

Fleming Way Bus Boulevard

Pavement Investigation Brief

Swindon Borough Council

08 October 2019

Notice

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This document has 19 pages including appendices.

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
P01.1	For Tender	NJ	MA	MA	MA	13/07/2018
P02	For Tender	-	NJ	MA	MA	19/07/2018
P03	For Tender – Additional Pavement Investigation	AK	BN	DG	MA	27/09/2019
P04	For Tender – Asbestos details included	AK	MA	MA	MA	08/10/2019

Client signoff

Client	Swindon Borough Council
Project	Fleming Way Bus Boulevard
Job number	5191994
Client signature / date	

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1. Introduction

As part of the Fleming Way Bus Boulevard detailed design stage, commissioned by Swindon Borough Council, additional pavement investigations are proposed to supplement the information available from the preliminary design stage. In part this is due to the changes to the extent of the scheme scope. The pavement investigation is proposed in order to determine the layer depths, condition and strength of the existing pavement layers. The results will be used to determine the appropriate pavement widening and maintenance treatment options.

A schematic map is provided in [Appendix A](#) which indicates the relevant sections.

In summary, the intended pavement investigation will consist of:

- a. Coring with Dynamic Cone Penetrometer (DCP) testing;
- b. Ground Penetrating Radar (GPR);
- c. Falling Weight Deflectometer (FWD) testing; and
- d. Laboratory testing of pavement layers.

1.1. General Conditions

- a. All responsibilities regarding Health and Safety shall be fulfilled;
- b. Calibration certificates shall be provided for all test equipment, where required, in accordance with DMRB Volume 7;
- c. Statutory undertakers' equipment shall be located;
- d. The Principal Contractor shall be contactable by Swindon Borough Council (SBC) for the duration of the survey works.
- e. Should night time working be required, survey works can only proceed after approval by SBC.
- f. No fresh water, wastewater or liquid of any kind shall be discharged into any surface watercourse, drain or sewer within or adjacent to the site. The Principal Contractor is to provide a suitable method to restrict the flow of water onto the highway during coring operations.
- g. Dust and odour shall be kept to a minimum during the works and the Principal Contractor shall have a methodology in place for dealing with any issues arising.
- h. All site testing shall be carried out in accordance with HD 29/08 (DMRB Volume 7, Section 3, and Part 2) and all laboratory testing must be carried out by a testing house that has the relevant UKAS accreditation for each individual test.

1.2. Access and Site Procedures

- a. The proposed investigation works will involve accessing the existing highways operated by SBC, and therefore require permission from the SBC. The Principal Contractor shall obtain such permissions in advance of any work being undertaken with the assistance of SBC.
- b. The Principal Contractor is required to make suitable arrangements to ensure all permits are in place prior to commencing the work on site.

1.3. Traffic Management and Road Space

The Principal Contractor shall be responsible for:

- a. Complying with the traffic management restrictions employed by SBC;

- b. The application and booking of the necessary road space and/or network occupancy with SBC prior to implementing the required traffic management measures, the contact details at SBC for long period “works” type activities on the network is Sean Smith 01793466357;
- c. Providing traffic management layouts and associated method statements and risk assessments for approval by SBC, prior to commencement;
- d. Preparing and submitting Traffic Safety and Management proposals prior to the work to which they relate, for the Project Manager’s consideration;
- e. Implementing, maintaining and removing the required traffic control, carried out in accordance with Chapter 8 of the Traffic Signs Manual - “Traffic Safety Measures and Signs for Road Works and Temporary Situations”.

1.4. Health, Safety and Welfare

- a. The Principal Contractor shall be responsible for all aspects of health and safety of the works. The tendering organisation shall be required to undertake the role of Principal Contractor in accordance with CDM 2015. This role will be confirmed and appointed in writing by SBC.
- b. The Principal Contractor shall ensure that suitable and adequate welfare facilities are provided for the use of all personnel on site (including SBC and Atkins staff) prior to any works commencing in accordance with “Provision of Welfare Facilities during Construction Work – Construction Information Sheet number 59”, including site set-up.
- c. With regards to Statutory undertakers’ services, the Principal Contractor shall ensure all known services and drainage are fully identified before commencing investigation activity on site. To assist in this process, the Principal Contractor will be provided with copies of the utility drawings that have already been produced as part of the scheme design, see Appendix A. However, these drawings are not to be considered as exhaustive and the Principal Contractor will still be responsible for making their own investigations and enquiries in this regard.
- d. All core locations shall be scanned with a Cable Avoidance Tool (CAT) and “Genny” signal transmitter prior to excavation.
- e. The Principal Contractor shall ensure that all staff and operatives receive briefing on hazards associated with the work.
- f. The Principal Contractor shall ensure that all staff working at individual locations throughout the site keep in contact with the Principal Contractor’s site investigation team leader.
- g. The Principal Contractor shall ensure that all relevant staff have the appropriate training and up to date certificates to use the machinery and equipment required.
- h. The Principal Contractor shall provide copies of his Construction Phase Plan including site-specific Risk Assessment and Method Statement to the Client (SBC) for review and comment, one week in advance of the works, and ensure their approval is in place prior to commencing any works on site (see section 1.6).
- i. Consideration must be given to potentially harmful substances within the area. The presence of vermin should be assumed (leptospirosis). In addition to this, the site is assumed to be used by drug users and for antisocial activities. Consideration should be given to the presence of hypodermic needles and other drug/sex paraphernalia.

- j. The Principal Contractor to submit a Health and Safety file once the works have finished. This is to include information such as, details of the reinstatement works, any residual risks noted and anything that could have an impact on the H&S working in that area.

1.5. Site Information

- a. Historic boreholes indicate that groundwater level is between 2.3 – 15.5m bgl. There was significant variation in the height of groundwater between the historic boreholes. It should be noted that the 2.3m bgl groundwater reading at BGS SU18SE168 drained within a day and the rest of readings at that borehole were between 8.2 – 8.4m bgl. The next shallowest groundwater level was 4.88m bgl at BGS SU18SE155. Given the age of the boreholes the groundwater level may have changed since.
- b. Potential on-site sources of contamination include:
 - As high ground water table can be expected at site location, there is a high risk of ground water interfering with construction works.
 - Material of unknown provenance which may have been used to infill the Wilts and Berks Canal and may contain a range of inorganic and organic contaminants. This potential infill is not considered to be a gas risk on this basis that it would have been placed over 75 years ago;
 - Former warehouse used to store unknown materials which was historically located at the north-western end of the site, this may have resulted in leakage or spillage of a range of inorganic and organic contaminants to ground;
 - Material of unknown provenance used in road construction which may contain a range of inorganic and organic contaminants; and
 - Localised leakage and spillage of chemicals/hydrocarbons/fuels as a result of the use of the site as a road.
- c. Potential off-site sources of contamination include:
 - Former railway sidings and goods shed which were located within 10m of the north of the site, these are a source of a range of organic and inorganic contaminants as a result of leakages and spillages to ground;
 - Infilled clay pit and former brick and tile works which is a potential source of metals and other inorganics, and potentially a range of organic and inorganic contaminants and landfill gas if waste was used to infill the clay pit;
 - Former gas works which is a potential source of polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, phenols, cyanide, ammoniacal nitrogen, metals as a result of leakages and spillages to ground;
 - Garages formerly located at the eastern end of the site which are a potential source of a range of organic contaminants such as fuels, oils, solvents and inorganic contaminants such as acids and metals as a result of leakages and spillages to ground;
 - Former engineering works located which is a potential source of a range of organic and inorganic contaminants as a result of leakages and spillages to ground; and

- Bus station which is a potential source of a range of organic contaminants such as fuels, oils, solvents and inorganic contaminants such as acids and metals as a result of leakages and spillages to ground.
- d. Buried asbestos have been identified within the Fleming Way site and therefore could be potentially encountered within the works area. Refer to the Geotechnical Interpretative Report (GIR), FWB Blvd-ATK-GEN-RP-CE-000001 where asbestos have been identified in WS08 and TP01A.

1.6. Restoration of the Site

The Principal Contractor shall remove from site, upon the completion of site work, all surplus materials connected with the execution of the works.

The Principal Contractor shall rectify any damage to property, including cutting or damage to fences.

Reinstatement shall be carried out in accordance with the New Roads and Street Works Act 1991 and in full compliance with the Manual of Contract Documents for Highway Works (MCHW); Volume 1; Specification of Highway Works (SHW), and to the satisfaction of SBC site representative.

1.7. Method Statements

The Principal Contractor shall submit Method Statements to SBC/Project Manager prior to commencement of the operation to which the Method Statement refers. Method Statements shall include, but not be limited to, the following operations:

- a. Site welfare and storage;
- b. Pavement Coring;
- c. Dynamic Cone Penetrometer (DCP) testing;
- d. Ground Penetrating Radar (GPR);
- e. Falling Weight Deflectometer (FWD) testing;
- f. Reinstatement;
- g. Traffic management.

The Principal Contractor shall carryout Risk Assessmnts before commencing any works on site. These should be site specific and include all noted risks and mitigation. Welfare and storage should be contained within the Construction Phase Plan.

1.8. Reporting

A factual pavement investigation report shall be produced which summarises the findings from the site and laboratory works. The report shall be provided in electronic format. All presented data shall additionally be provided in (un-locked) Excel spreadsheet format to enable future analysis by the Designer.

The final report shall be submitted within two weeks of completion of the site activities.

1.9. Data Referencing

The core hole and DCP locations should be recorded using GPS with coordinates in Ordinance Survey Grid Reference (OSGR) format. The Principal Contractor shall produce a drawing to show the locations of all cores taken. All test data (across the different survey techniques) shall be presented against a common chainage system. This will be as per the scheme (design) chainage system which is indicated on the location plans in [Appendix A](#).

2. Pavement Investigation

2.1. Coring

A total of 12 cores are proposed to be extracted with approximate core locations provided in [Appendix A](#). Coring (and logging) shall be undertaken in accordance with Chapter 7 of HD 29/08. All pavement core locations are provisional. Prior to intrusive works the Principal Contractor must ensure that the cores are not located over any statutory undertakers' plant (services) or buried structures. The Principal Contractor shall verify the absence of services using the relevant service plans, identifying relevant surface features and performing a CAT and "Genny" scan of each core location. Should the presence of buried services be suspected, the location shall be revised, and the checking of the location shall be repeated.

The cores shall be 150mm diameter as stated and to the full depth of the bound construction for logging and examination purposes, with nominal locations as indicated on the drawing provided in [Appendix A](#). All cores shall be stored by the Principal Contractor for minimum period of 6 months after extraction to allow for any necessary subsequent testing.

2.1.1. Core Investigation Reporting

Reporting is to take the form of both photographic and written logs of pavement construction layers together with descriptions of the condition of each layer.

Core logs are required for all the cores extracted. Each core log shall contain a colour photograph of the core of suitable clarity, with the layer thickness, type of material and description of the condition of all the layers recorded in an adjacent table. The material type of the sub-base (immediately below the bound layers) shall be recorded in the core logs. Further details of the type and format of information to be recorded are provided in Chapter 7 of HD 29/08.

The core logs shall also contain the results of a PAK test to determine the presence of tar in any asphalt layers. If any tar is identified in the PAK test, the sample must be tested in the laboratory for identification Polynuclear Aromatic Hydrocarbons (PAHs) levels.

A Schedule of Quantities for all test methods is provided in [Appendix B](#).

2.2. Dynamic Cone Penetrometer (DCP)

DCP testing shall be undertaken in accordance with Chapter 7 of HD 29/08. The purpose of DCP testing is to provide sub-base condition and depth together with identifying and estimating sub-grade type and CBR.

DCP testing shall be undertaken at all 150mm diameter proposed core locations. In strong stabilised layers and / or granular materials with large particles progress may be hampered or negligible. DCP testing must extend to a depth of 1m below the underside of the pavement. If no valid data is available after 20 blows it can be assumed that the DCP will not penetrate the material (as per HD 29/08 Clause 7.30).

A field sheet like HD 29/08 Figure 7.4 should be used to collate the data on site. The information collected should then be provided as raw data, recording the penetration after each blow, presented in a spreadsheet (MS Excel) format, along with the number of blows / penetration plots in accordance with HD 29/08.

A Schedule of Quantities for all test methods is provided in [Appendix B](#).

2.3. Reinstatement of Core Holes

Excavation, trimming and reinstatement of paved areas shall comply with SHW Clause 706 and the Specification for the Reinstatement of Openings in Highways (New Roads and Street Works Act, 1991). The cut edges of the core hole shall be painted with cold bitumen joint sealer as approved by SBC.

Core holes shall be backfilled with materials compacted to refusal with a circular headed vibrating hammer. The layer thickness shall be in accordance with BS 594987. The Principal Contractor shall

ensure the surface layer of the reinstated core holes obtains a good match with the surrounding material.

A Schedule of Quantities for all activities (including reinstatement) is provided in [Appendix B](#).

2.4. Ground Penetrating Radar (GPR)

The Ground Penetrating Radar (GPR) shall be undertaken in accordance with Chapter 6 of HD29/08 (DMRB Volume 7, Section 3, and Part 2). In general, the survey will be used to determine layer thickness, changes in construction, delamination etc.

GPR measurements shall be conducted for the extents summarised in Table 2.1 below on all lanes and indicative test lines shown in [Appendix A](#). The survey shall be undertaken at slow speed (< 30km/h). Any general information relevant to the data, e.g. presence of visual defects, proximity to structures, etc. shall also be recorded.

GPR surveys shall not be carried out when standing water is present on the surface of the pavement.

Cores will be required to identify or confirm each type of construction and determine layer thicknesses at specific locations within the survey site to calibrate or confirm the calibration of the GPR system that will be used in the survey.

The GPR is to identify the thickness and material type of each of the layers of the pavement construction down to the sub-grade. The proposed tolerances for the determination of the layer thicknesses are to be in accordance with, or better than, the industry best practice of $\pm 8\%$ for bound layers and $\pm 15\%$ for unbound layers.

The Principal Contractor shall provide the Investigation Supervisor with the GPR profiles and moisture plots referenced clearly to the drawing to allow easy comparison with other pavement condition data from the same site. Once the cores are recovered, the Principal Contractor shall calibrate the GPR data against the core samples and superimpose core depths on the GPR profiles.

For the final report, the GPR survey results must be presented in a format which can be readily understood by the Investigation Supervisor and referenced clearly to the drawings to allow easy comparison with other pavement condition data from the same site. The data must be provided in electronic Excel spreadsheet format.

The GPR survey report must include:

- a. a text section summarising the results of the survey, assumptions used to interpret the radar data, measurement accuracy achieved, problems encountered, etc;
- b. a graphical display of the survey results;
- c. tabulation of the survey results;
- d. core logs where appropriate.

Graphs and tables should be produced to a standard format, displaying as much information as possible.

The following information should appear on the graphs and tables:

- a. Date of survey;
- b. Survey location including road names, section, chainage in meters along road from start of section, direction of survey, location of airside features where this aids location referencing of the survey data;
- c. Lane(s) surveyed;
- d. Road type/construction;
- e. Surface moisture condition;
- f. Pavement depth in millimetres and metres;
- g. Location and size of subsurface defects;
- h. Location of cores, core details and corresponding radar depths
- i. Sampling of radar system – average sampling interval and sampling method (time driven or distance)

A Schedule of Quantities for all test methods (including GPR) is provided in [Appendix B](#).

Table 2.1: Proposed GPR extents

Road Sections	Directions	Lanes	Start Ch.	End Ch.	Survey Length (m)
Holbrook Way	EB	2	0	203	406
Cheltenham Street	NB	1	0	75	75
Milford Street	NB	2	0	30	60
West End Bus Turning (existing car park)	EB/WB	-	-	-	150
Total					691

2.5. Falling Weight Deflectometer (FWD)

2.5.1. FWD Requirements

An FWD survey shall be undertaken in accordance with Chapter 5 of HD 29/08 to assess inter alia the deflections and stiffness's of the existing pavement. FWD measurements shall be carried out at 5m intervals and for the extents summarised in Table 2.2 in all lanes and indicative test lines shown in [Appendix A](#).

The Principal Contractor shall supply proof of calibration of the FWD machine and a copy of the accreditation certificate that authorises it for use on trunk roads prior to commencement of the survey.

Three load cycles, or “drops”, at a target load of 50 kN + 10% shall be carried out at each test location after an initial settling drop. Should the central deflection consistently be less than 100 microns, then the target load should be increased to 75 kN +10%.

There must be no standing water on the road surface and care must be taken to ensure that the whole area of the plate is in contact with the surface.

Air and pavement temperature (at a depth of 100 mm) measurements shall be taken at the start and end of each test section and at least every 30 minutes during the survey. Temperatures must also be recorded when passing into or out of continuously shaded areas on the carriageway and areas having significantly different surface characteristics. This data should be recorded in the FWD site data file.

The FWD operator shall produce a log sheet containing at a minimum the following information:

- Data file names and contents;
- Location of any abnormal deflection bowls;
- Road name, direction of traffic, GPS coordinates (OSGR) format, scheme chainage reference;
- Information relevant to the data, e.g. presence of visual defects, proximity to structure, etc.

Table 2.2: Proposed FWD extents

Road Sections	Directions	Lanes	Start Ch.	End Ch.	Approx. Survey Length (m)
Holbrook Way	EB	2	0	203	406
Cheltenham Street	NB	1	0	75	75
Milford Street	NB	2	0	30	60
West End Bus Turning (existing car park)	EB/WB	-	-	-	150
Total					691

2.5.2. FWD Reporting

The FWD report shall be consistent with the requirements provided in HD 29/08. The report shall consist of:

- a. Tabulation of FWD deflection data and statistical analysis and plotting of deflection profiles;
- b. Back-analysis of FWD deflection data using a suitable linear elastic program to determine the effective stiffness moduli of the various pavement layers and subgrade at each FWD test point (including RMS and AMD) with appropriate pavement thickness;
- c. The Principal Contractor shall also submit all data files containing the raw deflection data (f20 / f25 file format) and the FWD site data file in electronic Excel format. The file format shall be compatible with HAMODULUS software for back analysis.

A Schedule of Quantities for all test methods (including FWD) is provided in [Appendix B](#).

3. Laboratory Testing Requirements

3.1. General

The list of potential laboratory tests, to be undertaken on selected material samples, is provided in Table 3.1. Where required, test results obtained on cored samples taken from the investigation shall be reported in accordance with the standards against which they were tested. These should be reported together with appropriate interpretation.

All materials and samples must be retained for possible testing until instructed in writing by the Project Manager confirming the disposal of samples.

The test schedule will be prepared from the deliverables described above as, for example, core logs will need to be examined to determine what testing is suitable for each core.

A Schedule of Quantities for all activities (including lab testing) is provided in [Appendix B](#). The Principal Contractor is to provide a rate only for laboratory testing at a laboratory, UKAS accredited for each individual test, unless otherwise stated by the Project Manager. The Designer will instruct laboratory testing quantities (if any) on the retained core samples after analysis of the incoming data described in **Section 2**.

Table 3.1: Potential Scope of Laboratory Testing

Test Method	Samples
Core Density (Bulk and Maximum Density), Air Void Content	Asphalt layer (selected)
Compressive Strength in accordance with BS EN 12504 - 1 and BS EN 12390- 3 and 7.	HBM layers from cores
Asphalt Stiffness in accordance with BS EN 12697 26 (Annex C – IT-CY) @ 20°C.	Asphalt layer (selected)
Chemical Tests Speciated PAHs (Polynuclear Aromatic hydrocarbons) Speciated PAHs by GC-MS comprising: - Acenaphthene - Acenaphthylene - Anthracene - Benz(a)anthracene - Benzo(a)pyrene - Benzo(b)fluoranthene - Benzo(ghi)perylene - Benzo(k)fluoranthene - Chrysene - Coronene - Dibenzo(ah)anthracene - Fluoranthene - Fluorene - Indeno(123cd)pyrene - Naphthalene - Phenanthrene - Pyrene Results reported in mg/kg, maximum detection limit 1ppm	Asphalt layer (selected)

3.2. Testing on Asphalt

Chemical tests relating to tar contents shall be undertaken on cores. The choice of layers to be sampled and tested for the presence of PAHs will be driven by the detection of likely tar-bearing layers during coring (via PAK marker and/or the characteristic odour associated with PAHs).

The asphalt tests shall be carried out on selected intact asphalt layers and shall be agreed with the Designer. These tests will include:

- Bulk Density in accordance with BS EN 12697-6, Procedure B;
- Maximum Density in accordance with BS EN 12697-5, Procedure A;
- Void Content in accordance with BS EN 12697-8
- Indirect Tensile Stiffness Modulus (ITSM) test in accordance with BS EN 12697-26 Annex C (IT-CY).

3.3. Testing on Hydraulically Bound Materials (HBM)

Cores consisting of Hydraulically Bound Materials (HBM) shall be cut, capped and tested for compressive strength and density in accordance with:

- a. BS EN 12390-3 "Testing hardened concrete. Compressive strength of test specimens"; and
- b. BS EN 12390-7 "Testing hardened concrete. Density of hardened concrete".

The tests shall be undertaken on selected intact samples (to be agreed with the Designer). These will include compressive strength of HBM.

Appendices

Appendix A - Location Plan and Layout Drawings

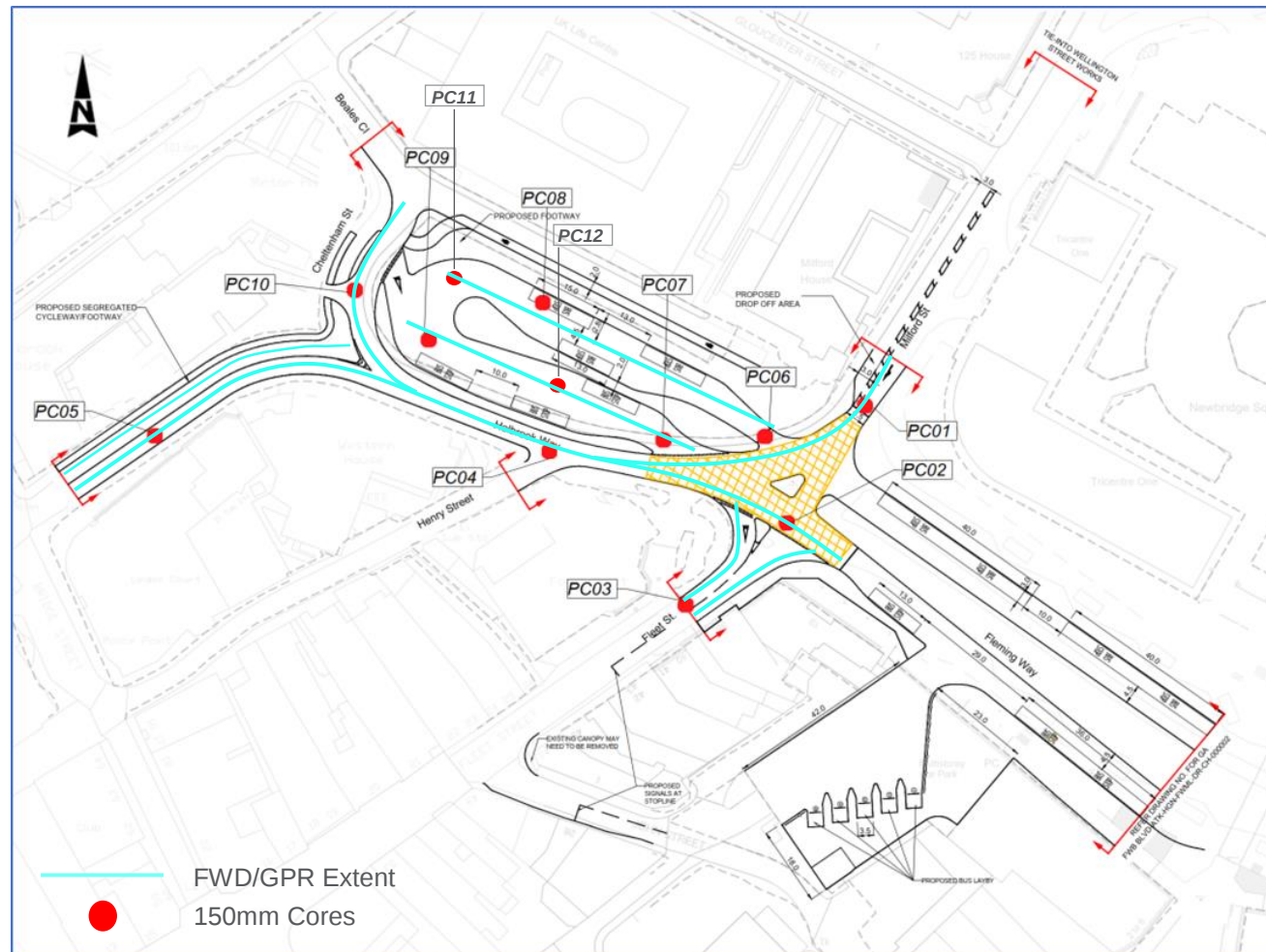


Figure A.1: Fleming Way Pavement Investigation Location Plan

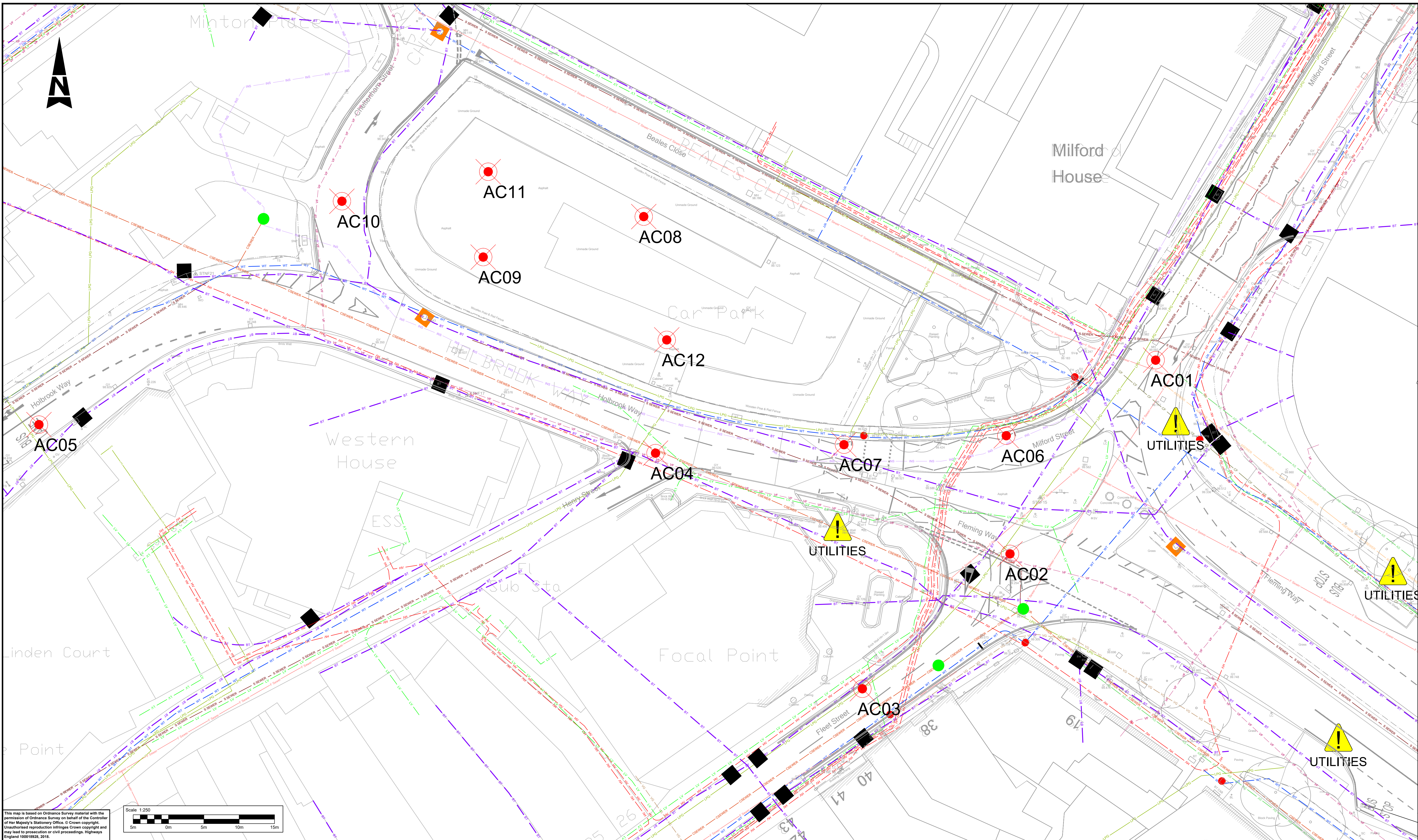
DO NOT SCALE

Millimetres

0

10

100



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LEGEND

Ø150mm PAVEMENT CORE

NOTES

- DO NOT SCALE FROM THIS DRAWING
- EXACT LOCATION OF STATUTORY UNDERTAKERS APPARATUS TO BE CONFIRMED ON SITE
- REFER TO DRAWINGS FWB Blvd-ATK-VUT-FWML-DR-CH-000001 AND FWB Blvd-ATK-VUT-FWML-DR-CH-000002 FOR EXISTING UTILITIES ON SITE
- EXACT LOCATION OF PAVEMENT CORES TO BE ADJUSTED TO AVOID UNDERGROUND UTILITIES PRESENT AT THE LOCATION ONCE THE CONTRACTOR HAS BEEN APPOINTED
- CORES SHOULD BE TAKEN FROM HEAVIEST LOAD LANE AND WHERE VISIBLE PAVEMENT DAMAGE OR DEFORMITY IS OBSERVED

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

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

Construction UTILITIES, LIVE TRAFFIC

Maintenance / Cleaning TBC

Use TBC

Decommissioning / Demolition TBC

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
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Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
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Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
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Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
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Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
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Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
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Drawing Suitability

FOR TENDER

Status D2

Project Title

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Client



Drawing Title

ADDITIONAL PAVEMENT CORE SAMPLES

Drawing Number

Project

Originator

Volume

FWB Blvd

- ATK

- HGT

-

XXSR_BH

- DR

- CH

- 000001

Location

Type

Role

Number

Original Size: A1

Scale: 1:250

Project Ref. No: 5167597

Sheet: 1 of 1

Rev: P01

Appendix B - Schedule of Quantities

Table A.1: Schedule of Quantities

Item No.	Brief Section	Description	Unit	Quantity	Rate	Cost
1	2.1	Coring				
1.1		150mm Core Extractions and logging	No.	12		
1.2		PAK test	No.	12		
2	2.2	Dynamic Cone Penetrometer	No.	12		
3	2.3	Reinstatement of core locations	No.	12		
4	2.4	Ground Penetrating Radar (GPR)	Lane m	691		
5	2.5	Falling Weight Deflectometer (including Back Analysis)	Lane m	691		
6	3.0	Laboratory Testing				
	3.2	Asphalt				
6.1		ITSM (asphalt)	No.	TBC		Rate only
6.2		Density (Bulk and Maximum)	No.	TBC		
6.3		Void Content (asphalt)	No.	TBC		
6.4		Chemical-PAHs	No.	TBC		
6.5		Leachable PAHs	No.	TBC		
	3.3	HBM				
6.6		Cylinder Strength (HBM)	No.	TBC		Rate only
7	1.6	Report				
7.1		Electronic copy	No.	1		
8	1.2	Traffic Management	Lump Sum	1		
Notes:						
1. A brief description of the traffic management layout proposed for the works and the number of shifts required shall be inserted into the priced Schedule of Quantities.						

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