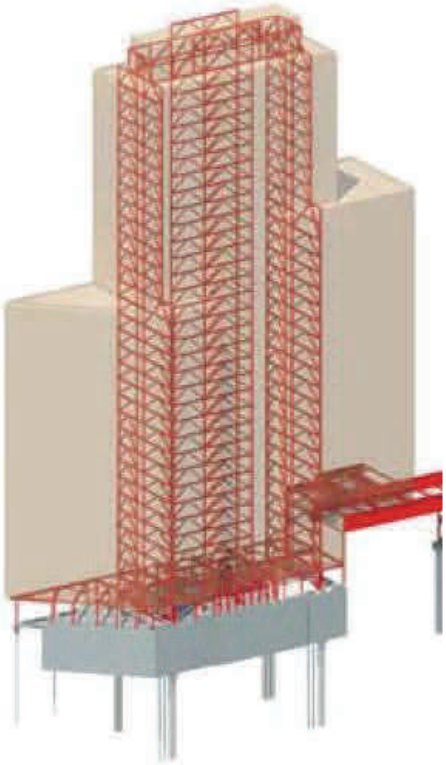
Large Scale Modular Construction— Description of Innovation

With increasing pressure for quicker project delivery, improved quality, and safer construction work, a few noteworthy projects have turned to modular construction as a means of satisfying these current challenges on large projects. Although prefabrication has been used at a small scale and at a large scale on many industrial projects, it has not been used extensively on high-end residential or institutional buildings, such as high-rise apartment building and hospital facilities. Two projects, particularly the B2 Atlantic Yards and the Miami Valley Health Ohio have shown the promises of increased use of modular construction. Both of these have been accomplished by Skanska, who has developed a modular construction division within its company.

A number of distinctions make modular construction truly an innovation. Modular construction has two different structural parts; the modules and the superstructure. The superstructure must be designed in a way to receive the modules. Each module must be structural sound independently to account for transportation and lifting stresses. After lifted into place, the modules are pinned to their neighboring units, which transfer their loads down to a site built plinth. This technique eliminates almost all concrete in the superstructure, creating a significantly lighter frame. Atlantic Yards used 930 modules with 255 unique structure types. With modular construction, finish work can occur within the module prior to lifting in place, improving quality and speeding up construction. Furthermore, facades and windows can be installed on the module in the factory, without concerns of weather or working at heights. Bathrooms and mechanical risers are typically completed before the modules arrive to the site.
Many modular projects not only require a non-traditional design process but must also successfully negotiate the strong union interests. Many modular projects are successful by arranging agreements with union laborers to perform work in the factory. In the Atlantic Yards project, deals were agreed upon that allowed for unionized work both on and off-site. Modular construction greatly reduces the number of crane movements and on-site work. At Atlantic Yards, construction time is reduced by a third. Additional advantages include improved quality control, greater production rates, reduced weather delays, improved safety, and reduced site disruption.

Modular construction can be anticipated to be used on many buildings in the future that have a high number of repetitive units, including toilet rooms, hospital patient rooms, and apartment units.



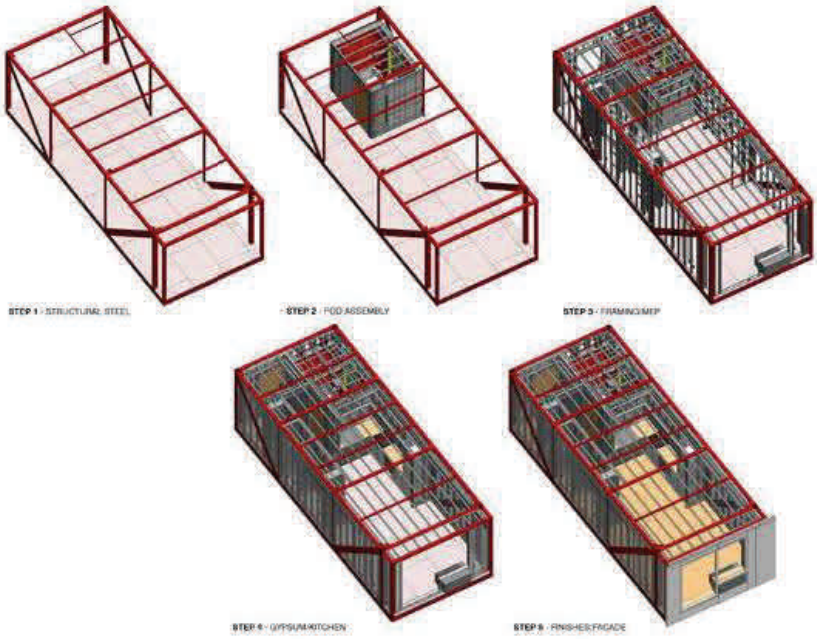


Diagram showing the construction sequence of the modules