HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

NEW MONKS FARM - LANCING

CONSTRUCTION OF HIGHWAY BRIDGE – HW02 (WSCC REF: 1790)

16 JUNE 2021

APPROVAL IN PRINCIPLE

In accordance with “CG 300 Technical approval of highway structures”, formerly “BD 2/12 Technical Approval of Highway Structures”.

Ref: 14904-HOP-XX-RP-S-0200 Rev. P02

HOP Consulting Limited
HOP House, 41 Church Road
Hove, BN3 2BE
Registered 4402211 England
T: +44 (0)1273 223900
E: ask@hop.uk.com
W: www.hop.uk.com

bsi. ISO 9001:2015 Quality Management FS553582
INVESTORS IN PEOPLE | Gold Until 2020
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Constructionline

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Client : New Monks Farm Development ltd.
American Express Community Stadium
Village Way
Falmer
Brighton
BN1 9BL

Prepared by	Checked by	Approved by	Revision
Andrew Burt	**Tristan Banks**	**Tristan Banks**	**P01 - Initial issue**
Tristan Banks			**P02 – minor updates**

0.0 PROJECT DETAILS

Name of Project:	New Monks Farm - Bridges
Name of Bridge or Structure:	Bridge HW02
Structure Reference Number:	1790
Summary:	This AIP covers the construction of a new highway bridge (2 of 5) at the above site, crossing a watercourse, offered for adoption to WSCC Highways. The planned construction date is late spring 2021.

1.0 HIGHWAY DETAILS - TYPE OF HIGHWAY

Access Road to Commercial and Residential Developments, the horizontal alignment of which is shown on CEP drawing 22236-1614 A "Structure Location and Details" located in Appendix B.

1.1 Permitted Traffic Speed

50mph (Signed at 30 mph)

1.2 Existing Weight Restriction

None, new construction.

2.0 SITE DETAILS

2.1 Obstacles Crossed

Unnamed watercourse fed mainly by springs. Refer to CEP drawing 22236-1614 A "Structure Location and Details".

3.0 PROPOSED STRUCTURE

3.1 Description of Structure and Design Working Life

Construction of a new concrete bridge based on requirements of West Sussex County Council Drainage and Environment Agency Ecology. Arrangement, width and span as follows and as general arrangement drawings in Appendix B.

Bridge Ref.	Width Overall	Span (c/c piles)	Description
HW02 (1790)	14.55m	16.05m	One way, 2 Lane roadway. Shared footpath and cycle way on one side, hardened verge on the other.

The main beam elements will be precast, pre-stressed, reinforced concrete (RC) units supported on integral reinforced concrete abutments. Abutments are based on requirements of West Sussex County Council Drainage and Environment Agency Ecology.

Main beams are precast concrete and there will be an in-situ concrete deck spanning between the beams and providing an over-slab to the precast elements.

A Steel Sheet Pile (SSP) wall will be provided in front of the RC abutments to retain the material behind and protect the bridge from scour. A 75mm joint between the substructures of bridge HW01 (1789) & bridge HW02 (1790) will be provided to allow for lateral movements.

Design Life Category 5, minimum 120-year design life.

3.2 Structural Type

Single spanning precast beam units bearing on integral reinforced concrete abutments.

3.3 Foundation Type

Reinforced concrete abutments with driven piled foundations.

3.4 Span Arrangement

General arrangement as shown on drawings in Appendix B.

16.05m single square span (measured c/c of piles).

3.5 Articulation Arrangements

Main span is integral with no bearings. Longitudinal fixity provided by integral connection. Thermal movement accommodated by flexibility of the abutment structures.

A Type 2 Asphaltic Plug Joint according to BD33/94 (Table A.1 of CD 357) will be provided at the ends of the bridge deck.

3.6 Classes and Levels

3.6.1 Consequence Class

CC2.

3.6.2 Reliability Class

RC2.

3.6.3 Inspection Level

IL2 relating to RC2.

3.6.4 Design Supervision

DSL2 relating to RC2.

3.7 Road Restraint System Type

Galvanised metal post and rail parapet (sufficient for normal containment N2, flexible parapet Class A) conforming to NA to BS EN 1991-2:2003 Table NA.6. Vertical infill bars will be present. End terminals will not be provided. Parapets will be provided with 45 degree ‘cranked ends’ at both approach and exit.

The bridge has a non-segregated cycle path / footway on the eastern side of the bridge, locations are shown on CEP drawing 22236-3-002 P1. Cycle path compliant parapets will be provided on the eastern side of the bridge. Timber post and rail fences on approach and exit from the bridge will be provided to guide all pedestrian and cycle users onto the bridge and offer some protection from falling down the slope.

Reference should be made to the risk assessment in Appendix E, subject to detailed design and Road Safety Audit.

3.8 Proposals for Water Management

The bridge will cross a stream/channel which is providing essential drainage to the wider development site and is generally fed by springs.

Back of abutment drainage will be provided to minimise build-up of water behind the abutment walls which will also include drainage parallel and through the joints and will be connected to a new drainage system, with outlet into the watercourse. Topside rodding points will be provided as well as accessible catch pits for maintenance. All to be developed at detailed design.

Drainage strategy can be provided by Civil Engineering Partnership (CEP); under a separate scheme.

Scour protection of the bridge foundations is provided by steel sheet pile wing walls.

3.9 Proposed Arrangements for Future Maintenance and Inspection

3.9.1 Traffic Management

Traffic management for inspection and maintenance to be described in an appropriate method statement and shall be in accordance with Chapter 8 of the Traffic Signs and General Directions.

3.9.2 Access

Bridge structure HW02 (1790) is offered for adoption to the Highway Authority.

Access to the underside of the structure is from the adjacent adopted highway. Defined work areas and access routes will be provided to allow close inspection.

Access to exposed faces of abutments and wing walls will be by stepped access from road level. Access steps, handrailing and lifebuoys are provided to enable safe inspection.

A hydraulic access platform/underbridge inspection vehicle is considered the most appropriate form of access to the bridge soffit.

Access to the parapet will be from the verge. Pedestrian guard rail (parapet) to be fitted to the bridge edge beams.

3.10 Environment and Sustainability

Environmental requirements provided by Local Lead Flood Authority (West Sussex County Council) in respect of flow in watercourses. Ecological requirements from the Environment Agency will be incorporated into design.

Ordinary Watercourse Consent will be required for the works.

The maintenance of the watercourse will be the legal responsibility of a Management Company that will be established once works reach an appropriate stage.

Economic use of materials has been achieved though the use of the latest design software and finite element methods. This has allowed lighter and slimmer elements to be used whilst providing sufficient capacity. Pre-cast elements have been extensively used to reduce construction time and transportation.

Opting for a large bridge span with battered channel sides, rather than a vertically sided culvert for example, allows for a suitable watercourse width which can provide a shallow gradient at bed level to encourage biodiversity.

3.11 Durability Materials and Finishes

New Concrete (120yrs): RC40/50

Concrete exposure class:	XC3/4, XD3
New Reinforcement Steel:	Grade 500B to BS4449:2005
Reinforcement tying wire:	Stainless Steel
Prestressing tendons:	To Specialist Manufacturer design

Reinforcing Cover (Abutments):

- Wall and Base Earth Side: 50mm +15mm = 65mm
- Wall and Base Internal Side, base: 35mm +15mm = 50mm
- Top: 50mm +15mm = 65mm

Reinforcing Cover (Prestressed RC Beams):

- Cover to soffit: To Specialist Manufacturer design
- Sides: To Specialist Manufacturer design
- Top: To Specialist Manufacturer design

Reinforcing Cover (In situ RC Deck):

- Bottom cover: 35mm +15mm = 50mm
- Top cover: 50mm +15mm = 65mm
- Sides: 50mm +15mm = 65mm

Handrailing and parapets: Galvanised Steel

Surface finishes to be as follows:

- Vertical and Horizontal formed finishes will be to F3
- Vertical and Horizontal unformed finishes will be generally to U4, except
- Vertical and Horizontal unformed finishes overlain by waterproofing will be to U5 (the bridge deck will include a waterproofing system in accordance with SHW cl 2003)

Other surface treatments to be as follows:

- Cut back bitumen in accordance with SHW cl 2004:3
- Parapets and exposed edges of the structure will be treated with a pore-water lining impregnate.

Fill to structures: Class 6N/6P as table 6/1 of MCDHW

3.12 Risks and Hazards Considered

The layout of the structure is based on construction being carried out over land with the watercourse diverted beneath structure once complete.

The following construction risks have been considered in addition to those normally associated with construction activities:-

i. Soft ground, particularly during wet conditions. On-going testing work required.
ii. Management of local ecology during construction works.
iii. Working in or by an existing watercourse where water levels flow volumes and directions can vary dependent on tidal state, sluicing, rainfall, etc.
iv. Stability of excavations, particularly during wet conditions.

v. The temporary condition including requirement for pumping, over pumping and vehicle management.
vi. Construction noise and air pollution.
vii. Potential falling from height during the construction phase.
viii. Handling of large units (lifting precast sections and headwalls).
ix. Programming constraints (the road cannot be used whilst the bridge is being installed).
x. Scour adjacent to abutments considered low risk due to the very low water velocities.

The following maintenance & inspection risks have been considered:-

xi. Slips, trips and falls.
xii. Working at height and over water.
xiii. Stability of access equipment.
xiv. Management of local ecology and environment.
xv. Working by an existing watercourse.
xvi. Live traffic.

The following demolition risks have been considered:-

xvii. Soft ground adjacent to the structure.
xviii. Management of local ecology during demolition works.
xix. Working in or by an existing watercourse.
xx. Stability of excavations, particularly during wet conditions, pump etc.
xxi. The temporary condition including requirement for pumping, over pumping and vehicle management.
xxii. Demolition noise, dust and air pollution.
xxiii. Falling from height when parapets are removed.
xxiv. Lifting of large units (precast sections).
xxv. Demolition of pre-cast elements.
xxvi. Road closures/ diversions.

3.13 Estimated Cost of proposed structure together with other structural forms considered and the reasons for their rejections including comparative whole life costs with dates of estimates

The budget cost estimate for bridge construction is approximately £400k to £420k, subject to detailed contractor costing.

A number of alternative forms of construction were considered for the bridge deck, namely:

- A reinforced concrete culvert;
- In-situ reinforced concrete;
- Pre-stressed pre-tensioned beams with in-situ topping;
- Steel beams with in-situ slab; and
- Articulated simply supported concrete deck.

3.13.1 Deck

Proprietary pre-stressed concrete beams with a concrete in-situ topping and integral abutments was selected for the detailed design due to the following advantages:

- Buildability – The bridge beams can be factory quality precast and then lifted in to place vastly reducing the requirement for falsework. The precast bridge beams provide a safe initial working platform for the remaining deck construction to follow. An in-situ concrete deck was not selected for this reason.
- Good quality control – Pre-casting in factory controlled and monitored conditions results in higher quality finish durability and accuracy.
- Durability for long service life – RC40/50 precast concrete designed for 120 year service life within XC3/4 and XD3 exposure classes. A steel beamed bridge was not selected due to perceived additional maintenance painting requirements.
- Rapid and efficient construction, low maintenance costs, low whole life costs and inherent fire resistance.
- Increased biodiversity on the banks of the watercourse, in front of the retaining wall i.e. a culvert was not selected for this reason.

3.13.2 Articulation

An articulated simply supported bridge was not adopted due to West Sussex County Council (WSCC), the Overseeing Organisation, requirements for an integral bridge with no bearings, as also recommended in the DMRB.

3.13.3 Run-On-Slabs

Options for bridges with and without run-on-slabs at either end have been considered. Due to the possible risk of future settlement of the highway and hence, risk of differential settlement between the highway surface and bridge deck; run-on-slabs were considered and initially proposed.

As shown on CEP drawing No. '22236-1-039 P1', Long term settlement of the carriageway is estimated at <10mm at bridge HW02 (1790), therefore, run-on slabs have been omitted from this structure.

The highway is constructed on a thick stratum of alluvium. There is a risk that the highway immediately adjacent to the piled bridge, will settle over time. It is considered unfeasible to excavate the alluvium to a competent stratum below and replace with engineered fill.

It is considered that suitable contingency measures are considered and allowed for to rectify future minor differential settlements.

3.13.4 Steel Sheet Pile (SSP) Retaining Walls

Alternative full depth reinforced concrete abutments have been considered which would retain the material behind the bridge. These have not been adopted in order to decrease rotational stiffness in the bridge deck less and save on reinforcement weight.

An independent cantilevered SSP retaining wall will be installed in front of the bridge abutments to retain material over a nominal height of 1.5m. these consider the following aspects:

1. **Scour.** The bridge abutment intersects the sloped bank of the watercourse. Particularly on the outer corner of watercourses, scouring could be a risk and we have considered a design allowance of 0.5m. An option to embed the R.C. abutment

further into the riverbank to allow for some scouring was considered, however, through analysis this has led to the abutments becoming heavier stiffer sections and caused increased moments in the deck and piles.

2. **Slope Stability.** The slopes are constructed within the low strength Made Ground and Alluvium. The slopes are not engineered for heavy loads to be placed behind them and hence there is risk of movement and destabilisation. The SSP's are adopted to provide additional stability and robustness to the slopes.
3. **Temporary Stability.** The earthworks are currently completed on site with road levels excavated to formation level and slopes and channels installed. It is anticipated that the SSP walls will be installed from a crane, sited some way away from the channels. Following installation of the SSP, a piling mat can be constructed behind the SSP where it is anticipated that a leader rig or similar will be used to install the bridge bearing piles. It is not anticipated that the slope would be suitable to resist the surcharges imposed by the piling activities being undertaken behind the wall, without temporary support provided by the SSP's.
4. **Consistency.** As shown in drawing 14904-HOP-ZZ-XX-DR-S-0001 P5, there are 5No. bridges on this site. Other bridges, particularly HW04 (1792) and HW05 (1793) do have a greater retained height for the SSP wall up to approximately 1 to 2m. These bridges are generally more suited to the SSP option. Therefore, we can acknowledge that other options do exist for bridges HW01 (1789) and HW02 (1790) and a flexible mattress could be an appropriate solution (or other). These options have been considered and a consistent approach across all 5No. bridge has been adopted as it is assumed this is an economic approach.

The SSP is considered a durable low maintenance solution and could be utilised during construction for temporary retention of a working platform.

3.13.5 Bearing Piles

Alternative bearing piles have been considered; steel tubes, continuous flight auger and H-Piles. H-piles have been adopted with full depth reinforced concrete abutments in order to decrease rotational stiffness in the bridge deck, save on reinforcement weight and provide flexibility in the overall system for thermal movement.

3.14 Proposed Arrangements for Construction

3.14.1 Construction sequence

i. Clear site including any ecology/wildlife management, reduce level and install crane mat.
ii. Install SSP retaining wall, wing wall piles and temporary guardrails on SSPs.
iii. Install working platform as required.
iv. Install foundation piles.
v. Excavate to abutment formation level and reduce piles to proposed cut-off level.
vi. Excavate channel between wingwalls and form battered banks.
vii. Cast and construct in-situ reinforced concrete abutments (up to construction joint and forming 'bearing shelf').
viii. Install precast concrete beams.

ix. Place permanent shuttering and cast in-situ concrete deck slab, including parapets, reinforcement connection between abutment and deck.
x. Install and compact abutment backfill with drainage provisions.
xi. Complete earthworks up to final level.
xii. Form deck waterproofing, road construction, install vehicle restraint barriers and parapets.

3.14.2 Traffic Management

None required.

3.14.3 Services diversions

No services anticipated to be affected. All new services to be installed subsequent to bridge construction via ducts above the deck, in the bridge verge infill.

3.14.4 Interface with the existing structures

No existing structures exist. However, it should be noted that the substructure on the Southern abutment includes a 75mm joint between HW01 (1789) & HW02 (1790) to allow for lateral movement.

3.15 Resilience and Security

The structure will be designed for 120 year life to full highways loading and will have suitable durability for its environment. The monolithic nature of an integral concrete bridge should ensure a good degree of future robustness.

4.0 DESIGN / ASSESSMENT CRITERIA

4.1 Actions

4.1.1 Permanent Actions

The principal permanent actions are concrete and self-weight, weight of soil and earth pressure in accordance with BS EN 1991-1.1. Self-weight of fill to be used is 20kN/m^3.

4.1.2 Snow, Wind and Thermal Actions

In accordance with EN1991.

Snow loading not considered (NA to BS EN 1991-1-3 NA.4.1.1)

Thermal actions ins accordance with Section 6 of BS EN 1991-1-5 and NA to BS EN 1991-1-5, adopting Approach 2 for determination of vertical temperature difference component.

4.1.3 Persistent Actions relating to Normal Traffic under AW regulations and C&U regulations

LM1 and LM2 loading in accordance with BS EN 1991-2 and the National Annex to BS EN 1991-2, figure NA. 6, with guidance followed in PD6694-1:2011 +A1 2020 for the design of the foundations.

4.1.4 Persistent Actions relating to General Order Traffic under STGO regulations

Load model LM3 – SV100 vehicle in accordance with BS EN 1991-2 and the National Annex to BS EN 1991-2, with guidance followed in PD6694-1:2011 +A1 2020 for the design of the foundations.

4.1.5 Footway or Footbridge Persistent Actions

Load model LM4 applied to the footway only, applied as surcharge of 5kN/m² in accordance with BS EN 1991-2 and NA to BS EN 1991-2. Guidance followed in PD6694-1:2011 +A1 2020 for the design of the foundations.

4.1.6 Persistent Actions relating to Special Order Traffic, provision for exceptional abnormal indivisible loads including location of vehicle track on deck cross-section

Not applicable.

4.1.7 Accidental Actions

Loading in accordance with BS EN 1991-2 clause 4.7.3 and NA to BS EN 1991-2

4.1.8 Action During Construction

The design will take into account adverse loading during execution as outlined in BS EN 1991-1-6 and the appropriate National Annex.

4.1.9 Special rules for combinations of actions

None.

4.1.10 Any Special Loading not covered above

None.

4.2 Heavy or High Loads Route Requirements and arrangements being made to preserve the route, including any provision for future heavier loads or future widening

Not applicable.

4.3 Minimum Headroom Provided

Headroom varies under bridge HW02 (1790) depends on watercourse alignment (channel is curved on plan) but is typically 1.8m without bridge deflection. Headroom is set to be in excess of 300mm minimum required freeboard clearance on predicted high water level within watercourse as agreed with The Environment Agency and Local Lead Flood Authority (West Sussex County Council).

A clearance of approximately 3.4m is present between the midline soffit and the channel bed.

Approximately 1.2m headroom exists for access to the bridge beam/abutment interface.

4.4 Authorities Consulted and any special conditions required

Local Lead Flood Authority (West Sussex County Council), Environment Agency (EA) and Adur District Council (ADC).

It is noted that no specific Planning Permission exists for the bridge structures and this is also subject to Ordinary Watercourse Consent.

4.5 List of Relevant Documents from the TAS

See Appendix A.

4.6 Proposed Departures from Standards given in 4.5

No departures have been identified at this stage.

4.7 Proposed Methods for dealing with aspects not covered by Standards in 4.5

Not applicable.

4.8 Proposed Safety Critical Fixings

None.

5.0 STRUCTURAL ANALYSIS

5.1 Methods of Analysis Proposed for Superstructure, Substructure and Foundations

5.1.1 Method of analysis for ultimate limit states (excluding fatigue)

The design will be carried out using linear elastic analysis of a grillage model in a finite element software package LUSAS Bridge. The precast main beams and in-situ deck elements will be analysed as beam elements, forming an effective grillage. The abutment walls will be modelled as surface elements and the piles as beam elements with Winkler spring supports, based on the soil characteristics.

The precast main beams will be designed by a specialist supplier.

Steel Sheet Piles (SSP) will be used for cantilevered wing walls to withstand horizontal loading due to earth and ground water pressures. Surcharge will also be considered however; it is expected that highways loading will be resisted by the bridge abutments. The SSP wall will be designed using WALLAP.

The foundations will be formed from driven steel piles to be designed by a specialist contractor. Pile loads will be shown on relevant drawings.

5.1.2 Method of analysis for fatigue

Fatigue checks will be performed using clause 6.8 of BS EN 1992-1-1, NA to BS EN 1992 and PD 6687-2:2008. Following clause 6.8.6, full fatigue checks on the reinforcement can be avoided and adequate fatigue resistance will be assumed for the reinforcing bars under tension, if the stress range under the frequent live load combination does not exceed certain values that are taken from table 2A within PD 6687.

5.1.3 Method of analysis for serviceability limit states

The design will be carried out using linear elastic analysis of a grillage model in a finite element software package LUSAS Bridge. The precast main beams will be designed by a specialist supplier.

The SSP wall will be designed using WALLAP.

Global movements of the structure (both transversely and longitudinally) have been limited to 20mm.

5.2 Description and Diagram of Idealised Structure to be used for analysis

Bridge loading and load effects to be analysed using LUSAS as per diagram in Appendix C.

Section properties for main beam elements will be taken from supplier's information.

5.3 Assumptions intended for calculation of structural element stiffness

Reinforced concrete element properties will be calculated assuming un-cracked sections and using standard elastic methods of analysis.

5.4 Proposed Earth Pressure Coefficients (k_a, k_0 or k_p) to be used in the design of earth retaining elements

Further to the geotechnical summary information in Section 6, Table 1 below gives outline soil parameters to be used in the design of the bridge. These are to be confirmed as part of the ongoing site investigation.

Soil parameters for bridge HW01 (1789) are based on borehole BH61 from the Soils Ltd. site investigation campaign.

Strata	**Units/ notation**	**Made Ground**	**Alluvium**	**Newhaven Chalk**	**6N/6P Backfil**
Top level	mOD	-	+0.82	-9.88	-
Predominant classification		Firm CLAY	Soft to Firm CLAY	CHALK	Gravel
Cohesion		Cohesive	Cohesive	Cohesionless	Cohesionless
SPT blows	N	7 - 32	6	9 – 14 (Dc)	-
Density (Dry)	γ, kN/m^3	18	17	14	-
Density (Saturated)	γ_{sat} kN/m^3	21	19	19	19
Drained properties					
Effective cohesion	c' kN/m^2	0	0	-	-
Angle of shearing resistance	Φ' º	21	21	32	35
Poisson's ratio	v	0.34	0.34	0.24	-
Youngs modulus	E' MN/m^2	0	32	>80	-
Undrained properties					
Undrained cohesion	Cu kN/m^2	50	30	-	-
Angle of shearing resistance	Φ º	0	0	-	-
Poisson's ratio	v	0.5	0.5	-	-
Active earth pressure K_A		0.47	0.47	0.31	0.27
Passive earth pressure K_P		2.1	2.1	3.26	3.69
At rest earth pressure K_0		0.64	0.64	0.47	0.43
Earth pressure distribution K*		-	-	-	1.36

Table 1 – Bridge HW02 (1790) Adopted soil parameters TBC

Detailed soil parameters are taken from Soils Ltd. Letter dated 20th January 2021 reference 18452/LR/HOP.

6.0 GEOTECHNICAL CONDITIONS

6.1 Acceptance of Recommendations of the Geotechnical Reports to be used in the design/assessment and reasons for any proposed changes

Preliminary ground investigations have been carried out by Soils Ltd, where the Geotechnical Investigation Report ref: 16141/GIR/Rev1.02 and 15666/GIR/Rev1.01, have been provided. Recent updates are provided in the Supplementary Investigation Report 18452/SIR_R27 dated September 2020. All detailed information is available on request.

Both reports recommend the use of pile supported foundations which are proposed to be adopted in design. Pertinent extracts are included in Appendix D.

Refer to section 5.4 for a summary of the geotechnical parameters used in the design. The following geotechnical information is collated in accordance with Managing Geotechnical Risk CD 622 Appendix C:

6.1.1 C1 Project

New bridge at New Monks Farm (OS Ref: 105764000N, 5196919232E), 14.5m span and 14.3m nom. width. All highways work off-structure are subject to separate approvals.

6.1.2 C2 Objectives

To construct a bridge suitable for carrying full highways load over a minor spring fed watercourse.

6.1.3 C3 Existing information

- Soils Ltd. Geotechnical Investigation Report ref: 16141/GIR/Rev1.02;
- Soils Ltd. Geotechnical Investigation Report ref: 15666/GIR/Rev1.01; and
- Soils Ltd. Supplementary Investigation Report 18452/SIR_R27.

6.1.4 C4 Geotechnical risk

Summary risks from Soils Ltd. report 1566/GIR/Rev1.01 “quantitative risk assessment” seen below in Table 2.

No.	Risk	Commentary
I	Contamination	No exceedances were recorded for representative contaminants; concentration for human health receptor to Soil Guideline Values (SGV), Category 4 Screening Levels (C4SL’s) or Suitable 4 Use Level (S4UL).
II	Asbestos	ACM was not detected within any of the samples.
III	Groundwater	Hydrogeological Appraisal Report will dictate if groundwater and associated aquifers are at risk from any pollutants identified on-site.
IV	Soil Gas	Low to moderate risk of soil gas associated with the thickness of Made Ground, to be monitored.

V	Site waste	Largely Inert Waste Land Fill Category. The remaining tests were classified as Stable Non-Reactive Hazardous waste in a non - hazardous landfill.

Table 2 – Summary of geotechnical risk assessment

6.1.5 C5 Proposed studies and investigations

Geotechnical Design Report (GDR) required prior to detailed design stage to confirm parameters used in the initial design, soil springs, settlement characteristics and advise on negative skin friction etc.

6.1.6 C6 Specialist consultation

Not required.

6.1.7 C7 Programme

GDR required before piling work commences in 2021.

6.2 Geotechnical Design Report Highway Structure Summary Information

STRUCTURE NAME Bridge HW02 (1790)	**OS GRID REFERENCE** 105764000N, 5196919232E	**REFERENCE/ COMMENTS**
STRUCTURE TYPE Integral concrete bridge	**AIP REF** 14904-HOP-XX-RP-S-0200	
DESIGNERS GEOTECHNICAL ADVISOR Soils Ltd.	**DESIGN LIFE** 120 years	
GEOTECHICAL CATEGORY 2	**QUANTATIVE GEOTECHNICAL INVESTIGATIONS** See section 6.1	See HD22/08 cl 3.2 & 3.3 and BS EN1997-1 cl 2.1(10) – (21)
SOILS/ GEOLOGY Site consists of made ground over alluvium over chalk.	**RELEVENT TRAIL HOLES** Borehole BH61 CPT 202	
STRATA	**TYPICAL DEPTHS**	
Made ground Alluvium Chalk	6 to 1 mAoD 1 to -10 mAoD -10 mAoD onwards	
PREVIOUS GROUND HISTORY No existing structures exist at this site. The new bridge will cross a modified but existing watercourse.		
CONTAMINATED GROUND RISK ASSESSMENT REQUIRED No		

<table>
<tr><td colspan="6">GROUNDWATER
Groundwater encountered between 3 and mBGL</td><td></td></tr>
<tr><td colspan="6">PROTECTION OF STRUCTURE AGAINST CHEMICAL ATTACK
ACEC classification AC-1</td><td></td></tr>
<tr><td colspan="6">EARTH PRESSURE VALUE
See Table 1 in Section 5.4.</td><td></td></tr>
<tr><td colspan="6">SPREAD FOUNDATIONS
Not Applicable</td><td></td></tr>
<tr><td colspan="6">PILE DESIGN</td><td rowspan="3">At ULS</td></tr>
<tr><td>STRUCTURE ELEMENT</td><td>FOUNDING STRATUM</td><td>TOE LEVEL (mAoD)</td><td>PILE WIDTH. (m)</td><td>PILE LENGTH (m)</td><td>PILE RESISTANCE (kN)</td></tr>
<tr><td>Founding piles</td><td>Chalk</td><td>-22.0</td><td>0.37</td><td>26.0</td><td>1,250</td></tr>
<tr><td colspan="6">PILE TYPE:
H-Pile (UC Section)
CRITERIA FOR SELECTING PILE TOE LEVEL:
Vertical, horizontal and moments resistance of pile
ALLOWANCE FOR NEGATIVE SKIN FRICTION WITHIN DESIGN:
Not included in preliminary design (subject to GDR).</td></tr>
<tr><td colspan="6">DIFFERENTIAL SETTLEMENT
See section 6.3.</td><td></td></tr>
<tr><td colspan="6">GEOTECHNICAL SUPERVISION/ MONITORING
To be specified in the GDR.</td><td></td></tr>
</table>

Table 3 – Geotechnical Report Summary

6.3 Differential Settlement to be allowed for in the design of the structure

+/- 10mm.

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

Preliminary ground investigations have been carried out by Soils Ltd, where the Geotechnical Investigation Report ref: 16141/GIR/Rev1.02 and 15666/GIR/Rev1.01, have been provided. Recent updates are provided in the Supplementary Investigation Report 18452/SIR_R27 dated September 2020. All detailed information is available on request.

A Geotechnical Design Report is required prior to detailed design stage to confirm parameters used in the initial design, soil springs, settlement characteristics and advise on negative skin friction etc.

The following is an extract of the above latter report in regard to pile design.

4.3.1 Piled Foundations

If adopted the piled foundations must be taken through any Made Ground and Alluvium into suitable strength soils of the Newhaven Chalk Formation. The construction of a piled foundation is a specialist job with the actual pile working load depending on the particular type pile and installation method.

Prior to finalising the foundation design the advice from a reputable contractor who is familiar with the ground and groundwater conditions present at the site should be sought. The load capacities are provided for varying diameters and lengths of bored piles taken into the Newhaven Chalk Formation, based on SPT "N60" values and inferred Cu values, where the pile passes through the cohesive soils of the Alluvium, and must only be used for preliminary design purposes. A factor of safely of 2.5 was applied to the shaft ultimate bearing value and a factor of safety of 5 was applied to the base ultimate bearing value and depicted by the design line outlined in Appendix C.1. Due to the proximity of the River Adur groundwater was considered to be at surface for the purposes of design. An Alpha value of 0.45 and an Nc of 9 was adopted for the cohesive soils of the Alluvium.

The bearing values given in Appendix C.1., are applicable to single piles. Where piles are to be constructed in groups the bearing value of each individual pile should be reduced by a factor of about 0.8 and a calculation made to check the factor of safety against block failure. From ground level at least the upper 3m of the pile shaft has been ignored in the preliminary pile design given. The thickness of Made Ground varies significantly at this site and therefore attention should be paid to the logs and pile designs for the locations closest to the proposed bridge locations.

To prevent necking of the green concrete, temporary casing may be required where the pile passes through the Made Ground or granular Alluvium and below the groundwater table. To achieve the full bearing value a pile should penetrate the bearing stratum by at least five times the pile diameter. No allowance has been made for negative skin friction that could be generated where piles pass through Made Ground and Alluvium deposits underlying the site. The negative skin friction must be applied to the pile working load and must not be factored.

To prevent any downward migration of potential contaminants within the Made Ground into the underling groundwater/aquifers or create preferential vertical pathways between aquifers, specific piling techniques should be employed in accordance with The National Groundwater and Contaminated Land Centre Report NC/99/73: Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention published by the EA, which presents guidance on piling on contaminated sites. Therefore, the proposed piling method would need to be agreed and approved by the EA before piling works would commence on site. It is therefore likely that a Foundation Works Risk Assessment (FWRS) would be required by the EA in order to assess the risk posed by the piling methodology to be adopted and if necessary discusses potential mitigation measures; Soils Limited can provide the relevant guidance including the FWRA, upon request.

It should be noted that when the GIR was written, circular piles were anticipated in the design. These have subsequently been replaced with H-Piles. Updated detailed design work will be carried out specifically for H-Piles.

7.0 CHECKING

7.1 Proposed Category

Category 2.

7.2 If Category 3, name of proposed Independent Checker

Not applicable.

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

Piles will be driven steel subject to specialist design and detail.

The deck is formed of precast concrete beams that will be constructed off site and hoisted into position. Edge/parapet beams are also precast.

There are no requirements for temporary propping.

In situ shuttering will be provided where required.

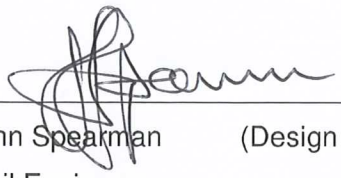
Temporary stability, lifting and temporary crane bases etc are the contractor's responsibility which will be the subject of a method statement subject to the approval of the Engineer.

8.0 DRAWINGS AND DOCUMENTS

8.1 List of Drawings and documents accompanying the submission

Site Location Plan	14904-HOP-ZZ-XX-DR-S-0001
Deck Level Plan and GA	14904-HOP-01-XX-DR-S-0200
Sections	14904-HOP-01-XX-DR-S-0203
Site Layout Indicating Existing Services	22236-2321
Compaction & Settlement Assumptions	22236-1-039
Structure Location Plan	22236-1614
Extent of Works (Contract 3)	22236-3-002

9.0 THE ABOVE IS SUBMITTED FOR ACCEPTANCE

Signed	
Name	John Spearman (Design team Leader)
	Civil Engineer
Engineering Qualifications	BSc CEng MICE
Name of Organisation	HOP Consulting ltd.
Date	14th July 2021
Signed	
Name	Nigel Hosker (Check team Leader)
	Civil Engineer
Engineering Qualifications	BSc CEng FICE
Name of Organisation	HOP Consulting ltd.
Date	14th July 2021

10.0 THE ABOVE IS REJECTED/AGREED*

subject to the amendments and conditions shown ~~below~~

on the following page

**delete as appropriate*

Signed	A. Cook
Name	Andrew Cook
	Engineer
Engineering Qualifications	BEng CEng MICE
TAA	West Sussex County Council
Date	12/07/2021

APPENDIX A – TECHNICAL APPROVAL SCHEDULE

Comments from Section 10

Clauses 3.7, 4.6 & drgs 200 & 203 - Approach and exit safety fences (& terminals) that connect to the bridge parapets are not proposed by the designer. As acknowledged by the designer this is yet to be accepted by WSCC. The inclusion of a Risk Assessment within the AIP is noted, but this should be part of the justification within a DfS (ref AIP clause 4.6). Prior to the D&C submission a DfS in accordance with the *Departures from Standards: Procedures for Local Highway Authorities*, should be submitted to henry.moyo@westsussex.gov.uk for review. Any changes to the design as a result of the DfS review process are at the Designers risk.

Clause 6.2 - The GIR and GDR have yet to be fully reviewed and accepted by WSCC. The provisional information provided is tentatively accepted wherein deviation from the proposed design format of the foundations is considered to be unlikely. Nevertheless, any changes to the design as a result of the GIR and GDR review process are at the Designers risk.

Drg 203 - The drawing currently shows service ducts in mass concrete. It is accepted that concrete protection is required but it should only be provided at the ducts, elsewhere in the verge construction granular fill is required.

HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

APPENDIX A

Technical Approval Schedule (TAS)

Schedule of Documents Relating to Design of Highway Bridges and Structures

(All documents are taken to include revisions current as of 09 September 2020)

The standards listed are typically required for a highway structure.

Additional standards needed for a particular design should be added to the section at the bottom of the TAS.

The Designer is responsible for ensuring that the standards and references given in the schedule are correct and up to date.

Eurocodes and associated UK National Annexes			
Eurocode part	**Title**	**Amendment / Corrigenda**	***Notes***
Eurocode 0	**Basis of structural design**		
BS EN 1990:2002 +A1:2005	Eurocode 0: Basis of structural design	+A1:2005 Incorporating corrigenda December 2008 and April 2010	See CD 350 section 7 for additional guidance.
NA to BS EN 1990:2002 + A1:2005	UK National Annex to Eurocode 0 Basis of structural design	National Amendment No.1	See CD 350 section 7 for additional guidance.
Eurocode 1	**Actions on structures**		
BS EN 1991-1-1:2002	Eurocode 1: Actions on structures. General Actions. Densities, self-weight, imposed load for buildings	Corrigenda December 2004 and March 2009	
NA to BS EN 1991-1-1:2002	UK National Annex to Eurocode 1: Actions on structures. General Actions. Densities, self-weight, imposed load for buildings	Corrigenda July 2019	
BS EN 1991-1-3:2003 +A1:2015	Eurocode 1: Actions on structures. General Actions. Snow loads	+A1:2015 Incorporating corrigenda December 2004 and March 2009	
NA + A2:18 to BS EN 1991-1-3:2003+A1:2015	UK National Annex to Eurocode 1: Actions on structures. General Actions. Snow loads	+A2:2018 Incorporating corrigenda June 2007, December 2015 and October 2018	

NA +A1:2020 to BS EN 1991-2:2003	**UK National Annex to Eurocode 1: Actions on structures. Traffic loads on bridges**	**Corrigendum No.1 Amendment June 2020**	**See CD 350 section 7 for additional guidance.**
Eurocode 2	**Design of concrete structures**		
BS EN 1991-1-4:2005 +A1:2010	Eurocode 1: Actions on structures. General Actions. Wind actions	+A1:2010 Corrigenda July 2009 and January 2010	
NA to BS EN 1991-1-4:2005 + A1:2010	UK National Annex to Eurocode 1: Actions on structures. General Actions. Wind actions	National Amendment No.1	
BS EN 1991-1-5:2003	Eurocode 1: Actions on structures. General Actions. Thermal actions	Corrigenda December 2004 and March 2009	
NA to BS EN 1991-1-5:2003	UK National Annex to Eurocode 1: Actions on structures. General Actions. Thermal actions	-	
BS EN 1991-1-6:2005	Eurocode 1: Actions on structures. General Actions. Actions during execution	Corrigenda July 2008, November 2012 and February 2013	
NA to BS EN 1991-1-6:2005	UK National Annex to Eurocode 1: Actions on structures. General Actions. Actions during execution	-	
BS EN 1991-1-7:2006 +A1:2014	Eurocode 1: Actions on structures. General Actions. Accidental actions	+A1: 2014 Corrigendum February 2010	
NA+A1 to BS EN 1991-1-7:2006+A1:2014	UK National Annex to Eurocode 1: Actions on structures. Part 1-7 : Accidental actions	+A1:2014 Incorporating corrigenda August 2014 and November 2015	See CD 350 for additional guidance.
BS EN 1991-2:2003	Eurocode 1: Actions on structures. Traffic loads on bridges	Corrigenda December 2004 and February 2010	See CD 350 section 7 for additional guidance.
BS EN 1992-1-1:2004 + A1:2014	Eurocode 2: Design of concrete structures– Part 1-1: General rules and rules for buildings	Incorporating corrigendum January 2008, November 2010 and January 2014	
NA + A2:2014 to BS EN 1992-1-1:2004 + A1:2014	UK National Annex to Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings		
BS EN 1992-2:2005	Eurocode 2: Design of concrete structures – Part 2: Concrete bridges – Design and detailing rules	Corrigendum July 2008	
NA to BS EN 1992-2:2005	UK National Annex to Eurocode 2: Design of concrete structure – Part 2: Concrete bridges – Design and detailing rules	-	

NA +A1:2020 to BS EN 1991-2:2003	**UK National Annex to Eurocode 1: Actions on structures. Traffic loads on bridges**	**Corrigendum No.1 Amendment June 2020**	**See CD 350 section 7 for additional guidance.**
Eurocode 2	**Design of concrete structures**		
BS EN 1992-3:2006	Eurocode 2: Design of concrete structures – Part 3: Liquid retaining and containment structures	-	
NA to BS EN 1992-3:2006	UK National Annex to Eurocode 2: Design of concrete structures – Part 3: Liquid retaining and containment structures	-	
BS EN 1992-4:2018	Eurocode 2: Design of concrete structures – Part 4: Design of fastenings for use in concrete		
NA to BS EN 1992-4:2018	UK National Annex to Eurocode 2: Design of concrete structures – Part 4: Design of fastenings for use in concrete		
~~**Eurocode 3**~~	~~**Design of steel structures**~~		
BS EN 1993-1-1:2005 + A1:2014	Eurocode 3: Design of steel structures – Part 1-1 General rules and rules for buildings	Corrigenda February 2006 and April 2009	
NA + A1:2014 to BS EN 1993-1-1:2005 + A1:2014	UK National Annex to Eurocode 3: Design of steel structures – Part 1-1 General rules and rules for buildings	-	
~~BS EN 1993-1-3:2006~~	~~Eurocode 3: Design of steel structures – Part 1-3 General rules – Supplementary rules for cold-formed members and sheeting~~	~~Corrigendum November 2009~~	
~~NA to BS EN 1993-1-3:2006~~	~~UK National Annex to Eurocode 3: Design of steel structures – Part 1-3 Supplementary rules for cold-formed members and sheeting~~	~~-~~	
~~BS EN 1993-1-4:2006~~	~~Eurocode 3: Design of steel structures – Part 1-4 General rules – Supplementary rules for stainless steels~~	~~-~~	
~~NA to BS EN 1993-1-4:2006~~	~~UK National Annex to Eurocode 3: Design of steel structures – Part 1-4 Supplementary rules for stainless steels~~	~~-~~	
~~BS EN 1993-1-5:2006+A2:2019~~	~~Eurocode 3: Design of steel structures – Part 1-5 Plated structural elements~~	~~Corrigendum April 2009, +A1:2017 Amendment No. 1, +A2:2019~~	
~~NA to BS EN 1993-1-5:2006~~	~~UK National Annex to Eurocode 3: Design of steel structures – Part 1-5 Plated structural elements~~	~~-~~	
~~BS EN 1993-1-6:2007+ A1:2017~~	~~Eurocode 3: Design of steel structures – Part 1-6 Strength and stability of shell structures~~	~~+ A1:2017 Amendment No. 1~~	

NA +A1:2020 to BS EN 1991-2:2003	UK National Annex to Eurocode 1: Actions on structures. Traffic loads on bridges	Corrigendum No.1 Amendment June 2020	See CD 350 section 7 for additional guidance.
Eurocode 2	**Design of concrete structures**		
~~BS EN 1993-1-7:2007~~	~~Eurocode 3: Design of steel structures – Part 1-7 Plated structures subject to out of plane loading~~	~~Corrigendum April 2009~~	
~~BS EN 1993-1-8:2005~~	~~Eurocode 3: Design of steel structures – Part 1-8 Design of joints~~	~~Corrigenda December 2005, September 2006, July 2009 and August 2010~~	
~~NA to BS EN 1993-1-8:2005~~	~~UK National Annex to Eurocode 3: Design of steel structures – Part 1-8 Design of joints~~	~~-~~	
~~BS EN 1993-1-9:2005~~	~~Eurocode 3: Design of steel structures – Part 1-9 Fatigue~~	~~Corrigenda December 2005, September 2006 and April 2009~~	
~~NA to BS EN 1993-1-9:2005~~	~~UK National Annex to Eurocode 3: Design of steel structures – Part 1-9 Fatigue~~	~~-~~	
~~BS EN 1993-1-10:2005~~	~~Eurocode 3: Design of steel structures – Part 1-10 Material toughness and through-thickness properties~~	~~Corrigenda December 2005, September 2006 and March 2009~~	
~~NA to BS EN 1993-1-10:2005~~	~~UK National Annex to Eurocode 3: Design of steel structures – Part 1-10 Material toughness and through thickness properties~~	~~-~~	
~~BS EN 1993-1-11:2006~~	~~Eurocode 3: Design of steel structures – Part 1-11 Design of structures with tension components~~	~~Corrigendum April 2009~~	
~~NA to BS EN 1993-1-11:2006~~	~~UK National Annex to Eurocode 3: Design of steel structures – Part 1-11 Design of structures with tension components~~	~~-~~	
~~BS EN 1993-1-12:2007~~	~~Eurocode 3: Design of steel structures – Part 1-12 Additional rules for the extension of EN 1993 up to steel grades S 700~~	~~Corrigendum April 2009~~	
~~NA to BS EN 1993-1-12:2007~~	~~UK National Annex to Eurocode 3: Design of steel structures – Part 1-12 Additional rules for the extension of EN 1993 up to steel grades S 700~~	~~-~~	
~~BS EN 1993-2:2006~~	~~Eurocode 3: Design of steel structures – Part 2 Steel bridges~~	~~Corrigendum July 2009~~	

NA +A1:2020 to BS EN 1991-2:2003	**UK National Annex to Eurocode 1: Actions on structures. Traffic loads on bridges**	**Corrigendum No.1 Amendment June 2020**	**See CD 350 section 7 for additional guidance.**
Eurocode 2	**Design of concrete structures**		
~~NA + A1:2012 to BS EN 1993-2:2006~~	~~UK National Annex to Eurocode 3: Design of steel structures – Part 2 Steel bridges~~	~~+ A1:2012~~	
BS EN 1993-5:2007	Eurocode 3: Design of steel structures – Part 5 Piling	Corrigendum May 2009	
NA + A1:2012 to BS EN 1993-5:2007	UK National Annex to Eurocode 3: Design of steel structures – Part 5 Piling	+ A1:2012	
Eurocode 4	**Design of composite steel and concrete structures**		
BS EN 1994-1-1:2004	Eurocode 4: Design of composite steel and concrete structures – Part 1-1 General rules and rules for buildings	Corrigendum April 2009	
NA to BS EN 1994-1-1:2004	UK National Annex to Eurocode 4: Design of composite steel and concrete structures – Part 1-1 General rules and rules for buildings	-	
BS EN 1994-2:2005	Eurocode 4: Design of composite steel and concrete structures – Part 2 General rules and rules for bridges	Corrigendum July 2008	
NA to BS EN 1994-2:2005	UK National Annex to Eurocode 4: Design of composite steel and concrete structures – Part 2 General rules and rules for bridges	-	
~~**Eurocode 5**~~	~~**Design of timber structures**~~		
~~BS EN 1995-1-1:2004 + A2:2014~~	~~Eurocode 5: Design of timber structures – Part 1-1 General – common rules and rules for buildings~~	~~+ A2:2014 Incorporating corrigendum June 2006~~	
~~NA to BS EN 1995-1-1:2004 + A2:2014~~	~~UK National Annex to Eurocode 5: Design of timber structures – Part 1-1 General – common rules and rules for buildings~~	~~+ A2:2014~~	
~~BS EN 1995-2:2004~~	~~Eurocode 5: Design of timber structures – Part 2 Bridges~~	~~-~~	
~~NA to BS EN 1995-2:2004~~	~~UK National Annex to Eurocode 5: Design of timber structures – Part 2 Bridges~~	~~-~~	
Eurocode 6	**Design of masonry structures**		
BS EN 1996-1-1:2005+A1:2012	Eurocode 6: Design of masonry structures – Part 1-1 General rules for reinforced and unreinforced masonry structures	+A1:2012 Corrigenda February 2006 and July 2009	

NA +A1:2020 to BS EN 1991-2:2003	**UK National Annex to Eurocode 1: Actions on structures. Traffic loads on bridges**	**Corrigendum No.1 Amendment June 2020**	**See CD 350 section 7 for additional guidance.**
Eurocode 2	**Design of concrete structures**		
NA to BS EN 1996-1-1:2005 +A1:2012	UK National Annex to Eurocode 6: Design of masonry structures – Part 1-1 General rules for reinforced and unreinforced masonry structures	Corrigendum October 2015	
BS EN 1996-2:2006	Eurocode 6: Design of masonry structures – Part 2 Design considerations, selection of materials and execution of masonry	Corrigendum September 2009	
NA to BS EN 1996-2:2006	UK National Annex to Eurocode 6: Design of masonry structures – Part 2 Design considerations, selection of materials and execution of masonry	Corrigendum No.1	
BS EN 1996-3:2006	Eurocode 6: Design of masonry structures – Part 3 Simplified calculation methods for unreinforced masonry structures	Corrigendum October 2009	
NA +A1:2014 to BS EN 1996-3:2006	UK National Annex to Eurocode 6: Design of masonry structures – Part 3 Simplified calculation methods for unreinforced masonry structures	+A1:2014	
Eurocode 7	**Geotechnical design**		
BS EN 1997-1:2004+A1:2013	Eurocode 7: Geotechnical design – Part 1 General rules	+A1:2013 Corrigendum February 2009	
NA+A1 to BS EN 1997-1:2004+A1:2013	UK National Annex to Eurocode 7: Geotechnical design – Part 1 General rules	+A1:2013 Incorporating Corrigendum No.1	
BS EN 1997-2:2007	Eurocode 7: Geotechnical design – Part 2 Ground investigation and testing	Corrigendum June 2010	
NA to BS EN 1997-2:2007	UK National Annex to Eurocode 7: Geotechnical design – Part 2 Ground investigation and testing	-	
~~**Eurocode 8**~~	~~**Design of structures for earthquake resistance**~~		
~~BS EN 1998-1:2004 + A1:2013~~	~~Eurocode 8: Design of structures for earthquake resistance – Part 1 General rules, seismic actions and rules for buildings~~	~~Corrigendum June 2009, January 2011 and March 2013~~	
~~NA to BS EN 1998-1:2004~~	~~UK National Annex to Eurocode 8: Design of structures for earthquake resistance – Part 1 General rules, seismic actions and rules for buildings~~	~~-~~	
~~BS EN 1998-2:2005+A2:2011~~	~~Eurocode 8: Design of structures for earthquake resistance – Part 2 Bridges~~	~~Corrigenda February 2010 and February 2012~~	

NA +A1:2020 to BS EN 1991-2:2003	UK National Annex to Eurocode 1: Actions on structures. Traffic loads on bridges	Corrigendum No.1 Amendment June 2020	See CD 350 section 7 for additional guidance.
Eurocode 2	**Design of concrete structures**		
~~NA to BS EN 1998-2:2005~~	~~UK National Annex to Eurocode 8: Design of structures for earthquake resistance – Part 2 Bridges~~	-	
~~BS EN 1998-5:2004~~	~~Eurocode 8: Design of structures for earthquake resistance – Part 5 Foundations, retaining structures and geotechnical aspects~~	-	
~~NA to BS EN 1998-5:2004~~	~~UK National Annex to Eurocode 8: Design of structures for earthquake resistance – Part 5 Foundations, retaining structures and geotechnical aspects~~	-	
~~**Eurocode 9**~~	~~**Design of aluminium structures**~~		
~~BS EN 1999-1-1:2007 + A2:2013~~	~~Eurocode 9: Design of aluminium structures– Part 1-1 General structural rules~~	~~+ A2:2013 Incorporating corrigendum March 2014~~	
~~NA to BS EN 1999-1-1:2007 + A1:2009~~	~~UK National Annex to Eurocode 9: Design of aluminium structures – Part 1-1 General structural rules~~	~~National Amendment No.1 Corrigendum No.1~~	
~~BS EN 1999-1-3:2007 + A1:2011~~	~~Eurocode 9: Design of aluminium structures – Part 1-3 Structures susceptible to fatigue~~	~~+ A1:2011~~	
~~NA to BS EN 1999-1-3:2007 + A1:2011~~	~~UK National Annex to Eurocode 9: Design of aluminium structures – Part 1-3 Structures susceptible to fatigue~~	~~+ A1:2011~~	
~~BS EN 1999-1-4:2007 +A1:2011~~	~~Eurocode 9: Design of aluminium structures – Part 1-4 Cold formed structural sheeting~~	~~+ A1:2011 Corrigendum November 2009~~	
~~NA to BS EN 1999-1-4:2007~~	~~UK National Annex to Eurocode 9: Design of aluminium structures – Part 1-4 Cold formed structural sheeting~~	-	

Bsi Published Documents

For guidance only unless clauses are otherwise specified in BD 100/16 Annex B.

Published Document reference	Title	Notes
~~PD 6688-1-1:2011~~	~~Recommendations for the design of structures to BS EN 1991-1-1~~	~~See CD 350 Annex A for additional guidance.~~
~~PD 6688-1-4:2015~~	~~Background paper to the UK National Annex to BS EN 1991-1-4~~	~~See CD 350 Annex A for additional guidance.~~
~~PD 6688-1-7:2009 +A1:2014~~	~~Recommendations for the design of structures to BS EN 1991-1-7~~	~~See BD100 clause 2.17 and Annex B for additional guidance.~~
~~PD 6688-2:2011~~	~~Recommendations for the design of structures to BS EN 1991-2~~	~~See CD 350 Annex A for additional guidance.~~

NA +A1:2020 to BS EN 1991-2:2003	**UK National Annex to Eurocode 1: Actions on structures. Traffic loads on bridges**	**Corrigendum No.1 Amendment June 2020**	**See CD 350 section 7 for additional guidance.**
Eurocode 2	**Design of concrete structures**		
PD 6687-1:2010	Background paper to the UK National Annexes to BS EN 1992-1 and BS EN 1992-3	See BD100 clauses 2.15, 2.16 and Annex B for additional guidance.	
PD 6687-2:2008	Recommendations for the design of structures to BS EN 1992-2:2005	See BD100 clause 2.16 and Annex B for additional guidance.	
~~PD 6695-1-9:2008~~	~~Recommendations for the design of structures to BS EN 1993-1-9~~	~~See CD 350 Annex A for additional guidance.~~	
~~PD 6695-1-10:2009~~	~~Recommendations for the design of structures to BS EN 1993-1-10~~	~~See CD 350 Annex A for additional guidance.~~	
PD 6695-2:2008 + A1:2012 Incorporating Corrigendum No.1	Recommendation for the design of bridges to BS EN 1993	See CD 350 Annex A for additional guidance.	
~~PD 6696-2:2007 + A1:2012~~	~~Background paper to BS EN 1994-2 and the UK National Annex to BS EN 1994-2~~	~~See CD 350 Annex A for additional guidance.~~	
PD 6694-1:2011 + A1:2020	Recommendations for the design of structures subject to traffic loading to BS EN 1997-1	See CD 350 Annex A for additional guidance. Amended 27 May 2020	
~~PD 6698:2009~~	~~Recommendations for the design of structures for earthquake resistance to BS EN 1998~~	~~See CD 350 section 7 for additional guidance.~~	
~~PD 6703:2009~~	~~Structural bearings – Guidance on the use of structural bearings~~		
~~PD 6705-2:2020~~	~~Structural use of steel and aluminium. Execution of steel bridges conforming to BS EN 1090-2. Guide~~	~~Replaces PD 6705-2:2010 + A1:2013~~	
~~PD 6705-3:2009~~	~~Recommendations on the execution of aluminium structures to BS EN 1090-3~~		
~~PD 6702-1:2009+A1:2019~~	~~Structural use of aluminium. Recommendations for the design of aluminium structures to BS EN 1999~~	~~Amended 31 May 2019~~	

Execution Standards referenced in British Standards or Eurocodes		
Execution Standard reference	**Title**	**Notes**
~~BS EN 1090-1:2009+A1:2011~~	~~Execution of steel structures and aluminium structures - Part 1: Requirements for conformity assessment of structural components~~	
~~BS EN 1090-2:2018~~	~~Execution of steel structures and aluminium structures. Technical requirements for the execution of steel structures~~	~~Supersedes BS EN 1090-2:2008+A1:2011~~
~~BS EN 1090-3:2019~~	~~Execution of steel structures and aluminium structures – Part 3: Technical requirements for aluminium structures~~	~~Supersedes BS EN 1090-3:2008~~
BS EN 13670:2009 Incorporating corrigenda October 2015 and November 2015	Execution of concrete structures	

Product Standards referenced in British Standards or Eurocodes		
Product Standard reference	**Title**	**Notes**
BS EN 206:2013	Concrete – Specification, performance, production and conformity	Corrigendum May 2014
BS EN 1317-1:2010	Road Restraint Systems – Part 1 – Terminology and general criteria for test methods	
BS EN 1317-2:2010	Road Restraint Systems – Part 2 – Performance classes, impact test acceptance criteria and test methods for safety barriers.	
BS EN 1317-3:2010	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 – Performance classes, impact test acceptance criteria and test methods for terminals and transitions of safety barriers.	*Draft BS EN 1317-4 for public comment published in June 2012*
BS EN 1317-5:2007+A2:2012	Road Restraint Systems – Part 5 - Product requirements and evaluation of conformity for vehicle restraint systems	Incorporating corrigendum August 2012 *Draft prEN 1317-5 for public comment published in December 2013*

Product Standards referenced in British Standards or Eurocodes		
Product Standard reference	**Title**	**Notes**
PD CEN/TR 16949:2016	Road Restraint System – Pedestrian restraint system - Pedestrian parapets	*Bsi Published Document / CEN Technical Report published in July 2016* *(This document should not be used. The requirements of BS 7818:1995 apply.)*
Draft prEN 1317-7	Road restraint systems - Part 7: Performance classes, impact test acceptance criteria and test methods for terminals of safety barriers	*Draft prEN 1317-7 for public comment published in June 2012* *(This document should not be used. All terminals should continue to be in accordance with ENV1317-4.)*
PD CEN/TS 17342:2019	Road restraint systems - Motorcycle road restraint systems which reduce the impact severity of motorcyclist collisions with safety barriers	*Replaces* PD CEN/TS 1317-8:2012 *(This document should not be used.)*
~~PD CEN/TR 17081:2018~~	~~Design of fastenings for use in concrete – Plastic design of fastenings with headed and post-installed fasteners~~	
~~BS EN 1337-1:2000~~	~~Structural bearings – Part 1: General Design Rules~~	
~~BS EN 1337-2:2004~~	~~Structural bearings – Part 2: Sliding elements~~	
~~BS EN 1337-3:2005~~	~~Structural bearings – Part 3: Elastomeric bearings~~	
~~BS EN 1337-4:2004~~	~~Structural bearings – Part 4: Roller bearings~~	
~~BS EN 1337-5:2005~~	~~Structural bearings – Part 5: Pot bearings~~	
~~BS EN 1337-6:2004~~	~~Structural bearings – Part 6: Rocker bearings~~	
~~BS EN 1337-7:2004~~	~~Structural bearings – Part 7: Spherical and cylindrical PTFE bearings~~	
~~BS EN 1337-8:2007~~	~~Structural bearings – Part 8: Guide bearings and restraint bearings~~	
~~BS EN 1337-9:1998~~	~~Structural bearings – Part 9: Protection~~	
~~BS EN 1337-10:2003~~	~~Structural bearings – Part 10: Inspection and maintenance~~	
~~BS EN 1337-11:1998~~	~~Structural bearings – Part 11: Transport, Storage and Installation.~~	
BS EN 10025-1:2004	Hot rolled products of structural steels Part 1: General technical delivery conditions.	
~~BS EN 10025-2:2019~~	~~Hot rolled products of structural steels Part 2: Technical delivery conditions for non-alloy structural steels.~~	~~Supersedes BS EN 10025-1:2004~~

Product Standards referenced in British Standards or Eurocodes		
Product Standard reference	**Title**	**Notes**
~~BS EN 10025-3:2019~~	~~Hot rolled products of structural steels Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels.~~	~~Supersedes BS EN 10025-3:2004~~
~~BS EN 10025-4:2019~~	~~Hot rolled products of structural steels Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels.~~	~~Supersedes BS EN 10025-4:2004~~
~~BS EN 10025-5:2019~~	~~Hot rolled products of structural steels – Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance~~	~~Supersedes BS EN 10025-5:2004~~
~~BS EN 10025-6:2019~~	~~Hot rolled products of structural steels – Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition.~~	~~Supersedes BS EN 10025-6:2004+A1:2009~~
BS EN 10080:2005	Steel for the reinforcement of concrete – Weldable reinforcing steel - General	
BS EN 10210-1:2006	Hot finished structural hollow sections of non-alloy and fine grain steels – Part 1: Technical delivery conditions	
BS EN 10210-2:2019	Hot finished structural hollow sections – Part 2: Tolerances, dimensions and sectional properties	Supersedes BS EN 10210-2:2006
BS EN 10248-1:1996	Hot rolled sheet piling of non alloy steels. Technical delivery conditions	
BS EN 10248-2:1996	Hot rolled sheet piling of non alloy steels. Tolerances on shape and dimensions	
BS EN 12063:1999	Execution of special geotechnical work. Sheet pile walls.	
BS EN 14388:2005	Road traffic noise reducing devices	There is a 2015 version, however the 2015 version is not harmonised.
BS EN 15050:2007 + A1:2012	Precast concrete products – Bridge elements	See BD100 clause 2.18 for additional guidance.

British Standards		
British Standard reference	**Title**	**Notes**
BS 4449:2005+A3:2016	Steel for the reinforcement of concrete	No longer covers plain round bar. (See BS4482 up to 12mm dia, see BS EN 10025-1 for larger sizes and dowels. See BS EN 13877-3 for dowel bars in concrete pavements.)
BS 5896:2012	Specification for high tensile steel wire and strand for the prestressing of concrete	
BS 7818:1995	Specification for pedestrian restraint systems in metal	Currently the requirements of BS 7818:1995 are to be used instead of PD CEN/TR 16949:2016
BS 8002:2015	Code of practice for earth retaining structures	
BS 8004:2015 +A1 2020	Code of practice for foundations	Amendment +A1:2020
BS 8006-1:2010+A1:2016	Code of practice for strengthened/reinforced soils and other fills	
BS 8500-1:2015+A2:2019	Concrete – Complementary British Standard to BS EN 206: Method of specifying and guidance for the specifier.	Incorporating Corrigendum No.1 Amendment +A2:2019
BS 8500-2:2015+A2:2019	Concrete – Complementary British Standard to BS EN 206 : Specification for constituent materials and concrete.	Amendment +A2:2019
BS 8666:2005	Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete	Incorporating Amendment No.1

The Manual Contract Document for Highway Works (MCHW)		
MCHW reference	**Title**	***Notes***
MCHW Volume 1: March 2020	Specification for Highway Works	*Specification compliant with the execution standards must be used. A Departure is necessary for the parts where a compliant revision has not been published. Amendments March 2020*
MCHW Volume 2: March 2020	Notes for guidance on the Specification for Highway Works	*Notes for guidance compliant with the execution standards must be used. A Departure is necessary for the parts where a compliant revision has not been published. Amendments March 2020*
MCHW Volume 3: February 2017	Highway Construction Details	

The Design Manual for Roads and Bridges (DMRB)		
DMRB reference	**Title**	**Notes**
GG 101 Revision 0	Introduction to the Design Manual for Roads and Bridges	Replaces GD 01/16
GG 102 Revision 0	Quality Management Systems for Highway Design	Replaces GD 02/16
GG 103 Revision 0	Introduction and general requirements for sustainable development and design	
GG 104 Revision 0	Requirements for Safety Risk Assessment	Replaces GD04/12 and IAN 191/16
GG 184	Specification for the use of Computer Aided Design	Replaces IAN 184/16
CG 300 Revision 0	Technical approval of highway structures	Supersedes BD 2/12
CG 302 Revision 0	As-built, operational and maintenance records for highway structures	Supersedes BD 62/07
CG 303 Revision 0	Quality assurance scheme for paints and similar protective coatings	Supersedes BD 35/14
CG 305 Revision 0	Identification marking of highway structures	Supersedes BD 45/93
CG 501 Revision 2	Design of highway drainage systems	Supersedes HD 33/16, TA 80/99
CD 127 Revision 0	Cross-sections and headrooms	Replaces TD 27/05 and TD 70/08
CD 350 Revision 0	The design of highway structures	Supersedes BD 100/16, BA 57/01, BD 57/01 and IAN 124/11
CD 351 Revision 0	The design and appearance of highway structures	Supersedes BA 41/98
~~CD 352~~ ~~Revision 0~~	~~Design of road tunnels~~	~~Supersedes BD 78/99~~
~~CD 353~~ ~~Revision 0~~	~~Design criteria for footbridges~~	~~Supersedes BD 29/17~~
CD 354 Revision 1	Design of minor structures	Supersedes BD 94/17
CD 355 Revision 0	Application of whole-life costs for design and maintenance of highway structures	Replaces BD 36/92 and BA 28/92
CD 356 Revision 1	Design of highway structures for hydraulic action	Supersedes BA 59/94
CD 357 Revision 1	Bridge expansion joints	Replaces BD 33/94, BA 26/94, IAN 168/12 and IAN 169/12
CD 358 Revision 1	Waterproofing and surfacing of concrete bridge decks	Replaces BD 47/99, BA 47/99 and IAN 96/07
CD 359 Revision 0	Design requirements for permanent soffit formwork	Supersedes BA 36/90 and IAN 131/11
~~CD 361~~ ~~Revision 0~~	~~Weathering steel for highway structures~~	~~Supersedes BD 7/01~~
~~CD 362~~ ~~Revision 0~~	~~Enclosure of bridges~~	~~Replaces BD 67/96 and BA 67/96~~
CD 363 Revision 0	Design rules for aerodynamic effects on bridges	Replaces BD 49/01
CD 364 Revision 0	Formation of continuity joints in bridge decks	Replaces BA 82/00

The Design Manual for Roads and Bridges (DMRB)		
DMRB reference	**Title**	**Notes**
~~CD 365 Revision 1~~	~~Portal and cantilever signs/signals gantries~~	~~Replaces BD 51/14, IAN 193/16, BE 7/04~~
CD 366 Revision 0	Design criteria for collision protection beams	Replaces BD 65/14
~~CD 368 Revision 0~~	~~Design of fibre reinforced polymer bridges and highway structures~~	~~Replaces BD 90/05~~
CD 369 Revision 0	Surface protection for concrete highway structures	Replaces BA 85/04
CD 372 Revision 0	Design of post-installed anchors and reinforcing bar connections in concrete	Supersedes IAN 104/15
CD 373 Revision 0	Impregnation of reinforced and prestressed concrete highway structures using hydrophobic pore-lining impregnants	Supersedes BD 43/03
CD 374 Revision 0	The use of recycled aggregates in structural concrete	Supersedes BA 92/07
~~CD 375 Revision 1~~	~~Design of corrugated steel buried structures~~	~~Supersedes BD 12/01~~
CD 377 Revision 0	Requirements for road restraint systems	Supersedes TD 19/06
CD 622 Revision 0	Managing geotechnical risk	Replaces HD 22/08, BD 10/97 and HA 120/08
CS 461 Revision 0	Assessment and upgrading of in-service parapets	Supersedes BA 37/92 and IAN 97/07
GD 304 Revision 0	Designing health and safety into maintenance	Replaces IAN 69/15
~~LA 104 Revision 1~~	~~Environmental assessment and monitoring~~	~~Supersedes HA 205/08, HD 48/08, IAN 125/15, and IAN 133/10~~
~~LA 106 Revision 1~~	~~Cultural heritage assessment~~	~~Supersedes HA 208/07, HA 60/92, HA 75/01~~
~~LA 110 Revision 0~~	~~Material assets and waste~~	~~Supersedes IAN 153/11~~
LA 113 Revision 1	Road drainage and the water environment	Supersedes HD 45/09
LD 119 Revision 0	Roadside environmental mitigation and enhancement	Formerly LA 119, which superseded HA 65/94 and HA 66/95

Interim Advice Notes		
IAN reference	**Title**	**Notes**
IAN 105/08	Implementation of construction (design and management) 2007 and the withdrawal of SD 10 and SD 11	

Miscellaneous		
Standard reference	**Title**	**Notes**
CHE Memorandum 227/08	The Impregnation of Reinforced and Prestressed Concrete Highway Structures using Hydrophobic Pore Lining Impregnants	CHE memoranda are internal Highways England documents and not available to external organisations. This CHE memorandum is included as a useful reference for the Technical Approval Authority.
CIRIA C543	Bridge Detailing Guide	
CIRIA C766	Control of cracking caused by restrained deformation in concrete	Supersedes C660
CIRIA C686	Safe Access for Maintenance and Repair	
CIRIA C760	Guidance on embedded retaining wall design	

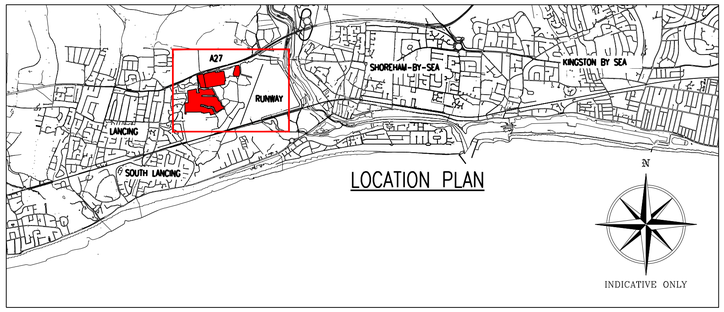
Additional Standards **Additional standards needed for a particular design should be listed here.**		
Reference	**Title**	**Notes**

APPENDIX B - DRAWINGS

As per Section 8.1, the following drawings are included in the submission.

Site Location Plan	14904-HOP-ZZ-XX-DR-S-0001
Deck Level Plan and GA	14904-HOP-01-XX-DR-S-0200
Sections	14904-HOP-01-XX-DR-S-0203
Site Layout Indicating Existing Services	22236-2321
Compaction & Settlement Assumptions	22236-1-039
Structure Location Plan	22236-1614
Extent of Works (Contract 3)	22236-3-002

Project/Task No. 14904/01 Scale: 1:2000 ORIGINAL DRAWING SIZE A1



LOCATION PLAN

INDICATIVE ONLY

LEGEND

- WORK AREA
- CONTRACTOR'S COMPOUND AREA
- BRIDGE
- BH BOREHOLE
- WS WINDOW SAMPLE

WORKS PACKAGE 14904-HOP-01 REFERS TO 5No. BRIDGE CONSTRUCTION ONLY. ALL OTHER WORK BY OTHERS INCLUDING EARTHWORKS, BUILDING, DRAINAGE AND HIGHWAYS.
FOR A LIST OF ALL STRUCTURES ON SITE, REFER TO CEP DRAWING 22236-1614.

PORTSMOUTH

A27 TRUNK ROAD

BRIGHTON

HW01

BH61
20.5m

HW02

HW03

HW04

HW05

BH54
15.0m BEGL

BH53
16.0m BEGL

BCA BH01
36.5m BEGL

BCA BH02
31.0m BEGL

BCA BH03
30.5m BEGL

BCA BH04
26.0m BEGL

BCA WS01

BCA WS08

CONTRACTORS COMPOUND TBC

PROPOSED INDICATIVE CONSTRUCTION ACCESS (TBC)

PROPOSED INDICATIVE CONSTRUCTION ACCESS (TBC)

PROPOSED INDICATIVE CONSTRUCTION ACCESS (TBC)

NOTE - EXISTING SERVICES ARE PRESENT CLOSE TO HW04, REFER TO HOP DRAWING 14904-HOP-ZZ-XX-DR-S-0400

NOTE - WS07 & WS08 WERE NOT COMPLETED DUE TO LIMITED ACCESS AND PROTECTED SPECIES BEING ENCOUNTERED

WS707
7.0m BEGL

BCA BH10
23.0m BEGL

BCA BH11
18.0m BEGL

WB7/BH1
15.1m BEGL

WS706
7.0m BEGL

SHOREHAM AIRPORT RUNWAY

INDICATIVE ONLY

SITE PLAN
(1:2000)

New Monk's Farm Structures					Coordinates (centre of structure)	
Contract	WSCC Ref	Clear span (m)	Span (c/c piles) (m)	Max. Width Overall (m)	E	N
HW01	1789	13.05	14.05	16.980	519673.631	105763.943
HW02	1790	15.05	16.05	15.010	519691.923	105764.000
HW03	1791	14.05	15.05	12.055	519857.734	105715.017
HW04	1792	11.05	12.05	12.055	520052.665	105971.047
HW05	1793	14.05	15.05	12.055	519377.203	105466.778

KEY RESIDUAL RISKS

NEW MONK'S FARM BRIDGE WORKS - KEY ACTIVITIES AND RISK

PRINCIPAL CONTRACTOR TO REVIEW HAZARDS, TABLED BELOW, WHEN COMPILING 'CONSTRUCTION PHASE HEALTH AND SAFETY PLAN', 'RISK ASSESSMENTS AND METHOD STATEMENTS' (RAMS). THE PRINCIPAL CONTRACTOR SHOULD ALSO REFERENCE THE DESIGNERS RISK ASSESSMENT (REF. 14904-HOP-01-XX-DC-S-0001) AND ADDITIONAL H&S INFORMATION CONTAINED WITHIN THE PRE-CONSTRUCTION INFORMATION DOCUMENT.

THIS IS NOT AN EXHAUSTIVE LIST OF HAZARDS AND THE PRINCIPAL CONTRACTOR SHOULD COMPLETE THEIR OWN INDEPENDENT ASSESSMENT PRIOR TO COMMENCING WORKS.

THE PRINCIPAL CONTRACTOR IS RESPONSIBLE FOR ALL ASPECTS OF THE WORKS INCLUDING WORKING TO ALL RELEVANT STANDARDS, CODES OF PRACTICE, IMPLEMENTATION OF ENVIRONMENTAL CONTROL MEASURES AND HEALTH AND SAFETY LEGISLATION

ACTIVITY, SITUATION OR OPERATION	ACTIONS TO BE TAKEN BY THE CONTRACTOR TO ELIMINATE THE HAZARD OR REDUCE THE RISK
1. ACCESS ON SITE	CONTRACTOR TO MANAGE & ESTABLISH ACCESS ROUTES. POSSIBLE ACCESS ROUTES SHOWN ON SITE PLAN.
2. GENERAL PUBLIC AND OTHER USERS ON SITE	CONTRACTOR TO PROVIDE CLEAR SIGNAGE AND BOUNDARY PROTECTION AROUND ACCESS ROUTES, ALERT SECURITY IF PUBLIC GAINS ACCESS. MINIMISE CONSTRUCTION NOISE AS FAR AS PRACTICABLE, POSSIBLY WITH USE OF NOISE SCREENS AND SILENCED PLANT.
3. SOFT AND POOR QUALITY GROUND	CONTRACTOR TO INSTALL PILING MATS WHERE PLANT IS NEEDED, INSPECT AND IMPROVE GROUND QUALITY WHERE NECESSARY. ON-GOING TESTING WORK REQUIRED, ESPECIALLY IN RESPONSE TO WET CONDITIONS.
4. WORKING AT HEIGHT	WHERE WORKS MAY BE REQUIRED AT HEIGHT OR OVER WATER, SUITABLE EDGE PROTECTION AND ACCESS TO BE PROVIDED. CONTRACTOR SHALL CONSIDER THE WORK AT HEIGHT HIERARCHY GUIDANCE PROVIDED BY THE HSE AND THE WORK AT HEIGHT REGULATIONS 2005 AND THE THE CONSTRUCTION, HEALTH AND SAFETY MANUAL, VOLUME 1, SECTION 5, WORK AT HEIGHT.
5. EXISTING SERVICES	CONTRACTOR TO BE AWARE OF EXISTING SERVICES THROUGHOUT THE SITE AND ACCESS WAYS.
6. GROUND CONTAMINATION	CONTRACTOR TO REVIEW CONTAMINATION REPORT AND CONFIRM ON SITE THAT GROUND IS SAFE TO WORK.
7. WORKING BY AN EXISTING WATERCOURSE	CONTRACTOR TO MANAGE FLOODING MITIGATION, PUMPING AND WATER MANAGEMENT. EARLY WARNING SYSTEM AND EVACUATION PLANS, MAINTAIN EXISTING FLOOD DEFENCE MEASURES WHERE NECESSARY. MONITOR RAINFALL, TIDAL STATE ETC. AND PLAN WORKS ACCORDINGLY.
11. TEMPORARY WORKS AND STABILITY OF EXCAVATIONS IN PROGRESS	CONTRACTOR TO MANAGE THE STABILITY OF EXCAVATIONS, PARTICULARLY DURING WET CONDITIONS AND IN AREAS OF POORER GROUND QUALITY.
12. PRESENCE OF RATS, SEAGULLS, PIGEONS CARRYING WEIL'S DISEASE, LEPTOSPIROSIS AND OTHER DISEASES	CONTRACTOR TO MANAGE ON SITE H&S AND WELFARE, ADVISE OPERATIVES ON THE RISKS AND TO INSTRUCT THEM TO WASH THEIR HANDS PRIOR TO EATING AND SMOKING. THE CONTRACTOR IS OBLIGED TO PROVIDE ADEQUATE WELFARE FACILITIES WHICH SHOULD INCLUDE BUT IS NOT LIMITED TO, WASHING FACILITIES, EYE BATH ETC.
14. LIGHTING	CONTRACTOR TO MANAGE AND CONSIDER LIGHTING REQUIREMENTS AS NECESSARY, THERE IS CURRENTLY NO WORKING LIGHTING SYSTEM.
15. MATERIAL STORAGE	CONTRACTOR TO MANAGE AND COORDINATE. MATERIALS STORAGE MUST NOT OBSTRUCT ACCESS OR EGRESS ROUTES.
17. EXPOSURE OF OPERATIVES TO FRESH CONCRETE CAUSING CHEMICAL BURNS, DERMATITIS, ASPHYXIATION ETC.	CONTRACTOR TO MANAGE
20. LIFTING OPERATIONS	CONTRACTOR TO MANAGE & ESTABLISH DESIGNATED LIFTING ZONES. REFERENCE LIFTING OPERATIONS AND LIFTING EQUIPMENT REGULATIONS 1998 (LOLER)
21. COVID-19	CONTRACTOR IS RESPONSIBLE FOR ENSURING SUITABLE MEASURES ARE IN PLACE AND THAT THE WORKPLACE IS COVID SECURE

1. GENERAL

(i) This drawing is not to be scaled, work to figured dimensions only, confirmed on site.

(ii) This drawing is to be read in conjunction with all relevant architectural drawings, detailed specifications where applicable and all associated drawings in this series.

(iii) Any discrepancy on this drawing is to be reported immediately to HOP for clarification.

(iv) The contractor is responsible for all temporary works and for the stability of the works in progress.

(v) Ground investigation locations taken from drawing 14904-HOP-ZZ-XX-DR-S-0002

DRAWING COMPILED FROM MAP DATA, OS TOPOGRAPHY AND CEP DRAWING 3-450 FOR SETTING OUT. ALL DIMENSIONS TO BE CONFIRMED ON SITE. DO NOT SCALE DRAWING.

CHANGES AS CLOUDED	MG	TB	03.06.21	P6
FOR CONTRACT	MP	TB	03.03.21	P5
BRIDGE LEVELS REDUCED	IW	TB	28.01.21	P4
TENDER UPDATES	MP	TB	15.01.21	P3
TENDER UPDATES	MP	TB	23.10.20	P2
TENDER ISSUE	IW	TB	25.09.20	P1
Description	By	Aprvd.	Date	Rev.

PRELIMINARY DRAWING
NOT FOR CONSTRUCTION

Title: SITE PLAN

Project: NEW MONKS FARM - BRIDGES LANCING

Client: NEW MONKS FARM DEVELOPMENT LTD

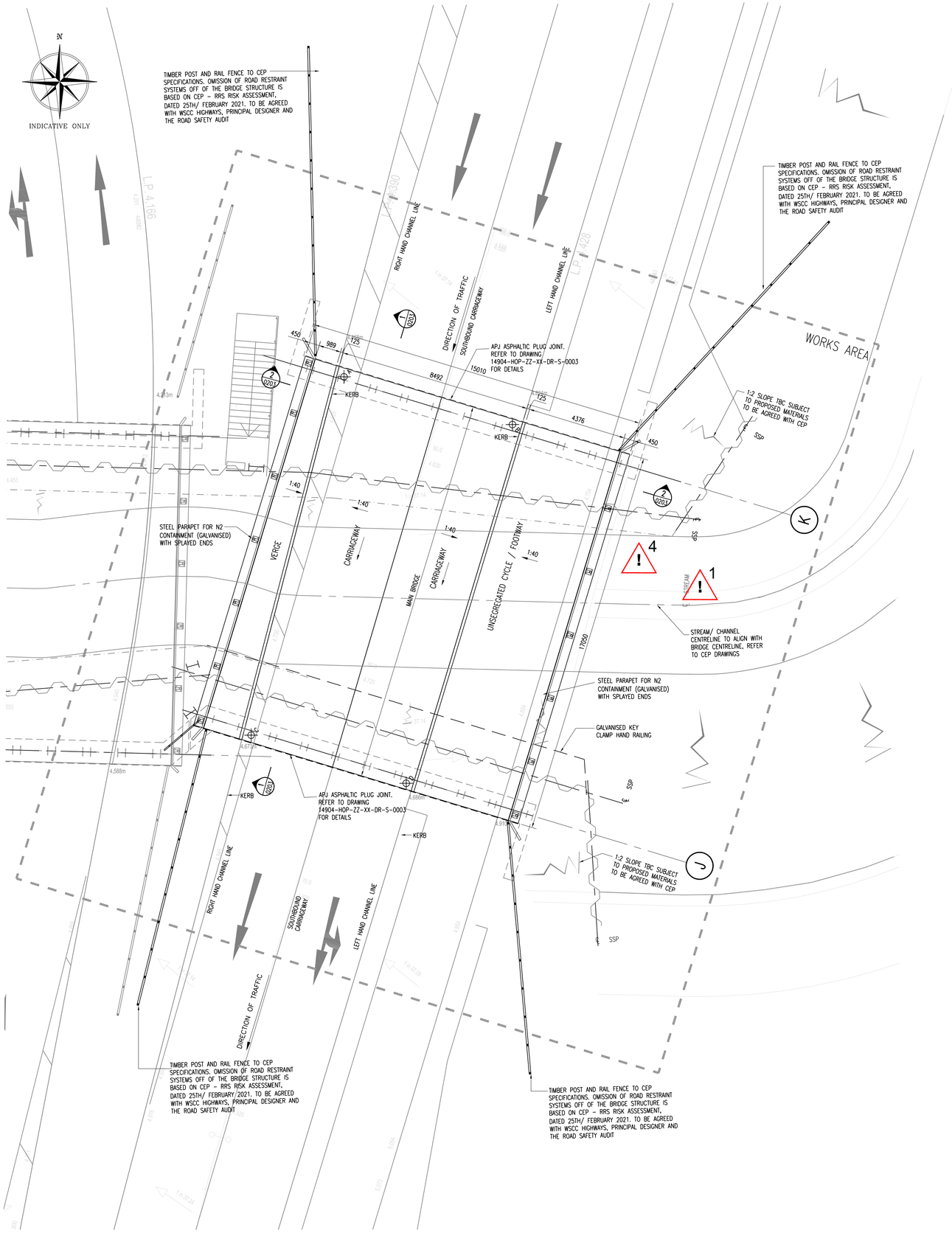
HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
HOP House, 41 Church Road
Hove, East Sussex BN3 2BE
www.hop.uk.com
ask@hop.uk.com
+44 (0)1273 223900

Drawing No. 14904-HOP-ZZ-XX-DR-S-0001 Status D2 Rev. P6

© Copyright

1:20 0 0.2m 0.4m 0.6m 0.8m 1m
1:50 0 0.5m 1m 1.5m 2m 2.5m
1:100 0 1m 2m 3m 4m 5m

\\hop-data-2016\DATA\HOP PROJECTS\14904 New Monks Farm Lancing\Drawings\Rev P\Bridges\14904-HOP-ZZ-XX-DR-S-0001 Site Plan.dwg



HW02 – DECK LEVEL PLAN AND GENERAL ARRANGEMENT

(1:100)

ALL HIGHWAY WORKS, SURFACING, DRAINAGE, WHITELINING, FENCING (OFF BRIDGE) ETC. ARE NOT PART OF THESE WORKS AND BY OTHERS

LEVELS

POINT	APPROX.FRL (REFER TO CEP DRAWINGS)	S.S.L.
A	+4.489m	+4.335m
B	+4.519m	+4.335m
C	+4.669m	+4.525m
D	+4.682m	+4.525m

REFER TO CEP DRAWINGS FOR ROAD SETTING OUT, MAKEUP, FALLS, CROWNS ETC.

GENERAL

ALL DESIGN IS SUBJECT TO AIP APPROVAL BY WEST SUSSEX COUNTY COUNCIL

ALL WORKS IN ACCORDANCE WITH THE DMRB AND SPECIFICATION FOR HIGHWAYS WORKS (SHW). DETAILED SPECIFICATION PROVIDED AT TENDER

COORDINATES

ALL COORDINATES PROVIDED ARE TO BE CROSS CHECKED WITH CEP DRAWINGS AND CONTRACTOR TO SATISFY WORKS ARE COORDINATED PRIOR TO ANY CONSTRUCTION

THIS DRAWING IS ISSUED FOR FINAL COORDINATION. HOWEVER, IT SHOULD BE NOTED THAT THE AIP FOR BRIDGE HW02 (WSCC REF: 1790) IS STILL OUTSTANDING. THEREFORE, ALL DETAILS ARE SUBJECT TO CHANGE AND APPROVAL.

ANY CONSTRUCTION UNDERTAKEN BEFORE APPROVAL IS AT THE CONTRACTORS OWN RISK.

WATER MAIN MAY NEED INSULATING. CONTRACTOR TO LIAISE WITH SOUTHERN WATER

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

1. EXISTING SERVICES
2. LIFTING OF PRECAST BEAMS INTO POSITION. CONTRACTOR TO CHECK CRANE STABILITY AND ALL LIFTING REQUIREMENTS
3. ALL VEGETATION TO BE REMOVED. OBSTRUCTION RISK DUE TO ROOTS TO BE CONSIDERED
4. WORKING AT HEIGHT OVER WATER
5. MINIMUM HEADROOM PROVIDED AND NON-STANDARD RAIL HEIGHT – RESTRICTED ACCESS

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

Project/Task No. 14904-01 Scale: AS SHOWN ORIGINAL DRAWING SIZE A1

1. GENERAL

(i) This drawing is not to be scaled, work to figured dimensions only, confirmed on site.

(ii) This drawing is to be read in conjunction with all relevant architectural drawings, detailed specifications where applicable and all associated drawings in this series.

(iii) Any discrepancy on this drawing is to be reported immediately to the partnership for clarification.

(iv) The contractor is responsible for all temporary works and for the stability of the works in progress.

2. BRIDGE NOTES

(i) All levels are in metres above Ordinance datum (Newlyn).

(ii) This drawing is to be read in conjunction with provisional Approval In Principle (AIP).

(iii) Structure must not be opened to heavy construction plant or live traffic until in-situ concrete has reached characteristic 28 day strength.

(iv) Proposed construction sequence to be confirmed by contractor.

(v) Refer to Hazard tables, see DWG 14904-HOP-ZZ-XX-DR-S-0001.



KEY PLAN

(NTS)

N
INDICATIVE ONLY

UPDATED AS CLOUDED	MP	TB	16.06.21	P3
FOR CONTRACT	IW	TB	03.03.21	P2
ISSUED FOR TENDER	MP	TB	23.10.20	P1
Description	By	Aprvd.	Date	Rev.

PRELIMINARY DRAWING
NOT FOR CONSTRUCTION

Title: HIGHWAY BRIDGE HW02 (1790) DECK LEVEL PLAN AND GA

Project: NEW MONKS FARM – BRIDGES LANCING

Client: NEW MONKS FARM DEVELOPMENT LTD

HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
HOP House, 41 Church Road
Hove, East Sussex BN3 2BE
www.hop.uk.com
ask@hop.uk.com
+44 (0)1273 223900

Drawing No. 14904-HOP-ZZ-XX-DR-S-0200 Status D2 Rev. P3

© Copyright

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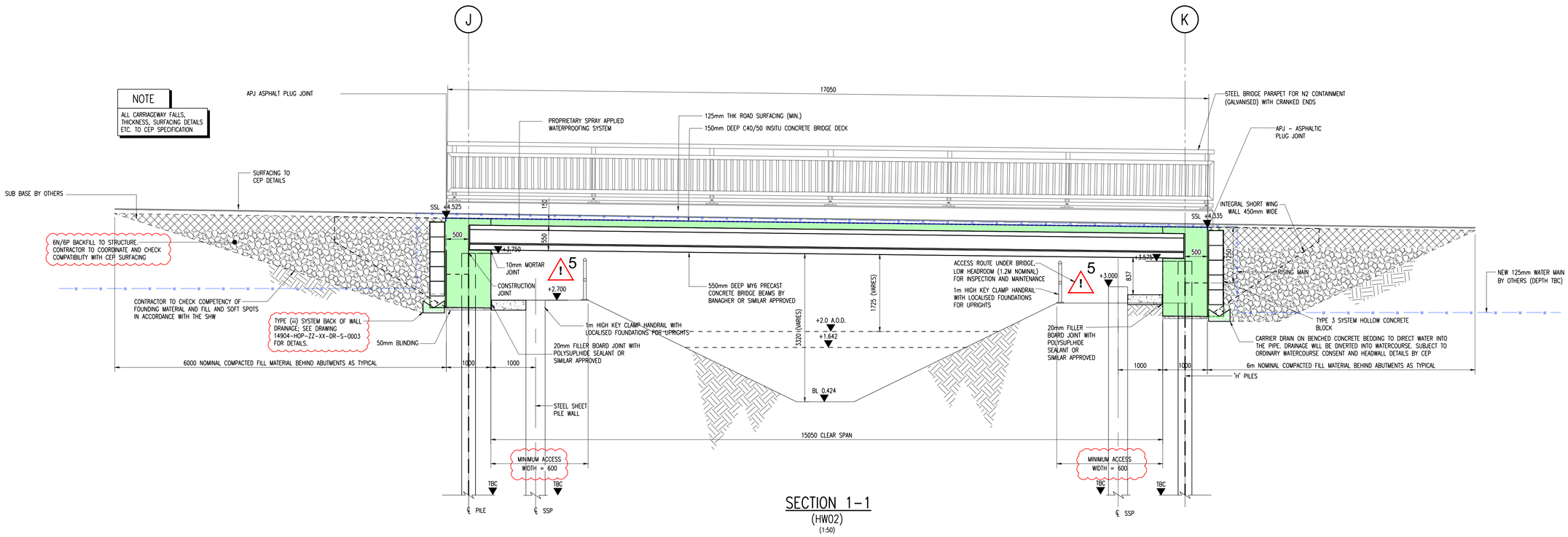
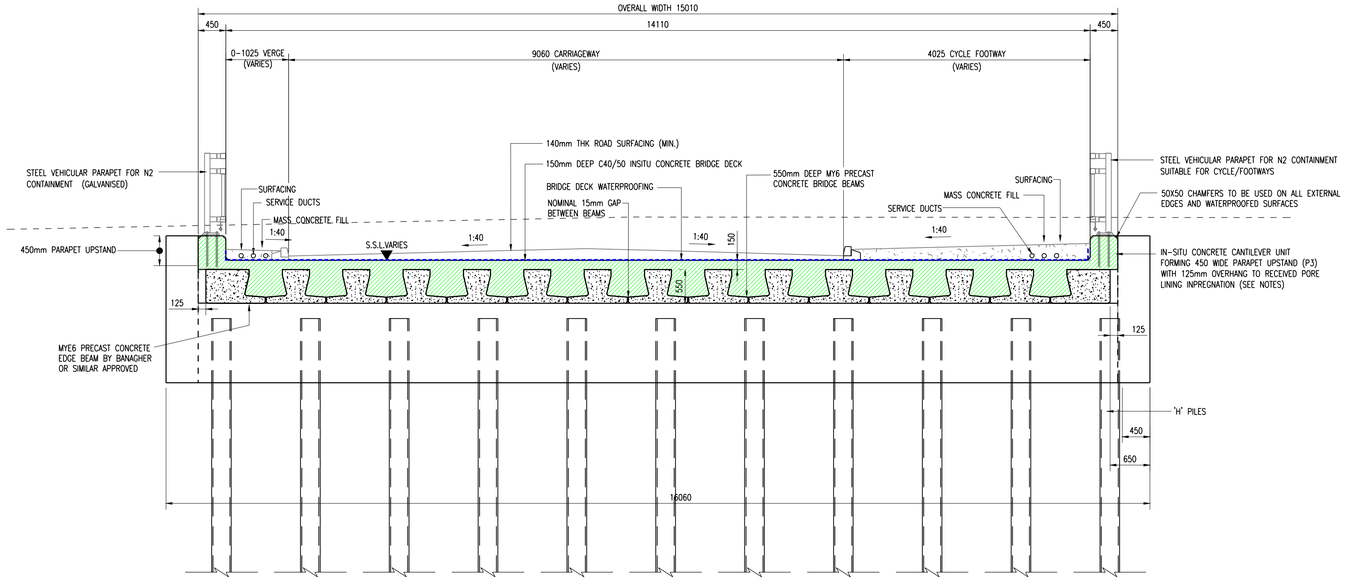
1:50 0 0.5m 1m 1.5m 2m 2.5m
1:100 0 1m 2m 3m 4m 5m

P:\PROJECTS\14904 New Monks Farm, Lancing\Drawings\Task 01 - Bridges\HOP\14904-HOP-ZZ-XX-DR-S-0200 1001 0202 0203 Meredith Gilbert



SECTION 1-1
(HW02)
(1:50)



SECTION 2-2
(HW02)
(1:50)

WATERPROOFING
PROPRIETARY SPRAY APPLIED WATERPROOFING SYSTEM

RC ESTIMATE
FOR INDICATIVE RC ESTIMATES TENDER SEE "DESIGN SUMMARY" DOCUMENT

GENERAL
ALL DESIGN IS SUBJECT TO AIP APPROVAL BY WEST SUSSEX COUNTY COUNCIL

ALL WORKS IN ACCORDANCE WITH THE DMRB AND SPECIFICATION FOR HIGHWAYS WORKS (SHW). DETAILED SPECIFICATION PROVIDED AT TENDER

COORDINATES
ALL COORDINATES PROVIDED ARE TO BE CROSS CHECKED WITH CEP DRAWINGS AND CONTRACTOR TO SATISFY WORKS ARE COORDINATED PRIOR TO ANY CONSTRUCTION

THIS DRAWING IS ISSUED FOR FINAL COORDINATION. HOWEVER, IT SHOULD BE NOTED THAT THE AIP FOR BRIDGE HW02 (WSCC REF: 1790) IS STILL OUTSTANDING. THEREFORE, ALL DETAILS ARE SUBJECT TO CHANGE AND APPROVAL.

ANY CONSTRUCTION UNDERTAKEN BEFORE APPROVAL IS AT THE CONTRACTORS OWN RISK.

WATER MAIN MAY NEED INSULATING. CONTRACTOR TO LIAISE WITH SOUTHERN WATER

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION
IN ADDITION TO THE HAZARDS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

1. EXISTING SERVICES
2. LIFTING OF PRECAST BEAMS INTO POSITION. CONTRACTOR TO CHECK CRANE STABILITY AND ALL LIFTING REQUIREMENTS
3. ALL VEGETATION TO BE REMOVED. OBSTRUCTION RISK DUE TO ROOTS TO BE CONSIDERED
4. WORKING AT HEIGHT OVER WATER
5. MINIMUM HEADROOM PROVIDED AND NON-STANDARD RAIL HEIGHT - RESTRICTED ACCESS

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

Project/Task No. 14904-01 Scale: AS SHOWN ORIGINAL DRAWING SIZE A1

1. GENERAL
(i) This drawing is not to be scaled, work to figured dimensions only, confirmed on site.

(ii) This drawing is to be read in conjunction with all relevant architectural drawings, detailed specifications where applicable and all associated drawings in this series.

(iii) Any discrepancy on this drawing is to be reported immediately to the partnership for clarification.

(iv) The contractor is responsible for all temporary works and for the stability of the works in progress.

2. CONCRETE
(i) Concrete generally to BS 8500-2 and BS EN206-1.

(ii) Designated concrete mixes to be as follows:
a: Blinding - GEN 1
b: Mass concrete foundation - GEN 3
c: Reinforced concrete - C40/50

(iii) Maximum aggregate size to be 20mm.

(iv) Reinforced concrete elements to have 50mm concrete blinding beneath when cast on the ground.

(v) All materials, workmanship, construction and tolerances to latest edition of The Design Manual for Roads and Bridges.

(vi) Formed concrete finishes shall typically be F3 to the specification highways works unless noted otherwise. Unformed surfaces shall be U4 generally except surfaces which will receive weatherproofing which require a U5 finish.

(vii) All exposed and waterproofed surfaces to have a 50mm chamfer. In-situ cast parapets to be provided with a drip/arris unless noted otherwise.

(viii) Nominal concrete cover to be 65mm on exposed faces and 50mm on internal faces. Exposure classes XD3 and XC3 / 4 to be considered. Minimum 380 kg/m³ of cement to be provided for XD3.

(x) Fosroc Famguard bridge deck waterproofing system to be applied to the structure, or similar approved.

(xi) All exposed parapets to be treated with a hydrophobic pore liner, to be agreed with the Engineer.

(xii) All buried concrete surfaces to be painted with Black Jack 908 by Sika or similar approved. To be applied in accordance with the suppliers instructions.

(xiii) All tying wire to be stainless steel or similar approved.

(xiv) All precast beam details to the suppliers specification with agreement with HOP i.e. cover, strength etc.

3. BRIDGE NOTES
(i) All levels are in metres above Ordinance datum (Newlyn).

(ii) This drawing is to be read in conjunction with provisional Approval In Principle (AIP).

(iii) Structure must not be opened to heavy construction plant or live traffic until in-situ concrete has reached characteristic 28 day strength.

(iv) Proposed construction sequence to be confirmed by contractor.

(v) Refer to Hazard tables, see DWG 14904-HOP-ZZ-XX-DR-S-0001.

4. SURFACING
(i) All surfacing to CEP drawings

(ii) Waterproofing to be protected by proprietary geosynthetic layer - details to be agreed with the Engineer

UPDATED AS CLOUDED	MP	TB	16.06.21	P3
FOR CONTRACT	IW	TB	03.03.21	P2
ISSUED FOR TENDER	MP	TB	23.10.20	P1
Description	By	Aprvd.	Date	Rev.

PRELIMINARY DRAWING
NOT FOR CONSTRUCTION

Title: HIGHWAY BRIDGE HW02 (1790) SECTIONS

Project: NEW MONKS FARM - BRIDGES LANCING

Client: NEW MONKS FARM DEVELOPMENT LTD

HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
HOP House, 41 Church Road
Hove, East Sussex BN3 2BE
www.hop.uk.com
ask@hop.uk.com
+44 (0)1273 223900

Drawing No. 14904-HOP-ZZ-XX-DR-S-0203 Status D2 Rev. P3

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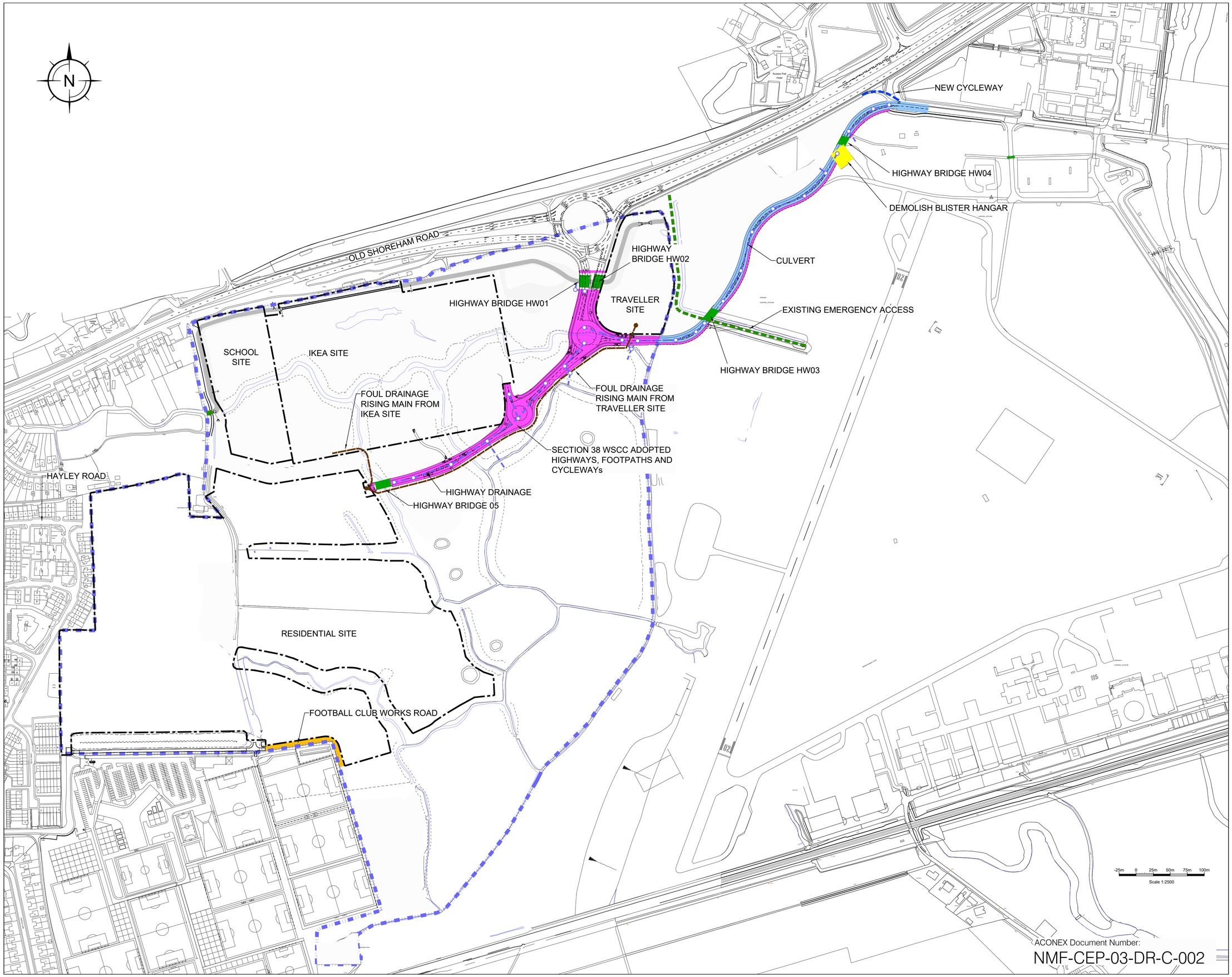
P:\PROJECTS\14904 New Monks Farm, Lancing\Drawings\Task 01 - Bridges\HOP\14904-HOP-ZZ-XX-DR-S-0200 0201 0202 0203 Meredith Gilbert

1:20 0 0.2m 0.4m 0.6m 0.8m 1m
1:50 0 0.5m 1m 1.5m 2m 2.5m
1:100 0 1m 2m 3m 4m 5m



GENERAL NOTES:

1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.

2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.

3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.

4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

Contract 3

- WSCC Adopted Highways, Footpaths and Cycleways
- Bridges and Culvert Structures
- Mash Barn Lane Cycleway
- Extend Football Club Private Road to Pitches
- Foul Drainage Connections for IKEA and Travellers Camp
- Airport Highways, Footpath and Cycleways
- Construction Highway Drainage

REV	DATE	INT	DESCRIPTION	CHK
P	25.09.20	AJD	ISSUED FOR TENDER	SRM
A	27.07.17	AJD	Highway drainage added	

Issue Status FOR TENDER

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishersgate
Sussex
BN41 1RA

01273 424424
reception@civil.co.uk
www.civil.co.uk

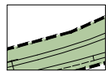
CLIENT The Community Stadium Ltd

PROJECT New Monks Farm
Lancing
Contract 3 - Adoptable Highways

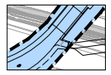
TITLE Site Layout
Extent of Works

DRAWN	DATE	PROJECT NO.
A Davies	Feb 2018	22236
ENGINEER	CHECKED	ORG. No. / REV.
S Magowan		3-002 P1
SCALE		
1:2500 @ A1 1:5000 @ A3		

ACONEX Document Number:
NMF-CEP-03-DR-C-002



Previously filled and mostly surcharged.
Excavated and filled as Type 2 material to Specification for Highway Works Table 6/1 and 6/4. Less than 10mm anticipated settlement on completion .
Design CBR 5%



Not previously surcharged but at approximately finish levels.
Type 1 fill material to Specification for Highway Works Table 6/1 and 6/4.
During construction settlement > 20mm, long term settlement > 10mm
Design CBR 5%



Fill to 2-3m, Type 2 fill material to Specification for Highway Works Table 6/1 and 6/4. Possible settlement during construction, long term > 20mm
Design CBR 5%

GENERAL NOTES:

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2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.

3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.

4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

N

-20m 0 20m 40m 60m 80m

REV	DATE	INT	DESCRIPTION	CHK
P1	22.12.20	AJD	First Issue	SRM

Issue Status: FOR INFORMATION

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishersgate
Sussex
BN41 1RA

01273 424424
reception@civil.co.uk
www.civil.co.uk

CLIENT: The Community Stadium Ltd

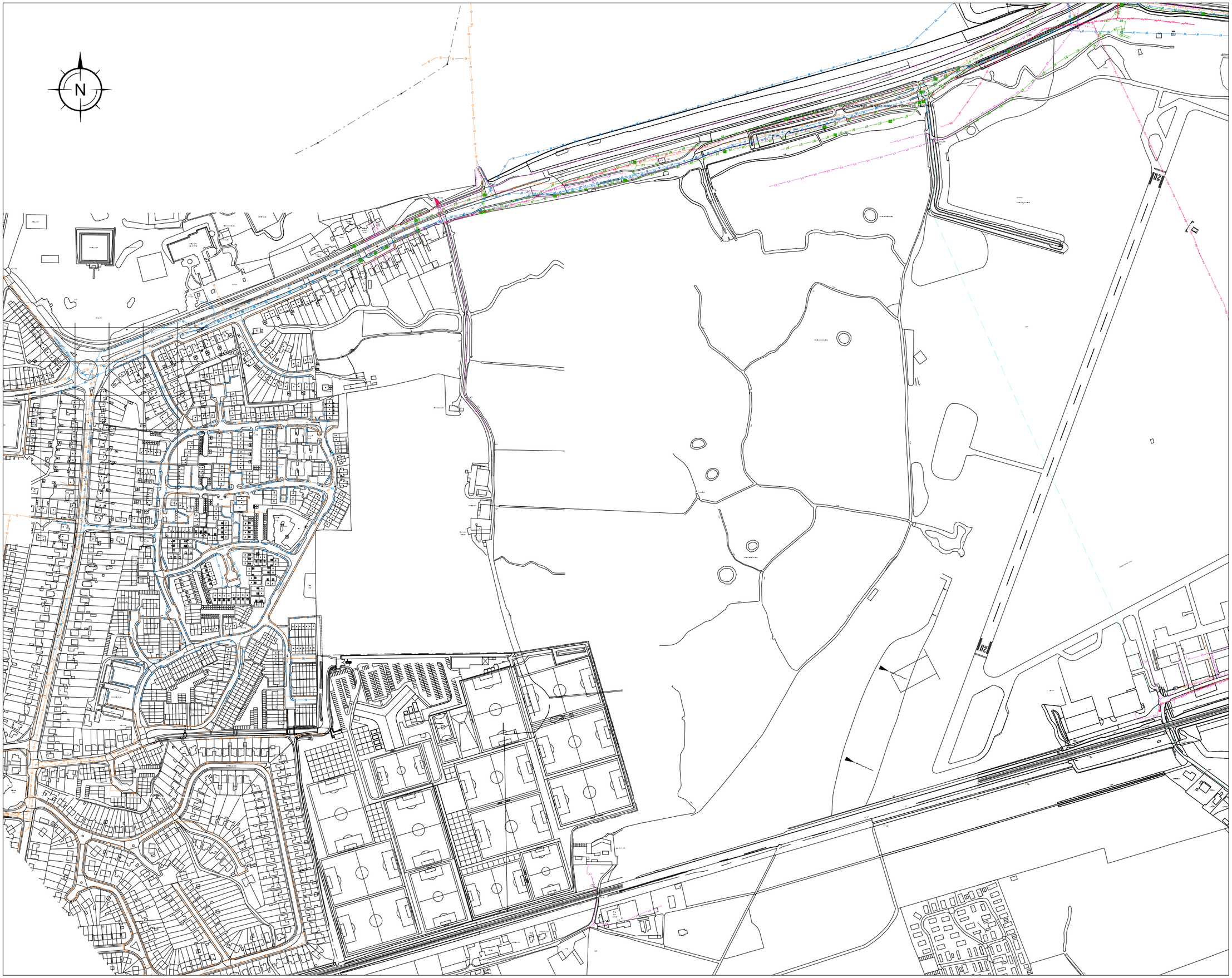
PROJECT: New Monks Farm, Lancing

TITLE: Compaction And Design Settlement Assumptions

DRAWN	DATE	PROJECT NO.
A Davies	Dec 2020	22236
ENGINEER	CHECKED	DRG. No. / REV.
S Magowan	SRM	1-039 P1

SCALE: 1:2000 @ A1, 1:4000 @ A3

ACONEX Document Number:
NMF-CEP-01-DR-C-040



NOTES:

1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.

2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.

3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.

4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

Legend:

- HV Electric
- LV Electric
- BT
- Water
- LP Gas Mains
- HP Gas Mains
- Foul

NOTE:
Information compiled from services plans received and reproduced in good faith. Specific locations to be confirmed on site prior to construction.

REV	DATE	INT	DESCRIPTION	CHK

Issue Status: PRELIMINARY

11 Tungsten Building
George Street
Fishersgate
Sussex
BN41 1RA
Tel: 01273 424424
Fax:01273 424425
email: design@civil.co.uk

the civil engineering practice

CLIENT: The Community Stadium Ltd

PROJECT: New Monks Farm
Lancing

TITLE: Site Layout
Existing Services Layout

DRAWN	DATE	PROJECT NO.
A Davies	July 2016	22236
ENGINEER	CHECKED	DRG. No / REV
G Waller		2321

SCALE: 1:2500 @ A1, 1:5000 @ A3