MESSAGE FROM MBI’S EXECUTIVE DIRECTOR

Thank you for taking the time to read our latest Modular Advantage. We know that there aren’t many sources out there dedicated to modular construction and we appreciate you recognizing us for our efforts.

The 5-in-5 Initiative

We at the Modular Building Institute are focused on growing the modular market share to 5% in 5 years. Our initiative began in 2015 when we identified the top markets for 2016 by the forecasted expenditures. The top markets included multifamily, education, healthcare, and retail and commercial. Our first edition of this updated magazine focused on the multifamily market and how the market as a whole was seeing modular construction as a more conventional building method as construction costs were rising. Our second quarter edition featured MBI’s membership directory and updates on modular construction in the education market. The education market no longer sees traditional relocatable buildings as the only form of modular construction they can use to grow their campuses. We have seen a growth of permanent modular construction in the education market around the world.

In the 2016 annual reports, the forecasted top markets have not changed. We will continue to focus our attention on continuously growing the use of modular construction in these markets through educating owners, developers, architects, engineers, and contractors who work in these fields.

Modular in Healthcare

Inside this issue, you will find information on the healthcare market and the steady usage of modular construction to create new and additional square footage for healthcare projects. Axis Construction Corp. partnered with NRB, Inc. on a recent project to build an 18,000 square foot, two-story health clinic in Staten Island, New York. The Vanderbilt Ave Family Health Center is expected to be completed July 2017. The project is in collaboration with MJCL Architects, proponents for modular construction.

This recent win is one of many in recent years for the Axis and NRB partnership in the healthcare market. Many of these past projects won Awards of Distinction from the Modular Building Institute including a project for the New York City Health and Hospitals, the Queens Hospital Center; and a project from the same owner, The Ida G. Israel Community Health Center (case study on page 1B). These projects won the awards based on a number of criteria including architectural excellence, technical innovation, cost-effectiveness, energy efficiency, and calendar days to complete. These New York based projects are amazing examples of how the area has embraced the modular building industry.

New York is bustling with modular construction including the recent completion of the tallest modularly constructed building, Pacific Park, by FC Modular. With this level of attention, modular construction is steadily gaining toward that 5% market share that was forecasted in 2015. Thank you for assisting us in reaching this goal.

Sincerely,

Tom Hardiman, CAE

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The building industry has indeed come a long way with technological innovations and modern equipment resulting in smarter processes, shorter build times and cost optimization. Modular construction, for instance, is increasingly being accepted as a viable building method that addresses the most common challenges of traditional construction processes without compromising on quality, strength or performance.

The linear framework of the traditional construction industry is not only labor- and cost-intensive but also presents multiple risks in terms of project deliverability, safety, productivity and supply chain efficiencies. Advances in modular construction have led to the introduction of disruptive technologies and practices including offsite prefabrication and lean manufacturing that help overcome all these shortcomings while ensuring quality structures.

With assured advantages such as shorter time-frames, and reduced labor and construction costs, modular construction is evolving into a preferred method of building in commercial and residential projects. Especially so in healthcare developments, which must balance shrinking budgets and green design objectives with the constant demand to deliver new or renovated facilities faster to meet the growing need for patient care. Modular construction is particularly relevant to the healthcare sector due to the need for repeatable units in volume numbers featuring integrated, adaptable and sustainable design, and delivered in a time- and cost-effective manner.

Building professionals who have employed modular construction techniques in their projects have achieved substantial gains. Results from a recent survey of 800 architects, engineers and contracting professionals reveal the significant advantages of modular construction including shorter project schedules (66%); lower budgets (65%); and reduced construction waste (77%).

The many benefits of modular construction for healthcare projects:

Reduced construction schedule
Modular construction improves a project’s speed-to-market by synchronizing offsite and onsite work. While prefabrication and module assembly are carried out in a controlled offsite environment, onsite work progresses at the same time, helping complete the building 50 percent faster than traditional construction processes. Modular construction projects can help to remove up to 80 percent of the building construction activity from the site, minimizing the impact of site disruptions and inclement weather, maximizing safety and ensuring guaranteed timelines.

Reduced labor and construction costs
With a major segment of modular construction work executed offshore, labor requirement onsite...
is minimized. This can help the project to achieve substantial cost savings from these shorter build times, less labor costs and minimal waste generation.

Consistency in construction
Manufacturing the modular units and components offsite in a controlled environment ensures a high level of quality as well as consistency in construction to meet performance and compliance requirements unique to the healthcare segment.

Reduced waste generation
Made-to-measure buildings and factory manufactured building components ensure waste generation is minimized on the construction site. Construction and demolition waste from traditional building processes accounts for more than 38 percent of Australia's total waste sent to landfill.

Ausco Modular in healthcare projects
Ausco Modular delivered the $2.5 million Ivanhoe HealthOne facility in rural NSW, with sections constructed interstate and transported separately for assembly on site.

The company also supplied 26 large modules for the recently completed $23 million redevelopment of Canberra Hospital’s emergency department, with the modules craned into place over the department’s access road.

A market leader in modular and prefabricated buildings in Australia and the Asia-Pacific region for over five decades, Ausco Modular delivers full turnkey solutions for the healthcare sector with its 360 Degree Service. This unique turnkey design-and-build service encompasses engineering, compliance, approvals, offsite manufacture, onsite construction, handover and documentation.

...
“Flexibility is one of the hallmarks of the RAD modular approach,” Logan Scow, project manager for Banner Health stated. “We can receive an additional vault if our demands increase.”

The patented modular system provided by RAD can accommodate any new demand or technology that Banner Health may seek in the future.

To meet the center’s short timeline and allow them to start seeing patients as soon as possible, RAD used a PRO System that had been previously leased to the Mayo Clinic in Phoenix, a short distance from Sun City. The Mayo Clinic leased the PRO System complete with furnishings and equipment for 32 months, which allowed them to enter the market while the construction of their new hospital in Phoenix was in process.

To ensure that the building completely met Banner MD Anderson's program needs, RAD renovated the existing facility, adjusted the floor plan by moving doors and walls and added an additional 1,219 square feet that included a CT suite and expanded clinic space. "We selected RAD Technology’s system due to the shorter timeline to opening, and because of the structure’s temporary, modular design. The RAD technology facility will serve as a bridge to a planned permanent expansion space on our hospital campus."

-- Dr. Leonard Gunderson, Chair of the Department of Radiation Oncology at Mayo Clinic, Scottsdale

To ensure that the building completely met Banner MD Anderson’s program needs, RAD renovated the existing facility, adjusted the floor plan by moving doors and walls and added an additional 1,219 square feet that included a CT suite and expanded clinic space. RAD’s Director of Architecture and Engineering, George Olear, designed the modifications, updates, and refurbishments to coordinate with the architecture and colors of the region. The earth tones used in and on the new facility complement the surrounding desert region.

In addition, to further meet the future needs of Banner MD Anderson, RAD has already designed an expansion for their facility, as Banner MD Anderson is anticipating their center to grow rapidly and is predicting the need for additional space prior to the hospital expansion being completed. To ensure that the pre-designed addition can be added quickly, RAD installed oversized electrical utilities onsite to accommodate the current facility and future vault with additional medical equipment.

Banner Health and The University of Texas MD Anderson Cancer Center partnered to provide cancer care to patients in Arizona creating Banner MD Anderson Cancer Center. They originally provided radiation oncology treatment at two locations in Arizona, Banner Thunderbird Medical Center in Glendale and Banner Desert Medical Center in Mesa. After the success of their first two facilities they decided to open a third cancer center at Banner Boswell Medical Center in Sun City, Arizona. For this expansion they wanted to find a way to quickly and effectively bring their expertise to the patients at Banner Boswell Medical Center before a planned expansion five years away.

Banner MD Anderson turned to design-builder RAD Technology Medical Systems’ (RAD) team of innovators, problem solvers and seasoned medical industry veterans to provide them with the perfect solution.

RAD used their revolutionary patented modular radiation therapy vault and cancer care clinic to create the perfect solution for Banner MD Anderson. One of the primary benefits of RAD’s system is that it is factory-fabricated, eliminating the need for lengthy onsite construction. The patented design uses granular shielding material instead of concrete that can be added to the facility onsite and later evacuated if needed. By selecting this type of cancer center construction, Banner MD Anderson was able to begin providing patients with access to new treatment in a matter of months.

After meeting with Banner MD Anderson to assess their needs RAD determined their PRO System to be the best fit. The final completed center is 5,214 square feet and can be relocated, expanded or left onsite as a permanent structure. This flexible solution aligned perfectly with the hospital’s goals of the planned expansion and renovation that will include a cancer center in a few years. They are able to use the RAD PRO System for as long as they need in Sun City and then relocate it to one of their other locations when the hospital expansion is complete. In addition, should Banner MD Anderson require additional or less space at the next location, RAD can easily add or remove modules.

We selected RAD Technology’s system due to the shorter timeline to opening, and because of the structure’s temporary, modular design. The RAD technology facility will serve as a bridge to a planned permanent expansion space on our hospital campus.

-- Dr. Leonard Gunderson, Chair of the Department of Radiation Oncology at Mayo Clinic, Scottsdale

To meet the center’s short timeline and allow them to start seeing patients as soon as possible, RAD used a PRO System that had been previously leased to the Mayo Clinic in Phoenix, a short distance from Sun City. The Mayo Clinic leased the PRO System complete with furnishings and equipment for 32 months, which allowed them to enter the market while the construction of their new hospital in Phoenix was in process.
This project highlights how unique RAD's patented modular building solution is. The facility consists of 16 separate modules, parts of which were fabricated in Quebec, Indiana and Arizona. The modules arrived onsite and then were assembled and made ready in less than 50 days. The building includes shielded spaces for a linear accelerator and a CT SIM as well as exam rooms, offices, nurses' station, reception area and waiting room, restrooms and more. The therapy room with the linear accelerator is surrounded by over two million pounds of mass to shield and protect the patients, clinicians and public from the radiation. The shielding is designed to protect against radiation energy levels at 180 times that of a normal diagnostic x-ray.

Another unique aspect of the patented design is its ability to accommodate a variety of linear accelerators, a further innovation by RAD. Mayo had selected one manufacturer and Banner MD Anderson another. In conventional construction they would have been cast in concrete with the only solution for change being a jackhammer.

“This is where modular construction and factory fabricated solutions brings superior results,” stated RAD President, John Lefkus. “Our patented PRO Vaults include a modular base frame system, which allows for the easy exchange from one accelerator to another, and if energy levels change, the shielding system can be adjusted to accommodate any product on the market.”

“The flexibility of the modular approach allowed one client to lease the facility and another use it as an interim solution with future expandability and relocatability,” adds George Olear. “The ‘green’ aspects of the approach are unsurpassed. Instead of millions of pounds of concrete being placed and later removed, the granular shielding remains in its native state being able to be used for some future purpose without any processing. We basically can recycle both the building components and the shielding components.”

The newly constructed RAD Cancer Center at Banner Boswell allows them to provide radiation treatment close to where their patients live and work. In addition, the flexibility of the system provides them with a facility that they will be able to easily add on to, relocate and continue to use at other sites as their needs change.

This project truly captures the three components of RAD’s patented modular approach — Time, Technology and Unique Financing. The project was completed in a fraction of the time of traditional construction; the patented design offers a component approach to equipment installation facilitating future upgrades along with a shielding method that can be modified without the cost and disruption of expensive lead and high density block solutions. Lastly, RAD has been successful developing cancer treatment facilities in four countries for the most distinguished cancer providers and looks forward to continuing to help institutions to efficiently provide lifesaving cancer treatments to patients in need.

The University of Virginia’s Medical Center recently had an MRI facility added to their current center. The new MRI facility was built by NRB, Inc., using modular construction. The building modules were created off-site in Pennsylvania, then transported to Charlottesville, Virginia, where they were installed in late 2015.

The modules arrived about 90% complete. They already included everything from plumbing and air conditioning, to desks and automatic doors. Local residents were fascinated with the speed of installation for the project, because it was so fast, contrary to the construction process of a traditional build, which can take months to complete onsite.

NRB says it takes about three months to pre-build the structure off-site, but only about a week to install and finish the building. According to NRB, the University of Virginia uses the modular building to help complete more MRI scans for patients in a more permanent facility.

“PEOPLE ARE AMAZED. THEY MIGHT GO HOME FRIDAY FROM WORK AND COME BACK MONDAY AND HAVE A BUILDING THAT WASN’T THERE. IT’S PRETTY NEAT.”

-- Lee Bachman,
Construction Manager , NRB, Inc.
A VIEW FROM AN INDEPENDENT DESIGN CONSULTANT

Written by Steven Fisher, SMF Design Engineering Ltd.

Working as an independent consultant in the modular construction industry can be an exciting and rewarding experience. Collaborating with different companies, on a wide range of projects and across a multitude of sectors, experiencing different products and ways of working. Although there are inevitable downsides. The uncertainty that comes with not having guaranteed work and associations that often come on a finite basis. Overall, however, I find this way of working both effective and mutually beneficial.

Toward the end of 2015, I was working for a client who asked me to carry out what seemed to be a pretty straightforward job. They had just been awarded a contract to produce a modular extension for an Adult Care Ward for the Wye Valley NHS Trust at Hereford County Hospital, in the UK. The building would accommodate 16 beds, along with a reception area, offices, various utility rooms and would consist of 15 modular bays plus a linkway to the existing hospital building.

As we all know, the driving principle of modular construction is a simple one, transportable sized units are lined and/or stacked in order to create a single larger unit. Sometimes it can be this straightforward, but I have found there to be an increasing number of projects that require something a little different. Something that can directly rival the flexibility of more traditional construction techniques.

An initial look at the specification revealed nothing suspicious and a study of the architectural drawings wasn’t too alarming. OK, the building was not a straightforward job, but it was a good design. The main contractor fabricated a steel platform, which would be supported at the agreed dig locations and with some painstaking co-ordination between myself and the main contractor, we ensured that the modules themselves would sit perfectly on top, successfully supporting the structure and allowing for services and drainage below.

Steel platform for modules to sit on.

Our next challenge was the roof. Once again, to minimize ground disturbance we were limited to pre-agreed rain water drainage locations. These would be fed using long drainage valleys running across the entire width of the building. In order to accommodate this it would require a fall across the length of the modules and a drop into a drainage valley, which would itself run into the rain water hoppers located at either end.

The real challenge here was to manage the build-up in dimensions that would accommodate reasonable transportable limits. We had to account for the floor make-up and then the minimum requirement of a 2.7m internal suspended ceiling height. We also had to account for the space required for services above the ceiling plus the steel lattice roof system where we had to achieve a minimum fall requirement into the valleys. This was particularly evident in the longest bays where the valley sat in the mid-section of the modules. To accomplish this we effectively had two lattice beams falling to the middle of the 13.6m long modules where they would drop into a 1m wide flat section, only just deep enough to add the required fall to the drainage hoppers positioned at opposite ends of the building. The unavoidable break in the continuity of the roof steel inevitably resulted in a weakened roof structure but once again this was rectified by introducing some strategically placed mid bay supports, which we would hide inside an internal corridor wall.

Fitted out internally with stelvetite and externally clad in plastisol covered boards along with all of the necessary mechanical/electrical facilities including medical gases, the building was ready to be handed over. To add extra light to the wards, monodraught sun pipes were installed in the central bays as well as in a site erected linkway to the existing building.

The open-minded approach by all those involved and willingness to be flexible in the execution of the design resulted in quick resolutions and kept the project timescales on track. I found my independent position to be a great benefit in mediating between the design objectives on the main contractor’s side and manufacturing capabilities of the sub-contractor. With the build completed and all parties’ satisfied, this open-minded approach was an enjoyable experience. Overall, we all benefited from this level of co-operation, long may it continue.

Rear exterior of the Adult Care Ward.
MBI and Clemson University collaborated on a book for modular building professionals:

INTRODUCTION TO COMMERCIAL MODULAR CONSTRUCTION

Edition: February 2015
Publisher: Modular Building Institute

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Does your company have a new product, innovative project, recent hire, a change in your office location, or a revamped website? Please share it with us so we can let others in the industry know your latest news.

Please send your stories and high resolution photos to the MBI’s communications department via email: communications@modular.org. Don’t miss the opportunity to let others in the industry hear about the exciting developments in your company!

REMINDERS:
Each year MBI holds the Awards of Distinction contest. It is the commercial modular industry’s premier awards program offering competition for best of show, first place, and honorable mention in 20+ categories. Entries are permanent (PMC), temporary/relocatable (RB), green and renovated buildings, as well as marketing pieces. MBI’s 2017 Awards of Distinction contest will open in October 2016. Contest open to all MBI members: www.modular.org/AwardEntry.aspx

Upcoming Modular Advantage Deadlines:
4th Quarter | September 9, 2016:
(Ad artwork & article content due)
Magazine focus: Commercial (Retail, QSR) Market & Year in Review

1st Quarter (2017) | December 10, 2016:
(Ad artwork & article content due)
Magazine focus: Trends on the Horizon (Technology innovations and 2017 Outlook)

Send article content to: communications@modular.org

MBI and Clemson University collaborated on a book for modular building professionals:

Introduction to Commercial Modular Construction

The Modular Building Institute (MBI) along with Clemson University developed Introduction to Commercial Modular Construction over two years with the goal of introducing the reader to an innovative and exciting construction method. This book discusses the modular building process compared to traditional site-built construction and is designed to help the reader understand terminology and concepts of modular building including client needs, design, fabrication, transportation, and installation.

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ORDER YOUR COPY THROUGH MODULAR.ORG TODAY!
Permanent modular construction offers quiet, safe, and clean applications for medical, surgical, clinical, laboratory, and dental use. The insight MBI contractors have from designing and building thousands of medical facilities has resulted in satisfied healthcare professionals the world over. Whenever organizations or communities need a new rehabilitation clinic, emergency room, operating room, hospital extension, laboratory, diagnostic center, or other medical facility, permanent modular buildings can be custom built on the tightest budgets while maintaining strict medical and aesthetic specifications.

Why Attend Offsite Construction Expo?

The 2016 Offsite Construction Expo offers a focused presentation of the abilities of offsite construction across all markets. Attendees and exhibitors alike will benefit from the variety of modular vendors and component suppliers all in one room. Previous show participants said:

"[THE BEST PART WAS] NETWORKING WITH INDUSTRY PEOPLE FROM ACROSS THE COUNTRY."

"I’VE READ ABOUT OFFSITE MODULES BUT HAD NEVER SEEN ONE UP CLOSE."

"[THE EXPO] SHOWED A DIFFERENT SIDE OF THE INDUSTRY AND MAY HAVE CHANGED HOW WE ARE VIEWED FROM THE OUTSIDE."

"A GOOD MIX OF PREFABRICATION SYSTEMS WERE REPRESENTED."

"THE QUALIFIED LEADS GENERATED WAS THE BEST ASPECT OF THE EXPO."

Offsite construction is ideal for the following markets: Education, Healthcare, Hospitality, Retail, Multifamily, and Office. The Offsite Construction Expo is the greatest opportunity to reach developers, owners, contractors, architects, engineers, government agencies, and schools.

REGISTER TO ATTEND or EXHIBIT NOW! WWW.OFFSITECONSTRUCTIONEXPO.COM

Contact us at info@hardimanwilliams.com or call 434-202-8180.
THE IDA G. ISRAEL COMMUNITY HEALTH CENTER

Architectural Excellence

The Ida G. Israel Community Health Center is a replacement clinic for one lost in Hurricane Sandy. The new clinic is strategically placed in the same neighborhood as the original clinic with close proximity to Coney Island Hospital. The objective was to get a replacement facility up and running quickly for the community, so the use of permanent modular construction was ideal. The building incorporates dental, behavioral health, and substance abuse clinics, all while meeting the stringent New York City building codes and Department of Health regulations. The building blended the right mix of architectural, structural, mechanical/electrical features while maintaining strict adherence to budget requirements, critical to the success of the project as it was funded by FEMA. The building features a storefront entry system allowing natural light to fill the entryway, factory applied thin-brick exterior with full parapet, ceramic tiled toilet rooms, and clean and smooth interior finishes of the offices and clinic spaces for ease of maintenance.

Technical Innovation and Sustainability

In order to get the replacement clinic operational as quickly as possible, Coney Island Hospital chose offsite construction as the solution. The “offsite” construction process ensured shorter site installation time as all the modules had been built together to ensure precision fit and finish at the plant before being deconstructed for transport. Further, this process allowed the building to arrive with all the exterior brick installed as well as a high level of completion on the interior, reducing site completion time significantly. The building was designed with minimal interior columns to allow for maximum flexibility in use. It was designed using high-efficiency, energy saving interior light fixtures with occupancy sensor controls in all rooms, low VOC paints, high-efficiency natural gas HVAC units, reflective white modified Bit roofing, and large windows for natural day lighting with insulated glazing.

Cost Effectiveness

Building this facility in a controlled environment and away from the site helped reduce time and costs in project management and general conditions. The clinic meets the critical HVAC requirements of a healthcare facility by utilizing roof top air handlers, VAV boxes and supplemental cooling systems for IT/Data, all of which are tied into and controlled by a state-of-the-art building controls system. Interior lighting consists of high efficiency, energy saving light fixtures and occupancy sensors. Other energy efficient properties include rigid insulation on the exterior walls and roof and sprayed insulation under the floor providing for a superior building envelope. All of which keeps operating costs to a minimum. Due to existing soil conditions, driven piles were utilized to support the foundation system.

client’s board was clear, at the cost of compromised finishes or quality. Throughout the building and design process careful attention was given to interior finishes and layout that would meet the demands of a quick moving medical practice. Space for storage and efficient transportation of equipment — both in usage and rotation — allows for a high level of flexibility throughout the floor plan.

Cost Effectiveness

Offsite construction simultaneously completed with on-site earth work and creation of a stem wall foundation allowed for a quick occupancy of the facility. Profitable use of the clinic was achieved quickly through a shorter timeline for construction. This initial phase of a multi-phase vision for the continued growth of Southern Coos Hospital demonstrated to the surrounding community the care and attention to detail that the hospital and its foundation planned to bring to the expansion project and to consequential growth of patient services. There is no better testament to considerate, deliberate planning and conscientious asset management than to experience high quality customer care in the new facility.
DENTAL CLINIC REPLACEMENT

Architectural Excellence

This 2,390 square-foot dental office appears small from the outside, yet has all of the state of the art features found in large dental facilities; i.e., full laboratory, x-ray/imaging, sterile work station, (5) operatories, multiple offices, consulting rooms, spacious waiting room, and even a main entrance vestibule. The building is set at grade and also uses “frame-less” floor construction. The frame-less design allowed workers to set the building as low as possible and is consistent with a permanent structure. As soon as the modular sections were set, roof trusses were delivered and set the next day. The steep roof design reflects the northern resort area style amid the tall surrounding pines. A large dormer element that breaks up the roofline was installed on the most visible side of the building. The building also has site installed stonework and clapboard siding with shake accented gables adding a warm, human and less commercial character more fitting for the rustic wooded setting.

Technical Innovation and Sustainability

As mentioned, this permanent dental office was built as a “frame-less” modular. The modules were dropped into this tight location with a crane, which was then used to stack the frames onto one carrier. The frames were then taken back to the factory and re-used for other projects.

Cost Effectiveness

McDonald Modular Solutions partnered with Rockford Construction, an established general contractor with impressive operations in the north west corner of the state. Rockford efficiently handled the site related portion of the project with their tremendous resources in this otherwise sparse area for contracting. Their contacts and access to resources, coupled with our modular building advantage, allowed the entire structure to be complete in less than 90 days. During the entire construction process, the dentist was able to keep her dental practice fully operational in the existing office building on the same lot. She was able to take a weeks’ vacation and was completely moved into her new clinic the following week without missing a beat.
VETERANS AFFAIRS PSYCHIATRIC HOSPITAL

Architectural Excellence

Due to the design-build project delivery system utilized, Silver Creek and the design architect collaborated from the project onset to provide a building which not only seamlessly fits into the existing design of the surrounding medical campus, but also maximizes the benefit of modular construction. The project consists of a two-story structure which houses 30 exam rooms, 59 offices and consultation rooms, 2 break rooms, 6 waiting rooms, a large multi-purpose space and all necessary supporting spaces. The building’s exterior consists of two-tone stucco with bronze aluminum window and door systems to match the adjacent structures. The building interior utilizes various color and finish material schemes to develop clearly defined operational spaces and provide context to the occupants. The final building reflects the coordinated efforts of the design team and construction team to provide a client focused experience.

Technical Innovation and Sustainability

The program requirements provided by the client required the building to utilize a central corridor system as well as provide a large outdoor space within the confines of the building. To meet these requirements Silver Creek developed a series of specialized building frames that utilized offset columns and cantilevered beams to accommodate the corridors. The building used larger than typical modules (14’x60’) with concrete floor decks and 13-foot floor to floor heights. The delivery of the modules to the project site required the preparation of specialized shipping systems in order to accommodate the size and weight of the modules, as well as mitigating the access issues present at the project site. Special planning was used to organize the interior spaces in a manner which minimized the amount of “close-up” work that would be done on site at the module joint locations.

Cost Effectiveness

Due to the complexity and scope of the project, the ability to perform the work in a factory environment provided the opportunity for significant cost reductions and increased quality control measures. The careful placement of the offices and exam rooms resulted in a vast majority of those spaces being enclosed on all sides within a single module. All of the enclosed spaces were fully finished in the factory (casework, flooring, ceiling, paint) in order to reduce the costs associated with work performed on-site. Spaces that could not be enclosed due to size or location were partially finished in the factory and wherever possible the remaining finishes were pre-cut in order to minimize the duration of work on site.
INDUSTRY ANALYSIS
2016 ANNUAL REPORTS

ABOUT THE MODULAR CONSTRUCTION INDUSTRY

Unlike the federally regulated HUD-Code manufactured housing industry, the modular construction industry is regulated primarily at the state and local levels by code and agency administrators. As with site-built structures, the modularly constructed facility must meet the local codes where the building is to be located. There is no special “modular building code” or exceptions for a building constructed utilizing the modular construction process. It is simply a different and more efficient manner to assemble the materials and components of a building.

Modular construction can be utilized for commercial, residential, institutional or industrial applications.

The term “modular” literally means “designed with standardized units or dimensions, for easy assembly and repair or flexible arrangement and use.” The modular process is employed in numerous applications and projects including submarines and cruise ships, heavy industrial plants, and even nuclear facilities.

MODULAR INDUSTRY SEGMENTS

Modular construction, applied to the building industry, can be further segmented into commercial or residential markets. MBI serves commercial modular construction markets. For information about the residential modular industry, visit modularhome.org.

Commercial Modular Buildings are non-residential, factory-built structures designed to meet provincial, state, and local building codes. Commonly, these buildings are constructed in accordance with the International Building Code (IBC) or a version of a code modeled after the IBC.

Within the commercial modular building industry there are two distinct divisions, both represented by MBI:

- **Relocatable Buildings (RB)** – Relocatable modular buildings are designed to be reused or repurposed multiple times and transported to different sites. Relocatable Building as defined in the 2015 International Existing Building Code (IBC) – a partially or completely assembled building constructed and designed to be reused multiple times and transported to different building sites.

- **Permanent Modular Construction (PMC)** – PMC is an innovative, sustainable construction delivery method utilizing offsite, lean manufacturing techniques to prefabricate single or multi-story whole building solutions in deliverable module sections. PMC buildings are manufactured in a safe, controlled setting and can be constructed of wood, steel or concrete. PMC modules can be integrated into site built projects or stand alone as a turn-key solution, and can be delivered with MEP; fixtures and interior finishes in less time, with less waste and higher quality control compared to projects utilizing only traditional site construction.

Residential Modular – One and two family factory-built structures designed to meet state and local building codes. Commonly built to the International Residential Code (IRC) or some code modeled after the IRC.

Institutional or Industrial – Modular construction in reference to this application typically involves mechanical and electrical systems, piping and components of larger industrial structures such as off-shore oil rigs or industrial plants. While utilizing the modular construction processes, the result is not typically a completed three-dimensional (or volumetric) building as in the other cases.

<table>
<thead>
<tr>
<th>MARKET</th>
<th>TEMPORARY/RELOCATABLE</th>
<th>PERMANENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>Federal HUD code; manufactured housing</td>
<td>State-adopted IRC code; modular homes</td>
</tr>
<tr>
<td>Commercial</td>
<td>State-adopted IBC code; relocatable/industrialized buildings</td>
<td>State-adopted IBC code; permanent modular construction (PMC)</td>
</tr>
</tbody>
</table>
COUNTLESS INDUSTRIES REGULARLY USE PERMANENT MODULAR CONSTRUCTION (PMC), INCLUDING SCHOOLS, BANKS, RESTAURANTS, HOSPITALS, MEDICAL CLINICS, DAYCARE CENTERS, AND CORRECTIONAL FACILITIES – JUST TO NAME A FEW. THE INDUSTRIES THAT UTILIZE OUR SERVICES ARE NUMEROUS (AS MEASURED BY THE NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM, OR NAICS), BUT THE MOST COMMON CATEGORIES INCLUDE:

- **New Multifamily Housing Construction**
- **Commercial & Institutional Building Construction**

**ABOUT PERMANENT MODULAR CONSTRUCTION (PMC)**

Countless industries regularly use permanent modular construction (PMC), including schools, banks, restaurants, hospitals, medical clinics, daycare centers, and correctional facilities – just to name a few. The industries that utilize our services are numerous (as measured by the North American Industry Classification System, or NAICS), but the most common categories include:

- **New Multifamily Housing Construction**
- **Commercial & Institutional Building Construction**

**The primary benefits of PMC include:**

**GREENER:** Reduced environmental impact – less site damage, less material exposure, and less waste in landfill.

**FASTER:** Streamlined construction process – in many cases, occupancy occurs 50 percent faster than with conventional construction.

**SMARTER:** Resource-efficient – more efficient use of skilled labor and fewer materials wasted.

Commercial modular buildings are non-residential structures, completed 60- to 90-percent offsite in a controlled manufacturing environment, then transported and assembled at the final building site. This can comprise the entire building or be components or subassemblies of larger structures. In many cases, modular contractors work with traditional general contractors to leverage the resources and advantages of each type of construction.

Primarily, four stages make up a permanent modular construction project:

1. **Design approval by the end user and any regulating authorities.**
2. **Assembly of module components in a controlled environment.**
3. **Transportation of modules to a final destination.**
4. **Erection of modular units to form a finished building.**

**DESIGN CONSIDERATIONS FOR PMC**

It is important to note that if a project is to utilize modular construction successfully, the process begins at the design phase. There are some characteristics to modular construction that should be considered when designing a project:

- Three-dimensional modules have widths that are typically nominal 8, 10, 12, 14, and 16 feet, with 12 and 14 feet being the most common. Framing dimensions are typically 2 inches less than nominal size.
- Module heights vary from approximately 11 feet, 6 inches to 13 feet, not including the height of the unit’s transport trailer or frame.
- Wood-frame construction is the most common type of construction; however, manufacturers also build with steel and concrete and can meet the requirements for Type-I, -II, and -III construction.
- Multistory modular buildings can be built up to the maximum stories allowed by code. A majority of modular buildings are 1 to 3 stories, but a rapidly growing trend is 4- to 8-story facilities. A handful of projects have exceeded 15 stories in the U.K. and U.S., including the tallest modular building at 32-stories.
- Restroom areas should be designed so that a module “marriage line” does not split the space.
- Multiple roof-framing styles are available. Some styles can be completed in the factory and some may require the installation of trusses onsite.
- Modular buildings can be configured using modules of various lengths and widths.

**Typical modular project schedule:**

**MODULAR CONSTRUCTION SCHEDULE**

**SITE BUILT CONSTRUCTION SCHEDULE**

**TIME SAVING:** Simultaneous site development and building construction at the plant reduces schedule by 50% to 59%
MBI has identified six key markets for PMC in North America:

- **COMMERCIAL HOUSING & MULTIFAMILY**
  - Modular construction offers the ability to provide condominiums, apartments, hotels, student dorms, and workforce accommodations in about half the time offices, conference rooms, elegant lobbies, kitchens, restrooms, and large open spaces for cubicles or other partition systems. MBI members have architectural and engineering designs for cubicles or other partition systems. MBI members were asked to provide total revenue from modular construction activities.

- **OFFICE & ADMINISTRATIVE**
  - Permanent modular buildings serve as corporate headquarters, satellite bureaus, institutional and administrative buildings, and offices for all business types. Modern single- and multi-story buildings can be configured in a number of ways to include independent offices, conference rooms, elegant lobbies, kitchens, restrooms, and large open spaces for cubicles or other partition systems. MBI members have architectural and engineering designs for workspace planning, storm water management, landscaping, parking, and zoned heating and air conditioning. If it is time to capitalize on company growth, modular construction offers a fast, economical approach.

- **COMMERCIAL & RETAIL**
  - Simply put, quicker occupancy equals quicker return on investment. Modular construction is accelerated construction. Why is this so important to banks, restaurants, convenience stores, childcare centers, and other retail establishments? Because earlier occupancy means a customer generates revenue faster. In fact, it’s not uncommon for many modular buildings to be up and running in as little as 24 hours—an important consideration for retailers of all types.

- **HEALTHCARE**
  - Many hospitals and healthcare facility contractors are turning to modular, primarily for building components such as bathroom pods and headwalls. However, entire hospitals have been constructed utilizing modular construction techniques. Modular construction offers quiet, safe, and clean applications for medical, surgical, clinical and dental use.

- **INSTITUTIONAL & ASSEMBLY**
  - This market includes police and fire stations, prisons, and facilities used for assembly such as churches. While not a large market overall, some modular companies specialize in these markets.

In 2015, MBI represented 73 North American modular manufacturers and obtained revenue and sales information from about one third of those companies. Members were asked to provide total revenue from modular manufacturing.

MBI analyzed more than 700 modular projects and determined that, on average 55 percent of the total value of the building project costs consisted of the modular manufactured component with the rest of the building’s value determined by site-related activities. To accurately compare to the CMD database, MBI adjusted the PMC module production revenue accordingly to reflect the total value of new construction projects. After making these adjustments, MBI estimates that the total value of new permanent modular construction projects put in place in 2015 in North America at $3.71 billion.

MBI compared total PMC project revenue of $3.71 billion to the total value of new construction put in place in North America as reported by CMD Group of $136 billion to get a market share of 2.72 percent.
PRODUCTION

Modular manufacturers are located throughout North America, with larger clusters of manufacturers in Pennsylvania, Georgia, Texas, Indiana, California, and Alberta, Canada. Most manufacturers in North America are single-location operations and can competitively transport units within a 500-mile radius of their plant. Peak employee size varied significantly, obviously impacted by market and geography, as well as the physical size of the plant. While not necessarily an indication of actual activity, the average manufacturer is approved to build in 20 states.

Manufacturers reported an average of 114 workers at peak production in 2015, down from 170 reported in the prior year report. In 2015, the average manufacturer reported production of 155,548 square feet and an average of 229 modules (based on an average module size of 680 square feet).

MBI has analyzed manufacturer production data for the past four years to determine a production benchmark. The average manufacturer produced 330 floors per year over the past four years. In addition, average square footage production per manufacturer during this period was 223,500.

Depending on the level of customization required by the owner and architect, most modules leave the factory 60 to 90 percent complete, with wiring, plumbing, structural and mechanical systems inspected and approved before arriving at the site.

REGIONAL DATA

As stated earlier, MBI represents 73 manufacturers in North America. Manufacturers are located in the following regions:

NORTHEAST

Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, and New York

$18.9 BILLION in new construction put in place in MBI’s key markets in 2015.

Key markets in this region are healthcare, education, and multifamily. This region has benefited from high-profile modular projects, particularly in New York, which have generated additional interest for the industry.

According to CMD, this region had approximately $18.9 billion in new construction put in place in MBI’s key markets in 2015. CMD forecasts key markets to grow in this region by 5.3 percent during the next year. MBI members are well-positioned to take advantage of this growth opportunity in the Northeast with several manufactures active in these key growth markets.

MID- ATLANTIC

Virginia, West Virginia, Pennsylvania, Maryland, District of Columbia, Delaware, and New Jersey

$13.2 BILLION in new construction put in place in MBI’s key markets in 2015.

According to CMD, this region had approximately $13.2 billion in new construction put in place in MBI’s key markets in 2015. CMD forecasts strong growth in key markets in this region during the next five years, including a 31 percent projected increase in 2016. This growth will be driven by the retail, office, education, and government office markets. The industry is well-positioned for growth in this region with numerous companies active in these key growth markets.
According to CMD, this region had approximately $21.8 billion in new construction put in place in MBI’s key markets in 2015. CMD forecasts a 21 percent growth in key markets in this region in 2016, fueled by healthcare, hotels, and multifamily projects. This region represents a larger growth opportunity for the industry as a whole, as the industry has the capacity to build more in this region. However, the industry’s efforts in this region have not been heavily focused on these key growth markets.

According to CMD, this region had approximately $30.4 billion in new construction put in place in MBI’s key markets in 2015. CMD forecasts a slight decrease in key markets in this region by about 3 percent in 2016. However, retail, multifamily, hotel, and education markets remain solid and these are strong core markets for industry manufacturers in this region. The South Central region is still among the strongest in terms of new construction activity.

According to CMD, this region had approximately $15.8 billion in new construction put in place in MBI’s key markets in 2015. CMD forecasts growth in key markets in this region by 18 percent overall during the next year. Key growth markets in this region are projected to be retail, multifamily, healthcare, and education. Again, industry capacity is not a concern in this region. A stronger focus on retail and healthcare in this region should pay dividends for industry participants.

According to CMD, this region had approximately $21.8 billion in new construction put in place in MBI’s key markets in 2015. CMD forecasts growth in key markets in this region by 29 percent overall during the next year. Growth is projected to be driven by the retail, multifamily, and education markets.
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PERMANENT MODULAR CONSTRUCTION - REGIONAL DATA

NORTHWEST
Oregon, Washington, Idaho, Alaska, and Hawaii

$8.2 BILLION in new construction put in place in MBI's key markets in 2015.

According to CMD, this region had approximately $8.2 billion in new construction put in place in MBI’s key markets in 2015. CMD forecasts a 17 percent decline in key markets in this region overall during the next year. Education, multifamily, and healthcare markets remain viable opportunities for the industry in this region.

NORTH CENTRAL
Colorado, Kansas, Nebraska, South Dakota, North Dakota, Wyoming, and Montana

$6.4 BILLION in new construction put in place in MBI’s key markets in 2015.

According to CMD, this region had approximately $6.4 billion in new construction put in place in MBI’s key markets in 2015. CMD forecasts a 25 percent decline in key markets in this region during the next year. In terms of number of manufacturers, this region is perhaps the industry’s weakest of the ten North American regions.

WESTERN CANADA
British Columbia, Alberta, and Saskatchewan

C$11.4 BILLION in new construction put in place in MBI’s key markets in 2015.

According to CMD, this region had approximately C$11.4 billion in new construction put in place in MBI’s key markets in 2015. CMD forecasts a 9 percent overall decline in key markets in this region during the next year. For the past several years, production in this region has been dominated by workforce housing supplied to oil and gas companies. However, falling oil prices significantly cooled this market as new capital projects were put on hold.

EASTERN CANADA
Manitoba, Ontario, and Quebec

C$15.1 BILLION in new construction put in place in MBI’s key markets in 2015.

According to CMD, this region had approximately C$15.1 billion in new construction put in place in MBI’s key markets in 2015. CMD forecasts 16 percent growth in key markets in this region during the next year. Growth projections are driven by the retail, general office, multifamily, healthcare, and education markets. In fact, CMD projects growth in all key MBI markets for this region. This region represents a growth opportunity for the industry.

Key markets in this region were largely driven by the energy sector – oil, coal, gas. Declining oil prices and political uncertainty (i.e., Keystone XL pipeline decision) have impacted this region’s construction activity.

CMD is forecasting 11.9 percent decline in this market overall for 2016 as a result of oil prices. This means the large number of modular manufacturers in this region must diversify and find alternative markets beyond workforce housing accommodations for the oil sector.

C$ = Canadian dollars
PMC SUMMARY

The overall market share for PMC activity in North America was approximately 2.72 percent of all new construction starts in MBI’s key markets: multifamily housing, educational, office, healthcare, retail, and institutional and assembly. This is down slightly from last year’s estimated 2.93 percent.

MBI launched an industry growth initiative known as “5-in-5” in late 2014, with a goal of growing the modular market share to 5 percent of new construction activity by year end 2019. Despite this slight set back in 2015, we are confident that the opportunities and advantages still exist to reach this goal. However, in order for the industry to reach this goal, industry participants must do a better job of recognizing and focusing on growth markets and shifting production activity away from stagnant ones.

Specifically, the industry needs to continue to show gains in the multifamily, office, and educational markets, but be much more aggressive in pursuit of the healthcare and retail markets.

Geographically, MBI sees growth opportunities in Eastern Canada, Southeast U.S. and North Central U.S. specifically in healthcare and retail markets. Additionally, multifamily markets in California and Western Canada are opportunities the industry should capitalize on for further growth. In other regions, steady gains in core markets such as office space and education should provide the foundation for overall industry growth to help attain 5 percent market share by 2020.
ABOUT RELOCATABLE BUILDINGS (RB)

Relocatable modular buildings are utilized for schools, construction site offices, medical clinics, sales centers and in any application where a relocatable building can meet the need for temporary space. These buildings offer fast delivery, ease of relocation, low-cost reconfiguration, accelerated depreciation schedules and enormous flexibility. Relocatable modular buildings are not permanently affixed to real estate but are installed in accordance with manufacturer’s installation guidelines and local code requirements. These buildings are essential in cases where speed, temporary space, and the ability to relocate are necessary.

STAGES OF RB CONSTRUCTION

Primarily, four stages make up the relocatable building cycle:

1. Design approval by the end user and any regulating authorities.
2. Construction of modules in a controlled environment.
3. Transportation of modules to a building site where final onsite assembly is completed.
4. Relocation to a new site for next use or return to a qualified plant to be repurposed.

THE ADVANTAGES

FLEXIBLE

Some facilities are used as an adjunct to existing buildings, while others are standalone facilities. Flexibility and reutilization are the hallmarks of relocatable buildings. Unlike structures built onsite, which generally have fixed utilization and occupancy design, relocatable units fulfill a unique function of reutilization that is not site specific. It is not unusual to have a relocatable building serve a wide variety of users during its long lifespan.

The flexibility of these buildings makes them a secure investment because it often allows lessors to enjoy cash flows adequate to service debt during economic downturns. This flexibility is further enhanced by the ability to relocate buildings to more prosperous cities or industries as opportunities arise. Certain market segments of the industry are cyclical. This is particularly true of education, prisons, and governmental agencies that want to transfer funding for facility needs from capital budgets to operating budgets. This concept also applies to industries that may want to expand but are uncertain about the long-term strength of their growth. Budget-driven companies often opt for leased facilities. In such cases, modular buildings offer benefits and options without long-term capital commitments.

RAPID DEPLOYMENT

No other method of construction allows for such rapid deployment of space. In cases of large scale natural disasters, code compliant relocatable buildings can be deployed within days to provide shelter, medical clinics, and classrooms to help restore a sense of normalcy to a community.

REMOTE LOCATIONS

Given that relocatable buildings are constructed offsite in controlled settings, finding a skilled labor force in remote locations is less of an issue. From the hottest, driest desert locations to the coldest, most severe winter climates, relocatable buildings can be utilized anywhere.

SHORTER DEPRECIATION SCHEDULES

The primary difference between permanent construction and relocatable buildings is that, in many cases, relocatable buildings are not permanently affixed to real estate. This allows for the building to be considered personal property or equipment and depreciated over a shorter span. While MBI provides a guideline in this appendix, it is important to consult a professional tax advisor on this matter.

SUSTAINABLE

Relocatable buildings have been frequently criticized as being less than energy efficient structures. However, in recent years, many end users are beginning to realize the positive environmental impact of relocatable buildings. The fact that the building is designed and constructed to be reused and relocated at multiple sites eliminates the need to build new structures at each of the subsequent locations of the relocatable building. In short, one relocatable building moved to 10 different locations throughout its life takes the place of the energy required and waste associated with constructing 10 separate buildings. Relocatable buildings are 100 percent reusable.

KEY MARKETS SERVED

MBI has identified eight key markets for RB in North America:

■ EDUCATION

Relocatable buildings have become a critical factor in managing student demographics and increasing enrollments. Relocatable classrooms are also ideal for swing space during new construction or renovation. Convenient, flexible, cost-effective temporary buildings can be delivered and operational in as little as 24 hours. These classrooms are measured for quality and code compliance by state or third-party agencies through routine and random inspections, testing, and certification services.

Customers may choose single classrooms or arrange multiple buildings in clusters to create a campus feel. MBI members supply steps, decks, ramps, and even furniture. Members also offer lease, purchase and lease-to-purchase financing for a variety of public and private school needs. These classrooms are sometimes referred to as temporary, portable, or mobile classrooms.

School districts across North America are collectively the largest owners of relocatable classrooms, with about 180,000. California schools own close to 90,000 units; Texas schools own about 20,000; Florida schools own about 17,000. Typically, larger school districts with high growth are more likely to the units, which explains why California, Texas and Florida have so many. States like Georgia, North Carolina, Virginia, and Maryland own and operate about 3,000 each.

■ CONSTRUCTION SITE

Relocatable buildings have their roots in construction-site trailers, where speed, temporary space and relocations are important. Used as standard field offices, construction site and in-plant buildings are available for immediate delivery. Standard construction is wood, but steel units are available to meet noncombustible requirements. In-plant buildings are available as single- or two-story units for industrial environments with noise-reducing insulation, and are typically moveable by forklift and include electrical and communications wiring, heating, air conditioning and even plumbing.

■ HEALTHCARE

Relocatable buildings for healthcare applications are designed and constructed to uncompromising standards of quality. A customer’s new clinic, hospital extension, laboratory, diagnostic center, MRI unit, dentist office or other medical facility can be open for business and serving communities in as little as a few days. Is your interest in serving patients...
as quickly as possible in the most safe and aesthetically pleasing environments available? These facilities offer quick, quiet, safe and clean buildings with an unlimited choice of interior décor and furniture and equipment leasing.

<table>
<thead>
<tr>
<th>GENERAL ADMINISTRATIVE &amp; SALES OFFICE</th>
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| When production demands increase, relocatable buildings can be quickly and efficiently put together in a quality-controlled factory. Typical retail applications include new home sales centers, banks, golf pro shops, automobile fleet ownerships, college bookstores and concession stands. If a client’s emerging business needs are short term, temporary space will accommodate their financial investments. For retail occupancies, this can mean significant cash flow advantages. Standard floor plans are being put together in a quality-controlled factory. Typical retail applications include new home sales centers, banks, golf pro shops, automobile fleet ownerships, college bookstores and concession stands. If a client’s emerging business needs are short term, temporary space will accommodate their financial investments. For retail occupancies, this can mean significant cash flow advantages.

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; STORAGE</th>
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| Economical and convenient equipment and storage buildings offer onsite protection from inclement weather and theft. Day in and day out, relocatable buildings offer durability and strength. Equipment shelters for construction sites, chemical storage buildings, temporary generator housing and other applications are designed and built by MBI members to guard a client’s investment. These buildings can be as simple as steel containers to units that are heated and air conditioned with exteriors of brick, stone aggregate or stucco.

<table>
<thead>
<tr>
<th>EMERGENCY &amp; DISASTER RELIEF</th>
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| There is simply no other means of providing fast, transitional shelter and basic community needs following natural disasters than relocatable buildings. Relocatable buildings can be quickly and efficiently deployed for emergency shelter, medical and educational needs, or to accommodate relief workers.

<table>
<thead>
<tr>
<th>DATA COLLECTION PROCESS</th>
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| We would like to thank Gordon Brothers-AccuVal for assisting with data collection. In addition to aggregate data provided by Gordon Brothers-AccuVal, data for this report was compiled from a variety of additional sources, including a prepared survey questionnaire sent to members and non-members in the industry, public filings (EDGAR in the U.S. and SEDAR in Canada), information obtained from state and provincial modular regulatory agencies, and direct communication with company leaders. Each year, MBI compiles data about the modular construction industry and each year the public wants more information and detail. One of the challenges in gathering this data is the diversity among the industry participants. Modular construction in and of itself is not a storage container for either short- or long-term use. Heavy-duty storage units feature ground-level entry with double-swing doors for easy accessibility and are ideal for construction-site storage, equipment storage, warehousing, record-keeping, industrial manufacturers, retailers and others.

<table>
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<tr>
<th>SECURITY</th>
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</table>
| Relocatable buildings can be custom built for a variety of access and control situations. Toll booths, ticket sales offices, guard stands and weigh stations are common applications. One- and two-story wood and steel buildings have straight walls or varying permutations are common applications. Fire, theft and vandalism can be a significant problem for any business, and relocatable buildings offer protection from these hazards.

<table>
<thead>
<tr>
<th>COMMERCIAL/RETAIL</th>
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</table>
| Earlier occupancy means quicker return on investment. For retail occupancies, this can mean significant cash flow advantages. Standard floor plans are being put together in a quality-controlled factory. Typical retail applications include new home sales centers, banks, golf pro shops, automobile fleet ownerships, college bookstores and concession stands. If a client’s emerging business needs are short term, temporary space will accommodate their financial investments. For retail occupancies, this can mean significant cash flow advantages. Standard floor plans are being put together in a quality-controlled factory. Typical retail applications include new home sales centers, banks, golf pro shops, automobile fleet ownerships, college bookstores and concession stands. If a client’s emerging business needs are short term, temporary space will accommodate their financial investments. For retail occupancies, this can mean significant cash flow advantages.

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<tr>
<th>MODULAR ADVANTAGE</th>
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| In general, relocatable buildings, if property maintained and operated, have useful lives comparable to any other building type. Capital improvements, such as HVAC replacement and roof replacement, are frequently made to these units, which can extend their useful lives for several additional years. A typical relocatable building will be moved on average of seven times over its life. Again, this varies based on the size and type of the unit. For example, a smaller building made up of one or two modules may move 12 to 15 times over its life. Construction site offices are good examples of this. Larger complexes, on the other hand, may only move 3 to 5 times over their life.

<table>
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<tr>
<th>NAICS CATEGORIES</th>
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<tr>
<td>321992 – pre-fabricated wood buildings and structures</td>
</tr>
<tr>
<td>323111 – pre-fabricated steel buildings and components</td>
</tr>
<tr>
<td>236220 – commercial building construction</td>
</tr>
<tr>
<td>531120 – commercial building rental or leasing</td>
</tr>
</tbody>
</table>

The data in this report represents about 70 percent of the industry owned assets and revenue of the relocatable buildings industry in North America. While we have made every effort to glean relevant data from all available sources and to make appropriate curren conversions when necessary, we caution that this report is based on the best available data and may not be representative of specific company activities. It is important to note that not all data collected from each module was used in every statistical calculation. This report represents the most comprehensive single source of data on a diverse industry over a broad geographic region and within multiple markets and is based on the best available data.

<table>
<thead>
<tr>
<th>GENERAL BUSINESS OPERATIONS</th>
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<tr>
<td>Based on a 2011 report by Sage Policy Group analyzing thousands of relocatable building transactions over a 10-year period, the average annual return on investment of a relocatable building sold was 18 percent, which was achieved after an average holding period of 5.8 years. (Source: Sage Policy Group, Inc. The Economic &amp; Financial Performance of the U.S. Modular Building Industry)</td>
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Average sales price to original cost ratio of 121 percent for year-end 2015.

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<th>DEPRECIATION</th>
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</thead>
</table>
| When asked about depreciation and residual values of the lease fleet, responses varied based on conditions and capital improvements to the fleet, market use of the fleet, and the composition of the types of units in the lease fleet (construction offices, classrooms, etc.). A majority of the units in the industry lease fleet are depreciated over a 20-year period with a 50 percent residual value.
The economic life (different than depreciable life) of a leased relocatable building is determined by comparing the total cost of maintaining the asset with the income producing capacity over its useful life. Cost includes the initial manufactured cost plus all expenditures for items such as maintenance and taxes incurred during its life. Income includes lease revenue during the building’s useful life and sale value upon disposition. Residual value is understood to be the anticipated “value” of the building at the end of the lease.

The mean annual depreciation has ranged between 5 - 6 percent for the last several years.

**SIZE OF THE MARKET**

MBI estimates that there are a total of more than 500,000 code-compliant relocatable buildings in use in North America today. Public school districts across North America collectively own and operate about 200,000 relocatable classrooms, with the industry owning and leasing about 300,000-350,000 buildings. Additionally, many construction companies own a fleet of construction offices that move from site to site. These figures do not include “non-coded” units such as storage and shipping containers, although these units typically make up about 15 percent of a provider’s fleet.

MBI obtained lease fleet data from six North American lease fleet owners comprising 72,321 single wide units, 54,842 units in complexes and 16,021 classroom units. MBI combined this data with data from other sources on 72,781 units for a total of 215,965 total North American units, or about 61 percent of the total industry owned fleet. Revenue reported from these sources totaled approximately $2.1 billion.

MBI estimates that there are about 70 North American fleet owners accounting for the 350,000 industry owned units, on an average fleet size of 5,000. However, the 10 largest fleet owners control approximately 75 percent of all industry owned units in North America.

<table>
<thead>
<tr>
<th>NUMBER OF COMPANIES</th>
<th>% OF FLEET OWNED</th>
<th>NUMBER OF UNITS OWNED</th>
<th>AVERAGE FLEET SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>75%</td>
<td>262,500</td>
<td>26,250</td>
</tr>
<tr>
<td>60</td>
<td>25%</td>
<td>87,500</td>
<td>1,458</td>
</tr>
<tr>
<td>70</td>
<td>100%</td>
<td>350,000</td>
<td>5,000</td>
</tr>
</tbody>
</table>

**UTILIZATION**

For year-end 2015, the overall utilization rate was 69.8 percent across all North American markets and regions.

**OVERALL UTILIZATION**

MBI obtained data from five Canadian companies with a combined lease fleet of 24,786 units. Their approximate utilization on 31 December 2015 of 68.3 percent down from 72.97 percent utilization rate for year-end 2014. These companies generated approximately C$254 million in revenue in 2015 from their relocatable businesses. Many of these companies also generated income from camps and catering businesses, which were not included in this data, but represented a significant amount of revenue.

MBI represents about 50 companies based in Canada, including 22 manufacturers of modular structures. Several of these members have global operations and are among the largest companies in the industry. However, the Canadian relocatable building market is different than the U.S. market in some respects. The Canadian market is heavily influenced by the oil, gas, mining, and other resource extraction industries. For example, many companies, particularly in Western Canada, have a fleet of “drill camps” which are heavy duty skid-mounted units designed to house workers in remote locations. These units are built for ease of transportation and installation. These units lack the “permanency” of larger camp lodging facilities which are often multi-story facilities and remain on site for several years.

Some companies operate more permanent open camps which, practically speaking, are similar to hotels. The revenue generated from the construction of these camp facilities for a customer has been captured in MBI’s Permanent Modular Construction report. Rent revenue from company-owned open camps have not been captured in this report. It should be noted that revenue from that source is significant and is in excess of $1 billion annually. The on-going leasing revenue for existing relocatable facilities such as drill camps, as well as all other relocatable building market, have been incorporated into this report.

Another difference in the Canadian relocatable market is the company business model itself. In the U.S. the largest fleet owners typically specialize in owning and leasing units rather than manufacturing them and generate a majority of their revenue from the sale and lease of relocatable buildings and auxiliary products such as stairs and ramps.

In Canada, some of the largest fleet operators have a more diverse revenue stream. For example, large fleet owners are also primarily manufacturers as well. This practice is less common in the U.S.

The relocatable building industry is directly impacted by overall construction activity. CMD reports that non-residential construction activity was down considerably for 2015 and continues to drop in 2016. Non-residential activity in Canada was down 50 percent in the first quarter of 2016 compared to the first quarter of 2015. On the positive side, consumer spending outlook and government investment in infrastructure projects could help offset the losses due to falling oil prices.
British Columbia, Alberta, and Saskatchewan

In recent months, this region has experienced an economic downturn due to lower oil prices and delays in capital projects from large oil and gas companies. This region was dominated by companies building lodging facilities for remote workforce housing as well as drill camps and other temporary facilities in conjunction with this market. The lower oil prices caused many companies to lay off workers, reducing the need for accommodations. This in turn put downward pressure on the housing market and the Alberta economy has cooled as a result.

Additionally, the wildfires that forced the complete evacuation of Fort McMurray will have a significant impact on the region. This market in Alberta was so dominate for the industry that it impacted the entire regional production. It is unclear how many businesses will rebuild in the region while oil prices remain below the rate needed to restart operations.

CMD is forecasting nearly C$40 BILLION in new multifamily construction over the next five years in Ontario and Quebec.

The growth markets and opportunities in Eastern Canada are somewhat more diverse than in Western Canada. According to CMD, healthcare construction starts in this region will be strong over the next 5 years, approaching $2.5 billion annually over the next several years. This is a great opportunity for RB companies with temporary medical and office facilities in their fleet, as quick and flexible swing space is critical during construction.

The multifamily market is expected to grow over the next five years, particularly in Ontario. CMD is forecasting nearly C$40 billion in new multifamily construction over the next 5 years in Ontario and Quebec. Again, new construction starts will benefit RB companies with construction site offices and complexes that can be used for swing space during construction activity.

C$ = Canadian dollars

UNITED STATES MARKET

OVERVIEW

Nearly half of the U.S. relocatable buildings market is generated from the sale and lease of relocatable classrooms and construction site offices. It is not uncommon in the U.S. for a company to have virtually all of its lease fleet concentrated in one or both of these markets.

While the average age of relocatable classrooms owned by school systems varies, with many facilities exceeding 20 years, the average age of classrooms owned and leased by the industry is generally less than ten years. Classrooms constructed to newer building codes are generally more energy efficient and durable than older units that have been relocated multiple times.

One of the biggest challenges with relocatable buildings is the lack of understanding from local code officials on how to treat a building that has been relocated to their jurisdiction. MBI has developed a “Guide for Code Compliance for Relocatable Buildings,” a summary of which can be found on page 56.

In the U.S. market, MBI obtained aggregate data from Gordon Brothers-AccuVal on companies with a total of 143,184 units in their collective lease fleets. Of these, 97,012 units were leased on 31 December 2015 for an industry-wide utilization rate of 67.75 percent, up from 66.87 percent at year-end 2014. The utilization rate can be further segmented by product type as follows:

<table>
<thead>
<tr>
<th>PRODUCT TYPE</th>
<th>UTILIZATION RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singles</td>
<td>69.25%</td>
</tr>
<tr>
<td>Complexes</td>
<td>69.15%</td>
</tr>
<tr>
<td>Classrooms</td>
<td>56.20%</td>
</tr>
</tbody>
</table>

The overall number of units in the fleet as reported by these companies increased year-over-year by 9.2 percent, from 131,142 units reported to just over 143,000. A majority of this increase was in the single-wide market from the companies included in this data.
U.S. REGIONAL DATA

This data varied by region with some areas experiencing higher utilization rates for single-wides, while others fared better with educational units. Utilization by region and by product segmentation can be found below. Regional data obtained from Gordon Brothers-AccuVal does not include publicly available data.

REGION 1: NORTHEAST

Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, and New York

FLEET OWNERS: RELOCATABLE BUILDINGS (EXCLUDE STORAGE CONTAINERS) ME, VT, NH, MA, CT, RI, NY

<table>
<thead>
<tr>
<th></th>
<th>@ 12/31/15</th>
<th>@ 12/31/14</th>
<th>Percent increase or decrease</th>
<th>Utilization @ 12/31/15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of singles in fleet</td>
<td>8,955</td>
<td>8,143</td>
<td>9.97%</td>
<td>76.36%</td>
</tr>
<tr>
<td>Number of floors in complexes</td>
<td>4,167</td>
<td>3,546</td>
<td>17.51%</td>
<td>73.27%</td>
</tr>
<tr>
<td>Number of classrooms in fleet</td>
<td>739</td>
<td>728</td>
<td>1.51%</td>
<td>52.10%</td>
</tr>
</tbody>
</table>

REGION 2: MID-ATLANTIC

Virginia, West Virginia, Pennsylvania, Maryland, District of Columbia, Delaware, and New Jersey

FLEET OWNERS: RELOCATABLE BUILDINGS (EXCLUDE STORAGE CONTAINERS) VA, WV, PA, MD, DC, DE, NJ

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Percent increase or decrease</th>
<th>Utilization @ 12/31/15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of singles in fleet</td>
<td>8,099</td>
<td>-0.88%</td>
<td>70.37%</td>
</tr>
<tr>
<td>Number of floors in complexes</td>
<td>5,488</td>
<td>1.24%</td>
<td>68.64%</td>
</tr>
<tr>
<td>Number of classrooms in fleet</td>
<td>1,833</td>
<td>-8.30%</td>
<td>61.87%</td>
</tr>
</tbody>
</table>
## INDUSTRY ANALYSIS - 2016 ANNUAL REPORTS
### RELOCATABLE BUILDINGS - UNITED STATES MARKET

### REGION 3: SOUTHEAST
Florida, Georgia, Alabama, Mississippi, North Carolina, South Carolina, and Tennessee

<table>
<thead>
<tr>
<th>FLEET OWNERS: RELOCATABLE BUILDINGS (EXCLUDE STORAGE CONTAINERS)</th>
<th>FL, GA, AL, MS, NC, SC, TN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of singles in fleet @ 12/31/15</td>
<td>13,190</td>
</tr>
<tr>
<td>Number of singles in fleet @ 12/31/14</td>
<td>12,508</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>5.45%</td>
</tr>
<tr>
<td>Number of singles on lease @ 12/31/15</td>
<td>8,738</td>
</tr>
<tr>
<td>Utilization of singles @ 12/31/15</td>
<td>66.25%</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/15</td>
<td>14,577</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/14</td>
<td>12,323</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>18.29%</td>
</tr>
<tr>
<td>Number of complexes on lease @ 12/31/15</td>
<td>8,691</td>
</tr>
<tr>
<td>Utilization of complexes @ 12/31/15</td>
<td>59.62%</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/15</td>
<td>4,925</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/14</td>
<td>7,784</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>-36.73%</td>
</tr>
<tr>
<td>Number of classrooms on lease @ 12/31/15</td>
<td>2,649</td>
</tr>
<tr>
<td>Utilization of classrooms @ 12/31/15</td>
<td>53.79%</td>
</tr>
</tbody>
</table>

### REGION 4: SOUTH CENTRAL
Louisiana, Texas, Arkansas, New Mexico, and Oklahoma

<table>
<thead>
<tr>
<th>FLEET OWNERS: RELOCATABLE BUILDINGS (EXCLUDE STORAGE CONTAINERS)</th>
<th>LA, TX, AR, NM, OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of singles in fleet @ 12/31/15</td>
<td>11,610</td>
</tr>
<tr>
<td>Number of singles in fleet @ 12/31/14</td>
<td>8,854</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>31.13%</td>
</tr>
<tr>
<td>Number of singles on lease @ 12/31/15</td>
<td>8,374</td>
</tr>
<tr>
<td>Utilization of singles @ 12/31/15</td>
<td>72.13%</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/15</td>
<td>11,753</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/14</td>
<td>9,933</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>18.32%</td>
</tr>
<tr>
<td>Number of complexes on lease @ 12/31/15</td>
<td>9,090</td>
</tr>
<tr>
<td>Utilization of complexes @ 12/31/15</td>
<td>77.34%</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/15</td>
<td>1,935</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/14</td>
<td>5,984</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>-67.66%</td>
</tr>
<tr>
<td>Number of classrooms on lease @ 12/31/15</td>
<td>1,493</td>
</tr>
<tr>
<td>Utilization of classrooms @ 12/31/15</td>
<td>77.16%</td>
</tr>
</tbody>
</table>
## REGION 5: CENTRAL
Ohio, Kentucky, Indiana, Michigan, Illinois, Wisconsin, Minnesota, Iowa, and Missouri

<table>
<thead>
<tr>
<th>Fleet Owners: Reusable Buildings (Exclude Storage Containers)</th>
<th>OH, KY, IN, MI, IL, WI, MN, IO, MO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of singles in fleet @ 12/31/15</td>
<td>9,071</td>
</tr>
<tr>
<td>Number of singles in fleet @ 12/31/14</td>
<td>6,969</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>30.16%</td>
</tr>
<tr>
<td>Number of singles on lease @ 12/31/15</td>
<td>6,664</td>
</tr>
<tr>
<td>Utilization of singles @ 12/31/15</td>
<td>73.46%</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/15</td>
<td>5,322</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/14</td>
<td>4,937</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>7.80%</td>
</tr>
<tr>
<td>Number of complexes on lease @ 12/31/15</td>
<td>3,899</td>
</tr>
<tr>
<td>Utilization of complexes @ 12/31/15</td>
<td>73.26%</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/15</td>
<td>976</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/14</td>
<td>1,076</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>-9.29%</td>
</tr>
<tr>
<td>Number of classrooms on lease @ 12/31/15</td>
<td>640</td>
</tr>
<tr>
<td>Utilization of classrooms @ 12/31/15</td>
<td>65.57%</td>
</tr>
</tbody>
</table>

## REGION 6: WESTERN
California, Arizona, Nevada, and Utah

<table>
<thead>
<tr>
<th>Fleet Owners: Reusable Buildings (Exclude Storage Containers)</th>
<th>CA, AZ, NV, UT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of singles in fleet @ 12/31/15</td>
<td>11,588</td>
</tr>
<tr>
<td>Number of singles in fleet @ 12/31/14</td>
<td>9,823</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>17.97%</td>
</tr>
<tr>
<td>Number of singles on lease @ 12/31/15</td>
<td>7,298</td>
</tr>
<tr>
<td>Utilization of singles @ 12/31/15</td>
<td>62.98%</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/15</td>
<td>9,017</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/14</td>
<td>8,423</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>7.05%</td>
</tr>
<tr>
<td>Number of complexes on lease @ 12/31/15</td>
<td>6,343</td>
</tr>
<tr>
<td>Utilization of complexes @ 12/31/15</td>
<td>70.34%</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/15</td>
<td>5,151</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/14</td>
<td>1,819</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>183.18%</td>
</tr>
<tr>
<td>Number of classrooms on lease @ 12/31/15</td>
<td>2,329</td>
</tr>
<tr>
<td>Utilization of classrooms @ 12/31/15</td>
<td>45.21%</td>
</tr>
</tbody>
</table>
## REGION 7: NORTHWEST

Oregon, Washington, Idaho, Alaska, and Hawaii

<table>
<thead>
<tr>
<th>FLEET OWNERS: RELOCATABLE BUILDINGS (EXCLUDE STORAGE CONTAINERS)</th>
<th>OR, WA, ID, AK, HI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of singles in fleet @ 12/31/15</td>
<td>6,825</td>
</tr>
<tr>
<td>Number of singles in fleet @ 12/31/14</td>
<td>6,016</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>13.45%</td>
</tr>
<tr>
<td>Number of singles on lease @ 12/31/15</td>
<td>4,488</td>
</tr>
<tr>
<td>Utilization of singles @ 12/31/15</td>
<td>65.76%</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/15</td>
<td>2,889</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/14</td>
<td>2,039</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>41.69%</td>
</tr>
<tr>
<td>Number of complexes on lease @ 12/31/15</td>
<td>1,997</td>
</tr>
<tr>
<td>Utilization of complexes @ 12/31/15</td>
<td>69.12%</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/15</td>
<td>211</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/14</td>
<td>241</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>-12.45%</td>
</tr>
<tr>
<td>Number of classrooms on lease @ 12/31/15</td>
<td>181</td>
</tr>
<tr>
<td>Utilization of classrooms @ 12/31/15</td>
<td>85.78%</td>
</tr>
</tbody>
</table>

## REGION 8: NORTH CENTRAL

Colorado, Kansas, Nebraska, South Dakota, North Dakota, Wyoming, and Montana

<table>
<thead>
<tr>
<th>FLEET OWNERS: RELOCATABLE BUILDINGS (EXCLUDE STORAGE CONTAINERS)</th>
<th>CO, KS, NE, SD, ND, WY, MT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of singles in fleet @ 12/31/15</td>
<td>2,983</td>
</tr>
<tr>
<td>Number of singles in fleet @ 12/31/14</td>
<td>2,874</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>3.79%</td>
</tr>
<tr>
<td>Number of singles on lease @ 12/31/15</td>
<td>1,986</td>
</tr>
<tr>
<td>Utilization of singles @ 12/31/15</td>
<td>66.58%</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/15</td>
<td>1,629</td>
</tr>
<tr>
<td>Number of floors in complexes in fleet @ 12/31/14</td>
<td>1,270</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>28.27%</td>
</tr>
<tr>
<td>Number of complexes on lease @ 12/31/15</td>
<td>1,083</td>
</tr>
<tr>
<td>Utilization of complexes @ 12/31/15</td>
<td>66.48%</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/15</td>
<td>251</td>
</tr>
<tr>
<td>Number of classrooms in fleet @ 12/31/14</td>
<td>261</td>
</tr>
<tr>
<td>Percent increase or decrease from prior year</td>
<td>-3.83%</td>
</tr>
<tr>
<td>Number of classrooms on lease @ 12/31/15</td>
<td>193</td>
</tr>
<tr>
<td>Utilization of classrooms @ 12/31/15</td>
<td>76.89%</td>
</tr>
</tbody>
</table>
INDUSTRY ANALYSIS - 2016 ANNUAL REPORTS
RELOCATABLE BUILDINGS - GUIDE FOR CODE COMPLIANCE FOR RBs

GUIDE FOR CODE COMPLIANCE FOR RELOCATABLE BUILDINGS

All newly constructed relocatable buildings must be constructed in accordance with the building codes that are in effect at the time of the building’s construction. These buildings are constructed off-site and many elements are concealed when the building arrives to the site (closed construction).

As such, most states (35) have a state-wide administrative program in place to determine if the building itself was constructed in accordance with all applicable codes. The terminology varies within state programs with many referring to these buildings as “industrialized buildings”, or even “manufactured buildings.” The latter term is not generally preferred as it tends to imply that these buildings are constructed to the same federal HUD code as manufactured housing products, which is not the case.

These state programs require manufacturers of relocatable buildings to be approved by the state agency, have a quality assurance program approved, and submit regular reports. Additionally, each floor plan the manufacturer intends to build must be reviewed and approved by a licensed third party design professional in the state. These professionals are sometimes referred to as compliance assurance agencies (CAA) or third party inspection agencies (TPIA). Once the manufacturer and plan is approved, every manufactured section or module of an industrialized building shall be marked with a label supplied by the TPIA that includes the name and address of the compliance assurance agency and the certification label number.

The relocatable building will also have a manufacturer’s data plate that is permanently attached on or adjacent to the electrical panel posted in the location as noted on the drawings, and includes information such as:

1. Occupancy group
2. Manufacturer’s name and address
3. Date of manufacture
4. Serial number of module
5. Design roof live load, design floor live load, snow load, wind and seismic design
6. Codes, and standards of construction
7. Approved Quality assurance agency or approved inspection agency
8. Envelope thermal resistance values
9. Electrical service size
10. Fuel burning equipment and size
11. Special limitations if any

Following this process, the building is ready to be permitted and placed on its first location and is considered approved or “registered” in the state. Registered buildings should be accepted in all localities as meeting the requirements of the codes for the building itself. The label affixed by the third party is the indication for the local building code official that the unit does in fact comply with codes. The local, therefore, generally has no jurisdiction over “what is inside the box.” However, local requirements affecting buildings, such as local land-use and zoning, local fire zones, site development, building setback, side and rear yard requirements, property line requirements, and subdivision regulations are within the scope of the local authority.

EXISTING RELOCATABLE BUILDINGS

Unique to relocatable buildings is that they are designed and constructed with the explicit purpose of being relocated and used multiple times possibly at multiple locations, including in other states.

Once relocated from its original site, the building is now considered an “existing building” (per IBC 2015, one for which a legal building permit has been issued). Prior to 2015, Chapter 34 of the IBC contained compliance information for existing buildings. Beginning with the 2015 IBC, Chapter 34 has been removed in its entirety and replaced with a “pointer” to the International Existing Building Code or IEBC (IBC 2015 Section 101.4.7).

In Chapter 13 of the 2015 IEBC, “Relocated or Moved Buildings,” Section 1301.1 Scope states that “this chapter provides requirements for relocated or moved structures, including relocatable buildings as defined in Chapter 2.” Those requirements address various life safety issues such as the wind loads, seismic loads, and snow loads. Any existing relocatable building moved into a new jurisdiction must meet these load conditions. The local code official can find this information from the manufacturer’s data plate affixed to the building.

Aside from the specific site and zoning issues, a local building code official needs only to locate the third-party label and the manufacturer’s data plate on the relocatable building to determine compliance.

If the building is missing either the label or the data plate, the building is subject to approval by the local code official.

Relocatable Building defined (2015 IEBC) – a partially or completely assembled building constructed and designed to be reused multiple times and transported to different building sites.

RELOCATABLE BUILDING SECTOR SUMMARY

With approximately $6 billion in building assets and $5-6 billion in annual revenue, the relocatable building industry showed signs of improvement in 2015 with overall utilization up slightly from 66.87 percent at year-end 2014 to 67.75 percent at year-end 2015. Revenue mix was generated from roughly the same market segments with construction site offices leading the way at 30 percent.

With nearly one-third of industry owned assets “on the sideline,” construction of new fleet units is not anticipated in the near future. Additionally, more stringent code requirements will add to the cost of newly constructed units, without a corresponding increase in rental rates. This will encourage owners to spend more on renovations and repairs to extend the useful lives of existing assets, and to continue to challenge regulations that unduly limit revenue generation on their assets. These factors are materializing in the form of higher resale values of existing units, up to 121 percent of original cost in 2015 from 11 percent in 2014.

Customers in all these markets will continue to utilize relocatable buildings for their speed, flexibility, practicality, and cost.
In the next issue of Modular Advantage:

The Commercial (retail, QSR) Market will be the focus of the fourth quarter issue of the Modular Advantage. This market is part of MBI’s 5-in-5 marketing initiative to grow modular construction to 5% of the overall construction industry by 2020. The fourth issue will also feature a Year in Review section that will showcase completed high-profile modular projects along with previous milestones from 2016. This will be the perfect wrap-up issue to an amazing year in modular construction!

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9% of attendees are from countries outside of North America

2016 WORLD OF MODULAR JOB TITLES

- 5% - Account & Project Managers
- 2% - Marketing
- 2% - Professor or Student
- 42% - C Level Decision Makers (Pres., VPs, CEOs, CFOs, COOs, Directors, Owners, Principals)
- 14% - Branch, Region, & General Managers
- 22% - Business Development
- 9% - Other
- 4% - Engineers, Architects, & Designers
- 52% - Account & Project Managers
- 2% - Marketing
- 2% - Professor or Student
- 42% - C Level Decision Makers (Pres., VPs, CEOs, CFOs, COOs, Directors, Owners, Principals)
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