

Stone Tower Research Project
Indicative Cost Comparison (RevA)

Date: 20 February 2020

Job Reference: J007908

1.0 SUMMARY

1.1 This paper looks at the comparative costs for a notional commercial office tower. It has been assumed that the tower is 30 storeys with a total Gross Internal Floor area of 37,800 m² / 406,875 ft².

1.2 For comparison purposes the following structural solutions have been considered;

- Stone exoskeleton + Stone Cores + Floors
- Stone exoskeleton + CLT Cores + Floors
- Steel frame + Concrete Core + LW Steel/Concrete deck + concrete topping
- Concrete frame + Concrete Core + concrete topping

2.0 Frame and Upper Floors Cost Comparison

2.1 Stone Exoskeleton, Core+Floors (*stone "cladding" envelope already included*)

Description	£	£/m ² (Gross based on GIFA)
Stone columns and beams; 5,282m ³ @ £1,666/m ³	£8.79m	£232/m ²
Secondary steelwork; 5kg/m ² based on GIA; 186t @ £3,000	£0.56m	£15/m ²
Stone core walls; 4,850 m ² @ £150/m ²	£0.73m	£19/m ²
Pre-tensioned stone floor planks (above ground); 37,800 m ² @ £288/m ²	£10.88m	£288/m ²
Allowance for miscellaneous items; plinths; expansion joints; other structures; 37,230 m ² @ £15/m ²	£0.56m	£15/m ²
Frame and Upper Floors Total	£21.52m	£569/m²

2.2 Stone Exoskeleton + CLT Core+CLT Floors (stone "cladding" envelope already included)

Description	£	£/m ² (Gross based on GIFA)
Stone columns and beams; 5,282m ³ @ £1,666/m ³	£8.79m	£232/m ²
Secondary steelwork; 5kg/m ² based on GIA; 186t @ £3,000	£0.56m	£15/m ²
CLT core walls; 4,850 m ² @ £180/m ²	£0.87m	£23/m ²
CLT floor planks (above ground); 37,800 m ² @ £200/m ²	£7.56m	£200/m ²
Allowance for miscellaneous items; plinths; expansion joints; other structures; 37,230 m ² @ £15/m ²	£0.56m	£15/m ²
Frame and Upper Floors Total	£18.34m	£485/m²

2.3 Steel Frame (no stone "cladding" or envelope included)

Description	£	£/m ² (Gross based on GIFA)
Steel frame including fittings; 80kg/m ² based on GIA; 2,978t @ £2,500/t	£7.45m	£200/m ²
Secondary steelwork; 5kg/m ² based on GIA; 186t @ £3,000	£0.56m	£15/m ²
Fire protection; 3,164t @ £650/t	£2.06m	£55/m ²
Reinforced concrete core walls; 4,850m ² @ £350/m ²	£1.70m	£46/m ²
Lightweight concrete on steeldeck (above ground) 35,989 m ² @ £120	£4.32m	£116/m ²
Allowance for miscellaneous items; acoustics; waterproofing; plinths; expansion joints; other structures; 37,230 m ² @ £20/m ² (increased to reflect greater requirement for above)	£0.74m	£20/m ²
Frame and Upper Floors Total	£16.83m	£452/m²

2.4 Concrete Frame (no stone "cladding" or envelope included)

Description	£	£/m ² (Gross based on GIFA)
In situ concrete columns and beams based on GIA; 37,230 m ² @ £280/m ²	£10.42m	£280/m ²
Secondary steelwork; 5kg/m ² based on GIA; 186t @ £3,000	£0.56m	£15/m ²
Reinforced concrete core walls; 4,850m ² @ £350/m ²	£1.70m	£46/m ²
Pre-cast planks (above ground) 35,989m ² @ £120	£4.32m	£116/m ²
Allowance for miscellaneous items; waterproofing; plinths; expansion joints; other structures; 37,230m ² @ £15/m ²	£0.56	£15/m ²
Frame and Upper Floors Total	£17.56	£472/m²

3.0 Total Building

- 3.1 The below summary identifies indicative modelled costs for a simple open plan tower to CAT A. These costs are indicative only for comparative purposes and assume first quarter 2020 prices with no inflation, risk or contingency allowances. The costs also exclude any Site Preparation or Basement works.
- 3.2 These cost allowances are notional only and will be subject to adjustment by size, shape, specification, site conditions, etc.
- 3.3 Preliminaries costs have been applied at a consistent percentage across the material types for comparison purposes. The impact of speed savings need to be established to determine impact on the preliminaries allowance.
- 3.4 The same Gross Internal Floor Area and External Envelope area have been assumed for all comparison studies.
- 3.5 On the façade, for modelling purposes, it has been assumed that the Steel and concrete solutions will be primarily higher quality façade system as they will need to act as the final planning approved face. The stone option reflects a lower curtain wall specification as it is behind the stone column and beam line specification and therefore able to utilise a glazing/opaque mix to reflect the existence of the exoskeleton.
- 3.6 For CAT A works, a lower cost has been applied to the Stone model. This is to reflect the reduced build-up prior to the suspended floor as no binding or levelling screeds would be needed for either stone or CLT floor plates due to the stone working as a level finish. Similarly, stone soffits can be left as exposed fair finish.

Element	Stone	Stone / Timber Floor	Steel	Concrete
Substructure ¹	£65/m ²	£65/m ²	£65/m ²	£70/m ²
Frame & Upper Floors	£569/m ²	£485/m ²	£452/m ²	£472/m ²
Roof, Stairs and External Walls ²	£485/m ²	485/m ²	£565/m ²	£565/m ²
Internal Walls; Doors; Finishes and FF&E ³	£250/m ²	£250/m ²	£295/m ²	£295/m ²
MEP Services ⁴	£630/m ²	£630/m ²	£650/m ²	£650/m ²
CAT A Works (Indicative costs)	£300/m ²	£300/m ²	£360/m ²	£360/m ²
Preliminaries & OH&P @ 25%	£603/m ²	£575/m ²	£597/m ²	£603/m ²
Indicative Building Cost (Based on GIFA)	£2,902/m²	£2,790/m²	£2,984/m²	£3,015/m²

- 3.4 The Steel Construction Info website identifies a Total Building shell & Core cost (£/m2/GIFA) for Q4 2019 of £2,642/m2 for steel and £2,784/m2 for concrete. These include Basement works and Contingency allowances but exclude CAT A costs, so are comparable to the above when adjusted.
- 3.5 Spons 2020 identifies a cost of £2,962/m2 for a tower office development to CAT A. This includes basement works so is comparable when adjusted.
- 3.6 Stone budget costs for Frame and Upper Floors provided by Polycor and The Stonemasonry Company Ltd.
- 3.7 CLT budget costs for floors and core supplied by Eurban Ltd and Egoi Ltd.

- 1. *Assumes no Basement or significant site preparation works for modelling purposes*
- 2. *Stone façade reflects a saving as exoskeleton is the equivalent of the stone cladding on steel or concrete frames allowing a reduction in specification requirements as cladding for steel and concrete will need fireproofing, weathering, insulating and galv/ss clamps to the stone veneers*
- 3. *Stone façade reflects a reduced sum on curtain wall finishes assuming the stone elements are the finish*
- 4. *Notional reduction on services to reflect potential savings due to the exoskeleton acting shading and therefore reducing further requirements, heat gain, etc*

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