



THE ABILITY OF DESIGN TO IMPACT WELLNESS

Rockwood Retirement Communities
Post Occupancy Evaluation

BACKGROUND SUMMARY

Rockwood Retirement Communities is a forward-looking, not-for-profit organization providing a range of independent, assisted living, and skilled nursing services to older adults in Spokane, Washington. On its South Hill campus there is a 1960's high-rise called the Ridge, a skilled nursing building, and a community of homes referred to as the Forest Estates. When Rockwood's leadership recently decided to reposition their South Hill Campus to provide new residential apartments and more common areas, a crucial consideration was to go beyond simply improving residents' physical wellbeing, but to address the full spectrum of wellness as well.

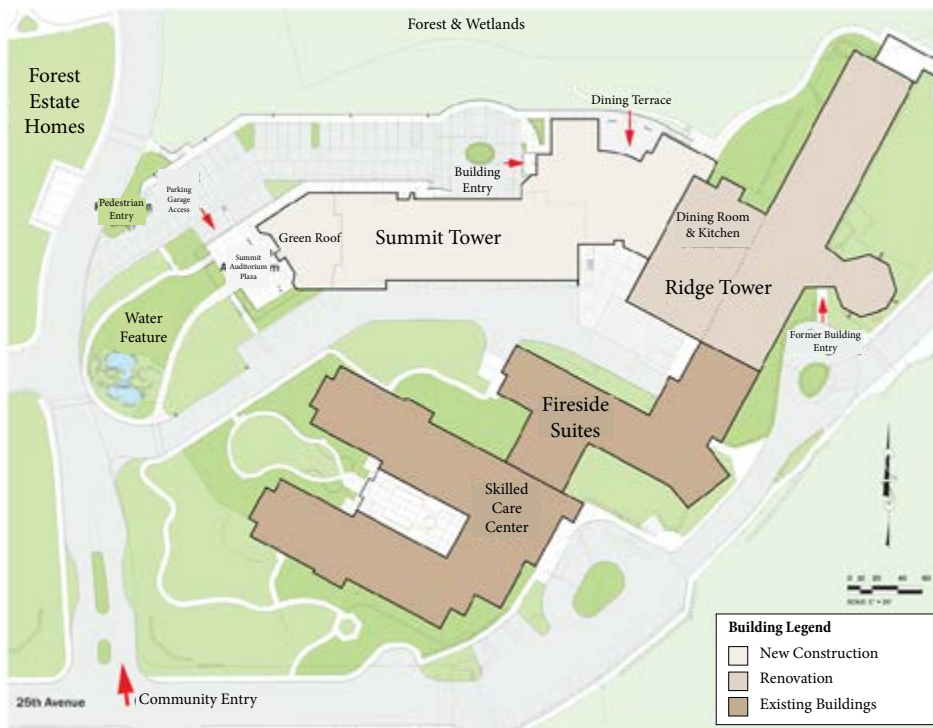
A comprehensive and preexisting program called Livewell—embracing the eight dimensions of wellness through exercise programs, healthy meals, spiritual activities, vocational opportunities, art and education programs—had proven to be popular with both residents and staff, but the Ridge building on South Hill could neither adequately support this program nor further the client's overarching vision for achieving whole-person wellness on the part of its residents. Rockwood leadership's vision focused on helping residents to stay physically and psychologically healthy, as well as mentally active, by introducing design

attributes that included elements of touch, daylight, water, color, natural ventilation, spatial forms, textures, and views of nature in order to generate feelings of surprise, anticipation, satisfaction, and delight.

In addition to Perkins Eastman's commitment to design excellence for generational living communities focused on aging adults and programs that support whole-person wellness, the firm is also pioneering research into the applications of Biophilic Design in these communities.

Biophilic Design recognizes the inherent ties between people and their environments, as well as the importance of creating a connection between the two to create a platform for long-term health. Using this research as our platform, as well as Rockwood's broader design vision, we discussed with our client the idea to include Biophilic Design principles as a fundamental contributing element of the design process for the new addition to the existing South Hill campus. To our delight, the client was very supportive of utilizing Biophilic Design as an organizing framework and adopting it as a philosophical approach to design that supported their long-term goals. Rockwood understood that Biophilic Design could help to improve resident wellbeing, retain staff, and support their marketing objectives.

As the design process moved from concept to execution, **Biophilic Design principles became the filters by which decisions were made regarding layout, details, materials, and furniture selection.** The master plan was informed by the need to preserve an established wetland ecosystem as well as enable residents to directly experience environmental features, such as natural light, textured natural materials, and panoramic views of conifers and distant mountains. For the interior, designers



shaped the main corridor to emulate the flow of a river, or more specifically, the nearby Spokane River, known as the “Riverwalk,” so that residents could experience the spatiality of natural shapes and the sense of discovery one has when navigating a winding river.

Since opening in 2016, residents at The Summit (Rockwood’s expansion) now have the opportunity to travel along the “Riverwalk,” socialize with a drink while enjoying views of the adjacent forest, sit in pools of sunlight by the fireplace, cozy up with a book in the library, preview activities at the entry, attend a party in one of the common areas complemented by views of distant scenery, and take a fitness class while enjoying the natural setting of the wetlands. **The natural appeal of The Summit’s common spaces is that they encourage residents to spend more time away from their private apartments and engage with other residents in a social setting.**

We first visited the property and carefully observed how The Summit’s spaces were being utilized, but we realized that, as designers, our initial impressions were entirely subjective. For our findings to have any gravity, we needed to be objective in our inquiry so that the impact of our design decisions could be evaluated quantitatively. To accomplish this, **Perkins Eastman performed both a pre- and a post-occupancy evaluation, which are powerful tools for verifying if design intent has achieved its intended goals** and, if so, what aspects work or do not work to reinforce the desired outcome. We devised a questionnaire with the input of Rockwood’s leadership, which proved an invaluable resource. The pre-occupancy survey, to measure baseline reaction to the existing community, took place late-April 2016. The post-occupancy data collection occurred several months after The Summit opened in September 2017.

Perkins Eastman and Rockwood jointly developed an online questionnaire that could be accessed by readouts, digitally, as well as physically, and submitted by hard copy if needed. In the questionnaire, we posed all manner of questions that touched on all aspects and features of what makes for a healthy environment, and how The Summit’s physical environments have impacted the daily lives, activities and feelings of the residents.

Questions fell into six categories:

1. Sustainability to create a healthy ecology
2. Campus activities and amenity spaces
3. Qualities of the spaces such as lighting, acoustics and wayfinding
4. Biophilic attributes and how the attributes affect resident perception of various spaces
5. How the spaces made residents feel
6. Whether residents felt any improvement in their physical, emotional, and intellectual wellness due to changes in spaces and programs associated with the renovation and addition

Of all those surveyed, 159 residents responded to the pre-construction survey and 205 to the post-construction survey. Sixty-seven percent of the respondents lived at Rockwood prior to undertaking the design project; 19% moved in during the construction and 14% of the people participating in the survey moved in at post-construction. About 70% identified themselves as physically very mobile.

We were quite fortunate to have Rockwood as a client and true partner in this endeavor. Participants were curious about the findings of the post-occupancy evaluation and were open to working with us, along with their residents, to investigate the results and share them within the community and with the greater industry.





SUMMARY OF LESSONS LEARNED

While there are many nuanced conclusions gleaned from the data in this report, the list below represents some overarching findings worth sharing that may influence the design of future generational living communities.

When residents were asked about Biophilic Design attributes, they reported that the **qualitative design features dramatically improved** from an average originally around 30% in the pre-construction survey, to a final average of 88% in the new building.

- Qualitative aspects such as wayfinding, lighting, and acoustics all saw marked improvements, with wayfinding in particular now being listed as 'good' or 'very good' by over 94% of the residents.
- More residents now participate in programs more than before, and most notably, the Estate Home residents' participation in activities at The Summit also increased, bringing the whole campus together.
- All spaces elicit feelings that ranked on the positive side of the emotional spectrum.
- All aspects of wellness improved and a significant majority of surveyed participants stated that their physical, social, and intellectual wellness were better supported than before.
- Residents reported feeling good that the building is more ecologically sustainable than before.
- All indices were positive, attributable to programs as well as the environments that allowed diverse programs for wellness to occur. As several residents summarized, the new environment allows for increased dining, socialization, and exercise, with residents commenting that they "really do like the new space, it has increased all kinds of social interactions."
- Several respondents equated the new design to a resort environment, while others stated "the new spaces promote the feeling of living in a supportive, energized, stimulating village."
- In response to a question on Biophilic Design, one resident summarized that, "Everything demonstrates freedom and choice." Another stated that the "View of nature from the exercise room is very soothing and perfect for classes that are held there." Another resident commented, "I love the big windows and views, the natural colors and designs, the curvy hallway, the fireplaces. It's hard to pick the top three spaces."

There were only a few comments that suggested further improvements. Of note was one resident who recognized that the longer distances were "Great for younger folks [in their] 60's and 70's." but that it now was more "difficult getting around for folks in [their] 80's and 90's."

The following report documents the specific findings of the survey questions.

Key Goals

- 1 **Bring the larger community together through increased participation**
- 2 **Enhance design and programming to support whole-person wellness**

Definition



BIOPHILIC DESIGN:

Focused area of research that brings *people* to the center of the sustainability discussion. It attempts to scientifically understand how people interact with their environment and consequently how their environment can be designed to better support them.

SURVEY SUMMARY

SUSTAINABILITY

Seventy-nine percent of residents think that it is 'extremely important' or 'very important' to be green in their daily lives, which indicated a 16% increase from those who reported feeling similarly in the pre-construction survey. Further, 72% of respondents agree that the new design adequately minimizes environmental impact. The survey respondents also cited a range of things that could be improved upon in the future, including but not limited to community operations and additional amenities.

AMENITIES

Since the new building opened to residents, community-wide participation in **social events saw an increase of 15%**, **dining attendance increased by 21%**, **participation in educational programs increased by 11%**, and in wellness and fitness programs by 8%. Most likely all this was due to both the increase in physical space and the expansion of programs that the development allowed. Many residents commented that socialization within the community had increased due to the introduction of Rocky's, a very popular informal dining and bar venue at The Summit.

More than **53%** of respondents noted they 'agree' or 'strongly agree' when asked if they visit the community's amenity spaces more often than before the campus expansion, while a third of the respondents in that pool indicated that they linger longer as well. Overall, more than 62% of respondents stated that they appreciate the increased choice of amenity spaces on the building's main floor.

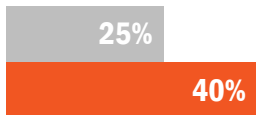
There was a marked improvement among residents of the Forest Estate homes in attending social events and other gatherings a few times a week, which was up to 32% from a previously reported 16% figure, pre-construction. Residents also reported dining outside of their own residences up to a 'few times a week,' up 26% from the previous 11%, pre-construction.

Forest Estate residents also doubled their customary once-a-day participation in wellness and fitness classes and programs, from 6% to 12%, while remaining steadily at a 40% attendance rate a few times a week.

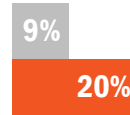
When looking at the survey participants from Forest Estate alone, 67% said they now visit the main floor amenity

PARTICIPATION IN ACTIVITIES CHANGES FROM PRE-CONSTRUCTION TO POST-CONSTRUCTION

Social Gatherings and Events



Educational/Classes/Programs



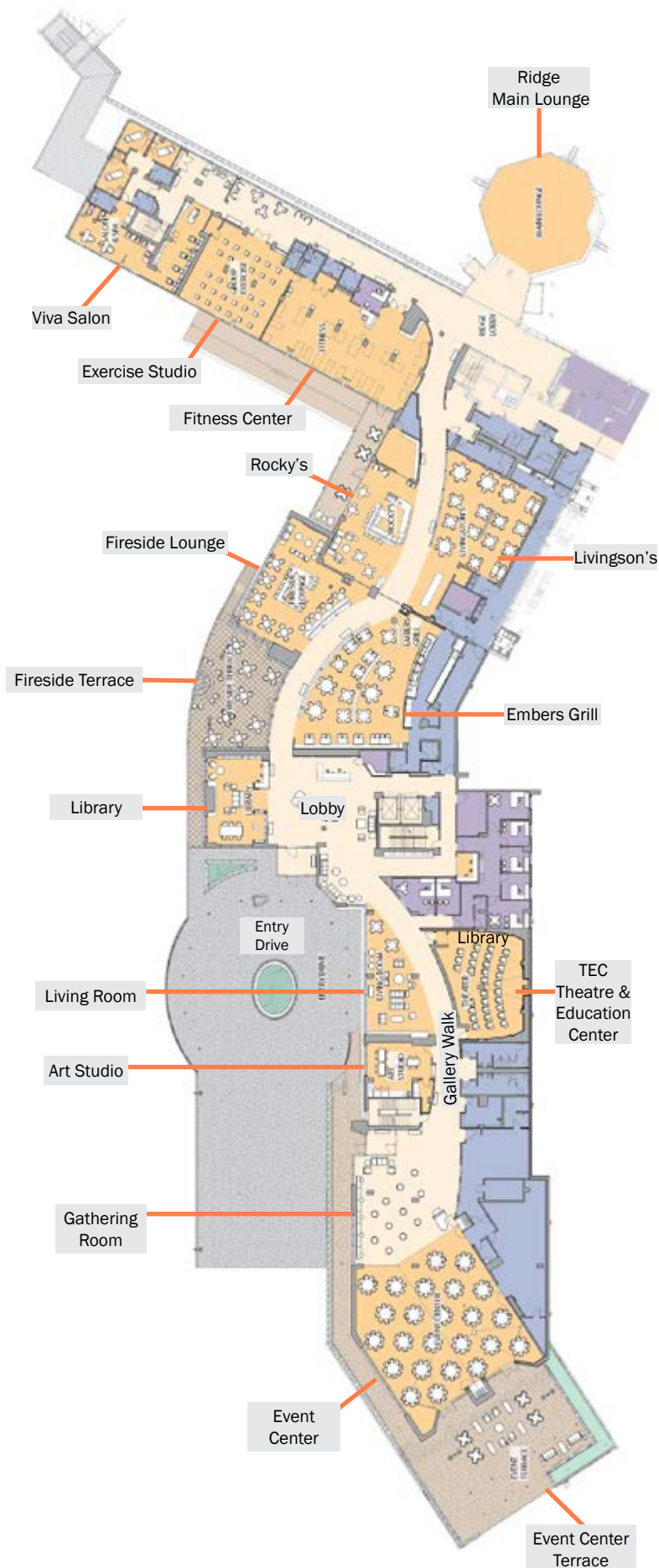
Dining Outside of Residence



Wellness/Fitness



■ Pre-Construction ■ Post-Construction



spaces more often, 52% say they linger longer, and 72% checked 'agree' or 'strongly agree' when asked if they appreciate the increased choice in main floor amenity spaces.

Considering all respondents collectively:

- **50%+ Visit dining rooms more often**
- **45% Linger longer in dining rooms**
- **68% Appreciate choice of dining venues**

For the Forest Estate participants, 64% 'agree' or 'strongly agree' that they visit the dining venues more often, 53% say they linger longer, and 80% say they appreciate the choice of dining venues.

When asked to list their 3 **favorite spaces**, many respondents opted not to discriminate and instead indicated a mutual liking for all amenity spaces. However, for those who did choose to rank their favorites, **the top four choices were Rocky's, the Library, the Theatre and Education Center (TEC), and the Fitness Center.** Commonly expressed opinions were: people generally liked to "eat, exercise and socialize," enjoyed reading a book and having a quiet place to rest, and that the Theatre and Education Center has great programming.

The following are specific comments and suggestions added by the residents with regard to the amenity spaces:

- Hearing loss makes many of the spaces difficult
- Some spaces are a long walk particularly for people in the Ridge
- Some people may not be into a particular activity in an amenity space
- Sight lines from the seats to the screen could be better in the TEC
- Some seating is uncomfortable
- The Ridge Lounge needs to be updated
- The exercise room could be larger

INDOOR ENVIRONMENTAL QUALITIES AND WAYFINDING

ACOUSTICS

Good acoustics are a critical design consideration for a number of reasons. They help provide an environment that enhances convivial conversation among residents, allows residents to enjoy watching movies, participate in a lively group discussion, and they allow residents to listen to a visiting lecturer without the use of enhanced audio.

According to the residents, **acoustics improved substantially post-construction.** In the existing building prior to construction, residents' overall scoring of acoustics ranked 'not good.' For example, in the salon, only 22% of residents said that acoustics were 'good' or 'very good'. The highest-rated space prior to construction was the Community Center, with 57% of surveyed residents offering their approval of acoustical conditions. In contrast, after construction was completed, the Embers Grill at The Summit ranked with 57% of survey participants rating it as 'good' or 'very good'. **The best acoustic performance was the Theatre and Education Center, for which 82% of residents ranked the space as 'good' or 'very good'.**

DAYLIGHTING

Shaped as an elongated rectangle oriented east to west, the new building allows the majority of common areas and resident apartments to be flooded with constant natural light. Natural light has proven to increase serotonin levels, which helps residents to feel more alert.¹ The northeast-facing outdoor dining terraces, for example, directly expose residents to short wavelengths of morning light, which helps improve circadian rhythms, which in turn improves sleep-wake patterns.²

Natural daylighting was frequently cited in people's comments as the quality that most attracted people to

relax in a particular space and socialize. Many residents also mentioned how much they enjoyed the views of nature and the light emanating from the large windows, which contributed to a greater sense of connectedness to the outdoors. Prior to construction, the average rating of 'good' to 'very good', with respect to daylighting, was only 47%.

After construction, the Embers Grill was ranked the lowest at 49%, with **the Fireside Lounge ranked as 'good' or 'very good' by 84% of participants – quite an improvement.**

ARTIFICIAL LIGHTING

The building's artificial lighting **improved from 52% of residents feeling the electric lighting was 'good' or 'very good', to 78% post-construction,** a 26% improvement overall. The Event Center, the space that was ranked as the best lit environment post-construction, scored particularly well with 89% of residents ranking the lighting as 'good' or 'very good'. Some residents did remark that the Livingston dining area felt dark, so perhaps some future design improvements will be considered.

WAYFINDING

An impressive 94% of residents reported that wayfinding in the newly constructed areas between the residential and amenity spaces was 'good' or 'very good'. That was a 23% increase from pre- to post-construction. **Ease in wayfinding helps reduce stress and makes activity spaces feel more accessible, which in turn promotes participation and engagement.** Applying that logic, the introduction of the "Riverwalk" has proven to be enormously successful.



INCORPORATING BIOPHILIC DESIGN PRINCIPLES



■ Connections to Nature

Biophilic Design recognizes that as human beings we are integrally linked to nature, so it is natural that our designs should reinforce those connections. Wherever we could, we used natural elements and created opportunities to connect people to the elements water, earth, air, and plants. We highlighted both with near and distant views.



■ Freedom and Choice

Residents feel that they can use any space at any time; they are free to choose. This includes the skylounge which can be reserved by them for special events or used as a drop-in space where they can enjoy one another's company while gazing at the mountains off in the distance.



■ Natural Materials

We used natural materials wherever possible to tie the interior together with the exterior to make the building fit naturally into its surroundings. This included incorporating natural patterns into fabrics, motifs into the art, the wood ceiling and paneling, the stone floor, and the reception desk.



■ Prospect and Refuge

People feel most comfortable when they're in a position to feel safe and withdrawn from environmental conditions, while also enjoying an unimpeded view of potential hazards or opportunities. We created this with intention in the library. Located off the main lobby in a clearly defined room with comfortable materials, it includes a hearth, bookcases, and views out to the main entry drive where residents, staff, and other visitors can see people coming and going from the building. There are also views into the wetland forest.



■ Resilience and Adaptation

It is important to include the awareness of seasonal weather and time changes. We created opportunity for people to spend time outdoors, as well as connected interior spaces to the outside with large expanses of glass so people could sense the sun, see the leaves change with the seasons, and be aware of the clouds rolling in as the weather changed.



■ Rich Sensory Information and Movement

We feel more alive when we can process an environment that stimulates all of our senses. Each space we designed takes into account the residents' ability to experience changes in light level, temperature, feeling a breeze, or smelling a delicious meal being prepared on the grill.



■ Serendipity

To create a sense of mystery and risk, coupled with a reliable safeguard, we designed an organizing circulation spine that undulates like a river. Nicknamed the “Riverwalk” a.k.a. Gallery Walk, the day lit space with clerestory windows, views to nature, eddies that allow for casual meetings, and connections to all the major social spaces create a clear wayfinding path that is enjoyable to walk along.



■ Variations on a Theme

As in nature, there is repetition with variation wherever one looks. We were careful in our design to repeat elements such as curves in the floor, walls, and ceilings, to reinforce the variations on a theme.

BIOPHILIA

We asked residents if the building’s new design better supports each of the following attributes of Biophilic Design, and in which spaces they were most evident. The following scores are ordered by pre- and post-construction, and are the rankings for each being ‘supported very well’ and ‘well combined.’

Respondents seemed to understand, based on each quality’s corresponding description(s) provided in the narrative, the specific attributes of the spaces surveyed and the respective qualities that each Biophilic attribute imbues. It was telling to see – based on these Biophilic Design attributes – the degree to which residents felt their physical environment had improved, ranging from a high of 66% of residents noting improvements for “Serendipity” to 49% of residents noting

Connections to Nature

Views of nature and ecosystems and access to those natural landscapes and ecosystems. Daylight and/or simulated natural light are important as well as natural and/or simulated natural ventilation.



Freedom and Choice

The ability to make a choice, and freedom of mobility and wayfinding.



Natural Materials

Natural building and decorative materials with natural color palettes.



Prospect and Refuge

Achieved through unimpeded views over a distance, sheltered settings such as a place to withdraw from environmental conditions or the main flow of activity. Having transitional spaces.



■ Pre-Construction ■ Post-Construction

improvements for “Rich Sensory Information and Movement.” All of the targeted post-construction Biophilic Design attributes were acknowledged to be present by over 80% of the respondents. All attributes occurred in at least two spaces and in as many as five spaces in each response.

The highest-rated and most oft-cited improvement was “Freedom and Choice,” with 92% of surveyed residents offering their approval. This attribute refers to choice of venues, activities, and social interaction, as well as mobility and wayfinding with acceptable walking distances.

Resilience and Adaptation

Includes awareness of seasonal, weather, and temporal changes/patterns. It includes the age, change, and the patina of time.



Rich Sensory Information and Movement

This includes a full-range of senses including: subtle changes in air temperature, relative humidity, surface temperatures, varying and changing intensities of light and shadow, random or ephemera.



Serendipity

Describes the sense of mystery and sense of risk coupled with a reliable safeguard.



Variations on a Theme

This can be incorporated through naturalistic patterns and textures as well as shapes and forms. It can be literal or abstract.



■ Pre-Construction ■ Post-Construction

BIOPHILIA

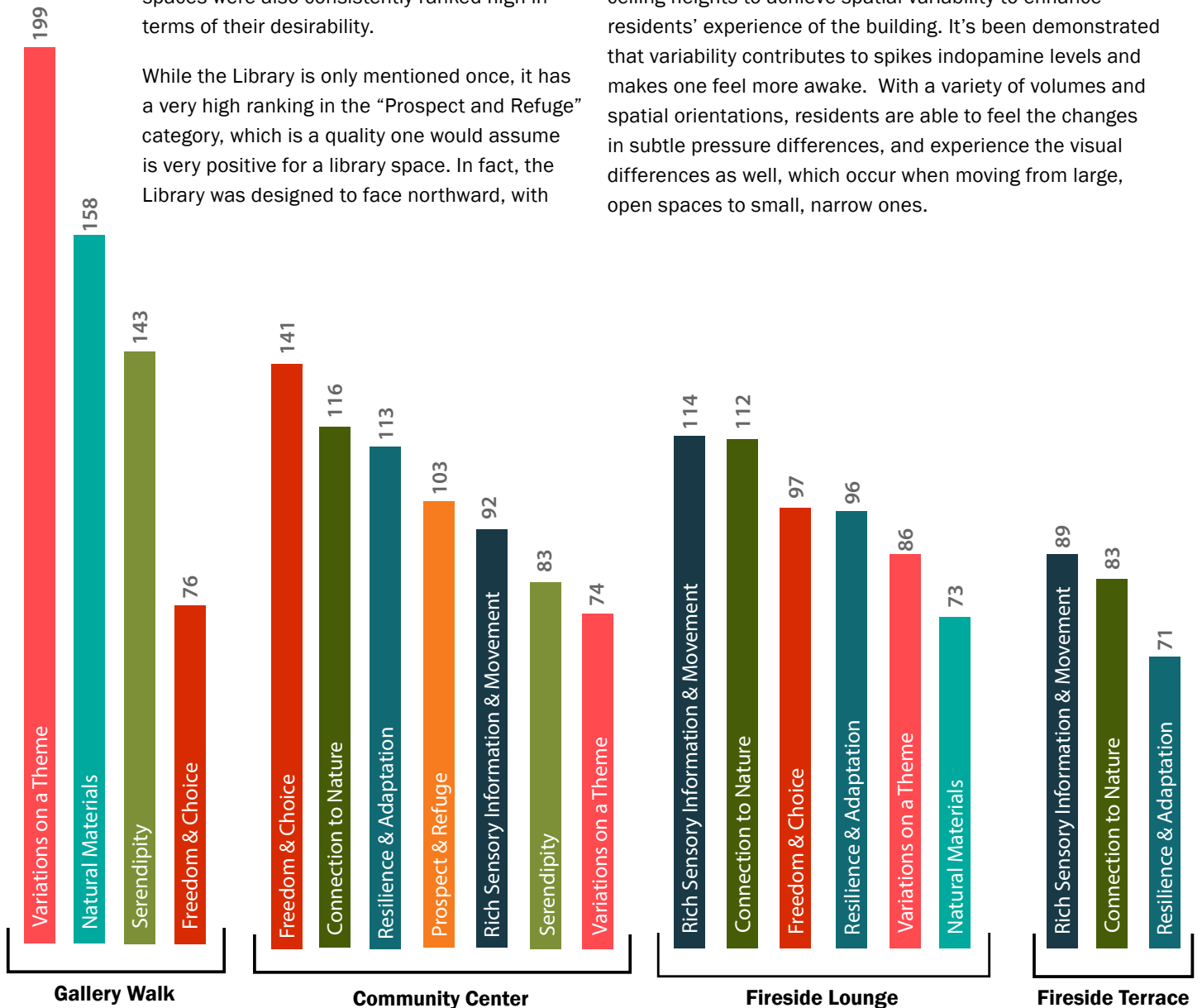
We wanted to understand which spaces most embody each attribute, so we asked the residents to define their top three spaces and how they felt each one epitomized the strongest feeling for Biophilic quality. **The scores are the number of respondents who selected an attribute in their top three.**

From the analysis of the above data, we can see that **the Community Center and the Fireside Lounge are mentioned most frequently in relation to biophilic attributes**, with the Gallery Walk (a.k.a. “Riverwalk”) listed with four individual Biophilic attributes. Some of these spaces were also consistently ranked high in terms of their desirability.

While the Library is only mentioned once, it has a very high ranking in the “Prospect and Refuge” category, which is a quality one would assume is very positive for a library space. In fact, the Library was designed to face northward, with

low ceilings and a warm, centrally-located fireplace, which contributes to the sense of privacy and refuge. The room is positioned adjacent to the building’s main entry point so that residents in the space can see visitors and fellow residents as they approach The Summit’s main entrance turn around.

The Gallery Walk, a.k.a. “Riverwalk,” was rated as having three particularly strong biophilic attributes of note: “Variations on a Theme,” “Serendipity,” and “Natural Materials.” For “Variations on a Theme,” public spaces are located off the main corridor and utilize areas of lower ceiling heights to achieve spatial variability to enhance residents’ experience of the building. It’s been demonstrated that variability contributes to spikes in dopamine levels and makes one feel more awake. With a variety of volumes and spatial orientations, residents are able to feel the changes in subtle pressure differences, and experience the visual differences as well, which occur when moving from large, open spaces to small, narrow ones.



All residents get to experience these sensory variations throughout the course of walking from activity space to activity space. The idea of Serendipity: a sense of mystery, coupled with reliable safeguards, makes these passages particularly enjoyable. Further, the winding main corridor ignites in residents a sense of exploration and discovery. With no vanishing points hidden or in sight, residents never truly know what place or persons might be around the bend.

A variety of social spaces, with entrances obscured from a distance, enable residents to feel as if they are discovering these spaces anew (and the people in them) as they approach. This particular design consideration helps increase neural activity and floods residents' brains with dopamine and norepinephrine, which in turn improves cognitive functioning and general alertness.

“Serendipity” is the attribute that was rated most improved by residents from before the renovation and addition, most likely due to the addition of the Gallery Walk, a space that everyone uses on a daily basis.

“Natural Materials” also ranked highly and is an attribute lauded by The Summit’s residents. The materials, such

as wood, stone, and metals, were chosen based on their appealing tonal and textural variations. These variations of texture and color tones help to give residents a lot of rich visual information about their environment to absorb, thereby lowering visual and cognitive stress levels.

Predictably, a “Connection to Nature” was mentioned frequently in relation to the East Terrace and the Fireside Patio, both outdoor spaces, by survey respondents. This attribute was likewise ranked strongly in relation to the Sky Lounge, the Community Center, and the Fireside Lounge, all spaces with large windows facing toward trees, with both attractive near and distant views. The site itself as well as the building’s shape and orientation helps maximize the overall exposure of public and private spaces to the grove of conifer trees and wetlands situated to the north of The Summit. With most of the building’s common spaces located on the first floor, residents are immersed within a field of stunning and aromatic evergreens. Resident rooms, located on the upper floors, have panoramic views of the fractal vegetated skyline surrounding the

site. The Sky Lounge, a social gathering space located on the top floor, takes advantage of the lush sweeping vistas.

The community’s overall color palette was inspired by the forests and other natural flora of the Pacific Northwest. Greens, coppers, and reds adorn the walls, furniture, and window treatments of The Summit. Green was chosen due to its calming properties and because cone receptors in the human eye are most sensitive to green light frequencies; the eye can see more variations of green than of any other color.







FEELINGS

This portion of the post-construction survey asked residents how different amenity spaces introduced in the renovation made them feel. Twenty-three different feelings were listed for each space, both positive and negative.

Residents were prompted to select up to three adjectives that best described their feelings in relation to each space. Based on the answers we received, we then developed a weighted score based on the frequency of selection for each.

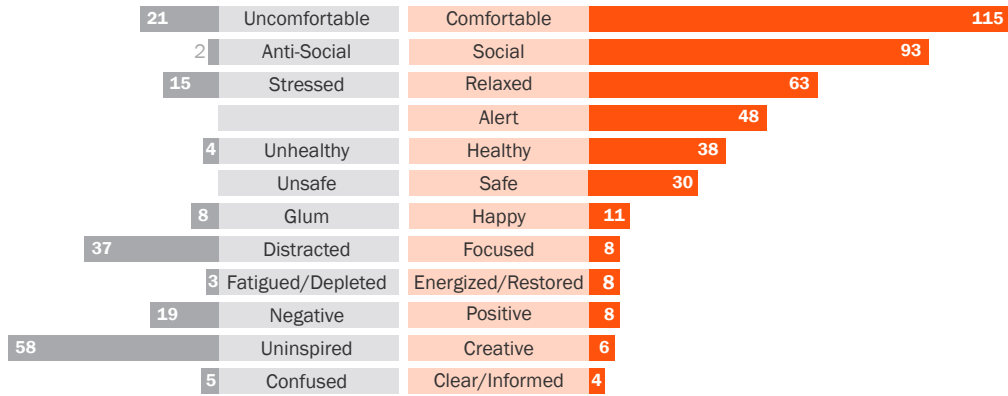
The most frequent feelings used to describe the spaces were: “Relaxed,” “Social,” “Comfortable,” and “Positive.” It is striking to note that no spaces received a score for a negative feeling above 63. The average rating for a negative feeling was 6.4 versus an average rating of 52 for positive feelings.

- The Library received the highest total selected score of 223, for “Relaxed.”
- The Sky Lounge had the largest spread of associated feelings, which may be due to its flexible use as both an informal drop-in space and a reserved space for programming.
- Overall, the spaces received a generally high score of positive feelings; although it is interesting to note that the slightly lower scores are for spaces situated further from natural daylight, such as Ember’s Grill and Livingstone’s.
- The Event Center appropriately received the highest score for “Focused/Alert,” since that is the feeling most appropriate to the activity.
- The Fireside Lounge and Rocky’s, both designed as informal drop-in spaces to enjoy drinks, meals and socializing, both received high ratings under feelings categories of “Relaxed,” “Comfortable,” and “Social.”

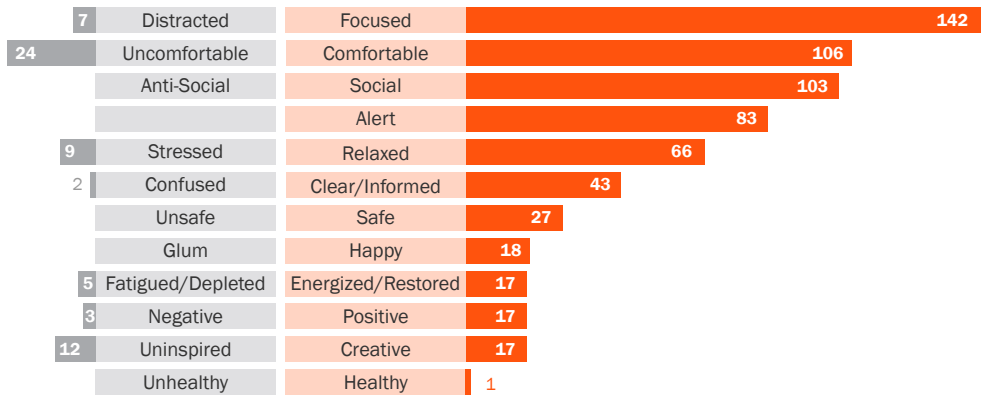
Conclusion

- **Positive votes outweigh negative by 8 times**
- **Negative Feelings for space never reached above 63 votes**
- **Gallery Walk received 28 times more positive votes over negative feeling votes**
- **Relaxed, Comfortable, Alert & Social, were the most identified feelings**

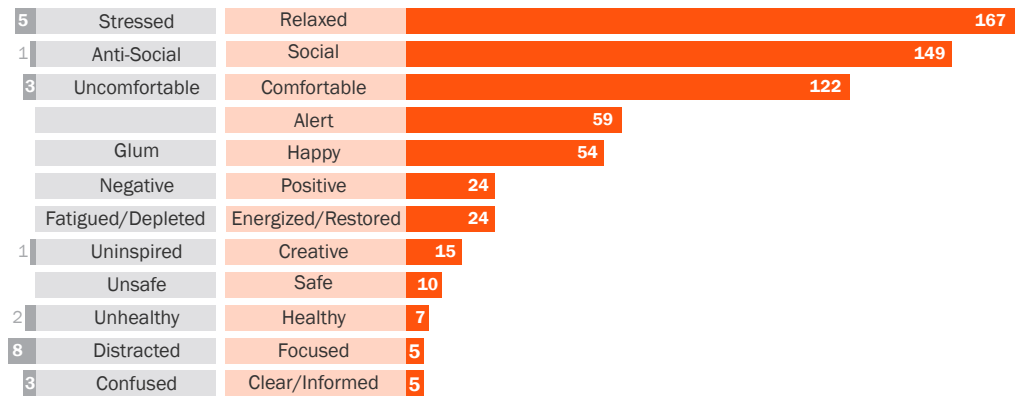
Ember's Grill



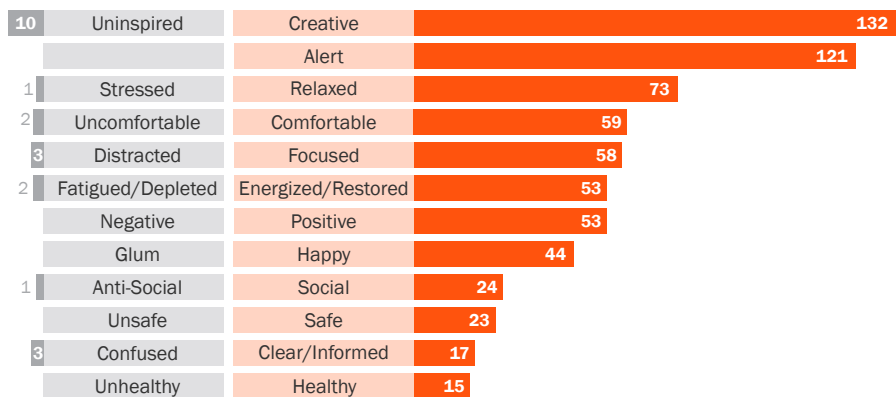
Event Center



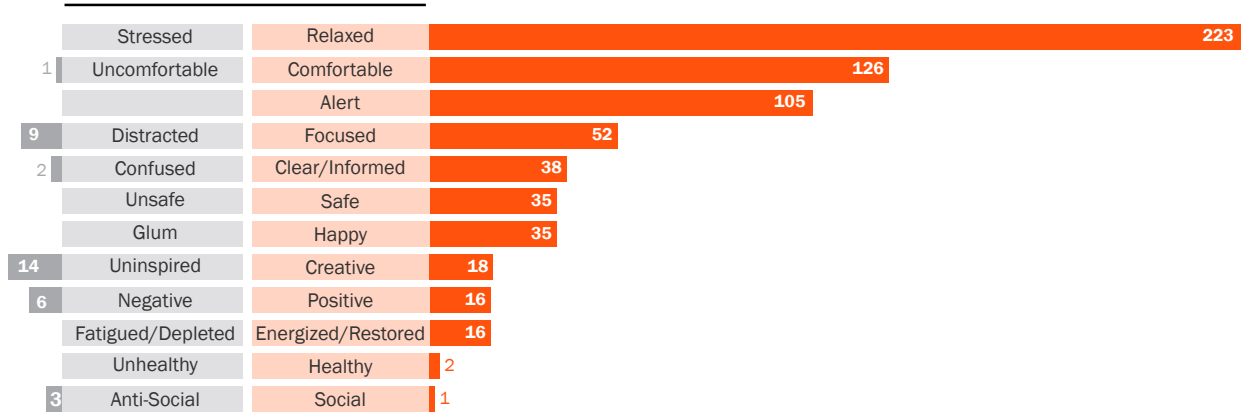
Fireside Lounge



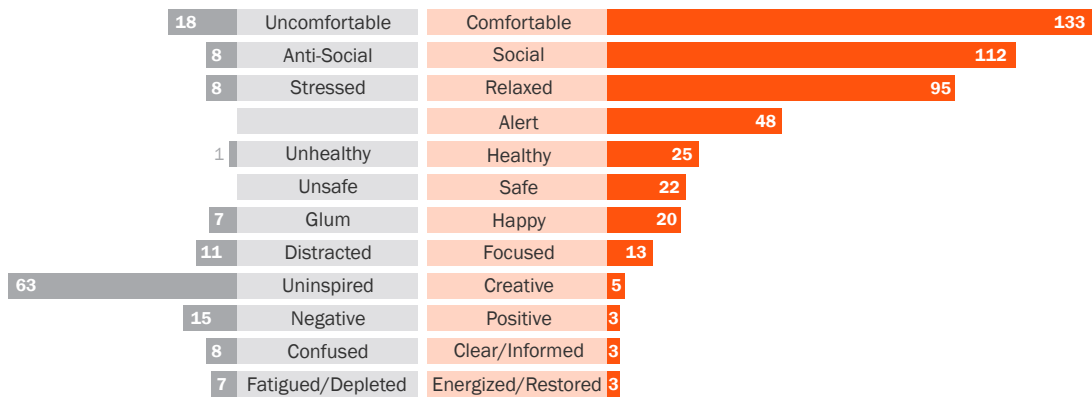
Gallery Walk



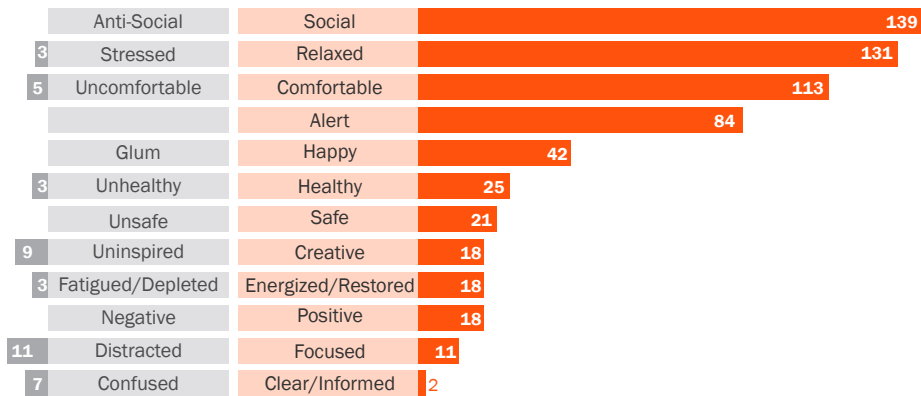
Library



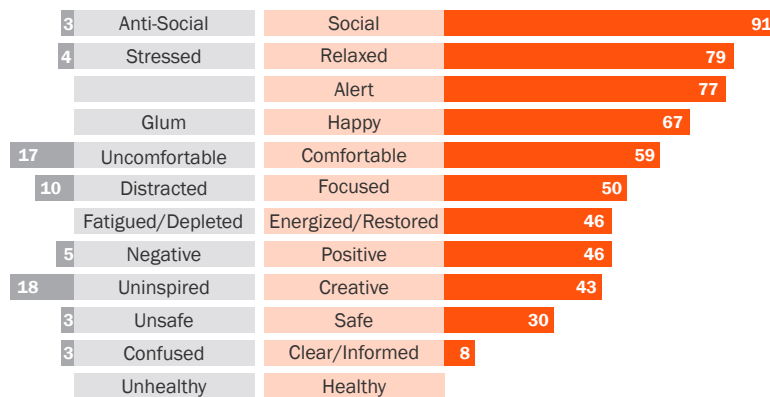
Livingston's



Rocky's



Sky Lounge



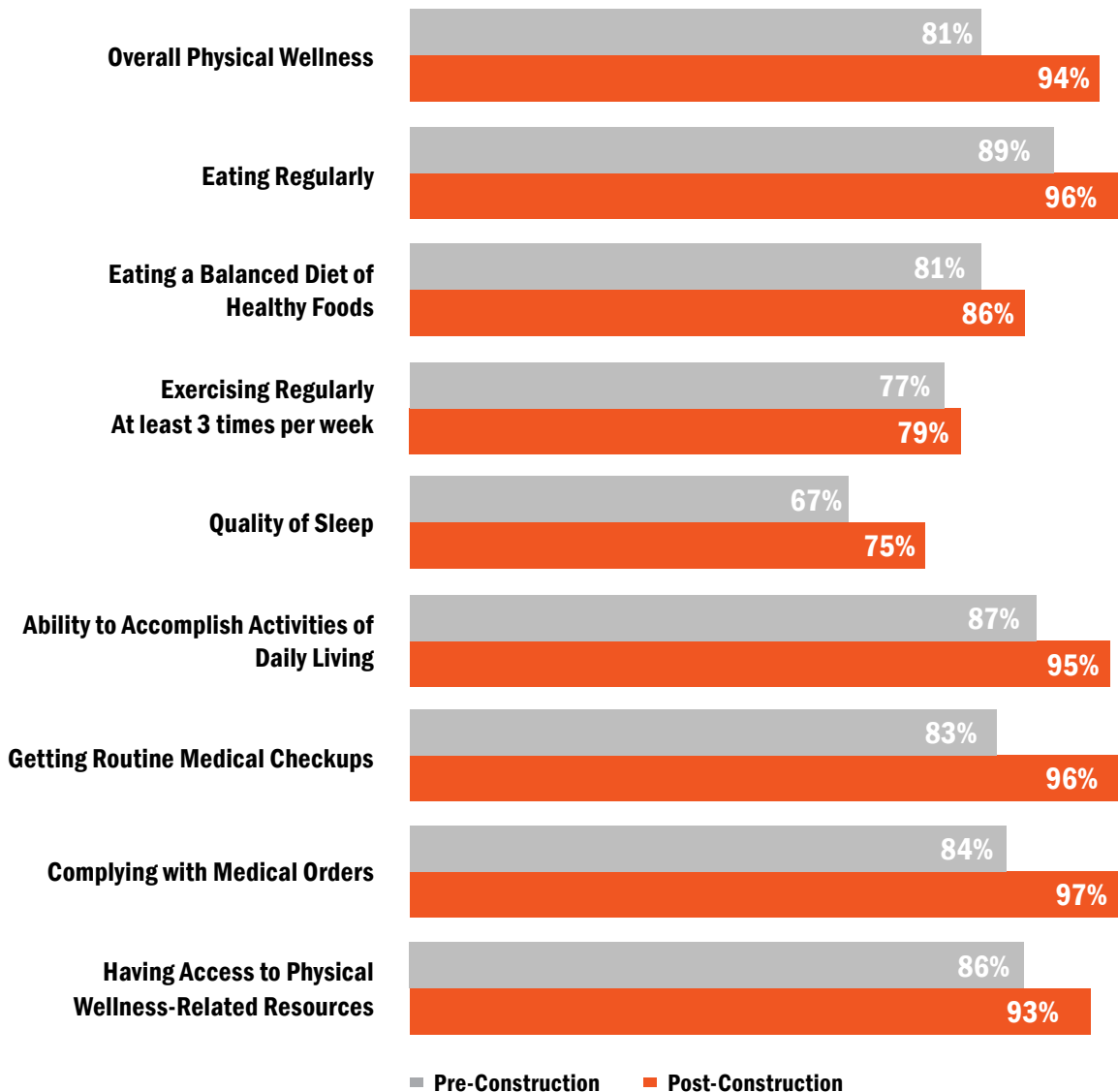
WELLNESS

Prior to undertaking this ambitious campus repositioning, Rockwood Retirement Communities already had a comprehensive and pioneering program focused on holistic wellness. However, the campus's existing building and physical environments did not adequately support this program. Exercise rooms were too small, there was only one dining venue, the lecture space was inadequate, and there was no multipurpose space for large group events, performances, and receptions.

PHYSICAL WELLNESS

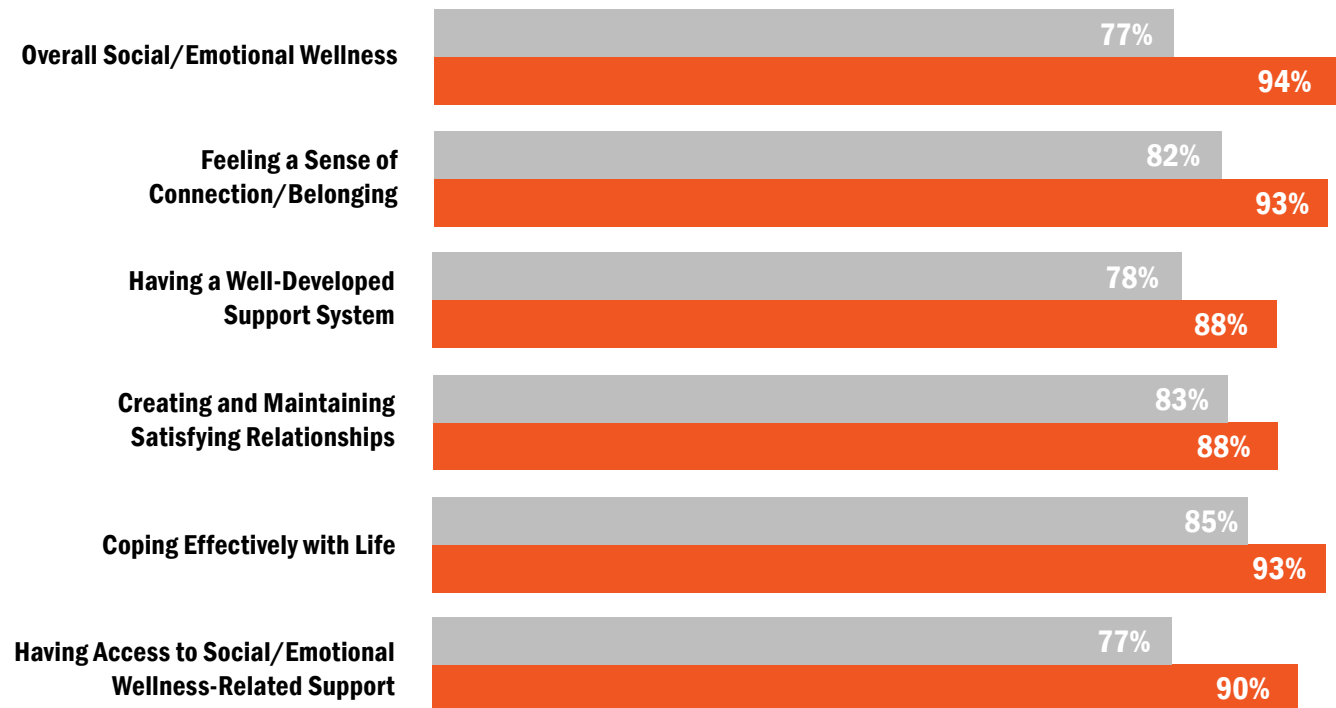
Prior to new construction, 81% of residents reported that their physical wellness was supported 'well' or 'very well.'

After the new building and repositioning was completed, residents who felt their environment supported their physical wellness 'well' or 'very well' increased to 94%, and all indices of physical wellness increased. Most telling among the measured improvements was that of the respondents who lived in Rockwood before the renovation, with 57% of those surveyed reporting that their physical wellness is now better supported than before the project began.



SOCIAL AND EMOTIONAL WELLNESS

Of the respondents who lived in Rockwood before the renovation, 64% reported that their social/emotional wellness is now supported better.



INTELLECTUAL WELLNESS

Of the respondents who lived at Rockwood before the renovation, 62% reported that their intellectual wellness is now better supported.



■ Pre-Construction ■ Post-Construction





CONCLUSION

This research clearly demonstrates the relationship between the environment and the users. **A well designed environment has the ability to have a positive impact on improved resident wellness.** More specifically, designing with Biophilic attributes in mind will improve a user's qualitative sense of their physical, emotional, and intellectual wellness.

Most notable is the attribute "Connections to Nature." Outdoor space or spaces with larger windows that bring access to natural light and views of the outdoor improve people's wellbeing and their positive feelings.

The "Serendipity" that brings spontaneity was also a key element worth integrating into projects, and of course if a space is more contemplative, such as the Library, the feeling of "Prospect and Refuge" should be considered to be woven into the design. All attributes taken together create good design.

The client's programs were also paramount in increasing all dimensions of wellness at The Summit. Having the spaces that support those programs, both scheduled and informal increased socialization which positively impacted the residents' satisfaction and hopefully longevity.

The take-away from this study is that our clients should expect their designers to be a partner in creating environments that support the wellness that the next generation of residents seek. Older adults know that decline is not necessarily the natural order. They are savvy and desire to move into communities where wellness is a major programmatic and environmental focus.

Communities that can point to initiatives that support whole-person wellness will be more competitive. Places that elicit a positive feeling of well-being will be places where we all want to be.





REFERENCES

- 1 Patrick, RP and Ames, BN. "Vitamin D and the omega-3 fatty acids control serotonin synthesis and action, part 2: relevance for ADHD, bipolar disorder, schizophrenia, and impulsive behavior." *FASEB J.* 29.6 (Jun 2015):2207-22.
- 2 Terman, JS, et al. "Circadian time of morning light administration and therapeutic response in winter depression." *JAMA Psychiatry* 58.1 (2001 Jan): 69-75.
- 3 Beery, A and Kaufer, D. "Stress, social behavior, and resilience: Insights from rodents." *Neurobiol Stress* 1.1 (2015 Jan) 116-127.
- 4 Nieuwenhuis, Sander, et al. "Decision making, the P3, and the locus coeruleus-norepinephrine system." *Psychological Bulletin* 131.4 (Jul 2005): 510-532.

Gronier, B, et al. "Activation of the mesocorticolimbic dopaminergic system by stimulation of muscarinic cholinergic receptors in the ventral tegmental area." *Psychopharmacology (Berl)*. 147. 4 (Jan 2000) 347-55.
- 5 Aston-Jones, G and Cohen, JD. "An integrative theory of locus coeruleus-norepinephrine function: adaptive gain and optimal performance." *Annual Review of Neuroscience* 28 (2005):403-50.
- 6 Robinson, SJ and Schmidt, JT. "Fluorescent Penetrant Sensitivity and Removability - What the Eye Can See, a Fluorometer Can Measure." *Materials Evaluation* 42.8 (July 1984): 1029-1034.





CREDITS

Primary Author: Leslie Moldow, FAIA, LEED AP, Perkins Eastman

Secondary Author: McCall Wood, Perkins Eastman

Researcher: Emily Chmielewski, Perkins Eastman

Photography: Benjamin Benschneider

Graphics: Perkins Eastman

Contributors: Laura Jaye, Perkins Eastman

Krizelle Dizon, Perkins Eastman

Architect of Record: NAC

Design Architect: Perkins Eastman

Interior Design: Perkins Eastman

For more information regarding the results of this research study, please contact:

Leslie Moldow - Perkins Eastman

l.moldow@perkinseastman.com

McCall Wood - Perkins Eastman

m.wood@perkinseastman.com

**BOSTON
CHARLOTTE
CHICAGO
COSTA MESA
DALLAS
DUBAI
GUAYAQUIL
LOS ANGELES
MUMBAI
NEW YORK
OAKLAND
PITTSBURGH
SAN FRANCISCO
SHANGHAI
STAMFORD
TORONTO
WASHINGTON DC**

WWW.PERKINSEASTMAN.COM