Schematic Design Narrative

San Jose Evergreen New Gym Building and Racquetball Court Building Renovation 2014-0174

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LPAS Architecture + Design

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SUMMARY

The project is a new 38,000 square foot gymnasium building including new gyms and fitness rooms, locker rooms, and offices, as well as back of house spaces. The project will also include the renovation of the existing 11,500 square foot racquetball court building.

The project will tie into existing electrical, hydronic, and technology utilities to be brought to the site (within 5’-0” of the building) by other design and construction teams.

The renovation of the racquetball court has no previous design. Total project area is approximately 50,000 square feet.
DIVISION 21 - FIRE PROTECTION

PART 1 - SCOPE OF WORK

1.1 WORK INCLUDED:

A. Wet pipe automatic fire sprinkler system.

B. Dry standpipe system (Variance).

C. Fire Department Connection.

D. Fire System Backflow Preventer.

1.2 DESIGN CRITERIA

A. Codes - Systems are to be designed in accordance with the latest edition of the following codes:


9. Local Amendments to above Codes.

10. SJFD approved variance for fire department access and fire hydrants.

B. Standards – The following reference standards are to be used for the design:

1. ANSI – American National Standards Institute.

2. ASCE – American Society of Civil Engineers.

3. ASME – American Society of Mechanical Engineers.

4. ASSE – American Society of Sanitary Engineering.
8. FM - FM Global.
11. ICC-ES AC193 Mechanical Anchors in Concrete Elements.
12. ICC-ES AC308, Post-Installed Adhesive Anchors in Concrete Elements.
13. NEMA – National Electrical Manufacturer’s Association.
15. OSHA – Occupational Safety and Health Administration.
16. San Jose Evergreen Community College District Standards.
17. UL – Underwriters’ Laboratory.
18. UL Fire Protection Equipment Directory
19. UL Online Certifications Directory.

1.3 WET AUTOMATIC FIRE SPRINKLER SYSTEM – DESIGN CRITERIA

A. Densities:
   1. A variance for fire department access and number of fire hydrants has been approved by City of San Jose Fire Prevention and a condition of approval is a minimum design density of Ordinary Hazard Group I (.15/1500) for the entire building. Portions of the building determined to be a more severe occupancy classification are to be calculated for the higher design density.

B. Description:
   1. The building will be completely protected by a hydraulically designed wet pipe fire protection sprinkler system designed to meet NFPA Standard 13 and the requirements of the state and local Fire Marshal. Quick response sprinklers will be provided in all Light Hazard Occupancy areas.
   2. A double check detector valve assembly listed for fire protection use will be provided between fire protection systems and public water supply connection and installed at a location acceptable to the local water purveyor and fire department.
3. A fire department pumper connection (FDC) will be located within fire department acceptable distance from a fire hydrant. A method of draining fire department connection will be provided.

4. The area of fire sprinkler systems to not exceed 52,000 square feet and each fire sprinkler system riser to consist of a supervised control valve, check valve, pressure relief valve, flow switch, gauge, drain and inspector’s test connection. Location of inspector’s test connection to be as approved by the approving authority.

5. Location and type of tamper and flow switches will be coordinated with the fire alarm system. All switches will be individually addressed and annunciated at fire alarm control panel.

6. The 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 all underground pipe to the location of the hydrant flow test.

7. Piping will be concealed above finished ceilings and within walls except for areas exposed to structure. Coordinate all exposed fire sprinkler piping with the Architect prior to final shop drawings.

8. Sprinklers will be located in center or quarter point of ceiling tiles and symmetrically with other ceiling features. Ceiling features include, but are not limited to, walls, lights, air diffusers, and other architectural features.

9. Complete sprinkler coverage for all rooms, combustible concealed spaces and overhangs will be provided.

10. Main 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 flow from pressure pipe or will discharge to the exterior of the building.

11. Electrical connections and wiring as required will be provided for a complete and operable fire protection system, including, but not limited to flow switches, supervisory switches, and the like. Audible electric sprinkler flow alarms on the exterior of the building will be provided.

12. Seismic restraints for sprinkler and standpipe systems suitable for the Seismic Zone and local soil conditions will be provided.

13. Field conditions will be verified and building reports analyzed prior to submittal of bid. Design and installation will be based on the more stringent requirements if AHJ or FM Global requirements differ from Code.

14. Hydraulic calculations, seismic sway bracing calculations, stamping of drawings are to be performed by a California Licensed Engineer in conformance with all the jurisdictions requirements for submittal to local agencies for building permit, coordination with Architect, and getting approval from the AHJ.
15. All fire sprinkler taps made into the main horizontal distribution piping are to come off the top of the pipe.

16. All sprinkler system submittals are to be provided to the Architect for review. Insurer requirements will be coordinated with the Owner and Architect.

17. All visible piping to be coordinated with the Architect prior to installation or Contractor will be required to remove and relocate per Architect’s direction. Painting of visible piping to be coordinated with the Architect.

C. Materials:

1. Materials to be UL Listed or FM Approved for their intended fire protection use, new, free of defects, of current manufacture, and identified.

2. Sprinklers heads:
   b. Concealed Style: Viking Mirage, Quick Response, Concealed Flat Plate. SIN VK462; Finish: Coordinate with Architect.
   c. Sidewall Style: Viking Microfast, Quick Response. SIN VK304; Finish: Coordinate with Architect.
   d. Unfinished Ceiling Spaces: Upright style, Viking Microfast, Quick Response, SIN VK300; Finish: Coordinate with Architect.

3. Underground Pipe: Ductile Iron Class 52 or PVC.

4. Aboveground Pipe:
   a. 2-inches and smaller: Black Steel Schedule 40, threaded.
   b. 2 ½-inches and larger: Black Steel Schedule 10, grooved.

5. Fittings: Victaulic style full flow grooved fittings. Threaded cast or ductile iron fittings. Welded fittings. Mechanical tees to be Victaulic Style 920 or approved equal. Victaulic style 921, 922, 923, and 925 mechanical tees are not approved.

6. Couplings: Victaulic style 77 or 75 flexible grooved couplings or style 07 rigid grooved couplings, threaded, or welded joints. Victaulic “Roust-a-Bout” style or plain end couplings are not acceptable.

1.4 DRY STANDPIPE SYSTEM – DESIGN CRITERIA

A. Description:

1. A variance for fire department access and number of fire hydrants has been approved by City of San Jose Fire Prevention and a condition of approval is an underground and overhead dry standpipe system. The dry standpipe FDC will be
located at a remote location near the wet pipe fire sprinkler FDC location and within 100-feet of an existing fire hydrant. The dry standpipe FDC will supply an exterior free-standing standpipe connection on the East side and a wall mounted connection on the West side of the building. Both standpipe connection locations will be installed with (2) Class I Hose Valve connections with threaded connection acceptable to the local authority.

2. The exterior free standing standpipe connection will be supplied by underground piping and the wall mounted connection will be supplied by pipe installed at the interior of the building and coordinated with all trades.

B. Materials:

1. Materials to be UL Listed or FM Approved for their intended fire protection use, new, free of defects, of current manufacture, and identified.

2. Underground Pipe: Ductile Iron Class 52 or PVC.

3. Aboveground Pipe: Galvanized Steel Schedule 10 or 40, threaded or grooved.

4. Fittings: Victaulic style full flow grooved fittings. Threaded cast or ductile iron fittings. Welded fittings. Mechanical tees to be Victaulic Style 920 or approved equal. Victaulic style 921, 922, 923, and 925 mechanical tees are not approved.

5. Couplings: Victaulic style 77 or 75 flexible grooved couplings or style 07 rigid grooved couplings, threaded, or welded joints. Victaulic “Roust-a-Bout” style or plain end couplings are not acceptable.

END OF FIRE PROTECTION SECTION

END OF DIVISION 21
DIVISION 22 - PLUMBING

PART 1 - SCOPE OF WORK

1.1 SUMMARY OF WORK

A. Install a complete and operational plumbing system for the new 39,000 square foot San Jose City College Gymnasium Complex and renovate the existing 11,500 square foot Racquetball Court Building, including the following:

1. Domestic water, storm water and sanitary sewer site utilities to 5’-0” from the building.

2. New natural gas service to laundry and domestic gas water heaters.

3. Future provisions for solar thermal for the domestic and laundry water heating systems.

4. It is the design intent of these specifications to provide efficient, energy-efficient and cost effective plumbing systems which are easily isolated and maintained.

B. Work Included:

1. Aboveground and underground sanitary waste and vent system.

2. Aboveground and underground storm and aboveground overflow drainage system.

3. Potable domestic cold water (DCW) system.

4. Potable domestic hot water (DHW) system with circulation systems.

5. Natural gas system.

6. Cooling coil condensate drain system for mechanical equipment.

7. Plumbing fixtures.

8. Plumbing equipment.


1.2 PLUMBING SYSTEM DESIGN GUIDELINES

A. Codes - Systems are to be designed in accordance with the following codes:


2. California Mechanical Code (most recent adopted edition for proposed time of permitting).
Schematic Design Narrative: San Jose Evergreen New Gym Building and Racquetball Court Building Renovation


5. California Electrical Code (most recent adopted edition for proposed time of permitting).


7. NFPA (most recent adopted edition for proposed time of permitting).


9. Local Amendments to above Code.


B. Standards – The following reference standards are to be used for the design:

1. AGA – American Gas Association.

2. ANSI – American National Standards Institute.

3. ASHRAE – American Society of Heating, Refrigeration and Air Conditioning Engineers.

4. ASME – American Society of Mechanical Engineers.

5. ASPE – American Society of Plumbing Engineers

6. ASSE – American Society of Sanitary Engineering.


8. AWS – American Welding Society.


10. CISPI – Cast Iron Soil Pipe Institute.

11. CS – Commercial Standards.

12. EPA – Environmental Protection Agency.

13. NEMA – National Electrical Manufacturer’s Association.
15. NSF – National Sanitation Foundation.
16. PDI – Plumbing and Drainage Institute.
17. San Jose Evergreen Community College District Standards.
18. UL – Underwriters’ Laboratory.

1.3 LEED CERTIFICATION
A. The project will be pursuing LEED Silver certification. The project design team will meet required credits and will select between “Desired” and “Allowed” credits in order to obtain LEED Silver certification.

1.4 PLUMBING CALCULATIONS
A. The Plumbing Design Engineer will do the following calculations:
   1. Domestic water sizing calculations.
   2. Sanitary drainage calculations.
   3. Storm drainage calculations.
   4. Natural gas sizing calculations.
   5. Domestic and laundry water heating system(s) and circulating pump sizing calculations.
   6. Solar thermal calculations for domestic and laundry water heating systems.

1.5 PLUMBING SUBMITTALS
A. Plumbing contractor will submit complete plumbing fixture, equipment and specialty equipment and device cut-sheets for review.

1.6 PLUMBING DESIGN CRITERIA
A. Project Site Utilities:
   1. The plumbing design engineer will verify with local water agency and/or Civil Engineer the water pressure available to the project.
   2. The plumbing design engineer will coordinate with San Jose Evergreen Facilities and Salas O’Brien for new gas service for this project.
   3. The plumbing design engineer will coordinate with the Civil Engineer domestic water, storm water and sanitary sewer points of connection 5’-0” outside the building including pipe sizes, invert elevations, drainage fixture units for sanitary
waste, water supply fixture units/gpm for domestic water, and square footage/gpm for storm drainage.

4. The plumbing design engineer will coordinate location of roof mounted domestic and laundry water heating equipment, and with mechanical design engineer and Architect prior to the start of any work.

B. Plumbing:

1. Storm piping to be routed at 1/8- inch per foot.

2. Sanitary waste piping to be routed at ¼-inch per foot. Obtain approval from local authorities for piping, with slope less than 1/4-inch per foot.

3. Domestic cold and hot water piping sized with a maximum pressure drop of 2 PSI per 100 feet and a maximum velocity of 6 feet per second. Domestic hot water return calculated maximum velocity not greater than 4 ft/second. Piping mains inside building to be above ceiling.


6. See Architectural Drawings for location of all plumbing fixtures.

C. Thermal Solar Domestic Hot Water Systems

1. Thermal solar system to support domestic hot water for plumbing fixtures and laundry washing machines.

PART 2 - PLUMBING SYSTEMS

2.1 SANITARY WASTE AND VENT SYSTEM:

A. The sanitary waste system will convey waste from the plumbing fixtures and HVAC equipment by gravity to 5’-0” outside the building.

B. Aboveground and underground sanitary waste and vent piping will be no-hub service weight, cast iron with no-hub fittings and will comply with ASTM A 888 and CISPI 301.

C. Sanitary waste and vent piping no-hub coupling will be heavy duty type conforming to ASTM 888, will be type 304 stainless steel; worm drive clamps will be type 304 stainless steel and sealing gasket will be neoprene conforming to ASTM C-564. Couplings will conform to Factory Mutual Standard 1680, Class 1 and ASTM C-1540.
D. Trap priming of floor drains or floor sinks will accomplished with the following methods:

1. For bathroom trap seal primer valve (low lead) with integral automatic anti-siphon protection. The priming valve to discharge on both pressure drop and pressure spike. PPP Model: CPO-500.

2. For mechanical room and laundry electronic trap primer valve assembly, recessed or surface mounted, similar to Precision Plumbing Products Model PT or PTS, 120volt/1phase power supply, single point connection.

E. P-Trap insulation to be provided for all plumbing fixtures.

2.2 DOMESTIC COLD WATER SYSTEM:

A. The domestic water service distribution piping within 5'-0" of the building is under Plumbing Design Engineer scope of work.

B. The domestic cold water system will be distributed through-out the building to all plumbing fixtures, plumbing equipment, mechanical equipment and devices. Each branch pipe is to be provided with a branch shut-off valve (ball valve).

C. Domestic water piping to be as follows:

1. Underground: Type K soft temper copper tubing with flared bronze fittings. Pipe wrap will be provided for corrosion protection.

2. Aboveground: Type L drawn copper, 125 psi maximum service pressure, 250 degrees F maximum service temperature.

D. No fixture will have a pressure lower than 35 psi or higher than 80 psi.

E. System is designed to prevent water hammer conditions by providing lead-free air chambers/shock arrestors for fixtures, and shock arrestors for quick closing valves.

F. Protection against backflow will be maintained with Code approved backflow prevention devices.

G. Hose bibbs will be provided with vacuum breakers. Locate hose bibbs in all mechanical rooms, perimeter of the building, and roof. Coordinate locations with Architect.

H. Provide plumbing stops at every plumbing fixture connections.

I. Provide water connections and vacuum breakers as required to all new plumbing fixtures and other appliances such as dishwasher, ice maker, coffee makers (if plumbed-type), etc.

2.3 DOMESTIC HOT WATER SYSTEM:

A. The domestic hot water system will provide 110 degrees F hot water to all showers, lavatories and sinks.

B. The laundry hot water system will provide 140 degrees F-to-160 degrees F hot water to the washing machines.
C. Piping service will be type L drawn copper, 125 psi maximum service pressure, 250 degrees F maximum service temperature

2.4 CONDENSATE DRAIN SYSTEM:

A. The cooling coil condensate drain system will drain all clean water drainage from any mechanical cooling equipment (coordinate with the mechanical contractor) either by gravity or condensate pump. All primary condensate drain piping located above IDF, MDF, electrical rooms will be provided with a secondary containment pipe. Minimum pipe size to be 4” minimum. Provide a ¼” drain tube from secondary containment and terminate at ¼” below finished ceiling in corridor. The primary condensate drain system will terminate into a service sink or lavatory tailpiece with an air gap fitting.

2.5 NATURAL GAS SYSTEM

A. Gas service enters the building at the ground level. The gas meter and regulator will be located outside the building. Gas will be routed to the domestic hot water heaters and laundry dryers.

2.6 PLUMBING FIXTURES:

A. The plumbing fixtures will be high efficiency, low flow type as required to meet California Green Building Code and District Design Standards.

B. Mounting height of plumbing fixtures, flush valve control location, etc., are to conform to the following:

1. As shown on the Architectural Drawings.
2. As required by ADA.
3. Industry Standards.

C. Plumbing Fixtures are to be equal to the following:

1. Water closets (WC-1 and WC-2 ADA Compliant) will be wall mounted, elongated front bowl, vitreous china, 1.28 gallon per flush used with high efficiency flushometer valve.
2. Urinals (UR-1 and UR-2 ADA Compliant) will be wall mounted, vitreous china, 0.125 gpf. Used with high efficiency flushometer valve.
3. Public lavatories (L-1) will be under counter mount, vitreous china, ADA compliant fixtures with sensor operated faucets 0.50 gpm. Thermal mixing valve to be recessed in wall below lavatory with access panel painted to match wall color.
4. Standard showers (SH-1) will be wall mounted, with universal pressure balance rough-in valve, chrome pressure balance valve trim, tubular shower arm and 1.5 gpm non-adjustable shower head.
5. ADA Compliant shower (SH-2) will be wall mounted, with universal pressure balance rough-in valve, chrome pressure balance valve trim with lever handle, shower system (1.5 gpm) and hand shower wall union.

6. Training Room sink will be under counter mounted, vitreous china, sensor operated faucet 0.5 gpm, thermal mixing valve to be recessed in wall below lavatory with access panel painted to match wall color.

7. Public Electric Water Cooler (EWC-1) will be wall mounted bi-level stainless steel with recessed in-the-wall refrigeration system with safety bubblers and front push buttons and wall mounting frame.

8. Service sink (SSK-1) will floor mounted one piece construction, square drop front mop receptor with 3-inch drain. Receptor to be manufactured of tan and white marble chips in white Portland cement. Receptor to be 32”x32”x12” high with wall mounted faucet with vacuum breaker, double stops and bucket hook; mop hanger with 3 clamps; flat strainer and two (2) panels of 32.”

D. Fixture Supports:

1. Support wall hung water closets (bariatric), urinals and lavatories on heavy duty, full size, concealed, commercial grade carriers mounted to floor structure.

2. Support other fixtures mounted on stud partitions on heavy concealed wall brackets bolted to a 1/4-inch thick by 5-inch high steel plate anchored firmly to studs with bolts (or welded to metal studs). Plate to extend one stud each way beyond fixture mounting point width.

2.7 PLUMBING WATER HEATING EQUIPMENT

A. Water Heating Systems, General:

1. Water heating systems to packaged type systems to be located in mechanical room at ground floor.

2. Water heating systems to be ASME and UL Listed.

3. Gas-fired water heaters to be high efficiency condensing type.

4. Potable hot water expansion tank for tank type heaters. Expansion tank to be ASME bladder potable water type.

5. Digital mixing centers for hot water recirculation temperature maintenance system.

6. Domestic hot water circulation pumps.

2.8 PLUMBING INSULATION

A. Plumbing insulation to meet requirements per California Green Building Code.
B. Insulation materials to have a closed-cell structure to prevent moisture from wicking. Insulation material to be manufactured without the use of CFCs, HFCs or HCVCs. It is to also be formaldehyde free, low-VOC (meets SCAQMD Rule 1168), fiber-free, dust free and have an EPA-registered antimicrobial additive built-in to resist mold and mildew growth.

C. Insulation to be closed-cell flexible elastomeric thermal insulation.

D. Adhesives for insulation to be compatible with insulation product.

2.9 PLUMBING VALVES

A. All valves 2-inch and smaller to comply with requirements of California Health and Safety Code, Section 116875.

B. All valves are to be of the same manufacturer.

C. Ball valves for shut-off and to isolate equipment, parts of systems or vertical risers. Ball valves to be limited to 4-inches and smaller. Valves to be 3-piece for 2-12/-inch and larger.

D. Swing check valves to be on discharge side of pumps.

E. Hot water return balancing valves to be in domestic hot water recirculating systems.

F. Ball valve to be provided for main domestic water shutoff.

2.10 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

A. Identification will be provided for all plumbing piping and equipment. All piping concealed or exposed to have identification markers and flow arrows per ANSI A13.1-2007.

B. Pipe markers to be pressure sensitive vinyl (self sticking) material with 360 degree pipe flow arrows and fluid being conveyed. Locate pipe markers every 20 feet on horizontal pipe runs, one foot in front of each valve, thermometer or gauge, at each branch or riser take-off, each passage through walls and floors, at least twice in each room and each story traversed by piping system.

C. Valve tags to be attached to each line shutoff valve with brass chain and color-coded plastic laminated tag. Engrave laminate tags with 1-inch designated numbers.

D. Equipment identification name plates will be engraved plastic and securely attached to each piece of equipment. Nameplates to be 1-inch high, 1/8-inch rigid plastic with beveled edges with black background and white border and letters.

E. Pipe markers, valve tags and equipment name plates to be Brimar, Seton Name Plate, Brady or comparable product.
PART 3 - EXECUTION

3.1 INSTALLATION

A. The following will be provided:
   1. Supports, vibration isolation, and seismic bracing, for all plumbing piping and equipment.
   2. Cleaning and flushing.
   3. Chlorination of domestic water system.

B. Installation Practices:
   12. Avoid interference with other trades.
   13. Maintain access and clearance.
   14. Run piping parallel with or at right angle to walls and other piping, neatly spaced and with plumb riser.
   15. Maintain maximum headroom by offsetting as necessary.
   16. Maintain ceiling height and coordinate work with other trades. No exposed piping unless approved by Architect.
   17. Maintain minimum 1" clearance from adjacent work, including insulation.
   18. Provide shock absorbers in all flush valves, solenoid valves, and quick closing pressurized shut-off valves and where required by code.
   19. Provide dielectric unions at all ferrous to copper connections.
   20. Provide reduced pressure backflow preventer as required.
   21. Connect drainage, water, and gas to all mechanical and plumbing equipment requiring same.
   22. All potable water systems will be flushed and sterilized in a manner approved by the City of San Jose Health Department.
   23. Provide all excavation, trenching and backfill for all work done in this Section.
   24. Install piping with provisions for expansion and contraction.
   25. Wrap all uninsulated, buried, steel, copper and cast-iron pressure piping and fittings for corrosion protection.
   26. Provide shut-off valves at connection to all plumbing and HVAC equipment.
27. Provide shut-off valve and check valve on the cold water line to each water heater. Provide expansion tank downstream of check valve.

28. No cross connections between potable water and other water systems. Provide backflow preventer to water make-up to HVAC equipment, training room equipment.

29. Materials used are not to be likely to support microbial growth and are not to be degraded by cleaning materials.

30. Provide solid ring chrome plated escutcheons (for 2” and smaller) and split-ring (2-1/2” and larger) on piping passing through walls, floor, or partitions, etc., exposed to view.

31. Seal all void space where piping passes through fire rated walls with UL listed fire stopping material.

32. Seal all void space where piping passes through non-rated walls with fiberglass material.

33. Provide branch isolation valves servicing each toilet rooms.

34. Provide access panels in ceilings, partitions, enclosures, etc., as required in order to achieve easy access to all equipment and devices provided or installed under this section.

35. Coordinate with HVAC work to locate floor drains in mechanical rooms and fan rooms so as to provide required function, while avoiding the need to run drain piping across floors which creates tripping hazards.

36. Coordinate with local utility for location and placement of backflow preventers. Provide freeze protection as required. Coordinate with electrical.

37. Provide means to accept motion in any direction where piping crosses building seismic joints. Coordinate with structural engineer to determine required range of motion.

38. Provide drain valves with hose valve connections for all domestic hot and cold water risers, water heaters and other equipment.

END OF PLUMBING SECTION

END OF DIVISION 22
DIVISION 23 - HVAC

PART 1 - DESIGN CRITERIA

1.1 CODES

A. Systems are to be designed in accordance with the latest edition of the following codes:

1. California Building Code (most recent adopted edition)
2. California Mechanical Code (most recent adopted edition)
3. California Plumbing Code (most recent adopted edition)
4. California Fire Code (most recent adopted edition)
5. California Electrical Code (most recent adopted edition)
7. Local Amendments to above Codes

1.2 STANDARDS

A. The following reference standards are to be used for the design:

1. AMCA – Air Movement and Control Association International, Inc.
2. ANSI – American National Standards Institute
3. ARI – Air Conditioning and Refrigeration Institute
4. ASHRAE – American Society of Heating, Refrigeration, and Air Conditioning Engineers
5. SMACNA – Fire and Smoke Damper Installation Guide
6. SMACNA – Guidelines for Seismic Restraints of Mechanical Systems
7. SMACNA – Standards for Duct Construction
8. EPA – Environmental Protection Agency
9. NEMA – National Electrical Manufacturer’s Association
10. UL – Underwriters’ Laboratories
11. LEED – Leadership in Energy and Environmental Design
12. NFPA - National Fire Protection Association:
13. San Jose Evergreen Community College District Standards.

1.3 LOAD CALCULATIONS – OUTDOORS DESIGN CONDITIONS

A. System load calculations are to be based on the following outdoor design conditions:

1. Summer – 88 degrees F DB / 68 degrees F MCWB (per District Design Standards) for airside system calculations. Based on ASHRAE/Climate data for San Jose.

2. Winter – 33 degrees F DB (per District Design Standards) for airside system calculations and heating system calculations

1.4 LOAD CALCULATIONS – INDOOR DESIGN CONDITIONS

A. System will be designed to maintain the following temperature and humidity conditions. (Numbers below are the set-point to which load calculations will be completed and to which the control system will be set).

<table>
<thead>
<tr>
<th>Space</th>
<th>Summer (degrees F)</th>
<th>Winter (degrees F)</th>
<th>Relative Humidity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Occupied Zones</td>
<td>74 ±2</td>
<td>70 ±2</td>
<td>No Control</td>
</tr>
<tr>
<td>Server Room/IDF/MDF</td>
<td>72 ± 2</td>
<td>No Heating</td>
<td>No Control</td>
</tr>
<tr>
<td>Unoccupied Areas (Elec. Closets, Water Heater Rooms, etc.)</td>
<td>85</td>
<td>55</td>
<td>No Control</td>
</tr>
<tr>
<td>Elevator Machine Rooms</td>
<td>As required by elevator equipment vendor</td>
<td>As required by elevator equipment vendor</td>
<td>As required by elevator equipment vendor</td>
</tr>
</tbody>
</table>
1.5 LOAD CALCULATIONS - INTERNAL AIR CONDITIONING LOADS ASSUMPTIONS:

A. Space lighting, equipment and ventilation loads are:

<table>
<thead>
<tr>
<th>Space Type</th>
<th>Occupancy SF/OC</th>
<th>Light load W/SF</th>
<th>Eq load. W/SF</th>
<th>Ventilation load CFM/SF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td>20</td>
<td>1.2</td>
<td>0.5</td>
<td>0.38</td>
</tr>
<tr>
<td>Corridor</td>
<td>100</td>
<td>0.6</td>
<td>0</td>
<td>0.15</td>
</tr>
<tr>
<td>Elec/Tele</td>
<td>300</td>
<td>0.7</td>
<td>1.5</td>
<td>0.15</td>
</tr>
<tr>
<td>Lobby</td>
<td>15</td>
<td>1.5</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Office</td>
<td>100</td>
<td>1.1</td>
<td>0.5</td>
<td>0.15</td>
</tr>
<tr>
<td>Restroom</td>
<td>100</td>
<td>0.8</td>
<td>0</td>
<td>0.15</td>
</tr>
<tr>
<td>Gymnasium/Fitness</td>
<td>15</td>
<td>1</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Training Room</td>
<td>15</td>
<td>1</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>Locker/Dressing Room</td>
<td>50</td>
<td>0.8</td>
<td>0</td>
<td>0.15</td>
</tr>
</tbody>
</table>

B. People –

4. Number of people to be based on ASHRAE standard 62.1-2007 and California Title 24.

C. Ventilation Rate – ASHRAE Std. 62-2007 / California Title 24

1.6 LOAD CALCULATIONS - ENVELOPE LOAD ASSUMPTIONS:

A. Walls: Composite U-Value will be determined based on actual building design conditions. We assume R-19 and R-13 insulation between framing members per the LEED Energy Modeling Summary.

B. Glazing: Dual pane glazing U-Value of 0.462 and SHGC of 0.605 and U-Value of 0.462 and 0.312 per the LEED Energy Modeling Summary.

C. Roof: Composite U-Value will be determined based on actual building design conditions. We assume R-25 and R-30 per the LEED Energy Modeling Summary.

1.7 LOAD CALCULATION METHODOLOGY

A. All cooling loads to be completed with industry standard software such as Trace 700, Carrier HAP, etc. Load calculations are to meet industry standard as outlined in the most current ASHRAE Fundamental Handbook.
1.8 LOAD CALCULATIONS – SYSTEMS SIZING

A. Block Loads: Air Distribution Systems are to be sized based on block loads. Over-sizing by adding all peak loads is not allowed.

B. Airside System Sizing: Air handlers, associated coils, associated filters, and associated energy recovery devices are to be sized for an extra 10 percent load capacity than required for calculated loads. This final load capacity is to be used in sizing systems based on velocities noted later in this Schematic Narrative. An additional extra 4 percent leakage capacity in fan motor horsepower to account for duct leakage is to be provided. As an example, if load calculations indicate an air handler is required at 10,000 CFM with 2,000 CFM outside air, air handler components will be selected for 11,000 CFM with 2,200 CFM outside air. All system components are to be designed based around the 11,000 CFM capacity with 2,200 CFM outside air. Once the final motor brake horsepower is selected from 11,000 CFM, an additional 4 percent will be added to the brake horsepower prior to selecting the motor horsepower.

C. Terminal Units: A safety factor will not be provided in terminal unit sizing (includes VAV/CAV terminal units, fan coils, etc.)

D. Split Systems: A cooling capacity safety factor of 10 percent with air tunnel sizing equal to airside system sizing will be provided.

1.9 EQUIPMENT AND COMPONENT SELECTION

A. Coils (Cooling and Heating): 400 Feet Per Minute (FPM). Maximum waterside pressure drop of 10 feet H2O.

B. Filters: 400 FPM. The final static pressure will be calculated by adding the initial pre-filter pressure drop to the final filter pressure drop plus one-inch H2O dirty filter loading. For equipment such as energy recovery devices where there is only one filter on the exhaust airstream, the final static pressure will be calculated by adding the initial filter pressure drop and a half-inch H2O dirty filter loading.

C. Fans: Maximum fan revolutions per minute (FRPM) of 1,200 RPM, minimum efficiency of 65 percent or better, premium efficiency motors.

D. Terminal Units: Terminal units to be sized with a maximum pressure drop of 0.3” H2O including two row heating coils. Maximum waterside pressure drop of 10 feet H2O.

E. Ductwork Mains: All main ductwork (ductwork upstream of three or more terminal units for supply or three or more registers for return/exhaust) are to be sized with extra capacity equal to 10 percent. Variable volume system supply air main ductwork upstream of terminal units will be sized at friction pressure drop of 0.1” H2O per hundred feet of ductwork. Variable volume system supply air branch ductwork downstream of terminal units and return/exhaust air ductwork mains and branches will be sized at friction pressure drop of 0.08” H2O per hundred feet of ductwork. Main supply air ductwork (ductwork upstream of terminal units) is to never exceed 1,800 FPM. Main return/exhaust air ductwork is to never exceed 1,500 FPM. Main supply air ductwork downstream of terminal units is to never exceed 750 FPM. Transfer air is to be sized at a
velocity not to exceed 250 feet per minute. Balancing dampers will be provided at each floor for supply, return, and exhaust.

F. Pipe Sizing: All main piping (piping upstream of three or more terminal units) to be sized with extra capacity equal to 10 percent. Piping is to be sized at a friction pressure drop of three feet H2O per one hundred feet of piping. Maximum water velocity in piping systems not to exceed 7 feet per minute.

G. Diffusers: Diffusers are to be selected at airflows below 250 CFM each. Where the load is more than 250 CFM in a room multiple diffusers will be provided. Design is to include consideration of airflow patterns to make sure that air streams do not collide creating dumping. Diffusers will be selected at 5NC lower than Room Maximum NC values noted for the project.

H. Return and Transfer Grilles: Return air grilles are to be selected at airflows below 500 CFM per grille. Transfer grilles are not to exceed 250 FPM in ductwork used for transfer or 250 FPM in face of grille.

1.10 LEED REQUIREMENTS

A. The project will be pursuing LEED Silver Certification. Design Team will provide the following services as a minimum:

1. All LEED documentation including filling out templates and providing required calculations for credits assigned to the Design Team and agreed upon in the Fee Proposal.

2. Assistance during the commissioning and enhanced commissioning phases.

3. LEED Energy modeling utilizing ASHRAE 90.1-2007 for the baseline model. Regardless of CUP design, the energy goals for the project are a reduction in energy cost from ASHRAE 90.1-2007 by 24 percent prior to application of renewable energy.

4. Responses to USGBC review comments for credits assigned to the Design Team and agreed upon in the Fee Proposal.

B. The following LEED credits will be pursued on this project:

1. SSep1.
2. SSep4.1.
3. SSep4.2.
4. SSep4.3.
5. SSep4.4.
6. SSep7.2.
7. SSep8.
8. WEp1.
9. WEc2.
10. WEc3.
11. EAp1: Commissioning Authority will be hired by the District.
12. EAp2.
13. EAp3: For compliance coordinate with CUP designers.
14. EAc1: Seven credits (improve by 24 percent without renewables).
15. EAc3: Commissioning Authority will be hired by the District.
16. EAc4: For compliance if it is required to coordinate with CUP designers.
17. EAc5.
18. MRp1.
21. MRc5.
22. EQp1.
23. EQp2.
24. EQc1.
25. EQc2.
26. EQc3.1.
27. EQc3.2.
28. EQc4.1.
29. EQc4.2.
30. EQc4.3.
31. EQc4.4.
32. EQc5.
33. EQc6.1.
34. EQc7.1.
35. EQc7.2.
36. IDc1.1.
37. IDc1.2.
38. IDc2.
39. RPc1.1.

1.11 ACCEPTABLE NOISE LEVELS (ASHRAE CHAPTER 48, TABLE 1)

<table>
<thead>
<tr>
<th>Room Type</th>
<th>Maximum NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Offices</td>
<td>30</td>
</tr>
<tr>
<td>Conference Rooms / Meeting Rooms</td>
<td>25-30</td>
</tr>
<tr>
<td>Classrooms</td>
<td>30</td>
</tr>
<tr>
<td>Open Plan Offices</td>
<td>40</td>
</tr>
<tr>
<td>Office Corridors / Lobby</td>
<td>40</td>
</tr>
<tr>
<td>Server Room</td>
<td>45</td>
</tr>
<tr>
<td>Gymnasiums</td>
<td>45</td>
</tr>
</tbody>
</table>

A. Project to be designed and to operate to the acoustical criteria noted in the table above.
B. Any additional acoustical criterion is to be adhered to as dictated by project acoustical consultant.
C. Sound traps will be provided at main air handling unit supply air discharge and return air intakes. Air handler system sound traps may be removed if acoustical consultant proves to Owner that resultant NC values will not be compromised and NC values noted in table above will be maintained.

1.12 TEMPERATURE CONTROLS AND ZONING

A. Individual temperature controls will be based on functions, exposure, and Owner request. Preliminary zoning for the purposes of cost estimating have been included on the mechanical drawings.
B. All zones will be zoned as shown on the mechanical drawings and are to be provided with a single duct variable volume terminal unit. Heating will be provided at the terminal unit via an integral reheat coil.

C. Each corner exposure (NE, NW, SE, and SW) is to be on a separate zone fed by its own variable volume terminal unit. Heating will be provided at the terminal unit via an integral reheat coil.

D. All high occupancy rooms with potential high latent loads are to be on a separate zone fed by a variable volume terminal unit with hot water reheat coil.

E. In rooms with diffusers, one diffuser minimum per occupied space.

F. Perimeter offices will be provided with one zone for every three offices maximum.

G. Demand control ventilation systems will be provided per Title 24 Energy Code Requirements.

PART 2 - HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS

2.1 FIRST AND SECOND FLOORS

A. Air Handling Units (AHU-1, 2, 3, 4) In the Main Building:

1. Four (4) air handling units (AHU) will be used. AHU-1 will serve first floor, lobby, office, and staff lockers. AHU-2 will serve the gymnasium. AHU-3 will serve the first and second floor locker rooms, public restrooms, tickets and concessions, classrooms, training room, fitness center, and lab. AHU-4 will serve the team restrooms, team dressing rooms, showers and locker rooms.

2. Approximate Capacity: 8,000 CFM for AHU-1, 30,000 CFM for AHU-2, 15,000 CFM for AHU-3 and 10,000 CFM for AHU-4.

3. Fans: Supply and return fans will be direct drive plug fan with variable frequency drives. Fan array system for both supply fan and return fan.

4. Pre-Filter: Panel Filter, MERV-8 (initial pressure drop not to exceed 0.15-inch water column).

5. Final Filter: Bag filter, MERV-13 (initial pressure drop not to exceed 0.25-inch water column).


7. Pre-Heat Coil: A heating hot water pre-heat coil will be provided to minimize morning warm-up time and reduce fan power usage required to warm-up the building. Coils will be copper tubes/aluminum fins. Red brass connections.
8. Indirect evaporative cooling section with indirect evaporative heat exchangers, wet-side fans, water pumps, hoods, filter section, distribution manifold and nozzles, float valves, overflow and drain.

9. DDC Controls will be used. Control will support multiple energy conservation features including temperature setback, static pressure reset, fan modulation based on filter loading, etc.

10. Airflow measuring system: Minimum outside air, outside air, supply air, and return air will be provided with airflow measurement devices similar to Ebtron, system to be compatible with all flow rate ranges expected for each part of the system.

11. Electrical: Motors will all be selected to be premium efficiency. Single point electrical connection (460V) for fans, and a single point electrical connection (120V) for lights, control power, etc. Each fan in array to have separate variable frequency drive (VFD).

B. Packaged Rooftop Units (AC-1 and AC-2) In Racquetball Building:

1. Two (2) packaged rooftop units will be used. AC-1 will serve the west portion of the racquetball court. AC-2 will serve the east portion of the racquetball court.

2. Approximate Capacity: 8,000 CFM for AC-1 and AC-2.

3. Fans: Supply and return fans will be direct drive plug fan with variable frequency drives. Fan array system for both supply fan and return fan.

4. Pre-Filter: Panel Filter, MERV-8 (initial pressure drop not to exceed 0.15-inch water column).

5. Final Filter: Bag filter, MERV-13 (initial pressure drop not to exceed 0.25-inch water column).


7. Furnace: A high efficiency modulating gas furnace is to be used for heating.

8. DDC Controls will be used. Control will support multiple energy conservation features including temperature setback, static pressure reset, fan modulation based on filter loading, etc.

9. Airflow measuring system: Minimum outside air, outside air, supply air, and return air will be provided with airflow measurement devices similar to Ebtron, system to be compatible with all flow rate ranges expected for each part of the system.

10. Electrical: Motors will all be selected to be premium efficiency. Single point electrical connection (460V) for fans, and a single point electrical connection
C. Heating hot water and chilled water will be provided from the CUP. Tertiary pumping will be provided with two chilled and two heating hot water pumps operating in a lead-lag fashion.

D. Heating hot water will be provided from the campus hot water loop and will be delivered to the AHU heating coil and to each of the terminal reheat coils.

E. Chilled water will be provided from the campus chilled water loop and will be delivered to the air handling units’ cooling coil.

F. The distribution system will be a variable volume system with reheat. Temperature control will be achieved through the VAV reheat coil (see mechanical drawings for zoning).

G. High occupancy areas such as the gymnasium, locker rooms, classrooms, multipurpose rooms, and dressing rooms will be designed to have four airflow setpoints. These setpoints will be based on occupancy, need for ventilation, need for heating, and need for cooling. There will be an unoccupied (as sensed through an occupancy sensor in the zone) minimum airflow setpoint, an occupied airflow setpoint to maintain space temperature and space CO2 levels at 1000 ppm, a minimum reheat setpoint set for calculated heating loads, and finally a maximum cooling setpoint. CO2 levels will be monitored at the Building Management System and an alarm will be generated whenever it is exceeded and the system is set at full flow.

H. The restrooms will be provided transfer air from adjacent corridors via a ducted transfer grille.

I. Return air will be provided via a return air plenum. Return air boots with sound attenuation and duct lining will be provided at sound sensitive rooms such as conference rooms and classrooms.

J. Split Systems: Each Data Telecom Room (IT Room or IDF Room) and Elevator Machine Room will be provided with its own dedicated split system. The split systems will have a minimum efficiency EER of 18.

K. General Exhaust: The general exhaust will be provided through dedicated fans to serve areas as indicated in the drawings.

L. Local Exhaust: Local exhaust will be provided at each electrical room (activated through a temperature sensor), at each break room (continuously operating during occupied hours), and at each copy room (continuously operating during occupied hours). Local exhausts are to discharge into an exhaust duct routed to the roof.

2.2 TEMPERATURE CONTROLS SYSTEMS AND BUILDING MANAGEMENT SYSTEM (BMS):

A. All controls will tie into the BMS.
B. The controls contractor will provide all wiring per Division 26 requirements.

C. The controls contractor will provide all required interface devices (i.e. BacNet cards for VFD’s, etc.).

D. All new HVAC systems will be controlled and monitored.

E. Points List (Minimum requirements, actual points list as required to achieve project design intent noted in this document):

1. Air Handling Unit (AHU-1, 2, 3, 4):
   a. DO Minimum Outside Air Damper
   b. AO Economizer Outside Air Damper
   c. AO Return Air / Mixed Air Damper
   d. AI Supply Air Flow
   e. DO SA Discharge Damper
   f. DI SA Pre-Filter
   g. DI SA Final Filter
   h. DO Supply Fan VFD Start/Stop
   i. DI Supply Fan VFD Status
   j. AI Supply Fan VFD Speed
   k. AI Supply Fan VFD Temperature
   l. DI Supply Fan VFD Alarm
   m. AI Supply Fan VFD KWH
   n. AO Chilled Water Coil Valve
   o. AO Heating Hot Water Coil Valve
   p. AI Supply Air Temperature
   q. AI Differential Static Pressure
   r. DI High Static Cut-Out
   s. AI Outside Airflow (Min. and Economizer)
   t. DI Smoke Detector
u. AI Return Air Temperature  
v. AI Return Airflow  
w. DO Return Fan VFD Start/Stop  
x. DO Exhaust Air Damper  
y. DI Return Fan VFD Status  
z. AI Return Fan VFD Speed  

aa. AI Return Fan VFD Temperature  
bb. DI Return Fan VFD Alarm  
cc. AI Return Fan VFD KWH  

dd. AI Outside Air Temp (at two points on the roof)  

2. Chilled Water Distribution:  
a. AI Chilled Water Differential Pressure at Building Riser  
b. AI Chilled Water Supply Temp at Building Riser  
c. AI Chilled Water Return Temp at Building Riser  
d. AI Chilled Water Flow at Building Riser at Building Riser  

3. Heating Hot Water Distribution:  
a. AI Heating Hot Water Differential Pressure at Building Riser  
b. AI Heating Hot Water Supply Temp at Building Riser  
c. AI Heating Hot Return Temp at Building Riser  
d. AI Heating Hot Flow at Building Riser  

4. Terminal VAV units:  
a. AI Zone Temperature  
b. AO Zone Setpoint Adjust  
c. AI Supply Air Temperature  
d. AI Airflow  
e. AO Control of Modulating Reheat Coil Valve
5. Miscellaneous Monitoring I/O Points:
   a. AI Building Pressure (at two points on each floor)
   b. AI CO2 concentration / PPM

6. Split Systems
   a. AI Room Temperature
   b. DI Unit Status
   c. DI Unit Alarm
   d. DO Unit Start/Stop
   e. AO Room Setpoint adjust
   f. DI Condensate overflow switch

7. Fans (without variable frequency drives)
   a. DI Fan status
   b. DI Fan alarm
   c. DI Fan start/stop

8. Fans (with variable frequency drives)
   a. DO Exhaust Fan VFD Start/Stop
   b. DI Exhaust Fan VFD Status
   c. AI Exhaust Fan VFD Speed
   d. AI Exhaust Fan VFD Temperature
   e. DI Exhaust Fan VFD Alarm
   f. AI Exhaust Fan VFD KWH

9. Graphics: Provide dynamic, colored graphics package for each floor, showing all equipment and associated control data in real-time and with the ability to monitor and change setpoints.

END OF HVAC SECTION

END OF DIVISION 23
PART 1 - DESIGN CRITERIA

1.1 CODES:

A. Systems will be designed in accordance with the following codes:

1. ANSI Electrical Systems
2. ANSI Handicapped Code - A117.1
3. California Occupational Safety and Health Act of OSHA
5. NFPA-72, National Fire Alarm Code - 2010
8. State of California Code Regulations, Titles 8, 17, 19, and 22, Division 7, 24 - Part 3
13. Division of the State Architect (DSA)

1.2 STANDARDS:

A. The following reference standards will be used in design:

1. ADA – Americans with Disabilities Act
2. ANSI – American National Standards Institute
3. ANSI Electrical Systems
4. ANSI Handicapped Code - A117.1
5. ASTM – ASTM International
10. Cal/OSHA California Occupational Safety and Health Act of OSHA
11. CSA – CSA International
12. DSA – Division of the State Architect
13. ETL – Electrical Testing Laboratories
15. IEEE – Institute of Electrical and Electronics Engineers
16. IES – Illuminating Engineering Society
17. ISO – International Organization for Standardization
18. LEED – Leadership in Energy and Environmental Design
19. NEC – National Electric Code
20. NECA – National Electrical Contractors Association
21. NEMA – National Electrical Manufacturers Association
22. NETA – National Electrical Testing Association
23. NFPA – National Fire Protection Association
24. San Jose Evergreen Community College District Standards
25. UL – Underwriters Laboratories Inc.
1.3 WORK INCLUDED:
A. Incoming normal power and telecommunication services.
B. Normal power distribution system.
C. Lighting and lighting control system.
D. Grounding system.
E. Power wiring to HVAC, plumbing, and Owner-furnished equipment.
F. Telecommunication systems rough-ins and raceway system.
G. Security systems rough-ins and raceway systems.
H. Fire alarm and detection system.
I. Emergency egress and exit lighting.
J. Paging and intercom systems.
K. Cable television system rough-ins and conduit system.

1.4 WORK EXCLUDED:
A. Starters for selected HVAC packaged equipment.
B. Furnishing and installation of telecommunication system equipment, cables, and devices.
C. Furnishing and installation of security system equipment, cables, and devices.
D. Sprinkler system flow switches and valve tamper switches.
E. Package starters for sewage ejector and sump pumps.
F. Energy management system.
G. Temperature control system wiring.
H. High voltage work including the provision of furnishing and installing high voltage transformer and selector switch.

1.5 WORK FURNISHED BY OTHERS:
A. Incoming telecommunication service cables.
B. HVAC low voltage control wiring.
C. Security system infrastructure cable and equipment.

D. Data system infrastructure cable and equipment.

E. Paging and intercom cable and equipment.

**PART 2 - ELECTRICAL AND LOW VOLTAGE SYSTEMS**

2.1 INCOMING ELECTRICAL SERVICE

A. The source of main electrical power service for the project will be derived from the campus central plant via the existing electrical loop. A pad-mounted high voltage transformer will step down the voltage to 480V and will be located within 20'-0" of the main electrical room. The provision of the transformer and extension of the electrical service will be by the District.

B. Main switchboard will be located in the main electrical room. The main electrical room is to be located at the ground floor level within close proximity to the step-down transformer.

C. Provide code-required grounding electrodes at the main service and transformer.

2.2 NORMAL POWER SERVICE AND DISTRIBUTION

A. The new physical education building will be served by a 1200 amp, 480/277 volt, 3-phase, 4-wire main switchboard. The main switchboard will include a main circuit breaker and distribution sections with feeder breakers of quantity to serve distributed loads. The design prohibits series-rated short circuit protection systems or techniques.

B. The new physical education building will have the main electrical room on the first floor, a satellite electrical room in gym area and on second floor. Distribution panelboards, transformer and branch-circuit panelboards are to be provided at electrical room to serve the power and lighting system requirements in each respective area.

C. Low-voltage transformers are to be used to step-down the voltage required to serve 120/208 volt devices, appliances, equipment, and systems. The standard dry type indoor step-down transformers are to be 480V, 3-phase, 3-wire, primary - 208Y/120V, 3-phase, 4-wire secondary.

D. A dedicated distribution panel and part of the main switchboard line up will be located in second floor electrical room to serve mechanical equipment on the roof.

E. At the existing lab building, existing panelboards will be utilized to serve the new lighting fixtures and miscellaneous loads.
2.3 UTILIZATION VOLTAGES:

A. 480VAC, 3-phase, 3-wire: motor loads ¾ horse power and larger.

B. 277/480VAC, 3-phase, 4-wire: fluorescent and HID lighting. 120/208V may be used for all non-mechanical loads to simplify the building’s internal distribution.

C. 120/208VAC, 3-phase, 4-wire: convenience outlets, service equipment, appliances, and motors smaller than ¾ horsepower.

2.4 CONDUIT AND WIRE

A. All conduits to be concealed except in mechanical and electrical rooms. Galvanized rigid steel conduit to be used in concrete slabs and below grade. PVC Schedule 40 direct buried will be used for electrical and telephone service conduits run underground. PVC Schedule 40 will be used for site lighting. Minimum size conduit to be 3/4 inch trade size for both power system and telecommunication system; also, minimum 1 inch for power system to be used below slab or where concealed in concrete. EMT will be used in hung ceilings and non-masonry walls.

B. Grounding conductors will be provided in all feeder and branch circuits.

C. All conductors are to be copper with THWN insulation for wet or underground and THHN for dry locations. Type XHHW will be used for sizes larger than #1/0. Conductor sizes to be No. 12 AWG minimum for power and No. 14 AWG for controls or signal.

D. Flexible steel conduit to be used to connect unit heaters, motors, lay-in light fixtures, and transformers. Liquid-tight flexible steel conduit will be used in damp and wet locations.

2.5 LIGHTING SYSTEMS

A. System Description

1. A complete lighting system for all indoor and outdoor building mounted illumination is to be provided. The indoor lighting system will consist primarily of energy-efficient fluorescent sources. Incandescent lighting will be used only as requested by the Owner or where aesthetics is of prime importance. The outdoor lighting system will consist primarily of fluorescent sources. Fluorescent or LED sources will be used for in-grade and wall mounted applications. Fixtures will use optical systems and sources that are in compliance with local lighting ordinances. Light levels between 1.0 to 2.0 foot candles will be maintained throughout the site to provide for traffic and pedestrian safety.

2. In general, indoor lighting controls will consist of a combination of low voltage, relay based lighting control panels and local occupancy sensors. Outdoor lighting controls will consist of a low voltage relay based lighting control panel with astronomical time clock function.
3. Design Lighting Levels.

a. Average Maintained Footcandles

<table>
<thead>
<tr>
<th>AREA</th>
<th>RECOMMENDED LIGHTING LEVEL (FOOTCANDLES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offices</td>
<td>30-40</td>
</tr>
<tr>
<td>Gymnasium</td>
<td>50</td>
</tr>
<tr>
<td>Fitness Center/Lab</td>
<td>30</td>
</tr>
<tr>
<td>Laundry</td>
<td>30</td>
</tr>
<tr>
<td>Utility Rooms</td>
<td>30</td>
</tr>
<tr>
<td>Training Rooms</td>
<td>30</td>
</tr>
<tr>
<td>Locker/Dressing Rooms</td>
<td>5-10</td>
</tr>
<tr>
<td>Storage</td>
<td>10</td>
</tr>
<tr>
<td>Circulation</td>
<td>10</td>
</tr>
<tr>
<td>Restrooms</td>
<td>10</td>
</tr>
<tr>
<td>Lobby</td>
<td>5-10</td>
</tr>
<tr>
<td>Multipurpose Room</td>
<td>30</td>
</tr>
<tr>
<td>Classrooms</td>
<td>50</td>
</tr>
<tr>
<td>Exterior Lighting and Pedestrian Pathways</td>
<td>1-2</td>
</tr>
</tbody>
</table>

b. No point of exit and egress path is to be less than 1 footcandle at the floor. Emergency lighting will be achieved using integral 90 minute battery packs.

B. Equipment and Materials

1. Lighting Fixtures – Indoor

a. Office: 2-lamp 1’X4’ recessed fluorescent with high efficiency lens.

b. Training Room: 2-lamp 1’X4’ recessed fluorescent with high efficiency lens.

c. Team Dressing Room: 2-lamp 1’X4’ recessed fluorescent with acrylic prismatic lens.

d. Locker Room: 2-lamp 1’X4’ recessed fluorescent with acrylic prismatic lens and 4” square, wet location, LED downlight at shower stall.

e. Storage: 2-lamp fluorescent, surface or pendant mounted, open industrial strip with wire guard.

f. Circulation: 2-lamp, 4’ long surface wall mounted direct/indirect fluorescent.

g. Radius Corridor: 1-lamp, 4’ long surface mounted fluorescent strip with asymmetric reflector mounted to architectural cove.
h. Restroom: 1-lamp cross section fluorescent perimeter system and 4” square LED downlight.

i. Classroom: 2-lamp cross section, pendant hung direct/indirect fluorescent.

j. Multipurpose: 4-lamp 16” diameter, pendant hung, compact fluorescent high bay.

k. Gymnasium: 2-lamp 23” diameter, pendant hung, metal halide high bay with integral dimmable halogen lamp.

l. Laundry: 2-lamp, 1’X4’ recessed fluorescent with acrylic prismatic lens.

m. Lobby: Adjustable LED track head on surface track mounted within architectural cove and recessed, lensed, linear fluorescent wall asymmetric slotlight.

n. Fitness Center/Lab: Adjustable LED track head on surface track mounted within architectural cove and recessed, lensed, linear fluorescent wall asymmetric slotlight.

o. Utility Room: 2-lamp surface or pendant mounted open industrial strip with wire guard.

2. Lighting Fixtures – Outdoor

a. 11-1/2” diameter, in-grade, pulse start metal halide wide flood wall washer.

b. Exterior Canopy: 4” square recessed compact fluorescent downlight.

c. Exterior Walkway: 14’ high fluorescent light column.

d. Exterior Covered Walkway: 10” diameter, in-grade LED uplight.

3. Lamps and Ballasts

a. In general, fluorescent lamps will be high output (third generation) T8 or T5 lamps with energy efficient electronic ballast. All fluorescent lamps will have a color temperature of 3,500 degrees Kelvin and a color rendering index (CRI) of 82 or greater.

b. Metal halide lamps will be clear with a color rendering index (CRI) of 70 or greater.

c. Fluorescent ballasts will be high frequency electronic type with less than 10 percent total harmonic distortion. T8 and T5 lamp ballasts will be instant start type. Program rapid start will be used where occupancy sensors are controlling the fixture. Lamp and ballast compatibility are essential for high energy saving.
d. High intensity discharge ballasts will be high power factor, constant wattage type.

4. Lighting Control

a. All lighting will be automatically controlled to meet the requirements of California Title 24.

b. Lighting will be controlled via low voltage, relay based lighting control panel. Building lighting to have automatic shutoff system in accordance with California Title 24 requirements.

c. Occupancy sensors will be provided in all private offices, conference rooms, break rooms, restrooms, and storage rooms. Occupancy sensors will be of the passive infrared or combination infrared/ultrasonic type. Manual override of occupancy sensors will be provided in private offices, break rooms, conference rooms, and storage rooms.

d. Provide dual-level switching for all spaces 100 square feet or larger in which the connected lighting load exceeds 0.8 watts per square foot. The light switching is to be capable of a reasonably uniform reduction of luminance.

e. For daylit areas greater than 250 square feet provide at least one control that controls only luminaries in the daylit area, and controls at least 50 percent of the lamps.

f. Prepare Title 24 calculations and documents for compliance.

2.6 ENERGY MANAGEMENT SYSTEM

A. A raceway system of conduit, pull rope, and outlet boxes will be provided in compliance with the requirements and standards of the campus.

B. The minimum conduit size to be 1-1/4".

2.7 TELECOMMUNICATION SYSTEM

A. A comprehensive voice and data outlet boxes and raceway system will be provided to provide pathways for telecommunications room to all points in the building.

B. A conduit infrastructure will be provided to every voice and data outlet in the building.

C. Minimum conduit size of 1”. All outlet boxes are to be 4-11/16” square, by 2-1/8” deep.

D. A cable tray system will be provided along the corridors to serve as the backbone raceway.

E. A telecommunication ground bus bar will be provided in the telecommunications room, that is a minimum of a 4” x 6” x ¼” thick ground bus bar with a minimum of a #6 ground wire bonded to the main grounding system of the building.
2.8 SECURITY SYSTEM

A. A comprehensive raceway system of conduits; pull rope, and outlet boxes will be provided in compliance with the requirements and standards of San Jose Evergreen Community College District Guidelines.

B. The minimum conduit size to be 1”.

2.9 PAGING AND INTERCOM SYSTEM

A. A comprehensive raceway system of conduits; pull rope, and outlet boxes will be provided in compliance with the requirements and standards of San Jose Evergreen Community College District Guidelines.

B. The minimum conduit size to be 1”.

2.10 CABLE TELEVISION SYSTEM

A. A comprehensive raceway system of conduits; pull rope, and outlet boxes will be provided in compliance with the requirements and standards of San Jose Evergreen Community College District Guidelines.

B. The minimum conduit size to be 1”.

END OF ELECTRICAL SECTION

END OF DIVISION 26
DIVISION 27 - TELECOMMUNICATIONS SYSTEM

PART 1 - DESIGN CRITERIA

1.1 CODES AND STANDARDS:

A. Systems are to be designed in accordance with the latest edition of the following codes and standards:

2. California Electrical Code 2010
3. California Building Code 2010
4. National Fire Protection Association (NFPA)
5. California Energy Conservation Code, Title 24
6. Utility Company Standards, Rules, and Regulations
7. California Fire Code 2007 and Local Fire Marshal
8. BICSI TDMM, Twelfth Edition
9. ANSI/TIA-568-C.0 Generic Telecommunications Cabling for Customer Premises
10. ANSI/TIA-568-C.1 Commercial Building Telecommunications Cabling Standard
11. ANSI/TIA-568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standard
13. ANSI/TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
14. ANSI/TIA/EIA-606-A Administration Standard for Commercial Telecommunications Infrastructure
15. ANSI-J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
16. San Jose Evergreen Community College District Standards.

1.2 WORK INCLUDED

A. Horizontal 4-pair cable supporting distributed data network communication systems.
B. Horizontal 4-pair cable supporting distributed voice communication systems.
C. Backbone distribution cable from campus system to telecommunications room supporting voice and data systems.

D. Cable and pathways infrastructure to support community access television (CATV).

E. Cable and pathway infrastructure to support paging and intercom systems.

F. Cable and pathway infrastructure to support security systems.

1.3 TELECOMMUNICATIONS OUTLET (TO)

A. 4-pair unshielded twisted pair (UTP) Category 6 voice and data network cabling will be provided.

B. Each standard telecommunications outlet (TO) will consist of three Category 6 ports that can be patched as a data port or a voice.

C. Terminate all 4-pair cable to 8-pin, 8-contact category 6 communication jack.

1.4 BACKBONE CABLING INFRASTRUCTURE

A. Interbuilding Copper Backbone: The interbuilding (connecting buildings) copper backbone system will consist of 100 ohm, Category 3, 24 AWG, multipair copper cable terminated on 110 type termination blocks. Fused protection panels will be incorporated to prevent injury due to electrical short. Multipair copper count is 100-pair which is minimal as it is assumed that a voice over IP phone system will be utilized. Multipair copper cable to existing racquetball building will be provided for supporting new voice and data services as required per the renovation.

B. Interbuilding Fiber-Optic Backbone: The interbuilding (connecting buildings) fiber-optic backbone cable will consist of an OSP hybrid 24-strand 50/125 um OM3 grade multimode fiber-optic cable and 12-strand single mode fiber optic cable from campus system to telecommunications room in the new building. Fiber-optic cables will terminate in rack-mounted, fiber-optic distribution units. Fiber-optic connector and bulkhead types are recommended to be LC-style connectors to allow higher density fiber-optic strand counts in the same amount of rack space.

1.5 COMMUNICATIONS EQUIPMENT ROOM

A. Telecommunication Racks: The telecommunication room will consist of two (2) combination of 7-foot by 19-inch standalone equipment and 19-inch wall-mount racks to support backbone and horizontal cable installation for the installation of Owner-provided network equipment and servers. The MPOE will have space allocated for future four-post server racks. All racks will be seismically braced with overhead ladder racking and properly anchored floor hardware.

B. A ground bus bar system will be provided in the telecommunication room. #3/0 ground wire from telecom main ground bus to building grounding system will be provided.
C. Wire Management: Equipment racks will have one 6-inch vertical wire manager on each end and in between each equipment rack. One single-unit horizontal wire manager at the top and bottom of each column of patch panels and equipment, and one double-unit horizontal wire manager in between each patch panel will be provided.

D. The finish for all telecommunication room racks and wire management is black.

E. A cable tray system will be provided in telecommunication room to serve as the backbone raceway infrastructure.

F. A wire-basket cable tray system will be provided in the main corridors to serve as the raceway infrastructure. J-hooks will be provided by the telecommunications contractor.

G. Two dedicated electrical circuits will be provided per equipment rack.

H. Pathways installed per ANSI/TIA/EIA-569-B standards:
   a. Two (2) 4-inch and two (2) 2-inch conduits from existing telecom vault into the telecommunications room of the new building will be provided for connection to telecom and broadband service providers.
   b. Three (3) 4-inch conduits from nearest telecom vault into the telecommunications room of the new building will be provided to connect this building to the campus system. 2-cell fabric innerduct will be installed in one of the 2-inch conduits for fiber optic cable installation.
   c. Wire basket style cable tray will be provided in all major corridors where high cable density is required.
   d. 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.
   e. 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.

1.6 DISTRIBUTED PAGING AND PUBLIC ANNOUNCEMENT SYSTEM

A. A minimum amount of speaker will be provided to allow the public, students and faculty to hear public announcements.

B. Amplification will be provided to supply power to speakers in the building. Amplifiers should be located in the telecommunication room.

C. Paging system will interface with telephone system so announcements can be administered through an extension on the phone system.

D. Two conductor shielded cable will be provided to speakers from amplifiers.
1.7 COMMUNITY ACCESS TELEVISION (CATV)

A. RG-6 quad shield coaxial cable will be provided from the telecommunication room to the CATV wall outlet plate.

B. F-style coaxial connector plates will be provided at CATV wall plate locations.

1.8 SECURITY SYSTEM

A. Access controlled doors, intrusion door contacts, motion detectors, alarm notification devices, and IP Video Surveillance recording system will be provided.

B. System will be connected to the campus security system. System will be capable of integrating selected electrical, HVAC, fire alarm function in an effort to manage occupied areas during unscheduled times.

C. The following systems will be integrated into the security design:

1. Access Control – Control locking and unlocking, and monitoring of selected interior and exterior doors. Access will be obtained by presenting a building management issued proximity card to a door/gate/elevator card reader system.

   a. Additional measures can be integrated where required – i.e. biometrics, PIN codes, etc.

2. Internet Protocol (IP) Video Surveillance – IP cameras will be placed to monitor both interior and exterior spaces and will work in conjunction with the access control and intrusion system to deter and identify theft, vandalism, robberies, arson, and trespassing events.

3. Intrusion Alarm – external and internal door monitoring for forced entry or door left ajar. During scheduled occupancy all alarms will report to campus security system where appropriate action will be determined by security personnel. System will communicate with CCTV cameras to capture video documentation of events while events are happening.

4. Emergency Call Station – call stations will be strategically placed as to assist the public in an event of threat in areas outside the building such as in the utility tunnel.

5. A raceway system of conduits, pull rope, and outlet boxes will be provided in compliance with the requirements and standards of the campus.

6. The minimum conduit size to be 1”.

END OF TELECOMMUNICATIONS SYSTEM SECTION

END OF DIVISION 27
DIVISION 28 - FIRE ALARM SYSTEM

PART 1 - FIRE ALARM SYSTEM

1.1 CODES

A. Systems are to be designed in accordance with the latest edition of the following codes:

4. NFPA 72
5. Local Amendments to above Codes.

1.2 STANDARDS

A. The following reference standard are to be used for the design:

1. San Jose Evergreen Community College District Standards.

1.3 DESIGN CRITERIA

A. The system manufacturer will be Simplex 4100 to match existing campus system.

B. The fire alarm system will provide system alarm, supervisory and trouble signal monitoring, and alarm notification for the building. The system will be provided with a network interface module to communicate with the campus fire alarm network. 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.

C. Activation of system smoke 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 building. Activation of sprinkler tamper switches and HVAC duct mounted smoke detectors will initiate supervisory signals, which will annunciate on the FACP and the FAA.

D. Automatic smoke detection will be provided for fire life safety functions, air handler control and for protection of fire alarm control equipment. Manual pull stations will be provided at all building exits. Notification will be provided throughout the building via an emergency voice/alarm communication system (EVACS) with visible alarm signals provided in common use areas.
E. Control outputs will be provided for fire safety functions, such as air handler shut down, fire smoke damper closure, fire door release, and elevator control.

END OF FIRE ALARM SYSTEM SECTION

END OF DIVISION 28