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Electronic Transfer of Geotechnical Data from Ground Investigations

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Foreword

The product of all geotechnical investigations is data on which to base decisions on future action and develop safe and efficient designs. The scale and complexity of projects as well as pressures to undertake such work in the shortest possible time has already led to the use of computers for data preparation and analysis, although the roles of the various components of the investigation process have meant significant duplication of effort in transferring data to and from a printed interface.

This document seeks to facilitate electronic transfer and storage of data in the context of many existing but differing computer software systems, but does not aim to displace the status of the printed report. By adopting the conventions which it sets out, the industry should rapidly be able to implement electronic data transfer at minimal extra initial cost and bring long term benefit to itself, its clients and the public at large.

Leonard Threadgold
Working Party Chairman

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1 INTRODUCTION

In recent years computer technology has advanced considerably. This has resulted in computers with better facilities and larger capacities, at a cost which makes them available to even the smallest practitioners in the field of geotechnology. As a consequence, database systems have been adopted by the producers of geotechnical data for the efficient preparation and presentation of reports in printed format. Receivers who wish to make use of their own software for study and analysis of the data have generally re-entered it into their system. Clearly, the transfer of such data by electronic means without the need for a printed interface would help to minimise costs, time and the potential for error and encourage better use of the data. To achieve this, however, it is essential that the receiver's software can understand the format used by the producer.

It must be recognised that there has already been a proliferation of systems which differ both in form and purpose even though much of their contents are common. There is therefore an urgent need for the establishment of a common Data Interchange Format which can be accepted by all the components of the industry as being appropriate to preparation, analysis and storage. Recognition of this by the Association of Geotechnical Specialists (AGS) led to the holding of a seminar in June 1991 and subsequently to the setting up of a working party to establish such a format, the outcome of which is embodied in this document.

The format has been designed to ensure that implementation in relation to existing software should require only relatively minor programming work. New systems should embody the format from inception. Once in place each system should be capable of interfacing with any other system using the same format.

In addition to the obvious benefit in relation to data transfer, the common Data Interchange Format allows both producers and receivers to use their own familiar forms and facilities and hence aids the implementation of quality assurance procedures. Storage and access to the data is rendered far more efficient and the establishment of data banks by producers, receivers and national bodies is facilitated.

2 SCOPE

The transmission by electronic media of most of the data currently presented in Factual Reports, including Borehole Records, Trial Pit Records, In Situ Test Data and Laboratory Test Summaries, is considered a realistic objective but the transmission of **all** data, particularly from more complex testing, is not covered by this document.

Although the ability to record the descriptive introductory elements of a report on electronic media may be considered desirable in order to provide compact storage, word processor functions such as tabulations, underlining and fonts could not be reproduced without the use of identical word processing packages by both preparer and receiver. It must be remembered that the primary aim of this document is to aid the transfer of data and to allow its ready manipulation. This function is considered inappropriate to the descriptive elements of a report. The printed copy remains the definitive document and the data presented on electronic media supplements this in a far more flexible form. Whilst the development of computer and scanning technology may render inclusion acceptable in the future, the reproduction of the descriptive section in electronic format currently lies outside the scope of this document. Similarly the transmission of drawings by electronic means is not covered.

3 PRESENTATION

This document presents the Geotechnical Data Interchange Format which should be adopted in conjunction with software used for the preparation of geotechnical data, its analysis and storage. It explains the concepts which have been used in preparing the format and the way in which it can be implemented in relation to future projects. The structure of data files is outlined and examples presented. Management of the system including Specifications, Preliminary and Final data is illustrated together with aspects such as file security and the maintenance of a single contact for the evolution of Data Dictionaries to accommodate

new technology as it becomes readily available.

A disk containing an example of a Data Interchange File, which may be used as a benchmark, and the Data Dictionary accompany this document.

4 CONCEPTS

4.1 Base Data

In general, the files which are used should contain basic data such as exploratory hole records and the test data required to be reported by the relevant British Standards and other recognised documents and which would normally be contained within a Factual Report. Any interpreted data can be handled by the particular program being operated but this is a matter for the user rather than for any fundamental database structure.

4.2 File Format

The file format is intended to provide the widest possible level of acceptance and in view of this it is considered that the data should be transmissible using ASCII files, MS-DOS version 3.2 and IBM compatibility. The rules for creating Data Files are presented in Appendix 1. They have been drawn up to enable the use of the AGS Format by the simplest existing programs, in particular spreadsheets, as well as more comprehensive database systems.

4.3 Data Dictionary

In order to provide maximum flexibility and to allow the file formats to be more easily recognised by the non-specialist, it is considered that the Data Dictionary approach for the various elements of the database should be adopted. Such a Data Dictionary can be compatible with a wide range of existing programs and should aid the structuring of future software.

4.4 Groups and Fields

In order to structure the data in a consistent and logical manner it has been divided into Data Groups within which a series of Fields are defined. The Data Groups have been chosen to relate to specific elements of data which are obtained, such as project information, exploratory hole details and strata details. For data of a more complex nature it may be necessary to define two or more Data Groups.

Fields within each Data Group identify specific items such as stratum description, sample depth etc. They have been defined as having the status of **KEY, COMMON** and **ADDITIONAL.**

Key Fields are necessary in order to define the data unambiguously. All Key Fields associated with each Data Group must therefore be present.

Common and Additional Data Fields are of the same basic type, but whereas it is envisaged that the Common Fields are likely to be required in most investigations, Additional Fields may also be required in particular circumstances. It is envisaged that the Additional Fields required will be specified on a job by job basis. It has also been recognised that complete Data Groups may be defined as "Additional" and these are listed in Appendix 3.

The Additional Fields and Data Groups listed are by no means complete and it is envisaged that the Data Dictionary will expand to incorporate other areas.

An illustration and discussion of the significance of the data file structure and Key, Common and Additional Fields is given in Figure 1.

4.5 Units

Details of the default units to be used for each of the Data Fields are given in Appendices 2 and 3. These are the preferred units for each of the data dictionary definitions and should be used wherever possible. They will either be the appropriate SI units or the unit defined by the particular British Standard relating to that specific item of data.

It is recognised that situations will occur where neither the SI unit nor the British Standard unit are being used. Provision is made for these non-standard data units to be declared in the data transfer file. Reference should be made to Appendix 1 for the appropriate data format rules relating to non-standard units.

5 FILE SECURITY

5.1 Labelling

Clear labelling of media and conventions for its security and management are vital to the implementation of a practical system. These aspects are dealt with in Appendix 4.

5.2 Virus Protection

The transfer of data between computer systems can render the data vulnerable to attack by a virus. A computer virus is a program that is loaded and executed without the knowledge of the computer user. The virus hinders the operation of the system or damages or destroys program and data files. Many virus programs are able to replicate and spread within a system making them very difficult to eradicate. Most virus programs attach to program files but it is possible for data files to be affected also. The risk of transfer of a virus would be reduced by precluding executable files from the data disk.

The checking of disks for the presence of virus programs is done by proprietary virus scanning programs of which there are a number commonly available. A virus checker should be used by the Producer of the data to scan each data transfer disk prior to despatch and also by the Receiver of the disk before using it.

6 PRELIMINARY AND FINAL DATA

The data files are structured in order to allow presentation of preliminary data and up-dating during the course of a project prior to issue of the final data. Preliminary data in electronic format can be useful on major projects where design is undertaken during the period of the geotechnical investigation and this is dealt with in the Specification clauses of this document. However, the need for this facility needs to be very carefully considered by the receivers before including it in their specifications since it will require the imposition of rigorous management procedures. The highlighting of changes in data is considered to pose major problems and hence preliminary data should be replaced by subsequent data and not merely updated by it. Where the highlighting of changes is required, this should be a facility incorporated in the receivers' software. This does not preclude submission of parts of the data on separate discs but the Producer must ensure that the data within all separate issues are compatible, and that updates are carried through all sub-sets of the data. Each issue must be given a unique issue sequence number.

7 MANAGEMENT

In order to provide a framework within which the data can be used, it is necessary to have specifications which fall into the following categories:-

National Specification
General Specification
Particular Specification

The National Specification identifies the requirement for digital data whilst examples of General Specification clauses and Particular Specification clauses are presented in Appendix 5.

8 HARDWARE

The data interchange format has been selected to maximise flexibility in the choice of hardware which may be used by the various parties in the data-handling process. It is expected that in most cases, however, use will be made of stand-alone PC's but compatibility between the providers, receivers and storers is an essential element. A review of Interchange Facilities is presented in Appendix 6.

9 UPDATING

It is recognised that with the rapid development of technology and the concepts of how the data dictionary approach may be used, it will be necessary to establish a means of updating this document in coming years. Aspects such as the addition of further Data Groups or Fields or

the introduction of computer technology such as scanning and drawing systems and improvements in the hardware available will need to be accommodated. In order to facilitate this a Register of users will be maintained by the Association of Geotechnical Specialists and in order that users may be kept up to date with developments, a Registration Card is included in Appendix 7. This should be sent to the AGS so that users may be made aware of developments.

Problems in the use of this format may arise from time to time. In order to rationalise the process of clarification and, where necessary, modification in due course, a Software Report Form is included in Appendix 7. This should be used to bring any problems to the attention of the AGS.

Extensions to the Format will become necessary from time to time but any modification cannot be considered to comply with the AGS format until it has been approved by the AGS. Forms for seeking approval are included in Appendix 7.

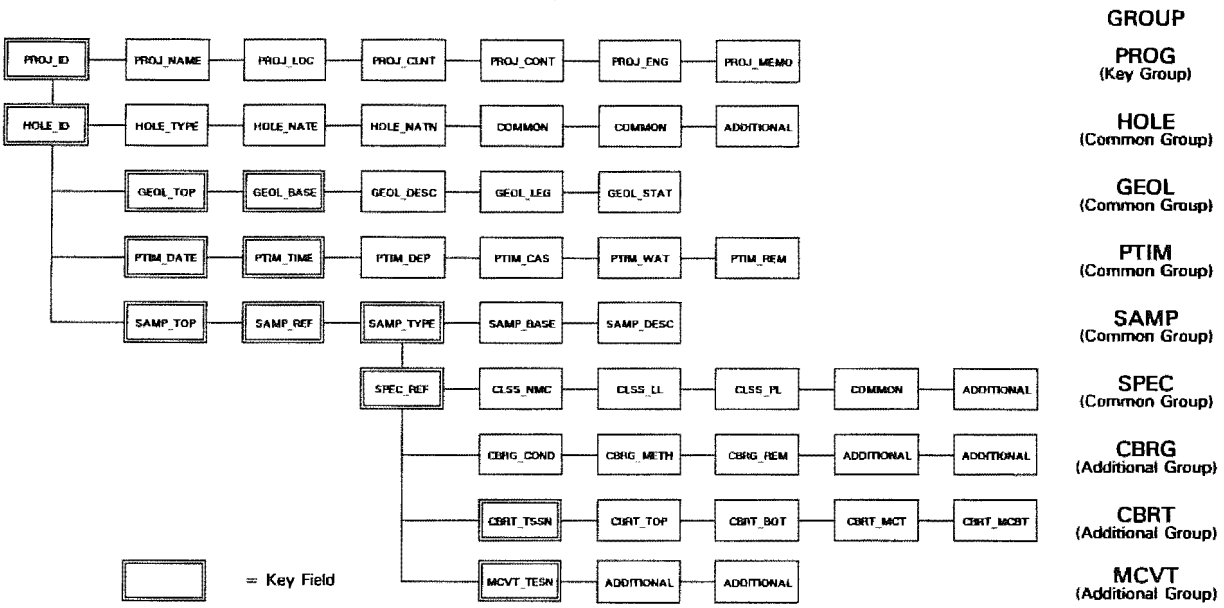
10 EXAMPLE AND BENCHMARK FILES

To provide guidance on the formulation of the data interchange format, an example of a series of typical data groups in ASCII format is given in Appendix 8.

A disk containing a full Data Dictionary listing, together with a benchmark file is also included within Appendix 8 to use when evaluating system compatibility. Use of this benchmark file cannot ensure full system compliance with this format but is intended to assist in the process.

FIGURE

1. Data File Structure



This Figure illustrates part of the data file showing its structure, the significance of the data Groups and the Key, Common and Additional Fields within them.

For example, to uniquely convey the information CLSS_PL (Plastic Limit) in Group CLSS (Classification Tests) it is necessary to include the project identification, the hole number, the sample reference, sample type and specimen reference (PROJ_ID, HOLE_ID, SAMP_TOP, SAMP_REF, SAMP_TYPE and SPEC_REF). The Key Field SPEC_REF is required to cover the situation where more than one test of a single type is undertaken on a sample.

Similarly to uniquely convey the stratum description GEOL_DESC in Group GEOL, it is necessary to include also the project identification, and hole number and the top and base of the stratum.

An exception to this general rule is that, as all data on a single disk relates to the same project, the Key Field PROJ-ID need only be included in the Group PROJ.

Some tests are covered by two groups where one group contains general test data and the other contains data appropriate to various stages of the test. This is illustrated in relation to the CBR test (Groups CBRG and CBRT).

The Group GRAD is an example of a group where the test results consist of more than one number (ie. percentage passing for each sieve size). An example data file for this group is included in Appendix 8.

FIGURE 1
DATA FILE STRUCTURE

APPENDIX 1

RULES FOR CREATING DATA FILES

THE RULES FRAMEWORK

Introduction

This Appendix sets out the Rules that define the Geotechnical Data Interchange Format (GDIF). The Rules have been the subject of much discussion and these notes seek to explain the overall framework within which they are formulated.

A fundamental consideration has been that potential users of the Format should be able to use standard software tools to produce the data files.

The spreadsheet is the most basic tool for the task, readily allowing data "tables" to be created and ASCII data files to be produced. Likewise, data files produced according to the Rules can be read directly by spreadsheet software.

Although the Rules make it possible for users to manipulate GDIF data files using spreadsheets alone, it is to be expected that more specific software will become available to automate the reading and writing of the data files. These software systems may range from simple data entry and edit programs through to complete database systems with data translation modules for GDIF files.

Another fundamental point to bear in mind when assessing these Rules is that the resulting data file has been designed to be easy for the computer to read. The data files do not replace the printed reports which they accompany. However the layout does allow data items to be readily identified should the need arise.

The following sections explain some points of detail in the Rules.

ASCII 'CSV' Files

The Rules define ASCII data files of a type commonly referred to as CSV (Comma Separated Value). This type of file is readily produced and read by many spreadsheet (and other) systems. The data items are separated by commas and are surrounded by quotes (").

Delimiters

The Rules allow any data field to contain text. Also, some countries use the comma in place of the decimal point. For these reasons ALL data fields must be surrounded by quotes. When inputting data to a spreadsheet, prefix all numeric entries with a quote. In this way all the data fields will be stored as text and CSV output will produce quotes around all items.

Note that most spreadsheet and database systems provide a VALUE( ) function (or similar) to convert text data to numeric data. This function can be used where calculations need to be carried out on data imported from GDIF files.

Key, Common & Additional Fields

The data fields defined by the Format fall into one of three categories:

KEY	fields must be included every time a data group appears in a data file.
COMMON	fields are those fields that are expected to be used in most data files.
ADDITIONAL	fields are those fields that are expected to be used less frequently.

Continuation Lines

The Rules define a scheme for producing continuation lines where there are long data fields.

Although the scheme may seem complex at first sight, it is the system automatically produced by spreadsheets if the long data items are continued on additional rows IN THE SAME DATA COLUMN. Similarly, these data files will read into spreadsheets and preserve the long data items in their correct column order, for any length of data. It should be noted that spreadsheets impose a finite limit (eg. 240) on the number of characters within a single data field.

The special <CONT> symbol will always be in the HOLE_ID field, and thus <CONT> should never be used as a HOLE_ID.

RULES FOR CREATING DATA FILES

The following rules must be used when creating a data interchange file.

1. The data file shall be entirely composed of ASCII characters. The extended character set may be used.

2. Each data file shall contain one or more data GROUPs. Each data GROUP contains related data.

3. Within each GROUP, data items are contained in data FIELDs. Each data FIELD contains a single data VARIABLE. Each line of the data interchange file can contain several data FIELDs.

4. The order of data FIELDs on each line within a GROUP is defined at the head of each GROUP by a set of data HEADINGs.

5. Data HEADINGs and GROUP names must be taken from the approved Data Dictionary.

6. The data HEADINGs fall into one of 3 categories:

   KEY/COMMON/ADDITIONAL

   KEY fields must appear in each GROUP. These are necessary to uniquely define the data. *HOLE_ID should always be the first field except in the "**PROJ" GROUP, where "*PROJ_ID" should be the first field.

7. All data VARIABLEs can contain any alphanumeric data (ie. both text and numbers). Numerical data should be in numerals. Eg. 10 not TEN. (See also DELIMITERS)

8. Data GROUP names, data field HEADINGs and data VARIABLEs must be enclosed in double quotes ("..."). Quotes within data variables should be represented by single quotes ('...').

9. The data field HEADINGs and data VARIABLEs on each line of the data file should be separated by a comma (,).

10. Each GROUP name shall be preceded by 2 asterisks (**).

    Eg. "**HOLE"

11. HEADINGs shall be preceded by 1 asterisk (*).

    Eg. "*HOLE_ID"

12. No line of data HEADINGs or data VARIABLEs shall exceed 240 characters. The character count should include delimiting quotes and commas.

    Eg. "*HOLE_ID","*HOLE_NATE" = 23 characters

13. A line of data HEADINGs exceeding 240 characters can be continued on immediately following lines. A data HEADING must not itself be split between lines. A comma must be placed at the end of a HEADINGs line that is to be continued.

    Eg. "*HOLE_ID","*SAMP_TOP","*SAMP_REF","*SPEC_REF",
    "*CLSS_LL","*CLSS_PL","*CLSS_PI"

14. A line of data VARIABLEs exceeding 240 characters can be continued on immediately following lines. Data VARIABLEs can be split between lines.

    A VARIABLE continuation line shall begin with the special name "<CONT>" in place of the first data VARIABLE. (PROJ_ID or HOLE_ID)

    The continued data is then placed in the correct field order by inserting the appropriate number of Null data VARIABLEs before it.

    Eg. "**GEOL"
    "*HOLE_ID","*GEOL_TOP","*GEOL_BASE","*GEOL_DESC"
    "501","1.2","2.4","Very stiff brown CLAY with"
    "<CONT>","","","extremely closely spaced fissures"

    (See also CONTINUATION LINES)

15. Null data VARIABLEs must be included as 2 consecutive double quotes ("").

    Eg. ,"",

    (See also DELIMITERS)

16. Data GROUPs can be repeated within a file with different HEADINGs.

17. The number of data HEADINGs per GROUP shall not exceed 60.

18. If non-standard units are to be used for any data VARIABLES in a group then a UNITS line must be placed immediately after the HEADINGS line.

    An entry must be made for each data VARIABLE. Null entries ("") must be used for data VARIABLES that are in standard units.

    The non-standard units must be entered between " ".

    The line must begin with the special name <UNITS> in place of the first data variable. (PROJ_ID or HOLE_ID)

    Eg. "**GEOL"
    "*HOLE_ID","*GEOL_TOP","*GEOL_BASE","*GEOL_DESC"
    "<UNITS>","FEET","FATHOMS",""

APPENDIX 2

DATA DICTIONARY
KEY AND COMMON DATA GROUPS

DATA DICTIONARY - KEY AND COMMON DATA GROUPS

Data Sets

This Appendix defines the data dictionary entries for the Key and Common data Groups with their associated data Fields.

The status of the individual data fields is shown by

Status	Symbol
KEY	*
COMMON	
ADDITIONAL	A

Data Units

The data units shall be those given in the appropriate British Standard pertaining to that particular item of data unless separately defined in a UNITS line. The data unit shall not be included in the ASCII data field.

Examples

Typical examples are given against most of the data fields to indicate the type of information which may be expected. They are not intended to be representative of any one soil and hence may not be mutually compatible.

Notes

1. Exploratory Hole Types

CP	Cable Percussion (shell and auger)
RC	Rotary Cored
RO	Rotary Open hole
W	Wash boring
IP	Inspection Pit
TP	Trial Pit/trench
OP	Observation Pit/trench
SCP	Static Cone Penetrometer
DCP	Dynamic Cone Penetrometer
DP	Dynamic Probe sampling
IRES*	In situ Resistivity
ICBR*	In situ CBR test
IDEN*	In situ Density test
IRDX*	In situ Redox test
IVAN*	In situ penetration Vane test
IP+CP+RC	Combined hole type, as appropriate

2. Sample Type

U	Undisturbed sample - Open drive
P	Piston sample
TW	Thin Walled push in sample
BLK	Block sample
CBR	CBR mould sample
D	Small Disturbed sample
B	Bulk disturbed sample
LB	Large Bulk disturbed sample (for earthworks testing)
C	Core sample
W	Water sample
G	Gas sample

3. Standard Penetration Test Type

S	Split Spoon
C	Cone

4. Soil Strength Test Types

UU	Unconsolidated quick Undrained (single specimen)
UUM	Unconsolidated quick Undrained (Multi-stage)
CD	Consolidated Drained
CDM	Consolidated Drained (Multi-stage)
CU	Consolidated Undrained with pwp measurement
CUM	Consolidated Undrained with pwp measurement (Multi-stage)
OTHR	Other eg. anisotropic consolidation, consolidated quick undrained

} Stress path plots

5. Grading Analysis Test Type

WS	Wet Sieve
DS	Dry Sieve
PP	Pipette
HY	Hydrometer

KEY GROUP

Project Data

Group Name : PROJ		- Project Information		
Status	**Heading**	**Unit**	**Description**	**Example**
*	**PROJ_ID**		Project identifier	6421/A
	PROJ_NAME		Project title	Acme Gas Works
	PROJ_LOC		Location of site	London Road, Croydon
	PROJ_CLNT		Client name	Acme Enterprises
	PROJ_CONT		Contractors name	Acme Drilling Ltd
	PROJ_ENG		Project Engineer	Acme Consulting
	PROJ_MEMO		General project comments	

COMMON GROUPS

Exploratory Hole Data

Group Name : HOLE			Hole Information	
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/ number	327/16A
	HOLE_TYPE		Type of exploratory hole	CP Note 1
	HOLE_NATE		O.S. National Grid six figure Easting	523145
	HOLE_NATN		O.S. National Grid six figure Northing	178456
	HOLE_GL	m	Ground level relative to Ordnance Datum	16.23
	HOLE_FDEP	m	Final depth of hole	32.60
	HOLE_STAR	dd/mm/yyyy	Date of start of excavation	18/03/1991
	HOLE_LOG		The **definitive** person responsible for logging the hole	DPG
	HOLE_REM		General remarks on hole	Chiselled 1 - 1.5m
A	HOLE_LETT		Ordnance Survey letter grid reference	TQ 123 456
A	HOLE_LOCX	m	Local grid x co-ordinate	565
A	HOLE_LOCY	m	Local grid y co-ordinate	421
A	HOLE_LOCZ	m	Level to local datum	+106.6
A	HOLE_DIAM		Details of hole diameter	200mm to 18.0m then 150mm to 32.60m
A	HOLE_CASG		Details of casing used	200mm to 18.0m 150mm to 30.0m
A	HOLE_ENDD	dd/mm/yyyy	Hole end date	22/03/1991
A	HOLE_BACD	dd/mm/yyyy	Hole backfill date	22/03/1991
A	HOLE_CREW		Name of driller	A.B. Driller
A	HOLE_ORNT	deg	Orientation of hole (degrees from north)	50
A	HOLE_INCL	deg	Inclination of hole (degrees from horizontal)	90
A	HOLE_EXC		Plant used	JCB - 3CX or Hand
A	HOLE_SHOR		Shoring/support used	None, Speedshore
A	HOLE_STAB		Stability	Stable during excavation
A	HOLE_DIMW	m	Trial pit width	0.9
A	HOLE_DIML	m	Trial pit length	2.5

Group Name : DREM	-	Depth Related Remarks		
Status	**Heading**	**Unit**	**Description**	**Example**
*	HOLE_ID		Exploratory hole name/ number	6421/A
*	DREM_DPTH	m	Depth of DREM_REM	12.50
	DREM_REM		Depth related remark	Driving boulder ahead of casing from 12.50 to 13.80

Group Name : PTIM	-	Hole Progress by Time		
Status	**Heading**	**Unit**	**Description**	**Example**
*	HOLE_ID		Exploratory hole name/ number	6421/A
*	PTIM_DATE	dd/mm/yyyy	Date of progress reading	20/03/1991
*	PTIM_TIME	hhmm	Time of progress reading	1435
	PTIM_DEP	m	Hole depth at PTIM_TIME	22.13
	PTIM_CAS	m	Depth of casing at PTIM_TIME	20.50
	PTIM_WAT	m	Depth to water at PTIM_TIME	16.56
	PTIM_REM		Remarks at PTIM_TIME	Stopped drilling on client's instruction

Group Name : WSTK	-	Water Strike Details		
Status	**Heading**	**Unit**	**Description**	**Example**
*	HOLE_ID		Exploratory hole name/ number	6421/A
*	WSTK_DEP	m	Depth of water strike	17.20
	WSTK_CAS	m	Casing depth at time of water strike	15.70
	WSTK_DATE	dd/mm/yyyy	Date of water strike	19/03/1991
	WSTK_TIME	hhmm	Time of water strike	1640
	WSTK_POST	m	Post strike depth of water after WSTK_NMIN minutes	10.23
	WSTK_NMIN	min	Minutes after strike	20
	WSTK_FLOW		Flow rate remarks	Steady flow of water into hole
	WSTK_SEAL	m	Depth at which water strike sealed by casing	19.10

Group Name : SAMP	-	Sample Reference Information		
Status	Heading	Unit	Description	Example
*	HOLE_ID		Exploratory hole name/ number	6421/A
*	SAMP_TOP	m	Depth to TOP of test sample	24.55
*	SAMP_REF		Sample reference number	24
*	SAMP_TYPE		Sample type	D Note 2
	SAMP_DIA	mm	Sample diameter	100
	SAMP_BASE	m	Depth to BASE of test sample	25.00
	SAMP_DESC		Sample description	Stiff brown very silty CLAY
	SAMP_UBLO		Number of blows required to drive sampler	35
	SAMP_REM		Sample remarks	No recovery
A	GEOL_STAT		Stratum code (for use with trial pits)	LC

Group Name : CORE	-	Rotary Core Information		
Status	Heading	Unit	Description	Example
*	HOLE_ID		Exploratory hole name/ number	6423/A
*	CORE_TOP	m	TOP of core run	2.54
*	CORE_BOT	m	BOTTOM of core run	3.54
	CORE_PREC	%	Percentage of core recovered over core run	32
	CORE_SREC	%	Percentage of solid core recovered over core run	23
	CORE_RQD	%	R.Q.D. for core run	24
	CORE_REM		Rotary remarks	Foam flush used

Group Name : FRAC	-	Fracture Spacing		
Status	Heading	Unit	Description	Example
*	HOLE_ID		Exploratory hole name/ number	6423/A
*	FRAC_TOP	m	Depth to top of Fracture Index zone	31.20
*	FRAC_BASE	m	Depth to bottom of Fracture Index zone	33.65
	FRAC_FI		Fracture Index over zone	22
	FRAC_IMIN		Minimum Index over zone	NI
	FRAC_IAVE		Average Index over zone	22
	FRAC_IMAX		Maximum Index over zone	35

Does not seem NI right!

Is this the right way round?

$FRAC = \frac{1}{I_f} \times 1000$

Group Name : GEOL	- Stratum Descriptions			
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/ number	6421/A
*	**GEOL_TOP**	m	Depth to the TOP of stratum	16.21
*	**GEOL_BASE**	m	Depth to the BASE of description	17.25
	GEOL_DESC		General description of stratum	Stiff brown very silty CLAY
	GEOL_LEG		Legend code	4A
A	GEOL_STAT		Stratum code	LC

Group Name : DETL	- Stratum Detail Descriptions			
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/ number	6421/A
*	**DETL_TOP**	m	Depth to TOP of detail description	3.46
*	**DETL_BASE**	m	Depth to BASE of detail description	3.76
	DETL_DESC		Detail description	Claystone

For rock SML Convention is SPT (or CPT)
19.50–19.95
13, 22/31, 22 for △ 35 mm
Casing 12.90

A2/9

In Situ Test Data

Group Name : ISPT		- Standard Penetration Test Results		
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/ number	6421/A
*	**ISPT_TOP**	m	Depth to top of test	13.50
	ISPT_SEAT		Number of blows for seating drive	14
	ISPT_MAIN		Number of blows for main test drive	35
	ISPT_NPEN	mm	Total penetration for test	450
	ISPT_NVAL		SPT 'N' value	35
	ISPT_CAS	m	Casing depth at time of test	12.00
	ISPT_WAT	m	Water depth at time of test	2.50
	ISPT_TYPE		Type of SPT test	S Note 3
	ISPT_REM		Remarks relating to the test	
A	ISPT_INC1		Number of blows for 1st 75mm	6
A	ISPT_PEN1	mm	Penetration	75
A	ISPT_INC2		Number of blows for 2nd 75mm	8
A	ISPT_PEN2	mm	Penetration	75
A	ISPT_INC3		Number of blows for 3rd 75mm	8
A	ISPT_PEN3	mm	Penetration	75
A	ISPT_INC4		Number of blows for 4th 75mm	9
A	ISPT_PEN4	mm	Penetration	75
A	ISPT_INC5		Number of blows for 5th 75mm	9
A	ISPT_PEN5	mm	Penetration	75
A	ISPT_INC6		Number of blows for 6th 75mm	9
A	ISPT_PEN6	mm	Penetration	75

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Group Name : PREF		- Piezometer Installation Details		
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/ number	6421/A
*	**PREF_TDEP**	m	Depth to bottom of piezometer tip	7.25
	PREF_DATE	dd/mm/yyyy	Piezometer installation date	22/03/1991
	PREF_TYPE		Piezometer type	Pneumatic
	PREF_TRPS	m	Depth to top of response zone	6.50
	PREF_BRPS	m	Depth to base of response zone	7.50
	PREF_REM		Details of type and depths of grouting and readout arrangements/locations	

Group Name : POBS	-	Piezometer Readings		
Status	Heading	Unit	Description	Example
*	HOLE_ID		Exploratory hole name/ number	6421/A
*	PREF_TDEP	m	Depth to reference level of piezometer tip	7.25
*	POBS_DATE	dd/mm/yyyy	Date of piezometer reading	26/03/1991
	POBS_TIME	hhmmss	Time of piezometer reading	164000
	POBS_DEP	m	Depth to water below ground surface	6.40
	POBS_HEAD	m	Head of water above piezometer tip	0.85
	POBS_REM		Remarks	Reading taken during heavy rain

Laboratory Testing Data

Group Name : CLSS	-	Classification Tests		
Status	**Heading**	**Unit**	**Description**	**Example**
*	HOLE_ID		Exploratory hole name/ number	6431/A
*	SAMP_TOP	m	Depth to TOP of test sample	6.50
*	SAMP_REF		Sample reference number	12
*	SAMP_TYPE		Sample type	U Note 2
*	SPEC_REF		Specimen reference number	i)
	CLSS_NMC	%	Natural moisture content	57
	CLSS_LL	%	Liquid limit	62
	CLSS_PL	%	Plastic limit	38 or NP
	CLSS_PI	%	Plasticity index	24 or NP
	CLSS_DDEN	Mgm^{-3}	Dry density	1.45
	CLSS_BDEN	Mgm^{-3}	Bulk density	1.66
	CLSS_PD		Particle density	2.65
	CLSS_<425	%	Percentage passing 425 μm sieve	12
	CLSS_PREP		Method of preparation	Natural moisture content, wet sieve etc.
A	CLSS_SLIM	%	Shrinkage limit	17
A	CLSS_LS	%	Linear shrinkage	11
A	CLSS_HVP	kNm^{-2}	Hand vane undrained shear strength (peak)	40
A	CLSS_HVR	kNm^{-2}	Hand vane undrained shear strength (remoulded)	15
A	CLSS_PPEN	kNm^{-2}	Pocket penetrometer undrained shear strength	40

Group Name : GRAD	-	Particle Size Distribution Analysis Data		
Status	**Heading**	**Unit**	**Description**	**Example**
*	HOLE_ID		Exploratory hole name/ number	6431/A
*	SAMP_TOP	m	Depth to TOP of test sample	6.50
*	SAMP_REF		Sample reference number	12
*	SAMP_TYPE		Sample type	U Note 2
*	SPEC_REF		Specimen reference number	ii)
*	GRAD_SIZE	mm	Sieve or particle size	3.35
	GRAD_PERP	%	Percentage passing	25
	GRAD_TYPE		Grading analysis test type	W Note 5

Group Name : CHEM			- Chemical Tests	
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/ number	6431/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	12
*	**SAMP_TYPE**		Sample type	U Note 2
*	**SPEC_REF**		Specimen reference number	ii)
	CHEM_TSUL	%	Total soil sulphate content	0.06
	CHEM_ASUL	gl^{-1}	Sulphate aqueous extract 2:1 soil/water	0.17
	CHEM_WSUL	gl^{-1}	Water sulphate content	0.01
	CHEM_PH		Soil/water pH value	7.2
	CHEM_REM		Remarks	
A	CHEM_ORGM		Method of organic test	Dichromate
A	CHEM_ORG	%	Organic matter content	12
A	CHEM_020	%	Percentage passing 2mm sieve	80
A	CHEM_LOI	%	Mass loss on ignition	26
A	CHEM_CO2M		Method of carbonate test	
A	CHEM_CO2	%	Carbonate content (as CO_2)	15
A	CHEM_ACL	%	Percentage of acid soluble chloride ions	0.1
A	CHEM_WCL	%	Percentage of water soluble chloride ions	0.05
A	CHEM_DCL	mgl^{-1}	Dissolved chloride ions	70
A	CHEM_CLN		Notes on chloride test	
A	CHEM_TDSM		Total dissolved solids. Test method and notes	
A	CHEM_TDS	%	Total dissolved solids in water	1.0
A	CHEM_RESM		Resistivity test method	
A	CHEM_RES	ohm	Resistivity of soil sample corrected to 20°C	2000
A	CHEM_REMC	%	Moisture content of sample for resistivity	11.0
A	CHEM_REBD	Mgm^{-3}	Bulk density of sample for resistivity	2.10
A	CHEM_RDXM		Redox test information	
A	CHEM_RDX		Redox potential	400
A	CHEM_RDPH		pH of redox sample	7.0

Group Name : TRIG			- Triaxial Test - General	
Status	**Heading**	**Unit**	**Description**	**Example**
*	HOLE_ID		Exploratory hole name/ number	6431/A
*	SAMP_TOP	m	Depth to TOP of test sample	6.50
*	SAMP_REF		Sample reference number	12
*	SAMP_TYPE		Sample type	U Note 2
*	SPEC_REF		Specimen reference number	iii)
	TRIG_TYPE		Test type	UU Note 4
	TRIG_COND		Sample condition	Undisturbed, Remoulded etc
	TRIG_REM		Test method and additional information, failure criteria etc.	
	TRIG_CU	kNm^{-2}	Value of undrained shear strength	75
A	TRIG_COH	kNm^{-2}	Cohesion intercept associated with TRIG_PHI	2
A	TRIG_PHI	deg	Angle of friction for effective shear strength triaxial test	32

Group Name : TRIX			- Triaxial Test	
Status	**Heading**	**Unit**	**Description**	**Example**
*	HOLE_ID		Exploratory hole name/ number	6431/A
*	SAMP_TOP	m	Depth to TOP of test sample	6.50
*	SAMP_REF		Sample reference number	12
*	SAMP_TYPE		Sample type	U Note 7
*	SPEC_REF		Specimen reference number	iii)
*	TRIX_TESN		Triaxial test/stage number	1
	TRIX_SDIA	mm	Specimen diameter	38
	TRIX_MC	%	Specimen initial moisture content	15
	TRIX_CELL	kNm^{-1}	Total cell pressure	100
	TRIX_DEVF	kNm^{-1}	Deviator stress at failure	360
A	TRIX_SLEN	mm	Sample length	76
A	TRIX_BDEN	Mgm^{-3}	Initial bulk density	2.12
A	TRIX_DDEN	Mgm^{-3}	Initial dry density	1.84
A	TRIX_PWPI	kNm^{-1}	Porewater pressure at start of shear stage	50
A	TRIX_PWPF	kNm^{-1}	Porewater pressure at failure	60
A	TRIX_STRN	%	Strain at failure	9
A	TRIX_MODE		Mode of failure	Brittle, plastic

Group Name : CONG	-	Consolidation Test - General		
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/ number	6431/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	12
*	**SAMP_TYPE**		Sample type	U Note 2
*	**SPEC_REF**		Specimen reference number	iv)
	CONG_TYPE		Oedometer or Rowe, primary or secondary consolidation	Oed, Rowe
	CONG_COND		Sample condition	Undisturbed, remoulded etc
	CONG_REM		Test details including method statement	Log time method, laboratory temperature 21°C, sample from base of U100 sample, axis vertical
A	CONG_INCM	m^2MN^{-1}	Coefficient of volume compressibility over CONG_INCD	0.36
A	CONG_INCD	kNm^{-2}	Defined stress range	p'o to p'o+ 100
A	CONG_DIA	mm	Test specimen diameter	75
A	CONG_HIGT	mm	Test specimen height	19
A	CONG_MCI	%	Initial moisture content	21
A	CONG_MCF	%	Final moisture content	18
A	CONG_BDEN	Mgm^{-3}	Initial bulk density	2.12
A	CONG_DDEN	Mgm^{-3}	Initial dry density	1.96
A	CONG_PDEN		Particle density (BS 1377) with # if assumed	#2.65
A	CONG_SATR	%	Initial degree of saturation	98
A	CONG_SPRS	kNm^{-2}	Swelling pressure	100
A	CONG_SATH	%	Height change of specimen on saturation as percentage of original height	+1.1

Group Name : CONS	-	Consolidation Test		
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/ number	6431/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	12
*	**SAMP_TYPE**		Sample type	U Note 2
*	**SPEC_REF**		Specimen reference number	iv)
*	**CONS_INCN**		Oedometer stress increment number	3
	CONS_IVR		Initial voids ratio	0.80
	CONS_INCF	kNm^{-2}	Stress at end of stress increment/decrement	400
	CONS_INCE		Voids ratio at end of stress increment	0.62
	CONS_INMV	m^2MN^{-1}	Coefficient of volume compressibility over stress increment	0.32
	CONS_INCV	m^2yr^{-1}	Coefficient of consolidation over stress increment	4.12
A	CONS_INSC		Coefficient of secondary compression over stress increment	0.12

Group Name : ROCK	-	Rock Testing		
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/ number	6423/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	2.54
*	**SAMP_REF**		Sample reference number	12
*	**SAMP_TYPE**		Sample type	C Note 2
*	**SPEC_REF**		Specimen reference number	ii)
	ROCK_PLS	MNm^{-2}	Uncorrected point load (I_s)	2.3
	ROCK_PLSI	MNm^{-2}	Size corrected point load index (I_s 50)	2.5
	ROCK_PLTF		Point load test type axial, diametral or lump, parallel to bedding.	A, D, L, P
	ROCK_UCS	MNm^{-2}	Uniaxial compressive strength (size corrected)	16.8
A	ROCK_PREM		Details of point load test, additional to ROCK_PLTF	
A	ROCK_UREM		Notes on uniaxial compressive strength test, including sample dimensions	
A	ROCK_E	MNm^{-2}	Elastic modulus	220
A	ROCK_MU		Poisson's ratio	0.3
A	ROCK_BRAZ	MNm^{-2}	Tensile strength by the Brazilian method	50
A	ROCK_BREM		Notes on Brazilian tensile strength test including sample dimensions	
A	ROCK_SDI	%	Slake durability	23
A	ROCK_SREM		Notes on slake durability test	
A	ROCK_PORO	%	Rock porosity	17
A	ROCK_PORE		Notes on type of porosity test	
A	ROCK_MC	%	Natural moisture content	18
A	ROCK_DDEN	MNm^{-3}	Rock dry density	1.88
A	ROCK_SOUN	%	Soundness Test	5.4
A	ROCK_MREM	%	Solution used for ROCK_SOUN, sieve sizes used, number of cycles	Magnesium sulphate etc.

APPENDIX 3

DATA DICTIONARY
ADDITIONAL DATA GROUPS

DATA DICTIONARY - ADDITIONAL DATA GROUPS

Data Sets

This Appendix defines the data dictionary entries for the Additional data Groups with their associated data Fields. Groups should be selected as appropriate to the project.

Notes

1. **Static Cone Penetrometer Type**

EC	Electric Cone
PC	Piezocone
MC	Mechanical Cone

2. **Sample Type**

U	Open drive Undisturbed sample
P	Piston sample
TW	Thin Walled push in sample
BLK	Block sample
CBR	CBR mould sample
D	Small Disturbed sample
B	Bulk disturbed sample
LB	Large Bulk disturbed sample (for earthworks testing)
C	Core sample
W	Water sample
G	Gas sample

Group : STCN - Static Cone Penetration Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6421/A
*	**STCN_DPTH**		Depth of result for static cone test	
A	STCN_FORC	kN	Axial force (Qc)	
A	STCN_FRIC	kN	Frictional force on sleeve (Qs)	
A	STCN_RES	MNm^{-2}	Cone resistance	
A	STCN_FRES	kNm^{-2}	Local unit side friction resistance	
A	STCN_PWP1	kNm^{-2}	Porewater pressure	
A	STCN_TYP		Cone Test Type	MC [Note 1]
A	STCN_REF		Cone Identification Reference	PQ47
A	STCN_INC	deg.	Cone inclination from vertical	0
A	STCN_CON	μScm^{-1}	Conductivity	0.01
A	STCN_PWP2	kNm^{-2}	Second Pore Water Pressure	15.0
A	STCN_TEMP	°C	Temperature	10

Group : CONC - Cone Calibration Group				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6421/A
*	**CONC_REF**		Cone Identification Reference	PQ47
*	**CONC_X**	kN	X co-ordinate on Calibration Curve	15.75
A	CONC_Y	mV	Y co-ordinate on Calibration Curve	4.50
A	CONC_DATE	dd/mm/yyyy	Date of Calibration	24/03/1992

Group : DPRB - Dynamic Probe Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6451/A
*	**DPRB_DPTH**	m	Depth to start of dynamic probe increment	2.50
A	DPRB_TYPE		Dynamic probe type	Macintosh
A	DPRB_BLOW		Dynamic probe blows for increment DPRB_INC	7
A	DPRB_INC	mm	Dynamic probe increment	100
A	DPRB_REM		Details of weight, drop height, and probe	

Group : IDEN - In Situ Density Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name, number (or location)	6461/A or DEN 7
*	**IDEN_DPTH**	m	Depth of in situ density test	1.25
A	IDEN_REM		Details of in situ density test	Nuclear probe
A	IDEN_IDEN	Mgm^{-3}	In situ bulk density	1.86
A	IDEN_MC	%	Moisture content relating to in situ test	18

Group : ICBR - In Situ CBR Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name, number (or location)	6421/A or CBR 6
*	**ICBR_DPTH**	m	Depth to top of CBR test	0.50
A	ICBR_REM		Details of apparatus and surcharge	10kg surcharge
A	ICBR_ICBR	%	CBR value	1.2
A	ICBR_MC	%	Moisture content relating to test	25

Group : IVAN - In Situ Vane Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name, number (or location)	6421/A
*	**IVAN_DPTH**	m	Depth of vane test	13.50
A	IVAN_REM		Details of vane test, vane size, vane type	
A	IVAN_IVAN	kNm^{-2}	Vane test result	60
A	IVAN_IVAR	kNm^{-2}	Vane test remoulded result	45

Group : IRES - In Situ Resistivity Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name, number (or location)	6421/A or RES/12
*	**IRES_DPTH**	m	Depth range to which in situ resistivity test relates	0 to 10
A	IRES_TYPE		Type of resistivity test	
A	IRES_IRES	ohm cm	Result	2000
A	IRES_REM		Details of test eg. electrode spacing and configuration	

Group : IRDX - In Situ Redox Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name, number (or location)	6421/A or RDX 2
*	**IRDX_DPTH**	m	Depth of redox test	1.0
A	IRDX_REM		Details of redox test and probe type	
A	IRDX_PH		pH	7.0
A	IRDX_IRDX	mV	Redox potential	400

Group : IPRM - In Situ Permeability Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6471/A
*	**IPRM_BASE**	m	Depth to base of test zone	12.95
A	IPRM_TOP	m	Depth to top of test zone	12.20
A	IPRM_TYPE		Type of test	Rising, Falling, Constant Head
A	IPRM_PRWL	m	Depth to water in borehole or piezometer immediately prior to test	10.60
A	IPRM_SWAL	m	Depth to water at start of test	5.40
A	IPRM_TDIA	m	Diameter of test zone	0.150
A	IPRM_SDIA	m	Diameter of standpipe or casing	0.019
A	IPRM_IPRM	ms^{-1}	Permeability	5×10^{-9}
A	IPRM_REM		Test remarks	

Group : PUMP - Pumping Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6431/A
*	PUMP_TIME	hhmmss	Time of reading	143500
A	PUMP_DATE	dd/mm/yyyy	Date of reading	16/03/1991
A	PUMP_DEPTH	m	Depth to water below ground	
A	PUMP_QUAT	ls^{-1}	Pumping rate from hole	
A	PUMP_REM		Remarks	

Group : CMPG - Compaction Tests - General				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6431/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	7.50
*	**SAMP_REF**		Sample reference number	15
*	**SAMP_TYPE**		Sample type	LB [Note 2]
*	**SPEC_REF**		Specimen reference number	ii)
A	CMPG_REM		Notes on compaction test required under BS 1377 : 1990	
A	CMPG_TYPE		Compaction test type	2.5kg, 4.5kg or vibro
A	CMPG_MOLD		Compaction mould type	Standard or CBR
A	CMPG_375	%	Weight percent of material retained on 37.5mm sieve	7
A	CMPG_200	%	Weight percent of material retained on 20mm sieve	15
A	CMPG_PDEN		Particle density measured or assumed (#)	#2.65
A	CMPG_MAXD	Mgm^{-3}	Maximum dry density	2.06
A	CMPG_MCOP	%	Moisture content at maximum dry density	14
A	CMPG_REM		Notes on compaction test required under BS 1377 : 1990	

Group : CMPT - Compaction Tests				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6431/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	7.50
*	**SAMP_REF**		Sample reference number	15
*	**SAMP_TYPE**		Sample type	LB [Note 2]
*	**SPEC_REF**		Specimen reference number	ii)
*	**CMPT_TSSN**		Compaction point number	1
A	CMPT_MC	%	Moisture content	7.8
A	CMPT_DDEN	Mgm^{-3}	Dry density at CMPT_MC moisture content	1.85

Group Name: RELD			Relative Density Test	
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6431/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	8.50
*	**SAMP_REF**		Sample reference number	16
*	**SAMP_TYPE**		Sample type	LB [Note 2]
*	**SPEC_REF**		Specimen reference number	ii)
A	RELD_REM		Method of test	
A	RELD_DMAX	Mgm^{-3}	Maximum dry density as BS 1377 part 4 cl 4	2.15
A	RELD_375	%	Weight percent of sample retained on 37.5mm sieve	7.0
A	RELD_063	%	Weight percent of sample retained on 6.3mm sieve	10
A	RELD_020	%	Weight percent of sample retained on 2mm sieve	5.0
A	RELD_DMIN	Mgm^{-3}	Minimum dry density as BS 1377 part 4 cl 4	1.65

Group : MCVG	-	MCV Test - General		
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6481/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	18
*	**SAMP_TYPE**		Sample type	LB [Note 2]
*	**SPEC_REF**		Specimen reference number	ii)
A	MCVG_REM		Notes on MCV test as BS 1377 Part 4 Cl. 5.4, and 5.5. Test report items a) and c)	
A	MCVG_200	%	Weight percent of material retained on 20mm sieve	15
A	MCVG_NMC	%	Natural moisture content	21
A	MCVG_PRCL		MCV precalibrated value as BS 1377 Part 4 and whether higher or lower.	>10

Group : MCVT - MCV Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6481/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	18
*	**SAMP_TYPE**		Sample type	LB [Note 2]
*	**SPEC_REF**		Specimen reference number	ii)
*	**MCVT_TESN**		MCV test number	1
A	MCVT_MC	%	Moisture content	17
A	MCVT_RELK		MCV value at MCVT_MC moisture content	12.3
A	MCVT_BDEN	Mgm^{-3}	Bulk density related to the MCVT_RELK MCV	2.0

Group : CBRG - CBR Test - General				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6491/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	22
*	**SAMP_TYPE**		Sample type	LB [Note 2]
*	**SPEC_REF**		Specimen reference number	ii)
A	CBRG_COND		Sample condition	Undisturbed, Remoulded etc
A	CBRG_METH		Method of remoulding	Heavy compaction
A	CBRG_REM		Notes on CBR test	Natural, soaked, duration of soaking, $10kN/m^2$ surcharge
A	CBRG_NMC	%	Natural moisture content	20
A	CBRG_200	%	Weight percent retained on 20mm sieve	10
A	CBRG_SWEL	mm	Amount of swell recorded	3.0

Group : CBRT - CBR Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6491/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	22
*	**SAMP_TYPE**		Sample type	LB [Note 2]
*	**SPEC_REF**		Specimen reference number	ii)
*	**CBRT_TESN**		CBR test number	1
A	CBRT_TOP	%	CBR at top	eg 6.4
A	CBRT_BOT	%	CBR at bottom	5.2
A	CBRT_MCT	%	Moisture content at top	15
A	CBRT_MCBT	%	Moisture content at bottom	14
A	CBRT_BDEN	Mgm^{-3}	Bulk density	1.82
A	CBRT_DDEN	Mgm^{-3}	Dry density	1.60

Group : PTST - Laboratory Permeability Tests				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6411/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	12
*	**SAMP_TYPE**		Sample type	U Note 2
*	**SPEC_REF**		Specimen reference number	ii)
*	**PTST_TESN**		Permeability test number	2
A	PTST_REM		Permeability test method	Constant head permeability test
A	PTST_COND		Sample condition	undisturbed (undist), remoulded (rem) etc.
A	PTST_SZUN	mm	Size cut off of material too coarse for testing	5
A	PTST_UNS	%	Proportion of material too coarse for testing - BS 1377 Part 5 cl 5.7	36
A	PTST_DIA	mm	Diameter of test sample	102
A	PTST_LEN	mm	Length of test sample	200
A	PTST_MC	%	Initial moisture content of test sample	20
A	PTST_BDEN	Mgm^{-3}	Initial bulk density of test sample	2.24
A	PTST_DDEN	Mgm^{-3}	Dry density of test sample	1.87
A	PTST_VOID		Voids ratio of test sample	0.37
A	PTST_K	ms^{-1}	Coefficient of permeability	0.000004
A	PTST_TSTR	kNm^{-2}	Mean effective stress at which permeability measured (when measured in triaxial cell).	112
A	PTST_ISAT	%	Initial degree of saturation	72
A	PTST_FSAT	%	Final degree of saturation	98
A	PTST_PDENS		Particle density, measured or (#) assumed	2.65

BS 1377 : Part 6 Test 6

$\left(\frac{SG}{DD}\right) - 1 =$

$\frac{(MC \times SG)}{e_0} = ISAT$

Group : SHBG - Shear Box Testing - General				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6331/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	12
*	**SAMP_TYPE**		Sample type	U Note 2
*	**SPEC_REF**		Specimen reference number	ii)
A	SHBG_TYPE		Test type eg. small shearbox, large shearbox, ring shear	small shear box
A	SHBG_REM		Test notes eg. undisturbed, pre-existing shear, recompacted, rock joint, cut plane	Undisturbed
A	SHBG_PCOH	kNm^{-2}	Peak cohesion intercept	5
A	SHBG_PHI	deg	Peak angle of friction	26.5
A	SHBG_RCOH	kNm^{-2}	Residual cohesion intercept	1
A	SHBG_RPHI	deg	Residual angle of friction	13.0

Group : SHBT - Shear Box Testing				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6331/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	12
*	**SAMP_TYPE**		Sample type	U Note 2
*	**SPEC_REF**		Specimen reference number	ii)
*	**SHBT_TESN**		Shear box stage number	1
A	SHBT_MC	%	Specimen initial moisture content	20
A	SHBT_BDEN	Mgm^{-3}	Bulk density	1.96
A	SHBT_DDEN	Mgm^{-3}	Dry density	1.63
A	SHBT_NORM	kNm^{-2}	Shear box normal stress	100
A	SHBT_DISP	mms^{-1}	Displacement rate	
A	SHBT_PEAK	kNm^{-2}	Shear box peak shear stress	65.5
A	SHBT_RES	%	Shear box residual shear stress	47.2
A	SHBT_PDIS	mm	Displacement at peak shear strength	2.35
A	SHBT_RDIS	mm	Displacement at residual shear strength	12.41
A	SHBT_PDEN		Particle density, measured or, (#) assumed	2.65
A	SHBT_IVR		Initial voids ratio	0.5
A	SHBT_MCI	%	Initial moisture content	20
A	SHBT_MCF	%	Final moisture content	18

Group : TNPC - Ten Per Cent Fines				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6321/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	25
*	**SAMP_TYPE**		Sample type	B Note 2
*	**SPEC_REF**		Specimen reference number	ii)
A	TNPC_TESN		Ten per cent fines test number	1
A	TNPC_REM		Notes on testing as per BS 812	
A	TNPC_DRY	kNm^{-2}	10% fines values on dry aggregate	70
A	TNPC_WET	kNm^{-2}	10% fines value on wet aggregate	60

Group : FRST - Frost Susceptibility				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6341/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	11
*	**SAMP_TYPE**		Sample type	U Note 2
*	**SPEC_REF**		Specimen reference number	ii)
A	FRST_COND		Sample condition	Undisturbed (undist), remoulded (rem) etc.
A	FRST_REM		Notes on frost susceptibility testing as per TRRL SR 829	
A	FRST_DDEN	Mgm^{-3}	Dry density	1.96
A	FRST_MC	%	Moisture content	24
A	FRST_HVE1	%	Frost heave, first specimen	3.0
A	FRST_HVE2	%	Frost heave, second specimen	4.5
A	FRST_HVE3	%	Frost heave, third specimen	3.5
A	FRST_HVE	%	Mean heave of 3 specimens	3.67

Group : CHLK - Chalk Crushing Value Test				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6131/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	2.50
*	**SAMP_REF**		Sample reference number	10
*	**SAMP_TYPE**		Sample type	LB Note 2
*	**SPEC_REF**		Specimen reference number	ii)
*	**CHLK_TESN**		Chalk crushing test number	1
A	CHLK_CCV		Chalk crushing value as BS 1377 Part 4 Cl 6	3.5
A	CHLK_MC	%	Chalk natural moisture content	20
A	CHLK_SMC	%	Chalk saturated moisture content	25
A	CHLK_010	%	Weight percent of material retained on 10mm sieve	
A	CHLK_REM		Remarks	

Group : TOXA - Solid Contaminants, Group A				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6141/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	5.50
*	**SAMP_REF**		Sample reference number	8
*	**SAMP_TYPE**		Sample type	B Note 2
*	**SPEC_REF**		Specimen reference number	ii)
A	TOXA_REM		Remarks	
A	TOXA_ANTI	$mgkg^{-1}$	Antimony (Total)	10
A	TOXA_ARSE	$mgkg^{-1}$	Arsenic (Total)	40
A	TOXA_BARI	$mgkg^{-1}$	Barium	125
A	TOXA_BERY	$mgkg^{-1}$	Beryllium	5
A	TOXA_BORA	$mgkg^{-1}$	Boron (Available)	2
A	TOXA_BORT	$mgkg^{-1}$	Boron (Total)	2
A	TOXA_CAD	$mgkg^{-1}$	Cadmium (Total)	2
A	TOXA_CHRO	$mgkg^{-1}$	Chromium (Hexavalent)	600
A	TOXA_CHRT	$mgkg^{-1}$	Chromium (Total)	600
A	TOXA_COBA	$mgkg^{-1}$	Cobalt (Total)	10
A	TOXA_COPA	$mgkg^{-1}$	Copper (Available)	50
A	TOXA_COPT	$mgkg^{-1}$	Copper (Total)	50
A	TOXA_IROS	$mgkg^{-1}$	Iron (Soluble)	5
A	TOXA_IROT	$mgkg^{-1}$	Iron (Total)	5
A	TOXA_LEAA	$mgkg^{-1}$	Lead (Available)	500
A	TOXA_LEAT	$mgkg^{-1}$	Lead (Total)	500
A	TOXA_MAGN	%	Magnesium (% of dry weight)	50
A	TOXA_MANG	%	Manganese (% of dry weight)	500
A	TOXA_MERC	%	Mercury (% of dry weight)	1
A	TOXA_MOLT	%	Molybdenum (Total) (% of dry weight)	5
A	TOXA_NICA	%	Nickel (Available) (% of dry weight)	20
A	TOXA_NICT	%	Nickel (Total) (% of dry weight)	20
A	TOXA_SELE	$mgkg^{-1}$	Selenium	10
A	TOXA_TINS	$mgkg^{-1}$	Tin	20
A	TOXA_VANA	$mgkg^{-1}$	Vanadium	5
A	TOXA_ZINA	$mgkg^{-1}$	Zinc (Available)	130
A	TOXA_ZINT	$mgkg^{-1}$	Zinc (Total)	50

Group : TOXB - Solid Contaminants, Group B				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6141/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	12
*	**SAMP_TYPE**		Sample type	B Note 2
*	**SPEC_REF**		Specimen reference number	ii)
A	TOXB_REM		Remarks	
A	TOXB_HYDR	$mgkg^{-1}$	Aromatic Hydrocarbons	25
A	TOXB_ASBP		Asbestos (Presence of Yes/No)	N
A	TOXB_CALO	$kJkg^{-1}$	Calorific Value	25
A	TOXB_CHLO	$mgkg^{-1}$	Chloride	10
A	TOXB_COAL	$mgkg^{-1}$	Coal tar derivatives	5
A	TOXB_CYAT	$mgkg^{-1}$	Cyanide (Total)	5
A	TOXB_CYAC	$mgkg^{-1}$	Cyanide (Complex)	20
A	TOXB_CYAF	$mgkg^{-1}$	Cyanide (Free)	1
A	TOXB_CYCL	$mgkg^{-1}$	Cyclohexane extract	2000
A	TOXB_THIO	$mgkg^{-1}$	Thiocyanate	10
A	TOXB_FERC	$mgkg^{-1}$	Ferricyanide	100
A	TOXB_FERF	$mgkg^{-1}$	Ferro-ferricyanide	200
A	TOXB_FLUD	$mgkg^{-1}$	Fluoride	10
A	TOXB_NITR	$mgkg^{-1}$	Kjeldahl Nitrogen (Total)	50
A	TOXB_IGNI	% of dry weight	Loss on ignition @ 600°C	10
A	TOXB_OCHL	μgkg^{-1}	Organic Chlorine	20
A	TOXB_PHET	μgkg^{-1}	Phenol (Total)	2
A	TOXB_PHEM	μgkg^{-1}	Phenol (Monohydric)	5
A	TOXB_ORTH	μgkg^{-1}	Orthophosphate	10
A	TOXB_PHOT	μgkg^{-1}	Phosphorous (Total)	20
A	TOXB_PCBP		Polychlorinated biphenyls - presence of (<50µg/kg or >50µg/kg)	<50
A	TOXB_PCBS	μgkg^{-1}	Polychlorinated Biphenyls	2
A	TOXB_HCAR	μgkg^{-1}	Polynuclear Aromatic Hydrocarbons	10
A	TOXB_SULE	$mgkg^{-1}$	Elemental Sulphur	50
A	TOXB_SULT	$mgkg^{-1}$	Sulphate (Total)	1000
A	TOXB_SULW	gl^{-1}	Sulphate (2:1 Soil/Water extract)	7

A	TOXB_SULI	$mgkg^{-1}$	Sulphide	10
A	TOXB_SULF	$mgkg^{-1}$	Sulphide (Free)	10
A	TOXB_SULP	$mgkg^{-1}$	Sulphur	100
A	TOXB_SOLV	$mgkg^{-1}$	Toluene Extractable Matter	5000
A	TOXB_ASBT		Asbestos type	
A	TOXB_ASBC		Asbestos fibre count	
A	TOXB_BOD	$mgkg^{-1}$	Biochemical oxygen demand	25
A	TOXB_COD	$mgkg^{-1}$	Chemical oxygen demand	25
A	TOXB_COMB	$kJkg^{-1}$	Combustibility	7000
A	TOXB_ELCO	μscm^{-1}	Electrical conductivity at 20° C	0.001
A	TOXB_MOIL	$mgkg^{-1}$	Mineral Oil	3
A	TOXB_PH		pH	6
A	TOXB_SOLT		Type of solvent used in solvent extract test	Toluene
A	TOXB_CLHY	$mgkg^{-1}$	Chlorinated hydrocarbons	
A	TOXB_OTHR	$mgkg^{-1}$	Other types	0.23
A	TOXB_OTH		Definition of TOXB_OTHR	

Group : TOWA			Water Contaminants, Group A	
Status	Heading	Unit	Description	Example
*	HOLE_ID		Exploratory hole name/number	6151/A
*	SAMP_TOP	m	Depth to TOP of test sample	6.50
*	SAMP_REF		Sample reference number	12
*	SAMP_TYPE		Sample type	W Note 2
*	SPEC_REF		Specimen reference number	ii)
A	TOWA_REM		Remarks	
A	TOWA_ANTI	mgl^{-1}	Antimony	2
A	TOWA_ARSE	mgl^{-1}	Arsenic	2
A	TOWA_BARI	mgl^{-1}	Barium	5
A	TOWA_BORO	mgl^{-1}	Boron	2
A	TOWA_CAD	mgl^{-1}	Cadmium	0
A	TOWA_CALC	mgl^{-1}	Calcium	1
A	TOWA_CHRO	mgl^{-1}	Chromium	5
A	TOWA_COBA	mgl^{-1}	Cobalt	0
A	TOWA_COPP	mgl^{-1}	Copper	5
A	TOWA_IRON	mgl^{-1}	Iron	1
A	TOWA_LEAD	mgl^{-1}	Lead	1
A	TOWA_MAGN	mgl^{-1}	Magnesium	10
A	TOWA_MANG	mgl^{-1}	Manganese	10
A	TOWA_MERC	mgl^{-1}	Mercury	0
A	TOWA_MOLY	mgl^{-1}	Molybdenum	1
A	TOWA_NICK	mgl^{-1}	Nickel	5
A	TOWA_POTA	mgl^{-1}	Potassium	2
A	TOWA_SELE	mgl^{-1}	Selenium	2
A	TOWA_SODI	mgl^{-1}	Sodium	10
A	TOWA_TINS	mgl^{-1}	Tin	0
A	TOWA_VANA	mgl^{-1}	Vanadium	5
A	TOWA_ZINC	mgl^{-1}	Zinc	10

Group : TOWB			Water Contaminants, Group B	
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6151/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	12
*	**SAMP_TYPE**		Sample type	W Note 2
*	**SPEC_REF**		Specimen reference number	ii)
A	TOWB_REM		Remarks	
A	TOWB_AMMO	mgl^{-1}	Ammonia	25
A	TOWB_AMMN	mgl^{-1}	Ammoniacal Nitrogen	25
A	TOWB_BICA	mgl^{-1}	Bicarbonate	10
A	TOWB_BIOX	mgl^{-1}	Biochemical Oxygen Demand (5 Day)	20
A	TOWB_CHOX	mgl^{-1}	Chemical Oxygen Demand (Soluble)	20
A	TOWB_CHLO	mgl^{-1}	Chloride	0
A	TOWB_CYAT	mgl^{-1}	Cyanide (Total)	1
A	TOWB_CYAC	mgl^{-1}	Cyanide (Complex)	1
A	TOWB_CYAF	mgl^{-1}	Cyanide (Free & Simple)	1
A	TOWB_THIO	mgl^{-1}	Thiocyanate	1
A	TOWB_OXYD	mgl^{-1}	Oxygen (Dissolved)	5
A	TOWB_COND	μScm^{-1}	Electrical Conductivity	0.001
A	TOWB_FLUO	mgl^{-1}	Fluoride	0
A	TOWB_OILS	mgl^{-1}	Mineral Oils	5
A	TOWB_NITA	mgl^{-1}	Nitrate	2
A	TOWB_NITI	mgl^{-1}	Nitrite	7
A	TOWB_NITR	mgl^{-1}	Kjeldahl Nitrogen (Total)	0
A	TOWB_CHLO	mgl^{-1}	Chlorine (Organic)	0
A	TOWB_PETR	mgl^{-1}	Petroleum Ether Extractable Matter	5
A	TOWB_PHET	mgl^{-1}	Phenol (Total)	1
A	TOWB_PHEM	mgl^{-1}	Phenol (Monohydric)	1
A	TOWB_ORTH	mgl^{-1}	Orthophosphate (Total)	5
A	TOWB_PHOT	mgl^{-1}	Phosphate (Total)	5
A	TOWB_PHPT	mgl^{-1}	Phosphorous (Total)	0
A	TOWB_HCAR	mgl^{-1}	Polynuclear Aromatic Hydrocarbons	10
A	TOWB_PCBS	μgl^{-1}	Polychlorinated Biphenyls	5
A	TOWB_BIPO		Polychlorinated Biphenyls - presence of ($<50\mu gl^{-1}$ or $>50\mu gl^{-1}$)	<50
A	TOWB_DISS	mgl^{-1}	Total Dissolved Solids	10
A	TOWB_SUSP	mgl^{-1}	Total Suspended Solids	20

A	TOWB_TONI	mgl^{-1}	Total Oxidised Nitrogen	5
A	TOWB_VSOL	mgl^{-1}	Volatile Suspended Solids	5
A	TOWB_ESUL	mgl^{-1}	Sulphur (Elemental)	10
A	TOWB_SULA	gl^{-1}	Sulphate	50
A	TOWB_SULI	mgl^{-1}	Sulphide	10
A	TOWB_VFAT	mgl^{-1}	Volatile Fatty Acids	0
A	TOWB_ACAL	mgl^{-1}	Acidity/Alkalinity	
A	TOWB_COTD	mgl^{-1}	Coal Tar Derivatives	100
A	TOWB_PH		pH	5
A	TOWB_REPT	mV	Redox Potential	50
A	TOWB_CHHY	$mgkg^{-1}$	Chlorinated hydrocarbons	10
A	TOWB_OTHR	mgl^{-1}	Other types	
A	TOWB_OTH		Definition of TOWB_OTHR	

Group : GAST - Gas Constituents				
Status	**Heading**	**Unit**	**Description**	**Example**
*	**HOLE_ID**		Exploratory hole name/number	6151/A
*	**SAMP_TOP**	m	Depth to TOP of test sample	6.50
*	**SAMP_REF**		Sample reference number	6
*	**SAMP_TYPE**		Sample type	G Note 2
*	**SPEC_REF**		Specimen reference number	ii)
A	GAST_REM		Remarks	
A	GAST_TEMP	°C	Temperature of gas at time of sampling	8
A	GAST_OX	% vol	Oxygen	0.16
A	GAST_NIT	% vol	Nitrogen	2.4
A	GAST_CARD	% vol	Carbon Dioxide	33.6
A	GAST_METH	% vol	Methane	63.8
A	GAST_HYDS	% vol	Hydrogen Sulphide	0.00002
A	GAST_ETHA	% vol	Ethane	0.005
A	GAST_PROP	% vol	Propane	0.002
A	GAST_HYD	% vol	Hydrogen	0.05
A	GAST_HEL	% vol	Helium	0.0000005
A	GAST_HIGA	% vol	Higher Alkanes	0.1
A	GAST_CARM	% vol	Carbon Monoxide	0.001
A	GAST_ETHE	% vol	Ethene	0.018
A	GAST_ACET	% vol	Acetaldehyde	0.005
A	GAST_ISOB	% vol	Isobutane	0.002
A	GAST_NBUT	% vol	n - butane	0.001
A	GAST_SATH	% vol	Saturated Hydrocarbons other than Methane, Ethane, Propane, Butane	0.005
A	GAST_UNSH	% vol	Unsaturated Hydrocarbons other than Ethene	0.009
A	GAST_HALO	% vol	Halogenated Compounds	0.00002
A	GAST_ORGS	% vol	Organosulphur Compounds	0.00001
A	GAST_ALCO	% vol	Alcohols	0.00001
A	GAST_HYDC	% vol	Hydrogen Cyanide	0.00001
A	GAST_DIES	% vol	Diethyl Sulphide	0.0000005
A	GAST_RAD	Bqm^{-3}	Radon	200
A	GAST_OTHR	% vol	Other Types	0.023
A	GAST_OTH		Definition of GAST_OTHR	

APPENDIX 4

FILE SECURITY

Security of Magnetic Media
Magnetic Media Labelling Formats
Magnetic Media Index Record

SECURITY OF MAGNETIC MEDIA

Backup copies of media

The Producer will make two identical copies of each disk containing ASCII data.

The first copy will remain the property of the Producer and will be kept by him until the expiry of the contract maintenance period.

The second copy will be given to the Receiver who will be responsible for its long term retention. The Receiver will make a backup copy of the disk for security purposes immediately on receipt.

Media labelling

All magnetic media will be securely labelled and clearly marked with

The title 'AGS Format ASCII Data'
The project identification (PROJ_ID)
The data of issue to the Receiver
The name of the Producer
The name of the Receiver
The unique issue sequence number

An example of the form of label is included.

Media index

The Producer will maintain an index detailing for each issue of data

The heading 'AGS Format ASCII Data'
The title 'Media Index Record'
The project identification (PROJ_ID)
The unique issue sequence number
The date of issue to the Receiver
The name of the Producer
The name of the Receivers representative to whom the media was given
A general description of the data transferred

In addition the index will detail for each ASCII file

The file name including the extension ".AGS"
The date of file creation
The time of file creation
The file size in bytes
A general description of the data contained in each file

An index sheet should be prepared each time a disk is issued. The Producer should retain one copy of the index sheet and give a copy to the Receiver when the disk is handed over. An example of the form of index to be adopted is included.

The files shall contain ".AGS" files only. The disks shall contain no executable files and shall be checked for viruses before issue.

Magnetic Media Labelling Formats

AGS Format ASCII data
7507/49 Road Improvement
Date: 16/10/91
From: A Contractor Co Ltd
To: A N Engineer Seq : 2.10

Format for 5.25" disk label

AGS Format ASCII data
7507/49 Road Improvement
Data : 16/10/91
From: A Contractor Co Ltd
To: A N Engineer
Seq: 2.10

Format for 3.5" disk label

Format for a Media Index Record Sheet

AGS Format ASCII Data

Media Index Record

Project Identification	
From	
To	

Issue Sequence Number	Date of Issue	Issued To	General Notes

File Name	Creation Date	Creation Time	File Size in Bytes	General Description of data transferred

This sheet may be copied

APPENDIX 5

EXAMPLES OF GENERAL AND PARTICULAR SPECIFICATION CLAUSES WITH ASSOCIATED NOTES FOR GUIDANCE

EXAMPLES OF GENERAL AND PARTICULAR SPECIFICATION CLAUSES WITH ASSOCIATED NOTES FOR GUIDANCE

In order to assist in the drafting of ground investigation specifications, examples of the type of clauses and associated notes for guidance for implementing digital data are given in this Appendix. Not all of these clauses are likely to be required in all contracts but the intention is to provide the appropriate clauses for most scales of ground investigation.

SPECIFICATION FOR DIGITAL DATA

General

1 Unless otherwise required in the Contract, the Contractor is to provide field and laboratory data in digital form, as well as in paper form.

2 The definitive copy of the field and laboratory data shall be the paper copy.

Format

3 The data shall be provided in ASCII format, on disks or other transmission media as agreed by the Engineer, and formatted to be compatible with MS-DOS Version 3.2. The files shall not be compressed.

4 The format of the digital data files shall comply with Appendix 1 of the Association of Geotechnical Specialists (AGS) publication 'Electronic transfer of geotechnical data from ground investigations'. The Key data groups and, where recorded, common data groups, shall be included in accordance with Appendix 2 of the above AGS publication.

5 Additional data groups or fields required for the data specified in the Contract shall be included in accordance with Appendices 2 and 3 of the AGS publication 'Electronic transfer of geotechnical data from ground investigations'. Any new, amended or additional groups or fields in the Contract shall only be created with the Engineer's approval.

Security

6 All disks, or other agreed transmission media, shall be securely labelled and clearly marked with:

The title 'AGS Format ASCII Data'
The project identification (PROJ-ID)
The date of issue to the Engineer
The name of the Contractor
The name of the Engineer
The unique issue sequence number

If more than one disk, or other agreed transmission medium, is required, then each shall be clearly labelled to indicate the order in which the Engineer should read the data. The split of the data into separate files shall be decided by the Contractor. The unique sequence number shall run sequentially from the start of the contract. Where more than one disk is required for a particular issue of digital data, this fact shall be clearly identified on the labels in that issue.

7 Until the completion of the maintenance period, the Contractor shall keep an index detailing:

The heading 'AGS Format ASCII Data'
The title 'Media Index Record'
The project identification (PROJ-ID)
The unique issue sequence number
The date of issue to the Engineer
The name of the Contractor issuing the transmission media
The name of the Engineer to whom the transmission media was issued
A general description of the data transferred

For each data file, the index will detail:

The file name including the extension, ".AGS".
The date the file was created
The time the file was created
The file size in bytes
A general description of the data contained in each file

The Contractor shall retain one copy of the index sheet and shall issue to the Engineer a copy of the completed index sheet with the disk(s), or other agreed transmission medium.

Preliminary Data

8 The Contractor shall issue digital copies of all preliminary data whenever required by the Engineer.

9 The preliminary data may be subject to update as necessary in the light of laboratory testing and the further examination of samples and cores. When available, laboratory data shall be input.

10 In addition to the labelling given in Clause 6, the disks shall be labelled 'PRELIM' and a unique sequence number given to the disk for each issue of digital data to the Engineer.

11 A list of data items not included in the digital data but included in the paper copy shall be provided.

12 All preliminary data in digital form shall be able to be presented in the same form as it is to be used for the Factual Report.

Factual Report

13 In addition to the labelling given in Clause 6 of this specification, the disk(s), or other agreed transmission media, submitted with the Factual Report shall be labelled 'FINAL'.

14 The digital data provided by the Contractor with the Factual Report is required to be complete and a total replacement of any previous preliminary data.

15 In addition to the paper copies of the Factual Report, the Contractor shall provide a Report with a digital copy of those field and laboratory data specified in the Contract to be in digital form. This report shall consist of a paper copy of the descriptive account from the Factual Report, a disk(s), or other agreed transmission medium, containing the digital data, paper copies of any data not included in digital form, and the Contract Drawings. The paper copies shall be firmly bound within stiff covers. The disk(s), or other agreed transmission medium, and the Contract Drawings shall be contained within the same covers in such a manner that they are secure within the document but allow ready access.

Dummy Set of Data

16 Prior to the start of work on the Contract the Contractor shall submit to the Engineer a dummy set of data in the required format for the approval of the Engineer.

Submitting Data

17 Updated disks, or other agreed media, shall be provided as required by the Engineer as work proceeds. The Contractor shall make two identical copies of each disk, whether preliminary or final. The first copy shall be retained by the Contractor until the expiry of the contract maintenance period. The second copy will be issued to the Engineer.

Units of Measurement

18 The units of measurement shall be those given in Appendices 2 and 3 of AGS publication 'Electronic transfer of geotechnical data from ground investigations' unless other units of measurement for digital data are given in the Contract.

NOTES FOR GUIDANCE ON THE SPECIFICATION FOR DIGITAL DATA

General

NG 1 A copy of the digital data may in some circumstances accompany every issue of the paper copies and the data shall be subject to the same timing and submission requirements. However, the Engineer may, depending on the contract, prefer to receive digital data only after a significant amount of data has been collected.

NG 2 The paper copy is definitive.

Format

NG 3 The acceptable media for the transmission of data should be given on a site specific basis.

NG 4 The data dictionary defining these headings is given in the AGS publication 'Electronic transfer of geotechnical data from ground investigations'.

NG 5 The Engineer is responsible for contacting the AGS to ensure that any digital data proposed to be used, and which are not included in the AGS publication mentioned in NG 4, have not already been assigned a heading. By following this procedure, new standard headings can be issued.

Security

NG 6 It is critical that disks, or other agreed transmission media, are properly labelled to ensure easy identification. The AGS publication mentioned in NG 4 gives an example of the form of label which can be adopted for 3.5 inch and 5.25 inch disks.

NG 7 The index is also critical to the proper management of disks, or other agreed transmission media. The AGS publication mentioned in NG 4 gives an example of the form of index which can be adopted.

Preliminary Data

NG 8 Only the preliminary data or Factual Report may be required in digital form for some contracts. The timing of submission of the digital data may also require specifying.

NG 9 The Engineer and the Contractor must be aware of the problems posed by the presence of small sets of data in a series of files and the potential for and the presence of errors in the data sets. These become very important if the data is being transferred to a data base where incoming data is added to existing data. The organisation of the data prior to issue is the responsibility of the Contractor. The Contractor's system must ensure that data originating from different sources within the Contractor's organisation is compatible.

NG 10 The sequential numbering of data issues must be rigorously adhered to so that no data versions are issued out of sequence. When errors or inconsistencies are noted in the data, by either the Engineer or Contractor, they should be corrected by the Contractor and a corrected data set issued. When a change or addition is made to data within an issue, a complete data group should be reissued, not just the changed fields. This may not require complete replacement of the whole data set which includes other previous issues.

NG 11 The requirement for identification of data items, which are not included in the preliminary data set ensures that no information is left out when each digital data record is issued.

Factual Report

NG 15 The requirements given for the Report containing the digital data are to ensure that the bound volume is as complete as the full paper copy. The transmission of the descriptive account as a print file is not considered appropriate as some features can be lost in transfer. The requirement for data items, which are not included in the digital data, to be given ensures that no information is left out when the digital data is issued.

Dummy Set of Data

NG 16 This requirement ensures that the Contractor is using the standard headings and that the digital data can be accurately transferred.

Submitting Data

NG 17 The second copy will be given to the Engineer who should, immediately on receipt, make a backup copy for security purposes.

The Engineer is likely to be receiving information from a number of sources within the Contractor's organisation, eg field data and laboratory data. The Contractor's data management system must ensure that all issues are compatible and numbered in the correct sequential order. The Engineer must be prepared to manage the data as it arrives. Any file transmitted during the Contract may contain all or part of the data available at that time. It may contain borehole log data, laboratory data or both.

Units of Measurement

NG 18 It is necessary for the Engineer to be certain exactly what the units of measurement are for the data being received. It is recognised that units may be specified elsewhere in the contract. Any units different to those in the AGS publication mentioned in NG 4 must, however, be specified for the digital data in order to ensure an understanding of transferred data.

APPENDIX 6

INTERCHANGE FACILITIES

INTERCHANGE FACILITIES

There are a number of methods for transferring electronic data between microcomputers, namely:

(i) Portable Transfer

- "Floppy" Disks
- Magnetic Tape
- Optical Disks
- Removable Hard Disk Cartridges

(ii) Hard-wire Transfer

- Modem to Modem (telephone line)
- Local and Wide area Networks

In principle any of these methods could be used to transfer the ASCII data files. However, it is anticipated that in most practical cases "Floppy" Disks will be used.

DISKS

There are four principal types of floppy disk in use on IBM-PC and compatible microcomputers. Only disks compatible with MS-DOS version 3.2 format will be used.

Physical Size	Storage Capacity (MS-DOS formatted)
5¼"	360 kb
5¼"	1.2 Mb
3½"	720 kb
3½"	1.5 Mb

The 3½" disks are more robust than 5¼" disks and can generally be sent by post in normal envelopes without requiring special protection. They are light and a single disk can be sent at the lowest "letter post" rate. Also a majority of new computers are now supplied with 3½" disk drives. For these reasons 3½" disks are preferred.

It is important to establish that the data RECEIVER has the same disk size (3½"/ 5¼") and the same (or larger) capacity as the PRODUCER. The larger capacity drives can read lower capacity disks but not vice versa.

APPENDIX 7

REPLY FORMS

Registration
Request for Amendments or Extensions
Software Problem Report

AGS ASSOCIATION OF GEOTECHNICAL SPECIALISTS

Electronic Transfer of Geotechnical Data from Ground Investigations

Registration No. (To be Allocated)

REGISTRATION

Business Name Address Post Code Country			
Telephone No.		Contact Name	
Facsimile No.		Signature	
Issue No. Purchase Date Submission Date			

For Office Use	
Date Received Date Registered	

COMMUNICATION RECORD	
Date	Description

Notes:
1) This form should be sent to the following address for registration:
Association of Geotechnical Specialists, PO Box 250, Camberley, Surrey, GU15 1UD
2) A copy of this form is not acceptable for registration but you may wish to take a copy for your own records.
3) An acknowledgement of your registration and registration number will be sent to your business address.
4) You will be notified of any approved amendments or extensions of the format for one year after purchase. Subsequent notification will be subject to a maintenance fee.
5) Any changes to the registration details should be notified to the Association of Geotechnical Specialists.

AGS ASSOCIATION OF GEOTECHNICAL SPECIALISTS

Electronic Transfer of Geotechnical Data from Ground Investigations

Registration No.

REQUEST FOR AMENDMENTS OR EXTENSIONS

Business Name Address Post Code Country			
Telephone No.		Contact Name	
Facsimile No.			
Date of Request		Signature	

Notes:
1) This form should be used to request from the Association of Geotechnical Specialists approval for amendments to the document or extensions to the AGS format.
2) Until amendments or extensions to the format have been officially approved in writing by the AGS they cannot be considered to comply with the AGS format although it is recognised that arrangements between producers and receivers may be necessary from time to time to deal with particular circumstances.
3) When approval has been given all registered users will be notified, subject to their continued registration.
4) The request should be submitted by the registered contact name. Where this contact name changes, the AGS should be notified accordingly.
5) Copies of this form will be acceptable for notification.
6) The form should be sent to **Association of Geotechnical Specialists,** PO Box 250, Camberley, Surrey, GU15 1UD

For Office Use			
Date Received		Request No.	
Date Considered		Date of Response	
Approved as submitted			
Approved with amendments			
Re-submission with amendments requested			
Proposal not accepted			
Other response			
Notes on response			

Details of amendment or extension to be given on separate sheet attached.
This form may be copied.

AGS ASSOCIATION OF GEOTECHNICAL SPECIALISTS

Electronic Transfer of Geotechnical Data from Ground Investigations

Registration No.

REQUEST FOR AMENDMENTS OR EXTENSIONS - DETAILS

Details of Amendment or Extension Requested

Information to be provided:-
Data Group required:
Data Field(s) required:
Common/Additional ?
Default Units:
Comments:
Example of Usage:

This form may be copied.

Sheet of

AGS ASSOCIATION OF GEOTECHNICAL SPECIALISTS

Electronic Transfer of Geotechnical Data from Ground Investigations

Registration No.

SOFTWARE PROBLEM REPORT

Business Name Address Post Code Country			
Telephone No.		Contact Name	
Facsimile No.			
Date of Notification		Signature	

Notes:
1) This form should be used to notify the Association of Geotechnical Specialists of any problems encountered in using the Geotechnical Data Interchange Format.
2) The form should be sent to **Association of Geotechnical Specialists**, PO Box 250, Camberley, Surrey, GU15 1UD
3) Any solution identified will be notified to all registered users subject to their continued registration.

Nature of Problem.
Please describe in detail the nature of the problem, the exact situation of occurrence and the Data Group and Data Field, if applicable, where it occurs.

For Office Use			
Date Received		Notification No.	
Date Considered		Date of Response	
Action taken: Update notified:			

This form may be copied.

APPENDIX 8

EXAMPLE DATA INTERCHANGE FILE AND BENCHMARK FILE

EXAMPLE OF DATA INTERCHANGE FILE

```
"**PROJ"
"*PROJ_ID","*PROJ_NAME","*PROJ_CLNT"
"123/abc","Towy Valley Cyder Company","A. Client & Partners"


"**HOLE"
"*HOLE_ID","*HOLE_TYPE","*HOLE_NATE","*HOLE_NATN","*HOLE_GL",
"*HOLE_FDEP","*HOLE_STAR","*HOLE_LOG"
"501","","554293","221884","91.90","30.6","","T.A."
"504","CP","12","13","12.5","9.2","12/1/1990","FHS"


"**GEOL"
"*HOLE_ID","*GEOL_TOP","*GEOL_BASE","*GEOL_DESC"
"501","0.0","10.8","Stiff becoming very stiff grey slightly sandy CLA"
"<CONT>","","","Y with a little fine to medium chalk and occasional f"
"<CONT>","","","lint gravel.   (BOULDER CLAY) "
"501","10.8","30.6","Very stiff brown CLAY with extremely closely spa"
"<CONT>","","","ced fissures. Occasional silt dustings on fissures.  "
"<CONT>","","","  (LONDON CLAY) "
"504","0.0",".2","Loose FILL with ash and brick"
"504","0.2","1.4","Soft grey CLAY"
"504","1.4","1.9","Brown SILT"
"504","1.9","2.6","Soft grey CLAY"
"504","2.6","3.8","Laminated blue grey CLAY"
"504","3.8","5.2","Hard brown to grey SILTSTONE"
"504","5.2","7","Fresh DOLOMITE"
"504","7","9.2","DOLOMITE"


"**DETL"
"*HOLE_ID","*DETL_TOP","*DETL_BASE","*DETL_DESC"
"501","1.7","1.9","brown grey mottled grey "
"501","3.8","4.0","occasional coarse gravel "
"501","4.8","5.1","occasional black mudstone gravel "
"501","5.2","5.5","sandy clay "
"501","10","10.3","dark brown "
"501","10.8","10.9","dark brown "
"501","13.4","13.8","Foreman notes claystone band "
"501","29","30.1","white trace fossils "
```

```
"**SAMP"
"*HOLE_ID","*SAMP_TOP","*SAMP_REF","*SAMP_TYPE","*SAMP_BASE",
"*SAMP_DIA"
"501","1.0","","D","1.2",""
"501","1.80","5","B","2.4",""
"501","3.60","","W","",""
"501","4.50","10","W","",""
"501","5.00","11","B","5.4",""
"501","5.70","13","W","",""
"501","7.10","16","D","7.6",""
"501","8.60","20","W","",""
"501","9.00","19","B","9.45",""


"**CLSS"
"*HOLE_ID","*SAMP_TOP","*SAMP_REF","*SAMP_TYPE","*SPEC_REF",
"*CLSS_NMC","*CLSS_LL","*CLSS_PL","*CLSS_PI","*CLSS_DDEN",
"*CLSS_BDEN","*CLSS_PD"
"501","1.80","5","B","a","19.0","","","","","","",""
"501","5.00","11","B","","20.0","","","","","","",""
"501","7.10","16","D","","77.0","89.0","60.0","29.0","","","",""
"501","9.00","19","B","ii","14.0","35.0","21.0","14.0","2.37","2.70",""


"**GRAD"
"*HOLE_ID","*SAMP_TOP","*SAMP_REF","*SAMP_TYPE","*SPEC_REF",
"*GRAD_SIZE","*GRAD_PERP","*GRAD_TYPE"
"501","1.80","5","B","a","37.5","100","WS"
"501","1.80","5","B","a","9.5","92","WS"
"501","1.80","5","B","a","4.75","75","WS"
```

AGS Format ASCII Data

Media Index Record

Project Identification	EXAMPLE FILES
From	M ZYTYNSKI
To	AGS

Issue Sequence Number	Date of Issue	Issued To	General Notes
1	09/04/92	AGS	

File Name	Creation Date	Creation Time	File Size in Bytes	General Description of data transferred
EXAMPLE.AGS	27/05/92	12:20p	6883	Typical example file.
ALL.AGS	06/05/92	15.05p	14291	File with all groups and fields in alphabetical order.