

Dunkin' Donuts Center

Renovation and Expansion

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In 2005, the Rhode Island Convention Center Authority purchased the multi-purpose arena, formerly known as the Providence Civic Center, from the City of Providence. The result was a new lease on life for the Dunkin' Donuts Center to become an integral part of its convention center complex, which includes the adjacent Rhode Island Convention Center. A new pedestrian bridge between will unite the two facilities into the world-class Rhode Island Convention and Entertainment Complex.

Affectionately known as “The Dunk,” Ellerbe Becket, the project’s Architects, teamed with Thornton Tomasetti, the project’s structural engineers, to renovate the arena, originally designed by Ellerbe Becket and opened in 1972. The renovation was a facelift that included a new entry plaza, lobby, suites, general seating, concession stands, expanded restroom facilities, scoreboard, locker rooms, administrative offices and a pedestrian connection to the adjoining convention center. The renovation has

Figure 1: Work is scheduled over 3 years and 2 event seasons. Operations and access/exiting scheme for the first off-season is shown.

already started to reap results as the NCAA awarded the first and second rounds of the 2010 Men’s Division I Basketball Tournament to the Dunk.

The process began back in 2004 when the Rhode Island Convention Center Authority (the “Authority”) commissioned Ellerbe Becket, with CSL International and Gilbane Building Company. CSL, Convention Sports & Leisure International, was engaged to provide a market and financial analysis related to various arena renovation options developed by Ellerbe Becket. Gilbane Building Company was retained to provide cost estimates related to various arena renovation options developed by Ellerbe Becket, and is now serving as construction manager on the project. The team developed a formal feasibility study analyzing revenue generation, program and design options, and full development costs that addressed the following key goals:

- Extend Dunkin’ Donuts Center’s life as a multi-use venue for the next 20 – 30 years;
- Provide citizens and users with a compelling facility that would enhance event presentations, the patron experience, and the quality of life in Providence and the State of Rhode Island;
- Revitalize the image of the Dunkin’ Donuts Center, in terms of the perception of citizens, patrons, and artists who perform in the facility;
- Create new revenue opportunities for the facility;
- Identify and recommend physical upgrades to produce operating efficiencies of the facilities; and
- Improve upon the exterior and interior architecture and aesthetics of the facility.



Rendering looking towards the northeast of the Renovated Dunkin Donuts Center showing new entry stairs, new lobby and new pedestrian bridge link to convention center.



Figure 2: New main entry lobby at northeast corner of building under construction.

The charge to the consulting team was to evaluate the feasibility of the facility as a permanent home for minor league sports and college basketball, with a reserved seating capacity of approximately 12,000 to 13,000, as a modern state-of-the-art mid-market multi-purpose arena.

In the summer of 2005, the State Legislature authorized funding for the project. The Authority ultimately chose a team that included architects Ellerbe Becket and structural engineers Thornton Tomasetti to provide complete programming and design services through the construction, administration and project close-out phases.

Scope and Logistics

In order to accomplish the improvements without major interruption to the event schedules currently in place at the Dunkin' Donuts Center, the construction schedule, which began in early 2006, will span over nearly three years and two event seasons. As work is underway, it is being accomplished during off-hours and non-event days during the event seasons, and during full-time hours in the summer months.

The renovation includes the following work (Figure 1, page 31):

- Addition of new individual and party suite towers, concessions areas, and a video scoreboard.
- New seating and restrooms.
- A new lobby structure (Figure 2).
- A new pedestrian bridge link to the Convention Center.
- Renovations of the arena restaurant and bar areas.
- Upgrades for the food service kitchens as well as for the various conference and meeting rooms within the arena.
- A new elevator lobby at the suite level.
- New corridors at the suite level to link the suites on both sides of the arena to the new elevator lobby.
- Renovations to back-of-house areas including locker, training and dressing areas.
- Improvements to the ice floor, building lighting, signage, and exterior building envelope.
- Renovations to the building physical infrastructure, mechanical, fire, and life safety systems.

Renovation and Modernization

Luxury Suite Towers

Twenty (20) luxury suites are being constructed as part of the renovation project with ten (10) suites on each side of the arena. New food courts are being constructed below the new suites on the main concourse level. To achieve a wide-open, interior wall food court, without bracing or partition walls as preferred by the architects and the owner, steel moment frames were selected to support the new suites. Steel beams supporting a lightweight concrete composite floor slab was selected to frame the floors (Figure 3).

The suite towers on each side of the building are major structural additions to the existing building. The added mass and seismic forces from these additions exceeded the threshold limits prescribed by the current 2004 Rhode Island State Building Code (which is the 2003 International Building Code with the 2004 Rhode Island Amendments), above which the entire structure would need to conform to the current code's seismic requirements for new structures. The existing structure, designed in 1970, was not designed or detailed for seismic loads. To upgrade the existing structure to meet the seismic requirements of the current code would have been impractical and cost prohibitive.

In addition, the original building is supported by concrete piles. The high cost and extra time needed for installing piles next to the existing building led the team to investigate the use of spread footings. Data from plate load testing performed by the geotechnical engineer confirmed that differential settlements between the new and existing foundations could be held to an acceptable amount if the foundations for the suite towers were designed as spread footings.



Figure 3: New suite tower designed as independent structure from existing building.

Thus, the suite towers were designed as independent structures above the main concourse (grade level), separated from the existing building by an expansion joint. Where steel beams tied into the massive existing concrete pylons, multi-directional slide bearings were used (Figure 4). Concrete foundation walls were constructed below the main concourse level and tied to the existing concrete foundation wall, which was determined to be a continuous basement shear wall with excess capacity for current seismic lateral loads.

On the interior side, platforms for the suite seating were built up over the existing cast-in-place seating bowl with lightweight concrete placed on high-density Styrofoam fill.

Lobby

A new 4000 square-foot entrance and lobby area was designed as part of the renovation. Once completed, the new lobby, a 30 foot tall one-story building, will have a curved curtain wall at the front that will align and continue through the Pedestrian Bridge to the adjoining convention center (Figure 2). Two sides of the lobby will be open to the existing building. Column locations were restricted and could only be on three sides of the new lobby space. As with the suite towers, the lobby structure was designed to be independent from the existing building. Steel moment frames were selected to provide an open, brace-free space. In order to reduce story drift, steel columns were designed to be fixed at the base. Steel canopies were designed at the front of the lobby as cantilevers from the steel lobby columns.



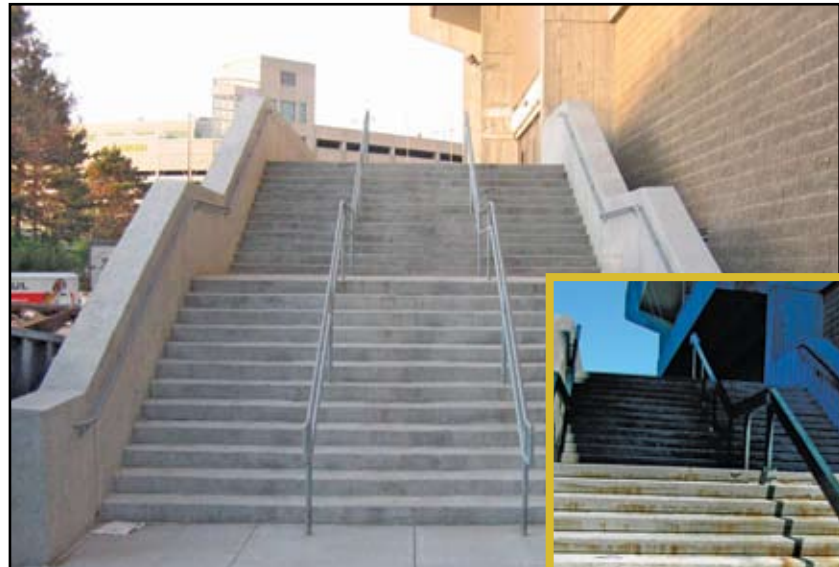
Figure 4: Multi-Directional Slide Bearing of new suite tower beam to existing concrete column to transfer gravity loads only.

Pedestrian Bridge Connection

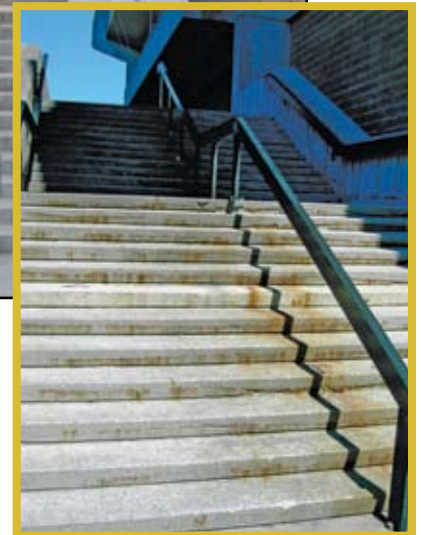
The pedestrian bridge, a cornerstone of the renovation, will unite the Dunkin' Donuts Center and the Rhode Island Convention. Once completed, the bridge will be curved in plan and will have a length of approximately 100 feet with a main span of approximately 90 feet. Because of this curvature, the bridge was designed with curved steel trusses on both sides and horizontal trusses at the top and bottom to form a curved box truss that will resist vertical and lateral loads, as well as torsional forces due to the curved geometry. The walking surface inside the through truss will rise approximately 6 feet from the new arena lobby to the convention center. To accommodate this elevation change, the floor framing, spanning between truss verticals, follows the sloping profile of the slab while the truss is held flat with a constant depth of 18 feet 6 inches.

Exterior Concrete Structures

Providence is located in a salt air environment, close to the Atlantic coastline and, as a result, gets its share of winter ice, snow and de-icing salts. All the exterior concrete structures, including platforms and stairs on the north side and stairs on the west side, were deteriorated from frequent use of de-icing salts and from 30 years of exposure to the salt air environment. Deterioration was prominent at the construction joints and at the top and bottom slab surfaces where numerous spalls exposed rusted reinforcing steel. Leaks were also present at many of the exterior elevated plaza slabs. After a site investigation, that included testing for concrete soundness and chloride ion content, the engineer, architect and owner agreed that all exterior concrete structures would be demolished and rebuilt. However, existing pile foundations that support the exterior stairs and platform areas were found to be in good condition, and thus were salvaged and re-used to support these rebuilt concrete structures. Epoxy-coated rebar was specified for the rebuilt exterior stairs and platforms. A surface coating and positive drainage were specified for all exterior top concrete surfaces to protect the concrete from future chloride-related deterioration.



Epoxy coated steel and positive drainage utilized to maximize the durability and lifespan of this exterior concrete.



Condition of existing concrete made replacement the most feasible option.

Conclusion

The renovated, expanded and improved Dunkin Donuts Center is set to be complete for the 2008 event season. The renovation of this arena demonstrates how an existing aging facility can be updated architecturally and structurally to successfully incorporate many of the features of new arenas, making it available for the enjoyment of generations to come. ■

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