

Design ground water level was assumed to be at the ground level.

To manage settlements the following measures are proposed:

- a geogrid/geocell mattress will be constructed at the base of the embankment
- staged embankment construction with hold periods
- piles/CMC columns will be utilised in the vicinity of the bridge abutment structures
- Instrumentation including road & plate settlement gauges, settlement pins and pneumatic piezometers

Project risks associated with this approach and measures to reduce and/or mitigate risk are covered in the following table:

	Risk Reduction – GI & Monitoring	Mitigation
<ul> <li>Ground conditions worse than anticipated resulting in greater total and/or differential settlements.</li> </ul>	In advance of detail design:  CPT & boreholes testing to validate stiffness/consolidation parameters.	<ul> <li>If necessary, CMCs utilised along a greater length of the approach embankments and potentially to greater depths.</li> </ul>
settlement taking longer.	In advance of detail design:  Permeability testing within the Structureless Chalk required to validate the assumed hold period durations.  During construction: Piezometers, settlement plates & structure pins (or similar) will be utilised to monitor the settlement against trigger points.	<ul> <li>If necessary, CMCs utilised along a greater length of the approach embankments and potentially to greater depths.</li> <li>Hold periods managed through monitoring with trigger points.</li> <li>Allowance in program for lengthening hold periods.</li> </ul>
<ul> <li>Construction programme/sequence required for the bridge structures results in additional settlements being induced once the deck is in place and resulting in total/differential settlement tolerances being exceeded.</li> </ul>		<ul> <li>If necessary, a temporary bridge could be utilised during construction instead of the permanent bridge.</li> <li>If necessary, integral connections locked at a later stage in construction following further settlement (confirmed by trigger points).</li> </ul>



## Appendix C – CDM designer's risk register for the Countess flyovers

Potential hazards and risk have been defined and will be detailled in further stages, early stage and risks will continue to be considered as the design develops. A detailed risk register will be developed during detailed design.



Reduce risk at source - amend design
 Provide risk information - add to design

Hierarchy of Mitigation

1. Eliminate hazard - design out

## DESIGN HAZARD ELIMINATION AND REDUCTION REGISTER

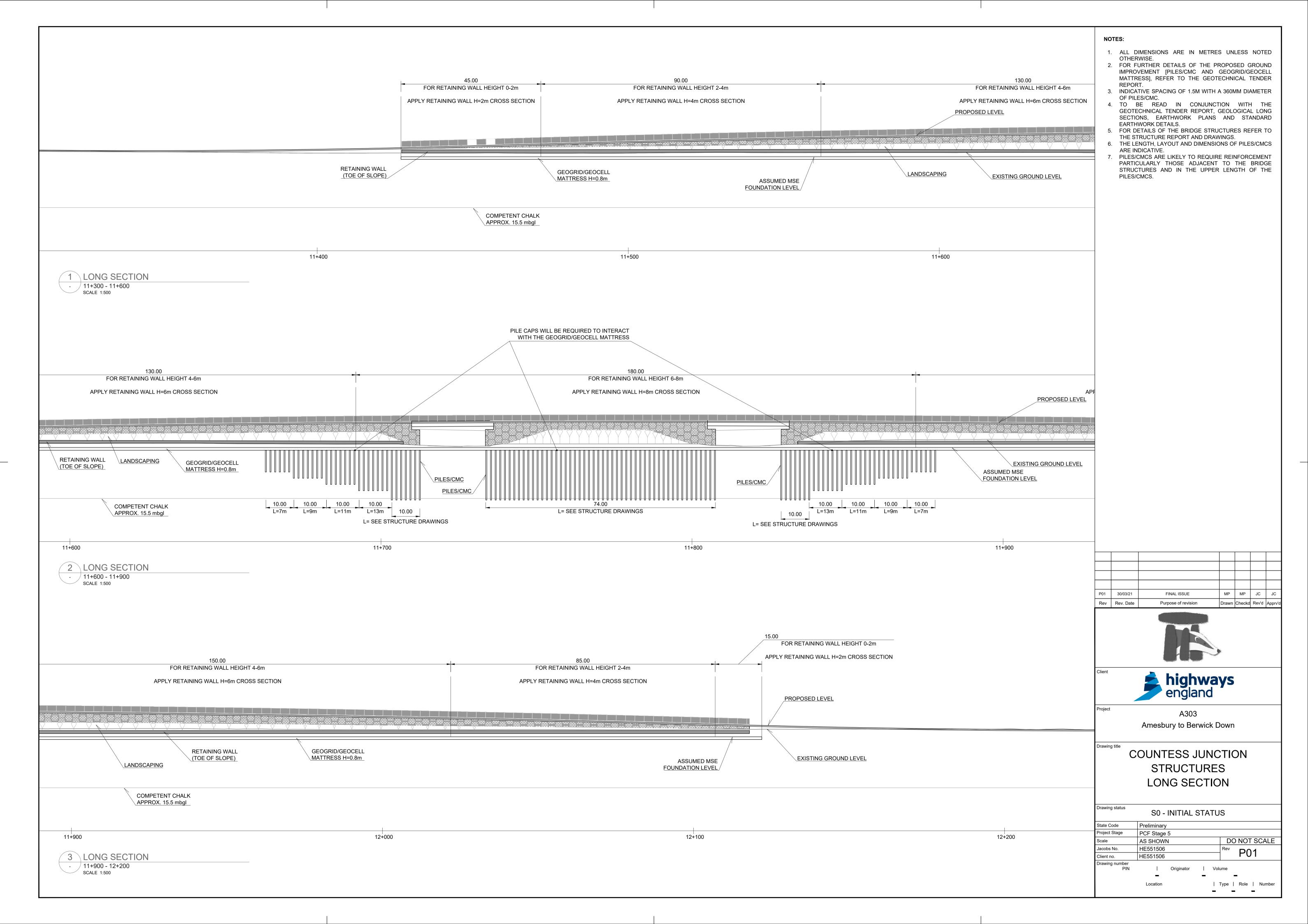
					Conference Dissiplies				į		١	Occurred Defendance	4
	FIO	ectivame	Design Stage	r cura	meering Discipline		†	Structure	Date		Ĭ	Cullelli	elerence
A303 Ame	sbury to Berwick	A303 Amesbury to Berwick Down (Stonehenge) - Countess flyovers	3 Tender Design		Structures			Countess Junction Flyovers	22 February 2021		Qua	lity Su	Quality Submission
Ref:	Phase C/M/D	Activity	Potential Hazards	Risk	Person(s) Affect	S 7	~	Design Measures to Eliminate Hazards	Design Measures to Reduce Risk	Residual risk information to be provided going forward	r s	DZ	Included on Drawing/Document No.'s • References
<u>6</u>	v	Construction of Counters flyovers	In-Situ construction works	Injury to workforce	Site personnel	4	8 MA 00	Design to allow the offsite manufacture where possible to ensure controlled conditions	Identification and Communication of design advice such as guidance on the equipment to be used	Competent constracto to be used and detailed construction risk assessment to be completed upon reward of detailed design	en	4 12	
2.0	O	Construction of Countess flyovers	Crane movement and Liffing of materials	Dropping of heavy leans, material during construction resulting in injury and death, Sile personnel and damage to materials and A3-45	Sie personnel	8	± 8 ±	The use of mechanical hoists to be designed where possible to reduce lifting	Identification and Communication of design advice including the correct procedure for iffing materials and the use of crash/protection decks	Contractor to follow design advice and follow appropriate lifting procedures. Protection/Crash decks to be designed	23	5 10	
3.0	v	Construction of Countess flovers	Impact on construction schedule due to interference with precast beams procurement	Construction of funnel could be delayed if flyovers construction slow down or delays due to construction or traffic interruptions and delays in precast beams supply.	Sile personnel	ю 	15 Die	Dissessociate construction of Countess Inyovers from construction of the turnel	Seassociale construction of Countess Provide usual precast elements in design lyoness from construction of the turnel   for easier procuement	Contractor to adapt to any construction or precast supply delay during flyovers construction	2	5 10	
4.0	C&M	Operation of Highways	Terrorist attack	Injury to public	Public	2 4	8 N/	N/A	Security management and security features of building to be designed at detailed design stage, specialist advise to be sought at design stage	Contractor to follow design actrice and build to design	-	4	
99	×	Report and manteriance of operations   Difficulty in conducting repairs over highway, street furniture and tendocaping operational highway.		Vehicular accidente dumig manhenance Public and site personnel causing injury and death	Public and site personnel	ω 4	De de be be be		Solety features (such as walkways) to be designed at detailed design stage. Maintenance regime to be determined at detailed design stage.	Residual isk information to be included in CAM manustia and the Health and Safely File. Closing the operational highway miligates the risk of injury caused.	-	4	
9:0	×	Operation of Highways	Heavier vehicle than considered in the design above Green Bridge 3	Damage to the structural stability and potential breakdown	Public and road user	2 3	6 5 55 55 FE	Design should be robust and take extra resistance allovable and provide regral solutions where platic behaviour in structure could appear	Include additional signaling with file limitation of load over the bridge as per design specifications	Maintenance team to take into account limitations in the programme	2	2 4	
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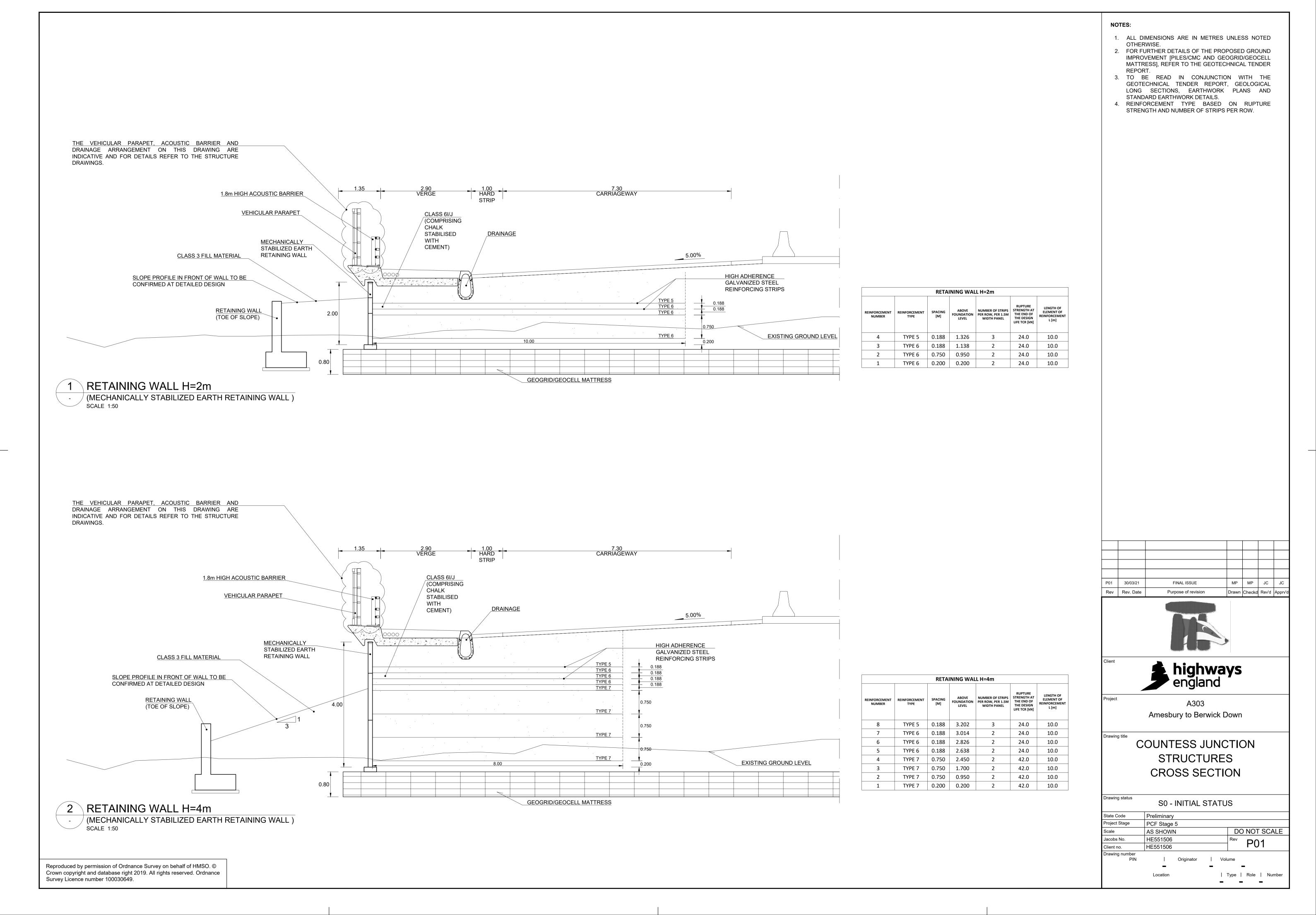
Team Badger Date:	Team Budger Inhemal Date:	Team Budger in hemal	
Team Badger	Team Badger Intern	Team Badger Intern	
Prepared by:	Reviewed by:	Approved by:	

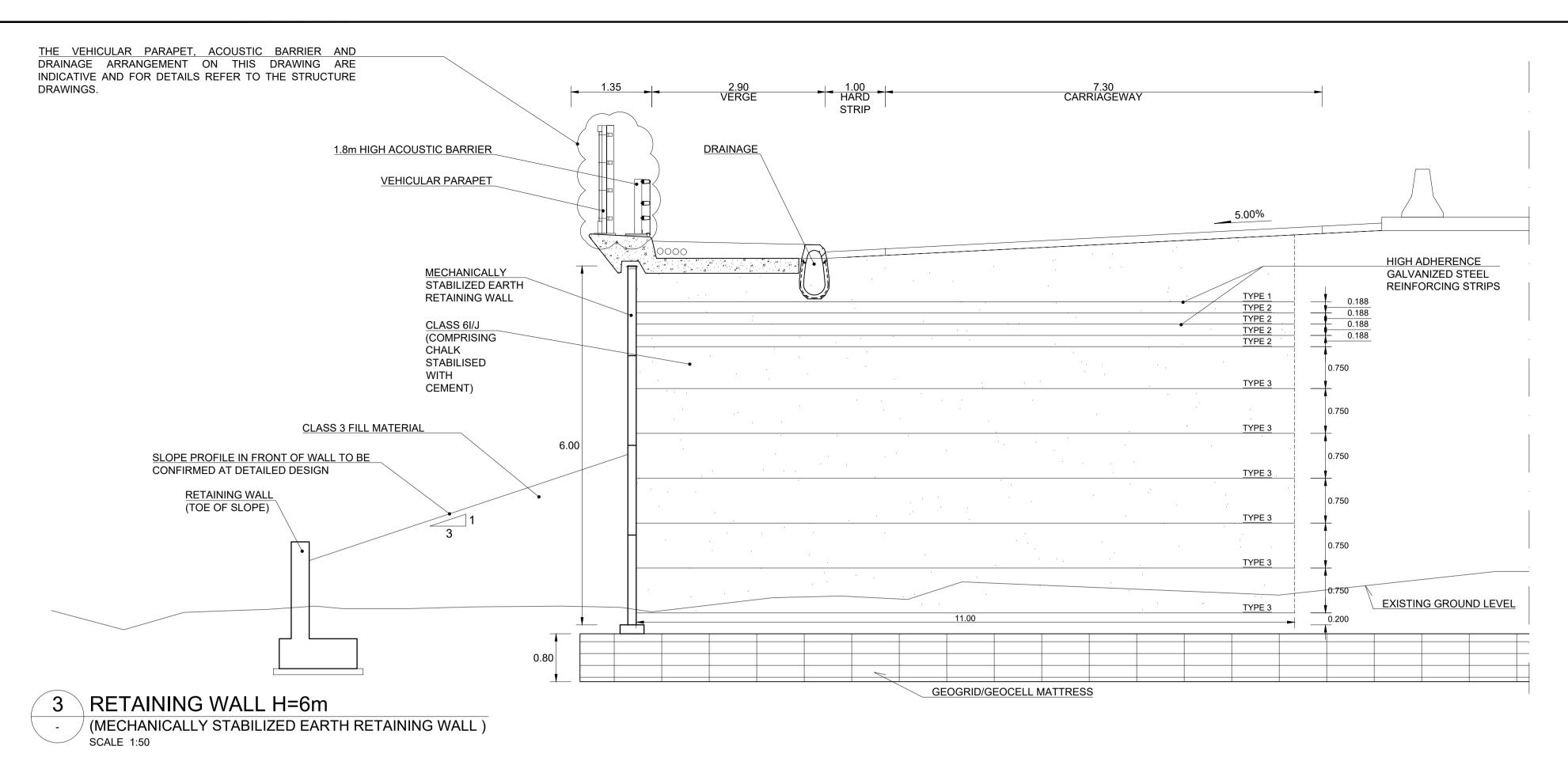
Construction



## **Appendix D – Embankment drawings**







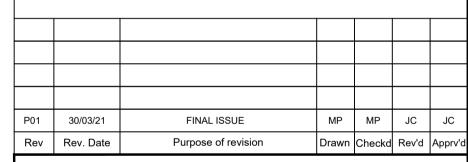
RETAINING WALL H=6m										
REINFORCEMENT NUMBER	REINFORCEMENT TYPE	SPACING [M]	ABOVE FOUNDATION LEVEL	NUMBER OF STRIPS PER ROW, PER 1.5M WIDTH PANEL	RUPTURE STRENGTH AT THE END OF THE DESIGN LIFE TCR [kN]	LENGTH OF ELEMENT OF REINFORCEMENT L [m]				
11	TYPE 1	0.188	5.452	3	24.0	11.0				
10	TYPE 2	0.188	5.264	2	24.0	11.0				
9	TYPE 2	0.188	5.076	2	24.0	11.0				
8	TYPE 2	0.188	4.888	2	24.0	11.0				
7	TYPE 2	0.750	4.700	2	24.0	11.0				
6	TYPE 3	0.750	3.950	2	42.0	11.0				
5	TYPE 3	0.750	3.200	2	42.0	11.0				
4	TYPE 3	0.750	2.450	2	42.0	11.0				
3	TYPE 3	0.750	1.700	2	42.0	11.0				
2	TYPE 3	0.750	0.950	2	42.0	11.0				
1	TYPE 3	0.200	0.200	2	42.0	11.0				

7.30 CARRIAGEWAY THE VEHICULAR PARAPET, ACOUSTIC BARRIER AND DRAINAGE ARRANGEMENT ON THIS DRAWING ARE STRIP INDICATIVE AND FOR DETAILS REFER TO THE STRUCTURE DRAWINGS. 1.8m HIGH ACOUSTIC BARRIER DRAINAGE VEHICULAR PARAPET 5.00% HIGH ADHERENCE GALVANIZED STEEL REINFORCING STRIPS MECHANICALLY STABILIZED EARTH **RETAINING WALL** TYPE 1
TYPE 1
TYPE 2
TYPE 3
TYPE 3 0.188 0.188 0.188 0.188 0.188 0.188 0.188 0.188 CLASS 6I/J (COMPRISING CHALK STABILISED WITH CEMENT) TYPE 3 TYPE 3 CLASS 3 FILL MATERIAL 8.00 SLOPE PROFILE IN FRONT OF WALL TO BE TYPE 3 CONFIRMED AT DETAILED DESIGN <u>TYPE 4</u> RETAINING WALL (TOE OF SLOPE) TYPE 4 TYPE 4 TYPE 3 EXISTING GROUND LEVEL GEOGRID/GEOCELL MATTRESS 4 RETAINING WALL H=8m

RETAINING WALL H=8m									
REINFORCEMENT NUMBER	REINFORCEMENT TYPE	SPACING [M]	ABOVE FOUNDATION LEVEL	NUMBER OF STRIPS PER ROW, PER 1.5M WIDTH PANEL	RUPTURE STRENGTH AT THE END OF THE DESIGN LIFE TCR [kN]	LENGTH OF ELEMENT OF REINFORCEMENT L [m]			
17	TYPE 1	0.188	7.142	3	24.0	11.0			
16	TYPE 1	0.188	6.954	3	24.0	11.0			
15	TYPE 2	0.188	6.766	2	24.0	11.0			
14	TYPE 2	0.188	6.578	2	24.0	11.0			
13	TYPE 2	0.188	6.390	2	24.0	11.0			
12	TYPE 2	0.188	6.202	2	24.0	11.0			
11	TYPE 2	0.188	6.014	2	24.0	11.0			
10	TYPE 2	0.188	5.826	2	24.0	11.0			
9	TYPE 3	0.188	5.638	2	42.0	11.0			
8	TYPE 3	0.750	5.450	2	42.0	11.0			
7	TYPE 3	0.750	4.700	2	42.0	11.0			
6	TYPE 3	0.750	3.950	2	42.0	11.0			
5	TYPE 3	0.750	3.200	2	42.0	11.0			
4	TYPE 4	0.750	2.450	3	42.0	11.0			
3	TYPE 4	0.750	1.700	3	42.0	11.0			
2	TYPE 4	0.750	0.950	3	42.0	11.0			
1	TYPE 3	0.200	0.200	2	42.0	11.0			

## NOTES:

- 1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE
- 2. FOR FURTHER DETAILS OF THE PROPOSED GROUND IMPROVEMENT [PILES/CMC AND GEOGRID/GEOCELL MATTRESS], REFER TO THE GEOTECHNICAL TENDER
- 3. TO BE READ IN CONJUNCTION WITH THE GEOTECHNICAL TENDER REPORT, GEOLOGICAL LONG SECTIONS, EARTHWORK PLANS AND STANDARD EARTHWORK DETAILS.
- 4. REINFORCEMENT TYPE BASED ON RUPTURE STRENGTH AND NUMBER OF STRIPS PER ROW





Amesbury to Berwick Down

**COUNTESS JUNCTION** STRUCTURES

**CROSS SECTION** 

S0 - INITIAL STATUS

State Code	Preliminary			
	·			
Project Stage	PCF Stage 5			
Scale	AS SHOWN		DC	NOT SCALE
Jacobs No.	HE551506		Rev	D01
Client no.	HE551506			PUI
Drawing number PIN	Originator	\	/olume	_
	Location	١	Туре	Role   Number

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SCALE 1:50

(MECHANICALLY STABILIZED EARTH RETAINING WALL)