



June 2018

Report

Design Standards Guide

**Capital Works Projects – For a Typical
Whole-time Fire Stations
Nottinghamshire Fire & Rescue Service**

making the difference

WORKING DRAFT



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engineering change

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NOTTINGHAMSHIRE
Fire & Rescue Service
Creating Safer Communities

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Version 1 dated 01 June 2018

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1 Introduction and Foreword

It should be noted that this document is not intended for the production of a 'model' fire station to be reproduced across the fire sector, but is the starting point for the introduction of a common set of 'design standards' that could be incorporated into fire station designs. This would of course, if deemed appropriate by those individual fire service. This should therefore be seen as a guide.

The origins and primary purpose for the development of this document lay in the need by Nottinghamshire Fire & Rescue Service to have a consistent approach and design philosophy across its property portfolio for their fire station replacement programme; primarily for its Whole-time stations.

The document is intended to be a living document, to be updated as lessons are learnt and when the introduction of design innovations are identified and introduced through the lifetime of the document.

The secondary purpose of this document is intended to provide a starting point to engage with the fire service community and for the cross fertilisation of ideas in the design and the development of fire station buildings across the sector.

It is acknowledged that each fire service will have differing needs for a fire station, this, amongst others, will be based on their individual crewing requirements, the operational delivery models, local factors such as location, planning restrictions, ground conditions et-al.

Having said this, there are elements within fire station construction that may have similarities across the sector as a whole or in part; where these similarities occur then standardisation can be achieved. Hence the this being a set of design standards rather than a standard design.

The main advantages of introducing design standardisation across the fire service, to a greater or lesser degree, is to promote the construction sector in alignment of their delivery and supply chains to an agreed specification. This doesn't mean all buying the same product or sourcing from a single supplier. This is more about having a performance specification allowing multiple suppliers to understand the needs of the fire service and aligning their delivery model to meet the requirements. This will help to ensure competition is maintained within the market and is aimed at providing the fire sector better value.

It's important that anyone using this document as a guide, that it is understood that the information, specifications, drawings and designs contained within the document are not warranted by those consultancies who were part of its development. This rider is not an uncommon prerequisite within the construction industry and is something the consultants have made clear from the start of the process.

2 Design Guide Use

This document has been produced on behalf of Nottinghamshire Fire & Rescue Service (NFRS) to provide a consistent approach to new whole-time Fire Station developments based on the provision of a 'typical' 3 bay fire station. The document details the basis for the design specification standards for future projects and for the use by all project team members (users, specifiers, designers etc) to provide a baseline for each new project. The general layouts and specifications contained within the Standard Design Guide (SDG) are based on the process of evolution, consultation and operational feedback through the programme of fire station development since 2010.

Should any change to the specification or intent detailed within this report, a business case is to be submitted through Nottinghamshire Fire & Rescue Service governance process. Any proposed changes will be determined on their merit and assessed on a case-by-case basis.

3 Project Requirements

3.1 Sustainability

The overall ethos behind achieving each of the performance specifications enclosed within this guide follows a 'fabric first' approach to design. This means ensuring the building's key elements are optimised from a performance perspective as far as economically viable, prior to secondary renewable energy opportunities being considered.

It is a requirement of all Nottinghamshire Fire & Rescue Service new build capital works projects that the design should aim to achieve a 20% improvement of the minimum standards identified within Building Regulations Part L (or any subsequent superseding document) as noted above through a fabric first approach.

This requirement has been developed with NFRS's consultants for the following reasons:

- To include passive measure relating to Part L of the Building Regulations at the design stage where installation costs are at their most advantageous.
- That this increase to the part L standard is physically and practically achievable.
- That these measures are cost effective and provide value for money.

3.2 Time Lapse Camera

All projects are required to include the provision of a time lapse camera to document and record the works progression on site.

The time lapse camera is to achieve the following;

- Images and playback should be accessible to the full project team at all times during the construction works to allow observation of project progress.
- Access to the images and playback is to be provided for all NFRS through a secure portal or similar.
- Images are to be taken at 10 minute intervals as a minimum.
- Images are to be stored securely during the project timeline.
- The full recording of time lapse images are to be handed over at completed within digital O&M Manuals.
- Time lapse recording should start at the first activity on site to the point of practical completion and should record all images between these two points.

3.3 E-Tendering

All projects shall be procured using an e-Tendering portal approved by Nottinghamshire Fire & Rescue Service procurement team. All tender communications shall be via this online portal.

3.4 Social Value Benefit

Where possible, the project should encourage the use of an 'Employer Hub' (or similar) to encourage local employment within the area of the fire station development.

3.5 Server Room Access

NFRS ICT staff require early access to the Server and Communications Rooms at least 4 weeks prior to Practical Completion (PC) for up to 5 working days. The Server and Communications Rooms requiring access should be effectively complete and should not require a return visit from the main contractor before practical completion. Nottinghamshire Fire & Rescue Service staff or its directly employed sub-contractors may require access to other areas of the site for cable pulling and the like; this is to be facilitated as part of the works and included with the contractor's programme.

3.6 Building Maintenance Service Level Agreement

Nottinghamshire Fire & Rescue Service operate a Building Maintenance Service Level Agreement. This document is to be included within the tender and contract documentation for capital works projects to make the contractor aware of their responsibilities during the defects liability period.

This agreement is enclosed within the appendices.

In addition to this service, during the main building contract's rectification period the main contractor shall;

- Provide a comprehensive maintenance service for all installed plant and equipment in accordance with the manufacturer requirements and will provide a maintenance schedule that requires action within the defects liability period for all items of plant and equipment
- Include all planned and preventive maintenance within the defects liability period including a maintenance requirements and replacement of all consumable items.

3.7 Warranties

Nottinghamshire Fire & Rescue Service required full supply and installation warranties from all sub-contractors providing primary building components. This should include but not limited to;

- Substructure (e.g. Piling, ground floor slab)
- External Facade (e.g. curtain walling, cladding, masonry)
- Roof including coverings
- Electrical and mechanical services plant and equipment
- Lifts, hoists any other plant or equipment coming under LOLER
- Fire Bay Doors
- Fuel Tank
- Underground tanks
- Electrical generators
- Sliding / powered Gates

Sub-consultant collateral warranties will also be required for all specialisms.

Exact wording of the collateral warranties required shall be defined within the tender documentation.

3.8 Product Specifications

Please note, wherever a product name is referenced within this design guide, these are named on an 'or similar and approved' basis. Other products may be submitted for approval of an

equal or better standard, however; for the avoidance of doubt, NFRS do not warrant that any product offered as an alternative will be accepted.

3.9 **Component specifications**

Nottinghamshire Fire & Rescue Service have a number of specific requirements for standard components that are a requirement of all fire stations. They include;

- Merridale Fuel Tank
- Arkinstall Kit Racks
- PEKO Dryers
- Miele Washing Machine
- Garran Boot Lockers

Data sheets for each of these components are enclosed within the Appendices.

3.10 **Training requirements**

New build fire stations should be developed in line with Nottinghamshire Fire & Rescue Service's policies for training facility provision where applicable.

3.11 **Landscaping**

Nottinghamshire Fire & Rescue Service are committed to sustainable development. As part of this, any trees that are removed as part of capital works must be replaced three trees of UK indigenous species; these are to be located on the NFRS site being developed or in the immediate local area.

3.12 **New build / refurbishment**

At project inception, an options appraisal is to be carried out in order to ascertain the most appropriate development option. This should consider the practicalities of each potential development option with recommendations. These options are to be presented to the Finance and Resources Committee of Nottinghamshire Fire & Rescue Service.

3.13 **Hoardings**

All sites should, where possible, have solid hoarding installed to its perimeter. The site hoarding should be branded with Nottinghamshire Fire & Rescue Service signage. Designs will be developed for each scheme individually by NFRS to suitably publicise the development of a new fire station.

3.14 **Media and Branding**

All media releases, reports and the like are to be coordinated through Nottinghamshire Fire & Rescue Service's media team. No project stakeholders are permitted to release project details to the media without prior permission from NFRS.

Any signage or publicly released documentation shall be in accordance with Nottinghamshire Fire & Rescue Service's branding policy enclosed within the Appendices.

3.15 **Building Information Modelling (BIM)**

All new fire station projects shall be developed adopting a BIM Level 2 methodology. The project teams shall develop and follow a project-specific BIM Execution Plan detailing the uses

for BIM on the project and confirm process for executing BIM throughout the project lifecycle. As a minimum, the BIM methodology should include the following;

- Adoption of a Common Data Environment for the sharing and coordination of project data by the Information Manager.
- Information to be shared in agreed, common file formats (e.g. IFC) to facilitate the compilation of a federated BIM model.
- Handover of an active, fully populated BIM Level 2 model, compliant with the requirements of the Fire Service.

Generally, the projects shall comply with the requirements of PAS 1192:2:2013 where the requirements for achieving building information modelling (BIM) Level 2 during the capital / delivery phase of projects are specified.

Further details of the output requirements of the BIM Level 2 model to be established on a project-by-project basis.

An example of the BIM execution plan to be developed for each project is included within the appendices.

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4 Architectural Requirements

4.1 General Notes

- Each typical room within a new station will have a Typical Room Data Sheet, as in Section 6.
- Engine bays are low-heated spaces (frost protection heated only up to 10deg C) so should be treated as a separate entity to the main building.
- Sourcing materials – consider locally sourced materials where financially viable.
- Pigeon deterrents are to be fitted wherever nesting and roosting could cause a problem (eg no open structure to canopy at rear etc.).
- Where possible, occupied rooms should not be landlocked (without windows).
- All manufactures named are preferred and are subject to 'or equal approved' status.
- All designs are subject to signoff from an Access Consultant to ensure the Equalities Act is addressed.
- Air tightness design criteria 5m³/m².hr or less 50Pa pressure differential.
- U-Values are to be 20% better than current Building Regulations.

4.2 Roof

Pitched roofs are preferred where possible. Access and maintenance to be kept to a minimum. All external materials to be appropriate to their surroundings, to be agreed to by the local Planning Authority, U-Values to be 20% better than current Building Regulations standards. All materials to be robust and require little maintenance.

- 4.2.1 Monopitch Metal Standing seam Roof:** 10deg. pitch. Comprising of insulated panels with a low traditional seam Euroclad Vieo or equal approved.
- 4.2.2 Flat roof / Canopy to rear:** PVC-P single ply membrane laid to minimum fall. Sika Sarnafil adhered roofing system, or equal approved. For maintenance access only. Canopy to be large enough to fit 2No fire appliance engines under.
- 4.2.3 Edge protection: Fall arrest systems are not acceptable.** Flat roof to have parapets where appropriate. Access to be confirmed on project basis.
- 4.2.4 Photo Voltaic Generation:** Required on the main roof where practical; see M&E details.

4.3 External Walls

- 3.3.1 Cavity masonry wall construction:** Where applicable, 103mm clay facing brick (to be sensitive to its surroundings) mortar joint colour to fit in with brick colour (to be approved) with bucket handle joints, 130mm cavity with full fill rigid insulation (or similar and approved).
- 3.3.2 Rendered masonry wall construction:** Insulated smooth render finish, 7N/mm² medium density concrete block to BS EN 771-3 outer leaf (to Structural Engineers specification), 130mm cavity with full fill Rockwool 'Cavity' semi rigid insulation (or similar and approved).
- 3.3.3 Entrance Canopy:** Rain screen system to be horizontally laid in panels to match curtain walling size where applicable. To be detailed around fascia and also soffit. Internal gutter and rainwater pipes. Euroclad Alucobond PPC (colour to be determined) or equal approved.
- 3.3.4 Signage:** Fire station name, crest and logo to be as per attached design.

- 3.3.5 Training tower:** Engineer strength brick to withstand powerful spot water pressure. Mortar to have a weathered joint to reduce likelihood of water damage.
- 3.3.6 Above ground drainage:** Soil and vent pipes to terminate at eaves level with bird proof cage and lead flashing.
- 3.3.7 Surface water roof drainage:** Where hidden gutter system are used then these are to be powder coated aluminium rainwater systems, colour to be confirmed.
- 3.3.8 Letter Box:** Main entrance to have a letter box through external wall.
- 3.3.9 Access:** Access control required to main entrance, internal main circulation door, kit room, stores and rooms directly off appliance bays.

4.4 Windows and External Doors

All buildings to be naturally vented where possible. Opening lights to all glazing areas. High level opening lights to have manual Teleflex.

- 3.4.1 Glazing:** To be double glazed argon filled units with solar control glass LT = 0.67 Min / G = 0.37 Max to be used on South, North and East elevations Inner pane: low emissivity glass, glazing at ground floor level - laminated safety glass. Glazing at other floor levels where glass is below 800mm affl to be laminated safety glass. Glazing at other floor levels above 800mm affl to be safety glass if required to meet all requirements of BS / Building Regulations. Outer pane: high performance solar control. Pilkington Suncool or equal approved.
- 3.4.2 Curtain Walling:** Where forming the design, specialist designed and installed thermally broken, powder coated aluminium curtain walling system complete with all hinges, handles, restrictors, concealed anti-slam devices, 15mm deep caps to mullions and transoms, colour matched insulated aluminium spandrel panels. System to include opening vents to suit ventilation strategy. All connections to structure to be concealed or where visible, to have bespoke well designed special shaped plate connections to CA approval. Weather tightness to comply with BS 6375 to suit location and exposure of building. Security to PAS 23 & 24 certification and "secured by design" standards. Supporting structure to be primary structural frame, allow for secondary supports as specified by Structural Engineer. All curtain walling at ground floor level (for safety and security) and any other location required for safety is to have toughened safety glass to meet requirements of BS /Building Regulations. Schuco or equal approved.
- 3.4.3 Sun Tubes:** Sun pipes in fire bays to be above each fire appliance where practicable to provide the maximum amount of natural light and to provide natural light in landlocked rooms/ circulation within the main building. SolaTube 330mm DS-C. 530mm dia for 600mm sq. Suspended Ceiling Tile Sky Vault Series. 740mm sq for appliance bays.
- 3.4.4 Internal Blinds:** Black out blinds to all computer rooms and quiet room. Vertical glare control blinds on all offices, training rooms, gym and canteen.
- 3.4.5 Fly Screens:** To all openable windows in occupied rooms.
- 3.4.6 Glazed doors:** Powder coated aluminium double-glazed door (glass specification to match curtain walling) complete with integral frame, Equality Act compliant threshold, solid stainless steel ironmongery to CA approval, lock and weather seals. Doors are to be integrated into the surrounding external wall system. Principal access doors to be automated. Schuco or equal approved.

3.4.7 Louvered Steel / Aluminium Plant doors: Powder coated steel / aluminium insulated louvered door sets with internal stiffeners and reinforcement as necessary, integral frame, lock and weather seals.

3.4.8 Fire Appliance Bay Sectional Overhead Doors: Powder coated aluminium (reinforced as appropriate) insulated plastic/insulated panel sections as indicated on the elevations. Fully automated electrical operated with safety bottom safety edge and photo beam. Units to be installed to manufacturers recommendations. Clear height of 4.7m. Assa Abloy Crawfords OH1042F Full vision sectional doors, or equal approved.

All doors and gates to be developed in accordance with the Code of Practice for Automatic Doors and Gates and Code of Practice for Industrial Doors and Domestic Garage Doors, as enclosed within Appendix I.

Aluminium frame with double glazed acrylic infill and solid bottom panel, with standard lift tracks, electric operation via a 3 phase 415-volt motor c/w emergency manual chain override, with safety bottom edge and 2 No photocells (1 No at the top and 1 No at the bottom), with anti-lift device, safety cable break and spring break devices included, wire and commission from your powered isolator which should be available at the time of installation and include a neutral and a 5 pin "Euro" socket.

Colour – Bottom panel only to be Red RAL 3002 both sides. All other panels which are fully glazed to have glazing bars and frames Red RAL 3002 outside and Bone White RAL 9010 inside.

Automatic opening Doors–

- All doors to be spring balanced.
- Front Bay doors to have declutch opening on motor failure ensuring lifting handles inset into the bottom panels on the inside only.
- Rear bay doors to be chain operated on motor failure.
- Front bay doors to open via an interface box on a signal from the Systel mobilising turnout system. Close on timer with audible and flashing light warning when the high-level safety beam has been broken (by Fire Appliance) and reconnected (Fire Appliance clearing the beam).
- Front bay doors to have low level safety beams.
- Rear door's control to be set to one press open and 'dead man' closing.
- Bottom Safety edge to all doors.

4.5 Stairs

3.5.1 Entrance/principal staircase: Bespoke high quality folded plate fully welded steel trays, concrete filled treads with carpet finish as per adjacent floor finish, closed risers, 55mm proprietary aluminium contrasting nosing/inserts, required to both tread and riser. 45mm diameter handrail, balusters all stainless steel brushed finish with toughened glazed infill panels. Stairs and balustrades to specialist Sub-contractors design and to be fully compliant with AD Parts M & K.

3.5.2 Rear staircase: Pre-cast concrete staircase, floor finish as per adjacent floor finish, closed risers, 55mm proprietary aluminium contrasting nosing/inserts, required to both tread and riser. 45mm diameter handrail, balusters all stainless steel brushed finish painted mild steel balustrading with mild steel bars and infill panels. Stairs and balustrades to specialist Sub-contractors design and to be fully compliant with AD Parts M & K.

4.6 Internal Walls

- 3.6.1 Internal Blockwork walls:** 100mm fair-faced or common to suit finishes and design. 7N/mm² dense concrete blocks to BS. Blockwork design as required by structural engineer finished with mist and two full coats diamond matt, colour tbc.
- 3.6.2 Internal Metal stud partitions:** Single/ Double boarded severe duty rated to BS5234 metal stud proprietary partition system. Minimum acoustic performance Rw 50 dB generally and Rw 58 dB to enclosing partitions to Offices, Private Study Room, Meeting Rooms, Training Rooms and Quiet Room. Fire rating as per fire strategy design drawings. Finish skim coat plaster. British Gypsum or equal approved.
- 3.6.3 Hygienic wall covering:** 2.5mm extruded PVC sheet to: Main Kitchen, Appliance Bay Walls, Laundry Room, and BA room, Appliance cleaning room, locker rooms, Toilets, splash backs & shower areas. Altro Whiterock or equal approved (colours to be agreed) Extruded PVC sheet should have a satin finish rather than gloss to avoid glare from light reflection and to provide visual contrast with sanitary fittings.
- 3.6.4 Column encasements:** No exposed steelwork columns within rooms. British Gypsum Gypliner encase or similar approved.
- 3.6.5 Pattressing:** As required by FF&E within room data sheets - 13mm plywood / OSB continuous pattress layer to locker areas, Fire Kit Room, Showers, Toilets, Gymnasium, Kitchen, Communications Room, and Stores.
- 3.6.6 Corner Protection:** To all external corners in circulation areas. One-piece surface mounted corner guard, Gradus 185 or equal approved.

4.7 Internal Doors incl Ironmongery

- 3.7.1 Internal Doors:** Solid core door veneer faced sets with 'Barum' type European hard wood frame and architraves, fire resistant; non-fire resistant and acoustic rated to suit particular location/function. Clear glass vision panels of appropriate specification compliant with fire rating and EA requirements. Heavy service areas to have laminate faced and roll edged doors and hardwood veneered doors elsewhere. Leaderflush Shapeland Designer Solidcor and extended performance doors or equal approved. Veneer to be Oak Crown cut.
- 3.7.2 Architraves & Skirting's, Isolated Trims:** European hard wood and painted soft wood to ancillary areas. Minimum profile sizes 16 x 90mm skirting's, 16 x 45mm architraves all machined profiled. UPVC bull-nosed window boards to be used throughout.
- 3.7.3 Ironmongery:** All internal and external doors: Grade 316 16mm diameter solid stainless steel ironmongery to approval. All internal doors to have push plates and pull handles unless otherwise specified. Closers to all doors off circulation spaces including store cupboards etc. Elementer D line or similar approved.
- 3.7.4 Signage:** The signs for all sanitary accommodation should include an embossed pictogram with 100mm high symbol. All signage to meet Equality Act requirements.

4.8 Ceilings

- 3.8.1 Board type ceilings and bulkheads:** Staircase bulkheads, principal room perimeters to allow full suspended ceiling tile layouts Construction: seamless plaster board and skim to proprietary metal suspension system. British Gypsum Casoline MF or equal approved.

3.8.2 Suspended Moisture Ceilings: Toilets, shower areas, locker rooms, kitchens and gymnasium. Lay in grid accessible high humidity resistant mineral tile ceilings. SAS International Cermaguard or equal approved.

3.8.3 Suspended Ceilings: Generally, Lay in grid accessible regular edged mineral tile ceilings, SAS International Optima or equal approved.

4.9 Flooring

4.9.1 Barrier Matting: To entrance area including all circulation and stair areas. Forbo Noway Tuftuguard classic or equal approved. Colour to be agreed.

3.9.2 Non-Slip Vinyl: To Gymnasium including 2.5mm safety sheet vinyl with fully welded seams and coved skirting with capping trim to suit wall finish. Altro Reliance, Altro Aquarius in Shower areas, Altro Stonghold 30 in Kitchen or equal approved. Colour to be agreed.

3.9.3 Sheet vinyl: 2mm sheet vinyl with fully welded seams and coved skirting with capping trim to suit wall finish. Altro Zodiac smooth or equal approved. Colour to be agreed.

3.9.4 Carpet Tiles: 500 x 500mm loop pile heavy contract anti-static conductive (Office/ Training/ Quiet rooms) Deso Verso or equal approved. Colour to be agreed.

3.9.5 Resin Floor (Appliance Bay): Heavy duty non-slip epoxy floor finish. Product to be Altrocrete 6mm or equal

3.9.6 Circulation Carpet tiles: 500 x 500mm entrance matting carpet. Forbo Coral or equal approved. Colour to be agreed.

4.10 Sanitary ware

3.10.1 Integrated plumbing system (IPS): (To conceal cisterns, soil/waste and supply pipework) Board/panel type 13mm solid Grade laminate decorative face each side and radius and polished edge treatment. Stainless steel fittings. Vanesta Washroom Systems V-Epps or equal approved colour to be agreed.

3.10.2 Toilet pans and Cistern: Armitage shanks Contour 21 with concealed cistern or equal approved.

3.10.3 Wash hand basins: All sinks to be countertop units with cupboards below, Armitage shanks contour 21 counter. Venesta Profile K4 vanity unit or similar approved. Colour to be agreed.

3.10.4 Cleaners Sink: Armitage shanks Alder Heavy duty cleaners sink. Or equal approved.

3.10.5 Accessible Doc M: Disabled WC handrails and fittings to be provided in grey plastic coated steel. Armitage Shanks Doc M Contour 21 Back to wall pack wc suite with concealed cistern, Grey (LG) seat, grey grab rails to meet current standards or similar approved. Grab rails and toilet seat to be visually contrasting with wall colour.

3.10.6 Shower cubicles: Armitage shanks Synergy Pivot 1200 c Corner Door with Idealite Low Profile Rectangular Upstaged Shower tray or equal approved.

3.10.7 Accessible shower room: Armitage Shanks or equal approved System: Doc M Contour 21 Shower room pack, Grey (LG) seat, grey grab rails to meet current standards (grab rails to be visibly contrasting to wall) Fitting to include toilet roll holders, soap dispensers, hand dryers, paper towel dispensers and soap holders to showers - Allow for safety glass mirrors to all sanitary areas. Grab rails and emergency alarms in the accessible areas. All accessible toilet fixtures to meet current standards.

3.10.8 Taps: To be mono mixer taps.

3.10.9 Hand dryers: To be manually operated (not automatic) Warner Howard or similar approved. Paper towel dispensers to be provided by client and fitted by main contractor.

4.11 FF&E incl Lifts

3.11.1 Lift: Lift specification by M&E Consultant. Doors to be Stainless Steel, internal finishes to be agreed by the Access Consultant.

3.11.2 Tea Station: Ground floor training room: Kitchen base units and wall units as shown on the ground and first floor plans including work top. Howdens Greenwich or similar approved. To be Equality Act compliant.

3.11.3 Ground Floor BA Room: Stainless steel heavy duty and impact resistant worktop and carcass with inset stainless-steel double sink and double draining board. Allow for space for horizontal storing of breathing apparatus cylinders. Steel Plan or equal approved, subject to client approval. See appendix for typical layout and details.

3.11.4 Ground floor Kit room: Heavy duty mesh PPE kit hanging storage system, kit racks with 2 pegs per person; Arkinstall or similar approved. Rack numbers subject to whole-time and retained staff establishment. Subject to client approval. See appendix for typical layout and details.

3.11.5 Kitchen: Kitchen to be provided with base and wall units and stainless-steel worktops with inset stainless-steel sink and separate stainless steel inset wash hand basin. Allow for space for refrigerators and other appliances. (One number oven to be Equality Act compliant) Steel plan or equal approved, subject to client approval. See appendix for typical layout and details.

3.11.6 Changing Lockers: Boot Seat Locker Size: 1800mm high x 450mm wide x 450mm deep. Boot seat: 280mm, Top Box Locker Size: 600mm High x 450mm wide x 450mm deep. Locking: Cam lock with two keys and all locks have different keys and are to a mastered series

3.11.7 Changing rooms/ showers: Contractor to allow for the design and installation of benching, subject to client approval.

3.11.8 Laundry: To have 2No. full size PEKO drying units or similar approved, 2No. Miele Washing units or similar approved, Floor drain, stainless steel short bath with Domestic shower and drying rail above, specialist PPE kit store and drying unit. Subject to client approval. See appendix for typical layout and details.

4.12 Fire Protection

Provide fire collars top all pipe penetrations through party walls/ floors.

Provide fire alarm, emergency lighting, heat and smoke detectors to comply with building regulations.

Visual beacons to fire alarms need to be installed in sanitary accommodation on both floors to meet current regulations including for the visually impaired.

Form fire barriers/ separating walls in roof voids to ensure compartmentation where required.

4.13 External Works

- 3.13.1 Boundary treatments:** All boundaries to be secure with a minimum height of 1800mm anti-climb fencing, brickwork walls to match existing or acoustic fencing as required. All boundary treatments are to be site specific and subject to client approval.
- 3.13.2 RTC:** (Road traffic compound) As indicated on the proposed site plan and external boundary wall drawing Bekasure posts manufactured specifically for use with Securifor 358 fencing panel system from high grade steel or similar approved. Posts to be polyester powder coated. Colour TBC Securifor 358 weldmesh panels 76.2mm x 12.7mm welded mesh intersection. Horizontal wires at 12.7mm centres, vertical wires at 76.2mm centres. All wires 4mm diameter. Panels manufactured from pre-galvanized wires and polyester powder coated. Securifor or equal approved, colour TBC, subject to client approval. See appendix for typical layout and details.
- 3.13.3 Automated Vehicular Gates:** Polyester powder coated stainless steel. Colour: 9005, black. Newgate Automated sliding security gate or similar approved, subject to client approval.
- 3.13.4 Training Tower:** Engineering grade brick three storey tower. Second and third floors of the tower to have galvanized hot-dip access walkway to each floor and ladder access with 1100mm high balustrading around. Ground floor to house a drying room or plant room with floor drain. Rain water pipes to be boxed and protected internally. 1No. window opening per floor to include a bird deterrent shutter. Subject to client approval. See appendix for typical layout and details.
- 3.13.5 Fuel Store:** 10,000lt self-bunded fuel store with a 10m fuel delivery hose. To be located on a concrete hardstanding with ACO drains to capture any spill. Merridale or similar approved.
- 3.13.6 Water tank:** 2,000lt underground tank for open water training use. Access cover to be hinged and suitable for HGV traffic.
- 3.13.7 Sheet drying hoist:** To be located under the rear canopy or within the appliance bay.
- 3.13.8 Cycle store:** Cycle store or shelter to be included. Final number of storage numbers to be confirmed as site specific.
- 3.13.9 Vehicle wash area:** To be located under rear canopy, to be concrete laid to falls with ACO type drain surrounding area. Drainage from vehicle wash area to be discharged to foul drain due to foam training using same area. Jet wash to be provide by main contractor with all necessary electrical supply and cold-water supply. Jet wash to be heavy duty mobile unit make and model to be confirmed.
- 3.13.10 Refuse Area:** Provide area for industrial refuse bin to be accessible by refuse collection contractor.

- 3.13.11 Bollards:** Provide heavy duty bollards to protect against HGV vehicular impact to all external building columns, building corners, vehicle doors, fuel tanks, external plant and machinery etc.
- 3.13.12 Defibrillator:** Provide the necessary supports and electrical infrastructure to allow NRF's to install a defibrillator on the external wall near to the entrance of the building. Final location to CA approved.
- 3.13.13 Access:** Provide electronic keyless access to both sides of the fence / access gates for cyclists and vehicles, on driver's side for use with NFRS's electronic access control system.
- 3.13.14 Landscaping:** Separate specification site specific to be provided for landscaping.

WORKING DRAFT

5 Civil Requirements

5.1 Substructure, Frame

Structural design to be considered on an individual project-by-project basis.

5.2 Anchor Points

Training towers shall include Anchor Points in accordance with the specification enclosed with the appendices.

5.3 Civils

Each new fire station shall include 1 training hydrant located within the yard for training use to provide the minimum water flow rate and capacity for fire hydrants. The hydrant is to be supplied as an un-metered water supply directly from the water authority's mains supply. This water supply is to be separate from the domestic water supply to the station building.

A petrol interceptor shall be incorporated into the design in order to prevent petrol from discharging into the drainage system.

Fire appliance bay entrance doors shall include level access with a Aco linear drainage channel across each entrance and exit. Fire appliance bay floor to be laid to fall.

Level access is to be provided to and from the fire appliance bay for pedestrian access and egress to expressly avoid steps (up or down), trip hazards and the like.

6 Building Services Requirements

6.1 Enabling & Utility Infrastructure Works

Desktop studies are to be undertaken which shall include obtaining infrastructure services record drawings and advising the design team of the implications including costs of any existing services that may require diverting either as enabling works or as an element of the main construction works. Typically the following services should be investigated:

- Electrical Network and Site Supplies.
- Telecommunications - Openreach/BT Utility Services.
- Virgin Media.
- Other Fibre Networks.
- Gas Services.
- Mains Water Supply.
- Drainage.

Should the new fire station site be in a location where existing buildings are to be demolished, arrangements are to be made for the disconnections of the existing service connections for gas, electricity, water and telecommunication systems.

The appointed designers shall undertake a design load assessment for all the new building utilities and submit an application to the relevant provider. This application shall be undertaken at an appropriate time to determine if there are any local infrastructure upgrade requirements associated with the provision of the new supply and the associated costs.

6.1.1 New Gas Utility Services

A new gas supply shall be required with an external meter (pulsed) in a kiosk on the site boundary with underground pipework rising on the external wall to a ground floor plant room.

6.1.2 New Water Utility Services

A new mains water supply shall be required with an external meter (pulsed) on the site boundary with underground pipework rising in the ground floor plant room.

This supply shall provide all the mains domestic cold water requirements of the building.

The incoming supply will also cover the provision of 1 No training hydrant located within the yard for training use to provide the minimum water flow rate and capacity for fire hydrants. The hydrant is to be supplied as an un-metered water supply directly from the water authority's mains supply. This water supply is to be separate from the domestic water supply to the station building. It should be noted that under the Fire and Rescue Service Act, water supplied for the purpose of training to the Fire and Rescue Service is to be supplied free of charge by the statutory undertaker (the water authority).

6.1.3 New Electrical Supply

A new incoming electrical supply shall be provided at low voltage (LV) and shall terminate within a new LV switch panel located in the Ground Floor Plant Room.

6.1.4 Telecommunications Utility Services

The Fire Service shall order, instruct and pay for the supply and installation of any new incoming fibre/telecommunication services and not as part of the main building contract. However, the main contractor shall provide the associated attendances typically as noted below but not limited to:

- Suitable ducts, trenching, trunking and wire way routes from the boundary to the telecommunications incoming location.
- Containment to be provided throughout the new service route to the server room.
- Sealing of services entry's /exits both building and fire stopping where required.
- Telecommunication infrastructure within the fire station boundary including all access chambers, manholes, pulling pits and the like
- Any other attendances as identified the client's specialist not specifically mentioned within the design guide.

New ducts are to be installed for the use of the nominated telecommunications provider, separate ducts shall be provided for Virgin Media and BT Openreach to allow the Fire Service a choice of supplier for telephone/Fibre services.

6.2 Mechanical Design Criteria

5.2.1 Sustainability

The key driver for all new sites is to reduce the CO₂ emissions to achieve a minimum 20% betterment of the target emission rate (TER) as outlined in the Building Regulations Part L BRUKL report.

To ensure that best value is provided from the design measures proposed, the energy strategy must be carefully considered across the three hierarchical and sequential stages: -

I - Be Lean: Good practice approach to energy demand reduction through careful application of passive design techniques in the first instance. A high performance thermal envelope is proposed with high levels of thermal insulation and air tightness as set out further below.

II - Be Clean: Promotion of energy efficiency through specification of engineering services and consideration of heat recovery etc. All mechanical supply air ventilation systems shall incorporate heat recovery.

III - Be Green: Inclusion of on-site renewable energy generation to further de-carbonise the development and minimize reliance on fossil fuel consumption once strategies I and II above have been assessed and maximized within the context of the scheme. Integration of a roof mounted Solar Photovoltaic array is proposed on all new development to maximise all available/suitable roof space.

Adopting a 'fabric first' approach is the preferred method to achieve most of the emission reductions required.

5.2.2 Passive Solar Control

Fenestration facing East through to west should be designed to limit summer solar gain to the building to assist in preventing summertime overheating.

It is recommended that glazed elements comprise the following performance criterion, which is proposed with balanced consideration of limiting solar gain whilst not detrimentally trading-off loss of day light: -

- Glazing G Value = 0.37 (max)
- Glazing Lt Value = 0.67 (min)

The inclusion of blinds is also recommended to all habitable / working areas.

5.2.3 Building Envelope

To ensure the 'fabric first' policy is the main driver the building envelope will need to improve on minimum 'U' value levels set out by Building Regulations Approved Document L2A (2013): Conservation of fuel & power in new buildings other than dwellings (ADL2A).

To deliver the required CO2 savings for any new development the primary focus should be on ensuring that the building fabric is sufficiently air-tight and intrinsically thermally efficient before other energy reduction / generation measures are considered.

Below is a table outlining the proposed minimum improvement for any new structure not heavily reliant on cooling. These 'u' values represent the best starting point for the design.

	Current Minimum U-Value	Proposed Initial Design U-Value
External Walls	0.35 W/m ² K	0.22 W/m ² K
Exposed Roofs	0.25 W/m ² K	0.14 W/m ² K
Glazing	2.2 W/m ² K	1.90 W/m ² K
Ground Floor	0.25 W/m ² K	0.18 W/m ² K
Vehicular Access Doors	1.50 W/m ² K	1.50 W/m ² K

U-values must be calculated using the methods detailed in: -

BS EN ISO 6946: 2007 (Building components and building elements. Thermal resistance & thermal transmittance. Calculation method)

BS EN ISO 13370: 2007 (Thermal performance of buildings. Heat transfer via the ground. Calculation methods) and using the conventions set out in BR 443 (Conventions for U-value calculations).

5.3.4 Air Tightness

The air tightness of a building affects its energy consumption and hence CO₂ emissions.

Considering the low energy aspirations of any new build station, it is recommended a value of 5m³/h/m² at 50Pa is adopted from the outset of the project. (ADL2A of the Building Regulations states that the maximum air permeability must be less than 10m³/h/m² at 50Pa).

To achieve this lower figure, the design team will need to have a robust strategy in terms of air tightness from the outset.

6.3 Daylighting

The provision of good day lighting is essential in a low energy building. The CO₂ emissions associated with artificial lighting installations in many buildings can often represent a significant percentage of the total CO₂ emissions. Providing good day lighting penetration into the core of the building will significantly reduce the CO₂ emissions for the scheme and will greatly enhance the quality of the environment in the areas served.

Glazing heights should be maximized and where possible provision should be provided for deep plan daylighting. Internal finishes must maximize room reflectance levels.

Sun pipes / tubes should be used to provide natural daylight where practicable throughout the building.

6.4 On-site Renewable Energy Generation

Low and Zero Carbon (LZC) technologies when combined with passive engineering solutions are to be utilised wherever possible to make further reductions to the carbon footprint for any new build station and help to reduce reliance on fossil fuel consumption.

Following the implementation of the fabric first approach outlined the designers will need to provide an appraisal of the LZC or renewable energy options available. The preferred technology is roof mounted solar photovoltaic (PV) panels.

The number of PV panels required should not be limited to achieve the target of a 20% CO₂ saving but to maximise the available area for installation.

6.5 Design Standards

All engineering services installations shall be developed in accordance with all current Building Regulations, the Non-Domestic Heating, Cooling and Ventilation Guide, British Standards, CIBSE Guidelines, The Equality Act and the 17th Edition IET Wiring Regulations, Construction (Design and Management) Regulations, Local Water Authority Byelaws & Current Water Industry Regulations, BSRIA Guidelines and LS Regulations – Control of Legionnaires Disease.

The following design data is proposed to reflect the minimum requirements for the M&E services performance to the office areas: -

- Ambient Conditions

- Winter; -5°C / 100% Sat
- Summer; 30°C db / 22°C wb
- LPHW Heating
 - Flow; 70°C
 - Return; 50°C Radiators or Perimeter Heating
- Domestic Water
 - HWS Flow; 60°C (41°C Disabled)
 - HWS Return; 55°C (Minimum)
 - Cold Water Storage N/A
- Envelope Performance
 - U Values; See Building Envelope section
 - Air Permeability; See Air Tightness section
- Fresh Air; 12 l/s/p
- Occupancy; See Room Data Sheets
- WC Ventilation; 10 ACH⁻¹ extract
- Building services equipment noise levels
 - Open plan; NR 40
 - Cellular Offices; NR 35
- Humidity Control; Not Provided
- Internal Design Temp
- Offices:
 - Winter; 21°C (Minimum)
 - Summer; 24°C +/- 2°C
- WC & Circulation
 - Winter; 20°C (Minimum)
 - Summer; Un-Controlled
- Maximum Summertime Temperature
 - Not to exceed 25oC for more than 5% of occupied hours
 - Not to exceed 28oC for more than 1% of occupied hours

6.6 Mechanical Services Descriptions

6.6.1 General

The mechanical services solution must reliably provide a suitable environment while minimising energy consumption. Operationally, the building services systems need to be straight forward and easily maintainable. Plant needs to be accessible with minimum disruption to the core activities of the new building.

6.6.2 Heating

The design team are to investigate the local area for potential connections to a district heating scheme. If available, connection to a local DH scheme is the preferred method of heating.

Except for specific areas such as the comms room and gym the space heating shall be provided via a LPHW heating system, being relatively efficient, maintenance familiar and of reasonable value. When including radiators these shall be combination of steel panel and low surface temperature radiators to suit their location.

The heating medium shall be generated centrally in a ground floor plantroom area. High efficiency, fully condensing, gas fired wall hung boilers shall be provided and each gas fired boiler shall be sized for approximately 66% of the peak heating load, to provide both resilience and redundancy (actual number of boilers to be determined on a project by project basis).

Secondary pumped systems shall distribute heat throughout the building in relevant zones to serve all areas, ventilation plant, etc. as required. The design of the heating systems shall allow for differing time zones within the building.

Wherever possible and practical, pipework shall be concealed from view and primary pipework distribution shall be within the ceiling and floor voids.

For further information please refer to Typical LPHW Heating & HWS Schematic in the appendices for typical system requirements

6.6.3 Ventilation

It is intended that the extent and use of natural ventilation should be maximized where possible as shown on the philosophy drawing. However, it is essential that a noise and air quality surveys are carried out to confirm the preferred strategy will not result in the occupied spaces experiencing pollution and noise issues. If any issues are highlighted, then an alternative strategy would be to mechanically ventilate the occupied spaces. This would allow for acoustically compliant and controlled 'on-demand' natural ventilation, including strategies for secure night time purging / cooling.

Opening windows are to be provided as a primary means of ventilation and the window opening area should equate to circa 5% of the floor area.

All landlocked internal spaces shall be mechanically ventilated with heat recovery.

Dirty areas (i.e. WC areas, changing rooms and shower rooms) shall be provided with stand-alone local exhaust systems to satisfy Building Regulations and local heat recovery systems to the changing areas. These systems shall generally comprise local occupancy (PIR) controls with timed overrun facilities, such that when occupancy is not detected, the fans shall operate at a lower speed (economy setting) to ensure that a negative air trend is maintained whilst again helping to drive operational efficiencies.

Where mechanical dirty extract systems are provided these shall comprise of duty and stand-by fan motors to increase resilience.

The designer must consider the ventilation to training and large meeting room areas. These spaces will have high density populations at various times and modelling is to be undertaken to ensure a suitable working environment can be maintained during heavy use.

All PEKO dyers units are to be provided with fixed ventilation ductwork and not the flexible ductwork that comes as part of the packaged product.

6.6.4 Cooling

To comply with the low energy principles of the scheme, the provision of cooling (air-conditioning or comfort cooling) will be kept to the Communications / Server Rooms and gym only.

6.6.5 Domestic Water Systems

Hot water will be generated centrally and stored in the ground floor Plant Room using a storage cylinder served from the LPHW system (with emersion back up).

Domestic hot water for all sanitary ware shall be distributed to ensure hot water is readily available and to also satisfy guidelines regarding the risk of legionella growth. Hot water at all wash hand basins will be blended to a reduced temperature at point of use via thermostatic mixing valves (TMV3 type) to minimise the risk of scalding to staff. Hot water supplies serving kitchen and cleaning type sinks will not be blended and will dispense full temperature hot water.

The cold-water service will enter the building in the ground floor plant room.

All domestic cold-water outlets are served direct from the mains water supply due to the relatively low demand typical to this type of development to minimise maintenance and space allocation associated with water storage.

Water saving fittings and flow regulators are to be fitted where possible for all domestic hot and cold-water outlets, in line with the sustainable principles of the project.

Note – no mains water pipework to pass through or over the Communications / server room area.

For further information please refer to Typical LPHW Heating & HWS Schematic in the appendices for typical system requirements

6.6.6 Building Management System

A BMS control panel will be provided, located within the ground floor plant room to serve all mechanical plant and equipment. The mechanical control panel will comprise an LCD network display panel installed to the front of the control panel to allow interrogation of the system and set-point adjustment.

BMS communication will be via the data network and a suitable interface will be required. Full plant graphics to be displayed on the LCD screen.

The system must be capable of providing 3 stages of frost protection

- Outside Frost Protection
- Plant Protection
- Internal Frost protection

The BMS is to be fully open-source protocol.

For further information please refer to indicative BMS drawing in the appendices for typical system requirements

6.6.7 Above Ground Drainage

Above ground drainage will be provided to all items of sanitary ware via uPVC pipework systems in accord with British Standards and Building Regulation requirements.

6.6.8 Sprinklers

Sprinklers will not be required generally, however the designer must carry out a full risk assessment to review the firefighting precautions with the fire consultant / building control as part of the design development process.

6.6.9 Insulation

All domestic services, LTHW heating pipework, DX cooling pipework and supply and extract ventilation (excluding WC extract) will be thermally insulated, protected, and have suitable vapour barrier where concealed within service routes, risers boxing etc. Insulation levels will be in full accordance with relevant guidance and standards. Within plant areas all services will be aluminium clad for additional protection.

All refrigeration suction lines will be insulated with 19mm Armaflex Class 'O' insulation with all joints being in accordance with the manufacturer's instructions. All insulation external to the building will be finished with two coats of arma-finish HM coating.

6.6.10 Compressed Air Installation

A compressed air installation shall be supplied and installed by a specialist supplier to suit the requirements for the site.

In particular they shall supply and install the compressor and all necessary pipework and connections for the BA Room and Compressor Room.

If the new fire station has a vehicle maintenance pit, 4No compressed air connection points per pit shall be installed to meet the operation needs. This is to be served by a separate air compressor.

6.6.11 Pressure Washer

The main contractor is to provide a Portable Pressure Washer within connections adjacent to the fire appliance bay to Wash the fire appliances externally.

The Pressure Washer currently preferred is:-

- Quill Panther Cold Water Machine or similar approved

The unit is to be served from the mains water supply with suitable WRAS approved protection.

6.6.12 Underground MDPE Tank (Open Water Training Tank)

All sites are likely to require an MDPE underground tank capable of holding 2000 litres.

Approx. Dimensions are 1950mm length and 1300mm diameter – location will be determined on a site by site basis.

This tank has no other M&E attendances and is for training purposes for use by the Fire Service.

6.6.13 Fuel Tank

All sites shall include the design, supply and installation of a 10,000 litre capacity totally enclosed fully bunded diesel storage tank to environmental specifications including the dispensing facilities, the details below are based on Merridale (MIS Fuel Monitoring Ltd) specification but equal and approved systems are acceptable, the systems which shall be complete with:

- Security cabinet with roller shutter door
- Offset fill assembly
- Vent assembly
- Top suction assembly

A security cabinet complete with a Merridale Auditor GS1 70 litres per minute heavy duty ATEX approved commercial fuel pump with built in fuel management system for use with existing datakeys, complete with:

- Ten metre delivery hose
- Pump mounting stool
- Hose safety break coupling
- Automatic nozzle
- 1 HP motor
- Highly accurate positive displacement piston meter ($\pm 0.25\%$)
- Heavy duty pumping unit with air separation
- Internal totaliser
- PC link
- Metal numeric keypad
- Illuminated display
- Datakey reader
- Secure bypass switch
- Pressure regulating valve (Environment Agency recommended)
- Electrical distribution board and on-board cabling
- Network interface adaptor
- Lightning barrier/surge protection

One Merridale Auditor GT1 electronic tank management system, complete with:-

- Merridale Auditor GT1 display unit

- Tank contents probe
- Overfill and bund sensors
- Audible and visual alarms

WORKING DRAFT

6.7 Electrical

6.7.1 General

The electrical services solution for the new Fire Station must provide a suitable environment while minimising energy consumption. In practice, it needs to be straightforward and easily maintainable. Plant needs to be accessible with no disruption to the core business of the building.

6.7.2 Low Voltage Mains and Sub-Mains Distribution

The supply to the building shall be via a new independent incoming low voltage electrical supply from the local distribution network operator (DNO). The incoming low voltage electrical supply shall be designed and installed in accordance with the requirements of latest Edition including amendments of BS 7671.

The new low voltage electricity supply shall terminate in cut outs and metering within a ground floor Plantroom. The supply will then feed a dedicated LV switch board via a generator auto change-over panel comprising of either a wall or floor mounted panel board arrangement.

The main LV switch panel shall comprise of a wall or floor mounted cubicle style arrangement. The panel board arrangement shall be of a modular pattern to allow easy extension. The panel will be a fully type tested assembly with appropriate certification, and facilitate for thermal inspection of the busbars, and internal assemblies.

The environmental protection of the main LV switch panel shall be a minimum of IP31.

Transient Voltage Surge Suppression (TVSS) shall be provided to the following items of equipment, in line with BS EN 62305-4:-

- Main incoming utility supply
- Distribution boards serving dedicated ICT equipment

From the LV switch board sub-mains cables will distribute through the building serving MCB distribution boards.

Final MCB distribution boards shall be of the split type and suitably sub-metered and assembled from standard manufacturer components either to fully meter the total load (power boards) or separately for lighting and power loads.

All MCB distribution boards shall comply with the relevant parts of BSEN60439 and phase identification to BS7671.

All MCB distribution boards shall be fabricated from rust protected sheet steel and be coated with epoxy powder paint the finished colour to be standard manufacturers.

All MCB distribution boards shall include a fully shrouded main busbar assembly which shall include integral provision for the electrical connection and isolation of an unused outgoing ways and the live side terminals of outgoing occupied MCB ways. Where boots or similar devices are supplied to cover live parts of spare ways the board will be deemed not to comply with this requirement.

It will be possible to take visual readings for both arrangements while the door of the distribution board is closed and locked off.

All low voltage switchgear and cabling shall incorporate 25% spare capacity for future additional loads.

A framed copy of the "As-Installed" single line diagram shall be provided adjacent all main and sub-main LV switch panels.

6.7.3 Generator Changeover Arrangement

An automatic changeover switch shall be provided to allow for the full load of the entire building to be transferred to the Standby Generator set.

The changeover switch shall be located adjacent to the incoming panel board in the Plant Room, this shall include voltage sensing and control equipment a sensing loop shall be wired to the control panel on the Generator set to instigate the engine start.

The equipment shall consist of a new changeover contactor unit with front access wall mounting changeover unit of welded sheet steel construction manufactured and tested in accordance with BS EN 60439-1, finished in light grey stove enamel shade RAL 7032 having an ingress protection rating of IP31.

Upon reinstatement of the mains supply, the supply from the Generator must be retained for a short period of time to establish the mains supply is secure once again before transferring back.

6.7.4 Generator Provision

A standby generator set shall be housed within a waterproof acoustic housing with a sound attenuation less than an average figure of 78dBA @ 1 metre in assumed free field conditions. (Note: The location of the generator set and the required acoustic properties will need to be reviewed and agreed on a site by site basis, due to local sound constraints and the design of the enclosure/Generator installation and location provided to suit those requirement).

An extended capacity bunded base fuel tank complying with the latest DEFRA Regulations will be required. The fuel tank shall have the capacity for 24 hours at full load.

The set will come complete with an automatic mains failure control panel mounted to the fabricated base frame.

In addition to the auto change over facilities a suitably IP rated manual change over switch and plug in facility in line with the generator supply cabling will be allowed for the installation of a temporary standby generator in the event of an issue/breakdown of the proposed permanent standby generator.

6.7.5 Electricity Metering

An electricity metering strategy shall be employed to meet Part L of the building Regulations. The meters will be used to monitor energy consumption. They will also help to fine tune the buildings operation and reduce carbon emissions. Remote reading of meters shall be provided via the Building Management System (BMS) to allow easy collection of data and automatic analysis of consumption trends, typically the meters as a minimum shall be capable of displaying the following

- Maximum demand (kW & kVA)
- Energy Consumption (kWH)

- Current in each phase & neutral
- Voltage in each phase & neutral
- kVA in each phase & neutral
- kW in each phase & neutral
- kVAr in each phase & neutral
- Hz in each phase & neutral

To comply with Part L of the building regulations it is advised that direct metering is provided to a minimum of 90% of the energy usage systems. To achieve this, multimeters will be connected to both incoming and outgoing circuits where applicable within distribution boards and main panels.

6.7.6 Earthing & Bonding

The new building shall be provided with an earthing and supplementary bonding system to meet the requirements of the IEE Wiring Regulations and BS 7430: Part 1 1998.

6.7.7 Wiring and Containment systems

Wiring systems shall be of types which are entirely suitable for the services with which they are associated in terms of providing for correct functioning of the services and equipment, and of being compatible for the voltage, current and frequency of supply.

All wiring systems shall comply with the requirements of BS 7671 (IEE Wiring Regulations).

All wiring associated with fire alarms and emergency lighting shall conform to the requirements of BS5839 Part 1 2013 or updated editions and BS5266 2011 or updated editions respectively.

The mechanical strength and rigidity of all wiring systems shall be suitable to withstand the dangers of mechanical damage or electrical forces which might occur during the construction and/or operation of the building.

Plant room areas and surface installation areas shall be wired in single core cables installed in steel galvanised conduit and trunking to suit the environment.

A cabling and containment support system will be installed to provide a complete electrical installation compliant with BS 7671 for the following services: -

- Mains distribution will generally consist of XLPE/SWA/LS0H cabling installed on cable ladder rack or cable tray.
- General lighting and power will be Twin & Earth 6242B 300/500V BS7211 XLPE/LSZH Low Smoke cables run on galvanised steel cable basket (multiple runs) or trunking within the ceiling void or fixed using proprietary cable supports and drawn in flush galvanised steel conduits. Circuits feeding Personal Computers shall be provided with earthing arrangements compliant with BS 7671 IEE Wiring Regulations.
- Voice data installations, Category 6, 4 core UTP cable will be supported by means of a cable basket and conduit installation.
- Security and emergency lighting system cabling systems will be supported by means of basket and conduit installation.

- Fire Alarm cables shall be Enhanced fire resisting pliable red sheathed cables manufactured to BS 7629 and should meet the PH120 classification in accordance with EN 50200 clipped direct or installed on dedicated cable tray/basket.

All containment systems will be suitably sized with adequate provision for future modifications to the system (25% spare capacity.)

6.7.8 Power Factor Correction

Power factor correction (PFC) may be used to reduce energy costs and to help comply with Part L of the Building Regulations.

A power factor assessment shall be carried out by the design and build contractor and if deemed necessary, power factor correction shall be provided combined with the main LV switch board, although we would not envisage power factor correction being necessary for a typical Fire Station Building.

6.7.9 General Lighting and Lighting Controls

Lighting throughout will be provided in accordance with the CIBSE Code for Interior Lighting.

The lighting installation is to be designed to optimise the internal environment and appearance, whilst minimising energy consumption and maintenance activities. High efficiency, low energy control gear will be provided in the majority of cases to satisfy the schemes low energy requirement. In this case LED light sources are the preference where practicable to the suit the application.

Occupancy and absence detection shall be by either high performance microwave units positioned for optimal detection or good quality passive infra-red detectors where appropriate. Sensors shall incorporate photocell features to allow dimming control of carefully selected luminaires where daylight contribution could precipitate energy savings. Dimmable luminaires will be of the electronic digital type.

Typical Fire Station, Lighting Levels & Lighting Controls Philosophy drawings have been included within the design guide to provide an indication type of luminaires acceptable to the Fire Service in terms of their appearance, longevity, performance, and quality of construction. These drawings also provide details of the lighting levels required and the typical lighting controls strategy.

It is a particular requirement of the Fire Service to include areas seen from the main road with a proportion of light to give the appearance that the building is occupied even when it is empty (this will apply in all cases to the fire appliance bays). The lighting controls shall be controlled via the microwave detectors, and if unattended the luminaires will dim down to 15%, when station signals are operated or presence is sensed the luminaires will automatically raise the illumination to 100%. In addition to the above when sufficient day light is available the lighting shall be automatically be switched off.

The above controls requirement would always include the fire appliance bay, but other rooms to be included would depend on the orientation of the building, in the typical building case the foyer and training room.

Switchplates for lighting shall be recessed mounted adjacent to door entries within rooms. Consideration shall be given to contrasting switchplate colours in line with DDA (Disability Discrimination Act) recommendations and Building Regulations Part M will be considered.

Where automatic lighting control is not suitable then switching circuits shall be arranged to switch luminaires adjacent to window walls separately to those located deeper in the room. This will provide staff with a manual method of controlling lighting to suit natural daylight.

The controls philosophy will be straightforward, with easy to use and accessible controls for the occupants.

Should a training tower be included within the development, lighting within the training tower needs to be suitable robust and IP rated for the activities to be undertaken within the tower. Control shall be local switches via a local control panel, emergency control is to be provided to allow all lighting to be switched on from the emergency control location.

6.7.10 Emergency Lighting

Emergency lighting will be provided throughout the proposed development to BS 5266: 2011 Part 1 and to meet the requirements and recommendations of the local Building Control Officer generally utilising separate self-contained self-test emergency LED luminaires.

The category of emergency lighting shall be M3 and NM3. Emergency lighting shall be provided to all defined and undefined escape routes and accommodation throughout the new building. Additional emergency lighting shall be provided in the following areas: -

- External areas in the immediate vicinity of escape exits, including disabled access ramps directly outside building entrances.
- All toilets.
- Plant rooms and switch cupboards.
- External plant areas.

Where required by NFRS to enable use of spaces out of hours by the public, self-contained, maintained emergency exit signage will be provided to supplement the general emergency lighting installation.

Emergency lighting will be required to all workshop and fire appliance areas in order to provide illumination where machine parts may continue to move after the electricity supply has failed.

6.7.11 External Lighting

All external lighting will be in accordance with CIBSE Lighting Guide and BSEN 13201 and BS 5489.

External lighting shall be provided to areas including pedestrian and fire access routes, circulation routes, main entrance, generator location, fuel tank location, building façade and any external illuminated signs.

The entire external lighting scheme shall provide a uniform and visually attractive environment to emphasise the architectural features of the building but in keeping with the Fire Service requirements.

Where external mechanical plant is located on roofs, suitable external lighting shall be provided to aid access and future maintenance of plant.

There shall be various control methods for the external lighting which shall be developed with the Fire Service at a later stage, but shall include time clock and photocells, manual override and call out signal override.

6.7.12 Dark Sky Criteria: -

Compliance with dark sky criteria is to be achieved using precise light control from luminaire head/optic.

Luminaires installed shall have no upward light component in accordance with dark sky compliance. The local authority's dark sky policy shall be consulted prior to installation of external lighting.

Control of external lighting shall be sympathetic with the dark sky criteria but shall also include the operational control associated with the requirements of a live Fire Station.

The following design principles shall be adopted: -

- light what is necessary only
- light the areas we need to only
- light only when it is necessary
- external lights and their light distribution shall be positioned so as to avoid light spill into the sky and onto neighbouring properties.

6.7.13 Utility Power & Fixed Equipment

Small power will generally consist of wall mounted twin socket outlets to the perimeter of the rooms and at an appropriate density in dado type trunking for IT use. Floor boxes positioned to provide ease of use are to be installed in the training / meeting rooms or other rooms where required.

Accessories will generally be of grey plastic finish (contrasting with background). Where accessories may be subject to mechanical damage e.g. plant rooms, appliance bay, compressor room etc., metal clad accessories shall be used. Weatherproof accessories shall be used to external/wet areas where appropriate.

Dado trunking shall be utilised throughout the project which satisfies the need for compliance with the Category 6 structured cabling standard. As a minimum, meeting rooms, offices and the reception. Typically the dado trunking shall be 3-compartment, finished in white and manufactured as MK Electric, Prestige Plus.

The number of power outlets required shall be generally as per the room data sheets for client requirements. In addition to these power outlets and power supplies noted by the client's data sheets the designer shall make due allowance for supplies to specialist services equipment (security/fire/ICT/PA/etc.), mechanical services and final connections, as necessary, to provide a full and complete installation.

All fixed equipment supplies shall be ascertained through the room data sheets and Client/end user consultation process as the design develops.

Hand and hair Dryers are to be energy efficient and manual operation type, the current preferred supplier being Warner Howard and Heatrae Sadia hair and hand dryer ranges, or equal and approved.

Adequate provision should be made in circulation areas to permit the use of domestic cleaning equipment.

All cleaner's sockets shall either be fed from dedicated RCD protected circuits or will be fitted with an integral residual current device (RCD). All cleaners socket outlets shall be on dedicated ring main circuits and not used for any other purpose. Cleaners' sockets shall be provided to all areas assuming a maximum flex length of 9 metres, however, flexes should not be run through doorways.

Where equipment is permanently installed or where there is a possibility of equipment theft, switched double pole 13amp spur outlets shall be used in preference to switched socket outlets. The spur outlet shall incorporate a red neon lamp indicating when the supply to the equipment is live.

6.7.14 Electrical supplies for ICT equipment

Where required, ICT network switches and servers shall be supplied through individual dedicated electrical supplies that cannot be switched off unintentionally. Sufficient socket outlets shall be provided to minimise the use of adapters or extension leads to computers and peripheral equipment.

Consideration shall be given to high integrity earthing for power circuits feeding ICT equipment, as required by BS 7671 17th Edition IEE Wiring Regulations.

6.7.15 Cooker Points & Control

Cooker points shall be provided within the main kitchen as required depending on the fire station size.

The supplies to the cooking appliances, that is the Oven's and the Induction Hob shall be wired through a contactor and interfaced with the Call Out signals so that the appliances will shut down automatically on operation of the call out system. A manual reset is required.

6.7.16 Drying Cabinets

Drying Cabinets shall be provided within the Laundry Room, the number determined by the station size by typically 2 No per station. The cabinets shall be manufactured by Peko and shall be their TS5121 units or similar approved. (Type to be confirmed during the design period with the Fire Service).

For ducting requirements of the PEKO units refer to the Ventilation section containing with the Mechanical Services Description

6.7.17 Vehicle Charging Points

Electric vehicle charging systems shall be supplied, installed, tested and commissioned in accordance with the latest version of all applicable standards, guidance, statutory regulations (some of the key standards are scheduled below) and as detailed within BS 7671 and the IET Code of Practice for Electric Vehicle Charging Equipment Installation.

BS EN 60529 Degrees of protection provided by enclosures (IP code)	
BS EN 60947-2	Low-voltage switchgear and control gear – Part 2: Circuit-breakers

BS EN 61008-1	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) – Part 1: General rules
BS EN 61009-1	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules
BS EN 61558-2-4	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V – Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers
BS EN 61851	Electric vehicle conductive charging system
BS EN 62196	Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles
BS EN 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)
BS EN 62752	In-cable control and protection device for mode 2 charging of electric road vehicles (IC-CPD)(IEC 62752)
ENA (Energy Networks Association) – Engineering Recommendation G12 – Requirements for the application of protective multiple earthing to low voltage networks	
SMMT (The Society of Motor Manufacturers and Traders Limited) – Electric Car Guide	
Office for Low Emission Vehicles – Making the Connection – The Plug-In Vehicle Infrastructure Strategy	
All standards, guidance and statutory regulations detailed within Section 2E-3	
All Statutory Regulations (and Associated Memorandum) detailed within Appendix 2 (Informative) ‘Statutory Regulations and Associated Memoranda’ of BS 7671 – IET Wiring Regulations – Requirements for Electrical Installations. Reference shall be made to all official supporting guidance documents	
All British Standards detailed within Appendix 1 ‘British Standards To Which Reference Is Made In This Standard’ of BS 7671 – IET Wiring Regulations – Requirements for Electrical Installations	

Each station will have a minimum of 1 No dual 7/7.36kW (2 No 32A sockets) fast charge floor mounted Electric Vehicle Charging units, number of which to be agreed with the client on a site by site basis.

The NFRS preferred suppliers are as follows (other will be considered subject to an equal service provided):

- Chagemaster
- Pod Point

6.7.18 Fire Alarms

A new fire alarm system will be provided to meet the requirements of BS 5839 Part 1: 2013 and relevant Building Regulations stipulations. It shall be an analogue addressable system designed for low false alarm potential. The exact Category of the system should be confirmed by consultation with Building Control, the NFRS insurer and the NFRS themselves, however it is expected that a Category L1 system will be required.

The fire alarm panel will be located on the ground floor designated Fire Station entrance area or reception. The panel will be fully recessed of a neat attractive appearance. Typically, the Fire Alarm Panel will be as Advance MX 500, fully addressable and an open protocol system.

The fire alarm system shall be wired in fire rated soft skin type cable typically "Firetufplus Enhanced" installed on a separate containment system.

A telecommunications link is to be provided for remote monitoring of the fire alarm system.

The detectors shall be of the combined type incorporating sounders within the detector heads and also where appropriate to meet DDA (Disability Discrimination Act) Visual Alarm Devices/beacons.

The fire alarm system is envisaged to be a single stage evacuation system on an alarm condition, unless otherwise agreed with the NFRS and relevant Local Authorities.

Loop driven addressable interface units for connection to other systems. Make final connection to these other systems and commission links as part of the overall testing.

Fire alarm interface relays shall be supplied, installed and commissioned in particular for the following systems: -

- Building Management System
- HVAC panels - isolate all supply air mechanical services plant.
- Automatic doors – failsafe "open" on activation of alarm system to provide free egress
- Door access control - failsafe "open" on activation of fire alarm system
- Fire door holders - failsafe "open" on activation of fire alarm system
- Automatic barriers and doors – failsafe "open" on activation of fire alarm system
- Disabled Refuge Alarm system – all outstations at disabled refuges switch to active mode on activation of fire alarm system
- Incoming Gas service solenoid valve - isolate gas supply to the building on activation of fire alarm system
- Lift - to drive lift to the ground floor position and park with doors open as agreed with Building Control/Fire Officer.

Allowance shall allow for key isolate facilities on the main fire alarm panel to prevent ancillary devices and outputs operating on routine test such as the following:

- Building Management System & HVAC panels - isolate all supply air mechanical services plant
- Incoming Gas service solenoid valve - isolate gas supply to the building on activation of fire alarm system
- Automatic doors – failsafe “open” on activation of alarm system to provide free egress
- Door access control - failsafe “open” on activation of fire alarm system
- Fire door holders - failsafe “open” on activation of fire alarm system
- Automatic barriers and doors – failsafe “open” on activation of fire alarm system
- Disabled Refuge Alarm system – all outstations at disabled refuges switch to active mode on activation of fire alarm system
- Lifts - to drive lift to the ground floor position and park with doors open as agreed with Building Control/Fire Officer.

6.7.19 Proposals for IT/Communications Strategy

The IT strategy shall be developed in consultation with the NFSR IT specialists and shall be in compliance with the following:

- BS EN 50173 Information technology. Generic cabling Systems
- BS EN 50174 Information Technology - Cabling Installation
- ISO/IEC 11801 Information technology Generic cabling for customer premises
- BS 6701 Cabling Installation, Operation, Maintenance
- ANSI/TIA/EIA 568B Commercial Building Telecommunication Cabling Standard
- ANSI/TIA/EIA-607 Grounding & Bonding
- TIA 942 Telecommunications Infrastructure Standard for Data Centres
- BS 7671: 2008 IEE Wiring Regulation 17th Edition
- Room Data Sheets

It is assumed that the electrical services scope of works / attendance shall include the following: -

- The provision of data wiring as advised (Assumed Category 6 wiring).
- Provision of containment for data wiring.
- Provision of cabinets and patch panels to the specialist requirements.
- Provision of outlet plates and termination of cables at outlet plates.

The structured cabling system shall support the customer for a minimum of at least 25 years.

Generally wiring would be routed behind suspended ceilings within corridor areas fixed to a system of cable baskets with drops to wall mounted outlets contained within conduit to allow for future rewiring providing some level of future proofing to the system. Cables rising between floors would be fixed to cable baskets within dedicated riser positions strategically located.

It is assumed that IT/communications incoming services, equipment hardware and software will be provided outside of main contract by NFSR.

The server room shall require dedicated power, communication and air conditioning feeds as detailed elsewhere within the design guide, but shall include the following:

- Lighting shall be a minimum of 350 lux in the horizontal plane and 200 lux in the vertical plane, measured 1m above the finished floor
- Room decor – finished in light, easy to clean non-static finish
- Light fittings shall be located at a minimum of 2600mm.
- Minimum of one light fitting but if more than one must be an emergency and situated above the main exit.
- Positive air pressure to prevent ingress of dust into the room.
- A minimum of one air change per hour.
- Server equipment power supplies likely to be 2 No 32A commando sockets.
- A minimum of two twin 13A power sockets fed from their own distribution board supply for maintenance and inspection purposes only.

Wireless access points are required throughout the complex, the wireless access equipment will be provided by the client's IT specialist. The associated data points will be provided by the installation contractor.

6.7.20 Security Systems

The security systems for the new building will be formulated in conjunction with consultations with NFRS.

Security systems proposed shall be designed to interface with and avoid conflict with the fire alarm system.

As a minimum, the security systems will consist of: -

- Digital CCTV system
- Intruder Alarm system (No works envisaged)
- Access Control/Door Entry system
- Audio/Visual Door Intercom system

6.7.21 Digital CCTV System

A digital CCTV system shall be provided internally and externally as agreed with the client's design team.

The installation shall typically consist of but may not be limited to:

- Vandal resistant colour / monochrome dome cameras.
- Power supply units
- 19" LCD TFT colour monitors.
- 1TB minimum with the ability to record up to 30 days, 16 channel DVR, lockable.
- Cabinet, certification, and warning signs.

The images recorded shall be colour and the installation shall record digitally on site to a hard disk drive and retain images for a period of at least one calendar month.

The CCTV system will be installed to give camera coverage to the following areas: -

- External Building perimeter areas
- Building entrance/exit points
- Reception desks or foyer
- Car Park and Main Entrance to the site.

The CCTV system as a whole shall be able to provide images for use as evidence for the purpose of Police prosecution. CCTV cameras will be located such that they aid identification of individuals and the images and the way in which they are managed by the CCTV system shall be of "evidence quality."

The CCTV shall be capable of being viewed remotely via LAN / WAN including at NFRS HQ.

The data of the CCTV system will comply with NSI-NACOSS.

6.7.22 Time Lapse and Monitoring CCTV Camera System

The construction contract shall include for the supply and installation of a Time Lapse & Monitoring CCTV Camera System for the duration of the project.

The system shall film and monitor the site/project from commencement on site until completion or otherwise advised by the Fire Service.

It is assumed that 1 No camera system would suffice and a summary of the requirements are noted below, this may not be exhaustive and the system provided shall be suitable for the particular site:

- Agree scope of work with the client on a site by site basis.
- Inclusion of installation of cameras, masts and any other bracketry required to suit the site.
- Full service throughout project, including data (3G and 4G) charges to a secure connection between cameras and Supplier's Servers
- Constant automated monitoring of camera system from suppliers servers with advanced diagnostic and reboot functions
- Manual checking of cameras, at least three times a day, every day
- Guarantee of service throughout including repairs if required
- All management of cameras to shoot at either standard or user-defined intervals
- Imagery stored securely in three or more geographical locations for redundancy
- Supplier access (browser, mobile and tablet version). Password protected or open TBC with the client on a site by site basis
- Automated time lapse edit production every week
- 'Latest Images' to be provided every hour
- Unlimited embedded images and video in the client's website
- Derig of all cameras

- Final edit of material and provision online and on 3 x USB sticks.

The works shall be undertaken by a specialist contractor such as Lobster Pictures Ltd.

6.7.23 Door Access System

A door access system to all perimeter doors and certain internal doors, shall be provided, the full details to be determined during the design stage in consultation with the client, generally in line with the strategy indicated on typical Fire Station Drawings issued with the Design Guide.

Unless otherwise agreed with the client the door access control system shall be as manufactured by Siemens/Bewator and applied to the doors as detailed on the RDS's, a general assessment of the Access Control requirements for a typical fire station indicated on the Design Guide drawings for reference purposes. Final design and requirements to be agreed with the client and determined by the layout of the building.

A Door entry intercom/call unit system shall also be required as the front door will be locked and the reception will not always be manned. A dual height entry dual height entry intercom is to be provided and shall be compatible with the Fire Stations telephone system.

Access readers will also be required for external automatic gates, including the requirement for dual height readers mounted on a suitable post or posts depending on the number of entries to the site.

The door controls are to be located in the server room.

6.7.24 Specialist Communication Systems

The Fire Service has various specific communication requirements including, but not limited to, the following:

- Mobilisation systems
- Call Out signals and lights
- Externally mounted antennas for tertiary and retained alerter systems
- Primary and Secondary fixed lines
- PA systems interfacing
- Interfaces to door access, gates and internal / external lighting
- Interfaces to gas valves and cooking equipment
- Greenwave System where required

All requirements, attendances etc. shall be developed and incorporated within the design in consultation with NFRS and their specialist supplier's.

6.7.25 Mobilising system

Space shall be allowed for 28u cabinet, footprint 600mm x 600mm (x2 space requirement for pre RCC), although it may be possible to fit the equipment within a combined data rack, site specific to be agreed with NFRS ICT specialist.

Tertiary alerting system. Requires installation of external receiving antenna and feeder.

Retained alerter system. Requires installation of external transmit omni antenna (@ 147.8 MHz) on low loss feeder and mounted at the highest point on site.

Pre RCC primary bearer. ISDN2E, secondary bearer. PSTN.

Post RCC bearers will be provided by EADS and will be primary bearer. WAN, secondary bearer. Paknet.

Plant interface allowing interface to appliance indicator lights, station lights, doors, cooker gas control valve etc. Note: This will be provided by EADS post RCC.

6.7.26 Call-Out Lights and Signals

A Specialist Call-Out Signalling system shall be required, full details and requirements to be incorporated at the detailed design stage.

Containment shall be provided to house the call out system wiring.

6.7.27 Greenwave System

Should it be required the Highways Authority shall design and procure the Greenwave System, which will include the Outstation Transmission Unit and ADSL router to be located in the Station Server Room.

The contractor shall provide attendances on the Greenwave system which includes the provision of containment and cabling (typically 1.5mm² csa) for the switch relay circuit (2, 3 or 4 depending on how many green-waves are configured) from the OTU housing to operations area (push-buttons).

The contractor shall provide containment from the Server room to the Muster Area as advised by the specialist designer.

The contractor is to provide a duct from the station to the boundary of the site for the incoming Greenwave cabling.

The Greenwave System may not be required for this site so a provision sum shall be allowed for these works in the first instance. However, should this be a requirement this should not affect the overall programme as the contractor should allow for the fact that this may be instructed.

6.7.28 Public Address System

A public address (PA) system for the new building in accordance with BS6259: 1997 Code of practice for the design, planning, installation, testing and maintenance of sound systems.

The system shall be zoned to allow specific areas calls when required and the system shall be interfaced with the Fire Call Out Systems and the phone networks as well as the associated microphone input units.

It is envisaged that the call point and control station will be located within the Administration Office.

The system equipment shall be rack mounted and shall interface with the Call-Out systems and Phone networks.

Typically the system to be supplied will be from Mustang Communications being their Macro M2508/D equipment with a rack mounted kit (BRK-30) or similar approved. The system interfaces with the Call-Out systems and Phone networks as well as having microphone inputs.

The general input module requirements are:

- Priority 1. T270 multi-function tone generator (for station alarm).
- Priority 2. L300 line input module for control speech.
- Priority 3. M240 microphone module.
- Priority 4. T300 trimphone tone generator.
- Priority 5. L300 line input module for skype connection.

6.7.29 Pager Antenna Installation

A Pager Antenna installation will be provided for the new building, normally the antenna will be mounted on the tower when a tower is provided and an alternative location will have to be agreed when no tower is available, be it a building mounted mast or a remote mast, at a height required by the specialist.

This system must be designed by a specialist and the location agreed with the planning officer and NFRS.

The following needs to be supply and installed for the pager Antenna system including but may not be limited to the following:

- 1 No S.C6B, Glass Fibre Co linear antenna @ 147.8 megahertz, gain 6Db.
- 1 No SWB30, Standoff Bracket.
- 1 off 2140.01.00.00 Antenna parallel clamp (pair)
- 1 No ST5/3 Steel Scaffold pole 3 metre length 2-inch diameter.
- All associated cable and containment for the antenna system.
- Column and mast when required.

6.7.30 Audio Frequency Induction Loop System (AFILS)

Audio frequency induction hearing loops are now a requirement in the UK to comply with the Disability Discrimination Act, which has become embodied in the Buildings Regulations Part M.

The systems shall comprise of amplifiers, induction loops and all necessary connections.

The following areas will require induction loops, but note a typical Fire station will not include a Main reception, although shared facilities/location may include a reception:

Location	Description
Main Reception (Where a reception is provided)	Concealed, localised, counter induction loop system built into desk c/w audio input facility and swan neck

	microphone along with a handheld portable induction loop systems.
Meeting room	An Infra-Red system with local amplifier and plate microphone. The amplifier to be mounted above the dado trunking adjacent to the point of supply connection and the plate microphone being positioned centrally in the ceiling tile.
Training room	An Infra-Red system with local amplifier and plate microphone. The amplifier to be mounted above the dado trunking adjacent to the point of supply connection and the plate microphone being positioned centrally in the ceiling tile

Audio frequency induction loop systems shall be installed in accordance with BS7594:2011: Code of Practice for Audio frequency induction loop systems (AFLIS).

6.7.31 Audio Visual Systems

Containment and power supplies will be provided for the audio-visual systems in conjunction with the NFRS Audio Visual (AV) Specialist's requirements. Until specific user requirements are identified, we presume that the AV installation will be undertaken within the 'Fit Out' work by an AV Specialist.

The training room and where provided, meeting rooms, will be provided with ceiling mounted projectors and screens, the projector will require USB/VGA/Audio and data connections to be agreed on a site by site basis, each projector will require a local power supply.

6.7.32 Assisted WC Alarm

An emergency alarm will be installed in the disabled toilets and the repeater visual/audible alarm will be located where visible by the Fire Station staff members, i.e. Dining room and Reception.

The system shall consist of the following: -

- Pull cord alarm points in the disabled toilets. Pull cords shall terminate approximately 150mm above floor level.
- Lamp/tone indicator units fixed to the ceiling outside the disabled toilet.
- Reset unit located within the room.
- Repeater panel complete with audio/visual indication to main reception and the dining room.

6.7.33 Disabled Refuge Alarms

A new Emergency Voice Communication (EVC) - Disabled Refuge Alarm system in accordance with BS 5839-9, Equality Act 2010 and Building Regulations for safe efficient emergency evacuation within any structure is to be provided.

The refuge alarm will be installed comprising of a control unit located adjacent to the fire alarm panel with 24-hour battery back-up, intercom, audio/visual alarm and a remote intercom unit with reassurance lamp at the refuge outstation. The system shall be provided and installed to BS 5839 Part 9.

The EVC system shall allow voice communication in either direction between a central point and a number of other points throughout the building in a fire emergency situation.

All wiring associated with the Disabled Refuge Alarm system shall be carried out using Enhanced fire resisting pliable red sheathed cables manufactured to BS 7629 and should meet the PH120 classification in accordance with EN 50200 clipped direct or installed on dedicated cable tray/basket.

The components of the EVC system may be interconnected via a radial wiring arrangement or loop/multiple loop configuration.

6.7.34 Digital TV Aerial System

A new TV aerial system for distributing digital TV/FM and satellite signals will be provided within the building, this shall be designed by an appropriate TV systems specialist.

The system shall consist of television outlets to locations detailed on the RDS's and shall be connected to an aerial and distribution equipment.

The distribution equipment shall consist of an aerial, amplifier, distributors, surge diverters and any other necessary equipment.

All peripheral equipment shall be housed within purpose made enclosures.

The installation shall provide good quality reception to each coaxial outlet as recommended by CAI and are within the ranges. Reception at each outlet shall be proven on all channels and shall comply with the following Design Parameters:

- BS EN 50083 Cabled distribution systems for television and sound signals.
- BS 6330 Code of practice for reception of sound and television broadcasting
- BS 6513 Wideband cabled distribution systems
- BS 6259 Code of practice for the design, planning, installation, testing and maintenance of sound systems
- BS EN 60728 Cable networks for television signals, sound signals and interactive services
- Specialist installer to be a member of Confederation of Aerial Industries (CAI)

New wall mounted 37inch flat screen Televisions with integral Freeview shall be provided (Confirm the latest specification with the client during design but to be Samsung or LG).

6.7.35 Photo-Voltaic Solar Panel Installation

The fire station shall be provided with a Photo-Voltaic panel installation mounted onto the station roofs.

Specialist sub-contractors are to provide a fully designed package which shall make allowance for applications and discussions with the electrical supplier.

Please note the NFRS requirement is to have as much PV on the roof as practicable within the usable roof space ignoring the part L minimal requirements or the client's aspirations to have a building with a 20% improvement target of CO2 savings.

The installation shall also be installed to comply with the FPA Technical Division RC62 Recommendations for Fire Safety with Photovoltaic Panel Installations.

6.7.36 Lightning/Surge Protection

A lightning protection system will be provided in accordance with BS EN 62305-1: 2011. This will also include mains and sub-mains surge protection to protect sensitive equipment installed throughout the building.

Typically, the new installation will consist of an air termination network, where available the steel structure will be utilised as down conductors. If this cannot be utilised, down conductor tapes, (in a colour to be agreed with the Architect) integrated with the external cladding design will be employed. A sufficient numbers of earth electrodes will be installed.

The building shall be suitably zoned (LPZ) as detailed within BS EN 62305, with surge suppression installed as to reflect such requirements. The class of LPS shall fully consider the building layout, high location use, incoming services, utilities and all other loss factors as appropriate.

6.7.37 Attendance on Miscellaneous Systems

The following systems will require electrical attendances in the form of power supplies, data provision and containment back boxes etc., but not be limited to:

- Mechanical Systems:
 - Control Panels
 - Local Wall/Ceiling/Window Fans
 - Heat Recovery Ventilation Units
 - External Condensers
- Lift Supplier.
- Automatic Doors Supplier.
- Compressed Air System
- Fuel Tank Installation
- AV Systems
- Jet wash/Pressure Washer
- ICT System
- Security Supplier
- TV System Supplier
- Public Address System
- Fire Alarm System
- Renewables Systems i.e. PV.
- Oil separator.

- Call out systems including Greenwave.
- Defibrillator
- Vehicle Charging Points

6.7.38 Oil Separator Alarm

An Oil Separator Alarm system shall be provided for the site with a remote alarm signal provided to the Administration Office.

The oil separator alarm system is to be open protocol and the current preferred alarm system is manufactured by Labkotec Group, their Oilset – 1000 Oil Separator Alarm device or similar approved.

6.7.39 Defibrillator

A local external power supply is to be provided at each fire station for the provision of a defibrillator which will be supplied and fitted by others.

6.7.40 Vehicle Inspection Pit

Where included within the design, electrical service shall be provided to the vehicle inspection pits (typically as Premier Pits details) which shall consist of the following: –

- a 110V industrial sockets, allow for 2 No per pit, unless otherwise advised by NFRS.
- b Linear LED lighting suitable for Category 3, Zone 2 environment.

6.7.41 Electromagnetic Compatibility Regulations

Electrical installations must be compliant with the requirements of the Electromagnetic Compatibility Regulations. The regulations describe the electrical installation as a manufactured item, and therefore require the mechanical and electrical service installation to be tested for electromagnetic radiation and absorption.

Procurement contracts for all electrical equipment associated with the distribution of the electrical installation should stipulate that the equipment must be compliant with the Electromagnetic Compatibility Regulations.

6.7.42 Passenger Lift

A new Lift will be provided for the new Fire Station Building, the lift shall be provided by a Lift Specialist who will design, supply, install, test, commissioning and include the first 12 months maintenance for the lift equipment.

The lift shall under all conditions is to meet the "interval" as stated in CIBSE Guide D, Table 3.2.

The lift installation shall comply with the latest edition of the following standards where applicable:-

- BS EN 81-1 1998 Electric Lifts Amendment No. 1
- BS EN 81-2 1998 Hydraulic Lifts Amendment No. 1

- BS EN 81-3 2000 Service Hoists
- BS EN 81-28 2003 Remote Alarms
- BS EN 81-58 2003 Landing Doors Fire Resistance
- BS EN 81-70 2003 Access for Persons with Disability
- BS EN 81-72 2003 Fire Fighting Lifts
- BS EN 81-71 2005 Vandal Resistant Lifts
- Lift Directive 95-16-EC
- BS EN 81-80 2003 Safety Rules for the Construction and Installation of Existing Lifts
- The Lift Regulations 1997 No. 831
- Directive 2006/42/EC on machinery and amending directive 95/16/EC (recast)
- BS EN 12015 1998 Emission
- BS EN 12016: 1998 Immunity
- BS EN 8486-1 2007 Examination of Electric Lifts
- BS EN 8486-2 2007 Examination of Hydraulic Lifts
- ENC Directive 89-336 amended by 92-31 EEC and 93-68 EEC Low Voltage Directive
- BS EN 1238-5 2002 Stranded Ropes for Lifts
- BS 5655: Parts 1-14 where applicable
- BS EN 13411-5 2003 Terminations for Steel Wire Ropes
- BS 9999 2008 Code of Practice for Fire Safety in the Design and Management of Buildings
- BS 5588-8 1999 Codes of Practice for Means of Escape for Disabled People
- BS 7594 1993 Code of Practice for Audio Frequency Induction Loop Systems
- BS 5656-6 2002 Codes of Practice Lifts and Service Lifts
- BS 7255 Safe Working on Lifts
- BS 5588-12 Managing Fire Safety
- BS 7255 2001 Safe Working on Lifts
- PD 6500 Explanatory supplements to BS 5651: Part 1
- BS EN ISO 12100-1 2003 Safety of Machinery Basic Terminology
- BS EN ISO 12100-2 2003 Safety of Machinery Technical Principles
- Lift Operations and Lifting Equipment Regulations (LOLER) 1998

Generally the fire station would require the provision of 1No. Passenger lift suitable for general and disabled/wheelchair passenger with attendant.

The lifts are to be machine-room-less type with traction drive located at the top of the lift well.

6.7.43 M&E Access for Maintenance

All designers will give early consideration for access and routine maintenance of the mechanical installation, irrespective of the size, complexity and the extent of the proposed installation.

Mechanical services will not compromise the space and access routes for other services such as electrical services. Maintenance tasks will be able to be carried out with the minimum disruption to the continuity of supply and business's.

6.7.44 M&E Testing and Commissioning of Engineering Services

Detailed Requirements for testing and commissioned are to be outlined by the designer's specification, in general: -

All testing shall be carried out as recommended by the current edition of the IET wiring regulations (BS7671), relevant British and European Standards and Codes of Practice and current legislation.

The Contractor shall draw up an amplified testing and commissioning programme indicating critical dates of external influences.

The specification must outline that commissioning engineers being in attendance whilst the client representative verifies the results, and ascertains that the various elements of each system are in full working order. A minimum period of 1 week per month of the contract period (Minimum 2 weeks) shall be allowed for this procedure as guidance.

The intention is for the commissioning specialist to demonstrate the design intent of the systems has been achieved.

6.7.45 Seasonal Commissioning, Soft Landings & Fine Tuning

The object of the seasonal commissioning, soft landings and fine tuning is to ensure optimum performance is achieved and to minimise energy consumption of the Building and system installation

This process also allows post-occupancy evaluation of the building operation as a whole.

The designer is to include for the main contractor and building services contractors to attend the site during the first 12-month period post completion of the contract to undertake fine tuning and adjustment of each system.

During the soft landing period, progress reports will be required each month covering the following:-

- Comfort
- Performance tracking of environment.
- Control levels achieved to key spaces.
- Energy reductions and improvements (month on month).
- Recommendations for improvements at the next period(s).

The process shall allow also allow for a review of the daylighting control, general lighting controls system and review of the absence detection associated with the lighting control systems.

During the rectification period (defects liability period), the Contractor shall maintain all installed plant and equipment in which the manufacture recommends and is to provided a maintenance schedule that requires action within the rectification period. The Contractor shall also maintain all building fabric installed components in which the manufacture recommends and has provided a maintenance schedule that requires action within the rectification period.

WORKING DRAFT

WORKING DRAFT

8 Completion Requirements

At Completion, the Contractor shall handover a complete Operation and Maintenance file. As a minimum, this shall include;

- Accurate and dimensioned as-installed/as-built drawings, which include all approved changes throughout the construction phase. 'For Construction' drawings with an "as installed" stamp is not acceptable. For the avoidance of doubt the as-installed / as-built drawings are to accurately record the as-installed and as-built building, services and systems.
- As-installed / as-built drawing register
- Accurate list with contact details of all sub-contractor packages.
- Indexed and itemised list of all products, items, components and materials used in the construction c/w manufactures and installer's guarantees and or warranties.
- A fully indexed asset register of all plant and equipment installed, showing, manufacturers part number, installation date, maintenance intervals, CIBSE/manufactures life expectancy.
- User manuals for all plant, equipment and building fabric components.
- Comprehensive maintenance guides/instructions for all plant, equipment and building fabric components.

WORKING DRAFT

Appendices

Appendix A – Example Architectural Design Information

Appendix B – Example Services Design Information.

Appendix C – Building Maintenance Service Level Agreement

Appendix D – Component Specifications, including

Merridale Fuel Tank

Arkininstall Kit Racks

PEKO Dryers

Miele Washing Machines

Garran Boot Lockers

Appendix E – NFRS Branding Policy

Appendix F – Example BIM Execution Plan

Appendix G – Anchor Points Specification

Appendix H – Fall Protection Eyebolts Specification

Appendix I – Code of Practice for Automatic Doors and Gates and Code of Practice for Industrial Doors and Domestic Garage Doors.