 500 DRAINAGE AND SERVICE DUCTS, CLAUSE 513 (MATERIAL) AND CLAUSE 505 (PLACING).
 - RAISING REQUIREMENTS TO BE IN ACCORDANCE WITH SPECIFICATION FOR HIGHWAYS WORKS, SERIES 500, T5/5 AND BS EN 13242.
 - TESTING**
 - NOT REQUIRED. NO OVERCOMPACTION PERMITTED.
- BACKFILL FROM FORMATION LEVEL TO UNDERSIDE OF FOUNDATION:-**
- FILL**
 - ALL LOOSE/MADE GROUND/ SOFT SPOTS TO BE REMOVED OFF SITE.
 - THE SOILS AT THE BASE OF THE RESULTANT EXCAVATION SHALL BE CUT FLAT AND PROOF-ROLLED PRIOR TO THE IMPORTATION AND PLACEMENT OF SUITABLE GRANULAR FILL.
 - GRANULAR BACKFILL TO BE CLASS 6N GRANULAR/WELL GRADED STRUCTURAL FILL IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS VOL1 - SERIES 600 EARTHWORKS, T6/1 (CLASSIFICATION) AND T6/2 (GRADING) AND T6/4 (PLACEMENT & COMPACTION).
 - THE CLASS 6N MATERIAL MUST ALSO BE IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS VOL1 - SERIES 600 EARTHWORKS, CLAUSE 610 AND CLAUSE 611.
 - TYPE 6N GRANULAR STRUCTURAL FILL TO TERMINATE 300mm BELOW THE PROPOSED UNDERSIDE OF FOUNDATION.
 - THE FINAL 300mm OF FILL IS TO BE M.O.T TYPE 1 GRADED STRUCTURAL FILL IN ACCORDANCE WITH SPECIFICATION FOR HIGHWAY WORKS VOL1 - 800 SERIES ROAD PAVEMENTS, CLAUSE 803 (GRADING) AND CLAUSE 802 AND T8/4 (PLACING AND COMPACTION)
 - TESTING**
 - AT FORMATION LEVEL AND AFTER PROOF ROLLING, UNDERTAKE IN SITU CBR TESTING USING A 600mm DIAMETER PLATE AS PER BS 1377 PART 9 AT 15m INCREMENTS ALONG THE LENGTH OF THE FOUNDATIONS. CBR VALUE OF >5% REQUIRED.
 - AT EACH LIFT/LAYER, UNDERTAKE IN SITU CBR TESTING USING A 600mm DIAMETER PLATE AT 15m INCREMENTS ALONG THE LENGTH OF THE FOUNDATIONS. CBR VALUE OF 10% REQUIRED LOCAL TO FOUNDATIONS. CBR OF >5% REQUIRED TO LANDSCAPED LOCATIONS.
 - AT UNDERSIDE OF FOUNDATION ATOP OF THE M.O.T. TYPE 1 UNDERTAKE IN SITU PLATE LOAD TESTING USING A 600mm DIAMETER PLATE AT 15m INCREMENTS ALONG THE LENGTH.
 - CBR TESTS TO BE UNDERTAKEN IN ACCORDANCE WITH BS 1377-9 AND IAN 73/06 REV1 (2009) USING MIN. 600mm DIAMETER PLATE.
- FOR PLATE LOAD TESTS - LOAD APPLIED TO BE 225kN/m² IN 6 EQUAL INCREMENTS TO REPLICATE 3 TIMES THE MAXIMUM DESIGNED BEARING PRESSURE OF 75kN/m² UNDER THE RETAINING WALL BASE

ANY REMOVAL AND/OR DIVERSION OF EXISTING UTILITIES REQUIRED AS PART OF THE WORKS TO CONSTRUCT THE NEW RETAINING WALL TO BE CONFIRMED BY THE MEP ENGINEER.

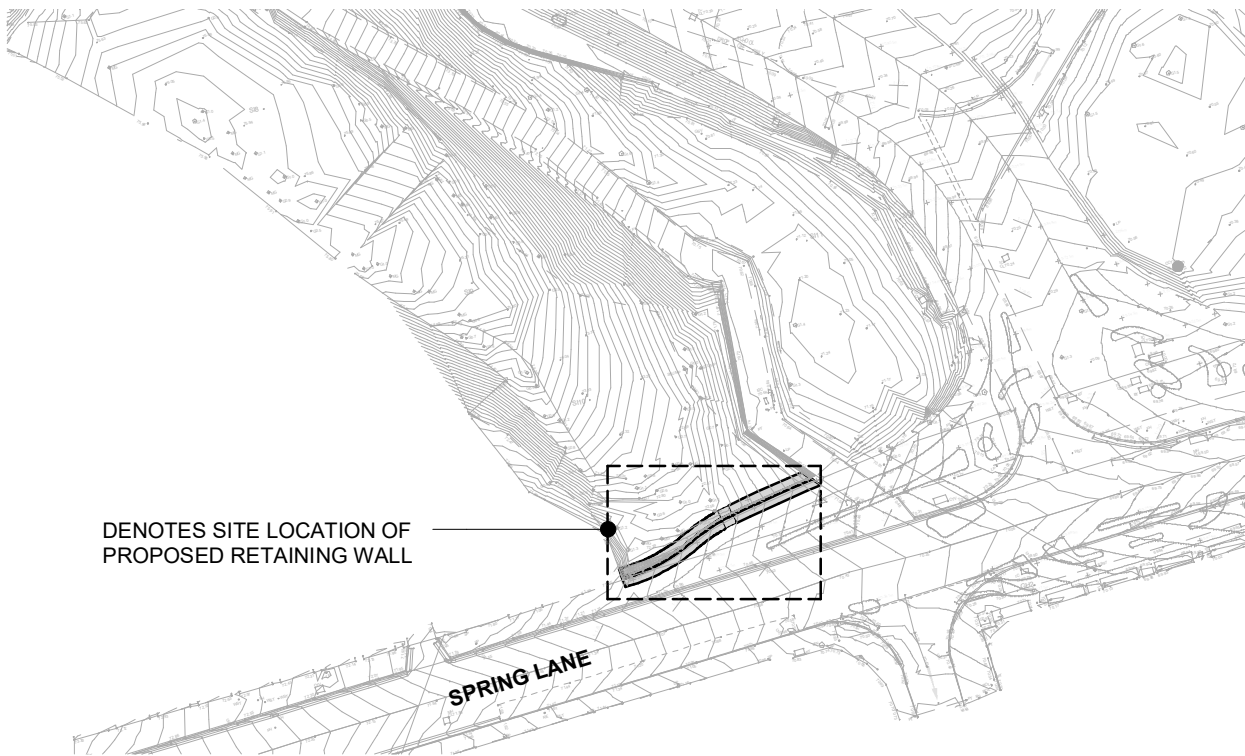
REFER TO HIGHWAY ENGINEER'S INFORMATION FOR DETAILS OF SETTING OUT FOR NEW RETAINING WALL.

THE RETAINING WALL DESIGN IS ASSUMED TO BE A CATEGORY 0 STRUCTURE IN LINE WITH CG 300.



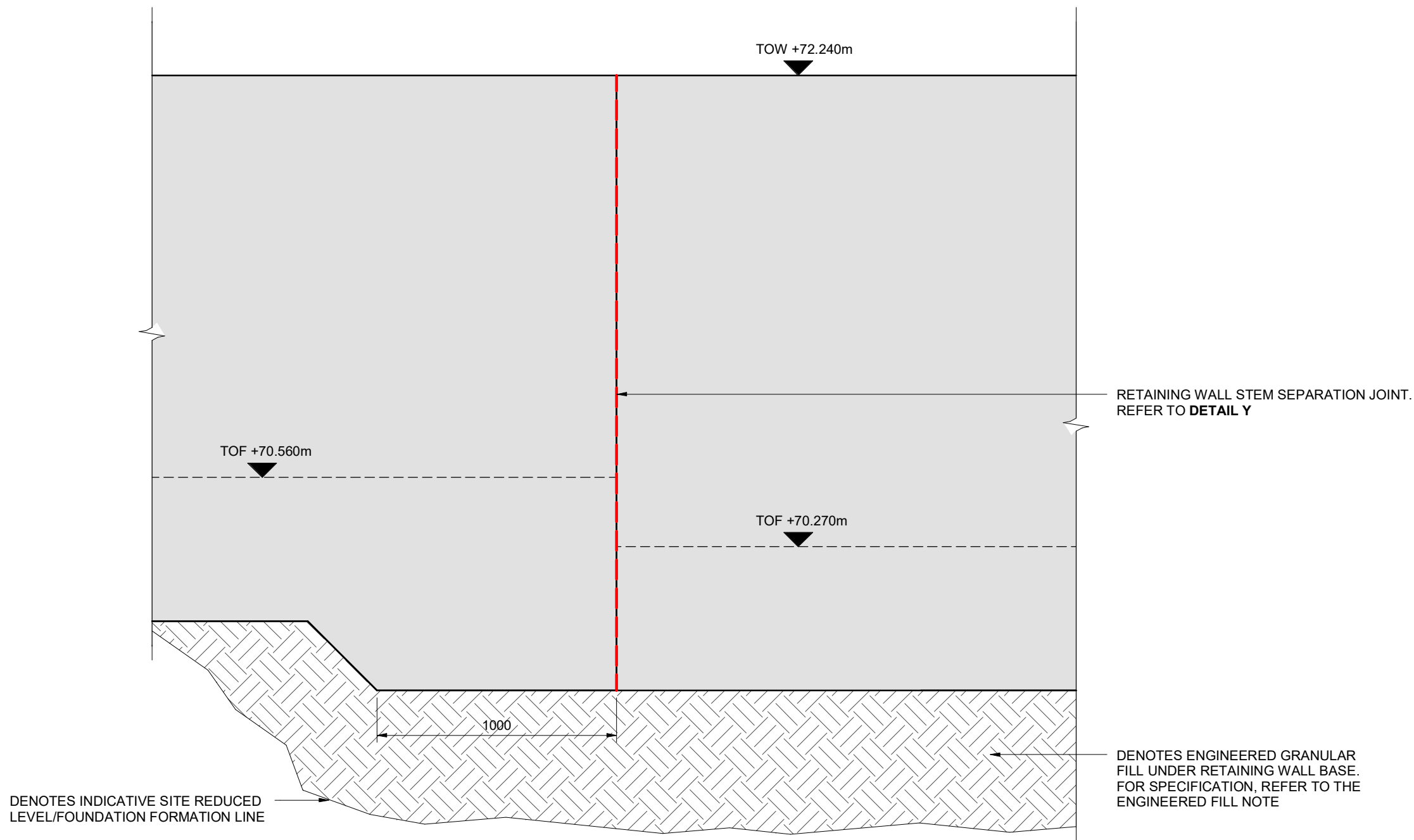
RETAINING WALL ELEVATION A

SCALE: 1 : 50



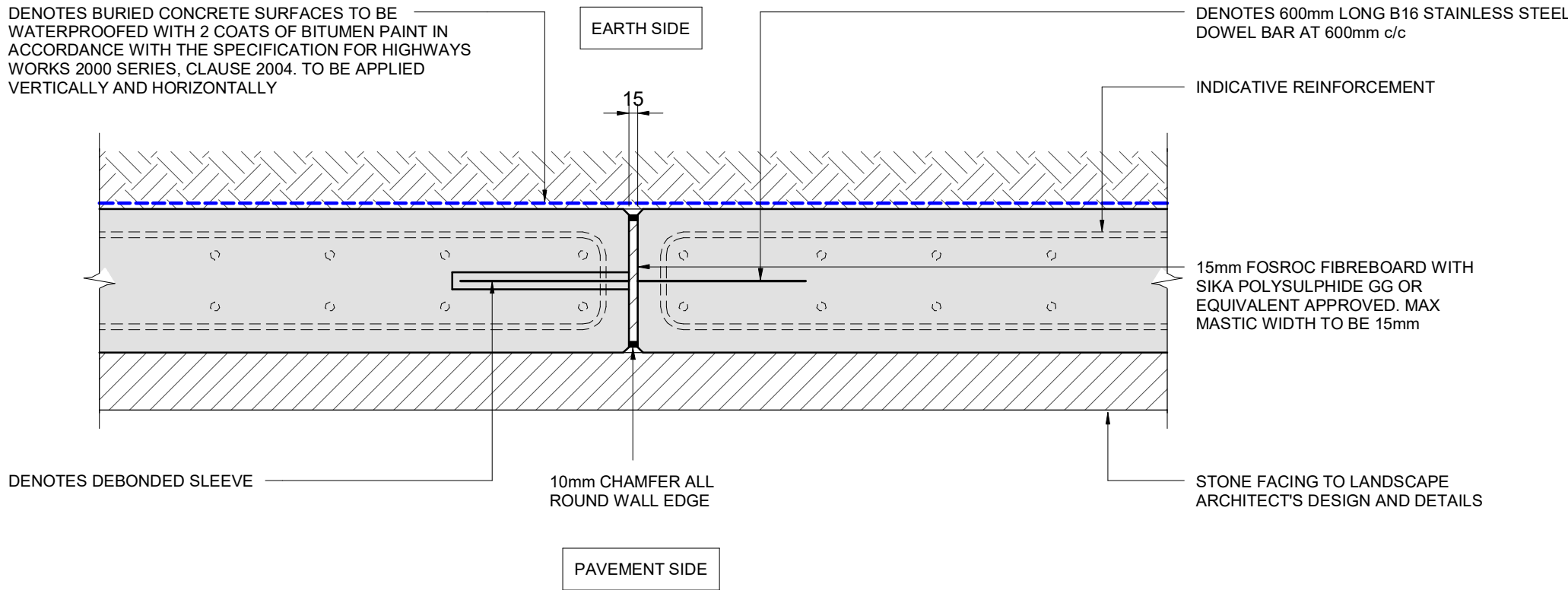
KEY PLAN

P01	STAGE 4 ISSUE	11.03.24	GM	PW
Rev:	Description:	Date:	By:	Chkd:
renaissance Renaissance Associates Ltd Carvers Warehouse 77 Dale Street Manchester M1 2HG				
Project: STAR RADCLIFFE ACADEMY, BURY				
Drawing Title: CYCLOPS JUNCTION RETAINING WALL				
Status: STAGE 4				
Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	MAR 24	GM	PW	AI
Scale:	As indicated	Project No:	2303-02	
Project Code:	Originator:	Volume:	Level:	Type: Role: Category / Number: Rev:
FS1013 -REN - EX - XX - D - C -	6000 -	P01		



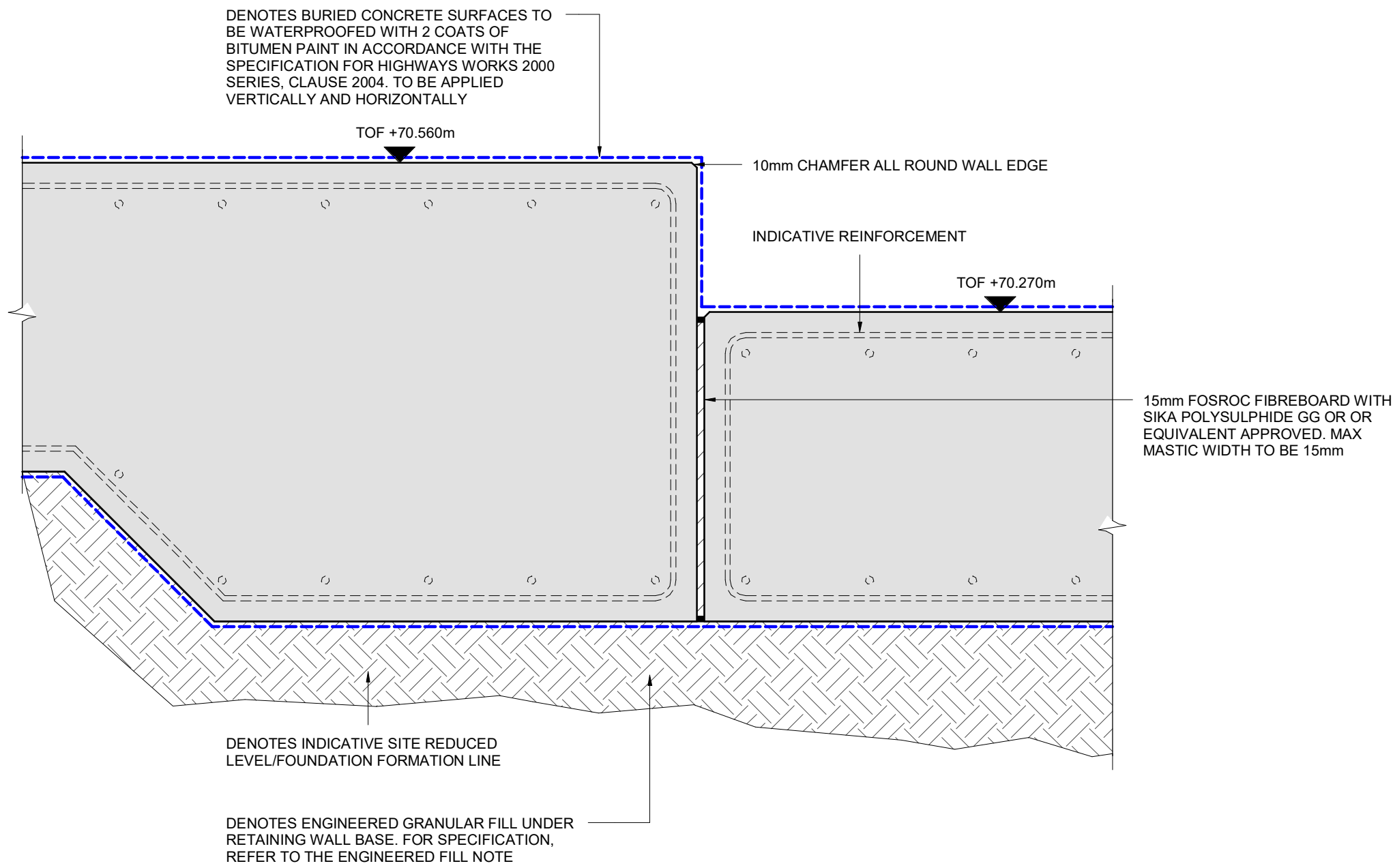
DETAIL X - RETAINING WALL
TRANSITION DETAIL

SCALE: 1 : 20



DETAIL Y - RETAINING WALL STEM
SEPARATION JOINT DETAIL

SCALE: 1 : 10



DETAIL Z - RETAINING WALL BASE
SEPARATION JOINT DETAIL

SCALE: 1 : 10

NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWING AND SPECIFICATIONS.
2. DO NOT SCALE FROM THIS DRAWING. ANY AMBIGUITIES OR ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS TO BE CHECKED / VERIFIED ON SITE.
3. ALL LEVELS ARE IN METRES. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. FOR GENERAL NOTES REFER TO DRAWING FS1013-REN-01-XX-D-S-2010
5. SOIL ALLOWABLE BEARING PRESSURE TO BE VERIFIED BY PLATE LOAD TEST PRIOR TO CONSTRUCTION
6. BURIED CONCRETE SURFACES TO BE COATED WITH 2 LAYERS OF BITUMEN PAINT APPLIED VERTICALLY AND HORIZONTALLY IN ACCORDANCE WITH SPECIFICATION FOR HIGHWAYS WORKS SERIES 2000, CLAUSE 2004

ENGINEERED FILL/TESTING SPECIFICATION:-

BACK OF RETAINING WALL FILTER DRAIN MATERIAL:-

- **FILL**
 - GRANULAR BACKFILL TO BE CLASS 6H IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS VOL.1 - SERIES 600 EARTHWORKS, T6/1 (CLASSIFICATION AND COMPACTION) AND T6/2 (GRADING).
 - PERMEABLE BACKFILL MATERIAL TO BE TYPE A (CLASS 6H) IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAYS WORKS VOL.1 - SERIES 500 DRAINAGE AND SERVICE DUCTS, CLAUSE 513 (MATERIAL) AND CLAUSE 505 (PLACING).
 - RADING REQUIREMENTS TO BE IN ACCORDANCE WITH SPECIFICATION FOR HIGHWAYS WORKS, SERIES 500, T5/5 AND BS EN 13242.
- **TESTING**
 - NOT REQUIRED. NO OVERCOMPACTION PERMITTED.

BACKFILL FROM FORMATION LEVEL TO UNDERSIDE OF FOUNDATION:-

- **FILL**
 - ALL LOOSE/MADE GROUND/ SOFT SPOTS TO BE REMOVED OFF SITE.
 - THE SOILS AT THE BASE OF THE RESULTANT EXCAVATION SHALL BE CUT FLAT AND PROOF-ROLLED PRIOR TO THE IMPORTATION AND PLACEMENT OF SUITABLE GRANULAR FILL.
 - GRANULAR BACKFILL TO BE CLASS 6N GRANULAR/WELL GRADED STRUCTURAL FILL IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS VOL.1 - SERIES 600 EARTHWORKS, T6/1 (CLASSIFICATION) AND T6/2 (GRADING) AND T6/4 (PLACEMENT & COMPACTION).
 - THE CLASS 6N MATERIAL MUST ALSO BE IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS VOL.1 - SERIES 600 EARTHWORKS, CLAUSE 610 AND CLAUSE 611.
 - TYPE 6N GRANULAR STRUCTURAL FILL TO TERMINATE 300mm BELOW THE PROPOSED UNDERSIDE OF FOUNDATION.
 - THE FINAL 300mm OF FILL IS TO BE M.O.T TYPE 1 GRADED STRUCTURAL FILL IN ACCORDANCE WITH SPECIFICATION FOR HIGHWAY WORKS VOL.1 - 800 SERIES ROAD PAVEMENTS, CLAUSE 803 (GRADING) AND CLAUSE 802 AND T8/4 (PLACING AND COMPACTION)
- **TESTING**
 - AT FORMATION LEVEL AND AFTER PROOF ROLLING, UNDERTAKE IN SITU CBR TESTING USING A 600mm DIAMETER PLATE AS PER BS 1377 PART 9 AT 15m INCREMENTS ALONG THE LENGTH OF THE FOUNDATIONS. CBR VALUE OF >5% REQUIRED.
 - AT EACH LIFT/LAYER, UNDERTAKE IN SITU CBR TESTING USING A 600mm DIAMETER PLATE AT 15m INCREMENTS ALONG THE LENGTH OF THE FOUNDATIONS. CBR VALUE OF 10% REQUIRED LOCAL TO FOUNDATIONS. CBR OF >5% REQUIRED TO LANDSCAPED LOCATIONS.
 - AT UNDERSIDE OF FOUNDATION ATOP OF THE M.O.T. TYPE 1, UNDERTAKE IN SITU PLATE LOAD TESTING USING A 600mm DIAMETER PLATE AT 15m INCREMENTS ALONG THE LENGTH.
 - CBR TESTS TO BE UNDERTAKEN IN ACCORDANCE WITH BS 1377-9 AND IAN 73/06 REV1 (2009) USING MIN. 600mm DIAMETER PLATE.
 - FOR PLATE LOAD TESTS - LOAD APPLIED TO BE 225kN/m² IN 8 EQUAL INCREMENTS TO REPLICATE 3 TIMES THE MAXIMUM DESIGNED BEARING PRESSURE OF 75kN/m² UNDER THE RETAINING WALL BASE.

P01	STAGE 4 ISSUE	11.03.24	GM	PW
Rev:	Description:	Date:	By:	Chkd:



Project:
**STAR RADCLIFFE ACADEMY,
BURY**

Drawing Title:
**CYCLOPS JUNCTION
RETAINING WALL DETAILS**

Status:
STAGE 4

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	MAR 24	GM	PW	AI

Scale:	As indicated	Project No:	2303-02
--------	--------------	-------------	---------

Project Code: Originator: Volume: Level: Type: Role: Category / Number: Rev:

FS1013 -REN - EX - XX - D - C - 6010 - P01