MONKTON BUSINESS PARK

CCTV TENDER SPECIFICATION

&

HEALTH & SAFETY PLAN

Project No 1159/4288/CCTV/Rev3)

Dec 11th 2006
PRE TENDER HEALTH & SAFETY PLAN

The items contained in this Pre Tender Health and Safety Plan which have been extracted from the Preliminaries section of the Minor Works Contract and must be read in conjunction with the other tender documents.

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Planning Supervisor:

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Telephone: 01482 627722
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Email: hull@dtagroup.co.uk
SECTION NO.1 PRELIMINARIES

A10 PROJECT PARTICULARS

110A THE PROJECT:

**Nature:** CCTV Installation

**Location:** Monkton Business Park, Hebburn

**Timescale for completion of construction work:** Work will be carried out starting in Jan 2007 and completing before end March 2007

120G EMPLOYER (CLIENT):

One North East, Stella House, Goldcrest Way, Newburn Riverside, Newcastle Upon Tyne, NE15 8NY

127G THE PRINCIPAL CONTRACTOR:

CCTV Contractor

147A PLANNING SUPERVISOR:

DTA Consulting Engineers

148 ELECTRICAL ENGINEER: (hereinafter referred to as ‘CA’):

Alex Lyon – DTA Consulting Engineers

149 CLERK OF WORKS:

The CA will carry out the Clerk of Works duties

150G ACCESS/WORKING ARRANGEMENTS:

Provision for access will be arranged by the CA in accordance with clause 3.4 of the contract conditions.

The Contractor is to agree access to the site(s) with the CA before commencement of the works.

The Contractor is deemed to have visited the site(s) and ascertained the means of access and any limitations thereto; no claims for additional costs caused by access difficulties arising from the execution of the works and which were identified at the date of tender will be allowed.

Where work requires the co-operation of the occupant for access, it is the Contractors sole responsibility under the contract to arrange this access at reasonable times with the occupant.

The Contractor shall be responsible for pre-inspecting the works if necessary in order to fully determine and ascertain the detailed requirements of each Works Order.

A11 TENDER AND CONTRACT DOCUMENTS

THE TENDER DRAWINGS are:

Contract No 1159

1159/E/01 & 1159/E/02
THE PRE-TENDER HEALTH AND SAFETY PLAN is provided separately. It refers to information given elsewhere in the preliminaries, specification and drawings.

A HEALTH AND SAFETY FILE for the site is available for inspection by appointment during normal office hours at the Main Contractors site office.

PRICING OF PRELIMINARIES WITHIN TENDER:
The contractor shall base his price for the Preliminaries on the basis that 11 cameras will be installed.
Any camera deleted from the Contract will be in accordance with the Schedule of Rates and will not include for any loss of profit.


THE SITE/EXISTING BUILDINGS

EXISTING MAINS/SERVICES:
To be checked and agreed with the main contractor before the commencement of works.

USE OF SITE: The sites are not to be used for any purpose other than the execution of the contract.

RISKS TO HEALTH AND SAFETY:
The nature and condition of the site(s)/building cannot be fully and certainly ascertained before it is opened up. However the following risks are or may be present. All statutory underground services
The accuracy and sufficiency of this information is not guaranteed by the Employer or the CA and the Contractor must ascertain for himself any information required to ensure the safety of all persons and the works.

RISKS TO HEALTH AND SAFETY:
- The nature and condition of the site(s)/building cannot be fully and certainly ascertained before it is opened up.
- The Contractor must ascertain for himself any information he may require to ensure the safety of all persons and the works.

RISKS TO HEALTH AND SAFETY – ASBESTOS
ASBESTOS: No suspected or recorded presence of Asbestos products is known within the building or the site(s).

If the Contractor suspects or discovers further substances which may/does contain Asbestos this must be reported to the CA immediately so that advice on actions to be taken can be given.

The accuracy and sufficiency of this information is not guaranteed by the Employer or the CA and the Contractor must ascertain for himself any information he may require to ensure the safety of all persons and the works.
243G ADDITIONAL MATERIALS CONTAINING ASBESTOS:

- Should the Contractor expose any materials (other than those identified above) containing asbestos during the course of the contract all work in the vicinity thereof shall be halted and the situation reported to the CA.
- The Contractor shall take all reasonable precautions to prevent any unauthorised persons coming into contact with the asbestos.
- The CA shall forthwith inform the Contractor as to the appropriate action and if it is decided to remove or encapsulate the asbestos this work will be carried out by a specialist who will be required to take the correct safety precautions when working with the material.

280 SITE VISIT: Before tendering, ascertain the nature of the site, access thereto and all local conditions and restrictions likely to affect the execution of the works.

SITE VISIT may be made by appointment with Alex Lyon Tel 01482 627722 mob 07810 567888

A13 DESCRIPTION OF WORK

110G GENERAL DESCRIPTION

- The works covered by this Contract and these schedules of rates comprise.
  The installation to complete operation of CCTV cameras, equipment, cables, controls and Radio Links and shall include for the monitoring and response of the installed system.

- Works Orders: All works orders shall be issued in writing by the CA shall give the following details.

  Works orders issued by the CA shall give the following details.

  a) Address of the premises
  b) Date when works order raised
  c) Description of the works required to be executed and period for completion
  d) Works order reference number
  e) Guidance on access availability where appropriate and person to contact

- The unit rates shall be deemed to include for the fact that the Employer does not bind itself to provide any guaranteed volume or continuity of work within the schedules and the rates shall apply to any works order irrespective of size, value or location within the contract area.

- The contractor shall only be reimbursed for work included in the works order unless directly instructed otherwise by the CA. Where the Contractor notices work not covered by the order, which in his opinion requires to be carried out, he must inform the CA as soon as possible and obtain his instructions.
The tender makes provision for continuing 3 year comprehensive maintenance contract with a 2hr response time for call out to repairs, and a 1/2hr response time to site in the event of an incident. Only contractors who can comply with this need tender. Proof of compliance should be included with the returned tender.

The tender also includes for 4 years pro-active monitoring of the system to local control centres therefore only contractors with Maxpro Training to level 2 integration need tender. Proof of compliance should be included with the returned tender.

Contractors on returning tenders should include:

- 3 Referees addresses and telephone no’s and relationship with contractor
- Last 3 years audited accounts,
- Full company details
- Details of completed town centre cctv installations within the last 3 years
- Details of existing cctv contracts.
- Details of completed installations during the last 3 years comprising fully functional cameras.

112 PREPARATORY WORK BY OTHERS

All works to be carried out by the contractor or their direct appointed specialist contractor, with the exception of 10 no bases to be cast which will be insitu at start of contract, the cctv contractor will however need to chemfix columns.

125G WORK BEYOND THE BOUNDARY OF THE SITE

Where work is described as being executed beyond the boundary of the site or in the public highway, the contractor's prices shall be deemed to include for the following as required.

- Adequate watching and lighting, traffic signalling, temporary barricades, walking platforms and warning notices sufficient to ensure the safety of all persons, and removing same on completion giving notice to the local authority,

140 WORK BY OTHERS CONCURRENT WITH THE CONTRACT

Will be described in the works orders issued by CA.

1. (a) List of properties in Contract Area (see the first recital) in respect of which orders under this contract may be issued: There are building works being constructed on the South Side Site, the contractor shall for tender purposes price the contract as if he is a nominated sub contractor to this site.

(b) Description of the types of work for which orders under this contract may be issued:

To supply and install a complete CCTV installation including, columns (To include column bases), controls, cameras, housings, fibre cabling (To include draw pits and ducting), networking to existing matrix, control room hardware/software alterations in order to monitor, record and control a 11 camera system made up PTZ cameras as
described. The tendering contractors shall raise questions and draw attention to the CA for any works not described on the drawings or in this specification that may be necessary for the complete workings of the system. All queries raised will be answered in writing by the CA and copies of replies sent to all tenderers. Omission within this specification of equipment/works necessary for the total functioning of the system as described will be deemed to be included for within the tender submission.

2. Approximate anticipated value of work to be carried out under the contract:

£305,000 (Three hundred and five thousand pounds) for contract period, plus monitoring and maintenance for 3 years

3. The installation contract period will be from mid Jan 2007 to end March 2007 but maintenance and monitoring till end March 2011

All works orders shall be issued in writing by the CA to the Contractor, except for ‘emergency repair’ and ‘priority’ works orders which shall be raised verbally by the CA and subsequently confirmed in writing.

4. The work will be carried out in accordance with the schedule of rates identified in item 5 below.

TERMS OF PAYMENT

5. Monthly claims to be submitted on dates to be advised, payment within 28 days.

To the rates listed in the Schedule of Rates above for orders measured and valued in accordance with the contract. (i.e. rates to be fully inclusive in the priced schedule).

6. Fixed Price: the rates are those given in the schedule or rates identified above current and the commencement of the contract period and which will not be changed for the duration of the contract period.

CONTRACTOR’S SAFETY POLICY

7. The Contractor’s safety policy to be attached

CONSTRUCTION INDUSTRY SCHEME (C.I.S)

8. The employer at the commencement of the contract period is a ‘contractor’ for the purposes of the act and the regulations.

INSURANCE

9. Public Liability Insurance cover for any one occurrence or series of occurrences arising out of one event...........£10,000,000

SETTLEMENT OF DISPUTES – ADJUDICATION

11. Clause 9B and 9C Clause 9B applies

12. Clause 9B.1 Arbitration – appointment of arbitrator:

AMENDMENTS TO THE FORM OF CONTRACT ARE AS DETAILED BELOW AND IN THE FOLLOWING DOCUMENT.

Clause 1.1 definitions and Clause 4.4 Valuation – day work

DELETE ‘The definition of Prime Cost of building works of a jobbing or maintenance character’.

INSERT ‘Definition of Prime Cost of day work carried out under a building contract issued by the royal institution of chartered surveyors and the building employers confederation (now construction federation), which is current at the date given by the employer for the return of tenders.’

Clause 2.4 defects

Line 1: DELETE ‘6 months of the order completion date’

INSERT ‘12 months starting from the completion date of handover.’

Clause 3.9

Exclusion from the site

Line 2: INSERT ‘and as described in the Preliminaries’

Model Clause 6.5A

Existing Structures – contents – risks of loss or damage

1. The existing structures in respect of which orders under this Contract may be issued together with the contents thereof owned by him or for which he is responsible shall be at the risk of the employer in respect of the full cost of reinstatement, repair or replacement of loss or damage due to one or more of the perils referred to in Clause 65A.2

2. The perils referred to in Clause 65A.1 are fire, lightning, explosion, storm, tempest, apparatus or pipes, earthquakes, aircraft, and other aerial devices or articles dropped there from, riot and civil commotion, but excluding the risks referred to in Clause 6.4.5.

3. Model clause 6.5A has been drafted on the basis that the term ‘risk’ means, in relation to the Contractor, that the Employer is responsible for loss or damage by the perils referred to in Clause 6.5.A.2 of the Conditions but can have recourse against the Contractor if the loss or damage to the existing structures and/or their relevant contents is caused by the negligence of the contractor or of those for whom the contractor is responsible.

Consequential amendments for Clause 6.5A

Clause 6.2 Last Line:
DELETE ‘Clause 6.5.1 and 6.5.2’

INSERT ‘Clause 6.5A.1 and 6.5.A.2

Clauses 6.5 to 6.7 DELETE

Clause 9.1 Notice of Reference to Arbitration

INSERT new paragraph 2

‘Failure to request the person named in the Appendix to appoint an arbitrator within 3 months of the foresaid written notice by either party shall be deemed to mean the right to arbitration has been abandoned.’

EXECUTION: The Contract will be executed as a named contractor, under the terms and conditions described herein but under the jurisdiction of the main contractor.

A30 TENDERING/SUBLETTING/SUPPLY

105 SCOPE: These conditions are supplementary to those stated in the invitation to tender and on the Form of Tender.

110G TENDERING to be in accordance with the principles of the NJCC Code of Procedure for Single Stage Selective Tendering 1996.

120G AMENDMENTS: No amendments are to be made to the schedules or other contract documents by tenderers. Tenders containing amendments or qualifications may be rejected.

130G COST TO BE INCLUDED: The Contractor is to allow for costs of fulfilling all liabilities and obligations referred to in the preliminaries, preambles and other tender documents as part of his tendered percentages.

140G PERIOD OF VALIDITY: Tenders shall remain open for acceptance for a period of two months from the date fixed for receipt of tender.

161 Exclusions: If the Contractor cannot tender for any part(s) of the work as defined in the tender documents he must inform the CA as soon as possible, defining the relevant part(s) and stating the reasons for his inability to tender.

165G CANVASSING: Any tenderer who directly or indirectly canvasses any member, official or agent of the authority concerning the award of the contract, or who directly or indirectly obtains from any such member, official or agent concerning any other tender or proposed tender for the contract shall be disqualified.

170 ACCEPTANCE OF TENDER: The employer and his representatives:

- Offer no guarantee that the lowest of any tender will be recommended for acceptance or accepted.
- Will not be responsible for any cost incurred in the preparation of any tender.
315G SPECIFICATION WITHOUT QUANTITIES: Tenders must include for all work shown or described in the tender documents as whole or clearly apparent as being necessary for the complete and proper execution of the works.

331G PRICING OF SPECIFICATION (Fully itemised schedule of rates): must be submitted within four working days of request.

341G ERRORS IN THE PRICED DOCUMENTS will be dealt with in accordance with the ‘Code of procedure for single stage selective tendering’ June 1996, Alternative 1.

450G A SCHEDULE OF RATES (unpriced) is included with the tender documents. The Contractor may insert additional items. A fully priced copy must be submitted with the tender.

552G HEALTH AND SAFETY INFORMATION: Unless previously provided as of a condition of inclusion on the Employers approved list of contractors a statement must be submitted with the tender describing the organisation and resources which the contractor proposes and undertakes to provide to safeguard the health and safety of operatives, including those of sub contractors and of any person who may be affected by the works.

- A copy of the contractor's health and safety policy document, including risk assessment procedures.
- Accident and illness records
- Records of previous health and safety executive enforcement action
- Records of training and training policy
- The number and type of staff responsible for health and safety on this project with details of their qualifications and duties.

570G AN OUTLINE CONSTRUCTION PHASE HEALTH AND SAFETY PLAN must be submitted within 4 working days of being requested and is to include the following:

Method statements related to the hazards identified in the pre-tender health and safety plan and/or statements on how the hazards will be addressed and other significant hazards identified by the contractor.

Details of the management structure and responsibilities

Arrangements for issuing health and safety directions

Procedures for informing other contractors and employees of health and safety hazards.

Selection procedures for insuring competency of other contractors, and site operatives.

Arrangement for co-operation and co-ordination between contractors
Procedures for carrying our risk assessment and for managing and controlling the risk.

Emergency procedures including fire precautions

Arrangements for ensuring that all accidents, illness and dangerous occurrences are recorded.

Contractor to provide own facilities if required.

Procedures for ensuring that all persons on site have received relevant health and safety Information and any training.

Arrangements for consulting with and taking the views of people on site.

Arrangements for preparing site rules and drawing them to the attention of those affected and ensuring their compliance.

Monitoring procedures to ensure to ensure compliance with site rules, selection and management procedures, health and safety standards and statutory requirements.

Review procedures to obtain feedback.

580G DISBURSEMENTS ARISING FROM THE PROVISION OF LABOUR:

The Contractor shall allow for all and any payments to be made arising under the National Insurance Acts, the Graduated Pensions Scheme, Redundancy payments, employment protection acts, including all and any amendments thereto or any statutory modifications or re-enactments thereof and any other disbursements arising from the direct employment of all labour. The contractor, shall when considering the employment status of all those providing labour, pay particular attention to the standing of workers on SC60/714 certificates, the holding of which does not necessarily exempt the contractor from the provisions of the above rights. In this respect the contractor shall pay due regard to guidance contained in the leaflet IR56/N139 entitled ‘Employed or Self Employed’ together with the complimentary notes contained in IR148/CA69 entitled ‘Are your workers employed or self employed?’ and the P7 ‘Employers guide to PAYE’ copies of these guidance leaflets can be obtained from a relevant tax office or tax enquiry centre.

710G APPROVED FIRMS: Each of the types of work listed below is to be carried out by the firm stated or, where alternatives are given, one of the firms of the contractors choice.

• Supply and installation of all cabling and ductwork for the complete installation to be carried out by the contractor or their specialist sub contractor.
• All works associated with the installation and commissioning of the digital recording installation to be carried out by the manufacturer. All electrical supplies will be the responsibility of the successful tenderer.
• Builders work will the responsibility of the successful contractor.

A31 PROVISION, CONTENT AND USE OF DOCUMENTS
DEFINITIONS AND INTERPRETATIONS

111G DEFINITIONS: The meaning of terms, derived terms and synonyms used in the preliminaries/general conditions and specification is as defined below or in the appropriate British Standard or British Standard glossary.

121G CA means the person nominated in the Contract as Architect or Contract administrator or his authorised representative.

130 IN WRITING: When required to notify, inform, instruct, agree, confirm, obtain information, obtain approval or obtain instructions do so in writing.

140 APPROVAL (and words derived there from) means the approval in writing of the CA unless specified otherwise.

180 CROSS-REFERENCES TO THE SPECIFICATION:

• Where a numerical cross-reference to a specification section or clause is given on drawings or in any other document the Contractor must verify its accuracy by checking the remainder of the annotation or item description against the terminology used in the referred to section or clause.

• Where a numerical cross-reference is not given, the relevant section(s) and clause(s) of the specification will apply, cross-reference thereto being by means of related terminology.

• Where a numerical cross-reference for a particular type of work, feature, material or product is given, relevant clause(s) elsewhere in the referred to specification section dealing with general matters, ancillary products and workmanship also apply.

• The Contractor must, before proceeding, obtain clarification or instructions in relation to any discrepancy or ambiguity which he may discover.

200G EQUIVALENT PRODUCTS:

• Where the specification permits substitution of a product of different manufacture to that specified and such substitution is desired, before ordering the product notify the CA within a reasonable time and, when requested, submit for verification documentary evidence and demonstrate that the alternative product is equivalent in respect of material, safety, reliability, function, compatibility with adjacent construction, availability of compatible accessories and, where relevant, appearance. Submit certified English translations of any foreign language documents. (The contractor shall note that the performance specification of the items described must be strictly adhered to if offering an alternative manufacturer and the alternatives shall be produced with the tender return along with statement of compliance. The contractor shall take particular note that the matrix must be compliant with the control room from which it is proposed to monitor it and the contractor will be responsible for all costs associated with integration of the proposed CCTV system into the existing equipment of the control room or a full new matrix be provided for addition of this contract.)
Any proposal for use of an alternative product must also include proposals for substitution of compatible accessory products and variation of details as necessary, with evidence of equivalent durability, function and appearance of the construction as a whole. If such substitution is sanctioned, and before ordering products, provide revised drawings, specification and manufacturer’s guarantees as required by CA. (The contractor shall note that the performance specification of the items described must be strictly adhered to if offering an alternative manufacturer and the alternatives shall be produced with the tender return along with statement of compliance. The contractor shall take particular note that the matrix must be compliant with the control room from which it is proposed to monitor it and the contractor will be responsible for all costs associated with integration of the proposed CCTV system into the existing equipment of the control room or a full new matrix be provided for addition of this contract.

201 EQUIVALENT PRODUCTS: Wherever products are specified by proprietary name and phrase ‘or equivalent’ is not included, it is to be deemed included.

210G BRITISH/EUROPEAN STANDARD PRODUCTS: Where any product is specified to comply with a British Standard for which there is no equivalent European Standard it may be substituted by a product complying with a grade or category within a national standard of another member state of the European Community or an international standard recognised in the UK specifying equivalent requirements and assurances in respect of material, safety, reliability, function, compatibility with adjacent construction, availability of compatible accessories, and, where relevant, appearance. In advance of ordering notify the CA of all such substitutions and, when requested submit for verification documentary evidence confirming that the products comply with the specified requirements. Any submitted foreign language documents must be accompanied by certified translations into English.

The contractor’s attention is drawn to the requirements of the Construction Products Regulations 1991, which give effect to the European Community Directive (89/106/EEC).

225 REFERENCES TO BSI DOCUMENTS are to the versions and amendments listed in the BSI Standards Catalogue current at the date of tender.

270G SIZES: Unless otherwise stated:
Products are specified by their co-ordinating sizes.

All timber sizes stated are finished sizes and all wrought and sawn timers shall be the full dimensions specified. The contractor shall be deemed to have allowed in his tender for ‘planning’ margins.

280 FIX ONLY means all labours in unloading, handling, storing and fixing in position, including use of all plant.

290 SUPPLY AND FIX: Unless stated otherwise all items given in the schedule of work and/or on the drawings are to be supplied and fixed complete.

TERMS USED IN REFURBISHMENT/ALTERATION
311 REMOVE means disconnect, dismantle as necessary and remove the stated element, work or component and all associated accessories, fastenings, supports, linings and bedding materials, and dispose of unwanted materials. It does not include removing associated pipework, wiring, ductwork or other services.

321 KEEP FOR REUSE means:
- During removal prevent damage to the stated components or materials, and clean off bedding and jointing materials.
- Stack neatly, adequately protect and store until required by the Employer or for use in the works as instructed.

331 REPLACE means:
- During removal prevent damage to the stated components or materials, and clean off bedding and jointing materials.
- Provide and fit in lieu new components, features and finishes which, unless specified otherwise, must match those which have been removed.
- Make good as necessary.

341 REPAIR means carry out local remedial work to components, features and finishes as found in the existing building, re-secure or re-fix as necessary and leave in a sound and neat condition. It does not include:
- Replacement of components
- Redecoration

351 MAKE GOOD means carry out local remedial work to components, features and finishes which have been disturbed by other, previous work under this contract and leave in a sound and neat condition. It does not include:

361 EASE means make minor adjustments to moving parts of the stated component to achieve good fit in both open and closed positions and ensure free movement in relation to fixed surrounds. Make good as necessary.

371 TO MATCH EXISTING means use products, materials and methods to match closely all visual characteristics and features of the existing work, with joints between existing and new work as inconspicuous as possible, all to approval of appearance.

DOCUMENTS PROVIDED ON BEHALF OF EMPLOYER

410 ADDITIONAL COPIES OF DRAWINGS: Two copies of drawings (not counting any certified copy of the Contract Drawings) will be issued on the contractor free of charge. Additional copies will be issued on request but will be charged to the contractor.

430 ADDITIONAL COPIES OF SPECIFICATION: After execution of the contract, two copies of the specification will be issued to the contractor in accordance with the contract. Additional copies will be issued on request, if available, but will be charged to the contractor.
440 DIMENSIONS: The accuracy of dimensions scaled from the drawings is not guaranteed. Obtain from the CA any dimensions required but not given in figures on the drawings nor calculable from figures on the drawings.

460 THE SPECIFICATION: All sections of the specification must be read in conjunction with the main contract preliminaries/general conditions.

461G CO-ORDINATED PROJECT INFORMATION: The documents have been prepared in accordance with the principles of co-ordinated project information and all sections of the materials and workmanship section of the documentation must be read in conjunction with the contract preliminaries/general conditions, measured work section/schedule of works and appropriate drawings.

691G RECORD DRAWINGS in accordance with the contract documents must be provided to the CA not less than 1 week before practical completion.

711 TECHNICAL LITERATURE: The contractor is required to keep copies of the following on site, readily accessible for reference by all supervisory personnel:

- Manufacturers’ current technical literature relating to all products to be used in the works.

720G MAINTENANCE INSTRUCTIONS AND GUARANTEES:

- Retain copies delivered with components and equipment (failing which, obtain), register with manufacturer as necessary and hand over to CA on or before practical completion.

- Notify CA of telephone numbers for emergency services by Subcontractors after practical completion.

A32 MANAGEMENT OF THE WORKS

100G SUPERVISION: Accept responsibility for co-ordination, supervision and administration of the works, including all subcontracts. Arrange and monitor a programme with each subcontractor, supplier, local authority and statutory undertaker, and obtain and supply information as necessary for co-ordination of works.

110G PERSON IN CHARGE: During the carrying out of works the contractor is to keep on the works a competent person in charge who shall be empowered to receive and act upon any instructions given by the CA or his representative.

120 INSURANCES: Before starting work on site submit documentary evidence and/or policies and receipts for the insurances required by the Conditions of Contract.

130 INSURANCE CLAIMS: If any event occurs which may give rise to any claim or proceeding in respect of loss or damage to the works or injury or damage to persons or property arising out of the works, forthwith give notice in writing to the employer, the CA and where appropriate the contractor’s insurers. Indemnify the employer against any loss, which may be caused by failure to give such notice.
140A ADVERSE WEATHER: Use all reasonable and suitable building aids and methods to prevent or minimise delays during adverse weather conditions.

140B CLIMATIC CONDITIONS: Keep an accurate record of:

- Daily maximum and minimum air temperatures (including overnight).
- Number of hours per day in which work is prevented by adverse weather.

150 OWNERSHIP: Materials arising from the alteration work are to become the property of the contractor except where otherwise stated. Remove from site as work proceeds.

212G PROGRAMME: As soon as possible and before starting work on site prepare in an approved form a programme for the works, which must make allowance for all:

- Planning and mobilisation by the contractor
- Subcontractor’s work
- Running in, adjustment and testing of engineering services
- Work resulting from instructions issued in regard to the expenditure of provisional sums.
- Work by others concurrent with the contract.

240G COMMENCEMENT OF WORK: Inform the CA at least 5 working days before the proposed date for commencement of work on site.

261 CA’S SITE MEETINGS:

The CA will hold site meetings to review progress and other matters.

Ensure the availability of accommodation and attend all such meetings.

The CA will chair the meetings and take and distribute minutes.

The contractor will attend any meetings requested by the main contractor for the existing main contract works under the build of the National Rail Museum.

450B DAYWORKS: No work will be allowed as day-work unless previously authorised by the contract administrator and confirmed in writing. All vouchers specifying the time daily spent upon the work (and if required by the contract administrator the workmen’s names) and the materials used properly priced and extended, shall be signed by the contract administrator.

450G DAYWORKS VOUCHERS: Give reasonable notice to the CA of the commencement of any work for which day work vouchers are to be submitted. Before being delivered, each voucher must be:

- Referenced to the instruction under which the work is authorised, and signed by the person in charge as evidence that the workmen’s names, the time spent by each, the plant and materials shown are correct.
INTERIM VALUATIONS: At least 7 days before the established dates for interim valuations submit the contract administrator details of amounts due under the contract together with all necessary supporting information.

LABOUR RECORD: Provide each week for verification by the CA a written record showing the number and description of craftsmen, labourers and other persons employed on or in connection with the works on each day of that week, including those employed by subcontractors.

A33 QUALITY STANDARDS/CONTROL

MATERIALS AND WORK GENERALLY

GOOD PRACTICE: Where and to the extent that materials, products and workmanship are not fully detailed or specified they are to be:

- Of a standard appropriate to the works and suitable for the functions stated in or reasonably to be inferred from the project documents.
- In accordance with relevant good building practice

GENERAL QUALITY OF PRODUCTS:

Products to be new unless otherwise specified.

For products specified to a British or European Standard obtain certificates of compliance from manufacturers when requested.

- Where a choice of manufacturer source is allowed for any particular product, the whole quantity required must be of the same type, manufacture and/or source unless otherwise approved. Produce written evidence of sources of supply when requested. **(The contractor shall note that the performance specification of the items described must be strictly adhered to if offering an alternative manufacturer and the alternatives shall be produced with the tender return along with statement of compliance. The contractor shall take particular note that the matrix must be compliant with the control room from which it is proposed to monitor it and the contractor will be responsible for all costs associated with integration of the proposed CCTV system into the existing equipment of the control room or a full new matrix be provided for addition of this contract.)**

Ensure that the whole quantity of each product required is of consistent kind, size, quality and overall appearance.

Where consistency of appearance is desirable ensure consistency of supply from the same source. Do not use different colour batches where they can be seen together.

If products are prone to deterioration or have a limited shelf life, order in suitable quantities to a programme and use in appropriate sequence. Do not use if there are any signs of deterioration, setting or other unsatisfactory condition.

PROPRIETARY PRODUCTS:
• Handle, store, prepare and use or fix each product in accordance with its manufacturers current printed or written recommendations. Inform CA if these conflict with any other specified requirement. Submit copies when requested.

• The tender will be deemed to be based on the products specified and recommendations on their use given in the manufacturers’ literature current at the date of tender.

• Where British Board of Agrément certified products are used, comply with the limitations, recommendations and requirements of the relevant valid certificates.

141 CHECKING COMPLIANCE OF PRODUCTS: Check all documentation and the products themselves to ensure compliance with the project documents. Where different types of any product are specified, check to ensure that the correct type is being used in each location. In particular check that:

• The sources, types, qualities, finishes and colours are correct, and match any approved samples.

• All accessories and fixings which should be supplied with the products have been supplied with the products have been supplied.

• Sizes are correct. Where tolerances are critical, measure a sufficient quantity to ensure compliance.

• The delivered quantities are correct, to ensure that shortages do not cause delays in the work.

• The products are clean, undamaged and in good condition.

• Products that have a limited shelf life are not out of date.

• The products specified and delivered to site are the most recent product/software available by the manufacturer.

151 PROTECTION OF PRODUCTS:

Prevent over-stressing, distortion and other damage.

Keep clean and free from contamination. Prevent staining, chipping, scratching or other disfigurement, particularly of products exposed to view in the finished work.

Keep dry to prevent premature setting, moisture movement and similar defects. Where appropriate store off the ground and allow free air movement between stored products.

Prevent excessively high or low temperatures and rapid changes of temperature in the products.

Protect adequately from rain, damp, frost, sun and other elements as appropriate. Ensure that products are at a suitable temperature and moisture content at time of use.
Ensure that sheds and covers are of ample size, in good weatherproof condition and well secured.

Keep different types and grades of products separately and adequately identified.

Keep products in their original wrappings, packing or containers, until immediately before they are used. Wherever possible retain protective wrappings after fixing and until shortly before practical completion.

Ensure that protective measures are fully compatible with and not prejudicial to the products/materials.

161  **SUITABILITY OF RELATED WORK AND CONDITIONS:** Provide all trades with necessary details of related types of work. Before starting each type of work, ensure that:

- Previous work is appropriately complete, in accordance with the project documents, to a suitable standard and in a suitable condition to receive the new work.

- All necessary preparatory work has been carried out, including provision for services, openings, supports, fixings, damp proofing, priming and sealing. The environmental conditions are suitable, particularly that the building is suitably weather tight.

171G  **GENERAL QUALITY OF WORKMANSHIP:**

Operatives must be appropriately skilled and experienced for the type and quality of work.

Take all necessary precautions to prevent damage to the work from frost, rain and other hazards.

Inspect components and products carefully before fixing or using and reject any which are defective.

Fix or lay securely, accurately and in alignment.

Where not specified otherwise, select fixings and jointing methods and types, sizes and spacing of fastenings in compliance with section Z20/relevant British Standards.

Provide suitable, packing at screwed and bolted fixings to take up tolerances and prevent distortion. Do not over tighten fixings.

Adjust location and fixing of components and products so that joints which are left open to view are even and regular.

Ensure that all moving parts operate properly and freely. Do not cur, grind or plane pre-finshed components and products to remedy binding or poor fit without approval.

181  **BS 8000: BASIC WORKMANSHIP:**
Where BS 8000 gives recommendations on working methods, compliance will be deemed to be a matter of industry good practice and not a requirement of the CA.

If there is any conflict or discrepancy between the recommendations of BS 8000 on the one hand the project documents on the other, the latter will prevail.

SAMPLES/APPROVALS

210G SAMPLES: Where approval of a product is specified the requirements for approval relates to a sample of the product and not the product as used in the works. Submit a sample or other evidence of suitability. Do not confirm orders or use the product until approval of the sample has been obtained. Retain approved sample in good, clean condition on site. Ensure that the product used in the works matches the approved sample. Remove when no longer required.

230 APPROVALS: Where and to the extent that products or work are specified to be approved or the CA instructs or requires that they are to be approved, the same must be supplied and executed to comply with all other requirements and in respect of the stated or implied characteristics either:

- To the express approval of the CA or
- To match a sample expressly approved by the CA as a standard for the purpose.

ACCURACY/SETTING OUT GENERALLY

310 SETTING OUT: The contractor is to take the dimensions from existing premises and check with dimensions given on the drawings. Allow for setting out the works and providing all instruments and attendance required for checking by the CA.

- The Contractor’s attention is particularly drawn to the fact that he is responsible for and shall entirely at his own cost amend any errors arising from his own inaccurate site measurements.

341 APPEARANCES AND FIT:

- Arrange the setting out, erection, juxtaposition of components and application of finishes to ensure satisfactory fit at junctions, no practically or visually unacceptable changes in plane, line or level and a true, regular finished appearance.

- Wherever satisfactory accuracy, fit and/or appearance of the work are likely to be critical or difficult to achieve obtain approval of proposals or of the appearance of the relevant aspects of the partially finished work as early as possible.

SERVICES GENERALLY

410G SERVICES REGULATIONS: Any work carried out to or which affects new or existing services must be in accordance with the Bye Laws or Regulations of the relevant Statutory Authority and entirely to their inspector’s satisfaction.
SERVICE RUNS: Make adequate provision for services, including unobstructed routes and fixings. Wherever possible ducts, chases and holes are to be formed during construction rather than cut.

MECHANICAL AND ELECTRICAL SERVICES must have final tests and commissioning carried out so that they are in full working order at practical completion.

SUPERVISION/INSPECTION/DEFECTIVE WORK

OVERTIME WORKING: Work outside those hours specified in A35/190G shall not be permitted without prior authority of the CA in writing.

Whenever permission to work overtime is requested, give CA not less than 48 hours notice, specifying times, types and locations of work to be done.

- Whenever overtime working, requested by the contractor, involves a Clerk of Works, Caretaker or any of the Employers other personnel in overtime working, then the contractor will be required to reimburse the employer the cost of such personnel, (i.e. the basic salary of such personnel applicable at the time the overtime is worked, based upon the NJC for local authority APT & C or manual workers scales as appropriate + 165% for on-costs + gas and electric charges).

- The contractor will be advised of the above cost and upon request provided with detailed build up thereof.

TIMING OF TESTS AND INSPECTIONS:

- Agree dates and times of tests and inspections with CA several days in advance, to enable the CA and other affected parties to be present. On the previous working day to each such test or inspection confirm in writing that the work or sample in question will be ready or, if not ready, agree a new date and time.

PROPOSALS FOR RECRYFICATION OF DEFECTIVE WORK/PRODUCTS

- As soon as possible after any part(s) of the work or any products are shown to be not in accordance with the contract, or appear that they may not be in accordance, submit proposals to CA for opening up, inspection, testing, making good, adjustment and the contract sum, or removal and re-execution.

- Such proposals may be unacceptable to the CA, and contrary instructions may be issued.

WORK AT OR AFTER COMPLETION

GENERAL:

Make good all damage consequent upon the work.

Remove all temporary markings, coverings and protective wrappings unless otherwise instructed.
Clean the works, working area and access routes thoroughly, reinstating surfaces to their condition prior to commencement of the works; remove all splashes, deposits, efflorescence, rubbish and surplus materials consequent upon the execution of the work, all to the satisfaction of the CA.

Cleaning materials and methods to be as recommended by manufactures of products being cleaned, and to be such and there is no damage or disfigurement to other materials or construction.

Obtain COSHH dated data sheets for all materials used for cleaning and ensure they are used only as recommended by their manufacturers.

Touch up minor faults in newly painted/repainted work, carefully matching colour, and brushing out edges. Repaint badly marked areas back to suitable breaks or junctions.

Adjust, ease and lubricate moving parts of new work as necessary to ensure easy and efficient operation, including appliances, valves and controls.

650G MAKING GOOD DEFECTS: Make arrangements with the CA and give reasonable notice of the precise dates for access to the various parts of the works for purposes of making good defects.
Inform CA when remedial works to the various parts of the works are complete.

655G CALL OUT PROCEDURES FOR CCTV SPECIALIST BUILDING SERVICES AND BUILDING WORKS:

The main contractor must allow for compliance with the emergency call out procedures for the duration of the 12 months defects liability period where so required in the technical specification.

Under the provision of the call out services, the Contract Administrator may issue instructions to the Contractor which require him to respond on site within 2 hours for critical installations/works and every effort must be made to restore the system to full working order as soon as possible. If a major component proves to be faulty then it shall be repaired and the system re-installed to normal within 48 hours of the fault being reported (‘critical priority’ only).

The Contractor shall be deemed to have made every allowance for working at short notice at all hours.

The 2 HOUR EMERGENCY CALL OUT, (7 days a week & 365 days a year) will apply to the following CRITICAL Service Installations/Equipment.
CCTV installation.

(CONTINUED IN CLAUSE 655H)

665H CALL OUT PROCEDURES FOR CCTV SPECIALIST BUILDING SERVICES AND BUILDING WORKS (CONTINUED)
Should the contractor not respond to the ‘critical priority’ call-outs the employer reserves
the right to have the defects rectified by a specialist CCTV contractor and the costs (at
contract rates) may be deducted by him from any monies due or to become due to the
contractor under this contract or may be recoverable from the contractor by the employer
as a debt.

- Full details of the emergency call out and repair arrangements shall be mounted in the
appropriate plant room as instructed in a glazed presentational frame, including:

<table>
<thead>
<tr>
<th>Contact Name</th>
<th>Tel. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Main Contractor</td>
<td>“</td>
</tr>
<tr>
<td>b) Building User</td>
<td>“</td>
</tr>
<tr>
<td>c) Plant Manufacturer</td>
<td>“</td>
</tr>
<tr>
<td>d) Emergency Call Out</td>
<td>“</td>
</tr>
<tr>
<td>Contractor (various)</td>
<td>“</td>
</tr>
</tbody>
</table>

(CONTINUED IN CLAUSE 655J)

655J CALL OUT PROCEDURES FOR CCTV SPECIALIST BUILDING SERVICES AND
BUILDING SERVICES AND BUILDING WORKS (CONTINUED):

Upon arrival and departure from the site the contractor’s operative(s) must report to the
designated person in charge of the building via security and sign the site log book of
contractor’s visits. On each and every occasion the contractor must present a worksheet
for signature by the designated person in charge of the building which details the nature
and extent of the problem and the actions taken, together with details the nature and
extent of the problem and the actions taken, together with details of the operatives
arrival and departure times and consumables used. A copy of this sheet is to be left on
site with the designated person in charge of the building.

All call-out information shall be repeated in a hard-backed A4 ring binder file.
This shall be handed to the building user for safekeeping and held in the 24 hour
manned station/enquiry office. The file shall be clearly marked ‘emergency call out’ on
the spine and front cover.

A34 SECURITY/SAFETY/PROTECTION

111G THE PRE-TENDER HEALTH AND SAFETY PLAN is provided separately.
It refers to information given here and elsewhere in the Preliminaries.
Nature of the project: Sections A10 and A13.
The existing environment: Section A12
Existing drawings: Section A11 and A12.
The design: Section A34
Construction materials: Section A34
Site-wide elements: Section A12.
Overlap with client’s undertaking: Sections A34 and A36
Site Rules: Sections A34 and A35
Continuing liaison: Section A31.
Construction Hazards arising from the design of the project include those identified below. Commonplace hazards which good management should control and good site practices are not listed.

- **Hazard:** Excavations of underground ducts, column bases and erection of columns. 
  **Precautions assumed:** Rope off and cone off area, provide temporary structural coverage of roads and footpaths.

- **Hazard:** Installation of electrical work 
  **Precautions assumed:** Restrict access of persons

- **Hazard:** Working near river bank 
  **Precautions assumed:** Provide suitable access platform/scaffolding and safety harness

- **Hazard:** Working adjacent main traffic routes 
  **Precautions assumed:** Cone off safe working area

THE CONSTRUCTION PHASE HEALTH AND SAFETY PLAN, developed from the outline construction phase health and safety plan (see section A30) must be submitted to the CA not less than 2 weeks before the proposed date for start of construction work. Do not start construction work until an adequate Health and Safety Plan has been submitted to the employer.

HEALTH AND SAFETY UPDATES: changes in design, whether by Contract Administrator of the Principal Contractor, which may affect the Principal Contractor’s Health and Safety Plan, sequence of working or the resources necessary to comply with health and safety legislation, shall be referred to the Planning Supervisor by the Principal Contractor in writing before any change is implemented. This relates only to the health and Safety aspects of the design and does not imply acceptance of the design by the Planning Supervisor.

The Principal Contractor shall prepare a Health and Safety Statement for each site progress meeting for the planning supervisor to cover the following:

1. Any previously unidentified hazards envisaged during the construction phase.
2. Any current methods of construction requiring a variation from the agreed health and safety plan.
3. Any relevant information to be passed to the planning supervisor for inclusion in the health and safety file.
4. Records of all accidents, including any event that results in accidental loss of plant of materials or a ‘dangerous occurrence’ or near miss which could have caused an accident or injury.

HSE APPROVED CODES OF PRACTICE: Comply with the following:

- Management of health and safety at work.
- Managing construction for health and safety.
- In occupied building the contractor is to comply with all emergency evacuation procedures.

SECURITY: Safeguard the site, the works, products, materials, plant, and all or part of any existing buildings and their contents affected by the works from damage and theft. Take all reasonable precautions to prevent unauthorised access to the site.
• The contractor’s attention is drawn to his contractual responsibilities with regard to vandalism and theft and he will be deemed to have made all necessary allowances when considering site security.

• Carry out a joint inspection of the existing building, or those parts of the existing building in the contractor’s possession, to take place on the date for possession stated existing in the contract, when all existing damage will be recorded.

• Where the building is occupied the contractor shall report to the occupants upon his arrival and departure from the site during the contract period and comply with all necessary security arrangements including securing the works at the end of each working day.

Where the work is to an existing Police Building this will remain operational during the course of the contract and the contractor must comply with all security arrangements.

The contractor will be required to furnish the Police through the CA, with the names, addresses, dates and places of birth and all personnel engaged on the works.

The Employer reserves the right to exclude personnel or demand the removal of any personnel on security grounds. Site personnel may be requested to report to reception daily for the issue of security passes where the building (or any part thereof) is occupied by the Employer.

• Site personnel must at all times wear ID Badges of approved form which clearly display:-

  1) Their photograph

  2) Their name

  3) The company name

135G HEALTH, SAFETY AND WELFARE: The contractor shall comply with the requirements of all current statues and regulations relating to and governing the health, safety and welfare of workpeople and shall allow for all costs involved in doing so.

150G OCCUPIED PREMISES: The premises or part of the premises will be occupied by the lessee, tenant, licensee or other occupiers and the Contractor is to take all reasonable steps to ensure the safety, welfare and comfort of the lessee, tenant, licensee or other occupiers. On no account must the lessee, tenant, licensee or other occupiers by exposed to danger and requirements of the Health and Safety at Work Act and all other relevant local or statutory requirements in respect of carrying out the works in occupied premises. Allow for protecting the furniture, fittings and personal property of the lessee, tenant licensee or other occupiers against damage arising from the execution of the works. Allow for keeping access routes clean and tidy at all times. All personnel engaged on the works shall carry, at all times, identification cards the content of which shall be subject to approval by the CA.

170 EMPLOYER’S REPRESENTATIVE SITE VISITS: Inform the CA in advance of all safety provisions and procedures (including those relating to materials which may be
deleterious), which will require the compliance of the Employer or his representative when visiting the site. Provide protective clothing and/or equipment for the Employer and his representatives as appropriate.

171G USE OF L.P.G. EQUIPMENT:

- The use of equipment using Liquefied Petroleum Gas (LPG) within all buildings either over 2 storeys or where the external walls are not of masonry construction is prohibited.
- The use of equipment using LPG within buildings of 2 storeys or less will only be permitted providing the following safeguards are taken:
  1) The quantity of LPG is limited to one 15kg container in any one building at any one time.
  2) The changing of cylinders must be undertaken in the open air outside the building.
  3) Cylinders not in use, spare cylinders and ‘empty’ cylinders must be stored outside of the building.
  4) Any room where LPG equipment is being used must be adequately ventilated.

190G CANCELLATION ON DEFAULT: In the event of default by the Contractor in the proper observance of any necessary health and safety requirements, cancellation of the written order by the CA shall not result in the Employer being obliged to reimburse either any costs incurred by the Contractor or the value of any abortive work except to such extent (if any) as those costs or that abortive work where incurred or performed without contravention of the health and safety requirement in question.

PROTECT AGAINST THE FOLLOWING:

200G MAINTENANCE OF PUBLIC ROADS: The contractor shall make good all damage to public roads, kerbs and footpaths, lawns etc., occasioned by heavy traffic, delivery of materials and building operations generally to the reasonable satisfaction of the CA and the local authority.

210G EXISTING MAINS AND SERVICES: The contractor shall maintain during the progress of the works, the existing drainage system, water, gas, and sewers, electric and other services and is to make arrangements for their continuance and take all necessary steps to protect and prevent damage to them. Should any mains, services ducts or lines be found to be in the way of new works, or require any attention, the contractor is to seek instructions from the CA.

- Where it is necessary to interrupt any mains or services for the purpose of making either temporary or permanent connections or disconnections, prior written permission shall be obtained from the CA and where appropriate from the Local Authority or Public undertaking and the duration of any interruption kept to a minimum.

215G STATUTORY OBLIGATIONS: The Contractor shall comply with the requirements of all statutes affecting the execution of the works, and shall allow for all costs in so doing.
220G NOISE:

- Comply generally with the recommendations of BS5228: Part1, Clause 9.3 for minimising noise levels during the execution of the works.
- Fit all compressors, percussion tools and vehicles with effective silencers of a type recommended by manufacturers of the compressors, tools or vehicles.
- Do not use pneumatic drills and other noisy appliances during normal working hours without consent of the CA.
- Do not use or permit employees to use radios or other audio equipment in ways or at times or at times which may cause nuisance.

231 POLLUTION: Take all reasonable precautions to prevent pollution of the site, the works and the general environment including streams and waterways.

240 NUISANCE: Take all necessary precautions to prevent personal injury, death, and damage to the works or other property from the fire. Comply with Joint Code of Practice, ‘Fire Prevention on Construction Sites’ published by the Building Employers Confederation, the Loss Prevention Council and the National Contractors’ Group.

263 FIRE PREVENTION: Smoking will not be permitted on the site except in designated areas which must be carefully controlled equipped with fire fighting and receptacles for the safe disposal of smoker’s materials and inspected to guard against risk of fire.

265 BURNING ON SITE of materials arising from the work will not be permitted.

280 MOISTURE: Prevent the work from becoming wet or damp where this may cause damage. Dry out the works thoroughly. Control the drying out and humidity of the works and the application of heat to prevent:
- Blistering and failure of adhesion
- Damage due to trapped moisture
- Excessive movement

290G WASTE:

- Remove rubbish, debris, surplus materials and spoil regularly and keep the site and works clean and tidy.
- Ensure that all rubbish receptacles, e.g. skips, left on site outside normal working hours have lockable covers or the like, which are secured to prevent the removal of contents.
- Remove all rubbish, dirt and residues from voids and cavities in the construction before closing in.
- Ensure that non-hazardous material is disposed of at a tip authorised by a Waste Regulation Authority.
• Remove all surplus materials and their containers regularly for disposal off site in a safe and competent manner as approved by a Waste Regulation Authority and in accordance with relevant regulations.

• Retain waste transfer documentation on site.

PROTECT THE FOLLOWING:

410 WORK IN ALL SECTIONS: Adequately protect all types of work and all parts of the works, including work carried out by others, throughout the Contract. Wherever work is of an especially vulnerable nature or is exposed to abnormal risks provide special protection to ensure that damage does not occur.

421G EXISTING SERVICES:

• Notify all service authorities and adjacent owners of the proposed works not less than one week before commencing site operations.

• Before starting work check positions of existing services.

• Observe service authority’s recommendations for work adjacent to existing services. Do not interfere with their operation without consent of the service authorities or other owners.

• If any damage to services results from the Works, notify CA and appropriate service authority without delay. Make arrangements for making good without delay to the satisfaction of the services authority or other owner as appropriate and at the CONTRACTOR’S EXPENSE.

• Replace marker tapes or protective covers disturbed by site operations to the service authority’s recommendations.

425G INTERRUPTION OF POWER SUPPLY:

At least 7 working days notice must be given of the need to interrupt the power supply to existing buildings.

430G ROAD AND FOOTPATHS: Adequately maintain roads and footpaths within and adjacent to the site and keep clear of mud and debris. Any damage to roads and footpaths caused by site traffic or otherwise consequent upon the works must be made good to the satisfaction of the local authority or other owner. Bear any costs arising.

The Contractor shall not make use of public or private roads, thoroughfares or footpaths, for deposition or storing plant or materials arising from or to be incorporated in the works, other than such plant, materials, tools and implements as shall from time to time be required for immediate use thereon, but shall provide at his own expense, suitable depots for such storage on site to be approved by the CA.

The true intent and a purpose of this clause is to restrict to the narrowest practicable limits the use of any public or private roads, thoroughfares or footpaths for the purpose
of giving effect to the Contract and to conserve as much as possible of the width of such roads, thoroughfares or footpaths for the use of vehicular and pedestrian traffic.

The Contractor shall provide at all times safe and sufficient pedestrian and vehicular access to all properties in the vicinity of and adjacent to the works.

440G RETAINED TREES/HEDGES/SHRUBS/GRASSED AREAS:

Adequately protect and preserve, except those which are to be removed.

Replace to approval or treat as instructed any species or areas damaged or removed without approval.

Mature trees and shrubs which, due to the Contractor’s negligence, are uprooted, destroyed, or in the opinion of the CA, damaged beyond reasonable changes of survival in their original shape, must by replaced with those of a similar type and age at the Contractor’s expense also any landscaping disturbed as part of this contract shall be reinstated at the contractors expense.

450 EXISTING FEATURES: Prevent damage to existing building, fences, gates, walls, roads, paved areas and other site features which are to remain in position during the execution of the works.

460 EXISTING WORK: Prevent damage to existing property undergoing alteration or extension and make good to match existing any defects so caused. Remove existing work the minimum necessary and with care to reduce the amount of making good to a minimum.

481 ADJOINING PROPERTY: Prevent trespass of workpeople. Take all reasonable precautions to prevent damage to adjoining property. Obtain permission as necessary from the owners if requiring to erect scaffolding on or otherwise use adjoining property, and pay all charges. Clear away and make good on completion or when directed. Bear the cost of repairing any damage arising from execution of the works.

490 EXISTING STRUCTURES:

- Provide and maintain during the execution of the works all incidental shoring, strutting, needling and other supports as may be necessary to preserve the stability of existing structures on the site or adjoining, that may be endangered or affected by the works.

- Support existing structure as necessary during cutting of new openings or replacement of structural parts.

- Do not remove supports until new work is strong enough to support the existing structure. Prevent overstressing of completed work when removing supports.

A35 SPECIFIC LIMITATIONS ON METHOD/SEQUENCE/TIMING

110G SCOPE: The limitations described in this section are supplementary to limitations described or implicit in information given in other sections or on the drawings.

120G POSSESSION OF THE SITE: Possession of the site by the Contractor will be restricted as follows:
The CA or any of his appointed agents shall have the power to issue instructions requiring the Contractor to stop any of the work to be executed under the provision of this Contract. The Contractor will only be allowed to re-commence the work upon an instruction from the CA or any of his appointed agents. The cost of any reasonable enforced waiting time shall be reimbursed to the contractor provided he has obtained a signed statement from the CA confirming the actual period of enforced waiting. The signed statement should be submitted with the account.

The Contractor shall ensure that normal vehicular traffic and pedestrian traffic over existing access roads and pavements are not impeded and is to keep open to the satisfaction of the CA, all rights of way on and about the premises including the area of the works.

175G WORKING HOURS:

Shall be normal working hours as defined in national working rule 6.

Where the works are to be executed within or adjacent to an occupied residential building/area work must not commence any earlier than 8:00am and must not continue after 6:00pm.

180G PROGRAMME OF WORKS: The Contractor shall provide a programme of works in respect of all programmed works orders.

The Contractor shall allow for maintaining constant communication with the CA throughout the Contract Period in order that information can be provided to him upon request.

Communications during normal working hours shall be provided by telephone contact with the contractor’s office representative.

The Contractor’s attention is drawn to the fact that his fully authorised representatives may be required to attend meetings with the CA as required on dates to be mutually agreed in order to discuss all matters concerning the works issued under the contract.

195 ACCESS TO THE SITE:

See Section A12

200G USE OF SITE:

See Section A12

250G COMPLETION IN SECTIONS OR PARTS:

Where the employer is to take possession of any Section or part of the works and such section or part will, after its completion, depend for its adequate functioning on work located elsewhere on the site, complete such other work in time to permit such possession to take place.
During execution of the remainder of the works ensure that completed sections or parts of the works have continuous and adequate provision of services, fire precautions, means of escape and safe access.

A36 FACILITIES/TEMPORARY WORK/SERVICES

111 LOCATIONS: Inform CA of the intended siting of all spoil heaps, temporary works and services.

125 MAINTAIN: alter adapt and move temporary works and services as necessary. Remove when no longer required and make good.

210G PUBLICITY: Before publishing this project in any trade journal national or local newspaper, brochure or in any other way, the contractor must submit for approval by the CA the text of the article or advertisement he proposes to have published.

270G ACCOMMODATION/LAND NOT INCLUDED IN THE SITE:

The Contractor may assume that land will be available without charge for the duration of the contract, provided that:

- It is used solely for the purposes of carrying out the works.
- The use to which it is put must not involve undue risk of damage.
- Any temporary adaptations must be approved by or on behalf of the employer before being carried out.
- Available services: None available.
- It must be vacated on completion of the works or determination of the contract.
- When vacated, its condition must be at least equivalent to its condition at the start of the Contract.

281 EXISTING ACCOMMODATION: The existing building(s) may not be used as temporary accommodation.

370G NAME BOARDS/ADVERTISEMENTS: Contractor’s/Subcontractors’ name boards or advertisements will not be permitted.

421G LIGHTING AND POWER: The Contractor may use the permanent electrical installation, but the employer does not undertake that it will be available.

445G TELEPHONES: Provide as soon as practicable a means of direct telephone communication with the Contractor’s person-in-charge.

Make arrangements (e.g. an external bell) to ensure that incoming calls are answered reasonably promptly.
A37 OPERATION/MAINTENANCE OF THE FINISHED BUILDING

To be read with Preliminaries/General Conditions

111A THE OPERATION AND MAINTENANCE MANUAL

- The Operation and Maintenance manual (incorporating the Health and Safety File and subtitled accordingly) is to be a comprehensive information source and guide for the employer and end users providing a complete understanding of the CCTV equipment and its systems and enabling it to be operated and maintained efficiently and safely. The Contractor is required to obtain or prepare all the information to be included in the manual, produce the required number of copies of the manual and submit them to the CA for checking by the Planning Supervisor and for delivery to the Employer.

- The manual is to consist of the following three parts:
  PART 1: GENERAL INFORMATION: Content as clause 123A, the information being provided to the Contractor by CA.
  PART 3: CCTV INSTALLATION: Content as clause 145A

- The presentation of the manual to be as clause 155.

- A complete draft of the manual must be submitted to the CA for comment not less than 2 weeks before the date for submission of the final copies of the Manual. Do not proceed with the production of the final copies of the manual unit authorised to do so by the CA.

- Final copies of the manual: Provide the CA with 3 copies not less than 2 weeks before practical completion.

118A THE HEALTH AND SAFETY FILE is an information source and guide for the Employer and end users providing an understanding of the building and its systems and enabling it to be operated and maintained safely. Provide the Planning Supervisor, with 2 copies of the information required below not less than 2 weeks before Practical Completion.

A full description of each of the building services systems installed written to ensure that the Employer’s staff fully understand the scope of facilities provided.

Operating and maintenance instructions for all equipment and systems installed.

Copies of manufacturer’s current technical literature and COSHH dated data sheets for all materials, plant and equipment selected by the Contractor.

123A THE OPERATION AND MAINTENANCE MANUAL PART 1: GENERAL INFORMATION must include:

- A general description of the sites.

- Details of ownership and all consultants and designers.

- Details of all authorities plus copies of all consents and approvals obtained.
• Names, addresses, telephone and fax numbers of all contractors, subcontractors, suppliers and manufacturers.

145A THE OPERATION AND MAINTENANCE MANUAL PART 3: CCTV INFORMATION must include:

A full description of each of the systems installed including their mode of operation, written to ensure that the Employer's staff fully understand the scope and facilities provided.

Diagrammatic drawings of each system indicating principal items of equipment, Duct runs etc.

The name, address and telephone number of the manufacturer of every item of plant and equipment together with catalogue list numbers.

Manufacturer’s technical literature for all items of plant and equipment, including operating and maintenance instructions.

A copy of test certificates for all items of plant and equipment used in the installation.

A copy of all manufacturers guarantees, warranties and maintenance agreements offered by subcontractors and manufacturers.

Emergency procedures, including telephone numbers for emergency services.

155 PRESENTATION OF OPERATION AND MAINTENANCE MANUAL: The manual is to be contained A4 size, plastic in covered, loose leaf, four ring binders with hard covers, indexed, divided and appropriately cover tiled. Selected drawings larger than A4, are to be folded and accommodated in the binders to that they may be unfolded without being detached from the rings.

190G ROUTINE SERVICING AND MAINTENANCE OF ALL INSTALLATIONS AND EQUIPMENT:

• Provide necessary materials and carry out all servicing and maintenance during defects liability period in accordance with manufacturer’s recommendations and as specified elsewhere.

• The Contractor shall provide at Practical Completion a schedule and proposed programme of works in respect of all routine servicing and maintenance items, and shall agree dates and times with the designated person in charge of the building.

• Should it become necessary to carry out works involving installation being closed down for an appreciable time, due notice shall be given and details agreed on the timing of the work so as to cause the least disturbance.
Upon arrival and departure from the site the Contractor’s operative(s) must report to the designated person in charge of the building via security and sign the police log book of contractor’s visits.

After each service visit the contractor must present for signature by the designated person in charge of the building a worksheet which details the nature and extent of the works carried out together with details of the operative’s arrival and departure times and consumables used. A copy of this sheet is to remain on site with the designated person in charge of the building and a copy forwarded to the CA.

225 TRAINING: Before practical completion, explain and demonstrate the operation of the installation to the employer’s representatives.

230G SPARE PARTS: The contractor shall supply within the contract tender figure the spare items listed in this specification.

500G END OF SECTION
SCHEDULE OF AMENDMENTS
TO
MONKTON BUSINESS PARK CCTV SPECIFICATION

JCT MINOR WORKS
BUILDING CONTRACT 2005 EDITION

This is a contract document
Signed on behalf of the Employer
Signed on behalf of the Contractor
The Contract shall be executed as a deed.

The form of Contract shall be the JCT Minor Works Building Contract 2005 edition, with the amendments set out in this Schedule, and shall have effect as so amended. This Schedule of Amendments shall take precedence over the printed JCT form.

ARTICLES

Article 7  Arbitration
Delete.

Article 8  Legal Proceedings
Delete the words "and (where it applies) to Article 7".

At the end of Article 8 add:

"and a court or judge thereof shall have jurisdiction to open up, review and revise any decision or opinion or certificate under the Contract. Any reference in the Contract to Arbitration or to an arbitrator shall be deleted and substituted with a reference to the English courts or a judge thereof".

CONDITIONS

Section 2  CARRYING OUT THE WORKS

Clause 2.7  Insert after, "as may be reasonable" the words:

", provided that no extension of time shall be granted to the Contractor if a material reason delaying completion of the Works could reasonably have been foreseen at the date of this Contract by a competent contractor exercising all the reasonable skill, care and diligence of a qualified and competent contractor experienced in carrying out works of a similar size, scope and complexity to the Works".
Clause 2.7A  Insert a new clause, clause 2.7A as follows:

"Progress"

The Contractor shall use constantly his best endeavours to prevent any delay in the progress of the Works, howsoever caused, and to prevent the completion of the Works being delayed beyond the date for completion stated in the Contract Particulars or further delayed beyond any later completion date fixed under clause 2.7 or at law (if any). The Contractor shall also do all that may reasonably be required to the satisfaction of the Architect/the Contract Administrator to proceed with the Works in both a regular and a diligent manner.

Clause 2.12  Add new clause 2.12:

2.12  "Materials not to be used"

The Contractor undertakes, represents and warrants to the Employer that exercising all the reasonable skill, care and diligence of a competent and experienced contractor, that to the extent that it is obliged to select or approve substances or materials for use in the Works:

2.12.1 it will act in accordance with the guidance contained in the publication, "Good Practice in the Selection of Construction Materials" (1997, by Tony Sheehan, Ove Arup & Partners, published by the British Council for Offices and the British Property Federation); and

2.12.2 that no other substances or materials generally known to be deleterious at the time of use and no other materials or substances which are prohibited by the Employer or which do not comply with any applicable British Standard or European Standard or any applicable Code of Practice, shall be used by or on behalf of it (unless specifically instructed in writing to the contrary by the Employer)."

Section 3  CONTROL OF THE WORKS

Clause 3.1  Delete and substitute:

"3.1.1  The Employer shall be entitled to assign this Contract or any part, share or interest herein without the consent of the Contractor.

3.1.2  The Contractor shall not be entitled to assign this Contract or any part, share or interest herein.".

Clause 3.3  Insert new clause 3.3.4:

"The Contractor shall be liable to the Employer for the acts and omissions (including those in tort) of the person to whom the Contractor has sub-let,
and the consent of the Employer to any sub-contracting shall not otherwise release or discharge the Contractor from liability to the Employer. The Contractor shall indemnify and hold the Employer harmless for all claims costs and proceedings acts and omissions (including those in tort) arising from or in relation to the sub-contractor. All sub-contractors shall be deemed to be domestic to the Contractor.”.

Clause 3.4A

Insert a new clause, clause 3.4A as follows:

"Works and materials not in accordance with the Contract

Where in the opinion of the Architect/the Contract Administrator works or materials are defective or not in accordance with the Contract or do not comply with a statutory or other legal requirement ("Failure"), even if the Failure is of a minor or non-material nature, the Architect/the Contract Administrator may, without prejudice to the Employer’s rights and remedies under this Contract or at law, issue instructions to the Contractor to:

(a) stop work, and subsequently to recommence work;

(b) undertake investigations and tests to determine the Failure and open up any work already performed and to make good the opening up;

(c) undertake remedial works, including the making good of any defects and the instruction may include specific requirements as to how to make good or repair the defects;

(d) remove or demolish and/or replace defective work or materials;

(e) give such further or other directions, after consultation with the Employer, as may appear to the Architect to be fair and reasonable to remedy or make good any defect or damage or breach of the Contract;

(f) accept the defective work or materials subject to a reduction in the sum to be paid under Article 2;

(g) certify, subject to the correction of the defects noted in the certificate, practical completion under clause 2.9 of the Works or a part thereof,

provided that an instruction given under this clause shall not entitle the Contractor to an extension of time or to any payment, and provided further that any reasonable and prudent costs associated with the issue of a certificate under this clause or compliance with it shall be paid by the Contractor to the Employer (unless no Failure is subsequently found to have existed). An instruction under this clause shall not constitute a variation under clause 3.6 or otherwise and is without prejudice to the powers under clause 3.4."

Section 4 PAYMENT
Clause 4.3A  Insert a new clause 4.3A as follows:

"Any retention shall be retained by the Employer without obligation to invest and without creating any fiduciary or other obligations on the part of the Employer to the Contractor."

Section 6  TERMINATION

Clause 6.4.1.3  Insert after "clause 3.9." the following word "or;".

Clause 6.4.1.4  Insert a new clause 6.4.1.4 as follows:

"if the Contractor does not comply with any instruction issued by the Architect/the Contract Administrator,"

Section 7  SETTLEMENT OF DISPUTES

Clauses 7.2  Delete, and substitute:

"Where pursuant to this Contract or Part II of the Housing Grants, Construction and Regeneration Act 1996 a dispute or difference is referred to adjudication, that adjudication shall be governed by and conducted in accordance with the Adjudication Rules of the Technology and Construction Solicitors Association, which are incorporated herein by reference. The decision of the adjudicator shall be binding on the parties until the dispute or difference is finally determined by a court or judge thereof."

Clause 7.3  Delete.

Schedule 1  ARBITRATION

Delete.

ADDITIONAL CONDITIONS

The following additional conditions shall have effect:

A1  SET OFF AND OTHER REMEDIES

A1.1  Nothing contained in this Contract (other than as to the giving of notices) shall oust or limit any right of the Employer under any statute or rule of law or of equity in the nature of set-off or abatement of price.

A1.2  If the Contractor becomes insolvent so that its covenant is impaired, then without prejudice to any other remedy it may have, the Employer shall be entitled to recover from the Contractor any premiums reasonably incurred to effect insurance (such as inherent defects insurance or other suitable cover) in order to arrange suitable alternative protection.
A2 HEALTH & SAFETY

The Contractor must in pursuance of its obligations under this Contract comply at all times with the provisions of the Health & Safety at Work etc Act 1974 ("HS Act") and in particular the Construction (Design and Management) Regulations 1994 or any amendments thereto ("CDM Regulations"), and insofar as they touch upon or concern its obligations under this Contract (but without prejudice to the generality of the foregoing):

1. Where the Contractor is also the Principal Contractor under the CDM Regulations, the Contractor must comply with the obligations of the Principal Contractor under those regulations;

2. Where the Contractor is also a "designer" as defined under the CDM Regulations, the Contractor must comply with the obligations of a "designer" under those regulations;

3. Co-operate fully with the Planning Supervisor and the Principal Contractor (if it is not either or both of those people) under the CDM Regulations;

4. Ensure that it allocates adequate resources to enable it to comply with its obligations in this Contract and the CDM Regulations;

5. Co-operate with all other persons involved in the Works as "designers" to consider the prevention of risks and protection of persons who may be exposed to risks;

and it must not by an act or omission do anything that would cause the Employer to breach or be prosecuted under the HS Act and/or the CDM Regulations.

A3 CORRUPT PRACTICES

The Contractor shall not:

- offer or give to any person in the service of the Employer any gift or consideration of any kind as an inducement or reward in relation to the obtaining or execution of this Contract or any other contract with the Employer or for showing favour or disfavour to any person in relation to this Contract or any other contract with the Employer, or

- enter into this Contract or any other contract with the Employer if, in connection with this Contract or any such other contract, commission has been paid or an Contract for the payment of commission has been made by him or on his behalf or to his knowledge.

A4 CONFIDENTIALITY

The Contractor must at all times keep confidential, treat as privileged, and not directly or indirectly make or allow any disclosure of, any provision of this Contract or any information relating to any provision or subject matter of the Works or the
site, or any information directly or indirectly obtained from another party under or in connection with the Works or the site, except to the extent:

(a) required by law;

(b) that the parties to this Contract otherwise agree in writing;

necessary to carry out its duties in relation to the Works, or in order to make full frank and proper disclosure to its insurers or intended insurers, or to obtain legal or accounting advice.

A5 PARTNERING

No partnering agreement which the parties may enter into (with or without other parties) in connection with the Works is intended to create legally enforceable rights or obligations between the parties or affect the terms of this Contract.

A6 DATA PROTECTION AND FREEDOM OF INFORMATION

A6.1 In relation to all personal data ("Personal Data") as defined in the Data Protection Act 1998 ("DPA") which is supplied by one party to the other party pursuant to their agreement, the Contractor shall at all times comply with the DPA as a data controller if necessary, including maintaining a valid and up to date registration or notification under the DPA covering the data processing to be performed by the Contractor in connection with the Works or this contract.

A6.2 The Contractor shall procure that any sub-contractor shall only undertake processing of Contract Personal Data reasonably required in connection with the Works or this Contract.

A6.3 The Contractor understands that under the Freedom of Information Act 2000 the Employer has certain obligations which may mean that certain parts of this Contract may be disclosed to third parties.
SECTION ONE

PREAMBLES
1.0 PREAMBLES

1.1 GENERAL

Where appropriate in this document, for Engineer, read Contract Administrator.

Supply, install, connect and test the whole of the systems in accordance with the Specification and drawings and for any other works given in the form of instructions during the progress of the Contract and leave the complete installation in good working order all to the satisfaction of the Engineer. Where Specialist Manufacturers/Supplies are to carry out termination of cabling installation of equipment and testing/commissioning, all such costs shall be included within the Tender.

The tenderer shall be deemed to have examined the specification and drawings, visited site to ascertain working conditions and access restriction and if all particulars required cannot be obtained from this examination, application for information shall be made to the Engineer.

The specification shall be used in conjunction with the drawings enumerated in the "Schedule of Drawings". Any work which is clearly intended to be done to carry out the evident meaning and intent of the specification, although not specifically, mentioned or shown on the drawing(s), shall be performed by the tenderer as if it had been detailed in the specification or shown on the drawings and everything is to be supplied to render the installation completely safe and efficient in all respects.

The tender drawings and specification are prepared as a basis for tendering only. It should be understood that they are diagrammatic only, and that the Contractor shall provide his own working drawings and for this purpose he must obtain all relevant structural and architectural information necessary.

The Specification and tender drawings contain references to products of specific manufacturers. The tender drawings have been prepared using the dimensions and salient features of the preferred equipment. The tender shall be based upon the equipment specified.

General Contents of Section 2.0

The clauses in this section of the specification comprise the Standard Clauses detailing the performance specification of materials and the method, and minimum standard of installation procedures to be adopted by the Contractor. Compliance with sections 1.0 and 2.0 is essential to all Contracts. All items, which are relevant to this Contract, must be strictly adhered to, and permission to deviate from any of these relevant sections must be obtained in writing from the Engineer prior to commencing the works.

The method of Electrical Installation practice as detailed in this section and sections 3.0 to 22.0 inclusive, indicate the minimum standard of works, workmanship, materials and the only methods, which will be acceptable to the Architect and/or Engineer.

All clauses in section 2.0 of this specification apply directly to the particular Contract and must be read in conjunction with any relevant clauses in section 1.0. and 3.0 to 22.0 inclusive.
1.2 STATUTORY AND GENERAL OBLIGATIONS

In respect of the installation, materials, components, equipment and workmanship comply with Statutory and other Obligations and the Regulations of any Local Authority, Public Services or Statutory Undertaking relating to the execution of the works. In particular comply with the requirements of:-

- BS7671 - I.E.E. Wiring Regulations.
- The CIBSE Codes and Guides.
- Hospital Technical Memoranda/Building Notes.
- The Health and Safety at Work Act.
- The Electricity at Work Regulations.
- The National Inspection Council for Electrical Installation Contracting.
- The Building Regulations.
- All other relevant British and European Standard Specifications and Codes of Practice.

All British and European Standards and Codes of Practice and reference documents referred to in this Specification shall mean the latest published edition including all revisions and amendments.

1.3 TYPE OF LABOUR

The Contractor shall keep upon the Works a competent Supervisor satisfactory to the Engineer.

Once approved, this representative shall not be changed without the agreement of the Engineer.

The Contractor shall supply all supervision, skilled and unskilled operatives to carry out the work in the best possible manner.

Trade custom in the employment of the appropriate grades of work people shall be followed and the Contractor shall be held responsible for ensuring that such is complied with.

Class of Work

All work done under the Contract shall be executed in the manner set out in the specification, or where not so set out, to complete satisfaction of the Engineer.

All works shall conform to the best principles of modern practice, and shall be carried out by fully competent skilled tradesmen.

The whole of the electrical work shall be carried out in strict accordance with the 16th Edition of the Regulations for Electrical Installations as issued by the Institution of Electrical Engineers BS7671: 1992 (hereinafter referred to as the IEE Regulations), and the Electricity at Work Regulations 1989.
1.4 MATERIALS AND SAMPLES

All materials supplied shall be new, undamaged, and free from corrosion, comply with the latest edition of the relevant British and European Standards and conform to the requirements of the Specification.

Any computer system, data processing equipment or part thereof, or system of data storage and retrieval, or communications system, network, protocol or part thereof, or storage device, microchip, integrated circuit, real-time clock system or similar device or any computer software (including but not limited to application software, operation systems, runtime environments or compilers), firmware or microcode supplied should comply with DISC PD 2000-1 or equivalent and written confirmation should be provided.

All materials shall be in accordance with the types and manufacture described in the specification and/or shown on the relevant drawings. Where the Electrical Contractor desires to use materials differing from those described, he shall first obtain the written approval of the Engineer.

Where quality and standards of materials are not specified they shall be of adequate quality and equivalent standard to similar specified items. All equipment, plant, pipes, fittings, switchgear, cables etc. shall each be of the same quality and manufacture throughout. Corresponding parts of similar equipment throughout the contract shall be proved to be interchangeable by the Contractor at any time when required by the Engineer.

Before the commencement of any work the Contractor shall submit to the Engineer such samples of workmanship, materials and equipment intended for the works as the Engineer may consider necessary. These samples will remain in the possession of the Engineer until completion of the Contract or be embodied in the installation if he deems it necessary.

Materials shall comply fully with the relevant British Standard Specification, unless otherwise described in Section 2.0 of the specification and/or on the drawings.

The Engineer reserves the right to inspect materials on site and to reject any materials not complying with the specification. The cost of any dismantling and re-erection of the installation shall be borne by the Electrical Contractor concerned.
1.5 INFORMATION TO BE PROVIDED BY THE CONTRACTOR

General

Supply two copies of all drawings for comment and three copies of the final version for use by the Employer.

The Engineer's comments on working or manufacturing drawings submitted by the Contractor shall not in any way relieve the Contractor of his responsibility in respect to the accuracy of all such drawings nor from his responsibility for providing equipment suitable for the location in which it is to be installed. The Engineer will draw attention to any divergence from the specified requirements or errors, which occur to him but his comment, shall not imply approval in terms of dimensional accuracy or completeness of detail.

The tender makes provision following the 1st year maintenance for continuing 3 year comprehensive maintenance contract with a 2hr response time for call out to repairs, and a 1/2hr response time to site in the event of an incident. Only contractors who can comply with this need tender. Proof of compliance should be included with the returned tender.

The tender also includes for 4 years pro-active monitoring of the system to local control centres therefore only contractors with Maxpro Training to level 2 integration need tender. Proof of compliance in the form of certification from Maxpro/Honeywell should be included with the returned tender.

Installation Drawings/Positioning of Equipment

Prepare drawings, based on the tender drawings showing proposals for the execution of the works. Prepare the drawings in such detail as to enable the works to be installed. Agree the precise route of all services with the Engineer.

Allow for attending co-ordination meetings with the Main Contractor when required and other Sub-Contractors and the Engineer as required to enable the installation drawings to be co-ordinated with those of other trades. Subsequently set out work involved and take all measurements and dimensions required for the installation on site.

Ascertain on site that the installation will not foul other permanent services or equipment. Notify the Engineer if it is necessary to make changes to take account of site conditions.

The positions of equipment shown on the drawings shall be assumed to be correct for the purpose of tendering but these positions are approximate only, and must not be scaled for the purpose of actual fixing. The Contractor shall consult the Architects Drawings for exact locations of equipment.

The Contractor shall be responsible for setting out all work involved and the taking of all measurements etc. required for the erection of all items on site, making any modifications as may be found necessary during the progress of the work.
Builders Work Information

Prepare drawings and schedules to show the architectural and structural requirements for all builders’ works and allow their integration into the Project. Include on these drawings and schedules requirements for foundations, bases and supporting structures for plant and equipment.

Mark out all builders work and carry out minor builder's work such as fixing of brackets and drilling of holes for screws.

1.6 CONTRACT ADMINISTRATION

Schedule of Rates

As relevant section in this document

Valuation of Instructions and Variations

As relevant section in this document.

Programme

As relevant section in this document

Protection and Cleaning

Ensure that all materials held on site, whether installed or awaiting installation, are adequately protected.

Progress, Supervision and Workmen

On receipt of the order, the Electrical Contractor shall take steps to acquaint himself with the general construction and details of the work of other traders on site, in particular the heating, gas and plumbing Contractors, in order to ensure that these works will not in any way hinder or obstruct the electrical work as planned and specified.

All site works shall be fully and properly supervised by a Supervising Electrical Engineer who shall visit the site regularly (at least once a week) to ensure that progress is maintained and shall attend site meetings as required and shall programme the work. Such a person shall be fully competent to discuss and consider with the Engineer all points which may arise under the Contract in respect of the mutual manner in which the work is being executed and shall be capable of making decisions to ensure that the installation is carried out diligently and complies with the terms of the Contract.

Inspection and Tests

The procedure shall include: -

The operation of accessories and all items of fixed equipment. These tests to be made under normal operation conditions and the results noted.
Method of Test

The procedure shall include:

The testing of all equipment in accordance with BS7671.

Operation of equipment by properly trained and competent persons.

For disconnection or similar operations as are required to fully satisfy the test requirements and reconnection to restore the installation.

For simulation of fault conditions in the installation to ensure that all alarms, controls, indicators and safety devices operate correctly and subsequent resetting to the correct operating conditions.

For simulation of fault conditions in the installation to ensure that all alarms, controls, indicators and safety devices operate correctly and subsequent resetting to the correct operating conditions.

For the simulation of fault conditions in the 'normal' electricity supply system to ensure that the emergency supply changeover contactors sensing circuits, failure relays, times etc. operate correctly and the subsequent re-setting of the network to the correct operation conditions.

For pressure tests on all armoured cables of 25mm² and above with lengths exceeding 5 metres. The tests to be made with isolators and switches in the open position and under competent supervision to ensure the non-occurrence of accident to person, installation or building.

For the application of a dc test voltage which is gradually increased to the full value and maintained for 5 minutes between conductors and between each conductor and armouring, the voltage to be in accordance with the table below:

<table>
<thead>
<tr>
<th>Cable Voltage Designation</th>
<th>Between Conductors</th>
<th>Between Each Conductor and Sheath</th>
</tr>
</thead>
<tbody>
<tr>
<td>600/1,000</td>
<td>3,500</td>
<td>3,500</td>
</tr>
<tr>
<td>1,900/3,300</td>
<td>10,000</td>
<td>7,000</td>
</tr>
<tr>
<td>3,800/6,600</td>
<td>20,000</td>
<td>15,000</td>
</tr>
<tr>
<td>6,350/11,000</td>
<td>34,000</td>
<td>25,000</td>
</tr>
</tbody>
</table>

For the rectification of faults or the renewal of any part of the installation which fails or breaks down as a result of the pressure test.

For tests on the wiring/cabling for such services as Fire Alarms, Intercommunication Systems, General Alarms, TV and Radio Systems to be made prior to the terminal equipment being connected but with the cable terminations completed, in order to preclude damage to the terminal equipment and to obviate any adverse effects on the test results.
The recording and completion of all schedules, test, and inspection and completion certificates with copies submitted to the Engineer.

In the event of unsatisfactory tests, for a witnessed repeat test after rectification of the fault(s).

**Test Equipment**

Shall be:

Correctly calibrated and certified for the limits of accuracy necessary. If an instrument used is considered suspect an authorised standard testing laboratory shall test it.

Provided with an insulated and shrouded probe with flexible lead for testing metalwork such as switch plates.

Of the following types for the associated function:-

- **Ring final circuit continuity**
  - Low reading ohmmeter capable of reading fractions of an ohm to a high degree of accuracy.

- **Protective conductor’s continuity**
  - Heavy current low reading ohmmeter capable of reading fractions of an ohm.

- **Earth electrode resistance**
  - Alternating current generator with a minimum voltage of 240 volts and a maximum current flow of 25 amps.

- **Insulation resistance**
  - Generator 500v dc

- **Polarity**
  - 'Avometre’ or other approved commercial instrument.

- **Earth fault loop impedance**
  - Phase-earth fault loop tester. Neutral-earth fault loop tester.

- **Residual Current Devices**
  - Capable of fully meeting testing requirements of BS 7671 for RCD’s.

Shall not:

Be of the 'stop go' type but must indicate the impedance value directly in ohms with means of measuring and correcting for voltage variations.

All test certificates shall be accompanied by the following information:-

i) Make, model and serial number of testing instrument or instruments used.
ii) Copies of calibration certificates for the above instrument

**Final Acceptance Tests**

Shall be:

Carried out at the completion of the Works.

Recorded upon the final acceptance record sheets.

**Testing**

The electrical installations shall be inspected and tested by the Electrical Contractor in accordance with Part 7 of the IEE Regulations.

It should be noted that electronic components might sustain serious damage as a result of accepted electrical installation test procedures. Conductors and other circuit components shall be tested prior to them being connected to electronic components.

The presence of electronic components shall be noted clearly on the circuit cards and in operating and maintenance manuals with an indication that testing procedures may result in damage.

During construction of the works the Electrical Contractor shall undertake all necessary tests to ensure compliance with the IEE Regulations and the specification upon completion of the works.

Where any part of the installation is to be concealed within the building fabric, tests shall be made to ensure that the installation is satisfactory prior to concealments.

Upon completion of the works, the whole installation shall be subjected to the tests, detailed hereafter and every defect shall be noted, corrected and brought to the notice of the Engineer.

All tests shall be witnessed by the Engineer to his full satisfaction. The Engineer shall be given at least one weeks’ notice, in writing, of the proposed tests. All tests shall be executed within the programme of building works.

All labour and test instruments shall be provided by the Electrical Contractor for carrying out the works. The instruments shall be correctly calibrated and certified for the limits of accuracy required and shall be operated by competent persons.

If, in the Engineers opinion, a particular instrument is not suitable, then an acceptable alternatives shall be provided. The Engineer shall be at liberty to demand the use of any testing instrument or apparatus that he may reasonably consider to be necessary in the execution of the testing.

If in the event of the installation failing to pass the tests, the Engineer shall be at liberty to deduct from the Contract price all reasonable expenses incurred by him, in attending the repetition of the tests.
The following items, where relevant, shall be tested in the sequence indicated. Standard methods of testing, in respect of some of the following regulations of this section, are given in the IEE Regulations, 713-02 to 713-09.

Continuity of protective conductors, including main and supplementary equipotential bonding.

- Continuity of ring final circuit conductors.
- Insulation resistance.

Insulation of site built assemblies.

- Protection of electrical separation.

Protection by barriers or enclosures provided during erection.

- Insulation of non conducting floors and walls.

Polarity.

- Earth fault loop impedance.

Earth electrode resistance.

Operation of residual current devices and fault voltage operated protected devices.

In the event of any test indicating failure to comply, that test and those preceding, the results of which may have been influenced by the fault indicated, shall be repeated after the fault has been rectified.

The sequence of the testing shall be as follows:-

**Continuity of Protective Conductors**

The Electrical Contractor shall separately test every protective conductor to verify that it is electrically sound and correctly connected. This test shall include all conductors and any extraneous conductive parts used for equipotential bonding as required by IEE Regulation 713-03.

**Continuity of Ring Final Circuit Conductors**

The Electrical Contractor shall test to verify the continuity of all conductors (including the protective conductor) of every ring final circuit as required by IEE Regulation 713-02.

**Insulation Resistance**

The test described in IEE Regulation 713-04 shall be made by the Electrical Contractor before the installation is permanently connected to the supply.
Where equipment is disconnected for the tests prescribed in IEE Regulations 613-6 and 613-7, and the equipment has exposed conductive parts required by the IEE Regulations to be connected to protective conductors, the installation resistance between the exposed conductive parts and all live parts of the equipment shall be measured separately and shall comply with the requirements of the appropriate British Standard for the equipment. If there is not appropriate British Standard, the insulation resistance shall be not less than 0.5 megohm (in accordance with IEE Regulations 613-8).

**Insulation of Site Built Assemblies**

Where protection against direct contact is intended to be afforded by insulation applied to live parts during erection in accordance with IEE Regulations 412-02, it shall be verified that the insulation is capable of withstanding, without breakdown or flashover, an applied voltage test equivalent to that specified in the British Standard for similar factory – built equipment (in accordance with Regulation 713-05).

Where protection against indirect contact is provided by supplementary insulation applied to equipment during erection in accordance with IEE Regulations, it shall be verified by test 413-03, that the insulating enclosure affords a degree of protection not less than IP2X (see BS5490) and that the insulating enclosure is capable of withstanding, without breakdown or flashover, an applied voltage test equivalent to that specified in the British Standard for similar factory built equipment.

**Electrical Separation of Circuits**

Where the IEE Regulations 411-02 or 471-02 applies, the electrical separation of the separated circuit shall be inspected and/or tested (in accordance with IEE Regulation 713-06).

**Protection Against Direct Contact by Barriers or Enclosures Provided During Erection**

Where protection against direct contact is intended to be afforded by barriers or enclosures provided during erection in accordance with IEE Regulation 412-03, it shall be verified, by test, that the enclosures or barriers afford a degree of protection not less than IP2X as appropriate, where those regulations so require (in accordance with IEE Regulations 713-07).

**Installation of Non-conducting Floor and Walls**

Where protection against contact is to be provided by a non-conducting location intended to comply with IEE Regulations 413-04 to 471-10, the resistance of the floors and walls of the location to the main protective conductor of installation shall be measured at not less than three points on each relevant surface, one of which shall be not less than 1 metre and not more than 1.2 metres from any extraneous conductive part in the location (in accordance with IEE Regulations 713-08)
**Polarity**

A test of polarity shall be made by the Electrical Contractor and it shall be verified that all fuses and single pole control devices are connected in the phase conductor only, that centre-contact bayonet and Addison-type screw lampholders in circuits having an earthed neutral conductor having their other or screwed contacts connected to that conductor, and that wiring has been correctly connected to socket outlets (in accordance with IEE Regulations 713-09).

**Earth Fault Loop Impedance**

Where protective measures are used which require a knowledge of earth fault loop impedance, the relevant impedances shall be measured by the Electrical Contractor or determined by an equally effective method (in accordance with IEE Regulation 713-10).

**Earth Electrode Resistance**

Where it is necessary to measure the resistance of an earth electrode, the test method described in the IEE Regulations 713-11.

**Operation of Residual Current Operated and Fault Voltage Operated Protective Devices**

Where protection against indirect contact is to be provided by a residual current device or fault voltage operated protective device, its effectiveness shall be verified by the Electrical Contractor by a test simulating an appropriate fault condition and independent of any test facility incorporated in the device (in accordance with IEE Regulations 713-12).

**Certification**

Following the inspection and testing by Chapter 7 of IEE Regulations, a completion certificate shall be given by the Electrical Contractor to the Engineer.

The Certificate shall be in the form set out in Appendix 6 of the IEE Regulations. Any defects or omissions revealed by inspection or test shall be made good before a completion certificate is issued.

An inspection certificate in accordance with IEE Regulations 713, shall accompany and be attached to the completion certificates.

**Manufacturer’s Test Certificates**

Manufacturer’s certificates of tests at the specified duties held at the manufacturer’s works shall be submitted for switchgear and transformers etc. prior to site delivery.

**Commissioning**

Commissioning shall be carried out by the Sub-Contractor to verify the correct operation of the whole installation.
This shall include proving of equipment installed by Specialist Electrical Contractors,

Equipment employing batteries shall be subjected to full performance tests including operation for the prescribed time period with battery re-charge accomplished in the specified time.

Equipment fitted with batteries shall be protected to ensure that the battery, charger or any other component discharge or recharge of the batteries when operating unattended sustains no damage.

Upon completion of all tests and commissioning, three copies of detailed certificates shall be provided by Electrical Contractors to show that the equipment, materials, installations etc., have been tested and commissioned as detailed above. One copy of each duly completed and signed, shall be submitted to the Architect within 14 days of the results being obtained. The second copy is for the Engineer.

The third copy of the certificate shall be retained to be included within operating and maintenance manuals. The results of the tests and details of completion for the Electrical test shall be detailed on Test and Completion Certificates respectively, issued by the National Inspection Council for Electrical Installation Contracting.

In addition all manufacturer’s certificates of tests at the specified duties carried out in the manufacturer’s works shall be submitted in triplicate as detailed above.

A notice to the effect that the installation should be periodically inspected, shall be secured to the main switchgear. The notice should read as follows:-

**IMPORTANT**

“This installation shall be periodically inspected and tested, and a report on its condition obtained as prescribed in the regulations for the Electrical Equipment of Buildings issued by the Institute for Electrical Engineers.”

Date of last inspection:

Recommended date of next inspection:

No commissioning shall be carried out whilst building finishing work or cleaning is taking place in the areas affected.

The Contractor shall include in the programme of work adequate time for commissioning, properly integrated into the overall programme which will bring the building and all trades to the level of completion to enable the commissioning of the plant and works to be carried out. He shall ensure that record manuals are kept of commissioning work which shall be made available for inspection at intervals or by request of the Clerk of Works.
System proving is defined as ‘the advancement of installation from the stage of strategic completion to full working order calibrated to design requirements’. It is the responsibility of the Contractor to prove the system and his tender shall include all costs and equipment necessary for this purpose.

The extent of the system proving shall broadly include the following for which allowance shall be made by the Contractor:-

Tests on the installation as previously described to demonstrate the soundness of the system and the issue of certificates.

Setting to work all systems.

Operating and regulating systems to meet the specification.

Demonstrating to the satisfaction of the Engineer that the specified performance of systems had been achieved.

Where appropriate and required in the specification the cost of bringing in staff from specialist suppliers shall be included.

Time will be arranged after practical completion and during furnishing of the buildings for the final balancing, regulating and demonstration of the systems.

The Contractor shall include for electrical testing of all power equipment, e.g. motors etc. which he has connected even though others supply it. These tests will be executed whilst testing the cables supplying the equipment.

The Contractor shall include in his tender figure for attendance by his staff during system proving of:-

i) All equipment and services provided under this Contract.

ii) All equipment and services supplied by others if electrical connections have been provided to the equipment and service under this contract, together with any attendance required as stated in subsequent sections of this specification.

The Contractor shall provide testing and commissioning and attendance by his staff for the system proving of Heating and Ventilating Control Panels to ensure the system operates to the design requirement of the H & V System.

1.10 INSTRUCTION

Following commissioning of the works and prior to practical completion, explain and demonstrate to the Employer's representative the purpose, function and operation of all systems. Include all items and procedures listed in the operating and maintenance manual. Include in this undertaking instruction from the manufacturers' service engineers. Allow a minimum of 2 working days for this exercise, which is to be carried out during normal working hours.
1.11 AS INSTALLED DRAWINGS

These drawings shall indicate the routes and sizes of all external and internal services and the actual positions of all terminal points.

Provide for each plant and switchroom included in his works, drawings/diagrams on heavy gauge paper sheet, framed, glazed and wall mounted in the respective rooms. Include positions of all items of plant and equipment as well as pipework, ductwork and electrical circuits of the installed plant.

Obtain approval before glazing and mounting.

Record drawings of buried services shall be dimensioned from fixed points, eg curbs, building lines etc. to indicate the exact route of all services and actual positions of all joints.

All the foregoing information shall be provided two weeks before the completion date. At this time the Contractor shall provide two paper prints of each record drawing and when these have been checked and agreed by the Engineer the Contractor shall provide one velograph copy of each drawing and one disk copy of the drawings in AutoCAD format.

In order to prepare these drawings the Contractor shall keep on site one set of drawings showing the progress of the work installed indicating all cables, trunking, cable tray, switch points, lighting points, socket points, switchgear, electrical plant and equipment etc., and showing all modifications and variations. These drawings shall be kept up to date as the work proceeds and facility shall be afforded to the Engineer to inspect these drawings as required.

The drawings must clearly show to any approved code: Main and Sub-main cable routes denoting number and type and size of conductors, earth tapes, earthing conductors and equipotential and supplementary bonding conductors, conduit, trunking, cable tray and final sub-circuit cables showing route, size and termination.

The drawings shall indicate for each conduit or cable whether it is run on the surface, concealed in wall chase, wall partition, structural floor or other size.

Draw-in boxes, distribution board switches, and all outlets are to be shown including isolators, motor starters, fire alarm devices etc. and where applicable the circuit and reference of all outlet points and equipment.

Control wiring diagram for all equipment supplied (including manufacturers drawings of special equipment) shall be kept on site and modified as the work proceeds to record any variations.

1.12 HAND OVER PROCEDURE

On completion of commissioning the Engineer will make a preliminary hand over inspection and list all outstanding works and defects. Rectify these defects and subsequently offer the works for final handover. The Engineer will only recommend handover following receipt of the record drawings, operating and maintenance
instructions, commissioning manual, written confirmation of the completion of outstanding work and satisfactory instruction to the Client's representative.

1.13 DEFECTS LIABILITY PERIOD

During the defects period attend to further/additional items that need attention.

Approximately three weeks before the end of the defects period the Engineer will produce a final defects list. Ensure that any items noted are rectified prior to the end of the defects period. Write to the Engineer confirming defects have been rectified and the work is complete.
SECTION TWO

PARTICULAR SPECIFICATION
2.0 SCOPE OF WORKS

2.1 INTRODUCTION

This part of the Specification describes the scope of the CCTV & Electrical Services installation and should be read in conjunction with the remainder of the Specification and Tender Drawings. Together they cover the manufacture, supply, delivery to site, off loading and positioning, co-ordination, installation, testing, setting to work and commissioning of the services installation.

The Electrical Services shall comprise:-

- All Trenching, underground ducts and Builders Work associated with the installation.
- CCTV Column Installation
- Installation of PTZ Cameras
- All associated electrical supplies.
- Provision of remote playback and archive software on laptop computer.
- Telemetry control transmission.
- Provision of wireless network
- Provision of fully comprehensive 3 year maintenance contract
- Provision of monitoring and response for 3 years

The installation shall take due account of all relevant British and European Standards, the requirements and regulations of the Local Authority, the recommendations of the Chartered Institution of Building Services Engineers, Building Regulations, The Health and Safety At Work Act.

The Contractor shall note that if successful he will act as Principal Contractor under the Construction (Design and Management) Regulations 1994. The Contractor shall make due allowance of liaising with his sub contractors (if any). For part of the South Side of the site the contractor shall for tender purposes consider themselves nominated sub contractors as it is likely that there will be building works being carried out, payments will still be made direct by One North East but all conditions of contract will be as the main conditions of contract for that project.

2.2 DESCRIPTION OF SERVICES

General

The works shall comprise the complete supply and installation of a camera system to monitor the entrance, egress and road movement of vehicles and persons at Monkton Business Park, Monkton. The employer will be One North East.

The camera system shall be capable of recording all cameras simultaneously for a period of 31 days @ 3.0 F.P.S.

The system to be a Digital Recording system with wireless connection to a remote Laptop Computer that will allow back up and playback of recorded images to a standard CD format.

The contractor shall provide a 3 year comprehensive maintenance contract following the 1st years maintenance and include for 4 years monitoring at a registered monitoring station within a radius that will satisfy the call out criteria.
• **Identification of Services/Strip Out**

There are no existing services to strip out

• **Incoming Supplies and Distribution Equipment**

The site requires a new incoming service for the camera installation, a provisional sum of £7500 is to be included for an incoming service by NEDL. The north side service will be accommodated within the base of the CCTV column but the south side service will be accommodated in a floor fixed steel enclosure to be supplied and installed by the contractor adjacent to an existing sub station. The steel enclosure will be capable of housing the incoming NEDL service and metering as well as the distribution board for outgoing supplies to the columns, the cabinet will also be capable of accommodating all control equipment for the matrix and shall be environmentally controlled. Also included within the contract is a provisional sum of £10,000 for a proposed brick built unit which if planning permission is granted will be next to the NEDL transformer room, in this event the costs for the floor cabinet will be excluded.

The contractor shall include for liaison with the service provider for provision of the incoming service, the Contract Administrator has carried out all initial enquiries for a 240v 10kva service capacity but at the time of tendering no reply has been received. On receipt the cost will be expended against the provisional sum of £7500.

The contractor will be responsible for arranging the site service to suit the programme of works; he shall also be responsible for all outgoing cabling and ducts from the service cabinet to each column and camera. The cabinet is to be supplied and installed in the position indicated on the design drawings, the cabinet shall be lockable and shall have fitted to it an electronic contact such that in the event of anyone tampering or opening the doors the cameras will switch on and monitor the cabinet for a period of 30 minutes, as well as sending an alarm back to the monitoring station, this is further described under the controls section later in this specification.

• **General Containment Systems**

With the exception of one of the bases and interconnecting ducts to the nearest cable chamber on the South Side of the site near to the road access all ducts and bases should have been installed by others. At the moment the North side ducts and bases are complete and part of the South Side however, it is anticipated that by the time this contract is awarded all bases and ducts will be installed by others with the exception of above mentioned on the South side, in this instance the contractor shall include for soft dig 600mm deep to accommodate 2 ducts from/to a floor inspection boxes which they shall supply and install at the corner junction near the proposed CCTV column as you turn into the road which runs between the 2 sides of the South Side. The contractor shall include for terminating the existing ducts and the new ducts into this inspection chamber which shall be by Centurian Chambers ref CU7/3LP 750mm cover complete with lid or equiv and approved.

• **Cabling Systems**

The contractor shall supply and install in ducts previously described 10mm 3 core xlpe/swa/pvc on the North side and 10mm 3c for each site of the South Side sites, (3 circuits on South Side and 1 on North Side). The contractor shall install 2 way MCB units
in each of the column bases for individual protection of the cameras and LED infra red lamp units. The armour will not be relied upon for the earth so all cables will be 3 core each shall emanate from a 16 amp MCB at the distribution piller/column cabling to be installed on a loop in loop out basis.

The columns shall have lockable hinged doors and back boards which shall be fitted such that all necessary items can be installed and accessible for maintenance without removal or disconnection. The contractor will be responsible for ensuring all items of equipment necessary for the system to operate as described are included for. Each column and the base cabinet shall be protected by Lightning protection by Furse or other equiv and approved.

- **Camera Columns**

The contractor shall supply and install 8M cabinet based columns, which shall be painted at the manufacturer's works prior to delivery they shall be painted to a standard RAL colour to be confirmed on receipt of planning permission. The columns shall be as manufactured by Altron and shall have wind down mechanisms to maintain the cameras without use of Hihabs. The mast shall be of suitable construction to carry the full weight of the camera assembly and all brackets for fixing of the proposed cameras and LED lamp units. The contract shall note that the bases have been cast without base plates so the bases will need to be drilled and the columns chemically fixed as per the CCTV column manufacturers instructions.

The contractor shall include for all builders work details in accordance with the design drawings, and shall allow for delivery and erection and fixing of the columns. The contractor shall note that there will be restrictions on delivery and erection and these shall be co-ordinated with the operation times of the surrounding businesses. The contractor shall include for any necessary traffic controls to enable the safe and complete installation of the columns. Details of the column are included in section 3 of the specification for guidance purposes only.

The columns and cameras shall be fitted with lightning protection equipment.

- **Cameras**

The contractor shall supply and install cameras as follows: -

The High-Resolution True Day Night Camera shall include, as a wide range of advanced features. The unit shall incorporate a 1/3-inch interline transfer CCD, digital signal processing (DSP), and a minimum of 480 TV lines of resolution utilizing an effective pixel count of no less than 768 (H) x 494 (V) NTSC, 752 (H) x 582 (V) PAL. The camera shall provide excellent colour performance in low light, down to 0.5 lux or less@ f1.2 (50IRE). The camera shall incorporate advanced circuitry allowing for automatic changeover to monochrome, providing monochrome performance in extremely low light down to 0.06 lux @ f1.2 (50IRE). The automatic changeover feature shall be incorporate a movable IR cut filter that is user selectable on or off by means of a menu selection. The camera must also include an electronic shutter with a minimum of eleven (11) shutter speeds, and automatic gain control (AGC) for operation in a wide range of lighting conditions. The AGC shall have a range from 0 to 38 dB, increasing the camera’s sensitivity automatically when the ambient light level drops. The camera shall include a switching 12VDC/24VAC power supply with adjustable linelock (from 0º to 280º) and internal sync mode. The power consumption shall be no more than 4.5 watts, and a green LED must be present to indicate when the camera is powered. The camera shall provide digital...
backlight compensation with six (6) sensing zones to electronically compensate for high background lighting and give detail which would normally be silhouetted. To allow the most suitable area to be selected, the user shall have the ability to activate the zones individually, or in any combination of the six zones. The High-Resolution True Day Night Camera shall have a signal to noise ratio of 50 dB with the AGC off. Auto-White Balance (WB-Auto), Preset White Balance (WB-Push), and Manual White Balance (WB-Manual), with red and blue gain settings must be available. The camera shall offer a menu system capable of activating all the features and options available on the camera. The menu must be superimposed on the video image for display on a monitor, and five buttons on the side of the camera shall be utilized for navigating through the menus. The High-Resolution True Day Night Camera shall include a movable IR cut filter that blocks IR light at wavelengths longer than 750nm when the filter is in front of the CCD sensor, and allows the IR light to be incident on the CCD when the filter is removed from in front of the CCD. The IR filter position can be controlled by auto detecting the luminance of the scene, manually switched or controlled by an externally driven control signal connected to the IR lamp connection on the rear panel of the camera. The High-Resolution True Day Night Camera shall include wired remote control of the camera via RS485 communication. The RS485 communication shall allow remote control of the functions that are accessible via the OSD Screen Display. The High-Resolution True Day Night Camera shall be the Honeywell HCD484E or equivalent.

The cameras shall be in weatherproof housing and high-speed heads and telemetry receiver cards, they shall be assembled and tested of site prior to installation.

Details of typical cameras are included in section 3 of the specification to allow the contractor to purchase all necessary brackets and controls for the full functioning of the camera system.

The cameras shall be linked to intelligent video motion detectors, which are to be dusk/dawn linked for night time use only, throughout the day the cameras will record all the time. The detector could be the ‘Pathfinder Fully Automatic Intelligent Detector’ by Visimetrics, a mixture of the Ernitec PIR 018 or 045 or 100 or equivalent and approved, the detectors shall send a signal back to the control room to alert them of presence in the area and switch on all cameras and Infra Red long range high power LED’s by Derwent Systems or equivalent and approved. The cabinet lock will also be linked to the camera facing the cabinet such that in the event of the cabinet being opened the camera switches on and records the activity around the cabinet for a period of 30min.

The contractor shall ensure all cabling and controls are included and shall allow within the programming for the above.

**Digital Video Recording & Radio Network**

As per drawing references 1159/E1 and 1159/E-02 –

To Transmit and control 11 off Honeywell or Ernitec or equiv and approved PTZ Cameras with Video loss / Alarm Contact / Power Fail / Heater Fail / PIR Inputs and control, or equivalent and approved.

2 Cameras on the North Side to be wirelessly linked across an existing railway line Full system to have remote connection via VPN (100mb full duplex) Broadband connection and allow for
Titan Vision IP CCTV and Control System Specification

System to operate via TCP/IP networking providing all functionality of playback via LAN, WAN or Dial up ISDN.

The system shall be full Duplex / Triplex i.e. simultaneous record, playback and transfer to CD-Rom without affecting recording process

All non-archived recordings shall be automatically overwritten after a defined number of days (min of 1, max of 366). Each camera shall have a different time period assigned before old files are deleted.

All cameras shall be capable of being named individually
All recorders shall be capable of being named individually (i.e. blocks of cameras)

MODULAR CONSTRUCTION

The construction of the system shall be completely modular to enable system expansion without redundancy. The system parameters shall be expandable by simply inserting additional Titan video switching or I/O modules into the system. Once the capacity of each system has been reached, further expansion shall be possible by adding additional recording units.

CONTROL COMPUTER

The system computer shall be 19” rack mounted. The minimum specifications shall be:

- Full Intel Pentium 4 microprocessor
- 1GB RAM
- 200Gb OS Hard disc Drive
- 64Mb Video Graphics
- DVD/RW
- Battery backed Real Time Clock
- SATA Raid 5 card (configurable for RAID 0, 1,5)

OPERATING SOFTWARE

The Replay Management System operating software shall be field proven over a minimum period of 3 years. Custom software will not be considered.

Recorder A No FX1008-1500CDX (2 off)

Physical Size / 4 U 19” Rack mount 480MM Deep
1,500 Gbyte Hard Disc Recording Capacity
1 off Video Monitor SVGA Port
1 off Spot monitor Output
1 off Network Interface
1 off I/O Alarm Card

Titan Video Server  No RSSC-200DVX  (1 off)

Physical Size / 4 U 19" Rack mount 480MM Deep
200 Gbyte Hard Disc Recording Capacity
1 off P4 3.2 GHz Processor
1 off Video Monitor SVGA Port
1 off Spot monitor Output
2 off 1000BaseT Network Interface

Site End Titan Transmission system consisting of

2 off NVR Type 1500Gbyte 8Ch                          Part No FX1008-1500CDX
1 off Managed Network Switch                          Part No T 2950 MS
1 off 1500KVA UPS                                       Part No UPS 1500
1 off 16Ch 1to5 Video Dist Amp                         Part No Vid T101R
2 off 485/IP Codec                                     Part No TMOX485IPC
3 off IP MPEG 4 Codec                                  Part No TACT-SED-2120R
4 off 12V DC PSU                                       Part No 12vDC-PSU-1A
1 off Titan Server                                     Part No VDS-200-XP-P4
2 off MPEG4 Wireless TX/RX                              Part No AP-5800-1-17DB-IA
1 off Wireless IP Terminal                              Part No T-WAP-24-LTOP-TVIS

Maxpro Subrack consisting of
1 off 16 Ch Honeywell Mux                               AXCD16EX
1 off 32 Ch Maxpro Subrack                              HMX1132
1 off Cont Card                                         RB105B
4 off Out put Cards                                     RB85
4 off Txt Gen Cards                                     MX205
1 off Telemetry Card 485                                RD316
1 off Alarm Card                                        RD400
1 off 16CH Mux                                          AXMD16EX

Receiving End

1 off Titan Client                                     Part No RSSC-200DVX
1 off Managed Network Switch                           Part No T 2950 MS
1 off 485/IP Codec                                     Part No TMOX485IPC
3 off IP MPEG 4 Codec                                  Part No TACT-SED-3300R
4 off 12V DC PSU                                       Part No 12vDC-PSU-1A

External Cabinet

The contractor shall supply and install an outdoor unit similar to those manufactured by Blakley Electrics tel 01924 290066 Fax 01924 290455.
The unit shall be floor mounted and all cabling will be bottom entry/exit. The unit shall be suitable for the environment in which it will be installed and will be made to accommodate the following: -

Incoming NEDL Service
Incoming 50 amp SPN MCB in enclosure
8way SPN MCB dist bd with 10amp outgoing ways
Space required to house all transmission, recording and the matrix equipment.
Mains Power Conditioner (1000vA)
Anti-condensation heater @ thermostat
Single socket outlet to maintain temperature in cabinet at 16 degrees
Small fan connected to thermostat to make on rise at 24 degrees
Enclosure to be lockable and complete with heavy duty lock and door/hinges
The cabinet shall be linked to CCTV cameras such that on tampering with the cabinet the cameras will be pre-set to look towards the cabinet.
There is also a provisional sum included for a purpose built unit to house this equipment should planning permission be granted however the contractor shall include the above item.

Matrix and Provision of Recording and Call Out Service

The selected contractor shall show on the Tender Summary Sheet all costs for installation of the system, maintenance of the system for 3 years and also 3 years monitoring of the system. The monitoring station selected to carry out the above shall be capable of providing a response time of 30 minutes or less and shall have existing operations within the area to enable effective service and response. The Contractors shall be identified with the tender submission on a separate sheet along with all fixed call out rates and hourly rates, the contractor shall also state the % mark up for all materials used on the maintenance and call out service.

The contractor shall obtain costs for monitoring of the fully functional cameras. The cameras will be 24 hr recorded on site but monitoring will be between the hours of 6pm and 8 am the following morning, 7 days a week 365 days a year. The monitoring will be provided by the selected contractor and shall include for re-active security attendance to site in the event of activity on the site which is considered abnormal, the company shall also inform the police and treat the event as a breach of security and carry out their normal security operation function in so far as attendance, action required and logging of the call outs. It is understood that the company can only cost for the availability of such measures and that actual attendance will be invoiced separately showing CCTV proof of reason for attendance, the cameras will each be fitted with motion detection to signal activity in the area back at the monitoring station. Attendance costs shall be shown additional to the tender.

Pictures will be monitored on a 21” monitor to be provided by the cctv contractor to others for installation within the control room, pictures will be sequenced from site and displayed in quad format, the selected camera will be displayed on the control position spot monitor for manipulation of the cameras as appropriate. The spot monitor will be recorded at the control room and all recording equipment will be supplied under this contract for installation by others. The contractor shall include for a video input switching module and all equipment necessary depending on the control room chosen by the cctv contractor.

The contractor shall include for all equipment and monies necessary to add the system to the monitoring station and shall check with the monitoring station on the type of equipment they use be it Maxpro/Honeywell/VMS or a.n. other, no post claim for any such items will be entertained.
The contractor shall liaise with the selected approved monitoring station and obtain costs from them for the monitoring in accordance with this specification.

The following describes the Video Management Control System requirements:

The Video Management/Control System shall be modular in design, offering capabilities and capacities to support a wide variety of applications. The system hardware shall be a high-density design, occupying minimal rack space, yet allowing fitting and removal of BNC connectors without the requirement of tools. Video and audio switching must co-exist in the same subracks in order to save space and reduce installation complexity. The subracks must be designed to mount into a 19” EIA rack without additional hardware, and shall provide excellent grounding capabilities. Each module shall be hot swappable, allowing individual modules to be removed and replaced with the power on without affecting the rest of the system. All modules must be easily installed or removed from the front of the subrack. A single Video Management/Control System Central Processing Unit (CPU) module shall support up to 4,080 video inputs and 256 video outputs interconnected in multiple racks, without degradation to the quality of the video signal. The Video Management/Control System CPU shall be external to the matrix chassis, and shall feature a high-speed processor with field proven control software designed specifically for the purpose of video and audio switching in a security environment. All system configuration and user programmed information must be stored in non-volatile memory that can retain critical data indefinitely without power. The Video Management/Control System’s Recorder Management feature shall allow for the monitoring and control of analog or digital recorders via the I/O capabilities of the system. No loss of recordings shall be insured via the automatic routing of video signals through the matrix switcher to “Standby Recorders” connected to the video outputs. The system must support a minimum of sixteen (16) direct control functions for each of up to two thousand (2,000) analog or digital video recorders, for a total of thirty-two-thousand (32,000) control functions. Recorder Management shall conform to all International and U.S. Patents. The Video Management/Control System CPU shall include a watchdog timer and supply voltage monitor to automatically restart the system in the event of a power failure or brown out conditions. A composite video output must be present on the CPU to display real-time installation and diagnostic information on any standard composite video input monitor. With the use of a QWERTY keyboard, information such as baud rates, integrity of video connection, current status of switched inputs to outputs, the real-time status of alarm inputs, keyboard status, active macros, and other important diagnostic information must be available. The Video Management/Control System Video Input Modules (VIM) shall be manufactured from high quality components, utilize surface mount technology, and provide near broadcast quality video. Each module shall provide eight (8) video inputs, with individual 75 Ohm termination jumpers. Looping inputs modules must be available. Each video input module must provide separate video loss and low video detection for each input, and be configurable to activate a separate macro on each individual alarm and restore. The macro shall have the ability to switch to a back-up camera and alert the operator of the video loss/restore. The Video Management/Control System Video/Audio Output Modules (VOM) shall be manufactured from high quality components, utilize surface mount technology, and provide near broadcast quality video. The module must be available in either eight (8) output or sixteen (16) output versions. Optional titling must allow the user to define up to five (5) lines of eighteen (18) character titles, with on-screen positioning, selectable for size, brightness, and foreground/background contrast. The text must be stored in non-volatile RAM to retain camera titles during loss of power. The Video Management/Control
System's Text Subrack shall accommodate up to sixteen (16) “standard” or “hidden” text modules. The “standard” text module shall be master clocked from the system CPU and insert text on to the video signal. The “hidden” text module shall also be master clocked from the system CPU, but shall encode the text onto the video signal. This method of encoding must allow for the text to be removed from the video display, even from an analog or digital recording. This shall allow for viewing of areas typically blocked by the standard text overlay. “Hidden” text shall comply with all International and U.S. Patents. The Video Management/Control System’s text shall be up to five (5) lines of up to eighteen (18) characters each with dynamic screen positioning, and must include camera description, time and date, dynamic operator messages, and alarm prompts. Text height shall not exceed eight (8) TV Lines under any circumstance. The Video Management/Control System Text Subrack shall be powered by 100/220 VAC, 60/50Hz external power supplies. The power supplies must be designed to mount into a 19” EIA rack without additional hardware. All modules installed in the text subracks shall be hot swappable without the need to remove power prior to servicing. The Video Management/Control System Audio Input Modules (AIM) shall be manufactured from high quality components, utilizing surface mount technology. The audio input module shall support up to eight (8) single-ended audio input connections. The installer shall have the ability to configure the audio inputs and outputs to switch in conjunction with video switching. An optional Multi-channel Video Titler shall be available to superimpose the date and time, as well as individual camera titles, on each video input. The unit shall provide 18-characters x 5 lines with user programmable position. Three video outputs per input with optional video loss detection, termination jumper, and optional sixteen (16) channels of infrared or resistive ladder VCR control must be available. The manufacturer of the Video Management/Control System shall offer a compatible surveillance microphone module, consisting of a pressure zone microphone (PZM) for wide, smooth frequency response, excellent clarity, and little off-axis coloration, and an audio preamplifier/balanced transmitter. The unit must have adjustable gain as well as indications for signal present and overload. The manufacturer of the Video Management/Control System must also offer a balanced receiver for eight microphones, allowing microphone modules to be remotely located. The balanced transmission system shall allow the transmission of the audio signal with minimal interference. Each channel must have adjustable gain, as well as indications for signal present and overload. The option of connecting a headset for audio monitoring and adjustment, and of phantom powering to the microphones to simplify installation, must be available. The receiver must be designed to mount into a 19” EIA rack without additional hardware. The Video Management/Control System shall support multiple video subracks on a single CPU. The subracks shall either be immediately adjacent to each other, or may be distributed throughout the site, or to remote sites, and interconnected by coaxial cable or other appropriate means of communications and video transmission. The Video Management/Control System shall support the addition of a second CPU and auto-changeover module (ACM) to provide a back-up system. The ACM module shall continuously monitor the condition of the active CPU, and if a problem is sensed, it must automatically switch control to the second CPU. The Video Management/Control System shall utilize external power supplies. Power supplies within subracks will not be accepted. Power supplies must be naturally ventilated without the need for cooling fans. The Video Management/Control System shall support satelliting, allowing multiple systems to be distributed throughout a facility or across multiple facilities. Each satellite system must contain a CPU and be interconnected so that one system may view and control inputs and outputs on one or more of the other systems. The interconnection between the systems shall be RS232 for control with sufficient video trunks for live
viewing of the cameras. Up to ninety-nine (99) satellite sites may be interconnected with coaxial cable, fiber optics, microwave, or other wide area communication providing near real-time video with minimal latency. The Video Management/Control System shall provide an alarm messaging protocol to allow the system to be connected to third party systems such as access control, building management, and programmable logic control systems. Configuration software shall be included to configure and download the Matrix/Switch Control System database to the CPU. The software shall be a 32-bit application compatible with Windows™ Server 2003. The software shall include “Wizards” to aid in new configurations, adding devices, and upgrading software. Multiple copies of the configuration software shall be provided without special license or software keys. The configuration software shall be installed on a PC. It must be possible to configure the system size to match the number of required video inputs, logical groups, video outputs, audio inputs, audio outputs, users, keyboards, alarm inputs, and macros, to reduce the time for uploading and downloading of the database. The Configuration Software shall organize data into tabbed folders, each representing a logical file. Information shall be entered into named fields, or selected from lists, and an interactive “help” function must be available to the assist the operator. If desired, the operator shall have the option of entering and editing data directly in the database tables. The user shall also have the ability to design and implement keyboard functions for the operation of connected equipment such as DVR’s, VCR’s, Multiplexers, etc… Each video input subrack shall have an optional alarm and relay termination panel to provide up to twenty-four (24) potential free alarm inputs and eight (8) Form C relay control outputs connected to removable terminal blocks. The alarms shall be used to trigger the macro engine to provide application specific functions, and the control outputs may be connected to a variety of devices for control by the macro engine. The Video Management/Control System shall utilize “alarm groups” for targeting alarm messages on to video output devices. When an alarm is detected, the alarm group number shall be used to determine which video output device will display the associated alarm message text. The range of allowable alarm groups shall be from zero (0) to ninety-nine (99). The alarm inputs and control outputs shall be expandable with optional I/O subracks and I/O modules, with each module providing eight (8) additional inputs or outputs. The optional modules shall increase the system capacity up to 30,000 alarm inputs and 10,000 control outputs. The I/O racks shall support Universal Peripheral Interface (UPI) modules that must be compatible with a broad range of Video Recording Units, Quads, Multiplexers, Motion Detectors, Frame Store, and Video Printer Devices. The UPI modules shall, at a minimum, meet the following specifications:

- Support up to eight (8) peripheral devices simultaneously via an RS232 port.
- Support up to eight (8) peripheral devices simultaneously via eight (8) PPM IR drive ports.
- Support up to eight (8) peripheral device alarm inputs, configurable as level sensing inputs. Level sensing alarm inputs shall be threshold adjustable to 3, 6, 9, or 12V by means of DIP-switches located on the UPI modules.
- Allow for pre-programming of a wide range of peripheral devices, including all major manufactures IR data code.
- Support an IR data code “learn mode” for compatibility with newer peripheral(s) for which preprogrammed IR data code does not exist.

When interfacing via the IR PPM mode, the UPI module must be capable of driving IR LED’s directly. The Video Management/Control System shall incorporate a powerful macro environment to perform actions in response to events. The system shall be able to initiate macros manually, based on an alarm event, or a time of day schedule, and can...
have nested conditional statements associated with the process. A minimum of 9,999 macros must be available, each with up to 50 multiple parameter steps, allowing for complex functions. The software shall have the ability to link macros to form longer macro strings. The Video Management/Control System shall incorporate time of day events to automatically activate macros at a specific time on any selected day or days of the week. The events shall be prioritized so that an event of a higher priority may have precedence over an event of a lower priority. The Video Management/Control System must provide logical camera selection, with a minimum of ninety-nine (99) logical camera groups supported. Any fixed camera or PTZ camera and preset may be defined as a logical selection, and it must not be necessary to pseudo number a camera in order to enter that camera as multiple logical selections. Up to four alternate camera views must be available, either from four separate cameras or a combination of presets on one or more high-speed domes. The option of associating audio inputs with each view must also be available. The operator shall be able to call a group and step through the cameras within that group using the keyboard jog/shuttle. The Video Management/Control System shall utilize “source groups”, which are groups of video input devices (cameras, recorders, etc…) that are linked together as specific access groups. This shall allow the system to control which video output channels have access to which video inputs. Source groups shall also be used to partition video input selections for specific operators. A source group number must be allocated for every video input, with a range of allowable source groups from zero (0) to ninety-nine (99). To control which video output channels have access to which scan sequences, each scan sequence or tour sequence shall also be allocated a source group number. The Video Management/Control System shall provide single key PTZ call of a predefined PTZ camera and preset from any currently selected camera. The user shall have the ability to assign logical numbers to the video inputs and video outputs regardless of the physical input and output connections. The Video Management/Control System manufacturer shall offer an optional Graphical User Interface (GUI) to provide an intuitive means to view and control the system. The GUI must allow the operator to import maps or floor plans representing the facility in standard JPEG, BMP, WMF, and EMF formats. The maps can be linked and different areas or zoomed areas can be selected. Utilizing the GUI, icons representing and controlling various devices such as cameras, high-speed domes, monitors, multiplexers, DVRs, VCRs, alarm inputs, controller outputs, macros, executable programs, and other such devices shall be selectable from a standard library. The user shall have the ability to create new icons and add them to the library. The icons shall be positioned by a simple “drag and drop” technique or shall be precision positioned by entering specific “x” and “y” coordinates. The operator must have the ability to lock the icons in place. The Video Management/Control System GUI shall support ninety-nine (99) GUI workstations. The Video Management/Control System shall offer auxiliary control ports to provide control of third party manufacturer’s equipment, such as specialty cameras, multiplexers, VCRs, and digital video recorders. This shall allow the installer to configure the keyboards to display device specific control commands and to transmit the commands to the controlled devices. The Video Management/Control System keyboards shall connect to an RS232 port on the system CPU, or to an RS232 port on an Auto Changeover Unit. The system must support a minimum of ninety-nine (99) fully programmable keyboard controllers. The Video Management/Control System must utilize access levels to restrict user access to cameras, monitors, keyboards, and certain sensitive system functions, and users must “log in” using a password. Access levels shall be individually created for each user and for each keyboard, with the user and keyboard levels combined at “log in”, resulting in a combination that provides the specific user access level at that specific keyboard. Users
shall be enabled/disabled manually or by a specific date. The keyboards shall be assigned a priority, resulting in keyboards of a higher priority having precedence over keyboards of a lower priority. Password protection from programming configuration changes and/or keyboard operator control functions shall be included. The system shall allow for up to ninety-nine (99) control priority levels. The Video Management/Control System must have the ability to assign keyboards to a dedicated monitor, in addition to the monitor selected by the user. Every video switch operation performed on the keyboard must additionally cause the input to be copied to the dedicated monitor. The keyboard shall allow the operator to control major functions such as switching video inputs and video outputs, pan, tilt, and zoom (PTZ) control, recorder control, multiplexer control, activation of macros, and alarm management. Recorder mode shall allow the operator to control functions such as stop, start, rewind, pause, record, play, search, and other commands supported from recorder command sets. Multiplexer control shall allow the operator to control multiplexer functions such as display modes, sequencing, and other user defined commands from multiplexer command sets. All keys on the Video Management/Control System keyboard shall have the ability to be reprogrammed, or intercepted. The keys can be reprogrammed to execute any macro sequence or mimic multiple keystrokes, and shall also be able to execute another macro sequence when released. The user must be able to specify the key to be intercepted by entering all, or part, of the original name of the key, or the standard command character allocated to that key. Once the key has been selected, the user shall enter their own description for the new function of the intercepted key. The Video Management/Control System shall generate system messages and alarms on the keyboard’s high-brightness LED panel display and/or on the video monitors. A text message shall be up to eighteen (18) characters in length, and multiple text messages shall be displayed simultaneously. The Video Management/Control System keyboard shall be ergonomically designed to minimize operator fatigue, and must incorporate a programmable LCD touch screen display, elastomeric push button switches to provide selection and control of video devices, and a variable speed joystick for control of PTZ cameras. The joystick shall incorporate integral zoom control, and must be centrally located on the keyboard to facilitate left or right handed operation. All keyboard configuration data shall be stored in FLASH RAM. The keyboard’s LCD keys and menus shall be user definable, with eight-thousand (8,000) buttons supported. Three LCD button sizes must be available, each with two (2) lines of programmable text. Upon selection of any key, a key message shall be sent to the CPU identifying the key that has been selected. In addition, a new menu may be selected. The Video Management/Control System CPU and keyboard shall support a library of nine-hundred-ninety-nine (999) individual key codes, each capable of selecting a standard function of the system, and/or executing a macro. The keyboard must include a Windows™ based graphical programming utility to allow the creation of keyboard configurations and menus from any PC. The keyboard shall support the upload and download of system configuration files to and from any PC. The keyboard housing shall be injection moulded, high impact ABS with a light gray finish, must include padded wrist rests, and shall provide two jog shuttles to support both video recorder control and camera “scroll” selection. Utilizing Protocol Interface Translators (PIT), the Video Management/Control System shall be uniquely flexible in its ability to interface with PTZ devices from multiple manufacturers without the need for external protocol conversion. The subrack controller modules shall provide simple DIP switch selection of a wide variety of industry protocols. Each sub rack controller module shall support a minimum of two different PTZ protocols concurrently. The Video Management/Control System shall be the Honeywell Video Systems MAXPRO-Net Series or equivalent.
The contractor shall include for all software writing and setting up of the systems in line
with the monitoring stations rules, regulations, working requirements and operations.

Alarms shall be sent back to the control room in the event of the following: -

Activity on site detected by motion detectors between 6pm and 8am the following day.
Loss of power
Loss of Video
Tampering with equipment housing
Loss of heating in equipment housing

**Maintenance**

The contractor shall include for 2 maintenance visits to all equipment and to each
camera throughout the warranty period and shall also cost for a further 3 years fully
comprehensive maintenance and replacement programme, with a call out guaranteed of
2 hrs during daylight hours and for 24hrs if the problem is considered to be at the
monitoring control room. The fully comprehensive maintenance will include all parts and
labour associated with the repair of the camera system and in the event of total failure of
a component part or complete unit outside of the warranty period then the item shall be
deemed to be replaced for a new unit. The maintenance procedure is outlined in this
specification. The contractor shall include all hire of equipment and travelling.

---

**CAMERAS**

<table>
<thead>
<tr>
<th>COLOUR BOX CAMERAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 x CC-PH22SDN Camera, Colour / mono, 470 lines, 0.5 / 0.01 lux, 12VDC/24VAC, CS/C, EI/DD/AI, DSP, AWB, PWI, RS485</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTERNAL CAMERA POWER SUPPLIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 x HPTV2401D Power supply, 240V/24V AC 1A,</td>
</tr>
</tbody>
</table>

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**MATRIX - MaxproNet**

<table>
<thead>
<tr>
<th>SUBRACKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x HVB4UX 4U VideoBlox Card Cage with 7 card slots includes power supply</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INPUT CARDS - VIDEO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x HVB16M16 16 Channel video matrix input card for 16 monitor output system, use with HVB16TO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OUTPUT CARDS - VIDEO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x HVB16TOX 16 Channel video matrix titled output card</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOFTWARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x HVBPIT44 RS422 to RS422 converter to be used for 3rd party product</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACCESSORIES VIDEOBLOX</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x HVB12C16I 16 Input Potential Free Alarm Receiver</td>
</tr>
<tr>
<td>1 x HVB12C16O 16 Output 1A /channel total max current 8A</td>
</tr>
</tbody>
</table>

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### Example Equipment

**MATRIX & VIDEO MANAGEMENT SOLUTION – MAXPRO** – Quantities to be checked depending on monitoring station proposed

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x</td>
<td>HVB16VDA3</td>
</tr>
</tbody>
</table>

**MATRIX CPU AND ANCILLARIES**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x</td>
<td>HMX-MAXPRONET</td>
</tr>
<tr>
<td>1 x</td>
<td>MAXCPUUSERINT</td>
</tr>
<tr>
<td>1 x</td>
<td>HEGS5300</td>
</tr>
</tbody>
</table>

**TELEMETRY RECEIVERS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 x</td>
<td>MXT400</td>
</tr>
</tbody>
</table>

### MAXPRO VIDEO MANAGEMENT SOLUTION

**MONITORS**

**LCD FLAT SCREEN VIDEO MONITORS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x</td>
<td>HMLCD21E</td>
</tr>
</tbody>
</table>

**ANCILLARIES SHOWN NET PRICE**

**EIA RACKS AND COMPONENTS PAN AND TILTS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 x</td>
<td>KP15ET2M/M</td>
</tr>
</tbody>
</table>

### PRE-BUILD & COMMISSIONING SHOWN NET PRICE

**Commissioning (Matrix and any interfaces)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX-Comm 1</td>
<td>Commissioning assistance on site for the Networking of the maxpro to remote monitoring control room</td>
</tr>
</tbody>
</table>

### COMMISSIONING
PREVENTIVE MAINTENANCE

Two (2) visits per annum at 6 monthly intervals.

Visit 1  Interim service to carry out interim service check

Visit 2  Major service to carry out a full system service check, including recalibration of camera lenses to confirm video signal levels and transmission signals.

The Preventative maintenance shall comprise of:-

a) Check the installation and siting of all equipment and devices against the specification and system records. Any changes will be reported in writing.

Check the satisfactory operation of all equipment and devices, including recalibration of cameras, lenses and transmission equipment to confirm video signal level.

Inspect all flexible connections.

Check normal and standby power supplies.

Check and service control equipment in accordance with manufacturer’s recommendations.

Check audible warning and alarm devices.

Check condition of system hardware, including lubrication of moving parts where necessary, regular replacement of wiper blades and gaskets and replacement of pan and tilt pre-set pots every 2 years.

Check full operation of system.

Clean all vision panels lenses and video monitors.

Ensure operator(s) are fully conversant with system operation.

PREVENTIVE MAINTENANCE SCHEDULE

Interim visit every 6 months comprising:-

Check the installation and siting of equipment/devices against the specification.

Check all flexible cables and connections.

Check mains and standby power supplies, including correct charging rates.

Check the satisfactory operation of all equipment and devices, including cameras, lenses pan/tilt etc.
Check operation of CCTV Controls.

Check remote signalling.

Check audible warning and alarm devices on CCTV system.

Check condition of system hardware, including lubrication of moving parts where necessary.

Check full operation of system.

Clean all vision panels lenses and video monitors.

Top up any washer bottles.

Ensure operators are fully conversant with system operation.

Visually check fittings etc.

**Major service visit every 12 months comprising:-**

**CCTV MANAGEMENT SYSTEM**

Check for operation in accordance with manufacturer's specification

Check for operation in accordance with the CCTV specification

Check all keyboard functions

Check time and date and all RS232 functions

Check all connections

**RECORDING EQUIPMENT**

Check for operation in accordance with manufacturer’s specification

Check for operation in accordance with the CCTV specification

Check operation including record and playback

Check that the customer has tape retention system for evidence purposes

Check if Y/C leads fitted

Check keyboard functions

**CAMERAS**

Check for operation in accordance with the CCTV specification
Check type and operation
Check and focus as necessary
Check operation of zoom
Check operation of kangaroo iris

**CAMERA HOUSING**
Check that warning labels are visible (where necessary)
Check sunshield, wash wipe, Thermostatically controlled heaters work as required
Check if housing is erosion free
Check seals around glass and is it erosion free
Check cable glands into rear are intact
Check that front of glass free of damage
Check if any renovation work required

**GROUND OR WALL MOUNTED CABINETS/COLUMNS/BRACKETS**
Check for water ingress & Check drainage holes are clear
Check general state of the cabinet
Check power supplies and standby power supplies, including correct changing rates
Check security of cabinet
Check wiring looms are tidy and secure
Check that electrical wiring conforms to BS 7671
Check cabinet/column/bracket fixings and are they sound
Check if any renovation work required
Check environmental controls

**FITTINGS AND FIXTURES**
Check for loose fitting covers etc.
Check for loose paint, scrub marks etc. repaint if necessary
Check for weathered components
Check if any renovation work required

PAN AND TILT UNITS

Check for operation in accordance with manufacturer’s specification
Check for operation in accordance with the CCTV specification
Check that units fixings are secure and erosion free
Check that flexible cables do not foul brackets etc.
Check that connectors are sound
Check the seals are intact and corrosion free
Check that the limit stops are set correctly
Check if any renovation work required

MAINS CONNECTION

Check that earthing and connections are in accordance with BS7671
Check that correct rated fuses are fitted

TRANSMISSION CABLES

Check the cables for video and audio levels
Check that cables are easily identified at termination
Check that all connections are crimped, soldered or clamped
Check that all joints are insulated and protected
Check all coaxial for strain relief sleeves

SYSTEMS LOG BOOK

Check system log visits, faults report etc.

CABLE ROUTING

Check all cables are within the secured area
Check all cables are mechanically protected where necessary
Check routing has taken into account possible sources of electrical interference
Check that the correct size and type of cables have been used

GROMMETS

Check that all cables passing through cur metal casing have been fitted with grommets

CABLE MARKING

Check all cables are easily identified at termination

CABLE CONNECTIONS

Check connections are crimped, soldered or clamped
Check that all joints are insulated and protected
Check tat all cable joints are within the secured area

OPERATORS INSTRUCTIONS

Check that all operators have been trained
Check that sufficient operator information is available to ensure correct sue of system

SYSTEM RECORDS

Check records for results of commissioning values of loop readings, voltages, resistances, video levels, signal to noise ratio etc.

Check records for system schematic
Check records for handover details
Check system log correctly filled in
Provide a hard copy on CD of test results

OVERALL STANDARD

Check system against the specification
Check system against the Codes of Practice/standards
Maintenance Check List Forms

Interim visit every 6 months comprising:-

<table>
<thead>
<tr>
<th>CHECKED</th>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the installation and siting of equipment/devices against the specification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check all flexible cables and connections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check mains and standby power supplies including correct charging rates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the satisfactory operation of all equipment and devices, including cameras, lenses pan/tilt etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check operation of CCTV controls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check remote signalling where necessary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check audible warning and alarm devices on CCTV system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check condition of system hardware, including lubrication of moving parts where necessary</td>
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<td></td>
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<tr>
<td>Check full operation of system</td>
<td></td>
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<tr>
<td>Clean all vision panels, lenses and video monitors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check software operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure operators are fully conversant with system operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual check for loose fittings etc.</td>
<td></td>
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</tr>
</tbody>
</table>

General Comments

CCTV Contractor signature that the CCTV System has been serviced in accordance with the Specification.

Signed  ......................................

Company  ......................................
# Major Service Check List:

<table>
<thead>
<tr>
<th>CCTV MANAGEMENT SYSTEM</th>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check for operation in accordance with manufacturers specification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Check for operation in accordance with the CCTV specification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Check all keyboard functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Check time and date and all RS 232 functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Check all connections</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Recording Equipment**

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check for operation in accordance with the Manufacturers specification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Check for operation in accordance with the CCTV specification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Check operation including record and playback</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Clean all equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Check that the customer has correct records for Data Protection Act</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Check that suitable maint records are available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Check if Y/C leads fitted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Check keyboard functions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Check hard drive</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Video Monitor Lap top**

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check that screen is clean and clear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Check that lap top is in good order</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Check screen pictures for quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Clean screens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Check and adjust controls as necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Check if Y/C leads fitted</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**General Comments**

CCTV Contractor signature that the CCTV System has been serviced in accordance with the Specification.

Signed ..........................................

Company ..........................................

__________________________

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<table>
<thead>
<tr>
<th><strong>Cameras</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check for operation in accordance with manufacturers specification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Check type and operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Check and focus as necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Check operation of zoom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Check operation of Kangaroo iris</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Camera Housing</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check that warning labels are visible (where necessary)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Check sunshield, was wipe. Thermostatically controlled heaters work as required</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Clean Vision Panels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Check housing is erosion free</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Check seal around glass and is it erosion free</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Are cable glands into rear intact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Is front glass free of damage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Check if any renovation work required</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Ground or Wall Mounted Cabinets/Columns</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check for water ingress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Check drainage holes are clear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Check general state of the cabinet/column</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Check paper work present and legible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Check power supplies and standby power supplies, including correct charging rates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Check security of cabinet/column</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Check wiring looms are tidy and secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Check that wiring conforms to the necessary standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Check water bottle and top up if required</td>
<td></td>
<td></td>
</tr>
<tr>
<td>j) Check cabinet/column/bracket fixings and are they sound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>k) Check if any renovation work required</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Fitting and Fixtures</strong></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

| **General Comments** |  |  |

**CCTV Contractor signature that the CCTV System has been serviced in accordance with the Specification.**

Signed .................................

Company .................................

82/123
<table>
<thead>
<tr>
<th><strong>Fitting and Fixtures</strong></th>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check for loose fitting covers etc.</td>
<td></td>
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<tr>
<td>b) Check for loose paint, scrub marks etc. repaint if necessary</td>
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<tr>
<td>c) Check for weathered components</td>
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<tr>
<td>d) check if any renovation work required</td>
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<tr>
<td><strong>Pan and Tilt Units</strong></td>
<td></td>
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</tr>
<tr>
<td>a) Check for operation in accordance with manufacturer’s specification</td>
<td></td>
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<tr>
<td>b) Check for operation in accordance with CCTV specification</td>
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<tr>
<td>c) Check that units are secure and erosion free</td>
<td></td>
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<tr>
<td>d) Check that flexible cables do not foul brackets etc</td>
<td></td>
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<tr>
<td>e) Check that connectors are sound</td>
<td></td>
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<tr>
<td>f) Check that seals are intact and corrosion free</td>
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<tr>
<td>g) Check that limit stops are set correctly</td>
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<tr>
<td>h) Check if any renovation work required</td>
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<tr>
<td><strong>Mains Connection</strong></td>
<td></td>
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</tr>
<tr>
<td>a) Check that earthing and connections are in accordance with current edition of the IEE regulations and BS7671</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>b) Check that correct rated fuses are fitted</td>
<td></td>
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</tr>
<tr>
<td>c) Check that all connections are crimped, soldered or clamped</td>
<td></td>
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<tr>
<td>d) Check that all joints are insulated and protected</td>
<td></td>
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<tr>
<td>e) Check readings against commissioning records</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>f) Check all coaxial for strain relief sleeve</td>
<td></td>
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</tr>
<tr>
<td><strong>Systems Log Book</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Check system log visits, fault reported etc.</td>
<td></td>
<td></td>
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<tr>
<td><strong>Cable Routing</strong></td>
<td></td>
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<td></td>
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<tr>
<td>a) Check all cables are within the secured area</td>
<td></td>
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<tr>
<td>b) Check all cables are mechanically protected where necessary</td>
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<tr>
<td>c) Check routing has taken into account possible sources of electrical interference</td>
<td></td>
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<tr>
<td>d) Check that the correct size and type of cables have been used</td>
<td></td>
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</tbody>
</table>

**General Comments**
### Grommets

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check that all cables passing through cut metal casing have been fitted with grommets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Cable Marking

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check all cables are easily identified at termination</td>
<td></td>
<td></td>
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</tbody>
</table>

### Cable Connections

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check connections are crimped, soldered or clamped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Check that all joints are insulated and protected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Check that all cable joints are within the secured area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Operator Instructions

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check that all operators have been trained</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Check that sufficient operator information is available to ensure correct use of system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### System Records

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check records for results of commissioning values of loop readings, voltages, resistance, video levels, signal to noise ratio, etc. (refer Section2:Schedule2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Check records for system schematic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Check records for handover details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Check records for operator training details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Check system log correctly filled in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Provide a hard copy on CD of test results (refer Section2:Schedule 2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Overall Standard

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Check system against the specification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Check system against Code of Practice/Standards</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### General Comments

CCTV Contractor Signature that the CCTV System has been serviced in accordance with the Specification.

Signed ........................................

Company .......................................
SECTION 3.0

WALL CABINET & HOUSINGS
3.0 DISTRIBUTION FUSEBOARDS

3.1 GENERAL

Shall be:-

To the appropriate British and European Standard

Adequate for the voltage, current fault levels, and type of supply, all as indicated on the drawings and equipment schedules.

Of the same manufacture throughout the works.

3.2 ENCLOSURES

Shall be:

Metal construction, with all electrical conductors, contacts etc. totally enclosed.

Unit or cubicle type construction.

Weatherproof (eg IP54) for exterior use.

Provided with facilities for padlocking or locking to prevent unauthorised interference. The locks to be operable by a key common to all enclosures, switchgear and distribution gear locks.

Provided with adequate means or isolation, earthing and insulation to ensure safety of operatives during maintenance works.

Adequately ventilated or cooled.

Finished in manufacturers standard stoved enamel finish. Plain steelwork to be painted to BS6150 with red lead primer and two coats of enamel to match the switchgear.

Arranged with operating handles, control knobs, push buttons etc. within the range of 450mm and 1950mm above floor level.

So designed and constructed as to provide effective segregation between incoming circuits/busbars/outgoing circuits/control circuits and equipment. Where equipment is fitted above busbar chambers it shall not be possible for objects to fall into the chamber.

The segregation provided shall prevent the passage of ionised gas, resulting from the making or breaking of any circuit under normal or fault conditions, to any busbar, adjacent switch etc.
3.3 Fuse Switches and Switch Fuses

Shall be:

To BSEN 60497-3

Fitted with HRC fuses to all line conductors for ac and to all poles of dc systems.

Fitted as required with a neutral terminal. For units exceeding 100A this terminal shall have a removable bolted link.

Provided with facilities for padlocking to prevent unauthorised interference, where located other than in an enclosure.

All fused switches, switch fuses and switches shall comply with BS5419 and shall be 500 Volt type.

All switchgear shall be provided with suitable locks for padlocking the switches in the ‘OFF’ position. The cover shall be interlocked with the operating mechanism to prevent it from being opened in the ‘ON’ position.

This interlocking shall also prevent the switch from being closed with the cover open unless the mechanism is operated by an authorised person for examination and maintenance purposes.

The cover shall be gasketted to prevent ingress of dust.

The switch action shall be on the ‘Quick Break’ on load design and shall be ASTA certified to adequately meet all required duties as specified.

The end plates shall be removable for drilling for conduit or cable entry and shall be fitted with additional distance pieces where necessary, alternatively ratings up to 60A may be provided with knockouts.

All fuses in switchgear shall be HRC type sized as specified or as detailed on the drawings for the fused-switch units or switch fuses etc., in which they are incorporated unless different ratings are shown on the drawings.

They shall be ASTA certified for compliance with BS88 Category of Duty 440V AC5 Class Q1.

In all cases, fuses shall be selected to provide short circuit protection and discrimination.

3.4 Moulded Case Circuit Breakers (MCCB)

Shall be:

To BSEN 60947-2.

Provided with facilities for padlocking to prevent unauthorised interference, where located other than in an enclosure.
All MCCB’s shall be rated at 500 Volts minimum, be ASTA certified for this operation duty and comply with BS3871 ‘Miniature and Moulded Case Circuit Breakers’.

Where specified MCCB’s shall be of the thermal/magnetic type having a quick make, quick break, trip free mechanism which prevents the MCCB from being closed or held in against short circuits or overloads. Tripping of every multi-pole MCCB shall be such that operation ensures simultaneous action in all phases.

Circuit breakers protection 2 or 3 phase circuits shall be of the multi-phase type. Multi-phase circuit breakers shall not be employed in single phase circuits.

Where the full capacity of a distribution board is not required, the Electrical Contractor shall allow for fixing blanking plates in vacant MCCB housings.

Clear indication shall be provided for the three positions of operation of the mechanism ‘ON’, ‘OFF’, ‘TRIPPED’. The operation shall be such that the MCCB shall trip automatically under fault conditions and to re-set the dolly shall require first moving through the ‘OFF’ position. All MCCB’s shall be provided with facilities for locking in the ‘OFF’ position.

MCCB’s shall be of the current limiter type where required to provide short circuit protection to MCCB’s downstream of the MCCB.

3.5 MINIATURE CIRCUIT BREAKERS (MCB)

Shall be:-

To BSEN 60898.

Type B throughout unless specified otherwise.

Provided with a single phase of three phase instantaneous magnetic tripping of a type as indicated on the distribution board schedules.

Provided with facilities for padlocking to prevent unauthorised interference, where located other than in an enclosure.

All MCB’s shall be rated 500 Volts minimum and comply with BS3871 ‘Miniature and Moulded Case Circuit Breakers’ and BS4752 Part 1 ‘Circuit Breakers’.

Where specified MCB’s shall be of thermal/magnetic type having a quick make, quick break, trip free mechanism which prevents the MCB being closed or held in against short circuits or overloads. Tripping of every multi-pole MCB shall be such that operation ensures simultaneous action in all phases.

Circuit breakers protecting 2 or 3 phase circuits shall be of the multi-phase type. Multi-phase circuit breakers shall not be employed in single phase circuits.

Where the full capacity of the distribution board is not required the Electrical Contractor shall allow for fixing blanking plates in the vacant MCB housings.
Clear indication shall be provided for the three positions of operation of the mechanism ‘ON’, ‘OFF’, ‘TRIPPED’. The operation shall be such that the MCB shall trip automatically under faults conditions and to reset the dolly shall require first moving through the ‘OFF’ position. All MCB’s shall be provided with facilities for locking in the ‘OFF’ position.

**Miniature Circuit Breaker Distribution Boards**

MCB Distribution Boards shall comply with BS5486 Part 12 “Particular requirements for miniature circuit breakers boards”. The cases shall be constructed of heavy gauge sheet steel, in such a manner as to afford rigidity and maximum ease of wiring for full size circuit and main cables. The cover shall be provided with an efficient gasket or alternatively designed with generous overlapping edges to prevent the ingress of dust. Components shall not be manufactured from zinc alloy in conjunction with sheet steel where they are relied upon for earth continuity. The cover shall be provided with a hinged steel door.

Where the door is required to be lockable, cylinder type locks shall be provided, having two keys per lock. All locked distribution boards shall be operated by a master key; six such keys shall be handed to the Engineer upon completion of the Contract.

The cases shall be provided with detachable cable/conduit terminating plates, which shall be reversible and interchangeable from top to bottom. Alternatively knockouts shall be provided.

All screws and nuts used in the construction of the case shall be fitted with shake-proof washers and care taken to ensure efficient earth continuity. An external earthing terminal with cable socket shall be fitted.

All MCB banks shall be fitted to frames with robust locking plates provided to secure the frames rigidly in the fixed positions. The banks shall be so spaced to obviate the necessity for insulating barriers, but protection shall be provided by means of insulating shields to prevent accidental contact with the main busbars and incoming main cable mains.

Busbars shall be of high conductivity hard drawn copper conductors connected to the MCB contacts by means of a spring washered screws or bolts, unless plug in type MCB’s are specified.

Where a main integral isolating switch is provided in a MCB case, it shall be arranged to isolate incoming live and neutral main cables from the busbars.

The isolator switch shall be rated at 500 Volts and of the quick make-and-break pattern with positive action. Incoming and outgoing terminals shall be fitted with two clamping screws, and outgoing conductors to the busbars shall be high conductivity hard drawn copper.

Isolating switches shall comply with IEE Regulations Section 537 and shall be capable of carrying their full load continuously and shall ‘make’ or ‘break’ their full rated load without undue burning of the contacts.
The isolating distances between contacts when in the open position shall not be less than those specified for isolators in BS5419.

Neutral bars shall be similar to the main busbars and shall have two screw terminals per way for ratings of 30A or over. Single screw connections will be allowed for capacities up to 30A. The neutral bars shall have one terminal for each MCB within the board, and connection of conductors to the neutral bar shall be in the same order as the MCB ways.

All distribution boards shall also contain internal earthing bars similar to the neutral bars detailed above, with one terminal for each MCB within the Board. Earthing conductors shall be connected in the manner described for neutral conductors.

**Voltage Drop**

Conductors shall be sized in accordance with IEE Regulations 525-01 to meet a 4% voltage drop between the origin of the installation and fixed current using equipment.

**Load Balancing**

The Electrical Installation shall be designed to provide balanced loads across the phases as far as possible. Where an additional load is introduced during the contract period, this shall be connected so as to maintain the balance, having due regard to phasing and safety within the premises.

**Supply Companies Connections**

Connections between the main switchgear and the Supply Company metering equipment shall consist of one of the following.

Where required by Section 3.0 of this specification, suitable provision shall be made on the Main Switch Gear Panel to accept the supply authorities equipment, and all interconnecting wiring within the panel shall be provided. Interconnecting wiring shall be in accordance with the IEE Regulations and the local Supply Company requirements.

Where the Supply Company provides a meter cubicle independent of the Main Switch Gear Panel then the Electricity Contractor shall install an adequately sized steel trunking between the meter cubicle and the main switchgear panel to contain the meter connections.

In instances where no meter cubicle is to be provided by the Supply Company, the authority’s meters shall be mounted directly onto a section of steel trunking so that to arrange to interconnect the meters, cut out and Main Switch Gear Panel and enclose the meter connections.

### 3.6. LABELS AND IDENTIFICATION

**Labelling**

All fused switch units, switch fuses, switches, busbar chambers, distribution boards etc., and all items of equipment on the main panel shall be identified in accordance with
section 514 of the IEE Regulations and shall have securely fitted externally a white ‘FORMICA’ or ‘TRAFFOLYTE’ label engraved with 6mm high black letters detailing the function of the equipment, any reference numbers and the size of incoming and outgoing cables and types.

Red, yellow, blue ‘Formica’ phase discs shall be fixed inside all switchgear and distribution boards to indicate to which phase of the supply the various circuits are connected. The colourings shall comply with the IEE Regulations.

Each distribution board shall be fitted internally with a TYPE WRITTEN list giving details of all MCB or fuse ratings, supply phase, equipment served and size and type of all circuit conductors. Each list shall be mounted in an envelope formed from 0.5mm thick clear non-inflammable material.

The envelope shall be open at one end and fitted to the inside of the distribution board with 5mm diameter rivets passing through eyelets in the envelopes.

An additional TYPED copy of each circuit card shall be incorporated in the maintenance manuals and handed to the Engineer.

Each TP or TP&N item of switchgear shall have fitted on the cover a yellow ‘Formica’ or ‘Traffolyte’ label having ‘CAUTION – 415 VOLTS’ engraved in 10mm high black lettering.

**Engraving**

The Electrical Contractor shall allow for engraving of all fused connection units, double pole switch accessories and other accessories which are required under this specification.

The accessory plate shall be engraving in either black or red, capital letters 5mm high detailing the appliance or equipment being supplied by the accessory, e.g. CCTV Camera
SECTION 4.0

CONTAINMENT SYSTEMS
4.0. CONTAINMENT SYSTEMS

General

Trunking shall only be installed in situations which will remain readily accessible throughout the life of the building. No cable trunking shall be installed behind a plastered ceiling or in other inaccessible locations.

4.1. TRUNKING – STEEL

Shall be:-

Electrically and mechanically continuous throughout and equipped with tinned copper links at each joint to ensure earth continuity to IEE Regulations, all links to be visible.

With all surfaces cleaned and free of paint at all earth connections.

Unless direct fixing is a definite requirement, firmly secured to the building fabric and spaced off the structure to minimum distance of 6mm by means of steel spacers spaced in accordance with IEE Regulations. Spans of trunking will only be permitted where the design of trunking is adequate to ensure undue deflection.

Fitted with recessed lids where used on floor trunking.

Fitted with fixed section of cover through and extending to 300mm either side of fire barriers.

Externally wrapped with crushed rock or blast furnace slab mineral wool with wire mesh reinforcing over the whole length within the fire barrier and the 300mm extension to either side.

Internally packed over the same distance, with either crushed rock or blast furnace slag mineral wool.

OR

Intumescent filler.

OR

Internal fire barriers to I.E.E. Regulations 527-02.

Installed clear of Building Insulations Materials.

Sheet Steel Cable Trunking

Steel cable trunking shall comply with BS4678 Part 1 steel surface trunking with Class 3 finish.

Sheet steel cable trunking may be used on installations employing steel conduits, for connecting two or more switchboards together or where several conduits would otherwise have to be run alongside each other. The Electrical Contractor must make proper allowance for the derating of cables installed together in a trunking system. The cables must be capable of carrying the current imposed by the equipment connected.
The Engineer must be consulted as to precise details concerning trunking routes and applications.

All lengths of trunking shall be heavy gauge zinc coated steel connected together by internally fitted rectangular couplings of sufficient width to provide a minimum bearing face of 25mm to which the lengths shall be bolted on site or welded at the factory.

Adequate provision shall be made to allow for expansion.

All tee pieces and bends shall be formed with similar means of connection and the inner radius area shall be such that cables will not be bent through a radius less than that prescribed in the IEE Regulations. Only bends and tees of approved pattern will be accepted.

All fixing screws within the trunking shall be of the round head type. The trunking shall have an overlapping well fitted lid securely fixed to the trunking by approved means that will avoid damage to the cables. Self tapping screws shall not be used.

All necessary accessories including long sleeve couplings, end pieces, bends, sets, tees, reducers, branches, fillets, pinracks, cable retainers etc., shall be allowed for in the Tender, and shall be purpose made units rather than being fabricated on site.

Where a change in direction of a trunking run occurs, the deviation should be affected by a purpose made unit manufactured on similar lines to the bends and tee pieces described above.

Where this is not practical, changes in direction shall be fabricated in a neat and workmanlike manner. All joints shall fit closely and gaps will not be permitted.

All burrs and sharp edges shall be removed, and no screws shall protrude into the trunking.

Trunking shall be firmly attached to its associated equipment either by bolted flanges or by male bushes and couplings.

Where trunking is connected to equipment by means of flange connectors the entry into the equipment shall be of the same cross section as the trunking.

Where trunking does not terminate in equipment, the otherwise open end shall be capped with a cover suitably bolted in position.

Where communications, extra low voltage circuits (Category 1) etc., are contained in a trunking, the requisite number of separate compartments shall be provided to segregate the wiring. Where conduits are taken off such trunking they shall not pass through other compartments unless prior permission is obtained from the Engineer.

Where trunking is required to be recessed in the structure of the building, it shall be fitted with overlapping coverplates with the finished edge of the trunking installed flush with the plasterwork.
Trunking runs shall be so arranged that the lid or cover plate is always on the top or side and not underneath, unless this cannot be avoided in which case the Engineer’s permission shall be obtained.

Wherever trunking passes through walls, vertical partitions etc., a fixed piece of trunking lid shall be fitted to the trunking, extending 25mm either side of the wall or other barrier. This is to allow removal of the adjacent lid without disturbing the building fabric. Care shall be taken to see that no orifice is left between the trunking and the building structure through which fire might spread.

On vertical runs of trunking which pass through floors, these shall be fitted with fire barriers in accordance with IEE Regulations. See Clause 2.16 relating to fitting of trunking lids.

Steel underfloor trunking shall be in accordance with BS4678 Part 2 steel underfloor (duct) trunking.

All necessary trunking support work, hangars, brackets and fixing requirements shall be provided by the Electrical Contractor.

Earth links of the appropriate size and type shall be installed at every jointing coupling, manufactured bend, tee etc., throughout the entire trunking system. Where trunking is used to provide protective conductor it shall comply with the requirements of the IEE Regulations. Alternatively, the Electrical Contractor shall install separate protective conductors in the trunking.

In cases where sheet steel trunking is installed where there is a danger of movement, a flexible earth conductor shall be installed bonding all joints in the trunking. This shall be fitted in addition to the standard earth links. Cable retaining strips shall be fitted at 1 metre intervals.

Insulated cable support pins shall be fitted at intervals of 4 metres in vertical runs of trunking.

4.2. TRUNKING – PVC

Lengths of trunking shall be cut square using a fine tooth tenon saw. After cutting of lengths of trunking the raw edges shall immediately be smoothed.

Holes in trunking shall be drilled, punched or cut by ring saw. Slots cut in the trunking shall be cut by jig-saw.

Manufactured bends, tees, elbows, etc. shall be used for all diversions and intersections. The throat of all angle connectors shall be splayed wherever possible.

Manufacturers standard fittings shall be used at all times.

Trunking and fitting connections shall be made using the components and adhesives as recommended by the trunking manufacturer.
Where trunking passes through floors or fire-retaining walls, ceiling etc. the trunking shall be packed for a distance of 300mm on each side of the floor or wall with glass fibre, after the cable installation has been completed.

Where trunking passes through a wall or obstructions, a short length of fixed cover shall be provided through the obstructed area and projecting 50mm beyond each face.

In roof voids trunking shall be fixed clear of thermal insulation and above ceiling joists using wooden spacers.

Electrical trunking shall not be located below water pipes, or structural members which are prone to condensation.

Cables shall be supported along the horizontal runs, be detachable cross bars and vertical runs by pin racks provided by the Manufacturer, mounted at intervals not greater than 1500mm.

Trunking shall be run as neatly as possible, to the approval of the Engineer. Trunking shall run truly vertical, horizontal or parallel with features of the building.

Insulated trunking and accessories shall comply (where applicable) to the physical tests contained in BS4607 “Non Metallic Conduits and Fittings for Electrical Installations”.

The insulated trunking shall only be used where an insulated conduit system is being installed unless specifically stated otherwise. The trunking shall be fixed by means of wood screws at intervals not exceeding 1 metre. Fixing holes shall be slotted to allow for any subsequent expansion due to temperature variations. Insulated trunking shall not be installed where ambient temperatures are expected to exceed +60°C or fall below –5°C. Care shall be taken to ensure that the trunking is not deformed by fixings; this applies particularly when trunking is fixed to an uneven surface. Packing pieces shall be securely fixed and plumb without being deformed.

Insulated cable trunking shall be smooth inside and outside and free from imperfection and manufactured by an approved manufacturer.

Insulated cable trunking shall be of the high impact resisting heavy gauge type to comply with BS4678 Part 4, fitted with well fitted lids of an approved type and size or as indicated in the specification, schedules or drawings.

Cable retaining strips shall be fitted at 1 metre intervals unless trunking is installed with the cover on the top side.

Insulated cable support pins shall be fitted at intervals of 4 metres in vertical runs of trunking and at the top of the vertical trunking.

Overlapping cover plates shall be fitted where installed flush with the building fabric. The finished edge of the trunking shall finish flush with the finished surface.

Insulated trunking shall be fitted with manufacturers standard tees, off-sets and other fittings where changes of direction occur.
Where trunking shall be fitted with manufacturers standard end plates and flares shall be fitted to connect to items of equipment.

Joints shall be effected using manufacturers standard internal connectors, and in accordance with the manufacturers recommendations.

Installation shall be in accordance with the appropriate conditions covering the installations of insulated conduit.

 Separate protective conductors shall be installed in the trunking.

All joints and fabricated bends etc., in insulated trunking shall be made in a neat and workmanlike manner and all joints in trunking and trunking cover shall fit closely and be free from gaps. Additional fixing shall be provided to the building structure 50mm either side of the joint.

Joints in the lid and trunking must not be allowed to coincide.

Trunking shall only be installed in situations which will remain readily accessible throughout the life of the building. No cable trunking shall be installed behind a plastered ceiling or in other inaccessible situations.

The manufacturers recommendations regarding the installation of insulated trunking must be adhered to at all times.

All conduit entries shall be made by means of purpose made bushes and couplings or adaptors.

4.3. TRAYPLATE

Hot dipped medium duty return flange galvanised complying with BSEN 10143 complete with all manufacturers accessories of 1mm minimum thickness for widths up to 150mm; of 1.5mm minimum thickness for widths above 150mm.

Supported at intervals such that the maximum deflections at any point is 10mm.

Bonded throughout its entirety by 12mm x 1.5mm copper links.

Fitted with fire barriers where passing through Fire Compartments.

Installed clear of building insulating materials.

**Cable Fixings**

Shall:

Be by means of proprietary forms of heavy duty plastic, clips or straps, or PVC covered copper or brass cable clips, brass saddles or straps. Refer to the appropriate section of the specification on the type of cable to be installed for the fixing method to be adopted.
Continuity and Earthing

Where vertical to horizontal intersections occur, a break between the vertical tray will be allowed if kept to a minimum, horizontal sections remaining continuous.

The horizontal and vertical sections of the tray shall however be bonded together using a 16.0mm² protective conductor with lug fixings to the tray.

Cable Trays

Cable trays shall be formed perforated steel of not less than 0.9mm thickness up to and including 100mm width, 1.25mm thickness from 150mm up to and including 300mm width, and 2.00mm thickness above 300mm width. They shall be galvanised unless otherwise indicated in Appendix 5 of the specification.

Tray shall be adequately sized to support the cables without bunching.

Support shall be by means of steel brackets installed at intervals necessary to provide a rigid fixing and ensure that no undue deflection occurs in the complete installation. Dome headed bolts, nuts and washers of finish suitable to the tray shall be used between tray and brackets.

Fixing of the fabric of the building shall be by means of expansion type masonry plugs or bolts. Fixings shall be galvanised unless otherwise stated.

Cable trays shall be installed using factory formed bends, elbows, tees, couplers and risers etc. Site fabrication of elbows etc. will only be permitted with the prior approval of the Engineer and where it is not possible to obtain the necessary factory made item.

Where cuts have been made the tray shall be painted with zinc rich paint.

Holes that have been cut to allow cables to pass through shall be suitably bushed.

Suspension sets shall comprise threaded M12 cadmium plated hanger rods together with nuts and locking washers, vertical hanger brackets, support channel, tray hold-down clips etc., all of which shall have a galvanised finish.

All cables shall be securely fixed to traywork and the complete installation must be carried out in a neat and workmanlike manner without crossovers. A 25% reserve margin in size and weight shall be allowed for all cable trayworks.

Cables of 30mm diameter and above shall be fixed using the appropriate size cable cleat as manufactured by BICC Limited, or of approved equal type and manufacture.

On multi light duty cable runs, cable straps of plastic coated metal shall be used to secure cables.

Bunching of cables will not be allowed.
4.4  WIRE BASKET

All wire basket type cable tray shall be zinc plated wire rod except where it is installed in corrosive atmospheres when the basket and any associated components shall be stainless steel. The wire rod shall be of minimum diameter 3.5mm (up to 50mm side depth) or 5.0mm (above 50mm side depth).

Proprietary mounting brackets bands, crossovers, reducers, couplers etc., shall be used throughout. Site fabrication sections shall not be permitted. When sections are cut, all sharp edges shall be removed and exposed metalwork shall be protected.

The wire basket shall be adequate size to support the cables without undue bunching and so supported that it will carry the cable load without undue deflection. Fixings shall be at regular intervals not exceeding 1.2m and at 225mm from bends and intersections.

All supporting steel and fixings shall be the same finish as the basket. All joints in sections of the wire basket and fixings to support brackets shall be achieved by means of round or mushroom headed bolts and nuts. All bolts and nuts shall be installed with the bolts on the inside of the basket, clear of any cables.

Fixing of cables to the wire basket shall be as Clause 4.3. for trayplate.

Manufacturers standard conduit termination plates shall be installed at all locations where solid or flexible conduit terminates on or at the cable basket.

4.5  PAINTING OF SUPPORTING STEELWORK ETC.

All supporting steelwork shall be free of rust and treated with an approved rust inhibiting compound prior to installation. The steelwork shall be painted with a minimum of two coats of red oxide paint prior to installation and finally painted with the appropriate undercoat and topcoat to match the associated equipment after installation.
SECTION 5.0

CABLING SYSTEMS
5.0  CABLELING SYSTEMS

5.1.  CABLES SHEATHED AND/OR ARMOURED

Approved by the British Approvals Service for Electric Cables (BASEC).

Delivered to site in one continuous length on a drum ready for laying.

PVC/SWA/PVC and PVC/ASA/PVC cables shall comprise copper conductors unless specifically detailed otherwise, insulated with PVC laid up with PVC fillers, bedded with an extruded inner PVC sheath, armoured with a single layer of galvanised steel wires or aluminium strip as specified and served overall with a PVC sheath.

Cables shall be manufactured to BS6346 “PVC insulated cables for electrical supply”, with conductor dimensions and resistances in accordance with BS6360 1981 “Copper conductors in insulated cables and cords”. Galvanised armour wires shall be in accordance with BS1442.

XLPE/SWA/PVC cables shall generally be constructed as PVC/SWA/PVC cables except that the conductors shall be insulated with cross-linked polyethylene (XLPE) in accordance with BS5467: 1988 “Armoured cables with thermosetting insulation for Electricity Supply”. Generally XLPE/SWA/PVC cables shall be employed unless detailed otherwise in Section 3.0 of this specification.

The Electrical Contractor’s attention to the IEE Regulations Where the armoured wires of cables are used to provide protective conductor they shall comply with the requirements of the IEE Regulations alternatively the Electrical Contractor shall install additional cables with copper conductors to reduce the impedance to a level which ensures compliance with IEE Regulations.

Unless permission is given by the Engineer, no joints will be allowed. In the event of joints being authorised, they shall be made using plastic boxes of approved design filled with an approved cold pouring plastic or resin compound. The cable box shall incorporate suitable copper tapes and clamps to bond the armouring of the jointed cables.

Compression joints shall be made with the correct size tool and pressure for the ferrules used, or have soldered joints using solder of grade ‘M’ or grade ‘C’ complying with the requirements of BS219.

The cables shall be terminated in the cable manufacturers approved glands. These shall be of the compression type provided controlled radial compression of the sheath seal. The gland shall incorporate an armour clamping ring and earthing ring, and where used outdoors, a lead washer shall be used to ensure a watertight joint between the gland and the unit to which it is fitted. The earthing ring shall be rigidly fixed to the item of equipment and termination using brass nuts, bolts and washers.

All gland terminations shall be protected by a PVC shroud which shall fit tightly over the cable.
All cables shall have the cores connected to bolted connection in busbars etc., by means of compression type termination, made off by means of hydraulic compression tools and suitable die to suit size of cable.

Each terminal shall be fitted with a brass washer between the socket and securing nut or bolt to ensure good electrical contact.

Where cables having aluminium conductors are specified, aluminium/copper bi-metal socket and pin type terminations shall be used.

Cable bends shall be in accordance with manufacturers details, and the IEE Regulations.

The Electrical Contractor is responsible for determining the true nature and extent of cable routes. No claim on the grounds of lack of knowledge will be entertained. All cable routes shall be agreed with the Engineer.

After the cables have been installed and terminated, but prior to putting into service, they shall be subjected to an insulation test of 500 volts and the results of these tests (recorded on test sheets) forwarded to the Engineer.

Cables shall be installed:

Without damage to either cable or building fabric.

Only when both cable and ambient temperatures are 5°C or above and have been so for the preceding 24 hours, or when special precautions have been taken to maintain the cable at or above this temperature.

With each run of cable marked at each end and at access points by a securely fixed non-corrosive metal or substantial plastic label, engraved to indicate the cable size and circuit.

As indicated on drawings and schedules with the routes measured on site.

Any length found to be measured too short shall be replaced with cable of the correct length.

In ducts and on the walls of buildings using plastic silicon aluminium claw type cleat supports.

Using cleats or proprietary P.V.C. covered copper or brass straps of the correct type, size and spacing to suit the particular cable, plastic cable ties shall not be permitted.

With protection from mechanical damage to a height of 1.5m above floor level where run vertically on the surface walls.

With fire resisting infill where passing through floors or walls.
In short lengths or earthenware duct where access to a building is required. The entry point to be sealed to prevent the ingress of gas, heat, flame, moisture and vermin. The sealing agent to have fire resistance equal to that of the structure.

Terminated in suitable bright dipped or plated brass compression glands to BS 6121 to provide an anchorage and a cross-joint bonding of the armouring such that all glands and boxes provide an effectively maintained earth continuity path.

Glands shall be totally enclosed within PVC shrouds.

With all conductors of equal cross section.

Shall not:

Be installed in direct contact with any form of polystyrene.

5.2. MINERAL INSULATED METAL SHEATHED CABLE (MIMS)

General

Of heavy duty grade for all sub-mains, motor wiring and 3 and 4 wire 415 volts.

Accessories

Shall be:

In accordance with BS6207.

Fitted with a wedge type or cold screw-on pot seals filled with plastics compound and provided with universal type glands in situations where temperatures will not exceed 80°C. Pots to be fitted with integral earth conductor.

Fitted with flameproof type gland when fitted to flameproof equipment.

Fitted with brass compression ring glands for general purposes and special compression ring glands to suit the regulations governing hazardous conditions.

Installed with clamps so designed that a gland is not required where plaster depth boxes are used.

Terminated using polychloroprene, polyvinyl chloride, or silicone rubber sleeving on the conductors to suit the temperature condition and equipment. Sleeving shall be anchored and sealed into pot type seals, coloured sleeves to be BS2848 and 3858.

Space ranger glands where screwed spout entry boxes or accessories are not used.

Installation

MIMS cables shall be:
Installed generally on cable tray in ceiling voids/roof spaces etc. where cable tray is not specified cables shall be clipped direct to the structure.

As a recessed installation except in the following locations:

- Plant Rooms
- Tank Rooms
- Ducts
- Switch Rooms

and any other locations where tray plate has been provided for the use of clipping fire detection and alarm wiring.

Protected to a height of 1.5m by trunking or conduit where surface mounted.

Provided with surge diverters connected across the tractive coils of all motor starters.

Shall not:

- Be run within screeded floors.

Cables

All MICS cables shall be in accordance with BS6207 “Mineral Insulated Cables Part 1” being of 600 volt grade unless other grades are requested. All cables and accessories on any one contract shall be unsheathed or LSF sheathed as specified in Appendix 5 of this specification. Where LSF sheathed MICV cables are used all other items shall be sheathed in the same colour, e.g. clips and saddles and PVC shrouds fitted at termination etc.

Clips and Saddles

Single MICS cables may be supported by one hole fixing clips, or one, two or three way saddles, for multiple cable runs. Spacer bar saddles shall only be used where indicated later in the specification.

Saddles and clips shall be fixed by brass round headed wood screws, plastic plugs being used for erection on concrete or brickwork. Supports shall be placed not more than 300mm apart or more than 150mm from the termination or bend on small cables, greater distances may be permitted on heavy cables and on vertical runs. Larger cables shall be fixed at intervals not more than those stated in the IEE Regulations.

Where four or more cables are installed together on the surface they shall be installed on cable tray unless the use of multiple saddles is required by Section 3.0 of the specification.

Cables shall be straightened and dressed neatly into place during fixing, without damage to the cable finish.

Method of Installation

The manufacturer’s recommended tools shall be used throughout the work.
MICs cables shall be installed in accordance with the IEE Regulations and the manufacturer's recommendations.

All bends shall be neat and uniform and not less than 6 times the diameter of the cable. Bending levers with padded surfaces shall be used for making all bends and offsets in cable larger than 10mm in diameter.

Where cables pass through holes in the building structure, short lengths of insulated conduit shall be threaded over the cables for protection against abrasion.

Where surface mounting cables pass through floors, they shall be protected to a height of 1.5 metres by steel conduit.

All parallel cable runs shall be grouped in neat and orderly manner with no crossovers, so that all cables may be easily removed at a later date.

Where MICS cables are installed in walls, they shall be run square and vertical.

All MICS cables laid underground shall be PVC sheathed and laid at a depth not less than 600mm. Where subsidence is likely to occur, allowance should be made for 'snaking' the cables.

Care shall be taken not to scratch the copper sheathing or break the PVC sheath. Any cables damaged in this way shall be replaced at the Electrical Contractor's own expense.

Where MICS cables are fixed in contact with cable tray, likely to give rise to corrosion, or drawn through conduit, the cables must be provided with LSF sheathing.

MICs cables shall be looped one complete turn where connections are made to motors and other equipment where vibration or expansion is likely to occur.

Surge suppressors shall be fitted to termination of MICS cables at contactors and 3 phase star connected motors.

**Cable Terminations**

The end of all cables shall be terminated with sealing pots made off without delay in accordance with the manufacturers instructions.

All glands shall be of the brass universal ring type and all seals shall be of the cold (105°C) type filled with the manufacturers recommended plastic compound. Cable seals shall not project into the interior or any boxes, distribution boards etc. A coupling and male brass bush shall be used at all non-spouted entries.

Where PVC sheathed MICS cables are employed, each gland shall be fitted with a PVC shroud, at all terminations.
All conductors at terminations shall be insulated with continuous “Neoprene” or heat resistant sleeving, they shall then be identified by coloured PVC insulated tape or by placing a 10mm length of coloured PVC sleeving over the conductor insulation.

All tails shall be of sufficient length to remake broken connections.

The system shall be wired on the loop-in principle, or as detailed in Section 3.0 of this specification.

Accessories such as conduit boxes etc. shall be black enamelled or galvanised as detailed in Appendix 5.

All boxes shall be complete with earth terminal.

In all cases where single conductors of mineral isolated cables of 4.0mm and below are secured in a terminal with a pinching screw and the ends shall be doubled back before insertion. For cables of 10mm² and above the ends shall be terminated in a cone grip cable socket of the lug or tag type specially manufactured for the purpose and sizes for the conductor concerned.

All joints shall be made in circular conduit boxes complying with BS4568 or in rectangular adaptable boxes which if of steel shall be of minimum thickness of 1.6mm.

Where cables are terminated in sheet steel boxes the terminations shall be fixed using coupling and smooth bore brass bush.

Circular conduit boxes complying with BS4568, into which the cable terminations shall be screwed, shall be installed at lighting points except where the luminaires have conduit entries.

All connections within the boxes shall be made by means of porcelain insulated brass connectors with pinching screws.

**Testing MICS Cables**

The cables, which shall be delivered to site with the manufacturers seals and identification labels intact, shall be tested upon receipt. During the installation each individual cable or complete run shall be tested not less than 24 hours after sealing with a 500 volt insulator tester. A schedule of these tests shall be handed to the Engineer.

Nothing less than an infinity reading must be obtained between the conductors or between any conductor and the cable sheath, all conductors being disconnected from any apparatus, any resealing or replacement necessary shall be carried out at the Sub-Contractors own expense.

All seals shall be tested immediately after completion and re-tested after the whole of the cable installations are complete in each particular section of the works. Any cable which does not exhibit the prescribed insulation resistance will be rejected.
5.3. **CABLES IN CONDUIT AND TRUNKING**

**Cables**

PVC single insulated cables to BS6007 for all sub-circuit LV and ELV wiring in plant rooms and within service ducts internal and external to the building.

Stranded conductors sized in accordance with the Distribution Board Schedules and as shown on the drawings.

Identify using proprietary cable sleeves where cables terminate into distribution boards and control panels etc. to indicate the way number and phase colour of a three phased circuit.

Each group of cables shall be labelled at 6 metre intervals, using a proprietary marker system.

'Doubling up' at protective devices will not be allowed other than for ring circuits.

**Wiring of Conduits and Trunking**

All cables shall be polyvinyl chloride (PVC) insulated to BS7211 “PVC insulated cables (non-armoured) for electrical power and lighting, 450/750 volt grade” unless an alternative is specified elsewhere in the specification. The quality and size of cable contained in any one conduit or trunking shall comply with BS7671 IEE Regulations 16th Edition.

No cable with a cross-sectional area of less than 1.5mm² shall be used. All cables installed in a conduit or trunking system shall be PVC single insulated conductors and shall be colour coded in accordance with the IEE Regulations.

Final circuits shall be run in conduits separate from main or sub-main cables. All cables in a conduit shall be drawn in simultaneously.

Where cables are installed in cable trunking the space factor shall be 40% to permit 5% to remain for future wiring after the completion of the installation.

In normal circumstances flexible conduit shall have a minimum length of 300mm and a maximum unstretched length of 800mm. It shall permit a full range of withdrawal, adjustment or movement of the equipment.

All cables shall be drawn in without the use of excessive force, without the use of lubricants, and the wiring shall be easily withdrawable.

Cables shall not pass through luminaires unless the luminaires are specifically designed with a wiring way protecting the cables from mechanical damage and/or heat.

The wiring of the installation must be in strict accordance with the drawings, cable sizes and circuit details, given in the specification and schedules of drawings, issued for the particular project.
All wiring of multi point sub-circuits must be carried out in the loop in system and no joints or connectors other than those required for the connection of luminaires and others that may be particularly mentioned in the specification will be allowed.

On all AC supplies, care must be taken to ensure that both live and neutral conductors are contained in the same conduit/trunking. The insulation of all cables connected to the neutral must be coloured black, the phase or live being coloured red in single phase systems.

The minimum length of spare cable generally to be left at each accessory shall be 150mm per conductor to enable terminations to be remade.

Cables must be terminated by one of the following methods:-

The cable conductors shall be sweated into lugs of the appropriate size for the cable and equipment terminal.

The cable conductors shall be secured by compression type lugs of the correct size or the cable and equipment terminal.

The cable conductors shall be secured in pinch screw terminals.

The cable conductors shall be secured by means of clamps.

Where cables are required to terminate at connectors, as at lighting points, such connectors shall be insulated with porcelain. Connectors shall receive two layers of PVC self adhesive tape.

The cross-sectional area of cable conductors shall not be reduced at terminations, and connections shall secure all the strands of stranded cables. Care shall be taken to ensure that cables are not damaged during preparation for termination.

Cables terminating at pinch screw terminals shall be twisted together and single cables shall have the conductor doubled back to ensure adequate purchase for pinching screws.

Cables connected to lampholders or other compartments at which heat is produced shall be insulated with heat resistant material capable of withstanding, without detriment, the temperature encountered.

5.4. FLEXIBLE CABLES AND CORDS

Shall:

Not have conductors smaller than 0.75mm² (24/0.2mm) unless otherwise specified.

Be 300/500 Volt Grade.

Be of circular construction, with colour coded cores in accordance with I.E.E. Wiring. Regulations 514 -07.
Be of either PVC or butyl rubber to BS7622 and BS6500 to suit the appropriate temperature conditions.

Be of heat resistant types of silicon rubber, PTFE glass braided for connections to luminaires.

All flexible cords and cables shall be of butyl silicone rubber or equal to BS6500 "Isolated Flexible Cords", rated in accordance with the equipment they service and shall be suitable for the operating temperature envisaged. In high temperature conditions flexible cables and cords shall be Elastomer to BS6007. They shall be multi core circular flexible cables or cords being insulated and sheathed and shall be colour coded in accordance with IEE Regulations.

PVC/PVC cables shall not share a common run of clips with any other type of cable.

Where cables cross pipe or duct runs the cables shall be supported beneath the pipe.

5.5. ALL INSULATED CABLES

Shall:

Be PVC insulated and sheathed to BS7211.

Incorporate circuit protective conductors.

Terminate in a box with fixed connections in locations where luminaires are to be fitted directly on to conduit boxes.

Terminate in incombustible enclosures securely fixed to the building fabric and earthed where of metal construction.

Run along or at right angles to any timber joists.

Installed at 50mm minimum distance from the top/bottom of floor or ceiling finishes.

Where run within plaster finish, be protected by means of plastics or galvanised metal channel.

Be installed in such a manner that the cables are not in direct contact with any form of polystyrene.

Where run in intermediate floors, be threaded through holes not exceeding 25mm drilled at half joist depth.

Unless adequately supported by the building fabric, in accessible positions, be clipped at distances not exceeding 225mm, generally in accordance with Appendix 11 of the I.E.E. Regulations.

Shall not:
Be installed in such a manner that they are supported by ceiling grids.

**PVC Insulated, PVC Sheathed Cables**

Except where specified PVC/PVC cables shall have copper conductors and shall comply with BS6004 PVC insulated cables (non armoured) for Electrical Power and Lighting. 300V/500V grade unless an alternative is specified elsewhere in the specification. The cores shall be coloured in accordance with IEE Regulations.

Generally PVC/PVC cables shall be run in ceiling and floor spaces and in round heavy duty high impact PVC conduits in walls, other methods of protecting cables in walls may be described in Section 3.0 of this specification.

Wiring shall be carried out on the looping-in principle, joints being allowed only at approved junction boxes and only in lighting circuits. Joint boxes shall be installed where they will be accessible after completion of the building.

No joints shall be allowed in protective conductors except at items of fixed equipment, socket outlets or other accessory, where loops are formed.

The cables shall be installed so as to give maximum rewireability commensurate with the specified method of installation. Cables installed in ceiling spaces shall be accessible through removable ceiling tiles or ceiling access traps and cables run in ceiling spaces shall not be imbedded in the building fabric.

Cables in ceilings shall be run parallel or at right angles to main secondary beams or joints etc., and no diagonal runs will be permitted.

All cables in suspended ceiling areas shall be installed into purpose made wiring stirrups which shall consist of adjustable ‘P’ clips as manufactured by Critchley Limited, or approved equivalent.

The ‘P’ clip shall be formed into a 75mm diameter loop with fixings to the ceiling soffit.

In order to afford a withdrawing facility, not more than 4 circuits or their equivalent are to be supported within the confines of one run of clips.

Cables shall be free to move in supporting clips and shall only be secured at terminations.

The clips shall be fixed at intervals not greater than 450mm and at 200mm each side of a bend or other change in direction. A clip shall be fixed at 200mm each side of a lighting point so as to support the cables serving the lighting point and wherever cables drop to leave the suspended ceiling area.

PVC/PVC cables shall not share a common run of clips with any other type of cable.

Where cables cross pipe or duct runs the cables shall be supported beneath the pipe or ducts.
Where the cables pass through floors or may be subject to damage or abuse, they shall be protected up to a height of 1200mm by heavy gauge conduit suitable bushed. In certain instances, and where indicated by the Engineer, the cable shall be protected up to a height of 1200mm by plastic capping or oval conduit.

Where cables pass through the building fabric they shall be adequately protected by means of isolated lengths of bushed conduits.

Cable entry into accessory boxes shall be via grommeted holes.

The internal radius of cable bends shall be not less than those set out in the IEE Regulations.

Cables run on fair faced brickwork shall be protected by means of heavy duty high impact PVC conduit securely connected to the accessory box.

Where cables converge and run to distribution boards, they shall be installed in PVC high impact trunking flanged to the Distribution Board. Cable entries to distribution boards shall be via a suitable sized grommeted hole. Attention is drawn to the IEE Regulations with particular reference to grouping of cables and derating.

All PVC/PVC cable terminations shall be made so that 150mm of spare cable shall be left in each conductor at an accessory. In distribution boards, conductors shall be sufficiently long to enable them to be connected to any circuit in any phase.

All protective conductors shall be sheathed with green and yellow sleeving at terminations.

Cables to lighting points shall terminate at bushed steel conduits boxes to BS4568 securely fixed in the ceiling. Cables shall enter via male brass bushed entries and an earthing terminal shall be provided in each box. Cable conductors shall terminate at isolated brass tunnel connectors.

Final connections to incandescent and fluorescent luminaires or batten lampholders shall be made by means of butyl and EP rubber isolated cables of the same cross-sectional area as the final sub-circuit cables. Final connections to ceiling roses at pendant lighting points may be made directly by the cable conductors and the flexible cord shall be of butyl rubber.

For close mounted unventilated incandescent ceiling luminaires the PVC insulated PVC sheathed wiring shall terminate in an accessible standard conduit box, with earth terminal, fitted approximately 300mm from the luminaire. The final connection between the fixed wiring and luminaire being by means of porcelain semi-recessed ceiling rose and 1.0mm² multi core butyl isolated flexible cable.

Where the internal operating temperature of a luminaire is such that high temperature cable of a specialist type is required, this shall be fitted in every instance.

At recessed luminaires, sub-circuit wiring shall terminate at a rigid PVC BESA type box located adjacent to the luminaire. A plug in ceiling rose shall be provided and fitted and final connection shall be made using multi core butyl insulated cord.
Surface installation cables shall be fixed by means of “Hiatt” or “Tower” type clips. The clips shall be spaced in accordance with the IEE Regulations.

Where cables are run under floors and in roof spaces, they shall be passed through holes drilled in the neutral axis of the joists where possible, but in no case shall the holes be less than 50mm from the top or bottom surface of any joist.

All runs shall be made straight, both parallel with and at right angles to the sides of the building. All risers and drops shall be vertical.

The cable entries of metal clad accessories shall be fitted with cable glands and buses as follows:-

On surface work - with a rubber packed gland Walsall list No. 0710 series or equal and approved.

On concluding work - rubber or PVC grommet.

5.6. FIRE RESISTANT CABLES

Shall be:

To BS6387 Categories C, W, Z, with red outer sheath and fully screened against electrostatic interference.

Installed generally on cable tray in roof spaces etc. Where tray is not available the cable shall be clipped direct to structure.

Where run with plaster finish, be protected by means of plastic or galvanized metal channel.

Be installed in such a manner that the cables are not in direct contact with any form of polystyrene.

Where run in intermediate floors, be threaded through holes not exceeding 25mm drilled at half joist depth.

Unless adequately supported by the building fabric in accessible positions, be clipped at distances not exceeding 225mm, generally in accordance with Appendix 11 of BS7671.

Bare circuit protective conductors shall be protected as in Clause 6.5.

A minimum of 1.5mm² for alarm conductors.

Terminated as per manufacturers recommended methods. Zero halogen low smoke polymeric glands shall be used on all terminations.

Installed with a minimum bending radius of 6 times the overall diameter of the cable.
Clips and fixings shall be of a type which will ensure the integrity of the cable fixing under fire conditions such as red coloured Zero Halogen Low Smoke coated copper 'P' clips. Plastic clips shall not be used. Where cables are fastened to cable trays and the fixing is also providing support, the fixings should also be fire resistant, i.e. stainless steel or copper.

**Armoured Cables Not Buried Underground**

Care shall be taken to ensure that all cable is installed without being twisted or kinked. Damaged cable will be rejected and must be replaced at the Electrical Contractor’s expense.

The cable shall be delivered to site with its end effectively sealed and any cables cut on site shall have their ends immediately and effectively sealed with a cap which will permit movement of the cores during installation without impairing the seal. Paper insulated cables shall have their ends sealed by means of a plumed on cap.

Cables installed on building surfaces shall be secured by means of correctly sized silicone aluminium claw or clamp fixing cleats, claw cleats for smaller cables, cleats for the larger cables.

Multiple cable runs shall be planned and installed in such a way that cross overs are eliminated. The design of multi-way cable support racks shall be submitted to the Engineer for approval before manufacture.

Spacing between cables shall be in accordance with IEE Regulations.

The Electrical Contractor shall take all reasonable precautions to ensure that the cables are not subjected to heating from adjacent service lines, heater units or plant operating at high temperatures.

When the routing of cables is not indicated on a drawing or described in Section 3.0 of this specification, the Electrical Contractor shall submit details of his proposed routing to the Engineer for approval prior to commencing the installation.

The Electrical Contractor shall supply and install all steelwork and other support structure required for the support and effective installation of the cables.

Where more than three cables are surface fixed together along the same route, then they shall be installed on to a heavy gauge cable tray of the perforated type, fixed at regular intervals to ensure that no bending or buckling occurs. On no account shall cables be stacked except where single core cables are specified as being in ‘trefoil’ formation.

Cables supported to steelwork shall be fixed by approved steel straps. The minimum bending radius of the cables shall be as stated in the IEE Regulations. All cable bends shall be adequately supported.

Special care shall be exercised in supporting cable terminations to ensure that undue strain is not placed on any part of a cable termination or equipment.
Cables shall be installed as neatly as possible and shall be protected from mechanical damage to a height of 2.0 metres above finished floor level by means of galvanised steel channel manufactured from steel of at least 2.0mm thickness designed to span a cable or group of cables and fixings.

Cable entry into a building from the ground shall be by means of salt glazed earthenware ducts adequately sized to permit installation without undue strain being placed on the cable when it is drawn in. Earthenware ducts shall be effectively sealed to protect the ingress of moisture, vermin etc.

Where low temperatures are present during installation of cables, the cables must be stored at a temperature above 5ºC for a minimum of 24 hours before installation commences.

5.7 Buried Cables, Markers and Cover Tiles

All MICS, PVC/ SWA/PVC, PVC/ASA/PVC or XLPE/ SWA/PVC cables which are required to be buried below ground level outside the premises shall be laid at a minimum of 600mm below ground level and in accordance with IEE Regulations.

Wherever cables are to be installed under roads, through foundations, walls or under concreted areas, they shall be enclosed in pipe ducts. The diameter of the ducts shall generally be 100mm unless detailed otherwise in Section 3.0. Ducts shall generally be PVC construction.

Route indicating blocks shall be set into the ground directly above buried cables; the blocks shall have the words 'Electricity Cables' with an indication of the direction of the cable. The top face of each block shall be level with the surrounding ground or finished level. The blocks shall be placed at changes in direction and at intervals of 50 metres.

A plate shall be fixed to walls 300mm above ground or floor level where cables pass from ground into building. The plate shall have the words 'ELECTRICITY CABLES' in 20mm lettering.

Cables installed in the ground shall be laid on a layer of fine sand not less than 50mm deep. A further layer of fine sand shall be placed firmly over the cable or cables to provide a bed for the earthenware or concrete interlocking cover tiles laid to protect the cables. Cable tiles shall be at least 50mm wider than the space occupied by the installed cables.
SECTION 6.0

EARTHING ARRANGEMENTS AND PROTECTIVE CONDUCTORS
6.0. EARTHING ARRANGEMENTS AND PROTECTIVE CONDUCTORS

6.1. GENERAL

The installation shall have separate neutral and protective conductors throughout.

Main equipotential bonding conductors shall connect to the main earthing Bars all incoming main metallic piped services except Telecommunication systems. The extraneous conductive parts of all other separate metallic services particular to the building shall be connecting including heating, air conditioning, compressed and vacuum systems and exposed metallic parts of the building fabric.

Where necessary, the extraneous conductive parts of exposed metalwork shall be connected to circuit protective earth conductors by local supplementary bonding conductors to maintain an equipotential zone.

The whole of the metallic portion of the installation other than current carrying parts shall be electrically and mechanically bonded to the consumers main earth terminal and also, if applicable, to the lightning protection system or other points specified.

The installation shall be earthed in accordance with:-

British Standard Code of Practice CP1013: Earthing.

6.2. MAIN EARTHING BARS

A main earth terminal shall be supplied and installed adjacent to the electricity supply cable termination. The terminal shall be of ample size and capacity to suit the installation. All items of equipment, switchgear etc., shall be bonded to this earth terminal using PVC insulated PVC sheathed cables, coloured green and yellow, and sized in accordance with the IEE Regulations. An ivorine label reading ‘SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE’, in engraved uppercase characters not less than 4.75mm high shall be permanently fixed immediately adjacent to or on the earth terminal.

A main earthing conductor shall be supplied and installed between the earth terminal and the incoming electricity supply cable using PVC insulated cables coloured green and yellow, and sized in accordance with the IEE Regulations. A heavy duty copper clamp complying with BS951 shall be used to bond the main protective conductor to the electricity supply cable armouring or metallic sheath (where applicable the armouring and sheath shall be bonded together), and shall be provided with an embossed metal label reading ‘SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE’, complying with IEE Regulations 514-13-01.

In those instances where earthing rods and/or earth leakage protection devices are to be used these will be detailed in Appendix 5 of this specification.
6.3. EARTHING CONDUCTORS AND CABLES

PVC single cable shall be used, these shall be installed from the earth bar to the point of utilisation described herein, clipped to the trayplate where provided and the structure/fabric of the building in accordance with the requirements of Section 6.2 (MIMS Cables).

All terminations shall be crimped and securely fastened to the plant or bar which is being bonded.

All terminations at the earth bar and points being bonded shall be identified to indicate the location and type of supply being earthed, these shall clearly be indicated on the Record Drawings.

6.4. PROTECTIVE CONDUCTORS

a) Where mains circuits are served via P.V.C. single cables installed in conduit and/or trunking separate C.P.C's shall be installed for each circuit in accordance with Table 54G of the I.E.E. Regulations.

b) All C.P.C’s shall be terminated at the accessory earthing point, back boxes or mounting boxes shall be bonded to the accessory.

c) Where circuits are to serve items of equipment having high earth leakage currents, the Contractor shall ensure the earthing systems comply with the requirement of BS7671 Section 607.

All protective conductors shall, wherever possible, be enclosed within metal trunking or conduit serving switchgear, distribution boards etc., so as to provide mechanical protection. Where protective conductors are run on building surfaces they shall be properly fixed and supported by means of PVC coated metal saddles, along selected routes.

Earth continuity between separate items of switchgear, distribution boards etc., mounted adjacent to one another shall be affected by means of high conductivity continuous copper tape, or PVC sheathed cable coloured green and yellow connecting all items to the earth terminal, in accordance with Clause 547 of the IEE Regulations.

All items of switchgear, accessories, luminaires, conduits and the outer sheaths of MICS cables, the armouring of all XLPE/SWA/PVC and PVC/SWA/PVC cables together with all other items of electrical plant and equipment shall be effectively earthed by means of a protective conductor, in accordance with Clause 547 of the IEE Regulations.

At every terminal point on the fixed wiring system, e.g. BESA boxes, accessory boxes etc., an integral earth terminal shall be provided. A protective conductor shall be provided and installed between this terminal and the earth terminal on the associated switch, socket outlet, luminaire etc.

Earth circuit protective conductor shall be connected to a multi-way earth terminal provided and fixed within each distribution board. The earth terminal shall be provided with an adequate number of ways such that not more than one conductor per terminal
shall be installed and the earthing conductors shall be connected in the same sequence as the current carrying conductors.

6.5. EQUIPOTENTIAL BONDING

All metal piped services e.g. heating, water and gas services, metal wastes and piped services at sinks, baths and showers etc., shall be bonded to the earth terminal, in accordance with Clause 413.02.02 of the IEE Regulations.

A 50mm section of each gas and water pipe, at positions close to their entry into the building, on the consumers side of the supply authorities valves and metering shall be cleaned and made smooth. A copper earthing clamp designed to permit the connection of protective conductors shall be provided. The clamp shall be a proprietary type or shall be fabricated from high conductivity copper strip, minimum size 40mm x 4mm which shall encircle the cleaned sections of the pipe. 40mm x 10mm brass bolts shall pass through 10mm holes drilled in the end return sections of each clamp and a brass bolt, washer and nut shall tighten the clamp on to the pipe. A permanent label, indelibly marked with the words ‘SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE’, in legible type not less than 4.75mm high shall be permanently fixed at the points of connection.

Connection between each clamp and the consumables main earthing terminal shall be made by the PVC insulated stranded copper cables. Each end shall be terminated in a sweated or crimped cable socket and connection to pipe clamps and earthing terminal shall be made onto the studs or bolts using brass nuts, washers and locknuts.

Connections between dissimilar metals are to be avoided. If unavoidable, they shall have the faces coated with petroleum jelly or similar neutral grease and in the event of copper being present it shall be tinned.

The bonding conductors shall be fixed using PVC coated metal saddles.

The final connection of bonding conductors from gas, water pipes and other services to the earth terminal shall not be completed until earth impedance tests have been satisfactorily completed.

Bonding connections to pipework shall be as unobtrusive as possible and where practicable, shall be made in the service ducts or accessible voids and shall be readily accessible, and their positions shall be indicated on the Record Drawings.

The metal waste of all sinks and basins shall be bonded to the hot and cold water pipes. The cables shall run so as to be inconspicuous as possible.

All equipment located in kitchens and toilets, e.g. cookers, hand dryers etc., shall have an additional supplementary bonding conductor interconnecting all pipework and the main earth terminal.

All earth bonding connections and safety earth labels shall be clearly visible at all times and shall not be covered by paint or lagging or otherwise obscured.
Connections to lightning conductors shall be as detailed in the BS Code of Practice BS6651: 1985 and Appendix 5 of this specification.

The provision of protective multiple earthing shall be in accordance with the Electricity Supply Company and as detailed in Appendix 5 of the specification, where applicable.

All materials and sundry items shall be provided whether or not specifically mentioned necessary to completely and effectively earth the installation. The installation shall be fully protected against dampness and corrosion and the effects of electrolytic action between dissimilar materials. A completely permanent installation shall be provided which shall be fully accessible for regular testing and inspection.
MONKTON INDUSTRIAL ESTATE CCTV – INSTALLATION, SERVICING & MONITORING

The contractor shall enter the constituent parts of the CCTV installation comprising the Tender Sum, all items shall be costed, and in the event that they are not then the tender will not be considered.

Preliminaries/Special Attendance £
CCTV Cameras £
CCTV Columns £
CCTV Controls £
CCTV Cabling £
Digital System £
Remote Lap Top Computer/Software £
Wireless Network £
Electrical Supplies £
External Cabinet £
Builders Work/Ducts £
Infra Red LED Units £

Maintenance Cost 1st Year £
Comprehensive Maintenance Cost 2nd year £
Comprehensive Maintenance Cost 3rd year £
Comprehensive Maintenance Cost 4th year £

Monitoring 1st Year £
Monitoring 2nd Year £
Monitoring 3rd Year £
Monitoring 4th Year £

Testing/Commissioning/Training £

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£

Contingency £100 00.00
Provisional Sum NEDL Supplies £750 00.00
Provisional Sum South Side Monitoring Building £10000.00
Provisional Sum BT £25000.00
Provisional sum control room installation of free issue equip £ 3000,00

Transfer to form of Tender £

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Signed by ..........................................................

On Behalf Off ..........................................................
Date ..................................................................................................................

MONKTON INDUSTRIAL ESTATE CCTV – MONITORING

Call out rate: £

Hourly rate for attending: £

Proposed monitoring company:
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MONKTON INDUSTRIAL ESTATE CCTV – INSTALLATION, SERVICING OF THE MONITORING

Call out rate for engineer: £

Hourly rate for attending engineer: £

% addition to materials and parts: %

Proposed contractor:
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Contractors on returning tenders should include:

3 Referees addresses and telephone no’s and relationship with contractor
Attached  Yes  No

Last 3 years audited accounts,
Attached  Yes  No

Full company details
Attached  Yes  No

Details of completed town centre cctv installations within the last 3 years
Attached  Yes  No

Details of existing cctv contracts.
Attached  Yes  No

Details of completed installations during the last 3 years comprising fully functional cameras.
Attached  Yes  No