

The following construction methods were investigated to determine whether or not they provided cost savings over the proposed stud frame/stick built for the office section and concrete masonry unit and truss system for the apparatus bays.

### **Insulated Concrete Forms (ICF)**

#### **System Description & Background:**

ICFs are an exterior wall assembly comprised of insulated forms that remains in place after concrete has been poured and cures. This system offers a cast in place concrete wall alternative with integrated insulation and fastening surfaces for exterior siding and interior finishes.

Based on a precedent project example with a low construction cost (Farmington, New Hampshire) the Public Safety Building Committee (PSBC) investigated ICF as a possible cost saving construction method. The PSBC conducted a thorough assessment of this option, including a site visit, meetings with Farmington town employees and the project construction management (CM) firm, and input from Caolo & Bieniek Associates and A. M. Fogarty (cost estimator) .

#### **Findings:**

While ICF systems offer long-term energy savings advantages and a robust and resilient construction, there would likely be no savings opportunities associated with this construction method. The low construction cost of the Farmington project appears to be predominantly related to the project location and timing. Some major influencing factors noted by architect and cost estimator include:

- Farmington utilized CM method of bidding. Princeton project based on MA Chapter 149, where 12 sub-bid categories are bid first, and a CM submits an overall bid based on filed sub-bid results.
- Project was constructed in 2016 – an inflation rate of 3-8% per year should be applied to understand true comparison.
- MA public procurement laws dictate that on projects over \$1.5 Million an Owner's Project Manager (OPM) be hired. Not required in NH.
- Higher standards for cells, booking rooms, interview room per MA Department of Public Health. These areas have much higher construction cost than the rest of the building.
- Prevailing wages required in MA (\$75 / hr. for general labor, \$95 / hr. for skilled). Farmington Project CM noted typical wage rate of \$20-\$25 per hour at time of site visit.
- Site challenges incurring extra project cost present at Princeton site not present in Farmington (Demo of school building, abatement of hazardous materials, no public water, ledge, contaminated ground water, fire water tank required)

## **Pre-Manufactured Building Systems**

### **System Description & Background:**

These systems include wood and steel building assemblies where components are engineered and manufactured off-site and delivered and assembled onsite. These systems typically consist of standardized bay sizes with exterior purlin systems for attaching siding and building shell components. The PSBC was particularly interested in this system as a potential way to reduce the on-site prevailing wage impacts by shifting frame construction to a prefabrication facility.

### **Findings:**

Conversations with a local rep for a prominent prefabricated building system supplier indicated that this option would not likely yield significant cost savings compared to the stud framed construction method currently considered for the Princeton project. While some savings may be achievable compared to the concrete masonry unit construction of the vehicle bay area, this would come with reduced building resiliency in an area of heavy traffic.

## **Modular Construction**

### **System Description & Background:**

Similar to premanufactured building systems, modular systems leverage the advantages of factory type assembly efficiencies. With modular construction, semi-complete portions of the building are manufactured off site; this can include frame and building shell, doors and windows, insulation, wiring, plumbing and other building systems. Similar to premanufactured buildings, the PSBC was interested in this system as a potential way to reduce the on-site prevailing wage impacts by shifting more of the building construction to a prefabrication facility.

### **Findings:**

The PSBC worked with an out-of-state modular manufacturing company to prepare a preliminary quote based on the initial Option B Floorplan last voted on by the Town. CBA worked to align this quote with omitted scope and project cost items not included in the estimate provided. While this exercise was based on preliminary assumptions, it seemed to indicate that once additional scope and cost items are factored in, the modular building approach is unlikely to yield major project cost reduction and may introduce additional challenges.