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**East Sussex County Council
Transport and Environment**

**Bexhill to Hastings Link Road
S08 Actons Farm Overbridge
Approval in Principle**

**Doc. Ref: JB-B1297000-PH2/1600.06a/0008
Revision 0
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Document control sheet

Client: East Sussex County Council Transport and Environment
 Project: Bexhill to Hastings Link Road Job No: B1297000
 Document Title: S08 Actons Farm Overbridge AIP

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Revision Summary

Client: East Sussex County Council Transport and Environment
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REVISION / DATE	COMMENT
Rev 0 07/09/12	Amended to incorporate TAA comments raised on Phase 1 AIP ref. JB-B1297000-PH1/1600.06a/0008(rev 0) Wingwall arrangement modified. Articulation proposal modified to exclude longitudinally fixed bearing. BHLR mainline verge Departure added. Geotechnical information updated.

1. HIGHWAY DETAILS

1.1 Type of highway

Over - Single lane 3.5m wide accommodation track with 1.0 m wide verges. Primary usage is for farm traffic and new Greenway (realigned Byway 76 including equestrians).

Under - Bexhill to Hastings Link Road - Wide single, two lane rural all purpose road (WS2).

1.2 Permitted traffic speed

Over: Traffic orders to be confirmed for restricted speed.

Under: 60 mph

1.3 Existing restrictions

The structure is located within the boundary of a Site of Nature Conservation Importance. No specific restrictions have been imposed.

2. SITE DETAILS

2.1 Obstacles crossed

The new Bexhill to Hastings Link Road (BHLR), a wide single, two lane urban and rural all purpose road (WS2), 10.0m wide carriageway with 1.0m wide hard strips and with 4.4m and 2.5m wide verges adjacent to the southbound and northbound lanes respectively.

3. PROPOSED STRUCTURE

3.1 Description of structure

The structure (OS grid reference 574891.3E, 110186.5N) is located 45m south of the existing Byway. It carries the realigned Actons Farm access track / Greenway route over the proposed BHLR.

The proposed new structure is a single span bridge consisting of a pair of painted steel beams with a concrete deck slab supported on bank seat supports with wing walls extending back parallel with the access road.

3.2 Structural type

The structure is a single span integral bridge designed as an end screen-type integral bridge in accordance with BA 42/96.

The superstructure is a single span, simply supported deck. It consists of a pair of fabricated painted steel girders acting compositely with a reinforced concrete deck slab. Transverse bracing will comprise K-bracing with a full depth reinforced concrete diaphragm/end-screen at the bearing support positions. The reinforced concrete deck slab will be cast on non-participating Glass Reinforced Plastic (GRP) permanent formwork. The parapet stringcourses will be cast in situ reinforced concrete. At the bankseats the end diaphragm will be supported on mechanical pot bearings supported on reinforced concrete plinths.

The substructures consist of reinforced concrete bankseat supports with reinforced concrete spread footings. Reinforced concrete wingwalls extend back parallel with the accommodation road. The wingwalls are both cantilevered from the bankseats and free-standing gravity cantilever retaining walls with partially debonded dowel connections to limit differential movement. The bankseats include cheek walls to the bearing shelves and access platforms for inspection of bearings.

3.3 Foundation type

Reinforced concrete spread footings to bankseats and free-standing wingwalls.

3.4 Span arrangements

Single 38m span between centreline of bearings. Skew angle 0°

3.5 Articulation arrangements

The structure will be of semi-integral design in accordance with BA 42/96.

Longitudinally guided and free bearings on both bank-seats

See plan of idealised structure in Appendix D.

3.6 Types of road restraint systems

The proposed road restraint system requirement has been confirmed by a RRRAP assessment. A type N1 classification in accordance with TD/19, metal vehicle parapet 1800mm high with 600mm solid infill panel at the bottom and mesh infill above, working width not greater than W4.

3.7 Proposed arrangements for maintenance and inspection

Inspection and maintenance of the substructure and bank-seats can be carried out at ground level from the level platform provided. Foundations will not be visible or accessible for inspection. Jacking points will be provided for bearing replacement as necessary. See also section 4.1.5.

3.7.1 Traffic management

General inspections can be carried out during normal working hours with adequate traffic management arrangements where necessary. Principal Inspections will require lane closures and single way working under traffic management.

3.7.2 Access

The deck soffit and outer parapet faces can be accessed by MEWP from the Link Road verge or carriageway or from the access track above.

Bearings can be accessed from the inspection platforms located in front of the abutments. The top surfaces and inner parapet faces can be accessed from the access track.

Foundations will not be visible or accessible for inspection.

3.8.1 Materials and finishes

Concrete	Element	Limiting Exposure Class	
C40/50	Deck slab	Soffit of permanent formwork	XD1
		Embedded ribs	Note A
		Top	XC3
		Cantilever soffit	XD1
C40/50	Parapet beams	XD1	

C40/50	Exposed abutment/wing walls	XD1
C40/50	Buried concrete	AC-3z
Note A	20 mm cover will be provided in accordance with IAN 95/07	
Reinforcement	All reinforcement to be grade 500B or 500C deformed bars to BS 4449:2005.	
	Dowels to be stainless steel : Strength Grade 500, material designation 1.4436 complying with BS 6744:2001 +A2:2009	
Structural steelwork	Steel beams: Grade S355J2+N in accordance with BS EN 10025.	
	No intermediate web stiffeners to be visible on external face of the completed structure.	
Parapets	Painted galvanised steel.	
Backfill to abutments and retaining walls	Fill material to structures to be Class 6N or 6P in accordance with Specification for Highway Works.	
Paint systems	All structural steelwork to be painted with a Type II paint system in accordance with the Specification for Highway Works.	
	Bearings to be painted with a Type IV paint system in accordance with the Specification for Highway Works.	
	Parapets to be painted with a Type V paint system in accordance with the Specification for Highway Works.	
	Exposure classification to be Inland Difficult Access – no maintenance up to 12 years, minor maintenance after 12 years, major maintenance after 20 years. Colour to be confirmed.	
Bolts	HSFG Steel bolts.	
Concrete Finishes		
Hidden / Buried surface	F1/U1	
Top of the deck slab	U4	
Deck soffit between main beams	Permanent formwork (GRP)	
Deck soffit (elsewhere)	F2	
Parapet fascia	F3/U3	
Other exposed elevations	F6 (grooved patterned profile finish)	
Protection		
	The top deck surface will be protected with a proprietary spray applied bridge deck waterproofing system to SHW CI 2003.	

All accessible concrete surfaces greater than 150mm below finished ground level to receive waterproofing to below ground concrete surfaces in accordance with the SHW CI 2004.

3.8.2 Sustainability issues

Conventional construction materials are proposed; therefore, no significant sustainability issues are foreseen.

3.9 Risks and hazards considered

Standard construction methods are anticipated along with normally associated risks and hazards. A design hazard log and risk assessment process is active for the scheme.

There are not considered to be any risks and hazards that would not be apparent to a competent contractor

3.10 Estimated cost of proposed structure together with other structural forms considered and the reasons for their rejection including comparative whole-life costs with dates of estimates.

The relative advantages, disadvantages and costs of various structural forms are discussed and appraised in Owen Williams reports No. 262701/012 'BHLR Structures Options Report' and No. 262701/060 'BHLR Structures Options Report – Addendum'.

3.11 Proposed arrangements for construction

3.11.1 Traffic management

N/A

3.11.2 Service diversions

N/A

3.11.3 Interface with existing structures

N/A

4. DESIGN CRITERIA

4.1 Live loading , Headroom

4.1.1 Loading relating to normal traffic under AW regulations and C&U regulations

Full HA loading in accordance with BD 37/01

4.1.2 Loading relating to General Order traffic under STGO regulations

Not required

4.1.3 Footway or footbridge live loading

Footway loading in accordance with BD 37/01

4.1.4 Loading relating to Special Order Traffic, provision for exceptional abnormal loads or indivisible loads, including location of vehicle track on deck cross-section

Not required

4.1.5 Any special loading not covered above

Jacking points will be provided between permanent bearing positions. The bridge will be designed to carry full HA design load during bearing replacement.

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

Bexhill – Hastings Link Road and the accommodation overbridge are neither heavy nor high load routes.

4.1.7 Minimum headroom provided

The minimum headroom of not less than 5.7m will be provided after allowing for deflections arising from dead load, live load and settlement.

4.1.8 Authorities consulted and any special conditions required

Authority Consulted	Special Requirement
ESCC Planning	None
ESCC	1 x 90mm PVC duct required over the structure (spare) 1 x 150mm duct required over the structure (spare)

4.2 List of relevant documents from the TAS

See Appendix A

4.2.1 Additional relevant standards

BS 8500; Part 1; 2006	Concrete; Complementary British Standard to BSEN 206-1; Method of specifying and guidance for the specifier
BS 8500; Part 2; 2006	Concrete; Complementary British Standard to BSEN 206-1; Specification for constituent materials and concrete
CHE Memorandum 227/08	The Impregnation of Reinforced and Prestressed Concrete Highway Structures Using Hydrophobic Pore Lining Impregnants

4.3 Proposed Departures from Standards given in 4.2 and 4.2.1

- Departure D3: Verges over/under Structures
- Implementation of CHE Memorandum 227/08 - Deletion of requirement for impregnation with hydrophobic pore lining impregnant
- Implementation of IAN 96/07 Rev 1 Guidance On Implementing Results Of Research On Bridge Deck Waterproofing
- Use of permanent formwork with deflection characteristics exceeding span/300

See Appendix E

4.4 Proposed methods for dealing with aspects not covered by Standards in 4.2 and 4.2.1

N/A

5. STRUCTURAL ANALYSIS

5.1 Methods of analysis proposed for superstructure, substructure and foundations

The deck will be analysed by plane linear elastic grillage analysis using proprietary software for vertical loads, assuming simple supports at the abutments.

The deck analysis will cover temporary and permanent stages and the action of deck cantilever formwork.

Out-of plane and secondary loading effects due to the curvature of the beams shall be evaluated in accordance with the guidelines outlined in the document 'Design of Curved Steel' by Steel Concrete Institute.

Analysis of deck slab for local effects to be carried out using a metre strip or Pucher chart method assuming that the slab is one way spanning and continuous over main girders.

The substructure and foundation will be analysed by simple hand calculations.

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

Model layout will be based on the recommendations given in 'Bridge Deck Behaviour, Second Edition' by E.C. Hambly.

See Appendix D.

5.3 Assumptions intended for calculation of structural element stiffness

Element stiffness for composite steel / concrete members will be determined in accordance with BS 5400; Part 3; 2000, Part 4; 1990 and Part 5; 2005 as implemented by the appropriate DMRB standards; ignoring reinforcement.

Element stiffness for concrete members will be determined in accordance with BS 5400; Part 4; 1990; Clause 4.4 using full elastic gross/ uncracked member cross sections ignoring the presence of reinforcement.

Global member stiffness for analysis will be determined as either composite or non-composite as appropriate to the construction or the permanent stage under consideration.

5.4 Proposed earth pressure coefficients (k_a , k_0 , or k_p) to be used in the design of earth retaining elements

For the analysis of earth retaining elements, k_a will be used for stability calculations and k_0 for structural element design. A representative peak angle of friction of 35° will be used, for which $k_a = 0.27$; $k_p = 3.69$ and $k_0 = 0.43$ (calculated in accordance with BD 30/87).

For analysis and design in accordance with BS8002 the soil parameters will be determined as a detailed design activity and will be implemented by specification of critical values within the contract specification appendices.

For class 6N backfill to the end screens, the mobilised earth pressure K^* in accordance with BA 42/96 shall be considered for the design of the end screens.

6. GEOTECHNICAL

6.1 Acceptance of recommendations of Section 8 of the Geotechnical Report to be used in the design and reasons for any proposed changes.

Section 2 of the Geotechnical Report has not been completed at this stage.

6.2 Geotechnical Report Highway Structure Summary Information (Form C)

A draft Geotechnical Report Highway Structure Summary sheet based on the information available in Part 1 of the Geotechnical Report is attached in Appendix C. A full Geotechnical Report Highway Structure Summary sheet and extracts from the completed Geotechnical Report Section 2 will be produced following development of the Geotechnical Report.

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

The structure is founded on spread footings extending to the stiff to very stiff laminated Clay / Silt of the Ashdown Formation. A maximum differential settlement of 25mm between abutments will be considered.

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

The preliminary choice of foundation is discussed in the draft Geotechnical Report Highway Structure Summary sheet contained in Appendix C. Part 2 of the Geotechnical Report, including Section 2 Highway Structures, is expected to be completed in Phase 2 of the project.

7. CHECKING

7.1 Proposed category of structure

Category 2

7.2 If Category 3, name of proposed Independent checkers.

N/A

7.3 Erection proposals or temporary works for which an independent check will be required, listing parts of the structure affected with reasons for recommending an independent check.

None

8. DRAWINGS AND DOCUMENTS

8.1 List of drawings and documents accompanying the submission.

Appendix A TAS dated February 2009

Appendix B	Drawing No B1297000-PH2/1600.01a/9081	Title Actons Farm Overbridge AIP General Arrangement
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Appendix C Geotechnical Information

Appendix D Idealised Structure

Appendix E Departures from Standards

9 THE ABOVE IS SUBMITTED FOR ACCEPTANCE

9.1 Submission by designer

Signed



Name: P. Blackie

Position: Structures team leader, Jacobs

Engineering Qualifications: BEng(Hons), CEng MICE

Date: 04/09/12

9.2 Endorsement by contractor

Signed



Name: S. LAPHORN

Engineering Qualifications: MEng (Hons) CEng MICE

Position: Design Coordinator

Hochtief Vinci Joint Venture

Date: 20/09/12

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

Reviewed:

Name:

Engineering qualifications:

Date:

Signed:

Name:

Engineering qualifications:

TAA

Date:

Appendix A List of Relevant Documents

Schedule of Design Documents Relating to Highway Bridges and Structures; February 2009

British Standards

BS 5268; Part 2; 2002	Structural Use of Timber
BS 5400	Steel concrete and composite bridges
Part 1; 1988	General Statement (see BD 15)
Part 2; 1978	Specification for loads (see BD 37)
Part 3; 2000	CP for design of steel bridges (see BD 13)
Part 4; 1990	CP for design of concrete bridges (see BD 24)
Part 5; 1979	CP for design of composite bridges (see BD 16)
Part 9; 1983	Bridge bearings (see BD 20)
Part 10; 1980	CP for fatigue (see BD 9)
BS 5628; Part 1; 1992	Unreinforced Masonry
BS 5930; 1999	Site Investigations
BS 6031; 1981	Earthworks
BS 8002; 1994	Earth retaining structures
BS 8004; 1986	Foundations
BS 8118; 1991	The structural use of aluminium
BS EN 1317-1-1998; Road Restraint Systems – Part 1	Terminology and general criteria for test methods
BS EN 1317-2-1998; Road Restraint Systems – Part 2	Performance classes, impact test acceptance criteria and test methods for safety barriers
BS EN 1317-3-2000; Road Restraint Systems – Part 3	Performance classes, impact test acceptance criteria and test methods for crash cushions
DD ENV 1317-4-2002; Road Restraint Systems – Part 4	Terminals and transitions
BS EN 14388; 2005	Road traffic noise reducing devices – Specification

Miscellaneous

~~Circular Roads No 61/72 – Routes for heavy and high abnormal loads.~~

~~Railway Group Approved Code of Practice GC/RC5510: Recommendations for the Design of Bridges (2000)
(for full list of other Network Rail Standards, refer to RSSB, Railway Safety and Standards Board)~~

~~Simplified Tables of External Loads on Buried Pipelines (1986)~~

The Manual of Contract Documents for Highway Works (MCDHW)

- Volume 1: Specification for Highway Works 1998, including amendments to May 2009
- Volume 2: Notes for Guidance on the Specification for Highway Works 1998, including amendments to May 2009
- Volume 3: Highway Construction Details 1991, including amendments to November 2008

The Design Manual for Roads and Bridges (DMRB)

- Bridges and Structures (BA Series)** *Reproduced on following pages*
- Bridges and Structures (BD Series)** *Reproduced on following pages*
- Bridges and Structures, Technical Memoranda (BE Series)** *Reproduced on following pages*

Traffic Engineering and Control, Standards (TD Series)

- TD 9/93 Road layout and geometry. Highway link design
- TD 19/06 Requirement of Road Restraint Systems & correction No. 1
- TD 27/05 Cross Sections and headroom
- TD 36/93 Subways for pedestrians and cyclists, layout and dimensions

Highways, Advice Notes (HA Series)

- HA 59/92 ~~————~~ Mitigating Against Effects on Badgers
- HA 80/99 Nature Conservation Advice in Relation to Bats
- HA 84/01 (1) Nature Conservation and Biodiversity
- HA 97/04 Nature Conservation Management Advice in Relation to Dormice
- HA 98/04 Nature Conservation in Relation to Amphibians

Highways, Standards (HD Series)

- HD 22/08 Managing Geotechnical Risk

ADVICE NOTES - BRIDGES AND STRUCTURES (BA SERIES)

BA 9/81	The Use of BS 5400: Part 10: 1980. Code of Practice for Fatigue Amendment No. 1
BA 16/97	The Assessment of Highway Bridges and Structures. Amendment No. 1 Amendment No. 2
BA 19/85	The Use of BS 5400: Part 3: 1982
BA 24/87	Early Thermal Cracking of Concrete Amendment No. 1
BA 26/94	Expansion Joints for Use in Highway Bridge Decks
BA 28/92	Evaluation of Maintenance Costs in Comparing Alternative Designs for Highway Structures
BA 30/94	Strengthening of Concrete Highway Structures Using Externally Bonded Plates
BA 34/90	Technical Requirements for the Assessment and Strengthening Programme for Highway Structures
BA 35/90	Inspection and Repair of Concrete Highway Structures
BA 36/90	The Use of Permanent Formwork
BA 37/92	Priority Ranking of Existing Parapets
BA 38/93	Assessment of the Fatigue Life of Corroded or Damaged Reinforcing Bars
BA 39/93	Assessment of Reinforced Concrete Half-joints
BA 40/93	Tack Welding of Reinforcing Bars
BA 41/98	The Design and Appearance of Bridges
BA 42/96	The Design of Integral Bridges [Incorporating Amendment No. 1 dated May 2003]
BA 43/94	Strengthening, Repair and Monitoring of Post-tensioned Concrete Bridge Decks
BA 44/96	Assessment of Concrete Highway Bridge and Structures
BA 47/99	Waterproofing and Surfacing Concrete Bridge Decks
BA 50/93	Post-tensioned Concrete Bridges: Planning, Organisation and Methods for Carrying Out Special Inspections
BA 51/95	The Assessment of Concrete Structures Affected by Steel Corrosion
BA 52/94	The Assessment of Concrete Highway Structures Affected by Alkali Silica Reaction
BA 53/94	Bracing Systems and the Use of U-Frames in Steel Highway Bridges
BA 54/94	Load Testing for Bridge Assessment
BA 55/06	The Assessment of Bridge Substructures and Foundations, Retaining Walls and Buried Structures
BA 56/96	The Assessment of Steel Highway Bridges and Structures
BA 57/01	Design for Durability
BA 58/94	Design of Bridges and Concrete Structures with External Unbonded Prestressing
BA 59/94	Design of Highway Bridges for Hydraulic Action
BA 61/96	The Assessment of Composite Highway Bridges
BA 67/96	Enclosure of Bridges
BA 68/97	Crib Retaining Walls
BA 72/03	Maintenance of Road Tunnels

ADVICE NOTES - BRIDGES AND STRUCTURES (BA SERIES)

BA 74/06	Assessment of Scour at Highway Bridges
BA 80/99	Use of Rock Bolts
BA 82/00	Formation of Continuity Joints in Bridge Decks
BA 83/02	Cathodic Protection for Use in Reinforced Concrete Highway Structures
BA 84/02	Use of Stainless Steel Reinforcement in Highway Structures
BA 85/04	Coatings for Concrete Highway Structures & Ancillary Structures
BA 86/06	Advice Notes on the Non-Destructive Testing of Highway Structures
BA 87/04	Management of Corrugated Steel Buried Structures
BA 88/04	Management of Buried Concrete Box Structures
BA 92/07	The Use of Recycled Concrete Aggregates in Structural Concrete
BA 93/09	Structural Assessment of Bridges with Deck Hinges

STANDARDS - BRIDGES AND STRUCTURES (BD SERIES)

BD 2/05	Technical Approval of Highway Structures
BD 7/01	Weathering Steel for Highway Structures
BD 9/81	Implementation of BS 5400: Part 10: 1980. Code of Practice for Fatigue
BD 10/97	Design of Highway Structures in Areas of Mining Subsidence
BD 12/01	Design of Corrugated Steel Buried Structures with Spans Greater than 0.9 Metres and up to 8.0 Metres
BD 13/06	Design of Steel Bridges. Use of BS 5400: Part 3: 2000
BD 15/92	General Principles for the Design and Construction of Bridges. Use of BS 5400: Part 1: 1988
BD 16/82	Design of Composite Bridges. Use of BS 5400: Part 5: 1979 Amendment No. 1
BD 20/92	Bridge Bearings. Use of BS 5400: Part 9: 1983
BD 21/01	The Assessment of Highway Bridges and Structures
BD 24/92	Design of Concrete Bridges. Use of BS 5400: Part 4: 1990
BD 27/86	Materials for the Repair of Concrete Highway Structures
BD 28/87	Early Thermal Cracking of Concrete Amendment No. 1
BD 29/04	Design Criteria for Footbridges
BD 30/87	Backfilled Retaining Walls and Bridge Abutments
BD 31/01	The Design of Buried Concrete Box and Portal Frame Structures
BD 33/94	Expansion Joints for Use in Highway Bridge Decks
BD 34/90	Technical Requirements for the Assessment and Strengthening Programme for Highway Structures
BD 35/06	Quality Assurance Scheme for Paints and Similar Protective Coatings
BD 36/92	Evaluation of Maintenance Costs in Comparing Alternative Designs for Highway Structures
BD 37/01	Loads for Highway Bridges

STANDARDS - BRIDGES AND STRUCTURES (BD SERIES)

BD 41/97	Reinforced Clay Brickwork Retaining Walls of Pocket Type and Grouted Cavity type Construction Use of BS 5628: Part 2: 1995
BD 42/00	Design of Embedded Retaining Walls and Bridge Abutments
BD 43/03	The Impregnation of Reinforced and Prestressed Concrete Highway Structures using Hydrophobic Pore-Lining Impregnants
BD 44/95	The Assessment of Concrete Highway Bridges and Structures
BD 45/93	Identification Marking of Highway Structures
BD 46/92	Technical Requirements for the Assessment and Strengthening Programme for Highway Structures [Stage 2 – Modern Short Span Bridges]
BD 47/99	Waterproofing and Surfacing of Concrete Bridge Decks
BD 48/93	The Assessment and Strengthening of Highway Bridge Supports
BD 49/01	Design Rules for Aerodynamic Effects on Bridges
BD 50/92	Technical Requirements for the Assessment and Strengthening Programme for Highway Structures Stage 3 – Long Span Bridges
BD 51/98	Portal and Cantilever Signs/Signal Gantries
BD 53/95	Inspection and Records for Road Tunnels
BD 54/93	Post-tensioned Concrete Bridges, Prioritisation of Special Inspections
BD 56/96	The Assessment of Steel Highway Bridges and Structures
BD 57/01	Design for Durability
BD 58/94	The Design of Concrete Highway Bridges and Structures with External and Unbonded Prestressing Design of Highway Bridges for Vehicle Collision Loads
BD 60/04	Design of Highway Bridges for Vehicle Collision Loads
BD 61/96	The Assessment of Composite Highway Bridges
BD 62/07	As Built, Operational and Maintenance Records for Highway Structures
BD 63/07	Inspection of Highway Structures
BD 65/97	Design Criteria for Collision Protector Beams
BD 67/96	Enclosure of Bridges
BD 68/97	Crib Retaining Walls
BD 70/03	Strengthened/Reinforced Soils and Other Fills for Retaining Walls and Bridge Abutments Use of BS8006: 1995, incorporating Amendment No. 1 (Issue 2 March 1999)
BD 74/00	Foundations
BD 78/99	Design of Road Tunnels
BD 79/06	The Management of sub-Standard Highway Structures
BD 81/02	Use of Compressive Membrane Action in Bridge Decks
BD 82/00	Design of Buried Rigid Pipes
BD 84/02	Strengthening of Concrete Bridge Supports Vehicle Impact Using Fibre Reinforced Polymers
BD 85/08	Strengthening Highway Structures Using Externally Bonded Fibre Reinforced Polymer
BD 86/07	The Assessment of Highway Bridges and Structures For The Effects of Special Types General Order (STGO) and Special Order (SO) Vehicles
BD 87/05	Maintenance Painting of Steelwork

STANDARDS - BRIDGES AND STRUCTURES (BD SERIES)

BD-89/03	The Conservation of Highway Structures
BD-90/05	Design of FRP Bridges and Highway Structures
BD-91/04	Unreinforced Masonry Arch Bridges
BD-94/07	Design of Minor Structures
BD-95/07	Treatment of Existing Structures on Highway widening Schemes

TECHNICAL MEMORANDA - BRIDGES (BE SERIES)

BE-13	Fatigue Risk in Bailey Bridges
BE-23	Shear Key Decks Amendment No. 1 to Annex
BE-5/75	Rules for the Design and Use of Freyssinet Concrete Hinges in Highway Structures
BE-7/04	Departmental Standard (Interim) Motorway Sign/Signal Gantries

INTERIM ADVICE NOTES (IAN)

IAN 117/08 Rev 1	Certification of combined kerb and drainage products
IAN-116/08	Nature conservation advice in relation to bats
IAN 104/07	The Anchorage of Reinforcement and Fixings in Hardened Concrete
IAN-97/07	Assessment and upgrading of existing parapets
IAN 96/07r1	Guidance on implementing Results of Research on Bridge Deck Waterproofing
IAN 95/07	Revised Guidance Regarding the Use of BS8500(2006) For the Design and Construction of Structures Using Concrete
IAN-91/07	Interim Advice on the identification of "Particularly at Risk" supports
IAN 70/06	Implementation of New Reinforcement Standards
IAN 69/05	Design for Maintenance
IAN 48/03	Measures To Minimise The Risk of Sulphate Attack (Including Thaumasite) - New Construction and Structures Under Construction
IAN-47/02	Post-Tensioned Grouted Duct concrete Bridges
IAN 41/02	European Cement Standards
IAN 05/96	BD 24/92 The Design of Concrete Highway Bridges and Structures. Use of BS 5400: Part 4:1990
IAN-04/96	BD 44/95 The Assessment of Concrete Highway Bridges and Structures
IAN-03/96	BA-50/93 Post-Tensioned concrete Bridges

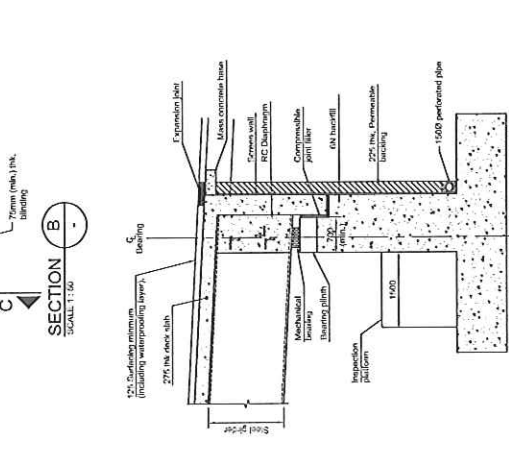
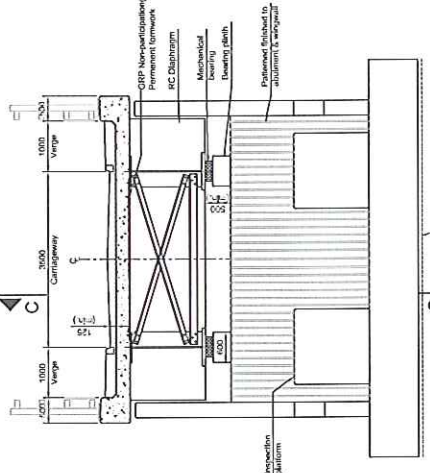
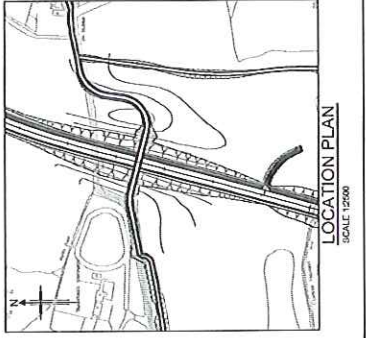
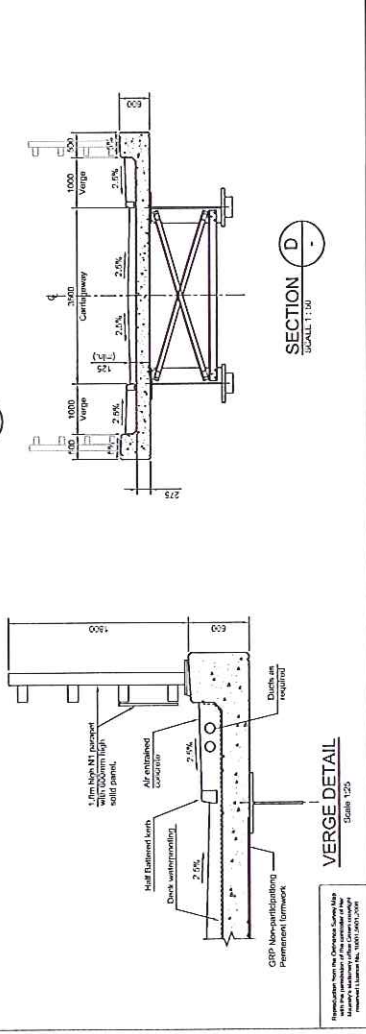
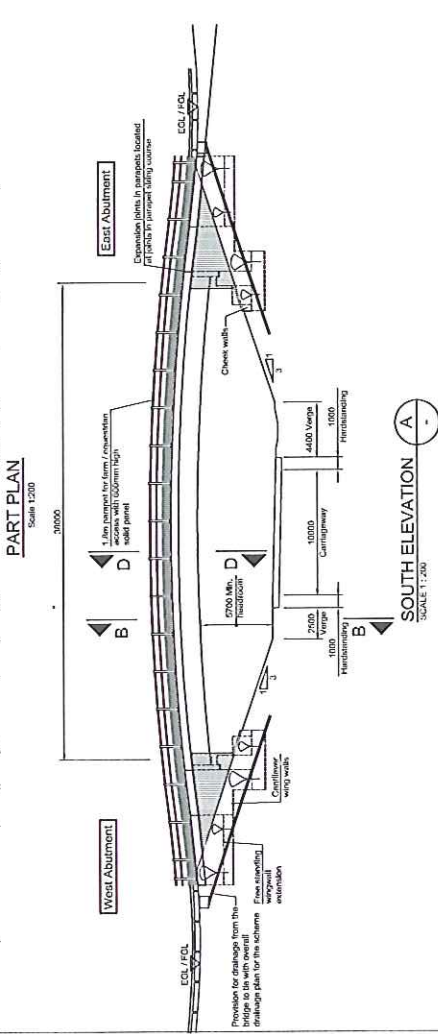
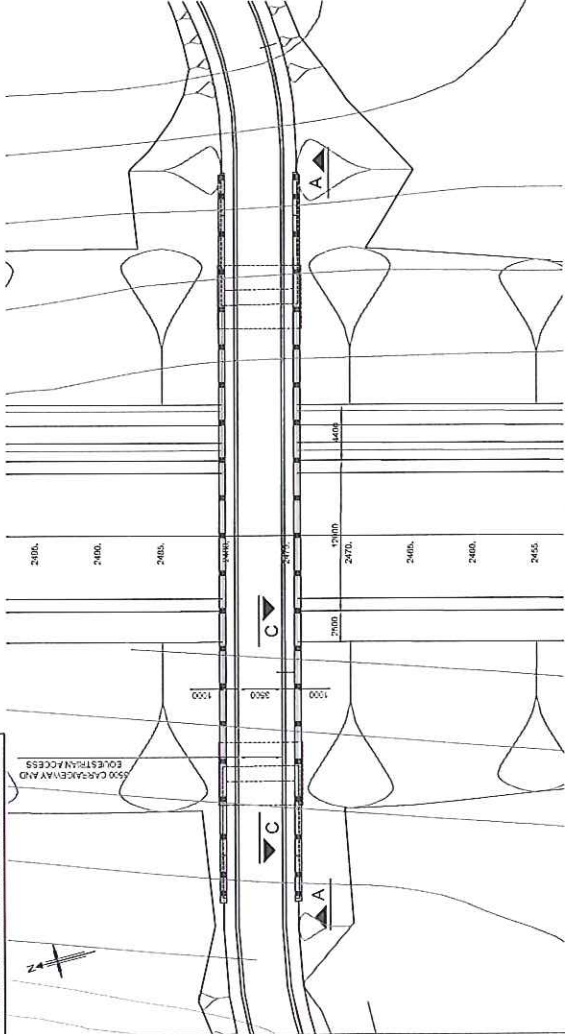
Appendix B Drawings

Drawing No
B1297000-PH2/1600.01a/9081

Title
Actons Farm Overbridge
AIP General Arrangement

Client: **B1297000/PH2/1600.01A/9081/0**

Notes:
 1. All dimensions in millimetres unless noted otherwise.
 2. All levels in metres A.O.D. (Above Ordnance Datum - Newlyn).



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
In addition to the information provided in the Health and Safety File, the contractor shall refer to the Safety, Health and Environmental Information File for the project.
CONSTRUCTION
MANIT DANCEY, GLANING
DECOMMISSIONING / DEMOLITION
The proposed client will be responsible for the decommissioning and demolition of the structure.

Rev	Date	Description	By	Chk	App	Rev

JACOBS
 Strategic & Commercial Planning, Civil & Structural Engineering, Environmental & Sustainability

Client: HOCHTIEF/VINCI
Contractor: JOINT VENTURE
East Sussex County Council

Project: BEXHILL TO HASTINGS LINK ROAD
Contracting for: ACTONS FARM OVERBRIDGE GENERAL ARRANGEMENT

Drawing No.: 12500/01A
Scale: 00, NOT TO SCALE

Drawing Number: B1297000/PH2/1600.01A/9081
Rev: 0

This drawing is not to be used in whole or part other than for the intended purpose and project as defined on the drawing. Refer to the contract for full terms and conditions.

Appendix C Geotechnical Information

BEXHILL TO HASTINGS LINK ROAD
GEOTECHNICAL SUMMARY INFORMATION

STRUCTURE NAME		CHAINAGE and OS Grid Reference		
S08 - Actons Farm Overbridge		Ch 2480 OS: 574891.3E, 110186.5N		
Rev: 1		DESIGN LIFE: 120 years		
SOILS/GEOLOGY		RELEVANT EXPLORATORY HOLES:		
		BH04, TP10 (May Gurney, 2006) BH120, BH121, BH122, BH123 (URS Investigation, 2009)		
Strata		Typical depths		
Topsoil / Made Ground		18.83 to 17.07 m OD		
Ashdown Formation		below 17.07 m OD		
PREVIOUS GROUND HISTORY		Agricultural land		
CONTAMINATED GROUND RISK ASSESSMENT REQUIRED				TBC
GROUNDWATER				
<p>Groundwater was encountered initially at levels between 10.99m OD (6.8m bgl – BH123) and 14.13m OD (4.7m bgl – BH4 seepage) within Ashdown Beds and rose to maximum levels of between 11.34m OD (6.5m bgl – BH121) and 14.18m OD (4.65m bgl – BH4) after 20 minutes. A second groundwater strike encountered confined groundwater in BH4 at a level of 10.43m OD (8.4m bgl) and rose to a level of 11.43m OD (7.4m bgl) in 20 minutes. The highest groundwater level recorded during the monitoring carried out in March 2009 at BH04 was 1.98m bgl.</p> <p>Allowing for seasonal fluctuations, the preliminary design groundwater level is assumed to be at 0.9m bgl.</p>				
EARTH PRESSURE VALUE K_0^* K_a^* K_p^*				
See Section 5.4 of the AIP.				
TYPE OF FOUNDATION		Spread footing		
BEARING CAPACITY				
Structure Element	Founding Stratum	Founding Level (m OD)	Footing Size	Allowable Bearing Pressure (kN/m ²)

Abutments	Ashdown Formation	15.80	7.5 x 4.2m	200	
PILE DESIGN: NA					
Structure Element	Founding Stratum	Toe Level (m OD)	Pile dia (m)	Pile length (m)	Pile working Load (kN)
<p>Note: Pile lengths and toe levels are approximate – pile cap elevations to be confirmed.</p> <p>Pile type:</p> <p>Criteria for selecting pile toe level: ...</p> <p>Allowance for negative skin friction within design:</p>					
SETTLEMENT					
Differential settlement to be allowed for between adjacent supports: 25mm					
Differential settlement to be allowed between structure and approach embankment : N/A					
CHEMICAL ANALYSIS					
<p>Buried Concrete Classification:</p> <p>The results of chemical tests on soil samples taken within the rural areas indicate pH values ranging between 3.8 to 9.4 and sulfates (2:1 Water Extract) values of between 10 to 900mg/l. The recommended Design Sulfate and Concrete Classification based on BRE Special Digest 1 (2005) are DS-2 and AC-3z respectively.</p>					
NOTES					
<ol style="list-style-type: none"> The ground sequence at the site is Made Ground/Top soil and Ashdown Formation. Based on the structure founding level, it will likely be founded on stiff to very stiff laminated Clay / Silt of the Ashdown Formation. The excavated foundation will need to be inspected for the presence of any widened fissures. 					





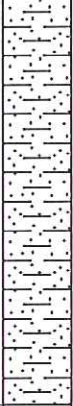
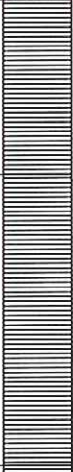



MAY GURNEY							Site		Borehole Number		
Boring Method Cable Percussion		Casing Diameter 150mm to 10.00m		Ground Level (mOD) 18.83		Client East Sussex County Council		Job Number SI1085			
		Location 574853.132 E 110200.159 N		Dates 01/03/2006		Engineer Owen Williams		Sheet 1/1			
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr	
0.10	D1				18.63	(0.20)	MADE GROUND. Soft organic dark brown orange slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse sulphurous smelling ash/slag. With roots and leaves.				
0.20-0.50	B1					0.20					
0.30	D2				18.33	(0.30)					
0.50-1.00	B2					0.50					
1.00	D3				17.83	(0.50)	Firm mottled orangish brown, grey and light brown sandy CLAY				
1.50	U1			60 blows		1.00	Very stiff mottled orangish brown, brown, light grey and light blue CLAY				
1.50	U1			60 blows		(1.50)	Very stiff mottled brown, light brown, grey slightly sandy desiccated CLAY				
1.95	D4	1.50		3,6/6,9,11,10		1.95	Very stiff mottled brown, light brown and grey slightly sandy SILT				
2.00-2.45	SPT N=36							2.00			
2.00	D6					16.33		2.50			
2.00-2.45	D5										
2.50-3.00	B3										
3.00	D7			65 blows		3.00	Very stiff light grey, grey and occasional dark orangish brown CLAY				
3.00	U2			65 blows		(1.70)					
3.50-3.87	SPT 50/215	1.50		2,7/12,21,17		3.50	Very stiff light grey, grey and occasional dark orangish brown CLAY				
3.50-3.95	D8				2,7/12,21,17			4.20			
4.00	D9				14.63	4.20					
4.20	D10										
4.50	U3			90 blows		4.50	Very stiff mottled orangish brown and light grey slightly gravelly slightly sandy iron stained SILT. Gravel is angular to subangular fine to coarse mudstone and sandstone				
4.50-5.00	B4			90 blows		(1.60)					
5.00	D12	1.50		Seepage(1) at 4.70m, rose to 4.65m in 20 mins. 5,9/11,21,18		5.00	Very stiff mottled orangish brown and light grey slightly gravelly slightly sandy iron stained SILT. Gravel is angular to subangular fine to coarse mudstone and sandstone				
5.00-5.35	SPT 50/195							5.80			
5.00-5.45	D11					13.03		5.80			
5.80	D13										
6.00	U4			90 blows		6.00	Very stiff mottled orangish brown and light grey slightly gravelly slightly sandy iron stained SILT. Gravel is angular to subangular fine to coarse mudstone and sandstone				
6.45	D14	1.50		2,5/9,11,13,17		6.45					
6.50-6.92	SPT 50/270							(4.20)			
6.50-6.95	D15										
6.50-7.00	B5										
7.00	D16										
7.50	U5			100 blows		7.50	Very stiff mottled orangish brown and light grey slightly gravelly slightly sandy iron stained SILT. Gravel is angular to subangular fine to coarse mudstone and sandstone				
8.00-8.27	SPT 50/115	1.50		8,15/27,23		8.00					
8.00	D17										
8.00-8.45	D18										
8.50-9.00	B6				Water strike(2) at 8.40m, rose to 7.40m in 20 mins.		9.00				
9.00	D19					9.00					
10.00	D20				8.83	10.00					

Remarks
Hand pit excavated to 1.20m
50mm diameter standpipe installed with flush cover
PID reading adjacent to BH at 0.30m bgl = 0.5ppm

Scale (approx)
1:50

Logged By
AE/AK

Figure No.
SI1085.BH4

						Site Bexhill to Hastings Link Road		Trial Pit Number TP10
Excavation Method Mechanically Excavated Trial Pit - 3 Tonne 360 degree excavator		Dimensions 4.20 x 0.50 x 3.60m		Ground Level (mOD) 17.61	Client East Sussex County Council		Job Number SI1085	
		Location 574915.987 E 110180.678 N		Dates 27/03/2006	Engineer Owen Williams		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D1				(0.30)	TOPSOIL. Greyish brown sandy CLAY.		
0.30-0.50	B1		HSV = TOO STIFF	17.31	0.30	Very stiff mottled yellowish brown and light yellowish grey slightly gravelly SILT / CLAY. Gravel is angular fine and medium very weak mudstone. Excavated as a coarse gravel with a little iron staining.		
			HSV = TOO STIFF		(1.40)			
1.10	D2					Very weak closely jointed yellowish grey and yellowish brown laminated interbedded CLAY and lithorelics MUDSTONE . Excavated as a coarse gravel and cobbles with iron staining.		
1.30	B2				1.70			
1.90-2.10	B3			15.91	(0.60)	Weak thinly bedded and closely jointed yellow grey and yellowish brown MUDSTONE. Excavated as a medium to coarse gravel and cobbles, some iron staining.		
					2.30			
2.50	B4			15.31	(1.00)	Very weak mottled closely jointed and thinly bedded light grey and yellowish grey MUDSTONE. Excavated as coarse gravel and cobbles.		
					3.30			
3.10-3.30	B5			14.31	(0.30)	Complete at 3.60m		
				14.01	3.60			
Plan .						Remarks Orientation of trial pit is 170 degrees Gas Readings at 0.50m. O2 20.8%, CO2 0.3%, CH4 0.0%, N2 77.2%. PID = 0.6 ppm. Trial Pit remained dry and stable throughout Trial Pit terminated at 3.60m due to hard conditions and nearing maximum reach of excavator		
						Scale (approx) 1:25	Logged By JT	Figure No. SI1085.TP10

Contract No: 49325727



Project: Bexhill - Hastings Link Road

Record of Borehole

Client: East Sussex County Council

BH120

SAMPLES & In situ TESTS

STRATA

Depth	Type/No.	SPT/U4 (Blows)	Water	Reduced Level (mOD)	Legend	Depth (Thickness)	DESCRIPTION	Insitu/ment/Backfill
0.15	D1			17.07	///	0.30	Soft, medium-brown slightly sandy CLAY with frequent rootlets. Sands are fine. (Topsoil) (TOPSOIL)	
0.30	D2							
0.50	D3						Fine-grained, yellow brown SAND with occasional fine, angular lithorelics of thinly laminated, highly weathered, grey/brown and orange/brown MUDSTONE. (ASHDOWN BEDS) Lithorelics of mudstone becoming more coarse and frequent from 0.5m bgl.	
1.00	D4						Becoming slightly clayey from 1.0m bgl.	
1.20	U5	(50 - Unrecorded)						
1.70	D6	N=47 (4/5/7/10/12/18)		15.67		1.70	Very stiff, closely fissured, grey/orange/brown CLAY, with rare light grey mottles. (ASHDOWN BEDS)	
2.00	SPT7 B8 U9	(50 - Unrecorded)		15.37		2.00	Firm, closely fissured, mottled orange/brown and pink/brown CLAY with rare, dark orange, iron staining. (ASHDOWN BEDS)	
2.40	D10			14.87		2.50	Very stiff, closely fissured, grey/brown CLAY, with rare yellow/brown mottles. (ASHDOWN BEDS)	
2.50	B11							
3.00	D12	N=>50 (15/18/27/23/75mm/-)				(1.00)	Mottling becoming more frequent below 3.0m bgl.	
3.50	SPT13 B14			13.87		3.50	Very stiff, very closely fissured, grey/brown CLAY, with rare orange and grey/yellow mottles. (ASHDOWN BEDS)	
4.00	D15 SPT16	N=81 (10/14/16/18/21/26)		13.37		4.00	Very stiff, very closely fissured, orange brown CLAY with occasional iron staining. (ASHDOWN BEDS)	
4.50	B17			12.87		4.50	Very dense orange/brown silty SAND, with frequent grey/brown mottles. (ASHDOWN BEDS)	
5.00	D18 SPT19	N=>68 (12/16/18/22/28/75mm/-)				(1.00)	Slight iron staining present below 5.0m bgl.	
5.50	B20			11.87		5.50	Stiff, very closely fissured, orange/brown and grey/brown sandy CLAY with rare lithorelics of fine, angular, weak, grey/brown SANDSTONE. Sands are fine. (ASHDOWN BEDS)	
6.00	D21 SPT22	N=>50 (12/14/32/18/75mm/-)		11.37		6.00	Very stiff, very closely fissured, grey/brown sandy CLAY, with occasional dark orange mottles. Sands are fine. (ASHDOWN BEDS)	
6.50	B23							
7.00	D24 SPT25	N=>50 (11/16/26/24/75mm/-)					Becoming soft to firm below 7.0m bgl, with rare lithorelics of fine, angular, grey/brown sandstone.	
7.50	B26			9.87		7.50		


Boring Progress and Water Observations									Chiselling			Water Added		GENERAL REMARKS
Date	Time	Hole Depth	Cas'g Depth	Cas'g Dia	Water Depth	Rose to	Time (mins)	Sealed (m)	From	To	Time (hh:mm)	From	To	



Draft 150mm casing to 3.0m bgl. U100 samples taken using double weight. No visual or olfactory evidence of contamination visible throughout the borehole. No groundwater encountered. Zone of weathering interpreted from Spinks et al. 1993: (V); (IV); (III); (II); (I).

Logged by: HH Checked by: CAB Status: Draft	Equipment: Contractor: Southern Testing Laboratories Ltd	Location: 574871.4 E 110179.5 N	Ground Level: 17.37 mAOD	Date: 05/01/2009 Start 06/01/2009 End	Scale: 1:40.0 Sheet 1 of 2
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 URS Corporation Ltd Home Lane Bedford MK43 1TS Telephone: 01234 24641 www.URS.co.uk

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Contract No: 49325727	 Record of Borehole BH120
Project: Bexhill - Hastings Link Road	
Client: East Sussex County Council	

SAMPLES & In situ TESTS			STRATA					
Depth	Type/ No.	SPT/U4 (Blows)	Water	Reduced Level (mOD)	Legend	Depth (Thickness)	DESCRIPTION	Insru-ment/ Backfill
8.00	D27 SPT28	N=>66 (12/14/16/26/24/75mm)				(1.00)	Very stiff, closely fissured, grey/brown sandy CLAY with occasional iron staining and grey/brown sandy patches. Sands are fine. (ASHDOWN BEDS)	
8.50	B29		8.87	8.50		Very stiff, closely fissured, orange/brown sandy CLAY with occasional yellow/grey mottling, and rare lithorelics of fine, angular, grey/brown SANDSTONE. Sands are fine. (ASHDOWN BEDS)		
9.00	D30 SPT31	N=>50 (11/27/23/75mm/-/-)						
9.50	B32					Lithorelics of sandstone becoming light grey below 9.5m bgl.		
10.00	D33 SPT34	N=>50 (13/17/25/25/75mm/-/-)		7.37		10.00	End of Borehole at 10.00m	

Boring Progress and Water Observations									Chiselling			Water Added		GENERAL REMARKS
Date	Time	Hole Depth	Cas'g Depth	Cas'g Dia	Water Depth	Rose to	Time (mins)	Sealed (m)	From	To	Time (hh:mm)	From	To	

Logged by: HH Checked by: CAB Status: Draft	Equipment: Contractor: Southern Testing Laboratories Ltd	Location: 574871.4 E 110179.5 N	Ground Level: 17.37 mAOD	Date: 05/01/2009 Start 06/01/2009 End	Scale: 1:40.0 Sheet 2 of 2
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URS Corporation Ltd Home Lane Bedford MK40 1TS Telephone: 01295 346641 www.urscorp.com

S:\BEXHILL BOREHOLE LOG File: J:\BEDFORD-JOBS\EAST SUSSEX COUNTY COUNCIL\URS2527 BEXHILL TO HASTINGS LINK ROAD\TECHNICAL\ACTUAL REPORT DATA\BEXHILL - HASTINGS URS ALLOP1 - 14092009 12:28:40
 URS Corporation Ltd Home Lane Bedford MK40 1TS Telephone: 01235 549641 www.URS.com

Contract No: 49325727
 Project: Bexhill - Hastings Link Road
 Client: East Sussex County Council



SAMPLES & In situ TESTS			STRATA					
Depth	Type/No.	SPT/U4 (Blows)	Water	Reduced Level (mOD)	Legend	Depth (Thickness)	DESCRIPTION	Instru- ment/ Backfill
0.10 0.20	D1 D2			17.64	///	0.20	Soft yellowish brown cream white mottled silty CLAY. Occasional fine rootlets. (TOPSOIL)	Backfill
0.50	D3						Soft, reddish to yellowish brown grey and orange mottled CLAY. (ASHDOWN BEDS)	
1.00	D4							
1.50	U5							
2.00	D6 SPT7	N=48 (5/7/12/8/14/14)		16.14	x x x x	1.70	Very stiff, fissured, thinly to thickly laminated grey to orangish brown slightly clayey SILT. Iron staining along fissures. (ASHDOWN BEDS)	
2.50	U8	(70 - 450mm)			x x x x			
3.00	D9				x x x x			
3.50	SPT10	N=>50 (3/6/7/13/20/10/30mm)			x x x x			
4.50	SPT11	N=31 (6/6/7/8/8/8)			x x x x			
5.50	U12	(110 - 350mm)			x x x x			
6.00	D13 SPT14	N=>50 (6/10/10/13/14/13/70mm)			x x x x			
6.50	U15	(120 - 450mm)			x x x x			
7.00	D16				x x x x			
7.50	U17	(120 - 250mm)			x x x x			

Boring Progress and Water Observations									Chiselling			Water Added		GENERAL REMARKS
Date	Time	Hole Depth	Cas'g Depth	Cas'g Dia	Water Depth	Rose to	Time (mins)	Sealed (m)	From	To	Time (hh:mm)	From	To	
18/12/08	16.00	5.00	3.00	150	DRY									
19/12/08	08.00	5.00	3.00	150	DRY									
19/12/08	09.00	6.70	3.00	150	6.70	6.68	5							

Logged by: JB & HH Checked by: CAB Status: Draft	Equipment: Cable Percussion Rig - Dando 2000 Contractor: Southern Testing Laboratories Ltd	Location: 574908.5 E 110182.8 N	Ground Level: 17.84 mAOD	Date: 18/12/2008 Start 19/12/2008 End	Scale: 1:40.0 Sheet 1 of 2
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Draft.
 150mm casing to 3.0m bgl.
 Chiseled from 8.15m bgl to 8.4m bgl.
 During logging no visible or olfactory evidence of contamination.
 Zone of weathering interpreted from from Spinks et al. 1993: (V); (IV); (III); (II); (I).

SHE: BEXHILL BOREHOLE LOG File: J:\BDRFORD-JOB\BEXHILL TO HASTINGS LINK ROAD\TECHNICAL\FACTUAL REPORT DATA\GFI\BEXHILL - HASTINGS URS ALL.DPJ Print: 14/01/2009 12:25:45
 URS Corporation Ltd Home Lane Bedford MK40 1TS Telephone: 01234 340641 www.urscorp.com

Contract No: 49325727	URS
Project: Bexhill - Hastings Link Road	Record of Borehole
Client: East Sussex County Council	BH122

SAMPLES & In situ TESTS			Water	STRATA			
Depth	Type/ No.	SPT/U4 (Blows)		Reduced Level (mOD)	Legend	Depth (Thickness)	DESCRIPTION
0.10 0.20	D1 D2			/// //	0.30	Soft dark brown fine sandy silty CLAY and rootlets (TOPSOIL)	
0.50	D3		18.17	x x x x		Soft reddish brown fine sandy silty CLAY. (V) (ASHDOWN BEDS)	
1.00	D4		17.47	x x x x	1.00	Very stiff, slightly fissured thinly laminated light grey reddish brown silty CLAY. Iron staining along fissure surfaces. (IV) (ASHDOWN BEDS)	
1.50	U5	(75 - 450mm)		x x x x			
2.00	D6 SPT7	N=>50 (3/7/8/13/18/11/30mm)		x x x x			
2.50	U8	(125 - 150mm)		x x x x			
2.75	D9			x x x x		Interbedded with a very weak, thinly laminated light grey iron stained SILTSTONE partially weathered to a clayey silt at 2.75m bgl. (III) (ASHDOWN BEDS)	
3.00	D10			x x x x			
3.50	SPT11	N=>50 (5/7/8/20/22/45mm/-)	14.97	x x x x	3.50	Very weak, fissured, thinly laminated grey dark grey MUDSTONE interbedded with light grey SILTSTONE at 4.5m bgl. Iron staining along fissures. Weathered to a very stiff clay (mudstone) or very stiff clayey silt (siltstone). (III) (ASHDOWN BEDS)	
4.50	D12 U13	(120 - 300mm)		x x x x			
5.00	D14 SPT15	N=>50 (7/10/16/20/14/70mm/-)		x x x x		Interbedded with light grey SILTSTONE at 4.5m bgl	
5.50	U16	(120 - 300mm)		x x x x			
6.00	D17			x x x x		No iron staining from 6.0m bgl.	
6.50	U18	(100 - 450mm)		x x x x			
7.00	D19 SPT20 D21	N=>50 (19/6/20mm/40/10/15mm/-/-)	11.42	x x x x	7.05	Very stiff, fissured, with occasional sheared surfaces thinly laminated orangish yellow CLAY. Orange brown staining along fissures. (III) (ASHDOWN BEDS)	
7.20	SPT22	N=>50 (25/70mm/-/50/70mm/-/-)	11.37	x x x x	7.10		
7.30			11.07	x x x x	7.40	Very weak, thinly laminated brown grey MUDSTONE. Occasional Iron staining. Partially weathered to a very stiff clay. (III)	

Boring Progress and Water Observations									Chiselling			Water Added		GENERAL REMARKS
Date	Time	Hole Depth	Cas'g Depth	Cas'g Dia	Water Depth	Rose to	Time (mins)	Sealed (m)	From	To	Time (hh:mm)	From	To	
05/01/09	10.30	4.70	2.50	150	4.70				7.20	7.30	00:15			

Draft 150mm casing to 2.5m bgl. Chiseled from 7.2 to 7.3m bgl. No visual or olfactory evidence of contamination throughout borehole. Slow groundwater seepage at 4.7m bgl. Zone of weathering interpreted from Spinks et al. 1993: (V); (IVb); (IVa); (IIIc); (IIIb); (IIIa); (IIb); (IIa); (Ia); (Ib).
 Hole left open for rotary coring. Scale: 1:40.0
 Sheet 1 of 2

Logged by: JB Checked by: CAB Status: Draft	Equipment: Cable Percussion Rig - Dando 2000 Contractor: Southern Testing Laboratories Ltd	Location: 574885.5 E 110202.4 N	Ground Level: 18.47 mAOD	Date: 05/01/2009 Start 05/01/2009 End
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Contract No: 49325727
Project: Bexhill - Hastings Link Road
Client: East Sussex County Council



SAMPLES & In situ TESTS			Water	STRATA					Instru-ment/Backfill
Depth	Type/No.	SPT/U4 (Blows)		Reduced Level (mOD)	Legend	Depth (Thick-ness)	DESCRIPTION		
							(ASHDOWN BEDS)		
							End of Borehole at 7.30m		

Boring Progress and Water Observations									Chiselling			Water Added		GENERAL REMARKS
Date	Time	Hole Depth	Cas'g Depth	Cas'g Dia	Water Depth	Rose to	Time (mins)	Sealed (m)	From	To	Time (hh:mm)	From	To	

Draft 150mm casing to 2.5m bgl. Chiseled from 7.2 to 7.3m bgl. No visual or olfactory evidence of contamination throughout borehole. Slow groundwater seepage at 4.7m bgl. Zone of weathering interpreted from from Spinks et al. 1993: (V); (IVb); (IVa); (IIc); (IIb); (IIa); (Ib); (Ia); (Ib).
 Hole left open for rotary coring.

Logged by: JB Checked by: CAB Status: Draft	Equipment: Cable Percussion Rig - Dando 2000 Contractor: Southern Testing Laboratories Ltd	Location: 574885.5 E 110202.4 N	Ground Level: 18.47 mAOD	Date: 05/01/2009 Start 05/01/2009 End	Scale: 1:40.0 Sheet 2 of 2
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URS Corporation Ltd Name: Lew Bedford MK40 ITS Telephone: 01234 340641 www.URS.com

SHM: BEXHILL BOREHOLE LOG File: J:\BIDFOR\JOB\BEXHILL TO HASTINGS LINK ROAD\TECHNICAL\ACTUAL REPORT DATA\BEXHILL - HASTINGS URS ALL.GPJ Printed: 14/02/2009 12:35:50
 URS Corporation Ltd Home Lane Bedford MK40 1TS Telephone: 01234 340041 www.urscorp.com

Contract No: 49325727
 Project: Bexhill - Hastings Link Road
 Client: East Sussex County Council


 Record of Borehole
BH123


SAMPLES & In situ TESTS			Water	STRATA			
Depth	Type/ No.	SPT/U4 (Blows)		Reduced Level (mOD)	Legend	Depth (Thickness)	DESCRIPTION
0.15	D1			// // //		Soft, medium brown CLAY, with occasional yellow/brown mottles and rootlets. (MADE GROUND) Becoming slightly sandy below 0.15m bgl.	
0.30	D2			// // //			
0.50	D3		17.29	// // //	0.50		
1.00	D4			- - - - -	(1.00)	Soft, yellow/brown sandy CLAY, with occasional medium to coarse, angular gravels of sandstone. (ASHDOWN BEDS) Becoming grey/brown below 1.0m bgl.	
1.20	U5	(50 - 450mm)		- - - - -			
1.50	D6 SPT7 B8	N=32 (6/6/7/8/7/10)	16.29	- - - - -	1.50	Stiff, thinly laminated, orange/brown CLAY with occasional grey mottles. (ASHDOWN BEDS)	
2.00	U9	(50 - 450mm)		- - - - -			
2.40	D10 B11		15.59	x x x x	2.20	Soft, grey/brown thinly laminated SILT with occasional, coarse, sub-angular lithorelics of siltstone. (ASHDOWN BEDS)	
3.00	U12	(50 - 450mm)	14.79	x x x x	3.00		
3.30	D13 SPT14 B15	N=68 (10/9/14/17/16/21)	14.29	- - - - -	3.50	Stiff, thinly laminated, orange/brown and grey/brown CLAY. (ASHDOWN BEDS)	
4.00	D16 SPT17	N=>68 (10/13/18/28/22/75mm/-)	13.79	- - - - -	4.00	Firm, thinly laminated, medium brown, slightly sandy CLAY, with rare, grey/brown mottles. (ASHDOWN BEDS)	
4.50	B18		13.29	x x x x	4.50	Soft, thinly laminated, orange/brown and grey, slightly sandy SILT. (ASHDOWN BEDS)	
5.00	D19 SPT20	N=>50 (28/24/50/75mm/-/-)		- - - - -	(1.00)	Soft, thinly laminated, grey/brown CLAY with occasional yellow and orange/brown mottles. (ASHDOWN BEDS) Mottling becoming rare below 5.0m bgl.	
5.50	B21		12.29	- - - - -	5.50	Very soft, thinly laminated grey/brown CLAY with occasional orange/brown mottles and fine to medium, subangular lithorelics of mudstone. (ASHDOWN BEDS)	
6.00	D22 SPT23	N=>71 (19/29/21/50/75mm/-/-)	11.79	- - - - -	6.00	Very soft, thinly laminated grey/brown CLAY with occasional orange/brown mottles and fine to medium, subangular lithorelics of mudstone. (ASHDOWN BEDS)	
6.50	B24		11.29	- - - - -	6.50	Very soft, thinly laminated grey/brown CLAY with occasional orange/brown mottles and fine to medium, subangular lithorelics of mudstone. (ASHDOWN BEDS)	
7.00	D25 SPT26	N=62 (11/12/12/15/16/19)	10.79	x x x x	7.00	Dense, thinly bedded, orange/brown and grey/brown, fine grained, silty SAND. (ASHDOWN BEDS)	
7.50	B27		10.29	x x x x	7.50		

Boring Progress and Water Observations									Chiselling			Water Added		GENERAL REMARKS
Date	Time	Hole Depth	Cas'g Depth	Cas'g Dia	Water Depth	Rose to	Time (mins)	Sealed (m)	From	To	Time (hh:mm)	From	To	
19/12/08	12.00	6.80	6.00	150	6.80	5.80	20							

Draft 150mm casing to 6.0m bgl. U100 samples taken using double weight. No visual or olfactory evidence of contamination. Zone of weathering interpreted from from Spinks et al. 1993: (V); (IV); (III); (II); (I). Hole left open for rotary coring.

Logged by: HH Checked by: CAB Status: Draft	Equipment: Cable Percussion Rig - Dando 2000 Contractor: Southern Testing Laboratories Ltd	Location: 574925.1 E 110194.9 N	Ground Level: 17.79 mAOD	Date: 18/12/2008 Start 19/12/2008 End	Scale: 1:40.0 Sheet 1 of 2
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URS Corporation Ltd Home Lane Bedford MK40 1TS Telephone: 01235 306041 www.URS.com
 File: J:\BEDFORD\JOB\BEST SUSSEX COUNTY COUNCIL\WSS727 BEXHILL TO HASTINGS LINK ROAD\TECHNICAL\ACTUAL REPORT DATA\BEXHILL - HASTINGS LINK 12.01.05
 Project: 14082008 12.01.05

Contract No: 49325727		 Record of Borehole BH123
Project: Bexhill - Hastings Link Road		
Client: East Sussex County Council		

SAMPLES & In situ TESTS			STRATA					
Depth	Type/No.	SPT/U4 (Blows)	Water	Reduced Level (mOD)	Legend	Depth (Thickness)	DESCRIPTION	Instrument/Backfill
8.00	D28 SPT29 B30	N=>62 (9/11/12/30/20/75mm/-)		9.79	x x x x x x x x x	8.00	Very soft, medium brown SILT. (ASHDOWN BEDS)	
				9.29	x x x x x x x x x x x x	8.50	Very dense, thickly laminated, orange/brown and grey/brown, fine grained silty SAND. (ASHDOWN BEDS)	
End of Borehole at 8.50m								

Boring Progress and Water Observations									Chiselling			Water Added		GENERAL REMARKS
Date	Time	Hole Depth	Cas'g Depth	Cas'g Dia	Water Depth	Rose to	Time (mins)	Sealed (m)	From	To	Time (hh:mm)	From	To	
									8.30	8.50	00:15			

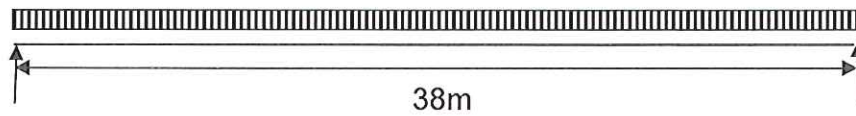
Draft
 150mm casing to 6.0m bgl.
 U100 samples taken using double weight.
 No visual or olfactory evidence of contamination.
 Zone of weathering interpreted from from Spinks et al. 1993: (V); (IV); (III); (II); (I).
 Hole left open for rotary coring.

Logged by: HH Checked by: CAB Status: Draft	Equipment: Cable Percussion Rig - Dando 2000 Contractor: Southern Testing Laboratories Ltd	Location: 574925.1 E 110194.9 N	Ground Level: 17.79 mAOD	Date: 18/12/2008 Start 19/12/2008 End	Scale: 1:40.0 Sheet 2 of 2
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Appendix D Idealised Structure

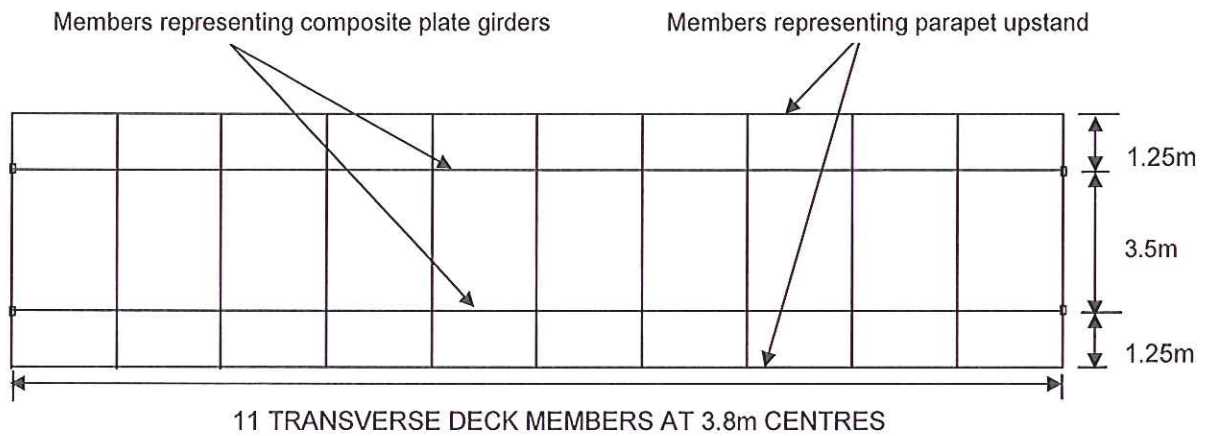
Step 1: Simply supported line beam analysis:

For self weight of steel elements & wet concrete deck on the steel-only section



Step 2: 2-D grillage model:

For superimposed dead loads and live loads on the composite section.



Appendix E Departures from Standards

Departure D3: Verges over/under Structures

Nature of Departure

A standard verge width of 2.5m has been applied along the scheme mainline. Where the mainline crosses over an underbridge, or under an overbridge, it has been decided to reduce the verge width to provide associated cost savings on structure construction. Verge widths will also be reduced on sideroads and accommodation works structures. The verges will be reduced to the minimum allowed, while ensuring necessary Stopping Sight Distance is maintained. The verge width will be tapered to the reduced width over an acceptable distance. Where verge widening has been provided around bends to maintain SSD these verges will not be minimised.

Reason for Departure

This departure is sought to minimise construction costs for the structures by minimising the necessary deck width. This departure is requested as the DMRB Standards require the verge width to be continuous and maintained over/under all structures. This leads to excessive structure widths which are uneconomical.

Mitigation Factors

There are no pedestrian facilities over any of the mainline structures so verge reduction will not impact NMUs in the majority of cases. On the accommodation overbridges, there will only be a minor usage, and the likelihood of NMUs coming into conflict with farm vehicles is minimal. In addition, these departures are only requested over short distances over/under structures.

Implications for Safety

Though a reduced verge width will mean vehicles running closer to either the abutments or parapets, a safe minimum required width will be provided. Where deemed necessary as a result of the RRRAP assessment, vehicle barriers will be installed to reroute any errant vehicles away from the parapets or abutments.

Departure - Deflection of permanent formwork units

BA 36/90 Clause 4.1.7 states that deflection of permanent formwork 4 hours after completion of concreting should not exceed 1/300 of the span of the formwork unit. It is proposed to use proprietary EMJ steel reinforced GRP permanent formwork units as permanent formwork to the concrete deck soffit. These units do not comply with the provisions of BD 36/90 Clause 4.1.7 and a Departure is sought to permit their use.

The reason for the deflection limit in BD 60 is not stated. There are several potential reasons for limiting deflection:

- Aesthetics/visual acceptability
- Avoidance of additional weight due to extra concrete required to make up the sag
- Consequent adverse effects on the design (extra dead weight and additional quantity) Compliance with design assumptions relating to reinforcement positioning and bar bending
- Risk of the deflected formwork units slipping off the support

In the case of the BHLR, the response to these concerns is as follows:

- It is unlikely that the sag in the formwork will be perceptible from ground level. There is no ready visual reference to which the sag can be related.

-
- The additional weight of concrete will be allowed for in the design and in the measure for the Initial Target Cost
 - The design assumptions will allow for the additional dead weight and the effects of the additional sag on the reinforcement positioning and bar bending, including the provision of cover and calculation of crack widths.
 - The width of the EMJ units will be chosen so that there is a sufficient and safe overlap of the units onto the beam flanges to obviate concerns regarding units slipping off supports.
 - Design assumptions for deflections will be taken from EMJ product data, interpolating for intermediate span lengths and thicknesses of slab if necessary. Load testing as per Cl 4.1.6 will not be carried out.

Departure - Hydrophobic Pore Lining Impregnant

BD 43/03 specifies various requirements for the impregnation of highway structures with hydrophobic pore lining impregnant. Following the completion of research into the long term effectiveness of hydrophobic pore lining impregnants on concrete highway structures, the Highways Agency is temporarily suspending requirements to apply all such impregnants as set out in BD43/03.

This suspension is detailed in CHE Memorandum 227/08 - The Impregnation Of Reinforced and Prestressed Concrete Highway Structures Using Hydrophobic Pore Lining Impregnants

This Departure seeks to apply this suspension to structures on the BHLR – i.e. the impregnant will not be applied.

This will not preclude the opportunity to apply impregnant in the future should this be required.

Departure # Implementation of IAN 96

This Departure seeks approval:

- to delete the requirement for an Additional Protective layer of sand asphalt to waterproofing unless required by an individual waterproofing system.
- to permit the application of bridge deck waterproofing to concrete less than 28 days old, providing this is in accordance with the waterproofing manufacturer's requirements and the provision of special additional coating or treatment to the concrete surface as required.

The above to be in accordance with IAN 96 and all associated provisions of IAN 96 shall apply.