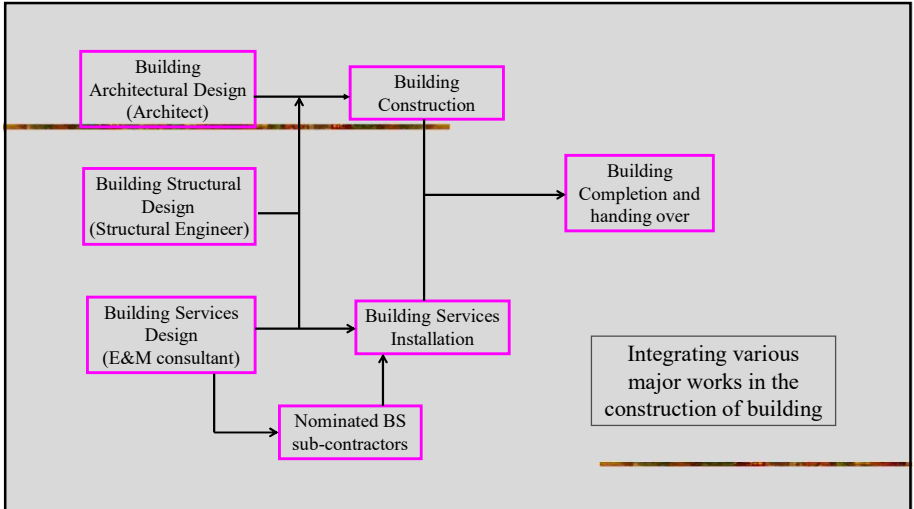


# **Building Construction and Building Services integration**

**機電設施在商業樓宇施工時  
與承建商的工作配合**

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November 2022  
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**Building services are an important part  
of the building fabric for high-quality  
modern buildings**



## **Essential building services in building include:**

**HVAC, Electrical, Fire Services, Plumbing & Drainage, Lift and escalator, Security system, Energy & Environment (BEAM+ concern & input), Telecommunication, Building Automation Systems, or other systems that provide human's environment comfort (e.g. acoustic, thermal insulation ...)**

## **How is such services related to building works?**

- **Many services works are required to run within the building, the installation of which needs to be carefully coordinated with other building works.**

e.g. openings on walls and floors  
rising main or duct shaft  
loading concern as for machine stand  
installation concern as for fixing or hanger of equipment  
arrange work and/or transportation access to facilitate installation

- **A large number of building services are required to fit-out carefully with the building finishes works**

e.g. Sanitary fittings,  
switch and panels on finished walls,  
service points exposed on the false ceiling,  
interior decoration related works.

- **Building services works exhibit certain degree of specialization that they have their own concern in design, installation and logistic requirements.**

- **Plant and equipment for many building services are heavy and huge in size that need special accommodation and handling during the construction process, for example**

Machinery: chiller plant, compressor and evaporator, air handling units, noise silencing installation, air filter, transformer, generator, lift machine, escalator, pumps, fire resisting related equipment, water treatment facilities

Pipe : for water supply, gas, drain, chill water, fire services

Duct : ventilation and air distribution system

Fire resisting equipment : fire dumper, fire stop, fire shutter

- **Many services are placed in inconvenient locations where access and installation are very difficult, for example**

On roof – chiller plant and other A/C related equipment, storage tanks, machine for external wall cleansing.

In mechanical floor or machine room – transformer, power distribution equipment, power generator, A/C related equipment, air filters, pumps, storage tanks, boilers.

Within ceiling void – cable, pipe, duct, a/c units, lighting, detectors and telecommunication related network ...

Other location – basement, service tunnel/trench, service shaft, duct riser, man-hole, confined space, dangerous goods store



## **Some BSE works affect the critical path of a building programme**

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Lift Services – required the handing over of the lift shaft and machine room for lift installation

Electrical – require to complete before the safe operation of the essential lighting, lift and fire services system

Water supply – require to complete before the safe operation of the FS system.

Fire service system – must be completed and obtained FS certification before building inspection for the occupation permit (OP)

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HVAC – form part of the essential building services for habitation and is also a major concern of the fire services system

Fire Fighting, Plumbing & Drainage – required for the safe and convenient habitation of a building

All these systems are thus required to complete for operation and inspection before the issuance of an Building Occupation Permit

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### **Example of special buildings where BSE requirements are more critical in nature**

- Building for medical purposes
- Large-scale high-rise office buildings
- Intelligent buildings
- Commercial complex
- Community & public buildings (e.g. theatre, exhibition halls or transportation facilities)
- Special industrial buildings esp. for go-down, cold store, cargo handling centre or logistic centre.
- Hotel or building with large catering provision (kitchen equipment)

### **Role of Main Contractor in the process**

**Main contractor often has the contractual obligation to take care the installation of building services, including:**

- Provide Nominated BS sub-contractors with the necessary supports, facilities and access for the carrying out of works (provide attendance to NSC).
- Coordinate the BS installation in accordance with the overall construction program.
- Carry out overall building services coordination such as lining up of pipe-run, service routing or ceiling services.
- Carry out the required building works at the agreed time and hand over the works/locations for installation of building services.

## **Building completion as part of the construction process**

The peak period for completing a building often occur at the last few months (from 6 to 12 months, or more) of the construction period depending on the complexity of the building.

### **Milestone of completion:**

- Time to start finishing work
- Delivery of the lift shaft & lift machine room
- Delivery of major locations where building services are to be sited.
- Completion of the major services especially for power supply, water supply, fire fighting system, a/c system electrical installation, lift services and building control system.
- Testing and commissioning process
- Building completion.


- Detail inspection by the client
- Inspection by the Building Department
- Handing over of the building
- Compilation of a defect list and arrangement for the rectification of the defects.
- Updating of the building drawings for submission – where major items (in particular where alteration has been made) that require the approval of the Building Department.
- Production of the as-built drawing for record and maintenance purposes – esp. for BSE works
- Finalization of the contract/final account.

**Other E&M special project cases – A & A works for complex project, the concerns include:**


- Fragmentated delivery of the working areas.
- Arrange non-disturbing working schedule for talents and building users
- Reinstate working areas after every daily works
- Arrange temporary services for disturbed services
- Arrange changing over of the old and new system
- Dismantling of the old system
- Arrange handing over and make good after final completion



## **Explanation Photos for Building Services Installation**

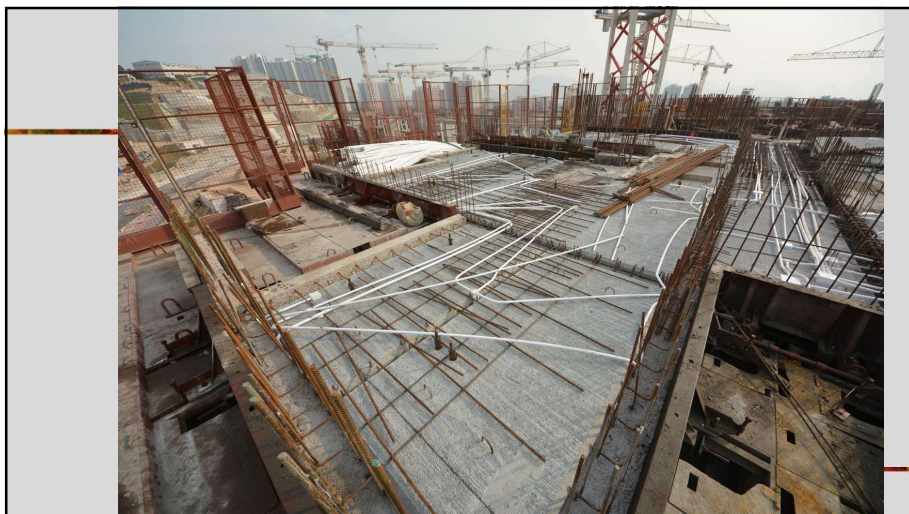


BS works need to be carried out at the  
same time with the building works

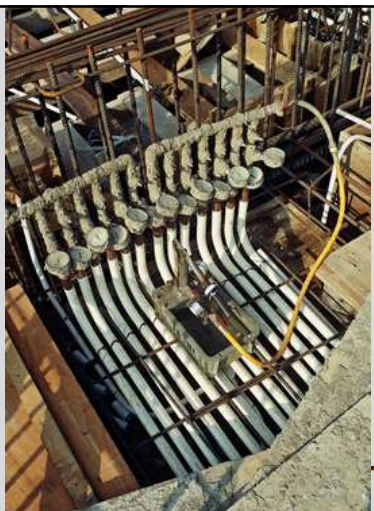


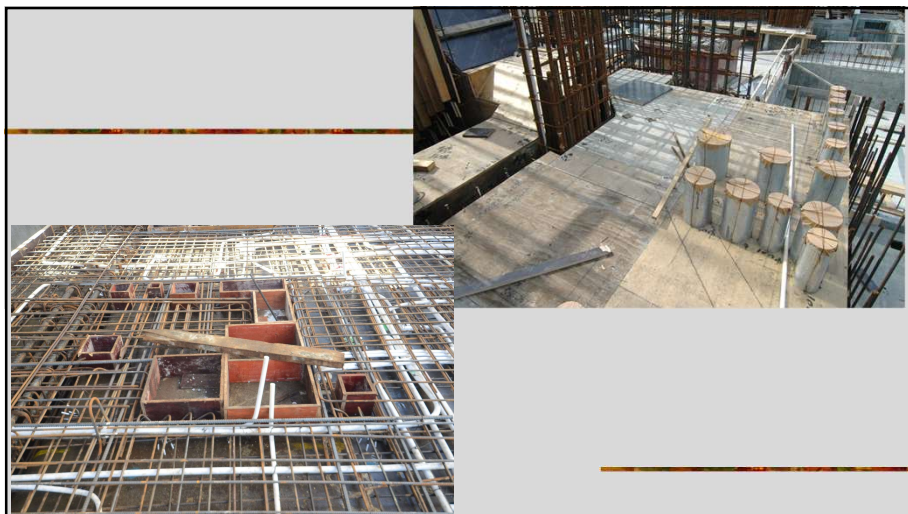






Service-runs inside floor slab





Service-runs inside walls





Cable trench  
in transformer  
room

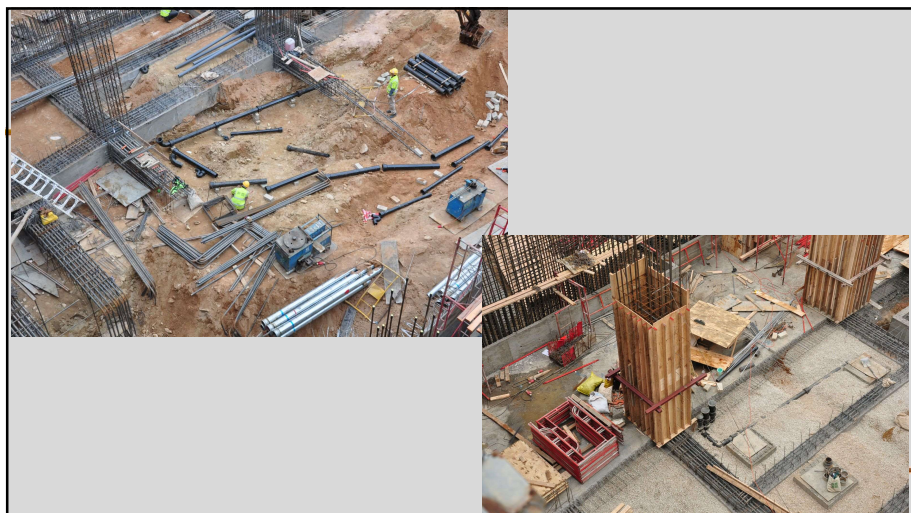
Service trench within  
sub-structure of building



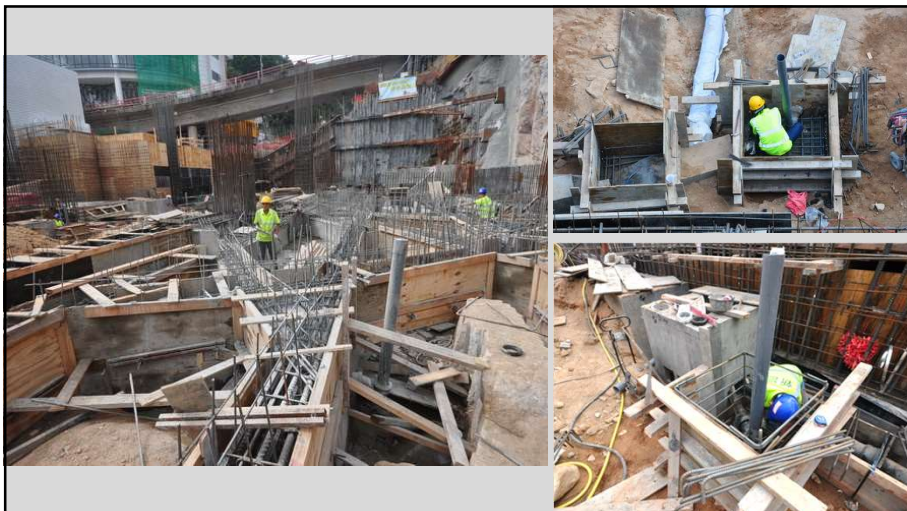
Lift door and lift machine installation

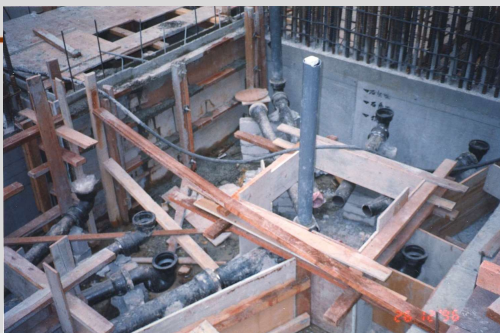




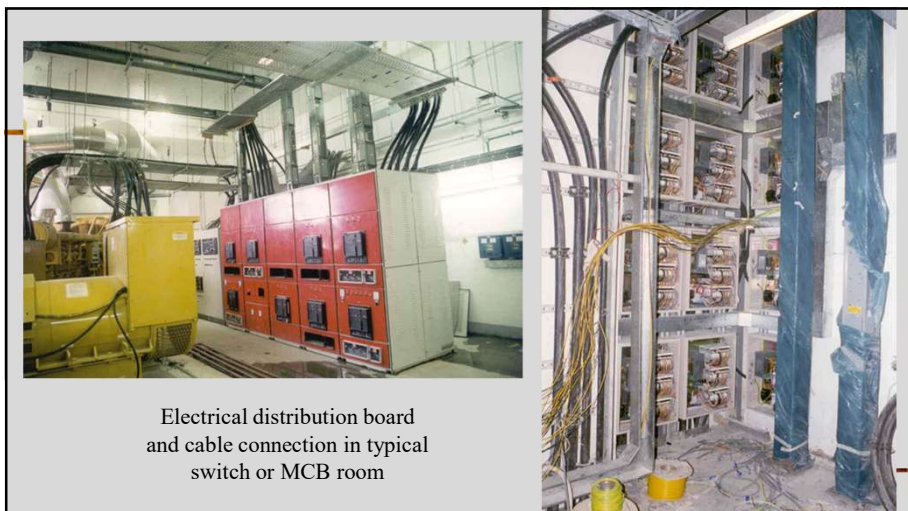
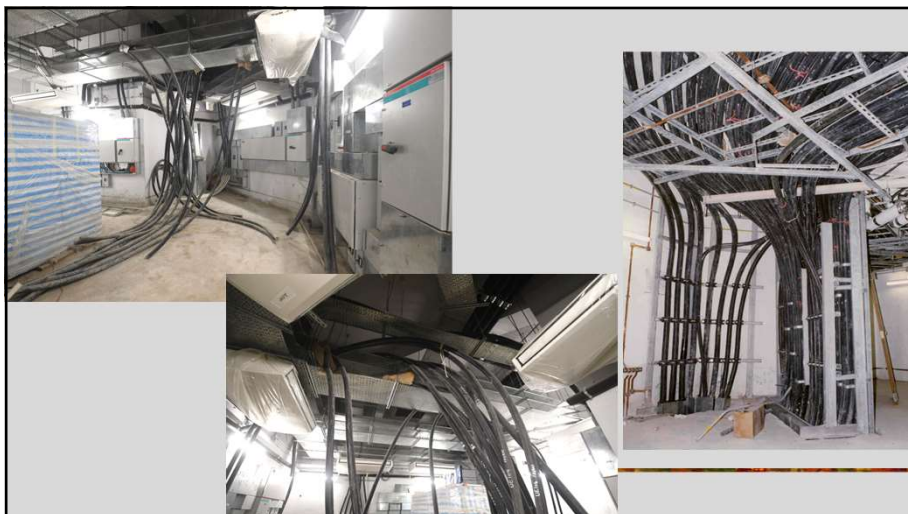






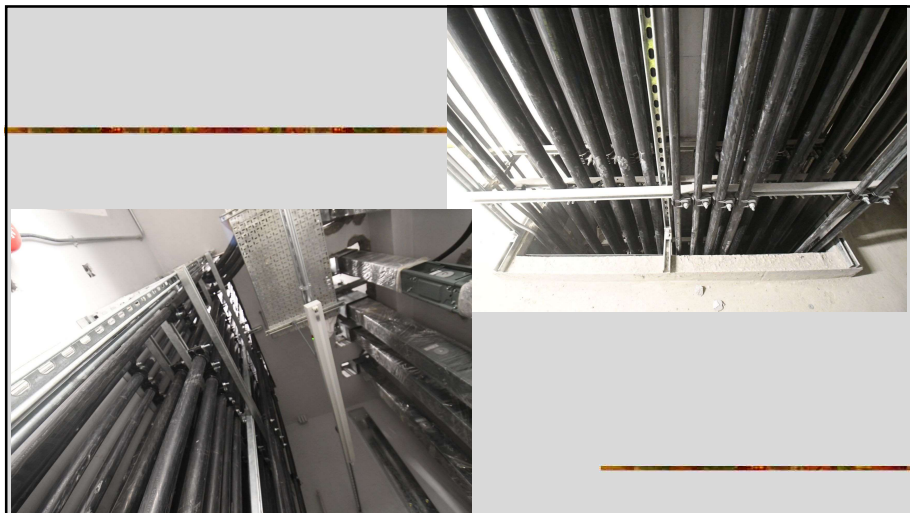


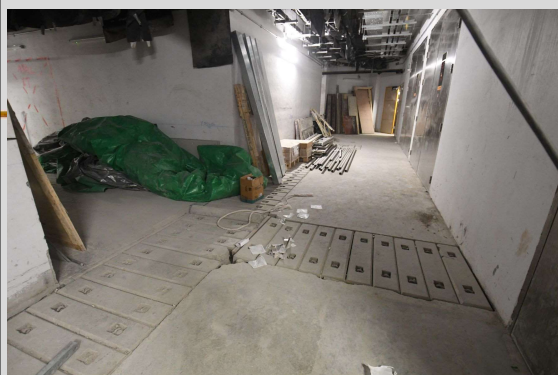
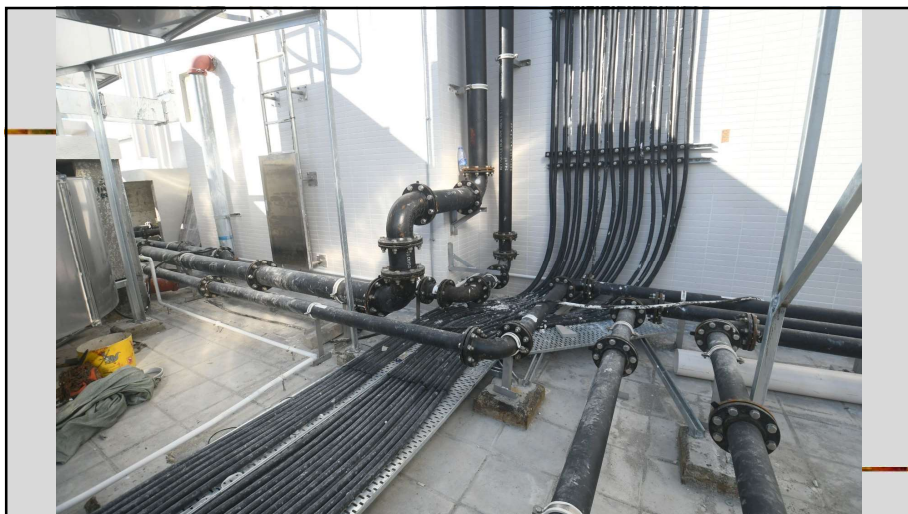
BS works related to  
Power supply installation



Electrical distribution board  
and cable connection in typical  
switch or MCB room







Running and accommodation of electric cable using cable trench







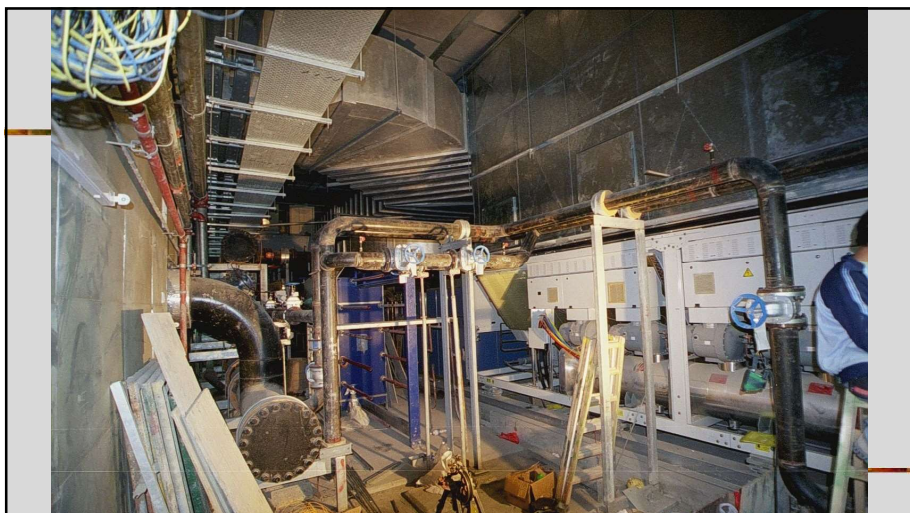
Switch board and control panel  
for electrical distribution systems





BS works inside machine room





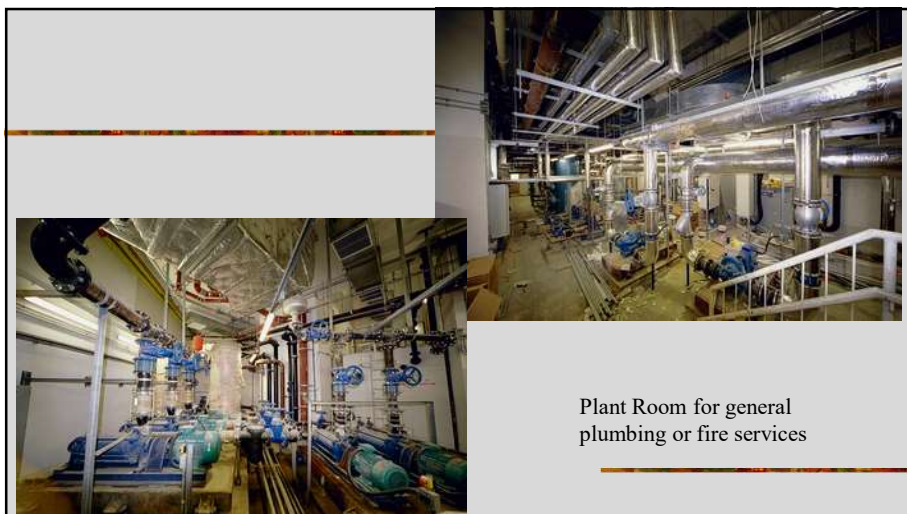




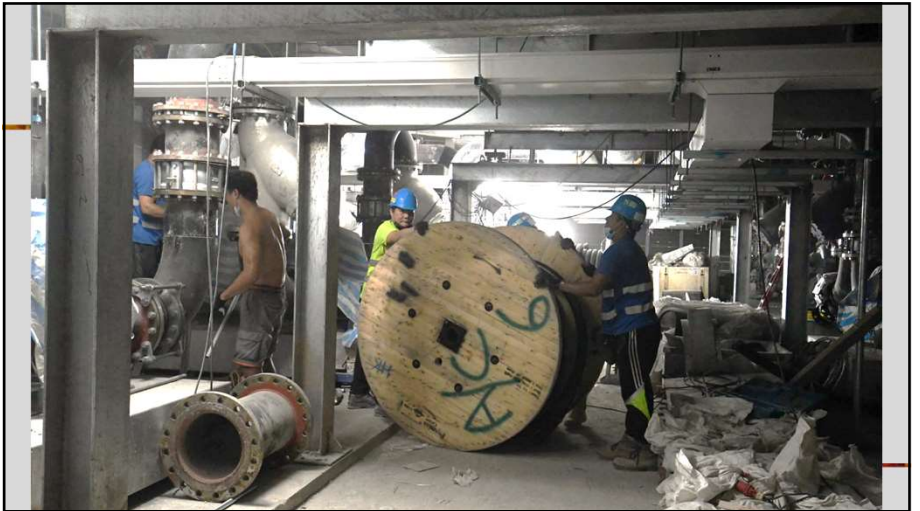


Plant Room before equipment fully installed







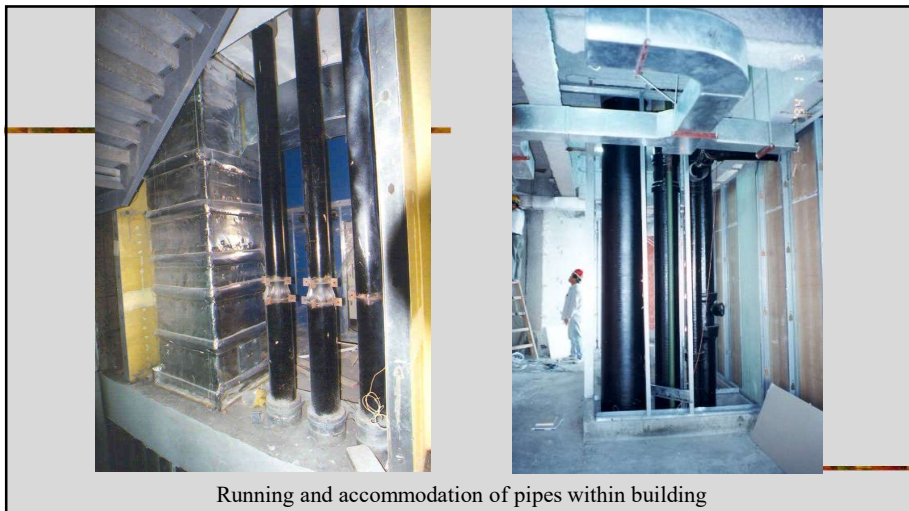




BS works inside service duct



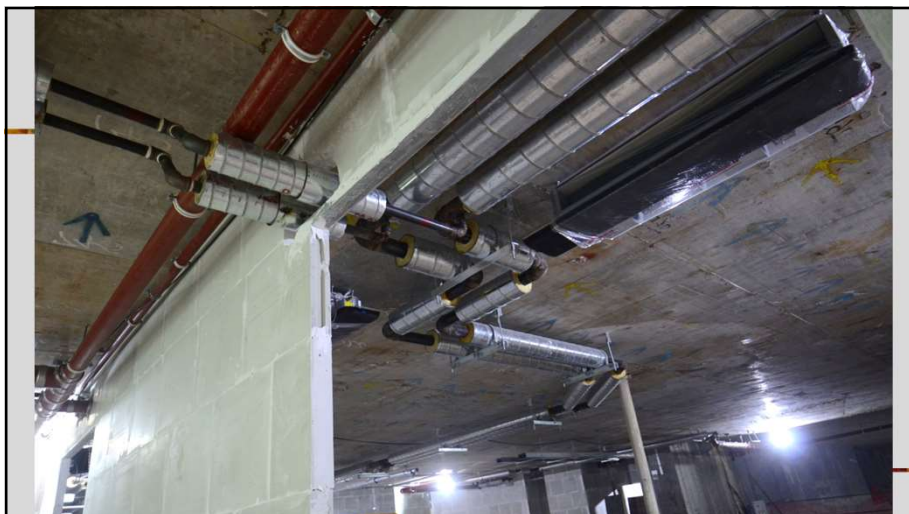




Running and accommodation of pipes within building







Fitting out work in the lift lobby wall

Forming services cubicles  
using the dry wall system



### Hilti products

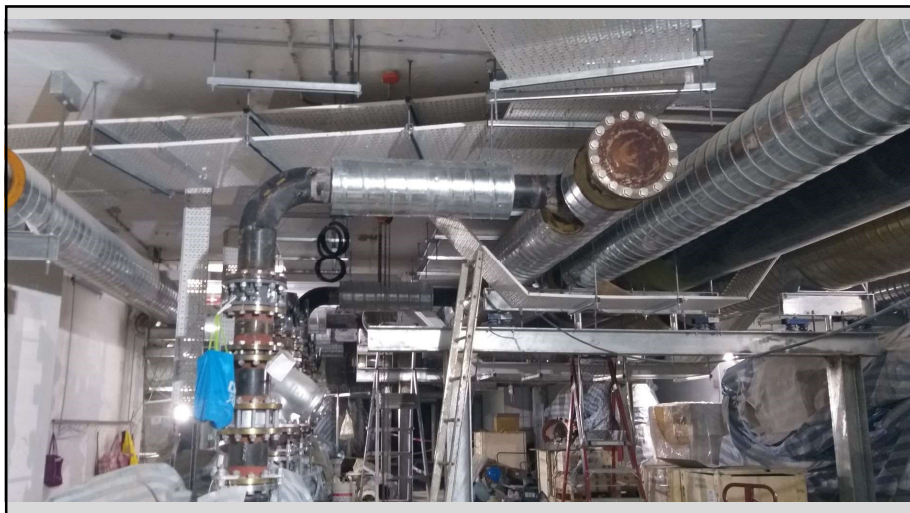
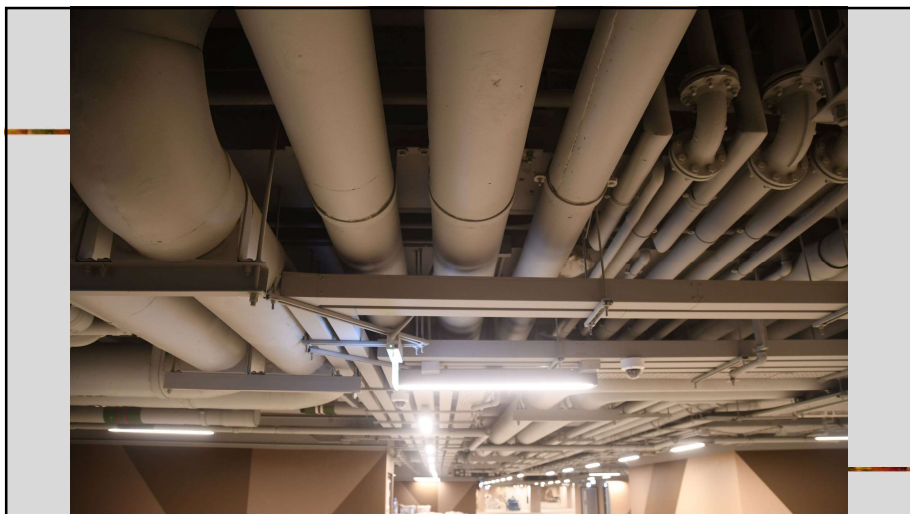
Firestop and fire protection systems

- Fire stop collar
- Cast-in and sleeve
- Fire stop sealant

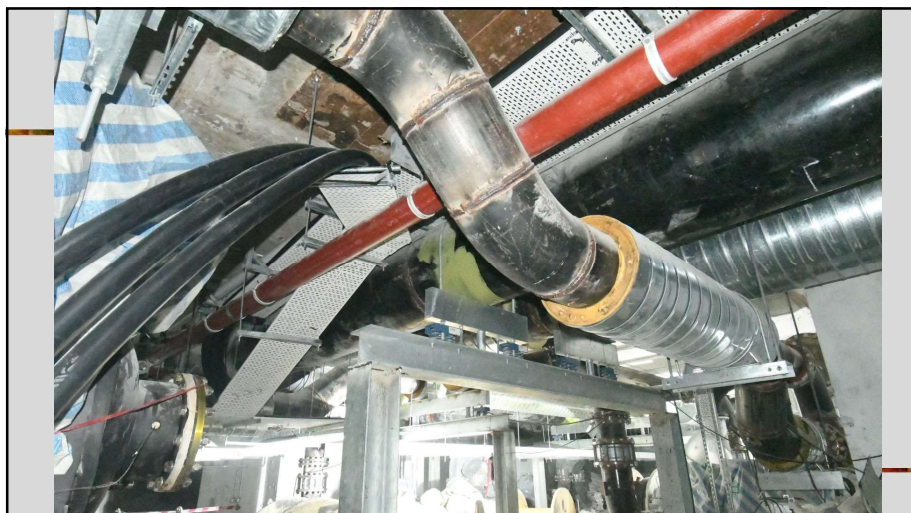


## Running of pipe and duct













Accommodation of large diameter pipes for a/c system



Water tank and pump systems





Base for heavy equipment requires input from builder's work



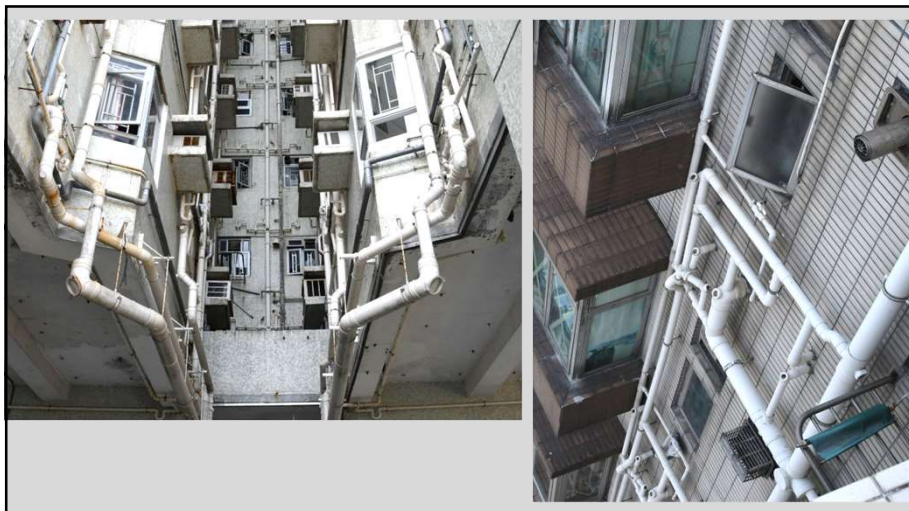
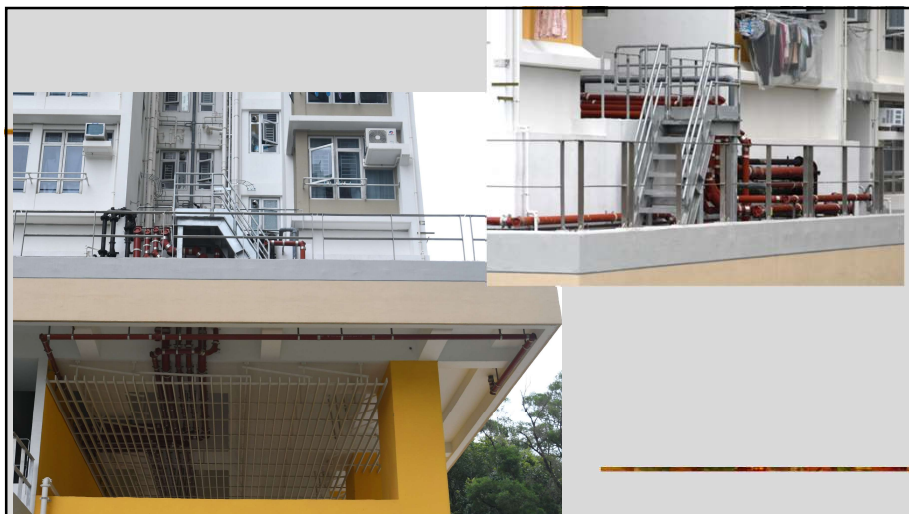
Machine base



Running and accommodation of large-sized pipe works









BS works located inside  
partition wall









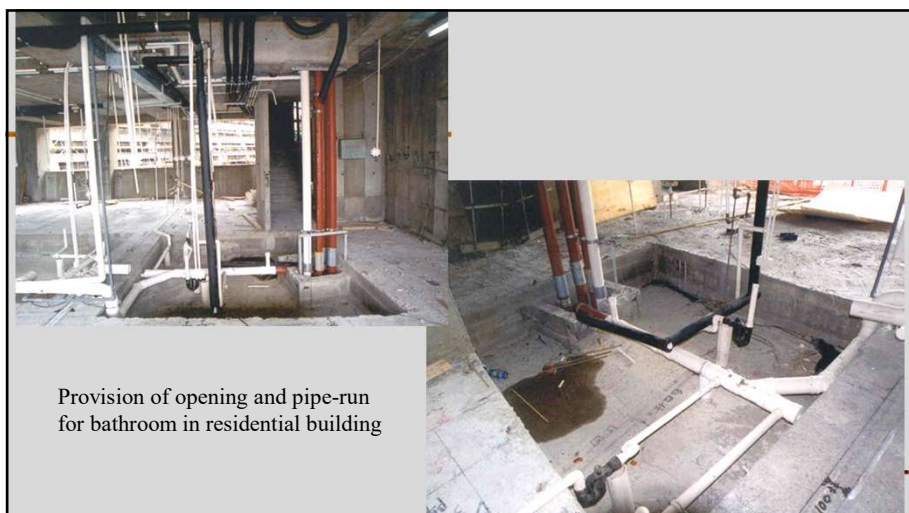
Typical service run inside a hotel room before partitioning



Building services installation has close integration with architectural or even interior design works







BS works involve raised floor  
and floor trucking

Laying of floor trunking with or  
without the use of raised floor



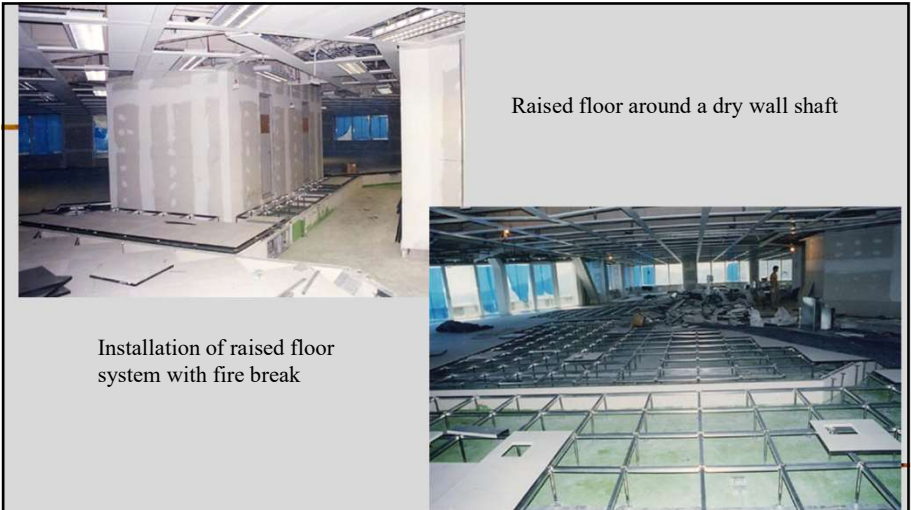




Floor trucking after the  
laying of screeding and  
fixed with a power socket

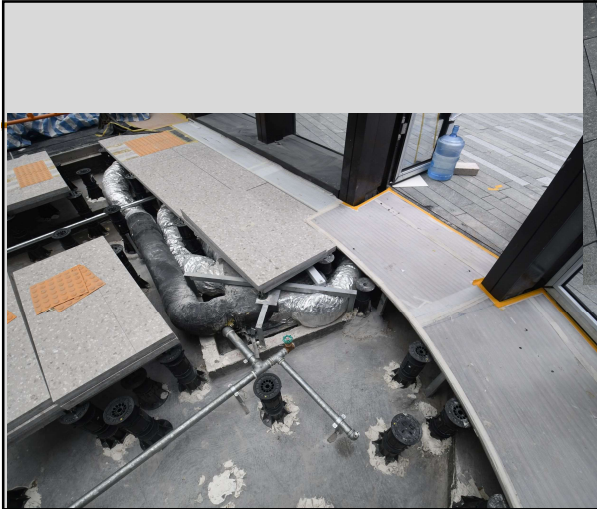


Installation of raised floor





Electrical trucking and air duct running within the raised floor circulating around the core wall





BS works inside false ceiling



False ceiling and  
building services  
inside the ceiling void



Ceiling services before the  
laying of false ceiling



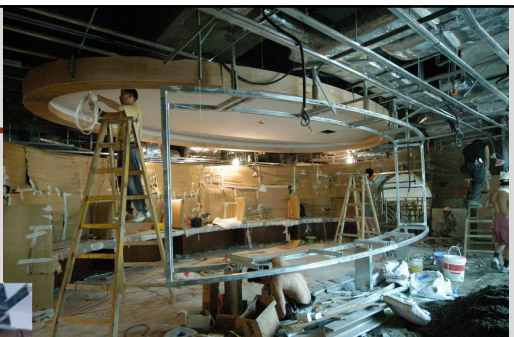
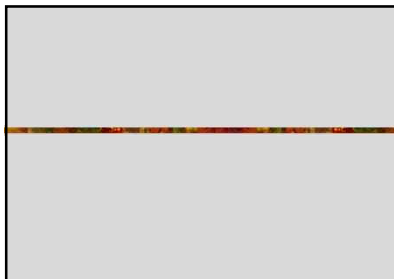
Air duct distribution before placing of the ceiling tiles





Complicated ceiling services works within a commercial complex where certain interior design elements are required

Fire shutter



Complicated ceiling services works within a commercial complex where curtain interior design elements are required





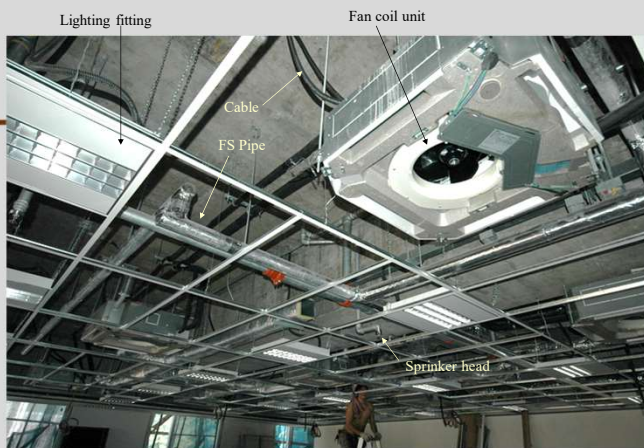


Complicated ceiling services works within a club facility  
where certain interior design elements are required

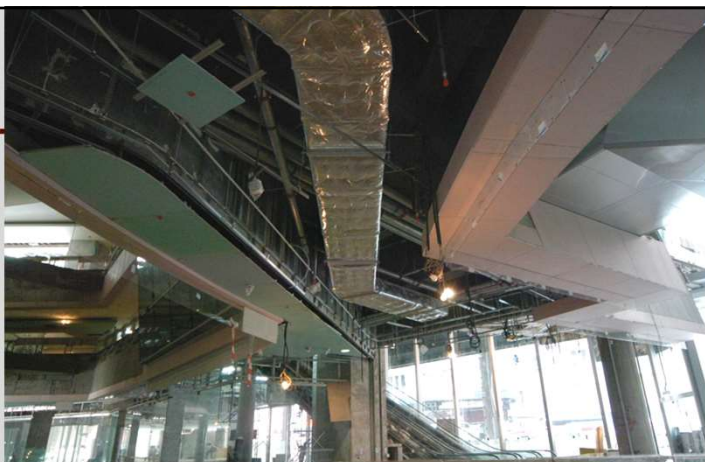




Complicated ceiling services works  
within a commercial complex



Close up view of typical ceiling services before placing the ceiling tiles

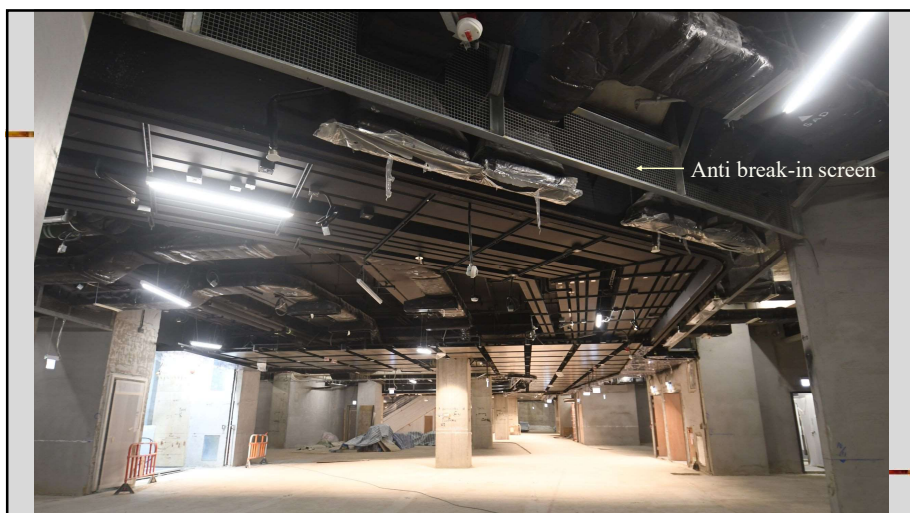


Close up view of ceiling services before sealing the ceiling with rigid panel



Complicated ceiling services layout







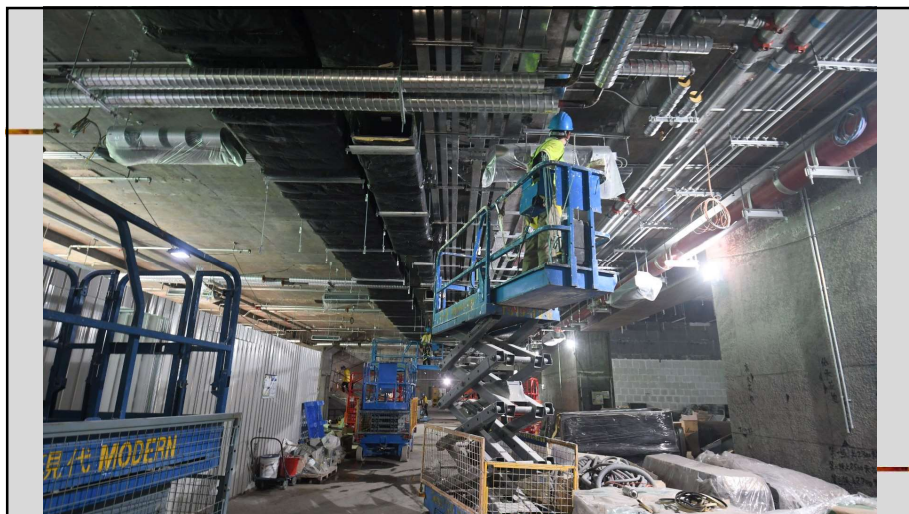


Installation of the ceiling services  
(using leader and work trestle)

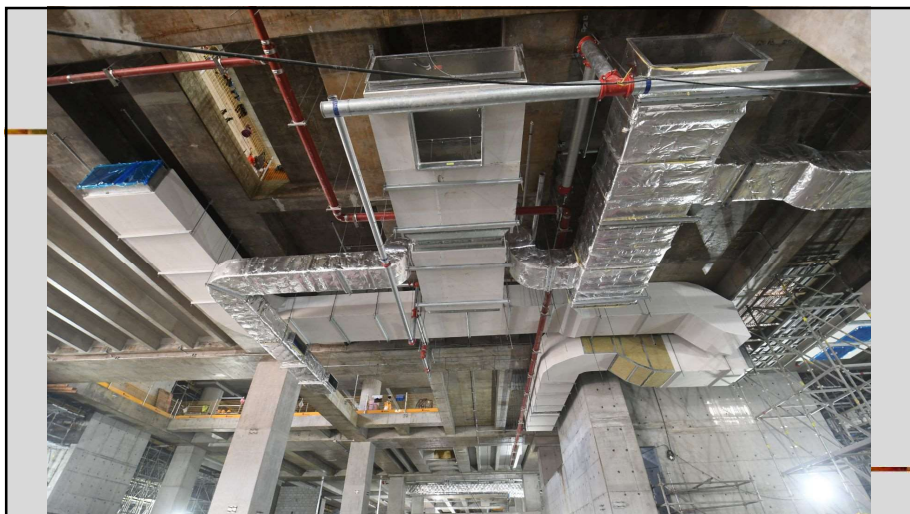


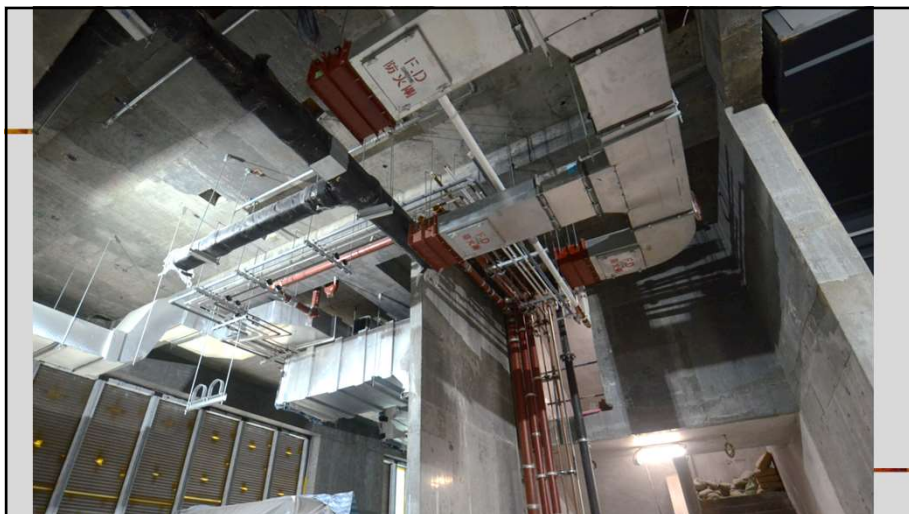
Installation of the ceiling services  
(using lifting platform)





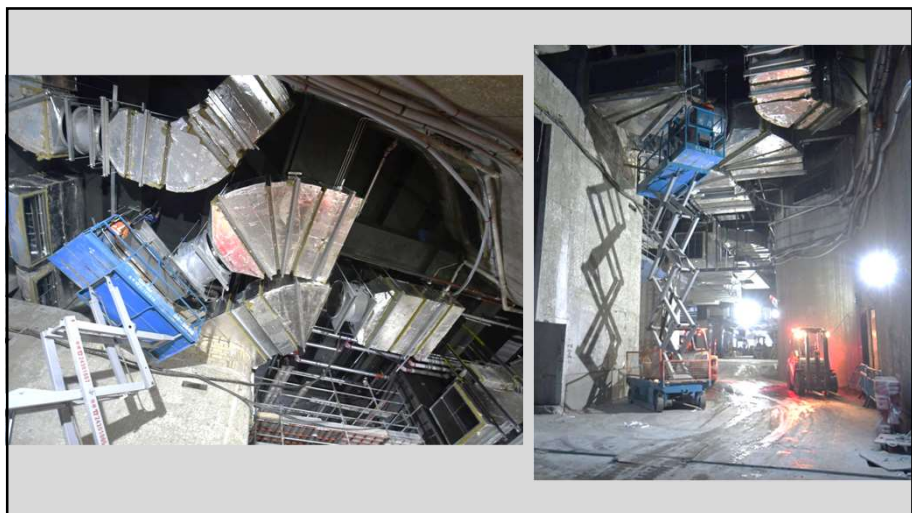
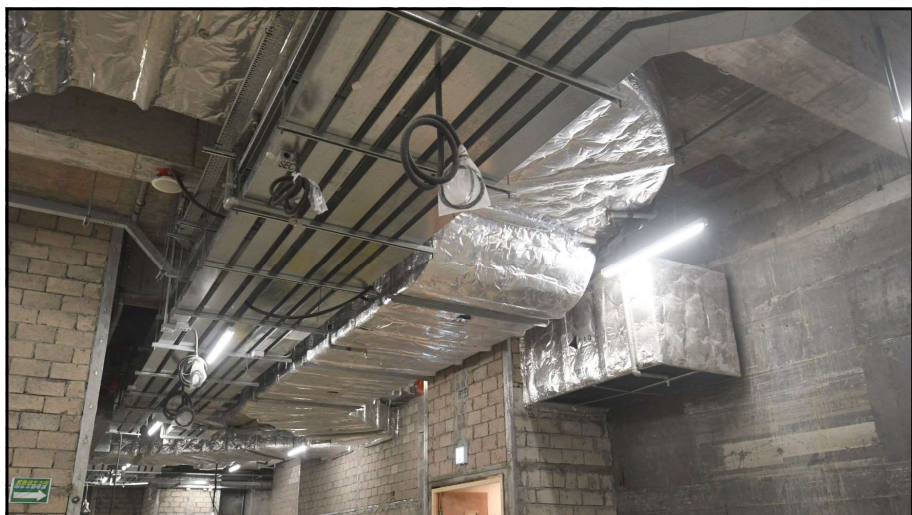
BS works related to  
HVAC installation





Ceiling services before the laying of false ceiling









Complicated duct system mounted on ceiling



Fire damper



Complicated duct system for large scale commercial complex



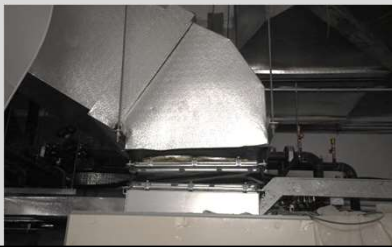










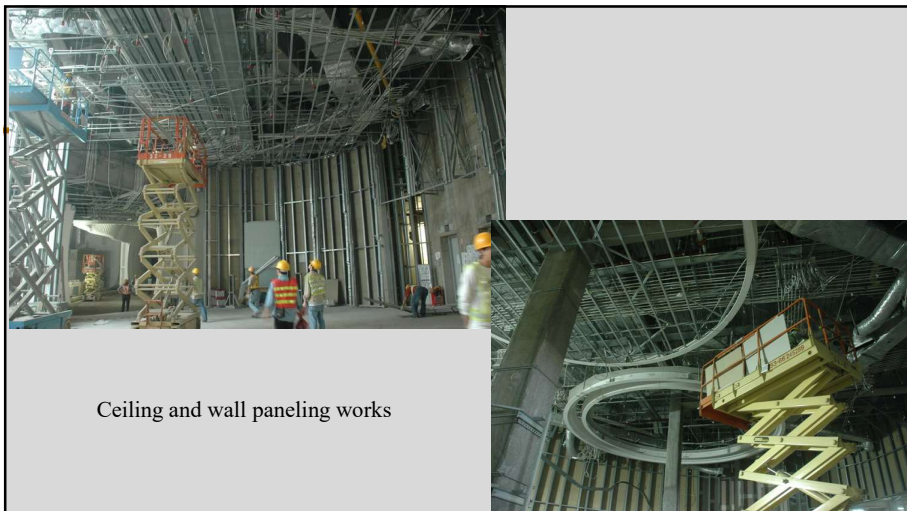


Silencing devices to control noise and vibration



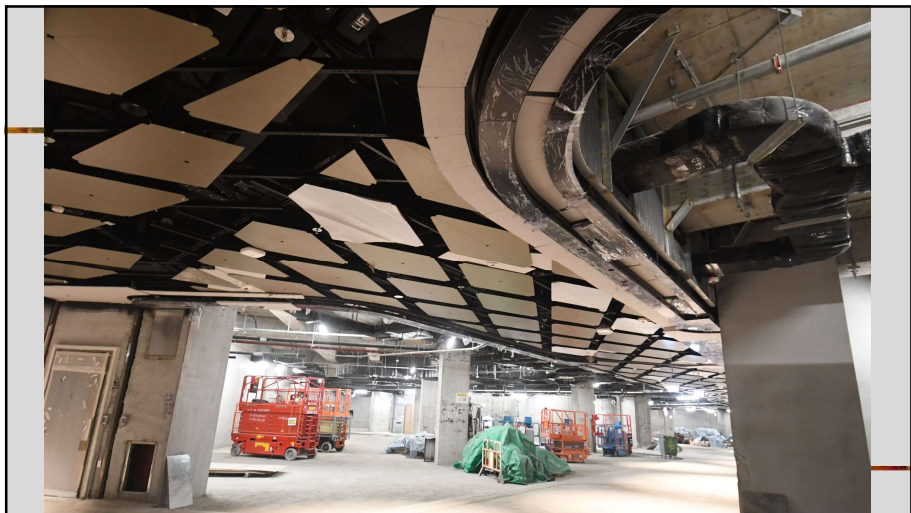


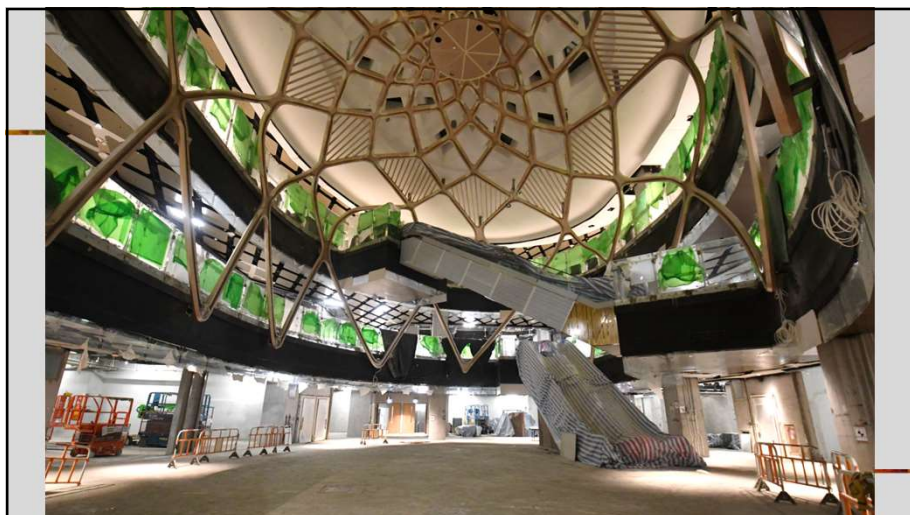
BS works involve detail  
finishing touch-up



Ceiling and wall paneling works



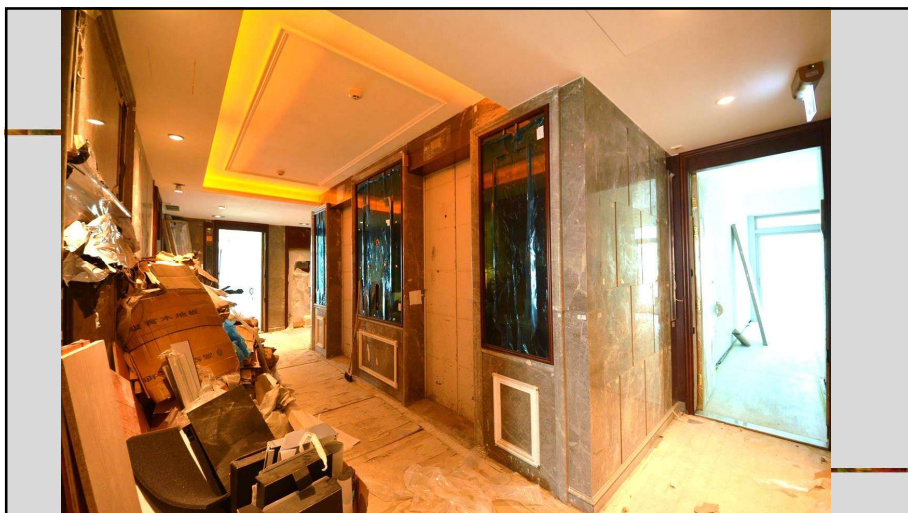




Final finish the lift lobby with delicate wall panels to decorate the lift doors (involve interior design components)



Lift installation – lift door installation fitting the lobby finishes

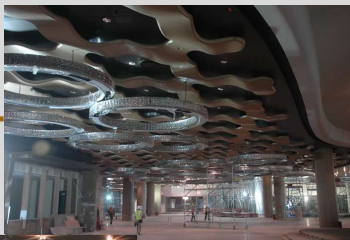




A false ceiling to be final touch-up with the installation of all ceiling service layout



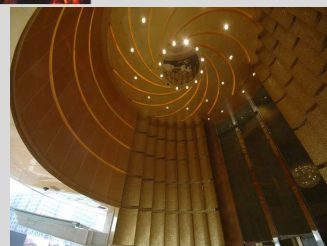




The ceiling  
basically finished



The ceiling  
basically finished



The ceiling basically finished



Equipment located on roof

Typical roof-mounted E&M equipment





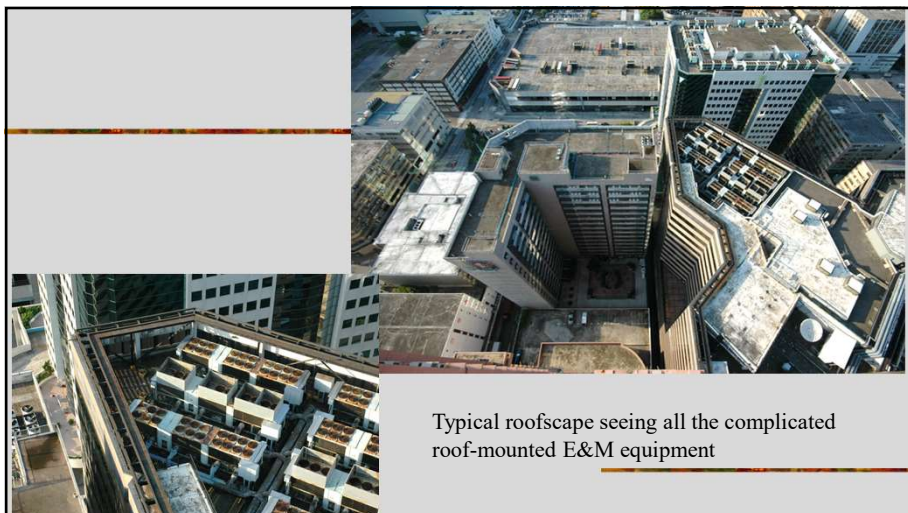






Chiller plant/evaporator units located  
on roof of a commercial complex







Air-cooling units for air conditioning system with silencer installed on flat roof







A/C equipment on roof





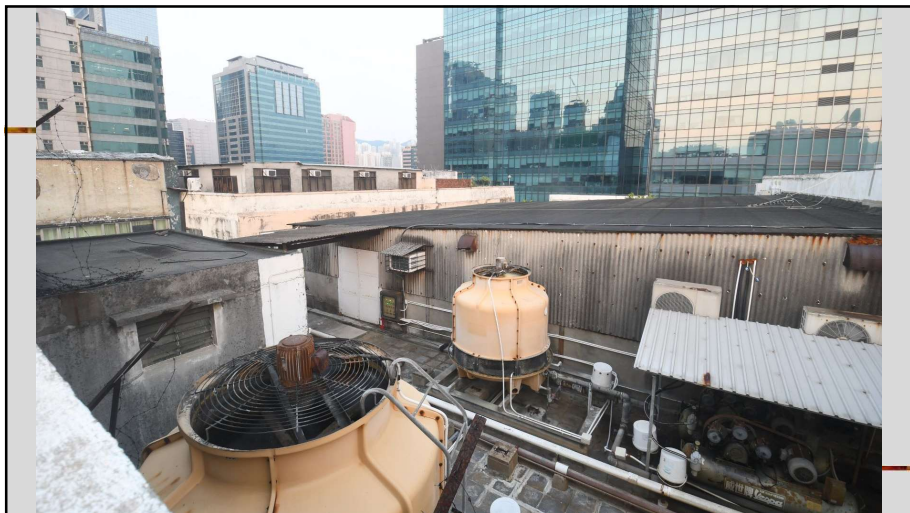
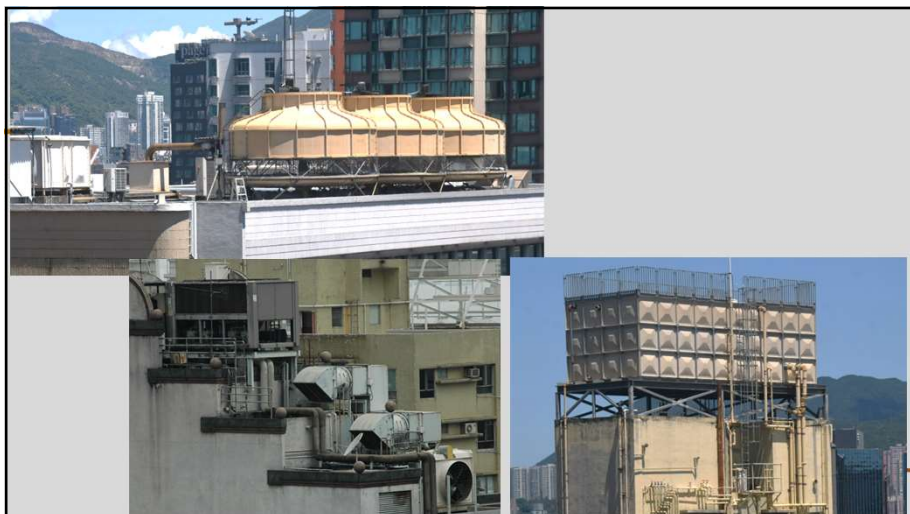
A/C plant and pipe work on roof



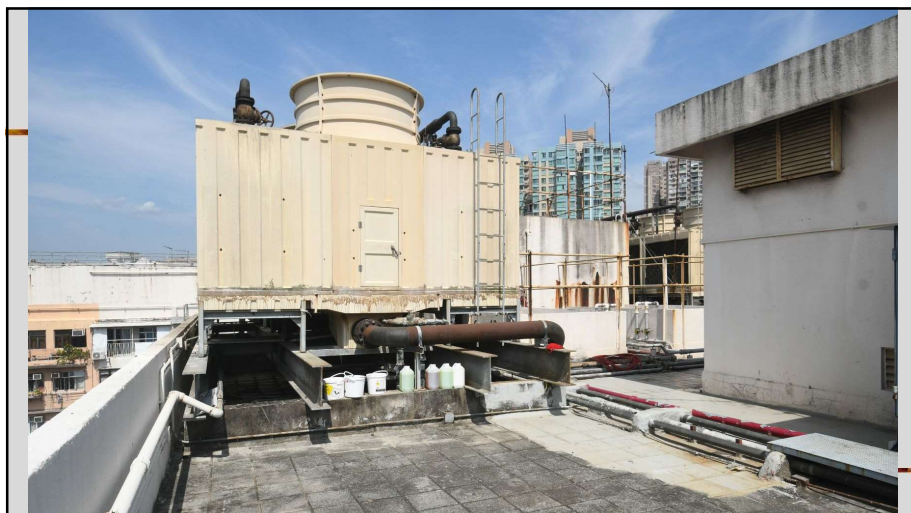
Typical roofscape seeing all the complicated roof-mounted E&M equipment















A/C plant and their  
pipework/power connection



A/C plant and their mounting









## Installation of emergency generator



Installation of generator for large scale office building or commercial complex





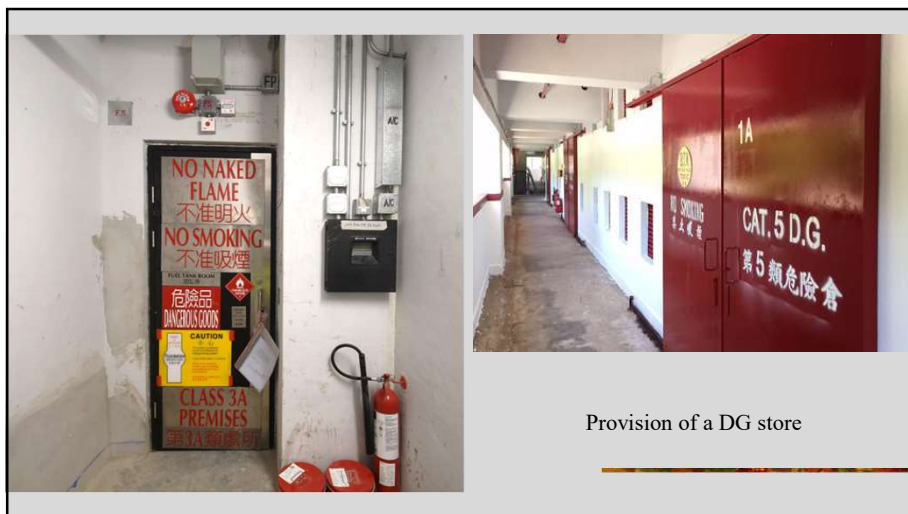


Installation of pressurized  
vessel and steam boiler









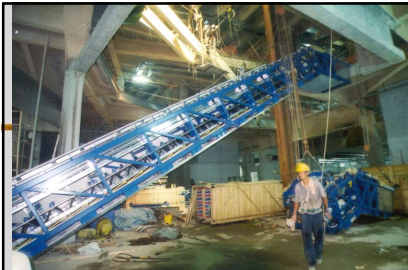
Provision of a DG store

Installation of lift, escalators  
and service gondola





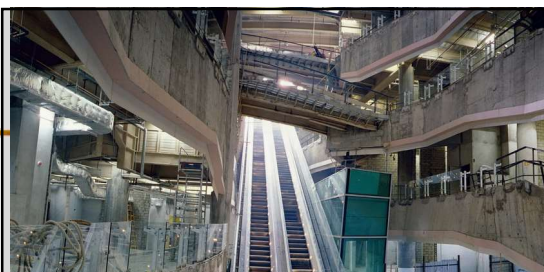
Installing Escalator onto building structure



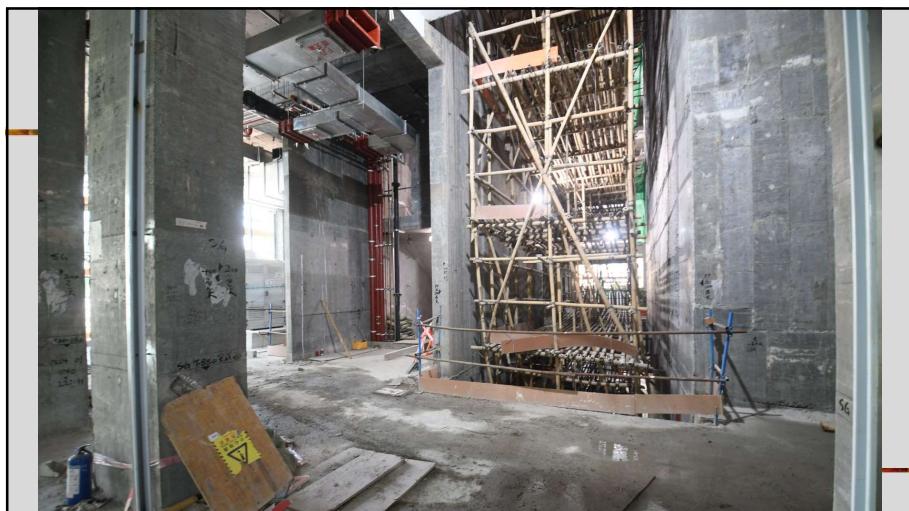
Installing Escalator into a large interior space with long-span and high headroom







Installation of escalator  
in difficult interior space







Installation of window cleansing equipment



Window cleaning system as a form of mechanical building maintenance system in building

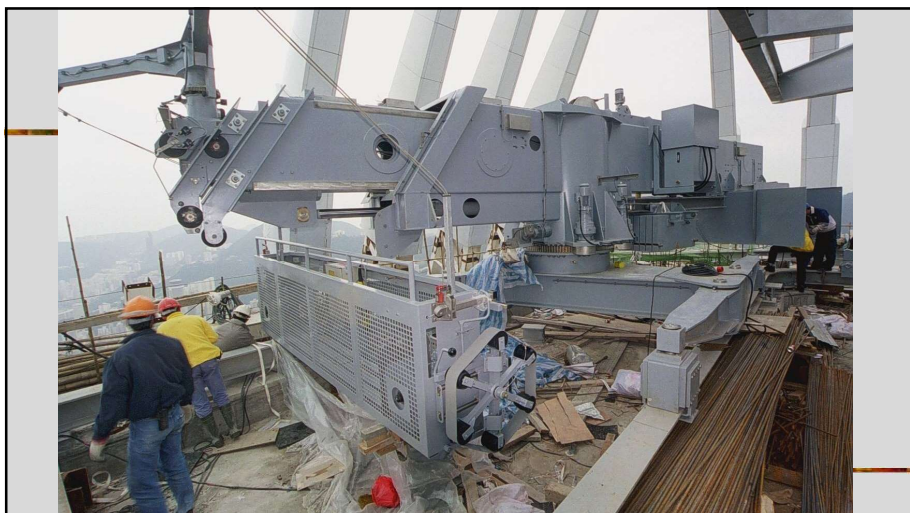




Window cleaning system  
as a form of mechanical  
building maintenance  
system in building









Window cleaning  
system and other  
facilities mounted  
on roof





Tracked platform for glass cleaning and general maintenance purposes within a commercial complex



Catering equipment



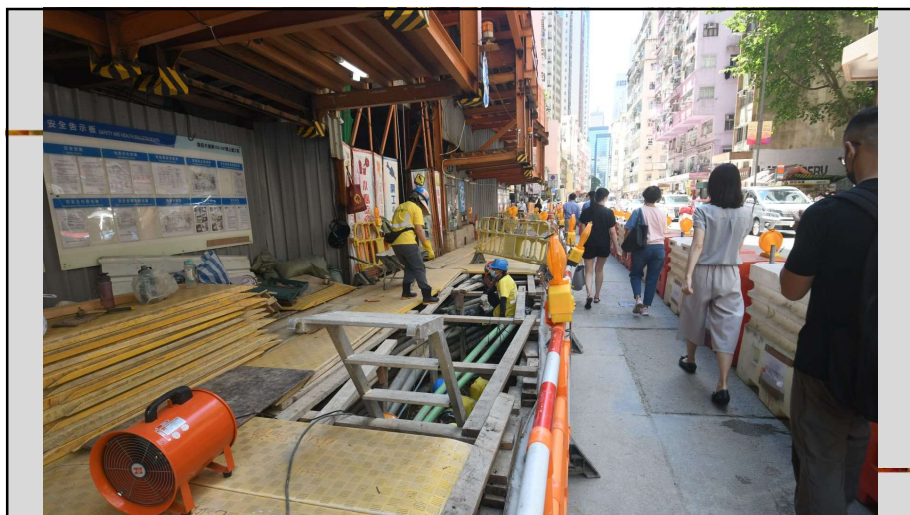


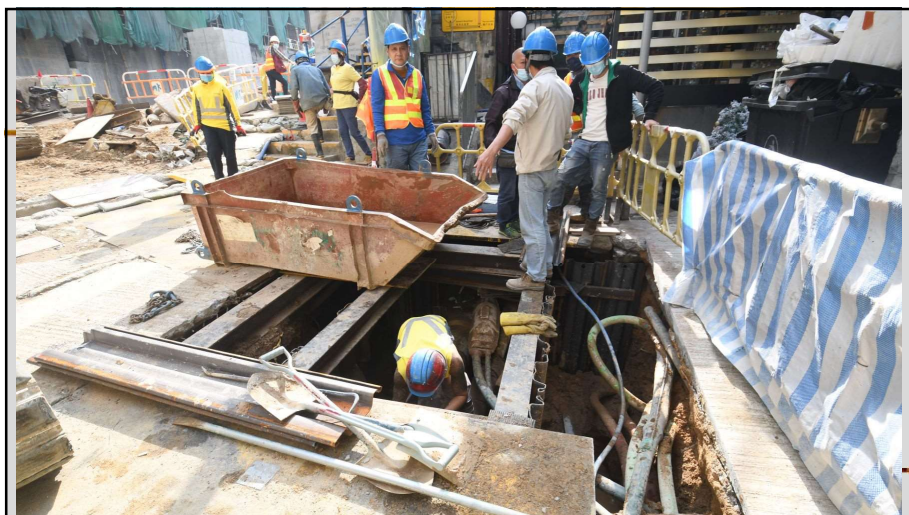


Very demanding building services integrated into building works for kitchen – ventilation, smoke extracting, fire prevention, gas and water supply, drainage etc .....



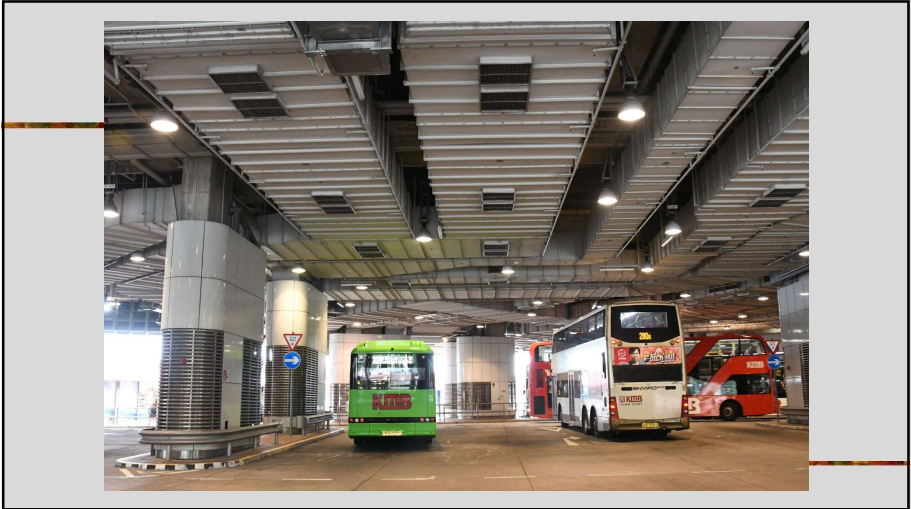
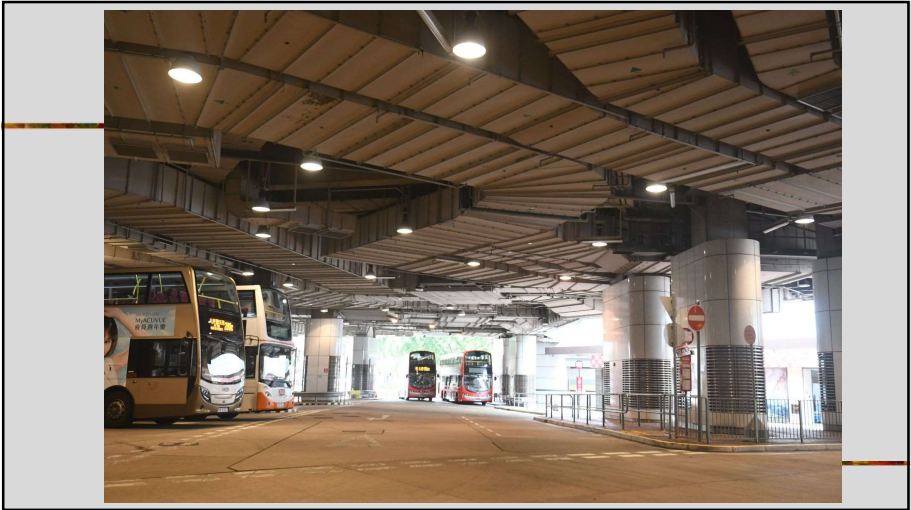
Service connection to  
government mains or  
public utility companies

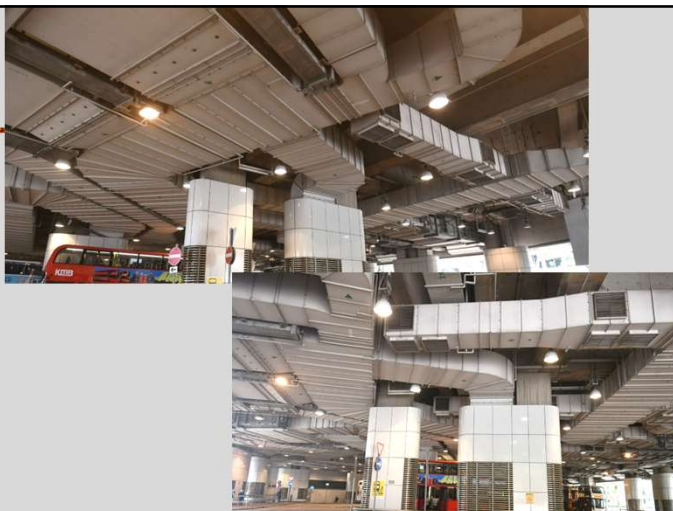




Public transport interchange









Other sophisticated system



Provision and installation  
of other modern systems -  
Light and signage





Provision and installation of other modern systems - Light and signage

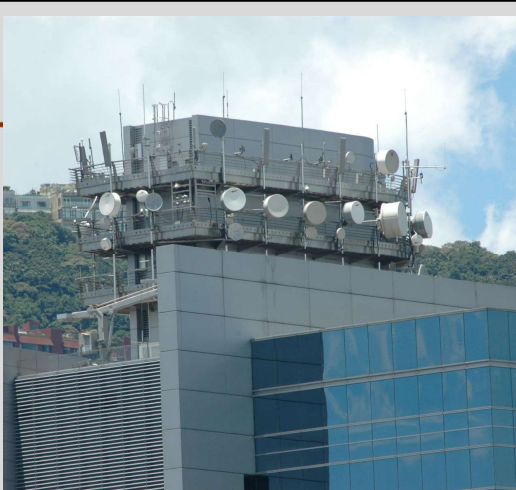


Provision and installation of other modern information systems – lighting for building exterior





Provision and installation of other  
modern information systems –  
LCD display panel





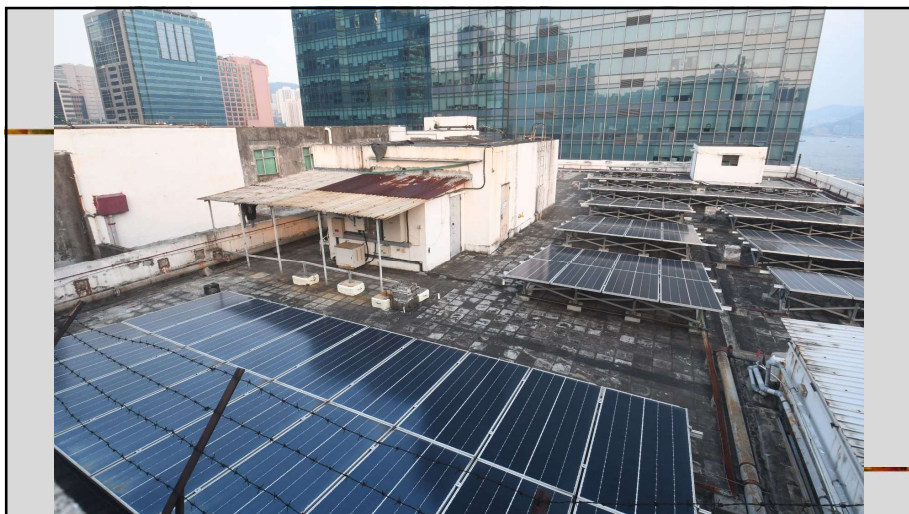
Inside a building  
automation control room  
where all major building  
services systems are  
being controlled and  
monitored



Solar Panels



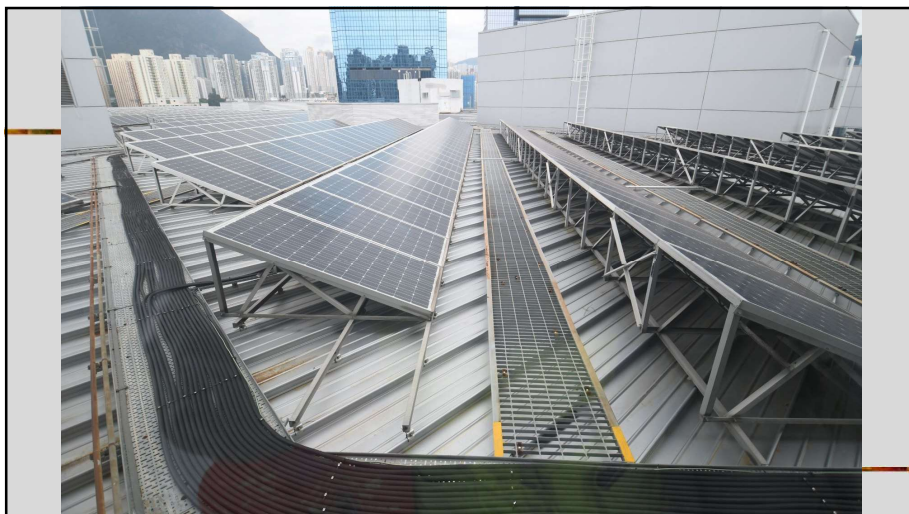




Provision and installation of  
other environmental systems –  
Solar panel



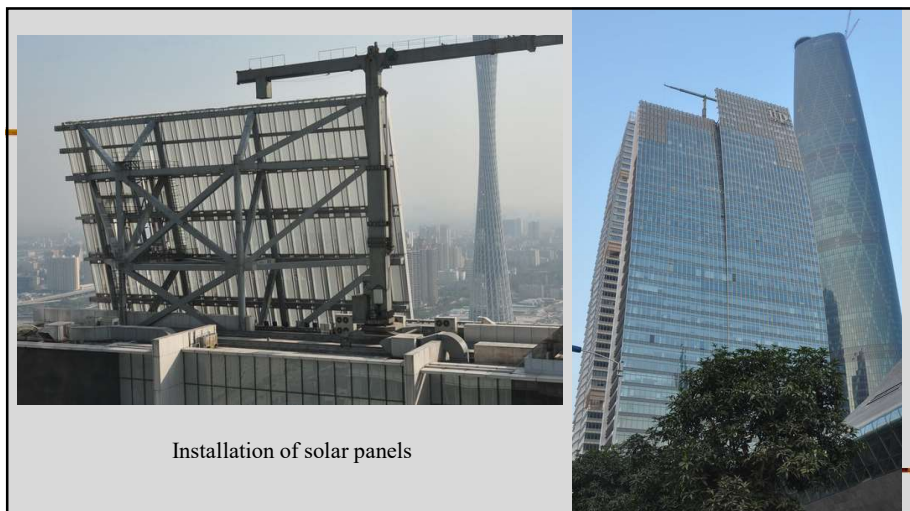
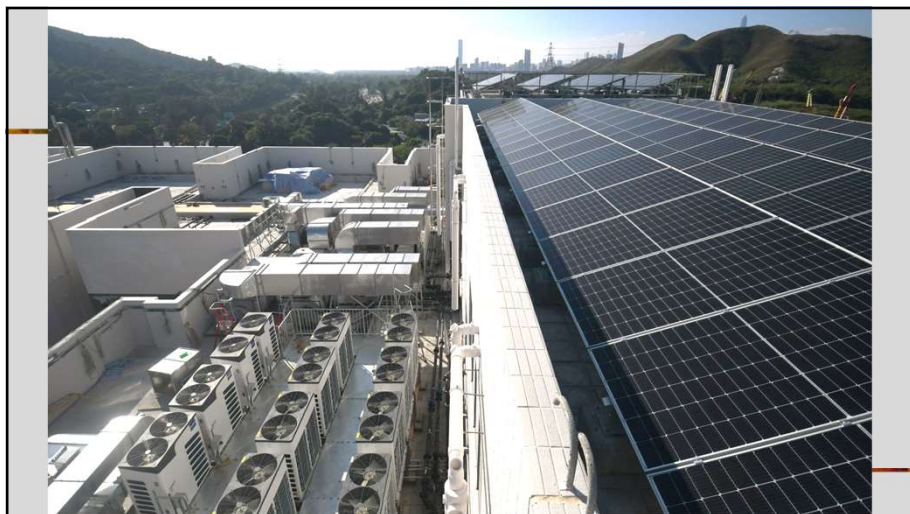




Installation of solar panels

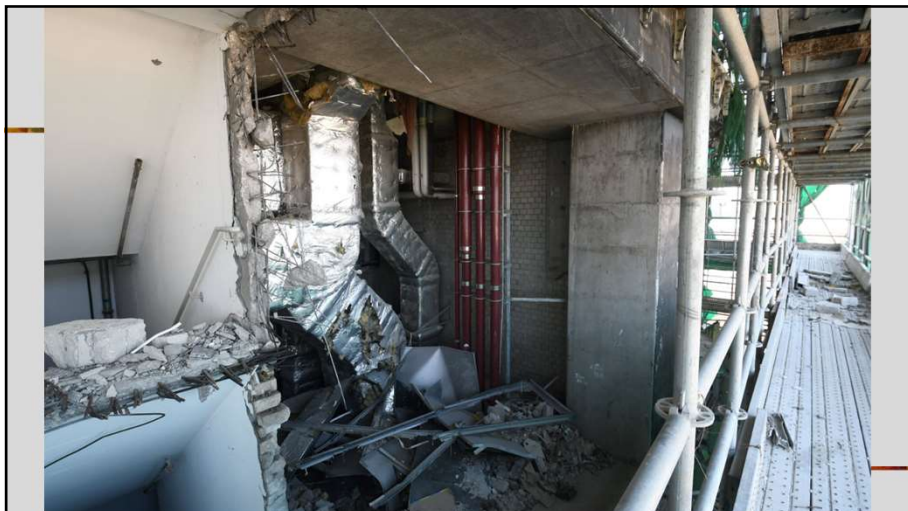


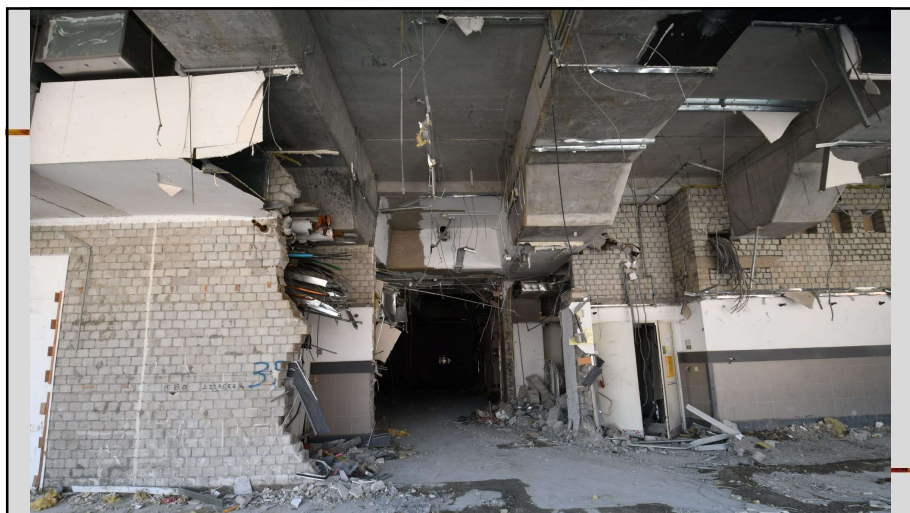






Dismantle/descommissioning  
E&M installation







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End of Presentation

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