FOOD SERVICE

The food service areas for the new OSU Cascades Campus facility are sized to accommodate 300 residents and a total of 600 people on campus with dining seats for approximately 200. Both meal plan (declining balance) and cash/retail capability is anticipated. 'Sensory' cooking and preparation, exposed to the customer and interactive, will be the basis of the design approach.

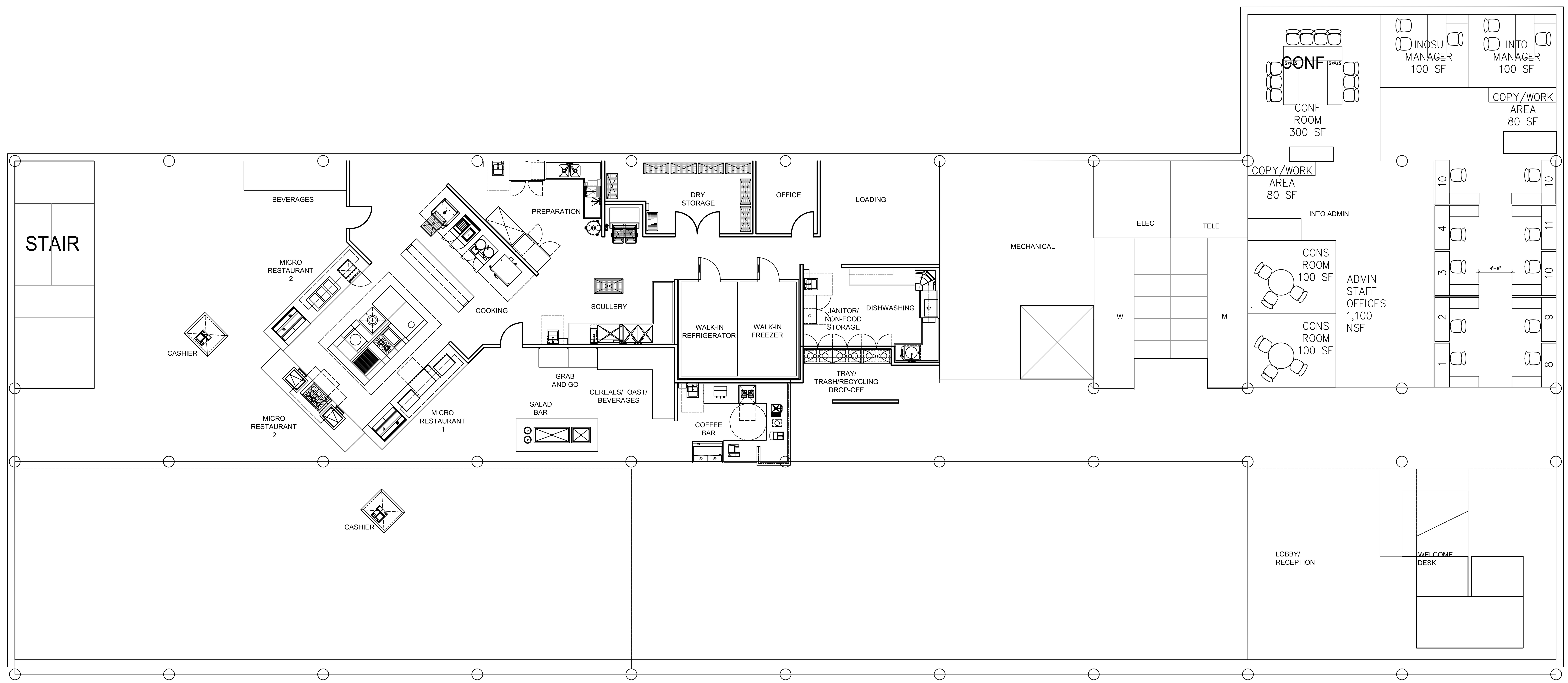
The facilities shall be designed and equipped for maximum flexibility, and responsiveness to accommodate campus population growth, menu diversity, international cuisine, sustainable energy consumption and management, efficient staffing, management and operations, and the unique location and environment of the Oregon Cascades area.

The food service program is currently envisioned to provide scalable facilities to provide for food preparation featuring fresh local and regional ingredients as well as the addition of international menu items. The equipment for the busy lunch service will also be sized to provide a more relaxed dinner service, fresh, healthy breakfasts, and a robust grab and go concept. Cooking classes may be possible in the Exhibition/Demo area. Equipment will be 'modular' in nature, allowing for replacement or an alternative menu or feature item in the future without large expense or disruption.

This facility is designed as an open kitchen with three 'micro restaurants' within the Servery configuration.
An open market area for soup/salad, cereals and other breakfast items, grab and go and beverages offers quick service.
A Coffee Bar with grab and go options will be open for extended hours with the option to have an outside barista contractor.
Cashless order/pay stations are planned in addition to on-line ordering applications for fast service and reduced labor.

Energy conservation and sustainability goals are very important for the food service operation. The equipment selected will be based on LEED criteria, such as low water usage, energy star electrical items, demand (variable air volume) ventilation systems, and food grade glycol cooling for refrigerated cabinets and serving vessels. Recycling, composting and waste management practices should be implemented to minimize environmental impact. A central collection container for waste cooking oils is planned for proper recycling.

The location of the food service building and the impact of the local climate have an impact on the food service facilities. Additional food storage is required for periods of time when weather conditions interfere with deliveries. Some of the most critical kitchen equipment items should also be placed on the emergency power system to facilitate operation during possible power interruptions.



OSU-Cascades Campus

Food Service Schematic Plan
3-28-2014

STRUCTURAL

Residential Building

The residential building will have two bars that will be three to four stories in height. The structural system for the building will be conventionally wood framed. The framing would consist of timber framed floors and roof (likely wood I joists for the floors and gang nail trusses at the roof). These elements would be supported by wood stud framed bearing walls. Portions of the building will likely have a transfer floor at the second floor to allow for open spaces at the ground floor. This floor would be constructed of timber framing supplemented with steel members to carry the transfer

The lateral system will consist of plywood sheathed shear walls at all levels. At the four story portions of the building, the ground floor shear walls will be steel braced frames or plywood sheathed wood walls depending on the layout of walls on the ground floor.

The large overhangs at the roof will be framed with I-joists (or 2x framing) spanning from the exterior walls to either a cantilevered condition or to a beam line. As alternates, glulam decking (i.e. lock deck) or CLT would be considered to be used as both the structural element and the finish material. The beam lines would be supported by round reinforced concrete-filled steel columns to achieve a 1-hour rating. Assume a 12" round pipe with 8" steel cage inside.

We assume the foundation will be conventional spread footings under columns and bearing walls and a 4" slab on grade at the ground floor. This would be the foundation system regardless of the structural frame of the building.

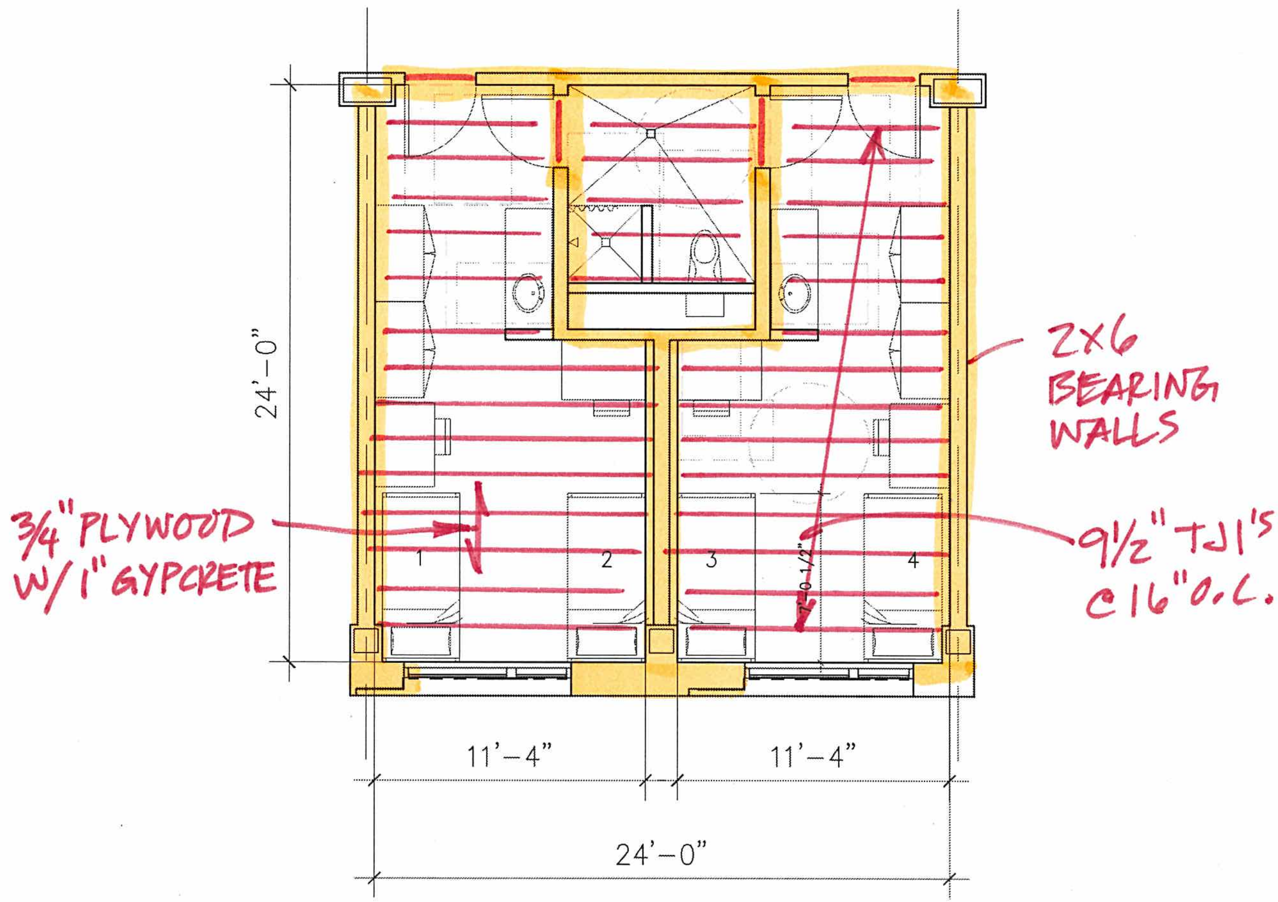
Dining Hall Building

This building will be a two story structure that will consist of timber floor and roof framing as shown in the attached diagrams. The second floor will be constructed with heavy timber girders, beams, and 3x decking. The floor for this option would be topped with plywood and 3" concrete. As an alternate to the timber framing for the floors, steel girders and beams could be used in lieu of the timber framing. The floor for this option would be concrete topping on metal deck.

The roof will be constructed of pre-engineered, gang nail trusses at 24" on center. The large overhangs will be framed with I-joists (or 2x framing) spanning from the exterior walls to either a cantilevered condition or to a beam line. As alternates, glulam decking (i.e. lock deck) or CLT would be considered to be used as both the structural element and the finish material. The glulam beams will be supported by round steel pipe columns.

This building will also be supported by conventional spread footings under columns and bearing walls with a 4" slab on grade.

The lateral system will likely consist of steel braced frames or plywood shear walls depending upon the system chosen and layout of the building.



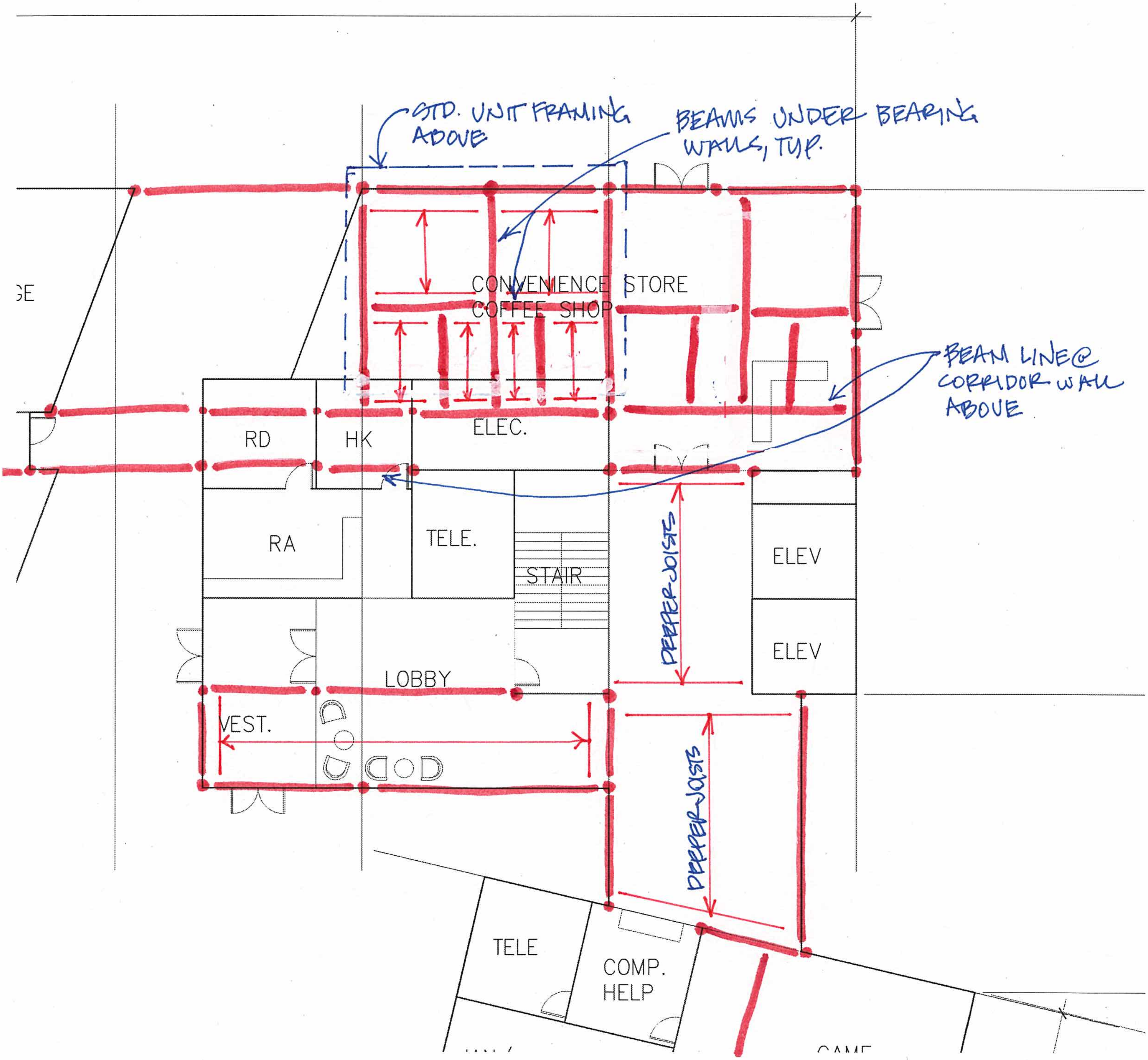
DOUBLE ROOM - ADAPTABLE
(QUAD WITH SHARED BATH)
535 NSF

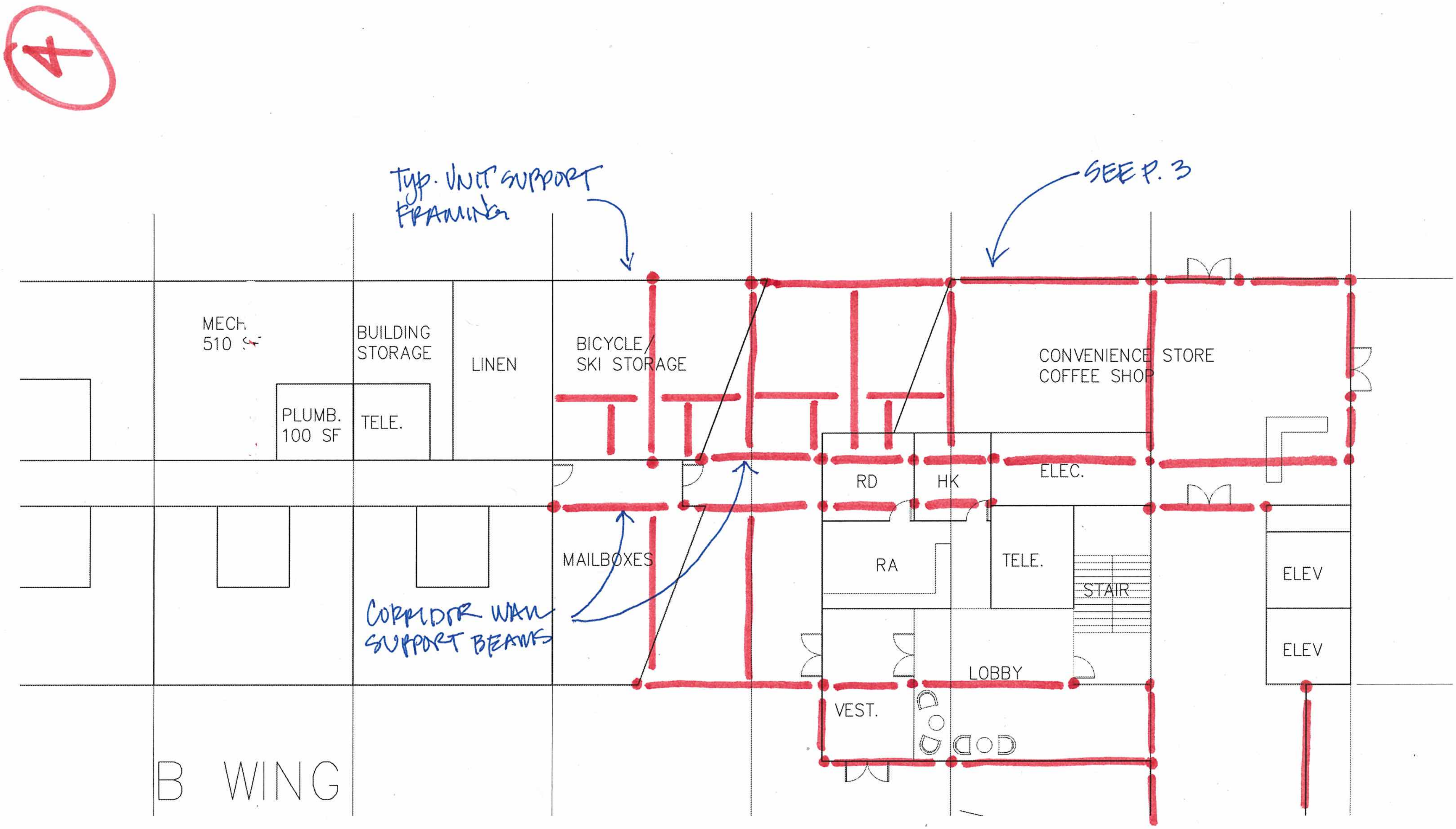
OSU CASCADES
INTO LIVING & LEARNING CENTER
Space Program

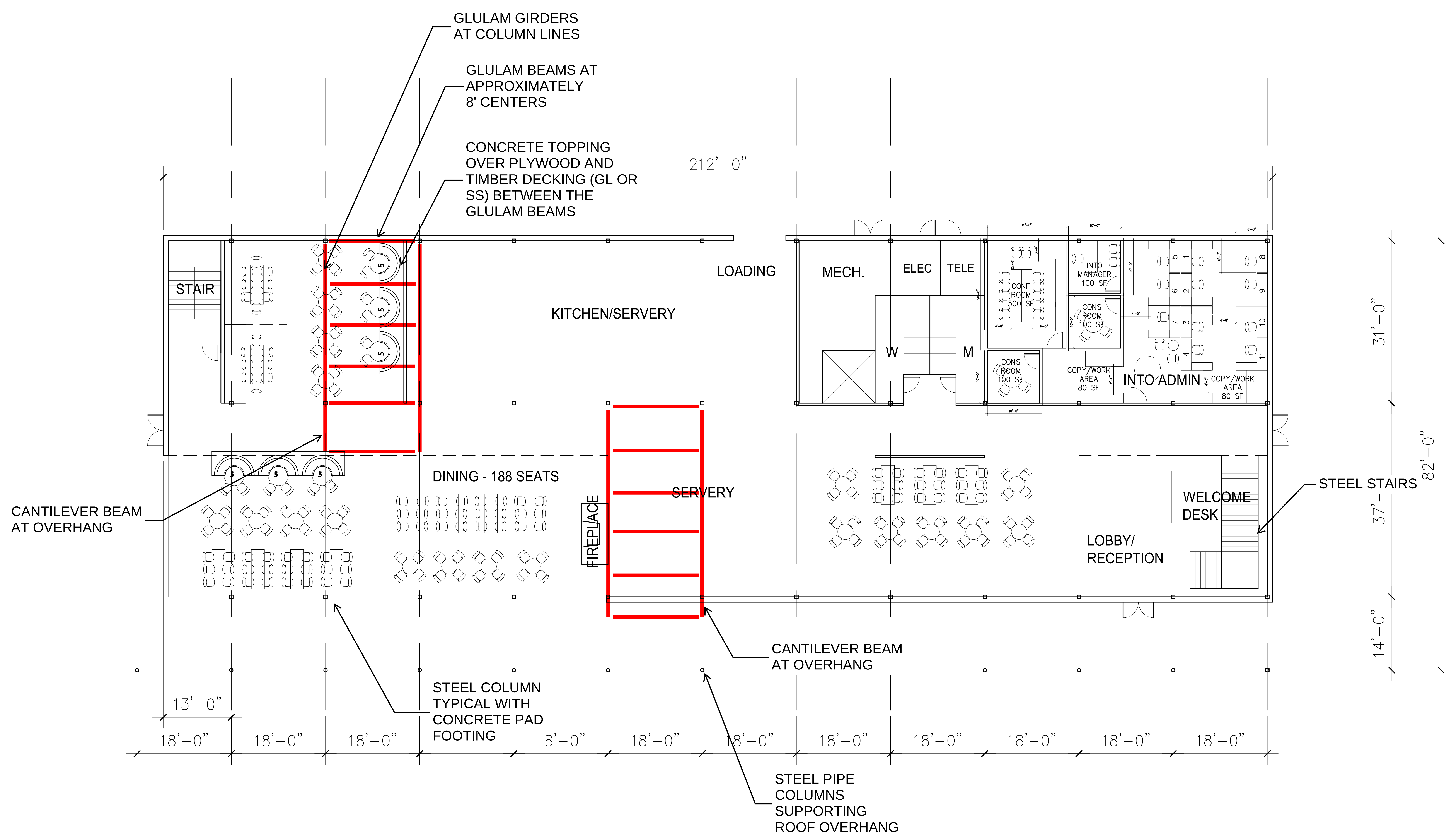
2


TELE
COMP.
HELP
JAN/
BLDG STORAGE
GAME
ROOM
LOUNGE
KITCHEN
T
FITNESS
C WING
2 BED
APARTMENT
LAUNDRY
ELEC
VEST
STAIR
31'-4 3/4"
26'-0"
26'-0"
26'-0"
29'-6"
10'-0"
BEAM UNDER
CORRIDOR WALL
BEAM TYP.
ASSUMED CENTER
BEARING WALL
LOCATION.
STD. JOISTS

3


STD. UNIT FRAMING ABOVE
BEAMS UNDER BEARING WALLS, TYP.
BEAM LINE @ CORRIDOR WALL ABOVE
CONVENIENCE STORE
COFFEE SHOP
RD
HK
ELEC.
RA
TELE.
STAIR
ELEV
ELEV
LOBBY
VEST.
DEEPER JOISTS
DEEPER JOISTS
TELE
COMP. HELP


4
TYP. UNIT SUPPORT FRAMING
SEE P. 3
MECH. 510 SF
BUILDING STORAGE
LINEN
BICYCLE/ SKI STORAGE
CONVENIENCE STORE COFFEE SHOP
PLUMB. 100 SF
TELE.
RD
HK
ELEC.
MAILBOXES
RA
TELE.
STAIR
ELEV
ELEV
CORRIDOR WALL SUPPORT BEAMS
LOBBY
VEST.
B WING



FRAMING PLAN LEVEL 2

14,840 gsf

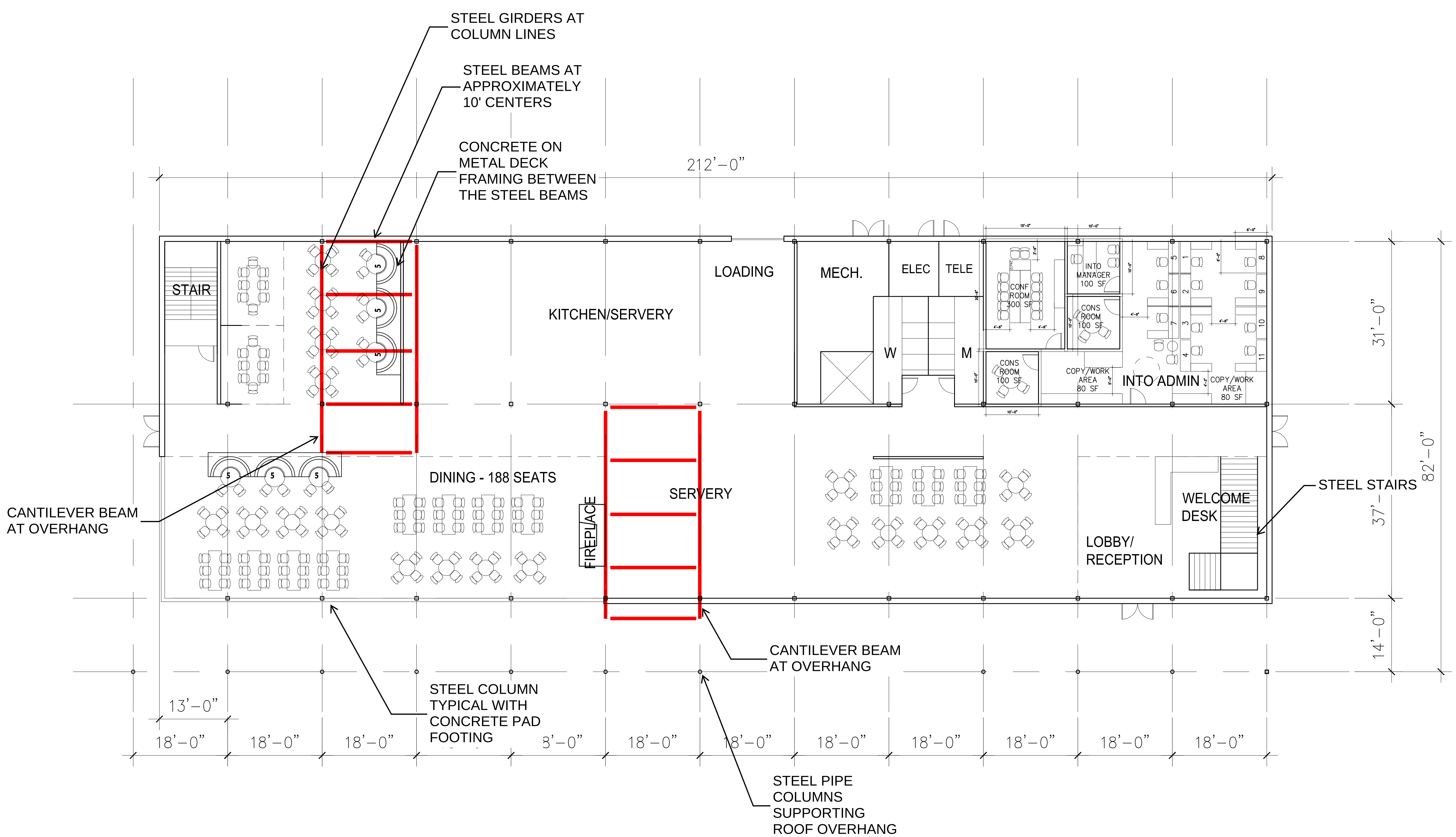
TOTAL
26,736 gsf

TIMBER FRAMING OPTION

FRAMING PLAN LEVEL 2

14,840 gsf

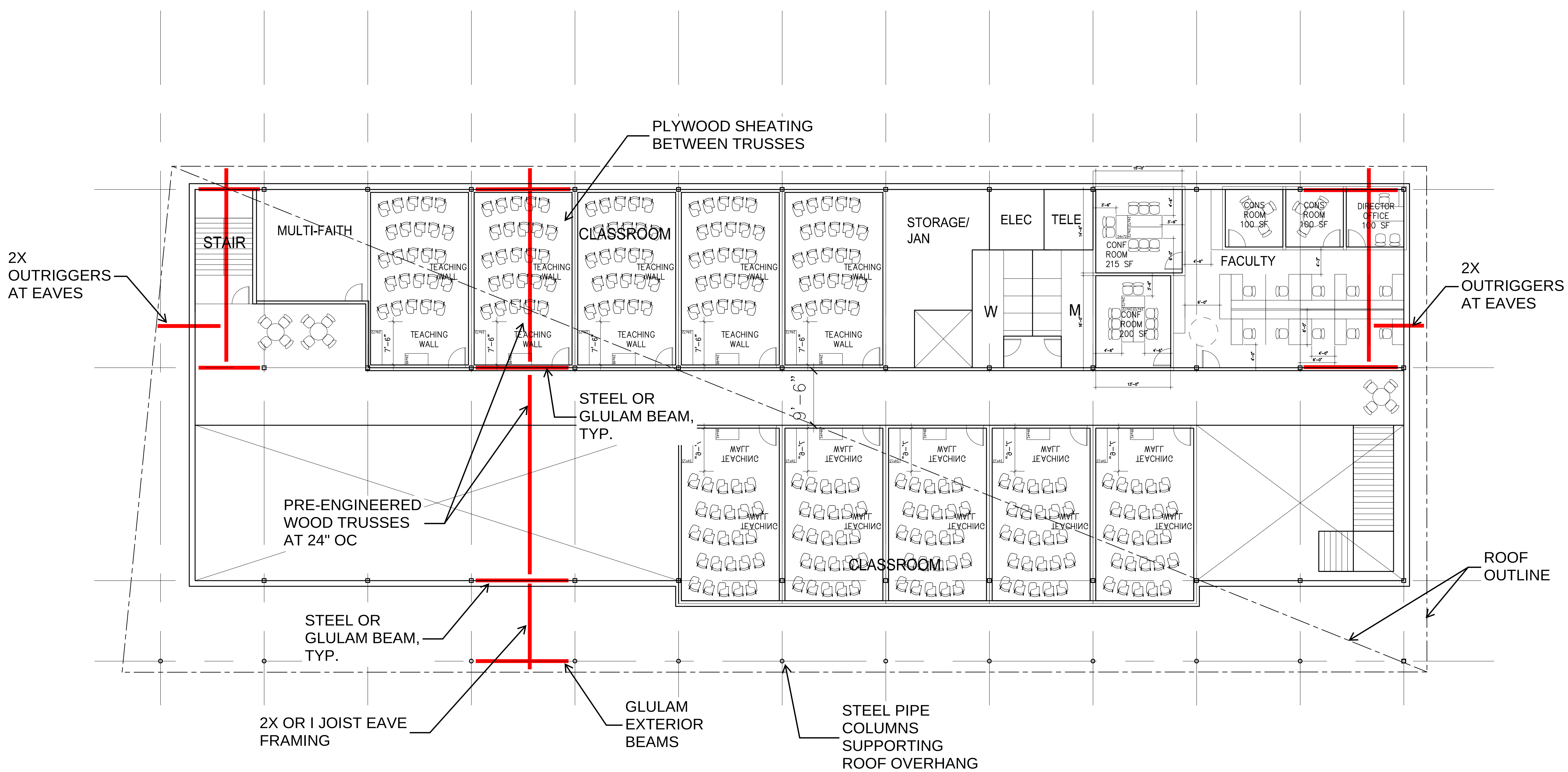
TOTAL
26,736 gsf



STEEL FRAMING OPTION

FRAMING PLAN ROOF

11,896 gsf



MECHANICAL

Building Envelope Systems

	Net Zero Energy "Ready"	LEED Silver Baseline
Roof Insulation	R-60 (U=0.017)	Oregon Code: R-21 (U=0.048)
Wall Insulation	R-21 cavity + 20 continuous (Assembly U=0.029-0.035)	Oregon Code: R-13 cavity + 7.5 continuous (Assembly U=0.064)
Glazing	U=0.20, SHGC=0.40	Oregon Code: U=0.46 (metal), U=0.35 (non-metal), SHGC=0.40 (all)
Window to Wall Ratio	30 percent	Oregon Code 30 percent recommended; 40 percent can be accommodated with improved envelope components
Shading	External Shades: Stationary or automatic motorized operable. Analysis required to optimize shading approach.	Internal Manually operated blinds and exterior overhangs.
Natural Ventilation (Code requires operable openings to be minimum 4 percent of floor area).	Sensors on operable windows shut down local HVAC system. Operable openings are motorized and automated in public areas.	Manual operable windows

Heating

Net Zero Ready System – Geothermal

A geothermal water to water heat pump system with a horizontal piping configuration is the preferred option to serve all air handling units, fan coil units, heat recovery ventilators (HRV) and hydronic baseboard heaters in the living units and classrooms as well as radiant slab hydronic loops (PEX tubing) in the commons and cafeteria areas. It is anticipated that this will be a hybrid system that will include a small, high efficiency, condensing boiler that supplements the geothermal system during peak heating load conditions. The heating loop will be designed for 110 degrees F return water and 130 degrees F supply with reset based on zone demand. Two-way control valves with a bypass valve to maintain minimum flow will be utilized. Type L copper piping with 30 percent propylene glycol for freeze protection is anticipated. A solar thermal system will be provided to pre-heat domestic hot water and heating water return.

This Net Zero Ready energy heating option could be easily modified to accept a connection to a central condenser water loop in the future. Connection to a central loop could increase operating efficiencies by better leveraging the different uses and time of day loading as well as to centralize the maintenance of the various building systems.

Net Zero Ready System – Central Utility Plant (CUP)

Building HVAC systems will be designed to have hydronic heating. This will consist of air handling units, fan coil units, heat recovery ventilators (HRV) and hydronic baseboard heaters in the living units and classrooms as well as radiant slab hydronic loops (PEX tubing) in the commons and cafeteria areas, similar to the Geothermal option above. A CUP located on site will provide condenser water or hot water to each building. If condenser water is provided, a water to water heat pump located in each building's mechanical room will be required to provide the 130 degree F typical supply water temperature to the heating equipment. If hot water is provided from the CUP, only a water to water heat exchanger is required at each building. If the central utility plant is to be added in the future, a boiler system in each building's mechanical room will be required to serve heating needs until the central plant is online and connected to the building. The CUP may consist of a combination of boilers, air to water heat pumps, cooling towers, and geothermal exchange.

LEED Silver / Code compliant System

As an alternative to the geothermal heat pump option, an air source high efficiency heat pump shall be utilized to produce hot water for the building as well as a gas fired backup condensing boiler to provide heating water to all air handling units, heat recovery ventilators (HRV) and hydronic baseboard heaters in the living units and classrooms as well as radiant slab hydronic loops (PEX tubing) in the commons and cafeteria areas.. The heating loop will be designed for 110 degrees F return water and 130 degrees F supply with reset based on zone demand. Two-way control valves with a bypass valve to maintain minimum flow will be utilized. Type L copper piping with 30 percent propylene glycol for freeze protection is anticipated.

LEED Silver / Code compliant Alternative System Option: Variable Refrigerant flow

An optional alternative system to serve the housing and dining buildings is a Variable Refrigerant Flow (VRF) System. The system consists of outdoor condensing units, likely to be located on grade outside each building. A refrigerant piping distribution system is routed throughout the building to controller boxes and fan-coils in every space. The system is efficient and provides both heating and cooling. However, the system requires large amounts of refrigerant to operate which presents a leak risk. The equipment typically has a shorter life cycle than hydronic-based equipment, which means it will need to be replaced more frequently. This option does not allow for a future connection to a central utility plant.

VE Baseline: Electric Heat

An optional alternative to serve the housing building is to provide only electric baseboard heaters at the perimeter. This option will have a much lower first cost by eliminating the boilers and hot water distribution system. The electrical service may increase in size to handle the electrical load. This system will consume more energy at a higher cost and does not allow for connection to a future central utility plant.

Cooling and Ventilation

Net Zero Ready System

Cooling serving the residential units and classrooms are to be provided by indoor heat recovery ventilators (HRV) containing hot water coils and DX split system cooling. All HRV units shall provide a minimum amount of outside air to each residential unit or classroom based on ventilation requirements as well as the minimum air volumes needed to provide cooling during the summer months. Each HRV will include an economizer for "free cooling" as well as 100 percent modulating exhaust capability. Exhaust air from the toilet rooms will be ducted to the rooftop HRV units for energy recovery. An integrated solar wall shall preheat incoming outside air during the winter months and shoulder seasons. HRV units will also include a variable speed supply and exhaust to airflow in response to temperature or CO2 sensors (demand based ventilation). At night, HRV supply fans will bring in cool, unconditioned outside air to flush out the space and delay temperature swings the following day.

HRV units serving the classrooms shall not only include the VFD control as referenced above, but also include a VAV terminal unit to control the air volume for sequencing minimum outside air, minimum cooling air during the summer months and ventilation control based on Co2 levels.

When the heating and cooling systems are deactivated, ventilation can be provided through operable windows. The operable windows will be provided with window switches to deactivate heating or cooling when windows are open.

All Classrooms and living units served by the HRV units will utilize displacement ventilation (63F degree supply air) capability. The preferred method of air distribution in these spaces consists of a ducted supply to two low displacement diffusers located in the corners of the room and a ducted, ceiling mounted return. The advantage of this method is superior ventilation effectiveness due to the introduction of cool, fresh air low in the space and the stratification of the warmer, stale air upward and out of the room via the return grille. Displacement ventilation also provides lower HVAC system sound levels in the space and a greater level of energy efficiency.

High efficiency indoor packaged units (RTU) will be provided to serve the Cafeteria and Kitchen area.

Ductless split system air conditioning units will be utilized for the Elevator Machine Room, Electrical, and Telecom Rooms.

The kitchen hoods shall consist of variable airflow exhaust hoods for the grease application with un-tempered makeup air.

Dryer vents shall be connected to heat recover system providing energy recovery to ventilation systems.

Controls to include a microprocessor-based, direct digital control (DDC) system with graphics at remote computer and simple user interface sensors located with the classrooms and living units.

LEED Silver / Code compliant System

Cooling serving the residential units and classrooms are to be provided by indoor heat recovery ventilators (HRV) containing hot water coils and DX split system cooling. All HRV units shall provide a minimum amount of outside air to each residential unit or classroom based on ventilation requirements as well as the minimum air volumes needed to provide cooling during the summer months. Each HRV will include an economizer for "free cooling" as well as 100 percent modulating exhaust capability. At night, supply fans will bring in cool, unconditioned outside air to flush out the space and delay temperature swings the following day.

Ventilation can be provided through operable windows at the occupant's discretion.

All Classrooms and living units served by the HRV units will utilize a more traditional approach of overhead air distribution. This consists of ceiling mounted supply and return grilles in each space which creates an air mixing situation that results in a slightly reduced indoor air quality when compared to the displacement ventilation approach.

Standard efficiency split system heat pumps will be provided to serve the Cafeteria, Kitchen, and classroom/office areas.

Ductless split system air conditioning units will be utilized for the Elevator Machine Room, Electrical, and Telecom Rooms.

Controls to include a microprocessor-based, direct digital control (DDC) system with graphics at remote computer and simple user interface sensors located with the classrooms and living units.

VRF and Electric heat only options

For the VRF and electric heat options, the ventilation systems will remain the same as the baseline system. The VRF system will provide full mechanical cooling in all spaces. The electric heat option provides only partial cooling through the ventilation system. It is anticipated that a combination of operable windows for natural ventilation, night flush, and potentially ceiling circulation fans will be sufficient in Bend climate to achieve acceptable thermal comfort during the summer months without mechanical cooling.

PLUMBING

Potable Water System – Net Zero

Option 1

Provide a capped water line branch from the main water line serving the building for future connection to the reclaimed water system. Space inside the building should be allocated for future water testing and equipment needed for net zero capabilities. A valve should be installed on the incoming city water service to stop flow of city water to the building if net zero is incorporated.

Option 2

There will be a new water service to the site. A backflow device is required to protect the city water system and it will be located on site near the city water connection. In order to become a Net Zero facility, the facility must be licensed and registered as a water district which will be required to test and report the quality of the water to the health department. The facility could develop a masters/graduate program in which the students maintain the system with a professor to oversee the facility. There will need to be a dedicated room inside the facility for testing the quality of the water.

A water storage tank is required to store the potable water. The facility is allowed to use city water to fill the water tank one time only and then must use reclaimed rain water that has been tested and filtered to make up the potable water. To meet Net Zero requirements, the roofs need to be constructed of a material that is NSF certified such as stainless steel.

Potable Water System – LEED Silver/Code Compliant

Domestic Cold Water System

There will be a new water service to the buildings. A backflow device is required to protect the city water system and it will be located on site near the city water connection. Water will be routed to all plumbing fixtures and equipment that require service. Shut-off valves will be located at each plumbing fixture and equipment. Hose bibs will be located around the perimeter of the buildings roughly 100-feet apart from each other. The following materials will be used inside the buildings for domestic cold-water piping.

Domestic Cold Water Mains

Copper tubing, Type L conforming to ASTM B88, copper fittings with soldered joints.

Domestic Cold Water Branch Lines

Cross-linked Polyethylene Tubing (PEX), Type A complying with ASTM F876 and F877, plastic fittings inserted into the expanded tubing and reinforcement rings using the "Engel Method."

Domestic Hot Water System

The domestic hot water system for the buildings will utilize a solar thermal system. Solar thermal panels will be installed on each of the buildings which will feed storage tanks located inside the buildings. A water heater will be installed at each solar system to provide backup as needed. Hot water will then be circulated throughout each building to minimize wait times for hot water at the fixtures.

Domestic Hot Water Mains

Copper tubing, Type L conforming to ASTM B88, copper fittings with soldered joints.

Domestic Hot Water Branch Lines

Cross-linked Polyethylene Tubing (PEX), Type A complying with ASTM F876 and F877, plastic fittings inserted into the expanded tubing and reinforcement rings using the "Engel Method."

Waste Water System – Net Zero Ready

Option1

Provide a capped branch line on the sanitary sewer system leaving the building for future connection to a reclaim system to reclaim this water. A shut-off valve should be installed downstream of the branch line to stop sewer flow to the city sewer system.

Option 2

All waste water will need to be captured and routed to either a membrane bio-reactor system or a planted cell system. These systems will filter and clean the water to a sufficient quality that the water can be re-used for non-potable uses such as toilet flushing. If a planted cell system is used, then a minimum of 25 percent of captured water must be discharged from the system. This percentage of discharged water could be routed to a dry well or used for irrigation purposes. The reclaimed waste water will be stored in a storage tank and will need to be pumped back inside the buildings for use.

Sanitary Drain, Waste, and Vent System/Storm Drain system

It is anticipated that there will a new sanitary sewer lateral that serves each building that connects to the city sewer system. Waste piping will be routed to each fixture. Each fixture will be vented with the vent piping collecting multiple fixtures and routed through the roof.

The storm drainage system will consist of primary and secondary roof drains. The primary drains will be routed down through each building and below grade to connect to the site storm drainage system. The secondary roof drains will routed down through each building and terminate through the exterior wall with a nozzle at 12-inches above grade. The following materials will be used inside the buildings and below the buildings out to 5-feet beyond each building edge.

Belowgrade Waste Piping and Fittings

No-hub cast iron pipe complying to ASTM A888/CISPI 301 and heavy duty couplings complying with ASTM C1540/SED 4000.

PVC pipe and fittings complying with ASTM D2665-91, Schedule 40, and solvent weld joints with solvent cement complying with ASTM D2235.

ABS pipe and fittings complying with ASTM D2661, Schedule 40, and solvent weld joints complying with AASTM D2235-93A.

Above Grade Waste Piping and Fittings

No-hub cast iron pipe complying to ASTM A888/CISPI 301 and standard duty couplings complying with ASTM C1540/SED 4000.

PVC pipe and fittings complying with ASTM D2665-91, Schedule 40, and solvent weld joints with solvent cement complying with ASTM D2235.

ABS pipe and fittings complying with ASTM D2661, Schedule 40, and solvent weld joints complying with AASTM D2235-93A.

Above Grade Vent Piping

No-hub cast iron pipe complying to ASTM A888/CISPI 301 and heavy duty couplings complying with ASTM C1540/SED 4000.

PVC pipe and fittings complying with ASTM D2665-91, schedule 40, and solvent weld joints with solvent cement complying with ASTM D2235.

ABS pipe and fittings complying with ASTM D2661, schedule 40, and solvent weld joints complying with AASTM D2235-93A.

Plumbing Fixtures

Water conserving plumbing fixtures will be utilized to incorporate water savings into each building. The following water conserving fixtures will be utilized:

1.28 gallon per flush toilets

0.125 gallon per flush urinals or waterless urinals

0.5 gallon per minute lavatory faucets.

1.5 – 2.0 gallon per minute shower heads.

1.5 gallon per minute faucets at sinks.

FIRE PROTECTION

General Requirements

This project consists of the design and construction of two new 4 story residential buildings, and one Dining/Classroom building.

Fire sprinklers are a contractor designed system which will be hydraulically designed and installed according to the 2010 Oregon Structural Specialty Code, the 2010 Oregon Fire Code, National Fire Protection Association (NFPA) Standards No. 13 and 24, as adopted by the local Authority Having Jurisdiction and local codes and interpretations.

All fire protection systems will use Underwriters Laboratories Listed or FM Global Approved components.

Each building will be protected by a separate wet-pipe fire protection system. Dry type sprinklers or a dry pipe sprinkler system, with pipes filled with compressed air or nitrogen, will be provided for areas subject to 40 degrees F, and less. If the dry system is filled with nitrogen, either nitrogen tanks or a nitrogen generator will be provided. If the dry system is filled with compressed air, a tank style air compressor will be provided.

Design of the fire protection system will be based on a hydraulic design that utilizes 90 percent of available pressure and will include interior and underground pipe to the location of the hydrant flow test.

Scope of Work

Fire Sprinklers

There will be a new water service to each building. A double check valve backflow prevention assembly, listed for fire protection will be provided between the fire sprinkler system and the public water supply connection. It is anticipated that the backflow device will be located in a vault on site near the city water connection or at the main sprinkler riser. If located in an outside vault, the vault will be provided with a sump pump or other method of gravity drainage. The backflow preventer control valves will be electrically supervised by the fire alarm system.

The fire sprinkler main riser will be located within 18-inches of an exterior wall. The fire sprinkler main control valve will be accessible, either as a wall post indicator valve (WPIV) or yard post indicator valve (PIV).

A fire department connection ("FDC") with check valve and method of drainage will be provided.

Piping will be concealed above finished ceilings and within walls except for areas exposed to structure, and will be coordinated with architectural features. Complete sprinkler coverage for all rooms, combustible concealed spaces, and overhangs will be provided.

Main, low point and auxiliary drains will be provided to drain the entire system. These will be connected to the sanitary sewer with a gravity drain sized to accommodate the flow, or will discharge to the exterior of each building. A dry pipe sprinkler system will have an inspector's test drain located beyond the farthest sprinkler in the system.

Electrical connections and wiring will be provided for a complete and operable fire protection system, including, but not limited to valve supervisory switches, flow alarms, etc. Audible electric sprinkler flow alarms on the exterior of the buildings will be provided. Supervisory switches, flow switches, pressure switches, bells and the like will be monitored by the fire alarm system.

Seismic sway bracing and interval- and end-of-branch line restraints will be provided for the sprinkler system.

Suspended ceilings will have sprinkler penetrations two inches larger than the sprinkler to accommodate seismic requirements and will be provided with large escutcheons. Alternately, a flexible sprinkler connector will be provided between the branch line(s) and sprinkler(s).

Quick response sprinklers will be provided throughout commercial spaces. Residential sprinklers will be provided in residential areas according to their listing. Finishes will be corrosion resistant white polyester, with white polyester escutcheons, or as coordinated with the architect. Recessed sprinklers will be provided.

Floor control stations will be provided so that sprinklers on one floor can be shut down for maintenance while still maintaining protection on other floors.

Black steel piping will be used for wet and dry sprinkler systems.

Fire Standpipes

If the highest floor level is more than 30-feet above the lowest level of fire department vehicle access, Class I standpipes will be provided per NFPA 14.

Fire Pump

If the available water pressure is inadequate for the fire sprinkler demand, a fire pump will be provided.

ELECTRICAL

Service Distribution

Utility power will be fed underground from pad mounted utility transformers to each building. Two 2500 Amp, 120/208 Volt, 3 phase, 4 wire services will be provided for the housing buildings. An 800 Amp, 120/208 Volt, 3 phase, 4 wire service will be provided for the Dining/Academic building. The utility CT/terminal cabinet and meter will be located in the Main Electrical Room on the ground floor of each building and will require an exterior door so the utility can access their equipment. The switchgear will be mounted on a 3-1/2-inch housekeeping pad, and include an integral surge protection device and contain main disconnect.

Branch panelboards will be located in electrical rooms on each floor of the housing building. Branch panelboards in the Dining/Academic building will be located in the main electrical room and in an electrical room on the second floor. Panelboards will have aluminum bussing and utilize bolt-on circuit breakers for convenience of local resetting of overcurrent protection when a fault has been cleared and removed safely. Motor starters and VFDs will be provided by the Mechanical contractor. Disconnect switches will be provided by the Electrical contractor unless provided integral with the equipment.

Branch circuit wiring assumes six duplex receptacles per 20-amp circuit. Self-testing GFCI outlets where required by code. Dedicated neutrals will be provided for each circuit.

» Feeder circuit wiring: copper THWN-2.
» Branch circuit wiring: copper THHN-2.

A diesel driven 200KW emergency generator will be located next to the housing building. It will supply back-up power to building emergency egress lighting, fire sprinkler pump, and elevator.

Energy Measurement for Net Zero Ready Building

Meters will be utilized to measure the energy consumption of each circuit individually as well as on-site energy generation. A measurement and verification plan will be created and implemented for reviewing system energy performances on an annual basis.

Dorm Room Lighting, HVAC, and Plug Load Management for Net Zero Ready Building

Card key switches will be utilized in dorm rooms to turn off room lighting, plugs, and HVAC when rooms are not occupied. Selective plugs in each room will be unswitched to allow for equipment that needs to be on when the space is unoccupied.

Infrastructure for Photovoltaic Panels for Net Zero Ready Building

Conduits for a future 2000 KW array of photovoltaic mono-crystalline solar panels will be provided.

Photovoltaic Panels for Code Compliant System

If buildings will be owned, partially owned, or controlled by Oregon State University, 1.5 percent of the total contract price associated with the buildings must be spent on photovoltaic panels, solar water heating, or other green energy technology.

LIGHTING

Interior Lighting

There are several important lighting concepts that will apply to the entire project and provide the basis for the lighting design approach in each area. The lighting systems will be an integrated part of the architectural design, physically and conceptually. They will reinforce the function and enhance the form of each space while providing visual continuity between spaces. This is especially valid for the architectural features of the lobby and public areas.

Dorm rooms shall utilize surface mount decorative glass LED luminaires. The luminaires will be connected to dimmer switches to allow the occupants control over the light level in the room. The LED will be a warm color temperature (2700k-3000k) to make the room feel more residential. One dimmable LED task light will be provided at each desk. Unit restrooms will use linear fluorescent vanity luminaires and recessed LED down lights.

In addition to the typical dorm room illumination the Residential apartments will use linear fluorescent in kitchen areas and surface mount decorative and recessed LED down lights in halls and “living rooms”

Residential Building corridors shall have a combination of recessed LED down lights or ceiling mounted luminaires and decorative wall sconces. This combination is designed such that the residents will feel that the corridors are not just a means of circulation but also an extension of their rooms.

Academic corridors will be illuminated using linear fluorescent or LED luminaires. Recessed LED wall wash or accent luminaires will be used in areas of visual interest and to create focal walls.

The lounge spaces will be illuminated using primarily style specific decorative pendant luminaires. In addition to the decorative pendants recessed LED down lights and style specific decorative wall sconces will be used.

Conference Rooms will use recessed linear LED slot and recessed LED wall wash luminaires. The layout of the luminaires will allow for many different configurations of each space. All luminaires will be dimmable to allow the occupants to adjust the light levels to suit the needs of the space.

Study nooks will use recessed linear LED slot luminaires. The layout of the luminaires will allow for many different configurations of each space.

Classrooms illumination will be provided using dimmable linear fluorescent indirect/direct pendant luminaires along with recessed or pendant mounted dimmable linear fluorescent wall wash luminaires for the head wall.

Single and multi-occupant offices will employ linear fluorescent indirect/direct pendant luminaires with dimming ballasts to allow the occupants the ability to adjust the light level.

Campus Gathering space will have multiple layers of illumination to allow the space to be used in many different configurations. Dimmable LED will be the primary source but dimmable linear fluorescent may also be used.

Stairs will be illuminated using a combination of style specific decorative pendants at the intermediate landings and recessed LED luminaires at each floor level.

Fluorescent ballasts will be high frequency electronic type with less than 10 percent total harmonic distortion. T8 and T5 lamp ballasts will be program rapid start. Lamp and ballast compatibility are essential for high energy saving.

Design Lighting Levels: Average Maintained Illumination

Area	Recommended Lighting Level (Footcandles)
Study Nook	270-323 lux (25-30fc)
Electrical Room	270-323 lux (25-30fc)
Dormitories	107-161 lux (10-15fc)
Conference Rooms	270-323 lux (25-30fc)
Classrooms	323-377 lux (30-35fc)
Storage	161 lux (15fc)
Academic Corridors	161-215 lux (15-20fc)
Residential Corridors	107-161 lux (10-15fc)
Campus Gathering	270-323 lux (25-30fc)
Stairs	53-107 lux (5-10fc)
Restrooms	107 lux (10fc)
Lounge	161-215 lux (15-20fc)
Single and Multi Occupant Offices	270-323 lux (25-30fc)

Exterior Lighting

Exterior lighting shall use LED sources. Luminaires shall use optical systems that are in compliance with local lighting ordinances. Light levels between 5-11 lux (0.5 to 1fc) shall be maintained throughout the site to provide for traffic and pedestrian safety. All exterior fixtures shall be controlled by the facility lighting control system using a time-clock on/time-clock off/photocell control strategy.

LED sources will have color temperature no higher than 4000k and will have color-rendering index (CRI) of 80 or greater.

Design Lighting Levels: Average Maintained Footcandles

Area	Recommended Lighting Level (Footcandles)
Exterior Lighting and Pedestrian Pathways	11-21 lux (1-2fc)

Lighting Control

All dimmers will be compatible with the controlled loads.

Corridor light levels will reduce by half during curfew hours but will return to full output when motion is detected.

Lighting control system shall use a combination of relay control panels (with time clock and photocell functions) and local occupancy/motion sensors (ultrasonic/infrared type). Daylighting controls shall be provided in areas required. Building lighting shall have automatic shutoff system in accordance with the 2010 Oregon Energy Efficiency Specialty Code.

Emergency Systems

Egress lighting will be provided as required by code in interior areas. The code-required alternate power source shall be via the engine generator.

FIRE ALARM

An automatic, addressable, fire alarm system will be provided to meet the requirements of the adopted editions of the Oregon Structural Specialty Code (IBC with Oregon Amendments), Oregon Fire Code (IFC with Oregon Amendments),NFPA 72 and the City of Corvallis requirements.

The system will be the EST3 by Edwards, UTC.

The fire alarm system will provide system alarm, supervisory and trouble signal monitoring, and alarm notification for the buildings, as required by Code. An alarm communicating transmitter will facilitate monitoring of the individual signals to the monitoring station at Campus Security in Cascade Hall. The system will have batteries to provide a secondary power source in case of primary power loss to the control panel or any remote power supply.

Activation of system fire detectors, manual pull stations, and sprinkler water flow switches will initiate alarm signals on the fire alarm control panel (FACP) and fire alarm annunciator (FAA), and activate the audible and visible notification appliances throughout the buildings. Activation of sprinkler tamper switches and HVAC duct mounted smoke detectors will initiate supervisory signals, which will annunciate on the FACP and FAA.

Manual pull stations and automatic fire detection will be provided where required by Code.

Audible and visible alarm devices will be provided throughout each building where required by Code. Additionally, each resident dwelling unit will be provided with visible alarms in all bathing, living and sleeping areas.

Smoke alarms and carbon monoxide alarms will be provided where required by Code. Alarms may be integrated with the fire alarm system for supervisory annunciation only.

Control outputs will be provided for fire life safety functions, such as air handler shut down, smoke damper closure, fire door release, and elevator control.

TECHNOLOGY

Pathways for Communications Systems

Wire Basket style cable tray will be provided in all major corridors where high cable density is required. Cable supports (rated J-hooks/adjustable saddles) are required for lower density areas where cable is not routed in cable tray to bundle cables together in a common path. Metallic 2-gang outlet boxes with single gang adapters with 1 inch metallic conduit/raceways to accessible ceiling space will be provided for routing and termination of low voltage cabling. Raceway installed per ANSI/TIA/EIA-569-B standards.

Voice, Data, and CATV Horizontal Cabling Infrastructure

Cabling will consist of 4-pair unshielded twisted pair (UTP) Category 6 data cabling and Category 3 voice cabling. The design will be based on the University's preferred manufacturer Ortronics/Berk-Tek and will require that the successful bidder submit at least a 20-year, end-to-end solution warranty for the completed installation of these products. All fiber backbone cabling and components will be Corning.

Each standard telecommunications outlet (TO) will consist of two Cat6 ports for data and one Cat3 port for voice.

Wireless Access Points will have one Category 6 cable per location. Locations and quantities will be determined during design based on software modeling by the University for their preferred manufacturer's system.

Voice and Data Backbone Infrastructure

Copper Backbone: The copper backbone system will consist of 100 ohm, Category 3, 24awg, multipair copper cable terminated on patch panels, one pair per port. These multipair cables will run from the main distribution frame (MDF) to each intermediate distribution frame (IDF). Mulitpair copper pair counts will be based upon the final number of voice locations.

Fiber-Optic Backbone: Fiber-optic backbone cable will consist of preterminated, 50/125um laser-optimized multimode fiber-optic cable and singlemode cable. Fiber optic cables will run from the MDF to each IDF. Fiber-optic strand count is proposed to be a 12-strand multimode and 12 strand singlemode to each IDF. All fiber-optic cables will be placed in MTP to MTP cassettes in rack-mounted, fiber-optic distribution units. Fiber-optic bulkheads for the MTPs are LC-style.

Communications Equipment Rooms

Telecommunications Rooms (TR's): The minimum recommended room size of the MDF is 14 feet by 12 feet and each IDF is 10 feet by 12 feet. All of these rooms are required to be environmentally controlled and have power receptacles for active equipment on generator back-up. The Owner will provide local rack-mount UPS units for power conditioning.

Telecommunication Racks: Each telecommunication room (also identified as MDF/IDF) will consist of a combination of 7 feet by 19 inches standalone equipment racks to support backbone and horizontal cable installation and Owner-provided network equipment and servers. All racks will be seismically braced to the telecom room floor. Racks will be Ortronics Mighty Mo.

Wire Management: All equipment racks will have one 10-inch wide vertical wire manager on each end and in between each equipment rack.

Wire basket tray will be provided overhead around the telecom rooms and equipment racks for cable management.

Electronic Access Control/Card Key and Intrusion Detection

Requirements for card readers at main door entrances and other doors as identified by the University. IEI will work with the University during design to identify doors that need access control and different levels of control.

Door contacts will be placed on exterior doors for intrusion detection. This system ensures all doors are securely closed and armed. Keypads will be place in each identified zones for arming/disarming. Motion detectors will be placed in areas identified by the University as part of the intrusion detection system. The motion detectors will be ceiling mounted and detect in a 360 degree pattern. Dual technology detectors with passive infrared and microwave signals will be used to lessen the possibility of false alarms.

Keypads will be located near common area doors to provide local readout, disable/enable features, and local programming capabilities in the event a workstation is not readily available.

IP Video Surveillance System

IP Video Surveillance system will be provided for monitoring of interior and exterior common areas, parking lots, and entrances. A Network Video Recorder (NVR) solution will be utilized as it takes advantage of existing IT infrastructure and is software based system, which is capable of utilizing most any industry standard camera.

Monitoring of IP Video Surveillance will be via use of PC workstations, local or remote from the facility. The IP video surveillance solution will be integrated with the Access Control/Intrusion Detection system to allow automatic surveillance triggering when an event identified.

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