National Highways

M25 J28 IMPROVEMENTS

DCO Requirement 3 Structures Review

HE551519-WSP-GEN-000-FM-ZQ-0013
JULY 2023

CONFIDENTIAL

National Highways

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EXECUTIVE SUMMARY

DCO Requirement 3 was the outcome of the Examining Authority not being fully satisfied that the design submitted for the M25J28 improvement scheme had been produced with full regard to the required aesthetics and being concerned about the potential that the fully designed and constructed scheme may differ from that reviewed.

This review has examined the design development of the significant structures proposed as part of the scheme. As would be expected, there has been some design evolution since the preferred options were selected and the details confirmed, the concept accepted in the Approval in Principle documents and then developed fully.

The application of the NPSNN Criteria for Good Design has been reviewed and it found that following the demands on technical design and safety that must be met, the NPSNN Design Criteria have been applied where practicable.

The structures have been reviewed from a general Environmental Impact Assessment perspective; it has been concluded that all structures reviewed fit within the limits of deviation as approved by the DCO.

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INTRODUCTION

1 INTRODUCTION

M25 J28 connects the M25 with the A12, a dual carriageway, and provides local access to Brentwood via the A1023 Brook Street. It is a heavily used junction which features a roundabout connected by traffic lights. The Highway Authority for the A12 from the M25 heading eastbound is National Highways. TfL is the Highway Authority for the A12 west of the junction.

The scheme is part of National Highways' Regional Investment Programme. The measures it includes were announced in the December 2014 Road Investment Strategy (RIS1). The Development Investment Partner is GRAHAM Ltd, supported by SWECO and Fairhurst. The scheme has been granted its Development Consent Order (DCO), however there were a number of requirements that must be fulfilled within the works timeframe.

Requirement 3 was the outcome of the Examining Authority not being fully satisfied that the design submitted had been produced with full regard to the required aesthetics and being concerned about the potential that the fully designed and constructed scheme may differ from that reviewed. This is set out in paragraphs 48 and 49 of the draft decision letter sent to National Highways on 16th May 2022. The Secretary of State considered that it was appropriate for the applicant to conduct the review; National Highways have requested that WSP carry out this review on their behalf making use of prior knowledge of the scheme from their role as Technical Advisor from PCF Stage 5.

1.1 ABBREVIATIONS

ADS – Advanced Direction Sign

AIP – Approval in Principle

CHS – Circular Hollow Section

DCO – Development Consent Order

DIP – Development Integrated Partner

ES – Environmental Statement

LM1 – Load Model 1 – loading from Authorised Wight regulations - traffic up to 44tonnes GVW

GVW – Gross Vehicle Weight

PCF – Project Control Framework

RIS1 – Roads Investment Strategy 1

SV – Loading from STGO vehicles

SOR – Structures Options Report

SOV – Special Order Vehicles

STGO – Special Types General Order

WFD – Water Framework Directive

2 REPORT PURPOSE

This report will review each of the significant structures that are shown in Volume 2.8, the 'Engineering drawings and sections' reference TR010029/APP/2.8 version 0, submitted as part of the DCO application, (here on in referred to as 'the submission') thus excluding the Typical headwalls on sheets 9/10 and 10/10. We have not reviewed bridge information shown on highway long sections as the purpose of these drawings is not to show the significant structures in detail.

Section 3 of this report will summarise the review undertaken of each of the significant structures listed below, providing scheme references, a description of the structure and its location and a summary of the devlopment of the structure from the Engineering Drawings and Sections to the design drawings provided by the DIP. The structure desicription provided will follow the latest 'For Construction' drawings..

Table 2-1 – Significant Structures

Scheme Structure Reference	NH Structure Key	Structure Name	Structure Type / Description
B01	39005	Alder Wood Bridge	Single span precast prestressed beam and slab deck integral with contiguous pile abutments
B02	39008	Grove Farm Underpass	Precast concrete box culvert of 'u' and 'n' sections
B03	39006	Duck Wood Bridge	Single span, curved, weathering steel composite integral bridge on piled foundations
B04	39007	Grove Bridge	Two span, curved, painted steel composite integral bridge on piled foundations
B05	39009	Maylands bridge	Three span, curved weathering steel composite integral bridge on skeleton abutments over piled foundations
C01	13748	Grove Culvert West Extension	Precast concrete box culvert
R02	39105	Maylands Bridge East Retaining Wall	Precast concrete panel faced reinforced earth retaining wall
R04	39107	M25 On-slip Retaining Wall	Large-format precast concrete modular block gravity retaining wall
R14	39117	Grove Farm Underpass South West Retaining Wall	Precast concrete panel faced reinforced earth retaining wall
R18	39119	Grove Bridge South West Retaining Wall	Precast concrete panel faced reinforced earth retaining wall

G01	39101	ADS Cantilever Gantry at Ch 530	Large-section CHS cantilevered gantry on piled concrete base
G04	39102	Long Span Portal Gantry at Ch 740	Steel spaceframe portal gantry on piled concrete bases
G06	39103	Long Span Portal Gantry at Ch 1806	Steel spaceframe portal gantry on piled concrete bases

Section 4 of this report will ascertain if the design is aesthetically sensitive, durable, adaptable, and resilient as it reasonably could be, it will be reviewed against the NPSNN criteria for good design in paras 4.28-4.35 inclusive as included in Appendix A.

In section 5 a review will also be conducted on the Environmental Statement which was part of the DCO submission. We will determine the maximum parameters that were set at this stage and analyse design changes.

In section 6, we make a determination on whether these design changes would give rise to materially new or different environmental effects to those reported in the Environmental Statement prepared at the DCO submission stage. This review will be limited to only structural design elements and visual and aesthetic effects, all other effects will be excluded from this review (e.g. Air, Noise, Ecological, Lighting etc).

Drawing extracts from the DCO submission are provided in the 'Structure References' sections within this report. For ease of reference, drawing extracts from the current 'For Construction' drawings are provided in the 'Structure Description' sections of the report and full, current 'For Construction' drawings for each structure are provided within Appendix B. In exception other drawing extracts are provided and if so clearly described.

2.1 LIMITATIONS

In reviewing the design information where a feature or material is now defined, but was not so in the DCO submission documentation, WSP have not considered this to be a change as without prior definition it is assumed that during the DCO examination the worst case would have been considered.

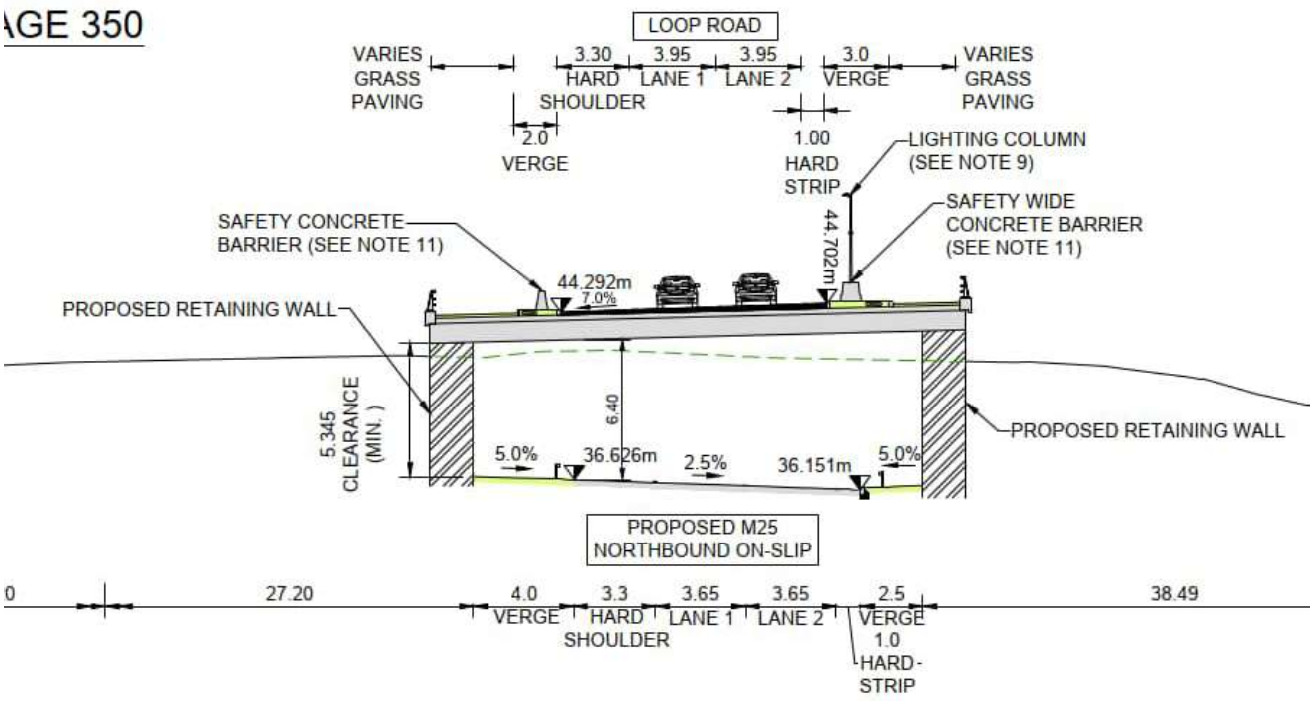
3 STRUCTURE REVIEWS

3.1 ALDER WOOD BRIDGE

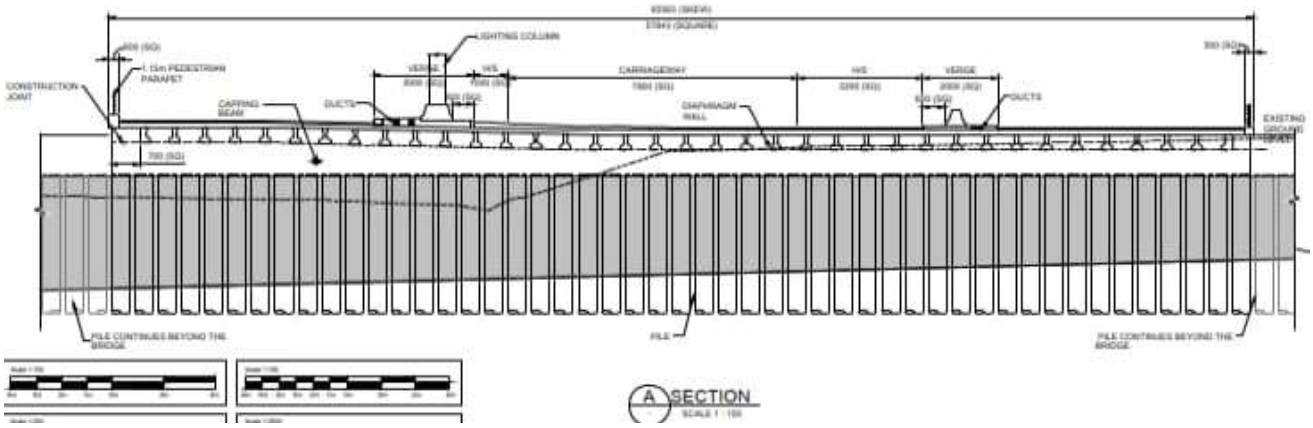
SCHEME REFERENCES

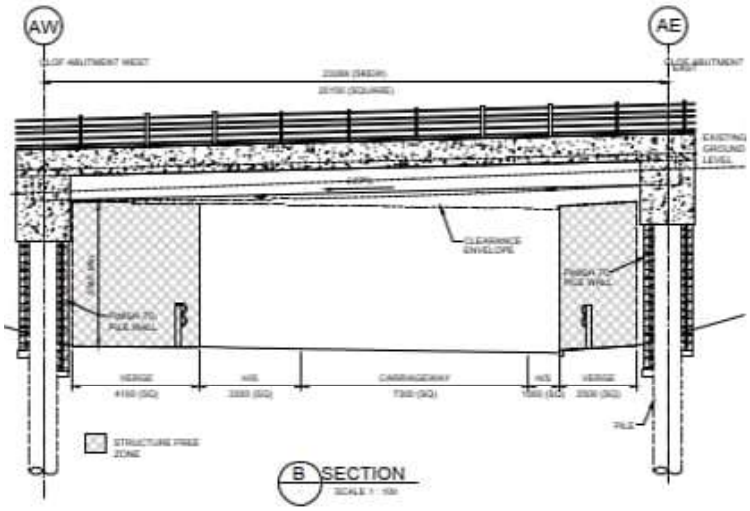
Alder Wood Bridge	Scheme Reference:	B01
	Asset Key:	39005
	Structure Reference No.:	28//M25/171.90/1
	OS Grid Location:	556428, 192717
	AIP Document reference:	HE551519-SWE-SBR-B01-RP-CB-50001 | P06
	GA Drawings references:	HE551519-SWE-SBR-B01-DR-CB-50100 | C02
		HE551519-SWE-SBR-B01-DR-CB-50101 | C02

Alder Wood bridge is shown on the following engineering drawings and sections sheets in the DCO submission: TR010029/APP/2.8 sheet 4/6 and TR10029/APP/2.8 sheet 1/10



Extract from DCO Engineering Sections – Typical Cross Sections – Sheet 4 of 6



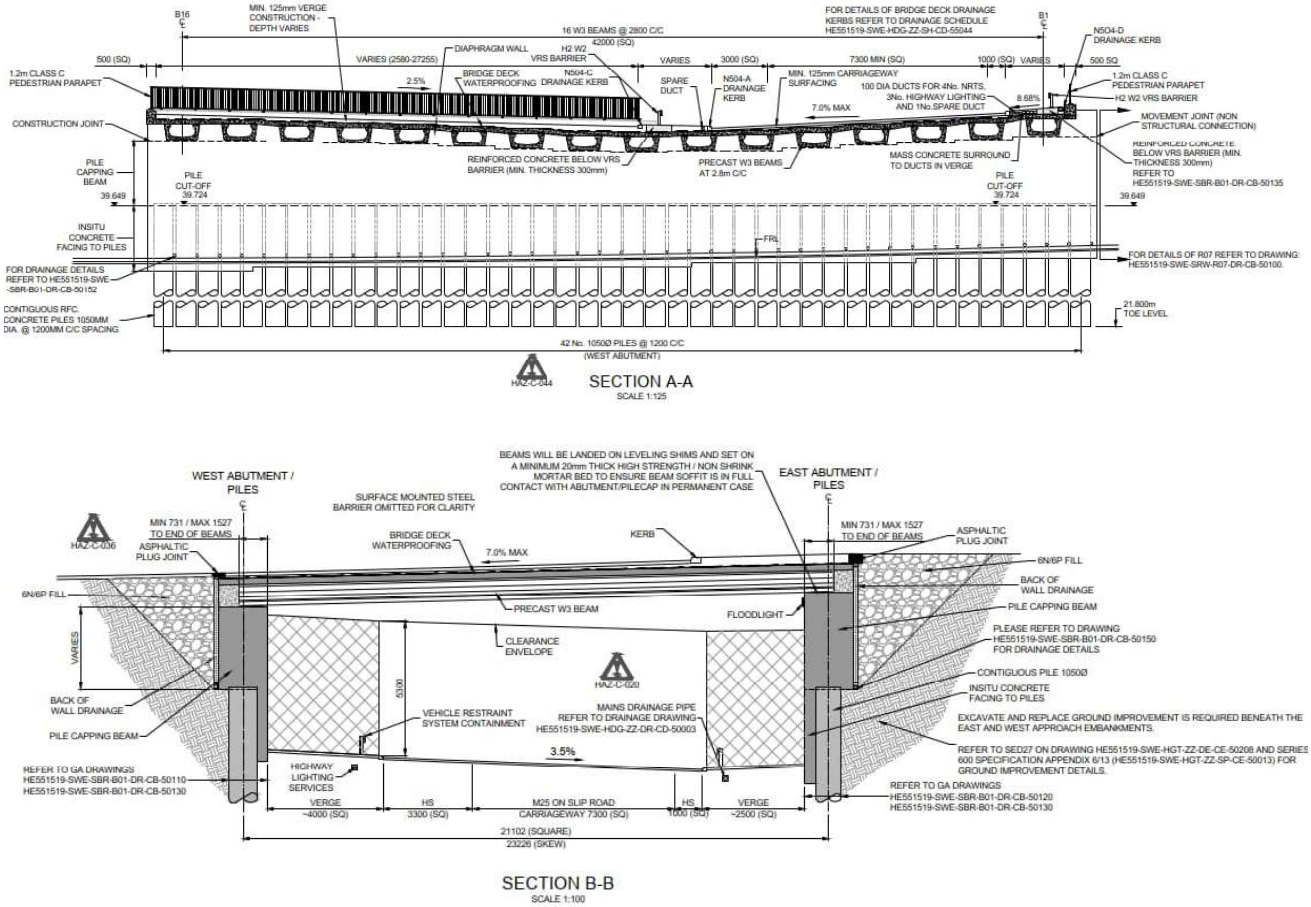


Extracts from DCO Engineering Sections – Alder Wood Bridge – Sheet 1 of 10

STRUCTURE DESCRIPTION

The proposed Alder Wood Bridge will carry the M25 Loop Road over the M25 J28 anti-clockwise on-slip road. The bridge will carry two lanes and a hard shoulder, travelling in the same direction. The bridge is located at the north side of the scheme extents and is crossed a short distance from the loop road diverge from the M25 anticlockwise carriageway.

The bridge is proposed to comprise contiguous pile wall abutments with precast prestressed 'W3' beams arranged at 2.8m centres and 24.8° skew with a skew span of 23m. Between and over the beams is a reinforced concrete slab. The structure has a skew width of 50.95m; the two-lane loop road crosses the structure on a curve at a further skew to the structural alignment. The deck, cast integral with the pile caps has a longitudinal fall of 5.75°. The visible parts of the abutments are clad in in-situ reinforced concrete. The wingwalls, constructed in a similar manner to the abutments have their own AIP.



Extract from Alder Wood Bridge General Arrangement – HE551519-SWE-SBR-B01-DR-CB-50101

STRUCTURE DEVELOPMENT

Alder Wood Bridge featured in two locations within the submission documentation. At this point the structure span was 23.3m and skew width was 65.6m. Precast prestressed Y and YE concrete beams are indicated at a similar skew to the current proposal.

During the AIP development stage the structure loop road was realigned and the bridge was narrowed by 14.1m and moved slightly north, with the southern elevation moving by approximately 20m; the span has also increased by 0.3m. The form of structure has remained very much the same, the main difference being the change of prestressed beam section which now provides an inclined outer face in place of the vertical one proposed in the submission.

On the deck vehicle restraint is still provided aligned with and each side of the loop road carriageway. Indicative pedestrian parapets mounted on the edge beams have been replaced with a vertical infill system to prevent climbing. The deck has a more pronounced valley in the centre of the long section, although ultimately the deck is still drained in the same direction as it would have been. Lighting columns were envisaged in the DCO submission and at AIP stage but have since been removed from the deck; It is expected that this is for ease of construction and maintenance rather than because the lighting level requirements have changed. Additional chevron sign boards are now proposed to improve driver perception of the tightening curve of the loop road. The spare / verge

deck area is now proposed to be paved with a brushed finish concrete with crack inducers on a 3x3m square grid.

Below the bridge the blockwork cladding was originally proposed to run full-height, however the lower part was changed to in-situ concrete to comply with standards and avoid dislodgement of the blocks in the event of errant vehicle impact. Later the remainder was changed to in-situ concrete with a plain F4 finish. It would be common to specify a featured finish to visually break up this large area and disguise any variations in the surface. There were no details of the lighting under the bridge in the DCO submission, but this design element has now been undertaken and lighting will be mounted on the abutments.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

Alder Wood Bridge, while of unusual geometry is of a fairly standard form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The use of pre-stressed concrete beams which are manufactured of site has a number of benefits; there is more control over the placement of the reinforcement and curing of the concrete, which is commonly heated in a pre-defined manner to speed the curing. The enhanced accuracy of reinforcement fixing will ensure the cover requirements are met and the prestressing means the concrete, most often, remains uncracked. These two factors reduce the rate of carbonation of the concrete and provides better protection for the reinforcement prolonging the service life of the structure.

The in-situ concrete elements of the parapet beams will be further from the carriageway than in a normal structure, so while they have been allocated the same exposure classification as normal they should receive less de-icing salts due to the wider structure. The concrete pile facing will be the most exposed element in the structure, considering its length and intermittent restraint from the piles there is the potential for cracks to form. While they are likely to be visible under close inspection the design will have been specified to control these to within permissible limits for durability.

The bridge is also designed with the deck integral to the abutments, this removes the need for joints which are a common weak point in both the carriageway surface and in the waterproofing of the structure. With no joints there is nowhere for salt-laden water from de-icing measures to leak into / onto a bearing shelf, which with accumulated debris are prone to draining poorly.

Maintainability

The external surfaces of the prestressed beams will generally require little maintenance, the most likely need would arise from impact damage either during or following construction.

Joints and bearings are the elements most often in need of routine or reactive maintenance, by designing them out it significantly reduces the maintenance activities required.

Spray applied deck waterproofing has been specified which is the preferred solution for long service life and is easily lapped if repair is required.

A combined kerb-drainage system is specified over the deck which is a common solution to avoid the need for complicated detailing and under-slung pipes (which are difficult to access and maintain)

the kerb drainage will need periodic jetting to remove debris to maintain its function; the presence of the hard shoulder will keep any over-flow clear of the running lanes and indicate that this is needed.

Back-of-abutment drainage between the contiguous piles follows the detailing recommended in the Bridge Detailing Guide, CIRIA report C543. This should allow water to drain out in a controlled manner at the foot of the wall and not build up behind the blockwork facing. The outlets will be visible just above the verge so the pipes can be jetted; this would most appropriately be undertaken in coordination with inspection activities so as to reduce disruption to the users.

The removal of the blockwork facing will reduce the maintenance requirements at the cost of large expanses of concrete. In accordance with document HE551519-SWE-SGN-ZZ-SP-CB-50002, the contract specific Appendix 17/2, anti-graffiti surface treatments are to be applied to the exposed concrete faces within 3m of the finished ground level to enable easier removal of graffiti should it occur.

Resilience

Both the M25 on-slip road under and loop road over are subject to motorway regulations so the structure is not readily accessible on foot by the public, and there are no footpaths. As above, lighting under the bridge will be fixed to the abutments (this is to avoid fixing to the prestressed beams), but to be effective they will be at high level. Lighting for the loop road is by means of lighting columns.

The lack of bearing shelf removes a vulnerability in the event that the structure became a target for terrorists.

The structure will carry a heavy load route, as such the structure has been designed for SOV-350 vehicles which is a greater load than the usual SV196, which in turn is greater than the LM1 loading representing normal traffic. This means that late in the service life of the structure, even if deterioration is such that it cannot accommodate SOV vehicles it is likely it will still be able to carry normal traffic and hence the vast majority of vehicles.

STRUCTURE SUMMARY

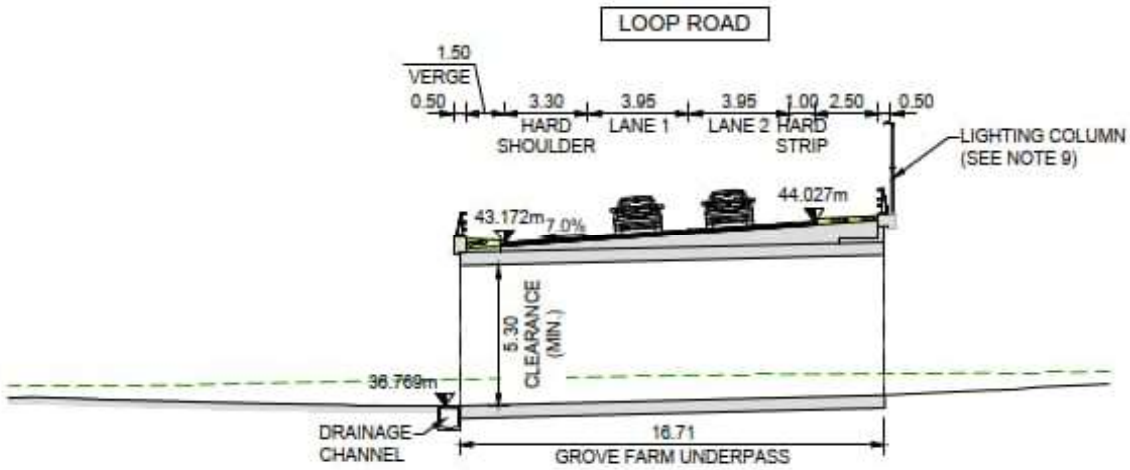
The structure has gone through evolutionary change since the outline shown in the submission. It makes use of a different beam section, but is still a concrete structure and on elevation will look very similar. The narrowing of the deck will reduce the tunnel effect to those passing under it. The substitution of the in-situ concrete facing, in place of the blockwork, to the abutment piles is a change, and will result in a large area of plain faced concrete which will appear ‘heavier’ to users of the slip road, but won’t be that visible in the landscape as such. While it is a change in materials it is not expected to be a material change requiring reassessment.

3.2 GROVE FARM UNDERPASS

SCHEME REFERENCES

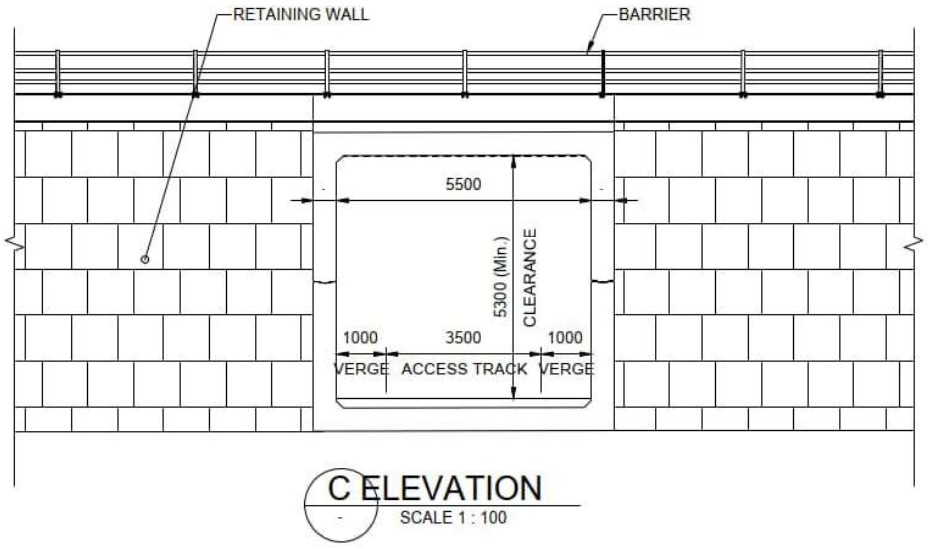
Grove Farm Underpass	Scheme Reference:	B02
	Asset Key:	39008
	Structure Reference No.:	28//M25/171.90/2
	OS Grid Location:	556343, 192738
AIP Document reference:		HE551519-SWE-SBR-B02-RP-CB-50001 | P04
GA Drawing reference:		HE551519-SWE-SBR-B02-DR-CB-50100 | C01
		HE551519-SWE-SBR-B02-DR-CB-50101 | C01

Grove Farm Underpass is shown on the following engineering drawings and sections sheets in the DCO submission: TR010029/APP/2.8 sheet 4/6 and TR10029/APP/2.8 sheet 4/10.



PROPOSED CROSS-SECTION OF LOOP ROAD AT CHAINAGE 435
SECTION I-I
Scale 1:200

Extract from DCO Engineering Sections – Typical Cross Sections - Sheet 4 of 6

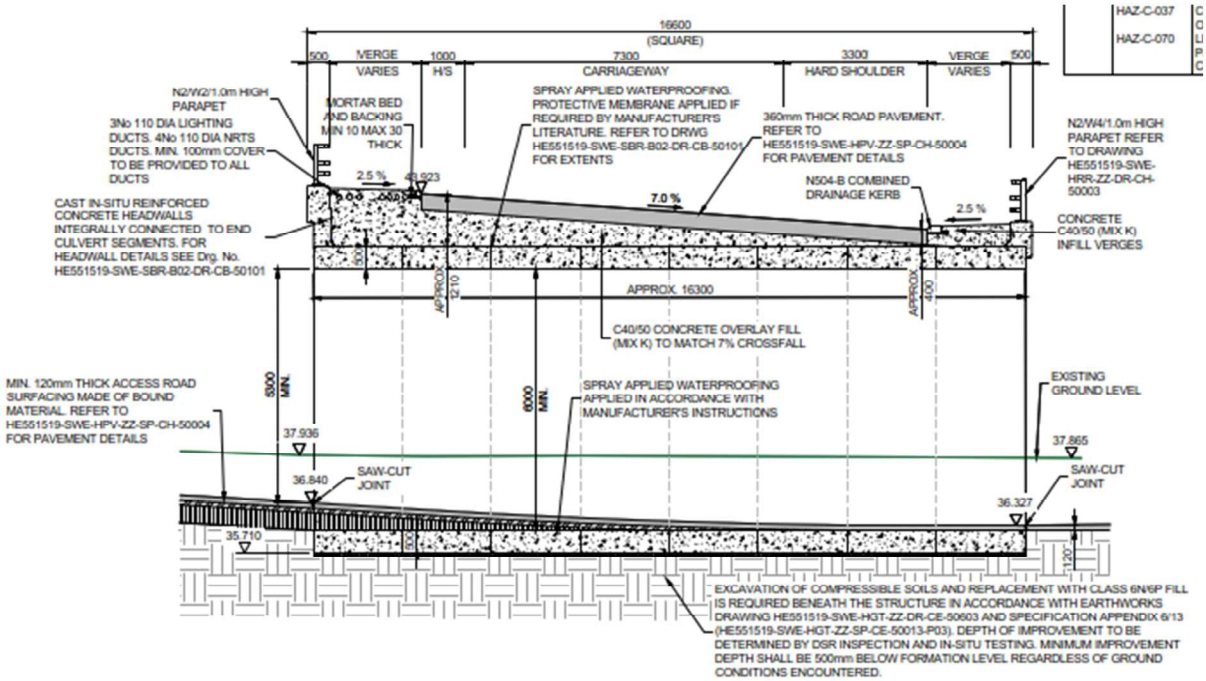


Extract from DCO Engineering Sections – Grove Farm Underpass - Sheet 4 of 10

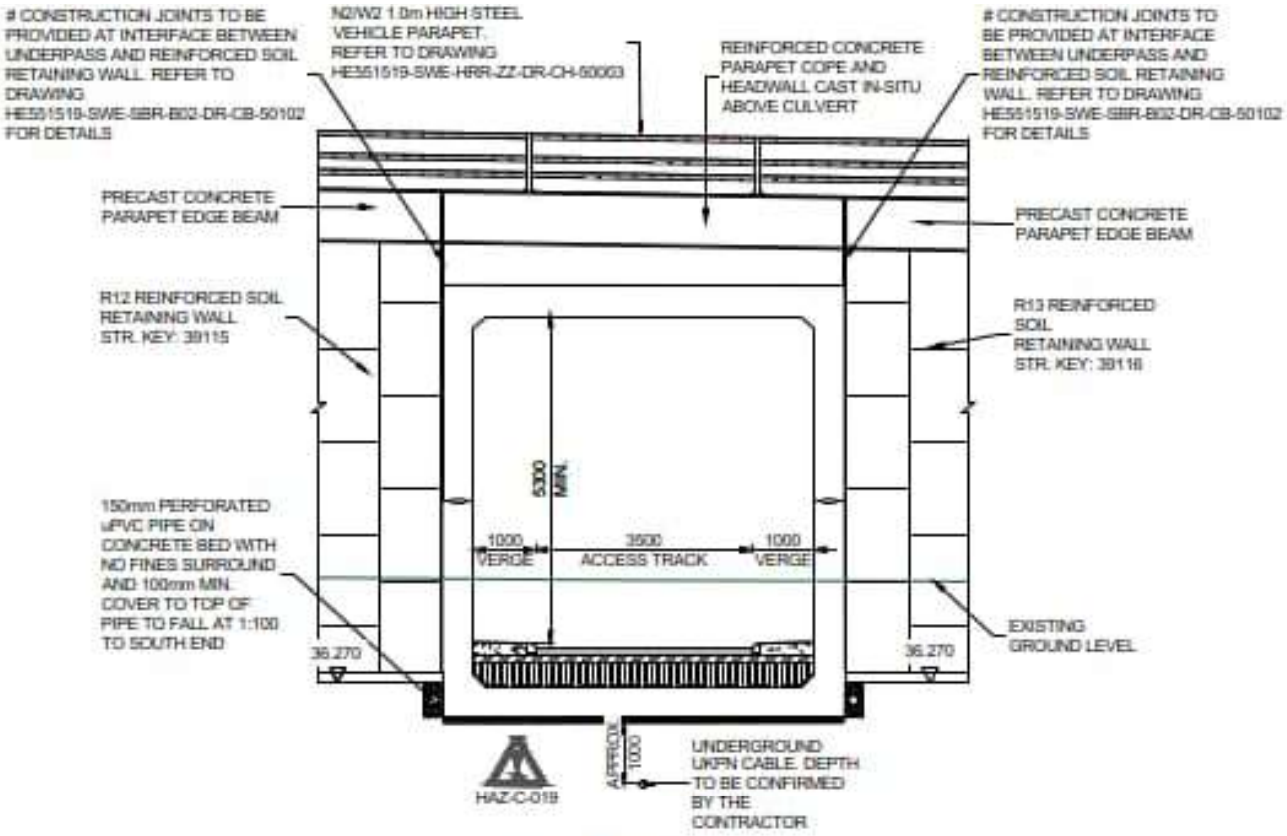
STRUCTURE DESCRIPTION

The proposed Grove Farm Underpass will carry the M25 Loop Road over an access road to Grove Farm. The bridge will carry a single carriageway of two lanes and a hard shoulder for traffic travelling in the same direction. The structure is located at the north side of the scheme area a short distance west of Alder Wood Bridge.

The bridge is proposed to comprise a single precast concrete box culvert of UAN sections. The culvert runs perpendicular to the loop road over, it will have a clear span of 5.5m and overall width of 16.6m. It will provide a minimum of 5.3m headroom at the north end, with the internal height of the culvert being 6.0m. The U and N units will have a joint at mid-height of the walls and vertical joints between each U and N pair. Above the culvert in-situ concrete parapet beam are provided surmounted by a vehicle parapet. Each side of the structure will be reinforced earth retaining walls with precast concrete cladding panels. These are considered separately within this report.



SECTION B-B



ELEVATION C-C

Extract Grove Farm Underpass General Arrangement - HE551519-SWE-SBR-B02-DR-CB-50100

STRUCTURE DEVELOPMENT

Grove Farm Underpass featured in two locations within the submission documentation. At this point the structure comprised of a box culvert of UAN section span was 5.5m, width 17.4m and internal height of 5.5m.

During the AIP development stage the structure loop road and bridge was realigned, with the skew removed by placement normal to the loop road and moved slightly north to suit the road realignment, as a result the bridge was narrowed by 0.8m. The internal structural height was increased by 0.5m to allow for standard precast units and a horizontal formation surface and still provide the required headroom. The expected result of this is that the northern edge beam would be deeper due to the greater level difference between the soffit and the loop road level above, however due to the greater than normal upstand above the adjacent verge level in the submission this is not the case. The form of structure has remained the same, the main difference being the taller units to simplify design and construction.

On the deck vehicle restraint is still provided at the edges of the deck and the verge widths still vary slightly reflecting the curved alignment of the loop road. Indicative vehicle parapets mounted on the edge beams have been confirmed as steel items and appear essentially as they did in the DCO submission. The verges are still of concrete fill and surface.

Below the bridge kerbs have been introduced to discourage vehicle impacts with the walls, the access road remains as asphalt. Inter-precast unit joints have been confirmed as sealed.

On the final design drawings, internal structural details have been confirmed, but externally the structure is as agreed in the AIP.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

Grove Farm Underpass is of a fairly standard form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The use of pre-cast concrete units which are manufactured of site has a number of benefits, there is more control over the placement of the reinforcement and curing of the concrete. The enhanced accuracy of reinforcement fixing will ensure the cover requirements are met. These factors reduce the rate of carbonation of the concrete and provides better protection for the reinforcement prolonging the service life of the structure. The joints between the units will however be an item for maintenance.

The in-situ concrete elements of the parapet beams are detailed conventionally and have been allocated the exposure classification that would be expected due to the use of de-icing salts on the adjacent carriageway. While the access road is unlikely to be salted/gritted to the same degree as a public road, vehicles using it will track salts off the public road so the lower inside faces of the box will have the same exposure class as the edge beams. It is therefore likely that these areas would be the first show signs of deterioration. The benefits of the segmental construction is that cracking is easier to control and as such is less likely to occur to a level that is visually apparent.

With the structure taking the form of a box, no movement joints or bearings are required. Waterproofing on the top will extend down the sides to below the horizontal joints, this together with

the individual joint treatments above and below this line should prevent water passing through the joints meaning the internal sealant does not have to perform to the same level as it would otherwise, thus prolonging its life; routine inspections will determine when it needs to be replaced. Back-of abutment drainage is also provided to ensure no pressure-head of water can built up behind the structure walls. The 'floor' of the box structure will also be waterproofed using the same system as the deck such that the hidden areas are protected.

Maintainability

The internal surfaces of the precast units will generally require little maintenance, the most likely need would arise from impact damage either during or following construction, with the arises of each unit being most vulnerable, these areas are however readily accessible for repair using standard access equipment.

Movement joints and bearings are the elements most often in need of routine or reactive maintenance, by selecting a form of structure without them it significantly reduces the maintenance activities required.

Spray applied deck waterproofing has been specified which is the preferred solution for long service life and is easily lapped if repair is required.

Over the structure the limited length of the structure mans no special measures are required for the loop road carriageway. A combined kerb-drainage system is specified in this area as it is above the reinforced earth blocks behind the approach embankment panels and doing so avoids the interface between gully tails and the reinforced earth straps that retain the facing panels. The kerb drainage will need periodic jetting to remove debris to maintain its function; the presence of the hard shoulder will keep any over-flow clear of the running lanes and indicate that this is needed.

There is a low point in the access road that passes through the structure at the south elevation this outlets to pond 2, soak-aways on the same size take water from the back-of-wall drainage which can be rodded/jetted from the verges of the access track on the north side.

The AIP stated that an anti-graffiti coating will be applied to the exposed concrete surfaces of the abutment and central pier, and this requirement is confirmed for surfaces within 3m of ground level in document HE551519-SWE-SGN-ZZ-SP-CB-50002, the contract specific Appendix 17/2. This will enable easier removal of graffiti should it occur.

Resilience

There are no plans for lighting of the underpass, so there is very little within the structure that can be vandalised. As above, an anti-graffiti coating will be applied to exposed concrete surfaces.

The lack of bearing shelf removes a vulnerability in the event that the structure became a target for terrorists.

By nature of its geometry and the superelevation of the loop road there is a reasonable level of concrete regulating fill over the structure. This will disperse individual wheel loads, and while this will have been accounted for in the design, most likely at the lowest thickness it will make the structure less sensitive to overloading. The structure will carry a heavy load route, as such the structure has been designed for SOV-350 vehicles which is a greater load than the usual SV196, which in turn is greater than the LM1 loading representing normal traffic. This means that late in the service life of

the structure, even if deterioration is such that it cannot accommodate SOV vehicles it is likely it will still be able to carry normal traffic and hence the vast majority of vehicles.

STRUCTURE SUMMARY

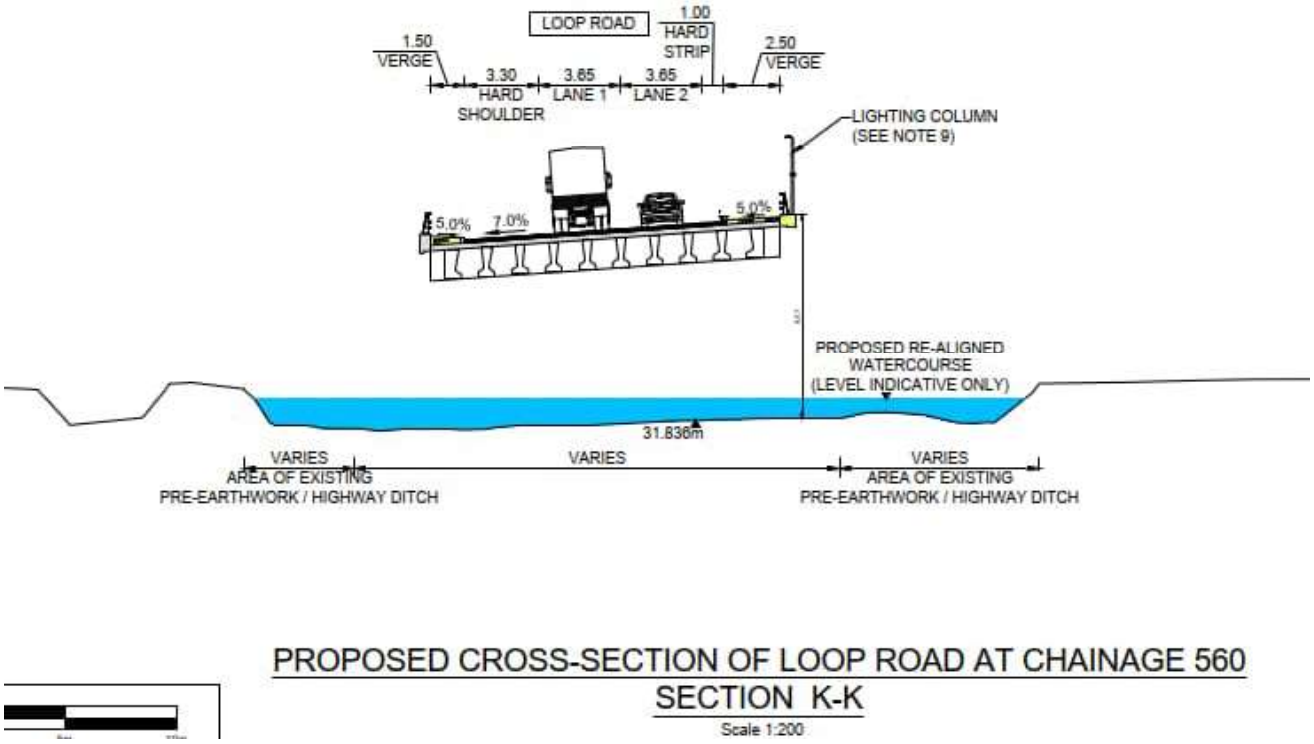
The structure has barely changed since the outline shown in the submission. The elevations will appear as in the submission, with the exception of minor effects due to removal of the structure skew. Overall the changes are not considered to be material in nature.

3.3 DUCK WOOD BRIDGE

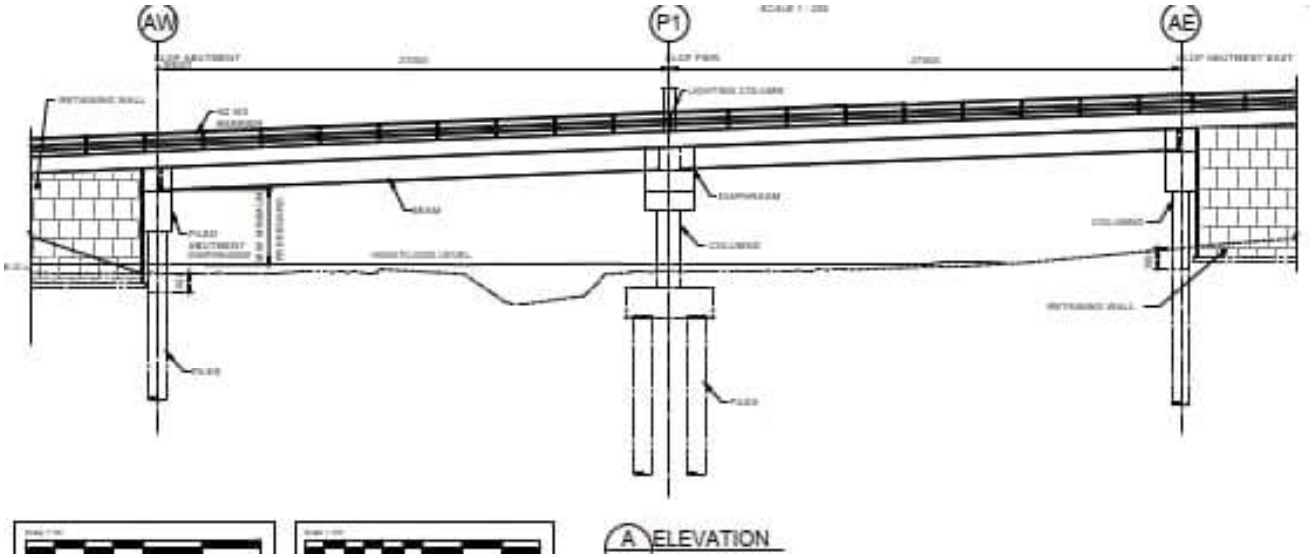
SCHEME REFERENCES

Duck Wood Bridge	Scheme Reference:	B03
	Asset Key:	39006
	Structure Reference No.:	28//M25//172.00/2
	OS Grid Location:	556243, 192674
	AIP Document reference:	HE551519-SWE-SBR-B03-RP-CB-50002 | P03
	GA Drawing reference:	HE551519-SWE-SBR-B03-DR-CB-50110 | C01
		HE551519-SWE-SBR-B03-DR-CB-50111 | C01

Duck Wood Bridge is shown on the following engineering drawings and sections sheets in the DCO submission: TR010029/APP/2.8 sheet 4/6 and TR10029/APP/2.8 sheet 2/10.



Extract from DCO Engineering Sections – Typical Cross Sections - Sheet 4 of 6



Extract from DCO Engineering Sections – Duck Wood Bridge - Sheet 2 of 10

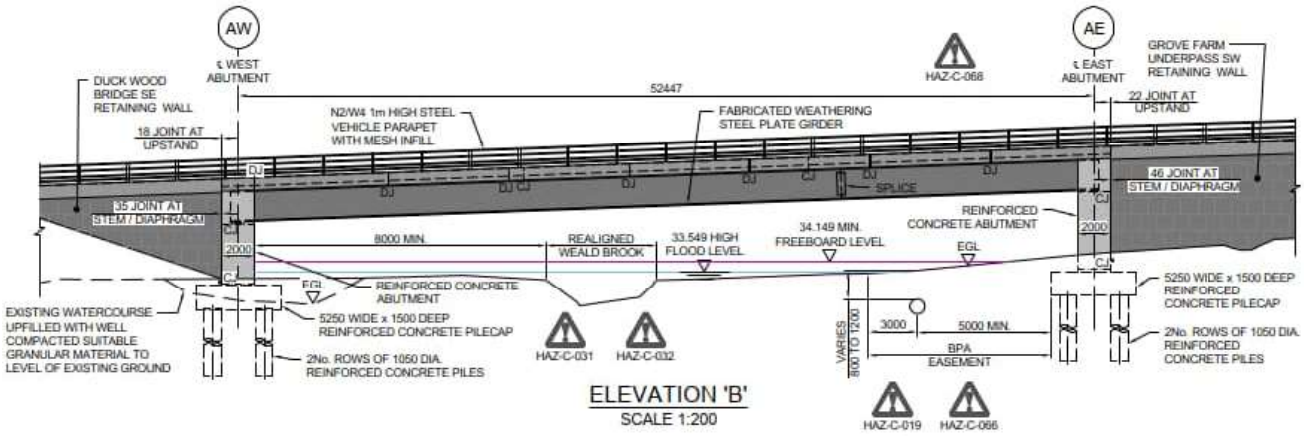
STRUCTURE DESCRIPTION

The proposed Duck Wood Bridge will carry the new M25 Loop Road over Weald Brook and its associated flood plain. The proposed structure is an integral single-span weathering steel composite multi-girder bridge, consisting of three braced pairs of girders, with a curved in-situ reinforced concrete deck slab and in-situ reinforced concrete abutments.

The alignment of the road requires the bridge to be curved in plan and therefore the span between centrelines of abutments varies from 52.447m to 55.808m. The deck width between outer faces of parapet beams is 16.60m, made as follows: 7.30m for the carriageway, 3.30m for the eastern hardshoulder, 1.00m for the western hard strip, 2.00m on each side for the verge and 0.50m on each side for the parapet edge beam. The carriageway will have a superelevation of 7%, while crossfall on the verges will vary from 5% to 7% in the western verge to 2.5% and 3.25% in the eastern verge.

The substructure will comprise 2m wide reinforced concrete abutment walls supported on buried pilecaps and piles.

The embankment for the M25 Loop Road on approach to and departure from the bridge will be retained by reinforced soil walls which are covered in a separate AIP document.



Extract from Duck Wood Bridge General Arrangement drawing - HE551519-SWE-SBR-B03-DR-CB-50110

STRUCTURE DEVELOPMENT

In the DCO submission Duck Wood Bridge was proposed to be a two-span bridge consisting of precast prestressed Y and YE concrete beams supported on pile abutment diaphragms. At this point, the structure span was 54.0m long (measured between centre points of abutments/ pier / abutment) and the total width of the deck 16.6m. During the AIP development, due to the curvature of the bridge, the typology of the bridge has been changed from a two-span prestressed concrete beams bridge to a single-span weathering steel composite multi-girder bridge.

The new span arrangement has resulted in an increase in the depth of the structural beams. This, along with other minor changes has reduced the minimum freeboard headroom to the high flood level to 3.575m from 3.80m. The actual freeboard provided under the southern edge beam is less than this as the soffit is at 36.617m (from the girder details drawing) and the flood level 33.549m, resulting in a clearance of 3.068m. It is presumed that although shown on the elevation, the 3.80m and 3.575m dimensions may have been taken on the structure centreline.

Due to the changes in the span arrangement of the bridge, the substructure has also been significantly modified. The intermediate support proposed in the DCO submission has been removed and the end supports have been changed from piled skeleton abutment diaphragms to an abutment wall founded on a pile cap. This modification comes from the fact that the supports will have to resist now greater loads and therefore a more robust structural system is required. The revised arrangement was presented to the SoS encapsulated in change 5 relating to a reduction to the realignment of Weald Brook (Work No. 23C) in letter reference HE551519-ATK-GEN-LN-XM-000011 dated 10th March 2021. This was agreed as the Examining Authority concurred with the submission as noted in the response in letter TR010029 dated 5th May 2021.

Originally the reinforced earth wingwalls would be connected by a third wall behind the skeleton abutment, this is now omitted as the abutment walls are now retaining structures.

At AIP stage the width of the eastern verge was 1.5m while the western one 2.5m, while in the detailed design stage both verges have been detailed to be 2.0m wide. This change will have increased the driver visibility distance on the inside of the loop road curve.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

Duck Wood Bridge, while of unusual geometry and at the higher span length for an integral bridge is of a fairly standard form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The bridge is proposed to be fully integral which eliminates the need for bearings and therefore it minimises the maintenance problems associated with the penetration of dirt, water and de-icing agent increasing the durability of the structure.

The use of weathering steel should through alternate wetting and drying develop an adherent patina that develops from a normal rust colour to a darker brown-purple colour requiring minimum maintenance. This will vary slightly due to differing localised exposures to the prevailing weather. The bolts are proposed to be weather resistant Tension Control Bolts to similarly minimize the maintenance although the splice areas between the beam sections may weather differently due to the increased retention of moisture and dirt at internal arises, and inspection dependant suitable maintenance carried out.

The only in-situ concrete element of the superstructure is the deck and parapet upstands. The deck will be subject to the exposure to de-icing salts and therefore a waterproofing system is proposed to be applied. The top surface of the bridge deck shall be protected with proprietary sprayed waterproofing applied directly to the deck slab and extending vertically down the back face of the abutment below the construction joint.

The reinforced concrete abutment wall will be the most exposed element in the structure, considering its length and that it is subject to cyclic expansion and contraction of the superstructure and earth pressures loading, there is the potential for cracks to form. While they are likely to be visible under close inspection, the design will have been specified to control these to within permissible limits for durability.

In the AIP it is stated that run off strips were going to be incorporated into the bottom flanges of the weathering steel girders to avoid staining of the substructure during the weathering process. These elements were not included in the detailed design drawings; however these would normally be added by the fabricator.

Maintainability

The steel beams will be in weathering steel removing the need for maintenance painting and therefore requiring little maintenance.

Movement joints and bearings are the elements most often in need of routine or reactive maintenance, the superstructure is integral with the abutments which eliminates the need for bearings and their associated maintenance under the bridge and lane closures.

Spray applied deck waterproofing has been specified which is the preferred solution for long service life and is easily lapped if repair is required.

To facilitate surface water run-off, carriageway crossfalls and vertical alignment of the road on the bridge have been designed to allow surface water to be collected in the edge of the carriageway, using combined kerb drainage units. This is a common solution to avoid the need for complicated

detailing and under-slung pipes (which are difficult to access and maintain). However, these units will need periodic jetting to remove debris to maintain its function.

Back-of abutment drainage, following the detailing recommended in the Bridge Detailing Guide, CIRIA report C543, is also provided to ensure no pressure-head of water can built up behind the structure walls.

The AIP stated that an anti-graffiti coating will be applied to the exposed concrete surfaces of the abutment and central pier, and this requirement is confirmed for surfaces within 3m of ground level in document HE551519-SWE-SGN-ZZ-SP-CB-50002, the contract specific Appendix 17/2. This will enable easier removal of graffiti should it occur.

Resilience

The lack of bearings removes the vulnerability of the structure to a terrorist attack. However, the bolted splice of the beams is an exposed weak point of the structure. Nevertheless, the splices have been detailed in a standard way and little can be done to protect them from these types of attacks.

The bridge has been designed for the effects of Special Order Vehicle load model SOV-350, which is a greater load than the usual SV196, which is turn is greater than the LM1 loading representing normal traffic. This means that the late in the service life of the structure, even if deterioration is such that it cannot accommodate SOV vehicles, it is likely it will still be able to carry normal traffic and hence the vast majority of vehicles.

STRUCTURE SUMMARY

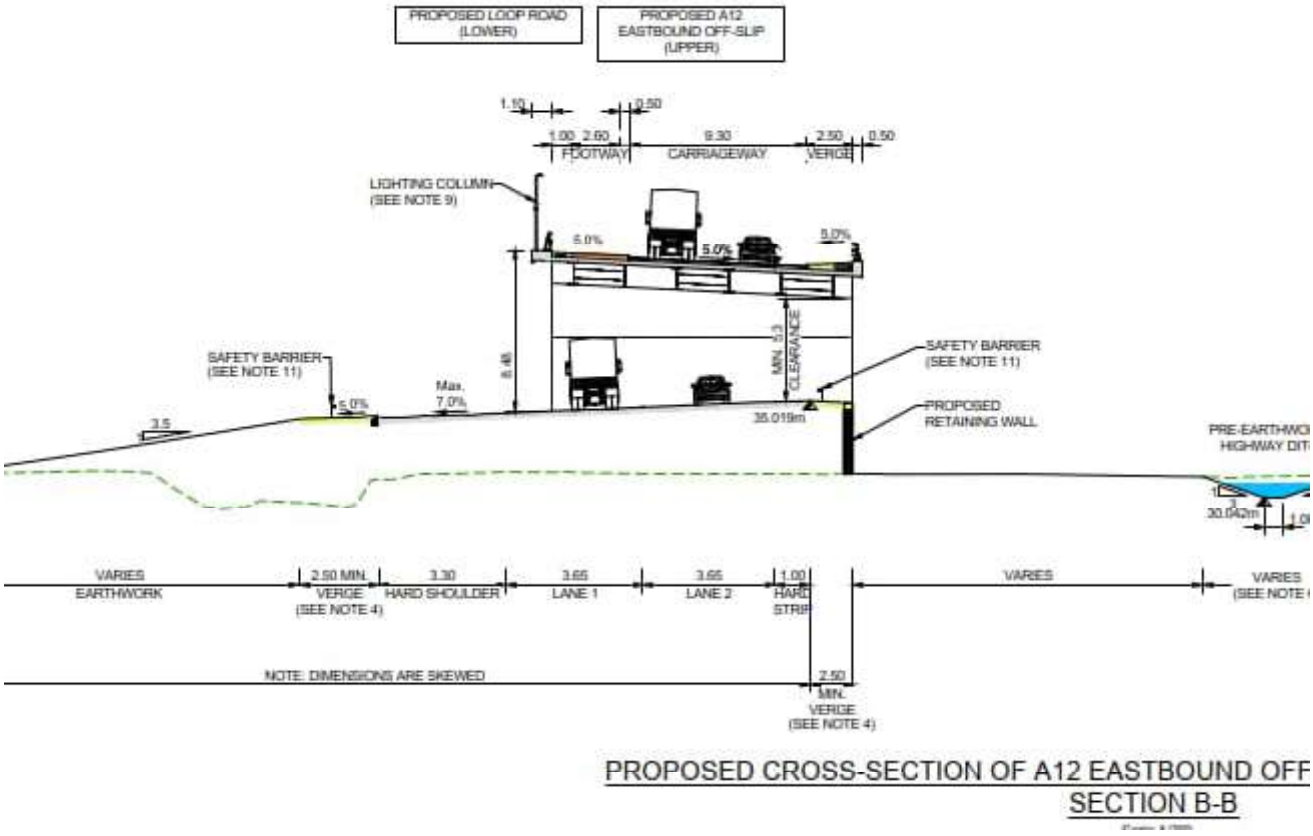
The structure has gone through significant evolutionary change since the outline shown in the submission. The omission of the pier and deeper beams of a different colour of single-span weathering steel composite girder bridge is a significant change from the two-span prestressed concrete beam bridge proposed in the DCO submission. The structure form is now more consistent with Grove and Maylands Bridges considered below. As addressed in the correspondence referenced above the changes were notified to and agreed by the Examining Authority as a no material change.

3.4 GROVE BRIDGE

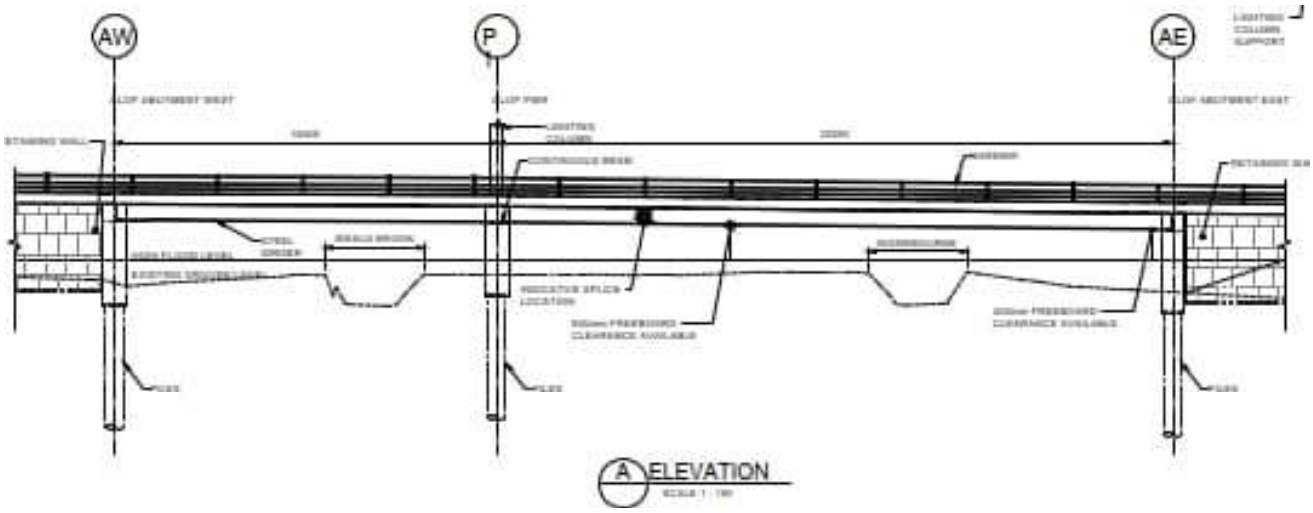
SCHEME REFERENCES

Grove Bridge	Scheme Reference:	B04
	Asset Key:	39007
	Structure Reference No.:	28//M25//172.40/1
	OS Grid Location:	556460, 192233
	AIP Document reference:	HE551519-SWE-SBR-C04-RP-CB-50001 | P03
	GA Drawing reference:	HE551519-SWE-SBR-B04-DR-CB-50110 | C01
		HE551519-SWE-SBR-B04-DR-CB-50111 | C01

Grove Bridge is shown on the following engineering drawings and sections sheets in the DCO submission: TR10029/APP/2.8 sheet 3/10



Extract from DCO Engineering Sections – Typical Cross Sections - Sheet 1 of 6



Extract from DCO Engineering Sections – Grove Bridge - Sheet 3 of 10

STRUCTURE DESCRIPTION

The proposed Grove Bridge will carry the new M25 Loop Road over Weald Brook, the Ingrebourne River and associated flood plain. The bridge will carry a single carriageway with two lanes and a hard shoulder, for traffic traveling in the same direction. The bridge is located at the south side of the scheme extents.

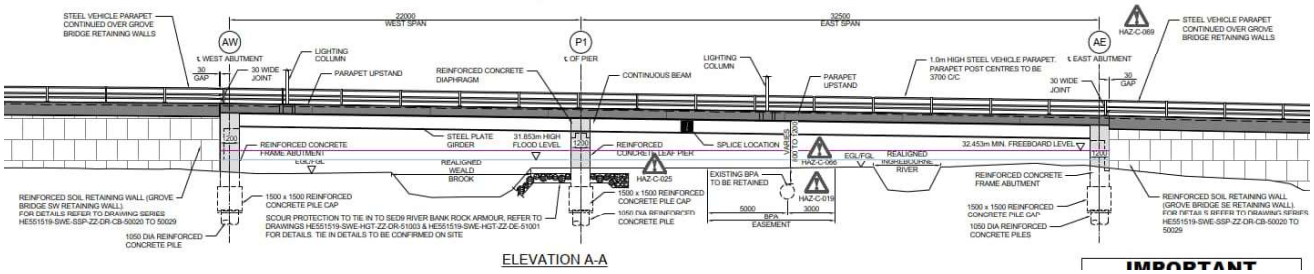
The proposed bridge is a two-span integral steel composite multi-girder structure with a curved in-situ reinforced concrete deck slab supported on in-situ reinforced concrete piles intermediate pier and abutments.

The alignment of the road requires the bridge to be curved in plan being the total curved span between abutment centrelines 54.50m which is split in two spans: 22.00m on the western span and 32.50m on the eastern span.

The deck width between outer faces of parapet beams is 16.60m, made as follows: 7.30m for the carriageway, 3.30m for the northern hardshoulder, 1.00m for the southern hardstrip, 2.00m on each side for the verge and 0.50m on each side for the parapet edge beam. The carriageway will have a superelevation of 7%.

The substructure will comprise 1200mm wide reinforced concrete abutment walls and leaf pier supported on buried pile caps which are founded on a single row of piles.

The embankment for the M25 Loop Road on approach to and departure from the bridge will be retained by reinforced soil walls which are covered in a separate AIP document.



Extract from Grove Bridge General Arrangement - HE551519-SWE-SBR-B04-DR-CB-50110

STRUCTURE DEVELOPMENT

In the DCO submission, Grove Bridge was proposed to be a two-span integral steel composite multi-girder bridge. The current proposal is detailed in a similar way and the form of the structure has remained very much the same.

On the deck vehicle restraint is still provided at the edges of the deck and the verge widths, like Duck Wood Bridge have been amended from 2.5m on the south side and 1.5m on the north side to 2.0m on both sides. Indicative vehicle parapets mounted on the edge beams have been confirmed as steel items and appear essentially as they did in the DCO submission. The verges are still of concrete fill and surface.

Lighting columns were envisaged in the DCO submission and AIP and was proposed to be located on the south side of the structure at the pier supported on an in-situ reinforced concrete blister behind the parapet upstand. However, in the detailed design drawings two lighting columns have been proposed to be located at quarter span of the western span and at a third span of the eastern span supported on a reinforced concrete corbel connected to the parapet beam. While this probably makes the lighting design easier it is usually preferred to place lighting columns above a visual support as previously shown. Other than this the elevation has seen negligable change.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

Grove Bridge is of a fairly standard form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The bridge is proposed to be fully integral which eliminates the need for bearings and therefore it minimises the maintenance problems associated with the penetration of dirt, water and de-icing agent increasing the durability of the structure. The bolted splices between the beams are likely however an item for maintenance.

The only in-situ concrete element of the superstructure is the deck and parapet upstands. The deck will be subject to the exposure to de-icing salts and therefore a waterproofing system is proposed to be applied. The top surface of the bridge deck shall be protected with proprietary sprayed waterproofing applied directly to the deck slab and extending vertically down the back face of the abutment below the construction joint.

The reinforced concrete abutment wall and intermediate pier will be the most exposed element in the structure, considering its length and that it is subject to cyclic expansion and contraction of the superstructure and earth pressures loading, there is the potential for cracks to form. While they are likely to be visible under close inspection, the design will have been specified to control these to within permissible limits for durability.

Maintainability

Movement joints and bearings are the elements most often in need of routine or reactive maintenance, the superstructure is integral with the abutments and central pier which eliminates the need for bearings and their associated maintenance under the bridge and lane closures.

Painted steel is specified due to the low freeboard been less than the minimum value imposed to ensure proper air circulation to allow the alternate wetting and drying needed for the weathering steel patina. A compatible paint colour (RAL 8004 Copper Brown) has been selected to blend with the weathering steel of the adjacent Maylands Bridge.

The bolted splices between the beams are the likely location first requiring maintenance of the coating due to the retention of moisture and dirt in the internal arrises and thinning of the coating at the external arrises. To carry out this maintenance operation either access from the floodplain or with an underbridge unit from the road would be required. However, due to the length of the bridge a splice is required and cannot be avoided, the location is acceptable as it is not directly over the watercourse and has been located in the less stressed section of the bridge.

Spray applied deck waterproofing has been specified which is the preferred solution for long service life and is easily lapped if repair is required.

To facilitate surface water run-off, carriageway crossfalls and vertical alignment of the road on the bridge have been designed to allow surface water to be collected in the edge of the carriageway, using combined kerb drainage units. This is a common solution to avoid the need for complicated detailing and under-slung pipes (which are difficult to access and maintain). However, these units will need periodic jetting to remove debris to maintain its function.

Back-of abutment drainage, following the detailing recommended in the Bridge Detailing Guide, CIRIA report C543, is also provided to ensure no pressure-head of water can built up behind the structure walls.

Inspection and maintenance of Maylands Bridge will be under traffic management on the Grove Bridge to provide access to the superstructure and substructure. Therefore, Grove Bridge will be affected with the maintenance/inspection operations on Maylands Bridge.

The bridge has a risk of vandalism in the form of graffiti to the abutment and central pier. The AIP stated that an anti-graffiti coating will be applied to the exposed concrete surfaces of the abutment and central pier, and this requirement is confirmed for surfaces within 3m of ground level in document HE551519-SWE-SGN-ZZ-SP-CB-50002, the contract specific Appendix 17/2. This will enable easier removal of graffiti should it occur.

Resilience

The lack of bearings removes the vulnerability of the structure to a terrorist attack. However, the bolted splice of the beams is an exposed weak point of the structure. Nevertheless, the splices have been detailed in a standard way and little can be done to protect them from these types of attacks.

The bridge has been designed for the effects of Special Order Vehicle load model SOV-350, which is a greater load than the usual SV196, which is turn is greater than the LM1 loading representing normal traffic. This means that the late in the service life of the structure, even if deterioration is such that it cannot accommodate SOV vehicles, it is likely it will still be able to carry normal traffic and hence the vast majority of vehicles.

The intermediate reinforced concrete pier is protected from the scour with a bank rock armour which was not detailed in the AIP. This protection will increase the resilience of this intermediate support making it less susceptible to scour.

STRUCTURE SUMMARY

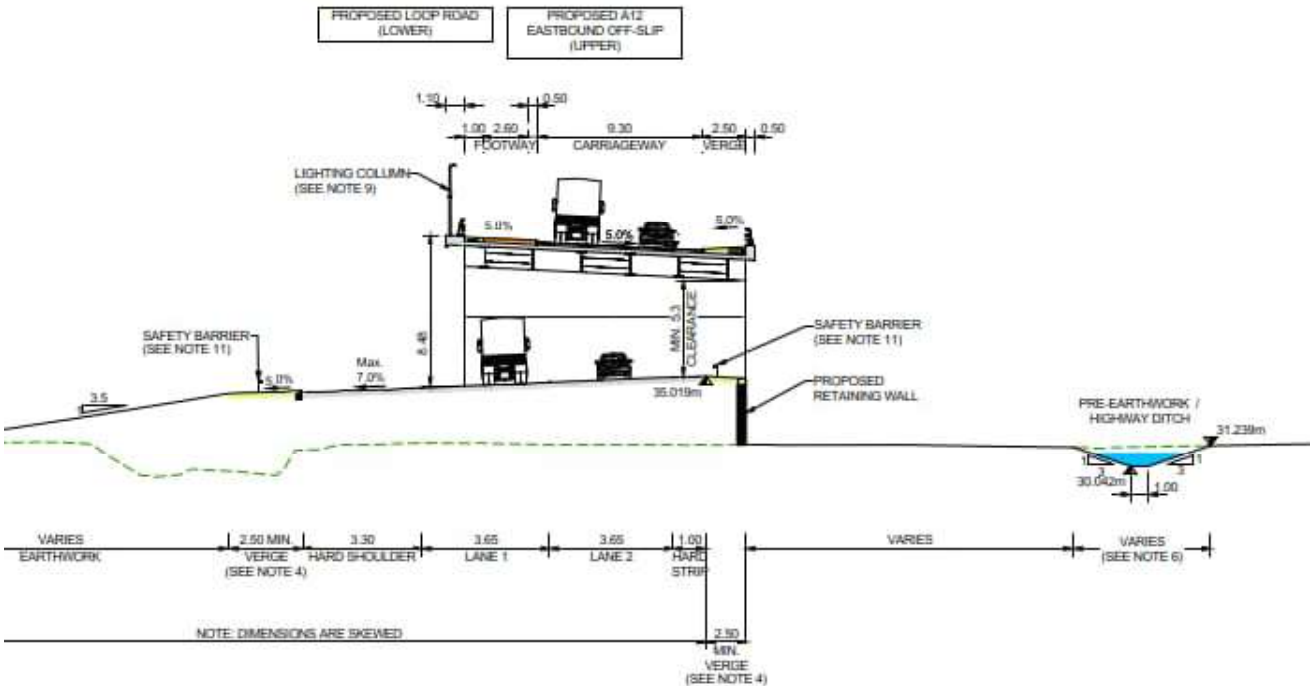
The structure has gone through evolutionary change since the outline shown in the submission, but it is still a two-span integral painted steel composite multi-girder bridge. Most of the changes are minimal and therefore are not considered to be material in nature.

3.5 MAYLANDS BRIDGE

SCHEME REFERENCES

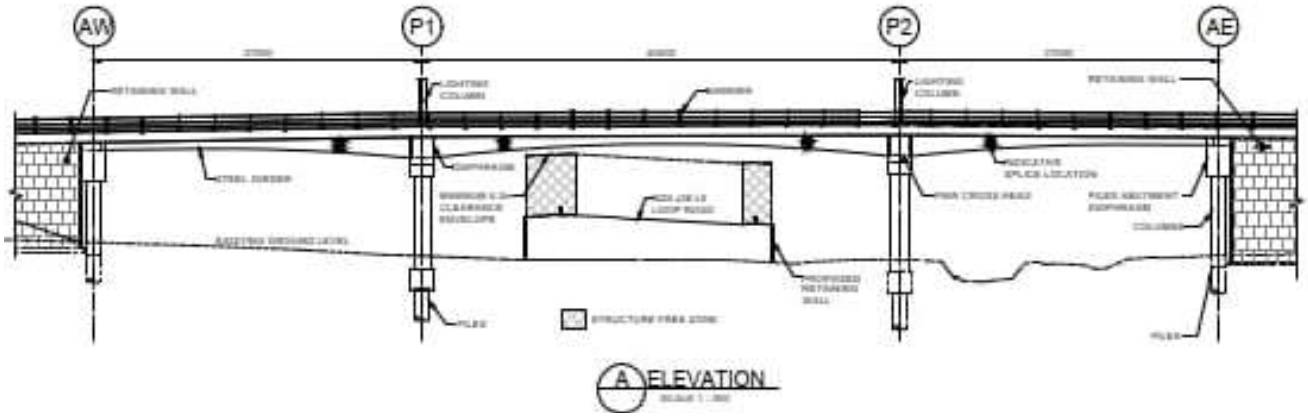
Maylands Bridge	Scheme Reference:	B05
	Asset Key:	39009
	Structure Reference No.:	/A12//18.30//1
	OS Grid Location:	556340, 192268
	AIP Document reference:	HE551519-SWE-SBR-B05-RP-CB-50001 | P04
	GA Drawing reference:	HE551519-SWE-SBR-B05-DR-CB-50110 | C01
		HE551519-SWE-SBR-B05-DR-CB-50111 | C01

Maylands Bridge is shown on the following engineering drawings and sections sheets in the DCO submission: TR010029/APP/2.8 sheet 1/6 and TR10029/APP/2.8 sheet 5/10



PROPOSED CROSS-SECTION OF A12 EASTBOUND OFF-SLIP ROAD
SECTION B-B
Scale 1:200

Extract from DCO Engineering Sections – Typical Cross Sections - Sheet 4 of 6



Extract from DCO Engineering Sections – Maylands Bridge - Sheet 5 of 10

STRUCTURE DESCRIPTION

The proposed Maylands Bridge will carry the A12 eastbound exit slip road over the proposed M25 Loop Road and Weald Brook. The bridge will carry a single carriageway with two lanes for traffic traveling in the same direction. The bridge is located at the south side of the scheme extents.

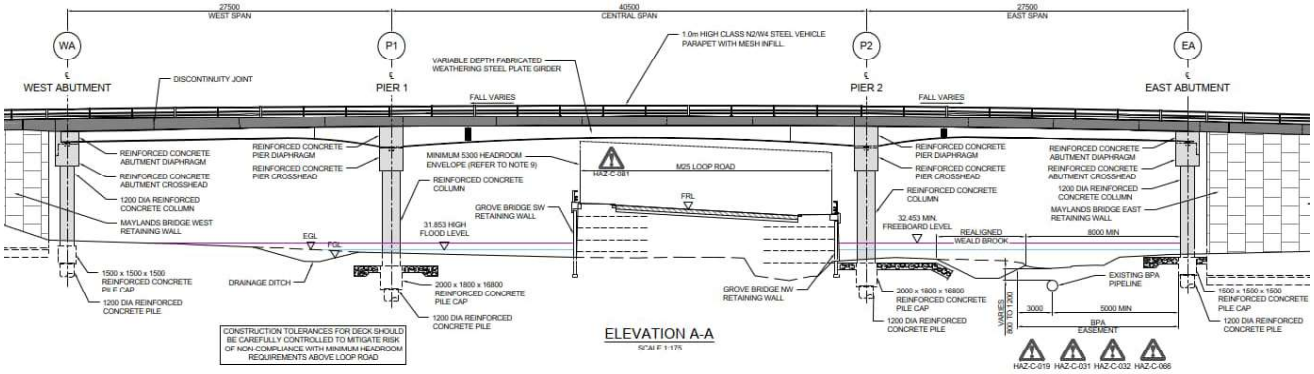
The proposed bridge will comprise a three-span variable depth weathering steel composite multi-girder structure with an in-situ reinforced concrete deck slab. The superstructure will be supported on in-situ reinforced concrete crossheads connected to a series of reinforced concrete columns bearing onto reinforced concrete pile caps.

The alignment of the road requires the bridge to be slightly curved in plan, the west span being straight and the central and east spans curved in plan. The total span of the bridge through abutment and pier centre points is 95.5m which is split as follows: a 27.50m west span, a 40.50m long central span and a 27.50m east span. Due to the significant span, the girders have a variable depth which varies from 1.75m at the intermediate supports to 0.875m at the end supports and centre of centre span.

The deck width between outer faces of parapet beams is 16.60m, made as follows: 8.60m for the carriageway and hardstrips, 4.10m for the northern verge, 2.90m for the southern verge and 0.50m on each side for the parapet edge beam. The carriageway will have a slope of 5%, while the northern verge will have a 2.5% fall and the southern verge a variable fall.

The substructure will comprise reinforced concrete crossheads supported on a series of reinforced concrete columns, squared section at the intermediate piers and circular section at the abutment, founded on reinforced concrete pile caps bearing onto reinforced concrete bored piles.

Reinforced soil retaining walls will be providing earth retention behind the abutments are structurally independent of the bridge and are covered in a separate AIP document.



Extract from Maylands Bridge General Arrangement HE551519-SWE-SBR-B05-DR-CB-50110

STRUCTURE DEVELOPMENT

In the DCO submission, Maylands Bridge was proposed to be a three-span integral composite multi-girder bridge. The current proposal is detailed in a similar way and the form of the structure has remained very much the same.

The total width of the bridge has been modified since the DCO submission. While in this one the width of the bridge was proposed to be 16.90m, in the detailed design drawings it is shown as 16.60m being in line with the other bridges. The carriageway and hardstrip width has been reduced from 9.30m to 8.60m, while the total footway/verges width remained at 4.10m in the northern verge and increased from 2.50m to 2.90m in the southern verge.

The shaping of the girder soffits have been amended, in the DCO submission the vertical radius in the side spans ran for approximately 75% of the span length, at AIP stage this variation had been removed from the side spans but was re-introduced in the design drawings, although reduced to approximately 25% of the span length, presumably for economy of fabrication. The depth of the shallow parts of the girders has also increased slightly. At DCO submission stage 4 splice locations were indicatively shown, this was reduced to 2 at AIP stage, and remains so in the design drawings. They are located at the western points of contraflexure in the centre and east spans.

The skeleton abutments still have five columns and the piers 2. At DCO stage the pier columns were shown the same size as the abutment columns, at AIP stage there were larger 1500mm diameter vs 1200mm and in the design drawings they are ovoid at 1500mm x 2100mm. The previously shown chamfers at DCO and AIP stages at the ends of the pier crossheads have now been omitted.

Lighting columns were envisaged in the DCO submission and AIP and was proposed to be located at each intermediate pier supported on an in-situ reinforced concrete blister behind the parapet upstand. However, in the detailed design drawings the lighting columns are on north side of the deck; on the western span, it is a short distance from the western pier, on the centre span a short distance from the eastern pier and over the eastern abutment. Note however that they are not however shown in the elevation on as this is provided on the south side of the structure. The relocation could be for ease of construction, as it moves the column support blisters away from the deck construction joints, as it is not expected that the lighting level requirements will have changed.

Furthermore, scour protection has been added to the intermediate piers and eastern abutment increasing the resilience of the structure.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

Maylands Bridge, while of unusual geometry is of a fairly standard form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The bridge is proposed to be fully integral at the abutment and pier supports which eliminates the need for bearings and therefore it minimises the maintenance problems associated with the penetration of dirt, water and de-icing agent increasing the durability of the structure.

The use of weathering steel should through alternate wetting and drying develop an adherent patina that develops from a normal rust colour to a darker brown-purple colour requiring minimum maintenance. This will vary slightly due to differing localised exposures to the prevailing weather. The bolts are proposed to be weather resistant Tension Control Bolts to similarly minimise the maintenance although the splice areas between the beam sections may weather differently due to the increased retention of moisture and dirt at internal arises, and inspection dependant suitable maintenance carried out. The only in-situ concrete element of the superstructure is the deck and parapet upstands. The deck will be subject to the exposure to de-icing salts and therefore a waterproofing system is proposed to be applied. The top surface of the bridge deck shall be protected with proprietary sprayed waterproofing applied directly to the deck slab and extending vertically down the back face of the abutment below the construction joint.

The reinforced concrete crossheads and columns of the intermediate and end supports will be the most exposed element in the structure, considering its length and that it is subject to cyclic expansion and contraction of the superstructure and earth pressures loading, there is the potential for cracks to form. While they are likely to be visible under close inspection, the design will have been specified to control these to within permissible limits for durability.

In the AIP it is stated that run off strips were going to be incorporated into the bottom flanges of the weathering steel girders to avoid staining of the substructure during the weathering process, however, these elements have not been included in the detailed design drawings, but it would be usual for them to be added by the fabricator if not already present.

Maintainability

The steel beams will be in weathering steel removing the need for maintenance painting and therefore requiring little maintenance.

Movement joints and bearings are the elements most often in need of routine or reactive maintenance, the superstructure is integral with the abutments and intermediate supports which eliminates the need for bearings and their associated maintenance under the bridge and lane closures.

Spray applied deck waterproofing has been specified which is the preferred solution for long service life and is easily lapped if repair is required.

To facilitate surface water run-off, carriageway crossfalls and vertical alignment of the road on the bridge have been designed to allow surface water to be collected in the edge of the carriageway,

using combined kerb drainage units. This is a common solution to avoid the need for complicated detailing and under-slung pipes (which are difficult to access and maintain). However, these units will need periodic jetting to remove debris to maintain its function.

As the superstructure is supported on crossheads and columns that do not retain any soil, no drainage is required at the back of the substructure. However, it is required for the retaining walls but that is covered in a separate AIP document.

Inspection and maintenance of Maylands Bridge will have to be under traffic management on the A12 off-slip and M25 Loop Road below to provide access to the superstructure and substructure and therefore would logically be carried out at the same time as Grove Bridge.

The bridge has a risk of vandalism in the form of graffiti to the abutment and central pier. The AIP stated that an anti-graffiti coating will be applied to the exposed concrete surfaces of the abutment and central pier, and this requirement is confirmed for surfaces within 3m of ground level in document HE551519-SWE-SGN-ZZ-SP-CB-50002, the contract specific Appendix 17/2. This will enable easier removal of graffiti should it occur.

Resilience

The lack of bearings removes the vulnerability of the structure to a terrorist attack. However, the bolted splice of the beams is an exposed weak point of the structure. Nevertheless, the splices have been detailed in a standard way and little can be done to protect them from these types of attacks.

The bridge has been designed for the effects of Special Order Vehicle load model SOV-350, which is a greater load than the usual SV196, which is turn is greater than the LM1 loading representing normal traffic. This means that the late in the service life of the structure, even if deterioration is such that it cannot accommodate SOV vehicles, it is likely it will still be able to carry normal traffic and hence the vast majority of vehicles.

Both intermediate piers and the eastern abutment are protected from the scour with a bank rock armour which was not detailed in the AIP. This protection will increase the resilience of the substructure making it less susceptible to scour.

The M25 Loop Road which passes beneath Maylands Bridge has a minimum headroom below 5.70m and therefore the superstructure and concrete columns has been designed to withstand the accidental action caused by road vehicles impacting on these elements.

STRUCTURE SUMMARY

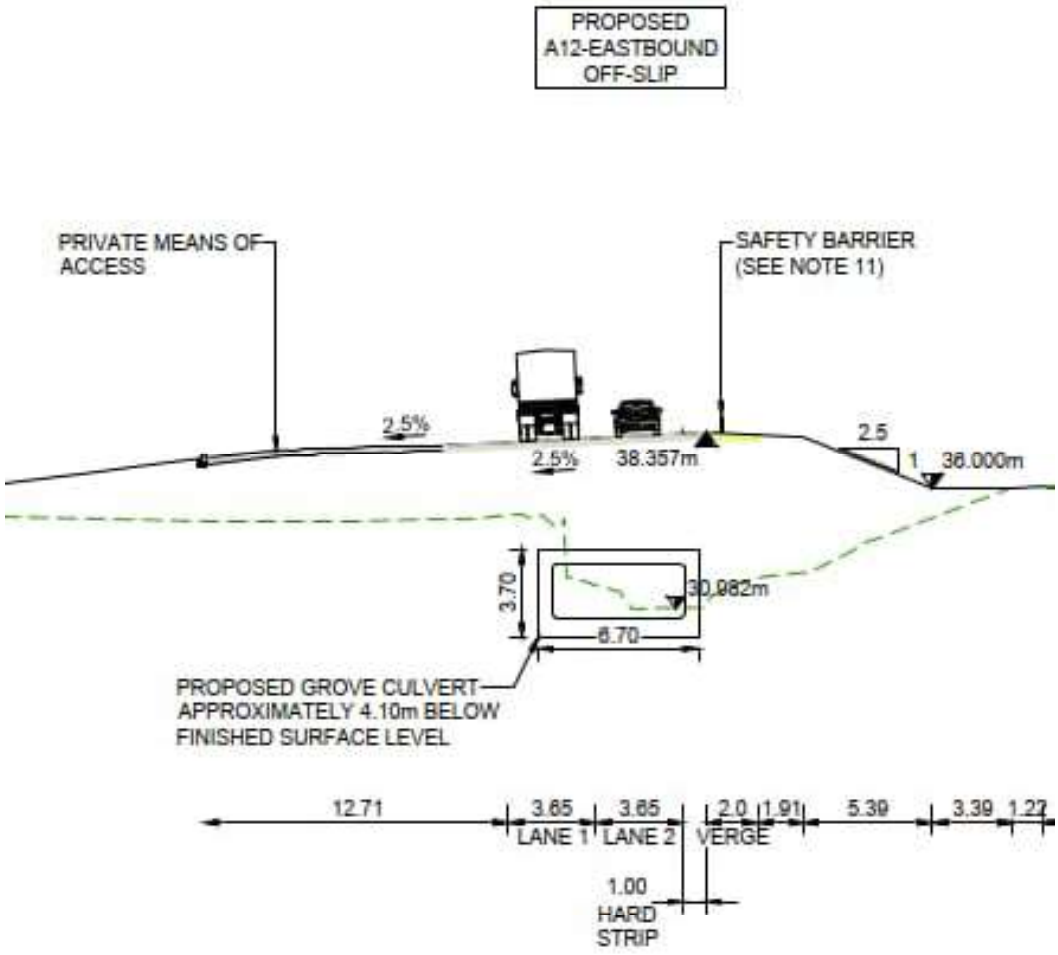
The structure has gone through evolutionary change since the outline shown in the submission, but it is still a three-span integral weathering steel composite multi-girder bridge. The piers have more substantial columns, but considering the higher vertical loads on the piers than the abutments it visually makes sense. The changes to the beam soffit profile are considered minor. Overall, the changes not considered to be material in nature.

3.6 GROVE CULVERT WEST EXTENSION

SCHEME REFERENCES

Grove Culvert Extension	Scheme Reference:	C01
	Asset Key:	13748
	Structure Reference No.:	A12//18.60/Q/1
	OS Grid Location:	556633, 192356
	AIP Document reference:	HE551519-SWE-SBR-C01-RP-CB-50001 | P04
	GA Drawing reference:	HE551519-SWE-SBR-C01-DR-CB-50100 | C02

Grove Culvert Extension is shown on the following engineering drawings and sections sheets in the DCO submission: TR10029/APP/2.8 sheet 4/10



Extract from DCO Engineering Sections – Typical Cross Sections – Sheet 2 of 6

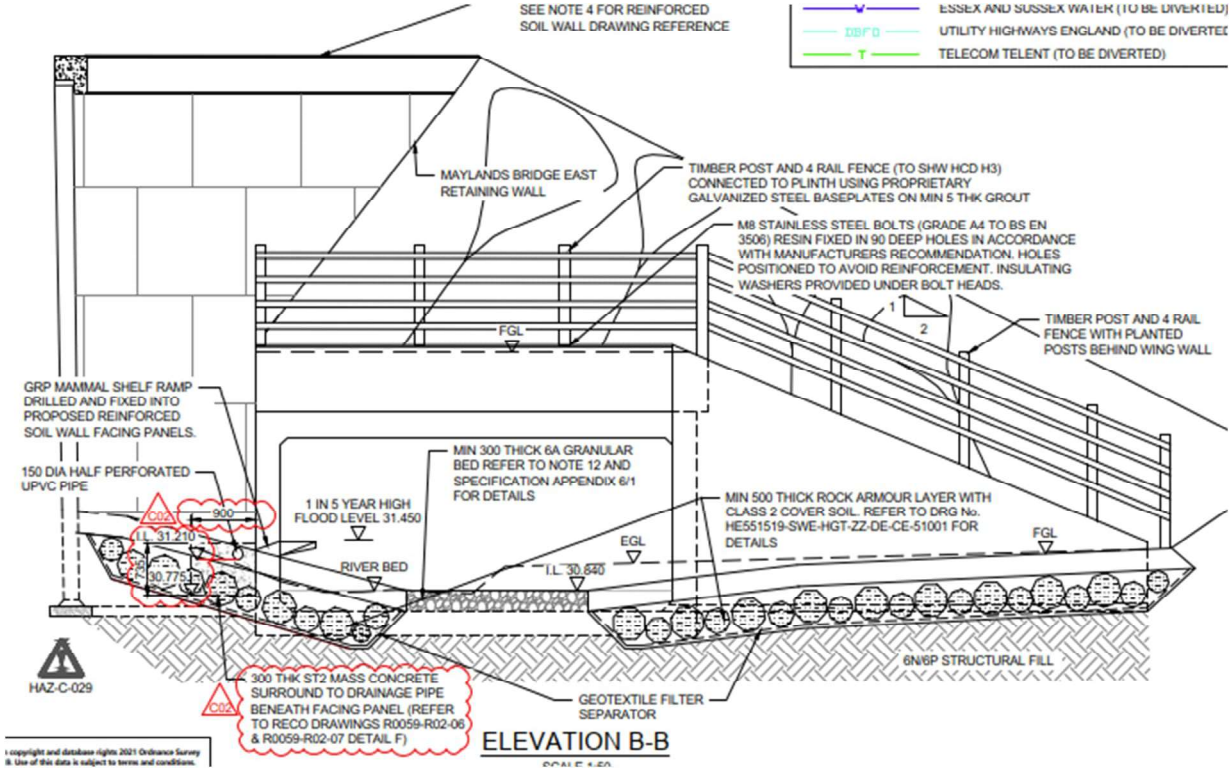
STRUCTURE DESCRIPTION

Grove Culvert, structure 5779, was constructed in 1965 as a twin-cell in-situ concrete box culvert with a length of 159m. Each cell has a clear span of 2.40m and internal height of 2.14m. It accommodates the Ingrebourne River. The culvert has previously been extended twice. The first extension was completed in 1982, with an 18m extension to the west end, and a 10m extension to the east end. It was further extended in 2008, with a 30m extension to the east end. These extensions were allocated a separate structure key 13748. The currently proposed extension of 80m at the west end brings to the total length to 297m and is to be treated as part of structure 13748. The existing reinforced concrete wingwalls at the west end will be demolished to accommodate the proposed extension.

Grove Culvert Extension is proposed as a single box culvert of 5.5m clear internal span and 2.44m internal height. It will accommodate approximately 300mm of granular bed material, thus the soffit will be aligned with that of the existing structure. The maximum height of fill over the culvert is approximately 4.8m. The extension will support the new, realigned, A12 Eastbound off-slip at a skew of 71 degrees to the structure span.

Maylands Bridge East Retaining Wall (considered below) abuts the north side of the west elevation, n the south side a splayed and tapered precast concrete wingwall will be provided.

As part of the works an existing bridge carrying the access track to Grove Farm will be completely demolished to allow the extension to be constructed. The access track will be modestly realigned restored on completion of the slip-road and join the same over the culvert extension.



Extract from Grove Culvert Extension General Arrangement - HE551519-SWE-SBR-C01-DR-CB-50100

STRUCTURE DEVELOPMENT

Grove Culvert Extension was shown in cross section only with external dimensions of 6.7m wide and 3.7m high. At AIP stage these values were 6.4m and 3.34m with 0.45m thick base, walls and top slab. At this stage the length of 80m was defined, and a 0.5m wide mammal ledge attached to the north wall of the culvert was shown. It was determined that the existing pedestrian guardrail would be removed from the west elevation of the exiting culvert, and because vehicle and pedestrian restraint is provided for by a vehicle parapet on a ground beam at higher level, the edge protection at the new culvert elevation would be provided by a normal duty guardrail mounted on the structure headwall or a timber post and 4 rail fence planted behind it. The headwall will be a precast concrete element connected to the culvert with hidden stainless steel dowels. Over the structure, each side of the carriageway are paved footways / verges and topsoiled shoulders and embankment slopes.

During detail design the section sizes were refined, reducing the 0.45m value to 0.35m, thus reducing the external dimensions to 6.2m x 3.14m. The concrete finishes in exposed areas are 'F3' a smooth, dense, fair finish. The wingwall arrangement is identical to that developed at AIP stage and the edge protection determined as the timber post and 4 rail fence. Anti-graffiti coatings will be applied within 3m of the adjacent finished ground level. Downstream of the culvert, larger sized rock armour has been specified to protect the banks and wingwall foundations from scour. To avoid the need for works throughout the combined length of the culvert and respond to the Environment Agency's requirement for a mammal ledge minor works are also proposed at the upstream elevation whereby one of the twin cells is provided with a concrete ramp /weir at each end so in normal flow conditions in once cell the water will not flow and over time will silt up to the top of level of the weir provide a dry passage.

On the final design drawings, internal structural details have been confirmed, but externally the structure is as agreed in the AIP.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

Grove culvert Extension is of a standard form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The use of pre- cast concrete units which are manufactured of site has a number of benefits, there is more control over the placement of the reinforcement and curing of the concrete. The enhanced accuracy of reinforcement fixing will ensure the cover requirements are met. These factors reduce the rate of carbonation of the concrete and provides better protection for the reinforcement prolonging the service life of the structure. The joints between the units are likely however to be an item for maintenance.

The only in-situ concrete element of the extension structure is the stitch between the exiting culvert and the first precast unit. All elements are relatively remote from the carriageways so exposure to de-icing salts will be reduced.

With the structure taking the form of a box, no movement joints or bearings are required. Waterproofing on the top will extend down the sides to 200mm below the soffit this together with the individual joint treatments above and below this line should prevent water passing through the joints

meaning the internal sealant does not have to perform to the same level as it would otherwise, thus prolonging its life; routine inspections will determine when it needs to be replaced. Back-of abutment drainage is also provided to ensure no pressure-head of water can built up behind the structure walls. The 'floor' of the box structure will be buried by the gravel bed which will provide protection to this area.

Maintainability

The internal surfaces of the precast units will generally require little maintenance, the most likely need would arise from impact damage either during or following construction, with the arises of each unit being most vulnerable, these areas are however readily accessible for repair using standard access equipment.

Movement joints and bearings are the elements most often in need of routine or reactive maintenance, by selecting a form of structure without them it significantly reduces the maintenance activities required.

Spray applied deck waterproofing has been specified which is the preferred solution for long service life, in this situation with it being well buried by the fill above it won't be affected by carriageway resurfacing and is unlikely that it will be uncovered unless significantly deteriorated. This is unlikely given the lack of environmental exposure. Sealant provided on the internal side of the joints between the precast units will need occasional replacement, access will be from the watercourse and likely to be timed with periods of low flow where the water can more easily be managed, or mobile platforms can be provided in and above the water level.

Over the structure the limited length of the structure means that no special measures are required for drainage of the A12 off-slip. Kerbs and gullies are provided for carriageway drainage. Rodding eyes are also provided in the verges to allow clearing of the back of wall drainage that will be installed each side of the culvert.

Anti-graffiti surface treatments are to be applied to the exposed concrete faces to enable easier removal of graffiti should it occur.

The GRP sections of the mammal ledge at each elevation may need repair following damage flood-borne debris in the river or possibly vandalism.

Resilience

As above, although an anti-graffiti coating will be applied to exposed concrete surfaces external to the culvert, the culvert will be difficult to access so is not considered to be at significant risk of vandalism.

The lack of bearing shelf removes a vulnerability in the event that the structure became a target for terrorists, the structure being largely buried would be relatively resilient in this respect and not an obvious target.

There is a significant depth of fill over the structure. This will disperse individual wheel loads, and while this will have been accounted for in the design, most likely at the lowest thickness it will make the structure less sensitive to overloading. The structure will carry a heavy load route, as such the structure has been designed for SOV-350 vehicles which is a greater load than the usual SV196, which in turn is greater than the LM1 loading representing normal traffic. This means that late in the

service life of the structure, even if deterioration is such that it cannot accommodate SOV vehicles it is likely it will still be able to carry normal traffic and hence the vast majority of vehicles.

STRUCTURE SUMMARY

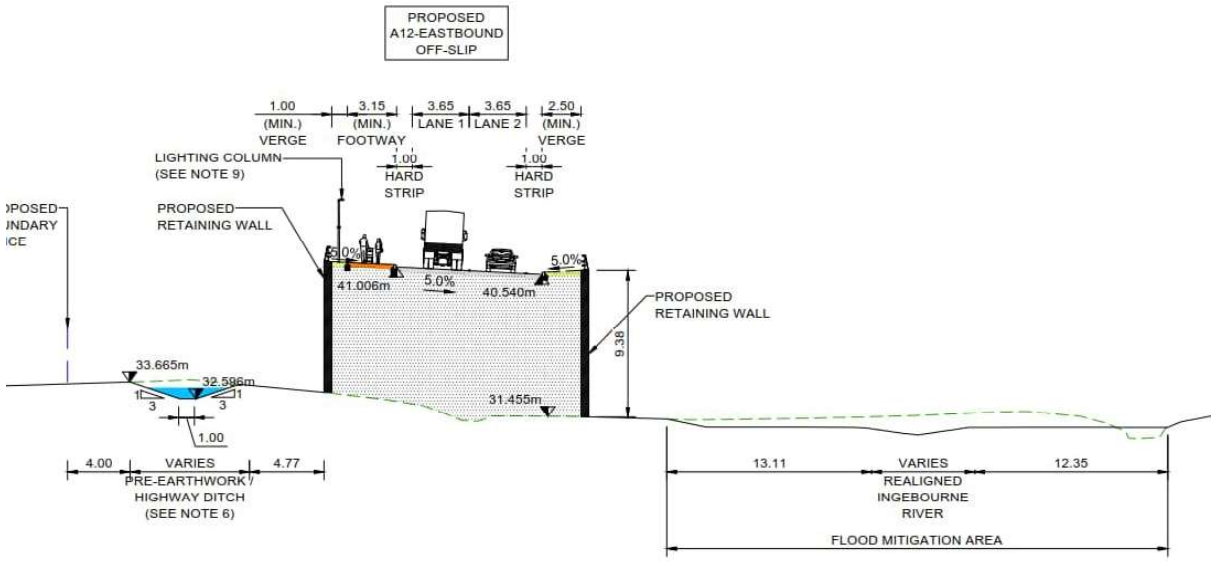
Limited information was provided within the outline shown in the submission, but the structure has reduced in span and height since that stage. The elevation will be below the perceived general ground level and will not be prominent in the landscape. Overall the changes are not considered to be material in nature.

3.7 MAYLANDS BRIDGE EAST RETAINING WALL

SCHEME REFERENCES

Structure Name:	Maylands Bridge East Retaining Wall
Scheme Reference:	R02
Asset Key:	39105
Structure Reference No.:	/A12//18.60/R/3
OS Grid Location:	556508, 192351
AIP Document reference:	HE551519-SWE-SSP-ZZ-RP-CB-50002 | P04
GA Drawing reference:	HE551519-SWE-SSP-ZZ-DR-CB-50027 | C01
	HE551519-SWE-SSP-ZZ-DR-CB-50028 | C01

Maylands Bridge East retaining wall is shown on the following engineering drawings and sections sheets in the DCO submission: TR10029/APP/2.8 Engineering Sections sheet 5 of 10 and Typical Cross Sections sheet 2 of 6.



Extract from DCO Engineering Sections - Typical Cross Sections - Sheet 2 of 6.

STRUCTURE DESCRIPTION

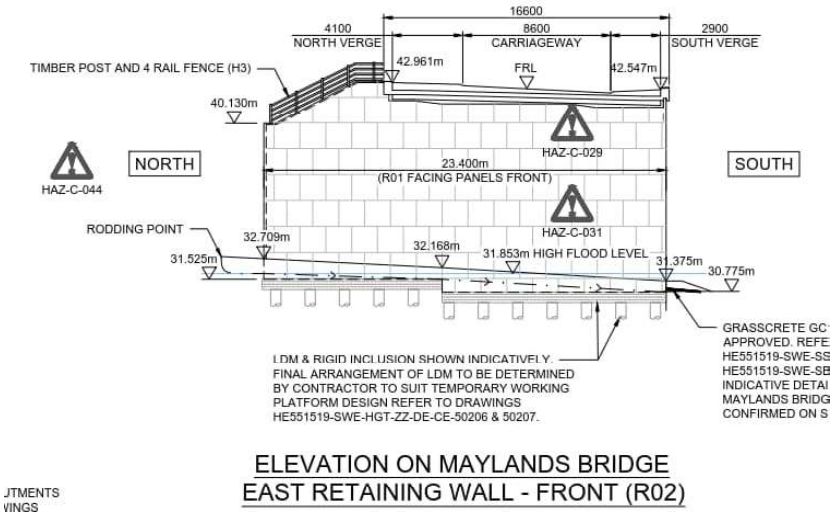
The proposed retaining wall is a proprietary reinforced soil retaining system and is required to support the approach embankments to Maylands Bridge on the A12 eastbound off-slip road. The proposed retaining wall is approximately 390m long with a maximum retained height of approximately 12.3m.

The reinforced soil walls will comprise dry laid modular precast concrete facing units connected to reinforcing strips which act to reinforce the compacted engineered fill and stabilise the retaining wall.

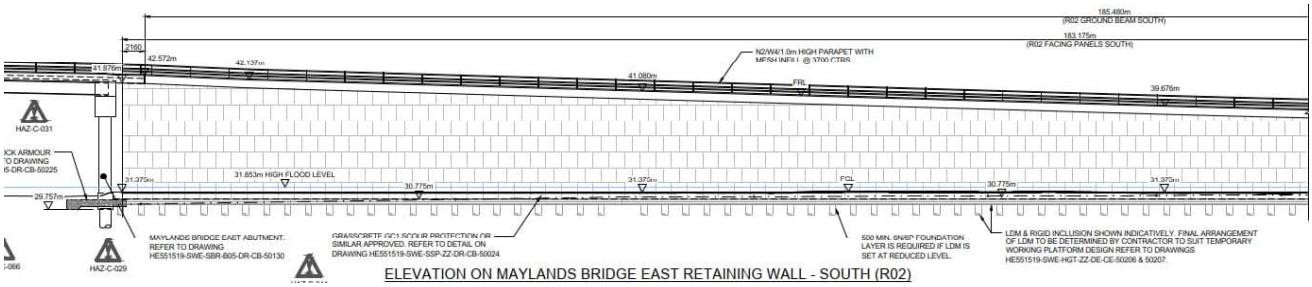
The precast concrete facing units will have a ‘hard’ face and be connected to the reinforcing strips using mechanical connectors. The precast concrete facing units will be founded on a mass concrete strip foundation on which the first layer of facing units can be laid.

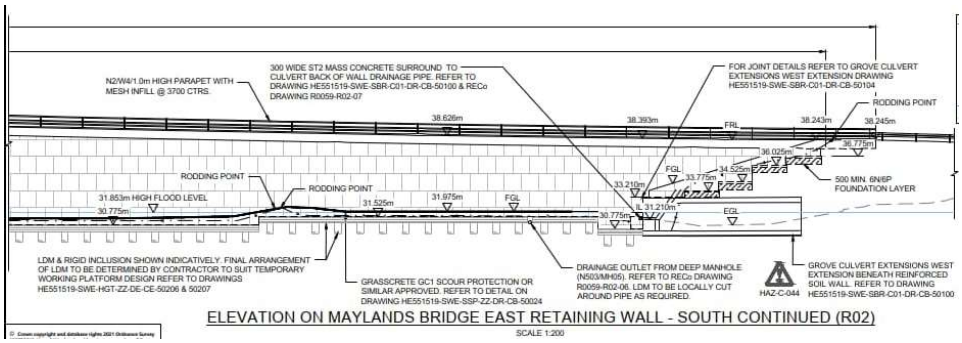
Above each retaining wall will be a reinforced concrete parapet ground beam that will support the vehicular containment parapets. The parapet ground beam will be structurally independent of the reinforced soil walls and will comprise a precast parapet coping unit supported on an in-situ reinforced concrete slab.

Maylands Bridge East Retaining Wall interfaces with the Grove Culvert West Extension at the south-east end, with the culvert extension being constructed in advance of the reinforced soil wall.



Extract from General Arrangement & Typical Details - Sheet 9 of 10. HE551519-SWE-SSP-ZZ-DR-CB-50028





Extract from General Arrangement &Typical Details - HE551519-SWE-SSP-ZZ-DR-CB-50027

STRUCTURE DEVELOPMENT

Maylands Bridge East and West retaining walls are shown indicatively in a couple of locations within the DCO submission documentation, both running adjacent to Maylands Bridge. The retaining walls have vertical sides that are faced with modular units. The bridge parapet continues from the bridge and along the retaining walls. Maylands Bridge is covered in section 3.5.

The form of construction described in the AIP has not changed from this depiction, the retained height varies along the length of the wall and has a maximum height a little above that shown in the typical cross section. The northern part of the wall has been moved north to reduce its height. The 1m high steel parapets will be provided along the length of the wall (south side) fixed to precast concrete parapet ground beams. These ground beams will not be visible when completed and are structurally independent of the reinforced soil walls. On the north side a timber safely fence runs along the top of the retaining wall, along the bottom of the slope, while a vehicle restraint system runs beside the carriageway at the top of the slope. This is only significant change to the wall shown in the DCO submission drawings which did not show these details.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

Maylands Bridge East retaining wall is of a standard prefabricated form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The precast concrete facing units will be connected by reinforcing strips made from galvanised steel or high-density polyethylene (HDPE) and suitable mechanical connectors.

Structural backfill between reinforced soil walls and behind bridge abutments where 6I/6J is not required will be Class 6N/6P to Series 600 of the Specification for Highway Works.

The form of construction has proven durable as the soil reinforcement elements are protected from the elements and mechanical damage once installed and the whole wall is able to accommodate minor movements.

Maintainability

A vertical layer of granular drainage fill will be used behind the precast facings to channel any water seepage to the toe of the wall. This layer will also prevent loss of fines through the joints and reduce the risk of displacement of the precast concrete facing units during compaction of the fill. Seepages are expected to be small as the carriageways and verges have hard surfacing and will be provided with sealed highway drainage. In addition, a membrane will be provided between the precast unit joints on the back face to stop fine materials from washing out between joints.

In accordance with contract specific Appendix 17/2 an anti-graffiti coating will be implemented on the outside face of the precast concrete facing units that are wholly or partially within 3m of the finished ground level. This will enable easier removal of graffiti should it occur and is believed to be suitable given the limited public access to the area in front of the wall.

Resilience

The retaining walls and all component elements of the retaining system have a design working life of 120 years. The hard facing concrete units have a Class F5 finish requiring a smooth and uniform texture.

STRUCTURE SUMMARY

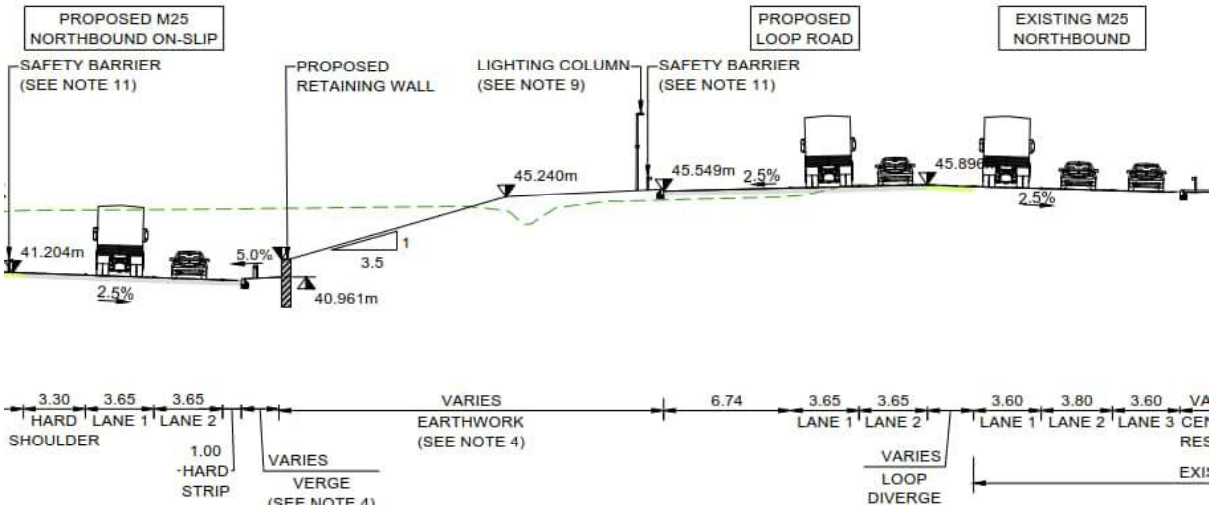
Different structure options were considered during an options study. The proposed structure has a good whole life cost when compared to the other options considered and does have a consistent appearance which minimises the use of natural materials for these relatively tall retaining walls. There is no material change to the external appearance of the retaining wall shown in the DCO submission drawings. The width between the north and south sides of the retaining wall has increased slightly, with a slope incorporated into the north side to reduce the structure retained height.

3.8 M25 ON-SLIP RETAINING WALL

SCHEME REFERENCES

Structure Name:	J28 M25 On-slip Retaining Wall
Scheme Reference:	R04
Asset Key:	39107
Structure Reference No.:	28/M25//172.00/R/4
OS Grid Location:	556596, 192532
AIP Document reference:	HE551519-SWE-SRW-R04-RP-CB-50001 | P04
GA Drawing reference:	HE551519-SWE-SRW-R04-DR-CB-50100 | C01
	HE551519-SWE-SRW-R04-DR-CB-50106 | C01

J28 M25 on-slip retaining wall is shown on the following engineering drawings and sections sheets in the DCO submission: TR10029/APP/2.8 Typical Cross Sections sheet 3 of 6.



Extract from Engineering Sections - Typical Cross Sections - Sheet 3 of 6.

STRUCTURE DESCRIPTION

The proposed retaining wall is a modular block gravity wall comprising interlocking precast concrete blocks arranged in a brick bond pattern. The blocks will be supported on an in-situ concrete spread foundation. The tallest sections will be further supported by shear trench ground improvements beneath the footing. The proposed retaining wall is 318m long with a maximum retained height of approximately 4.6m.

The profile of the retaining wall will comprise straight sections of modular block that follow the alignment of the proposed anti-clockwise on-slip road. At locations where the slip road alignment curves and where the embankment profile curves (south end), a modular block type that can facilitate a curve will be used. The blocks will be 1600 x 800 x 800mm (length, width, height) with smaller standard blocks at the joints between different sections. Voids created at the rear of the structure will be filled with mass concrete, but these will not be visible in the finished structure.

At the north end of the retaining wall, the modular block wall will interface with a proposed contiguous piled retaining wall, Alder Wood SE retaining wall. A 1.15m high guardrail will be provided along the entire length of the retaining wall.

STRUCTURE DEVELOPMENT

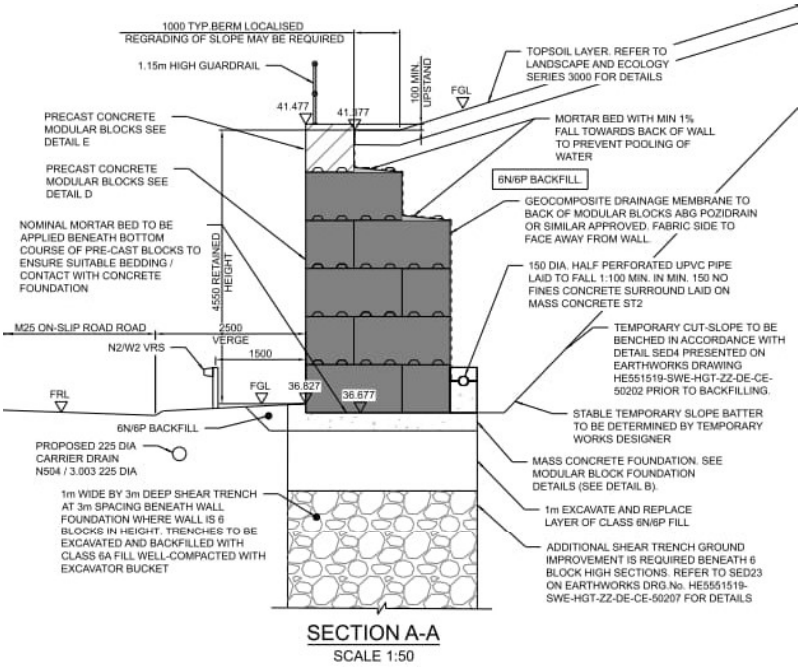
J28 M25 on-slip retaining wall is shown indicatively in only one location within the submission documentation, the section taken through the proposed M25 Northbound On-slip. The retaining wall was shown as having vertical face. The proposed design continues to have a vertical side formed from the interlocking precast concrete blocks.

The Structures Options Report (SOR) considered steel sheet piles, reinforced earth, crib, gabion baskets and precast concrete cantilever walls. The selection was made on the basis of whole life cost, simplicity of construction and minimum maintenance.

The form of construction described in the AIP has not changed significantly from the depiction in the DCO submission, although the wall details shown within the DCO submission provide minimal details of the retaining wall type. It appears that the overall wall height has increased from the dimension indicated in the section provided within the DCO submission, indeed it is noted in section 6 of the AIP that the wall increased in length and height since the SOR, when the wall was anticipated to have a maximum retained hight of 2.3m and length of 150m. This is understood to be partly because the abutting contiguous pile wall was shortened in tandem and partly due to realignment of the Loop Road and/or the M25 on-slip. Within the DCO submission no guardrail was shown running along the top of the wall, however it is proposed to provide a guardrail along the entire length of the retaining wall as shown from the section extracted from the design AIP.

The top of the retaining wall has a stepped profile as the number of blocks required and the ground profile varies, this stepped profile is not shown in the DCO submission drawings. The guardrail which runs along the top of the wall similarly steps in profile.

No colours are proposed for the finish to this retaining wall; the facing blocks will be natural concrete grey colour.



Extract from Sections and details drawing HE551519-SWE-SRW-R04-DR-CB-50106_C01.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

The J28 M25 on-slip retaining wall is of a standard prefabricated form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The proposed structure type is durable provided that the back of wall drainage is suitably maintained. This will prevent water passing through the joints prolonging the life of the modular blocks. Structural backfill behind the retaining wall will be Class 6N/6P to Series 600 of the Specification for Highway Works.

Maintainability

Water seepage through the modular block wall will be controlled by a drainage system covering the back of the wall leading to drainage pipes within the in-situ concrete spread foundation.

Maintenance requirements are considered to be minimal because the precast blocks are made from a high strength concrete and they are unreinforced, so the blocks are not at risk of corrosion induced by chlorides of carbonation.

The modular block wall is dry laid without mortar, and so will accommodate movement throughout its lifecycle removing the need to maintain expansion joints.

In accordance with contract specific Appendix 17/2 an anti-graffiti surface treatments are to be applied to the exposed faces within 3m of the finished ground level. This will enable easier removal of graffiti should it occur.

Inspection and maintenance of the retaining wall will have to be undertaken by means of a MEWP positioned on the verge in front of the wall for which lane closures will be needed on the M25 on-slip.

Resilience

The retaining walls and all component elements of the retaining system have a design working life of 120 years. The precast blocks have a Class F3 concrete finish.

In normal use the structure it will not be subject to any live load, however the wall has been designed considering a maintenance surcharge to facilitate the use of vehicles on the verge above the wall. An allowance, as required by the design codes, for unplanned excavation in front of the wall is also included in the design to mitigate against failure.

STRUCTURE SUMMARY

The proposed structure has the best whole life cost when compared to the other retaining wall options considered.

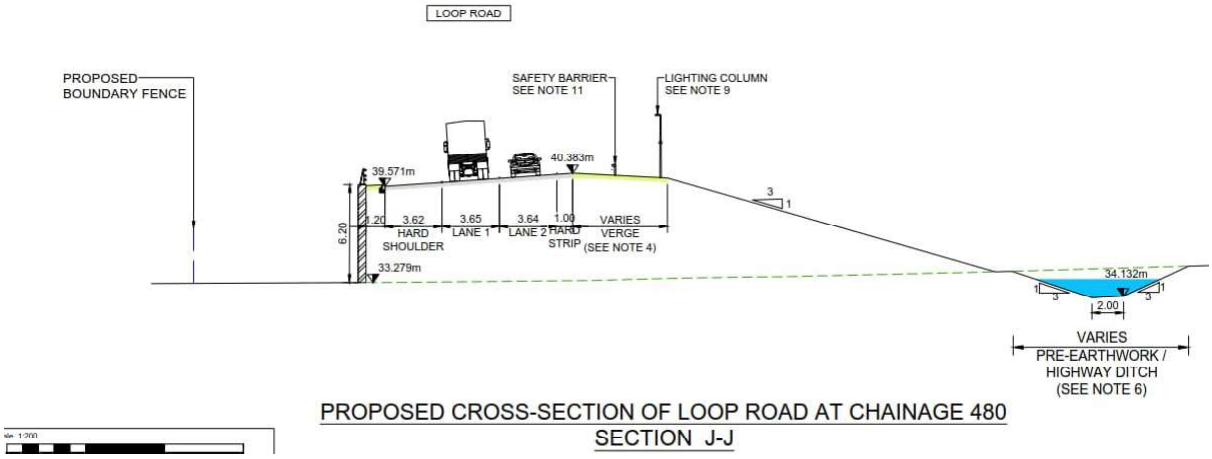
Limited information was provided within the DCO submission. The structure was simply defined as a “proposed retaining wall” with no dimensions stated in a cross section of the M25. The ‘joint’ position between this structure and Alder Wood Bridge SE retaining wall has moved, so direct comparisons are not representative. Although the height has increased, there is no significant change to the external appearance of the retaining wall shown in the DCO submission drawings other than the provision of a pedestrian guardrail along the top of the wall. Additionally, the stepped profile to the top of the retaining wall and the guardrail are not shown. It is not clear if these changes would be considered as material in nature.

3.9 GROVE FARM UNDERPASS SOUTHWEST RETAINING WALL

SCHEME REFERENCES

Structure Name:	Grove Farm Underpass SW Retaining Wall
Scheme Reference:	R14
Asset Key:	39117
Structure Reference No.:	28/M25//171.90/R/8
OS Grid Location:	556331, 192736
AIP Document reference:	HE551519-SWE-SSP-ZZ-RP-CB-50001 | P05
GA Drawing reference:	HE551519-SWE-SSP-ZZ-DR-CB-50022 | C01

Grove Farm Underpass SW Retaining Wall is a reinforced soil wall required to support the approach embankments to Grove Farm Underpass. The retaining wall is shown on the following engineering drawings and sections sheets in the DCO submission: TR10029/APP/2.8 Typical Cross Sections sheet 4 of 6.



Extract from Engineering Sections - Typical Cross Sections - Sheet 4 of 6.

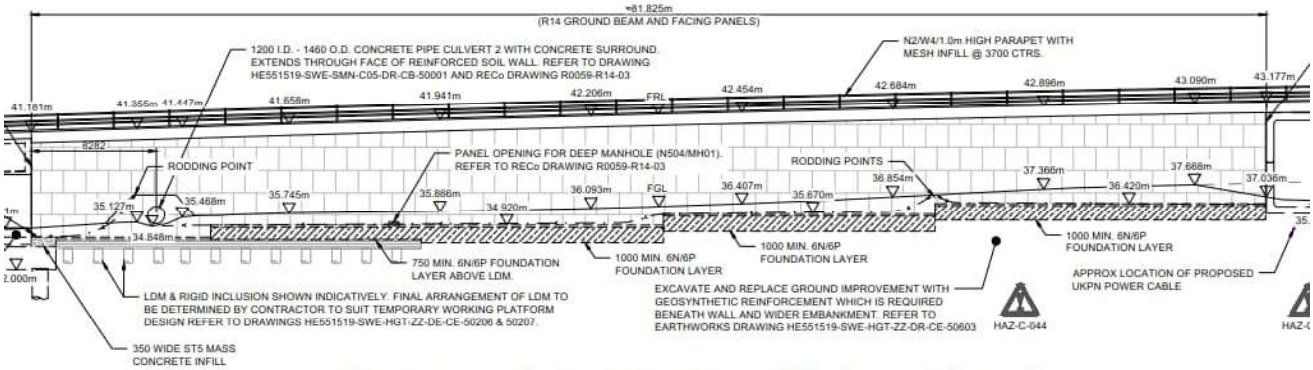
STRUCTURE DESCRIPTION

Grove Farm Underpass SW Retaining Wall is a proprietary reinforced soil retaining system and is required to support the approach embankments to Grove Farm Underpass. The proposed retaining wall is approximately 85m long with a maximum retained height of approximately 6.9m.

The reinforced soil walls will comprise dry laid modular precast concrete facing units connected to reinforcing strips which act to reinforce the compacted engineered fill and stabilise the retaining wall. The precast concrete facing units have a ‘hard’ face and are connected to the reinforcing strips using mechanical connectors. The precast concrete facing units are founded on a mass concrete

strip foundation on which the first layer of facing units can be laid. Further ground improvement is proposed below the strip foundation as required.

Above each retaining wall will be a reinforced concrete parapet ground beam, that will support the vehicular containment parapets. The parapet ground beam will be structurally independent of the reinforced soil walls and will comprise precast parapet coping units supported on in-situ reinforced concrete slab. The bridge parapet continues from the underpass and along the retaining wall.



Extract from General Arrangement - HE551519-SWE-SSP-ZZ-DR-CB-50022_C01 Sheet 3 of 10

STRUCTURE DEVELOPMENT

Grove Farm Underpass SW Retaining Wall is shown indicatively in only one location within the submission documentation, the section taken between Grove Farm Underpass and Duck Wood Bridge. The retaining wall was shown as having vertical face. The proposed design continues to have a vertical side and is faced with reinforced concrete modular units.

The form of construction described in the AIP has not changed significantly from this depiction. Parapets will be provided along the length of the wall on top of precast concrete parapet ground beams, these will not be visible when completed. The parapet ground beams are structurally independent of the reinforced soil walls.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

This retaining wall is of a standard prefabricated form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The precast concrete facing units will be connected by reinforcing strips made from galvanised steel or high-density polyethylene (HDPE) and suitable mechanical connectors.

Structural backfill between reinforced soil walls and behind bridge abutments where 6I/6J is not required will be Class 6N/6P to Series 600 of the Specification for Highway Works.

The form of construction has proven durable as the soil reinforcement elements are protected from the elements and mechanical damage once installed and the whole wall is able to accommodate minor movements.

Maintainability

A vertical layer of granular drainage fill will be used behind the precast facings to channel any water seepage to the toe of the wall. This layer will also prevent loss of fines through the joints and reduce the risk of displacement of the precast concrete facing units during compaction of the fill. Seepages are expected to be small as the carriageways and verges have hard surfacing and will be provided with sealed highway drainage. In addition, a membrane will be provided between the precast unit joints on the back face to stop fine materials from washing out between joints.

In accordance with contract specific Appendix 17/2 an anti-graffiti coating will be implemented on the outside face of the precast concrete facing units that are wholly or partially within 3m of the finished ground level. This will enable easier removal of graffiti should it occur and is believed to be suitable given the limited public access to the area in front of the wall.

Resilience

The retaining walls and all component elements of the retaining system have a design working life of 120 years. The hard facing concrete units have a Class F5 finish requiring a smooth and uniform texture..

STRUCTURE SUMMARY

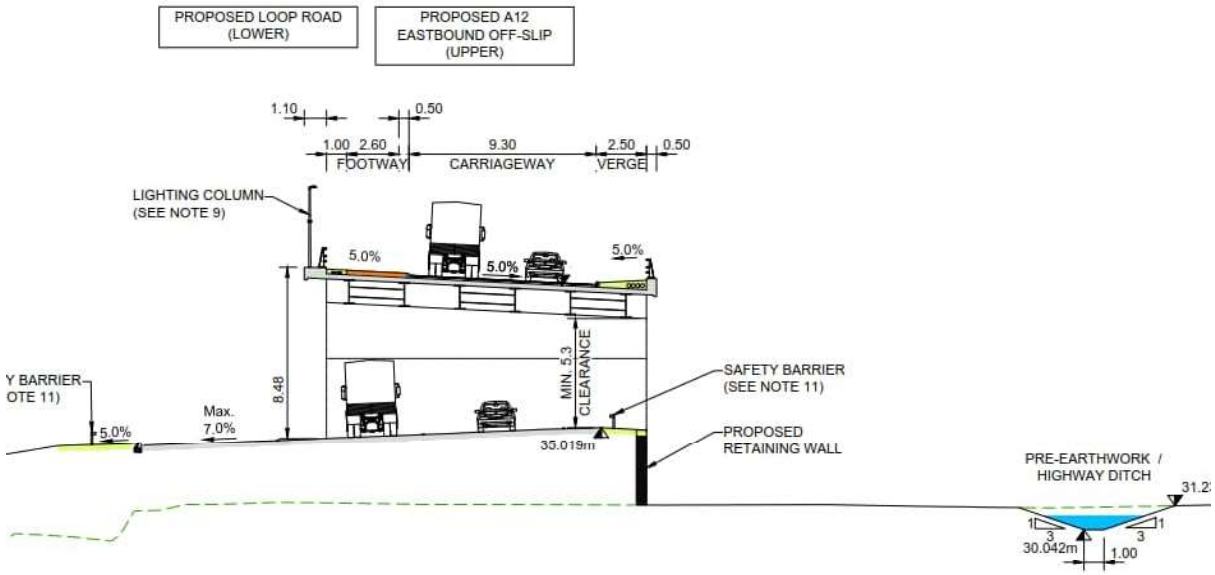
The proposed structure has a good whole life cost when compared to the other options considered and does have a consistent appearance with other retaining walls on this scheme which minimises the use of natural materials for these relatively tall retaining walls. There is no material change to the external appearance of the retaining wall shown in the DCO submission drawings.

3.10 GROVE BRIDGE SOUTHWEST RETAINING WALL

SCHEME REFERENCES

Structure Name:	Grove Bridge SW Retaining Wall
Scheme Reference:	R19
Asset Key:	39121
Structure Reference No.:	/A12//18.30/R/
OS Grid Location:	556432, 192228
AIP Document reference:	HE551519-SWE-SSP-ZZ-RP-CB-50001 | P05
GA Drawing reference:	HE551519-SWE-SSP-ZZ-DR-CB-50024 | C01

Grove Bridge SW retaining wall is a reinforced soil walls required to support the approach embankments to Grove Bridge. The retaining wall is shown on the following engineering drawings and sections sheets in the DCO submission: TR10029/APP/2.8 Typical Cross Sections sheet 1 of 6 and Engineering Sections sheet 3 of 10.



Extract from Engineering Sections - Typical Cross Sections - Sheet 1 of 6.

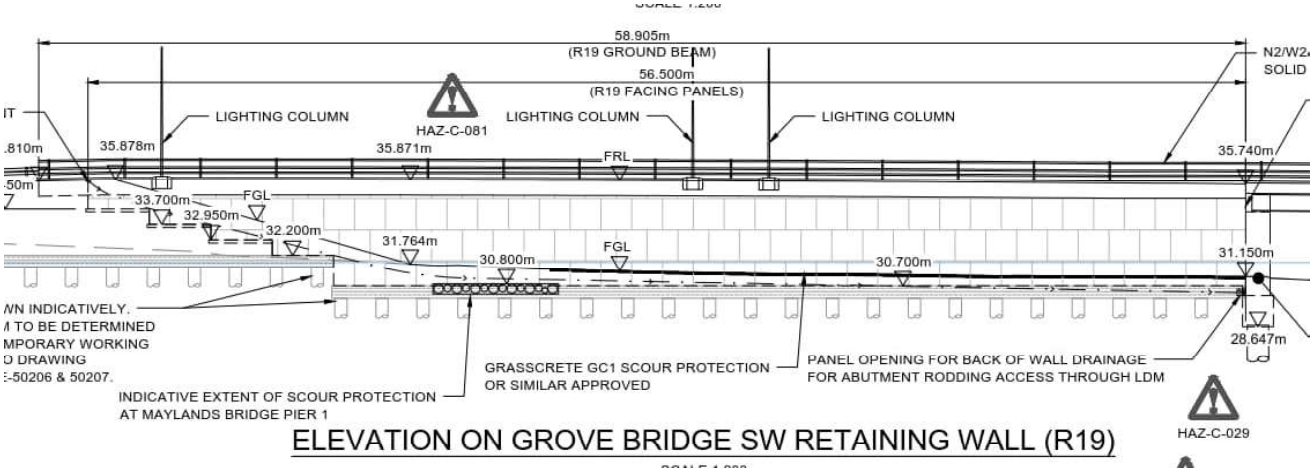
STRUCTURE DESCRIPTION

Grove Bridge SW retaining wall is a proprietary reinforced soil retaining system and is required to support the approach embankments to Grove Bridge. The proposed retaining wall is approximately 60m long with a maximum retained height of approximately 4.6m.

The reinforced soil walls will comprise dry laid modular precast concrete facing units connected to reinforcing strips which act to reinforce the compacted engineered fill and stabilise the retaining wall. The precast concrete facing units have a ‘hard’ face and are connected to the reinforcing strips

using mechanical connectors. The precast concrete facing units are founded on a mass concrete strip foundation on which the first layer of facing units can be laid. Additional ground improvement and some localised scour protection is proposed below the strip foundation as required.

Above each retaining wall will be a reinforced concrete parapet ground beam that will support the vehicular containment parapets adjacent to Grove Bridge. The parapet ground beam will be structurally independent of the reinforced soil walls and will comprise precast parapet coping units supported on in-situ reinforced concrete slab. The bridge parapet continues from the bridge and along the retaining wall. When road alignment allows, the parapet will transition to a suitable vehicle restraint system as is shown on the DCO submission drawing.



Extract from General Arrangement - HE551519-SWE-SSP-ZZ-DR-CB-50024 C01 Sheet 5 of 10

STRUCTURE DEVELOPMENT

Grove Bridge SW retaining wall is shown indicatively within the submission documentation, the taken below Maylands Bridge. The retaining wall was shown as having vertical face. The proposed design continues to have a vertical side and is faced with reinforced concrete modular units.

The form of construction described in the AIP has not changed significantly from this depiction. Parapets will be provided along the wall adjacent to Grove Bridge on top of precast concrete parapet ground beams, these beams will not be visible when completed. The parapet ground beams are structurally independent of the reinforced soil walls.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

This retaining wall is of a standard prefabricated form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The precast concrete facing units will be connected by reinforcing strips made from galvanised steel or high-density polyethylene (HDPE) and suitable mechanical connectors.

Structural backfill between reinforced soil walls and behind bridge abutments where 6I/6J is not required will be Class 6N/6P to Series 600 of the Specification for Highway Works.

The form of construction has proven durable as the soil reinforcement elements are protected from the elements and mechanical damage once installed and the whole wall is able to accommodate minor movements.

Maintainability

A vertical layer of granular drainage fill will be used behind the precast facings to channel any water seepage to the toe of the wall. This layer will also prevent loss of fines through the joints and reduce the risk of displacement of the precast concrete facing units during compaction of the fill. Seepages are expected to be small as the carriageways and verges have hard surfacing and will be provided with sealed highway drainage. In addition, a membrane will be provided between the precast unit joints on the back face to stop fine materials from washing out between joints.

In accordance with contract specific Appendix 17/2 an anti-graffiti coating will be implemented on the outside face of the precast concrete facing units that are wholly or partially within 3m of the finished ground level. This will enable easier removal of graffiti should it occur and is believed to be suitable given the limited public access to the area in front of the wall.

Resilience

The retaining walls and all component elements of the retaining system have a design working life of 120 years. The hard facing concrete units have a Class F5 finish requiring a smooth and uniform texture.

STRUCTURE SUMMARY

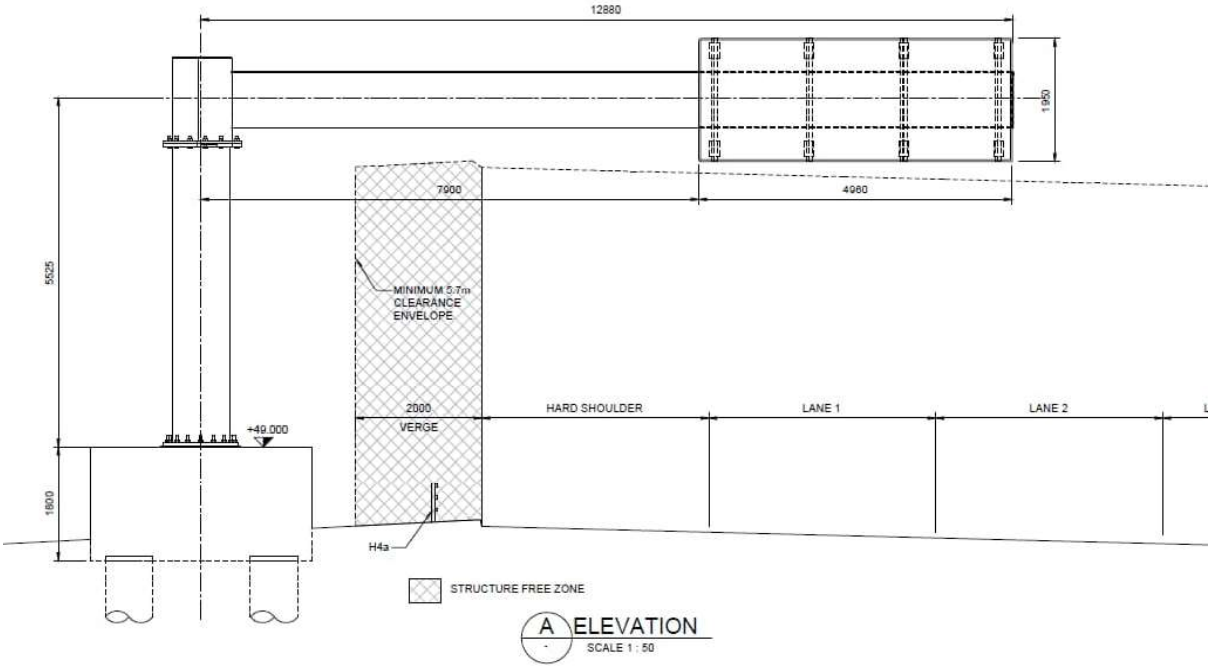
The proposed structure has a good whole life cost when compared to the other options considered and does have a consistent appearance with other retaining walls on this scheme which minimises the use of natural materials within the restrictions of the site. There is no material change to the external appearance of the retaining wall shown in the DCO submission drawings.

3.11 ADS CANTILEVER GANTRY AT CH 530 (GA3-NB-01)

SCHEME REFERENCES

Structure Name:	GN01 (ADS Cantilever Gantry)
Scheme Reference:	G01 (GA3-NB-01)
Asset Key:	39101
Structure Reference No.:	/M25//172.30/S/2
OS Grid Location:	556661, 192478
AIP Document reference:	HE551519-RAM-SGY-ZZ-RP-CB-50004 | P04
GA Drawing reference:	HE551519-RAM-SGY-GA3_NB_01-DR-CB-50001 | C01

GN01 is an advance direction sign (ADS) required over the northbound carriageway M25 North of Junction 28 including the verge and hard shoulder. This ADS is shown on the following engineering drawings and sections sheets in the DCO submission: Engineering Sections sheet 6 of 10.



Extract from DCO Engineering Sections - Sheet 6 of 10.

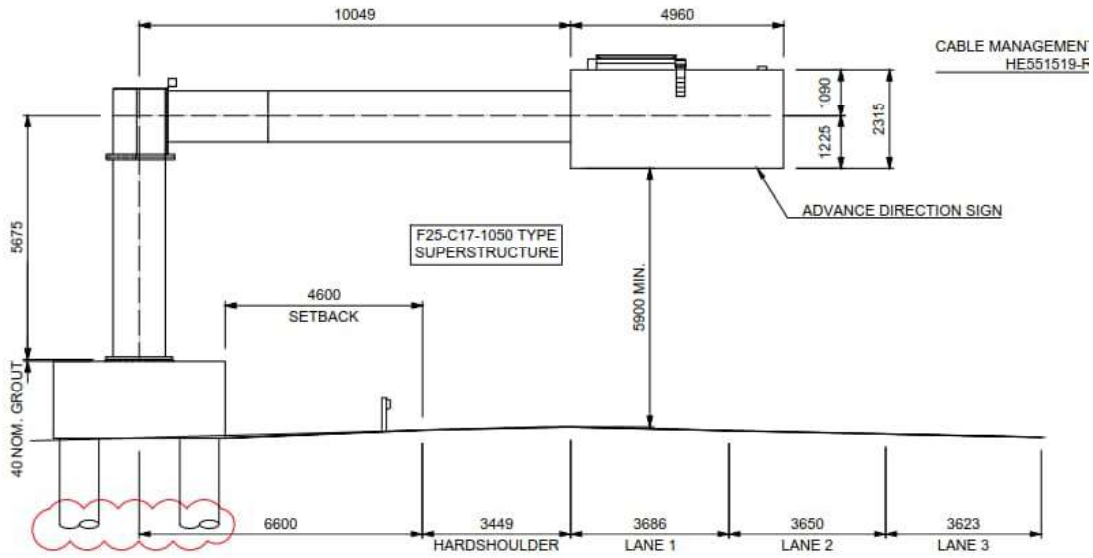
STRUCTURE DESCRIPTION

GN01 is a cantilever sign gantry supporting fixed advanced direction signage and associated sign lighting equipment. The gantry will be non-access for maintenance purposes. The gantry will span approximately 15m over the M25 to position the sign over lane 1. The sign width will be 4.96m and the sign height will be 2.32m.A circular hollow section (CHS) cantilever boom is cantilevered from a single CHS support column with flat plate bolted construction joint at connection between the boom

and leg. The structural connection between the superstructure and the foundation will be a bolted plate connection between leg assembly and plinth at base of gantry leg.

The foundation is a reinforced cast in situ concrete pile-cap founded on bored cast in situ reinforced concrete piles. The foundation protrudes above the adjacent local ground level by a minimum of 1500mm to provide impact protect to the gantry leg above.

The superstructure is non-passively safe and so must also be protected by a suitable road restraint system designed in accordance with CD 365.



NORTHBOUND CARRIAGEWAY ELEVATION

Extract from General Arrangement HE551519-RAM-SGY-GA3_NB_01-DR-CB-50001_C01

STRUCTURE DEVELOPMENT

The form of construction described in the AIP has not changed significantly from the depiction shown in the DCO submission. Dimensionally the sign cantilevers approximately 2.2m further than the DCO submission drawing due to required setback from the hard shoulder to the reinforced concrete foundation being increased. The sign height has also increased marginally from 1.95m to the 2.32m now proposed. The minimum clearance of 5.9m is provided to the sign face, this being larger than the 5.7m minimum clearance requirement.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

This gantry is of a standard prefabricated form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The reinforced concrete foundation will be constructed in-situ and will be designed to be durable elements. The design life of each gantry is 30 years with a fatigue life of 40 years. The foundations have a design life of 120 years.

Maintainability

Inspections and maintenance of the gantry will need be carried out during lane closures put in place on the road network as no gantry access is provided for this structure. Major maintenance of the gantry superstructure can be undertaken in-situ or by removing the gantry main boom and support leg, depending on the specific task being undertaken.

Resilience

The gantry steelwork will be protected by a suitable paint system while the hollow sections will be sealed to prevent the ingress of water. It has been estimated that minor maintenance of the steelwork will be required every 12 years and major maintenance every 20 years.

STRUCTURE SUMMARY

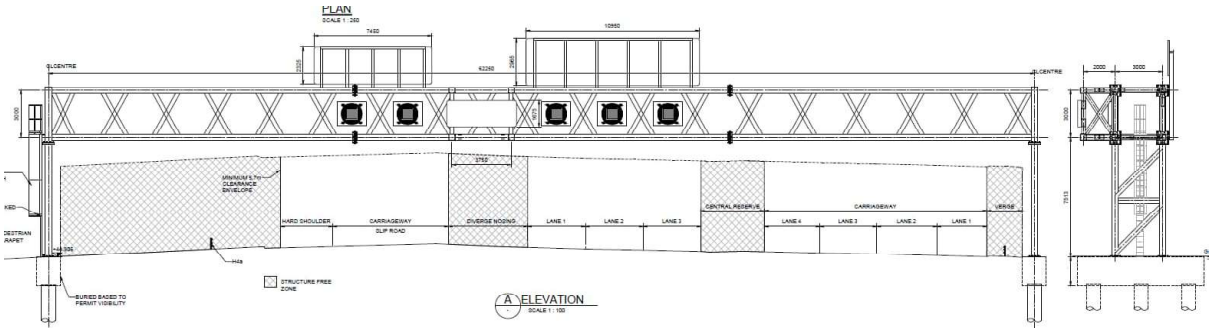
Steel is really the only viable material for this type of cantilever gantry, and it is known to have the required performance and resilience for this location. There are no significant changes to the external appearance, other than the dimensional changes described above. As such, the changes are not considered to be materially different from the gantry shown in the DCO submission drawings.

3.12 LONG SPAN PORTAL GANTRY AT CH 740 (GA3-NB-02)

SCHEME REFERENCES

Structure Name:	GN02 (Portal Gantry)
Scheme Reference:	G04 (GA3-NB-02)
Asset Key:	STR_39102
Structure Reference No.:	/M25//172.00/S/3
OS Grid Location:	556538, 192649
AIP Document reference:	HE551519-RAM-SGY-ZZ-RP-CB-50003 | P04
GA Drawing references:	HE551519-RAM-SGY-GA3_NB_02-DR-CB-50001 | C01
	HE551519-RAM-SGY-GA3_NB_02-DR-CB-50002 | C01

GN02 is a portal type gentry required to span over both carriageways of the M25 motorway and the M25 J28 Loop Road. This gantry is shown on the following engineering drawings and sections sheets in the DCO submission: Engineering Sections sheet 7 of 10.



Extract from DCO Engineering Sections - Sheet 7 of 10.

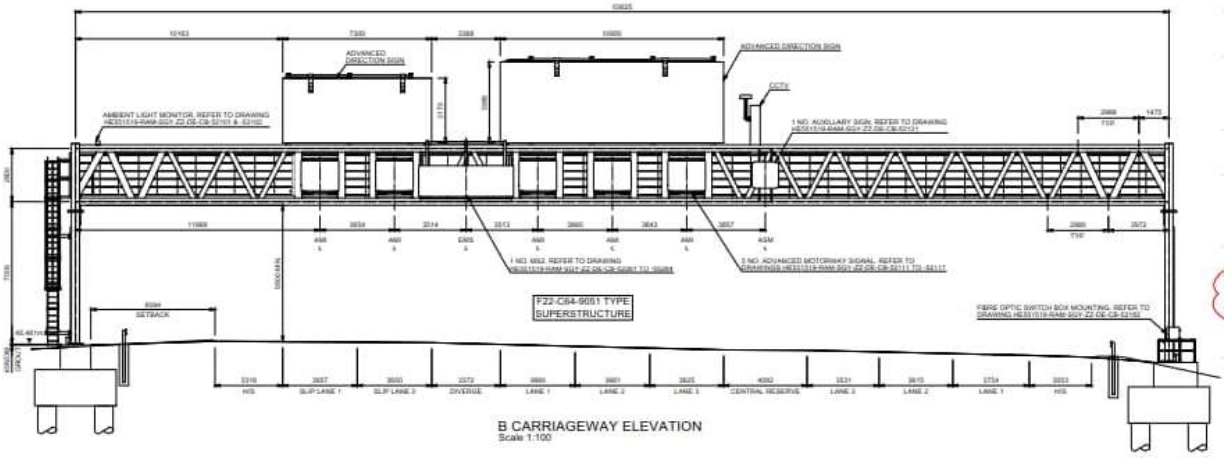
STRUCTURE DESCRIPTION

GN02 is a portal type gantry that will carry Advance Direction Signs (ADS), Advanced Motorway Indicator (AMI) signs, CCTV cameras, Variable Message Signs (VMS) and associated sign lighting equipment. The structure will be an access type gantry in order to allow for future maintenance and servicing of the structure and the signs and cameras that it carries. The gantry will span approximately 53.6m over the M25 and loop road diverge.

It has a welded steel space frame boom comprising square hollow sections with flat plate bolted construction joints at connection with square hollow section steel leg. The structural connections between the superstructure and the foundation will be bolted plate connections between the leg assembly and the plinth provided at the base of each gantry leg. Further bolted plate connections will be needed to join the main boom at suitable locations in order to limit the spans being transported to site. Each boom shall be sized to provide a clear walkway not less than of 1.5m wide by 2.1m high.

The foundation is a cast in-situ reinforced concrete pile-cap founded on bored cast in-situ reinforced concrete piles. The foundations of this structure do not protrude significantly above adjacent ground level.

The superstructure is non-passively safe and so will be protected by a suitable road restraint system designed in accordance with CD 365.



Extract from General Arrangement - HE551519-RAM-SGY-GA3_NB_02-DR-CB-50001_C01

STRUCTURE DEVELOPMENT

The form of construction described in the AIP has not changed significantly from the depiction shown in the DCO submission. Dimensionally the gantry span has reduced significantly from that shown in the DCO submission drawing as this was previously shown as being a span of 62.3m. The size of the signs positioned on top of the gantry have also changed marginally, with a slight increase in the height.

The DCO submission drawing showed a different bracing arrangement and omitted the access walkway enclosure so the two elevations look superficially different.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

This gantry is of a standard prefabricated form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The reinforced concrete foundation will be constructed in-situ and are designed to be durable elements. The design life of each gantry is 30 years with a fatigue life of 40 years. The foundations have a design life of 120 years.

Maintainability

All the equipment shall generally be maintainable from the gantry walkway without the requirement for traffic management other than that required to provide safe access to the gantry location. Access to the gantry walkway is via an access ladder fixed to one of the supporting gantry legs.

General Inspections and minor maintenance of the gantry structures may be carried out from the walkway. Principal Inspections will be carried out during lane closures put in place for general routine maintenance to the road network or, if necessary, specially arranged lane closures as deemed necessary for the safe operation of mobile access equipment as and when required.

Major maintenance of the gantry superstructures can be undertaken in-situ or by removing the gantry truss and support legs from the road under carriageway or under full road closure.

Resilience

The gantry steelwork will be protected by a suitable paint system while the hollow sections will be sealed to prevent the ingress of water. It has been estimated that minor maintenance of the steelwork will be required every 12 years and major maintenance every 20 years.

STRUCTURE SUMMARY

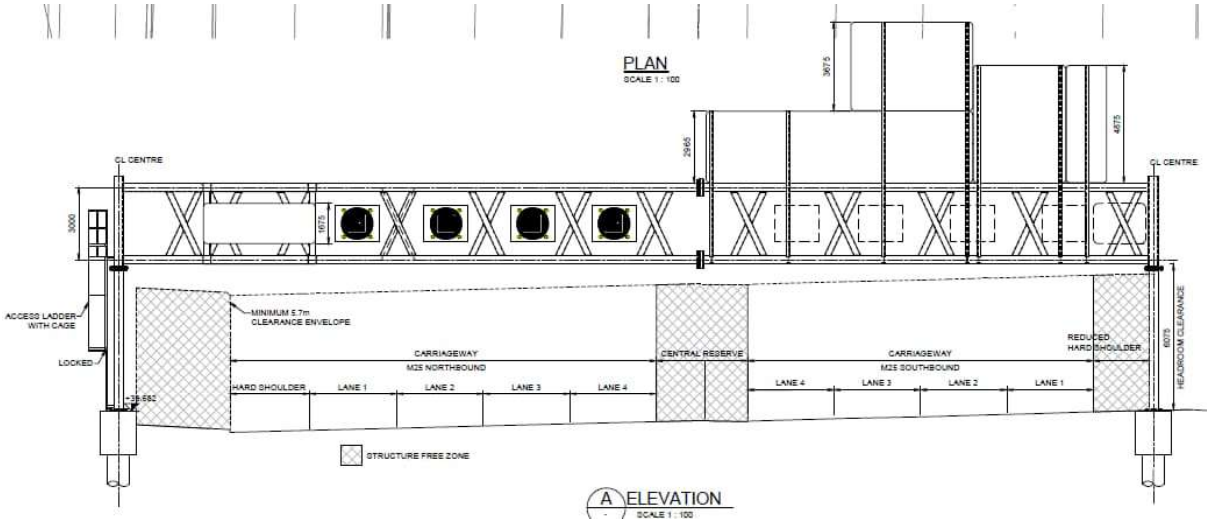
Steel is the most common material for a gantry of this span, as it is known to have the required performance and resilience for this location. Other than the dimensional change to span (reducing) mentioned above, there are no other significant changes to the external appearance of the gantry shown in the DCO submission drawings, the changes overall are not considered to be material in nature.

3.13 LONG SPAN PORTAL GANTRY AT CH 1806 (GA5-SB-01)

SCHEME REFERENCES

Structure Name:	GN03 (Portal Gantry)
Scheme Reference:	G06 (GA5-SB-01)
Asset Key:	39103
Structure Reference No.:	/M25//171.00/S/2
OS Grid Location:	555944, 193386
AIP Document reference:	HE551519-RAM-SGY-ZZ-RP-CB-50003 | P04
GA Drawing references:	HE551519-RAM-SGY-GA5_SB_01-DR-CB-50001 | C01
	HE551519-RAM-SGY-GA5_SB_01-DR-CB-50002 | C01

GN03 is another portal type gentry required to span over both directions of the M25 motorway. This gantry is shown on the following drawings and sections sheets in the DCO submission: Engineering Sections sheet 8 of 10.



Extract from DCO Engineering Sections - Sheet 8 of 10.

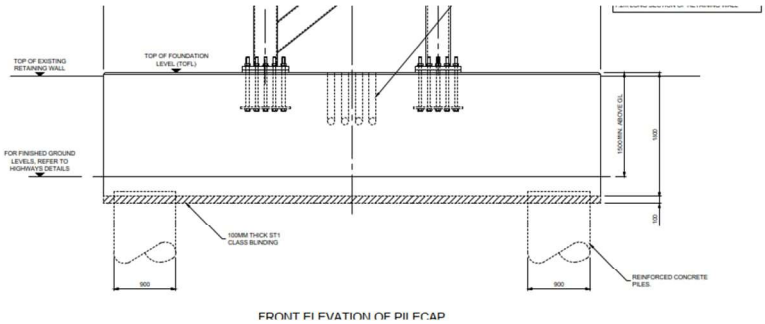
STRUCTURE DESCRIPTION

GN03 is a portal type gantry that will carry Advance Direction Signs (ADS), Advanced Motorway Indicator (AMI) signs, CCTV cameras, Variable Message Signs (VMS) and associated sign lighting equipment. The structure will be an access type gantry to allow for future maintenance and servicing of the structure and the signs that it carries. It will span approximately 44.0m over the M25.

It has a welded steel space frame boom comprising square hollow sections with flat plate bolted construction joints at connection with square hollow section steel leg. The structural connections between the superstructure and the foundation will be bolted plate connections between the leg assembly and the plinth provided at the base of each gantry leg. Further bolted plate connections

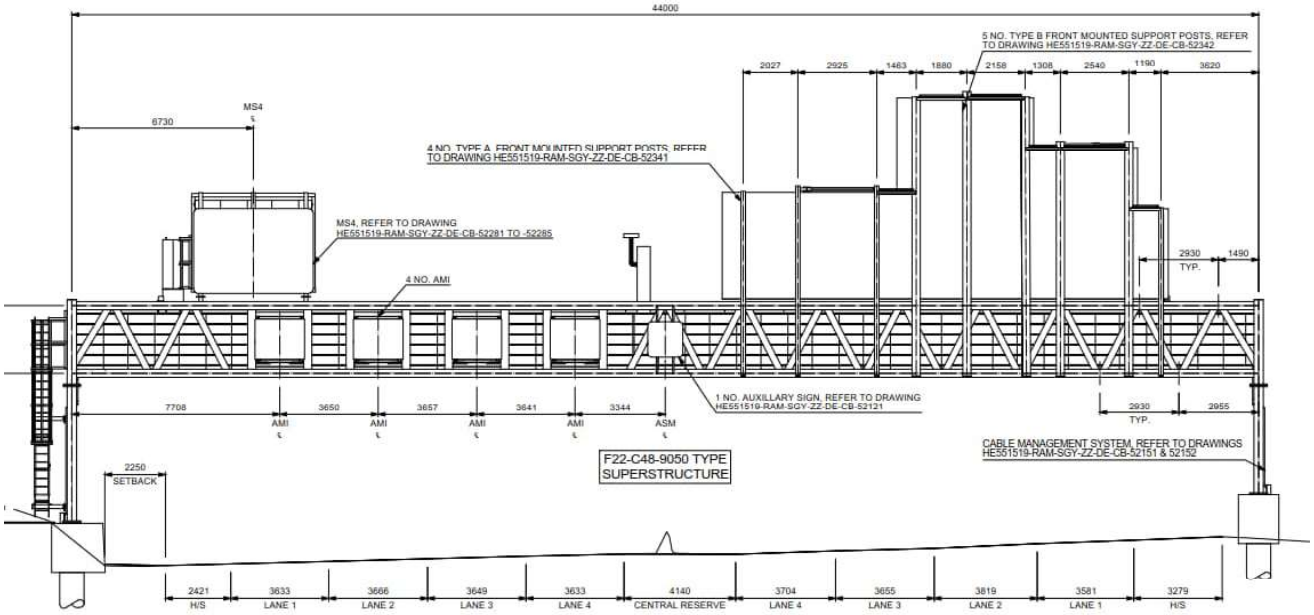
will be needed to join the main boom at suitable locations in order to limit the spans being transported to site. Each boom shall be sized to provide a clear walkway not less than of 1.5m wide by 2.1m high.

The foundation is a reinforced cast in situ concrete pile-cap founded on bored cast in situ reinforced concrete piles. Vehicle restraint systems will connect to the pile cap so the foundations of this structure project 1.5m high above ground level to carry vehicle impact loads. On the west side the foundation is to be constructed within the line of the existing 1.5m high retaining wall on the west side of the M25, as section of which will be removed to accommodate it:



FRONT ELEVATION OF PILECAP

Extract from substructure General Arrangement drawing sheet 2 of 2



Extract from General Arrangement - HE551519-RAM-SGY-GA5_SB_01-DR-CB-50001_C01

STRUCTURE DEVELOPMENT

The form of construction described in the AIP has not changed significantly from the depiction shown in the DCO submission. Dimensionally the sign span was not documented in the DCO submission drawing but it is unlikely to have changed significantly. The size of the signs over on the southbound carriageway have not changed since the DCO submission. On the northbound

carriageway the sign positioned on the traffic face of the gantry over the hard shoulder has been replaced with a MS4 sign positioned on top of the gantry structure.

A CCTV mast and an auxiliary sign are also now positioned over the central reserve which are not shown on the DCO submission drawing.

The DCO submission drawing showed a different bracing arrangement and omitted the access walkway enclosure so the two elevations look superficially different.

STRUCTURE DURABILITY, MAINTAINABILITY & RESILIENCE

This gantry is of a standard prefabricated form of construction. Durability, Maintainability and Resilience are considered in turn.

Durability

The reinforced concrete foundation will be constructed in-situ and are designed to be durable elements. The design life of each gantry is 30 years with a fatigue life of 40 years. The foundations have a design life of 120 years.

Maintainability

All the equipment shall generally be maintainable from the gantry walkway without the requirement for traffic management other than that required to provide safe access to the gantry location. Access to the gantry walkway is via an access ladder fixed to one of the supporting gantry legs.

General Inspections and minor maintenance of the gantry structures may be carried out from the walkway. Principal Inspections will be carried out during lane closures put in place for general routine maintenance to the road network or, if necessary, specially arranged lane closures as deemed necessary for the safe operation of mobile access equipment as and when required.

Major maintenance of the gantry superstructures can be undertaken in-situ or by removing the gantry truss and support legs from the road under carriageway or under full road closure.

Resilience

The gantry steelwork will be protected by a suitable paint system while the hollow sections will be sealed to prevent the ingress of water. It has been estimated that minor maintenance of the steelwork will be required every 12 years and major maintenance every 20 years.

STRUCTURE SUMMARY

Steel is the most common material for a gantry of this span, as it is known to have the required performance and resilience for this location. The foundations will sit unobtrusively within the highway corridor and other than the different sign locations and the additional signs mentioned above there are no other significant changes to the external appearance of the gantry shown in the DCO submission drawings, as such the changes overall are not considered to be material in nature.

4 NPSNN CRITERIA FOR GOOD DESIGN REVIEWS

This section of the report will ascertain if the design is aesthetically sensitive, durable, adaptable, and resilient as it reasonably could be, it will be reviewed against the NPSNN criteria for good design in paras 4.28-4.35 inclusive as included in Appendix A.

4.1 DOCUMENTS REVIEWED

A review of the following documents has been undertaken:

- NPSNN – Criteria for Good Design by Department for Transport
- 6.1 Environmental Statement Chapter 9: Landscape and Visual TR010029/APP/6.1
- 6.1 Environmental Statement Chapters: 1-4 TR010029/APP/6.1
- Design drawings provided by the DIP
- Engineering drawings and sections' reference TR010029/APP/2.8 version 0, submitted as part of the DCO application
- The Road to Good Design by Highways England

4.2 NPSNN CRITERIA REVIEW

VISUAL APPEARANCE (4.29)

The Scheme description is provided in Section 2.4 of the ES. A detailed description of the changes to the bridge structures from the Engineering Drawings and Sections in the DCO submission, to the design drawings provided by the DIP are described in Section 3 above.

Aesthetically and visually the main changes to the bridge structures, from the Engineering Drawings and Sections in the DCO submission, to the design drawings provided by the DIP are as follows:

Alder Wood Bridge:

- Bridge narrowed by 14.1m and south elevation moved by approximately 20m, the span has increased by 0.3m
- Lighting columns have been moved off the deck.
- Blockwork cladding below the bridge has been changed to in-situ concrete, with no feature finish.
- Wall mounted lights have been proposed under the bridge.
- Additional chevron sign boards are now proposed to improve driver perception.

Grove Farm Underpass:

- Minor changes to the skew of the structure.

Duck Wood Bridge

- Changed from a two-span prestressed concrete beam bridge to a single-span weathering steel composite multi-girder bridge.
- The reinforced earth wingwalls that would have been connected by a third wall behind the skeleton abutment have now been omitted as the abutment walls are now retaining structures.

Grove bridge

- Slight change in location of lighting columns on the bridge structure. Previously located on the south side of the structure at the pier supported on an in-situ reinforced concrete blister behind the parapet upstand. Now proposed to be located at quarter span of the western span and at a third span of the eastern span supported on a reinforced concrete corbel connected to the parapet beam. While this probably makes the lighting design easier, it is usually preferred to place lighting columns above a visual support as previously shown.

Maylands Bridge columns

- The width of the bridge has been narrowed slightly by 0.3m.
- Slight change in location of lighting columns on the bridge structure.
- Width of piers have increased to 1500mm x 2100mm

Grove Culvert west extension

- Concrete finishes in exposed areas are ‘F3’ a smooth, dense, fair finish.
- Edge protection determined as the timber post and 4 rail fence,
- Downstream of the culvert, larger sized rock armour with class 2 cover soil has been specified to protect the banks and wingwall foundations from scour.

Maylands Bridge East Retaining Wall

- The form of construction remains unchanged from the AIP
- The northern part of the wall has been moved north to reduce its height.
- Timber safety fence runs along the bottom of the slope with a vehicle restraint system beside the carriageway at the top of the slope.

M25 On-slip Retaining Wall

- The external appearance has not changed; However, the length of the retaining wall has increased from 150m to 318m and the height has changed from a maximum height of 2.3m to 4.6m.
- A guard rail has now been included along the entire length of the retaining wall.

Grove Farm Underpass Southwest retaining wall

- There is no change to the external appearance of the retaining wall shown in the DCO submission drawings.

Grove Bridge Southwest Retaining Wall

- There is no change to the external appearance of the retaining wall shown in the DCO submission drawings.

ADS Cantilever Gantry at CH 530

- The external appearance has not changed; However, the sign cantilevers approximately 2.2m further than the DCO submission drawings and the sign height has increased from 1.95m to 2.32m.

Long Span Portal Gantry at CH 740

- The span of the gantry has been reduced from 62.3m to 53.6m
- The signs positioned on the gantry have slightly increased in height.
- An access walkway enclosure has been included in the latest drawings. However, overall, there are no significant changes to the external appearance of the gantry.

Long Span Portal Gantry at CH1806

- Slight changes to the location of signs positioned on the gantry.
- Additional CCTV mast and auxiliary sign positioned over the central reserve.

Proposed Materials

A brief description of the proposed materials for the main structures is provided below.

Alder Wood Bridge and Grove Farm underpass will be concrete structures. Duck wood bridge, Grove Bridge and Maylands Bridge will be steel composite multi girder structures with in-situ reinforced concrete deck slab, similar to the existing M25 main carriageway bridge and J28 roundabout bridges.

Maylands Bridge East Retaining Wall, Grove Farm Underpass SW Retaining Wall and Grove Bridge SW retaining wall will be constructed from reinforced soil walls clad with precast concrete facing units. The M25 On-slip Retaining Wall will be a modular block gravity wall comprising interlocking precast concrete blocks arranged in a brick bond pattern. The blocks will be 1600 x 800 x 800mm (l,w,h) and will be grey in colour.

The Cantilever Gantry at CH530 will be constructed from steel, the only viable material for this type of cantilever gantry, with reinforced concrete foundation that protrudes by a minimum of 1500mm above ground level.

The Long Span Portal Gantries at CH 740 and CH 1806 will be a welded steel space frame boom comprising square hollow sections with flat plate bolted construction joints at connection with square hollow section steel legs. CH 1806 gantry will have reinforced concrete foundations that protrude by a minimum of 1500mm above ground level.

PRINCIPAL OBJECTIVES OF THE SCHEME (4.31)

The scheme objectives are set out in Chapter 2, section 2.2, of the ES. A brief description of the main objectives are to:

- Increase capacity and reduce congestion and delays by improving the link from the M25 to the A12;
- Reduce incident rates;
- Improve safety on the roundabout;
- Cater for future traffic demands;
- Minimise the impact of local air quality and noise; and
- Protect access for pedestrians and cyclists.

The Scheme is also required to minimise the environmental impact in accordance with the Design Manual for Roads and Bridges (DMRB).

NPSNN Design Criteria, paragraph 4.31, states "A good design should meet the principal objectives of the scheme by eliminating or substantially mitigating the identified problems by improving operational conditions and simultaneously minimising adverse impacts. It should also mitigate any existing adverse impacts wherever possible, for example, in relation to safety or the environment. A good design will also be one that sustains the improvements to operational efficiency for as many years as is practicable, taking into account capital cost, economics and environmental impacts."

Through the development of the options appraisals which is set out in Chapter 3 of the ES the preferred option was chosen for achieving the scheme objectives and balancing the needs of road users, the community, the environment and business. A detailed justification for the chosen option is provided in section 3.3 of the ES. This ties in with 4.31 of the NPSNN criteria for good design.

FUNCTIONALITY (4.33)

The overarching purpose of the scheme is to improve journey times by improving the link from the M25 to the A12. This will involve the construction of a new dedicated two-lane loop road from the M25 northbound carriageway to the eastbound carriageway of the A12. The design of the scheme has been driven by DMRB highway design standards that must be adhered to on operational and safety grounds.

The creation of the new loop road will include the provision of three new bridges and an underpass. Embankments and retaining walls will also be constructed as part of the scheme, along with the realignment of the existing A12 eastbound off-slip road and existing M25 northbound on-slip road. Improvements will be made to the existing A12 east and west bound carriageways, existing J28 roundabout, existing M25 northbound carriageway and the existing M25 northbound off-slip road. Replacement and installation of new gantries.

AESTHETICS (4.33)

The existing landscape quality of the area is described in the Landscape and Visual Impact Assessment (LVIA) which provides detailed descriptions on landscape character and the sensitivity to change. The following extract has been taken from the summary in the LVIA *"The Scheme is surrounded by areas of ancient and mature woodland, agricultural land, golf course and un-managed fields. The A12 and M25 are dominant elements in the landscape which detract from the attractiveness of the area. They create significant visual impact on the area, although this is ameliorated to some degree by the surrounding vegetation, and they create noise impacts on the area which also make the area less appealing for visitors and residents."*

There would inevitably be adverse effects associated with this type of scheme, most notably the loss of areas of ancient and mature woodland and two veteran trees, which combined with the construction of the scheme would affect the character of the area. Adverse effects were also identified for 9no. visual receptors that represent the views experienced by people.

Through the evolution of the design for the Scheme, adverse effects have been designed to be avoided or reduced where possible. Mitigation measures in the form of planting and habitat creation would, over time, help to reduce adverse effects and would reduce the number of significant adverse effects on visual receptors to 3no.

Whilst the Scheme is introducing new structures and features into the existing landscape it is important to note that existing infrastructure, specifically the M25 and A12, already impacts on the landscape and views of the area.

The existing M25 and A12 bridge structures that form J28 are constructed from a combination of steel composite multi girder structures and concrete with retaining walls that have been clad with precast concrete units. The material choices for the structures and engineering features for the Scheme have largely been driven by their durability, maintainability and resilience. However, they have also been chosen to tie in with the materials associated with the existing road infrastructure in the area.

As noted in the NPSNN and from the type and scale of the proposed Scheme, the extent to which the Scheme can contribute to enhancing the quality of an area is limited. As the design has evolved it has not tried to develop an iconic road or structural feature but has instead looked at ways to reduce the visual appearance within the landscape, as far as possible, while balancing capital costs, economics, operational efficiency and environmental impacts. This has mainly been through adopting a design that keeps structures as low as possible within the landscape and avoids vertical structures e.g. bridge supports or lighting columns, that might otherwise draw attention to the presence of the highway. In addition, mitigation measures such as planting to help screen the new structures where possible.

Other more recent design changes include the narrowing of the bridge deck on the Alder Wood Bridge, which would reduce the tunnelling effect on drivers using the M25 on-slip road and may allow for more vegetation to be retained; the change from a two-span bridge to a single span bridge at Duck Wood Bridge removes the need for a central concrete pillar in the Weald Brook Floodplain allowing for a more open aspect below the bridge structure and along the river corridor; Maylands Bridge has been narrowed slightly which may allow for more vegetation to be retained; the Maylands Bridge East retaining wall has been reduced in height by moving it to the north and including an embankment above, this would reduce the potential visual prominence of the wall itself although the

overall height of the structure would remain the same; and the Long Span Portal Gantry at CH 740 has been reduced in width by 8.7m.

Some of the recent design changes could have considered alternative options to help improve the visual appearance of some of the structures. This includes the change from blockwork cladding to an in-situ concrete wall with no feature finish below the Alder Wood Bridge, a feature finish would help to break up the single expanse of concrete; and the positioning of lighting columns on some of the bridge structures which have been moved away from visual supports but are usually preferred to align with visual supports.

DESIGN PRINCIPLES (4.33)

Highways England published 'The Road to Good Design' in January 2018 which provides 10 principles for good road design. The document was prepared to *"challenge thinking about the design and quality of our roads"* with an aim to *"designing an inclusive, resilient and sustainable road network; appreciated for its usefulness but also its elegance, reflecting in its design the beauty of the natural, built and historic environment through which it passes, and enhancing it where possible".*

The guidance notes that road design is bound to place and function more so than other design fields due to the specific demands on technical design and safety that must be met. It also notes *"Since aesthetic considerations must accept these demands, the potential for variation is more challenging, but still possible for many elements such as signs and lighting for example."*

Design principle 4 states, *"The aesthetic quality of a road and its design in relation to the places through which it passes, is integral to its function and the experience of those that use it. Good road design demonstrates sensitivity to the landscape, heritage and local community, seeking to enhance the place while being true to structural necessities."*

Design Principle 5 states, *"Functional, but responding positively and elegantly to the context, good road design allows for the expression of the character and identity of the places and communities through which a road passes. Good road design can enhance a sense of place and add to what we have inherited, particularly through the use of appropriate materials and traditions, but does not make unnecessary superficial or superfluous visual statements."*

Design Principle 6 states *"Making an important contribution to the conservation and enhancement of the natural, built and historic environment, good road design seeks to achieve net environmental gain. It is multi-functional, resilient and sustainable, allowing for future adaptation and technical requirements, while minimising waste and the need for new materials."*

It is noted in Section 2.2.3 of the ES that The Road to Good Design document and design principles were considered within the development of the scheme design.

SITING AND DESIGN MEASURES RELATIVE TO LANDSCAPE AND HISTORICAL CHARACTER AND FUNCTION (4.34)

Siting of the Scheme has been driven by technical highway design and safety to ensure adherence to design and safety standards in the DMRB. Minimising land take, disruption to communities, other infrastructure in the area and environmental constraints have also informed the siting, layout and design of the scheme.

The ES states, as far as practicable the Scheme has been designed to avoid or reduce the adverse effects associated with the proposed works. 2.4.3 of the ES Chapters 1-4 provides an overview of the main work elements. It identifies a couple of design decisions made to reduce adverse effects on the environment. These include:

- The retaining wall between Duck Wood Bridge and Grove Farm Underpass has been proposed to protect a high value tree and electricity transmission tower. (Reference 2.4.3 of the ES)
- Retaining walls between Maylands bridge and Grove culvert extension have been proposed to accommodate a new ecological mitigation area and limit the impact on Grove Wood.

Including embankments where possible, which can be planted with trees, also provides more effective integration and partial screening over time.

As discussed in the Aesthetics section above, more recent design changes of narrowing the width of the bridge deck on Alder Wood Bridge reduces the tunnelling effect below the bridge.

Where impacts cannot be reduced or avoided mitigations measures have been embedded into the Scheme design. The ES states, *"mitigation measures have been developed through an iterative design process with a multidisciplinary team responding to a complex range of environmental and engineering constraints found within and adjacent to junction 28 and following feedback through consultation".*

DESIGN PROCESS (4.35)

An assessment of the initial alternative options was carried out in accordance with the guidance in DMRB Volume 11 Section 2, Part 5, HA 205/08, with a staged approach undertaken when developing the options for the Scheme. Chapter 3 of the ES sets out the stages and options that were considered, assessed and developed to come to the overall preferred option. Consultation on the options was undertaken throughout the process and is detailed in Section 1.8 of the ES. The preferred option was chosen for achieving the Scheme objectives and balancing the needs of road users, the community, the environment and businesses.

At the time of the DCO submission the design drawings were at preliminary stage. Since the submission the design has been further refined and developed during the detailed design of the scheme and in the preparation of the construction drawings.

The changes to structures have been described in the Visual Appearance section above with further details described in the aesthetics section above. The main changes are to two of the bridge structures which have undergone changes to the materials proposed for the DCO submission; Alderwood Bridge and Duck Wood Bridge. The M25 On-Slip Retaining Wall has increased by 168m in length and 2.3m in height, at its maximum height; however, it's material finish has not changed.

Reducing the bridge deck on Alder Wood Bridge and changing Duck Wood Bridge from a two-span bridge to a single span bridge, removing the need for a central concrete pillar, shows that further design refinement has been undertaken and has taken into consideration the design principles set out in 'The Road to Good Design' document, specifically relating the design principles 4, 5 and 6.

The main change to Alder Wood Bridge is to the cladding on the bridge abutments which has changed from blockwork cladding to an in-situ concrete wall with no feature finish. A feature finish

would help to break up the single expanse of concrete. A similar material finish to other retaining structures in the Scheme, which have precast concrete facing units, could be applied here.

SUMMARY

The designs of the significant structures have been reviewed against the NPSNN Criteria for Good Design with a review of the latest design drawings provided by the DIP, the 'Engineering drawings and sections' reference TR010029/APP/2.8 version 0, 6.1 Environmental Statement Chapters: 1-4, 6.1 Environmental Statement Chapter 9: Landscape and Visual, submitted as part of the DCO application, and The Road to Good Design by Highways England.

The review has looked at the visual appearance, principal objectives of the scheme, functionality, aesthetics, design principles, siting and design measures relative to landscape and the historical character and function, and the design process.

The NPSNN Design Criteria acknowledges that the nature of a Scheme such as this is limited on the extent to which it can contribute to the enhancement of the quality of an area. It notes there may be limited choices on the physical appearance of some national network infrastructure and recognises that while national infrastructure projects need to be sustainable and aesthetically sensitive, durable, adaptable and resilient as reasonably possible, they need to have regard to regulatory and other constraints.

The Road to Good Design guide also recognises that road design is constrained by the specific demands on technical design and safety that must be met.

With that in mind the NPSNN Design Criteria states that *"good design should meet the principal objectives of the scheme by eliminating or substantially mitigating the identified problems by improving operational conditions and simultaneously minimising adverse impacts."* It states that account should be taken for functionality and aesthetics and there may be opportunities to demonstrate good design in terms of siting and design measures relating to existing landscape character, function, landform and vegetation.

The Road to Good Design also states *"Since aesthetic considerations must accept these demands, the potential for variation is more challenging, but still possible for many elements such as signs and lighting for example."*

The ES introductory chapters 1-4 provide details on the consultation undertaken, the scheme objectives, the alternative options considered and justification for the preferred option. The ES Introductory Chapter Figures provide details on the Environmental Constraints and Preliminary Environmental Design, and Chapter 9 Landscape and Visual provides details on the landscape and ecological mitigation proposed.

Since the DCO submission there have been some design changes made to the main structures. The changes have been described in the Visual Appearance section above with a more detailed and technical description in Section 3 of this report. The main changes are to Alder Wood Bridge, with a reduction in the width of the bridge deck and change of materials from blockwork cladding to in-situ concrete wall; and Duck Wood Bridge which has changed from a two-span prestressed concrete beam bridge to a single-span weathering steel composite multi-girder bridge. The M25 On-Slip Retaining Wall has also increased by 168m in length and 2.3m in height, at its maximum height; although the finish has not changed.

Overall the scheme has undergone various design iterations, and considered a variety of options to establish the most viable design option for achieving the scheme objectives, balancing the needs of road users, the community, the environment and business. The design has looked at ways to integrate the scheme into the existing landscape where possible, for example, reducing the width of bridge decks, and siting the layout to make best use of existing topography which allows structures to be reduced in height. Where it is not possible to remove impacts mitigation measures have been proposed to help reduce the impacts. Material choices have largely been dictated by technical design and safety standards. However, the design changes to the blockwork cladding on Alder Wood Bridge to an in-situ concrete wall with no feature finish could be reconsidered. A feature finish, such as precast concrete facing units used elsewhere on the Scheme, could be applied to help break up the single expanse of concrete.

5 CHANGES WITH RESPECT TO THE ENVIRONMENTAL STATEMENT

To satisfy Requirement 3, a review has be conducted on the Environmental Statement which forms part of the DCO submission. We will determine the maximum parameters that were set at this stage and analyse design changes.

5.1 OVERVIEW OF CHANGES

The Environmental Statement (ES) and Work Nos. that formed that DCO submission were checked against the Order Limits and Limits of Deviation in The M25 Junction 28 Development Consent Order (DCO).

Chapter 2 of the ES confirmed the Environmental Statement has been *'developed to a level sufficient to determine the size and location of the key works elements and the land interest required to construct, maintain and operate it.'*

The aesthetics of the structures were assessed in Chapter 4 of this report. Any changes to the structures shown in in the original DCO submission are highlighted in Chapter 3 of this report.

This chapter will review the structures against those changes outlined in the Chapter 3 and the Limits of Deviation outlined in the DCO (Part 2, No.7). These are as follows:

7.—(1) In carrying out the authorised development the undertaker may—

(a) deviate laterally from the lines or situations of the authorised development shown on the works plans to the extent of the limits of deviation shown on those plans;

(b) subject to paragraphs (c) and (d), deviate vertically from the levels of the authorised development shown on the engineering drawings and sections up to a maximum of 1 metre upwards or downwards;

(c) in respect of those parts of Work No. 6 situated between Duck Wood bridge and Grove bridge, deviate vertically from the levels of the authorised development shown on the engineering drawings and sections up to a maximum of 2 metres upwards or downwards;

(d) in respect of Work No. 18 deviate vertically from the levels of the authorised development shown on the engineering drawings and sections up to a maximum of 1 metre upwards only,

During the review the assessment will consider the limits of deviation and conclude if further assessment is needed to confirm if there *'a deviation in excess of these limits would not give rise to any materially new or materially different environmental effects in comparison with those reported in the environmental statement.'*

It has been assumed that the Environmental Impact Assessment, although based on a preliminary and holistic design (e.g. not structure specific) was based on a worst case scenario and to the Limits of Deviation set in the DCO.

Any conclusions made within this assessment are made as a comparison of the drawings made between DCO submission stage and AIP.

5.2 STRUCTURE SPECIFIC REVIEWS

ALDER WOOD BRIDGE

The EIA would have been undertaken to the engineering drawings and sections as set out in TR010029/APP/2.8 sheet 4/6 and1/10.

The construction of Alder Wood bridge would have formed Phase 1 activities which also included land closure of the M25, road marking alterations, construction of the retaining wall, earth works, paving and landscape. The Environmental Statement did not conduct the assessment as part of the phasing works during the construction phase.

In the Environmental Statement, the construction of the Scheme would directly impact Alder Wood resulting in the direct loss of broadleaved plantation (ash) woodland, dense scrub and semi-improved grassland. The loss of the habitat from the wood itself was described in Chapter 7 (Biodiversity) and Chapter 9 (Landscape and Visual). The loss of the habitat across the entire Scheme was accounted for as part of the Landscape and Environmental Management Plans produced as part of the Scheme.

No specific mention of Alder Wood Bridge is made within the technical topic assessments within the Environmental Statement. During the AIP development stage, the structure loop road was realigned, and the bridge was narrowed by 14.1m and moved approximately 20m north, the span has increased by 0.3m. Although the skew of the bridge has been amended it has not detracted from the overall footprint of the bridge structure. Therefore, the changes during the AIP development are deemed to be within the required DCO Order Limits and Limits of Deviation.

As such no further assessment as that undertaken within the Environmental Statement is required as no new or materially different environmental effects are predicted.

GROVE FARM UNDERPASS

The EIA would have been undertaken to the engineering drawings and sections as set out in TR010029/APP/2.8 sheet 4/6 and4/10. The underpass will act as the conduit for traffic on the access road to Grove Farm to pass under the M25 loop road.

The construction of the underpass will form part of the Phase 3 works. Engineering features were accommodated as part of the design to protect a high value tree and electricity transmission equipment. No specific mention of the Grove Farm Underpass is made within the technical topic assessments within the Environmental Statement. The bridge culvert has increased in height by 0.5m to allow for further road construction depth to suit the access alignment and maintain the required headroom since the DCO submission.

Therefore, the changes during the AIP development are deemed to be within the required DCO Order Limits and Limits of Deviation.

As such no further assessment as that undertaken within the Environmental Statement is required as no new or materially different environmental effects are predicted.

DUCK WOOD BRIDGE

The EIA would have been undertaken to the engineering drawings and sections as set out in TR010029/APP/2.8 sheet 4/6 and 2/10.

The bridge was designed to take the new M25 loop road over Weald Brook and its associated flood plain. The design of the bridge has changed from a two-span bridge to a single span bridge which has in turn meant that the depth of the structural beams has been increased.

The Environmental Statement reported that impacts as a result of Duck Wood Bridge (Biodiversity, Chapter 7 and Road drainage and the water environment, Chapter 8) include temporary disturbance to and permanent loss of flood plain and riparian habitat. The design of the bridge was made as 'high and wide' as feasible to prevent geomorphological and ecological impacts, and to limit the need for hard bank protection.

Due to the changes in the span arrangement of the bridge, the substructure has been modified so that the immediate support has been removed and end supports on piled skeletons founded on a pile cap. The removal of the immediate support should yield some improvement in environmental effects, but this in turn could potentially give rise to a change in environmental effects.

At AIP stage the width of the eastern verge was 1.5m while the western one 2.5m, while in the detailed design stage both verges have been detailed to be 2.0m wide.

In the DCO documentation the deck depth was not stated, however the drawings showed Y beams and the SOR references Y7's which are 1.3m deep. By reference to additional construction drawings, it was determined that the girder depth is now 1.915m, but the duck level has been raised by approximately 0.19m, so the level change of the soffit is approximately 0.425m. These changes are all within the DCO Limits of Deviation (+/- 1m vertically), it can therefore be concluded that no further environmental assessment is required.

Although the Proposed Structure is within the deviation of the limits as specified in the DCO submission, there have been significant changes to the structure. Due to the change in structure a determination was needed on whether this proposed change was a material change. A request was then officially submitted to the planning inspectorate, and they came to the determination that the change to Duck Wood Bridge would not lead to any additional environmental effects and therefore the change is not considered to be a material change. This correspondence located in Appendix C; within the correspondence the change is referred to as "Change Request 5". This suggests that no further assessment will be necessary as a result of this change.

GROVE BRIDGE

The EIA would have been undertaken to the engineering drawings and sections as set out in TR010029/APP/2.8 sheet 13/10. The bridge will carry the M25 over the Weald Brook and Ingrebourne River.

The ES reported in the Biodiversity (Chapter 7) and Road drainage and the water environment (Chapter 8) that construction of the Grove Bridge would have caused temporary disturbance to and permanent loss of the flood plan and riparian habitat (including loss of natural bank profile and marginal and in channel tree roots). Crossing structures were designed to be high and wide as feasible to prevent any adverse geomorphological and ecological impacts and designed to limit the

need for hard bank protection. The Grove Bridge loop road crossing was assessed as having a long term adverse impact on the watercourse habitat and habitat availability for aquatic species within the DCO boundary.

Mitigation and enhancements include the implementation of a flood plain compensation area and creation of a backwater to Weald Brook.

The verge widths of the bridge have been amended to 2.0m from both sides (originally 2.5m south side and 1.5 north side), however this has not changed the overall footprint of the bridge.

As the design has been updated within those set in the Order Limits and Limits of Deviation, no further assessment is required from that set out in the Environmental Statement as no new or materially different environmental effects are predicted.

MAYLANDS BRIDGE

The EIA would have been undertaken to the engineering drawings and sections as set out in TR010029/APP/2.8 sheet 1/6 and 5/10. The bridge will carry the A12 eastbound exit slip road over the proposed M25 loop road and Weald Brook.

The bridge was designed to be as high and wide as possible to limit the impacts on biodiversity (Chapter 7) and geomorphology (Chapter 8)

Since submission the overall footprint of the bridge has reduced by 0.3m which is within the Limits of Deviation. There is a 40% increase in the width of the pier columns, however this does not change the size of the pilecap or the vertical (downwards) limits posed within the DCO.

As the design has been updated within those set in the Order Limits and Limits of Deviation, no further assessment is required from that set out in the Environmental Statement.

GROVE CULVERT WEST EXTENSION

The EIA would have been undertaken to the engineering drawings and sections as set out in TR010029/APP/2.8 sheet 4/10. The existing Grove Culvert was design to accommodate the Ingrebourne River and has gone through two iterations of extension throughout its lifetime.

The DCO submission drawings only showed cross sections and the external dimensions have been reduced in terms of width and height at the AIP and detailed design stage. There is an overall reduction is the size of the structure as part of the AIP and the footprint of the structure remains unchanged.

Within the Biodiversity chapter (Chapter 7) of the ES, the extension of the culvert would cause a small direct loss of open channel, marginal and riparian vegetation and will contribute slightly to habitat fragmentation. The design of the culvert extension included ecological features including the inclusion of a natural river bed, naturalising features such artificial riffles downstream and safe mammal crossings. The Road drainage and the Water Environment (Chapter 8) assessment reported that increasing the culvert length may also have adverse impacts on flood risk a reduction in hydromorphological complexities and reduce biological and sediment continuity. However no significant adverse effects on surface water, WFD compliance, groundwater or fluvial and surface

water flood risk was identified during the construction phase and an acceptable risk of flood risk during the operational phase.

As the design has been updated within those set in the Order Limits and Limits of Deviation, no further assessment is required from that set out in the Environmental Statement.

MAYLANDS BRIDGE EAST RETAINING WALL

The EIA would have been undertaken to the engineering drawings and sections as set out in TR010029/APP/2.8 Engineering Sections sheet 5/10 and Typical Cross Sections sheet 2/6.

Retaining walls were mentioned in a variety of chapters in the ES, as their predominant role was to reduce impacts and footprint on the Scheme, noting their use to reduce impacts on the Ingrebourne floodplain, and tree and transmission structure avoidance. However, they were assessed as a collective rather than on a locational basis. Considering the total length, the majority of the retaining walls are earth reinforced, with sheet piling not considered for their construction to minimise effects of vibration and percussive activities.

Dimensions for individual retaining walls in the ES were not defined as design development was still being progressed at that stage, as a result we have assumed that the ES would have considered a worst-case scenario approach when assessing retaining walls. Based on this assumption no further assessment is required from that set out in the Environmental Statement.

M25 ON-SLIP RETAINING WALL

The EIA would have been undertaken to the engineering drawings and sections as set out in TR010029/APP/2.8 Cross Sections sheet 3/6.

As stated above, retaining walls were mentioned in a variety of chapters in the ES, but the assessment was not locational specific. Dimensions for individual retaining walls in the ES were not defined as design development was still being progressed at that stage, as a result we have assumed that the ES would have considered a worst-case scenario approach when assessing retaining walls. Based on this assumption no further assessment is required from that set out in the Environmental Statement.

GROVE FARM UNDERPASS SOUTHWEST RETAINING WALL

The EIA would have been undertaken to the engineering drawings and sections as set out in TR010029/APP/2.8 Typical Cross Sections sheet 4/6.

As stated above, retaining walls were mentioned in a variety of chapters in the ES, but their assessment was not locational specific. Dimensions for individual retaining walls in the ES were not defined as design development was still being progressed at that stage, as a result we have assumed that the ES would have considered a worst-case scenario approach when assessing retaining walls. Based on this assumption no further assessment is required from that set out in the Environmental Statement.

GROVE BRIDGE SOUTHWEST RETAINING WALL

The EIA would have been undertaken to the engineering drawings and sections as set out in TR010029/APP/2.8 Typical Cross Sections sheet 1/6 and Engineering Sections sheet 3/10.

As stated above, retaining walls were mentioned in a variety of chapters in the ES, but their assessment was not locational specific. Dimensions for individual retaining walls in the ES were not defined as design development was still being progressed at that stage, as a result we have assumed that the ES would have considered a worst-case scenario approach when assessing retaining walls. Based on this assumption no further assessment is required from that set out in the Environmental Statement.

ADS CANTILEVER GANTRY AT CH 530

This cantilever gantry will be positioned over lane 1 of the M25. The AIP drawings show that the sign has been positioned 2.2m further back from that shown in the DCO. However, the position will still be within the Order Limits. The sign height has increased from 1.95m to 2.32m and the clearance height increased from 5.7m to 5.9m. The preliminary environmental design drawings (Figure 2.2 of the Environmental Statement) outline the road layout and expected positions of the gantries. As part of the assumptions, the demolition of existing and construction of new gantries were to be undertaken as part of night-time working to limit the effects on traffic management.

The Environmental Statement detailed work to gantries in most of the chapter as part of the project description. More detailed assessment was undertaken in the Road drainage and the water environment (Chapter 8), Noise and vibration (Chapter 6) due to the foundation works of the gantries needing piling works which could cause disturbance to communities and potential creation of barriers to ground water flow or the addition of rapid vertical flow pathways to groundwater. Although with good design and mitigation these factors were not deemed significant.

As the design has been updated within those set in the Order Limits and Limits of Deviation, no further assessment is required from that set out in the Environmental Statement as no new or materially different environmental effects are predicted.

LONG SPAN PORTAL GANTRY AT CH 740 AND CH 1806

The span of the gantry at Ch 740 within the DCO submission has reduced in size from 62.3m to 53.6m, whereas the gantry at Ch 1806 has had little update to the size of the structure. The updated AIP designs of the gantries includes an access walkway enclosure has been added to the latest drawings for maintenance purposes only.

The preliminary environmental design drawings (Figure 2.2 of the Environmental Statement) outline the road layout and expected positions of the gantries. As part of the assumptions, the demolition of existing and construction of new gantries were to be undertaken as part of night-time working to limit the effects on traffic management.

The Environmental Statement detailed work to gantries in most of the chapter as part of the project description. More detailed assessment was undertaken in the Road drainage and the water environment (Chapter 8), Noise and vibration (Chapter 6) due to the foundation works of the gantries needing piling works which could cause disturbance to communities and potential creation of barriers to ground water flow or the addition of rapid vertical flow pathways to groundwater. Although with good design and mitigation these factors were not deemed significant.

Landscape and visual have confirmed the walkway closure causes no significant changes to the external appearance of the gantry.

As the design has been updated within those set in the Order Limits and Limits of Deviation, no further assessment is required from that set out in the Environmental Statement as no new or materially different environmental effects are predicted.

6 REVIEW FINDINGS

This review has examined the design development of the significant structures proposed as part of the M25 J28 Improvement scheme. As would be expected, there has been some design evolution since the preferred options were selected and the details confirmed, the concept accepted in the Approval in Principle documents and then developed fully.

The application of the NPSNN Criteria for Good Design has been reviewed, and it found that following the demands on technical design and safety that must be met, the NPSNN Design Criteria have been applied where practicable. The document acknowledges that the nature of a Scheme such as this is limited on the extent to which it can contribute to the enhancement of the quality of an area. It also notes there may be limited choices on the physical appearance of some national network infrastructure and recognises that while national infrastructure projects need to be sustainable and aesthetically sensitive, durable, adaptable and resilient as reasonably possible they need to have regard to regulatory and other constraints.

The structures have been reviewed from a general Environmental Impact Assessment perspective; it has been concluded that all structures reviewed fit within the limits of deviation as approved by the DCO and subsequent Change 5 in respect of the reduction to the realignment of Weald Brook and design changes to Duck Wood Bridge.

There are however some uncertainties around the retaining walls as they were mentioned in a variety of chapters in the ES; they were assessed as collective, rather than individually or locationally specifically. Dimensions for individual retaining walls in the ES were not defined, as the design was still being progressed at that stage, as a result we have assumed that the ES would have considered a worst-case scenario during assessment of the retaining walls. Based on this assumption no further assessment is required from that set out in the Environmental Statement.

Appendix A

NPSNN CRITERIA FOR GOOD DESIGN

4.28 Applicants should include design as an integral consideration from the outset of a proposal.

4.29 Visual appearance should be a key factor in considering the design of new infrastructure, as well as functionality, fitness for purpose, sustainability and cost. Applying "good design" to national network projects should therefore produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction, matched by an appearance that demonstrates good aesthetics as far as possible.

4.30 It is acknowledged however, that given the nature of much national network infrastructure development, particularly SRFIs, there may be a limit on the extent to which it can contribute to the enhancement of the quality of the area.

4.31 A good design should meet the principal objectives of the scheme by eliminating or substantially mitigating the identified problems by improving operational conditions and simultaneously minimising adverse impacts. It should also mitigate any existing adverse impacts wherever possible, for example, in relation to safety or the environment. A good design will also be one that sustains the improvements to operational efficiency for as many years as is practicable, taking into account capital cost, economics and environmental impacts.

4.32 Scheme design will be a material consideration in decision making. The Secretary of State needs to be satisfied that national networks infrastructure projects are sustainable and as aesthetically sensitive, durable, adaptable and resilient as they can reasonably be (having regard to regulatory and other constraints and including accounting for natural hazards such as flooding).62

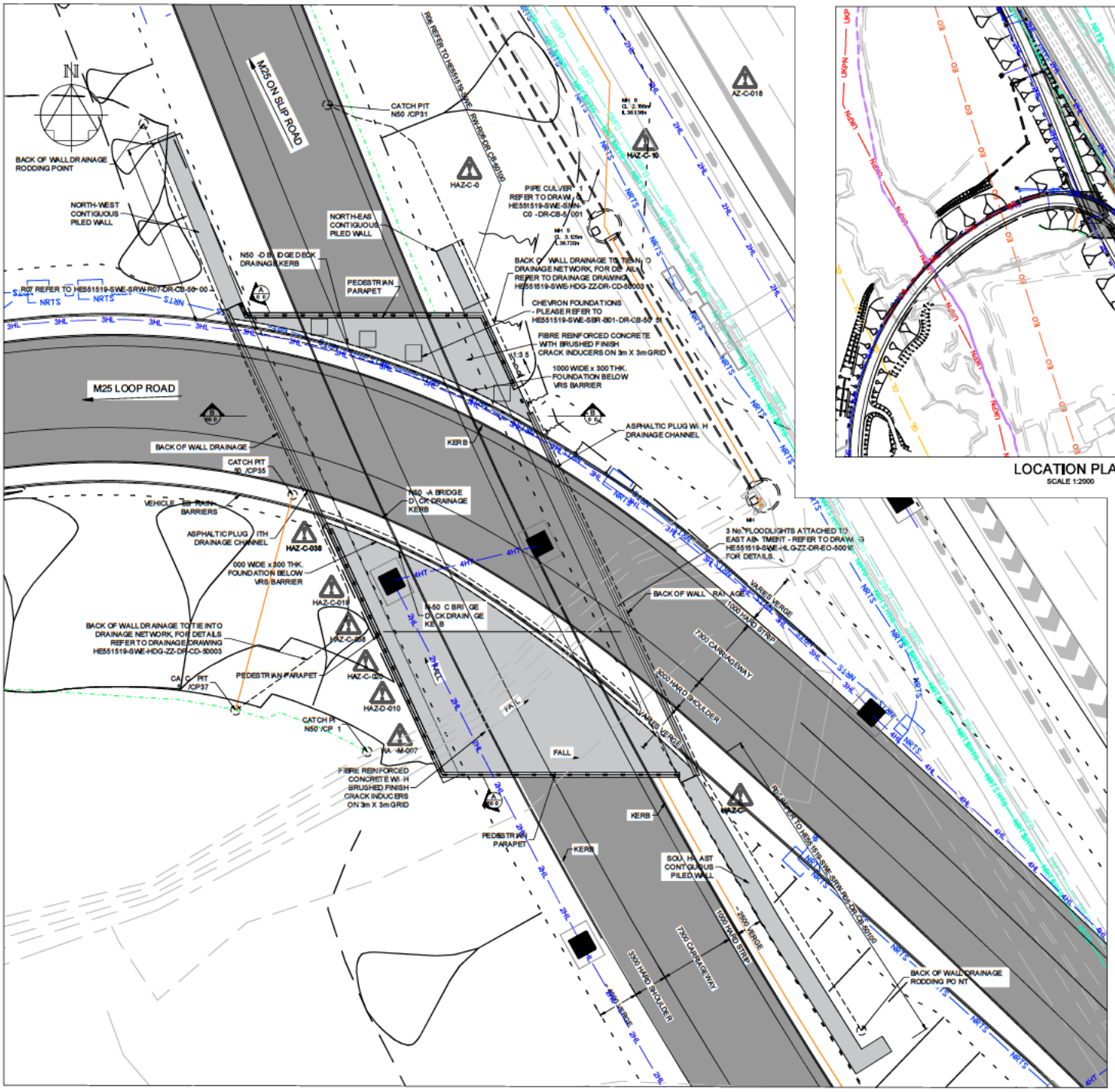
4.33 The applicant should therefore take into account, as far as possible, both functionality (including fitness for purpose and sustainability) and aesthetics (including the scheme's contribution to the quality of the area in which it would be located). Applicants will want to consider the role of technology in delivering new national networks projects. The use of professional, independent advice on the design aspects of a proposal should be considered, to ensure good design principles are embedded into infrastructure proposals.

4.34 Whilst the applicant may only have limited choice in the physical appearance of some national networks infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting and design measures relative to existing landscape and historical character and function, landscape permeability, landform and vegetation.

4.35 Applicants should be able to demonstrate in their application how the design process was conducted and how the proposed design evolved. Where a number of different designs were considered, applicants should set out the reasons why the favoured choice has been selected. The Examining Authority and Secretary of State should take into account the ultimate purpose of the infrastructure and bear in mind the operational, safety and security requirements which the design has to satisfy.

Appendix B

'FOR CONSTRUCTION' GENERAL ARRANGEMENT DRAWINGS



PLAN
SCALE 1:200

LOCATION PLAN
SCALE 1:2000

IMPORTANT

SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001

HAZARD REF	BRIEF DESCRIPTION OF HAZARD
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES INJURY TO SITE PERSONNEL
HAZ-C-020	WORKING NEAR UNDERGROUND SERVICES, DAMAGE TO BURIED SERVICES.
HAZ-C-025	POURING IN-SITU CONCRETE. COLLAPSE OF LARGE REINFORCEMENT CAGES OR FORMWORK PRIOR TO CONCRETING.
HAZ-C-036	INSTABILITY OF PRECAST SECTIONS OR CONCRETE ELEMENTS, INJURY TO OPERATIVES.
HAZ-C-038	THERE IS A RISK OF STRIKING UNEXPLODED ORDNANCE (UXO) DURING PILING OR EXCAVATION WORKS CAUSING INJURY OR FATALITY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-D-044	POTENTIAL LEACHING AND DOWNDRAG OF CONTAMINATED GROUND INTO UNDERLYING PRINCIPAL AQUIFER WHERE PILING THROUGH MADE GROUND INCLUDING UNCONTROLLED LANDFILL AREA. HUMAN HEALTH RISK FROM EXPOSING SITE OPERATIVES TO CONTAMINATED GROUND ARISING FOLLOWING EXCAVATION, CUTTING OR PILING WORKS IN UNCONTROLLED LANDFILL AREA.
HAZ-M-007	UNDERTAKING MAINTENANCE ACTIVITIES ON THE STRUCTURE, INCLUDING WORKING AT HEIGHT, ADJACENT TO LIVE TRAFFIC.
HAZ-D-010	REMOVAL OF BEAMS CONTAINING HIGHLY TENSIONED STRANDS.

0 5m 10m
1:100

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURES, EARTHWORKS AND ROADWORKS DRAWINGS.
2. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.
3. ALL LEVELS AND CHAINAGES IN METRES UNLESS NOTED OTHERWISE.
   ALL LEVELS ARE A.O.D. UNLESS NOTED OTHERWISE.
4. ALL EXTERNAL ARISES TO HAVE 25 x 25 CHAMFERS.
5. ALL INFORMATION RELATING TO THE EXISTING GROUND LEVEL IS BASED ON TOPOGRAPHICAL SURVEY AND BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION.

KEY TO SYMBOLS

REV	DATE	REVISION NOTE
P01	30/09/21	Issue for GRAHAM review
P02	26/11/21	Updated following GRAHAM comments
P03	07/02/22	Updated to SES comments
P04	10/03/22	Updated for GRAHAM comments
P05	17/11/22	ISSUE FOR STAGE APPROVAL
C01	17/11/22	ISSUE FOR STAGE APPROVAL
P06	16/02/23	Issue For Construction
C02	16/02/23	Issue For Construction

DESIGNER: SWECO / FAIRHURST

CONTRACTOR: GRAHAM

CLIENT: highways england

PROJECT TITLE: M25 JUNCTION 28 MPROVEMENTS

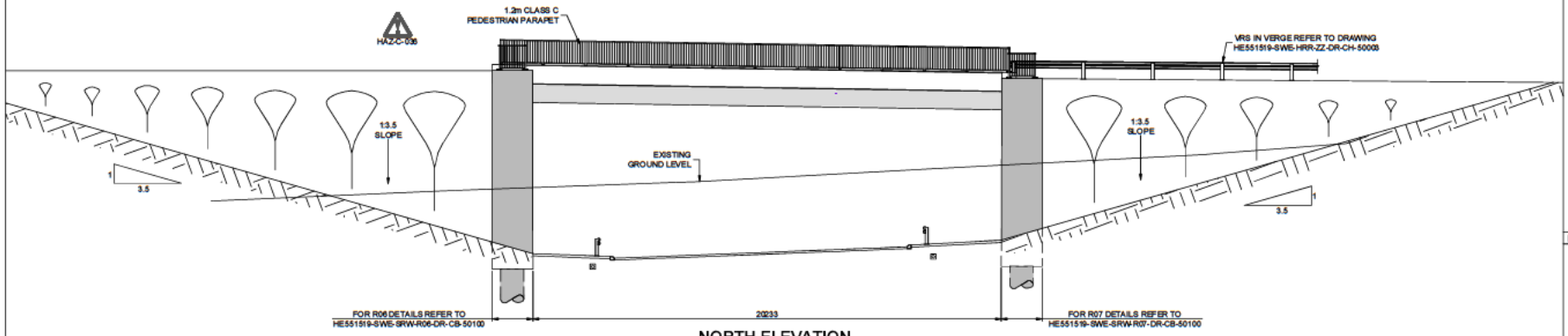
PROJECT STAGE: PCF STAGE 5

DRAWING TITLE: ALDER WOOD BRIDGE GENERAL ARRANGEMENT SHEET 1 OF 2

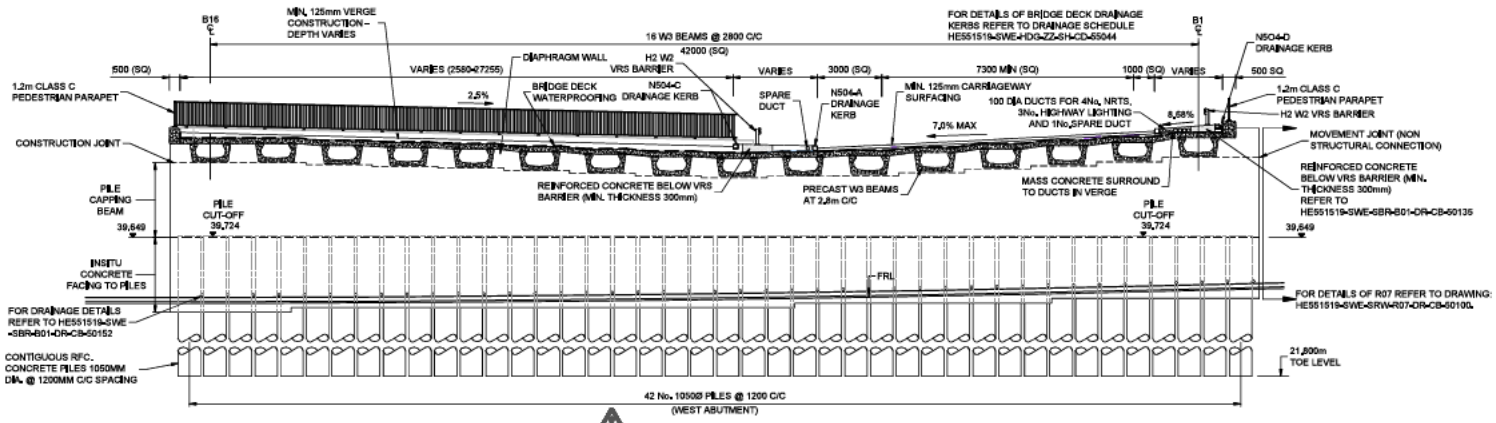
SUITABILITY: FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C02

DRAWING NUMBER: HE551519-SWE-SBR-B01-DR-CB-50100

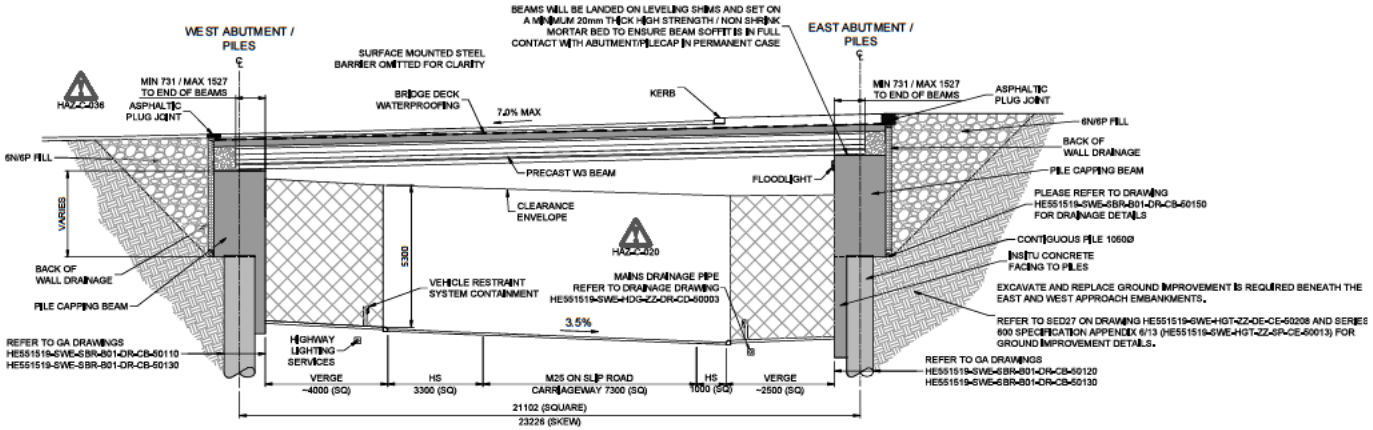


NORTH ELEVATION
SCALE 1:100



HAZ-C-044

SECTION A-A
SCALE 1:125



SECTION B-B
SCALE 1:100

IMPORTANT
SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001

HAZARD REF	BRIEF DESCRIPTION OF HAZARD
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES INJURY TO SITE PERSONNEL WORKING NEAR UNDERGROUND SERVICES. DAMAGE TO BURIED SERVICES.
HAZ-C-020	
HAZ-C-025	POURING INSITU CONCRETE. COLLAPSE OF LARGE REINFORCEMENT CAGES OR FORMWORK PRIOR TO CONCRETING.
HAZ-C-036	INSTABILITY OF PRECAST SECTIONS OR CONCRETE ELEMENTS. INJURY TO OPERATIVES.
HAZ-C-038	THERE IS A RISK OF STRIKING UNEXPLODED ORDNANCE (UXO) DURING PILING OR EXCAVATION WORKS CAUSING INJURY OR FATALITY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-C-044	POTENTIAL LEACHING AND DOWNDRAG OF CONTAMINATED GROUND INTO UNDERLYING PRINCIPAL AQUIFER WHERE PILING THROUGH MADE GROUND INCLUDING UNCTROLLED LANDFILL AREA, HUMAN HEALTH RISK FROM EXPOSING SITE OPERATIVES TO CONTAMINATED GROUND ARISING FOLLOWING EXCAVATION, CUTTING OR PILING WORKS IN UNCONTROLLED LANDFILL AREA.
HAZ-M-007	UNDERTAKING MAINTENANCE ACTIVITIES ON THE STRUCTURE, INCLUDING WORKING AT HEIGHT, ADJACENT TO LIVE TRAFFIC, REMOVAL OF BEAMS CONTAINING HIGHLY TENSIONED STRANDS.
HAZ-D-010	

1:100 0 5m 10m

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURES, EARTHWORKS AND ROADWORKS DRAWINGS.
2. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.
3. ALL LEVELS AND CHAINAGES IN METRES UNLESS NOTED OTHERWISE.
   ALL LEVELS ARE A.O.D. UNLESS NOTED OTHERWISE.
4. ALL EXTERNAL ARISES TO HAVE 25 x 25 CHAMFERS.
5. ALL INFORMATION RELATING TO THE EXISTING GROUND LEVEL IS BASED ON TOPOGRAPHICAL SURVEY AND BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION.
6. FOR GENERAL NOTES REFER TO HE551519-SWE-SBR-B01-DR-CB-50003
7. SQ = SQUARE DIMENSION

KEY TO SYMBOLS

- STRUCTURE FREE ZONE
- 6N/6P FILL TO STRUCTURES
- EXISTING UNDISTURBED GROUND

REV	DATE	REVISION NOTE
P01	30/09/21	Issue for GRAHAM review
P02	26/11/21	Updated following GRAHAM comments
P03	07/02/22	Updated to SES comments
P04	01/03/22	Updated for GRAHAM comments
P05	17/11/22	ISSUE FOR STAGE APPROVAL
C01	17/11/22	ISSUE FOR STAGE APPROVAL
P06	16/02/23	Issue For Construction
C02	16/02/23	Issue For Construction

DESIGNER: SWECO FAIRHURST

CONTRACTOR: GRAHAM

CLIENT: highways england

PROJECT TITLE: M25 JUNCTION 28 IMPROVEMENTS

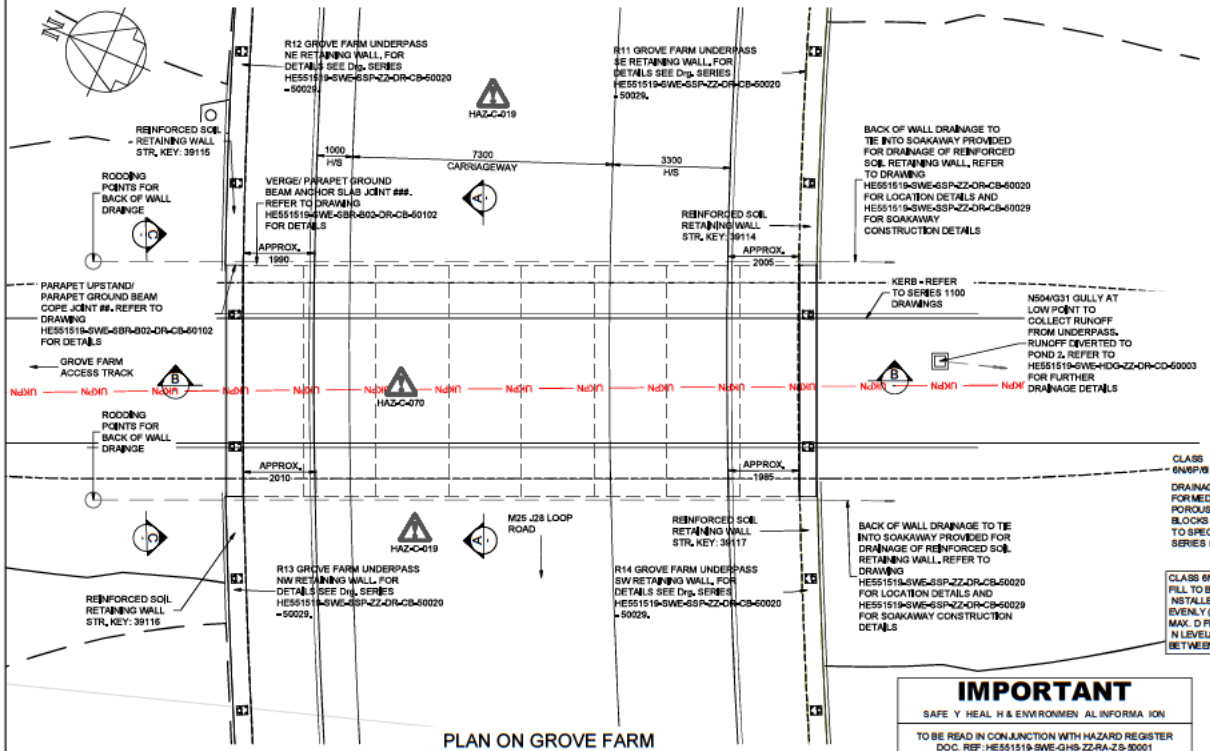
PROJECT STAGE: PCF STAGE 5

DRAWING TITLE: ALDER WOOD BRIDGE GENERAL ARRANGEMENT SHEET 2 OF 2

SUITABILITY: FIT FOR CONSTRUCTION

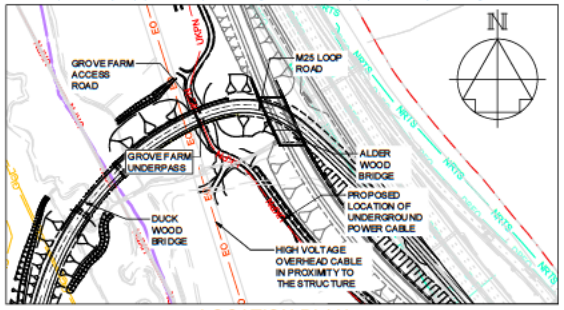
SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C02

DRAWING NUMBER: HE551519-SWE-SBR-B01-DR-CB-50101



PLAN ON GROVE FARM UNDERPASS

SCALE 1:75



LOCATION PLAN

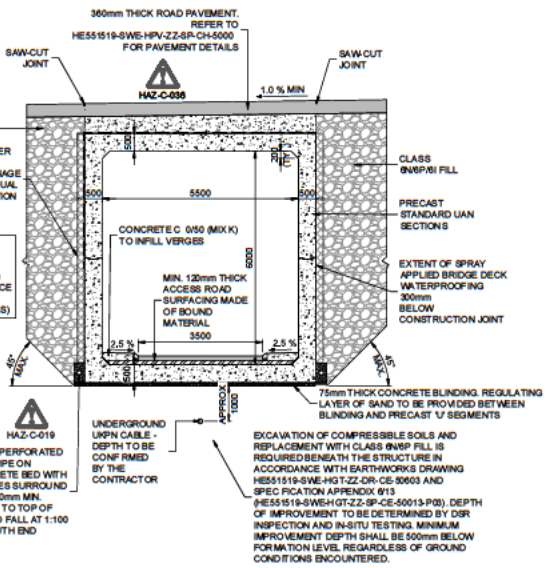
SCALE 1:2500

IMPORTANT

SAFE Y HEAL H & ENVIRONMEN AL INFORMA ION

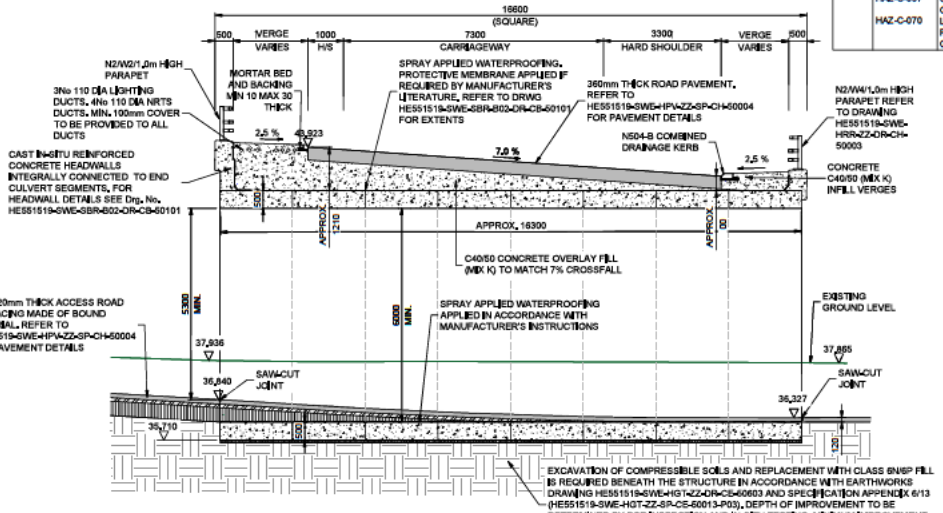
TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001

HAZARD REF AND BREF DESCRIPTION OF HAZARD:-	
HAZ-C-019	WORKING NEAR UNDERGROUND SER VICES. DAMAGE TO UNIDENTIFIED BUR IED SER VICES.
HAZ-C-036	INSTABILITY OF PRECAST SECT ONS OR CONCRETE ELEMENTS. INJURY TO OPERATIVES.
HAZ-C-037	CONFINED SPACE RISKS FOR OPERATIVES.
HAZ-C-070	LIFTING OPERATIONS IN CLOSE PROXIMITY TO OVERHEAD POWER CABLES (PYLONS)



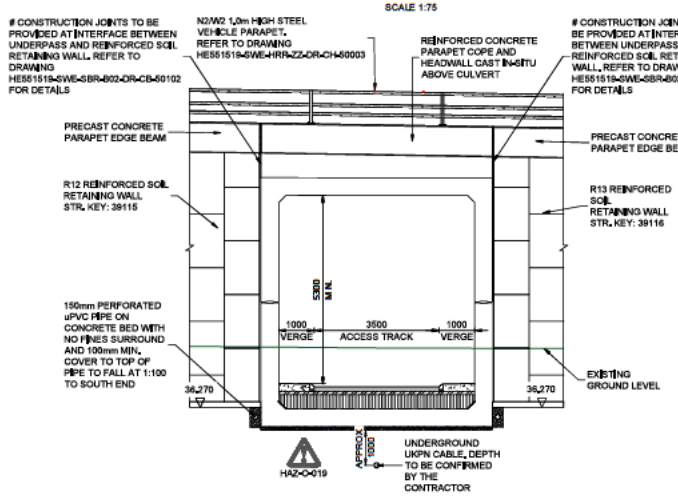
SECTION A-A

SCALE 1:75



SECTION B-B

SCALE 1:75



ELEVATION C-C

SCALE 1:75

NOTES

1. THE DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND SPECIF CATION. ANY DISCREPANCIES TO BE BROUGHT TO THE ATTENTION OF THE DESIGNER.
2. REFER TO DRAWING Ref. HE551519-SWE-SBR-B02-DR-CB-5000 FOR GENERAL NOTES.
3. FOR DRAINAGE DETAILS REFER TO 500 SERIES DRAWINGS: HE551519-SWE-HDG-ZZ-DR-CD-50001 - 50006 AND HE551519-SWE-HDG-ZZ-DR-CD-55001 - 55006
   FOR EARTHWORKS DETAILS REFER TO 600 SERIES D RAWINGS: HE551519-SWE-HGT-C01-DR-CE-50003 - 50007
5. FOR PAVEMENT DETAILS REFER TO 700 SERIES DRAWINGS: HE551519-SWE-HPV-ZZ-DR-CH-50006 - 50026
6. FOR KERBS, FOOTWAYS, AND PAVED AREA DETAILS REFER TO 1100 SERIES DRAWINGS: HE551519-SWE-HKF-ZZ-DR-CH-50001 - 50006

KEY TO SYMBOLS

RED LINE BOUNDARY

UTILITIES KEY

- UKPN — EXISTING UK POWER NETWORKS (TO BE DIVERTED)
- GL — EXISTING CADENT GAS LTD (TO BE DIVERTED)
- BPA — EXISTING BPA PIPELINE
- EO — EXISTING NAT ONAL GRID HIGH VOLTAGE OVERHEAD CABLES
- DBFO — HIGHWAYS ENGLAND UTILITIES (AREA 5)
- NRTS — NATIONAL ROADS TELECOMMUNICATION SERVICES

REV	DATE	REVISION NOTE
P01	13/10/21	Issue to Shay Murragh
P02	26/01/22	Issue to GRAHAM or review
P03	0 /03/22	Update to GRAHAM comments
P0	10/05/22	Update to GRAHAM and WSP comments
P05	10/05/22	P0 Drawing Corrupt
P06	0 /06/22	Update to GRAHAM comments
P07	02/09/22	Update to WSP comments
P08	17/11/22	ISSUE FOR STAGE APPROVAL
C01	17/11/22	ISSUE FOR STAGE APPROVAL

DESIGNER: SWECO / FAIRHURST

CONTRACTOR: GRAHAM

CLIENT: highways england

PROJECT TITLE: M25 JUNCTION 28 IMPROVEMENTS

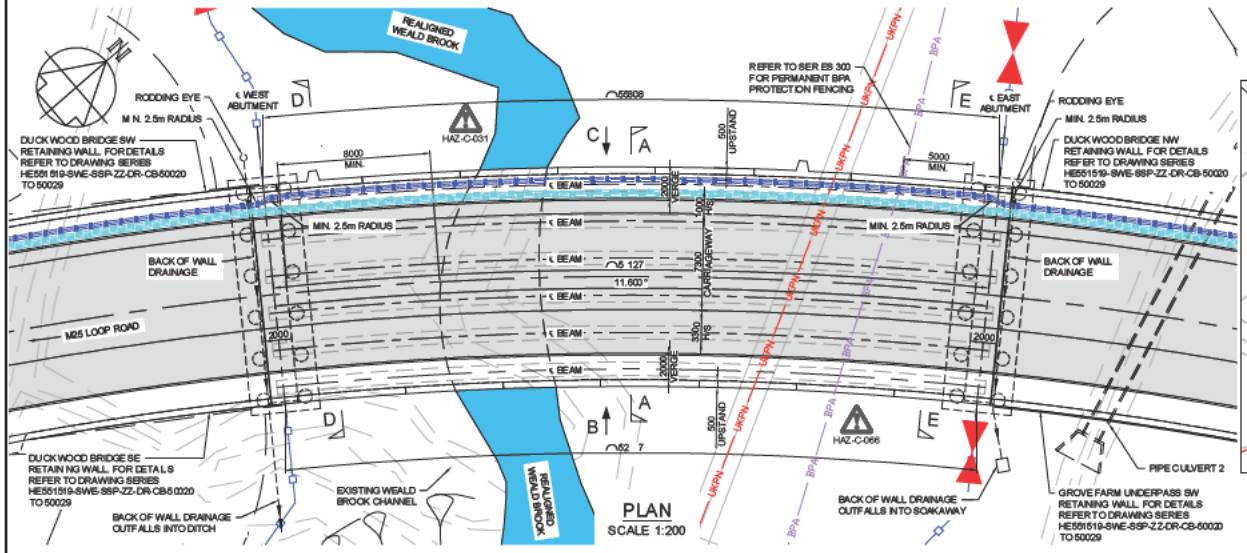
PROJECT STAGE: PCF STAGE 5

DRAWING TITLE: GROVE FARM UNDERPASS GENERAL ARRANGEMENT

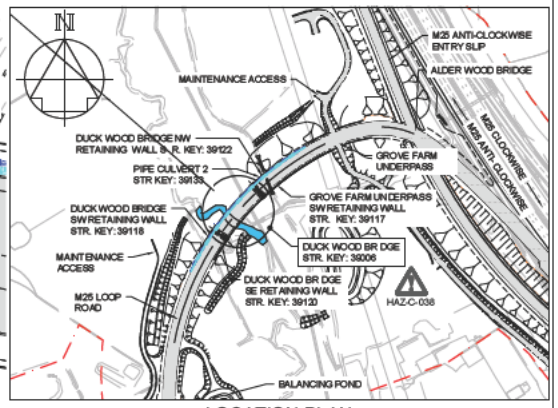
SUITABILITY: FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

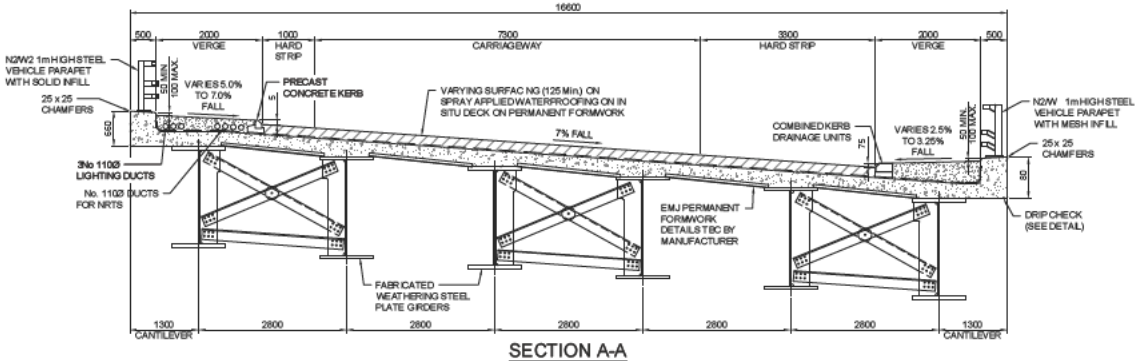
DRAWING NUMBER: HE551519-SWE-SBR-B02-DR-CB-50100



PLAN
SCALE 1:200



LOCATION PLAN
SCALE 1:2500



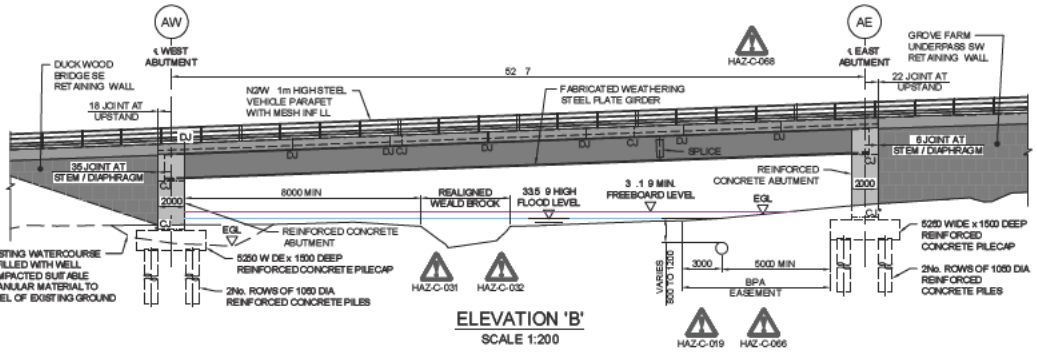
SECTION A-A
SCALE 1:50

UTILITIES KEY:

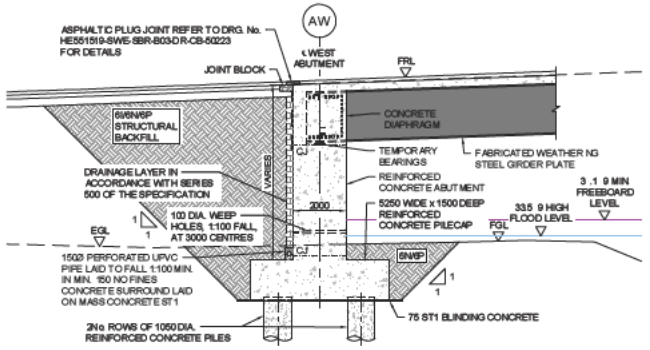
UKPN	EXISTING UK POWER NETWORKS (TO BE DIVERTED)
BPA	EXISTING BPA PIPELINE
3HL	PROPOSED STREET LIGHTING
NRTS	PROPOSED NATIONAL ROADS TELECOMMUNICATIONS SERVICES

KEY:

	RED LINE BOUNDARY
	PROPOSED CHAIN LINK DEER AND OTTER FENCE
	PROPOSED GATE FOR CHAIN LINK DEER AND OTTER FENCE
	HIGH FLOOD LEVEL
	MINIMUM FREEBOARD LEVEL
	WEALD BROOK
CJ -	CONSTRUCTION JOINT
DJ -	DISCONTINUITY JOINT



ELEVATION 'B'
SCALE 1:200



TYPICAL SECTION THROUGH WEST ABUTMENT
SCALE 1:100

NOTES

1. FOR NOTES REFER TO GENERAL NOTES DRAWING HE551519-SWE-SBR-B03-DR-CB-50100. FOR DRAWINGS SCHEDULE REFER TO DRAWING No. HE551519-SWE-SBR-B03-DR-CB-50103.
2. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE
3. DO NOT SCALE FROM THIS DRAWING.
4. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
5. ALL CHAINAGES ARE IN METRES, UNLESS NOTED OTHERWISE
6. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING No. HE551519-SWE-SBR-B03-DR-CB-50111.
7. ALL INFORMATION RELATING TO EXISTING GROUND LEVEL IS BASED ON TOPOGRAPHICAL SURVEY AND TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION.
8. THE CONTRACTOR MUST AGREE TEMPORARY PROTECTION MEASURES WITH ASSET OWNER FOR BPA PIPELINE DURING CONSTRUCTION OF DUCK WOOD BRIDGE.

IMPORTANT

SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001

HAZARD REF	BRIEF DESCRIPTION OF HAZARD:-
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL
HAZ-C-025	POURING IN-SITU CONCRETE. COLLAPSE OF LARGE REINFORCEMENT CAGES OR FORMWORK PRIOR TO CONCRETING.
HAZ-C-029	FLOODING INUNDATION OF EXCAVATIONS AND WORKING AREAS.
HAZ-C-031	POLLUTION OF WATERCOURSES DUE TO CONTAMINATION WITH CONSTRUCTION MATERIALS.
HAZ-C-032	RISK OF WATERBORNE DISEASES CONTRACTED BY SITE OPERATIVES.
HAZ-C-036	INSTABILITY OF PRECAST SECTIONS OR CONCRETE ELEMENTS. INJURY TO OPERATIVES.
HAZ-C-038	THERE IS A RISK OF STRIKING UNEXPLODED ORDNANCE (UXO) DURING PILING OR EXCAVATION WORKS CAUSING INJURY OR FATALITY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-C-066	RISK OF DAMAGING BPA PIPELINE.
HAZ-C-068	WORK AT HEIGHT - RISK OF FALLING FROM HEIGHT, INJURY TO OPERATIVES **BY FALLING ELEMENT.**

REV	DATE	REVISION NOTE
P01	16/03/22	ISSUED FOR REVIEW
P02	20/05/22	ISSUED FOR CONSULTEE REVIEW
P03	17/11/22	ISSUE FOR STAGE APPROVAL
C01	17/11/22	ISSUE FOR STAGE APPROVAL

[redacted]

DESIGNER
SWECO

CONTRACTOR
GRAHAM

CLIENT
highways england

PROJECT TITLE
M25 JUNCTION 28 IMPROVEMENTS

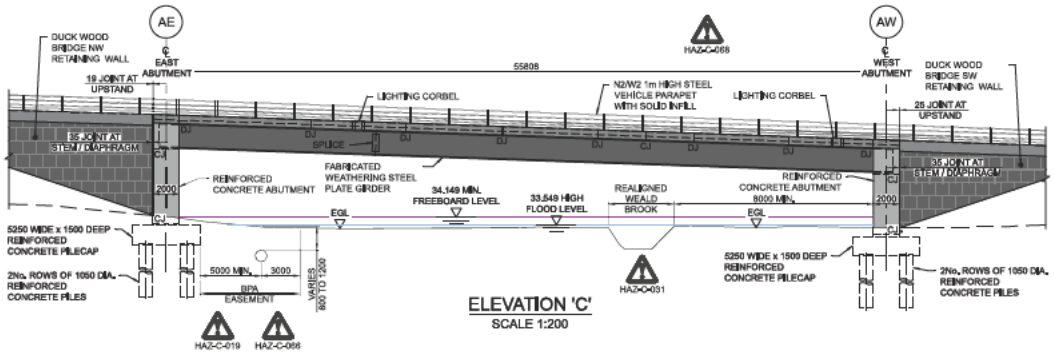
PROJECT STAGE
PCF STAGE 5

DRAWING TITLE
DUCK WOOD BR DGE
GENERAL ARRANGEMENT
SHEET 1 OF 2

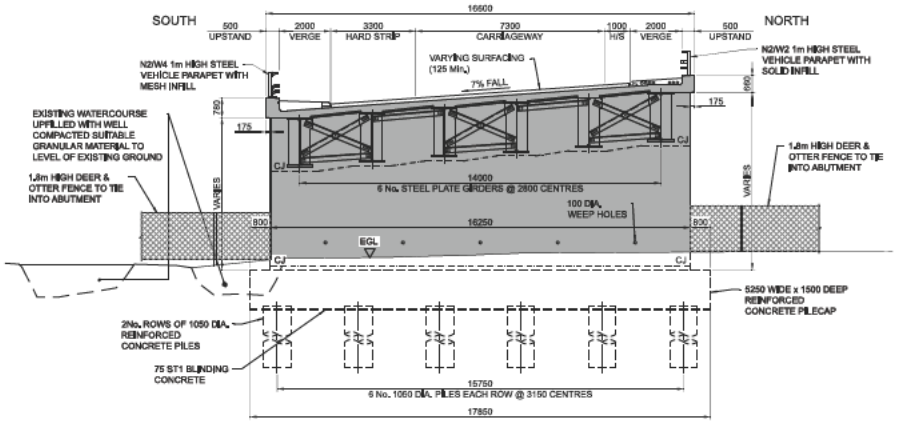
SUITABILITY
FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

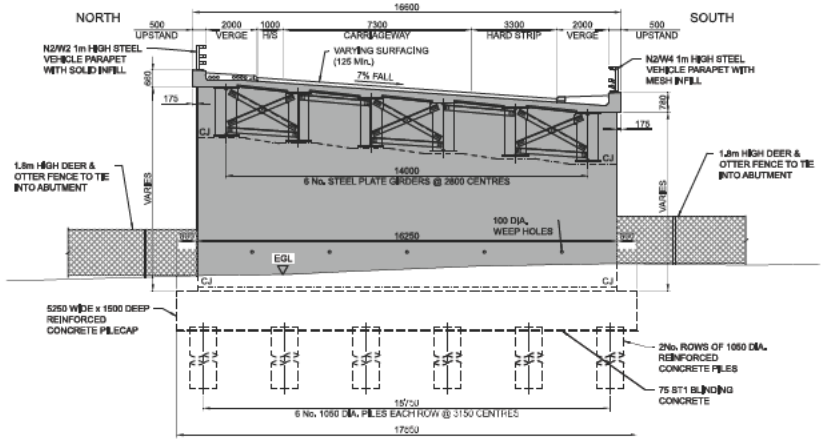
DRAWING NUMBER
HE551519-SWE-SBR-B03-DR-CB-50110



ELEVATION 'C'
SCALE 1:200



ELEVATION D-D
SCALE 1:100



ELEVATION E-E
SCALE 1:100

IMPORTANT
SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001

HAZARD REF AND BRIEF DESCRIPTION OF HAZARD:-	
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL.
HAZ-C-025	POURING IN-SITU CONCRETE, COLLAPSE OF LARGE REINFORCEMENT CAGES OR FORMWORK PRIOR TO CONCRETING.
HAZ-C-029	FLOODING INUNDATION OF EXCAVATIONS AND WORKING AREAS.
HAZ-C-031	POLLUTION OF WATERCOURSES DUE TO CONTAMINATION WITH CONSTRUCTION MATERIALS.
HAZ-C-032	RISK OF WATERBORNE DISEASES CONTRACTED BY SITE OPERATIVES.
HAZ-C-036	INSTABILITY OF PRECAST SECTIONS OR CONCRETE ELEMENTS. INJURY TO OPERATIVES.
HAZ-C-038	THERE IS A RISK OF STRIKING UNEXPLODED ORDNANCE (UXO) DURING PILING OR EXCAVATION WORKS CAUSING INJURY OR FATALITY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-C-066	RISK OF DAMAGING BPA PIPELINE.
HAZ-C-068	WORK AT HEIGHT - RISK OF FALLING FROM HEIGHT, INJURY TO OPERATIVES BY FALLING ELEMENT.

NOTES

1. FOR NOTES REFER TO GENERAL NOTES DRAWING HE551519-SWE-SBR-B03-DR-CB-50100, FOR DRAWINGS SCHEDULE REFER TO DRAWING No, HE551519-SWE-SBR-B03-DR-CB-50103.
2. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. DO NOT SCALE FROM THIS DRAWING.
4. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
5. ALL CHAINAGES ARE IN METRES, UNLESS NOTED OTHERWISE.
6. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING No, HE551519-SWE-SBR-B03-DR-CB-50110.
7. ALL INFORMATION RELATING TO EXISTING GROUND LEVELS IS BASED ON TOPOGRAPHICAL SURVEY AND TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION.
8. THE CONTRACTOR MUST AGREE TEMPORARY PROTECTION MEASURES WITH ASSET OWNER FOR BPA PIPELINE DURING CONSTRUCTION OF DUCK WOOD BRIDGE.

KEY:
- HIGH FLOOD LEVEL
- MINIMUM FREEBOARD LEVEL
- CJ • CONSTRUCTION JOINT
- DJ • DISCONTINUITY JOINT

REV	DATE	REVISION NOTE
P01	16/03/22	ISSUED FOR REVIEW
P02	20/05/22	ISSUED FOR CONSULTEE REVIEW
P03	17/11/22	ISSUE FOR STAGE APPROVAL
C01	17/11/22	ISSUE FOR STAGE APPROVAL

DESIGNER

SWECO

CONTRACTOR

GRAHAM

CLIENT

highways england

PROJECT TITLE

M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE

PCF STAGE 5

DRAWING TITLE

DUCK WOOD BRIDGE
GENERAL ARRANGEMENT
SHEET 2 OF 2

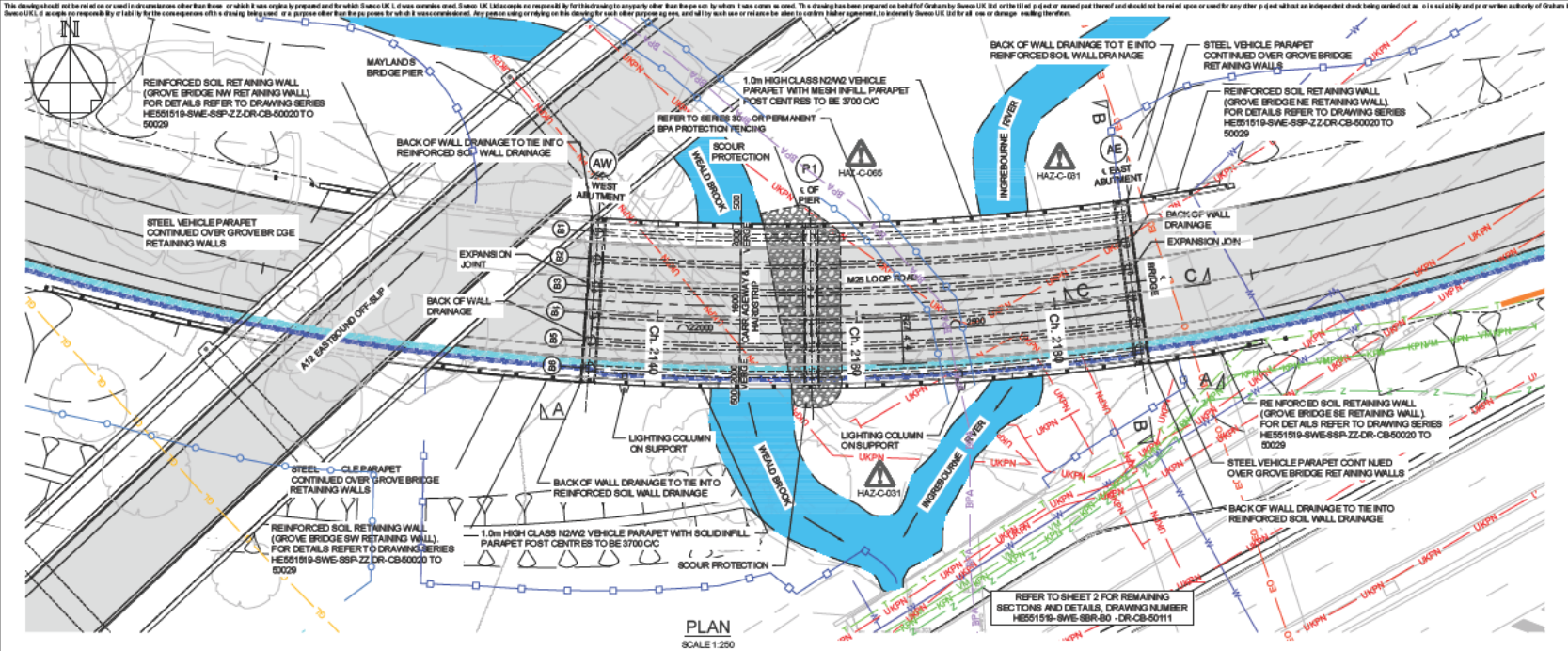
SUITABILITY

FIT FOR CONSTRUCTION

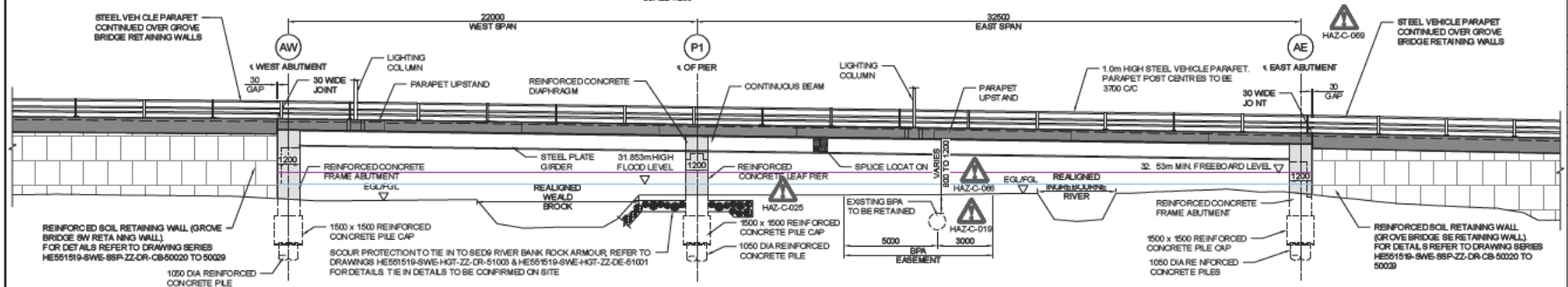
SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

DRAWING NUMBER

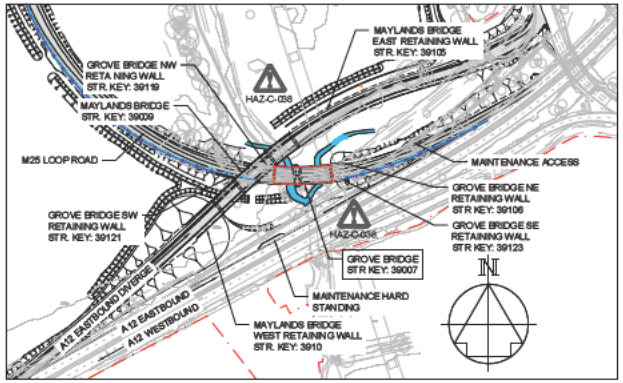
HE551519-SWE-SBR-B03-DR-CB-50111



PLAN
SCALE 1:250



ELEVATION A-A
SCALE 1:100



LOCATION PLAN
SCALE 1:2500

IMPORTANT

SAFE Y HEAL H & ENVIRONMEN AL INFORMA ION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001

HAZARD REF	BRIEF DESCRIPTION OF HAZARD:-
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL POURING IN-SITU CONCRETE.
HAZ-C-025	COLLAPSE OF LARGE REINFORCEMENT CAGES OR FORMWORK PRIOR TO CONCRETING.
HAZ-C-029	FLOOD NG INUNDAT ION OF EXCAVATIONS AND WORKING AREAS.
HAZ-C-031	POLLUTION OF WATERCOURSES DUE TO CONTAMINAT ION WITH CONSTRUCT ION MATERIALS.
HAZ-C-036	INST ABILITY OF PRECAST SECTIONS OR CONCRETE ELEMENTS. INJURY TO OPERATIVES.
HAZ-C-038	THERE IS A RISK OF STRIKING UNEXPLODED ORDNANCE (UXO) DURING PILING OR EXCAVATION WORKS CAUSING INJURY OR FATALITY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-C-063	DISPLACEMENT OR TWIST NG OF THE STRUCTURE DUE TO TEMPORARY SUPPORT SETTLEMENT.
HAZ-C-06	STEEL BEAM COLLAPSE DURING ERECTION USING SPMT VEHICLES.
HAZ-C-065	NCREASED RISK OF DAMAGING BPA PIPELINE DUE TO VIBRATIONS.
HAZ-C-066	RISK OF DAMAGING BPA P PELINE.
HAZ-C-068	WORK AT HEIGHT - RISK OF FALLING FROM HEIGHT, INJURY TO OPERATIVES BY FALLING ELEMENT.
HAZ-C-069	RISK OF ELECTROCUTION FROM OVERHEAD POWER LINES.

NOTES

1. FOR NOTES REFER TO GENER AL NOTES DRAWING HE551519-SWE-SBR-B0 -DR-CB-50100
2. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. DO NOT SCALE FROM THIS DRAWING.
4. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
5. ALL CHA NAGES ARE IN METRES, UNLESS NOTED OTHERWISE.
6. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING No. HE551519-SWE-SBR-B0 -DR-CB-50111.
7. ALL INFORMATION RELATING TO EXISTING GROUND LEVEL IS BASED ON TOPOGRAPHICAL SURVEY AND BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION
8. THE CONTRACTOR MUST AGREE TEMPORARY PROTECTION MEASURES WITH ASSET OWNER FOR BPA PIPELINE DURING CONSTRUCTION OF GROVE BRIDGE

KEY TO SYMBOLS

- RED LINE BOUNDARY
- HIGH FLOOD LEVEL
- MIN. FREEBOARD LEVEL
- RIVER
- SCOUR PROTECTION

UTILITIES KEY

- UKPN — EXISTING UK POWER NETWORKS (TO BE DIVERTED)
- GL — EXISTING CADENT GAS LTD (TO BE DIVERTED)
- BPA — EXISTING BPA PIPELINE
- ED — EXISTING NATIONAL GRID HIGH VOLTAGE OVERHEAD CABLES
- W — PROPOSED WATER_ESSEX & SUFFOLK WATER
- KPN — EXISTING INSTALCOM TO BE ABANDONED
- VM — EXISTING VIRGIN MEDIA TO BE ABANDONED
- Z — EXISTING ZAYO TO BE ABANDONED
- T — EXISTING TELENT TO BE ABANDONED
- PROPOSED CHAIN LINK DEER AND OTTER FENCE
- PROPOSED POST AND RAIL FENCE
- 3HL — PROPOSED LIGHTING DUCTS
- NRTS — PROPOSED TECHNOLOGY DUCTS

P02	0 .03/22	ISSUED FOR NH TA REVIEW
P03	0 6/05/22	UPDATED FOLLOWING H TA REVIEW
P0	1 3/06/22	MINOR UPDATES
P05	1 7/11/22	SSUE FOR STAGE APPR OVAL
C01	1 7/11/22	SSUE FOR STAGE APPR OVAL
REV	DATE	REVISION NOTE

DES GNER

SWECO

CONTRACTOR

GRAHAM

CLIENT

highways england

PROJECT TITLE

M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE

PCF STAGE 5

DRAWING TITLE

GROVE BR DGE
GENERAL ARR ANGEMENT
SHEET 1 OF 2

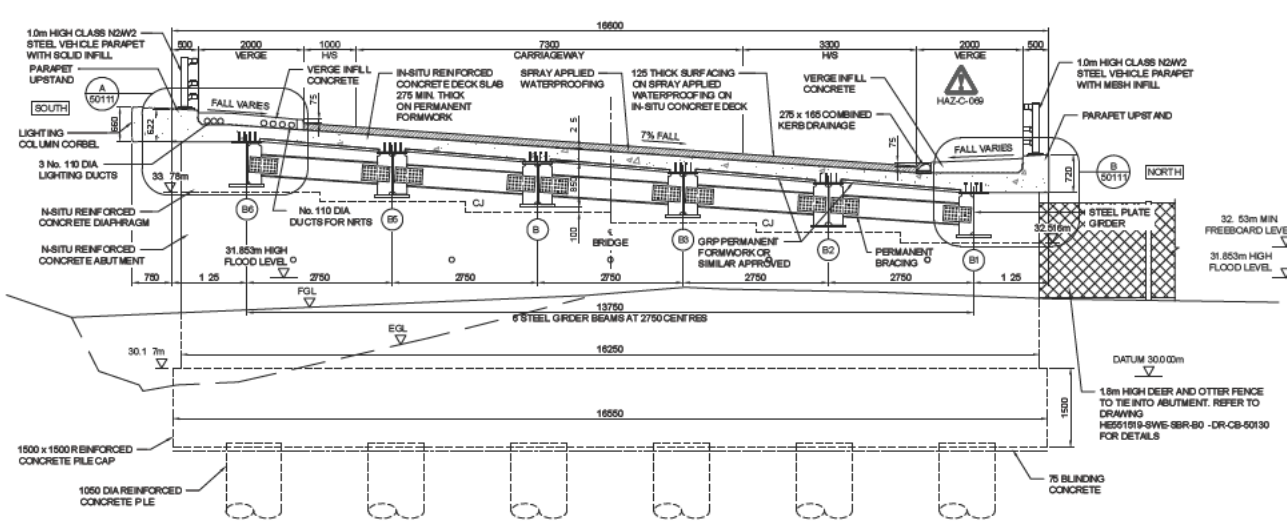
SUITABILITY

FIT FOR CONSTRUCTION

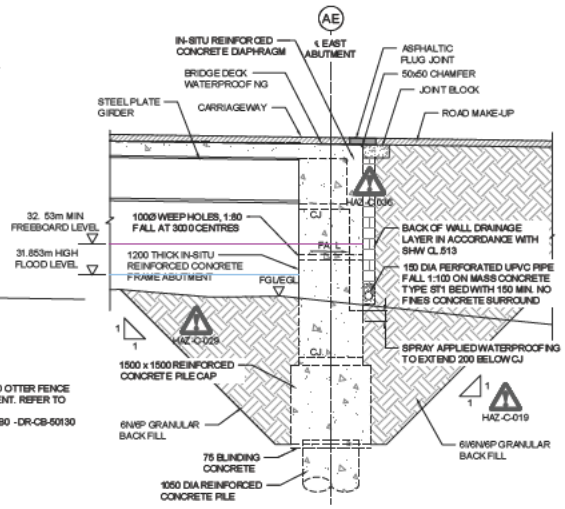
SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

DRAWING NUMBER

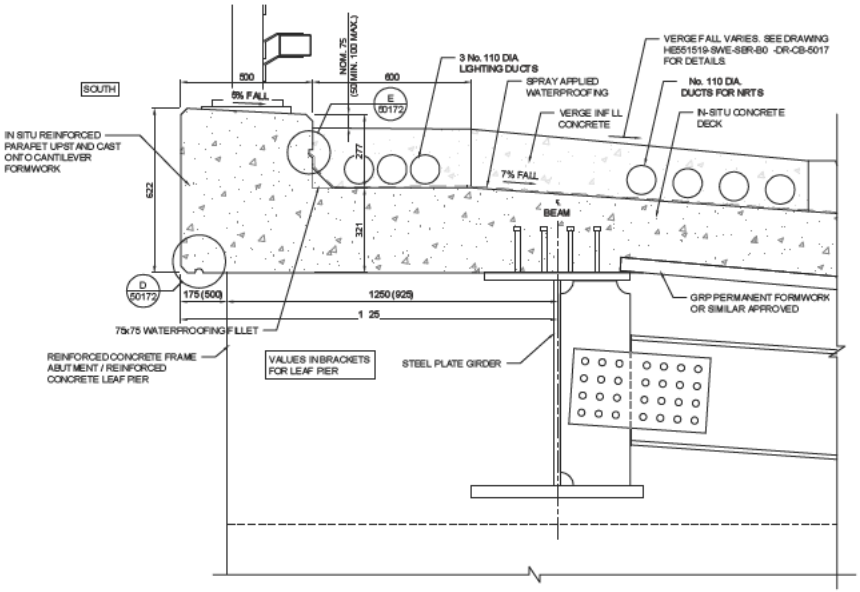
HE551519-SWE-SBR-B04-DR-CB-50110



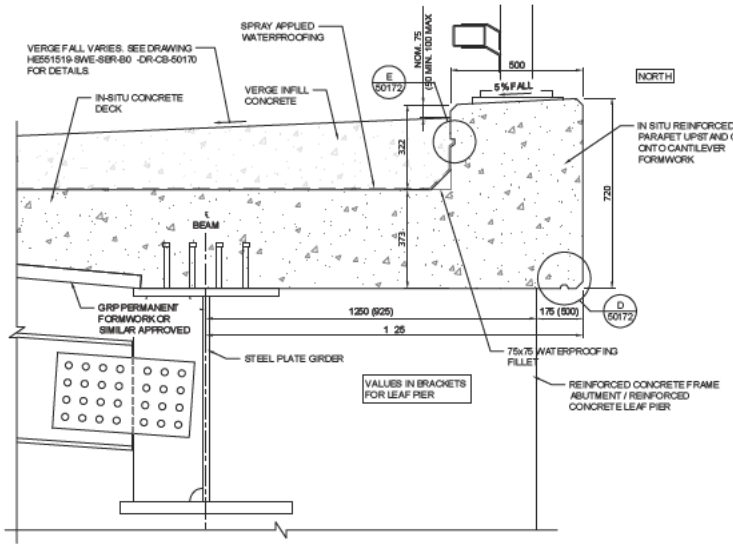
SECTION B-B
SCALE 1:50



SECTION C-C
SCALE 1:50



DETAIL A
IN-SITU PARAPET UPSTAND
SCALE 1:10



DETAIL B
IN-SITU PARAPET UPSTAND
SCALE 1:10

NOTES

1. FOR NOTES REFER TO GENERAL NOTES DRAWING HE551519-SWE-SBR-B0 -DR-CB-50100
2. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. DO NOT SCALE FROM THIS DRAWING.
4. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
5. ALL CHAINAGES ARE IN METRES, UNLESS NOTED OTHERWISE.
6. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING No. HE551519-SWE-SBR-B0 -DR-CB-50110
7. ALL INFORMATION RELATING TO EXISTING GROUND LEVELS IS BASED ON TOPOGRAPHICAL SURVEY AND BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION

HIGH FLOOD LEVEL
MIN. FREEBOARD LEVEL

IMPORTANT
SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001

HAZARD REF	BRIEF DESCRIPTION OF HAZARD
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL.
HAZ-C-025	POURING IN-SITU CONCRETE. COLLAPSE OF LARGE REINFORCEMENT CAGES OR FORMWORK PRIOR TO CONCRETING.
HAZ-C-029	FLOODING INUNDATION OF EXCAVATIONS AND WORKING AREAS.
HAZ-C-031	POLLUTION OF WATERCOURSES DUE TO CONTAMINATION WITH CONSTRUCTION MATERIALS.
HAZ-C-036	INSTABILITY OF PRECAST SECTIONS OR CONCRETE ELEMENTS. INJURY TO OPERATIVES.
HAZ-C-038	THERE IS A RISK OF STRIKING UNEXPLODED ORDNANCE (UXO) DURING PILING OR EXCAVATION WORKS CAUSING INJURY OR FATALITY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-C-063	DISPLACEMENT OR TWISTING OF THE STRUCTURE DUE TO TEMPORARY SUPPORT SETTLEMENT.
HAZ-C-06	STEEL BEAM COLLAPSE DURING ERECTION USING SPMT VEHICLES.
HAZ-C-065	INCREASED RISK OF DAMAGING BPA PIPELINE DUE TO VIBRATIONS.
HAZ-C-066	RISK OF DAMAGING BPA PIPELINE.
HAZ-C-068	WORK AT HEIGHT - RISK OF FALLING FROM HEIGHT, INJURY TO OPERATIVES BY FALLING ELEMENT.
HAZ-C-069	RISK OF ELECTROCUTION FROM OVERHEAD POWER LINES.

REV	DATE	REVISION NOTE
P01	01/02/22	ISSUED FOR GRAHAM REVIEW
P02	0 /03/22	ISSUED FOR NH TA REVIEW
P03	09/05/22	UPDATED FOLLOWING NH TA REVIEW
P0	13/06/22	MINOR UPDATES
P05	17/11/22	ISSUE FOR STAGE APPROVAL
C01	17/11/22	ISSUE FOR STAGE APPROVAL

DESIGNER
SWECO

CONTRACTOR
GRAHAM

CLIENT
highways england

PROJECT TITLE
M25 JUNCTION 28 IMPROVEMENTS

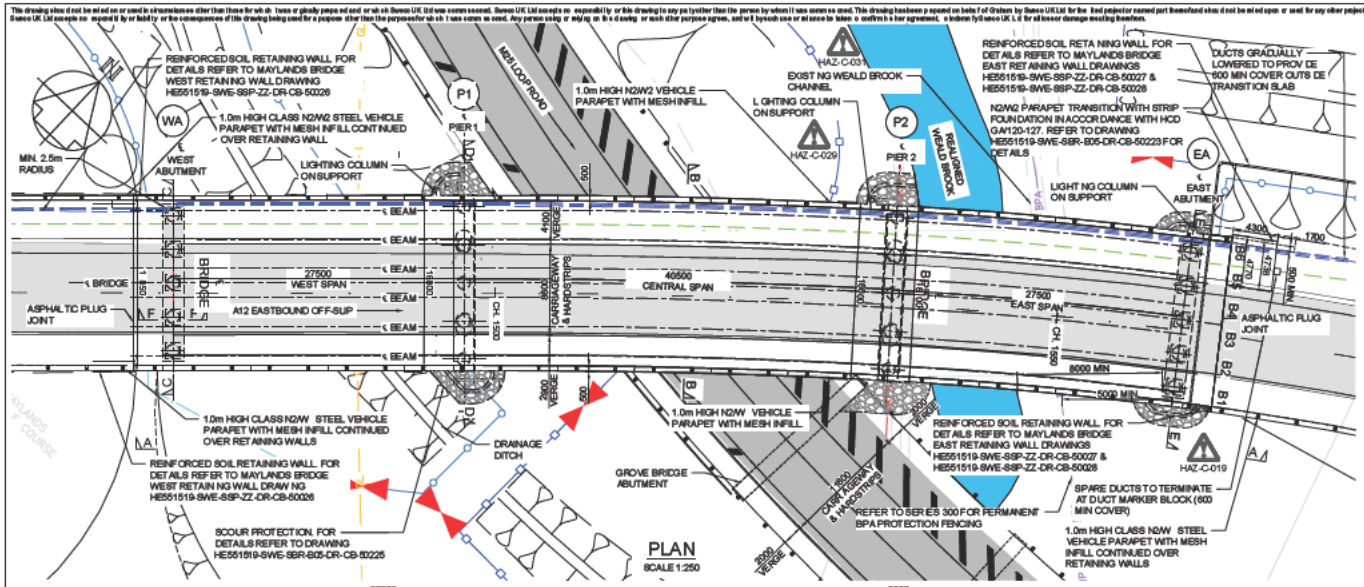
PROJECT STAGE
PCF STAGE 5

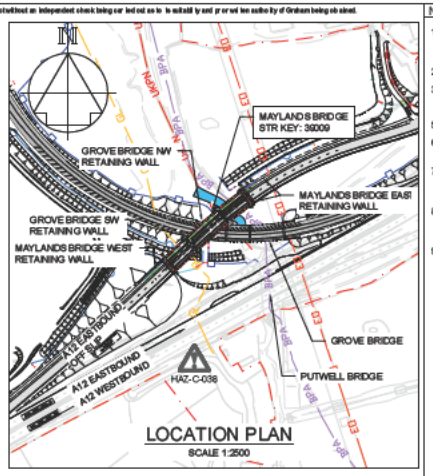
DRAWING TITLE
GROVE BRIDGE
GENERAL ARRANGEMENT
SHEET 2 OF 2

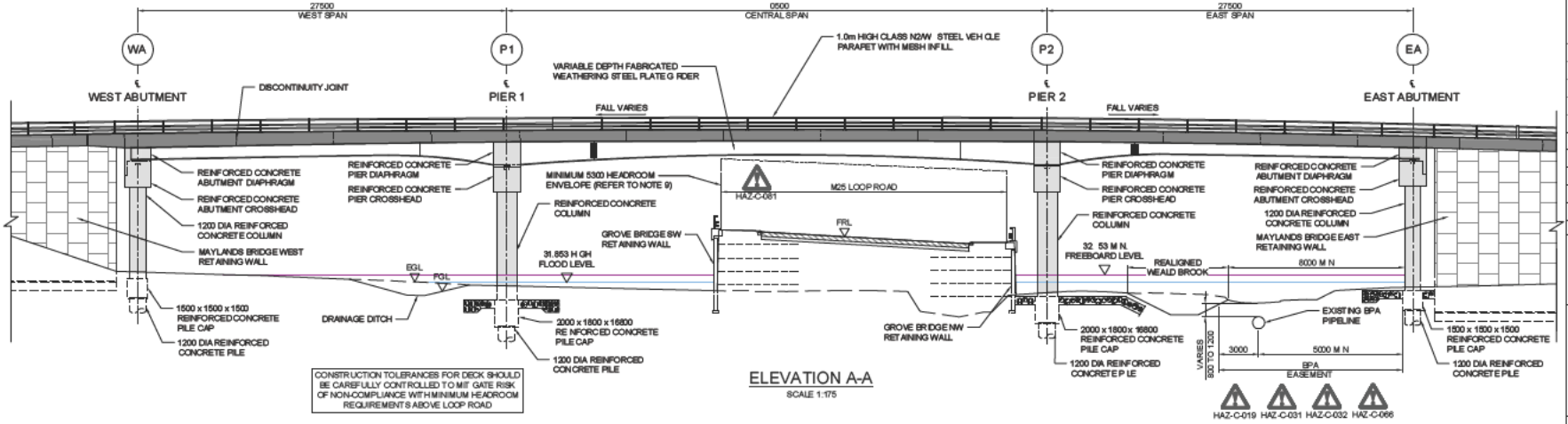
SUITABILITY
FIT FOR CONSTRUCTION

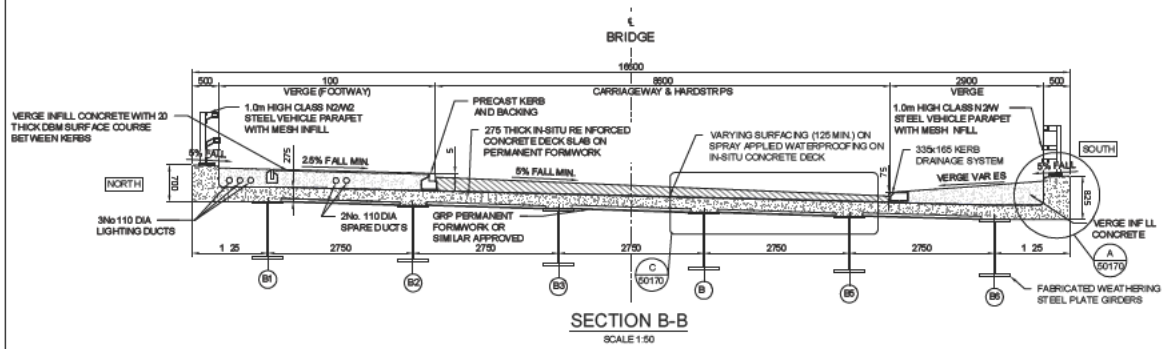
SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

DRAWING NUMBER
HE551519-SWE-SBR-B04-DR-CB-50111









KEY:

- RED LINE BOUNDARY
- PROPOSED CHAIN LINK DEER AND OTTER FENCE
- PROPOSED TIMBER POST AND RAIL FENCE
- PROPOSED GATE
- HIGH FLOOD LEVEL
- MINIMUM FREEBOARD LEVEL
- WEALD BROOK
- LIGHTING DUCTS
- SCOUR PROTECTION
- N2/W2 VRS
- SPARE 110 DIA DUCTS

UTILITIES KEY:

- UKPN — EXISTING UK POWER NETWORKS (TO BE DIVERTED)
- GL — EXISTING CADENT GAS LTD (TO BE DIVERTED)
- BPA — EXISTING BPA PIPELINE
- EO — EXISTING NATIONAL GRID HIGH VOLTAGE OVERHEAD CABLES
- GL — PROPOSED CADENT GAS LTD

NOTES

1. FOR NOTES REFER TO GENERAL NOTES DRAWING No. HE551519-SWE-SBR-B05-DR-CB-50100. FOR DRAWING SCHEDULE REFER TO DR AWING No. HE551519-SWE-SBR-B05-DR-CB-50103.
2. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. DO NOT SCALE FROM THIS DRAW NG.
4. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
5. ALL CHAINAGES ARE IN METRES, UNLESS NOTED OTHERWISE.
6. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING No HE551519-SWE-SBR-B05-DR-CB-50111.
7. ALL NFORMATION RELATING TO EXISTING GROUND LEVEL IS BASED ON TOPOGRAPHICAL SURVEY AND TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION.
8. THE CONTRACTOR MUST AGREE TEMPORARY PROTECTION MEASURES WITH ASSET OWNER FOR BPA PIPELINE DURING CONSTRUCTION OF MAYLANDS BRIDGE.
9. THE CONTRACTOR S AT TENTION IS DRAWN TO THE HEADROOM PINCH POINT AT THE BACK OF VERGE ADJACENT TO PIER 1. CAREFUL CONTROL OF CONSTRUCTION LEVELS WILL BE REQUIRED TO ENSURE THE MINIMUM 5.3m HEADROOM CAN BE ACHIEVED. ASSUMED DESIGN TOLERANCES:
   - STEEL BEAM SOFFIT LEVELS 10mm
   - LOOP ROAD BACK OF VERGE LEVEL 15mm

IMPORTANT

SA FE Y HEAL H & ENVIRONMEN AL INFORMA ON

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001

HAZARD REF AND BRIEF DESCRIPTION OF HAZARD:-

HAZ-C-019	WORKING NEAR UNDERGROUND SERV CES. INJURY TO SITE PERSONNEL
HAZ-C-025	POURING IN-SITU CONCRETE. COLLAPSE OF LARGE REINFORCEMENT CAGES OR FORMWORK PRIOR TO CONCRETING.
HAZ-C-029	FLOODING INUNDATION OF EXCAVATIONS AND WORKING AREAS.
HAZ-C-031	POLLUTION OF WATERCOURSES DUE TO CONTAMINATION WITH CONSTRUCTION MATERIALS.
HAZ-C-032	RISK OF WATERBORNE DISEASES CONTRACTED BY SITE OPERATIVES.
HAZ-C-038	THERE IS A RISK OF STRIKING UNEXPLODED ORDNANCE (UXO) DURING PILING OR EXCAVATION WORKS CAUSING IN URY OR FATALITY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-C-066	RISK OF DAMAGING BPA PIPELINE.
HAZ-C-056	WORK AT HEIGHT - RISK OF FALLING FROM HEIGHT, INJURY TO OPERATIVES BY FALLING ELEMENT.
HAZ-C-081	MINIMUM HEADROOM PINCH POINT AT PIER 1.

P02	09/09/22	UPDATED IN RESPONSE TO COMMENTS
P03	30/09/22	DBB GN UPDATES AS CLOUDED
P0	26/09/22	UPDATED IN RESPONSE TO COMMENTS
P05	17/11/22	ISSUE FOR STAGE APPROVAL
C01	17/11/22	ISSUE FOR STAGE APPROVAL
REV	DATE	REVISION NOTE

[redacted]

DESIGNER

SWECO

CONTRACTOR

GRAHAM

CLIENT

highways england

PROJECT TITLE

M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE

PCF STAGE 5

DRAWING TITLE

MAYLANDS BR DGE
GENERAL ARRANGEMENT
SHEET 1 OF 2

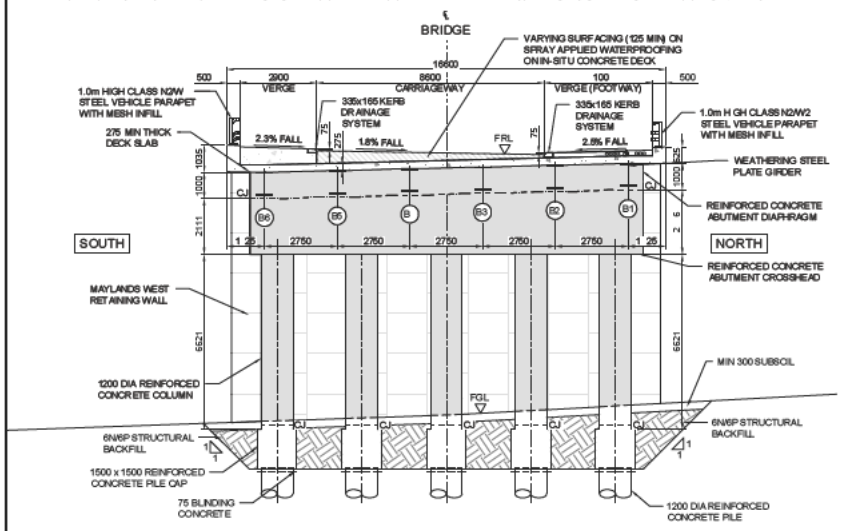
SUITABILITY

FIT FOR CONSTRUCTION

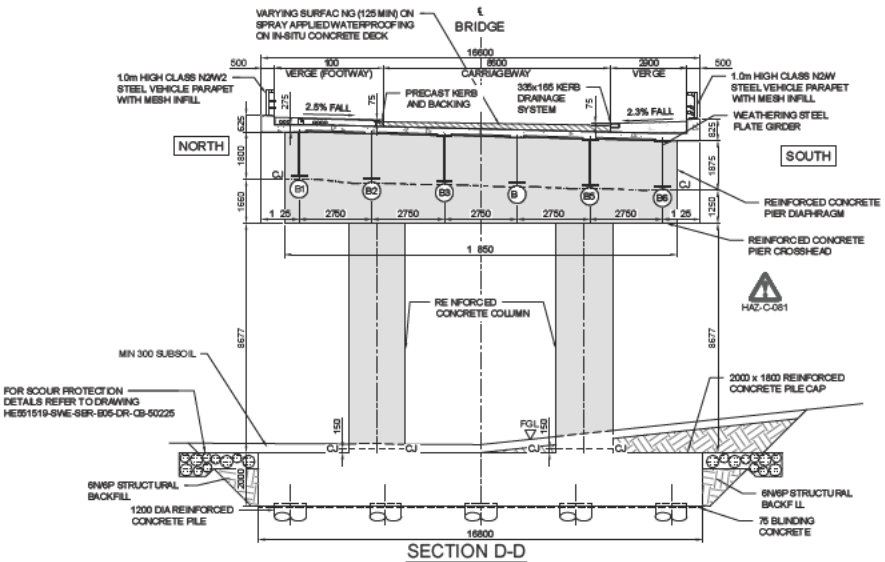
SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

DRAWING NUMBER

HE551519-SWE-SBR-B05-DR-CB-50110



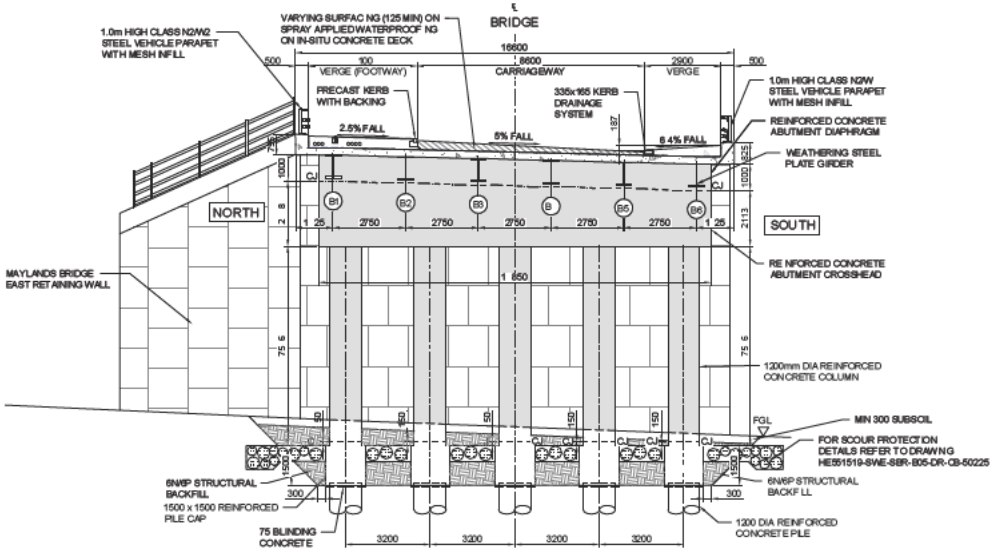
SECTION C-C
SCALE 1:100



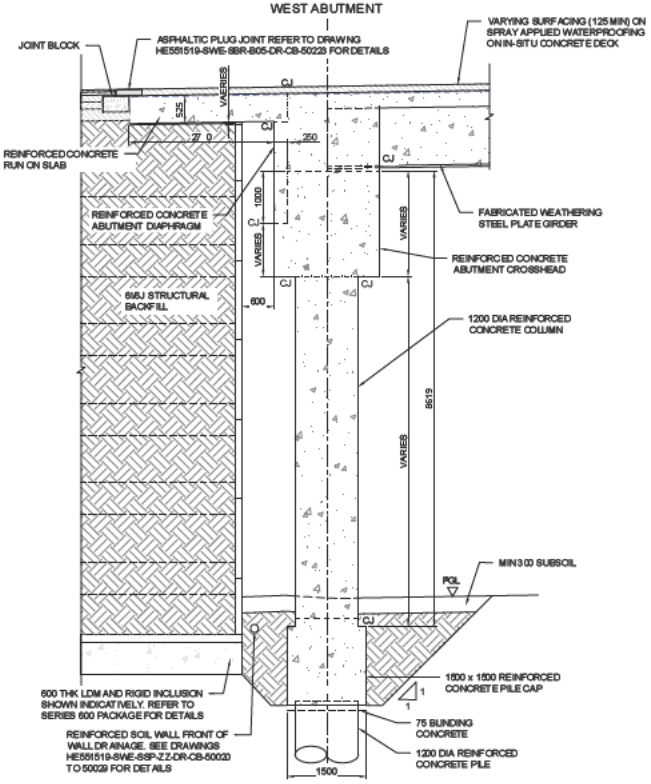
SECTION D-D
(P ER 2 ELEVATION SIMILAR)
SCALE 1:100

WA

WEST ABUTMENT



SECTION E-E
SCALE 1:100



SECTION F-F TYPICAL SECTION THROUGH WEST ABUTMENT (EAST ABUTMENT SIMILAR BUT HANDED)
SCALE 1:50

NOTES

1. FOR NOTES REFER TO GENERAL NOTES DRAW NG No HE551519-SWE-SBR-B05-DR-CB-50100. FOR DRAWING SCHEDULE REFER TO DRAWING No. HE551519-SWE-SBR-B05-DR-CB-50103.
2. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. DO NOT SCALE FROM THIS DRAWING.
4. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
5. ALL CHA NAGES ARE IN METRES, UNLESS NOTED OTHERWISE.
6. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING No. HE551519-SWE-SBR-B05-DR-CB-50110.
7. ALL INFORMATION RELATING TO EXISTING GROUND LEVEL IS BASED ON TOPOGRAPHICAL SURVEY AND TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCT ON.
8. THE CONTRACTOR MUST AGREE TEMPORARY PROTECT ON MEASURES WITH ASSET OWNER FOR BPA PIPELINE DURING CONSTRUCTION OF MAYLANDS BRIDGE.
9. THE CONTRACTOR'S ATTENTION IS DRAWN TO THE HEADROOM PINCH POINT AT THE BACK OF VERGE ADJACENT TO PIER 1. CAREFUL CONTROL OF CONSTRUCT ION LEVELS WILL BE REQUIRED TO ENSURE THE MINIMUM 5.3m HEADROOM CAN BE ACHIEVED. ASSUMED DESIGN TOLERANCES:
   - STEEL BEAM SOFFIT LEVELS 10mm
   - LOOP ROAD BACK OF VERGE LEVEL 15mm

KEY:

CJ - - - - - CJ - CONSTRUCT ION JOINT

IMPORTANT

SAFE Y HEAL H & ENVIRONMEN AL INFORMA ON

TO BE READ IN CONJUNCT ION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001

HAZARD REF AND BRIEF DESCRIPTION OF HAZARD>	
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL
HAZ-C-025	POURING IN-SITU CONCRETE. COLLAPSE OF LARGE REINFORCEMENT CAGES OR FORMWORK PRIOR TO CONCRETING.
HAZ-C-029	FLOODING INUNDATION OF EXCAVATIONS AND WORKING AREAS.
HAZ-C-031	POLLUTION OF WATERCOURSES DUE TO CONTAMINATION WITH CONSTRUCTION MATERIALS.
HAZ-C-032	RISK OF WATERBORNE DISEASES CONTRACTED BY SITE OPERATIVES.
HAZ-C-038	THERE IS A RISK OF STR K NG UNEXPLODED ORDNANCE (UXO) DURING PIL NG OR EXCAVATION WORKS CAUSING NJURY OR FATALITY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-C-065	RISK OF DAMAG ING BPA P PELINE.
HAZ-C-066	WORK AT HEIGHT - RISK OF FALLING FROM HEIGHT, NJURY TO OPERATIVES BY FALLING ELEMENT.
HAZ-C-081	MINIMUM HEADROOM PINCH PO NT AT PIER 1.

REV	DATE	REVISION NOTE
P02	08/09/22	UPDATED N RESPONSE TO COMMENTS
P03	30/09/22	DESIGN UPDATES AS CLOUDED
P0	17/11/22	ISSUE FOR STAGE APPR OVAL
C01	17/11/22	ISSUE FOR STAGE APPR OVAL

DES GNER

SWECO

CONTRACTOR

GRAHAM

CL ENT

highways england

PR OJECT TITLE

M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE

PCF STAGE 5

DRAWING TITLE

MAYLANDS BRIDGE
GENERAL ARRANGEMENT
SHEET 2 OF 2

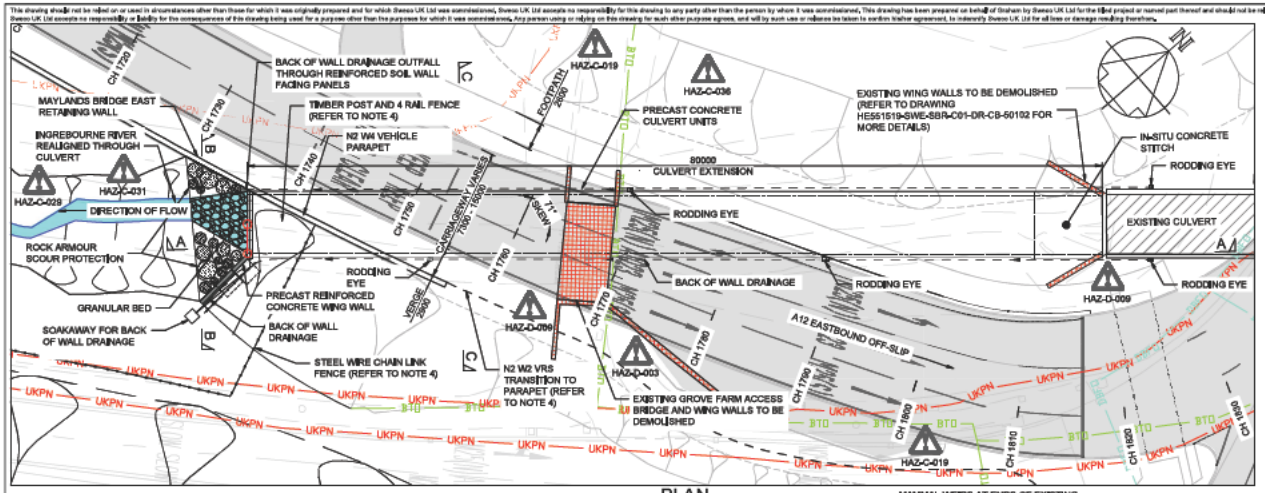
SU TABILITY

FIT FOR CONSTRUCTION

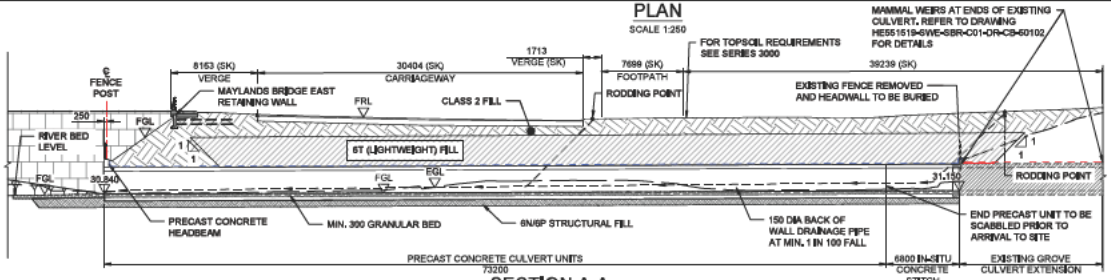
SH EET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

DRAWING NUMBER

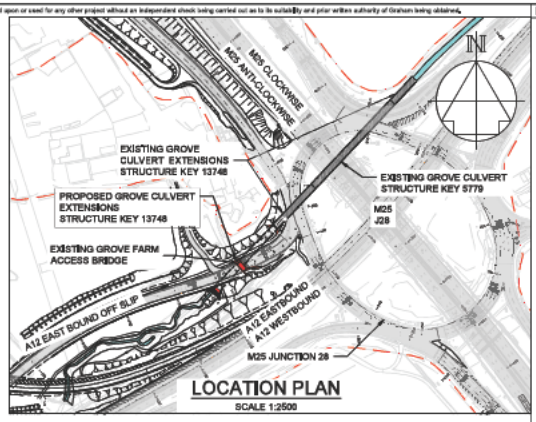
HE551519-SWE-SBR-B05-DR-CB-50111



PLAN
SCALE 1:250



SECTION A-A
SCALE 1:250



LOCATION PLAN
SCALE 1:2500

IMPORTANT
SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-60001

HAZARD REF	BRIEF DESCRIPTION OF HAZARD
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL
HAZ-C-029	FLOODING. INUNDATION OF EXCAVATIONS AND WORKING AREAS.
HAZ-C-031	POLLUTION OF WATERCOURSES DUE TO CONTAMINATION WITH CONSTRUCTION MATERIALS.
HAZ-C-036	INSTABILITY OF PRECAST SECTIONS OR CONCRETE ELEMENTS. INJURY TO OPERATIVES.
HAZ-C-050	CONFINED SPACE ACCESS FOR CONSTRUCTION PERSONNEL
HAZ-C-003	DEMOLITION OF UNKNOWN STRUCTURAL ELEMENTS
HAZ-C-009	REMOVAL OF ELEMENTS CONTAINING ASBESTOS
HAZ-M-029	CONFINED SPACE ACCESS FOR INSPECTION & MAINTENANCE PERSONNEL

ASSUMED CONSTRUCTION SEQUENCE (VARIATIONS TO BE AGREED WITH DSR ON SITE)

1. CARRY OUT GENERAL SITE CLEARANCE AND PREPARATION, INSTALL REQUIRED TRAFFIC MANAGEMENT ON A12
2. INSTALL SHEET PILES AND CONSTRUCT TEMPORARY EMBANKMENT AND CRANE PLATFORMS
3. DEMOLISH EXISTING CULVERT WING WALLS, CONSTRUCT TEMPORARY CHANNEL AND DIVERT INGREBOURNE RIVER
4. EXCAVATE FOR CULVERT EXTENSION AND WING WALL FOUNDATIONS, INSTALL 6N/6P FILL TO FORMATION LEVELS
5. INSTALL PRECAST CULVERT BOX UNITS, HEAD BEAM AND WING WALL UNITS
6. INSTALL GRANULAR BED MATERIAL FOR FULL LENGTH OF PRECAST CULVERT BOX UNITS
7. APPLY SETTLEMENT HOLD PERIOD OF MINIMUM 4 WEEKS
8. INSTALL OVERPUMPING TO INGREBOURNE RIVER AND DIVERT FLOW FROM TEMPORARY CHANNEL THROUGH PRECAST CULVERT
9. INSTALL BACK OF WALL DRAINAGE PIPES
10. PREPARE EXPOSED SURFACES OF EXISTING CULVERT AND DRILL AND FIX DOWELS FOR CONNECTION TO IN-SITU STITCH
11. CONSTRUCT IN-SITU CONCRETE STITCH BASE SLAB INCLUDING MAMMAL WEIR
12. CONSTRUCT IN-SITU CONCRETE STITCH WALLS
13. CONSTRUCT IN-SITU CONCRETE ROOF SLAB
14. APPLY SPRAY APPLIED WATERPROOFING TO FULL LENGTH OF CULVERT EXTENSION
15. INSTALL GRANULAR BED MATERIAL INSIDE IN-SITU STITCH
16. CONSTRUCT IN-SITU CONCRETE WEIR AND RAMP AT ENTRANCE TO EXISTING CULVERT
17. CONSTRUCT IN-SITU CONCRETE RAMP AT EXIT FROM EXISTING CULVERT
18. INSTALL GRP MAMMAL SHELF TO IN-SITU STITCH SECTION AND RAMP AT ENTRANCE TO EXISTING CULVERT
19. BACKFILL CULVERT IN ACCORDANCE WITH SHW CL610 IN CONJUNCTION WITH CONSTRUCTION OF MAYLANDS BRIDGE EAST RETAINING WALL AND INSTALLATION OF BACK OF WALL DRAINAGE LAYERS, OUTFALL NORTH BOW DRAINAGE PIPE THROUGH FACING PANELS
20. EXTRACT TEMPORARY SHEET PILES
21. CONSTRUCT A12 EASTBOUND OFF-SLIP EMBANKMENT AND CARRIAGEWAY
22. OVERPUMPING TO CEASE AND PIPING TO BE REMOVED.
23. INSTALL FENCING
24. INSTALL ROCK ARMOUR SCOUR PROTECTION AT OUTFALL FROM CULVERT EXTENSION
25. INSTALL GRP MAMMAL SHELF RAMP AT OUTFALL FROM CULVERT EXTENSION

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS STATED OTHERWISE.
2. ALL LEVELS AND CHAINAGES IN METRES UNLESS NOTED OTHERWISE. ALL LEVELS ARE A. O. D. UNLESS STATED OTHERWISE.
3. COORDINATES ARE TO A LOCAL GRID IN ACCORDANCE WITH IAN 98/07.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURES, EARTHWORKS AND ROADWORKS DRAWINGS & SPECIFICATION APPENDICES. FOR DETAILS OF CONSTRUCTION INTERFACES REFER TO THE FOLLOWING SERIES APPENDICES AND SPECIFIC DRAWINGS:
   - SITE CLEARANCE (SERIES 200)
   - FENCING (SERIES 300): HE551519-SWE-HFS-ZZ-DR-CH-50002
   - ROAD RESTRAINT (SERIES 400): HE551519-SWE-HRR-ZZ-DR-CH-50002
   - DRAINAGE (SERIES 500): HE551519-SWE-HDG-ZZ-DR-CD-50002
   - EARTHWORKS (SERIES 600): HE551519-SWE-HGT-C01-DR-CE-50003, HE551519-SWE-HGT-ZZ-DR-CE-50302 & HE551519-SWE-HGT-ZZ-DE-CE-51001
   - REINFORCED SOIL WALL (SERIES 2500): HE551519-SWE-HSS-ZZ-DR-CB-50020 TO 50029
   - LANDSCAPE & ECOLOGY (SERIES 3000)
   - AS BUILT DRAWINGS: M25DBFO-M13_J004ARP-STR-D-013567
5. ALL BURIED SURFACES EXCEPT THOSE PROTECTED BY A PROPRIETARY WATERPROOFING SYSTEM SHALL BE PAINTED WITH TWO COATS OF CUT BACK BITUMEN IN ACCORDANCE WITH MCHW CLAUSE 2004.
6. CONCRETE FINISHES:
   - EXPOSED FORMED SURFACES - F3
   - EXPOSED UNFORMED SURFACES - U3
   - BURIED FORMED SURFACES - F1
   - BURIED UNFORMED SURFACES - U1
   - AREA OF TOP SLAB TO BE WATERPROOFED - U4
7. CONCRETE MIXES IN ACCORDANCE WITH SPECIFICATION APPENDIX17/1:
   - BLINDING CONCRETE - ST2
   - HEADWALL AND WING WALLS - C40/50 MIX REF B
   - PRECAST UNITS - C50/60 MIX REF C
   - IN-SITU STITCH - C40/50 MIX REF F
   - MAMMAL WEIR AND RAMPS - C40/50 MIX REF F
8. ALL EXTERNAL ARRISES SHALL HAVE 25 x 25 CHAMFERS
9. DURING CONSTRUCTION FILL LEVELS BEHIND BOX WALLS SHALL NOT DIFFER BY MORE THAN 0.5m.
10. ANTI GRAFFITI COATING TO BE APPLIED TO ALL EXPOSED SURFACES OF THE HEADWALL WITHIN 3m OF THE FGL.
11. PRECAST BOX AND WING WALL UNITS TO BE MANUFACTURED BY SHAY MURTAGH IN ACCORDANCE WITH DRAWINGS SPECIFIED IN APPENDIX I:

3455_S01_SMPL_C-01_9000	3455_S01_SMPL_HB_01_9001
3455_S01_SMPL_C-01_9001	3455_S01_SMPL_RW_01_9000
3455_S01_SMPL_C-02_9000	3455_S01_SMPL_RW_01_9001
3455_S01_SMPL_C-02_9001	3455_S01_SMPL_RW_02_9000
3455_S01_SMPL_C-03_9000	3455_S01_SMPL_RW_02_9001
3455_S01_SMPL_C-03_9001	3455_S01_SMPL_RW_03_9000
3455_S01_SMPL_BA_1000	3455_S01_SMPL_RW_03_9001
3455_S01_SMPL_HB_01_9000	

12. BED MATERIAL COMPOSITION SHOULD BE A MIX OF SMALL BOULDERS AND COBBLES (250-400mm), COURSE BOULDERS (200-800mm) AND A FINER MATRIX OF SANDS AND SILTS. THE ARRANGEMENT OF BED MATERIAL SHOULD BE AS ADVISED BY THE GEOMORPHOLOGIST ON SITE.

P04	17/1/22	ISSUE FOR STAGE APPROVAL
C01	17/1/22	ISSUE FOR STAGE APPROVAL
P05	07/03/23	MINOR AMENDMENTS AS CLOUDED
C02	07/03/23	MINOR AMENDMENTS AS CLOUDED
REV	DATE	REVISION NOTE

DESIGNER

SWECO

CONTRACTOR

GRAHAM

CLIENT

highways england

PROJECT TITLE

M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE

PCF STAGE 5

DRAWING TITLE

GROVE CULVERT EXTENSIONS
WEST EXTENSION
GENERAL ARRANGEMENT

SUITABILITY

FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C02

DRAWING NUMBER

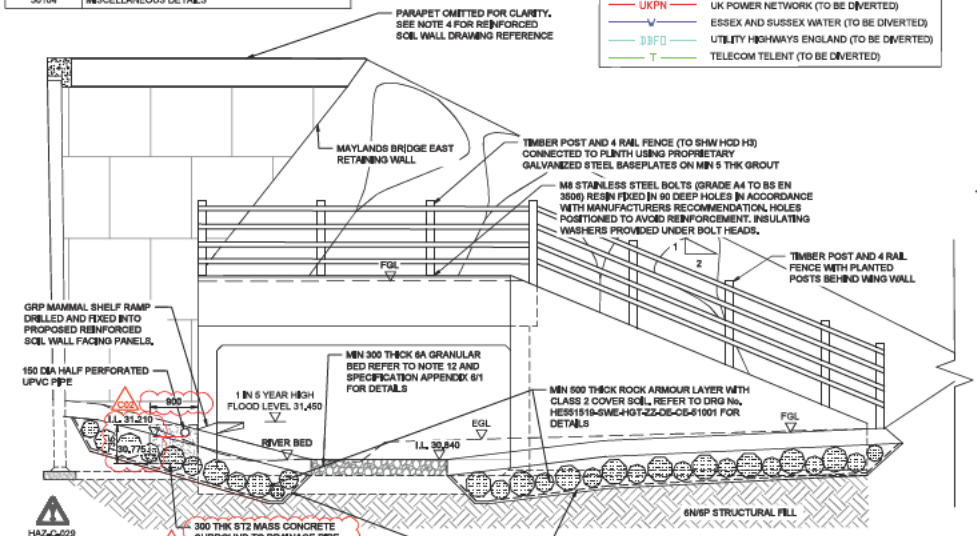
HE551519-SWE-SBR-C01-DR-CB-50100

DRAWING SCHEDULE
HE551519-SWE-SBR-C01-DR-CB-XXXXX

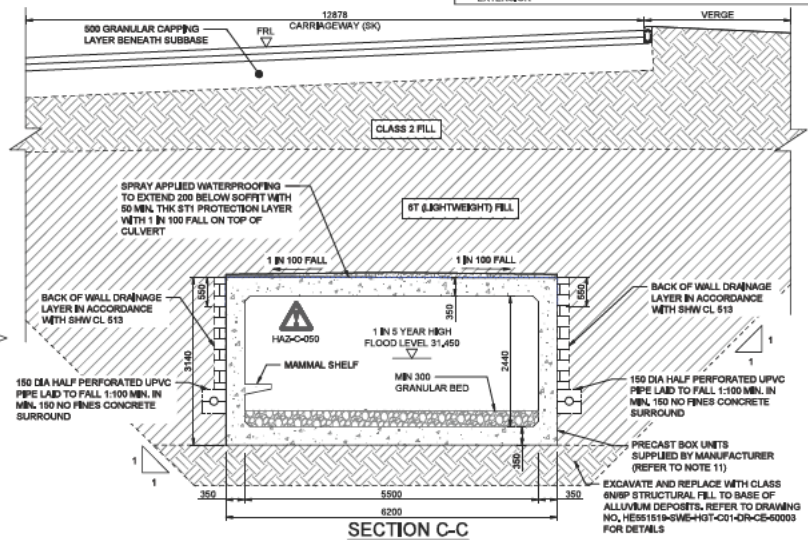
DRAWING No. :	TITLE
50100	GENERAL ARRANGEMENT
50101	CONCRETE OUTLINES AND SETTING OUT INFORMATION
50102	EXISTING CULVERT MODIFICATION DETAILS
50103	IN-SITU STITCH RC DETAILS
50104	MISCELLANEOUS DETAILS

KEY:

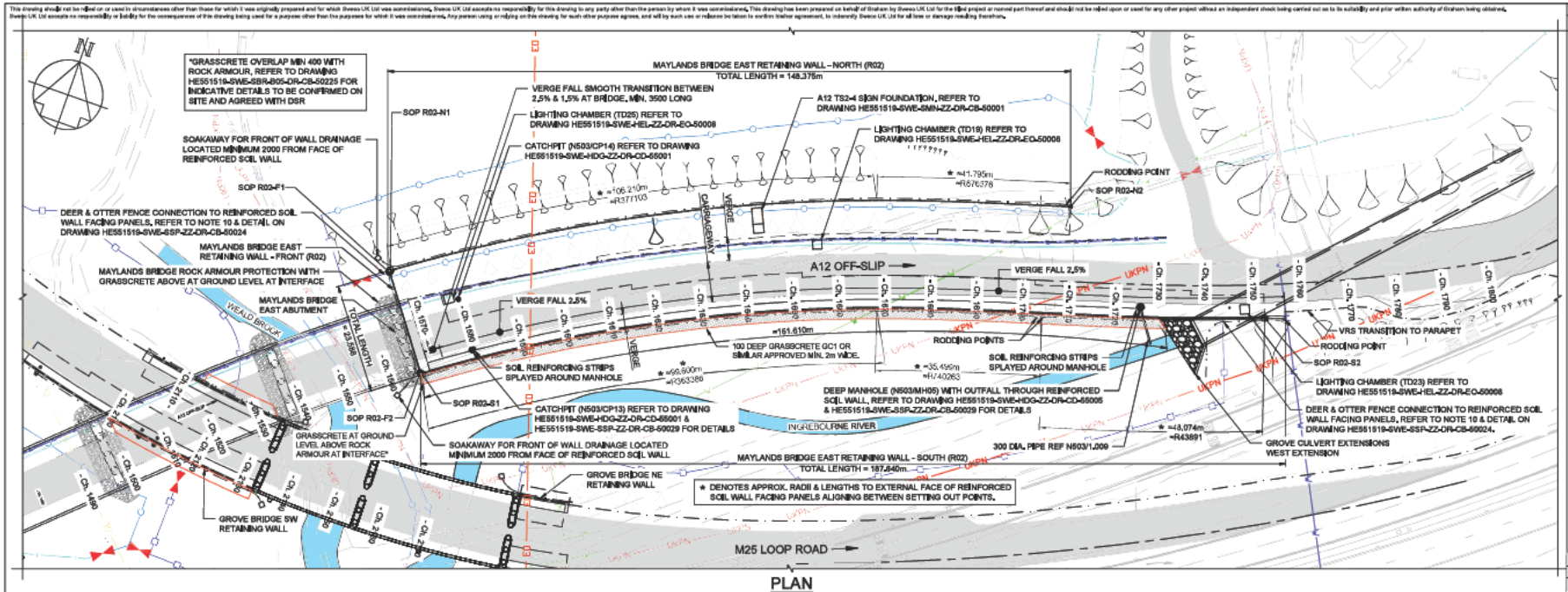
- EXISTING WATERPROOFING
- PROPOSED SPRAY APPLIED WATERPROOFING
- RED LINE BOUNDARY
- TO BE DEMOLISHED
- BTO — BT OPENREACH (TO BE DIVERTED)
- UKPN — UK POWER NETWORK (TO BE DIVERTED)
- ESSEX AND SUSSEX WATER (TO BE DIVERTED)
- UTILITY HIGHWAYS ENGLAND (TO BE DIVERTED)
- TELECOM TELENT (TO BE DIVERTED)



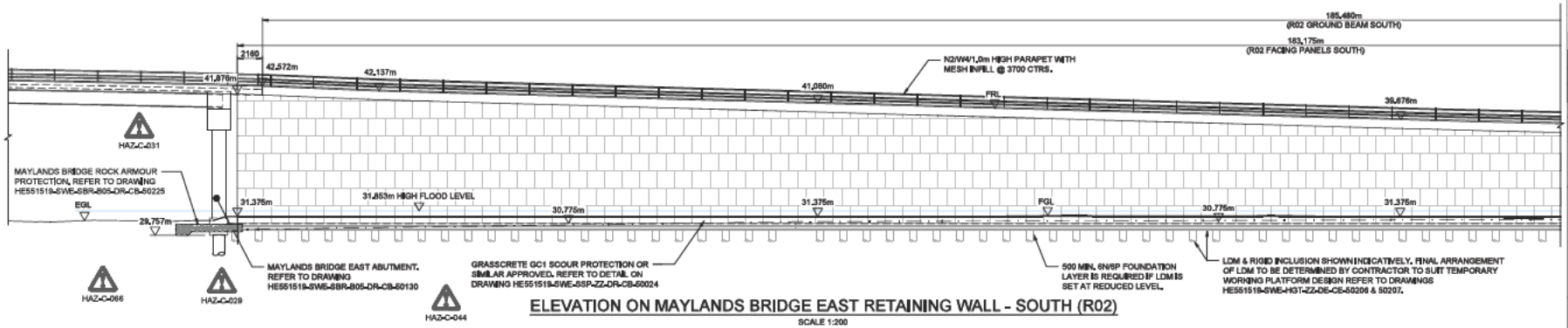
ELEVATION B-B
SCALE 1:50



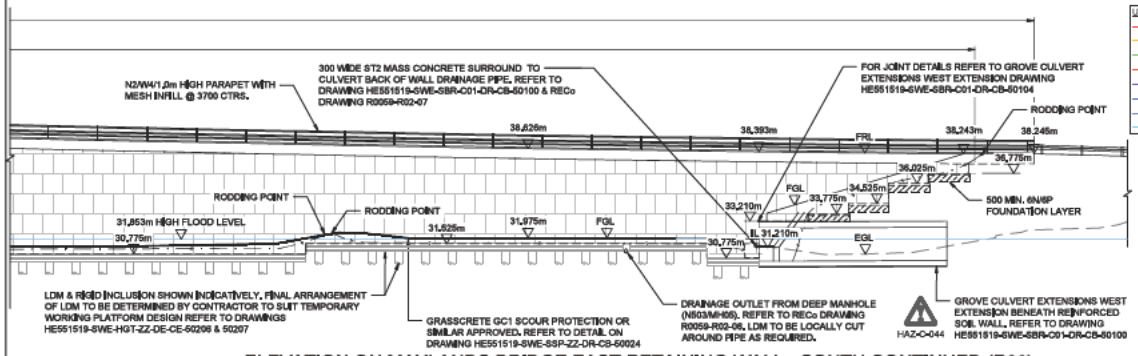
SECTION C-C
SCALE 1:50



PLAN
SCALE 1:500



ELEVATION ON MAYLANDS BRIDGE EAST RETAINING WALL - SOUTH (R02)
SCALE 1:200



ELEVATION ON MAYLANDS BRIDGE EAST RETAINING WALL - SOUTH CONTINUED (R02)
SCALE 1:200

UTILITIES KEY:
- UKPN — EXISTING UK POWER NETWORKS (TO BE DIVERTED)
- GL — EXISTING CADENT GAS LTD (TO BE DIVERTED)
- W — EXISTING WATER_ESSEX & SUFFOLK WATER (TO BE DIVERTED)
- EI — EXISTING UKPN HIGH VOLTAGE OVERHEAD CABLES
- BPA — EXISTING BPA PIPELINE
- W — PROPOSED WATER_ESSEX & SUFFOLK WATER
- SHL — PROPOSED STREET LIGHTING DUCTS
- SPARE DUCTS

MAYLANDS BRIDGE EAST RETAINING WALL SOUTH (R02) - SETTING OUT POINTS

SOP REF:	LOCAL GRID EASTINGS (m)	LOCAL GRID NORTHINGS (m)
R02-S1	17453.177	363302.271
R02-S2	17620.403	363373.734

IMPORTANT
SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-60001.

HAZARD REF	BRIEF DESCRIPTION OF HAZARD:-
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL
HAZ-C-029	FLOODING CAUSING INUNDATION OF EXCAVATIONS AND WORKING AREAS.
HAZ-C-031	POLLUTION OF WATERCOURSES DUE TO CONTAMINATION WITH CONSTRUCTION MATERIALS.
HAZ-C-042	RISK OF DAMAGING HP CADENT GAS MAIN DURING CONSTRUCTION. INJURY TO SITE PERSONNEL.
HAZ-C-044	LEACHING OF CONTAMINATED GROUND AND ASBESTOS INTO PRINCIPAL AQUIFER DURING EXCAVATION WORKS.
HAZ-C-058	RISK OF DAMAGING DIVERTED UKPN CABLES. ELECTROCUTION OF SITE PERSONNEL.
HAZ-C-066	RISK OF DAMAGING BPA PIPELINE DUE TO CONSTRUCTION ACTIVITIES.

NOTES
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
3. ALL CHAINAGES ARE IN METRES, UNLESS NOTED OTHERWISE.
4. COORDINATES ARE TO A LOCAL GRID IN ACCORDANCE WITH IAN 99.
5. SETTING OUT SHOULD BE CHECKED AND VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
6. CONCRETE MIXES FOR THE PRECAST FACING PANELS, MASS CONCRETE LEVELLING PAD, PARAPET COPING UNIT AND ANCHOR SLAB AND STITCH ARE AS PER SUPPLIER DESIGN, REFER TO NOTE 7.
7. FOR REINFORCED SOIL WALL DETAILS REFER TO SUPPLIER DRAWINGS LISTED ON DRG.No. HE551519-SWE-SSP-ZZ-DR-CB-50018.
8. WHERE THE REINFORCED SOIL WALLS ARE NOT FOUNDED ABOVE IMPROVED GROUND, SUB-FORMATION SHOULD BE PROOF ROLLED AND INSPECTED BY THE DESIGNER'S SITE REPRESENTATIVE, AND ANY UNSUITABLE SOFT LOOSE MATERIAL SHOULD BE EXCAVATED AND REPLACED WITH CLASS 6N/6P FILL IN ACCORDANCE WITH SERIES 600 PRESENTED ON STANDARD EARTHWORKS DETAILS DRAWING HE551519-SWE-HGT-ZZ-DR-CE-50203.
9. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURES, EARTHWORKS AND ROADWORKS DRAWINGS & SPECIFICATION APPENDICES FOR DETAILS OF CONSTRUCTION INTERFACES REFER TO THE FOLLOWING SERIES APPENDICES AND SPECIFIC DRAWINGS:
   - FENCING (SERIES 300): HE551519-SWE-HFE-ZZ-DR-CH-50002 & HE551519-SWE-HFE-ZZ-DR-CH-50003
   - ROAD RESTRAINT (SERIES 400): HE551519-SWE-HRR-ZZ-DR-CH-50002 & HE551519-SWE-HRR-ZZ-DR-CH-50003
   - DRAINAGE (SERIES 500): HE551519-SWE-HDG-ZZ-DR-CD-50002 & HE551519-SWE-HDG-ZZ-DR-CD-50003
   - EARTHWORKS (SERIES 600): HE551519-SWE-HGT-ZZ-DR-CE-50302 & HE551519-SWE-HGT-ZZ-DR-CE-50303, HE551519-SWE-HGT-ZZ-DR-CE-50602 & HE551519-SWE-HGT-ZZ-DR-CE-50603, HE551519-SWE-HGT-ZZ-DR-CE-50702 & HE551519-SWE-HGT-ZZ-DR-CE-50703, HE551519-SWE-HGT-ZZ-DE-CE-50203, HE551519-SWE-HGT-ZZ-DE-CE-50206 & HE551519-SWE-HGT-ZZ-DE-CE-50207
   - PAVEMENT (SERIES 700)
   - KERBS AND PAVED AREAS (SERIES 1100): HE551519-SWE-HKF-ZZ-DR-CH-50002 & HE551519-SWE-HKF-ZZ-DR-CH-50003
   - TRAFFIC SIGNS & SIGNALS (SERIES 1200): HE551519-SWE-HSN-ZZ-DR-CH-50002
   - STREET LIGHTING (SERIES 1300): HE551519-SWE-HLG-ZZ-DR-EO-50002 & HE551519-SWE-HLG-ZZ-DR-EO-50003
   - COMMS (SERIES 1500)
   - LANDSCAPE & ECOLOGY (SERIES 3000)
10. DEER & OTTER FENCE NON-LOAD INFILL PANEL ANGLE TO BE CONNECTED TO REINFORCED SOIL WALL FACING PANELS WITH A MINIMUM 3 NO. M12 100 LONG GALVANISED STEEL ANCHORS AND FILLET WELDED 170 ACHESIVE OR SIMILAR APPROVED. ANCHORS SHALL HAVE A MINIMUM 600 SPACING AND MAXIMUM 1000 SPACING AND SHALL NOT BE FIXED WITHIN 300 OF ANY FACING PANEL JOINT. ANCHORS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, REFER TO SPECIFICATION APPENDIX 31 FOR FENCING DETAILS.
11. FACING PANELS SHOWN INDICATIVELY. REFER TO SUPPLIER DRAWINGS FOR PROPOSED LAYOUT AND DETAILS INCLUDING PANEL JOINTS.

KEY:
- RED LINE BOUNDARY
- INDICATIVE REINFORCED SOIL WALL FRONT OF WALL DRAINAGE
- PROPOSED POST AND 4 RAIL FENCE
- PROPOSED GATE FOR CHAIN LINK DEER AND OTTER FENCE
- SOAKAWAY
- PROPOSED VEHICLE RESTRAINT SYSTEM (VRS)
- INDICATIVE EXTENT OF REINFORCED SOIL BLOCK
- PROPOSED DEER AND OTTER FENCE

REV	DATE	REVISION NOTE
P07	10/02/23	UPDATED FOR REVISED FOUNDATION LEVELS
P06	07/03/23	ISSUE FOR STAGE APPROVAL
C01	07/03/23	ISSUE FOR STAGE APPROVAL

DESIGNER: SWECO

CONTRACTOR: GRAHAM

CLIENT: highways england

PROJECT TITLE: M25 JUNCTION 28 IMPROVEMENTS

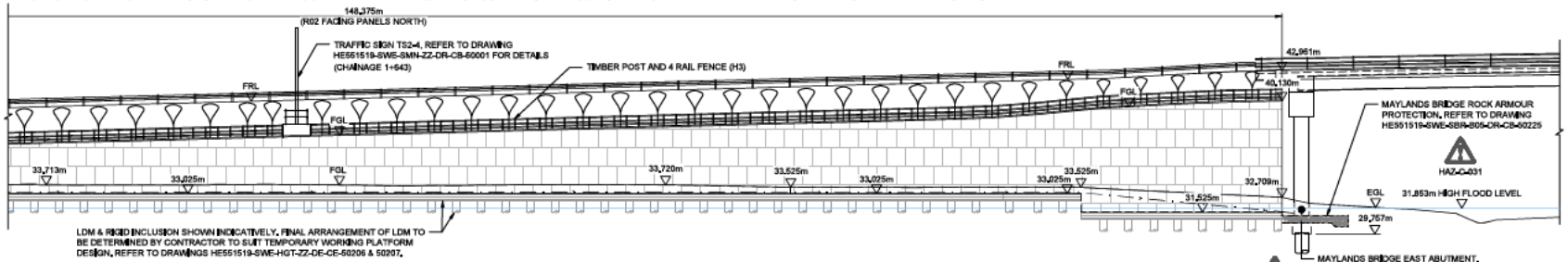
PROJECT STAGE: PCF STAGE 5

DRAWING TITLE: REINFORCED SOIL WALLS GA GENERAL ARRANGEMENT & TYPICAL DETAILS SHEET 8 OF 10

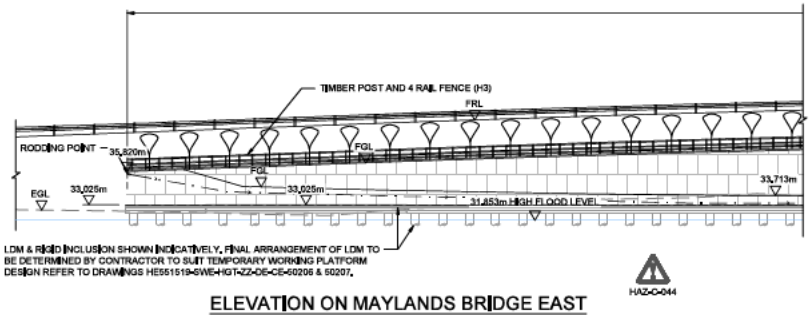
SUITABILITY: FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

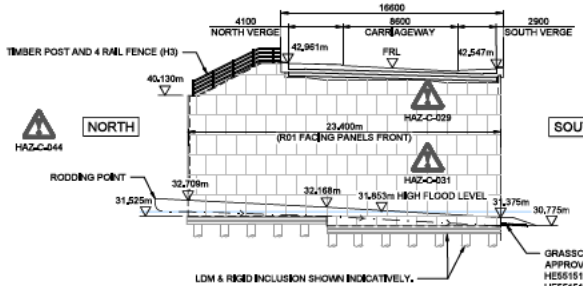
DRAWING NUMBER: HE551519-SWE-SSP-ZZ-DR-CB-50027



ELEVATION ON MAYLANDS BRIDGE EAST RETAINING WALL - NORTH (R02)
SCALE 1:200



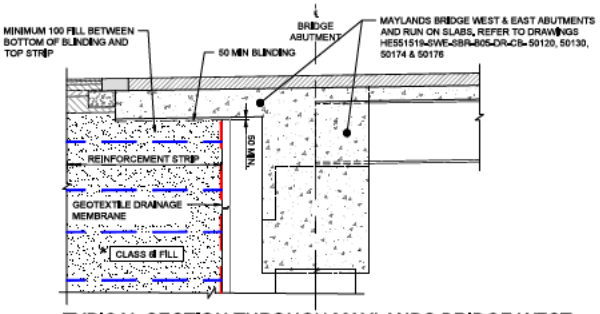
ELEVATION ON MAYLANDS BRIDGE EAST RETAINING WALL - NORTH CONTINUED (R02)
SCALE 1:200



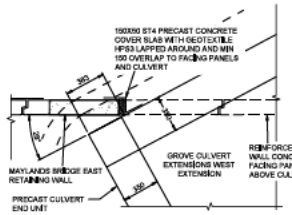
ELEVATION ON MAYLANDS BRIDGE EAST RETAINING WALL - FRONT (R02)
SCALE 1:200

MAYLANDS BRIDGE EAST RETAINING WALL NORTH (R02) - SETTING OUT POINTS		
SOP REF:	LOCAL GRID EASTINGS (m)	LOCAL GRID NORTHINGS (m)
R02-N1	17439.319	363321.127
R02-N2	17573.043	363382.605

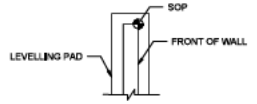
MAYLANDS BRIDGE EAST RETAINING WALL FRONT (R02) - SETTING OUT POINTS		
SOP REF:	LOCAL GRID EASTINGS (m)	LOCAL GRID NORTHINGS (m)
R02-F1	17439.236	363320.607
R02-F2	17452.655	363302.360



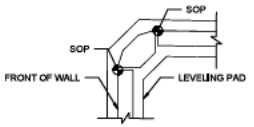
TYPICAL SECTION THROUGH MAYLANDS BRIDGE WEST ABUTMENT AND MAYLANDS BRIDGE WEST RETAINING WALL
(EAST ABUTMENT AND RETAINING WALL SIMILAR BUT HANDED)
SCALE 1:50



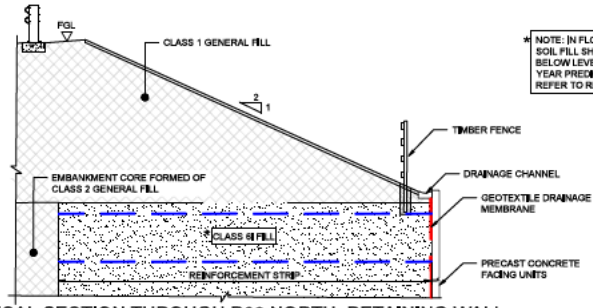
PLAN ON JOINT @ R02 GROVE CULVERT INTERFACE
SCALE 1:25



TYPICAL WALL SETTING OUT POINT @ ENDS
SCALE 1:25

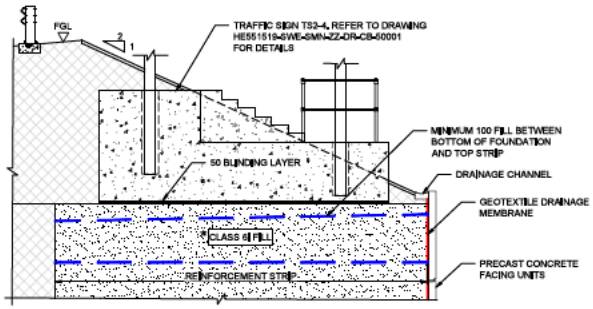


TYPICAL WALL SETTING OUT POINTS @ R01 & R02 CORNERS
SCALE 1:25



* NOTE: IN FLOOD RISK AREAS REINFORCED SOIL FILL SHALL COMPRISE CLASS 6I(2) FILL BELOW LEVEL EQUIVALENT TO 1 IN 100 YEAR PREDICTED FLOOD RISK LEVEL + 1m. REFER TO RECo DRAWINGS FOR DETAILS

TYPICAL SECTION THROUGH R02 NORTH RETAINING WALL
SCALE 1:50



TYPICAL SECTION THROUGH R02 NORTH RETAINING WALL @ TRAFFIC SIGN LOCATION - CH. 1+643
SCALE 1:50

IMPORTANT
SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-60001.

HAZARD REF AND BRIEF DESCRIPTION OF HAZARD:-	
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL.
HAZ-C-029	FLOODING CAUSING INUNDATION OF EXCAVATIONS AND WORKING AREAS.
HAZ-C-031	POLLUTION OF WATERCOURSES DUE TO CONTAMINATION WITH CONSTRUCTION MATERIALS.
HAZ-C-042	RISK OF DAMAGING HP CADENT GAS MAIN DURING CONSTRUCTION. INJURY TO SITE PERSONNEL.
HAZ-C-044	LEACHING OF CONTAMINATED GROUND AND ASBESTOS INTO PRINCIPAL AQUIFER DURING EXCAVATION WORKS.
HAZ-C-058	RISK OF DAMAGING DIVERTED UKPN CABLES, ELECTROCUTION OF SITE PERSONNEL.
HAZ-C-066	RISK OF DAMAGING BPA PIPELINE DUE TO CONSTRUCTION ACTIVITIES.

NOTES
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
3. ALL CHAINAGES ARE IN METRES, UNLESS NOTED OTHERWISE.
4. COORDINATES ARE TO A LOCAL GRID IN ACCORDANCE WITH IAN 98.
5. SETTING OUT SHOULD BE CHECKED AND VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
6. CONCRETE MIXES FOR THE PRECAST FACING PANELS, MASS CONCRETE LEVELLING PAD, PARAPET COPING UNIT AND ANCHOR SLAB AND STITCH ARE AS PER SUPPLIER DESIGN, REFER TO NOTE 7.
7. FOR REINFORCED SOIL WALL DETAILS REFER TO SUPPLIER DRAWINGS LISTED ON DRG.No. HE551519-SWE-SSP-ZZ-DR-CB-50016.
8. WHERE THE REINFORCED SOIL WALLS ARE NOT FOUNDED ABOVE IMPROVED GROUND, SUBFORMATION SHOULD BE PROOF ROLLED AND INSPECTED BY THE DESIGNER'S SITE REPRESENTATIVE, AND ANY UNSUITABLE SOFT/LOOSE MATERIAL SHOULD BE EXCAVATED AND REPLACED WITH CLASS 6N/6P FILL IN ACCORDANCE WITH SED7 PRESENTED ON STANDARD EARTHWORKS DETAILS DRAWING HE551519-SWE-HGT-ZZ-DR-CE-50203.
9. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURES, EARTHWORKS AND ROADWORKS DRAWINGS & SPECIFICATION APPENDICES, FOR DETAILS OF CONSTRUCTION INTERFACES REFER TO THE FOLLOWING SERIES APPENDICES AND SPECIFIC DRAWINGS:
   - FENCING (SERIES 300): HE551519-SWE-HFE-ZZ-DR-CH-60002 & HE551519-SWE-HFE-ZZ-DR-CH-50003
   - ROAD RESTRAINT (SERIES 400): HE551519-SWE-HRR-ZZ-DR-CH-50002 & HE551519-SWE-HRR-ZZ-DR-CH-60003
   - DRAINAGE (SERIES 500): HE551519-SWE-HDG-ZZ-DR-CD-50002 & HE551519-SWE-HDG-ZZ-DR-CD-50003
   - EARTHWORKS (SERIES 600): HE551519-SWE-HGT-ZZ-DR-CE-50302 & HE551519-SWE-HGT-ZZ-DR-CE-50303, HE551519-SWE-HGT-ZZ-DR-CE-60602 & HE551519-SWE-HGT-ZZ-DR-CE-50603, HE551519-SWE-HGT-ZZ-DR-CE-50702 & HE551519-SWE-HGT-ZZ-DR-CE-50703, HE551519-SWE-HGT-ZZ-DE-CE-50203, HE551519-SWE-HGT-ZZ-DE-CE-50206 & HE551519-SWE-HGT-ZZ-DE-CE-50207
   - PAVEMENT (SERIES 700)
   - KERBS AND PAVED AREAS (SERIES 1100): HE551519-SWE-HKF-ZZ-DR-CH-50002 & HE551519-SWE-HKF-ZZ-DR-CH-50003
   - TRAFFIC SIGNS & SIGNALS (SERIES 1200): HE551519-SWE-HSN-ZZ-DR-CH-60002
   - STREET LIGHTING (SERIES 1300): HE551519-SWE-HLG-ZZ-DR-EO-50002 & HE551519-SWE-HLG-ZZ-DR-EO-50003
   - COMMS (SERIES 1500)
   - LANDSCAPE & ECOLOGY (SERIES 3000)
10. DEER & OTTER FENCE NO-LOAD INFILL PANEL ANGLE TO BE CONNECTED TO REINFORCED SOIL WALL FACING PANELS WITH A MINIMUM 3 NO. M12 100 LONG GALVANISED STEEL ANCHORS AND HILTI HIT-HY 170 ADHESIVE OR SIMILAR APPROVED. ANCHORS SHALL HAVE A MINIMUM 600 SPACING AND MAXIMUM 1000 SPACING AND SHALL NOT BE FIXED WITHIN 300 OF ANY FACING PANEL JOINT. ANCHORS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, REFER TO SPECIFICATION APPENDIX 3/1 FOR FENCING DETAILS.
11. FACING PANELS SHOWN INDICATIVELY. REFER TO SUPPLIER DRAWINGS FOR PROPOSED LAYOUT AND DETAILS INCLUDING PANEL JOINTS.
12. FOR DRAWING KEY REFER TO DRAWING NO. HE551519-SWE-SSP-ZZ-DR-CB-50027.

REV	DATE	REVISION NOTE
P05	21/10/22	UPDATED FOR TfL COMMENTS
P06	17/11/22	ISSUE FOR STAGE APPROVAL
P07	10/02/23	UPDATED FOR REVISED FOUNDATION LEVELS
P08	07/03/23	ISSUE FOR STAGE APPROVAL
C01	07/03/23	ISSUE FOR STAGE APPROVAL

DESIGNER: SWECO

CONTRACTOR: GRAHAM

CLIENT: highways england

PROJECT TITLE: M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE: PCF STAGE 5

DRAWING TITLE: REINFORCED SOIL WALLS GENERAL ARRANGEMENT & TYPICAL DETAILS SHEET 9 OF 10

SUITABILITY: FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

DRAWING NUMBER: HE551519-SWE-SSP-ZZ-DR-CB-50028

WALL SETTING OUT POINTS

SOP REF	LOCAL GRID EASTINGS (m)	LOCAL GRID NORTHINGS (m)	LEVEL* (m)
S01	17 52. 75	363729. 16	36.677
S02	17 63.775	363712.895	36.677
S03	17 69.172	36370 .979	36.677
S0	17 73. 82	363698.729	37. 77
S05	17 82.071	363687.880	37. 77

*LEVELS ARE TO UNDERSIDE OF PRECAST CONCRETE BLOCKS

CONSTRUCTION SEQUENCE

STAGE 1 SITE SETUP
- CONSTRUCT THE BARRIER / FENCE TO DEMARCATE THE SAFE WORKING ZONE
- DETERMINE POSITION OF EXISTING SERVICES

STAGE 2 EXCAVATION
- EXCAVATE EXISTING EMBANKMENT MATERIAL AND BATTER

STAGE 3 GROUND IMPROVEMENT
- GROUND TO BE EXCAVATED BELOW FOUNDATION LEVEL AND REPLACED AS FOLLOWS:
  - 2- BLOCKS HIGH - 300 DEEP REGULATING LAYER.
  - 5 BLOCKS HIGH - 1000 DEEP DIG AND REPLACE USING 6N/6P FILL.
  - 6 BLOCKS HIGH - 1000 DEEP DIG AND REPLACE USING 6N/6P FILL AND 1m WIDE BY 3m DEEP SHEAR TRENCH AT 3m SPACING IN ACCORDANCE WITH DRAWING NO HE551519-SWE-HGT-ZZ-DE-CE-50207

STAGE 4 CONSTRUCTION OF MODULAR BLOCK WALL
- FOUR BLINDING
- ERECT SHUTTERING AND CAST IN-SITU CONCRETE FOUNDATION
- LIFT PRECAST BLOCKS INTO POSITION
- WATERPROOF REAR FACE OF THE WALL, INSTALL BACK OF WALL DRAINAGE AND BACKFILL
- INSTALL GUARDRAIL

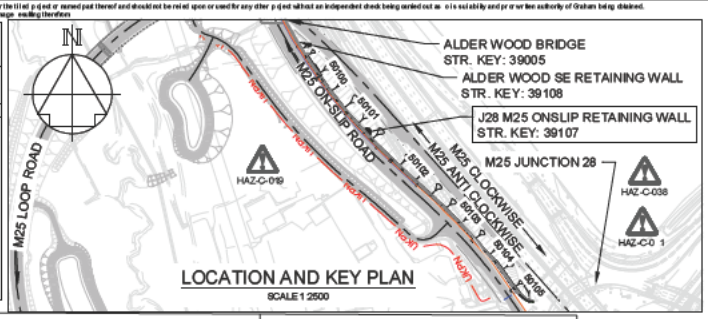
STAGE 5 FINISHES
- REGRADE SLOPE, TOPSOILING AND PLANTING

IMPORTANT

SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

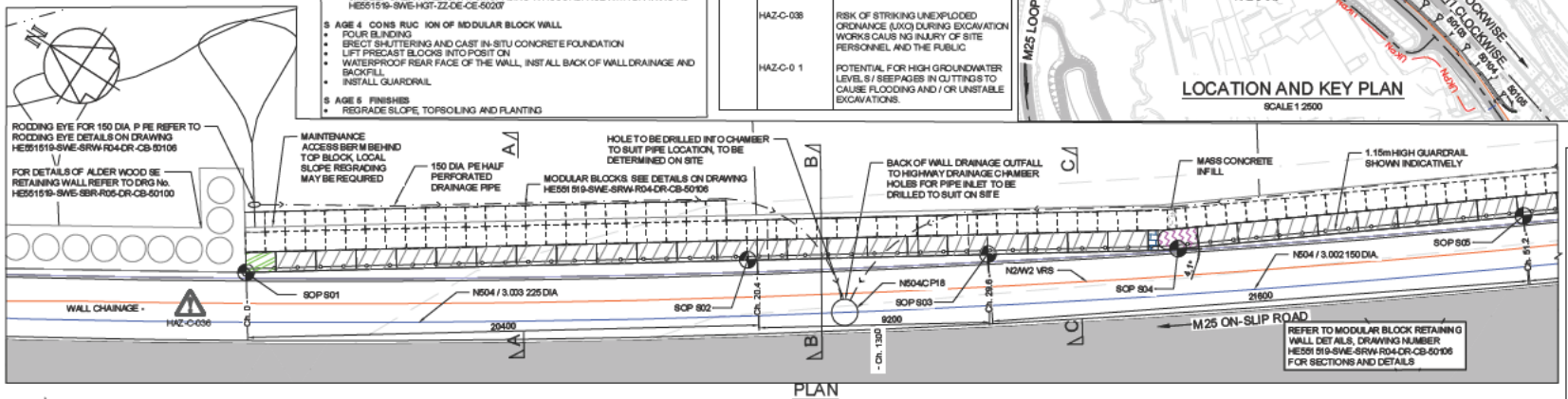
TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001.

HAZARD REF	BRIEF DESCRIPTION OF HAZARD:-
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL
HAZ-C-036	INSTABILITY OF PRECAST ELEMENTS DURING BACK FILLING. INJURY TO SITE PERSONNEL
HAZ-C-038	RISK OF STRIKING UNEXPLODED ORDNANCE (UXO) DURING EXCAVATION WORKS CAUSING INJURY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-C-041	POTENTIAL FOR HIGH GROUNDWATER LEVELS / SEEPAGES IN CUTTINGS TO CAUSE FLOODING AND / OR UNSTABLE EXCAVATIONS.



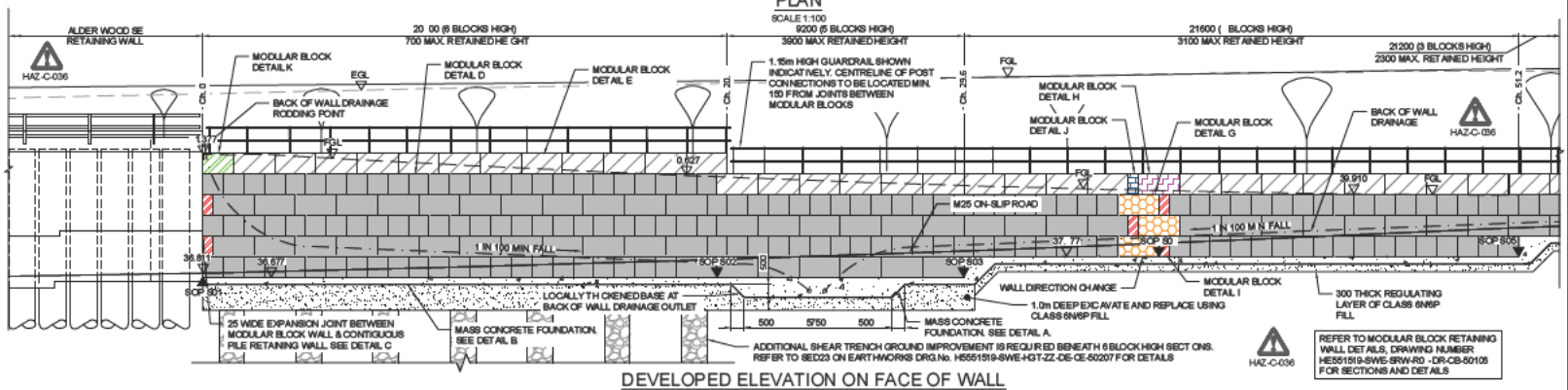
LOCATION AND KEY PLAN

SCALE 1:2500



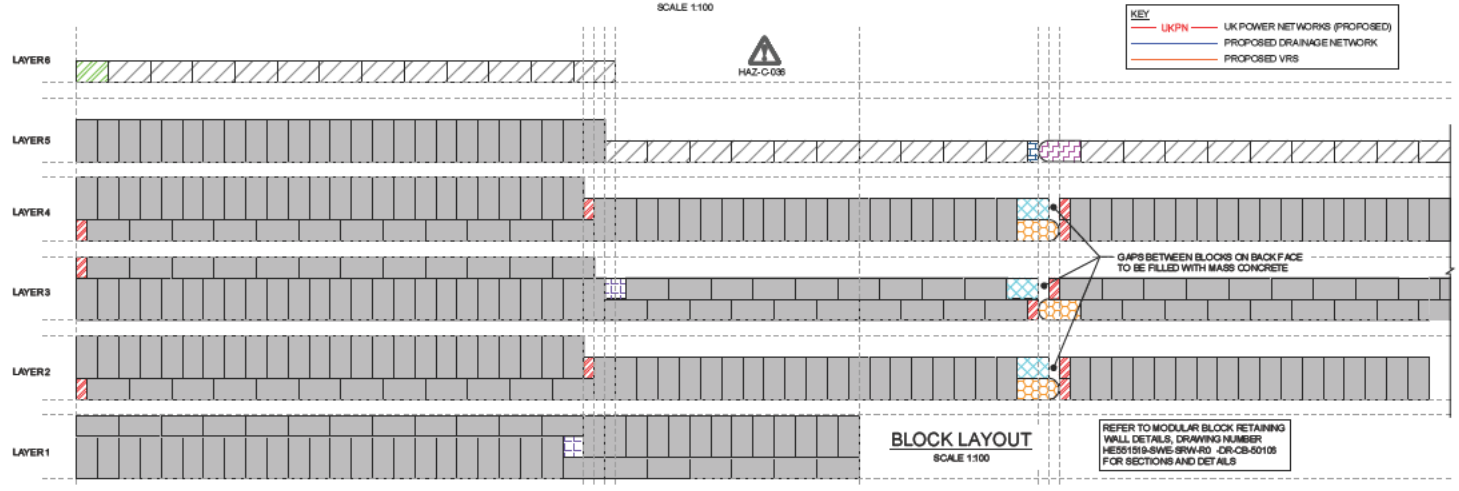
PLAN

SCALE 1:100



DEVELOPED ELEVATION ON FACE OF WALL

SCALE 1:100



BLOCK LAYOUT

SCALE 1:100

DRAWING LIST

HE551519-SWE-SRW-R0 -DR-CB-50:	
100	GENERAL ARRANGEMENT SHEET 1 OF 6
101	GENERAL ARRANGEMENT SHEET 2 OF 6
102	GENERAL ARRANGEMENT SHEET 3 OF 6
103	GENERAL ARRANGEMENT SHEET OF 6
10	GENERAL ARRANGEMENT SHEET 5 OF 6
105	GENERAL ARRANGEMENT SHEET 6 OF 6
106	SECTIONS AND DETAILS

KEY CONTINUED

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
3. ALL EXTERNAL CONCRETE ARISES TO HAVE 25x25mm CHAMFER.
4. ALL CHAINAGES ARE IN METRES UNLESS NOTED OTHERWISE.
5. COORDINATES ARE TO A LOCAL GRID REFERENCE IN ACCORDANCE WITH IAN 99/07.
6. ONLY ONE SHEAR TRENCH SHALL BE EXCAVATED AND BACKFILLED AT ANY GIVEN TIME TO REDUCE RISK OF TRENCH COLLAPSE AND DESTABILISING OF EXISTING EMBANKMENT.
7. CONCRETE MIXES SHALL BE IN ACCORDANCE WITH SPECIFICATION APPENDIX 17/1:
   - IN-SITU FOUNDATION C 0/50 MIX REF D
   - RODDING EYE SURROUND AND THRUST BLOCK C 0/50 MIX REF D
   - BLINDING CONCRETE ST2
   - PIPE BEDDING ST2
   - MASS CONCRETE INFILL ST5
8. CONCRETE FINISHES TO BE AS PER MCHW SERIES 1700 UNLESS NOTED OTHERWISE
   - MODULAR BLOCKS - F
   - BURIED UNFORMED SURFACES - U1
   - BURIED/HIDDEN FORMED SURFACES - F1
   - EXPOSED FORMED FACES - F3
   - EXPOSED UNFORMED FACES - U3
9. THE MODULAR BLOCKS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. BLOCKS TO BE INSTALLED WITH A VERTICAL FRONT FACE TO TIE IN WITH CONTIGUOUS PILE WALL. PRECAST MODULAR BLOCKS IN ACCORDANCE WITH BS EN 13369. CONCRETE GRADE C 0/50 TO BE CONFIRMED BY SUPPLIER.
10. BACKFILL BEHIND WALL TO BE CLASS 6N/6P IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS SERIES 600 AND IN ACCORDANCE WITH SPECIFICATION APPENDIX 6/1
11. ALL EXCAVATIONS AND FORMATIONS TO BE INSPECTED BY DESIGNER'S SITE REPRESENTATIVE (DSR). ANY SOFT SPOTS TO BE EXCAVATED AND REPLACED WITH CLASS 6N OR 6P GRANULAR FILL TO COMPLY WITH SPECIFICATION APPENDIX 6/1 AND CLAUSE 612 OF THE SPECIFICATION FOR HIGHWAY WORKS (SHW)
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   - DRAINAGE (SERIES 500): HE551519-SWE-HDG-ZZ-DR-CD-50003
   - EARTHWORKS (SERIES 600) : HE551519- SWE-HGT-ZZ-DE-CE-50207, HE551519-SWE-HGT-ZZ-DE-CE-50303
   - KERBS AND PAVED AREAS (SERIES 1100)
   - STREET LIGHTING (SERIES 1300)
   - LANDSCAPE & ECOLOGY (SERIES 3000)
13. ALL BURIED CONCRETE SURFACES EXCEPT THOSE PROTECTED BY A PROPRIETARY WATERPROOFING SYSTEM TO BE PAINTED WITH TWO COATS OF CUT BACK BITUMEN IN ACCORDANCE WITH MCHW CLAUSE 2201 TO 200 BELOW FINISHED GROUND LEVEL.
14. FOR GUARDRAIL DETAILS REFER TO HIGHWAY CONSTRUCTION DETAILS DRG. MCX 0138. AN EDGE DISTANCE OF 450 SHOULD BE MAINTAINED TO FRONT FACE AND ENDS OF WALL.

P01	26/11/21	ISSUE FOR GRAHAM REVIEW
P02	16/01/22	ISSUE FOR WSP REVIEW
P03	25/03/22	UPDATED FOLLOWING NHTA REVIEW
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P05	17/11/22	ISSUE FOR STAGE APPROVAL
C01	17/11/22	ISSUE FOR STAGE APPROVAL
REV	DATE	REVISION NOTE

[redacted]

DESIGNER: SWECO

CONTRACTOR: GRAHAM

CLIENT: highways england

PROJECT TITLE: M25 JUNCTION 28 IMPROVEMENTS

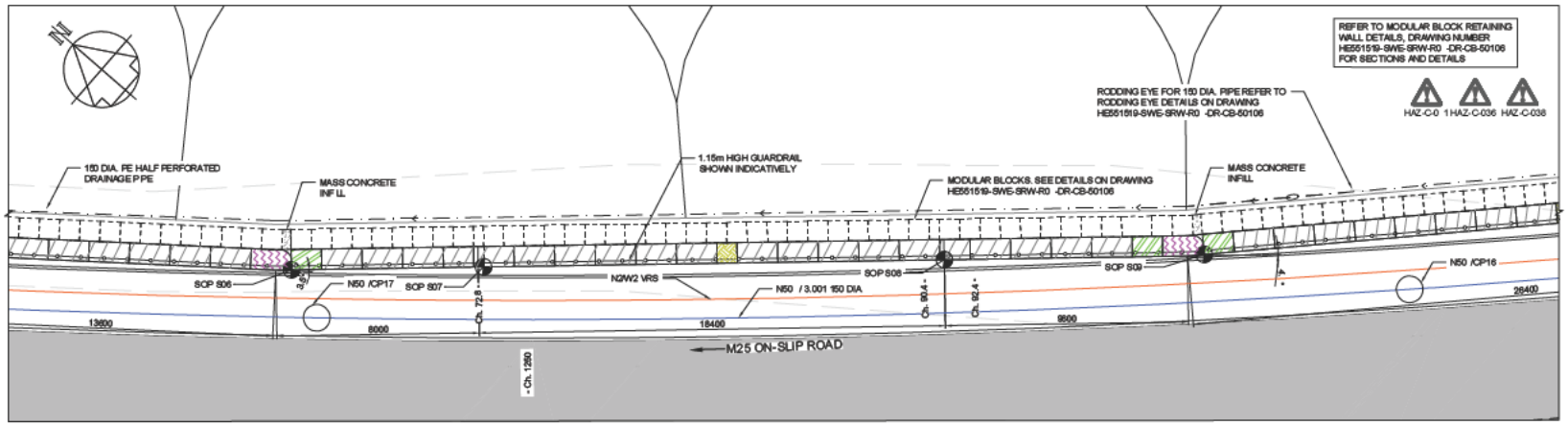
PROJECT STAGE: PCF STAGE 5

DRAWING TITLE: J28 M25 ONSLIP RETAINING WALL GENERAL ARRANGEMENT SHEET 1 OF 6

SUITABILITY: FIT FOR CONSTRUCTION

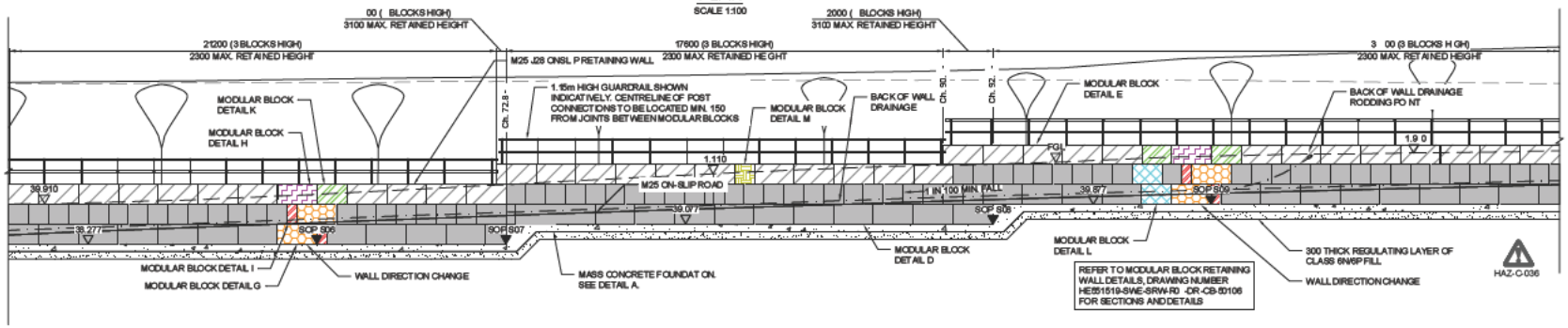
SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

DRAWING NUMBER: HE551519-SWE-SRW-R04-DR-CB-50100



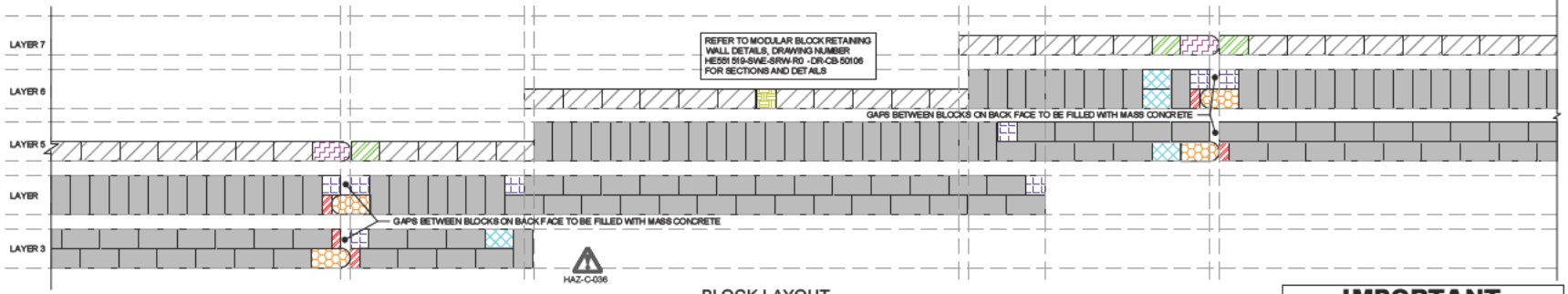
PLAN

SCALE 1:100



DEVELOPED ELEVATION ON FACE OF WALL

SCALE 1:100



KEY CONTINUED

BLOCK LAYOUT

SCALE 1:100

KEY

PROPOSED DRAINAGE NETWORK

PROPOSED VRS

WALL SETTING OUT POINTS

SOP REF	LOCAL GRID EASTINGS (m)	LOCAL GRID NORTHINGS (m)	LEVEL* (m)
S06	17 90.931	363676.758	38.277
S07	17 96.000	363671.112	38.277
S08	17508.150	363657.576	39.007
S09	17515.0 6	3636 9.97	39.677

*LEVELS ARE TO UNDERSIDE OF PRECAST CONCRETE BLOCKS

IMPORTANT

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HAZ-C-038	RISK OF STRIKING UNEXPLODED ORDNANCE (UXO) DURING EXCAVATION WORKS CAUSING INJURY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-C-0 1	POTENTIAL FOR HIGH GROUNDWATER LEVELS / SEEPAGES IN CUTTINGS TO CAUSE FLOODING AND / OR UNSTABLE EXCAVATIONS.

NOTES

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   - PIPE BEDDING ST2
   - MASS CONCRETE INFILL ST5
8. CONCRETE FINISHES TO BE AS PER MCHW SERIES 1700 UNLESS NOTED OTHERWISE:
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   - BURIED UNFORMED SURFACES - U1
   - BURIED/HIDDEN FORMED SURFACES - F1
   - EXPOSED FORMED FACES - F3
   - EXPOSED UNFORMED FACES - U3
9. THE MODULAR BLOCKS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. BLOCKS TO BE INSTALLED WITH A VERTICAL FRONT FACE TO TIE IN WITH CONTIGUOUS PILE WALL. PRECAST MODULAR BLOCKS IN ACCORDANCE WITH BS EN 13369. CONCRETE GRADE C 25/30 TO BE CONFIRMED BY SUPPLIER.
10. BACKFILL BEHIND WALL TO BE CLASS 6N/8P IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS SERIES 600 AND IN ACCORDANCE WITH SPECIFICATION APPENDIX 6/1
11. ALL EXCAVATIONS AND FORMATIONS TO BE INSPECTED BY DESIGNER'S SITE REPRESENTATIVE (DSR). ANY SOFT SPOTS TO BE EXCAVATED AND REFILLED WITH CLASS 6N OR 6P GRANULAR FILL TO COMPLY WITH SPECIFICATION APPENDIX 6/1 AND CLAUSE 612 OF THE SPECIFICATION FOR HIGHWAY WORKS (SHW)
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   - EARTHWORKS (SERIES 600): HE551519-SWE-HGT-ZZ-DE-CE-50201, HE551519-SWE-HGT-ZZ-DE-CE-50303
   - KERBS AND PAVED AREAS (SERIES 1100)
   - STREET LIGHTING (SERIES 1300)
   - LANDSCAPE & ECOLOGY (SERIES 3000)
13. ALL BURIED CONCRETE SURFACES EXCEPT THOSE PROTECTED BY A PROPRIETARY WATERPROOFING SYSTEM TO BE PAINTED WITH TWO COATS OF CUT BACK BITUMEN IN ACCORDANCE WITH MCHW CLAUSE 2001 TO 200 BELOW FINISHED GROUND LEVEL.
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15. REFER TO DRAWING HE551519-SWE-SRW-R0 -DR-CB-50100 FOR DRAWING SERIES LIST

REV	DATE	REVISION NOTE
P01	26/11/21	ISSUE FOR GRAHAM REVIEW
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P03	25/03/22	UPDATED FOLLOWING HIGHWAYS ENGLAND REVIEW
P04	10/03/22	UPDATED FOLLOWING GRAHAM COMMENTS
P05	17/11/22	ISSUE FOR STAGE APPROVAL
C01	17/11/22	ISSUE FOR STAGE APPROVAL

[redacted]

DESIGNER

SWECO

CONTRACTOR

GRAHAM

CLIENT

highways england

PROJECT TITLE

M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE

PCF STAGE 5

DRAWING TITLE

J28 M25 ONSLIP RETAINING WALL
GENERAL ARRANGEMENT
SHEET 2 OF 6

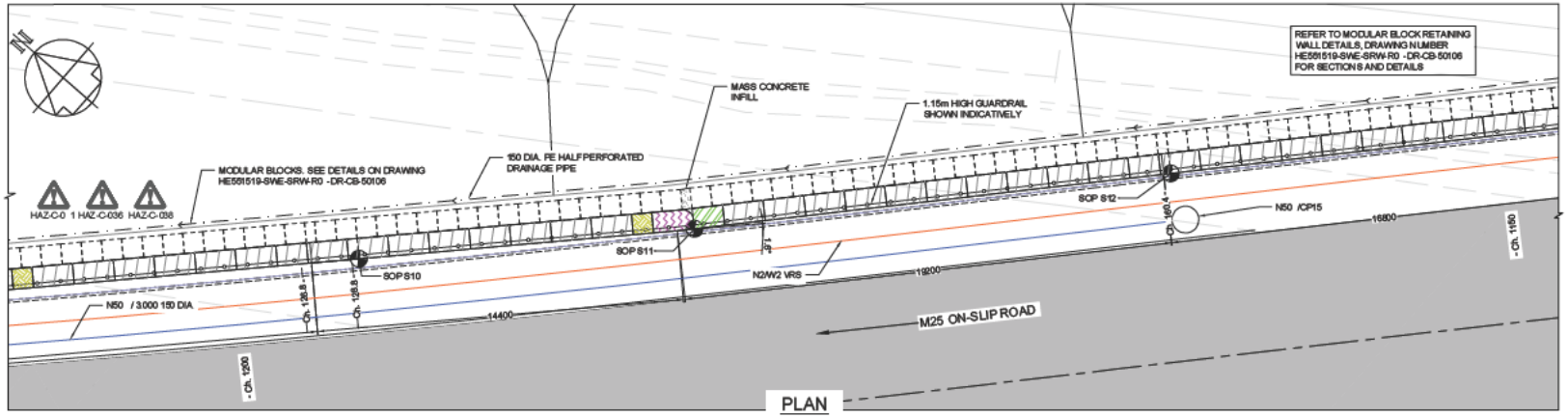
SUITABILITY

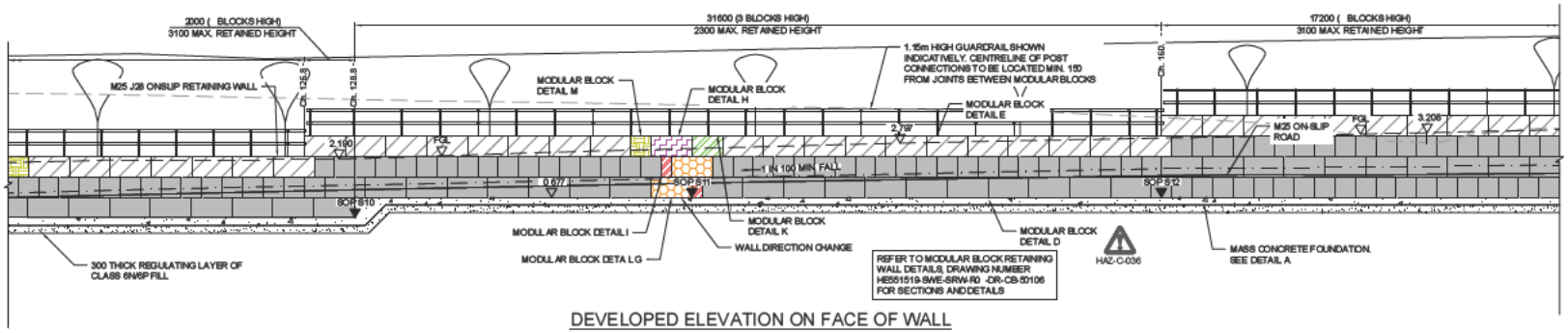
FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

DRAWING NUMBER

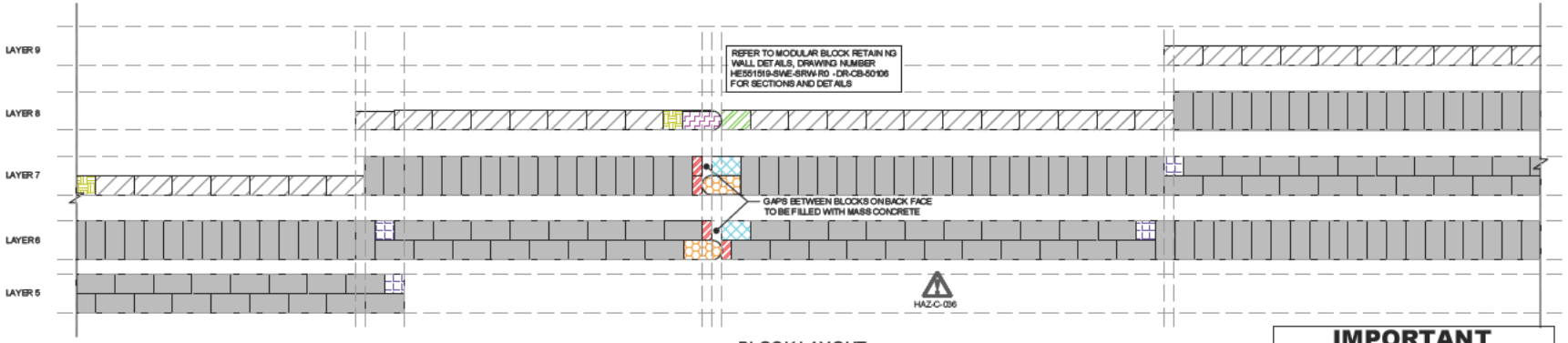
HE551519-SWE-SRW-R04-DR-CB-50101





DEVELOPED ELEVATION ON FACE OF WALL

SCALE 1:100



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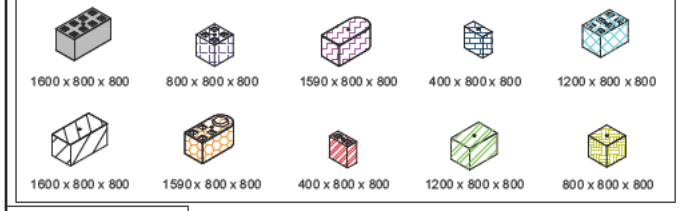

BLOCK LAYOUT

SCALE 1:100

KEY

PROPOSED DRAINAGE NETWORK

PROPOSED VRS

WALL SETTING OUT POINTS

SOP REF	LOCAL GRID EASTINGS (m)	LOCAL GRID NORTHINGS (m)	LEVEL* (m)
S10	1753 .918	363630.822	38.977
S11	175 .	363621.669	0.667
S12	17568.3 2	363609.006	0.667
S13	17570.553	363597.878	0.667

*LEVELS ARE TO UNDERSIDE OF PRECAST CONCRETE BLOCKS

IMPORTANT

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HAZ-C-01	POTENTIAL FOR HIGH GROUNDWATER LEVELS / SEEPAGES IN CUTTINGS TO CAUSE FLOODING AND / OR UNSTABLE EXCAVATIONS.

NOTES

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   - RODDING EYE SURROUND AND THRUST BLOCK C 0/50 MIX REF D
   - BLINDING CONCRETE ST2
   - PIPE BEDDING ST2
   - MASS CONCRETE INFILL ST5
8. CONCRETE FINISHES TO BE AS PER MCHW SERIES 1700 UNLESS NOTED OTHERWISE:
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10. BACKFILL BEHIND WALL TO BE CLASS 6N/6P IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS SERIES 600 AND IN ACCORDANCE WITH SPECIFICATION APPENDIX 6/1
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C01	17/11/22	ISSUE FOR STAGE APPROVAL

DESIGNER: SWECO

CONTRACTOR: GRAHAM

CLIENT: highways england

PROJECT TITLE: M25 JUNCTION 28 IMPROVEMENTS

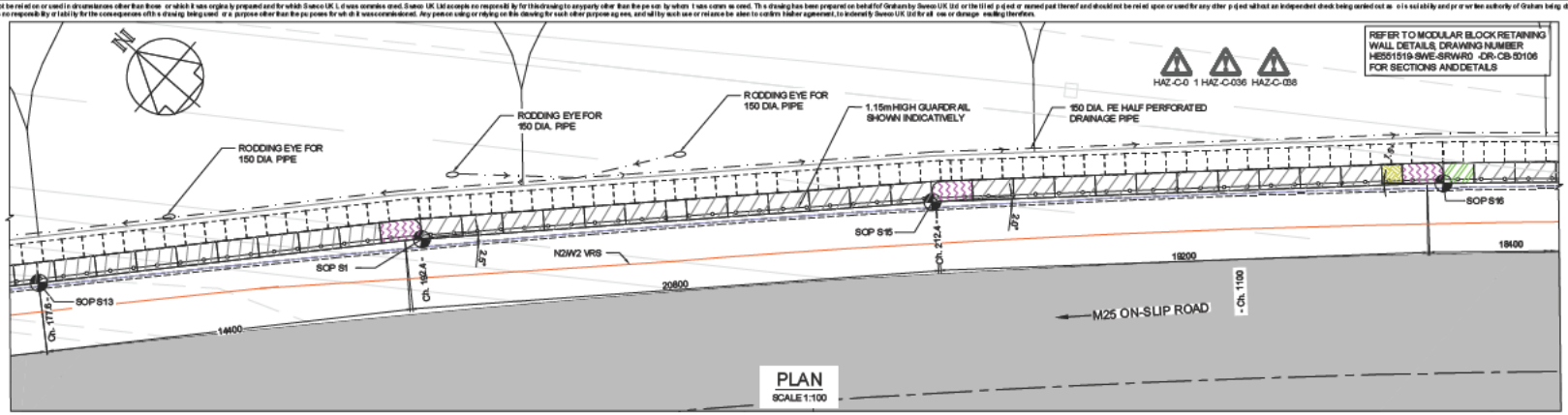
PROJECT STAGE: PCF STAGE 5

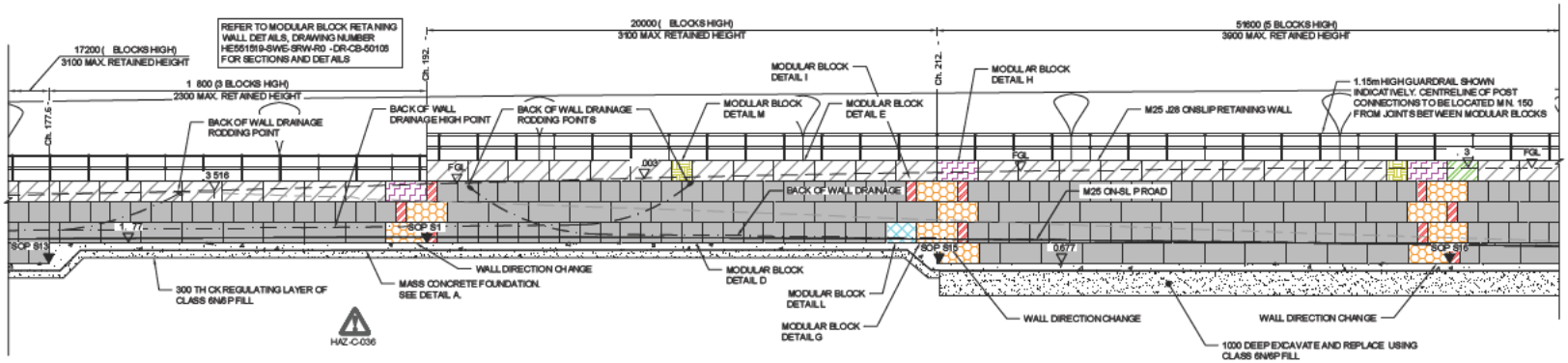
DRAWING TITLE: J28 M25 ONSLIP RETAINING WALL GENERAL ARRANGEMENT SHEET 3 OF 6

SUITABILITY: FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

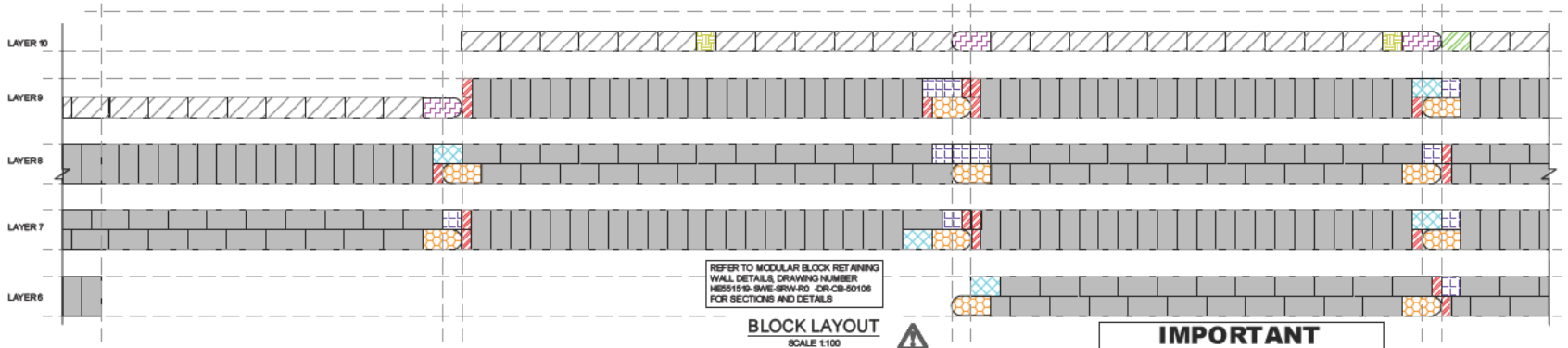
DRAWING NUMBER: HE551519-SWE-SRW-R04-DR-CB-50102





DEVELOPED ELEVATION ON FACE OF WALL

SCALE 1:100



BLOCK LAYOUT

SCALE 1:100

HAZ-C-036

WALL SETTING OUT POINTS			
SOP REF	LOCAL GRID EASTINGS (m)	LOCAL GRID NORTHINGS (m)	LEVEL* (m)
S1	17581.666	363587.71	1. 77
S15	17595.857	363573.622	0.677
S16	17609.51	363559.0 5	0.677

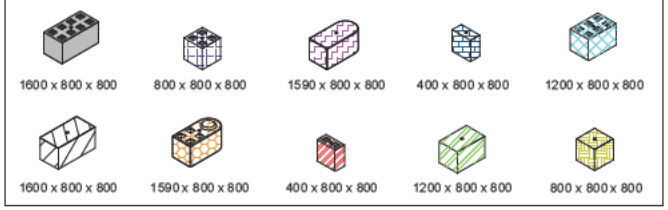
*LEVELS ARE TO UNDERS DE OF PRECAST CONCRETE BLOCKS

KEY

PROPOSED DRAINAGE NETWORK

PROPOSED VRS

KEY CONTINUED



IMPORTANT

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7. CONCRETE MIXES SHALL BE IN ACCORDANCE WITH SPECIFICATION APPENDIX 17/1:
   - IN-SITU FOUNDATION C 0/50 MIX REF D
   - RODDING EYE SURROUND AND THRUST BLOCK C 0/50 MIX REF D
   - BLINDING CONCRETE ST2
   - PIPE BEDDING ST2
   - MASS CONCRETE INFILL ST5
8. CONCRETE FINISHES TO BE AS PER MCHW SERIES 1700 UNLESS NOTED OTHERWISE
   - MODULAR BLOCKS - F
   - BURIED UNFORMED SURFACES - U1
   - BURIED/HIDDEN FORMED SURFACES - F1
   - EXPOSED FORMED FACES - F3
   - EXPOSED UNFORMED FACES - U3
9. THE MODULAR BLOCKS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS. BLOCKS TO BE INSTALLED WITH A VERTICAL FRONT FACE TO TIE IN WITH CONTIGUOUS PILE WALL. PRECAST MODULAR BLOCKS IN ACCORDANCE WITH BS EN 13369. CONCRETE GRADE C 0/50 TO BE CONFIRMED BY SUPPLIER.
10. BACKFILL BEHIND WALL TO BE CLASS 6N/6P IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS SERIES 600 AND IN ACCORDANCE WITH SPECIFICATION APPENDIX 6/1
11. ALL EXCAVATIONS AND FORMATIONS TO BE INSPECTED BY DESIGNERS SITE REPRESENTATIVE (DSR). ANY SOFT SPOTS TO BE EXCAVATED AND REPLACED WITH CLASS 6N OR 6P GRANULAR FILL TO COMPLY WITH SPECIFICATION APPENDIX 6/1 AND CLAUSE 612 OF THE SPECIFICATION FOR HIGHWAY WORKS (SHW)
12. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURES, EARTHWORKS AND ROADWORKS DRAWINGS & SPECIFICATION APPENDICES. FOR DETAILS OF CONSTRUCTION INTERFACES REFER TO THE FOLLOWING SERIES APPENDICES AND SPECIFIC DRAWINGS:
   - FENCING (SERIES 300): HE551519-SWE-HRE-ZZ-DR-CH-50003
   - ROAD RESTRAINT (SERIES 00): HE551519-SWE-HRR-ZZ-DR-CH-50003
   - DRAINAGE (SERIES 500): HE551519-SWE-HDG-ZZ-DR-CD-50003
   - EARTHWORKS (SERIES 600): HE551519-SWE-HGT-Z1Z-DR-CE-50201, HE551519-SWE-HGT-ZZ-DR-CE-50303
   - KERBS AND PAVED AREAS (SERIES 1100)
   - STREET LIGHTING (SERIES 1300)
   - LANDSCAPE & ECOLOGY (SERIES 3000)
13. ALL BURIED CONCRETE SURFACES EXCEPT THOSE PROTECTED BY A PROPRIETARY WATERPROOFING SYSTEM TO BE PAINTED WITH TWO COATS OF CUT BACK BITUMEN IN ACCORDANCE WITH MCHW CLAUSE 2001 TO 200 BELOW FINISHED GROUND LEVEL.
14. FOR GUARDRAIL DETAILS REFER TO HIGHWAY CONSTRUCTION DETAILS DRG. MCX 0138. AN EDGE DISTANCE OF 150 SHOULD BE MAINTAINED TO FRONT FACE AND ENDS OF WALL.
15. REFER TO DRAWING HE551519-SWE-SRW-R0 -DR-CB-50100 FOR DRAWING SERIES LIST.

P01	26/11/21	issue for GRAHAM review	
P02	16/01/22	ISSUE FOR WSP REVIEW	
P03	25/02/22	UPDATED FOLLOWING HIGHWAYS ENGLAND REVIEW	
P0	10/03/22	UPDATED FOLLOWING GRAHAM COMMENTS	
P05	17/11/22	ISSUE FOR STAGE APPROVAL	
C01	17/11/22	ISSUE FOR STAGE APPROVAL	
REV	DATE	REVISION NOTE	

[redacted]

DESIGNER

SWECO

CONTRACTOR

GRAHAM

CLIENT

highways england

PROJECT TITLE

M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE

PCF STAGE 5

DRAWING TITLE

J28 M25 ONSLIP RETAINING WALL
GENERAL ARRANGEMENT
SHEET 4 OF 6

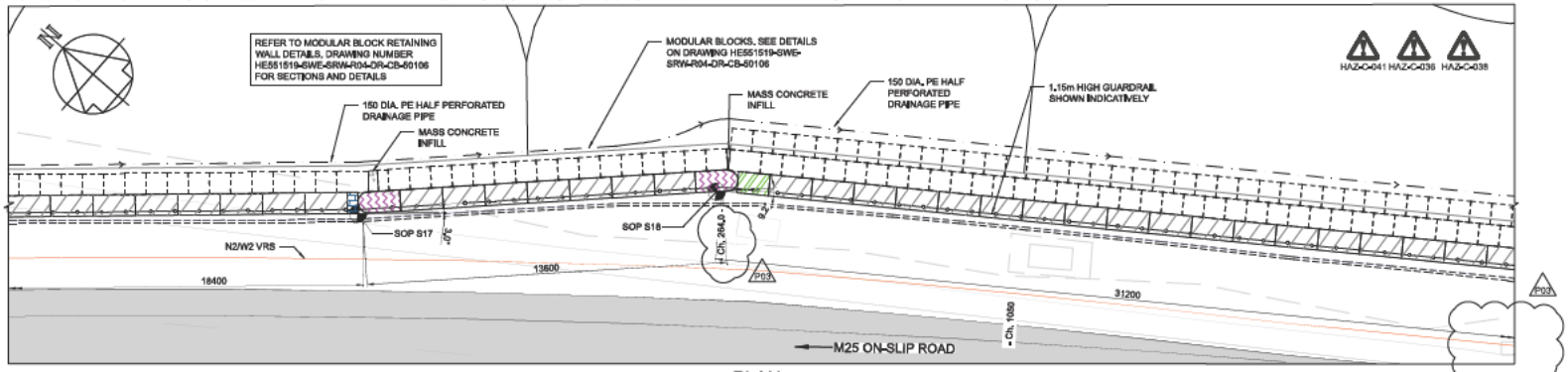
SUITABILITY

FIT FOR CONSTRUCTION

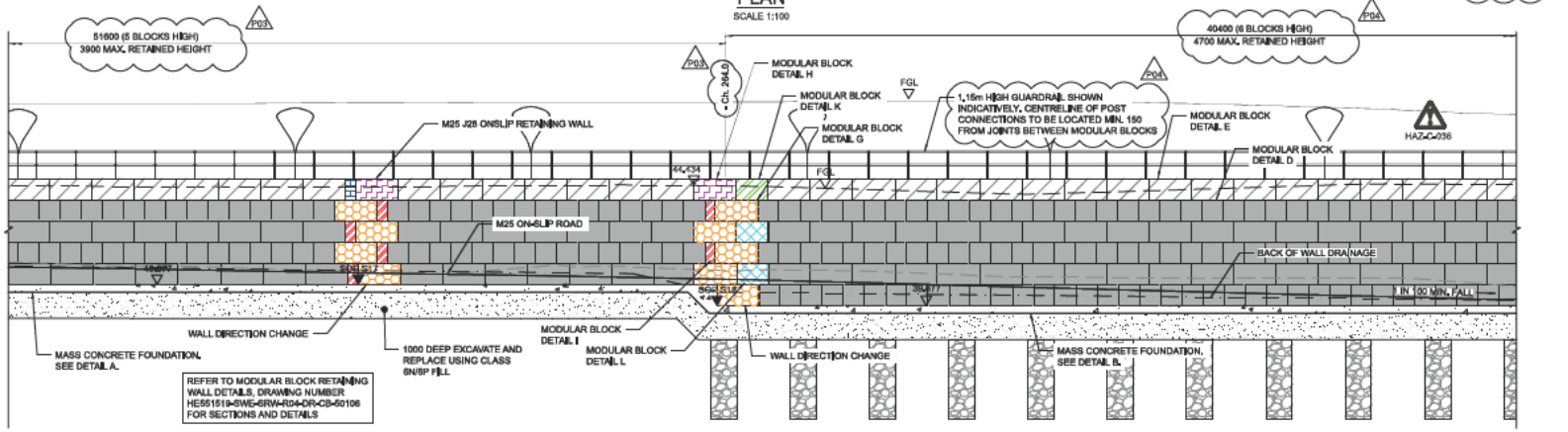
SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

DRAWING NUMBER

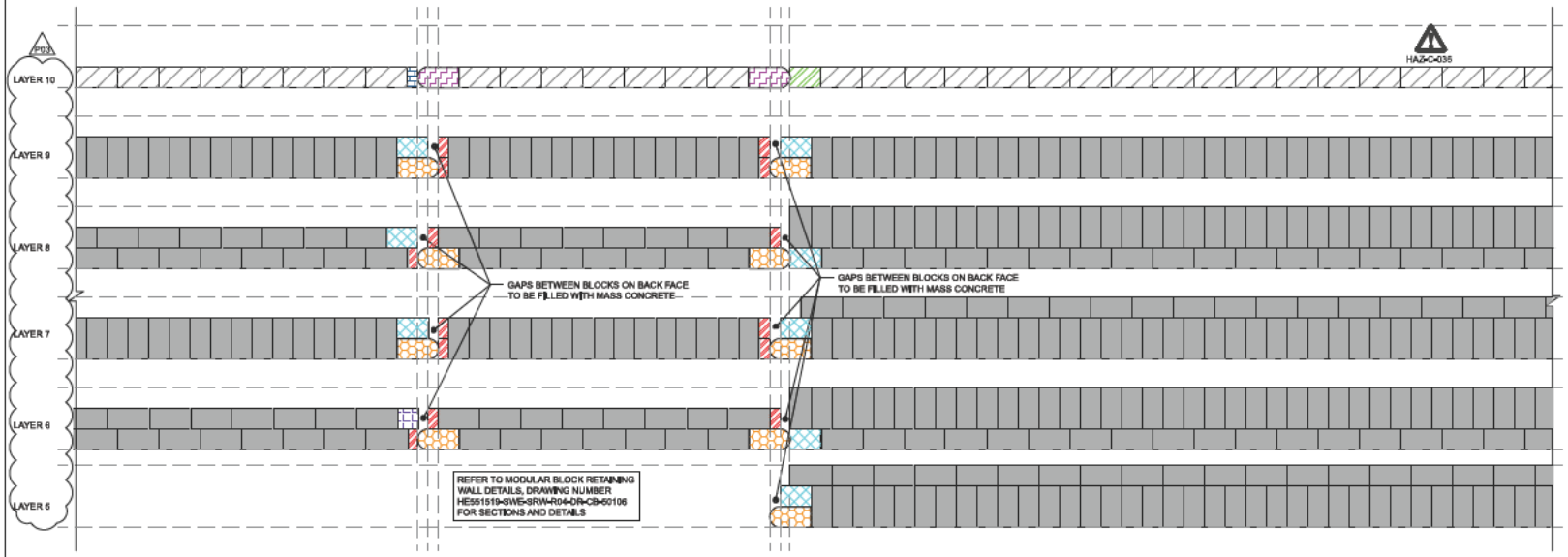
HE551519-SWE-SRW-R04-DR-CB-50103



PLAN
SCALE 1:100



DEVELOPED ELEVATION ON FACE OF WALL
SCALE 1:100



BLOCK LAYOUT
SCALE 1:100

KEY CONTINUED


1600 x 800 x 800


1600 x 800 x 800


800 x 800 x 800


1590 x 800 x 800


1590 x 800 x 800


400 x 800 x 800


400 x 800 x 800


1200 x 800 x 800


1200 x 800 x 800


800 x 800 x 800

NOTES

1. REFER TO DRAWING HE551519-SWE-SRW-R04-DR-CB-50100 FOR NOTES.
2. REFER TO DRAWING HE551519-SWE-SRW-R04-DR-CB-50100 FOR DRAWING SERIES LIST.

WALL SETTING OUT POINTS			
SOP REF:	LOCAL GRID EASTINGS (m)	LOCAL GRID NORTHINGS (m)	LEVEL* (m)
S17	17621.200	363545.889	40.677
S18	17630.710	363536.223	39.877

*LEVELS ARE TO UNDERSIDE OF PRECAST CONCRETE BLOCKS

IMPORTANT
SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001.

HAZARD REF	BRIEF DESCRIPTION OF HAZARD:-
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL.
HAZ-C-036	INSTABILITY OF PRECAST ELEMENTS DURING BACK FILLING. INJURY TO SITE PERSONNEL.
HAZ-C-038	RISK OF STRIKING UNEXPLODED ORDINANCE (UXO) DURING EXCAVATION WORKS CAUSING INJURY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-C-041	POTENTIAL FOR HIGH GROUNDWATER LEVELS / SEEPAGES IN CUTTINGS TO CAUSE FLOODING AND / OR UNSTABLE EXCAVATIONS.

KEY

PROPOSED DRAINAGE NETWORK
PROPOSED VRS

REV	DATE	REVISION NOTE
P01	26/11/21	Issue for GRAHAM review
P02	19/01/22	ISSUE FOR WSP REVIEW
P03	25/02/22	UPDATED FOLLOWING NH TA REVIEW
P04	10/03/22	UPDATES FOLLOWING GRAHAM COMMENTS
P05	17/11/22	ISSUE FOR STAGE APPROVAL
C01	17/11/22	ISSUE FOR STAGE APPROVAL

DESIGNER
SWECO

CONTRACTOR
GRAHAM

CLIENT
highways england

PROJECT TITLE
M25 JUNCTION 28 IMPROVEMENTS

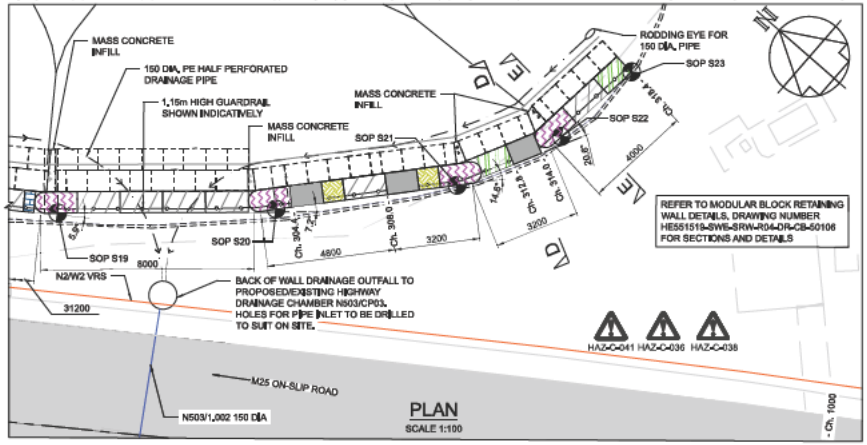
PROJECT STAGE
PCF STAGE 5

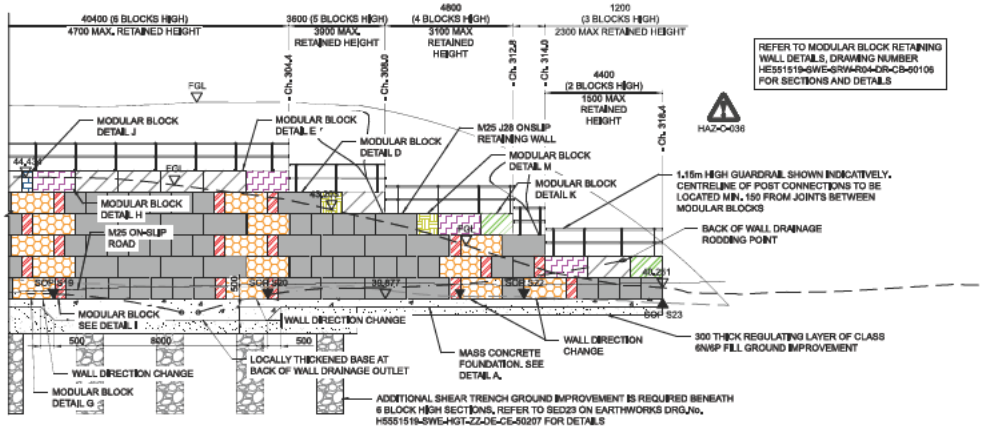
DRAWING TITLE
J28 M25 ONSLIP RETAINING WALL
GENERAL ARRANGEMENT
SHEET 5 OF 6

SUITABILITY
FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

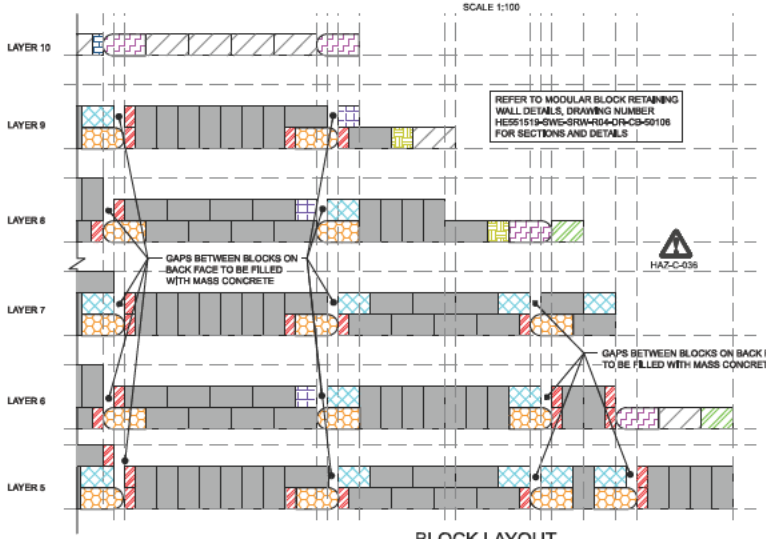
DRAWING NUMBER
HE551519-SWE-SRW-R04-DR-CB-50104





DEVELOPED ELEVATION ON FACE OF WALL

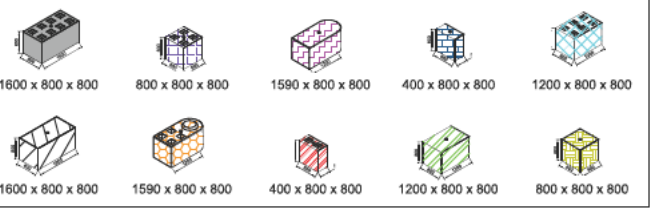
SCALE 1:100



BLOCK LAYOUT

SCALE 1:100

KEY CONTINUED



KEY

PROPOSED DRAINAGE NETWORK

PROPOSED VRS

WALL SETTING OUT POINTS

SOP REF:	LOCAL GRID EASTINGS (m)	LOCAL GRID NORTHINGS (m)	LEVEL* (m)
S19	17649.362	363510.164	39.877
S20	17654.837	363504.086	39.877
S21	17659.955	363498.561	39.877
S22	17663.892	363497.820	39.877
S23	17667.448	363497.421	39.877

*LEVELS ARE TO UNDERSIDE OF PRECAST CONCRETE BLOCKS

IMPORTANT

SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001.

HAZARD REF AND BRIEF DESCRIPTION OF HAZARD:-

HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL
HAZ-C-036	INSTABILITY OF PRECAST ELEMENTS DURING BACK FILLING. INJURY TO SITE PERSONNEL.
HAZ-C-038	RISK OF STRIKING UNEXPLODED ORDNANCE (UXO) DURING EXCAVATION WORKS CAUSING INJURY OF SITE PERSONNEL AND THE PUBLIC.
HAZ-C-041	POTENTIAL FOR HIGH GROUNDWATER LEVELS / SEEPAGES IN CUTTINGS TO CAUSE FLOODING AND / OR UNSTABLE EXCAVATIONS.

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
3. ALL EXTERNAL CONCRETE ARISES TO HAVE 25x25mm CHAMFER.
4. ALL CHAINAGES ARE IN METRES UNLESS NOTED OTHERWISE.
5. COORDINATES ARE TO A LOCAL GRID REFERENCE IN ACCORDANCE WITH IAN 99/07.
6. ONLY ONE SHEAR TRENCH SHALL BE EXCAVATED AND BACKFILLED AT ANY GIVEN TIME TO REDUCE RISK OF TRENCH COLLAPSE AND DESTABILISING OF EXISTING EMBANKMENT
7. CONCRETE MIXES SHALL BE IN ACCORDANCE WITH SPECIFICATION APPENDIX 17/1:
   - IN-SITU FOUNDATION C40/50 MIX REF D
   - RODDING EYE SURROUND AND THRUST BLOCK C40/50 MIX REF D
   - BLINDING CONCRETE ST2
   - PIPE BEDDING ST2
   - MASS CONCRETE INFILL ST5
8. CONCRETE FINISHES TO BE AS PER MCHW SERIES 1700 UNLESS NOTED OTHERWISE
   - MODULAR BLOCKS - F4
   - BURIED UNFORMED SURFACES - U1
   - BURIED/HIDDEN FORMED SURFACES - F1
   - EXPOSED FORMED FACES - F3
   - EXPOSED UNFORMED FACES - U3
9. THE MODULAR BLOCKS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. BLOCKS TO BE INSTALLED WITH A VERTICAL FRONT FACE TO TIE IN WITH CONTIGUOUS PILE WALL. PRECAST MODULAR BLOCKS IN ACCORDANCE WITH BS EN 13369, CONCRETE GRADE C40/50 TO BE CONFIRMED BY SUPPLIER.
10. BACKFILL BEHIND WALL TO BE CLASS 6N/6P IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS SERIES 600 AND IN ACCORDANCE WITH SPECIFICATION APPENDIX 6/1
11. ALL EXCAVATIONS AND FORMATIONS TO BE INSPECTED BY DESIGNER'S SITE REPRESENTATIVE (DSR). ANY SOFT SPOTS TO BE EXCAVATED AND REPLACED WITH CLASS 6N OR 6P GRANULAR FILL TO COMPLY WITH SPECIFICATION APPENDIX 6/1 AND CLAUSE 612 OF THE SPECIFICATION FOR HIGHWAY WORKS (SHW)
12. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURES, EARTHWORKS AND ROADWORKS DRAWINGS & SPECIFICATION APPENDICES. FOR DETAILS OF CONSTRUCTION INTERFACES REFER TO THE FOLLOWING SERIES APPENDICES AND SPECIFIC DRAWINGS:
   - FENCING (SERIES 300): HE551519-SWE-HFE-ZZ-DR-CH-50003
   - ROAD RESTRAINT (SERIES 400): HE551519-SWE-HRR-ZZ-DR-CH-50003
   - DRAINAGE (SERIES 500): HE551519-SWE-HDG-ZZ-DR-CD-50003
   - EARTHWORKS (SERIES 600) : HE551519-SWE-HGT-ZZ-DE-CE-50207, HE551519-SWE-HGT-ZZ-DS-CE-50303
   - KERBS AND PAVED AREAS (SERIES 1100)
   - STREET LIGHTING (SERIES 1300)
   - LANDSCAPE & ECOLOGY (SERIES 3000)
13. ALL BURIED CONCRETE SURFACES EXCEPT THOSE PROTECTED BY A PROPRIETARY WATERPROOFING SYSTEM TO BE PAINTED WITH TWO COATS OF CUT BACK BITUMEN IN ACCORDANCE WITH MCHW CLAUSE 2004 TO 200 BELOW FINISHED GROUND LEVEL.
14. FOR GUARDRAIL DETAILS REFER TO HIGHWAY CONSTRUCTION DETAILS DRG. NCX 0136. AN EDGE DISTANCE OF 180 SHOULD BE MAINTAINED TO FRONT FACE AND ENDS OF WALL.
15. REFER TO DRAWING HE551519-SWE-SRW-R04-DR-CB-50100 FOR DRAWING SERIES LIST.

REV	DATE	REVISION NOTE
P01	26/11/21	Issue for GRAHAM review
P02	19/01/22	ISSUE FOR WSP REVIEW
P03	25/02/22	UPDATED FOLLOWING NH TA REVIEW
P04	10/03/22	UPDATES FOLLOWING GRAHAM COMMENTS
P05	17/11/22	ISSUE FOR STAGE APPROVAL
C01	17/11/22	ISSUE FOR STAGE APPROVAL

[redacted]

DESIGNER

SWECO

CONTRACTOR

GRAHAM

CLIENT

highways england

PROJECT TITLE

M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE

PCF STAGE 5

DRAWING TITLE

J28 M25 ONSLIP RETAINING WALL
GENERAL ARRANGEMENT
SHEET 6 OF 6

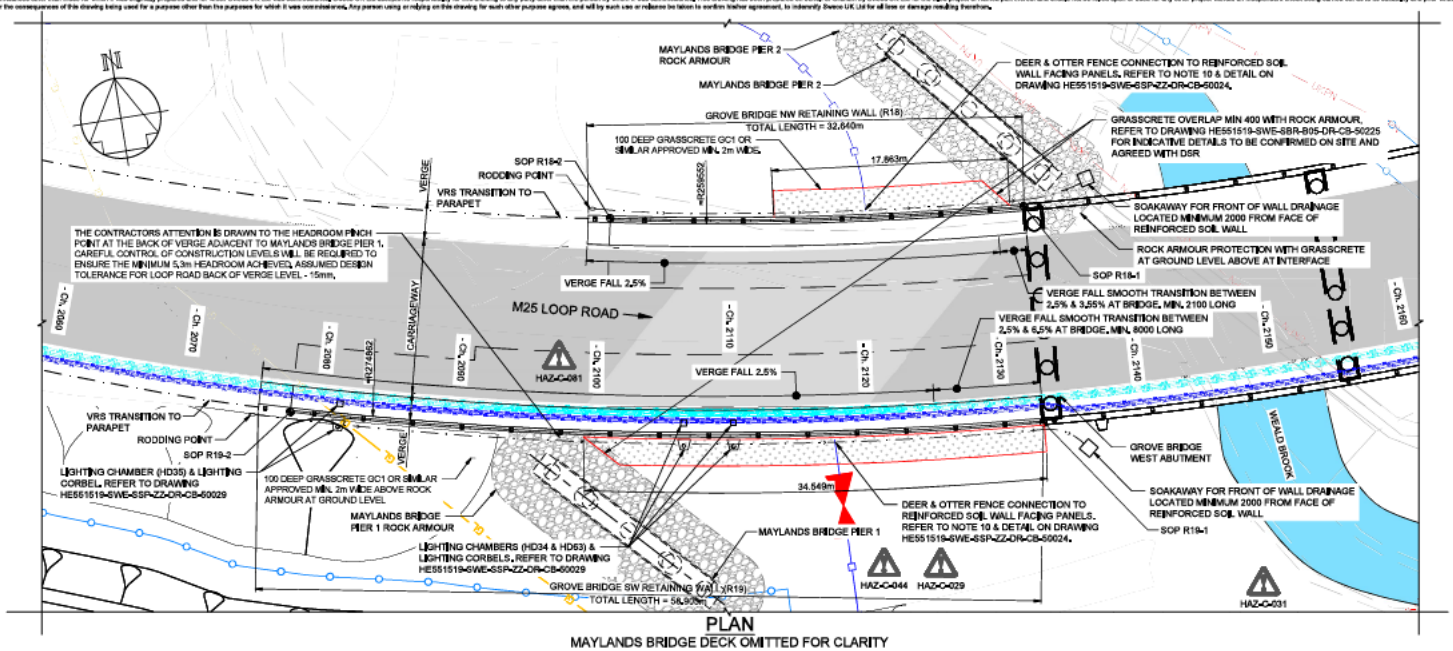
SUITABILITY

FIT FOR CONSTRUCTION

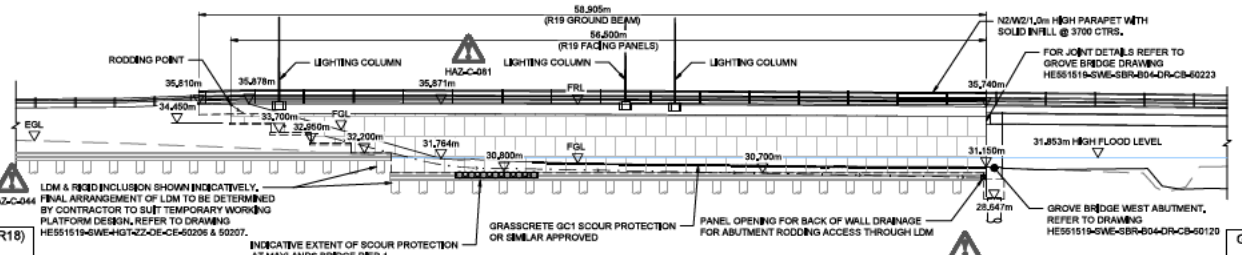
SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

DRAWING NUMBER

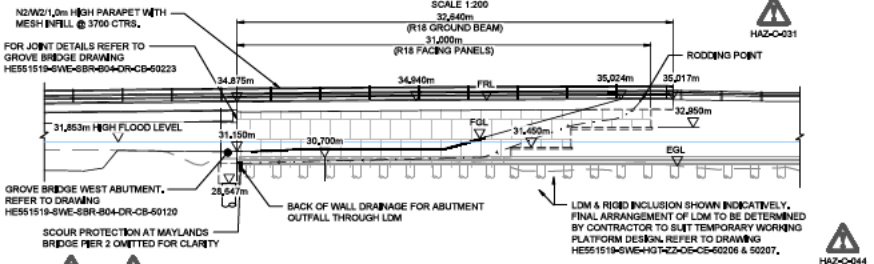
HE551519-SWE-SRW-R04-DR-CB-50105



PLAN
MAYLANDS BRIDGE DECK OMITTED FOR CLARITY
SCALE 1:200



ELEVATION ON GROVE BRIDGE SW RETAINING WALL (R19)

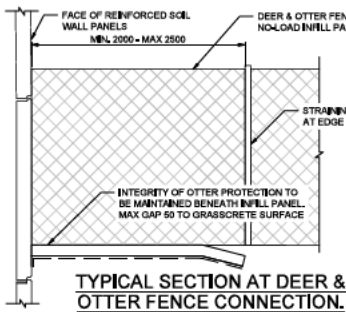


ELEVATION ON GROVE BRIDGE NW RETAINING WALL (R18)
SCALE 1:200

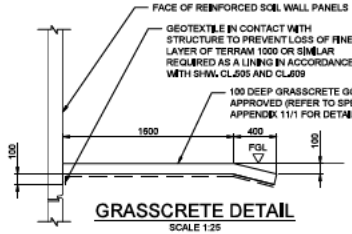
GROVE BRIDGE NW RETAINING WALL (R18) SETTING OUT POINTS		
SOP REF:	LOCAL GRID EASTINGS (m)	LOCAL GRID NORTHINGS (m)
R18-1	17427.962	363282.866
R18-2	17397.246	363286.912

GROVE BRIDGE SW RETAINING WALL (R19) SETTING OUT POINTS		
SOP REF:	LOCAL GRID EASTINGS (m)	LOCAL GRID NORTHINGS (m)
R19-1	17428.845	363266.653
R19-2	17371.295	363276.406

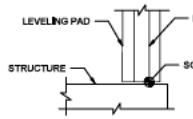
UTILITIES KEY:
- UKPN — EXISTING UK POWER NETWORKS (TO BE DIVERTED)
- GL — EXISTING CADENT GAS LTD (TO BE DIVERTED)
- SHL — PROPOSED STREET LIGHTING DUCTS
- NRTE — PROPOSED NATIONAL ROADS TELECOMMUNICATIONS DUCTS



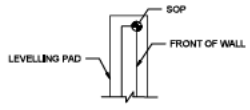
TYPICAL SECTION AT DEER & OTTER FENCE CONNECTION.
SCALE 1:25



GRASSCRETE DETAIL
SCALE 1:25



TYPICAL WALL SETTING OUT POINT @ STRUCTURE INTERFACE
SCALE 1:25



TYPICAL WALL SETTING OUT POINT @ ENDS
SCALE 1:25

IMPORTANT
SAFETY, HEALTH & ENVIRONMENTAL INFORMATION

TO BE READ IN CONJUNCTION WITH HAZARD REGISTER DOC. REF: HE551519-SWE-GHS-ZZ-RA-ZS-50001.

HAZARD REF AND BRIEF DESCRIPTION OF HAZARD:-	
HAZ-C-019	WORKING NEAR UNDERGROUND SERVICES. INJURY TO SITE PERSONNEL
HAZ-C-029	FLOODING CAUSING INUNDATION OF EXCAVATIONS AND WORKING AREAS.
HAZ-C-031	POLLUTION OF WATERCOURSES DUE TO CONTAMINATION WITH CONSTRUCTION MATERIALS.
HAZ-C-042	RISK OF DAMAGING HP CADENT GAS MAIN DURING CONSTRUCTION. INJURY TO SITE PERSONNEL.
HAZ-C-044	LEACHING OF CONTAMINATED GROUND AND ASBESTOS INTO PRINCIPAL AQUIFER DURING EXCAVATION WORKS.
HAZ-C-058	RISK OF DAMAGING DIVERTED UKPN CABLES. ELECTROCUTION OF SITE PERSONNEL.
HAZ-C-066	RISK OF DAMAGING BPA PIPELINE DUE TO CONSTRUCTION ACTIVITIES.
HAZ-C-081	MINIMUM HEADROOM PINCH POINT AT PIER 1

NOTES
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM.
3. ALL CHAINAGES ARE IN METRES, UNLESS NOTED OTHERWISE.
4. COORDINATES ARE TO A LOCAL GRID IN ACCORDANCE WITH IAN 99.
5. SETTING OUT SHOULD BE CHECKED AND VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
6. CONCRETE MIXES FOR THE PRECAST FACING PANELS, MASS CONCRETE LEVELLING PAD, PARAPET COPING UNIT AND ANCHOR SLAB AND STITCH ARE AS PER SUPPLIER DESIGN, REFER TO NOTE 7.
7. FOR REINFORCED SOIL WALL DETAILS REFER TO SUPPLIER DRAWINGS LISTED ON DRG. No. HE551519-SWE-SSP-ZZ-DR-CB-50016.
8. WHERE THE REINFORCED SOIL WALLS ARE NOT FOUNDED ABOVE IMPROVED GROUND, SUB-FORMATION SHOULD BE PROOF ROLLED AND INSPECTED BY THE DESIGNER'S SITE REPRESENTATIVE, AND ANY UNSUITABLE SOFT LOOSE MATERIAL SHOULD BE EXCAVATED AND REPLACED WITH CLASS 6N/6P FILL IN ACCORDANCE WITH SERIES 600 PRESENTED ON STANDARD EARTHWORKS DETAILS DRAWING HE551519-SWE-HGT-ZZ-DR-CE-50203.
9. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURES, EARTHWORKS AND ROADWORKS DRAWINGS & SPECIFICATION APPENDICES FOR DETAILS OF CONSTRUCTION INTERFACES REFER TO THE FOLLOWING SERIES APPENDICES AND SPECIFIC DRAWINGS:
   - FENCING (SERIES 300): HE551519-SWE-HFE-ZZ-DR-CH-50002 & HE551519-SWE-HFE-ZZ-DR-CH-50003
   - ROAD RESTRAINT (SERIES 400): HE551519-SWE-HRR-ZZ-DR-CH-50002 & HE551519-SWE-HRR-ZZ-DR-CH-50003
   - DRAINAGE (SERIES 500): HE551519-SWE-HDG-ZZ-DR-CD-50002 & HE551519-SWE-HDG-ZZ-DR-CD-50003
   - EARTHWORKS (SERIES 600): HE551519-SWE-HGT-ZZ-DR-CE-50302 & HE551519-SWE-HGT-ZZ-DR-CE-50303, HE551519-SWE-HGT-ZZ-DR-CE-50602 & HE551519-SWE-HGT-ZZ-DR-CE-50603, HE551519-SWE-HGT-ZZ-DR-CE-50702 & HE551519-SWE-HGT-ZZ-DR-CE-50703, HE551519-SWE-HGT-ZZ-DE-CE-50203, HE551519-SWE-HGT-ZZ-DE-CE-50206 & HE551519-SWE-HGT-ZZ-DE-CE-50207
   - PAVEMENT (SERIES 700)
   - KERBS AND PAVED AREAS (SERIES 1100): HE551519-SWE-HKF-ZZ-DR-CH-50002 & HE551519-SWE-HKF-ZZ-DR-CH-50003
   - TRAFFIC SIGNS & SIGNALS (SERIES 1200): HE551519-SWE-HSN-ZZ-DR-CH-50002
   - STREET LIGHTING (SERIES 1300): HE551519-SWE-HLG-ZZ-DR-EO-50002 & HE551519-SWE-HLG-ZZ-DR-EO-50003
   - COMMS (SERIES 1500)
   - LANDSCAPE & ECOLOGY (SERIES 3000)
10. DEER & OTTER FENCE NO-LOAD INFILL PANEL ANGLE TO BE CONNECTED TO REINFORCED SOIL WALL FACING PANELS WITH A MINIMUM 3 NO. M12 100 LONG GALVANISED STEEL ANCHORS AND HILTI HIT-HY 170 ADHESIVE OR SIMILAR APPROVED. ANCHORS SHALL HAVE A MINIMUM 600 SPACING AND MAXIMUM 1000 SPACING AND SHALL NOT BE FIXED WITHIN 300 OF ANY FACING PANEL JOINT. ANCHORS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, REFER TO SPECIFICATION APPENDIX 3/1 FOR FENCING DETAILS.
11. FACING PANELS SHOWN INDICATIVELY. REFER TO SUPPLIER DRAWINGS FOR PROPOSED LAYOUT AND DETAILS INCLUDING PANEL JOINTS.

KEY:
- RED LINE BOUNDARY
- INDICATIVE REINFORCED SOIL WALL FRONT OF WALL DRAINAGE
- PROPOSED POST AND 4 RAIL FENCE
- PROPOSED GATE FOR CHAIN LINK DEER AND OTTER FENCE
- SOAKAWAY
- PROPOSED VEHICLE RESTRAINT SYSTEM (VRS)
- INDICATIVE EXTENT OF REINFORCED SOIL BLOCK

REV	DATE	REVISION NOTE
P06	10/02/23	UPDATED FOR REVISED FOUNDATION LEVELS
P07	07/03/23	ISSUE FOR STAGE APPROVAL
C01	07/03/23	ISSUE FOR STAGE APPROVAL

DESIGNER: SWECO

CONTRACTOR: GRAHAM

CLIENT: highways england

PROJECT TITLE: M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE: PCF STAGE 5

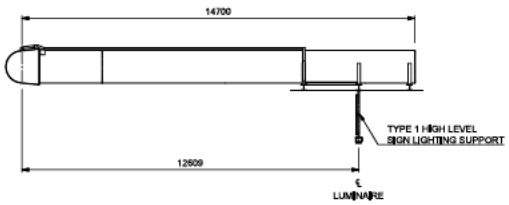
DRAWING TITLE: REINFORCED SOIL WALLS GENERAL ARRANGEMENT & TYPICAL DETAILS SHEET 5 OF 10

SUITABILITY: FIT FOR CONSTRUCTION

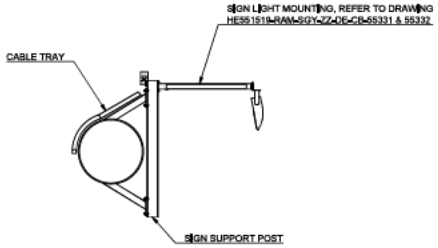
SHEET SIZE	SCALE	STATUS	REVISION
A1	AS SHOWN	A5	C01

DRAWING NUMBER: HE551519-SWE-SSP-ZZ-DR-CB-50024

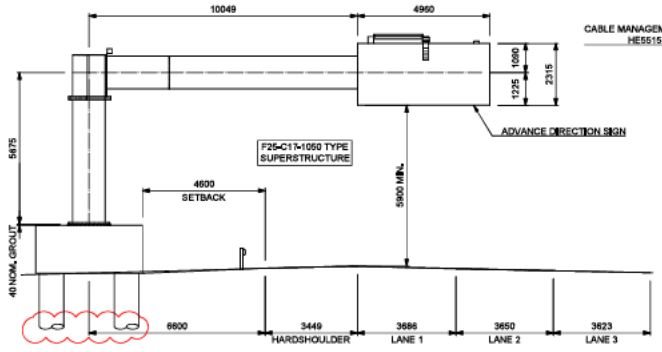
10. FOR PAINTING DETAILS, REFER TO APPENDIX 19 OF THE SPECIFICATION.
11. ALL EXISTING DIMENSIONS, WHERE RELEVANT, ARE TO BE CONFIRMED ON SITE BY THE CONTRACTOR PRIOR TO FABRICATION.
12. VEHICLE RESTRAINT SYSTEM SHALL BE AS DETAILED IN APPENDIX 4/1 OF THE SPECIFICATION. UNLESS OTHERWISE NOTED WITHIN THE SPECIFICATION, EN 1317 VEHICLE INTRUSION VALUES SHALL NOT EXCEED THE WORKING WIDTH.
13. THE GANTRY BOOM SHALL HAVE A FABRICATED PRE-CAMBER AS PER THE REQUIREMENTS ON THE GANTRY STRUCTURAL DETAILS DRAWINGS. FOR CANTILEVERED GANTRIES, DURING INSTALLATION, THE GANTRY LEG SHALL BE INCLINED AS PER THE REQUIREMENTS ON THE GANTRY STRUCTURAL DETAILS DRAWINGS.
14. FOR QUANTITY OF ALM SENSORS, SIGN LIGHTING PHOTOCELL MOUNTINGS AND JUNCTION BOX MOUNTINGS REQUIRED ON THIS GANTRY, REFER TO ITS OR LIGHTING DRAWINGS. CABLE TRAY ARRANGEMENT ADJUSTED TO SUIT IF NECESSARY.
15. FOR CABINET AND DUCT DETAILS REFER TO ITS OR LIGHTING DRAWINGS AS APPROPRIATE.
16. FOR FOUNDATION DETAILS, REFER TO THE SUBSTRUCTURE DRAWINGS HE551519-RAM-SGY-ZZ-DE-CB-51601, 51701 & 51702. THE FOUNDATION SHALL BE POSITIONED SUCH THAT NO PART OF THE GANTRY SUPERSTRUCTURE IS WITHIN A VERTICAL DISTANCE OF 1.5m FROM THE ADJACENT CARRIAGEWAY LEVEL.
17. FOR SUPERSTRUCTURE DETAILS REFER TO DRAWINGS HE551519-RAM-SGY-ZZ-DE-CB-51801 TO -51802.
18. UNLESS OTHERWISE NOTED, FOR STANDARD DETAILS, REFER TO HE551519-RAM-SGY-ZZ-DE-CB-55000 DRAWING SERIES.



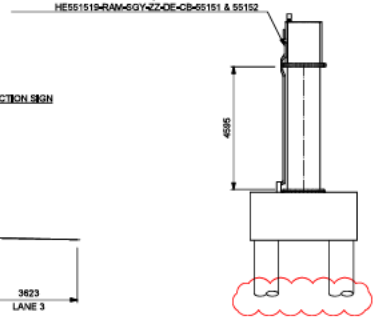
TOP BOOM PLAN
Scale 1:100



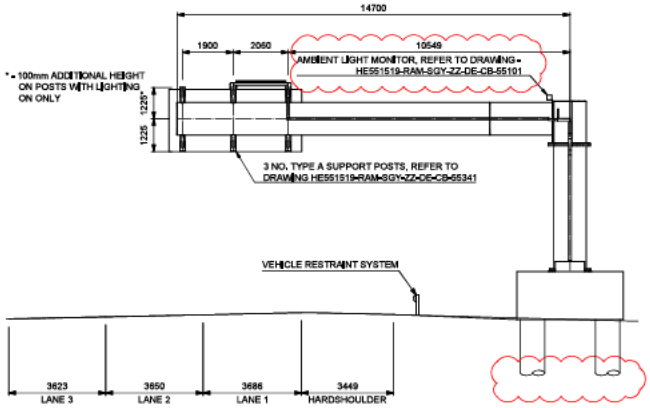
TYPICAL SECTION ALONG GANTRY
Scale 1:50



NORTHBOUND CARRIAGEWAY ELEVATION
Scale 1:100



VERGE ELEVATION
Scale 1:100



REAR ELEVATION
Scale 1:100

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
NONE

Maintenance / Cleaning
NONE

Use
NONE

Decommissioning / Demolition
NONE

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES RELATED TO SITE DATUM UNLESS NOTED OTHERWISE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT CONTRACT DRAWINGS.
4. [NOT USED]
5. NO SITE WELDS SHALL BE PERMITTED.
6. EARTH BONDING AND LIGHTNING CONDUCTION SHALL BE IN ACCORDANCE WITH HCD DRAWING MCX 0509 AND RELEVANT STANDARD DETAIL DRAWING.
7. FOR EQUIPMENT SUPPLIED BY THE CLIENT, THE LIGHTING DESIGN TEAM SHALL CONFIRM THE DETAILS AND MOUNTING ARRANGEMENTS OF THE EQUIPMENT PRIOR TO FABRICATION. FOR CONTRACTOR SUPPLIED ITEMS, THE CONTRACTOR SHALL CONFIRM THE DETAILS AND MOUNTING ARRANGEMENTS OF THE EQUIPMENT PRIOR TO FABRICATION.
8. SIGN SIZES, OVERHANGS AND FIXING DETAILS ARE TO BE CONFIRMED BY THE SIGN SUPPLIER PRIOR TO FABRICATION OF THE GANTRY.
9. FOR LIFTING ATTACHMENTS AND LIFTING ARRANGEMENT, REFER TO RELEVANT STANDARD DETAIL DRAWING.

KEY TO SYMBOLS

REV	DATE	REVISION NOTE
C01	27/05/22	FIT FOR CONSTRUCTION
P01	21/03/22	FIRST ISSUE

DESIGNER
RAMBOLL

CONTRACTOR
GRAHAM

CLIENT
highways england

PROJECT TITLE
M25 JUNCTION 28 IMPROVEMENTS

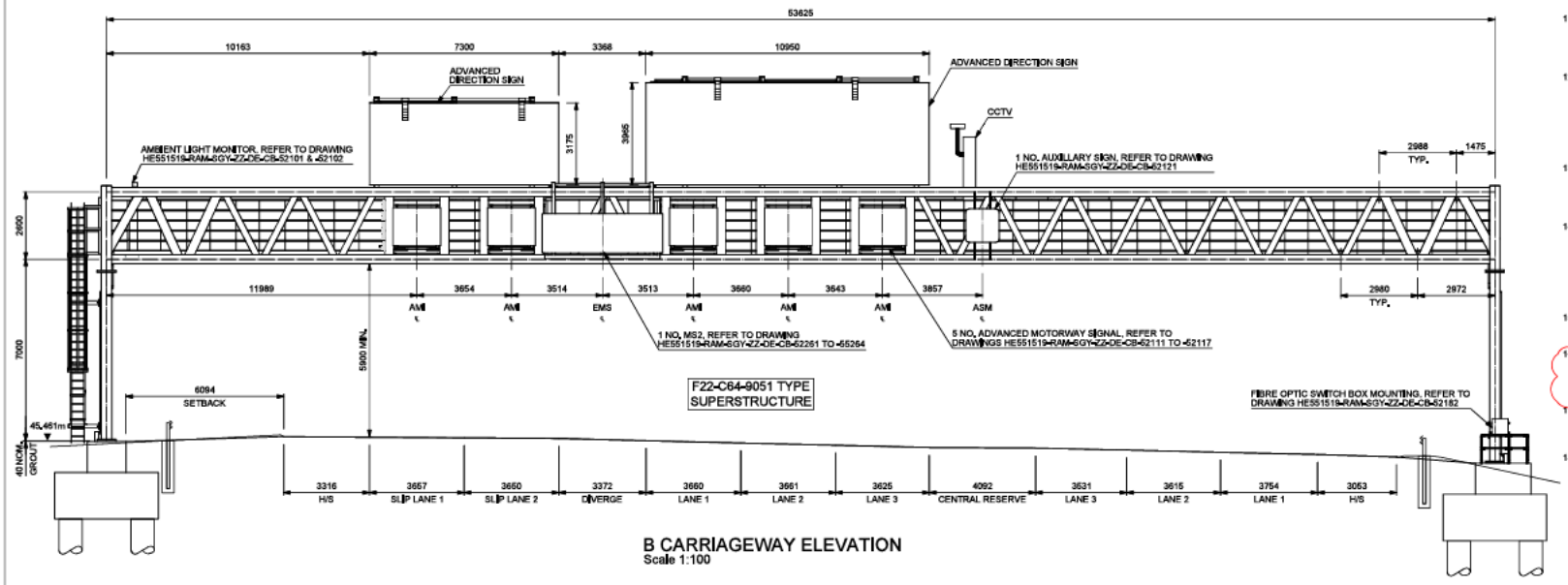
PROJECT STAGE
PCF STAGE 5

DRAWING TITLE
GANTRY GA3-NB-01
SUPERSTRUCTURE
GENERAL ARRANGEMENT

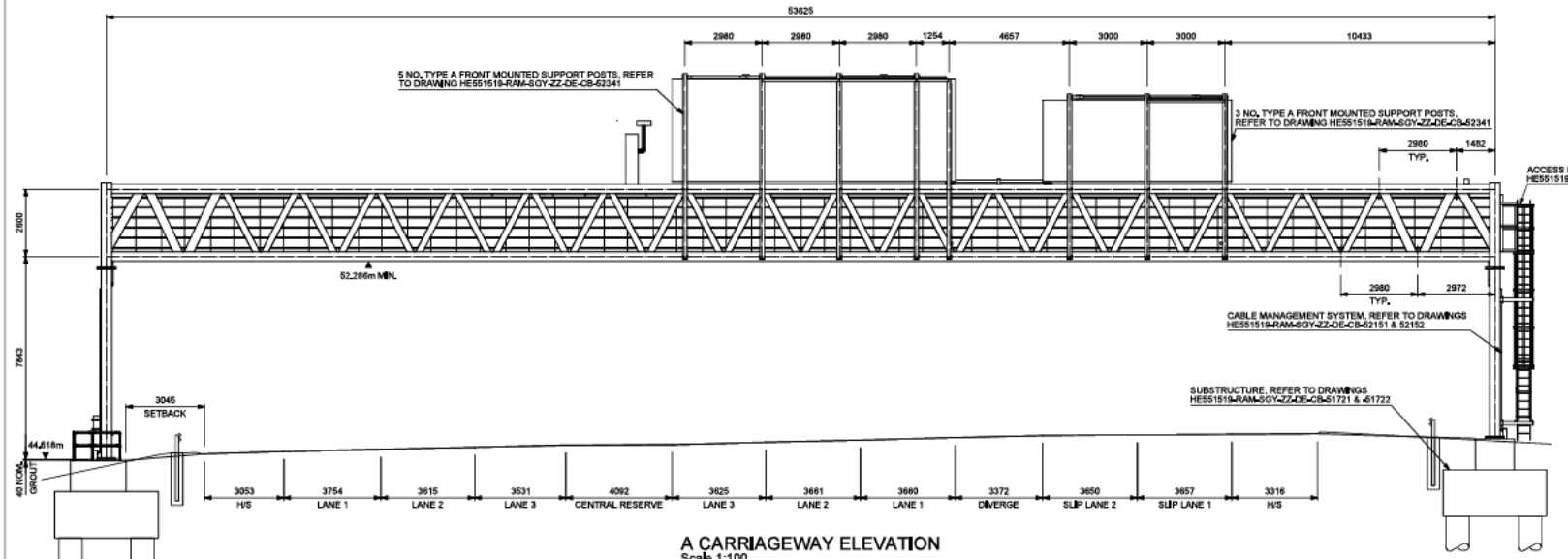
SUITABILITY
FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS NOTED	A	C01

DRAWING NUMBER
HE551519-RAM-SGY-GA3_NB_01-DR-CB-50001



B CARRIAGEWAY ELEVATION
Scale 1:100



A CARRIAGEWAY ELEVATION
Scale 1:100

10. FOR PAINTING DETAILS, REFER TO APPENDIX 19 OF THE SPECIFICATION.
11. ALL EXISTING DIMENSIONS, WHERE RELEVANT, ARE TO BE CONFIRMED ON SITE BY THE CONTRACTOR PRIOR TO FABRICATION.
12. VEHICLE RESTRAINT SYSTEM SHALL BE AS DETAILED IN APPENDIX 4/1 OF THE SPECIFICATION, UNLESS OTHERWISE NOTED WITHIN THE SPECIFICATION. EN 1317 VEHICLE INTRUSION VALUES SHALL NOT EXCEED THE WORKING WIDTH.
13. THE GANTRY BOOM SHALL HAVE A FABRICATED PRE-CAMBER AS PER THE REQUIREMENTS ON THE GANTRY STRUCTURAL DETAILS DRAWINGS.
14. FOR QUANTITY OF ALM SENSORS, SIGN LIGHTING PHOTOCELL MOUNTINGS AND JUNCTION BOX MOUNTINGS REQUIRED ON THIS GANTRY, REFER TO ITS OR LIGHTING DRAWINGS. CABLE TRAY ARRANGEMENT ADJUSTED TO SUIT IF NECESSARY.
15. FOR CABINET AND DUCT DETAILS REFER TO ITS OR LIGHTING DRAWINGS AS APPROPRIATE.
16. FOR FOUNDATION DETAILS, REFER TO THE SUBSTRUCTURE DRAWINGS HE551519-RAM-SGY-ZZ-DE-CB-51601 AND 51721 TO -51724.
17. FOR SUPERSTRUCTURE DETAILS REFER TO DRAWINGS HE551519-RAM-SGY-ZZ-DE-CB-51821 TO -51823.
18. UNLESS OTHERWISE NOTED, FOR STANDARD DETAILS, REFER TO HE551519-RAM-SGY-ZZ-DE-CB-52000 DRAWING SERIES.

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES RELATED TO SITE DATUM UNLESS NOTED OTHERWISE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT CONTRACT DRAWINGS.
4. [NOT USED]
5. NO SITE WELDS SHALL BE PERMITTED.
6. EARTH BONDING AND LIGHTNING CONDUCTION SHALL BE IN ACCORDANCE WITH HCD DRAWING MCX 0509 AND RELEVANT STANDARD DETAIL DRAWING.
7. FOR EQUIPMENT SUPPLIED BY THE CLIENT, THE ITS DESIGN TEAM SHALL CONFIRM THE DETAILS AND MOUNTING ARRANGEMENTS OF THE EQUIPMENT PRIOR TO FABRICATION. FOR CONTRACTOR SUPPLIED ITEMS, THE CONTRACTOR SHALL CONFIRM THE DETAILS AND MOUNTING ARRANGEMENTS OF THE EQUIPMENT PRIOR TO FABRICATION.
8. SIGN SIZES, OVERHANGS AND FIXING DETAILS ARE TO BE CONFIRMED BY THE SIGN SUPPLIER PRIOR TO FABRICATION OF THE GANTRY.
9. FOR LIFTING ATTACHMENTS AND LIFTING ARRANGEMENT, REFER TO RELEVANT STANDARD DETAIL DRAWING.

KEY TO SYMBOLS

REV	DATE	REVISION NOTE
C01	27/05/2022	FIT FOR CONSTRUCTION
P01	30/03/2022	FIRST ISSUE

DESIGNER: RAMBOLL

CONTRACTOR: GRAHAM

CLIENT: highways england

PROJECT TITLE: M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE: PCF STAGE 5

DRAWING TITLE: GANTRY GA3-NB-02 SUPERSTRUCTURE GENERAL ARRANGEMENT SHEET 1 OF 2

SUITABILITY: FIT FOR CONSTRUCTION

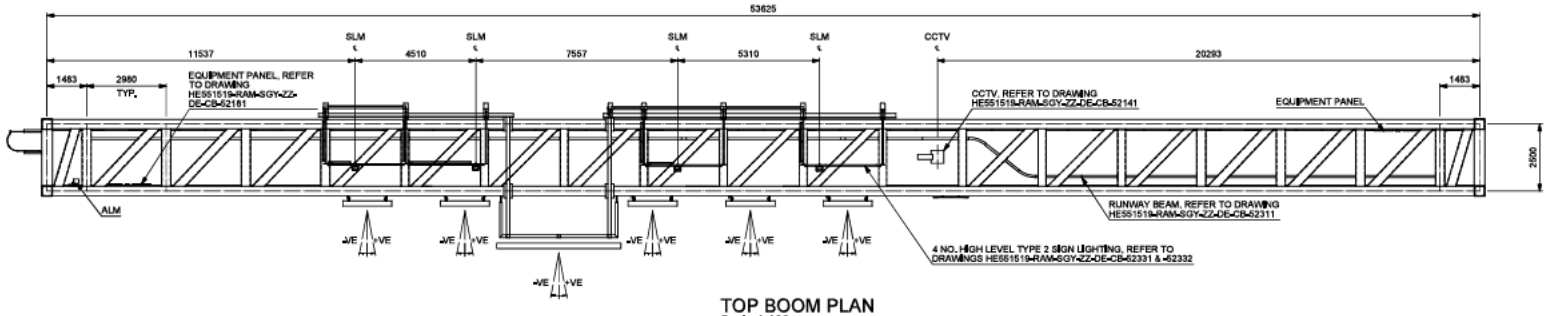
SHEET SIZE	SCALE	STATUS	REVISION
A1	AS NOTED	A	C01

DRAWING NUMBER: HE551519-RAM-SGY-GA3_NB_02-DR-CB-50001

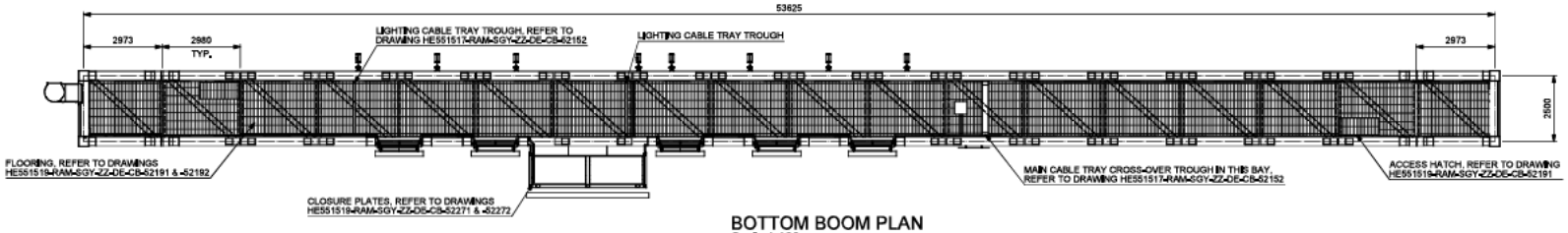
SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

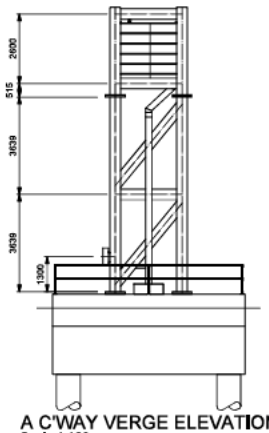
Construction	NONE
Maintenance / Cleaning	NONE
Use	NONE
Decommissioning / Demolition	NONE



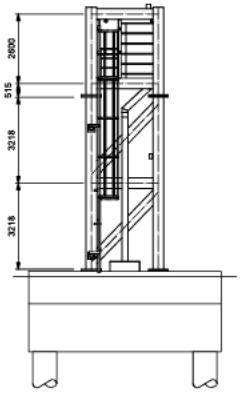
TOP BOOM PLAN
Scale 1:100



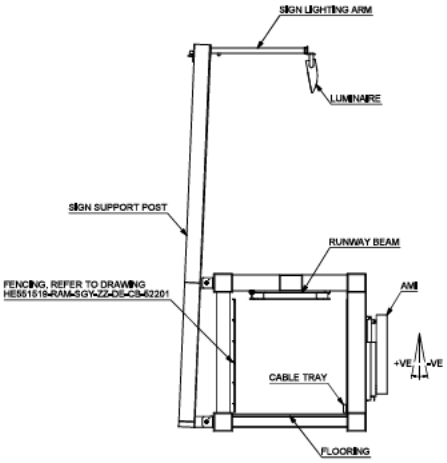
BOTTOM BOOM PLAN
Scale 1:100



A C'WAY VERGE ELEVATION
Scale 1:100



B C'WAY VERGE ELEVATION
Scale 1:100



TYPICAL SECTION ALONG GANTRY
Scale 1:50

'B' C'WAY SIGNAL SETTING OUT							
MS2	H	5°					
	V	4.4°					
AMI		SL1	SL2	L1	L2	L3	
	H	7°	4°	3°	3°	3°	
	V	4.5°	4.5°	4.5°	4.5°	4.5°	

NOTES

1. FOR GENERAL NOTES, REFER TO SHEET 1

KEY TO SYMBOLS

REV	DATE	REVISION NOTE
C01	27/05/2022	FIT FOR CONSTRUCTION
P01	30/03/2022	FIRST ISSUE

DESIGNER
RAMBOLL

CONTRACTOR
GRAHAM

CLIENT
highways england

PROJECT TITLE
M25 JUNCTION 28 IMPROVEMENTS

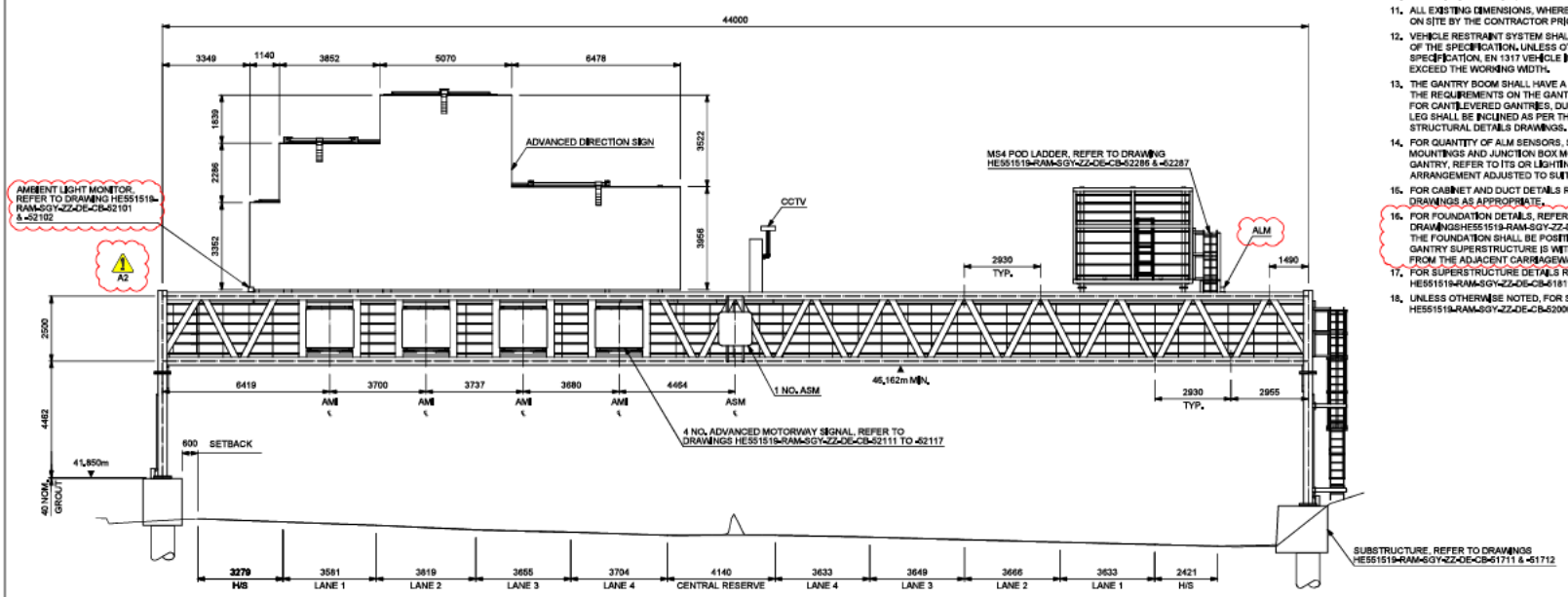
PROJECT STAGE
PCF STAGE 5

DRAWING TITLE
GANTRY GA3-NB-02
SUPERSTRUCTURE
GENERAL ARRANGEMENT
SHEET 2 OF 2

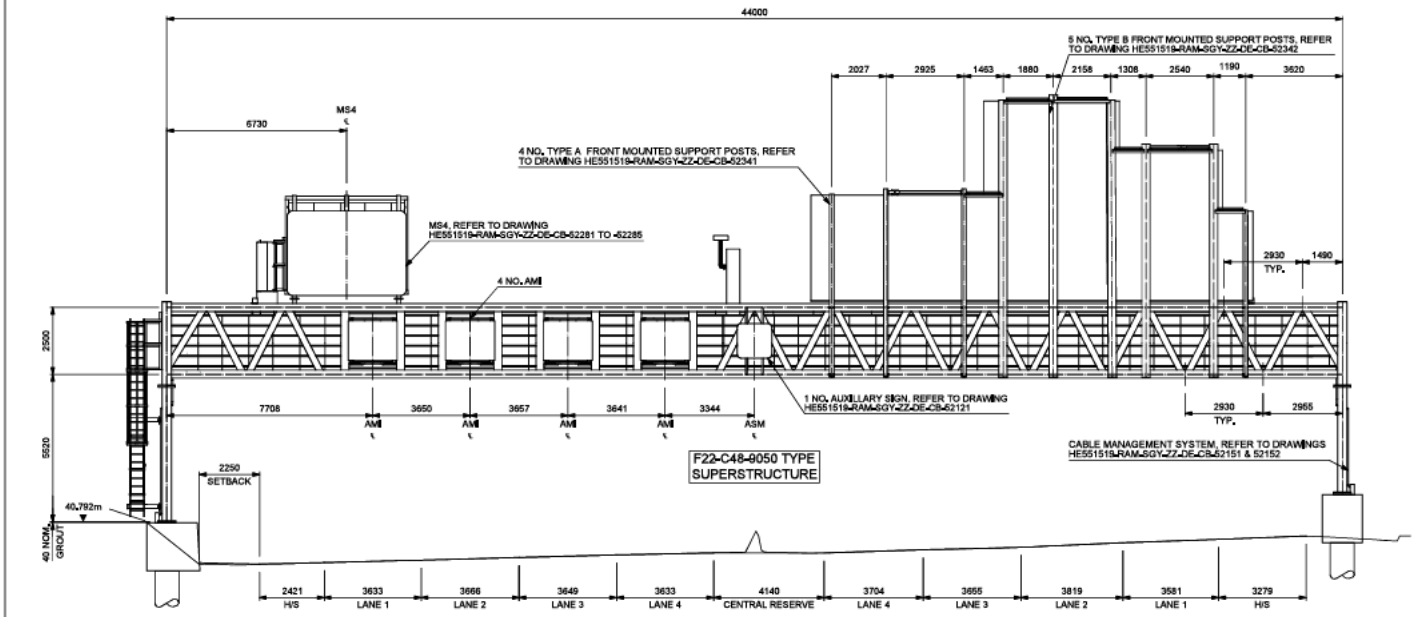
SUITABILITY
FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS NOTED	A	C01

DRAWING NUMBER
HE551519-RAM-SGY-GA3_NB_02-DR-CB-50002



A CARRIAGEWAY ELEVATION
Scale 1:100



B CARRIAGEWAY ELEVATION
Scale 1:100

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15. FOR CABINET AND DUCT DETAILS REFER TO ITS OR LIGHTING DRAWINGS AS APPROPRIATE.
16. FOR FOUNDATION DETAILS, REFER TO THE SUBSTRUCTURE DRAWINGSHE551519-RAM-SGY-ZZ-DE-CB-51601 AND 51711 TO -51714. THE FOUNDATION SHALL BE POSITIONED SUCH THAT NO PART OF THE GANTRY SUPERSTRUCTURE IS WITHIN A VERTICAL DISTANCE OF 1.5m FROM THE ADJACENT CARRIAGEWAY LEVEL.
17. FOR SUPERSTRUCTURE DETAILS REFER TO DRAWINGS HE551519-RAM-SGY-ZZ-DE-CB-51811 TO -51813.
18. UNLESS OTHERWISE NOTED, FOR STANDARD DETAILS, REFER TO HE551519-RAM-SGY-ZZ-DE-CB-52000 DRAWING SERIES.

NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES RELATED TO SITE DATUM UNLESS NOTED OTHERWISE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT CONTRACT DRAWINGS.
4. [NOT USED]
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9. FOR LIFTING ATTACHMENTS AND LIFTING ARRANGEMENT, REFER TO RELEVANT STANDARD DETAIL DRAWING.

KEY TO SYMBOLS

THESE NOTES ARE BASED ON THE USE OF EXPERIENCED AND COMPETENT CONTRACTORS CARRYING OUT THE WORK USING AN APPROVED SAFE METHOD OF WORKING

KEY TO HEALTH AND SAFETY SYMBOLS:
- INDICATES A RESIDUAL RISK REQUIRING A COMPULSORY ACTION
- INDICATES A RESIDUAL RISK FOR INFORMATION
- INDICATES A RESIDUAL RISK REQUIRING A PROHIBITIVE ACTION
- INDICATES A RESIDUAL RISK AS A WARNING

REV	DATE	REVISION NOTE
C01	27/05/2022	FIT FOR CONSTRUCTION
P01	22/03/2022	FIRST ISSUE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
A2 - RISK OF COMING INTO CONTACT WITH OR IN CLOSE PROXIMITY OF CABLES WHICH WILL RESULT IN BURNS, LIFE CHANGING INJURIES OR DEATH.

Maintenance / Cleaning
NONE

Use
NONE

Decommissioning / Demolition
NONE

DESIGNER: RAMBOLL

CONTRACTOR: GRAHAM

CLIENT: highways england

PROJECT TITLE: M25 JUNCTION 28 IMPROVEMENTS

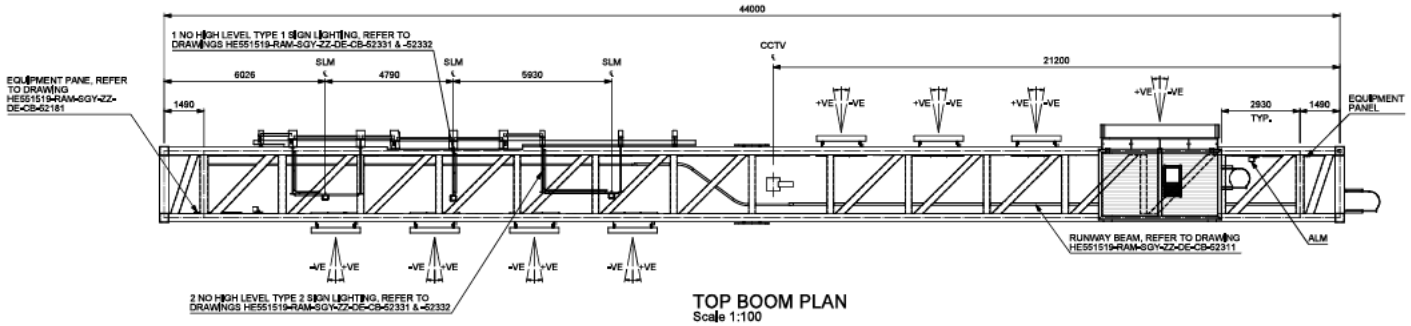
PROJECT STAGE: PCF STAGE 5

DRAWING TITLE: GANTRY GA5-SB-01 SUPERSTRUCTURE GENERAL ARRANGEMENT SHEET 1 OF 2

SUITABILITY: FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS NOTED	A	C01

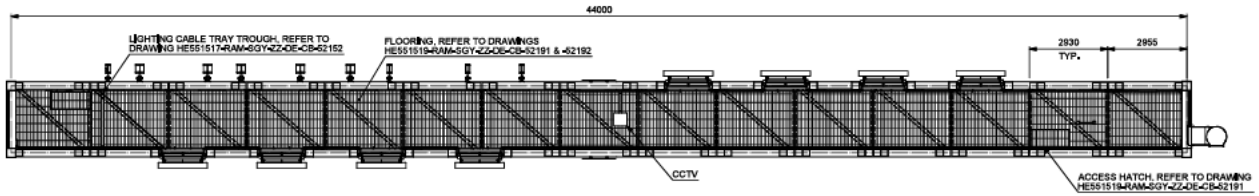
DRAWING NUMBER: HE551519-RAM-SGY-GA5_SB_01-DR-CB-50001



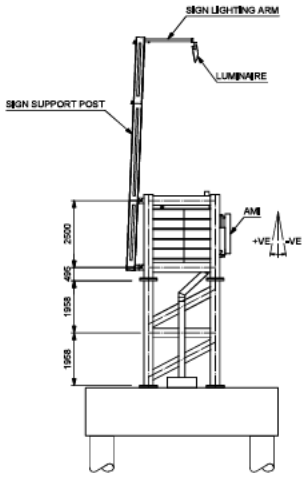
TOP BOOM PLAN
Scale 1:100

'A' C'WAY SIGNAL SETTING OUT					
		L1	L2	L3	L4
AMI	H	2,3°	2,3°	2,3°	2,3°
	V	2°	2°	2°	2°

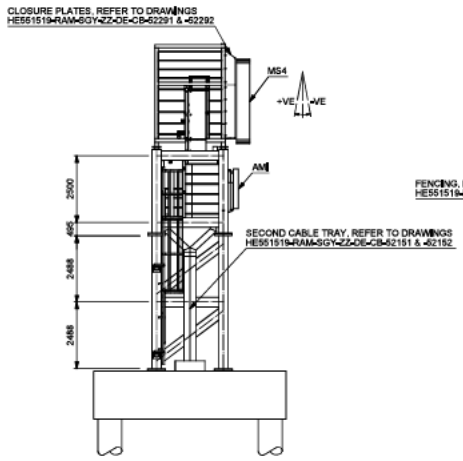
'B' C'WAY SIGNAL SETTING OUT					
MS4	H	1°			
	V	3°			
		L1	L2	L3	L4
AMI	H	2,8°	2,8°	2,8°	2,8°
	V	2°	2°	2°	2°



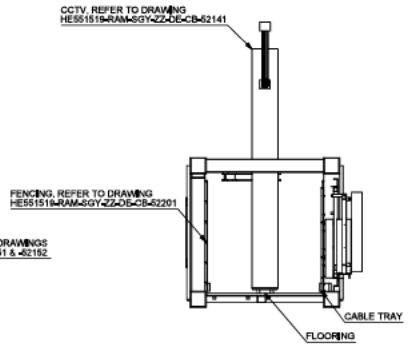
BOTTOM BOOM PLAN
Scale 1:100



A C'WAY VERGE ELEVATION
Scale 1:100



B C'WAY VERGE ELEVATION
Scale 1:100



TYPICAL SECTION ALONG GANTRY
Scale 1:50

NOTES
1. FOR GENERAL NOTES, REFER TO SHEET 1

KEY TO SYMBOLS

REV	DATE	REVISION NOTE
C01	27/05/2022	FIT FOR CONSTRUCTION
P02	31/03/2022	SIGNAL SETTING OUT
P01	22/03/2022	FIRST ISSUE

DESIGNER
RAMBOLL

CONTRACTOR
GRAHAM

CLIENT
highways england

PROJECT TITLE
M25 JUNCTION 28 IMPROVEMENTS

PROJECT STAGE
PCF STAGE 5

DRAWING TITLE
GANTRY GA5-SB-01
SUPERSTRUCTURE
GENERAL ARRANGEMENT
SHEET 2 OF 2

SUITABILITY
FIT FOR CONSTRUCTION

SHEET SIZE	SCALE	STATUS	REVISION
A1	AS NOTED	A	C01

DRAWING NUMBER
HE551519-RAM-SGY-GA5_SB_01-DR-CB-50002

Appendix C

DCO APPLICATION CHANGE REQUEST CORRESPONDENCE

Our Ref: HE551519-ATK-GEN-LN-XM-000011

Thomas Selby
Project Manager
Highways England
1 Walnut Tree Close
Guildford
Surrey GU1 4LZ

M25j28@highwaysengland.co.uk
0300 123 5000

Mr Richard Allen
Lead Member Examining Authority
Planning Inspectorate
National Infrastructure Planning
By email only

10 March 2021

Dear Sir

M25 junction 28 improvement scheme
Planning Inspectorate reference: TR010029
Notification of intention to make a request for additional changes to the Scheme (Changes 5-7)

I am writing to inform you that Highways England intends to submit an additional request for three changes to its application for a Development Consent Order (DCO) for the M25 junction 28 improvement scheme ("the Application").

Since submission of the Application in May 2020, Highways England has continued to engage with stakeholders and has undertaken further preliminary design work to refine the plans for the implementation and construction of the Scheme. As a result of this work Highways England has identified three further changes that it wishes to make to the Application (the Proposed Changes), which are outlined below.

As Highways England submitted an earlier change request to the Examining Authority (ExA) at deadline 3A on 18 February 2021 for changes numbered 1-4, the changes outlined in this letter have been numbered to follow on sequentially from those, and as such are referred to as Changes 5, 6 and 7.

Change 5 – Reduction to the realignment of the Weald Brook (Work No. 23C)
This change would reduce the length of straightening of the Weald Brook from approximately 70 metres to 40 metres. Realignment (straightening) of the Weald Brook is required due to the construction of the new loop road (Work No. 6),

including a new bridge, 'Duck Wood bridge' (Work No. 6C) which will carry the new loop road over the Weald Brook.

The original design for Duck Wood bridge was a two-span bridge with a central supporting pier which resulted in the need to realign a stretch of the Weald Brook (Work No. 23C). As a result of design development, revisions are proposed to the design of the bridge, including removal of the central supporting pier, meaning that the extent of realignment of the Weald Brook is reduced.

This change has been discussed with the Environment Agency and the London Borough of Havering who have provided positive feedback on this proposed change.

Change 6 – Realignment of UK Power Networks (UKPN) diversion (Work No. 30)

This change is to the realignment of the diversion underground of an existing 11kV overhead electric line owned and operated by UKPN approximately 640 metres long (Work No. 30). In the Application the diversion commences at a point situated south of the loop road (Work No. 6) in proximity of the proposed Grove bridge, and terminates approximately 120 metres north of the loop road and Duck Wood bridge as shown on sheets 1 and 3 of the Works plans [APP-006].

Change 6 is to revise the alignment for the cable diversion – which would still be below ground – moving it closer to the M25. The diversion would commence from UKPN's existing underground cable adjacent to the Weald Brook culvert to the west of the M25 and terminate at UKPN's substation on the M25 northbound on-slip near the Brook Street roundabout.

Highways England consulted UKPN on the proposed alignment prior to the Application being made and the proposed diversion was agreed in principle at that time. However, UKPN has recently expressed concerns that sections of the proposed diversion route in the Application are subject to surface water flooding and so UKPN has asked for the route to be revised. Change 6 therefore is to revise the alignment to address those concerns and the revised route has been agreed with UKPN. Further details of the proposed realignment will be included in the consultation materials being prepared in relation to these changes.

Change 7 – Refinement of Maylands golf course accommodation works (Work No. 32)

Change 7 is a refinement of the golf course accommodation works (Work No. 32) to accommodate an alternative design for replacement hole 2, associated remodelling, landscaping and other related works. This change follows continued discussions with Luddington Golf Ltd, which included reviewing the information provided as part of their Written Representations [REP2-032] together with that received from the landowner, Glebelands Estates Ltd [REP2-031].

As explained at the Issue Specific Hearing 1 (ISH1) held on Wednesday 3 March and Thursday 4 March 2021, Highways England continues to engage with the operator of Maylands Golf Course, Luddington Golf Ltd, and the freeholder Glebelands Estates Ltd, in order to best mitigate impacts of the Scheme on the

existing layout at Maylands Golf Course. As a result, an alternative solution for the redesign of the relevant part of the golf course is proposed, and further details of this will be included in the consultation materials being prepared in relation to these changes.

Change 7 would require an extension to the Order limits in the Application to include additional land occupied by the golf course. The additional land is only needed on a temporary basis. Highways England does not need to acquire it or rights in it. Accordingly, The Infrastructure Planning (Compulsory Acquisition) Regulations 2010 (the 2010 Regulations) would not be engaged.

Notwithstanding this prospective change, as explained at the ISH1, Highways England would be grateful if the ExA would proceed to determine whether to accept Change 3. If Change 7 is applied for following consultation and accepted by the ExA, Highways England's intention is to then withdraw Change 3 and proceed only with Change 7.

Proposed timetable for requesting the changes
In assessing the Proposed Changes, Highways England has had regard to the advice contained in the Planning Inspectorate's Advice Note 16 (How to request a change which may be material).

Highways England recognises that the decision as to whether any of the Proposed Changes individually or cumulatively constitute material changes is a matter for the ExA to determine. Having regard to the guidance, Highways England considers that Changes 5 and 6 are non-material. Change 7 may be regarded as a material change given that it would result in the need for additional land outside of the Order limits in the dDCO.

Highways England considers that it would be appropriate to engage with potentially affected stakeholders arising from these changes on a non-statutory, targeted basis. Consultation is therefore proposed with Luddington Golf Ltd, Glebelands Estates Ltd, the Environment Agency, affected utility companies, the London Borough of Havering, Brentwood Borough Council, Essex Country Council, those with an interest in land affected by the Proposed Changes and those registered as Interested Parties to the Scheme with the Planning Inspectorate.

The results of all such engagement will be provided in the formal change request, which will take into account all representations received. As for Changes 1-4, Highways England does not intend, subject to the ExA's views, to publish newspaper notices or erect site notices advertising the consultation due to the targeted nature of the changes.

Highways England intends to make a formal request to the ExA to accept the Proposed Changes no later than 27 April 2021 (Deadline 6).

I should be grateful if you would acknowledge safe receipt of this letter and arrange for a copy of it and its enclosures to be placed before the ExA.

I look forward to your response.

Yours faithfully,

Tom Selby

Thomas Selby
Highways England
Project Manager for the M25 junction 28 improvement scheme

The Planning Inspectorate

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All Interested Parties and Statutory Parties

Your Ref:

Our Ref: TR010029

Date: 5 May 2021

Planning Act 2008 (as amended) Section 89
The Infrastructure Planning (Examination Procedure) Rules 2010 (as amended) – Rules 9 and 17

Application by Highways England for an Order granting Development Consent for the M25 Junction 28 Improvement Project - Request to Make Changes to the Original Application

We are writing to inform you of the Procedural Decision made by the Examining Authority (ExA) to request additional consultation regarding the Applicant's request for the ExA to accept an amendment to the above-mentioned Development Consent Order (DCO) application. This formal Change Request, Nos. 5, 6 and 7 to the application was made at Deadline 6 [REP6-002], [REP6-022] and [REP6-023]. Interested Parties (IPs) will note that Change Requests 1 to 4 were accepted into the Examination on 26 February 2021 [PD-012] and 19 March 2021 [PD-013].

As it currently stands, the Applicant seeks development consent for 31 different works associated with the construction of a new slip road at Junction 28 which intersects the M25 with the A12.

The Applicant states [REP6-002], [REP6-022] and [REP6-023] that since the preparation and submission of the application, they have been in continued dialogue with Statutory Parties and IPs and as a result, they wish to make the following changes to the application.

Change Request No	Work No.	Summary of Change
5	23C	Reduction to the realignment of the Weald Brook following a design change to Duck Wood bridge, part of Work No 6 (proposed M25/A12 loop road)
6	30	Realignment of Work No 30 (diversion of overhead power lines to underground) from that shown on the Works plans [REP6-003] to an area to the east and adjacent to Work No 8 (M25 on slip realignment).
7	32	Enlargement of the Order limits by 54,578m^2 and to Plots 1/14, 3/21 and 3/23 (all temporary possession) to facilitate the realignment of Hole 2 and other works.

The ExA has assessed the Applicant's request in line with paragraphs 109 to 115 of DCLG Guidance 'Planning Act 2008: examination of applications for development consent' and the Planning Inspectorate's Advice Note 16 National Infrastructure Planning ().

Change Request Nos 5 and 6

The Applicant states that there would be no additional environmental effects from Change Request No 5 that have not been assessed within the Environmental Statement. As the works in this case would result in a reduced level of alignment to the Weald Brook, the ExA concurs and accepts Change Request 5 into the Examination as a non-material change.

The Applicant identifies potential landscape and visual and biodiversity effects caused by Change Request No 6 as a result of the inability to tree plant in this location. This is because the proposed realigned electric line would require an easement for access and maintenance purposes. However, the Applicant considers that the trees would be planted elsewhere within the Order limits such that there would be no additional environmental effects that have not been assessed within the Environmental Statement. The Applicant identifies [REP6-002], [REP6-022] and [REP6-023] that Change Request No 6 would be within the existing Order limits and would not involve additional land or powers sought currently.

Having examined the proposal, the ExA is satisfied that Change Request No 6 does not fundamentally alter the application and given the scope of works proposed and can also be accepted into the Examination as a non-material change.

Change Request No 7

The Applicant considers that a strong case exists for Change Request No 7 to be accepted into the Examination. This is because the sought changes only affect the Maylands Golf Club and has been undertaken in consultation with the Club's owners and landowners.

However, the ExA notes that the extension to the Order limits is not inconsiderable in size, and no response has been received from Luddington Golf Ltd or Glebelands Estate giving its views on this change; albeit that the ExA notes that no additional land and only Temporary Possession powers are sought. Furthermore, while the ExA notes the Applicant's assertion that there would be no change in the assessment conclusions in respect to landscape and visual and biodiversity, the Applicant nevertheless acknowledges that the extension to the Order limits encroaches further into the Ingrebourne Valley Site of Metropolitan Importance for Nature Conservation and that additional mitigation for habitat creation to mitigate the impact of the change on terrestrial habitat would be required.

While the ExA concurs with the Applicant that the Infrastructure Planning (Compulsory Acquisition) Regulations 2010 would not be engaged, we nevertheless consider that the views of IPs should be sought before the ExA determines whether this change can be accepted into the Examination.

Request for Responses

The ExA requests the views of IPs, particularly Luddington Golf Ltd, Glebelands Estates Ltd, London Borough of Havering and Natural England on the materiality of Change Request No 7. The ExA wishes to establish only whether the requested changes constitute a material change to the application, either individually or cumulatively, and whether or not it falls within the scope and assessment of the Environmental Statement. If it is the views of IPs that it does not, the ExA will require evidence of where the change would exceed the envelope of the Environmental Statement.

The ExA requests that the views of all relevant IPs are made in writing by **Deadline 7, Thursday 20 May 2021.**

Should you have any queries regarding the content of the letter, please contact the case team using the details at the top of this letter.

Yours faithfully

Richard Allen

Lead Member of the Examining Authority

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