07 / DESIGN APPROACH

The trends and themes described above have some specific implications on the design of lab spaces, as designers rise to the challenge of meeting the future needs of the fast-growing and constantly evolving science sector.

Facade design may need to respond to the increasing desire for "science on show" while fulfilling high building performance requirements. Adjacencies of different relevant functions must be captured and connectivity provided, along with encouraging the "chance encounter".

Space provision for the building in operation must be worked through with appropriate areas for loading bays, storage and facilities management incorporated into the design.

Provision of flexible space will offer the potential for future conversion and allow users to flex between wet and dry lab space. Testing the layouts for potential usage options at an early stage allows the team to make a considered economic provision for central plant, with strategies for locally flexing the provision as usage proportions change.

Overprovision of services does not benefit the scheme economically or strategically, adversely affecting floor heights, plant sizes and capital cost.

The location of plant needs careful consideration to permit use of vibration-sensitive equipment associated with life science. Early identification of zones where low vibration can be easily safeguarded helps define equipment zones and influences plant locations. Providing sufficient distance between fume extract requirements and intake locations adds further constraints. Defining an economic but agile strategy early in the project allows the optimum solution to be achieved for services, structure and architecture.

The structural solution needs to respond to floor-loading requirements to keep the building's use flexible over its lifespan and to meet localised vibration criteria requirements. The structural layout could be developed to set a rational grid that responds to design efficiencies, while at the same time creating swing space for laboratory or office planning modules.

08 / ABOUT THE COST MODEL

The cost model is based on the following:

- A standalone, eight-storey plus half-basement new-build laboratory building in central London housing a combination of biology, chemistry and digital labs with adjacent offices and write-up space. The building is designed with inherent flexibility to enable the relative proportions of laboratory and office space to flex over the life of the building. The laboratory space comprises one-third dry labs and two-thirds wet labs to containment level two, CL2.
- For the purposes of setting a notional budget, the cost model assumes a shell and core construction by a developer ready for occupation and fit-out by a single tenant. The shell and core includes the substructure, superstructure, facade, and the arrival/lift lobby/WC/back-of-house fit-out together with central plant and distribution for core MEP services. All other fit-out is included in the ranges shown for tenant fit-out.
- The shell and core includes a raft foundation with secant pile basement perimeter wall, in-situ concrete ground and upper floor slabs, in situ concrete frame to cater for loadings and vibration requirements, curtain wall facade, reinforced concrete roof slab to cater for rooftop plant.
- The MEP element of the cost model is based on a central air plant services strategy with typical cooling, heating and ventilation loads. The shell and core includes plant, equipment and system distribution to occupied areas to facilitate the extension of the fit-out requirements by the tenant. The shell and core cost model includes drainage, central hot and cold water supplies, modular condenser boilers, space heating, air treatment, ventilation, electrical and protective systems. Special life science implications are limited to notional shell and core allowances for limited laboratory area MEP services infrastructure. Medical gases and compressed air systems are included as an allowance subject to specialist design and costing.
- The majority of the mechanical plant is on the roof, restricting use of the basement to water storage and main electrical plant. Rooftop mechanical plant gives the advantage of fresh air intake at high level and immediate access to heat rejection air.
- The fit-out ranges allow for wall, floor, ceiling finishes, raised access floors where appropriate, fixed furniture and fittings, including benching, fume cupboards, cold rooms. Loose furniture and special equipment is excluded. Services include fit-out of space with enhancements for dedicated ventilation, gases and water for laboratory environment.
- All rates are base date Q1 2019
- Exclusions from this cost model include fees, VAT, demolitions, site clearance, external works, incoming utilities, section 106/278, CIL payments and the like.

Areas

- Vibration sensitive laboratories: 462m²
- Laboratories: 6,040m²
- Office/hub space/meeting suite/cafe fit-out: 4,077m²
- Lift lobbies/reception areas: 836m²
- Plant, WCs, circulation, back-of-house: 3,955m²
- Total GIA: 15,370m²

09 / COST MODEL

	Element cost (£)	Cost/m² GIFA	% total cost
SUBSTRUCTURE	**3,710,000**	**241.36**	**7.47**
Enabling works (breakout slab; beams; temp works / propping etc	347,000		
Piling mat (including disposal), for basement secant piling only	65,000		
Secant piling to perimeter (750mm-diameter piles, including guide wall and capping beam	1,360,000		
Cavity drainage and blockwork liner wall	170,000		
Excavation including disposal	423,000		
Raft slab (1.5m deep) including hard-core, reinforcement, insulation, dpm	650,000		
Extra over for forming lift pits	40,000		
Ground floor slab (250mm flat slab including formwork and reinforcement)	520,000		
Below-slab drainage (including allowance for additional drainage for wet labs)	130,000		
SUPERSTRUCTURE	**18,810,000**	**1,223.73**	**37.89**
Frame and upper floors	**6,010,000**	**391.00**	**12.10**
Reinforced concrete frame; 6.8x8.5m grid; concrete core and concrete columns and beams	3,074,000		
300mm reinforced in-situ concrete upper floors	2,873,000		
Extra over for riser grillages (2.5% of GIA)	58,000		

09 / COST MODEL (CONTINUED)

	Element cost (£)	Cost/m² GIFA	% total cost
Stairs	**340,000**	**22.12**	**0.69**
Dogleg staircases including handrails and balustrades	285,000		
Feature staircases to office/hub areas (excluded – in tenant fit out rates)	0		
Sundry access	50,000		
Roofs	**1,170,000**	**76.12**	**2.36**
300mm reinforced in-situ concrete upper floors	390,000		
Inverted roof system with insulation; monolithic fully bonded membrane system; including perimeter and upstand detailing	260,000		
Allowance for grillage above roof plant space	520,000		
External walls	**9,500,000**	**618.05**	**19.13**
Curtain walling to office and laboratory floors	7,387,000		
Extra over for ground floor reception glazing	449,000		
Plant screening to perimeter of roof	673,000		
Revolving doors	200,000		
DDA pass doors	10,000		
Cafe entrance doors	10,000		
Delivery entrance	75,000		
Mock up and test	400,000		
BMU	300,000		
Internal walls and doors	**1,790,000**	**116.45**	**3.61**
Internal walls and doors to form lift lobbies, risers, WCs and shell space	1,655,000		
Allowance for riser doors	136,000		
FINISHES & FITTINGS	**2,260,000**	**147.03**	**4.55**
Arrival/reception fit-out; double-height space	375,000		
Lift lobby fit-out	238,000		
WC fit-out – self-contained unisex bathrooms	613,000		
Finishes to plant rooms	90,000		
Cleaners' cupboard finishes and fittings	18,000		
Allowance for shower and bike space fit-out (20 bike spaces, 2 showers)	50,000		
Allowance for escape stair and back-of-house finishes	874,000		
Fit-out to net internal areas/usable space – excluded, by tenant, see fit-out ranges below	0		
M&E / PUBLIC HEALTH INSTALLATIONS	**11,600,000**	**754.67**	**23.36**
Sanitaryware	**0**		
Excluded (included in fittings and finishings above)			
Disposal installation	**489,000**		
Rainwater disposal, soil waste/vent to WCs based on all WCs comprising self-contained unisex bathrooms			
Water installation	**423,000**		
MCWS storage, hot and cold water distribution to self-contained unisex bathrooms			
Heat source	**142,000**		
Gas-fired condensing boiler, based on heat load of 90W/m², 3 x 450kW, flues from basement			
Space heating	**2,580,000**		
Cooling load based on 150W/ m², roof mounted, air-cooled chillers, 3 x 1,000kW, chilled/low-temp water distribution. Handling unit to office and hub 2 x 3m³/s, laboratory air handling unit 3 x 8m³/s, ductwork distribution serving floors			
Ventilation	**1,432,000**		
WC, basement ventilation, mechanical smoke extract 2x 10kW fans, lab exhaust system 8 x 1m³/s			
Electrical	**2,321,000**		
Based on 105W/m², HV/LV and submains distribution, life safety generator 1x 400kVA, shell and core: power, lighting, earthing and bonding			
Gas	**23,000**		
Gas distribution to boilers			
Medical gases	**380,000**		
Allowance for medical gases system	230,000		
Allowance for compressed air system	150,000		
Protective	**507,000**		
Dry risers, sprinkler installation, lightning protection			
Communication	**1,214,000**		
Fire detection and alarm, voice alarm, security/CCTV, building management system			
Special (excluded)	**0**		
Fume cupboards, MRI or similar implications excluded			
MEP testing/commissioning/subcontractor prelims	**1,752,000**		
Renewables – allowance	**338,000**		
LIFTS	**890,000**	**57.90**	**1.79**
Passenger lifts serving basement to level 7	500,000		
Extra over for fire-fighting controls to 1nr passenger lift	5,000		
Goods lift serving ground to roof	165,000		
Fire-fighting lift to secondary core	220,000		
BUILDER'S WORK IN CONNECTION WITH SERVICES	**750,000**	**48.79**	**1.51**
Allowance for BWIC; enhanced performance criteria	750,000		
PRELIMINARIES	**5,700,000**	**370.83**	**11.48**
Main contractor preliminaries @15%	5,700,000		
OHP	**2,190,000**	**142.48**	**4.41**
Main contractor OH&P @5%	2,190,000		
RISK	**1,380,000**	**89.78**	**2.78**
Main contractor design and build risk @3%	1,380,000		
CONTINGENCY	**2,360,000**	**153.54**	**4.75**
Design reserve/contingency @5%	2,360,000		
TOTAL CONSTRUCTION COSTS	**49,650,000**	**3,230.01**	**100.00**

Tenant fit-out allowance ranges

For wall, floor, ceiling finishes, raised access floors as appropriate, fixed furniture/fittings, including benching, fume cupboards, cold rooms and MEP services to the space: £26,260,000–£32,590,000

Comprising:

Allowance for vibration sensitive lab fit-out (462m²)	£6,250-£6,750/m²	£2.9m-£3.1m
Allowance for laboratory fit-out (6,040m²)	£2,800-£3,600/m²	£16.9m-£21.7m
Allowance for office/hub space/meeting suite /cafe fit-out from shell, including Cat A fit-out (4,077m²)	£1,400 to £1,650/m²	£5.7m-£6.7m
Extra over for feature stairs (five levels)	£150,000-£200,000/level	£0.75m-£1.0m