PEARL additional information for fire issues

The lighting arrangement in the existing PAMELA facility, which was agreed to be the worst case assumption for the lighting provisions for the PEARL. Mainly interested in plan area/dimensions of each platform, we assume they are solid panels? Also what are the distance between centres of each panel. What is the degree of vertical movement needed for each operational mode:

- Further information on the types of materials and goods to be stored, how they are to be stored
- What is the height of storage proposed and if any reduction in the height of the racking can be considered
- What materials are expected to be utilised when constructing the experimental set ups in the Laboratory space
- Examples and brief descriptions of the types of experiments being carried out and frequency, how the experiments will be set up and run particularly when external participants are involved. Will simulated smoke be used in all experiments etc.
- Management level that the UCL would be capable of providing, such as managing the evacuation carrying out specific experiment fire risk assessments, particularly where the escape routes are significantly affected or in the instance where the alarm is switched off etc. due to smoke simulations.

Lighting arrangement

The measurements of the lighting arrangement are as follows:

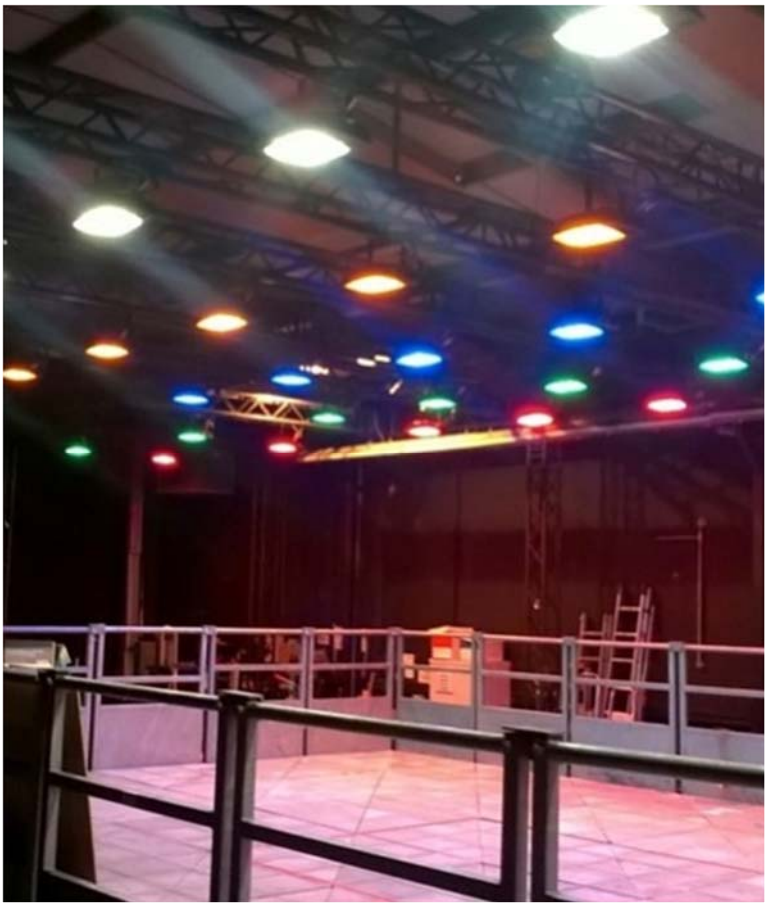

Figure 1 General image of the lighting system at PAMELA. These units are 3.5m above the platform floor (about 4.5m above the building floor), and spaced approximately 1.4m apart in both directions in order to produce an even lighting coverage on the platform floor. In PEARL these will be set normally 7m above the platform floor (8m above the building floor) and the supporting frame will be lowerable in sections – to the floor for maintenance, but to around 3.5m for some experiments (for example when we are simulating indoor environments). In the main though they will be used at their maximum height to obtain a maximum illuminance of 1500 lux on the platform floor. It is still to be established what the separation between the units will be in PEARL. This depends on the power of the LED units and the spread: the key is to obtain an even illuminance across the whole floor: simply put, the more powerful and the greater the spread of the units, the greater the separation between them. Detailed measurements at PAMELA will be made this week. Currently in PAMELA (not shown in this photograph) we have additional high intensity units (providing illuminance of 15,000 lux on the platform floor) and these are set in between the coloured units shown in the photograph. The intention is that these units will be incorporated so that there will be single lighting units able to deliver all experimental lighting needs, but we do not know yet what the dimensions of these will be (this is one of the issues to be explored in the lighting design contract).

1. Lamp dimensions:

- Coloured one: 27 (W) x 41.5 (D) x 25cm (H) [RH side in the left photo above]

- White High powered one: 58 (W) x 34 (D) x 28cm (H) [LH side in the left photo above] (* H includes a bracket to hold a lamp unit. An attachment holds top of the bracket from a gantry.)

2. Lamp positions: C is coloured one, and P is powered one. Unit is cm. (measurements starting from the Office end; Rows 2+ in centimetres from the first row)

   1st row: C - 82 - P - 98 - C - 79 - P - 83 - C - 67 - P - 95 - C - 60 - P - 66 - C - 153 -

   2nd row:- 152 –

   3rd row:- 155

   4th row:- 148 -

   5th row:- 145 -

   6th row: - 146 -

   7th row:- 168 -

   8th row: Side farthest from the office

Figure 2 Lighting units at PAMELA. Left: High powered white unit; Right: Colour unit

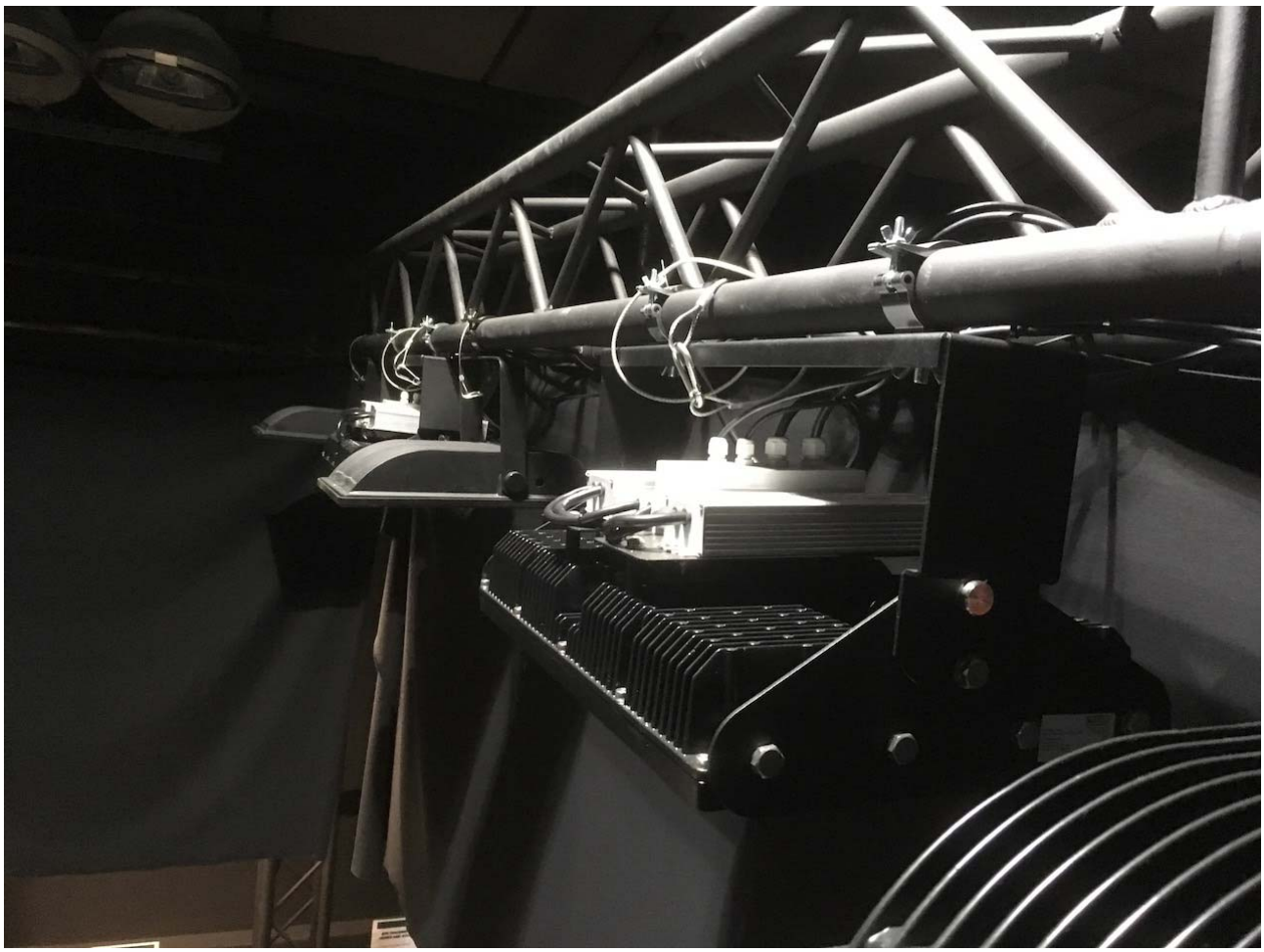

Figure 3 Upper side of lighting units: foreground: high powered white unit; Rear: colour unit

Figure 4 Bracket for colour unit

Materials and goods to be stored

Large items to be stored on pallet racking; small items in fireproof cabinets

1. Framed wooden scenery sets, mock-up units (see Figure 5)
2. A small stock of various sized ply, small cross-section timber for constructing frames, brought in when needed for immediate use; stored items made from these materials
3. Temporary screens used for creating mazes etc. (see Figures 8 and 9)
4. Prefabricated office pod units (see Figure 6)
5. Concrete pavers, wood floor panels, spare steel trays for the configurable floor, spare actuator units, cables of various lengths and dimensions associated with the configurable floor, speaker units, lighting systems
6. Loudspeakers and lighting units, tripods
7. Cameras, instruments, hand tools for carpentry, metalwork, electronics
8. Acoustic baffles (stored around the building, on the floor). These will be triangular (in plan) units, 4m high and 800mm deep, with different surfaces and sound absorbance qualities on each face. These are on wheels so that they can be moved around the experiment area, and are motorised so that

they can rotate on their own axis to present a different face to the experiment area.

Figure 5 Mock-up train unit and platform edge doors made from plywood (with polycarbonate glazing in the platform edge doors, but open windows in the train). We would not be expecting to have such a mock-up in PEARL as we will have actual (steel/aluminium) train carriages stored outside for most purposes, but it is possible that we would need to create and store a new design mock-up (as in this case where the research was about a new innovative design). This also shows some plywood panelling used to screen off the 'platform' rear edges. These are made from 3 ply (as can be seen in the photo, the train and doors are made from much thicker 15-20mm ply). We are expecting the large scenery sets (e.g. 100m long street) to be much more substantial than this, with steel reinforcement, and representing the 3D environment of a street frontage (i.e. incorporating window sills, doorways etc.). We operate these experiments with a number of assistants (ratio 1:10) for health and safety reasons.

Figure 6 A prefabricated office pod used for various experiments in PAMELA. This is a commercial panel-based office unit, which can be assembled to sizes as needed using modular panel units, but is stored disassembled

Racking height

The proposed racking height is 6m, with the intention that scenery sets up to 8m high could be stored vertically, accessed by forklift reach trucks. If the storage is located within the main laboratory space it will be very difficult to reduce height because this would mean taking up additional floor space and this is not available within the footprint without compromising the requirements.

Materials

Most scenery sets will be made out of 15mm (or thicker) plywood, framed with Deal or similar wood and/or steel bracing. All fabrication materials will be risk-assessed as part of the design process.

Experiments

Figure 5 shows a typical experiment for our railway work. In these experiments we have a large number of people who are instructed to board/alight/ignore a train in a station, according to experimental protocols. They do this around 500 times over a three week period, working alternative days. Each experiment 'run' takes about 120 seconds, with around 5 minutes to assemble the participants before the 'run' and another 5 to clear them afterwards. Sometimes there is a large pause between

'runs' when we need to adjust the train (e.g. change some characteristic of the train) to model different situations.

Another example is shown in Figure 7, where the floor is configured with different design characteristics (in this case, simple and complex ramp gradients) of a station platform. In this case, each participant is accompanied by a researcher as they perform a series of tasks. The number of assistants is based on a 1:1 ratio in this case.

Figure 7 Experiments with visually impaired people to explore different ramp gradients for the Victoria Line Upgrade

Most experiments involve single participants undertaking a particular trial (see Figure 8 for an example), where a single participant is being tested. In these cases, there are usually more assistants than participants, as it is necessary to record different data streams in a simultaneous process and that requires one person to take charge of each DataStream. Other similar examples would include a person being asked to navigate a maze constructed from standard temporary screens (see Figure 9).

Figure 8 A neurology experiment where spatial memory is being tested. In this case, a featureless room is set up (framed plywood panels) and the size and shape of the room is changed during the experiment.

Figure 9 A simple maze set up for an Ophthalmology experiment under low lighting levels. The maze is constructed from standard temporary screens, arranged as required.

Management

In PAMELA we have a strict set of management rules for operation all the time. Special rules are set on a case-by-case basis for each experiment and these are usually subject to scrutiny during the ethics application process (a risk assessment is required for each experiment). In terms of non-experiment issues, such as working practices and storage requirements, these are in place at PAMELA, including COSHH assessments for all materials on the premises. In the main we avoid retaining

any COSHH substance and these are obtained only as we need them and any leftover following the specific use is disposed of immediately and according to COSHH requirements. We expect the same to apply to PEARL, including the special arrangements that would pertain in relation to the workshop space and equipment. This would apply to the provision of First Aid trained personnel on the premises, training and associated certifications, authorisations and permissions for use of equipment or processes. The main issue for PEARL will be that it is a larger premises with more people on site, and more activities may be taking place at the same time, and this will be taken into consideration in developing the Operations Manual for the facility.

When large numbers of the public are present (e.g. for the 'crowd-based' experiments, the number of assistants hired to support the experiment is based on the number of people we have in place and their primary role is to deal with evacuation, accidents etc. the number so assessed on a case-by-case basis and approved by the CEGE Departmental Health and Safety Officer and Ethics Committee. Where experiments are specifically affecting other safety processes – e.g. researching fire evacuation routes – these would be independent of the building's evacuation routes and the assistants will be trained to enable people to leave the building safely in the event of a real fire/alarm. If the alarm system needs to be switched off because of e.g. smoke being deployed in the experiment, this would be part of the experiment's risk assessment and suitable cover would be provided as required.

All visitors to the premises will be required, before entering the working area, to undergo a briefing about hazard safety, including fire, trip hazards, the risks that might arise if particular equipment is in operation (in some cases the risk assessment would preclude untrained visitors from being in the operational area), and they will be required to wear appropriate PPE for the pertaining situation. Visitors will always be escorted whilst on the premises.

The staffing levels for the facility include a full management supervision of the working environment, personnel and equipment. When additional staff are required (e.g. when a large number of participants is required in a particular experiment), additional assistants will be hired and charged to the experiment costs.