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Lane Community College Building 18

Sustainability Report





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1. HISTORY AND BACKGROUND

1a. BUILDING HISTORY



Lane Community College Building 18 was constructed as part of the original campus in 1973. The building was designed as the campus's industrial technology building where woodshop, technical drafting, and other technology classes were taught. Throughout the years, the building use has changed numerous times. The first floor now houses the campus health clinic as well as two classrooms used primarily by the nursing program. The second floor at the time of this renovation was mostly abandoned after being used as a temporary library while the Center Building was being renovated. The only occupied space on the second floor was a computer classroom and associated support/office room associated with the Media Arts department.

For the most part, each new function of the building throughout the years resulted in new room layouts and related interior modifications. Building systems were not modified to any notable degree. Before the project described in this report was initialized, a holistic view of the building shell and core systems was taken. The purpose of the resulting feasibility study was not only to determine the best future use of the building but also to identify building systems in need of upgrades.

1b. PROJECT BACKGROUND

As part of a major bond to improve and upgrade campus facilities, the second floor of Building 18 was identified as an underutilized area of campus. In addition to the bond funds available for renovation, a grant was awarded to improve the seismic resistance of the building. As noted above, a feasibility study was performed to determine the best future use of the unoccupied portions of the second floor. Ultimately it was determined that the Media Arts program that was currently spread throughout the campus would be consolidated into the building.

Irrespective of the conversion of the existing second floor into a new home of for the Media Arts Department, a number of building-wide sustainability strategies were implemented as part of the renovation project. The existing roofing was replaced and new roof insulation was installed. All existing lights within the area of renovation were replaced with new LED system systems. In addition, the media arts department replaced their old theatre lights with new LEDs outside the scope of this project. This switch resulted in the reduction of the anticipated cooling loads and negated the need for a new ductless heat pump for the recording studios originally anticipated in the design. The existing multi-zone air handling unit serving the second floor was rehabilitated and converted to a variable volume system. The air-handling unit for the first floor received a new coil due to a previously identified deficiency in that part of the unit. The existing relief fan in the basement serving both units was replaced to improve known pressurization issues with the building. Controls for all air handling systems were upgraded to a modern direct digital controls (DDC) system. The existing plumbing fixtures on the second floor were replaced with more water efficient fixtures.



The grant funded seismic modifications included the introduction of exterior thermal mass in the form of exterior concrete shear walls. Existing overhead exterior beams connecting two other campus buildings to Building 18 were removed and seismic joints were introduced at elevated walkways. During the reroofing of the building, plywood sheathing and supporting sleepers were added to utilize the roof as a structural diaphragm. The goal of the seismic work was to improve the building's resiliency in the face of a seismic event thus extending the building's potential future use.



EXIT



2. LEED CONSIDERATIONS

2a. LEED CONSIDERATIONS



Lane Community College is committed to sustainable design and construction and has a standing policy to meet Leadership in Energy and Environmental Design (LEED) Silver requirements whenever possible for campus construction. During the Building 18 study, several sustainable strategies were identified. All these strategies were implemented with the exception of the replacement of the existing hollow metal doors and exterior windows. Building 18 is the last building to be renovated with what remained of the 2009 bond. Due to budget constraints of the bond, limited allowable use of the seismic grant funding, and the anticipated number of LEED credits available for this project, it was decided to not pursue LEED certification for this particular project. Regardless, the report is organized in accordance with the LEED BD+C Version 4 criteria checklist for the sake of clarity.

2b. LOCATION AND TRANSPORTATION

The LCC Building 18 project involved the renovation of existing facilities without expansion of the building footprint. None of the possible location LEED points including sensitive land protection, increases in surrounding density, or development on a high priority site was available for the project.

Lane Community College is a strong supporter of alternative means of transportation. The BikeLane program provides free rental of bicycles to students on a semester basis. The LCC student identification card serves as a bus pass as a result of a mandatory student transportation fee. The college has partnered with Lane Transit District's DriveLessConnect program to connect people to others coming to the campus for the purpose of carpooling. Some of the parking closest to the buildings are reserved for carpool vehicles. A small area of existing parking has been covered with solar panels that help power electric vehicle charging stations. While these campus wide sustainability measures have made great strides in reducing the campus's carbon footprint with the reduction of individual cars coming to campus, the programs do not translate easily to LEED points for this particular project.



The main campus of Lane Community College has robust access to quality transit via the Lane Transit District bus system. There are currently ninety-nine weekday bus trips to the campus. This would have been sufficient to obtain one LEED point in principal. However, in order to be eligible for the point, there must also be a minimum of forty weekend trips to the site. Due to the nature of the campus schedule, there are no weekend routes to the site thus negating the available point.

There are existing bicycle storage racks located throughout campus. However, there are no long term bicycle storage areas within the required 100 feet walking distance of a main entry in order to qualify for the LEED bicycle facilities points.

The LEED point for green vehicles requires that five percent of the all parking spaces are preferred parking for green vehicles and that two percent all of parking spaces to provide electric vehicle plug in stations. While LCC has a large number of preferred parking stalls reserved for carpool vehicles, only 20 of the 3,352 public parking spaces provide electric vehicle charging stations. The number of electric vehicle charging stations calculates to be .5 percent of the total campus parking.

2c. SUSTAINABLE SITES



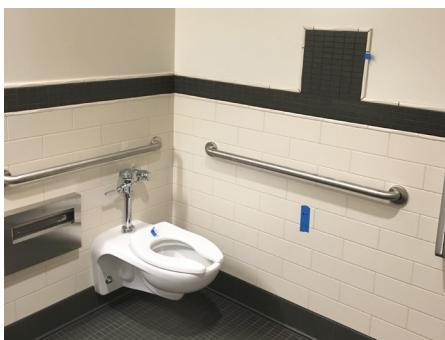
A minimal amount of existing site was disturbed during the construction of shear wall footings. The building site is surrounded by pavement and was constructed during the summer when rainfall runoff is not a concern. An erosion and sedimentation control plan or environmental site assessment was not implemented for the project. The only two plant beds effected by the exterior shear wall work were restored to their original state with the contractor returning soils and the college staff restoring the plant bed to its previous condition prior to construction. There is an existing open space lawn located to the south of the building that served as a staging area by the contractor during construction. The irrigation system and lawn area were restored at the completion of the project. No new open space was created as a result of this project.



The project contributed to the reduction of heat island effect with the removal and replacement of the existing dark roof shingles at sloped areas and dark built-up roof at the flat roof areas. The sheet metal panels installed at the sloped roofs have an initial reflective SRI rating of 78, far exceeding the LEED minimum of 39. The low sloped roof areas received single ply roofing with a three year aged SRI 64 rating which matches the LEED minimum requirement. It should be noted that the single-ply roofing has an initial SRI of 76 while the LEED minimum SRI is 82 at initial installation.

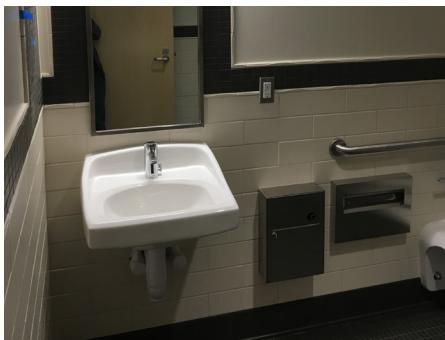
The majority of the existing building perimeter lights were replaced with LED lighting that emits light in the downward direction thus reducing night sky lighting. The lighting replacement meets the requirement for maximum allowed percentage of total lumens emitted above horizontal of the light fixture. In addition, no light trespass was anticipated onto the adjacent properties. The existing building is part of a campus with no nearby property lines.

2d. WATER EFFICIENCY



Reduction of outdoor water use was not considered for this project due to the existing conditions. The exterior of the building is accessible on three sides at both the first and second floor levels. The majority of the building is surrounded by impermeable pavement. The two narrow plant beds on two sides of the first floor remained in place at the completion of the project.

The renovation of the second floor provided an opportunity to reduce indoor water use. After study of the entire building's toilet needs, it was determined that the second floor had a surplus of three urinals compared to building code minimum. In addition to reducing the total number of toilet fixtures, all the water fixtures on the second floor were replaced. Many of the fixtures were original to the building and far exceeded the current plumbing code requirements for water use. The toilets, urinals, and break room sink all meet the LEED criteria for 20% reduction of water usage from the LEED determined building baseline rate. The lavatories in the toilets have a flow rate of .5 GPM which only meets the baseline rate and not the 20% reduction that may have qualified the fixtures for a LEED prerequisite for indoor water use reduction.



The LEED prerequisite of separate water metering for the building is met in the form of a water meter on the west side of the building. Further enhanced water metering in the form of metering at individual areas or building systems was not a part of the project scope and as a result water metering LEED points are not available for the project.

2e. ENERGY AND ATMOSPHERE

The campus employs an in-house engineer who performed the commissioning of this project. The campus commissioning agent worked with the mechanical, electrical, and plumbing engineers during design to ensure compliance with campus energy standards. The commissioning agent reviewed the construction drawings and provided input for the commissioning requirements noted in the specifications. The commissioning agent was present at many of the construction jobsite meetings and performed on-site observations during key stages of construction. Since the commissioning agent is a qualified employee of the owner with sufficient experience, the LEED credit for enhanced commissioning may have been obtained. The commissioning agent reviewed the contractor submittals, field verified built conditions, performed HVAC controls review, reviewed operation and maintenance manuals, coordinated occupant training of building systems, and continues to monitor the building energy usage and controls.

A whole building energy analysis was not performed for the building. Rather an hourly spreadsheet analysis focusing on heating and fan energy consumption was performed by the mechanical and electrical consulting engineering firm. The analysis determined that HVAC controls upgrades demonstrated a saving of 33,272 KWH per year or an estimate \$16,267 per year. This technical assistance study was submitted to the Energy Trust of Oregon and resulted in a monetary credit given to the campus for energy reduction.

LEED has a prerequisite for energy metering at the building level. Building 18 has a separate electrical meter for the building but only has limited sub-metering within the building for additional LEED credit. The new HVAC control system does allow for metering of energy use via remote tracking. There is no gas supplied to the building providing an opportunity for sub-metering credit. In addition to the individual building metering, LCC's Institute for Sustainable Practices reports their energy use by building when that information is available. While the reporting of energy use is not referenced specifically in LEED, the practice is known to reduce energy use by making the building users mindful of their energy usage.

The building's mechanical system is supplied by the campus's central heating and cooling plant. The central plant was recently overhauled to reduce the energy consumption of the campus as a whole. While this project resulted in substantial energy savings, the savings are not easily translated into LEED credits for individual buildings on campus. The LEED prerequisite of no chlorofluorocarbon based refrigerants in new HVAC systems was met with this project



2f. MATERIALS AND RESOURCES



The Lane Community College facilities department has a robust recycling program and required recycle stations at all renovated and new construction areas. Building 18 has two recycle stations that collect, paper, mixed recycling, and landfill waste. The first recycle station is in the main common area which serves as the student hub for the media arts department. The second recycle station is located in a hall near the staff offices. The existing lamps are LED with no mercury containing elements that require special handling for recycling. The technology and information services department on campus handles the disposal of electronic waste.

A past structural study of the building identified major deficiencies in the building's ability to resist lateral forces. A seismic grant successfully awarded to the Owner allowed the building to remain with the necessary seismic retrofits in lieu of complete replacement of the building. The retrofit instead of complete teardown saved substantial resources from being wasted.



The second floor of the building was mostly gutted prior to the start of construction due to the open space needed for use as a temporary library. As a result, the demolition debris associated with this project was mostly limited to interior finishes and the removal of the existing roofing. The nature of construction results in a certain amount of construction waste as well. The general contractor maintained two debris bins during the duration of the project. One was for waste, the other was for co-mingled recycling. According to receipts kept by the general contractor 2,360 pounds of construction material was diverted from the waste stream to a recycling program.



2g. INDOOR ENVIRONMENTAL QUALITY

The existing multi-zone air handling unit servicing the second floor was refurbished and converted into a variable-air volume air handling unit. The converted air handling unit was designed to supply tempered supply air to new variable-air volume terminal units located in the ceiling of the second floor. The existing relief fan in the basement mechanical room was also replaced to improve building pressurization during economizer cooling. The project was designed to comply with minimum ventilation requirements per the 2014 Oregon Mechanical Specialty Code 2014, Section 403. This meets the prerequisite of minimum indoor air quality performance for LEED. The entire campus of LCC is smoke free. There are smoking pavilions provided near the campus entry points within the parking lot areas. The campus policy is in compliance with the LEED enhanced criteria for schools.

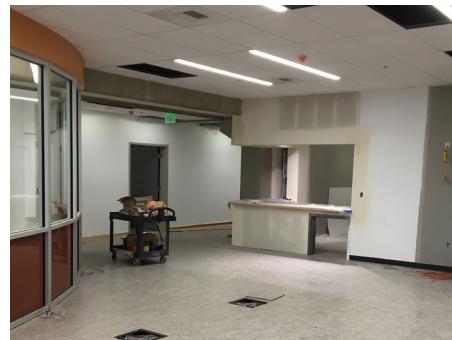
Due to the sound sensitive recording areas that double as classrooms, the newly constructed classrooms were designed to exceed the LEED minimum of 40dBA for background noise. Production Studio A was designed to meet a noise criteria between 20 and 25 which is equivalent to 30-35dBA. Production Studio B was designed to meet a noise criteria between 25 and 30 which is equivalent to 35-40dBA. The south wall of Production Studios A and B are adjacent to an existing lawn area and parking lot next to that. In order to reduce the exterior noise intrusion into the space, the existing windows in Production Studio B were covered and the walls received acoustical wall absorption panels. At Production Studio A, the mass of new concrete shear walls were introduced at the south wall facing the parking lot and east wall adjacent to a main campus walkway. In order to reduce reverberation time with the classrooms, acoustic wall panels were installed along the walls as directed by an acoustical designer.

While documentation in accordance with the general emissions evaluation criteria was not accumulated for the low-emitting materials credit, the selection of interior finishes was mindful of low-emitting materials. The main flooring material was linoleum compliant with SCS Floorscore. The acoustical ceiling tiles meet the LEED low-emitting materials criteria by complying with the California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010. The maximum amount of volatile organic compounds in the painting materials do not exceed 114 grams per liter including the epoxy paint utilized in the toilet rooms.

Individual thermal comfort was a high priority for the project given past issues with heating and cooling the building. The introduction of variable air volume terminal units to the second floor resulted in at least fifty percent of individual occupants having access to thermal controls. This would result in a LEED point. The design team designed the mechanical system to meet ASHRAE Standard 55-2010 requirements but it was not verified to LEED level after construction.

All of the offices and classrooms have adjustable lighting control levels with at least three settings. In addition, the Production Studios and breakout space have multi-zone lighting to allow for optimum lighting for video screening, projections, white board presentations, and other activities.

While it is recognized that daylighting and quality exterior views are important factors in personal well-being, the functional aspects of the building spaces required a number of the existing windows to be covered or removed. The Production Studios are used to teach photography, videography, and audio recording. The introduction of window blinds to existing windows were not deemed sufficient to provide complete blackout to the room and at the same eliminate exterior noise interference. The remaining exterior windows were utilized to their fullest extent. The staff offices, break room, and student commons are all located with access to exterior light.



A photograph of a modern two-story building with a light-colored concrete facade and a red brick section. The building features a balcony with a white railing on the upper level. A green door is visible on the left side. The roof is made of dark grey metal panels. In the foreground, there's some bare trees and a paved area. The sky is clear and blue.

3. CONCLUSION

3. CONCLUSION SUMMARY

The Building 18 Renovation was a complicated project that combined various design goals with multiple funding sources. The Media Arts Department needed a communal hub where collaborative design and the free exchange of ideas could be promoted. The department also needed to consolidate a series of specialized rooms spread throughout campus into a reduced number of more functionally flexible rooms. From a building maintenance and facilities standpoint, the project needed to increase the thermal resistance of the building envelope, resolve known HVAC deficiencies, and improve the building's seismic resilience. All of this needed to be accomplished within budget limitations while incorporating LCC's sustainable design standards. The sources of funding included bond funds, general building maintenance funds, and seismic grants.

One of the largest contributions to material and resource savings was the ability to extend the useful life of the building by increasing seismic resistance. The seismic retrofit greatly reduced the potential for loss of life and property without replacing the structure entirely. Due to careful consideration of the required program areas and utilization of flexible spaces, an overall reduction of the campus square footage dedicated to the Media Arts Department was accomplished.

At the start of the design process, mechanical systems were identified as needing remediation. The college has had past success converting existing multi-zone units in many campus buildings to variable air volume systems and conversion of the original pneumatic controls to new DDC systems. This process was followed for the project in addition to remediation of known deficiencies of the mechanical and fan systems. Modifications resulted in a heating and fan energy savings of 33,272 KWH per year. The introduction of the DDC controls allowed for remote building monitoring and programming improvements based on building performance and use.

Great effort was made to incorporate sustainable features into the project. The replacement of the roof opened the door to reduction of the heat island effect with the use of new roofing materials; increased thermal comfort and reduction of energy use with the addition of roof insulation; and increased building longevity with the introduction of seismic diaphragm framing. Water efficiency was improved with the replacement of all plumbing fixtures on the second floor with water efficient fixtures. An overall reduction in the number of fixtures was also accomplished with an analysis of building's overall fixture needs. When the new walls were constructed, careful attention was given to acoustical construction. In addition, low-VOC emitting materials contributed to healthier indoor air quality.

Although the project was not LEED certified, the design and construction team was mindful of sustainable practices from initial concepts through final completion. The focus was to reuse what could be salvaged and only construct new elements that would improve the functionality and comfort of the building occupants. The intention of LEED is to create healthy, highly efficient and cost-saving green buildings. The Building 18 Renovation project successfully balanced the intent of LEED while meeting the allocated budget and improving the experience of the building occupants.

