THE HIGHWAYS AGENCY
THE SCOTTISH OFFICE DEVELOPMENT DEPARTMENT
THE WELSH OFFICE
Y SWYDDFA GYMREIG

THE DEPARTMENT OF THE ENVIRONMENT FOR NORTHERN IRELAND

Specification for Geodetic Surveying Services

Summary: This Specification for Geodetic Surveys sets out the requirements for Geodetic

REGISTRATION OF AMENDMENTS

REGISTRATION OF AMENDMENTS

VOLUME 5 CONTRACT DOCUMENTS FOR SPECIALIST ACTIVITIES
SECTION 1 GEODETIC SURVEYS

PART 2
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1. INTRODUCTION

1.1 General

1.1.1 This specification is for the use of survey firms engaged in work for the Department and for Design Organisation responsible for the administration of geodetic survey services.

1.2 European Mutual Recognition

1.2.1 Except where the specified standard implements or is technically equivalent to a Harmonised European Standard or to a European Standard adopted for use within the European Communities after 31 December 1985, any requirement for products or materials to comply with a British Standard shall be satisfied by compliance with

(i) a relevant standard or code of practice of a national standards institution or equivalent body of any states of the European Economic Area.

or (ii) a relevant international standard recognised in any states of the European Economic Area.

or (iii) a relevant specification acknowledged for use as a standard by a public authority of any states of the European Economic Area.

or (iv) traditional procedures of manufacture of any states of the European Economic Area where these are the subject of a written technical description sufficiently detailed to permit assessment of the goods or materials for the use specified

or (v) a European Technical Approval (ETA) issued in accordance with the Construction Products Directive 89/0106/EEC (or, until procedures are available for the issue of ETAs, a specification sufficiently detailed to permit assessment) for goods or materials of an innovative nature or subject to innovative processes of manufacture and which fulfill the purpose provided for by the specified standard.

provided that the proposed standard, code of practice, specification, technical description or European Technical Approval provides in use levels of safety, suitability and fitness for purpose equivalent to those required by the specified standard in so far as they are not inconsistent with the Essential Requirements of the Construction Products Directive (89/106/EEC).

1.3 Changes and Amendments to the Specification

1.3.1 This Specification is a reproduction of that contained in Volume 5 Section 1 Part 2 of the Manual of Contract Documents For Highway Works modified by the Substitute, Additional, Cancelled or Amended Clauses or Figures, listed in Clauses 1.3.5, 1.3.6, 1.3.7 and 1.3.8 respectively.

1.3.2 Insofar as any Substitute, Additional or Amended Clause or Figure may conflict or be inconsistent with any provisions of the Specification, the Substitute, Additional or Amended Clause or Figure shall always prevail.

1.3.3 Any reference in the Contract to a Clause or Figure Number shall refer to any Substituted, Additional or Amended version of that Clause or Figure within the Contract. A list of Substituted, Additional or Amended Clauses or Figures will be found in Sections 1.3.5 - 1.3.8.

1.3.4 Where the Specification requires options to be deleted or details to be added, these shall be explicitly identified. This shall be performed by drawing a line through the options to be deleted and inserting in manuscript items to be inserted, in both cases using black ink. Deletions and insertions shall not be made by editing the text using a word processor or similar device.

1.3.5 List of Substitute Clauses or Figure Numbers

None

1.3.6 List of Additional Clauses or Figure Numbers

See Annex 1

1.3.7 List of Cancelled Clauses or Figure Numbers

See Annex 2

1.3.8 List of Amended Clauses or Figure Numbers

See Annex 3

1.4 The Survey Contractor

1.4.1 Organisations considered for contracts under this Specification.

1.5 The Survey Advisor

1.5.1 The Survey Advisor is the Design Organisation's representative for Geodetic surveys.

1.5.2 For each commission, a Survey Advisor shall be appointed who shall be a qualified and experienced Land Surveyor and who may be an employee of the Design Organisation or an employee of a survey contractor not invited to tender. The Survey Advisor shall assist the Design Organisation from the inception of the planning process by preparation of the detailed project survey specification. He shall also be responsible for providing advice during the assessment of the tenders, providing support to the Design Organisation during the contract period and ensuring that the requirements of the Specification are properly met in time and tolerance.

2. PURPOSE AND SCOPE

2.1 Location

Location – A5 Bittesby

Road Number(s) A5
Area of survey as shown on drawing No. HE604077-KIER-VGN-A5_BITTESBY-DR-Z-0100_01 to 02.pdf
Town – A5 BITTESBY
County (ies) - Leicestershire

2.2 Aim of the Project for which the Survey is Required

Investigate the drainage system along the A5 southbound with a view to piping a section of the existing ditch behind the lay-by near Bittesby Stables. This is required to resolve third-party flooding.

2.3 Aim of the Survey

To carry out a Topographical of the area shown on the Drawings to include the following:

Establish, locating and survey a framework of Permanent Ground Markers. Prepare plans at *1:500* scales, ~~with~~/ without contours. Prepare String Digital Models and/ or other digital information as detailed in the specification, Clause *13.4*. ~~Photograph the area in black and white to a scale of 1: ..... for a photographic mosaic.~~

2.4 Brief Description of Survey Area

Location – A5 Bittesby

Survey area: See drawing HE604077-KIER-VGN-A5_BITTESBY-DR-Z-0100_01 to 02.pdf

Approx. Length: 550m.
Terrain conditions for area of survey –Existing carriageway, verge, lay-by, footway and ditch.

2.5 Use of the Survey Information

The survey information will be used for the following purposes:
Preliminary and detailed design of improvements to the drainage assets, including piping a section of existing ditch.

GENERAL REQUIREMENTS

2.6 Health and Safety at Work etc Act 1974

2.6.1 All activities performed during the course of work undertaken by the Survey Contractor on this Contract shall be in accordance with the requirements of the Health and Safety at Work etc Act 1974. The Survey Advisor shall inform the Survey Contractor of any operations or areas which involve safety considerations over and above those normally required during survey activities.

2.7 Landowners, Occupiers and Entry

2.7.1 Unless otherwise stated in Appendix A, owners and occupiers of all the land covered by the survey will have been notified in writing of the period during which entry is likely to be required and their permission for entry obtained by the Design Organisation or the Survey Advisor. Not with standing the above, the Survey Contractor shall also notify in writing all occupiers before gaining entry and agree with them all routes and means of access. Where access to the Survey Contractor is refused, the Survey Contractor shall immediately notify the Survey Advisor.

2.8 Control

2.8.1 A horizontal and vertical control framework shall be established by the Survey Contractor and submitted to the Survey Advisor for approval. Control points shall be marked in such a manner that their location shall allow effective future use. Their construction shall be sufficient to withstand at least 5 years of normal usage, taking into account the surroundings at each location. The types of material used shall be such that their impact upon the environment and any normal activities at each location is minimised.

2.8.2 Connection to the Ordnance Survey National Grid, where required, shall be specified by the Survey Advisor before the start of the Survey, together with details of any Local Grid system required. Clause 5.2.4.

2.8.3 A Control Report shall be produced in accordance with Clause 5, Project Control.

2.8.4 All survey control stations shall be referenced to surrounding detail and a location plan prepared by the Survey Contractor showing these references to permit their later re-establishment.

2.8.5 The accuracy and density of the control shall be as defined in the appropriate Clause of this Specification.

2.9 Detail to be Surveyed

2.9.1 The nature and type of features to be surveyed will depend upon the scale of the survey and the purpose for which the survey information is required. Lists of features, which the Survey Advisor shall mark to show those required for this survey, are contained in the appropriate Clause of this Specification.

2.9.2 Where features cannot be surveyed to the specified accuracy without extensive clearing of vegetation or obstructions the instructions of the Survey Advisor shall be obtained.

2.9.3 Features shall be represented in accordance with the feature symbol tables in Appendix B.

2.9.4 The line or point to be surveyed on a feature shall be at the feature's intersection with the ground surface unless otherwise required in the appropriate Clause of this Specification or in Appendix B.

2.9.5 Identification of all objects shall be based upon their nature and surroundings. Where exact identification is not possible, a general purpose description shall be used.

2.9.6 Any building or surface which is in a state of change at the time of the survey shall be annotated to this effect, with the boundary of the area of change indicated. The Survey Advisor shall specify any areas where the degree of change is such that either limited, or no, survey information is required within the area.

2.9.7 The ground surface shall be surveyed such that any point interpreted from this information shall be within the tolerance specified of the actual ground surface location for the area and type of surface involved. These tolerances are given in the appropriate Clause of this Specification.

2.10 Presentation

2.10.1 All survey information shall be presented in a format and manner which allows for easy use and which permits additional copies to be made as necessary, excepting any limitations which may be imposed in respect of the copyright of data from third parties.

2.10.2 All final products from the source data shall be supplied on stable media. All products supplied shall be intelligible and usable for the purpose specified.

2.10.3 Within *one week* of award of the Contract, the Survey Contractor shall supply samples of the output, for approval by the Design Organisation within *5* working days of the date of receipt.

2.10.4 On completion of the Survey, the Survey Contractor shall deliver to the Survey Advisor a detailed survey report, covering those items specified in the appropriate Clauses of this Specification. The Contract shall be considered to have been completed upon acceptance of the suitability of this report and of all the survey data delivered and accepted.

2.11 General

2.11.1 Within *one week* of award of the Contract, the Survey Contractor shall provide the Survey Advisor with a detailed programme and method statement of the activities the Survey Contractor intends to carry out, in order to meet the Contract timetable and the Specification. The method statement shall include copies of calibration certificates for the survey equipment.

2.11.2 The Survey Contractor shall conform with all requirements of any private or public utility service company involved as far as access to their facilities is concerned. The Survey Advisor shall identify those facilities which can be inspected by the Survey Contractor and those which can only be inspected by the statutory undertaker concerned.

2.11.3 The Survey Contractor shall ensure that written permission is obtained from the Survey Advisor for any works which in the opinion of the Survey Contractor are likely to cause damage to property.

2.11.4 The Survey Contractor shall make provision to carry out any traffic safety and management requirements necessary to undertake the Survey on public roads in accordance with all relevant statutory regulations. Details of these requirements shall be included in Appendix C.

2.11.5 All source survey information shall be safely held by the Survey Contractor for a period of three years from the date of completion of the Survey Contract. After this period it may then be destroyed without reference to the Design Organisation or Survey

Advisor unless otherwise instructed in Clause 14.3.3.

2.11.6 Prior to the commencement of survey works, the Survey Contractor shall attend a pre-contract meeting with the Design Organisation.

3. PROJECT INFORMATION

3.1 Client

[redacted]

3.3.2

3.4 Existing Mapping

3.4.1 Existing mapping available for inspection:¬Brief description and source:- None
.....
~~Scale:- .....(Digital/Non Digital)~~
~~Available from:- .....~~
~~Times:- .....~~

3.5 Existing aerial photographs available for inspection:-

Brief description:- *None*

.....

~~Scale:- .....(Colour/Monochrome)~~
~~Available from:- .....~~
~~Times:- .....~~

3.6 Landowners and Occupiers

3.6.1 Landowners/occupiers have been notified of the following:-

a. Purpose and scope of survey .....(~~Yes~~/No)

b. Expected period of survey and commencement date .....(~~Yes~~/No)

c. Arrangements for survey marker way leaves .....(~~Yes~~/No)

3.6.2 Land owner/occupier information:-

a. Schedule of owners/occupiers – All land to be surveyed within Highways England ownership.

b. Information to be obtained by the Survey Contractor and made available to the Design Organisation/ Survey Advisor .....(~~Yes/~~No)

c. Other arrangements *N/A*

3.7 Access

~~**3.7.1** Details of special access requirements in survey area -~~

3.8 Restrictions

~~**3.8.1** Details of restrictions to the survey programme -~~

3.9 Contacts

3.9.1 Details of contacts in the Highway and Police Authorities, private and public utility service companies and other Statutory Authorities in the area - See Appendix F.

3.10 Traffic Safety and Management

3.10.1 Details of requirements for traffic safety and management - See Appendix C.

3.11 Services

3.11.1 Details of any known information on location of Public/Private services and supplies - See Appendix G.

3.12 Contract Drawings

3.12.1 Schedule of Contract Drawings - See Appendix H.

4. PROJECT CONTROL

4.1 Project Control Requirements

4.1.1 Horizontal and vertical control frameworks shall be established to satisfy the following specified survey requirements:

~~a. Revision and/or upgrading of existing mapping as specified in Clause 6.~~

b. Production of new mapping as specified in Clause 7.

c. Survey of key points as specified in Clause 7.2.11.1 and shown on the Contract Drawings in Appendix H.

d. Survey of existing structures as specified in Clause 11.

e. Setting-out during construction.

~~f. Structural monitoring.~~

4.2 Planimetric Control

4.2.1 Framework

4.2.1.1 Planimetric control shall be made up of a framework to provide a suitable foundation for the production of a reliable survey. The framework shall comprise of all of the following elements:

a. Primary points connected by direct measurement and located at a nominal distance ~~..... m~~ apart and not less than ~~or ..... m~~ apart.

b. Secondary points tied into the primary points and located at a nominal distance of ~~or ..... m~~ apart and generally not less than ~~or ..... m~~ apart.

c. Minor control points as required for mapping at the specified scale.

4.2.2 Location of Permanent Ground Markers

4.2.2.1 The primary and secondary control points shall be defined by permanent ground markers. Prior to installation the approximate locations of the permanent ground markers shall be defined in one of the following ways:

a. Marked on a set of plans by the Survey Contractor and submitted together with a diagram of the proposed control framework to the Survey Advisor for approval.

~~b. Marked on the Contract Drawings scheduled in Appendix H.~~

4.2.2.2 Final positions of permanent ground markers shall be determined by terrain and intervisibility constraints. Any position which differs substantially from that defined in Clause 5.2.2.1 shall be subject to approval by the Survey Advisor.

4.2.2.3 Minor control points shall not be permanently marked.

4.2.3 Construction of Permanent Ground Markers

4.2.3.1 Permanent Ground Markers shall be stable for a period of 5 years and shall be of a construction which conforms to the types illustrated in Appendix J.

4.2.4 Survey Grid

4.2.4.1 The planimetric control shall be related to one of the following:

a. A plane rectangular grid with an origin defined by the nearest National Grid 10 km intersection to the south-west of the survey area and with the same orientation as the National Grid.

The origin of the plane grid shall be .....m E and .....m N.

The origin values selected shall ensure that all survey grid co-ordinates are positive.

~~b. An existing grid .....~~

~~.....~~

~~.....~~

~~c. An arbitrary plane local grid .....~~

~~.....~~
~~.....~~

4.2.4.2 A description of the grid system used shall be defined on one of the following:

a. A key plan or data file

~~b. Each survey plan or data file~~

4.2.5 Accuracy Acceptance Criteria

4.2.5.1 The acceptance criteria specified below are in terms of internal rather than absolute accuracies and are given as permitted deviations for distances, angles and levels. Internal accuracies are more critical to the construction process than the absolute accuracy of points in a higher co-ordinate system.

4.2.5.2 The relation between the permitted deviation (PD) and root mean square error (rmse) is: PD = 2.5 x rmse.

4.2.5.3 Where the control system forms a network, it shall be observed by measuring sufficient distances and angles to obtain a redundant number of observations, which shall then be adjusted by a least squares method.

4.2.5.4 When comparing measured distances and angles with those derived from the adjusted co¬ordinates the differences shall not exceed the following permitted deviations:

a. **Primary Points**

Distances: ~~either~~ ± 0.5√L mm ~~or ± .... √L mm~~
Angles: ~~either~~ ± $\frac{0.035}{\sqrt{L}}$ degrees ~~or ± $\frac{....}{\sqrt{L}}$ degrees~~

As an offset: ~~either~~ ± 0.61√L mm ~~or ± .... √L mm~~

b. **Secondary Points**

Distances: ~~either~~ ± 0.75√L mm ~~or ± .... √L mm~~
Angles: ~~either~~ ± $\frac{0.045}{\sqrt{L}}$ degrees ~~or ± $\frac{....}{\sqrt{L}}$ degrees~~

As an offset: ~~either~~ ± 0.75√L mm ~~or ± .... √L mm~~

c. **Minor Control**

Distances: ~~either~~ ± 1.0√L mm ~~or ± .... √L mm~~
Angles: ~~either~~ ± $\frac{0.09}{\sqrt{L}}$ degrees ~~or ± $\frac{....}{\sqrt{L}}$ degrees~~

As an offset: ~~either~~ ± 1.5√L mm ~~or ± .... √L mm~~ where L is the distance in metres between the points concerned. In the case of angles, the shorter of the two distances defining the angle shall be used.

4.2.6 Schedule of Permanent Control Stations

4.2.6.1 A schedule shall be prepared giving the following information:

a. Station designation
b. Plan co-ordinates
c. Level value (where available)
d. Description
e. Ordnance Survey triangulation stations (if used)

4.2.7 Location Diagrams

4.2.7.1 A location diagram shall be prepared for each permanent ground marker on a standard form, an example of which is shown in Appendix K.

4.2.8 Control Framework Diagram

4.2.8.1 A simple plan shall be prepared of the planimetric control framework showing the surveyed connections between the permanent ground markers.

4.3 Vertical Control

4.3.1 Framework

4.3.1.1 Permanent ground markers and permanent bench marks (if required) shall be connected by levelling and adjusted to the datum bench marks.

4.3.2 Location

4.3.2.1 The vertical control framework shall be defined by the permanent ground markers of the planimetric network and the permanent bench marks in the locations shown on the Contract Drawings scheduled in Appendix H.

4.3.3 Construction

4.3.3.1 Permanent bench marks shall be stable for a period of either 5/ ~~....~~. years and their construction shall conform to the illustration given in Appendix L.

4.3.4 Datum

4.3.4.1 All levels shall be related to one of the following:

a. Ordnance Datum – Newlyn/~~Liverpool~~.

~~b. Other datum - .....~~

4.3.4.2 The value of the datum bench mark to which the survey is related shall be confirmed by check levelling to other existing bench marks.

4.3.4.3 The location, description and value of each datum bench mark used shall be quoted on one of the following:

a. A key plan or data file
~~b. Every survey plan or data file~~

4.3.5 Accuracy Acceptance Criteria

4.3.5.1 When comparing measured height differences with those derived from the adjusted reduced levels, the differences shall not exceed the following permitted deviations:

a. Between bench marks, primary stations and other closed loops in the framework: ~~either~~ ± 12√K mm ~~or ± .... √K mm~~, where K is the distance levelled in km

b. Between adjacent secondary stations or minor control points less than 300 m ~~or ..... m~~ apart: ~~either~~ ± 5 mm ~~or ± ..... mm~~

4.3.6 Schedule of Bench Marks

4.3.6.1 A schedule shall be prepared giving the following information:

a. Bench mark designation
b. Level value
c. Description
d. Ordnance Survey bench marks (if used)

4.3.7 Location Diagrams

4.3.7.1 A location diagram shall be prepared for each datum bench mark and for each other permanent bench mark on a standard form, an example of which is shown in Appendix M.

4.3.8 Level Framework Diagram

4.3.8.1 A simple plan shall be prepared of the vertical control framework showing the levelled connections between the bench marks.

4.4 Control Report

4.4.1 On completion of the fieldwork and adjustment, a comprehensive control report shall be prepared detailing the methods used and checks applied, any problems encountered and demonstrating that the results achieved are in compliance with this Specification.

4.4.2 An advance copy of the report, together with copies of the horizontal and vertical control framework diagrams, schedules of stations and bench marks, and station and bench mark location diagrams, shall be submitted to the Survey Advisor for his approval. On approval, this shall form part of the final report.

7. NEW MAPPING

7.1 Scale

7.1.1 A survey shall be performed to produce new mapping at the following scales:

~~a. 1:1250~~
~~b. 1:1000~~
c. 1:500
~~d. 1:200~~
~~e. 1:100~~
~~f. 1:50~~
~~g. Other.....~~

7.1.2 The areas to be surveyed at each scale shall be as shown on the Contract Drawings scheduled in Appendix H.

7.2 Features/Detail to be Surveyed

7.2.1 Control Points

7.2.1.1 The following features and details shall be surveyed:

a. Ordnance Survey trigonometrical stations
b. Permanent survey stations
c. Ordnance Survey bench marks used in the survey
d. Permanent bench marks
e. Other.....

7.2.2 Building/Structures

7.2.2.1 The following features and details shall be surveyed:

a. The plinth ~~(or roof)~~ line of all permanent buildings
b. Open sides of buildings
c. Pre-fabricated houses
d. Hutments, camps
e. Outbuildings
f. Garden sheds
g. Glasshouses
~~h. Covered passages and archways~~
i. Internal property divisions between abutting buildings where visible externally
j. Ruins or partially demolished buildings or foundations - by the walls and masonry visible at the time of the survey
k. Names and numbers of all buildings, trade premises or plots
l. Building under construction
m. Bridges
n. Overhangs and canopies
o. Other .....
.....

7.2.3 Boundary Features

7.2.3.1 The following features and details shall be surveyed:

a. Fences (showing type and height)
b. Gates
c. Stiles
d. Hedges -showing type, height and width
e. Walls - showing type, height and width
f. Boundary markers
g. Other .....
.....

7.2.4 Roads, Tracks and Footpaths

7.2.4.1 The following features and details shall be surveyed:

a. Kerb line *and* edge of surfacing to carriageways
b. Tracks and bridle paths
c. Rides and drives
d. Footways
e. Pedestrian crossings
f. Steps
g. Traffic islands
h. Paths in public grounds
i. Paths in private grounds
j. Tunnels and/or underpasses
~~k. Changes of paved surface materials~~
l. Bridges and subways
m. Other *Top and bottom of Kerbs*
(Surveyed points shall be adjacent)
Edge of carriageway

Lane lines
Footways
Drainage chambers (Inverts of all pipes, sump and cover level), gullies, service chambers
Front and back of footway
Any changes in cross fall – (ie. Crown lines on roundabouts)
As defined on standard detail drawings attached

7.2.5 Street Furniture and Visible Service Features

7.2.5.1 The following features and details shall be surveyed:

a. Call boxes - type identified, eg police, RAC, AA, etc
b. Letter boxes
c. Bus Stops
d. Lamp posts
e. Telecommunication poles
f. Electricity poles
g. Vent pipes
h. Road signs
i. Road and street name boards
j. Hoardings
k. Notice boards
l. Traffic signal and control boxes
m. Vehicle detector pads
n. Drains or gullies
o. Fire hydrants
p. Stop valves and stop cocks
q. Manhole and inspection covers
~~r. Covers or lights to cellars~~
~~s. Parking meters and ticketing machines~~
t. Barriers
u. Bollards
v. Marker posts
w. Other *Safety Barrier top and bottom (showing type)*
Safety Barrier anchors
All road markings (showing type and all changes in type)
Road studs (showing type, spacing, colour and all changes in type)
Chart Nodes
Manholes and Inspection chambers (showing reference no. And cover level)

~~7.2.6 Railways~~

~~**7.2.6.1** The following features and details shall be surveyed:~~

~~a. Gauge faces of railway running rails~~
~~b. Points and cross-overs~~
~~c. Level crossings~~
~~d. Buffers~~
~~e. Platforms~~
~~f. Bridges~~
~~g. Signal boxes~~
~~h. Signals~~
~~i. Telephone points~~
~~j. Height gauges~~
~~k. Overhead electrification gantries - with heights~~
~~l. Tunnels~~
~~m. Air shafts~~
~~n. Water troughs~~
~~o. Warning signs~~
~~p. Cable troughs and runs~~
~~q. Point/signal operating rods/wires~~
r. ~~Other.....~~
~~.....~~

7.2.7 Water, Drainage and Coastal Features

7.2.7.1 The following features and details shall be surveyed:

a. Lakes
b. Ponds
c. Reservoirs
d. Rivers
e. Streams
f. Water courses
g. Ditches
h. Canals and towpaths
i. Wells
j. Springs
k. Marshes
l. Locks
m. Aqueducts
n. Water towers
o. Culverts

p. Millraces
q. Siphons
r. Sluice gates
s. Weirs
t. Waterfalls
u. Fords
v. Mooring posts
w. Pumps
x. Troughs
y. Tanks
z. Fountains
A. Sewer outfalls
B. Piers, jetties and landing stages
~~C. Harbour walls and breakwaters~~
~~D. Groynes and sea defences~~
~~E. Tunnels~~
~~F. Hydraulic rams~~
G. The direction of flow of all rivers, streams and cater courses
H. Other *Surface Water Channels*
Storm Sewer Outfalls *(within survey area only)*

7.2.8 Slopes and Earthworks

7.2.8.1 The following features and details shall be surveyed:

a. Cuttings and embankments
b. Terraced slopes
c. Retaining walls
d. Mounds
e. Open pits
f. Quarries
g. Rock outcrops
h. Tips
~~i. Adits and mineshafts~~
~~j. Other.....~~

7.2.9 Woods, Trees and Recreation Areas

7.2.9.1 The following features and details shall be surveyed:

a. Playgrounds and sports facilities
b. Parks and open spaces
c. Trees and Woods

(i) Details of species, girths/diameter (measured 1 m above the ground), height and spread (drawn) of all trees greater than *0.2*m girth shall be supplied and plotted to scale.

(ii) Isolated trees above *0.2m* trunk diameter

~~(iii) Individual trees above ....m trunk diameter in wooded areas.~~

(iv) Tree count with average girth, height and spread in wooded areas.

(v) Canopy line to be plotted.

~~(vi) Staked saplings - individual and/or areas thereof to be plotted.~~

~~(vii) Schedule of trees.~~

~~d. Ornamental garden features.....~~
~~e. Other.....~~

7.2.10 Industrial

7.1.10.1 The following features and details shall be surveyed:

~~a. Tanks~~
~~b. Conduits and pipes~~
~~c. Valve chambers~~
~~d. Filter beds~~
~~e. Transformers (boundary fences only)~~
f. Electricity sub-stations and switch boxes boundary fences only)
g. Pylon bases and reference numbers
h. Overhead lines and cables
~~i. Flagstaffs and masts~~
~~j. Gas storage vessels and pipes~~
k. Other .....

7.2.11 Key Points

7.2.11.1. The planimetric co-ordinates of the key points shown on the Contract Drawings scheduled in Appendix H shall be surveyed to the accuracy specified in the appropriate Clause of this Specification.

7.2.12 Spot Levels

7.2.12.1. The spot levels of the following features shall be surveyed:

a. Pavements, kerbs, channels and centre-line of roads at 5 m intervals between cross-sections
b. Steps and ramps (top and bottom)
c. Corners of buildings and other structures
~~d. Floor levels of buildings (or, when inaccessible, threshold levels which shall be clearly annotated)~~
~~e. Railway lines (highest rail/both rails at ..... m intervals)~~
~~f. Centre of railways at sleeper level at ..... m intervals~~
~~g. Hilltops, depressions and saddles~~
h. Top and bottom of embankments at *10m* intervals
i. Ditches, outfalls, stream, culverts and drains including bank and bed/invert levels at *10m* intervals
j. Water levels (with date and time of survey) of rivers, streams, water courses, canals, ponds, lakes and reservoirs, and where applicable, flood water levels
k. Storm water gullies, manholes, inspection covers, ducts and conduits
l. Heights of overhead cables ~~(specify)~~ .....
m. At additional locations indicated on the Contract Drawings scheduled in Appendix H
n. Other *For curves with a radius less than 100m at 5m intervals.*
For curves with a radius less than 25m at 3m intervals
Verges and embankments – 5m grid
Changes in embankment/rock face profile.

7.3 Accuracy

7.3.1. The planimetric co-ordinates of directly surveyed points shall be correct to ± 0.03 m rmse on carriageways and hard surfaces, and ± 0.1 m rmse on other surfaces, when checked from the nearest control point.

7.3.2. The levels of directly surveyed points shall be correct to within ± 0.005 m rmse on carriageways and hard surfaces, and to within ± 0.05 m rmse on other surfaces, (except on ploughed or otherwise broken surfaces), when checked from the nearest control point.

7.3.3. Features which cannot be surveyed to the specified accuracy without extensive clearing shall be treated in one of the following methods:

a. Surveyed approximately and annotated/ labelled accordingly.
~~b. Cleared by, or with the authority of, the Survey Advisor or Design Agent.~~

7.3.4. The co-ordinates of key points as defined in Clause 7.2.11 shall be accurate to within ± 0.005 m rmse when checked from the nearest control point.

7.4.1. Definition

7.4.1. The spacing of points on planimetric features shall be such that interpolated points are correct to within ± 0.03 m on hard or well-defined features, and to within ± 0.15 m on other features.

ALTERNATIVELY
~~The spacing of points on planimetric features shall be such that the straight line joining any two adjacent points on a feature shall not deviate from the true position of that feature by more than ± ..... m on hard or well-defined features, and by more than ± ..... m on other features.~~
~~ALTERNATIVELY IN EITHER OF THE ABOVE, ... could be replaced by more than twice the accuracy specified in Clause 7.3.1.~~

7.4.2. The spacing of levels shall be such that the ground configuration, including all discontinuities, is correctly represented except for minor features such as small banks and ditches which are insignificant in terms of earthworks quantities.

7.4.3. The spacing of levels shall be such that interpolated points shall not deviate from the true ground surface by more than ± 0.01 m on hard or well-defined surfaces, and by more than ± 0.06 m on other surfaces.

7.4 Presentation

7.5.1. The presentation of surveyed information shall be as defined in Clause 12.7.

10. UNDERGROUND SERVICES

10.1. Area of Investigation

10.1.1. The area to be investigated shall be one of the following:

~~a. The whole of the area covered by the Survey Contract~~

The specific areas shown on the Contract Drawings HE604077-KIER-VGN-A5_BITTESBY-DR-Z-0100_01 to 02.pdf

~~b.~~

10.2. Investigation Requirements

10.2.1. The investigation shall be carried out using one of the options given in Clause 10.3. All investigations shall be confined to mains services, except for the following:

a. .....

10.3. Types of Survey

10.3.1. From Service Records

10.3.1.1. This shall comprise the addition of utility services record information and local authority drainage, relating information where possible to common detail, services 'furniture', trench scars and overhead lines.

10.3.2. From Service Records and On-Site Visual Investigation

10.3.2.1. This shall include the requirements of Clause 10.3.1, together with the lifting, where permissible, of all services covers except where damage to cover or frame would result, and identifying the contents of chambers. Service runs shall be assumed to be straight. Additional requirements shall be as follows:

a. Drainage

(i) Measure and survey all invert and backdrop depths

(ii) Show all pipe sizes and direction of flow

(iii) Link manholes by proving connection

(iv) Show all connections at manholes

b. Other services

(i) Relate chamber contents to record information

(ii) Relate record information as in a. above

10.3.3. From Service Records, On-Site Visual Investigation and Route Tracing

10.3.3.1. This shall include the requirements of Clauses 10.3.1 and 10.3.2, together with the following:

a. Drainage

(i) Determine outlets to manholes

(ii) Electronically trace the actual route

(iii) Locate concealed manhole positions

(iv) Electronically trace pumping main

a. and show depths at 5 m intervals

b. Water and Gas (including LPG)

(i) Electronically trace all detectable water and gas mains

(ii) Show depths at ..... m intervals on mains

(iii) Provide sizes from

(i) records

(ii) visual site investigation

(iii) excavation

c. Electricity

(i) Electronically trace all high medium and low voltage cables, street lighting, control cables, etc

(ii) Provide depths of cables at ..... m intervals

d. Telephones

(i) By arrangement with the relevant utility company, electronically trace all cable routes

(ii) Show depth to top of ducts at joint boxes and the number of ducts

e. Other services or structures

(i) Electronically trace route of .....
.....

(ii) Show depth at ..... m intervals of
.....

10.4. Schedules and Reports

10.4.1. Where information is based on records, a schedule shall be compiled showing the service, the contact address, telephone and fax numbers, and the title, reference number, scale and date of the source data. This shall be contained in...

10.4.2. All information obtained from records shall be annotated (R) on the final services drawings and digital data files.

10.4.3. A report shall be prepared on the investigation of the services. This shall include details of any particular difficulties encountered during the Survey and any qualification regarding the accuracy of the information shown. A cautionary note shall be provided on all final services drawings and digital data files detailing any limitations in the information provided concerning completeness and accuracy.

~~**10.5. CCTV Surveys**~~

~~**10.5.1.** A CCTV survey shall be carried out on the following services using colour/black and white photography:~~

~~a. All foul and storm water sewers in excess of ..... mm diameter~~

~~b. Those sewers indicated on the plan provided with the Contract Drawings scheduled in Appendix H~~

~~c. Jetting of sewers required prior to survey.~~

~~**10.5.2.** The following results shall be provided:~~

~~a. .....~~

10.6. Presentation

10.6.1. For presentation, services shall be grouped as indicated in Clause 12.6.1 and shown as indicated in Table in Clause 12.7.1.

10.6.2. The conventions, abbreviations, line types and other representational features to be used shall be those given in Appendix P.

12. PRESENTATION OF DRAWINGS

12.1. General

12.1.1. 12.1.1The final drawings shall show all the surveyed details specified.

12.1.2. 12.1.2Where digital data is specified the final drawings shall be produced by one of the following:

a. Entirely from the digital data file

~~b. Other .....~~

12.2. Drawing Format

12.2.1. The layout of the survey drawings shall be as shown on the Contract Drawings scheduled in Appendix H.

12.2.2. The Survey Advisor shall provide a sample of the title block and general arrangement to be used for all drawings.

12.2.3. Adjoining drawings shall conform to one of the following:

~~a. Butt jointed~~
~~b. Overlapped by ..... mm with detail drawn to a cut line~~
c. Overlapped by 75 mm with all common detail shown on both drawings
~~d. As shown in 12.2.1, where drawings do not form a straight line~~

12.2.4. Final drawings shall be drawn at the scale(s) and on the sheet size(s) specified in Appendix Q.

12.3. Grid

12.3.1. The grid shall be shown on all drawings at ..... mm intervals by one of the following:

~~a. Continuous lines~~
b. Symmetrical crosses at grid intersections with ticks at the sheet edges

12.3.2. The grid values shall be shown at the sheet edges.

~~12.4. Revision/Upgrading of Existing Mapping~~

~~**12.4.1.** Revised planimetric detail, additions and height information as specified in Clauses 6.6, 6.7 and 6.8 respectively shall be treated in one of the following ways:~~

~~a. Shown on the base mapping source medium specified in Clause 6.5.~~

~~b. Recompiled and shown as a strip survey of the area specified in the Contract Drawings schedule in Appendix H. The strip shall be plotted in the top half of an .... size sheet and orientated such that the proposed centre line is generally parallel to the street edge.~~

~~c. Other .....~~

~~**12.4.2.** Contours shall be plotted at ..... mm vertical intervals with every ....m contour shown as a double thickness line. The value of the contours shall be shown at distances along the contour of not more than ..... mm. Where contours are very close together, values shall only be shown on thickened contours.~~

~~**12.4.3.** In flat areas where the distance between contours is likely to exceed ..... mm additional spot heights shall be shown at the following locations:~~

~~a. As indicated by the Survey Advisor on the Contract Drawings scheduled in Appendix H~~

~~b. Other .....~~

12.5. New Mapping

12.5.1. All surveyed detail specified in Clause 7 shall be represented as specified in Clause 12.7.

~~**12.5.2.** Contours shall be plotted at ..... mm vertical intervals with every ....m contour shown as a double thickness line. The value of the contours shall be shown at distances along the contour of not more than ..... mm. Where contours are very close together, values shall only be shown on thickened contours.~~

~~**12.5.3.** In flat areas where the distance between contours is likely to exceed ..... mm additional spot heights shall be shown at the following locations:~~

~~a. As indicated by the Survey Advisor on the Contract Drawings scheduled in Appendix H.~~

~~b. Other .....~~

12.6. Underground Services

12.6.1. Where drawings of underground services are required they shall be grouped as follows:

~~a. Each service shown on a separate sheet~~

b. All services shown on the same sheet

c. Building and Civil Engineering (B and CE) services (foul and storm water sewers, water) shown on the same sheet

d. Mechanical and Electrical (M and E) services (gas, electricity, telecommunication, etc) shown on the same sheet

~~e. Other .....~~

12.7. Plan Presentation

12.7.1. Levels, contours and underground services information shall be shown as follows:

Feature	On detail sheet	As separate drawing	In full tone on half tone detail sheet	As overlay
Levels	✓			
Contours	✓			
Services	✓			
.....				

~~**12.8. Noise Evaluation**~~

~~**12.8.1.** Levels for noise evaluation shall be added to unmarked copies of the Contract Drawings specified in Clause 4.12 at the positions stated in Clauses 9.2 and 9.4.~~

~~**12.8.2.** For clarity, levels shall be prefixed GL, EL or RL for ground level, eaves level and ridge (or roof) level respectively.~~

12.9. Existing Structures

12.9.1. The plan position of the structure and any floor plans required shall show the features specified in Clause 11.2.2.

12.9.2. Elevations shall show the features and defects specified in Clause 11.2.2. They shall be clearly annotated to describe the elevation.

12.9.3. Sections shall be compiled from the plans and elevations. They shall be designated as Section A-A' etc and the line of the section shall be clearly indicated on the plan.

12.9.4. Dimensions, levels and coordinates of key features shall be shown on the plan survey and elevations as specified by the Survey Advisor.

13. PRESENTATION OF DIGITAL DATA

13.1. Introduction

13.1.1. The supply of digital data can be relatively straightforward, or potentially complex. This Clause assumes the Design Organisation is obtaining data for an established modelling / CAD system, and that major facets of the design and implementation are therefore explicitly defined. Completion of the options in this Clause and in Appendix S which gives feature descriptions shall satisfy this requirement. Where the Design Organisation has developed its own system, or is not using a pre-defined system, guidance is given on areas of relevance. Definitions used in this Clause are defined in Appendix T.

13.2. Purpose of Data and Basic Data Structure

13.2.1. When digital data is the end product of a geodetic survey, the general requirement is for one or more of three purposes: a digital terrain model, a cartographic model, or a geographic model. While there is information common between the three models, it is often impractical to contain all information in one data set. The model(s) required for this Project are as follows:

Digital Terrain Model (MX)

Cartographic Model (AutoCad)

13.3. Data Classification

13.3.1. Data Modelling

13.3.1.1. If the classification is not pre-defined by the modelling / CAD system in use by the Design Organisation, and selected for the supply of data, it will be necessary to establish a data model. The basic requirements of such a model and the associated record definition are described in Appendix T.

13.3.2. Data Set Grouping

13.3.2.1. Subject to the physical constraints noted in Clause 14.2, the transfer set shall be one of the following:

~~a. A single logical data set containing all features~~

b. Supplied in 1 data set, the grouping of data for each set being as identified in the Feature Code Table in Appendix S.

13.4. Data Structure

13.4.1. Data Format

13.4.1.1. The data shall be compatible with one of the following:

a. Modelling / CADsystem MX Road V8i
Version AutoCad (2010/LT 2010

b. Transfer / exchange format
.....
(i) MX in Genio
(ii) AutoCad as Dwg File (2010) with 3d points as blocks,
(iii) AutoCAD Civil 3D ASCII and CSV point files in PNEZD format

13.4.2. Geometric Definition

13.4.2.1. If features are not described by Clause 13.4, it will be necessary to supply a data model and record definition, the general requirements for which are described in Appendix T. This shall include the following:

a. Coordinates in metres to the accuracy defined in Clause 3, GENERAL REQUIREMENTS.

b. Unique junction points

c. Crossing, or 'T' unique junction points between similar features

~~d. A permitted level of data redundancy not exceeding ..... %~~

e. A distance between two adjacent points on the same feature of not less than ..... metres, except where the points, such as short returns, are

essential to accurately define the shape.

f. A default text alignment ~~either~~ parallel to the general alignment of the survey ~~or East-West.~~

~~**13.4.2.2.** Height information which is not required as discrete surveyed points (spot heights), or is not a height value of planimetric data, shall be defined as follows:~~

~~a. Digital contours (continuous 2-D feature with height attribute)~~

~~b. A digital terrain model with points at ..... metre spacing, normal to the nominal grid, with height supplied in metres to ..... decimal places~~

13.5. Presentation

13.5.1. Data Representation

13.5.1.1. If presentation drawings are required, the product shall be defined in Clause 12, PRESENTATION OF DRAWINGS.

13.5.2. Symbols

13.5.2.1. The symbol references shall be as defined in the feature code table given in Appendix S.

13.5.3. Coverage

13.5.4. Each data set shall be one of the following:

a. A single logical data file, the limits of which cover the survey area

b. ~~A series of files with geographical boundaries as defined in Appendix R~~.

13.6. Proofs

13.6.1. Any proofs required in this Clause are concerned with completeness of the digital data and are only to examine content, coding, etc.

13.6.2. Proof drawings or prints, which have not been retouched, shall be made from each data set(s), in the groups defined in the feature code table in Appendix S. Proofs shall be supplied on paper or other suitable media.

13.6.3. The Survey Advisor may require colours or extra plots to be produced to discriminate between the main features of each grouping. The data proofs may be either to any convenient sheet size or as defined in Appendix Q.

13.6.4. Overlaps and border information are not required. The project grid shall be plotted, and where relevant shall be aligned to the National Grid. If several proof plots are supplied, a simple index diagram shall be included.

13.7. Data Integrity

13.7.1. There are three elements to data integrity; physical, logical and data validity. Many modelling / CAD systems validate some, or all of these elements on reading data into the system.

13.7.2. Where this is not the case, the Design Organisation may find it appropriate to consider the use of validation software. Areas to be considered, if such an option is adopted, are identified in Appendix U.

13.8. Additional Requirements

13.8.1. All text strings to be contained in a separate model.

13.8.2. The following features shall be surveyed as continuous strings:

a. Top and Bottom of kerb (channel lines)

b. Edge of carriageway

c. Lane lines

d. Centre lines

e. Change in cross fall / crown lines

f. Top of safety barrier

14. PRODUCTS TO BE DELIVERED

14.1. Drawings

~~**14.1.1.** All transparencies, unless otherwise agreed by the Survey Advisor, shall be supplied with the image printed in a positive form on dimensionally stable material with matt surfaces. They shall be produced either by digital methods or by acceptable flat bed processes.~~

~~**14.1.2.** Master transparencies shall be forward reading and plotted on material not less than ..... mm thick. Duplicate transparencies shall be reverse reading and plotted on material not less than ..... mm thick.~~

14.1.3. The number of copies of drawings required shall be as specified in the following table:

	Preliminary Drawings	Final Drawings
Advance transparencies		
Master transparencies		
Duplicate transparencies		
Paper plots		
Dyeline copies		

14.1.4. Two sets of proof plots of the final drawings shall be sent to the Survey Advisor, who shall return one set within 5 working days with any amendments required to be incorporated in the final drawings.

14.1.5. The approved Final Drawings shall be retained by the Contractor for a period of one year from the issue of the final certificate (Clause 31 Conditions of Contract), during which time they shall be made available to the Survey Advisor on request. At the end of the one year period the Final Drawings shall be delivered to the Employer unless otherwise directed.

14.2. Digital Data

14.2.1. Media Type

14.2.1.1. Data shall be supplied on the following:

a. Medium ..... **external flash drive**

b. Size .....

c. Capacity .....

d. Compatibility with operating system .....

e. Version / revision Windows 7

14.2.2. Coverage

14.2.2.1. When writing data sets to the medium, the files shall comply with the following:

a. ~~Span several volumes with the media sequentially numbered~~.

b. Not span the media volumes, the data files being split as necessary with each containing correct headers and terminators.

14.2.3. Annotation

14.2.3.1. Where multiple media and/or multiple data sets are supplied, the Survey

Contractor shall supply a list of all media, stating individual contents.

14.2.3.2. Each media item shall be individually labelled with the Project title, reference number, and date. In addition each item shall be uniquely referenced in the form 'Item 1 of 9'.

14.3. Final Report and Schedules

14.3.1. The final report shall be typed and bound. It shall describe the methods, techniques and equipment used in the survey, the parameters used in the transformation from the National Grid and the closing errors in both the plan and level nets and in the connections to Ordnance Survey control. Where the Ordnance Survey control is proved to be out of tolerance the course of action agreed with the Survey Advisor shall be stated.

14.3.2. The report shall also include the following:

a. A schedule of PGMs showing reference number, National and local grid coordinate and level related to project datum.

b. A schedule of PBMs showing reference number, level related to project datum and coordinate to the nearest metre.

c. Station descriptions of all PGMs and TBMs showing the type of marker, a location sketch with reference to permanent points of detail, coordinate and level

d. A diagram of the plan control showing all connections within the net and to Ordnance Survey control (if used) with an indication of the accuracy of closures

e. A diagram of level control showing all connections between PGMs, TBMs and Ordnance Survey Bench Marks (if used) with misclosures

f. Copies of Ordnance Survey Triangulation Station descriptions for all stations used in the survey

g. Copies of Ordnance Survey Bench Mark lists showing Bench Marks used, missing, damaged or out of tolerance

14.3.3. All source survey information shall be safely retained by the survey contractor for a period of three/ ..... years from the date of completion of the contract.

15. REFERENCES

1. Health & Safety at Work etc Act 1974.

2. Construction Products Directive. (89/106/EEC).

3. **BS EN 471 : 1994 -British Standards Institution**
Specification for high visibility warning clothing.

4. Traffic Safety and Control (Traffic Safety) Measures - Chapter 8 of the Traffic Signs Manual.

BIBLIOGRAPHY

1. National Joint Utilities Group (NJUG) - Quality Control Procedures for Large Scale Ordnance Survey Maps digitised to 1988. NJUG Publication No13

APPENDIX A

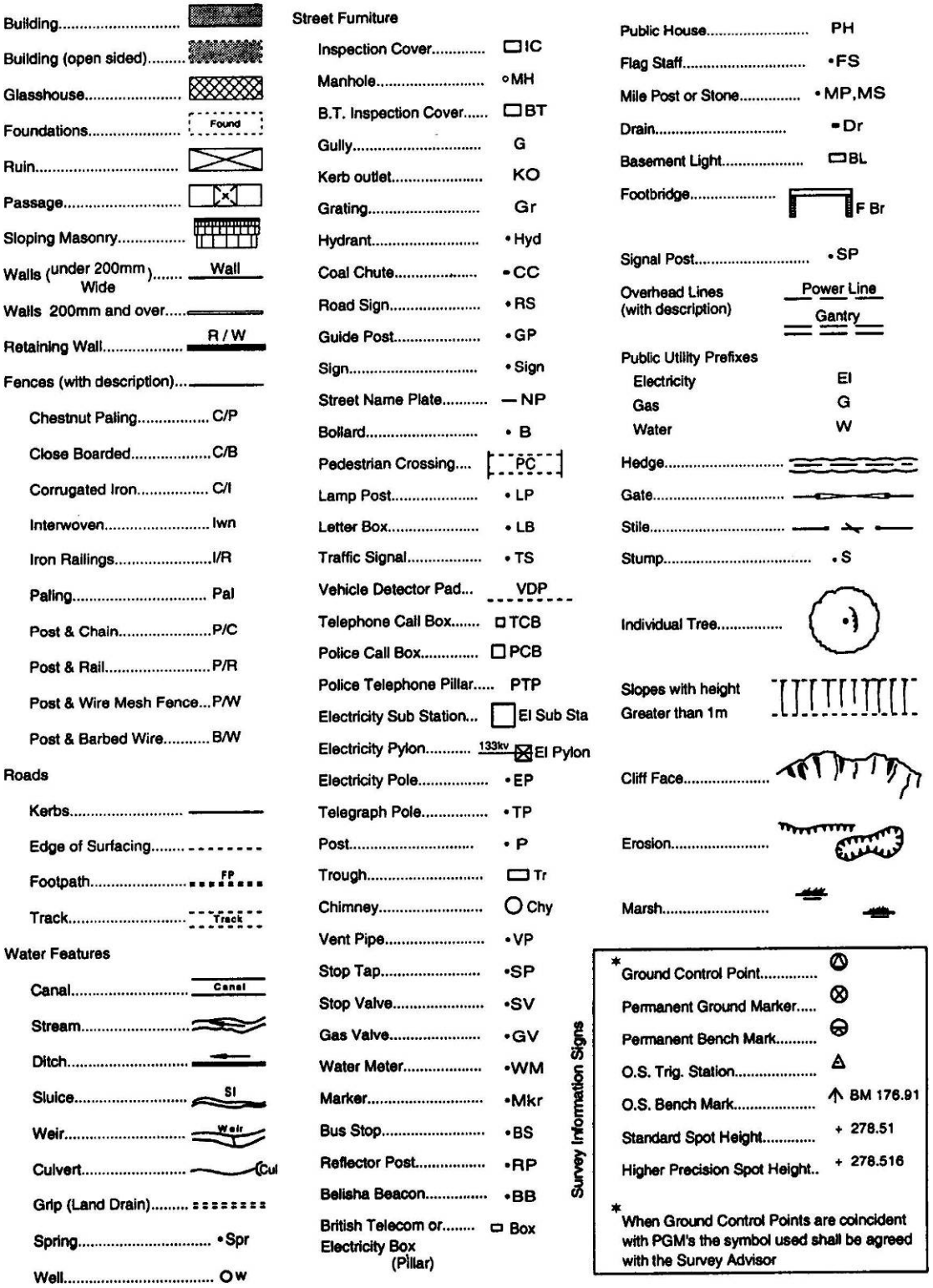
SCHEDULE OF LANDOWNERS AND OCCUPIERS

Location 1 –

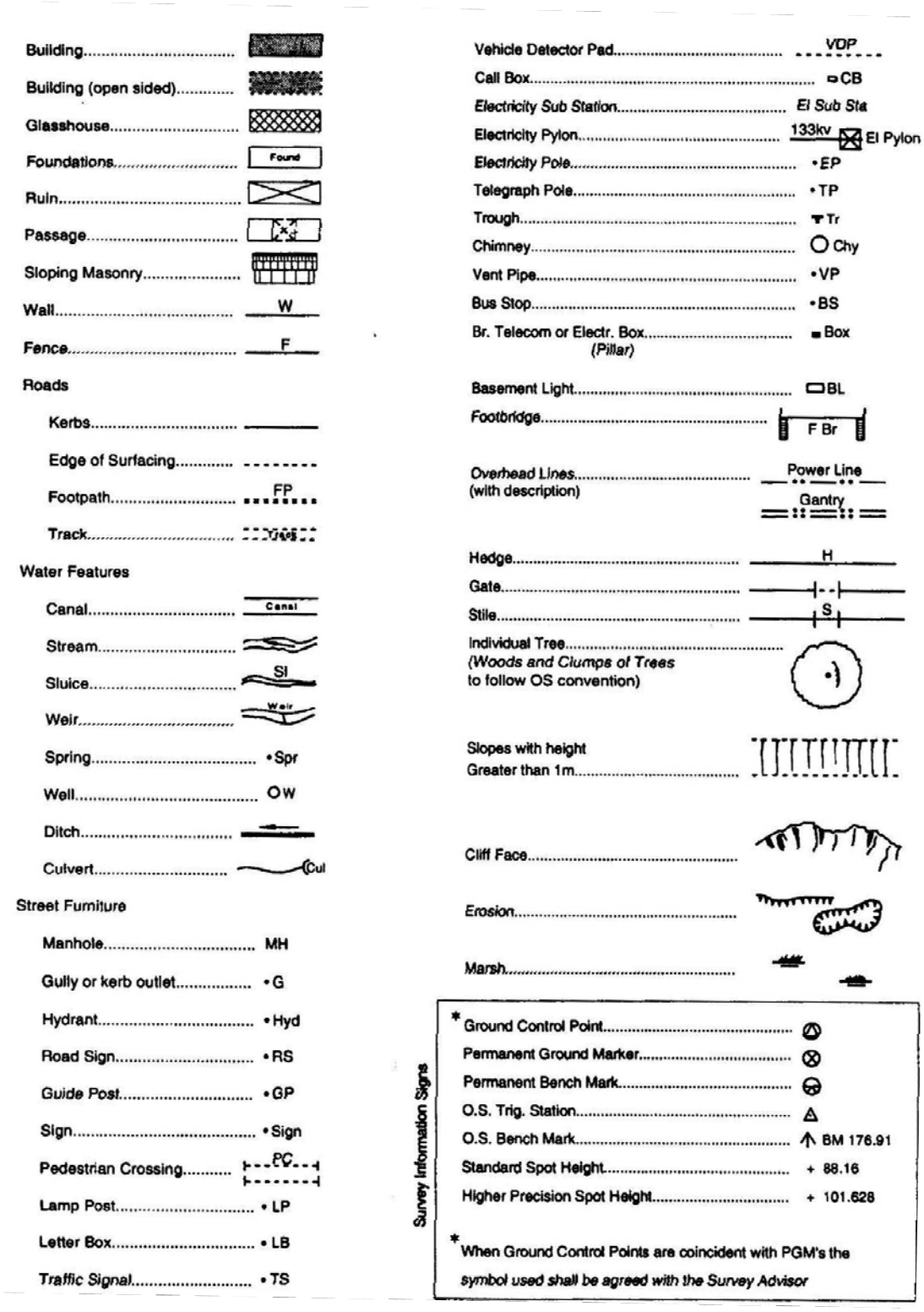
Plot number	Name, address and telephone number	Status	Permission to enter land given to/date
1	Secretary of State for Transport of Great Minster House 76 Marsham Street London SW1P 4DR Tel: 020 7944 3000	Owner	

TABLE OF FEATURE SYMBOLS

Conventional Feature Symbols to be used for 1:500 Scale mapping.



Conventional Feature Symbols to be used for 1:1000, 1:1250, 1:2500 & 1:10 000 Scale mapping.



be Detail Signs to used for 1:1000 Scale mapping

REQUIREMENTS FOR TRAFFIC SAFETY AND MANAGEMENT

Traffic Safety and Control (Traffic Safety) Measures

"When surveying work is being carried out on or close to an existing highway, the Contractor shall display suitable warning signs in accordance with Chapter 8 of the Traffic Signs Manual".

"Where work is carried out on or adjacent to a highway open to vehicles the Contractor shall ensure that the work force and site supervisory staff at all times wear high visibility warning clothing as specified in BS EN 471 : 1994.

Location 1 – A5 Bittesby

Road name and reference number	Special requirements	Required by
A5 Bittesby	Undertaken within the drainage works traffic management provisions	Highways England

RESTRICTIONS TO THE SURVEY PROGRAMME

Location – A5 Bittesby

Plot number	Details of known restrictions to the survey programme	Restriction required by
	none	HE

SCHEDULE OF CONTACTS

Organisation	Address, telephone and fax numbers	Name and position or rank of individual contacts
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

SCHEDULE OF EXISTING INFORMATION ON UNDERGROUND SERVICES

REPRESENTATION OF UNDERGROUND SERVICES CONVENTIONS

Where the Design Organisation or Survey Advisor is responsible for compiling the schedule of underground services, the linestyles and abbreviations shall be depicted in the following manner:¬

Drainage (Foul)		——— > ———
Drainage (Storm)		——— > ———
Water Main (Fresh)	O/H	——— | ———
Water Main (Fresh)	U/G	——— | ———
Water Main (Salt)	O/H	——— SW ———
Water Main (Salt)	U/G	——— SW ———
Central Heating	O/H	——— CH ———
Central Heating	U/G	——— CH ———
Hydraulic Main	O/H	——— H ———
Hydraulic Main	U/G	——— H ———
Gas Main	O/H	——— G ———
Gas Main	U/G	——— G ———
Compressed Air	O/H	——— CA ———
Compressed Air	U/G	——— CA ———
Fuel Pipe	O/H	——— FP ———
Fuel Pipe	U/G	——— FP ———
Steam Pipe	O/H	——— S ———
Steam Pipe	U/G	——— S ———
British Telecom	O/H	——— T ———
British Telecom	U/G	——— T ———

Electricity Cable	O/H	———	√	———
Electricity Cable	U/G	———	√	———

ABBREVIATIONS

AAV	Automatic air valve
Abnd	Abandoned
(AC)	Assumed connection
AC	Asbestos cement
a/g	Above ground
AG	Air grating
AGL	Airfield ground lighting
ALK	Alkathene
(AR)	Assumed route but proved connection
AV	Air valve
B	Bollard
B&CE	Building & civil engineering
BB	Belisha beacon
Bd	Backdrop
BIG	Back inlet gully
BL	Bed level
BT	British Telecom
CA	Compressed air
CC	Control cable
CCTV	Closed circuit television
CE	Cleaning eye
CH	Central heating
CI	Cast iron
CJ	Cable joint
CL	Cover level
CM	Cable marker (low Cable on wall)
CP	Catch pit
CPP	Cathodic protection point
CR	Cable riser
Cul	Culvert
CV	Control valve
CWS	Cold water service
d	Approx depth of service
D	Diesel
DFL	Duct floor level
DH	Divisional hydrant
DI	Ductile iron
dis	Disused
DL	Duct level
DLB	Disused light base
DM	Domestic main
DP	Downpipe
DrC	Drainage channel
DSS	Distribution sub- station
DT	Disconnection trap
ECM	Electric cable marker
ECP	Electric cable pit
ECR	Electric cable riser
EDB	Electric distribution board
EH	Escape hatch
EHV	Extra high voltage
EL	Effluent level
EM	Electricity meter
EP	Electric pole
EPT	Earthing point
ER	Earthing rod

ABBREVIATIONS (Cont'd)

ET	Electronically traced
EWS	Emergency water supply
FA	From above
FA	Fire alarm
FAI	Fresh air inlet
Fb	From below
FD	French drain
FFP	Fuel fill point
FH	Fire hydrant
FHO	Fuel hydrant outlet
FHPM	Fuel high point marker
FL	Floor level
FLt	Flood light
FLM	Fuel line marker
FLPM	Fuel low point marker
FM	Fire main
FP	Feeder pillar
FPR	Fuel Pipe riser
F&R	Flow & return
G	Gully
GC	Gas cock
GM	Gas meter
GP	Gully pot
GPP	Gas protection point
GPR	Gas pipe riser
GS	Gas syphon
GT	Grease trap
GV	Gas valve
HB	Hand basin
HBL	Hatch box level
HD	Heating duct
HL	High level
HP	Heating pipe
ht	Height
HV	High voltage
HW	Head wall
HWS	Hot water service
IC	Inspection chamber
IL	Invert level
IT	Interceptor trap
K	Kerosene
KO	Kerb outlet
L	Light
LB	Link box
LD	Land drain
LDU	Link disconnecting unit
LH	Lamp hole
LHP	London hydraulic power
LL	Low level
LP	Lamp post
LPG	Liquid petroleum gas
LV	Low voltage
MC	Mercury Communications
M&EE	Mechanical & Elect Eng
MH	Manhole
Mkr	Marker
NFI	No further information
NIC	Not in commission
o/h	Overhead
OL	Obstruction light
OT	Oil trap

ABBREVIATIONS (Cont'd)

Pd	Depth to top of pipe
PDC	Power distribution console
Pe	Polyethylene
PE	Pot end
POL	Petrol oil lubricants
PP	Pressure point
PR	Pipe riser
PRV	Pressure reducing valve
PVC	Polyvinyl chloride
(r)	From records
Rad	Radiator
RE	Rodding eye
RG	Road gully
RMU	Ring main unit
RWP	Rain water pipe
RWS	Rain water shoe
RV	Reflux valve (non return)
SA	Soakaway
SC	Stop cock
SD	Sump depth
SE	Side entry
SI	Spun iron
SL	Sump level
Sof.D	Soffit depth
Sof.L	Soffit level
SP	Stand pipe
Spr	Sprinkler
ST	Stop tap
StB	Strobe beacon
StL	Strobe light
SV	Sluice valve

SCHEDULE OF FINAL DRAWINGS

Schedule of Drawings, Scales & Sheet Sizes

SCALE	SHEET SIZE	REMARKS
1/500	A0 (841mm, 1189mm)	An A0 frame will be provided in either dwg/dxf format, to indicate the available plotting area
1/200	A0 (841mm, 1189mm)	For existing under and over bridge details.

DEFINITIONS FOR DIGITAL DATA

This Appendix concerns the transfer of digital data from the Survey Contractors system. To avoid ambiguity, the following definitions shall apply.

Attribute

Characteristics and/or descriptions attached to a feature. A feature may have none, or many attributes.

Cartographic Model

A data set, the primary requirement of which is to produce a graphic output. Coding is often limited to information for drafting purposes, such as line or symbol type, and often includes data such as grid and border, titles etc.

Clean Data

A data set with unique junction points.

Data Set

A part of a transfer set which may be homogeneous (ie a noise survey data set), or a geographical subset.

Digital Ground or Terrain Model (DGM or DTM)

A data set usually representing the ground surface (ie 'bare earth', excluding buildings). The model is most often defined by a regular grid of 'posts', each of which has a height. Additional data may include break lines to record heights for definite changes of slope.

Feature

A point or line defined by two or three dimensional coordinates. By definition, a point has no dimensions but may require an orientation and/or scale attribute for output as a symbol. Curves are features defined by a series of straight lines, or a series of points with a regular or complex curve attribute.

Field

A field is a unique unit of data, eg a height coordinate field.

Geographic Model

A data set which explicitly includes the relationships (topology) associated with the geometry. It will sometimes include attributes which are not spatial (ie ownership). This form of model is most suitable for analysis in a geographical information system.

Headers and Terminators

The first and last records of a data set. They usually contain information to explicitly identify the start and finish of a data set.

Null Height

A height entry which is interpreted as no value. Usually an impossible value such as -999 m.

Record

A logical group of fields which is written with a terminator character.

Symbol

A graphic representation of a feature (usually a point). Not usually inherent in the data themselves, but a result of interpretation by the processing software and/or definition by the user.

Transfer Set

The complete data for the project, including supporting information.

Unique Junction Points

Clean data occur when any junction point has only one set of coordinates (2 or 3-D as appropriate): ie in graphic terms there are no under- or over-shoots. Normally, points will only be added to create a 'crossing' or 'T' junction where one would sensibly occur to complete a polygon (such as a fence and wall etc). A junction would be illogical between a river and fence, or an overhead line and road.

Volume

A physical item of media. A transfer set may be written to several volumes.

Specification Clause 1.3.6

LIST OF ADDITIONAL CLAUSES OR FIGURE NUMBERS

Specification Clause No.	Specification Clause Heading
3.6.6	GENERAL REQUIREMENTS - General
13.8	PRESENTATION OF DIGITAL DATA - Additional Requirements

Specification Clause 1.3.7

LIST OF CANCELLED CLAUSES OR FIGURE NUMBERS

Specification Clause No.	Specification Clause Heading
5.1.1.a	Project Control Requirements
5.1.1.f	Project Control Requirements
5.2.2.1.b	Location of Permanent Ground Markers
5.2.4.1.a	Survey Grid
5.2.4.1.a	Survey Grid
5.2.4.2.b	Survey Grid
5.3.4.3	Datum
6	REVISION OR UPGRADING OF EXISTING MAPPING
7.2.6	Railways
7.3.3.b	Accuracy
8	AERIAL PHOTOGRAPHY
9	SURVEYS FOR NOISE EVALUATION
11	EXISTING STRUCTURES
11.2.2.b	Defects
12.2.3.a	Drawing Format
12.2.3.b	Drawing Format
12.2.3.d	Drawing Format
12.4	Revision or Upgrading of Existing Mapping
12.5.2	New Mapping
12.5.3	New Mapping
12.6	Underground Services
12.8	Noise Evaluation
13.3.2.1.a	Data Set Grouping
13.4.2.2	Geometric Definition
13.5.4.a	Coverage
14.1.1	Drawings
14.2.2.1.a	Coverage
Appendix J	CONSTRUCTION OF PERMANENT GROUND MARKERS
Appendix K	LOCATION OF PERMANENT GROUND MARKERS
Appendix L	CONSTRUCTION OF PERMANENT BENCH MARKS
Appendix M	LOCATION OF PERMANENT BENCH MARKS
Appendix N	FLIGHT PLAN FOR AERIAL PHOTOGRAPY
Appendix S	FEATURE CODING SCHEME FOR GEODETIC SURVEYS
Appendix T	SYMBOL DEFINITIONS FOR OUTPUT
Appendix U	DATA INTEGRITY VALIDATION

Specification Clause 1.3.8

LIST OF AMENDED CLAUSES OR FIGURE NUMBERS

Specification Clause No.	Specification Clause Heading
2	PURPOSE AND SCOPE
2.1	Location
2.2	Aim of the Project for which the Survey is Required
2.3	Aim of Survey
2.5	Use of Survey Information
3	GENERAL REQUIREMENTS
3.3.2	Control
3.5.3	Presentation
3.6.1	General
4	PROJECT INFORMATION
4.1.1	Client
4.2.1	Design Organisation
4.3.1	Survey Advisor
4.6.1	Landowners and Occupiers
4.6.2	Landowners and Occupiers
7	NEW MAPPING
7.2.4.1	Roads, tracks and Footpaths
7.2.5.1	Street Furniture and Visible Service Features
7.2.7.1	Water, Drainage and Coastal Features
7.2.9.1	Woods, Trees and Recreation Areas
7.2.12.1	Spot Levels
7.3.1	Accuracy
7.3.2	Accuracy
7.3.4	Accuracy
7.4.1	Definition
7.4.3	Definition
10	UNDERGROUND DERVICES
10.5	CCTV Surveys
12	PRESENTATION OF DRAWINGS
12.2.3	Drawing Format

Specification Clause No.	Specification Clause Heading
12.2.4	Drawing Format
12.7.1	Plan Presentation
13	PRESENTATION OF DIGITAL DATA
13.2.1	Purpose of Data and Basic Data Structure
13.3.2.1	Data Set Grouping
13.4.1.1	Data Format
13.4.2.1	Geometric Definition
14	PRODUCTS TO BE DELIVERED
14.2.1.1	Media Type