SEAPORT L4
BOSTON, MA

Project Completion: 2022

Structural EOR: McNamara Salvia

Steel Fabricator: Cives Steel Company

Architect: Gensler

General Contractor: Suffolk

Owner: WS Development

525,000 square feet

CASE STUDY

VULCRAFT SPANS THE GAP BETWEEN OPEN SPACE AND BUDGET

During the planning phase of the design-build process for a 525,000 square foot distinctive Boston office building, the engineers and architects faced three tasks: maximize open space by eliminating bulkheads in an otherwise sleek modern building, ensure the project went together smoothly to stay on schedule, and control costs in order to preserve the owner's budget. By choosing Nucor Vulcraft's composite joists as part of the structural flooring, the project achieved the owner's vision of open space and improved construction efficiency, all while saving over $700,000 in material costs.

BACKGROUND

Seaport L4 is a nineteen level office building overlooking a park in an industrial area near the Boston Convention Center. Most of the building is tenant office space, including outdoor terraces on alternating levels. It includes retail space on the first two levels, including a "Paseo" public promenade. There are two mechanical levels on floor 18 and 19 which, combine with flood barriers at ground level to prevent disruptions to the tenant's servers and work. The primary use is office space occupied by one of the 10 largest companies in the United States, although the building will have community workspaces and conference rooms.

> "With the owner wanting to maximize the floor to floor heights as high as possible in combination with long spans of up to 50 feet, the only solution was a composite truss. Composite joists allow all of your mechanicals to run through in that higher plane so you're not dropping any ducts, any plumbing, anything down below the floor. It really gave them what they wanted, high floor to floor heights and big, clear spans.

Rachel Gerhart, P.E.
Project Manager - McNamara Salvia

NUCOR® VULCRAFT

OPENING UP SPACE WHILE MAKING MEP EASY

McNamara Salvia, a Boston-based structural engineering firm, was the structural engineer of record on Seaport Block L4 and designed the superstructure for that project. Rachel M. Gerhart, P.E., Project Manager at McNamara Salvia explained, "L4 is a unique building. It will house a high-profile business when it comes in and with that comes the desire for higher floor to floor heights, as well as longer clear spans. In order to achieve that you really have to go with composite trusses. In order to get that high floor to floor height, be able to get the MEP ducts and everything running through those web and Vierendeel openings and maintain those long clear spans. I think that was one of the biggest challenges - just coordinating all of that."

Vulcraft's composite joists were easily able to run water, electrical, and data lines through spaces in the open web of the composite joist, something not possible with beams without added cuts, materials cost, or excessive engineering. Even better were the large rectangular Vierendeel openings for HVAC and other MEP runs that could be added to the composite joists in key areas. Vierendeel openings can be quite large, and at mid-span use a rule-of-thumb of two: 2xD when determining the width (W) of the clear opening.

Running the MEP primarily through the composite joists meant that higher floor to floor heights and large expanses of ceiling without bulkheads were possible. Their efficient composite design also allowed the composite joists to span greater lengths, which resulted in a larger bay format in column and joist spacing (typically 10 - 15 feet). Those longer clear spans and clean ceiling lines free of bulkheads are important in a building designed to look as sleek as Seaport L4.

COMPOSITE JOISTS OFFER A MAJOR COST ADVANTAGE

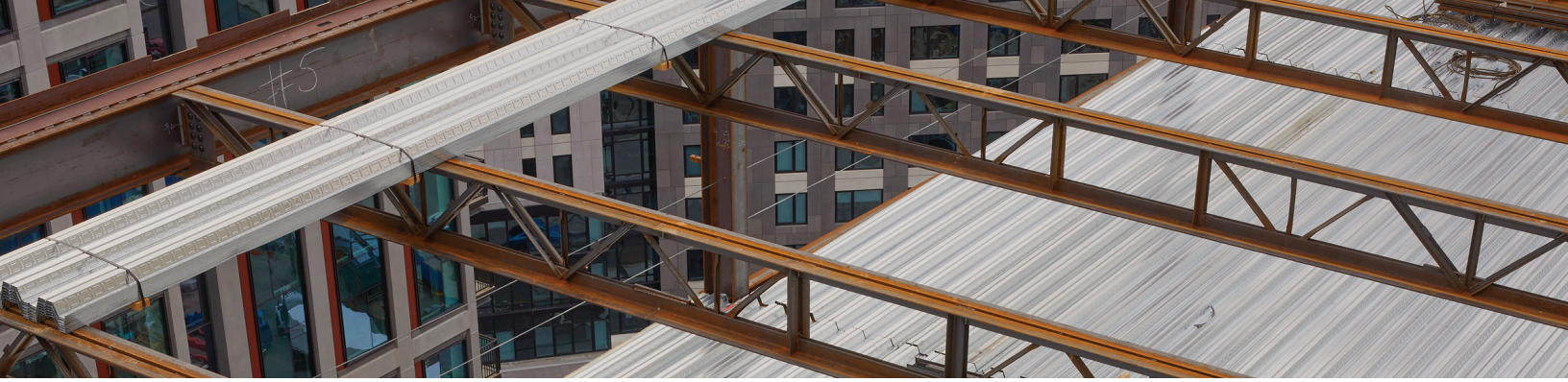
Another key benefit of the composite joists compared to beams was a major savings in cost of materials. Composite joists typically save 36% over the cost of beams, which adds up quickly. The amount of composite joists saved the Seaport L4 project over $700,000 in budget.

This cost savings is partly due to the top and bottom chord members being made of separate angles, so the top chord can be smaller than the bottom chord by approximately 60%, reducing the weight of the CJ Joist.

> "We designed the joists as 'flush frame' connections, where the top chord of the joist is flush with the top flange of the girder beams. This allows the beams to be composite with the concrete slab.

Kevin O. Clark, P.E., Design Engineer - Nucor Vulcraft

NUCOR® VULCRAFT



DROP-IN-PLACE BEAM REPLACEMENTS KEEP THINGS ON SCHEDULE

A key advantage of the composite joists was their design utilizing extended shear tabs, which let the joists be lowered straight down into place. Typically, joists have to be carefully maneuvered so that they are aligned properly before they can be fastened. This can be a complicated or frustrating job that ties up cranes and erector crews — even with good luck.

Vulcraft supplied Seaport L4 with CJ-series composite joists that, because of the inclusion of extended shear tabs, could be dropped in without having to wrangle them into alignment. This saved the cranes and erectors 25% of the time spent, keeping the schedule going smoothly.

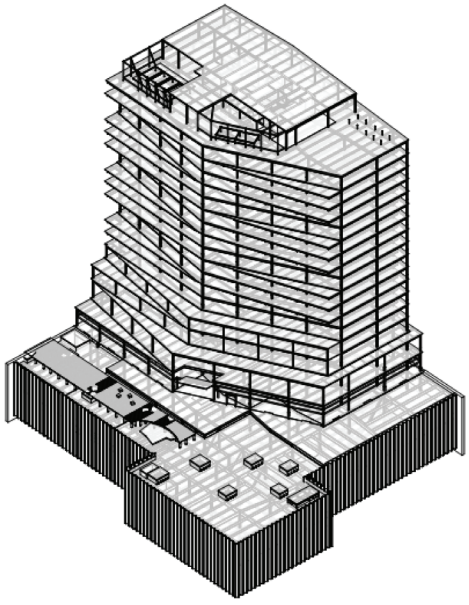
The shear tabs were designed to resist torsion, as the spandrel girder and girder wide flange beams were not designed to resist eccentric loading. In this project it was simpler and more economical to engineer the composite joists and their connections (including the extended shear tabs) to deal with torsion.

> “We use Vulcraft metal deck on all of our jobs. I don’t think I’ve ever done one where I haven’t specced it or it hasn’t been used. Not only do we utilize their composite trusses, but we also use their simple K Series joists and trusses as well. Vulcraft is very integral to the work that McNamara Salvia does.
>
> **Rachel Gerhart, P.E.**
> **Project Manager - McNamara Salvia**

VULCRAFT PROVIDES INDIVIDUALIZED DESIGNS OF COMPOSITE JOISTS

Vulcraft supplied the composite joists and composite deck for floors 4-17. This included CJ series composite steel joists and 3VLI 18 GA structural deck. The deck was combined with 3 ¼″ of lightweight concrete to form a 6 ¼″ LWC slab.

Vulcraft also needed to perform substantial design work due to the building’s trapezoidal shape and striking visual features. The lot is an abnormal shape and architectural features around the building’s perimeter included protruding balconies and cuts in the building’s exterior lines. This led to the structural framing supporting the CJ series joists being skewed. Therefore almost every joist supplied by Vulcraft had different lengths and an individual design.



NUCOR® VULCRAFT

“

We have a really good working relationship with Vulcraft. They always provide exceptional service. They get back to us when we have technical questions and they’re just awesome to work with and we really appreciate that both on the design side and the construction side when those things start to come together. We pepper the Vulcraft team with weird questions all the time and they always come back with responses.

Rachel M. Gerhart, P.E., Project Manager - McNamara Salvia

THE RESULT

Ultimately Vulcraft’s composite joists were able to help McNamara Salvia achieve the goals of WS Development for its tenant while saving budget and reducing construction headaches. Maximum floor to floor height, long clear spans, and clean lines were all accomplished through composite joists with flush frame connections and space to run MEP. All while saving $700,000 when compared to beams, in all helping this distinctive modern building take shape.

ASK AN EXPERT

For more details about composite joists, visit vulcraft.com. Details on engineering and sales contacts for your area can be found on the site.

CALL (402) 844-2400

NUCOR®
VULCRAFT