

# CASE STUDY



## VILLANOVA UNIVERSITY FINNERAN PAVILION

Comprehensive  
Commissioning Services for  
a State-of-the-Art Division 1  
Basketball Facility

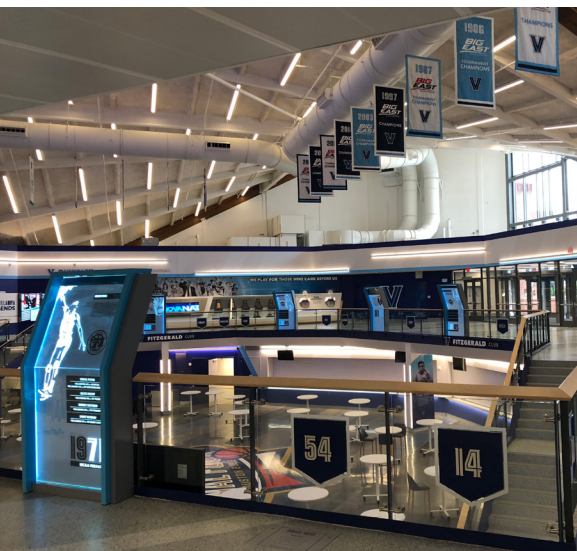
### CHALLENGE

When Villanova announced that the school's board of trustees had approved a \$60 million renovation of their 31-year-old multi-purpose field house, they had three goals in mind: a modernized NCAA Division I basketball-only facility, a premier fan experience, and improved operational efficiency within the Pavilion to support the Men's and Women's Basketball programs. Originally built in 1986, the old field house would be transformed into a 198,000-square-foot, 6,500-seat basketball arena to include spectator seating, concourse and entrance lobbies, concession and kitchen areas, public restrooms, home and visiting locker rooms, facility offices, and utility rooms for the mechanical, electrical, and plumbing systems.

Coming out of their 2016 and 2018 NCAA Championship wins, the school looked to improve the amenities and targeted areas of the building's infrastructure so it would be on par with other higher education arenas including improving behind-the-scenes operations by the facilities staff during events. As with most campus projects, it was imperative that this work be completed on a busy, occupied campus and within 18 months in order to open in time for the start of the new 2018-2019 basketball season.

MBP was brought on at the start of the construction phase to provide third party, independent commissioning services for the systems to be commissioned including HVAC equipment, building automation system (BAS), electrical distribution including normal and emergency power, lighting control system, low voltage systems fire protection, life safety, and domestic hot water. Additional project team members included EwingCole as the designer of record and Hunter Roberts as the Construction Manager.

MBP's commissioning services included development of the commissioning plan, preparation of pre-functional checklists (PFC) to be completed by the installing subcontractors, site observation visits to identify potential issues, lead commissioning progress meetings,



observation of acceptance phase testing including testing, adjusting, and balancing (TAB) verification and functional performance testing (FPT), oversight of the contractor training for the operations and maintenance (O&M) team, review of record documentation including as-built plans, warranties, and O&M manuals, seasonal testing, tenth month warranty visit, and submission of the final commissioning report.

## SOLUTION

MBP was added to the project team at the start of the construction phase while the existing structure and equipment were being demolished. During the demolition process, the condition of the existing constant volume, single speed air handling units, AHU-1 through AHU-5, which were to be refurbished for future use to serve the arena portion of the facility, were reassessed by Villanova with input from EwingCole as the HVAC engineer and MBP as the commissioning agent. This reassessment of the AHUs led to the decision to replace the units with new, more efficient variable speed AHUs while construction was ongoing and impacting the overall project schedule which had a hard deadline for the renovation of the facility to be completed by October 2018.

As a result of the change, the installation and start-up of the new units shifted back in the project schedule to the July to August time frame with the AHU controls integration into the existing BAS completed in early September. Throughout these changes, MBP worked with Hunter Roberts their mechanical subcontractor to observe the installation and start-up of the AHUs prior to completing the acceptance phase commissioning activities for the testing TAB verification and the initial FPTs before the start of the college basketball season in October.

During the acceptance testing, MBP identified an operational issue for the revised sequence of operation for the new units for AHU-1, AHU-2, and AHU-3 in which the paired, existing to remain, exhaust fans EF-11, EF-10, and EF-9 respectively did operate when the AHUs were operating in low speeds. Per the revised sequence of operation, the exhaust fans set to only operate when the AHUs were in economize mode utilizing 100% outdoor air in order to maintain space pressure within the building.

However, MBP observed during the testing, that with the exhaust fans during normal operation of the AHUs a stagnate air condition existed in the upper decks of the arena seating resulting in a high humidity condition and condensation forming on the metal surfaces in those areas. From review of the system operation with the engineer of record and the building automation subcontractor, the sequence of operation changed to have the exhaust fans run in tandem with the AHUs whenever they were operational.





## RESULT

During the commissioning process, MBP identified over 220 issues dealing with the quality of installation of material as well as operational issues for the systems to be commissioned. Throughout the project, MBP used a collaborative approach with representatives from Villanova's O&M team, the designer of record, the construction manager, and the installing subcontractors to review the identified issues and implement solutions in order to enhance the spectator experience and operational efficiency of the base building mechanical, electrical, and plumbing systems.

From discussion with the Villanova project team during the tenth month warranty visit held in July 2019, the fan reaction to the new facility had been overwhelmingly positive during the first year with minimal operational issues experienced by the O&M team.

With its modern glass facade, museum-like atrium, and brand-new basketball arena, the Finneran Pavilion is truly worthy for a team of national champions.

## EMERGENCY SHELTER UTILIZATION

Villanova University is located in a densely-populated area with old homes and old tree growth which resulted in multiple occasions of significant power loss to portions of their campus over the years due to hurricanes and winter storms. On multiple occasions, the loss of electrical power to large portions of the campus lasted multiple days.

As a result, Villanova used the Pavilion Renovation to not only create a first-class basketball arena, but also add the ability to use the facility as an emergency shelter-in-place. With the ability to provide short term shelter for a large portion of their campus population, the renovation project provided a new 650 KW emergency generator, which is capable of supporting not only the code required life safety systems, but also portions of the base building HVAC, lighting, electrical distribution, domestic hot water, and kitchen equipment which would allow for the Pavilion to be occupied if other portions of the campus were to lose power for a significant period of time.

As part of the commissioning, MBP conducted a full building electrical power dump test as part of the systems integration testing performed during the acceptance phase of the project. This test verified that automatic transfer switches were fully operational for both the code required emergency power distribution and lighting panels as well as the operational safety (OS) distribution powers, which allowed for the additional non-code required systems to operate so the Pavilion could remain occupied.