



**Indoor Environment Quality + Residence Hall
17th Avenue Residence Hall, University of Minnesota,
Minneapolis, MN
Report 1**

**February 2015, Minneapolis, MN
Sustainable Post-Occupancy Evaluation Survey (SPOES)
B3 Guidelines**

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1.0 Overview

The purpose of this report is to examine the connection between sustainable design criteria used in the design of 17th Avenue Residence Hall on the University of Minnesota Twin Cities Campus and residents' satisfaction with their living environment. The 17th Avenue facility was designed using the B3 Guidelines (formerly known as the Minnesota Sustainability Guidelines or MSBG) and completed for occupancy in 2013. The B3 Guidelines track specific state-funded, B3 buildings as a means of demonstrating real outcomes aimed at the conservation of energy resources, creation and maintenance of healthy environments, and occupants' satisfaction with their building environments. The Sustainable Post-Occupancy Evaluation Survey (SPOES) was developed to assess human outcomes in workplace, classroom, and residence hall settings in compliance with the B3 Guidelines project tracking requirements. This is a report of residents' responses at 18 months post-occupancy. The survey was conducted in February 2015 and is the first of two required survey events for this building.

This SPOES report focuses on residents' satisfaction with the physical environment as related to 23 indoor environment quality (IEQ) criteria such as lighting, thermal, and acoustic conditions in their primary living units. Residents' satisfaction with the facility (site, building, and interior) and the effect of the facility's physical environment on their perceptions of their academic performance and health also are included. Finally, a brief look at residents' commuting practices and physical activities within the building are reported. The report provides descriptive information about residents' perceptions of the IEQ of their resident hall environment (overall facility and primary living unit). In addition, this information serves the broader development of knowledge regarding the influence of IEQ on individuals living in residence hall environments.

2.0 Method

SPOES consists of a self-administered, Internet-based, questionnaire submitted to and completed by resident. The SPOES questionnaire has been tested for **validity** (measures what it is intended to measure) and **reliability** (repeatability or replicability of findings). Residents rate their level of satisfaction on a **Likert-type scale** (measurement scale) from 1 (very dissatisfied) to 7 (very satisfied) with IEQ of the facility and their primary living spaces. They also rate the influence of their physical environment on their perception of their academic performance and health on a scale from 1 (hinders) to 7 (enhances). There were no physical measurements taken of environmental conditions such as temperature or acoustic level. This study is limited to residents' perceptions.

The report provides a descriptive summary of the results stated as a **mean** (average of all responses), **standard deviations** (SD) (how different scores are from each other and the mean), and **number of responses** (N) for each question analyzed. The mean for a 7-point scale is 4.00. Lower or higher means reflect stronger tendencies towards dissatisfaction/satisfaction and hinders/enhances. Means that are close to the center of the scale (4) are considered to be neither dissatisfied/hinders or satisfied/enhances.

When interpreting **mean** responses, the following labels were used:

- 1.00 - 3.50 dissatisfied (hinders)
- 3.51 - 4.50 neither satisfied (enhances) nor dissatisfied (hinders)
- 4.51 - 7.00 satisfied (enhances)

An IEQ Score is also calculated for residents' satisfaction with IEQ in their primary living spaces. This is a statistical combination of category-level IEQ scores, which results in a single IEQ score for all residents on category-level IEQ criteria and is reported in an IEQ Scorecard.

2.1 Description of the Questionnaire

Residents first rate their level of satisfaction with the facility (site, building, and interior) and the influence of their physical environment on their perception of their academic performance and health. Then they respond to questions about their satisfaction with their primary living spaces in relation to IEQ criteria from the B3 Guidelines. Additionally, residents' physical activities and commuting practices are investigated.

In the SPOES questionnaire, the 23 IEQ criteria listed below are evaluated. There are two levels of criteria, categories and attributes. As shown in the list, the 'overall' criteria are boldfaced and called 'categories' or 'category level' criteria. A category is broader or more general such as Overall View Conditions or Overall Indoor Air Quality. Some categories have 'attributes' or 'attribute level' criteria and provide greater detail about the category. For example, Overall Thermal Conditions is a category level question, and there are four attribute level questions related to thermal conditions such as adjustability, air velocity (draft), humidity, and temperature. Overall Acoustic Conditions is a category with attributes of residents' ability to hear desired sounds and their ability to limit undesired sounds. There are 12 category-level and 11 attribute level questions. Means are calculated and reported for all category and attribute-level criteria.

An IEQ Satisfaction Score is also calculated for residents' satisfaction with IEQ in their primary living spaces. This is a statistical combination of the 12 category-level criteria only and results in a single, mean IEQ Satisfaction Score for all residents' satisfaction with the physical conditions of their primary living spaces. Attribute-level criteria are not included in the IEQ Score because unequal weight would be given to criteria that have both category and attribute-level questions.

In the following list, **category (boldface)** criteria are listed in alphabetical order. If a category has attributes, they are listed with the category.

Overall Acoustic Quality

- Ability to hear desired sounds
- Ability to limit undesired sounds

Overall Appearance (aesthetics)

Overall Cleaning and Maintenance

Overall Daylighting Conditions

- Amount of daylighting
- Adjustability of daylighting

Overall Electric Lighting Conditions

- Amount of electric lighting
- Adjustability of electric lighting

Overall Furnishings

- Function of furnishings

Overall Indoor Air Quality

Overall Privacy

Overall Technology

Overall Thermal Conditions

- Adjustability of thermal conditions
- Air velocity (drafty/stagnant))
- Humidity (dry or moist)
- Temperature (hot or cold)

Overall Vibration and Movement

Overall View Condition

2.2 Limitations

Residents' participation is voluntary, and responses are self-reported. As is true with all survey research, the responses indicate residents' perceptions. There were no physical measurements, e.g., temperature, humidity, or lighting levels, of the environment taken.

3.0 Sample Description

3.1 Description of Building

The 17th Avenue Residence Hall is a co-educational living community serving students at the University of Minnesota. The building is located on the East Bank campus of the University of Minnesota at 326 17th Avenue SE, Minneapolis, Minnesota, adjacent to parking and campus transit provisions. The six-story facility includes seven units for single individuals (128 sf each) with documented disabilities and 289 units for double occupancy (196 sf each). Double occupancy units share restroom facilities for 10-12 of the units and have access to other common (shared) spaces on each floor. The building was intentionally designed to serve students' academic and community needs with dedicated common living rooms, dining areas, meeting rooms, practice rooms, and study spaces on the main floor and lower level.



Figure 1. 17th Avenue Residence Hall, University of Minnesota (Photo credit: <http://www1.umn.edu/twincities/maps/17RH/>)

3.2 Description of Respondents

The 17th Avenue Residence Hall was designed to house up to 600 student residents. This survey was administered to approximately 595 students, and the response rate to the questionnaire was approximately 15%. Of those responding, 78% were male, 30% were female, and 2% were other. The mean age of respondents was slightly over 19 years, with a range of 18 to 21 years.

The 17th Avenue Residence Hall opened for occupancy in August of 2013. Eight percent of the respondents reported they have lived in the residence hall more than three semesters, 5% of the respondents have lived there for two-three semesters, 81% of the residents have lived there for one-two semesters, and 6% of the respondents have lived in the residence hall during the current semester.

Relating to the percentage of time (including sleep) residents spend in their primary living unit, 13% of the respondents reported they spend more than 75% of their time during the week in their primary living unit; 33% spend 51-75% of their time in their primary living unit; 45% spend 25-50% of their time in their primary living unit, and 9% spend less than 25% of their time in their primary living unit.

The 17th Avenue Residence Hall has four types of primary living units available to student residents ranging from a single room without a bath to a double room with a bath. Results indicated 2 % of the residents have a single room with a bath, 8% have a single room without a bath, 89% have a double room with without a bath, and 2% have a double room with bath. (Percentages do not add up to 100% due to rounding errors).

4.0 Findings and Discussion

4.1 17th Avenue Facility (Site, Building, and Interior): Overall Satisfaction, Academic Performance, and Health

Residents responded to questions concerning the 17th Avenue facility, (site, building, and interior) and their overall satisfaction with the facility, overall perceptions of their academic performance in relation to the facility, and their overall perception of their health in relation to the facility. Table 1 shows the means and standard deviations of their responses as well as how the responses are interpreted. Figure 2 is a graph that shows the mean for each question as a blue mark. The standard deviation is shown by the vertical bar that runs from green, representing satisfied (or enhanced) and red representing dissatisfaction (or hindered). Gray represents the ‘neither/nor’ range of responses. In cases where there were no dissatisfied responses, the bar will be all grey and green. This graph is simply a visual image of the findings from Table 1.

Table 1. 17th Avenue Residence Hall Facility - overall satisfaction, academic performance, and health

Facility (site, building, and interior)	Mean (1-7)	SD	N	Interpretation
Overall satisfaction	5.81	1.11	64	Satisfied
Overall academic performance	5.32	1.19	65	Enhances
Overall health	5.17	1.27	65	Enhances

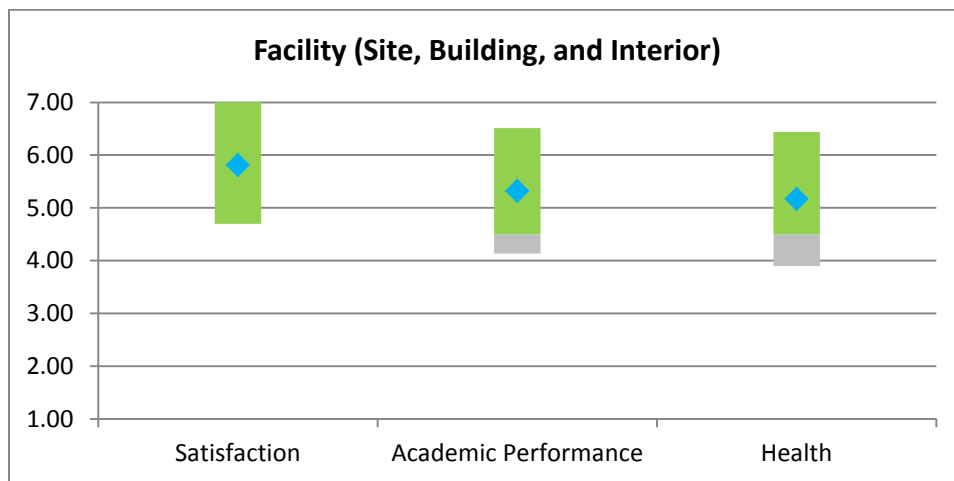


Figure 2. 17th Avenue facility - overall satisfaction, academic performance, and health

Results indicated that respondents were **satisfied (M = 5.81)** with the 17th Avenue facility (building, site, and interior). Further, they reported that their overall academic performance was **enhanced (M = 5.32)** and their overall health was **enhanced (M = 5.17)** by the facility.

4.2 17th Avenue Facility Common Spaces (shared with all residents): Overall Satisfaction

Residents responded to questions concerning the 17th Avenue facility (site, building, and interior) and their overall satisfaction with the shared common spaces located on the main floor and the lower level. Table 2 shows the means and standard deviations of their responses as well as how the responses are interpreted. Figure 3 is a visual image of the findings from Table 2.

Table 2. 17th Avenue Residence Hall common spaces (main floor and lower level) - overall satisfaction

Facility (site, building and interior) Common Space	Mean (1-7)	SD	N	Interpretation
Computer (technology room)	5.91	1.13	65	Satisfied
Meeting rooms (study, collaboration, conference)	5.85	1.14	65	Satisfied
Main lounge (living room)	5.74	1.2	65	Satisfied
Kitchen	4.92	1.47	65	Satisfied
Dining hall	4.89	1.67	65	Satisfied
Laundry room	4.65	1.58	65	Satisfied

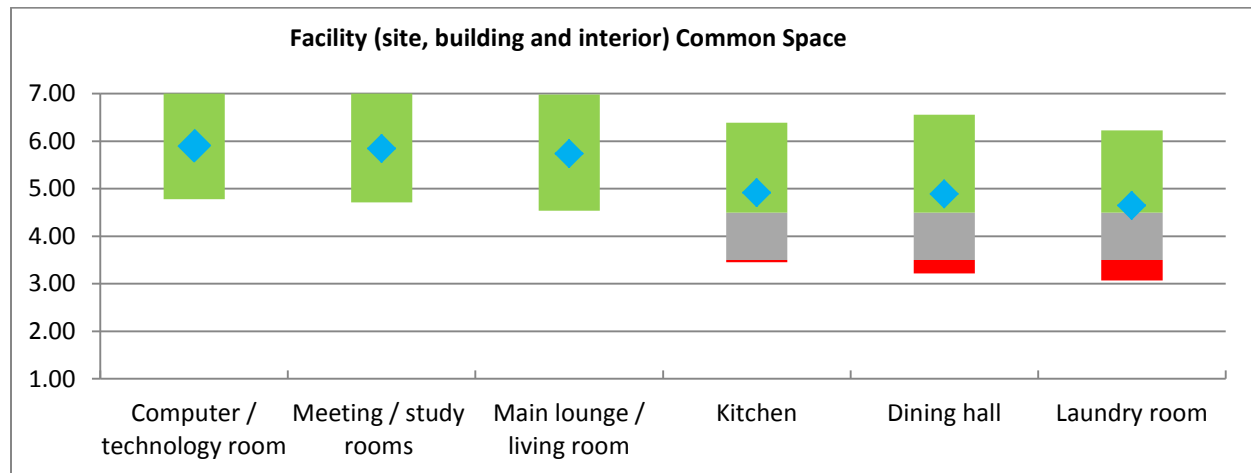


Figure 3. 17th Avenue Residence Hall common spaces (main floor and lower level) - overall satisfaction

Results indicated that residents were **satisfied** with the computer (technology room) (**M = 5.91**), the meeting rooms (study, collaboration, conference) (**M = 5.85**), the main lounge (living room) (**M = 5.74**), the kitchen (**M = 4.92**), the dining hall (**M = 4.89**), and the laundry room (**M = 4.65**) at the 17th Avenue Residence Hall.

4.3 Primary Living Unit: Overall Satisfaction, Academic Performance, and Health

Residents responded to questions concerning their overall satisfaction and overall perceptions of their academic performance and health as related to their primary living unit (e.g., single and double rooms with and without a bath). Table 3 shows the means and standard deviations of their responses as well as how the responses are interpreted. Figure 4 is a visual image of the findings from Table 3.

Table 3. Primary living space - overall satisfaction, academic performance, and health

Primary Living Space	Mean	SD	N	Interpretation
Overall satisfaction	5.69	1.25	64	Satisfied
Overall academic performance	5.14	1.45	64	Enhances
Overall health	5.21	1.36	63	Enhances

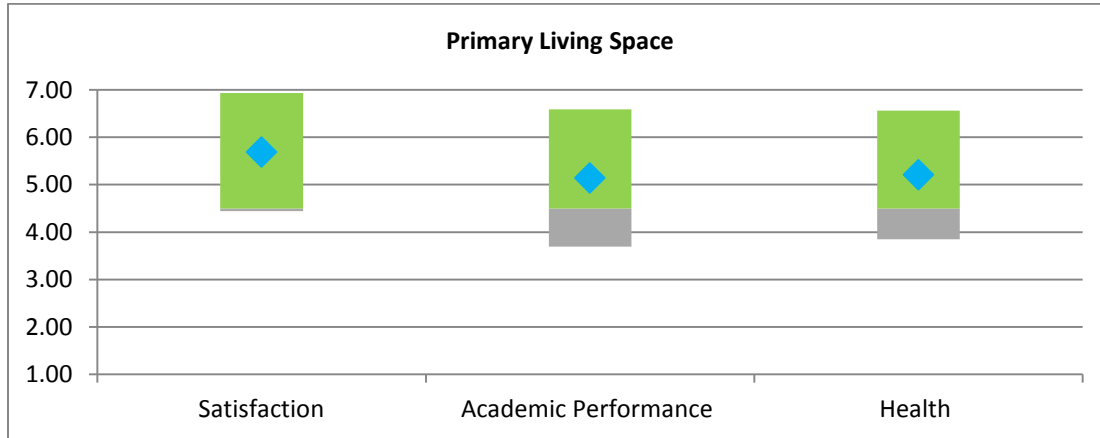


Figure 4. Primary living unit - overall satisfaction, academic performance, and health

Results indicated that residents were **satisfied (M = 5.69)** with their primary living unit and reported that their overall academic performance (**M = 5.14**) and overall health (**M = 5.21**) were **enhanced** by their primary living unit.

4.4 Primary Living Unit and Common (shared) Spaces: Overall Satisfaction

The 17th Avenue Residence Hall provides several common or shared spaces (living room / lounge, bathrooms, on each floor for use by the student residents. The common (shared) spaces selected for this study included the living room / lounge and the bathroom spaces. Residents responded to questions concerning the common or shared spaces associated with their primary living unit. Table 4 shows the means and standard deviations of their responses as well as how the responses are interpreted. Figure 5 is a visual image of the findings from Table 4.

Table 4. Primary living unit and common (shared) spaces - overall satisfaction

Shared common spaces	Mean (1-7)	SD	N	Interpretation
Living Room / Lounge	5.56	1.31	64	Satisfied
Bathroom	4.89	1.67	63	Satisfied

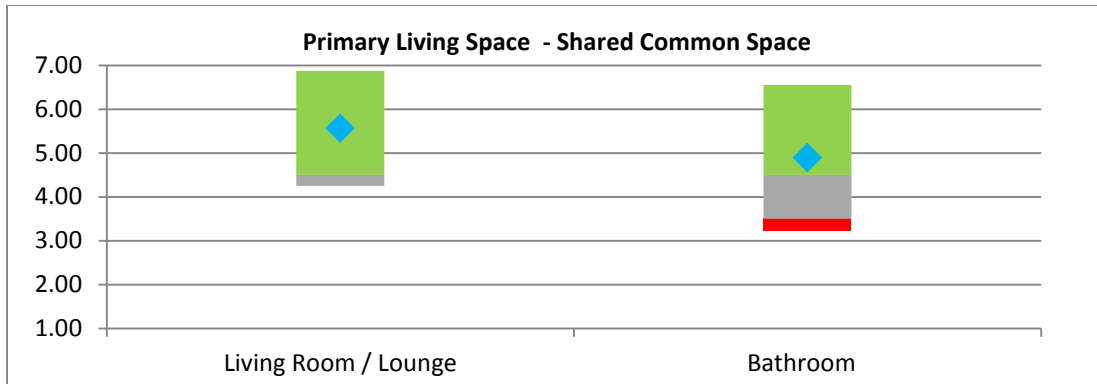


Figure 5. Primary living unit and common (shared) spaces - overall satisfaction

Results indicated that respondents were **satisfied (M = 5.56)** with their living room / lounge associated with their primary living space and **satisfied (M = 4.89)** with the bathroom in their primary living unit.

4.5 Primary Living space: Satisfaction with Indoor Environment Quality (IEQ)

Residents responded to questions concerning their satisfaction with IEQ criteria (thermal conditions, indoor air quality, acoustic conditions, etc.) related to their primary living unit (e.g., single and double occupancy spaces with or without bathrooms). Table 5 shows the means and standard deviations of their responses as well as how the responses are interpreted. Figure 6 is a visual image of the findings from Table 5.

Table 5. Primary living unit - satisfaction with IEQ conditions

#	Primary Living Space IEQ Criteria (1-23) (Category level criteria are bold face)	Mean	SD	N	Interpretation (D = Dissatisfied) (S = Satisfied)
1	Adjustability of thermal conditions	6.43	1.07	65	Satisfied
2	Overall thermal conditions	6.09	1.01	65	Satisfied
3	Temperature (hot or cold)	6.05	1.01	65	Satisfied
4	Amount of daylighting	6.05	1.05	65	Satisfied
5	Overall daylighting conditions	6.02	1.05	65	Satisfied
6	Overall appearance (aesthetics)	5.92	1.21	64	Satisfied
7	Function of furnishings	5.91	1.18	65	Satisfied
8	Air velocity (drafty or stagnant)	5.89	1.20	65	Satisfied
9	Ability to hear desired sounds	5.85	1.14	65	Satisfied
10	Humidity (dry or moist)	5.74	1.34	65	Satisfied
11	Overall indoor air quality	5.71	1.40	65	Satisfied
12	Overall technology	5.69	1.39	65	Satisfied
13	Overall furnishings	5.63	1.38	65	Satisfied
14	Adjustability of daylighting	5.61	1.33	64	Satisfied
15	Overall view conditions	5.50	1.68	64	Satisfied
16	Overall vibration and movement	5.49	1.53	65	Satisfied
17	Overall cleaning and maintenance	5.39	1.71	64	Satisfied
18	Overall electric lighting conditions	5.26	1.53	65	Satisfied
19	Overall privacy (sound and visual privacy)	5.14	1.66	65	Satisfied
20	Amount of electric light	5.02	1.67	65	Satisfied
21	Overall acoustic quality	5.00	1.80	65	Satisfied
22	Adjustability of electric lighting	4.60	1.84	65	Satisfied
23	Ability to limit undesired sounds	4.34	2.12	65	Neither S or D

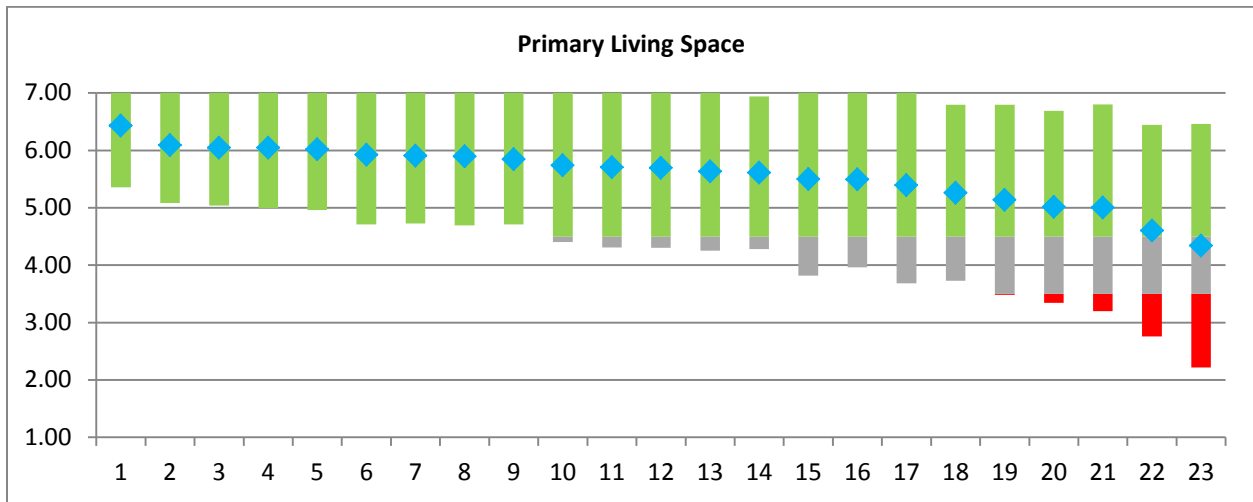


Figure 6. Primary living unit - satisfaction with IEQ conditions (IEQ 1-23 are listed in Table 5 above)

Results indicated that residents were satisfied with 22 of the IEQ criteria in their primary living spaces, i.e., means at or above 4.50. They were neither dissatisfied nor satisfied with one IEQ criterion, their ability to limit undesired sounds. There were no results indicating dissatisfaction with any of the IEQ criteria. The mean satisfaction scores are at the moderate to high levels, however, there is still room for improvement of residents’ satisfaction with their primary living spaces and will be addressed in Section 6.2 Recommendations. Further explanation of these scores also can be found in Appendix A. Open-Ended Responses.

4.4 IEQ Satisfaction Scorecard

The IEQ Satisfaction Score is determined by calculating a mean of all overall category level IEQ criteria. At this time, all variables are weighted equally in this calculation as little evidence exists that provides rationale for weighting some variables heavier than others. The IEQ mean is representative of a fair overall IEQ score and can serve as a benchmark of residents’ satisfaction with the physical environment of their primary living space. As shown in Figure 7, the **IEQ Satisfaction Score** for primary living spaces at the 17th Avenue Residence Hall is **5.57**.

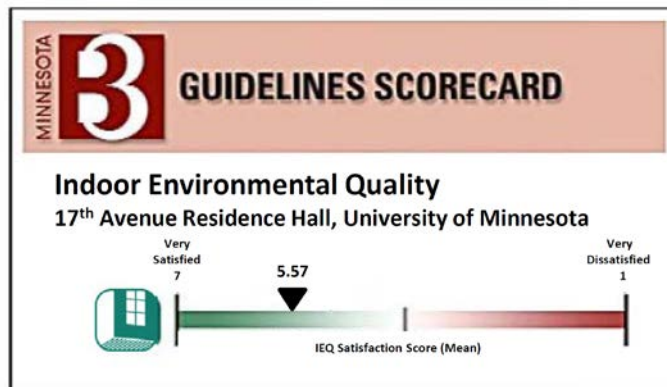


Figure 7. Primary living unit - IEQ Satisfaction Score

Overall, the residents showed a moderately high level of satisfaction with IEQ as indicated by the mean score of **5.57**. As shown in Table 5, satisfaction with Overall thermal conditions, Overall daylighting conditions, and Overall appearance were the criteria with the highest satisfaction (all over 5.9) and pulled the IEQ Satisfaction Score in a positive direction. The lowest rated criterion, Overall acoustic quality (5.0) although still positive, pulled the IEQ Score down just a bit. Any of the IEQ criteria can be addressed by building management to increase residents' satisfaction. Recommendations to assist with this process are noted in Section 6.2 Recommendations. Please note that the IEQ Satisfaction Score only uses the category level criteria (those labeled 'Overall'; see section 2.1, paragraph 3 for explanation).

5.0 Physical Activity Engagement and Commuting Practices

In the final section of the survey, residents responded to questions regarding their overall physical activity while at the 17th Avenue facility (site, building, and interior) and their commuting practices.

5.1 Physical Activity Engagement

Providing residents with opportunities for alternative paths of travel around the residence hall facility, e.g., taking stairs as opposed to the elevator, provides opportunities to engage in additional types of physical activities. Engaging in physical travel throughout the residence hall can be associated with healthier lifestyles.

Table 6. Overall physical activity (walking, stair use, etc.) affected by the 17th Avenue Residence Hall

17th Avenue Residence Hall	Mean (1-7)	SD	N
Overall physical activity (walking, stair use, etc.)	5.23	1.15	64

Results indicated that residents felt that 17th Avenue facility moderately **enhanced (M = 5.23)** their physical activities (walking, stair use, etc.). Further, of the 64 residents responding to this question, 69% said they were **satisfied** with the facility's influence on their overall physical activity; 28% said they were **neither dissatisfied nor satisfied**; and 3% were **dissatisfied**.

5.2 Commuting Practices

The 17th Avenue Residence Hall is located on the northeastern side of the East Bank of the University of Minnesota. The east bank campus is located north of metropolitan hub providing bus and light rail transit service through the campus environment. The University provides several parking facilities, bike paths, and sidewalks throughout the campus and adjacent to the 17th Avenue Residence Hall.

Table 7 provides results on residents' primary mode of transportation. These results, although not related to IEQ, do offer the University insight into residents' commuting behaviors and opinions. These data can provide important information about commuting practices that can reduce transportation energy consumption.

Table 7. Commuting Practices – Primary mode of transportation

17th Avenue Residence Hall Facility	Walk	Public transit	Car (Vehicle)
Primary mode of transportation on campus	95%	3%	2%

Related to primary modes of transportation, 95% of the student residents walk, 3% use public transit (bus or light rail), and 2% use a vehicle.

6.0 Conclusions

6.1 Summary

A post-occupancy evaluation was conducted of residents of 17th Avenue Residence Hall at approximately two years after it was first occupied. About 15% of the residents responded to the survey.

The survey included questions related to residents' overall satisfaction with the facility (site, building, and interior) and influence of the facility on their overall academic performance and health. Residents were **satisfied** with the facility (**M = 5.81**); they found the facility **enhances** their overall academic performance (**M = 5.32**) and **enhances** their overall health (**M = 5.17**). In addition, similar results were reported when residents were asked these same questions about their primary living spaces. They reported overall **satisfaction** (**M = 5.69**) with their primary living spaces and that their overall academic performance was **enhanced** (**M = 5.14**) by their primary living spaces. Additionally, their overall health was **enhanced** (**M = 5.21**) by their primary living space. As the range of scores was from 1-7, scores that showed satisfaction are in the upper range of positive satisfaction.

Most of the survey questions related to residents' satisfaction with the IEQ criteria in their primary living spaces). Residents' responses showed they were **satisfied** with the all but one of the IEQ criteria. The mean satisfaction scores ranged from 4.60 (Adjustability of electric lighting) to **6.43** (Adjustability of thermal conditions). Again, this shows a moderate to high positive levels of **satisfaction**. Residents responded **neither dissatisfied nor satisfied** to only one criterion, Ability to limit undesired sounds (4.34).

From the residents' responses, an IEQ Score was developed and shows respondents' satisfaction with the IEQ of all category level criteria. For 17th Avenue Residence Hall, the IEQ Satisfaction Score was **5.57**. This score reflects a moderately high satisfaction level. Finally, residents reported that 17th Avenue Residence Hall **enhances** their physical activity, which is one of the sustainable design criteria that influences occupant behavior.

6.2 Recommendations

The satisfaction scores are certainly in the positive direction, however, improvement may be possible. For IEQ categories that can be physically measured (e.g., thermal, acoustic, and lighting), it is recommended that these measurements be taken in the primary living units. Specific recommendations for the most common areas of occupants' concern follow:

Acoustic Conditions

- Identify acoustic criteria for overall requirements.
- Determine if any task areas differ now from their original spatial layout/use (study rooms adjacent to noisy spaces).

- Develop specialized acoustical performance requirements to support functional programming residents' tasks (e.g., sources of recurrent noise that need to be controlled, special user populations that may have distinct auditory performance limitations, or multiple uses of building spaces that may have different acoustic criteria). Identify and apply appropriate acoustics modeling software for the project.
- Measure acoustic performance onsite with full building systems (heating, ventilation, air conditioning; HVAC) running.
- Identify residents' privacy concerns via focus groups and/or log complaints relative to acoustical conditions for further evaluation.
- Consider residents' tasks within shared spaces to determine if spatial layout changes can be made for increased acoustic control.

Lighting Conditions

- Identify residents' lighting performance criteria that are to be met to achieve goals by conducting onsite measurements of existing illumination and compare them to standards for residents' tasks as identified by the Illuminating Engineering Society (IES).
- Determine if any task areas differ now from original intent to be sure illumination quantity and quality are not impeded by physical changes to the space (i.e., walls, ceilings, furnishings, fixtures, or equipment).
- Develop additional quality lighting criteria as needed for special facility (e.g., influence of daylight quality or quantity) or employee (e.g., age, task duration) issues.
- Log complaints related to lighting conditions for further evaluation.
- Identify poor lighting conditions in the workspace caused by a lack of control over daylighting, which can cause glare and eyestrain.

Personal Adjustability

- Determine if adjustability issues arise with temperature, lighting, or furnishings via a focus group.
- Identify personal, individual problem areas and relate them to other IEQ issues via log of complaints relative to adjustability.
- Provide education to residents about any existing/achievable adjustment options, e.g., furnishings, air diffusers, lighting, temperature control, etc.

Privacy Conditions

- Identify residents' privacy concerns via focus groups or log complaints relative to privacy to determine if visual or audio privacy is most affected.
- Determine if any task areas or responsibilities differ from original intent and develop alternatives or modifications.
- Consider adding noise masking equipment and/or visual screening depending on the nature of the complaints.
- Document and compare acoustic privacy problem areas with acoustic measurements to pinpoint specific problem areas.

Thermal Conditions

- Measure thermal performance conditions on site.
- Log complaints related to thermal conditions for further evaluation.
- Determine special thermal comfort requirements or problems that may be encountered in the building due to physicality of work activities, duration of sitting, or design/layout considerations. Focus groups

can be useful in identifying problem locations.

- Determine if any residents' task areas differ now from original layout to determine if air flow is meeting systems design intent.
- Review conditions that affect thermal comfort using ASHRAE Standard 55-2004 or *Human Factors Design Handbook* (see B3 Guidelines).

It seems obvious that residents' satisfaction can be improved by addressing the criterion that had 'neither dissatisfied nor satisfied' scores. The above recommendations can help address change in this one criterion reported by respondents. However, addressing some of the other criteria before they become an issue is recommended and can further improve residents' satisfaction. Exploring these areas in more detail and making adjustments may increase overall satisfaction at the primary living space. It is a good investment to improve residents' satisfaction, which, in turn affects their academic performance and their health.

This study investigated residents' satisfaction with the facility and primary living spaces of the 17th Avenue Residence Hall. IEQ satisfaction is individual, but the results of the survey show a central tendency of moderately high satisfaction with the facility and most of the IEQ criteria at the living unit level. The results can be used as a diagnostic tool to aid in improving IEQ conditions for residents and to set the benchmarks from which improvement can be measured in the future.

Appendix A. Open-Ended Responses

Residents had the opportunity to raise specific concerns on the overall facility and their primary living spaces. Important information can be gleaned from the open-ended responses. Students in the 17th Ave Residence Hall raised specific concerns about the bathrooms, specifically water pressure, and dining room and concern about the general degradation of the facility. There were positive comments as well. Following are qualitative responses to the criteria. Generally, the comments are shown as written.

Open Ended Comments

Bathrooms

- The water pressure in all of the bathrooms [is poor]. I could not possibly get clean in those.
- I believe that the bathrooms should have bigger curtains because the ones that it currently has make it a really cold space to be in.
- There should be some sort of sanitary waste disposal in the women's bathroom stalls.
- The bathroom stalls are too low, they also make it so that if you were in a stall, you will not be able to hear the person in the next stall, or even if you were not in a stall. This is an issue because if there is a fire and there was someone in the stall and the door is hot, they will not be able to escape from the bottom. If there was someone who say fainted or is screaming for help from a stall and you were in another stall or from outside the stall, you would not be able to hear him/her. These are the safety hazards I, as a resident, am concerned about.
- The bathrooms are consistently unclean.
- The water pressure is HORRIBLE and should be increased! It may be "sustainable", but it makes for a lot of extra time in the shower. I'm not paying \$2,000+ to have things below my standards. Even if it was increased a little bit it would go a long way.
- Water pressure in showers suck. Very, VERY dissatisfied with the water pressure in showers.
- Please clean the restrooms. There is something in the shower near my room on the second floor that is questionable. I don't know what it is or why it keeps growing.
- My only dislike (which has escalated into a major nuisance) is the terrible water pressure in the showers. Fix that and I feel that the dorm is fine.

Conference Room / Study Spaces

- Conference rooms are always occupied, sometimes by only one person. I suggest at least 3 people sign their names and give a time limit.
- It would be nice to have curtains in the study lounges so that when it gets dark people aren't always looking through the large windows and distracting you.
- It would be nice to have white boards in more than just one lounge per floor

Dining Room

- The dining hall is far too crowded, and there are too few vegetarian options on some days.
- The dining hall hours are absolutely ridiculous. I don't know who decided them, but they have zero conception of college students. Not all of us are athletes who sleep at 10 pm every night. I am up late, studying, doing whatever and the fact that the dining hall isn't open late when I get hungry is frustrating. Breakfast is also an issue, which stops around ten. What normal student is up well enough before ten to get down there?? Very few. Fix this!!
- The dining hall is nice, but the proportions are very small, and not a lot of meat is served.
- The dining hall facility is okay, but there isn't enough seating and the way it's run (aka already plated

food) doesn't help the lines move quickly.

- The dining hall is poorly kept, as there are often a lack of utensils, drinks, and as of lately, the dining hall has been running out of food that is planned for the menu.
- The dining hall could use a sandwich bar
- Dining hall portions make it difficult to eat without spending a lot of time.

Kitchen

- I HATE the community kitchen. Why is there no toaster? Why isn't there a kitchen on every floor? Why aren't there more community microwaves???? This is pretty basic stuff. Cooking is my #1 favorite de-stress activity and I can't do it here because the facilities suck!

Laundry

- The laundry room could be kept much cleaner and the washers/dryers in much better shape (many times many are broken).
- The floor lounges desperately need blinds. It can be very hard to be in one of them, let alone study, when the sun is right in your eyes.
- Almost every time that I head down the Laundry Room to use a machine, there was at least one machine out of order. The place was almost always a mess. I understand that there is a day that it is cleaned, but that laundry room is used by EVERY student in the residence hall - it should be cleaned more than once every week.
- The laundry room has plenty of washers and dryers, but is always very messy, and the washers and dryers aren't of very high quality.

Overall cleaning and maintenance / Appearance

- The interior in places looks a little worn for the building being so new. I would be more satisfied if the walls didn't seem so easy to ding up.
- It can get dirty quick, especially the kitchen, bathrooms, and laundry room.
- Overall cleanliness of the lounges, laundry rooms, and bathrooms are dissatisfying.
- The paint on the walls comes off super easily and there always seems to be 1-3 washers and dryers that are broken.
- Cleanliness of shared spaces should be improved as well as the enforcement of quiet hours since noise is a common occurrence past 11pm.

Parking and Access to Building

- Parking/drive-up access on 17th Ave is inadequate. Thankfully parents/drivers are allowed to pull up for short periods of time, but the design of the sidewalk and plantings along the road inhibit this very necessary activity. Back-door access on 18th is not much better due to the distance between the door and the road.

Overall Positive

- I'm satisfied.
- I like that it seems open for a dorm
- Overall, 17th is decent. I much preferred living in Frontier Hall during my Freshman year (but I was living in a suite).

Resident Floor Lounges

- The floor lounges desperately need blinds. It can be very hard to be in one of them, let alone study,

when the sun is right in your eyes.

- The study lounges are not designed for individual study. The dining hall is far too crowded, and there are too few vegetarian options on some days.
- More TV and more community lounges.
- It would be nice if there were blinds in the corner lounges with the TV, also more tables in the study lounges.

Appendix B. Glossary

Descriptive statistics

Statistics used to summarize large sets of data (i.e., means, frequencies, medians). Descriptive statistics describe only the sample under consideration and are not intended to infer results to the larger population.

Frequency

A descriptive statistic that provides information about how many of a particular response or measurement are observed.

Likert-type scale

A measurement technique, employed in questionnaires and interviews, that utilizes a range of standardized response categories such as strongly agree, agree, etc.

Mean

The average score of a set of data calculated by adding all scores together, then dividing by the number of scores.

N

The number of subjects or participants responding to the questions, or a single question, in the study.

Reliability

The repeatability or replicability of findings; the same results are produced each time. Instruments and procedures should produce the same results when applied to similar people in similar situations, or on a second occasion.

Standard deviation

A statistic used to measure the variability of a group of scores (how different scores are from each other and the mean). For example, if the range of scores is 1-7 and the mean (average) is 5.0 with a standard deviation of 1.0, then the scores are closely clustered around the mean, i.e., there is one unit of variation among all scores. If the mean was 5.0 and the SD was 3.0, there is a broader range of variation among the scores...a smaller SD means the scores are similar and the mean score is likely to be more accurate and more useful (this is better!).

Validity

The extent to which an instrument or procedure measures what it is intended to measure (internal validity). The generalizability of results to another population (external validity).