Updated: 10/31/2011

Volumes I-III

Divisions 1-48

SAN DIEGO COMMUNITY COLLEGE DISTRICT

Design Guidelines & Standards Manual

CITY COLLEGE

MESA COLLEGE

MIRAMAR COLLEGE

CONTINUING EDUCATION

Campus Facilities Services

District wide 619 388-6422
City 619 388-3537
Mesa 619 388-2814
Miramar 619 388-7823

Facilities Management

619-388-6546

2010 District Design Standards Manual

Volume I

SAN DIEGO COMMUNITY COLLEGE DISTRICT

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Updated: 10/31/2011

Note that significant revisions to the 07/07/2010 Version of the District Design Standards Manual are shown in **BLUE** print.

Divisions 1-14

Prepared by:

Architectural Department
Facilities Management
San Diego Community College District

Sample Specification Sections

Note that sample specification sections depicting content from these District Standards have been incorporated by hyperlink to reinforce the Updated District Standards language and to help the A/E team to organize their design and materials and incorporate the District Standards and Guidelines. These are sample reference specifications and their use and reference in no way relieves the architects and engineers from preparing accurate technical specifications specific to the project for which they are contracted.

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Cross Reference Matrix

MASTER FORMAT - CONSTRUCTION SPECIFICATIONS INSTITUTE	**DATE REVISION ISSUED**	AUTODESK REVIT SYSTEM FAMILIES	AUTODESK REVIT IMPERIAL LIBRARY	Greenspecs
PROCUREMENT AND CONTRACTING REQUIREMENTS GROUP				**VOLUME I**
Division 00 Procurement and Contracting Requirements	07/07/2010			
GENERAL REQUIREMENTS SUBGROUP				
Division 01 General Requirements	07/07/2010			
FACILITY CONSTRUCTION SUBGROUP				
Division 02 Existing Conditions	03/22/2010	Under Development		Under Development
Division 03 Concrete	07/07/2010	RSF-09 Ramps		Under Development
		RSF-12 Stairs		
		RSF-13 Structural Beams		
		RSF-14 Structural Columns	RIL-04 Columns	
		RSF-15 Structural Foundations	RIL-23 Structural	
		RSF-16 Structural Framing	RIL-24 Sustainable Design	
		RSF-17 Walls		
Division 04 Masonry	07/07/2010	RSF-14 Structural Columns	RIL-04 Columns	Under Development
		RSF-16 Structural Framing	RIL-05 Curtain Panel by Pattern	

Cross Reference Matrix

MASTER FORMAT - CONSTRUCTION SPECIFICATIONS INSTITUTE	**DATE REVISION ISSUED**	AUTODESK REVIT SYSTEM FAMILIES	AUTODESK REVIT IMPERIAL LIBRARY	Greenspecs
		RSF-17 Walls	RIL-06 Curtain Wall Panels	
			RIL-24 Sustainable Design	Under Development
Division 05 Metals	07/07/2010	RSF-08 Railings	RIL-02 Balusters	Under Development
Division 06 Wood, Plastics, and Composites	07/07/2010	RSF-12 Stairs	RIL-02 Balusters	Under Development
		RSF-16 Structural Framing	RIL-03 Casework	
		RSF-17 Walls	RIL-24 Sustainable Design	
Division 07 Thermal and Moisture Protection	07/07/2010	RSF-10 Roofs	RIL-24 Sustainable Design	Under Development
Division 08 Openings	07/07/2010	RSF-02 Curtain Systems	RIL-05 Curtain Panel by Pattern	Under Development
		RSF-03 Curtain Wall Mullions	RIL-06 Curtain Wall Panels	
			RIL-09 Doors	
Division 09 Finishes	07/07/2010	RSF-01 Ceilings	RIL-07 CUSTOM	Under Development
		RSF-04 Detail Items	RIL-08 Detail Components	
		RSF-05 Floors		

Cross Reference Matrix

MASTER FORMAT - CONSTRUCTION SPECIFICATIONS INSTITUTE	**DATE REVISION ISSUED**	AUTODESK REVIT SYSTEM FAMILIES	AUTODESK REVIT IMPERIAL LIBRARY	Greenspecs
Division 10 Specialties	07/07/2010	Under Development	RIL-24 Sustainable Design	Under Development
Division 11 Equipment	07/07/2010	Under Development		Under Development
Division 12 Furnishings	07/07/2010	Under Development	RIL-12 Furniture	Under Development
			RIL-13 Furniture Systems	
Division 13 Special Construction	NOT USED		RIL-22 Specialty Equipment	Under Development
Division 14 Conveying Equipment	07/07/2010	Under Development		Under Development
FACILITY SERVICES SUBGROUP				**VOLUME II**
Division 21 Fire Suppression	07/07/2010	Under Development		Under Development
Division 22 Plumbing	07/07/2010	Under Development	RIL-19 Plumbing Fixtures	Under Development
Division 23 Heating, Ventilating, and Air Conditioning	07/07/2010	Under Development	RIL-16 Mechanical Equipment	Under Development
Division 25 Integrated Automation	NOT USED			Under Development
Division 26 Electrical	07/07/2010	Under Development	RIL-10 Electrical	Under Development

Cross Reference Matrix

MASTER FORMAT - CONSTRUCTION SPECIFICATIONS INSTITUTE	**DATE REVISION ISSUED**	AUTODESK REVIT SYSTEM FAMILIES	AUTODESK REVIT IMPERIAL LIBRARY	Greenspecs
			Fixtures/ Equipment	
			RIL-14 Lighting Fixtures	
Division 27 Communications	07/07/2010	Under Development		Under Development
Division 28 Electronic Safety and Security	07/07/2010	Under Development		Under Development
SITE AND INFRASTRUCTURE SUBGROUP				**VOLUME III**
Division 31 Earthwork	Under Development	RSF-11 Site (Pad)		Under Development
Division 32 Exterior Improvements	07/07/2010	Under Development	RIL-18 Planting	Under Development
			RIL-21 Site	
			RIL-17 Parking	
Division 33 Utilities	07/07/2010	Under Development	RIL-24 Sustainable Design	Under Development
Division 34 - **47**	NOT USED			
Division 48 Electronic Power Generation	Under Development	Under Development		Under Development

Cross Reference Matrix

MASTER FORMAT - CONSTRUCTION SPECIFICATIONS INSTITUTE	**DATE REVISION ISSUED**	AUTODESK REVIT SYSTEM FAMILIES	AUTODESK REVIT IMPERIAL LIBRARY	Greenspecs
DESIGN PROCESS	Under Development		RIL-01 Annotations / Schedules	
		RSF-07 Model Text	RIL-11 Entourage / Generic Models / ADA	
			RIL-15 Mass	
			RIL-20 Profiles	
			RIL-24 Sustainable Design	
			RIL-25 Title Blocks	

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Volume

I

DESIGN GUIDELINES AND STANDARDS MANUAL

Executive Summary

These guidelines and standards have been developed to promote the efficient, predictable, and cost effective design and construction of all new and modernized buildings on the campuses of the San Diego Community College District. The document establishes a framework that combines previously developed District Standards, new sustainable design guidelines and specifications, and Autodesk's Revit Families and Libraries. The previously developed District Standards have been updated to include lessons learned from recent campus construction projects as well as contributions from the Facilities Services Maintenance and Operations Staff. The sustainable design guidelines and specifications have been developed using the U.S. Green Building Council's LEED Criteria, GreenSpec by the Construction Specification Institute (CSI), and the draft version of the California Green Building Code. Incorporating state of the art three dimensional building information modeling (BIM) techniques using object based data within the Revit Families will allow architects, engineers, and contractors to digitally collaborate earlier in the design and construction process with greater accuracy, certainty, and thoroughness. In the near future, these criteria, systems and data will be made available through a digital model as a Facilities Services tool that will be useful in monitoring, managing and maintaining the buildings to be built and rebuilt.

The guidelines in this manual serve as supplementary requirements to implement the facilities and grounds project policies and procedures that shall be adhered to on all campuses. The District Architect, Facilities Services Department, Program Management Team, Campus Project Managers and all Architects of Record (AOR), Engineers of Record (EOR), consultants, general contractors, trade contractors, and Project Inspectors of Record (IOR) are to use this manual as the standard of measurement for any and all design and construction projects for the San Diego Community College District.

USE OF DESIGN GUIDELINES AND STANDARDS MANUAL

Policy
District policy is to set forth a framework of criteria and standards that establishes a level of consistency and quality for all new and rehabilitated building projects.

Scope
The A/E/C firms retained to execute the design of new and remodeled buildings will be expected to follow the Design Guidelines, meet or exceed the standards described herein, and provide the consistency required within each college. The guide will not only provide the tools to meet these goals, but will furthermore offer the time-saving benefit of clearly identifying the level of quality and consistency that will be acceptable by each college. Providing these consistencies will greatly enhance the long-term maintenance of these facilities.

The criteria and standards are generic for the Projects overall. Specific requirements related to each college will be addressed in individual campus guidelines and during the design process.

Updates and Issues
Design Criteria and Standards are developed, edited and reviewed by the Building Design Standards Committee that, as a minimum, consists of representatives the campuses, faculty, Architectural Department, Facilities Services, Project Inspection, and the District Architect. The District Architect is responsible for the maintenance and updating of the Guidelines and Standards. Proposed variations to the District Guidelines and Standards must be submitted in writing to the District Architect for review and written approval prior to depicting such variations in the design documents.

Summary
The Design Guidelines and Standards Manual provide technical standards that the design and construction teams will be expected to meet or exceed.

BUILDING REVIEW PROCESS AND PROBLEM LIST

The following is a summary of a process we agree to utilize to better communicate the requirements of building design and to deal with discrepancies as the building is being designed, constructed and after it is completed:

The Architectural Department, Facilities Services, I.T. department staff, College Police, and Campus Site Staff agree to thoroughly participate in the design process by meeting with design consultants at required milestones and reviewing plans—changes and/or input will be forwarded IN WRITING by email or a department memo to the District's designated Project Manager and to the District Architect but not the Architect of Record. Special meetings are scheduled with the Architect of Record hired for the project to discuss any concerns and to review marked up plans.

The Project Manager will be responsible for coordinating and managing the design and construction contracts, and will keep a list of problem items or issues, which includes at a minimum the description of the item, date identified, name of person who identified, name of person responsible for completing and date completed (Refer to the sample "ISSUE MANAGEMENT CHECKLIST" format on the next page with links to the electronic MS Word Version and a demonstration sample to better understand how to use the form). The responsible party agrees to e-mail status of the item to all interested parties on a regular (preferably weekly) basis.

Milestones for Review are at a minimum as follows:
100% Schematic Design Submittal
50% Design Development Submittal
100% Design Development Submittal
50% Construction Documents Submittal
DSA Submittal Set
Substantial Completion (Punch List Period)
After Beneficial Occupancy

When the project is deemed substantially complete by the Architect of Record, and the punch list process begins, the contractor is to notify designated District Project Inspector and Project Manager for the Project so they can meet the contractor at the campus to assure the problems are clearly understood and resolved to the mutual satisfaction of all interested parties. The Project Inspector for the Project will notify Facility Management Staff and the Regional Facilities Supervisor (and appropriate technical staff) on a final walk-through during the punch list process.

ISSUE MANAGEMENT CHECKLIST

The District has determined that design and construction projects anticipated under the Measure S & N Bond Programs need to be more closely tracked as the project develops so as to monitor the issues that arise to make sure they are adequately resolved prior to construction. Sample checklists have been developed for use by the AEC teams.

- **REFER TO SAMPLE ISSUE MANAGEMENT CHECKLIST (Blank MS Word) - (Click Here)**
- **REFER TO SAMPLE ISSUE MANAGEMENT CHECKLIST (Sample Guide PDF) - (Click Here)**

Project Name:
Project Architects Firm:
Issued by:

Project Issue Management Checklist
Date:
Page 1 of 4

Item	Date Initiated	Assigned to	Issue Description	Action Needed	Status
Black = Previously Listed		New Updates: Red = AOR/Team	Blue = MEP	Green = SDCCD-PM	CLOSED = Remove from List
MEETINGS:		AOR/PM			
1.1.	10-0707	AE Team	1. Bi-Weekly meetings at Architects office	Attend	Ongoing
1.2.					
SCHEDULES:		CM/GC/PM			
2.1.					
2.2.					
DSA & PLANCHECK:		AOR			
3.1.					
3.2.					
BUDGET/PRICING/BIDDING:		CM/GC			
4.1.					
4.2.					
SUSTAINABILITY:		AOR & TEAM:			
5.1.					
5.2.					
A/E DISCIPLINES:		CM/AOR & TEAM:			
6. Architectural					
6.1.					
6.2.					

PROJECT PROGRAMMING

Policy

District policy is to set out the programming criteria, standards, processes, and procedures for the San Diego Community College District (the District) Construction Program.

GENERAL PROGRAMMING PROCESS AND PROCEDURES

General

Consultant shall, in close coordination with College Campus Project Manager, Faculty and Staff, perform the following services:

A. Review the approved College Master Plan and visit the project site to become thoroughly familiar with existing conditions, assets and constraints.
B. Review all existing program data including existing college space inventory and enrollment history and projections. Prepare a thorough Project Description and Scope statement and submit it to the District Architect for Review and Comment.
C. Conduct a needs assessment to determine 5-year space needs for this project.
D. Prepare an analysis of existing space versus existing Full Time Equivalents (FTEs) to determine whether eligibility exists for California Community College (CCC) Funding Participation.
E. Prepare a detailed program for this project separated into site and building- related requirements and submitted as draft and final versions.
F. Include the information listed below in the detailed program for each project component:
G. Description of function to be accommodated.
H. Size/capacity of each facility including occupancy, where applicable.
I. Required toilet room facilities.
J. Required building utilities including power, lighting, public address system, audio visual devices, fire alarm, voice communications, data communications, climate control, ventilation, water and wastewater systems.
K. Surface improvements, including paving and landscaping.
L. Description of any required demolition and remodeling.
M. Consultant shall, based on approved program and site plan, prepare a rough- order-of-magnitude (ROM) construction cost estimate to validate that the facility can be implemented within the parameters of the District funding allocation. Consultant shall also prepare a conceptual bar graph schedule which spans the period from Notice-to-Proceed to project completion.

Site Related Program

A. Establish project limits based on approved master plan. Indicate that all improvements within these limit lines are part of the project scope.
B. Describe required surface improvements including but not limited to:
    1. Outdoor physical education facilities
    2. Roads and fire department access

3. Parking including ADA requirements
4. Bike racks
5. Pedestrian walkways
6. Service yards
7. Courts/plazas
8. Outdoor seating
9. Outdoor lighting including required foot-candles
10. Landscape
11. Security Talk-A-Phones (Coordinate with College Police Dept.)
    a. Provide for ETP-400DV to be In contract - Contractor Furnished Contractor Installed (CFCI) and also programmed per IT Manager's requirements

C. **Low Impact Development (LID)**

1. Integrate LID concepts where possible into landscaped areas and site improvements to manage stormwater runoff as a resource.

2. Mimic pre-development site hydrology through source control and site design LID techniques to capture and retain stormwater runoff for treatment, retention, or infiltration.

3. Conserve natural area, soils, and vegetation and minimize disturbances to natural drainage areas.

4. Incorporate landscape designs that promote water retention and evapotranspiration.

5. Maximize the percentage of pervious surfaces for low traffic areas, parking lots, trails, and pedestrian walkways to allow percolation of stromwater into the ground.

6. Minimize directly connected impervious areas by directing roof, parking lot, and surface flows to pervious/vegetated areas.

D. Fire Alarm & Intrusion Alarm

E. Fire Accessibility Plan

1. Note that DSA requires a fire accessibility site plan, specific to the project, including a fully dimensioned fire department access route. All fences and gates along the fire access route shall be indicated with required dimensions. Include fire hydrant locations, post indicator valves, fire department connections and fire sprinkler risers. Indicate which hydrants were used for testing in the fire flow data report with elevations from the lowest tested hydrant to the building being served. Also on the fire accessibility site plan, provide a local fire authority plan review approval stamp with all the information included per DSA requirements

F. Fire Flow Requirements

1. Work closely with the District to provide a fire flow data report, with a minimum of two hydrants tested in the immediate vicinity of the proposed project. Testing for the fire flow data report shall be conducted by the local fire authority or certified staff from the local water purveyor. The fire flow data report shall indicate which hydrants were tested and elevations. Fire flow tests are to be conducted within six months of submittal to DSA.

G. DSA Submittal Requirements
   1. Note that DSA will require the certification letters and DSA Application Numbers for all existing elements affected by the proposed scope of work, including the path of travel from the area of proposed work to the parking lot and public right of way. The walkways and parking lot are included in the path of travel and require the application number to be indicated on the site plan.

Building Related Programming

The following description is applicable for new buildings or additions to existing buildings. However, building additions require that the existing portion of the building be surveyed to determine compliance (or non-compliance) with American Disabilities Act (ADA), California Building Code (CBC) (seismic related design) and the absence or presence of toxic substances (asbestos, lead-based paint, others). The District has ADA transition plans and record drawings for all campuses.

Programming of Teaching Stations

Space standards, as applicable, are to follow CCC Title 5 regulations. The Title 5 regulations set forth utilization ratios for classrooms and laboratory spaces as well as Assignable Square Foot (ASF) allocation per full time equivalent faculty (FTEF) for office space and student stations by room use. The latter is divided into fifty-two categories. Also included are space allocations for libraries, indoor and outdoor physical education facilities. *Refer to District Space Standards in the table below:*

Programming of Non-Teaching Stations

Space allocation for these rooms is to be based on user demands and generally acceptable standards and include, but are not limited to, the following:

General office space

1. Faculty work rooms
2. Conference rooms
3. Storage rooms
4. Support rooms for reproduction and facsimile
5. Cafeteria/dining rooms
6. Food preparation/food dispensing areas
7. Vending machine rooms
8. Day care facilities

Space Program Data Verification and Definition

Existing program data is to be verified and confirmed to assure that it is current and addresses the priorities established during the campus master planning process. Following this verification, an in-depth analysis shall be conducted with faculty and staff to determine detailed requirements of each component which will become part of the final program. Where applicable, space allocation for new construction is to follow the standards set forth in the California Code of Regulations. Adherence to these standards, even though not required for locally funded Bond projects, will aid future funding requests. The following rules shall apply in determining office, classroom and laboratory spaces.

General Rules

1. Office Space **-** 140 ASF based on full time equivalent faculty (FTEF). Of this area 80 ASF are allocated to each FTEF with the balance of 60 ASF used for office support areas.
2. Classroom Space - Based on use of a minimum of 53 hours out of 70 hours per week with at least 66% of their stations occupied.
3. Laboratory Space - Based on use of a minimum of 27.5 hours out of 70 hours per week with at least 85% of the stations occupied.

Classrooms and Laboratories

The standards listed below in are based on Barclays California Code of Regulations, California Community Colleges-Title 5:

ASF Standards

Use Category	Assignable Square Feet (ASF) Per Student Station	Remarks
Office Space	140	Full Time Equivalent Faculty (FTE)
Agriculture	115	
Architecture	60	
Biological Sciences	55	
Business and Mgmt.	30	
Classroom	15	
Seminar Rooms	15	
Teaching Laboratories	TBD	
Communications	50	
Computer & Info Science	40	
Advanced CAD Computer Lab	86	ASF Includes Req'd Support Spaces
Education	75	
Use Category	**Assignable Square Feet (ASF) Per Student Station**	**Remarks**
Diesel	200	
Air Conditioning	130	
Refrigeration	130	
Auto-Body & Fender	200	
Auto-Mechanic	200	
Auto-Technology	75	
Small Engine Repair	100	
Aviation Maint.	175	
Plastics	130	
Stationary Eng.	200	

Engineering	75	
Fine & Applied Arts	60	
Foreign Language	35	
Health Services	50	
Home Economics	60	
Letters	35	
Library Science	35	
Mathematics	35	
Physical Sciences	60	
Psychology	35	
Public Affairs & Serv.	50	
Social Sciences	35	
Commercial Services	50	
Interdisciplinary	60	
Carpentry	175	
Electricity	175	
Plumbing	175	
Glazing	175	
Roofing	175	
Masonry	175	
Dry Wall	175	
Plastering	175	
Painting	175	
Millwork	90	
Metal Trades	90	
Welding	90	
Machine Tools	90	
Heavy Equipment	200	
Auto-Mechanics	200	
Auto-Body & Fender	200	
Graphics Arts	80	
Stationary Eng.	200	

Library Space

All library space shall be computed by assignable square feet for library functions as specified in the subdivisions of this section. Square feet are "assignable" only if they are usable for the function described. Areas such as the main lobby (excluding card catalogue area), elevators, stairs, walled corridors, rest rooms and areas accommodating building maintenance services are not deemed usable for any of the described functions.

Stack Space= 1 ASF x Number of Bound Volumes

Number of Volumes

Initial Increment = 16,000 volumes

Additional Increments

(a) Under 3,000 DGE*= +8 volumes per DGS **

(b) 3,000-9,000 DGE = +7 volumes per DGS

(c) Above 9,000 DGE = +6 volumes per DGS

Staff Space= (140 ASF x Number of FTE Staff) + 400 ASF
Number of FTE Staff
Initial Increment= 3.0 FTE
Additional Increments
(a) Under 3,000 DGE= +.0020 FTE Staff per DGS
(b) 3,000-9,000 DGE= +.0015 FTE Staff per DGS
(c) Above 9,000 DGE= +.0010 FTE Staff per DGS

Reader Station Space= 27.5 ASF x Number of Reader Stations
Number of Reader Stations
Initial Increment= 50 Stations
Additional Increments
(a) Under 3,000 DGE= +.10 Stations per DGS
(b) 3,000-9,000 DGE= +.09 Stations per DGS
(c) Above 9,000 DGE= +.08 Stations per DGS

Total Space = Initial Increment= 3,795 ASF
Additional Increments
(a) Under 3,000 DGE= +3.83 ASF per DGS
(b) 3,000-9,000 DGE= +3.39 ASF per DGS
(c) Above 9,000 DGE= +2.94 ASF per DGS

Audio-Visual Space
For audio-visual and programmed instruction activities associated with library learning resource functions, additional areas sized for individual needs but not exceeding the following totals for the district as a whole.

Total Space= Initial Increment= 3.500 ASF
Additional Increments
(a) Under 3,000 DGE*= 1.50 ASF per DGS**
(b) 3,000-9,000 DGE= 0.75 ASF per DGS
(c) Above 9,000 DGE= 0.25 ASF per DGS
* Day-Graded Enrollment
** Day-Graded Student

Conference Rooms 200 TO 400 S.F.

Indoor Physical Education (PE) Facilities Standards
The total assignable square feet (ASF) for indoor PE is determined for each campus as follows:

TARGET FTE	ASF/FTE

2,000	12
3,000	11
4,000	10.5
5,000	10.2
6,000	9.7
8,000	9.0
10,000	8.1
15,000	7.4
20,000	6.6
25,000	6.0

Outdoor Physical Education Facilities Standards

Outdoor physical education facilities are planned for each campus as follows:

Enrollment	Teaching Stations	Acres
2,500	4	18
5,000	8	22
7,500	9	26
10,000	11	29
15,000	14	34
20,000	17	37
25,000	19	39

Special outdoor facilities such as tennis courts and handball courts are to be provided on the following basis: facilities providing for twenty-four students constitute one teaching station; that is, six tennis courts or six handball courts constitute one teaching station.

Corridors

Recommended Corridor Width/Height Standards

Corridor with offices on each side:	6 ft.
Corridor with offices on one side:	5 ft.
Corridor and instructional rooms on one side:	8 ft.
Corridor with instructional rooms on each side: (where doors open into corridor)	10 ft.
Corridor with instructional rooms on each side: (where doors open into protected inset)	8 ft.
Minimum Corridor Height:	8-ft. Clear
Optimal Corridor Height:	10-ft. Clear

Format of Program

Programs for new construction as well as building rehabilitation/repair and additions shall follow

District's Space Program. Programs for remodeling shall be presented with a detailed description of room amenities and furnishings as well as diagrammatic layouts.

Amenities/Equipment/Furniture
Either as part of the detailed space program form or in matrix form, list the following by room:

Type I Equipment: All built-in cabinets, counters, lab benches, fume hoods, etc which are customarily part of the construction contract. Note that a mock up sample is required for typical Lab Casework during the construction submittal process.

Type II Equipment: Furniture and all movable (copier, fax, printers, etc.).

a) Data communication requirements (computer related)
b) Voice communication requirements (phone related)
c) Special power requirements (voltage, amps, emergency power)
d) Special utility requirements (gas, compressed air, distilled water, oil and acid separations)
e) Special environmental requirements (humidity control, 100% exhaust, special lighting requirements-dimming)
f) Other project-related requirements determined as a result of communication with faculty and staff.

Note: Provide small scale floor plans (on 8-1/2x11 paper) with descriptive paragraphs and examples of equipment layouts.

General Programming Phase - Sustainable Design
The District is committed to sustainable development and has mandated that by District Policy 7800 that all new construction projects shall show implementation of energy efficiency, green building and sustainable measures. It is the policy of the District for all projects to be as energy efficient and as space efficient as possible. Refer to the Green Standards and Green Building Procedures at the end of this section.

Conceptual Design Phase
In addition to all the programming services described above, for some “blended” funding projects consisting of Title 5 and Bond Program funds, the Programming Consultant shall provide Conceptual Design Services. Such services shall be of adequate scope to satisfy the requirements of a CCC FPP and shall include the following deliverables:

1. Progress review meetings, 3 each minimum, with College Project Manager, faculty, and staff
2. Detailed Project Description
3. Site information
4. Vicinity map
5. Existing Campus Plan
6. Master Plan, addressing improvements and showing facility under consideration.
7. Site Plan- showing project-related site improvements
8. Building Information

9. Floor Plans
10. Sections
11. Exterior elevations
12. Axonometric view, perspective, or 3D Modeled Rendering.

- **REFER TO SAMPLE AOR DELIVERABLES CHECKLIST - (Click Here)**

Conceptual Design Phase— Sustainable Design
(see Green Building Procedure at end of Guidelines for more information)
All final programming documents must contain a section related to sustainability. For new building projects, the report should describe in detail how the project will comply with the USGBC requirements to achieve a LEED™ Silver Level Rating at a minimum. The supporting documentation must comply and receive approval from the USGBC to earn the credit points shown on the LEED™ Project Checklist. The report shall contain all the assumptions and requirements that are necessary so that the follow-on Architectural/ Engineers can use the information to continue the design and obtain the remaining points for LEED™ certification.

Also, a completed LEED™ Project Checklist must be submitted to the District Architect for approval at the following stages: end of the design charrette, and at progress submittals. Each time a check list is submitted, a coordination meeting shall be held with the District Architect and other interested parties to discuss each item of the checklist and its implementation to program documents. After satisfactory discussions, resolutions and revisions to the documents, these will then be submitted to the District for approval.

New Building Projects
The conceptual design for new building projects must have sustainable features that achieve a LEED™ Silver Level of Certification at a minimum. The Programming Consultant team must have a LEED™ accredited professional as part of the team. All the sustainable features should be incorporated early in the design process in order to ensure an integrated green building design solution.

Conceptual Design Process for New Buildings and Major Renovations
The College Design Team, including all college key stakeholders, project management and design professionals, will convene to determine if the project complies with the District definitions for new construction and is a sustainable candidate. If the project is not a sustainable candidate, the Programming Consultant shall prepare a detailed report justifying the decision for the District Architect's review and approval.

If the building project is a sustainable candidate, after the general programming effort is complete the team will develop initial design concepts and alternatives by holding an intensive charrette. Issues under discussion are to include the implications of building orientation, shape, aspect ratio of the building, shading, etc. Three alternative design schemes are to be developed and one recommended alternative is to be chosen.

The Programming Consultant then presents all three alternatives to the District Architect, who then discuss the merits of each option. Approved design schemes continue to the next stage of the design process. After obtaining final District Architect approval, the project progresses to the next stage of design development.

Major Renovation Projects (Interior or Exterior)

Conceptual design schemes for major renovation projects should have sustainable features and may be required to achieve LEED™ certification to be determined on a case by case basis.

Conceptual Design Process for Major Renovation Projects

The College Design Team, including all college key stakeholders, project management and design professionals, will convene to determine if the project complies with the definition outlined for major renovation and is a sustainable candidate. If the project is not a sustainable candidate, the Programming Consultant shall prepare a detailed report justifying the decision for the District Architect's review and approval. If the building project is a sustainable candidate, after the general programming effort is complete the team will develop initial design concepts and alternatives by holding an intensive charrette. Issues under discussion may include topics such as design of external glazing systems, the effect of day lighting, heat load, costs, etc.

The Programming Consultant then presents all three alternatives to the District Architect, who then reviews the merits of each option. Approved design schemes continue to the next stage of the design process. After receiving final District Architect approval, the project progresses to the next stage of design development.

SAN DIEGO COMMUNITY COLLEGE DISTRICT A/E/C PROJECT CRITERIA

GENERAL REQUIREMENTS FOR DESIGN TEAM SERVICES SCOPE

Project Design And Construction Process

1. Project Information
   Project Files: Directory & Description
   a. Project Description/Information
      - Folder may contain: documents about location, scope; budget and schedule; project teams involved; contact information and directory; information pertaining to the project or SharePoint Portal. The Design Team shall post submittals and submit memos, agenda, and minutes on SharePoint. Access to SharePoint will be provided by the Program Manager (Gafcon).
   b. Project Planning Documents
      - Folder may contain: soil's study, EIR and survey
   c. Contracts
      - Folder may contain: all architectural and/or consulting contracts also contract amendments; all contracts pertaining to professional services
   d. District Documents/Legal Documents
2. Reference Documents
   a. Drawings Sets
      - Files may contain: drawing logs and drawing sets
   b. Project Manual and Specifications
      - Files may contain: project manuals and specification
   c. Insurance
      - Files may contain: insurance certificate
3. Design Information
   a. Communication
      - Folder may contain: transmittals, letters agendas and/or meeting minutes pertaining to design
   b. Preliminary Design
      - Folder may contain: architectural documents, schematics, and preliminary design related documents
   c. Construction Documents
      - Folder may contain: LEED documents and/or construction documents related to the project
   d. Cost Estimates
      - Files may contain: cost estimates of construction
4. Design Review
   a. Folder may contain: district review, constructability, VE, and/or design related review documents.

5. Bid & Award
   a. Folder may contain: bid documents, bidder list, bid analysis, bid process, bid award and bid correspondence; proposal (no contract) and construction contract
   b. CM Multiple Prime and Design Build Teams have been successfully used by the District (e.g. Mesa College Math & Science Building project). Sub-Trade design/building packages have been used where subcontractor trades are brought onto a project design schemes. Trades such as Precast Concrete, Drywall, Window Wall, and Mechanical, Plumbing and Electrical trades have been successfully contracted for Predesign, design detailing, fabrication, and construction.
6. Pre-Construction
   a. Folder may contain: preliminary submittals; schedule of values; cash flow schedule; subcontractors list; notice to proceed (NTP) and any pre-construction related documents
7. Construction Information
   a. Communication
      - Folder may contain: transmittal; letters; meeting agenda and meeting minutes; issue logs and memorandum
   b. Schedule
      - Folder may contain: baseline schedule and schedule updates
   c. RFI's
      - Folder may contain: requests for information (RFI's)
   d. Submittals
      - Folder may contain: submittals and submittal logs
   e. Purchase Orders
      - Folder may contain: purchase orders
   f. Payment Application
      - Folder may contain: payment applications and/or payment requisitions
   g. Change Management
      - Folder may contain: change order work order and/or change management related document; pending/preliminary change orders (PCO), change orders (CO), contract change order (CCO) and field work orders (FWO); proposals (with existing contract) and request for proposals (RFP); allowance authorization requests (AAR); estimates and ASI's
   h. Notices and Bulletins
      - Folder may contain: notice and notice of noncompliance; preliminary; stop work; stop payment; subcontractor; substitution request and certificate of substantial completion
   i. Weekly Report
      - Files may contain: weekly reports
   j. Monthly Report
      - Files may contain: monthly reports
   k. Safety (Safety Plan, Safety Report, and etc)
      - Files may contain: safety related documents and safety reports (weekly)
   l. SWPPP requirements before and during construction

m. Testing/Geotech
n. Franchise Utilities

8. Inspection Records
   a. Folder may contain: daily report, notice of non-compliance, specialty, and any inspection related documents to be completed by Project Inspector
9. Fixtures Furniture and Equipment
   a. Files may contain: FF&E related documents, budget, scope and FF&E manual and specifications
10. Telecom Room (to be completed by District I.T. Department)
11. Post Construction Information
    a. Folder may contain: As-Built, Commissioning, Manuals, Warranties, and post construction information
12. Division of the State Architect (DSA) - Sign-off to be completed by Architect and District
13. SDCCD Prop S & Prop N Closeout Checklist to be completed by Project Construction Manager:

NO	DESCRIPTION	RESPONSIBLE	DATE COMPLETED	REMARKS
1	Punchlist completion			
2	Remove all temporary site facilities, trailers, and etc.			
3	Collect all final invoices/billings: Complete and deliver final billing			
4	Final inspection			
5	Notify Builder Risk carrier of project completion			
6	Final cleaning - interior			
7	Final cleaning/Rubbish removal - site			
8	Secure subcontractor as-built drawings (from General Contractor)			
9	Secure operations & maintenance (O & M) manuals			
10	Secure all project warranties (may be part of O & M manuals)			
11	System start-up and customer training			
12	District does not require surplus materials or spare parts. Do not include additional stock in specs.			
13	Collect and transfer keys to owner			
14	Change over utility connections/fees (gas, electric, telephone, and etc.)			
15	Reconcile change orders and retainage			
16	Complete final designer affidavits and closeout docs			
	- Substantial Completion (Designer)			
	- Final Completion (Designer)			
	- Notice of Completion (Agency)			
17	Notice of Termination - SWPPP (Storm Water Resources Control Board)			
18	Finalize logs (RFI, submittals, and etc.)			

Miscellaneous Design Requirements

1. Do not specify overstock products; just provide for maintenance manuals, product literature warrantees and as-built BIM model, drawings and specifications.
2. The following Division Specification Submittals shall be submitted to the District Architect along with the A/E early in the construction phase for review and comment prior to ordering materials:
   a. Hardware
   b. Fire Alarm
   c. Intrusion
   d. Roofing
   e. Signage
   f. Paint; with complete drawdown per Vol. 1 page 60.
   g. Toilet Accessories
   h. Floor Boxes
   i. Substitutions
3. At each Telcom room, provide one unopened box of ceiling tiles for each room and deliver to District I.T. representative.
4. Provide a dedicated Telcom Room on each floor of all new buildings.
5. Provide conduit only at locations at doors for Owner Supplied Owner Installed (OSOI) emergency/public address 2-way phones.
6. The Main Telcom (generally on the on first floor) shall have a stand-alone AC unit.
7. At Lab Classrooms provide for accessible desks for teachers.
8. Note that final building / room numbering shall be determined by the District Architect. This should happen after the 100% S.D. submittal. Submit a small scale floor plan(s) with to District.
9. Architectural signage Lettering and numbering shall meet District standards and be provided by Architect's Signage consultant.
10. Signage shall be located where required by code and in an unobstructed view.
11. Provide Paint draw-downs colors with as-builts to show what paint is on what wall. Provide semi-gloss finish at classrooms, halls, and toilet rooms.
12. Mail delivery to faculty and administration is handled differently at each campus. Only Mesa College delivers mail as of 1/1/10 and mail is delivered to designated faculty work areas.
13. Project Close-out: Provide the following:
    a. Operation and repair manuals with product literature and maintenance instructions for all plumbing equipment, door hardware, electrical doors, locks, fire doors (like Won Doors), graffiti coatings, designer exterior wall coverings, etc.
    b. Elevators compliance with District elevator specifications and State Certification.
    c. Green Products manufacturers, cut sheets and repair info. (i.e. eco friendly paving)
    d. Flooring - product literature and maintenance instructions
    e. Roofing - warranty info, material info, installer info, repair info.
    f. Complete up-to-date and accurate as-builts of infrastructure, piping, valving, and equipment.

g. **The City of San Diego Fire Prevention Bureau requires a Knox Box at the main entry; only one is required per building. Requirement should be coordinated with the Fire-Rescue Department. Current contact is Steve Carroll at 619-533-4431.**

Noise and Vibration Control:

1. **Noise and vibration, that is the emission and transmission control is the combined responsibility of the design profession and their consultants and must be considered in the design of every building, or space, even though specific requirements might not be stated in the guidelines.**
2. **Principal considerations must be given to noise and vibration control as follows:**
   a. **Noise control to provide for maximum usefulness of the facility by keeping levels of sound within ranges which are conducive to study and work or other uses for which the facility is designed.**
   b. **Noise control in compliance with OSHA requirements for the health and safety of building occupants; control shall be for all areas of the facility, including equipment rooms, boiler rooms, and fan rooms.**
   c. **Vibration control to limit sound produced by equipment and for protection of the equipment and the building structure. On recent projects slight vibration of the main HVAC lines caused the projector to vibrate which in turned causes enough vibration on the screen for students to complain of nausea.**
   d. **Special attention should be given to proximity by keeping noise producing equipment removed as far as possible from areas requiring low sound levels. For example, classrooms should not be adjacent to mechanical rooms.**
   e. **A post-construction sound test shall be specified to prove the integrity of sound control where control is critical.**
3. **General design criteria for rooms requiring acoustic control;**
   a. **All plumbing penetrations in walls must be caulked airtight.**
   b. **Where fixtures of any type are installed ensure that required acoustic wall construction extends behind these recessed elements.**
   c. **Maximize separation of operable windows so that opening window areas of adjoining rooms requiring acoustical protection in order to minimize sound transfer.**
   d. **Do not use recessed mounted lighting fixtures at ceilings of rooms requiring acoustical protection.**
   e. **Space doors to rooms requiring acoustical protection so that neighboring rooms do not have directly adjoining doors, and stagger doors so that doors on opposite sides of corridors do not directly face each other. Do not place any doors to rooms requiring acoustical protection opposite stairwell or restroom doors.**
   f. **Do not place restrooms or lounges over rooms requiring acoustical protection.**
   g. **Provide a maximum gap of ½" at all door bottoms.**

Building Entrance Lobbies

1. **The lobby shall contain a building directory, a lockable bulletin board for schedules and special announcements.**
2. **Each main entry lobby should have an electronic video monitor; coordinate with the IT Project Manager for specific criteria.**
3. An AED device shall be provided in each lobby of every new campus building. Architectural plans should show location and coordinate OFOI AED device.
4. **Provide automatic door opener at accessible exterior entry door.**
5. **Building Memorial Plaque is required at each new building lobby. Design Professional shall make provisions for a wall area in the main lobby to be used for installation of a future plaque.**
6. **Corner guards should be provided to 48" AFF in entry recesses and appropriate locations.**

Classroom Design Requirements

1. **Effective classroom design requires a collaborative approach to planning and programming to facilitate the instructional mission. The focus must be the users; both students and faculty. The goal is to enhance the communication from instructor to student and student to instructor in the most efficient and simple manner.**
2. **These guidelines are not meant to be static. They should be reviewed and updated on an annual basis. Any proposed revisions or suggestions are welcomed and should be submitted to the District Architect.**
3. **Student entries/exits should be at the back of the room, or if not possible, at the sides. The students should not enter at the front (teaching wall) of the room, which interferes with the instructor. Entrances/exits required near the front of lecture rooms should be designed to minimize the amount of outside light cast on the projection screen.**
4. **Wall surfaces under whiteboards to be coated with extra heavy duty paint to facilitate washing off shoe marks.**
5. **All classrooms lighting levels should be reviewed and approved by the District Architect.**
6. **Machinery and other noises need to be located remote from the classrooms.**
7. **Dedicated locations for waste and recycling containers should be near the classroom doors.**
8. **Windows should be towards the back of the classroom.**
9. **Windows should be designed to not cast sun or day-light onto the front instructional area.**
10. **For lecture rooms over 100 occupants there should be no windows without specific approval from the District Architect.**
11. **Glare on whiteboards can cause distractions to learning, carefully review classroom lighting.**
12. **For classrooms designed as computer labs, additional space shall be provided for printing tables and lockable storage space for printing supplies, batteries, paper, cartridges, etc.**
13. **There should be no visual obstructions, such as columns or podiums, between student seating and the whiteboards and screens.**
14. **Ceiling Tiles; use tegular tiles; 24 x 24 or 24 x 48 sizes and normal grid members.**

FACILITY SERVICES DEPARTMENT STANDARDS FOR NEW CONSTRUCTION

The following standards are required for new construction by Facility Services.

A. Custodial Lockers (Closet)

Provide 150 usable square feet (s.f) minimum at ground floor level, 100 usable square feet (s.f) on 2nd and additional floors *(no storage of equipment in rooms to reduce minimum square footage; if doors open in, the square footage must be increased.)*

1. Custodial locker on each floor or every 20-25,000 square feet
2. Floor style mop sink with backsplash of stainless steel panels, ceramic tile with dark grout. FRP shall not be used for the mop sink backsplash but may be used on other custodial room walls. Wall hung faucets over mop sink will be Chicago 897-RCF(rough chrome utility faucet), or District approved equal.
3. Three wall mounted shelves 6' long, starting 3' off floor
4. Grip all closet organizer 1-36" holder #660420 from Waxie
5. Vented door, if possible
6. Exhaust fan
7. Lighting- minimum 2-4’ fluorescent with diffuser.
8. Floor drain 1st preference is: Kohler K-6710-0 Whitby cast iron 28x28 service sink.
9. Floor finish shall be 6X6 Ceramic floor tile, sheet linoleum, or sealed concrete, **no terrazzo**.
10. Two GFCI electrical outlets for custodians use
11. Computer hook up so analysis of HVAC can be accomplished
12. One locking cabinet of 50-100 cubic feet
13. No water heaters, HVAC systems, or electrical panels in this room.
14. For casework use plywood base.

B. Campus Storage

1. Each Continuing Ed site should have a minimum of 300 square feet of custodial storage area for campus material such as furniture, catalogs, etc.

C. New Restroom Standards

1. Public Men's restrooms shall include lavatories, toilets, and waterless or 1-Pint urinals (see Division 22); Women's restrooms shall include lavatories and toilets.
2. **Provide automatic door opener at multi-stall restrooms on at least one level.**
3. Single Accommodation restrooms shall not be provided within new and remodeled construction (one per Building) unless otherwise directed by District
   a. If directed by District provide the following:
      - Lockable with Privacy keying.
      - Emergency Call box (Provide one near door adjacent to instructor desk at every classroom, laboratory and lounge at a minimum. Verify design with District Architect.
      - Toilet and waterless or 1-Pint urinal.
4. Electric Hand dryers by Dyson Air Blade or equal; (quiet rated), should be located adjacent to sinks

5. Soap dispensers should be located at wall over the hand washing sinks.
6. Paper towel dispensers are not to be used in single and multiple accommodation toilet rooms.
7. All labs and restrooms to get hot water. Provide automatic single temperature hot water mixer valves.
8. Only one single accommodation restroom is to be provided in each new building.
9. At Laboratory facilities provide eye wash, deluge shower, and Emergency Showers according to the chemical elements being used per state standards. Emergency Showers shall not be included in the handicap stall in public toilet rooms. All showers shall have a drain. Every eye wash not in a sink shall have a floor drain.
10. Provide stubbed out water supply piping nipples capped with chrome caps at each waterless urinal until otherwise directed by DSA. If acceptable to DSA, terminate stub out inside wall.
11. Water hose bib must have keyed valve and be recessed or located behind a keyed access panel.
12. All floor drains need to slope to drains with easily removable covers.
13. When adding tile to a remodeled restroom, fixtures are to be removed and then replaced when tile installation is complete. Do not leave fixtures in place and tile around them.
14. Water supply shut off valves to be easily reachable.
15. Ventilation fans twice recommended size.
16. Toilets to be floor mounted:
    a. Provide dual flush (Flushometer - Sloan Uppercut or District approved eq.)
17. Faucets, Delta touch-less 4" model #591-LGHGMHDF
18. Urinals, 1-Pint auto- flush battery powered urinal or waterless Steward K-4917 by Kohler if directed to provide waterless urinal (or District approved eq).
19. Shower valves supplies by a separate cold/hot feed use Moen 8375 Posi-Temp Pressure-balancing valve (chrome trim); showers feed by single premixed and tempered water line use Chicago 770-665 slow-closing valve.
20. Toilet partitions:
    a. Durable solid polymer or district approved equal
    b. Floor mounted overhead braced

GENERAL GREEN DESIGN GUIDELINES AND STANDARDS

- **REFER TO SAMPLE PROJECT SUSTAINABILITY CHECKLIST - (Click Here)**

Programs Adopted by District

1. USGBC
2. SDG&E Savings by Design
3. California Community Colleges - Independently Owned Utilities (CCCIOU) Program

Environmental Attributes of Concrete

1. Optimizes energy performance
2. Contains recycled materials
3. Creates sustainable sites
4. Manufactured locally
5. Durability
6. Specific benefits of cast-in-place concrete vs. pre-cast

Other Site and Building Factors to be Considered:

1. Durability of Materials
2. Life-cycle costs
3. Recycled Content
4. Recycled Water
5. Rainwater Harvesting and use of bioswales
6. Recarbonization
7. Local/Regional Nature
8. Maintenance Demands
9. Labor and Materials Savings
10. Optimized Energy Performance
11. Enhanced Lighting
12. Low VOC content
13. Vegetation Preservation
14. Brownfield Redevelopment
15. Minimize/Eliminate Heat Islands (Parking Lots)
16. Utilize Pervious Paving

San Diego Community College District Green Building Policy 7800:.

1. District Policy 7800 establishes a Green Building Policy and Major Renovation Standards. District Procedure 7800.1 currently requires that LEED™ (Leadership in Energy and Environmental Design) certification (with a minimum level of 33pts) be pursued for all new occupied structures as well those undergoing major renovations.
2. Members of the District Environmental Sustainability Committee worked together with Facilities Management to draft a revised procedure dated 4/22/10) that requires that a minimum level of LEED™ Silver certification be pursued on new projects and major

renovations with a goal of higher levels of certification (e.g. LEED™ gold) on applicable projects. For projects where attainment of LEED™ Silver is not practicable due to project constraints, justification for a lower level of LEED™ certification will be provided to the project building committee and the District Environmental Stewardship Committee. The revised procedure has been reviewed and approved by the Academic, Classified and Student Senates at all campuses.

3. Use of Sustainability promoters/Third party verification systems (LEED, Green Globes, Green Highways, Green Roads, Cool Cities) are encouraged for their sustainable criteria.
4. Projects shall exceed California Title 24 Energy Code by 15-20%
5. 10% of the energy utilized by the project must be renewable with at least 5% of the total project's energy generated on site.
6. 75% of Construction waste shall be recycled to be diverted from landfill.
7. Projects shall account for Enhanced Commissioning to be provided by the District.
8. Requirement to manage data on performance of building.
9. All final building programs shall indicate consideration of the following:
    a. LEED™ Materials and Resources, Prerequisite 1 – Storage and Collection of Recyclables. Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills. Designate an area for recyclable collection and storage that is appropriately sized and located in a convenient area. Consider employing cardboard balers, aluminum can crushers, recycling chutes, and other waste management technologies to further enhance the recycling program.
    b. LEED™ Indoor Environmental Quality, Prerequisite 1 – Minimum IAQ Performance. Establish minimum indoor air quality (IAQ) performance to prevent the development of indoor air quality problems in buildings, maintaining the health and well being of the occupants. Locate air intakes away from contaminant sources. Examples include locating air handling unit intakes away from loading docks, diesel generator exhaust, etc.
    c. LEED™ Indoor Environmental Quality, Credit 5 – Indoor Chemical and Pollutant Source Control. Avoid exposure of building occupants to potentially hazardous chemicals that adversely impact air quality. Provide separate exhaust and plumbing systems for rooms with contaminants to achieve physical isolation from the rest of the building. Install permanent architectural entryway systems such as grills or grates to prevent occupant-borne contaminants from entering the building.
10. Other District standards for Sustainable Design:
    a. Each campus shall facilitate and maintain an ongoing waste recycling program that establishes where facilities on campus will handle recycled materials including paper, cardboard, glass, plastics, and metal.
    b. Wherever wood is to be used in design of new or renovated buildings, a 95% recycled content shall be used as a requirement for concrete formwork, casework, and doors.
    c. Bamboo and other plentiful renewable woods shall be specified and detailed.
    d. The designer shall specify the Carpet and Rug Institute's Green Label Plus Program. All carpet cushion installed in the building shall have low emitting materials and backing.
    e. The District's Facilities Services have adopted a program of Green cleaning materials and

techniques.

f. The District desires that new and renovated buildings shall stand out as examples of good sustainable achievements within the learning environment at each campus. Accordingly the Designers for each and every new and renovated building shall provide for Education signage and tours using static and Touchscreen technology to demonstrate the green aspects of the materials and systems.
g. The District has committed to a minimum standard of LEED Silver and to assist the designer in achieving a rating of LEED™ Silver or Gold has retained "Enhanced Commissioning Agents" to act as the District's LEED Administrator for their projects while the Architect shall provide for a fundamental commissioning agent as a direct member of the design team.
h. As of January 2013 Community Colleges will be required to comply with CALGreen, all projects initiated shall use the requirements of the California CALGreen Code which is set by the California Building and Standards Commission as the basis of the California Building Code in July 2010 and to be incorporated in the CBC in 2013.
i. Architects shall engage the SDG&E Savings by Design energy efficient buildings program assistance, resources and incentives in the design of new facilities.
j. Architects shall submit LEED™ Score Card Matrix to the District Architect at each milestone submittal.

SDCCD GREEN BUILDING PROCEDURE 7800.1

I. STATEMENT OF PROCEDURE

A. PURPOSE

At the February 18, 2010 Board meeting, The Board of Trustees approved the "Green Building Policy and Major Renovation Standards," Policy 7800.

The Purpose of this document is to provide further information and guidance for implementing District policies and standards for the design and construction of green buildings and renovations. These guidelines are intended to provide specific scope, direction, and expectations underlying from the Board Policy on Green Building.

Resource sustainability is critically important to the San Diego Community College District, the City of San Diego, and the State of California. Efficient energy use and efficiently designed buildings are central to this effort. Energy conservation in building design provides environmental education, reduces the carbon footprint of the District, and reduces the operating budget for the District.

The Chancellor has delegated authority to the Vice Chancellor of Facilities Management for responsibility of implementation of this procedure.

B. PROCEDURE GUIDELINES

1. New Buildings
   - i. Energy efficiency in green building design is critical for the District; it is a goal of the District's that all new building projects outperform the required provisions of the California Energy Code (Title 24) energy-efficiency standards by at least 20 percent. All new projects should register with San Diego Gas & Electric's Savings by Design program.
   - ii. Architects and engineers that are selected to design the District's projects shall strive to design buildings that outperform Title 24 energy-efficiency standards by 30 percent whenever possible.
   - iii. At the Schematic Design review all sustainable measures and the LEED scorecard should be submitted to the District.
   - iv. The District will design and build all new buildings to a minimum standard equivalent to a LEED-NC Silver rating, per the version of LEED that is current at time of Schematic Design approval.
   - v. Wherever possible the District will strive to achieve a standard equivalent to a LEED-NC Gold rating.

vi. The District will provide a 3rd party commissioning agent to perform LEED enhanced commissioning for each new project. The Project design team must allow for LEED enhanced commissioning at the Design Development stage and assist the District's consultant as required throughout the course of the projects.

vii. Due to the regional scarcity of water it is the intent of the District that new buildings will comply with the regional Low Impact Development (LID) standards, and the District design guidelines, and prevent water from being used only once unless it is required as direct contact process water.

viii. Also due to water scarcity the District will encourage the use of reusable water bottles by installing a "Hydration Station" or similar device that allows for the filling of cups or bottles. This devise will be located in the lobby of each building as deemed appropriate by Facilities Management.

ix. The District requires that at least 5% of the total project's energy is generated on site from renewable sources.

x. It is the intent of the District to promote creative solutions for sustainable buildings; it is the expectation that all architects and engineers hired by the District are knowledgeable in sustainable design and will strive to provide the District with sustainable design solutions and options as a basic service during the design process.

2. Building Renovations
   i. Significant renovation projects shall apply sustainable design principles to the systems, components, and portions of the building being renovated per this document. At Schematic Design approval, all renovation projects should include a listing of sustainable measures under consideration.
   ii. Renovation of buildings that require 100% replacement of mechanical, electrical, and plumbing systems and replacement of over 50% of all non-shell areas (interior walls, doors, floor coverings and ceiling systems) should at a minimum comply with LEED-NC Silver or equivalent. Subject to life cycle cost analysis, such projects should outperform Title 24 California Energy Code by at least 20%; and register with San Diego Gas & Electric's Savings by Design program.
   iii. Renovation projects that do not fall under item ii above should at a minimum comply with LEED-CI certified rating and register with the Savings by Design program, if eligible; or, the CCC-IOU program through SDG&E.
   iv. All renovation projects must comply with the EPA (Environmental Protection Agency) Indoor Air Quality checklist for renovation and repairs of buildings; for example, products with non-VOC, testing and removal of lead based paint and asbestos, changing air handling unit filters after renovation.

3. Implementation
   i. Any requested exception from the standards listed in the guidelines may be requested during preparation of the schematic design through the District Architect.

ii. Projects that cannot meet the minimum standard of LEED-NC Silver, or equivalent should strive to achieve a LEED-NC Certified rating. Projects that are unable to achieve a LEED-NC Certified rating should submit a LEED-NC scorecard and supporting documentation to the District Architect, showing the credits that the project did achieve.

iii. During the design process, all projects will include consideration of life-cycle cost analysis recognizing the importance of long-term operations and maintenance in the performance of the District's facilities. The life-cycle cost analysis shall incorporate the initial design/build costs; operating costs (energy, water, sewage, recycling, and other utilities); maintenance repair and replacement costs; and other environmental or social costs/benefits (impact on transportation, solid waste, water, energy infrastructure, worker and student productivity, outdoor air emissions, etc.) to evaluate the long-term investment value of design alternatives. The lowest initial costs shall not be the sole or prevailing factor used to select a particular construction model.

iv. The design team shall work in an integrated manner, so that the building is designed as a whole system in lieu of a collection of stand-alone components. The integrated project team will strive to make design decisions that emphasize integration, efficiency, sustainability, and performance.

v. Each Project will achieve at least 75% waste diversion of construction and demolition debris.

vi. The District will perform Post-Occupancy Evaluations and Commissioning 12 to 14 months after substantial completion to ensure that the building and its component systems meet the requirements of the occupants and conform to the design intent and the intent of this document.

vii. The District will continuously evaluate the feasibility of other energy-saving measures with equivalent demonstrable effect on the environment and reduction in fossil fuel usage with the goal of reducing District-wide non-renewable energy consumption and greenhouse gas (GHG) emissions.

OTHER DISTRICT STANDARDS, GUIDELINES AND MASTERPLANS

There are a variety of other standards, guidelines available that should be referenced as part of the Design and Construction Teams efforts in developing a new facility on one of the college campuses. Please use the links below to direct you to the proper District information.

Other Standards and Guidelines:

SDCCD CAD Standards **(Click Here)**

SDCCD BIM Building Standards **(Click Here)**

Universal Access Standards **(Click Here)**

SDCCD Signage Standards **(Click Here)**

SDCCD I.T. Infrastructure Standards **(Click Here)**

City College Design Guidelines **(Click Here)**

Mesa College Design Guidelines **(Click Here)**

Campus Master Plans

City College Campus Master Plan **(Click Here)**

Mesa College Campus Master Plan **(Click Here)**

Miramar College Campus Master Plan **(Click Here)**

Continuing Education College Campuses Master Plans **(Click Here)**

ADA Transition Plans

City College Campus Accessibility Transition Plan **(Click Here)**

Mesa College Campus Accessibility Transition Plan **(Click Here)**

Miramar College Campus Accessibility Transition Plan **(Click Here)**

Continuing Education College Campuses Accessibility Transition Plans **(Click Here)**

Program Management Guide (Gafcon) **(Click Here)**

GENERAL CONDITIONS CRITERIA

A. Division 00 General Conditions, Special Conditions, and instructions to bidders have been prepared by San Diego Community College District Legal Council and have been approved by the Director of Facilities. General Conditions are not to be modified except via the Special Conditions.

- **REFER TO SAMPLE DISTRICT GENERAL CONDITIONS SECTION 007200 (Click Here)**

Volume I - DIVISION 00
PROCUREMENT AND
CONTRACTING REQUIREMENTS

GENERAL REQUIREMENTS CRITERIA

- Temporary Tree and Plant Protection.
- Construction Waste Management and Disposal.
- Storm Water Pollution Prevention Plan.

STORM WATER POLLUTION PREVENTION PLAN

- **REFER TO SAMPLE STORM WATER POLLUTION PREVENTION PLAN SECTION 015000 (Click Here)**

A. **All projects that disturb soil will develop a plan to meet the LEED prerequisite for Sustainable Sites credit for Construction Activity Pollution Prevention. Projects that disturb less than one acre will develop a SWPPP that controls sediment, materials and waste and other pollutants in stormwater.**
B. **Projects that disturb greater than one acre of soil are subject to the California Construction General Permit (GCP) for Storm Water Dischargers from Construction Sites and Land Disturbing Activities (Order No. 2009-009-DWQ or current) and will develop a Storm Water Pollution Prevention Plan (SWPPP) that meets the requirement based on the projects risk level.**
C. **Careful consideration should be given to ensuring all projects seek permit coverage in a way that is cost effective, feasible from a construction management perspective and complies with the requirements of the construction general permit. Projects of less than one acre in size that are adjacent to other projects, related in time line or project scope, are hydraulically connected, and/or are managed by the same construction manager or contractor should consider seeking coverage under the CGP with a single Waste Discharge Identification number.**
D. **All project SWPPP's should be prepared by a Qualified SWPPP Developer and follow the SDCCD SWPPP template for the appropriate sized project. The SWPPP should be tailored to address site specific project conditions, including the selection of the BMP's appropriate for the site and each phase of construction.**
E. **During the conceptual phase, a preliminary water balance calculation using the method in Appendix 2 of the CGP will be conducted to determine the need for post-construction BMP's and to consider integration of LID features into the project. This calculation will be refined during the design development and preparation of the construction drawings to reflect actual site conditions and post-construction BMP's selected.**

F. **The selection, siting and sizing and operation and maintenance requirements of the post-construction BMP's should be documented in a Water Quality Technical Report (WQTR).**
G. **All BMP's for each project phase should be shown on a single water pollution control drawing (WPCD) or set of drawings in the SWPPP.**

TEMPORARY TREE AND PLANT PROTECTION

- **REFER TO SAMPLE TEMPORARY TREE AND PLANT PROTECTION SECTION 015639 (Click Here)**

A. Submit construction schedule (pursuant to the project's Submittal Requirements) which includes time frame for work near existing plant material. Provide transplanting and tree removal schedule including tree transplants and locations. Obtain approval by Landscape Architect prior to beginning of transplanting work and construction near restricted area.

B. Submit proposed methods and schedule for effecting tree and plant protection for approval, including proposed methods, materials, and schedule for root pruning, construction pruning, aeration and subsequent tree fertilization. Mark plan location of root pruning and siltation fencing in field with paint for approval by Landscape Architect. Any root pruning which is required due to construction work adjacent to existing trees and shrubs designated to remain shall occur any time ground can be worked except when tree or shrubs are in leaf. Root pruning when tree or shrubs are in leaf may occur only with approval by Landscape Architect.

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

- **REFER TO SAMPLE CONSTRUCTION WASTE MANAGEMENT & DISPOSAL SECTION # 017419 (Click Here)**

A. The implementation of a construction waste management plan during the execution of any construction project will significantly reduce the amount of waste going to landfills.
B. Prior to starting construction a Waste Management Plan shall be provided to Campus Facility Services that confirms where on Campus Recycled Materials will be collected, staged, handled, and/or picked up from the Campus. Construction waste recycling shall be source separated wherever possible.
C. Contractors and subcontractors shall achieve "end-of-project rates" of a minimum 75 percent for salvage/recycling, with a further goal of achieving 90 percent, by weight, of total non-hazardous solid waste generated by demolition and construction operations. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators.
D. Facilitate recycling and salvage of materials, including the following:
    1. Demolition Waste:
        a. Asphalt paving.
        b. Concrete.

c. Site Clearing Debris.

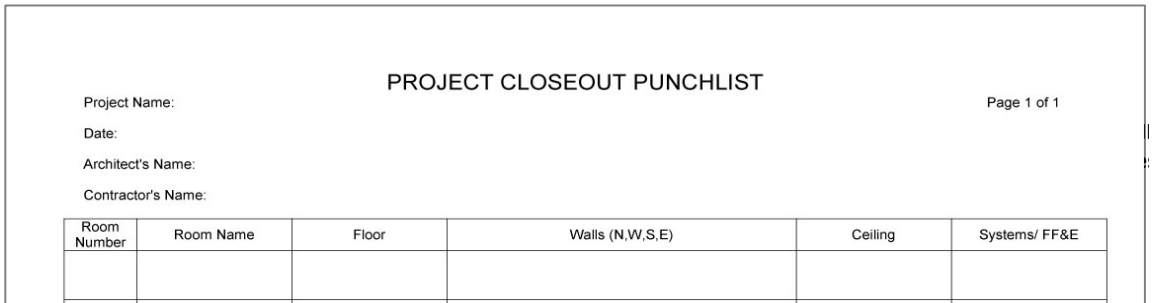
2. Construction Waste:
   a. Masonry and CM.
   b. Wood sheet materials.
   c. Metals.
   d. Roofing.
   e. Insulation.
   f. Carpet and pad.
   g. Gypsum board.
   h. Piping.
   i. Electrical conduit.
   j. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
      1) Paper.
      2) Cardboard and Boxes.
      3) Plastic sheet and film.
      4) Polystyrene packaging.
      5) Wood crates.
      6) Plastic pails.

SDCCD PROJECT CLOSEOUT

- **REFER TO SAMPLE DISTRICT PROJECT CLOSEOUT CHECKLIST # 017701 (Click Here)**

A. Project Closeout Checklist Index
   1.1. General Closeout Procedures.
   1.2. Substantial Completion & Inspection procedures.
   1.3. Final Completion & Inspection procedures.
   1.4. Final Cleaning.
   1.5. Adjusting.
   1.6. Demonstration and Instructions.
   1.7. Project Record Documents.
   1.8. Operation and Maintenance Manuals.
   1.9. Submittal of Warranties.
   1.10. Spare Parts and Maintenance Materials.
   1.11. Commissioning
   1.12. Instruction of Owner's personnel.
   1.13. Final DSA Change Order
   1.14. Final DSA Verified Reports

- **REFER TO SAMPLE DISTRICT PUNCHLIST FORM - (Click Here)**



PROJECT CLOSEOUT PUNCHLIST

Project Name: Page 1 of 1

Date:

Architect's Name:

Contractor's Name:

Room Number	Room Name	Floor	Walls (N,W,S,E)	Ceiling	Systems/ FF&E

Use this format for developing a Punchlist to capture project conditions that are incomplete, damaged, incorrect, or

SITEWORK REQUIREMENTS BEFORE AND DURING CONSTRUCTION

A. Note: "Sitework Requirements" included here in the prior version has been relocated to Division 32.

B. This Division establishes essential guidelines for the preparation of the site in and around where the work of demolition and construction will occur.

REFER TO SAMPLE EXISTING CONDITIONS SECTIONS BELOW:

- **REFER TO SAMPLE-UTILITY DEMO-PLUMBING SECTION 024113A - (CLICK HERE)**
- **REFER TO SAMPLE -UTILITY DEMO-ELECTRICAL SECTION 024113B - (CLICK HERE)**
- **REFER TO SAMPLE BUILDING DEMOLITION SECTION 024116 - (CLICK HERE)**
- **REFER TO SAMPLE SELECTIVE DEMOLITION AND SITE PREPARATION SECTION 024119 - (CLICK HERE)**

CAST IN PLACE CONCRETE

- **REFER TO SAMPLE CAST-IN-PLACE CONCRETE SECTION 033000 - (CLICK HERE)**

A. Cast-in-Place Architectural Concrete: Formed concrete that is exposed to view on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.
B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
C. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.

- **REFER TO SAMPLE ARCHITECTURAL CONCRETE SECTION #033300 - (Click Here)**

ARCHITECTURAL PRECAST CONCRETE

- **REFER TO SAMPLE PRECAST ARCHITECTURAL CONCRETE SECTION #034500 - (Click Here)**

A. Build mockups to comply with the following requirements:

1. Build mockups of the following:
   a. Typical exterior site wall of cast-in-place architectural concrete as shown on Drawings
2. Demonstrate curing, cleaning, and protecting of cast-in-place architectural concrete, finishes, and contraction joints, as applicable.
3. In presence of Architect, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.
4. Obtain Architect's approval of mockups before casting architectural concrete.
5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Required Materials

1. Pozzolans:

a. Coal fly ash: ASTM C618, Class C or F [Class F can replace up to 60% of Portland cement by weight, while Class C can replace up to 70% of Portland cement by weight subject to requirements of mix design, approval by Structural Engineer, results of tests with actual materials to be used, and applicable codes.]
b. Ground granulated blast furnace slag: ASTM C989

2. Aggregates:
   a. Recycled, crushed concrete aggregate meeting requirements of ASTM C33 and subject to approval by Structural Engineer.
3. Admixtures:
   a. Coloring: ASTM C494 [Clay- or mineral-based pigments include:]
      1) Native earths: Ochre, raw umber
      2) Calcined earths: Burnt umber, burnt sienna
      3) Natural iron oxides
4. Sealers:
   a. Sodium silicate
   b. Penetrating sealer: [Maximum VOC allowed: 600 grams/liter. Specify lowest VOC available.]

C. Required LEED Credits
   1. LEED MRc4: Recycled content; Percent, by weight, of 100% post-industrial Flyash.
   2. LEED MRc5: Regional Materials; Provide a statement from the manufacturer stating that materials provided were manufactured and harvested within a 500 mile radius of the project. Indicate location.

MASONRY - GENERAL

A. Any free standing masonry site walls over 72 inches in height shall be constructed per Title 24 requirements and DSA approved. Any wall that is not approved by DSA must be built to San Diego Regional standards and approved by the District Architect.

CONCRETE UNIT MASONRY

- **REFER TO SAMPLE CONCRETE UNIT MASONRY SECTION #042200 - (CLICK HERE)**

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
C. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
D. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
   1. Fly Ash: 25 percent.
   2. Combined Fly Ash and Pozzolan: 25 percent.
   3. Silica Fume: 10 percent.
   4. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
F. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, un
chipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
G. Finish
   1. Integrally colored standard surface finish is preferred.

2. Glazed CMU is preferred.
3. Split-face not recommended in high traffic areas, or in areas subject to graffiti.
   a. Exterior surfaces of concrete or masonry construction generally shall not be painted. A clear or colored (stain) water repellent sealer shall be used. Where subject to graffiti, use anti-graffiti system to a height of 10 feet above grade (flat or semi-gloss finish where appropriate).
   b. Where split face CMU is used, pay particular attention to proper flashing detailing.
   c. Sealers: Penetrating sealer maximum VOC allowed: 600 grams/liter

H. Required LEED Credits
   1. LEED MRc4: Recycled content; Provide a statement from the manufacturer stating the recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial.
   2. LEED MRc4: Recycled Content; Fly Ash; 5% of mixture, by weight, shall be 100% post-industrial fly ash.
   3. LEED MRc5: Regional Materials; Provide a statement from the manufacturer stating that materials provided were manufactured and harvested within a 500 mile radius of the project. Indicate location.

METALS - GENERAL

A. Where metals are used at the exterior of a building, they shall be finished so as to protect the metal and its surrounding materials from degradation typically known in the industry.
B. Required LEED Credits
   1. LEED MRc4: Recycled content; Provide a statement from the manufacturer stating the recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial.
   2. LEED MRc4: Recycled Content; Steel must contain recycled content.
   3. LEED MRc5: Regional Materials; Provide a statement from the manufacturer stating that materials provided were manufactured and harvested within a 500 mile radius of the project. Indicate location.
   4. LEED EQc4.2 : Low Emitting Materials; Provide a statement from the manufacturer including the recycled content percentage, by weight, and whether the recycled content is postconsumer or postindustrial.
   5. Provide a statement from the manufacture stating that materials provided were manufactured within a 500 mile radius of the project. Include location.
   6. VOC emissions from all paints applied onsite must have low or no VOC content

STRUCTURAL STEEL FRAMING

- **REFER TO SAMPLE STRUCTURAL STEEL FRAMING SECTION #051200 - (CLICK HERE)**

A. Where exact sizes and weights called for are not readily available, secure the Structural Engineer's acceptance of suitable sizes in time to prevent delay due to such substitutions.

METAL FABRICATION

- **REFER TO SAMPLE METAL FABRICATIONS SECTION #055000 - (CLICK HERE)**

A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

METAL STAIRS

- **REFER TO SAMPLE METAL STAIRS SECTION #055100 - (CLICK HERE)**

A. Exterior stairs, where used as required exits, shall meet the requirements of the California Building Code. See CBC 1009.3.
B. Exterior site stairs shall have treads between 11 inches and 14 ½ inches; risers shall be between 4 inches and 6 ½ inches.
C. Surface of treads shall be non-slip and pitched forward at 1/8 inch per foot to drain surface water.
D. Stair nosings shall comply with ADA requirements by using metal inserts

DECORATIVE METAL

- **REFER TO SAMPLE DECORATIVE METAL SECTION #057000 - (CLICK HERE)**

A. Metal Wall Panels
   1. Minimize use as a finish within 8 ft. above the adjacent walkway or landscape surface
   2. 22 gauge minimum with Kynar finish
   3. Detail appropriately for weatherproofing and constructability
B. Exposed exterior metal within 10 ft from floor shall have a galvanized finish and not be painted. Exposed exterior metal higher than 10 ft from floor and galvanized may be painted with primer rated for galvanized finish and two coats of paint or high performance (Kynar) paint.

DECORATIVE METAL RAILINGS

- **REFER TO SAMPLE DECORATIVE METAL RAILINGS SECTION #057300 - (CLICK HERE)**

A. Stair and Ramp Railings:
   1. Construct railings of galvanized steel, or stainless steel with an unpainted finish.
   2. Consider adding a second handrail in areas that will be heavily used by small children at mid height.
   3. Provide a "Cane" rail at the base of a ramp or stair that is at a height of 2"-4”off the walking surface.
   4. Where guardrails are required, do not use aircraft cable in design.

WOOD, PLASTICS & COMPOSITES - GENERAL

A. General Carpentry and Interior Architectural Woodwork is included in these sections.

GENERAL

A. It is preferred that all wood based products came from "FSC Certified Wood" sources certified by the Forest Stewardship Council unless specified by the District Architect. Provide certification and chain of custody documentation from the manufacturer.
B. If wood sheathing is used, employ plywood sheathing; do not use OSB.

REQUIRED LEED CREDITS

A. LEED EQc4: Low-Emitting Materials; Provide documentation from the manufacturer identifying the VOC and chemical component limits for the materials provided.
B. LEED EQc4 Low Emitting Materials; Provide documentation from the manufacture identifying the VOC and chemical component limits for the adhesives provided.
C. LEED EQc4 Low Emitting Materials; Urea-formaldehyde resin binders are unacceptable.

ROUGH CARPENTRY

- **REFER TO SAMPLE - MISCELLANEOUS ROUGH CARPENTRY- SECTION #061053 - (CLICK HERE)**

A. Verify that fire treatment will not reduce structural performance at elevated temperatures.

INTERIOR ARCHITECTURAL WOODWORK

- **REFER TO SAMPLE - INTERIOR ARCHITECTURAL WOODWORK - SECTION #064023 - (CLICK HERE)**

A. Countertops
   1. Recycled-Glass Concrete: Cast concrete made from Portland cement, sand, and recycled glass aggregates.
   2. Synthetic Cast Slabs:
      a. Cast, lightweight material containing fly ash, polypropylene fibers, nontoxic synthetic resins, and recycled inert materials.

b. Cast terrazzo- like material containing waste marble chips, recycled plastic, and plastic or Portland cement binder.
c. Stone:
    1) Salvaged stone tiles or slabs
    2) Locally Quarried stone
d. Tile: See Div. 09 Tile
e. Recycled-Plastic Solid Surfacing: Minimum 60% post-Industrial waste.
    1) In public restrooms, provide design option for 2-3 compartment lavatories
    2) Alternative is stained stamped concrete countertop also.

PLASTIC LUMBER

A. Plastic Lumber: Minimum 90% recycled content; manufactured lumber and shapes created by melt processing. The lumber and shapes shall be manufactured from any resin or blend of resins with added compounding materials such that the quality of the finished product complies with this specification.
    1. Solid sections
    2. Hollow sections
B. Composite Lumber: Plastic composite lumber and shapes containing nonplastic filler, typically wood or cellulose fiber.
C. Reinforced Plastic Lumber: Plastic lumber containing an inner core of structural material
D. Plastic lumber cannot be painted. Some composite plastic lumber can be painted.

THERMAL & MOISTURE PROTECTION DESIGN GUIDELINES - GENERAL

A. No roof drains exiting near entrance doors
B. Roof hatch should not be located against an exterior wall.

REQUIRED LEED CREDITS

A. LEED EQc4: Low-Emitting Materials; Provide documentation from the manufacturer identifying the VOC and chemical component limits for the materials provided.

THERMAL INSULATION

- **REFER TO SAMPLE THERMAL INSULATION SECTION #072100 - (CLICK HERE)**

A. Materials
    1. Thermal Batt Insulation:
        a. Formaldehyde-free fiberglass batts: made with lower toxicity acrylic resin.
        b. Standard glass fiber: Minimum 15% post –consumer recycled content, minimum 30% total recycled content.
        c. Mineral wool, rock wool: Minimum 75% post-industrial metallurgical slag
        d. Cotton: Recycled denim
    2. Rigid Board insulation:
        a. Cellular glass foam: Inert, nontoxic, suitable for use below grade.
    3. Damp Spray-Applied Cellulose Insulation: Suitable for vertical installations
        a. Cellulose: 80% post-consumer paper
            1. Fire retardant.: Borate
        b. Mineral wool: 60% post-industrial recycled content (slag)
    4. Loose Fill Insulation:
        a. Mineral wool: 60% post-industrial recycled content (slag)
        b. Cellulose: 80% post-consumer paper (Can be applied to wall and ceiling cavities by attaching netting to the face of the studs)
        c. Foamed-in- Place Insulation:
            1) Silicate Foam: Composed of an inorganic, cementitious stabilizer (magnesium oxide), a microscopic cell generator, a catalyst, and

compressed air; fireproof, nontoxic, no VOC emissions; nonsettling; nonshrinking, friable if touched or jostled

2) Soy-based open-cell polyurethane: Water-based polyurethane, low-density, no VOC emissions after 30 days; foaming agent: carbon dioxide and water.

NEW ROOFING AND RE-ROOFING

- **REFER TO SAMPLE POLYVINYL-CHLORIDE (PVC) ROOFING SECTION #075419 - (Click Here)**

A. All roof tie-ins should be tied into existing roof for at least 24 inches,
B. New roof curbs should be at least 8 inches high.
C. Perform flood test of roof before final inspection.
D. Roof hatches should be a minimum size of 30 inches by 36 inches, and provide interior padlock provisions. Provide looping handrail mounted to roof hatch curb.
E. Provide continuous walk pad from hatch to each piece of mechanical equipment.
F. Roof hatch should not be located against an exterior wall.
G. Roof hatch ladder shall extend up and over roof for safety at new and remodeling projects.
H. All roof drainage systems shall be designed to allow for rainwater harvesting for water reuse to promote low impact development. Water shall be directed to bioswales, detention /retention cisterns, and/or building's recycled water system.
I. No roof drains exiting near entrance doors.
J. Rooftop overflow drains shall be no more than 2 inches above the roof drain and overflow drain piping outlets shall exit the building through an exposed scupper or downspout spilling above grade into the landscape. Buildings shall be designed to accommodate exposed overflow drainage especially where curtain walls are used. Only as a last resort may an overflow drain outlet connect directly into the sanitary sewer piping at the upper floors but only in limited conditions and as approved by the District Architect.
K. Curbs for roof mounted equipment shall be 8 inches minimum above finished roofing.
L. Clerestory windows sills shall be 12 inches minimum above finished roofing.
M. Provide architectural screening of roof mounted mechanical equipment that would otherwise be visible to the public. Design with attention to future re-roofing and waterproofing.
N. All re-roofing bids will provide for the contractor to complete a pull test of the roof that is to be bid. It is the roof contractor's responsibility to ascertain the condition of the light weight under the existing roof before a bid is submitted. If the roof contractor pull test shows that the light weight is in poor condition, it will be noted in the bid with a cost to resolve the problem.
O. All roof drains will be replaced when re-roof is being done.
P. All sheet metal pans under existing HVAC units will be replaced with new sheet metal pans and covered with a cap sheet before the HVAC equipment is reattached to the roof.

Q. New rooftop equipment should be mounted on a raised curb or pier with room for future re-roofing

R. All new roof work will be 60 mil single membrane PVC Sarnafil or equal specs. 20 year labor and material warranty. Manufacturer shall certify the roofing installation in writing. Roofing system should comply with the following material specifications:
   1. Single-Ply Membranes: (Ballast and mechanical fastenings make recycling easier. When adhesives are used, use low-VOC adhesives (less than 250 grams/liter). Avoid products containing chlorine or halogenated fire retardants.
      a. Thermoplastic membranes: (15-20 year life expectancy)
         1) Polyvinyl chloride(PVC) (contains chlorine)
         2) Thermoplastic olefin (TPO) (requires use of halogenated fire retardants for fire rating of unballasted applications)
         3) Ethylene propylene diene monomer (EPDM) (is a recyclable synthetic rubber but is not currently being recycled)
         4) Polyethylene: Copolymers and terpolymers of polyethylene contain no halogenated compounds.
      b. Modified bitumen (Recycled-content available, 10-year life expectancy)
   2. Built-Up Roofing where use for Re-roofing or where directed by District Architect.
      a. Modified bitumen (Modifiers improve properties resulting in longer life but include styrene butadiene, a highly toxic material to manufacture)
   3. Fluid-Applied Roofing:
      a. Rubberized asphalt (Recycled content, recyclable)
   4. Acrylic latex
      a. Reflective acrylic coating that complies with Energy Star Roof program
   5. Green Roofs (Protects membrane and permits rooftop planting; reduces roof runoff by 50% for a typical storm; reduces heat gain through roof)
      a. Roofing membrane: Single-ply membrane
      b. Root barrier
      c. Drainage layer
      d. Water retention layer (some systems)
      e. Geotextile
   6. Provide Roof Walkway Pads from access point to each piece of equipment.
   7. Where stair to the roof are not provided, provide for a roof hatch to allow access to every rooftop/mechanical area.

DISTRICT APPROVED ROOFING SYSTEM MANUFACTURERS:

A. 60 mil single ply PVC membrane (FM I-90); See also District Reference Roofing Specifications.
   1. Sarnafil or equal

2. Duralast ((ASTM D6754-02. Note: Duralast can custom produce their sheets in 60 mil thickness).
3. Fibertite (ASTM D6754-02. Note: Fibertite can custom produce their sheets in 60 mil thickness).
4. Tremco

SHEET METAL FLASHING AND TRIM

- **REFER TO SAMPLE SHEET METAL FLASHING & TRIM SECTION #076200 - (Click Here)**

A. .All sheet metal pans under existing HVAC units will be replaced with new sheet metal pans and covered with a cap sheet before the HVAC equipment is reattached to the roof.
B. Review design for proper flashing details
    a. Minimize the use of caulking for sealing at permanent structures. Use mechanical overlap and counter-flashing wherever possible.

ROOF ACCESSORIES

- **REFER TO SAMPLE ROOF ACCESSORIES SECTION #077200 - (Click Here)**

1. Roof hatches should be a minimum size of 30 inches by 36 inches, and provide interior padlock provisions. Provide looping handrail mounted to roof hatch curb.
2. Roof hatch ladder shall extend up and over roof for safety at new and remodeling projects.

EXPANSION CONTROL

- **REFER TO SAMPLE EXPANSION CONTROL SECTION #079500 - (Click Here)**

1. Seismic joint covers: Provide manufactured extruded aluminum joint covers with clear anodized finish. Locate seismic joints with consideration to constructability. Properly detail for a watertight installation. Make sure that roof and floor joint covers are coordinated with wall joint covers.

OPENINGS (DOORS AND WINDOWS)

GENERAL

A. It is preferred that all wood based products for wood doors and windows come from "FSC Certified Wood" sources certified by the Forest Stewardship Council unless specified by the District Architect. Provide certification and chain of custody documentation from the manufacturer.

REQUIRED LEED CREDITS

A. LEED MRc4: Recycled content; Provide a statement from the manufacturer stating the recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial.
B. LEED MRc4: Recycled Content; Material shall contain recycled content.
C. LEED MRc5: Regional Materials; Provide a statement from the manufacturer stating that materials provided were manufactured and harvested within a 500 mile radius of the project. Indicate location.
D. LEED EQc4.2 : Low Emitting Materials; VOC emissions from all paints applied onsite must have low or no VOC content
E. LEED EQc4: Low-Emitting Materials; Urea-Formaldehyde resin binders are unacceptable.
F. LEED EQc4: Low-Emitting Materials; Provide documentation from the manufacturer identifying the VOC and chemical component limits for the materials and sealants provided.
G. LEED EQc8: Daylighting and Views; High light Tvis values.

HOLLOW METAL DOORS AND FRAMES

- **REFER TO SAMPLE HOLLOW METAL DOORS AND FRAMES SECTION #081113 - (Click Here)**

A. Frames
    1. Exterior Frames:
        a. Metal frames, 14 gage minimum. Fully weld frames with corners mitered, reinforced, and continuously welded full depth and width of frame including faces, rabbet or rebate, and fixed stops.
    2. Interior Frames:

a. Metal frames, 16 gage minimum, heavier if doors are wider than 3'. Continuously weld and grind smooth all corner joints and contact edges once joints are closed tight.

3. Anchoring: Securely anchor all frames to the floor. Minimum three wall anchors on each jamb.
4. Reinforce frames for all required hardware.
5. Grout: Fill with mortar all metal door frames in masonry walls.

WOOD DOORS

- **REFER TO SAMPLE FLUSH WOOD DOORS SECTION #081416 - (Click Here)**

A. It is preferred that all wood based products came from "FSC Certified Wood" sources certified by the Forest Stewardship Council unless specified by the District Architect. Provide certification and chain of custody documentation from the manufacturer.
B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
C. Door Manufacturers: Subject to compliance with requirements, doors may be provided by::

1. Algoma Hardwoods, Inc.
2. Eggers Industries.
3. Haley Brothers, Inc.
4. Marshfield Door Systems, Inc.
5. or District Approved Equal.

DOOR HARDWARE

GENERAL

A. **The District uses the BEST 7-pin system with a TC keyway. This is the standard for the District.**
B. **To determine how the building should be keyed and how many keys are required for each door the contractor needs to set up a meeting with the Campus Project Manger and the individual responsible for keying at each campus; Mesa- Kathy Wells; Miramar- Elaine Vega; City-Jerry Davis; CE-per Bob Parker. The keying hierarchy then needs to be submitted to the District Locksmith.**
C. **The District Locksmith will review key hierarchy to determine its compatibility with the site master key system.**

D. **The District Locksmith will order the required cores and stamp keys from Stanley Best using the appropriate budget code. Orders will take up to 4 weeks.**
E. **District Locksmith will provide the keys and cores to the contractor.**
F. **The contractor must submit the control keys and master keys to the District Locksmith after the building is completed or the District will withhold $10,000 from the contractors payment request.**
G. **The point of contact for the District will be the District Locksmith and the Building & Grounds Supervisor.**

- **REFER TO SAMPLE DOORS HARDWARE SECTION #087100 - (Click Here)**

A. Panic Devices:
   1. Von Duprin Series 98/99 Exit Devices
   2. Precision Exit Devices 2103 Stainless Steel Finish
   3. District approved Equivalent

B. Door Closures:
   1. LCN 4041
   2. Norton 7500 series
   3. District approved Equivalent

C. Locks:
   1. Mortise lock
      a. Best (45h series with lever handle 14H)

b. Schlage (L series with lever handle 17A)
c. Falcon (M Series with lever handle QG)

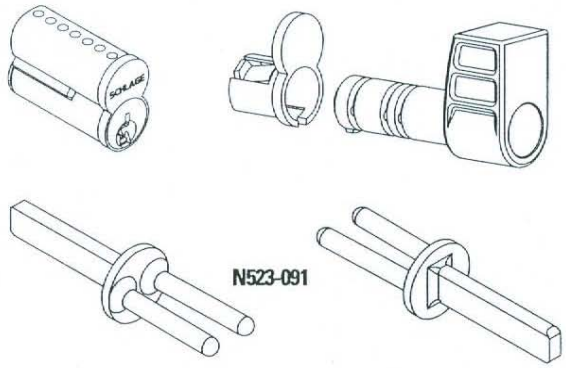
2. Cylindrical levers:
   a. Best (9K series with lever handle 14C)
   b. Schlage (ND series with lever handle Sparta BD)
   c. Falcon (T Series with lever handle Q)
3. Deadbolts:
   a. Best (83T series)
   b. Schlage (B600 series)BD
   c. Falcon (D200 series)
4. Cylinders:
   a. Best (7-pin removable cores)
   b. Best (Rim Cylinder-1E72 series)
   c. Best Mortise Cylinder- 1E74 series

Small Format Interchangeable Core

Available in all lever designs, the small format IC option is designed for Schlage Everest® B Family Restricted keyway cores and is also completely compatible with Best®, Falcon®, and other small format interchangeable cores.

To order complete locks with Everest B Family *Restricted keyway cores*, change product suffix from PD to GD and provide letter of authorization from end user. Example: ND53GD. To order locks less core, change suffix to BD. To order with keyed brass construction cores, change suffix to HD. To order with disposable plastic construction cores, change suffix to BDC.

Small Format Core **Disposable Construction Core**



Small Format Interchangeable Cores

Number	Description
80-036	7-Pin uncombinated Everest B Family Restricted keyways
80-037	7-Pin combinated Everest B Family Restricted keyways
80-043	6-pin uncombinated Falcon / Best keyways
80-033	7-pin uncombinated Falcon / Best keyways
M204-152*	Disposable plastic construction core
N523-091	SFIC Driver

Available 606 and 626 finish only. Specify keyway for existing systems.

80-033 and 80-043 cores are available in Best A, D, E, F, G, H, J, K, L, and M keyways. Specify keyway by suffixing "B" to keyway letter, e.g. "AB".

80-036 and 80-037 Restricted keyway cores require a letter of authorization from the end user. Schlage assigns the keyway when establishing new Everest Restricted key systems.

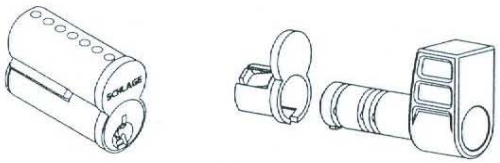
*M204-152 does not have a finish option.

Small Format Interchangeable Core (SFIC)

Available in BC100 and B600-Series, the small format IC option is designed for Schlage Everest B Family restricted keyway cores and is also completely compatible with Best®, Falcon, etc. small format cores.

To order complete locks with Everest B Family *restricted keyway cores*, change product suffix from P to GD and provide letter of authorization from end user. Example: B660GD. To order locks *less core*, change suffix to BD.
To order with *keyed brass construction cores*, change suffix to HD. To order with *disposable plastic construction cores*, change suffix to BDC.

Small Format Core **Disposable Construction Core**



Number	Description
80-036	7-Pin uncombinated Everest B Family restricted keyways
80-037	7-Pin combinated Everest B Family restricted keyways
80-043	6-pin uncombinated Falcon / Best keyways
80-033	7-pin uncombinated Falcon / Best keyways
M204-152	Disposable plastic construction core
B610-282	BC100, B600/700-Series outside housing less core
B610-281*	BC162, B662/772 inside housing less core and faceplate

* Inside housing has no finish. Order finished faceplate B610-014 separately.

Cores available 606 and 626 finish only. Housings available in the same finishes as corresponding complete locks.

80-033 and 80-043 cores are available in Best A, D, E, F, G, H, J, K, L, and M keyways. Specify keyway by suffixing "B" to keyway letter, e.g. "AB".

80-036 and 80-037 restricted keyway cores require a letter of authorization from the end user. Schlage assigns the keyway when establishing new Everest restricted key systems.

DOOR SECURITY CONTACTS:

A. Provide surface mounted door security contacts at steel door frames (Sentrol 1087T or approved equivalent).
B. Security, keyed to MER4 sub-master. If joint use as Telco see Telco requirements.
C. Supply all locks with construction cylinders to secure the building until replaced by Owner with "Best 7-Pin removable Cores" in cylinders at job completion. All locks must accommodate "Best 7-Pin removable Cores" cylinders.

LOCKSETS:

A. Use Best Lock with District's Proprietary Keyway
B. Construction cylinders by contractor.
C. Final cylinders to be delivered to District Facilities Personnel at Facilities Services.

DOOR REQUIREMENTS

A. Provide kick plate at push side of all classroom doors
B. Provide stainless steel lockset push plates at both sides of all classroom doors.

GLAZING SYSTEMS

- **REFER TO SAMPLE GLAZING SECTION #088000 - (Click Here)**

A. Glazing Insulation Performance for heating climates: Glazing system shall meet or exceed the following unit U-factors based on NFRC standards:
    a. Multiple low-e coatings or films between interior and exterior panes of glass with argon or krypton gas between the panes: U<0.20
    b. Two layers of glass, one of which is coated a low-e coating, with argon or krypton gas between the panes: U > 0.30
B. Solar Heat Gain Coefficient (SFGC) for cooling climates: Glazing system shall meet or exceed the following SHGC:
    c. Selective low-e coating: SHGC< 0.40

C. Provide thermal breaks for metal framed windows. Specify durable, factory-applied finishes: anodized, polyvinylidene fluoride (Kynar), Siliconized polyester.

Volume I - DIVISION 08
OPENINGS
(DOORS & WINDOWS)

BUILDING FINISHES - GENERAL

REQUIRED LEED CREDITS

A. LEED MRc4: Recycled Content; Provide a statement from the manufacturer including recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial; Ceramic tile shall contain post-consumer recycled content
B. LEED EQc4: Low-Emitting Materials; Provide documentation from the manufacturer identifying the VOC and chemical component limits for the materials provided (paints, finishes, tiles, carpet, adhesives, etc.). VOC content of all indoor adhesives must be water based with a maximum 44 grams/liter.
C. LEED EQc4 Low Emitting Materials; Urea-formaldehyde resin binders are unacceptable.

EXTERIOR FINISH DESIGN GUIDELINES

A. Material Durability under all environmental conditions and abuse by occupants must be considered.
B. Exterior walls shall be constructed of durable, minimal materials consistent with expectations for buildings with a usable life of 50-100 years.
C. Economy in maintenance costs.
D. Aesthetic quality. Inadequacies in design which allow problems such as cracks, or water run-off staining to develop may severely affect the aesthetic quality of a building.
E. Typical stucco has not proven to be a durable material in high traffic areas. However, its use is acceptable where not subjected to abuse, or if an impact-resistant substrate is used.
F. Consider using a durable wainscot with stucco above in high traffic locations
G. Where split-face CMU is used, indicate smooth-face units for locations to receive signage, light fixtures, louvers, and other items.
H. In detailing, avoid horizontal ledges where birds can perch or nest.
I. In detailing, avoid exterior openings where birds, bees and insects can enter structures.
J. Exterior walls and assemblies form a weather barrier and a selective filter for heat, sound, fire and the passage of people. Structurally, walls must provide stability under all environmental conditions. Selection considerations of all exterior wall systems include:
    1. Code requirements for combustibility and fire-ratings.
    2. Functional and security requirements related to glazing and openings.

3. Structural frame, whether load-bearing or non-load -bearing, the spacing of horizontal framing members may affect the choice.

K. Recommended exterior materials:
   1. Concrete masonry units:
      a. Standard surface finish
      b. Integrally colored
      c. Glazed CMU
      d. Split-face (*not recommended in high traffic areas, or in areas subject to graffiti*)
   2. Concrete / Precast Concrete Wainscot:
      a. Poured-in-place
      b. Pre-cast
      c. Tilt-up
   3. Brick (Use only as a veneer)
      a. Standard brick
      b. Glazed brick
   4. Exterior cement plaster (stucco)
   5. Metal Wall Panels
      a. 22 gage min. with Kynar finish
      b. Detail appropriately for weatherproofing and constructability
      c. Minimize use as a finish within 8 ft. above the adjacent walkway or landscape surface
      d. Not recommended in high traffic areas; material is easily scratched.

Portland Cement Plastering

- **REFER TO ASTM C 840-88 APPLICATION & FINISHING OF GYPSUM BOARD - (Click Here)**

A. Do not use expanded metal lath; use wire mesh or self furring metal lath; shall meet CBC requirements.
B. Do not apply stucco over masonry.
C. Where allowable by Code, use plywood or Georgia Pacific DensGlass® Exterior Sheathing as substrate beneath lath and plaster; otherwise, use high-impact resistant gypsum board.
D. Though cracking of Portland Cement plaster generally cannot be completely eliminated, the proper detailing and installation of the cement plastic stucco can greatly reduce cracking.
   1. Thickness shall be 7/8" at exterior walls, and 3/4" at interior walls or soffits;
   2. Recommended Drying/Curing times shall be 7 days for scratch coat; 3-5 days for brown coat; and 28 days for finish coat before painting.
   3. "For exterior Portland cement plaster, install Control joints to create panels no larger than 144 sq. ft. with no dimension exceeding 18 ft. or a length to width ratio of 2.5 to 1." (Reference: Plaster and Lathing Systems Manual - National Association of Architectural Metal Manufacturers)
   4. Expansion screeds shall be provided in exterior Portland cement plaster where breaks in structural systems and dissimilar substrates are included in the design of the walls. The

panels of plaster within the boundary of joints should be kept as square as possible. Lath shall be broken along expansion joint lines. Joints shall also be provided at the perimeters and edges of plaster membranes that would otherwise be restrained against movement. Attempt to align expansion joints wherever possible with other architectural elements and consistent with a modular spacing. Show joints on contract drawings.

E. integral color finish coats may be used in lieu of painting (short life-cycle requires future painting). Color plaster finish coat shall be a minimum of 1/8 inch thick.
F. Exterior cement plaster weep screeds shall be placed a minimum of six inches above adjacent ground.
G. Precautions when using Portland Cement plaster
   1. Smooth troweled Portland Cement plaster should be avoided
   2. Plaster over plywood paneling and wood frame
   3. Plaster stress concentration causes cracks.
   4. Use medium or float finish on exterior cement plaster stucco finishes. Do not use heavy texture finishes.

INTERIOR FINISH DESIGN GUIDELINES

- **REFER TO SAMPLE PORTLAND CEMENT PLASTERING SECTION #092400 - (Click Here)**

A. Ceiling finishes: Ceilings are important for various considerations. They offer the designer opportunities for acoustical control and light reflectance. Ceilings shall be easily maintained and replaced. They also shall provide access to overhead systems.
B. Sound Transmission Classification must be considered for each space.
C. STC ratings shall be considered in developing SDCCD building standards for labs, offices and classrooms. Lessons learned tells us that noise generated by the HVAC and spoken sound leaking between offices need to be considered.
D. Do not use exterior insulation and finish (EIFS) systems.
E. **Do not use Green Board.**
F. Material Selection
   1. Durability, ease of maintenance, and lower life cycle costs should be considered during the selection of materials for future projects. This will create comfortable and long-lasting buildings for the campus and provide the College with long-term financial benefits.

Gypsum Board Wall Assembly Requirements

- **REFER TO SAMPLE GYPSUM BOARD SHAFT-WALL ASSEMBLY SECTION #092116 - (Click Here)**
- **REFER TO SAMPLE NON-STRUCTURAL METAL FRAMING SECTION #092216 - (Click Here)**
- **REFER TO SAMPLE GYPSUM BOARD SECTION #092900 - (Click Here)**

A. Installation of QuietRock or an equal assembly at the interior walls is required to achieve industry standard levels of sound transmission
B. Provide Chair rail at 34 inches to center in classrooms at back and side walls.
   1. Acceptable Manufacturers: InPro Corp.; Wallguard; Korogard; and Boston Retail
C. Provide prefinished cleanable wainscot paneling at 48 inches to top at all corridors, foyers and lobbies; may use precast concrete, GFRC, stone or ceramic tile, or semi-gloss paint as project budget allows.
D. Provide corner guards to top of wainscot or may be full height if appropriate:
   1. Cornerguard in corridors
   2. Coreguard
   3. Thoroseal

Tiling Installation

- **REFER TO SAMPLE TILING SECTION #093000 - (Click Here)**

A. Preferred Tile Materials
   1. Ceramic-Free Recycled Glass Tile: Minimum 85% post-consumer recycled glass
   2. Porcelain Tile: Minimum 70% post-industrial feldspar.
   3. Stone Tile: Post-industrial waste
   4. Cement Mortar:
      a. Dry-set mortar: Zero-VOC
      b. Latex-Portland cement mortar: Zero-VOC
      c. Thin-set mortar: Zero-VOC
   5. Tile Adhesive: Water-based, low-VOC (Maximum 44 grams/liter)
   6. Grout: Cement-based, petroleum-and plastic-free grout
   7. Sealants: Low-VOC
      a. Single-component polyurethane sealant: Zero-VOC
      b. Two- component polyurethane sealant: Maximum VOC: 45 grams/ liter
B. Ceramic tile: ceramic tile is appropriate for use in restrooms and showers.
C. Insure that the color and style selected has been in production for at least 5 years. Do not use discontinued tiles.
D. Use only simple, plain colors, styles and textures
E. Size of tile: 6"x6" minimum or larger on the floor, dark grout. 12"x12" minimum on walls, dark grout. Other sizes may be considered in special locations as approved in writing by the District Architect.
F. American made tiles are strongly preferred.
G. Use cementious backer board for walls. DensShield Tile Backer is acceptable. Comply with TCNA standards.
H. Tile in food preparation areas, shower and locker rooms, and other “wet” areas, shall have a smooth, easily cleanable surface which is moisture and grease resistant. Also, flooring in wet areas shall meet the code and industry standard for non-slip surfaces.

Ceiling Installation

- **REFER TO SAMPLE ACOUSTICAL PANEL CEILINGS SECTION #095113 - (Click Here)**

A. Sound rated fiberglass batting above the ceilings is required to achieve industry standard levels of sound transmission.
B. Suspended and glue-up ceiling systems:
   1. The extent and type of suspended acoustical ceilings shall be reviewed with the District prior to commencing working drawings.
   2. Preferred system is 24" x 48" acoustical panels with a15/6" heavy duty grid.
   3. Consider using acoustical panels with anti-microble treatment to avoid the potential for mold growth.
   4. Acoustical panels shall have zero formaldehyde emissions.
   5. Suspended acoustical grid ceilings shall not be used in student toilet rooms
   6. Detail and specify suspension systems for seismic restraint in accordance with CCR and interpretation of regulations issued by DSA. These regulations are more stringent than those included in California Building Code.
   7. Recommended minimum height is 9 feet above finish floor.
   8. Sprayed-on finishes are discouraged except in auditorium or other high spaces.

Linoleum Flooring

- **REFER TO SAMPLE LINOLEUM FLOORING SECTION #096516 - (Click Here)**

A. Linoleum Tile is recommended in all interior spaces unless carpet or other specialized floor coverings are installed i.e. wood for gyms and dance floors and ceramic tile in restrooms.
B. Approved Manufacturers:
   1. Forbo
   2. Armstrong
   3. Johnsonite
C. NORA system rubber flooring is not to be used in any area.

Carpet Standards

- **REFER TO SAMPLE CARPETING SECTIONS #096816 - (Click Here)**

A. District Approved Carpet Manufacturers shall contain Recycled material and include:
   1. Tandus Flooring - 6 ft. roll goods or carpet tile **(District Standard is Powerbond RS for rolled carpet and ER3RS for Modular Tile or approved equal).**

2. Mannington carpet tile - 12 ft roll goods, **Integra HPRE**
3. Interface - Carpet Tile, **interfaceFLOR**

B. Submit cut sheets with VOC levels highlighted, showing that carpet systems meet or exceed the minimum standards contained in the carpet and Rug Institute (CRI) Green Label Indoor Air Quality Testing Program (CRI: www.carpet-rug.com,800-882-8846)
C. Submit invoices and documentation from manufacturer of the amounts of post-consumer and post-industrial recycled content by weight for products with specified recycle content.
D. Provide a cut sheet and/ or material safety data sheet for every sealant used within the building (not including the exterior surface of the building), with VOC levels highlighted.
E. Provide a cut sheet or other documentation for every composite wood (carpet substrate) and agfiber product used, verifying that no urea-formaldehyde resins were used.
F. Preferred Carpet Performance Criteria;

ALL CARPET MATERIALS ARE NOT CREATED EQUAL. Soft surface flooring is typically treated as an aesthetic component of the environment. In reality, carpet plays a much greater role. Carpet can add comfort underfoot and acoustic values to the education environment. It also has the ability to improve dB ratings, reduce glare and reduce hot spots. The wrong carpet material can contribute to indoor air quality concerns, maintenance difficulties, and a premature degradation period. Allergens (pigpen effect), biological growth, and indoor air quality are of great concern therefore a minimum carpet standard is in place and shall be adhered to by all parties.

Carpet Standards-Roll Goods

1. **Appropriate applications:**
   a. **Classrooms**
   b. **Multi purpose rooms**
   c. **Common areas**
   d. **Hallways**
   e. **Libraries**
   f. **Child development room**
   g. **Other spaces as approved**

Provide ONLY those roll goods products that meet the specification herein. NO SUBSTITUTES.

1. **Surface wear layer composed of 1/13th-1/15th gauge tufted continuous filament 6,6 nylon Antron fiber and installed with molecularly bound seams to provide a monolithic appearance.**
2. **Surface Texture: Level or Textured loop, 100% Nylon with modification ration of 1.5 for soil release capabilities.**
3. **Wear Layer Thickness: 0.109 inch – 0.187 inch per ASTM D418.**

4. **Sheet Width: 6-12 feet (1.8 M).**
5. **Material Composition: Wear layer and cushion fully fused under heat and pressure and warranted against delamination. Provides a Radon reduction barrier and meets the EPA definition of enclosure for asbestos, including molecular bound seams.**
6. **Delamination: No delamination per ASTM D-3936.**
7. **Seaming Method: Manufacturing seaming compound.**
8. **Seam Integrity: Provide independent test results. Phillips Chair Test; No seam separation after 50,000 cycles. Moisture Penetration by Impact at SEAMS @ 10 psi; No penetration after 10,000 impacts. The British Spill IS NOT an acceptable measurement for moisture barrier.**
9. **Cushion Type: Closed Cell Cushion ONLY; NO LESS than 0.156 inches thick.**
10. **Compression Set: ASTM D-1667: Max-10%, with Compression Deflection ASTM D-1667; Min 7 lbs./sq. inch at 25%.**
11. **R-Value: ASTM C-177: 0.68 or higher.**
12. **Static Coefficient of Friction: ASTM C-1028: Passes ADA requirements.**
13. **Static Propensity: AATCC 134: 3.5 KV or less.**
14. **Flooring Radiant Panel: ASTM E-648 or NFPA 253: Class 1.**
15. **Acoustic Requirements: Noise Reduction Coefficient (NRC): 0.20 Minimum.**
16. **Installation System: Adhesive must meet CRI Green Label Plus requirements. A peel & stick method applied to the back at the time of manufacture is preferred.**
17. **Antimicrobials: Antimicrobials are EPA registered pesticides. Antimicrobial additives are not allowed during the manufacture of these flooring products. Provide test results showing NI rating per test ASTM E-2471-05 indicating no efficacy. Installation adhesives are exempt from this section.**
18. **Indoor Air Quality: Must meet the indoor air quality requirements in California's Section 01350 Specification.**
19. **Sustainability: All product claims must comply with the US Federal Trade Commissions' Guides for the Use of Environmental Marketing Claims (CFR Title 16 part 260).**
20. **Recyclability: Product to be 100% recyclable. Company to have an in-place, operational recycling program for product (at the end of its useful life). Program shall recycle 100% of the product in the same operation. The program shall not consist of incineration (including waste-to-energy).**

Carpet Standards-Modular Carpet Tiles

1. **Appropriate applications:**
    a. **Staff/Faculty offices with modular furniture**
    b. **Access panel floors**
    c. **Flat wire and duct work access**
    d. **Accessibility requirement**
    e. **Other spaces must be approved for carpet tile**

Provide only those Modular carpet tile products that meet the specifications herein. NO SUBSTITUTES. 50cmx50cm size Orthogonally ambiguous non repeating pattern which allows for random installation with dyelot mergeability pile density of 6000 1/12th-1/15th gauge 6,6 fiber 100% solution dyed with no less than 30% post consumer product backing.

1. **Surface Texture: Level or Textured loop, 100% Nylon with modification ration of 1.5 -2.0 for soil release capabilities.**
2. **Installation method shall require no adhesive of any type to be applied to sub-floor**
3. **Flooring Radiant Panel: ASTM E-648 / NFPA 253: Class 1 (CRF: 0.45 watts/sq cm or greater)**
4. **Federal Flammability: CPSC FF 1-70: Passes**
5. **Smoke Density: ASTM E-662 / NFPA 258: $\leq$ 450 Flaming Mode**
6. **Electrostatic Propensity: AATCC 134 (Step & Scuff): 3.0 kV or less**
7. **Static Coefficient of Friction: ASTM C-1028: Passes ADA Requirements for Accessible Routes (minimum 0.60)**
8. **Delamination of Secondary Backing of Pile Floor Coverings: ASTM D-3936: No Delamination**
9. **Lightfastness: AATCC 16E: $\geq$ 4 @ 100 hours**
10. **Product must contain a minimum of 30% recycled content by weight. This percentage is calculated by dividing the weight of recycled content in one square yard of finished carpet by the total weight of one square yard of finished carpet, and multiplying by 100. [(Recycle Content Weight) / (Total Product Weight) x 100] per FTC Marketing Guides 16 C.F.R. § 260.7 (e).**
11. **Product must be available inclusive of a recycled content secondary backing with no up-charge.**

12. **Recycled content and post consumer content must not be subject to availability. Post industrial and post consumer recycled content of product installed must be the same as those required by Project requirements.**

13. **Recycled content must be expressed as an exact percentage or a range. Statements such as "*up to* 60%" recycled content are not acceptable.**

14. **Recycled content products provided must have equal or better performance and cost no more than comparable virgin products.**

15. **Durable stain inhibitor should be applied to the fiber during product manufacturing to resist fiber staining and soiling. Initial: Minimum 500 ppm Fluorine per CRI TM-102 After two hot water extractions per AATCC 171: Minimum 400 ppm Fluorine per CRI TM-102**

Permanent Matting

All areas that are to receive new floor coverings and have an exterior door are to receive the following:

1. **Standard single door installation area: 4.5' x 4.5'**

2. **Double door installation area: 7.5' x 9'**

3. **LEED Points: All exterior entrances must have a minimum 10' installation area**

   A. **Pile heights average: 0.187 inch (ASTM D-418, Sec. 12)**
   B. **Pile Characteristic: Multi-level loop**
   C. **Surface Flammability: Passes CPSC FF 1-70 (ASTM D-2859)**
   D. **Flooring Radiant Panel: Class 1 (mean average CRF: 0.45 w/sq cm or higher) (ASTM E-648)**
   E. **Electrostatic Propensity: 3.0 kV or lower – Permanent Conductive Fiber (AATCC 134)**

Fiber Reinforced Plastic Panels

- **REFER TO SAMPLE FIBER REINFORCED PLASTIC PANELS SECTION #09771 - (Click Here)**

A. "Marlite" FRP - color P-100 white may be used on the walls of custodial and utility rooms in lieu of paint; except at custodial rooms sink backsplashes.
B. District approved equal.

Paint Standards

A. After the completion of the project, before final payment, a color chart of all colors and the locations will be provided to the District Service Center. The paint contractor upon completion of the project will provide to the District a floor plan of the area (building) showing all areas that have been painted with a legend identifying what colors are on what walls, door, trim and any other surfaces that were painted. In addition to the floor plan the contractor will also provide to the District a draw down with paint formula for each color and gloss used to paint the building. The draw downs will be 8.5 by 11 inches and presented in a notebook.
B. Contact information on the painting contractor, including name and phone numbers will be provided to the District Service Center for future reference.
C. Water-based paints and coatings shall be used wherever possible due to VOC restrictions. Paint materials shall comply with the latest California Architectural Coatings Suggested Control Measure (SCM) VOC limits. Consider using zero-VOC paints for both new and existing surfaces.
D. The District prefers including the project color schedule in the bid documents. District approval of the color schedule is required prior to its incorporation into the project.
E. Follow Campus standard interior and exterior color palette choices.
F. Preferred Paint Materials
    1. Waterborne Latex (Acrylic) Emulsion Paint:
        a. Zero-VOC paint: Flat and eggshell, VOC content less than 5 grams/ liter
        b. Low-VOC paint: Semi-gloss and gloss, VOC content less than 100 grams/ liter
    2. Oil-Based Paint: Low-VOC paint (maximum VOC content: 380 grams/ liter); maximum 10% aromatic hydrocarbons content (For increased resistance to yellowing specify high quality, soy-based oil paints.)
    3. Low-Biocide Paint: For interior use, formaldehyde-free; free of fungicides or bactericides classified as mercury acetates, phenol phonates, or phenol formaldehyde (reduced shelf life. Paints are made to order; lead-time may be 1 to 2 months.)
    4. Epoxy; Waterborne epoxy; maximum VOC content: 200 grams/ liter (extremely durable, suitable for floors)
    5. Transparent Finishes: (Pigments provide some UV Protection.)
        a. Polyurethane, water-based: Maximum VOC content: 170 grams/liter
        b. Penetrating oil: Oil-Based, water-reducible exterior finish.
    6. Paint Strippers- Low-Emitting: Shall not contain methylene chloride. Avoid products containing methanol and trichloroethane.

Exterior Paint

- **REFER TO SAMPLE EXTERIOR PAINT SECTION #099113 - (Click Here)**

A. Color integral exterior cement plaster stucco finish shall be used in conjunction with paint finish. Color plaster finish coat shall be a minimum of 1/8 inch thick.

Interior Paint

- **REFER TO SAMPLE INTERIOR PAINT SECTION #099123 - (Click Here)**

A. Classrooms/hallways that have been painted shall have a 2-Coat Semi-Gloss finish. Also, provide 3-Coats if industrial grade semi-gloss finish for high traffic trim and doors.
B. Use only one color (Vista white) for custodial and supply rooms, closets, storage, and other utility type spaces.
C. Confirm that gypsum wall finish is at least a Level 4 finish. Provide Level 5 finish at high traffic areas like lobbies and corridors. **Drywall level 4 along with a semi-gloss paint is acceptable in lieu of level 5.**

SPECIALTIES REQUIREMENTS

GENERAL DESIGN GUIDELINES

Building Plaques:

A. Each new Campus building shall have a Bronze Project Team Recognition Plaque including the names of the Board of Trustees and LEED information as directed by the District Architect.

Visual Display Surfaces

- **REFER TO SAMPLE VISUAL DISPLAY SURFACES SECTION #101100 - (Click Here)**

A. White Boards
   1. In schools, offices and industry, the whiteboard, or dry erase board, has become an important tool for teaching and training processes. With the addition of computers to the classroom and office, *chalk* dust from the old chalkboards became troublesome to the keyboards, hard drives and monitors of computers, as well as to those people who suffered from allergies. Due to necessity and convenience, whiteboards are now a more popular alternative to chalk. The District prefers a white porcelain enamel steel surface board. The product we have found to be the best is the Claridge LCS Deluxe with a 5/8" aluminum face trim, map rail, and marker rail; they can be viewed at www.claridge.com.
   2. This Deluxe wallboard offers an excellent white porcelain enamel steel writing surface. When written on with LCS markers the image goes on wet, dries instantly and is removed easily with any standard eraser.
   3. These Porcelain Steel boards are intended for moderate to high or long term usage. The porcelain construction

is much less susceptible to ghosting effects. These whiteboards are manufactured with a steel background which allows for magnets to be applied to them.

4. District Approved whiteboard Manufacturers:
   a. The District standard is Claridge Products LCS2XXX (Deluxe) - LCS Deluxe Wallboard with Aluminum Trim - Medium to Large
5. **Contact information**

   Claridge Products
   Western Division
   14736 Wicks Road
   San Leandro, CA 94577
   Contact Person: Ty
   (510) 351-8183
6. **Whiteboard requirements**
   a. 5/8" satin anodized aluminum frame
   b. 2-5/8" deep marker tray with end enclosures
   c. Available with or without map rail
   d. Provide Units with map rail that have tan cork insert and one map hook for every two feet of map rail (minimum of 2 hooks)
   e. Angled clip hangers are included
   f. Steel Markerboard accept magnets and magnetic aids
   g. 4 assorted markers and one felt eraser included.
   h. Neither chalk nor abrasive cleaners should be used on LCS writing surface. It is recommended that Claridge Board Cleaner (No. 683) is used for upkeep.
   i. Available Whiteboard standard sizing:

Map Rail	Size
With Map Rail	3'H x 4'W
With Map Rail	4'H x 10'W
With Map Rail	4'H x 12'W
With Map Rail	4'H x 16'W
With Map Rail	4'H x 4'W
With Map Rail	4'H x 6'W
With Map Rail	4'H x 8'W
Without Map Rail	3'H x 4'W
Without Map Rail	4'H x 10'W
Without Map Rail	4'H x 12'W
Without Map Rail	4'H x 16'W
Without Map Rail	4'H x 4'W
Without Map Rail	4'H x 6'W
Without Map Rail	4'H x 8'W

7. **Whiteboard Mounting Height:** 36" above finished floor to top of chalk tray

Toilet Compartments

- **REFER TO SAMPLE TOILET COMPARTMENT SECTION #102113 - (Click Here)**

A. Toilet Partitions:
   1. Provide durable toilet partitions of solid plastic, Stainless Steel, or Phenolic -Verify with District.
   2. 33" min. clear inside dimension between partitions is district Standard for toilet stall width.
   3. Coordinate brackets and fasteners with Tile wainscot and wall system to ensure an even substrate for anchorage
   4. Provide concealed fasteners wherever possible.
   5. Floor mounted overhead braced toilet partitions are required.
   6. Provide at least one shelf in each restroom.

Toilet Accessories

- **REFER TO SAMPLE TOILET ACCESSORIES SECTION #102800 - (Click Here)**

A. **General**
   1. Provide theft resistant fasteners for all accessory mountings.
   2. No condom dispensers shall be provided.

B. **Soap Dispensers**
   1. Wall Mounted
      a. District Approved wall mounted Soap Dispensers Manufacturers:
         1) Bobrick B-4112 Contura Series
      b. The container will be type 304, 20-gauge (1.0mm) stainless steel with satin finish.
      c. Seamless construction except for the top where refilling will take place.
      d. Provide plastic soap refill-indicator window.
      e. A hinged stainless steel lid for top filling and a minimum filling capacity of 40-fluid oz.
      f. Valve spring should be stainless steel, stainless steel hinges, with a back plate of 22-gauge stainless steel.
      g. Liquid soap dispensers - Motion sensor controlled*(mounted accessible for filling)* (hardwired - not battery):
   2. Deck Mounted
      a. District Approved wall mounted Soap Dispensers Manufacturers
         1) Bobrick B-826.1820 6V hardwires
      b. Automatic touch-free sensor eliminates cross contamination. Meets Barrier-Free accessibility standards. Sensor detects user's hand to automatically dispense

controlled amount (O.8ml) of soap; activation range is 4" (100mm) from sensor lens. Reduces soap usage, waste.

c. Provide brushed aluminum or bright-polished chrome spout cover.
d. Provide model with 2000 hand washes per 1600ml OneShot® soap refills. Soap refills available from sanitary supply distributors.
e. Red LED light blinks when soap refill is low. Yellow LED light blinks when battery life is low (average battery life 100 soap refills or 2 years). Water-resistant battery compartment and motor housing.
f. Provide B-826-20 AC ADAPTER (6V) for one B-826 Automatic Lavatory soap dispenser
g. Mount transformer under countertop.

C. **Toilet Paper Dispenser**

1. ADA required stalls:
   a. District Approved ADA TP Dispensers Manufacturers
      1) Multi-Roll Toilet Tissue Dispenser- Bobrick-B4388
   b. It must be able to hold two rolls of toilet tissue up to 5-1/4 inch.
   c. Must have a flush tumbler lock.
   d. Must be designed so that the extra roll above drops in place when the bottom roll is depleted.
   e. Must have heavy duty spindles.
2. All other non-ADA required stalls and open restrooms:
   a. District Approved TP Dispensers Manufacturers
      1) Bobrick's classic series twin jumbo roll toilet tissue dispenser-B-2892
   b. Satin-finish stainless steel.
   c. Equipped with tumbler lock.
   d. Must hold two 10inch (255mm) diameter, rolls of toilet tissue.
   e. Must be convertible to hold 2 ¼ inch and 3 inch diameter core rolls.
   f. Must have a sliding access panel to expose one roll at a time, which allows easy roll change over.
   g. Must have a wide viewing slot in front/door revealing amount of tissue on both rolls.

D. **Paper Towel Dispenser**

1. Paper Towel Dispensers are no longer acceptable at multiple accommodation Toilet Rooms. They may be used in custodial closets, laboratories and specialty classrooms, or as directed by District Architect.
2. District Approved Paper Towel Dispensers Manufacturers
   a. B-4262 Contura Series Surface- Mounted Paper Towel Dispenser.
3. Satin-finish stainless steel.
4. Tumbler lock on top of cabinet.
5. Door swings down for loading towels.
6. Dispenses 400 C-fold or 525 multifold towels or District approved equal.

E. **Toilet Seat Cover Dispensers**
   1. District Approved Paper Towel Dispensers Manufacturers
      a. Bobrick Classic Surface Mounted Seat-Cover Dispenser. B-221
   2. Satin-finish stainless steel.
   3. Dispenses 350 single-or half-fold toilet seat covers.

F. **Dual Sanity Napkin/Tampon Dispensers:**
   1. District Approved Manufacturers
      a. B-43500 Contura Series Recessed Sanitary Napkin/Tampon Vendor
   2. Satin-finish stainless steel
   3. Dispenses 31 napkins and 22 tampons.
   4. Single-coin mechanisms convertible for 25¢-operation
   5. Two flush tumbler locks. Separate lock and key for coin box.

G. **Electric Hand Dryers:**
   1. Provide Electric hand dryers mounted adjacent to sinks at all single and multiple accommodation toilet rooms (one for every 3 lavatories.)
   2. District Approved Manufacturers
      a. Dyson Airblade, or District approved equal.

H. **Trash Can Standards**
   1. Specifics on trash can are listed below:
   2. From Waxie catalog:
      a. Classrooms: Brown, Item#730132C 41 1/4" qt 11"x19 7/8"x 15 1/4"
      b. Offices: Brown, Item#730113C 28 1/8" qt 10 1/2"x15'x 14 1/2"
         1) Refer to Division 32 for product literature

Safety Equipment

A. **Defibrillators and Cabinets:**
   1. Each new Campus building shall have a Defibrillator and either a surface mounted or recessed Cabinet permanently mounted in a prominent public location (i.e. Lobby perhaps near a Fire Extinguisher Cabinet) as directed by the District Architect; **min. one per floor**.

The **POWERHEART**® AED G3 Plus

Our flagship automated external defibrillator, complete with RescueCoach™ and CPR metronome to pace chest compressions

Appropriate Locations

- Work places
- Transportation
- Sporting venues
- Schools
- Retail & hotels
- Recreation facilities
- Places of worship
- Any public place

Primary Benefits

Reliability. The device is Rescue Ready®, meaning it self-tests daily to ensure it works when you need it.

Ease of Use.

- The RescueCoach™ voice prompts and metronome guide you through a very stressful rescue situation.
- The device knows when to (and when not to) deliver the shock.
- The text screen lends extra help in noisy and chaotic environments.

Assurance. The unit has a 7-year warranty and a 4-year full battery replacement guarantee.

CARDIAC science

Rescue Ready® performance sets Powerheart AEDs apart

Our Rescue Ready technology distinguishes us among competitors.

+ Every day, to ensure anytime functionality, the AED self checks all main components (battery, hardware, software, and pads).
+ Every week, the AED completes a partial charge of the high-voltage electronics.
+ Every month, the AED charges the high-voltage electronics to full energy.

If anything is amiss, the Rescue Ready status indicator on the handle changes from green to red and the device will emit an audible alert to prompt the user to service the unit. In sum, a Powerheart AED is Rescue Ready when a life depends on it.

Most anyone can operate a Powerheart AED G3 Plus

In the chaos that follows sudden cardiac arrest, concerned but untrained people are hesitant to intervene. Will they know what to do? There's a life on the line!

We designed the Powerheart AED G3 Plus with RescueCoach™ voice prompts to talk rescuers through the steps.

+ When the rescuer applies the pads, the device analyzes the heart rhythm and "knows" when to deliver (or not deliver) the shock.
+ The shock is delivered automatically, with no button to push, and no human intervention. (We also make a semi-automatic version.)
+ After the shock, the unit prompts for CPR with a built-in metronome that sets the pace for proper chest compressions.

In a University of Pennsylvania simulated rescue study, the AED G3 Plus helped untrained adults deliver CPR of a quality similar to that of trained professionals.[1]

[1] Peer reviewed study by Benjamin S Abella et. al. "Untrained Volunteers Perform High Quality CPR When using an Automatic External Defibrillator with a CPR Voice Prompting Algorithm." Circulation. 2007; 116:II_437.

The **POWERHEART**® AED G3 Plus

TECHNICAL SPECIFICATIONS	
DEFIBRILLATOR	
Operations	9390A (fully automatic version) and 9390E (semi-automatic version)
Waveform	STAR® biphasic truncated exponential
Energy (J) range available	Escalating variable energy (VE) 105J to 360J
Protocols	5 energy protocols available
Factory default (nominal)	200VE, 300VE, 300VE
Voice prompts	RescueCoach voice instructions guide user confidently through rescue process
CPR cadence	Metronome for compression frequency
Text screen	Displays rescue prompts to guide user through rescue process as well as additional critical rescue information for EMS responders
Visible indicators	Rescue Ready status indicator, SmartGauge battery status indicator, service indicator, PAD indicator, text display
Audible alerts	Voice prompt, system alert
Synchronized shock	Built-in automatic synchronization feature
Pacemaker pulse detection	Yes
Programmable	Yes, via MDLink®
Pediatric capability	Yes
Warranty	7 years
PADS	
Minimum combined surface area	228 cm^2 (35.3 sq in)
Extended length of lead wire	1.3 m (4.3 ft)
Supplied	Self-checking, pre-connected to the AED
Type	Adult, pre-gelled, self-adhesive, disposable, non-polarized (identical pads can be placed in either position) defibrillation pads
Shelf life	2 years
BATTERY	
Type	IntelliSense® lithium battery
Guarantee	4-year, full operational replacement
AUTOMATIC SELF-TESTS	
Daily	Battery, pads (presence and function), internal electronics, SHOCK/CONTINUE button, and software
Weekly	Battery, pads (presence and function), internal electronics, partial energy charge, SHOCK/CONTINUE button, and software
Monthly	Battery, pads (presence and function), internal electronics, full energy charge cycle, SHOCK/CONTINUE button, and software
EVENT DOCUMENTATION	
Type	Internal memory
Internal memory	60 minutes ECG data with event annotation, multiple rescue functionality
ECG playback	Viewable via Rescuelink® software via PC
Communications	Serial port or USB (via adapter) for PC with Windows
Clock synchronization	Rescue event time stamp of event data
DIMENSIONS (H x D x W)	8 cm x 31 cm x 27 cm (3.3 in x 12.4 in x 10.6 in)
WEIGHT	3.1 kg (6.6 lb)
MODEL NUMBERS	
9390A-501	Powerheart AED G3 Plus Automatic with 2005 AHA/ERC Guidelines protocols
9390E-501	Powerheart AED G3 Plus Semi-Automatic with 2005 AHA/ERC Guidelines protocols
	Each AED package includes (1) defibrillator, (1) IntelliSense battery (9146), (1) pair of defibrillation pads, and (1) Quick Start Tool Kit including CD-Rom with AED Manual, Training Video, Rescuelink and MDLink, and serial communication cable

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Volume I - DIVISION 10 SPECIALTIES

EQUIPMENT REQUIREMENTS

GENERAL DESIGN GUIDELINES

AV Considerations for Layout of Learning Spaces

A. Whenever feasible, as much flexibility as possible should be included in structuring the room, so as to provide opportunity for multiple learning configurations (lecture style, group work, individual work, etc.); this is most useful and practical in general classroom spaces, as opposed to laboratories and lecture halls.
B. Sharing the ceiling is a challenge, as lighting and HVAC ventilation compete for space with the distributed sound system, ceiling mounted document camera, and projector placement.
    1. These systems sometimes interfere with each other and the following factors should be taken into consideration:
        a. Avoid placing the projector and screen directly under light fixtures, as the light can wash out the image; although with the level of lumens specified for SDCCD projectors and controlled lighting, this can be managed to a certain extent.
        b. If light fixtures are not recessed lighting style, consider their profile in laying out the projector and screen placement.
        c. Never place an HVAC vent in front of a projection screen, as it will cause vibration, making it unreadable, and can damage the screen over time.
    2. The ceiling height adds another consideration to this mix, as does the floor and whether it is flat or tiered.
        a. On a flat floor, the screen needs to be placed so that people in the back rows have enough clearance to see the screen. Minimum height is often recommended at 45" above the finished floor (AFF); however, industry standards recommend even higher to assure that everyone can see what is projected to the screen.
        b. With a 10' ceiling, a 100" wall mounted diagonal screen could be placed at 48"AFF. This accounts for 6" of clear space above the screen for aesthetics, 6" for the screen casing, and 60" for the screen. With ceiling recessed screens, they can be placed even higher in the room, raising the screen approximately 6-8" higher. However, these are most easily managed with electric controls.
    3. Consider the methods for teaching that need to take place in the room.

a. With labs, this means any teaching/lecturing that will take place in the lab, including demonstrations, and the actual hands-on lab work done by the students.
b. With lecture halls, consider if the projection system will be used simultaneously with the whiteboard, and if any demonstrations will be conducted at the lectern/demonstration table.
c. With classrooms, consider flexible re-configurations depending upon type of engagement inherent in the instruction.

4. In addition to the reflective ceiling plan, draw a side view to reflect line of vision and any interference. Per the District BIM Guidelines the A/E must model the Projector Throw Clearance.
5. In the end it will be a give and take to layout the rooms. There are structural considerations for the room, teaching considerations for the room, and AV considerations for the room. The goal is to manage these three considerations for the purpose of optimal learning and teaching opportunities for students and faculty.

Projection Screens:

- **REFER TO SAMPLE PROJECTION SCREEN SECTION #115213 - (Click Here)**

A. Determine the approximate location of the projector in the classroom or teaching lab and confirm with the District's Audiovisual Librarian and the District Architect.
B. General assumptions:
   1. +Diagonal screen size = 100” (width=60”, height=80”)
   2. +Bottom of screen to floor = 45”
   3. +Aspect ratio: 4:3
C. The online calculator (http://www.epson.com/images/landing/calculator/index.html) may be used to locate the projector unit distance from the front wall and from the ceiling.

Epson PowerLite 6110i Specifications

Projection System
High aperture Epson 3-chip 3LCD technology
Projection Method
Front/rear/ceiling mount

LCD
Driving Method
Epson Poly-silicon TFT Active Matrix
Pixel Number
786,432 dots x 3 (1024 x 768) LCDs
Native Resolution
XGA
Aspect Ratio
4:3 (supports 16:9)
Pixel Arrangement
Cross stripe

Projection Lens
Type
Manual focus/zoom
F-number
1.75 – 2.42
Focal Length
24 – 38.22 mm
Zoom Ratio
Optical zoom 1.0 – 1.6

Lamp
Type
230 W UHE
Life*
3500 hours (High Brightness Mode)
4000 hours (Low Brightness Mode)

Screen
Throw Ratio Range
1.48" – 2.39"
Size (projected distance)
30" – 300" (2.7' – 48.2')
Keystone Correction
Vertical: ±30 degrees
Brightness (High Brightness Mode)
Up to 3500 lumens (ISO 21118 Standard)
Contrast Ratio (High Brightness, Game Mode)
Up to 600:1
Brightness Uniformity (typical)
90%
Color Reproduction
16.7 million colors

Dimensions (W x D x H)
Including Feet
16.3" x 13.4" x 6.3"
Excluding Feet
16.3" x 13.4" x 5.7"
Weight
15.4 lb/7 kg

Effective Scanning Frequency Range
Pixel Clock
13.5 MHz – 162 MHz
Horizontal
15 KHz – 99 KHz
Vertical
50 Hz – 120 Hz

Remote Control
Features
Source search selection, power, aspect resize, color mode, volume, e-zoom, A/V mute, freeze, menu, page up and down, help, auto, mouse functions, ID

Operating Angle
Right/left: ± 30 degrees
Upper/lower: ± 15 degrees
Operating Distance
19.7 ft (6 m)

Display Performance
Native
1024 x 768
Resize
640 x 480
800 x 600
1280 x 1024
1400 x 1050
1600 x 1200

Video I/O
Display Performance
NTSC: 500 line
PAL: 500 line
(depends on observation of the multi-burst pattern)
Input Signal
NTSC/NTSC4.43/PAL/M-PAL/N-PAL/PAL60/SECAM
SDTV: 480i, 480p; HDTV: 720p, 1080i
Interfaces
Computer/component video: Mini D-sub HD 15 pin x 2
S-video: Mini DIN x 1
Composite video: RCA x 1
Audio in x 4 (RCA (L & R) x 1, mini stereo x 3)
Variable audio out: mini stereo x 1
LAN networking: RJ-45 x 1
Serial: RS-232c x 1
Monitor out: Mini D-sub 15 pin x 1

Other Features
Audio Output
5 W monaural
Audio Signal
500 mVrms/47K ohm
Operating Temperature
32 °to 104 °F (0 °to 40 °C)
Power Supply Voltage
100 – 240 V ±10%, 50/60 Hz AC

Power Consumption
331 W, 10.4 W standby (network on), 0.4 W standby (network off)
Fan Noise
39 dB (High Brightness Mode)
33 dB (Low Brightness Mode)
Security
Kensington®-style lock provision, anchor (metal) bar for security lock or cable

Support — The Epson Connection™
Pre-sales Support
U.S. and Canada 800-463-7766
Internet Web Site www.epson.com
Projector resources available at presenteronline.com
Service Programs
Two-year limited warranty, 90-day lamp warranty, Epson Road Service Program and Epson PrivateLine® dedicated toll-free support (U.S. and Canada only)
Contents
Power cable, computer cable, projector remote control, batteries, cable cover, user manual CD, Easy Management™ software CD, Quick Setup Sheet, PrivateLine support card, password protection sticker

Accessory Part Numbers

Replacement remote control	1456530
Smoke filter	V13H134A12
Universal projector ceiling mount	ELPMBPJF
Advanced projector ceiling mount with precision gear	ELPMBPRG
High security projector ceiling mount	ELPMBATA
Adjustable suspended ceiling channel kit	ELPMBP01
False ceiling plate kit	ELPMBP02
Structural round ceiling plate	ELPMBP09
Adjustable extension column (pipe) 6" - 9'	ELPMBC01
Security flex foot kit	ELPMBF01
Distribution amplifier	ELPDA01
Component to VGA video cable	ELPKC19
S-video cable	ELPSV01
50" portable screen	ELPSC06
60" portable pop-up screen	ELPSC07
80" portable pop-up screen	ELPSC08
Duet™ screen	ELPSC80
Image presentation camera	(ELPDC05) V12H162020
Kensington security lock	ELPSL01

* Lamp life results will vary depending upon mode selected, environmental conditions and usage. Lamp brightness decreases over time.

Packaging Specifications

PowerLite 6110i	Replacement Lamp	Replacement Air Filter
Dimensions: 22.7" x 21.8" x 11.1" (W x D x H)	Dimensions: 6.3" x 5.6" x 5.6" (W x D x H)	Dimensions: 11.4" x 4.1" x 1.9" (W x D x H)
Weight: 24.2 lb	Weight: 0.96 lb	Weight: 0.35 lb
	Master Carton	Master Carton
	Dimensions: 13.1" x 28.4" x 6.8" (W x D x H)	Dimensions: 18.6" x 11.8" x 4.7" (W x D x H)
	Weight: 11.6 lb	Weight: 4.4 lb
	Units Per Master Carton: 10	Units Per Master Carton: 10

EPSON
EXCEED YOUR VISION

Epson America, Inc.
3840 Kilroy Airport Way, Long Beach, CA 90806

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www.epson.com
www.epson.ca

DA-LITE

ADVANTAGE® ELECTROL® (UP TO 12' x 12')

Automatic Electric Projection Screen Model

SPECIFICATION DATA

DA-LITE SCREEN COMPANY, INC.
3100 North Detroit Street
Post Office Box 137
Warsaw, Indiana 46581-0137
Phone: 574-267-8101
800-622-3737
Fax: 574-267-7804
Toll Free Fax: 877-325-4832
www.da-lite.com
e-mail: info@da-lite.com

SUGGESTED SPECIFICATIONS: _____ projection screen(s), _____ (H) x _____ (W), electrically operated 120 volt (60Hz), not more than 2.4 amp with a quick connect male plug-in connector on the motor. Shall have specially designed motor mounted inside the roller, to be three wire with ground, quick reversal type, oiled for life, with automatic thermal overload cutout, integral gears, capacitor and an electric brake to prevent coasting. To have preset but adjustable limit switches to automatically stop picture surface in the "up" and "down" positions. Junction box shall be externally integrated into the housing making it possible to install the housing and wire to the building's electrical system during construction. The junction box shall contain a quick connect connector that is mounted in the housing for easy plug-in connection to the motorized fabric and roller assembly. The roller to be of rigid metal. The motorized fabric and roller assembly to be installed in the case at the factory or at a later time at the job site. Roller mounting brackets to be adjustable to allow centering or offsetting of the screen within the case. Screen to be designed for left or right-hand motor installation. Screen fabric to be flame retardant and mildew resistant fiberglass with black masking borders standard. Bottom of fabric shall be formed into a pocket holding a metal rod. Heavy duty plastic caps shall protect the ends of the rod. Top, front and back of case to be made of extruded aluminum powder coated white. End caps to be of heavy gauge steel, powder coated white. Bottom of case to have a removable access door. Door to be of extruded aluminum powder coated white. Bottom of case to be self-trimming, with a built-in flange around the bottom of the case. To be complete with a three-position control switch and cover plate. Suitable for use in environmental air space in accordance with section 300-22 (c) of the National Electric Code, and sections 2-128, 12-010 (3) and 12-100 of the Canadian Electrical Code, part 1, CSA C22.1. Screen to be listed by Underwriters' Laboratories.

c UL us

VIDEO (NTSC 4:3) FORMAT DIMENSIONS (2" standard black drop at top)

Viewing Area		Nominal Diagonal		Overall Length of Case (does not include flange)		Approx. Ship. Wt.	
H x W	Cm	In.	Cm	In.	Cm	Lbs.	Kg
43" x 57"	109 x 145	72"	183	65½"	166	60	27.2
50" x 67"	127 x 170	84"	213	75½"	192	65	29.5
57" x 77"	145 x 196	96"	244	89½"	227	77	34.9
60" x 80"	152 x 203	100"	254	89½"	227	77	34.9
69" x 92"	175 x 234	120"	305	101½"	258	89	40.4
87" x 116"	221 x 295	150"	381	125½"	319	100	45.4
105" x 140"	267 x 356	180"	457	149½"	380	106	48.1
120" x 160"	305 x 406	200"	508	169½"	431	123	55.8

HDTV (16:9) FORMAT DIMENSIONS (2" standard black drop at top)

Viewing Area		Nominal Diagonal		Overall Length of Case (does not include flange)		Approx. Ship. Wt.	
H x W	Cm	In.	Cm	In.	Cm	Lbs.	Kg
45" x 80"	114 x 203	92"	234	89½"	227	75	34.0
52" x 92"	132 x 234	106"	269	101½"	258	88	39.9
54" x 96"	137 x 244	110"	279	105½"	268	89	40.4
58" x 104"	147 x 264	119"	302	113½"	288	95	43.1
65" x 116"	165 x 295	133"	338	125½"	319	98	44.5
78" x 139"	198 x 353	159"	404	149½"	380	104	47.2
90" x 160"	229 x 406	184"	467	169½"	431	123	55.8

16:10 WIDE FORMAT DIMENSIONS (2" standard black drop at top)

Viewing Area		Nominal Diagonal		Overall Length of Case (does not include flange)		Approx. Ship. Wt.	
H x W	Cm	In.	Cm	In.	Cm	Lbs.	Kg
50" x 80"	127 x 203	94"	239	89½"	227	75	34
60" x 96"	152 x 244	113"	287	105½"	268	89	40.4
69" x 110"	175 x 279	130"	330	119½"	304	97	44
87" x 139"	221 x 353	164"	417	149½"	380	104	47.2

SQUARE FORMAT DIMENSIONS (screens with ^ have 2" standard black drop at top)

Sizes		Overall Length of Case (does not include flange)		Approx. Ship. Wt.	
H x W	Cm	In.	Cm	Lbs.	Kg
50" x 50"	127 x 127	55½"	141	54	24.5
60" x 60"	152 x 152	65½"	166	61	27.7
70" x 70"	178 x 178	75½"	192	68	30.8
84" x 84"	213 x 213	89½"	227	79	35.8
6' x 8'^	183 x 244	101½"	258	89	40.4
8' x 8'	244 x 244	101½"	258	91	41.3
7' x 9'^	213 x 274	113½"	288	96	43.5
9' x 9'^	274 x 274	113½"	288	97	44.0
8' x 10'^	244 x 305	125½"	319	100	45.4
10' x 10'^	305 x 305	125½"	319	102	46.3
9' x 12'^	274 x 366	149½"	380	106	48.1
12' x 12'	366 x 366	149½"	380	119	54.0

Electrical junction box extends 2¾" past case length on left end of case (1¼" past ceiling flange). Internal junction box available (will add 3½" to overall case length and must be specified at time of order, recommended for drywall installations).
Overall case length dimensions ±¼" (6mm).
Detail dimensional drawings, wiring diagrams and installation instructions available upon request.
Specifications subject to change without notice.
Custom formats and sizes available upon request.

Matte White: Seamless in all sizes.
High Contrast Matte White: Available in sizes where both dimensions do not exceed 10'.
Video Spectra 1.5: Available in sizes where both dimensions do not exceed 8'.
High Power®: Available in sizes up to 9' x 12'. Horizontal seam required when both dimensions exceed 6'.

WHEN ORDERING, MARK APPROPRIATE SELECTIONS:

Select size from charts above.

Select viewing surface:

- ❑ Matte White
- ❑ High Contrast Matte White
- ❑ High Power®
- ❑ Video Spectra 1.5

Greenguard® and Greenguard® Children and Schools Certified.

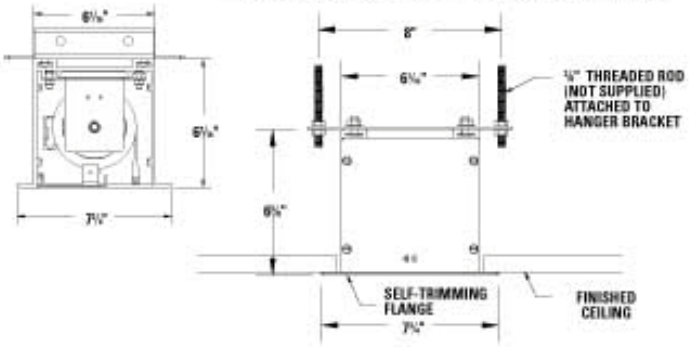
Optional Accessories:

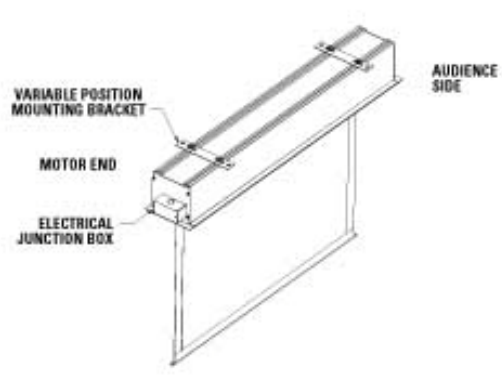
- ❑ Extra Drop available to lower picture area more than normal. Specify total drop at top _____ (black or white) or at bottom _____ (black or white). 13' maximum total surface height including picture area.
- ❑ Single Motor Low Voltage Control (LVC) - external.
- ❑ Single Motor Low Voltage Control (LVC) - built-in.
- ❑ Wireless Remote Control for LVC.
  - ❑ Radio Frequency Remote.
    - ❑ Radio Frequency Range Extender available
  - ❑ Infrared Remote.
- ❑ Silent Motor for sizes up to 9'x12'.
- ❑ Silent Motor with Integrated LVC for sizes up to 9'x12'.
- ❑ Key Locking Cover Plate for 120V or LVC Switch.
- ❑ Key Operated Switch for 120V only (NOTE: Cannot be used with LVC).

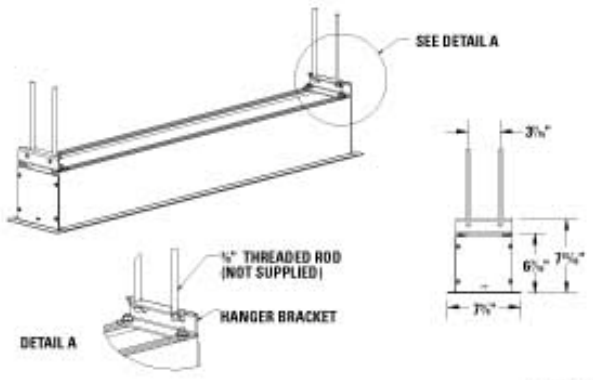
Project:	
Architect:	
Phone:	
Contractor:	
Phone:	
Supervisor:	
Phone:	
Supplier:	
Date:	
Revised:	

- ❑ No Borders (Black masking borders standard).
- ❑ 220 Volt (50 Hz) Motor.
- ❑ Video Projector Interface Control - external.
- ❑ Video Projector Interface Control - built-in (Adds 10" to case length on 220V motor only).
- ❑ SCB-100 RS-232 Serial Control Board - external.
  - ❑ NET-100 Ethernet-Serial Adapter
- ❑ SCB-100 RS-232 Serial Control Board - built-in. (adds 10" to overall length of case)
  - ❑ NET-100 Ethernet-Serial Adapter
- ❑ SCB-200 RS-232 Serial Control Board - built-in only. (adds 10" to overall length of case)
  - ❑ NET-200 Ethernet-Serial Adapter
  - ❑ WC-200 Wall Controller
  - ❑ IR-200 Infrared Remote

ADVANTAGE® ELECTROL® SUGGESTED METHODS OF INSTALLATION







Rev. 2/10

Laboratory Equipment

A. Manufacturer shall have at least 5 years experience in the fabrication of the specified equipment and shall have 10 installations of equal or larger size.

FURNISHINGS REQUIREMENTS

Window Shading Devices

- **REFER TO SAMPLE ROLLER WINDOW SHADES SECTION #122413 - (Click Here)**

A. Horizontal Classroom Blinds are no longer acceptable.
B. Roll Up Shading Devices - Section 12505: Window Treatments:
   1. Mecho Shade or eq.
      a) www.mechoshade.com; or www.vimco.com
      b) Track by Marshal - McMurray Co.
      c) At Classroom and exterior Office windows.
   2. Mecho distributer is Artisan Design Group in San Diego. Mecho shades are roller window coverings.
   3. Provide Manual chain operated,
   4. Openness factor will vary from orientation of glass to transmittance of glass. The Fabric shall be designed to have a range of 5-12% openness, depending on the orientation and the manufacturer's selection guide; to be reviewed by District Architect.
   5. Clear Aluminum side tracks,
   6. Fascia concealer

Metal Laboratory Casework

A. LEED MRc4: Recycled content; Provide a statement from the manufacturer stating the recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial.

Wood Laboratory Casework

A. It is preferred that all wood based products came from "FSC Certified Wood" sources certified by the Forest Stewardship Council unless specified by the District Architect. Provide certification and chain of custody documentation from the manufacturer.

B. Installer must be certified by the manufacturer and have successfully completed at least 5 installations of wood laboratory casework of equal or greater complexity as indicated.
C. LEED EQc4: Low-Emitting Materials; Provide documentation from the manufacturer identifying VOC and chemical component limits for all wood glues and sealants.
D. LEED Provide documentation from the manufacturer showing that all composite wood products provided do not contain urea-formaldehyde resin.

FF&E Selection Process

A. When selecting furniture vendors, give preference to companies with strong environmental principles, including recycling programs, reduced VOC emissions, and use of FSC- Certified wood.
B. Furniture vendors on contract as of October 2011.
   1. BKM - Steelcase
      Carol Sperry
      csperry@bkmsd.com
      (858) 569-4790
      9201 Spectrum Center Blvd Suite 100
      San Diego, Ca 92123
      www.steelcase.com

   2. GM Business Interiors – Herman Miller
      Ellie Hirasuna
      ehirasuna@gmbi.net
      (619) 236-0500
      110 West "A" Street Ste 140
      San Diego, Ca 92101
      www.hermanmiller.com
   3. KI
      Jennifer Smith
      jennifer.smith@ki.com
      (858) 484-5384
      14321 Claymore Court
      San Diego, Ca 92129
      www.ki.com
   4. OM Workspace – Teknion
      Ann Stark
      AnnStark@omworkspace.com
      (760) 583-1716
      www.teknion.com

C. Systems in Contract

1. All systems/desking systems. The furniture vendors will be able to get the line information to you.
2. Files/bookcases - The furniture vendors will be able to get the line information to you.
3. Classroom Chairs
   a. Move Stack Chair – Upholstered seat Model # 490410
   b. KI – Strive Chair – Upholstered and Poly seat
   c. Virco – Tab Arm Chair – Model # SG418TAFBR
4. SDCCD has a mock up space that the users are required to visit at the start of each project, so that they can see a sampling of what is offered. The FF&E PM will coordinate this meeting with the Purchasing Department when necessary.

D. What items will have to go out to bid?
   1. Classroom Tables
   2. Conference Tables
   3. Task Chairs
   4. Stools
   5. Guest Chairs (unless the users would like to use the classroom seating chairs)
   6. Any other type of furniture that is not listed on contract. Purchasing will determine which items will be on contract and which items will be biddable.

E. How to handle biddable furniture.
   1. Coordinate with the District FF&E Project Manger.
   2. Develop performance specifications for the items. Please be specific, since they will most likely have to go with the lowest bidder. We will determine exact finishes after all biddable items come back.

F. Accessibility requirements
   1. Please contact the following DSPS officers for their occupancy requirements:
      a. Miramar College - Jeff Higginbotham – jhigginb@sdccd.edu
      b. City College - Debra Wright-Howard – 619-388-3513
      c. Continuing Education – Anne Heller – 619-388-3951
      d. Mesa College – Brian Stockert – 619-388-2539
   2. The ADA tables should be crank height adjustable.
   3. Please confirm with each campus, but most prefer to have special seating for the ADA stations. They would like this chair to be ergonomic for people with back injuries.

G. Computer Tables
   1. The District prefers not to have floor boxes. Please have all power coming off the walls.
   2. Floor boxes and locations if provided must be approved by the District Architect.
   3. Currently, the computer tables are under evaluation for a standardization process. The FF&E PM will let you know how to address these tables.

H. Layouts

1. For layout purposes please use the following measurements:
   a. Computer tables – 30" x 72" – for 2 people. CPU sling - district's computers have a dimension of: 13.8" H x 7.0" W x 14.6" D
   b. Classroom tables – 24" x 60" – for 2 people
   c. Aisles – SDCCD prefers aisles of 4' minimum in most cases.
   d. Offices – The following are the minimum requirements for each Faculty office:
      1) A lockable door with a key
      2) One desk with one lockable drawer with a key
      3) One desk chair
      4) One chair for visitors
      5) One lockable filing cabinet with a key
      6) Shelving for books
      7) Approximately 100 square feet
2. Classrooms – please provide the following in all classroom layouts:
   a. Instructor's table – 24" x 72" table preferably by podium.
   b. Instructor's Chair – Typically, these will be the same as classroom chair which will be located with the instructor's table. Please ask the user group for their preferences.
   c. Podium Stool
   d. Smart Podium – dimensions – 36" W x 30" D x 44" H. The district would like to maintain 5' from the front wall, and 36" clear on other 3 sides
      1) Smart Podium is Owner furnished and contractor installed and comes with accommodations for:
         a) Computer
         b) Projector
         c) Assisted Listening Device
         d) Podium
         e) AV and Controls

3. District FF&E Contacts:

   Tricia Hendrickson – FF&E Project Manager
   Cell: 619-942-2889
   Office: 619-819-6727
   thendrickson@gafcon.com

   Laura Faustine – FF&E Project Manager
   Cell: 619-992-6434
   Office: 619-819-5485 x 2209
   lfaustine@gafcon.com

I. Computer Desk Criteria
   1. General:
      a. **Verify current requirements with the District FF&E Project Manager.**
      b. The intent of the computer desks is to provide versatility in the computer classrooms, conveniently converting them to standard classrooms by lowering and concealing the computer monitors. In the closed position, the vertical work surfaces must be smooth, free of obstruction and suitable as a writing surface. In the open position, the monitors must be completely visible to the user, and all controls easily accessible.
   2. Operation:
      a. Two types of mechanisms shall be provided to raise and lower the monitors. One must be fully electronic, using a low-voltage motor, housed within the desk. The control switch to raise and lower the monitor shall be mounted below the work surface, close to the user. The electrical components shall all be U.L Listed.
      b. The monitor opening must accommodate a 22: LCD monitor and have VESA compliant mounting bracket. The monitor must have the capability to pivot up to 15 degrees to accommodate user-preferred viewing angle.
      c. The second type shall be manual, operated either by crank, spring-load, or pneumatic arm.
      d. The mouse and keyboard may be housed and concealed with the monitor or on a separate keyboard tray mounted under the work surface.
      e. Both options shall ensure the integrity of cabling and housed equipment during raising/lowering operation.
   3. Construction:
      a. Horizontal work surfaces shall be constructed of at least 1" thick, 45 lb. medium density fiberboard or particleboard with high-pressure laminate and high-pressure backing sheet. All fiberboard and particleboard components shall be of domestic origin.
      b. Edge options shall include Post-formed Laminate, Urethane, T-mold, PVC and Vinyl. Flat laminate self-edged is not acceptable. Offerings may combine a Post-formed front edge with one of the other three edges. These desk may be used in a side-by-side configuration. Please consider this when identifying an appropriate edge for the sides.
      c. Work surfaces shall be bolted to leg assemblies using torx-head (tamper-resistant) bolts through threaded steel inserts in the underside of the surface.
      d. The frame of a steel constructed desk shall be tubular with full width/height sheet metal panels. All steel components must have matching powder-coat finishes.
      e. All MDF wood components must be compliant with the California Air Resources Board (CARB) regulations.
      f. Available options shall include side panels with grommets, keyboard and mouse holder, full modesty panels, lower cord channel to accommodate most power strips, and sturdy, adjustable steel CPU holders that maximize legroom.

g. Each model shall have corresponding dual or tandem desk available (two computer systems) with a minimum width of 72 inch width. Single use desk must have a minimum width of 36 inches.
h. Each model shall have a corresponding desk available meeting all ADA compliance regulations.

4. Power and Data:
   a. The power in-feed shall bring power from the building power source up to the beam electrical system of the computer desk. The in-feed must be pre-wired to connect at least four computer desks. Each desk must include four 110 power inputs and two RJ-45 data ports. Power and data shall be placed under the desk. Each shall have cable management features for the cable runs from the CPU/monitor to the owner/data ports.
5. Warranty:
   a. The successful bidder will be required to furnish a minimum five (5) year warranty including all terms and conditions, limitations, and exclusions from either the manufacturer or the successful bidder's company on all equipment. The cost of the warranty shall be included in the unit price for each item bid.

Waste Management

A. Separate packaging materials in accordance with the Waste Management Plan and place in designated areas for recycling.

Site Furnishings

- **REFER TO SAMPLE SITE FURNISHINGS SECTION #129300 - (Click Here)**

A. Also refer to Site Furniture located in Volume III - Division 32.

ELEVATOR REQUIREMENTS

Elevator Controls

- **REFER TO SAMPLE ELEVATOR SECTION #142000 - (Click Here)**

A. General

1. **The District does not want exterior elevators as a general rule; if required entries must be covered and there must be positive drainage away from the elevator door.**
2. There will be no use of proprietary elevator systems for both traction and hydraulic elevators.
   a. Elevator Control Systems
   b. Fault Diagnostic System
   c. Maintenance Dam

B. Elevator Control Design Standards
   1. Elevator Control Systems:
      a. Provide a non-proprietary microprocessor controlled dispatching. Include hardware necessary to protect motors, motor drives and door operators. Software shall control group and simplex program operations.
   2. Fault Diagnostic System: Provide all hardware such as computer, keyboard and CRT monitor or manufacturer's hand held diagnostic tool to retrieve and display the following:
      a. Diagnostic system shall be capable of determining faults most to find. It shall constantly monitor the condition of all car computers. When variances occur from the normal mode, the change or fault shall be detected, the location of the elevator, time of day, number of times fault occurred, along with fault code message shall stored on memory. This information shall be retrievable to a minimum of the last 200 entries.
   3. Maintenance Data: After completion and prior to final acceptance, submit three sets of complete and accurate maintenance data specific for each elevator. Final payment will not be made until received.
      a. Manuals: Describe proper use and maintenance of equipment, points, and types of lubricants used and frequency of lubricant application.

b. Parts Catalogs: Complete listing of all parts of equipment and components used in the installation.
c. Wiring Diagrams: One laminated set mounted in machine room, one reproducible Mylar set and one blue line set delivered to Owner. Wiring diagrams shall be as built, specific for this installation, and reference identification on drawings shall match points identified on terminals of controllers.
d. Maintenance Tool and Software Manuals: Provide maintenance tools and supporting software documentation required for the complete maintenance of the entire system including diagnostics and adjusting, Maintenance tool may be hand held or built into control system and shall be of the type not requiring recharging or re-programming nor of the automatic destruct type. The tool and supporting software may be programmed to operate only with this project's identification serial numbering.
e. Power rotor on all elevators
f. Provide stand alone air-conditioning and ventilation unit for equipment room.
g. Provide Rescue-vator on all elevators.
h. **Sump pumps may be installed in elevator pits at some sites that have ground water issues.** Elevator sump pits may drain into the sanitary sewer.
i. Elevator pits will be waterproofed.
j. Two-year warranty by installer supported by local elevator maintenance company - 45-minute or less response time on emergency calls. Elevator will provide same day service on calls.
k. Note that Elevator inspectors have been concerned about the heat generated in Elevator Machine Rooms due to hydraulic pump capacity. Provide either louvered doors and wall vents sized accordingly or provide for a mechanical ventilation system.
l. Provide for permanent structural Hoistway Beam at all shafts (even though not required by code).
m. Neither Card Readers nor cameras are required at elevators
n. Confirm the need for added Maintenance Term with the District Architect.
o. At all traction elevators, provide emergency release to drop to first floor for exiting of elevator cab.
p. Verify requirements for ADA accessible elevator with emergency power.
q. Elevator contractor shall provide a key box in the pit of the elevator to house the elevator equipment room key. The key box should be mounted next to the light switch in the elevator pit.

END OF VOLUME I

2011 District Design Standards Manual

Volume II

SAN DIEGO COMMUNITY COLLEGE DISTRICT

3375 Camino del Rio South #310
San Diego, CA 92108

Phone 619.388.6546 • Fax 619.388.6509

Updated: 10/31/2011

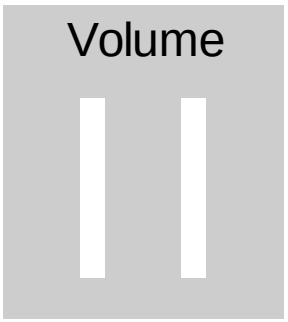
Note that significant revisions to the 07/07/10 Version of the District Design Standards Manual are shown in **BLUE** print.

Divisions 15-30

Sample Specification Sections

Note that sample specification sections depicting content from these District Standards have been incorporated by hyperlink to reinforce the 10/31/2011 Updated District Standards language and to help the A/E team to organize their design and materials and incorporate the District Standards and Guidelines. These are sample reference specifications and their use and reference in no way relieves the architects and engineers from preparing accurate technical specifications specific to the project for which they are contracted.

Volume II - DIVISION 15-20
RESERVED



WET PIPE SPRINKLER SYSTEMS

- **REFER TO SAMPLE WET PIPE SPRINKLER SYSTEMS SECTION #211313 (Click Here)**

GENERAL:

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device.

B. At least one tampered shut-off valve shall be provided for each floor of a building.

C. Standard-Pressure Piping System Component: List for 175-psig minimum working pressure at Mesa College; verify the listings for the other campuses for basis of design criteria.

D. Comply with the provisions of applicable NFPA standards including:
   1. NFPA 13, Standard for the Installation of Sprinkler Systems
   2. NFPA 24, Standard for the Installation of Private Fire Service Mains and their Appurtenances.
   3. NFPA 72, National Fire Alarm and Signaling Code (CA Amended) 2007 Edition (see UL Standard 1971 for "Visual Devices."
E. Reference Code sections for NFPA Standards – 2007 CBC (SFM) Chapter 35.

SEISMIC PERFORMANCE:

A. Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13, ASCE/SEI 7 and latest State of California requirements.

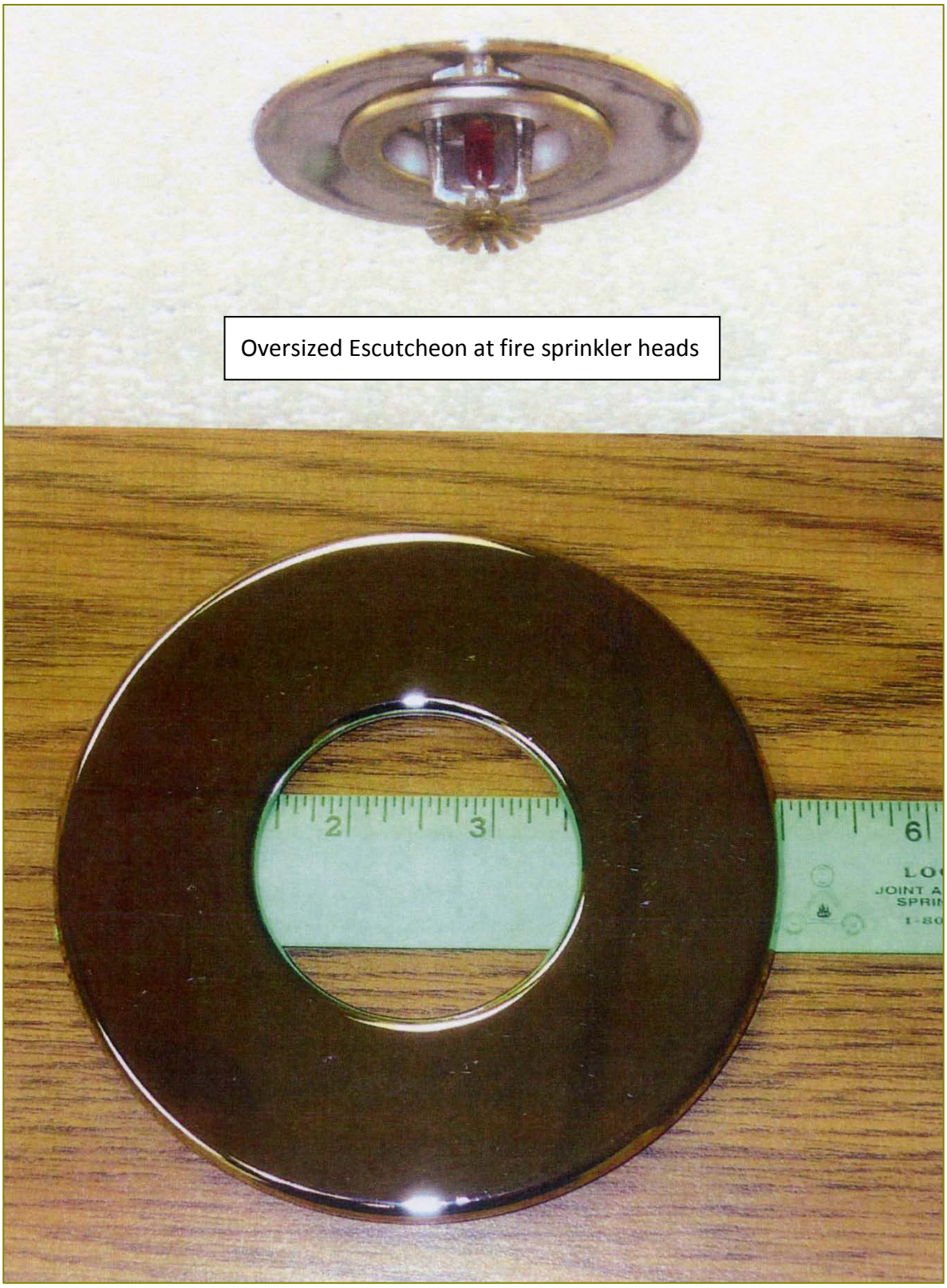
B. DSA has required Flex connectors or oversized escutcheon at all fire sprinkler heads. Provide the oversized escutcheons until otherwise directed by the District.
   1. ASCE Standard, Revision of ASCE 7-98 to 7-02 sets the requirement.
      a) "9.6.2.6.2.1 Seismic Design Category C. Suspended ceilings in Seismic Design Category C shall be designed and installed in accordance with the CISCA

recommendations for seismic Zones 0-2, (Ref. 9.6-16, except that seismic forces shall be determined in accordance with Sections 9.6.1.3 and 9.6.2.6.1.

b) Sprinkler heads and other penetrations in Seismic Design Category C shall have a minimum of 1/4 in. (6 mm) clearance on all sides." San Diego is in Seismic Zone 1

C. Mechanical-T and -cross pipe fittings: Permitted in retro-fit applications only (not applicable for new projects), but only upon prior specific written approval from Engineer

D. Alarm-device types shall match piping and equipment connections.



Oversized Escutcheon at fire sprinkler heads

Volume II - DIVISION 21
FIRE SUPPRESSION

PLUMBING & PIPING SYSTEMS REQUIREMENTS

GENERAL REQUIREMENTS

A. Underground pipe design standards shall be of 50+ year quality standards.
B. Contractor and architect shall provide accurate as-built 3D BIM model per District BIM standards.
C. Provide an access ladder in storm drain and sewer manholes that are greater than four feet deep per San Diego Regional Standards.

GENERAL DESIGN GUIDELINES

A. **Unisex, single-occupancy restrooms shall be provided as follows, with no exceptions;**
    a. **One per building for each 100,000 SF, this will be a public accessible restroom with the control of the keys to be determined by the specific Dean. A sign should be posted providing direction to the individual with the key.**
B. Hose bibs every 100 feet in lockable flush boxes
C. **For design of multi-stall restroom facilities, men should be consistently on the right and women on the left.**
D. **Where drinking fountains are provided near multi-stall restrooms they should be recessed.**
E. Architecture and plumbing design shall Coordinate that eyewash stations and emergency showers have floor drains
F. Environmental Plumbing considerations
    1. Avoid polyvinyl chloride (PVC) pipe for water delivery and drain systems (due to potential impacts of PVC disposal at end of product life)
    2. Do not use solder containing lead.
    3. Use of greywater shall be encouraged (non-treated water from showers, lavatories, and clothes washers) for below grade landscape irrigation where applicable.

SANITARY AND STORM SEWER SYSTEMS

A. Goals and Objectives:

1. Provide safe, efficient and easily maintained systems. Coordinate Elevations of surfaces; level appurtenances with relationship to other site elements.

2. Provide systems that are designed to be easily accessible for maintenance.
3. Design storm drainage systems for a 50 year rain. Storm drains that are otherwise compliant, serving collection deeper than 2", shall have a full size clean out adjacent to collector to serve its outlet drain.
4. Coordinate the design of storm and sanitary sewer systems with state and local governing authorities. Comply with San Diego city regulations for storm water leaving the site.
5. **All storm water shall be collected and piped off-site only if water cannot be filtered through landscape or other means.**
6. The District maintains service request forms and contact points for public utility systems.
7. Design systems that do not require pumping. Coordinate the depth of site utilities with building utilities.

B. Waste Piping - General

1. Acceptable sanitary sewer pipe materials:
   a. Cast-iron; no hub (husky bands above/below grade couplings)
   b. SDR 35 PVC sewer pipe
2. Acceptable storm drainage pipe materials:
   a. Ductile iron; within building zone of influence.
   b. HDPE with gasketed water-tight couplers
   c. SDR 35PVC pipe
3. Note that only cast-iron is acceptable beneath buildings under a concrete slab, however storm drain piping shall not be routed underneath buildings.
4. Laboratory sinks and floor drains shall use copper piping.
5. Do not use asbestos cement piping.
6. Use mechanical pipe joints wherever possible
7. Where soil is acidic, encase metallic pipe in PE sheathing
8. Use consistent type of piping and fittings; review selection with District
9. Provide accessible clean outs, opening to practical clear space adequate for server equipment and personnel to service the cleanout.
10. In system design, consider future expansion, or the addition of re-locatable units.
11. Outdoor Lunch areas require a large catch basin with a separator to retain solids
12. Where drain lines are required in planter areas, locate lines to avoid proposed trees.
13. If roof drain lines are required to be connected to the storm drain system. Coordinate depth of footings where required so piping can be properly installed.
14. Exterior downspouts shall be scheduled 40 galvanized steel pipe. Equip downspouts with cast iron "T" cleanout with ABS plug just above grade.
15. Provide storm drain connection to drain electrical manholes.
16. Where retaining walls include perforated pipe foundation drainage connect to storm drain system.
17. Locate catch basins so that runoff from paved areas does not pond on hardscape.
18. Avoid locating catch basins or manholes in pedestrian traffic lanes.

19. At drainage structure inlets in pedestrian traffic areas, spacing of grating bars shall comply with ADA requirements.
20. Building underground drainage/sewer piping shall be laid in a uniform bed of sand; provide pea gravel bedding material beneath piping laid to drain from 2 ft. outside of building.
21. Contractor to pressure jet storm drains and sewers at end of construction, prior to occupancy to insure they are free of any construction debris, then specify that Contractor is to video-tape sewers and storm drains to verify alignment, full and drainage. Video tape must show a wet run water test with inspector present.
22. Provide 24 inch wide concrete apron around catch basins located in decomposed granite surfacing.
23. Grates for catch basin inlets shall be galvanized steel, traffic rated and ADA compliant in all traffic areas.
24. In any building the water delivery water system and bathroom on each floor must be able to be isolated from the rest of the building without affecting the water supply system to the remainder of the building. Provide shut-off valve in accessible area for all restrooms.

C. Laboratory Piping Requirements

1. For PP Drainage Pipe and Fittings, provide ASTM F 1412, pipe extruded and drainage-pattern fittings molded, with Schedule 40 dimensions, from PP resin with fire-retardant additive complying with ASTM D 4101; with fusion-joint ends.
   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      1) IPEX Inc.
      2) Orion Fittings, Inc.; a
      3) George Fischer Sloane Inc.
2. Adapters and Transition Fittings shall be Corrosion-Resistant including assemblies with combination of clamps, couplings, adapters, and gaskets; compatible with piping and system liquid; made for joining different piping materials.

Domestic water system

A. Goals and Objectives:

1. The intent of this section is to define system features that will provide a safe and sanitary domestic water distribution system designed for a life of 50 years, with low maintenance and operating costs. Natural gas shall be the energy source of choice for all heating requirements. Electric heat shall only be used when the installation of natural gas is cost prohibitive.

B. Domestic water lines

1. Neither galvanized steel nor soft copper water piping shall be used for domestic water systems except for under slab trap primers. All domestic water lines within buildings and above ground shall be type "L" copper. Cold water piping below grade shall be type "L" copper, with wrought copper brazed fittings. Pipes outside buildings in the ground will be. Copper up to 3 inch lines and C900 for larger lines with mechanical compression couplings, mechanical joints, or cement lined cast iron bell and spigot pipe with cement lined cast iron Class D fittings. Asbestos cement pipe shall not be installed.
2. Sterilization or disinfection of domestic water systems shall be by approved processes and testing.
3. Shut-off valves shall be installed for each building on an exterior wall and clearly labeled. Shut-off .valves for the building may be inside the building provided they are in a service room, e.g., such as custodial, with access to an attic, etc. Where the valve must be in the ground, a concrete box shall be provided.
4. Branch mains serving fixtures in a battery shall be valved at pipe space; single fixtures and lines to hose bibs shall be valved. Concealed lines shall be provided with partition stops. No toilet room piping shall be exposed. Each restroom and cafeteria shall be provided with isolation valves. Use hot and cold full port ball valves only. Partition stops to be accessible through access panels.
5. Exterior water piping shall sheathed/encased with 6 inches of clean sand below and 12 inches above the piping. All valves operators are to be within 6 inches of grade. All portions of pipes within a minimum of 24 inches of covering over piping and fittings to finished grade. Install metallic tracer wires/tube over all below-grade piping. Trap primer valves should be accessible through access panels on vertical walls.

C. Inspection and Testing Water Piping:

1. All water piping shall be inspected in conformance with the applicable provisions of CCR Title 24 and the Uniform Plumbing Code and local regulations. All water piping shall be flushed out and hydrostatically tested at 150-psi pressure. No air testing shall be allowed.
2. Copper lines shall be isolated from all dissimilar metal and equipment with dielectric couplings. Dielectric couplings shall be used for all connections between pipe or tubing and all hot water equipment, both on inlets and outlets.
3. Meter size shall be determined by a consulting Engineer for each site by flow demand, available pressure, length of lines and future requirements. The water meter installation shall be provided in the construction contract. At least three water services shall be provided for each site, one for domestic, one for all landscape irrigation, and one for fire protection. In addition, schools with turf playfields designed to be maintained by the City of San Diego shall receive a separate meter and separate service, currently only Miramar College. The water service may consist of, either one or more meters manifolded in parallel with bypass and gauges. Use meters in parallel in cases where the meter

installation and rate charges would cost less than the next larger single meter size. This is to be determined by the consulting Mechanical Engineer following a cost-of-service analysis.

D. Pressure Regulators for Domestic Water:

1. Pressure regulators shall be required when water pressure exceeds 80 psig. Pressure regulators shall be two or more regulator valves manifolded together. If very high flow volume is required, pilot-operated regulators may be required. It may be necessary to install multiple regulators. If the current requirements do not require installation of a regulator, space shall be provided for the future addition of a regulator where possible, all regulars should have unions on inlet and outlet piping adjacent to regulator.
2. Strainers shall be provided ahead of all regulators. Gate valves and flanged unions shall be installed on each side of the strainer regulator assembly over 2" to facilitate servicing. One set of 0 to 200 psi pressure gauges shall be installed upstream and downstream of the strainer regulator assembly.
3. Regulator assemblies may vary in makeup and layout depending on conditions (load, length of lines, and pressure drops, etc.) to suit each project as determined by the consulting Mechanical Engineer. All services shall be above ground in a fenced area.
   a. Small services (up to 75 gpm and less than 2 inch pipe size) may be handled with just two regulators in parallel, one for high-flow and one for low-flow.
   b. Medium size services (up to 100 gpm and 2 ½ inch pipe size) may have multiple regulator assemblies for high-flow conditions and one smaller assembly on a straight-through run for low-flow conditions from the regulator assembly to serve toilet facilities for portable buildings, if these areas can be anticipated and suitable toilet facilities are not provided for them in adjacent permanent building(s). Lines shall be properly valved at the service end with a ball valve in a service box, and shall be capped or stubbed off.
   c. Large size services (over 100 gpm and pipe size above 2 1/2 inch) shall have multiple regulator assemblies similar to the medium service. The service gate valves on both the line from the meter(s) and the line to the building shall be installed above ground. Provide in the specifications that the contractor shall deliver to the District Inspector or Maintenance Department two wrenches of a length adequate to operate any gate valve installed.
4. Provide valved water branch lines of a minimum 2 inch size downstream the regulator assembly to serve toilet facilities for portable buildings, if these areas can be anticipated and suitable toilet facilities are not provided for them in adjacent permanent building(s). Lines shall be properly valved at the service end with a ball valve in a service box, and shall be capped or stubbed off downstream from the valve.

E. Water Valves:

1. Temperature and pressure relief valves shall be piped to the full size of valve to point of discharge, with no other valve in the discharge line. Relief valves shall discharge into an approved receptor in a visible location. Brass compression unions should be used to join temporary pressure valve drains to the valves; they serve to help facilitate valve change.
2. Water hammer arresters shall be located, sized and certified according to manufacturers recommendations. Branch lines in toilet rooms feeding batteries of fixtures with quick closing valves shall be equipped with water hammer arresters. Air chambers are not acceptable. Access panels shall be provided for their removal and replacement.
3. Shut off valves shall be provided for each restroom.

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F. Hose Bibs:

1. Hose bibs used in or on buildings shall be provided with partition stops or shall be fed with fixtures having stop valves. Hose bibs in finished areas shall be rough chrome plated; all others shall be rough brass. Hose bibs accessible to students shall be a vandal proof type.
2. Provide outside hose bibs every 100’ around all buildings (exterior). Domestic water shall be used for wall mounted hose bibs at buildings for maintenance and cleaning purposes; greywater shall be used for quick coupler landscape hose bibs with signage indicated same.
3. Provide a chrome-plated, lock shield cold water hose bib in a chromed recessed box with cover in men and women restrooms.
4. Provide outside hose bibs at each rooftop mechanical area (enclosure).

G. Domestic Water Systems:

1. The generation and delivery of hot water shall comply with the regulations of the Uniform Plumbing Code and of CCR Title 24, Article 2, Division 7, Service Water Heating. As far as design is concerned, system components, distribution systems, hot water requirement estimates, and equipment sizing shall follow the recommendations of the ASHRAE Current Systems Handbook, Chapter 34, "Service Water Heating", unless higher or larger provisions are called for by National, State or Local codes or regulations.
2. Hot water requirements for individual portable classroom buildings or remote locations shall be provided with individual, minimum size of 6-gallon electric water heaters, with drain pan.
3. The hot water system shall have adequate capacity for full recovery. Multiple high efficiency type heaters with fast recovery shall be used.
4. Natural gas is the preferred energy source for water heating and shall be used whenever available. Heaters serving isolated or remote locations may use electricity as a heat source with 6-gallon storage tanks or the use of multiple smaller heaters installed in a manifold arrangement is desired over the use of one or two large boilers where approved by District, non-storage type instant P.O.S. heaters may be used.
5. Re-circulating lines and pump shall be installed on hot water systems whenever there is are remotely located fixture requiring hot water in excess of 60' of delivery piping

between heat source and fixture. All circulation systems shall be Type L copper installed as much as possible in accessible areas, where possible fittings in circulation system shall be cast brass copper sweat type.

H. Direct Water Heaters:

1. Water Heaters–Gas: These heaters shall be AGA certified; power vented commercial type; high-thermal efficiency, glass lined. 125 psig working pressure; magnesium anode; insulation (per CCR Title 24 Article 2); 100 percent safety shut-off; combination temperature and relief valve. Ball valve and check valve shall be provided on cold water piping and outlet piping at heater and shock absorber and thermometer on hot water piping from heater; ASTM T & P valve. PVC flue through roof shall be provided, as well as approved weather cap.
2. Water Heaters-Electric: These heaters shall; be commercial type, magnesium anode, with immersion type thermostats and heating elements Heaters shall be UL 174 rated, and labeled. Ball valve and check valves shall be provided on cold water piping to heater, and shock absorbers and ball valve and adjustable thermometers on hot water piping from the heater and ASME T&P relief valve. Adequate service space to be provided in front of heater service panel.
3. Electric Booster Heaters-Dishwasher: These heaters shall be stainless steel, rod-type element, aquastat, combination pressure and temperature relief to the outside. They shall be ASME and UL approved.

I. Hot Water Storage Tanks:

1. Tanks shall bear AS ME label for 150 psig service. All storage tanks shall be equipped with magnesium anodes. All larger storage tanks shall either be unlined steel (but be equipped with magnesium anodes), or shall be lined with SOC-CO-CO, Kessite No.1, or Heresite of 6 millimeter thickness applied in three coats minimum, with baking between each coat.
2. Copper lines shall be isolated from hot water tanks and other equipment with dielectric couplings or unions.
3. All hot water storage and water heater tanks shall be equipped with a shut off valve and check valve installed in the cold water and hot outlet supply to the storage tank. A thermometer shall also be installed at the hot water outlet.
4. Where approved by the District, properly sized commercial on demand type tankless water heaters may be used.

J. Insulation of Hot Water Storage Tanks and Piping:

1. Unfired service water storage tanks as well as service hot water supply and recirculation piping (except for run outs for fixtures not longer than 10ft. in length) shall be insulated in compliance with the provisions of CCR Title 24, Article 2, Division 7.

K. Domestic Water Pumps:

1. Circulating Pumps (in –line): Circulating pumps shall have a 175 psig working pressure. These pumps shall have a bronze body, flanges and impeller, carbon and stainless steel shaft, and drip-proof premium efficiency motor. These pumps should be of the maintenance free self-lubricated type. Installation shall include separate service ball valve shut offs immediately upstream and downstream of the pump. Additionally, a bleed hose bib shall be installed between the pump and he downstream service shut off.
2. Circulating Pumps (floor mounted): These pumps shall be direct connected, close coupled, centrifugal, and rated at 1750 RPM. Pumps shall be equipped with enclosed type bronze impellers, a mechanical seal, a drip-proof premium efficiency motor, and reinforced metal flexible connections on suction and discharge.

SANITARY WASTE SYSTEM

- **REFER TO SAMPLE SANITARY WASTE AND VENT PIPING SECTION #221316 - (Click Here)**
- **REFER TO SAMPLE SANITARY WASTE PIPING SPECIALTIES SECTION #221319 - (Click Here)**

A. Goals and Objectives:

The intent of this section is to define system features that will provide a safe and sanitary system for disposal of liquid waste and sewage.

B. Soil Waste and Vent Lines:

1. Chemical Waste and Vent Lines-Use polypropylene fittings, vents, and waste lines on all chemistry sinks. Dilution or neutralization tanks will not normally be required.
2. Sewer Lines-Copper sewer lines in the ground shall be kept 4 feet away from other metal pipes or conduits when running parallel to same, and are to be separated by one foot when intersecting other metal pipe lines or conduits. At point of intersection wrap lines for I foot each way with an approved 10 millimeter plastic tape with a 50 percent overlap. Sewer lines serving toilets shall not be less than 4 inch diameter.
3. Vents – Plumbing vents may be:
   a. Cast iron pipe, service weight, no hub, with neoprene gasketed fittings
   b. Copper drainage tube, type DWV, with wrought or caster brass solder fittings.
   c. Roof vent termination points shall appropriate protection against roofing material or debris entering vent system.
4. Closet bends shall be 4” x 4”. No 4”x3” closet bends shall be used in District restrooms.

C. Sewer material-Within Buildings:

1. In ground: Service weight cast iron no-hub pipe with no-hub cast iron couplings or type DWV copper with wrought or cast brass DWV solder fittings.
2. Above ground: Service weight cast iron no-hub pipe with no-hub cast iron couplings or type DWV copper tubing with DWV wrought or cast brass solder fittings.
3. Food prep and service sink grease traps should be located in unobstructed, accessible areas for necessary maintenance.

D. Cleanouts:

1. Provide cleanouts as required by code, where not covered by District standards. The only exception is that cleanout sizes shall be the same as pipe sizes, with the maximum cleanout size being 6 inches. Cleanouts shall be brought to finish grade/surface on a full "Y" angles. Cleanouts in floors or exterior walkways shall have nickel-brass frames and cover plates with mechanical fasteners and set flush with finish floor.
2. Cleanouts at exterior locations, except in walkways, shall terminate in a number three meter box with a cast iron cover marked "sewer", and set flush with finish grade. Cleanouts shall be threaded pipe using a screw plug. Compressor type cleanouts with a rubber seal shall not be acceptable. A minimum 4-inch thick concrete base shall be poured into the base of the box to secure the riser to prevent it from turning. Cleanout boxes shall be installed in line with drainage systems. Lid color shall be as follows: Blue indicating Water, Yellow indicating Gas and Green indicating Sewer. Building and Exterior cleanouts should be of the 2-way type.
3. Provide access door or locking cover plates for cleanouts in walls. Use floor cleanouts in preference to wall type where practical. Terminate wall cleanouts above horizontal waste lines e.g., urinals, lavatories, water closets.
4. Cleanouts shall be provided every 75 feet of developed lengths and extended to the surface to be readily accessible. Two-way cleanout at exterior edge of building.
5. Cleanout plugs must be lubricated and installed in such a manner to allow for easy removal.
6. Where manholes are installed they shall be installed every 200 ft. of developed length, in lieu of cleanouts.
7. Provide cleanouts, at end of all horizontal runs, at all changes of direction exceeding 135 degrees, and at all floor levels. Cleanouts shall be fronted with clear, accessible service space.
8. Floor cleanouts will be installed where there is no conflict with the structural features of the building. Wall cleanouts will be used in lieu of floor cleanouts where structural conflicts exist.
9. Where required end-of-the-line cleanouts would normally be set in a building interior space, the cleanout shall be extended to a serviceable exterior space and be terminated in

an approved manner. in carpeted areas they shall be extended to the exterior of the building, and be terminated in an approved manner.

10. Stub-outs for future buildings, including a sewer line to serve toilet facilities for portable buildings where these areas can be anticipated, shall be terminated in a full "Y" cleanout brought to within 6 inches of grade, and located in a number 3 concrete meter box with a cast iron cover set flush with finish grade. Cleanout boxes shall be installed in line with the piping run.
11. All sewer lines, 6-inch diameter and smaller, shall pass inspection under ten foot head of water, with no leakage.
12. Accessible cleanouts to be provided in each bathroom, custodial, laundry and kitchen area to serve fixtures within their respective rooms. Cleanouts should be extended to an accessible point next to the fixture it serves and not obstructed by that fixture.
13. Cleanouts shall not be concealed in a wall.

STORM DRAINAGE SYSTEM

- **REFER TO SAMPLE STORM DRAINAGE PIPING SECTION #221413 - (Click Here)**

A. Goals And Objectives:

The intent of this section is to define system features that will provide a rainwater drainage system to dispose of rain from a 4inch minimum rainfall without pooling or allowing erosion.

B. Downspout and Storm Drain System:

1. All downspout and storm drain piping underneath buildings, and to a point 5 ft. 0 inch outside and 6 inches above concrete slabs, shall be ASTM A 74 service weight hub-and-spigot cast iron pipe with cast iron fittings using elastomeric gaskets. (Husky HD 4 band).
2. All downspout piping to 6 inches above grade shall be ASTM AI20 Schedule 40 galvanized steel pipe and fittings. Anchoring for securing the piping shall be as determined by the consulting Mechanical Engineer.
3. Non-pressure type cement pipe, or Schedule 40 PVC pipe may be used, from 5 ft. outside of building, if so selected by the consulting Mechanical Engineer, for sizes up to 8 ft. in diameter, using approved and correct fittings per pertinent ASTM specifications.
4. For exposed rain leaders, use unpainted Schedule 40 galvanized iron pipe with threaded or mechanical couplings. In general, rain leaders should be concealed in walls or pipe chases to minimize maintenance and improve appearance. Galvanized steel, cast iron, or copper may be used for concealed rain leaders. When making a transition from copper or plastic to cast iron, use a mechanical dielectric coupling. Domes on roof drains shall be attached to the drain body in a vandal-proof manner. Plastic domes shall not be used. No P-traps shall be permitted in storm drain lines. All piping is to be run as straight as possible without unnecessary bends.
5. Provide clean outs in all rain water systems. Use sanitary fittings whenever possible. Cleanouts shall be a 4" galvanized tee with a newer seal or ASS plug.

6. Provide a clean sand backfill around all underground piping, 6 inches below pipe and 12 inches above pipe.
7. Roof over flow drains shall be daylighted from the roof through a scupper or brought to and through the wall at the lowest level through a drain outlet that would be visible to the Facility Services Staff. While recent code changes may now allow over flow drains to be connected to the storm sewer system piping within the building, this will only be allowed if the flow of water from the roof over flow drain can be visibly seen and/or monitored by water flow sensors.
8. Drains: Minimum slope for any drain in the District is ¼ inch per foot fall.

PLUMBING FIXTURES

- **REFER TO SAMPLE PLUMBING FIXTURES SECTION #224000 - (Click Here)**

A. Goals and Objectives:

1. Provide safe and sanitary plumbing systems with low operating and maintenance costs.
2. System design shall consider ease of fixture accessibility.
3. Select low-flow, water-efficient plumbing fixtures

B. Design Criteria:

1. Location of plumbing equipment must not conflict with the clearance required in front of electrical panels or other equipment.
2. All location and mounting heights shall be as directed by the construction documents, SDCCD Planning Guides, and/or as specified herein.
3. Where feasible and where back to back fixture carriers are specified, provide a 24" wide, walk-in pipe and plumbing chase access should be provided for multiple fixture restrooms accessible through men's room only.
4. Stop valves shall be provided at all fixtures to enable shut down of supply to fixture. Shut-off valves shall be provided for groups of areas of plumbing fixtures to prevent having to shut off entire building(s) for repair or maintenance. Use full port valves only. Do not use compression fittings, use IPS type stops only. Ball valves are preferred to gate valves. Contractor to provide District inspector, at job completion with a register of water shutoffs at job site including areas or fixtures served by each valve. Valve tags to be contractor provided that correspond to valve identification numbers on register so as to guide maintenance personnel to shut off location.
5. Water lines serving each faucet with provisions for a hose attachment shall be provided with a vacuum breaker. Vacuum breaker to be outside walls, not mounted inside walls.
6. All garbage disposals in food service areas shall be provided with an automatic flow of water through an air gap device or vacuum breaker.
7. Branch lines in restrooms feeding batteries of fixtures with quick closing valves, such as flush valves or quick-closing faucets, shall be equipped with water hammer arresters.

Install ball valves ahead of water hammer arresters and in such a manner as to be readily accessible for replacement.

8. Water services shall be divided into three separately metered services; one for the primary school site (except for any additional remote service to supply/relocatables), one for all landscape irrigation, and one for fire protection. Approved backflow prevention devices shall be provided in each service at the main takeoff. Contractor to secure and provide initial certification of backflow devices. Building domestic water delivery systems requiring backflow to include all devices 2" larger should be split and manifolded with properly sized matching backflows installed in parallel to that area. Brass backflow devices shall be protected from theft and tampering by a stainless steel mesh cage, secured to the concrete slab below the device. The cage shall include a hinged or sliding lockable access panel so as to allow for certification testing and repairs.
9. No-hub cast iron sewer pipe shall be installed under buildings or in the ground. PVC piping is not acceptable within buildings. Plastic pipe is in the crawl space under permanent buildings.
10. Provide 4-band or "Husky" type couplings where no-hub pipe is used.
11. All piping, fittings and strainers size 3 inches and less, in water pressure regulator stations 3 inches and less, shall be brass or copper.
12. Self-closing metering faucets (requiring 5 psi or less operating pressure) shall be used in all school lavatories.
13. Water piping shall not be installed in or under concrete slabs, but may be installed under raised buildings with a crawl space.
14. All vents through the roof shall be metal-type and provided with a vandalism-proof cap. Where roofing is a built-up roof with gravel, PVC or ABS is not acceptable, except when installed in conjunction with single-ply roofing systems.
15. The main soil line cleanout shall be extended to grade and made accessible within 2 feet of exterior of each building, and shall be 2-way cleanout.
16. Showers for the handicapped, if any, shall be hand-operated with flexible hose, a single lever water control and vacuum breaker.
17. Lead shall not be used in any system. All solvents shall be water flushed.
18. Sterilization or disinfection of domestic water systems shall be approved by processes and testing.
19. Hot water shall be provided at all service sinks. If not economical to supply from a central hot water source, a minimum 6-gallon electric water heater shall be installed at each service sink. No hot water shall be provided in student restrooms.
20. At least one hose bib shall be made available within 10 feet of equipment on every roof that has mechanical cooling/heating equipment installed thereon.
21. All sanitary, horizontal waste and storm lines shall be rodded out. Rodding shall be accomplished using a rotary cutter, which shall be full size of pipe being cleaned. The lines shall be flushed simultaneously. Rodding shall not take place until building construction is complete, but prior to occupancy. This work shall be done in the presence of the School District Inspector.

22. The contractor shall provide a videotape of the interior of the sanitary and storm drainage and sewer systems at the completion of the job. Taping shall be done with the District Inspector present. Drain videos to include running water, so as to show a consistent drain "fall" and absence of "bellies" in drain piping.
23. No DWV copper shall be used in drain branches serving waterless urinals. Dirty arms for waterless urinals shall fall ¼" per foot.
24. Eye Washes: Free standing shower-type eye washer fixtures are to be located near a floor type drain in order to be served by the drain.
25. All cold, hot and re-circulating water piping, as well as de-ionized, fire sprinkler and gas piping, shall be appropriately labeled in at least two suitable locations as needed in each room that piping is installed. Flow direction shall be indicated with arrows and easily visible on pipe runs.
26. Bathroom shut off valves will be located in a bathroom interior wall 5 feet above the floor with an access door installed such that both valves can be operated through one wall penetration.
27. **Sloan sensor activated faucet is acceptable as long as it is hardwired and not battery powered. If sensor is used, each faucet should be wired separately and not in a daisy-chain.**
28. **Standard for stainless steel sink and Drinking Fountain is now 18 ga. and no longer 24 ga.**

C. Faucet Types:

Item	Make/Model	Part Number
Bathroom Lavatory Sinks 4" center faucets	Chicago	802-665CP
De-ionized faucet – for labs	Chicago	869-BPVC
Kitchen wall mount sink faucets double and triple pot sinks	Chicago	445 L8CP
Lavatory faucet, single hole, deck mount for potable water	Chicago	930-CP
Lavatory Air/Gas Vacuum dispensers	Chicago	900 series valves
Service/custodial sinks	Chicago	897-CP (wall mount)
Toilet Floor Mount Disabled	Kohler	K4368 (12" rough)
Toilet Floor Mount Standard	Kohler	K4350 (12" rough)
Lavatory faucets; hot & cold	Sloan	EAF-100
Lavatory faucet; cold only	Sloan	EBF-615
Lavatory peddle values	Chicago	625 CP or 625 LPSLOCP
Gooseneck single-hole electronic faucet	Moen	8303

"Emergency Shower Eyewash Station" fixture	WaterSaver	Varies

D. Multiple Gang Lavatory Sinks:

1. Trough sink (Kohler - Undertone® 60" undercounter trough sink - K-3157; EKO - Commercial Trough CounterSink; Sonoma Cast Stone Commercial Trough Countertop).
2. Solid Surface 3- compartment sink
   a. Stained/ stamped concrete also acceptable.

E. Urinals:

1. 1- Pint Urinals are preferred to the waterless**.** District standard manufacturer is Zurn or Moen, Sloan, or Kohler. Unit should be battery powered; china urinal and flushometer should match and come as a single unit. A Clean out shall be provided that serves the sanitary tee for that urinal.

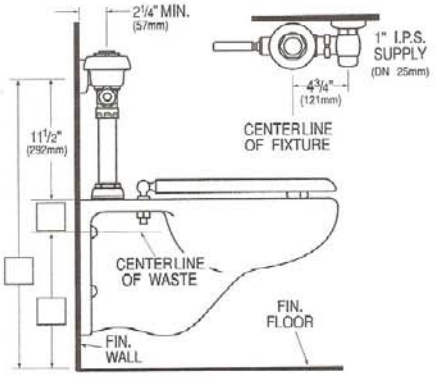
2. Waterless Urinals; The **Waterless urinal** is no longer installed in the District.

F. Flush Valves

NEW

UPPERCUT™

The Fastest Way to Start Saving Water!



WES-111 Dual-Flush Flushometer S.S. — Rev. 0b (10/05)

Dual-Flush Flushometer WES-111

▶ **Description**
Exposed Water Closet Flushometer with Dual-Flush Feature, for floor mounted or wall hung top spud bowls.

▶ **Flush Cycle**
☐ Model WES-111 Low Consumption
(Down 1.6 gpf/6.0 Lpf, Up 1.1 gpf/4.2 Lpf)

▶ **Specifications**
Dual-Flush, Quiet, Exposed, Diaphragm Type, Chrome Plated Closet Flushometer with the following features:

- Lifting Handle UP initiates reduced flush (1.1 gpf/4.2 Lpf), eliminating liquid and paper waste, saving a ½-gallon of water
- Pushing Handle DOWN initiates full flush (1.6 gpf/6.0 Lpf), eliminating solid waste and paper
- Reduces water volume by up to 30% when activated UPWARDS
- Antimicrobial Coating on Handle protects against germs
- PERMEX™ Synthetic Rubber Diaphragm w/Dual Filtered Fixed Bypass
- Distinctive Green ADA Compliant Metal Non-Hold-Open Handle with Triple Seal Handle Packing signifies Water Conserving Device
- 1" I.P.S. Screwdriver Bak-Chek™ Angle Stop
- Free Spinning Vandal Resistant Stop Cap
- Adjustable Tailpiece
- High Back Pressure Vacuum Breaker Flush Connection with One-piece Bottom Hex Coupling Nut
- Spud Coupling and Flange for 1½" Top Spud
- Sweat Solder Adapter w/Cover Tube and Cast Set Screw Wall Flange
- High Copper, Low Zinc Brass Castings for Dezincification Resistance
- Non-Hold-Open Handle, Fixed Metering Bypass and No External Volume Adjustment to Ensure Water Conservation
- Flush Accuracy Controlled by CID™ Technology
- Diaphragm, Handle Packing, Stop Seat and Vacuum Breaker molded from PERMEX™ Rubber Compound for Chloramine Resistance
- Includes (2) adhesive backed Metal Wall Plates etched w/Instructions

Valve Body, Cover, Tailpiece and Control Stop shall be in conformance with ASTM Alloy Classification for Semi-Red Brass. Valve shall be in compliance to the applicable sections of ASSE 1037, ANSI/ASME A112.19.2 and Military Specification V-29193.

▶ **Variations**

☐	TP	Trap Primer
☐	YG	Extended Bumper on Angle Stop (for seat with cover)
☐	YO	Bumper on Angle Stop (for open front seat without cover)

See Accessories Section of the Sloan catalog for details on these and other Flushometer variations.

Patent Pending

This space for Architect/Engineer approval

SLOAN®

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www.sloanvalve.com

G. Hydration Station:

1. Provide for one hydration (bottle or cup filling) station at the lobby or other central location at every new or reconstructed building. Use Hawes 2000 Hydration Station that is semi-recessed or approved equal.

2000
Hydration Station

FEATURES & BENEFITS

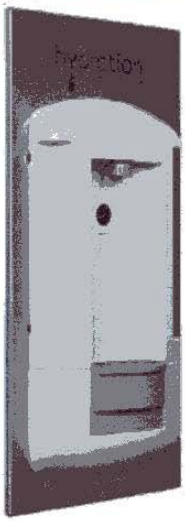
Sensor Operated
Electric sensor allows for touch-free hygienic operation, eliminating the need for manual activation under a number of circumstances.

Antimicrobially Treated
Specific components are antimicrobially treated using the natural protection of silver which helps protect against the growth of mold and mildew on those treated components.

Quality Control
The Hydration Station is pre-built and fully water and pressure tested to ensure no leaks and proper function for reduced installation time and added peace of mind.

Finish
#4 satin stainless steel finish back panel can be easily cleaned and maintained while also resisting corrosion.

Servicing
Durable ABS plastic front panel allows simple access to internal components. Hidden lock and hinges discourages vandals.



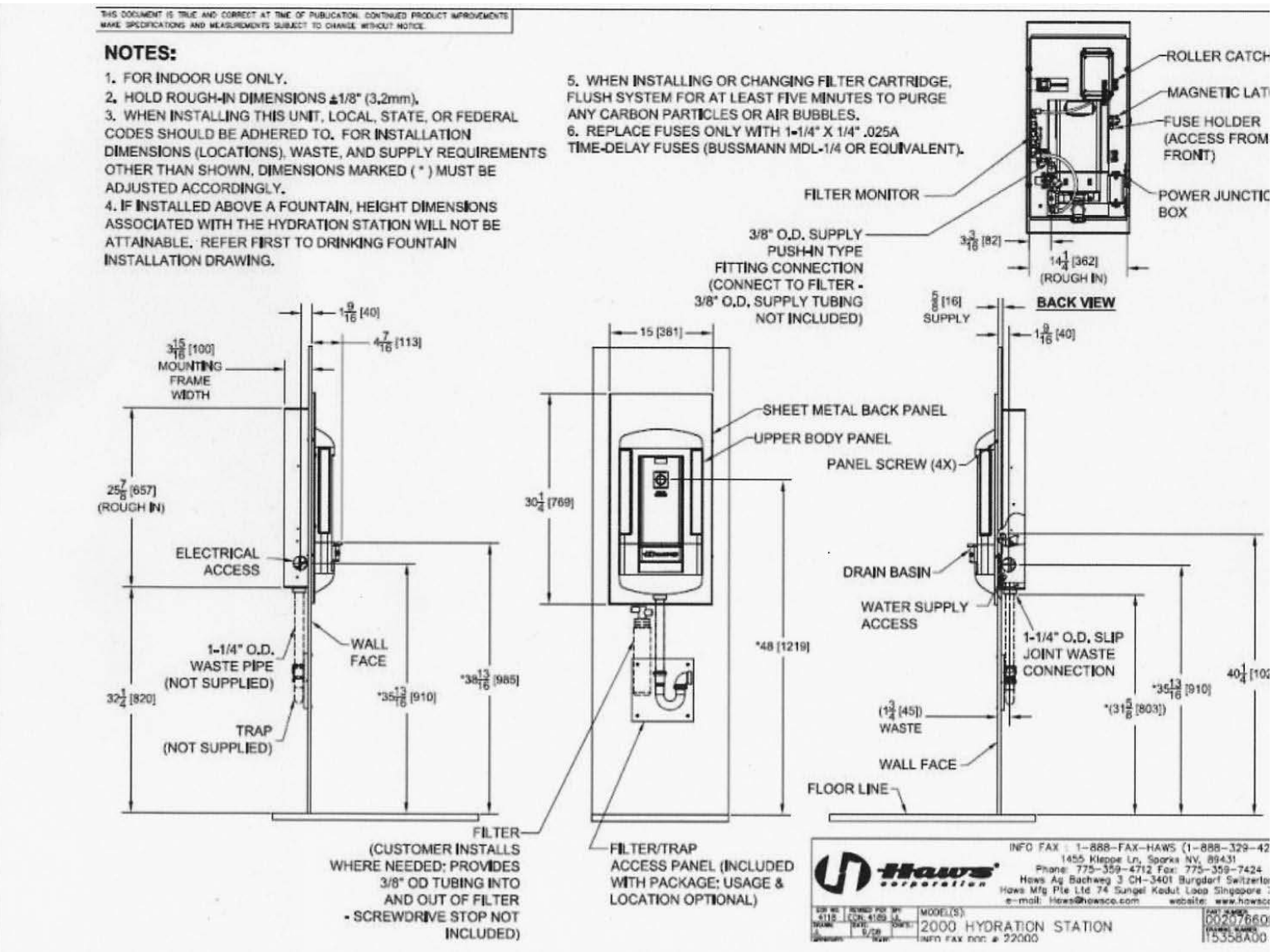
OPTIONS

- ❑ HCR8 (8 gallon chiller)

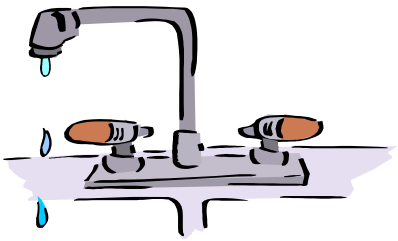
To see all options for this model, visit www.hawsco.com.

SPECIFICATIONS

Model 2000 Hydration Station is a semi-recessed, bottle or cup filling station constructed of durable ABS plastic and 18 gauge, Type 304 Stainless Steel with a satin finish. It shall feature an electric sensor allowing for touch-free hygienic operation, laminar flow to prevent splashing, .8 gpm flow rate for quick fill-up, and antimicrobially treated components to prevent the growth of mold and mildew on those treated surfaces. Hidden lock and hinges on ABS front panel allows access to internal components and indicator light to notify when filter replacement is necessary. The mounting consists of heavy gauge galvanized steel frame, hardware and trap access panel. Tailpiece is 1-1/4" O.D. Provision for trap (not included) must be made in or behind wall.


THIS DOCUMENT IS TRUE AND CORRECT AT TIME OF PUBLICATION. CONTINUED PRODUCT IMPROVEMENTS MAKE SPECIFICATIONS AND MEASUREMENTS SUBJECT TO CHANGE WITHOUT NOTICE.
NOTES:
1. FOR INDOOR USE ONLY.
2. HOLD ROUGH-IN DIMENSIONS ±1/8" (3.2mm).
3. WHEN INSTALLING THIS UNIT, LOCAL, STATE, OR FEDERAL CODES SHOULD BE ADHERED TO. FOR INSTALLATION DIMENSIONS (LOCATIONS), WASTE, AND SUPPLY REQUIREMENTS OTHER THAN SHOWN, DIMENSIONS MARKED (*) MUST BE ADJUSTED ACCORDINGLY.
4. IF INSTALLED ABOVE A FOUNTAIN, HEIGHT DIMENSIONS ASSOCIATED WITH THE HYDRATION STATION WILL NOT BE ATTAINABLE. REFER FIRST TO DRINKING FOUNTAIN INSTALLATION DRAWING.
5. WHEN INSTALLING OR CHANGING FILTER CARTRIDGE, FLUSH SYSTEM FOR AT LEAST FIVE MINUTES TO PURGE ANY CARBON PARTICLES OR AIR BUBBLES.
6. REPLACE FUSES ONLY WITH 1-1/4" X 1/4" .025A TIME-DELAY FUSES (BUSSMANN MDL-1/4 OR EQUIVALENT).
ROLLER CATCH
MAGNETIC LAT
FUSE HOLDER (ACCESS FROM FRONT)
POWER JUNCTIO BOX
FILTER MONITOR
3/8" O.D. SUPPLY PUSH-IN TYPE FITTING CONNECTION (CONNECT TO FILTER - 3/8" O.D. SUPPLY TUBING NOT INCLUDED)
3 3/16 [82]
14 1/4 [362] (ROUGH IN)
BACK VIEW
5/8 [16] SUPPLY
1 9/16 [40]
15 [381]
SHEET METAL BACK PANEL
UPPER BODY PANEL
PANEL SCREW (4X)
30 1/4 [769]
*48 [1219]
3 15/16 [100] MOUNTING FRAME WIDTH
4 7/16 [113]
25 7/8 [657] (ROUGH IN)
ELECTRICAL ACCESS
1-1/4" O.D. WASTE PIPE (NOT SUPPLIED)
WALL FACE
32 1/4 [820]
TRAP (NOT SUPPLIED)
*35 13/16 [910]
*38 13/16 [985]
DRAIN BASIN
WATER SUPPLY ACCESS
1-1/4" O.D. SLIP JOINT WASTE CONNECTION
(1 3/4 [45]) WASTE
*(31 5/8 [803])
*35 13/16 [910]
40 1/4 [102
WALL FACE
FLOOR LINE
FILTER (CUSTOMER INSTALLS WHERE NEEDED: PROVIDES 3/8" OD TUBING INTO AND OUT OF FILTER - SCREWDRIVE STOP NOT INCLUDED)
FILTER/TRAP ACCESS PANEL (INCLUDED WITH PACKAGE: USAGE & LOCATION OPTIONAL)
Haws corporation
INFO FAX : 1-888-FAX-HAWS (1-888-329-42
1455 Kleppe Ln, Sparks NV, 89431
Phone: 775-359-4712 Fax: 775-359-7424
Haws Ag Bachweg 3 CH-3401 Burgdorf Switzerlo
Haws Mfg Pte Ltd 74 Sungei Kadut Loop Singapore
e-mail: Haws@hawsco.com website: www.hawsco
MODEL(S):
2000 HYDRATION STATION
INFO FAX doc # 22000
00207660
15358A00

SPECIAL PLUMBING SYSTEMS



A. Goals and Objectives:

1. Provide system features that will provide safe and sanitary special plumbing systems with long life and ease of maintenance.
2. When air conditioning condensate plumbing is beyond the drain receptacle, and above grade, use DWV copper. Pipe and fitting joints to be tin antimony (95/5). Provide dual drains on any units above the ceiling.
3. Except for spouts and spout fittings, deck-mounted de-ionized H20 Dispenser for laboratory use shall not have fittings or connectors at their base less than 1/2" nominal pipe size.

WATER AND GAS SUPPLY AND DISTRIBUTION SYSTEMS

- **REFER TO SAMPLE NATURAL GAS PIPING SECTION #227000 - (Click Here)**

A. Goals and Objectives:

1. Provide safe and sanitary water supplies for potable water, irrigation water and fire water systems.
2. Provide safe gas piping systems that comply with utility company and government requirements. Coordinate the design of water systems with state and local governing authorities.
3. The District maintains service request forms and contact points for public utility systems.
4. Provide separate services for domestic, fire and irrigation water, along with separate meters for each.

B. Water Service:

2. Provide water systems that minimize wasting of water.
3. Locate water meters and control valves above ground; secure in a fenced enclosure.
4. Verify meter location with San Diego City Water Department. Contact prior to design.
5. Provide separate meter for irrigation water.
6. Acceptable underground water pipe materials:
   a. Type "L" copper with silver soldered joints.
   b. Cement-lined ductile iron with mechanical or flanged joints.
   c. PVC Schedule 80 or Class 200 as applicable, with ductile iron joints.
7. Do not use ABS or asbestos cement piping.
8. Do not use glued pipe fittings; use mechanical joints or soldered copper.
9. Use copper for lines 3 inches and smaller.

10. Where soil is acidic, encase metallic pipe in PE sheathing.
11. Use consistent type of piping and fittings; review selection with District.
12. Provide zone valves for water supply to each building.
    a. Identify valve locations on Contract drawings and post printed/numbered valve schedule in a building mechanical room for service reference. Tag valves with corresponding numbers for identification of zones controlled by each valve.
    b. Underground outdoor water shut offs shall include a brass tag identifying the area of the building it serves.
13. Do not use piping less than 3/8" diameter.
14. Do not use 3-piece valves underground.
15. Both single and multi-story buildings shall have main hot and cold water shutoffs for services; same for custodial, kitchen and related areas with multiple plumbing fixtures. Additionally each floor in multi-story buildings shall have accessible hot and cold shut-offs for each floor.
16. Buildings that are served by a campus "looped" water system, or connected systems fed by 2 separate meters, shall be plumbed in such a way that individual buildings or areas can be isolated, (shut off) with one water valve.

C. Fire Water Service:

1. Coordinate number and locations of fire hydrants, detector check valves and alarm devices with State and local fire authorities. Contractor to supply certified flow charts for hydrants showing sufficient water volume and pressure to serve protected area.

D. Gas Service:

1. Use PE piping for gas distribution underground.
2. Provided shut-off valve for gas service to each building.
3. An underground gas piping to include tracer wire to meet local code.
4. Provide seismic automatic shut off valves at each gas main and shut-off. Provide protective enclosure.
5. Confirm design goal of 10 Lbs. minimum gas pressure at project meter.

HVAC SYSTEMS REQUIREMENTS

A. **General Requirements:**
   1. Main Point of Entry (M.P.O.E.) I.T. Environmental Requirements
      a. Dedicated Air Conditioning is required unless only used as MPOE without joint use as Telco. See also Telco requirements.
      b. Environmental HVAC considerations
         1) Select equipment with highest efficiency available.
         2) Choose cooling equipment that does not utilize ozone-depleting refrigerants
         3) Maximize efficiency of mechanical systems through duct sealing and high-efficiency fans.
         4) Select radiant heating systems that are effective at lower air temperatures.

B. Commissioning:

- **REFER TO SAMPLE COMMISSIONING SECTION #230800 - (Click Here)**

   1. Commissioning is a quality based process developed for the contractors use as a means of managing the quality of the installation, start-up, and operation of the building equipment and systems to ensure they perform according to the design intent and the Owner's operational needs. The commissioning process shall encompass and coordinate the separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
      a. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations, the Owner's needs, and to industry accepted minimum standards and that they receive adequate operational checkout by installing Contractors.
      b. Verify and document proper and energy efficient performance of equipment and systems.

C. **HVAC Construction Equipment**
   1. New package units should have a minimum SEER rating of 12
   2. Units above 5-ton shall use 460v 3-phase; ***Note:*** *do not install 460v units above ceilings*.

3. 5-ton units shall use 208v, 230v 3-phase
4. Use 3-Phase motors, where it supports the best operation of the equipment
5. Reciprocating type compressors 5-ton and under only in package units. Larger units, scrolls are preferred.
6. Use 134A, R410A or R22 refrigerant
7. When chillers are air cooled use all copper fins/copper tubes.
8. Manufacturers: Use York, Trane or McQuay compressors or Turbo Core Compressors.
9. Larger tonnage units: use two each (for 300 ton, use two 150 ton units)
10. Computer server rooms use carrier duct free split system, Russell refrigeration medium temperature. Commercial grade condensing unit and matching fan coil unit.
11. Hot water /chill water pumps: install two (ea.) to operate alternately.
12. Exhaust fans: use direct drive; **exhaust fan motors shall be sized to handle 110% design airflow at design static pressure and 110% design static pressure at design airflow.**
13. Timers: use Tork Mod. DTS200A/DZS200A
14. Thermostats: use White/Rogers 7-day programmable electrical thermostats.
15. Boiler Manufacturers: Use Kelly or Patterson
16. Provide the means to measure outside air temperature, room temperature, supply air temperature, return air temperature, discharge air temperature, mixed air temperature on economizers. VAV systems shall show duct static pressure and building static pressure.

D. **HVAC Controls**
1. Ethernet compatible controls.
2. **Automated Logic, Web controls for EMS and Lighting.**
3. HVAC Controls
   a) DDC Controls by Automated Logic
   b) Conventional Controls consisting of time clock, bypass timer and room thermostats

E. **Ductwork Standards**
1. Vent ducting: must provide access to coils for cleaning
2. All vent ducting exposed to the weather will be covered with lagging tape, P/N OV-L44 or equal and lagging adhesive P/N lag grip 671 or equal.
3. Ducting must also be crowned to assure drainage.

F. **Ductwork**

- **REFER TO SAMPLE METAL DUCTS SECTION #233113 - (Click Here)**

1. SMACNA HVAC Duct Construction Standards for Metal and Flexible Ducts 2nd Edition – 1995
2. California Mechanical Code, Chapter 10, Duct Systems

3. Ductwork exposed to weather shall be waterproof and lined with high quality duct liner. Ducts shall be pitched, cross-break, or have a cap sheet to provide rainwater drainage.
4. Ducts penetrating roofs shall be detailed with curbs and proper flashings.
5. All concealed supply, return and exhaust ducts shall be sealed with a high quality duct sealant similar to Polymer Adhesive Air seal #11.
6. Manual volume dampers shall be shown on drawings for all branch ducts to supply, return and exhaust outlets. Use high quality manual volume dampers similar to Ruskin.
7. Flexible duct connections shall be used for all duct connections to flexibly mounted equipment.
8. Flexible ducts shall be UL Class 1, 7 foot length with factory attached collars.
9. Completely detail duct supports and seismic restraints.

G. **HVAC Package Equipment**

1. Rooftop package gas/electric units are preferred. Acceptable manufacturers include Trane, York, and Carrier.
2. Air handler units exposed to weather shall be specifically designed for outdoor use. Weatherproofing an indoor unit is not acceptable.
3. Exhaust fans shall be direct drive whenever possible. Acceptable manufacturers include Cook and Greenheck.
4. Ceiling supply diffusers shall be modular core type with or without perforated face. Sidewall supply diffusers shall be double deflection type.
5. Ceiling return grilles shall match ceiling supply diffusers. Use ¾ inch blade spacing.
6. Exhaust grilles shall be ¾ inch blade type.
7. Completely detail HVAC seismic restraints.

H. **Other HVAC Related Components**

1. Gas cocks shall be high quality bronze body plug type.
2. Appliance connectors shall be stainless steel.
3. Gas pipe and fittings exposed to weather shall be galvanized.
4. Completely detail piping supports and seismic restraints.
5. Condensate piping in ceiling space shall be insulated.
6. HVAC Filters: Only standard filter sizes are to be used.

HEAT GENERATING SYSTEMS

A. Goals and Objectives:

1. Provide heat generating systems to maintain specified thermal conditions and at the same time minimize energy costs.
2. Use heat generating systems equipment which is :
   a) Designed and built for commercial and/or industrial applications.

b) Installed in a professional manner by experience contractor as approved by the equipment manufacturer.

3. Electric heat sources shall not be used. Gas furnaces shall be used in package air-handlers capable of two stage or modulating control. Forced air heating system shall have a ducted return.

B. Central Heating Boilers and Accessories:

1. Centralized heating hot water boiler plants shall be designed with multiple, staged, hot water generators, selected for high-efficiency (equal to 85% or greater) operation.
2. Low Nitrous Oxide (NOx) burners with modulating gas valves shall be specified whenever possible.
3. Systems shall be monitored and controlled through the District Energy Management Control Systems (EMCS). Time clocks and self-contained temperature controls shall not be used.
   a) Avoid dual service hot water boilers where both space heating and water heating requirements are met by one or more heat generators.
   b) Select heat-generating equipment, which is sized with automatic controlled outside air dampers for minimum flow during building warm-up period.
   c) Steam heat generation equipment is not to be specified.
   d) Use heat recovery strategies whenever possible.

C. Gas Furnaces:

1. Gas furnaces and heaters greater than 250,000 BTU in size, are to be constructed with 321 stainless steel heat exchangers. Unit heaters to be constructed with aluminized steel heat exchangers.
   a) Use ducted combustion air with forced-drafts fans (natural drafts units shall not be used).
   b) Allow enough space for maintenance.

D. Fuel Fired Heater:

1. Use only high-efficiency, high-quality heaters.
2. Furnaces shall be designed to operate on natural gas only.
3. Unit heaters can be used in some application with District approval.

E. Heat Pumps:

1. Heat pumps can be used if natural gas is not readily available, minimum of 12 SEER.

COOLING GENERATING SYSTEMS

A. Goals and Objectives:

1. Provide cooling systems when required to maintain specified thermal conditions.
2. Cooling Generated Systems shall use equipment, which is:
   a) Designed and built for commercial and/or industrial applications.
   b) Installed in a professional manner by experienced contractors as approved by the equipment manufacturer, and to afford access for maintenance.
   c) Designed to meet varying loads. Variable flow air systems shall be considered the norm.
   d) Integrated with the use of occupancy sensors and the District EMCS - Automatic Logic Systems in system design.

B. Central Cooling Equipment and Accessories:

1. Systems shall be monitored and controlled through the District EMCS - Automatic Logic Systems.
2. Specify and install cooling equipment with high EER or SEER ratings.
3. Provide variable frequency drives (VFD's) on all equipment rated at 5 horsepower (hp) and greater.
4. Use energy efficient motors.
5. Screw compressors and rotary compressors shall not be specified.

C. Economizers:

1. Use air economizers on air conditioning systems.

D. Evaporated Coolers:

1. May be used only under specific and limited conditions, to be determine by SDCCD Architects and HVAC Department.

E. **E. Refrigeration Systems:**

1. Shall be Bulb Type Thermostat controls with Freeze-Stat or Defrost controls.

AIR DISTRIBUTIONS SYSTEMS

A. Goals and Objective:

1. Provide system features that will provide a supply of air to the conditioned spaces that is:
   a) Temperature controlled.
   b) Filtered and augmented with outside air control and CO_2 sensors.
   c) Uniformly distributed throughout each zone.
   d) Delivered in a draft free manner and at an acceptable noise level less than NC 35.
   e) Supplied in a well-controlled energy efficient manner.

B. System Acoustical Features:

1. In order to control sound levels in spaces such as classrooms, offices, and multimedia centers refer to ASHRAE HVAC Applications Handbook, Chapter on Sound, and Vibration Control, "Design Guideline for HVAC Noise in Occupied Spaces."
2. Locate noise generating equipment such as compressors, fan coil units, exhaust fans, and pumps outside the conditioned spaces.
3. Control duct noise transmission into the occupied spaces with turning vanes, low duct and discharge grill velocities, and sound attenuation baffles and material.
4. Ensure vibration-isolating connections are adequate between air handlers, connecting ducts, and the supporting structure(s).

C. Efficient System Energy Use:

1. Use low-pressure drop filters, dampers, silencers and diffusers. Filters shall be of an extended surface type, configured for easy replacement.
2. Use high-efficiency backward curved or airfoil impellers fans.
3. Use variable frequency drives (VFDs) for motors of 5 horsepower and greater with variable loads.
4. Use "premium efficiency" motors, tailor the size of the motors for their task, can be optional drive belt.
5. Locate exhaust hoods and return air intakes near heat and/or odor generating equipment such as copiers and kilns, to expedite removal of heat and odors from the space and minimize air temperature variations within the space. Areas of specific concern are graphic arts rooms, areas with large copiers, and food preparation/serving areas. Air supplies to the space shall be sized to accommodate the additional exhaust requirement.
6. Locate thermostats away from known locations where heat generating equipment will be located or where natural airflow will be obstructed by furniture, equipment or partitions. Avoid locations on exterior walls or near doors or windows.
7. Connect system controls to the District EMCS.
8. Shall use Economizers on units 5 ton and larger.

D. Minimize System Maintenance and Costs:

1. Locate system components requiring routine service outside the conditioned space to avoid disruption of classroom and administrative activities, and ensure manufacturers minimum accessibility clearances are provided around equipment components requiring service or replacement.
2. Damper actuators shall be installed outside the volume control units.
3. Access panels shall be located and sized to provide ready and unobstructed access to components when needing service or replacement.
    1. Where interior insulation is required, ensure that it is resistant to air erosion and deterioration due to environmental factors such as humidity and corrosive air borne chemicals. Insulation material(s) limitations of use and application precautions, as

detailed in manufacturer's publications, shall be carefully considered during all stages of a building's life cycle; design, materials specification, construction, operation/maintenance, and renovation. Internal HVAC system insulation materials shall be designed to be durable when rated in accordance with ASTM or UL 181 erosion tests. All internal insulation materials shall not support microbial growth as determined by ASTM or UL. HVAC systems shall be designed and insulation installed in a manner, which prevents insulation contact with liquid water. Fiberglass is not to be used as an interior insulation material for supply ducting that is downstream of the filters.

2. In environments that are considered high risk for fungus, mold, and other microorganism growth, ultra violet lamps should be installed for sterilization of air handling units coils and air discharge plenums.
3. Do not use pneumatic controls and actuators on new construction, and avoid their use on replacement and retrofit projects where economically feasible.
4. Flexible duct connections shall not exceed 7 feet in length and shall be properly sized and matched, and mechanically connected with clamps, brackets, or screws for a solid, secure fit.
5. All air distribution grilles and registers shall be equipped with opposed blades dampers (OBD's), at the device and at the main duct work take off.
6. Air intakes shall be positioned to avoid ingesting contaminated air, and to minimize vandalism. Avoid locating air intake near or downwind of loading docks and passenger pick up zones, and positioned in relation to vent locations in accordance with the California Mechanical Code.

TERMINAL AND PACKAGE UNITS

A. Goals and Objectives: Terminal and package units used in the air conditioning systems shall be:

1. Designed and built for commercial and/or industrial applications. Installed in a professional manner by experienced contractors as approved by the equipment manufacturer.
2. Maintained in accordance with a recognized preventive
3. maintenance program to provide the highest possible system efficiencies.
4. Single duct variable volume terminal units will be used on air conditioned areas where a large air-handling unit is serving a multitude of occupied areas with different occupancies and orientation.
5. Package units may be used in small isolated air-conditioned areas with integral heating coils, or natural gas duct heaters.

B. Terminal Units:

1. Systems shall be monitored and controlled through the District EMCS, where cost effective.
2. Provide removable panels on terminal units to permit access to dampers, regulatory assemblies, and other parts requiring service, adjustment, or maintenance with airtight gaskets
3. and quarter-turn latches.
4. Do not located terminal units above classrooms areas.
5. Determine noise levels, then provide attenuator section lined with insulation as may be required.
6. Maximum damper leakage allowance shall be a rate of 2.5 percent of nominal terminal airflow at 1 inch wg inlet static pressure.

C. Package Units:

1. Specify the use of natural gas heating.
2. Use, where possible, extended surface disposable air filters, with ultra low-pressure drop filters.
3. Use seismic vibration isolators.
4. Use forward curved direct drive centrifugal indoor fans.
5. Use 100% OSA economizers having 15 CFM fresh air per person minimum on package units.
6. Use hermetically sealed compressors 5 ton or smaller, and scroll compressors on package units 7 ½ tons or greater.
7. Do not use window type air conditioners.
8. Air cooled condensers on package air conditioning equipment to be copper tube, copper fin construction on all units.
9. Fifteen (15) CFM per person of outside air, in accordance with latest ASHRAE Standards, shall be positively supplied to all occupied classrooms.
10. Package air conditioning units shall have full access and services provisions to all components of the unit once installed.
11. The condensate drains shall be connected outside the air handling unit, and this water should be discharged through an air lock. The depth of the drain tap should be twice the static pressure differential of the AHU's fan. The AHU base mount shall be high enough to accommodate this depth. The pitch of the drain should be ¼ inch per foot.
12. Package unit for Monday thru Friday must be operational twenty-four (24) hours a day, seven (7) days a week.

CONTROLS AND INSTRUMENTATION

- **REFER TO SAMPLE INSTRUMENTATION AND CONTROL FOR HVAC SECTION #230900 (Click Here)**

A. Goals and Objectives:

1. SDCCD has begun the implementation of a district wide EMCS. Controllers at each individual site are linked through use of Local Area Network (LAN), and all sites are linked to each other and to the Maintenance and Operations office through use of the District Wide Area Network (WAN).
2. The EMCS provides the means to measure and analyze the energy performance of individual systems (mechanical and electrical) and sites, in addition to providing direct control of the site mechanical systems.
3. All new construction shall include installation of the District Standard EMCS to provide monitoring and control of all mechanical systems. These new mechanical systems, as well as the new EMCS installations, shall include provisions for periodic testing and recalibration. Detailed control sequences of operation, and product specifications shall be used.
4. Shall use current sensors for VFD feedbacks. Use (DI's), digital inputs for feedbacks
5. Temperature sensors and wells shall be installed at 45˚ on all horizontal piping runs of chilled water systems, heating hot water systems and domestic hot water systems.
6. Pete's plugs shall be installed on the inlet and outlet sides of all pumps, condenser water loops, heating hot water loops, chiller barrel heat exchangers and on all inlet and outlet of all piping systems going into and out of buildings.
7. Controls, temperature and pressure sensors or gauges shall be labeled with large legible lettering of a type and style sufficient to withstand the elements.

B. Equipment controlled by the Energy Management System:

1. Boilers.
2. Package HVAC units.
3. All chillers, towers and KW meters.
4. All pumps 5 horsepower and larger.
5. Associated valves.
6. Exterior lighting.

SPECIAL HVAC SYSTEMS AND EQUIPMENT

A. Goals and Objectives:

1. Special HVAC systems and equipment used by the District in their air conditioning and refrigeration systems shall be:
    a) Designed and built for commercial and/or industrial applications.
    b) Installed in a professional manner by experienced contractors as approved by the equipment manufacturer.
    c) Maintained in accordance with a recognized preventative maintenance program to provide the highest possible system efficiencies.

d) Design to include all Department of State Architect seismic requirements.

2. Select the use of computer air conditioning systems to meet temperature and humidity requirements as required by the computer equipment supplier. Year around operation shall be considered in the selection of equipment. Split systems shall be used in Monday thru Friday rooms.

B. System Description:

1. Use extended surface, low-pressure drop disposable air filters configured for easy replacement.
2. Select and install special HVAC equipment with high EER and SEER.
3. Consider economizers for systems rated at 5 tons of refrigeration or greater, unless modeling indicates appropriate use on smaller units.
4. Select HVAC and refrigeration equipment to meet actual special systems load requirements and provide physical space for additional equipment if future load requirements increase.
5. Consider heat recovery strategies where possible on special large refrigeration and cooling units.
6. Exhaust heat from printers and copiers where direct duct connections are provided.

C. Building Systems Approach to Provide Good IAQ Control:

1. Where possible, locate HVAC equipment in such a manner to provide outside air supplies without the use of lengthy runs of ductwork.

INDOOR AIR QUALITY

A. General:

1. SDCCD Building Systems Approach is based on a group of ASHRAE Standards with the common goal of good indoor air quality and comfort.
2. A school building is a dynamic entity with often changing pollutant, heating and cooling loads. A well design and functioning ventilation system will respond to any change in loads before it affects the occupants. It is often difficult to accomplish this ideal condition in schools, however, the Building System Approach should be applied at the design stage and continued through construction, commissioning, operator training, and ongoing building operation and maintenance. It requires interaction between many disciplines and proper IAQ education of key systems operators. The common goal is to ensure the health and comfort of building occupants over the life of the building.

B. Rules of the Building System Approach:

1. Adherence to the following standards and guidelines, or current standards is instrumental to a successful application of the Building Systems Approach.
   - ASHRAE Standard 62.1-2004 (for ventilation).

- ASHRAE Standard 55-2004 (for comfort).
- ASHRAE Standard 52.1-1992 (for filtration).

2. These standards and guidelines should be studied by all relevant building personnel, and equipment operation and maintenance manuals should be changed accordingly. Some equipment may need to be modified.
3. There are seven main indoor environmental issues to consider during the programming, design and construction phases of a new building.
4. Provide for Merv 13 filters unless otherwise directed.

C. Guidelines

1. Site Plan: The physical site that the future building will occupy and its outdoor environment must be studied with respect to how they will likely impact the future indoor environment. Prevailing weather and wind patterns, ambient air quality, and major outdoor sources of pollution should be considered.
2. Building Configuration: The building configuration may impact the migration of pollutants both from the outside to the inside, and within the building both vertically from one floor to another and horizontally across floors. Issues to be scrutinized include location and orientation of building air intakes, exhausts, and stacks, planning of vehicle access, parking, and garages, pollutant pathways, apertures and glazing in relation to solar heat load and IAQ.
3. Heating, Ventilating, and Air Conditioning (HVAC) System: In today's tight, sealed, energy efficient buildings the majority of the indoor air is introduced through the HVAC system. Proper design of these mechanical systems, therefore, is imperative to the creation of a healthy indoor environment. The design team must review the projected occupant densities, activities, and locations in the building and ensure proper respective ventilation rates and distribution. This task includes critical attention to ventilation flexibility, core versus perimeter loads, control systems humidification/dehumidification, filtration systems, dedicated exhausts, occupied space layout, and energy recovery technology. Particular areas of concern are explained in further detail as follows:
   a) Outdoor (Fresh) Air in Building Air Supply: The minimum requirements of outdoor air for all types of building and spaces can be found in ASHRAE Standards 62.1-2004 or current standard.
   b) Temperature and Relative Humidity (RH): What is considered appropriate temperature and relative humidity levels indoors may vary from location to location within SDCCD, but they must remain constant in each season, with slightly higher temperatures being acceptable in summer. ASHRAE Standard 55-2004 or current standard recommends comfort ranges, District standards are heating 68 degrees and cooling 76 degrees.
   c) Filters in HVAC Systems: Filters shall be selected based on the ASHRAE Standard 52.1-1992 or current standard, which requests that filter manufacturers specify both a weight

test and a dust test for each class of filter. Filters shall also be well fitting. The outdoor air quality shall be considered, when specifying filter efficiency.

d) Maintaining Correct Pressurization Within Buildings: A school building shall be under slightly positive pressure. Some areas, including special use areas with dedicated exhaust such as art areas, shall be under negative pressure in order for cleaner building air to flow toward the more contaminated areas, helping dilute the contaminates, and finally being exhausted. Air from special use areas shall not be re-circulated, unless it has been subjected to cleaning with filters appropriate for the contamination produced.

4. Maintainability: The ability to conduct frequent and effective maintenance on the HVAC system during the building's operational life is another critical step toward a healthy indoor environment. This ability can be greatly enhanced via full consideration of maintainability at the design stage. Proper access points to critical areas of the HVAC system must be included in the design. Building and mechanical system materials best suited for resistance against corrosion, microbial contamination, and other IAQ factors shall be identified. Insulation material characteristics shall be included.
5. Interior Material Selection: The materials for the interior spaces shall be selected carefully with regard to their future impact on the indoor pollutants loads. The general principles of making sound environmental material selection decisions must be customized to the specific indoor environment planned. Material selection criteria to be judged include off gassing, fiber release, microbial support, sink effect, durability, proper installation, and maintenance for good IAQ.
6. Implementation of Temporary Ventilation and Filtration Practices:
   a) Such practices shall be implemented when interior finishing products are to be applied or installed at the end of construction or during renovations. This may require increased ventilation rates and schedules and the use of items such as temporary operations and pre-filters, unitary conditioning filtering units, and removing doors and windows.
7. Prudent Ventilation Regime: Once the HVAC system is activated, and its proper function and control system is fully verified it shall be set to operate on the maximum fresh air which is possible on a 24 hour basis with the return air dampers closed down. The system shall also be set to dehumidify and warm the interior as far as is practicable for products to cure and for acceptable working conditions. Preventing cold conditions will cause more VOCs to be emitted early from interior finishes. This mode should be maintained for a minimum of 48 hours before beneficial occupancy. This is a general recommendation that may not be suitable for all systems.
8. Installation Sequence: Installation of equipment, materials and finishes in a particular order can have a beneficial impact on final indoor air quality. The District may require wet products such as adhesives and paints to be applied before the installation of potential sinks such as fabrics, ceiling tiles and furniture.

ELECTRICAL SYSTEMS REQUIREMENTS

GENERAL DESIGN GUIDELINES

A. To accommodate effective and safe cleaning of buildings, place designated GFI electrical outlets every 100 feet throughout building for custodial equipment such as buffers, floor machines, and vacuums.

GENERAL REQUIREMENTS

A. At Computer labs and standard classrooms, provide wall outlets for power and data; Use of Floor outlets shall be minimized **and must be approved**.
B. Conduits and raceways for power, data, and classroom systems controls shall be provided at podiums. Power, data, and classroom systems controls by FF&E Podiums shall be fixed to the floor and made accessible to the disabled. **Access to podiums must meet Title 24 accessibility standards**. The **lighting circuit** for Telco rooms shall not be connected to the building lighting time clock. See Division 27.
C. **The District is requiring Smart Meters on all new buildings; see attached section at the end of Division 26.**
D. **The District standard controls Automated Logic for the Energy Management System will have a maximum of four points for each transformer.**

Service and Distribution

A. Goals and Objectives:

1. The design of the Electrical Distribution System shall meet or exceed all requirements of the California Electrical Code.
2. The design of the electrical service and distribution systems shall be based on long term (more than 30 years) maintainability of the systems. Provisions shall be made for the future growth of the District. Space and capacity shall be allotted for increasing the original designed electrical load by 20 percent. The future capacity shall be calculated on connected load. The use of the demand loads is not permitted.

B. System Description:

1. The distribution system shall be 3-phase, 600 V or less. Existing campuses have different distribution system types. Generally radial type supplies power from single source through radial lines that are extended to the various areas of the District.
2. For sites with loads less than 500 kVA, including future growth, the service shall be 120/208 volt, three phases, four wires. For services larger than 500 kVA the service shall be 277/480 volt, three phase, four wire.
3. Electrical service shall be underground and shall meet the requirements of the San Diego Gas and Electric where lines are under the jurisdiction of SDG&E; otherwise meet all current applicable codes. The electrical designer shall coordinate all on-site and off- site improvements required to install the new electrical service to the site. **A/E shall coordinate work with SDG&E Savings by Design and CCCIOU.**
4. All San Diego Gas and Electric fees shall be included in the project budget.
5. Site Utilities:
   a) The San Diego Gas and Electric transformer shall be a location approved by the utility company and shall minimize the transformer secondary feeder length.
   b) Utility transformers shall be site-oriented to avoid student access and provide proper maintenance access.
   c) Where transformers are connected to District utilities, location shall be approved by the District.
6. Service Entrance:
   a) Ground fault protection shall be provided with the main breaker as required by the CEC.
   b) The electric room shall not house the telecom/data network equipment, which shall be located in a separate room.
   c) SDG&E meter room and main switchboard room shall have exterior access.
   d) The electrical room shall have double-doors and keyed to SDCCD standards. The opening shall be not less than the largest single piece of equipment.
   e) Electrical room shall have a duplex outlet on each wall.
   f) Electrical room shall have adequate lighting that is not on a timer or occupancy sensor.
   g) Electrical room shall have floors with proper slope for drainage. Surrounding ground elevation shall not be higher than finished floor. Floor drains shall not be installed in electrical rooms; natural drainage to the exterior shall be used.
   h) Cabinet and panel mounting locations shall be selected for efficient serviceability.
7. Branch Circuits:
   a) All mechanical equipment shall be connected to a separate feeder and panel board separate from lighting and receptacle loads.
   b) Separate circuits for lighting, mechanical and general-purpose loads shall be provided.
   c) The computer switching equipment in IDF's shall be powered by a circuit separate from classroom computer loads, Up to four powered switches may be on a single circuit.
   d) Computer laboratories shall be provided with a minimum of six circuits.

e) All raceways shall be a minimum of ¾ inch conduit. Use of ½ inch conduit is not acceptable.
f) Classrooms shall have not less than two duplex outlets on each wall. There should be alternate circuits on adjacent receptacles.
g) Surface mounted raceways are not acceptable in any educational or office space. Outlets must be recessed into walls.

8. Panel Boards:
   a) All distribution panels shall be provided with a main circuit breaker for each building.
   b) Provide for 20% additional capacity for future circuits at all main panels and branch panels.
9. Grounding:
   a) Provide a service entrance ground within 5 feet of service entrance.
   b) Provide a building ground at each distribution panel per code.
   c) Where grounding rod is provided, resistance shall not exceed 5 ohms.
10. Conductors and Conduits:
   a) All conductors shall be copper THHN; where subject to moisture, provide THWN insulation type.
   b) All conductors shall be in conduit or raceways.
   c) There shall not be less than one 3 inch conduit from power distribution to each sub-distribution panel.
   d) Underground raceways shall be PVC or non-metallic raceway materials. Duct banks shall be encased in red concrete.
   e) All power and signal underground distribution system shall be run in separate duct banks and through a separate manhole system. Signal and power shall never occupy the same manhole.
   f) Conduits shall be rigid metal where exposed in a room. Conduits within a wall or otherwise concealed shall be in EMT or rigid below 6 feet AFF.
   g) The use of MC Cable shall not be used without approval. 6 foot fixture whips are permitted.
   h) Compression fittings only
   i) Penetration through rated walls to use firestop EZ-path or equal.
11. Meters:
   a) Meter rooms shall be accessible by SDG&E personnel at all times.
   b) Meters shall be located inside of the main electric room for protection from the elements.
   c) Site meters shall have a dedicated 4-20 mA or pulse output for input to the District Energy Management Control System.
12. Surge Protection:
   a) Transient voltage surge suppressors shall be installed at each auxiliary panel As follows:
   b) Surge Protective Device Description: Unit type, panel-mounted design with The following features and accessories:

1) LED indicator lights for power and protection status.
2) Audible alarm, with silencing switch, to indicate when protection has failed.
3) One set of dry contacts rated at 5 A, 220-V ac, for remote monitoring of protection status.
4) Arrangement with wire connections to phase buses, neutral bus, and ground bus.
5) Red and green LED indicator lights for power and protection status.
6) Audible alarm, with silencing switch, to indicate when protection has failed.
7) Suppressors shall be installed in panels that supply HVAC equipment.

13. Warning mark:
    a) All enclosures that do not clearly show that they contain electrical devices shall be marked with a black lightning flash on a yellow background within a black triangle as NFPA-79 Code requires.

INTERIOR LIGHTING

- **REFER TO SAMPLE INTERIOR LIGHTING SECTION #265100 - (Click Here)**

A. Lighting systems shall be designed to be the most energy efficient possible for the specific applications. If current technology allows for a more efficient system than what is in the District Standard then the District would be receptive to the newer technology.
B. All interior light fixtures to be fluorescent fixtures unless approved by District Architect. No T-12 lighting.
C. Fluorescent lamps for classroom, lab, and corridor spaces shall be coordinated and approved through the District Facilities Department and the District Architect. A/e should submit proposed lighting plan and fixture cut sheets in schematic design submittal.
D. Fluorescent lamps for utility spaces shall be 4 foot, 25 watt type having a T 8 lamp and medium bipin bases or equal as manufactured by Phillips or equal; part no. F32T8/ADV850/XLL/ALTO-25W. Lamps shall have a correlated color .temperature of 5000 k with a color rendering index (CRI) of 82 and contain no more than 1.7mg of mercury. The lamps are to be operated on high frequency electronic soft start ballasts specifically designed for 25 watt T 8 lamps. The rated design lumen output shall be 2280 lumens and the rated average life shall be 40,000 hours at 12 hours per start. The District has standardized on the 5000 Kelvin fluorescent lamps for utility rooms and some retrofits.
E. Provide Philips 5000 lamps with minimum 4 year warrantee on lamps and minimum 4 year warrantee on ballasts. Certain classrooms that require a larger spectrum of light may use 32 watt 2900 K lamps by Phillips or equal.
F. Provide fixed data on lamps to rooms using product number in Revit Model.
G. District Standardize is for two fixtures: T-5 indirect and Super T-8 .
H. T-8 Ballasts shall be by Advance:
    1. 2 lamp Low, Program Start - IOP-2S32-LW-SC351
    2. 2 lamp Normal, Program Start - IOP-2S32-SC351

I. Input voltage to be 120 volt unless noted on plans.
J. Provide motion sensor/timer switches at all rooms.
K. Light fixtures shall have a label specifying the lamp type specified for LEED Silver Certified Criteria.
L. Interior Luminaires:
    1. Linear fluorescent-T5,T8
    2. Integral daylight controls
    3. Uplight or combined uplight and downlight
    4. Exit Signs: Maximum 5 watts per face
        a. Lamps
            1) LED
            2) Electrominescent

EXTERIOR LIGHTING

- **REFER TO SAMPLE EXTERIOR LIGHTING SECTION #265600 - (Click Here)**

A. Fluorescent fixtures. Some exterior lights shall be classified as security lighting and will go on and off with photo cells. All other exterior lights will go on by photo cell and off by time clock. Smaller fixtures use compact fluorescent.
B. Pole lights shall match existing pole lighting fixtures in the area around the new building on that campus, unless otherwise directed by the District Architect.
C. All exterior building, walkway, pole and site lighting shall be installed so that each light can be controlled in an alternate method such as A/B switching. Pole lights are to be induction lighting. Exterior building lights are to be fluorescent. Pole standards shall be by District Architect.
D. Exterior lighting shall be placed on an existing LCP panel, or new LCP panel to match existing District wide standard.
E. Exterior Luminaires:
    1. Full-cutoff luminaries:
    2. Photovoltaic power source
    3. Lamps
        a. Fluorescent
        b. Metal halide
        c. High-pressure sodium
        d. LED (primarily decorative)
F. Standard Lighting Controls Manufacturers - (**Automatic Logic is the District Standard**).
    1. For all other buildings including learning and resource buildings, electronic lighting control systems shall be installed to control building, site corridor and assembly area lighting. A photocell shall be incorporated into the control system.
        a. Occupancy Sensors:
            1) Passive, infrared motion sensor

2) Ultrasonic sensor
3) Mounting:
   a) Wall
   b) Ceiling

b. Light Level Controls:
   1) Automated control system computes light levels based on daylight intensity, occupancy sensors, and timed schedules.

ENVIRONMENTAL LIGHTING CONSIDERATIONS

A. Lamps
   1. Fluorescent Lamps:
      a. T8 Lamp or T5 Lamp
         1) Mercury:
            a) Nonleachable form
            b) Reduced mercury content
      b. Efficancy: T5-90 to 100 lumens/ watt, depending on wattage
      c. Color Rendering Index (CRI) Minimum 70
   2. Compact Fluorescent Lamps (CFLs):(Equivalent wattages for fluorescent/incandescent lamps: 7W= 25W,11W = 40W, 15W = 60W, 20W = 75, 25W = 100W
      a. Circuline
      b. Folded Tube
      c. Twisted tube
      d. Dimmable
      e. Color Rendering Index (CRI) Minimum 80
   3. High-Intensity Discharge Lamps: High-bay applications are often better served with high-output T5 fluorescent fixtures.
      a. Metal halide
      b. High-pressure sodium
      c. Mercury vapor (generally not recommended)
      d. Low-pressure sodium (generally not recommended)
   4. Halogen Lamps
      a. PAR lamp
      b. Low-voltage MR16

B. Ballasts
   1. Fluorescent Lamp Ballasts
      a. Efficiency: shall meet or exceed California Energy Commission Requirements
      b. Tandem wiring: Use two lamp ballasts; provide interwiring between fixtures
      c. Type: (Magnetic ballasts are not allowed.)
      d. Integral Ballast for CFL
         1) Modular ballast for plug-in lamp
            a) High-frequency electronic

b) Power Factor 90% minimum
c) High Ballast Factor
2) Dimmable: 100%-10%

C. UPS
1. Refer to Division 27 for UPS panels requirements in each building's IT room.

SMART METERING

Each new and renovated project will comply with the Smart Metering Guideline.

San Diego Community College District

District-Wide Smart Metering

Guidelines for

NEW & RENOVATED BUILDINGS

City College, Mesa College, and Miramar College

Prepared by: **Randall Lamb** May 24, 2011

Table of Contents

INTRODUCTION – *Program Description*

As part of its Green Building Policy, the San Diego Community College District (SCDDC) is deploying a District Wide Smart Metering System (SMS). This program is expected to generate specific energy consumption information for each of the three campuses, all buildings within those campuses and certain systems within those buildings. The information will be used to 1) confirm building performance for LEED compliance, 2) compare campuses and buildings for operational efficiencies, and 3) develop operational and maintenance programs that will reduce energy consumption and cost.

All new and remodeled facilities on the three campuses will require "smart meters" to be installed as part of their design and construction process. These meters will be connected to the Automated Logic Corporation's (ALC) interface module in a similar fashion as other environmental control devices. These interface modules are then connected through the campus data networks and the District wide data network to the SMS management system located in the SDCCD Data Processing Center.

Existing buildings on the three campuses will be retrofitted to comply with these same SMS requirements.

The purpose of this document is to provide the SMS guidelines for all new and remodeled buildings located on the three District campuses.

METER LOCATION GUIDELINES

Meters shall be installed to measure building's electrical, gas, chilled water and heating hot water loads. These meters shall measure, where possible, the following loads:

Electrical

- Building main electrical service
- Indoor lighting
- Exterior lighting
- Air handling equipment
- Fume hoods or other laboratory equipment
- Any special or unique power loads

Meters may be positioned to determine the above categories in an additive or subtractive configuration.

Gas

- Building main gas service
- Kitchens
- Any special or unique gas loads

Chilled Water

- Building main chilled water service

Heating Hot Water

- Building main hot water service

Electrical – Main Building Service

Measured Quantities:	1. Voltage per phase 2. Voltage line to line 3. Voltage line to neutral 4. Current per phase 5. Power factor per phase 6. kWh, Consumption 7. kW, Real power 8. kW, Demand 9. Frequency 10. kVA per phase 11. kVAR per phase 12. THD, Voltage line to neutral 13. THD, Voltage line to line 14. THD, current per phase
Measurement Configuration:	For 3-phase application, 208-600V, 3 wire delta or 4 wire wye.
Operating Temperature:	20 degrees C. to +70 degrees C. For exterior mounting, consider the local ambient temperature extremes and moisture proof enclosures.
Humidity Operating Range:	5% to 90% RH (non-condensing)
Accuracy:	ANSI C12.20 (0.5% Accuracy)
Frequency:	60 Hz
Output:	Modbus RTU/RS485
Display:	Background-illuminated graphic display
Suggested Manufacturers:	1. Square D 2. Eaton 3. Electro Industries/GaugeTech 4. Veris Industries 5. Siemens

Electrical – All other Electrical Loads *(lighting, mechanical, any special power)*

Measured Quantities:	1. Voltage per phase 2. Current per phase 3. kWh 4. Real-time load in kW 5. Power factor per phase

Measurement Configuration:	For 3-phase application, 208-600V, 3 wire delta or 4 wire wye.
Operating Temperature:	20 degrees C. to +70 degrees C. For exterior mounting, consider the local ambient temperature extremes and moisture proof enclosures.
Humidity Operating Range:	5% to 90% RH (non-condensing)
Accuracy:	ANSI C12.20 (0.5% Accuracy)
Frequency:	60 Hz
Output:	Modbus RTU/RS485
Display:	None

Suggested Manufacturers:	1. Square D 2. Eaton 3. Electro Industries/GaugeTech 4. Veris Industries 5. Siemens 6. E-Mon Energy Monitoring

Gas – Main Building Service

Measured Quantities:	Cubic Feet of Natural Gas
Measurement Configuration:	Natural Gas service to a building
Operating Temperature:	-40 degrees F to +140 degrees F.
Humidity Operating Range:	5% to 90% RH (non-condensing)
Accuracy:	± 1% of scale
Pulse Frequency:	Not less than two pulses per revolution. Meter pulser shall be coupled to meter dial to provide a pulse rate of not less than one pulse for every 100 cubic feet of gas.
Output:	Pulse Output
Rotary Type:	Rotary type meter shall conform to AGA B109.3 Meters shall be pipe or pedestal mounted and provided with a strainer immediately upstream. Meters shall be provided with over-pressure protection as specified in ASME B31.8. Meters shall be suitable for accurately measuring and handling gas at pressures, temperatures, and flow rates present. Meters shall have a pulse switch initiator capable of operating up to speeds of 500 pulses per minute with no false pulses and shall require no field adjustments or calibration. Initiator shall provide the maximum number of pulses up to 500 per minute that is obtainable from the manufacturer. The minimum pulse rate shall not be less than one pulse per 100 cubic feet of gas.
Suggested Manufacturers:	1. Dresser 2. Elster – American Meter

Chilled Water and Heating Hot Water – BTU Meters

Measured Quantities:	1. Total Energy 2. Total Flow 3. Energy Rate 4. Flow Rate 5. Supply Temperature 6. Return Temperature
Measurement Configuration:	Chilled water , heating hot water, Domestic Hot Water, and condenser water
Liquid Temperature Range:	32 degrees F to 200 degrees F.
Humidity Operating Range:	5% to 90% RH (non-condensing)
Accuracy:	Differential temperature accuracy ±0.15° F over calibrated range. Computing nonlinearity within ±0.05%.
Frequency:	60 Hz
Output:	Modbus RTU/RS485
Display:	Alphanumerical LCD Display
Suggested Manufacturers:	1. Onicon 2. Flexim 3. GE Panametrics

Chilled Water and Heating Hot Water – Flow Meters

Flow meter should be vortex shedding type

Measured Quantities:	Flow Rate (gpm)
Measurement Configuration:	Chilled water , heating hot water, Domestic Hot Water, and condenser water

Liquid Temperature Range:	32 degrees F to 200 degrees F.
Humidity Operating Range:	5% to 90% RH (non-condensing)
Accuracy:	±2% accuracy with minimum flow rate of 1 fps.
Output:	Analog Output
Display:	Digital LCD Display

Suggested Manufacturers:	1. Dresser 2. Bell & Gossett 3. Paco 4. GE PanaFlow MV82

Chilled Water and Heating Hot Water – Temperature Sensors

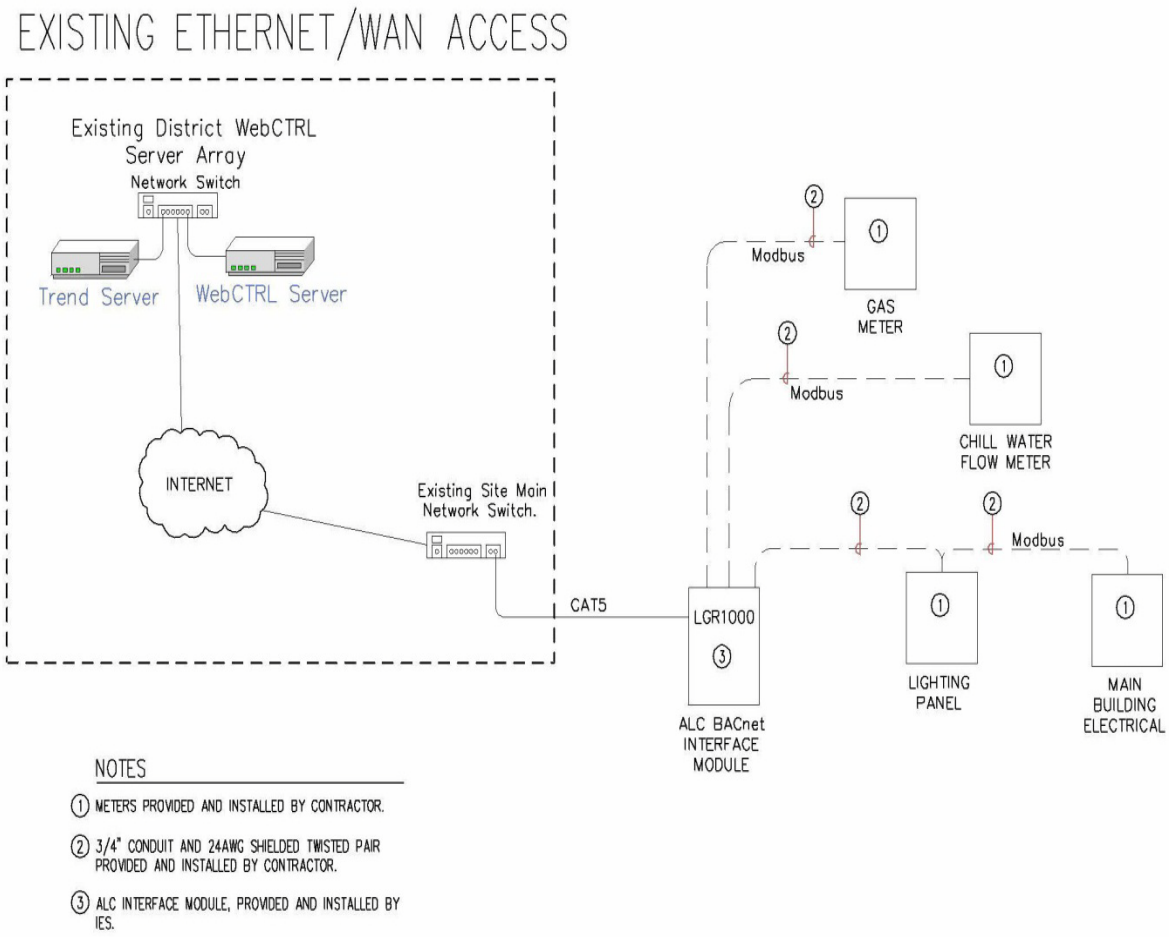
Measured Quantities:	Temperature (°F)
Temperature Range:	-32 degrees F to 200 degrees F.
Humidity Operating Range:	5% to 90% RH (non-condensing)
Accuracy:	±0.1% accuracy
Output:	Analog Output

Suggested Manufacturers:	1. Johnson Controls 2. GE 3. Pyromation

INSTALLATION GUIDELINES

Install meters in accordance with standard practices for good workmanship and other ANSI approved installation standards. Meter's output terminals shall be connected to closest Automated Logic Corporation (ALC) interface module using 24AWG shielded twisted pair (STP) cable, Belden #9841 or equal, in ¾"conduit. Coordinate the location of the closest ALC modules with District's energy automation contractor, Integrated Energy Solution (IES). Each meter installed, shall be accompanied with the form in Attachment A (District Wide Smart Metering Installation Form).

Refer to diagram below for the general overall connection of the meters and areas of responsibility.



ATTACHMENT A

Meter Documentation

District Wide Smart Metering Form						
Campus:	City ☐		Mesa ☐		Miramar ☐	
Building's Name:						
Meter Type:	Electrical ☐		Gas ☐		BTU ☐	
Meter Model #:						
Metered System:						
Electrical:	Main Entrance ☐		Lighting ☐		Mechanical ☐	
	Special System ☐		Special System Description:			
Mechanical:	Chilled Water ☐		Heating Hot Water ☐		Building Gas ☐	
	Kitchen/Spacial Gas ☐		Domestic Hot Water ☐		Other ☐	
Meter's Location: (e.g., Switchboard "MSB" in main electrical room, Chilled water pipe in mechnical room "ABC")						
Meter's Tag number as defined by ALC:						
Note: This form must be compeleted and submitted to the district for every smart meter installed.						

Division

27

COMMUNICATIONS REQUIREMENTS

I) DESIGN GUIDELINES FOR TELECOMMUNICATIONS

A) General Issues

1) A San Diego Community College District Information Technology Project Manager (IT PM) shall be assigned to all construction projects

a) The IT PM shall

(1) Be available and participate during all phases of design and during the construction period.

(2) assist in understanding the current needs of the IT department to support the student, faculty and staff IT needs within the building

b) SDCCD Information Technology Contacts

(1) Primary contact(s):

Jim Phalan
IT Project Manager Prop S/N
District office/DSC
City College
Continuing Education
619-388-1135 (office)
619-654-1162 (cell)
619-388-1195 (fax)
jphalan@sdccd.edu

Don Bertram
IT Project Manager Prop S/N
Mesa College
Miramar College

619-388-1166 (office)
619-654-1166 (cell)
619-388-1195 (fax)
dbertram@sdccd.edu

(2) Secondary contact

Glenn Bowers
Manager, Network and PC Services
619-388-1161 (office)
619-388-1195 (fax)

2) Telecommunications Room (MPOE/MDF/IDF)

a) MPOE (Minimum Point Of Entry)

(1) The MPOE is where all outside plant cables enter the building from an outside communication vault.

(2) Requires a non-vented door leading directly to the outside of the building. If outside door is not possible, then leading into a main hallway on the 1st floor.

(3) The MPOE and MDF can be located in one room provided the required ASF is achieved.

(4) A minimum of four 4" conduits are required for cable pathways from the MPOE to the MDF.

(5) A stand-alone MPOE does not require any environmental controls

b) MDF (Main Distribution Frame)

(1) Each building will have one MDF. The MDF will contain core routers and switches for the building and provide services to additional IDF's if required.

(2) Requires a non-vented door leading directly to the outside of the building. If outside door is not possible, then leading into the main hallway on the 1st floor.

(3) Requires dedicated computer room air conditioning (CRAC) with a thermostat located inside the MDF room. Room temperature to be maintained at 72 degrees ± 2 degrees 24 hours a day 7 days a week.

(4) Requires dedicated 208V power distribution panel

c) IDF (Intermediate Distribution Frame)

(1) All secondary telecommunication rooms are called IDFs and will contain additional switches and/or server equipment to support the surrounding area

(2) Requires a non-vented door leading directly to a main hallway

(3) Requires dedicated computer room air conditioning (CRAC) with a thermostat located inside the MDF room. Room temperature to be maintained at 72 degrees ± 2 degrees 24 hours a day 7 days a week.

d) All MPOE/MDF/IDF's

(1) When possible, the door should open out of the room

(2) Door should be located at one corner of room

(3) When possible, the door should be on the "short" wall

(4) Doors should be keyed for a District MER4

e) Access

(1) To other spaces shall not be granted through MDF/IDF

(2) To MDF/IDF shall not be gained through other spaces

f) Location

(1) Normally each MDF /IDF should be located close to the center of area servicing within the building

(2) All IDF's for each floor should be stacked on top of each

(3) Location must not exceed 260 feet per drop inclusive of all pathways, conduits and cable trays

(4) If cable lengths will exceed 260 feet per drop, an additional IDF must be added to each floor to support all current and future data/telecommunication needs

g) Assignable Area

(1) Assignable space shall be determined using interior room dimensions

(2) Typical MPOE will be at least 80 assignable square feet with a minimum short wall distance of 8 feet.

(3) Typical MPOE/MDF combined room will be at least 220 assignable square feet with a minimum short wall distance of 12 feet.

(4) Typical MDF will be at least 180 assignable square feet with a minimum short wall distance of 10 feet.

(5) Typical IDF will be at least 120 assignable square feet with a minimum short wall distance of 8 feet.

h) Walls/Surface Finishes

(1) Drywall from floor to ceiling

(2) All walls to be taped, spackled and painted

(3) After final paint has been applied, install Fire-Rated Backboard

(a) Shall be installed on all walls

(b) Shall be 100% painted after IOR's inspection of material (Fire Rating Symbol can be masked and remain visible)

(c) Shall be 5/8" minimum thickness

(d) Shall start at 6" AFF

(e) Shall rise to 8 ½' AFF (similar to standard 4' x 8' plywood sheets)

(f) Shall be installed before any equipment, conduits, etc. is mounted on the wall

i) Flooring

(1) Shall have 100% vinyl composition tile (VCT) coverage on all floors including Access Flooring with matching base.

(2) Conduits or sleeves penetrating the floor shall extend between 3" and 6" AFF

j) Ceiling

(1) Shall be open to floor above with no T-Grid or other plenum ceiling

(2) All ventilation ducts shall be installed at the wall and not enter the room

(3) When installed within the MDF/IDF, "Fan Coil Units" shall be mounted above the door

(4) No other HVAC units or components will be placed within the MDF/IDF

k) Lighting

(1) Shall consist of a minimum of two (2) each double bulb 4' fluorescent type fixtures

(2) Shall be hung by chain from the ceiling and allow for a 90 degree reposition to maintain parallel positioning

(a) Intent is to light the front and back of Data/Server racks and not the cable tray running through the middle, racks may be parallel to the long wall or the short wall

(3) Shall not be controlled by building lighting control panel (LCP)

(a) MDF/IDFs must be usable 24/7

(4) Light switch can have motion or occupancy sensor to turn lights on and off but must have a manual override to turn lights on or off.

(5) Should be installed at minimum 10' AFF

l) Plumbing or other "wet" pipes

(1) No plumbing supplies, returns, drains, etc. shall run through any MDF or IDF

(2) When this is not possible, a solid run with no joints must be used. Plumbing should run as not to have any leaks directly over items mounted to the wall or Data/Server racks running through "middle" of the room. This must be coordinated with assigned IT project Manager

m) Other utilities or services

(1) No fan coils, compressors, pumps, water or drainage pipes, ducts or other devices not directly related to the function of the MDF/IDF shall be placed in any MDF/IDF

(2) No transformers, UPS, converters, power supplies or other electrical items not directly related to the function of the MDF/IDF shall be placed in any MDF/IDF

B) Pathways (CFCI)

1) All data conduits will be installed with pull string

2) All data conduits shall have a blue/green banding & labeled "TEL/DATA Use Only" both ends

3) Sufficient number and size NOT to exceed 40% fill ratios depending on type of cable (plenum, outside plant, fiber or CAT6) and its corresponding outside diameter (O.D.)

a) For O.D. purposes, use the following in determining 40% fill ratios

(1) Systimax CAT 6 copper

(2) Systimax 48 SM fiber

See Fill Ratio chart below

Fill Ratio	Conduit Trade Size (Diameter in Inches)	SYSTIMAX - CAT6	
		Inside Plant 0.23" OD 1071 & 2071	Outdoor Plant 0.25" OD 1571
28%	1"	5	4
	2"	7	6
	4"	11	9
40%	1"	21	17
	2"	30	25
	4"	45	38
60%	1"	84	71
	2"	121	102
	4"	182	154
28%: Recommended fill ratio for the cable capacity of horizontal pathway conduits that have no more than two 90 degree bends (180 degrees total) and are no longer than 100 ft.			
40%: Recommended fill ratio for initial installation of cable in furniture and horizontal pathway.			
60%: Recommended fill ratio for unplanned additions after initial installation. This fill ratio range may be used as an estimate and does not account for corners and other factors.			
All are per BICSI TDMM			

b) Fire-rated wall penetrations

(1) Use E-Z Path or Hilti devices

(2) Observe 40% fill ratios based on same criteria as above

(3) Ensure all fire caulking is 100% complete and inspected by IOR prior to cable pulls

4) Outside plant

a) All conduits shall

(1) be 4" inside diameter Schedule 40 or higher grade PVC

(2) Be a package of 4 each (minimum). Total number to be verified by IT PM

(3) have a pull tape not rope installed in all conduits

(4) have one mule tape installed within the package

b) Innerduct

(1) Contractor shall install

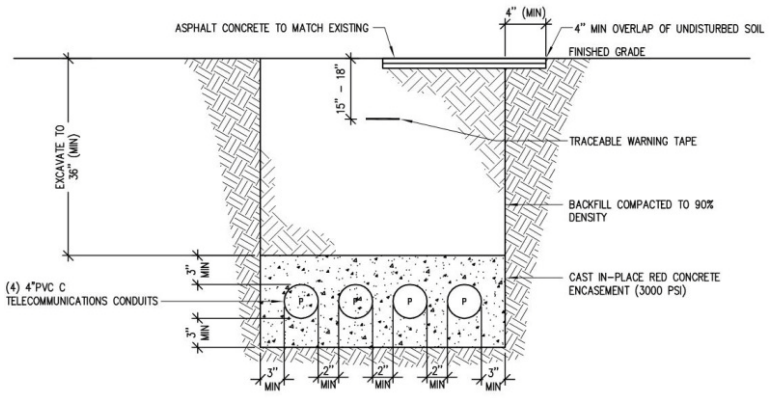
(a) Two 3-pocket MaxCell 4" in one conduit per package for fiber OSP

(b) Two 3-pocket MaxCell 4" in one conduit per package for copper OSP

c) Slurry encasement

(1) All 4" conduits to be installed during construction will be installed at prescribed depth using chairs to set spacing and encased in slurry (see diagram below).

(2) Typical depth is 4 feet with 3 feet of coverage over encasement as shown



TELECOMMUNICATIONS DUCT BANK (TYPICAL)

5) Inside Plant

a) Inside conduits, cable trays, pathways and wall penetrations

(1) Shall meet all requirements as specified by IEEE 802.3u

(2) Shall be clearly identified on all DD, DSA and Construction Drawings

(3) All conduits and cable trays must have access from an accessible area

(4) The primary pathways for inside plant should be via the above ceiling grid space. Below or in slab conduits for data should only be utilized when absolutely necessary.

(5) Inside plant should utilize cable tray as the primary means of distribution in the above ceiling grid areas.

b) Floor Boxes(where approved)/Wall Access panels

(1) Raised floor/Access flooring

(a) Submit one with electrical and data compartments configured as a submittal item.

(b) Comply with requirements of applicable local codes, NEC, UL, and NEMA Standards pertaining to floor boxes and components. Meet or exceed UL Fire Classification requirements for recessed and flush style boxes. Listed and Labeled in accordance with NFPA 70, Article 100

(c) Accessibility Compliance: Design device flange to meet ADA Accessibility Guidelines as to changes in floor and ground surface levels.

(d) Must be capable of accommodating a minimum two 20 amp 120VAC electrical circuits and 12 CAT-6 data circuits

(e) Box should have at a minimum, three (3) 1" concentric knockouts, one (1) 1.25" Knockout, and one (1) 2" knockout.

(f) Floor boxes are discouraged and must be approved by District Architect. If floor boxes are provided, submittals should be submitted to District Architect prior to acceptance.

(g) Floor box covers should be manufactured from die-cast aluminum with powder coat finish. The covers should have the capability to accept tile or carpet inserts or solid covers.

(h) Conduits feeding floor box need to accommodate the fill ratio for power and data cables being installed at the specific location. Coordinate final configuration with IT PM.

(2) Cast in Concrete

(a) Submit one with electrical and data compartments configured as a submittal item.

(b) Comply with requirements of applicable local codes, NEC, UL, and NEMA Standards pertaining to floor boxes and components. Meet or exceed UL Fire Classification requirements for recessed and flush style boxes. Listed and Labeled in accordance with NFPA 70, Article 100

(c) Accessibility Compliance: Design device flange to meet ADA Accessibility Guidelines as to changes in floor and ground surface levels.

(d) Must be capable of accommodating a minimum two 20 amp 120VAC electrical circuits and 12 CAT-6 data circuits

(e) Floor boxes are discouraged and must be approved by District Architect. If floor boxes are provided, submittals should be submitted to District Architect prior to acceptance.

(f) Box should have at a minimum, three (3) 1" concentric knockouts, one (1) 1.25" Knockout, and one (1) 2" knockout.

(g) Floor box covers should be manufactured to meet requirements for cast in concrete environment. The covers should have the capability to accept tile or carpet inserts or solid covers.

(h) Conduits feeding floor box need to accommodate the fill ratio for power and data cables being installed at the specific location. Coordinate final configuration with IT PM.

c) Surface Mounted Raceways

(1) Surface mounted Raceways

(a) Raceway will be a minimum dual channel raceway for branch circuit wiring and data network, voice, audio video low voltage wiring.

(b) Raceway should be manufactured from aluminum alloy and be UL Listed

(c) Should feature a two piece design with a base and a snap-on cover.

(d) Minimum size should be a minimum of 8 sq. inches of internal volume space of which 4.5 sq. inches for the data compartment and 3.5 sq. inches for the electrical compartment.

d) Number of riser conduits/sleeves shall be sufficient between the floors

(1) All conduits or sleeves will be 4" in size

(2) Minimum of two conduits/sleeves for each IDF above or below MDF. Refer to 40% fill ratios in determining the number conduit/sleeves required. This shall be verified with IT PM

Example - MDF (1st Floor) to IDFs on 2nd, 3rd and 4th floors

- **MDF to IDF 2nd floor – minimum 6 conduits/sleeves**
- **IDF (2nd floor) to IDF (3rd Floor) – minimum 4 conduits/sleeves**
- **IDF (3rd floor) to IDF (4th floor) – minimum 2 conduits/sleeves**

e) Conduit risers within classrooms, labs, lecture halls, conference rooms and offices

(1) All data drops should be fed by minimum 1" conduits within the wall and/or floors

(2) All data boxes should be Quad electrical J-box with duplex reducer mounted within the wall

(3) Data boxes should normally have (1) 1" EMT from j-box location to an accessible ceiling space

(4) If more than 6-8 cable drops are needed, either use;

(a) One each 2" EMT, or

(b) Two each 1" EMT, or

(c) More as prescribed by 40% fill ratio for CAT6 UTP plenum cable per manufacturer's specification

f) Recommended penetrations for fire-rated walls are EZ-Path (preferred) and Hilti devices

(1) Quantity and size of these devices should be consistent for the number of cables that will pass through the wall.

(2) Installation of these devices should include all fire stopping required to maintain fire rating of fire-rated walls

(3) Wiring contractors will provide fire stopping to the interior of conduits, etc.as required to maintain fire rating of fire-rated wall

C) Electrical Requirements

1) Power Panels/Distribution Panels (CFCI)

a) A dedicated surface-mounted Power Distribution Panel (sized as necessary to accommodate the required circuits) should be located in the MDF room. This panel will provide power (at a minimum) to the main Critical Power IT UPS (Uninterruptible Power Supply) and convenience outlets within the MDF

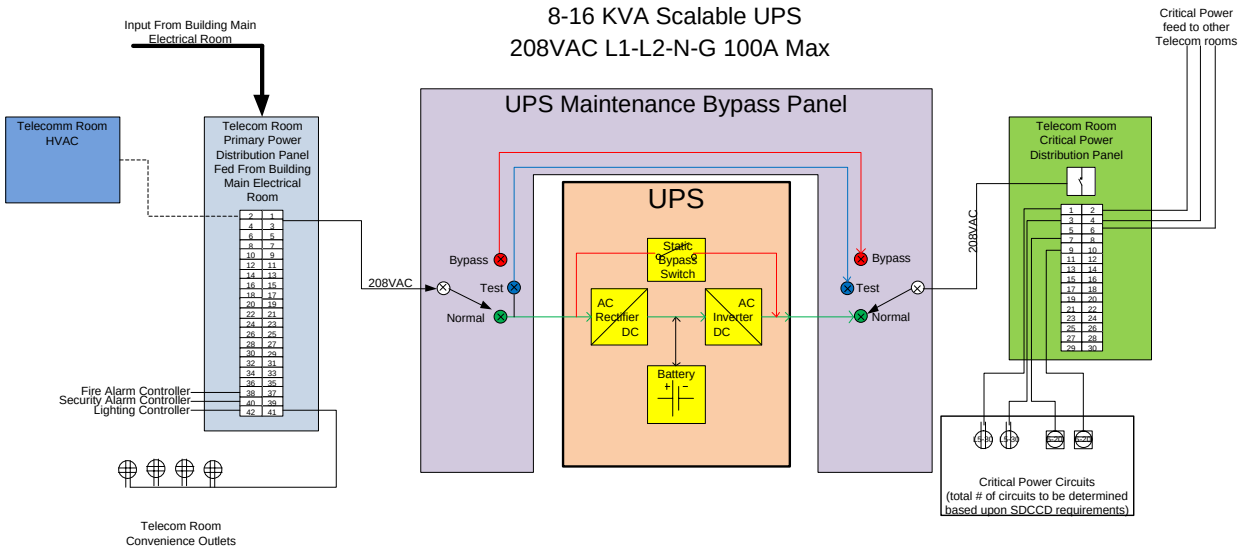
b) A surface-mounted Critical Power Distribution Panel (sized appropriately to accommodate all individual dedicated circuits for all floors in a stack) to be located in the MDF room. This panel is fed from the output of the Critical Power IT UPS.

2) **Ground Bus (CFCI)**
   a) **A ground bus bar is required in each MDF/IDF**
   b) **All ground bus bars are to be the same electrical ground as building ground for electrical systems for the building**
   c) **Each MDF/IDF ground bus bar shall be tied together with the ground bus bar located in the MDF**
3) **Convenience Outlets**
   a) **One Quad Outlet will be located in the middle each wall**
      (1) **If any wall is longer than 10 feet, then place (2) each quad outlets evenly spaced**
   b) **One Duplex Outlet will be located at 96" AFF on the opposite "short" wall from the door**
   c) **One Duplex outlet will be located on the "short" wall adjacent to the door per Intrusion panel**
      (1) **Verify with District Fire/Alarm team on number of intrusion panels in each MDF/IDF**
4) **Controls**
   a) **MDF/IDF requires 7/24 service**
   b) **Electrical, lighting and CRAC requirements preclude placing these services on a building management system**
   c) **District monitoring of lighting and CRAC should be included with local controls for both.**
   d) **HVAC/Lighting Control may be located in the MDF Telco on same short wall adjacent to Door as Fire/Intrusion alarm systems at 96" AFF or higher**
5) **Transformers/Inverters**
   a) **No transformers should be co-located within the MDF or IDF rooms**
   b) **No transformers in adjacent rooms should be on common walls with the MDF or IDF rooms**
   c) **No Inverters should be co-located in any MDF/IDF**
6) **Telco UPS Requirements (OFCI)**
   a) **District IT will purchase an appropriate size UPS for each MDF/IDF**
   b) **Construction Electrical contractor shall be responsible to provide the appropriate plugs, outlets, wiring, conduits and installation as required, thus Owner Furnished**

Equipment (UPS) and Contractor Installed (all other items not limited to what is described here)

c) District IT will determine which makes and models will be installed for each new building. This information will include the number of UPS that will be installed, which MDF/IDFs and make/models of each unit.

San Diego Community College District
Typical 8-16KVA UPS Single Line Drawing



d) The above diagram should be used as a reference and should be modified for each new building. Final design should be completed in concert with direction from the assigned IT PM for the project

e) Per the diagram above, the project electrical contractor will perform the following tasks;

(1) Install the Surface Mounted Telecom Room Primary Power Distribution Panel with appropriately sized circuits for the required services (to be confirmed by the IT PM)

(2) Install the Surface Mounted UPS Maintenance Bypass Panel(OFCI)

(3) Install the Surface Mounted Telecom Room Critical Power Distribution Panel with appropriately sized circuits for the required services (to be confirmed by the IT PM)

(4) Route power from the Telecom Room Primary Power Distribution Panel to the UPS Bypass Switch/Panel using EMT

(5) Route power from the UPS Bypass Switch/Panel to the UPS using EMT and Seal Tight

(6) Route Power from the UPS back to the UPS Bypass Switch/Panel

(7) Route Power from the UPS Bypass Switch/Panel to the "Telecom Room Critical Power Distribution Panel"

(8) From the "Telecom Room Critical Power Distribution Panel" (4) each dedicated Quad circuits will be provided to each MDF/IDF room

(a) Location will be verified by IT PM

(9) From the "Telecom Room Critical Power Distribution Panel" (2) each dedicated circuits will be provided to (normally) one MDF/IDF room utilizing a L5-30R receptacle

(a) Location will be verified by IT PM

(10) All circuits and receptacle's will be labeled at each location

f) In addition, a dedicated wall mounted L6-30R is needed in each IDF. Location to be determined by assigned IT PM

(1) Separate dedicated circuit from the "Telecom Room Primary Power Distribution Panel" to each Telco

(2) L6-30R will be mounted on the wall

(a) Location to be verified by IT PM

D) Heat Loads

1) Initial equipment heats loads will be based on the placement of 1-3 core switches in the MDF and 1-2 Core switches or multiple Stackable Switches in each IDF.

a) Location of the Core Switches will generally be in the 1st floor MDF room but could be located on an upper floor as directed by the District IT Manager

b) Each Core switch has redundant 1200 watt power supplies and will be at max loads

c) Stackable switches at 375 watts may be distributed throughout the building MDF/IDF locations

2) MDF will have a minimum of one 12-16 kVA UPS with up to 16kVA load (this includes a core router switches and servers)

3) Each IDF will have a minimum of 2 and a maximum of 8 switches at 375 watts each (750-3000 watts) plus any required HP DL380 series servers. Estimating 2-4 servers (800 watts each) could be added within 1- 2 years after opening building. This could add an additional 1600 - 3200 watts of load in an IDF room.

E) SDCCD Information Technology Project Manager

1) **IT PM will assist the project architect and electrical engineer to determine the following information;**
   a) **Cable pathways**
      (1) **Cable trays**
      (2) **Conduits**
      (3) **Which manhole will provide District IT backbone facilities**
   b) **J-box locations for;**
      (1) **Data/telephone drops**
      (2) **Emergency phone drops including site located Talk-a-phone**
      (3) **Call box drops**
   c) **Provide location in MDF and/or IDFs for the following items;**
      (1) **Fire panels and Annunciators**
      (2) **Intrusion panels**
      (3) **Wiring (110 blocks)**
      (4) **HVAC controller(s)**
      (5) **Lighting Control panel(s)**
   d) **Working with Campus A/V coordinator, will provide assistance with Infrastructure to support A/V equipment**
   e) **Coordinating work of district wiring vendor**
   f) **MDF and IDF room layout**
   g) **Wiring plan**
   h) **Outside Plant Cabling (OSP) both copper and fiber**
   i) **Inside Plant Cabling (ISP) both copper and fiber**
   j) **All other wiring needed for other items, TV, Video-teleconferencing, etc.**
   k) **IT switch locations**
   l) **Assist (with campus A/V coordinator)in coordinating work of district A/V vendor**
   m) **Assist (with District Police) in coordinating work of District Safety Camera vendor.**

F) **IT PM will assist the General Contractor foreman/project manager or Construction Manager (CM-Multi-Prime contracts) Superintendent/Project manager with the following;**

1) **Setting up a meeting to integrate installation of OSP and ISP cabling with District Wiring Vendor into the Project Master Schedule**

2) **Setting up a meeting to integrate installation of A/V wiring and equipment into the Project Master Schedule**
3) **Coordinating District IT personnel to support network and telephone needs for commissioning items**
4) **Coordinating District IT personnel and District Wiring Contractor to support FF&E items for a successful move-in of District Staff/faculty/Students into new and renovated buildings**
5) **Be the primary point of contact for District IT related issues during to the construction period**
6) **Attending meetings as needed to maintain active communications for District IT during the construction period.**

G) **The San Diego Community College District (SDCCD), Information Technology (IT) Department works with the architect and engineers to design the following:**

1) **Data/telephone cabling pathways**
   a) **Cable Trays**
   b) **Data/Telephone Conduit and Box Locations**
   c) **Conduit Labeling**
   d) **Pull Strings**
2) **Ladder rack installations in primary corridors/hallways**
3) **Audio Visual solutions, infrastructure to support (power/conduits/floor box locations)**
4) **Lighting issues in all classrooms/conference rooms that will have Audio Visual solutions**
5) **Dedicated power to Audio Visual locations**
6) **MDF/IDF room (MPOE/MDF/IDF) size, backboards, lighting, ground bus bars**
7) **Fire Panel location if in MDF/IDF**
8) **Alarm Panel location if in MDF/IDF**
9) **MDF/IDF Dedicated Power Distribution panels**
10) **MDF/IDF Dedicated CRAC if needed**
11) **Conduit from nearest campus data manhole to new building**

NOTE: All of the above shall be part of the construction contract

H) **SDCCD contracts with their own third party vendors to procure and/or install some or all of the following:**

1) **UPS and UPS Equipment**

2) **All racks, cable tray, wire management residing in the MDF/IDF(s)**
3) **All Data/Telephone Cabling**
4) **Audio Visual equipment to include possible electric screens in ceiling grid and projector mounting hardware**
5) **Telephone solutions, including desktop phones and emergency classroom phones**
6) **Camera systems, if any**
7) **All fiber-optic and copper connectivity to new building**
8) **All fiber-optic and copper cabling in new building**

I) **The following items shall be accommodated in the construction schedule. Please provide the assigned SDCCD IT Project Manager with a copy of the construction schedule and place all IT Project Managers and the Network Manager on the email list to be inform of any changes to that schedule and to receive the weekly Owner's Meeting minutes. The assigned IT Project Manager shall attend the weekly meetings as needed and on a periodic basis to maintain good communications with the project management team.**

1) **Completion of MDF/IDF rooms**
   a) **VCT Flooring**
   b) **Walls completed and painted**
   c) **Backboards installed, inspected and painted on all walls**
   d) **Door installed (may be temporary with construction core)**
   e) **Lighting (may be temporary construction lights provided by electrical contractor)**
2) **Date to begin installation of Outside Plant cabling (both copper and fiber facilities)**
3) **Date to begin rough in of Inside Plant Cabling (both copper, CAT6 and fiber facilities)**
4) **Date to complete IT cabling related to commissioning items;**
   a) **HVAC controller**
   b) **EMS**
   c) **LCP**
   d) **PV**
   e) **Elevators**
   f) **Fire Alarm**
   g) **Intrusion Alarm**
5) **Date to complete IT cabling related to move-in of faculty and staff;**

a) **Faculty/Staff**

b) **Computers**

c) **Phones**

d) **Fax machines**

e) **Printers**

f) **Other IT related items**

6) **Instructional**

a) **Computers**

b) **Emergency Phones**

c) **Printers**

d) **Other IT related items**

J) **Communications between management team and SDCCD IT vendors**

1) **SDCCD IT Vendors understand construction safety rules, and are bonded and insured. For each construction project, all SDCCD IT vendors (each worker) shall attend safety orientation, safety briefings as directed by the GC and/or CM.**

2) **SDCCD IT Vendors (assigned Foreman) shall attend the weekly foremen meetings as directed by the GC and/or CM.**

3) **Conflicts between SDCCD IT Vendors and the GC and/or CM, should be directed to the assigned IT Project Manager. The PM shall resolve the conflict and shall take appropriate action when conflict involves workmanship, inappropriate conduct and failure to perform issues. Scheduling issues shall be discussed and corrected as swiftly as possible.**

4) **The goal of the SDCCD IT department is for a smooth partnership between the District's personnel and its vendors, and the project construction team.**

II) DESIGN GUIDELINES FOR TELEPHONY SYSTEMS

A) Emergency Classroom Telephones

1) **Emergency Classroom Telephones will be installed in every instructional classroom to facilitate communication needs.**

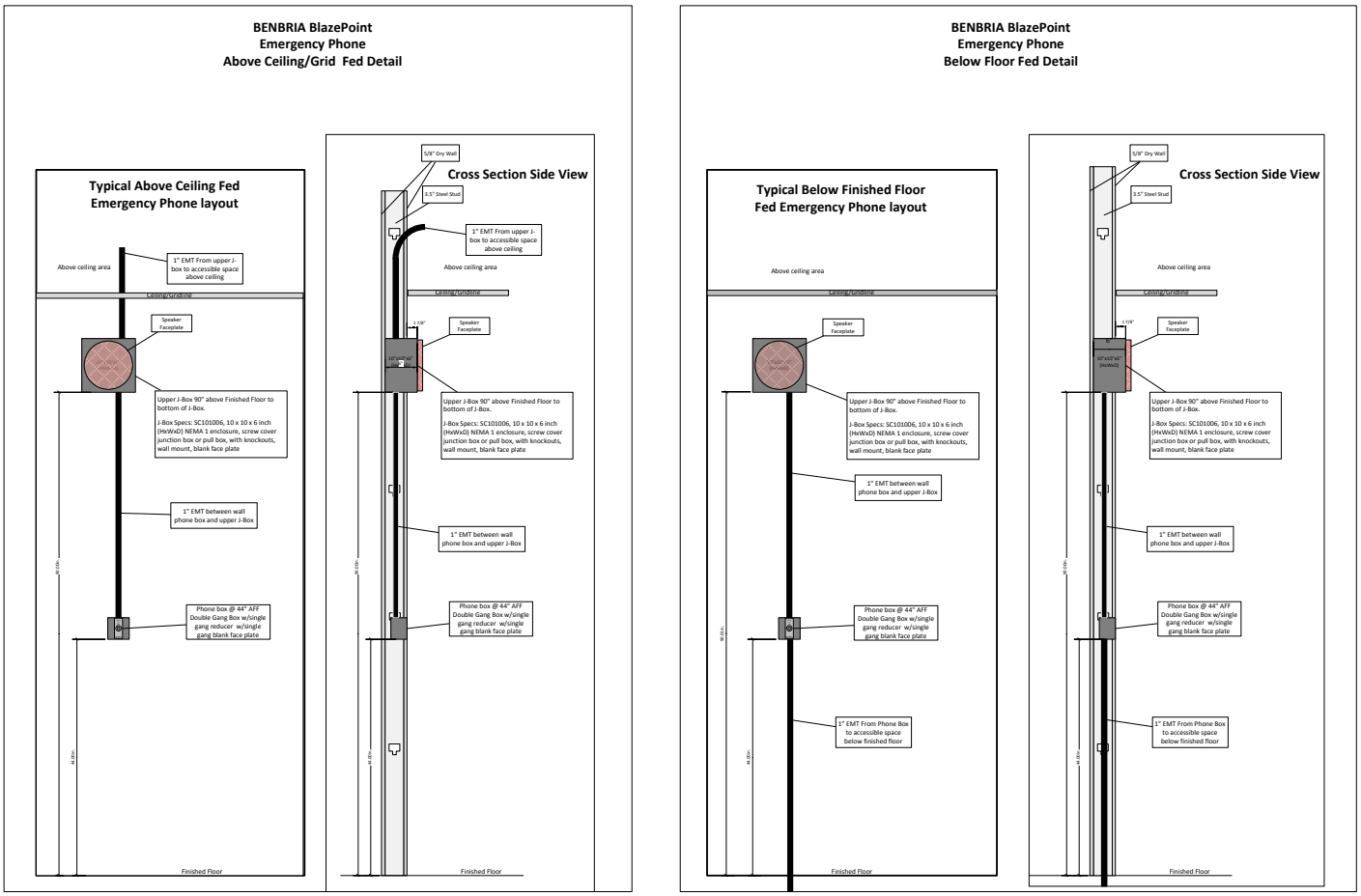
   a) **SDCCD will provide and install (OFOI) the Emergency phone device.**

   b) **Electrical contractor is responsible for installing the conduit and J-Box as per design (CFCI).**

2) **The location of these devices will normally be near the main entry/exit door and should project sound toward the classroom audience**

SDCCD BlazePoint Emergency Phone Typical Layout

Created 02/24/2011 Rev 1.0 (DPB)



3) **The above diagram should be used as a typical installation for each classroom emergency phone installation. Final design and location should be completed in concert with direction from the assigned IT PM for the project**

B) Elevator Emergency Phone

1) Emergency phones will be installed in all elevators.

a) Phone will be integrated into the control panel of the elevator.

b) Elevator Phone must be compatible with the SDCCD PBX system (Mitel SX2000) using an ONS analog port.

c) Phone must be programmable to dial out to SDCCD College Police Dispatch

(1) Programming must be able to be accomplished locally by SDCCD Telephony Technicians or by dialing into the unit from another on-site PBX line

(a) Any hardware, software, and instructions for programming must be provided to SDCCD IT Telephony Manager.

(b) NOTE: All SDCCD elevators dial an on-premise SDCCD PBX number and do not have access to the Public Switched Telephone Network (PSTN).

III) DESIGN GUIDELINES FOR AUDIO-VISUAL SYSTEMS

A) STANDARD CLASSROOMS

1) This section is intended for rooms with a projector and screen installation with a lectern/podium/teaching desk

2) Projector Location:

a) The projector will be located 12'6" from the front wall. It should be center of the room. It's important that this location is centered on a ceiling tile and not on the ceiling grid.

b) Power for the projector should be a 6' whip, above the ceiling grid, 14' from the front wall. The whip is a temporary condition. The outlet will be ceiling mounted by the audio visual contractor when installation of the projector is completed.

3) Screen Location:

a) The top of the screen enclosure will be mounted a minimum of 108" AFF. This is important so that the bottom of the screen, when extended is no lower than 40" AFF. The screen has a 60" drop. The enclosure is an additional 8". The screen should be centered on the front wall.

b) The fire strobe should not be located behind the screen location. A ceiling mounted strobe is preferred.

c) The clock should be mounted on the rear wall.

d) If the room is equipped with a white board, and a whiteboard light is used, the light must be installed above the screen mounting height, 108" AFF.

e) **Note –All classrooms screens are manual, with Controlled Screen Return (CSR). Structural backing must be provided for the screens. The shipping weight is 55 pounds. The dimensions of the case are 102”W x 6”H. The District’s AV contractor will provide and install the screens.**

4) **Room Lighting Fixtures:**

a) **If pendant lights are used, the lowest point on the light must be at least, 9’6” AFF, and run parallel to the projector. Per SDCCD BIM standards, projector throw should be modeled for clashes with light fixtures.**

5) **Lectern location:**

a) **To meet ADA and the Districts DSPS accessibility requirements, there must be a 48” clear space from the lectern to the lip of the white board tray, or any other protrusion from the teaching wall.**

b) **Floor Box**

(1) **Location to support the teaching podium/desk/lectern location should be located at 5 feet from front wall and 4 feet from side wall**

c) **Typical floor box should be a Wiremold RFB-11 or Wiremold AT8 or similar. Coordination should be done with assigned IT PM**

d) **Two, 1.25” (minimum size) conduits are needed from the floor box to the space above the ceiling grid.**

e) **Duplex power receptacles are required in the floor box and on the projector whip.**

B) NON-STANDARD ROOMS

1) **This section is intended for rooms with a projector and screen installation, but without a lectern.**

2) **When a lectern is omitted from a standard Smart Classroom installation, there are two alternatives for housing the electronic equipment that would otherwise be located in the lectern.**

3) **Equipment Alternative #1:**

a) **This the preferred alternative. All A/V electronic equipment will be installed within casework in the room or in a stand-alone credenza. For either of these options, the equipment will be installed in a standard 19” wide rack, (outside dimensions: 22.48”H x 20.40”W x 17.91”D). The rack will then be inserted into the casework or credenza. When casework installation is selected, please provide screen vent on door.**

b) **One, 2" grommet is necessary in the rear of the credenza as a pass-through for the necessary cables.**

c) **A duplex power receptacle is required within the case work or on the wall behind the credenza location. A duplex power receptacle is also required on the power whip for the projector.**

d) **A quad data drop is required within the casework or on the wall behind the credenza location. A single data drop is also required to the controller.**

e) **A 3-gang j-box will be required to mount the system controller. A location will be identified per project, by the AV Project Manager.**

f) **One 1" conduit is required from the controller to the space above the ceiling grid**

g) **One 1" conduit is required from the equipment rack location (casework or credenza) to the space above the ceiling grid**

h) **(Options) If the room is equipped with a floor box and/or LED display, then one, 1" conduit is required from the LED display to the space above the ceiling grid.**

i) **Two 1.25" (minimum size) conduits are needed from the floor box to the space above the ceiling grid**

j) **One 1" conduit is also required from the floor box to the equipment rack location.**

k) **The notes from the Standard Classroom for the projector location, screen location and lighting fixtures apply to this section as well.**

4) **Equipment Alternative #2:**

a) **Electronic equipment will be installed in a wall-mounted, rack-box. Specifications for the wall mounted box will be provided by the District's A/V Vendor as needed per project.**

b) **When possible, the wall box is built into the wall. Power and data are run into the wall box from the rear, within the wall.**

c) **In addition to the power for the wall box, a duplex power receptacle is also required on the power whip for the projector.**

d) **A quad data drop is required to the rear of the wall box. A single data drop is also required to the controller.**

e) **A 3-gang j-box will be required to mount the system controller. A location will be identified per project, by the AV Project Manager.**

f) **One, 1" conduit is required from the controller to the space above the ceiling grid.**

g) **One, 1.25" conduit from the wall box to the space above the ceiling grid**

h) **(Options) If the room is equipped with a floor box and/or LED display, then one, 1.25" conduit is required from the LED display to the space above the ceiling grid.**

i) **Two, 1.25" (minimum size) conduits are needed from the floor box to the space above the ceiling grid.**

j) **One, 1.25" conduit is also required from the floor box to the equipment rack location.**

k) **The notes from the Standard Classroom for the projector location, screen location and lighting fixtures apply to this section as well.**

C) CONFERENCE ROOMS

1) Conference Rooms will be equipped with an LED display instead of a projector and screen.

2) Display Infrastructure:

a) **The display location will require backing to mount the display. The location will also need a duplex power outlet and a 1.25" conduit with a 1-gang j-box installed 60" AFF. The duplex outlet and the 1 gang j-box should be mounted centered of the display wall in coordination with the furniture layout; e.g., center of conference room table.**

b) **1.25" conduit will be needed from the floor box to the equipment rack location.**

c) **1.25" conduit will be needed from the equipment rack location to the area above the ceiling grid.**

d) **1.25" conduit will be needed from the display location to the area above the ceiling grid.**

e) **1" conduit will be needed from the controller to the area above the ceiling grid**

f) **A 3-gang low voltage mud ring will be needed at the same height as the light switches, left of the display. Note – some installations will require a 2-gang mud ring instead. Please confirm with the AV Project Manager.**

(1) A network cable drop will be needed at this location.

D) PUBLIC ADDRESS SYSTEM

1) The District standard is for a building-wide public address system to be installed in all new buildings with more than two floors. The public address system will be designed and installed by the District's audio visual contractor.

2) The point of initiation for an announcement will be through the District's telephone system. Audio output for an announcement will be through speakers installed in all designated announcement zones.

3) **Announcement zones will include corridors, conference rooms, classrooms and student/faculty lounge areas.**

4) **PA system Infrastructure Requirements**

   a) **The control hardware for the PA system will be rack-mounted in an IDF or MDF closet. The specific closet will be determined on a per-project basis. The total rack space needed for the hardware may be up 24 U's.**

   b) **Where available, speakers will be installed above the t- grid. Where t-grid is not available, speakers may be surface mounted. Speaker locations will be determined on a per-project basis.**

   c) **Typically, speaker cable will be run above the t-grid. Where t-grid is not available, the AV contractor will coordinate with the CM to determine the optimum cable path.**

   d) **A half inch cable pass-through will be needed into each room where PA speakers will be installed.**

E) DIGITAL SIGNAGE

1) **Digital Signage for informational, way-finding, and safety purposes, will be a component of all new buildings. A minimum of one (1) digital signage display shall be located on each floor of any new building. Coordinate the exact locations of all digital signage displays with the Audio Visual Project Manager. The digital signage displays shall be located in a high-visibility area. A typical location would be:**

   a) **Entrance Lobby**

   b) **Elevator Lobby**

   c) **Staircase Landings (for large staircases only)**

   d) **Public Gathering / Common Areas**

2) **Display Mounting**

   a) **All flat panel display locations shall have structural backing support provided inside the wall construction. Back support shall be a minimum of ¾" plywood spanning the entire size of the flat panel display. Display specifications will be provided by the audio visual contractor.**

   b) **For locations requiring extra large displays (60"+) and/or cantilever or swing arm mounts, additional backing support will be required. Specifications will be provided by the audio visual contractor.**

   c) **Power receptacles located behind the display shall be recessed "clock" style outlets.**

   d) **Typical Flat Panel Display mounting heights will be 52" AFF to the bottom of the display.**

e) Typical electrical, data, and low voltage connection plate heights will be 60" AFF. A dual port data connection and dual power is required at all Digital Signage Display locations.

f) A cable path must be identified from each display location to an IDF/MDF closet to be determined on a per project basis.

g) Digital Signage hardware and installation will be provided and installed by the District's Audio Visual Contractor

A. Digital Clocks (wireless)

1. Locate clock on the wall opposite the teaching wall or back third of the side wall; include in Contractor Bid.

2.5" and 4" 4-Digit Display

2.5" and 4" 6-Digit Display

Primex Wireless
GPS Synchronized Time Systems
shall be District Standard

Wall Display
14201G 4"(10.16cm), 4-digit display, 120 vac
Green LED Display

Digital Clocks (wireless) cont'd

Transmitter 1- watt model number 14006 with internal antenna

**Transmitter 1-watt Model number 14000E
with external antenna**

**CommandPoint
72 XR Transmitter
72XR5 5-watt Transmitter**

ELECTRONIC SAFETY & SECURITY REQUIREMENTS

INTRUSION ALARM SYSTEMS

General:

1. **Provide submittal and shop drawings to District Architect for review with Facilities prior to acceptance.**

PART 1 GENERAL

1.1 GENERAL AND SPECIAL CONDITIONS

A. General and Special Conditions apply to all work under this section.

B. The Contractor shall furnish all labor, equipment, tools, material, drawings, et cetera, necessary for a complete intrusion alarm system. The system shall be as designed by the Owner. The purpose of the furnished specifications and drawings is to convey to the Contractor the scope of the work required, all of which the Contractor is responsible to furnish.

C. The Contractor shall examine all existing physical conditions which may be material to, or affect, the performance of his work. No extra payments will be allowed made necessary by his failure to do so. Any omission, discrepancy, or lack of clarity shall be promptly identified to the Owner and Engineer for clarification prior to bidding the project.

D. The Contractor shall provide all devices and equipment required by these specifications and drawings. Under no circumstances shall the Contractor omit or delete any devices or equipment without the written directive of the Owner or Engineer.

1.2 DEFINITIONS

A. AHJ – Authority Having Jurisdiction (DSA-Inspector)

B. Approved – Unless otherwise stated, materials, equipment, or submittals approved by the Owner, Architect, or AHJ

C. Communicator – The Control/Communicator

D. Concealed – Hidden from view

E. Contractor – The Company awarded the primary contract for this work and any of its subcontractors, vendors, suppliers, or fabricators.

F. Device – any peripheral equipment including, but no limited to, door contacts, motion detectors, keypads, expansion modules, sounders, etc.

1. **Applied to wiring, conduit, etc. – installed or run above drop ceilings, in chases, inside walls, etc.**
2. **Applied to door contacts, installed inside the top of door frames and doors.**

G. Dispatch – The San Diego Community College Police Dispatch Center.

H. District - The San Diego Community College District.

I. Engineer – The system designer or engineering company designated by the owner.

J. EOL – End-of-line resistor. Typically 1000 (1k) ohms for Bosch equipment.

K. Exposed – Visible or not concealed

1. **Applied to wiring, conduit, etc. – installed or run on walls, ceilings, etc. where it is visible.**
2. **Applied to door contacts, installed on door frames and doors at the top of the door.**

L. IAC - Intrusion Alarm Communicator, see 'Communicator' above.

M. Intrusion Alarm System – the entire system including all panels, devices, wiring, etc.

N. Owner – San Diego Community College District.

O. Panel – see 'Communicator' above.

1.3 SCOPE OF WORK

A. The Contractor shall furnish and install, unless otherwise indicated, all items required for a complete Intrusion Alarm System(s) as described in these specifications and drawings.

1. **Provide a new, state of the art Intrusion Alarm System. This is to include all wiring, communicators, modules, door contacts, motion detectors, keypads, panic/hold-up switches and any other devices and equipment specified either in these specifications or on the blueprints.**

2. **Provide a network connection for each Panel from the nearest available connection to the District network. Cable to be run by others.**

3. **Provide an on-site, factory trained technician acceptable to the Owner and AHJ to supervise the installation.**

4. **Provide an on-site project manager.**

5. **Conduct weekly progress meetings and issue monthly written job progress reports to the Owner's Representative and Engineer.**

6. **Submit shop drawings to the Engineer or Owner's Representative for approval by the Engineer and Owner.**

7. **The contractor shall provide any x-ray of walls or slabs prior to core drilling and any required fireproofing or sealing of the cores.**

8. **Prior to the final acceptance test and pre-testing by the Contractor, conduct a complete test of the entire system upon completion of the installation to assure the Owner's Representative and Engineer that the system is operational.**

9. **Conduct the final acceptance test. The Alarm Contractor shall furnish personnel who are familiar with the installation at a time convenient to the Owner's Representative, the Engineer, and the AHJ. This test shall take place as soon as convenient after the completion of the installation and prior to the building being turned over to the Owner for occupation. If necessary, any punch list items shall be corrected and the entire system re-tested at the Contractor's expense prior to final acceptance of the system. The two-year warranty shall begin upon acceptance of the system by the Owner's Representative, the Engineer, and the AHJ.**

10. **Provide training of the Owner's personnel as required by the Owner. A maximum of two days shall be required for this training.**

11. Provide a two-year job site warranty of all materials and labor as specified elsewhere in this section.

1.4 RELATED WORK

A. Materials and work specified in other sections.

1. Fire stopping
2. Basic electrical materials and work
3. Mechanical (heating and air-condition duct locations, etc.)

1.5 SYSTEM DESCRIPTION

A. The Intrusion Alarm System shall be a state-of-the-art, networked system and shall be programmable using the District's current software over the District network (WAN).

B. The Intrusion Alarm System shall communicate to Dispatch via the District WAN.

C. Each Alarm Initiation Device shall be on its own zone either on the Communicator or on a zone expansion module connected to the Communicator.

1.6 APPLICABLE STANDARDS

The latest adopted issue of the following standards is hereby made a part of this specification:

A. NFPA 70 – *National Electrical Code*

B. Uniform Building Code (with California Amendments)

1.7 SUBMITTALS

A. Provide complete product data (including manufacture's descriptive and technical literature) and catalogue cut sheets clearly marked to indicate the model and catalogue number of each device for approval by the engineer and Owner's Representative.

B. Provide shop drawings including building floor plans showing device locations, complete wiring and schematic diagrams, conduit size, wire routing, and field terminations; panel layout including all modules and interconnections with the panel. The shop drawings shall show the proposed layout of the panel and all peripheral equipment and devices, its location in relation to other equipment in the area, and clearances for maintenance and serviceability. Shop drawings shall be prepared using a minimum scale of 1/8" = 1 foot for plans and ¼" = 1 foot for details.

C. Provide substantiating calculations showing the adequacy of power supplies and back-up batteries. If additional power supplies are required, provide calculations for those as well. All power supplies shall have a minimum of 20 percent additional capacity for later expansion if necessary.

D. Provide submittals within two weeks of notice to proceed. Partial submittals are NOT acceptable and will be returned to the contractor unreviewed.

E. All costs to review additional submittals resulting from an initial rejection shall be the responsibility of the submitting contractor. The Owner shall back-charge the Contractor for additional review(s).

F. Submittals rejected by the Owner's Representative and the engineer shall be corrected and resubmitted within seven (7) days of the review letter date.

1.8 DELIVERY, STORAGE AND HANDLING OF MATERIALS

A. Contractor will deliver all materials to area of project designated by the Owner's Representative. Vehicles shall not block fire lanes or fire doors during delivery of materials

B. Owner will not accept deliveries for the Contractor

C. The Owner's Representative will designate an area within the facility for storage of all materials. At the end of each working day, all materials shall be returned to the designated area. Material, equipment, tools, etc will not be left outside the storage area without the consent of the Owner's Representative

D. The cost of all material handling, delivery and freight is the Contractor's responsibility. The Owner or his representatives will not be responsible for material delivered to the site.

E. Maintain premises free from accumulation of waste materials or rubbish caused by this work. At the end of each day, remove from the site all surplus materials, tools, and all waste. The Contractor shall leave the premises clean to the Owner's satisfaction.

F. The Contractor shall arrange and pay for parking

1.9 WARRANTY

A. The Contractor shall provide a two (2)-year written guarantee against defects in material and workmanship furnished under this Contract. The costs of such guarantee shall be part of the purchase price. The guarantee commences when the Owner's Representative and Engineer accept the system and installation

B. The guarantee shall include all necessary material, travel, labor and parts to replace defective components or materials at the job site. The Contractor shall commence repair of any "in guarantee" defects within 24 hours of notification of such defects.

C. The Contractor shall make allowances in his guarantee to cover diagnosis of system defects, which might ultimately be the responsibility of others to correct. When this occurs, the Owner's Representative and other affected trades shall be notified.

D. The Contractor shall keep in effect the performance bond for one year after the system has been accepted by the Owner's Representative and the Design Professional

1.10 AS-BUILT DRAWINGS

A. Maintain at the site an up-to-date, marked set of as-built drawings, which shall be corrected and delivered to the Owner's Representative upon completion of the work

1.11 CHANGES

A. No changes are to be made in the installation from the layout unless specifically approved by the Owner's Representative. This does not include minor revisions for the purpose of coordination of work.

1.12 DAMAGE

A. The Contractor shall be responsible for all damage to the building, its contents, systems, etc. caused by his work during or after installation, testing, clean-up, etc.

1.13 CLEAN-UP

A. Maintain the premises free from accumulation of waste materials or rubbish caused by this work to the Owner's standard for cleanliness. Carpeting shall be protected from damage and clean up will be the responsibility of the Contractor.

B. At the completion of work, remove all surplus materials, tools, etc. and leave the premises clean to the Owner's standard of cleanliness.

1.14 SAFETY

A. All work shall be performed in compliance with the Occupational Safety and Health Act of 1970 (OSHA) and Construction and Safety Act Standards.

1.15 QUALITY ASSURANCE

A. The Intrusion Alarm Contractor shall maintain a fully staffed branch office including application engineers, drafters and technical service personnel within 30 miles of the San Diego metropolitan area.

B. The electrical contractor shall perform installation of all electrical circuits for the Intrusion Alarm System, including wire installation and terminations. The Intrusion Alarm Contractor shall install all intrusion alarm wiring related devices and make all connections associated with them.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. Acceptable equipment for this project must be suitable for use with the District Wide Area Network (WAN)

B. Acceptable equipment for this project must be compatible with the Bosch RPS programming software and be downloadable over the District WAN.

C. Acceptable equipment for this project shall have sufficient zone and user capacity to handle the usage for which it is intended.

D. Product data information for alternate products shall be submitted to the Engineer and Owner's Representative within seven (7) days after the pre-bid meeting for product equivalency approval.

E. Products for this project shall be of the latest design; obsolete or discontinued products will not be accepted.

2.2 INSTALLATION MATERIAL

A. Wiring

1. All wiring is to be solid jacketed: stranded wire is not to be used.

2. All field wiring is to be 22-4 solid station wire with a white outer jacket. Conductor shielding shall be Red, Black, Yellow and Green.

3. Wiring between the panel (and peripherals) and the punch blocks shall be 22-10 or 22-12 solid station wire. Conductor shielding shall be Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, and White. Pink and Tan shielding are the standard for the additional wires for the 12-conductor wire (22-12)

4. All field wiring is to be clearly labeled with permanent marker to be readily identifiable at punch blocks. Each wire is to be labeled with the type of device and its location in such a way as to identify the specific device to which it is connected..

5. **Splices shall be kept to a minimum. All splices shall be made only in terminal cabinets or on approved backboards using 50-pair, #66 punch blocks. Standoffs are not to be used with the punch blocks.**

B. Conduit

a. **Where used, conduit shall be 1/2" minimum and shall conform to NFPA 70 for the specific application**

b. **Conduit that is concealed or installed in unfinished areas shall be electric metallic tubing and flexible conduit in conformance with NFPA 70.**

c. **Conduit exposed to weather shall comply with NFPA 70 and the requirements of the AHJ.**

d. **All fittings shall be listed and approved for the specific conduit. For threaded rigid steel conduit do not use threadless or compression-type fittings.**

e. **All EMT conduit fittings shall be steel or malleable iron compression couplings and connectors.**

f. **Maximum conduit fill shall be fifty (50) percent of that permitted by the California Electrical Code**

g. **All concealed system conduit shall be blue in color or externally identified at 10-foot intervals, in each space, and at junction box covers, by permanent blue paint suitable for the purpose.**

h. **Exposed conduit in finished areas shall be plastic wiremold type as specified elsewhere or on the blueprints. Fill shall not exceed fifty (50) percent of its rated capacity. Wiremold not closely matching the surface on which it is installed shall be painted to match the surface on which it is installed.**

C. Terminal Cabinets

a. **Minimum size shall be 11 inches x 15 inches x 4 inches deep with a hinged lockable cover. For cabinets 24 inches x 24 inches or larger plate covers mounted with tamper resistant screws may be used.**

b. Terminal cabinets shall be identified as part of the Intrusion Alarm System on the outside face of the cabinet with an engraved plastic label using ½ inch white letters on a blue background.

D. Plenum Cable

a. Shall be installed per National Electrical Code, Articles 725 and 760.

b. The cable shall be marked with the wire model number, wire gauge, and number of conductors.

c. The cable shall be UL listed for low voltage signaling applications.

2.3 CONTROL EQUIPMENT

A. Communicator (Intrusion Alarm Communicator, Panel)

1. The communicator shall be a Bosch 9412G-C with a DX4020 Network Interface Module unless otherwise specified. If building usage permits the 7412G-C may be used in buildings of less than 20,000 square feet with approval of the engineer. The 9412G-C must be used in buildings of 20,000 square feet or larger or where more than 56 zones are required. The DX4020 is to be mounted inside the communicator cabinet and connected to the District network using a Category 5 or better cable. Firmware version 7.06 is not to be used – version 7.07 or higher is preferred. The latest version (currently version 3 – 9412GV3), shall be used.

In the event this communicator is no longer available another communicator may be used provided that it has at least the same capabilities and is compatible with the Bosch RAM/RPS programming software. Otherwise the communicator shall be supplied with at least two (2) computers, to be specified by the District IT department and include all software necessary for trouble shooting, upgrading, and programming the new equipment. These computers are to be installed (1 in the College Police dispatch center and the other in the Alarm Technicians' office), programmed and tied

into the District network by the contractor in cooperation with the District Alarm Technicians and the District IT department.

2. The communicator shall be capable of communicating to the alarm monitoring system in Dispatch via the District network and include all equipment necessary for such communication.

3. Unless otherwise specified the communicator shall be manufactured by Bosch and be the model specified.

4. The communicator shall be programmable via the District network using the Bosch RPS software.

5. A separate electrical outlet shall be provided for each communicator. The outlet shall be a duplex type mounted in a single gang box with the grounding terminal at the bottom. Outlets for the alarm systems shall be on a separate dedicated circuit. The circuit breaker shall be clearly marked and have a breaker lock to prevent the breaker from being accidentally turned off.

B. Power Supplies

1. All power supplies shall be designed with a capacity of at least 20 percent more than currently used.

2. If more power is required than is available from the communicator, additional auxiliary power supplies shall be used. Each auxiliary power supply shall be 12 VDC and a minimum capacity of 5 amps. (Altronix LCS5C12X or approved equal.)

3. Back-up power supplies (batteries) shall be of sufficient capacity to operate the system for a minimum of eight (8) hours.

C. Keypads

1. Keypads shall be Bosch D1260W unless otherwise specified

2. A maximum of eight (8) keypads shall be connected to each communicator.

3. Each keypad shall be assigned a unique address. Where possible the keypad address shall correspond with the area to which it is assigned

D. Modules

1. **Network interface module (NIM) – Bosch DX4020. Used to connect the communicator to the District WAN.**

2. **Zone expansion module - Bosch D8128D. Eight (8) zone module used to connect additional zones to the communicator. One required for each additional eight zones or portion thereof in excess of the eight zones available on the main board of the communicator.**

3. **Relay module – Bosch D8129. Used to add additional outputs to the communicator. One is available (relay A) on the main board of the communicator.**

2.4 ALARM INITIATING DEVICES

A. Door Contacts – GE/Sentrol 1087T

1. **Unless otherwise indicated, are to be surface mount, spdt (form C) type - Sentrol 1087T or approved equal.**

2. **Flush mounted contacts may only be used where aesthetics is a concern. In aluminum or silver colored frames use USP 270 spdt or approved equal. Under no circumstances are flush mount contacts to be used in steel doors or steel door frames.**

3. **Are to be of a color that most closely matches the door and frame on which they are mounted**

B. Roll-up Door Contacts – GE/ Sentrol 2207AU

1. **Unless otherwise indicated, are to be floor mounted.**

2. **The magnet is to be mounted magnet side down and may need a mounting bracket for proper orientation.**

C. Explosion-proof Door Contacts – GE/Sentrol 2807T

1. **To be used where the potential of explosion exists: for example welding gas or gasoline storage areas.**

D. Motion Detectors Honeywell/C&K DT7400 Series

1. **Unless otherwise indicated are to be wall mounted and be of the dual technology (combination PIR and microwave) type – Honeywell/C&K DT7400 series or approved equal.**

2. **In very large open areas (fifty feet or more in each direction) a ceiling mounted detector may be used with the approval of the Engineer and Owner's Representative – Honeywell/C&K DT5360 or approved equal.**

3. **In all cases motion detectors are to be of a range appropriate to the area being protected.**

E. Hold-up/Panic Switches

1. **Unless otherwise specified, are to be of the latching type using a metal forked key to reset. – Amseco HUS-7AI or approved equal.**

F. Projector Alarms

1. **May be used in other applications as well such as large screen monitors.**

2. **Shall be of the pull-apart type – GRI 4704A or approved equal**

3. **The assembly shall consist of the following:**
   a. **One GRI 4704A contact**
   b. **Two each GRI M4704 magnets & 4635 sockets. (One each comes with the contact)**
   c. **One Omron 6C873 (or equal) relay**
   d. **One ATW SGST-W (or equal) minihorn**
   e. **Necessary mounting hardware**

2.5 OTHER EQUIPMENT

A. Sounders

1. **Minihorns – ATW SGST-W or approved equal.**

2. **Sirens – ATW 508 or approved equal. Only to be used in area where the ambient noise level is such that a minihorn could not be readily heard.**

PART 3 INSTALLATION

3.1 EQUIPMENT

A. General

1. **The Contractor shall provide factory trained and authorized personnel for on-the-job supervision of the proper installation of devices in cooperation with, or as may be required by, other trades. This shall include the following:**

    a. **Provide specific on-site instructions to others on mounting and installation of each type of device by physically observing the installation of one or more of each type of device, as required, to assure that the installer is properly instructed in the work.**

    b. **Provide supervision as required by others to properly perform alarm installation work.**

    c. **Coordinate with the Engineer and District alarm technicians the programming of the communicator and all related equipment.**

    d. **Perform a complete test of the system, certifying that all devices have been activated and that the devices and systems have performed in accordance with the requirements of this specification.**

    e. **Provide as-built layout drawings and detailed wiring diagrams to the Engineer and Owner's Representative.**

2. **All mounting screws, except those supplied with the equipment, shall be combination phillips/slotted head. When mounting hardware is supplied, the equipment shall be mounted using the supplied hardware where feasible.**

3. **All communicators, panels, terminal cans, punch blocks, modules, etc. shall be mounted no lower than 48 inches (to the bottom) nor more than 78 inches (to the top) above the finished floor.**

4. **All Bosch equipment is to only be installed by Bosch trained and certified installers or under the direct supervision of the District Alarm Technicians.**

B. Wiring

1. **All device wiring is to be home run from each device to the room where the communicator is located or other designated centralized location (such as a remote telecommunications room) and terminated on a 50 pair #66 punch block. Each alarm initiating device (motion detector, door contact, hold-up button, etc.) shall be on its own zone on the communicator. Wiring from the communicator (or modules) is to be on the left side of the punch block. Wiring out to the devices is to be on the right side of the punch block. Connection between the left and right sides shall be made using bridging clips.**

2. **Loop wiring is to be #22-4 solid white jacket station wire unless otherwise specified. The conductor insulation shall be red, black, yellow, and green. The red/black combination is to be used for power only. Each wire is to be labeled at the punchblock with the type of device and its location in such a way as to identify the specific device to which it is connected.**

3. **Loop wiring for devices not requiring power shall be yellow/black for the primary loop and, if a second loop is used on the same wire, red/green for the second loop. The yellow (or red) shall be the loop feed and the black (or green) shall be the loop return or common.**

4. **Motion detectors and other devices requiring power shall use the red as positive power, black as negative power, yellow as loop feed, and green as loop return or common.**

C. Communicator

1. **The communicator is to be mounted on a ¾" plywood backboard using four #10, ¾" or 1" long, pan head screws with combination flat/Phillips head using the cabinet furnished by the manufacturer of the communicator.**

2. **Wiring from the punch block to the communicator shall be #22-10 or 22-12 solid station wire. If 22-12 is used the tan and pink wire may not be utilized. Conductor insulation colors shall be as listed below. Wires shall be run and be connected as follows:**

Wire	Use	(7412)	(9412)

Black	Common (#12)	- Power	(#29)		(#29)
Brown	Zone #1 (#11)	Zonex 2 out	()	(#26)	
Red	Zone #2 (#13)	+ DC Power	(#32)	(#32)	
Orange	Zone #3 (#14)	Zonex +Power	(#32)	(#24)	
Yellow	Zone #4 (#16)	Data Out	(#31)		(#31)
Green	Zone #5 (#17)	Data In	(#30)	(#30)	
Blue	Zone #6 (#19)	Zonex 2 in	()	(#25)	
Violet	Zone #7 (#20)	Zonex 1 out	(#28)	(#28)	
Grey	Zone #8 (#22)	Zonex 1 in	(#27)	(#29)	
White	Common (#12)	Zonex -Power	(#29)	(#23)	

3. Zone expansion may be accomplished by using a Bosch D8128D OctoPOPIT 8-zone module for each additional 8 zones or portion thereof. Up to eight OctoPOPITs may be used for the 7412 or 15 per Zonex loop (30 total) for the 9412.

D. Modules

1. D8128D OctoPopit

a. This is an 8-zone expansion module used for adding addition zones to the Communicator. One module is needed for each additional eight (8) zones or portion thereof.

b. D8128D OctoPOPIT modules may be added to the communicator. Each OctoPOPIT must be programmed sequentially (i.e. the first for zones 9 thru 16, the second for zones 17 thru 24 etc.) prior to power up. All zones on each OctoPOPIT require an EOL resistor.

c. If installed remotely, may need to be wired directly to the Zonex loop on the main board of the communicator without going through a punch block. If more than one OctoPopit is used, the jumper supplied with the unit may be used to interconnect the additional units.

d. Wiring between the OctoPOPIT and the punch block shall be 22-10 or 22-12 (see Communicator above) solid wire and connected as follows:

Brown	1st Zone (9, 17, etc.)	Loop Feed
Red	2nd Zone (10, 18, etc.)	Loop Feed
Orange	3rd Zone (11, 19, etc.)	Loop Feed

Yellow	4th Zone (12, 20, etc.)	Loop Feed
Green	5th Zone (13, 21, etc.)	Loop Feed
Blue	6th Zone (14, 22, etc.)	Loop Feed
Violet	7th Zone (15, 23, etc.)	Loop Feed
Gray	8th Zone (16, 24, etc.)	Loop Feed
Black	Common	Loop Return
White	Common	Loop Return

2. **D-8129 Relay Module**

   a. **This is an 8-relay output module. One module is needed for each additional eight (8) outputs or portion thereof.**

   b. **Each module needs to be programmed prior to power up.**

   c. **If used for minihorns, the relay address must correspond with the address of the keypad with which the minihorn is associated.**

   d. **If used for minihorns do not use relay A on the main board for a keypad associated minihorn, use the corresponding relay from the D8129 instead.**

   e. **Install a jumper wire from the positive (+) power terminal of the D8129 to the common terminal of each relay.**

   f. **Use the same wiring configuration as for the D8128D OctoPopit (section 3.3.A.3 above). Connect the black and white (common) wires to the negative (-) power terminal on the D8219 and the 'loop' wires to the Normally Open (NO) terminal for each relay..**

3. **DX4020 NIM**

   a. **Must be mounted inside the communicator cabinet, in the right-hand position on the top of the cabinet.**

   b. **Must be wired directly to the SDI bus on the communicator. Do not wire through a punch block.**

   c. **To be programmed by the District alarm technicians.**

E. Keypads

1. **Keypads shall be mounted 48 inches above the finished floor maximum to the highest operating component of the keypad.**

2. **Wire to the keypads shall be 22-4 and have the specified colors from the SDI bus tied to the corresponding colors on the keypad harness.**

3. **A minihorn shall be installed directly above each keypad either four (4) feet above the keypad or maximum of 12 inches (to the bottom of the minihorn) below the ceiling, whichever is lower.**

F. Door Contacts

1. **Door contacts shall be installed on (or in) the door frame approximately four (4) inches from the latch side of the door.**

2. **The yellow and black wires are to be used. The red and green wires are spares and may be cut off at the contact. If a second contact is connected to the same wire the red and green wires may be used for the second loop.**

3. **The yellow (or red) wire shall be tied to the Closed Loop (CL) terminal and the black (green) wire to the Open Loop(OL) terminal.**

4. **The EOL shall be installed between the Open Loop (OL) and Common terminals on the contact.**

G. Motion Detectors

1. **Unless otherwise specified motion detectors shall be installed using #6 pan head sheet metal screws seven feet six inches (7'6") to eight feet (8') above the finished floor or six inches (6") below the ceiling whichever is lower measured to the top edge of the detector.**

2. **The motion detectors shall be installed in such a way as to cover the area for which they are intended to protect (e.g. windows). If necessary they are to be corner mounted or mounted using swivels designed for use with the motion detector.**

3. **The ceiling mounted DT-5360 has a thirty (30) foot radius (minimum) coverage and is only be used in very large open areas. It must be mounted at least twenty-five (25) feet from any wall and thirty (30) feet from any window.**

4. **Motion detectors shall be wired as follows:**

Conductor	Punch Block	Contact
Red	+ DC Power	Positive power (+) terminal
Black	- DC Power	Negative power (-) terminal
Yellow	Loop Feed	Closed loop (CL) terminal
Green	Loop Return	One side of the tamper switch

5. **The EOL shall be tied between the Common alarm terminal and the opposite side of the tamper switch from the green wire.**

H. Panic/Hold-up Switches

1. **Panic/Hold-up switches shall be installed in such a way as to prevent accidental activation of the switch. They should not be mounted facing directly out or up, unless specifically designated.**

2. **The same wiring scheme shall be used as for door contacts (section 3.4 above)**

I. PowerPoint Projectors

1. **Two magnet assemblies (GRI 4702M/4635) shall be used. One shall be mounted on the projector using LOCTITE Super Bonder 409 or equivalent. The other shall be mounted away from the projector (preferably on the ceiling) but close enough that the contact can easily be inserted into it without extending the contact cable.**

2. **An ATW SGST-W Minihorn shall be mounted in close proximity to the projector (preferably on the ceiling) so that the wiring from the contact can be connected to the minihorn without splicing additional wire to it.**

3. **A 12VDC double-throw relay (Omron 6C873 or approved equal) shall also be used.**

4. **The wiring and devices shall be connected as follows:**

   A 22-4 white station wire from the punch block to the unit connected as follows:

Conductor	Punch Block	Contact
Red	+ DC Power	Open Loop on 4704A
Black	- DC Power	- Terminal on relay & minihorn
Yellow	Loop Feed	Yellow wire on relay (closed loop terminal)
Green	Loop Return	Green Wire on relay (open loop terminal)

Relay: Five wires (yellow, green black & 2 red) as follows:

Conductor	Relay	Other location(s)
Red	+ Coil	4704A Common & + terminal on minihorn
Black	- Coil	Black from panel & - terminal on minihorn
Red	Common contact	One side of EOL resistor
Green	Open Loop contact	EOL and green from punch block
Yellow	Closed Loop contact	Yellow from punch block

4704A Contact

Common	+ terminals on relay coil and minihorn
Open Loop	Red wire (+ DC Power) from punch block

If a wiring schematic is needed, it is available through the District Alarm Technicians' office.

J. Sounders

1. Sounders shall be mounted directly above each keypad either four (4) feet above the keypad or maximum of 12 inches (to the bottom of the minihorn) below the ceiling, whichever is lower and elsewhere as indicated.

2. A 22-4 wire shall be used to connect the sounder to the relay.

3. The red wire shall be for the positive (+) power and tied to the positive terminal on the sounder. The black wire shall be for the negative (-) and be tied to the negative (-) terminal on the sounder.

4. For sounder circuit requiring greater power (multiple minihorns, sirens, etc.) the yellow wire may be tied in parallel with the red wire and the green wire in parallel with the black wire. In such cases the red and yellow wires shall be twisted together as shall the black and green wires.

K. Other Devices

1. **Other devices not requiring power shall be installed per manufacturer's instructions or as directed by the District Alarm Personnel. The same wiring scheme shall be used as for door contacts (section 3.4.B through 3.4.D above).**

2. **Other devices requiring power (such as glass break detectors) shall be installed per manufacturer's instructions unless otherwise specified or instructed by the District Alarm Personnel. The same wiring scheme shall be used as for motion detectors (section 3.5.D above).**

3.2 TESTING / QUALITY CONTROL

A. The final alarm acceptance test shall be coordinated with the Owner's Representative and the Engineer. A letter certifying that the installation is complete and fully operational shall be forwarded to the Owner and Engineer.

B. The Contractor, the Engineer, Owner's Representative, and an authorized representative from each supplier of equipment shall be in attendance at the final acceptance test to make necessary adjustments. The final test shall include, but not be limited to:

1. **A test of the complete system for grounded, open and shorted circuits.**

2. **A test of each device for functions specified and for the required alarm actions.**

3. **All communications equipment shall be tested to ensure that all signals are received the SDCCD Police Dispatch Center. This includes, but is not limited to, all network and digital communications.**

4. **A test of the system for electrical supervision.**

5. **A test to verify that the emergency power source (back-up battery) is capable of operating the system for specified periods.**

6. **A test to verify that the system will operate under specified trouble conditions.**

7. **A test to verify that the system will perform all specified tasks**

8. **A test to verify that a hard copy of all required system actions will be properly provided.**

C. A minimum of 2 day(s) may be required for these tests.

D. If the system requires a retest by the Engineer or Owner's Representative, all costs for the retest shall be the responsibility of the Contractor.

E. The Contractor shall pay all overtime pay required by the Owner's Representative for witnessing the acceptance test.

3.3 TRAINING

A. Provide training of Owner's personnel in the proper operation procedures. The training program for the Owner's personnel shall include the following:

1. Operations and Maintenance Manuals containing complete operating instructions, outline step-by-step procedures required for system start up, operation, and shut down, including the manufacturer's name, model number, service manual, parts lists, and brief description of all equipment and their basic operation features. Complete maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, trouble-shooting guide, and as-built blueline drawings of the complete system, including conduit layout, equipment layout, device labels, and simplified wiring and control diagrams of system. Operations and Maintenance Manuals shall be submitted and approved prior to conducting the training course.

2. Three separate 2 -hour training sessions for operating personnel. The sessions are to cover proper operating and response procedures. These instructions shall be sufficient to enable an untrained person to properly operate the system.

3.4 AS-BUILTS

A. Provide a complete set of reproducible, two (2) blue line prints, and a set of disks in AutoCAD of the drawings and wiring diagrams reflecting "as-built" conditions.

B. Provide a complete set of "as-built" data sheets for all equipment connected to the system.

C. Provide complete "as-built" software for all relevant components.

D. All items of this section shall be provided prior to final payment request.

3.5 SPARE PARTS

A. All spare parts shall be directly interchangeable with the corresponding components of the installed system

B. The following spare parts shall be furnished to the Owner. Quantities to be specified elsewhere.

1. Door contacts
2. Motion detectors (of each type)
3. Panic/Hold-up witches
4. Keypads
5. Expansion modules
6. Any other device(s) specified

FIRE ALARM SYSTEMS

1 GENERAL

1.1 GENERAL AND SPECIAL CONDITIONS

A. General and Special Conditions shall apply to all work under this section.

B. The Contractor shall furnish all equipment, materials, tools, labor, engineering, drawings, etc. necessary for a complete total coverage, addressable fire alarm system. The Contractor shall not delete any equipment or devices without the written directive of the Owner and Engineer.

C. The purpose of the furnished specifications and drawings is to convey to the Contractor the scope of work required, all of which the Contractor is responsible to

furnish, install, adjust, and make operable.

D. The fire alarm system shall comply with all applicable codes including, but not limited to, the following: National Fire Code (NFPA72), California Building Code, California Fire Code, National Electric Code (NFPA70).

E. The Contractor shall examine all existing physical conditions, which may be material to the performance of his work. No extra payments will be allowed to the Contractor as a result of extra work made necessary by his failure to do so. Omission, discrepancy or lack of clarity shall be promptly identified to the Owner and Engineer for clarification prior to the bid due date.

F. Doors that lead to the Fire Alarm Panel shall have signage in RED that reads, " FIRE CONTROL PANEL INSIDE."

1.2 DEFINITIONS

A. ADA -- Americans with Disabilities Act.

B. AHJ -- Authority Having Jurisdiction (Division of State Architect).

C. Approved -- Unless otherwise stated, materials, equipment, or submittals approved by the Owner, Architect or AHJ.

D. Contractor -- The Company awarded the prime contract for this work and any of its subcontractors, vendors, suppliers or fabricators.

E. CSFM -- California State Fire Marshal.

F. District (The District) -- The San Diego Community College District

G. Engineer -- Engineer or engineering company designated by the District.

H. FACP -- Fire Alarm Control Panel.

I. Fire Alarm System – The entire fire alarm system including all panels, annunciators, devices, and peripheral equipment. The system shall monitor all devices and connected equipment and generate all appropriate responses and signals.

J. Listed -- Materials or equipment included in a list published by a nationally

recognized laboratory that maintains periodic inspection of production of listed equipment and material, and whose listing states either that the equipment or materials meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

K. NFPA -- National Fire Protection Association.

L. Owner – The San Diego Community College District

1.3 SCOPE OF WORK

A. The Contractor shall furnish and install, unless otherwise indicated, items required for a complete fire alarm system as outlined in these specifications and shown on the drawings. The work includes, but is not necessarily limited to, the following:

1. Provide a new state-of-the-art fully automatic addressable fire alarm system, including smoke detectors, manual pull stations, heat detectors, duct detectors, ADA compliant annunciation (strobes, horns, etc.), waterflow switches, valve supervisory devices, magnetic door holders and any other devices or equipment specified either elsewhere in these specifications or on the blueprints.

2. Provide a point addressable control system, addressable initiating devices, signaling devices, indicating devices, sensors, annunciators, relays, software, accessories and other materials and equipment for a complete operating system.

3. Provide monitoring of the fire sprinkler system.

4. Provide duct-mounted smoke detectors in the main supply-air ducts(s) to effect shutdown of each air handler rated at supplying more than 2000 CFM. Provide control relays to actuate smoke/fire doors as shown on the drawings.

5. Connect to the existing HVAC control system to provide control functions, in accordance with the specifications.

6. Provide a network connection from the new FACP to the existing fire alarm OnyxWorks or current District monitoring system including all necessary

hardware components. Network drop to be furnished by others.

7. **Install all data into the OnyxWorks or current District monitoring software. This shall include all data necessary for the proper functioning of the system and shall include, but not necessarily be limited to, the building graphics (blueprints/floorplans for the project, device types, locations and addresses, etc.), panel information, network IP addresses, etc.**

8. **Provide smoke detectors in each elevator machine room and in each interior elevator lobby. Provide relay modules to effect primary and alternate floor recall of each elevator. Connect the new fire alarm system to the elevator controls for elevator recall. Where required provide heat detectors to be mounted at the top of each elevator shaft. Heat detectors shall be fixed temperature.**

9. **Provide detailed terminal-to-terminal alarm system shop drawings, wiring diagrams, and battery calculations for all components and voltage drop calculations (voltage drop not to exceed 10% per notification appliance circuit), sequence of operation, and operating and maintenance instructions. Drawings (plans) shall use**

10. **Provide an on-site, factory-trained technician acceptable to the Engineer and the Owner's Representative to supervise the installation.**

11. **Provide an on-site project manager.**

12. **Conduct weekly progress meetings and issue monthly written job progress reports to the Owner's Representative and the Engineer.**

13. **Submit shop drawings and product data submittals to the Engineer for approval by the Engineer and Owner.**

14. **Where required the Contractor shall provide x-ray of walls or slabs prior to any core drilling and any required fireproofing of the cores.**

15. **The Contractor shall submit a bar graph schedule at the pre-Construction meeting.**

16. **Conduct a complete test of the system upon completion of installation to assure the Owner's Representative, the Engineer, and the AHJ that the**

system is operational. This test shall take place prior to a final acceptance test and pre-testing by the Contractor.

17. Conduct the final acceptance test as required by CFC/NFPA 72. The Alarm Contractor shall furnish personnel who are familiar with the installation at a time convenient to the Owner's Representative, the Engineer and the AHJ. The two-year warranty shall begin upon approval by the Owner's Representative, the Engineer and the AHJ. The acceptance test shall take place as soon as convenient after the completion of the installation.

18. Provide training of the Owner's personnel in accordance with the specification.

19. Provide a two-year job site warranty of all materials and labor furnished under this section.

1.4 RELATED WORK:

A. Materials and methods specified in other sections:

1. Automatic Sprinkler System.

2. Firestopping.

3. Basic Electrical Materials and Methods, Division 1600, except where modified in this section.

4. Mechanical (Fan and Smoke Control) Division 15.

B. Materials furnished and installed by others but wired by this Contractor:

1. Sprinkler waterflow switches, valve supervisory switches and other sprinkler supervisory switches shall be furnished and installed by others. The Fire Alarm Contractor shall wire these switches to the fire alarm system and adjust them for proper operation.

1.5 SYSTEM DESCRIPTION

A. The fire alarm system shall be a UL listed; CSFM approved addressable system

capable of individual annunciation of all devices as well as zoned alarm, common trouble, and supervisory signaling.

B. **The fire alarm system shall be capable of programming changes through the main CPU without the use of external devices such as laptop computers or proprietary programming tools.**

C. **The fire alarm system shall be provided with a continuous sounding evacuation signaling system.**

D. **Where indicated the fire alarm system shall be zoned in accordance with the specifications and drawings.**

E. **System circuit wiring:**

1. **All fire alarm and supervisory alarm initiating circuits shall be NFPA Style 4 or Style 6 (see manufacturer's specification for specific panel) Signaling Line Circuits (SLC) from the fire alarm control panel to the devices.**

2. **Initiation Device Circuits (IDC) shall be wired NFPA Style B as part of an addressable device connected to an SLC circuit.**

3. **Notification Appliance Circuits (NAC) shall be wired NFPA Style Z as part of an addressable device connected to an SLC circuit.**

4. **All notification appliance circuits shall be NFPA Style Y from the fire alarm control panel to the devices.**

5. **All point addressable Signaling Line Circuits shall be NFPA Style 4 or Style 6.**

1.6 APPLICABLE STANDARDS

A. **The latest adopted issue of the following standards is hereby made a part of this Work by reference thereto:**

1. **NFPA 13 – Sprinkler Systems**

2. **NFPA 70 - *National Electrical Code,***

3. **NFPA 72 - *National Fire Alarm Code,***

4. **NFPA 90A - *Installation of Air Conditioning and Ventilating Systems***

5. **UL Standard 268 - *Smoke Detectors for Fire Protective Signaling***

6. **UL Standard 268A - *Smoke Detectors for Duct Application***

7. **UL Standard 1971 - *Signaling Applications for the Hearing Impaired***

8. **Americans with Disabilities Act (ADA)**

9. **American National Standards Institute (ANSI) A117.1**

10. **American National Standards Institute (ANSI) A17.1**

11. **California Building Code (CBC)**

12. **California Fire Code (CFC)**

1.6 SYSTEM OPERATION

A. **The addressable fire alarm system shall perform the following functions:**

1. **Continuous monitoring of all supervisory signal initiating devices.**

2. **Continuous monitoring of all electrically supervised fire alarm initiating, supervisory and notification appliance circuits.**

3. **Continuous monitoring of all panels, voice communication equipment, and data transmission lines.**

4. **Continuous monitoring of all addressable modules.**

5. **Operation of elevator controls as required.**

6. **Operation of all audible and visual signals as indicated.**

7. **Operation of all required HVAC controls as indicated.**

8. **Operation of all magnetic door holders**

B. **Upon change in status of any device on the system, the CPU shall:**

1. **Activate audible and visual status change indicators and display the system point number, point description and message associated with the point at the FACP and all annunciators located at the site.**

2. **Display the account information, point number, point description and point status as well as the floor plans and other graphics associated with the building and specific point via the OnyxWorks or current District monitoring system located in the District's Police Dispatch Center.**

3. **Permanently record the change in status, time, date, point description, and message associated with the point on the onsite printer as specified elsewhere in these specifications.**

C. **Activation of any manual fire alarm station, waterflow switch, smoke detector, heat detector, duct smoke detector, sprinkler supervisory valve or other fire alarm initiating device shall cause the following functions to occur.**

1. **Manual Pull Station operation shall:**

a. **Perform all operations as described in 1.7.B above.**

b. **Activate the audible and visible notification appliances throughout the building.**

c. **Activate the HVAC system fans, dampers and other mechanical equipment.**

d. **Release all doors normally held open by door-control devices.**

e. **Where required transmit a zoned fire alarm signal to the College Police Remote Station via the digital communicator.**

2. **Sprinkler system waterflow switch operation shall:**

a. **Perform all operations as described in 1.7.B above.**

b. **Activate the audible and visible notification appliances throughout the**

building.

c. Activate the HVAC system fans, dampers and other mechanical equipment.

d. Release all doors normally held open by door-control devices.

e. Where required transmit a zoned fire alarm signal to the College Police Remote Station via the digital communicator.

3. Area smoke detector or heat detector operation shall:

a. Perform all operations as described in 1.7.B above.

b. Activate the audible and visible notification appliances throughout the building.

c. Activate the HVAC system fans, dampers and other mechanical equipment.

d. Release all doors normally held open by door-control devices.

e. Where required transmit a zoned fire alarm signal to the College Police Remote Station via the digital communicator.

4. Elevator lobby or elevator machine room smoke detector or heat detector shall

a. Perform all operations as described in 1.7.B above.

b. Activate the audible and visible notification appliances throughout the building.

c. Activate the HVAC system fans, dampers and other mechanical equipment.

d. Release all doors normally held open by door-control devices.

e. Recall the elevators to the first floor or alternate floor.

f. Where required transmit a zoned fire alarm signal to the College Police Remote Station via the digital communicator.

5. **Duct smoke detector activation shall**

a. **As required operate as a supervisory device and perform all operations as described in 1.7.C.5 or as an alarm device and perform the same functions as a smoke detector as described in 1.7.C.3 above.**

b. **Activate the HVAC system fans, dampers and other mechanical equipment associated with the specific detector.**

c. **Shut down the supply air fan if the duct smoke detector is downstream of this fan.**

d. **Where required transmit a zoned fire alarm signal to the College Police Remote Station via the digital communicator.**

6. **Supervisory device operation shall:**

a. **Activate audible and visual status change indicators and display the system point number, point description and message associated with the point at the FACP and all annunciators located at the site.**

b. **Display the account information, point number, point description and point status as well as the floor plans and other graphics associated with the building and specific point via the OnyxWorks monitoring system located in the District's Police Dispatch Center.**

c. **Permanently record the change in status, time, date, point description, and message associated with the point on the onsite printer as specified elsewhere in these specifications.**

d. **Where required transmit a supervisory signal to the College Police Remote Station via the digital communicator**

D. **Removal of any devices, wiring disarrangement, or system component failure shall:**

1. **Activate audible and visual status change indicators and display the system point number, point description and message associated with the point at the FACP and all annunciators located at the site.**

2. **Display the account information, point number, point description and point**

status as well as the floor plans and other graphics associated with the building and specific point via the OnyxWorks monitoring system located in the District's Police Dispatch Center.

3. Permanently record the change in status, time, date, point description, and message associated with the point on the onsite printer as specified elsewhere in these specifications

4. Where required transmit a supervisory signal to the College Police Remote Station via the digital communicator

E. When any point in the system returns to normal, the CPU shall:

1. Activate audible and visual indicators and display point identification, time, date and message.

2. Acknowledgment of "system return to normal" will print the time, date, point identification and message. Acknowledgment will also silence all audible indicators associated with the point at the CPU.

F. Where required zoned alarms shall be transmitted by the DACT. Each floor shall have a minimum of one zone. Automatic and manual devices shall not be combined on the same zone and, at a minimum, shall be separated by floor. Each of the following shall be on its own zone and shall not be combined onto zones with any other type of device: waterflow/pressure switches, supervisory devices, and duct detectors.

1.7 SUBMITTALS

A. Provide complete product data (including manufacturer's descriptive and technical literature); and catalog cut sheets clearly marked to indicate model and catalog number, installation instructions, maintenance and testing procedures, dimensions, and wiring diagrams for the equipment provided. Where devices furnished by the Contractor involve work by another Contractor or Subcontractor, submit additional approved data sheets and shop drawing copies to the Contractor or Subcontractor.

B. Provide shop drawings, including building floor, plans showing sequence of operations, device locations, complete wiring and schematic diagrams, including conduit size and wire routing, wiring size and counts, wire color codes, field terminations; control panel layout, including all modules, circuit terminals and

interconnections, overall cabinet dimensions; complete riser diagrams indicating wiring sequence for all devices and control equipment. Drawings shall show proposed layout and anchorage of equipment and appurtenances and equipment relationship to other parts of the work, including clearances for maintenance and operation. All shop drawings are to be provided with the manufacturer's logo clearly printed on each drawing.

C. **Provide substantiating calculations, including calculations for determining secondary power supply requirements and voltage drop calculations. Battery calculations shall list the supervisory and alarm current requirements for each component. Battery recharging period shall be included with the calculations. The voltage drop calculations shall list the distance and current draw of each notification appliance and the formula used and shall not exceed 10 percent.**

1. **Prior to purchase or fabrication of any material, approval shall be obtained from The District and Engineer. Make six (6) complete submittals of all shop drawings, wire diagrams, and literature for review and approval.**

2. **Provide complete submittal within two (2) weeks of notice to proceed.**

3. **PARTIAL SUBMITTALS ARE NOT ACCEPTABLE AND WILL BE RETURNED TO THE CONTRACTOR UNREVIEWED.**

D. **Submittals rejected by the Owner's Representative and Engineer shall be corrected and resubmitted within seven (7) days of notification of rejection.**

1.8 DELIVERY, STORAGE, AND HANDLING OF MATERIALS

A. **Contractor will deliver all materials to area of project designated by The District. Vehicles shall not block fire lanes or fire doors during delivery of materials.**

B. **Owner will not accept deliveries for the Contractor.**

C. **The Owner's Representative will designate an area within the facility for storage of all materials. At the end of each working day, all materials shall be returned to the designated area. Material, equipment, tools, etc will not be left outside the storage area without the consent of the Owner's Representative.**

D. **No material storage facilities are available on site. The Contractor is to include in his bid the cost of storage trailers or other suitable storage facilities. The Contractor's storage trailers will be parked in areas designated by the Owner.**

E. **The cost of all material handling, delivery and freight is the Contractor's responsibility. The Owner or his representatives will not be responsible for material delivered to the site.**

F. **Maintain premises free from accumulation of waste materials or rubbish caused by this work. At the end of each day, remove from the site all surplus materials, tools, and all waste. The Contractor shall leave the premises clean to the Owner's satisfaction.**

G. **The Contractor shall arrange and pay for parking.**

1.9 WARRANTY

A. **The Contractor shall provide a two (2)-year written warranty against defects in material and workmanship furnished under this Contract. The costs of such warranty shall be part of the purchase price. The warranty commences when the Owner's Representative and Engineer accept the system and installation.**

B. **The warranty shall include all necessary material, travel, labor and parts to replace defective components or materials at the job site. The Contractor shall commence repair of any "in warranty" defects which may cause the fire alarm system to be impaired within 8 hours of notification of such defects.**

C. **The Contractor shall make allowances in his warranty to cover diagnosis of system defects, which might ultimately be the responsibility of others to correct. When this occurs, the Owner's Representative and other affected trades shall be notified.**

D. **The warranty shall include all necessary factory and field software required to perform the specified tasks.**

E. **The Contractor shall include, as part of the two-year warranty, a test and inspection of the entire fire alarm system within one month prior to the end of the first year and another at within one month prior to the expiration of the two-year construction warranty. The Contractor shall provide a written report of any deficiencies and repair any of the deficiencies. The test and report shall conform to the certification as described in NFPA 72.**

1.10 AS-BUILT DRAWINGS

A. Maintain at the site an up-to-date, marked set of as-built drawings, which shall be corrected and delivered to The District upon completion of the work.

B. Furnish the Owner with one (1) reproducible set of each approved shop drawing, revised to show "as-built" conditions.

1.11 CHANGES

A. Make no changes in installation from layout as shown on drawings unless the Engineer and DSA specifically approve change. This does not include minor revisions for the purpose of coordination.

1.12 DAMAGE

A. The Contractor shall be responsible during the installation and testing periods of the fire alarm system for any damage to the building, its contents, etc. caused by the Contractor's work.

1.13 QUALITY ASSURANCE

A. The fire alarm system manufacturer shall maintain a fully staffed branch office including application engineers, drafters and technical service personnel within the San Diego metropolitan area.

B. The Contractor shall employ NICET certified fire alarm system installers. Minimum certification for on-site supervisory personnel shall be Level III. Installers shall be minimum Level II.

C. The electrical contractor shall perform installation of all electrical circuits for the fire alarm system, including wire installation and terminations. The fire alarm contractor shall install all fire alarm related devices and make all connections associated with them.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. Acceptable equipment for this project must be listed for use with the present fire alarm network operating system in use by the District.

B. Product data information for other desired manufacturers shall be submitted to the Engineer and The District within Seven (7) days after the pre-bid meeting for product equivalency approval.

C. Products for this project shall be of the latest design; obsolete or discontinued products will not be acceptable. All equipment supplied shall be UL and California State Fire Marshal (CSFM) listed for required function.

2.2 INSTALLATION MATERIALS

A. All wire and cable shall be new and CSFM/UL listed and/or approved for use in fire alarm signal systems per CFC/NFPA 70, Article 760. All wire shall be solid conductors of copper, minimum size of No. 18 AWG, and insulation rated at 600V.

B. Manufacturer's recommended wire type and gauge shall be used. If the fire alarm manufacturer specifies wire from a specific manufacturer(s), this wire shall be used unless the fire alarm manufacturer indicates in writing that other wire manufacturers are considered equal.

C. All conduit, junction boxes, pull boxes and fittings shall conform to the following:

1. Conduit:

a. Conduit shall be (3/4) -inch minimum electric metallic tubing (EMT) and flexible conduit (in wet areas use rigid steel conduit), in conformance with NFPA 70.

b. Conduit exposed to weather shall comply with NFPA 70 and the requirements of the AHJ.

c. Conduit exposed in finished areas shall be Wiremold 800 or 2300 series (plastic). In areas where the Wiremold does not closely match the surface on which it is mounted, it shall be painted to

match the surface and/or the surrounding area.

d. All fittings shall be listed and approved for the specific conduit.

e. For threaded rigid steel conduit do not use threadless or compression-type fittings.

f. All EMT conduit fittings shall be steel or malleable iron compression-type couplings and connectors. Do not use set screw or indentation type of fittings.

g. Maximum conduit fill shall be 75 percent of that permitted by the California Electrical Code.

h. Magnetic door holding circuits and other non-power limited circuits shall be in separate raceways.

i. Provide conduit and wiring between the FACP and each elevator machine controller to effect elevator recall as specified herein. This conduit and wiring shall be independent of that required for any other function.

j. All concealed system EMT conduit shall red in color.

k. Exposed flexible conduit used for attachment to waterflow and valve tamper switches or similar applications shall be liquid-tight and shall be the minimum length required for neat and secure installation. Flexible conduit shall not be buried or located closer than 12 inches to grade.

2. Junction and Pull Boxes:

a. Shall be installed in accordance with the National Electrical Code, state or local codes.

b. Provide galvanized sheet steel junction and pull boxes, with screw-on covers and of types, shapes, and sizes to suit each respective location and installation.

c. Boxes exposed to weather, moisture, at or adjacent to water or steam connections, at sprinkler waterflow switches and supervisory switches

shall be corrosion-resistant, cast-metal weatherproof outlet boxes of types, shapes, and sizes, including depth of boxes with threaded conduit ends, cast-metal face plates with spring-hinged waterproof caps suitable for each application, including face plate gaskets and corrosion-resistant fasteners.

d. Each box shall be large enough to accommodate required splices and conduit in accordance with the NEC.

e. Sectional boxes shall not be used.

f. Boxes shall be painted red or otherwise designated for identification as part of the fire alarm system.

3. Field Terminal Cabinets (FTC):

a. Shall be UL listed for use in electrical wiring systems.

b. Minimum size shall be 12 inches by 12 inches by 4 inches deep with a hinged lockable cover or a plate cover attached by tamper-resistant screws.

c. Terminals cabinets shall be mounted no less that 48 inches nor more than 78 inches above the finished floor

d. Terminal strips shall be numbered and a list of all termination's shall be permanently affixed to the inside cover of all terminal cabinets.

e. Terminal cabinets shall be identified as part of the fire alarm system on the outward face of the cabinet.

4. Plenum Cable:

a. Shall be installed per National Electrical Code, Articles 725 and 760.

b. The cable shall be marked with the wire model number, wire gauge, and number of conductors.

c. The cable shall be UL listed for fire alarm signaling applications.

D. All wiring components shall be UL listed. Wiring methods shall conform to NFPA 70,

Sections 760 and 780.

2.3 CONTROL EQUIPMENT

A. Fire Alarm Control Panel (FACP):

1. **The FACP shall be fully compatible with OnyxWorks or the current District monitoring software. Compatability shall include, but not necessarily be limited to, the ability to modify programming, operate control functions (silence alarms, troubles, reset the panel, etc.), monitor (the FACP, devices, etc.), display devices by point (point address, location, and description), and check the status of the panels remotely using OnyxWorks or the current District monitoring software.**

2. **The FACP shall be a Notifier NFS2 series (320, 640, or 3030) sized to allow a minimum of twenty-five percent (25%) expansion for future use. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.**

3. **The FACP shall be wall-mounted and installed in the location shown on the blueprints and approved by the Owner's Representative. The FACP shall be equipped with a locked enclosure having removable access panels for servicing of electronic components.**

4. **The FACP shall contain a microprocessor based Central Programming Unit (CPU) and power supply. The CPU shall communicate with, and control, the following types of equipment used to make up the system: intelligent addressable smoke and heat detectors, addressable modules, printer, annunciators, and other system controlled devices.**

5. **The CPU shall be equipped with a non-volatile main memory. This memory shall not be lost even if the system's primary and secondary power systems fail.**

6. **Normal operating power for the FACP shall be a dedicated 120 VAC, single-phase, 60 Hz circuit supplied from the building distribution power panel. The circuit breaker shall be clearly marked and equipped with a lock to prevent accidental shutting off of the breaker.**

7. **The system-operating terminal shall be an LCD display with a QWERTY keyboard and other keys for programming, accessing, and operating the system. Functions**

shall include, but not necessarily be limited to, adding or eliminating devices, accessing history logs, checking status of points, acknowledging and resetting signals, etc.

8. Bypass system functions or features during manual system tests shall be capable of being operated by using a single "hot button" for each function and shall include, but no necessarily be limited to, the following functions: horns & strobes, elevator recall, smoke control systems, door release equipment, automatic extinguishing systems, fan shut down, and smoke dampers.

2.4 ALARM INITIATING DEVICES

A. Manual fire alarm pull stations shall be provided where indicated. The manual fire alarm pull stations shall be cast metal type or Lexan red with raised or depressed lettering. The manual fire alarm pull station shall be dual-action type. Where pull station covers are used manual fire alarm pull stations are to be single action.

Surface-mounted stations shall mount on a red finished back box. Semi-recessed stations shall mount on a standard electrical box. Operation of a manual fire alarm station shall cause its contacts to lock-in until manually reset and visually indicate an actuation. The station shall be reset using the same key as the FACP.

Each station shall be individually addressed at the central control panel. Stations, which rely on wires from auxiliary contacts to the panel, do not meet this requirement.

B. Sprinkler system waterflow switches are to be provided where indicated. The waterflow switches, which are wired under this section, shall contain a suitable, adjustable retard device; be of the vane type; and actuate upon flow from a single sprinkler. Waterflow switches shall be housed in a substantial metal housing with gasketed cover. The switch shall actuate in no less than 45 seconds nor more than 90 seconds after the inspectors test valve is opened. Pressure switches are not acceptable.

C. Addressable point monitoring devices shall be provided to monitor waterflow switches. The wiring from the monitored device to the point-monitoring device shall be a (Style B) electrically supervised circuit. The point monitoring device shall send an individual address to the fire alarm control panel.

D. Point addressable smoke detectors shall be provided where indicated.

1. Photoelectric smoke detectors shall be provided with integral LED's to indicate detectors in alarm. The detectors shall operate from the 2-wire alarm initiating circuit

and be listed under UL Standard 268, latest edition. Line transient and RFI protection shall be built into the detector. Mounted concealed detectors shall have a remote indicator light or LED. There shall be provisions for mounting a control relay in the base of the detector.

2. Ionization smoke detectors shall be provided with integral LEDs to indicate detectors in alarm. The detectors shall operate from the 2-wire alarm initiating circuit and be listed under UL Standard 268, latest edition. Line transient and RFI protection shall be built into the detector. Mounted concealed detectors shall have a remote indicator light or LED. There shall be provisions for mounting a control relay in the base of the detector.

3. Duct-mounted smoke detectors shall be provided, where indicated, with approved duct housings mounted on the exterior of the duct, and shall have perforated sampling tubes extended across the width of the duct. Each mounted concealed detector shall have a remote indicator light and a remote test and reset switch, which shall be clearly visible, clearly labeled and readily accessible. Provide an auxiliary D.P.D.T. load relay for fan shutdown control.

   Duct detectors shall either be addressable or provided with an addressable point monitoring module.

4. HARSH type detectors shall be provided were indicated.

E. Point addressable heat detectors shall be provided where indicated. The heat detectors shall be combination fixed temperature (135^{o}) and rate-of-rise unless otherwise indicated. The heat detectors shall be self-restoring and contain an integral LED to indicate detectors in alarm.

F. General

1. Each device shall be field set and assigned a unique address. Devices that take their address from their position in the circuit are unacceptable because if devices are later added or removed, existing addresses, descriptors and commands must be reprogrammed.

2. Additional devices must be capable of being added to the circuit from any point in the circuit and without affecting any existing device's address or function.

3. All means of addressing detectors and modules must be by manually adjustable rotary type switches. Bar coded devices are not acceptable.

4. Each addressable device shall be provided with a clearly visible, printed label with the address of the device. This label shall be clearly readable from a distance of ten feet.

2.5 NOTIFICATION APPLIANCES

A. Alarm horn units shall be provided as required to provide a sound level 15 dBA above ambient noise levels. The units shall be surface mounted in unfinished areas and semi-flush in finished areas. The units shall operate on 24 volts DC (VDC) polarized power to allow for supervision.

B. Visual alarm units shall be provided where indicated. The visual alarm units shall contain strobe light source and sturdy transparent lens. Standard finish shall be red with the word "FIRE" imprinted on the body. All visual units shall operate on 24 VDC polarized power to allow for supervision. Visual units shall be in accordance with the ADA and UL Standard 1971.

C. Fire alarm bells shall be provided where indicated. The bells shall be six-inch diameter, vibrating units with a minimum sound output of 90 dBA at 10 feet. All bells shall operate on 24 VDC polarized power to allow for supervision unless otherwise indicated.

2.6 SUPERVISORY DEVICES

A. Valve supervisory devices shall be provided for all indicated sprinkler control valves. The valves including butterfly-type, O.S.& Y, or a combination of both. The valve supervisory devices shall be installed to transmit a supervisory signal to the panel within the first two turns of the control valve handle or when the stem of the valve has moved a distance of 1/5 of the length of the stem, whichever is less.

B. Post indicator Valve (PIV) supervisory switches shall be provided for all indicated control valves. All switches shall be SPDT with gasketed rain-tight enclosures. The PIV supervisory switch shall be installed to transmit a supervisory signal within the first two turns, but no less than one-half turn, of the valve handle or when the stem of the valve has moved a distance of 1 /5 of the length of the stem, whichever is less.

2.7 CONTROL DEVICES

A. Provide control relays/contacts for elevator recall, fan shut down, and smoke control

sequence. The control relays/contacts shall be 24 VDC low voltage type, each with number of contacts as required and housed in metal enclosure. The contacts shall be rated as required for continuous duty.

B. Magnetic door holders shall be provided where shown. The door holders shall be powered by 24 VDC circuits and shall be of the fail-safe design and shall have a minimum holding force of 25 pounds.

C. Provide addressable control devices where shown to control fan units. The addressable control device shall be individually controlled from the FACP. Power to these devices shall be provided and supervised from the FACP.

2.8 REMOTE STATION TRANSMITTING EQUIPMENT

A. Where required central station transmitters (DACT) shall be provided as indicated at the FACP to transmit alarm and trouble signals for fire alarm system to SDCCD Police Remote Station. Transmission methods shall satisfy requirements of the station and NFPA 72.

B. Where required the DACT shall be as specified by the District and shall be compatible with the District's programming and monitoring software. A Universal DACT (UDACT) shall not be used.

2.9 REMOTE ANNUNCIATOR

A. Provide LCD remote annunciators where indicated. The annunciator shall provide a backlit, super twist, 80 or 160 character liquid crystal display (LCD) for display of all system information. The annunciator shall also provide keys programmed for system control functions, such as acknowledge, silence, reset, as well as other custom-control functions as required. The annunciator shall be mounted with a clear, hinged, locking cover, using the same key as the fire panel.

B. Provide graphic remote annunciators where indicated. The graphic annunciator shall be LED spot luminous for each zone in the system and shall have supervised wiring from the control panel. The complete graphic display shall be submitted to the Engineer for review prior to fabrication of the panel.

C. Provide LED remote annunciator where indicated. The annunciator shall provide RED alarm and YELLOW trouble LEDs for each zone in the system and shall have supervised wiring from the control panel. The annunciator labeling shall be submitted to the Engineer for review

prior to fabrication of the panel..

PART 3 EXECUTION

3.1 INSTALLATION

A. The contractor shall provide factory trained and authorized personnel for on-the-job supervision of the proper installation of devices in cooperation with, or as may be required by, other trades. This shall include the following:

1. Provide specific on-site instructions to others on mounting and installation of each type of device by physically observing the mounting of one or more of each type of device, as required, to assure that the installer is properly instructed in the work.

2. Provide supervision as required by others to properly perform alarm installation work.

3. Perform a complete test of the system, certifying that all devices have been activated and that the devices and systems have performed in accordance with the requirements of this specification.

4. Install, test, trouble-shoot and correct all system software provided under this specification. This includes, but is not limited to, actual keyboard entry, reprogramming required to meet this specification, and any other tasks associated with the system software.

5. Participate in other related testing, including smoke control, fire pump, fire sprinkler system, etc. which involves the operation of the fire alarm control panel and to verify the proper functioning of the fire alarm related equipment..

6. Provide layout drawings and detailed wiring diagrams to the Division of the State Architect (DSA) as required by the Submittal section of these specifications and the AHJ.

B. All work shall be installed as shown and in accordance with the manufacturer's specifications, unless otherwise specified

1. Control Panel

The control panel and its components shall be securely mounted on a ¾ inch plywood backboard so that no part of the cabinet is less than 12 inches or more than 78 inches above the finished floor. All manually operable controls shall be at least three feet and less than five feet above the finished floor. Panel shall be installed to comply with the

requirements of UL 864.

Unless a separate battery cabinet is mounted directly below the control panel, no conduit is to penetrate the bottom of the control panel cabinet.

2. Detectors

a. Detectors shall be mounted on the ceiling not less than 4 inches (100 mm) from the side wall to the near edge, or if side wall, between 4 inches (100 mm) and 12 inches (300 mm) down from the ceiling to the top of the detector.

b. Detectors shall be located at least three feet from diffusers of air handling systems.

3. Manual Fire Alarm Stations

Manual fire alarm stations shall be mounted at 48 inches (145 mm) at the pull handle above the finished floor. Where the manual pull station and notification device are located in the same area they shall be center vertically with each other in the same location.

4. Visual Signal Appliances

Visual signal appliances shall be wall mounted such that the entire lens is no less than 80 inches (2030 mm) nor more than 96 inches (2435 mm) above the finished floor or 6 inches (152 mm) below the ceiling, whichever is lower. .

5. Audible Signal Appliances

Where ceiling heights permit, wall-mounted appliances shall have their tops at 90 inches (2300 mm) above the finished. floor or 6 inches (152 mm) below the ceiling whichever is lower.

6. Combination Audible and Visual Signal Appliances

The location of audible/visual signal appliances shall comply with visual signal appliance mounting requirements.

7. Annunciators

Annunciators shall be mounted so that all controls shall be no less than 54 inches

or more than 60 inches above the finished floor. Where the annunciator, manual pull station and notification device are located in the same area they shall be center vertically with each other in the same location.

8. Peripheral Equipment

Where located remotely from the control panel all peripheral equipment (relay modules, monitoring modules, control modules, etc.) not located in terminal cabinets or device mounting boxes shall be mounted no less than 72 inches AFF.

Where located in exposed locations (lobbies, halls, offices, etc.), peripheral equipment shall be in a recessed cabinet with a hinged lockable door using the same key as the FACP, 48 to 72 inches AFF, and painted to match the surrounding wall.

C. Contractor shall furnish all material and labor to provide a complete and functional system, which operates in accordance with the requirements of this specification. This shall include the following:

1. Unless otherwise indicated all wiring is to be in conduit.

2. Conduit, raceway and wiring systems as indicated herein, and throughout the specifications, and shown on the drawings.

a. All wiring shall be appropriately color-coded, and permanent wire markers shall be used to identify the terminations for each circuit at the control panel.

b. Strap or bundle all cables and wires inside equipment enclosures and terminal cabinets, parallel to the enclosure sides.

c. Splices shall be kept to a minimum. Splices shall be made in device mounting boxes and terminal cabinets only. Pull boxes and terminal cabinets must be clearly marked and readily accessible. More than four (4) splices in one location must be in a terminal cabinet.

Exception: Devices available only with "pig-tail" connections shall be connected to the circuit wiring using approved insulated wire nuts and wrapped with electrical tape.

2. Repair all surface areas where existing fire alarm equipment has been removed. All holes and walls shall be filled with UL fire-stopping material capable of maintaining the fire-resistance of the fire barriers.

3. Replace all damaged ceiling tiles.

4. Paint all exposed conduit, raceway, access panels, etc., and repair or patch surfaces to match existing finish.

5. All coring and sleeving required. Core drilling shall be performed by qualified personnel to minimize damage. All rebar shall be located before drilling. The Contractor shall repair any damage that occurs because of core drilling.

6. For existing facilities all underground trenching and conduit shall be the responsibility of the contractor.

D. Pay for and obtain all permits, approvals, fees and charges required for this work.

3.2 TEST/FIELD QUALITY CONTROL

A. The final alarm acceptance test shall be coordinated with the Owner and the Engineer. A letter certifying that the installation is complete and fully operational shall be forwarded to the Owner and Engineer.

B. The final alarm acceptance test shall be done in compliance with CFC/NFPA72. All required documentation shall be completed and provided to the Owner upon acceptance of the system.

C. The Fire Alarm Contractor and the Owner's Representative shall be in attendance at the final acceptance test to make necessary adjustments. The final test shall be conducted after final clean-up of the area. Per NFPA 72 (2007 edition paragraph 5.7.1.11) '[Smoke] Detectors shall not be installed until after the construction cleanup of all trades is complete and final.' The final acceptance test shall include, but not be limited to:

1. A test of the complete system for grounded, open and shorted circuits.

2. A test of each alarm-initiating and supervisory device for functions specified and for the required alarm actions.

3. All communications equipment shall be tested to ensure that all signals are received

the SDCCD Police Dispatch Center. This includes, but is not limited to, all network and digital communications (DACTs), types and accuracy of signals, etc.

4. A test of the system for electrical supervision.

5. A test to verify that the emergency power source is capable of operating the system for specified periods.

6. A test to verify that alarm signals will operate under specified trouble conditions.

7. A test to verify that the system will operate under specified trouble conditions.

8. A test to verify that the system will perform all specified tasks

9. A test to verify that sound uniformity of voice alarm system has been achieved and voice messages are intelligible in all areas of coverage.

10. A test to verify that a hard copy of all required system actions will be properly provided.

D. A minimum of 3 day(s) will be required for these tests.

E. If the system requires a retest by the Engineer, all costs for the retest shall be the responsibility of the Contractor.

F. The Contractor shall pay all overtime pay required by the AHJ for witnessing the acceptance test.

G. Provide a separate test message to facilitate testing of the required voice message unit.

H. Contractor shall be present at other related tests, including but not limited to, emergency generator, fire pump, and smoke control.

3.3 TRAINING

A. Provide training of Owner's personnel in the proper operation procedures. The training program for the Owner's personnel shall include the following:

1. Operations and Maintenance Manuals containing complete operating instructions, outline step-by-step procedures required for system start up, operation, and shut down, including the manufacturer's name, model number, service manual, parts lists,

and brief description of all equipment and their basic operation features. Complete maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, trouble-shooting guide, and as-built drawings of the complete system, including conduit layout, equipment layout, device labels, and simplified wiring and control diagrams of system. Operations and Maintenance Manuals shall be submitted and approved prior to conducting the training course.

2. Three separate 2 -hour training sessions for operating personnel. The sessions are to cover proper operating and response procedures. These instructions shall be sufficient to enable an untrained person to properly operate the system.

3.4 AS-BUILTS

A. Provide three (3) complete sets of prints, at least one of which is reproducible, and a set of disks in AutoCAD of "as-built" drawings and wiring diagrams

B. Provide a complete set of "as-built" data sheets for all equipment connected to the system.

C. Provide complete "as-built" software for all relevant components including, but not limited to, FACP programming and OnyxWorks (or current monitoring software) data files.

D. Provide NFPA 72 completion certificate, signed by the AHJ.

E. Provide a completed test form which complies with NFPA 72, signed and dated by the fire alarm system manufacturer or his agent.

F. All items of this section shall be provided prior to final payment request.

3.5 SPARE PARTS

A. All spare parts shall be directly interchangeable with the corresponding components of the installed systems.

B. Spares of each of the following which have been used on this project shall be furnished to the Owner: Unless specified elsewhere quantities shall be a minimum of one of each device or two (2) percent of the number of each device used, whichever is greater.

1. Manual fire alarm stations.

2. Smoke detectors, including bases.

3. Duct type detectors

4. Heat detectors.

5. Control relays/devices

6. Addressable monitoring modules.

7. Strobe units.

8. Horn/strobe units (of each candela rating)

3.5 SERVICE CONTRACT

A. If a separate test and inspection type service is requested, the service contract must include the following:

1. Performance of a test and inspection of the fire alarm system quarterly during which the Contractor shall:

a) Test the operation of each waterflow alarm device in the alarm system by opening the inspector's test valve, test alarm and trouble transmitters, and visually inspect each device as it is tested.

b) Test the operation of each supervisory valve switch by opening the valve and verifying the receipt of a signal within the first two renovations of the hand wheel or within one-fifth of the travel distance, and visually inspect each device as it is tested.

c) Remove any dirt or dust and make any minor adjustments or calibrations, which are apparent from inspection or testing of the device.

2. Perform a semi-annual test of the entire smoke detection system and manual fire alarm system as per NFPA 72 testing method requirements.

B. Emergency service, including all parts and labor, during the warranty period is

to be included in the system purchase price

C. Service definitions:

1. Emergency Services: Emergency service is a special request for assistance from the Owner that necessitates a special trip or labor. A request to advance a regularly scheduled test and inspection trip is not emergency service.

2. Quoted Rates: Quoted rates refer to the labor rates quoted on the bid form or to adjusted rates which shall be supplied to the Owner at the beginning of each new contract term. In absence of this contract, the rates shall be Contractor's currently published billing rates.

D. A written test and inspection report is to be submitted to The District at completion of every periodic system test and inspection visit.

NOT USED

END OF VOLUME II

2011 District Design Standards Manual

Volume III

SAN DIEGO COMMUNITY COLLEGE DISTRICT

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Phone 619.388.6546 • Fax 619.388.6509

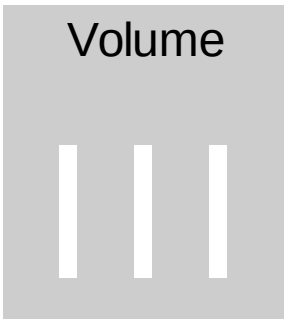
Updated: 10/31/2011

Note that significant revisions to the 07/07/10 Version of the District Design Standards Manual are shown in **BLUE** print.

Divisions 31-48

Sample Specification Sections

Note that sample specification sections depicting content from these District Standards have been incorporated by hyperlink to reinforce the 10/31/2011 Updated District Standards language and to help the A/E team to organize their design and materials and incorporate the District Standards and Guidelines. These are sample reference specifications and their use and reference in no way relieves the architects and engineers from preparing accurate technical specifications specific to the project for which they are contracted.



CIVIL ENGINEERING & UNDERGROUND UTILITY GUIDELINES AND STANDARDS

General:

A. Civil Engineering drawings shall include actual "San Diego Regional" trench and underground pipe details that are to be referenced in contract.
B. References to the City of San Diego "Green Book" shall include the actual "Green Book" drawings.
C. In 2010, the District engaged in an existing site utility evaluation and documentation from the various as-built drawings and specifications. Based on a future projection taken from each of the four campuses' approved master plans, a further site utility master plan has been developed to aid the design team in their efforts to understand how to interface between existing utilities and proposed building and facilities improvements. These studies and master plans are available on the District's Website or are available from the District Architect.

General:

A. Geotechnical Report is given to bidders as a reference document. Recommendations from the report must be clearly shown in contract documents.
B. Drawings must clearly show the extent of over-excavation beyond the building and under the footings.
C. Geotechnical Engineer of Record shall review earthwork specification prior to bid.
D. **For projects at Miramar College the following two notes should be added to the contract documents;**
    a. **One; "The Contractor may encounter old military ordinance. The Contractor shall notify the District immediately if they encounter any ordinance".**
    b. **Two; "Geotechnical investigation for the surrounding improvements describes the underlying soils as sandy clay over highly cemented gravel and cobble conglomerate (Linda Vista Formation). Trenching into the Linda Vista Formation will be difficult and will require heavy equipment".**

EXTERIOR IMPROVEMENTS REQUIREMENTS

General Design Guidelines

A. Provide barriers such as walls, raised planters, shrub massings, galvanized post and galvanized chain barrier or fencing where pedestrian circulation is not desired.
B. Paving Design
   1. Pedestrian paving to provide safe, durable, carefully thought-out ADA Accessible pedestrian access to support all facility functions.
   2. Design all paving for maintenance vehicle traffic
   3. Provide minimum 10-foot paved access to waste collection area.
   4. When replacing and expanding existing walkways no portion of remaining sidewalk should be less than 3 feet wide, replace entire walkway if this cannot be achieved.
   5. Control joints in walkways and mow curbs should be located a maximum of 5 feet on center with expansion joints at 40 feet. No panel should be larger than 100 square feet.
   6. Downspouts should not drain across pedestrian flatwork
   7. Slope flatwork away from utility vault lids
   8. Minimize walkways that reduce in width for a short distance or have angles of less than 90 degrees.
   9. Provide radius or angled corners where shortcuts might be taken.
   10. Minimum walkway widths:
      a. 12 feet adjacent to buildings
      b. 8 feet for high use walkways between buildings
      c. 5 feet for low use walkways
      d. 8 feet minimum where used for occasional vehicular traffic.
   11. At parking areas, swales shall be concrete and not asphalt to drain to concrete gutters.
   12. Pedestrian Walkway Design:
      a. Identify areas that will receive high traffic use, such as cafeteria, lunch areas, auditorium, office, etc.
      b. Provide access that is as direct as possible between building entrances and activity areas.
C. **Parking Design**

1. Vehicular circulation: circulation should be continuous within the lot. Drivers should be able to maneuver within the site without having to return to the street. Dead end lots should be avoided whenever possible. If a loading dock or other service-related area exists in a parking lot, adequate circulatory space needs o be allowed for service vehicles.
2. Access: For small parking lots, one entrance/exit point is usually adequate. Larger, high traffic lots shall have a minimum of two driveways.
3. All driveways should be a minimum of 24 feet wide. When driveways are less 24 feet wide, separate entrances and exits at least 12 feet wide shall be provided to ease congestion.
4. Parking should be provided at both sides of traffic aisle.
5. Provide wheel stops at parking spaces where adjacent to sidewalk to prevent encroachment in required walking surface width.
6. Parallel parking should be avoided across from 90 degree parking.
7. Parking lots should be set back from the sidewalk a minimum of 10 feet.
8. District Standard open parking lot stalls shall be **8'-6" wide min.** by 20'-0" long. Any proposed deviation from this standard must be approved in writing by the District Architect.
9. Signage for parking lots and structures shall be reviewed by College Police.
10. **Parking signage will be 0.050 aluminum and fixed to walls at four points with tamper resistant hardware or in two points if fixed to a single pole. Surface of signs, painting, and markings to meet Caltrans criteria.**
11. **Prohibitive signs are red text on white background.**
12. **Staff signs are blue text on white background.**
13. **Disabled signs are per California Building Code (white text on blue background).**
14. **Student signs are green text on white background.**
15. **Information signs are black text on white background.**
16. **All "STAFF", "STAFF/FLEX", "METERED", AND "CARPOOL" parking spaces will be marked at the entry of the space with 5-inch lettering in all capital letters.**
17. **The standard call boxes for parking lots and structures are "Talk-a-Phone" products. Open areas use towers and parking garages use wall mounted systems. Call boxes are set to call SDCCD Police Dispatch at 619-388-6405. Coordinate with District for specific type and location for call box.**
18. **Permit machines are used in parking lots and structures for one day users who do not use an issued District parking permit. The standard machine is a Ventek M400 pay station.**
19. **Parking Structures must be securable from vehicles and pedestrians after hours.**

SITEWORK REQUIREMENTS

A. **Paving**

- **REFER TO SAMPLE CONCRETE PAVING SECTION #321313 - (Click Here)**

1. Concrete Paving
   a. Vehicle Paving must be at least 6 inches thick, #5 rebar at 18' each way.
   b. Minimum reinforcing pedestrian paving standard shall be #4 bars at 24 inches each way; not wire web fabric.
   c. All concrete 2500 psi minimum w/.50 or less c/w ratio - No pea gravel mixes.
   d. Heavy traffic area a minimum of 3,500 psi must be used.
   e. When existing concrete flatwork is cut into for new trenching, replacement concrete will be 3/4" rock; 2500 psi concrete at least 4" thick set on a 2" sand base.
   f. All repairs in walkways should be doweled into existing concrete.
   g. Provide sub-base design profile per the project's Record Geotechnical Report.
   h. Ponding is not acceptable. Ensure proper drainage, with 1% to drain slope minimum and 2% maximum cross slope away from building.
   i. Refer to soils report for recommendations regarding the paving sections and base requirements. Over-excavate and replace expansive soils if required. Notify District Architect for direction if no soils report is available.
   j. Secondary fibrous reinforcement of concrete paving is desirable.
   k. Preferred finish for concrete walks is a medium broom finish, with brush strokes perpendicular to the primary direction of travel. Do not use salt finish or stamped textures.
   l. Gradients:
      1) Pedestrian paths with gradients under 5 percent are considered walks. Walks with grades from 5% to 8.33% max. are considered ramps and have special design requirements. Refer to current ADA and Title 24 requirements for ramp design. Walks with grades of 4 to 5 percent should include short (5'-0") level areas approximately every 100 feet and for every 30" of rise.
   m. Joints in concrete
      1) Provide expansion joints and control joints to control cracking at least every 10 feet.
         a) Concrete control cuts by approval of the district architect.
         b) Hand troweled control joints are preferred to cutting
         c) Where saw cut control joints must be used, cut 1/3 the slab depth minimum.

Concrete paving expansion joints shall receive sealant. Use only elastomeric expansion joint sealants as identified in Guide Specifications.

n. Curb cuts
   1) Curb cuts shall be provided where there is a change in grade from the street to the sidewalk and along any walkway that is to be used for handicap access, as required. Refer to current ADA and Title 24 requirements for ramp design.

o. Concrete trenches
   1) The minimum width of the trench shall be 18 inches. On both sides of the trench cut, the contractor will dowel into the existing concrete and place #4 rebar at 24 inch on center to tie the new concrete into the existing concreteThe control joint can either be worked in during the pour or within 48 hours of being completed.

p. Concrete stairs
   1) At stairs, use metal nosings. Provide access that is as direct as possible between building entrances and activity areas.

2. Asphalt Paving
   a. All asphalt that has been removed or that is being installed as will have 12 inch of class II base and 4 inches of 3/4" asphalt and 2" of 3/8 asphalt or as engineered.
   b. Asphalt shall be placed in two layers and curing time between layers shall meet Caltrans Chapter 39 specifications
   c. Fire Lanes;
      1) Provide for all required Fire Lanes with curbs that are painted red and stenciled "Fire Lane" as directed by local fire marshal.
      2) Profile shall meet PSI rating per local fire marshal.
      3) At pedestrian walkways that may also be used as fire lanes, removable bollards or planter pots may be used to keep campus traffic off these lanes. Maintain a 12 ft min. clearance between barriers for campus pick-up trucks.

LANDSCAPE STANDARDS

GENERAL:

A. For every 20,000 SF of additional landscape, an enclosed gardening storage area of 100 SF with a cast iron slop sink and dirt filter will be required.

B. All work will contain a cost to restore landscape to the condition before construction began. The contractor will be responsible for the repair of any irrigation lines, sprinklers and valves that are damaged during construction.
C. The landscape supervisor responsible for that area will be required to be present for the final inspection and approve the repairs to the landscape and the irrigation system.
D. **All landscape areas are potential areas where LID concepts can be applied. Landscape areas can serve as vegetative swales and bioretention areas. Rooftops and impervious areas can be drained into landscape areas. Soil amendments can improve the soil quality, infiltration and water storage capacity. Water collected in cisterns or rain barrels can irrigate a portion of the landscape area. All of these BMP's, including the planting of deciduous and evergreen trees are eligible for credit to reduce the runoff volume associated with increased impervious area of the project.**

IRRIGATION:

- **REFER TO SAMPLE PLANTING IRRIGATION SECTION #328400 - (Click Here)**

A. Note: Calsense is a District approved sole source system and shall be installed and programmed at the beginning of the project to get the full benefit of the Calsense and water regulations. Coordinated closely with the Landscape Supervisor at the specific campus site.
   1. Installed sprinkler will be Pop-ups-Rain Bird 1800, or Hunter Pro Spray Using Pro Spray nozzles. Rotors - Rain Bird 3500, Rain Bird 7005, Hunter "I" Series
   2. Installed valves will be Hunter ICV's with Accu-Set; or Rainbird valves PESB-R (For Miramar Reclaimed water) with PRS-D" (Pressure regulating module)
   3. Backfill with top soil and appropriate tape markers
   4. Quick couplers every 100 feet around sidewalks and buildings.
   5. Valve manifolds - threaded union on both sides
   6. Isolation valves on each manifold with a quick coupler (3/4")
   7. 14' gauge direct burial wire
   8. Paige P-7171-D communications cable between hardwired controllers
   9. CAT5 or CAT6 data cable, with RJ45 terminal shall be required, as needed
   10. Controllers have a dedicated circuit
   11. Controller specifications must be verified by Calsense field service personnel prior to installation
   12. Controllers must have 8' x 5/8" ground rod, per controller installation specifications
   13. All controller installations must have written "Calsense Installation Certification" prior to project being signed off
   14. Interior controllers shall have a Calsense stainless steel back plate assembly
   15. Exterior controllers shall be placed in a Calsense SSE-R lockable stainless steel enclosure.
   16. Stainless steel cage on backflow to City specifications.

17. Where there is concrete adjacent to landscaping a minimum of two 4” sleeves will be placed for electrical and irrigation, in alignment with the depth of the irrigation pipe or conduit..
18. Wherever there is a valve a quick coupler must be next to it.
19. All irrigation that goes under concrete driveways and patios should be sleeved.
20. No funny pipe on swing joint applications.
21. Install ultra high flow nozzles on the larger sprinkler heads for large open areas. (to apply the maximum amount of water in minimal amount of time.)
22. A master valve and Calsense FM series flow meter must be installed with all new systems.
23. A Calsense rain bucket must be installed if one does not exist at the site. Rainbucket location must be verified by Calsense field service personnel prior to installation.
24. A Calsense ET gage must be installed if one does not exist at the site. ET gage location must be verified by Calsense field service personnel prior to installation.
25. All extra irrigation wires should be the color yellow. Two extra yellow 14 gauge wires will be run at each valve manifold.
26. Quick couplers should be every 100 feet on a landscape project.
27. Swing joint assembly (page 15) for sprinkler heads should consist of 3 marlex and one schedule 80 riser 4"-6" in length and appropriate thread size to sprinkler head. Also use check valves only where necessary.
28. Lateral pipes that are not mainline shouldn't be deeper than 18 inches.
29. Set sprinkler heads in from concrete edges at least 2" (especially in shrub beds).
30. Valve manifolds (page 14) should end with a tee and a stub out with a cap.

E. **Landscape Water Management:**

1. Civil design team shall implement Bioswales throughout each and every Landscape condition around new and renovated buildings using building roof rainwater, site area drainage water, and building generated grey water if applicable.
2. Where applicable use detention pipes or overflow cisterns for heavy rain and flood conditions.

F. **Watering Guidelines** (During Maintenance Period): TBD

G. **<u>Automatic Controller(s) and Related Equipment</u>**

1. Contact a Calsense representative prior to designing a system to review communications and flow monitoring requirements.
2. After the completion of a project SDCCD must receive a complete diagram of the irrigation watering zones.

3. Controller(s) shall be as indicated on the drawings, and shall be manufactured by Calsense Inc. Controller shall be installed per manufacturer's specifications, as shown on the drawings, and as specified herein. All controllers shall be the **Calsense ET2000e** series.
4. The controller will be housed in a weatherproof, lockable, stainless steel, powder coat painted cabinet suitable for wall mounting or freestanding stainless steel, pedestal mounting.
5. The controller shall operate on an input o f 120 VAC, 6.0 Hz, 1.0A and a 40 VA transformer with output of class 2, rated 24 VAC, maximum total load 1.5A and be capable of actuating up to (4) .25A solenoids plus a master valve or pump start relay.
6. All additional components shall be installed as per manufacturer's specifications. Contact Calsense Inc.
7. The controller shall communicate with other controllers in line-of-sight proximity using spread-spectrum radios, providing a reliable communication link instead of a hardwire communication path when sharing data. The spread-spectrum radio option does not require FCC licensing, and offers a secure error correcting frequency hopping radio link immune to outside interference. A single controller model number shall be -SR, while multiple controllers sharing a single spread-spectrum radio shall be designated as a MSR and -MS configuration.
8. The controller shall communicate with a central computer using an Ethernet network designed to connect the model ET2000e controller with serial interface to an existing network using the TCP/IP protocol. The Ethernet option shall be integrated into the controller and shall not require a separate power source. The **Calsense** controller shall be model -EN when one controller is sharing one Ethernet connection, and shall be model -MEN when the controller is connected to the Ethernet jack and is also sharing this jack with -ME option controllers. The user shall supply an Ethernet (RJ45) connection at the controller location with the network set to have access to the connection. The Ethernet network shall be set to assign a static IP address to the model ET2000e controller.
9. Provide remotes. Each Calsense controller shall be accompanied with an RRe board, appropriate antenna and hand held remote.

H. **Weather Monitoring**

1. The central control system shall include a remote connected ET gage (model ETG) where shown on the plans and specifications. The ET measuring device shall be powered by the selected field controller designated as a -G model. Install per manufacturer's specifications. Only one per campus is required; verify existing conditions.

I. **Flow Monitoring**

1. All new **Calsense** irrigation systems shall be provided with a separate meter, master-valve and flow sensor assembly. The Model FM flow meter uses two #14 AWG, one red, and

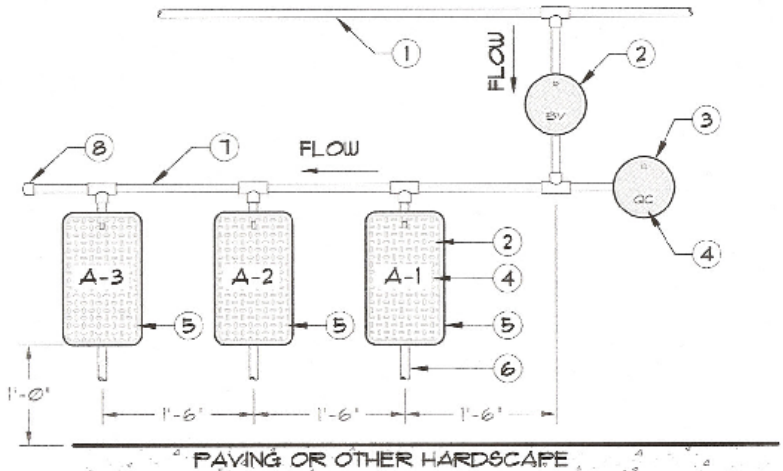
one black in 1" PVC conduit to connect to the irrigation controller. The maximum wire run between flow meter and controller is 2000 ft.

2. Install as per manufacturer's specifications; master valve needs to be normally closed; flow sensor needs to be brass only.
3. The central control system shall include a remote connected Rain Bucket (model RB-1) and shall be shown on the plans and specifications. The rain-measuring device shall be installed as per manufacturer's specifications. Only one rain bucket is required per campus. It should be located on the highest roof.
4. The ET Gage (model ETG) and the Rain Bucket (model RB-1) shall be supplied by the **Calsense** factory, Carlsbad, CA to the customer through local distribution.
5. Provide a dedicated irrigation system water meter or a device to measure irrigation use separate from domestic use.

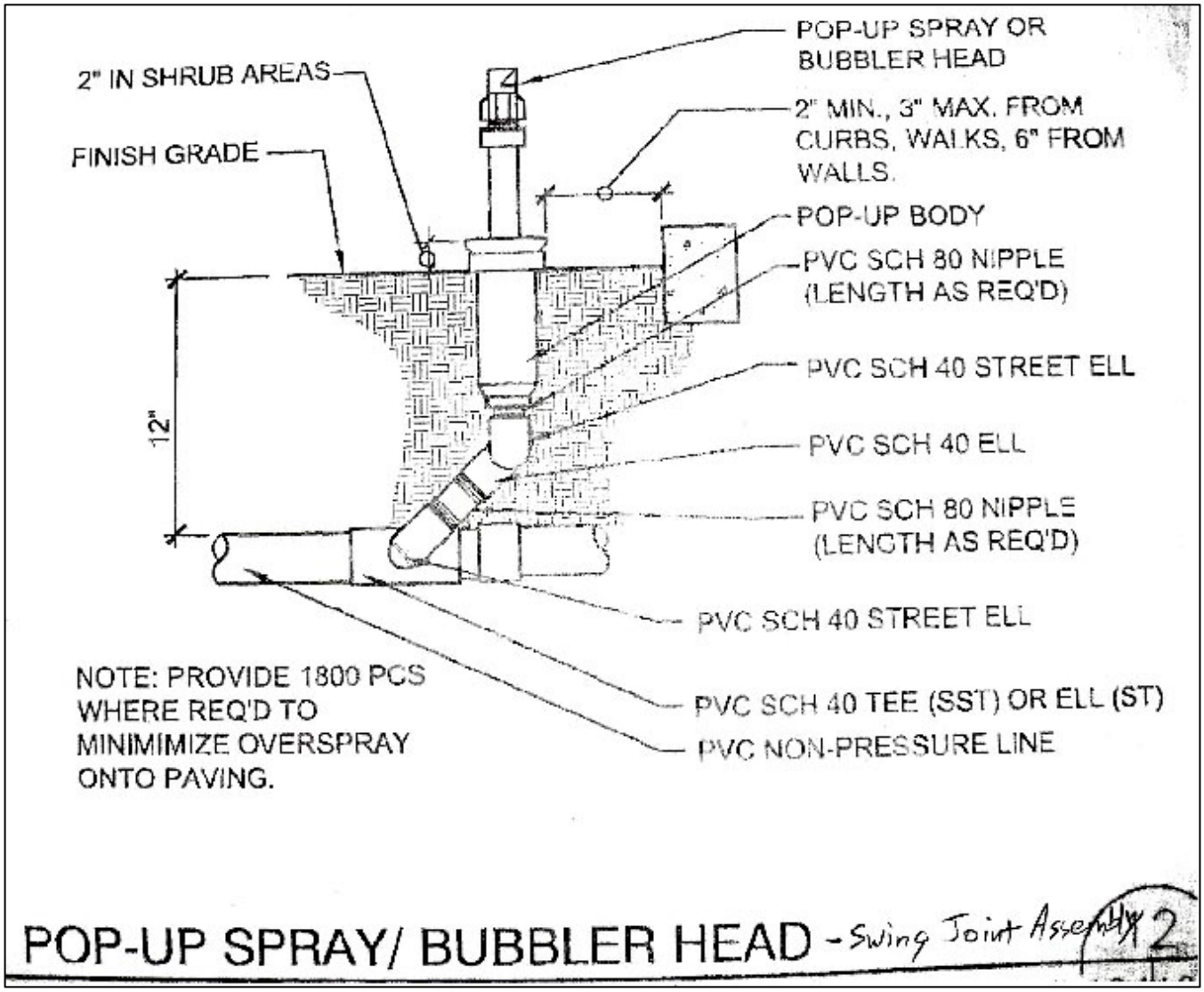
J. **Computerized Central Control System**

1. The computerized central control system shall be installed in conformance with the manufacturer's instructions and shall consist of a central control computer and software, satellite irrigation controllers, irrigation controller enclosure cabinets, radio and/or phone communication options and/or 2 -wire path cable, and flow/weather sensor options.

K. **Design for Manifold Configuration**



L. **Design for Swing Joint Assembly**



M. **Landscape Planting**

- **REFER TO SAMPLE PLANTS SECTION #329300 - (Click Here)**

1. District utilizes a designated gardening supervisor at each campus. Coordinate with the Campus gardening supervisor through the landscape programming, design and plant selection process.
2. Grounds department must receive an accurate as-built of the irrigation drawings with laminated diagram.

3. Select trees, shrubs, and groundcovers that are insect, animal (rabbits) and disease resistant.
4. Locate shrubs and deciduous trees with respect to minimizing ingress of loose organic material into air handling systems.
5. Maintain at least a one-foot width of concrete mow strip against buildings to help keep irrigation and mulch away from walls. Concrete mow curbs must be used to separate turf and shrub areas.
6. Preferred plant materials are those that are best suited to actual site conditions. There are many factors affecting appropriate plant material selection. Climate, durability, color, water requirements, proper zoning, consideration of the waste stream, and maintenance are critical factors to consider.
7. The limit of turf areas to only those locations necessary and functional. Design ornamental areas with low water use groundcovers, drought tolerant shrubs, mulches and hardscape. When turf is used, the correct type must be selected based on use, location, water consumptions and zoning, Bermuda, Fescue, or Perennial rye. Consult with Landscape Supervisor for special conditions.
8. Recommended mulch: Shredded mulch (free of weeds). No bark, pea gravel or other similar materials.
9. The utilization of soil amendments to improve water conservation, water percolation and water retention capacity.
10. No rock over 1 inch. 12 inches of top soil tilled in with a complete pre plant fertilizer will be used.
11. Imported soil shall be natural, friable, and well draining soil. Provide soil free from subsoil, brush, objectionable weeds, seeds, rocks, organic or inorganic debris. The soil shall be free of any toxic substance, soil sterilants, salts, and no soil removed from roadbed excavations. This soil shall be Screened Topsoil mix with a composition as follows:
    a. Screen size: 3/8”
    b. 65-75% sand
    c. 15-20% silt
    d. 10-14% clay
    e. Ece: 0-3 dS/m
    f. pH: 6.0-7.5
12. The Contractor shall furnish to the District a soil report made from the intended import by an approved agricultural lab. The report shall include composition breakdown. This report will be used by the District as a basis for final soil amendment recommendations. Soil imported to the site and found unsuitable by the District shall be removed from the site and replaced with an approved soil at the Contractor expense. The Contractor shall pay all expenses for soil testing of import materials.
13. The use of shredded bark materials to cover and cool the soil, reduce weed growth, slow erosion and minimize evaporation in shrub areas is to be 3" thick minimum. Landscape

improvements in all areas shall be located to permit the proper operation of irrigation systems and effective use of maintenance equipment.

14. Plant location and spacing shall permit normal plant development without undue crowding or pruning.
15. Soil testing by a certified agronomic soil laboratory and/or 24 hour percolation tests should be conducted prior to the design and installation of plants and irrigation systems.
16. All planting areas shall be have positive surface drainage with a minimum gradient of 2 percent and shall be adequately drained with a system of drain inlets and pipe where required.
17. All plant material will be inspected by Facilities Landscape Supervisor and the Project Landscape Architect and either accepted or rejected for size and condition of plant material, prior to planting.
18. Apply pre-emergent-herbicide.

N. **Landscape Trees**

1. Trees should be planted a minimum of 20 feet from any sewer lines, main lines, or underground utilities unless otherwise directed by the District Architect.
2. Trees shall be located a minimum of 96 inches from the face of curb or sidewalk unless otherwise directed by the District Architect.
3. Trees shall be planted a minimum of 20 feet from any traffic signal, stop sign or light standard. unless otherwise directed by the District Architect
4. Landscape improvements over 30 inches in height are prohibited within 10 feet of a driveway unless otherwise directed by the District Architect.
5. Trees and shrubs shall be located and maintained to preserve a clear perimeter access area of at least 10 feet from fire hydrants, utility poles, overhead wires, street lights, and above ground utility structures unless otherwise directed by the District Architect.
6. In areas of existing or new development without an approved street tree plan, the tree selection should complement the existing predominant species unless specified otherwise by SDCCD and the Landscape Supervisor from the project's campus.
7. Plant selection shall be limited to those species which are considered relatively disease and pest free and require minimal trimming to be maintained in a safe and attractive condition.
8. Trees with surface root systems that tend to damage sidewalks, curbs, and streets shall not be planted adjacent to paved areas.
9. Trees with low spreading branches shall not be planted. Major branches should be a minimum of 8 feet above the sidewalk and 14 ½ feet above the street.
10. Trees shall be planted a minimum of 8 feet from all paved surfaces, unless otherwise directed by the District Architect.

11. Trees which fruit heavily, attract bees, or have a tendency to drop branches, shall not be planted in heavily used areas for safety and maintenance reasons.
12. Certain trees that drop leaves, needles or other litter shall not be planted with thick shrubs or groundcover to reduce maintenance.
13. Root barriers (minimum of 24 inches deep from grade) shall be used on all trees planted in or near sidewalks, curbs, and driveways.
14. Tree planting holes should be intersected by 3 evenly spaced trenches that are 12 inches deep. The trenches should extend on both sides of the planting hole a minimum of 6 feet. The finished planting hole should resemble a wheel with 6 spokes. This method does not apply in parking areas. Trenches should not be closer than 6 feet to any concrete, pavement or building.
15. Backfill soil for tree planting shall be amended per recommendation of District appointed arborist and/or soil testing.
16. All trees must be properly staked to meet industry standards.
17. All 24" box trees shall have a trunk caliper of no less than 1 ½".
18. All 15 gallon trees shall have a trunk caliper of ¾ to 1". Palms are to be purchased by brown trunk height. Necessary brown trunk height for pedestrian walkways is 6'.

O. **Tree Protection**

1. During construction all existing trees shall have protective fencing installed 10' beyond the drip edge of the tree to protect the root zone of the tree.
2. During construction, contractor is responsible to irrigate trees on a weekly basis to maintain the health of the tree. District may have a certified arborist inspect trees for through project and make suggestions.
3. All roots that are damaged or are to be removed and shall be clean cut, inspected and covered with soil.
4. If tree branches are in the way, the branch shall be removed with a saw, no stubs left. Consult a certified arborist prior to removal.
5. During construction, if excessive root zone is removed and the tree is no longer safe, contractor shall be responsible for removal. Determination will be made by the District's designated Licensed Arborist.
6. If construction equipment damages the trunk or several large branches of a tree, the contractor will be responsible for the removal and replacement of tree of same or equal size and value.

P. **Tree and Plant Selection**

1. The District requires trees and plants that are low on maintenance and water usage.

2. Do not use Eucalyptus, Melaleuca, Pines, Sycamore Xylosma or plantanus racemosa, Hibiscus, Hebe, erythrina (Caffra), or Poplar trees.
3. Unacceptable groundcover: Do not use Equisetum "hyemale" (Common name: Horsetail); Exception: Can be grown in containers.
4. Unacceptable plant material: Cortaderia selloana (Common name: Pampas Grass).
5. If using Palms, only use King Palms; no washingtonia robusta.
6. Refer to the following for the District Landscape Departments' preferred plants and trees. **Trees and plants that are not on the following list shall be submitted to the District Architect for approval prior to specifying.**

   a. Low Water Use Plants - This is a list of plants that do not require lots of water once established:

      1) Ground Cover or Low Growing
         a) Coreopsis sp
         b) Ceanothus griseus
         c) Ceratostigma plumbaginoides
         d) Festuca glauca
         e) Gazanias
         f) Ice Plant Varieties
         g) Juniper prostrate forms
         h) Lantana sp
         i) Lavendula
         j) Liriope
         k) Myoporum parvifolium
         l) Rosmarinus officinalis prostrata
         m) Salvia

      2) Shrubs
         a) Aucuba (only in shade)
         b) Agapanthus sp
         c) Bouganvillea sp
         d) Cassia sp
         e) Calliandra sp
         f) Cistus sp
         g) Clivia sp
         h) Echium sp
         i) Grevillea sp
         j) Hemerocallis sp (just as accents)
         k) Juniper sp

l) Lavatera sp
m) Leptospermum sp
n) Nerium oleandra
o) Pittosporum sp
p) Plumbago capensis (Royal cape)
q) Photinia sp
r) Rhapiolepis indica (Majestic beauty)
s) Rosmarinus officianlis
t) Santolina sp
u) Statice perizii
v) Stretlitzia reginae

3) Vines
a) Wisteria
b) Other low water use vines appropriate to San Diego
c) Albizzia sp (mimosa or silk tree)
d) Arbutus unedo (strawberry)
e) Callistemon sp
f) Cedrus deodara
g) Chitalpa tashkentensis
h) Geijera parvifolia
i) Leptospermum laevigatum
j) Jacaranda mimosifolia
k) Araucaria heterophylla
l) Erythrina Coralloides (Naked Coral)
m) Erythrina Crista Galli (Cockspur Coral)
n) Cotinus Coggygria (Smoke Tree)Podocarpus gracilior (acceptable but not preferred - messy)
o) Podocarpus macrophyllus (acceptable but not preferred - messy)

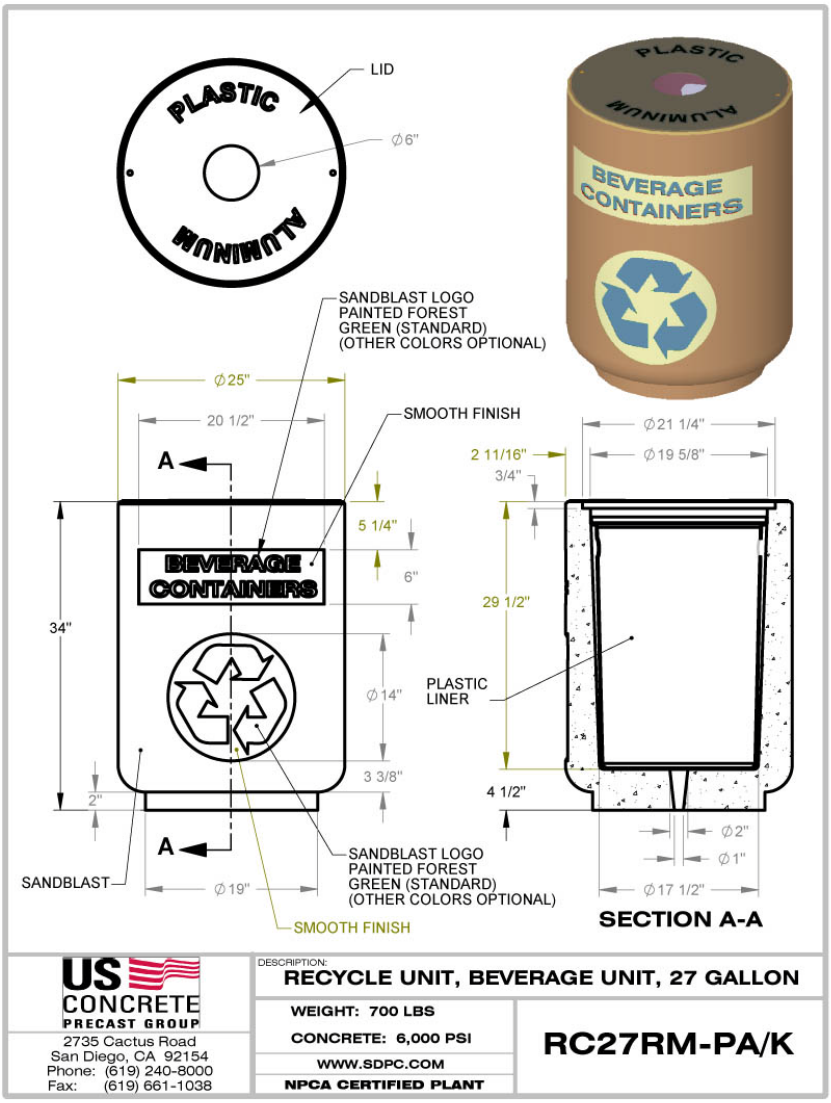
Q. **Greenhouses**

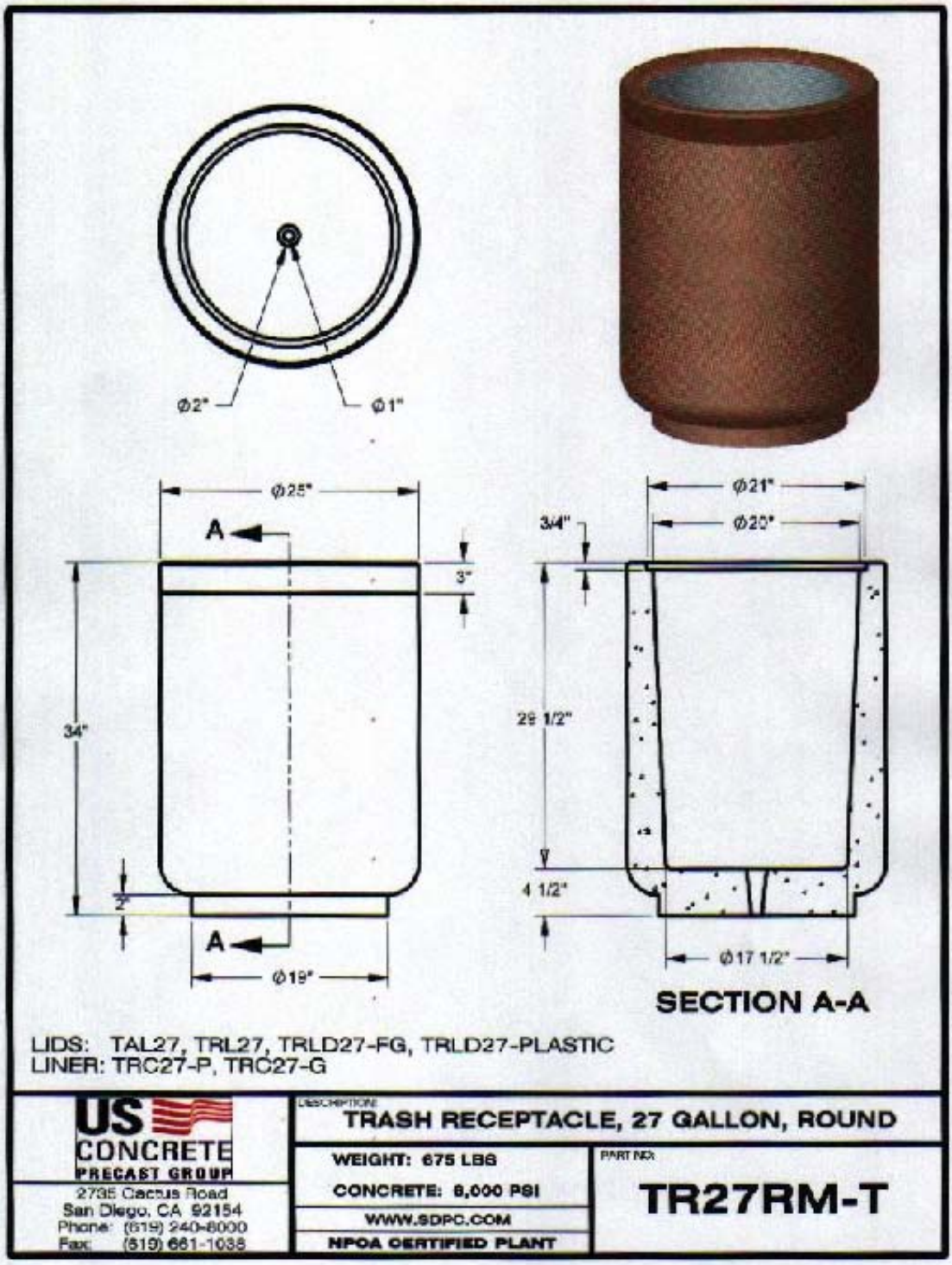
1. Where a new Greenhouse is included on a campus, provide 8" floor sinks with dirt trap at each floor sink.

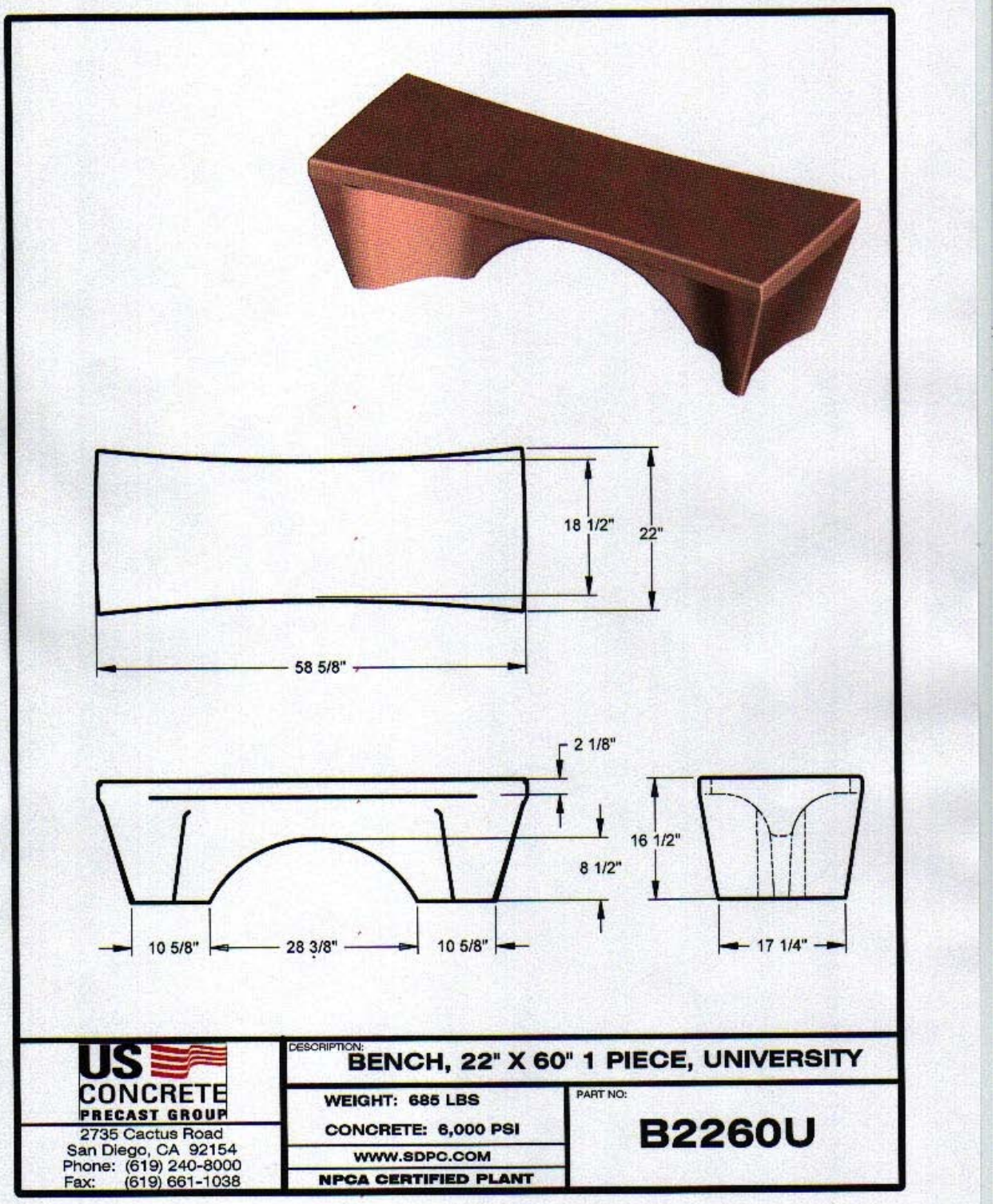
R. **Site Furniture**

- **REFER ALSO TO SAMPLE SITE FURNISHINGS SECTION #129300 - (Click Here)**

1. See Recycle Units, Trash Units and Tables Specifications
2. Use of recycled plastic for benches is an acceptable alternative.
   a. SiteCraft Pre-Cast Concrete
   b. Other proposed alternates should be submitted to District Architect for approval.
3. Precast concrete is a type of construction material made with concrete case in a reusable mold or "form: and cured in a controlled environment. They are purchased from US Pre-Cast (formerly San Diego Precast)
   a. Note: Lettering/logo on recycle containers shall be blue




Ø2"
Ø1"
Ø25"
A
3"
34"
2"
A
Ø19"
Ø21"
Ø20"
3/4"
29 1/2"
4 1/2"
Ø17 1/2"
SECTION A-A
LIDS: TAL27, TRL27, TRLD27-FG, TRLD27-PLASTIC
LINER: TRC27-P, TRC27-G
US CONCRETE PRECAST GROUP
2735 Cactus Road
San Diego, CA 92154
Phone: (619) 240-8000
Fax: (619) 661-1038
DESCRIPTION
TRASH RECEPTACLE, 27 GALLON, ROUND
WEIGHT: 675 LBS
CONCRETE: 6,000 PSI
WWW.SDPC.COM
NPOA CERTIFIED PLANT
PART NO:
TR27RM-T

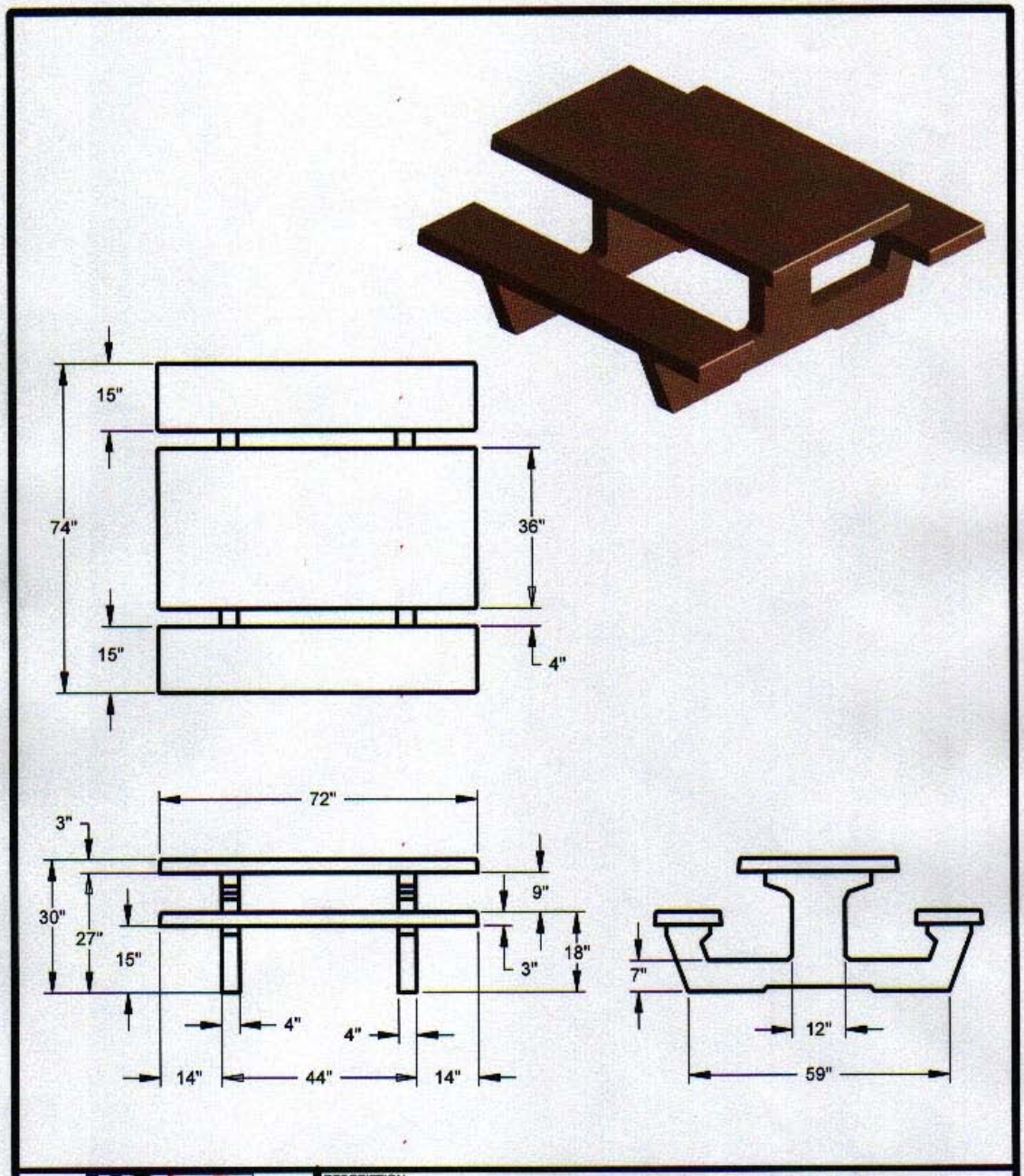


US CONCRETE PRECAST GROUP
2735 Cactus Road
San Diego, CA 92154
Phone: (619) 240-8000
Fax: (619) 661-1038

DESCRIPTION:
BENCH, 22" X 60" 1 PIECE, UNIVERSITY

WEIGHT: 685 LBS
CONCRETE: 6,000 PSI
WWW.SDPC.COM
NPCA CERTIFIED PLANT

PART NO:
B2260U

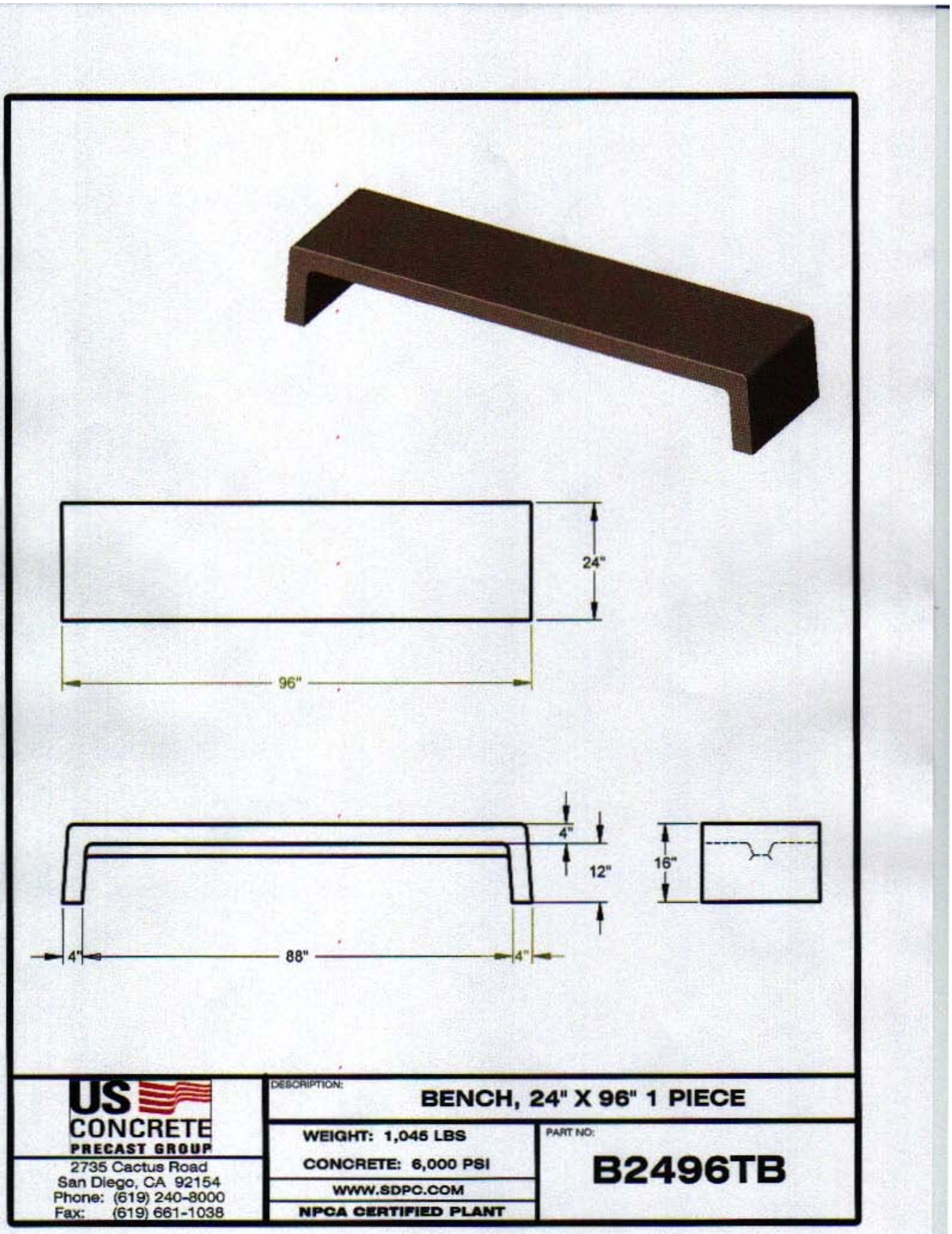


US CONCRETE PRECAST GROUP
2735 Cactus Road
San Diego, CA 92154
Phone: (619) 240-8000
Fax: (619) 661-1038

DESCRIPTION: **TABLE SET, 6' TOP - 5 PIECE**

WEIGHT: 1,770 LBS
CONCRETE: 6,000 PSI
WWW.SDPC.COM
NPCA CERTIFIED PLANT

TS6-5PC



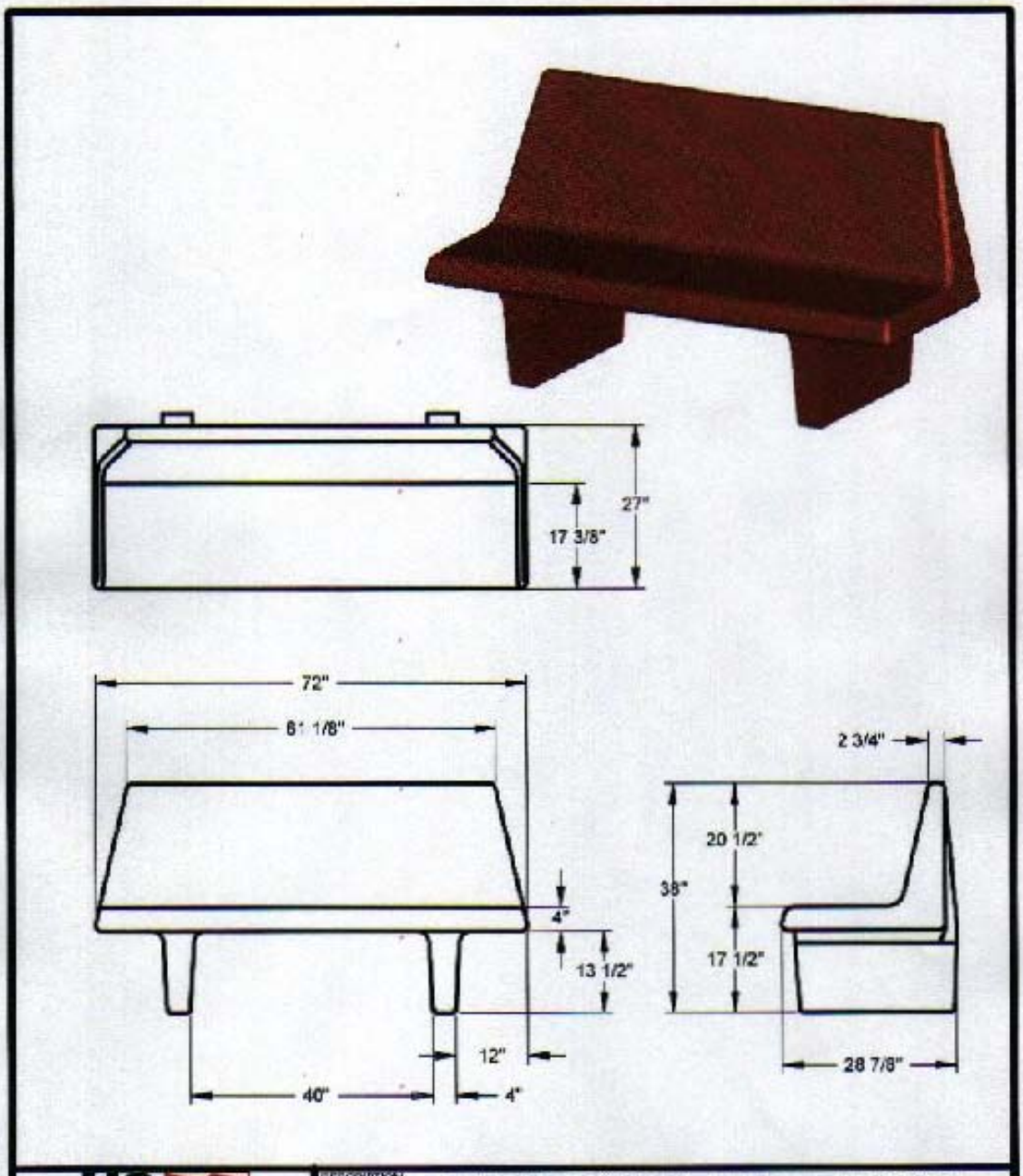
US CONCRETE
PRECAST GROUP

2735 Cactus Road
San Diego, CA 92154
Phone: (619) 240-8000
Fax: (619) 661-1038

DESCRIPTION:
BENCH, 24" X 96" 1 PIECE

WEIGHT: 1,045 LBS
CONCRETE: 6,000 PSI
WWW.SDPC.COM
NPCA CERTIFIED PLANT

PART NO:
B2496TB

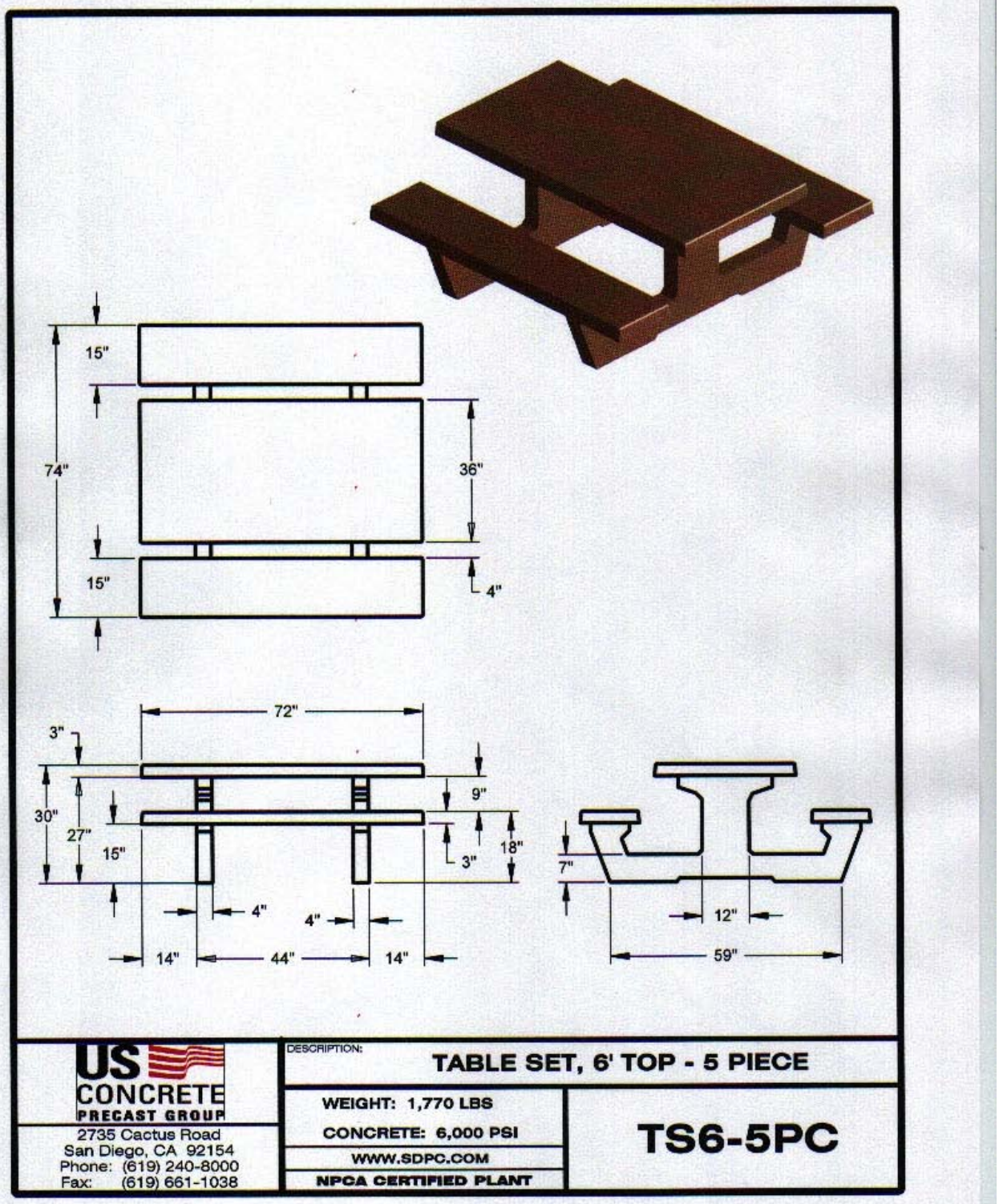


US CONCRETE
PRECAST GROUP
2735 Cactus Road
San Diego, CA 92154
Phone: (619) 240-8000
Fax: (619) 661-1036

DESCRIPTION: **BENCH, 19" X 72" 1 PIECE, BACKED**

WEIGHT: 1,515 LBS
CONCRETE: 6,000 PSI
WWW.SDPC.COM
NPCA CERTIFIED PLANT

PART NO: **B1972SD**



US CONCRETE PRECAST GROUP
2735 Cactus Road
San Diego, CA 92154
Phone: (619) 240-8000
Fax: (619) 661-1038

DESCRIPTION: **TABLE SET, 6' TOP - 5 PIECE**

WEIGHT: 1,770 LBS
CONCRETE: 6,000 PSI
WWW.SDPC.COM
NPCA CERTIFIED PLANT

TS6-5PC

Volume III - DIVISION 32 EXTERIOR IMPROVEMENTS

UTILITY REQUIREMENTS

- **REFER TO SAMPLE SITE UTILITY WATER DISTRIBUTION PIPING SECTION #331116 - (Click Here)**
- **REFER TO SAMPLE STORM UTILITY DRAINAGE PIPING SECTION #334100 - (Click Here)**

A. **Stormwater Management Standards**

1. Best Storm Water Management Practices:
   a. Considering the District's goal for sustainable water management, solutions like the Bay Saver Technologies product shall be considered for District on all projects. Proven structural BMP's designed to efficiently and effectively treat stormwater by separating debris and trapping pollutants before they enter the waterways. All Bay Separators, can be fabricated into multiple sizing combinations to fit a variety of applications and custom installations and shall be strongly considered by the design team.
   b. Solutions like the Bay Saver Technologies Bay Filter product shall also be considered for District all projects. Utilizing concrete vaults, an easy-to-handle cartridge design, a proven mixed media sand filter, and a spiral wrapped layered construction, **BayFilter** removes very fine sediment and nutrient pollutants at an astounding maximum flow of 30 GPM per cartridge. This system provides for over 42 square feet of surface area per cartridge and assures greater than 80% TSS removal, greater than 50% reduction in total phosphorous, greater than 12% reduction in dissolved phosphorous, and greater than 50% reduction in turbidity.
2. Although reclaiming storm water represents only 1 LEED point, it is most valuable for the health of the region's water management system. There are cost effective solutions applicable for such storm water treatments but they are campus wide solutions.
3. Design Team shall provide for a water retention basin or cistern to facilitate the use of filtered and recycled grey water from lavatories, showers, and other "non-blackwater" generators for use for landscape irrigation around each proposed building project.
4. Wherever possible hose bibs provided for landscape irrigation shall be supplied with recycled grey and not potable water.
5. Wherever recycled water is used in a building or landscape project, provide grey colored pipe and signage to assure that no one would ever drink, wash or treat the recycled water as potable.
6. Potable water shall be used for water fountains and other fresh water uses.

7. All water use distributions shall be designated as potable or recycled water using appropriate signage.
8. Efforts shall be made by the design team to utilize grey water as the conditioned water from a Campus' Central plant for heating and cooling.

B. **Building Rainwater Management:**

1. Where feasible, design team shall consider providing for a small cistern on the roof to capture rainwater and filtered greywater for use on garden roof and other above grade irrigation elements such as greenhouses.
2. Though it is likely that most building projects will require significant paving and hardscape around them, design teams shall seriously consider the use of more pervious paving wherever possible.

NOT USED

LOW IMPACT DEVELOPMENT SITE DESIGN STANDARDS

Low Impact Development (LID) is an innovative stormwater management approach with a basic principle to manage rainfall at the source. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff. Instead of conveying and treating stormwater in costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level. Almost all components of the urban environment have the potential to implement LID techniques. This includes not only open space, but also rooftops, streetscapes, parking lots, sidewalks, and medians. LID is a versatile approach that can be applied to new development, urban retrofits, and redevelopment projects.

Each section of this chapter provides a description of LID BMPs the District considers acceptable, and includes siting considerations and a summary of advantages and limitations. These sections provide information on design specifications, potential LEED credits, offset credits for the water balance calculator required by the Construction General Permit (Order No. 2009-009-DWQ), and operations and maintenance requirements. Other LID BMPs that are appropriate to the site may be considered subject to District review and approval. Specifications for the following LID practices that are acceptable to the District can be found on the page indicated:

a. **Vegetated swales and filter strips (Volume III-35-6)**
b. **Flow through planter boxes and tree box filters (Volume III-35-11)**
c. **Permeable pavements and pavers (Volume III-35-17)**
d. **Bioretention systems (Volume III-35-22)**
e. **Dry wells with pretreatment (Volume III-35-29)**
f. **Soil amendments (Volume III-35-34)**
g. **Infiltration trenches and basins (Volume III-35-37)**
h. **Rain barrels and cisterns (Volume III-35-45)**
i. **Dry and wet ponds (Volume III-35-48)**
j. **Green roofs (Volume III-35-54)**

Methodology

The following steps shall be performed to appropriately and successfully site, size, and design appropriate LID practices for all new development and major renovation projects:

1. **Opportunities to implement LID practices and features should be integrated into project planning during all phases of design. LID opportunities should be considered and maximized at the conceptual design phases and refined during design reviews as specific features, techniques and Best Management Practices (BMPs) are incorporated into the site design.**
2. **The design consultant shall prepare a Water Quality Technical Report (WQTR) detailing the basis of design for the proposed LID stormwater management techniques to treat, retain, or infiltrate runoff.**
3. **Vegetation for the proposed LID practices shall be consistent with the District's Design Standards Division 32 Exterior Improvements and use drought tolerant landscaping.**
4. **LID features shall be labeled with an interpretive sign, where practical, identifying them as a LID feature and explaining their function in improving water quality.**
5. **All storm drain inlets shall be stenciled with prohibitive language and a graphical icon to discourage illegal dumping and discharges.**
6. **Percolation/infiltration testing shall be performed using the ASTM Double-Ring Infiltrometer test method. Based on the type and size of the proposed LID practice, borings may be required at the selected location(s) and must be at least 10 feet below the invert of the LID practice's bottom. Percolation/infiltration test results must be used when sizing the LID practice. The distance to the ground water table should be obtained and recorded during soil testing.**
7. **The water quality volume captured by LID practices shall be drawn down within 72 hours to prevent the breeding of vectors.**
8. **During construction, areas where post-construction LID practices will be or are installed shall be protected to prevent soil compaction and construction site drainage, erosion, and sediment from flowing through the LID practices and fouling the system prior to the completion of construction.**

Water Quality Technical Report (WQTR)

The WQTR serves to document the sizing, selection, siting and other design considerations for LID and post-construction BMPs. The WQTR also includes important information on the operation and maintenance requirements needed to keep the BMPs functioning as designed.

A Preliminary WQTR shall be submitted to the District for review and comment at the 100% Schematic Design Submittal milestone. The Final WQTR shall be submitted to the District for review and comment at the 50% Design Development Submittal milestone.

The final WQTR shall contain the information detailed below. The Preliminary WQTR should contain sufficient information to prepare a water balance calculation, determine the LID BMP footprint or other potential site constraints, anticipated pollutant removal efficiencies, and soil testing for required the site, if applicable.

a. **Project Description**
b. **Project Area (including pervious and impervious surface quantities)**
c. **Anticipated and potential pollutants of concern**
d. **Narrative detailing the project's LID features, including but not limited to:**
    i. **LID practices**
    ii. **Steps taken to conserve natural areas, soils, and vegetation, minimize disturbances to natural drainage areas, and minimize soil compaction**
    iii. **Impervious areas directed to pervious/vegetated areas**
    iv. **Location and use of permeable surfaces**
    v. **Disconnection of roof downspouts to vegetated areas**
e. **Project hydrology and depth to groundwater**
f. **Soils report and infiltration test results using one of the following standard test methods:**
    i. **ASTM D 3385-03; or**
    ii. **ASTM D 5093-02**
g. **LID practice sizing calculations**
h. **Project water balance as detailed in State Water Resources Control Board (SWRCB) Order 2009-0009-DWQ, Appendix 2 including landscape features and LID BMPs used as offset credits.**
i. **Project grading plans with LID practice design details**
j. **Operation and maintenance (O&M) plan for all proposed LID measures, including:**
    i. **O&M activities**
    ii. **O&M procedures**
    iii. **Maintenance schedule and O&M frequency**
    iv. **Handling and disposal of any wastes**
    v. **Inspection and recordkeeping requirements**

Sizing Criteria

Proposed LID practices shall be sized and designed in accordance with each of the Stormwater Management BMP specifications in this Design Guidelines and Standards Manual. Natural and passive design solutions such as the incorporation of LID practices are preferred. Structural treatment control BMPs should only be proposed as a last resort in the event that LID alternatives are determined to be infeasible in meeting water quality treatment objectives.

LID practices and post-construction BMPs shall be implemented to reduce pollutants in stormwater discharges that are reasonably foreseeable after all construction phases have been completed at the site. LID practices should be designed for volumetric or flow based treatment using one of the following sizing standards:

- **a. The post-development peak stormwater runoff discharge rates shall not exceed the estimated pre-development rate for developments where the increased peak stormwater discharge rate will result in increased potential for downstream erosion.**
- **b. Where post-construction treatment control BMPs are incorporated, at a minimum, either the volumetric or flow based treatment control design standard, or both, shall be used to mitigate (infiltrate, filter, or treat) stormwater runoff:**
  - **i. The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or**
  - **ii. The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the California Stormwater BMP Handbook – Industrial/ Commercial, (2003); or**
  - **iii. The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event; or**
  - **iv. The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the area; or**

v. **The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.**

Vegetated Swales and Filter Strips

Description

Vegetated swales can be an effective design strategy to treat and convey runoff from impervious surfaces. Swales can be integrated into landscaping to provide filtration, evaporation, infiltration and detention of stormwater. Swales are low in maintenance and act as linear biofilters along the perimeter of a property or internal landscaped areas. Runoff is directed to these linear landscaped spaces and travels slowly over vegetated surfaces, allowing pollutants to settle while reducing runoff velocities.

Pollutant Removal Effectiveness	
Bacteria	Low
Metals	Medium
Nutrients	Low
Oil and Grease	Medium
Organics	Medium
Sediment	Medium
Trash	Low

Filter strips are large planted or native vegetated areas strategically placed between a potential pollutant source and storm drain inlet. The term "buffer strip" is sometimes used interchangeably with filter strip. Vegetated filter strips are broad sloped, open vegetated areas that reduce pollutants of concern in shallow distributed sheet flow from contributing drainage areas.

Siting Considerations

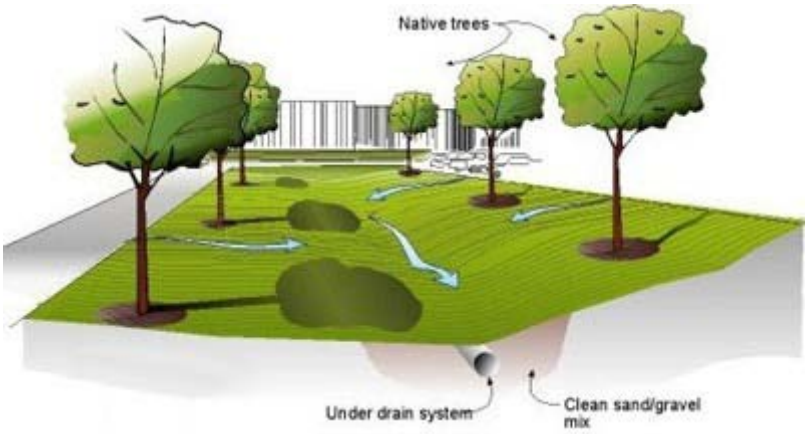
A. Vegetated Swales:

1. **Can be used to serve areas of less than 10 acres, with slopes no greater than 5%.**
2. **Steep terrain and/or large tributary areas may cause erosive flows.**
3. **Limited project site slope may cause ponding.**

B. Vegetated Filter Strips:

1. **Requires a significantly large open space with a 1 to 15% slope.**

2. **Requires shallow sheet flow that is evenly-distributed across the entire width of the filter strip. The maximum flow path from a contributory impervious surface should not exceed 150 feet.**
3. **Limited slope may cause ponding.**



Advantages and Limitations

A. Vegetated Swales:

1. **Advantages**
   a) **Life expectancy of at least 50 years.**
   b) **Can be used in all soil types, natural or amended.**
   c) **Blends in with the surrounding landscape and is aesthetically pleasing.**
   d) **Delays peak runoff by reducing flow velocities and improves water quality.**
2. **Limitations**
   a) **Suitable for grades between 1% and 5%; when slopes are greater than 2.5% the swale should be paired with weirs or check dams.**
   b) **"Turf" swales require irrigation and may not meet water conservation goals.**
   c) **Cannot treat very large drainage areas.**

B. Vegetated Filter Strips:

1. **Advantages**
   a) **Removes sediment, reduces runoff volumes, and delays peak flow by reducing runoff velocities.**
   b) **Provides water quality protection by reducing the amount of sediment, organic matter, nutrients, and pesticides in runoff.**
   c) **Provides erosion protection for sloped areas.**
   d) **Often constructed along roadways, drive aisles, parking lots, and waterways.**
2. **Limitations**
   a) **"Turf" swales require irrigation and may not meet water conservation goals.**
   b) **Cannot treat a very large drainage area and requires sufficient open space.**

c) **Effectiveness is dependent on soil characteristics, slope steepness, landscape shape, ratio of the filter area to the area generating the runoff, filter width, and thickness of vegetative cover.**

Potential LEED Credits

A. Primary

1. **Sustainable Sites – Credit 6 – "Stormwater Management" (1-2 Points)**

B. Other

1. **Sustainable Sites – Credit 7 – "Landscape and Exterior Design to Reduce Heat Islands" (1-2 Points)**
2. **Water Efficiency – Credit 1 – "Water Efficient Landscaping" (1-2 Points)**
3. **Innovation and Design Process (1-4 Points)**

Potential Offset Credit in Water Balance Calculator

A. Vegetative Swale Credit

1. **Swale must meet Treatment Control BMP 30 (TC-30 - Vegetated Swale) from the California Stormwater BMP Handbook, New Development and Redevelopment (available at www.cabmphandbooks.com.).**
2. **The maximum flow velocity for runoff from the design storm event should be less than or equal to 1.0 foot per second.**

Design Specifications

A. Sizing Criteria

1. **Vegetated Swales:**
   a) **Flow based sizing standards should be used to design vegetated swales.**
   b) **Should be designed so that the water level does not exceed 2/3^{rds} the height of grass or 4 inches, whichever is less, at the design treatment rate.**
   c) **If longitudinal slopes exceed 2.5%, use weirs or check dams to reduce flow velocities.**
   d) **The width of the swale should be determined using Manning's equation using a value of 0.25 for Manning's *n*.**
   e) **Side slopes should not be steeper than 3:1 (H:V).**
   f) **Pollutant removal effectiveness can be maximized by increasing the residence time of water in the swale using weirs or check dams.**
2. **Vegetated Filter Strips:**
   a) **Slopes should not exceed 15%.**
   b) **Minimum length in the direction of flow is 15 feet.**
   c) **Maximum length in the direction of flow towards the filter strip is 150 feet.**

B. Plants

1. **Select vegetation using the "Tree and Plant Selection" standards described in Volume III – Division 32 for Exterior Improvements.**
2. **Plant materials should be tolerant of drought conditions, ponding fluctuations, and saturated soils for a 48 hour period.**
3. **Selection of appropriate plant material should be dependent on several factors including:**
   a) **Micro-climatic conditions of planting area**
   b) **Soil type**
   c) **Plant's ability to aid in the removal of pollutants of concern**
   d) **Visual characteristics of plants (texture, color, and form)**
   e) **Maintenance requirements**
   f) **Non-invasive**

g) **Disease resistance**

Operations and Maintenance

A. General Requirements

1. **Mow and remove vegetated clippings and litter.**
2. **Remove accumulated sediment from the top of bank, swale bed, and/or behind check dams.**
3. **Inspect for pools of standing water.**
4. **Inspect swales bi-annually for erosion, damage to vegetation, sediment, and debris.**
5. **Fertilize and replace vegetation before the rainy season.**
6. **Regular inspections and maintenance is required during the establishment period.**

Flow-Through Planter Boxes and Tree Box Filters

Pollutant Removal Effectiveness	
Bacteria	High
Metals	High
Nutrients	High
Oil and Grease	High
Organics	High
Sediment	High
Trash	High

Description

Flow-through planter boxes are suitable for any location as they are placed over impervious surfaces. It is ideal for urban environments where space is limited. They incorporate both plants and underlying filter soils for the removal of pollutants. After filtration, runoff is collected in an underdrain system that is routed to an appropriate outlet structure.

Tree box filters are structurally landscaped reservoirs used to collect and filter runoff prior to discharging to a catch basin or storm drain. As runoff passes through the tree box filter, gross pollutants such as trash and debris are captured by the surface layer and other pollutants are filtered as water percolates through the planter soil to the collection underdrain. Both flow-through planter and tree box filters are aesthetically pleasing and improve water quality by reducing pollutants of concern.

Siting Considerations

1. **Both flow-through filter systems are suitable for just about any location, especially where space is limited.**
2. **When an underdrain system is used to connect to an outlet structure, the minimum slope of the perforated pipe to the outlet structure should be 0.5%.**
3. **The contributing drainage area shall be restricted to 4% of the planter box's surface area.**

Advantages and Limitations

A. Advantages:

1. **Requires little space resulting in wide applicability.**
2. **Aesthetically pleasing.**

3. **Provides stormwater treatment through filtration.**
4. **Disconnection of roof downspouts and directly connected impervious areas.**

B. Limitations:

1. **A relatively limited volume of stormwater can be mitigated.**
2. **May require pre-treatment to prevent clogging.**
3. **Contributing drainage areas should be less than 1 acre for small-scale, on-lot devices.**
4. **Recommended only where there is positive drainage towards the outlet structure.**

Potential LEED Credits

A. Primary

1. Sustainable Sites – Credit 6 – "Stormwater Management" (1-2 Points)

B. Other

1. Sustainable Sites – Credit 7 – "Landscape and Exterior Design to Reduce Heat Islands" (1-2 Points)
2. Water Efficiency – Credit 1 – "Water Efficient Landscaping" (1-2 Points)
3. Innovation and Design Process (1-4 Points)

Potential Offset Credit in Water Balance Calculator

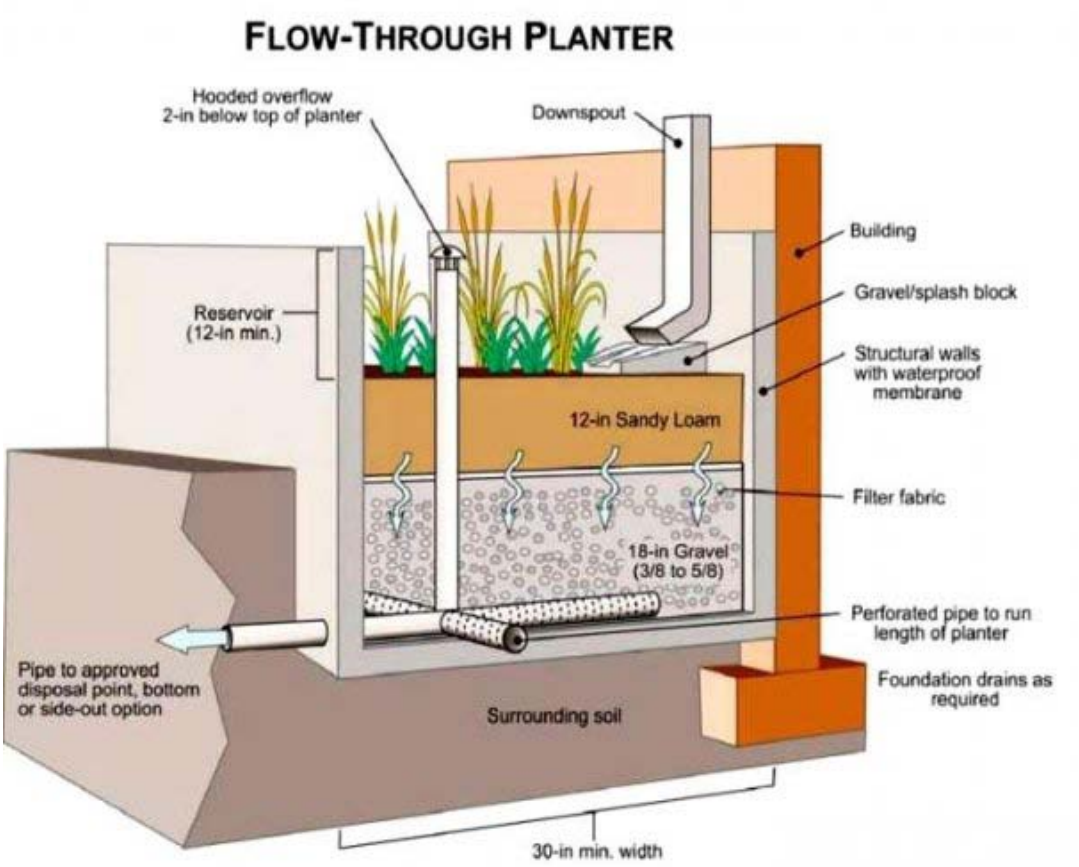
A. Rooftop Disconnect Credit

1. Offset credit of 100 percent of the total rooftop area draining to the planter area can be obtained provided:
   a) The rooftop area connected to each disconnected downspout is less than 600 square feet; and
   b) Raised beds or landscape areas are properly designed to contain the rooftop runoff from the design storm event.

Design Specifications

A. Sizing Criteria

1. Flow-through filters should drain completely within 48 hours for vector control.
2. Sizing preferences for flow-through planter boxes:
   a) 9-inch deep reservoir at the top of the planter;
   b) 3-inch layer of mulch;
   c) 18-inches of planter material; and
   d) 12-inches of clean gravel at the bottom of the planter with an underdrain system.
3. Flow-through planters and tree box filters should be designed for flow based treatment using one of the following sizing standards:
   a) The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the area; or
   b) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards.



B. Underdrains

1. Underdrains must meet the following criteria:
    a) Must be *slotted* polyvinyl chloride (PVC) pipes;
    b) Appropriately sized;
    c) Slots shall be longitudinally spaced such that the pipe has a minimum of one square-inch per lineal foot;
    d) Minimum slope of 0.5%;
    e) Geotextile fabric must be placed between the planting media and clean gravel; and
    f) Must drain freely to an acceptable discharge point.

C. Overflow

1. A 6-inch diameter vertical PVC overflow pipe connected to the underdrain pipe is required. The overflow pipe inlet should raise 6-inches above the mulch with a spider cap.

D. Plants

1. Select vegetation using the "Tree and Plant Selection" standards described in Volume III – Division 32 for Exterior Improvements.
2. Plant materials should be tolerant of drought conditions, ponding fluctuations, and saturated soils for a 48 hour period.

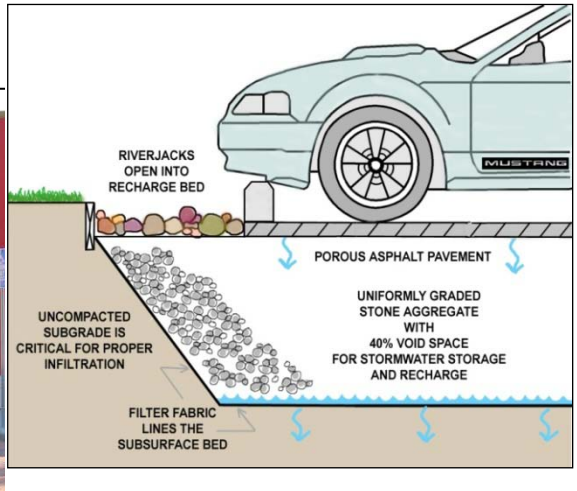
3. Appropriate placement and selection of tree and plant species is important to achieve desired benefits and reduce potential problems such as pavement damage by surface roots and poor growth performance.
4. Selection of appropriate plant material should be dependent on several factors including:
    a) Micro-climatic conditions of planting area
    b) Soil type
    c) Plant's ability to aid in the removal of pollutants of concern
    d) Visual characteristics of plants (texture, color, and form)
    e) Maintenance requirements
    f) Non-invasive
    g) Disease resistance
5. The extent and growth pattern of the root structure must be considered when trees are planted. Follow the standards provided in "Landscape Trees" of Volume III – Division 32 for Exterior Improvements.

Operations and Maintenance

A. General Requirements

1. Flow-through planters and tree box filters require annual plant, soil, and mulch layer maintenance to ensure optimum filtration, storage, and pollutant removal capabilities. In general, maintenance requirements are typical landscape care procedures and include:
    a) Watering: Drought tolerant plants should be selected and not require watering after establishment. Watering may be required during prolonged dry periods, even after plants are established.
    b) Erosion Control: An energy dissipater such as a splash block, rock, or rip-rap will be required to prevent erosion at the inlet point(s). Flow inlets, ponding, and surface overflow areas should be inspected periodically. Maintenance will consist of replacing soil, plant material, and/or mulch in areas where erosion has occurred.
    c) Plant Material: Occasional pruning and removal of dead plant material may be necessary. Replace all dead plants and if specific plants have a high mortality rate, assess the cause and, if necessary, replace with more appropriate species. Periodic weeding is necessary until plants are established.
    d) Nutrients and Pesticides: The soil mix and plants should be selected for optimum fertility, plant establishment, and growth to minimize the use of potential pollutant sources.
    e) Mulch: Replace mulch annually in planter boxes where heavy metal deposition is likely (e.g., contributing areas that include parking lots and roads).
    f) Soil: Soil mixes should be designed to maintain long-term fertility and pollutant processing capability.

Permeable Pavement and Pavers



Description

Permeable pavements and pavers can be used to infiltrate stormwater while simultaneously providing a stable load-bearing surface. While forming a surface suitable for walking and driving, permeable pavements and pavers also contain sufficient void space to infiltrate runoff into the underlying gravel layer and recharge the groundwater aquifer, if soil permeability permits. An optional filter layer with subdrains may be incorporated for installations on soils that do not support infiltration. Pervious pavements can dramatically reduce impervious surface coverage without sacrificing the intensity of the use.

Pollutant Removal Effectiveness	
Bacteria	Low
Metals	High
Nutrients	High
Oil and Grease	High
Organics	Low
Sediment	Low
Trash	High

There are four main categories of permeable pavements: poured in-place pervious concrete, permeable asphalt concrete, unit pavers, and granular materials. Each of these materials utilizes a gravel filled reservoir. The gravel provides a stable load-bearing surface as well as an underground reservoir for water storage and infiltration (if soil permeability permits).

Siting Considerations

1. Traffic loading and design speeds are important in determining which type of pervious pavement is applicable.
2. Compliance with the Americans with Disabilities Act.
3. The use of permeable pavement may be restricted in areas with high wind erosion.
4. Can only be applied to relatively flat sites.
5. Infiltration rate of native soil (if infiltration is proposed).

6. Runoff from unpaved areas should not be directed towards pervious pavement or pavers due to the potential for sediment to clog the system.
7. When an underdrain system is used to connect to an outlet structure, the minimum slope of the perforated pipe to the outlet structure should be 0.5%.

Advantages and Limitations

A. Advantages:

1. Provides significant reductions in surface runoff volume, peak discharge rate, temperature, and pollutant loading.
2. Can be designed with an underdrain in situations where infiltration is not feasible.
3. Reduces pavement ponding.

B. Limitations:

1. Only applicable for low traffic volume areas.
2. To maintain effectiveness, porous pavements require frequent maintenance.
3. Easily clogged by sediments if not situated properly.
4. Extended rain can reduce the pavement's load bearing capacity.
5. Should not be used in areas with high danger of pollutant spills.

Potential LEED Credits

A. Primary

1. Sustainable Sites – Credit 6 – "Stormwater Management" (1-2 Points)

B. Other

1. Innovation and Design Process (1-4 Points)

Potential Offset Credit in Water Balance Calculator

A. Porous Pavement Credit

1. Offset credit of 30 to 100 percent of the porous pavement area can be obtained depending on the type of paver and the depth of the gravel base.

Design Specifications

A. Sizing Criteria

1. Apply to flat sites or slopes less than 3%.
2. Permeable pavement and pavers using infiltration or an underdrain system should be designed for volume treatment or flow based control, respectively. BMPs should be designed using one of the following sizing standards:
    a) The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area, from the formula recommended in Urban Runoff

Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

b) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the California Stormwater BMP Handbook – Industrial/Commercial, (2003); or

c) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event; or

d) The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the area; or

e) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

3. Runoff from large rain events will overflow and bypass the BMP where it can be rerouted to another type of BMP or to the nearest stormwater conveyance system.
4. The cross section typically consists of multiple layers: pavement surface, top filter, reservoir, bottom filter, filter fabric, and underlying soil.
    a) Pavement Surface: Pavement surface material ranging from depths of 2 to 4 inches depending on required bearing strength and pavement surface design requirements.
    b) Top Filter: 0.5-inch diameter crushed stone to a depth of 1 to 2-inches.
    c) Reservoir: Use crushed stone of 1.5 to 3-inches in diameter. Depth of this layer depends on the desired storage volume but typically ranges from 2 to 4 feet. It should be designed to drain completely within 48 hours for vector control.
    d) Bottom Filter: 2-inch thick layer of 0.5-inch crushed stone.
    e) Filter Fabric: Line the entire trench area to inhibit soil from migrating into the reservoir layer and reducing storage capacity.
    f) Underlying Soil: Should have an infiltration capacity of at least 0.1 inch/hour but preferably greater than 0.5 inches/hour.

B. Underdrains

1. Underdrains must meet the following criteria:
    a) Must be *slotted* polyvinyl chloride (PVC) pipes;
    b) Appropriately sized;
    c) Slots shall be longitudinally spaced such that the pipe has a minimum of one square-inch per lineal foot;
    d) Minimum slope of 0.5%;
    e) Geotextile fabric must be placed between the gravel layer and underlying soil; and
    f) Must drain freely to an acceptable discharge point.

C. Overflow

1. When using an underdrain system, an adequately sized vertical PVC overflow pipe is required.

Operations and Maintenance

A. General Requirements

1. Recommended operation and maintenance procedures for permeable pavement and pavers include:
    a) Regular sweeping to keep the permeable pavement/pavers clean and free of leaves, debris, and sediment.
    b) Overflow devices shall be inspected for obstructions or debris, which shall be removed upon discovery. Overflow or emergency spillways shall be capable of transporting high flows to an approved stormwater conveyance system.
    c) Vegetation and large shrubs/trees that limit access or interfere with porous pavement operation shall be pruned.
    d) Poisonous, nuisance, dead, or odor producing vegetation should be removed using safety precautions such as gloves, protective clothing, and/or closed-toe shoes.
    e) Access to the pervious pavement shall be safe and efficient.
    f) Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.
    g) Standing water creating an environment for the development of insect larvae shall be eliminated.
    h) Holes in the ground located in and around the pervious pavement shall be filled and compacted.

Bioretention Systems

Description

Bioretention systems retains runoff in a vegetated depression and goes through a variety of physical, biological, and chemical treatment processes while undergoing infiltration, evaporation, and transpiration. Runoff may enter through inlets, curb cuts, or roof downspouts and the entering velocity must be non-erosive, typically resulting in the use of energy dissipaters. Runoff is gradually filtered through plants and an engineered soil mix to promote the adsorption of pollutants. The surface mulch layer serves as the first line of treatment and will stop and trap larger sediments and gross pollutants.

Pollutant Removal Effectiveness	
Bacteria	High
Metals	High
Nutrients	Medium
Oil and Grease	High
Organics	High
Sediment	High
Trash	High

For areas with less permeable native soils, a perforated underdrain system can be used to maximize infiltration rates and redirect the filtered stormwater runoff into the local storm drain system.

Siting Considerations

1. An underdrain is required in soils with low permeability.
2. When an underdrain system is used to connect to an outlet structure, the minimum slope of the perforated pipe to the outlet structure should be 0.5%.
3. Shallow groundwater table may not permit complete drawdown between storms.

Potential LEED Credits

A. Primary

1. Sustainable Sites – Credit 6 – "Stormwater Management" (1-2 Points)

B. Other

1. Sustainable Sites – Credit 7 – "Landscape and Exterior Design to Reduce Heat Islands" (1-2 Points)
2. Water Efficiency – Credit 1 – "Water Efficient Landscaping" (1-2 Points)
3. Innovation and Design Process (1-4 Points)

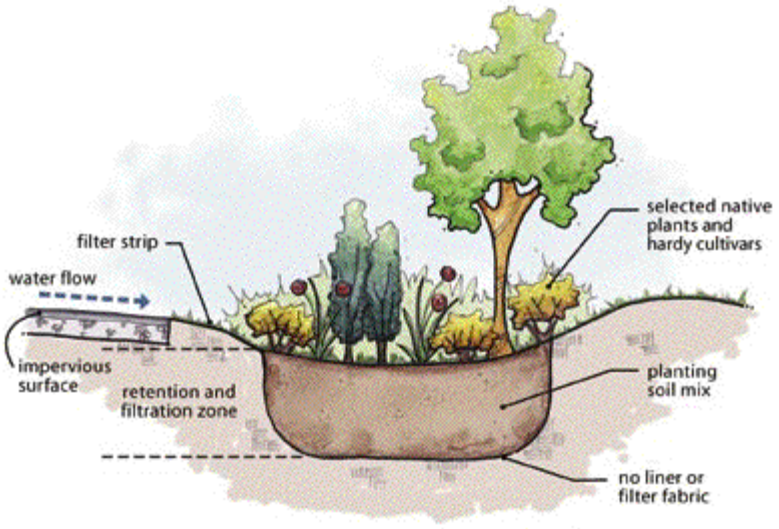
Advantages and Limitations

A. Advantages:

1. Effective in removing sediments and pollutants of concern.
2. Provides shade, windbreaks, and enhanced aesthetics.
3. Delays peak flow by providing retention capacity and reducing runoff velocities.

B. Limitations:

1. Not appropriate for locations where spills may occur or where the groundwater table is within 10 feet of the bioretention system's invert.
2. Not recommended where tree removal would be required or for areas with slopes greater than 20%.
3. May pose a vector control problem if not properly maintained.



Design Specifications

A. Geotechnical and Landscape Considerations

1. Bioretention systems located within 50 feet of a steep slope shall utilize an underdrain system. A geotechnical report must be provided to address the potential effects of infiltration on the steep slope if a bioretention system without an underdrain is sited within 200 feet of the slope or hazardous landslide area.
2. An underdrain should be provided when using native soils with permeability less than 0.5 inches/hour (measured using the ASTM Double-Ring Infiltrometer test method).
3. If sheet flow is conveyed to the treatment area over stabilized grassed areas, the site must be graded in such a way that minimizes erosive conditions. Sheet flow velocities shall not exceed 1 foot per second.

B. Pretreatment

1. Bioretention systems are encouraged to use a filter strip to pretreat and spread incoming flows from roadways. Bioretention systems that treat runoff from sidewalks or other "cleaner" surfaces do not require pretreatment.

C. Sizing Criteria

Runoff entering the bioretention system must completely drain the ponding area and planting soil within 48 hours. Bioretention provides storage aboveground, in the planting soil void spaces, and in the gravel drainage layer (if applicable). Bioretention systems are to be sized, with or without underdrains, such that the surface volume will fill the available ponding depth (may not be greater than 6 inches), the void spaces in the planting soil, and the gravel drainage layer (if applicable).

1. Bioretention systems using infiltration or an underdrain system should be designed for volume treatment or flow based control, respectively. BMPs should be designed using one of the following sizing standards:
    a) The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or
    b) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the California Stormwater BMP Handbook – Industrial/Commercial, (2003); or
    c) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event; or
    d) The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the area; or
    e) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.
2. Determine the base of the bioretention system by factoring in the side slopes, design percolation rate, design volume, and required drawdown time.
3. The base of the drainage layer should have no slope (level).

D. Underdrains

1. Underdrains must meet the following criteria:
    a) Minimum of 6-inches in diameter;
    b) Must be *slotted* polyvinyl chloride (PVC) pipes;
    c) Slots shall be longitudinally spaced such that the pipe has a minimum of one square-inch per lineal foot;
    d) Minimum slope of 0.5%;
    e) Geotextile fabric must be placed between the planting media and gravel layer;
    f) Elevated from the bottom of the bioretention system by 6-inches within the gravel layer; and
    g) Must drain freely to an acceptable discharge point.

E. Overflow

1. When using an underdrain system, an adequately sized vertical PVC overflow pipe is required and the inlet should rise 6 inches above the planting media with a spider cap.

F. Plants

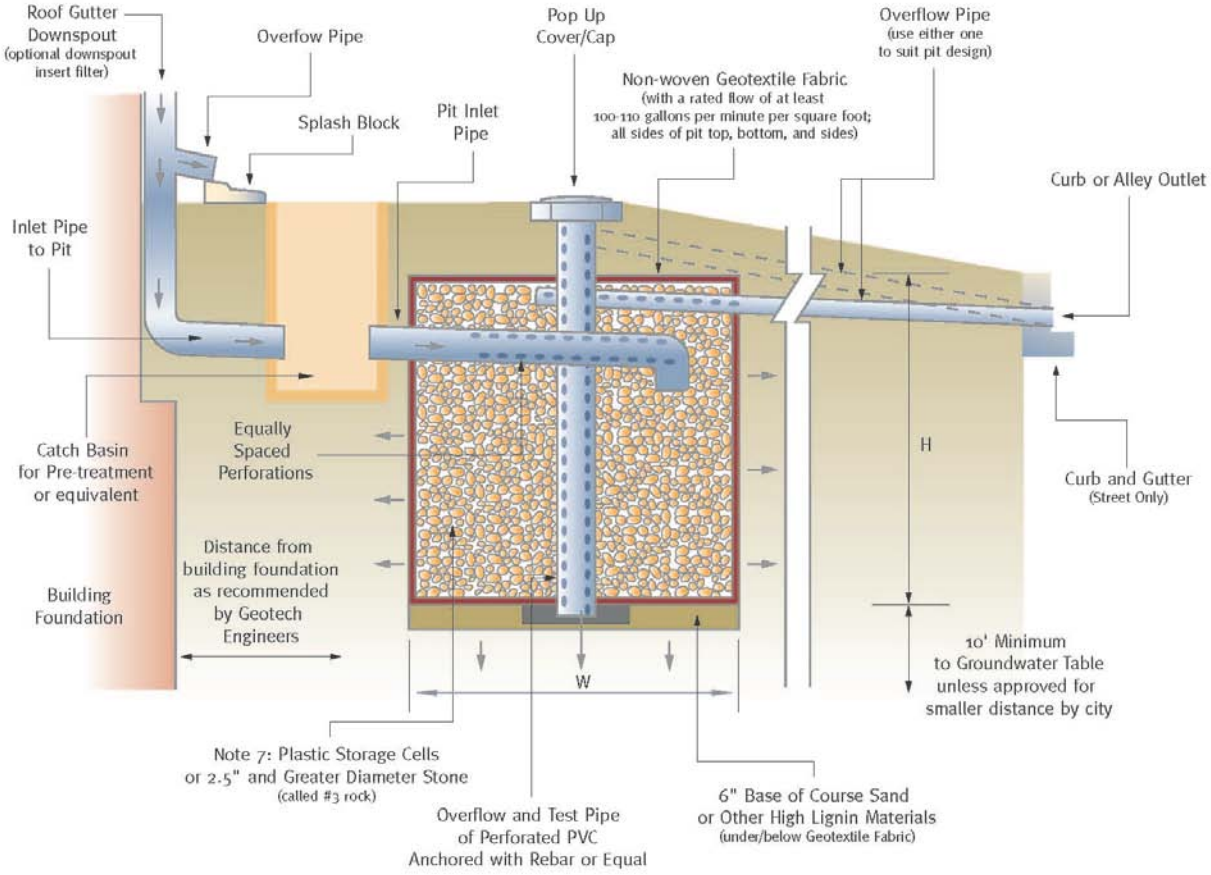
1. Select vegetation using the "Tree and Plant Selection" standards described in Volume III – Division 32 for Exterior Improvements.
2. Plant materials should be tolerant of drought conditions, ponding fluctuations, and saturated soils for a 48 hour period; and
3. Selection of appropriate plant material should be dependent on several factors including:
    a) Micro-climatic conditions of planting area
    b) Soil type
    c) Plants ability to aid in the removal of contaminants
    d) Visual characteristics of plants (texture, color, and form)
    e) Maintenance requirements
    f) Non-invasive
    g) Disease resistance

Operations and Maintenance

A. General Requirements

1. Bioretention systems require annual plant, soil, and mulch layer maintenance to ensure optimum infiltration, storage, and pollutant removal capabilities. In general, bioretention maintenance requirements are typical landscape care procedures and include:
    a) Watering: Drought tolerant plants should be selected and not require watering after establishment (2 to 3 years). Watering may be required during prolonged dry periods after plants are established.
    b) Erosion Control: Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred.
    c) Plant Material: Occasional pruning and removing of dead plant material may be necessary. Replace all dead plants and if specific plants have a high mortality rate, assess the cause and, if necessary, replace with more appropriate species. Periodic weeding is necessary until plants are established.
    d) Nutrients and Pesticides: The soil mix and plants should be selected for optimum fertility, plant establishment, and growth.
    e) Mulch: Replace mulch annually in bioretention systems where heavy metal deposition is likely (e.g., contributing areas that include parking lots and roads).
    f) Soil: Soil mixes for bioretention systems should be designed to maintain long-term fertility and pollutant processing capability.

Dry Wells with Pretreatment



Description

Pollutant Removal Effectiveness	
Bacteria	High
Metals	High
Nutrients	High
Oil and Grease	High
Organics	High
Sediment	High
Trash	High

Dry wells share operational similarities with sumps, french drains, drain fields, and shallow injection wells. They are simple underground systems that typically hold rooftop runoff (or other small impervious areas) in their void space for gradual percolation. Runoff will enter the system through a surface inlet where it will be redirected to the dry well. Pretreatment techniques are recommended to prevent clogging and guarantee long-term reliability of the infiltration rate.

When designed properly, a dry well can serve small impervious areas such as rooftops. They help to disconnect impervious areas and reduce the amount of runoff entering the storm drain system. Dry wells are typically shallow disposal systems designed to infiltrate stormwater runoff below the ground surface.

Siting Considerations

1. Used to capture runoff from rooftops or other small impervious areas.
2. Installation must have a minimum clearance of 10 feet from the invert of the dry well and seasonal high groundwater table, and any building foundation to prevent seepage.
3. Cannot be installed in areas where hazardous materials are expected to be present in greater than "reportable quantities" as defined by the U.S. Environmental Protection Agency (USEPA) in 40 CFR 302.4.

Potential LEED Credits

A. Primary

1. Sustainable Sites – Credit 6 – "Stormwater Management" (1-2 Points)

B. Other

1. Innovation and Design Process (1-4 Points)

Advantages and Limitations

A. Advantages:

1. Requires minimal space to install.
2. Low installation costs.
3. Runoff reduction.
4. Provides groundwater recharge.
5. Can serve small impervious areas.
6. Disconnects directly connected impervious areas.

7. Enhances water quality without affecting aesthetics.

B. Limitations:

1. Requires pretreatment to prevent clogging.
2. Risk of groundwater contamination.
3. Requires permitting through the U.S. Environmental Protection Agency, if classified as a Class V injection well.
4. Services limited drainage areas.
5. Not recommended in areas next to slopes that are greater than 40%.
6. Minimum clearance of 10 feet from the invert of the dry well and seasonal high groundwater table, and any building foundation.

Design Specifications

A. Sizing Criteria

1. Dry wells that are deeper than their widest surface dimension are classified as Class V Inject Wells and regulated by the USEPA (40 CFR 146.5(e)(4)). These wells must comply with the requirements of the Federal Underground Injection Control Program.
2. Must be sized for volumetric treatment control using one of the following sizing standards:
    a) The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or
    b) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the California Stormwater BMP Handbook – Industrial/Commercial, (2003); or
    c) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.

B. Soils Considerations

1. Minimum permeability of 0.5 inches/hour and measured using the ASTM Double-Ring Infiltrometer test method.

C. Overflow

1. Must be able to safely convey system overflows to downstream drainage systems. The downstream drainage system must have sufficient capacity to convey the overflow from the dry well.

D. Pretreatment

1. Pretreatment is strongly encouraged to extend the functional life of a dry well.

E. Observation Pipe

1. Provide perforated observations pipe (such as 6" diameter PVC) to serve as a test well to allow for inspection and maintenance.

Operations and Maintenance

A. General Requirements

1. Should be inspected quarterly as well as after every storm event exceeding 0.5-inches of rainfall. The water level in the test well should be the primary means of measuring infiltration rates and drain times.
2. Disposal of debris, trash, sediment, and other waste material from the pretreatment area should be performed at regular intervals or as needed.

B. Maintenance Standards

The following is a summary of routine maintenance activities recommend for a dry well.

Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed	Frequency
Inlet/Outlet Sediment Accumulation	Minor sediment accumulation that affects flow through the dry well.	Sediment cleaned out.	Annually prior to wet season.
Inlet/Overflow	Inlet-outlet areas clogged with sediment and/or debris.	Material removed so that there is no clogging or blockage of the inlet or overflow area.	After major storm events (>0.5 inches/24 hours).

Soil Amendments

Description

Soils in the arid climate of San Diego tend to lack organic matter and nutrients, and often have a high silt and/or clay content. Soils high in clay content have slow infiltration rates, resulting in high runoff potential. The infiltration and water storage capacity of such areas can be amended by improving the organic content of the soil. This is achieved by amending the native soil with organic materials or by importing topsoil.

Siting Considerations

1. In areas where soils have high clay content.

Potential LEED Credits

A. Primary

1. Not available.

B. Other

1. Innovation & Design Process (1-4 Points)

Potential Offset Credit in Water Balance Calculator

B. Soil Quality Credit

1. Offset credit can be obtained if the soils used for landscaping meet the ideal bulk densities listed in Table 1 of the Water Balance Calculator in the Soil Quality Tab (Appendix 2 of the Construction General Permit (Order No. 2009-0009-DWQ).

Advantages and Limitations

A. Advantages:

1. Serves to reduce stormwater runoff volumes.
2. Improves water quality through filtration.
3. Improves plant growth and overall aesthetics.
4. Reduces or eliminates the need for fertilizing.
5. Reduces net erosion.
6. Results in reduced total maintenance costs for landscaping.

B. Limitations:

1. Not applicable for steep slopes due to the increase in soil moisture which cause soil instability.
2. In order to be effective, slopes must be less than 33%.

Design Specifications

A. General Considerations

1. An experienced professional should be consulted.
2. The most cost-effective strategy is to save and reuse native topsoil, and to protect areas of native vegetation wherever possible.
3. Soils should be analyzed by a laboratory to determine the specific soil amendments needed.
4. To optimize water holding capacity and plant health, organic material including leaf compost, peat moss, or composted manure should be included in the soil amendments.
5. Incorporate amendments during conclusion of site development.
6. Care must be taken around existing trees and shrubs to prevent root damage during construction and soil amendment application.

Operations and Maintenance

A. General Requirements

1. For areas that incorporate turf, annual soil aeration should be conducted.
2. Organic topdressing mulch may need to be supplemented at certain intervals.

Infiltration Trenches and Basins

Description

Pollutant Removal Effectiveness	
Bacteria	High
Metals	High
Nutrients	High
Oil and Grease	High
Organics	High
Sediment	High
Trash	High

Infiltration facilities are similar to stormwater detention systems but are constructed with a highly permeable base that is specifically designed to infiltrate runoff. It is usually not practical to infiltrate runoff at the same rate that it is generated; therefore, these facilities generally include both a storage component and a drainage component.

Infiltration trenches are long, narrow, rock-filled trenches that receive stormwater runoff from small drainage areas. Infiltration trenches temporarily hold stormwater runoff within a sub-surface trench prior to infiltration into the surrounding soils.

Infiltration basins are usually shallow with flat, vegetated bottoms and side slopes. Infiltration basins are sited in either natural or excavated open areas and designed to temporarily hold stormwater runoff prior to infiltration through the basin floor.

Both are similar in function except that an infiltration trench's stored volume is held below ground, while an infiltration basin is held aboveground.

Siting Considerations

A. Infiltration Trenches

1. Groundwater separation should be at least 10 feet from the trench's invert to the seasonal high groundwater table and a minimum of 100 feet away from groundwater wells. Exceptions to the 10 foot separation can be made if the infiltration trench is designed by a licensed

professional, installed with an under drain, and with written approval of the Regional Water Quality Control Board and County of San Diego Department of Environmental Health.
2. Placement should be a minimum of 10 feet away from buildings, slopes, and highway pavement, and a minimum 100 feet from bridge structures.
3. Base flow should not be present in the tributary watershed.

B. Infiltration Basins

1. Soil should not have more than 30% clay or 40% of clay and silt combined for acceptable infiltration rates.
2. Groundwater separation should be at least 10 feet from the basin's invert to the seasonal high groundwater table and a minimum of 100 feet away from groundwater wells.
3. Placement should be a minimum of 10 feet away from buildings, slopes, and highway pavement, and a minimum 100 feet from bridge structures.
4. Sites constructed of fill, having a base flow, or with a slope greater than 15% should not be considered.
5. Base flow should not be present in the tributary watershed.
6. Ensure that adequate head is available to operate flow-splitter structures (to allow the basin to be offline) without ponding in the splitter structure or creating backwater upstream of the splitter.

Potential LEED Credits

A. Primary

1. Sustainable Sites – Credit 6 – "Stormwater Management" (1-2 Points)

B. Other

1. Innovation and Design Process (1-4 Points)

Advantages and Limitations

A. Infiltration Trenches

1. Advantages
    a) Controls runoff and discharges to surface waters.
    b) Excellent pollutant removal capabilities.
    c) Provides erosion and flood control for less than a 2-year storm event.
    d) Provides groundwater recharge.
    e) Replicates pre-development hydrology.
2. Limitations
    1. Not appropriate for sites with Hydrologic Soil Types C and D.
    2. Risk of groundwater contamination in very coarse soils.
    3. Requires complete stabilization of upstream drainage areas prior to construction.
    4. High failure rates due to clogging and high maintenance burden. Once clogged it is very difficult to restore the designed function.
    5. Pretreatment required.

6. Not recommended to treat industrial sites or sites where hazardous spills may occur.
7. Not suitable for fill areas or steep slopes.
8. Minimum clearance of 10 feet from the invert of the trench to the seasonal high groundwater table, and any building foundation.

B. Infiltration Basins

1. Advantages
   a) Controls runoff and discharges to surface waters.
   b) Excellent pollutant removal capabilities.
   c) Provides erosion and flood control for less than a 2-year storm event.
   d) Provides groundwater recharge.
   e) Provides habitat value.
   f) Replicates pre-development hydrology.

2. Limitations
   a) Dependent upon soil and subsurface conditions (minimum infiltration rate of 0.5 inches/hour).
   b) Not appropriate for sites with Hydrologic Soil Types C and D.
   c) Risk of groundwater contamination in very coarse soils.
   d) Requires complete stabilization of upstream drainage areas prior to construction.
   e) Sediment forebay required.
   f) Not recommended to treat industrial sites or sites where hazardous spills may occur.
   g) Not suitable for fill areas or steep slopes.
   h) Minimum clearance of 10 feet from the invert of the basin to the seasonal high groundwater table, and any building foundation.

Design Specifications

A. Geotechnical Considerations

1. Infiltration Trenches
   a) Suitable for Hydrologic Soil Types A and B.
   b) Minimum permeability of 0.5 inches/hour measured using the ASTM Double Ring Infiltrometer Test method if installed without an underdrain.
2. Infiltration Basins
   a) Suitable for Hydrologic Soil Types A and B. Determine soil type from mapping and consult USDA soil survey tables to review other parameters such as the amount of silt and clay, presence of a restrictive layer or seasonal high water table, and estimated permeability. The soil should not have more than 30% clay or 40% of clay and silt combined. Eliminate sites that are clearly unsuitable for infiltration.

B. Pretreatment

1. Infiltration Trenches

a) Provide pretreatment in order to reduce the sediment load. Pretreatment refers to design features that provide settling of large particles before runoff reaches a management practice, easing the long-term maintenance burden. To ensure that pretreatment mechanisms are effective, designers should incorporate practices such as grassed swales, vegetated filter strips, detention, or a series of plunge pools.

2. Infiltration Basins
   a) Provide a pretreatment sediment forebay to reduce sediment load. Settling of large particles before runoff reaches a management practice will ease the long-term maintenance burden.

C. Sizing Criteria

1. Infiltration Trenches
   a) Provide pretreatment if sediment loading is a maintenance concern for the trench.
   b) Reduce the opportunity for standing water and associated vector problems. The infiltration trench should be sized to drain all accumulated water within 72 hours.
   c) The use of vertical piping, either distribution or infiltration enhancement, is not allowed to avoid classification as a Class V injection well per 40 CFR 146.5(e)(4).
   d) Infiltration trenches should be designed for volume treatment control using one of the following sizing standards:
      i. The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or
      ii. The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the California Stormwater BMP Handbook – Industrial/Commercial, (2003); or
      iii. The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.

2. Infiltration Basins
   a) Provide pretreatment if sediment loading is a maintenance concern for the basin.
   b) Include energy dissipation at the inlets.
   c) Reduce the opportunity for standing water and associated vector problems. . The infiltration basin should be sized to drain all accumulated water within 72 hours.
   d) The basin's invert should be determined by using the water quality volume over the hydraulic conductivity and drawdown time.
   e) Infiltration basins should be designed for volume treatment control using one of the following sizing standards.
      i. The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area, from the formula recommended in Urban

Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

ii. The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the California Stormwater BMP Handbook – Industrial/Commercial, (2003); or

iii. The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.

D. Plants

1. Infiltration Trenches
   a) Not applicable.
2. Infiltration Basins
   a) Select vegetation using the "Tree and Plant Selection" standards described in Volume III – Division 32 for Exterior Improvements;
   b) Plant materials should be tolerant of drought conditions, ponding fluctuations, and saturated soils for a 48 hour period; and
   c) Selection of appropriate plant material should be dependent on several factors including:
      i. Micro-climatic conditions of planting area
      ii. Soil type
      iii. Plants ability to aid in the removal of contaminants
      iv. Visual characteristics of plants (texture, color, and form)
      v. Maintenance requirements
      vi. Non-invasive
      vii. Disease resistance

E. Observation Pipe

1. Provide perforated observations pipe (such as 6" diameter PVC) to serve as a test well to allow for inspection of the subsurface conditions.

Operations and Maintenance

A. General Requirements

1. Recommended operation and maintenance guidelines for infiltration facilities include:
   a) Inspection and maintenance to ensure that water infiltrates within 48 hours to prevent the creation of vector habitats.
   b) Observe drain time for the design storm after completion or modification of the facility to confirm that the desired drain time has been obtained.

c) Schedule semiannual inspections for the beginning and end of the wet season to identify potential problems.
d) Remove accumulated trash and debris at the start and end of the wet season.
e) If erosion occurs, revegetate immediately and stabilize with erosion control materials such as mulch or a mat until vegetation cover is established.

Rain Barrels and Cisterns

Description

Pollutant Removal Effectiveness	
Bacteria	High
Metals	High
Nutrients	High
Oil and Grease	High
Organics	High
Sediment	High
Trash	High

Rain barrels and cisterns are containers, which capture stormwater runoff as it comes down through the roof gutter system. Rain barrels are placed outside of a building at roof downspouts to store rooftop runoff for later reuse in lawn and garden watering. Cisterns also collect runoff from impervious surfaces such as rooftops, parking lots, and walkways, but store the water in significantly larger volumes in manufactured tanks or underground storage units. Rain barrels and cisterns can be implemented without the use of pumping devices, instead relying on gravity flow. The collection of this stormwater reduces the amount of stormwater runoff and assists in the reduction of potential pollutants entering the stormwater conveyance system.

The first flush of runoff is known to wash off and carry a significant portion of pollutants to the storm drain system. By using rain barrels and cisterns, a quantifiable amount of stormwater runoff from impervious surfaces such as rooftops, parking structures, and walkways can be captured and stored onsite to reduce the runoff volume and peak runoff flow rates. For smaller storm events, this captured runoff will reduce pollutant loads to the receiving water by preventing constituents from ever leaving the respective property.

Siting Considerations

1. Should be located for easy maintenance.

Potential LEED Credits

A. Primary

1. Sustainable Sites – Credit 6 – "Stormwater Management" (1-2 Points)

B. Other

1. Water Efficiency – Credit 1 – "Water Efficient Landscaping" (1-2 Points)
2. Innovation and Design Process (1-4 Points)

Potential Offset Credit in Water Balance Calculator

A. Rain Barrel/Cistern Credit

1. Offset credit of 90 percent of the total volume of rain barrels and cisterns can be obtained.

Advantages and Limitations

A. Advantages:

1. Low installation cost.
2. Requires little space for installation.
3. Reduces the amount of stormwater runoff.
4. Conserves water usage.
5. Capable of capturing the first flush.
6. Reduction in the discharge of pollutants due to reduction of overall offsite flow volume.

B. Limitations:

1. Limited amount of stormwater runoff can be captured due to San Diego's arid climate.

Design Specifications

A. Sizing Criteria

1. The required capacity of a cistern and rain barrel is a function of the impervious surface area that drains to it, the inches of rainfall required to fill the vessel, and water losses due to evaporation. Rain barrels and cisterns should be designed to prevent mosquito access.

Operations and Maintenance

A. General Requirements

1. Maintenance requirements are minimal and consist of regular unit inspection and any of its constituent parts and accessories. All components should be inspected at least twice a year and repaired or replaced as needed.
2. During the wet season, rain barrels and cisterns should be inspected periodically for mosquitoes.

Dry and Wet Ponds

Description

Pollutant Removal Effectiveness	
Bacteria	Medium
Metals	Medium
Nutrients	Low
Oil and Grease	Medium
Organics	Medium
Sediment	Medium
Trash	High

Dry ponds are basins whose outlets have been designed to detain the design volume for up to 48 hours to allow sediment particles and associated pollutants to settle and be removed. Dry ponds do not have a permanent pool and are designed to drain completely between storm events.

Wet ponds are constructed, naturalistic ponds with a permanent or seasonal pool of water (also called a wet pool). They are among the most widely used stormwater practices and there are several different versions of the wet pond design.

Siting Considerations

A. Dry Ponds

1. Typically 0.5% to 2.0% of the total contributing drainage area required.
2. Minimum clearance of 10 feet from the invert of the dry pond to the seasonal high groundwater table, and any building foundation.
3. Dry ponds placed on slopes greater than 15% or within 200 feet from a hazardous slope or landslide area will require a geotechnical investigation.
4. Appropriate for new or redevelopment project sites of 10 acres or larger.

B. Wet Ponds

1. Typically sized for 2% to 3% of the total contributing drainage area.
2. Requires regular source of dry-weather flows if water level is to be maintained.
3. Not permitted near steep slopes or hazardous areas.

Potential LEED Credits

A. Primary

1. Sustainable Sites – Credit 6 – "Stormwater Management" (1-2 Points)

B. Other (for wet ponds only)

1. Innovation and Design Process (1-4 Points)

Advantages and Limitations

A. Advantages:

1. If properly designed, ponds can have a lifetime of 50 years.
2. Inexpensive and easy to construct and operate due to its simplicity.
3. Provides significant removal of sediments and associated toxics.
4. Provides erosion and flood control.
5. Wet ponds can increase property values.

B. Limitations:

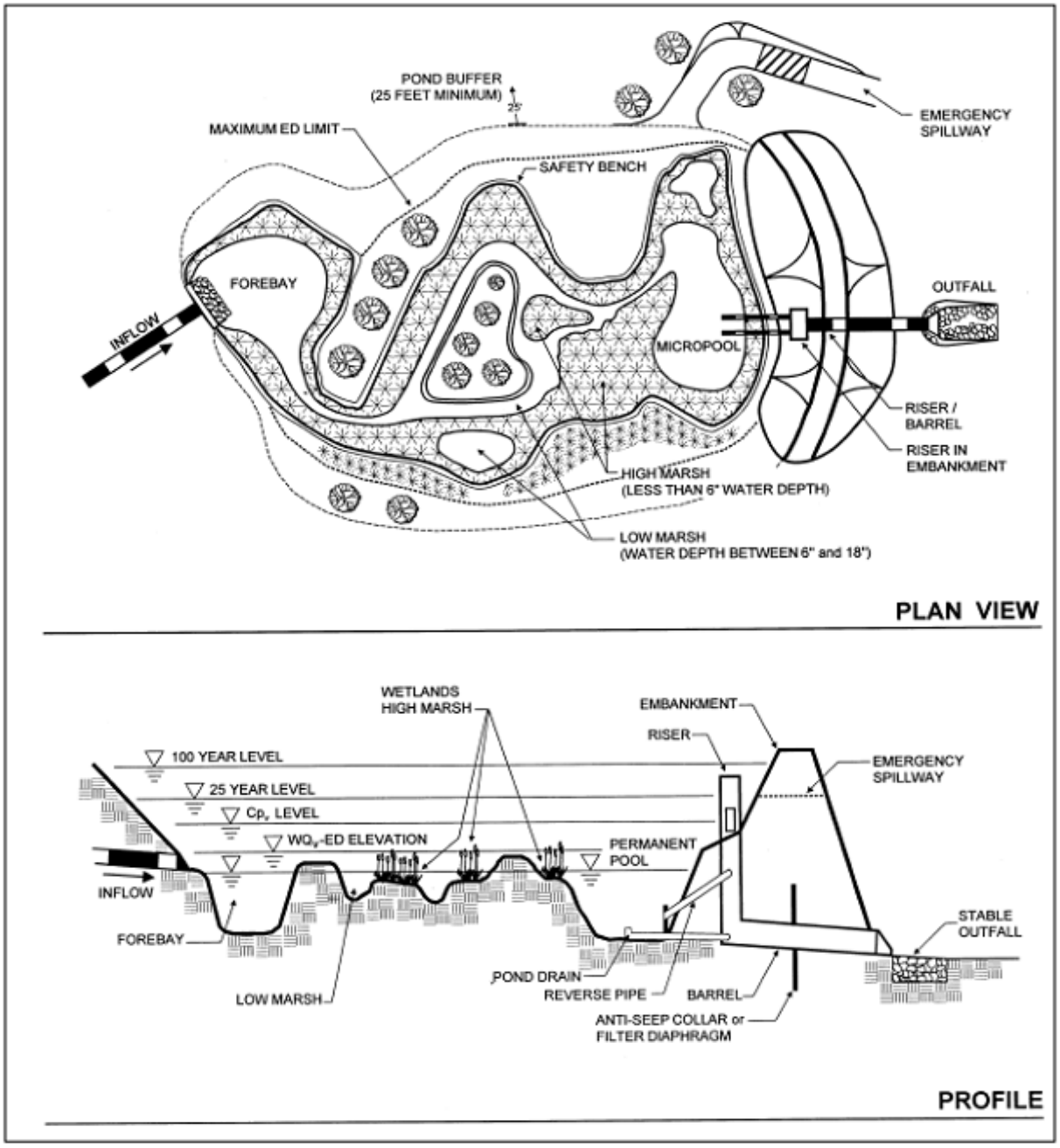
1. Limited to moderate pollutant removal.
2. Ponded water may cause vector problems.
3. Dry ponds decrease property values.
4. Public safety concerns.
5. Depending on volume and depth, pond designs may require approval from the California Division of Safety of Dams.

Design Specifications

A. Sizing Criteria

1. Ponds should be designed for volumetric treatment control using one of the following sizing standards:
    a) The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or
    b) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the California Stormwater BMP Handbook – Industrial/Commercial, (2003); or
    c) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.
2. The total basin volume must include an additional 5% for total suspended solids (TSS) accumulation. Freeboard is in addition to the total basin volume.
3. The length-to-width ratio at half basin depth shall be a minimum of 1.5:1 (H:V).

4. The cross-sectional geometry across the width of the basin should be approximately trapezoidal with a maximum side slope of 3:1 (H:V).
5. A low flow channel shall be provided. A low flow channel is a narrow, shallow trench filled with pea gravel (or equivalent) that runs the length of the basin to drain dry-weather flows. The low flow channel shall tie into the outlet structure.
6. A basin should be large enough, or provide a ramp, to allow for equipment access.
7. A wet pond's water depth may not exceed 8 feet.
8. Include energy dissipation in the inlet design and a sediment forebay to reduce resuspension of accumulated sediment and facilitate maintenance.



B. Soil Considerations

1. Ponds can be used with almost all soils and geology, with minor design adjustments for rapidly percolating soils. If rapidly percolating soils are present, the pond should be designed by a licensed engineer to include lower permeability soils in the subgrade to prevent rapid, untreated infiltration.
2. Slopes of the pond shall be analyzed for slope stability.

C. Energy Dissipation

1. Dissipation devices should be constructed of sound materials such as stones or concrete.
2. Must also be used at the outlet from the pond unless the basin discharges to a storm drain or hardened channel.

D. Forebay

1. As untreated stormwater enters the pond, it passes through a forebay for coarse solids removal. The forebay may be constructed using an internal berm made out of earthen embankment material, grouted riprap, or other structurally sound material.
    a) The pond shall be sized so that 25% of the total volume is in the forebay.
    b) A gravity drain outlet from the forebay must extend the entire width of the internal berm.
    c) The forebay outlet shall be offset from the inflow flow line to prevent short-circuiting.
    d) Permanent steel post depth markers shall be placed in the forebay to define settled sediment removal limits at 50% and 100% of the forebay sediment storage depth.

E. Plants

1. Select vegetation using the "Tree and Plant Selection" standards described in Volume III – Division 32 for Exterior Improvements.
2. Plant materials should be tolerant of drought conditions, ponding fluctuations, and saturated soils for a 48 hour period; and
3. Selection of appropriate plant material should be dependent on several factors including:
    a) Micro-climatic conditions of planting area
    b) Soil type
    c) Plants ability to aid in the removal of contaminants
    d) Visual characteristics of plants (texture, color, and form)
    e) Maintenance requirements
    f) Non-invasive
    g) Disease resistance

Operations and Maintenance

A. General Maintenance

1. Maintenance is critical for ponds to continue to function as originally designed. A specific maintenance plan shall be formulated for each facility outlining the schedule and scope of maintenance operations, as well as documentation and reporting requirements. The following are general maintenance requirements:
    a) Ponds should be inspected annually and after major storm events.
    b) Maintain site vegetation and replace dead vegetation immediately.
    c) Accumulation of sediment exceeding 50% of the sediment storage capacity in the forebay, as indicated on the permanent steel post depth markers, should be removed.
    d) Following sediment removal activities, replanting and/or reseeding of vegetation may be required for reestablishment.

e) Inspect frequently for mosquito breeding.

Green Roofs

Description

Pollutant Removal Effectiveness	
Bacteria	High
Metals	High
Nutrients	Medium
Oil and Grease	High
Organics	High
Sediment	High
Trash	High

Green roofs are vegetated roof systems that capture and retain rainfall. There are two types of green roofs: extensive and intensive systems. Intensive systems have large depths and cover much of the roof while extensive systems feature minimal planting mediums and require little maintenance. Green roofs not only enhance water quality and reduce the amount of runoff entering the storm drain system, but they are visually appealing and can be used as a recreational/park space on building tops. Depending on the design and plant selection, intensive systems may require heavy maintenance during the dry season.

Siting Considerations

1. Can be installed during initial construction or as part of a retrofit and on slopes up to 40 degrees.
2. Roof must be able to support extra loading from a saturated roof and planting materials.
3. A living non-irrigated vegetated roof is possible to maintain, however irrigation may be required during Xeriscape plant establishment.

Potential LEED Credits

A. Primary

1. Sustainable Sites – Credit 6 – “Stormwater Management” (1 Point)

B. Other

1. Sustainable Sites – Credit 7 – "Landscape and Exterior Design to Reduce Heat Islands" (1 Points)

Potential Offset Credit in Water Balance Calculator

A. Green Roof Credit

1. A green roof credit of 70 percent of the area of the roof will be subtracted from the proposed roof top impervious area if:
   a) The green roof has a slope less than 15 percent or a grid to hold the substrate in place until a thick vegetation mat forms.
   b) The green roof must be designed by a professional engineer who has assessed the necessary load reserves and designed the roof structure to meet state and local codes, and
   c) The irrigation needed for plant establishment and/or to sustain the green roof during extended dry periods, is from stored, recycled, reclaimed, or reused water.

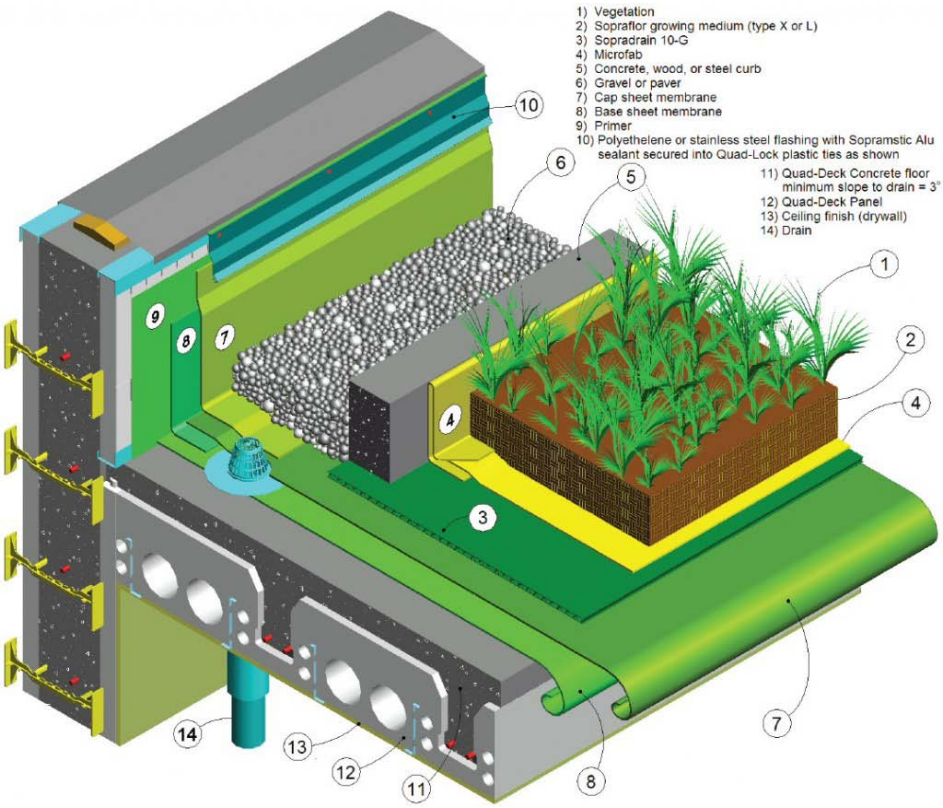
Advantages and Limitations

A. Advantages:

1. Does not require additional space.
2. Reduces overall volume of stormwater and mitigates peak flow.
3. Reduces pollutants of concern by microbial processes and plant uptake.

B. Limitations:

1. Requires drought-tolerant vegetation.
2. Increases roof load.
3. Requires maintenance to the same extent as any other landscaped area.
4. Needs to be watered regularly until vegetation is established.
5. Fire safety provisions must be abided by and may affect the location and the extent of vegetated roofing that is allowed.



Design Specifications

Green roofs should be designed and constructed by an experienced vegetated roof specialist.

A. Structural Roof Support

1. Generally, the roof must be able to hold an additional 10 to 25 pounds per square foot due to saturated soils.

B. Underdrains

1. Underdrains must meet the following criteria:
    a) Appropriately sized for design volume;
    b) Must be *slotted* polyvinyl chloride (PVC) pipes;
    c) Slots shall be longitudinally spaced such that the pipe has a minimum of one square-inch per lineal foot;
    d) Must be sloped at a minimum of 0.5%;
    e) Geotextile fabric may be placed between the planting media and the drain rock; and
    f) Must drain freely to an acceptable discharge point.

C. Overflow

1. An appropriately sized vertical PVC overflow pipe should rise 6-inches above the planting media with a spider cap at various locations.

D. Plants

1. Select vegetation using the "Tree and Plant Selection" standards described in Volume III – Division 32 for Exterior Improvements;
2. Plant materials should be tolerant of drought conditions, ponding fluctuations, and saturated soils for a 48 hour period; and
3. Selection of appropriate plant material should be dependent on several factors including:
    a) Micro-climatic conditions of planting area
    b) Soil type
    c) Plants ability to aid in the removal of contaminants
    d) Visual characteristics of plants (texture, color, and form)
    e) Maintenance requirements
    f) Non-invasive
    g) Disease resistance

Operations and Maintenance

A. General Requirements

1. Inspection: Regular inspection is required to guarantee proper functioning of any drainage or irrigation components.
2. Pruning: As need to maintain the appearance of the roof. Weeding and removal of dead plant material should be scheduled to coincide with important horticulture cycles.

B. Maintenance Standards

The following is a summary of routine maintenance activities recommend for green roofs.

Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed	Frequency
Vegetative Debris Accumulation	Vegetative debris accumulated on surface.	Vegetative debris cleared out.	As needed.
Vegetation	Unhealthy plants and appearance.	Provide irrigation until plant establishment.	
	Replace dead or diseased plants.	Alive and healthy.	

ELECTRIC POWER GENERATION REQUIREMENTS

A. **Photovoltaic Array Power Generation:**
   1. The District has committed to providing 1 megawatt of PV power on Mesa College and possibly City College and Miramar College in the future.
      a) An important issue as regards LEED points is which building project is to be used to account for the LEED point for this power generation. Campus Project Manager shall carefully consider the benefits of one building project over another to account for the energy points. Note that on the Mesa Campus the majority of the power generation will go back to the SDG&E Grid. Other campuses shall consider redistributing such alternative power to the Campus in an attempt to take the campus off the grid except for backup power.
      b) Discuss with District any potential uses of Photovoltaic power on new or existing buildings.

END OF VOLUME III