STAGE Case Study (Commentary and Images)

STAGE reviews within design development

Project: Demolition and New Build

Contract Type: Design and Build Contract

Programme: 18 month (Design and Construct)

Sector: Further Education

Existing Environment

Significant issues established via the STAGE 1 assessment
(Client existing users and Design Team Members)

Best Practice Consideration(s):

- Arson and vandal risk identified – Action: Devise security plan to commence from day one handover.
- Asbestos damage building – Commission of full type 3 survey during holiday period. Full information ascertained in the early stages of project costing. Resources allocated to manage this aspect in budget.
- Flooding site (floodplain) – Established early on during design development. Site levels revised for proposed building.
- Flooded basement and pump room – Provision for site pumping
- Chemical hazards – Review of lab undertaken with client lab staff, safety cabinet and extract flue programmed to be removed in specialist decontamination package during demolition.
- Underground Services – Identified early on, building footprint design away from known services, sub ground services marked out on site as a day one activity.
- Overhead high voltage pylons – Initial designs had outhouse transformer structure located under these lines, design change moved this structure to remove impact risk. Exclusion zone marked out around pylons as a day one activity on site.
- Asbestos lagged boiler system – identified early on and special programme item arranged for removal. Boilers were located under floodwater and required pumping arrangements.

Comments

- Above issues were identified, recorded and discussed during this initial STAGE 1 review.
- During the STAGE 1 review, forward actions, owners and timescales were set and recorded in H&S register
- CDM-C was nominated to be the registers administrator
- The Architect noted all raised issues and reviewed the whole building footprint to reflect the site constraints
- Forward actions that would affect construction were recorded for inclusion into tender documents. These were significant and unusual hazards only.

Construction – Construct ability

Significant issues established via the STAGE 2/3 Assessment
(Design Team Members and Contractor)

Best Practice Consideration(s):

- Pre fabrication of components on site.
- Stairs were pre-cast off site.
- Programme Consideration: early installation of stair and roof elements for safe staff access and weather protection for workers.
- Grading of whole site with type 1 for safe access and to reduce slip/ trip incidents.

Comments

- Consideration by structural engineers (STAGE 2) and the contractors (STAGE 3) improved productivity and programme, thus reduced the overall level of construction work on site

Best Practice Consideration(s):

- Steel work bolted, reducing need for hot work and improve install speed.
- Installation of edge protection at time of steel work frame install providing collective protection. This was for floor and roof levels.
- Programmed Consideration: early consideration and installation of netting in procurement.
- Early installation of steel floor and protection of riser openings

Comments

- Consideration by structural engineers (STAGE 2) and the contractors (STAGE 3) improved productivity and programme and reduced the overall level of construction work on site

Best Practice Consideration(s):

- Work at height done from MEWP reducing the need for large numbers of workers placed in at risk situations.
- Good ground formation, type 1 compacted and concrete base allowed full movement of mobile crane for assembly purposes and MEWP activities.

Comments

- Consideration by the contractors (STAGE 3) to consider build ability indentified their lifting strategy (deemed that use of towers not necessary) and that ground makeup and space would allow use of mobile units. Local HV pylons / sub ground services and route across site was also considered at this point to prevent above/ below ground impacts.

Best Practice Consideration(s):

- Resources and budget; safety nets were included to protect workers close to leading edge operations (Roofing).

Comments

- Consideration by contractor during STAGE 3 when considering steel installation methods and roofing / floor installation practices.

Best Practice Consideration(s):

- Sufficient lay down areas, delivery vehicle routes, crane swing requirements and loading radius logistic items were considered.
- Site traffic / pedestrian routes established throughout site.
- Site fully enclosed by fencing, secure entrance with security and traffic routes with turning circles established.

Comments

- Consideration and development of site layout/ logistic plan was considered in outline during STAGE 2 and detailed during review STAGE 3.

Best Practice Consideration(s):

- Consideration of site security and site welfare needs established early on
- Services for site welfare (electricity, water and waste) established and orders placed early to allow for connections on day one.
- Site water hydrant supply established
- Consideration and development of site set up considered early on establishing full welfare on site from day one.
- Assessment considered site numbers to ensure sufficient space and cabins were allocated.
- Considerations for cooking, drying and changing rooms and first aid were established.

Comments

- Review undertaken outline in STAGE 2, fully in STAGE 3. STAGE 3 was completed 8 weeks prior to commencement on site and enabled good time for procurement of all enabling packages.

End Use / Future Maintenance

Strategy established via the STAGE 2/3 Assessment (Design Team Members and Client Team (FM and End Users)

Strategy validated and reviewed via STAGE 4/5 (Design Team Members, Contractors and Client Team (FM and End Users)

Best Practice Consideration(s):

- Accessible drainage access set away from the middle of road / footways reducing risk and operation impact for future maintenance.
- Parking space adjacent all service points requiring regular maintenance access
- Low level lighting on the building and walkway (bollards) for safe lamp changes
- Clear, level and hard standing movement space around the building for MEWP and Service vehicles.

Comments

- Consideration for future access needs for specialist maintenance equipment identified in STAGE 2, detailed in STAGE 3

- Review aimed to offer minimum risk option where practical.

Best Practice Consideration(s):

- CCTV that requires regular maintenance mounted on a drop pillar. This removes the risk to clean at height.

Comments

- The need for CCTV security identified in STAGE 2, requirement for drop pillar was considered from this meeting and eventually specified by designers in tender documents.

Best Practice Consideration(s):

- Direct placement of disability parking away from main traffic routes with no road cross over points.
- Level hard standing access from parking spaces to main reception / hosting areas.
- Clear access to and around the building footprint for emergency services and maintenance vehicles

Comments

- Access routes and outline emergency strategy identified in STAGE 2/3. From this a detailed strategy plan was developed to encompass issues identified.

Best Practice Consideration(s):

- Design of car park has included a turning (roundabout) layout to reduce the need for reversing.
- No drainage main access points designed within the 'live roadway' system

Comments

- Road way design considered during STAGE 2, ideal of offsetting drainage was communicated as good practice and was incorporated by the Architect and Civil engineer into the design.
- Use of turning points discussed, but project footprint enable use of turning circles.

Best Practice Consideration(s):

- Design of car park floor finishes and raised curbing on pedestrian routes to reduce vehicle misuse.

Comments

- Consideration of pedestrian routes during STAGE 2. The need to clearly demark people and car environments. The use of raised areas and coloring was explored.

Best Practice Consideration(s):

- Level route from road system to main goods in area and principal workshop areas. This aids deliveries and maintenance.
- Ample temporary storage / unloading space.

Comments

- Identification of all goods in and waste out needs were discussed during STAGE 2. This identified two focal points and these areas underwent focused review.

Best Practice Consideration(s):

- All street lighting that requires occasional at height access (via MEWP) is set way from existing overhead electricity transmission lines.
- Street lighting pylon located hard stand areas for easy MEWP access.

Comments

- Initially discussed during STAGE 2 review, the locations were plotted to removal install and future maintenance risks.
- Design considered the need for vehicles to access each light fitting for future maintenance.

Best Practice Consideration(s):

- Removable bollards installed to prevent unlawful access around the building hard stand but allows passage of pedestrians, small delivery carts and bicycles (Bike store far right of image).
- Main Switch room accessible by road for maintenance vehicle access.

Comments

- Consideration for access management was considered in STAGE 3 to reduce abuse of service access routes.

Best Practice Consideration(s):

- Ample space provided within car park for workshop material drop off.
- Bin store location considered bin vehicle access arrangements, allowing level access from store to bin vehicle collection area.

Comments

- Clear loading areas were designed following initial STAGE reviews.

Best Practice Consideration(s):

- External stairwells protected from rain to prevent moss build up.
- External lighting provided on escape stair
- External lighting accessible without the need of access equipment and positioned to be accessed off flat floor landings.

Comments

- Consideration given to all external lighting locations during STAGE 2/3 review.

Best Practice Consideration(s):

- Inclusion of rear access gate for larger service vehicles and regular landscape maintenance vehicles. Allowing direct access to playing fields and removing need to travel through car park / pedestrian area.

Comments

- Consideration given during STAGE 1 / 2 reviews to ensure building footprint could accommodate key vehicle movements.
- Benefit of including service gate was collectively agreed and included into the overall scheme.

Best Practice Consideration(s):

- Inclusion of 'crash bars' around structural columns.
- Further clear, level hard standing for maintenance vehicle.
- Further example of low level lighting and CCTV access strategy.

Comments

- Consideration of service vehicle impact was considered during STAGE 2 reviews and hard standing loading capacity was specified at this point as was protective measures.
- Review acknowledged that some positive impacts introduce new risks and these had to be considered (potential vehicle impacts).

Best Practice Consideration(s):

- Consideration and inclusion of moveable bries solaria to allow window cleaning.

Comments

- STAGE 2 identified this method of solar cooling and identified this had an impact on window cleaning. Design was developed to include easy movable sections to facilitate this requirement.

Best Practice Consideration(s):

- Further example of low level accessible lighting and level access routes. Allowing for future safe, quick and easy future maintenance.
- External facing access door(s) inset to reduce of risk of pedestrian and ad hoc service vehicle clashes.

Comments

- During STAGE 2 review, a clear strategy was collectly agreed that external lighting should be kept accessible and at a low level. This intent was communicated forward by the architect to the specialist lighting designer.

Best Practice Consideration(s):

- Consideration and allowance in design for emergency vehicle access. Design accommodates free movement for all fire tenders used by the local authority.

Comments

- During initial STAGE 2 review, the link bridge was identified and considered for possible vehicle impact. Review undertaken to confirm all local Fire Authority vehicles could access under this section, thus supporting the overall STAGE 1 fire strategy.

Best Practice Consideration(s):

- Accessible windows for cleaning by use of reach cleaning system.
- Only one element of design was unable to meet the overall cleaning strategy and was designed to be cleaned internally (refer to next image)

Comments

- STAGE 2/ 3 design review reviewed each elevation and considered each window against the overall window cleaning strategy. One window was identified as problematic and revised arrangements were introduced by the schemes architects.

Best Practice Consideration(s):

- Second floor window accessible internally for the purpose of window cleaning. It was considered and deemed too high for external methods by the design team and support the desire to install fixed external blinds in this area.

Comments

- Revised strategy identified and implemented post STAGE 3 assessment and team consideration.

Best Practice Consideration(s):

- Clear access routes provided around all drainage gutters and easy access to all man hole areas.
- Dedicated pedestrian routes provided through main entrance and within the car park area.

Comments

- Further examples of clear pedestrian routes onsite considered during STAGE 2/3
- Drain strategy confirmed during STAGE 2 review and validated during STAGE 3

Best Practice Consideration(s):

- Clear access routes provided to underground tank (Rainwater harvesting) storage area.
- Grounds strengthen to ensure future maintenance vehicle can access this area without damaging paving initially designed for pedestrian use only.

Comments

- Need to access storage tank for ad hoc maintenance was considered during STAGE 2. Post review, it was confirmed that 'transit' sized vehicles may need to access this area and the architect communicated expected loading of this equipment to civil engineer for consideration. This resulted in an increase in general paving loading capacity, installation of drop curbs for access and lowering of the rain water harvesting tank to remove risk of collapse due to heavy vehicle movement above.

Best Practice Consideration(s):

- Double leaf doors provided in main throughway to assist internal deliveries and high volume people movement.
- Key doors provided with fire alarm magnetic openers to allow them to be left open, thus improve circulation without compromising the fire strategy.

Comments

- Detail on these doors and option to include magnetic holders were considered via the STAGE 3 process.

Best Practice Consideration(s):

- All internal lighting positions considered planned furniture locations to consider access and light level above and around each item.

Comments

- During STAGE 2, an overall strategy was agreed not to place light fittings directly over final furniture. Architect communicated end users floor plans to M&E engineers who draft final scheme ensuring limited conflicts and that adequate lighting would be provided to key areas, such as workstations.

Best Practice Consideration(s):

- Specialist consultancy services introduced where design team felt expert knowledge was required. In this case the trapeze walkway for the drama studio.

Comments

- The STAGE 2 review indentified that specialist lighting needed to be introduced into a drama area. This led to reviews with specialist design to ensure design proposals were valid and safe.

Best Practice Consideration(s):

- Access mess installed to allow semi trained persons (students) to safely work on stage lighting.

Comments

- Although identified during a STAGE 2 review, the specialist nature of the 'trapeze' system required a specific off line review away from the STAGE process. Final findings were fed back into the STAGE process and recorded in the H&S register.

Best Practice Consideration(s):

- Ample lighting was provided in the stage light at height work area.
- Special management arrangements established to ensure drop hazards through mesh system was controlled.

Comments

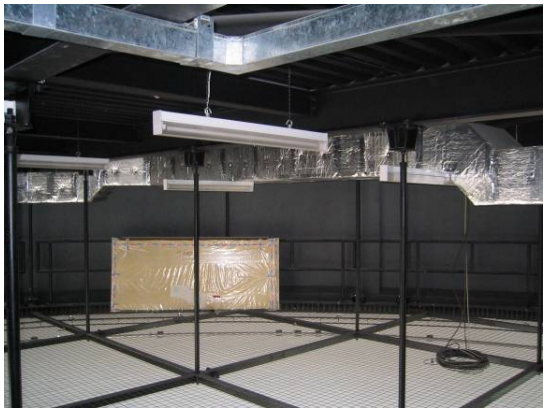
- Although a specialist design package, the STAGE 2 review identified that detail communication was required with the specialist design team and the main design team. This communication was co ordinate via the project Architect.
- Future management control measures for this system were communicated to the H&S File.

Best Practice Consideration(s):

- Trapeze area weight restrictions were confirmed, accessed and communicated to the contractors and final end users.

Comments

- Communication of residual hazards connected to this system was considered during STAGE 3 review.
- Residual risks (drop hazards, weight loading and service/ maintenance needs) were communicated post STAGE review, via the H&S register to the contactor via H&S Plans and the End User via the H&S File.



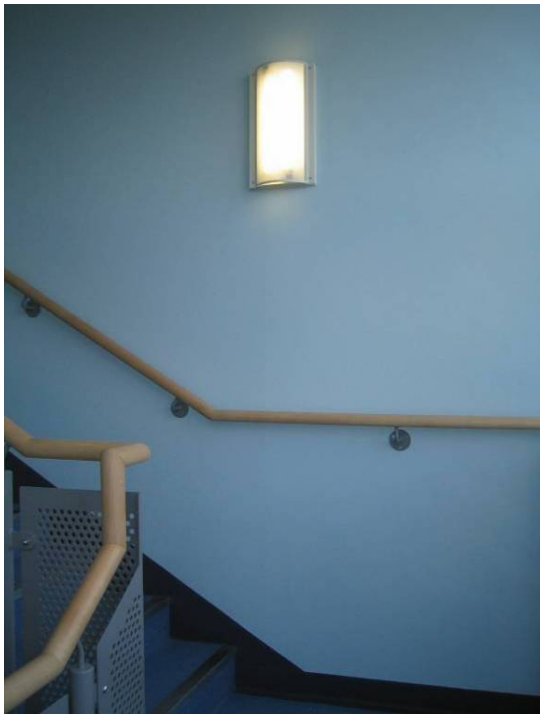
Best Practice Consideration(s):

- All lighting fittings on stair cases were located to be accessed off level landings without the need of any access equipment.
- No lights were ceiling mounted above the ground floor landing.

Comments

- Consideration was given to future lighting access during STAGE 2 where policy direction was given that double height lights are avoided where practical.

- STAGE 3 validated design proposals. Reduced risk for both construction and end users without the loss of any benefits



Best Practice Consideration(s):

- Lighting fittings in double height areas, such as atriums were located at low level and 'up lighted'

Comments

- Design intent communicated during STAGE 2, validated during STAGE 3.
- Lighting designers confirmed that sufficient lighting levels could be achieved via up lighting.

Best Practice Consideration(s):

- All plant rooms were provided with leaf and a half doors to allow easier access when component changes are required.
- Size of largest component was considered during STAGE 2 and sizes communicated to the Architect

Comments

- Consideration during STAGE 2, the architect increased door size to support both the install and future maintenance process. They further considered the route to this area to ensure no single leaf doors on route would hider access of largest tank component.

Best Practice Consideration(s):

- Ample room provided within every plant room allows space to work on distribution boards.
- Consideration of plant withdraw space, include large tank.
- Easy access to isolation switches
- Well lit
- Room supplied with 230 rcd supplies.

Comments

- During STAGE 2, design policy was agreed that the architect should consider ample space for M&E services.
- M&E team drafted early layout plans of these areas and provided them to the Architect (Showing key components only)
- Architect included space into early layout drawings.

Best Practice Consideration(s):

- In future library location, light designed to fit between isles to improve light levels and allow easy lamp changes.

Comments

- STAGE 3 confirmed row locations for M&E input.

Best Practice Consideration(s):

- All main service runs located within the ceilings are fully accessible for future maintenance access.
- Removal tiles installed to allow access to main trucking, tray and pipe work valves.
- Ceiling grid spotted on key valve locations.

Comments

- During STAGE 2 review, locations of key service runs were discussed.
- Post discussions on the runs, the architect ensured all service routes were accessible for future maintenance and alterations
- Full information communicated in final O&M manuals.

Best Practice Consideration(s):

- Within Computer / IT locations, light fittings were designed and located to consider screen glare.
- Natural lighting via roof lights introduced.
- 'Best option' fittings were considered at depth.

Comments

- STAGE 2, intent to locate all fitting at lower level was not achievable in IT area due to final lighting needs.
- Detailed assessment confirmed best forward strategy which included the use of long life lighting and high density output.
- Use of winch system considered on light fittings, but deemed financially and practically unviable.

Best Practice Consideration(s):

- Drainage where possible was designed to be accessible from leading unprotected edges.
- Skylights in each classroom designed to be cleaned from roof service route.
- All roof areas are accessible from internal staircase for safe access.

Comments

- STAGE 2 reviews established overall design intent regarding external guttering and window cleaning assess arrangements.

Best Practice Consideration(s):

- External lighting provided in service routes.

Comments

- Due to the external placement of roof plant and the need for regular access, lighting was considered during STAGE 2 assessment. Once discussed, the Design team collectively agreed that lighting was required to these areas and proposals were included into the overall design.

Best Practice Consideration(s):

- Non slip finish applied in external roof access routes.

Comments

- Consideration was given during STAGE 2 to provide safe routes to plant farms and non slip routes were agreed.

Best Practice Consideration(s):

- Skylights provided are non fragile and fall protected.

Comments

- At STAGE 2 review, consideration was given to ensure fragile materials were not specified into the design.
- STAGE 3 review confirmed sky light proposals and manufactures details for inclusion in to the H&S file.

Best Practice Consideration(s):

- All roof areas have full edge protection

Comments

- STAGE 4 confirmed that one area had not been given full edge protection via a fixed parapet wall.
- This STAGE 4 process identified the oversight and proposed installation on a freestanding handrail system which was collectively agreed.

Best Practice Consideration(s):

- Easy access for drain pipe Roding / jetting.
- Designed to be easily cleaned from safe internal walkway
- Windows able to be cleaned without ladders.

Comments

- Roof access strategy developed in STAGE 2 review.

Best Practice Consideration(s):

- Full edge protection around all roof mounted plant by increasing the parapet wall during design.
- Wall was installed early on in the construction process to establish full protection for construction workers.
- Ample flat service routes provided around all equipment
- Not shown, but bridges installed over piped sections.
- External lighting and rdc power supplies provided to all plant farms to assist future maintenance.

Comments

- Initial design proposals specified roof plant wall at 300mm. STAGE 2 review identified this and team collectively agreed an 1100mm plus enclosure.

Best Practice Consideration(s):

- Main roof skylight fully protected and can be cleaned without the need of access and / PPE equipment.

Comments

- Consideration during STAGE 2 review improved fixed protection to the roof light fixture.

Best Practice Consideration(s):

- Full lighting study undertaken to ensure security and safety of key vehicle and pedestrian routes. This considered the use of low level lighting as proposed.

Comments

- Study undertaken after STAGE 3 review to validate design proposals were fit for purpose.