Mechanical, Electrical, Plumbing Narrative

Oregon Bach Festival

Prepared for

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GLUMAC

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D30 MECHANICAL

D3000 General

- Codes
  - 2014 Oregon Structural Specialty Code (OSSC) based on 2012 International Building Code (IBC)
  - 2014 Oregon Energy Efficiency Code (OEESC) based on the 2009 International Energy Conservation Code (IECC)
  - 2014 Oregon Mechanical Specialty Code (OMSC) based on 2012 International Mechanical Code (IMC) and 2012 International Fuel Gas Code (IFGC) with State Amendments
  - 2014 Oregon Plumbing Code (OPC) based on 2009 Uniform Plumbing Code (UPC) with State Amendments
  - 2014 Oregon Fire Code (Based on the 2012 International Fire Code)
  - 2014 Oregon Electric Specialty Code (Based on the 2014 National Electric Code (NEC) with State Amendments
- Standards
  - ASHRAE 55 Thermal Environmental Conditions for Human Occupancy
  - ASHRAE 62.1 Ventilation for Acceptable Indoor Air Quality
  - ASHRAE 62.2 Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings
  - ASHRAE 90.2 Energy Efficient Design of Low-Rise Residential Buildings
  - NFPA 90A: Standard for the Installation of Air-Conditioning and Ventilating Systems, 2012 Edition.
  - NFPA 90B: Standard for the Installation of Warm Air Heating and Air-Conditioning Systems, 2012 Edition.
  - NFPA 101: Life Safety Code, 2012 Edition
  - Air Conditioning and Refrigeration Institute (ARI) Standards
  - Air Moving and Conditioning Association (AMCA) Standards
  - Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- Design Criteria
  - The HVAC systems and equipment will be sized based on load calculations that comply with the following design criteria.
  - Outdoor design conditions
    - Summer: 91.4°F db/66.5°F wb (ASHRAE 0.4%, Eugene, OR)
    - Winter: 22.4°F (ASHRAE 99.6%, Portland, OR)
  - Elevation: 374 ft.
  - Climate Zone: 4 (2014 OEESC, Chapter 3)
  - Evaporation 68.8°F wb (ASHRAE 0.4%, Eugene, OR)
- Indoor design conditions (for load calculations)
  - All conditioned areas:
    - Cooling: 75°F+/-2°F
    - Heating: 70°F +/-2°F
  - Exceptions:
    - Electrical Rooms: 75°F (Cooling Only)
    - Telecom Rooms: 75°F (Cooling Only)
    - Elevator Machine Rooms: 75°F (Cooling Only)

    - Humidity control:
        - Rehearsal Hall: 60% RH maximum
        - Musical Instrument Storage: 55% RH maximum
    - Ventilation criteria:
        - Comply with the following minimum requirements:
            - Oregon Mechanical Code, Chapter 4
            - Oregon Building Energy Efficiency Standards
            - ASRHAE Standard 62.1
    - Exhaust to outdoors (minimum rates)
        - Toilet – Public Restrooms: 75 CFM (continuous).per Water Closet or Urinal.
        - Janitor closet: 1.0 CFM/Sq. ft., minimum

- Building envelope
    - Refer to Architectural Drawings and Specifications for envelope requirements.
    - All envelope components will meet Oregon Energy Code minimum prescriptive criteria (OEESC Table 502.1.1, 502.1.2 and 502.3)

- Internal heat gains
    - Lighting: (assumes a mix of LED & florescent lighted)
        - Lobbies: 0.5 W/Sq.Ft.
        - Office: 0.6 W/Sq.Ft.
        - Rehearsal Room: 1.25 W/Sq.Ft.
        - Corridors: 0.4 W/Sq.Ft.
        - Public Restrooms: 0.4 W/Sq.Ft.
    - Receptacle power in all areas: 0.8 W/Sq.ft. (To be coordinated with UO historical data)
    - Data rooms: 24,000 Btuh per room (Initial Estimate)
    - Office Occupants: 250 Btuh sensible / 200 Btuh latent (ASHRAE Fundamentals)
    - Rehearsal Room Occupants: 225 Btuh sensible / 105 Btuh latent (ASHRAE Fundamentals)
    - Musicians: 305 Btuh sensible / 545 Btuh latent (ASHRAE Fundamentals)
- Occupancy criteria:
    - Lobby: 33 Sq Ft/person
    - Office: 142 Sq Ft/person
    - Conference: 20 Sq. Ft./person
    - Rehearsal Room: 100 Occupants, 30 Musicians
    - Storage: 0 persons
- HVAC Zoning Criteria:
    - Office: one zone (temperature sensor) per four enclosed offices
    - Conference room: one zone (temperature sensor) per room)
    - Lobby: one zone (temperature sensor)
    - Rehearsal: one zone (temperature sensor & humidistat)
    - Musical Storage: one zone (temperature sensor & humidistat)
    - Data/telecom/Elec: one zone (temperature sensor) per room

- Ductwork design criteria
    - Maximum Friction Loss
        - Low Pressure: 0.08 inch wg/100 ft.
        - Medium Pressure: 0.2 inch wg/100ft
    - Maximum Velocity
        - Overhead: 1000 FPM

        - In Shaft: 1500 FPM (Low Pressure)
        - In Shaft: 2000 FPM (Medium Pressure)
    - Coils
        - Maximum face velocity: 350 fpm
        - Maximum fins per inch: 12
        - Maximum air pressure drop - cooling coil: 0.50 inch wc (wet coil)
        - Maximum air pressure drop – heating coil: 0.25 inch wc

- Acoustical
    - The following noise NC/RC criteria levels will be achieved and as defined in the ASHRAE HVAC Applications Handbook 2011 Chapter 48. These levels address the mechanical systems only. Actual sound performance requirements for each space must be verified with acoustical consultant.
        - Office Spaces: 25-30
        - Corridors and lobbies: 30-35
        - Rehearsal Space: 15 to 20

- Seismic:
    - Anchorage and restraints will be a deferred design by the contractor and will be coordinated with structural engineer and authority having jurisdiction.

- The HVAC system includes the following sustainable design features.
    - Window switches to shut-off HVAC units when a window is open if operable windows are provided.
    - Demand Control Ventilation in all high-occupancy spaces per OEESC Section 503.2.5.1.
    - Displacement Ventilation strategy to serve rehearsal hall
    - Div 26 occupancy sensor integration for temperature setbacks
    - Variable frequency drives to operate motors over 1 hp.
    - 100% dry-bulb economizer functionality
    - No CFC based refrigerants are used in the building HVAC systems.
    - Select refrigerants and HVAC equipment that meet LEED requirements to minimize the emission of compounds that contribute to ozone depletion.

D3010 Energy Supply

- All equipment (heating, cooling & fans power) will be shall be 460V/3Ph whenever possible. See electrical for additional information.
- Per coordination with UO, due to project size and location on campus it was deemed not cost effective to tie into UO's central plant (steam & chilled water). OBF mechanical design centers around stand-alone air cooled heat pump equipment with electric resistance reheat coils where necessary for thermal zoning.

D3020/D3030 Heat Generating & Cooling Systems

- Primary heating & cooling shall be high efficient air cooled heat pumps with evaporator, condenser & refrigeration circuit designed for heat pump operation with 4-way reversing valve. The outdoor coil shall have an electronic expansion valve to control refrigerant flow. The compressors shall be variable speed or shall include multiple compressors for staging.
- Reheat heating shall be from integral electric resistance coils at local variable volume terminal units where required per thermal zoning requirements in the office bar.

D3040 Distribution Systems (see floor plans for capacities)

- Office Bar
    - Packaged Air-Cooled Heat Pump Air Handling Unit
        - Variable volume control w/ direct drive fans
        - 2-stage or variable speed compressors
        - 100% economizer
        - Morning Warm-up Bypass
        - Factory spring isolation curb
        - Manufacturer: Aaon or equivalent
    - Split System Air-Cooled Heat Pumps (temperature control only)
        - Heating/cooling function
        - Serves electrical & telecom rooms
        - Standby power
        - Manufacturer: Mitsubishi or equivalent
    - Split System Air-Cooled Heat Pump (temperature & humidity control)
        - Heating/cooling function
        - Serves music instrument storage room
        - Standby power
        - Manufacturer: Liebert or equivalent
    - Supply air from a variable volume air cooled heat pump unit will be via medium pressure ductwork to downstream VAV boxes. All supply air downstream from the VAV boxes will be via low pressure ductwork.
    - All exhaust & return air will be low pressure ductwork.
    - Diffusers shall be of commercial quality with appropriate UL listing: Titus, Price, or equivalent.
- Rehearsal
    - Custom Air-Cooled Heat Pump Air Handling Unit
        - Variable volume control w/ low sound selection direct drive fans
        - Variable speed compressors
        - 100% economizer
        - Morning Warm-up Bypass
        - Humidity Control
        - Acoustical Package
            - 4” insulation casing
            - Compressor blankets

- Integral sound traps on supply & return
- Manufacturer: Energy Labs, Mammoth or equivalent

- Supply air from a variable volume air cooled heat pump unit will be via low pressure ductwork discharged to a pressurized tightly sealed under-floor concrete plenum.
- Return air from a variable volume air cooled heat pump unit will be via low pressure ductwork to local diffusers in the space.
- Diffusers shall be of commercial quality with appropriate UL listing: Titus, Price, or equivalent.

D3050 Terminal Units

- Office Bar
  - Variable air volume terminal units
    - Controls shall be direct digital, pressure independent and shall be housed in a NEMA 1 enclosure. Integrate to building BAS system which hall control/monitor the system
    - Assemblies hall contain a welded 26 gauge (minimum) steel acoustical plenum box lined with non-fiberglass 1" thick insulation
    - Electric coil shall be UL listed and housed in an attenuator section.
    - Units shall be controlled to maintain temperature & carbon dioxide as indicated on zoning plans. Units shall have multiple setpoints (cooling max, ventilation max, heating max, and minimum).
    - Terminal shall be of commercial quality with appropriate UL listing: Titus, Price, or equivalent.

D3060 Controls & Instrumentation

- The building will be provided with a Siemens' Direct Digital Control (DDC) BAS control and monitoring system based on a native BACnet architecture. System shall consist of head-end system located in this building with DDC point server, alarm printer and user interface. System shall be provided with data logging and trending capabilities, sufficient digital storage and processor speed for these functions and a workstation interface (located in the 1st floor mechanical room) to access the logged and trended data. System shall integrate with UO's campus Siemens' system.
- It is assumed that the heat pump air handling units, split systems & vav boxes will be controlled via its own internal controls system. The DDC system will have the ability monitor setpoints with alarms and override setpoints as required to adjust operation.
- See zoning plans for additional information:
  - Temperature control
  - CO2 control
  - Humidity control
  - Underfloor air plenum pressure control
  - Window sensor integration
  - Div 26 occupancy sensor status
  - Etc

D3070 Systems Testing & Balancing

- Testing, adjusting, and balancing shall include, but not be limited to air handling systems, underfloor plenum pressure testing, air distribution ductwork, temperature control, general exhaust, and split systems fan coil unit adjustments.

- Owner (University of Oregon) shall hire out or perform all TAB related work on this project noted in project specifications and related specifications. (This scope of work shall not be bid out under the General or Mechanical Contractor.)

D50 Electrical

D5010 Electrical Service & Distribution

D5000 General

- Applicable Codes and Standards
    - The electrical system shall conform to the governing codes and standards as required by the authorities having jurisdiction. The following is a partial list of the main codes and standards for this project
        - Codes:
            i) 2014 Oregon Electrical Specialty Code (OESC) based on 2014 National Electrical Code (NEC).
            ii) 2014 Oregon Energy Efficiency Code (OEESC) based on the 2009 International Energy Conservation Code (IECC)
            iii) 2014 Oregon Structural Specialty Code (OSSC) based on 2012 International Building Code (IBC)
            iv) 2014 Oregon Fire Code (Based on the 2012 International Fire Code)
        - Standards:
            v) Illuminating Engineering Society of North America (IESNA).
            vi) Institute of Electrical and Electronics Engineers (IEEE).
            vii) American National Standards Institute (ANSI).
            viii) A.D.A. Standards for Barrier Free Design.
            ix) National Fire Protection Association (NFPA)
            x) Underwriters Laboratory (UL)
            xi) UO Campus Construction Standards
- Seismic Bracing:
    - Electrical equipment must be installed and braced for the appropriate seismic zone location. Electrical equipment includes: exit signs, egress lighting fixtures, distribution equipment, transformers, etc.

D5010 Electrical Service & Distribution:

- Utility Service, Distribution and Equipment:
    - Incoming Service:
        xii) Primary voltage distribution will be routed underground from campus service vaults to new medium-voltage transformers, which will be located on the west side of the building.

xiii) Pull vaults shall be provided as necessary to assist the cable installation and as required by the campus standards. The service laterals will enter the building underground.
xiv) Power will be supplied to the facility by 480/277 Volt, 3 phase, 4 wire service.
xv) The Contractor shall provide all underground raceway system (conduits, vaults listed above, etc.) and conductors.

- Service Transformers:
  - i) Service transformers will be pad-mounted. One utility transformer will be provided for each service.
  - ii) Service transformers will be installed with NEMA 3R enclosures.

- Electric Rooms/Spaces:
  - The electrical room on the first level will have building service equipment and electrical distribution for the entire facility.
  - Emergency/standby electrical distribution equipment will be located in the electrical room on the first level. This equipment will be served by an independent service transformer.
- Main Service:
  - A 500kVA transformer serving a 600A 480Y/277V 3-phase, 4-wire distribution board will be provided to power normal power loads for the project. The distribution board will be located in the electrical room within proximity of the utility transformer.
  - Refer to metering and TVSS requirements below for main distribution board.
  - Basis of design will be Square D electrical distribution equipment.
- Power Distribution:
  - All panel boards will be surface mounted with bolt-in breakers and will include 20% spare breaker capacity.
  - Transformers: 208/120V power will be derived from dry-type step-down transformer. Dry-type transformers will be 150° degree C, class H, 220 - degree insulation, indoor ventilated and TP-1 rated.
  - Basis of design will be Square D electrical distribution equipment.
- Alternate Power Systems – Emergency and Standby:
  - Emergency/Standby Power:
    - iii) A 150kVA transformer serving a 175A 480Y/277 Volt, 3-phase, 4-wire panel will be provided to power emergency and standby loads for the project. The transformer will be located outdoors adjacent to the normal power transformer.
  - Loads Served From Emergency System:
    - iv) The following loads will be served via secondary distribution/branch circuit panels:
      - .1...iv.1. Life safety system control panels and remote panels, including fire alarm.
      - .1...iv.2. Exit signs and egress lighting throughout the building.

      Emergency lighting in the following areas:
      - .1...iv.2.1. Main Lobby and Elevator Lobbies.

.1...iv.2.2. Mechanical Rooms.
.1...iv.2.3. Stairwells and defined egress pathways.
.1...iv.2.4. Elevator Machine Rooms.
.1...iv.2.5. Electrical Rooms.
.1...iv.2.6. Restrooms (minimal).
.1...iv.3. Elevator cab lights.
.1...iv.4. One elevator.
.1...iv.5. Sewage ejector pumps.
.1...iv.6. Security Control Panels.
.1...iv.7. Security Cameras.
.1...iv.8. Electric Door Locks.
.1...iv.9. Building Automation System Remote Panels.
.1...iv.10. IDF room equipment loads.
.1...iv.11. Mechanical cooling for server and IDF rooms.
.1...iv.12. Sensors for restroom plumbing fixtures (sinks, toilets & urinals).

D5090 Other Electrical Systems

- Metering and Power Monitoring:
    - The Basis of Design will follow IPMVP Option D for new buildings and Option B for ECM (Energy Conservation Measures) with Savings Method 2.
    - Meter digital readouts shall not be mounted within tunnels.
    - Meter Communication Systems must connect to standby/emergency power.
    - Meter Communication Systems must be compatible with and connect to Facility Services private Ethernet trunk.
- TVSS:
    - Transient voltage surge suppressor (TVSS) devices will be provided in all 208/120 V branch circuit panels serving telecom equipment.
- Grounding:
    - A copper building main reference ground bus will be installed in the electrical room. It will connect to the main distribution board, to the main incoming water line, to the UFER grounding electrode, to building steel and to the neutral point of all local transformers. A 3/0 kcmil copper grounding riser will be run the full height of the building to inter tie copper ground bars in electric and telecom rooms transformers.
    - Green ground conductors shall be provided in all feeder conduits.
    - The telecom system shall be fully grounded, including cable tray, cabinets, etc.
- Wiring Method/Raceways:
    - All branch circuit wiring will be copper. A separate conductor will be used as the ground.
    - Feeders for panel boards are generally sized for the panel rating, allowing for connected loads plus 25% spare capacity. As the Basis of Design, all feeders will be copper.

- Feeders to HVAC equipment shall be sized per NEC (as a minimum), or as recommended by the manufacturer.
- All feeders and branch circuits larger than 10 AWG will utilize stranded conductors.
- Dedicated neutrals for each circuit will be provided to comply with NEC 210.4(B).
- Conductors will be upsized for voltage drop (3% VD 60% loaded or actual load if higher).
- The lighting, power, and fire alarm systems will be in conduit. Electrical raceways below grade or in concrete slab on grade will be PVC schedule 40.
- The telecom and security system cabling will be in conduit or cable tray.

- Wiring Devices:
  - Miscellaneous receptacles and switches in the core, lobbies, toilet rooms, mechanical areas, and other utility areas will be installed as required.
  - Receptacles shall be commercial grade, rated at 20 A.
  - Cover plates throughout the facility will be nylon in public areas and stainless steel in mechanical and non-public spaces.
  - Ground fault circuit interrupting (GFCI) devices will be provided as required by Code.
  - Receptacles will be provided within 25 feet of all mechanical equipment and in elevator pits.
- Mechanical/Equipment Connections:
  - Mechanical Equipment:
    v) Connections will be made for all mechanical equipment. All motors 3/4 hp and larger will be wired for 480 volt, 3-phase power. Motors less than 3/4 hp will be wired for 120 volt, 1-phase power. Magnetic starters and VFDs will be furnished by mechanical contractor and installed by the electrical contractor with the necessary power wiring to the starter and from the starter to the motor. All VFD's not integral to the factory assembled equipment will be physically mounted at the equipment by electrical contractor. Necessary power wiring to the VFD and from the VFD to the motor is to be installed.
    vi) Mechanical Loads - Refer to mechanical and plumbing sections of this narrative for equipment and locations.
  - Elevator Equipment:
    vii) Power, signal and raceways for elevator equipment will be provided by electrical contractor per the elevator equipment vendor in addition to providing all provisions required by the State Elevator Inspector.
  - Building Equipment:
    viii) Power, signal and raceways for the building equipment will be provided by electrical contractor. Building equipment will include items like ADA motorized doors.
- Miscellaneous Electrical Requirements:
  - Site Electrical – Power and fire alarm for civil vaults, security equipment, etc.
- Identifications:

- All electrical equipment will be provided with labelling that identifies the equipment name, voltage, power source, arc fault information, etc.
- Branch panels will be provided with type-written panel directories.
- All receptacles will be labelled with the panel and circuit number on Kroy or Brothers stick-on labels.
- All junction boxes will be provided with panel name and circuits.
- A single line diagram will be provided in electrical room.

- Testing:
  - All electrical systems will be tested.
- Fire Alarm System
  - A complete, addressable fire alarm system including smoke detectors and audio/visual alarm devices meeting ADA disability and code requirements will be included.
  - Smoke detection will be provided in the following areas:
    ix) Elevator Lobbies.
    x) Corridors.
    xi) Toilets.
    xii) Electrical rooms.
    xiii) Mechanical rooms.
    xiv) Electronics/telecommunications rooms.
    xv) Other spaces as required by code.
  - Smoke detectors will be provided in all elevator lobbies, interfaced with the elevator controller to provide elevator recall functions as required by ASME/ANSI 17.1 Elevator Code.
  - Elevator controller shutdown will be provided per code for fire and or smoke conditions in the elevator machinery room.
  - Duct smoke detection will be provided to comply with the Uniform or International Mechanical Codes, and will include unit shut down.
  - Manual stations will be located at all exterior exits, and exits from each individual floor.
  - Electromagnetic hold open/release devices on all elevator lobby and stairwell doors will release the doors upon activation of the life safety system and are provided with a battery backup for non-alarm conditions only to prevent nuisance closings.
  - A fire alarm annunciator will be provided in the lobby. Due to the addressable nature of the fire alarm system, detectors will annunciate either individually or by groups common to one room or space. Annunciation will be alphanumeric, corresponding to the room designations commonly used within the facility.
  - Fire alarm wiring will use fire alarm system rated cable and be installed in conduit where required by code. Wiring shall be class A type and include isolator modules at each floor to limit maximum system failures to individual floors. The emergency voice evacuation speakers and visual alarm devices will be zoned as follows:
    xvi) One zone for each floor (ground through penthouse).
    xvii) One zone for the elevators.

xviii) One zone for the elevator lobbies.
xix) One zone for each stairwell.

- The fire alarm system will be design build. The contractor will design the fire alarm system and install it. The contractor is responsible for coordinating with the mechanical contractor, architect and AHJ.

D5020 Interior Lighting

- General: Lighting will comply with the following
  - UO Campus Construction Standards, May 2011, Section 26 50 00
  - Oregon Energy Code
  - Oregon Model for Sustainable Development
- Luminaires:
  - Dedicated LED luminaires provide the greatest opportunity for light quality, control, longevity and energy savings. The design team will specify high efficacy and high CRI LED luminaires that illuminate interior and exterior spaces appropriately. Luminaires will be “off the shelf” products. LED drivers will also include typical 0-10volt dimming for lighting control system interface.
  - LED lighting deviates from the University of Oregon Construction Standards document. The design team believes this deviation is critical to the long term sustainability of this project.
- Lighting Controls:
  - The design documents will indicate Lighting Control Zones, device locations, and will include a sequence of operations (SOO). This SOO will describe the design intent to meet the needs of the project as well as the Oregon energy code. The approach allows multiple lighting control system vendors to propose system alternatives for evaluation by University of Oregon and the design team.

D5030 Communications Equipment Rooms

- A single communications equipment room will be provided, and will serve as the building’s main distribution frame (MDF) as well as the main point of entry (MPOE) for communications service to the building.
- Plywood Mounting Backboards: ACX-type plywood with no voids, 4-foot wide x 8-foot long x 3/4-inch thick. Backboards shall be fire-treated plywood. All exposed backboard surfaces shall be painted with two coats of matte white paint.
- Ground Bus Bars: 1/4-inch copper, minimum 4 inches high by 12 inches wide, mounted with 4-inch stand-off brackets.
- Ladder Rack Cable Tray: Steel construction, 9-inch rung spacing. 18-inch minimum width. CPI, or equal.
- Equipment Racks: Two-post universal 7-foot high equipment rack with TIA/EIA standard 19” wide mounting rails.
- Cable Management: 84-inch high, 10-inch wide, 12-inch deep, vertical cable management channels mounted to each side of rack. 1 or 2 rack unit height, rack-mounted horizontal cable management. Provide above and below patch panels for horizontal cabling terminations.

- Copper interbuilding backbone cable will be provided by UO Network & Telecom Services (UO NTS), and will be routed via underground conduit pathways to the campus tunnel system located on the west side of the adjacent building located to the west of the project.
- Fiber interbuilding backbone cable will be provided by UO Network & Telecom Services (UO NTS), and will be routed via underground conduit pathways to the campus tunnel system located on the west side of the adjacent building located to the west of the project.
- Category 5e unshielded twisted pair cable: any manufacturer extra headroom (300+ Mhz) category 5e cable.
- Category 5e Station Jacks: Panduit mini-com TX5e jacks CJ5E88TGXX, color to match electrical outlet color.
- Single gang device plates: Panduit mini-com CFPnXX classic series device plates or CFPnSY for stainless steel device plates, number of jack positions as required. Match color and style of electrical trim.
- Modular Furniture device plates: Panduit mini-com appropriate for modular furniture yet to be selected. This is a coordination issue. Bid shall include modular furniture device plates.
- Category 5e patch panels: Panduit CPPL48WBLY mini-com 48 port patch panels loaded with mini-com TX5e jacks, black in color.
- Wireless Access Points: Station termination: Panduit 2-port surface mount housing for above ceiling applications and 2-port single gang device plate for terminations in finished walls.
- Access Control: Proximity card reader controlled access at selected doors. System requires access control main panel, door control panels, intrusion detection system for door position monitoring, and management software. AMAG is UO standard.
- Combination keypad/proximity card readers. HID is University standard.
- Video Surveillance: IP based cameras, Arecont or as specified by UO personnel. Network equipment including PoE switches, servers/storage, and software are existing or provided by UO.
- Emergency Phones: Assume two emergency phone locations on site. Locations to be determined by campus public safety.

D20. Plumbing

D2000 General:

- This narrative describes the design direction for the plumbing systems serving the University of Oregon Bach Festival. This project is comprised of a 10,000 square foot 2 story office building and performance hall. A commercial grade plumbing system is anticipated for the building.

D2020 Domestic Water distribution:

- Potable Cold Water
    - A 2 inch domestic water connection from the local utility with a 1-1/2 inch meter is estimated for the building. The incoming static water pressure is approximately 80 psi. The water service entrance will contain the domestic double check valve

backflow preventer, water heater, expansion tank, and hot water recirculation pump in an 8 foot x 10 foot room on the lowest level.. Domestic water will be routed in Type L copper piping with soldered joints to all potable water fixtures. Freeze proof hose bibs be located every 100 feet around the perimeter of the building Water hammer arresters will be located at all banks of fixtures as well as at all locations where fast closing valves are located. Fiberglass insulation will be provided for domestic hot and cold water piping systems

- Domestic Water Heating:
    - It is estimated that a single 30 gallon electric water heater will be needed. A master mixing valve will be provided to limit hot water distribution temperatures for 120F. The hot water return will be circulated through a 1/20 hp bronze fitted inline pump. Fiberglass insulation will be provided for domestic hot and cold water piping systems

D2030 Plumbing Fixtures and Drains:

- Plumbing Fixtures
    - Plumbing fixtures and drains would be chosen for long service and water savings. Glumac suggests fixtures be wall hung flush valve type for all water closets and urinals. Stacking of the restrooms and plumbing fixtures is the most cost effective method. Lavatories, water closets and urinals, and electric water coolers shall be specified to be ADA compliant.

Water Closets:	Kohler Kingston with Sloan (1.28 gpf) 111-1.28 manual flush
Urinals:	Kohler Bardon with Sloan (0.125 gpf) 186-0.125 manual flush
Lavatories:	Kohler Brookeline (0.5 gpm) Chicago Faucet 2200
Break Room Sinks:	Elkay Lustertone Single Bowl (1.5 gpm) Chicago Faucet with blade handles
Janitor Sinks:	Stern-Williams Crescent 28”x28”x12” Mop Sink with Chicago Wall Mounted Service Sink Faucet

- Drains
    - Floor drains would be located in each toilet room with two or more fixtures and floor sinks/drains would be provided in all mechanical rooms and adjacent to equipment requiring drainage. All floor sinks/drains would be automatically trap primed to maintain trap seals.

D2040 Sanitary Waste

- A 4 inch sanitary sewer is estimated to serve the building. Assuming a 1% slope from the building, the 4” sanitary service provides a capacity of 172 drainage fixtures units (DFU). Waste systems shall be no-hub cast iron with heavy duty couplings with separate vent lines.

D2050 Rain Water Drainage

- The roof area is approximately 6,000 square feet. With a rainfall intensity of 1.3 in/hr, a 6 inch storm water service connection to the city utility is required. Separate roof drain and

overflow drains would be provided for each of the roof areas. Roof drains would be collected and run down the building to a storm water connection at the building perimeter. Storm systems shall be no hub cast iron with heavy duty couplings. Overflow drainage will be routed separately and daylighted near grade. Horizontal rainwater leaders and drain bodies shall be insulated with fiberglass blanket.

D2090 Other Plumbing Systems

- Wall thicknesses in the building should consider plumbing system requirements. The following are suggested wall thicknesses for different design conditions; 12 inch minimum wall for drinking fountains with coolers, 13 inch minimum wall for single wall mounted toilets, 21 inch minimum wall for back to back wall mounted toilets, 8 inch minimum wall for storm drain pipes is recommended.

D40. Fire Protection

D4000 General:

- The design would follow nationally recognized fire protection standards and the requirements of the local building and fire codes. Means of Egress would be in accordance with NFPA. Egress systems designed per NFPA 101 are generally considered to meet or exceed the requirements of the IBC. All other Fire Protection features, such as occupancy, fire resistive construction, building size limitations, and opening protection would be provided in accordance with the IBC and comply with local Amendments.

D4010 Sprinklers:

- Quick response sprinklers would be utilized throughout. All piping would be Schedule 10 with roll groove Victaulic joints for mains and Schedule 40 steel with threaded fittings for branch piping.

D4030 Fire Protection Specialties:

- A 4” fire service connection and double detector check backflow preventer will be located in the water entry room on the first floor. The estimated available pressure appears sufficient to supply the sprinkler system without the use of a fire pump. This will need to be verified by hydraulic calculation.
- Fire protection systems, such as fire sprinkler, fire alarm and elevator control, would be provided in accordance with referenced standards.
- Fire sprinkler systems would be provided throughout the building in accordance with NFPA 13 and insurance company requirements. The prospective insurance company should be contacted early to determine any recommended or mandatory requirements above and beyond code.
- All dry piping will be galvanized for corrosion control.
- A fire department connection and alarm bell will be provided at the building exterior.

APPENDIX ITEMS

- Electrical Load Summary Calculations
- Mechanical System Concept Options