Medford Fire Facility Design

Winter 2014 • Architecture

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UNIVERSITY OF OREGON

SCI
Sustainable Cities Initiative

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About SCI

The Sustainable Cities Initiative (SCI) is a cross-disciplinary organization at the University of Oregon that promotes education, service, public outreach, and research on the design and development of sustainable cities. We are redefining higher education for the public good and catalyzing community change toward sustainability. Our work addresses sustainability at multiple scales and emerges from the conviction that creating the sustainable city cannot happen within any single discipline. SCI is grounded in cross-disciplinary engagement as the key strategy for improving community sustainability. Our work connects student energy, faculty experience, and community needs to produce innovative, tangible solutions for the creation of a sustainable society.

About SCYP

The Sustainable City Year Program (SCYP) is a year-long partnership between SCI and one city in Oregon, in which students and faculty in courses from across the university collaborate with the partner city on sustainability and livability projects. SCYP faculty and students work in collaboration with staff from the partner city through a variety of studio projects and service-learning courses to provide students with real-world projects to investigate. Students bring energy, enthusiasm, and innovative approaches to difficult, persistent problems. SCYP's primary value derives from collaborations resulting in on-the-ground impact and expanded conversations for a community ready to transition to a more sustainable and livable future.

SCI Directors and Staff

Nico Larco, SCI Co-Director and Associate Professor of Architecture

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About City of Medford

Medford, located in Jackson County in Southern Oregon's Rogue Valley, has a population of 75,920 within a metropolitan statistical area of 206,310 people, the 4th largest in the state. The City was founded in 1883 at its present site because of its proximity to Bear Creek and the Oregon and California Railroad, becoming the County seat in 1927.

The downtown is a National Historic District and it is flourishing today due to support from the City's Urban Renewal Agency in cooperation with business and property owners. New construction, building restorations, infrastructure improvements and community events are creating a forward-looking downtown grounded in its diverse past. Streets have been realigned and improved with with new pedestrian and bicycle amenities.

Medford is the economic center for a region of over 460,000 people in Southern Oregon and Northern California. In the past, its economy was fueled by agriculture and lumber products. Although the lumber industry has declined, three lumber mills, Boise Cascade, Timber Products and Sierra Pine, remain. The area also is home to an expanding vineyard and wine industry that includes a large assortment of varietals and over 60 wineries. Lithia Motors, the 9th largest auto retailer in the U.S., has been headquartered in Medford since 1970.

The City is a regional hub for medical services. Two major medical centers employ over 7,000 people in the region. Medford is also a retirement destination, with senior housing, assisted living and other elder care services acting as an important part of the economy.

The Bear Creek Greenway extends from Ashland through central Medford and includes a 26-mile multi-use path, linking several cities and numerous parks. Roxy Ann Peak, one of Medford's most prominent landmarks, is a 3,573-foot dormant volcano located on the east side in Prescott Park, Medford's largest city park at 1,740 acres.

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Executive Summary

This report explores issues, opportunities, and design proposals for four different fire station sites in Medford, Oregon. The goal of this studio was to envision new fire-rescue facilities consistent with LEED certification and applicable to the design and construction of four new facilities for the City of Medford in the near future. Students were asked to create design concepts including exterior and interior views, floor plans, diagrams, and any other drawings that would convey the overall ideas of the designs.

The research undertaken for this project reached well beyond the spectrum of architectural issues with a primary focus on existing fire station designs as well as emerging trends and technologies. It was imperative for each design to support fire-rescue staff and new emergency vehicles, convey community identity, and educate the users about sustainable practices. Providing multiple uses for the site was critically important to creating opportunities for community involvement. Focusing on flexibility of spaces, embracing the existing city infrastructure, and generating ideas about how the spaces could serve both public and private functions were prevailing themes in every proposal that was positively received by the city and fire department alike.

The 26 schemes developed in this studio are diverse in both formal expression and in programmatic organization. Students dealt with the programmatic elements in a variety of ways, sometimes clustering buildings around a central courtyard, and other times spreading the building out linearly for ease of circulation. Similarities are found in the inclusion of environmental systems and generally energy-conscious design techniques.

The City of Medford provided data and documentation of previous work products (program documents, reports, market studies, architectural plans and maps) that were extremely beneficial in the initial schematic phase of the project. The schemes were presented to the city, the fire department, the general public, and design professionals multiple times to strengthen the concepts. In the end, each scheme offered valuable insight into innovative fire station design beyond the built element. With these recommendations, putting to use available and cutting-edge architectural and emergency-response concepts, these fire stations have the potential to improve the identity of neighborhoods and harbor an efficient, competent, and sustainable fire department.

Introduction

The City of Medford Fire-Rescue currently has five fire stations. Of those stations, four are not up to modern building standards. This architectural design studio focused on taking a straightforward approach to organizing a new fire station for each of four sites in Medford, Oregon. Issues of particular interest to students were improving storage, workplace efficiency, structure and means of construction, all with an emphasis on how to approach the design sustainably. Each new station is proposed to be energy efficient and silver LEED certified.

The programs for the new fire stations vary in size from site to site (roughly 9,000-11,000 square feet), but always include work space and living quarters for the fire-rescue staff, as the building is a second home to the crews. The “private” quarters include all one would find in a house: places for cooking, eating, sleeping, bathing and relaxing. Appropriate spaces are also needed for meeting, storing and cleaning gear, and training. At the same time, a fire station is a civic building. It is a part of its community, and as such, a place for the community to use. All parts of the building require ease of access to the firefighting vehicles, as response time to emergencies is of the utmost importance.

To explore and expand the scope of inquiry for all four sites, the City of Medford chose to engage 26 design students to develop individual design possibilities. This method allowed students to collaborate with city staff and design professionals to supply advanced ecological designs for a building that will house crews and supplement the community for the next 50 years.

Figure 1: Aerial image showing Fire Department No. 2 and its surrounding context

Medford Fire Department No. 2

1169 Stewart Avenue, Medford, OR

Located on the corner of 8th and Lincoln, the existing Medford Fire Station No. 2 can easily be confused for a house in its suburban context. The major distinguishing features of the station are the large garage that houses the station's only fire engine, a flagpole, and two lampposts taken from Medford's original city hall. According to local firemen, the large evergreen tree growing behind the station was planted by firefighters over 60 years ago.

The current station is very small with cramped living spaces that are filled with large furniture pieces that are essential but cumbersome in the current context. Rooms have been adapted from their original purpose; the workout room and office have been squeezed in wherever they fit.

Curtains separate the stuffy and poorly insulated bedrooms. The station offers little privacy to the firefighters stationed there due to a lack of storage and no distinction between male and female bathrooms and bedrooms.

The apparatus bay barely contains its single fire engine. Additionally, the firefighters' turnouts are located in the apparatus bay, which is a practice that damages the fire suits. There are currently not enough parking spots to accommodate all cars during the change in shifts. The firefighters have to carefully organize their cars in single file, preventing each car in front of them from exiting.

Fire Station No. 2 is located in the southwest region of Medford and provides for the highest number of emergency responses out of any of Medford's stations. Clearly, Fire Station No. 2 has outgrown the capacity of the existing facilities. Therefore, the station will be relocated to a new site, which will be able to accommodate the station's present and future needs.

Allen Chung

Figure 1: View of building from the north

Chung developed his design for Fire Station No. 2 by organizing the programmatic requirements into three distinct areas within the building. The public realm, including the main entry, community room and staff offices, is located on the ground floor and is accessed from the north. The support spaces, which include equipment, storage and vertical circulation, separate the private wing on the east from the fire rescue vehicles on the west.

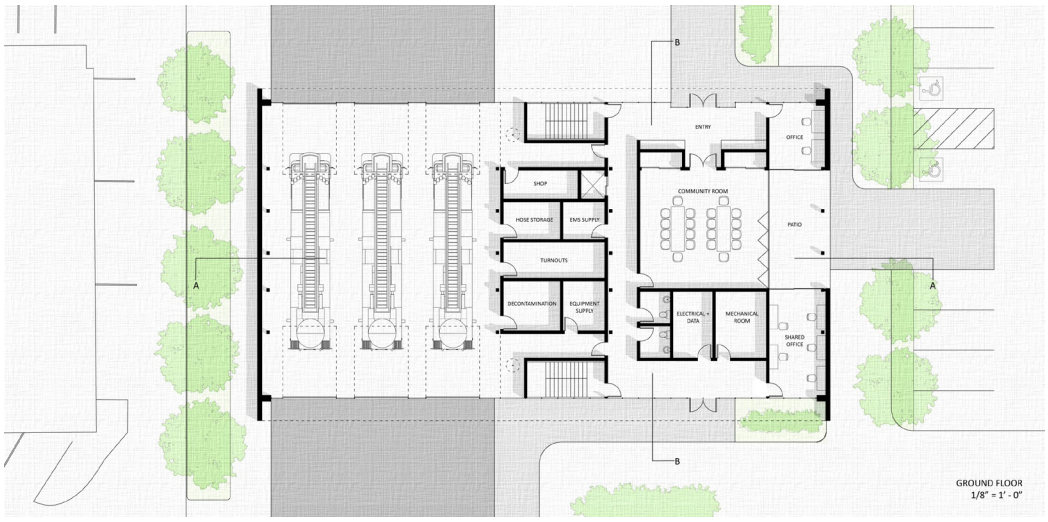


Figure 2: First floor plan.

The most private spaces in the building, including all living spaces for the fire rescue staff, are located on the second floor directly above the public and support wings. Fire poles are located next to each stairwell and adjacent to the dayroom and gym to allow for quick response times in case of emergencies.

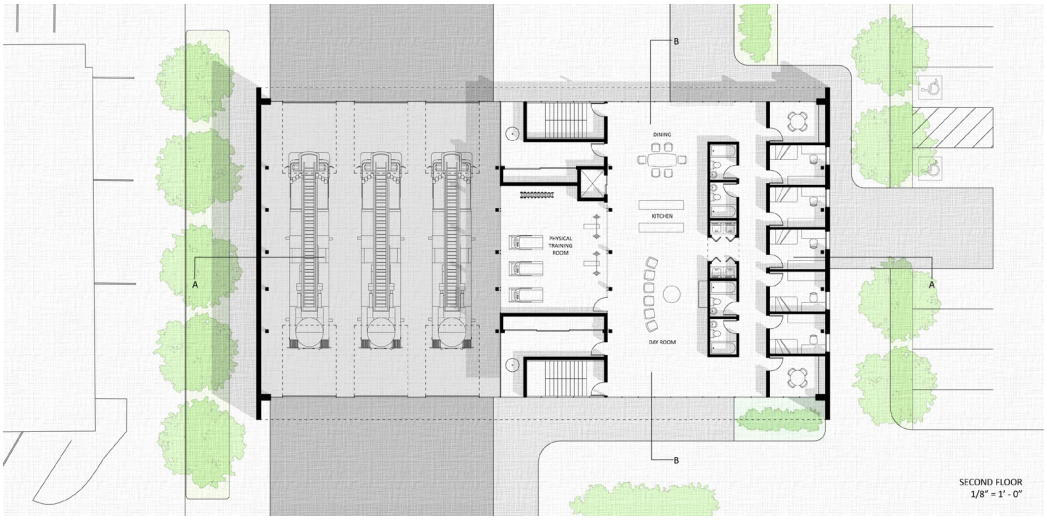
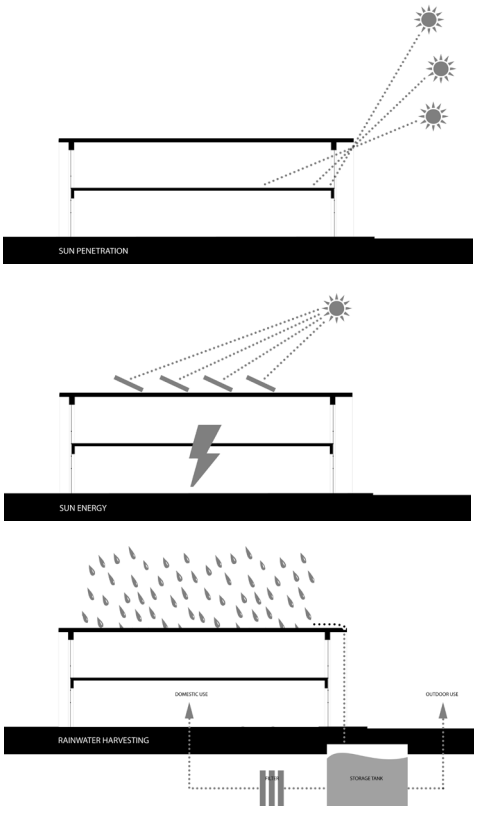


Figure 3: Second floor plan.

Chung designed the north facade of the building to be mostly glass, allowing the public to view the inner workings of their local fire station. He also implemented several environmental strategies to use that public visibility as a catalyst for sustainability in the City of Medford.

The floor-to-ceiling glass on the north and south facades allows for daylight to penetrate deep within the inner rooms of the building, while an overhang provides a way to combat unwanted glare and solar heat gain. The large roof allows for an array of PV panels (see Appendix A) to be installed, collecting energy for use in the building. Chung placed a water cistern beneath the building's floor slab to be used for rainwater collection and greywater recycling (see Appendix A).



Figures 4, 5 and 6: Diagrams showing environmental systems.

Figure 7: View of the apparatus bay.

Figure 8: View of the community room on the ground floor.

Figure 9: View of the day room on the second floor.

Omar Hason

Figure 1: View of building entry from the northwest.

Hason's approach to Fire Station No. 2 stemmed from the lack of space in the existing station and the lack of character in response to its surroundings. The three goals set out at the start of the project were:

1. Recognize the fire station's role as a civic building and define it as a space for community;
2. Identify the fire station as a home for fire-rescue staff where they will spend 1/3 of their lives; and
3. 3) Strategically use daylight to illuminate the building as needed.

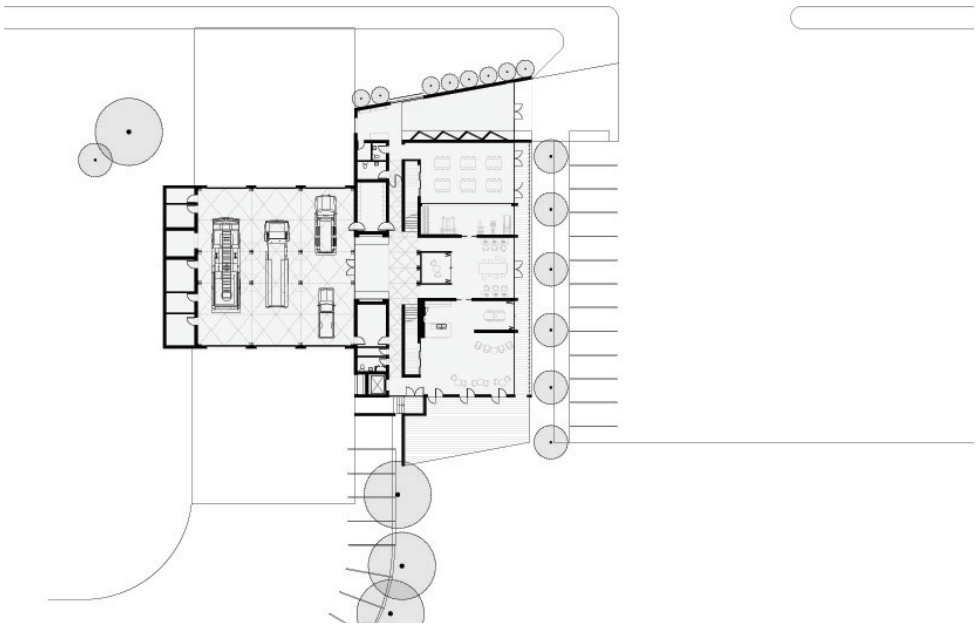


Figure 2: First floor plan

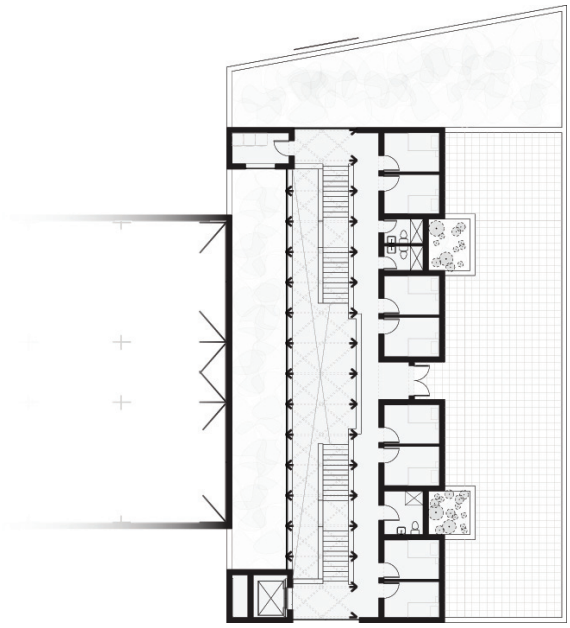
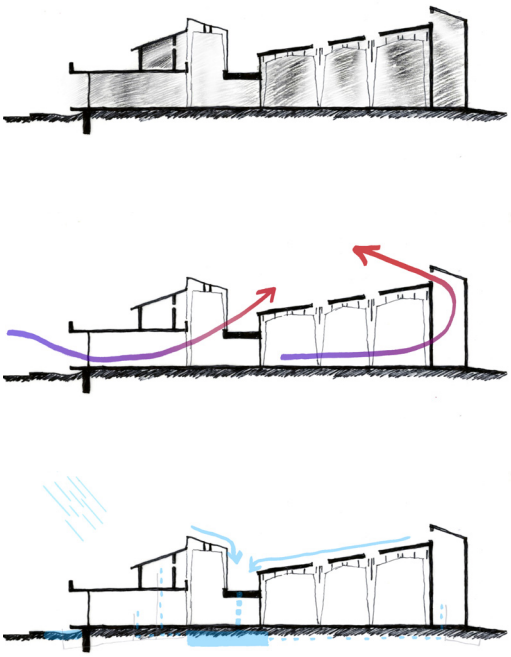


Figure 3: Second floor plan.



Figures 4, 5 and 6: Diagrams showing environmental strategies used in the design.

The building's layout was split into three types of spaces: living, working and transition. Each area is arranged on the site to maximize views and solar exposure to the spaces that need it most. With this particular arrangement, Hason used the building's form to explore ideas about water catchment and treatment, passive heating/ ventilation, and daylighting.

The building's structure varies from board-formed concrete and a steel base, to glulam wood beams and intersecting "geometric fins" used to capture daylight and pull it down into the darker parts of the building. The building is ordered around the areas with the most light. These daylit spaces are then enhanced by the addition of adjacent rooms and views out into nature.

Figure 7: View of the apparatus bay.

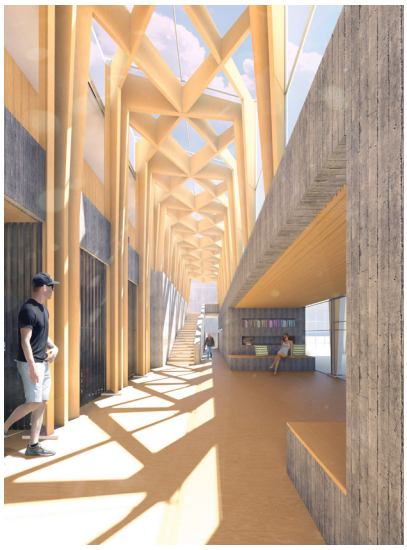


Figure 8: View of daylit atrium space.

Figure 9: Interior perspective looking out into the landscape.

Reema Issa

Figure 1: View of day room.

Issa approached the design of Fire Station No. 2 by way of programmatic requirements. She recognized the need for a design that would incorporate the civic functions of a pragmatic fire station with the aesthetic functions of a living space for fire-rescue staff working 24-hour shifts.

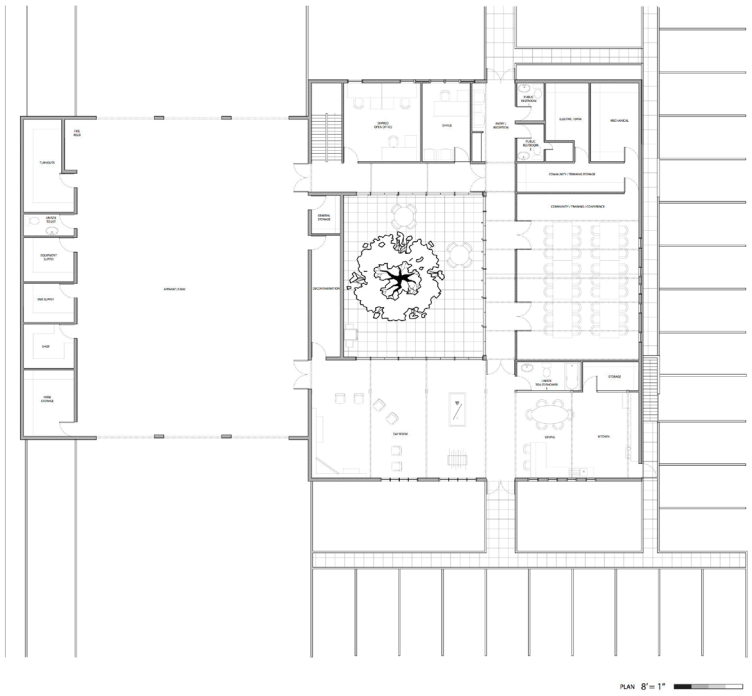


Figure 2: First floor plan.

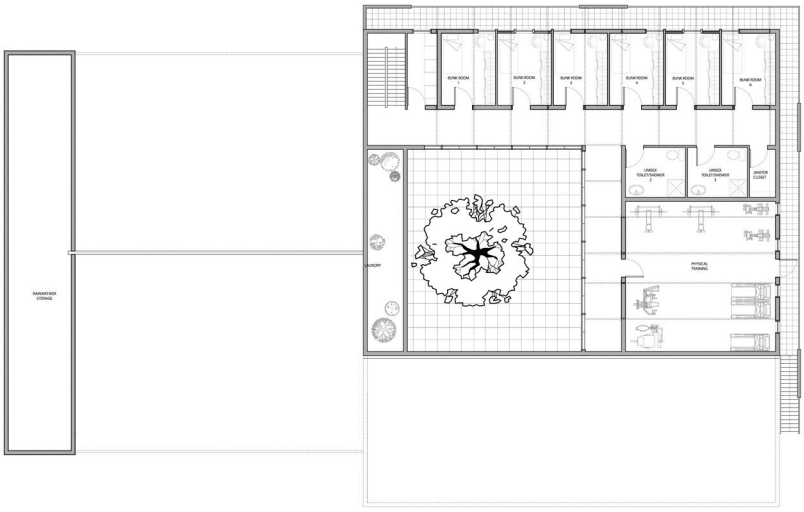


Figure 3: Second floor plan.

The public entrance to the new Fire Station No. 2 is located on the north side of the site, with a view to the fire engines in the apparatus bay facing West Stewart Street. The staff's entrance is on the south side, adjacent to parking, and intersects the two most-used rooms: the kitchen and the dayroom. The courtyard and community room in the center of the building serve as a buffer zone between the public realm on the north side of the ground floor and the private realm of the south wing and second floor.

Bedrooms and physical training facilities are located on the second floor and are wrapped around the central courtyard to allow for quick response time in the event of a call. While proximity to the apparatus bay is extremely important, Issa's courtyard also provides an opportunity for respite from the chaos of the job. Additionally, the butterfly roof is designed to catch and store water for use in the fire engines and reuse in greywater systems (see Appendix A) in the building.

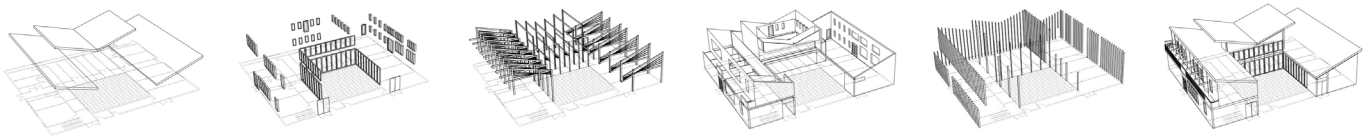


Figure 4. Diagram showing building structure.

David Jones

Figure 1: View of the exterior from the parking lot.

This design takes its organization from site orientation and principles of sustainability. Jones created a two-story, linear layout for the design of Fire Station No. 2, choosing to place the public spaces of the building on the north side and the more private spaces on the sunlit, south side and second floor above. ¬¬The apparatus bay is the prominent feature along the north elevation. A shed roof sits above the entire building, sloping to the south to allow for an array of PV panels (see Appendix A) to be placed on top.

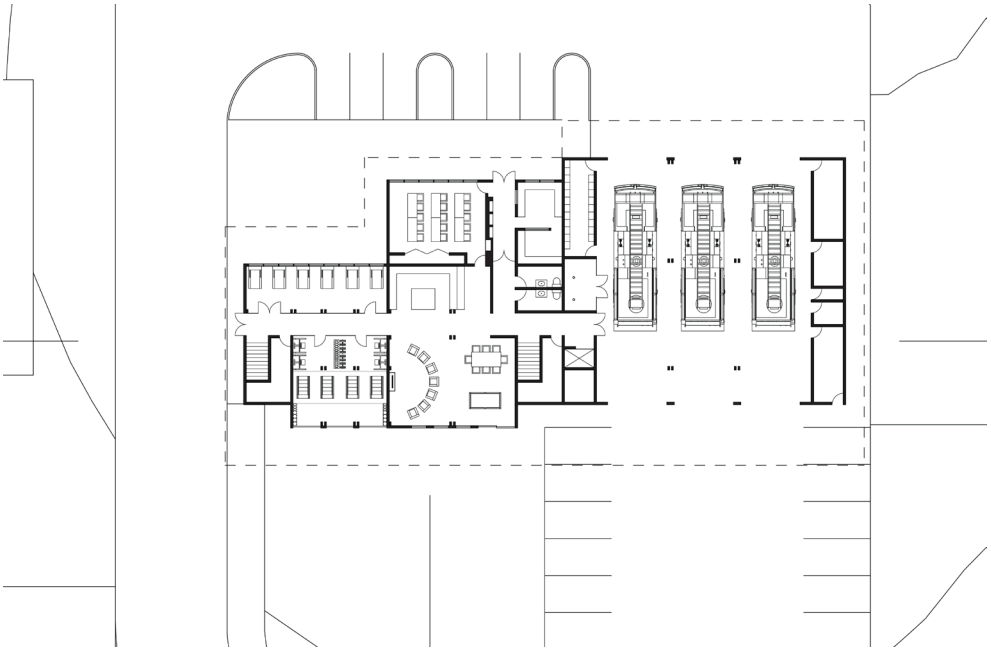


Figure 2: First floor plan.

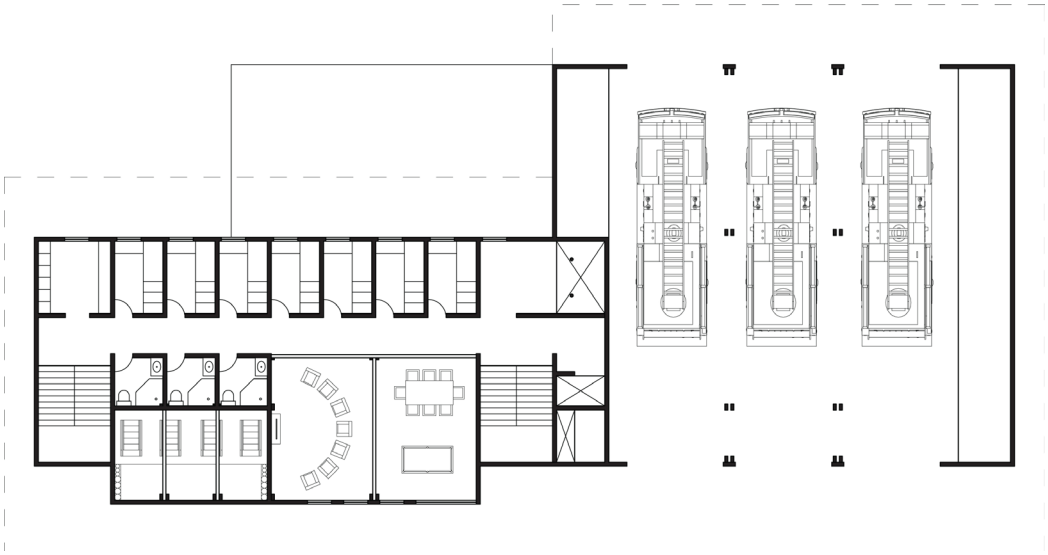


Figure 3: Second floor plan.

The red Cor-Ten steel enclosure of the building recalls the traditional brick structure of old firehouses, while the exposed wood structure of the interior provides a more residential setting for the crew members who are stationed on site.

Figure 4: Section perspective through day room

Figure 5: Elevation of south facade.

DillonJones

Figure 1: View of North elevation from the West Stewart Street.

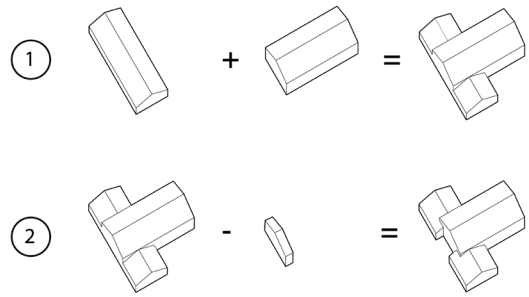


Figure 2: Diagram showing the development of the building's form.

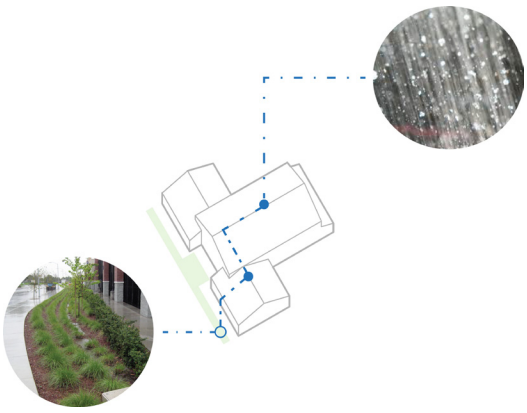


Figure 3: Diagram showing collection and reuse of rainwater.

Dillon Jones' design for Fire Station No. 2 was derived from the basic principle of splitting the public and private functions into two separate buildings, then combining the two into a tripartite system.

Jones stated that it was "important that the fire station has a public presence without imposing itself on the adjacent neighborhood." With this goal in mind, spaces such as a public, street-facing plaza and entrance lobby serve to welcome residents from the community while maintaining privacy for the staff on call.

Sustainability was a driving factor in the design of Fire Station No. 2; Jones specified a double-insulated wall enclosure to reduce the need for active mechanical systems and improve acoustic separation from the street to the north. The Cor-Ten steel shed roof acts as a water catchment system and filters captured water through a new bioswale (see Appendix A) located next to the public plaza.

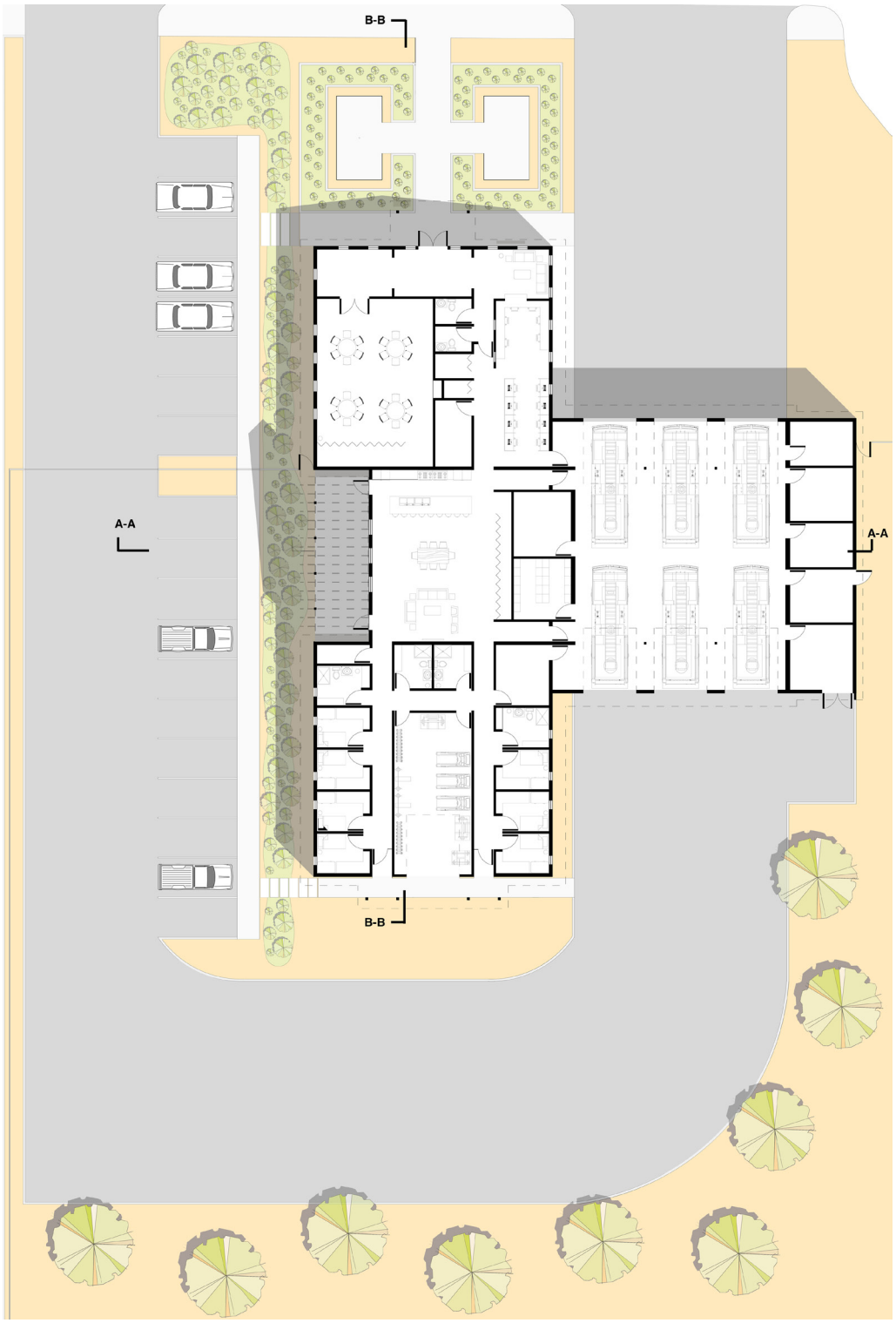


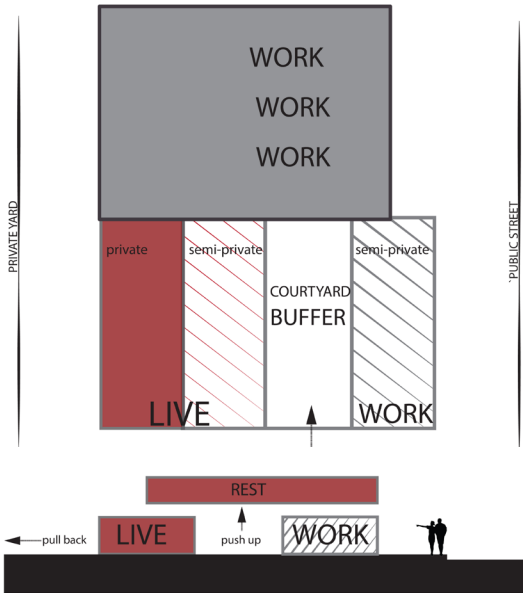
Figure 4: Floor plan.

Heather Meyer

Figure 1: View of public entry from the east.

Meyer's design for Fire Station No. 2 came from an early schematic idea of splitting the building into two separate wings defined by "live" and "work," then linking the two through a second story containing the "rest" activities. A courtyard used for the public entry doubles as a buffer zone between all three areas of the building.

To promote sustainable practices in the City of Medford, Meyer designed two structural roof systems for the building: a large, water-retaining green roof (see Appendix A) sits above the complex of buildings, while the main structures have a sloped metal roof to direct the excess water to a storage cistern (see Appendix A) to be used for summer irrigation. Overflow water from the cistern can be stored in a bioswale (see Appendix A) on the south side of the site.



Figures 2 and 3: Diagrams showing the splitting of programmatic requirements.

Figure 4: Site section looking east.

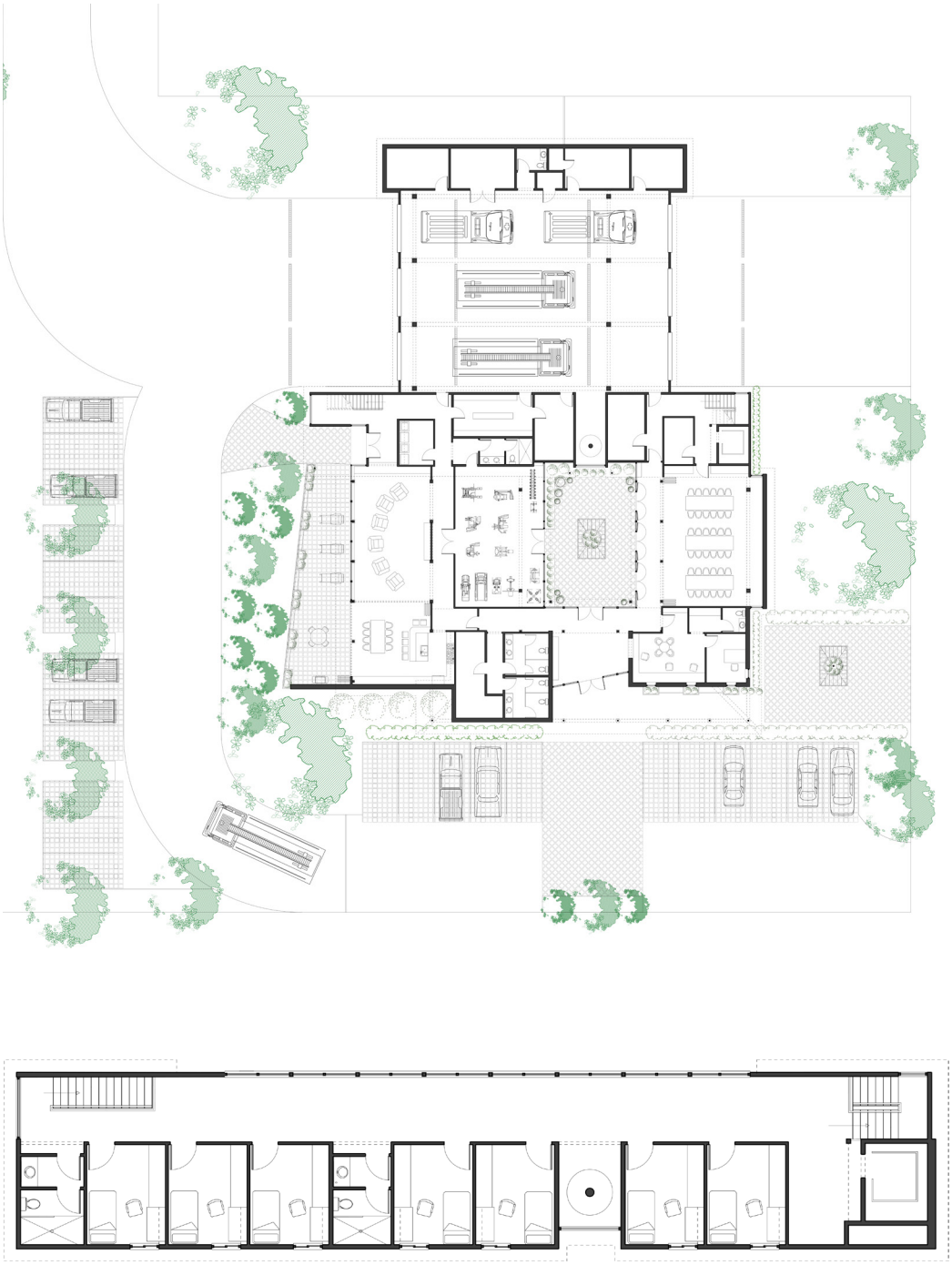


Figure 5: First and second floor plans.

Medford Fire Department No. 3

530 Highland Drive, Medford, OR

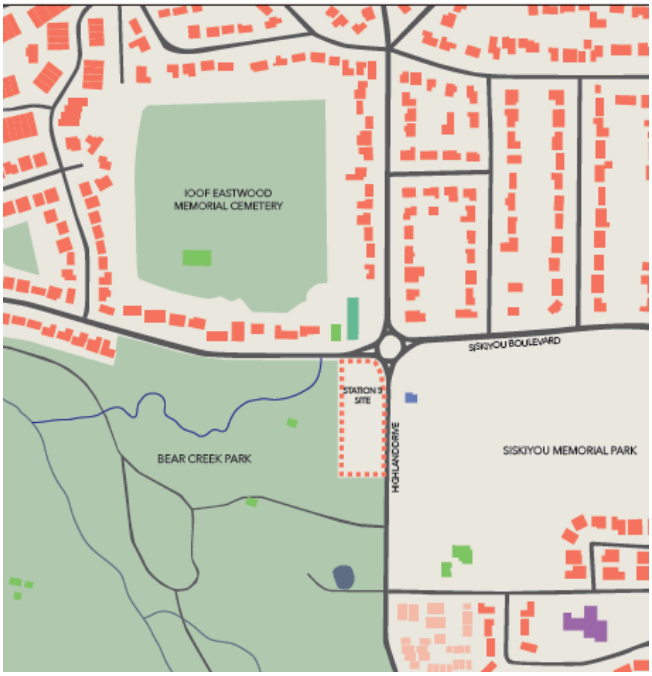


Figure 1: Aerial image showing Fire Department No. 2 and its surrounding context

Originally built in 1954, Fire Station No. 3 was constructed in the midst of what was once the middle of Medford's farming fields. Now, this home-like fire station is the most centrally located station in the city, presiding over the southern district of Medford. With two remodeled garage add-ons built to accommodate the developing designs of fire-rescue vehicles, Station No. 3 no longer fits the needs of the city. The area has developed into a park-like residential area and the site is dominated by the green space of Bear Creek Park and a nearby historic cemetery.

Though located in a prominent location on the corner of Bear Creek Park, Station No. 3 has no civic presence or public authority inherent in its architecture. It easily blends in with the suburban area in which it resides. With the appearance and design of a small 1950s residential home, the fire station has no hint of being a public building. The difference between the park and the fire station's property is indecipherable, and the station is often mistaken as part of the park by the general public. A chain-link fence has stopped most intruders from trespassing but the overall appearance still does not give the impression of a fire station nor of a symbol of help for those in need.

Tudor Bertea

Figure 1: Exterior street view.

The design for Fire Station No. 3 in Medford, Oregon was inspired by the structure of the actual apparatus that is at the heart of every fire department: the fire engine. The tripartite structure of the building works to cohesively integrate the three functional demands of the “fire-house”: living, working, and support spaces.

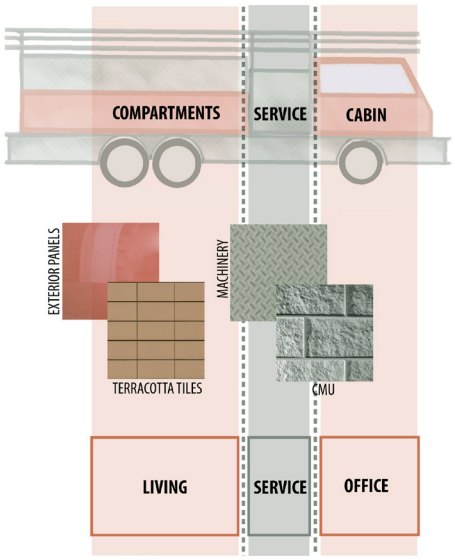


Figure 2: Concept diagram showing key source of inspiration for the building.

Figure 3: Site Plan.

Figures 4 and 5: First and second floor plans.

In a world where emergencies happen around the clock, firefighters become a pivotal component of the community, and their ability to respond efficiently is of the utmost importance. The organization of this rectilinear building focuses on minimizing the response time of the firefighters. One of the key issues raised by the firefighters consulted for this project was the proximity of the sleeping quarters to the apparatus bays. To address this programmatic need, all dorm rooms are placed on the second floor, right above the apparatus bay. The inclusion of four fire poles links the bays and the bedrooms, ensuring a quick response when necessary.

Figure 6: Diagram illustrating ecological methods used in the design.

The ecological impact of a building this size is not insignificant, especially considering the large amount of water consumption and the environmental contaminants involved. In an attempt to reduce the ecological footprint of Fire Station No. 3, Bertea's design integrates a system for recycling water within the heart of the building, as well as a roof system comprising of fly roofs and green roofs (see Appendix A) to battle the hot southern Oregon sun.

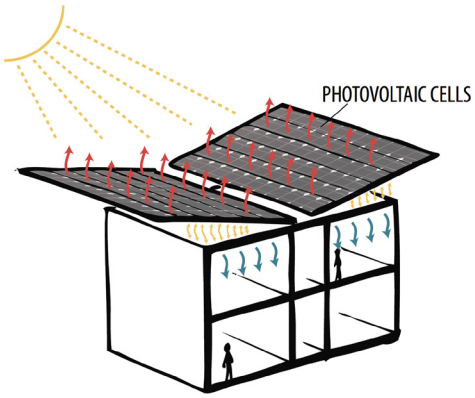


Figure 7: Function of the fly roof system.

Figures 8-10: Interior renderings of Fire Station No. 3.

Mary Bradbury

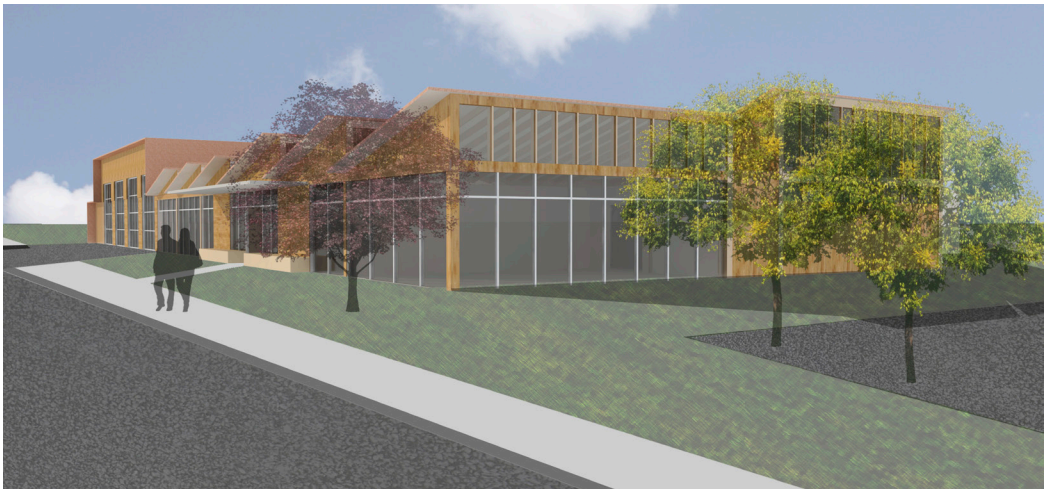


Figure 1: Street view of the building.

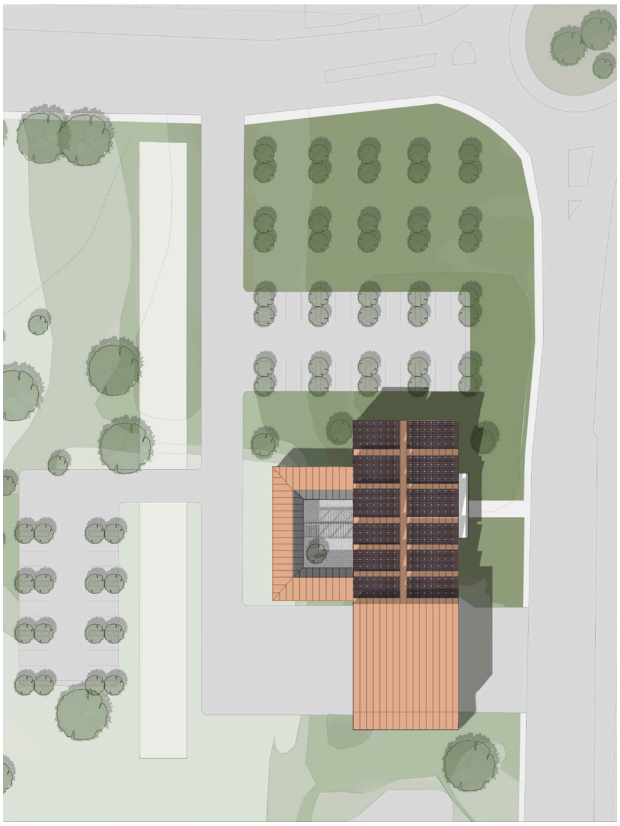


Figure 2: Site plan.

The first issue Bradbury tackled in this design was the proximity of the site to a traffic circle to the northeast. To avoid hazardous disruption to traffic flow, Bradbury shifted the placement of the fire station as far south as the site would allow.

A key feature of this design is the inclusion of a courtyard, embedded in the domestic area of the building. The more social living spaces, like the kitchen and exercise room, open onto this courtyard.

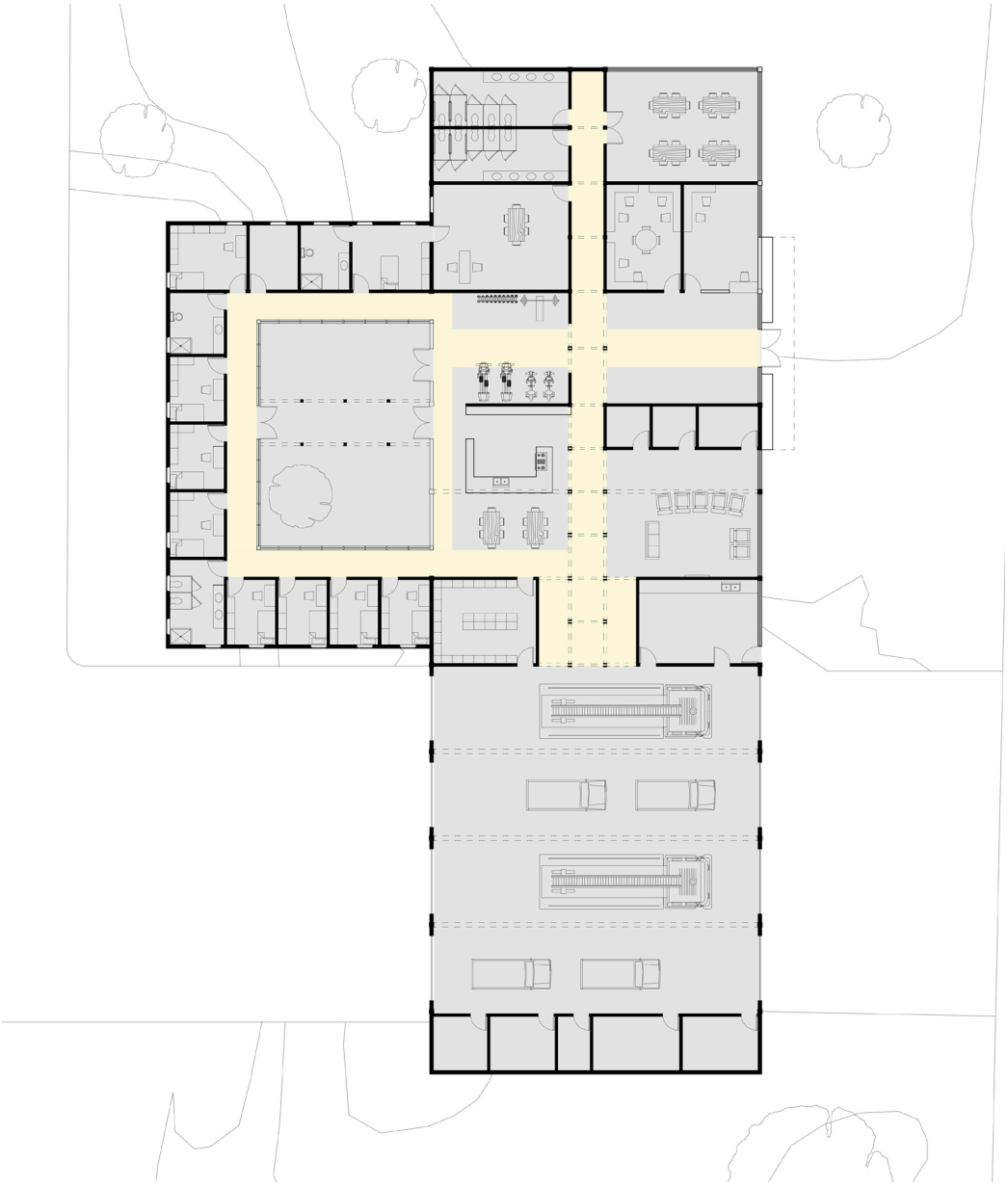


Figure 3: Floor plan.

The main body of the building is predominantly day-lit with north-facing skylights, a system put in place as a means of energy conservation. The south-facing slopes of the skylights provide a place for solar panels (see Appendix A) to further offset energy use. A channel in the middle of the roof funnels rainwater to a cistern (see Appendix A) at one end of the building.

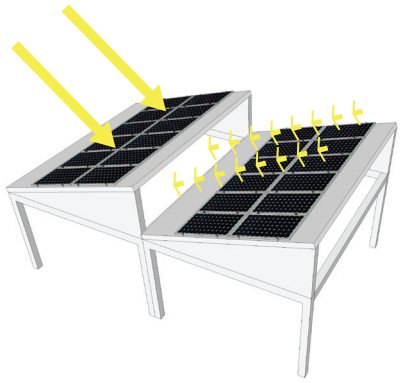


Figure 4: Diagram of the roof system -- a combination of skylights and PV panels.

Inside, the openness and connectivity of the various living spaces promotes a community atmosphere while still allowing for some separation between activities. The dayroom and kitchen/dining area are connected visually, but are separated by the central spine of circulation. Both the kitchen/dining room and the exercise room are connected to the courtyard for easy access to outdoor activities. The dorm rooms are located along the courtyard edges, providing visual and acoustical separation from the adjoining park.

Many typical fire stations, including the original station on this site, lack high-quality outdoor space for the firemen to use. However, this often-overlooked necessity is a focal point of this design. The structure of the main body of the building is modular for flexibility and possibility of future expansion.

Figure 5: Interior perspective of the kitchen and dining area.

Taylor DeBerry

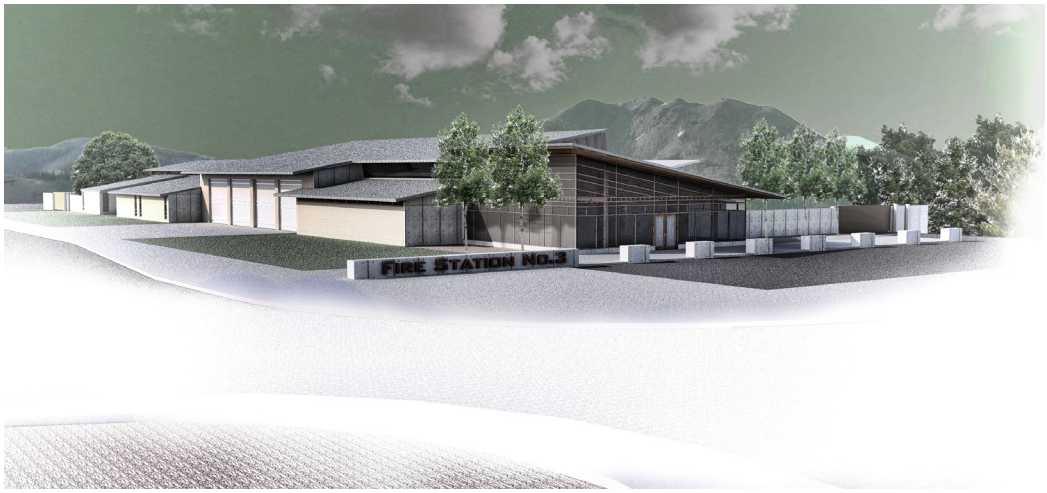


Figure 1: Exterior view of the building.

The key objective of DeBerry's design was to create an inviting community space that fits into its suburban environment. The former was achieved through the use of transparency; glass walls were strategically located to ensure views of the landscape around the building, as well as to welcome members of the community. To respect its suburban context, the building is designed as a single-story, horizontal structure.

Figure 2: Interior view of the apparatus bays.

Figure 3: Interior view of the dayroom.

Fire Station No. 3 is the most centrally located station in Medford and thus has the heaviest of programmatic requirements. Response time is crucial in any fire station and as such, was a key component in the layout of DeBerry's design. Living spaces are located directly off of the main circulation path and in close proximity to the apparatus bays. Furthermore, the building is kept to a single story to eliminate the necessity for stairs and elevators.

The site for this station is located in close proximity to a traffic circle, a factor that caused significant traffic issues for the previous fire station on the site. To address this issue, the apparatus bay was moved further away from the traffic circle, thus ensuring better traffic flow. To keep all fire-rescue staff within close proximity to the emergency vehicles, DeBerry centered the apparatus bay within the buildings.

Figure 4: Floor plan.

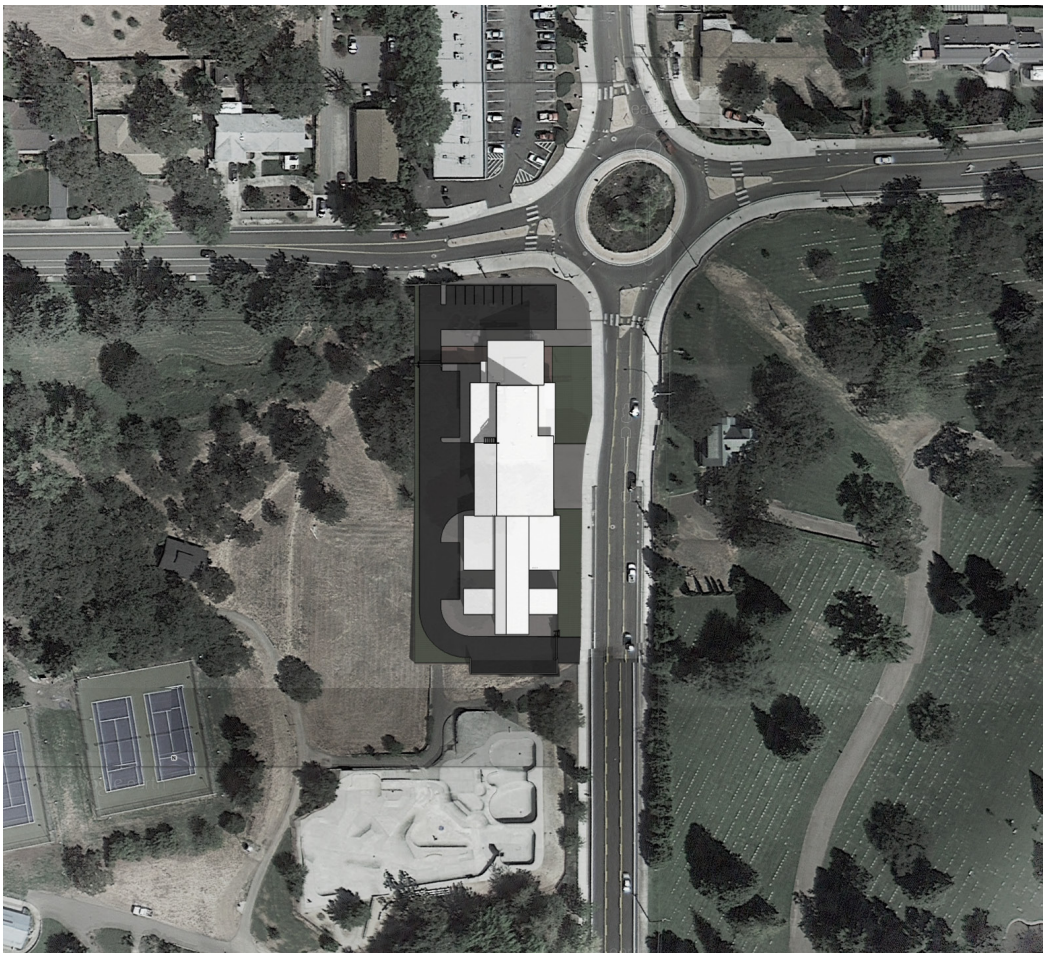


Figure 5: Site plan.

Sustainability was a core objective for the design. Deberry's fire station is designed to accommodate the functional requirements of 2032 and beyond. The building envelope, one of the biggest expenses of any building, has been minimized. All rooms with high levels of activity have direct connection to the outdoors as well as abundant glazing, providing daylight as well as views. Finally, a bioswale (see Appendix A) to the west end of the site helps reduce pressure on the storm water collection systems.

Yuta Fukuda

Figure 1: East elevation of the building.

Fukuda's design focuses on the balanced coexistence of the domestic, professional and public functions of the fire station. These varying functional requirements need to be in close proximity to the apparatus bays given the importance of response time. However, they also need to be separated given their differing spatial requirements. In this design, Fukuda has arranged the three types of functions in a bar-like building with the apparatus bays to the north, the public areas to the south and the living spaces in between. The three functional areas are connected via a clear circulation path, ensuring quick response times.

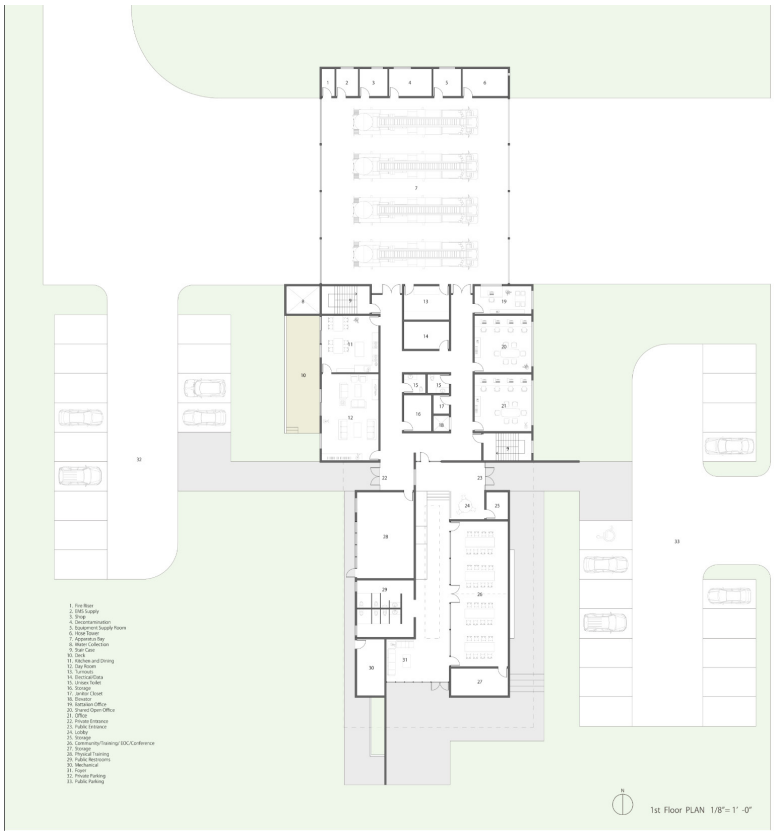


Figure 2: First floor plan.

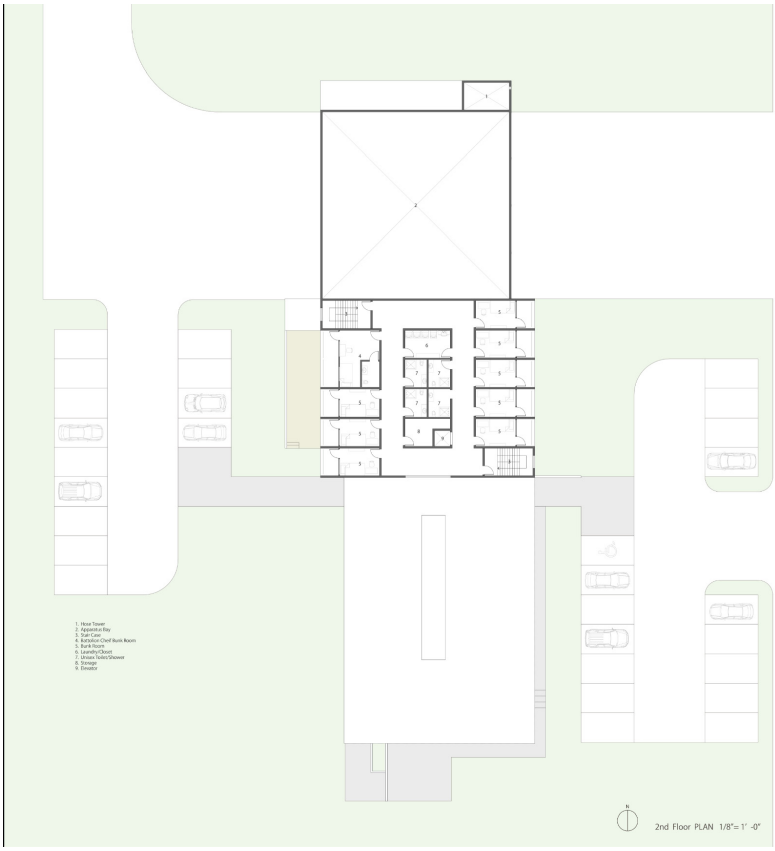


Figure 3: Second floor plan.

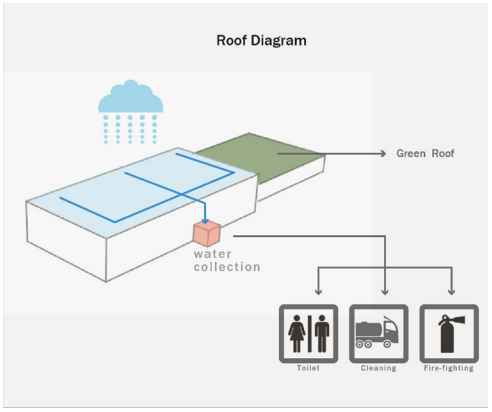


Figure 4: Diagram of water collection system.

A key characteristic of the building's site plan is the separation of pedestrian and vehicular traffic. Vehicular routes do not circle around the building, thus ensuring that pedestrians will not have to cross streets to approach the park located to the west of the building.

The integration of sustainable strategies was an important consideration in Fukuda's design. The building has two flat roofs, both presenting excellent opportunities for water collection. Rainwater is collected from the higher roof plane and either stored directly in a cistern (see Appendix A) for later use or directed to the green roof (see Appendix A) on the lower roof plane.

John Loest

Figure 1: Exterior view of the new fire station.

This design focuses on creating a cohesive live-work environment for the firefighters who will call it home for one-third of their lives. Some key design objectives were to:

1. Provide for a quick response time both at the human and vehicular scale;
2. Create a place for the public to gather and take pride in as a civic symbol of Medford;
3. Harbor growth and allow for an extension of the neighboring park; and
4. Incorporate sustainable strategies in the forms of daylighting, bioswale design (see Appendix A), and use of local building materials.

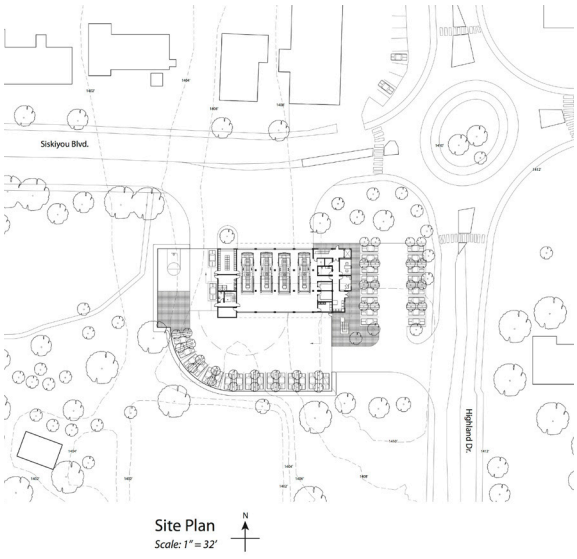


Figure 2: Site Plan.

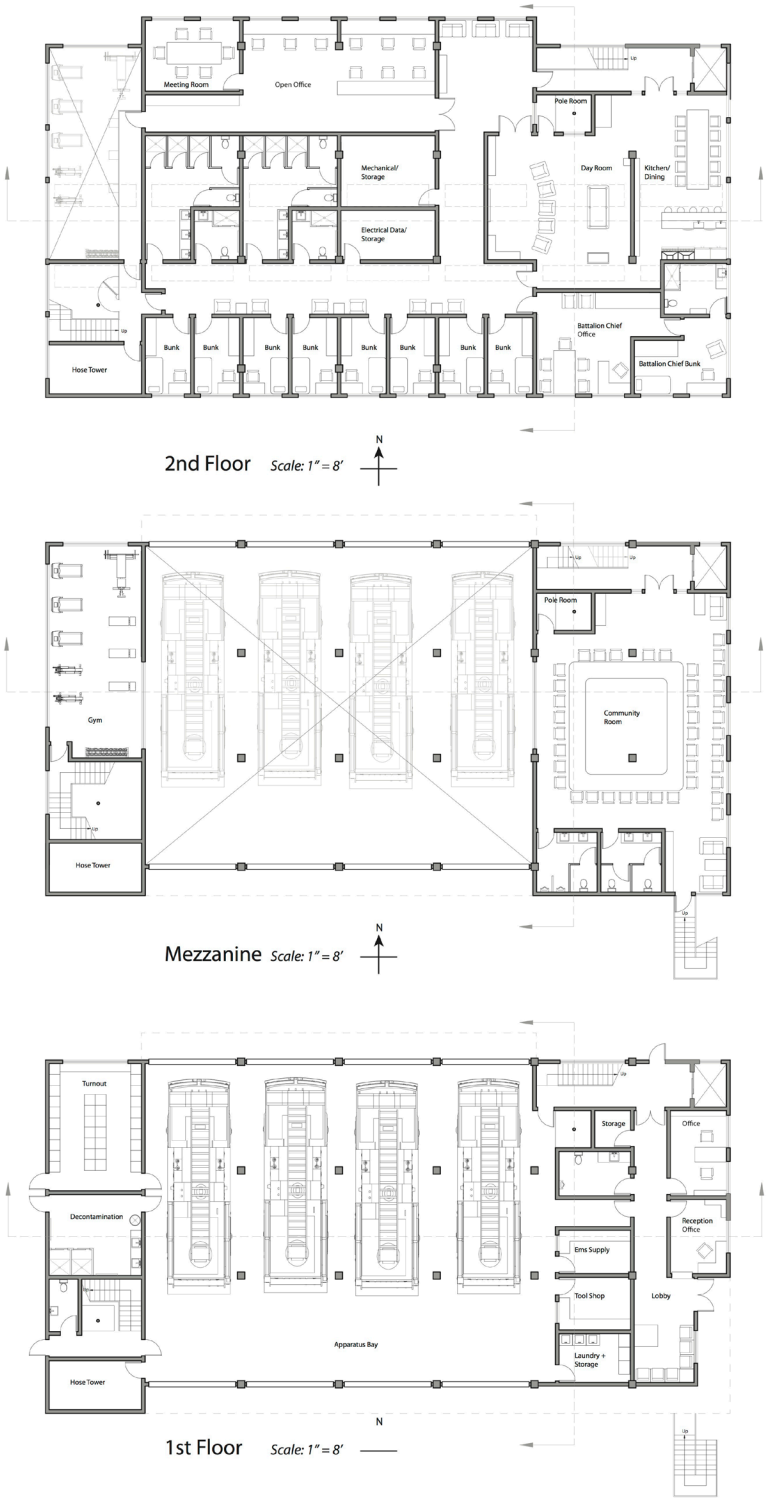


Figure 3: First and second floor plans

The dimensions of the apparatus bays, measuring 18’-0” wide by approximately 60’-0” long, became the basis of a module and informed the primary organization of the fire station. This grid helped to establish the structural system and the organizational concept of the building. As the new headquarters for firefighting operations for the city of Medford, at approximately 18,500 sf, this fire station is ready to take on the future of emergency response.

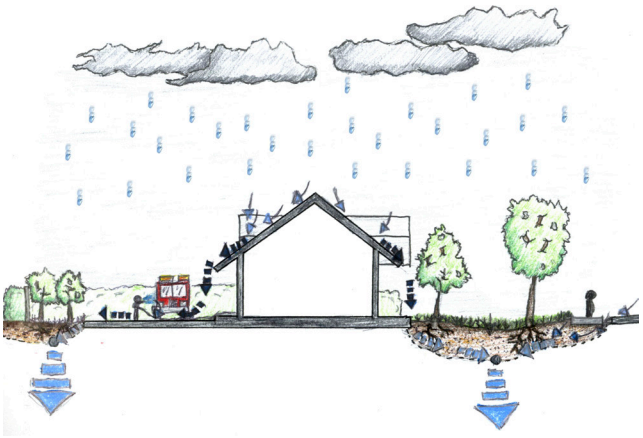


Figure 4: Diagram showing water collection through the use of bioswales

Figure 5: Rendering of the workout space.

Miranda Shum

Figure 1: Exterior view of the new fire station.

Figure 2: Site plan.

An important issue tackled by this design was the placement of the new fire station in relation to the traffic circle located to the northeast of the site. To address this issue, Shum positioned the new building further south than the existing building. She then positioned the building at a 60-degree angle to the street, allowing for more pull-out space for the fire trucks.

Shum's design for Fire Station No. 3 features a two-story building, with public spaces below (including the offices, community room, apparatus bays and support spaces) and private spaces above (including the bedrooms, kitchen and dining room, and gym). These floors are connected via two stairs and two fire poles. The fire poles connect the living spaces directly to the apparatus bays, thus ensuring low response times. The second floor also includes two outdoor patio spaces, to be used by the firefighters in times of relaxation.

Figure 3: Floor plans.

Figure 4: Elevation of the East face of the building.

Medford Fire Department No. 4

2208 Table Rock Road, Medford, OR

The building currently functioning as Fire Station No. 4 was constructed in 1969 and looks its age. Set in a suburban area with a trailer park to the north, residential buildings to the west and a park to the east, this station blends in with its suburban surroundings, but perhaps too well. From the exterior, the building can easily be mistaken for another suburban home, complete with a gable roof and traditional garage door. The site of this station is very large, roughly 1.29 acres and houses not only the fire station, but also the Medford Fire Department training facility.

Most of the 1.29-acre lot is covered in asphalt, making stormwater management a dilemma. In contrast to the vast site, the fire station is very small at around 3,801 sf. According to the report submitted by Group Mackenzie, “almost every room in the station has multiple uses, which creates overcrowding of staff and equipment.” The bunk “rooms” are separated from each other and from the exercise space via curtains, meaning privacy is almost non-existent. The exercise space is extremely cramped and barely meets the needs of the fire-rescue staff.

Sarah Cohen

Figure 1: Perspective of the building from the street. The glass facade allows visitors to see the firefighters in action.

Cohen's two-story design for Fire Station No. 4 builds off of the traditional fire station typology and makes adjustments according to the specific needs of the site. An important issue addressed in this design was vertical circulation. The private living quarters are located on the second floor (including the bedrooms, a large kitchen, dayroom, dining room, and a patio space on the south side of the building). Thus the connection between the second floor and the apparatus bay was critical to maintaining a low response time.

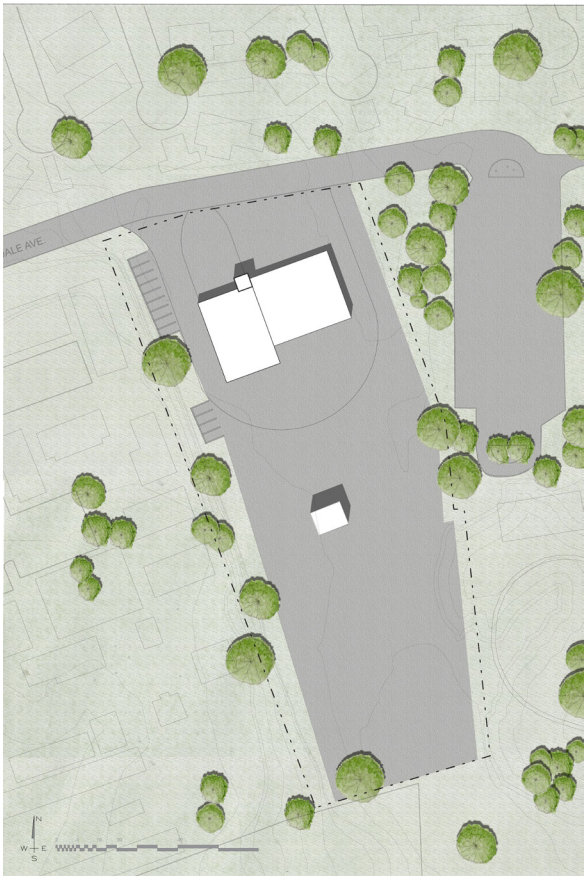


Figure 2: Site plan.

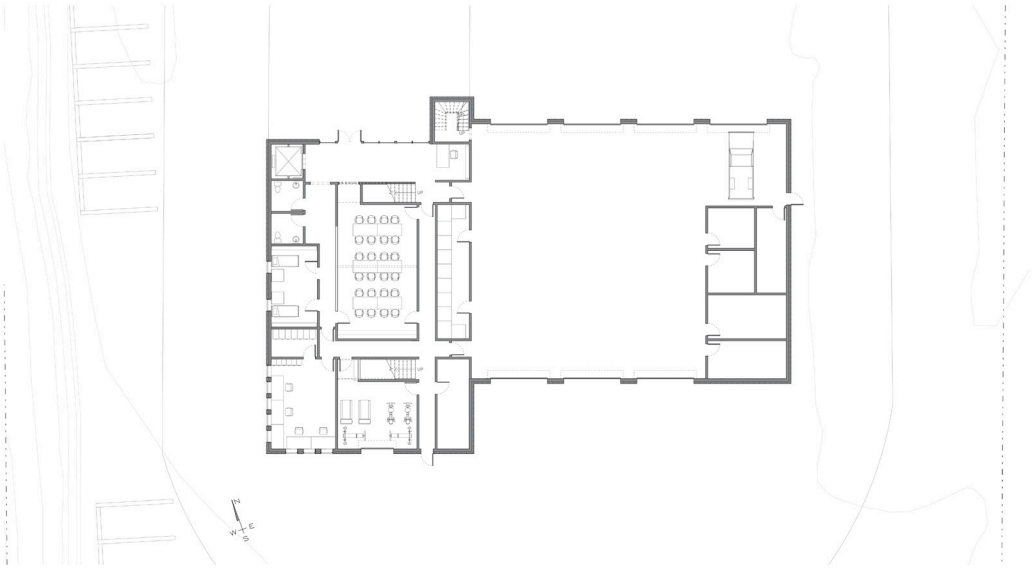


Figure 3: First floor plan.

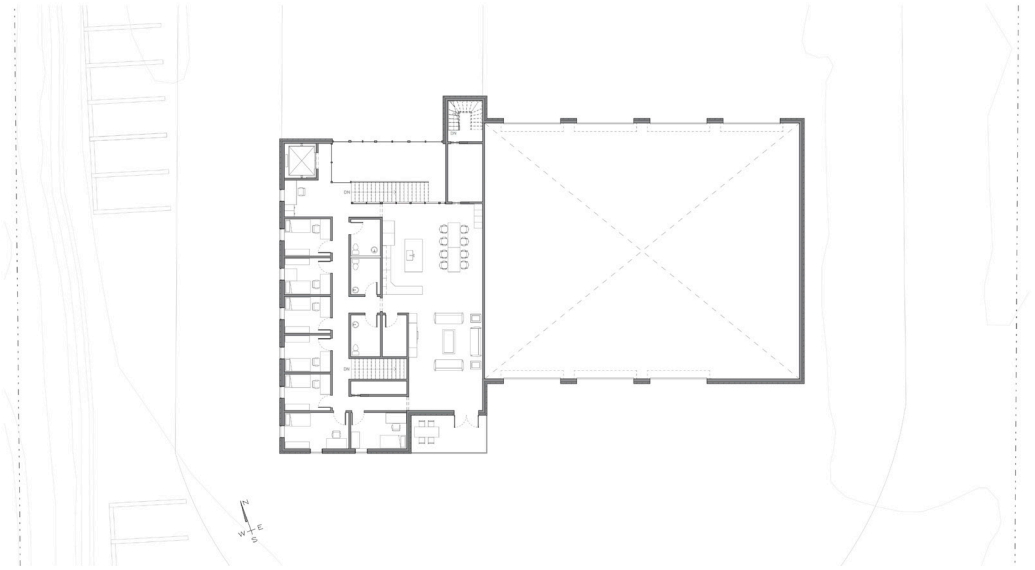


Figure 4: Second floor plan.

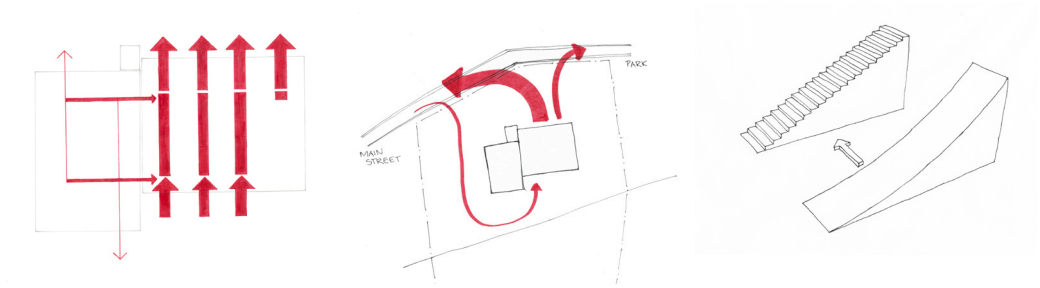


Figure 5: Diagram of internal, external and vertical circulation.

Traditionally, firefighters entered the apparatus bay by way of a fire pole or slide. Embellishing upon the idea of the fire slide, Cohen's design uses a single run staircase with long treads, allowing for firefighters to run more easily and safely down the stairs. The stairs lead directly to the apparatus bay for quick response times.

Figure 6: Rendering of the dayroom on the second floor.

Patrick Mincks

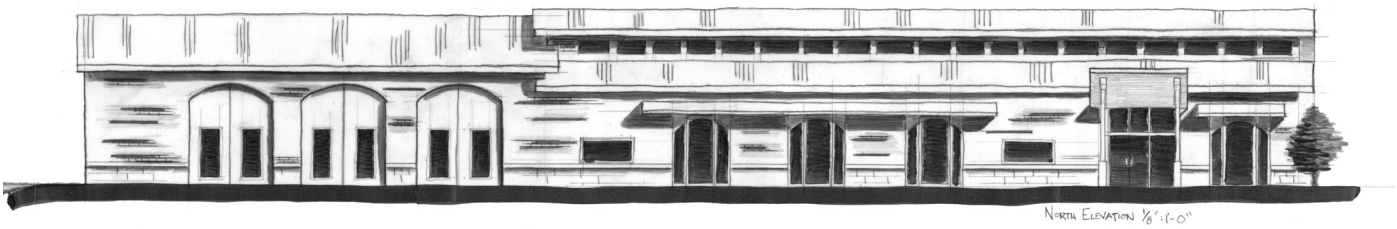


Figure 1: View of the building from the street.

Mincks' design for Fire Station No. 4 takes the form of a two-story, rectilinear building. Throughout the design process, reconciling the functionality of the fire station with the domestic needs of a "fire house" was one of Mincks' top priorities. One of his key design moves was to flip the original orientation of the building. He placed the apparatus bays on the east side of the building as opposed to the west to eliminate possible blind spots from the west side of the site (the most common direction to approach the building). A key organizational element of this building is the circulation space along the north side of the building. The goal for this simple circulation scheme was to keep response times as low as possible.

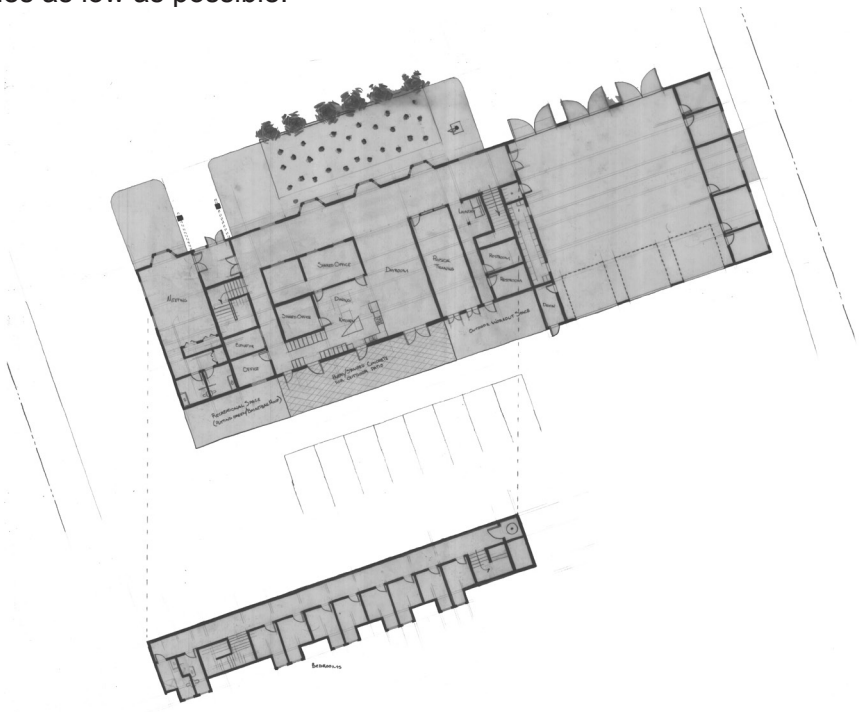


Figure 2: Floor plan.

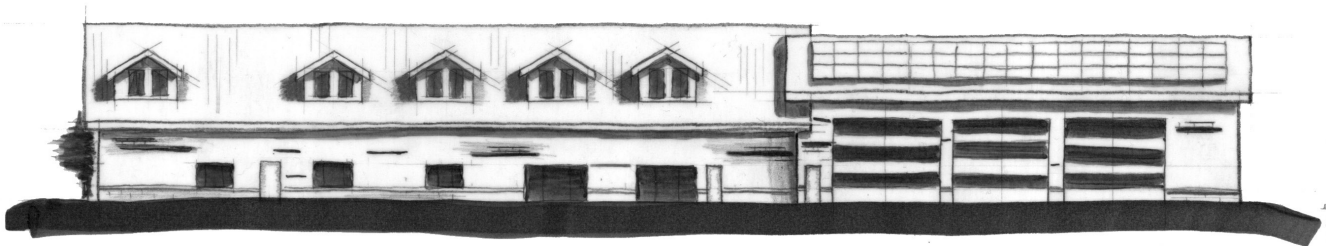


Figure 3: South elevation of building.

The program spaces in Mincks' building are distributed between two floors, with the bedrooms on the upper floor. Though unconventional for an American fire station, Mincks' cited the importance of visual and acoustical privacy as the key reason for including a second floor. Apart from issues of privacy, spreading programmatic functions into two stories reduces the amount of building enclosure, often the most expensive component of building construction. Furthermore, the narrow, rectilinear layout of the building creates more opportunities for daylighting, thus reducing reliance on electricity.

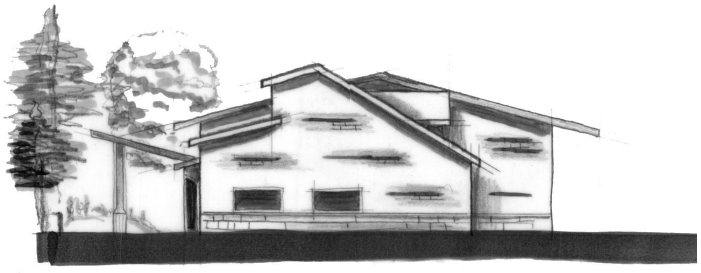


Figure 4: West elevation of building.

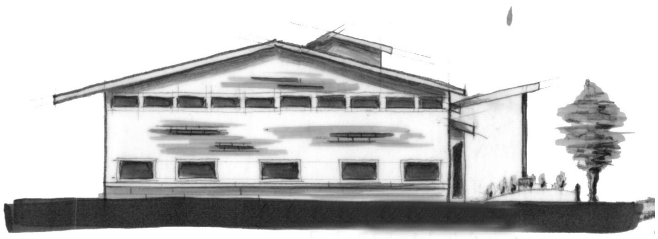


Figure 5: East elevation of building.

Kiana Motahari-Asl

Figure 1: View of the building from the street.

Motahari's starting point for this design was the reconciliation of the fire "station" with the fire "house". The identity of Fire Department No. 4 as a "station" was translated into a rectilinear, masonry volume, speaking to the gravity of its civic purpose. The identity of the building as a fire "house" is physically represented by a wedge-shaped wood frame building, meant to incite a sense of comfort and warmth.

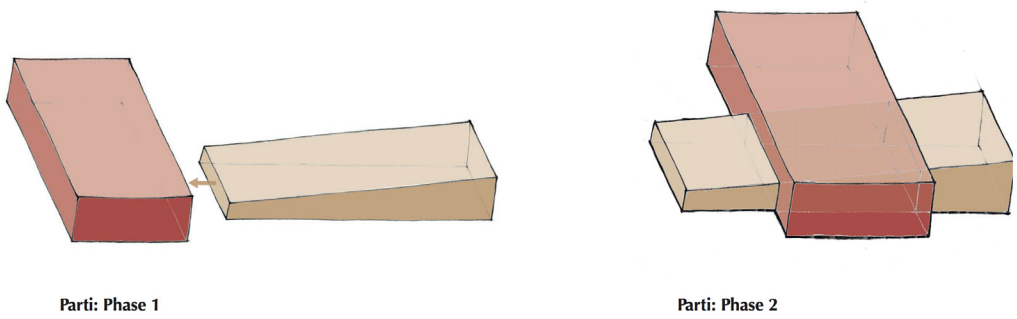


Figure 2: Diagram illustrating the main concept of the design.

Fire Station No. 4 is unique in the sense that it also includes a training facility, requiring heavy amounts of pavement. Therefore, an open-air courtyard was created at the intersection of the two main volumes, conceived as a means of providing a more human-friendly outdoor space on the site. Furthermore, the site is slightly lower than the buildings surrounding it and is therefore exposed to the view of its neighbors. The central courtyard not only provides human-friendly space, but also private open-air space.

Figure 3: View of the courtyard space in the center of the building.

To further mediate the site's exposure to its neighbors, a line of trees was added along its perimeter. These evergreens work to define the area of this large site and protect it from prying eyes.

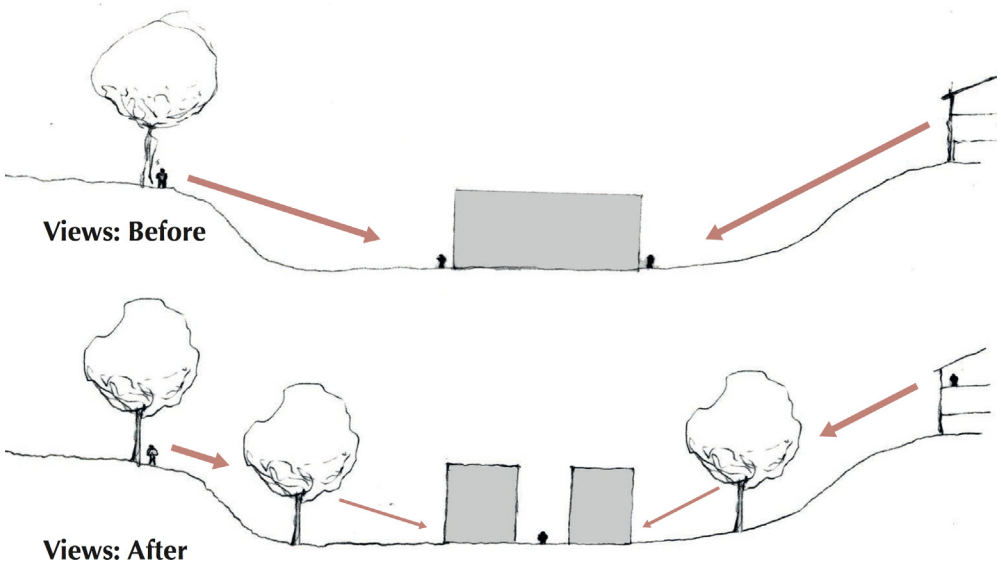


Figure 4: The site before and after the addition of trees along its perimeter.

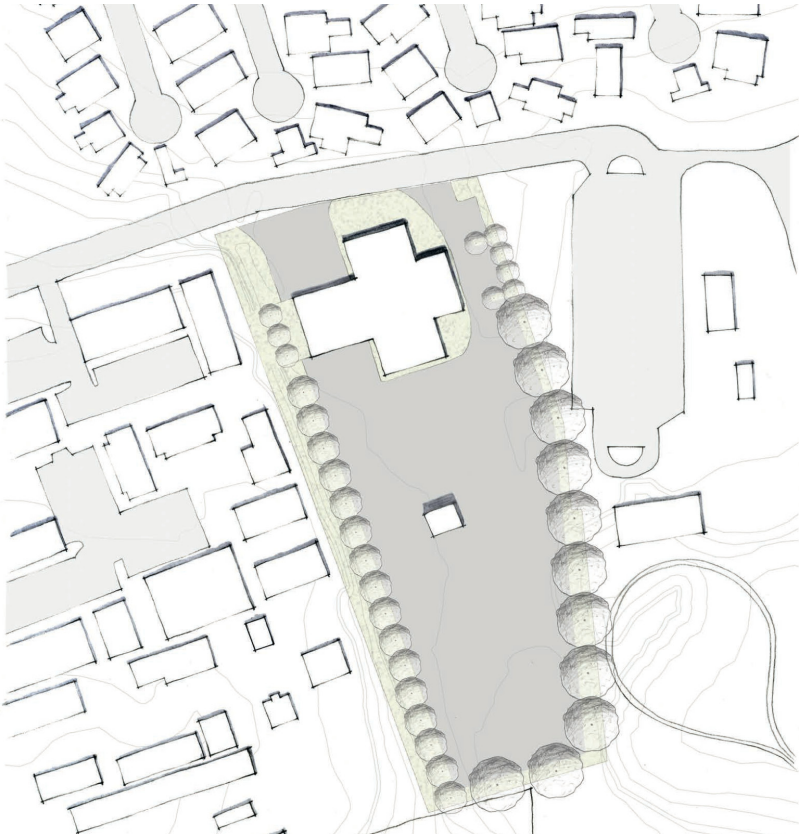


Figure 5: Site plan.

Figure 6: Floor plan.

Motahari kept the floor plan and circulation paths as simple as possible to ensure low response times. The public and private spaces are located at opposite ends of the building with semi-private spaces acting as a buffer in between. These semi-private areas are separated from the courtyard by two sets of foldable glass walls. On nice days, these two walls can fold away to create one large open-air space in the center of the building.

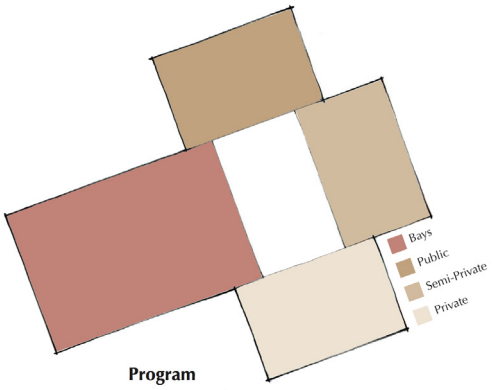


Figure 7: Organization of functions from public to private.

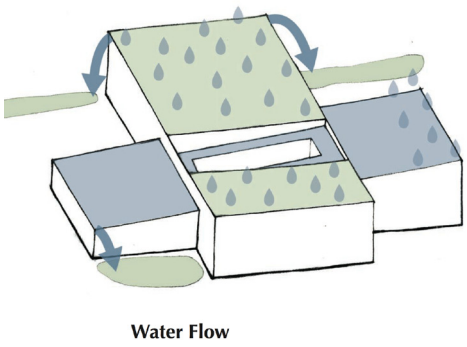


Figure 8: Diagram illustrating water collection strategies of the roof.

The integration of green strategies was an important aspect of this design. One of these strategies was the inclusion of bioswales (see Appendix A) along the western edge of the site; stormwater from the site is directed toward these rain gardens that in turn filter the water for later use. Another sustainable strategy was the inclusion of a green roof (see Appendix A) on the masonry volume of the building.

Stephanie Pak

Figure 1: View of the building from the main street.

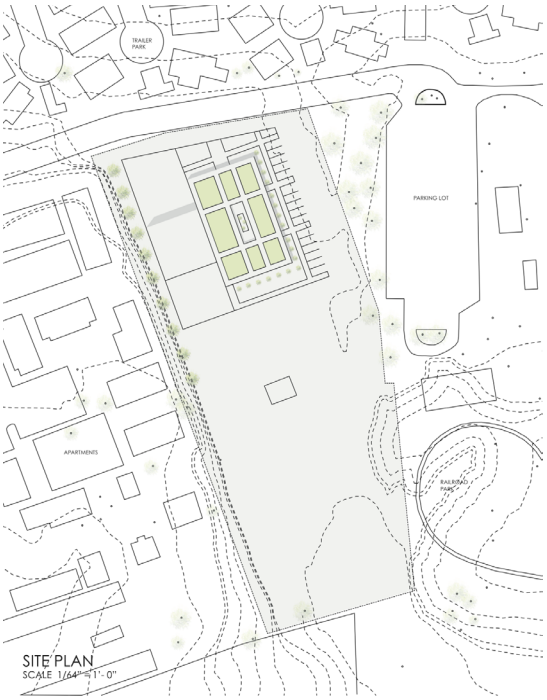


Figure 2: Site plan.

A fire station serves two crucial purposes: the first and most important function is to house the fire-rescue vehicles that serve the ultimate purpose for any fire station, while the second function is to create a domestic space for the firefighters that will call it home. Stephanie Pak translated these two functions into two orthogonal forms. The taller, square-based volume houses the apparatus bays, while the rectilinear volume supports the domestic functions.

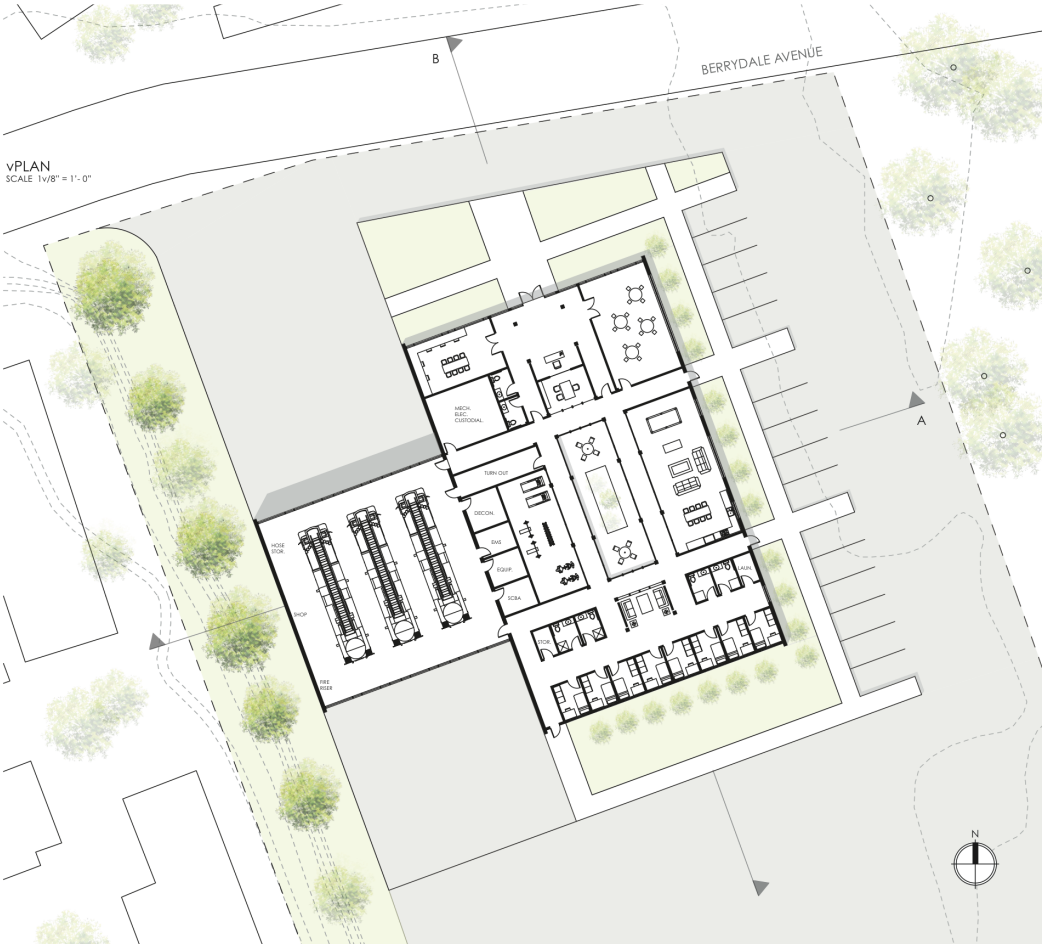


Figure 3: Floor plan.

A key feature of Pak's design is the integration of a courtyard in the center of the domestic space. This courtyard was conceived as a direct response to the vast amounts of pavement currently covering the site. By focusing the building inward rather than out toward the pavement, Pak achieved a livelier atmosphere in the building. Furthermore, this courtyard improves ventilation inside the building, as well as allows more daylight to enter the building and thus reduces energy costs.

Figures 4: Interior view of the courtyard.

Figures 5: Interior view of the courtyard.

Shikha Subramanian

Figure 1: Exterior view of the main entrance.

This design for Fire Station No. 4 was inspired by the dual functions of a fire station as a fire-rescue facility and home. Subramanian interpreted these dual functions into two masses expressed differently through the use of materials; the volume housing the apparatus bays is made of concrete, while the domestic volume is predominantly wood.

The floor plan is organized into a series of rectangles. The northernmost rectangle houses the public spaces including the lobby, reception desk, offices, and community room. A courtyard is located in the center of the building with the gym adjacent to it, allowing the courtyard to serve as an extension of the exercise space in fair weather. The sleeping quarters are aligned along the eastern wall to gain morning sunlight. The dayroom is located along the southern edge of the building, ensuring a private environment for relaxation. Another important feature of this design is a running track that effectively separates the training facility from the fire station.

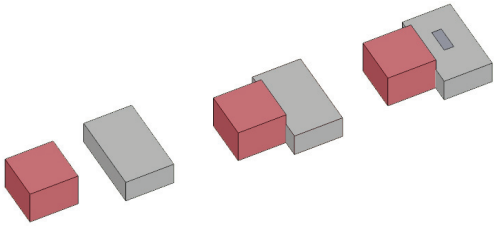


Figure 2: Diagram illustrating the two masses that comprise Subramanian's design.

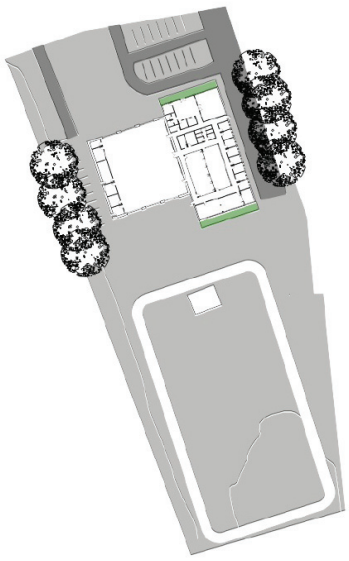


Figure 3: Site plan.

One of Subramanian's major design goals was to provide flexible spaces, an example of this being the dayroom. This space is a combination of four functions: kitchen, dining room, living room & TV room. These areas can either be separated via operable partitions or opened up to allow large gatherings.

Some green strategies include the introduction of a bioswale (see Appendix A) around the perimeter of the site, and a multi-layered "fly roof" to allow air to circulate between the two layers, thus cooling the roof and preventing heat loss. Additionally, the roof extends past the building by four feet, acting as shading for exterior glazing and a mediator for solar heat gain.

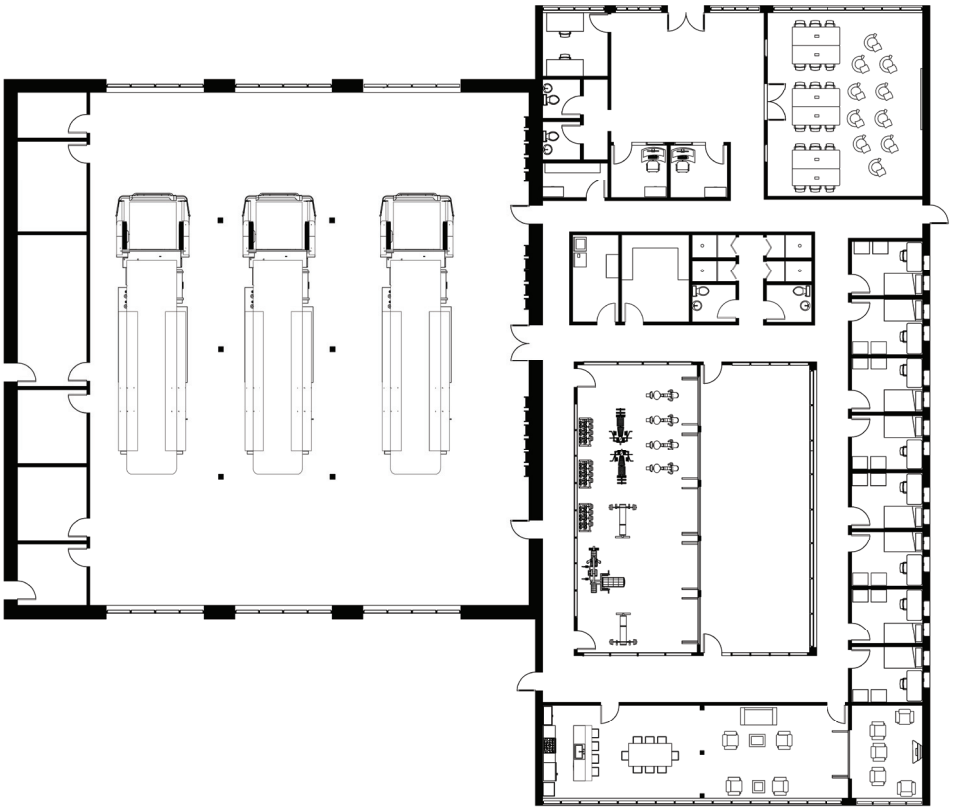


Figure 4: Floor plan.

Figure 5: View of the apparatus bays.

Figure 6: View of the community room.

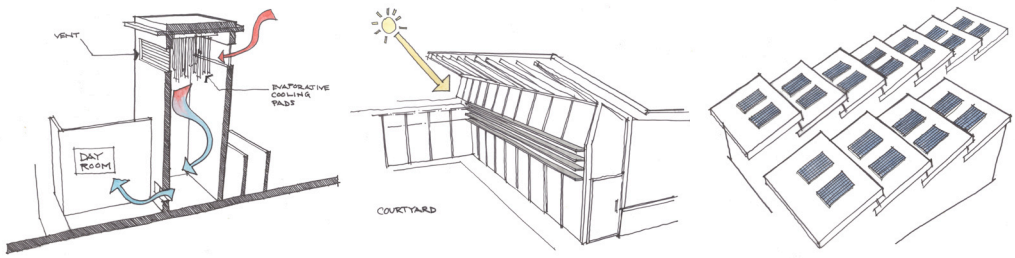
Figure 7: View of the dayroom.

Figure 8: View of the exercise room and adjacent courtyard.

Zack Vacovsky

Figure 1: Perspective of main entrance.

In Vacovsky's view, "the challenge of designing a new fire station for the city of Medford lies in the relationship between a fire station as a civic icon and its ability to provide adequate space for the firefighters to function properly." His proposal focuses on arranging main spaces around central cores of circulation to help maintain low response times in the event of an emergency. One particular idea explored in the formulation of this design was the integration of a courtyard with amenity spaces, such as dining and physical training, to be used in flexible indoor/outdoor scenarios. This project's relationship with the Sustainable Cities Initiative evoked a clear sense of environmental stewardship. Many green building practices were explored when designing this fire station. Solar orientation was a driving factor behind design decisions as well as material palette selection.



Figures 2-4: Diagrams showing sustainable strategies utilized in the building.

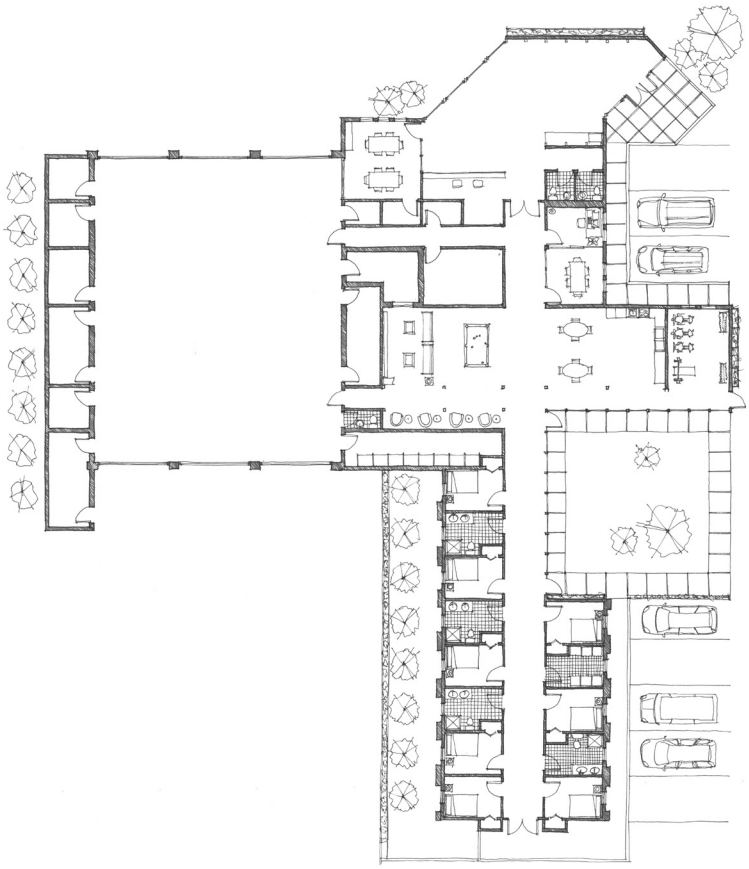


Figure 5: Floor plan.

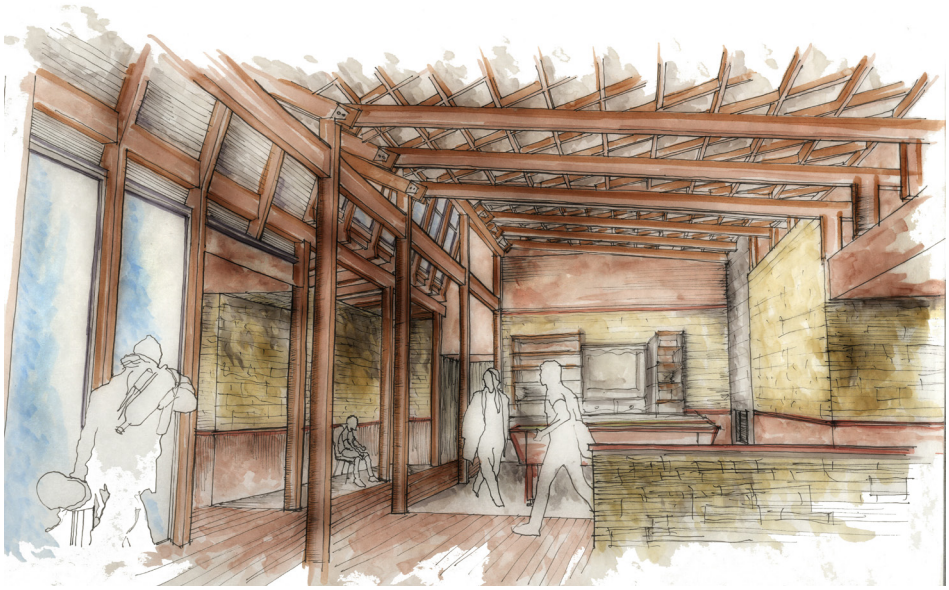


Figure 6: Perspective of the dayroom.

Figure 1: Aerial view of Fire Department No. 5 and its surrounding context.

Medford Fire Department No. 5

2124 Roberts Road, Medford, OR

Fire Station No. 5 in Medford, Oregon is a building that at first glance seems to not take full advantage of its site. The entire southern half of the property is an unused dirt lot, while the majority of the built area is allocated to a driveway and parking. The building itself does not seem to engage the site or the context around it in any way.

The actual firehouse is a small residential building with a cluttered interior. The kitchen serves double duty as the station office and the living room and one of the bedrooms is also used as a workout area. The fire engine barely fits in the apparatus bay and there is little room for storage throughout the station. One quality of the site that is welcoming is the bio-swale lining North Keene Way Drive. This landscape element coupled with the handful of existing trees on site provides potential for a scheme that could tie the new fire station into the environment that surrounds it.

Mercedes Butchas

Figure 1: Interior view of the community room.

Mercedes Butchas' design for Fire Station No. 5 is comprised of two bar-like buildings, with the more prominent structure housing the fire rescue vehicles in immediate relation to the adjacent streets. The linear layout of the second building allows for quick and easy circulation through the corridors, significantly reducing response times.

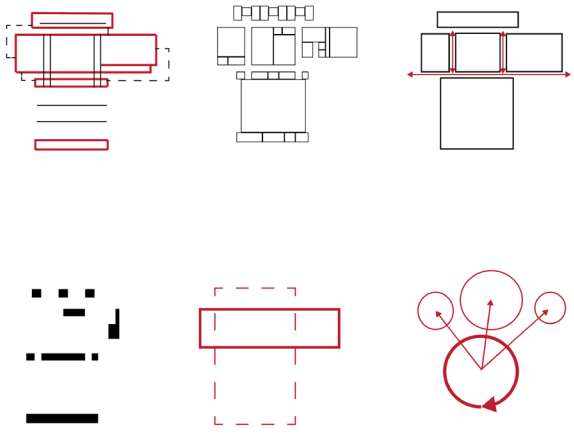


Figure 2: Diagrams showing spatial organization of Fire Station No. 5.

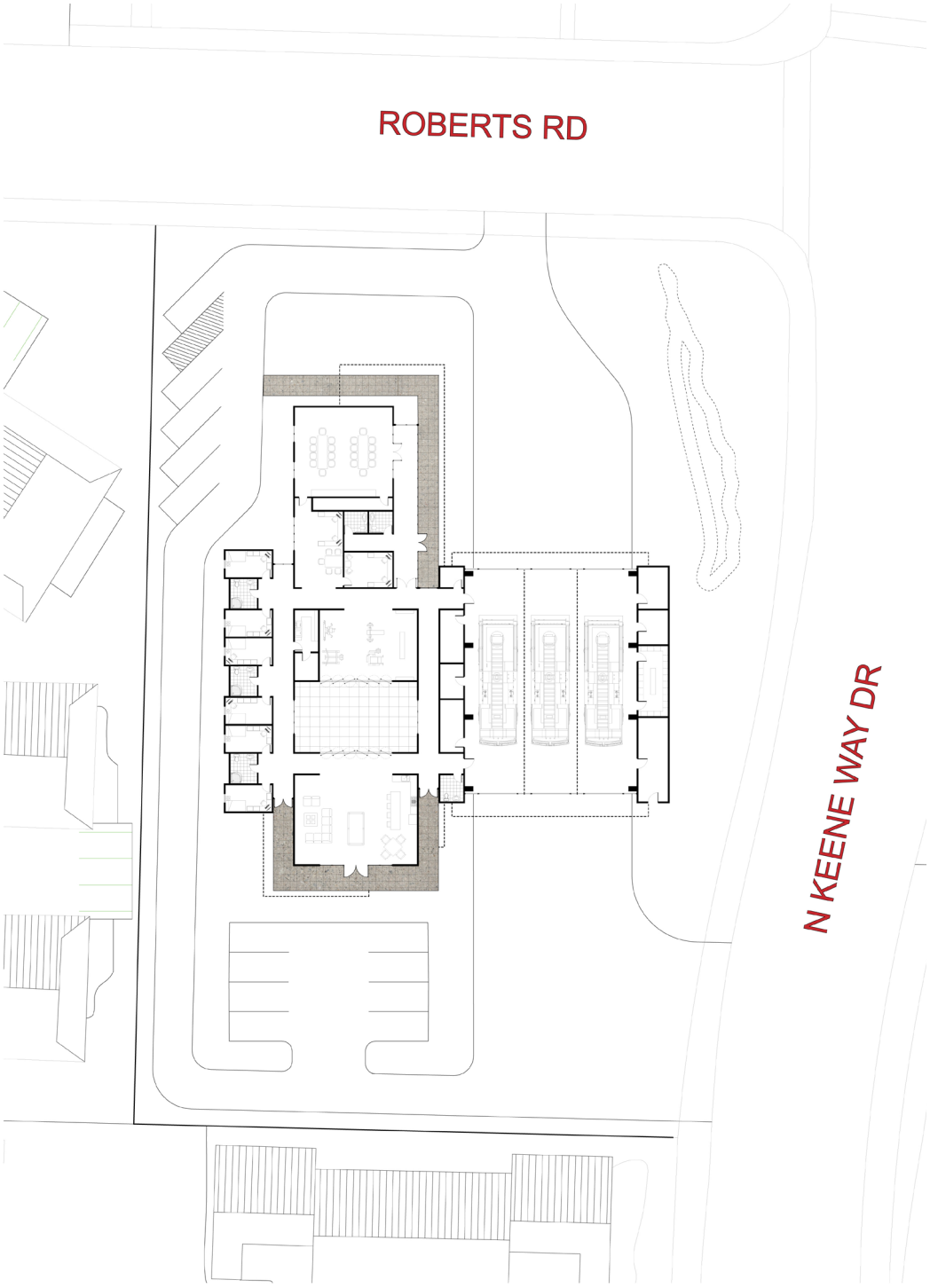


Figure 3: Floor plan.

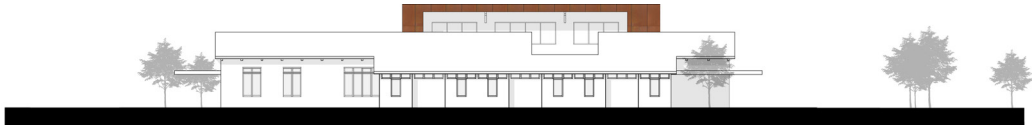


Figure 4: West elevation of Fire Station No. 5.

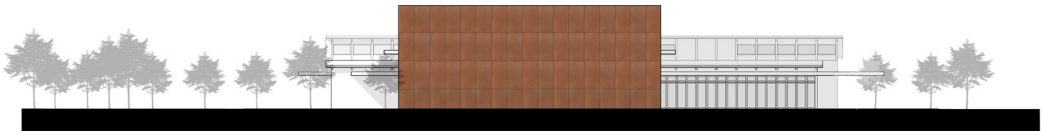


Figure 5: East elevation of Fire Station No. 5.

Butchas dealt with the issue of the split private/public functions by dividing the parking into separate visitor and staff lots, locating the staff entry on the south side of the building while the public entry remains to the north. Visitors to the site will pass by the community room with a full view of the fire-rescue vehicles before entering the public lobby. The apparatus bay, wrapped in red Cor-Ten steel, recalls the historical design of brick fire stations, while providing a unique view of the future of these buildings.

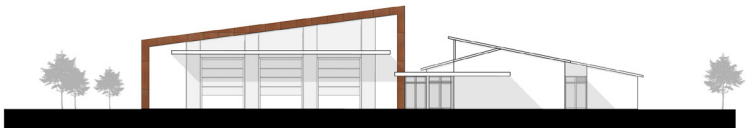


Figure 6: North elevation of Fire Station No. 5.

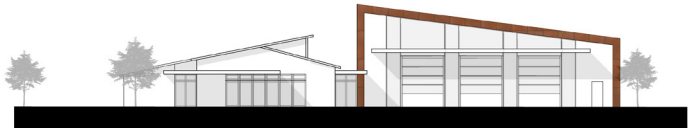


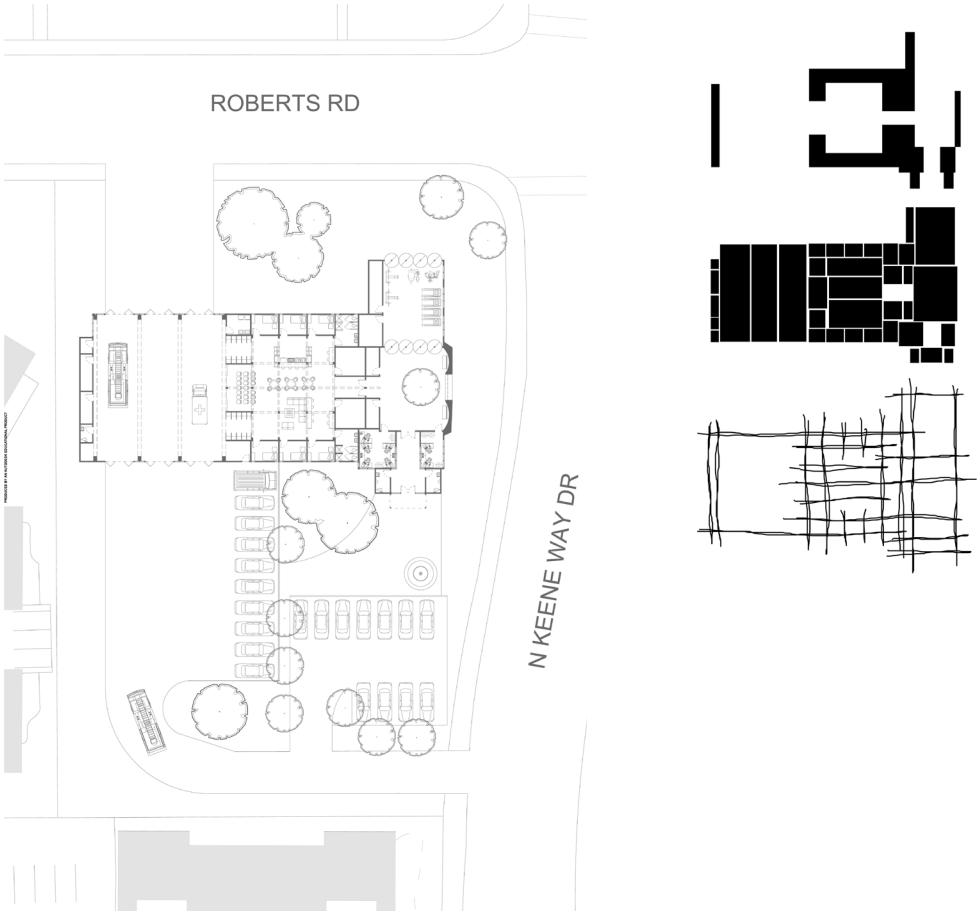
Figure 7: South elevation of Fire Station No. 5.

Hunter Clement

Figure 1: Interior view of the apparatus bay.

The goal of Hunter Clement's design for Fire Station No. 5 was to provide firefighters with a home away from home that promotes bonds between those who share a shift, as well as to provide security and privacy from the surrounding community.

The dayroom is central to the building's volume and houses the kitchen, dining area and lounge area. Sleeping quarters surround this space and define an otherwise open, double-height room inside. To the west of the dayroom, firefighters have access to a multi-purpose room that looks out into the apparatus bays. This room can be used for private calls or meetings between firefighters, and provides direct access to the fire-rescue vehicles in case of emergencies.



Figures 2 and 3: Floor plan and diagrams showing spatial organization

The north and south walls of the apparatus bays are glazed, displaying the fire engines and other vehicles to the public. Heavy concrete columns along the edges of the structure, as well as deep rafters under the roof, remove the need for internal column support, freeing the floor space below for the firefighters to move about freely.

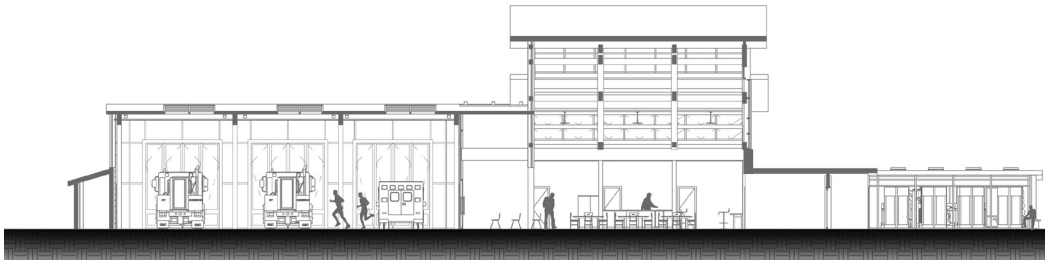


Figure 4: Building section cutting east-west through the site.

Figures 5: Interior perspective showing day room.

Figures 6: Interior perspective showing dining area.

At the eastern end of the building are the courtyard area, exercise room, offices spaces and public entry. When the outdoor courtyard is not in use by the public, it can be used as an outdoor exercise/training space by the firefighters.

Quick response times are essential in a fire station setting, so Clement designed the building to follow a rectilinear form with corridors that give firefighters a straight line of access to the apparatus bays from any point in the building.

All parking is located on the southern edge of the site, giving the building a landscaped northern front that faces the street. Private parking is separated from public parking and is gated off from the public lot. Clement designed the program to be adaptable for future additions. More sleeping quarters can be added to either side of the day room or public lobby if necessary.

Figures 7: Interior perspective showing exercise facilities.

Figure 8: Interior perspective showing apparatus bay.

Amanda Daniels

Figure 1: Exterior view of entrance and apparatus bay.

This design for Fire Station No. 5 was conceived as an accommodation for activities varying from the domestic to the heroic. Accommodations for the firefighters' work activities are housed in a more formal, brick building while the domestic functions are kept to a more residential, wood-clad structure.

The building organization is segmented into three areas based on functional needs: fire-rescue vehicles, firefighters, and the community. A circulation route runs through the middle of the main building with two corridors that provide access to the apparatus bay.

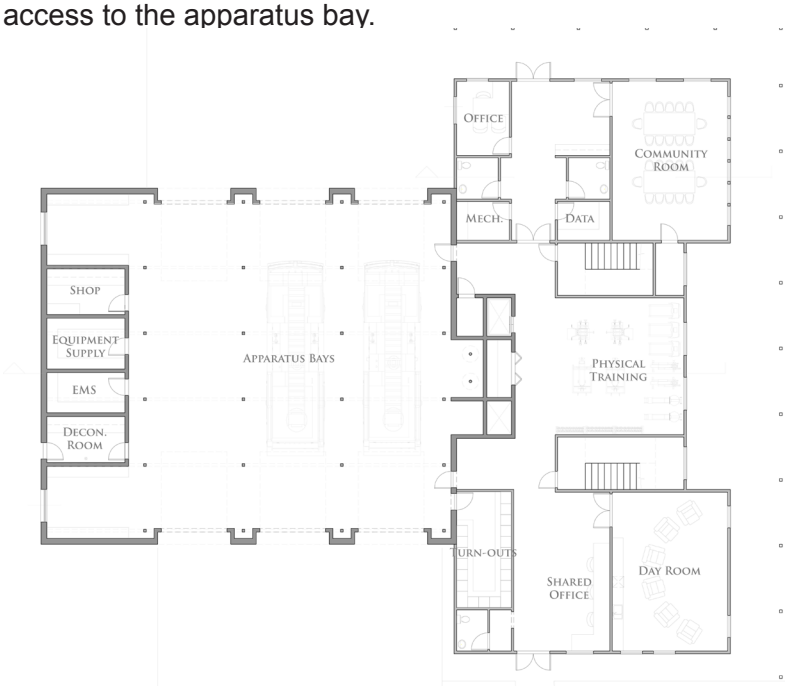


Figure 2: First floor plan.

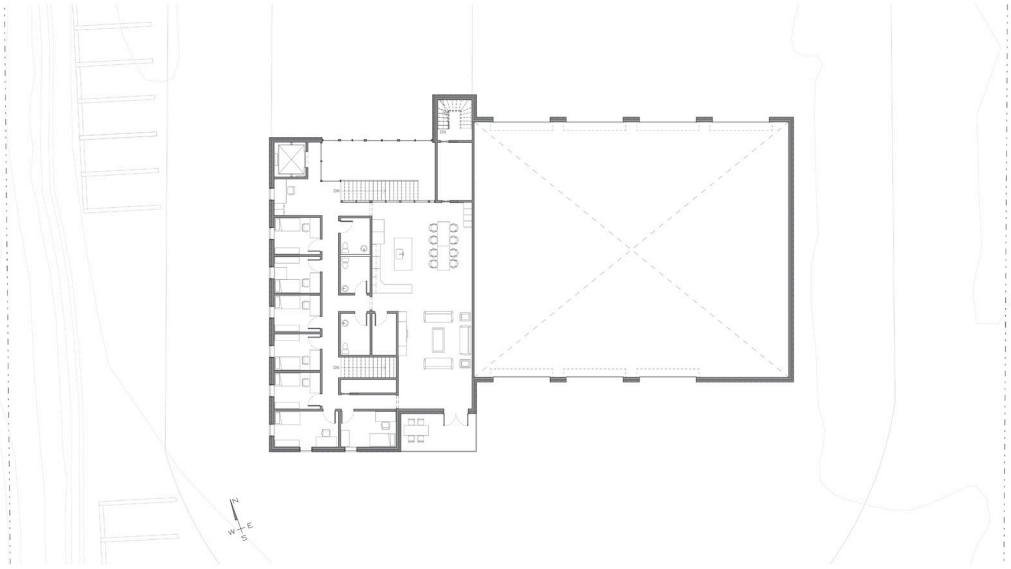


Figure 3: Second floor plan.

The majority of the living spaces are kept to the second floor to physically and acoustically separate them from the louder, more public areas of the building. Each room in the building is positioned to allow adequate daylighting levels.

Sustainability was a driving factor in Daniels' design, with landscaping carefully chosen for its drought-resistant and low-maintenance qualities. Environmental strategies were introduced to address solar energy and water collection. The sloped aluminum roof over the main building collects water at the bottom into a gutter that leads to a rain cistern (see Appendix A). This water can then be used for irrigation and greywater systems (see Appendix A) in the building.

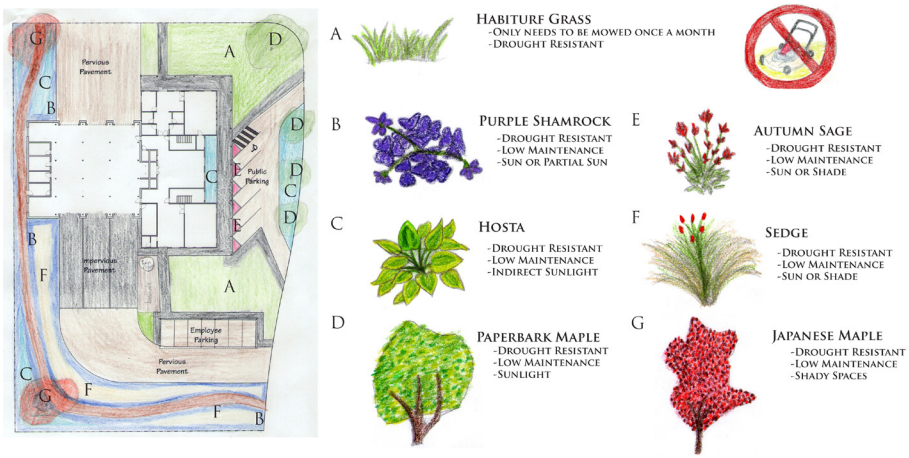
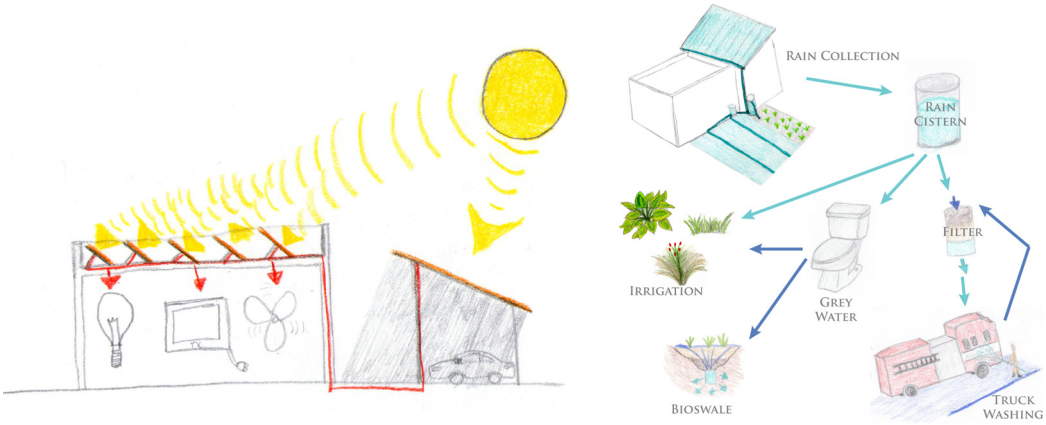


Figure 4: Diagram showing different landscaping elements.



Figures 5 and 6: Diagrams showing potential for the collection of rainwater and solar energy.

During the wet season, as the rain cistern becomes filled to capacity, an adjacent bioswale (see Appendix A) collects overflow stormwater and filters it to be reintroduced into the greywater systems as well. Above the apparatus bay, an array of PV panels (see Appendix A) are located on the roof to collect solar energy to help offset the cost of electricity in the station. There is also an opportunity for solar hot water collectors on the east side of the apparatus bay roof.

Figure 7: Chipboard model of the building.

Richard Garrod

Figure 1: Exterior view of entrance and apparatus bay.

The current Fire Station No. 5 lacks many of the necessary fundamental elements required for the station to function properly. Garrod cited inadequate storage space, a degrading structural system, and an awkward house-like layout as a few of the varying challenges that the staff experience everyday. As a solution to this problem, the new fire station presents a prime opportunity to not only address these current issues, but also prepare the fire station for future needs.

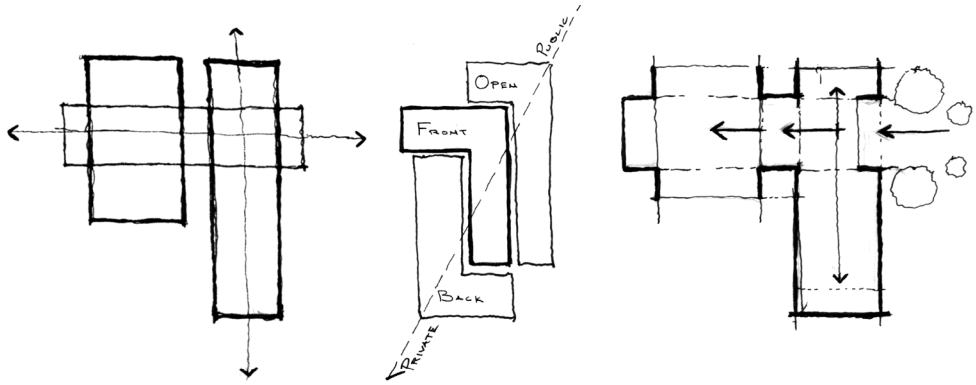
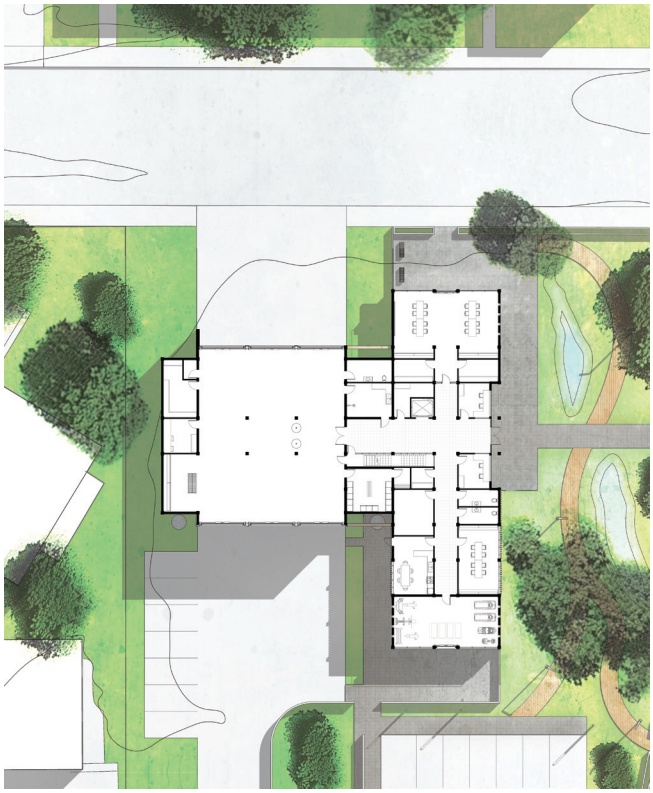


Figure 2: Diagram showing spatial organization.



Figures 3 and 4: First and second floor plans.

The current site has rich opportunities for fostering a strong connection with its community. Further development of the existing bioswale (see Appendix A) created the opportunity to develop it into a community garden that serves as a public gateway to Fire Station No. 5. The building is designed with a clear and simple form to address the need for a quick response time to emergency situations.

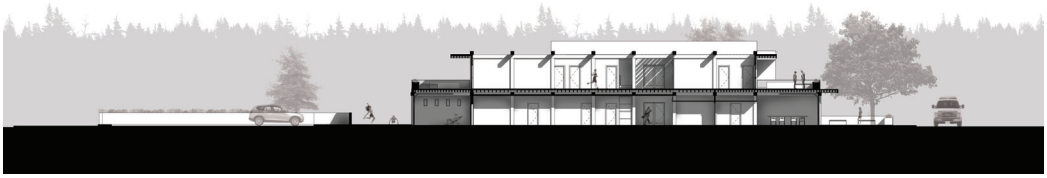


Figure 5: Building section cutting north-south through the site.

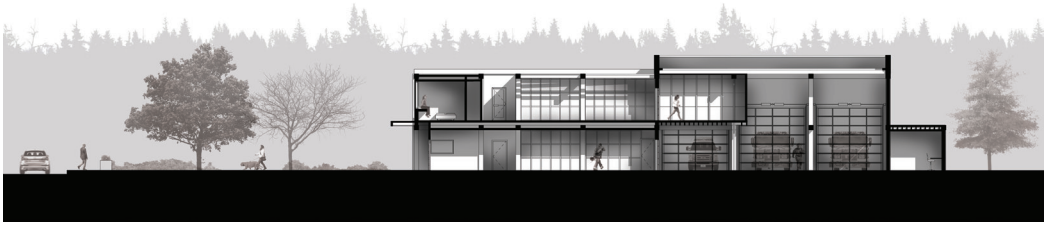


Figure 6: Building section cutting east-west through the site.

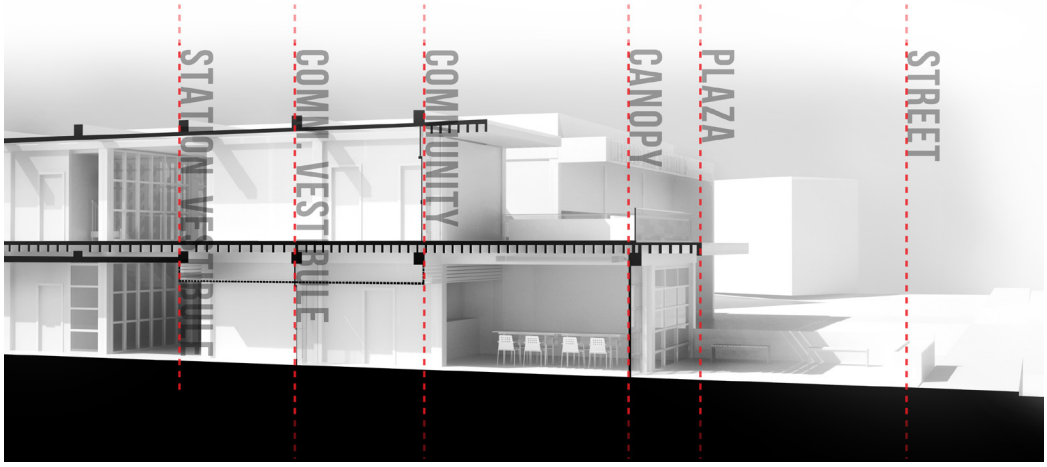


Figure 7: Section perspective showing demarcation of program inside building.

With a simple grid layout, the design for Fire Station No. 5 utilizes a simple, exposed timber frame post-and-beam structural system. A key advantage to the use of an orthogonal organizational system is the allowance of a straightforward and cost-effective construction strategy, as well as the use of local materials. The structure is further emphasized within the building through exposed wooden purlins at pivotal spaces, such as the community room, and the transitional apparatus access path. These wooden purlins, in turn, help to create visually dramatic light and shadow spatial qualities.

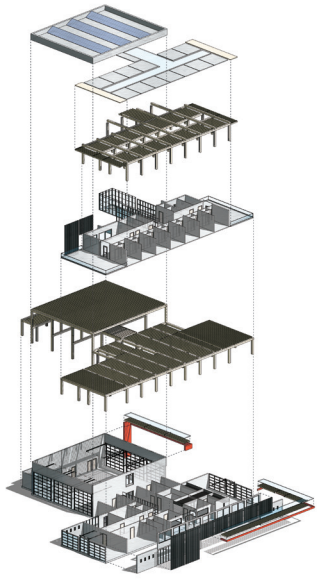


Figure 8: Levels of structure within the building.

Figure 9: Site plan.

Evan Goodwin

Figure 1: View of entry lobby from the north.

Evan Goodwin's design for Fire Station No. 5 was derived from a series of diagrams exploring the peculiar typology of the fire station, requiring a high level of public presence and identity while maintaining a sense of privacy and security for the fire-rescue staff who live inside.

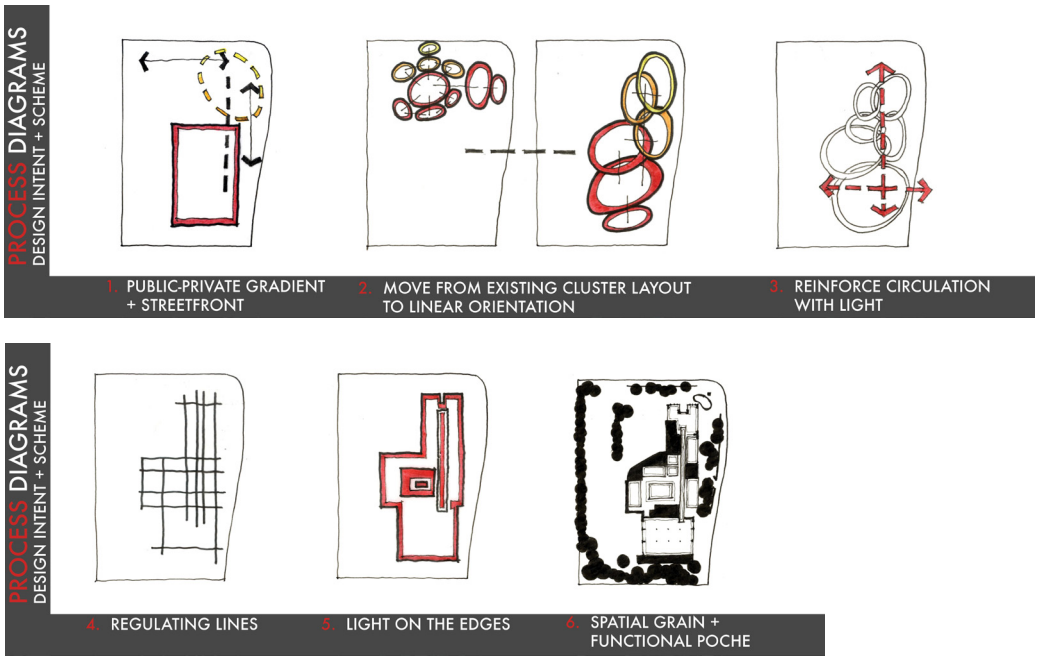
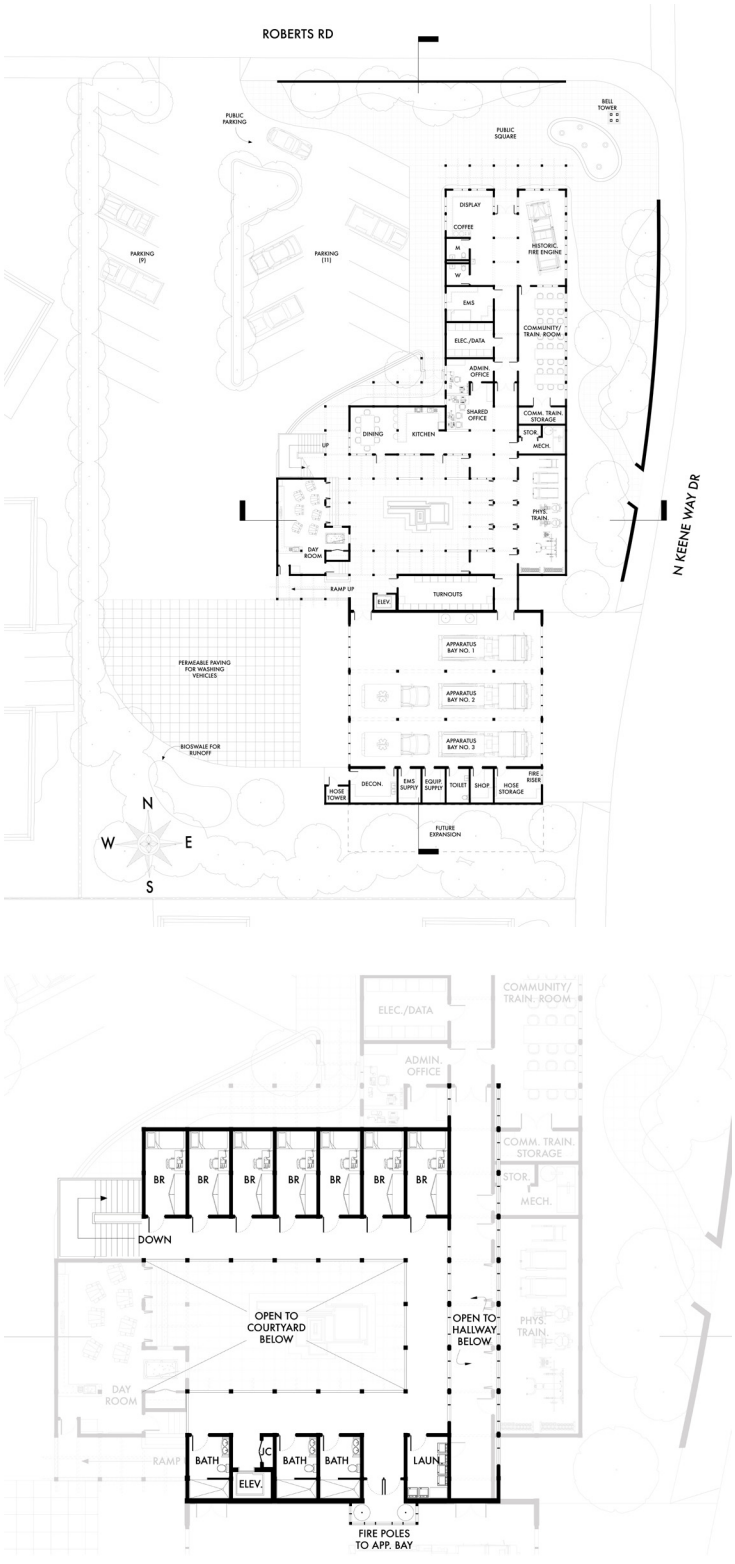


Figure 2: Diagrams showing process of finding the building's form.



Figures 4-5: First and second floor plans.

Figure 6: Site section cutting north-south.

According to Goodwin, “The architecture should reflect the civic nature of the building, but be careful to not impose on the existing fabric of the neighborhood in which it sits.” To create a sense of community and neighborhood identity along both street fronts, Goodwin designed a small public square with a promenade of trees and weekend farmers’ market in mind.

The counterpoint of this public square is the private outdoor courtyard located within the heart of the living quarters on the south side of the site. The space in between is used as an intimacy gradient, and is defined by the light well that runs above the building’s main circulation route.

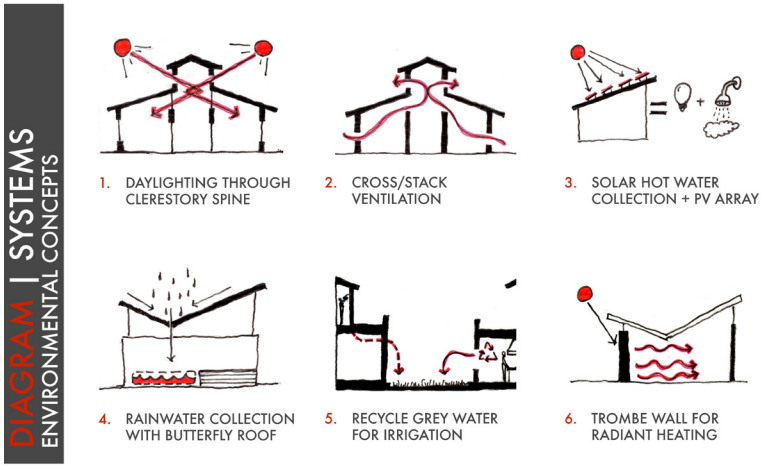
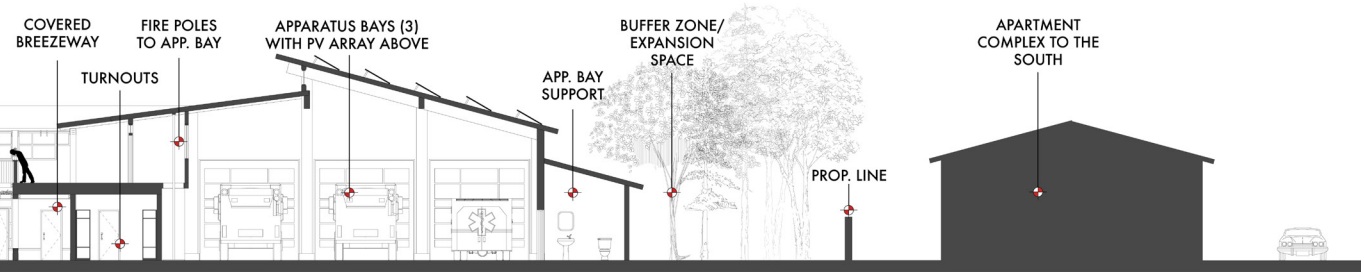


Figure 7: Diagrams showing environmental strategies.



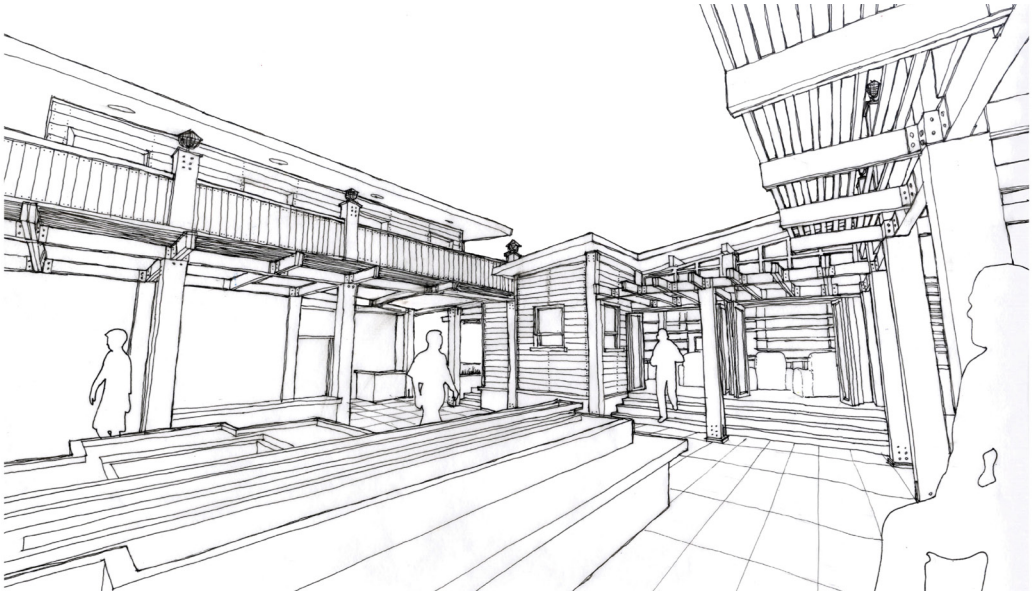


Figure 8: View of courtyard.

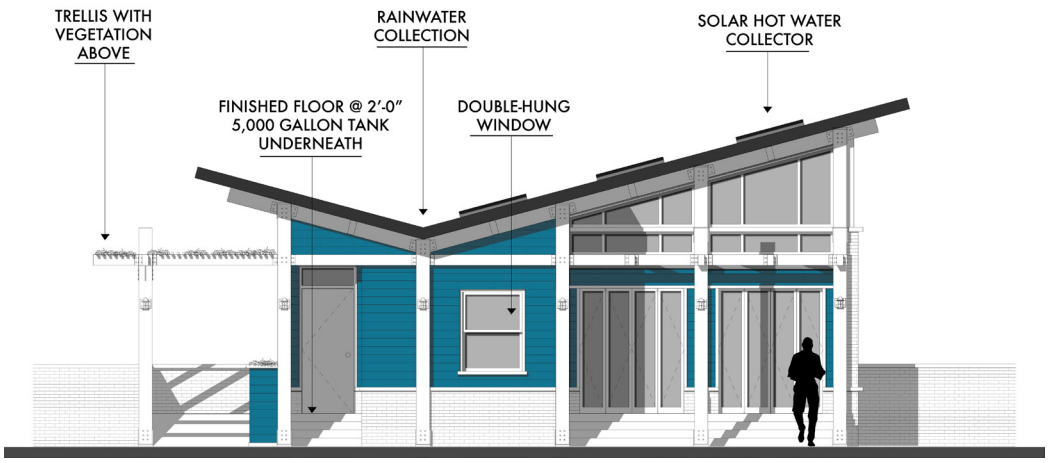


Figure 9: Elevation of dayroom.

Monika Moechtar

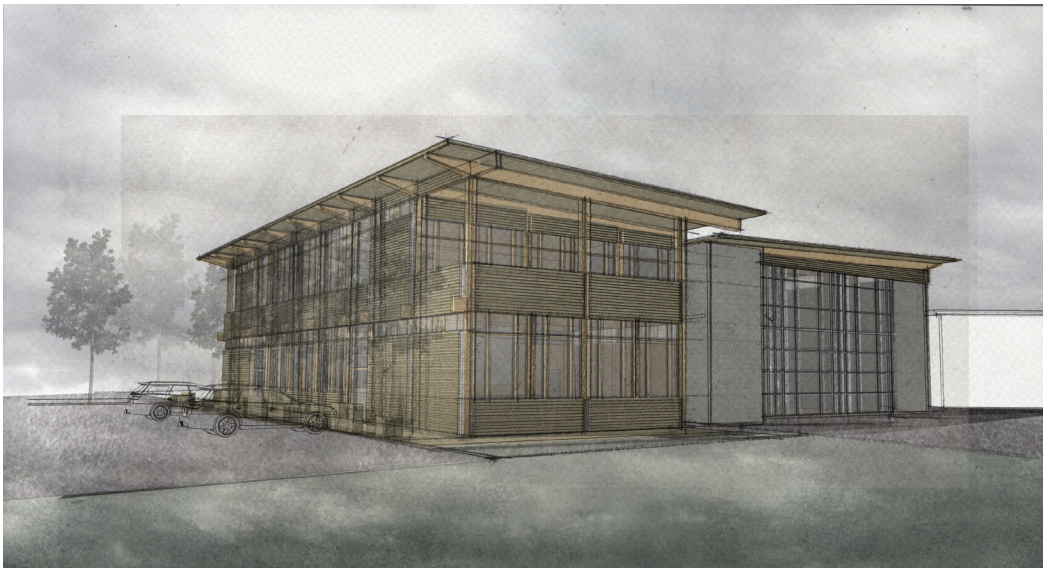


Figure 1: Exterior view of Fire Station No. 5.

For the design of Fire Station No. 5, Monika Moechtar chose to focus on creating a building that would serve as a symbol of safety and a place for community to gather in its neighborhood. To invite the public in, Moechtar dedicated the northeast corner of the site to public functions. The community room and entry lobby are located on the first floor, while the more private rooms (bedrooms, restrooms and physical training room) are located on the second floor.

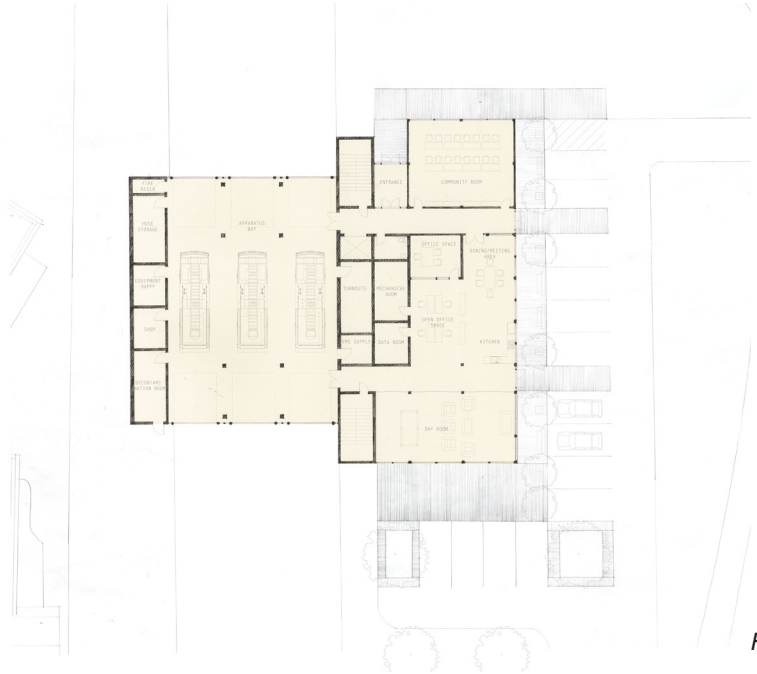


Figure 2: First floor plan.

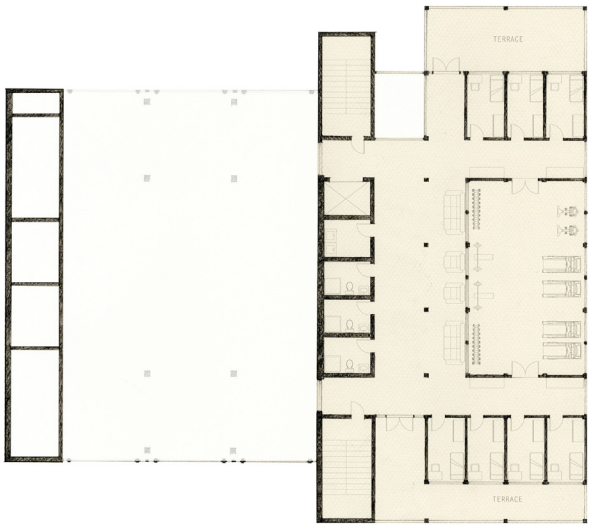


Figure 3: Second floor plan.

Moechtar placed semi-private rooms, such as the living room, day room and kitchen, in between the community room and the private upstairs rooms to create a buffer space in between the public and private areas of the new fire station. By using a two-storey scheme, the building footprint was reduced and cost of construction was significantly lessened.

Moechtar employs the use of a water cistern to collect rainwater from the sloped roofs for reuse in non-potable systems and irrigation.

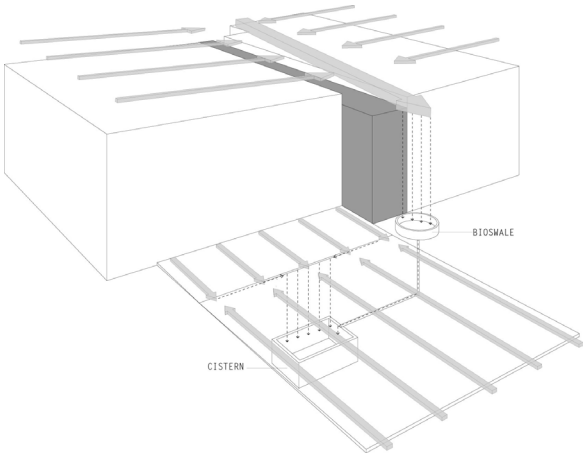


Figure 5: Diagram illustrating the components of the rainwater catchment system.

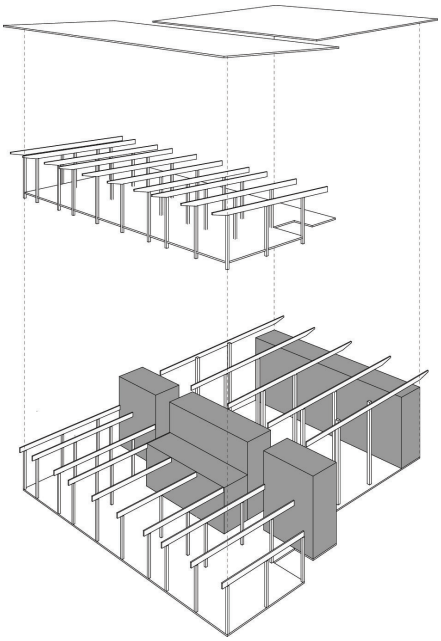


Figure 6: Section through the site cutting east-west.

Lane Pak

Figure 1: Exterior view of Fire Station No. 5 at sunset.

Lane Pak's approach to the design for Fire Station No. 5 stemmed from her desire to create a "beacon" for the neighborhood. While the station is a public arena for various activities, Pak also recognized that it serves as a second home for the firefighters.

As an institution unifying both communal and residential priorities, an emphasis was made on creating a clear distinction between the two functions within the building. All rooms containing public activities are placed in direct relationship to the main roads, Roberts Road and North Keene Way Drive. Meanwhile, all rooms used for private and individual functions are located opposite, facing the immediate bordering residential area to provide a quieter environment within.

Figure 2: Floor plan.

Figure 3: North elevation.

Figure 4: South elevation.

Figure 5: East elevation.

Figure 6: West elevation.

Figure 7: Section perspective cutting through apparatus bay and offices.

Iris Wu

Figure 1: Exterior view of building from Roberts Road.

Wu's design for Fire Station No. 5 employs a simple, interlocking, wood-frame structure to create a clear spatial organization inside its 10,000 square-foot envelope. Particular care was taken in designing the wooden facade and core circulation, as these were two defining elements in the overall design.

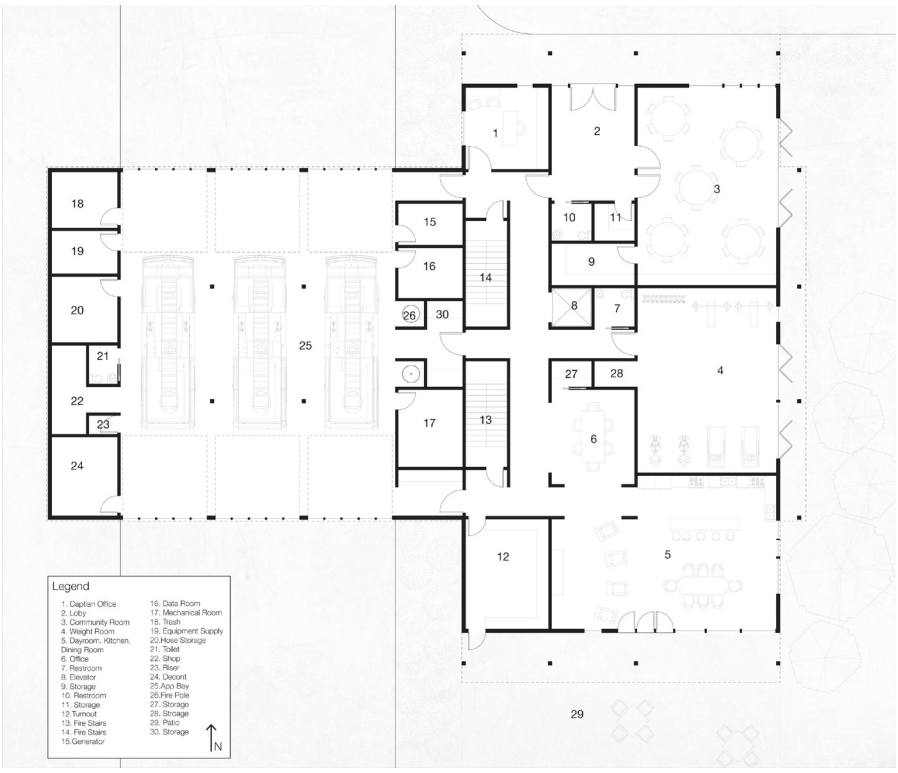


Figure 2: First floor plan.

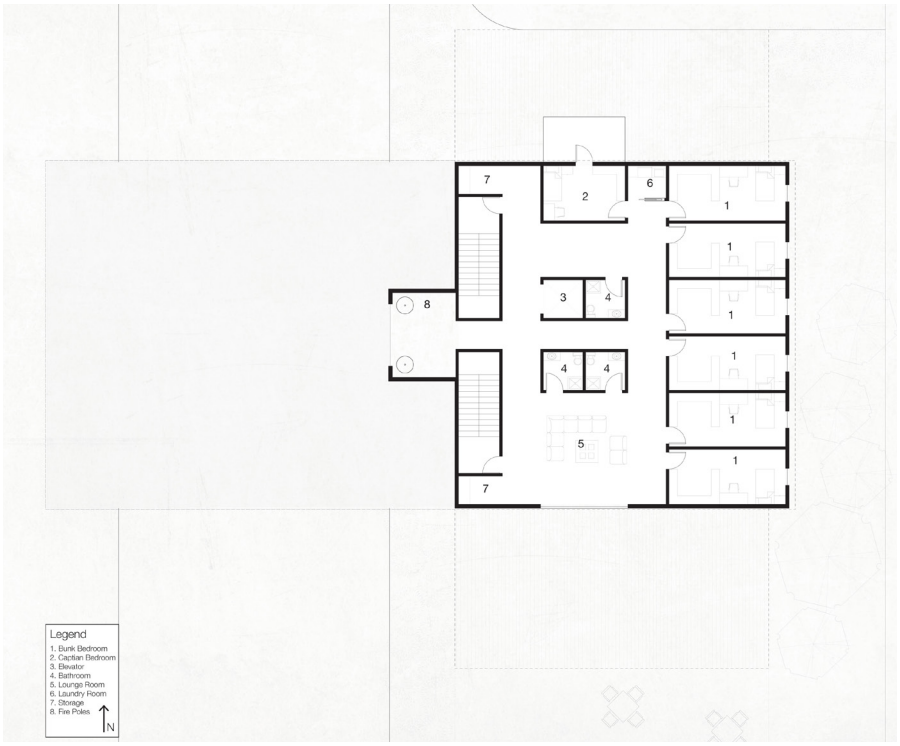


Figure 3: Second floor plan.

Sustainable features were incorporated into the roof system, with an array of PV panels (see Appendix A) on the high roof and green roofs (see Appendix A) on either side, above the smaller volume. Rather than splitting the program into two separate buildings, Wu combined living areas with work-related spaces, weaving circulation throughout to demarcate changes in function.

Figure 4: Interior rendering of dining space.

Conclusion

While the designs for the four different fire station sites varied in style and layout, some common themes did emerge that began to connect the various designs. The project began with the goal of creating LEED Silver certified buildings, so environmental systems were heavily emphasized during the design phase. Strategies such as rainwater collection, bioswales used for runoff, and the employment of photovoltaic arrays and solar hot water collectors served to guide the City of Medford in a more sustainable direction for their civic buildings (see Appendix A).

Programmatic requirements were also a driving factor in most designs--students typically split their designs into one volume containing private functions and another volume used for more public activities. While some designs combined the programs strategically, almost all of them used circulation or landscaping to emphasize distinctions between the two.

When the time comes to build the new fire stations, the students hope that these recommendations will help guide the city in its efforts to design a fire department that will introduce new ways of thinking about fire-rescue facilities of the future.

Appendix A | Technical Terms

Green Roof

As its name would suggest, a green roof is a layer of green plant material placed on a roof plane. There are two types of green roofs: intensive and extensive. For the purposes of this report, all mentions of green roofs refer to the extensive variety. These roofs consist of a thin layer of planting medium with various layers of waterproofing and insulation underneath. The overall depth of this system is around 4-6 inches, weighing anywhere from 15-50 pounds per square foot. The planting material for this type of green roof is chosen specifically for its low maintenance and irrigation needs. Some of the many benefits of this roofing system are as follows:

- Increased insulation for the roof and thus reduction of heat loss
- Protection of roofing membrane from the sun's UV rays, increasing its lifespan
- Absorption of rainwater for collection purposes
- Reduction of the speed of water entering the stormwater management system
- Reduction of heat island effect, resulting in lower thermal loads on the building's HVAC system

Bioswale

"Bioswales" or "rain gardens" are landscape elements designed to remove silt and pollution from surface runoff water. They consist of a swaled drainage course with gently sloped sides to allow water to percolate into the soil. This shallow trough-like depression is filled with vegetation, generally chosen for their low maintenance. These gardens are ideal for parking lots and industrial complexes, given their tendency to be covered in impervious surfaces like asphalt. The water that would usually enter and often overwhelm the storm water management system, flows instead to the bioswales on the site and is either absorbed into the ground or collected for later use.

Water cistern

A cistern is a repository for holding rainwater. Cisterns can be placed either above or below ground and can be made of any waterproof material. Today, cisterns usually take the form of prefabricated concrete tanks placed below ground.

PV panel

The purpose of photovoltaic panels, or PV panels, is to convert solar energy directly into electric energy. Often placed on roof surfaces, these panels consist of a number of photovoltaic cells.

Greywater

The water used and produced by buildings is separated into 3 categories: potable water, greywater, and blackwater. Greywater is the domestic wastewater from bathroom fixtures (such as basins, showers and baths, excluding toilets), laundry fixtures (such as clothes-washing machines and laundry troughs) and kitchen facilities (such as sinks and dishwashing machines). Depending on the level of wastewater treatment, greywater can be recovered and used for applications such as toilet flushing and irrigation.

Appendix B | Suggested Program

(Based on the "Facilities Master Plan" developed by Group Mackenzie)

Fire Station 2

10,050 sf

Apparatus Bay

- 3 Bays, 960 sf each
- 2880 sf

Apparatus Support Rooms

- Turnouts, Decontamination, EMS Supply, Equipment Supply, Hose Storage, Shop, Toilets, Fire Risers
- 836 sf

Living Quarters

- Bunk Rooms, Restrooms, Dining, Kitchen, Day Room, Physical Training, Laundry, Storage
- 2630 sf

Administration

- Staff Workstations, Crew Offices
- 416 sf

Building Support

- Electrical & Data, Mechanical, Janitor
- 312 sf

Community & Training Rooms

- Reception, Community Room, Coffee Service, Storage, Restrooms
- 1301 sf

Parking

- Public Parking, Staff Parking, Support vehicle
- 4050 sf

Site Elements

- Apparatus Bay Aprons, Generator, Trash, Patio
- 6156 sf

Fire Station 3

14,760 sf

Apparatus bays

- 4 bays, 960 sf each
- 3840 sf

Apparatus Support Rooms

- Turnouts, Decontamination, EMS Supply, Equipment Supply Room, Hose Storage, Shop, Toilets, Fire Riser
- 900 sf

Living Quarters & Administration

- Bunk Rooms, Battalion Chief Bunk Room, Restrooms, Dining, Kitchen, Day Room, Physical Training, Laundry, Storage
- 3106 sf

Administration

- Battalion Chief Office, Staff Workstations, Crew Offices
- 2008 sf

Building Support

- Electrical & Data, Mechanical, Janitor Closet
- 312 sf

Community & Training Rooms

- Reception, Community Room, Coffee Service, Storage, Restrooms
- 2134 sf

Parking

1. Public Parking, Staff Parking, Support Vehicle
2. 5508 sf

Site Elements

- Apparatus Bay Apron, Generator, Trash, Patio
- 8351 sf

Fire Station 4

10,536 sf

Apparatus Bay

- 3 Bays, at 960 sf per bay
- 2880 sf

Apparatus Support Rooms

- Turnouts, Decontamination, EMS Supply, Equipment Supply, SCBA, Hose Storage, Shop, Unisex Toilet, Fire Riser
- 3927 sf

Living Quarters

- Bunk Rooms, Toilets, Showers, Dining, Kitchen, Day Room, Physical Training, General Storage, Laundry
- 2836 sf

Administration

- Staff Workstations, Crew Offices
- 416 sf

Building Support

- Electrical & Data, Mechanical, Janitor Closet
- 312 sf

Community and Training Rooms

- Reception Area, Community Room, Coffee Service, Storage, Restrooms
- 1289 sf

Parking

- Public Parking, Staff Parking, Support Vehicles
- 4050 sf

Site Elements

- Apparatus bay Aprons, Trash, Patio, Generator
- 6425 sf

Fire Station 5

9,340 sf

Apparatus Bays

- 3 Bays, 960 sf each
- 2880 sf

Living Quarters

- Bunk Rooms, Restrooms, Dining, Kitchen, Day Room, Physical Training, Laundry, Storage
- 2334 sf

Administration

- Staff Workstation, Crew Offices
- 416 sf

Building Support

- Electrical & Data, Mechanical, Janitor Closet
- 312 sf

Community & Training Rooms

- Reception, Community Room, Coffee Service, Storage, Restrooms
- 1301 sf

Parking

- Public Parking, Staff Parking, Support Vehicles
- 4050 sf

Site Elements

- Apparatus Bay Aprons, Generator, Trash, Patio
- 6431 sf

Definitions:

Community Room: A multi-purpose space intended primarily for community gatherings and staff meetings.

Day room: The day room is essentially the living room of the fire station. This room usually features a TV and comfortable furniture arranged around it.

Appendix C | References

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