SAN BERNARDINO COMMUNITY COLLEGE DISTRICT

Request for Task Order Proposal: SBVC - Technical Building Commissioning under the Master Services Agreement for Commissioning Services

IMPORTANT NOTE: THIS POSTING IS INTENDED FOR PRE-QUALIFIED PROFESSIONAL SERVICES FIRMS ONLY; RESPONSES FROM OTHER FIRMS OR FROM SUBCONTRACTORS WILL NOT BE ACCEPTED

Project Title:	**SBVC - Technical Building Commissioning**
Project Number:	**CC01.3601.03**

Post Date:	4/2/2020
Pre-Proposal Meeting:	4/16/2020 **11:00 AM – Microsoft Teams Web Ex Online meeting. A meeting invite will be sent by Sherri Lien Giffin**
Q&A Cut-Off:	4/22/2020 2:00PM PST
Due Date:	**4/30/2020 2:00PM PST – Electronic Submission via Egnyte link – See 2.3 below**
Anticipated Start:	6/8/2020

1. Background Information

San Bernardino Community College District (SBCCD) desires to engage a qualified Commissioning Agent (Cx A) to provide Commissioning Services associated with the San Bernardino Valley College (SBVC) Technical Building Replacement (also referred to as Career Pathways 1-CP 1) design and construction project. The Technical Building Replacement project would construct a new Technical Building adjacent to the Health & Life Sciences Building at SBVC. The new Technical Building will provide 67,873 ASF (100,525 GSF) for CTE programs on campus. Building space will constitute 59,612 ASF of laboratory space, 2,061 ASF of office space, 6,000 ASF of study space, and 200 ASF of other support space. Design and Construction services will be procured under a separate SBCCD General Construction contract. For further information, refer to the Scope of Services (Exhibit 6 to this RFTOP).

Commissioning Services: This Request for Task Order Proposal seeks proposals for Commissioning and/or related Services for the specified Project as set forth in Exhibit 6 hereto. The proposer is sometimes herein, and in other RFTOP documents, referred to as the "Applicant" and/or "Prime."

2. General Instructions

2.1. Carefully review this Request for Task Order Proposal ("RFTOP").

2.2. Please fully and directly respond to each request for information.

2.3. All submissions must be uploaded by no later than than identified in Table on Page 1 of this RFTOP and will be in an electronic format ONLY in one single .pdf for all sections of the proposal. Use the one-time only link to Egnyte for the submission:

https://sbccdpmo.egnyte.com/ul/fstw5BDvzj

Once you use connect to Egnyte via the link above enter your name, email address and company name and then select "Continue". You will drag and drop your.pdf proposal where indicated on the screen an include a message (optional) then select "Send these files". No further action is required.

2.4. Direct any questions and/or requests for clarifications by contacting:

Sherri Lien Giffin via email at sherri.lien.giffin@aecom.com
Use subject line: RFC_ CC01.3601.03 _ SBVC - Technical Building Commissioning

ALL RFCs MUST BE SUBMITTED PRIOR TO THE "Q&A CUT-OFF" DATE MENTIONED ABOVE. Contact with Board Members, District, College, PMO staff, or other persons not specifically noted regarding this RFTOP will result in disqualification. RFC correspondence will be addressed in an addendum to this RFTOP. Addenda will be distributed via email to each shortlisted firm's primary point of contact provided in their original Statement of Qualifications response to the related Request for Qualifications.

2.5. Exhibits required to be submitted with your task order proposal that do NOT count toward the stated page limit are further described within the submittal instructions below: (Applicant Cover Letter, Exhibits: 2 (Fee Proposal); 3 (Delivery Schedule); 4 (Project Representative, Key Personnel and Others Seeking Approval); 5 (Confidentiality Agreement); and 7 (Acknowledgement of Addenda).

3. Specific Submittal Instructions

3.1. Request for Task Order Proposals – Qualifications, Experience, Approach (Exhibit 1 to your Proposal). Your response to this RFTOP is not to exceed 15 pages, using no less than 11-point font. The word "page" means one side of a sheet of paper.

3.2. Table of Contents: Please include a Table of Contents tabbed in the following order:

1. Cover Letter
2. Exhibit 1: Team Qualifications
    a) Technical Approach Narrative
    b) Team Organization, Roles, and Responsibilities
    c) Project Experience
3. Exhibit 2: Fee Proposal
4. Exhibit 3: Delivery Schedule
5. Exhibit 4: Key Personnel Resumes
6. Exhibit 5: Confidentiality Agreement
7. Exhibit 7: Acknowledgement of Addenda

3.3. Evaluation Categories and Associated Points:

Evaluation Category	**Points**
Required: Exhibit 1 Team Qualifications	
Cover Letter	Required (No Points)
Technical Approach Narrative	25
Team Organization, Roles, and Responsibilities	10
Project Experience	10
Required: Exhibit 2 Fee Proposal	40
Required: Exhibit 3 Delivery Schedule	Included in Technical Approach Narrative
Required: Exhibit 4 Key Personnel Resumes	15
Required: Exhibit 5 Confidentiality Agreement	Required (not scored)
Required: Exhibit 7 Acknowledgement of Addenda	Required (not scored)
Total RFTOP Points	**100**

3.4. Cover Letter: Please include a single-page cover letter indicating why you are the most qualified consultant to perform the work. Your cover letter will not count in the 15-page limitation. (not scored)

3.5. Team Qualifications (Exhibit 1 to your Proposal) should include the TOC items listed above and described in further detail below. **Total Points available for this section: [45 Points]**

3.5.1. Technical Approach Narrative: Provide a specific narrative approach that your team will implement to complete the scope of services identified in this RFTOP (and further described in Exhibit 6). Your narrative approach should reflect your Delivery Schedule (Exhibit 3). It should also describe how you plan to incorporate

sustainable project features, as well as articulate your Quality Assurance/Quality Control (QA/QC) Plan. (25 Points)

3.5.2. Team Organization, Roles, and Responsibilities: Provide an organizational chart and a brief narrative describing the personnel you plan to utilize in providing the Services requested per this RFTOP for the proposed Project. This section should also include an explanation of your team's capacity to deliver the Services requested.

Please describe anticipated individual staff roles and responsibilities related to the scope of services for all proposed personnel. Also indicate how each team member will perform their assigned role to fulfill Project requirements and successfully complete the work. Describe any collective project experience where team members have worked together in the past. **Resumes must be provided separately (as part of Exhibit 4)** and should only highlight qualifications and experience relevant to the scope of work and Project description for this Task Order. Key personnel may include staff from Subconsultant firms (if any) that you plan to utilize in providing the Services requested in this RFTOP for this Project. (10 Points)

3.5.3. Project Experience: Please list Applicant (Prime Firm) and Subconsultant experience working on similar projects, if any. Provide no more than five (5) projects, using a single-sided page for each project description. Articulate how elements of those projects align with the scope of work specified in Exhibit 6 and other pertinent criteria as defined herein. (10 Points):

3.5.3.1. Project size and overall construction value

3.5.3.2. Sustainable project features

3.5.3.3. Project completion dates

3.5.3.4. Experience working on Community College projects in California, including any work performed with the San Bernardino Community College District ("SBCCD" and/or "District")

3.3 Request for Fee Proposal (Exhibit 2 to your Proposal): Total Points available for this section: [40 Points]

3.3.1 Provide a Fee Proposal in accordance with the terms, conditions, requirements, and process indicated in the Master Services Agreement including, but not limited to, the following:

3.3.1.1 A Lump Sum amount for Services as defined by the Master Services Agreement and as described in the Scope of Services (Exhibit 6). Services are estimated to be required for the number of workdays noted in the Preliminary Schedule, which is included in Exhibit 6 to this RFTOP.

Assume this duration as you develop your Fee Proposal (Exhibit 2). The Fee shall be broken down as follows:

1. Title 24 and LEED Fundamental Commissioning Services

2. Additional for LEED Enhanced Commissioning Services

Note: The Lump Sum amount must also include a detailed staffing breakdown identifying the hours required of each team member to complete the requested Services. This amount MUST be based exclusively on the "Hourly Rates and Personnel Classifications" included in the Master Services Agreement. No deviations or additional fee inclusions will be accepted as part of these Lump Sum amounts.

3.3.1.2 The format for this submittal shall comply with the following requirements: a worksheet in MS Excel format itemizing the various tasks, the personnel, the estimated hours, hourly rates, subtotal amount of each service/task identified above, and the total fees proposed.

3.3.1.3 A description of the pre-authorized "Additional Services" (if any);

3.3.1.4 A description of the pre-authorized reimbursable expenses allowed by the Master Services Agreement (if any);

3.4 Delivery Schedule (Exhibit 3 Submittal Requirements): Total Points available for this section: [Included in Technical Approach Narrative]

3.4.1 Provide a Delivery Schedule in accordance with the terms, conditions, requirements, and process indicated in the Master Services Agreement, including, but not limited to, the following (no additional points, as points will be assigned as part of the Technical Approach Narrative referenced above):

3.4.1.1 A complete Delivery Schedule with clearly identified durations for each deliverable identified within the RFTOP documents.

3.5 Key Personnel Resumes (Exhibit 4 Submittal Requirements) Total Points available for this section: [15 Points]

3.5.1 Qualifications of Key Personnel, including Others Seeking Approval (if any) in accordance with the terms, conditions, requirements, and process indicated in the Master Services Agreement, will be assessed on an individual basis as well as an organized team. Applicants should adhere to the same group of staff members, Subconsultants, and overall team makeup submitted in the Applicant's initially submitted Statement of Qualifications. Additional staff members, Subconsultants, and/or specialized disciplines may be proposed should the Applicant define one or more roles well-suited for the successful completion of work specific to this Project.

3.5.2 Resumes are required for all team members who will contribute to the completion of this work, including Prime consultant staff and any proposed Subconsultant staff.

3.5.3 If any Prime or Subconsultant team member proposed to participate in the completion of this work was not included in your original SOQ submittal, Others Seeking Approval must submit their resumes and indicate "Seeking District Approval" next to their proposed position title on the resume.

Each team member will be reviewed for approval by the District for this task. Applicant shall not arbitrarily substitute team members or subconsultants for any reason without written acceptance by the District. Applicant shall not arbitrarily substitute team members or Subconsultants for any reason without written acceptance by the District.

3.5.3.1 Experience working on projects of similar size and scope, with an explanation regarding projects on which proposed staff member has successfully performed in the role assigned per their task order proposal submission, experience working on higher education projects, and achieving the CALGreen and LEED goals set forth for this project.

3.6 Confidentiality Agreement (Exhibit 5 Submittal Requirements) - (Required Form)

3.6.1 Complete and sign the Confidentiality Agreement attached to this RFTOP

3.7 Acknowledgement of Addenda (Exhibit 7 Submittal Requirements) - (Required Form)

3.7.1 Applicant must acknowledge the receipt and review of all Addenda issued, sign the provided form, and include with its submission.

4. Master Services Agreement Compliance

The selected firm will provide all requested Services in accordance with the executed Master Services Agreement. All work is to follow San Bernardino Community College District requirements for professional services.

5. Task Order Schedule

It is anticipated that services will commence immediately upon execution of the Task Order(s) that will be awarded through this RFTOP Process. Note that execution of the Master Services Agreement, if not already in place, will occur concurrently with the Applicant's first Task Order. The actual start time for the requested services will be identified in the final Task Order Agreement.

6. Additional Requirements

In addition to the scope outlined in the Master Services Agreement and RFTOP, the proposer shall provide the following services, including but not limited to:

6.1. Reference all available program standards, policies and procedures posted on the District website:

http://www.sbccd.org/Facilities_Planning_and_Construction/Master_Plans

Please note: Several sets of standards, policies, and procedures are not yet available on this website. We anticipate that the District-Wide Standards, Sustainability Policy, and other relevant documentation will be posted on the District website, associated with the same link provided above, on future a date that is still to be determined.

6.2. Initiate and participate in discussions with the representative of the Program Management Office ("PMO"); Construction Management Team ("CMT"), if any; District's Director, Facilities, Planning and Construction; other consultant teams working on this and/or other projects that may interface with this project's scope; as required, regarding this project.

6.3. Prepare and distribute meeting minutes of all Project related meetings related to Consultant's services/tasks.

6.4. Consultant shall work closely and in cooperation with the District, PMO, and CMT (if any) staff, and shall be readily accessible at all times for review and coordination.

6.5. Acquire Division of the State Architect (DSA), Local Fire Marshall, and other applicable Authority Having Jurisdiction (AHJ) permits.

7. Evaluation Process and Scoring Criteria: Total Points Available for All Sections: [100 Points]

7.1. Proposals received after the stated deadline will not be eligible for consideration, subject to the District's discretion.

7.2. Proposals found to be compliant, containing all items required per Section 2 – General Instructions and Section 3 – Specific Submittal Instructions, will then be evaluated by an Evaluation Committee consisting of at least three members representing SBCCD (e.g. Director of Facilities, Purchasing Officer, District Staff and the PMO). The Evaluation Committee members will have working knowledge of the technical aspect of the services defined in the Request for Task Order Proposal. The Evaluation Committee members will be provided a copy of the Request for Task Order Proposal, copies of the proposals, and a corresponding scoring matrix.

7.3. Proposals deemed compliant will be reviewed for responsiveness by the PMO and/or District Staff.

7.4. Firm and Specific Personnel Experience and Qualifications for this Project:

7.4.1. The firm's capability to fulfill the defined scope of work as demonstrated by its experience working on a similar project.

7.4.2. The clarity and specificity of firm's responses as they relate to this project.

7.4.3. The qualifications of firm's staff identified within their proposal to perform the tasks assigned.

7.4.4. Proposed staff members' experience with specific project type.

7.4.5. Resumes are required for all proposed staff included on the team organizational chart, even if sub-consultants.

8. Fee Proposals

Fee proposals of the best qualified/or highest-ranked firm can be negotiated, if necessary. If an agreement on the fee proposal from the best-qualified or highest-ranked firm cannot be reached between SBCCD and the best-qualified or highest- ranked firm, SBCCD will proceed to the next best qualified or highest-ranked firm to review and negotiate fee proposals. If necessary, this procedure will continue until all shortlisted firms have been exhausted.

9. Document Chart

Request for Task Order Proposal
(this document that you are reading containing instructions for proposal submission)

Attachment 1:	Task Order
Exhibit 1:	Team Qualifications (Applicant to Submit)
Exhibit 2:	Fee Proposal (Applicant to Submit)
Exhibit 3:	Delivery Schedule (Applicant to Submit)
Exhibit 4:	Key Personnel Resumes (Applicant to Submit)
Exhibit 5:	Confidentiality Agreement (Form provided must be signed)
Exhibit 6:	Scope of Services (Attached for reference)
Exhibit 7:	Acknowledgement of Addenda (Form provided must be signed)
Exhibit 8:	District Standards (Will be provided later)
Exhibit 9:	Campus Standards (Will be provided later)
Exhibit 10:	Task Order Form (Sample)
Exhibit 11:	Request for Task Order Proposal and Addenda (Placeholder)
Exhibit 12:	MSA, Task Order Form, & Consultant Firm Proposal (Placeholder)
Exhibit 13:	District-Approved Key Personnel (Placeholder)
Exhibit 14:	Other Contractual Documents
Appendix A:	Reference Documents
	A.1 – Spec Section TOC
	A.2 – Basis of Design

SEE Request for Task Order Proposal Exhibits identified above and set forth below for further requirements.

Requirements for this submittal are defined by the RFTOP

Requirements for this submittal are defined by the RFTOP

Requirements for this submittal are defined by the RFTOP

CONFIDENTIALITY AGREEMENT

(Applicant shall submit one form. Each Consultant/Sub-Consultant Firm must submit an additional form)

The undersigned, a duly authorized officer of _____
[Enter name on the line above of Applicant/Consultant/Subconsultant Firm, as applicable]
has the duly delegated authority to execute and contractually bind the below-named signatory to this Confidentiality Agreement, does hereby represent, warrant, and agree that: (1) any and all financial, statistical, personal, technical, or other data and information that is designated confidential by the PMO or District and made available to any of the foregoing and the content of any or all verbal discussions or negotiations between the PMO and/or District concerning the terms or other content of a Task Order Proposal or other offer, submitted to the PMO or District (collectively, "Confidential Information") shall be kept in strictest confidence and no disclosure of any part of the Confidential Information shall be made to anyone other than authorized employees, agents, representatives, contractors, subcontractors, consultants, or sub-consultants having a need to know the Confidential Information in order to assist the Applicant in preparing its Task Order Proposal, or other offer; (2) Applicant and the other signatories hereto, shall take all necessary steps to ensure that the Confidential Information is not disclosed by any employees, agents, representatives, contractors, subcontractors, consultants, or sub-consultants having a need to know the Confidential Information employed or retained by the Applicant, including, without limitation, requiring each such employee, agent, representative, contractors, subcontractors, consultants, or sub-consultants to execute a written agreement, substantially similar in form to this Confidentiality Agreement, promising to protect the Confidential Information from disclosure; and (3) the signatories shall, if requested by PMO or District, return to PMO or District the originals and all copies of the Confidential Information, as well as any notes, summaries or other writings reflecting the content of Confidential Information, within five (5) calendar days of request by PMO or District.

Date: _____

_____
[Name of Applicant or Team Member Firm]

_____
[Signature of Applicant (if individual) or its Officer]

_____
[Typed Name of Person Signing]

_____
[Office or Title]

Exhibit 6: Scope of Services

1. Project Description

San Bernardino Community College District (SBCCD) desires to engage a qualified Commissioning Authority (CxA) to provide Commissioning Services associated with San Bernardino Valley College (SBVC) Tech Building (Career Pathways 1-CP 1) design and construction project. The Technical Building Replacement project would construct a new Technical building adjacent to the Health & Life Sciences Building at San Bernardino Valley College. The Technical building will provide 67,873 ASF (100,525 GSF) for CTE programs on campus. Building space will constitute 59,612 ASF of laboratory space, 2,061 ASF of office space, 6,000 ASF of study space, and 200 ASF of other support space.

The existing Technical Building, with exception of the recently renovated East Wing, will be demolished upon occupancy of the new building. The Diesel program will vacate the Transportation building upon occupancy of the new Technical building.

The building design will include features to exceed the requirements of Title 24, part 6 Energy Code by at least 15%, CALGreen Tier 1 (min) and has a goal set for LEED Gold v4 and solar ready for ZNE (Zero Net Energy) with a goal of targeting ZNE in the future. This project will include the installation of increasingly efficient mechanical and electrical devices, as well as the use of improved materials, to ultimately reduce operational and maintenance costs. The building will be constructed to current code and accessibility (ADA) requirements.

The proposed mechanical system will comprise of a combination of radiant heating and cooling systems and air handling systems for classrooms and lab areas and evaporative units with ceiling fans and unit water heaters for high bay shop areas. Chilled water and heating hot water will be derived from a heat recovery chiller that would be connected to the main campus chilled water loop. Domestic hot water will be derived from a heat pump water heater located in the building.

Lighting will comprise of LED light fixtures equipped with occupancy and daylight controls. Emergency power to egress lighting will be derived from a central inverter system. Photovoltaic panels will be provided on the south side of the facility to offset a portion of the building's energy usage.

Preliminary Hard Construction Estimate: ~$70,000,000.00

Preliminary Overall Project Schedule:

Task	Duration
Task Order Issued	0 days
Preliminary/Schematic Plans (complete)	0 days
Construction/Bid/Permit Documents	13 months
Permit Approvals (DSA)	10 months
Bid/Award	4 months
Construction	30 Months
Commissioning (overlapping construction duration)	1-2 month
Move-in	1 month

2. Scope of Services

General Guideline: The following is a general guideline for the Commissioning Process, which will be considered a standard District requirement for this project:

- Compliance with Title 24
- LEED v4 pre-requisite, and enhanced commissioning submission/certification across all pathways is required by the District
- Compliance with requirement that may be set forth by DSA (Division of State Architect)
- The District may require additional items that it feels are beneficial in the development of a successful Commissioning Process

1) The following systems will be commissioned as part of this scope of work:

   I. Heating, Ventilating and Air Conditioning (HVAC)

   II. Building/Energy Management System (BMS/EMS)

   III. Indoor and outdoor lighting systems & controls

   IV. Domestic Hot Water (DHW) systems

   V. Onsite renewable energy systems

   VI. Irrigation systems, as needed

   VII. Rainwater harvesting systems, as needed

   VIII. Emergency Power Systems (EPS), as needed

   IX. Electrical

   X. Fire/Life Safety

   XI. Security Systems

XII. Additional systems, as determined by the District

2) Design Phase Requirements

The Commissioning Agent shall play a vital role in the design process and facilitate the full design review in collaboration with the A/E team and District. Specific tasks required include:

I. Owner's Project Requirements (OPR) – Immediately upon contract execution, develop a project-specific OPR based on the template provided by the District in coordination with the project team that incorporates LEED v4, Cal Green and Title 24 requirements, and aligns with the District Project Guidelines. Update this document at Design Development, Construction Documents, Bid and Project Closeout. (Duration 2 weeks)

II. Basis of Design (BOD) - Review the BOD for alignment to the District Project Requirements at each design review cycle (outlined below). Provide comments to the team for review and response. Back check all comments in subsequent design milestones. (Duration 1 week)

III. Review Owner's Draft or Final 2020 Sustainability Plan to make sure that goals are reflected in the OPR and BOD. (Duration 1 week)

IV. Design Peer Reviews – Review the design documents, including plans, specifications, Basis of Design, and energy model for compliance with the District's requirements, engineering best practices, and maintenance standards. Participate in design review meetings and maintain a central commissioning comment log.

a. Schematic Design (SD) – No formal CxA (Commissioning Authority) review.

b. Design Development (DD) – Peer review the DD set and provide comments to the District and A/E Team. Ensure conformance with the OPR and BOD. The A/E team will provide the CxA with written responses and include updates in the DSA Initial Submittal CD set. (Duration 2 weeks)

c. Initial DSA Submittal – Conduct full peer review and provide comments to the District and A/E Team. The A/E team will provide the CxA with written responses and include updates in the DSA Back Check set. (Duration 2 weeks)

d. DSA Backcheck/Bid – Verify that items have been corrected from the DSA submission set. Any ongoing/subsequent issues shall be relayed to the District project manager and Sustainability Office for possible inclusion in an addendum. (Duration 2 weeks)

V. Controls Meeting - Attend a controls design meeting to review and formulate the controls scope and sequence of operations with the District and design team.

VI. Commissioning Plan & Lessons Learned Meeting – Formulate a commissioning plan outlining key schedule dates, attendees required at each meeting, and responsibilities of all parties. Reach out to District and PMO staff to gather lessons learned from recently completed projects for inclusion into the plan. The PMO will schedule the appropriate design professionals and District parties to attend each meeting.

VII. Commissioning Specifications – Develop the Commissioning specification no later than 100% DD to ensure each is tailored and appropriate for the specific project at hand. All changes shall be tracked and approved by the District. These specifications will be included in the construction bid documents. Coordinate with the Architect/Engineer

VIII. Code Forms - Complete and submit the commissioning-related forms for DSA and other regulatory bodies. Respond to all comments.

3) Construction Phase Requirements

The following tasks are required of the CxA during the Construction Phase:

I. Update Commissioning Plan – Update the Commissioning Plan as required for any changes to the plan for use during the kick-off meeting that will be updated with key schedule information and process updates throughout construction.

II. Construction Kick-Off Meeting – Facilitate a commissioning kick-off meeting with the entire commissioning team including the contractor and relevant sub-contractors. Discuss:

a) Submittal and RFI review process for the entire team

b) Key commissioning milestones including approximate dates for site installation reviews and functional testing durations

c) Commissioning meeting intervals and proposed topics of discussion

d) Commissioning team member roles and responsibilities

III. Construction Schedule Review – Review the master construction schedule to ensure commissioning plan activities have been adequately incorporated and provide comments to the contractor and District on any suggested updates.

IV. Submittal Reviews – Review all commissioned equipment submittals and provide comments to the District and Engineer of Record for communication to the contractor. Keep a log of these comments, ensure record submittals

address commissioning concerns, and confirm that Buildings & Grounds (B&G) comments are being logged.

V. RFI Reviews – Review necessary commissioned system RFIs throughout construction for compliance with the project documents and District Project Requirements.

VI. Commissioning Meetings – Hold periodic meetings with the project team throughout construction to ensure the schedule is being followed and required commissioning tasks are being completed by the team. Review the master issues log at each meeting. These meetings shall be held in increasing frequency as the project progresses to commissioning phase and testing.

VII. Site Inspection Review – At a minimum, conduct three site inspections with the District to review the current installation and confirm that installed equipment will operate and function as intended. Maintain a master issues log throughout construction (including submittals, RFIs, site installation and functional testing items) and review at every commissioning meeting.

VIII. Pre-Functional Checklists – Prepare and provide pre-functional checklists to the team for use during start-up. The pre-functional checklists shall be reviewed and approved by the District and contractor prior to use. The contractor shall use these checklists as part of the start-up process.

IX. Functional Test Scripts – Develop the functional test scripts and share with the District for approval prior to use. All updates and changes shall be incorporated by the CxA.

X. Functional Test Execution –. Witness functional test script execution on site and document the results. All commissioned systems with the project scope shall be tested (no sampling). Create site reports and keep an issues log of all items that require resolution. Revisit the site to complete seasonal testing as necessary and document in the commissioning plan.

XI. Systems Manual – Provide the District with a systems manual for the operation of the commissioned systems. At a minimum, this manual shall include the O&M manuals, as-built sequences and set points, troubleshooting recommendations, and maintenance requirements for the systems.

XII. Performance Period / Trend Review – Gather and analyze at least three weeks of BMS trend data upon beneficial occupancy. Log any performance issues and bring them to the attention of the District. Share all reviewed data directly with the PMO and the District.

XIII. Training / Transition – The District is focused on implementing a proper transition process from construction to operations and continuous improvement. Develop a transition plan in consultation with the District, including a review of

O&M manuals and verification of onsite training by the installing sub-contractors. Lead a training session exclusively with District staff to provide lessons learned, results of the functional testing process, and operational fundamentals of the commissioned systems.

XIV. Final Commissioning Report – Provide the District with a final commissioning report summarizing the entire process and include final outstanding items and recommendations for future work.

4) Post-Occupancy Phase Requirements

The District believes that the Commissioning process should extend into the first year of operations. The CxA shall complete the following warranty-phase tasks:

I. Respond and review to issues encountered by the Buildings and Grounds (B&G) staff during the first year of the warranty period (start date as determined by the District).

II. No later than two (2) months prior to the end of the warranty period (currently 2 years), review building operations by surveying B&G staff and testing systems of concern to develop an issues log to be addressed by the contractor. Back check these items after completion.

III. Organize and complete a lessons learned session with District staff including B&G, Sustainability, and Design teams. Communicate and discuss major issues encountered during design and construction and provide feedback to ensure future projects do not make the same mistakes.

5) Additional miscellaneous services and tasks required for Commissioning (Cx) Services

The selected consultant(s) and/or consultant teams shall keep proper records of all projects commissioned pursuant to this RFTOP, including, but not limited to, copies of all project correspondence, CxA plan, submittals, shop drawings, and schedules. All such project records shall be submitted to the District after the completion of the project and shall become property of the District;

The selected consultant(s) must have sufficient staff to handle several projects simultaneously and promptly complete assigned tasks. Work must begin on assigned tasks within ten (10) days of Task Order issuance.

Deliverables, as specified in each RFTOP, will be prepared in accordance with the applicable codes and regulations and District standards including, but not limited to, the District and/or College standards, OPRs, Sustainability Plan, etc.

End of Document

ACKNOWLEDGMENT OF ADDENDA

The Applicant acknowledges the receipt and review of all Addenda issued, if any, for this Procurement by indicating below the Addendum No. and Date thereof, as well as signing this form and returning it with your Task Order Proposal:

PROJECT NAME: **SBVC – Technical Building Commissioning**

PROCUREMENT NUMBER: **CC01.3601.03**

Addendum No.	Date Received

Applicant: _____

By: _____

Date: _____

[District Standards will become available once approved by the District for use in specific relation to this Task Order]

[Campus Standard Documents will be inserted here with each RFTOP and will be specific to each Task Order once the District approves for use]

SAN BERNARDINO COMMUNITY COLLEGE DISTRICT

PROFESSIONAL SERVICES TASK ORDER

SBVC - Technical Building Commissioning under the Master Services Agreement for Commissioning Services

Contract Number:	XXXXXXXXX	**Task Order Number:**	XXXXXXXX
Consultant:	XXXXXXXXX		
College:	San Bernardino Valley College		
Project Name:	Technical Building Commissioning		
Project Identification(s):	CC01.3601.03		
Effective Date:	XXXXXXXX		

GENERAL WORK DESCRIPTION: Consultant shall provide Services as described in Exhibit 6 to this Task Order entitled "Scope of Services".

COMPENSATION SUMMARY:

Consultant shall provide Services and be paid as follows:

Basic Services Fees:	
Reimbursables (If Any):	
Total Task Order Amount (Not To Exceed):	**$0.00**
Task Order Amounts Previously Assigned (Various Task Orders):	$0.00
Cumulative amount of Task Orders assigned to date:	$0.00

Total Contract Amount is based on Task Orders Issued.

Distribution: (1) Print Copy to Program Management Contract File, (1) Electronic Copy to Consultant Copies: (1) with each invoice

THIS TASK ORDER ("Task Order") is effective as of the date of the last party to sign this document by and between **The San Bernardino Community College District**, ("DISTRICT") and the CONSULTANT identified above.

RECITALS

WHEREAS, DISTRICT and CONSULTANT have entered into a Master Services Agreement for SBVC - Technical Building Commissioning Services between District and Consultant dated [insert date of award of the Master Services Agreement], ("Agreement"/"MSA"); and

WHEREAS, this Task Order is executed by DISTRICT and by CONSULTANT pursuant, and with the intent that it be subject, to the terms and conditions of said Agreement;

For valuable consideration, receipt of which is hereby acknowledged, DISTRICT and Consultant agree as follow s:

1. Services. CONSULTANT shall furnish in accordance with the terms of the MSA and this Task Order the Services that are described in Scope of Services – "Exhibit "6" and defined in Exhibit "1" – Consultant Proposal, both attached hereto. In the event of a conflict, the Scope of Services w ill take precedence.

2. Compensation.

2.1 Services. CONSULTANT shall receive as compensation for satisfactory performance of all or each portion of the Services as defined by Exhibit 6, the amount identified in Fee Proposal - Exhibit 2 as provided by the Selected Firm and accepted by the PMO.

2.2 Reimbursable Expenses. Reimbursable Expenses as permitted by the MSA and as modified or supplemented, if at all, **shall not exceed** for any individual or aggregate Reimbursable Expense the amount identified above.

3. Performance Schedule. CONSULTANT shall perform its Services and provide deliverables in accordance with the schedule set forth in the Delivery Schedule - Exhibit "3" attached hereto.

4. Definitions. Capitalized terms used in this Task Order shall have the meanings set forth in the MSA.

5. Incorporation: The recitals and the Exhibits 1 through 14, listed below , attached to this Task Order are incorporated herein and hereby made part hereof. If the terms of any Exhibits conflict with the terms of this Task Order, the latter shall control.

Attachment 1:	Task Order
Exhibit 1:	Team Qualifications (Applicant to Submit)
Exhibit 2:	Fee Proposal (Applicant to Submit)
Exhibit 3:	Delivery Schedule (Applicant to Submit)
Exhibit 4:	Key Personnel Resumes (Applicant to Submit)
Exhibit 5:	Confidentiality Agreement (Form provided must be signed)
Exhibit 6:	Scope of Services (Attached for reference)
Exhibit 7:	Acknowledgement of Addenda (Form provided must be signed)
Exhibit 8:	District Standards (Will be provided later)
Exhibit 9:	Campus Standards (Will be provided later)
Exhibit 10:	Task Order Form (Sample)
Exhibit 11:	Request for Task Order Proposal and Addenda (Placeholder)
Exhibit 12:	MSA, Task Order Form, & Consultant Firm Proposal (Placeholder)
Exhibit 13:	District-Approved Key Personnel (Placeholder)
Exhibit 14:	Other Contractual Documents
Appendix A:	Reference Documents
	A.1 – Spec Section TOC
	A.2 – Basis of Design

6. Agreement. This Task Order shall be performed in accordance with and subject to the terms and conditions of the Multiple Award Master Services Agreement (MSA) for Commissioning and related Services.

ACCEPTANCE: The CONSULTANT and DISTRICT agree to perform their respective obligations in accordance with and subject to the terms of this Task Order and the MSA/Agreement and their respective attachments.

CONSULTANT		**DISTRICT**	
By:	_____	**By:**	_____
			Jose Torres
Title:	_____	**Title:**	Executive Vice Chancellor
Date:	_____	**Date:**	_____

[Request for Task Order Proposal and Addenda will be inserted here after Award of a Task Order]

[Consultant Task Order Form and Proposal will be inserted here after Award of a Task Order]

Requirements for this submittal are defined by the RFTOP

[District Approved Key Personnel and Consultant/Sub-Consultant Documentation will be inserted here after Award of Task Order]

[Other Contractual Documents will be inserted here as necessary and will be specific to each Task Order]

Reference Documents

DISCLAIMER

The following reports, documents, and other information are provided as "Information Available" for the Project and for reference only. The reports, documents, and other information are not, and shall not become, part of the Contract Documents for the Project. The District makes no representation or warranty as to the accuracy and/or completeness of the information contained in the reports, documents, and other information, and hereby specifically disclaims the accuracy and/or completeness of such reports, documents, and other information. The District has no independent information, independent knowledge, and no expertise, as to what the contents of the reports, documents, and other information mean, and/or how same may or may not affect construction of the anticipated Project. The District makes the disclosure of the existence of the reports, documents, and other information, and all of their contents to ensure that the reports, documents, and other information, and their contents are made known and available to the Consultant. The Consultant is solely responsible for determining any impact on the Project and the Consultant's pricing and costs regarding the Project. This Disclaimer shall be read as if it is set forth on the face page of all the documents set forth below.

Reference Documents Include Appendices:

A.1 – Spec Section TOC

A.2 – Basis of Design

FINAL SD SUBMITTAL

San Bernardine Valley College: Technical Building Replacement

701 South Mount Vernon Avenue, San Bernardino, CA 92410

5007016 000

Specification Table of Contents

January 22, 2020

HMC Architects

HMC Architects

SECTION 00 01 10

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END OF TABLE OF CONTENTS

FINAL SD SUBMITTAL

San Bernardine Valley College: Technical Building Replacement

701 South Mount Vernon Avenue, San Bernardino, CA 92410

5007016 000

Basis of Design

January 22, 2020

HMC Architects

SCHEMATIC DESIGN SUBMITTAL

CIVIL BASIS OF DESIGN

Snipes-Dye January 22, 2020

Grading

1. The project proposes a new Technical Building. Currently, the project site is a temporary parking lot. Site grading will generate building pad and provide ADA access and vehicular access through the project site. Pad grading for the proposed structure will be designed to work with the existing site and campus conditions, while considering adherence to ADA and current stormwater requirements. The grading concept for the project site is to make it accessible throughout.

Storm Drainage

1. The project will require detailed hydrology, hydromodification, and stormwater quality reports and design. The project will be designed to meet the current standards and regulations as required by the governing agency and district along with the small MS4 permit. Storm water will be collected through the site. A combination of pervious and impervious surfaces are being considered for the site. Drainage shall be designed to drain to landscaped areas, collected, treated, and detained per regulations. Bio-filtration basins and/or tree wells are being considered as a method to provided water quality treatment. Drainage patterns in the existing condition generally drain north-west to south-east to an existing storm drain system that ultimately connects at the eastern and southern part of the campus, this same pattern will be maintained. Post development treatment BMP's shall be designed to treat stormwater before it leaves the project site. Treated storm water shall be collected throughout the development in designed bio-filtration detention basin(s) and then conveyed to the existing storm drain system. Geotechnical testing will be required to establish existing soil percolation and infiltration rates so that the appropriate BMP design measures can be implemented.

Site Utilities

1. The current site contains existing infrastructure to serve the proposed site development. A public water mains is located adjacent to the project site. Domestic water and fire services will serve the project from this existing public main. It is likely that at least one on-site fire hydrant will be required. An irrigation system will be fully designed to serve the site by the Landscape Architect. Existing sewer lines exist and should be able to serve the proposed building. Existing electrical and gas

are located near the project site, and some backbone distribution will need to be relocated. Natural gas will be supplied from an existing gas lines near the project site. Chilled water runs adjacent to the project site along the north side.

Dust and Erosion Control

1. Currently there are no Dust and Erosion control measures on the project site. The proposed project will implement design to control dry weather dust and erosion control. This can be accomplished with various paving and surface treatments. A Storm Water Pollution Prevention Plan (SWPPP) will be developed as a part of the project. The SWPPP should address wet and dry weather mitigation measures, including monitoring of storm water run-off for pollutants of concern. It will also address permanent post construction BMP's.

Pavement

1. Where possible pervious pavement options should be considered to reduce the storm water run-off. Standard concrete or AC pavement will be utilized in parking areas and concrete and pavers are may be proposed for some walkways. Concrete should be used for trash enclosures to accommodate heavy truck loads. Portions of the existing site hardscape will be analyzed and assessed along the accessible path of travel. Due to the nature of this project and its use, more site pavement and heavy pavement sections are likely to be proposed.

SCHEMATIC DESIGN SUBMITTAL

LANDSCAPE BASIS OF DESIGN

EPT Design January 22, 2020

The new home for San Bernardino Valley College's Technical Building is located on an existing gravel parking lot nestled between the existing science and Technical Buildings along with the recently completed gymnasium project. Directly adjacent to the new Technical Building is an existing biology garden where students can learn about the different biomes of California. Leading into the site is a prominent pedestrian promenade connecting students from the south parking lot to the stadium entrance. This pedestrian promenade is furnished with California native planting and banded concrete paving that will blend with the new Technical building site. The Landscape goal with the new Technical Building is to seamlessly blend the existing biology garden and gymnasium project with the new site, connecting them through similar hardscape and plant materials.

The landscape design for the San Bernardino Valley College Technical Building embraces the idea of movement through its form-making, circulation patterns, and nodes designed systematically throughout the site. After looking into the variety of technical programming offered in the building, our design is inspired by both the micro and macro levels of technology. On the micro level, looking at the forms of a circuit board and understanding how the conductive tracks move information from one point to another. On the macro level, understanding the angular form-making of a concept sketch for a new car to improve dynamics and overall performance. When applying these design concepts throughout the architecture and landscape, we then begin to link the existing campus with the future of SBVC by creating a more systematical and effective campus through social space and circulation. Site amenities will include large plaza spaces, a variety of seating options, a large lawn amphitheater opening towards the existing biology garden, and stormwater solutions.

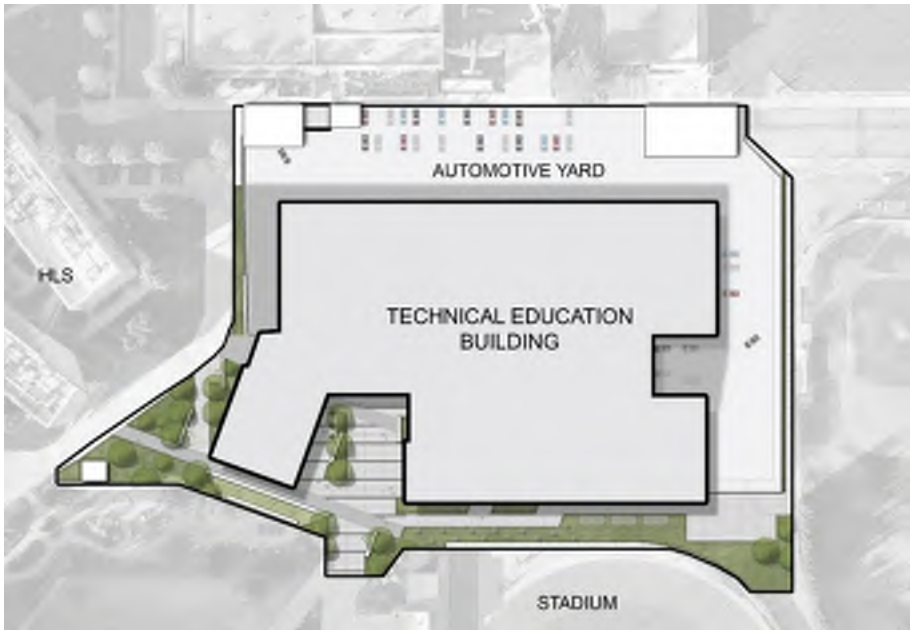
SCHEMATIC DESIGN SUBMITTAL

ARCHITECTURE BASIS OF DESIGN

HMC Architects January 22, 2020

Project Description

The Technical Building Replacement project would construct a new Technical Education building adjacent to the Health & Life Sciences Building at San Bernardino Valley College. The new Technical building will provide 67,873 ASF (100,525 GSF) for CTE programs on campus. Building space will constitute 59,612 ASF of laboratory space, 2,061 ASF of office space, 6,000 ASF of study space, and 200 ASF of other support space.
The existing Technical Building, with exception of the recently renovated East Wing, will be demolished upon occupancy of the new building. The Diesel, Auto Restoration, EV Tech, Heavy Truck, etc. programs will vacate the existing Technical building upon occupancy of the new Technical building. Secondary effects of this project also include inactivation and demolition of the existing Technical building. The building design will include features to exceed the requirements of Title 24, part 6 Energy Efficiency by at least 15%. This project will include the installation of increasingly efficient mechanical and electrical devices, as well as the use of improved materials, to ultimately reduce operational and maintenance costs. The project is pursuing LEED Silver minimum.
Approx. SF 69,873ASF (100,525GSF). Construction budget of state-approved FPP (about 50% of total) is $70.8M."

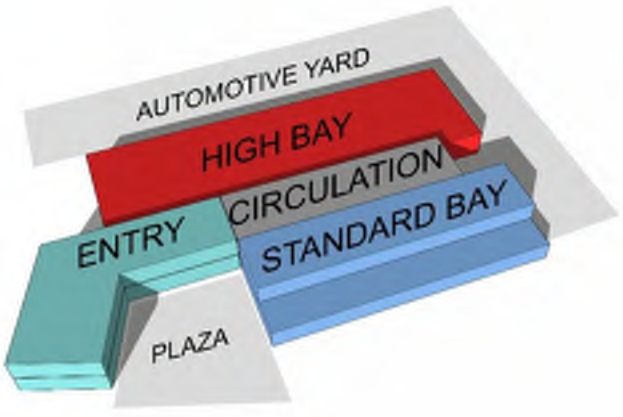


Basis of Design

Through a collaborative design process with the project team representing San Bernardino Valley College, the Community College District, and HMC, a set of key goals were developed and a vision for the design of the Technical Education Replacement Project was established. key goals of the project focused on providing a "*State-of-the-Art Educational Facility",* that will "*Enriching Student Experience"*, "*Demonstrate Leadership is Sustainability"*, foster "*Partnership with Industry"*, and "*Enhancing Exposure and Community Relationships"*. Focusing on these guiding principles throughout the design process, these objectives became the strength of the solution.

Building & Site Organization

The two-story building is organized into four major zones – The *"Entry Wing"* of the building which also defines the entry plaza, contains the main shared and event spaces of the building, including the main lobby and exhibit spaces, as well as the Division Office. The single-story *"High-bay"* bar along the north side of the building houses the Automotive Mechanical, Auto-Restoration & Street Rod, and Heavy truck programs and sits adjacent to the automotive yard at the north and east edges of the site. The two-story *"Standard bay"* along the south edge contains the Machine Technology, Electricity & Electronics, HVAC&R, and Water Supply Technology departments. Connecting and feeding into the instruction bays, the *"Circulation Corridor"* in addition to circulation and typical core functions, supports key project goals of enriching the student experience and connectivity by providing a variety of collaborative sticky spaces to support learning and cross disciplinary education outside the classroom. These spaces include seating areas, digital and traditional workspace, as well as display space, and provide visual links between instructional spaces.



Architectural Expression

The architectural expression draws inspiration from a rich campus architectural context, its environmental setting, the technical nature of its program, and the principal goals and vision established. The primary envelope of the building is thought of as a skin, similar to that of an automotive body or electronic device. In the most successful examples of both, the envelop elegantly and efficiently serves to protect and conceal, to reveal or expose, and to transmit and convey information, all for the purpose of enhancing function and experience of the user. The buildings primary panelized metal skin acts as a wrap for the program, revealing and concealing its program in response to the natural environmental, flow of circulation, to defining views, support the program, and enhance the user experience.

The technical nature of the buildings programs also informed decisions concerning selection of building systems and materials. A variety of strategies selected support the educational program by taking an “on-display” presence within the building design. The expressive use of building technologies such as photovoltaics, HVAC equipment, 3D printed, and CNC finishes all support a goal for the building to act as a teaching tool.

Primary material and color selections and formal language of the building design, in addition to their functionality, were chosen both for their common use on campus and their relationship with the industrial nature of the projects program. Materials including composite metal panel, daylighting wall and glazing systems, louver shade systems, and perforated metal paneling result in a design expression that while unique and driven strongly by its function, is also contextual and familiar within the campus setting.

saiful·bouquet
structural engineers

San Bernardino Valley College – Technical Building
Structural Basis of Design & Design Criteria

1. Building Description

1.1 General

The project consists of a new partial 2-story Technical Building located at the SBVC campus. The building has approximately 113,500 SF of framed area. The first floor includes laboratory spaces such as Computer, Machine, Heavy truck, Hybrid & EV, and Tutoring Center. The 2nd level accommodates laboratory spaces for Electronics, HVAC, Industrial Automation, Computer application and staff offices.

The west entrance of the building opens into a two-story atrium and narrows to form a corridor along the length of building moving east. Automotive, hybrid – EV and heavy truck labs are located on the north side of the corridor. Machine lab, flex labs to name a few are located on the south side of the corridor. The North portion of the building, housing Automotive labs etc. is a one-story structure with an elevated roof about 25ft from the first level finished floor. Many thermal chimneys have been provided on the northern roof for ventilation purposes.

The automotive lab area is visualized to be uninterrupted space with columns located at the lab periphery, approximately 85'-0" apart. Thus, the girders supporting the roof directly above this area are consequently deep and heavy.

The south portion of the building is a two-story structure housing labs, tutoring centers and faculty offices. The south side of level 2 accommodates outdoor solar and HVAC labs. The partially open roof above this area supports solar PV panels. A light monitor on the roof runs in line with the corridor at level 2. Labs at this level are located on either side of the corridor as well. The height is 17'-0" for this double-height portion of the building.

1.2 Gravity Systems Description

The proposed construction for the project is of Structural Steel. The typical floor consists of 3" metal deck w/ 3 ¼" light-weight concrete fill slab. The decking is supported by wide flange steel beams that are typically spaced at 10'-0" to 12'-0" on center. The steel beams are in turn supported by steel girders which span between columns.

For the roof slab on the 2-story structure, a 2" metal deck w/ 2 1/2" light-weight concrete fill slab is proposed. The typical roof decking is supported by the wide flange steel beams spaced at 10'-0" to 12'-0" on center. The wide flange steel beams at all levels will typically be designed compositely with the slab

A 2" bare metal deck forms the structural portion of the roof for the one-story building. The steel framing is very similar to the other levels, except that the spacing of the beams is reduced to 8'-0" to 10'-0" on center.

1.3 Seismic Systems Description

The lateral load resisting system for the building consists of Steel Buckling Restrained Brace (BRB) frames in both principal directions. The BRB frames will be strategically distributed throughout the building to provide effective and efficient lateral support to the structure. The concrete filled deck acts as a horizontal diaphragm to transfer the lateral forces to the seismic force resisting elements. Given the large openings in the diaphragm horizontal diagonal steel beams forming diaphragm trusses will be utilized for transfer of the diaphragm forces around the large central openings.

2. Codes and Reference Standards

2.1 Governing Code

Governing Code Authority: Division of State Architects (DSA)
Code: 2019 California Building Code with any applicable local city and including the DSA amendments

2.2 Reference Standards

American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI)
ASCE 7-16: Minimum Design Loads for Buildings and Other Structures, inc.

American Institute of Steel Construction (AISC)
AISC 360-16: Specification for Structural Steel Buildings
AISC 341-16: Seismic Provisions for Structural Steel Buildings, inc. Supp. No. 1

American Concrete Institute (ACI)
ACI 318-14: Building Code Requirements for Structural Concrete
TMS 402-16 / ACI 530-16: Building Code Requirements for Masonry Structures

American Welding Society (AWS)
AWS D1.1-15: Structural Welding Code - Steel
AWS D1.8-16: Structural Welding Code - Seismic Supplement
AWS D1.4-17: Structural Welding Code – Reinforcing Steel

3. Geotechnical Report

A draft site specific geotechnical report has been prepared by Leighton Consulting, Inc dated November 19th, 2019. Based on the geotechnical consultant's recommendations, the structure of the proposed building will be supported on shallow spread footings. Combined footings are anticipated under the lateral braces in the buildings. The gravity columns will typically be supported on isolated footings.

4. Serviceability Criteria

4.1 Vertical Deflection Criteria

Steel: Non-Composite Beam Deflection Criteria (For bare metal deck at Roof only)

Live Load (Roof):

Interior Beams:	L/360 or 1" Max
Perimeter Beams:	L/360 or 0.75" Max (for Plaster finish)
	L/360 or 0.50" Max (where Glazing occurs)

Dead + Live Load (Roof):

Interior Beams:	L/240
Perimeter Beams:	L/240

Steel: Composite Deflection Criteria (Floor framing)

- *Initial Construction Dead Load (wet concrete)*
  - For both Exterior & Interior Beams: No limit

- *Post Composite Live Load:*
  - Perimeter Beams: L/360 ----- For Typical Metal Stud/Curtain Wall
  - Interior Beams: L/360 ---- For Typical Partitions

- *Post Composite Superimposed (DL_{super}+LL):*
  - Perimeter Beams: L/360 of 0.75" Max ---- For Typical Metal Stud
    L/360 of 0.50" Max ---- For Curtain Wall
    Interior Beams: L/240 or 0.75" Max For Typical partitions

- *Total Deflection (Pre-Comp. DL + Post-Comp. Superimposed DL + Post-Comp. LL – Camber)*
  - For Interior Beams: L/240
  - For Perimeter Beams: L/240
  - Do not check the shored deflection criteria.

Beams & Girders Supporting Elevator Sheave Beams

Δ_{total} = L/1666 (Applies only to elevator static loads).

4.2 Floor Vibration Criteria

- The following special vibration criteria will be utilized for the design of the noted laboratory spaces. All other laboratories and spaces in the building will not be subject to any special vibration criteria.

Area	Walking Speed	Maximum Velocity (µ-in/sec)
Lab area including Biology, Microbiology, Anatomy, Chemistry, Physics & Instrument rooms	75 steps/min	4000 µ-in/sec

4.3 Camber

Camber 80% of pre-composite dead load deflection
Minimum camber = ¾"

5. Gravity Loads

5.1 Dead Loads

Estimated weight of construction material, including self-weight of structural framing and super-imposed dead loads (e.g. ceiling, flooring, roofing, MEP)

Exterior Skin Loads: 20 PSF
Mechanical Equipment and pads: 50 PSF over mechanical roof area (Actual Weights will be used in latter phases)
Stairs: 50 PSF

5.2 Live Loads

1)	Classrooms	50 psf, Non - reducible
2)	Labs	50 psf, Non - reducible
3)	Light Storage Areas	125 psf, non-reducible
4)	Corridors	80 psf, reducible
5)	Partition Allowance (for LL < 80psf)	15 psf, reducible
6)	Roof	20 psf, reducible
7)	Mechanical Roof	50 psf, reducible

6. Seismic Design Parameters

Variable	Value	Reference (ASCE 7-10 U.N.O)
Risk Category	III	CBC 2019 *Table 1604A.5*
Importance Factor (Seismic)	Ie = 1.25	*Table 1.5-2*
Seismic Ground Motion Values:	S_S = 2.449 g	(Geotech Report, Page 14)
	S_1 = 0.982 g	(Geotech Report, Page 14)
	S_{MS} = 2.449 g	(Geotech Report, Page 14)
	S_{M1} = 1.669 g	(Geotech Report, Page 14)
	S_{DS} = 1.663 g	(Geotech Report, Page 14)
	S_{D1} = 1.113 g	(Geotech Report, Page 14)
Site Class	D	Geotechnical Report
Long-Period Trans. Period	T_L = 8 sec	*Figure 22-12*
Seismic Design Category (SDC): E		*CBC 2019 Section 1613A.2.5*

Response Modification Factors:

System Description	Response Modification Factor (R)	System Overstrength Factor (Ωo)	Displacement Amplification Factor (C_d)
Buckling Restrained Brace Frames (BRBF)	8	2.5	5.0

Approximate Building Period Parameters:

System Description	C_t	x
Buckling Restrained Brace Frames (BRBF)	0.03	0.75

Max Allowable Story Drift (Δa @ CM per ASCE 7-16 12.12.1):

All Floors	$0.02h_{sx}$

ρ, Rho = As applicable per code

7. Wind Loads

Variable	Value	Reference (ASCE 7-10 U.N.O)
Exposure	C	*§1609A.4.3 (CBC 2019)*
Basic Wind Speed	*Vult* = 105 mph	*§1609A.3, Figure 1609A.3(2) (CBC 2019)*
Directionality Factor	K_d = 0.85	*Table 26.6-1*
Topography Factor	K_{zt} = 1.00	*§26.8.1*
Natural Frequency	Based on calculated natural frequency from elastic analysis n_1 < 1 Hz each direction	
Structure is "Flexible"		
Damping Ratio	β = 0.05	
Gust Effect Factor	G_x = 0.85	*§26.9.1*
Enclosure Classification:	Enclosed	
Internal Pressure Coeff:	GC_{pi} = ±0.18	*Table 26.13-1*

8. Material Strengths

11.1 Structural Steel

Steel Wide Flange Members:	ASTM A992 Gr. 50, Fy = 50 ksi
Steel Channel, Angle, Plates:	ASTM A36, Fy = 36 ksi (UNO)
Exception – SFRS Plates:	ASTM A572 Gr. 50, Fy = 50 ksi

Pipes:	ASTM A53 Grade B, Fy = 35 ksi
HSS (Round):	ASTM A500 Grade C, Fy = 46 ksi
HSS (Rectangular):	ASTM A500 Grade C, Fy = 50 ksi
Machine Bolts:	ASTM A307 (UNO)
Anchor Bolts:	ASTM F1554, Fy = 36 ksi (UNO)
High Strength Bolts:	ASTM A325-N (UNO)

11.2 Concrete

Portland Cement:	ASTM C150, Type II
Normal Weight Concrete (145 pcf):	ASTM C33 Hard Rock Aggregate
Slab on Grade	3,000 psi (Normal Weight) UNO on plan
Grade Beams	4,000 psi (Normal Weight) UNO on plan
Continuous Footings	3,000 psi (Normal Weight) UNO on plan
Spread Footings	3,000 psi (Normal Weight) UNO on plan
BRBF Footings	4,000 psi (Normal Weight) UNO on plan
All Other Concrete	3,000 psi (Normal Weight) UNO on plan
Lightweight Concrete (110 pcf):	ASTM C330 Expanded Shale Aggregate.
Slab on Metal Deck	3,000 psi

11.3 Reinforcing Steel

All Reinforcing except per below:	ASTM A615, Grade 60
Reinforcing to be welded:	ASTM A706, Grade 60

11.4 Metal Deck:

Deck and Accessories:	ASTM A653-SS, Grade 50 (Galvanized G-60)

11.5 Composite Studs:

Shear Studs (“Nelson” Studs):	ASTM A29, GRADES C1010 THROUGH C1020

END OF REPORT

San Bernardino Valley College

Technical Building – Schematic Basis of Design

P2S ENG

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January 22, 2020

P2S Project #0360

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MECHANICAL SYSTEMS

The design of the heating, ventilating and air conditioning (HVAC) systems for the proposed Technical Building will address the overall objective of providing a system that meets the occupants' needs, provides a safe environment, and accommodates changes in the building operation. The proposed mechanical system will include evaporative cooling air-handling units, exhaust fans, hydronic systems, radiant heating/cooling, heater recovery chiller, controls, and air distribution systems. The building systems will provide heating, ventilation, and air conditioning in conformance with applicable codes and specific requirements of the design criteria.

The new Technical Building will be built just south of the existing Technical Building at the approximate location outlined below.

The codes and standards listed below are minimum requirements.

- California Building Standards Administrative Code (Title 24, Part 1), 2019
- California Building Code (Title 24, Part 2), 2019
- California Mechanical Code (Title 24, Part 4), 2019
- California Plumbing Code (Title 24, Part 5), 2019
- California Energy Code (Title 24, Part 6), 2019
- California Fire Code (Title 24, Part 9), 2019
- California Referenced Standards Code (Title 24, Part 12), 2019

Reference Standards and Guidelines:

- ASHRAE Standard 52.2-2017
- ASHRAE Standard 62.1-2019
- ASHRAE Standard 55-2017
- UL: Underwriters Laboratories, Inc.

Ambient Design Criteria

Project Location:	San Bernardino, CA
Latitude:	34.1N
Longitude:	117.3W
Elevation:	1,125 feet
CEC Climate Zone:	10

	Summer	Winter
Design Temperature:	102F DB/69F MCWB	31F

The project will utilize Region 10 Climatic Data for San Bernardino. Heat gains and losses to the exterior will be calculated using Title 24 outdoor design conditions for San Bernardino, CA at frequency levels of 0.5% for summer dry bulb and mean coincident wet bulb temperature and 0.2% for winter dry bulb temperature.

HVAC Performance Criteria

The HVAC systems will be designed to provide user comfort, enhanced indoor environmental quality, and maximize energy efficiency. Reduced maintenance and operating costs versus typical standard packaged variable air volume (VAV) systems will be incorporated.

Indoor Design Conditions & Zone Criteria:

Building Space	Cooling Temp/RH	Heating Temp	Occ. Density (sf/ person)	Plug Load (W/sf)	LPD (W/sf)	CO_2 Sensor (DCV)
Offices	78°F/50%	68°F	100	1.5	0.6	N
Classroom/Lecture	78°F/50%	68°F	# seats	1.0	0.6	Y
Lobby	78°F/50%	68°F	100	0.5	1.1	N
Computer Lab	74°F/50%	68°F	# seats	TBD	0.6	Y
Meeting/ Conf. Room	78°F/50%	68°F	# seats	0.5	1.0	Y
Reception	78°F/50%	68°F	100	0.5	0.6	N
Flex Labs	74°F/50%	68°F	30	TBD	0.9	Y
Main Automotive Lab	74°F/50%	68°F	100	TBD	0.9	N
Auto Restoration Lab	74°F/50%	68°F	100	TBD	0.9	N
Street Rod Lab	74°F/50%	68°F	100	TBD	0.9	N
Hybrid and EV Lab	74°F/50%	68°F	100	TBD	0.9	N
Steam Clean Lab	74°F/50%	68°F	100	TBD	0.9	N
Heavy Truck Labs	74°F/50%	68°F	100	TBD	0.9	N
Transmission Lab	74°F/50%	68°F	100	TBD	0.9	N
Engine Lab	74°F/50%	68°F	100	TBD	0.9	N
CAD/CAM Lab	74°F/50%	68°F	100	TBD	0.9	N
Machine Lab	74°F/50%	68°F	100	TBD	0.9	N
Machining Inspection	74°F/50%	68°F	100	TBD	0.9	N
Industrial Maintenance Lab	74°F/50%	68°F	100	TBD	0.9	N
Grind Room	74°F/50%	68°F	100	TBD	0.9	N

Building Space	Cooling Temp/RH	Heating Temp	Occ. Density (sf/ person)	Plug Load (W/sf)	LPD (W/sf)	CO_2 Sensor (DCV)
Backflow Lab	74°F/50%	68°F	100	TBD	0.9	N
Electronics Lab	74°F/50%	68°F	100	TBD	0.9	N
High Power Elec Lab	74°F/50%	68°F	100	TBD	0.9	N
Industrial Automation Lab	74°F/50%	68°F	100	TBD	0.9	N
HVAC&R Labs	74°F/50%	68°F	100	TBD	0.9	N
Lab Storage	78°F/50%	68°F	0	0.5	0.6	N
General Storage	78°F/50%	68°F	0	0.2	0.6	N
IDF/MDF	78°F	N/A	0	TBD	0.6	N
Electrical	105 F	N/A	0	TBD	0.6	N
Restrooms / Custodian	N/A	N/A	0	0.2	0.6	N

Indoor Air Quality

The design will meet the minimum requirements of ASHRAE Standard 62.1-2019, Ventilation for Acceptable Indoor Air Quality (with errata). The mechanical ventilation systems will be designed using the ventilation rate procedure or Title 24 - whichever is more stringent. The naturally ventilated areas of the building will comply with ASHRAE Standard 62.1-2019 and California Title 24.

A permanent monitoring system will be provided to ensure that the ventilation systems maintain design minimum airflow requirements. The system will also monitor carbon dioxide levels within naturally ventilated and densely occupied spaces.

Individual comfort controls will be provided for the building occupants to enable adjustments to meet individual needs and preferences. Radiant areas require larger zones and provide stable comfort control.

Room Noise Criteria

Generally, the design NC levels will be met through selection based on manufacturer's Sound Power Level data, use of sound attenuating devices including sound attenuators (sound traps), acoustical duct and plenum lining, flexible ductwork. The background Noise Criteria (NC) is a measurable goal of the noise that should not be exceeded by the HVAC system in various areas. Equipment will be selected for minimum noise levels consistent with operating parameters. The use of sound control devices that generate pressure drop will be avoided when possible. Round ductwork will be used where possible to avoid duct "oil-canning."

Both A Practical Guide to Noise and Vibration Control for HVAC Systems, published by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the ASHRAE Applications Handbook will be utilized in the design.

The room noise levels will be designed in concert with the acoustical engineer to meet the following levels with the air handling systems on but excluding occupant noise sources.

Area	Maximum Noise Level
Classrooms Conference Rooms Enclosed Offices	NC-30
Computer Labs	NC-35
Open Offices Areas Corridor/Circulation	NC-40
Labs Toilet/Janitor/Storage	NC-45+

Sustainable Design Strategies

The building will be designed for net-zero ready performance with target EUI of approximately 36 kbtu/sf. LEED v4.1 Gold or Platinum is being targeted.

Modeling of building performance is being performed utilizing Integrated Environmental Solutions (IES) Virtual Environment. The following analysis and simulation will be performed for this project:

- Solar Analysis on Building
- Thermal Analysis and Energy Simulation
- Daylight Analysis
- Natural Ventilation Analysis
- Solar Chimneys CFD model
- HVAC Systems Simulation

High-level modeling using a program such as Cove Tool will be used initially to determine an EUI baseline and for evaluating the savings of the various efficiency measures outlined in this document.

Sustainability measures being reviewed for feasibility:

- Condensate capture from evaporative cooling units
- Eliminating natural gas / combustion equipment
- Radiant wall panels
- Natural Ventilation
- Solar Chimneys

Other technologies investigated but not feasible or cost-effective:

- ground-source heat pumps/geothermal (non-ideal climate)
- phase change materials (not currently a method for modeling to take credit for the feature)

The summer thermal comfort zone will be expanded to 78-80F for certain spaces by utilizing local ceiling fans and radiant systems. This measure saves energy by reducing the amount of cooling required.

Primary Systems include evaporative cooling air handlers as primary cooling and ventilation source, radiant floor heating & cooling, unit and infrared heaters, and a heat recovery chiller as a primary source of heat. Considering the very high summer temperatures, no spaces will have passive-only systems (i.e. radiant system with natural ventilation only) because natural ventilation is not desirable when it is 90+ degrees outside. Spaces will either have active-only systems or mixed-mode. This is covered in greater detail in later sections.

The proposed building envelope components improve upon the title 24 code requirements to minimize heat gain or loss from the building. Note that these requirements are not yet confirmed as of the SD submittal and may be updated with ongoing architectural coordination:

Roof components:

	Type	U-value	Equivalent R-value	Remarks
2019 Title 24 Minimum Performance	Concrete/ Other	0.034	29.4	Requires Rigid insulation with a value of R-24 (4"-5" thick) on top of concrete deck in order to meet the minimum code requirements.
2019 Title 24 Minimum Performance	Metal Building	0.041	24.4	Depends on insulation system. For an assembly with continuous insulation only, requires R-24 rigid insulation to meet the minimum code requirements.

Exterior Walls:

	Type	U-value	Equivalent R-value	Remarks
2019 CEC Minimum Performance (Table 140.3-B)	Metal-Framed	0.062	16.1	Will require R-19 insulation between studs plus approximately 2" of continuous rigid exterior or interior insulation.
2019 CEC Minimum Performance (Table 140.3-B)	Mass Light (i.e. 6" CMU solid-grouted, ungrouted, or insulated; or 8" or 10" CMU ungrouted or insulated)	0.170	5.88	Depends on type of wall system, i.e. CMU (grouted, empty, or insulated) or solid masonry/concrete walls – see attached pages. The values in the attached tables are without any continuous rigid insulation. To calculate the R-value of the entire assembly with continuous insulation: (1 / U-factor from table) + R-value of Continuous Insulation For example, to meet the minimum code requirement, a 6" medium weight solid-grouted CMU wall would require R-4.5 of continuous insulation.

Fenestration: Values are for the entire fenestration assembly, includes mullions, framing, etc. This is not glazing alone.

	U-value	SHGC	Remarks
2019 CEC Minimum Performance – Fixed Windows	0.36	0.25	Values from Table 140.3-B of 2019 CEC.
2019 CEC Minimum Performance – Operable Windows	0.46	0.22	Values from Table 140.3-B of 2019 CEC.
2019 CEC Minimum Performance – Glazed Doors	0.45	0.23	Values from Table 140.3-B of 2019 CEC.
2019 CEC Minimum Performance – Curtain Wall/Storefront	0.41	0.26	Values from Table 140.3-B of 2019 CEC.

Glazing Window-to-Wall Ratio:

West	Maximum of 40%
Overall	Maximum of 40%

Primary HVAC Systems

There are multiple combinations of heating and cooling strategies implemented within the building depending on the space types. These include:

Active Systems: Indirect evaporative cooling VAV AHU as primary ventilation and cooling source, fan coil units in electrical/telecom spaces, and local space heating via hot water unit heaters.

Passive Systems: Radiant floor heating and cooling with natural ventilation available, ceiling fans, or both. Solar chimneys for passive heating/cooling in the high-bay spaces during part of the year is being evaluated.

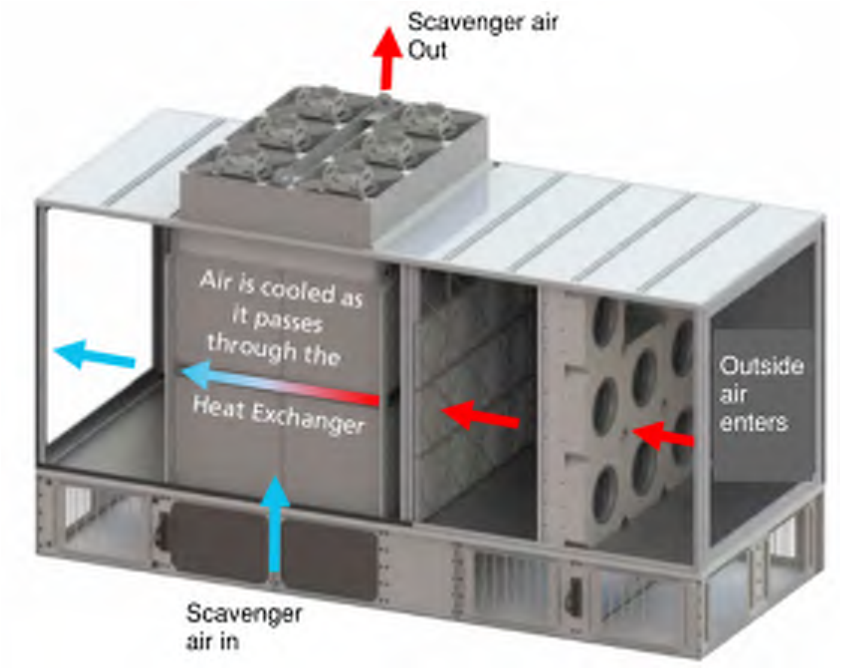
Mixed-Mode Systems: Active combines with natural ventilation and radiant systems with interlocks

System Type	Building Space	System Description
Active	Automotive Labs Flex Labs	Evap. Cooling AHU with local hot water unit heaters.
	Telecom Rooms	Chilled water fan coils
	Electrical Rooms	Chilled water fan coils
Mixed Mode	Conference/Mtg Rooms Lobby/Reception Offices Hallway/Circulation Classrooms/Lecture	Evap. Cooling AHU for ventilation only, with radiant slab heating/cooling.
	Computer Labs	Evap. Cooling AHU with radiant slab for heating only.

Evaporative Cooling VAV Air Handling System (Active)

The variable air volume air handlers will be located on the roof towards the South end of the building, away from the High-bay lab areas. The initial proposed design includes two units, one for the first floor and one for the second floor. This will decrease overall required shaft space and duct sizes. The air distribution will be able to shut-off areas when not in use to allow the variable speed fans to reduce airflow, static pressure and energy. The Manufacturer shall be Energy Labs, Western Air, or Equal.

An evaporative cooling section will be used to temper outside air from 100+ degrees down to 75-80F range. The evaporative cooling section will cool the supply air through simple evaporation of water. It utilizes a heat exchanger between the water and air stream such that the moist air never comes in direct contact with the conditioned environment. This type of system does not use nearly as much energy as a chilled water system and vapor compression chiller (like from the central plant). The heating coils are selected to match the heat recovery chiller temperatures. The heating coil will have copper fins and copper tubes and stainless steel casing.



A supplemental chilled water coil is included as the evaporative section can't cover the full loads. The CHW cooling coils the air handlers will be designed for 42/62F entering and leaving water temperatures to match the campus loop. Chilled water coils will be sized for a maximum face velocity of 400 fpm, a minimum of 6 rows, 10 fins per inch maximum, and having a minimum wall thickness of 0.02". Coils will have aluminum fins and copper tubes; stainless steel casing and stainless steel condensate drain pans.

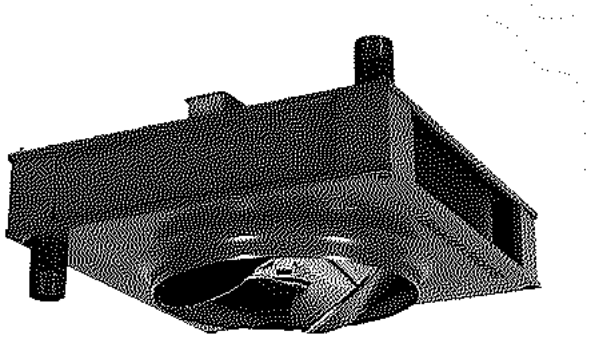
Air filters shall be rigidly supported, extended area type, U/L listed as Class 2, Minimum Efficiency Reporting Value (MERV) rating of 13 per ASHRAE Standard 52.2, 12-inch thick with a universal gasketed-holding frame.

Carbon dioxide levels will be monitored throughout the densely occupied (‚â• 25 people per 1,000 ft2) spaces. The measurement of carbon dioxide levels allows the building automation system to reduce the amount of outside air brought into the building when it has to be cooled or heated. There will be a differential pressure sensor that measures the difference in pressure between in the inside and the outside of the building. This reading will be used to ensure that the building remains positively pressurized.

Hot Water Unit Heaters (Active)

Spaces that are not heated by the radiant slab system require a separate system. The initial proposal is to use space heating in each area consisting of hot water units heaters. Cooling and ventilation in these areas is via the evaporative AHU. Electrical infrared radiant heaters were also considered but California code limits their use to a degree that they are not feasible to include as an option

The hot water unit heaters utilize a hot water coil and blow warm air into the occupied areas. Due to their very "industrial" appearance, the application of this system type is limited to the lab spaces and will not be used in classrooms, offices, or other high visibility areas. Two options are shown below for a horizontal or vertical downward airflow.



Natural Ventilation (Passive)

Natural ventilation is ventilation provided by thermal, wind or diffusion effects through doors, windows, atria, or other intentional openings in the building as opposed to mechanical ventilation which is ventilation provided by mechanically driven equipment such as fans and blowers. Natural ventilation has potential to significantly reduce the energy cost required for mechanical ventilation for certain area in the buildings. Natural ventilation will be utilized for some spaces only at certain part load conditions (Mixed Mode) to reduce energy consumption and achieve for a more sustainable design, as deemed feasible.

Natural ventilation shall be introduced into the space by utilizing two fundamental approaches:

1. Wind driven cross-ventilation.
2. Buoyancy driven stack ventilation (solar chimneys)

Wind driven cross-ventilation occurs via ventilation openings (windows) on opposite sides of enclosed space. A significant difference in wind pressure will cause wind driven ventilation, which will flow across the enclosed spaces from window opening to window opening. For times when the wind pressure is not available, the design will employ buoyancy-driven stack ventilation to move air flow through the spaces. Buoyancy driven stack ventilation relies on density differences between layers of hot and cold air, along with height differences in the locations of the openings to move a flow of air through the space. Since warm air is less dense than colder air, the cooler denser air will tend to fall when the two layers of air come in contact with each other while the warmer lighter air will be displaced upwards.

Both of these approaches are being reviewed for feasibility. All areas will have mechanical ventilation to handle conditions where natural ventilation would be untenable. Natural ventilation is an option which would allow turning off airflow to those spaces under ideal conditions and save fan energy.

Radiant Slab Heating & Cooling (Passive)

Radiant floor cooling and heating shall be via network of cross-linked polyethylene (PE-X) pipes embedded in the concrete slab. The pipes will be looped with 6 inches of spacing between them. The pipes are placed on top of a layer of thermal insulation to reduce heat loss on the underside of the slab. This system utilizes the thermal storage heat capacity the concrete slab to reduce peak loads and transfer them outside the period of occupancy. To minimize occupant discomfort, the floor temperatures shall be in range 66F minimum for cooling and 80F maximum for heating.

Each radiant zone will have an associated circulation pump in the mechanical room and also requires a manifold cabinet inset into the wall at the space. The manifold cabinet contains the valves for controlling cooling or heating flow to that zone.

Radinat manifold in a wall cabinet (sample)

Hot water shall be provided from the heat recovery chiller on the roof and it will be supplied to the radiant floor tubing at 110-120F for radiant heating to yield an 18F temperature difference at full load conditions. The feasibility of using cooling water from chilled water return from the central plant will be investigated and evaluated. A 6-way valve for the zone will allow the zone to change to cooling mode, even when other radiant zones are still in heating mode. In order to avoid any condensation on the floor, the DDC system shall monitor the dew point temperature of the spaces to always deliver to the floors a chilled water supply temperature above the dew point temperature.

Ceiling fans will be utilized with these passive natural ventilation and radiant slab systems to widen the summer thermal comfort zone. An ASHRAE article has noted that occupants with local control of air speed from a ceiling fan, can tolerate space temperatures of 80+F, due to the air movement and evaporative cooling effect felt by the occupants. [1]

Mixed Mode Heating Ventilating and Air Conditioning (Mixed Mode)

Mixed mode is a hybrid two-mode HVAC system can provide comfortable indoor environment energy efficiently utilizing both natural and mechanical forces at different times of the day or season of the year. Mixed mode ventilation takes advantages of natural ventilation forces, using mechanical forces only when natural forces are not sufficient. The difference between conventional (active) and mixed mode system is that a mixed mode system can be controlled automatically between natural and active modes in order to minimize energy consumption when active systems are not required to maintain satisfactory indoor air quality and thermal comfort. The DDC system will monitor and control these spaces to

[1] Arens, E, Turner, S, Zhang, H and Paliaga, G. 2009. Moving Air for Comfort. ASHRAE Journal. Atlanta: American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.

automatically control certain window openings and radiant flow systems to automatically switch from passive to active heating or cooling at the appropriate conditions and times to provide the comfort necessary, while saving energy whenever possible.

High-Volume Low-Speed Fans

The design will also utilize high-volume low-speed fans, commonly referred to by one of the largest manufacturers “Big Ass Fans”. These fans increase air circulation in large open areas and increase user comfort at higher temperatures, allowing the building to save energy with higher setpoints.

Telecom/Electrical/Elevator Machine Rooms (Active)

The telecom building distribution frame (BDF), inter-building distribution frame (IDF), electrical rooms, and elevator machine rooms shall be air conditioned by chilled-water cooling only fan coil units with a circulation pump for after hours cooling. The fan coil units will utilize EC motors to minimize fan energy consumption. Temperatures will be maintained per the guidelines provided by the University, typically 78 max for BDF/IDF/elev. And 90-95 for electrical rooms.

Exhaust Systems

General building exhaust will be provided for the restrooms and janitorial closets. The exhaust fans will be located on the roof. Restroom exhaust air rate is based on 10 air changes per hour and will be ventilated with makeup air from hallways.

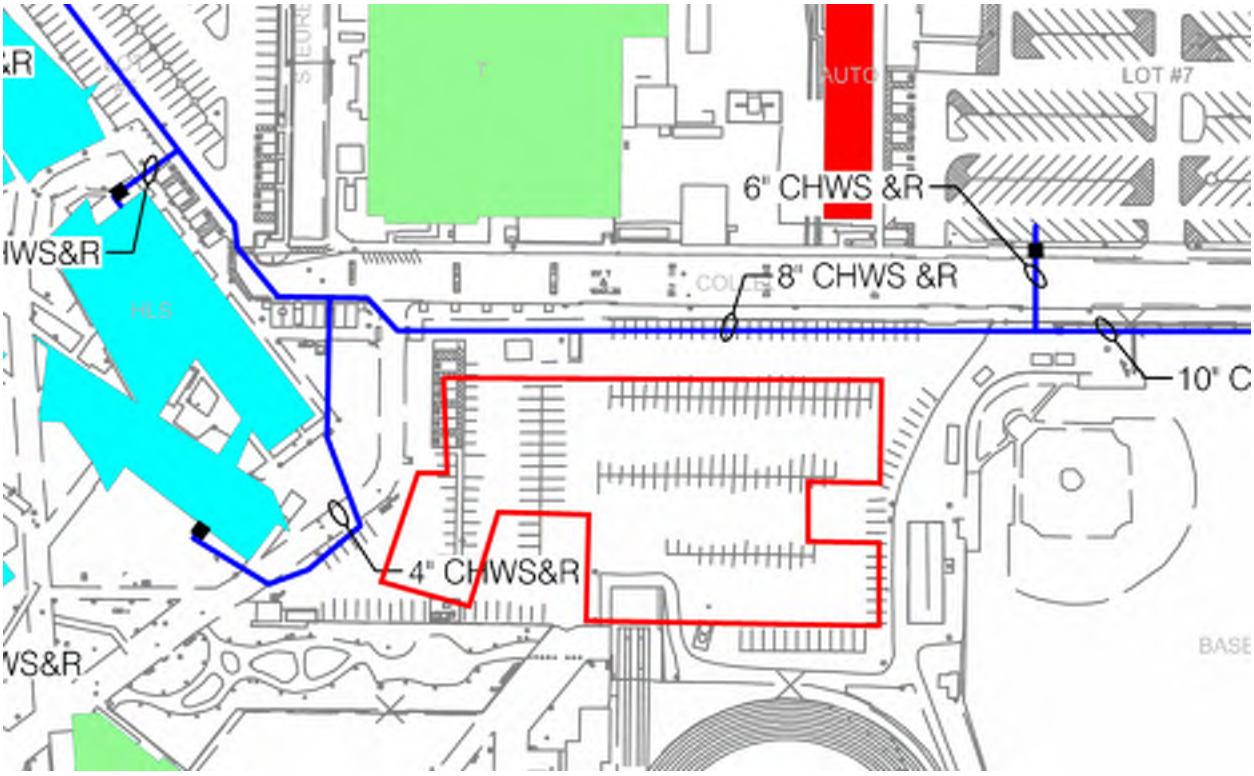
The Automotive Labs require 1.5 CFM/SF per the 2019 CMC table 403.7. This ventilation rate was applied to all Lab spaces in the building as an initial assumption until more information about the equipment and requirements in each Lab are known. These spaces are class 2 air which will not be recycled but rather once-through exhausted via local exhaust fans on the roof. The exhaust will be divided across several fans to reduce duct sizes, duct length, and energy consumption.

The 2019 CMC also requires vehicle shops/labs to have local exhaust connections for each vehicle bay. The intent is to have vehicle exhaust snorkel systems from under the floor and routed to exhaust on the roof via shafts elsewhere.

Hydronic Systems

The building will have a Heat Recovery Chiller that ties into the campus CHW loop. This would allow the building to get CHW from the local chiller or the loop. Hot water will be generated locally at the building by the Heat Recovery Chiller and supplemental boilers. Local energy metering will include Onicon System-10 Btu meters for heating hot water and chilled water.

The building site contains existing CHW piping from the campus loop and a branch serving the Health and Life Science Building (shown below in blue). While the building itself does not sit on the existing piping (outline below in red), portions of the pipe may need relocation due to site work and excavation.



Piping Materials

Underground chilled water piping will be pre-insulated Polyvinyl chloride (PVC) pipe with high-density polyethylene (HDPE) jacket, push-on joints, with Mega-lug connections.

Chilled water and heating hot water piping within the building: 3" and larger, Schedule 40 black weld steel pipe ASTM A53, with 1-1/2" thermal insulation to minimize heat gain or loss and prevent condensation.

Chilled water and heating hot water piping within the building: 2-1/2" and smaller Type "L", hard drawn copper tube.

Radiant floor cooling and heating shall be via network of cross-linked polyethylene (PE-X) pipes embedded in the concrete slab. The pipes will be looped with 6 inches of spacing between them.

Duct Systems

Supply Air Ductwork

Supply air duct system will be galvanized steel of minimum 3-inch water gauge pressure class for mains. Branch ducts will be minimum 2-inch class. Sealing, reinforcing and supporting will be according to SMACNA standards. Ductwork shall have thermal insulation to minimize heat gain, and prevent condensation.

General Exhaust Ductwork

General exhaust duct system will be galvanized steel of minimum 2-inch water gauge pressure class. There will be no insulation provided for exhaust ductwork.

Diffusers and Exhaust Air Grilles

In exposed lab areas, ventilation and exhaust air will utilize "sidewall style" bar grilles mounted on the ductwork.

In areas with ceilings, plaque type architectural diffusers will be used for supply, with perforated face return/exhaust.

Grilles shall be of aluminum construction in Lab areas and steel in the rest of the building.

Insulation Materials

All concealed supply air ducts shall be insulated with 1-1/2" thick foil-faced fiberglass insulation. All exposed supply air ducts in mechanical rooms and in duct shafts shall be lined. Exterior ductwork shall have 2" lining.

Chilled and heating hot water piping shall be insulated with 1-1/2" thick heavy density fiberglass with vapor barrier jacket. Insulation for all outdoor piping shall be covered with aluminum jacket.

Insulation for underground chilled water piping shall be factory applied 1" thick void free polyurethane foam with HDPE jacket.

Vibration Isolators

All rotating and reciprocating equipment shall be provided with vibration isolation systems including seismic restraint to prevent transmission of vibration to structure. Air handlers shall only have the fans isolated.

Controls

The building automation/energy management system (BMS) for the main gym building will be compatible with the Automated Logic Corporation controls, which is the existing campus energy management system. The system will be able to integrate multiple building functions, including equipment supervision and control, alarm management, energy management, and historical data management and archiving. In addition the lighting schedule shall interface with the HVAC controls for single schedule input.

The provided controllers must not utilize any proprietary drivers or jar files. The controllers must use the latest stable firmware release from the manufacturer, LON based space temperature and humidity sensors shall have a digital display with adjustable set points. All relays utilized in the control system shall be IDEC relays with status lights.

All control panels will be stand alone in memory, networking, and control operations. The design of the controls will be in a modular format, permitting future expansion capabilities. The system will monitor and control equipment according to the sequence of operation, as well as additional input and output points.

Energy inputs into HVAC system will be metered and monitored. This includes electrical, chilled water and steam utilities.

ELECTRICAL SYSTEM

The design of the electrical system for proposed Technical building will encompass service to the proposed building, interior and exterior lighting, power distribution systems and a fire alarm system. All these systems will be designed to provide the user with maximum flexibility and all equipments that form part of these systems will be selected for durability and maintenance ease that are consistent with the current campus standards.

The following applicable codes and standards will be referenced for the electrical design for the proposed building.

Applicable Codes

- California Building Standards Administrative Code (Title 24, Part 1), 2019
- California Building Code (Title 24, Part 2), 2019
- California Mechanical Code (Title 24, Part 4), 2019
- California Electrical Code (Title 24, Part 3), 2019
- California Energy Code (Title 24, Part 6), 2019
- California Fire Code (Title 24, Part 9), 2019
- California Referenced Standards Code (Title 24, Part 12), 2019

Reference Standards And Guidelines

- NFPA 72: National Fire Alarm Code
- 2010, 10th Edition of the Illuminating Engineering Society of North America Handbook (IESNA)

Design Criteria

Following are design voltages and load calculation criteria for the proposed building.

Design Voltages

Primary voltage:
4160V, 3 phase, 3 wire

Secondary voltages:
480Y/277V, 3 phase, 4 wire
208Y/120V, 3 phase, 4 wire

Overall Connected Volt-Ampere Per Square Foot

AREA	CONNECTION	VOLT AMPERE (PSF)
Offices	Lighting	0.65
	Receptacle	2.0
Conference Rooms	Lighting	0.85
	Receptacles	3.0
Classrooms	Lighting	0.7 (+ lecture board)
	Receptacles	3.0
Multi-Purpose Rooms	Lighting	0.85
	Receptacles	3.0
Dining	Lighting	0.4
	Receptacles	3.0
Restrooms	Lighting	0.65
Storage/Other	Lighting	0.4
Kitchen	Lighting	0.95
	Receptacles	3.0
	Equipment Power	30.0
Corridor	Lighting	0.6
	Receptacle	0.5
Main Lobby	Lighting	0.85
	Receptacle	3.0
Mechanical/ Electrical Spaces	Lighting	0.6
	Power	Actual Motor HP

Sustainable Design Strategies

The following sustainable design strategies will be adopted in design of the electrical systems for the subject building:

- Promoting task lighting in offices to reduce overhead lighting power densities.
- Utilize automatic day lighting and demand control system. Using dimming controls in combination with occupancy sensors and photo sensors to reduce lighting energy in the building.
- Promoting energy efficient lighting in spaces to achieve required foot-candles with reduce fixtures
- Promoting cut off LED lighting outdoors
- Promoting energy efficient distribution transformers to reduce no load and load losses.
- Promoting metering with central display to monitor energy generation and consumption.
- Photovoltaic solar provisions per CalGreen – title 24.

Proposed Electrical Service

Based on preliminary load calculations, the proposed building will be served from a medium voltage 1500kVA, 4160kV-480/277V exterior pad mount transformer. The medium voltage transformer will derive its service from a new selector switch off of existing manhole EMH-13 located north west of the proposed facility and will intercept existing feeders 3 and 4. From the medium voltage transformer, a new feeder will be extended to the proposed building with (5)4"C – 4#500kcmil and 1#1/0gnd to serve the proposed main switchboard in the main electrical room.

The main electrical room will be provided in the lower level of the building. Individual floor electrical rooms will be stacked above each other. 480-120/208V energy efficient dry type transformers will be provided

in the main electrical room and on individual electrical rooms on each floor to meet the power requirements of the building. 100A, 480/277V 3P, 4W panel boards will be provided to serve lighting on each floor.

Proposed Normal Electrical Distribution System

The low voltage distribution serving the building will consist of 480/227V, 2000-ampere switchboard with 2000-ampere main circuit breaker equipped with ground fault protection. The distribution section assembly will be rated for 65,000 amperes interrupting capacity and will be designed to have 25% spare capacity.

480/277V, 3 phase, 4 wire risers will originate from the 480/277V main distribution board and extend upward into each electrical room on the floors where connections to lighting panels and 480-208/120V energy efficient dry type transformers will be made. Energy efficient dry type transformers will serve 120/208V, phase, 4wire main distribution board which in turn will serve 225A, 120/208V, 3phase, 4wire distribution panel boards located within the electrical rooms on each floor that will meet the power requirements of the offices, conference rooms, workshops, activity areas and associated support areas. Transformers shall not be supported from walls and shall be floor mounted using Mason Industries Type BR for transformers up to 250 kW. Transformers 250kW and above shall utilize Mason Industries type SLR

Dedicated 120/208V panelboards will be provided in the workshop areas to allow for emergency power off control for the equipment. Panel boards will be surface mounted in the electrical room and will include 42 circuits. 20% spare circuit breakers will be included in each panel.

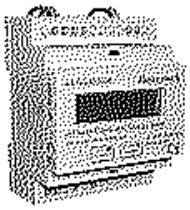
Lighting on each floor will be served from 100A, 277/480V, 3phase, 4wire panel boards located in the electrical room of each floor.

Mechanical loads will be served from dedicated 480V and 208V panelboards located on each floor.

Telecommunications loads will be served with dedicated panelboards located in the data rooms. The main data room will have a 225A, 120/208V, 3P, 4W panelboard and support data rooms will have a 100A, 120/208V, 3P, 4W panelboard.

A dedicated system shall be provided to serve lighting control panels, mechanical control panels, and access control panels. A UPS shall be provided to serve this distribution system and sized to handle these loads. UPS is to provide protection against power spikes and brownouts.

A digital metering system for the kW and kWh usage will be provided for each building as part of the design.



Proposed Distribution Voltages

480V, 3 phase, 3 wire for all motor loads 1 horsepower and larger
277V for lighting
120V for receptacles
120/208V, single and three phase for computer labs, offices and study rooms.

Power Wiring

Provide equipment power connections to motors, fans, pumps, water heaters, etc. Include intermediate equipment connections where main power is concerned, specified by manufacturer. Examples include hood motors to control panels, Hand-Automatic-Off disconnects, etc. Provide raceways for low voltage circuits. Low voltage wiring (< 120 Volts) shall be the responsibility of the other trades respectively (mechanical, plumbing, IT, etc). Additional auxiliary scope to include, but not limited to, the following: motorized shades, motorized doors, automatic valves, washer/dryers, trash compactor, and elevators. All food service equipment protected by fire suppression and hoods shall have shunt trip overcurrent protection with connection to fire alarm system. Elevator shall meet all applicable building, ASME, CEC, and other codes, and include necessary fire alarm connections.

Grounding

Provide a new grounding system for the building and the main switchboard per CEC requirements. Grounding distribution shall be interconnected with dedicated busbars at all electrical and IDF/BDF rooms (Lyncote XIT, Chatsworth, Hargar). Grounding system shall connect all electrodes present to building including structural elements, incoming water service, etc. Bond required equipment including switchboards, panels, metallic conduit and raceways, transformers, etc. Provide a dedicated equipment grounding conductor on all circuits.

Lighting Performance Criteria

Light fixtures and systems will be selected for efficiency, durability, maintenance ease, and to accentuate the area architecture. Light fixtures will also be located for maintenance ease. Indoor lighting will be tailored to building's needs and theme. Light Fixtures, lamps and ballasts will be selected to maximize energy conservation, provide adequate foot-candles to meet IES standards, provide glare free illumination, allow users to have flexibility of light levels and harvest daylight savings. Occupancy controls shall be provided to maximize energy savings in intermittently occupied spaces.

The illumination levels will conform to the latest edition of Illuminating Engineering Society (IES) guidelines, and will be as follows:

Area	Average Foot Candles
Offices	30-50 fc
Conference	50 fc
Lounge	50 fc
Event/Multipurpose	100 fc
Lobby	20-30 fc
Classroom	30-50fc
Restrooms	15-25 fc
Electrical/Mechanical Rooms	50 fc
Telecom Rooms	50 fc (at 3ft working height)
Corridors	15 fc (floor level)
Exterior/Landscaping	1-5 fc (grade level), 5fc average for main egress ways

Basis of lighting design as follows:

1. Offices: recessed LED lighting.
2. Corridors and restrooms: recessed LED linear and downlights, pendant/stem mount where open ceiling. Pendants and stems to conform with architectural aesthetics
3. Classrooms: LED light fixtures to match ceiling and zoned to dim areas for projection screens and televisions.
4. General lighting shall be level 80 color rendering index (CRI) minimum.
5. Mechanical and Electrical rooms: industrial vapor-tight, 4 ft LED, cable/chain hung for ease of alterations.
6. Exterior: LED (3500K) wall packs, bollards at the fire lane, and poles fixtures to match Campus standards.
7. LED Exit signs will be provided at all exits and along the path of egress.

Stairwells shall be illuminated using linear LED light fixtures. Lights shall provide safe and dependable coverage during occupied times (10fc minimum at floor egress). Fixtures to utilize multi-level lumen output and integral motion sensor to decrease energy consumption when space is unoccupied.

LED fixtures shall be installed on the outside building at key locations of activity and safety. All exterior lighting, including building perimeter lighting, shall conform to the campus and LEED guidelines. The perimeter of the buildings will be highlighted by wall mounted light fixtures and down lights located to enhance architectural features. These fixtures will also provide coverage for pedestrians in proximity of the buildings.

Provide emergency lighting (light fixtures on emergency power). Selectively circuit designed fixtures operate on normal and emergency. Implemented along all egress paths in lounges, multipurpose rooms,

electrical rooms, corridors, stairs, and any other interior public access areas holding 39 or more occupants. Egress illumination shall conform to the latest CBC and DSA requirements. Emergency lighting will be served from an central lighting inverter with minimum 90 minute back-up. LED Exit signs will be provided at all exits and along the path of egress.

Exterior light fixtures shall be Full cut-off, dark sky compliant, LED energy efficient fixtures. Exterior lighting shall be designed to meet the requirements of IES RP-20-14 and Title 24. Exterior lighting controls shall provide time clock, photocell control, and occupancy sensors as required by Title 24. Exterior lighting shall include courtyards, walk way paths, building entries, parking lot, loading docks, etc.

Lighting Control System

Provide a distributed digital lighting control system to meet the requirements of the Title 24. The system to incorporate occupancy sensor control, daylight harvesting, time clock controls, and demand control to allow utility demand response. System shall be capable of connecting to campus BMS systems for operability. Where installed, lighting controls shall operate in unison with A/V control devices.

Provide dimming/relay modules local to respective fixtures (not from a central control panel). Devices shall network together over communication cable. The system shall provide a Graphic User Interface utilizing building floor plans and allow interface with the campus building management system (BMS) for centralized control.

1. Lighting shall operate with linear dimming in all occupied spaces. Back of house spaces shall be on/off and will meet the latest requirements of Title 24.
2. All spaces shall be equipped with occupancy sensors, with the exception of mechanical and electrical utility rooms.
3. All spaces with exterior glazing, and an electrical load of 120 watts or more, shall be equipped with daylight sensors and automatic dimming based on natural light levels.
4. Corridors shall be equipped with occupancy sensors, and shall automatically reduce light levels, as required by Title 24 when occupants haven't been detected for 15 minutes.
5. At moveable partition exterior/interior walls provide dedicated lighting controls to each, with ability to merge controls upon opening. Include automated contact control provisions to activate segregation upon closed states.

Outdoor lighting shall be controlled by a photocell and time clock system and occupancy sensors that interface with the lighting control panel.

Emergency System

Provide a lighting inverter to serve all emergency lighting. Emergency power will be provided for systems legally required by the Authority Having Jurisdiction, and DSA State fire marshal. Emergency power shall serve elements essential to human life safety such as egress and exit lighting (interior and exterior exits) and access control at code required locations.

Fire Alarm System

Provide building a complete manual/addressable fire alarm system with voice evacuation. System shall conform to current California Building, Fire and NFPA 72 Codes. Division of State Architecture (DSA) is the primary jurisdictional authority for this project. Fire Alarm System shall be installed in dedicated and marked conduits (red stripes at each end is required). All fire alarm boxes are required to have red covers.

New initiating and indicating devices shall be placed throughout the floors to meet current code requirements.

Alarm shall include the following:

1. One remote LCD alphanumeric annunciator at the main building entrance with an eighty-character digital readout indicating which device is in alarm or trouble mode is required. Coordinate exact location with the State Fire Marshal.
2. Locate the Fire Alarm Control Panel (FACP) with an eighty-character digital readout indicating which device is in alarm or trouble mode inside the main electrical room.
3. Fire alarm connections to all fire suppression systems and door hold-opens are required.
4. Dedicated fiber-optic connection shall be made from the FACP to the campus main command center.
5. System shall include the following devices be installed per latest CBC and CFC codes:
    a. Monitoring, control, and power: fire alarm control panel, battery backup.
    b. Initiating devices: manual pull stations, smoke and heat detectors, duct detectors, etc.
    c. Indicating devices: speakers, strobes, etc.
    d. Elevator shunt override, emergency lighting activation/dimming override, etc.
    e. Output to allow interface to Theater and Audio-Visual systems to silence during a fire alarm announcement.

The new fire alarm system shall be consistent with campus standards and approved vendors for consistency and integrity (Gamewell FCI – Campus Standard sole sourced). System to be connected to campus security network, central fire department station, and campus BMS via BACNet.

PLUMBING SYSTEMS

The intent of this report is to establish a basis of design for the plumbing discipline to meet the new Technical Building Replacement project requirements and coordinate the integration of these systems into the building architecture. Our design of the proposed Technical Building will incorporate the objective of providing a system that complies with the occupant needs and provides a more efficient and safer environment. The scope of Plumbing includes plumbing fixtures, domestic water distribution, sanitary sewer, waste, vent, storm drainage, natural gas and compressed air system.

Applicable Codes

The Plumbing Systems will be designed in accordance with listed applicable Codes, Standards and Authorities Having Jurisdiction, the Owner's insurance underwriters and in accordance with current good engineering practices.

- California Building Standards Administrative Code (Title 24, Part 1), 2019
- California Building Code (Title 24, Part 2), 2019
- California Mechanical Code (Title 24, Part 4), 2019
- California Plumbing Code (Title 24, Part 5), 2019
- California Energy Code (Title 24, Part 6), 2019
- California Fire Code (Title 24, Part 9), 2019
- California Referenced Standards Code (Title 24, Part 12), 2019

Reference Standards and Guidelines

- ANSI American National Standards Institute
- UL Underwriters Laboratories
- AGA American Gas Association
- ASME American Society of Mechanical Engineers
- ASSE American Society of Sanitary Engineers
- ASTM American Society for Testing and Materials
- AWWA American Water Works Association
- CISPI Cast Iron Soil Pipe Institute
- NSF National Sanitation Foundation
- PDI Plumbing and Drainage Institute

Domestic Cold Water

Domestic cold water system shall be based on a maximum velocity of 5 feet per second and the following maximum allowable pressure loss: 3 psi per 100 feet. A minimum of 25 psi to the last and most remote plumbing fixtures and/or equipment will be provided.

The building domestic cold water system shall be sized based on Chapter 6, Table 610.3 & 610.4 of the California Plumbing Code.

Potable cold water supply shall connect to the existing cold water campus distribution loop. Points of connection will be coordinated with Civil Engineer. A water meter located at the building entry and connected to the EMS shall be provided and coordinated with Mechanical and Electrical accordingly.

Domestic water will be distributed to plumbing fixtures, hose bibs and water heater via city street main water pressure.

Shut-off valves shall be provided in a central location where possible and behind an access panel. Groups of fixtures on each floor will be provided with isolation valves for ease of maintenance. Each plumbing fixture will also be provided with individual isolation valves (fixture stops) for maintenance purposes.

Water hammer arrestors shall be provided behind access panels at locations in compliance with the code.

Hose bibbs shall be provided at building perimeter at 75 ft. spacing and on roof for equipment service. Additional hose bibbs at roof for future PV panel wash down will be provided (if any).

Domestic Hot Water

Domestic hot water will be generated using air source heat pumps and will provide for all hot water needs to the building. Hot water will be generated and stored at 140 ° F to eliminate the risk of Legionella bacteria growth. Water temperature will be subsequently stepped down via master thermostatic mixing valves to 120 ° F for distribution in the building.

Hot water shall be circulated back to the source equipment. Where the hot water piping routing creates a sub-loop, a balancing valve shall be provided to maintain the temperature of the piping system.

A hot water re-circulation system will also be provided and re-circulated by a closed loop domestic in-line pump with a motor capacity of approximately 1/2 horsepower.

A seven (7) day twenty-four (24) hour programmable time clock, aqua stat and temperature sensors will maintain the hot water temperature within 105°F to 120°F range.

The hot water heater and associated components will be located in the mechanical room located on the 2nd floor. Hot water shall be routed to all domestic plumbing fixtures.

All hot water distribution piping will be insulated with appropriate thickness of insulation and fire-retardant jacket.

Sanitary Sewer and Vent System

The building sanitary drainage and vent system shall be sized based on Chapter 7, Table 702.1 and 703.2 of the California Plumbing Code.

A Sand/Oil interceptor (SOI) will be provided to serve floor drains and service sinks in the shops classrooms.

New sanitary sewer piping shall connect to the existing sewer infrastructure. Point of connection will be coordinated with Civil Engineer.

Sanitary sewer will serve the restrooms, custodian room, mechanical equipment and any floor drains/sinks.

New sanitary vent piping shall be routed above ceiling and terminate at an approved location thru roof.

Vent terminations through roof will be coordinated so as to avoid any light monitors, clearstory, and interference with PV panels (if any) and/or HVAC equipment outside air intakes.

Cleanouts shall be provided above all urinals, lavatories, upper terminal water closets, and sinks.

Floor drains with trap primers shall be provided in Student restrooms, Staff restrooms, Shower/lockers rooms, custodian closets and mechanical rooms.

Hub drain for the fire sprinkler system main drain inside the fire riser room on the ground floor will be provided and connected to the sanitary system as applicable. Further coordination with Fire Sprinkler drawings will be required.

Indirect Waste and Condensate Drainage Systems

HVAC condensate drainage piping will be provided to each HVAC unit. Such piping will drain to an indirect waste connection to the sanitary sewer/waste system via approved receptor, tailpiece connection at the nearest lavatory or sink, or a fixed air gap mounted within a stainless steel panel in wall.

Rooftop packaged units condensate shall drain to roof mounted floor receptors adjacent to air handlers. Roof receptors shall have elevated rims of 2” minimum in height above roof level to prevent drainage of rainwater.

Storm Drain System

The building storm drainage system shall be sized based on Chapter 11, Table 1101.7 and 1101.11 of the California Plumbing Code. Sizes shall be based on 2"/hour rainfall intensity.

A complete gravity storm drainage system connecting to each roof drain and overflow drain shall be provided.

Roof drains will be collected and connected to separate risers and will be connecting to the underground on-site storm drainage system per coordination with Civil Engineer. The Civil Engineer will collect the roof drainage system from the building to central collection points including any perimeter exterior drains.

Primary drainage will be connected to campus infrastructure while Secondary (Overflow) drains will daylight and terminate thru face of outside wall at 12" to 18" above finished grade to center of pipe. Provide wall flanges at overflow terminations.

Natural Gas System

Natural gas supply shall connect and extend to the existing high pressure gas system on campus as required.

A new gas supply connection will be provided for the building comprising of a gas pressure regulator, automatic gas seismic shut-off valve and lube type shut-off at the gas rise.

Gas to the building will be routed below grade on site with service deriving from the campus infrastructure. Gas supply into the building will step-down from high pressure and distribute at low pressure into the building to all gas-fired appliances and equipment. A gas meter located at the building entry and connected to the EMS shall be provided and coordinated with Mechanical and Electrical accordingly.

Compressed Air System

A new compressed air system shall be provided to the building to serve the shops classrooms. The classrooms spaces shall be served from a central system using an ultra-quiet, Rotary Screw compressor with integrated tank. Refer to floor plans for quantity and location of air outlets.

Probable Utility Loads for new Student Center Building

- Domestic/Cold Water: 212 FU's = 94 GPM.
- Sewer/Waste: 176 FU's = 61 GPM.
- Storm Drainage: 100,525 (Approx. roof square ft.) = 2090 GPM (based on 2" rainfall rate)

Plumbing Fixtures

The plumbing fixtures shall be commercial grade, code and energy compliant fixtures meeting College campus standards and CalGreen requirements.

Fixture maximum flow rates are as follows:

- Water closets: 1.28 GPF.
- Urinals: 1/8 GPF or non-water type with approval from College.

- Lavatory faucets: 0.35 GPM.
- Kitchen sink faucets: 1.8 GPM.

Noise and Vibration Control

Products, including toilets, urinals, and flush valves, will be selected to minimize the generation of noise and vibration into the domestic water system. A minimum 1/4-inch resilient material will be provided between domestic hot and cold water piping, waste and vent lines and the building structure. Specific noise and vibration control measures for Domestic Water, Waste and Vent Piping include:

1. Horizontal Suspended: Tolco Clevis Hanger with felt. Provide cable seismic restraints if required by code.
2. Horizontal Supported: Elmdor Stoneman Trisolator
3. Riser Supports: Hubbard Holdrite Silencer #278 between riser clamp and building structure
4. Partition Penetrations: Coordinate with other trades to avoid contact where plumbing penetrations occur.

FIRE PROTECTION SYSTEMS

The building will be equipped with an automatic wet-pipe fire sprinkler system with a riser control manifold located on the first floor. Each riser on the control manifold will be designated to feed one sprinkler zone not to exceed the floor area limits of NFPA 13. Each zone will be clearly identified on a weather proof zone map on display in the riser room.

The building firewater line will be connected to the on-site water main. A double detector check valve assembly (DDCVA) will be installed outside the building to protect the supply main. Downstream of the building double detector check valve assembly, a fire department connection will be provided to allow the fire department to pressurize the building fire suppression system. If the new firewater line is connected to an existing private fire water main already equipped with a DDCVA, a post indicator valve (PIV) will be installed outside of the building to isolate it from other systems.

Applicable Codes

- California Building Standards Administrative Code (Title 24, Part 1), 2019
- California Building Code (Title 24, Part 2), 2019
- California Plumbing Code (Title 24, Part 5), 2019
- California Fire Code (Title 24, Part 9), 2019
- California Referenced Standards Code (Title 24, Part 12), 2019

Reference Standards and Guidelines

- UL Underwriters Laboratories
- NFPA 13 - Installation of Sprinkler Systems, 2016 Edition
- NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 2016 Edition
- NFPA 72 – National Fire Alarm and Signaling Code, 2016 Edition

Design Criteria

- The hydraulically designed sprinkler system shall be provided with a minimum 10 percent safety margin. The actual fire sprinkler system provided is subject to San Bernardino Valley College approval.
- Pending results of a fire flow test, a fire pump may be required and will be housed in the fire pump room.
- The sprinkler system will be hydraulically designed to meet the following densities:
  - Light Hazard - 0.10 GPM per ft2 over the most remote 1500 ft2
  - Ordinary Hazard I - 0.15 GPM per ft2 over the most remote 3000 ft2
  - Ordinary Hazard II – 0.20 GPM per ft2 over the most remote 3000 ft2

Application

- Light Hazard- General classrooms, offices, lobbies, corridors
- Ordinary Hazard Group I – science classrooms, mechanical rooms, storage rooms, service rooms

Systems Description

- Water Supply shall be from the 6" fire water line tying into an existing dedicated fire water system comprised of a backflow preventer, fire water meter and Post Indicator valve.

Protection Area per head:

Construction Type	Max. Protection Area (ft2)	Maximum Spacing (ft)	Occupancy Classification
Noncombustible unobstructed	225	15	Light Hazard
Noncombustible obstructed	225	15	Light Hazard
Combustible unobstructed w/ no exposed members	225	15	Light Hazard
Combustible unobstructed w/ members less than 3ft on center	130	15	Light Hazard
Combustible obstructed all w/ exposed members 3ft or more on center	168	15	Light Hazard
Combustible obstructed all w/ members less than 3 ft on center	130	15	Light Hazard
Combustible concealed all spaces in accordance w/ 8.6.4.1.4	120	15 parallel to the slope 10 perpendicular to the slope	Light Hazard
ALL	130	15	Ordinary Hazard

- The system components shall include the following:
  - Automatic Fire Sprinkler piping, sprinklers, hangers, and seismic bracing
  - Valve and water-flow switch monitoring
  - Audible sprinkler flow alarms on the exterior and interior of the building. The fire protection system shall be monitored by the central fire alarm system in the building
  - Hand-held fire extinguishers shall also be provided to comply with NFPA 10, CCR Title 19 and the District Guide specifications

- Piping shall be concealed above ceilings and within walls except for non-public equipment rooms without ceilings. Piping in public areas with no ceilings will be coordinated with architect.
- Coverage will be provided for rooms, void spaces, overhangs and as required by code, with sprinkler protection in combustible attics.

- Sprinkler heads in ceilings will be concealed pendant type with white or chrome finish cover plate flush with ceiling. Sprinkler heads will be concealed in finished ceilings and exposed in non-finished spaces such as mechanical rooms, data rooms, and/or electrical rooms. High temperature sprinkler heads will be provided in electrical rooms. OS&Y gate or butterfly valves with tamper switches will be provided to isolate heads in these rooms.
- All isolating and sectionalizing valves on the fire protection system will be provided with tamper switches that shall be annunciated at the fire alarm control panel.
- The system shall have a central control panel with digital read-out as part of the Fire alarm system. The system should be installed so that it may be connected to an automation system.
- Piping Material 2" nominal diameter and smaller shall be ASTM A 795 steel piping schedule 40 black steel-pipe. Connections or fittings shall be threaded, flanged or welded.
- Piping larger than 2" nominal diameter may be ASTM A 795 Schedule-10 roll-grooved black steel pipe. Connections or fittings shall be grooved or welded.
- Sprinkler heads shall be spaced for symmetry with ceiling features. Any additional heads required to accomplish this spacing shall be provided in base bid. Basis of head location shall be:
  - Maximize symmetry in room.
  - Align sprinklers in straight rows.
  - Locate in center of ceiling tiles.

TECHNOLOGY SYSTEMS

The telecommunications infrastructure for the new Technical Building at San Bernardino Valley College will provide a state of the art infrastructure to support voice, data, security, audio-video (infrastructure), emergency phone and wireless communications. It will be designed according to the College's current standards, EIA/TIA 568C and 569B standards and BICSI publications (TDMM and OSPDRM).

The telecommunications infrastructure shall be installed by a certified manufacturer's representative with material and labor covered under an extended warranty. A minimum of a 15-year warranty from an approved manufacturer is required.

Applicable Codes

- 2019 California Building Standards Administrative Code (CCR Title 24, Part 1)
- 2019 California Building Code (CCR Title 24, Part 2)
- 2019 California Electrical Code, (CCR Title 24, Part 3)

Publications and Standards

- All publications, standards, and codes identified in the Contract Documents.
- Electronics Industry Alliance/Telecommunications Industry Association (EIA/TIA)
- EIA/TIA 568-C - Commercial Building Telecommunications Wiring Standard
- EIA/TIA 569-B - Commercial Building Standard for Telecommunications Pathways and Spaces
- EIA/TIA 606 - Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

- EIA/TIA 607 - Commercial Building Grounding and Bonding Requirements for Telecommunications
- EIA/TIA-310-D – Cabinets, Racks, Panels and Associated Equipment
- ANSI/TIA/EIA 526-14A – Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- ANSI/TIA/EIA 526-7 - Measurement of Optical Power Loss of installed Single-mode Fiber Cable Plant
- NFPA-70 – National Electrical Code
- Federal Communications Commission (F.C.C.), Part 15 and Part 68.
- BICSI Standards (current version)
- Mt. San Antonio College Technology Standards

Design Criteria

The telecommunications design criteria for the major telecommunications infrastructure components are listed below:

IT / Telecom Rooms

Dedicated telecommunications rooms shall be included in the building design. The rooms support the installation of IT and low voltage technology systems equipment and are the point of distribution and connection of communications cabling. The Technical building shall include a Building Distribution Frame (BDF) room and two Intermediate Distribution Frame (IDF) rooms. The BDF and the IDFs in the new building shall be similar in size to each other- minimum 15' x 10' and shall be vertically stacked, where possible. Based on the size of the building the telecom rooms will be located as required to meet the distance limitation of 90 meters maximum for the data cables from the outlets to the BDF/IDF rooms.

The BDF and the IDF shall be connected with a minimum of (4) 4" conduit for distribution of fiber optic and copper riser cables. Each IDF will serve upper level stacked IDF's with two (4) 4" conduit sleeves. Fiber Optic riser cables between the BDF and the IDF closets will be 24 single-mode terminated in a fiber terminal. The copper cable connecting the BDF to the IDF (riser cable) will consist of a 25 pair cable terminated on a 110 block. Ceilings in the BDF/IDF shall be open to the deck above, doors shall be a minimum 36" wide x 7' height and sealed concrete or grounded static control vinyl tile flooring. No water sources such as sinks, water heaters or plumbing systems located in the room or in the near vicinity.

A separate electrical service panel sized to support 225 amps shall be placed in the BDF room. If the building is to have an emergency generator, the panel shall be connected to the Automatic Transfer Switch for the generator. Power outlets mounted at IT equipment racks shall be 20amp, 120-volt quad, dedicated circuits plus 30amp, 208-volt dedicated circuits. Wall mounted outlets shall include (3) 20 amp, 120-volt outlets in the BDF, 1 located at 72" on backboard behind equipment rack and 2 at 18" AFF on backboard near data terminal blocks.

A separate electrical service panel sized to support 150 amps shall be placed in each IDF room. The IDF rooms shall be provided with 20amp, 120-volt quad, dedicated circuits and 30amp, 208-volt dedicated circuits at IT equipment racks. Wall mounted outlets shall include 2-20 amp, 120-volt outlets located at 72" on backboard behind equipment rack and (2) at 18" AFF on backboard to support security and other wall mounted equipment.

The telecommunications BDF and IDF closets require a 24/7 cooling to provide a controlled environment. The dedicated cooling shall be separate from the building HVAC system. The BDF will require cooling for

an anticipated heat load of 18,000 BTU (IDF 12,000 BTU) with sufficient venting and heat/air conditioning sensors installed to provide consistent temperature and humidity. Operating temperature design target will be between 64 and 75 degrees with 30 to 50 percent relative humidity.

Telecom room lighting requirement is 50-foot candles measured 3 feet above the finished floor.

Equipment in the telecom rooms will be rack mounted on a minimum of two (2) 7'Hx19"W 2-post equipment racks (2 per each room) with integral 10" wide vertical wire managers. The outside plant (OSP) voice grade cables will be terminated onto wall mounted protected terminals. Patch cords shall be used to connect data ports on the patch panels to the network switches. Incoming optical fiber cabling will be terminated in a rack mount fiber enclosure. Category 6A rated patch cords shall be provided by the contractor for all ports as part of the project. A 12" cable runway system will be installed in the BDF and IDF closets to route cabling around the rooms and to the equipment racks.

Grounding and bonding that complies with TIA/EIA 607 shall be designed using bus bars connected by a 3/0 conductor, enclosed in a 1" conduit back to the building electrical service ground. All conduits, trays and other equipment shall be bonded to the bus bars using #6 AWG conductors.

Building Dedicated Cable Pathways

The structure will utilize support systems such as wire hangers, cable tray and/or conduit above ceiling areas to distribute the horizontal station cables from the telecom rooms to the voice/data outlets.

The standard wall outlets shall consist of 4 11/16-inch square (quad), extra deep outlet box. A 1 ¼" conduit minimum 6" bushed with pull-string shall be run from the outlet box up the wall and into the accessible ceiling area, for the telecommunications contractor.

Building Communications Cabling

Horizontal, Category 6A, copper station cables will be installed from each voice/data outlet jack to the BDF or IDF rooms and shall follow the College cabling color standards. All voice and data cables shall be terminated on Category 6A jacks at the outlets and mounted to faceplates. The data or voice cables shall be terminated in Category 6A, 48-port Patch Panels in the equipment racks.

Standard voice and data outlets will consist of either 3 or 4 category 6A plenum cables terminated on Category 6A jacks in a four-port faceplate, depending on the application or space they support.

Additional outlets may be provided as necessary for miscellaneous requirements as noted below. A voice or data outlet will be provided adjacent to the equipment location for each of the following:

- Emergency telephones
- Fire Alarm Control Panel
- Energy Management Control System Cabinet
- Security Camera Locations
- WiFi Access Point Locations
- Special Assistance Phones
- ADA workstations

Patch Cords and Station Cables

Patch Cords for the active electronics (copper and fiber) and station side (desk-top) shall be provided for all devices including but not limited to computers, wireless access points, printers, facsimiles, emergency phones, etc.

Wireless Communications

Data outlets will be included in selected locations for owner provided wireless access points. Wireless outlets shall consist of two data jacks located above the dropped ceiling that is easily accessible through the removal of ceiling tiles or within easy access from an access hatch. All classrooms, labs and learning areas shall have full coverage. Wireless will be available throughout the building.

Campus Backbone Pathway & Cabling

The building will require additional campus infrastructure including outside plant (OSP) conduit with connection to existing campus Telecommunication manhole. The conduit pathway shall be four (4) 4" conduits entering the BDF. The building will receive its own dedicated backbone cabling connectivity that will be extended from the campus MDF to the Technical Building.

New OSP fiber optic cable shall be installed from the campus MDF to the new technology BDF room located on the first floor. Star topology design will be implemented for the distribution of OSP cable and shall be distributed from the CSB building to the new BDF in the new Technical Building along the east side of the campus; manhole locations feed from the CSB building through parking lots #11, #9 and #8, and run alongside the track area out towards the HLS building.

Emergency Phones

Emergency phones will be installed at or near the building; exact locations will be determined based on accessibility. Conduit shall be provided from the Emergency Phone to the nearest BDF or IDF closet. A blue strobe shall be mounted above each Emergency phone.

Audiovisual Systems

Audio Visual (AV) systems infrastructure and equipment will be installed to support presentation and digital display functions of the building room types. AV infrastructure requirements will include the following dedicated pathway and support systems to provide for the use of AV systems:

- Conduit pathways, back boxes and floor boxes
- Power outlets for dedicated AV equipment
- Structural mounting and wall backing for dedicated AV equipment

Anticipated AV systems functionality include the following per room type. System requirements will be reviewed and confirmed by College representatives in upcoming design review meetings.

<u>Lobby Area</u>

- Wall mounted LED display for digital signage info, schedules, and events
- Digital signage media player, network connected, mounted on rear of display

Deans Office

- Wall mounted LED display as extended desk top display from local PC computer, owner provided
- Laptop computer connection wall plate
- Wireless presentation gateway for source inputs from tablets and smart phones
- Sound from displays built in speakers
- The system will be controlled through either the handheld remote supplied with the display or touch panel interface

Classroom Labs

- Ceiling mounted projector with recessed motorized projection screen
- Local PC Computer with wireless keyboard and mouse.
- Laptop computer connections through floor box to lectern top cable hatch
- Ceiling mounted speakers
- ADA Compliant Assistive Listening System
- Touch panel interface either wall mounted or lectern top
- Equipment will be rack mounted and housed in an equipment rack

Lecture Rooms

- Ceiling mounted projector with recessed motorized projection screen
- Local PC Computer with wireless keyboard and mouse.
- Laptop computer connections through floor box to lectern top cable hatch
- Ceiling mounted speakers
- ADA Compliant Assistive Listening System
- Touch panel interface either wall mounted or lectern top
- Equipment will be rack mounted and housed in an equipment rack

Meeting Rooms

- Wall mounted LED display
- Local PC Computer with wireless keyboard and mouse, owner provided with videoconferencing software
- Laptop computer connections through floor box to table top cable hatch
- Wireless presentation gateway for source inputs from tablets and smart phones
- Ceiling mounted speakers
- ADA Compliant Assistive Listening System connection panel
- Wall mounted camera for video conferencing
- Ceiling or table mounted microphone arrays for voice pick-up during conferencing
- Table top touch panel interface
- Equipment will be rack mounted and housed in a credenza or millwork

Security Systems

The Security Systems will encompass the following technologies - Surveillance, Physical Access Control and Intrusion Detection. The design will be according to the most current San Bernardino Valley College Security Technology Standards, stakeholder input and security systems design best practices.

The security systems shall be installed by vendor certified installers with the appropriate State of California Contractor's License(s).

Applicable Codes

- 2016 California Building Standards Administrative Code (CCR Title 24, Part 1)
- 2016 California Building Code (CCR Title 24, Part 2)
- 2016 California Electrical Code, (CCR Title 24, Part 3)
- National Fire Alarm Codes (NFPA 72)
- All Local, State, County or Federal codes and ordinances

Publications and Standards

All Publications, standards, and codes identified in the Contract Documents.

- Telecommunications Industry Association TIA
- American National Standards Institute ANSI
- American Society for Testing and Materials ASTM
- Electronics Industry Association EIA
- Electrical Testing Laboratories ETL
- Federal Communications Commission FCC
- Institute of Elect. and Electronics Engineers IEEE
- National Electrical Contractors Association NECA
- National Electrical Manufacturers Association NEMA
- National Fire Protection Association NFPA
- Occupational Safety Health Act OSHA
- Underwriter's Laboratories UL

DESIGN CRITERIA

The design criteria for the separate elements comprising facility security systems is listed below:

Access Control

Access control equipment shall be installed on all perimeter doors, and specific interior doors leading to secure areas or high-value assets, and other doors as directed by the College.

Locking Hardware

Schlage Door locking hardware shall consist of the following types of equipment:

- Hardwired Integrated locksets with integral proximity card reader

- Wireless Integrated locksets with integral proximity card reader
- Electrified Mortise / Cylindrical Locksets
- Electric Door Strikes
- Pass-through Hinges

Locking hardware shall be connected to the power supply / controller activation relay via manufacturer specified cabling.

Credentials

The College shall issue i-Class Smart credentials which shall double as identification badges. The front side of the credential shall be printed with the credential holders name, department, and photograph, superimposed upon the College logo. The reverse side of the credential shall bear a message directing personnel who find a credential to return it to the Campus Public Safety office.

Credential Readers (Non-integral to lockset)

Shall be capable of reading standard 125KHz proximity credentials as well as i-Class smart credentials. Credential readers shall be connected to the door controller via manufacturer specified cabling.

Door Controllers

Shall be IP compatible and installed local to the door(s) being controlled. Controllers shall be capable of Power over Ethernet operation and shall be capable of independent operation if communications with the Physical Access Control headend are interrupted. Transactions shall automatically upload from the controller to the headend and changes to the database shall automatically download from the headend to the controller upon reconnection with the headend. Door controllers shall be connected to the network via Category 6A cabling.

All door hardware and access control components will be manufacturer by Schlage Electronics.

Physical Access Control Software / Headend

The Access Control software / headend shall be an enterprise level software platform with an infinite scalability so that the College may add additional access-controlled doors and / or credential holders as required in the future with no concern for an upper limit.

Software shall be SMS manufactured by Vanderbilt, Premier 5 Client Software.

The software platform shall have the following functionalities as a minimum:

- Shall connect to the network via Category 6A cabling
- Compatibility with edge-based door controllers
- Archiving to a secondary database
- Alarm acknowledgement hyper-links
- Integration with Schlage wireless and hardwired integrated locksets
- Integration with the College Video Management System
- Web browser access to system modules
- BACnet integration capability

- Virtual I/O capability
- Bridge panel integration
- Elevator support
- Multiple workgroup capability
- Forced Arming Support
- Single button system-wide lockdown capability
- Bluetooth / Smart Device credentialing
- Mobile credential issuance

Video Surveillance

Cameras

Cameras shall be installed to provide coverage of the following areas:

- Exterior Building Perimeter – Area coverage with minimum 5-megapixel cameras and lensing / placement to allow for general activity observation and recording (minimum 20 Pixels per Foot (PPF) across the horizontal center of the Field of View (FOV)).
- Interior or Exterior Building Entry / Exit Areas – Spot coverage with resolution, lensing and camera placement sufficient to allow for a high probability of facial recognition (minimum 40 PPF across the horizontal center of the FOV).
- Building Interiors, Cash Handling Areas – Spot coverage with resolution, lensing and placement sufficient to allow for a high probability of facial recognition of the customer (minimum 40 PPF across the horizontal center of the FOV).
- Walkways / Gathering Areas – Area coverage with minimum 5-megapixel cameras and lensing / placement to allow for general activity observation and recording (minimum 20 PPF across the horizontal center of the FOV).
- Parking Lots – Area coverage with minimum 5-megapixel cameras and lensing / placement to allow for general activity observation and recording (minimum 20 PPF across the horizontal center of the FOV).
- Campus Vehicular Entry / Exits – Spot coverage with resolution, lensing and placement sufficient to allow for a high probability of license plate capture (minimum 40 PPF across the horizontal center of the FOV).
- Emergency Phone locations - Area coverage with minimum 360 degree 5-megapixel cameras and lensing / placement to allow for general activity observation and recording (minimum 20 PPF across the horizontal center of the FOV). Also, a face height pinhole camera at all Emergency phone locations.
- Cameras shall be compatible with Power over Ethernet (PoE)

The camera data shall be transported to the closest MDF / IDF for network connection to the Video Management System (VMS) via Category 6A cable. Surveillance system cabling shall be run in conduit when traversing outside spaces or inaccessible ceiling spaces, and via J-hook or cable tray in accessible ceiling spaces.

Camera runs shall be limited to < 90M (295') whenever possible. In cases where the distance to be covered exceeds this distance due to camera placement, a fiber optic cable-based data extender shall be utilized.

Cameras shall be selected based upon utilization requirements and camera performance specifications, including resolution, minimum illumination, Image per Second (IPS) capability. Where ambient

illumination is not sufficient for camera performance requirements, supplemental illumination shall be utilized.

Video analytics provide a means for campus staff to monitor areas for speed, direction of travel, loitering and other activities without constant observation as the analytics will alert to violations of established policies. Where this capability is required, camera based (edge) analytics shall be utilized, in order to reduce bandwidth requirements.

Cameras which are programmed to record upon motion within the cameras Field of View (FOV) shall have their motion detection coverage configured separately for each camera and shall be configured to the greatest extent possible to avoid moving bushes, adjoining street vehicular traffic, and any other movement which is not related to activity the College wishes to record.

Video Management Systems (VMS)

The VMS shall be an enterprise level software platform with an infinite scalability so that the College may add additional cameras as required in the future with no concern for an upper limit. The College currently have a VMS supporting their facilities. The surveillance cameras for this new permanent building will be integrated into the existing College VMS.

The VMS shall have the capability to record from 1 to 30 IPS from each camera on an individual basis.

The VMS shall have matrix-type operation so that any camera input can be sent to any workstation on the network with appropriate user authorization. User log-ons shall be assignable with a specific level of operational authority regarding such features as:

- Live camera views
- Recorded camera views
- Pan, tilt and zoom (PTZ) camera operation
- Deletion of video data
- Exporting video
- Alert acknowledgement

The VMS shall be Ocularis VMS Software by OnSSI, or a comparable VNS software.

Intrusion Detection System

Intrusion detection shall be utilized to notify responders when:

- There is an entry into secure spaces while system is in an armed state
- A duress / hold-up button is activated, whether the system is armed or disarmed
- A fixed glass pane is broken, whether the system is armed or disarmed

Intrusion detection will be provided in areas listed below.

- Door/Window Position Sensors
- Motion Detectors
- Glass break Sensors
- Duress/Hold-up Buttons
- Notification Services

- Main Control Panel
- Keypad Arming Stations

Emergency Responder Radio Coverage

Distributed Antenna System (DAS) will be designed as necessary to support the "Emergency Responder Radio Coverage" for the San Bernardino County first responders. The new building shall have approved radio coverage for emergency responders within the building, based upon the existing coverage levels of the emergency responder systems of the jurisdiction (at the exterior of the building). The design from P2S will encompass a complete DAS emergency responder radio system, including conduit, cable pathways, DAS equipment, antennas with specific coordinated locations and system coverage details.

The DAS-ERRC is anticipated to include the following:

- ERRC system design and compliance with the requirements set forth in CFC 510, CRF 47 and FCC Part 90, 90.219.
- ERRC equipment shall be FCC certified and fully compatible with current operational frequencies.
- ERRC equipment shall be capable of supporting analog and digital modulation.
- ERRC system shall be designed to minimize amplifier downlink gain.
- ERRC system shall be equipped with battery backup or uninterruptable power supply (UPS) providing not less than 12 hours of operation at full power.
- ERRC system shall be equipment to support a minimum of 5 monitoring alarms.
- Required separation distances between ERRC equipment and other mechanical, electrical and telecommunications equipment. Required separation distances between ERRC antennas and antennas of other radio systems.
- ERRC system shall include anti-oscillation circuitry.
- The transmitted noise and spurious interference measured within a 10 kHz bandwidth at the donor antenna shall not exceed -43dBm and in no case shall result in a calculated noise level greater than -150dBm.
- Power to be provided by a single dedicated 120V 20A circuit.

All Publications, standards, and codes identified in the Contract Documents.

- 2019 California Electrical Code, Title 24, Part 3
- 2019 CFC- California Fire Code, Title 24, Part 9
- Federal Communications Commission (FCC) - Title 47 of the Code of Federal Regulations, Part 90.
- Federal Communications Commission (FCC) Rules, Parts 15 and 22
- NFPA 72 2017

Requirements set forth by first-responder code, ordinance, or the PSN AHJ shall supersede the requirements described herein and shall be met in their entirety. It is the Contractor's responsibility to ensure that the DAS complies with local code, ordinances or requirements established by the PSN AHJ.