

## IV. DESIGN REQUIREMENTS

### 1.0 PRIOR PLANNING

#### A. Project Origination

This project originated with the desire to ensure that CPTC students had access to learning in real-world environment that replicated best industrial practices in order to provide students with a fully immersive learning experience. The colocation of CPTC's manufacturing programs into a new Center for Advanced Manufacturing Technologies will also allow the college to develop new capabilities that overlap existing programs (for example, additive manufacturing, advanced composites, metrology and calibration, and engineering technology) and will also allow for the efficient shared use of learning resources such as equipment, classrooms, and computer labs across multiple programs.

In 2014, the college prepared a Project Request Report which was successful in obtaining legislative funding for the project. Initial funding in the 15-17 Capital Budget contained the proviso that the project be developed using the Design-Build methodology. This project conforms to Clover Park Technical College's Master Plan Facilities Plan and represents CPTC's commitment to creating real-world learning environments. The facility proposed herein fully conforms to the policies, goals and objectives established by this long-range planning document. Building life expectancy is a minimum of 50 years.

### 2.0 BASIC CODE & REGULATORY REQUIREMENTS

#### A. Codes

Design and construction shall also adhere to the latest applicable codes, unless stated otherwise. The general applicable codes include:

1. 2015 International Building Code as adopted by the City of Lakewood
2. 2015 International Fire Code as adopted by the City of Lakewood
3. 2015 International Mechanical Code as adopted by the City of Lakewood
4. 2015 Uniform Plumbing Code as adopted by the City of Lakewood
5. 2015 National Electrical Code
6. 2015 International Fuel Gas Code
7. ANSI A17.1 - Safety Code for Elevators and Escalators
8. ICC/ANSI A117.1-2009 Accessible and Usable Buildings and Facilities
9. 2015 Washington State Energy Code (WSEC)
10. Washington State Ventilation and Indoor Air Quality Code
11. City of Lakewood Public Works, Land Use and Development Codes and Standards  
(note: Design Review will be required)
12. Pierce County Public Works Stormwater Regulations
13. Lakewood Water District Regulations

Upon request by the Owner or authorities having jurisdiction, the Design-Build team shall provide calculations supporting the design and the adherence to codes, regulations and requirements.

### 3.0 SITE

#### A. Site Context

The Center for Advanced Manufacturing Technologies (CAMT) site is a previously-developed parcel at the heart of the Clover Park Technical College.

The site currently supports Building 22 and adjacent parking/vehicle access. It is directly accessible from the main Hageness Drive entrance to the college from Steilacoom Blvd. SW. It is bounded to the east by parking, to the north by Redwood Drive, and to the south by the main pedestrian plaza. Demolition of the existing Building 22 is included in the project scope.

#### Project Site



#### 1. Topography

Existing grades within the project area are relatively flat. Site work will include re-grading the project area to provide the building subgrade, asphalt parking and concrete walks. A preliminary site survey was prepared for this project and is attached to this RFP. Analysis and interpretation of this survey as it relates to design of the CAMT are the responsibility of the Proposers. Subsequent topographic and physical survey of the site and its utilities may be executed at the option of the Proposers.

#### 2. Climate

The site experiences climatic conditions typical to the south Puget Sound. Prevailing winds come from the south. Based on climate and solar access the preferred orientation for the CAMT is east-west with administrative functions oriented to the east.



3. Soils

Soil conditions that predominate on Clover Park Technical College generally consist of slightly silty, sandy, gravel and cobbles. This soil type is characterized by good drainage and bearing capacity. Four test borings were executed as part of the development of this RFP. The findings of these borings are provided for general use by Proposers. Analysis and interpretation of these findings as it relates to design of the CAMT are the responsibility of the Proposers. Subsequent or additional geotechnical investigation may be executed at the option of the Proposers.

4. Environmental

According to the Pierce County GIS database there are no wetlands on the site.

The College has prepared an AHERA Survey of the existing Building 22 and has provided the report of this survey in the RFP. During the execution of site borings, no hazardous or contaminated soils were encountered. While the College has not identified controlled or hazardous materials in the soils within the project site, the campus site was initially a Navy supply depot and as there have been occurrences of localized contaminated soils on previous projects, the successful D/B Contractor is expected to exercise due diligence during site operations.

5. Easements

The City of Lakewood has required an easement extension from Steilacoom Blvd. The College will issue this easement prior to the work of this project. There are no other known easements on the project site which may impact the intended use or CAMT project.

6. Historical/Cultural

In accordance with Governor's Order 05-05, CPTC has reviewed available documents and determined that the site is unlikely to have historic or archeological importance. The Department of Archaeology & Historic Preservation (DAHP) concurs with CPTC's Determination of No Historic Properties Affected. In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and DAHP notified.

7. Noise

Comply with City of Lakewood noise ordinances. Meet all requirements of WAC 173-60-040 during construction. Maintain the level of construction noise inside adjacent buildings and/or rooms from exceeding a dB(A) 60 curve (with windows closed). The noise level of each piece of equipment shall not be greater than 85 dB(A) at a distance of 50 feet as measured under noisier operating conditions. Provide rubber-tired equipment whenever possible instead of metal-tracked equipment. Mufflers for stationary engines shall provide hospital-area silencing quality. Equip air compressors with silencing packages. Electric-driven compressors are preferred.

**B. Architectural Context**

The existing campus context at CPTC exhibits a great variety of architectural styles with an equally broad range of design and construction quality.

1. Design Analysis

With the site's strong presence from Hageness entrance and prominent location, the design approach shall complement the existing aesthetic character of the campus while at the same time express the site's role as a between the campus core and the west campus zone. The many elements that define the



campus should be studied during the design process including view axes, edges, buffers, transitional zones and, pedestrian and vehicular circulation.

2. Design Approach

The following shall be considered in the development of concept and design work:

- a. Enhance the established building fabric of campus building (primarily the new academic buildings) and function.
- b. Respect the architectural style, scale and spatial structure of the Lakewood Campus and capture its spirit.
- c. Develop a building which reflects its role within the context of the campus.
- d. The height of the proposed building should not exceed two-stories,
- e. All concepts shall result in an appropriately scaled sequence of forms relating to existing campus open space and adjacent buildings.
- f. Prepare concepts that develop sequenced exterior spaces, as much as possible, which support the larger campus but establish a hierarchy specific to this site.
- g. Concepts shall reflect a hierarchy of public, academic, and industrial functions. This hierarchy shall be addressed in both exterior and interior spaces.
- h. Establish public activity and create a façade at east that reflects the recent academic building on campus and engages the pedestrian mall as much as possible, given the program parameters
- i. Design solutions should reflect the architectural thinking of our time and should not merely mimic existing campus or historic styles.

Detailed discussion on tenant needs, access, layout, organization and other functional issues is provided in Section V. Design Program – Space Program, Room Data Sheets, Drawings and Diagrams.

**C. Site Planning**

1. CPTC has identified a number of preferences influencing development of the CMAT site:
  - a. It is desired to locate the new building toward the center of the identified site. This would allow relocating the parking that will be displaced to the eastern portion of the site where it could also serve evening uses at Building #23.
  - b. The preferred public face of the CAMT is to the east, facing the campus green. By contrast, the preferred location of back-of-house functions are from Redwood Drive and the parking area to the west.
  - c. Primary public access will come from the newly developed parking at the east and north portions of the site. Service access will be from Redwood Drive.
  - d. Site development must include extension of the main pedestrian plaza along the south edge of the site.

**4.0 SUSTAINABILITY & LEED**



The State of Washington and Clover Park Technical College are committed to creating high performance facilities that will ensure the optimal health and productivity of occupants and buildings users. The Owner has registered the project with the U.S. Green Building Council under version NC 2009. It has been assigned USBGC Project ID no. 1000075174.

The Center for Advanced Manufacturing Technology will be certified to LEED Silver by the United States Green Building Council (USGBC) in accordance with Chapter 39.35d RCW "High Performance Public Buildings" and Department of Defense requirements. Sustainability was discussed in detail during programming process and the resulting checklist of targeted credits is presented in the Appendix of this RFP. The design/build team will be required to perform an eco-charrette during Schematic Design to further explore sustainability goals and opportunities. As the building design and construction progresses, additional credits may be identified for possible incorporation into the project.

#### Architectural LEED

It is the Proposers responsibility for selecting and achieving the credits necessary for successful LEED Silver certification, with six exceptions:

1. The D/B Contractor must achieve the following optional credits:
  - a. EA-c3 – Enhanced Commissioning
  - b. EA-c5 – Measurement & Verification
  - c. IEQ-8.1 – Daylight and Views – Daylight

For use in determining LEED strategy, Finalists should note that the building site qualifies as a brownfield to the extent necessary for achieving credit SS-c3,

Importantly, CPTC views its commitment to sustainability – which it expects its D/B Contractor to uphold – as more than a collection of LEED credits. Fundamental to CPTC's planning is to create facilities that are:

1. planned to work with, not against, nature;
2. timeless, simple, durable, and flexible to assure long life without the need for significant capital, maintenance, and operations expenditures;
3. designed to foster occupant well-being.

CPTC conceives these sustainable principles not just as secondary add-ons but rather as strong design elements that reveal the agency's environmental commitment while creating aesthetic delight and operational efficiencies. Strategies include abundant use of controlled natural light, preference for locally-sourced materials, native and drought-tolerant plantings, robust well-insulated and sealed exterior wall and roof assemblies, and highly efficient mechanical and lighting systems.

#### Landscape LEED

1. The use of plant material on the site promotes the sustainability of the project. The irrigation system shall reduce water use and promote sustainability.

#### Site / Civil LEED

The following is a list of site / civil LEED credits that are considered achievable



1. SS Prereq 1 – Construction Activity Pollution Prevention – the civil site plans and specifications will include an erosion control plan and Stormwater pollution prevention plan as standard protocol to address and achieve this required item.
2. SS6.1 Stormwater Design – Quantity Control – the site is located in an area that contains well-draining soils. Based on our current understanding of the site soils the runoff from the entire site will be able to be infiltrated onsite. Infiltration of the site runoff will achieve this point.
3. SS6.2 Stormwater Design – Quality Control - the site is located in an area that contains well-draining soils. Based on our current understanding of the site soils the runoff from the entire site will likely be able to be infiltrated onsite. Infiltration of the site runoff will achieve this point since infiltration will satisfy the requirement to treat all of the site’s impervious storm runoff.

#### Mechanical LEED

The Design-Build proposer shall incorporate a sensibly sustainable design for the new facility. The Design-Build proposer should submit a design and design options for a building that cost effectively conserves energy and water. The project must achieve, at minimum, LEED Silver certification. The contractor is responsible for providing all required LEED paperwork and submission.

Design the Building Envelope, Lighting, other end use systems, and HVAC to maximize Building Operations, Maintenance and Energy Performance. At a minimum, the project should be designed to achieve a required minimum energy savings of 20% energy use (kBtu) over Washington State Energy Codes in effect at the time of project permitting, in addition to the LEED Silver Certification requirements including a minimum 5pts for EA Credit 1 for a 20% energy cost (\$) savings.

The Building Performance Criteria will be established in accordance with LEED-v4 EA, Credit 1, Optimize Energy Performance, Option 1, Whole Building Simulation achieving a minimum required 5pts for a total of 20% energy cost savings. Resultant savings shall be analyzed for proposed design as compared to ASHRAE standard 90.1-2007, which establishes minimum requirements for Energy Efficient Design of Buildings for LEED EA Credit 1.

#### Electrical LEED

1. Provide lighting controls to meet LEED requirements.
2. Review daylighting and lighting design options that reduce the lighting watts per square to various levels below energy code.
3. Provide a lighting design that minimizes offsite glare.
4. Provide cut-off fixtures outside, but also keep in mind any campus standard fixture.
5. AT the new parking area, provide electric car charging stations compatible with all Electric Vehicle Supply Equipment (EVSE) Standards and Recommended Practices, including SAE J1772 NEC 625, UL 2231 and UL 2594. Provide 40 amp, 208 volt, single phase systems. Enclosure shall be rated NEMA Type 4 Watertight. Also provide 20 amp, 120 volt receptacles with dedicated circuits at each designated parking stall.

#### Lighting LEED



Energy usage for lighting will target a 30% improvement over ASHRAE 90.1 2007, which is the baseline for LEED 2009 documentation. Should the credit for Sustainable Sites SSc8 be pursued, no light may trespass beyond the property line. Enhanced controls may be considered in executive offices as well as open office areas.

## 5.0 ARCHITECTURAL

### Architectural Design: Overarching Criteria

In recognition of the prominent location of the CAMT at the literal “front door” of campus, CPTC views this project, as an opportunity to extend the design and quality of the campus buildings as represented by the recent Building 21 and adjacent Building 23. Accordingly, the following architectural requirements and preferences shall be considered in the development of concept and design work:

1. Provide a modern, functional, and efficient facility that:
  - a. Integrates within the context of the CPTC Campus
  - b. Bridges between recent campus “college” buildings (21, 23) and older “industrial” buildings (25)
  - c. Recognizes the unique learning needs of applied-technology programs
  - d. Is durable and easy to maintain
2. Consider the various approach sequences to the project site and building; specifically, from the Hageness Circle entrance, from the campus green, and pedestrian promenade.
3. Interior spaces should have the benefit of natural light wherever possible. In spaces not conducive to traditional window openings, this may include clerestory windows or skylight assemblies. In private offices within open administration suites, this may include borrowed lights with views to shared windows.
4. Exterior wall assembly systems that relies for its water resistance on the exterior face of the assembly are not acceptable. Examples of prohibited exterior wall assemblies include single wythe masonry and EIFS.

Detailed discussion on program needs, access, layout, organization and other functional issues is summarized in Section V. Design Program – Space Program, Room Data Sheets, Drawings and Diagrams.

### Building Exterior / Interior Finishes, Materials and Furnishings

Materials and finishes should be robust and of good quality, contributing to an overall appearance of permanence without extravagance.

Materials and finishes should reflect the variety of functions performed in this facility and take into consideration characteristics such as durability, ease of maintenance, appropriateness, and sound transmission.

Throughout the facility, materials, finishes and furnishings should reflect project and CPTC sustainability goals in terms of material choices, means of assembly, location of manufacturer, etc.

All materials and finishes should meet life-cycle cost analysis standards and established sustainability goals. Building life expectancy is a minimum of 50 years.

The following is a partial list of preferred architectural finishes and material systems:



1. Exterior Enclosure
  - a. Primary Façade:

Institutional-grade construction, with double wythe masonry or similar robust construction indicative of a significant public building. Veneer shall at minimum consist of concrete or concrete masonry units with preference for brick at major public programmatic elements. Prefinished steel metal panels with Kynar-type coating is acceptable as an accent material. Wall assembly must include infiltration and vapor barriers, drainage pathways to discharge moisture to the outdoors, and insulation required to meet energy code and performance objectives.
  - b. Secondary Façade:

Same as primary façade, but other than a masonry or concrete protective wainscot a higher percentage of prefinished steel metal panels with Kynar-type coating and concealed fasteners or equivalent is acceptable.
  - c. Windows:

Extruded aluminum thermally-broken frames, with fixed and operable sash sections. Color- or clear-anodized aluminum finish. Clear insulated low-E glass.
  - d. Storefront/Curtain Wall:

Extruded aluminum thermally-broken frames. Clear insulated low-E glass w/safety glazing where required. Main entrance doors at storefront to be medium-stile standard aluminum with concealed closers and custom pulls glazed with low-E glass, with laminated inner pane for blast protection. ADA automatic push button operators are required at one leaf at primary entries.
  - e. Hollow Metal Doors and Frames:

Typical exterior personnel doors to be minimum 16-gauge insulated flush galvanized hollow metal with 14-gauge frames, solid grouted. Frames and hinges wired for access control systems. Field-applied paint to be spray-applied only.
  - f. Overhead Doors:

Motor-operated, overhead sectional panels with insulated 16-gauge steel curtain and insulated glazing. Field-applied paint to be spray-applied only.
  - g. Exterior Hardware:

Heavy-duty, commercial-grade, lever-handle cylindrical locksets, satin chrome finish, ADA compliant, with removable cores keyed to CPTC mater keying system. Exit devices on primary entrances and at all doors required by code. Provide prox-card access control system integrated to the existing campus standard at all exterior doors and where indicated at program spaces.
2. Roofing
  - a. Low Slope (1/2 inch/ft minimum):

60 mil minimum TPO/PVC single-ply membrane, 20-year system warranty. At exposed interior roof decking at public areas, either fully adhere roofing system or control screw penetrations both in spacing and alignment. If there is roof-top equipment, provide maintenance walkways from access stair to equipment. Provide polystyrene (Type IV minimum) insulation required to meet energy code and performance objectives.
  - b. Pitched Roofs:



Mechanically-locked standing seam metal panels with no exposed fasteners, 22-gauge minimum prefinished metallic-coated steel sheet metal panels with Kynar-type coating. Provide polystyrene (Type IV minimum) insulation required to meet energy code and performance objectives.

- c. Skylights/Monitors:  
Aluminum-framed skylights or monitors. Color- or clear-anodized aluminum finish. Clear insulated low-E glass, with laminated inner pane for security protection. Locate to minimize energy use.  
  
To reduce dependence on electric lighting, provide factory-assembled commercial-quality tubular skylight assemblies, Solatube or equal, in select spaces not adequately served by natural light.
- d. Fall Protection: Provide code-compliant fall protection system.

3. Interior Construction

- a. Partitions:  
All walls are to be constructed full height to structure above.  
  
At ground floor bearing walls and non-bearing walls at shop spaces, provide abuse resistance surface or construction to 8-ft height.  
  
For non-bearing walls not requiring abuse resistance, provide 5/8-inch minimum Type X gypsum wallboard on metal studs. Provide acoustic batt insulation at all private offices, classrooms and conference rooms. Provide abuse-resistant veneer plaster at all exposed framed wall surfaces in corridors. Provide fiberglass-mat-faced gypsum wallboard with water-resistant core at wall surfaces receiving ceramic tile.
- b. Interior Doors:  
Minimum 18-gauge full flush hollow metal door in 16-gauge welded hollow metal frame, solid-grouted. Include transom or sidelights to provide daylight and views to spaces without windows.  
  
Interior wood doors shall be solid core & FSC certified.
- c. Interior Hardware:  
Heavy-duty, commercial-grade, lever-handle cylindrical locksets, satin chrome finish, ADA compliant, with removable cores keyed to CPTC master keying system. Exit devices and surface-mounted closers at all doors required by code. Integrate exterior doors with access control system. Kick plates at all doors with closers. Low energy automatic operators on all doors to toilets and other high-traffic public spaces. Following are preferred by CPTC:
  - 1. Satin chrome or satin stainless finishes
  - 2. Main entrance door(s) should have Roton Continuous hinges.
  - 3. Butt hinges, five knuckle or concealed bearing.
  - 4. Door closers are LCN.
  - 5. Stanley/Best lock sets, cylinders, with removable cores.
  - 6. Keys to have Do Not Duplicate stamped on them. Key numbers stamped on them. Cores are to be stamped. Keyway is F.
  - 7. Door operators: Record.
  - 8. Cabinet locks: Olympus
  - 9. Exit Devices: ae Von Duprin.
  - 10. No exterior pairs with concealed vertical rods. Rim Exit devices with removable mullions.
  - 11. Escutcheon plates and round pulls for the exterior doors



- d. Interior Glazing:  
Safety glazing in hollow metal frames with steel stops. Fire-rated at rated walls.
- 4. Flooring
  - a. Exposed Concrete:  
Exposed slab with clear liquid hardener/sealer at most locations. Prefer polished finish at lobby and similar public spaces.
  - b. Tile Flooring:  
Provide porcelain tile at restrooms
  - c. Carpet:  
2-foot-square nominal carpet tile with recycled-content backing in offices and classrooms.
  - d. Sheet Flooring:  
At support spaces with heat-welded seams. No vinyl permitted.
  - e. Epoxy:  
Liquid-applied. Provide embedded quartz granules for slip-resistance in shop spaces.
  - f. Base:  
Rubber: 4-inch rubber top set at all non-tile floors. Provide tile base at tile floors.
- 5. Walls
  - a. Painted:  
2-coats over primer or block filler. Provide architectural best grade satin-sheen acrylic enamel except semi-gloss at toilet rooms and building maintenance rooms.
  - b. Ceramic Tile:
    - c. Glazed tile to 8 feet minimum at all toilet rooms
- 6. Stairs and Railings:
  - a. Stairs:  
Steel stairs system, with sealed precast concrete treads/risers with anti-slip inserts. Ladders, ship ladders/stairs and lapeyre-type stairs are not permitted for roof access.
- 7. Ceilings:
  - a. Acoustic Tile:  
At administrative office spaces and classrooms, 2-foot-square non-rated fine-textured acoustical tile with a tegular edge in a 9/16-inch suspended metal grid.
  - b. Gypsum Wallboard:  
Water-resistant horizontal-grade gypsum wallboard on suspended metal framing at toilet and shower rooms.
  - c. Exposed Structure:  
Where no ceiling is provided, paint exposed steel structure, ducts and conduit.
- 8. Specialties:
  - a. Toilet Accessories:  
Surface-mounted, stainless steel accessories consisting of; receptacles for napkins; grab bars (one set per accessible toilet); and one mirror (24 inches x 48 inches) per lavatory. Owner will provide



soap dispensers, toilet seat cover dispensers, tower dispensers, and waste receptacles for installation by D-B team.

- b. Toilet Partitions:  
Ceiling-mounted HDPE or similar.
- c. Signage:  
Plastic interior signage with room names and numbers with raised letters, numbers, and Braille. Signage system includes: Building directory with removable inserts and plans showing exit pathways; Room identification with number and removable inserts; and dedication plaque at main entrance.
- d. Fire Extinguisher Cabinets:  
Recessed cabinets with stainless steel finish, glass doors, and cast "Fire" handle at 100 feet maximum spacing.
- e. Casework:  
All casework to be modular. At each classroom provide podium specifically designed to house a rack for instructional media. At workrooms and coffee stations provide upper and lower cabinets.
- f. Architectural Casework:  
Architectural casework to be utilized where indicated on the room data sheets and for trash and recycling collection stations (minimum one per floor), and display cases in lobby.
- g. Marker boards:  
Dry-erase marker board with lifetime porcelain enamel finish, cork map rail, map hooks and chalk tray. Marker boards to have 4-feet by 8 feet module.
- h. Tack boards:  
Tackable linoleum surface, 4 feet by 4 feet, at each classroom. Provide 8 feet by 4 feet in workrooms and corridors.
- i. Projection Screens:  
Motor-operated, 8-foot wide tensioned screen format. Provide one per classroom and conference room unless otherwise indicated. Integrate into framed ceiling and or soffit where necessary.
- j. Window Treatment:  
Manual roller shades in the offices and classrooms. Motor operated where needed for glare control at clerestory or light monitors. 90 percent shade except 95 percent at classrooms. Provide complete valance or pockets.
- k. Acoustic Panels:  
Abuse-resistant, Class A fire-rated. Provide as required for acoustic control.
- l. Entrance Mats:  
Minimum two-zone system comprised of exterior recessed slip-resistant stainless steel foot grilles and interior recessed walk-off mats. 12 lineal feet path of travel minimum.
- m. Corner Guards:  
Stainless steel, for use at all outside corners in corridors.

Public Art



As a State of Washington project, funds have been reserved for public art at the CAMT. While the D/B Contractor will not participate in artist selection, the public art process thrives when the objects are genuinely integrated into the facility. To that end, the D/B contractor will be required to work with the selected artist during design of the CAMT, to include inclusion of supplementary structure and or utilities. Successful Proposer will also be required to facilitate coordination with the artist during installation.

Acoustic and Noise Control

There are two primary acoustical requirements for the CAMT, sound transmission and sound quality. Both elements will be definitive in the successful use of the spaces. Sound transmission prevents sound from interfering with activity between spaces and between activities within a space. Selections of wall types and ceiling assemblies, when wall do not run to the underside of structure, is the primary way sound transmission is controlled. The descriptors used in quantifying the ability of these assemblies to control sound transmission is the Sound Transmission Class (STC) and the Ceiling Articulation Class

Controlling the sound quality within spaces of the TMC is equally important. Within a space noise levels can rise and speech intelligibility can be reduced based on the reflective properties of the material treatments. Reverberation time is that quality of a space associated with the reflectivity of the materials. A space with all hard surfaces will reflect sound for a longer period of time. For designing spaces, the time it takes sound to decay 60 decibels is quantified as the descriptor RT60. This type of measurement is made by octave band in the frequency associated with the use of a space. For each type of space there are appropriate levels of reverberation depending on the use. The following reverberation times associated with the functions of different types of spaces.

Type of space	Satisfactory sound level	Maximum Sound Level	Reverberation Time
Conference Room	30	40	0.6 to 0.8
Open Office Areas	40	45	0.4 to 0.6
Private Office Areas	35	40	0.6 to 0.8
Corridors & Lobbies	45	50	0.4 to 0.6

Interior Noise Levels:

The CAMT program provides for a variety of spaces that will require control of sound transmission and sound quality. The larger shops/Labs are critical noise and vibration producing spaces. These spaces will positive means of noise-control to prevent noise from impacting other operations in the building and achieving the following noise attenuation levels:

Space	NC Criterion Sound	Pressure Level (dBA)
Enclosed Offices	35	42
Open Office Space	35	42
Classroom/Conference Room	30	37



Break Room	40	47
Public Restroom	45	52
Shops/Labs	60	65

Roof-Top HVAC: The roof structure should be provided with an assembly achieving a minimum of STC 45. This can be completed using a composite metal deck system with 3-inches of concrete above the flutes of the decking. Rooftop mechanical equipment must be selected, or, if necessary, mitigated to produce no more than 75 dB(A) of radiated noise within 5 feet. Vibration isolation must be provided in accordance with the American Society of Heating Air Conditioning and Refrigeration Engineers (ASHRAE), HVAC Applications Chapter 48.45, Table 47, Selection Guide for Vibration Isolation. Mechanical permit documents must show calculations for Code compliance to receiver property lines. Noise and vibration isolation calculations and mitigation treatments must be documented and included in the construction documents for mechanical equipment and plumbing elements of the project. Construction administration must include noise monitoring at all adjacent receiver property lines for compliance with Table 2. This testing should be conducted in accordance with Washington Administrative Code.

**6.0 LANDSCAPE**

The landscape design for the Center for Advanced Manufacturing Technologies includes the design and installation of plant material, irrigation systems, and site improvements, including amenities. The project shall adhere to the Clover Park Technical College (CPTC) Master Plan, and the City of Lakewood Municipal Code (LMC).

The landscape improvements and design shall be aesthetically integrated and cohesive with the landscape of the CPTC campus. The landscape character of the campus is defined by a network of plazas, sidewalks, open lawn with deciduous trees, and drifts of accent shrubs and groundcover near entrances and key pathway intersections. Recent improvements to the east of the project should be continued in the design and programmatic function of the site improvements for the Center for Advanced Manufacturing Technologies project.

Surrounding parking lots improved by the project shall meet City of Lakewood standards for parking lots and required landscape. Existing trees should be preserved to the extent feasible. If existing significant trees require removal, they shall be replaced per LMC requirements. Plant materials shall be drought tolerant, native and or adapted to the south Puget Sound region. Plants proposed shall be consistent with plants used elsewhere at the CPTC campus.

**1. Codes & Standards**

The following codes/guidelines associated with landscape improvements must be adhered to:

- a. 2008 General Administration Facilities Design Guidelines and Construction Standards.
- b. USGBC LEED NC Version v.2009:
  - 1) State of Washington RCW 39.35D requires minimum Silver rating (50-59 points).
- c. City of Lakewood Municipal Code (LMC):
  - 1) 18A.30.840 Development Standards Public/Intuition Zoning District
  - 2) 18A.50.200 Community Design
  - 3) 18A.50.300 Tree Preservation



- i. 18A.50.305 Purpose - Tree Preservation
      - ii. 18A.50.310 Applicability - Tree Preservation
      - iii. 18A.50.320 Significant Tree Preservation
    - 4) 18A.50.400 Landscaping
      - iv. 18A.50.405 Purpose - Landscaping
      - v. 18A.50.415 Exceptions - Landscaping
      - vi. 18A.50.420 Landscaping Standards
      - vii. 18A.50.425 Landscaping Types
      - viii. 18A.50.430 Landscaping Regulations by Zoning Districts
      - ix. 18A.50.435 Landscaping Design
      - x. 18A.50.440 Street Tree Standards
      - xi. 18A.50.445 Plan Requirements - Landscaping
      - xii. 18A.50.450 Landscaping Installation
      - xiii. 18A.50.455 Water Conservation and Suggested Plant Materials
      - xiv. 18A.50.460 Maintenance - Landscaping
      - xv. 18A.50.465 Guarantee - Landscaping
    - 5) 18A.50.500 Parking
      - xvi. 18A.50.510 Purpose - Parking
      - xvii. 18A.50.520 Applicability - Parking
      - xviii. 18A.50.530 Parking Standards
      - xix. 18A.50.540 Loading and Unloading
      - xx. 18A.50.550 Use and Site Specific Standards
      - xxi. 18A.50.560 Parking Space Standards by Use Type
- d. Clover Park Technical College Master Plan (December 2014)

## 2. Existing Systems Overview

- a. The site surrounding the existing Building 22 includes expanses of pavement for parking lots and the following site features:
  - 1) A dense row of pine trees along Redwood Drive SW. If preserved, these trees have a potential to meet screening requirements for the existing or redeveloped parking lots per LMC.
  - 2) Existing bioretention swales are located within the parking lot to the west of Building 22. The condition of the shrubs and groundcover is poor. The CPTC Master Plan indicates new planting within an improved parking lot to the west of the Center for Advanced Manufacturing Technologies. If preserved, existing bioretention swales rehabilitated with new soil and plants adapted to bioretention swales may provide additional support for LEED credits.
  - 3) The existing Pedestrian Mall to the southeast includes raised concrete planters, colored concrete walkways, and shrub/groundcover areas adjacent to Building 23. Extension of the Pedestrian Mall along the south boundary of the project is required. The extension should maintain design continuity with the existing mall to the extent feasible. This includes pedestrian scale lighting and planting.

## 3. Quality of Materials and Systems

- a. The following quality of materials and systems for the landscape improvements shall be adhere to:
  - 1) Plant materials shall adhere to the American Nursery & Landscape Association / American National Standards Institute (ANSI): Z60.1, American Standard for Nursery Stock (ASNS).
  - 2) Seed shall adhere to the United States Department of Agriculture (USDA): Federal Seed Act.



- 3) Tree protection and preservation shall adhere to:
  - i. International Society of Arboriculture (ISA) Best Management Practice Series.
  - ii. Tree Care Industry Association (TCIA): Standards for Tree Care Operations ANSI A300, Latest Edition.
- 4) Cross Connection Control Devices for irrigation systems shall be a manufacturer and product model approved for use by the Washington State Department of Health, Olympia, Washington, or a Department of Health-certified agency.
- 5) Water meter installation for irrigation shall adhere to City of Lakewood Public Works standards.
- 6) Site furnishings shall be consistent with the make and model of existing furnishings on the CPTC campus, unless otherwise approved by CPTC.
- 7) Hardscape materials, including, but not limited to concrete, color concrete, and unit pavers shall be consistent in color, durability, size and finish as elsewhere on the CPTC campus, unless otherwise approved by CPTC.

#### 4. Special Considerations

- a. Oak trees have been observed growing within the project site boundaries. Their exact species should be determined by an ISA certified arborist. If they are Garry Oak or Oregon White Oaks (*Quercus garryana*) with a diameter-breast-height (DBH) of 6 inches or more, they are considered significant trees per Lakewood Municipal Code, and shall be retained to the extent feasible or mitigated.
- b. Pedestrian Mall improvements shall be included, extending the existing mall east, adjacent to the new Center for Advanced Manufacturing Technologies building. Design Guidelines for the mall improvements are detailed in the CPTC Master Plan and include color concrete or unit pavers, planting, site furnishings, and pedestrian scale lighting. The mall design shall accommodate vehicular traffic and match existing hardscape materials. The overall typical width shall be 60' to 80' wide with minimum 24' wide and 13'-6" height clearance for emergency vehicles. The planting design shall include open lawn areas with deciduous trees and a minimum 5' landscaped buffer adjacent to building entrances. Secondary and tertiary sidewalks shall be included to and from parking areas and building entrances.
- c. The CPTC Master Plan requires the development of Hageness Circle as a ceremonial entrance to the central campus zone from Steilacoom Boulevard SW as part of the Building 22 removal and development of the Center for Advanced Manufacturing Technologies. This circular drive extension shall include entry signage, landscape improvements including lawn and trees, and be an identifiable marker for the community.
- d. To support lawn and planting areas, an automatic irrigation system is required. Low volume irrigation design is encouraged, such as drip or rotatory nozzles, to reduce water use and meet LEED Water Efficiency Credit requirements. Irrigation products shall be consistent with those used elsewhere on the campus.
- e. To continue the established campus aesthetic, shrub and groundcover planting areas shall be limited to building entrances, the pedestrian mall, along building facades, significant landmarks, entry signs, and as otherwise required by the CPTC Master Plan and the Lakewood Municipal Code.



- f. Crime Prevention through Environmental Design (CPTED) principles shall be followed for the planting and urban design improvements to support a safe and secure campus environment.
- g. Proposed landscape improvements shall not increase the level-of-effort for maintenance as established elsewhere on the CPTC campus.

## 7.0 SITE/CIVIL DESIGN

The site is located at the southeast quadrant of the intersection of Redwood Drive and Hageness Drive, in the western portion of the campus. The site is currently developed with a parking lot and Building 22, the campus maintenance building. The proposed Center for Advanced Manufacturing Technologies building replaces the existing Building 22 and displaces some of the surface parking. Displaced parking is to be replaced within the project area.

### 1. Codes & Standards

The following codes/guidelines must be adhered to:

- a. 2008 General Administration Facilities Design Guidelines and Construction Standards.
- b. CPTC Facilities Master Plan 2014 Update, December 30, 2014
- c. Washington Department of Ecology Stormwater Management Manual for Western Washington as adopted by the City of Lakewood
- d. Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction
- e. Lakewood Water District Cross Connection Control Program
- f. Pierce County Sewer Division Standards
- g. West Pierce Fire and Rescue Fire Protection Standards
- h. Washington Department of Transportation

### 2. Systems Overview

#### a. Existing Conditions

The flat site is currently developed with Building 22 on the east, and parking and associated landscaping to the west. North of the project area is Redwood Drive, and to the east is Hageness Drive; both are private campus roads. To the south of the site is an open field, which is currently being used by campus maintenance, and Building 25. Perimeter Drive SW borders the site on the west.

The site slopes down from east to west at very gradual slopes, with approximately 3 feet of fall across the entire site. Building 22 has 3-foot high truck docks on all sides; therefore, the building sits above the surrounding parking areas. The parking area to the west of Building 22 slopes gradually to planter islands which infiltrate runoff.

There is a pedestrian walkway running east/west just south of the building. This walkway is identified as the "primary pedestrian mall/walkway" in the 2014 Campus Wide Master Plan and extends through the entire campus, connecting all buildings and parking areas.

#### b. Utilities

- 1) Water Service – Water service is provided by the Lakewood Water District through a campus wide master meter located in the northeast corner of the campus. There is a water main located south of the site in the pedestrian mall that is running east/west. This water main provides fire hydrant



coverage and domestic water service to the campus buildings adjacent to the mall. A fire loop around the proposed CAMT building will be required to provide adequate fire coverage and hydrant flow for the proposed building, per West Pierce County Fire and Rescue Standards. This loop will be connected to the water main in the pedestrian mall. Review by the Campus Maintenance Department to verify conformance with Campus Standards will be required.

- 2) Sanitary Sewer Service – Sanitary Sewer Service to the site is provided by a sewer main located just north of the existing Building 22. All existing services are to be located and abandoned per Pierce County Sewer Standards.
- 3) Stormwater Service – Stormwater for the area appears to drain to two basins. Building 22 drains to a series of storm manholes located south of the building. These manholes appear to have no outlet are a likely functioning as drywells. The parking area to the west drains to a series of bioretention planters located in landscape islands that infiltrate runoff. The campus soils are typically outwash soils, suitable for stormwater infiltration. The stormwater system for the CAMT Building is expected to provide infiltration for the developed area and water quality treatment for all pollution generating surfaces. All facilities are to be designed in accordance with the City of Lakewood and Washington Department of Ecology standards.
- 4) Natural Gas Service – Natural Gas service for the site is provided by Puget Sound Energy from a gas main located just north of the existing Building 22. If the natural gas main is displaced by the proposed CAMT Building it is to be replaced without interruption of gas service to the surrounding facilities.

### 3. Quality of Materials and Systems

- a. Site facilities are to be constructed with materials consistent with standard industry practices, and the Washington Department of Transportation Standard Specifications for Road and Bridge Construction.
- b. The primary pedestrian mall/walkway is to be extended to the west extended along the south boundary of the project and constructed of materials consistent with other areas of the campus. The existing mall is constructed of a mix of precast pavers, stamped concrete, and brushed concrete. The extension should be coordinated with these materials. The pedestrian mall is constructed to support fire truck access and serves as a fire access road for the adjacent buildings. The layout of the pedestrian mall is to fit in the context of the campus, buildings, and surrounding walkways.

## 8.0 STRUCTURAL DESIGN CRITERIA

The facility provided shall be suitable for higher-education and industrial use with minimum uniform live loads increased for corridors, assembly areas, stairs and exits, light storage, vehicular driveways and yards, and other uses specified in Section V. Design Program - Space Program, Room Data Sheets, Drawings and Diagrams. In addition to a requirement to meet minimum standards included in governing building codes, State of Washington facilities guidelines, and this RFP, the structural system should provide a comfortable working environment, serviceability, minimal maintenance requirements, flexibility to accommodate future expansion and changes in occupancy, and low life cycle costs.

### 1. Codes & Standards

The following codes/guidelines must be adhered to:



- a. 2015 International Building Code (IBC) as amended by Washington Administrative Code Chapter 51-50 and as adopted by 15A.8.010 of City of Lakewood Municipal Code.
- b. All referenced standards listed by reference number below shall have title and effective date listed in chapter 35 of the IBC.

**2. Narrative and Systems Overview**

The structural design loads shall be in accordance with the IBC using criteria that include the following minimum loadings:

- a. Dead load consisting of the estimated actual weights of structure, coverings, and permanent contents, including equipment such as cranes.
- c. Collateral load of 10 pounds per square foot on all roof and elevated floor framing, to account for suspended items such as ceilings, ductwork, piping and lights.
- d. Roof live load of 20 pounds per square foot, reducible in accordance with IBC Section 1607.12.2.1.
- e. Minimum roof uniform snow load of 25 pounds per square foot.
- f. Floor live loads, reducible in accordance with IBC Section 1607.10 where noted:
  - 1) Classrooms and Offices – 65 pounds per square foot uniform load (reducible) + 15 pounds per square foot uniform partition load and 2000 pound concentrated load.
  - 2) Mechanical rooms – 125 pounds per square foot and 2000 pound concentrated load, or weight of any mechanical equipment plus 50 pounds per square foot.
  - 3) First floor corridors – 100 pounds per square foot (reducible).
  - 4) Upper floor corridors – 80 pounds per square foot (reducible).
  - 5) Stairs – 100 pounds per square foot and 300 pound concentrated load on tread (reducible).
  - 6) Assembly occupancies – 100 pounds per square foot.
  - 7) Storage rooms – 125 pounds per square foot.
  - 8) Labs, manufacturing rooms, and manufacturing storage rooms – 250 pounds per square foot and 3,000 pound concentrated load.
- g. Ultimate design wind speed of 115 miles per hour, exposure C, in accordance with IBC section 1609 and ASCE 7 Section 26.7.3.
- h. Maximum considered earthquake ground motion parameters of  $S_s=1.291 g$  and  $S_1=0.507 g$ ; seismic importance factor = 1.25. Site class shall be determined by the geotechnical engineer licensed in the State of Washington preparing the soil investigation report, in accordance with ASCE 7, Section 20.1.
- i. Life-safety components required to function after an earthquake and components containing hazardous contents will be designed for an Importance Factor of 1.5 in accordance with ASCE 7 Section 13.1.3 These include:
  - 1) Fire protection sprinkler system
  - 2) Egress stairway framing
  - 3) Stairway pressurization fans (if used)
  - 4) Egress lighting and exit signage
- j. Special Inspections for Seismic Resistance per IBC 1707 and testing per 1708. This includes structural inspections and inspections of erection and fastening of exterior enclosure, mechanical, electrical and piping installation.

**3. Quality of Materials and Systems**

- a. Any construction type that meets the requirements of applicable building codes and this RFP, and provides standards of serviceability, maintenance requirements, flexibility for future expansion and changes in occupancy, and low life cycle costs may be used.
- k. Design and Construction to be as per the IBC, referenced standards, and the following:



- 1) Foundations, excavation, subgrade preparation, and potential geologic and seismic hazards shall be per the recommendations of a geotechnical engineer licensed in the State of Washington in accordance with IBC Section 1803.6. Geotechnical investigations were reported in "Geotechnical Data Report: Proposed Industrial Technology Building at Clover Park Technical College" by Hart Crowser on June 10, 2016, No. 19220-00.
  - 2) Concrete: ACI 318, ACI 360R-10
  - 3) Masonry: TMS 402/ACI 530/ASCE 5, TMS 602/ACI 530.1/ASCE 6.
  - 4) Structural Steel: AISC 360 and AISC 341.
  - 5) Cold Formed Steel: AISI S100, AISI S200.
  - 6) Steel Joists: CJ-10, JG-10, K-10, and LH/DLH-10.
  - I. Use of construction types, materials, or construction methods not covered in referenced standards will require approval by the State based on submitted evidence including testing, reports, calculations, and government and association approvals demonstrating that code, state, and RFP requirements and intent are being met.
4. Special Considerations
- a. Essential Facilities/Seismic Requirements  
The facility is Risk Category III, in accordance with IBC 2015 Table 1604.5.
  - b. Serviceability
    - 1) Vertical deflection of framing members shall be limited to a maximum of  $1/360$ th of the span under live load and  $1/240$ th of the span length under the total load.
    - 2) Differential static soil settlement across any structural bay shall be less than  $1/2$  inch. Structural bays supporting overhead crane shall limit differential static soil settlement between crane supports to  $1/4$  inch.
    - 3) A vibration analysis shall be required for members supporting rotating equipment such as ventilating fans and floor joists supporting walkable surfaces. Acceleration limit on office and classroom floors shall be 0.5 percent of gravity, in accordance with American Institute of Steel Construction Design Guide 11.
    - 4) Story drift shall be limited to values established by ASCE 7, but no more than 2 percent of story height.
  - c. Flexibility for Future Expansion and Changes in Occupancy  
For any structural system that will limit the ability for modifications (ie, post-tensioned concrete) for changes in uses such as new plumbing penetrations or block-outs or areas allowing for future penetrations shall be provided and located on record drawings.
  - d. Compatibility with Non-Structural Elements  
The structure and expected structural movements due to wind, seismic, and temperature fluctuation shall be compatible with non-structural components and their attachments to the structure. Sufficient separations shall be provided to preclude damage to non-structural components or unintended effects on the structure under code specified movements.
  - e. Floor Flatness shall be within  $1/4$  inch in a ten-foot radius (non-cumulative). The maximum deviation is not to exceed 1 inch between any two points on the floor.
  - f. Reinforce concrete slabs on grade for crack width control in accordance with ACI 360R, Design of Slabs-on-Ground.

## 9.0 CONVEYANCE SYSTEMS

### A. Elevator

General: Provide manufacturer's standard elevator system with 2,500 lb capacity and 100 fpm speed, and designed for travel distances indicated. The elevator should be able to accept an emergency gurney. Where



components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system.

**B. Overhead Bridge Crane**

General: Where indicated in Section V, provide single girder overhead crane on traveling rails on the brackets attached to the Building structure>

**C. General Code Requirements**

Conveyance design and installation should conform to all applicable standards including the following Codes, regulations and inspection processes:

1. Compliance with Regulatory Agencies: Comply with most stringent applicable provisions of following codes, laws, and/or authorities, including revisions and changes in effect:
  - a. Safety Code for Elevators and Escalators, ASME A17.1.
  - b. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2.
  - c. Elevator and Escalator Electrical Equipment, ASME A17.5.
  - d. Washington Administrative Code (WAC).
  - e. National Electrical Code, NFPA 70.
  - f. Americans with Disabilities Act, ADA and A117.1.
  - g. Local Fire Authority.
  - h. Requirements of most stringent provision of local authority having jurisdiction.
  - i. Life Safety Code, NFPA101.
  - j. International Building Code (IBC).
2. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies. The State of Washington Labor and Industries elevator division is the applicable Code Authority having jurisdiction.
3. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.
4. Check operation of each elevator with Owner's personnel present before date of Substantial Completion. Determine that operation systems and devices are functioning properly.
5. Provide a one-year maintenance service and warranty

**10. MECHANICAL SYSTEM GENERAL REQUIREMENTS**

**A. General Building Description**

The purpose of this Request for Proposal (RFP) document is to establish the minimum performance and quality standards for the Center for Advanced Manufacturing Technologies on the Lakewood Campus at



Clover Park Technical College. The Design-Build contractors will use this RFP to prepare their designs for the building mechanical systems.

The selected mechanical subcontractor will be entirely responsible for the design, permitting, building, start-up, and testing of all the mechanical, fire protection, and plumbing systems. The design shall be the responsibility of the mechanical engineers of record who shall be registered professional engineers in the State of Washington. The mechanical contractors shall provide complete and functional systems. All systems shall be provided with adequate service clearances. Equipment shall be easily maintainable and shall be easily accessible.

The mechanical Design-Build contractors shall provide a written guarantee for a period of one year from the date of substantial completion that covers the entire system including equipment, materials and workmanship.

All systems shall be designed and engineered with long term operational efficiency and cost performance in mind. The proposer is encouraged to propose the greatest performance energy savings. The Design-Build Contractor is encouraged to provide a proposal that exceeds the minimum required energy savings.

#### **B. Codes and Standards**

1. 2015 International Building Code with Washington State Amendments
2. 2015 International Mechanical Code with Washington State Amendments
3. 2015 Washington State Energy Code
4. 2015 International Fire Code with Washington State Amendments
5. 2015 Uniform Plumbing Code with Washington State Amendments
6. ASHRAE Standard 62.1-2010 – Ventilation Standard for Indoor Air Quality
7. ASHRAE Standard 55-2010 – Thermal Comfort
8. ASHRAE Standard 90.1-2010: Energy Standard for Buildings except Low-Rise Residential Buildings
9. LEED Version 2009 for New Construction
10. ADA or Uniform Federal Accessibility Standards
11. National Fire Protection Association (NFPA) Standards
12. National Electrical Manufacturers Association (NEMA)
13. National Electrical Contractors Association (NECA)
14. National Electric Code (NEC)
15. American National Standards Institute (ANSI)
16. Institute of Electrical and Electronic Engineers (IEEE)
17. Underwriters Laboratories (UL)
18. General Administration Facilities Design Guidelines & Construction Standards 2008



19. RCW 70.235.050 Green House Emission Limits for State Agencies

**C. Operations, Maintenance and Energy Performance Design Submittal Requirements**

The Design-Build Contractor must provide the following documentation and calculations as part of the RFP response and submittal:

1. A narrative explanation of the Design-Build Contractor's building environmental systems (i.e. lighting, envelope, HVAC, domestic hot water, electrical, telecommunications, special systems and others) that are proposed for achieving:
  - a. Operational and Maintenance efficiencies.
  - b. Design-Build Contractor's Energy Savings Commitment offer, which must meet or exceed the Owner's desired energy savings (as listed above).
2. Description of calculation methods including modeling software, zoning, baseline assumptions, and proposed building assumptions used in preparing the analysis.
3. Submit a proposed ELCCA Work Plan adapted to Design-Build delivery and illustrating the ELCCA integration with the Design-Build process. For reference, review the Energy Life-cycle Cost Analysis Guidelines for Public Agencies in Washington State, January 2016, Figure 2.1 and Chapter 4.
4. Submit building energy estimated results for both the baseline building and the proposed building design concept:
  - a. Annual energy usage breakdown by system category: HVAC, interior lighting, exterior lighting, plug and equipment loads, domestic hot water, miscellaneous.
  - b. Summary of annual natural gas (if applicable) and electrical energy usage and energy costs based on current utility rate schedules.
5. After contract award, the Design-Build Contractor must provide the following documentation and calculations as part of completing the final LEED submittal requirements and design phase services:
  - a. During the design phases, a life cycle cost analysis worksheet must be prepared for the proposed HVAC system, and any proposed energy alternatives. Utilize the Washington State DES Energy Life Cycle Cost Spreadsheet and established escalation and discount rates. The spreadsheet determines the cumulative costs (50 year life cycle costs) of ownership. Provide a description of any assumptions used in preparing this analysis.
  - b. Prepare an ELCCA Report as outlined in Chapter 5 of the Energy Life-cycle Cost Analysis Guidelines for Public Agencies in Washington State, January 2016, and adapted to this Design-Build delivery.
6. The Design-Builder must develop and submit to USGBC in accordance with LEED submittal documentation requirements for EA Credit 1, and ultimately attain the proposed number of points for this credit. Additionally, for Energy Star compliance, the Design-Builder must submit all documentation at design completion to EPA energystar.gov.

**D. Greenhouse Gas Emissions**



Provide a description of how this project will reduce greenhouse gas emissions and help State agencies meet the requirements of RCW 70.235.050 Greenhouse Emission Limits for State Agencies. Refer to the College plan for Greenhouse Reduction contained in the 2014 Master Plan.

## 11.0 PLUMBING DESIGN CRITERIA

### A. General Code Requirements

Plumbing systems shall be designed and built to meet current codes. Provide for required permits, inspections, construction sequences, quality assurance, and safety practices.

### B. Plumbing Design Criteria

Plumbing piping sizing criteria is listed below:

Domestic Water Piping:

- Minimum pressure 35 PSI at most remote outlet
- Maximum pressure 80 PSI at any location
- Maximum Static Pressure Loss 6 PSI/100'
- Maximum velocity is 8 fps for cold water and 5 fps for hot water

Waste and Vent Piping:

Minimum ¼" per foot slope inside the building Size using tables in the Uniform Plumbing Code

### C. Plumbing Fixtures

1. All plumbing fixtures including lavatories, sinks, floor drains, shall be commercial grade low flow fixtures complete with trim. The plumbing contractor will be required to connect to all equipment requiring plumbing connections. All sensor operated fixtures shall be battery powered.
2. Water closets shall be automatic flush ultra-low flow, with a manual push button override. Dual flush water closets are not acceptable. Waterless urinals are not acceptable for this project. Water closets shall be wall hung with a service access corridor provided behind each fixture. Provide floor mounted water closets where access corridor cannot be provided. A single occupant restroom shall be provided with a bariatric wall mounted water closet and concealed cast iron extra heavy duty 1,000 pounds bariatric carrier.
3. Lavatory faucets shall be self-charging automatic low flow fixtures.
4. Mop sinks shall be corner mounted floor sinks. Terrazzo and cast iron sinks are not acceptable.
5. Floor drains shall be ABS or cast iron. They shall be insulated for acoustical purposes. Stainless steel floor drains shall be provided for condensing boilers.
6. Trap Primers shall be flush valve type and shall be provided to maintain a water seal for all traps. Standard trap primers that rely on a drop in water pressure to activate are not acceptable. Provide trap seals for traps in areas that are not climate controlled.
7. Emergency eyewash and shower fixtures shall be provided where required by code and where indicated in the room data sheets.
8. Provide drinking fountains with chilled water and bottle-filler.



9. Acceptable fixture manufacturers are summarized below. Plumbing fixture types and their minimum performance requirements are shown in Table 1, below.
10. Manufacturers are based on the following:
  - a. Fixtures: American Standard, Kohler.
  - b. Floor Drains/Sinks: J.R. Smith.
  - c. Trap Primers: J.R. Smith, Precision Plumbing Products
  - d. Faucets: Chicago Faucets, American Standard.
  - e. Flush Valves: Sloan Royal, Zurn.
  - f. Drainage Products: JR Smith, Josam, Zurn, Wade, Watts.
  - g. Wall hydrants: Zurn
  - h. Refer to Table 2 below for minimum performance requirements of fixtures.

Plumbing Fixture Types and Minimum Performance Requirements					
Fixture	Location	Type	Control	Flow	Notes
Water Closet	Restrooms	Wall hung, vitreous china.	Sensor Operated flush valve with manual override	1.28 GPF	ADA provided where required
Water Closet	Single Occupant Restroom	Wall hung, bariatric type	Sensor Operated flush valve with manual override	1.28 GPF	ADA provided where required. Provide concealed bariatric carrier.
Lavatory	Restrooms	Wall hung, vitreous china	Sensor Operated	0.5 GPM	ADA provided where required
Urinal	Restrooms	Wall Hung, vitreous china	Sensor Operated flush valve with manual override	0.125 GPF	ADA provided where required



Plumbing Fixture Types and Minimum Performance Requirements					
Fixture	Location	Type	Control	Flow	Notes
Sink	Breakroom/ Kitchen	Self-rimming, counter mounted, Stainless steel	Dual handle faucet, goose neck spout	1.5 GPM	ADA faucet Insta-hot at sink
Sink	Shops	Wall hung, vitreous china	Sensor Operated	0.5 GPM	ADA provided where required
Mop Sink	Janitor/Custodial	Floor Mount in corner.	Wall mount faucet with dual handles. Vacuum breaker spout with pail hook and 3/4 inch male hose thread outlet.	2.5 GPM	
Drinking fountain with bottle filler	Varies	Dual height with bottle filling station, stainless steel	Front push pad operation for drinking fountains and sensor operation at bottle filler	1.0 GPM Minimum at bottle filler	Refrigerated
Wall Hydrant	Bldg Exterior	Freeze proof – Recessed Box type	Manual		
Wall Hydrant	Shops	Recessed Box type	Manual		

Table 1: Plumbing Fixture Types and Minimum Performance Requirements

**D. Systems Overview**

1. Quality of Materials and Systems

The Design-Builder proposal shall include a list of materials and equipment that will be used on the project. Where applicable the list shall include:

- a. Piping material used.
- b. Allowable water heater manufactures.



- c. Allowable pump manufacturers.
- d. Allowable water softener manufacturers.
- e. Piping test requirements.
- f. Other equipment not included in this list that describes the quality of materials that will be provided.

2. Sanitary

A complete sanitary waste and vent system will be provided. Piping slope will be a minimum of ¼" per 1'. Waste and vent piping shall be no-hub cast iron. Underground piping shall use heavy duty couplers. Provide floor trench drains to service water jet machines in the cutting lab and general equipment in the manufacturing lab. Provide a sand and oil separator for trench drains. Provide settlement tanks both inside and outside with the inside tank routed to the outside tank to service the trench drains.

3. Storm Water

A roof and overflow drain system shall be provided as required by code. The overflow storm drain system will daylight utilizing downspout nozzles at the first floor level above grade. Storm piping shall be no-hub cast iron. Insulate all horizontal roof drain lines.

4. Natural Gas

Natural gas service is available to the site from Puget Sound Energy. Natural gas may be used for building or domestic water heating. If natural gas is used a single utility meter will be provided. Gas piping will be installed per Washington State codes and Puget Sound Energy requirements.

5. Domestic Cold Water

Domestic cold water is available on site. The domestic water system shall be provided with positive means to control backflow, with a reduced pressure backflow preventer at the cold water header and appropriate backflow preventers at sources of possible contamination within the building, such as mechanical equipment or industrial cold/hot water systems.

Cold water will be distributed to the plumbing fixtures. Freeze-proof hose bibs should be distributed around perimeter of building (at a 50' on center minimum), and be provided for the recycle rooms, trash room, near mechanical equipment, and where it may be required for cleaning or servicing of equipment. All distribution piping shall be copper or PEX piping.

Vertical domestic water risers shall be provided with isolation valves at each floor. Provide ball type isolation valves at all major branches and at all restroom groups and the breakroom/kitchen.

Irrigation: A backflow device shall be provided for the irrigation system.

6. Domestic Hot Water

Domestic hot water can be provided by natural gas hot water heaters, heat pumps, solar hot water with gas backup, or another source that supports the project energy goals and budget. Domestic hot water will be distributed throughout the building with a water recirculation system. All distribution piping shall be copper or PEX piping. The domestic hot water system and components shall be controlled by the building management system. Ground water temperature used for domestic water heater sizing shall be based on 40°F. Water heater shall produce 140°F temperature water for health



purposes and be delivered to the fixtures at a maximum of 110°F. All public fixtures shall be protected by a device capable of limiting the water temperature to 110°F for scald prevention. Acceptable manufacturer for domestic water heaters are A.O. Smith with no substitutions.

7. Industrial Cold and Hot Water (where required)

Industrial cold water may be provided for HVAC system makeup water. Industrial water systems will be isolated from the domestic water system by means of a reduced pressure backflow preventer.

8. Water Softener

Provide a central water softener system located in the mechanical room for industrial machine equipment shown to have a water connection. Refer to the Industrial Shop requirements in Section 5 for equipment lists, location, and connection requirements.

9. Solar Water Heating

Solar water heating systems are acceptable but not required. System diagrams, freeze protection methods, controls, and other design considerations should be provided as part of the design-build proposal. The system shall include a backup heating water source. The anticipated energy savings and potential economic incentives available should also be provided with the design-build proposal. If a solar water heating system is not provided the contractor shall provide infrastructure for addition of a future solar hot water heating system.

E. Submittals

Provide product data sheets and/or prescriptive specifications for the following equipment as part of the RFP submission:

- 1. Plumbing Fixtures.
- 2. Plumbing Equipment.
- 3. Any special energy saving fixtures, equipment or materials.

12.0 HEATING, VENTILATING AND AIR CONDITIONING DESIGN CRITERIA

A. Thermal Comfort and Indoor Air Quality

Building HVAC systems will be designed to comply with ASHRAE Standard 55-2010 and 62.1-2010. The Design-Build proposer shall include a narrative description for how indoor environmental air quality will be achieved. The narrative should include where local exhaust will be included, use of operable windows, and thermal zoning to be utilized. Central air handling units shall be provided with MERV 13 filtration. The table below summarizes the minimum zoning requirements.

<b>Minimum Thermal Zoning Requirements</b>
--



<b>Exterior Perimeter Enclosed Offices</b>	≤250 sf/zone
<b>Interior Enclosed Offices</b>	≤ 500 sf/zone
<b>Exterior Perimeter Corner Offices</b>	Separately zoned
<b>Conference Rooms</b>	Separately zoned
<b>Open Area Offices</b>	≤1,000 sf/zone
<b>Labs</b>	Separately zoned
<b>Classrooms</b>	Separately zoned
<b>Mechanical/Electrical Support</b>	Separately zoned

**B. Systems Overview**

1. General

The State requires that the mechanical systems are reliable, have a proven track record for operation and service, and are easily maintainable.

Provide complete and fully operational mechanical systems, including the coordination of work with other specification divisions. All work shall be completed in accordance with applicable codes. Provide all required permits, inspections, construction sequences, quality assurance, and safety practices.

All work is to be coordinated with other trades by General Contractor. All materials shall be new and of reputable quality. Contractor shall provide one-year warranty for all work and materials. All equipment and systems installation shall provide for required maintenance space as recommended by manufacturer or code as a minimum.

Route all ductwork, piping, compressed air, vacuum piping, mechanical equipment, and appurtenances to not interfere with two interior equipment cranes located in the Manufacturing CNC Labs.

Coordinate utility shut offs with College and authority having jurisdiction.

2. Quality of Materials and Systems

The Design-Builder proposal shall include a list of materials and equipment that will be used on the project. Where applicable the list shall include:

- a. Piping material used.
- b. Allowable air handler manufactures.
- c. Allowable chiller manufacturers.
- d. Allowable boiler manufacturers.
- e. Allowable cooling tower manufacturers.
- f. Allowable fan manufacturers.
- g. Allowable heat exchanger manufacturers.
- h. Allowable pump manufacturers.
- i. Ductwork materials and construction standards.
- j. Ductwork pressure testing requirements.
- k. Piping test requirements.



- l. Allowable terminal unit manufacturers.
- m. Any other equipment not included in this list that describes the quality of materials that will be provided.

3. Design Criteria and Considerations

All systems shall be provided in compliance with all code requirements. At a minimum the following data should also be taken into consideration in the design. Duct sizing shall be in accordance with ASHRAE and SMACNA requirements, taking into account noise considerations. Provisions for thermal expansion shall be provided. Supply diffusers and registers shall be selected for proper throw and noise criteria. Exhaust and return grilles shall be sized at a maximum of 500 fpm. Air transfer grilles shall be sized at a maximum of 250 fpm. Every grille, register, and diffuser shall be provided with a means of balancing in the ductwork. Opposed blade dampers in the grilles, registers, and diffusers are not an acceptable means of balancing for items connected to ductwork. Provide spiral ductwork as it will be exposed throughout the building. Outside air louvers shall be sized to eliminate the possibility of water entrainment, typical maximum velocity shall be 500fpm.

Design Performance:

Design Temperatures	Heating	Cooling
Outdoor Conditions Olympia, WA	29 F	82 F DB/65 F WB
General Occupied Space	70 F DB	75 F DB
Conference Rooms	70 F DB	75 F DB/50% RH
Mechanical Spaces	65 F DB	Ventilate to 95 F DB
Electrical Spaces	65 F DB	Ventilate to 85 F DB
Comm Rooms (MDF, IDF, Telecom)	NA	85 F DB
Classroom	70 F DB	75 F DB/50% RH
Shops/Labs	70 F DB	75 F DB/50% RH
Office, Conference, Dispatch	70 F DB	75 F DB/50% RH

4. Heating Systems

The building heating loads shall be calculated as required by the 2015 Washington State Energy Code. Consideration should be given to architectural systems that can reduce building heating load, coordinate with building architect. Heating water boilers are preferred for space heating. Redundant boilers shall be provided and sized at a maximum of 100% of the building load. Acceptable manufacturers for boilers is Aerco and Cleaver-Brooks. Steam shall not be provided as a space heating method. Heating water system and appurtenances shall be provided in a mechanical room located within the building envelope. Hydronic building pumps shall be provided at 100% redundancy. Provide variable speed pumps. Acceptable manufacturers for pumps is Taco, Armstrong, Paco. Heating water piping shall be copper or PEX suitable for application and location in the building.



Include the following as part of the Deign-Builder proposal:

- a. Narrative describing the heating system and methods used to improve efficiency.
- b. Conceptual heating system plan.
- c. Conceptual thermal zoning plan.
- d. List of specific major heating equipment.
- e. Cut sheets of recommended heating equipment.

5. Allowable vendors for each type of equipment.

Cooling Systems

The building cooling loads shall be calculated as required by the 2015 Washington State Energy Code. Consideration should be given to architectural systems that can reduce building cooling load, coordinate with building architect. Preferred cooling system is chilled water provided by high efficiency chiller and cooling tower. Provide 100% redundant cooling water pumps. Provide variable speed pumps. Acceptable manufacturers for pumps is Taco, Armstrong, Paco. Chilled water piping shall be steel or copper. Provide independent cooling systems for telecom, IDF, and MDF rooms.

Include the following as part of the Deign-Builder proposal:

- a. Narrative describing the cooling system, methods used to improve efficiency, and a description of how passive strategies are used if applicable.
- b. Conceptual cooling system diagram.
- c. Conceptual thermal zoning plan.
- d. List of specific major cooling equipment.
- e. Cut sheets of recommended cooling equipment.
- f. Allowable vendors for each type of equipment.

6. Air Handling Systems

The building loads shall be calculated as required by the 2015 Washington State Energy Code and Washington State Mechanical Code. Energy recovery should be used where practical or required by code. Natural ventilation is not acceptable. Air handling equipment shall be located in an enclosed rooftop penthouse. Penthouse shall be access by stairs. Ladder access is not acceptable. Exposed rooftop equipment is not acceptable. Heat Pumps are not acceptable.

Include the following as part of the Design-Builder proposal:

- a. Narrative describing the air handling system, methods used to improve efficiency, locations of independent local exhaust.
- b. Conceptual air handling system diagram.
- c. List of specific major air handling equipment.
- d. Cut sheets of recommended air handling equipment.
- e. Allowable vendors for each type of equipment.

7. Specialty Systems

Provide all specialty systems as required by code. Refer to the Industrial Shop requirements in Section 5 for equipment lists, location, and connection requirements. Some systems are listed below:

- a. Provide a compressed air system to include but not limited to: three screw air compressors each



sized at 50% capacity; a storage tank; filter; and air dryer located in a mechanical room with distribution piping and accessories routed to machine equipment shown to have a compressed air connection.

- b. Provide a central vacuum system located in a mechanical room with distribution piping and accessories routed to machine equipment as required.
  - c. Provide an outdoor dust collection system integrated with electrical services to machine equipment as required. Centrally locate dust collector outdoors to service equipment in building. Route dust collection exhaust ductwork through interior of building with only exposed ductwork required for connection to dust collector.
8. Provide emergency eye wash stations with tempered water in each laboratory and shop.
9. Controls

A direct digital control (DDC) Bacnet compatible system shall be provided to control and monitor all HVAC equipment and systems. Controls shall be by Siemens or Distech Controls. Valve and damper actuation will be electric type with Belimo as the preferred vendor. The control system will be complete and allow for full control and monitoring from the operator's terminal or from an off-location via the internet. The operator's terminal shall be a laptop located in the main mechanical room. The control system will perform all required control functions, including optimization of equipment and system performance, reliability, equipment life and energy consumption. All building services, gas, water, electricity etc., shall be monitored by the DDC system. A system that allows for an easy export of the metering data to Portfolio Manager shall be provided. The DDC system shall be certified and approved by the Building Network owners.

Provide demand controlled ventilation for all the spaces. As this building will typically not be fully occupied this should allow for energy savings.

An extensive measurement and verification system is anticipated to carefully monitor all of the building's energy use. Provide metering system to meet the WSEC, LEED EA<sub>c5</sub>, and to verify the energy performance requirements.

### 13.0 FIRE PROTECTION DESIGN CRITERIA

#### A. Design Criteria

The entire building will be totally sprinklered in accordance with NFPA 13. A double check valve assembly shall be provided for the fire service in an independent fire sprinkler riser room.

The fire sprinkler system shall comply with NFPA 13 and local Fire Marshal requirements. Coordinate with the owner to meet the requirements of either UL or FM Global. In general, the fire sprinkler system shall consist of connection to new water service, including electric fire pumps, jockey pump, controllers, automatic transfer switch, main flow alarm station, zone control valves and flow indicators, alarm bell, fire sprinkler piping and heads, as required. All related fire protection accessories as required will be provided. Coordinate location and type of tamper, flow, and pressure switches with the fire alarm system. Provide exposed and concealed fire sprinkler piping as required.

Lakewood Water District reports the following regarding fire flow:

CPTC is in the District's booster pump generated 455' pressure zone so the flows will slightly vary depending on how many boosters are called to operate in order to meet demand.



**B. Systems Overview**

1. Wet Pipe Sprinkler System

The entire building will be sprinkled in accordance with NFPA 13. In general, system to consist of connection to new water service, including detector double check assembly, main flow alarm station, zone control valves and flow indicators, alarm bell, wet and combination standpipe, standpipe hose valves, fire department connection, roof outlets, wall and/or post type control valves for roof outlets, and sprinkler piping and heads. All required system isolation valves shall be provided with tamper switches.

Standpipes with required hose connections shall be provided where required within stairways in accordance with NFPA 14. The sprinkler system/combination standpipe system shall provide a fire protection system designed and installed in strict accordance with NFPA, IFC, and local Fire Marshal requirements.

The design-builder shall verify and if necessary provide sufficient fire hydrant locations to service the new building.

2. Dry Pipe Sprinkler System

Dry pipe sprinkler systems will be used where sprinklers are subject to freezing.

3. Pre-Action Fire Extinguishing System

Provide pre-action fire sprinkler system in areas housing computer, radio and telecommunications equipment (e.g., MDF, IDF and equipment rooms).

**C. Quality of Materials and Systems**

Sprinkler heads in rooms with ceilings shall be concealed head type or sidewall type with polished chrome escutcheons and upright rough brass finish type heads in unfinished areas. Horizontal dry sidewall sprinkler heads shall be provided for overhangs, and other perimeter areas subject to freezing. Quick-Response heads will be provided in all light hazard areas.

**14.0 COMMISSIONING**

Commissioning services will be required per the Washington State Energy Code and as necessary to achieve both fundamental and enhanced commissioning LEED Credits. Provide a third party Commissioning Authority acceptable to the Owner to direct the enhanced commissioning requirements for LEED version 2009. The Commissioning Authority will review design documents and make recommendations during the Program phase, design phase, construction phase, acceptance phase, and post acceptance phase. Installation verification will be performed, functional testing, and performance period of measurement and verification. Commissioning documents will be provided during design, process, verification, and operation and maintenance documents.

**15.0 ELECTRICAL – POWER DISTRIBUTION DESIGN CRITERIA**

**A. General Building Description**

1. The Design-Build Contractors will use this Request for Proposal (RFP) narrative to prepare their designs for the building electrical systems.



2. The selected electrical subcontractor will be entirely responsible for the design, permitting, building, start-up and testing of all the electrical, emergency power, lighting, lighting controls, fire alarm, telecommunications, audio/visual, and other low-voltage systems as described throughout the RFP document. The design shall be the responsibility of the Electrical Engineer of Record who shall be a registered Professional Engineer in the State of Washington. The electrical contractors shall provide complete and functional systems.
3. The electrical design-build contractors shall provide a written guarantee for a period of one year from the date of substantial completion that covers the entire system including equipment, materials and workmanship.
4. The electrical system shall comply with the latest adopted editions of the following:
  - a. National Electrical Code.
  - b. National Electrical Safety Code (NESC).
  - c. NFPA 70E, Electrical Safety in the Workplace.
  - d. WAC 296-46B.
  - e. Washington State Energy Code, latest adopted edition.
  - f. NFPA 72, National Fire Alarm Code.
  - g. International Fire Code, latest adopted edition with local amendments.
  - h. American's with Disabilities Act Accessibility Guidelines (ADAAG).
  - i. LEED v. 2009.

**B. Quality of Materials and System**

1. The Design-Build proposal shall include a submittal of materials, equipment and calculations that will be used on the project. Where applicable, the list shall include:
  - a. Underground vaults.
  - b. Oil filled pad-mounted transformers.
  - c. Main Switchboard load calculations.
  - d. Switchboards.
  - e. Metering at Main Switchboard for both incoming and output.
  - f. Emergency generator, sound-proof enclosure, and all generator components.
  - g. Remote annunciator for emergency generator.
  - h. Generator fuel tank.
  - i. Transfer switches.
  - j. Short Circuit Study.
  - k. Overcurrent Protective Device Selective Coordination Study.
  - l. Arc flash study.
  - m. Arc flash labels per NFPA 70E.
  - n. Panelboards.
  - o. Transformers.
  - p. Surge Protective Devices (SPDs).
  - q. Power meters and metering network.
  - r. Conduit.
  - s. Wire.
  - aa. Fittings.



- bb. Bushings.
- cc. Junction boxes.
- dd. Seismic bracing and support details per Structural criteria and manufacturers' requirements.
- ee. Ground bars.
- ff. Electrical Floorboxes.
- gg. Conduit supports.
- hh. Fire Alarm System.
- jj. Grounding components, including ground rod and ground bushings.
- kk. Labeling.
- ll. Lighting Controls:
  - i. Occupancy sensors.
  - ii. Vacancy sensors.
  - iii. Daylighting sensors.
  - iv. Room controllers.
  - v. Power packs.
  - vi. Relay packs.
  - vii. Scene controllers.
  - viii. Programmable lighting control panels.
  - ix. Typical lighting control wiring diagrams for each room type.
- nn. Light Fixtures.
- oo. Lighting calculations (footcandles) for all spaces, interior and exterior.
- pp. Exit signs.
- rr. Emergency lighting inverters.

**C. Secondary Normal Distribution**

1. The main service shall be sized per the National Electrical Code using actual loads. The main service shall have a minimum of 25% spare capacity.
2. The main switchboard shall be rated 480Y/277 Volt, 3 Phase, 4 Wire. The bussing shall be copper with silver plating and shall be full capacity throughout. Ground bus shall extend the full length of the switchboard. Circuit breakers shall be fully rated. The use of series ratings is prohibited.
3. All circuit breakers 225 amperes and above shall be fully adjustable LSI, with the main breaker having LSIG. All circuit breakers 100 amp to 200 amp shall have an instantaneous setting. The circuit breaker for the surge protective device may be non-adjustable molded case.
4. Square D, GE, or Eaton/Cutler-Hammer.

**D. Emergency and Standby Power**

1. Provide a diesel engine/generator for this project that serves Emergency (N EC 700) and Optional Standby (NEC 702) loads as follows:
  - a. Emergency
    - i. Egress lighting.
    - ii. Exit signs.
    - iii. Fire alarm.



- b. Standby
    - i. MDF / IDF Room power and air conditioning.
    - ii. Access control and security system.
    - iii. Elevator
  - c. The power systems for Emergency shall be selectively coordinated per NEC Article 700.
  - d. Normal, Emergency, and Optional Standby branch circuits and feeders shall be in separate racewaysystems.
  - e. The generator shall be manufactured by Cummins/Onan, Caterpillar and Kohler and have 72 hours of fuel at full load, located in a UL 2085 fuel tank belly tank. Provide dial type fuel gauge and calibrated dipstick.
    - i. Provide a design of the generator pad that restrains the generator per the manufacturer's recommendations. Design shall also be designed for anticipated seismic forces. Design shall be designed and stamped by a Registered Structural Professional Engineer in the State of Washington.
    - ii. Provide emissions mitigation per Puget Sound Air Quality standards and per Pierce County requirements. Contractor shall manage the application process for Pierce County and the Puget Sound Air Quality enforcement agency.
  - f. Provide a separate circuit breaker for a load bank. The load bank circuit breaker shall be automatically tripped off in a power outage.
  - g. The generator shall have the capability to shed optional standby loads only in the event of a generator overload via its control panel, which will tell the Automatic Transfer Switch (ATS) to go to the neutral/center-offposition.
  - h. Provide a BACNET output for remote monitoring of the generator.
  - i. Provide a wired remote annunciator. Locate as di.
  - j. Automatic Transfer Switches shall be manufactured by generator manufacturer. Automatic Transfer Switches shall have BACNET communications.
  - k. Provide critical grade silencer and Schedule 10 stainless steel exhaustsystem.
- 2. Provide two Automatic Transfer Switches for the above branches. All Automatic Transfer Switches shall be time delay neutral style.
  - 3. The Emergency and Optional Standby power systems shall use circuitbreakers.
  - 4. The generator shall be sized with a minimum of 25% spare capacity.

**E. Power Studies**

- 1. Provide short circuit study to determine the available fault current at each component of the electrical distribution system, including: power distribution equipment, switchboards, distribution panels, panelboards, motor control centers, disconnect switches, variable frequency drives, elevator controllers, UPSs, and mechanical equipment with feeders sized over 60 amps. Verify that equipment being provided is rated for the available fault current.
- 2. Provide an overcurrent protective device selective coordination study that determines settings of breakers to optimize selective coordination. Coordination study shall comply with requirements of NEC 700.



3. Provide an arc flash study for all equipment listed above per NFPA 70E requirements. Label all equipment with pre-printed labels that indicate the hazard risk category, incident energy at 18 inches, the flash protection boundary, recommended PPE, shock hazard circumstance, limited protection boundary, restricted protection boundary, prohibited protection boundary, and tool and glove requirements.

**F. Panelboards**

1. All panelboards shall use copper bussing. Circuit breakers shall be bolt-on type. Enclosures shall be hinged door-in-door type.
2. Panelboards shall be fully rated for the available fault current. Series rated systems are not permitted.
3. Feeders to panelboards shall meet or exceed the bussing rating of the panelboard (i.e. #4/0 wire to a 225 amp panel).
4. Panelboards located in a different room from its distribution panel shall be provided with a main circuit breaker.
5. All main circuit breakers shall be individually mounted, molded case.
6. Provide 25% minimum spare breakers in each panelboard.
7. Provide 25% minimum spare capacity in each panelboard.
8. Provide typewritten panel schedules in all panelboards and switchboards.
9. Provide typewritten overcurrent device settings LSIG for panelboards and switchboards with adjustable overcurrent devices which match the settings reported in the overcurrent protective device selective coordination study.
10. Provide a 30A-3P breaker in the first panel on the output of a transformer for an externally mounted Surge Protective Device.
11. Provide a 30A-3P breaker in panelboards that serve communication rooms and computer equipment for an externally mounted Surge Protective Device.
12. Panelboards shall be Square D, GE, or Eaton/Cutler-Hammer.

**G. Transformers**

1. Transformers shall be dry type with 220-degree C insulation.
2. Windings shall be copper.
3. Efficiency shall meet US Department of Energy 2016 requirements.
4. Sound level shall not exceed 35dB.
5. 10kV BIL.
6. Provide k-13 transformers for all office and IT loads.



**H. Uninterruptible Power Supply (UPS)**

1. All communication rack mounted UPS's in communication rooms shall be Owner provided.

**I. Power Metering**

1. Provide metering per the Washington State Energy Code and as required by LEED. The meters shall be monitored by the Energy Monitoring System. Meters shall be provided with communication protocol that is compatible with the Energy Monitoring System.

**J. Wiring Methods**

1. All wiring shall use conduit and wire as the wiring method. MC cable is not permitted.
2. PVC conduit (Schedule 40) shall only be used underground. Elbows and vertical conduit risers shall be Galvanized Rigid steel Conduit(GRC).
3. GRC conduit shall be used above ground outdoors and in areas subject to damage from vehicles or equipment.
4. EMT conduit shall be used indoors where not subject to damage. Minimum size shall be 3/4".
5. Couplings and connectors shall be waterproof steel compression-type only. Zinc-die- cast, malleable, setscrew, and indent couplings and connectors shall not be used.
6. All wiring shall be stranded copper only. No solid or aluminum wire. Minimum #12 for power and lighting circuits. #14 minimum for controls.
7. Provide dedicated neutral conductor for each 120 Volt and 277 Volt circuit.
8. Insulation shall be THHN/THWN for interior branch circuits. Feeder conductor insulation shall be THHN/THWN or XHHW-2. Underground feeder insulation shall be XHHW-2.
9. Use threaded rod and/or a trapeze supported with threaded rod to support overhead raceway.
10. See Washington State standards for wire identification requirements.
11. Electrical floor boxes shall be flush and fully adjustable pre- and post- concrete pour. Cover shall protect and keep out water, dirt, and debris and shall also match adjacent floor type appearance. Floor boxes on grade shall be cast iron. Wiremold/Legrand Evolution Series or approved equivalent.
12. Provide overhead bus duct in shop areas to feed shop equipment overhead. Provide cord drop and receptacle to each piece of shop equipment. Coordinate voltage, phase, circuit size and NEMA receptacle configuration with shop equipment. Overhead bus duct shall have minimum of 50% spare capacity. Overhead bus duct shall be a maximum of 10 feet away from shop equipment.

**K. Device Layouts**

1. Locate receptacles and associated telecommunications outlets within 6 inches of each other.
2. Locate receptacles as follows:



- a. Offices: One double duplex receptacle at desk location. One duplex receptacle on each of the three other walls.
- b. Computer Labs: Provide floor box for Duplex receptacles shall be located every 8 feet, with a minimum of two duplex receptacles on each wall. Provide an electrical floor box at teacher desk.
- c. Labs: Duplex receptacles shall be located every 8 feet, with a minimum of two duplex receptacles on each wall. Provide an electrical floor box at teacher desk.
- d. Conference Rooms: One duplex receptacle 8 feet. Provide an electrical floor box centered below conference table.
- e. Corridors: One general duplex receptacle for housekeeping every 30 feet maximum along hallways and corridors. Provide receptacles adjacent to elevators and in stairwells at each landing.
- f. Provide GFCI duplex receptacles every 4 feet on countertops in kitchens.
- g. Provide receptacles for each piece of equipment.
- h. All utility, electrical, mechanical, janitor, and storage rooms shall have at least one general duplex receptacle near the door. Janitor's room must be GFCI if there is a mop sink.
- i. Provide a receptacle within 25 feet of all mechanical equipment.
- j. Provide GFCI receptacles in all bathrooms, kitchens, indoor wet locations, locker rooms and associated showering facilities, garages, service bays, at all countertops within 6 feet of sinks, and on rooftops and outdoors.
- k. Provide exterior weatherproof GFCI receptacles near each exterior door, each with a dedicated utility circuit.
- l. Provide exterior weatherproof GFCI receptacles within 25-feet of all exterior and rooftop mounted mechanical equipment with a dedicated utility circuit.
- m. Provide L5-20R cord drops for each IDF and MDF communication equipment rack.

#### L. Circuiting Requirements

- 1. At most five receptacles shall be connected to a circuit where not designated otherwise in this section.
- 2. Provide dedicated 20 amp circuits for each the following:
  - a. Photocopiers.
  - b. Laser printers.
  - c. Microwaves.
  - d. Vending machines.
  - e. Coffee machine.
  - f. Two at kitchenette counters.
  - g. Toaster.
  - h. Refrigerator.
  - i. Dishwasher.
  - j. Shop Equipment.
- 3. Provide one circuit per three receptacles in conference rooms.
- 4. Provide one circuit per 2 workstations maximum. Verify with Owner whether there are any high



power users that may need their own dedicated circuit.

5. Receptacles shall be Leviton, Hubbell or Pass & Seymour and be 20 amp industrial grade hard use. Confirm with owner the style and type. Utility receptacles shall be white.
6. Stainless steel cover plates shall be used.

#### M. Labeling

1. Label all major pieces of electrical equipment, including switchboards, distribution panels, panelboards, transformers, disconnect switches, variable frequency drives, UPSs, PDUs, transfer switches. Labels shall indicate the equipment name, voltage, amperes, upstream source(s) and downstream loads, where applicable. Labels shall be 3-layer, and attached with screws, not just adhesive. Labelling shall meet additional WAC requirements, where applicable.
2. Label receptacles, switches, and furniture whips with panel name and circuit number. Use labeler to produce small letters and numbers. Use black letters with a clear background for general circuits and red letters with clear background for computer circuits.
3. Provide orange labels for emergency equipment.
4. Transformer labels shall be metal and engraved with information required.

#### N. Grounding

1. Ground per NEC Article 250. Soares book on grounding and IEEE "Recommended Practice for Grounding of Industrial and Commercial Power Systems" shall be used as guides.
2. Run all grounding electrodes to a ground bar within the main electrical room, which in turn connects to the main switchboard.
3. Provide a UFER ground in addition to ground rods and bonding to water pipe at the main service.
4. All conduits shall have an equipment grounding conductor sized per Article 250.
5. Provide a ground bar in each electrical room that is used for grounding transformers.
6. Provide a #4/0 ground riser to each electrical room, which interconnects each of the ground buses. The riser terminates on the main ground bar in the main electrical room.

#### O. Lighting Controls

1. Provide lighting controls per the current Washington State Energy Code and per LEED. This includes:
  - a. Provide occupancy sensors in all classrooms, conference rooms, meeting rooms, lunch and break rooms, offices, restrooms, laboratory, classroom, storage rooms, janitor closets, and other spaces less than 300 square feet enclosed by floor-to-ceiling height partitions. Provide additional controls in other multi-occupant spaces as required by LEED.
  - b. Coordinate with mechanical engineer if lighting control integration with the HVAC system is



required. If the mechanical engineer requires lighting control integration, the ceiling mounted occupancy sensors shall shift the HVAC into an Unoccupied Mode of Operation after the room has been vacant for 20 minutes (AUTO OFF). The occupancy sensor shall either be equipped with an on-board relay contact or be programmed to operate one of the isolated relays in the digital control system module for use by a building management system for HVAC control. The occupancy sensor shall be programmed to operate the dedicated isolated contact closure in conjunction with the lighting controls. The occupancy sensor settings shall be high sensitivity and fixed time (not automatic learning). Contractor shall coordinate the specific manufacturer settings of the installed system to match the programming described above.

i. Conference Rooms

- 1) The lighting fixtures in these rooms shall be controlled by a digital programmable wall box based dimming control system. The dimming control system shall be provided with sufficient dimming channels to control each light fixture types individually as specified by the lighting designer.
- 2) When a combined room is used in single mode lectern lighting is typically the fixture(s) furthest away from the operable partition. In combined mode the lectern lighting is typically the fixture(s) closest to the operable partition. Coordinate with architect which room's lectern should be active in combined mode.
- 3) Each room shall have a minimum of one wall mounted remote button station with the buttons specifically programmed and labeled for the specific room per the matrix for button labeling and programming issued by the Lighting Designer or Architect. The remote button station shall have the capability to manually dim the currently activated scene up and down without additional fixtures, not included in the current scene, coming on. The dimming control panel shall also accept control signals from an audiovisual system to control lighting in each room where A/V systems are being provided; a RS232 serial interface port, shall be flush wall mounted behind the audio visual equipment rack location in each room. The key pad buttons for A/V control systems shall provide the users with full control of the room lighting levels including a minimum of four scenes: The scenes shall be similar to the following: Button 1: All On/Off; Button 2: Center On/Off; Button 3: Wall 1 On/Off; Button 4: Wall 2 On/Off; Button 5: Dim Up/Down.

ii. Automatic daylight zone control, using dimming drivers not switching. Area of control shall not exceed 2,500 square feet per Washington State standards. The primary daylight zone shall be controlled separately from the secondary daylight zone. Controls shall only control luminaires within the daylight zone(s) and shall incorporate time-delay circuits to prevent cycling of light level changes of less than 3-minutes. Where there are multiple entries into the same lighting zone, provide a switch at each point of entry.

iii. Automatic shutoff of permanently installed tasklighting.

iv. Manual light reduction controls.

v. Controls shall be manufactured by Leviton. Manufacturer shall have been in the business of manufacturing and providing service for lighting control equipment for similar capabilities and size, under the same name and ownership, for a minimum of five years preceding bid date of the project. All components and assemblies shall be factory pre-tested prior to installation. Factory trained technicians shall be on site for start-up, commissioning and training. Factory trained technicians shall be available for telephone support twenty four



(24) hours a day, seven (7) days a week. All equipment shall be U.L. listed.

2. Provide a programmable lighting control panel that automatically sweeps on and off lights at set times. Flicker warnings shall be provided before lights are turned off.
3. Provide manual override switches approximately every 50 feet along main corridors so that occupants can switch the lights back on for two hours before they automatically shut off again.
4. Panel shall store its programming for at least ten hours after loss of power.
5. Panel may control exterior lighting as well, but must use an astronomic and photocell combination input to turn the lights on and off.
6. Panel shall be manufactured by Leviton and have a BACNET interface.

**P. Surge Protective Devices (SPDs)**

1. Provide externally mounted surge protective devices. They shall be connected to a circuit breaker within the equipment they are protecting.
2. SPDs shall be rated for the available fault current.
3. SPDs shall be UL Listed 1449, 3<sup>rd</sup> Edition.
4. The SPD at the main switchboard shall be rated 150kA, mode to mode.
5. SPDs at panelboards shall be rated 50kA, mode to mode. Provide for all panels feeding lighting, and the first panel on the output of each transformer that serves offices and IT loads. Provide for the panel that feeds the server room UPS.
6. Provide 60A-3P breakers for switchboard SPDs and 30A-3P breakers for panelboard SPDs.

**Q. Fire Alarm System**

1. Provide a Class A addressable fire alarm system per NFPA 72, consisting of speakers (not horns), strobes, valve and sprinkler flow monitors, smoke detectors, duct smoke detectors, elevator controls, and other devices as required. Provide air handling shutdown as required. Provide smoke control and pressurization functionality if it is determined to be a requirement. Provide a remote annunciator at the main entrance if the fire alarm control panel is not located there.
2. The fire alarm system shall be Honeywell Notifier.

**R. Wireless Clock System**

1. Provide a Primex wireless clock system. Provide receiver switch to receive the campus wireless signal and amplify it to the clocks in the building. Provide analog 12-1/2" clock in all rooms, except bathrooms, stairwells, storage rooms, mechanical/electrical/telecommunication rooms and janitor rooms. Provide one clock in rooms less than 1,000 square feet. Provide two clocks in rooms from 1,000 square feet to 4,000 square feet. For larger spaces, provide a minimum of three clocks.

**15.1 ELECTRICAL – LIGHTING DESIGN CRITERIA**



**A. General Codes and Standards**

1. Lighting shall be designed to meet or exceed the Washington State Energy Codes in effect at the time of project permitting. If Desired EUI Goal is required, lighting shall be designed to achieve Desired EUI Goal.
2. Lighting levels shall meet the IESNA (Tenth Edition) recommended light levels (within the limits of the energy code watt restrictions).
3. Egress lighting levels shall meet the requirements of the International Building Code and International Fire Code, along with any local amendments.

**B. Testing Agencies**

1. All fixtures shall be UL and/or ETL listed. LED's shall be tested to LM-80-08 and LM-79-

**C. Light Levels and Maintained Footcandles**

1. Open Office and Collaborative spaces: 30-40 footcandles.
2. Offices: 40-50 footcandles.
3. Lobby and Reception Areas: 15-20 footcandles.
4. Conference Rooms: 40-50 footcandles.
5. Storage Rooms and Janitor closets: 10 footcandles.
6. Electrical/Mechanical, Server, Telecom Rooms: 20 footcandles.
7. Elevator Machine Rooms: 20 footcandles minimum.
8. Elevator Lobbies: 15 footcandles minimum.
9. Corridors, Restrooms and Phone Rooms: 10-15 footcandles.
10. Stairwells: 15 footcandles.
11. Kitchens: 40-50 footcandles.
12. Classrooms: 40-50 footcandles.
13. Shops: As identified in Section 5

**D. Lamp Types and Color Temperature**

1. All luminaires shall utilize Light Emitting Diodes (LED) as their source of light. Color temperature for interior luminaires shall be 3,500K with minimum of 80 CRI. Rated life shall be LM80 of 50,000 hours for LED.
2. Compact fluorescent sources shall be avoided in order to reduce energy loads and extend maintenance.

**E. Drivers**

High efficiency LED drivers shall be used throughout. When required for daylight response dimmed light levels, drivers shall be 0-10v and dim to 10% of full output. Rooms with AV access shall include dimming drivers which dim from 100% to 1%.

**F. Luminaire Efficiencies**

Luminaire efficiency for all sources to be 80% or greater.

### **G. Emergency Egress**

Selected fixtures from general lighting layouts will be provided in all public areas and along the path of egress and shall be backed up by the emergency generator and supplied from the NEC 700 distribution system so battery back-up is not required.

### **H. Exit Signs**

All Exit signs shall be green LED. Edge-lit signs will be used in public spaces and aluminum housings in utilitarian areas. Bug-eyes shall not be used. All Exit signs shall be backed up by the emergency generator and supplied from the NEC 700 distribution system.

### **I. Space by Space Lighting Concepts**

1. All open office areas will utilize pendant direct/indirect. Layouts will reinforce building architecture while remaining general enough to allow for future reconfigurations of work stations. Luminaires in daylight areas will have integrated photocells and 0-10VDC dimming drivers.
2. Individual offices shall utilize pendant direct/indirect. Luminaires in daylight areas will have integrated photocells and 0-10VDC dimming drivers.
3. In Classrooms and conference rooms, the lighting will be designed avoid AV conflicts. Sources will be linear and down lights and will dim from 100% to 1%. Presentation walls will be evenly washed with light. Provide 4-scene digital controllers that control dimming of each fixture type and fixture location type. Dim fixtures so that each of the following can be controlled separately: general lighting, projection screen, side and rear wall, miscellaneous can lights, and podium.
4. Reception desks and public lobby areas shall be illuminated with a combination of recessed downlights and pendant indirect fixtures to elevate the ceilings and highlight reception and seating groups. Recessed wallwash fixtures will also highlight feature walls and/or signage.
5. In Circulation Areas, general lighting shall be provided by linear luminaires that provide good general illumination on the walls.
6. Stairs are to be illuminated in such a way that ladder-access for fixture maintenance will not be required.
7. Back of House spaces including all electrical, mechanical and storage rooms are to be provided with basic strips. Wire guards shall be provided on all fixtures.
8. Storage rooms shall be illuminated with basic strips. Provide wire guards on all fixtures.

### **J. Exterior Lighting**

1. Exterior lighting will include canopy or building mounted wall sconces at all exit doors. The primary entry doors will be featured with higher light levels. LED sources will direct light downward with full cut-off optics at all exit doors.
2. Outdoor path and shared public spaces shall be designed to match the existing campus fixtures and to minimize dark areas and promote a sense of security through use of high color-rendering sources at uniform light levels. Fixtures will be well shielded to avoid direct view to sources which add glare.



Full cut-off luminaires will be used wherever possible to reduce upward-directed light and sky-glow. Limited and controlled directional uplighting may be used for signage and specialty features in limited locations and quantities. All exterior sources shall be LED.

3. Multi-level controls with combined photocell/time interface allow for reduced light levels and energy loads after office hours.
4. Selected fixtures from building egress doors to 10-feet away from building in path of egress shall be backed up by the emergency generator and supplied from the NEC 700 distribution system for egress lighting.

**K. Special Considerations: Lighting Control Systems for Energy Conservation**

1. Code required automatic shutoff controls shall be via occupancy sensors in all required rooms.
2. Code required lighting automatic shutoff controls shall be controlled by a lighting control panel system of time programmable low voltage relays to control lighting during unoccupied hours.
3. Code required light reduction controls shall be installed.
4. Light fixtures in daylight zones shall be dimmable, controlled by local daylight sensors for continuous daylight dimming.
5. Conference Room: Preset Control System with RS232 interface with all AV systems.
6. Exit stairwells shall be circuited and zoned to reduce light levels when unoccupied.

**16.0 INTEGRATED SECURITY SYSTEM DESIGN CRITERIA**

Integrated security systems shall be designed to provide all materials and labor for the installation of Electronic Safety and Security (ESS) systems, including video surveillance, access control and intrusion detection applications as required in the building. All equipment and materials shall be new, free from defects, of current manufacture, of the quality specified or shown. Each type of material shall be of the same manufacturer throughout the work. This work includes cameras, access control systems, card readers, motion detectors, intrusion detection devices, cabling and pathways, cabinets, network storage servers, field devices, and administration. The design contractor shall be responsible for complying with the room data sheets provided to understand the features required for each space.

Design, furnish, install, test, and place into satisfactory and successful operation all equipment, materials, devices, equipment and necessary appurtenances associated with security system to support standards-compliant systems that integrate features. See room data sheets for features required in each space.

The work shall include all materials, equipment, software, and apparatus not specifically mentioned herein or noted on the plans but which are necessary to make a complete working system, compatible with and complementary to the existing campus systems

Designs shall comply with industry best practices and industry standards from ONVIF and PSIA.

**16.1 Codes & Standards**



- A. Adhere to the following codes, standards and guidelines:
1. National Fire Protection Association (NFPA) – NFPA 70: National Electrical Code (NEC)
  2. National Fire Protection Association (NFPA) – NFPA 101: Life Safety Code
  3. National Electrical Safety Code (NESC)
  4. Washington Industrial Safety and Health Act (WISHA)
  5. Occupational Safety and Health Act (OSHA)
  6. Surveillance Video Industry Standards
    - a. Open Network Video Interface Forum (ONVIF):
      - 1) Test Specification version 12.06 (June 2012)
      - 2) Core Specification version 2.4 (August 2013)
  7. Electronic Safety and Security Industry Standards:
    - a. Physical Security Interoperability Alliance (PSIA)
      - 1) IP Media Device Specification (March 2009)
      - 2) Recording and Content Management (RaCM) Specification (December 2009)
      - 3) Video Analytics Specification (September 2010)
      - 4) Common Metadata and Event Model (April 2011)
      - 5) Area Control Specification (November 2011)
      - 6) Access Control and Intrusion Detection Profiles (June 2013)
  8. ANSI/TIA - 455: Fiber Optic Test Standards
  9. ANSI/TIA - 526: Optical Fiber Systems Test Procedures
  10. ANSI/TIA - 568-C.0: Generic Telecommunications Cabling for Customer Premises
  11. ANSI/TIA - 568-C.1: Commercial Building Telecommunications Cabling Standard
  12. ANSI/TIA – 569-B: Commercial Building Standard for Telecommunication Pathways and Spaces
  13. ANSI/TIA – 606-A: Administration Standard for Commercial Telecommunications Infrastructure
  14. ANSI/TIA – 607-B: Commercial Grounding (Earthing) and Bonding for Customer Premises
  15. ANSI/TIA – 862: Building Automation Systems Cabling Standard for Commercial Buildings
  16. ANSI/TIA -TSB67: Transmission Performance Specifications for Field Testing of Unshielded Twisted Pair Cabling Systems
  17. ANSI/TIA -TSB75: Additional Horizontal Cabling Practices for Open Offices
  18. ANSI/TIA-1152: Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
  19. ISO/IEC 61935-1: Specification for the Testing of Balanced and Coaxial Information Technology Cabling
  20. ISO/IEC IS 11801: Generic Cabling for Customer Premises
  21. NECA/FOA 301-1997: Standard for Installing and Testing Fiber Optic Cables
  22. NECA/BICSI 568-2001: Standard for Installing Commercial Building Telecommunications Systems
  23. IEEE 802.3 (series): Local Area Network Ethernet Standard, including the IEEE 802.3z Gigabit Ethernet Standard
  24. BICSI: BICSI Telecommunications Cabling Installation Manual (TCIM)
  25. BICSI: BICSI Telecommunications Distribution Methods Manual (TDMM)
  26. BICSI: BICSI Outside Plant Design Reference Manual (OSPDRM)
  27. BICSI: BICSI Network Design Reference Manual (NDRM)
  28. ASTM E 84, "Surface Burning Characteristics of Building Materials"
  29. ASTM E 119, "Fire Tests of Building Construction and Materials"
  30. ASTM E 814, "Fire Tests of Through Penetration Firestops"
  31. ANSI/UL263, "Fire Tests of Building Construction and Materials"
  32. ANSI/UL723, "Surface Burning Characteristics of Building Materials"
  33. ANSI/UL1479, "Fire Tests of Through Penetration Firestops"
  34. Underwriters Laboratories Inc. (UL) – Fire Resistance Directory



**16.2 Required Manufacturers (Basis of Design)**

- A. Integrated security systems shall be designed for construction using materials from the current product lines of the manufacturers required by Clover Park Technical College (CPTC).
- B. The basis of design for video surveillance system is Pelco IP video cameras and related systems.
- C. The basis of design for access control systems is Honeywell NetAXS with an existing local server.
- D. The basis of design for intrusion detection systems is Honeywell.
  
- E. Systems for the new building shall be from these manufacturers only so that the new systems can integrate with the existing integrated campus management system.
- F. It is not required that any integration be provided between two or more different systems. In other words, the access control system and the video surveillance system do not require cross communication or interoperation.
- G. Designs shall comply with the requirements of these manufacturers such that the manufacturers will certify the installation with their warranty. The construction documents shall require that the Contractor's installation workmanship fully comply with the current installation requirements from the manufacturer of these products, even if those requirements exceed industry standard practices.
- H. The designer shall incorporate each manufacturer consistently throughout the entire project and shall design an integrated security system that will be suitable for construction using products from these manufacturers.

**16.3 Designer/Engineer Qualifications Requirements**

- A. The designer or engineer that designs integrated security systems shall meet the following qualifications and requirements:
  - 1. The Designer shall hold training certificates from the manufacturers of each system. The certified Designer shall be a direct full-time employee of the Design Firm, and the Design Firm shall continue to employ a minimum of one certified Designer throughout the duration of the project. The certified Designer shall be directly involved in the design of the project.  
The Design Firm responsible for designing integrated security systems shall have completed no less than five similar projects (in terms of size and construction cost) under the Design Firm's current business name within the past three years.

**16.4 Installation Contractor Qualifications Requirements**

- A. The contractor that installs integrated security systems shall meet the following qualifications and requirements:
  - 1. The installation technicians shall be fully trained and certified by the manufacturer of the telecommunications materials to properly install the materials and to provide the full manufacturer-endorsed application warranty.
  - 2. The Contractor's installation technicians shall hold training certificates from the manufacturers of each system. The Contractor's certified installation technicians shall be direct full-time employee of the Contractor, and the Contractor shall continue to use only certified technicians throughout the duration of the project. The certified technicians shall be directly involved in the construction of the project.
  - 3. The Contractor responsible for installing the integrated security systems shall have completed no less than five similar projects (in terms of size and construction cost) under the Contractor's current business name within the past three years. The Contractor's project history shall include installation of common ESS equipment such as IP video cameras, RFID card readers, door control hardware, and intrusion detection sensors in a campus-type environment.

**16.5 Warranty**

Provide a Contractor-endorsed Warranty:



- A. Provide a Contractor-endorsed one-year warranty on labor and workmanship that shall commence on the date that the system is accepted by the Owner. Acceptance shall not necessarily mean the date of Owner occupancy or Substantial Completion, but rather the date that the Owner accepts the integrated security systems as complete and operational. Warranty documentation showing effective start date and coverage period shall be provided to the Owner immediately upon Owner acceptance.
  - 1. Provide all labor attributable to the fulfillment of this warranty at no additional cost to the Owner.
  - 2. This warranty shall not be voided by Owner's move, add and change activities. The resulting parts of any Owner-performed moves, adds and changes do not become part of the warranty. Nothing in this section shall be construed to terminate the warranty by performance of normal maintenance or service on the system or by expanding the system in any manner consistent with the original design and intent for the system.
  - 3. Provide a Manufacturer-Endorsed Warranty:
  - 4. Provide integrated security Manufacturer extended product, performance, application, and labor warranties that shall warrant all active and passive components used in the systems. Additionally, these warranties shall cover components not manufactured by the integrated security Manufacturers, but approved by the integrated security Manufacturers for use in the integrated security systems (i.e. "Approved Alternative Products"). The integrated security Manufacturer warranties shall warrant:
    - 5. That the products will be free from manufacturing defects in materials and workmanship.
    - 6. Provide materials and labor attributable to the fulfillment of this warranty at no cost to the Owner.
- B. Equipment managed under Owner's Accounts:
  - 1. All equipment manufactured by Pelco shall be registered by the Owner's representatives. The Contractor shall provide an electronic document listing the installed location, model numbers, and serial numbers for each Pelco device that has been installed.
  - 2. All other equipment:
  - 3. Submit equipment manufacturer warranty registration forms and online warranty registration to the equipment manufacturers on behalf of the Owner, providing the Owner's name and contact information.
  - 4. Coordinate with the Owner to obtain appropriate contact information for the forms and documentation.
- C. Provide PDF documentation (scanned completed forms, and printed online applications) to the Owner to demonstrate that warranty registration has been completed for all equipment.
- D. Provide an electronic document listing all equipment (installed location, manufacturers, model numbers, and serial numbers) along with the warranty start dates and coverage period for each device.

**17.0 TELECOMMUNICATION INFRASTRUCTURE DESIGN CRITERIA**

**17.1. General**

The telecommunications structured cabling system (SCS) shall provide all materials and labor for the installation of a telecommunications distribution system. All materials shall be new, free from defects, of current manufacture, of the quality specified or shown. Each type of material shall be of the same manufacturer throughout the work. This work includes Outside Plant Communications cabling and pathways, Inside Plant



Communications cabling and pathways, adequately sized telecommunications spaces, terminations, and administration. This also includes security, power and cooling for the telecommunications spaces. The design contractor shall be responsible for complying with the room data sheets provided to understand the size and complexity of the telecommunication system. The telecom components shall constitute the infrastructure to support the building occupants' technology needs.

Design, furnish, install, test and place into satisfactory and successful operation all equipment, materials, devices, and necessary appurtenances to provide a complete ANSI/TIA/EIA, NECA/NEIS and ISO/IEC compliant communications system as hereinafter described. The system is intended to be capable of integrating voice, data, and video signals onto a common media.

SCS designs shall comply with the practices depicted in the BICSI Telecommunications Distribution Methods Manual (TDMM).

The Structured Cabling System shall be tested for and be capable of 1 Gigabit Ethernet operation as specified in IEEE 802.3.

The work shall include all materials, equipment and apparatus not specifically mentioned herein but which are necessary to make a complete working ANSI/TIA/EIA and ISO/IEC compliant SCS.

#### 17.2 Codes & Standards

##### A. Adhere to the following codes, standards and guidelines:

1. National Fire Protection Association (NFPA) – NFPA 70: National Electrical Code (NEC)
2. National Fire Protection Association (NFPA) – NFPA 101: Life Safety Code
3. National Electrical Safety Code (NESC)
4. Occupational Safety and Health Act (OSHA)
5. ANSI/TIA - 455: Fiber Optic Test Standards
6. ANSI/TIA - 526: Optical Fiber Systems Test Procedures
7. ANSI/TIA - 568-C.0: Generic Telecommunications Cabling for Customer Premises
8. ANSI/TIA - 568-C.1: Commercial Building Telecommunications Cabling Standard
9. ANSI/TIA – 569-B: Commercial Building Standard for Telecommunication Pathways and Spaces
10. ANSI/TIA – 606-A: Administration Standard for Commercial Telecommunications Infrastructure
11. ANSI/TIA – 607-B: Commercial Grounding (Earthing) and Bonding for Customer Premises
12. ANSI/TIA – 862: Building Automation Systems Cabling Standard for Commercial Buildings
13. ANSI/TIA -TSB67: Transmission Performance Specifications for Field Testing of Unshielded Twisted Pair Cabling Systems
14. ANSI/TIA -TSB75: Additional Horizontal Cabling Practices for Open Offices
15. ANSI/TIA-1152: Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
16. ISO/IEC 61935-1: Specification for the Testing of Balanced and Coaxial Information Technology Cabling
17. ISO/IEC IS 11801: Generic Cabling for Customer Premises
18. NECA/FOA 301-1997: Standard for Installing and Testing Fiber Optic Cables
19. NECA/BICSI 568-2001: Standard for Installing Commercial Building Telecommunications Systems
20. IEEE 802.3 (series): Local Area Network Ethernet Standard, including the IEEE 802.3z Gigabit Ethernet Standard
21. BICSI: BICSI Telecommunications Cabling Installation Manual (TCIM)
22. BICSI: BICSI Telecommunications Distribution Methods Manual (TDMM)
23. BICSI: BICSI Outside Plant Design Reference Manual (OSPDRM)



24. BICSI: BICSI Network Design Reference Manual (NDRM)
25. ASTM E 84, "Surface Burning Characteristics of Building Materials"
26. ASTM E 119, "Fire Tests of Building Construction and Materials"
27. ASTM E 814, "Fire Tests of Through Penetration Firestops"
28. ANSI/UL263, "Fire Tests of Building Construction and Materials"
29. ANSI/UL723, "Surface Burning Characteristics of Building Materials"
30. ANSI/UL1479, "Fire Tests of Through Penetration Firestops"
31. Underwriters Laboratories Inc. (UL) – Fire Resistance Directory

17.3 Required Manufacturers (Basis of Design)

- A. Telecommunications distribution systems shall be designed for construction using materials from the current product lines of the manufacturers required by Clover Park Technical College (CPTC).
- B. The design shall be comprised of products from Ortronics. Design shall comply with the requirements of this manufacturer such that the manufacturer will certify the installation with their warranty. The construction documents shall require that the Contractor's installation workmanship fully comply with the current installation requirements from the manufacturer of these products, even if those requirements exceed industry standard practices.
- C. The design shall incorporate a manufacturer consistently throughout the entire project and shall design a telecommunications distribution system that will be suitable for construction using products from this manufacturer.
- D. The construction documents shall require that the installation workmanship fully comply with the current installation requirements from the manufacturers of these products.

17.4 Designer/Engineer Qualifications Requirements

- A. The designer or engineer that designs the telecommunications distribution system shall meet the following qualifications and requirements:
  1. The Designer shall be a Registered Communications Distribution Designer (RCDD) certified by and in current good standing with BICSI. The RCDD shall be a direct full-time employee of the Design Firm, and the Design Firm shall continue to employ a minimum of one RCDD throughout the duration of the project. The RCDD shall be directly involved in the design of the project.
  2. The Design Firm responsible for designing the telecommunications distribution infrastructure shall have completed no less than five similar projects (in terms of size and construction cost) under the Design Firm's current business name within the past three years.

17.5 Installation Contractor Qualifications Requirements

- A. The contractor that installs the telecommunications distribution system shall meet the following qualifications and requirements:
  1. The installation technicians shall be fully trained and certified by the manufacturer of the telecommunications materials to properly install the materials and to provide the full manufacturer-endorsed application warranty.
  2. The Contractor shall employ a minimum of one Registered Communications Distribution Designer (RCDD) certified by and in current good standing with BICSI. The RCDD shall be a direct full-time employee of the Contractor, and the Contractor shall continue to employ a minimum of one RCDD throughout the duration of the project. The RCDD shall be directly involved in the construction of the project.



3. The Contractor responsible for installing the telecommunications distribution infrastructure shall have completed no less than five similar projects (in terms of size and construction cost) under the Contractor's current business name within the past three years.
4. The following firms are known to CPTC to meet these qualifications:
  - a. Integrity Networks, Inc., Dale Morgan, (425) 264-9400

#### 17.6 Warranty

##### A. Provide a Contractor-endorsed Warranty:

1. Provide a Contractor-endorsed one-year service warranty against defects in materials and workmanship.
  - a. Provide all labor attributable to the fulfillment of this warranty at no additional cost to the Owner.
    - 1) The Contractor Warranty period shall commence upon Owner acceptance of the work.
  - b. This warranty shall not be voided by Owner's move, add and change activities. The resulting parts of any Owner-performed moves, adds and changes do not become part of the warranty. Nothing in this section shall be construed to terminate the warranty by performance of normal maintenance or service on the system or by expanding the system in any manner consistent with the original design and intent for the system.

##### B. Provide a Manufacturer-Endorsed Warranty:

1. Provide SCS Manufacturer extended product, performance, application, and labor warranties that shall warrant all passive components used in the SCS. Additionally, these warranties shall cover components not manufactured by the SCS Manufacturers, but approved by the SCS Manufacturers for use in the SCS (i.e. "Approved Alternative Products"). The SCS Manufacturer warranties shall warrant:
  - a. That the products will be free from manufacturing defects in materials and workmanship.
  - b. That the cabling products of the installed system shall exceed the specification of ANSI/TIA/EIA 568-B and exceed ISO/IEC 11801 standards.
  - c. That the installation shall exceed the specification of ANSI/TIA/EIA 568-B and exceed ISO/IEC 11801 standards.
  - d. That the system shall be application-independent and shall support both current and future applications that use the ANSI/TIA/EIA 568-B and ISO/IEC 11801 component and link/channel specifications for cabling.
2. Provide materials and labor attributable to the fulfillment of this warranty at no cost to the Owner.
3. The SCS Manufacturer Warranties shall be provided by the selected SCS Manufacturers and shall be:
  - a. For Category 6 cabling work, provide the Ortronics Product Warranty with 25-Year Certified Installation.
  - b. For fiber optic cabling work, provide the Ortronics Product Warranty with 25-Year Certified Installation
    - 1) Provide a copy of the warranty registration documentation to the Owner at the time of submittal to the manufacturers.
4. The SCS Manufacturer Warranty period shall commence upon a Warranty Certificate being issued by the manufacturer. The Warranty Certificates shall be issued no later than three months after Owner acceptance of the work.

#### 17.7 Telecommunications Materials

- A. Wherever possible, all materials and equipment used in the installation of this work shall be of the same Manufacturer throughout for each class of material or equipment.
- B. Materials shall be new and carry the UL label. Comply with ANSI, IEEE and NEMA standards, where applicable.
- C. Provide all incidental and/or miscellaneous hardware (including equipment cables and connectors) not explicitly specified or shown on the Contract Documents that are required for a fully operational, tested, certified and warranted system.



- D. Provide cables of the same type or application in the same color throughout the project, unless otherwise indicated. Multiple colors of the same cable type are not acceptable.

17.8 Outside Plant Telecommunications Infrastructure Materials

- A. Cabling: Provide 12 strands of singlemode fiber optic cabling to Building 24. Terminate cabling in the existing splice closure in the maintenance hole north of Building 11 (the campus data center). This splice closure has 48 available fiber strands.
- B. Existing Maintenance Holes: All vaults are 4'x4'x4' pull holes. The existing conduits in these pull holes appear to have adequate space for the new cable. The following is a list of the pull holes through which the new outside plant singlemode cable will need to be routed to the new building.
  - 1. Building 11 north vault: Contains existing splice closure with available capacity.
  - 2. Building 16/15/14/11 intersection
  - 3. Building 17 south: Turns into crawl space of building 17
  - 4. Building 19 south
  - 5. Building 22 NE corner: West wall available for a new ductbank for Building 24 trench. Two conduits on the south wall that serve the existing building shall be cut off and plugged when building is removed.
- C. Existing Conduit Pathways (ductbanks): There is available space in each of the ductbanks for one new singlemode cable to be added. However, the closer the cable gets to the Building 11 pull hole, the more congested the conduits become.

17.9 Telecommunications Spaces

- A. The building shall contain one main telecommunications room (MDF) which shall act as a central telecommunications room and entrance facility for the building. Core network equipment supporting the entire building shall be installed in this room. Dell 4-post racks with ReadyRails are required for server applications.
- B. The MDF shall be sized to accommodate a combined total of six equipment racks and/or cabinets. A 4-foot service zone shall be maintained at the front and rear of the equipment racks/cabinets and at the end of each row of equipment racks/cabinets. MDF sizing shall provide sufficient rack space that at least 30% of the rack space in the room shall be vacant (to support future growth) after the date of occupancy.
- C. The building shall contain one or more secondary telecommunications rooms (IDF) which shall support telecommunications infrastructure for regions of the building. Telecom rooms shall be located strategically. Telecom rooms should be either centric within the building or close to the classrooms where cable density is high, whichever is more strategically and economically desirable. Network electronics supporting a region of the building shall be installed in these rooms. Ortronics 2-post racks are required for IDFs.
- D. Each IDF shall be sized to accommodate three racks (typical) but no fewer than two equipment racks (minimum). At a minimum a 10x12 space (interior dimensions) should be allocated for telecom rooms. A 4-foot service zone shall be maintained at the front and rear of the equipment racks and at the end of each row of equipment racks.
- E. The walls of the MDF and all IDFs shall be covered with 3/4 inch fire resistant plywood painted on all sides with light color fire resistant paint, while leaving the fire rating stamp of the plywood be visible for inspection prior to installation. The door to each MDF and IDF shall open out, shall automatically close, and shall be secured by a card-based access control system.
- F. Overhead ladder racking shall be installed in the MDF and IDFs for the purpose of routing telecommunications cabling around the room and to/from racks. Ladder racks shall be sized 12" wide or 18" wide as required to support the cabling in the room.
- G. Provide power outlets and power distribution equipment as required to support the Owner's network equipment in the MDF and each IDF. At a minimum, the power outlets shall be X quantity of 120VAC quad receptacles per rack and Y quantity of 120VAC duplex receptacles per wall. These outlets shall be served by electrical panels that are dedicated to technology systems and which do not serve large electrical loads or motors. In addition to the

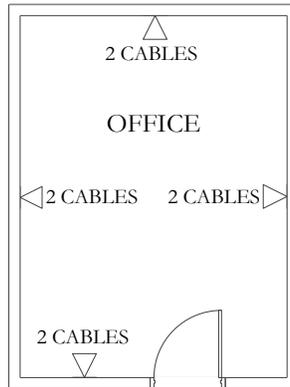


technical power outlets, convenience power outlets from other electrical panels shall also be installed on two walls in the MDF and each IDF.

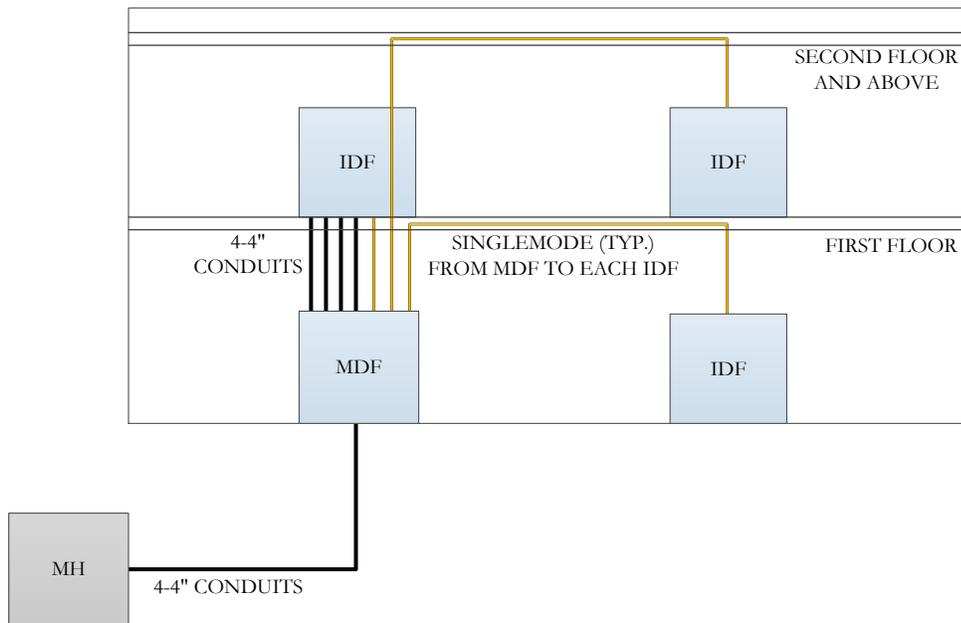
- H. The air temperature in the MDF and each IDF shall not exceed 78 degrees on the date of occupancy and shall also not be expected to exceed 78 degrees when the room is fully loaded at some future date, with 30% to 50% relative humidity. For the telecommunications rooms where relatively small heat load is expected, the heat shall be removed through the use of a positive pressure air exchange solution. Mechanical refrigeration air conditioning shall be provided for the MDF and IDFs wherein the heat load produced by the Owner's network equipment will exceed the amount that can be removed through positive-pressure air exchange or where the humidity can't be maintained within the specified range.
- I. Lighting in the MDF and IDFs shall be at least 50 footcandles between the equipment rack rows (measured at three feet above the floor). Fixtures shall be located above walk-aisles to minimize shadowing on the rack-mounted equipment.
- J. MDF and IDFs shall be dedicated for use with technical systems. Power distribution equipment, water piping, HVAC and other systems that don't directly serve the telecom room shall not be located inside.

17.10 Inside Plant Telecommunications Infrastructure Materials

- A. Backbone Fiber: CPTC only uses singlemode fiber on its campus (no multimode cabling). CPTC requires 10GB and 40GB bandwidth. Fiber optic cabling shall be terminated with LC-duplex connectors.
- B. Backbone Copper: CPTC does not require copper backbone cable to be installed into the new building. Campus-wide, only 15 analog circuits are in use and this number will likely decline. Any necessary analog circuits can be carried via fiber produced with an analog gateway.
- C. Category 6 – Horizontal Cable: CPTC has standardized on the use of Category 6 cabling from Ortronics, noting that the majority of the existing cabling on the campus is from Ortronics. CPTC requires that the cabling be installed by an Ortronics-certified installer and requires that the Ortronics' Product Warranty with 25-Year Certified Installation be provided for the system.
- D. All cabling routed exposed through air plenums shall be plenum-rated. Cabling that routes through slab-on-grade flooring or other wet areas shall be rated for wet applications. Otherwise, cabling is permitted to be non-plenum rated.
- E. All cabling and pathways shall remain accessible post-construction. Cable trays shall have at least 8" of clearance above trays and 12" clearance to one side of the trays.
- F. Offices: CPTC requires two Cat6 cables per outlet and have one outlet on each wall of the room (4 outlets total with 8 cables total per office) as depicted in the diagram below.



- G. Pathways: CPTC requires the following pathways entering and within the building:
1. Four 4" conduits from the nearest maintenance hole (MH) into the main telecom room (MDF).
  2. Four 4" conduits from the MDF up to the second floor telecom room (IDF).
  3. Cable tray routing from the MDF throughout the first floor.
  4. Cable tray routing from the second floor telecom room throughout the second floor.
  5. Secondary telecom rooms on a floor should be served by the cable tray.



- H. Network Electronics
1. Switches: Each building on campus has its own network switch. Building 24 will be similar. CPTC uses network switches from HP.



2. Wireless Access Points (WAP): The CPTC networking group uses a saturation model when selecting the locations for WAPs. CPTC uses Aruba/HP wireless products. These WAPs cover a 75' radius. CPTC requires 2 cables per outlet serving the WAPs.
  3. Power over Ethernet: POE+ is used throughout the campus and will be used in the new building to serve WAPs, cameras, VOIP and other applications.
- 17.11 Television Distribution Infrastructure  
Television distribution cabling is not required in this project.
- 17.12 Fire Alarm System Materials
- A. Fire Alarm System: Several different manufacturers are used throughout the campus. Honeywell Notifier Shall be the basis of design for the CAMT
- 17.13 Grounding and Bonding
- A. A grounding and bonding infrastructure shall be designed and installed to bond all non-current-carrying metal equipment and materials to the nearest telecommunications grounding system, in accordance with TIA Joint Standard-607-B, Grounding and Bonding Requirements for Telecommunications in Commercial Buildings and the NEC.
    1. The telecommunications grounding backbone shall consist of pre-drilled solid copper busbars interconnected with properly sized copper conductors (minimum #2 AWG).
    2. #6 AWG Bonding jumpers shall terminate at the busbar.
    3. This system shall be designed in conjunction with the electrical power grounding system. The grounding and bonding system shall not rely upon metallic conduits or framing studs for a grounding path.
- 17.14 Firestopping
- A. Firestopping material shall conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire test in a configuration that is representative of the actual field conditions. Manufactured by:
    1. Specified Tech. Inc., Hilti, or approved equal, regardless of the products or manufacturers specified in Division 7.
  - B. Fire-Rated Cable Pathways: Device modules shall be comprised of steel raceway with intumescent foam pads allowing 0 to 100 percent cable fill:
    1. Specified Technologies Inc. (STI) EZ-PATH Fire Rated Pathway
  - C. Firestop Pillows: Pillows shall be re-enterable, non-curing, mineral fiber core encapsulated on six sides with intumescent coating contained in a flame-retardant poly bag:
    1. Specified Technologies Inc. (STI) SpecSeal® Series SSB Pillows
    2. Hilti CP 657 Firestop Brick
- 17.15 Construction Schedule
- A. Provide a time-scaled construction schedule indicating construction phases and deadlines associated with this work. At a minimum, the following tasks shall be shown on the schedule:
    1. Start of outside plant ductbank and maintenance hole construction
    2. Dates of outside plant ductbank concealment (concrete and backfill)
    3. Start of conduit and box rough-in
    4. Start of main campus cable feed to building MDF
    5. Start of MDF and IDF build out
    6. Start of vertical riser cable installation
    7. Start of horizontal cable installation



8. Start of horizontal cable termination
  9. Date when elevator telephone service required (if applicable)
  10. Date when building automation system (HVAC) will require network service
  11. Start of outlet device termination and labeling
  12. Start of installation testing – provide Owner’s IT representative w/preliminary test results.
  13. Start of final inspection process
- 17.14 Service Outages
- A. Any telephone, data or security systems service outage required to perform work under this Contract shall be performed at a time that is coordinated with and convenient to the Owner. Submit to the Owner (in writing) for Owner’s approval, a schedule showing the dates and times the Contractor desires to perform outage-causing work. This schedule shall be submitted no less than five days prior to commencing work. It may be necessary to perform this work at night, on holidays or during maintenance shutdowns. The Contractor shall include in his bid all premium time labor costs for this work.
- 17.15 Identification and Labeling
- A. General: Labeling and administration shall comply with ANSI/TIA/EIA 606 and standard industry practices.
  - B. Labels shall be arranged such that they are readable after cabling has been dressed and secured.
  - C. Labeling shall be affixed to all communications equipment, conduits, cabling and grounding/bonding systems.
  - D. All cables shall be labeled within 3 inches of the termination, with the label oriented to be readable without manipulating the cable. Labels shall be laser printed with a clear overwrap to protect the printing from inadvertent smudging.
- 17.16 Testing
- A. Test each cable in accordance with Contract requirements, manufacturer requirements, industry standards, and warranty requirements.
  - B. Provide test records on a form approved by the Owner’s IT Representative. Submit the test results for each cable. The records shall include the unique cable identifier, outcome of test, indication of errors found, cable length, retest results, and name and signature of technician completing the tests. Provide test results to the Owner’s IT Representative for review and acceptance within two weeks of Substantial Completion.
    1. Prepare and submit the test results in the native file type from the cable test device and also in Adobe Acrobat PDF electronic form (on a CDROM) to the Owner’s IT Representative for review. Handwritten test results will not be accepted.
  - C. Costs of testing shall be borne by Contractor. Contractor shall provide all instruments, equipment, labor and materials to complete testing. Should tests detect any defective materials, poor workmanship or variance with requirements of Specifications, Contractor shall make any changes necessary and remedy any defects at his expense.
- 17.17 As-built Drawings and Record Drawings
- A. Records - Maintain at the job site a minimum of one set of As-built Drawings, Specifications, and Addenda. As-built Drawings shall consist of redline markups of changes to Contract Documents such as drawings, specifications and spreadsheets, including maintenance hole/handhole butterfly drawings.
    - a. At the beginning of the work, set aside one complete set of the drawings to be maintained as a complete As-built Drawings set. Notations shall be done in a neat and legible manner as specified in Division 01 and in accordance with the Architect/Engineer’s instructions.
    - b. The As-built Drawings shall be updated daily by the foreman to show every change from the original drawings, and the exact locations, sizes and kinds of equipment. Clearly identify system component labels and identifiers on As-built Drawings. This set of drawings shall not be used for any other purpose



and shall be maintained at the job site.

- c. The actual locations and elevations of all buried lines, boxes, monuments, stub-outs and other provisions for future connection shall be shown on the As-built Drawings, and shall be referenced to the building lines or approved bench marks.
- d. Keep As-built Drawings at the job site and make them available to the Owner and Engineer at any time.
- e. Keep As-built Drawings current throughout the course of construction. ("Current" is defined as not more than one week behind actual construction.)
- f. Show identifiers for major infrastructure components on As-built Drawings.
- g. Upon completion of construction, deliver the marked-up As-built Drawings to the Architect/Engineer.
- h. The Architect/Engineer shall prepare CAD-drafted Record Drawings by updating the original construction drawings to reflect the revised content shown on the As-built Drawings. Provide Record Drawings to the Owner in both the native CAD file format and also plotted to Adobe Acrobat PDF format.

#### 18.0 AUDIO-VISUAL / INSTRUCTIONAL MEDIA

Instructional media systems shall be designed to provide all materials and labor for the installation of multimedia audio visual applications as required in each programmed space in the building. All materials shall be new, free from defects, of current manufacture, of the quality specified or shown. Each type of material shall be of the same manufacturer throughout the work. This work includes cabling and pathways, adequately sized equipment rooms and cabinets, media source equipment, equipment for distribution routing scaling and amplification, output equipment, and administration. This also includes security, power and cooling for the equipment rooms. The design contractor shall be responsible for complying with the room data sheets provided to understand the features required for each space. The instructional media systems shall constitute the infrastructure to support the building occupants' audio visual and multimedia needs.

Design, furnish, install, test, and place into satisfactory and successful operation all equipment, materials, devices, and necessary appurtenances associated with audio/visual equipment cabinets, racks, frames, enclosures, cable management, cabling, furniture and power hardware to support standards-compliant audio/visual systems. See room data sheets for features required in each space.

The work shall include all materials, equipment, software, and apparatus not specifically mentioned herein or noted on the plans but which are necessary to make a complete working system, compatible with and complementary to the existing campus systems

Designs shall comply with industry best practices promoted by InfoComm guidelines and training/certification programs.

#### 18.1 Codes & Standards

- A. Adhere to the following codes, standards and guidelines:
  1. National Fire Protection Association (NFPA) – NFPA 70: National Electrical Code (NEC)
  2. National Fire Protection Association (NFPA) – NFPA 101: Life Safety Code
  3. National Electrical Safety Code (NESC)
  4. Occupational Safety and Health Act (OSHA)
  5. ANSI/TIA - 455: Fiber Optic Test Standards
  6. ANSI/TIA - 526: Optical Fiber Systems Test Procedures
  7. ANSI/TIA - 568-C.0: Generic Telecommunications Cabling for Customer Premises
  8. ANSI/TIA - 568-C.1: Commercial Building Telecommunications Cabling Standard



9. ANSI/TIA – 569-B: Commercial Building Standard for Telecommunication Pathways and Spaces
10. ANSI/TIA – 606-A: Administration Standard for Commercial Telecommunications Infrastructure
11. ANSI/TIA – 607-B: Commercial Grounding (Earthing) and Bonding for Customer Premises
12. ANSI/TIA – 862: Building Automation Systems Cabling Standard for Commercial Buildings
13. ANSI/TIA -TSB67: Transmission Performance Specifications for Field Testing of Unshielded Twisted Pair Cabling Systems
14. ANSI/TIA -TSB75: Additional Horizontal Cabling Practices for Open Offices
15. ANSI/TIA-1152: Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
16. ISO/IEC 61935-1: Specification for the Testing of Balanced and Coaxial Information Technology Cabling
17. ISO/IEC IS 11801: Generic Cabling for Customer Premises
18. NECA/FOA 301-1997: Standard for Installing and Testing Fiber Optic Cables
19. NECA/BICSI 568-2001: Standard for Installing Commercial Building Telecommunications Systems
20. IEEE 802.3 (series): Local Area Network Ethernet Standard, including the IEEE 802.3z Gigabit Ethernet Standard
21. BICSI: BICSI Telecommunications Cabling Installation Manual (TCIM)
22. BICSI: BICSI Telecommunications Distribution Methods Manual (TDMM)
23. BICSI: BICSI Outside Plant Design Reference Manual (OSPDRM)
24. BICSI: BICSI Network Design Reference Manual (NDRM)
25. ASTM E 84, "Surface Burning Characteristics of Building Materials"
26. ASTM E 119, "Fire Tests of Building Construction and Materials"
27. ASTM E 814, "Fire Tests of Through Penetration Firestops"
28. ANSI/UL263, "Fire Tests of Building Construction and Materials"
29. ANSI/UL723, "Surface Burning Characteristics of Building Materials"
30. ANSI/UL1479, "Fire Tests of Through Penetration Firestops"

Underwriters Laboratories Inc. (UL) – Fire Resistance Directory

18.2 Required Manufacturers (Basis of Design)

- A. Instructional media systems shall be designed for construction using materials from the current product lines of the manufacturers required by Clover Park Technical College (CPTC).
- B. The basis of design is defined as solutions comprised of control/interface products from Crestron. Output devices shall be manufactured by major name brand companies. Designs shall comply with the requirements of these manufacturers such that the manufacturers will certify the installation with their warranty. The construction documents shall require that the Contractor's installation workmanship fully comply with the current installation requirements from the manufacturer of these products, even if those requirements exceed industry standard practices.
- C. The design shall incorporate each manufacturer consistently throughout the entire project and shall design an instructional media system that will be suitable for construction using products from these manufacturers.
- D. The construction documents shall require that the installation workmanship fully comply with the current installation requirements from the manufacturers of these products.



18.3 Designer/Engineer Qualifications Requirements

- A. The designer or engineer that designs instructional media systems shall meet the following qualifications and requirements:
  - 1. The Designer shall hold the CTS-D certification from InfoComm and be in current good standing with InfoComm. The CTS-D shall be a direct full-time employee of the Design Firm, and the Design Firm shall continue to employ a minimum of one CTS-D throughout the duration of the project. The CTS-D shall be directly involved in the design of the project.
  - 2. The Design Firm responsible for designing the instructional media systems shall have completed no less than five similar projects (in terms of size and construction cost) under the Design Firm's current business name within the past three years.
- B. The contractor that installs instructional media systems shall meet the following qualifications and requirements:
  - 1. The installation technicians shall be fully trained and certified by the manufacturer of the telecommunications materials to properly install the materials and to provide the full manufacturer-endorsed application warranty.
  - 2. The Contractor shall hold the CTS-I certification from InfoComm and be in current good standing with InfoComm. The CTS-I shall be a direct full-time employee of the Contractor, and the Contractor shall continue to employ a minimum of one CTS-I throughout the duration of the project. The CTS-I shall be directly involved in the design of the project.
  - 3. The Contractor shall hold the following two certifications from Crestron and be in current good standing with Crestron:
    - 4. Crestron CAPE Certified Programmer
    - 5. Crestron Digital Media Certified Designer (DMC-D)
  - 6. The Contractor responsible for installing the instructional media systems shall have completed no less than five similar projects (in terms of size and construction cost) under the Contractor's current business name within the past three years. The Contractor's project history shall include installation of common audio/visual equipment such as speaker systems, video projection and audio/video routing in a campus-type environment.
  - 7. The following firms are known to CPTC to meet these qualifications:
    - 8. Dimensional Communications, Inc., 360-424-6164
    - 9. AAtrionics, Inc., 253-656-4866

18.5 Warranty

- A. Provide a Contractor-endorsed Warranty:
  - 1. Provide a Contractor-endorsed one-year warranty on labor and workmanship that shall commence on the date that the system is accepted by the Owner. Acceptance shall not necessarily mean the date of Owner occupancy or Substantial Completion, but rather the date that the Owner accepts the audio/visual systems as complete and operational. Warranty documentation showing effective start date and coverage period shall be provided to the Owner immediately upon Owner acceptance.
    - a. Provide all labor attributable to the fulfillment of this warranty at no additional cost to the Owner.
    - b. This warranty shall not be voided by Owner's move, add and change activities. The resulting parts of any Owner-performed moves, adds and changes do not become part of the warranty. Nothing in this section shall be construed to terminate the warranty by performance of normal maintenance or service on the system or by expanding the system in any manner consistent with the original design and intent



for the system.

B. Provide a Manufacturer-Endorsed Warranty:

1. Provide instructional media Manufacturer extended product, performance, application, and labor warranties that shall warrant all active and passive components used in the systems. Additionally, these warranties shall cover components not manufactured by the instructional media Manufacturers, but approved by the instructional media Manufacturers for use in the instructional media systems (i.e. "Approved Alternative Products"). The instructional media Manufacturer warranties shall warrant:
  - a. That the products will be free from manufacturing defects in materials and workmanship.
2. Provide materials and labor attributable to the fulfillment of this warranty at no cost to the Owner.
3. Equipment managed under Owner's Accounts:
  - a. All equipment manufactured by Crestron shall be registered by the Owner's representatives. The Contractor shall provide an electronic document listing the installed location, model numbers, and serial numbers for each Crestron device that has been installed.
4. All other equipment:
  - a. Submit equipment manufacturer warranty registration forms and online warranty registration to the equipment manufacturers on behalf of the Owner, providing the Owner's name and contact information.
  - b. Coordinate with the Owner to obtain appropriate contact information for the forms and documentation.
  - c. Provide PDF documentation (scanned completed forms, and printed online applications) to the Owner to demonstrate that warranty registration has been completed for all equipment.
  - d. Provide an electronic document listing all equipment (installed location, manufacturers, model numbers, and serial numbers) along with the warranty start dates and coverage period for each device.
5. Warranty Coverage Periods
  - a. Provide extended warranties with 5-year coverage periods for all projectors, video panels, control systems, audio/visual switchers/matrices, digital signal processors, and other major equipment.

18.6 Instructional Media Materials

- A. Wherever possible, all materials and equipment used in the installation of this work shall be of the same Manufacturer throughout for each class of material or equipment.
- B. All audio/visual systems and applications shall be arranged, assembled, wired, and configured identically to other applications in similar rooms within this project. Component arrangement, wire numbering, wire color, wire type, wire manufacturer, wire routing, etc. shall all be consistent throughout the project
- C. Materials shall be new and carry the UL label. Comply with ANSI, IEEE and NEMA standards, where applicable.
- D. Provide all incidental and/or miscellaneous hardware (including equipment cables and connectors) not explicitly specified or shown on the Contract Documents that are required for a fully operational, tested, certified and warranted system.
- E. Provide cables of the same type or application in the same color throughout the project, unless otherwise indicated. Multiple colors of the same cable type are not acceptable.
- F. All cables shall be unspliced and not coupled.
- G. Configure, program, adjust, and tune all equipment according to manufacturer requirements such that it will perform as required. From the perspective of users of the audio/visual systems, all systems shall be installed to look, feel, and operate similarly to other comparable existing facilities throughout the Owner's campus.

18.7 AV Furniture



- A. Design and install (assemble) Instructor Consoles, Podiums, Credenzas and mobile AV stations.
- B. Design and install (cut in and mount) cable access boxes with required connectors or retractors in each applicable piece of furniture.

18.8 AV Equipment

- A. Design and provide the equipment and materials listed below as required to achieve the program functionality
  - 1. Wiring and cabling
  - 2. Equipment racks, cabinets, and enclosures
  - 3. Furniture
  - 4. Amplifiers
  - 5. Audio DSP (Digital Signal Processor)
  - 6. Speakers
  - 7. Assistive listening devices
  - 8. Microphones (wired and wireless)
  - 9. CD players
  - 10. Digital audio recorders
  - 11. In-ear monitors
  - 12. Blu-ray players
  - 13. Video cameras
  - 14. Video conferencing systems
  - 15. Video distribution amplifiers
  - 16. HDBaseT distribution equipment
  - 17. Video switches/matrices
  - 18. Projection screens
  - 19. Video projectors
  - 20. Video panels
  - 21. Touch panel interfaces
  - 22. Button panel interfaces
  - 23. Control processors
  - 24. Presentation wireless remote controls

18.9 AV Cabling



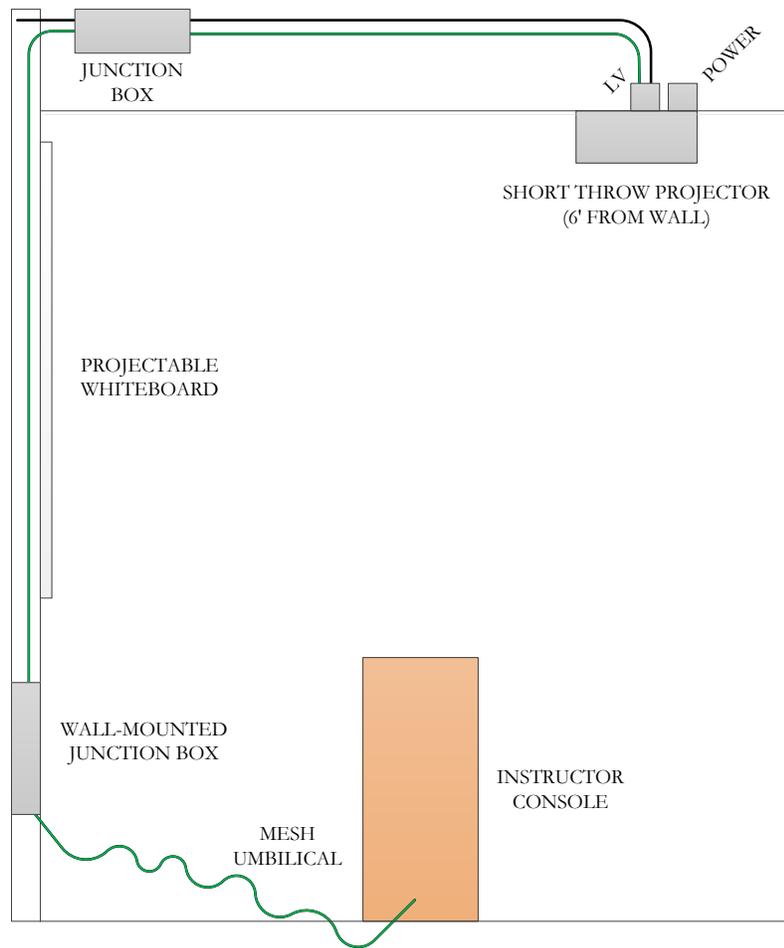
- A. All AV cabling shall be plenum rated and shall be professional grade products (not consumer grade) such as Belden, Gepco, C2G, etc.

18.10 Identification and Labeling

- A. General: Labeling and administration shall comply with ANSI/TIA/EIA 606 and standard industry practices.
- B. Labels shall be arranged such that they are readable after cabling has been dressed and secured.
- C. Labeling shall be affixed to all equipment, conduits, cabling and grounding/bonding systems.
- D. All cables shall be labeled within 3 inches of the termination, with the label oriented to be readable without manipulating the cable. Labels shall be laser printed with a clear overwrap to protect the printing from inadvertent smudging.

18.11 Audio Visual Features

- A. Room Types (Application Spaces)
  - 1. Classroom: Each classroom shall have projectable whiteboards such as Da-Lite's Idea Screen or similar. IdeaPaint and Walltalkers are not acceptable. Each room shall have an instructor console/podium that will be connected to a wall-mounted junction box via a mesh umbilical. The instructor console shall to be movable. The instructor console shall include an equipment rack inside and host the A/V equipment. Wall-mounted junction boxes from FSR, Inc. are desirable (WB-X series). Projectors shall be short throw (not ultra-short throw), mounted approximately 6' from the whiteboard.



2. Labs: Design and provide A/V equipment suitable for use with presentation functions, mounted on a mobile cart so that it can be moved around the lab wherever multimedia is needed.
3. Conference Rooms: Design and provide a presentation-only audio visual application. Dedicated video conferencing equipment is not required.
4. Digital Signage: Design and provide large video panels (approximately 65" -70" diagonal) to display digital signage content. Provide one per floor in the public circulation.

18.12 AV Conduits and Raceways

- A. Conduits, boxes and other cabling raceways supporting audio visual applications shall comply with all standards and requirements described for telecommunications cabling in section 18.o.

18.13 AV Equipment Racks and Enclosures



- A. Provide junction panels, racks, cabinets, and enclosures with all associated hardware according to locations, elevations, and plan views as shown in the Contract Documents.
  - B. A/V Equipment Racks, Cabinets, and Enclosures:
    - 1. Provide racks, cabinets, and enclosures as shown on the Contract Documents.
    - 2. Assemble racks and install components as shown, and ensure that all moving parts (doors, drawers, latches, etc.) function as intended.
    - 3. Provide exhaust fans as shown on the Contract Documents and as required for reliable operation of the equipment.
    - 4. Work with the electrician to ensure that the power outlets and data boxes designated to serve the A/V equipment are installed in the proper locations.
  - C. All rack mounted equipment and cabling shall be securely attached.
- 18.14 AV Grounding and Bonding
- A. The grounding and bonding requirements for audio visual applications shall comply with all standards and requirements described for telecommunications infrastructure in section 18.o.
  - B. Ensure that active electronic equipment is properly grounded per manufacturer's requirements.
- 18.15 AV Firestopping
- A. The firestopping requirements for audio visual applications shall comply with all standards and requirements described for use with telecommunications infrastructure in section 18.o.
- 18.16 Testing
- A. Test each audio visual function in accordance with Contract requirements, manufacturer requirements, industry standards, and warranty requirements.
  - B. Provide test records on a form approved by the Owner's IT Representative. Submit the test results for each audio visual application. The records shall include the outcome of each feature test, indication of errors found, remediation method, retest results, and name and signature of technician completing the tests. Provide test results to the Owner's IT Representative for review and acceptance within two weeks of Substantial Completion.
    - 1. Prepare and submit the test results in Adobe Acrobat PDF electronic form (on a CDROM) to the Owner's IT Representative for review. Handwritten test results will not be accepted.
  - C. Costs of testing shall be borne by Contractor. Contractor shall provide all instruments, equipment, labor and materials to complete testing. Should tests detect any defective materials, poor workmanship or variance with requirements of Specifications, Contractor shall make any changes necessary and remedy any defects at his expense.
- 18.17 Deliverables
- A. All deliverables shall be provided to the Owner prior to Audio/Visual System acceptance and shall include, but not be limited to:
    - 1. Manufacturer user manuals shall be delivered to the Owner in a single binder as well as in PDF form on USB flash drive.
    - 2. Wireless licensing documentation.
    - 3. Video and Audio system test reports shall be delivered to the Owner in digital PDF format.
    - 4. All programs, modules and layout source code loaded on A/V systems shall be delivered to the Owner on USB flash drive. Programs shall be uncompiled, editable and executable. The Owner shall retain the rights and ability to edit programs, modules, and layouts.
    - 5. All software licensing shall be loaded and certificates delivered to the Owner
    - 6. All as-built drawings indicating all A/V devices, device locations, mounting detailed wiring schematics, and



labeling.

7. Any accessory hardware (including adapters, batteries, brackets, cables, connectors, covers, dongles, remote controls, and tools) that is provided by the manufacturer with equipment, but which does not become permanently installed.

18.18 AV As-built Drawings and Record Drawings

- A. The requirements As-built Drawings and Record Drawings for audio visual applications shall comply with all standards and requirements described for use with telecommunications infrastructure in section 18.o.
- B. In addition, the Contractor shall provide one-line schematic diagrams for all audio visual application depicting how the system is wired. The diagrams shall show all equipment with equipment models and serial numbers. The diagrams shall show all cables and wiring connections, indicating cable/wire type and wire labeling.

18.19 AV Commissioning and Demonstration

- A. Provide a comprehensive verification of all A/V equipment and systems using a commissioning agent. Determine whether A/V systems meet the construction specifications, Contract Document requirements, standards, objectives, and manufacturer-listed performance guidelines.
- B. Prior to beginning the commissioning process, the Contractor and commissioning agent shall hold a meeting with the Owner to review the commissioning requirements, commissioning process, and required metrics.
- C. Any shortcomings discovered during the commissioning process shall be resolved by the Contractor.
- D. The Owner may conduct an independent commissioning process.
- E. Commissioning Checklist – Commissioning agents shall use the InfoComm ASPVC as the basis of the commissioning checklist. The ASPVC check list can be found at:  
[http://www.infocomm.org/cps/rde/xbcr/infocomm/CAVSP\\_Checklist.pdf](http://www.infocomm.org/cps/rde/xbcr/infocomm/CAVSP_Checklist.pdf)
- F. Provide 4 hours of demonstration and training to Owner’s Representatives.
- G. Demonstrate operation of each space to the Owner’s Representative