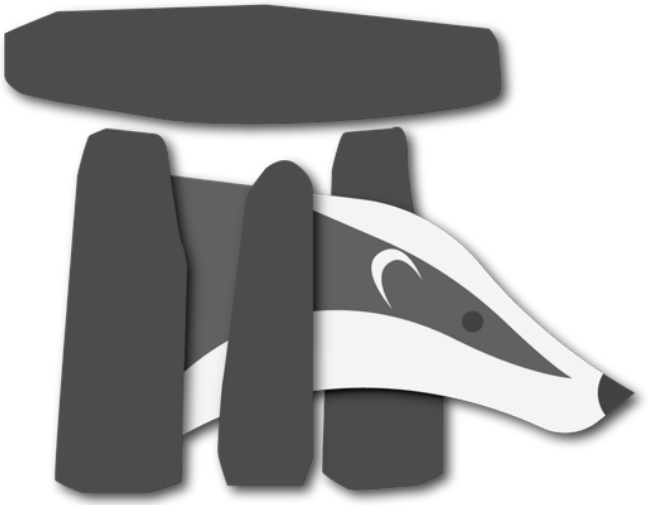

highways england

QS9C
Outline Approval in Principle (AIP) for:
Countess Roundabout Flyover

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APPENDICES

Project Details

Name of project: A303 – Amesbury to Berwick Down in Wiltshire.

Name of bridge or structure: Countess Junction flyovers

Structure reference No.: TBA

Summary

This Outline AIP covers the Countess Junction flyovers. This document records the agreed basis and outline criteria to be carried forwards for the detailed design of a highway structure in accordance with Highways England's Technical Approval (TA) procedures as outlined in CG 300. These procedures are required to give increased assurance for the required execution of highway structures.

Expected construction dates of scheme from 2023 to 2028.

1 HIGHWAY DETAILS

1.1 Type of highway

This is a proposed Dual 2-lane all-purpose carriageway (D2AP) with traffic lane widths outside the tunnels in accordance with CD 127, and four (4) slip roads all-purpose connector road (DG1C and (MG1C) providing access and egress from the new A303 in each direction.

1.2 Permitted traffic speed

As stated in the DCO Traffic Regulation Measures Plans (speed limits) the current proposal is for a 70-mph speed limit on this section of the highway network. Slip roads are for 40 mph speed limit. During contraflow for planned maintenance, a reduced 35 mph speed limit will be adopted or as deemed necessary to maintain safety.

1.3 Existing restrictions

The Countess Junction flyovers shall be designed and constructed as two separate single spans, fully integral structure carrying the A303 over the Countess roundabout.

2 SITE DETAILS

2.1 Obstacles crossed

Proposed Countess Junction flyovers structures spans over the Countess roundabout and A345. Site within World Heritage Site, thus DCO in place and mitigations in accordance with Detailed Archaeological Mitigation Strategy.

3 PROPOSED STRUCTURE

3.1 Description of structure and design working life

Countess flyovers are two integral portal bridges with decks composed of precast concrete beams and cast in situ concrete compression slab supported on bank seats on MSE walls.

Precast concrete Y beams and compression slab conform the decks, while the substructure is composed of bank seats and deep foundation with cast in situ piles.

These structures will not have permanent expansion joints nor bearings, due to be single spans and integral with substructure.

Six separate parallel vertical retaining walls constructed with soil reinforced with high adherence galvanised steel reinforcing strips and an engineering fill between will form three embankments (two approach embankments and one within the Junction between bridge structures).

Steel reinforced strips will be connected to precast concrete facing panels.

In regard to long term design strength two types of high adherence galvanized steel reinforcing strips are designed, 24kN and 42kN.

The maximum height of the MSE wall will be 8m.

The proposed vertical spacing layout of steel strips is 0.188m or 0.75m.

The maximum length of the reinforcement shall be up to 11m.

The Countess Junction flyovers structures will be designed for a design working life category 5 in accordance with Table 7.1 of DMRB CD 350 and Table NA.2.1 of British National Annex to BS EN 1990:2002.

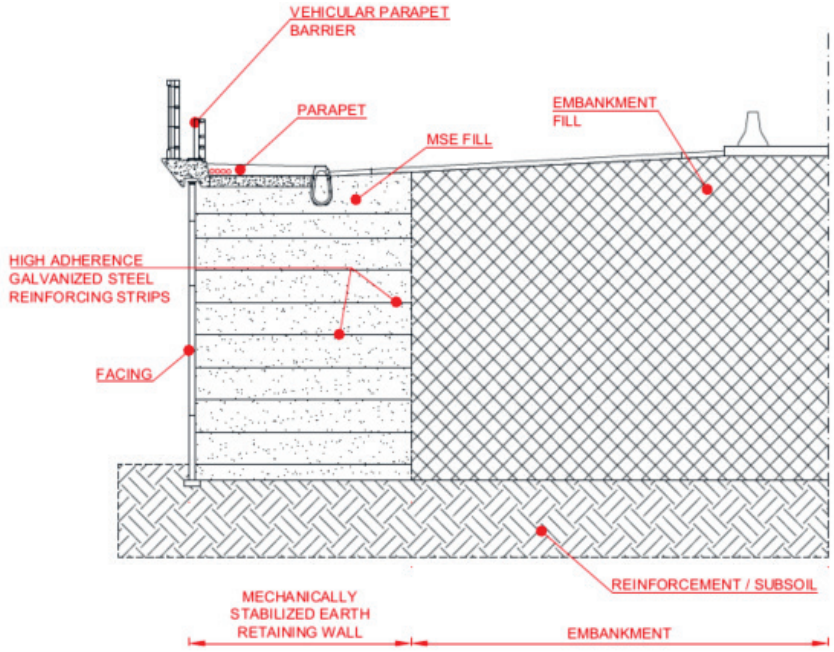
Nonstructural elements like safety and noise barriers will be design for a working life category 2 (typically 50 years design working life) according to table 7.1 of DMRB CD 350.

3.2 Structural type

Integral portal bridges with decks composed of precast concrete beams and cast in situ concrete compression slab supported on bank seats.

Vertical retaining wall supported by steel strips and a precast concrete facing panels.

General layout below (refer to appended drawings for actual details).



3.3 Foundation type

Shallow foundations in bank seats at abutments.

A geogrid/geocell mattress will be constructed at the base of the embankment.

Ground improvement in the form of piles/CMC columns will be utilized in the vicinity of the bridge abutment structures to reduce and manage settlements.

3.4 Span arrangements

Both decks are single span 26.70m each separated 68.38m.

3.5 Articulation arrangements

Due to be designed as an integral structure, ends of each deck are fixed to the supporting bankseats.

3.6 Classes and levels

A) Consequence class

For the main structure CC2, in line with CD 350, Table 7.2, and BS EN 1990 Table B1.

B) Reliability class

RC2 for whole structure and K_{FI} taken as 1.0, in accordance with BS EN 1990 Table B3.

C) Inspection level

Design Supervision Level DSL2. Inspection Level IL2 as required by CD 350, Table 7.2. for whole or parts of structure, in accordance with CD 350, Table 7.2.

3.7 Road restraint systems requirements

The structure has a VRS systems at both edges and the central reserve.

The central reserve will be provided with a rigid concrete barrier and the edges of the decks will be provided with steel vehicle parapets. The containment level shall be H2 and a Class B Impact Severity Level (ISL), according to 5.1 of ITPD Vol 2 part 2 and DMRB CD 377.

The edge VRS will be subject to an assessment according CD377 and the associated RRRAP at detailed design stage.

Crossover will need to be accommodated in the central VRS.

Proposed heights for Vehicle Parapets: 1000mm

According to section 13.4 of ITPD Vol 2 part 2, a noise barrier shall be provided on the northern and southern sides of the underbridge, approach and joining retaining Structures at Countess Roundabout Flyover. These barriers will be attached to dedicated posts independent of the VRS system. VRS system and noise barriers will be separated a distance equal to the working width of the VRS.

Required height for noise barriers: 1800mm.

3.8 Proposals for water management.

2 lines of bridge kerb drainage units will be used to drain the carriageways disposed in the lower side of them along the decks, connected to combined kerb drainage units in the approach ramps.

Bridge deck waterproofing shall be continuous, covering the entire deck between parapets upstands including the central reserve and verges. It will be composed of waterproofing membranes.

For the bankseats surfaces buried or in contact with backfilling, it will be applied a waterproofing membrane system and a bottom horizontal perforated tubes, as detailed in drawing HE551506-BGR-SBR-Z4BRC00Z-DR-S-0003.

Drainage shall be provided at the top [highway drainage] and on the base, outside of the MSE wall.

3.9 Proposed arrangements for future maintenance and inspection

A) Arrangements for future maintenance and inspection of structure. Access arrangements to structure.

Access for maintenance and inspection of the structure will be via the carriageway lane or full carriageway during closures for the elements on the deck. For those elements located underneath the decks, access will be via the use of mobile working platforms operating from the A345 under the deck.

The inspection and survey programme and methodology for the structures Assets shall include the baseline survey and inspection requirements in accordance with bellow baseline survey and inspection requirements:

- **Bridge structures:**
    - **General inspection frequency:** Year three (3) of Maintenance Period and two (2) yearly thereafter.
    - **Principal Inspection frequency:** Year one (1) and year five (5) of Maintenance Period and six (6) yearly thereafter.

3.10 Environment and sustainability

The use of precast concrete beams for the decks and the efficient engineering solution of MSE walls precast concrete facing panels, reduces site works, material and energy usage and subsequent CO_2 emissions, which benefits the environment. This methodology also eliminates the requirement for piling rigs to be visible on the horizon from the World Heritage Site.

3.11 Durability - materials and finishes

The durability of materials utilized will be such that the design life of 120 years is met with concrete specification in accordance with BS8500-1:2015.

The in situ and pre-cast concrete elements shall be grade C32/40 minimum.

Reinforcement shall be High Yield Grade B500B or B500C ‘Ribbed’ bars conforming to BS 4449:2005+A2:2009 and BS EN 10080:2005 with a characteristic yield strength fy = 500MPa.

The final finish to all in situ concrete pours will be determined during detailed design to suit the agreed design vision requirements. Buried concrete elements in permanent contact with the soil shall be painted with two coats of cut back bitumen or equivalent.

Finishes of the structures will be aligned with Design Vision principles:

- Warm coloured precast concrete finish to mechanically stabilized earth retaining wall.
- Edge treatment: Precast concrete, smooth finish, warm colour.
- Visual barrier – external face: Abstraction of woven pattern in lightweight concrete consistent with River Till visual screen detail.
- Acoustic barrier – facing road: Wood-concrete cladding to inside face of visual screen, behind road restraint system.

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

Early identification of risks in accordance with CDM regulations as referred to in **Appendix D**.

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

Provided in Financial Submission.

3.14 Proposed arrangements for construction

A) Construction of structure

Typical construction sequence for this type of decks:

- Partial filling of approach ramps.
- Execution of foundations: piles for bank seats in abutments.
- Bank seats of abutments.
- Placing of concrete beams on the substructure and pouring of concrete to complete the deck.
- Completion of approach embankments.
- Execution of road pavement, barriers and finishing.

Construction sequence for embankments:

- Excavate & Replace (or recompact) any Unsuitable/Soft Made Ground Deposits present at surface.
- Install piles / CMCs where required.
- Installation of Geogrid/Geocell Mattress.
- The wall formation level is prepared, the concrete levelling pad constructed, and the first course of precast concrete facing panels erected and temporarily propped.
- Class 6I/J is placed and compacted behind the facing up to the level of the first layer of high adherence strips.
- The high adherence strips are then laid and attached to the panel lug embedded in the precast concrete facing panels, using galvanized steel connection bolts.
- A further course of precast concrete facing panels is placed, and successive layers of frictional fill are placed and compacted on top of the high adherence strips until the level of the next layer of strips is reached. The sequence is repeated up to the required height of the structure.
- Embankment Stage 1 – Construct MSE embankment to circa 4m height, as well as dwarf walls and landscape fill.
- Hold Period (1 month assumed subject to trigger levels).
- Embankment Stage 2 - Construct the remainder of the MSE walls.
- Hold Period (1 month assumed subject to trigger levels).
- The parapet support units are constructed using normal reinforced concrete construction techniques.

B) Traffic management

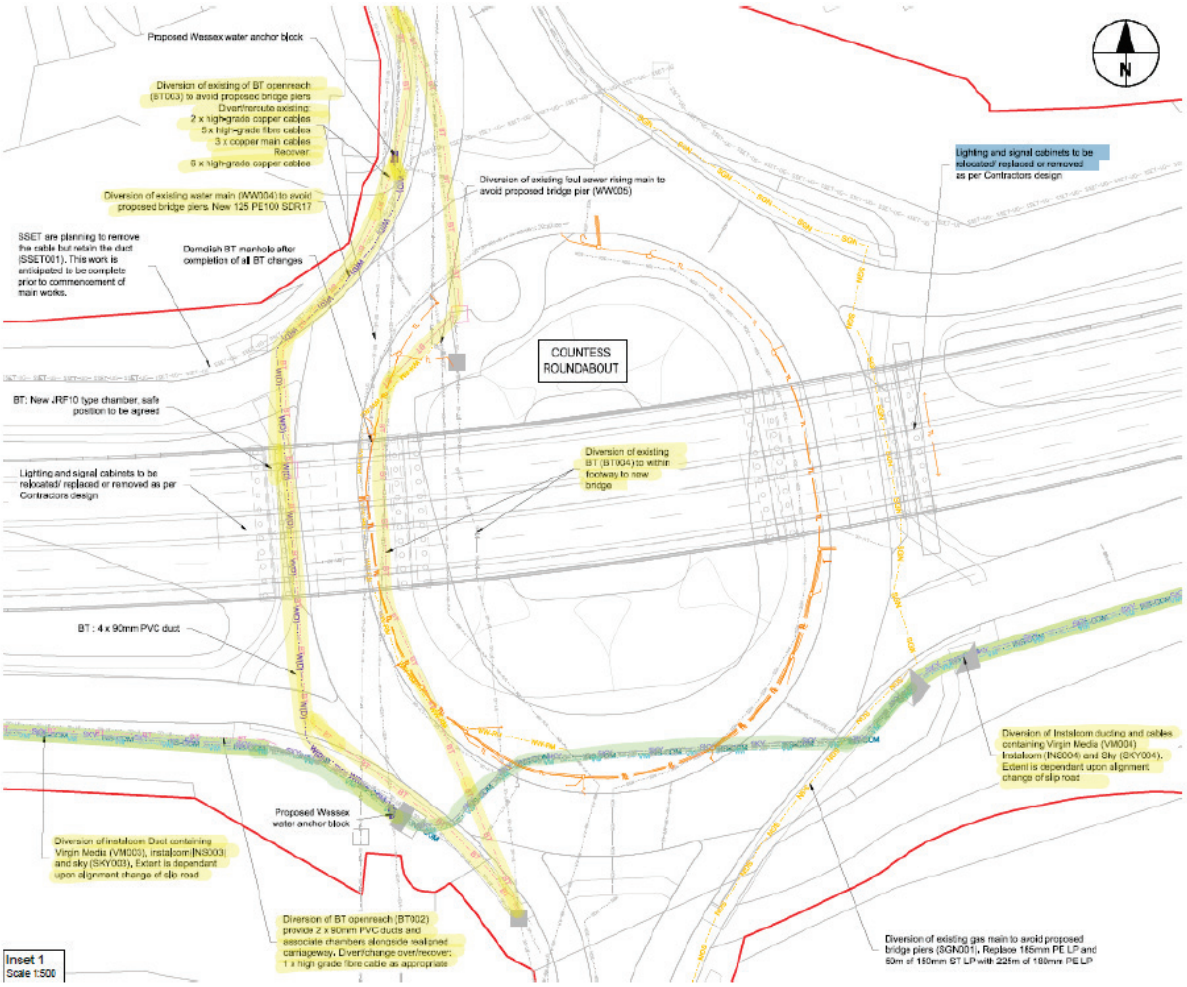
Traffic management is expected to be necessary as the Countess junction flyovers structure interact with the existing A303 and the A345. Traffic management proposals and construction sequencing has been provided by BADGER as part of the Quality Submission process.

C) Service diversions

The utilities to be diverted at Countess roundabout have been identified as follows:

- **Wessex water (Potable Water). WW004.** Diversion of existing main from northbound exit to A345 Countess Rd via new west footway of new western underpass to rejoin existing main to west of northbound Countess Rd entry over approx. 150m. Anchor blocks to be constructed at each end by Wessex Water.
- **Wessex water (foul Rising Main). WW005.** Diversion of existing pumping main located within central island of Countess Roundabout into new east footway of new western underpass to rejoin existing pumping main within southern area central island of Countess Roundabout over approx. 100m.
- **BT Openreach. BT003.** 250m diversion of existing cables comprising 2 x high grade copper; 5 x high grade fibre and 3 x copper cabling through 4 x 90mm ducting to avoid new bridge structure from a point opposite the entrance to the Travelodge on A345 Countess Rd via new west footway of new western underpass to rejoin existing cabling immediately southwest of roundabout to existing chamber.
- **BT Openreach. BT004.** Diversion of existing cabling comprising 3 x copper distribution and 3 x high grade fibre cabling through 4 x 90mm ducting from a point opposite the entrance to the Travelodge A345 Countess Rd via new east footway of new western underpass to rejoin existing cabling to west of northbound Countess Rd entry over approx. 240m.
- **SGN. SGN001.** Diversion/ replacement of existing 185 mm PE LP 150mm ST LP mains within area of proposed east bridge abutment with 180mm PE LP within new east footway of new eastern underpass to rejoin existing main within existing verge of Countess Road southern exit over approx. 225m.
- **Centurylink (managed by Instalcom). INS004.** Slew of existing 4-way duct system to line of new verge
- **Virgin Media. VM004.** Virgin Media apparatus is contained within CenturyLink ducting.
- **Sky. SK004.** Sky apparatus is contained within CenturyLink ducting
- Lighting and signal cabinets to be relocated and replaced
- **BT002:** Diversion of BT Openreach alongside realigned carriageway (slip road).
- **INS003:** Diversion of Instalcom Duct alongside alignment change of slip road.
- **VM003:** Diversion of Instalcom Duct (Virgin Media) alongside alignment change of slip road.

Below picture highlighting above service diversions:



D) Interface with existing structures

According to table 14-14 of ITPD Vol 2 part 2, the existing subway at Countess Roundabout shall be retain and fill the sections of the subway which supports the existing slip roads and demolish the remainder of the subway.

The Pumping Station at Countess Roundabout shall be retained, as well the next culverts:

- East of Countess Roundabout Culvert
- East of River Avon Bridge Culvert
- Minor Culvert (with headwalls) west of Countess Roundabout
- Minor Culvert (with headwalls) east of Countess Roundabout.

4 DESIGN CRITERIA

4.1 Actions

A) Permanent actions

Permanent actions will be applied in accordance with BS EN 1991-1-1 including the National Annex.

Parapet weight – 12 kPa – vertical unfactored load uniformly distributed under parapet.
Soil weight – 10 kPa – vertical unfactored load uniformly distributed under carriageway.

Assumed characteristic densities:

- Fill soil density: 20kN/m^3
- Groundwater: Groundwater level for detailed design was assumed to be at existing ground level.

B) Snow, wind and thermal actions

Snow actions will be considered in the structure as per BS EN 1991-1-3:2003 +A1:2015 and NA + A2:18 to BS EN 1991-1-3:2003+A1:2015.

Wind actions will be considered in the structure as per BS EN 1991-1-4:2005 +A1:2010 and NA to BS EN 1991-1-4:2005 + A1:2010.

Thermal actions will be considered in the structure as per BS EN 1991-1-5:2003 and NA to BS EN 1991-1-5:2003.

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

Load models LM1, LM2 and LM4 as per BS EN 1991-2 and NA to BS EN 1991-2:2003.

D) Actions relating to General Order traffic under STGO regulations

SV80, SV100 and SV196 loading as per CD 350 Table 7.6.2 & the National Annex to BS EN 1991-2:2003 and PD6688-2:2011.

E) Footway or footbridge variable actions

Variable actions considered in the footpath around the edge in accordance with BS EN 1991-2.

F) Actions relating to Special Order traffic, provision for exceptional abnormal indivisible; loads including location of vehicle track on deck cross-section

The structure will not be designed for Special Order Traffic, i.e., abnormal indivisible loads.

G) Accidental actions

Actions during construction will be considered in accordance with BS EN 1991-1-6:2005 and its UK National Annex. Vehicle impact loads on columns will be applied in accordance with BS EN 1991-1-7 including the National Annex and PD6688-2:2011, where applicable.

Actions due to explosion are not considered.

H) Actions during construction

It will be considered actions during construction for any machinery above the bridge in accordance with BS EN 1991-1-6:2005 and its UK National Annex.

I) Any special action not covered above

Not applicable.

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

Not considered.

4.3 Proposed minimum headroom to be provided

Minimum headroom = 5300mm plus sag curve compensation.