School design is in the frame

Sustainability and speed of construction are just two of the reasons why a steel-framed solution was chosen for a state-of-the-art primary school in Essex.

Forming an important part of the South Maldon Garden Suburb development, a state-of-the-art steel-framed primary school and nursery is currently being built. Located to the south of the historic Essex town of Maldon, the overall development will eventually include up to 1,000 new homes, areas for shops and businesses alongside sports fields, allotments and green spaces.

To cater for the much larger population moving into the area, the new school will be able to accommodate more than 400 primary school pupils as well as 56 pre-school children.

Deploying its Intelligent Solutions approach – which the company says helps it offer modern construction methods combined with carbon reduction tools to create sustainable projects – Morgan Sindall Construction has worked collaboratively with Essex County Council and Ingleton Wood to create the school’s advanced net zero carbon in operation design. This sustainable policy extends to the construction programme as the entire site is diesel-free.

Morgan Sindall Construction’s Essex Area Director, Andrew Harper-Rowe, says: “Once complete, this net zero educational establishment will make a real difference in the local community, providing generations of pupils with sustainable school places and a facility that’s tailored to the needs of those living and working in Maldon.”

Work on the greenfield site began in May 2023. Prior to the steel frame being erected, a piled raft
slab was installed, using piles up to a depth of 20m. According to Ingleton Wood Structural Engineer Aakar Saber, this solution was chosen due to the bearing capacity, high shrinkability and dissolution features of the soil, which could have posed a risk of differential settlement if shallow foundations were used.

“Having the slab installed early in the programme helped the steel erection achieve its quick programme as it provided a clean flat surface for the MEWP,” says Morgan Sindall Construction Site Manager Charlie Fix.

“This was particularly helpful as the steelwork installation commenced shortly after a very wet July, when much of the site was particularly muddy.”

Project steelwork contractor, AC Bacon Engineering, has fabricated, supplied, and erected 110t of structural steelwork for the project, while its package also included lifting the metal decking packs on to the first floor and installing edge protection barriers.

Completed during a three-week period, the entire steel frame was erected using one 80t-capacity mobile crane, which had to be positioned in three separate locations.

The steelwork forms one large braced frame, which is predominantly two-storeys high for the
A composite floor with profiled deck utilises the advantages of both steel and concrete. Therefore, it’s a more cost-effective form of construction, with a slimmer floor build-up and it’s quick to install. Based around a regular grid with perimeter columns spaced at 6m centres and internal spans of up to 8m, the two-storey part of the frame has central corridors with classrooms positioned along either side.

The majority of the building services will be positioned in the corridors, below the steel beams. A suspended ceiling will be installed, ensuring none of the steelwork or services will be seen in the completed project.

The braced steel frame gains its stability from cross bracings, which are strategically-positioned around stairwells and within internal and partition walls.

The single storey parts of the project are designed around a similar column layout, although the main hall has a slightly larger 12m span. As well as constructing the main steel-framed building, Morgan Sindall Construction is also undertaking landscaping around the site, installing a Multi-Use Games Area (MUGA) and two grass football pitches.

Summing up, Ingleton Wood Associate Planner Rebecca Howard, says: “Sustainability will be at the core of the primary school and nursery at the Limebrook Way development in Maldon. “Working closely with Morgan Sindall Construction and Essex County Council, we will use our multi-disciplinary expertise to deliver strikingly modern, net zero buildings that will benefit from solar electricity panels, electric vehicle charging points, thermal mass storage to absorb, store and release heat, as well as a combination of mechanical and natural ventilation.”

Limebrook Primary School & Nursery will open its doors in time for the 2024 Autumn term.

Consequence class and robustness

One of the important criteria for the design of Limebrook Primary School was the consequence class and the application of the rules in BS EN 1991-1-7. David Brown of the Steel Construction Institute reminds designers of this important aspect of design.