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East Sussex County Council

East Sussex County Council
Transport and Environment

Bexhill to Hastings Link Road
S10 Hillcroft Farm Overbridge
Approval in Principle

Doc. Ref: B1297000-PH2/1600.06a/0010
Revision 0
September 2012

Document control sheet

Client: East Sussex County Council
Project: Bexhill to Hastings Link Road
Document Title: S10 Hillcroft Farm Overbridge AIP

Transport and Environment
Job No: B1297000

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DATE 07/09/2012	SIGNATURE	SIGNATURE	SIGNATURE	SIGNATURE
Document Status: Issued for Approval				

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Revision Summary

Client: East Sussex County Council
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Transport and Environment
Job No: B1297000

REVISION / DATE	COMMENT
Rev 0 07/09/12	Amended to incorporate TAA comments raised on Phase 1 AIP ref. JB-B1297000-PH1/1600.06a/0010(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 footpaths 13a/13b including equestrians and cyclists).

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 overbridge (OS grid reference 575717.4E, 110647.9N) is located approximately 100m to the east of the existing Bridleway / Hillcroft Farm access track. It carries the realigned Hillcroft Farm access track / new 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

Clear square span 38.0m Skew angle 0 degrees

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 TD19), 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
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 surfaces	F1/U1
Top of the deck slab	U4
Deck Soffit between main beams	Permanent formwork (GRP)
Deck soffit edge cantilevers	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 Cl 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 Cl 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

Abnormal Vehicle load - none

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

N/A

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^o 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 Clay/ very weak Siltstone 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/9101	Title Hillcroft Farm Overbridge AIP General Arrangement
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
Date: 07/09/12

Engineering Qualifications: BEng(Hons), CEng MICE

9.2 Endorsement by contractor

Signed 

Name: S. LAPTHORN

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:
TAA

Engineering qualifications:

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 97/01~~	~~Nature Conservation Management Advice in Relation to Dormice~~
~~HA 98/01~~	~~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: I979 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: I990
~~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~~

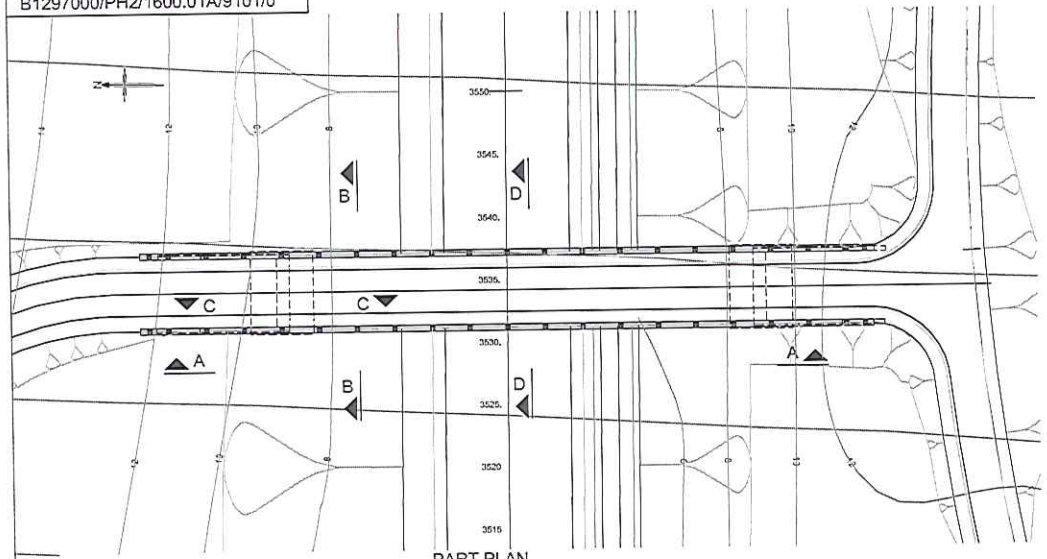
INTERIM ADVICE NOTES (IAN)

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~~

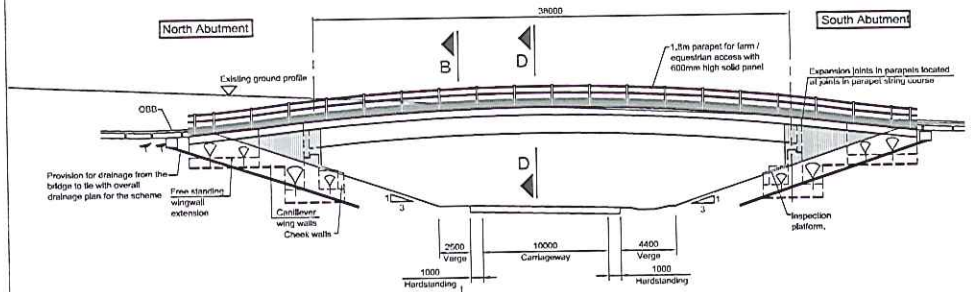
Appendix B Drawings

Drawing No	Title
B1297000-PH2/1600.01a/9101	Hillcroft Farm Overbridge AIP General Arrangement

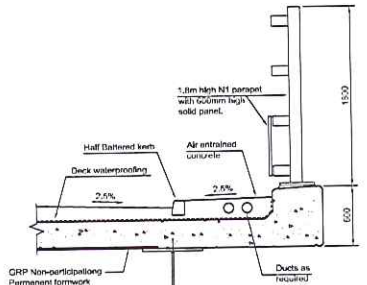
Drawing number / Rev
B1297000/PH2/1600.01A/9101/0



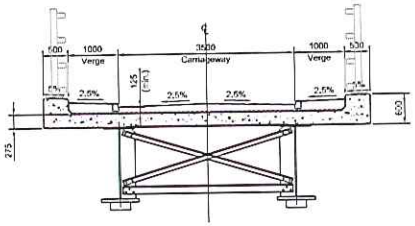
PART PLAN
Scale 1:200



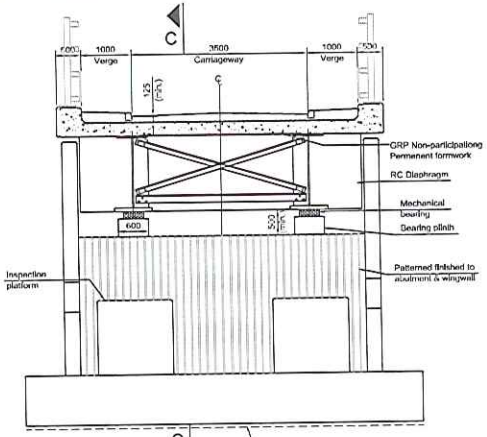
WEST ELEVATION A
SCALE 1:200



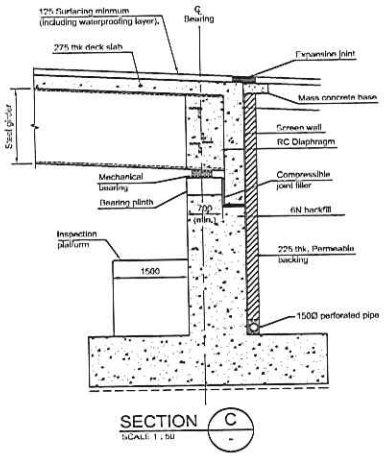
VERGE DETAIL
Scale 1:25



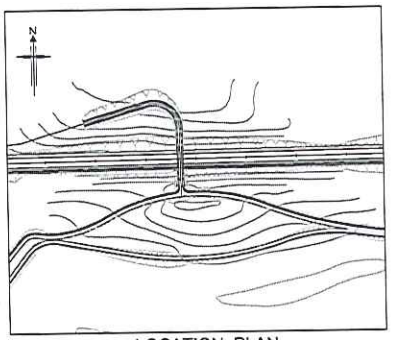
SECTION D
SCALE 1:50



SECTION B
SCALE 1:50



SECTION C
SCALE 1:50



LOCATION PLAN
SCALE 1:2500

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 hazards/risks normally associated with the types of work detailed on this drawing, note the following :

CONSTRUCTION
-

MAINTENANCE / CLEANING
-

DECOMMISSIONING / DEMOLITION
-

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

0 500 1000 1500 2000 2500 mm
SCALE 1:25

0 1000 2000 3000 4000 5000 mm
SCALE 1:50

0 5000 10000 15000 20000 mm
SCALE 1:200

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Rev'd	Appv'd
0	19/09/12	FOR APPROVAL IN PRINCIPLE	DP	PW	PS	RD

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www.jacobs.com

Client: HOCHTIEF/VINCI JOINT VENTURE

Employer: EAST SUSSEX COUNTY COUNCIL

Project: BEXHILL TO HASTINGS LINK ROAD

Drawing title: HILLCROFT FARM OVERBRIDGE GENERAL ARRANGEMENT

Drawing status: FOR APPROVAL IN PRINCIPLE

Scale	1:200 @ A1 DO NOT SCALE
Jacobs No.	B1297000
Client no.	
Drawing number	B1297000-PH2/1600.01A/9101
Rev	0

Appendix C Geotechnical Information

BEXHILL TO HASTINGS LINK ROAD

GEOTECHICAL SUMMARY INFORMATION

STRUCTURE NAME S10 - Hillcroft Farm Overbridge			**CHAINAGE and OS Grid Reference** Ch 3535 OS: 575717.4E, 110647.9N	
Rev: 1			**DESIGN LIFE:** 120 years	
SOILS/GEOLOGY			**RELEVANT EXPLORATORY HOLES:** BH13 (May Gurney, 2006) BH137R (URS Investigation, 2009)	
Strata			**Typical depths**	
Ashdown Formation			Below existing ground levels (Aprox 10.8 to 13.4m OD)	
PREVIOUS GROUND HISTORY			Agricultural land	
CONTAMINATED GROUND RISK ASSESSMENT REQUIRED			No	
GROUNDWATER Groundwater was encountered initially at 4.83m OD (6.0m bgl) and rose to 5.13m OD (5.7m bgl) after 20 minutes in BH13. A second groundwater strike encountered confined groundwater at -0.42m OD (11.25m bgl) and rose to a level of 1.83m OD (9m bgl). Groundwater monitoring carried out between April 2006 and November 2009 indicates a depth of up to 0.7m bgl. Allowing for seasonal fluctuations, the preliminary design groundwater level is assumed to be at ground level.				
EARTH PRESSURE VALUE K_0* K_a* Kp* Refer to Section 5.4 of AIP.				
TYPE OF FOUNDATION	Spread footing			
BEARING CAPACITY				
Structure Element	Founding Stratum	Founding Level (m OD)	Footing Size	Allowable Bearing Pressure (kN/m2)

Abutments and wingwalls	Ashdown Formation	7.0 (North) 6.6 (South)	8.0 x 4.20m	200

PILE DESIGN N/A

Structure Element	Founding Stratum	Toe Level (mAOD)	Pile dia (m)	Pile length (m)	Pile working Load (kN)

Note: Pile lengths and toe levels are approximate – pile cap elevations to be confirmed.

Pile type:

Criteria for selecting pile toe level:

Allowance for negative skin friction within design:

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

Buried Concrete Classification:

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.

NOTES

1. The ground sequence at the site is Top Soil and Ashdown Formation. It is recommended that the structure is founded on the stiff to very stiff Clay/ very weak Siltstone of the Ashdown Formation.
2. The excavated foundation will need to be inspected for the presence of any widened fissures.
3. Groundwater behaviour indicates presence of confined aquifer. This factor should be considered during construction.

MAY GURNEY

Site	Borehole Number
Bexhill to Hastings Link Road	BH13

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm cased to 20.00m	10.83	East Sussex County Council	SI1085
Location	**Dates**	**Engineer**		**Sheet**
575721.156 E 110618.738 N	22/03/2006-23/03/2006	Owen Williams		1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
0.00-0.35	B1					(0.35)	TOPSOIL. Firm dark brown and brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse flint and mudstone.
0.35-0.90	B2				10.48	0.35	
						(0.55)	Yellow and orange brown silty SAND.
0.90	D1				9.93	0.90	
1.50	U1			53 blows		(1.50)	Firm to stiff brown, grey brown and orange brown gravelly CLAY. Gravel is angular to subrounded flint and siltstone
1.95	D2						
2.40	D4				8.43	2.40	
2.50-2.80	SPT 50/150	2.50		11,16/20,30			Weak fine grained SANDSTONE recovered as an orangish brown and light brown very gravelly silty fine SAND. Gravel is angular to subangular fine to coarse weak sandstone
2.50-2.95	D3					(1.20)	
2.50-3.00	B3						
3.50-3.76	SPT 25*/140 50/120	3.50		8,17/22,28	7.23	3.60	
3.50-3.95	D5						Very weak SILTSTONE recovered as a yellow, orange and brown fine sandy SILT
3.60	D6						
4.00-4.50	B4						
4.50	U2			70 blows			
						(2.40)	
4.95	D7						
5.50-5.88	SPT 50/230	5.50		4,6/9,18,21,2			
5.50	D8						
5.50-5.95	D9						
6.00	D10			SLOW(1) at 6.00m, rose to 5.70m in 20 mins.	4.83	6.00	Very stiff grey brown sandy CLAY
						(0.60)	
6.50-6.88	SPT 50/230	6.50	5.90	3,10/16,16,17,1	4.23	6.60	Very stiff mottled orange, brown, light grey and brown sandy CLAY with some weak mudstone gravel.
6.50-6.95	D11						
6.60-7.00	B5						
						(1.40)	
7.50	D12						
7.50	U3			100 blows			
8.00	D13				2.83	8.00	Firm mottled orange brown, brown and light grey slightly gravelly sandy CLAY. Gravel is angular to subangular fine to coarse mudstone.
8.50-8.89	SPT 50/235	8.50	WET	4,7/10,13,20,7			
8.50-8.95	D14						
8.50-9.00	B6					(1.50)	
9.50-9.84	SPT 50/190	9.50	8.50	4,11/14,24,12	1.33	9.50	Very stiff light orangish brown SILT
9.50-9.95	D15						

Legend: ▼1 ▽1 ▼2

Remarks
Hand exavated pit to 1.20m
19mm diameter standpipe piezometer installed with flush cover
PID reading adjacent to BH at 0.30m bgl = 0.4ppm

Scale (approx)	Logged By
1:50	AE/AK

Figure No. SI1085.BH13

MAY GURNEY

Site	Borehole Number
Bexhill to Hastings Link Road	BH13

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm cased to 20.00m	10.83	East Sussex County Council	SI1085
	Location	**Dates**	**Engineer**	**Sheet**
	575721.156 E 110618.738 N	22/03/2006-23/03/2006	Owen Williams	2/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(1.30)				
10.50	D16									
10.50	U4			100 blows	0.03	10.80				
10.80	D17						Very stiff light grey sandy CLAY.			
						(0.60)			▽2	
				FAST(2) at 11.25m, rose to 9.00m in 20 mins.	-0.57	11.40				
11.50-11.95	D18						Very weak greyish brown SANDSTONE / SILTSTONE. Recovered as a silty sandy siltstone GRAVEL			
11.50-11.68	SPT 25*/120 50/55	11.50	9.00	15,10/50						
						(1.35)				
12.50	D20									
12.50	U5			100 blows	-1.92	12.75				
12.50-12.95	D19						Very stiff blue and grey CLAY			
12.75	D21									
12.75-13.25	B7									
13.50-13.92	SPT 50/270	13.50	8.80	4,8/9,13,18,10						
13.50-13.95	D22									
13.50-14.00	B8									
14.50	D23									
14.50	U6			72 blows						
14.95	D24									
15.50-15.89	SPT 50/240	15.50	9.00	5,8/9,12,20,9						
15.50-15.95	D25									
15.50-16.00	B9									
						(7.70)				
16.50	D26									
16.50	U7			100 blows						
16.50-16.95	D27									
16.50-17.00	B10									
17.50-17.75	SPT 50/95	17.50	10.00	6,14/39,11						
17.50-17.95	D28									
17.50-18.00	B11									
18.50	D29									
18.50	U8			100 blows						
19.00-19.50	B12									
19.50-19.85	SPT 50/195	19.50	11.50	5,10/15,20,15						
19.50-19.95	D30									
20.00-20.34	SPT 50/190	20.00	11.80	7,10/17,20,13						

Remarks

Scale (approx)	Logged By
1:50	AE/AK

Figure No. SI1085.BH13

MAY GURNEY

Site	Borehole Number
Bexhill to Hastings Link Road	BH13

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm cased to 20.00m	10.83	East Sussex County Council	SI1085
	Location	**Dates**	**Engineer**	**Sheet**
	575721.156 E 110618.738 N	22/03/2006-23/03/2006	Owen Williams	3/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
20.00	D31					(7.70)				
20.00-20.45	D32				-9.62	20.45	Complete at 20.45m			

Remarks

Scale (approx)	Logged By
1:50	AE/AK

Figure No. SI1085.BH13

Contract No: 49325727

Project: Bexhill - Hastings Link Road

Client: East Sussex County Council

URS

Record of Borehole

BH137R

SAMPLES & In situ TESTS				Water	STRATA				
Depth	Type/ No.	Core Run (m)	TCR(%) SCR(%) RQD(%)		Reduced Level (mOD)	Legend	Depth (Thick-ness)	DESCRIPTION	Instru-ment/ Backfill
		0.00						Very weak brown SILTSTONE - recovered as stiff to very stiff brown gravelly SILT. Gravel is angular to subangular, fine to coarse siltstone. (ASHDOWN BEDS)	
1.40, -1.80	1R		TCR=60% SCR=60% RQD=0%		11.63		(1.80) 1.80		
					10.43		(1.20) 3.00	Assessed Zone of Core Loss	
		3.00			9.83		(0.60) 3.60	Very weak brown SILTSTONE - recovered as very soft to soft brown gravelly SILT. Gravel is angular to subangular, fine to coarse siltstone. (ASHDOWN BEDS)	
					9.61		3.82	Very weak brown SILTSTONE (ASHDOWN BEDS)	
					9.43		4.00	Very weak brown SILTSTONE - recovered as brown gravelly SILT. Gravel is angular to subangular, fine to coarse siltstone. (ASHDOWN BEDS)	
			TCR=90% SCR=86% RQD=40%		7.73		(1.70) 5.70	Very weak brown mottled grey fractured SILTSTONE. Fractures are horizontal to vertical, very closely to medium spaced, rough and undulating with gravel infill between surfaces (ASHDOWN BEDS)	
					7.43		6.00	Assessed Zone of Core Loss	
		6.00			6.91		(0.52) 6.52	Very weak brown SILTSTONE - recovered as brown slightly silty angular coarse siltstone GRAVEL with occasional siltstone cobbles. (ASHDOWN BEDS)	
					6.70		6.73	Very weak brown SILTSTONE - recovered as very stiff brown slightly gravelly SILT. Gravel is angular, fine to medium siltstone. (ASHDOWN BEDS)	
					6.56		6.87		
					6.43		7.00	Very weak red-brown MUDSTONE - recovered as very stiff red-brown CLAY (ASHDOWN BEDS)	
			TCR=85% SCR=73.3% RQD=50%				(1.55)	Very weak brown SILTSTONE - recovered as brown very silty angular to sub-angular fine to coarse siltstone GRAVEL. (ASHDOWN BEDS) Very weak orange-brown mottled grey fractured SILTSTONE. Fractures are horizontal to sub-vertical, closely spaced, rough and planar with occasional gravel infill between surfaces (ASHDOWN BEDS)	
					4.88		8.55		
					4.43		(0.45) 9.00	Assessed Zone of Core Loss	
9.35,	2R	9.00						Very weak grey mottled orange-brown and red SILTSTONE - recovered as stiff to very stiff grey mottled orange-brown and red gravelly SILT. Gravel is angular to sub-angular, fine to coarse siltstone. (ASHDOWN BEDS)	

Boring Progress and Water Observations								
Date	Time	Hole Depth	Cas'g Depth	Cas'g Dia	Water Depth	Rose to	Time (mins)	Sealed (m)

Chiselling			Water Added	
From	To	Time (hh:mm)	From	To

GENERAL REMARKS

Draft.
Air Mist Flush

Logged by:	Equipment:	Location:	Ground Level:	Date:	Scale:
AH	Rotary Core - Comacchio 450P	575702.2 E	13.43	13/03/2009 Start	1:50.0
Checked by: CAB	Contractor: Southern Testing Laboratories Ltd	110655.3 N	mAOD	13/03/2009 End	Sheet 1 of 3
Status: Draft					

Contract No: 49325727

Project: Bexhill - Hastings Link Road

Client: East Sussex County Council

URS

Record of Borehole

BH137R

SAMPLES & In situ TESTS				Water	STRATA				
Depth	Type/ No.	Core Run (m)	TCR(%) SCR(%) RQD(%)		Reduced Level (mOD)	Legend	Depth (Thick-ness)	DESCRIPTION	Instru-ment/ Backfill
-9.75									
							(1.60)	Very weak grey mottled orange-brown and red SILTSTONE - recovered as stiff to very stiff grey mottled orange-brown and red gravelly SILT. Gravel is angular to sub-angular, fine to coarse siltstone.	
			TCR=83.3%						
			SCR=83.3%		2.83		10.60		
			RQD=24%				(0.55)	Very weak dark red fractured MUDSTONE. Fractures are horizontal to sub-vertical, very closely to closely spaced, rough and planar (ASHDOWN BEDS)	
					2.28		11.15		
					1.93		11.50	Very weak grey and orange-brown fractured SILTSTONE. Fractures are horizontal to sub-vertical, very closely to medium spaced, rough and planar with orange staining on fracture surfaces (ASHDOWN BEDS)	
							(0.50)	Assessed Zone of Core Loss	
					1.43		12.00		
		12.00							
12.40, -12.80	3R						(1.00)	Very weak orange-brown MUDSTONE - recovered as very stiff orange-brown CLAY (ASHDOWN BEDS)	
					0.43		13.00		
			TCR=73.3%					Very weak to weak grey-brown fractured SILTSTONE. Fractures are horizontal to sub-horizontal, very closely to closely spaced, rough and undulating (ASHDOWN BEDS)	
			SCR=73.3%				(1.20)		
			RQD=70%						
					-0.77		14.20		
							(0.80)	Assessed Zone of Core Loss	
					-1.57		15.00		
		15.00							
							(1.75)	Very weak dark red and orange-brown MUDSTONE - recovered as very stiff dark red and orange-brown CLAY (ASHDOWN BEDS)	
16.20, -16.50	4R		TCR=100%						
			SCR=100%						
			RQD=41.7%		-3.32		16.75		
							(1.25)	Very weak grey and dark grey fractured SILTSTONE. Fractures are sub-vertical, closely to medium spaced, rough and planar (ASHDOWN BEDS)	
					-4.57		18.00		
		18.00						Very weak grey and dark grey MUDSTONE (ASHDOWN BEDS)	
			TCR=100%						

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. Air Mist Flush

Logged by: AH	Equipment: Rotary Core - Comacchio 450P	Location: 575702.2 E 110655.3 N	Ground Level: 13.43 mAOD	Date: 13/03/2009 Start 13/03/2009 End	Scale: 1:50.0
Checked by: CAB	Contractor: Southern Testing Laboratories Ltd				Sheet 2 of 3
Status: Draft					

Contract No: 49325727

Project: Bexhill - Hastings Link Road

Client: East Sussex County Council

URS

Record of Borehole

BH137R

SAMPLES & In situ TESTS				Water	STRATA				
Depth	Type/ No.	Core Run (m)	TCR(%) SCR(%) RQD(%)		Reduced Level (mOD)	Legend	Depth (Thick-ness)	DESCRIPTION	Instru-ment/ Backfill
19.00, -19.30	5R		SCR=100% RQD=100%				(2.00)	Very weak grey and dark grey MUDSTONE	
					-6.57		20.00	**End of Borehole at 20.00m**	

Boring Progress and Water Observations								
Date	Time	Hole Depth	Cas'g Depth	Cas'g Dia	Water Depth	Rose to	Time (mins)	Sealed (m)
13/03/09	12.30	20.00	3.00	150				

Chiselling			Water Added	
From	To	Time (hh:mm)	From	To

GENERAL REMARKS

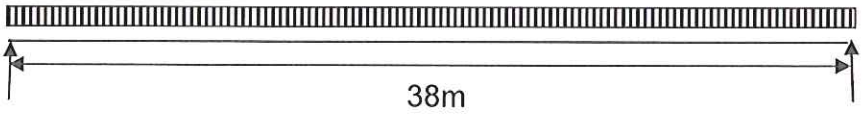
Draft.
Air Mist Flush

Logged by:	Equipment:	Location:	Ground Level:	Date:	Scale:
AH	Rotary Core - Comacchio 450P	575702.2 E	13.43	13/03/2009 Start	1:50.0
Checked by: CAB	Contractor: Southern Testing Laboratories Ltd	110655.3 N	mAOD	13/03/2009 End	Sheet 3 of 3
Status: Draft					

Appendix D Idealised Structure

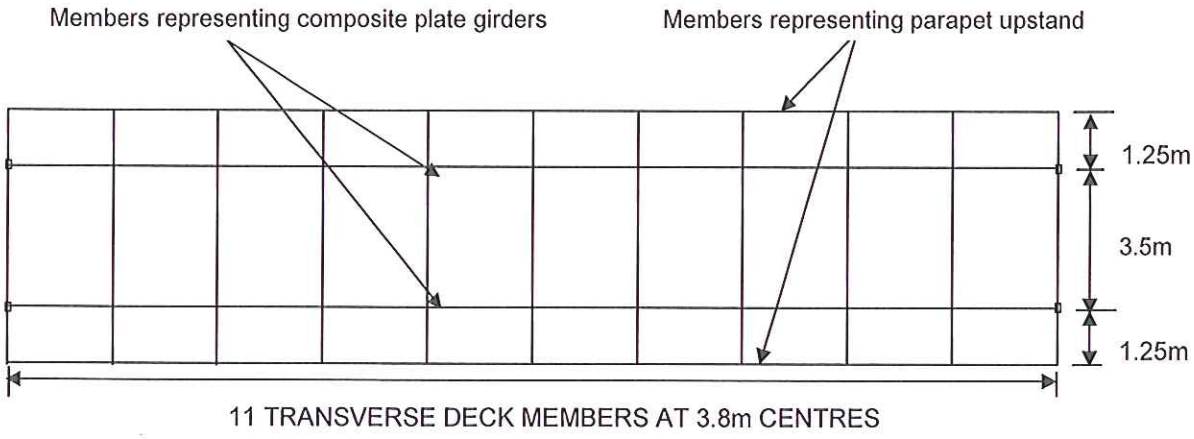
Step 1: Simply supported line beam analysis:

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.