Joint-Use 21st-Century Post Secondary Education Center

May 20, 2014

DRAFT
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1 INTRODUCTION

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The Joint-Use 21st Century Post-Secondary Education Center (JU21-PSEC) is a unique collaboration between the San Jose Evergreen Community College District (SJECCD) and the Milpitas Unified School District (MUSD).

Creating a local community college campus in Milpitas has been a long-term goal for both districts. SJECCD has been looking to better serve the needs of the residents in Milpitas and surrounding areas with accessible and relevant post-secondary courses, and to improve regional economic development opportunities by providing access to career and technical education. MUSD has desired a facility that would allow MUSD high school students access to college level courses while completing their high school curriculum.

JU21-PSEC allows for a unique blend of secondary and post-secondary education that will benefit MUSD students and the greater Milpitas community. The JU21-PSEC will be funded by the SJECCD Measure G-2004 bond program.

In May 2013 at a meeting of SJECCD Board of Trustees, a resolution was adopted to approve the use of California Education Code Section 81700 authorizing SJECCD to enter into design-build contracts for projects exceeding $2.5 million.

In June 2013, MUSD and SJECCD entered into a Ground Lease and Joint Use Agreement for the development of JU21-PSEC on a portion of the Russell Middle School campus located at 1500 Escuela Parkway in the city of Milpitas.

In February 2014, SJECCD issued a Request for Statements of Qualifications for Architectural Services (RFQ #0809-13) for the preparation of programming documents that will form the "Basis of Design" for the Design-Build (D/B) team.
In March 2014, LPA Inc (LPA) was selected to develop a programming document and design criteria for JU21-PSEC.

A Programming Committee, comprised of members from both SJECCD and MUSD, met regularly with LPA from March to May 2014 to determine the project goals and program requirements.

LPA has prepared this document to describe the general scope of the project and establish the building program parameters and design criteria. This document states the project’s goals, the activities to be accommodated, and special requirements and considerations that will guide the design process as determined in collaboration with the Programming Committee. Specific requirements have been identified and are inter-related. The D/B team will be required to translate the stated criteria into a design solution that adheres the requirements of the college.

This programming documentation should be considered as the starting point of the design process and viewed as a statement of the minimum project requirements. It is anticipated that more detailed criteria and data will be developed by the selected D/B team as the design process evolves.
Goals

As a post-secondary school, the JU21-PSEC will be a new building type for the City of Milpitas. Adult education is offered in Milpitas, but not college-level courses. The project will be a sustainable learning facility whereby community college students and eligible high school students learn together in a unique intersegmental setting. The goal is to foster a college-going culture at MHS by providing educational opportunities in collaboration with SJECCD. In addition, the facility will provide curricular opportunities for adult students in and around the Milpitas area. The planned opening date is Fall of 2016.

The building itself is expected to be a creative response to the needs of the program and be a cost-effective high quality design that engages the users and the outside pedestrians. JU21-PSEC should have a strong street presence and be inviting to the community. The building should fit into the context of, and support the visual unity of the neighborhood while at the same time serving as an icon to the community.

The pedagogy of the facility will be focused around 21st Century Learning. 21st Century Learning encourages the student academic experience to occur through group learning and collaboration, with the instructor serving as a facilitator. It is a concept to be encouraged through technology and infrastructure, as well as through spatial relationships and flexibility.

The Design Committee has determined the following program goals:

1. Classroom environment
   - Classrooms should be flexible both in terms of usage and courses taught in the classroom.
   - At least half the classrooms are visually on display to the rest of the college campus either through moveable partitions or glass walls (either interior, exterior, or both)

2. Outdoor learning areas
   - The open social spaces are as valuable as the building. The learning space shall extend to the outdoors for at least half of the classrooms.
   - The outdoor spaces should in itself be defined either through level changes or material differentiation to encourage different sized groups to be able to meet.

3. Collaboration spaces
   - Collaboration spaces should be areas that encourage the same, along with communication, critical thinking, and creativity.
   - Collaboration spaces will be a space for group meetings that would be shared by both faculty, staff and students.
4. Technology and infrastructure
   - The building should have advanced connectivity and technology, and would ideally be able to adapt to a rapidly changing technology

5. Faculty
   - The faculty spaces should encourage faculty collaboration. This is partially achieved by minimizing the number of enclosed offices and creating an interactive environment.

6. College hub
   - A space where students and teachers can share time and space shall be provided. This space should encourage students, faculty, and staff to engage in impromptu dialogue.
   - Opportunities for introverts and those needing more individual privacy should also be accommodated for.

7. Community
   - The intent is to provide a presence in the neighborhood that is sensitive to the existing schools and the adjacent residential homes.
   - The history or involvement of SJECCD and MUSD should be shared with the community through the completed project.

In addition to the goals above, the Districts mandate a LEED Silver project. The project will be replacing an existing grassy playfield that currently has a pervious surface, a nonexistent heat island effect, and no exterior lighting. The future building should be a built environment that is sensitive to this replacement.

To achieve these project goals, the D/B team will meet the minimum guidelines provided in this document, including a minimum LEED Silver rating.
References

2013 California Building Code California Code of Regulations, Title 24, California Building Standards Commission, July 2013

Hetch Hetchy Water and the Bay Area Economy, Bay Area Economic Forum, October 2002


San Jose Evergreen Community College District Annual Report, San Jose Evergreen Community College District, 2013

San Jose Evergreen Community College District Standards + Campus Guidelines Handbook - DRAFT, HMC Architects, May 2013

Thomas Russell School Site Plan, Van Bourg / Nakamura and Associates Architecture and Planning, April 1964
Abbreviations

ASF  Assignable Square Feet
D/B  Design-Build architect, to be determined
GSF  Gross Square Feet
JU21-PSEC  Joint-Use 21st Century Post-Secondary Education Center
LEED  Leadership in Energy and Environmental Design program developed by the USGBC
LPA  LPA Inc (programming architect)
MHS  Milpitas High School
MUSD  Milpitas Unified School District
NTS  Not To Scale
RMS  Russell Middle School
ROW  Right of Way
STEM  Science, Technology, Engineering, and Math
SFPUC  San Francisco Public Utilities Commission
SJECCD  San Jose Evergreen Community College District
USGBC  United States Green Building Council
VTA  Santa Clara Valley Transit Authority
WI  SJECCD Workforce Institute
2 DESCRIPTION

2-1 Project Scope
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Figure 2.1 - Site location on Milpitas land use map (NTS)
The project site is at the southwest grass field at Russell Middle School, located at 1500 Escuela Parkway, Milpitas, California. The scope of work for JU21-PSEC includes the construction on a 3-acre site of a new LEED-Silver (minimum) one or two story building, new utility lines to service the new building, a new vehicle parking lot with lighting, bicycle parking, trash enclosure, appropriate edge and campus landscaping, and all associated signage, site preparation, and improvements.

The Programming Committee will continue to develop the STEM course offerings at the campus as the building design develops. Initial course offerings will be a blend of secondary and post-secondary education, including Workforce Development courses. These are:

- General education courses, such as History, Social Sciences, and English
- Courses requiring the use of a biology lab and computer lab
- Career-specific development including robotics

Figure 2.2 - Approximate 3 acre site boundary overlaid on 1964 site plan (NTS)
**Figure 2.3 - Approximate 3 acre site boundary overlaid on aerial view (NTS)**
Site Context

The site is located on the east side of Escuela Parkway between Washington Drive and Manzano Street (Figures 2.3 and 2.4).

Figure 2.4 - Project site

North
Russell Middle School is located to the north of the site. The land the project will be sited on was previously the grassy playfields for RMS (Figure 2.5).

Figure 2.5 - Russell Middle School north of the site
East
The RMS playfields are located to the east of the site. There is a hard surface play area as well as a grassy field (Figure 2.6).

South
A single family residential neighborhood comprised of all single story homes is located to the south (Figure 2.7). There is wood fencing at the boundary between the neighborhood and the fields. A dirt path that has been used daily by students to access elementary, middle, and high school from the neighborhood runs along the fencing (Figure 2.8).
West
The site is bordered to the west by a wide pedestrian sidewalk along Escuela Parkway. (Figure 2.9). The sidewalk was renovated within the past ten years along with the installation of the Milpitas pipeline distributing recycled water to the Milpitas community. The recycled water provides irrigation to plants and trees, and is separate from potable water lines. Also along Escuela Parkway is a bike path that connects to the Hetch Hetchy trails.

Figure 2.9 - View of the sidewalk and street trees along the west boundary

Figure 2.10 - Milpitas High School across Escuela Parkway, southwest of the site

Figure 2.11 - Marshall Pomeroy Elementary School across Escuela Parkway, northwest of the site
Climate
Milpitas is generally a warm climate with few extreme temperatures. Rainfall is limited, usually occurring during the winter months. Winter temperature averages range from 40 degrees F to 45 degrees F with occasional low temperatures dropping to 25 degrees. Summer temperature averages range from 80 degrees F to 90 degrees F with occasional temperatures reaching over 100 degrees F.

Views
Although the views immediately to the north, west, and south are those of an urban neighborhood, the view to the east is that of the lush Monument Peak hillside that is part of the Mount Diablo range. The view should be taken into consideration with the building design, but is not a primary driver of the design.

Public Transportation
There are two bus lines from Santa Clara Valley Transportation Authority (VTA) that are in close proximity to the site: Route 66 Kaiser San Jose to Milpitas / Dixon Road via Downtown San Jose and Route 46 Great Mall / Main Transit Center to Washington & Escuela.

Hetch Hetchy
San Francisco’s Hetch Hetchy water system is a 167-mile, gravity-driven network of dams, reservoirs, tunnels, pump stations, aqueducts and pipelines that collects Tuolumne River runoff on federal lands near the Yosemite Valley and transports it to the San Francisco Bay Area. The San Francisco Public Utilities Commission (SFPUC) manages and operates the Hetch Hetchy system.

The Hetch Hetchy pipelines are underneath the Hetch Hetchy trails that run west of highway 680 as it travels through Milpitas. A portion of the trail transitions to Escuela Parkway which serves as a connector between Washington Drive and Russell Lane (Figures 2.12 and 2.13). Refer to the Site Survey from Sandis Engineers for additional information.

Figure 2.12 - Hetch Hetchy trail, facing north from Washington Dr.  Figure 2.13 - Escuela Parkway, facing south from Washington Drive
Site Analysis

The existing site is a grass field at the southwest corner of the Russell Middle School campus at 1500 Escuela Parkway in Milpitas. As of June 2014, the site has not been parcelled to the official 3 acre boundary for site development. The land use transfer should be completed by XXX, 2014. Refer to the Soils Report from Cleary Consultants (May 2014) and Site Survey from Sandis Engineers (May 2014) for additional information.
Site Constraints

The following constraints may have an impact on the site and construction. Refer to the Joint-Use 21st Century Post-Secondary Education Center Draft Initial Study for additional site constraints.

Hetch Hetchy Right-of-Way
The Hetch Hetchy Right-of-Way is located directly underneath Escuela Parkway. There is no parking nor stopping of vehicles allowed immediately around the project site along Escuela Parkway. Parking for construction vehicles will need to be coordinated with the Districts and schools to minimize the impact to the surrounding neighborhood.

School Traffic
The surrounding school hours are between 8:00 a.m. and 3:00 p.m. Traffic congestion in the immediately surrounding neighborhoods occur prior to 8:00 a.m. and between 3:00 pm and 3:30 p.m.

Russell Middle School Playfields
The site boundary is offset from the perimeter of the existing RMS hard-surface play area for a distance of XXX. No construction will be allowed to overflow into the play area.

Site Setbacks
Although there are no formal setback requirements for the site from either the City of Milpitas nor from the State of California, sensitivity to the properties immediately adjacent to the site should be observed. Not only will it maintain a certain measure of privacy and light to these properties, but it will also help to mitigate noise from the parking lot, campus classroom functions, and the middle school playfields. It is the District’s intent that the JU21-PSEC be perceived as a positive addition to the community by the surrounding neighborhood. It is important that the building’s aesthetics and scale appropriately convey both quality and value to the community. In maintaining this positive relationship, it should be considered to situate the future building away from the residential homes.
3 PROGRAM

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Building Program

The building program for the JU21-PSEC totals 11,760 ASF. The square footage requirements listed for each space are a minimum amount. These also establish a base bid. Spaces may be combined with other spaces if it will result in a streamlined building that still meets the programming requirements.

### BUILDING PROGRAM - ASSIGNABLE SQUARE FEET

<table>
<thead>
<tr>
<th>Description</th>
<th># of rms</th>
<th>SF per room</th>
<th>SF total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms (seats 30-35)</td>
<td>5</td>
<td>850</td>
<td>4,250</td>
</tr>
<tr>
<td>Large lecture rooms</td>
<td>1</td>
<td>1,700</td>
<td>1,700</td>
</tr>
<tr>
<td>Shared classroom / lecture storage</td>
<td>1</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Biology lab plus separate lab storage/prep</td>
<td>1</td>
<td>2,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Computer classroom</td>
<td>1</td>
<td>850</td>
<td>850</td>
</tr>
</tbody>
</table>

Teaching Spaces subtotal: 8,880

| Lobby                                               | 1        | 400         | 400      |
| College hub / charging / vending                   | 1        | 1,200       | 1,200    |
| Collaboration/group room - 10 person table         | 1        | 220         | 220      |
| Collaboration/group room - 6 person table          | 2        | 120         | 240      |

Common areas subtotal: 2,060

| Dean’s office                                       | 1        | 120         | 120      |
| Dean’s receptionist / office administrator          | 1        | 100         | 100      |
| Open office                                         | 1        | 300         | 300      |
| Break area                                          | 1        | 120         | 150      |
| Work area / storage                                 | 1        | 120         | 150      |

Faculty spaces subtotal: 820

ASF: 11,760

Descriptions for each of the spaces follow. Refer to the Section 4 Design Criteria and Section 5 Room Data Sheets for additional information.

If additional building construction funds are available after meeting the above minimum program requirements, the D/B team is allowed to provide additional components to the building. These include:

- Achieving a LEED rating above Silver or net-zero project
- Creating a chemical lab space and the additional storage/prep requirements in lieu of a biology lab
- One (1) additional classroom
- One (1) private dedicated faculty conference room
The classrooms, lecture rooms, and laboratory will be spaces that are setup to allow for flexibility for teaching styles, coursework, and furniture layout. The relationships between 1) classroom space, 2) furniture, 3) technology, and 4) pedagogy are important to the success of JU21-PSEC. The D/B team will influence all four factors through infrastructure and strategic space adjacencies.

In each of these teaching spaces, at least one of the walls will be a smart teaching wall. If not functioning as a window wall or moveable partition, the other three walls should allow for collaboration with additional electronic display surfaces, whiteboards, or a tackable surface. All of the walls should have power outlets and least one data port.

Each room is required to have controlled daylighting with motorized window shades.
Classrooms

The number of students in the classrooms will range from 30 to 35 students. The desks will need to be mobile enough to allow for flexibility in set-up, whether it is set up in a traditional lecture style, or in a circular set-up for large group discussions, or in a multiple number of groups composed of 4-6 students.

A minimum of two (2) classrooms are required to have glass walls with an opening of 8'-0” or wider leading into the outdoor courtyard or into adjacent interior spaces, such as the hallway or another classroom. If the classroom has access to outdoor spaces, not only will this bring natural air and light into the space, but will expand the options for where groups of students can congregate. If the wall adjacent to another room or hallway can open fully, this will allow the classrooms to spill out into the space for additional square footage.

The wide openings can have doors that are either folding glass partitions, roll-up garage-door style, or frameless sliding glass doors (for interior conditions).

There will be a minimal amount of storage available in the room. Items that are to be stored will be limited to those that are specific for the classroom itself (markers, erasers, audio/visual cords, etc). Student storage will not be required. The instructor may store any materials in their designated storage space within the faculty area.
Lecture room

The lecture room would be considered an expanded version of the classroom. The room can be divided in half with a moveable wall to create two classrooms. The space in the lecture room should allow for flexible seating - no raised platform nor tiered seating. The room will seat up to 70 students with mobile desks/chairs.

The lecture room will be flexible in size by having a direct connection to the JU21-PSEC Hub with a moveable wall partition. This would allow the room to support over 100 occupants for either a campus gathering or community event.

The room may also have glass interior and/or exterior walls with motorized dual-shade controls for both locations.

Since the lecture rooms will be used for a variety of coursework including sciences, a separate room for storing larger equipment or roll-in carts will be required. Otherwise, storage within the lecture room will be limited to items that are specific to the room (markers, erasers, visual cords, etc).
Laboratory

The wet laboratory will be used for courses that would support a biotechnology field. No fume hoods will be required since chemistry will not be a course offering at JU21-PSEC. Unlike the classrooms and lecture rooms, it will not be mandatory to allow for furniture flexibility as they will be standard wet lab biology casework.

It is an option that the laboratory connects with an adjacent classroom with a moveable wall partition. This would allow the laboratory instructor to move between a classroom with flexible furniture to a formal lab.

In addition to providing natural daylighting and natural ventilation, outdoor access in the laboratory would allow for students to use the landscaping as part of their science experiments and studies. This can be achieved with a moveable glass wall system such as a garage door or folding glass doors.

An optional component is to provide a display area in the hallway to showcase the science work being conducted within the lab.
Computer classroom

The number of students in the classroom will be between 30 to 35 students. Although each desk will be hard-wired with power and data ports, flexibility of furniture is still desired since the computer classroom may be used by other courses. This would mean that computer storage would need to be taken into consideration. The D/B team will need to coordinate with the two Districts for the type of computers to be used in the classroom - whether they are desktops, all-in-one-monitors, laptops, and/or tablets. Given the speed of technology advancement, this decision may be made closer to the time of construction.

The computer classroom should have glass at both the interior and exterior walls to allow for visual engagement from persons outside of the classroom.

A minimal # of printers would be available to the students. Space for larger plotters will not be required.
Robotics space

A robotics course is planned for at the JU21-PSEC. Robotics courses generally require students to work in teams, and engage fundamental technology, maths, and science concepts in their coursework.

Currently the building program does not support a dedicated robotics lab that would allow for tools and kits of parts to remain out in the open outside of class hours as the space may be shared with other courses. The JU21-PSEC teaching spaces need to remain available for multiple courses to be taught in the same space. Because of this, storage for robotics kits (or “Bot Boxes”) would need to be provided. The Bot Boxes are used by students or by teams of students.

A classroom with outdoor access would be the ideal location for a robotics course to occur to provide additional space for where robots can be tested.

An option is to provide a “Robot Garage” next to one of these outdoor-accessible classrooms. It would be space accessed from the exterior of the building and would be deep enough to contain a 24" deep base cabinet and upper shelving. This garage would act as both storage and a workbench for the class, and may reduce the amount of time spent for setting up and putting away equipment.
Outdoor Spaces

Outdoor areas will be an opportunity to extend the limited spaces for several building program areas. The majority of the spaces would greatly benefit from having access to the outdoors. Besides the obvious outdoor extension of the lobby and the student hub, having the classrooms and faculty spaces extend to the outdoor space for group gatherings or natural ventilation is highly desirable.

Helping to define group spaces of 4-6 people can be done either by providing varying seating options, changes in plant or ground material, or providing visual barriers.
The faculty will be comprised primarily of adjunct or part-time teaching staff. Since there will be no permanent members, no staff offices will be needed. There will be ten (10) daytime faculty and ten (10) evening faculty. The staff area will be an open office setting with bench seating for up to ten (10) people. Storage for the staff will be provided with twenty (20) half-size lockers.

The break area will be minimal in size as the staff will share the Hub space with the students. The break area should provide space for a 4-person seating, a microwave, refrigerator, and a prep sink. No dishwasher will be required. The D/B team is not restricted to making the break area enclosed.

Since the open office will be the main gathering space for the faculty, staff lounge furniture can be integrated within the open space.

Equipment to support the office will be located in the workroom/storage space, including the copy machine, office supplies, mail bin.

The Dean for JU21-PSEC will require a secured and enclosed office that will house a desk and a wide filing cabinet. Standard office power and data will also need to be provided in the Dean’s office.

The Dean will have an administrative assistant, also within an enclosed office that is directly adjacent to the Dean’s office. The administrative assistant may act as the front desk receptionist, an office manager, and possibly a student coordinator. The assistant should have a visual connection with the lobby and hub to be able to address visitors or students.
Collaboration spaces will be a space for group meetings that would be shared by both faculty, staff and students. Although they may be visually open, acoustic privacy for all of the rooms will be important, especially given that these will be the only meeting spaces available to the faculty.

The large meeting room will have a large conference table to seat 10 people. The table should be wired for both power and data. A digital monitor would be provided on one wall, and the remainder of available wall space should be a writing or tackable surface.

The two smaller rooms will have a conference table to seat 6 or less people. There will be no monitor available, but the remainder of the available wall space should be a writing or tackable surface.

The D/B team is encouraged not to limit the collaboration spaces to what’s listed on the program. In general, the building’s public spaces should allow for both individual contemplation or the casual collision. This is achieved by providing a diverse and flexible setting throughout the building. Spaces would have either visual separation or is separated from other spaces through the use of material or color change.
Lobby and Hub

The lobby and the hub will be in close vicinity to each other and may have shared resources. The lobby will provide an introduction of the JU21-PSEC to visitors, will contain signage that will provide directional assistance, and may also include information on the JU21-PSEC, SJECCD and MUSD.

The hub will be used by both student and staff. It should be a space which attracts students, faculty, and staff into the space.

Because there will be no formal food service, it is expected that students and staff will bring lunches from home and need a place to warm and prepare food. Space should be allocated for two microwaves and sink in a preparation area.

Two or three vending machines will be provided. The open area should seat a minimum of 80 people. The space may also function as a large meeting room, so any fixed seating should be located along the perimeter. Column placement should be coordinated with a possible presentation function.

Seating options should include dining and lounge seating.

Additional seating may be located at an adjacent outdoor space. Because these spaces will also serve students as a study space, wireless connectivity is essential along with some data and power outlets for hard wire connections and charging opportunities. Adequate power outlets will be needed throughout.

Since community functions would occur at the hub, having a direct connection to a lecture room is encouraged. Ideally this connection would be a moveable wall partition that would allow the lecture room audience to extend into the hub.
Building Support

Building support spaces include hallways, restrooms, utility closets (electrical, data, etc.), custodial spaces, and, if it is a two-story building, stairs and an elevator. These are not part of the building’s ASF, but have been identified because of their importance.

There is no loading / service area required for the building.

Restrooms
Besides providing the code requirements for the mens and womens toilet rooms, a “family” toilet room will be provided. The function of the room will be to serve as a gender neutral toilet room as well as a Mother’s room. It will include one water closet, one lavatory, and a baby changing station. GFCI outlets will be provided on each wall. To limit the use of the “family” toilet room for those who truly need it, access to the room will be provided with a key to be held by the Dean’s administrative assistant.

Custodial Spaces
Custodial duties will be provided by MUSD. A total of one (1) 100 SF minimum closet space will be needed. The door swing must not encroach in the 100 SF minimum space. Access to the roof for a single story building will be provided through the custodial space.

Security
Security standards are provided in the SJECCD campus standards.

Key card access and security cameras are required at all exterior entry doors. These doors shall be automated. 360 degree motion detectors are necessary at major circulation intersections. All systems shall be integrated with the campus security system. Additional coordination with SJECCD and MUSD concerning security will be required.
Adjacency Diagrams

LEGEND

- Direct adjacency
- ● ● Moveable wall partition
- — Moveable wall partition optional
- """"""" Visual connection

DRAFT
May 20, 2014
San Jose Evergreen Community College District | Milpitas Unified School District
Joint-Use 21st Century Post Secondary Education Center Programming Document
Parking and Access

The parking is planned to be self-park for students, faculty and staff with a possibility of pre-paid parking passes. Pay stations for visitors will be located near the lobby entry.

Various parking types will be provided on the site. The parking types will include the following:

1. **Accessible stalls as required by the California Building Code.**
2. **Five (5) dedicated staff parking spaces.**
3. **Two (2) dedicated visitor parking spaces.**
4. **Designated parking for both low-emitting/fuel-efficient vehicles and for carpool/van pool parking.** The total number should meet CalGreen minimum requirements with individual minimum numbers as follows:
   - LEED required minimum for parking for electric vehicles with charging capability, or four (4) parking minimum parking spaces.
   - LEED required minimum for car/van-pool parking, or eight (8) spaces. The spaces would be available on a first-come / first-serve basis. Special carpool parking stickers would be provided.
5. **Motorcycle parking spaces (optional).** Motorcycles are an efficient mode of transportation and requires a smaller parking footprint. Several dedicated spaces for motorcycles would also increase the efficiency of the parking lot if strategically located.
6. **Bicycle parking as required by CalGreen.** LEED requirements will not be considered as a showering or changing facility would be required. If the D/B team is able to incorporate such a facility in the building program in order to achieve LEED credits, then the Design Committee will take it under consideration. Otherwise, bicycle parking requirements should be at a minimum.
   - Bicycle parking for students and visitors per CalGreen requirements for 5% of the student population, or parking for twenty (20) bicycles, whichever is stricter.
   - Bicycle parking for faculty and staff that is secure and covered per CalGreen requirements.

Bicycle parking should also be visible to passersby to assist in security and encourage use.

The vehicular entry to the parking lot should be a minimum of three (3) lanes wide - minimum of one (1) lane for entry and a minimum of two (2) lanes for exiting (one left turn/straight lane, one dedicated
right turn lane).

Signage for the parking lot is important, including tow warnings to unauthorized vehicles.

Tree shading and solar panel shading is desired to minimize the heat island effect. Pervious pavers and landscaping is desired.

The D/B team will provide pedestrian access will be provided from the northwest of the site, but the access cannot be from the middle school. Signage will be required.

Parking security cameras will be a part of the building security system. Security cameras and blue phones are to be provided with special attention focused on pedestrian circulation areas and drive aisles. Security cameras will be needed at the vehicle entry/exit points.

Sufficient parking lighting needs to be provided, but attention to light pollution. Refer to CalGreen and LEED requirements for light pollution reduction requirements.
Additional Programming Notes

Student Registration
For one week, twice a year, an area for student registration and assistant would be needed. This will require a space for a table and a secured room to store student files.

Trash Enclosure Construction
A solid waste enclosure shall drain to the sanitary sewer per the City of Milpitas. Refer to Milpitas Municipal Code section XI-16-7. The enclosure entrance will have a minimum slope gradient of 2%, but no greater than 4% to prevent outside stormwater run off from entering the enclosure. A minimum ten-inch wide, three-inch height curb along interior walls shall be installed to prevent wall damage. A double swinging gate with bollards or J-hooks shall be installed at the front of the enclosure to provide a minimum 120-degree swing area and a minimum unobstructed inside opening of 12 feet. Minimum enclosure dimensions are 18.5 feet by 10.5 feet with a 6 inch thick minimum reinforced concrete pad to accommodate no less than 40,000 pounds. Minimum ceiling or trellis height is 15-feet.
## 4 DESIGN CRITERIA

| 4-1   | Sustainability              |
| 4-5   | Architecture                |
| 4-9   | 21st Century Learning Environment |
| 4-11  | Signage / Wayfinding        |
| 4-13  | Structural                  |
| 4-15  | Civil                       |
| 4-17  | Landscape                   |
| 4-19  | Parking                     |
| 4-21  | Electrical                  |
| 4-29  | Mechanical                  |
| 4-33  | Plumbing                    |
| 4-35  | A/V Technology              |
| 4-37  | Security                    |
| 4-53  | Communications              |
Sustainability

In addition to the mandatory compliance with CalGreen Standards (per the 2013 California Building Code at the time this programming document was written), the building must also achieve LEED Silver minimum per SJECCD standards.

Currently, the available LEED Silver versions are version 2009 (open for registration until June 2015) and new version V4 (launched in November 2013). It would be preferred that the building achieve LEED V4 Silver, but if cost is a prohibitive factor while time is not, LEED 2009 Silver will be accepted when the D/B team presents the cost difference between the two versions for the project. The D/B team must also identify the LEED registration date for JU21-PSEC to verify that it will meet the registration deadline before version 2009 expires.

A table for the two versions can be reviewed on the following page. The D/B team is to confirm the requirements directly from USGBC.

Sitework

The project will be replacing an existing grassy playfield that currently has a pervious surface, a nonexistent heat island effect, and no exterior lighting. The future building should be a built environment that is sensitive to this replacement. Strategies include:

- Solar panel shade structures in the parking lot
- A green roof to minimize stormwater runoff (as well provide roof insulation)
- Green walls to route stormwater through vertical planters
- Rainwater capture and reuse - the City of Milpitas currently supplies the site with recycled water lines for plants and irrigation. The D/B team will need to confirm with USGBC whether this can be included for LEED credit.
- Bioretention
- Permeable pavement

Providing drought tolerant plants as well as limiting turf grass areas to well purposed locations will be desired. In addition, a program may be coordinated with SJECCD for providing vegetation that would be useful to the science course labwork.

Transportation

Parking on-site will be limited, so use of alternative means of transportation (bus, carpooling, bicycling, walking) as well as use of high-efficiency modes of transportations (electric cars, motorcycles) should be encouraged. See additional information in “Parking and Access” in Section 3-Program of this document.

Building

Sustainable strategies that would be desirable for the building may
LEED for New Construction in Schools (v2009)

**SUSTAINABLE SITES** POSSIBLE: 24
- **40-49 Points**
  - **5S1** Construction activity pollution prevention REQUIRED
  - **5S2** Environmental site assessment REQUIRED
  - **5S3** Site selection
  - **5S4** Development density and community connectivity
  - **5S5** Brownfield redevelopment
  - **5S6** Construction waste management
  - **5S7** Heat island effect - nonroof
  - **5S8** Heat island effect - roof
  - **5S9** Site master plan
  - **5S10** Joint use of facilities

**WATER EFFICIENCY** POSSIBLE: 11
- **40-49 Points**
  - **4Wb1** Water use reduction REQUIRED
  - **4WE1** Water efficient landscaping
  - **4WE2** Innovative wastewater technologies
  - **4WE3** Water use reduction
  - **4WE4** Process water use reduction

**ENERGY & ATMOSPHERE** POSSIBLE: 33
- **40-49 Points**
  - **4EA1** Fundamental commissioning of building energy systems REQUIRED
  - **4EA2** Minimum energy performance
  - **4EA3** Fundamental refrigerant management
  - **4EA4** Optimize energy performance
  - **4EA5** On-site renewable energy
  - **4EA6** Enhanced commissioning
  - **4EA7** Enhanced refrigerant management
  - **4EA8** Measurement and verification
  - **4EA9** Green power

**MATERIAL & RESOURCES** POSSIBLE: 13
- **40-49 Points**
  - **4MR1** Storage and collection of recyclables
  - **4MR2** Building reuse - maintain existing walls, floors and roof
  - **4MR3** Building reuse - maintain interior nonstructural elements
  - **4MR4** Construction waste management
  - **4MR5** Materials reuse
  - **4MR6** Recycled content
  - **4MR7** Regional materials
  - **4MR8** Rapidly renewable materials
  - **4MR9** Certified wood

**INDOOR ENVIRONMENTAL QUALITY** POSSIBLE: 19
- **40-49 Points**
  - **4EQ1** Minimum IAQ performance
  - **4EQ2** Environmental Tobacco Smoke (ETS) control
  - **4EQ3** Minimum acoustical performance
  - **4EQ4** Outdoor air delivery monitoring
  - **4EQ5** Increased ventilation
  - **4EQ6** Construction IAQ management plan - during construction
  - **4EQ7** Construction IAQ management plan - before occupancy
  - **4EQ8** Low-emitting materials
  - **4EQ9** Indoor chemical and pollutant source control
  - **4EQ10** Central controllability of systems - lighting
  - **4EQ11** Central controllability of systems - thermal comfort
  - **4EQ12** Central controllability of systems - ventilation
  - **4EQ13** Daylight and views - daylight
  - **4EQ14** Daylight and views - views
  - **4EQ15** Enhanced acoustical performance
  - **4EQ16** Mold prevention

**INNOVATION** POSSIBLE: 6
- **40-49 Points**
  - **4I1** Innovation in design
  - **4I2** LEED Accredited Professional
  - **4I3** The school as a teaching tool

**REGIONAL PRIORITY** POSSIBLE: 4
- **40-49 Points**
  - **4RP1** Regional priority

**TOTAL** 110

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LEED for New Construction in Schools (v4)

**SUSTAINABLE SITES** POSSIBLE: 12
- **40-49 Points**
  - **Preq** Construction activity pollution prevention
  - **Preq** Environmental site assessment
  - **Preq** Building reuse - maintain existing walls, floors and roof
  - **Preq** Construction waste management
  - **Preq** Materials reuse
  - **Preq** Recycled content
  - **Preq** Storage and collection of recyclables
  - **Preq** Construction activity pollution prevention

**LOCATION & TRANSPORTATION** POSSIBLE: 15
- **40-49 Points**
  - **Preq** LEED for Neighborhood Development location
  - **Preq** Sensitive land protection
  - **Preq** High priority site
  - **Preq** Surrounding density and diverse uses
  - **Preq** Access to quality transit
  - **Preq** Bicycle facilities
  - **Preq** Reduced parking footprint
  - **Preq** Green vehicles

**WATER EFFICIENCY** POSSIBLE: 12
- **40-49 Points**
  - **Preq** Outdoor water use reduction
  - **Preq** Indoor water use reduction
  - **Preq** Building-level water metering
  - **Preq** Outdoor water use reduction
  - **Preq** Indoor water use reduction
  - **Preq** Cooling tower water use
  - **Preq** Water metering

**ENERGY & ATMOSPHERE** POSSIBLE: 31
- **40-49 Points**
  - **Preq** Fundamental commissioning and verification
  - **Preq** Minimum energy performance
  - **Preq** Building-level water metering
  - **Preq** Construction and demolition waste management planning
  - **Preq** Construction product disclosure and optimization - environmental product declarations
  - **Preq** Building product disclosure and optimization - sourcing of raw materials
  - **Preq** Building product disclosure and optimization - material ingredients
  - **Preq** Construction and demolition waste management

**MATERIAL & RESOURCES** POSSIBLE: 13
- **40-49 Points**
  - **Preq** Storage and collection of recyclables
  - **Preq** Construction and demolition waste management planning
  - **Preq** Minimum acoustic performance
  - **Preq** Enhanced IAQ strategies
  - **Preq** Low emitting materials
  - **Preq** Sustainable water use
  - **Preq** Regional priority
  - **Preq** LEED Accredited Professional

**INDOOR ENVIRONMENTAL QUALITY** POSSIBLE: 16
- **40-49 Points**
  - **Preq** Minimum IAQ performance
  - **Preq** Environmental tobacco smoke control
  - **Preq** Minimum acoustic performance
  - **Preq** Enhanced IAQ strategies
  - **Preq** Low emitting materials
  - **Preq** Sustainable water use
  - **Preq** Regional priority
  - **Preq** LEED Accredited Professional

**INNOVATION** POSSIBLE: 6
- **40-49 Points**
  - **Preq** Innovation
  - **Preq** LEED Accredited Professional

**REGIONAL PRIORITY** POSSIBLE: 4
- **40-49 Points**
  - **Preq** Regional priority

**TOTAL** 110
include:

- Building integrated photovoltaics on the roof
- Solar hot water
- Roof mounted skylights
- Use of materials that are either repurposed or have high recycled/recyclable content
- Electrochromic glass
- Climate control through operable windows and overhead fans
- LED fixtures throughout with occupancy and daylight sensors
- Water efficient fixtures which exceed Title 24
- Energy control and monitoring

If feasible, a net-zero building is highly desirable. The D/B team is encouraged to analyze the rate of return on investment on a net-zero building for consideration by SJECCD.

In addition, a sustainable building is one that is constructed of materials that are durable with a long life span.
Architecture

The project is new construction on a 3-acre site of a LEED-Silver (minimum) one or two story building, new utility lines to service the new building, a new vehicle parking lot with lighting, bicycle parking, trash enclosure, appropriate edge and campus landscaping, and all associated signage, site preparation, and improvements.

The building is expected to be a creative response to the needs of the program and be a cost-effective high quality design that engages the users and the outside pedestrians. JU21-PSEC should have a strong street presence and be inviting to the community.

Fitting into the context of the neighborhood does not mean the building should mimic an existing style of an adjacent building. Rather, it means to be considerate of neighbors’ concerns, whether it is RMS or the single family homes, regarding privacy, scale, massing, and streetscape.

The new building will serve as an introduction of its type Milpitas, not only by its presence, but also functionally as a new building type for high school students and the community to use. Besides providing an environment that keeps 21st century learning in mind, it will house classrooms that are flexible in size, a computer lab, and a biology lab.

The success of the building is also tied to the integration of the landscape and architecture. The landscape can function as an extension of the indoor spaces (such as classrooms or the Hub), as well as create outdoor “rooms” as well (for example: an arena for robotics testing).

Design of this project needs to follow careful analysis of the building program, relationship to exterior open space, aesthetic considerations, and sustainability goals.

The San Jose Evergreen Community College District District Standards and Campus Guidelines Handbook (Draft) should also be referenced by the D/B team along with this programming document.

Building Setbacks

While setbacks for the building are not mandatory, it is important to provide them at each of the boundary edges.

A setback from Escuela Parkway will affect the level of engagement from pedestrians with the building. There is not a high level of foot traffic along Escuela Parkway from the casual pedestrian. Most foot traffic are from K-12 students during peak times at the beginning or end of adjacent school hours. Sufficient space for landscaping between the building and the sidewalk would be appropriate.

The parking lot should not dominate the street frontage and should
be separated from the sidewalk with either the building, a screen, or landscaping.

A setback and fence from the adjacent middle school would provide security and a clear separation for both RMS and JU21-PSEC. There should not be any encouragement of engagement between the two properties. Any opportunities where people on the JU21-PSEC site, whether in the building or in the parking lot, are able to observe or access the middle school from the property boundaries should be strongly discouraged.

A significant fenced setback from the residential neighborhood will show a good faith measure between the Districts and the neighborhood. The residential neighbors may have noise concerns from construction, as well as visual privacy concerns if the building’s height allows users to see into their yards.

Fencing along setbacks should be attractive, long lasting, and discourage a person’s ability to climb them.

Visual Connections
Although the immediately views to the north, west, and south are those of an urban neighborhood, the view to the east is that of the lush Monument Peak hillside that is part of the Mount Diablo range. The view should be taken into consideration with the building design, but is not a primary driver of the design.

Height / Scale / Massing
A one-story building was discussed throughout the programming sessions between LPA, SJECCD, and MUSD. The majority of the surrounding buildings are at a one-story height. Still, a two-story building may be considered if feasible to the D/B team. Whether one-story or two-story, the D/B team would need to determine the setback from the sidewalk along Escuela Parkway so the building would not to be out of scale with pedestrians while still maintaining a welcoming street facade.

If a two-story building is to be considered, the shadows cast to outdoor spaces would need to be considered as well. Outdoor spaces that are designated to be an extension of indoor rooms should not be cast in solid building shadows for the majority of the day. This would make these outdoor spaces uninviting to the users.

The mass of the building should provide visual interest and continue to engage pedestrians without overwhelming them in scale.

Character
The JU21-PSEC should support the visual unity of the neighborhood while at the same time serving as an icon to the community. Its street
presence should be welcoming to the community and accented with landscaping.

Building Orientation
The D/B teams should consider orientation and design to take advantage of sunlight and wind direction for optimal building efficiency.

Building Entries
The building entry supports the identity of the building as well as provides access. The primary entry to the building should be directed towards the parking lot as this will be where most building users will be coming from. Bicycle parking should be located nearby.

A secondary entrance along Escuela Parkway would serve as an entry for building users who have either taken public transportation or are MHS students traveling on foot.

Interior components
Interior components will be addressed in the final documentation.
The pedagogy of the facility will be focused around 21st Century Learning. 21st Century Learning is a concept to be encouraged through not only the obvious set up for technology and infrastructure, but also through spatial flexibility and relationships.

Additional descriptions will be provided in the final documentation.
Signage / Wayfinding

Minimum signage requirements will be listed in final programming documentation.
Structural Basis of Design

1. **Building Code:** 2013 California Building Code, including all Division of the State Architect, Structural Safety (DSA-SS) amendments and referenced standards.

2. **Reference Standards:** As indicated in the 2013 California Building Code, including but not limited to the following:
   b. American Concrete Institute (ACI) Standard 318-11: Building Code Requirements for Structural Concrete
   f. American Iron and Steel Institute (AISI) Standard S100-07/S2-10 North American Specification for the Design of Cold-formed Steel Structural Members, and other referenced AISI Standards
   g. American Welding Society (AWS) Standards D1.1-10, D1.3-08, D1.4-11, D1.8-09, and QC1-06.

3. **Design Loads:** As required by the Building Code.
   a. Dead Loads: Accommodate loads from weights of building materials, construction itself, and all fixed equipment and contents.
   b. Live Loads: Accommodate loads from use and occupancy of the building, either uniformly distributed loads or concentrated loads as prescribed by code, whichever are more demanding structurally.
   c. Environmental Loads: Accommodate loads from all environmental forces in accordance with the building code and the following:
      i. Lateral Soil Loads: Lateral pressure of soil adjacent to vertical substructure elements, including potential surcharge from fixed or moving loads and potential hydrostatic pressure.
      ii. Vertical Soil Loads: Full soil and hydrostatic pressure applied over entire substructure area.
      iii. Wind: Forces attributable to design wind speed at project location applied in accordance with the building code.
      iv. Seismic: In accordance with the building code.

4. **Foundations:** Provide foundations capable of supporting all long- and short-term loading in compliance with the building code and the project geotechnical report. Foundation design shall consider the effects of short-term and long-term differential and total settlement, durability of foundation elements, and local and regional geologic and environmental factors.

5. **Floors on Grade:** Provide reinforced concrete structural slabs installed over fill or at excavated and compacted grade, in accordance with the recommendations provided in the project geotechnical report. Include provisions for all required depressions in the floor, such as trenches, pits, and sumps. Slab on
grade design shall provide for durability, resistance to moisture and vapor transmission, prevention of cracking, prevention of settlement, drainage and support of code-required vertical and horizontal loads.

6. **Superstructure:** The building’s superstructure shall be designed to safely resist all code-required loads, including but not limited to dead loads, live loads, wind loads, seismic loads, and soil loads. Superstructure design shall provide for safety, durability, limitation of deflection, vibration resistance for occupant comfort, and ease of maintenance.

7. **Non-structural Elements:** Building elements anchored to or supported by the building and the attachment/anchorage of these elements shall be designed to resist all code-required vertical and lateral loads. These elements include but are not limited to cladding, equipment, casework, partitions, ceilings, lights, monitors, ducts, pipes, sprinklers, parapets, awnings, canopies, appurtenances, etc.

8. **Construction Loads and Erection Stresses:** The building shall be capable of accommodating temporary construction loads and erection stresses during construction.
Civil

**EARTHWORK**

**GENERAL SITE GRADING**
The existing topography of the site is relatively flat, sloping from east to west. A majority of the site ultimately conveys stormwater runoff via sheet flow to Escuela Parkway to the east.

The finished floor of the proposed Education Center Building will be established approximately 12”-18” higher than adjacent street and Thomas Russell Middle School elevations (to be confirmed by civil survey, which was not available at the time of this documents preparation). Landscape areas around the building will be established with a minimum of 2% of slope away from the building. New hardscaped plaza areas around the building will be designed to a minimum slope of 1% and a maximum slope of 2%. All walkways are to be designed with a 1.8% maximum cross slope and 4.8% maximum slope along the path of travel.

Parking lot grading will generally be sloped toward landscaped areas away from the proposed building. Accessible stalls are to be graded with a slope not to exceed 2% in any direction. Generally parking lot slopes will be sloped at 1% to 2% considering the flat existing site.

Over Excavation Requirements:

No geotechnical report was available at the time of this documents preparation.

**EXTERIOR IMPROVEMENTS**

**ASPHALTIC CONCRETE PAVING**

Asphalt pavement sections and subgrade preparation will be determined by the Geotechnical Engineer. No geotechnical report was available at the time of this documents preparation.

Asphalt shall be PG64-10 per Caltrans Specifications, Section 92. Aggregate base shall be Class 2 per Caltrans Specifications, Section 26.

**PORTLAND CEMENT CONCRETE PAVING**

Portland cement concrete pavement sections and subgrade preparation will be determined by the Geotechnical Engineer. No geotechnical report was available at the time of this documents preparation. Finish on concrete to be broom and sandblast. Natural gray color. Speed dowels should be from Greenstreak. Aggregate base shall be Class 2 per Caltrans Specifications, Section 26.

**UTILITIES**

**DRAINAGE SYSTEMS**

The existing site conveys stormwater runoff via sheet flow to Escuela Parkway to the east. The street flow is conveyed via concrete curb and gutter and eventually into a curb opening catch basin at the intersection of Manzano Street and Escuela Parkway. Ultimately the City storm drainage system discharges to Calera Creek then to San Francisco Bay about 2 miles west of the project site.

The project’s stormwater drainage system will be designed so that post-construction runoff rates and duration shall not exceed pre-project rates and duration in accordance with the requirements listed in the Santa Clara Valley Urban Runoff Pollution Prevention Program C.3 Stormwater Handbook. Building roof drains will discharge to landscaped areas where practical. Parking lot runoff will sheet flow to proposed water quality treatment areas generally located along the south edge of the site. A new connection to the City storm drainage system will be required at the southwest corner of the site.

Drain pipe shall be PVC (SDR 35) for pipes 12-inches and less in diameter, and RCP (CL-IV) for pipes 18-inches and larger. Drainage Manholes shall be 48-inch diameter precast concrete with cast iron frames and grates. Area drain inlets shall be precast concrete or HDPE and will range in size from 6” round to 18” square grates. Trench drains shall be 6-inch minimum width with sloping bottoms. Storm drain cleanouts shall be installed at changes in pipe direction and at
STORMWATER QUALITY

As discussed previously, the project is subject to the requirements listed in the Santa Clara Valley Urban Runoff Pollution Prevention Program C.3 Stormwater Handbook. The project site will increase impervious area by more than 10,000 s.f., therefore; C.3 source control, site design and treatments apply. The project site will create more than one acre of new impervious area and it is in the “green area” of the Milpitas HM Applicability Map, therefore; the project must implement Hydromodification Management (HM) requirements. Definitions of stormwater terms can be found in the C.3 Stormwater Handbook.

At the time of this document, no geotechnical report was available for review. We anticipate using a combination of Site Design and Low Impact Design techniques to mitigate hydromodification. If underlying soils are determined to be pervious, infiltration techniques will be used to reduce the volume of runoff from the site. If underlying soils are determined to be impervious, other options will be considered such as rainwater harvesting, pervious pavements, green roofs or a combination of best management practices.

SANITARY SEWER SYSTEMS

A new 6- or 8-inch connection to the public sewer system in Escuela Parkway will be required to serve the proposed building. Sanitary sewer pipes may be VCP (ES) or PVC (SDR 35) installed with slopes ranging from 0.5% to 2% or greater. Sewer cleanouts shall be installed at changes in pipe direction and at intervals of 100 feet maximum.

WATER SYSTEMS

Water system will be a separate fire and domestic water supply. The fire system will have an 8” PVC (C-900) Class 200 looped main with two connections to the public water system in Escuela Parkway. The fire water connections require double detector check backflow protection. The fire hydrants and fire department connections shall be per the City of Milpitas Fire Department requirements.

Domestic water mains shall be PVC (C-900) Class 150 for lines 4-inches and larger. Domestic water service laterals 3-inches and smaller shall be Type K soft copper. The domestic water service shall include a reduced pressure principle (RPP) backflow device and water meter per City requirements.
LANDSCAPE

GENERAL APPROACH
The existing site is an existing turf playfield and is a permeable site for storm water runoff. The new development should encourage creative mitigation of increased site impermeability through the collection and use of roof and parking lot runoff via sustainable site solutions such as bioswales, retention/detention ponds, and bio-filtration.

The proposed JU21-PSEC will have uses that are relatable to exterior courtyards or outdoor classrooms that could provide an indoor/outdoor relationship, and would encourage the programming of exterior spaces. Examples would be roll up doors to exterior hardscape, amphitheaters, and shaded classroom break out spaces.

Overall site development should be designed with the ability to attain a LEED Silver Certification. This goal would include providing all necessary site amenities such as bike racks, water efficient landscaping, etc.

The project’s specific plant pallet should be drought tolerant with the use of native species and non-invasive water-conserving plants encouraged where possible to achieve as low a water requirement as possible. The use of turf should be discouraged, unless it is required for a specific programmatic function. All selection of plants should be based on a disease and pest resistance, and availability from local/regional landscape suppliers.

The practice of grouping and designing the landscape with plant arranged in similar hydro zones (plants with similar water use) is encouraged. Plants should be selected and planted appropriately based upon their adaptability to the specific site climatic, topographic, and soil conditions.

The design should focus upon providing usable outdoor spaces, along with blurring the line between indoor and outdoor use, at the interior atriums to provide natural daylight and interior views to landscape. The site development should strive to provide seating for impromptu, break-out meetings in a variety of spaces where education and socialization can take place. The planting pallet shall adhere to the college standards, and focus on native and drought tolerant, sustainable species. The landscape should reinforce and relate to the adjacent campus uses, and the major pedestrian routes and overall campus and surrounding environs.

Planting / Trees:
The plant pallet and individual species selected for this project shall reflect the campus goals of sustainability through the use of materials that are suitable for the local climate, while not requiring excessive maintenance or demanding exorbitant amounts of water. The selected species shall all comply with a plant pallet reviewed and approved by campus maintenance personnel, Campus Architectural Committee and Landscape Committee. The planting design and irrigation system shall comply with all state guidelines for water efficient landscapes.

Any existing plant material or trees that can be retained and reused would be encouraged. One such area for consideration would be the recently planted streetscape along Escuela Pkwy.

IRRIGATION

GENERAL
The irrigation system and all its related components shall be planned and designed to allow for proper installation, management, and maintenance.

To achieve this goal, the following design criteria should be incorporated:

- Fully automatic, state-of-the-art control systems utilizing evapotranspiration and/or soil moisture sensing data.
- Take advantage of existing reclaimed water line @ Escuela Pkwy with local water supply.
authority regulations and restrictions that may apply.

- The irrigation system shall be designed to prevent runoff, overspray, or other similar inefficient conditions where irrigation flows onto adjacent non-targeted areas.

- The use of “drip irrigation” via on soil, or sub-soil delivery of irrigation water is encouraged to facilitate maximum efficiency as applicable.

The irrigation system should be state-of-the-art, and fully automatic, complying with all local and state laws for water efficiency. The system shall be designed in conjunction with all Campus standards for materials & manufacturer’s. The new system shall be compatible with the adjacent, existing campus irrigation and maintenance standards, while incorporating a controller with weather monitoring equipment to provide for the most sustainable and efficient installation.

Hardscape

PAVING
The design and selection of materials for the hardscape shall adhere to the college goals of sustainability and cohesion of campus through consistent materials. The majority of the pedestrian system should be natural grey concrete with appropriate finish, with special areas possibly using integrally colored concrete with decorative finishes to highlight special social areas. All opportunities to incorporate permeable paving should be explored.
Parking

Minimum parking requirements will be listed in final programming documentation.
Electrical

Part 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrical: Provision and distribution of electrical power to operate all electrically-operated devices, including those included under other services and those provided separately by the Owner; electric lighting to illuminate spaces and tasks, both interior and exterior, independent of reliance on natural light; and grounding systems; comprising the following elements.

B. Service and Distribution: Service entrance equipment, distribution equipment, transformers, motor control equipment, service and feeder wiring (conductors and raceways), monitoring, safety and control equipment, and other elements required for a complete functional system.
   1. Main Electrical Service: The utility will provide a service transformer to convert its distribution voltage to the building’s utilization voltage.
   2. Distribution Circuit Configuration: Radial circuit arrangement.
   3. Switchgear Location: Locate the main switchboard in an electrical room.
   4. Panelboard Locations: Locate the panelboards in electrical rooms. Do not locate panelboards in public corridors, hallways, or stairwells.
   5. 480-208Y/120-Volt Transformer Locations: Locate transformers in electric rooms for efficient distribution and noise isolation. Do not locate transformers in public corridors, hallways, or stairwells.

C. Branch Circuits: Branch circuit wiring and receptacles and other branch circuit wiring systems, comprising the following elements:
   1. Branch circuit breakers.
   2. Conductors and cable in metal conduit from panelboards to fixtures, wiring devices, and mechanical equipment.
   3. Raceways and boxes.
   4. Wiring devices, including, but not limited to, receptacles, floor boxes and plates, wall switches, wall dimmers, remote control switching devices, and wall plates.

D. Interior Lighting: Comprising the following elements:
   1. Luminaires for general illumination.
   2. Accent lighting.
   3. Built-in task lighting where appropriate.
   4. Emergency lighting.
   5. Illuminated exit signs.

E. Exterior Area Lighting: General lighting of exterior spaces including driveways, walkways, and parking areas, comprising exterior luminaires, poles, standards, or other means of mounting the luminaires, power supply, and controls.


1.02 RELATED REQUIREMENTS

A. San Jose-Evergreen Community College District; District Standards and Campus Guidelines Handbook, Division 26 Electrical.

1.03 REFERENCE STANDARDS

Adhere to the requirements of the following reference standards or most current version, as applicable.

K. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.
L. California Electrical Code which adopts NFPA 70 - National Electrical Code, with amendments; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments.
M. California Code of Regulations, Title 24, Part 6, California Energy Code: Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments.

Part 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS
A. Product selection is at the discretion of the Design-Build Entities pending approval by Owner, excepting any products listed in this section (below). All product performance must conform to the following:
   1. Design Criteria
   2. All applicable codes;
   3. Program intent;
   4. Provide equipment listed, labeled or certified for use by a national recognized testing laboratory (NRTL) as recognized by the U.S. Department of Labor, OSHA, and bear the listing sticker in an accessible location.

2.02 UTILITY SERVICE ENTRANCE
A. Configuration:
   1. Underground service entrance.

2.03 SERVICE AND DISTRIBUTION
A. Transformer Applications:
   1. Distribution Transformers for Ordinary Loads: Use general purpose transformers.
   2. Distribution Transformers for Loads Sensitive to Noise and Harmonics: Shielded isolation transformers.
B. Secondary Service and Distribution Feeders:
   1. Conduits:
a. Use one of the following:
   1) Below Grade: IMC conduit, GRS conduit, or PVC conduit (schedule 40, minimum), with GRS elbows.
   2) Interior, Concealed: EMT.

C. Main Service Equipment:
1. Types of Equipment:
   a. Use the following:
      1) Low voltage switchgear.
      2) Switchboards.
      3) Distribution panels.
      4) Motor control centers.
   2. Main Devices:
      a. Use one of the following:
         1) Power circuit breakers.
         2) Molded case circuit breakers.
         3) Fused switches.
         4) Bolted pressure switch.
   3. Branch Devices:
      a. Use the following:
         1) Circuit breakers.
      b. Do not use:
         1) Fused switches.
   4. Busbars:
      a. Use the following:
         1) Copper.
      b. Do not use:
         1) Aluminum.

D. Branch Circuit Panelboards:
1. Busbars:
   a. Use the following:
      1) Copper.
   b. Do not use:
      1) Aluminum.
   2. Circuit Breakers:
      a. Use one of the following:
         1) Molded case circuit breakers.
      b. Do not use:
         1) Fused switches.

2.04 LIGHTING

A. Interior Lighting:
1. Use the following:
   a. Pendant-mounted direct-indirect or recessed direct fluorescent luminaires in office areas for general lighting.
   b. Occupancy sensors in private offices and conference rooms to control general lighting.
   c. Manual dimming controls in areas requiring dimming per Title 24.
   d. Fluorescent and compact fluorescent electronic ballasts with less than 10% total harmonic distortion.
   e. Daylighting controls to reduce the amount of electric lighting in areas with skylights and windows intended for daylighting use.
   f. Compact fluorescent lamps.
   g. LED light sources, powered by not less than 90% efficient power supply.
   h. T-5 and T-8 full size fluorescent lamps.
   2. Do not use the following:
      a. Incandescent lamps.
B. Emergency Lighting:
1. Use one of the following types:
   a. Building luminaires powered by emergency generator.
   b. Centralized inverter panels with battery pack.
2. Do not use the following:
   a. Self-contained battery-powered lighting units.

C. Exterior Area Lighting Luminaires:
1. Use one of the following types:
   a. Direct cut-off type lighting units.

D. Exterior Area Lighting Lamps:
1. Use the following type:
   a. LED light sources, powered by not less than 90% efficient power supply.

E. Exterior Lighting Control
1. Provide programmable lighting controls to facilitate flexible scheduling including astronomic feature.
2. Provide multiple channels to facilitate zoning of lighting control areas.
3. Photocell ‘on’ with time clock ‘off’ programming.

Part 3 - DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Electrical Power: Provide electrical power with the appropriate characteristics to operate all electrically operated devices, including those in other services.
1. The electrical system comprises the following elements:
   a. Electrical Energy Generation: Utility power sources, engine-generator systems, battery power systems, uninterruptible power supply systems and unit power conditioners.
   b. Service and Distribution: Service entrance equipment, distribution equipment, transformers, motor control equipment, service and feeders (conductors and raceways), monitoring, safety and control equipment, and other elements required for a complete functional system.
   c. Branch Circuits: Branch circuitry and receptacles and other branch circuitry systems.
   d. Other Electrical Power Elements: Transient voltage surge suppressors.
2. Utility Revenue Meters: Meter incoming electrical service on the low-voltage side of the service transformer (secondary metering) as required by Utility Company.
3. Where electrical power elements also must function as elements defined within another element group, the construction will meet the requirements of both element groups.
4. Capacity: Calculated in accordance with California Electrical Code.
5. General Receptacle System Voltage: 120 volts/1-phase/60 Hz.
   a. Provide 208 / 240 volt/1 and 3-phase/60 Hz receptacles where required for equipment.
6. Equipment Voltage: 480 volts/3-phase/60 Hz.
7. Lighting Voltage: 277 volt/1-phase/60 Hz. Use 120 volt/1-phase only when 277 volt/1phase
8. Main Switchboards: In accordance with code plus 10 percent spare capacity.
9. Interior Distribution Transformers: As required to serve building circuits and equipment plus 10 percent spare capacity.
10. Branch Circuit Panelboards: In accordance with code plus 10 percent spare capacity.

B. Distribution: Distribute electric power for equipment circuits, lighting circuits, receptacle circuits, and electrical utilization devices.
1. Branch Circuits: Provide adequate electrical power and safe and efficient distribution from electrical distribution equipment to lighting, wiring devices, equipment, and appliances, based on the project program, requirements of other sections.
C. Telecommunication Rooms (MDF/IDF)
   1. Provide 20-ampere duplex convenience electrical outlets installed on perimeter walls:
      1 duplex outlet placed every 6 linear feet at 18” AFF. Provide surface mounted outlets
      located and coordinated with the Owner after plywood backboard and equipment
      racking/overhead ladder racking installation is complete.
   2. Provide electrical outlets installed on all equipment racks. Provide electrical feed
      to equipment racks via conduit run along nearest wall, routed to the back side of
      each equipment rack, and terminated into simplex boxes mounted at the base of all
      equipment racks.

D. Lighting: Provide means electrically to light interior and exterior spaces.
   1. Interior Lighting: Provide artificial lighting for all interior spaces that is adequate in
      quality and distribution for the performance of tasks typical for the type of space and the
      characteristics of the intended population, regardless of the availability of natural light.
      a. Provide lighting controls to reduce electric light level when natural light is present,
         while maintaining specified light levels.
   2. Exterior Lighting: Provide electric lighting for exterior spaces, as required by the project
      program that is adequate in quantity, quality, and distribution for the performance of
      tasks typical for the type of outdoor space and the characteristics of the intended user
      population.

E. Solar Photovoltaic Power System
   1. Develop design and include infrastructure for future photovoltaic power system for
      connect in net metering configuration in coordination with the utility service.

3.02 AMENITY AND COMFORT CRITERIA

A. Accessibility: Comply with ADA Standards for Accessible Design.
   1. Lighting Controls: Provide accessible lighting controls for all spaces, regardless of
      location.
      a. Location: Where accessible lighting controls are required, provide devices that
         are mounted so they can be reached from a wheelchair and are not more than 48
         inches (1220 mm) and not less than 42 inches (1070 mm) from the floor.
      b. Operating Force: Where accessible lighting controls are required, provide controls
         that can be operated without tight grasping or pinching and by a force of not more
         than 5 lbf (22.2 N).

B. Electric Light Quality: Provide luminous environment in each space that is designed to
   complement the functions and the character of the space.
   1. Interior Lighting:
      a. Distribution: In keeping with geometry of space and location of visual tasks.
      b. Spatial Luminance: Provide luminous environments throughout project in which
         brightness ratios are maintained within the following ranges:
            1) Task Area and Adjacent Darker Surroundings: 3:1.
            2) Task Area and Adjacent Lighter Surroundings: 1:3.
            3) Task Area and More Remote Darker Surfaces: 10:1.
            4) Task Area and More Remote Lighter Surfaces: 1:10.
            5) Light Sources and Adjacent Surfaces: 10:1.
            6) Any Surfaces within Normal Field of View: 30:1.
      c. Color of Light: Appropriate for functions accommodated in space and
         characteristics of interior finishes.
         1) Color: Provide light sources throughout project with Color Rendering Index of
            not less than 80.
   2. Exterior Area Lighting:
      a. Glare Minimization: Provide exterior area lighting that minimizes the incidence of
         discomfort glare and avoids disability glare under all normal conditions of use, in
         accordance with IESNA recommendations.
      b. Color: Provide light sources throughout project with Color Rendering Index of not
         less than 60 and color temperature not greater than 4100 Kelvin.
4. DESIGN CRITERIA

3.03 DURABILITY CRITERIA

A. Expected Service Life Span:
   1. Electrical:
      a. Power Distribution Equipment: Same as building service life.
      b. Power Generation Equipment: Minimum 20 years.
      c. All Components of Life Safety-Related Systems: Minimum 20 years.
      d. Control Components, Except Wiring: Minimum 10 years.
   2. Lighting Fixtures: Minimum 15 years.
   3. All Grounding Systems: Life of the building without requiring any more maintenance than annual inspection and minor repairs not more frequently than annually.

B. Transformer Insulation Class: As follows:
   1. General-Purpose Transformers: Insulation Class 105 degrees C.

C. Corrosion Resistance: Provide electrical energy generation equipment which is resistant to corrosion.

D. Impact Resistance:
   1. Provide poles for parking lot area lighting that are located to avoid damage by automobiles, mounted to bases that are structurally capable of withstanding moderate impact, or protected by bollards or similar structures.

E. Vandal Resistance - Exterior Area Lighting:
   1. Parts not easily removed without the use of special tools.
   2. Lenses of tempered glass, high impact acrylic, polyacrylate, or polycarbonate.

3.04 METHODS OF CONSTRUCTION

A. The construction will use the following:
   1. Identification and Labeling
      a. Install nameplates on electrical equipment including:
         1) Individual circuit breakers on switchboards, distribution panelboards and motor control centers.
         2) Motor starters.
         3) Pilot lights, selector switches, overload resets, timers and other pilot control devices.
         4) Panelboards, switchboards, motor control centers, transformers, control cabinets and other major equipment.
5) Disconnect switches, time switches, contactors, relays and other miscellaneous equipment enclosures.

6) Light switches for which the control functions are not evident.

7) Describe item, control function of sequence or operation on each nameplate, as applicable.

8) Fabricate nameplates of laminated phenolic plastic, black front and back with white core. Bevel edges. Engrave through outer layer to produce white letters and numerals. For control pilot devices, engraved metallic plates, filled with enamel, are acceptable. Fasten nameplates to equipment with No. 4 Phillips, round head, cadmium steel, self-tapping screws.

2. Raceway Systems
   a. Install all wiring in raceways. Install raceway systems, including conduits, hangers and support channels parallel or perpendicular to structural members. Coordinate location of raceway systems with other Divisions prior to commencing installation.
      1) For use underground, provide a minimum of 24 inches of cover. Fabricate field bends with an approved thermal bender and jig or use factory-made bend. Maintain separation between conduits using plastic spacers specifically designed for the purpose.
      2) Conduit Supports:
         (a) Support all conduits at intervals not to exceed 10 feet.
         (b) Support individual conduits with conduit hangers or clamp back and nest back, if required for entrance into the equipment.
         (c) Support multiple conduits, 2 or more in parallel, with framing channel and pipe clamps.
      3) Conduit Bends:
         (a) Provide no more than (3) 90-degree conduit bends or the equivalent number of smaller radius bends in any conduit run between boxes or equipment.
         (b) Length of run: 400 feet maximum less 100 feet for each equivalent 90 degree bend.
         (c) Fabricate bends and offsets with a hickey or conduit bender designed specifically for use with the type of conduit to be bent, or use factory made bend.
         (d) Radius of Underground Bends: Minimum 12 times conduit radius.
      4) Provide conduit-sealing bushings at conduit penetrations through exterior walls to seal against fluid and gas pressure around the conduit.
      5) Fit all conduits that enter the enclosure of a switchboard, distribution panel, or motor control center with an insulated grounding bushing.
      6) Fit PVC conduits that enter underground pullboxes and junction boxes with belled ends.
      7) Install pull ropes in all empty conduits, #12 AWG in conduits 1 inch and smaller and 3/16 inch polypropylene rope in conduits 1-1/4 inch and larger.
   b. Conduit Supports:
      (a) Support all conduits at intervals not to exceed 10 feet.
      (b) Support individual conduits with conduit hangers or clamp back and nest back, if required for entrance into the equipment.
      (c) Support multiple conduits, 2 or more in parallel, with framing channel and pipe clamps.
   c. Conduit Bends:
      (a) Provide no more than (3) 90-degree conduit bends or the equivalent number of smaller radius bends in any conduit run between boxes or equipment.
      (b) Length of run: 400 feet maximum less 100 feet for each equivalent 90 degree bend.
      (c) Fabricate bends and offsets with a hickey or conduit bender designed specifically for use with the type of conduit to be bent, or use factory made bend.
      (d) Radius of Underground Bends: Minimum 12 times conduit radius.
   d. Provide conduit-sealing bushings at conduit penetrations through exterior walls to seal against fluid and gas pressure around the conduit.
   e. Fit all conduits that enter the enclosure of a switchboard, distribution panel, or motor control center with an insulated grounding bushing.
   f. Fit PVC conduits that enter underground pullboxes and junction boxes with belled ends.
   g. Install pull ropes in all empty conduits, #12 AWG in conduits 1 inch and smaller and 3/16 inch polypropylene rope in conduits 1-1/4 inch and larger.
   h. Boxes and Cabinets:
      a. Install junction boxes with covers accessible after installation. Do not install junction boxes flush with finish walls or ceilings unless specifically approved by the City of Woodland.
   i. Insulated Conductors and Cable:
      a. Exercise extreme care when pulling conductors and cable into conduits to avoid kinking, twisting, nicking or scratching of the insulation or the placement of extreme stress on the conductors or cable. When required, utilize UL approved pulling compounds to assist in pulling conductors.
         1) Color code conductors by phase sequence A-B-C when looking into the front of the equipment from left-to-right, top-to-bottom or front-to-back. Provide conductors with the appropriate phase color or mark conductors with a minimum of 6 inches of phase tape on ends connected to terminals. Phase code conductors as listed:
            (a) Voltage Phase A Phase B Phase C Neutral Ground
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(b) 120/208 Black Red Blue White Green
(c) 277/480 Brown Orange Yellow Grey Green

2) Identify all conductors with their respective circuit numbers at all boxes and terminals.
3) Use cast resin epoxy splices for splices in underground pullboxes.
4) Wrap all wire and cable operating at 480 volts AC or more with electric arc and fireproofing tape where wires are installed with other wires or cables.

5. Grounding
   a. Ground and bond the electrical system in accordance with the applicable codes.
      1) Ground the main service neutral and enclosure. Bond the metallic cold water and gas piping systems to the service ground.
      2) Install code size (#12 AWG minimum) green equipment ground wire secured using approved methods to all metal boxes in all raceways. Green tape may be used for identification of ground wires on # 4 AWG conductors and larger.
      3) Permanently and effectively ground all raceway systems, supports, cabinets, switchboards, transformers, control equipment, motor frames, lighting fixtures and other utilization apparatus.
      4) Provide a code size copper grounding-conductor, bonded at each end to equipment.

6. Electrical Work for Equipment
   a. Provide all connections to equipment requiring electrical supply.
      1) Review equipment specification requirements for additional work required.
      2) Provide outlets or hard wired connections as applicable.
      3) Provide flexible connections where required to minimize transmission of noise and vibration.

3.05 OPERATION AND MAINTENANCE CRITERIA

A. Capacity: Calculate capacity in accord with 2010 California Electrical Code and incorporating not less than the connected loads or the following load densities, whichever is greater:
   1. Receptacles: 5 VA per square foot of building area.
   2. Miscellaneous equipment: 2 VA per square foot of building area.
   3. Program intent.

B. Load Characteristics:
   1. Maximum Harmonic Current Distortion: Plus or minus 2 percent of design current.
   2. Transient Suppression: Limit voltage transients below damage curve of the electrical system and connected equipment.

C. Energy Efficiency:
   2. Comply with requirements of California Code of Regulations, Title 24, Part 6, California Energy Code. Design lighting systems to meet project energy goal of 20% below allotment.
   3. Interior Lighting Controls: Provide level of control of lighting appropriate to type of space and Owner’s requirements for energy conservation.
      a. Daylighting Controls: Provide separate lighting controls for spaces or zones adjacent to fenestration and areas with skylights.
         1) Controls: Daylight sensing controls, continuous dimming throughout project.
      b. Occupancy Controls: Provide lighting circuits for private offices that are controlled by devices that do not require action by occupants.
         1) Controls: Occupancy sensor and programmable timing control throughout project.
   4. Exterior Area Lighting Controls: Provide level of control of lighting appropriate to type of space and Owner’s requirements for energy conservation.
   5. Exterior Area Lighting Controls: Provide daylight sensing controls, on-off switches, and programmable timing.

END OF SECTION
Mechanical

Overview
The Design-Build team shall be responsible for complete design and installation of a Heating, Ventilation and Air-Conditioning (HVAC) to meet the programmatic needs of the facility. The HVAC systems will be “stand-alone” systems not connected to other campus HVAC systems or interconnected with existing buildings. The HVAC system shall be designed to be energy efficient, durable, adaptable, and maintainable while supporting the comfort, health and welfare of building occupants.

Codes & Standards
The Project HVAC systems shall comply with the following codes and standards:
- 2013 California Building Codes (Title 24)
- USGBC LEED Building Design & Construction (Silver minimum)
- ASHRAE Standard 55-2010
- ASHRAE Standard 62.1-2010
- SMACNA HVAC Duct Construction Standards
- NFPA 90A and NFPA 90B
- San Jose Evergreen Community College District Standards + Campus Guidelines

Design Criteria:
The Project HVAC systems shall be designed based on the following design criteria.
- Climatic Design Conditions:
  - Summer: 88 F DB / 68 F MCWB
  - Winter: 33 F DB
- Indoor Thermal Design Conditions:
  - 70 to 76 F DB
  - As recommended by ASHRAE Standard 55-2010
  - And/or as required for the program space
- Ventilation Criteria:
  - Per 2013 California Mechanical Code (CMC) Chapter 4 and ASHRAE 62.1-2010
  - Restrooms exhaust rates shall be calculated based on CMC Chapter 4 requirements.
  - Science classroom exhaust rates shall be calculated based on CMC Chapter 4 requirements.
  - Instructional fume hoods shall be provided as required per the building program;
- HVAC Acoustic Criteria:
  - Classrooms: HVAC background noise less than 45 DBA;
  - And/or as recommended by ASHRAE

Design Process:

HVAC System Zoning:
HVAC system design shall include separately controlled zones for each classroom, lab, conference room, and instructional space. Where offices are served, a maximum of three offices with similar solar exposures shall be served by a zone. Corner offices with multiple solar exposures shall be served as a dedicated zone. Design-build team shall prepare an HVAC zoning plan and submit to Owner for approval, prior to start of the construction documents phase.

HVAC System Load Calculations:
Design-build team shall prepare HVAC load calculations for all enclosed, conditioned areas of the building using hourly (8760 hrs/yr) HVAC load calculation software, using the design massing, building envelope, occupancy, lighting, and internal load parameters of the building. Sizing of HVAC system zone air terminal units, supply air distribution ductwork, and primary HVAC system capacity shall be determined based on HVAC system load calculations. Design team shall submit a summary of HVAC system load calculations assumptions (including any diversity factors and margins of safety) and results to the Owner for review and approval prior to the start of the construction documents phase.
HVAC System Ventilation Calculations
Design-build team shall prepare zone and system ventilation requirement calculations based on CMC Chapter 4 / ASHRAE Standard 62.1 as well as California Building Energy Efficiency Standards (Title-24). Design-build team shall calculate both "design" ventilation rate, based on peak anticipated occupancy, and minimum ventilation rate based on floor-area only ventilation requirements. HVAC system shall be designed to provide ventilation based on the system ventilation calculations. HVAC system design shall include outside air-flow monitoring station(s) to monitor system ventilation rate. Classrooms, conference rooms, and areas with design occupancy in excess of 40 sf/occupant shall include CO2 monitors to allow for demand controlled ventilation.

Energy Use / Title-24 Compliance Calculations
Design-build team shall prepare energy use calculations based on 2013 California Building Energy Efficiency Standards (Title-24, Part 6). Project design shall exceed Title-24 standards by at least 15%.

Primary HVAC Equipment
The building shall include (1) VAV packaged rooftop, air-cooled DX air conditioning unit to condition entire building. Unit is anticipated to be 30 to 40-tons in nominal capacity but final equipment sizing and selection will be based on HVAC load calculations as prepared by Design-Build team. HVAC unit will include vibration isolation curb, double-wall insulated cabinet, manufacture provided 100% air-side economizer, outside air-flow monitoring station, variable speed relief/exhaust air fan(s), variable speed supply air fan(s), stainless steel condensate pan, 2" pre-filters and 4" MERV-13 final filters, minimum 4-stages of cooling capacity, factory-installed controls with LonWorks interface.
Heating shall be provided by (1) natural gas-fired, forced-draft, non-condensing boiler. Boiler shall include fully modulating burner, factory-installed controls with LonWorks interface.
Hot water distribution shall be provided via (2) variable speed hot water pumps.
MDM, IDF, and elevator machine room shall be conditioned by dedicated DX split system cooling units.
Restroom, science room, and general exhaust shall be provided rooftop, upblast direct drive centrifugal exhaust fans.
Fume hood exhaust (if required) shall be provided by dedicated, constant volume rooftop centrifugal fans designed for fume exhaust.

VAV Terminal Air Units
VAV terminal air units with DDC controls shall be provided for all HVAC zones. Terminal air units shall include 2-row copper reheat coils, velocity controller, and 1" 'fiber-free' liner. Terminal air units shall include factory or field installed LonWorks compatible DDC controller.

Air Outlets and Inlets
Ceiling supply air diffusers shall be steel, compatible with ceiling types. Ceiling exhaust and return grilles shall be aluminum egg crate style. Wall supply diffusers as well as return and exhaust grilles shall be steel double deflection type with countersunk screw mounting. Manual balancing dampers shall be provided up stream of all supply air diffusers. Remote activated balancing dampers shall be provided for inaccessible ceiling conditions.

HVAC Ductwork and Insulation
HVAC supply, return, and exhaust ductwork shall be galvanized sheet metal, designed and installed per SMACNA duct construction standards and insulated per Title-24 requirements.
Supply duct insulation shall be external fiberglass or mineral fiber duct wrap with all service jacket. Internal fiberglass, duct liner shall be limited to rooftop ductwork and where required for acoustic performance. Return air shall be via plenum returns with limited, uninsulated return ductwork. Exhaust ductwork shall not be insulated. Support all ductwork in manner complying with SMACNA "HVAC Duct Construction Standards."
HVAC supply ductwork shall be sized for less than 0.10" wg/100 ft pressure drop. Medium pressure supply duct mains shall be sized for less than 1500 fpm peak velocity. Low pressure supply ductwork shall be sized for less than 800 fpm peak velocity.
Insulated flexible duct is permitted for final connection to supply air diffusers above concealed ceilings. Flex duct connections shall be no more than 6' in length. Flex duct shall not be used on exhaust or return air systems. Flex ducts shall be UL listed and meet Class 1 requirements of NFPA 90A.

Ductwork Accessories
Combination fire and smoke dampers (where required) shall be parallel blade type conforming to NFPA 90A and shall be integrated with area-wide fire alarm system.
Provide turning vanes for all mitered elbows in supply air ducts.
Provide airtight hinged access doors in ducts and plenums for cleaning and repairs for ductwork, volume dampers, fire dampers and control devices.
HVAC Piping and Insulation
HVAC piping shall be copper type L with soldered connections. Hot water supply and return insulation shall be performed pipe insulation, sized per Title-24 requirement, with all service jacket for interior piping and aluminum jacket for exterior piping.

HVAC Controls System
HVAC systems shall be monitored and controlled by DDC energy management system (EMS). Energy Management System to Lon-based, Johnson Controls (JCI) Metasys digital control system consisting of at least one system controller. System controller(s) shall be interconnected to the facility ethernet and to distributed equipment controllers as required for control of HVAC equipment. System controller shall connect to SJECCD host computers located at District Maintenance and Operations (DM&O) buildings. All HVAC control systems shall be Lonmark listed JCI Metasys hardware. Systems installer may be JCI or any JCI value added resellers.

Testing Adjusting and Balancing
Provide services of an independent agency for testing, analysis, and balancing of hydronic systems and air distribution for HVAC systems. Test and Balance Work shall be done in accordance with methods set up by Associated Air Balance Council (AABC) or NEBB.

Commissioning
Consistent with Owner standards and LEED criteria, independent commissioning agent shall coordinate a quality control process for the design, installation, start-up and turn-over of HVAC systems.
Plumbing

Overview
The Design-Build team shall be responsible for complete design and installation of a plumbing system to meet the programmatic needs of the facility.

Codes & Standards
The Project HVAC systems shall comply with the following codes and standards:
- 2013 California Building Codes (Title 24)
- USGBC LEED Building Design & Construction (Silver minimum)
- NFPA 90A and NFPA 90B
- San Jose Evergreen Community College District Standards + Campus Guidelines

DOMESTIC WATER PIPING
Piping within the building and above grade shall be Type "L" ASTM B88, hard drawn copper tubing with wrought copper sweat fittings per ANSI B16.18 and B16.22. Below grade piping outside of the building within five feet (5') of the foundation shall be Type "K" ASTM B88, hard drawn copper with wrought copper sweat fittings per ANSI B16.18 and B16.22. Below slab piping shall be Type "K" soft annealed copper tubing with no fittings below the slab.

RECYCLED WATER PIPING
Recycled water shall be provided for toilet and urinal flushing. Recycled water piping materials shall match domestic water piping criteria. Cross connection control shall be employed as required by Code for recycled water system use in water closets. Piping systems (including marking, color and separation) for recycled water shall conform to all codes for use in buildings.

SANITARY WASTE AND VENT PIPING
Soil, waste and vent piping within the building and outside within five feet (5') of the foundation shall be no-hub cast iron pipe and fittings conforming to CISPI Standard 301-04 or ASTM A-888-04. Exposed vent piping shall be Schedule 40 galvanized steel pipe, ASTM A53. Vents through roof shall terminate with vandal resistant hoods. Acid waste and vent piping shall be schedule 40 flame retardant polypropylene pipe and fittings with electrofusion joints conforming to ASTM D635, UL test method subject 94 and manufacturer’s specifications. Acid waste piping shall discharge to an acid neutralization basin with sampling box and sanitary waste and acid vent connections at the outlet.

FACILITY STORM DRAINAGE PIPING
Storm drain piping within the building and outside within five feet (5') of the foundation, and overflow drain piping within the building shall be no-hub cast iron pipe and fittings conforming to CISPI Standard 301-04 or ASTM A-888-04.

FACILITY NATURAL-GAS PIPING
Site gas distribution systems shall be medium pressure (5 PSI), with gas pressure regulators located at boiler and water heater. Building gas systems shall be standard delivery pressure (8” w.c.). Below grade gas piping shall be SDR-11 Polyethylene PE2406. Above grade concealed gas piping within the building shall be Schedule 40 black steel pipe conforming to ASTM A-53. Gas piping for the building shall be provided with a readily accessible building shutoff outside the building. Do not run gas piping underneath buildings and minimize routing of piping in ceiling spaces. Utilize accessible pipe chases wherever possible. For gas piping on roof, provide a main shutoff on the roof and shutoffs with stainless steel flexible connections to heating equipment throughout.

PLUMBING FIXTURES
Water closets shall be water efficient 1.28 GPF flushometer valve wall mount vitreous china with siphon jet action and elongated bowl with open front seat, in both ADA and non-ADA compliant configurations as applicable. Flushometer valve to be manual with ‘dual flush’ for ‘liquid or solid’ waste handles. Waterless urinals shall be used where possible or approved by campus personnel. Campus standard waterless urinal cutsheets are available upon request. Waterless urinal installations shall include water rough in for future installation of water based urinals. Waterless urinals shall be placed downstream from the water closets and lavatories to insure the urinal waste piping laterals are flushed.
Where water urinals are required, urinals shall be water efficient 0.125 GPF “pint flush” flushometer valve wall mount vitreous china with washdown action, in both ADA and non-ADA compliant configurations as applicable. Flushometer valve to be manual. Restroom lavatories shall be undercounter vitreous china with water efficient 0.5 GPM hot and cold water mixing valve type faucet, ADA compliant. All general use sinks shall be stainless steel self-rimming type. Kitchen sinks shall be ADA double bowl HW/CW with 2.2 GPM hot and cold water mixing valve type kitchen faucet and ¾ hp garbage disposal. Interior drinking fountains shall be dual height stainless steel refrigerated type with recessed compressor. Science room sinks shall be ADA single bowl drop in corrosion resistant resin type, HW/CW with serrated hose nozzle gooseneck faucet and integral vacuum breaker, 0.7 GPM. Eye Wash shall be accessible, plumbed unit with 0.4 gpm water capacity. Provide with paddle actuator, and two spray heads. Position spray heads over sink for sink mounted units, and mounted to a stainless-steel receptor bowl for wall mounted units. Provide a minimum 1-1/4 inch P-trap and drain pipe.

DOMESTIC HOT WATER SYSTEMS
Domestic hot water shall be produced by instantaneous, gas fired, condensing, 96% efficient minimum, EnergyStar, tankless heaters. Domestic hot water recirculating pump(s) shall be provided for any systems where furthest fixture is more than 50 feet from water heater.

PLUMBING SYSTEM MAINTENANCE
Provide chrome plated brass pipe escutcheons to completely cover pipe penetration hole in colors, walls, ceilings, or pipe sleeve extension. Provide sleeve seals for sleeves located in foundation walls below grade or in exterior walls. Provide unions at each threaded or soldered connection to all equipment, tanks and valves. Provide insulating couplings or flanges at connections of piping with dissimilar materials. Do not locate piping over or within 3 feet horizontally of electrical equipment. Isolation valves shall be installed at all bathrooms to isolate each bathroom for both hot and cold water. All floor drains shall be equipped with trap primers, accessible for service. Where ceramic tile is used for flooring, square grate top drains shall be used. Provide keyed hose bibb with vacuum breaker in each restroom. All automatic/sensor faucets shall have a local disconnect/toggle switch for custodial services/cleaning. All cleanouts shall be accessible for service and snaking. Locate cleanouts for ease of location and cleaning. Cleanouts at exterior surfaced areas shall be round cast nickel bronze access frame and non-skid cover. Cleanouts at exterior unsurfaced areas shall be line type with lacquered cast iron body and round epoxy coated gasketed cover. Provide concrete ring for support of cleanout. Cleanouts at interior finished floor Areas shall be lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas. Cleanouts at interior finished wall areas shall be line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw. Cleanouts at interior unfinished accessible areas shall be caulked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

Commissioning
Consistent with Owner standards and LEED criteria, independent commissioning agent shall coordinate a quality control process for the design, installation, start-up and turn-over of water heating systems.
A/V Technology

Additional A/V information will be provided in the final documentation.
Security

PART 1 - GENERAL

1.01 SECTION INCLUDES
A. Electronic safety and security services comprise:
   1. Fire Detection and Alarm: Elements required to detect fires and communicate fire location to occupants, facility management, and public fire fighting agencies.
   2. Access Control: Elements required to allow entry by authorized persons without the use of keys, control locks remotely, detect unauthorized materials during entry, and monitor and record access activity.
   3. Intrusion Detection: Elements required to detect unauthorized entry by persons and vehicles and provide staff panic alarm capability.
   4. Remote Surveillance: Elements required to provide remote visual and audible monitoring and recording of areas within and around the facility.
   5. System operation consoles, monitoring displays, input/output devices, control and data networks, and sound, data, and voice communication related to system functions.

B. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

1.02 RELATED REQUIREMENTS
A. San Jose-Evergreen Community College District, District Standards and Campus Guidelines Handbook: Division 28 Electronic Safety and Security, Division 26 Electrical.

B. San Jose-Evergreen Community College District Handbook: Section 8 Audio Visual and Information Technology.

1.03 REFERENCE STANDARDS


C. NFPA 13 Sprinkler Systems

D. NFPA 70 National Electric Code (NEC)

E. NFPA 72 National Fire Alarm Code


G. NFPA 38 Manually Actuated Signaling Boxes

H. NFPA 217 Smoke Detectors, Single and Multiple Stations

I. NFPA 228 Door Closers-Holders for Fire Protective Signaling Systems

J. NFPA 268 Smoke Detectors for Fire Protective Signaling Systems

K. NFPA 268A Smoke Detectors for Duct Applications
L. NFPA 346 Waterflow Indicators for Fire Protective Signaling Systems
M. NFPA 464 Audible Signaling Appliances
N. NFPA 521 Heat Detectors for Fire Protective Signaling Systems NFPA 864 Control Units for Fire Protective Signaling Systems
O. NFPA 1481 Power Supplies for Fire Protective Signaling Systems
P. NFPA 1610 Central Station Burglar Alarm Units
Q. NFPA 1638 Visual Signaling Appliances
R. NFPA 1971 Visual Signaling Appliances
S. NFPA 2017 General-Purpose Signaling Devices and Systems
T. UL 38 Manually Actuated Signaling Boxes
U. UL 50 Cabinets and Boxes
V. UL 864 Control Units for Fire Protective Signaling Systems
W. UL 268 Smoke Detectors for Fire Protective Signaling Systems
X. UL 268A Smoke Detectors for Duct Applications
Y. UL 346 Waterflow Indicators for Fire Protective Signaling Systems
Z. UL 464 Audible Signaling Appliances
AA. UL 521 Heat Detectors for Fire Protective Signaling Systems
AB. UL 1971 Visual Notification Appliances
AC. UL 294 - Standard for Access Control System Units

PART 2 – PRODUCTS

2.01 FIRE DETECTION AND ALARM COMPONENTS

A. GENERAL REQUIREMENTS
1. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for Local Protected Premises Signaling Systems except as modified and supplemented by this specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.
2. The Secondary Power Source of the fire alarm control panel will be capable of providing at least 24 hours of backup power with the ability to sustain 5 minutes in alarm at the end of the backup period.
3. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSIIASQC Q9001-1994.
4. The FACP and peripheral devices shall be manufactured or supplied 100% by a single U.S. manufacturer (or division thereof).
5. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final check-out and to ensure the systems integrity.
6. The FACP shall meet requirements of UL ANSI 864 Ninth Edition
7. The FACP shall provide the following features:
   a. Drift compensation to extend detector accuracy over life. Drift compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.
   b. Detector sensitivity test, meeting requirements of NFPA 72, Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.
   c. The ability to display or print system reports.
   d. Alarm verification, with counters and a trouble indication to alert maintenance personnel when a detector enters verification an excessive number of times.
   e. Positive Alarm Sequence (PAS presignal), meeting NFPA 72 requirements.
   g. Non-alarm points for general (non-fire) control.
   h. Periodic detector test, conducted automatically by the software.
   i. Walk test, with a check for two detectors set to same address.
   j. The FACP shall be capable of coding Notification Appliance Circuits in March Time Code (120 PPM), Temporal (NFPA 72), and California Code. Main panel notification circuits shall also automatically synchronize any of the following manufacturer's notification appliances connected to them: System Sensor, Wheelock, or Gentex with no need for additional synchronization modules.

8. Central Microprocessor
   a. The microprocessor shall be a state-of-the-art and it shall communicate with, monitor and control all external interfaces. A "watch dog" timer circuit to detect and report microprocessor failure.
   b. The microprocessor shall contain and execute all specific actions to be taken in the condition of an alarm. Control programming shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.
   c. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file.
   d. A special program check function shall be provided to detect common operator errors.
   e. An auto-programming capability (self-learn) shall be provided to quickly identify devices connected on the SLC and make the system operational.
   f. For flexibility and to ensure program validity, an optional Windows(TM) based program utility shall be available. This program shall be used to off-line program the system with batch upload/download. This program shall also have a verification utility which scans the program files, identifying possible errors. It shall also have the ability to compare old program files to new ones, identifying differences in the two files to allow complete testing of any system operating changes. This shall be in compliance with the NFPA 72 requirements for testing after system modification.

9. Local Keyboard Interface
   a. In addition to an integral keypad, the fire alarm control panel will accept a standard PS2-style keyboard for programming, testing, and control of the system. The keyboard will be able to execute the system functions ACKNOWLEDGE, SIGNALS SILENCED, DRILL and RESET.

10. Display
    a. The display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.
    b. The display shall include status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.
    c. The display shall contain an alphanumeric, text-type display and dedicated LEOs for the annunciation of AC POWER, FIRE ALARM, SUPERVISORY, TROUBLE, MAINTENANCE, ALARM SILENCED, DISABLED, BATTERY, and GROUND conditions.
    d. The display keypad shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.
    e. The display shall include the following operator control switches: ACKNOWLEDGE, ALARM SILENCE, DRILL (alarm activate), and SYSTEM RESET.
B. Enclosures:
   1. The control panel shall be housed in a UL-listed cabinet suitable for surface or semiflush mounting. The cabinet and front shall be corrosion protected and painted red via the powder coat method with manufacturer's standard finish.
   2. The back box and door shall be constructed of steel with provisions for electrical conduit connections into the sides and top.
   3. The door shall provide a key lock and shall provide for the viewing of all indicators.
   4. The cabinet shall accept a chassis containing the PCB and to assist in quick replacement of all the electronics including power supply shall require no more than two bolts to secure the panel to the enclosure back box.

C. Field Charging Power Supply: The FCPS is a device designed for use as either a remote 24-volt power supply or as a booster for powering Notification Appliances.
   1. The FCPS shall offer up to 8.0 amps (6.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge 18.0 amp hour batteries.
   2. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a control relay. Four NAC outputs, wired NFPA Style Y or Z, shall be available for connection to the Notification devices.
   3. The FCPS shall optionally provide synchronization of all connected strobes or horn strobe combinations when either System Sensor, Wheelock or Gentex devices are installed.
   4. The FCPS shall function as a sync follower as well as a sync generator.
   5. The FCPS shall include a surface mount backbox.
   6. The Field Charging Power Supply shall include the ability to delay the reporting of an AC fail condition per NFPA requirements.
   7. The FCPS shall provide 24 VDC regulated and power-limited circuitry per Standards.

D. Power Supply:
   1. The main power supply for the fire alarm control panel shall provide 7.0 amps of available power for the control panel and peripheral devices.
   2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.
   3. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other overcurrent protection shall be provided on all power outputs. The power supply shall provide an integral battery charger or may be used with an external battery and charger systems. Battery arrangement may be configured in the field.
   4. The main power supply shall continuously monitor all field wires for earth ground conditions.
   5. The main power supply shall operate on 120 VAC, 60Hz, and shall provide all necessary power for the FACP.

E. Programmable Electronic Sounders:
   1. Electronic sounders shall operate on 24 VDC nominal.
   2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones with an output sound level of at least 90 dBA measured at 10 feet from the device.
   3. Electronic sounders shall be flush or surface mounted as shown on plans.

F. Strobe lights shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:
   1. The maximum pulse duration shall be 2/10 of one second.
   2. Strobe intensity shall meet the requirements of UL 1971.
   3. The flash rate shall meet the requirements of UL 1971.

G. Audible Visual Combination Devices:
   1. Shall meet the applicable requirements of Section E listed above for audibility.
   2. Shall meet the requirements of Section F listed above for visibility.
H. Addressable Devices - General
1. Addressable devices shall employ the simple-to-set decade addressing scheme. Addressable devices which use a binary-coded address setting method, such as a DIP switch, are not an allowable substitute.
2. Detectors shall be addressable and intelligent, and shall connect with two wires to the fire alarm control panel signaling line circuits.
3. Addressable smoke and thermal (heat) detectors shall provide dual alarm and power/polling LEOs. Both LEOs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEOs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED.
4. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 10.
5. Detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base options shall include a base with a built-in (local) sounder rated for a minimum of 85 DBA, a relay base and an isolator base designed for Style 7 applications.
6. Detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel.
7. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).
8. Detectors shall provide address-setting means using decimal switches.

I. Addressable Pull Box (manual station)
1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual pull stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

J. Intelligent Multi-Sensing Detector
1. The intelligent detector shall be an addressable device which is capable of detecting multiple threats by employing photoelectric and thermal technologies in a single unit. This detector shall utilize advanced electronics which react to slow smoldering fires (photoelectric) and heat (thermal) all within a single sensing device.
2. The multi-detector shall include two bicolor LEDs for 360-degree viewing.
3. Automatically adjusts sensitivity levels without the need for operator intervention or programming. Sensitivity increases with heat.
4. Intelligent Photoelectric Smoke Detector
   a. The detectors shall use the photoelectric (light-scattering) principal to measure
   b. Smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.
   c. The detectors shall be ceiling-mounted and available in an alternate model with an integral fixed 135-degree heat-sensing element.
   d. Each detector shall contain a remote LED output and a built-in test switch.
   e. Detector shall be provided on a twist-lock base.
   f. It shall be possible to perform a calibrated sensitivity and performance test on the detector without the need for the generation of smoke. The test method shall test all detector circuits.
   g. A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs), on the detector, which may be seen from ground level over 360 degrees. These LEDs shall periodically flash to indicate that the detector is in communication with the
control panel.
h. The detector shall not go into alarm when exposed to air velocities of up to 1500 feet per minute (fpm).
i. The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber.
j. All field wire connections shall be made to the base through the use of a clamping plate and screw.

K. Projected Addressable Beam Detector
1. The projected beam type shall be a 4-wire 24 VDC intelligent, addressable projected beam smoke detector device.
2. The detector shall be listed to UL 268 and shall consist of a single transmitter and corresponding non powered reflector.
   a. The detector shall operate in either a short range (16'-230') or long range (16'-328') when used with an extender module.
3. The temperature range of the device shall be -22 degrees F to 131 degrees F.
   a. The detector shall feature an optical sight and 2-digit signal strength meter to ensure proper alignment of unit without need of special tools.
   b. The unit shall be both ceiling and wall mountable.
   c. The detector shall have the ability to be tested using calibrated test filters or magnet-activated remote test station.
4. The detector shall have four standard sensitivity selections along with two automatic self-adjusting settings. When either of the two automatic settings is selected the detector will automatically adjust its sensitivity using advanced software algorithms to select the optimum sensitivity for the specific environment.

L. Intelligent Ionization Smoke Detector
1. The detectors shall use the dual-chamber ionization principal to measure products of combustion and shall, on command from the control panel, send data to the panel representing the analog level of products of combustion.

M. Intelligent Thermal Detectors
1. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

N. Intelligent Duct Smoke Detector
1. The smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.
2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

O. Addressable Dry Contact Monitor Module
1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any normally open dry contact device) to one of the fire alarm control panel SLCs.
2. The monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box.
   a. The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
   b. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.
P. Two-Wire Detector Monitoring
   1. Means shall be provided for the monitoring of conventional Initiating Device Circuits populated with 2-wire smoke detectors as well as normally-open contact alarm initiating devices (pull stations, heat detectors, etc.).
   2. Each IDC of conventional devices will be monitored as a distinct address on the polling circuit by an addressable module. The module will supervise the IDC for alarms and circuit integrity (opens).
   3. The monitoring module will be compatible, and listed as such, with all devices on the supervised circuit.
   4. The IDC zone may be wired for Style D or Style B (Class A or B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
   5. The monitoring module shall be capable of mounting in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box or in a surface mount backbox.

Q. Addressable Control Relay Module
   1. Addressable control relay modules shall be provided to control the operation of fan shutdown and other auxiliary control functions.
   2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.
   3. The control relay module will provide a dry contact, Form-C relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relays may be energized at the same time on the same pair of wires.
   4. The control relay module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

R. Six Output Addressable Control Relay Module
   1. Up to 6 Addressable intelligent control relay modules combined on one circuit board shall be provided to control the operation of fan shutdown and other auxiliary control functions.
   2. Using rotary address switches, the first module shall be addressed from 01 to 154 while the remaining modules shall be automatically assigned to the next five higher addresses. Note: binary dip switches for setting address are not acceptable.
   3. Provision shall be included for disabling a maximum of three unused modules.
   4. A single isolated set of dry relay form C contacts shall be provided for each of the 6 module addresses, which shall be capable of being wired for either a normally-open or normally-closed operation.
   5. The module shall allow an addressable control panel to switch these contacts on command.
   6. The module shall contain removable plug in terminal blocks capable of supporting 12 AWG to 18 AWG wire.
   7. The control relays mounted on the module shall be suitable for pilot duty applications and rated for a maximum of 3.0 amps at 30 VDC, resistive, non-coded and 2.0 amps at 30 VDC maximum, resistive, coded.

S. Six-Zone Interface Module
   1. A six zone interface module shall be provided as an interface between the addressable panel and two-wire conventional detection zones.
   2. A common SLC input shall be used for all modules, and the initiating device circuits shall share a common external supervisory supply and ground.
   3. The first address on the interface module shall be addressed from 01 to 154 while the remaining modules are automatically assigned to the next five higher addresses.
   4. Address shall be set using decimal encoded rotary address switches. Binary address switches are not acceptable.
   5. Provision shall be included for disabling a maximum of two unused addresses of the six available.
   6. All two-wire detectors being monitored shall be two-wire compatibility listed with the six zone input module.
   7. The six zone input module shall transmit the status of a zone of two-wire detectors to the fire
alarm control panel. Status shall be reported as normal, open or alarm.

8. Removable plug-in terminals shall be provided capable of accepting from 18 AWG up to 12 AWG wire.

T. Multiple Two-Wire Detector Monitoring
1. A single multi input module shall be provided for the monitoring of up to 10 conventional Initiating Device Circuits populated with 2-wire smoke detectors as well as normally-open contact alarm initiating devices (pull stations, heat detectors, etc.).
2. Each IDC of conventional devices will be monitored as a distinct address on the polling circuit by an addressable point. The module will supervise the IDC for alarms and circuit integrity (opens).
3. The first address on the 10 input boards shall be set from 01 to 150 and the remaining module addresses shall be automatically assigned to the next nine higher addresses.
4. Provision shall be included for disabling a maximum of two unused addresses.
5. The supervised state (normal, open, or short) of the monitored device shall be sent back to the panel. A common SLC input shall be used for all modules, and the initiating device loops shall share a common supervisory supply and ground.
6. The IDC zone may be wired for Style D or Style B (Class A or B) operation. A green LED for each circuit shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel. LEDs shall latch on when a circuit is in alarm.

U. Fire/Smoke Detectors:
1. Use one of the following:
   a. Photoelectric smoke detectors.
   b. Beam detectors.
   c. Thermal detectors.
   d. Rate compensated detectors.

V. Warning Devices:
1. Use the following:
   a. Horns.
   b. ADA Strobes.
   c. Combination horn/strobes.

2.02 ACCESS CONTROL COMPONENTS
A. Access Control System: Provide control system and access control devices compatible with existing District’s software by standard, including the following components configured to provide complete system functionality:
1. IP Controller
   a. The IP Controller shall be of a distributed database design and provide access control, alarm monitoring and time zone control for both access to and egress from selected areas. The IP Controller shall process all data transmitted to and from the I/O boards connected to it. The controller shall use 12 VDC for power and be intended for use in low voltage, Class 2 circuits only.
   b. Provide a rechargeable battery as part of the power supply to provide full functionality for the controller, system communications and board-powered readers in the event of a power failure.
   c. House the IP Controllers in heavy-gauge steel enclosures with hinged front doors. Provide conduit knockouts available on sides and backs of the enclosures.
2. Two-Reader Controller
   a. The Two-Reader Controller shall be of a distributed database design and provide access control, alarm monitoring and time zone control for both access to and egress from selected areas. The Two-Reader Controller shall process all data transmitted to and from the I/O boards connected to it. The controller shall provide a rechargeable battery as part of the power supply to provide full functionality for the controller, system communications and board-powered readers in the event of a power failure.
b. Two-Reader Controllers shall be housed in heavy-gauge steel enclosures with hinged front doors. Conduit knockouts shall be available on sides and backs of the enclosures.

3. PoE One-Door Reader Controller
   a. Provide a rechargeable battery as part of the power supply to provide full functionality for the controller, system communications and board-powered readers in the event of a power failure.
   b. Mount the PoE One-Door Reader Controller in a three-gang junction box with an optional magnetic tamper switch.

4. PoE One-Door Reader Board
   a. The PoE One-Door Reader board shall be connected to a system controller and act as an interface between this controller and any of a variety of readers that can read ABA-formatted data or Wiegand®-formatted data from smart cards, proximity cards, magnetic-stripe cards, bar-coded cards or cards possessing a combination of these technologies. The board shall also be capable of supporting tri-stated LED control and buzzer control.
   b. The PoE One-Door Reader board shall support two (2) reading devices, the type being selectable through the application software. These reading devices are intended to control one door.
   c. Mount the PoE One-Door Reader board shall be mounted in a three-gang junction box with an optional magnetic tamper switch.

5. Two-Reader Board
   a. The Two-Reader board shall be connected to a system controller and act as an interface between this controller and any of a variety of readers that can read ABA-formatted data or Wiegand®-formatted data from smart cards, proximity cards, magnetic-stripe cards, bar-coded cards or cards possessing a combination of these technologies. The board shall also be capable of supporting tri-stated LED control and buzzer control.
   b. The Two-Reader board shall support up to two (2) reading devices of the same or different technologies, the type being selectable through the application software. Systems that are unable to use readers of different technologies on the same board or require a change in software, firmware or “other” interface devices shall be unacceptable.
   c. All two-reader boards shall be housed in heavy-gauge steel enclosures with hinged front doors. Conduit knockouts shall be available on sides and backs of the enclosures.

6. One-Reader Board
   a. The One-Reader board shall be connected to a system controller and act as an interface between this controller and any of a variety of readers that can read ABA-formatted data or Wiegand®-formatted data from smart cards, proximity cards, magnetic-stripe cards, bar-coded cards or cards possessing a combination of these technologies. The board shall also be capable of supporting tri-stated LED control and buzzer control.
   b. The One-Reader board shall support one (1) reading device, the type being selectable through the application software.
   c. All One-Reader boards shall be housed in heavy-gauge steel enclosures with hinged front doors. Conduit knockouts shall be available on sides and backs of the enclosures.

7. Input Board
   a. The Input Board shall be connected to a system controller and provide sensor monitoring and output control via its 16 supervised inputs. The states of the inputs shall be as follows: normally open; normally closed; 1 K normal, 2 K active; and 2 K normal, 1 K active. It additionally shall be possible to set the debounce and hold times for each input on the board. Each input point shall have a corresponding LED on the board that indicates the state of the point.
   b. The Input Board shall also provide two Form-C contact relays for optional use in controlling door strikes or other devices. Control of the relays shall be softwareassignableto be triggered by system actions. Pulse time of the relays shall be software-selectable between 1 and 255 seconds, inclusive.
   c. All input boards shall be housed in heavy-gauge steel enclosures with hinged front doors. Conduit knockouts shall be available on sides and backs of the enclosures.
   d. The Input Board shall accept 12 VDC for power.
   e. The Input Board shall have a dedicated input point for optional connection to an enclosure tamper switch and another dedicated input point for optional connection to a power-loss
monitoring device. Systems requiring use of one of the available input points on the Input Board for this monitoring shall be unacceptable.

8. Output Board
   a. The Output Board shall be connected to a system controller and provide output control via 16 Form-C, non-inductive relays with ratings of 5 A at 28 VDC. The relays shall be configurable for normal (relay energized when “on”) or inverted (relay de-energized when “on”) action. It shall also be possible to define the response desired for each relay when communications go offline between the Output Board and the controller: The relay shall be active, the relay shall be inactive, or the relay shall maintain its status at the moment communications go offline. Each relay shall have a corresponding LED on the board that indicates when the relay is energized.
   b. All output boards shall be housed in heavy-gauge steel enclosures with hinged front doors. Conduit knockouts shall be available on sides and backs of the enclosures.

   a. Provide device form factor to suit architectural mounting condition.
   b. Provide long range reader where required (e.g. exterior gates).

10. Remotely Operated Locks:
   a. Use one of the following:
      1) Electrically operated locksets.
      2) Electric strikes.
      3) Magnetic locks.

2.03 INTRUSION DETECTION COMPONENTS
A. Provide Bosch Security Systems or approved equal.

B. Arm/Disarm keypads
   1. Provide capability to arm and disarm the system using a standard access control card reader adjacent to intrusion alarm keypad.

C. Status Monitoring Devices:
   1. Use the following:
      a. Flush door monitor contacts.
      b. Strike monitors.
      c. Glass break detectors in administration and public areas
      d. Motion detectors in animal holding areas, focused / tuned to human access points and paths of travel.

2.04 REMOTE SURVEILLANCE COMPONENTS
A. Visual Monitoring Devices:
   1. Use the following:
      a. Color cameras and monitors.
      b. Black and white cameras and monitors.
      c. Stationary cameras.
      d. Network video recorder.
   2. Do not use:
      a. Pan, tilt, zoom controlled cameras.

B. Monitoring devices
   1. Monitoring computer workstation in Dispatch
   2. Flat screen monitor in reception lobby.

2.05 COMMON COMPONENTS
A. Communication Cabling:
   1. Use the following:
      a. Copper cable.
      b. Fiberoptic cable.
PART 3 - DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Fire Detection and Alarm: Provide automatic intelligent, microprocessor-controlled, fire alarm detection system as required by code and as follows:

1. Basic Performance:
   a. Initiation Device Circuits (IDC) shall be wired Class B (NFPA Style B) as part of an addressable device connected by the SLC Circuit.
   b. Notification Appliance Circuits (NAC) shall be wired Class B (NFPA Style Y) as part of an addressable device connected by the SLC Circuit.
   c. All circuits shall be power-limited, per UL864 requirements.
   d. A single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
   e. Alarm signals arriving at the main FACP shall not be lost following a primary power failure or outage of any kind until the alarm signal is processed and recorded.

2. Connect the protected premises system(s) to public fire department via transmission to remote central station supervising station.

3. Functional Operation:
   a. Detection, Alarm, Notification Methods: In accordance with NFPA 72. When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:
      1) The system Alarm LED on the FACP shall flash.
      2) A local sounder with the control panel shall sound.
      3) A backlit 50-character LCD display on the FACP shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
      4) In response to a fire alarm condition, the system will process all control programming and activate all system outputs (alarm notification appliances and/or relays) associated with the point(s) in alarm. Additionally, the system shall send events to a central alarm supervising station via either dial-up over PSTN or Internet or Intranet via PSDN or virtual private network.
   b. Evacuation Plan: Multiple smoke zones and alarm notification of any zone or combination of zones in addition to general evacuation of entire premises.
   c. Specific System Operations
      1) Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently programmed for verification of alarm signals. The alarm verification time period shall not exceed 2 minutes.
      2) Point Disable: Any addressable device or conventional circuit in the system may be enabled or disabled through the system keypad.
      3) Point Read: The system shall be able to display the following point status diagnostic functions:
         (a). Device status
         (b). Device type
         (c). Custom device label
         (d). Device zone assignments
      4) System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.
      5) System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 1000 events. Each of these activations will be stored and time and date stamped with the actual time of the activation. The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety. The history buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable substitutes.
      6) Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time. If any intelligent detector in the system responds with a reading that
is above or below normal limits, then the system will enter the trouble mode, and the particular detector will be annunciacted on the system display. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

7) Pre-Alarm Function: The system shall provide two levels of pre-alarm warning to give advance notice of a possible fire situation. Both pre-alarm levels shall be fully fielded adjustable. The first level shall give an audible indication at the panel. The second level shall give an audible indication and may also activate control relays. The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.

8) The fire alarm control panel shall include Silent and Audible Walk Test functions - Silent and Audible. It shall include the ability to test initiating device circuits and Notification Appliance Circuits from the field without returning to the panel to reset the system. The operation shall be as follows:
   (a). The Silent Walk Test will not sound NACs but will store the Walk Test information in History for later viewing.
   (b). Alarming an initiating device shall activate programmed outputs, which are selected to participate in Walk Test.
   (c). Introducing a trouble into the initiating device shall activate the programmed outputs.
   (d). Walk Test shall be selectable on a per device/circuit basis. All devices and circuits which are not selected for Walk Test shall continue to provide fire protection and if an alarm is detected, will exit Walk Test and activate all programmed alarm functions.
   (e). All devices tested in walk test shall be recorded in the history buffer.
   (f). All devices not tested in walk test shall be recorded in the history buffer.

9) Waterflow Operation
   (a). An alarm from a waterflow detection device shall activate the appropriate alarm message on the control panel display; turn on all programmed Notification Appliance Circuits and shall not be affected by the Signal Silence switch.

10) Supervisory Operation
    (a). An alarm from a supervisory device shall cause the appropriate indication on the control panel display, light a common supervisory LED, but will not cause the system to enter the trouble mode.

11) Signal Silence Operation
    (a). The FACP shall have the ability to program each output circuit (notification circuit or relay) to deactivate upon depression of the Signal Silence switch.

12) Non-Alarm Input Operation
    (a). Any addressable initiating device in the system may be used as a nonalarm input to monitor normally open contact type devices. Non-alarm functions are a lower priority than fire alarm initiating devices.

d. Detection:
1) Air Handling Units over 2,000 CFM (3360 cu m/h): Minimum of one detector in both supply and return.
2) Upon detection of fire or smoke condition, automatic notification of occupants.

e. Alarms:
1) Means for occupants to communicate same types of alarm as automatic system does.
2) Manual stations at minimum of 150 feet (45 m) intervals along means of egress paths.
3) Audible Alarms: Minimum of 15 dB over ambient noise, audible throughout common areas and means of egress.
4) Visual alarms, in locations required by code and public toilets and corridors.
5) Separate audible and visual signals for alarms and trouble notification in corridors.
6) Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently programmed for verification of alarm signals. The alarm verification time period shall not exceed 2 minutes.

f. Fire Protection Controls:
1) Provide connections between alarm and detection system and fire suppression system
activation sensors.

2) Upon Alarm: Shut down or deactivate the following:
(a). HVAC air distribution.
(b). Fire-rated door hold-opens.
(c). Locks restricting exit through doors constituting means of egress.
g. Audible and visual trouble notification of operations staff, for alarm zone failures, annunciator zone failures, ground faults, backup power failure, water supply equipment failures.

B. Access Control: Provide automatic and remote control of access to facility areas, as required by the code, the project program, and as follows.
1. Remote locking and unlocking at:
   a. Exterior doors and gates
   b. Doors between Public Access Zone and Reception Zone.
   c. Operations Zone entrances.
   d. Secure Zone entrances.
2. Keyless entry for occupants at:
   a. All exterior doors except storage rooms.
   b. Doors between Public Access Zone and Reception Zone.
   c. Operations Zone entrances.
   d. Secure Zone entrances.
3. For exterior doors, provide hardware with electric trim wired through power transfer on hinge side of door. Do not use electric strikes on exterior door.
4. For interior doors, electric strikes are acceptable.
5. Configure all electrically operated doors to fail secure.
6. See Sections DC B2 and DC C for mechanical locking devices required.

C. Intrusion Detection: Provide intrusion detection as required by the code, the project program, and as follows.
1. Door status monitoring of:
   a. Exterior doors.
   b. Operations Zone Entrances.
   c. Secure Zone entrances.
2. Intrusion detection via glass breaks and motion detectors.
3. Local and central station alarm notification.
4. Recording of door status changes and proper and improper access attempts.
5. Real-time status display of all controlled and monitored points; display located in Dispatch.
6. Staff Panic Alarm: Provide capability for staff members to trigger panic alarm at reception area and a minimum of two other locations in facility as designated by Owner.
   a. Provide audible and visual notification throughout facility

D. Remote Surveillance: Provide remote surveillance of specified areas as required by the code, the Program, and as follows.
1. Remote visual monitoring of:
   c. Approaches to Reception Zone from outside.
   d. Doors between Public Access Zone and Reception Zone.
   e. Operations Zone entrances.
   f. Secure Zone entrances.

E. Data Communications Functions: As required to accomplish system functions.
1. Connection between Internet and internal network.

F. Integrated systems performing all functions are preferred, subject to requirements of code for separated, independent systems.
G. Where electronic safety and security elements also must function as elements defined within another element group, meet the requirements of both element groups.

H. Substantiation:
   1. Proposal: Description of systems required, sources, input-side capacities, and means of distribution.
   2. Preliminary Design: Outline description of systems, inter-system interfaces, functions provided, and operator interface locations.
   3. Design Development: System equipment locations indicated on the drawings; details of each type of input and output device; capacities of systems; manufacturer's product data indicating products to be used.
   4. Construction Documents: Complete system details; detailed layout of input and output device locations.
   5. Construction:
      a. Submittals
         1) General: Submit in accordance with Division 00.
         2) Shop Drawings:
            (a). Include sufficient information, clearly presented, to determine compliance with drawings and specifications.
            (b). Include manufacturer’s name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
            (c). Show equipment and device layout, configurations, and terminations.
         3) Manuals:
            (a). Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
            (b). Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
            (c). Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.
      4) Software Modifications
         (a). Provide the services of a qualified technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.
         (b). Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.
      b. Testing of wiring systems for continuity, prior to functional performance testing.
      c. Commissioning of systems prior to functional performance testing.

3.02 HEALTH AND SAFETY CRITERIA
A. Electrical Hazards: Design in accordance with all NFPA standards that apply to the occupancy, application, and design.
   1. Control access to spaces housing electrical components and allow access only by qualified personnel.
   2. Comply with NFPA 70 requirements for hazardous locations applications.

3.03 STRUCTURAL CRITERIA
A. Seismic Design: Provide support systems which sustain static (dead) loads twice the weight of the system.
3.04 DURABILITY CRITERIA
A. Expected Service Life Span: Minimum 15 years.

B. Moisture Resistance and Thermal Compatibility: Use materials that will resist degradation and failure of signals under ambient conditions expected.

C. Enclosures: As required to protect equipment from environment in which it is installed, complying with NEMA 250 and:
   1. Areas to be Hosed-Down, or Equivalent, Exterior or Interior: Type 4.
   2. Exterior, Exposed to Weather and Wind: Type 3S.
   3. Exterior, Other Locations: Type 3R.
   4. Interior, Subject to Settling Dust, Falling Dirt, or Dripping Liquids: Type 5.
   5. Interior, Subject to Circulating Dust: NEMA Type 12.
   6. Interior, Other Locations: Type 1.

D. Corrosion Resistance: Use corrosion resistant materials.

E. Vandalism: Provide systems which are tamper-resistant.

3.05 OPERATION AND MAINTENANCE CRITERIA
A. Power Supplies:
   1. Building power with power line conditioner for all systems.

B. Power Consumption and Efficiency:
   1. Provide high efficiency power supplies.

C. Transmission Capacity:
   1. Within Buildings:
      a. Sound Communication Cabling: 10 megabits per second; RJ11 connectors.
      b. Data and Combined Data/Sound Communication Cabling: 100 megabits per second; RJ11 connectors.
      c. Visual Communication Cabling: Coaxial 75 ohm, plus 2 dB, 100 percent shielded.
   2. Substantiation:
      a. Closeout: Continuity and performance testing.

D. Data Storage Capacity:
   1. Keyless Entry Devices: Minimum of 100,000 unique combinations, with minimum of 4 levels of access authorization.

E. Unauthorized Use: Provide systems which minimize activation and use by unauthorized persons.

F. Ease of Operation:
   1. Minimum of one centralized monitoring display for all systems is preferred; locate Dispatch.
   2. Keyless Entry Devices: Reprogrammable from central control location.
   3. Ease of Use: Provide easy access to and working clearances around system components.
   4. Zoning: Arrange wiring and protective devices so that outages caused by local faults do not affect unrelated areas or systems.

G. Ease of Maintenance: Provide communications networks that are logically arranged and well-marked, using terminal panels that provide:
   1. Connections between each voice station and hub in server room.
   2. Point-to-point connections between each data input and output point and hub location in server room.

H. Allowance for Change and Expansion:
   1. Spare Distribution Capacity: 20 percent, minimum.
I. Training
   1. Operational: Minimum of 8 hours, for 1 person, for each separate system.

END OF SECTION
**PART 1 - GENERAL**

1.01 **SECTION INCLUDES**
   
   A. Communications services comprise the following:
      1. Voice and Data: Infrastructure for voice and data transmission and telephone equipment.
      2. VOIP Overhead Paging: Public address and music systems.
      3. Television: Television service, distribution, reception, and equipment.
      4. Clock System.
   
   B. Provide internal wiring and outlets at locations specified.
   
   C. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

1.02 **RELATED REQUIREMENTS**
   
   A. San Jose-Evergreen Community College District: District Standards and Campus Guidelines Handbook, Division 28 Electronic Safety and Security.
   
   B. San Jose-Evergreen Community College District Handbook: Section B, Audio Visual and Information Technology.

1.03 **REFERENCE STANDARDS**

   Adhere to the requirements of the following reference standards or most current version, as applicable.

   
   B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.
   
   C. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit, 2003
   
   D. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with rigid PVC Conduit and Tubing, 2004
   
   E. NEMA TC 6 and 8 – Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installations, 2003
   
   F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments.
   
   
   H. TIA-526-14-B Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant, October 2010
   
   
   J. TIA-568-C.1 - Commercial Building Telecommunications Cabling Standard Part 1: General
requirements, May 2012.


M. TIA-569-C - Telecommunications Pathways and Spaces; May 2012.

N. TIA-607-B - Commercial Building Grounding (Earthing) and bonding Requirements for Telecommunications; August 2011.

O. UL 6 - Electrical Rigid Metal Conduit - Steel, 2007

P. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings, 2011

Q. UL 1242 - Standard for Electrical Intermediate Metal Conduit - Steel, 2006

1.04 DEFINITIONS

A. MPOE - Minimum Point of Entry. The minimum location to which an outside service provider (Telco, CATV) will deliver their cable and/or services. The MPOE ‘belongs’ to the Telco in that it must meet the Telco specifications and standards in order for them to provide services to the MPOE. County usually negotiates to have services extended from the MPOE to the MDF - so that we have more control of the access to the equipment in the MDF.

B. BDF - Building Distribution Facility. The location which connects outside services (Telco, CATV) to a building’s inside wiring. The BDF belongs to the customer. May also be referenced as a Server Room

C. IDF - Intermediate Distribution Facility

D. SCS - Structured Cabling System. A standard methodology defined by TIA-568 specifications when planning and installing network cabling for commercial buildings. "A Panduit SCS" - further defines that the materials used should be of a particular manufacturer, installed according to manufacturer recommendation, in combination with standards set by TIA, in order to achieve a fully warranted system.

E. TIA/EIA - Telecommunications Industry Association/Electronics Industries Alliance. One of several associations that set the standards for the cabling industry.

F. CATV - Cable TV. This is TV service provided by an outside source, whether via satellite or cable. For example, WAVE Broadband. CATV services are being distributed on both coaxial cable (RG6) and Cat6, depending upon the service provider.

G. Station Cabling - A copper cable used for wiring between the BDF/IDF and the workstation outlet. The ‘category’ defines to what standard the cable must perform. County standard is Cat 6. Station cabling may also include coaxial cable for CATV.

H. OSP - Outside Plant Cable. Specifically manufactured to be placed aerially, directly buried, or placed within a buried conduit. Typically, OSP cable has additional water blocking materials inside the cable to prohibit water intrusion and corrosion should the sheathing be damaged.

I. ISP - Inside Plant Cable. May also be referred to as Riser Rated, or Plenum Rated. OSP cable must be spliced/transitional to ISP cable within 50’ of entering a building or leaving a conduit. ISP does not have water blocking materials, and is chemically suitable for being routed within inside spaces.
J. AFF - Above Finish Floor.

K. EMT - Electrical metallic tubing, sometimes called thin-wall. Used for communications conduits.

L. BOB - Bottom of Box, referring to placement of the electrical box (e.g. +/- 15” BOB AFF)

M. HSSD/VESDA - High Sensitivity Smoke Detector/Very Early Smoke Detection Apparatus. These are the type of smoke detectors County Facilities/Fire Techs are recommending rather than the installation of an FM200 type system.

N. BISCI - Building Industry Consulting Service International, another association that defines the standards for the IT industry. An RCDD (Registered Communications Distribution Designer) has two years ITS/distribution design experience, has gone through BISCI training and testing, and has to re-certify every 3 years.

O. BET - Building Entrance Terminal. At the point of demarcation, BET’s, safeguard communication equipment from damaging electrical surges that may get onto those incoming lines. These are used with OSP cable, and are the termination point, with fuses, to prevent surges and shorts from transmitting to the electrical equipment.

P. NVP - Nominal Velocity of Propagation. Length is one of the four primary test parameters specified Standards. Each type of cable insulating material--polyvinyl chloride, fluorinated ethylene propylene or polyethylene--has its own NVP, so the test set user must select and match the correct NVP to the cable under test. If NVP is not set accurately, you will get an incorrect length measurement.

Q. TBB - Telecommunication Bonding Backbone. This is the backbone grounding between the BDF and the IDF(s).

R. CBN - Common Bonding Network. The network of grounding within each room, tied to the TBB, and ultimately bonded to the building ground.

### PART 2 – PRODUCTS

#### 2.01 GENERAL REQUIREMENTS

A. All materials to be installed shall conform to a Panduit Structured Cabling Solution unless noted otherwise.

#### 2.02 OWNER-FURNISHED PRODUCTS

A. The following items are to be provided by Owner:

1. Owner’s operational computer network hardware and software.
2. Non-modem connection to Internet, including interface hardware. Note all services connecting to the Serving Utility’s network must meet Serving Utility’s security standards
3. Telephone sets, controller, and switching software.

B. Owner-Furnished Items: Performance requirements that specify characteristics of equipment items do not apply; requirements for accommodating items to the project do apply.

#### 2.03 VOICE AND DATA COMPONENTS

A. Equipment Racks

1. District Standards

B. Cable runway:

1. Application: Suitable for the support & management of telecommunications cables, either overhead or mounted vertically on a wall.
2. Provide all runway materials black in color.
3. Material (both stringer and rung): Steel tube, rectangular, 1-1/2” by 3/8” by 0.65” wall thickness.
U.L. Classified

4. Rungs: 9" on center, welded to stringer.

5. Cable Runway Installation Accessories
   b. Manufacturer

C. Overhead Cable Tray System
   1. Continuous, rigid, welded steel or stainless steel wire mesh cable management system. Cable tray systems are defined to include, but are not limited to, straight sections, supports and accessories.
   2. Install cable tray system according to TIA standards and manufacturer recommended installation practices.
   3. Tie system supports to primary structure.
   4. Provide all components required to install a complete pathway system.
      a. Provide splices, supports, and other fittings necessary for a complete, continuously grounded system.
         1) Fill Ratio: Cable tray may be filled to 40% of total fill capacity. Size cable tray to meet capacity requirements and to accommodate future cabling changes or additions.
         2) Depth: Provide cable tray with depth of 2 inches to 4 inches as determined by quantity of cables to be installed, maintaining spare and future capacity at installation.
         3) Width: Determine cable tray width by total number of cables within pathway, but provide tray not less than 12" wide.
         4) Load Span Criteria: IEC 61537, with load span criteria of L/200 (to exceed standard requirements of L/100) and a Safety Factor of 1.7.
   5. UL Classified cable trays may act as Equipment Grounding Conductors. Contact manufacturer for approved sizes.
      a. Use UL Classified splicing methods as recommended by Manufacturer.
         1) Ground cable trays at end of continuous run.
         2) Ground continuous cable tray runs every 60 feet.
      b. Ground cable trays that are not UL Classified per NEC requirements and manufacturer recommendations.
         1) Ground cable trays against fault current, noise, lightning, and electromagnetic interference by attaching grounding wire to each 10’ cable tray section with grounding clamp, e.g. Cablofil Model GNDCL.

6. Installation
   a. Install cable tray level and plumb according to manufacturer’s written instructions, coordination drawings and referenced standards.
      1) Cutting: Field-fabricate changes in direction & elevation following manufacturer’s instructions.

7. Miscellaneous Components
   a. Cable Hangers for support of station cabling once it leaves the cable wire tray system.
      1) Provide installed plenum rated hanger supports which meet ISO/IEC 18010, TIA-569-B. Manufacturers: Erico, or approved equal:
         (a) Cat Links J-hook supports
         (b) Cable Cat Loop supports
      b. Hook/Loop Cable Ties. Cable ties shall not be installed in a way which causes kinks, dents or malformation to cables in any way. Ties shall not be over tightened.
         1) Use: Panduit PN: #HLS-15R-0, black, 15’ roll, .75” width, cut to length.
         2) Do not use: Nylon lock tie straps for Cat. 6 cabling.

PART 3 - DESIGN CRITERIA

3.01 BASIC FUNCTION
A. Conduit Structures
   1. Provide OSP conduits installed for Telco and CATV local service providers from roadway terminating within Minimum Point of Entry (MPOE). Contact local service providers for
engineering specifications and requirements. Provide a minimum of three 4” conduits installed for Telco and one 4” conduit installed for CATV. Confirm requirements with service providers.

2. Provide OSP conduits installed between primary IT Server Room and roadway to intercept existing underground conduit system. Provide a minimum of three 4” conduits installed.
   a. Provide a vault installed for conduit runs in excess of 300’ or 180 combined degrees of bends.
   b. Vaults: Jensen Precast 4878PB or larger, sized: 4’ x 6’6” x 3’ deep, or larger as required; with labeled, hinged, bolting 2-part lids with risers.
   c. Provide minimum ¼” 1250# tensile strength pull tape in conduits.
   d. Install conduits in a manner that will allow the installation of OSP cable, not to exceed 10-5 times the bend radius of the cable being installed.
   e. Clean conduits prior to installation of inner duct or copper cable.

3. Provide conduits installed to provide pathway from overhead tray system into IT Server Room (Comm IT).
   a. Coordinate conduit locations with IT Server Room Layouts. Provide a minimum quantity of three 4” conduits installed at each IT Server Room. Provide additional conduits in size and quantities required installed for other trades (HVAC, Fire Alarm Security, Public Address, Radio and other systems)
   b. Stub conduits for cabling stubbed to below finished ceiling in telecom rooms.
   c. Provide conduits installed for any transition over a hard-lid ceiling in excess of 4’

4. Standard conduit and infrastructure for installation of media equipment (overhead projectors, drop down screens, podiums) is as follows:
   a. One (1) electrical outlet located in ceiling, to be placed 10’-12’ from screen placement and 6” off center right of screen.
   b. One (1) Electrical outlet located at ceiling height at screen location.
   c. One (1) floor box outlet located approximately 3’ off side edge of projector screen and approximately 5’ from screen wall.

5. Conduits:
   a. Provide conduits for installation of OSP cables as describe above.
   b. Use one or more of the following:
      1) PVC schedule 40, UL 651 and NEMA TC-2, for direct burial, with rigid or intermediate metal conduit elbows.
      2) PVC conduit, UL 651 and NEMA TC-6, to be encased in concrete.
      3) Intermediate metal conduit, UL 1242, with 20-mil tape wrapping.
      4) Rigid metal conduit, UL 6, with 20-mil tape wrapping.
         (a). Elbows, 24” minimum radius.
   c. Do not use:
      1) Nonmetallic conduit elbows for direct burial.

B. Structured Cabling System
1. General
   a. Omission of a part number of installation detail within this document does not preclude full and proper installation. All parts, equipment and labor necessary for a complete SCS are to be included in the scope of work.

2. Provide all infrastructure including:
   a. Racks
   b. Cabling and completed terminations at both ends
   c. Conduits and all related cabling pathways
   d. Outlet boxes with faceplates and jacks and applied identification labels
   e. Conduit and fiberoptic cabling between standalone buildings (if any)

3. Cabling Installation - General
   a. Complete all cabling installation in a professional manner, adhering to the most recent referenced codes and standards applicable to the Telecommunications Industry.
   b. Place cables placed within tray systems, or pathway structures to flat, in an orderly fashion, not having loops or slacks in excess of that specified within this document.
   c. Install cables to enter and exit conduit or penetration structures in an orderly manner, not blocking or creating a blockage within the structure.
d. Upon completion of all cabling installation, and acceptance by the Owner, where conduits or sleeves known to be subjected to different temperatures and where condensation is known to be a problem, such as passing from the interior to the exterior of the building, fill the conduit or sleeve with an approved material to prevent the circulation of warm air to a colder section of the conduit or sleeve.

4. For OSP cable installation, use equipment and rigs designed for pulling, placement and termination of multi pair copper cable; including reel trucks, mechanical mules, sheaves, shoes, anchors and equipment for drilling masonry, installing anchors, to install support and cable management hardware.
   a. Submit the cable pulling plan to the Owner prior to commencement of the operation.
   b. Route the multipair copper cable installation to comply with requirements as described herein.
   c. Ensure the cables are pulled into the ducts in a manner observing the bend radii and tension restrictions of the cable.
   d. Use appropriate shoes, guides, wheels and lubricants to prevent damage to the cable jacket and sheath during installation.
   e. Install shield bond connectors to the shields of all cables terminated at the BETs.
   f. Apply an appropriate amount of damming compound over the end of filled copper cables in indoor or dry environments to prevent seepage of cable filling compounds where encapsulant will not be used.
   g. Prior to closure assembly in dry or indoor installations, thoroughly clean off the filling compound on all exposed cable pairs and the cable insulation using appropriate cleaning solvents.
   h. Test all pairs spliced and all splice-related faults cleared prior to sealing the closure assembly.
   i. In order for the cable distribution system to be considered acceptable, the number of defective pairs shall be limited to a maximum of 1/100 of the total number of pairs and a maximum of two (2) pairs per pair binder group.

5. Outside Plant Cable
   a. Provide OSP cable installed between MDF / server room and inter-site building IT room (Comm IT).
   b. Provide OSP cable installed between MDF / server room and on-site detached building terminated in minimum 24"x24"x8" enclosure for voice and paging circuits only.
   c. Coordinate placement of cables within conduit structure with Districts IT Manager prior to beginning work.
   d. Through pulls are required. Should distance limitations exist, the copper OSP may be spliced with a re-enterable, sealed splice kit.
   e. Within the MPOEs or MDFs, as distance limitations dictate, copper cabling shall be spliced within a splice case, suitable for indoor installation within entrance facilities for splicing between OSP and ISP cable, and shall include all required accessories such as collars, grommets, bushings, bonding connectors, etc. Splices shall be inspected by County prior to closing case.

6. For FO OSP cable, install cable within innerduct installed within any conduit to be used for FO cable.
   a. Install maximum size and quantity innerduct allowed by conduit size, with type suitable for application (plenum, riser, OSP).
   b. Supply all innerducts with factory installed pull line.
   c. Base colors shall be orange, white, black, and yellow.
   d. Cap empty fiber optic ducts. Submittal of proposed innerduct specifications required for approval of OSP.

7. Backbone Cable
   a. Install backbone cables shall be installed between Server Room and IDF(s) for intra-building services.
   b. Backbone Copper Cable.
      1) Total quantity of pairs per backbone cable shall be determined in coordination with District IT.
      2) Coordinate backboard elevations showing mounting placement and cable routing with
c. Backbone Fiber Optic Cable.
   1) Total quantity of strands shall be determined in coordination with District IT.
   2) Install FO cable within inner duct installed within any conduit to be used for FO cable.
   3) Utilize suitable buffer tube fan out kits for cable management.
   4) Terminate fiber optic cable shall be terminated with LC connectors.

d. Backbone Coaxial Cable.
   1) Provide coaxial cable installed between the Server room and each IDF.
   2) Within Server Room, terminate coaxial cable with compression type connectors, leaving a 6’ service loop at final location.
   3) Coordinate termination location with District IT.

e. Station (Horizontal) Cabling
   1) Outlets
      a. Route station cabling to all workstations.
      b. Provide station cabling with an 18” service loop, coiled and secured above ceiling at each location.
      c. CATV/Coaxial
         1) Provide plenum-rated, quad shield coaxial cable routed to equipment rack, and installed into angled patch panels. Route cable within vertical wire management, utilizing cable spools. Refer to program requirements for CATV locations.
         2) Route all Cat. 6 cable (station and speaker) to 19” equipment racks within server room or IDF, terminated on Cat. 6 jack modules and installed into angled patch panels according to manufacturer recommended installation and TIA standards. Coordinate with District to develop rack layout and number plan for specific location.
            a. Route cable within vertical wire management utilizing cable spools.
            b. Do not cut or remove vertical wire management ‘fingers.’
            c. Route cables from both sides of the angled patch panels, and carefully terminate cables to remove the need for cable support bars or horizontal wire management.
            d. Do not cross cables over the center of the patch panels.

C. Overhead Cable Tray System
   1. Install cable tray system as central pathway for SCS. Miscellaneous components may be incorporated to complete routing of cable pathway.
   2. Provide all components required for a complete pathway system, including splices, supports, and other fittings necessary for a complete, continuously grounded system.

D. Cabling Pathways
   1. Provide conduit stubs with pull string to all desk and workstation outlets.
      a. Provide minimum 1” EMT stubs for standard wall mount desk and workstation outlets.
      b. Provide minimum 1 ½” EMT stubs for up to 3 modular desk and workstation outlets.
      c. Do not use corrugated metal or corrugated plastic conduit as conduit stubs.
      d. Install conduit stub from above accessible ceiling, to desk and workstation outlet locations.
      e. Angle conduit toward overhead tray system and terminate within a standard 411/16” square by 2-1/8” deep wall box mounted at minimum +15” BOB.
   2. Conduit banks
      a. For cables passing through fire-rated floors or walls, use through fire-rated wiring devices which contain an intumescent insert material that adjusts automatically to cable additions or subtractions.
         1) Specified Technologies, Inc. EZ Path Series 33
      b. For cable path passing through hard cap ceiling areas in excess of 3’ use 4” conduits
      c. 4” conduits and fire rated wiring devices shall be installed a minimum of (2) units per bank, maintaining a 40% fill ratio to allow for future growth. If 40% fill ratio is achieved, additional 4” conduits or fire rated wiring devices shall be installed.
E. Television: Provide the following television reception and distribution functions:
   1. Incoming broadcast television; internal distribution over cabling not broadcast.
   2. Cable television reception, via provider hard connection.
   3. Video/Audio Outlets: Required as specified in program.

F. Integrated systems performing all functions are preferred, subject to requirements of code for separated, independent systems.

G. Where communications elements also must function as elements defined within another element group, meet the requirements of both element groups.

H. Where services elements are located outside the building in the site area, meet applicable requirements

I. In addition to the requirements of this section, comply with all applicable requirements of Section B, Audio Visual and Information Technology.

J. Substantiation:
   1. Proposal: Description of systems required and means of distribution.
   2. Preliminary Design: Outline description of systems, inter-system interfaces, and functions provided.
   3. Design Development: Details of each type of input and output device; capacities of systems; manufacturer data.
   5. Construction: Testing of wiring systems for continuity, prior to functional performance testing.

3.02 AMENITY AND COMFORT CRITERIA
A. Accessibility: Comply with requirements of local authorities for facilities for the disabled.

3.03 HEALTH AND SAFETY CRITERIA
A. Electrical Hazards: Design in accordance with all NFPA standards that apply to the occupancy, application, and design.
   1. Control access to spaces housing electrical components and allow access only by qualified personnel.
   2. Comply with NFPA 70 requirements for hazardous locations applications.

3.04 STRUCTURAL CRITERIA
A. Seismic Design: Provide support systems which sustain static (dead) loads twice the weight of the system.

3.05 DURABILITY CRITERIA
A. Expected Service Life Span: Minimum 15 years.

B. Moisture Resistance and Thermal Compatibility: Materials that will resist degradation and failure of signals under ambient conditions expected.

C. Enclosures: As required to protect equipment from environment in which it is installed, complying with NEMA 250 and:
   1. Areas to be Hosed-Down, or Equivalent, Exterior or Interior: Type 4.
   2. Exterior, Exposed to Weather and Wind: Type 3S.
   3. Exterior, Other Locations: Type 3R.
   4. Interior, Subject to Settling Dust, Falling Dirt, or Dripping Liquids: Type 5.
   5. Interior, Subject to Circulating Dust: NEMA Type 12.
   6. Interior, Other Locations: Type 1.
3.06 **OPERATION AND MAINTENANCE CRITERIA**

A. **Power Supplies:**
   1. Building uninterruptible power for voice and data telecommunication systems.
   2. Building emergency power for all other systems.

B. **Power Consumption and Efficiency:**
   1. Comply with requirements for energy efficiency of electrical equipment in Title 20 and Title 24 Energy Efficiency Standards.

C. **Transmission Capacity:**
   1. **Within Buildings:**
      a. Sound Communication Cabling: 100 megabits per second; RJ45 connectors.
      b. Data and Combined Data/Sound Communication Cabling: 1 gigabit per second; RJ45 connectors.
      c. Visual Communication Cabling: Coaxial 75 ohm, plus 2 dB, 100 percent shielded.
   2. **Substantiation:**
      a. Coseout: Continuity and performance testing.

D. **Ease of Use:**
   1. Zoning: Arrange wiring and protective devices so that outages caused by local faults do not affect unrelated areas or systems.
   2. **Main Telecommunications Equipment Room:** Provide one for each building.
   3. **Branch Telecommunications Room(s):**
      a. Provide additional rooms to comply with TIA standards.

E. **Ease of Maintenance:** Provide communications networks that are logically arranged and well-marked, using terminal panels that provide:
   1. Connections between each voice location and hub in telecommunications equipment room.
   2. Connections between each data input and output location and hub location in telecommunications equipment room.
   3. Connections between each sound input/output location and hub location in telecommunications equipment room.

F. **Allowance for Change and Expansion:**
   1. Spare Distribution Capacity: 40 percent, minimum.
   2. Future Distribution Capacity: 40 percent, minimum.

G. **Owner Personnel Training:** Provide Demonstration and Training.
   1. Operational: Minimum of 8 hours, for 1 person, for each separate system.
   2. Maintenance: Minimum of 8 hours, for 1 person, for each separate system.

3.07 **TESTING CRITERIA**

A. **Copper OSP Cable**
   1. Individually test from both ends of the cable for continuity, power faults, and ground faults. Correct all shorts, opens, crosses, bad terminations, foreign voltages grounding problems, sheath continuity problems, etc. District expectation is 100% validity of pairs.
   2. Notify the District at least 24 hours prior to testing to allow observation at the District’s discretion.
   3. Record and turn over all test results to the District for review.

B. **Category 6 Cable**
   1. Cat 6 Installation: field test requirements
      a. Test every cabling link in the installation in accordance with the field test specifications defined in TIA-568-C.2, hereafter referred to as The Category 6 Standard:
         1) Wire Map
         2) Length
         3) Insertion Loss
         4) NEXT Loss
5) PS NEXT Loss
6) ACR-F Loss
7) PS ACR-F Loss
8) Return Loss
9) Propagation Delay
10) Delay Skew

b. Test the installed twisted-pair horizontal links from the IDF in the telecommunications room to the telecommunication wall outlet in the work area for compliance with the “Permanent Link” performance specification as defined in the Category 6 Standard.

c. One hundred percent of the installed cabling links must pass the requirements of the Category 6 Standard. Any failing link must be diagnosed and corrected. Follow the corrective action with a new test to prove that the corrected link meets the performance requirements. Provide the final and passing result of the tests for all links in the test results documentation.

d. A representative of the District IT shall be invited to witness field testing. The representative shall be notified of the start date of the testing phase five business days before testing commences.

e. A representative of the District IT may select a random sample of 5% of the installed links. The representative (or his authorized delegate) may test these randomly selected links and the results are to be stored. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the end-user representative shall repeat 100% testing and the cost shall be borne by the installation contractor.

C. Fiber Optic Standards

1. Fiber Optic Installation: field test requirements.
   a. Provide all labor, materials, tools, field-test instruments and equipment required for the complete testing, identification and administration of the work called for in the Contract Documents.
   b. In addition to the tests detailed in this document, the contractor shall notify the District or the District’s representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor shall carry out and record any additional measurement results at no additional charge.
   c. Testing shall be carried out in accordance with this document. This includes testing the attenuation and polarity of the installed cable plant with an optical loss test set (OLTS) and the installed condition of the cabling system and its components with an optical time domain reflectometer (OTDR). The condition of the fiber endfaces shall also be verified.
   d. Testing shall be performed on each cabling link (connector to connector).
   e. Testing shall be performed on each cabling channel (equipment to equipment) that is identified by the owner.
      1) Testing shall not include any active devices or passive devices within the link or channel other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.
   f. All tests shall be documented including OLTS dual wavelength attenuation measurements for multimode and singlemode links and channels and OTDR traces and event tables for multimode and singlemode links and channels.
      1) Optionally documentation shall also include optical length measurements and pictures of the connector endface.

D. Fiber Optic Performance Testing Parameters

1. All testing procedures and field-test instruments shall comply with applicable requirements of:
   a. ANSI Z136.2, ANS for Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode and LED Sources
   c. ANSI/TIA/EIA-455-59A, Measurement of Fiber Point Discontinuities Using an OTDR.
d. ANSI/TIA/EIA-455-60A, Measurement of Fiber or Cable Length Using an OTDR.

e. ANSI/TIA/EIA-455-61A, Measurement of Fiber or Cable Attenuation Using an OTDR.

g. ANSI/TIA/EIA-526-14-A, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant.

h. ANSI/TIA/EIA-568-C.0, Generic Telecommunications Cabling for Customer Premises.

i. ANSI/TIA/EIA-568-C.3, Optical Fiber Cabling Components Standard.

j. ANSI/TIA/EIA-606-A, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by the customer, unless the customer specifies their own labeling requirements.

2. Trained technicians who have successfully attended an appropriate training program, which includes testing with an OLTS and an OTDR and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:
   a. Manufacturer of the fiber optic cable and/or the fiber optic connectors.
   b. Manufacturer of the test equipment used for the field certification.
   c. Training organizations (e.g., BICSI, A Telecommunications Association headquarters in Tampa, Florida; ACP [Association of Cabling Professionals™] Cabling Business Institute located in Dallas, Texas)

3. The District or the District’s representative shall be invited to witness and/or review field-testing.
   a. The District or the District’s representative shall be notified of the start date of the testing phase five (5) business days before testing commences.
   b. The District or the District’s representative may select a random sample of 5% of the installed links. The District or the District’s representative may test these randomly selected links and the results are to be stored in accordance with Part 3 of this document. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the representative shall repeat 100% testing at no cost to the Owner.

3.08 RECORD COPY AND AS-BUILT DRAWINGS

A. Provide record copy drawings periodically throughout the project as requested by the Construction Manager or District, and at end of the project on CD-ROM. Record copy drawings at the end of the project shall be in CAD format and include notations reflecting the as built conditions of any additions to or variation from the drawings provided such as, but not limited to cable paths and termination point. CAD drawings are to incorporate test data imported from the test instruments.

B. The as-built drawings shall include, but are not limited to block diagrams, frame and cable labeling, cable termination points, equipment room layouts and frame installation details. As-builts may be required prior to full completion or acceptance of the project. The as-builts shall include all field changes made up to construction completion:
   1. Field directed changes to pull schedule.
   2. Field directed changes to cross connect and patching schedule.
   3. Horizontal cable routing changes.
   4. Backbone cable routing or location changes.
   5. Jack numbers notated at installed workstation locations.
   6. Associated detail drawings.

3.09 LABELING AND NUMBERING PLAN

A. Labels: Identifier assignment and colors shall conform to TIA/EIA-606-A, and be as approved by District Representative before installation.
   1. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.
   2. Shall be preprinted using a mechanical means of printing (e.g., laser printer). Hand written labels will not be accepted.
   3. Where used for cable marking, provide vinyl substrate with a white printing area and a clear “tail” that self laminates the printed area when wrapped around the cable. If cable jacket is
white, provide cable label with printing area that is any other color than white, preferably orange or yellow - so that the labels are easily distinguishable.

4. Where insert type labels are used provide clear plastic cover over label.

5. OSP cables shall be labeled on each end of the cable, within 3’ of termination, on either side of splice case within 1’ of termination, and within each vault, placed on the cable so that label may be seen from above vault.
   a. Provide plastic warning tape 6 inches wide continuously printed and bright colored 18” above all direct buried services, underground conduits and ductbanks.

6. Backbone Cables shall be labeled on each end of the cable, within 6” of termination.

7. Horizontal Cables (station cabling) shall be labeled on each end of the cable, within 6” of termination.

8. TBB grounding cable shall be labeled at each end of ground cable, and warning tags installed every 10’ along exposed cable. CBN cables require only warning tags, no additional labeling.

9. Label format shall be: [cable type]-[#pairs or strands]:[beginning location]-[end location]:  e.g.:
   a. 22AWG 100 pair: MDF - IDF1;
   b. FO50µ 12strand: MDF (Rack#, Bulkhead #, Strands # - #) - IDF1 (Rack#, Bulkhead #, Strands # - #)

10. OSP Labels: 1.31” x 3”, minimum, white in color, self-laminating:
    a. Panduit PN: SLCTWH, or approved equal.

11. Backbone Labels: 6.5” x 1” minimum, white in color, self-laminating:
    a. Panduit PN: S100X650YAJ, or approved equal.

12. Horizontal Labels: 1.5” x 1” minimum, white in color, self-laminating:
    a. Panduit PN: S100X150YAJ

13. FO Labels: 2” x 3.5” black on yellow.
    a. Panduit, PN: PST-FO, or approved equal.

14. Grounding Labels:
    a. Panduit PN: LTYK

15. 110 Termination Block Labels
    a. Panduit: PN C788X050Y1J, Label Inserts,

16. Racks shall be labeled with Row and Rack number, per drawings shown

17. Modular Patch Panels
    a. Labels shall be adhesive backed.
    b. Labels shall fit above the port without overlap to the next port or to the port itself.
    c. Panduit: PN C061X030FJJ, or equal Panduit type

B. Numbering Scheme: Scheme shall be consecutive 4-digit identifiers. Initial number within each IDF shall be coordinated with District IT.

1. Patch panel numbering will be numbered consecutively; with numbering scheme continued between one patch panel and the next.
   a. A/B configuration will not be used for numbering patch panels.

2. Valcom speaker locations shall be numbered in 4-digit numbering scheme as shown; using “S” prefix. Speaker cables shall be terminated into patch panels as noted on IDF Room Layouts.
   a. Speakers shall be labeled with “S” + 4-digit number using self-adhesive, black 10pt font on clear labels.

3.10 ROOM READINESS:

A. The following items must be completed in order for the MDF and IDFs to be considered ‘IT Ready’. IT staff must have access to the MDF Room, in ‘IT Ready’ state a minimum of 30 days prior delivery of required services (e.g. elevator/fire alarm lines), and/or prior to staff occupancy.

B. Room Readiness is required before any Telco or IT services can be requested or installed to the site. Failure to provide Room Readiness could negatively impact systems installation and testing (i.e. fire alarms, elevators).

C. These requirements are the minimum required for communications rooms. As applicable to MPOE and Specialty Server rooms, these should also be considered requirements.

1. Overhead tray system installed, secured, grounded
2. Conduit banks completed.
3. Pathway installed from MPOE to MDF; MDF to each IDF; MDF/IDF to Specialty rooms.
4. Feed cables from MDF to IDFs; MDF/IDF to Specialty rooms installed and routed to correct locations, terminated, and tested.
5. Sheetrock installed, taped, textured, and painted - Wall/ceiling finish completed.
6. Plywood installed and painted.
7. Lighting fixtures installed and functioning
8. Electrical work completed, including power installed onto equipment racks; all electrical functioning
9. Flooring finished/sealed
10. Ladder racking, equipment racks and rack peripheral equipment (e.g. wire management) installed
11. Station cabling installed and routed into BDF/IDF and routed to appropriate equipment rack.
12. Termination, testing, and labeling of station cabling completed.
13. Equipment rack and ladder rack grounding installed
14. Telecommunications Main Ground Bus installed
15. Fire Suppression within IT spaces installed, fully tested, and functioning.
16. HVAC equipment installed, fully tested, and functioning
17. Locking doors installed. Minimum of 8 keys provided to County Telecommunications Staff
18. All "construction" related tasks - including any task that creates dust, whether sheetrock, wood, or metal shavings.
19. All trades waste cleaned and removed
20. Equipment racks wiped clean
21. As-built floor plans with jack locations and numbers noted.

END OF SECTION
5 ROOM DATA SHEETS

Room data sheets will be provided in final documentation.