

**Specification
for
National Trust**

**REPLACEMENT OF
THE FIRE DETECTION AND ALARM SYSTEM
AT
CANONS ASHBY**



May 2017

**REPLACEMENT OF
THE FIRE DETECTION AND ALARM SYSTEM
AT
CANONS ASHBY**

Prepared by:

A.J.B. STONE BSc(Hons) CEng MIET

C.S. Todd & Associates Ltd
Hutton Roof
Eglinton Road
Rushmoor
Farnham
Surrey
GU10 2DH

Tel: 01252 792088
Fax: 01252 794165
E-mail: office@cstodd.co.uk
Website: www.cstodd.co.uk

June 2017

CONTENTS

1.	GENERAL	1
1.1	Introduction	1
1.2	Tendering Instructions.....	2
1.3	Listed building approvals.....	2
1.4	Scope of Work.....	2
1.5	Standards.....	3
1.6	Reference Drawings.....	4
1.7	Programme	5
1.8	Working Drawings and Documents	5
1.9	Commissioning and Acceptance Testing	5
1.10	Record Drawings and O&M Manuals	6
1.11	Manufacturer's Requirements	7
1.12	Builders' Works	7
1.13	Removal of Existing Equipment and Wiring	8
1.14	Spares.....	8
1.15	Warranty and Maintenance	8
1.16	Staff Training.....	8
1.17	Verification of Site Details	9
1.18	Attendance by Others	9
1.19	Protection of the Site and its Occupants	9
1.20	Method Statement and Risk Assessment	9
1.21	Health and Safety.....	10
1.22	Definitions	10
2.	BRIEF DESCRIPTION	11
2.2	Components.....	11
2.3	Alarm Strategy	11
2.4	Interfaces	11
3.	SYSTEM REQUIREMENTS	12
3.1	General	12
3.2	Wiring Arrangements	12
3.3	Circuit Design and System Architecture	12
4.	ZONING.....	14
4.1	Detection Zones	14
4.2	Alarm Zones.....	14
5.	OPERATIONAL REQUIREMENTS.....	15
5.1	General	15
5.2	Action in the Event of a Fire Alarm Condition.....	15
5.3	Action in the Event of a second detection device	15
5.4	Silencing of the Alarm Sounders	15
5.5	Resetting of the Alarm.....	15
5.6	Action in the Event of a Pre-alarm Condition	15
5.7	Action in the Event of a Fault Condition	16

6.	MANUAL CALL POINTS	17
6.1	General	17
7.	AUTOMATIC DETECTORS	18
7.1	Point Type Detectors.....	18
7.2	Aspirating Detectors.....	18
7.3	Beam Detectors	19
8.	CONTROL AND INDICATING EQUIPMENT	20
8.1	Control and Indicating Equipment	20
8.2	Zone Diagram	21
8.3	Power Supplies	21
9.	ALARM DEVICES.....	23
9.1	Electronic Sounders	23
9.2	Visual Alarm Devices	23
9.3	Audibility Tests.....	23
10.	INTERFACE WITH OTHER EQUIPMENT	24
10.1	Existing Interfacing.....	24
10.2	Remote Monitoring.....	24
10.3	'NIMBUS' System.....	24
10.4	Radio Pager	24
11.	WIRING AND INSTALLATION	25
11.1	General	25
11.2	Cable Routes	25
11.3	Junctions.....	26
11.4	Mounting of Fire Alarm Components.....	26
11.5	Workmanship	26
12.	LABELLING	28
12.1	General	28
13.	IMAGES	29
	APPENDIX 1 – SCHEDULE OF PRICES.....	30
	APPENDIX 2 – SCHEDULE OF RATES FOR ADDITIONS AND DELETIONS FROM THE SCOPE OF SUPPLY	32
	APPENDIX 3 – SCHEDULE OF RECOMMENDED SPARES	33
	APPENDIX 4 – SCHEDULE OF INFORMATION TO BE PROVIDED BY CONTRACTOR	34

1. GENERAL

1.1 Introduction

- 1.1.1 This specification refers to the replacement of the fire detection and alarm system at Canons Ashby, near Daventry, Northamptonshire, NN11 3SD.
- 1.1.2 Canons Ashby is a National Trust property, open to the public seven days a week. Visitors enter from the car park, past the Shepherd's Hut, along a path through the grounds and past the formal gardens to the house and other buildings.
- 1.1.3 The site consists of the Manor House, the Coach House and the Stables, and is set in extensive gardens.
- 1.1.4 The existing fire alarm system consists of a 'Notifier' non-addressable fire alarm system in the Manor House linked to two Protec non-addressable fire alarm systems in the Coach House and Stables. The system is in line with the recommendations for a Category L2 system.
- 1.1.5 The National Trust ('the Trust') requires that the new fire alarm system be as unobtrusive as possible, but that it should comply with the Trust specification for a Category L1/P1 system in the Manor House. The fire alarm system in the other buildings provides sufficient cover, but local management want an integrated system across the whole site, serviced by a single supplier, to improve its reliability and to simplify the management of the system. Currently the system in the Manor House is serviced by ADT and the other buildings are serviced by Protec. Having two suppliers has created complications for management and has perpetuated the system's unreliability.
- 1.1.6 The current systems are wired and non-addressable and the requirement is for the new system to be an open-protocol, analogue-addressable networked wired system.
- 1.1.7 There is a two-way radio system and a security pager system in use on site. These are to be replaced, with a new radio system combining both functions, which is to be interfaced with the new fire alarm system.
- 1.1.8 Canons Ashby currently has a poor internet service and a very weak cellular radio network service. The Trust requires a 'NIMBUS' interface on the new fire alarm system, so local Trust staff will need to be consulted as to how this is to operate.
- 1.1.9 The Trust requires the successful contractor to take responsibility for design, equipment supply, installation and commissioning of the fire detection and alarm system, as outlined in this specification.

1.2 Tendering Instructions

1.2.1 Competitive tenders are hereby sought from selected companies, who must, as part of any tender, confirm that the quoted price is in respect of design, supply, installation and commissioning of a system and equipment that complies with all clauses of this specification. In the absence of explicit confirmation, submission of a tender shall be deemed to constitute a warranty by the tenderer to this effect. **Any deviations from the requirements of this specification must be clearly stated in the tender.**

1.2.2 Completed tenders should include:

- a) A statement confirming compliance with all clauses of this specification or stating any deviations from, or qualifications to, the specification.
- b) The following, fully completed:
 - Appendix 1: Schedule of prices.
 - Appendix 2: Schedule of rates, for additions and deletions from the scope of supply.
 - Appendix 3: Schedule of recommended spares.
 - Appendix 4: Schedule of information, to be provided by contractor.
- c) Technical data and product information on all items of proposed equipment.

1.2.3 This specification outlines the requirements for the replacement of the fire detection and alarm system. In no way does it detract from the Contractor's responsibility for detailed design. Therefore, the submitted tender shall be based on a detailed survey of the site. No claims by the Contractor for additional work caused by failure to familiarize themselves adequately with the existing system layout shall be entertained by the Trust.

1.2.4 The Trust will not be bound to accept the lowest or any tender in respect of this contract.

1.2.5 The Trust will not accept any charges in relation to the costs incurred by the Contractor in preparing a tender.

1.3 Listed building approvals

1.3.1 It should be noted that Canons Ashby is Grade I listed, and the Trust shall seek the necessary approvals for the changes to the fire detection and alarm system.

1.4 Scope of Work

1.4.1 The replacement fire detection and alarm system described in this specification shall be designed, supplied, installed and commissioned by the Contractor. The successful contractor shall take full responsibility for all aspects of the design.

- 1.4.2 The Trust requires that a building contractor, familiar with the property, be appointed to carry out all building work associated with the installation of the fire alarm system.
- 1.4.3 This specification describes the complete replacement of the fire alarm systems in all three buildings, although it may be necessary to carry out the work as a series of phases, as funding for the work becomes available. The following stages are suggested as being appropriate, offering step by step benefits over the current system.
- 1.4.4 The scope of the works shall include the following stages:
- a) Replace the panel, detectors, sounders and interfaces in the Manor House with an analogue addressable system; verify existing cables to ensure they are fit for purpose; interface the shop and café fire alarm systems via addressed interface modules.
 - b) Add additional detectors in the mansion, to bring the system to Category L1/P1 standard.
 - c) Adjust the installed cables to form loop(s).
 - d) Replace the panels, detectors and sounders in the shop and café with an analogue addressable system. The panel should be sited in the Coach House shop.
 - e) Network the two systems by replacing the addressed interfaced modules in (a) with a network connection such that the system can be interrogated and controlled at either panel.
 - f) Provide a 'NIMBUS' interface.
 - g) Interface the fire alarm system with the new radio/pager system.
 - h) Complete all necessary builders' work, including the making good of any decoration, at each stage.
 - i) Remove and dispose of the existing fire alarm system components and materials, at each stage.

1.5 Standards

- 1.5.1 The fire detection and alarm system shall comply fully with the recommendations of the following standards, as amended to date:
- BS EN 54-2: *Fire detection and fire alarm systems - Control and indicating equipment.*
 - BS EN 54-3: *Fire detection and fire alarm systems - Fire alarm devices - Sounders.*
 - BS EN 54-4: *Fire detection and fire alarm systems - Power supply equipment.*
 - BS EN 54-5: *Fire detection and fire alarm systems - Heat detectors - Point detectors.*
 - BS EN 54-7: *Fire detection and fire alarm systems - Smoke detectors - Point detectors using scattered light, transmitted light or ionization.*
 - BS EN 54-11: *Fire detection and fire alarm systems - Manual call points.*
 - BS EN 54-12: *Fire detection and fire alarm systems – Line detectors using Optical Beam*

- BS EN 54-18: *Fire detection and fire alarm systems - Input/output devices.*
- BS EN 54-20: *Fire detection and fire alarm systems – aspirating smoke detectors.*
- BS EN 54-23: *Fire detection and fire alarm systems. Fire alarm devices. Visual alarm devices.*
- BS EN 54-25: *Fire detection and fire alarm systems – Components using radio links.*
- BS 5839-1: *Fire detection and fire alarm systems for buildings – Part 1: Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises.*
- BS 7671: 2008 + A3: 2015. *Requirements for Electrical Installations. IET Wiring Regulations. Seventeenth Edition.*

1.5.2 The fire detection and alarm system shall be in accordance with NT document entitled 'General Requirements for Fire Alarm Systems to be Installed for the National Trust Rev E' (copy attached). It shall also comply with the recommendations for a Category L1/P1 system, as defined in BS 5839-1.

1.5.3 On completion of the work, the Contractor shall issue a design certificate, an installation certificate, a commissioning certificate and an acceptance certificate of the types shown in Annexes H.1, H.2, H.3 and H.4 of BS 5839-1.

1.5.4 In addition, the Trust requires that a certificate of conformity shall be issued by an LPS 1014 certificated firm or, alternatively, that certificates in respect of the appropriate modules be issued by a certified member of the BAFE SP203-1 Scheme.

1.5.5 The Contractor shall draw attention, prior to the installation work, to any aspects of the proposed system that, in the opinion of the Contractor, would prevent compliance with the British Standards listed above. The absence of such comment by the Contractor shall be deemed to imply that the warranty offered encompasses all the requirements and recommendations of the British Standards listed above.

1.5.6 The versions of all British Standards referred to in this specification shall be those current at the date of commencement of the contract and shall include any prior amendments.

1.6 Reference Drawings

1.6.1 An indicative design of the new fire alarm system in the manor house has been carried out and the following drawings have been marked up showing the location of existing detectors, to be replaced on a like for like basis, where existing detectors must be replaced with detectors of an alternative type, where replacements for existing detectors should be relocated and where new detectors are to be added.

- 1.6.2 N/15/01-01 – Basement
- N/15/01-02 – Ground floor
- N/15/01-03 – First floor
- N/15/01-04 – Second floor

1.7 Programme

- 1.7.1 The Contractor, as part of the tender submission, shall include a provisional programme of works. The programme shall include all stages of the work up to, and including, handover, and shall be in a format acceptable to the Trust.
- 1.7.2 The Contractor's programme shall take into account the occupancy of the buildings during the installation and commissioning periods, and be flexible to accommodate any restrictions to working. Hours of work shall be subject to agreement with the Trust. Canons Ashby's opening times are available on the internet but, generally, are between 10:00 and 17:00 hours each day.
- 1.7.3 There may be limited access to the roof voids, due to the presence of bats in certain seasons. This should be discussed with the Trust.
- 1.7.4 During the upgrade programme, there will be occasions when parts of the fire detection and alarm system in Canons Ashby will need to be disabled for the connection of new devices. This downtime shall be kept to a minimum and, where possible, shall not be during the admission of the public to the site. The Contractor shall, at the beginning of each day, advise the Trust of the areas that are to be disabled. At the end of each day, the Contractor shall advise the Trust of any new devices that are now active. No part of the existing fire alarm system shall be disabled overnight, without prior approval of the Trust.
- 1.7.5 The programme shall include for progress meetings (during normal working hours) between the Contractor, the Trust and the Engineer, at times to be agreed by the Trust.
- 1.7.6 Site visits or surveys should be arranged with:
Helen Roadnight, House Manager
01327 861902, helen.roadnight@nationaltrust.org.uk

1.8 Working Drawings and Documents

- 1.8.1 Before the commencement of the installation work, the Contractor shall submit two copies of drawings in AutoCAD and PDF format, for approval by the Trust and the Engineer. These drawings shall indicate the proposed location of all devices, interfaces, control and indicating equipment, and cable routes. The Contractor shall provide wiring schematics, calculations and drawing details, as directed by the Trust and the Engineer.

1.9 Commissioning and Acceptance Testing

- 1.9.1 The Contractor shall confirm that:

- a) All new manual call points and detectors be tested and operate correctly. It shall be ensured that the correct indications, both visual and audible, are given at the fire alarm control panel and display devices supported by the 'NIMBUS' system.
- b) All manual controls at the fire alarm control panel operate correctly, including those for disablement of new devices or circuits.
- c) All new electronic sounders operate correctly and that the audibility levels throughout the Manor House, the Coach House and the Stables are verified and recorded on the 'as fitted' drawings.
- d) All existing output interface units and auxiliary equipment operate in the required manner.
- e) The 'NIMBUS' system receives correct signals of all events that occur on the fire detection and alarm system.
- f) The fire detection and alarm system complies with the operational sequence detailed in Section 5.
- g) The standby batteries for the fire alarm control and indicating equipment and any other power supplies forming part of the new system are adequately sized. Measurements of the quiescent and alarm loads shall be taken and compared with calculated values used at the design stage. Calculations and measurements shall be submitted to the Trust and the Engineer.

1.9.2 Commissioning shall be fully documented and the documentation submitted to the Trust and the Engineer.

1.9.3 The Contractor shall demonstrate the fire detection and alarm system by conducting a series of witnessed acceptance tests, as directed by the Trust and the Engineer. This shall take place after the commissioning of the system, as detailed in 1.9.1, and following receipt of the commissioning documentation by the Trust and the Engineer. Acceptance testing shall include the actuation of a sample of devices in the system, simulation of various faults, and operation of all manual controls. However, the Trust reserves the right to see 100% witness testing of all devices.

1.9.4 When new devices are commissioned and made active on the system, all activations during the subsequent seven days shall be recorded and investigated, and the necessary action taken to prevent re-occurrence. This arrangement is in place of the normal soak testing of new devices.

1.10 Record Drawings and O&M Manuals

1.10.1 Prior to handover, the Contractor shall furnish the Trust with two copies of the O&M manuals. An electronic copy of the O&M manual shall also be supplied in an agreed media format, to allow electronic storage. The O&M manual shall include:

- a) System overview and operating instructions.
- b) Wiring test results for any new cabling.
- c) System certificates as indicated in 1.5.3 and 1.5.4.
- d) Evidence that the standby batteries for the main fire alarm control panel, and any other fire alarm equipment that has been affected by this works,

are adequately sized. This evidence shall include measurement of the actual quiescent and alarm loads.

- e) 'As fitted' drawings showing the layout of all equipment, cable routes and cable sizes/types used. Every addressable device shall be labelled with its address details. The same information shall also be provided in AutoCAD and PDF format.
- f) A full list of all configured addressable devices including address, device type and text details. For interface units, the function of each device should be identified.
- g) Maintenance instructions.
- h) Relevant manufacturer's technical data sheets.

1.10.2 The Trust will not authorise the penultimate or final payment to the Contractor until the documentation in 1.10.1 above has been formally handed over and accepted.

1.11 Manufacturer's Requirements

1.11.1 The system shall be installed in accordance with the manufacturer's instructions. In particular, the Contractor shall take due note of, and comply with, the manufacturer's instructions on circuit design, loadings, and interfacing of other equipment, where appropriate.

1.12 Builders' Works

1.12.1 The Trust requires that the successful Contractor sub-contracts all builder's work to a contractor approved by the Trust. Details of such contractors are available from the Trust.

1.12.2 The Contractor shall be responsible for builders' works associated with the installation of new wiring and equipment, and the removal of existing equipment and wiring. The builders' work and making good to be undertaken by the Approved Contractor shall include, but not be limited to, the following:

- a) Creation of breakthroughs.
- b) Fire stopping of penetrations.
- c) Removal and replacement of suspended ceilings.
- d) Lifting and replacement of floor boards
- e) Making good surfaces suitable for final decoration by others, subject to agreement with the Trust.

1.12.3 The Contractor shall provide all special tools, scaffolding, specialist plant and/or other equipment required for the execution of the contract.

1.12.4 The Contractor shall obtain authorisation from the Trust, before installation of any equipment, due to the Grade I listed status of the buildings.

1.12.5 The Trust's insurers require that any penetrations through fire compartmentation walls and ceilings be undertaken by a FIRAS accredited contractor.

- 1.12.6 The details of the builder(s) the Contractor intends to be used for this work shall be detailed in Appendix 4. The Trust reserves the right to nominate specific contractors where appropriate.

1.13 Removal of Existing Equipment and Wiring

- 1.13.1 The existing fire alarm system that is made redundant by the replacement system shall be taken out of service, removed and disposed of as part of the contract in an environmentally sensitive manner. Any making good after the removal of such equipment shall also be undertaken by the Contractor with agreement from the Trust.

1.14 Spares

- 1.14.1 The Contractor shall provide a list of recommended spare parts and their associated costs (see Appendix 3). This list shall be submitted with the tender. Purchase of spares will be at the option of the Trust and will be additional to the contract sum.
- 1.14.2 Spares shall be available for a minimum of 10 years following the date of the final commissioning of the system.

1.15 Warranty and Maintenance

- 1.15.1 The Contractor shall provide a warranty of 12 months from the date of practical completion for the system, including all equipment and wiring covered by this contract. This shall include an emergency call-out service, available at all times (i.e. 24 hours per day, every day), with a call-out response time of no longer than four hours. It shall include all charges levied in connection with such call-outs during the warranty period.
- 1.15.2 As part of the contract, the Contractor shall include, as an option, for routine service and maintenance contracts for the system during the warranty period and for a period of 12 months from the end of this warranty period.
- 1.15.3 The quotation for the service and maintenance contract for the 12 months after the end of the warranty period shall provide, as options, for both standard and comprehensive cover.
- a) A standard contract shall include for routine six-monthly and annual inspection and testing in accordance with the recommendations of BS 5839-1.
 - b) A comprehensive contract shall include for the routine six-monthly and annual inspection and testing in accordance with the recommendations of BS 5839-1 and a 24-hour emergency call-out service, with a response time of no greater than four hours. All costs associated with labour and parts shall be included.

1.16 Staff Training

- 1.16.1 The Contractor shall provide refresher training in the operation of the system. The training for staff shall be in the form of a short course, lasting for no

longer than 30 minutes. The training schedule shall allow for two such sessions. The course shall cover, as a minimum, the following:

- a) A brief familiarisation of the fire detection and alarm system across the site.
- b) The indication of alarms and faults on the fire alarm control panels in the Manor House and Coach House shop.
- c) The use of all manual controls.
- d) The operational sequence.
- e) Procedures for routine testing.
- f) Procedures for isolating and restoring devices.
- g) Procedures for resetting the system clock.
- h) The use of additional display devices, e.g. smartphones operating from the 'NIMBUS' system.

1.17 Verification of Site Details

- 1.17.1 The Contractor shall be responsible for ensuring that the existing structure and site conditions are adequate for executing all work arising from the contract.

1.18 Attendance by Others

- 1.18.1 The Contractor, as part of this contract, shall arrange any attendance by others required in connection with interfacing of other services and systems, but the cost of such attendance by others will not be included in the contract. The Contractor shall provide details of any such arrangement in Appendix 4.

1.19 Protection of the Site and its Occupants

- 1.19.1 The Contractor shall protect against all hazards to the structure, fabric and contents of the buildings, and to its occupants, during the execution of his work. Risks include, but are not limited to:
 - a) The dropping of tools, ceiling tiles, roof tiles, liquids or other dangerous objects.
 - b) Insecure ladders, scaffolding and slippery floors.
 - c) Faulty, insecure and casually handled electrical equipment and hand tools.
 - d) Oil, grease and dirt.

1.20 Method Statement and Risk Assessment

- 1.20.1 At least two weeks prior to commencing work on site, the Contractor shall submit a method statement and risk assessment for consideration by the Trust.
- 1.20.2 The method statement and risk assessment shall include, but not be limited to:
 - a) Complying with work restrictions and hours of work.
 - b) Protection of the buildings, contents and their occupants.

- c) Identification of hazards and control measures.
- d) Installation method.
- e) Method of removal and disposal of existing equipment and wiring.

1.20.3 The method statement shall detail the methods to be employed to protect the contents of the buildings including carpets, furniture, fittings etc.

1.21 Health and Safety

1.21.1 The Trust operates a 'no hot work' policy, which must be strictly observed for this contract.

1.21.2 The Trust's Health and Safety requirements shall be fully complied with throughout the duration of the contract. This shall include a risk assessment for the works (see 1.19.)

1.21.3 The Contractor shall ensure compliance with the Health and Safety at Work, etc. Act 1974 and the Construction (Design and Management) Regulations 2015.

1.22 Definitions

Building(s):	Any of the buildings listed under site.
The Trust:	National Trust.
Contractor:	The specialist fire alarm company appointed by the Trust to carry out the works required by this specification.
Approved Contractor	The building contractor approved by the Trust to carry out the building work needed to comply with this specification.
Detector:	Also referred to as automatic detector, but includes point smoke detector, optical smoke detector, heat detector, multi-sensor, optical beam detector and aspirating detector.
Device:	Automatic detector, manual call point, interface, etc.
Engineer:	Specialist appointed by the Trust.
O&M Manuals:	Operation and maintenance manuals.
Site:	Canons Ashby, near Daventry, Northamptonshire, NN11 3SD.
Specification:	This technical specification and any tables, appendices or attachments thereto.
System:	The fire detection and alarm system (unless otherwise stated).

2. BRIEF DESCRIPTION

- 2.1.1 The existing fire alarm systems in Canons Ashby and associated buildings are to be replaced and the new system is to meet the recommendations of BS 5839-1 for a Category L1/P1 system in the Manor House.
- 2.1.2 The current radio communication system and pager system are being replaced with a new system combining both functions under a separate contract. The new system is to be interfaced with the fire alarm system, to allow staff to be given details of faults and activations.
- 2.1.3 The National Trust have indicated a preference for the new fire alarm system to be a wired system, to minimise maintenance costs and maximise reliability. So as to minimise disruption, it is intended to utilise existing wiring, where possible.

2.2 Components

- 2.2.1 In brief, the replacement fire detection and alarm system shall include:
- a) Control and indicating equipment located in the Manor House and the Coach House, which also covers the Stables.
 - b) Manual call points.
 - c) Point type heat, smoke and multi-sensor detectors.
 - d) Electronic sounders.
 - e) Any interfaces to link to fire protection equipment, the pager system and the automatic communication to the fire and rescue service.
 - f) The necessary hardware to allow the system to be monitored by the 'NIMBUS' system.
 - g) Any wiring needed to meet the requirements of this specification.

2.3 Alarm Strategy

- 2.3.1 The alarm strategy for the upgraded fire detection and alarm system shall be as outlined in Section 5.

2.4 Interfaces

- 2.4.1 Interfaces shall be provided as required, to meet this specification.

3. SYSTEM REQUIREMENTS

3.1 General

- 3.1.1 Signals from detectors shall be processed in such a way as to discriminate, as far as possible, between sources of fire and false alarms, and shall identify detectors that are becoming dirty. As a minimum, multi-state indications, i.e. normal, fire, fault and pre-alarm warning, shall be provided for each detector.
- 3.1.2 Any delay in the operation of primary output circuits shall not exceed three seconds in response to the operation of a manual call point.
- 3.1.3 It shall be possible to interrogate detectors to determine their analogue values and display these on the alphanumeric display of the fire alarm control panel. There shall be the facility to display an individual detector's value separately.
- 3.1.4 The controlling software of the system shall configure detectors and manual call points into zones, as detailed in Section 4.
- 3.1.5 The system shall be programmed to support the fire alarm strategy set out in Section 5.
- 3.1.6 The system shall be immune to EMC-related interference. In particular, the Contractor shall take into account the use of mobile telephones, pagers, computers and other electrical equipment used in the building.

3.2 Wiring Arrangements

- 3.2.1 Any new wiring in the Manor House shall be MICS cable, in accordance with the National Trust's standard for historic properties, and shall also meet the recommendations of BS 5839-1 for at least 'standard' fire-resisting cables.
- 3.2.2 The cables of the fire alarm system in the Coach House and the Stables shall meet the recommendations of BS 5839-1 for standard fire-resisting cables, but do not need to be of the MICS type.

3.3 Circuit Design and System Architecture

- 3.3.1 The three buildings on site, namely the Manor House, the Stables and the Coach House, are located relatively close to each other. The control and indicating equipment in the Manor House and the Coach House should display the same information, whilst operating in accordance with Section 5.
- 3.3.2 The system loading should be aimed at no more than 80% total capacity.
- 3.3.3 Removal of a device from the system shall not cause any remaining devices in the system to become inoperative.

3.3.4 It shall be possible to disable and re-enable detectors on the system. The controlling software shall permit individual detector disablement and detection zone disablement. Such detection zone disablement shall not render manual call points in the same zone inoperative.

4. ZONING

4.1 Detection Zones

4.1.1 The fire detection and alarm system shall be divided into zones.

4.1.2 The zone numbers in the Manor House shall be reconfigured to follow the recommendations of BS 5839-1 as follows.

1	Cellars
2	Ground Floor
3	Mezzanine Floor
4	First Floor
5	Second Floor
6	Tower Room
7	Main Stairway
8	Stairway 1
9	Stairway 2
10	Stairway 3
11	Donors Flat 1
12	Guest Flat

4.1.3 Coach House and Stables zones:

20	Shop/reception
21	Ladies WC
22	Gents WC
23	Gardener's Store
24	Attics
25	Stables Kitchen
26	Tea Room

4.2 Alarm Zones

4.2.1 The system shall be configured into the following alarm zones.

1	Manor House
2	Donors Flat 1
3	Guest Flat
4	Coach House shop
5	The Stables

5. OPERATIONAL REQUIREMENTS

5.1 General

5.1.1 The main buildings of Canons Ashby are, essentially, to be treated as one, for the purposes of the operation of the fire detection and alarm system.

5.2 Action in the Event of a Fire Alarm Condition

5.2.1 The activation of any manual call point or detection device shall result in:

- a) An appropriate visual and audible indication at the fire alarm control panels and any display devices.
- b) The activation of the fire pager.
- c) Operation of alarm devices in all alarm zones in evacuate (continuous) mode.
- d) Operation of all output interface units.
- e) Transmission of a fire signal to an alarm receiving centre (ARC) that is staffed at all times.
- f) Transmission of the appropriate data to the 'NIMBUS' system.

5.3 Action in the Event of a second detection device

5.3.1 The activation of a second manual call point or detection device shall result in:

- a) An appropriate visual and audible indication at the fire alarm control panels and any display devices.
- b) The activation of the fire pager.
- c) Operation of alarm devices in all alarm zones in evacuate (continuous) mode.
- d) Operation of all output interface units.
- e) Transmission of a verified fire signal to an alarm receiving centre (ARC) that is staffed at all times.
- f) Transmission of the appropriate data to the 'NIMBUS' system.

5.4 Silencing of the Alarm Sounders

5.4.1 Operation of the silence alarm control at the fire alarm control panel shall silence all sounders and switch off all visual alarms.

5.5 Resetting of the Alarm

5.5.1 Operation of the reset control at the fire alarm control panel shall reset the alarm.

5.6 Action in the Event of a Pre-alarm Condition

5.6.1 A pre-alarm condition shall result in appropriate visual and audible indication at the fire alarm control panels and any display devices.

- 5.6.2 The activation of the fire pager.
- 5.6.3 The transmission of the appropriate data to the 'NIMBUS' system.
- 5.6.4 It shall not result in the operation of any alarm warning devices or plant shutdown.
- 5.6.5 The pre-alarm condition will be investigated by the person responsible for the fire alarm system.

5.7 Action in the Event of a Fault Condition

- 5.7.1 A fault condition anywhere in the system shall result in appropriate visual and audible indication on the fire alarm control panels.
- 5.7.2 The transmission of the appropriate data to the 'NIMBUS' system.
- 5.7.3 The transmission of a fault signal to an ARC that is staffed at all times.
- 5.7.4 The fault condition shall be investigated by the contractor responsible for maintenance of the fire alarm system.

6. MANUAL CALL POINTS

6.1 General

- 6.1.1 Manual call points shall be addressable, coloured red and of the KAC type, or equivalent and approved, and complying with the requirements of BS EN 54-11 (single action Type A). They shall be suitable for use with the control and indicating equipment, and shall utilise a compatible signalling protocol.
- 6.1.2 The breaking of the manual call point's frangible element shall not result in the discharge of any fragments of glass or the like. Call points with resettable, plastic elements are preferred.
- 6.1.3 Manual call points shall be installed in the same locations as for the current fire alarm system (but see also 6.1.4).
- 6.1.4 A manual call point shall be located near to the fire alarm control panels, unless activation of the system into alarm can be achieved by a manual operation of the control panel.
- 6.1.5 Manual call points shall be mounted at a height of 1.2m above finished floor level, at easily accessible, well-illuminated positions that are free from potential obstructions and so as to avoid accidental activation.
- 6.1.6 Manual call points shall be fitted with clear plastic protective flaps, to aid in the avoidance of unwanted alarms.

7. AUTOMATIC DETECTORS

7.1 Point Type Detectors

- 7.1.1 Automatic point type smoke detectors and multi-sensor detectors shall comply with BS EN 54-7; point type heat detectors shall comply with BS EN 54-5 (Class A1 or A2).
- 7.1.2 Automatic point type detectors shall be installed in accordance with the spacing recommendations set out in BS 5839-1. The location of existing and new detectors is shown on the attached drawings (see Section 1.6). The final location of new and repositioned detectors shall be confirmed with the Trust and the Engineer.
- 7.1.3 All point type detectors shall be sited in accordance with the recommendations of BS 5839-1. Specifically, the Contractor shall ensure that no detector is closer than 500mm to a wall, beam or other ceiling obstruction.
- 7.1.4 Automatic detectors shall be addressable and compatible with the chosen range of control and indicating equipment.
- 7.1.5 Smoke, multi-sensor and heat detectors shall incorporate a red LED, to indicate operation, mounted in the detector or the base, oriented to make it easy to confirm operation. Any special fixing arrangements for mounting detectors shall be provided as part of the contract.
- 7.1.6 All detectors shall be of the low-profile type.
- 7.1.7 The type of detector used shall be based on meeting the objective of ensuring the earliest possible warning of fire, with the least likelihood of false alarms, and shall be determined as part of the Contractor's final design and agreed with the Trust and the Engineer.
- 7.1.8 If, during the warranty period, the sensitivity, alarm level or time delay settings require adjustment to avoid false alarms, this shall be undertaken by the Contractor as part of this contract.

7.2 Aspirating Detectors

- 7.2.1 The Drawing Room and Spencer's Room on the first floor have particularly ornate ceilings. The rooms are currently protected by point detectors, but the Trust requires the option to utilise aspirating smoke detection (ASD) instead.
- 7.2.2 The rooms are adjacent to one another, and it is envisaged that a single detector could be installed to protect both rooms. Tender proposals should include the option of ASD for these two rooms.

7.2.3 The voids above these two rooms currently do not have any detection. The Contractor shall include detection in these voids, either by the ASD or point detection.

7.2.4 In the cupboard in the Winter Parlour on the ground floor, there is a large void, which is not protected, currently. Access for servicing a detector would be problematic, so a remote sensing device should be considered, where the detector can be accessed from the cupboard, but the sensing is located in the void.

7.3 Beam Detectors

7.3.1 To avoid the fitting of a point detector to the ceiling of the ground floor entrance to the main staircase, a beam detector shall be installed, with the transmitter and receiver/reflector mounted above the door frame lintels.

8. CONTROL AND INDICATING EQUIPMENT

8.1 Control and Indicating Equipment

- 8.1.1 The existing control panel in the Manor House shall be replaced by new control and indicating equipment.
- 8.1.2 The Coach House and Stables control panels shall be replaced by a single control panel, located in the same place as the current Coach House control panel.
- 8.1.3 The two control panels in the Manor House and the Coach House shall be networked such that the displays indicate the same information.
- 8.1.4 The control and indicating equipment shall comply with the requirements of BS EN 54-2, but shall also satisfy the requirements detailed in the remainder of this section.
- 8.1.5 The primary means of displaying a fire alarm shall be via an individual visual red indicator for each detection zone.
- 8.1.6 A secondary means of individually displaying all alarms, faults and other events shall be provided, comprising an alphanumeric display. There shall be sufficient characters to display a plain English text description of the identity, nature, location and time of each event, including the device type and address number. An example of a typical displayed message is:
- Fire Loop 1, Device 33 15:13
Smoke Detector
The Stables Tea Room
- 8.1.7 An identical message should be displayed on all control panels and other devices (smartphones, etc.), for each unique event.
- 8.1.8 The text description for each zone and device shall be subject to approval by local Trust staff and the Engineer, prior to programming and finalisation of the zone diagrams.
- 8.1.9 Alphanumeric displays shall be clearly visible, e.g. vacuum fluorescent, back-lit liquid crystal type or equivalent, and be mounted at eye level.
- 8.1.10 The control and indicating equipment shall store all events occurring on the system in memory ('the event log').
- 8.1.11 Access to the event log and to the software to reconfigure text shall be restricted to authorized persons by the use of passwords or similar means.
- 8.1.12 The control and indicating equipment shall have a facility for testing the operation of the indicators. Operation of this shall momentarily cause all visual indicators to be illuminated and the internal buzzer to sound.

- 8.1.13 Facilities shall be provided at the local control and indicating equipment to permit disablement and re-enablement of any individual device or group of devices. Any disablement shall result in an audible and visual indication on both control and indicating equipment.
- 8.1.14 In addition to other controls specified elsewhere in this specification, the control and indicating equipment shall incorporate secure switches (not software implemented functions) to:
- a) Silence alarms.
 - b) Re-sound alarms.
 - c) Start alarms sounding. This may be combined with 2) above.
 - d) Reset the system.

8.2 Zone Diagram

- 8.2.1 A zone diagram shall be provided adjacent to the control and indicating equipment. The zone diagram shall show a diagrammatic representation of the buildings, showing at least building entrances, main circulation areas and the division into detection zones.
- 8.2.2 The zone diagram shall be supplied in a secure picture frame.
- 8.2.3 The zone diagrams shall be appropriate to the two locations.

8.3 Power Supplies

- 8.3.1 If the existing cabling between the electrical distribution board and the new control and indicating equipment described in 8.1 is not fire-resisting, the Contractor shall arrange for an NICEIC registered electrician to rewire this connection in fire-resisting cabling and provide the relevant certification. This work shall be shown as a separate activity in the pricing schedule in Appendix 1.
- 8.3.2 The mains supply for the new control and indicating equipment shall be terminated in an adjacent, secure double pole isolator, to meet the recommendations of BS 5839-1.
- 8.3.3 The standby power supply for the control and indicating equipment shall incorporate batteries of sufficient capacity to operate the control and indicating equipment and all associated devices during the failure of the normal power supply for:
- a) 24 hours in the quiescent state and, thereafter, for
 - b) 30 minutes in the alarm state, with all alarm devices operating.
- 8.3.4 The charger shall be capable of fully recharging the battery, from a fully discharged state, within 24 hours.
- 8.3.5 The standby power supply may, if not included within the control and indicating equipment, be housed in a separate adjacent enclosure. In the latter case, details of the size of the separate enclosure shall be given so

that arrangements can be made to accommodate it. Where a separate enclosure is used to house the standby power supply, the fuse protection shall be located in the separate enclosure so as to protect interconnecting cables.

- 8.3.6 The main and standby power supply shall be fully monitored for faults, indications of which shall be displayed on the control and indicating equipment.
- 8.3.7 The power supply shall comply with the requirements of BS EN 54-4.

9. ALARM DEVICES

9.1 Electronic Sounders

- 9.1.1 The electronic sounders shall comply with the requirements of BS EN 54-3. They shall be adjustable, to increase or decrease the sound levels to suit the local area.
- 9.1.2 Electronic sounders shall be installed in all areas.
- 9.1.3 Loop-driven base sounders shall be used and 50% of the detectors should be provided with sounders to ensure that the alarm levels required in BS 5839-1 are met.
- 9.1.4 The sound output shall be adjustable, either at the sounder or at the control and indicating equipment, to enable an even level of alarm sound to be achieved throughout the buildings.
- 9.1.5 The exact positioning of the electronic sounders shall be agreed with the Trust and Engineer during a pre-start tour of the site at the beginning of the works.

9.2 Visual Alarm Devices

- 9.2.1 Visual alarms, complying with BS EN 54-23, shall be located in all public toilet areas.

9.3 Audibility Tests

- 9.3.1 The Contractor shall conduct an audibility test during the commissioning of the system and shall record the following on a set of drawings:
 - a) The sound levels achieved.
 - b) Where any additional sounders are required in order to meet the requirement of BS 5839-1.
- 9.3.2 The drawings associated with 9.3.1 shall be issued to the Trust and Engineer with the commissioning documentation.
- 9.3.3 The installation of any additional sounders as a result of 9.3.1(b) shall be the subject of a variation to the contract.

10. INTERFACE WITH OTHER EQUIPMENT

10.1 Existing Interfacing

- 10.1.1 There shall be no changes in functionality to the existing interfacing with third party equipment.

10.2 Remote Monitoring

- 10.2.1 The existing 'Redcare' signalling of fire, verified fire and fault to an ARC shall be retained, although it may be necessary to arrange for connection to a different ARC, i.e. one that is able to operate with a 'NIMBUS' system.

10.3 'NIMBUS' System

- 10.3.1 A new 'NIMBUS' system interface shall be provided, using either wired or radio transmission, as deemed most appropriate and as agreed with the Trust.
- 10.3.2 Currently the only ARCs that are operating 'NIMBUS' and are, therefore, approved by the Trust, are Mitie, SMS and EMCS. For simplicity and cost effectiveness, the same ARC should be used for Security, remote monitoring and 'NIMBUS'. If the current ARC for security or remote monitoring is not one of the above, they should be put on notice and arrangements made to make the change, so that all three functions use the same ARC.

10.4 Radio Pager

- 10.4.1 The National Trust at Canons Ashby are investing in a new radio pager system; provision shall be made to interface to this new system.

11. WIRING AND INSTALLATION

11.1 General

- 11.1.1 All cables and internal wiring within enclosures shall be standard fire-resisting cable complying with the recommendations of sub-section 26.2 of BS 5839-1 and with an overall LSF sheath, in red. All cable accessories, such as clips and gland shrouds, shall also be supplied with LSF sheaths in red.
- 11.1.2 All cables shall have a minimum conductor size of 1.5mm².
- 11.1.3 All cables, in the Manor House, shall be of the MICS type, to comply with the Trust's requirements for the wiring of fire alarm systems in historic properties.
- 11.1.4 The coach house and the stables are considered of less historic importance and the requirement for MICS does not apply.

11.2 Cable Routes

- 11.2.1 The Contractor shall be responsible for determining the routes of all cables, and for ascertaining the lengths and sizes of all cables covered by this specification and to be provided as part of the contract.
- 11.2.2 Because of the nature of the building, proposed cable routes, where visible, shall be agreed with the Trust, before the installation of the cables.
- 11.2.3 Fire alarm cables shall not share the containment for data cables, mains distribution cables or other existing cables, unless separated from them by a partition within trunking.
- 11.2.4 The method of cable support and the proposed routes shall be subject to the agreement of the Trust and the Engineer. Generally, where more than three new cables are run together, they shall be laid on a galvanized metal cable tray, sized to take all cables required, plus 20%. The trays shall be suitable for bracket fixing, either to the wall or the ceiling. Metal fittings shall be used to secure cables to trays; plastic ties shall not be used.
- 11.2.5 All cables shall be clearly numbered using cable markers at both ends and where they enter or leave containment. These numbers shall be shown on the 'as fitted' drawings.
- 11.2.6 Penetrations drilled through walls or ceilings to accept cabling shall be sealed through the length of the penetration using a fire-resistant material. See also Section 7.3 of the National Trust specification: FAS General Requirements (Revision E).
- 11.2.7 All wiring shall be installed as neatly and unobtrusively as possible. Wiring shall, wherever possible, be concealed in ceiling or floor voids, or behind wall panels or covers. Cables shall be clipped to the structural elements of

the building at regular intervals not exceeding 300mm, including those within ceiling and floor voids.

11.2.8 The routes and type of cables used shall be shown on the 'as fitted' drawings.

11.3 Junctions

11.3.1 Joints in cables shall be limited to those required at devices specified, except as approved by the Trust and the Engineer.

11.3.2 All new junction boxes shall be red in colour. They shall be allocated numbers, which shall be shown on the 'as fitted' drawings, and clearly marked on the outside of each box. Terminal blocks and core ends shall be clearly marked, to identify the connections and function of each core. Any junction boxes containing relays shall be suitably marked with the function of each relay.

11.3.3 Cable ends shall be clearly marked at each point of termination, to identify the cable connections.

11.4 Mounting of Fire Alarm Components

11.4.1 The Trust requires that all building work is carried out by a building contractor approved by them.

11.4.2 All components of the fire alarm system shall be rigidly fixed to the structure of the building.

11.4.3 The Approved Contractor shall be responsible for drilling any holes needed for the mounting of equipment and any necessary making good.

11.4.4 The exact location of all equipment shall be approved by the Trust and Engineer, before the equipment is fitted. The Contractor shall be responsible for ensuring that no other services or facilities will be adversely affected by the installation of the new equipment. All junction boxes, equipment and any serviceable items must be sited so as to be freely accessible for maintenance, etc.

11.5 Workmanship

11.5.1 A high standard of workmanship is required in the installation of the wiring and other mechanical fittings.

11.5.2 The screen shall be earthed or terminated in accordance with the control panel manufacturer's instructions. Unless the manufacturer states otherwise, the screen shall be earthed and terminated at one point only. Multiple earths shall be avoided.

11.5.3 The installation shall be in accordance with the requirements of BS 7671.

11.5.4 Safety earths for metal boxes, cable trays and other exposed metal parts shall be earthed in accordance with the requirements of BS 7671, and not by using the screen of the cable.

12. LABELLING

12.1 General

- 12.1.1 Labels shall be permanent (e.g. printed on light fast, fade resistant plastic) or engraved on 'Traffolyte', rigidly fixed and of a type that is appropriate to their location. Letters shall be red on a white background.
- 12.1.2 Labels on loop devices may take the form of plastic tags, which must be legible from floor level.
- 12.1.3 The Contractor shall supply and mount labels that identify and, where necessary, provide location and/or operating instructions for all:
 - a) Items of control equipment.
 - b) Loop devices (manual call points, detectors, short-circuit isolators, interfaces, etc.).
 - c) Sounders and visual warning beacons.
 - d) Cables.
 - e) Junction boxes.
 - f) Terminals within junction boxes and control panels.

13. IMAGES

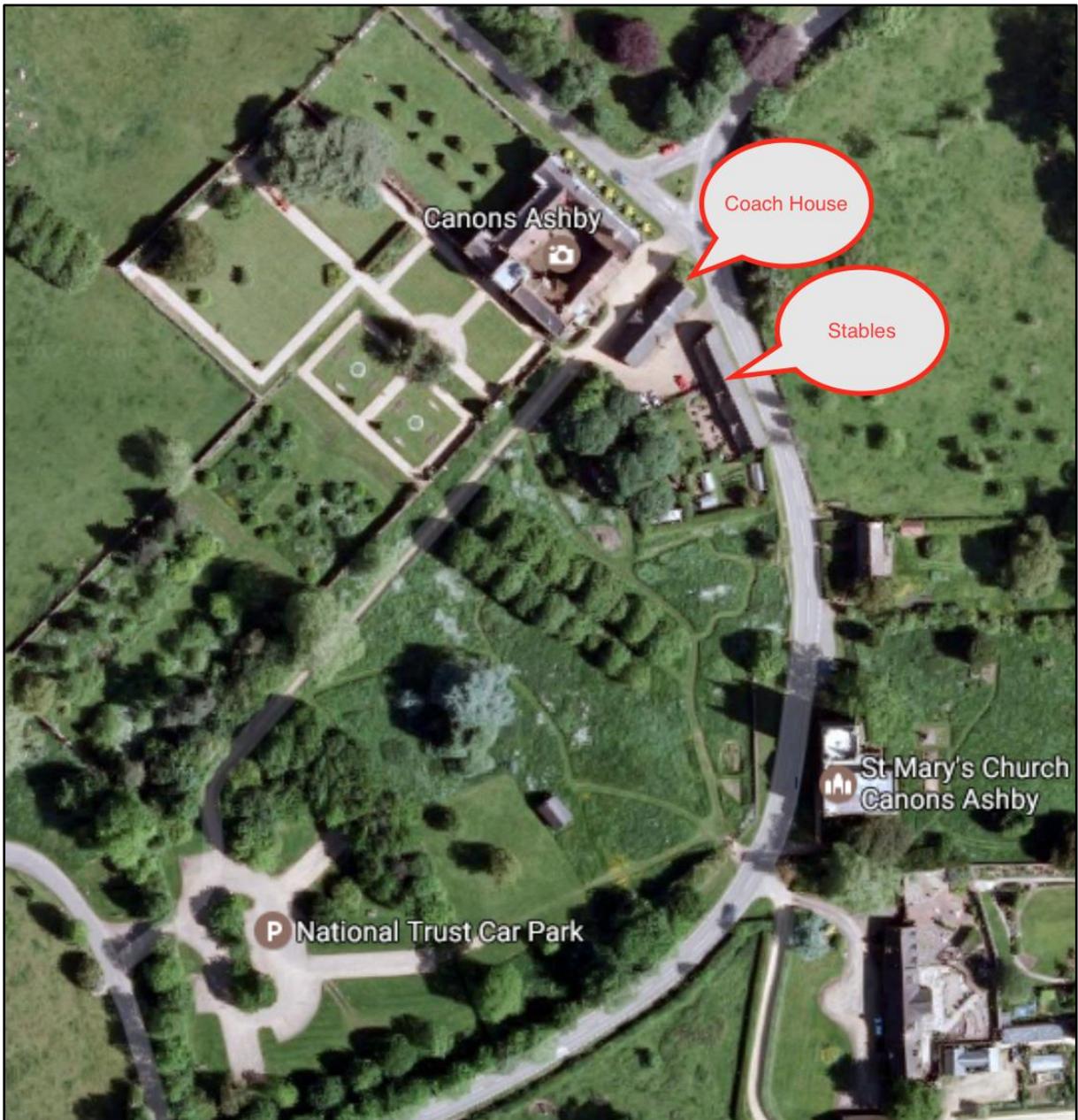


Figure 1 - Aerial view of the Canons Ashby site

APPENDIX 1 – SCHEDULE OF PRICES

	Item	Qty	Equipment and Material Unit Prices	Labour Unit Price	Total
1	Supply, installation and commissioning of the control and indicating equipment in Canons Ashby Manor House.				
2	Supply, installation and commissioning of the control and indicating equipment in Canons Ashby Coach House.				
3	Supply, installation and commissioning of manual call point.				
4	Supply, installation and commissioning of optical smoke detector c/w mounting base.				
5	Supply, installation and commissioning of optical smoke detector c/w integral sounder and mounting base.				
6	Supply, installation and commissioning of multi-sensor detector c/w mounting base.				
7	Supply, installation and commissioning of multi-sensor detector c/w integral sounder and mounting base.				
8	Supply, installation and commissioning of rate-of-rise heat detector c/w mounting base.				
9	Supply, installation and commissioning of rate-of-rise heat detector c/w integral sounder and mounting base.				
10	Supply, installation and commissioning of base mounted electronic sounder.				
11	Supply, installation and commissioning of optical smoke detector c/w integral audible and visual alarm and mounting base.				
12	Supply, installation and commissioning of interface module.				
13	Supply, installation and commissioning of short circuit isolators, as required.				
14	Supply, installation and connection of all system wiring including any data or power links required between Canons Ashby Manor House, Coach House and Stables.				

	Item	Qty	Equipment and Material Unit Prices	Labour Unit Price	Total
15	Removal of obsolete control and indicating equipment and devices.				
16	Making good in accordance with Section 1.10.2 d).				
17	Warranty Cover (see 1.13.1)				
18	Witness Testing (see 1.7.3)				
19	New mains cabling to control panel (see 8.3.1)				
20	Other items, if not included in the above prices.				
21					
22					
23					
24					
25					
26	Provisional sum of 5% of contract sum				
TOTAL CONTRACT PRICE =					
OPTIONS					
1	Routine Servicing and Maintenance during the warranty period (see 1.13.2).				
2	A one year standard contract for Service and Maintenance starting at the end of the warranty period (see 1.13.3 a).				
3	A one year comprehensive contract for Service and Maintenance starting at the end of the warranty period (see 1.13.3b).				
4	ASD detection in the Drawing Room and Spencer's Room (see 7.2.1 and 7.2.2)				
5	ASD detection in the void above the Drawing Room and Spencer's Room (see 7.2.3)				

APPENDIX 2 – SCHEDULE OF RATES FOR ADDITIONS AND DELETIONS FROM THE SCOPE OF SUPPLY

The tendering contractor shall quote, in the table below, rates for additions and deletions to the scope of supply. The quoted amounts shall be for the supply, installation and commissioning (including all necessary reprogramming of control equipment) of each item as appropriate.

	Item	Unit Price
1	Manual call point	
2	Optical smoke detector c/w mounting base	
3	Optical smoke detector c/w integral sounder and mounting base	
4	Rate of rise heat detector c/w mounting base	
5	Rate of rise heat detector c/w integral sounder and mounting base	
6	Multi-sensor detector c/w mounting base	
7	Multi-sensor detector c/w integral sounder and mounting base	
8	Mounting base with integral sounder	
9	Optical detector c/w audible and visual alarm and mounting base	
10	Interface module	
11	Short circuit isolator module	
12	10m of standard, fire-resistant MICS cable	
13	Hourly labour rate - normal working hours	/hr
14	Hourly labour rate - out of hours	/hr

APPENDIX 3 – SCHEDULE OF RECOMMENDED SPARES

The tendering Contractor shall quote, in the table below, the recommended quantity and unit price for commonly required spares and consumable items.

	Item	Qty	Unit Price	Total Price
1	Manual call point			
2	Optical smoke detector			
3	Rate of rise heat detector			
4	Multi-sensor detector			
5	Detector base			
6	Detector base with sounder			
7	Detector base with audible/visual alarm			
8	Interface module			
9	Short circuit isolator module			
10	Other common spares for control equipment or consumables. List below			
10a				
10b				
10c				
10d				
10e				
TOTAL COST FOR RECOMMENDED SPARES =				

APPENDIX 4 – SCHEDULE OF INFORMATION TO BE PROVIDED BY CONTRACTOR

1. The prices quoted include full compliance with the specification. YES/NO

2. If NO, proposed variations from the specification are as follows:

3. Name(s) of any sub-contractors(s), including electrical sub-contractor(s) and sub-contract builders:

4. Details of any attendance by others required in connection with interfacing of other services and systems (see 1.16.1).

This Appendix need not be completed if the above information is clearly contained within the tender submission.