



COSTING STEELWORK #26

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

The Office for National Statistics' latest data release reported that all work construction output decreased by 0.5% in the year to August 2023. New work output declined by 1.5% over the same period. The construction industry overall has offered durable activity levels after the pandemic until now, despite emerging weakness elsewhere in the economy. However, sub-sector output data reveals changes that the overall output narrative might not immediately convey.

In a stark change to the narrative for many recent years, private housing output volume dropped by 15% in the year to August 2023. Housing output is expected to continue posting reduced levels of activity over the remainder of 2023 and into 2024, although it is declining from a very high nominal level of output. Some of the latest falls in housing output were offset by increases in the infrastructure and the repair and maintenance sub-sectors, but these rises need to be sustained in order to ensure the industry does not generate adverse headlines about notable falls in total output.

Construction output trends are evolving to sketch a different picture expected for the next period of this market cycle. The bounce-back in activity after the initial stages of the pandemic saw a one-way market across much of the industry. Although total industry output adjusted for inflation did not quite reach pre-pandemic levels, it was a sustained period of improving total workload and activity.

External forces, which have been building for some time, are now clearly acting on the industry to crimp demand for construction services and outputs. Inflation was the first major issue that impacted demand, although it did not lead to a consequential adverse dent in the overall activity trend in the sector. Project and design reviews have increased in prevalence, along with the use of so-called value engineering, often to buy some time. Yet it is now higher interest rates and costs of borrowing that are materially hitting demand and activity.

As overall construction output remains in relatively decent shape, industry sentiment indicators confirm the neutral to broadly positive views across the industry. This is an aggregate view, and momentum is adjusting

across the industry's sub-sectors. Respective sentiment measures are already diverging to some extent and will become more nuanced in response to these evident changes in sub-sector activity. Still, at an aggregate level, the industry offers respectable workload and opportunities from the existing momentum and shows some resilience to the headwinds elsewhere in the economy.

Nevertheless, the effects of the rising interest rate environment are impacting construction activity now, and sentiment surveys will eventually reflect this changing picture.

The intense input cost pressures experienced over the last two years in many construction materials categories have largely receded. This is not to say input costs are falling across the board, only that the continuously upward cost pressures are abating or have ceased across a larger number of categories.

Aecom's building cost index – a composite measure of materials and labour costs – increased at an annual rate of just over 1% up to August 2023. However, the composite nature of the index and its aggregate measure of change mask two differing trends within the composite index. There is a clear divergence in the respective trends for materials inflation and labour rate inflation. An average measure for materials inflation shows negligible change over the year across a basket of items. By contrast, wage rates on average are still rising strongly at over 5% when compared with the middle point of 2022.

Tender prices rose more slowly over the 12 months to the end of Q2 2023. Aecom's tender price inflation

index recorded a 9.1% change across this period, continuing the elevated rate of inflation seen over the last 18 months. In other words, tender prices are still rising when measured against the same time a year ago; however, a slower pace of inflation is now being tracked.

Although prices were still rising at a notable pace at mid-2023 compared with a year ago, this juncture very likely registers a high-water mark in this part of the tender price inflation cycle. Price inflation will continue over the remainder of 2023 and into early 2024, although at a slower rate to that recorded at times over the previous 18 months.

Aecom's baseline forecast for tender prices is a 3% increase from Q4 2023 to Q4 2024, and a 3% increase from Q4 2024 to Q4 2025. As the construction industry's output moderates and is expected to continue slowing over the next 12 months, there will be on-going trend divergence across its sub-sectors. The balance of risks to forecasts of price trends is balanced evenly over the first 12-month forecast period due to competing upside and downside factors, and with a downside skew in the following period.

Tender price trends retain momentum from labour rates that are still rising at well over 5% on average. Some trades are showing a rate of increase that is higher still, partly because of overall capacity in the industry which is historically stretched. The twist for the end of 2023 and into 2024 will be how tempted the supply chain might be to consider projects with a lower potential project margin, if aggregate industry output is set to falter.

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	149.6	154.2
2	118.3	121.0	122.6	134.5	146.6	150.7	155.4
3	119.3	119.1	125.3	138.1	147.5	151.9	156.6
4	119.8	119.1	127.5	142.3	148.5	153.0	157.5

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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:

$$£165.00 + £110.00 + £28.00 = £303.00$$

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	149-181	Steelwork design based on 55kg/m ²
Steel frame to high-rise building	251-283	Steelwork design based on 90kg/m ²
Complex steel frame	283-335	Steelwork design based on 110kg/m ²
Floors		
Composite floors, metal decking and lightweight concrete topping	86-134	Two-way spanning deck, typical 3m span with concrete topping up to 150mm
Precast concrete composite floor with concrete topping	131-184	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)	23-33	Factory applied intumescent coating
Fire protection to steel columns and beams (90 minutes resistance)	27-45	Factory applied intumescent coating
Portal frames		
Large-span single-storey building with low eaves (6-8m)	108-142	Steelwork design based on 35kg/m ²
Large-span single-storey building with high eaves (10-13m)	132-169	Steelwork design based on 45kg/m ²

Figure 3: BCIS location factors, as at Q4 2023

Location	BCIS Index	Location	BCIS Index
Central London	127	Nottingham	102
Manchester	101	Glasgow	92
Birmingham	98	Newcastle	91
Liverpool	96	Cardiff	94
Leeds	92	Dublin	90*

*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 Q4 2023 are presented here.



Distribution warehouse, Prologis Park, Stoke-on-Trent

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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 Q4 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 3% 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	556	540
Total building	3,660	3,750

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 Q4 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 £4,010/m² against £4,048/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	379	321	340
Total building	4,090	4,048	4,010

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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 Q4 2023. The steel portal frame provides optimum build value at £920/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	123	187	142
Office	187	227	187
Total frame	127	189	145
Total building	920	995	963

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 Q4 2023. The steel portal frame provides the optimum build value at £3,345/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	184	234	207
Total building unit cost	3,345	3,400	3,358

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 Q4 2023. The steel frame with composite deck continues to provide the optimum build value, with the overall building cost at £3,430/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	688	500	470
Total building unit cost	3,705	3,490	3,430