

SECTION 8: MECHANICAL & ELECTRICAL SYSTEMS

8.5: INTEGRATED RECEPTION SYSTEM (IRS)

8.5.1 Purpose

This document covers the design, installation, supervision, inspection, commissioning, testing and all works necessary, to replace existing communal television equipment/systems and outlet points with a new 'Integrated Reception System' (IRS) for audio, television and satellite broadcasts.

8.5.2 Strength

- i. All materials must be new and previously unused. All goods and materials used in providing the system shall conform to EU and national standards, where such standards have been established, and to the Codes of practice issued by the relevant industry bodies;
- ii. All amplifiers and distribution equipment shall be sourced from a Sky Homes partnering supplier;
- iii. All equipment must be able to cope with the minimum and maximum signal levels, as approved, in the CAI SMATV Code of Practice and those levels listed above for the given frequencies in use.

8.5.3 Durability & Performance

- i. The whole of the work shall comply with the following, regulations, standards, recommendations and instructions:
- ii. The systems shall comply with the current technical conditions of the Licensing Authorities. It will be the responsibility of the Contractor to determine the requirement for any licences and apply for any licence that a site, building or property may require.

8.5.4 Visual Impact

All installations shall be designed in such a way that they do not affect the internal and external appearance of the properties involved. There will be a specific design challenge to properties situated that are either Listed or within a Conservation Area.

8.5.5 Environmental Considerations

- i. Electromagnetic radiation must be minimised to residents;
- ii. All cables should be low -smoke zero halogen;
- iii. The electricity consumption of the IRS system should be kept to the minimum including using high efficiency electronic components and by exploring the use of renewable energy.

8.5.6 Materials and installation

- i. The objective is to replace all existing communal television distribution systems owned and maintained by Camden Council;
- ii. The existing systems are to be replaced and upgraded to five-wire fully 'Integrated Reception Systems' (IRS) as described elsewhere within this document;
- iii. The work shall include the supply, install, wire, connect, test and commission of each system and the provision of one TV socket outlet point to each dwelling or location connected to that system. Costs options for a second TV socket situated within another room shall be priced for separately;

Note: Sky Plus shall be made available to all dwellings. The contractor is to supply, install, and wire and connect all equipment necessary, complete with a suitable TV outlet connected to the system;

- iv. During the course of the works, existing television and radio services must continue to be available to the residents;
- v. Upon completion of each site a list of address indicating the completed work and the site to which each dwelling is connected shall be provided to Camden Council;
- vi. The aerial assembly equipment for each site shall be erected in a location giving consideration to the following:
 - roof or wall mounted according to the type of building construction;
 - allowing for the alignment for both terrestrial and satellite services;
 - central to the building construction and locally to the head-end location;
 - easy access for maintenance purposes.

vii. The following paragraphs describe the design principle for the distribution of the network as it applies to the different types of property to be included within this contract, however tree and bush wiring is preferred:

- **Type 'A'**; relates to properties which are termed 'High Rise' (60 to 210 dwellings) and are a construction of high rise flats up to 28 floors. The head-end shall be situated inside the building and local to the aerial assembly which shall be sited on the roof of the building. The system of wiring shall be contained within the building and requires a 5-wire distribution network to be connected between the head-end equipment and 'Active Switches' located in a suitable locations to serve individual dwellings. Each dwelling shall be connected to the IRS with individual, un-interrupted cables connected between the TV socket outlet and the Switch. The design shall include for the provision of a TV socket outlet to be installed within the concierge office on the ground floor;
- **Type 'B'**; relates to properties which are termed 'Low Rise' (15 to 52 dwellings) and are a construction low rise flats or maisonettes up to 6 floors. The head-end shall be situated inside the building and local to the aerial assembly, which shall be sited on the external wall of the building. The system of wiring shall be contained within the building and requires a 5-wire distribution network to be connected between the head-end equipment and 'Active Switches' located in a suitable locations to serve individual dwellings. Each dwelling shall be connected to the IRS with individual, un-interrupted cables connected between the TV socket outlet and the Switch;
- **Type 'C'**; relates to properties which are termed 'Sheltered Housing - (up to 32 dwellings) and are a construction of dwellings within a single building up to thirteen floors. The head-end shall be situated inside the building and local to the aerial assembly which shall be sited on the roof of the building. The system of wiring shall be contained within the building and requires a 5-wire distribution network to be connected between the head-end equipment and 'Active Switches' located in a suitable position to serve individual dwellings. Each dwelling shall be connected to the IRS with individual, un-interrupted cables connected between the TV socket outlet and the Switch. The design shall include for the provision of a TV socket outlet to be installed within the Warden's dwelling and dayrooms;
- **Type 'D'** relates to properties which are termed 'Low Rise – Deck Access.' (Up to 258 dwellings) and are a construction low rise flats or maisonettes up to 7 floors with external communal walkways situated at certain floors of each block. The head-end shall be situated inside the building and local to the aerial assembly, which shall be sited on the external wall of the building. The system of wiring shall be contained within the building and requires a 5-wire distribution network to be connected between the head-end equipment and 'Active Switches' located in a suitable location to serve individual dwellings. Each dwelling shall be connected to the IRS with individual, un-interrupted cables connected between the TV socket outlet and the Switch;

- viii. Cables must be generally installed within communal areas and voids. Cables routes shall not pass through one dwelling for termination within another dwelling.
- ix. Where in the general geographical area of the contract, analogue terrestrial Channel 5 and some digital terrestrial multiplexes are not available the Contractor should indicate which of the services (if any) will not be available over the proposed system. Restricted Service License (RSL) services do not have a long term license and cover a small geographical area. Any inclusion of a RSL service should not be seen as permanent.
- x. Prior to work commencing a site test at each location should be performed to determine that all the services listed are available at the levels required for distribution). If any service is, as a result of the site test, found not to be available this must be reported to Camden Council immediately so that an agreement may be made as to which services will be provided.
- xi. *Services*

The services to be provided by each integrated reception system are as follows:

Service	Programmes	Frequency
Terrestrial Analogue	BBC 1	UHF
	BBC 2	UHF
	ITV	UHF
	Channel 4	UHF
	Channel 5	UHF
Terrestrial Digital	Multiplex 1	UHF
	Multiplex 2	UHF
	Multiplex 3	UHF
	Multiplex 4	UHF
	Multiplex 5	UHF
	Multiplex 6	UHF
RSL Analogue	Locally advised UHF	UHF
Satellite Digital	All horizontal and vertical transmissions, both low band and high band from the 28 degree east orbital position, in the transmission range from 10,700 MHz - 12,750 MHz	IF
FM Radio	The national and local services legally transmitted to the general area of the site concerned.	Band II
DAB	The radio programmes provided by the DAB services.	Band III
Closed Circuit TV Camera		UHF
	See separate document for further information	

Specification

- xii. Each IRS shall conform to the CENELEC, British Standards the CAI and the DTG standards and codes of Practice.

Planning

- xiii. The Contractor shall allow for the planning of each individual system. The planning must be undertaken to avoid common analogue interference patterns and particular reference to channel N +/- 1, 5 and 9 must be taken into account when allocating frequencies;
- xiv. The closed circuit television output (where applicable) shall be assigned to a UHF Channel; 21 or 22 taking into account the paragraph above;

- xv. The Contractor shall provide a schematic representation of the installed system for each site. The schematic diagram shall indicate the channels used for distribution, location of equipment, types of cables and earthing arrangements. The plan shall be submitted to the Contract Administrator for final approval prior to commencement on site. A copy of the plan shall be attached to the inside cover of the head-end enclosure;
- xvi. The system planning process shall include confirmation of the suitability of services and local conditions. Prior to work starting services should be verified at each of the sites indicated and that the quality of the signals will enable the requirements of the specification.

System Levels

- xvii. All signal levels must comply with the maximum provided for by the amplifiers to be installed taking into account adequate de-rating for the number of channels distributed and amplifiers in cascade;

The maximum/minimum levels at each outlet position on the system are as follows:

Frequency Band	Maximum Level	Minimum Level
Band II FM Radio	74 dBuV	54 dBuV
Band III DAB	65 dBuV	45 dBuV
Band IV/V Analogue	80 dBuV	60 dBuV
Band IV/V Digital	65 dBuV	45 dBuV
Satellite IF Digital	77 dBuV	52 dBuV

The terrestrial digital signals will require a minimum carrier to noise at the outlets of 26 dB.

C.C.T.V. Provision

- xviii. The Contractor shall provide and install, at each head-end, a modulator for the purpose of injecting local CCTV video output into the IRS network. The modulator shall be 'fit for purpose', non-domestic type and the Contractor shall arrange for the connection of the video output cables. Where no video output cables exist, an end of line resistor should be fitted to enable a functional service and appropriate testing;
- xix. The video output shall be assigned to a UHF channel; 21 or 22;
- xx. Measurement of Carrier to Noise should be made against a 'noise floor' and not between transponders. The recommended frequencies to set the noise floor are 1980MHz. in the low band and 1080MHz. in the high band;

- xxi. Should a transponder signal be present at these frequencies then the 'noise floor' frequency should be adjusted to avoid conflict. The new frequency should be noted and advised to Camden Council.

8.5.7 Site Specific Requirements

- i. The integral part of the telecommunications transmitting systems consist of sets of aerials mounted on steel masts and steel structures on roofs, or on parapets around roofs on the multi storey tower blocks. These aerials transmit radio frequency (RF) at varying levels. The National Radiological Protection Board (NRPB) set down exposure levels on (RF) radiation. Using the recommended set levels, all the telecommunication operators have arrived at safe working distances around their aerials. Although the transmitting levels vary depending on the size of the site and the air traffic it handles, the worst case scenario, maximum levels, have been used to calculate these safe working distances;
- ii. In all cases, people must not work within three metres or five metres in front of any aerial, dependant on which operator is using the tower block. Areas beyond three metres or five metres are perfectly safe.

8.5.8 Maintenance and security

- i. Upon commencement of work at each site, the Contractor shall maintain the existing television network service. The work shall include all repairs necessary to sustain the operation of the existing television network system up to its decommissioning;
- ii. Faults and repairs will be reported directly to the Contractor who shall respond to and repair the fault within 24 hours of the report. The work to complete the repair shall be a continuous operation to the fulfilment of the work. The work shall be deemed to be part of the IRS installation and carried out at no charge to Camden Council;
- iii. Where the fault/repair is outside the scope of the works this should be reported to Camden Council;
- iv. The installation of the IRS must be planned around the existing television network and allow, where necessary, for the temporary displacement of existing equipment to enable the fitting of new equipment associated with the IRS installation;
- v. Upon completion of the IRS installation the existing television network shall be decommissioned and removed where it is Camden Council property only e.g. the existing communal area provision. The contractor should include for making good. Where a resident's satellite dish has had to be removed to allow the works to progress the respective resident must be notified in advance and advised that their dish will not be reinstalled on completion.

As Fitted Drawings

- vi. The Contractor shall provide two sets of 'as fitted drawings' for each site. One set of drawings shall be submitted to Camden Council. One set shall be fitted to the site equipment.
- vii. The drawings shall show;
 - the channels used for distribution;
 - the layout of the head-end equipment
 - cables sizes;
 - a schematic layout of the distribution system;
 - number and location of equipment enclosures;
 - earthing arrangements.
- viii. An A4 size copy of the 'as fitted drawings' shall be fixed to the inside panel of the head-end equipment enclosure's door. The diagram shall be encapsulated in a 150 micron laminating pouch which shall be fixed with 4 mechanical fasteners (adhesives shall not be used).

Defects Liability

- ix. The Contractor shall maintain the completed IRS system without charge for a period of 12 months from the final date of commissioning of the site;
- x. Faults and repairs reported to the Contractor shall be addressed within 24 hours of the report. The repair work shall be a continuous operation until the completion of the work. All equipment and cable faults within the initial 12 month period shall be replaced or repaired by the Contractor at no charge to Camden Council;
- xi. Where it is deemed, by the Contractor that the fault or repair is outside the scope of defects liability, the work shall be reported to the Camden Council;
- xii. At the end of the defects liability period the certification of signal levels and reports on each system giving details of repairs, adjustments and alterations made to the system during the defects liability period shall be provided to Camden Council.

Maintenance Documentation

- xiii. A comprehensive manual, detailed technical information of all equipment and systems installed as described in this specification shall be provided to Camden Council on completion of the work, including:
 - Manufacturers address and telephone number.
 - Catalogue numbers of equipment and any spare parts.
 - Operating instructions.
 - Special instructions such as testing procedures for equipment and recommended periods between such tests.
 - Sketches
 - Test and completion certificates.

- Commissioning certificates.
- xix. An index shall be provided together with a front cover comprising:
 - Title
 - Address
 - Client
 - Contractor/installer.
 - Completion date of installation.
 - Warning note refraining anyone from removing any part of manual.

8.5.9 Quality Control

- The Contractor shall be a member of the Confederation of Aerial Industries Ltd and shall have the relevant qualifications for the installation of Television Distribution Systems. Where, subject to the approval of Camden Council, the Contractor employs the use of a sub-contractor, the Contractor shall be responsible for the sub-contractor and ensure proper supervision and adherence to the project requirements;
 - The use of teams of un-skilled or un-appropriately qualified operatives working under supervision shall not be allowed;
 - The IRS design for each site shall be based upon the following principles, according to the type of property in which the system is to be installed.
- i. Television and Audio Aerials*
- Television and Audio Aerials shall comply with the CAI Code of Practice;
 - All UHF antennas must incorporate a Balun to ensure the matching of the dipole to the feeder cables;
 - The aerial system, antenna, mast, mounts, support fasteners and cable anchors shall be designed and installed to withstanding wind speeds of 100mph/160kph;
 - Details of the location for the aerial assembly shall be supplied to the Contract Administrator for approval. The Camden Council's written approval of the location shall be sought by the Contractor prior to commencement of work;
 - Details of the support fasteners for the aerial assembly shall be supplied to Camden Council for approval;

- The aerial support structure must be connected to the respective lightning protection system via a suitably sized conductor tape secured to the building fabric in an approved manner using propriety fasteners.

ii. Satellite Dishes

- Each Satellite dish shall be of an adequate size for the system to which it is to be connected. The dish shall be capable of producing a 15 dB carrier to noise level at the installations site, for the given transponders being received;
- The satellite dish assembly, bracket, support fasteners and cable anchors shall be designed and installed to withstanding wind speeds of 60mph/100kph;
- The satellite dish shall be geographically aligned for maximum signal strength and carrier to noise ratios. The LNB shall be aligned so that the horizontal and vertical transponders appear equal and give maximum rejection of the opposite polarity;
- Details of the location for the satellite dish assembly shall be supplied to Camden Council for approval. Camden Council's written approval of the location shall be sought by the Contractor prior to commencement of work;
- Details of the support fasteners for the satellite dish assembly shall be supplied to the Camden Council for approval.
- The satellite dish support structure must be connected to the respective lightning protection system via a suitably sized conductor tape secured to the building fabric in an approved manner using propriety fasteners.

iii. Head-end Equipment

- All head-end equipment shall be mounted within a metal cabinet. The general layout of the equipment inside the cabinet shall be the Contractor's design;
- All head-end equipment shall be 'fit for purpose', neatly mounted within the cabinet and securely fixed to the cabinet's mounting plate using propriety screws in all fixing holes;
- Head-end equipment powered at 230 Vac shall be suitably fused and suitably connected to the power supply.

iv. Active Switches

- All switching equipment shall be mounted in a metal cabinet. The general layout of the equipment inside the cabinet shall be to the design of the Contractor;

- All switching equipment shall be 'fit for purpose', neatly mounted within the cabinet and securely fixed to the cabinet's mounting plate using propriety screws in all fixing holes;
- Switching equipment shall not be powered at 230 Vac and shall (where necessary) be 'line-powered'.

v.

Cables

- Co-axial cables used upon the Works shall be manufactured to the relevant parts of the British Standards. All cables shall have passed the benchmarking approval test as conducted by RN Electronics and have a certificate issued by RN Electronics to confirm that the cable meets with the benchmarking approvals;
- All co-axial cable shall have a nominal impedance characteristic of 75 ohms and will be suitable for the application concerned. Cable bending radii shall not be less than that advised by the manufacturer. The Contractor should note that all cables installed in this contract should be LSZH (Low Smoke Zero Halogen);
- Distribution cables connected between equipment shall be coloured black and installed as a continuous cable without joints;
- Final connection cables fitted between the active switch and the TV socket shall be coloured white and installed as a continuous cable without joints;
- Cables installed underground shall be installed within a suitably sized (minimum 98mm diameter) green PVC duct. The type of ducting shall be approved by the Camden Council and its installation shall be in accordance with the requirements of the New Roads and Streetworks Act (RASWA);
- Underground cable routes shall be approved by the Contract Administrator prior to any notices being sought. Underground joints in cables shall not be allowed. All joints must be made above ground within a lockable weatherproof enclosure;
- The cable must be earthed as necessary and at no point on the system must the loop impedance be greater than five ohms;
- Where applicable (in general terms this is where the cable needs protections from possible vandalising) external cables shall be protected by conduit, capping or trunking of a suitable size. All external surface routes must be cleared with the *Landlord* before installation.

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vi. *Cable Containment*

- In general terms, ALL cables shall be enclosed within galvanised steel trunking or galvanised steel conduit. Where trunking and conduit systems are to be coupled to equipment boxes and enclosures to facilitate the passage of cables, proprietary joints shall be made using mechanical couplers and flange plates. All joints in steel trunking shall be electrically 'cross-bonded' according to the requirements of the relevant British Standard;
- Trunking and conduit systems shall be fixed to the building fabric using installation methods described in the relevant British Standard together with the recommendations of the manufacturer. Trunking and conduit runs shall be continuous and all joints, corners and tees shall be made using manufacturer's moulded and manufactured components. Where a trunking system passes through floors and walls approved fire barriers shall be fitted inside the trunking. Holes made in the fabric of the building shall be made good using 'Rockwool' finished with intumescent mastic;
- Where cables are run across a flat roof area, they should be installed on a suitable cable tray of galvanised material. The tray should be fixed, at not less than one metre spacing, to a heavy duty brick or concrete block, by means of a standard screw and plug fixing, two fixings to each brick or block. The brick or block should be laid on a non-penetrating membrane of rubber or on two layers of mineral roofing felt. The substance used should be cut to the size of the brick or block and loose laid on the existing roof surface. Care must be taken should any shingle be located on the roof that the placing of any bricks or blocks does not cause penetration of the existing roof surface. Alternatively, a proprietary support unit may be used in place of the brick or block, such unit to be approved by Camden Council in writing prior to installation and installed to the manufacturer's instructions;
- Cable trays that are fixed vertically should be fixed using a method that locates the tray against a vertical surface, with a minimum spacing off of that surface of 12mm, at no more than one metre spacing so that the tray does not move in any plane;
- All cable trays must be earthed in line with the earthing statement of the IEE so that the installation meets 16th (or later) edition regulations;
- Internal cables, located in building risers, must be fixed to a cable tray or located within an enclosed conduit or trunking;

- Final connection cables fitted between the active switch and the TV socket shall not pass through any dwelling other than the dwelling in which it is to terminate. Within all dwellings the final connection shall be installed within surface mounted white PVC-U trunking. The trunking shall have a clip-on lid and shall be sized 25mm x 16mm. All joints, bends, tees and terminations shall be constructed from manufactured components. The trunking shall run the full length of the wall, either horizontally or vertically and in the corner of walls and ceiling or directly on the top of skirting boards or at the side of door frames and shall be fixed with round head screws at a maximum of 300mm centres and 150mm from corners or tees;
- Cable containment methods shall vary according to the type of property within which the IRS installation is to be fitted;
- Type 'A': the 5-wire distribution network shall be contained within a suitably sized galvanised steel trunking as a rising main within the communal area of the building utilising service cupboards and utility areas wherever possible. The trunking lid shall be secured with tamper proof screws;
- Cable containment installed in external ('open deck') communal areas shall galvanised steel trunking or conduit. Cable containment installed within internal ('enclosed deck') communal areas shall be in steel conduit or trunking installed at high level at the junction of the walls and ceilings;
- Type 'B': the distributed network shall be contained within suitably sized galvanised steel trunking, installed within the communal area of the building utilising utility areas and external fabric. The trunking lid shall be secured with tamper proof screws;
- Type 'C': the 5-wire distribution network shall be contained within a suitably sized steel trunking or conduit within the communal area of the building utilising floor and roof spaces, service cupboards and utility areas. Cabling within roof spaces shall be fixed to galvanised steel cable tray;
- Type 'D': the distributed network shall be contained within the fabric of the building within roof and floor voids, service cupboards and utility areas. Cables shall be generally contained within surface mounted steel trunking and conduit;

Note; Upon completion of the distribution network, trunking lid fastened with tamper proof screws shall be afforded the additional security of 'pop rivets' drilled and fitted into the trunking lid at similar intervals to machine screws.

vii. Cable Connections

- All terminations of coaxial cable shall be made using 'F' type connectors which shall be of the 'gel filled' crimped type and shall be of the correct size for the cable used;
- "'F' connectors shall be crimped using an approved crimping tool";
- "Coaxial cable shall be prepared for termination using an approved stripping tool ";

viii. Television Connection Cable

- Each dwelling must be supplied with a cable connection ('fly lead') between the TV outlet and the tenant's television set or video recorder and audio equipment. The fly lead shall be a minimum of 2m in length to suit the position of all AV equipment, terminated with appropriate connectors, and connected to the tenant's equipment;
- Where a satellite receiver is installed, additional fly leads must be supplied and connected between the IF outlet point and the satellite receiver. Properties that already have Sky Plus installed will require an extra fly lead;
- All fly leads shall be white coloured, 'Double Screened' and comply with the relevant parts of the relevant British Standard.

ix. Head-End Enclosures

- All head-end equipment shall be fitted within suitably sized metal enclosures which shall be;
 - welded seam, steel construction and powder coated;
 - dimensions to suit equipment;
 - rated at IP55 or better;
 - fitted with double door, lock and key;
 - fitted with a 20mm thick plywood mounting plate;
 - fitted with 50mm x 50mm open slot trunking to the internal perimeter;
 - fitted with a 6-way 13amp socket power supply.
- Where trunking and conduit systems are to be coupled to equipment enclosures to facilitate the passage of cables, proprietary joints shall be made using mechanical couplers and flange plates to the bottom entry position;
- Each enclosure shall be given a unique site reference number. The reference number shall be produced on a 'tuflex' name plate which shall be fixed to the front of the enclosure door by the use of 2 no. mechanical fasteners (adhesives shall not be used);
- An A4 size schematic diagram showing the general layout of equipment and the distribution of cables shall be fixed to the inside panel of the enclosure's door. The diagram shall be encapsulated in a 150 micron

laminating pouch which shall be fixed with 4 mechanical fasteners (adhesives shall not be used);

- All enclosures shall be fixed to solid walls using 4no. 5mm diameter resin anchors. The enclosure's lock shall be a standard cabinet cam lock with 90° movement and all locks shall be suited to the same key;

x. Active Switch Enclosures

- All active switch equipment shall be fitted within suitably sized metal enclosures which shall be;
 - welded seam, steel construction and powder coated;
 - dimensions to suite equipment;
 - rated at IP55 or better;
 - fitted with single door (with removable hinges), lock and key;
 - fitted with a 20mm thick plywood mounting plate;
 - fitted with 50mm x 50mm open slot trunking to the internal perimeter.
- All enclosures shall be fixed to solid walls using 4no. 5mm diameter resin anchors. The enclosure's lock shall be a standard cabinet cam lock with 90° movement and all locks shall be suited to the same key used for head-end enclosures;
- Where trunking and conduit systems are to be coupled to equipment enclosures to facilitate the passage of cables, proprietary joints shall be made using mechanical couplers and flange plates to the bottom entry position;
- Each enclosure shall be given a unique site reference number. The reference number shall be produced on a 'tuflex' name plate which shall be fixed to the front of the enclosure door by the use of 2 no. mechanical fasteners (adhesives shall not be used);
- An A4 size schematic diagram showing the general layout of equipment and the distribution of cables shall be fixed to the inside panel of the enclosure's door. The diagram shall be encapsulated in a 150 micron laminating pouch which shall be fixed with 4 mechanical fasteners (adhesives shall not be used).

xi. TV Socket Outlets

- The IRS system shall be connected to a TV socket outlet in each dwelling and other locations specified within the schedule of work. All TV socket outlets must be fully screened, flush mount type complete with surface mounting box. The socket shall have outlet ports for terrestrial and satellite television (2) including Sky Plus and Audio FM and DAB frequencies;

- The location of the socket outlet shall be immediately adjacent to or over the location of the existing television socket outlet. All new socket outlet provision should be fitted 500mm above finished floor level;
- Where the new socket and surface box assembly do not cover the existing socket outlet, a white blank plate fixed with suitable machine screws shall be fitted.

xii. 230V AC Power Supplies

- The Contractor shall install a dedicated 230 volt, 16amp power supply to each head-end enclosure. The power supply shall be connected to a suitable 'Landlord's' supply position wired using 4mm², 3-core PVC/SWA/PVC cable. The Contractor shall allow for the necessary connection arrangements, i.e. cable connections and protection device. The power supply shall be terminated within the head-end enclosure at a metal clad 20amp double pole isolator with pilot light. The third core of the supply cable shall be connected in parallel with the cable armour as a supplementary bonding conductor between the landlord's supply and the power supply isolator. A system 'earth terminal' shall be created adjacent to the isolator;
- Within the base of the head-end enclosure, a 13amp socket outlet arrangement fitted with 'surge' protection capable of supplying power to all the necessary equipment must be installed. The socket outlet arrangement shall be securely fixed to the enclosure's baseboard. All 230volt equipment installed within the head-end enclosure shall be fitted with 13amp plug tops (suitably fused) and connected to the 13amp socket outlet arrangement;
- All work associated with the installation of the power supply shall be undertaken, tested and commissioned by a qualified 'N.I.C.E.I.C. or E.C.A Approved Electrical Contractor'. A test and completion certificate for each power supply must be forwarded to Camden Council. The certificate shall be N.I.C.E.I.C. or E.C.A. issue.

xiii. Safety / Earth Bonding

- The total system must be installed to comply with the requirements of all relevant Health and Safety legislation and the safety statement as issued by the CAI;
- All relevant equipment must be Safety Earth Bonded in compliance with the relevant British Standard. All co-axial outer connections must be permanently bonded to the building's PME. It is the responsibility of the Contractor, and in particular the installing or servicing engineer, to ensure the system complies with all safety matters;

- Practical Safety Earth Bonding should follow the procedure set out below, however the requirements of the CAI statement, noted above give the technical requirements;
- Incoming cables from antennas should be bonded across the outer sheath of all relevant co-axial cables prior to the input of the IF/RF amplifiers. Drop Cables from multi switches to outlet plates should be bonded across the outer sheath of all drop cables;
- All electrical and electronic devices should be bonded to each other by means of an earth tag. Incoming and outgoing earth cables should be fixed in such a manner that should the device be disconnected from the system then the integrity of the earth is maintained. In general terms this would mean the earth cables being crimped together. Individual earth cables must not be wrapped around earth posts;
- The system must be earthed, via a minimum 4mm earth cable, taking into account the CAI statement on Earth Bonding and the requirement to maintain no more than a 5 ohm loop resistance, to the Buildings PME. Where individual buildings share an installation the earth must be connected to the relevant Building PME;
- The external Aerial Mount should also be connected to the installations earth if no lightning protection system is installed;
- If a Lightning Protection System is installed on the given building then the aerial mount should be connected to the protective strip by use of proper LPS equipment.

xiv. Network Commissioning Stage

- At each site, the installation and commissioning of the aerial assembly, the head-end equipment and the distribution network must be complete prior to the final connection of any property on that site. Fitting 'end of line resistors' must be allowed to all outlet ports to enable a satisfactory completion of the distribution network;
- Test results shall be submitted to the Contract Administrator for approval prior to final connection.

xv. Final Connection Stage

- Upon completion of the pre-commissioning stage and receipt of the approval of Camden Council, the Contractor shall commence final connection of each outlet. The final connection, including all cabling, mini-trunking testing and commissioning shall be completed during a single visit to each dwelling / outlet.
- The Contractor shall ensure that the:
 - 'fly-lead(s) is connected;
 - All television broadcast channels are available at the TV outlet;
 - CCTV channel is available at the TV outlet;

- Tenant's television is tuned to all available broadcast channels and CCTV;
 - Tenant receives a demonstration of the operation of the system upon the tenant's own television by the commissioning engineer;
 - Tenant completes and hands to the engineer the customer satisfaction questionnaire.
- Where a tenant has lost or fails to answer a questionnaire, the Contractor shall submit a questionnaire showing the reason for doing so;
 - The submission to Camden Council of the questionnaire for each dwelling or outlet shall be an indication of the completion of works at that dwelling or outlet for the purpose of payment.

xvi. Decommissioning

- Upon completion of the IRS installation the redundant television network shall be decommissioned and removed;
- The completion of the IRS installation will be determined on final connection to a minimum of 90% of dwellings/outlets associated with the system (or by agreement with Camden Council). Formal evidence of access attempts etc. must be agreed in advance with Camden Council and provided when requested to the local authority;
- Upon decommissioning, all wiring and equipment associated with the redundant television network must be removed from site.

xvii. Late Connections

- The Contractor shall allow for returns visits to each site for the purpose of connecting dwellings to the IRS installation following decommissioning. The Contractor shall allow for and maintain the provision of this service up to the end of the defects liability period.

xviii. Testing

- Prior to the hand-over of each system, all tests and a full inspection of the completed installation shall be carried out to ensure compliance with the specification. Any departures from the specification shall be rectified immediately. A system checklist shall be completed for each site and handed to Camden Council;
- The Contractor shall provide, for each site, a printed record of all measurements, together with a final commissioning certificate, indicating signals at the inputs and output of the main equipment and levels received at the outlets;
- The Contractor shall demonstrate to Camden Council that the picture quality on all the analogue television channels is to that stated on the Consultative Committee International Radio (C.C.I.R.) impairment scale; grade 4 and on the Digital television channels; error free;

- Test equipment shall carry a recent calibration date (within 6 months) and shall have a stated accuracy to within +/- 1.5 dB and be suitable for all the services indicated. The minimum requirement is a Spectrum Analyser, a simple signal strength indicator shall not be allowed.

8.5.10 Resident/Customer Choice

- i. The Contractor shall liaise with Camden Council and arrange, co-ordinate, attend and chair consultation meetings for tenants prior to the installation of the new systems in each relevant block/property;
- ii. The Contractor shall be responsible for all works associated with the composition, printing and delivering of letters informing the tenants of the details and the need to carry out the works.
- iii. Camden Council should be provided with a detailed log of the works on completion;
- iv. Residents should be provided with user-friendly guides on the operation of the system. The content of the guide should be approved by Camden Council in advance.
- v. The location of the socket should be agreed with the resident. Where this is not in the same position as the previous socket any decoration implications will be the responsibility of the tenant.
- vi. On completion of the installation residents will be required to remove their satellite dishes;
- vii. Cable runs should be carefully considered prior to the start of the installation and generally kept to the minimum.