



COSTING STEELWORK #24

MARKET AND COST MODELS UPDATE

COSTING STEELWORK

MARKET UPDATE

● Costing Steelwork is a series from Aecom, BCSA and Steel for Life that provides guidance on costing structural steelwork. This quarter provides a market update and revises the five cost models previously featured in Costing Steelwork

Construction sector sentiment saw a bounce going into the new year. The jump reflected the on-going good overall levels of workload across the industry and most areas of the country. The output trend, which the sentiment readings reflect, are supported by Office for National Statistics data that underscores the reasonable activity still in the industry. The sideways move in output volume over recent months does raise a question about underlying momentum and which direction the output trend will next take. With the gathering data – anecdotal and evidenced – sentiment is very likely to remain at or near a neutral level for a little while yet. Until now the construction sector has offered a relatively stable workload environment while other economic sectors face headwinds.

Construction new work output increased by 4.6% over the 12 months to Q4 2022, according to the latest data release from the Office for National Statistics. Looking into the monthly data points, there are discernible indications that the new work output trend is wavering and possibly reaching a crescendo. Seasonal effects might explain the notable overall drop in January of new work output since the months making up the fourth quarter; however, the January to February movement saw something of a reversal, with a small improvement in recorded volume. Some sizeable revisions to the 2022 data helped to improve the numbers for the year and push total output above its pre-pandemic level, although new work output is still to meet this threshold.

Market surveys reflect the tepid economic environment and the unclear – questionable, even – outlook for 2023. Household incomes are feeling the effects from higher energy costs, real terms pay reduction because inflation is so high, and a significantly higher interest rate environment than 12 months ago when the bank base rate was just 0.5%. Consumer spending has been subdued as the cost of living strains take hold. If the economy is still not as bad as initially feared, this offers little respite from the higher cost financing environment. Given the UK economy’s reliance on services and consumer spending, the prospect of an overall low growth environment across 2023 remains more likely than not.

Access to and cost of capital is referenced in business surveys as a growing issue. The construction sector is very unlikely to escape the issues arising from this factor, especially as its chain cash flow concerns are perennial. The number of construction insolvencies has increased steadily since 2021, and ongoing insolvency risks across the supply chain are elevated because of structural and cyclical issues. An acute inflationary environment over the last two years and structural industry capacity problems are exacerbated by higher costs of borrowing and funding, which now impacts contractor working capital, for example.

If current output levels are to be maintained, what will provide new construction demand in 2023? Alternatively, in an optimistic scenario, what will see output grow and go on to post higher or increased construction volume? Total construction output maintained a steady pace over 2022. Nonetheless, slower trends are evident across the two large sub-sector classifications of new work and repair and maintenance. This emerging trend relates to the twin problems of the inflationary backdrop and a significantly higher interest rate environment affecting both the private sector and domestic households by crimping their demand for construction services. For the private sector, greater risks proliferate around returns for developers and client organisations procuring construction services. Delays to public sector projects are evident too, as rising costs stretch budgets to their limits.

Construction input cost pressures are easing. Aecom’s building cost index – a composite measure of materials and labour costs – increased by 7.4% over the

12 months to February 2023. This continues a period of sustained disinflation that started last year, with the current rate of inflation almost half that recorded in the middle of 2022. Slower rates of building cost inflation will help to alleviate some of the commercial pressures stretching across the whole supply chain. Labour rate inflation still displays a range that waxes and wanes depending on situational demand at any point in time. An overall inflation rate of broadly 4%-5% across an aggregate measure has been remarkably consistent for some time.

Aecom’s tender price inflation index rose by 10.7% over the 12 months to Q1 2023. Further, the final quarter of 2022 saw an upward revision in the index too, securing 2022’s place as a record-breaking year for construction price growth. Tender returns analysed by Aecom are still seeing firm rates of price change. Input cost inflation that remains elevated, continuing momentum in workload continues albeit with some trend changes now occurring, and a tight labour market are the three key factors that underpin the record-breaking price trend. Input cost inflation pressure is dissipating, and this provides some alleviation to the enduring commercial pressures faced by the whole supply chain. However, the structural industry issues around supply chain and labour market capacity are longstanding and will maintain price growth pressure.

High rates of general price inflation remain an enduring problem, and the prospects are that it persists at elevated levels over 2023. Specifically for our sector, construction input cost and price inflation trends are likely to follow a similar narrative as that

Figure 1: Tender price inflation, Aecom Tender Price Index, 2015 = 100

Quarter	2019	2020	2021	2022	Forecast		
					2023	2024	2025
1	117.9	120.4	120.0	131.2	145.3	152.6	157.9
2	118.3	121.0	122.6	134.5	147.3	154.0	159.2
3	119.3	119.1	125.3	138.1	149.1	155.5	160.5
4	119.8	119.1	127.5	142.3	150.9	156.7	161.8

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for consumer prices. The on-going mix of issues and current workload momentum will ensure that tender price inflation continues steadily over the first half of 2023. Aecom's baseline forecast for tender prices is broadly a 5% increase from Q2 2023 to Q2 2024, and a 3.5% increase from Q2 2024 to Q2 2025. The balance of risks to forecasts of price trends is balanced evenly now over the first 12-month period, because of rising concerns across the financial sector globally and associated risks for the UK economy.

SOURCING COST INFORMATION

Cost information is generally derived from a variety of sources, including similar projects, market testing and benchmarking. Due to the mix of source information it is important to establish relevance, which is paramount when comparing buildings in size, form and complexity.

Figure 2 represents the costs associated with the structural framing of a building, with a BCIS location factor of 100 expressed as a cost/m² on GIFA. The range of costs represents variances in the key cost drivers. If a building's frame cost sits outside these ranges, this should act as a prompt to interrogate the design and determine the contributing factors.

The location of a project is a key factor in price determination, and indices are available to enable the adjustment of cost data across different regions. The variances in these indices, such as the BCIS location factors (figure 3), highlight the existence of different market conditions in different regions.

To use the tables:

1. Identify which frame type most closely relates to the project under consideration
2. Select and add the floor type under consideration
3. Add fire protection as required.

For example, for a typical low-rise frame with a composite metal deck floor and 60 minutes' fire resistance, the overall frame rate (based on the average of each range) would be:

$$£168.50 + £112.50 + £27.00 = £308.00$$

The rates should then be adjusted (if necessary) using the BCIS location factors appropriate to the location of the project.



Christ the King Centre for Learning, Merseyside

Figure 2: Indicative cost ranges based on gross internal floor area

TYPE	Base index 100 (£/m ²)	Notes
Frames		
Steel frame to low-rise building	152-185	Steelwork design based on 55kg/m ²
Steel frame to high-rise building	256-289	Steelwork design based on 90kg/m ²
Complex steel frame	289-342	Steelwork design based on 110kg/m ²
Floors		
Composite floors, metal decking and lightweight concrete topping	88-137	Two-way spanning deck, typical 3m span with concrete topping up to 150mm
Precast concrete composite floor with concrete topping	130-183	Hollowcore precast concrete planks with structural concrete topping spanning between primary steel beams
Fire protection		
Fire protection to steel columns and beams (60 minutes resistance)	22-32	Factory applied intumescent coating
Fire protection to steel columns and beams (90 minutes resistance)	26-43	Factory applied intumescent coating
Portal frames		
Large-span single-storey building with low eaves (6-8m)	111-146	Steelwork design based on 35kg/m ²
Large-span single-storey building with high eaves (10-13m)	135-173	Steelwork design based on 45kg/m ²

Figure 3: BCIS location factors, as at Q2 2023

Location	BCIS Index	Location	BCIS Index
Central London	129	Nottingham	102
Manchester	102	Glasgow	91
Birmingham	96	Newcastle	90
Liverpool	97	Cardiff	94
Leeds	91	Dublin	100*

*Aecom index



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COST COMPARISON UPDATES

● This quarter's Costing Steelwork provides an update of the five previously featured cost comparisons covering: offices, education, industrial, retail and mixed-use

These five projects were originally part of the Target Zero study conducted by a consortium of organisations including Tata Steel, Aecom, SCI, Cyril Sweett and the BCSA in 2010 to provide guidance on the design and construction of sustainable, low- and zero-carbon buildings in the UK. The cost models for these five projects have been reviewed and updated as part of the Costing Steelwork series. The latest cost models as of Q2 2023 are presented here.



Ben Page Photography

Holiday Inn tower, MediaCityUK, Manchester

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COSTING STEELWORK: OFFICES UPDATE

Below is an update to the offices cost comparison originally published in the Costing Steelwork Offices feature in Building magazine in April 2017.

One Kingdom Street, London, key features

- 10 storeys, with two levels of basement
- Typical clear spans of 12m x 10.5m
- Three cores – one main core with open atrium, scenic atrium bridges and lifts
- Plant at roof level

Cost comparison

Two structural options for the office building were assessed (as shown in figure 4):

- Base case – a steel frame, comprising fabricated cellular steel beams supporting a lightweight concrete slab on a profiled steel deck
- Option 1 – 350mm-thick post-tensioned concrete flat slab with a 650mm x 1,050mm perimeter beam.

The full building cost plans for each structural option have been reviewed and updated to provide current costs at Q2 2023. Over the course of the year increased costs have been largely offset by contractors working on reduced or no margin. The costs, which include preliminaries, overheads, profit and a contingency, are summarised in figure 4.

The cost of the steel composite solution is 1% higher than for the post-tensioned concrete flat slab alternative for the frame and upper floors, but 2% lower on a total building basis. The lighter frame and faster erection result in reduced foundations and a shorter programme. The latter is the main reason for the lower cost.

Figure 4: Key costs £/m² (GIFA), for City of London office building

Elements	Steel composite	Post-tensioned concrete flat slab
Substructure	93	98
Frame and upper floors	569	563
Total building	3,618	3,704

COSTING STEELWORK: EDUCATION UPDATE

Below is an update to the education cost comparison originally published in the Costing Steelwork Education feature in Building magazine in July 2017.

Christ the King Centre for Learning, Merseyside, key features

- Three storeys, with no basement levels
- Typical clear spans of 9m x 9m
- 591m² sports hall (with glulam frame), 770m² activity area and atrium
- Plant at roof level

Cost comparison

Three structural options for the building were assessed (as shown in figure 5), which include:

- Base case – steel frame, 250mm hollowcore precast concrete planks with 75mm structural screed
- Option 1 – in situ 350mm reinforced concrete flat slab with 400mm x 400mm columns
- Option 2 – steel frame, 130mm concrete topping on structural metal deck.

The full building cost plans for each option have been updated to provide current costs at Q2 2023. The comparative costs highlight the importance of considering total building cost when selecting the structural frame material.

The concrete flat slab option has a lower frame and floor cost compared with the steel composite option, but on a total-building basis, the steel composite option has a lower overall cost of £3,972/m² against £4,014/m². This is because of lower substructure and roof costs, alongside lower preliminaries resulting from the shorter programme.

Figure 5: Key costs £/m² (GIFA), for Merseyside secondary school

Elements	Steel + precast hollow-core planks	In situ concrete flat slab	Steel composite
Frame and upper floors	380	335	347
Total building	4,042	4,014	3,972

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COSTING STEELWORK: INDUSTRIAL UPDATE

Below is an update to the industrial cost comparison originally published in the Costing Steelwork Industrial feature in Building magazine in October 2017.

Distribution warehouse in ProLogis Park, Stoke-on-Trent, key features

- Warehouse: four-span, steel portal frame, with a net internal floor area of 34,000m²
- Office: 1,400m², two-storey office wing with a braced steel frame with columns

Cost comparison

Three frame options were considered:

- Base option – a steel portal frame with a simple roof solution
- Option 1 – a hybrid option: precast concrete column and glulam beams with timber rafters
- Option 2 – a steel portal frame with a northlight roof solution.

The full building cost plans for each option have been updated to provide costs at Q2 2023. The steel portal frame provides optimum build value at £912/m²; glulam is least cost-efficient. This is primarily due to the cost premium for the structural members necessary to provide the required spans, which are otherwise efficiently catered for in the steelwork solution.

With a hybrid, the elements are from different suppliers, which raises the cost. The northlights option is directly comparable with the portal frame in relation to the warehouse and office frame. The variance is in the roof framing as the northlights need more of this. Other additional costs relate to the glazing of the northlights.

Figure 6: Key costs £/m² (GIFA), for Stoke-on-Trent distribution warehouse

Elements	Steel portal frame	Glulam beams + purlins + concrete columns	Steel portal frame + northlights
Warehouse	126	185	146
Office	187	225	187
Total frame	129	187	148
Total building	912	983	956

COSTING STEELWORK: RETAIL UPDATE

Below is an update to the retail cost comparison originally published in the Costing Steelwork Retail feature in Building magazine in January 2018.

Asda food store, Stockton-on-Tees, key features

- Total floor area of 9,393m²
- Retail area based on 12m x 12m structural grid

Cost comparison

Three frame options were considered (as shown in figure 7) to establish the optimum solution for the building, as follows:

- Base option – a steel portal frame on CFA piles
- Option 1 – glulam timber rafters and columns on CFA piles
- Option 2 – a steel portal frame with a northlight roof solution on driven steel piles.

The full building cost plans for each option have been updated to provide costs at Q2 2023. The steel portal frame provides the optimum build value at £3,309/m², with the glulam option the least cost-efficient. The greater cost is due to the direct comparison of the steel frame solution against the glulam columns and beams/rafters. A significant proportion of the building cost is in the M&E services and fit-out elements, which reduce the impact of the structural changes.

The northlights option is directly comparable with the portal frame in relation to the main supermarket – the variance is in the roof framing as the northlights require more.

Additional costs beyond the frame are related to the glazing of the northlights and the overall increase in relative roof area.

Figure 7: Key costs £/m² (GIFA), for Stockton-on-Tees food store

Elements	Steel portal frame	Glulam timber rafters + columns	Steel portal frame + northlights
Structural unit cost	189	230	213
Total building unit cost	3,309	3,358	3,322

COSTING STEELWORK: MIXED-USE UPDATE

Below is an update to the mixed-use cost comparison originally published in the Costing Steelwork Mixed-use feature in Building magazine in April 2018.

Holiday Inn tower, MediaCityUK, Manchester

- 17-storey tower
- 7,153m² of open-plan office space on five floors (floors two to six)
- 9,265m² of hotel space on eight floors (floors eight to 15)

The gross internal floor area of the building is 18,625m². The 67m-high building is rectilinear with approximate dimensions of 74m x 15.3m.

Cost comparison

Three frame options were considered to establish the optimum solution for the building:

- Base option – steel frame with Slimdek floors
- Option 1 – concrete flat slab
- Option 2 – composite deck on cellular beams (offices) and UCs used as beams (hotel).

The full building cost plans for each option have been updated to provide costs at Q2 2023. The steel frame with composite deck continues to provide the optimum build value, with the overall building cost at £3,402/m².

Options 1 and 2 are arguably more typical for this building type. The base case structure is an unusual solution due to a decision to change the residential accommodation to office floors at a very late stage – time constraints precluded redesign of the tower block, hence the original Slimdek design was constructed.

Figure 8: Key costs £/m² (GIFA), for hotel/office building in Manchester

Elements	Steel frame with Slimdek	Concrete flat slab	Composite deck on cellular beams (offices) and UCs used as beams (hotel)
Structural unit cost	701	537	479
Total building unit cost	3,679	3,491	3,402