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1.1 INTRODUCTION

A. The San Diego Unified School District proposes to install air conditioning systems in specified classrooms and non-instructional spaces at selected school campuses.

B. This District Design Guide and Performance Criteria provides guidance to the Design Build Entities ("DB-E") for standardized HVAC system selection, HVAC system placement, HVAC controls requirements, structural and architectural guidelines. ***Any deviation from the preferred designs in this guide must be reported to and approved by the District during the design phase. Any subsequent deviations must be reported to and approved by the District prior to including the new deviation in the design.***

1.2 DEFINITIONS

A. A.F.F. – Above finished floor

B. AOR - Architect of Record.

C. ARCHITECT - The Architect is the person or entity identified as such in the Agreement; references to the "Architect" in the Contract Documents shall mean the Architect or the Architect's authorized representative. Unless otherwise stated, references in the Contract Documents to "the Architect" are references to the Architect or Architectural Firm that is associated with the DB-E that is retained by the District specifically for the Work and not the District Architect.

D. ASHRAE – American Society of Heating, Refrigerating and Air-Conditioning Engineers

E. BOE – Board of Education for San Diego Unified School District

F. BTU/HR – British Thermal Unit per hour

G. CONCEALED, EXTERIOR INSTALLATIONS - Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters

H. CONTRACT DOCUMENTS - The Contract Documents consist of the Agreement between the District and Contractor, Conditions of the Contract (whether General, Special, Supplemental or otherwise), Drawings, Specifications, including addenda thereto issued prior to execution of the Agreement, and any other documents listed in the Agreement. The Contract Documents shall also include modifications issued after execution of the NTP or Project Proposal.

I. DB-E - Design Build Entity

J. DDC – Direct Digital Controls

K. DISTRICT-The term "District" shall refer to the San Diego Unified School District, the District's Board of Education and the District's officers, employees, agents and representatives.

L. DIVISION OF STATE ARCHITECT ("DSA") - DSA is the California Division of the State Architect including without limitation the DSA's Office of Construction Services, Office of Design Services and the Office of Regulation Services; references to the DSA in the Contract Documents shall mean the DSA, its offices and its authorized employees and agents. The authority of DSA over the Work and the performance thereof shall be as set forth in the Contract Documents and Title 24 of the California Code of Regulations.

M. EMCS – Energy Management Control System

N. EXPOSED, EXTERIOR INSTALLATIONS: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

O. EXPOSED, INTERIOR INSTALLATIONS: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

P. FPC – Facilities Planning & Construction for San Diego Unified School District

Q. IDF- Intermediate Distribution Frame

R. MDF ROOM-Main Distribution Frame

S. MERV - Minimum Efficiency Reporting Value.

T. MEOR - Mechanical Engineer of Record

U. MFR – Manufacturer

V. NON-PERMANENT CLASSROOMS – Portable / Relocatable / Bungalow

W. PM - Project Manager for San Diego Unified School District

X. PUSH IN / PULL OUT – Adaptive academic programs for advanced and remedial students. Typically, English.

Y. SDUSD – San Diego Unified School District

Z. SEOR – Structural Engineer of Record

AA. SITE -The Site is the physical area designated in the Contract Documents for Contractor's performance, construction, and installation of the Work.

1.3 APPLICABLE CODES & STANDARDS

A. All systems will be designed in accordance with applicable building codes and related standards using approved materials and installation methods. Utilize the latest adopted version of the following applicable codes & standards:

1. California Building Code (CBC) by ICBO
2. California Mechanical Code (CMC) by ICBO
3. California Plumbing Code (CPC) by ICBO
4. National Electrical Code (NEC)
5. National Fire Code (NFC) by NFPA
6. American Society of Heating, Refrigeration and Air Conditions Engineer (ASHRAE) Handbooks
7. ASHRAE Standard 55, Thermal Environmental Conditions for Human Occupancy
8. ASHRAE Handbook, Fundamentals
9. ASHRAE Handbook, HVAC Applications
10. ASHRAE Handbook, HVAC Systems and Equipment
11. ASHRAE 62.1, Ventilation for Acceptable Indoor Air Quality
12. Collaborative for High Performance Schools (CHPS)
13. C.F.R. Part 435 and State of California Title 24, Building Energy Efficiency Standards
14. SMACNA, HVAC Construction Standards
15. FEMA-368, 2000 NEHRP Recommended Provisions for Seismic Regulations for New Building and Other Structures
16. NFPA 101, Life Safety Code
17. NFPA 90, Installation of Air Conditioning and Ventilation Systems
18. NFPA 70 National Electrical Code

19. ANSI/ICC A117.1-2003 Standard for Accessible and Usable Buildings and Facilities
20. The American with Disabilities Act, Public Law 101-336
21. Energy Policy Act, Public Law 102-486
22. American Society for Testing and Materials (ASTM)
23. NSF International, The Public Health and Safety Company™
24. American Society of Safety Engineers (ASSE)
25. Underwriters Laboratories Inc. (UL)
26. American National Standards Institute (ANSI)
27. Accessible and Usable Buildings and Facilities, Public Law 90-480
28. Architectural Barriers Act (ABA), Public Law 90-480
29. California Electrical Code (CEC) by ICBO.
30. NFPA 70 National Electrical Code.
31. ANSI/ICC A117.1-2003 Standard for Accessible and Usable Buildings and Facilities.
32. The American with Disabilities Act, Public Law 101-336.
33. American Society for Testing and Materials (ASTM).
34. NSF International, the Public Health and Safety Company™.
35. American Society of Safety Engineers (ASSE).
36. Underwriters Laboratories Inc. (UL).
37. American National Standards Institute (ANSI)
38. Accessible and Usable Buildings and Facilities, Public Law 90-480
39. Architectural Barriers Act (ABA), Public Law 90-480
40. NEBB, National Environmental Balancing Bureau

41. AABC, Associated Air Balance Council

42. TABB, Testing, Adjusting and Balancing Bureau

1.4 OVERVIEW

A. USE OF DISTRICT DESIGN GUIDE AND PERFORMANCE CRITERIA

1. The purpose of the District Design Guide and Performance Criteria is to establish the overall design intent and operational and technical MEP & Structural requirements for this Project. This District Design Guide and Performance Criteria, along with the other elements of the Design Build RFP, including Bridging Documents, provide engineering information as performance criteria for the Design-Build Entities ("DB-E") to prepare and submit their design and technical proposals for designing and constructing the Project. The DB-E shall be responsible for design and construction of a complete and operational system in conformance with the character, intent, performance, and function described in this District Design Guide and Performance Criteria.

2. The DB-E shall be responsible for all technical aspects of the design and documentation, including the development of the technical specifications for construction of the Project. Therefore, the text of this document is not intended to suggest a design solution, limit the choice of building systems, or provide the means and methods of accomplishing the work. The intent of the District Design Guide and Performance Criteria, RFP and Bridging Documents, is to generally describe the project in its entirety and to establish the minimum level of performance and quality acceptable to San Diego Unified School District ("District") for the 20 sites. Proposers shall interpret these documents as the standard against which their proposals will be evaluated by the District.

3. The following design criteria is to be used for the design.

    a. Verify existing design provided in the RFP.

    b. Enhance existing design as required to meet District objectives.

    c. Meet all current applicable Codes, regardless of guidance provided in this District Design Guide and Performance Criteria.

1.5 MECHANICAL

A. SYSTEM SELECTION

1. Given the specific nature of this project consisting of numerous interior space types and anticipated expedited design and construction sequences, the proposed HVAC systems for this type of project must take into account factors such as energy efficiency and life cycle costs balanced with other factors such as minimal impact to existing classroom spaces, building structure, etc. along with value and ease of maintenance.

2. The DB-E is to utilize a preferred system design for each type of space. When this is not possible, an alternative design must be coordinated with the District during the design phase of the project. Any subsequent deviations must be reported to and approved by the District prior to including the new deviation in the design.

3. The DB-E is responsible for developing an accurate understanding of all relevant site conditions that may impact the design work. This includes all existing structural, electrical, mechanical, alarm, data, and other building systems.

4. The DB-E should select design solutions that will facilitate cost-effective solutions whenever possible without sacrificing the integrity of the design. These solutions might be as simple as the type of mechanical unit specified or the placement of this unit as these factors can substantially affect the associated electrical, architectural, structural solutions, etc., and their respective cost.

B. PREFERRED SYSTEMS

1. Rooftop Packaged Units - The preferred design solution for permanent building spaces is to install a single rooftop, electrical cooling/gas heating vertical discharge packaged unit per space served.

    a. In the event that a single unit will not meet the required load of a particular space, provide multiple units to supply the space and consider the following criteria:

        i. Utilize the lowest number of units possible.

        ii. Evaluate the use of multiple zones and size units in regard to the zone needs.

iii. Coordinate with the SEOR for the allowable locations to place units and the required structural work associated with each unit. Take into account the total cumulative weight of multiple units and the associated structural work to properly support these units.

iv. Control of multiple units will require each unit to have their own respective thermostat. All scheduling, and operating coordination will need to be configured at each thermostat as part of this project but will ultimately be addressable and adjustable from the District EMCS.

b. In the event that the preferred vertical discharge unit design cannot be implemented, a horizontal discharge solution will be considered and must be coordinated with the District. Refer to the duct design section of this District Design Guide and Performance Criteria for information regarding exterior mounted ductwork.

2. Ground Mounted Packaged Units - In the event that locating a packaged unit on the roof is not feasible or desirable, ground mounted units can be acceptable; See System Location section for considerations for location of units.

3. Multiple Story Building - In applications where a multi-story building is to be conditioned, the preferred solution for the lower story spaces is the installation of a single rooftop, vertical discharge packaged unit. In the event that rooftop, vertical discharge packaged units cannot be utilized to serve the lower stories due to high constructability costs, the alternate solution is to install condenser / heat pump exterior units on the roof with refrigerant lines in new or existing chase and in-space air handlers/fan coils.

4. Indoor Vertical Packaged Units - An alternative to roof mounted equipment is the use of an indoor vertical packaged unit located in a corner of the room with direct access to openings to the exterior for outside air ventilation and heat discharge.

5. Ductless Split System Heat Pumps – An alternative to traditional ducted heat pump split systems is the use of ductless split system heat pumps to serve small individual spaces. DB-E shall ensure heating and cooling loads are properly matched to this smaller system. Ventilation and pressure relief shall be provided to the space via gravity vent intakes and outlets, forced ventilation or other suitable systems.

a. The DB-E shall provide careful coordination of condensate control means for ductless split system heat pumps. Provide integral condensate pump unit of adequate capacity to serve the ductless system condensate load. Provide dedicated electrical power to the condensate pump.

6. Window Mounted Air Conditioning Units - The non-permanent classrooms (portables / bungalows) are the most consistent in size and window unit type air-conditioning systems shall be the preferred air conditioning system. The DB-E shall ensure Code and District requirements for ventilation and heating are met.

   a. Space heating through use of existing or new suspended gas unit heaters is acceptable. DB-E shall ensure existing unit heaters are in good working order and proper operational condition.

C. SYSTEM PARAMETERS

1. The HVAC system outside design conditions shall be based on the Title 24 requirement values for the City of San Diego, CA.

2. The HVAC systems shall comply with the requirements of the latest version of the California Building Standards Code, including but not limited to, California Building Code (CBC) and California Mechanical Code (CMC). DB-E shall take into account any California Code Cycle adoption changes that may come into effect during the timeline of this project.

3. Energy Efficiency: The HVAC systems design shall exceed energy performance requirements of current Title 24 Part 6 by a minimum 15% better than benchmark.

4. Redundancy and Excess Capacity: Redundancy and/or excess capacity is not a requirement for the systems under this project.

D. HVAC SYSTEMS

1. All outdoor equipment shall be installed on roof platform curbs or grade mounted concrete pads. Maintain all required equipment clearances. Do not impede on path of travel clearances or adjacent site required clearances including designated fire lanes.

2. The DB-E shall determine the site natural gas system capacity available. If natural gas is not available or inadequate capacity is determined, specify high efficiency heat pump systems. Refer to the Plumbing section for information regarding gas

sizing.

3. Specify stainless steel heat exchangers on all gas heating equipment.

4. Specify MERV 8 filters on all packaged rooftop units and ducted split-systems.

5. Economizers:
    a. Specify 100 percent, differential dry-bulb or fixed enthalpy plus fixed dry-bulb controlled, outside air economizers on all HVAC equipment larger than 54,000 Btu/hr capacity. Designer shall have the option to exercise Title 24 economizer exceptions as allowed by CMC.

    b. Comply with all Title 24 mandatory measures with regard to economizers and required components.

    c. Comply with all Title 24 prescriptive requirements with regard to economizers and required components. (Applies only Prescriptive Compliance Method).

    d. Evaluate the use of economizers on smaller split-systems if practical.

6. Utilize overflow switches to disable non-furnace indoor split-system units in lieu of secondary drains.

7. Utilize secondary drains on all furnace indoor split-system units as overflow switches are not compatible.

8. Evaluate the required heating loads of a project to properly select a unit without the aid of an electric strip heater when possible. Electric strip heaters should only be considered when heating capacity of a heat pump does not meet the required heating load and the electric resistance heating system supplements a heat pump with a capacity of more than 75% of the design heating load. Refer to 2016 CA Title 24 Section 140.4 for additional requirements

E. SYSTEM SIZING

1. The DB-E shall perform appropriate energy load calculations to verify the correct sizing of the mechanical units based on the specific parameters of the space being conditioned and to provide an appropriate design solution for each space.

a. The DB-E shall exercise sound engineering caution to size the systems appropriately and prevent specifying oversized systems.

2. The DB-E shall review and revise as required the provided EnergyPro files submitted as part of the RFP bridging documents. The DB-E shall submit to the District revised EnergyPro electronic files and any other modeling or calculations utilized to validate, revise, and/or modify the design.

3. Specific site surveys and review of reference material shall be utilized to finalize the building thermal envelope and material properties for heating and cooling load calculations.

4. Winter design conditions shall be based on the 99.6% column dry bulb temperature. Summer design conditions for sensible heat load calculations shall be based on the 0.4% dry bulb temperature with its mean coincident wet bulb temperature. Design conditions for the summer ventilation load and all dehumidification load calculations shall be based on the 0.4% dew point with its mean coincident dry bulb temperature.

5. Operational schedules used for modeling design shall be from 8am to 4pm – 5 days a week to simulate a typical school bell schedule.

6. All conditioned spaces shall be set to the following:

   a. Cooling: 76°F DB +/- 2°F / 50% +/- 5% RH
   b. Heating: 68°F DB +/- 2°F / 50% +/- 5% RH

7. MDF Rooms and IDF rooms shall be set to the following:

   a. MDF Cooling: 76°F DB -80°F / 50% +/- 5% RH
   b. IDF Cooling: 80°F DB / 50% +/- 5% RH

F. ADDITIONAL GUIDELINES

1. Due to the high levels of outside air required in these spaces due to occupancy, the system size is dictated by the amount of outside air and the ability for the system to handle them.

2. Utilize demand control ventilation to take advantage of the minimum ventilation rate per SF when the space is not loaded while also being able to raise the required ventilation rate to meet the occupancy required rates.

3. Limit the percentage of outside air per unit to be no larger than 40% (except for full economizer function and where T24 mandates are higher) in order to ensure the unit mixed air temperature is within manufacturer's recommended values.

4. When designing spaces where additional rooms are to be conditioned (e.g. admin, offices, reception, etc.) group similar use spaces together based on exposure, schedules, and occupancy. Consider the following:

    a. Grouped spaces are considered to be single zones unless multiple units are being used.

    b. Locate a single zone thermostat in a common space unless there is a concentrated load that is to be accounted for.

    c. Route ductwork to allow for proper air distribution in each space and coordinate with existing components to avoid costly relocation of lights and ceiling supports.

    d. Provide ducted returns.

    e. Size all ductwork and supply air devices to provide uniform coverage and to alleviate drafts.

5. The DB-E shall submit the proposed HVAC zoning and thermostat location for review and approval by the District during the Design phase.

6. IDF/MDF Rooms: Provide ductless split units to cool the space. Units shall be commercial grade models that that are able to withstand the 24/7 operation schedule required and shall be provided with low ambient controls.

    a. Mount indoor units in a manner and location as to assure no liquid will leak over any electrical components.

    b. Provide one additional temperature sensor in the MDF room to integrate to the District EMCS for status and alarm. Mount the temperature sensor next to the manufacturer's provided temperature sensor.

c. Unit sizing is also dependent on the temperature requirements of the IT equipment being served. Coordinate required cooling / humidity set points with PM.

G. SYSTEM PLACEMENT

1. Rooftop Systems

a. Locate rooftop units far away enough from the building's roof edge to eliminate the need to provide guardrails. Refer to current building codes for required distances.

b. Refer to the structural and architectural sections of this District Design Guide and Performance Criteria for information regarding possible roof placement locations. Coordinate architectural and structural requirements prior to finalizing locations.

c. Perform site surveys to investigate any possible obstructions that might not allow for rooftop installations, e.g. photovoltaics, roof vents, architectural features.

d. Locate units far away enough from the building edges to limit the visual impact to the building's exterior elevation. When a unit cannot be located far enough away from the building's edge to conceal it, coordinate with the AOR on possible screening options. See Rooftop Equipment Screen Considerations section of this guide.

e. Locate units so as to not create audible distractions in any space. Consider proximity to openings into buildings and be vigilant to the breakout and radiated noise created by the equipment.

f. Locate units to meet code requirements for distances to intakes, exhausts, and plumbing vents.

2. Non-Rooftop Exterior Systems

a. The DB-E shall provide concrete housekeeping pads suitable for the weight load for all exterior grade mounted equipment.

b. Provide enclosure to prevent theft and unauthorized access.

c. Refer to the structural section of this District Design Guide and Performance Criteria for additional information regarding attachment.

d. Specify outdoor air connections to indoor distribution through the use of existing roof ventilators, wall louvers, wall openings, etc. whenever practical and ensure that the intakes meet all code requirements for allowable heights and distances.

3. Non-Rooftop Interior Systems
   a. The designer shall utilize indoor or exterior closets or soffits, adjoining corridor ceiling space whenever possible to allow maintenance of the unit without disruption to any school activities and to reduce or prevent noise transfer from the units into the occupied teaching space. Any deviation must be approved by the District.

   b. Refer to the structural section of this District Design Guide and Performance Criteria for additional information regarding attachment.

   c. Specify outdoor air connections to indoor units through the use of roof ventilators or wall louvers. Utilize existing wall openings whenever practical and ensure that the intakes meet all code requirements for allowable heights and distances.

4. Packaged Indoor Vertical Air Conditioning Unit Systems

   a. The DB-E shall utilize a packaged indoor vertical air conditioning unit that is designed to be installed in the corner of the classroom, adjacent to an exterior wall.

   b. Perform site surveys to investigate any possible obstructions that might not allow for a proper installation, e.g. cabinetry, windows, whiteboards, and equipment.

   c. The packaged indoor vertical air conditioning unit must be self-contained and meet the sound levels noted in section F below.

   d. The exterior wall will need to be modified to provide the required openings to account for the unit ventilation and heat dissipation requirements. Ensure that these openings will not be a nuisance to individuals, activities, or equipment at the exterior. Utilize existing wall openings whenever practical and ensure that the intakes meet all code

requirements for allowable heights and distances. Coordinate all required openings for architectural and structural impact.

5. Window Mounted Air Conditioners in Non-Permanent Classrooms
    a. Installations should occur at the smallest section of shutters where possible and not the windows so as to minimize the cost of in-filling the area removed for the air conditioner.

    b. When possible, locate window mounted air conditioners on the sides closest to the electrical panels to reduce the lengths of electrical wiring.

    c. Locate window mounted air conditioners on high louvers and avoid lower windows to reduce the attractive nuisance factor to children in the space.
    d. Properly secure all power cables and mount receptacles as shown on electrical plans.

    e. Provide any required louver infill and sealing around the unit.

    f. Provide all units that are located within possible paths of travel with condensate drain kits and refer to the plumbing section in this District Design Guide and Performance Criteria for guidelines on condensate drainage.

    g. Locate units as to not infringe on any paths of travel.

6. Window Mounted Air Conditioners in Non-Permanent Buildings with Multiple Spaces:
    a. Where portable buildings include interior partitioned spaces such as offices, conference rooms, etc. the DB-E shall provide means for air movement through the spaces.

    b. Locate the window mounted air conditioners in the main larger space. Achieve air movement through the spaces by use of means and devices including but not limited to wall mounted transfer air fans and grilles, door louvers, door undercutting, roof mounted exhaust fans, etc. Consideration for any applicable privacy requirements shall be coordinated with the District.

7. All equipment and ductwork shall be located in consideration of accessibility and serviceability requirements. Equipment shall have full access and service

provisions to all required components of the unit once installed.

H. DUCT DESIGN

1. The preferred design solution for duct placement is to install all ductwork indoors wherever possible to reduce roof duct supports, roof penetrations, and to maintain the ductwork in protected space away from the elements. ***When this is not practical, cost-effective or possible, an alternative design must be reported to and approved by the District during the Design Phase. Any subsequent deviations must be reported to and approved by the District prior to including the new deviation in the design.***

2. Locate ductwork to avoid having to relocate components that could have been identified by a thorough site investigation. Be vigilant of existing hanging equipment such as lights, ceiling fans, projectors, and exposed grid suspensions system (T-bar) ceiling supports. Be conscious of the cost associated with relocating a light, modifying a T-bar ceiling vs. moving a duct as Title 24 requirements trigger lighting upgrades with the relocation of existing lights and seismic upgrades may be triggered by modifying an existing T-bar ceiling.

3. General Requirements
    a. All ductwork shall meet the requirements of the latest edition of SMACNA HVAC Duct Construction Standards – Metal and Flexible.

    b. Low pressure ductwork to be sized not to exceed 1,600 feet per minute.

    c. Return air ductwork upstream of air handling unit to be sized at maximum 1,200 FPM.

    d. Flexible ducts of not more than 5 feet in length may be used to connect supply air terminal devices to rigid duct systems with stainless steel straps.

    e. All return and exhaust duct systems shall be fully rigid and ducted.

4. Noise Reduction
    a. For packaged rooftop equipment with vertical discharge ductwork directly from the bottom of the unit, provide 1” internal duct lining for a minimum of 10’ or up to (2) elbows, whichever occurs first.

b. For interior fan coils of split system units, provide lining in the main ductwork supply and return plenums and main trunk connection for a minimum of 10' from the fan coil unit.

5. Indoor Mounted Ductwork

   a. All ductwork shall be mounted as high as practical and no lower than 7'-2" A.F.F.

   b. All ductwork design layouts shall be coordinated with other disciplines to avoid clashes with lights, fire alarm devices, security devices, sensors, T-bar ceilings, Promethean boards and other existing systems. DB-E shall consult with District if relocation of devices becomes necessary during the design phase.

   c. Ductwork supports shall be per SMACNA and CMC guidelines.

   d. All exposed interior ductwork is to be supported with all-threaded rod (ATR).

      i. Galvanized sheet metal straps are acceptable in lieu of ATR when top of duct is within 12 inches of structure attachment point.
      ii. Restrain all ductwork in accordance with SMACNA guidelines.

   e. All concealed interior ductwork is to be supported with metal straps.

6. Outdoor Mounted Ductwork
   a. Rooftop mounted ductwork shall be supported per SMACNA requirements and shall be insulated to meet current Title 24 duct insulation requirements.

   b. Ductwork shall be double walled with insulation in the interstitial space or lined.

   c. Exterior mounted rectangular ductwork shall be installed with a slope of the top surface to allow for water to run off.

   d. Exterior mounted ductwork shall be weatherproofed.

e. DB-E shall coordinate for required roof attachments and waterproofing of supports.

I. ADDITIONAL DESIGN CONSIDERATIONS

1. HVAC Noise
   a. Refer to ASHRAE's Design Guidelines for HVAC Related Background Sound in Rooms (2015 ASHRAE Handbook – HVAC Applications, Table 42) based on ANSI Standard S12.60-2002., for sound requirements.

2. HVAC Air Devices
   a. Intake louvers are to be designed with a maximum face velocity of 500 feet per minute.

   b. Exhaust louvers are to be designed with a maximum face velocity of 1000 feet per minute.

   c. Special attention should be taken on the location of intake louvers so that it does not create a nuisance, such as they are not located in area where hazardous fumes may be brought into building (intake), etc.

3. Air Distribution Devices – (Registers, Grilles, Diffusers)
   a. Provide uniform air distribution and avoid drafts wherever possible. Consider the use of high velocity nozzles in large spaces to allow for proper coverage.

4. Roof Curbs
   a. Curb manufacturer shall be approved by the unit manufacturer and shall have calculated submittals.

   b. Curbs shall be designed to account for installation on sloped roofs.

   c. Evaluate the use of vibration isolation curbs and insulated curbs for noise reduction.

5. Relief Air
   a. Maintain code required separation from all air intakes and relief air openings.

   b. Utilize existing relief openings whenever practical.

   c. Size relief air openings to handle the full system airflow for units with 100% outside air economizer.

6. Power Exhaust
   a. Maintain Code required separation from all air intakes and relief air openings.

   b. Utilize power exhaust/economizer for units serving multiple spaces and for units larger than 5 tons.

   c. Install power exhausts per manufacturer's requirements and provide required service clearance to access panels and disconnects.

7. Testing and Balancing
   a. Testing, Adjusting and Balancing shall be provided for the following:
      i. HVAC systems serving multiple rooms.
      ii. Multiple HVAC systems serving a single space.
      iii. Single zone HVAC systems serving (1) space shall be exempt from Testing, Adjusting, and Balancing as required per the NEBB, AABC or TABB. In these cases, the HVAC system shall be balanced by setting the required outside airflow rate and the corresponding return rate shall be determined by subtracting the outside airflow rate from the supply airflow rate. Adjustments to air distribution device dampers or opposed blade dampers (OBDs) shall be made to reduce sound levels and to balance the airflow as uniformly as possible.

J. CONTROLS

1. All units with the exception of window mounted room air conditioners shall be able to be operated by a wireless thermostat mesh network. The wireless thermostat shall be application-specific and programmable to operate on a Zigbee Pro network, and be provided as a complete system, which includes the required configuration, standalone scheduling, and wireless coordinators (gateway managers) for future final integration to the District EMCS.

2. The goal of the controls scope of this project is to deliver a BACnet IP network- based control system that consists of wireless technology thermostats and associated wireless coordinators. This will allow District to have remote access, monitoring, and control over the HVAC equipment. The control system can operate in a stand-alone mode, independent of the head end controls, regardless of whether control points have been mapped to the District's control system or not.

3. Consideration should be given to existing controls systems with the goal of simplifying the process of future integration of thermostats into the District's

EMCS. These projects shall incorporate the latest District Guide specification for Controls to the extent applicable (attached).

4. For single spaces being served by multiple units:

    a. Design each unit to have its own dedicated thermostat.

    b. Configure each unit to operate at the same operating schedule and the same space temperature set point.

    c. Configure each unit to have a slight start-up delay to ensure non-simultaneous unit start-up.

    d. Schedule each unit to operate per the site operational schedule as a back-up, and allow for the District EMCS to control, schedule, and monitor the units.

    e. Evaluate the use of demand control ventilation in spaces with large occupancies to reduce outside air rates when not fully occupied and promote energy savings.

5. For multiple spaces being served by a single unit:

    a. Consider the final location of the thermostat. Locate the multi-room unit thermostat in common space unless there is a concentrated load that is to be accounted for.

    b. Consider the use of Zigbee Pro compatible wireless sensors in multi room spaces to ensure that code mandated ventilation rates are provided during occupancy.
    c. Schedule the unit to operate per the site operational schedule as a back-up, and allow for the District EMCS to control, schedule, and monitor the unit.

6. Mount thermostats at required ADA heights and coordinate locations to ensure thermostats and their respective occupancy sensors are situated in an optimal location to scan the room.

7. Thermostats shall not be mounted near exterior doors or windows, or on exterior walls. However, if conditions limit the placement of thermostats to be on exterior walls, install the thermostat with an insulated base.

8. Coordinate wireless coordinator locations with District. Locate wireless coordinators per the manufacturer's installation guidelines. Coordinate design with construction components that may limit network distribution.

9. The window mounted room air conditioners shall be designed and installed to be operated by the use a 4-hr twist timer in conjunction with the unit's integral thermostat. The window mounted room air conditioners shall be standalone units.

10. Ductless split system units shall be designed and installed to be operated by a manufacturer wall mounted remote thermostat. The DB-E shall incorporate occupant sensor devices to turn off the system upon an adjustable time period without activity sensed.

K. EXISTING SYSTEMS

1. The following list provides a general sampling of the various mechanical systems currently in place throughout the 20 sites:

   a. Mechanical room housed forced air furnace - Ducted Supply
   b. Mechanical room housed built-up air handler (Heat/Vent) – Ducted Supply
   c. Rooftop heat/vent unit - Horizontal roof mounted ducted supply
   d. Rooftop heat/vent unit - Vertical ducted supply
   e. Ceiling mounted hydronic heating air handers - Ducted supply
   f. Room mounted hydronic heating air handler - Ducted Supply
   g. Underfloor hydronic radiant heating system
   h. Gas Unit Heater
   i. Closet mounted split system furnace
   j. Ceiling mounted split system furnace
   k. 100% OA gas fired unit

2. The DB-E is to determine the impact of new HVAC systems on the existing HVAC systems in place. Determine whether the existing systems are to be completely taken out of service or are needed to continue servicing other building spaces. When existing HVAC systems are being impacted by new HVAC work provide a design solution for maintaining existing HVAC systems in service where necessary and for ensuring the systems will continue to function properly (e.g., system modification, heating hot water boiler plant, load balancing, controls

integration, etc.) Coordinate with District prior to proceeding.

1.6 STRUCTURAL

A. DESIGN CONSIDERATIONS

1. Perform a site-specific analysis and site observation of all structural, electrical, mechanical, alarm, data, and other building systems to confirm assumptions made regarding the existing conditions.

2. The DB-E shall consider performance criteria related to all disciplines. Collaboration between disciplines will ensure the "best value" is achieved for the entire project and not only for the structural design.

3. New units shall be located to minimize structural modifications.

4. When locating units, it is preferred to limit increasing the dead load to existing members no more than 5% to limit the amount of reinforcing required per 3403A.3 of the CBC.

5. Rooftop units are preferred.

6. Utilize existing openings to the extent practical.

7. At roof-mounted ductwork, utilize duct supports that can be installed without demolition of the existing roof sheathing to the extent practical.

8. In all cases, consideration should be given to the lateral load resisting system and the demand capacity ratio of each lateral element. In certain conditions, it may be prudent to use a less favorable unit location where the additional load from the new unit will require extensive modifications to the building lateral load resisting elements.

9. Reinforcing required on existing framing shall be compatible with the material properties of the existing construction. Preferably, the reinforcing will not extend beyond the depth of the existing framing.

10. Avoid on-site welding to the extent practical.

11. All existing framing receiving reinforcing shall be jacked up prior to receiving reinforcing, or otherwise shown to be adequate in the deflected state. Deflections should not exceed those specified in the CBC for new construction.

12. Avoid loading existing framing members that support operable partitions.

B. PREFERRED STRUCTURAL SOLUTIONS

1. The following order of preference has been developed to provide the DB-E with guidance only based on the District's goal to minimize structural alterations and cost and is not intended to restrict DB-E's design options.

2. Top floor (roof) of existing buildings

   a. First choice - Locate new package units directly on top of existing bearing walls and existing columns and eliminate the need for reinforcing of the existing structure.

   b. Second choice - Locate new package units within 1/3 end spans of existing structural members and avoid loading existing headers and existing framing members with more than one new unit to limit amount of reinforcement of the existing structure required.

   c. Third choice - Locate new package units to avoid existing headers and avoid mid-span of existing members.

   d. Fourth choice - Locate new package units such that only reinforcement of existing secondary members is required.

   e. Fifth choice - Locate new package units and add new secondary members.

   f. Sixth choice - Locate new package units such that reinforcement of existing secondary and existing primary members is required.

   g. Seventh choice - Locate new package units such that reinforcement of existing secondary, existing primary, and existing vertical load carrying members is required.

3. All other floors of existing buildings.

   a. First choice - Hang new indoor units within 1/3 end spans of existing structural members at existing roofs and floors to limit the amount of structural reinforcement required.

b. Second choice – Hang new indoor units such that reinforcement of existing members is required.

C. PREFERRED MEMBER STRUCTURAL REINFORCING

1. Reinforcing of Secondary Members

c. To reinforce existing wood members sister new members (preferably the same depth as or less than existing members depth, and only reinforce the length of existing member required) to existing member.

d. To reinforce existing plywood web, I-joist sister new members (preferably the same depth as or less than existing members depth, and only reinforce the length of existing member required) to existing members with web stiffeners.

e. To reinforce existing structural steel I-beam members, bolt flat steel plates (only the length required) to the bottom flange of the existing member.

f. To reinforce existing open web wood trusses, provide new members sistered to the existing members.

g. To reinforce existing steel bar joist trusses bolt reinforcing bar to each bottom chord angle (only the length required).

h. To reinforce existing concrete beams epoxy fiber, wrap the bottom of the member (only the length required).

i. To reinforce existing concrete elevated slabs epoxy fiber, wrap the bottom size of the slab (only the area required).

2. Reinforcing of Primary Members

a. To reinforce existing wood members sister new members to each face of the existing member (preferably the same depth as or less than existing members depth, and only reinforce the length of existing member required).

b. To reinforce existing structural steel I-beam members same as existing structural steel I-beam secondary members.

c. To reinforce existing wood truss members same as existing wood truss secondary members.

d. To reinforce existing structural steel truss members same as existing steel bar joist trusses secondary members.

e. To reinforce existing concrete beams same as existing concrete beam secondary members.

D. PREFERRED STRUCTURAL DETAILS SOLUTIONS

1. Duct Supports – it is preferred that the size of the ducts and the lengths of the supports be limited to what is specified in the ASCE 7 in order to limit the amount of seismic bracing and the number of gravity supports required. Provide new appropriate roof waterproofing.

2. Bearing of New Framing –

a. It is preferred to have the existing member transfer the shear to the existing bearing element and thus not require the new members to bear directly on the existing bearing element.

b. Where bearing of new members is required, it is preferred to notch or shim the new members to utilize and match the elevation of the existing bearing points.

E. ALTERNATE STRUCTURAL SOLUTIONS

1. Where the live load capacity of the existing members loaded by the new construction is exceeded, it is preferred to design for the prior approved live load and provide place cards to limit the amount of reinforcing, per 3404A.3.1 of the CBC.

2. The Design Professional is to provide the most cost-effective layout of the new mechanical units and the associate new duct work. The Design Professional is to locate the new units, ducts and openings to avoid existing electrical and mechanical distribution systems and units, and existing architectural features such as ceiling fans.

1.7 ELECTRICAL

A. USE OF DISTRICT DESIGN GUIDE AND PERFORMANCE CRITERIA

1. This Electrical District Design Guide and Performance Criteria is the criteria that shall be used to program and design electrical systems for the San Diego Unified School District (SDUSD or "District") for this specific project. This District Design Guide and Performance Criteria should be used as the basis for the development of site-specific individual project designs. All material provided herein is for reference purposes only. It remains the responsibility of the DB-E to use professional judgment to develop appropriate contract documents for the execution of the project specific work.

2. The DB-E is responsible for developing an accurate understanding of all relevant existing site conditions that may impact the design work. This includes all existing structural, electrical, mechanical, alarm data, and other building systems.

3. The following are suggested design criteria to be used for electrical design.
    a. Verify existing design provided in the RFP.
    b. Enhance existing design as required to meet District objectives.
    c. Meet all current applicable Codes, regardless of guidance provided in this District Design Guide and Performance Criteria.

B. HVAC ELECTRICAL CONNECTIONS

1. Use the highest voltage available at the site to feed the new HVAC units.
2. Electrical connections are based on the highest MCA ratings.
3. Electrical connections are sized to Code minimum. Voltage drop calculations will need to be performed by the site-specific designer to determine if wire size will need to be increased due to excessive voltage drop. Also take into account temperature rating of conductors that are mounted on the roof.
4. All new HVAC equipment shall be connected to a dedicated panel to be used only for HVAC equipment and related equipment. This is a title 24 requirement. New panel shall be equipped with main breaker, copper bussing and bolt-on breakers.
5. If possible utilize transformers to either step-up or step-down voltage on long feeders to minimize the need to pull new feeders.
6. All exposed conduits located on roofs, under eaves or on exterior walls shall be rigid steel conduit with threaded fittings.

7. All raceways located in areas accessible to students and staff shall be surface metal or surface plastic wireway. (See specifications).
8. All raceways located above T-bar ceilings, and in non-public spaces and installed above 8'-0" may be EMT. (See specifications).
9. All underground raceways shall be schedule 40 PVC with schedule 80 elbows. (See specifications).
10. All disconnect switches shall be heavy-duty type. Provide nameplates on all disconnect switches. (See specifications).

C. INDIVIDUAL BUILDING POWER

1. Ensure that each building has sufficient power to serve the additional HVAC loads that are being added.
2. Upgrade power to buildings as necessary to provide adequate power for the new HVAC loads. Upgrade panels, grounding and feeders back to source as needed.
3. Investigate the existing sites and determine if existing spare underground conduits exist of if removal of existing feeders will "free-up" conduit for use under this contract.

D. SITE POWER

1. Verify existing design shown in attachments. Verify where new electrical services are required.
2. Where new electrical services are required, complete and submit District SE-1 form.
3. Contact and submit new HVAC loads to the SDG&E planner for the area, whenever designs vary from existing designs provided.
4. Upgrade the incoming SDG&E service as necessary. Coordinate location of new service with the District, site personnel and SDG&E. Coordinate with SDG&E and obtain Service Order. Size the new service to satisfy Code requirements, but not beyond these requirements. Any revisions to existing SDG&E service orders shall be based upon essential criteria as follows:
   a. Code Requirements
   b. Cost

c. Impact to site (minimizing shut down times)

5. Verify existing calculations as required to support all service and panel upgrades. Wherever designs are changed, provide new calculations for District review.

6. In some cases, the electrical service may be large enough, but SDG&E may need to change out their transformer(s). If this is the case, coordinate the transformer(s) change out with SDG&E. Fully coordinate construction documents with SDG&E.

E. SITE CONSIDERATIONS

1. Document and clearly note on construction documents all relevant existing site conditions that may impact the installation on the new HVAC systems. This includes all existing lighting, fire alarm, data, power, intrusion and all other electrical devices that may be affected. Show these devices to be relocated and show all related work as required.

2. DB-E shall verify location of all existing on-site utilities and potential obstructions prior to designing new pathways whether buried or not.

3. As much as possible, utilize existing building structures to support new overhead feeder conduits. Design electrical system to minimize trenching required.

F. CARBON MONOXIDE DETECTION

1. Provide carbon monoxide detection in all classrooms, auditoriums and all other gathering spaces where room is served by a gas-powered HVAC unit. Per DSA, all gas fired units where installed inside a room or on the roof of a roof will require carbon monoxide detection.

2. Connect carbon monoxide detectors to existing fire alarm system, if the system is compatible. Provide a supplemental Carbon Monoxide system if the existing fire alarm control panel cannot support the new devices.

3. Provide CO detectors to meet all requirements of DSA.

1.8 PLUMBING

A. EXISTING SYSTEMS AND EQUIPMENT

1. For sites with an existing natural gas system, evaluate the system's adequacy to supply the new gas loads as noted below.

2. Specify that existing gas fired equipment (unit heaters, furnaces, boilers) which are not to be used in the future must have the gas piping disconnected and capped airtight at the existing gas cock.

   a. Gas boilers which are not to be reused shall be drained of water, disconnected and capped from the existing gas system.

3. Specify modifications required to reuse gas boilers which are to serve a reduced system load after addition of the HVAC system.

4. Determine if existing vents through roof connected to the sanitary sewer system will be within 10'-0" of HVAC units' outside air intake. Relocate roof vent terminations to provide this minimum clearance by:

   a. Reroute interior vent piping and provide new vent thru roof location.

   b. Provide horizontal pipe offset above roof and terminate with vertical pipe up to 24" minimum above roof.

B. NATURAL GAS SYSTEM FOR PACKAGED ROOFTOP UNITS AND FURNACES:

1. Size all gas piping in accordance with California Plumbing Code (CPC) Chapter 12.

2. Design of gas piping for sites with low pressure (7-inch water column) site distribution systems should include:

   a. Calculation of new and existing gas loads at each building and the total site demand.

   b. Credit gas loads due to removed and/or disabling gas equipment.

   c. Verification of adequacy of existing piping sizes to accommodate new and existing loads in accord with CPC Chapter 12 (see paragraph B.4).

d. Calculation of length of piping from existing meter/pressure regulator to most remote equipment (new or existing).

e. Verify adequacy of existing gas meter to accommodate gas load for entire site, including all new and existing to remain gas fired equipment. Analysis should include referencing manufacturer's published data on existing meter capacity range.
    i. Where this review indicates the new gas, demand is within 10% of the meter's listed capacity, designer shall inform the District. Submittal of the information to SDGE is to be made for their review of the meter.

f. Determine if existing gas shut-off valve to each building is adequately sized and can be reused. If not, provide new gas valve.

3. Design of gas piping for sites with medium pressure (5 psi) site distribution systems and with low pressure branch piping in buildings should include:

    a. Calculation of new and existing gas loads at each building and the total site demand.

    b. Verification of adequacy of existing piping sizes to accommodate new and existing loads in accord with CPC Chapter 12 (see paragraph B.4).

    c. Calculation of length of medium pressure piping from existing meter to each building.

    d. Calculation of length of low-pressure piping from building regulator to most remote piece of equipment (new or existing).

    e. Review of adequacy of existing gas meter to accommodate gas load for entire site, including all new and existing to remain gas fired equipment. Analysis should include referencing manufacturer's published data on existing meter capacity range.
        i. Where this review indicates the new gas, demand is within 10% of the meter's listed capacity, designer shall inform the District. Submittal of the information to SDGE is to be made for their review of the meter.

    f. Determine if existing gas shut-off valve and pressure regulator to each building are adequately sized and can be reused. If not, provide new gas valve and pressure regulator.

4. Where calculations indicate the existing low or medium pressure site main gas piping is inadequate to accommodate the new load it is preferred that all electric

heat pumps be used for the new equipment. This must be coordinated with the electrical and mechanical designers. If use of all electric units is not possible, designer shall inform the District. The cost and schedule impacts of the following options should be discussed with a final determination made by the District:

a. For existing medium pressure systems:

   i. Calculate the location in the existing system where the pipe cannot accommodate the total load.

   ii. Provide new piping from that location to the most remote equipment. If so required, this would include new piping from the meter throughout the site. Size piping to meet new total gas load.

   iii. Coordinate adequacy of existing meter with SDG&E.

   iv. Purge and test piping per CPC requirement

b. For existing low-pressure site distribution systems:

   i. Calculate the location in the existing system where the pipe cannot accommodate the total load.

   ii. Provide new piping from that location to the most remote equipment. If so required, this would include new piping from the meter throughout the site. Size piping to meet new total gas load.

   iii. Coordinate adequacy of existing meter with SDG&E.

   iv. Purge and test piping per CPC requirement

c. Review feasibility of converting site low pressure system to a medium pressure system as follows:

   i. Pressure test existing piping per CPC requirements to determine if it can accommodate the higher test pressure required for 5 psi piping.

   ii. Coordinate replacement of existing meter with SDG&E.

   iii. Provide pressure regulators throughout site at all connections to low pressure (7-inch water column) branch piping and/or equipment.

   iv. Purge and test piping per CPC requirements.

5. Gas system requirements for both medium and low-pressure distribution systems shall incorporate following:

    a. Gas piping on roof shall be one (1) inch maximum size wherever possible to minimize seismic requirement impact.

    b. Pressure regulators shall have overpressure protection device and located exterior to buildings. Interior pressure regulators are not allowed.

    c. Gas piping shall be:

        i. Above Grade: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

        ii. Below Grade: SDR 11, ASTM D2513.

    d. For the main gas supply piping to buildings, new or replacement gas valves and pressure regulators shall be located in an accessible location on the building exterior. Rooftop locations for gas regulators are acceptable where this allows pipe size reductions and the location is accessible to service personnel. When regulators are located on roofs a gas valve and union shall be provided at the regulator. In addition, a separate and accessible gas valve is required at grade level (see paragraph below).

    e. Gas isolation valves shall be located in accessible location without requiring equipment for access (i.e. ladder). Paint valve red along with lettering on wall: “Gas Shut-Off”.

    f. Stainless steel flexible connectors shall be provided at all locations where gas piping crosses a building seismic or expansion joint. Connector shall be listed for use with natural gas.

    g. Route and support gas piping under existing eaves and walkway covers wherever feasible in order to reduce amount of gas piping mounted on roof.

    h. Following installation, exterior steel gas piping shall be sanded to remove all rust, then primed and painted.

C. CONDENSATE DRAIN SYSTEM

1. Size piping based on the California Plumbing Code (CPC) Chapter 8. To the extent possible provide a common pipe serving multiple HVAC units. Determine the number of units which can be connected to a common pipe by evaluating:

a. Capacity of drain pipe (see CPC Table 814.3)

b. Unit locations.

c. Distance from most remote unit to point of termination.

d. Height required to slope pipe at ⅛ inch per foot minimum from most remote unit to point of termination compared to available height.

e. Condensate drain piping shall not terminate into sinks or floor sinks in kitchen or food preparation areas.

2. The options for condensate drain piping materials include:

   a. Roof mounted HVAC units, split system heat pumps, fan coil DX coils, interior mounted vertical packaged units, and window mounted air conditioners:

      i. Exterior pipe: Type M copper. All exterior piping shall be painted.

      ii. Interior pipe: Type M copper pipe with 1" polyolefin insulation and metal jacket or CPVC pipe. Paint pipe and supports to match adjacent wall or ceiling.

3. The options for termination of condensate drains in order of preference:

   a. Landscaping (the following requirements must be met):

      i. Point of termination must be located on a location that is normally exposed to direct sunlight throughout the day. North areas that are normally shaded during Winter months and all areas that are normally shaded by buildings, trees or shrubbery is not allowed

      ii. Piping shall terminate on a concrete splash block located 4' 0" minimum from walkways accessible by students or public. If point of termination into landscaping does not permit this clearance, terminate drain at two (2) inches above grade with elbow down.

      iii. Condensate from condensing furnaces shall ***not*** drain to landscaping unless the drainage first runs through a neutralizing kit before discharging to the landscape.

   b. Janitor sink, or exterior can wash: Provide piping as noted above and terminate into janitor sink with or can wash air gap.

   c. Exterior drywell:

i. Drywells shall be located at 36" minimum from face of exterior building wall.

ii. Drywells shall be sized to provide 2 cubic foot of area for each gallon per hour of condensate produced at design conditions (reference "System Sizing Guidelines") and draining into drywell. Calculation should include all units connected to the same drywell. Minimum size shall be 18-inch diameter by 30 inches deep.

d. Connection to interior fixture traps in restrooms or exterior drinking fountains: Provide piping as noted above and connect to house side of fixture trap.

i. Determine if interior condensate drain piping has adequate space to gravity drain at ⅛" inch per foot minimum to termination. If space is not adequate, provide condensate pump.

ii. Provide cleanouts in condensate piping at trap at mechanical unit and at a minimum of all aggregate horizontal changes in direction exceeding 135 degrees.

iii. A maximum ¾ inch pipe shall connect to a fixture trap.

iv. Paint pipe and supports to match adjacent wall or ceiling.

v. For mechanical units with overflow condensate drain connections provide 3/4" pipe. At units mounted above ceilings terminate drain in observable locations at 1" below ceiling. Provide escutcheon and paint pipe to match ceiling. At units exposed in rooms provide drain at connection and terminate at unit with elbow down.

e. Connection to interior fixture traps in classroom, offices and occupied spaces: Provide piping as noted above and connect to house side of fixture trap.

i. Fixture must be in the area controlled by the same person occupying the conditioned space (see CPC Article 814.6). Drains from units in other occupied spaces shall not combine to terminate at the same sink.

ii. Determine if interior condensate drain piping has adequate space to gravity drain at 1/8 inch per foot minimum to termination. If not, provide condensate pump.

iii. Provide cleanouts in condensate piping at trap at mechanical unit and at a minimum of all aggregate horizontal changes in direction exceeding 135 degrees.

iv. Provide escutcheons at all wall or ceiling penetrations. Paint pipe and supports to match adjacent wall or ceiling.

v. For mechanical units with overflow condensate drain connections provide 3/4" pipe. At units mounted above ceilings terminate drain in observable locations at 1" below ceiling. Provide escutcheon and paint pipe to match ceiling. At units exposed in rooms provide drain at connection and terminate at unit with elbow down.

f. For interior split system cooling units provide a condensate pump with reservoir and check valve. Coordinate electrical connection separate from unit.

D. PIPE SUPPORTS

1. Provide pipe supports with spacing according to California Plumbing Code Table 3.13.1.

2. Where gas and/or condensate drain piping will cross building seismic or expansion joints; provide pipe fittings or appurtenances to accommodate joints.

1.9 ARCHITECTURAL

A. ACCESSIBILITY (ADA and CBC Chapter 11)
   1. Work shall not reduce existing accessibility pertaining to buildings or site.

B. LANDSCAPING
   1. Any existing landscaping that damaged, removed or disturbed shall be replaced per District Standards.

C. PAINTING
   1. Exterior
      a. All new exposed conduit, plumbing, or other elements that run along the exterior of buildings shall be painted to match existing adjacent building surface color.
      b. All new exposed window or opening fill materials shall be painted to match adjacent existing exterior window frame or adjacent wall where no window frame exists.
   2. Interior
      a. All new exposed conduit, plumbing and other elements other than ductwork shall be painted to match existing adjacent building surface color.
      b. All walls that are penetrated by new work to be sealed and touched-up with paint to match existing wall color(s)
      c. All new exposed framing to be painted to match existing adjacent framing.
      d. All new blank-off panels to be painted to match existing adjacent surfaces
      e. All new window or opening fill materials shall be painted to match adjacent existing interior window frames.

D. CEILINGS
   1. Finishes on ceilings where work takes place are to be left in a finished appearance with minimal variation from original conditions.
      a. Install new ceiling finishes to closely match existing adjacent ceiling finish materials

b. Seal all penetrations

E. GROUND MOUNTED UNIT ENCLOSURES

1. Enclose units to prevent unauthorized access, potential injuries to students and personnel, and protect units from vandalism through means of chain-link enclosures. Enclosures shall consider and allow for proper operational and service access requirements. Consider the installation of a security cage to protect from theft or damage where accessible to students, personnel or visitors.

2. Evaluate the degree of visibility from all adjacent public ways. Minimize visibility of ground-mounted equipment and ductwork from adjacent public ways including streets, sidewalks and neighboring properties where unscreened ground-mounted equipment and ductwork may be objectionable.

F. EXISTING OBSTRUCTIONS

1. Project all existing finishes, fixtures, furniture, equipment, student work or staff work and other materials from dirt, dust or damage.

2. When the Work requires the removal or relocation of fixtures, furniture, equipment or other items, the DB-E shall remove or relocate such items and after Work is completed, relocate or reinstall such items to their original location and condition.

3. Coordinate all proposed removal, relocation or replacement and reinstallation of obstructions with the District Project Manager.

G. ROOFING SYSTEMS

1. Minimize the amount of roof penetrations, patching and roof repair.

2. All roof system patching and repair to be done with materials compatible with existing roofing system.

3. Some existing roof systems may be under warranty. The DB-E will request warranty information from the District prior to beginning work on any roof. If a roof is under warranty, the DB-E will perform all roof patching and repair per the roofing manufacturer's warranty requirements, including use of an authorized applicator and authorized repair methods so that the warranty is not voided.

4. When the amount of roofing removal, patching and repair on a building is so extensive that the BD-E determines that the cost of doing the work is reasonably

close to the cost of replacing the entire roofing system on the building, the DB-E may propose the removal of the entire roofing system and installation of a new warrantied roofing system for the District to review and approve.

H. SCREENING OF ROOF-TOP UNITS

1. Evaluate the degree of visibility from all adjacent public ways. Minimize visibility of rooftop equipment and ductwork from adjacent public ways including streets, sidewalks and neighboring properties where unscreened rooftop equipment and ductwork may be objectionable. The effectiveness of the equipment screening should also take into consideration future development in the surrounding area.
2. Rooftop equipment should be clustered and located near the center of the roof when practical to minimize visual exposure using the building height and profile as screening from the public ways.
3. Rooftop equipment and ductwork heights should be kept as low as possible so as to minimize visual exposure, structural wind loads and construction cost.
4. The method of screening shall be architecturally harmonious and integrated with the adjacent structure in terms of materials, color, shape and size. Consideration should be given to providing screening that is cost-effective both in installation and long-term maintenance.
5. Where rooftop ductwork is extensive and full screening is not practical, consideration may be given to painting ductwork so as to make it less noticeable.

H. ROOF-TOP EQUIPMENT SCREEN CONSIDERATIONS

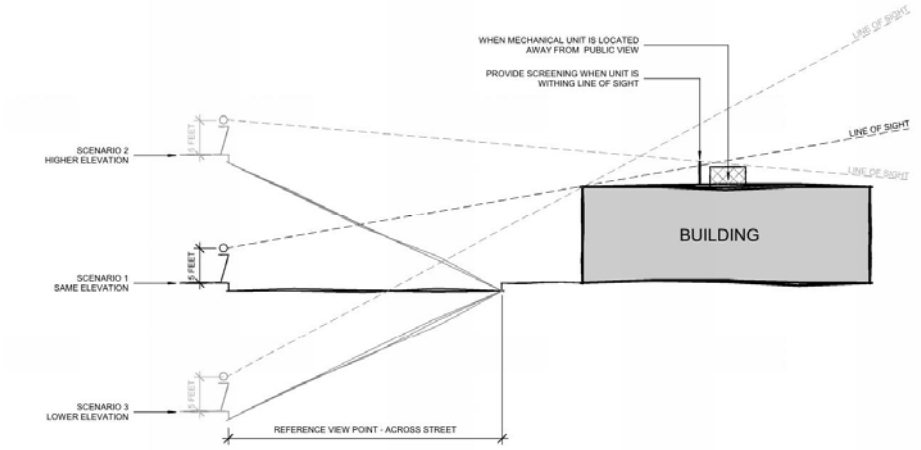
1. Limit the height and surface area of the screening to what is necessary for effective screening based on the sightlines from the public ways and neighboring properties.
2. Position the screening in the most effective locations based on sightlines and the best architectural integration of the screening.
3. Limit the length of the screening to the minimum necessary to effectively screen the equipment and ducts based on the sightlines.
4. Provide sufficient clearance below the screen to allow rainwater to flow unobstructed over the roof surface and to avoid debris accumulation.
5. Provide adequate access around each unit. Consider both routine service and system replacement.

6. Minimize the number of roofing penetrations.

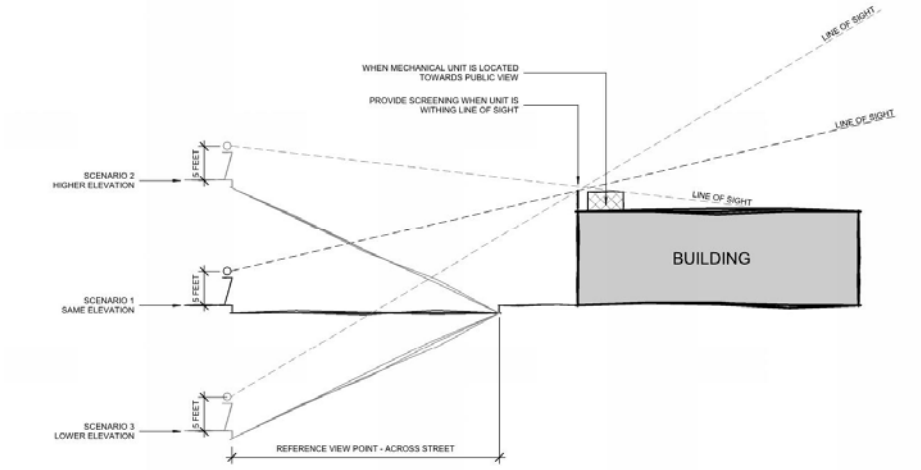
1.10 APPENDIX

A. APPENDIX A - REFERENCE ILLUSTRATIONS

APPENDIX A - REFERENCE ILLUSTRATIONS



SKETCH A



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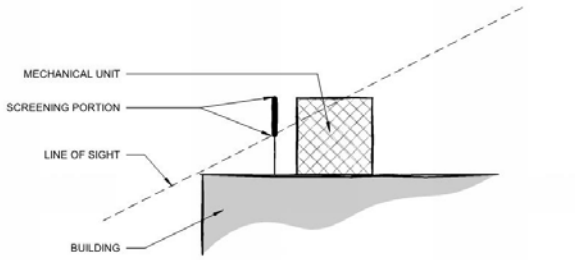
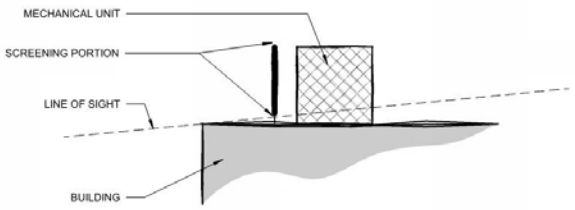

MECHANICAL UNIT
SCREENING PORTION
LINE OF SIGHT
BUILDING


MECHANICAL UNIT
SCREENING PORTION
LINE OF SIGHT
BUILDING

SKETCH C