

Perkins&Will

Research Journal

2019 — Volume 11.01



Editors:

Ajla Aksamija, Ph.D., LEED AP BD+C, CDT
Kalpana Kuttaiah, Associate AIA, LEED AP BD+C

Journal Design & Layout:

Kalpana Kuttaiah, Associate AIA, LEED AP BD+C

Cover Design:

Tim Pettigrew, LEED Green Associate

Acknowledgements:

We would like to extend our appreciation to everyone who contributed to the research work and articles published within this journal.

Perkins&Will

Perkins and Will is an interdisciplinary design practice offering services in the areas of Architecture, Interior Design, Branded Environments, Planning and Strategies, and Urban Design.

01

The Overnight Bed: An Analytical Study on Bedroom Types

Yanel de Angel, AIA, LEED AP® BD+C, CPHC, PHIUS, yanel.deangel@perkinswill.com

Stephen Messinger, AIA, LEED AP® BD+C, CPHC, stephen.messinger@perkinswill.com

Abstract

This article investigates bedroom as a typology that occurs across different building types: student residential life, private dwellings, hospitality and healthcare. The article also explores synergies between design strategies. We questioned whether these synergies could translate into innovative bedroom design ideas in unexpected ways. Research methods included literature review, qualitative and quantitative assessments, and design explorations. We learned that while there are constraints and opportunities, there were certain themes that emerged as overarching frameworks. These frameworks could provide a guide to think through design scenarios and potential new solutions to bring the ubiquitous bedroom into a new era where we enable respite and wellness as we recharge our bodies while we sleep or retreat into privacy.

Keywords: *respite space, translational design, student housing, hospital stay, hotel room, privacy, healing spaces*

1.0 Introduction

Everyone sleeps. Everyone wants to retreat into a safe, comfortable space to rest and relax. Most of the time, this is a room with a bed, which we will call “the Overnight Bed”. The overnight bed is ubiquitous across different building types, such as student rooms in campus residential halls, patient rooms in hospitals, hotel rooms in hospitality, and bedrooms in market rate or affordable units.

This study focuses on what makes a successful overnight bed and what are trends across typologies. Additionally, it explores the idea that design in one market can apply to another, thus providing opportunities for learning, best practices, and direct comparisons. This line of thinking includes ideas such as allowing one type to serve more than one purpose, a shift in the market where multiple typologies converge. Some relevant examples include: (1) residence halls converting into hotels for the summer; (2) hospitality design influencing a patient room to improve patient outcomes by incorporating

strategies of comfort, warmth, and relaxation; and (3) applying market rate standards to affordable housing to make these types adaptable or interchangeable as the market fluctuates.

The study analyzes quantitative and qualitative data across four market sectors. The quantitative side focused on bedroom unit minimum sizes, plan efficiencies, public-private layering of spaces, and location of systems servicing the room—furniture, outlets, lighting, mechanical systems and medical equipment. The qualitative side considered, more broadly, elements that enhance the experience, including daylight and views, noise levels and general comfort. Figure 1 shows comparison of bedroom typologies for the investigated market sectors.

In our methodology, we leveraged Perkins and Will’s benchmarking studies for each market sector, interviewed experts from each field and used a select number of projects as case studies. We first analyzed

data from the different market sectors to understand more deeply the issues pertinent to each before making comparisons to find synergies or clear differences. Throughout the process, we discovered a variety of relationships such as (1) durability is more important for institutions (like higher education and healthcare or a housing development investment) than for a hotel where the general expectation is cyclical renovations and trendy refreshes; (2) the location of systems serving the room was more critical for hospital bedrooms than for any other market sector and that it matters more for student housing than for a market bedroom unit; and (3) that the size of a bedroom – however small – did not have a big impact on experience or comfort in comparison to access to daylight and views.

An example of a side by side comparison is shown in Figure 1, where we compared each of the four markets using a common qualitative measure for Overnight Beds: Privacy. Across each market, experts agreed that privacy is a central factor in comfort and relaxation and each agreed that the organization and layout of the room significantly contribute to inhabitant comfort. For Residence Halls, there is a clear sequence from the often busy, loud, and very public corridor into the room, an escape from the students and activity that takes place on the floor. Upon entering the room, the space typically opens up with the beds as close as possible to the exterior window and natural light. The room size and organization typically allows for closets, bulky wardrobes, or bathrooms against the corridor wall and usually prioritizes space in the middle of the room. For Private Dwellings, the layout and organization is often around efficiencies with "wet walls" and other functional elements such as storage so that common areas and areas of respite are as deep into the volume of space as possible. Often the strategy is to create zones that allow for more communal gathering in the middle of the unit, combining traditionally separate rooms such as kitchen, dining, and living rooms into a larger central space. Another common goal is to create separation and privacy for the bathroom. For Hospitality, the storage, bathing, and other highly functional dense use areas are typically proximal to the entryway and provide a clear threshold. The room opens to focus very concretely on the area of rest, accented by primary amenities such as the bed, lounge furniture, television, or, in many cases, an expansive window with a view.

In the area of rest, (or immediately adjacent) there are other common elements such as a phone, room service guide, or music player. For Health Care, the threshold is often a "wet zone" for bathing, accompanied by a work or storage area. The separation from the bustling corridor and other patients may have elements such as a curtain or a sound machine. Beyond the first layer of functional spaces, the room centers around the patient experience, the bed, the accompanying amenities, and the guests. The respite areas are adjacent to the window and typically provide access to daylight and views as well as seating and small gathering space.

Our overarching findings were focused on synergies and converging strategies that could be leveraged across the four market sectors. These findings can be summarized as follows:

- A place of respite, such as the bedroom, requires attention to tangible elements in the room and intangible elements that are more about experiencing the space.
- The bedroom as a space of wellness and restoration requires sensitivity to circadian rhythm, supportive amenities, access to daylight and views, comfort and ergonomics.
- Durability vs. relevance in look and feel should be better balanced. For example, specifying healthy materials while balancing cyclical investment patterns to keep the bedroom fresh and attractive could help divert waste from landfills while reducing the amount of cyclical investment.
- Providing privacy and controls, whether it is about sharing or not, controlling lighting, temperature, and noise, should be considered as it has the most direct impact in the experience.
- In thinking about the overall experience, designing a cohesive environment with storytelling has the greatest impact in creating a contextual experience that is authentic and unique.
- Beyond adequate design and revenue, maximizing revenue is an important consideration for financial health and profit, therefore the potential revenue streams must be considered during the design process to accommodate possible additional or alternative sources into the design.

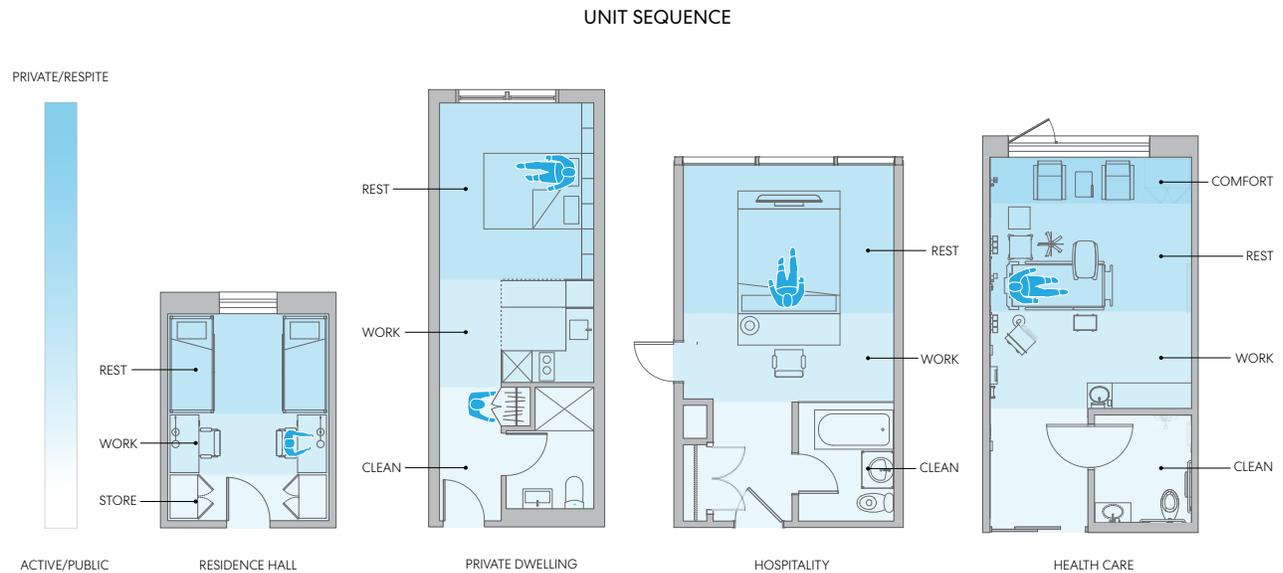


Figure 1: Side by side comparison for each of the four market sectors showing example layouts to describe the layering in each type of room. Diagram assumes a common corridor that is the most active/public zone, showing that upon entry into the room, each layer advances toward a more private and calming area adjacent to the window which provides daylight and views.

- Spaces that create social cohesion and support community building through intentional use of amenity spaces make a difference, especially with bedrooms are compressed to a minimum.
- Integrating gadgets and technology into the physical environment is important for consolidating technology and controls even when they are not totally concealed.
- Supporting sustainable lifestyles is a common trend, more commonly achieved by integrating strategies and making users active participants.
- Planning smart, even for micro sized units, often requires layering space and creating flexible bedroom modules.

2.0 Bedroom Typologies across Building Types

As part of the investigation, a deep dive into the different bedroom typologies was critical to understand the nuances, given various building types and program constraints. This method allowed for clarification

of special differences and allowed synergies and transferrable design ideas or attitudes to emerge. We analyzed Perkins and Will's residential benchmarks to look at room sizes; building layouts; space use and function; cost per room and per bed; building, floor plate, and room typologies; ratios of square feet per bed and beds per building; washroom strategies, organization, and quantities; and sustainability methods and metrics. We also analyzed code and regulation minimum size requirements in several key markets. Then, we selected one representative project case study to showcase quantitative and qualitative analysis and observations. In addition, we interviewed several market sector leaders who provided resources and helped identify key and relevant issues to focus on going forward.

2.1 Residence Halls

Residence Halls plan layouts are often designed to be as efficient as possible by conserving floor space, while allowing for comfort and amenities for the inhabitants. This efficiency can be achieved by grouping and stacking similar spaces, such as bedrooms or shared bathrooms.

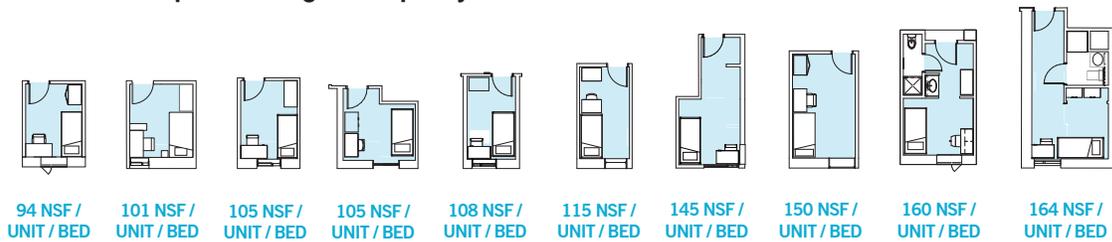
Providing the minimum footprint for bedrooms should consider furniture, size, clearances and campus standards. Figures 2 to 8 show results of the analysis, as well as one of the analyzed case studies.

Residence Halls offer a unique opportunity to educate students about sustainable and healthy living styles. This can be achieved by making them active participants in preserving energy and water. For instance, students could be made aware of when to take advantage of daylight instead of turning on the lights or when to open windows for natural ventilation. These educational

moments can become life lessons that stay with the students after they graduate.

Using Residence Halls as revenue generating buildings during the summer is not new. However, it has traditionally been done for summer camps or conferences. A new trend, flipping the Residence Hall as a hotel in the summer, has emerged as an alternative revenue stream. This means that hospitality practices and design strategies are being infused into Residential Halls for this new purpose¹.

Unit Size Comparison Single Occupancy



Unit Size Comparison Double Occupancy

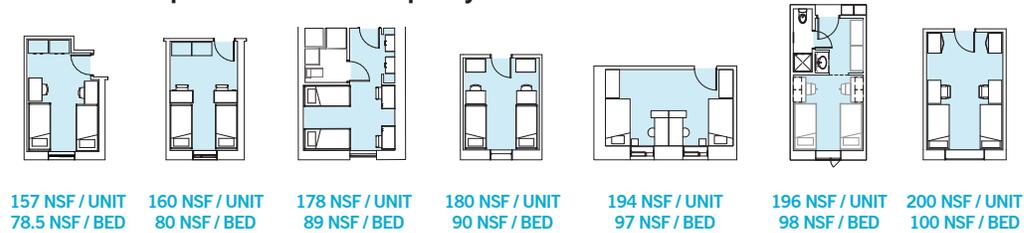


Figure 2: Benchmarking for Residence Halls showing net area per bed and per unit for single and double occupancy. Credit: Perkins and Will/ Boston Studio Residential Life experts (David Damon and Yanel de Angel).

Unit Size Comparison Semi Suites

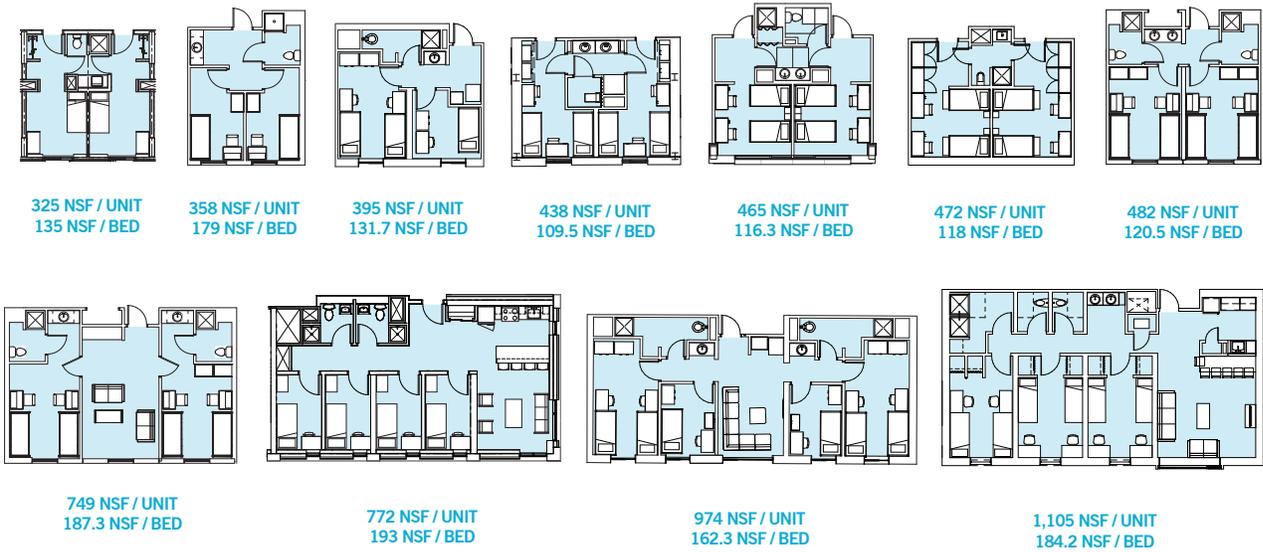


Figure 3: Benchmarking for Residence Halls showing net area per bed and per unit for suite style occupancy. Credit: Perkins and Will' Boston Studio Residential Life experts (David Damon and Yanel de Angel).

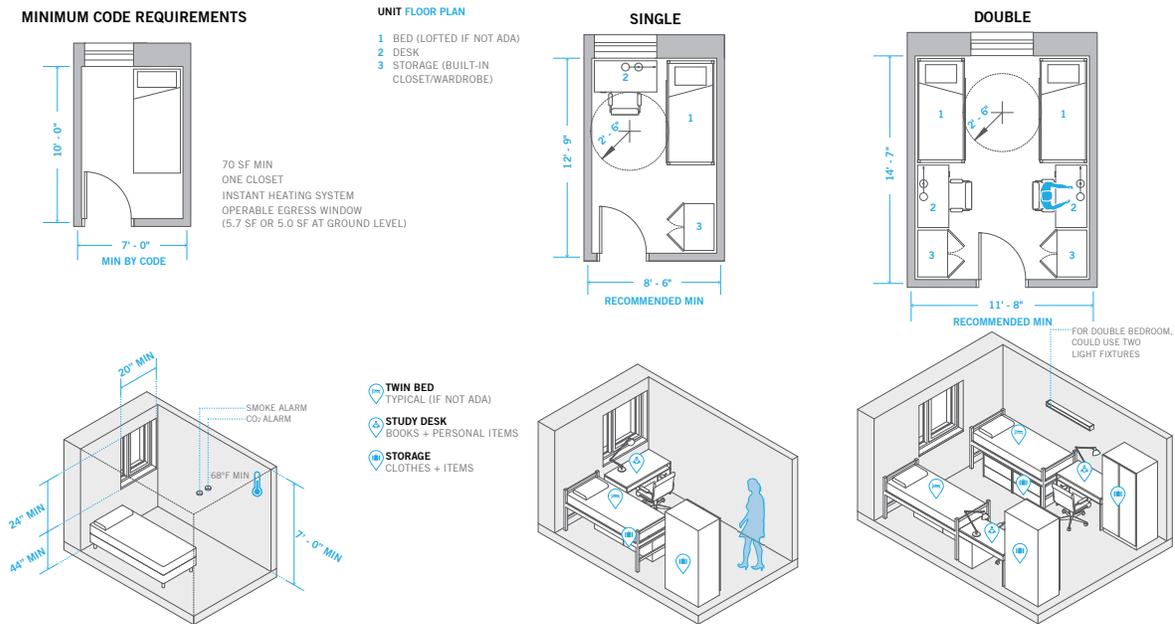


Figure 4: Minimal bedroom code requirements compared to student bedroom typical accommodations for single and double occupancy.

HEATING/ COOLING TERMINAL UNITS LOCATION AND TYPES

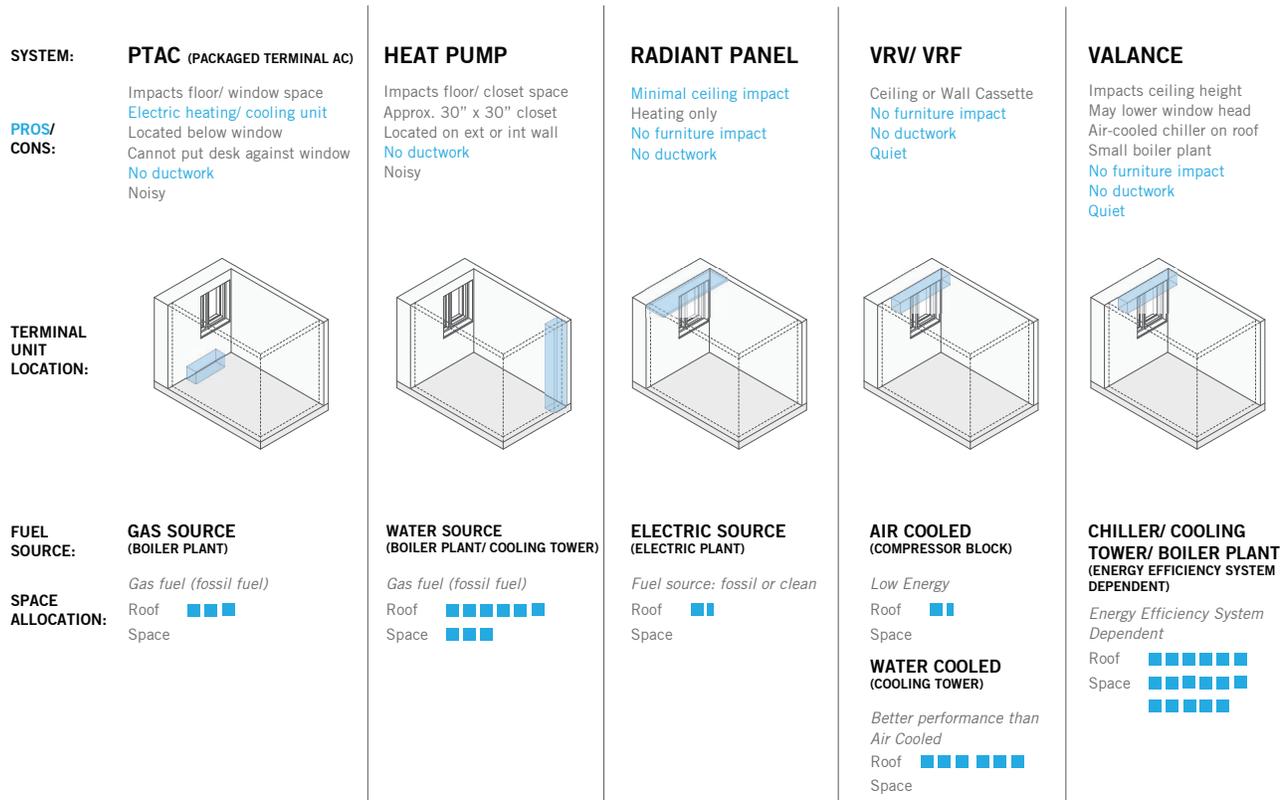


Figure 5: Heating and cooling terminal unit location and types and their impact on bedroom design. Credit: Graphic developed collaboratively by Buro Happold and Perkins and Will.

- Ⓛ DUPLEX RECEPTACLE AT 18" AFF, U.N.O.
- Ⓚ QUAD RECEPTACLE AT 18" AFF
- Ⓛ GFCI DUPLEX RECEPTACLE AT 48" AFF
- Ⓛ DATA RECEPTACLE AT 18" AFF
- Ⓛ CEILING MOUNTED OCCUPANCY SENSOR
- Ⓛ SMOKE DETECTOR
- Ⓛ HORN STROBE
- Ⓛ FIRE ALARM SPEAKER STROBE
- Ⓛ LIGHTING SWITCH
- Ⓛ THERMOSTAT CONTROL

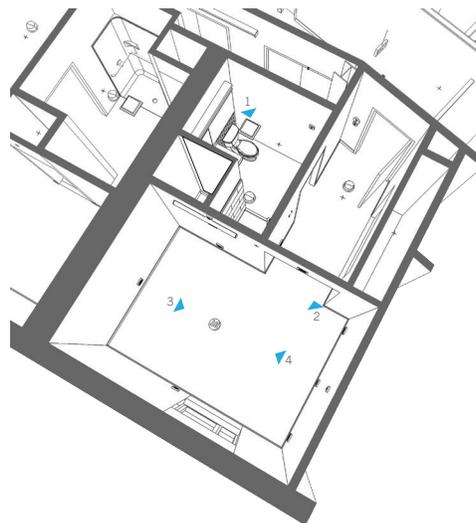


Figure 6: Case study of "digital bedroom mockup" at Merrill Place Residence Hall, Plymouth State University.

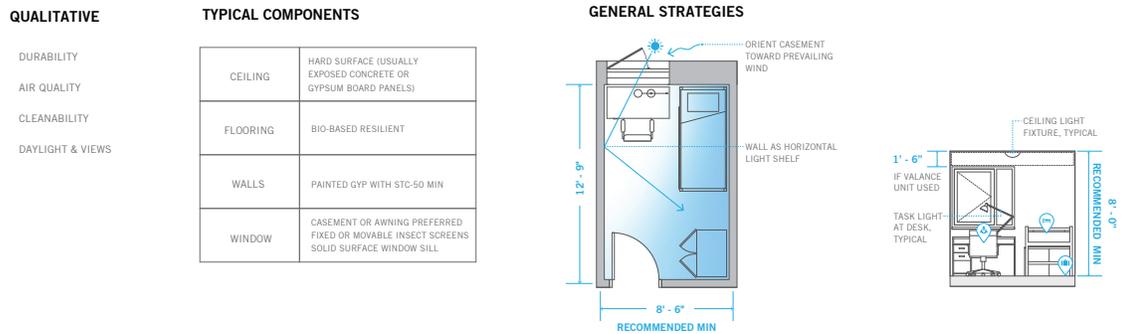


Figure 7: Top qualities sought after in student bedroom design, typical components to consider and general design strategies.

EDUCATIONAL DIAGRAM DISPLAYED AT THE RES HALL

- 1. VALANCE UNITS
- 2. OPERABLE WINDOWS POWER SWITCH
- 3. EFFICIENT LED LIGHTING
- 4. SUSTAINABLY HARVESTED FURNITURE
- 5. LOW FLOW PLUMBING FIXTURES
- 6. NON VOLATILE ORGANIC COMPOUNDS (VOC) PAINT
- 7. RESILIENT FLOORING
- 8. OCCUPANCY SENSOR
- 9. CARBON DIOXIDE DETECTOR

CASE STUDY: SUSTAINABLE BEDROOM FEATURES MERRILL PLACE RESIDENCE HALL, PLYMOUTH STATE UNIVERSITY

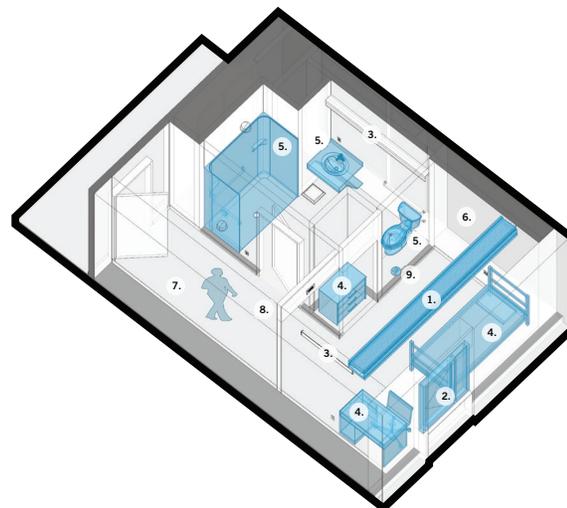


Figure 8: Case study of an educational poster designed to feature sustainability strategies integrated into the bedroom design at Merrill Place Residence Hall, Plymouth State University.

2.2 Private Dwelling

For the private dwelling category, we analyzed micro-units in six major cities across the United States that struggle with housing affordability due to high demand. We also looked at regulations typically used in affordable housing design as minimum requirements. For this market sector, bathroom inside or near bedrooms units was included as it is a typical condition. We interviewed local designers and built upon previous research on the subject of micro-units.

For the purpose of this study, Private Dwelling units are categorized as market rate or affordable housing units. The study uses minimal dimensions established by the Department of Housing and Urban Development (HUD) Fair Housing Act or city regulations as a departure point. Figure 9 shows a comparison of bedroom layouts for HUD minimum requirements, City of Boston minimum requirements and market rate unit example. There are minimum size requirements for a bedroom to be defined as a “habitable room.” The International Building Code (IRC) specifies minimum area of 70 square feet

and minimum horizontal dimension of 7 feet. Another important resource is Fair Housing Accessibility FIRST, an initiative designed to promote compliance with the Fair Housing Act design and construction requirements². As more people are drawn to living in dense environments and cities, market rate units are trending toward a more diverse clientele, which includes families, young professionals, and many forms of “non-traditional” living arrangements. While plan layouts vary, we begin with a simple bedroom, using examples of an Americans with Disabilities Act (ADA) layout to indicate strategies and a modular micro-unit to illustrate unit type variations³. Other private dwelling models could include long-term stay and co-working/co-living.

Key drivers for this market typology include accessibility and equity, modern lifestyles, and affordability. One method to allow for unit diversity within the width of the module is to create spaces that could expand without changing the base design. Specifically for micro-units, buildings with amenities are provided to all users outside the dwelling unit.

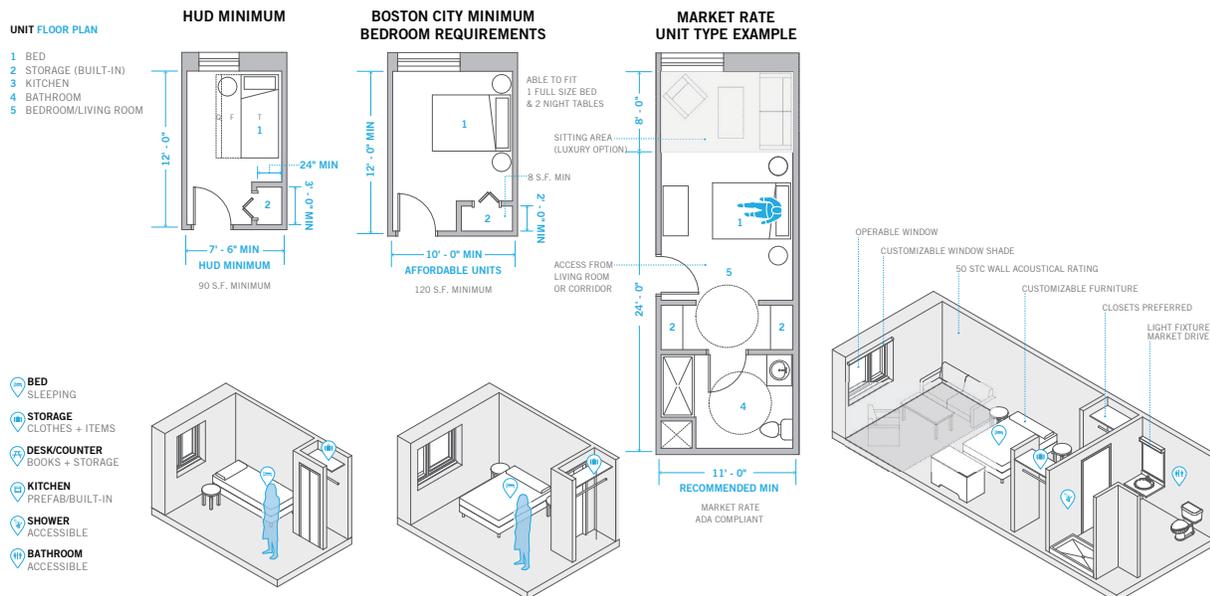


Figure 9: Comparative analysis of HUD minimum code constraints using Boston City minimum bedroom requirements and a typical market rate bedroom unit to illustrate differences.

Case Study—City Micro-Units: Micro-units are not a new concept, but they have taken hold in recent years, especially in cities where space is at a premium. Figure 10 compares layouts of micro-units as examples from various cities in the United States. The idea that units can be sized and purposed for a specific place is the starting point, but must be balanced with the need to have these rooms be part of a community fabric. This becomes a critical exercise in building community through shared amenities, places of respite, and keeping affordability as part of the design solution. In addition, these units now must further jump scales to connect to the surroundings, broader community, and larger urban environment.

Since the units are small, providing spaces for residents to gather is important to create a sense of community. These common spaces become places of respite, and a balance to the tight unit footprints. While micro-units could be a way to achieve affordability, the cost of repetitive individual kitchens and bathrooms should be considered. The Urban Land Institute (ULI) conducted a study that looked explicitly at micro-units in this context and found that location, connection to internal and external amenities, and price were the biggest drivers of successful rent and interest⁴.

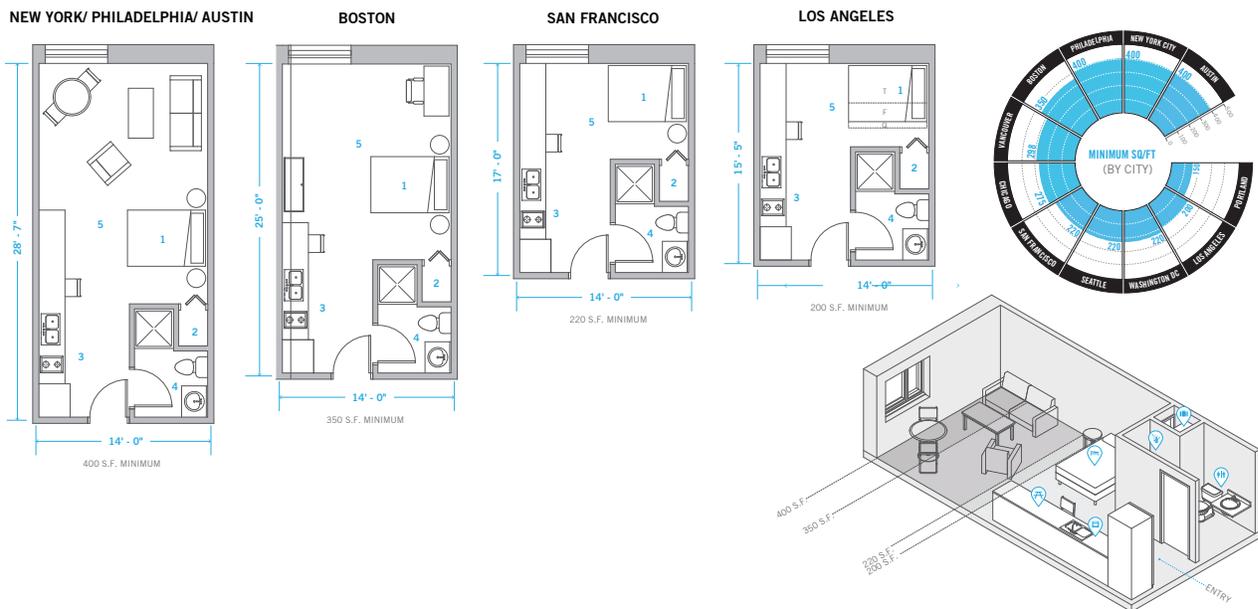


Figure 10: Comparison of micro-units in some U.S. cities where housing affordability is an issue. Credit: Katherine Schneider, Perkins and Will Innovation Incubator recipient.

2.3 Hospitality

We interviewed hospitality experts and experienced designers to assemble the necessary kit-of-parts that makes a typical hotel bedroom. We created an illustrative example that embodied the kit-of-parts, relationships, and typical design considerations for the bedroom. Figure 11 illustrates critical components at hospitality bedrooms. From all of the investigated market sectors, hospitality relies the most on staying ahead of fast moving trends. We selected a case study that represented recent trends and issues also present in higher education for the purpose of highlighting the opportunity of overlap in design thinking and planning.

Today’s traveler is looking for an authentic experience conveyed through storytelling and design. This is about tying guests to the specific location through materiality, patterns, and other physical and emotional connections. The desired outcome is a well-crafted story that relies on placemaking and particularities of the location. This place and experience must be special and unique. Paláez suggests that “sense of place”, “place attachment”, and

“place identity” are critical to the success of a hospitality environment for the guests⁵. Alonso and Ogle describe “character” as the fundamental driver in creating an appealing and inviting destination⁶.

Wellness has become critical in hospitality. To create an impactful experience, the design could bring nature into the room, provide lighting that mimics circadian patterns, and access to physical wellbeing opportunities including simple things such as having a yoga mat in the room.

Hospitality Trends: A hospitality bedroom serves as a home base where guests arrive, kick-off their shoes, get cleaned up, relax and get comfortable. It needs to be a quiet and restful place where guests can close the blinds and unwind. Figure 12 illustrates trend in hospitality bedroom design. A restful place to achieve a good night sleep is not only important in hotel rooms but in any bedroom⁷. Traditionally, all of the basic amenities were provided to a traveler as objects on a counter or in a drawer, but recently these are becoming more integrated and seamless. Lighting levels and technologies can be

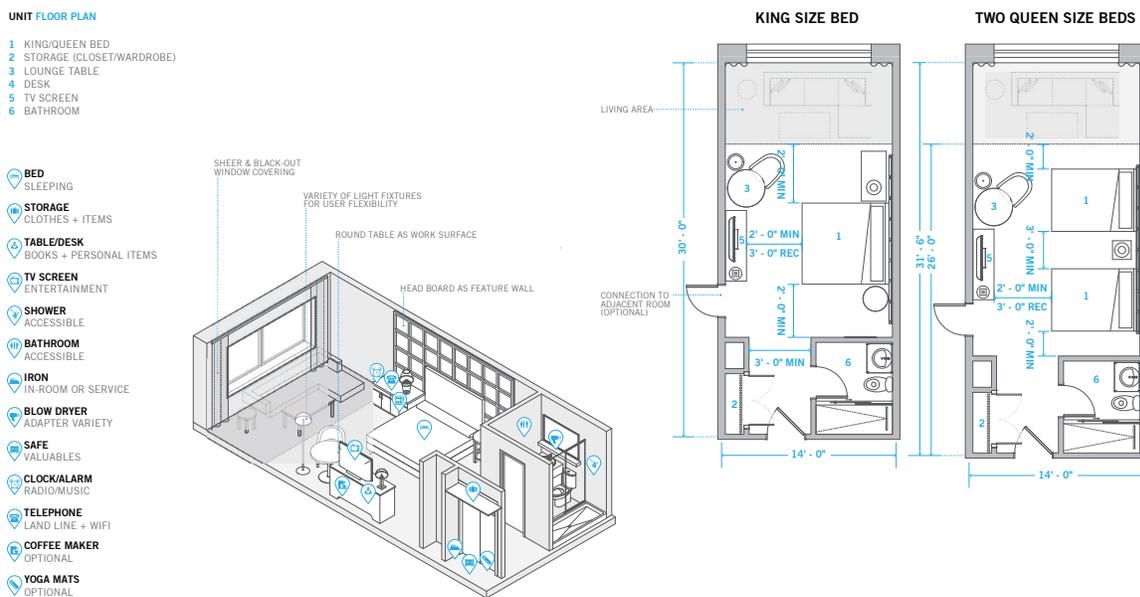


Figure 11: Illustration of critical components to consider for hotel bedroom design, showing two different typical bed sizes.

controlled as part of an individual preference in the bathroom and bedroom. Our internal clock is governed by the 24-hour cycle and daylight awareness is critical for our wellbeing. Daylight and artificial lights that mimic the natural rhythm of the sun and seasons is important to consider in all bedrooms⁹. Basic amenities for modern comfort and convenience are being incorporated into furniture or feature walls. Examples include, charging stations in side tables, digital readouts for weather and time in mirrors, and reading lamps, music players, and alarm clock headboards and other furniture.

Case Study: Hotel Grinnell, a former high school in a college town, was repurposed to be an affordable boutique hotel for the modern traveler. Combining historic preservation with efficiency and simplicity, the project maintains many touches of the original space and tells a story of adaptation and revival.

The project used local labor and manufacturing to produce all industrial iron furniture (canopy beds, platform beds, armories, vanity bases, table bases). Affordability was a key driver for project cost and

operations. For example, small spaces were turned into bunk rooms for college teams and youth groups. Wellness was a priority for guest comfort: live succulent plants in every room, daylight and views, organic materials and products, and guest room lighting dimming options to enable better alignment with circadian rhythms.

To reduce demolition and landfill materials, the project repurposed the original school, including the transformation of the gymnasium into a ballroom, the restoration of corridors to their original width, and the use of the former school kitchen as prep and catering kitchen.

The old locker room was converted to a vibrant bar and restaurant. Aptly named The Periodic Table, it serves locally brewed beers and a farm-to-table menu produced by a recognized local chef. The branding engages the story of the hotel; guest comment cards are called report cards and guest room guides are named primers and look like vintage composition books.

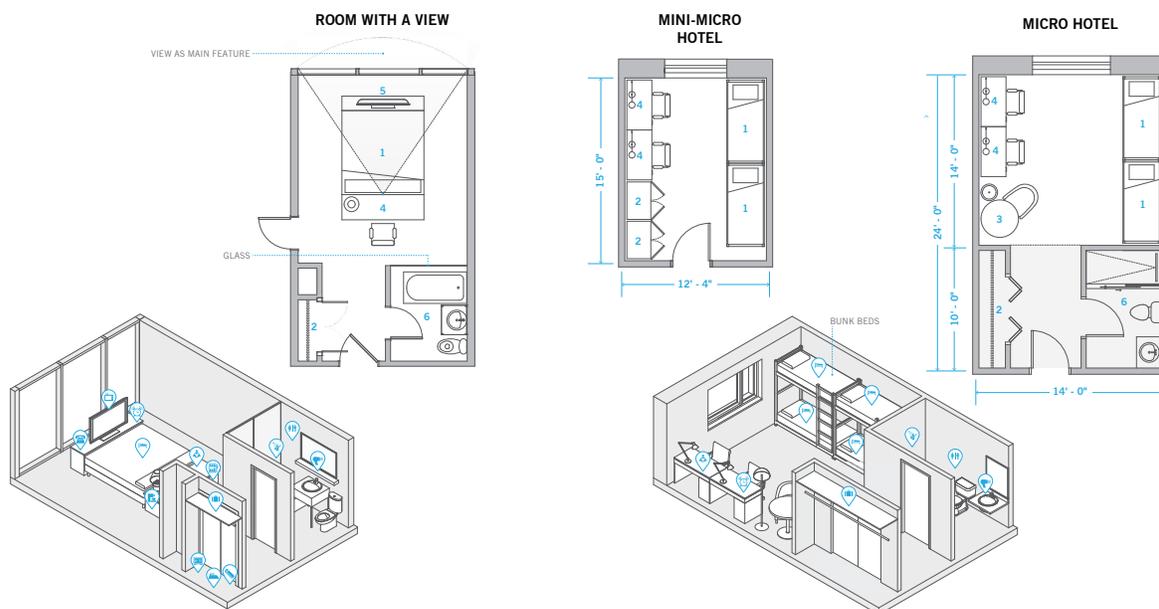


Figure 12: Illustration of hospitality trends, ranging from rooms with a view, mini-micro hotels and furniture arrangements.

2.4 Healthcare

We interviewed multiple healthcare leaders and designers to identify requirements for a hospital bedroom. Since there is great variety of bedroom typologies in hospitals – depending on patient needs – we illustrated a multipurpose patient room that could be converted to different functions or requirements. We selected a progressive case study, a competition project that challenges the typical patient room and focuses on infection control strategies.

The hospital bedroom enables an individual to get medical treatment in an environment conducive to health, wellness, and recovery. This place, much like a hotel room, often uses the headboard as an organizing surface with special controls for primary functions in the room. Caretakers must have critical resources at their fingertips without conflicting with the comfort and serenity needed for healing. In addition, this space needs to create a welcoming environment for family

and guests who provide a fundamental and important support system to encourage rapid recovery. As with Residential Halls, durability and cleanability are key drivers for material choices.

A healthcare overnight bed needs to provide access to natural light and views, with a clear strategy to create privacy when desired or required. Figure 13 shows layering of spaces in a patient room, and minimum code requirements. There have been countless empirical studies researching the topic of access to daylight and views as an important benefit to patient health and recovery. The results indicate that daylight and views contribute to shorter stays and better outcomes. A specific study that investigated these aspects concluded that the closer the bed is to the window, the faster a patient recovers⁹. Similarly, daylight and thoughtful lighting design that addresses circadian rhythms improves moods, reduces pain and agitation, and mitigates perceived stress¹⁰.

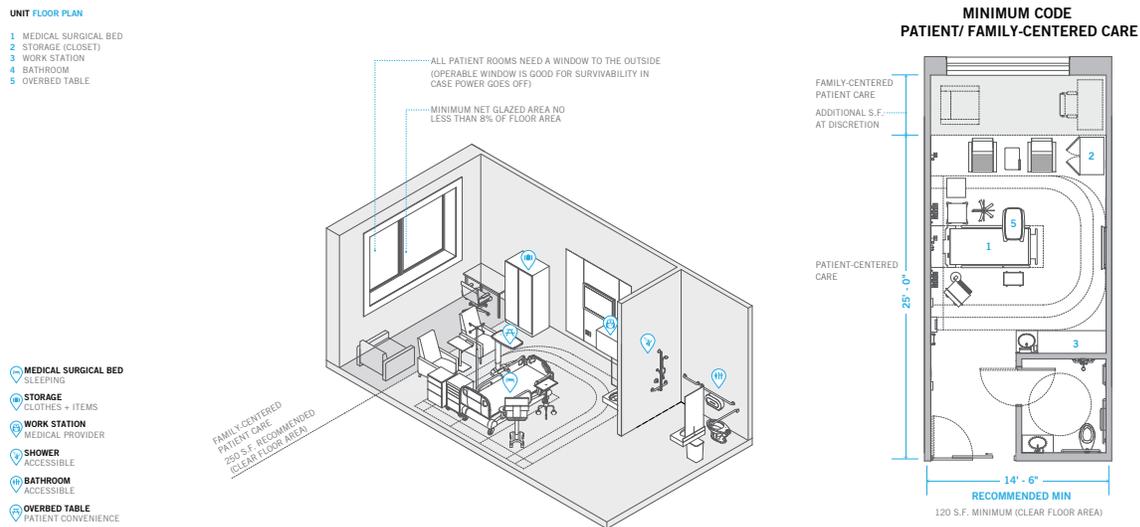


Figure 13: Illustration of patient bedroom layering of spaces for privacy and zoning of staff versus patient and family; and minimum code requirements as well as recommended design minimums for a patient/ family-centered care bedroom.

Case Study–I-CON Infection Control Patient Room: Healthcare Associated Infections (HAI) are a significant consideration within healthcare facilities^{11, 12, 13}. The proposed ‘I-CON’ patient room, shown in Figure 14, implements a comprehensive design investigation that speaks to improved cleanability techniques and planning, staff and patient circulation, and efficiencies relating to general room sanitation and discharge

cleaning times. These objectives assist in the reduction of infection transmission (between Staff/Patient, Family/Patient, Family/Staff), to achieve the complete elimination of microbial conditions and provide an aesthetically pleasant room environment for both the patient and staff.

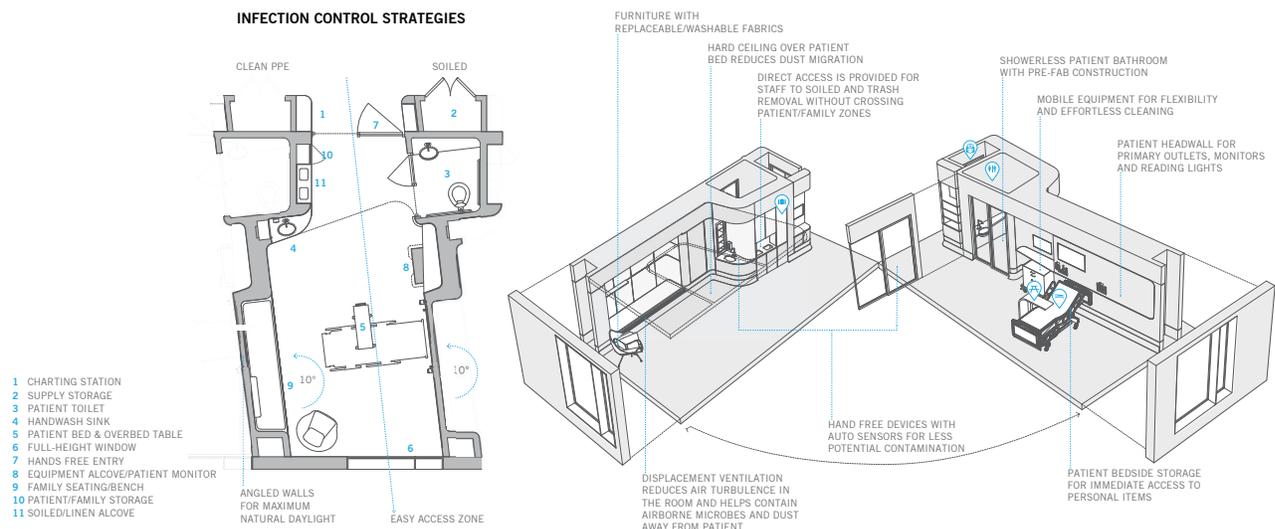


Figure 14: Case study showing design strategies to reduce likelihood of infections in health care overnight bed environment. key ideas include prefabricated elements, smooth washable surfaces, dedicated zones for people and for clean and soiled clothing, hands free operations from entry to exit, specific washing locations for employees and guests. Credit: Boston healthcare experts at Perkins and Will’s Boston Studio (Jeffrey Keilman, Romeo Moreira, Chris Karlson, Rashid Ashraf and Dennis Kaiser).

3.0 Conclusion

Our initial premise was that the “Overnight Bed” offered synergies across different practice areas and bedroom typologies. We learned that while each have unique challenges and opportunities, there were ideas translatable across typologies that could yield innovation in design. The following is a summary of themes we discovered in each specific practice area:

Residence Hall—Repetitive footprint, equity of space, durability/ materiality, create shared amenities outside the bedroom, living style as a learning opportunity, and dual purpose bedrooms that flip to hospitality in summer

Private Dwelling—Diversity of unit types, wide range of pricing to better serve diverse end users (families, young professionals, non-traditional living arrangements, roommates, etc), repetitive floorplan module design: flexibility for added space, increased efficiency by providing shared amenities at lower levels, and market driven or affordable pro forma models.

Hospitality—Focus on experience through storytelling, cleanability and durability, privacy and respite, modern comfort, health and wellness, and headboard to consolidate controls: lighting, music, cell charge, and temperature

Healthcare—Cleanability and durability, a place to get well, access to daylight/ views, floorplan zones: medical staff, patients and guest and family, and headboard to consolidate equipment and controls.

There were three recurrent themes that were present in all market sector categories: the bedroom as a place of restorative wellness, the opportunity to use integrated technologies for a more seamless experience, and how plan efficiencies and product durability have a direct impact in affordability. In all cases, wellness embodied material health and access to daylight and views. The integration of technology seems to be one of the biggest areas of design opportunity. Affordability is a common ground for private or institutional developers, as well as renters, owners and patients – all seeking a bedroom product that should balance investment and revenue generation potential.

Acknowledgments

The authors would like to acknowledge individuals who contributed knowledge and expertise in the different practice areas explored in this article: David Damon, Jeffrey Keilman, Katherine Schneider, Shiyao Liu, Abigail Gillespie, Sarah Brophy, Jackie McGee, Janet D’Aprix, Amy Rioux, Yili Zha, Paul Cattaneo, Khuyen Luong, Kristabel Chung, Sarah Martos and all of the Perkins and Will Innovation Incubator and Research team.

References

- [1] De Angel, Y., (2018). “How to Make Your Residence Halls Work Year-Round”, *The Journal of Higher Education*, Retrieved on 10/18/2018 from <https://www.chronicle.com/article/How-to-Make-Your-Residence/244832>.
- [2] United States Department of Housing and Urban Development, Fair Housing Accessibility First, Requirements, Retrieved on 10/3/2019 from <https://www.fairhousingfirst.org/fairhousing/requirements.html>.
- [3] United States Department of Justice, Civil Rights Division, Guidance on the 2010 ADA Standards for Accessible Design, Retrieved on 10/3/2019 from <https://www.ada.gov/regs2010/2010ADASTandards/Guidance2010ADASTandards.htm>.
- [4] Urban Land Institute, (2014). “The Macro View on Micro Units”, Report, Retrieved on 9/28/2019 from https://uli.org/wp-content/uploads/ULI-Documents/MicroUnit_full_rev_2015.pdf.
- [5] Pelaez, T., (2011). “Experimental Hospitality Environments: The Roles of the Interior Architectural Features in Affording Meanings of Place”, Master’s Thesis, Florida International University.

[6] Alonso, A., and Ogle, A., (2008). "Exploring Design among Small Hospitality and Tourism Operations", *Journal of Retail & Leisure Property*, Vol. 7, No. 4, pp 325–337.

[7] Walker, M., (2019). *Why We Sleep: Unlocking the Power of Sleep and Dreams*, New York, NY: Scribner.

[8] Foster, R., and Kreitzman, L., (2017). *Circadian Rhythms: A Very Short Introduction*, Oxford, UK: Oxford University Press.

[9] Park, M., Chai, C., Lee, H., Moon, H., and Noh, J., (2018). "The Effects of Natural Daylight on Length of Hospital Stay", *Environmental Health Insights*, Vol. 12, pp. 1-7.

[10] Joseph, A., (2006). "Impact of Light on Outcomes in Healthcare Settings", Retrieved on 10/3/2019 from <https://www.healthdesign.org/chd/research/impact-light-outcomes-healthcare-settings>.

[11] Mayer, J., Slager, S., Taber, P., Visnovsky, L., and Weir, C., (2019). "Forming a Successful Public Health Collaborative: A Qualitative Study", *Association for Professionals in Infection Control and Epidemiology*, Vol. 47, No. 6, pp. 628-632.

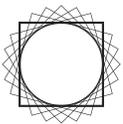
[12] Lateef, F., (2009). "Hospital Design for Better Infection Control", *Journal of Emergencies Trauma Shock*, Vol. 2, No. 3, pp. 175–179.

[13] Pratta, R.J., Pellowe, C.M., Wilson, J.A., Loveday, H.P., Harper, P.J., Jones, S.R.L.J., McDougall, C., and Wilcox, M.H. (2007), "epic2: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England", *Journal of Hospital Infection*, Vol. 65, Supplement 1, pp 1-59.

MOHAWK windpower 

This piece is printed on Mohawk sustainable paper which is manufactured entirely with Green-e certificate wind-generated electricity.

Through its "Green Initiative" Program, Phase 3 Media offers recycled and windpowered paper stocks, recycles all of its own post-production waste, emails all client invoices, and uses environmentally friendly, non-toxic cleaning supplies, additionally Phase 3 Media donates 5% of all sales from its recycled product lines to Trees Atlanta.



Perkins&Will
Research

© 2019 Perkins and Will. All Rights Reserved.
For more information, please send an email to pwresearch@perkinswill.com

