

Modular 101

If you are considering modular as a construction method for all or part of your upcoming project then this information applies to you. Here are a few things to think about as you venture down the modular path whether your project is a hotel, multifamily housing, student housing or assisted living.

Developer/Owner:

1. Engage the entire team as early as possible in order to eliminate redundancies and the related costs of redesign.
2. If you are looking at modular because the design you have for a conventional build did not prove cost effective, you will likely have to redesign to accommodate modular requirements and incur added costs to do so.
3. If you are looking for cost savings, the project must have an efficient design or it will be more expensive to accommodate your needs.
4. Determine who is on the team (AOR, GC & Consultants)
5. Get your lender on board early and be sure they are open to modular construction. There are distinct differences when lending on a modular projects vs. conventional construction. Understand the differences and requirements ***before*** going down the modular path. Modular construction is front-end loaded and every manufacturer has different payment terms. There is no “one-size-fits-all”. Plan and budget for the capital outlay earlier in the construction process.
6. Understand that modular will increase the height and width of the building elevation and footprint. (See Architect 6a & 6b)
7. If a hotel, determine what FFE will be provided to the modular manufacturer or by the Developer and determine the necessary ordering dates and schedules to accommodate the quicker construction schedule.

Architect:

1. Wood frame modular can achieve Type V and Type III construction.
2. We can build up to 5 stories on grade or over podium as long as there is a fire separated deck between the construction types.
3. The building footprint will grow in width and building elevation will grow in height when using modular units. Be sure your site can accommodate the growth and design accordingly.
 - a. Modular units (aka “boxes” or “modules”) are constructed as a 6-sided box. Each 6-sided box sits next to a 6-sided box and on top of a 6-sided box. As a result there is a double roof/floor assembly and a double wall assembly to account for.

- b. A multi-story modular building is typically 11' floor to floor vs 10' conventional.
 - c. Interior walls are double walls for every modular connection (modline). Therefore, the wall thickness between inside face of wall in one module to the inside face of wall in the next module will be 11 1/8".
4. Understand the module width constraints for transportation for your state and city and design accordingly. **14'x70' is optimum in California. Larger widths can be more easily transported in other states.**
- a. In California, 14' 11" is the maximum travel width without significant added costs) this is outside wall to outside wall including shipping material at the time of transport.
 - b. Transport costs for units under 15' wide are roughly ½ the cost of units 15' wide to 15'11" wide units.
 - c. Transport costs for units 16' and larger are almost 4x the cost of those under 15'.
 - d. Module length should not to exceed 70' in order to maximize the bidding pool of factories.
 - e. If you are building garden style units or needing a shorter unit, you can design using a saw box to maximize production and transportation costs.
 - f. A saw box is a modular unit built as one piece (70' long) but structurally designed to be two (34' pieces). The single unit is then cut in half and separated in the field. Note: there is approximately 4' of waste in the field.
 - g. Designing module lengths of 36' – 52' will result in higher cost/sf.
 - 1. Maximize the unit size the goes through production and design accordingly. Odd or inefficient sizes have the same labor rate in the factory and will result in a higher cost/sf.
 - 2. In today's market, an inefficiently designed project will not get priority and most manufacturers will decline to bid the project.
5. Understand what portion of the project can/should be built off-site vs the area to be built conventionally on site.
- a. Stairwells, elevator shaft framework and utility rooms can be designed and built into the modular units.
 - b. Angled walls, curved or odd shaped areas cannot be built modularly and must be built conventionally on site.
 - c. First floor large open space areas with spans of greater than 25' or with significant floor loads, such as garages, reception areas and community rooms should be built conventionally.
 - d. Apartments or hotel rooms may adjoin conventionally built areas easily.

- e. On grade modular units typically sit on a stem wall foundation and conventionally built areas are typically slab on grade. Understand the differences and plan accordingly for the transitions between floors and ceilings.
6. Work with PFL early to understand what drawings are provided as part of the State submittal process and eliminate redundancies early in the process. PFL will coordinate the project team and perform the integrated modeling so that the units built off-site will work in the field.
7. The architect is responsible for reviewing the modular consultant's state submittal package and incorporating it into the City permit set. The Owner's Architect will be the AOR for the complete project as it pertains to the City submittal.
8. PFL will provide sub bids and subcontract for the structural and MEP for the modular portion of the project unless the Owner contracts directly with PFL approved consultants.

General Contractor:

1. Understand what portion of the project will be done off-site. (Scope, spec, FFE)
2. Work closely with modular consultant to determine clear scopes of work for sub-trade bids/pricing. (ie: plumbers aren't providing or setting toilets, showers, sinks. Only making horizontal and vertical connections in the corridors).
3. Understand the requirements for slab-on-grade conventional areas vs the stem wall foundation area for modular units.
4. Visit the manufacturing plant to see the off-site construction process as early as possible.
5. Understand what items, finishes and materials are being supplied and installed by the modular manufacturer.
6. Logistics: Determine crane set crew, staging requirements, storage and security.
7. Clearly define punch-list scope and contingency budget for factory related repairs. (Minor cracks in drywall, etc.). The factory does not make field repairs.
8. Coordinate schedule and conventional build requirements with modular consultant.
9. Pre-con Budget: Anticipate, create and manage a reasonable Preconstruction budget. Subcontractor scopes are a key element in proper project pricing.

Why Should You Go Through All of This?

1. Speed to market, cost savings, time value of money, learn something new, media attention, progressive construction method, reduce inefficiencies, use of smaller sub-trades, less material cost fluctuation, better quality control, more security

during the construction process, less noise on site, less congestion on site, less people needed on site and weather constraints.

- A. Reduce the need and reliance on larger sub-trades because less work is done on site.
- B. Factory labor rates are substantially lower than most field rates for the same trades.
- C. Gives the GC a construction option that takes less manpower and allows them to run multiple projects simultaneously.
- D. Speed to market reduces the opportunity for material and labor delays, material escalation, product and project changes and the added costs that result from those changes.
- E. Selling point for the local jurisdictions
 - 1. Reduced noise on site (70% of build done off-site).
 - 2. Reduced construction parking, traffic, human footprint in volume and time on site.
 - 3. Reduced site trash (70% of build is off-site) and construction on site 20-40% shorter.
 - 4. Greater security due to speed of installation (7-10 modules set per day).The building is sealed up and secure in days/weeks instead of months.
 - 5. Less material delivered to site that can be subject to theft and vandalism.