5 BUILDING DESIGN GUIDELINES

INTRODUCTION

The building design guidelines will enable future buildings at El Camino College (ECC) to integrate with but not mimic, the strong architectural vernacular on campus in order to create a unified atmosphere for generations of students, staff, and community to come. The guidelines are the result of a study of the existing aesthetics or style of buildings on campus as well as an analysis of how buildings interact with exterior spaces.

The architectural guidelines are non-prescriptive by design and instead identify particular forms of architectural expression that are prevalent throughout the campus. Additionally, the guidelines identify material and colors that are compatible with those used in the earliest and most current campus buildings. The general framework provided by the guidelines continues the ECC tradition of continuity and compatibility among campus structures both in expression and materiality.

PART A EXISTING CHARACTER

CAMPUS DESIGN VERNACULAR

El Camino College has a very strong vernacular: most campus buildings have been designed in the California Modern style, which is a California interpretation of modernism derived from the International Style. This style is very appropriate for a campus as it is multivalent (has multiple meanings and associations), has no specific cultural references and is site responsive resulting in buildings that are each unique, but related.

The California Modern style of the 60's is characterized by the expression of volumes and planes rather than mass. It also emphasizes clean simplicity, surface articulation and integration with nature.

Initially planned to accommodate a moderate 500 students, the first buildings on the El Camino Campus were designed by a local Los Angeles architectural firm; Marsh, Smith & Powell. The firm was influenced by the modernist movement and believed in the same ideals as Richard Neutra. Such ideals included creating an architecture that has a timeless quality while creating a pleasant environment for occupants.

The first buildings tried to occupy a large acreage due to land being plentiful. By the early 1960's, the campus had grown by leaps and bounds and it became apparent that buildings should be developed in a more dense way. Subsequent buildings by other architects were developed on the periphery with the intent of keeping the center open and retaining the park-like character of the campus. Today, the campus is expected to grow even further .

PART B ARCHITECTURAL EXPRESSION

I. EXPRESSION OF VOLUME

- Massing
- Horizontality
- Planar Articulation
- Building Base
- Building Height
- Roofline
- Openings

II. EMPHASIS ON BALANCE

- Building Configuration
- Entry
- Scale & Proportion
- Seamless Transition
- Building Extension
- Asymmetry
- Datum
- Rhythm
- Tension
- Repetition

III. EXPRESSION OF STRUCTURE

- Visible Structure
- Visible Circulation
- Integration of Structure & Architectural Form

IV. SURFACE ARTICULATION

- Clean Simplicity
- Solid Patterns

V. CONNECTION TO SURROUNDINGS

- Overhangs
- Courtyards
- Breezeways
- Connectivity

I. EXPRESSION OF VOLUME

Massing

Horizontality

Building designs are strongly identified by geometric massing, often expressing the structures as sculptures, and consisting of volumes and planes interlocked in ways that form nicely scaled compositions.

Massing is most often not symmetrical, lending to a more informal character.

- Cubist geometrries
- Scaled compositions
- Interwoven planes

The campus is, and should remain, characterized by relatively low structures.

Most often, buildings are no more than two to three stories tall, which gives a horizontal feel and contributes to a pleasant human scale.

- Low structures (2-3 stories)
- Horizontal articulation
- Floating volumes

Though vertical articulation is not prohibited and could be used to break down the massing of buildings, it is important not to overpower the low-lying character of the campus.

Vertical structures, such as bell towers, spires or pylons should not be emphasized architecturally.

- No dominant vertical elements

Planar Articulation

- Layering of planes

- Bookends terminating buildings

Building Base

- Floating above ground plane

- Anchored to ground plane

Building Height

Varying the height of buildings helps break the streetscape and reiterate the informal character of the campus.

In addition, variation within the mass of individual buildings will help break the scale, transition spaces from outside to inside, and create a more diverse palette of spaces.

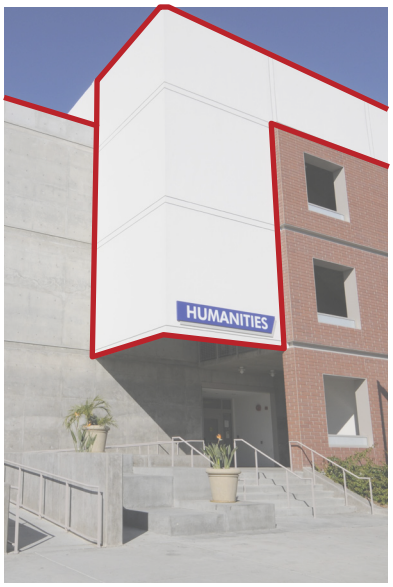
I. EXPRESSION OF VOLUME

Roofline

• Thin roof projection

All roofs on campus are flat, and therefore not a predominant building form.

Roof planes can systematically shade windows, define an outline, and reach out to shade and call out entries to buildings.



• Roof as part of wall

Roofs can be hidden behind parapets allowing the walls to extend uninterrupted.

In such case, the volumetric expression is more predomiant.

• Floating roof above clerestory

Roofs can be expressed as a volume instead of a plane.

Separating the roof from the main building mass through clerestory windows creates the impression of lightness and also emphasizes the proportions of the roof in elevation.

Openings

• Volumetric opening

• Ribbon windows

• Punched windows

Curtain walls or storefront windows can be used in certain locations to accentuate a volumetric expression, create openness between inside and outside and highlight a specific activity in a building.

• Deeply recessed windows

Windows can be expressed as horizontal bands that allow direct connection to occur between the building interior and its surroundings.

This openness encourages integration across disciplines and allows passers by to see directly into the classrooms, witnessing the educational component first hand.

At a smaller scale, windows can be treated individually as punched openings in a wall.

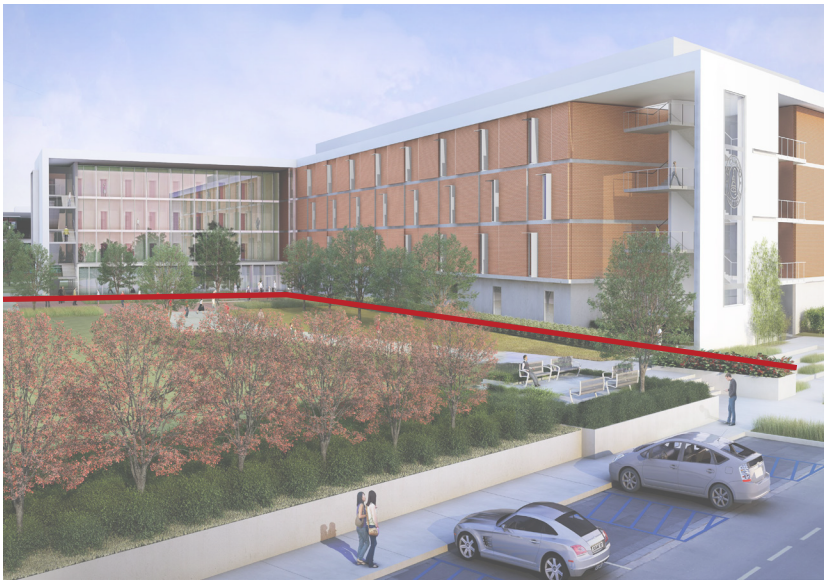
This usually works to set a specific rhythm on a facade or articulate building scale.

Shading devices such as fins and louvers can further add detail and depth.

Natural ventilation is an important component of human comfort and well-being, therefore operable windows are encouraged, especially in locations that will take advantage of the almost daily ocean breezes flowing through the campus.

II. EMPHASIS ON BALANCE

Building Configuration



Entry

Creation of open spaces such as courtyards and patios should be viewed as a positive outcome of building siting, rather than a residual by-product.

Building configuration and siting should encourage and preserve access to sunlight and fresh air.

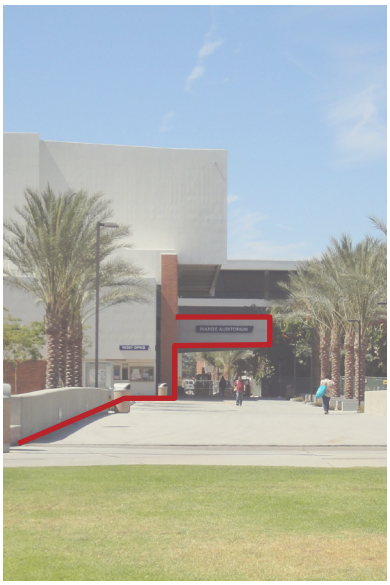
Careful attention should be given to how the mass of the building relates to adjacent buildings.

The campus plan has not developed in defined axial ways that tend to make building entries more obvious.

Entries should be better defined through careful siting, orientation, and architectural expression.

Though signage and lighting can help wayfinding, it is preferred that building entries are expressed through architectural elements.

Scale & Proportion



Building massing is manipulated to break down the scale of large surfaces and create welcoming entries, retreats and vistas.

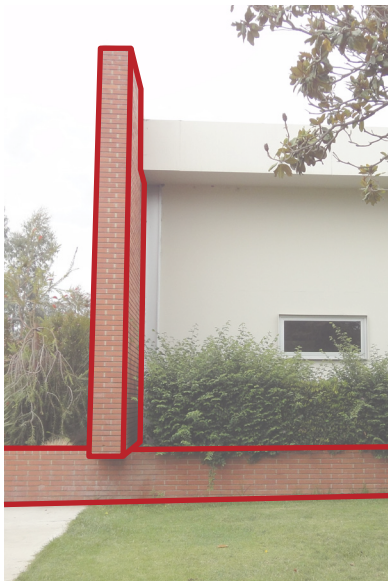
Elements extend out into the landscape tying the buildings to the ground while embracing the lush vegetation around them.

Seamless Transition

A seamless transition from building to site blends the boundaries of architecture.

Architectural elements such as slots in the concrete parapets repeat in site features such as the slots in the concrete seating.

Building Extension

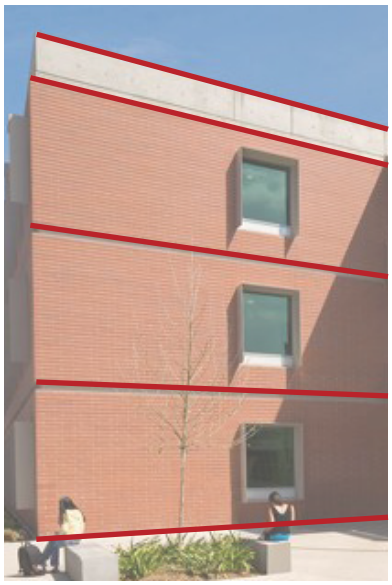


Walls are not only used to enclose indoor spaces, but also to define connections to the building outdoors. Whether extending as privacy walls or shading devices, walls become elements of the landscape such as seat walls, benches or planters.

II. EMPHASIS ON BALANCE

Asymmetry

Datum



El Camino College buildings have a modulation and rhythm of planes composed in an asymmetrical arrangement which responds to programmatic, climatic and site specific conditions.

The balance of forms and shapes makes for buildings that are meant to be seen and experienced from all sides.

There should be no formal building front and back, but primary and secondary sides instead.

Datums and planes of reference help break the scale of large surfaces and clarify the internal organization of the building by identifying floors.

Special exterior treatment of floor slabs such as reveal lines or floor projections will accentuate the horizontality of the building and create shadow depth.

Rhythm

Rhythm is found when a number of similar or related units are arranged in an orderly and unified composition.

Rhythm on a building exterior helps establish a large scale pattern and create visual interest in a surface.

Tension

Rhythm should not be only understood in its classical interpretation.

It might be desired in certain cases to create tension in the proportions of a facade.

Fenestration and facade details can be used to such end. Offsetting or alternating modules will create a more playful elevation without being random.

Repetition

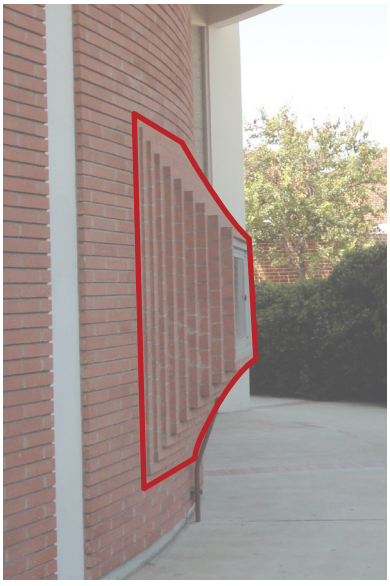
In other instances, it might be beneficial to create a more serene environment.

Elements that are part of the structural system of a building can help define a streetscape, enliven the building facade and create pockets of intimate spaces for gathering.

III. EXPRESSION OF STRUCTURE

Visible Structure

Visible Circulation



Applied ornament is absent from the building exteriors, allowing the structure and materiality to become the main aesthetic.

Structure, function and siting are the leading elements that determine the shape and look of the building.

Sophisticated detailing can be achieved through simple use of material without distracting from the overall simplicity of the building.

Exterior circulation can help identify access points to buildings.

External stairs and hallways can also become impromptu gathering areas for students before and after classes.

Integration of Structure & Architectural Form

Structural Overhang

Structural Parapet

Using material in their pure form will highlight special characteristics and clarify their purpose.

Structural elements such as walls, columns, beams and slabs should function not only to support the building, but also to achieve other architectural goals such as shading, edge definition or establishing a hierarchy in spaces.

Applied elements should be minimized.

- Concrete is poured and should be expressed as a volumetric element. It should not be painted or clad.
- Brick is modular and should be treated as a patterned surface.
- Veneers are, by nature, non-structural and are therefore discouraged.

IV. SURFACE ARTICULATION

Clean Simplicity

Buildings are articulated as a collection of planes that enclose indoor spaces and define outdoor spaces.

Walls, roofs, floors and overhangs are all treated with similar diversity.

All such surfaces should be very simple and true to their purpose.

Whether smooth, textured, screened or patterned, surfaces are articulated in a modern style where ornament is absent.

Solid Patterns

El Camino
Custom Relief
Pattern

V. CONNECTION TO SURROUNDINGS

Overhangs

Courtyards

Broad overhangs not only protect openings from the sun, but also protectecampus-users from the elements.

The College prefers shade that is provided in ways integral to the building design such as arcades and overhangs supported from the buildings.

These elements, along with building form and orientation, should be used to protect persons at building entries, courtyards and pathways

Courtyards are spaces that are defined by several buildings and are landscaped to provide visual interest, shade and invite students to sit and relax.

Building design should pay special attention to facades that open onto such courtyards. Large flat facades are discouraged in favor of smaller scale, stepped facades with outdoor hallways, columnades and overhangs.

Whether fully enclosed, U-shaped or L-shaped, the use of courtyard spaces will be determined by the buildings that create it.

Breezeways

• Pedestrian Connectivity

The indoor/outdoor relationship of buildings on campus humanizes spaces and creates comfortable buildings that are connected to their site.

Breezeways provide shade, pedestrian connection, and gathering areas, as well as open up vistas across the campus.

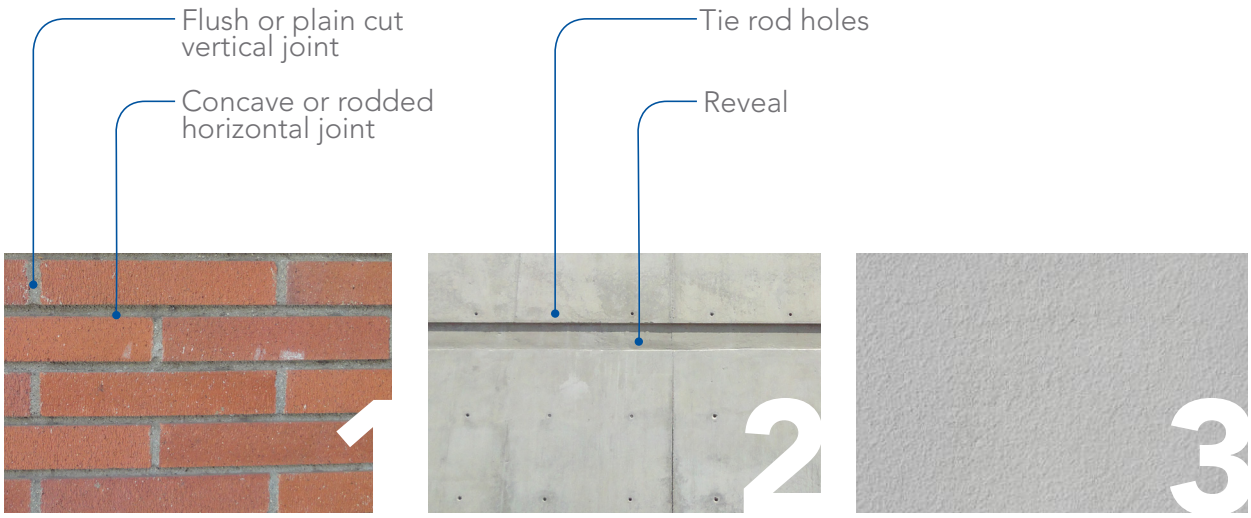
Breezeways should be used to connect or segregate certain programs from main public access at ground level.

Connectivity

• Visual Connectivity

The campus architecture has a fundamental relationship with the surrounding landscape. This style captures the landscape by using large high ceilingt window walls so that the landscape is clearly visible and is always part of the inhabitant's view of the room.

PART C MATERIAL and COLOR PALETTE



Materials and colors selected for future projects should be appropriate to both the design concepts of the individual projects as well as to the campus as a whole. Appropriateness can be loosely defined by how well the materials and colors contribute to creating harmony in mass, scale, form, color, and context thus establishing desirable learning environments and experiences.

Natural, raw materials typically used on site are: brick, concrete, stucco, precast concrete panels, glazing, and expressed metal. Exposed materials need to withstand corrosion from the South Bay marine atmosphere.

1. Brick
- Norman brick (No oversized brick)
- Mitered butt joint corners
- Color and textures as approved by College and compatible with original masonry construction
- Full veneer or structural brick (No thin brick)
- Brick coursing as appropriate (1/3 running bond and stack bond are typical on campus)
- Emphasize the horizontal

2. Concrete
- Fair faced natural concrete finish
- Light or medium sandblast finish as appropriate
- Form tie pattern as appropriate

3. Stucco
- Finish as approved by College (sand finish is typical on campus)
- Use as secondary/accent material

4. Precast Concrete Panels
- Distinct ECC relief pattern
- Stack bond configuration
- Established theme on existing campus buildings
- Use as accent feature

5. Glazing
- Color neutral
- High performance coated frames and mullions in silver or bronze color as approved by College and compatible with existing conditions

6. Expressed Metal
- Stainless steel or high performance coated in a color as approved by College and compatible with existing conditions

6 EXTERIOR LIGHTING

INTRODUCTION

The primary goal of establishing Exterior Lighting Standards for the college campus is to create a more unifying experience as a person travels through the campus, as well as utilizing organized zones of lighting language and treatments to assist with campus identity and wayfinding.

PART A EXISTING EXTERIOR LIGHTING CONDITIONS

PATHWAYS

- Majority of fixtures are cut-off Kim Archetype fixture with heights ranging from ~15' to 25'
- Fixtures utilize Metal Halide lamping with good color-rendering, however, color temperatures are inconsistent
- Due to cut-off fixture optics of fixtures, very little wash of light onto adjacent buildings
- Due to cut-off fixture optics of fixtures, only the fixture's bright aperture is visible diminishing the impact of the fixture form and aesthetic at night
- Current fixture spacing provides good light level uniformity throughout the campus.

COVERED PARKING

- Cost-effective linear fluorescent striplights are utilized within the new structure
- Good light level uniformity throughout
- Lighting approach creates a comfortable / safe environment by placing light not only on driving surface but also onto ceilings and walls

LANDSCAPING & PLAZAS

- Large palm trees throughout the site were typically not accentuated
- When uplighting trees does occur, both in-grade fixtures and above grade bullet fixtures were used
- Steplights are utilized at a few new "seatwall" and step locations. Otherwise lighting was not integrated into architectural elements.

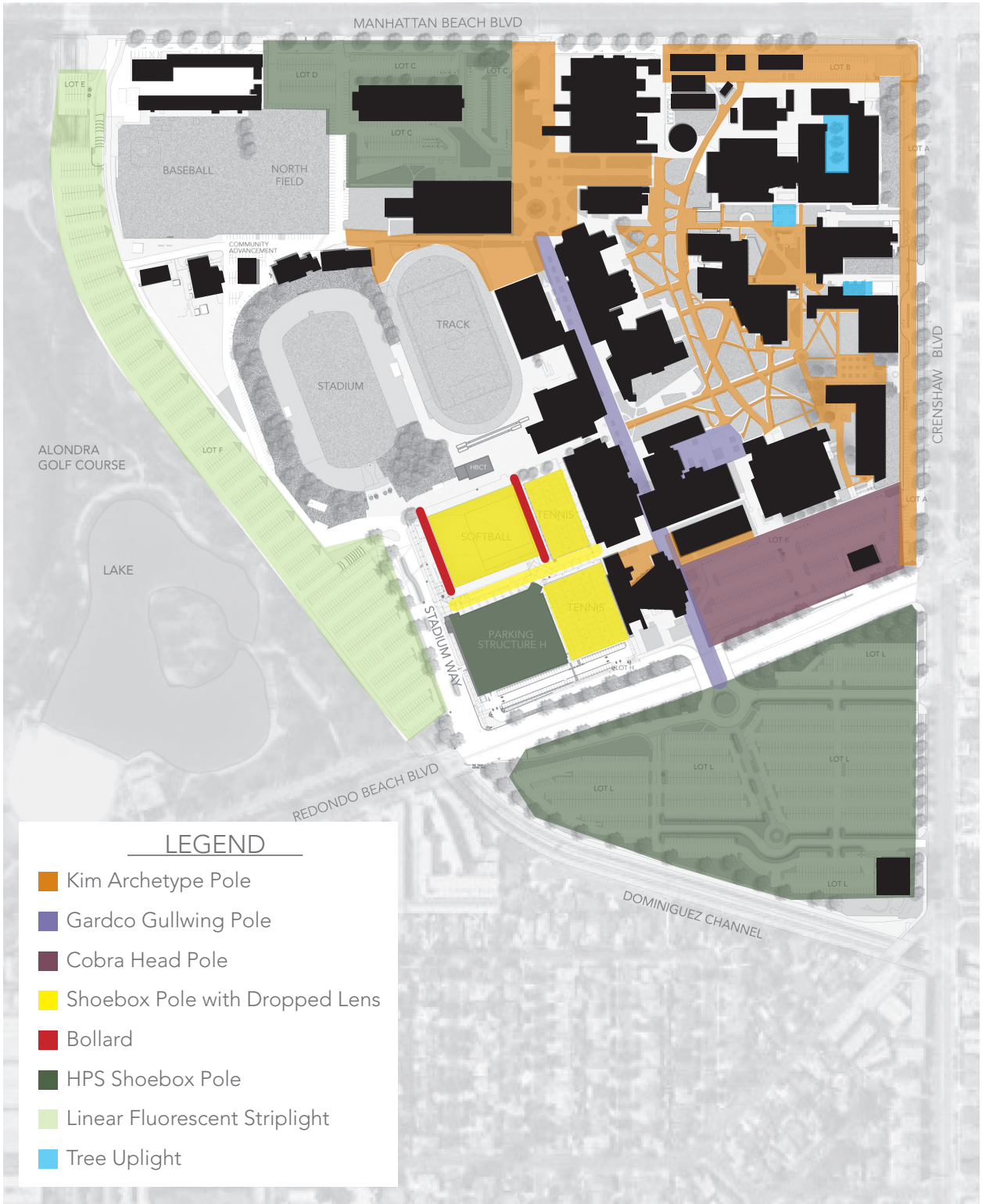
FACADES

- No lighting system dedicated to facade lighting utilized.
- Cut-off fixtures at secondary entries appear out of place due to large scale and form
- Under canopies utilize several downlight approaches (recessed, glowing surface mount, decorative, etc.)

SURFACE PARKING

- Variety of fixture styles and lamping utilized at parking areas

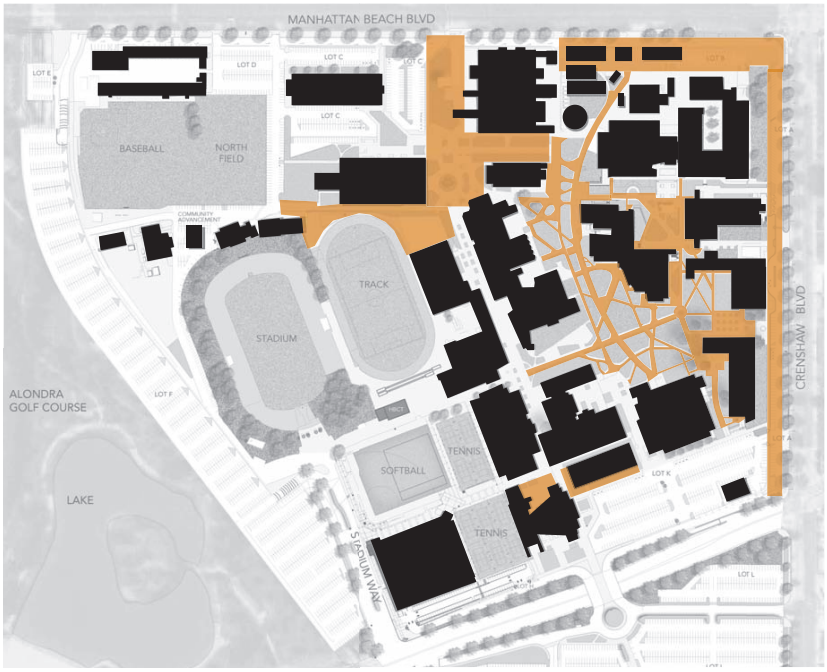
I. EXISTING LIGHTING ASSESSMENT



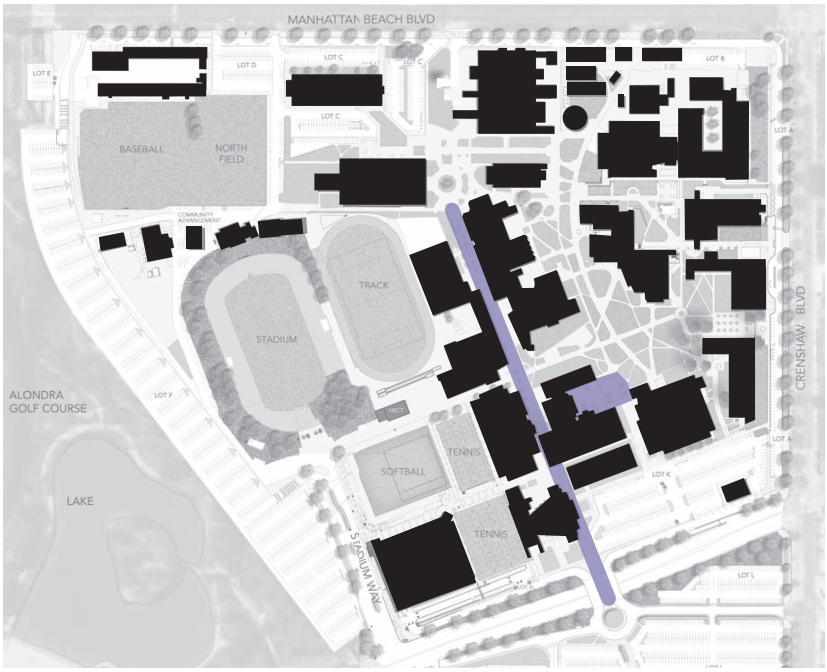
II. EXISTING LIGHTING ELEMENTS

CAMPUS STANDARDS HANDBOOK - EL CAMINO COLLEGE

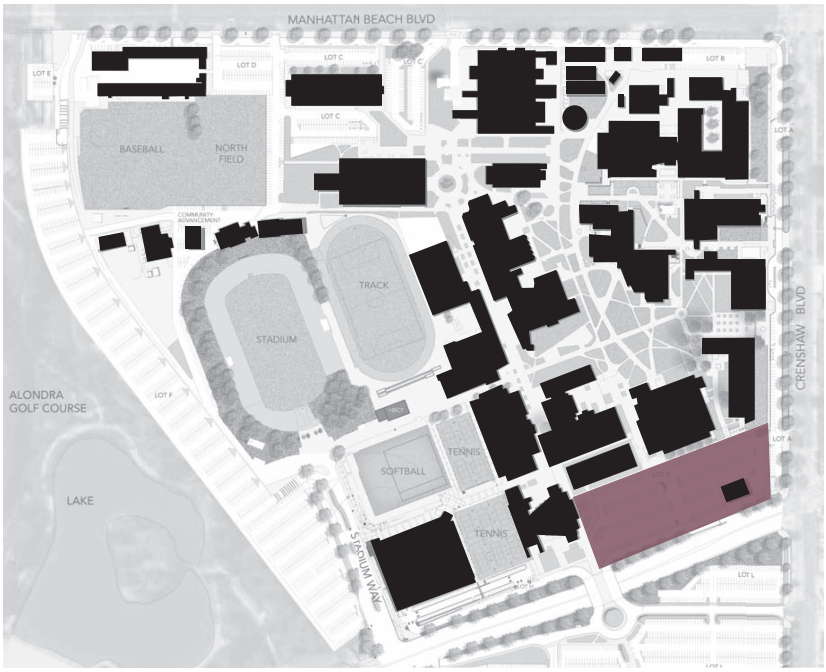
PEDESTRIAN PATHS AND SURFACE PARKING - KIM ARCHETYPE



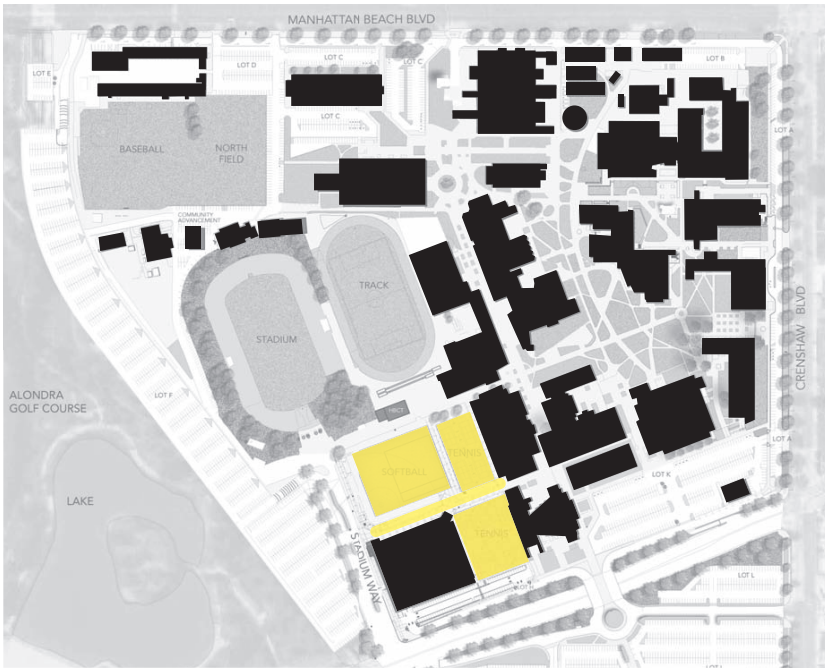
PEDESTRIAN PATHS - GARDCO GULLWING



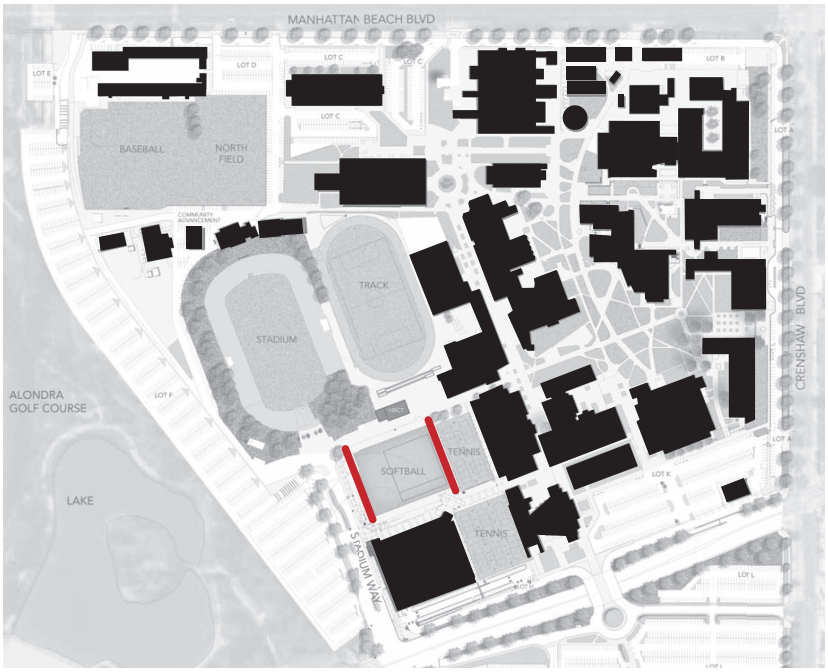
SURFACE PARKING - COBRA HEAD



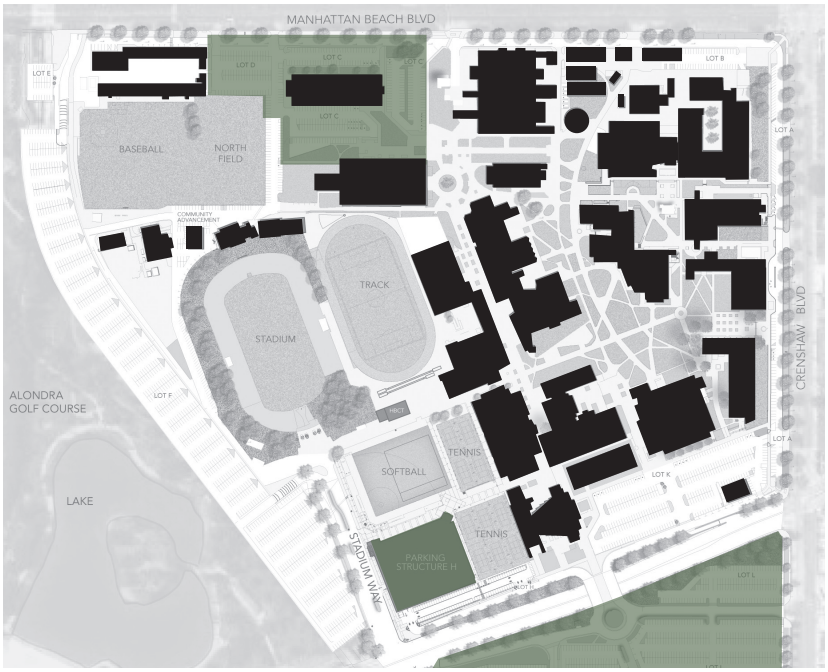
TENNIS COURT - SQUARE SHOEBOX



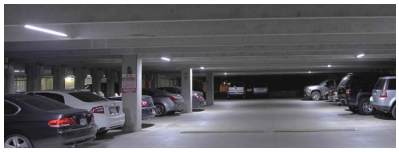
TENNIS COURT - BOLLARD



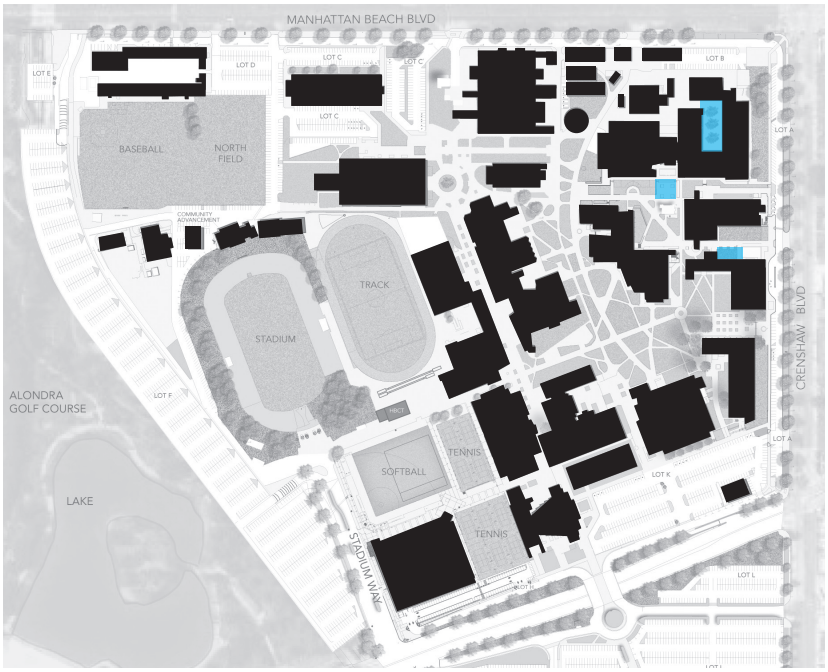
SURFACE PARKING - HPS SQUARE SHOEBOX

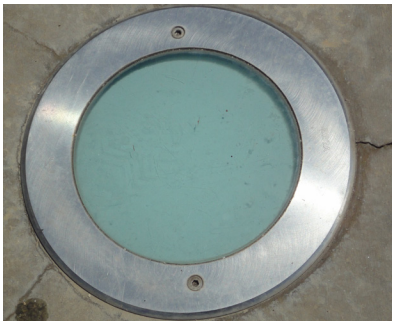


PARKING STRUCTURE INTERIOR AND ROOFTOP - POLE



PLAZA - TREE UPLIGHT





PART B EXTERIOR LIGHTING STANDARDS

INTRODUCTION

By implementing a site lighting masterplan, the campus will become more unified through a consistent lighting design that utilizes light to create areas of visual hierarchy and interest. In doing so, people will thus be more effectively drawn through the heart of the campus letting their eye guide them on their journey to their final destination.

I. GENERAL GUIDELINES

REQUIREMENTS:

- Design to meet current Title 24 exterior lighting requirements
- Design to comply with CAL-Green Building Code mandatory lighting measures

GOALS:

- Improve campus safety by utilizing high rendering lamp sources, providing appropriate and uniform light levels on the ground, and lighting of key elements surrounding the site
- Utilize energy efficient lamp sources (Ceramic Metal Halide, Fluorescent, & LED)
- Support the maintenance staff by incorporating long-life lamp sources which require less frequent re-lamping and minimize number of lamp types utilized throughout the site
- Support environmental concerns by utilizing cut-off lighting fixtures to assist in possible future LEED aspirations
- Meet the lighting level recommendations outlined in Section II - LIGHTING MASTERPLAN
- Minimize glare from fixtures
- Add more visual interest to the site including accentuating key landscape and architectural features
- Improve consistency of lighting fixture approach, including creation of a campus fixture family
- Improve consistency of fixture lamping, including color temperature and wattage
- Create unified zones of hierarcy throughout the site better assisting in wayfinding through the campus

ILLUMINANCE CRITERIA:

- The following illuminance levels shall be provided to closely conform with existing campus light levels or to meet IESNA recommended light levels as appropriate.

LOCATION		RECOMMENDED ILLUMINANCE LEVELS	BASIS OF RECOMMENDATION
Pedestrian Pathways	Walkways and Bikeways	1.5 FC Minimum	To match existing light levels
	Pedestrian Stairways	0.5 FC Minimum	To meet IESNA recommendation
Building Entries		5.0 FC Minimum	To meet IESNA recommendation
Surface Parking (High Activity)		0.9 FC Minimum	To match existing light levels & meet IESNA recommendation
Parking Garages	Parking and Pedestrian	1.0 FC Minimum	To meet IESNA recommendation
	Ramps and Corners	1.0 FC Minimum	To meet IESNA recommendation
	Entrance Area	2.0 FC Minimum	To meet IESNA recommendation
Vehicular Drives		0.5 FC Minimum	To meet IESNA recommendation

*1.0 FC minimum shall be provided for all areas designated as emergency egress to meet LA County Building Code requirements

II. EXTERIOR LIGHTING MASTER PLAN

To support the vision of unifying the campus through design, the Lighting Master Plan illustrates the breakdown of unique lighting zones which will be treated with varying lighting approaches, either due to differences in light level requirements or to assist with creating visual hierarchies and special areas within the campus.

GOALS:

- Differentiate primary pathways from outlying pathways
- Support student and visitor gathering in a welcoming and warm enviornment in plazas

IMPLEMENTATION:

PATHWAYS

- Utilizing unique light fixtures as well as accent surrounding of site elements including landscape and architectural features.

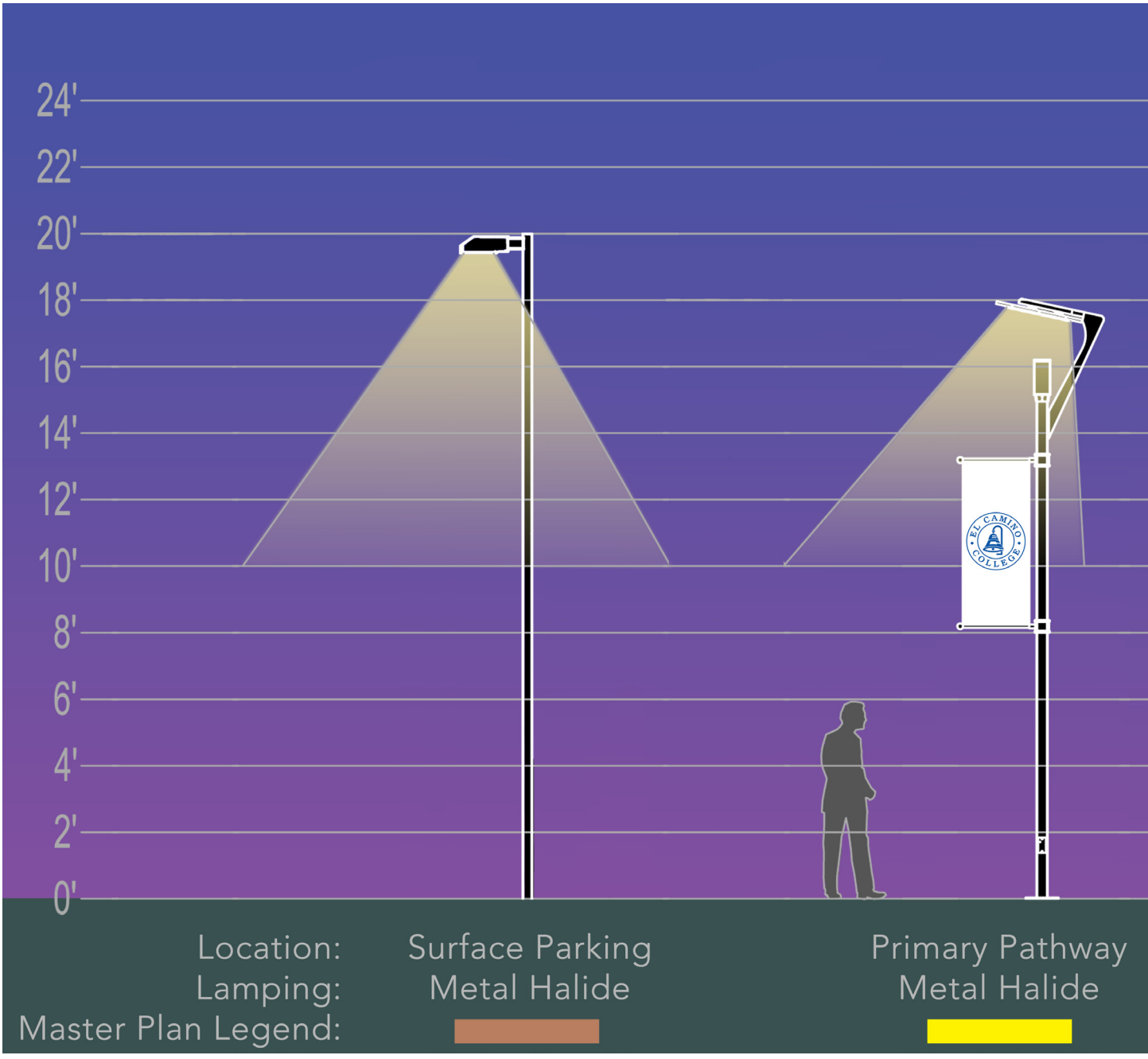
PLAZA ELEMENTS

- Accentuating landscape and architectural elements and creating an added layer of visual interest not present in the surrounding areas.

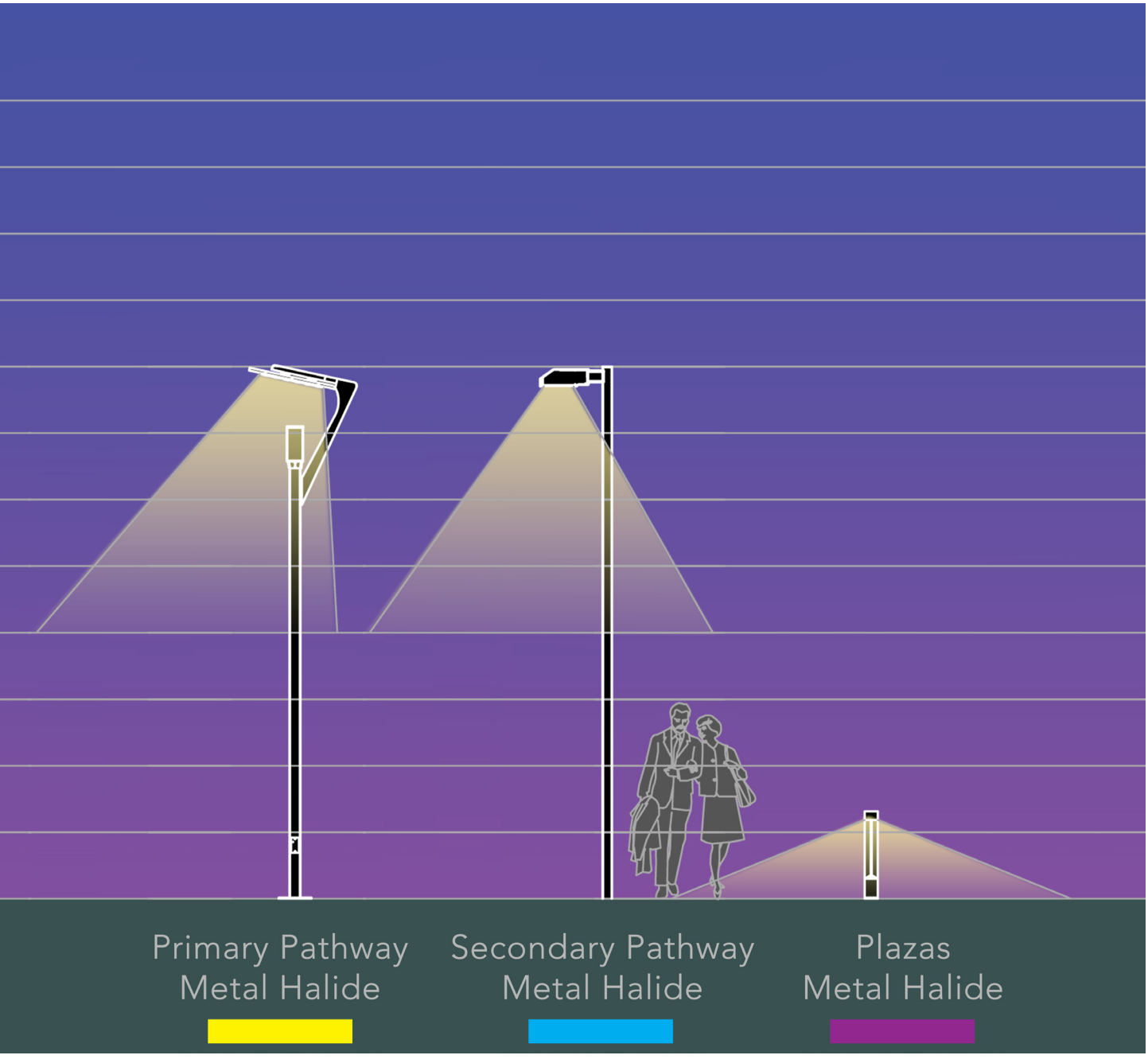

MANH ATTAN BE ACH B LVD
BASEBALL
YARD
YARD
NO RTH FIELD
STADIUM
ALONDRA GOLF COURSE
LAKE
SOFTBALL
TENNIS
TENNIS
STADIUM WAY
ONDO BE ACH B LVD
DOMINIGUEZ CHANNEL
CRENSH AW B LVD
LOT A
LOT B
LOT D
LOT K
LOT L
NEW LOT
LEGEND
Campus Entry
Primary Pathway
Secondary Pathway
Plaza
Internal Roadway
Open Parking
Sports Fields

III. EXTERIOR LIGHTING ELEMENTS

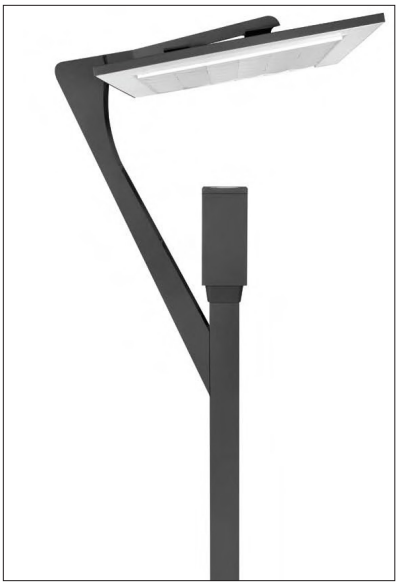
FIXTURE FAMILY



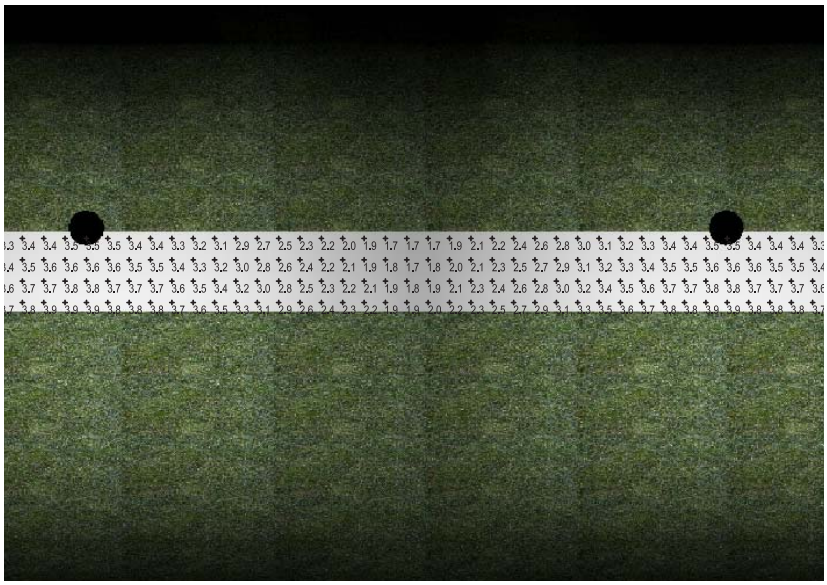
The above diagram illustrates the proposed family of fixtures to be utilized for the primary pathways, secondary pathways, plazas, and surface parking.


Primary Pathway
Metal Halide
Secondary Pathway
Metal Halide
Plazas
Metal Halide

PEDESTRIAN PATHWAYS - PRIMARY



• HEPER + MOONLIGHT



• TYPICAL PRIMARY PATHWAYS CALCULATION

Name: UNO
Fixture: UNO-1521-51-301-21316-SILVER-volts
Lamping: 150W T6 Ceramic Metal Halide at 3000K
Pole Height: Top of fixture head is 18'-0" above grade
Spacing: 60'-0"
Finish: Silver

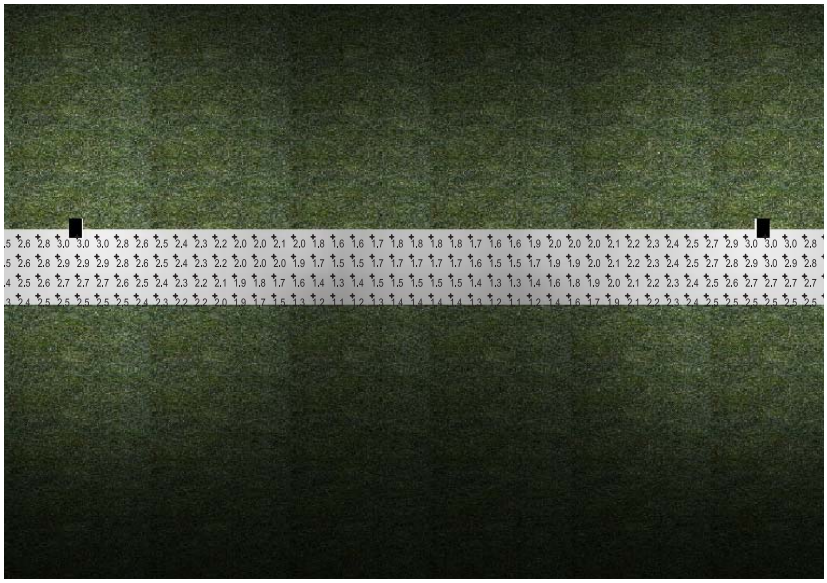
The primary pathways through the center of the campus should have a strong visual presence, utilizing an indirect lighting approach, while retaining cutoff requirements. This approach will help reduce possible glare to nearby pedestrians and distribute a softer light to the pathways below and create an aesthetic presence of the fixture at night.

For the primary pathway through the center of campus, larger poles which allow for banner integration should be considered. Connection integrity should be confirmed by a structural engineer. For the "Crescent Moon" primary pathway, the same style of fixture should be utilized, with a slightly smaller scale without any signage element.

To achieve the desired lighting levels on the pathway of 1.5 FC minimum, the above fixture, spacing, & lamp should be considered (typical spacing to be adjusted as necessary for unique path geometries)

PEDESTRIAN PATHWAYS - SECONDARY

• KIM LIGHTING



• TYPICAL SECONDARY PATHWAYS CALCULATION

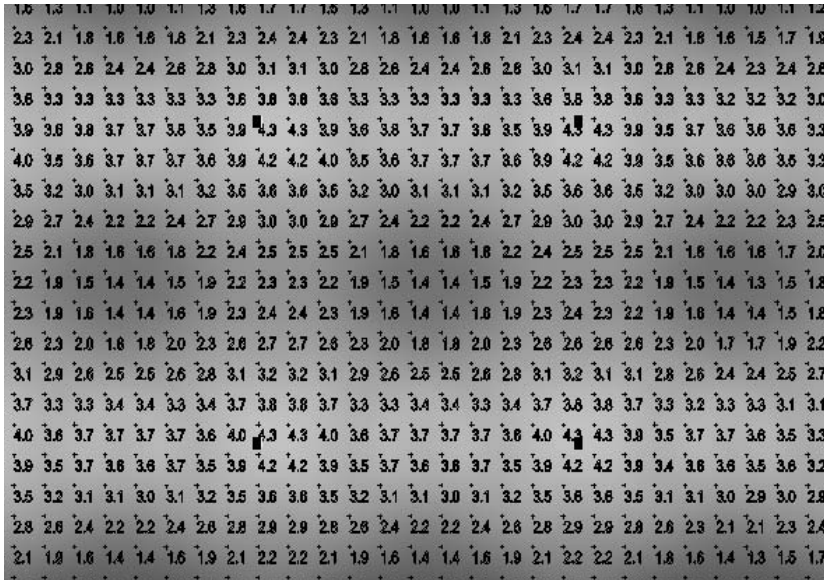
Name: Archetype
Fixture: 1SA-SAR3-100MH-volts-CC
Lamping: 100W ED17 Ceramic Metal Halide at 3000K
Pole Height: Top of fixture head is at 16'-0" above grade
Spacing: 90'-0"
Finish: Custom color by Campus

The secondary pathways throughout the site should utilize the existing pathway fixture located on the campus in an effort to re-use the lighting fixtures previously installed by the College. In an effort to better unify the design, the pathways should utilize, wherever feasible, a consistent pole height and color temperature of lamp.

To achieve the desired lighting levels on the pathway of 1.5 FC minimum, the above fixture, spacing, & lamp should be considered (typical spacing to be adjusted as necessary for unique path geometries)

SURFACE PARKING

• KIM LIGHTING



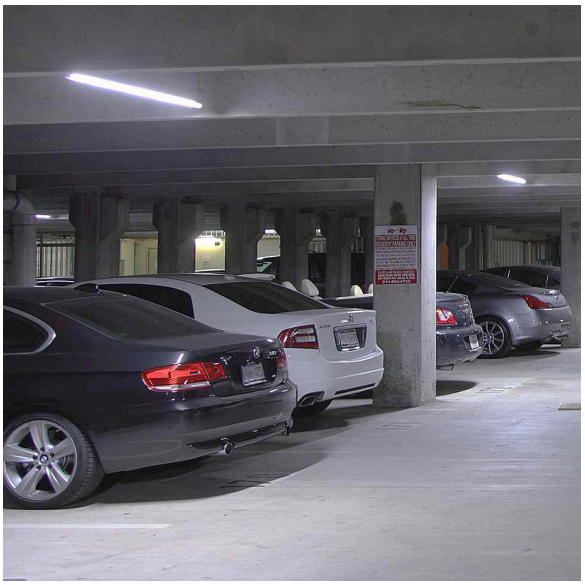
• TYPICAL SURFACE PARKING CALCULATION

Name: Archetype
Fixture: 1SA-SAR3-150MH-volts-CC
Lamping: 150W ED17 Ceramic Metal Halide at 3000K
Pole Height: Top of fixture head is 20'-0" above grade
Spacing: 50'-0"
Finish: Custom color by Campus

The larger scale Kim Archetype pole shall be utilized with ceramic metal halide lamping to improve uniformity, color rendering, and performance in the surface parking lot areas.

To achieve the desired lighting levels on the surface parking lots of 0.9 FC minimum, the above fixture, spacing, & lamp should be utilized(typical spacing to be adjusted as necessary for unique parking lot geometries)

COVERED PARKING



• PRUDENTIAL LIGHTING

Name: Fluorescent Striplight
Fixture: PT8W-WG-2T8-04'-YGW-SC-volts
Lamping: High Efficiency T8 Fluorescent at 3500K
Mounting: Surface Mounted
Finish: White

• KIM LIGHTING

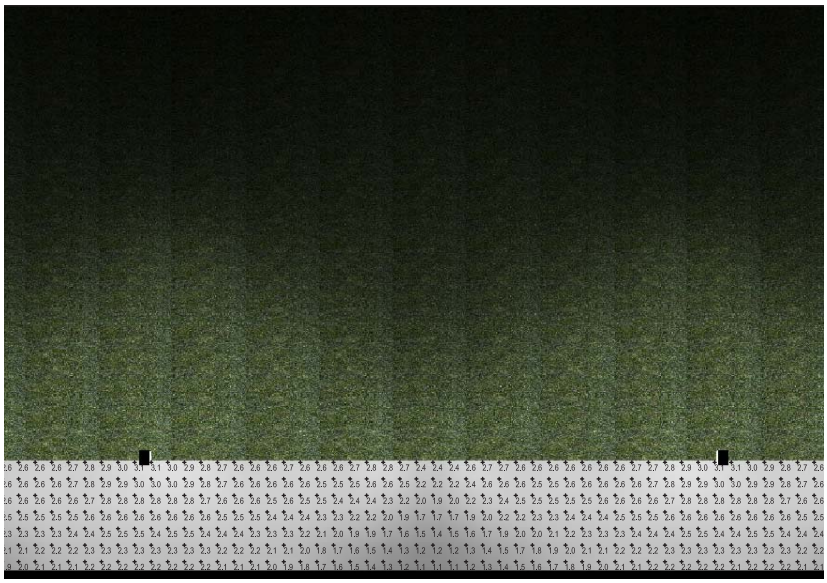
Name: Archetype
Fixture: 1SA-SAR3-100MH-volts-CC
Lamping: 100W ED17 Ceramic Metal Halide at 3000K
Pole Height: Top of fixture head is at 16'-0" above grade
Finish: Custom color by Campus

The covered parking area should utilize cost effective and energy efficient fluorescent striplights which provide appropriate light levels to the parking surface below as well as to the walls and ceiling of the structure making it feel brighter and safe. A wire guard accessory is also recommended to better protect the fixture.

For the roof parking areas, refer to Surface Parking lighting description on previous page.

INTERNAL ROADWAYS

• KIM LIGHTING



• TYPICAL INTERNAL ROADWAYS CALCULATION

Name: Archetype
Fixture: 1SA-SAR3-150MH-volts-CC
Lamping: 150W ED17 Ceramic Metal Halide at 3000K
Pole Height: Top of fixture head is 20'-0" above grade
Spacing: 70'-0"
Finish: Custom color by Campus

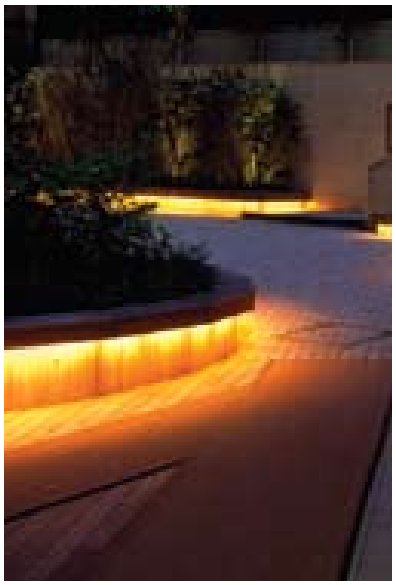
The internal roadways through the site should utilize the existing Kim Archetype fixture and, wherever feasible, a consistent pole height and color temperature of lamp.

To achieve the desired lighting levels on the roadway of 0.9 FC minimum, the above fixture, spacing, & lamp should be considered (typical spacing to be adjusted as necessary for unique roadway geometries)

CAMPUS ENTRIES

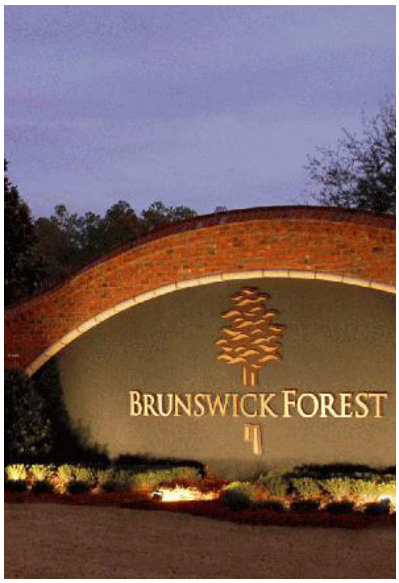
• CAMPUS FRONT DOOR

The campus entry serves as the first impression to guests & students and thus should be inviting and welcoming. Utilizing different layers of light and unique lighting solutions creates visual interest to the front door of the campus and better directs the eye and the guest through to the heart of the campus.



• FEATURED ELEMENTS

Featured elements such as fountains, landscape, and under-bench lighting should also be considered to better assist in creating a unique entry experience.



• ENTRY SIGNAGE

Illuminating signage at the entry during the evening will also more effectively direct the guest as they arrive. Lighting the signage either internally or externally should be considered depending on the design of the signage element itself. For signage located within the campus, it shall be confirmed that adjacent area lighting provides appropriate illumination onto all non-internally illuminated signs.

PLAZAS

Although plaza lighting should be approached in similar fashion, each should be unique in response to the varying features and elements that each possess. Lighting the surrounding surfaces and landscape elements, will assist in creating a unique space that is welcoming, safe, and comfortable for people to gather.

Featured lighting elements such as fountain lighting, underbench lighting, and tree lighting should be considered in all plazas depending on the availability of such elements.

• ERCO Bollard

Name: Midipoll Bollard
Fixture: Midipoll-33338-GRAPHITE-volts
Lamping: 35W T4 Ceramic Metal Halide at 3000K
Bollard Height: 2'-7"
Finish: Sliver

• BEGA

Name: Recessed Wall Luminaire
Fixture: 2310P-BS-volts
Lamping: 18W Compact Fluorescent at 3000K
Mounting: Recessed
Finish: Stainless Steel

• BEGA Steplight

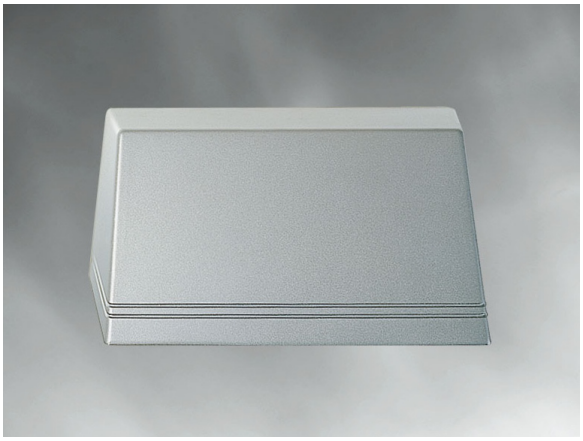
Name: Recessed Wall Luminaire
Fixture: 2286P-Stainless Steel-volts
Lamping: 13W Compact Fluorescent at 3000K
Mounting: Recessed
Finish: Stainless Steel

BUILDING FACADES

• BEGA Downlight

Name: Recessed ceiling Luminaire
Fixture: 1286P-BS-volts
Lamping: 9W Compact Fluorescent at 3000K
Mounting: Recessed
Finish: Stainless Steel

Existing buildings on the campus do not utilize a separate lighting system to highlight the facade, however, typically utilize the glow from within the building to draw attention to and show life within the building. Highlighting feature elements of a building such as the entry or canopy should be considered where appropriate, otherwise, downlighting from overhangs or full cut-off sconces at secondary entries should be considered.



• GARDCO

Name: Mini Sconce
Fixture: 111-MT-32TRF-volts-finish-SL
Lamping: 32W Compact Fluorescent at 3000K
(Finish varies per location)
Mounting: Wall Mounted
Finish: Custom color per application

SPORTS FIELDS

• SPORT FIELD

• CUTOFF SHIELD

If night lighting for a sports facility is desired, the College is to advise as to the classification of play as defined by the IESNA that is closest to the intended use for each field as well as anticipated number of spectators to confirm light level goals for the area. Light levels should be provided to meet IESNA requirements for that classifaction of play. Refer to current IESNA Lighting Handbook (Sports and Recreational Lighting Section) for Classes of Play and Facilities and associated Sports-lighting Illumination Recommendations. If the permanent lighting system is to account for televised broadcast, refer to NCAA illumination requirements for televised broadcast recommended light levels.

To light the fields of play, a high wattage Metal Halide fixture is recommended to achieve the high light levels and color rendering requirements. Also, the incorporation of a cutoff shield is recommended to better direct the light toward the field of play and reduce stray light from trespassing into the sky and the surrounding areas.

7 SPACE STANDARDS

INTRODUCTION

FRAMEWORK

It is El Camino College's intention to standardize spaces across the various locations to a size that is equitable and functional for the expected use over the life of the building, and remain within the guidelines of the California Community College Chancellor's Office (CCCCO) capacity guidelines ("Cap Load"). The proposed standards reflect the clearances required for the effective utilization of furniture and equipment within each space. The desired minimum usable square footage is noted on each diagram. Additional width or depth within the spaces would be acceptable, particularly in spaces that have structural elements, more specialized areas, or renovations of existing buildings and will be approved on a project by project basis.

FUNCTION

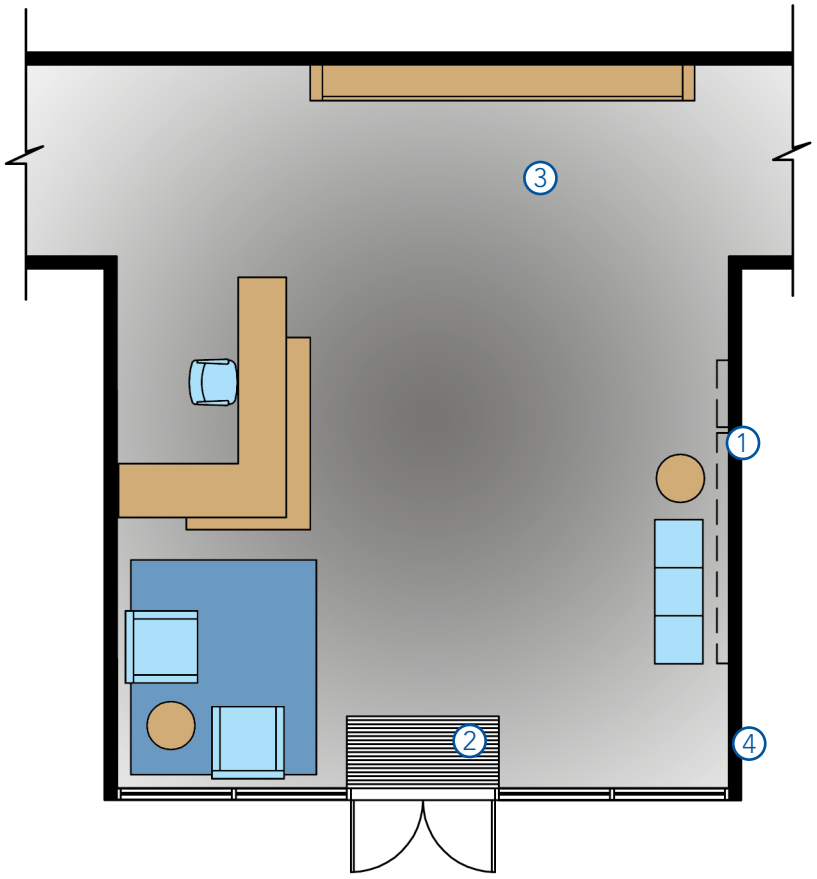
It is important to create rooms that are adaptable, flexible and functional. This allows rooms to adapt to constant changes in technology, while flexible and functional classrooms enable instructors and students to work together in a variety of learning environments which may best suit different programs. This flexibility is compatible with an interdisciplinary approach to instruction and current teaching pedagogies. Creating environments which promote learning and interaction between individuals and groups is highly desirable. Different sizes and types of gathering places are essential throughout the campus and within the buildings.

INTERIOR ARCHITECTURE

ECC's architecture is composed of planar compositions. As such, the interior architecture should clarify the elements that the buildings are composed of. Color and materials should inhabit one plane which flows from inside to outside. All planes, whether walls, floors, ceilings or partitions should be treated as distinct entities, in a singular way. Colors and materials selected for future ECC projects should lend an air of permanence and quality, while providing an overall sense of welcome. Colors and materials should be appropriate to both the design concepts of the individual projects, as well as to the campus as a whole. Appropriateness can be loosely defined by how well the colors and materials contribute to creating harmony in mass, scale, form, color and context, thus establishing desirable learning environments and experiences. Public spaces such as lobbies and corridors should incorporate more interesting and lively colors or patterns. In contrast, private spaces such as classrooms, study spaces, labs, etc. should incorporate materials and colors of a professional nature befitting the use of each space. There is no identifiable use of a signature or accent color therefore, accent colors should be appropriate for each building's color scheme.

PART A LOBBIES

LOBBY - NSF



LEGEND

1. Directory
2. Recessed walk-off mat
3. Display case
4. Artwork

SURFACES

Floor:	Terrazzo or porcelain tile, recessed area rug
Wall:	Painted drywall, wood paneling
Ceiling Ht:	Varies
Ceiling Type:	Painted drywall, acoustic material

LIGHTING

Refer to Part M

0 ft 8 ft 16 ft 24 ft

SCALE 1/8" = 1'0"

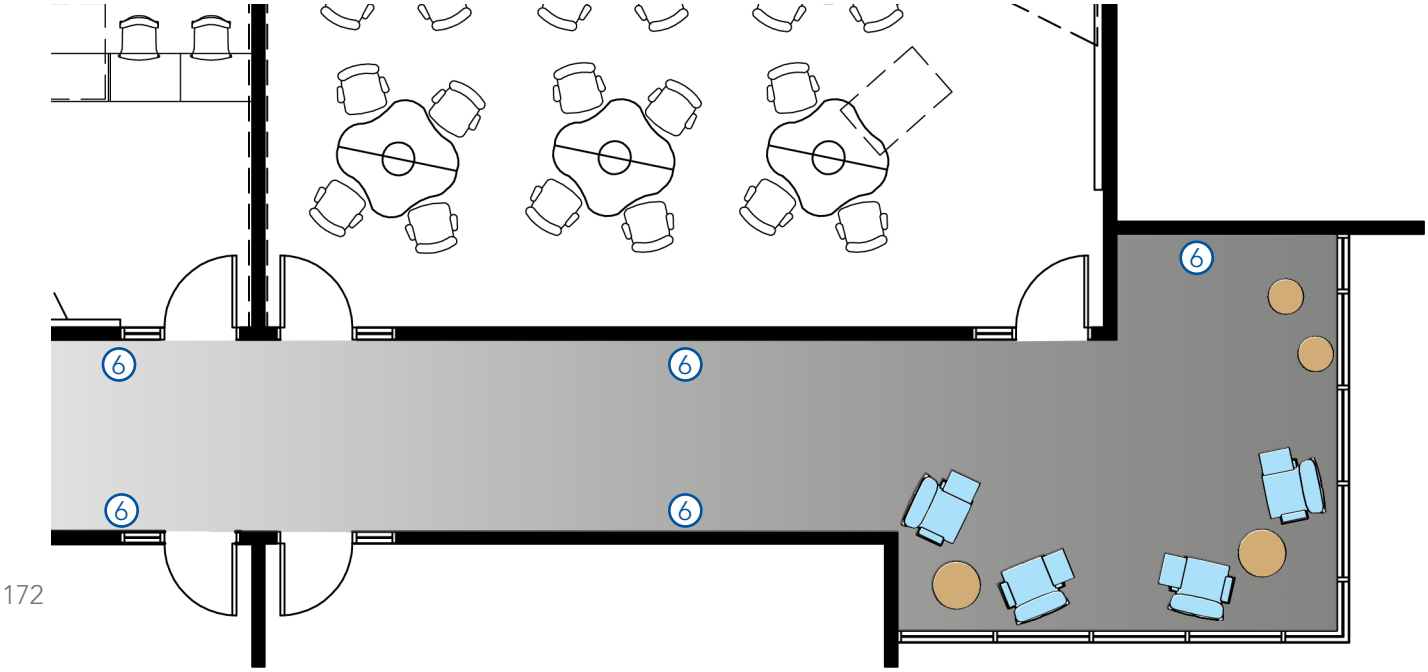
ARTWORK

The college encourages designers to incorporate artwork into the fabric of the Lobby's design. A good example of this is the custom wall tiles depicting an artistic impression of the original campus plan in the Administration Building's lobby. Proper lighting designating a place for permanent or rotating exhibits should be incorporated, even if the budget will not cover the cost of the original art.

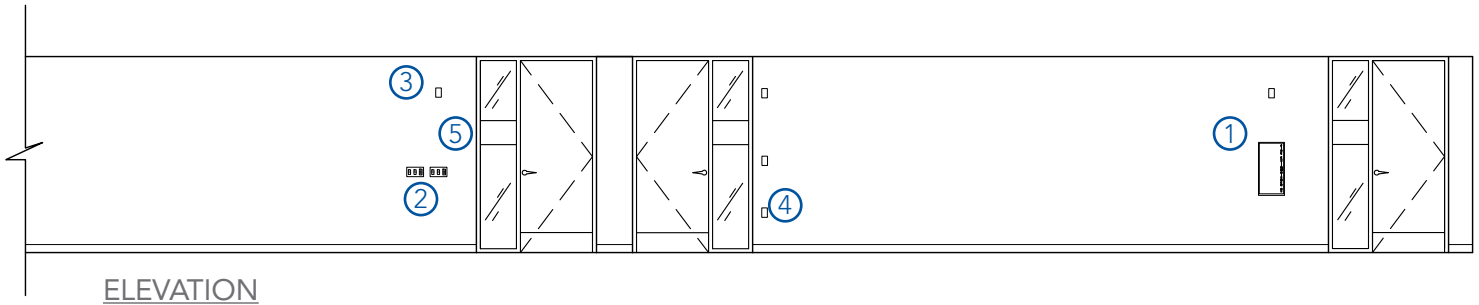
PART B CORRIDORS

CAMPUS STANDARDS HANDBOOK - EL CAMINO COLLEGE

PUBLIC CORRIDORS - NSF



172



ELEVATION

LEGEND

1. Fire extinguisher cabinet
2. Light switches, thermostat
3. Strobe
4. Outlet
5. Sidelight
6. Provide power/data outlets

SURFACES

Floor:	Resilient flooring
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

LIGHTING

Refer to Part M

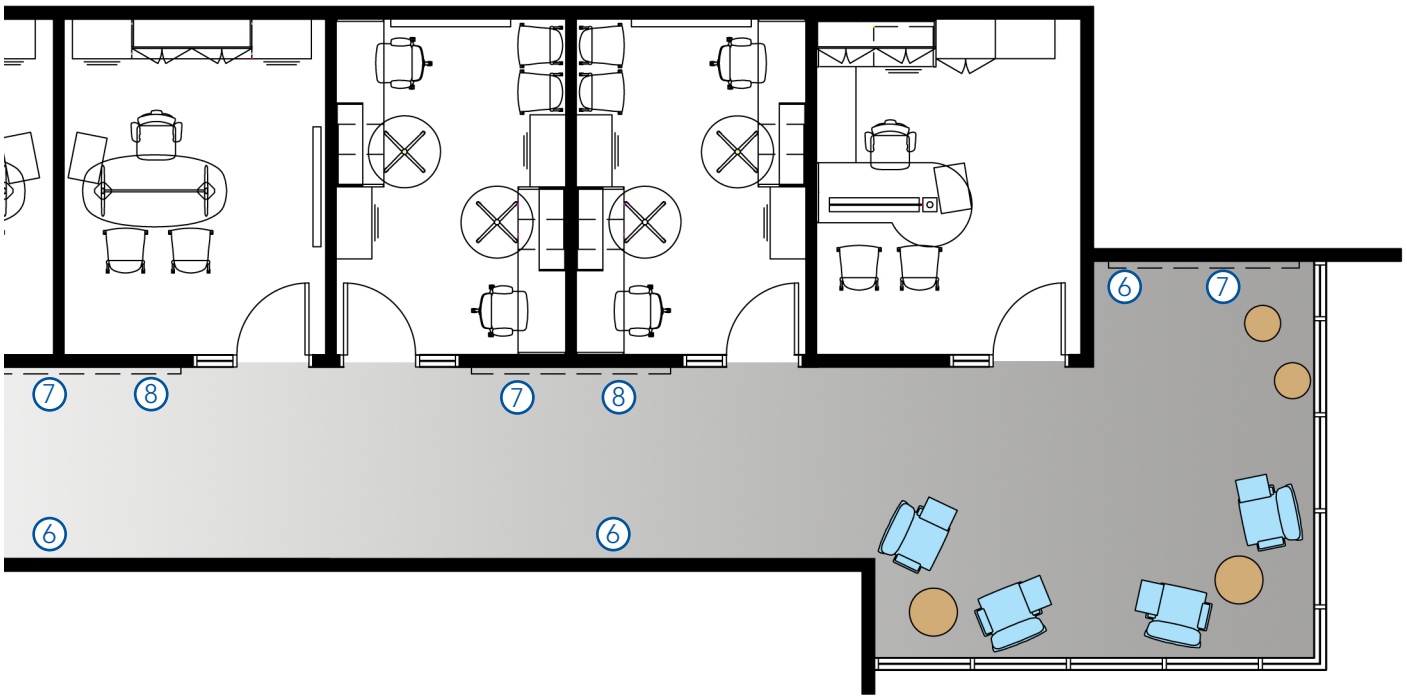
SCALE 1/8" = 1'0"

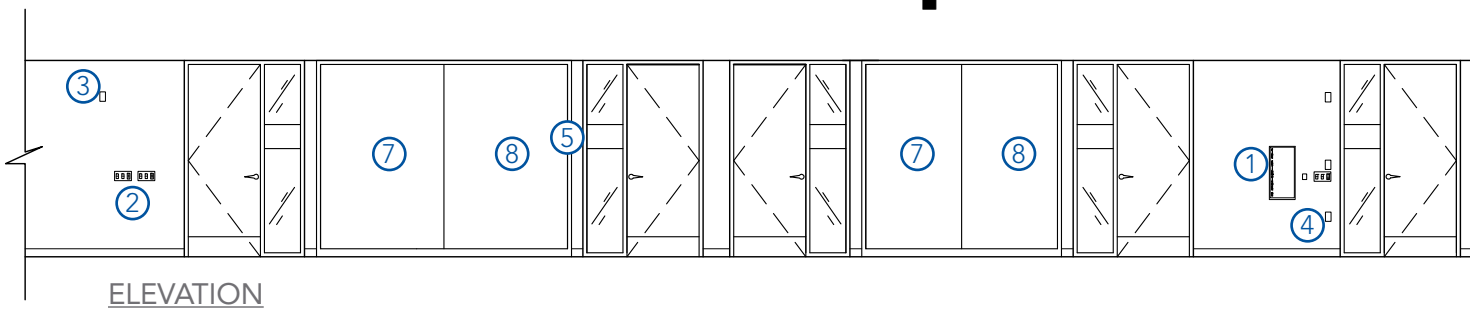
PUBLIC CORRIDOR

Public corridors adjacent to student classrooms should be comprised of highly durable materials and configured to provide students with opportunities for interaction.

PART B CORRIDORS

FACULTY OFFICE SUITE CORRIDORS - NSF





ELEVATION

LEGEND

1. Fire extinguisher cabinet
2. Light switches, thermostat
3. Strobe
4. Outlet
5. Sidelight
6. Provide power/data outlets
7. Markerboard
8. Tackboard

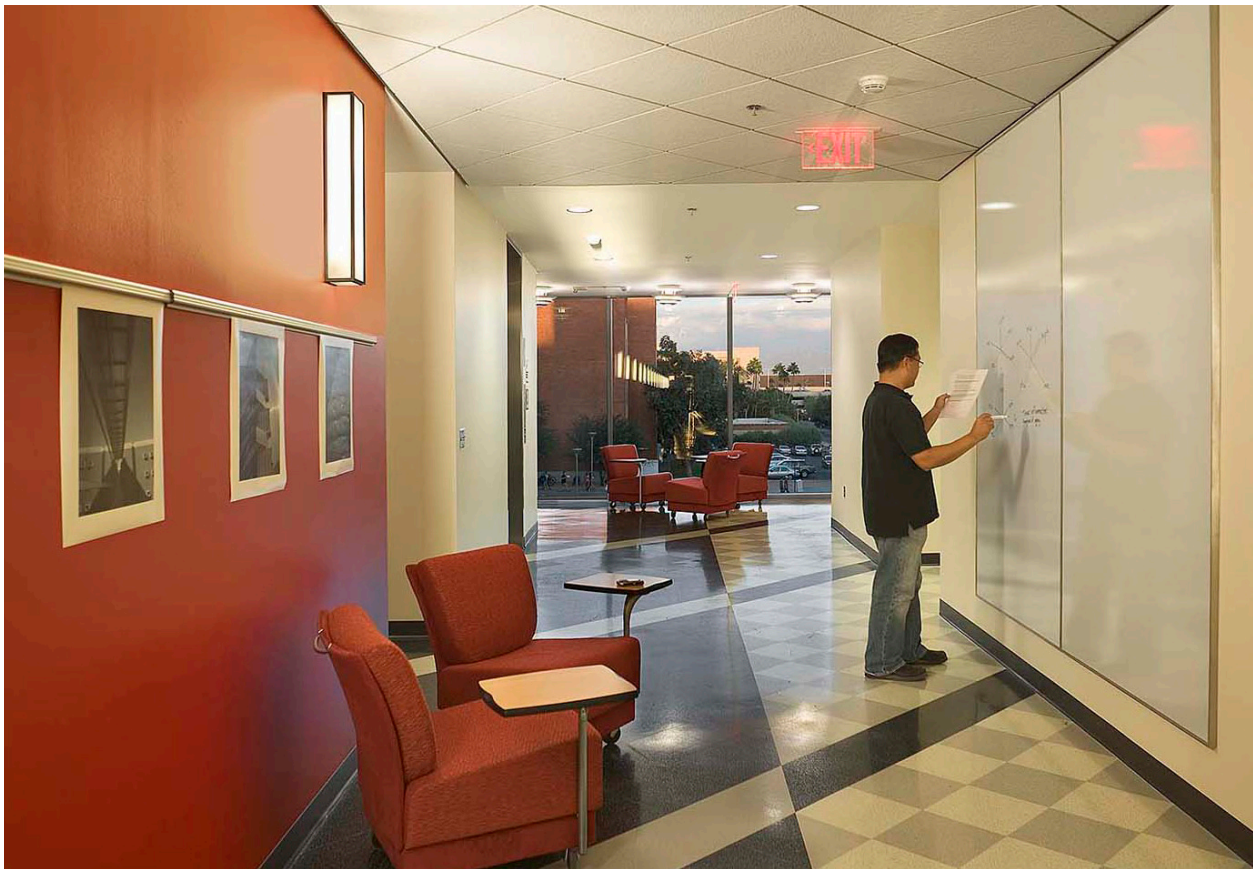
SURFACES

Floor:	Resilient flooring
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

LIGHTING

Refer to Part M

SCALE 1/8" = 1'0"



FACULTY OFFICE SUITE CORRIDOR

Faculty office suite corridors should provide space for interaction and collaboration among faculty members and between faculty and their students. Providing adequate seating groups along with tackboards and markerboards will foster this type of environment.

PART C COLLABORATIVE SUPPORT SPACES

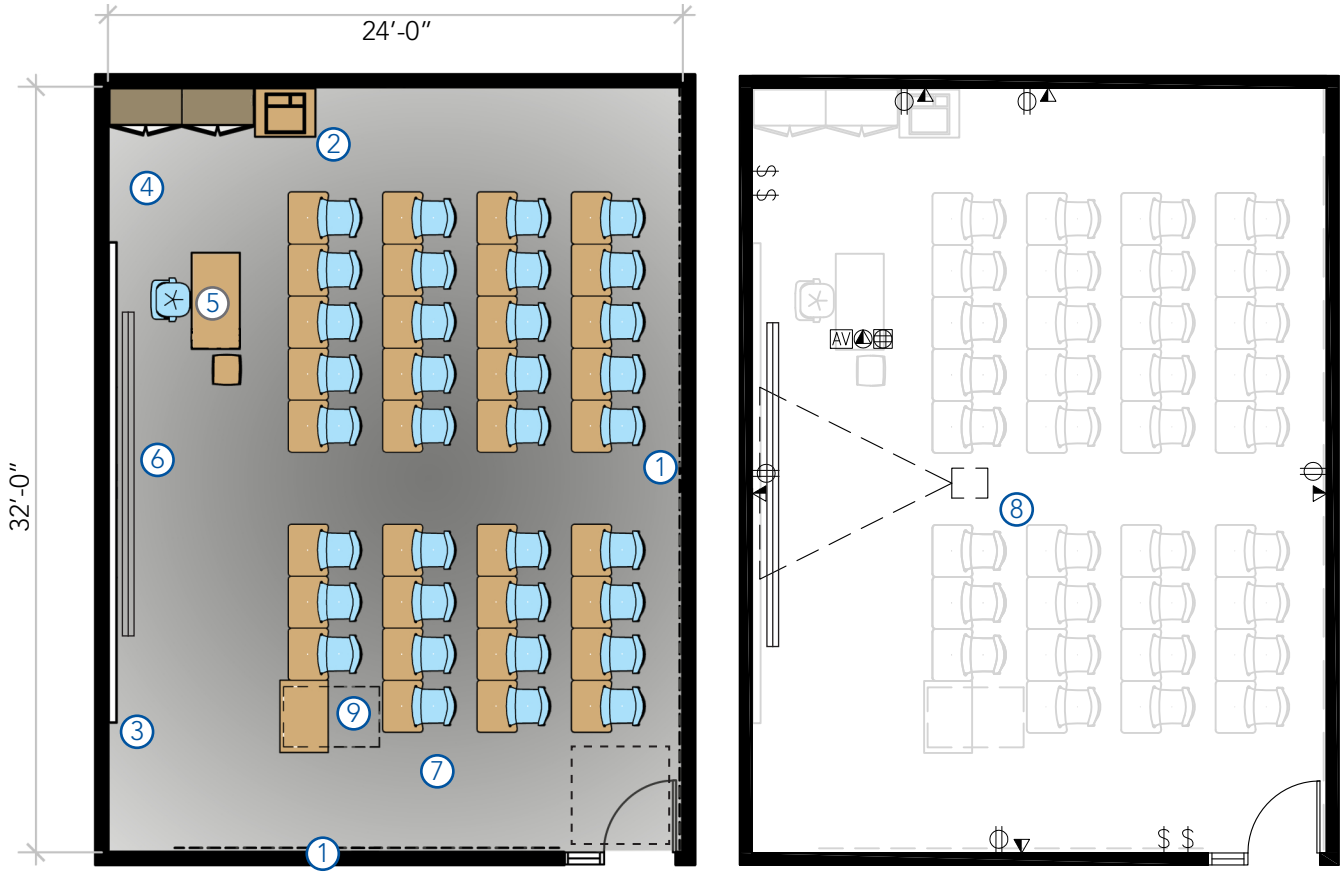
Buildings on campus should be designed with awareness and sensitivity for human interaction within the built environment. Designers should consider these often "un-planned" areas when designing new buildings and spaces and think first and foremost about the people who will occupy them. These flexible spaces should foster collaboration and social interaction as well as provide opportunities for individual focus and reflection.

Interior gathering spaces should be provided in each building, with furniture layouts that will accommodate multiple types of configurations and activities within the space. Places for rest and quiet study enhance the campus experience.

PART D CLASSROOMS

CAMPUS STANDARDS HANDBOOK - EL CAMINO COLLEGE

TRADITIONAL CLASSROOM - 765 ASF (40 SEATS)



LEGEND

1. Bulletin/tack board
2. Printer station
3. Whiteboard
4. Lockable storage cabinet
5. Instructor station with A/V equipment rack
6. Motorized projection screen
7. Chair desks
8. Projector - ceiling mounted
9. Accessible desk

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- A/V connector
- $ Light switch

SURFACES

Floor:	Resilient flooring
Wall:	Painted drywall
Ceiling Ht:	9′-0″ to 11′-0″
Ceiling Type:	Acoustical ceiling tile

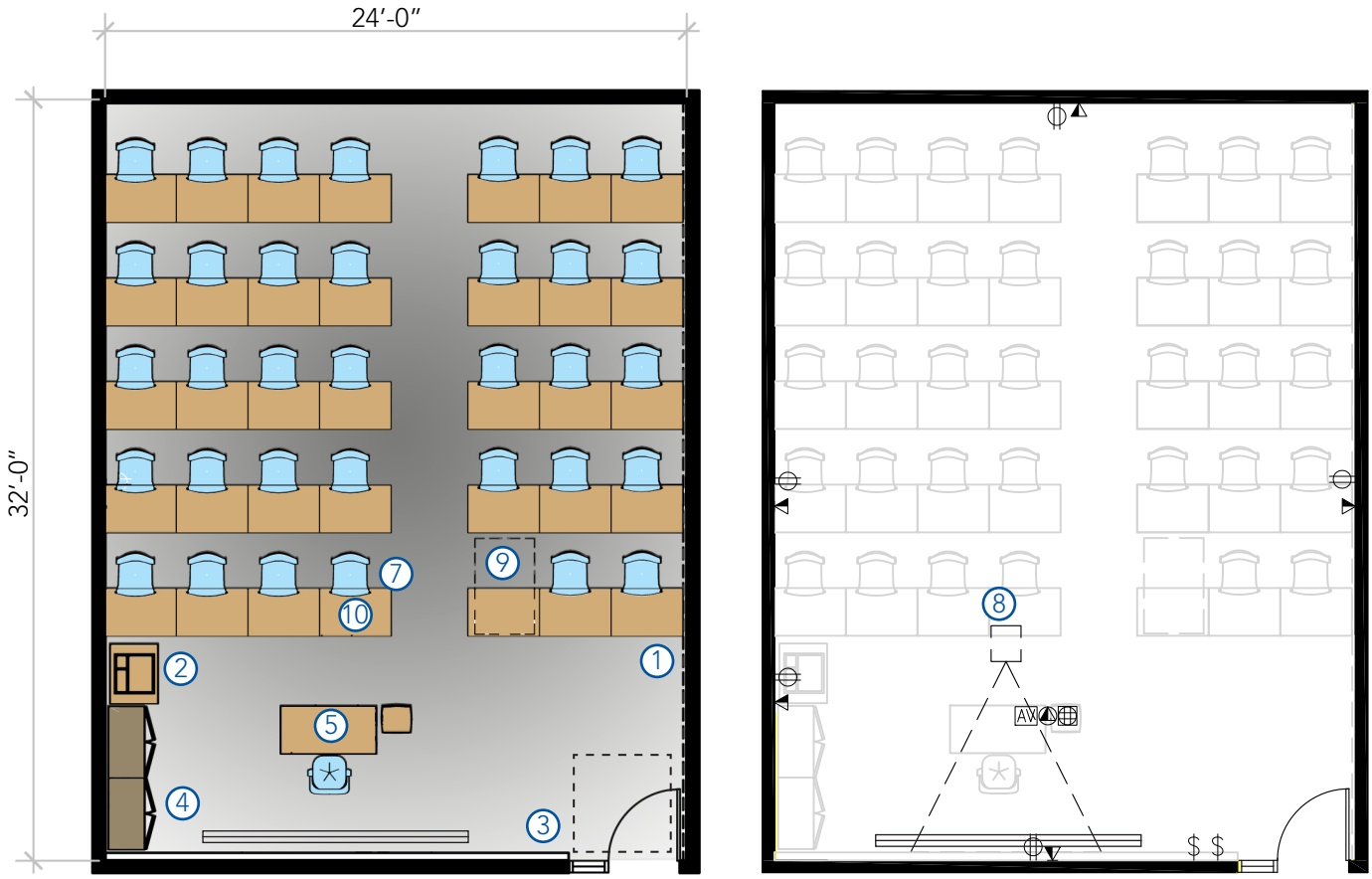
LIGHTING

Refer to Part M

0 ft 8 ft 16 ft 24 ft

SCALE 1/8″ = 1′0″

FLEXIBLE CLASSROOM - 765 ASF (35 SEATS)



LEGEND

1. Bulletin/tack board
2. Printer station
3. Whiteboard
4. Lockable storage cabinet
5. Instructor station with A/V equipment rack
6. Motorized projection screen
7. Stackable, mobile chairs
8. Projector - ceiling mounted
9. Accessible desk
10. Nesting, mobile tables

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- A/V connector
- $ Light switch

SURFACES

Floor:	Resilient flooring
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

LIGHTING

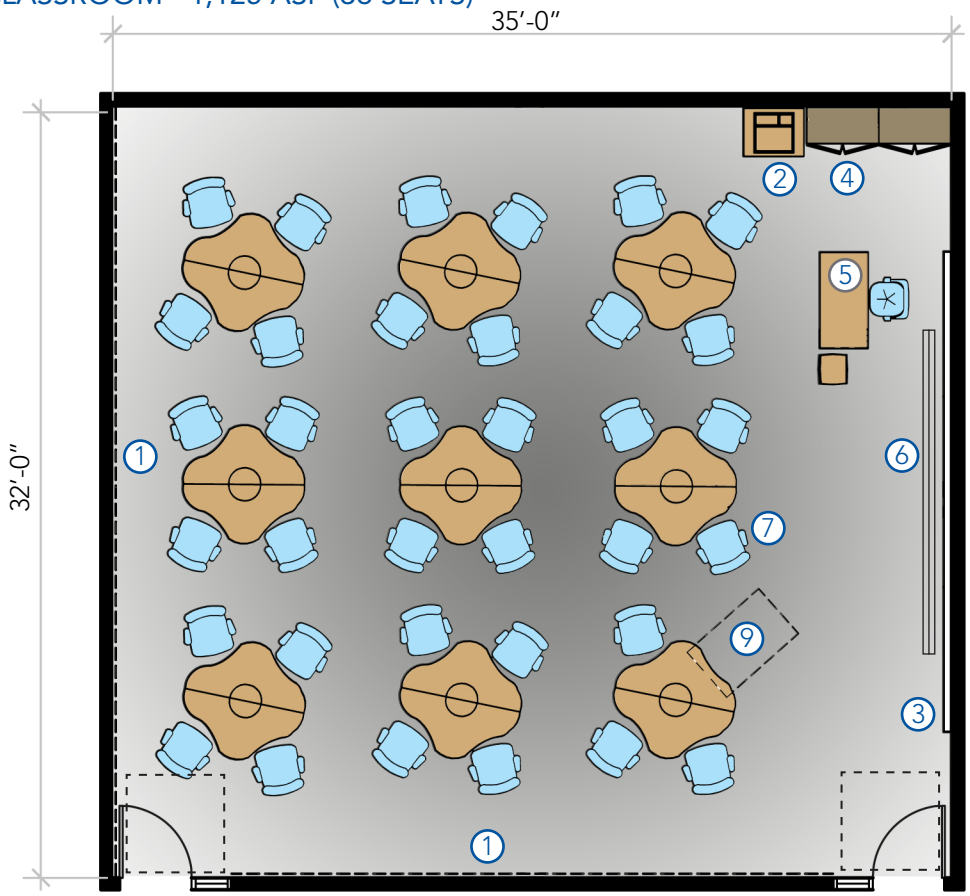
Refer to Part M

0 ft 8 ft 16 ft 24 ft

SCALE 1/8" = 1'0"

PART D CLASSROOMS

ACTIVE CLASSROOM - 1,125 ASF (36 SEATS)



LEGEND

1. Bulletin/tack board
2. Printer station
3. Whiteboard
4. Lockable storage cabinet
5. Instructor station with A/V equipment rack
6. Motorized projection screen
7. Stackable, mobile chairs
8. Projector - ceiling mounted
9. Accessible desk
10. Folding, mobile tables

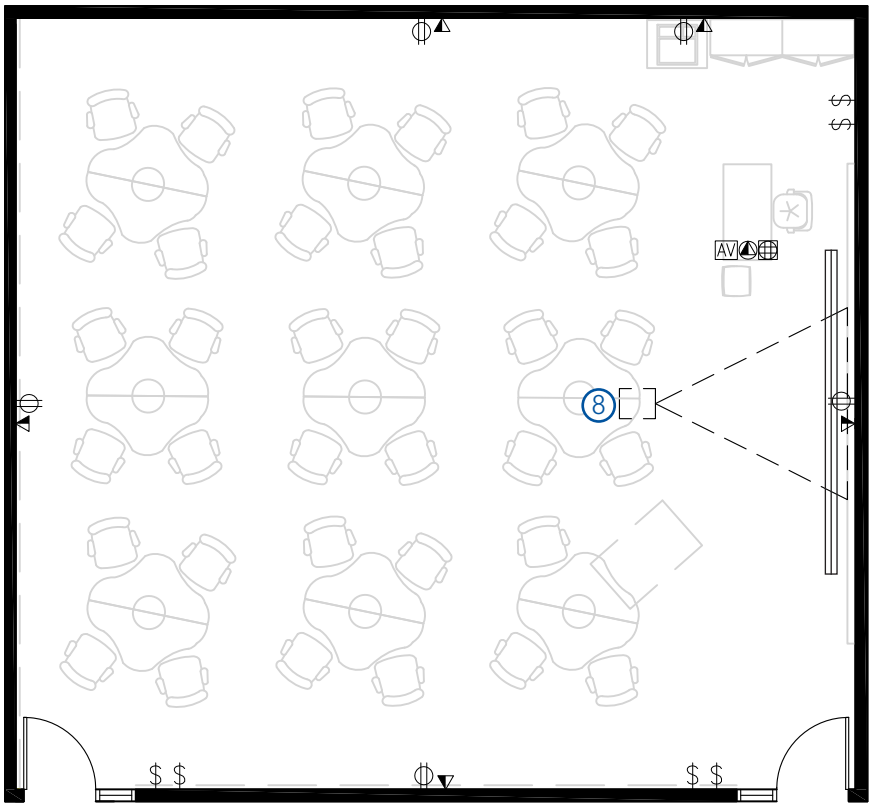
SURFACES

Floor:	Resilient flooring
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

LIGHTING

Refer to Part M

SCALE 1/8" = 1'0"



LEGEND

1. Bulletin board
2. Printer station
3. Whiteboard
4. Lockable storage cabinet
5. Instructor desk with A/V equipment rack
6. Motorized projection screen
7. Stackable, mobile chairs
8. Projector - ceiling mounted

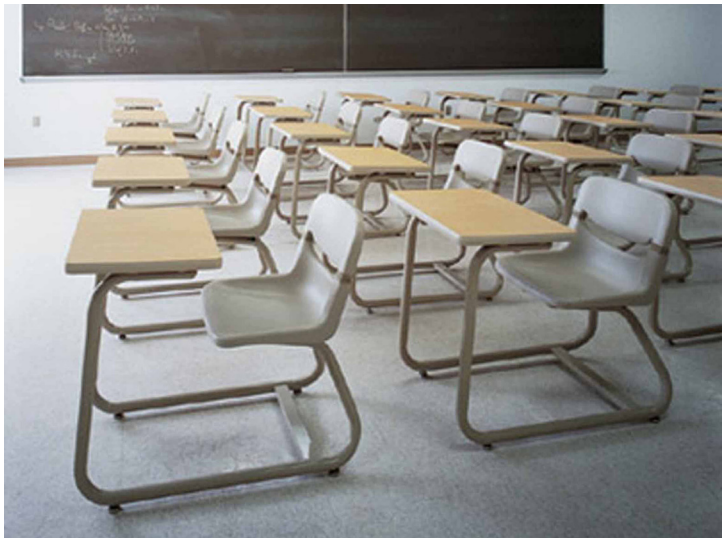
SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- AV A/V connector
- $ Light switch

0 ft 8 ft 16 ft 24 ft

SCALE 1/8" = 1'0"

PART D CLASSROOMS



TRADITIONAL CLASSROOM

Traditional and flexible classroom layouts are generally based on several key assumptions.

- Furniture consists of rows of chair desks or moveable tables and chairs.
- The room is oriented so that there is an obvious "front" suggested by the location of the writing and/or projection surface.
- The instructor's station is typically located toward the front of the room.
- Proportions are generally wider than deep for line of sight to whiteboard and instructor

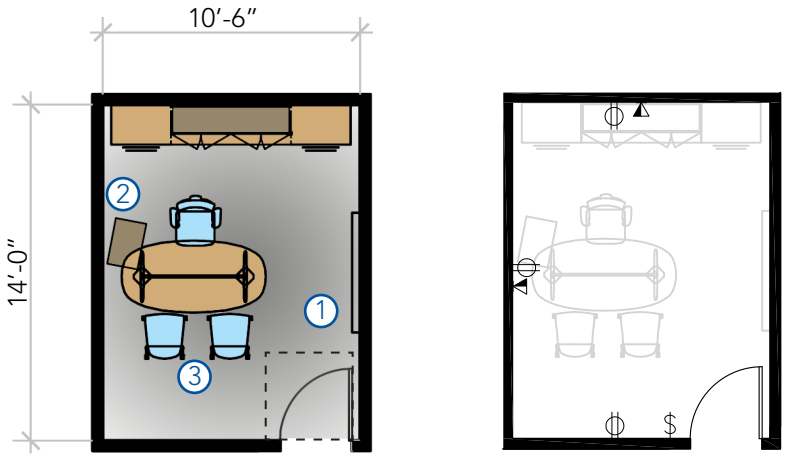
FLEXIBLE CLASSROOM

ACTIVE CLASSROOM

One important teaching trend is moving the instructor away from their didactic role as "sage-at-the-stage" to one of active facilitator. In this model of problems-based learning, students work in groups, at shared work surfaces, with chairs on wheels. Tables, which may also be on wheels, can be reoriented to allow for different workgroup methodologies. The instructor moves about the room interacting with different groups, offering suggestions and guidance. This studio classroom configuration may accommodate as few as 25 students or as many as 100.

PART E OFFICES

PRIVATE OFFICE OPTION 1 - 150 ASF
SINGLE OCCUPANCY



LEGEND

1. Whiteboard / tackboard
2. Mobile, lockable pedestal file
3. Guest seating

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- A/V connector
- $ Light switch

SURFACES

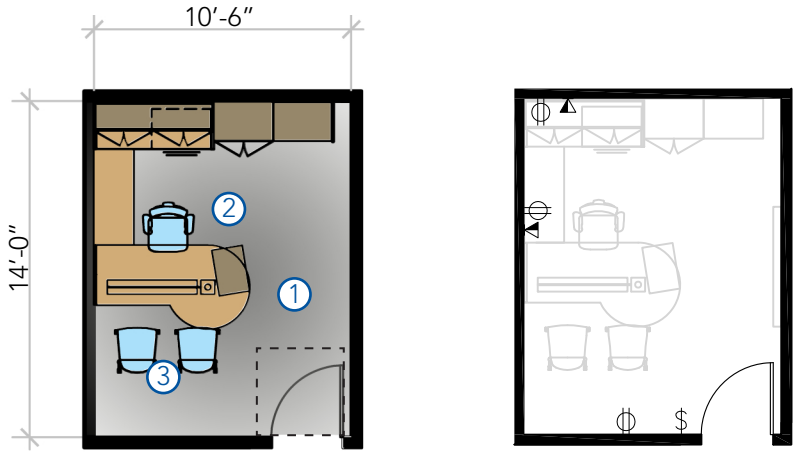
Floor:	Carpet tile
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

LIGHTING

Refer to Part M

SCALE 1/8" = 1'0"

PRIVATE OFFICE OPTION 2 - 150 ASF
SINGLE OCCUPANCY



LEGEND

1. Whiteboard / tackboard
2. Mobile, lockable pedestal file
3. Guest seating

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- A/V connector
- $ Light switch

SURFACES

Floor:	Carpet tile
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

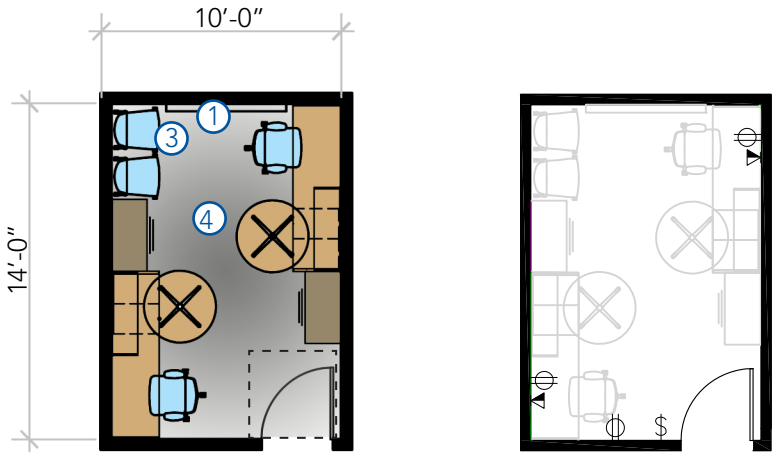
LIGHTING

Refer to Part M

SCALE 1/8" = 1'0"

PART E OFFICES

PRIVATE OFFICE - 140 ASF
DOUBLE OCCUPANCY



LEGEND

1. Whiteboard / tackboard
2. Mobile, lockable pedestal file
3. Guest seating
4. Mobile, nesting tables

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- A/V connector
- $ Light switch

SURFACES

Floor:	Carpet tile
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

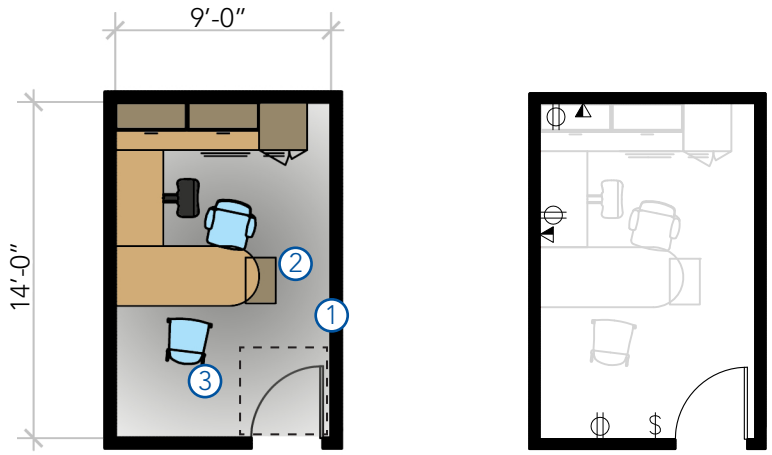
LIGHTING

Refer to Part M

0 ft 8 ft 16 ft 24 ft

SCALE 1/8" = 1'0"

PRIVATE OFFICE - 125 ASF
SINGLE OCCUPANCY



LEGEND

1. Whiteboard / tackboard
2. Mobile, lockable pedestal file
3. Guest seating

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- A/V connector
- $ Light switch

SURFACES

Floor:	Carpet tile
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

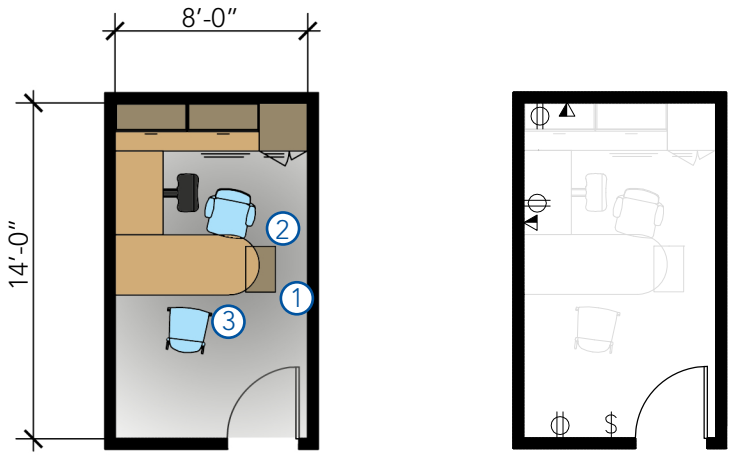
LIGHTING

Refer to Part M

SCALE 1/8" = 1'0"

PART E OFFICES

PRIVATE OFFICE - 110 ASF
SINGLE OCCUPANCY



LEGEND

1. Whiteboard / tackboard
2. Mobile, lockable pedestal file
3. Guest seating

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- A/V connector
- $ Light switch

SURFACES

Floor:	Carpet tile
Wall:	Painted drywall
Ceiling Ht:	9′-0″ to 11′-0″
Ceiling Type:	Acoustical ceiling tile

LIGHTING

Refer to Part M

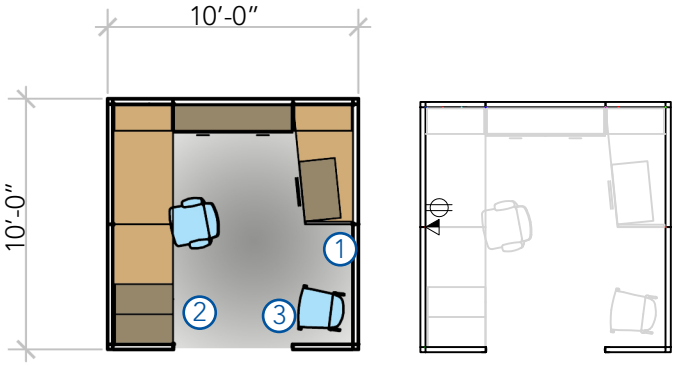
SCALE 1/8″ = 1′0″

PART E OFFICES

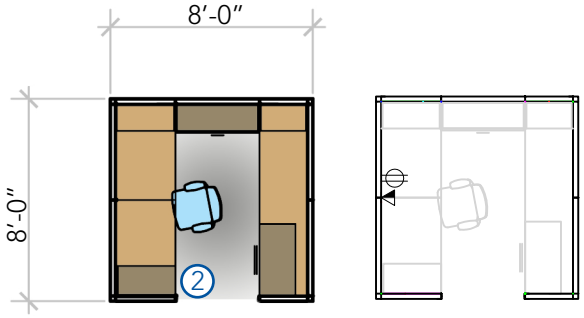
CAMPUS STANDARDS HANDBOOK - EL CAMINO COLLEGE

WORKSTATIONS

LARGE WORKSTATION
100 ASF



STANDARD WORKSTATION
64 ASF



LEGEND

1. Whiteboard / tackboard
2. Mobile, lockable pedestal file
3. Guest seating

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- A/V connector
- $ Light switch

SURFACES

Floor:	Carpet tile
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

LIGHTING

Refer to Part M

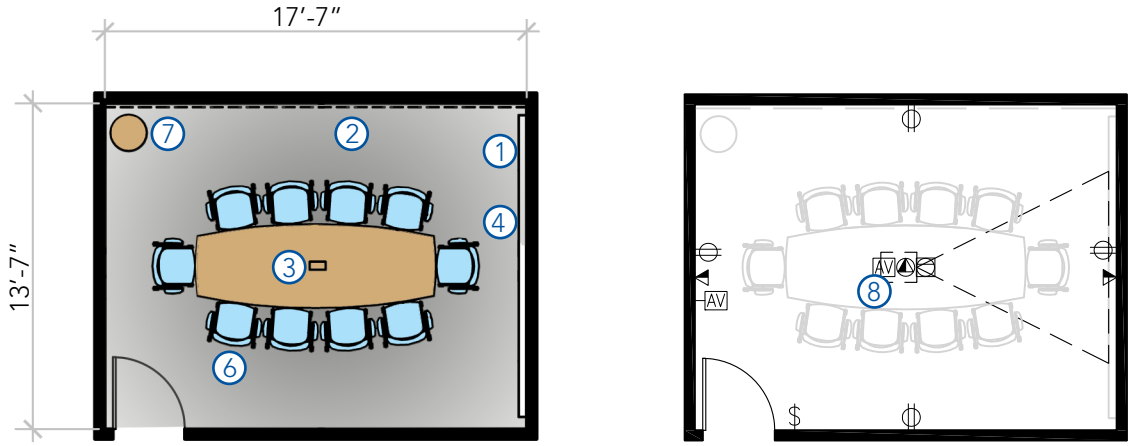
SCALE 1/8" = 1'0"

OFFICE SPACE STANDARDS

Job Category	Examples of Typical Job Titles	Space Type
Managers	Assistant Directors, Associates	150 ASF Private Office
Faculty	(Serves two faculty)	140 ASF Private Office
Supervisors	Supervisor of a unit,10 people or more	125 ASF Private Office
	Supervisor of a unit, 9 people or less	110 ASF Private Office
Technician/Specialist	Officer, Referee	100 ASF Workstation
Clerical/Acounting	Clerk	64 ASF Workstation

PART F CONFERENCE/MEETING ROOMS

SMALL CONFERENCE ROOM - 240 ASF (10 SEATS)



LEGEND

1. Whiteboard
2. Bulletin/tack board
3. Power/data access panel
4. Motorized projection screen
5. Built-in storage
6. Stackable, mobile chairs
7. Telephone table
8. Projector, ceiling mounted
9. Conference table, fixed

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- AV A/V connector
- $ Light switch

SURFACES

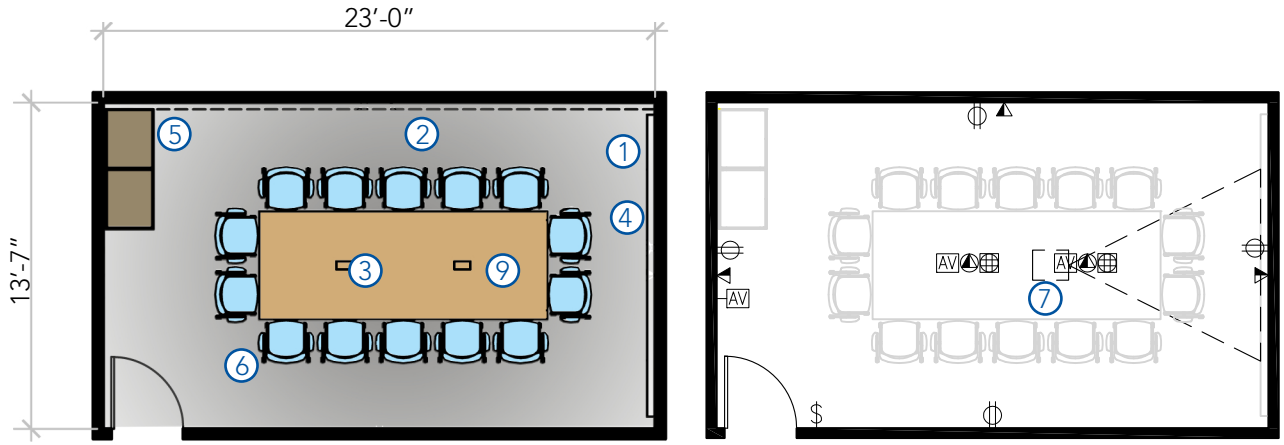
Floor:	Carpet tile
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

LIGHTING

Refer to Part M

SCALE 1/8" = 1'0"

MEDIUM CONFERENCE ROOM - 315 ASF (14 SEATS)



LEGEND

1. Whiteboard
2. Bulletin/tack board
3. Power/data access panel
4. Motorized projection screen
5. Built-in storage
6. Stackable, mobile chairs
7. Projector, ceiling mounted
9. Conference table, fixed

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- AV A/V connector
- $ Light switch

SURFACES

Floor:	Carpet tile
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

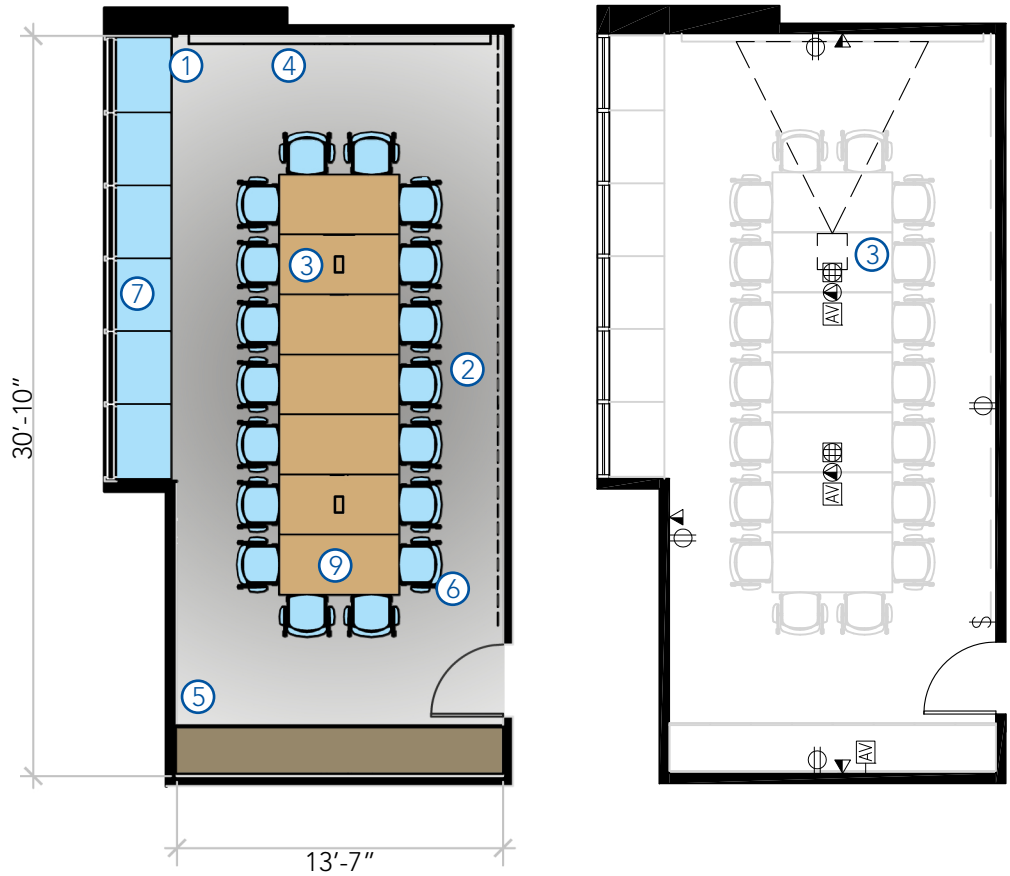
LIGHTING

Refer to Part M

SCALE 1/8" = 1'0"

PART F CONFERENCE/MEETING ROOMS

LARGE CONFERENCE ROOM - 420 ASF (18 SEATS)



LEGEND

1. Whiteboard
2. Bulletin/tack board
3. Power/data access panel
4. Motorized projection screen
5. Built-in storage
6. Stackable, mobile chairs
7. Built-in bench seating
8. Projector, ceiling mounted
9. Mobile, training tables

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- A/V connector
- $ Light switch

SURFACES

Floor:	Carpet tile
Wall:	Painted drywall
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Acoustical ceiling tile

LIGHTING

Refer to Part M

0 ft 8 ft 16 ft 24 ft

SCALE 1/8" = 1'0"

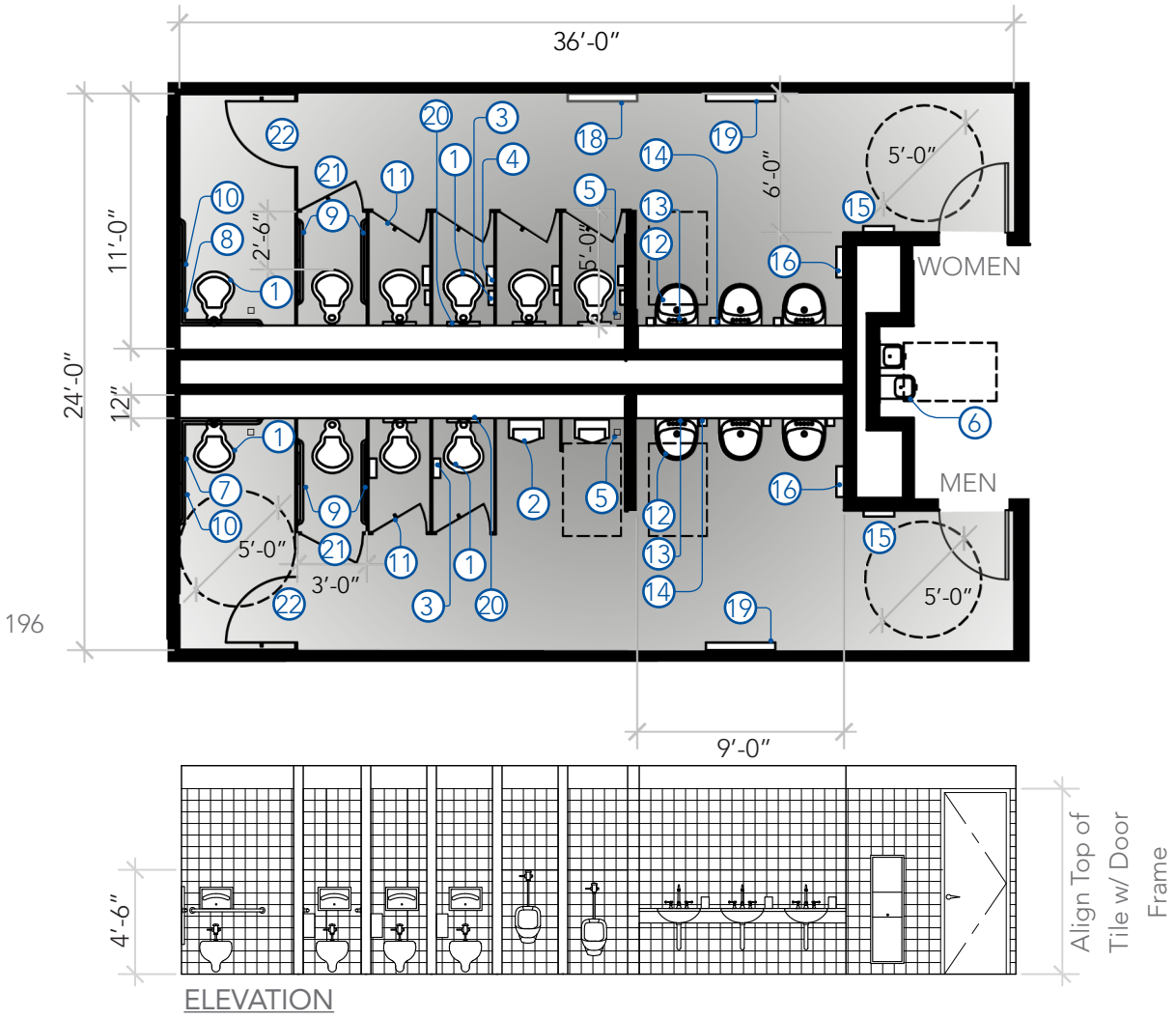
MEDIUM CONFERENCE ROOM

LARGE CONFERENCE ROOM

PART G TOILET ROOMS

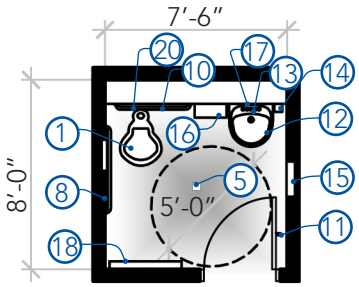
CAMPUS STANDARDS HANDBOOK - EL CAMINO COLLEGE

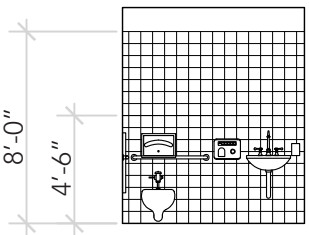
MULTIPLE ACCOMMODATION TOILET ROOM - 360 NSF (EACH OCCUPANCY)



ELEVATION

SINGLE OCCUPANCY TOILET ROOM - MINIMUM 50 NSF





ELEVATION

SCALE 1/8" = 1'0"

Toilet rooms should provide a continuous ledge, 12" in depth, spanning the area behind lavatories and toilets. This design element provides a convenient dry surface for occupants to set their personal belongings.

SURFACES

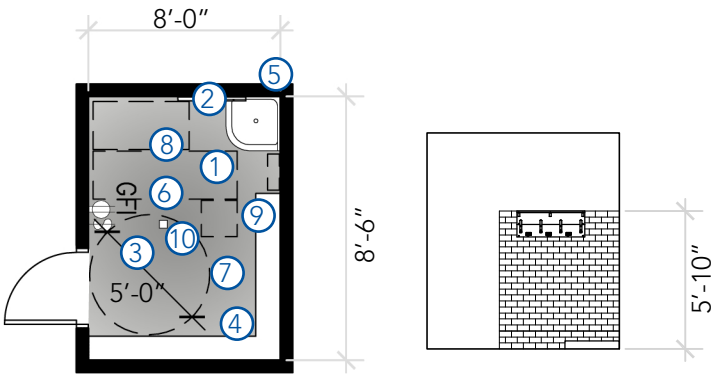
Floor:	12"x 12" porcelain tile
Base:	12"x 6" porcelain tile
Wall:	2"x 2" or 6"x 6" ceramic tile
Ceiling Ht:	9'-0" to 11'-0"
Ceiling Type:	Painted drywall

LEGEND

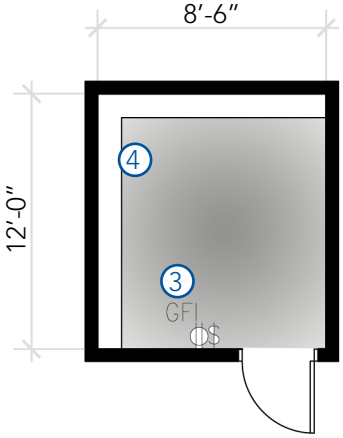
1. Water closet
2. Urinal
3. Twin jumbo roll toilet tissue dispenser - surface mount
4. Sanitary napkin disposal
5. Floor drain
6. Hi-lo drinking fountain
7. Combination toilet seat cover and toilet tissue dispenser - recess preferred
8. Combination toilet seat cover, sanitary napkin disposal and toilet tissue dispenser - recessed preferred
9. Horizontal grab bar
10. Two-wall, horizontal grab bar
11. Coat hook with bumper (2 per stall)
12. Lavatory - wall hung
13. Faucet
14. Soap dispenser - surface mount - OFCI
15. Combination paper towel dispenser and waste receptacle - recessed
16. Hand dryer - recessed preferred
17. Mirror (Staff Only)
18. Napkin/tampon vendor - recessed (Women's)
19. Diaper changing station
20. Toilet seat cover dispenser - recessed
21. Ambulatory accessible
22. Wheelchair accessible

PART H CUSTODIAL ROOMS

CUSTODIAL WET/EQUIPMENT CLOSET
MIN. 70 NSF



CUSTODIAL SUPPLY STORAGE ROOM
MIN. 100 NSF



LEGEND

1. Floor basin (mop sink) with 4″ curb
2. Mop rack/shelf with hooks
3. Ground fault interrupter (GFI) receptacle located approximately 2′-0″ AFF near door
4. Adjustable shelving - 1 foot deep by at least 15 lineal feet
5. Hot and cold water outlet with attached hose (and wall clip) for filling buckets, etc.
6. Mop cart - 2′-0″ x 6′-0″
7. Vacuum - 18″ x 18″
8. Floor machine (buffer) - 2′-0″ x 4′-0″
9. Step ladder
10. Floor drain

LIGHTING

Refer to Part M

SURFACES

Floor:	Hardened smooth concrete
Wall:	• Washable hard, smooth finish on concrete block • Glazed tile wainscot at floor basin
Ceiling Ht:	Slab to slab
Ceiling Type:	Exposed concrete or painted drywall
Door:	• 3′-0″ wide • Hollow metal frame

SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- A/V connector
- $ Light switch

0 ft 8 ft 16 ft 24 ft

SCALE 1/8″ = 1′0″

CUSTODIAL WET EQUIPMENT CLOSET

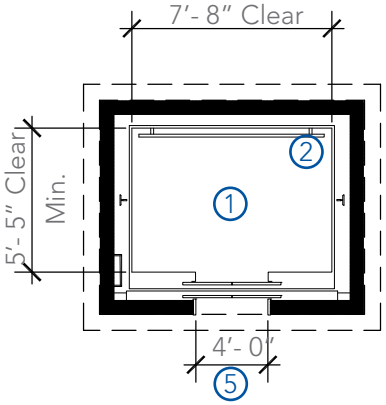
- Strategically located on all floors throughout a building.
- Locate to avoid moving equipment long distances.
- Doors shall swing out and shall be large enough to permit free movement of boxes and equipment.
- Provide adequate ventilation.

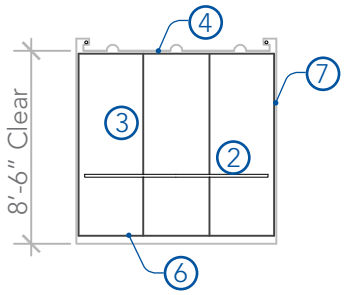
CUSTODIAL SUPPLY STORAGE ROOM

- One room per building for bulk storage of custodial supplies.
- Locate near elevator or loading dock to avoid moving equipment long distances.
- Doors shall swing out and shall be large enough to permit free movement of boxes and equipment.
- Provide adequate ventilation.

PART I ELEVATOR CABS

PASSENGER ELEVATOR - NSF





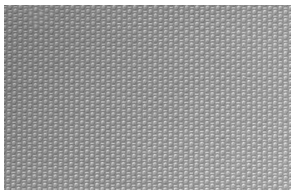
200

SURFACES

①	Floor:	Rubber tile or recessed floor pan with epoxy terrazzo / porcelain tile stone tile
②	Handrails:	#4 brushed stainless steel tubular handrail at back wall only
③	Walls:	Stainless steel wall panels
④	Ceiling:	Six panel brushed stainless steel with (6) recessed downlights and perimeter lighting
⑤		Doors and front returns: #4 brushed stainless steel (vertical)
⑥	Base:	#4 brushed stainless steel (vertical) 4″ high
⑦	Corner Reveals:	#4 brushed stainless steel (vertical)

LIGHTING

Refer to Part M

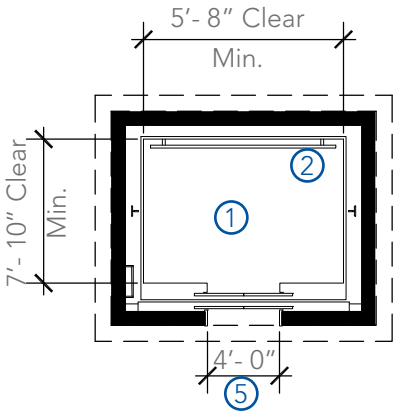


CABFORMS 1000-A

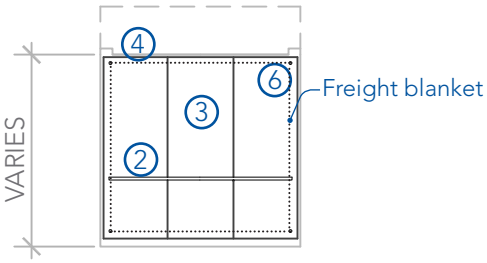
0 ft 8 ft 16 ft 24 ft

SCALE 1/8″ = 1′0″

SERVICE ELEVATOR - NSF



SIDE OPENING



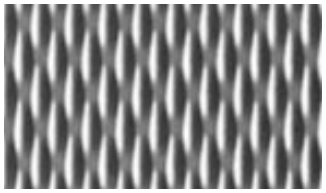
201

SURFACES

①	Floor:	Rubber tile or recessed floor pan with epoxy terrazzo / porcelain tile / stone tile
②	Rails:	#4 brushed stainless steel tubular handrail at back wall only
③	Walls:	Rigidized Metals or Rimex 5WL patterned stainless steel wall panels
④	Ceiling:	Six panel brushed stainless steel with recessed downlights or flush metal panel with cove light on four sides
⑤		Doors, front returns, base and reveals: #4 brushed stainless steel (vertical)
⑥		Freight blanket hook

LIGHTING

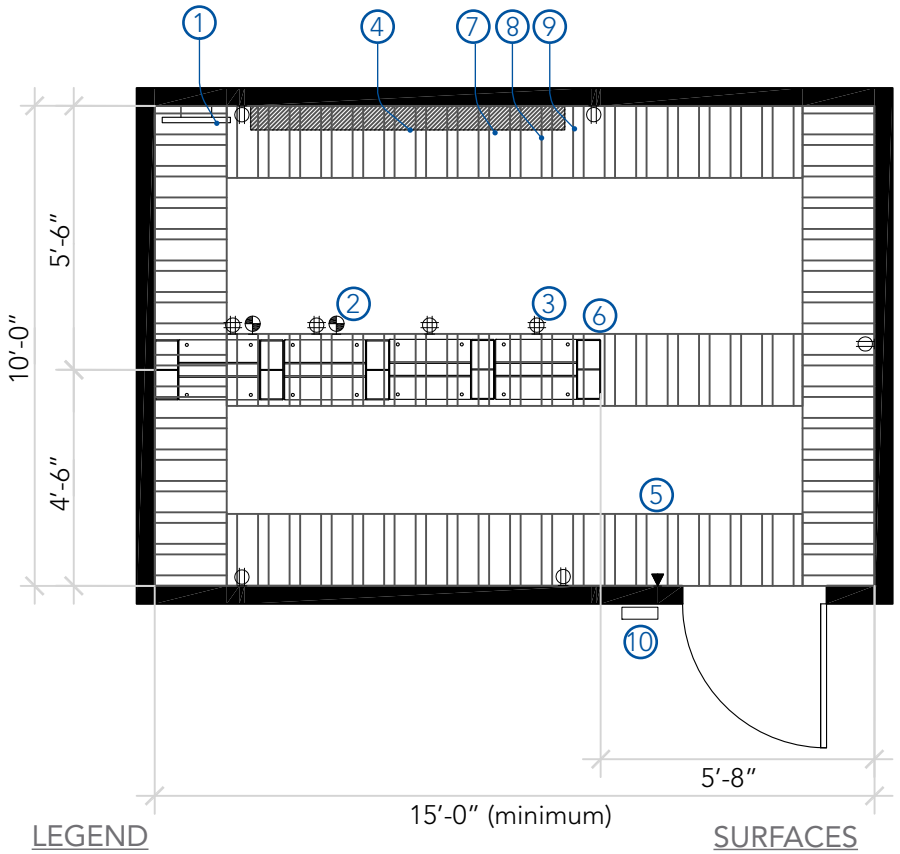
Refer to Part M



PATTERNED STAINLESS STEEL WALL PANELS

PART J TECHNOLOGY ROOMS

BUILDING DISTRIBUTION FRAME (BDF) - 150 NSF (minimum)



SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- A/V connector
- $ Light switch

LIGHTING

Refer to Part M

LEGEND

1. Telecom main grounding busbar at 18" AFF
2. 208V/30A outlet on dedicated circuit mounted on side of ladder rack
3. 120V/20A quadplex outlet on dedicated circuit mounted on side of ladder rack (typ.)
4. Wall mounted equipment
5. Wall mounted telephone
6. 19" equipment rack w/ 6" vertical cable management (typ.)
7. Convenience duplex outlet
8. 12" ladder rack @ 7'-6" AFF
9. 8'x4'x 3/4" sheets of A-C grade fire retardant treated plywood by General Contractor at all walls, plywood 2'-0"AFF to 10'-0" AFF
10. Security card access

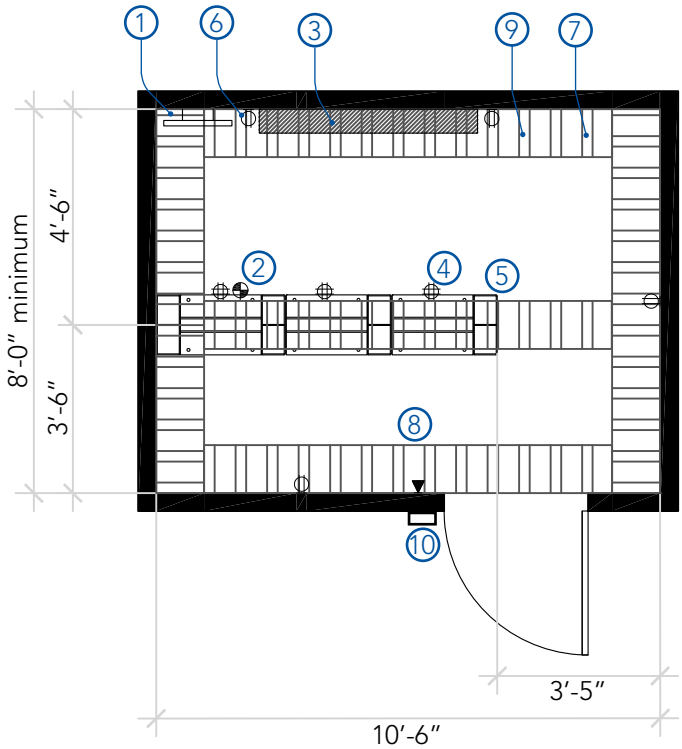
SURFACES

Floor:	Sealed concrete
Wall:	Exposed concrete, painted drywall, or hard smooth finish on concrete block wall
Ceiling Ht:	Slab to slab (8'-6" minimum)
Ceiling Type:	Underside of structure
Doors:	• 3'-0"wide solid, lockable door (no louvers in door) • Hollow metal frames • Hollow metal door for exterior doors
Notes:	• Connect to emergency power • Minimum clear height of 8'-0" clear of obstructions • No windows • Full height walls

0 ft 4 ft 8 ft 12 ft

SCALE 1/4" = 1'0"

INTERMEDIATE DISTRIBUTION FRAME (IDF) 85 NSF (minimum)



SYMBOLS

- Duplex
- Quadruplex
- Tel/Data
- Flush floor-mounted duplex
- Flush floor-mounted quadruplex
- Flush floor-mounted data
- AV A/V connector
- $ Light switch

LIGHTING

Refer to Part M

LEGEND

1. Telecom grounding busbar
2. Outlet on dedicated circuit
3. Wall mounted equipment
4. Quadplex outlet on dedicated circuit
5. 19" equipment rack w/ 6" vertical cable management
6. Convenience duplex outlet
7. 18" ladder rack @ 7'-6" AFF
8. Wall mounted telephone
9. 8'x4'x 3/4" sheets of A-C grade fire retardant treated plywood by General Contractor at all walls, plywood 2'-0"AFF to 10'-0" AFF
10. Security card access

SURFACES

Floor:	Sealed concrete
Wall:	Exposed concrete, painted drywall, or hard smooth finish on concrete block wall
Ceiling Ht:	Slab to slab (8'-6" minimum)
Ceiling Type:	Underside of structure
Doors:	• 3'-0" wide solid, lockable door (no louvers in door) • Hollow metal frames • Hollow metal door for exterior doors
Notes:	• Connect to emergency power • Minimum clear height of 8'-0" clear of obstructions • No windows • Full height walls

0 ft 4 ft 8 ft 12 ft

SCALE 1/4" = 1'0"

PART K MECHANICAL ROOMS

MECHANICAL ROOMS - NSF

- Provide adequate safe access and manufacturer's recommended working clearances for all equipment.
- Provide for replacement of the largest piece of equipment without removing permanent walls, large items of equipment or equipment essential to the principal on-going day-to-day building use.
- Provide direct access from the exterior for major mechanical rooms exceeding 100 net square feet.

In phased projects mechanical rooms shall be sized to include equipment for all the phases.

Air handling units, zone control devices, such as VAV boxes, mixing boxes, reheat coils, etc., shall also be located to provide unobstructed access to filters, bearings, manual valves, zone control devices and automatic control equipment.

VENTILATION

Mechanical rooms shall be ventilated by a thermostatically controlled fan.

SURFACES

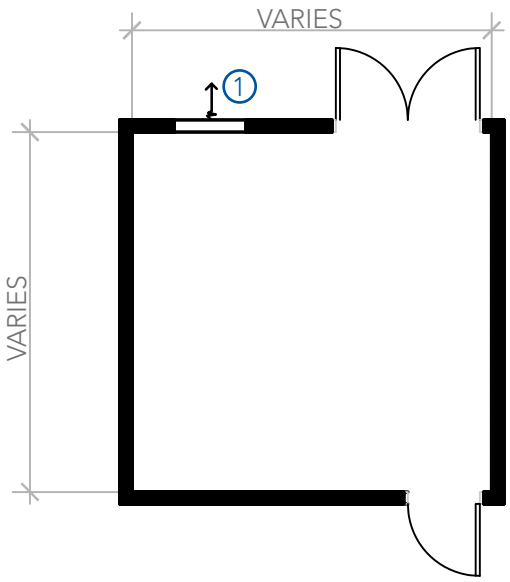
Floor:	Sealed concrete with floor drain
Wall:	Exposed concrete, painted drywall, hard smooth finish on concrete block wall
Ceiling Ht:	Slab to slab
Ceiling Type:	Underside of structure
Doors:	• 3'-0" wide, louvered door (interior) • Hollow metal frames • Hollow metal double exterior door where applicable

LIGHTING

Refer to Part M

PART L ELECTRICAL ROOMS

ELECTRICAL ROOMS - NSF



LEGEND

① Exterior wall louver (depending on room type)
② Provide concrete curbs for equipment

SURFACES

Floor:	Sealed concrete with floor drain
Wall:	Exposed concrete, painted drywall, hard smooth finish on concrete block wall
Ceiling Ht:	Slab to slab
Ceiling Type:	Underside of structure
Doors:	• 3'-0" wide, solid door (interior) • Hollow metal frames • Hollow metal double exterior door where applicable

LIGHTING

Refer to Part M

PART M INTERIOR LIGHTING APPROACH

	LOCATION	FIXTURE TYPE	LAMP SOURCE	RECOMMENDED LIGHT LEVELS	SWITCHING
PART A	Lobbies	Downlights, decorative pendants	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 10-20 FC average Task lighting: 40-50 FC average @ work plane	General lighting to be switched separately from accent and task lighting
PART B	Corridors	Fluorescent 2x2 direct/ indirect fixtures	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 10-20 FC average Task lighting: 40-50 FC average @ work plane	General lighting to be switched separately from accent and task lighting
PART C	Collaborative Support Spaces	Fluorescent 2x2 direct/ indirect fixtures	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 10-20 FC average Task lighting: 30-40 FC average	General lighting to be switched separately from accent/display lighting as well as task lighting
PART D	Classrooms	Fluorescent 2x2 direct/ indirect fixtures	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 40-50 FC average Vertical task lighting: 20-30 FC average @ display locations	General lighting to be switched separately from accent/display lighting as well as fixtures located adjacent to projection screen
PART E	Offices	Fluorescent 2x2 direct/ indirect fixtures	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 20-30 FC average Task lighting: 40-50 FC average @ work plane	General lighting to be switched separately from accent/display lighting as well as task lighting
	Workroom	Fluorescent 2x2 direct/ indirect fixtures	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 20-30 FC average Task lighting: 40-50 FC average @ work plane Vertical task lighting: 20-30 FC average @ display locations	General lighting to be switched separately from accent/display lighting as well as task lighting
	Faculty Lounge	Fluorescent 2x2 direct/ indirect fixtures	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 10-20 FC average Food prep counters: 20-30 FC average @ work plane	General lighting to be switched separately from accent/display lighting and task lighting at counters

	LOCATION	FIXTURE TYPE	LAMP SOURCE	RECOMMENDED LIGHT LEVELS	SWITCHING
PART F	Mail Room	Fluorescent 2x2 direct/ indirect fixtures	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 20-30 FC average Task lighting: 40-50 FC average @ work plane	General lighting to be switched separately from task lighting
	Conference/ Meeting Rooms	Fluorescent 2x2 direct/ indirect fixtures	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 20-30 FC average Task lighting: 40-50 FC average @ work plane Vertical task lighting: 20-30 FC average @ display locations	General lighting to be switched separately from accent/display lighting as well as task lighting For areas requiring low light level for projection, task lighting systems should be dimmable to at least 5%
PART G	Toilet Rooms	Downlights, cove lighting at back of stalls and sink	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 10-20 FC average Vertical lighting @ mirrors: 20-30 FC average	Lighting to be switched on one zone
PART H	Custodial Rooms	Surface or pendant mounted fluorescent utility lights	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 10-20 FC average	Lighting to be switched on one zone
PART I	Elevator Cabs	Downlights or cove light on four sides	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 5-10 FC average	Lighting to be switched on one zone
PART J	Data Rooms	Surface or pendant mounted fluorescent utility lights	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 10-20 FC average Equipment task lighting: 20-30 FC average	Lighting to be switched on one zone Locate lighting a minimum of 8’-6” AFF
PART K/L	Mechanical/ Electrical Rooms	Surface or pendant mounted fluorescent utility lights	All fluorescent and CFL: 3500K All LED sources: 3000K - 3500K	General lighting: 10-20 FC average Equipment task lighting: 20-30 FC average	Lighting to be switched on one zone

8 SPECIFICATIONS, STANDARDS & SYSTEMS

INTRODUCTION

The purpose of these guidelines is to help assure that all projects on campus that involve engineered structural are designed and constructed in accordance with applicable building codes, related professional standards and publications, as well as prevailing standard of care and best practices for structural engineering services.

These guidelines are not comprehensive and should be used in conjunction with the most current applicable codes and regulations at the time for each individual development project.

Div 2 EXISTING CONDITIONS

02 41 13 SELECTIVE SITE DEMOLITION

- Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties

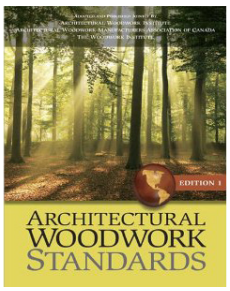
02 41 13 STRUCTURE DEMOLITION

- Do a full demolition of everything within limit line, including foundations. Everything is demolished if not serving something else.

Div 6 WOOD, PLASTICS and COMPOSITES

06 41 00 ARCHITECTURAL WOOD CASEWORK

- Refer to Division 12 for countertops.
- Wood-Veneer-Faced Architectural Cabinets: Materials, workmanship and installation shall be "Custom Grade" in accordance with Architectural Woodwork Standards (AWS).
- Casework shall be factory finished unless noted otherwise.
- Plastic Laminate Clad Architectural Cabinets: Materials, workmanship and installation shall be "Custom Grade" in accordance with Architectural Woodwork Standards (AWS).
- All exposed and semi-exposed surfaces of casework shall be finished in specified high pressure decorative laminate (HPDL).
- All cabinet interiors shall be finished in melamine
- Avoid use of plastic laminate on countertops.
- Substrate: MDF - Sierra Pine Medite II (no added formaldehyde)



CASEWORK HARDWARE	
Hinge Manufacturer: Blum Model: CLIP top 170 degree concealed hinge Finish: Nickel-plated steel	
Pulls Manufacturer: Doug Mockett Model: DP3B Tab pull Finish: Satin nickel	
Drawer Slides Manufacturer: Accuride Model: 9301 Series, full extension, heavy duty slides Finish: Clear zinc (C)	
Shelf Supports Manufacturer: U.S. Futaba Inc. Model: Medium duty application, continuous line bore in millwork cabinet with spoon type supports Finish: Nickel	
Cabinet Locks Manufacturer: Olympus Model: Style 100DR & 200DW. Door and drawers to have small finger pulls (No Cam Locks), with National Keyway 5 pin master keyed. Finish: US 26D Satin chrome	

Div 7 THERMAL and MOISTURE PROTECTION

*** Entire section to be reviewed and coordinated with National Roofing Consultants, Inc.**

NRC

07 19 00 WATER REPELLENTS

- Evonik Industries, Protectosil AQUA-TRETE Concentrate
- Waterborne saline with a VOC content of 90g/L.

07 21 00 THERMAL INSULATION

- Free of formaldehyde and asbestos

07 22 16 ROOF BOARD INSULATION

- Core shall be HCFC-free

07 54 24 FULLY-ADHERED THERMOPLASTIC ROOFING

- Acceptable Manufacturers: Sika Sarnafil or Johns Manville
- Fully-adhered feltback thermoplastic PVC membrane roofing system installed over concrete substrate.

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NEED NEW INFO FROM NRC

Div 8 OPENINGS

08 10 00 DOORS AND FRAMES

- Exterior:
  - Hollow metal doors, Steelcraft "L" Series 16ga honeycomb core, galvanized, capped on top and with galvanized 14ga steel frames.
  - Storefront doors to have wide stiles doors to accommodate 98 devices.
- Interior:
  - Solid core wood doors with 16ga steel frames; use knockdown frames at interiors.

08 50 00 WINDOWS

- Locate and specify windows, when possible, to enable convenient window cleaning by occupants and maintenance personnel.
- Pivoting windows or easily accessible windows for cleaning are desirable.

08 71 00 DOOR HARDWARE

- Contact Ingersoll Rand to write the hardware specification (Section 08710) for all district projects.
- District personnel are trained in the installation and maintenance of the material and the maintenance department owns considerable stock of material for repair work. The district is not prepared to accommodate the adoption of additional hardware as the hardware standard in place serves the campus well.
- Ingersoll Rand contact: Igor Telyatnikov (626) 359-5555
- District master locksmith: Roy Dietz (310) 660-3593 x. 3067

HARDWARE TYPE	USE	NOTES	
Locksets	General	Mortise: Schlage L9000L-06A series	
	Exterior classrooms and exterior student/ public restrooms	L9076L-06A less outside lever trim with Ives VR900 Series pull	
	Student/public restrooms with fire-rated doors	L9070L-06A	
	Staff restrooms both interior and exterior	L9080L-06A	

08 71 00 DOOR HARDWARE (CONTINUED)

HARDWARE TYPE	USE	NOTES	
Electrified Locksets	General	Mortise: Schlage L9000L-EL/ EU-06A Series. Design for all construction Less Cylinder	
Key System	General	ASSA V-10 System. ID#6DA1475 A97/95 Master Keyed-Sargent Key System	
Cylinders	General	ASSA V-10 Interchangeable Core	
Padlocks	General	6621 (6721NRWO) Master Pro Series with ASSA V-10 cylinders. #V-10 #V65611 Comp/ MK A97	
Exit Devices	General	Von Duprin CD98 Series. Use non-keyed mullions plus rim panic devices at pairs. Specify 6" wide stiles and rail type doors.	
	Non rated openings	Ives VR900 series pull handle	
Electrified Exit Devices	Non rated openings	Von Duprin EL 98 series	
	Rated openings	Von Duprin 996L-F lever trim	
Mullions	General	Von Duprin 4954 Series use KR4954 with MT54 storage bracket kit	
Surface Closer	Exterior	LCN 4041 Series x H-EDA arms at out swinging doors	
	Interior	LCN P4041 Series (Push Side) All closers to be thru bolted	
Floor Closers	New	Do not specify	
	Existing	Remove and replace with continuous hinges if conditions permit.	

08 71 00 DOOR HARDWARE (CONTINUED)

HARDWARE TYPE	USE	NOTES	
Low Energy Power Operators	General	LCN Senior Swings 9000 Series, LCN 4600 Series. LCN mounting plate and bodyguard/safety sensors for all operators.	
Coordinators	General	Ives COR Series as detailed	
Auto-Flush Bolts	General	Ives FB30-40-50-60 Series	
Astragals			
Power Supply	General	Von Duprin PS873-2 Note: Add AO to nomenclature when using auto operator	
Power Transfer	General	Von Duprin EPT10	
Pivots	General	Ives 7200 Series	
Hinges	Exterior	Markar FM-300 HT Continuous Hinges	
	Interior	Markar FM-300 Continuous Hinges	
Overhead Stops	General	Glynn Johnson 90 Series. Use only where floor or wall stops are inadvisable. When used, use heavy weight hinges or continuous hinges.	
Floor Stops	Exterior	Ives FS18S	
	Interior	Ives FS436/FS438 Series	
Wall Stops	On Interior Doors Only	Ives 50/60C Series (Use only when necessary) or Trimco	

08 71 00 DOOR HARDWARE (CONTINUED)

HARDWARE TYPE	USE	NOTES	
Door Plates	Kickplates	Ives 8400 Series, 10"H x 2" less than door width (1" LDW at non-mullioned pairs)	
	Push/Pull Plates	Ives 8200 Series and 8303-8 Series or Trimco	
	Anti-Vandal Plates	Ives VR900 Series & Trimco 1097HASP Pull with 33 Series devices	
Door Seals and Thresholds	General	Pemko	
Key Cabinets	General	HPC, Lund or Telkey. Size of cabinet to be appropriate to door count	

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08 71 13 AUTOMATIC DOOR OPERATORS

08 74 00 ACCESS CONTROL HARDWARE

08 80 00 GLAZING

- Each piece of glass furnished shall bear the manufacturer's label identifying name of manufacturer, proprietary brand name and product number, and quality, grade and thickness.

Div 9 FINISHES

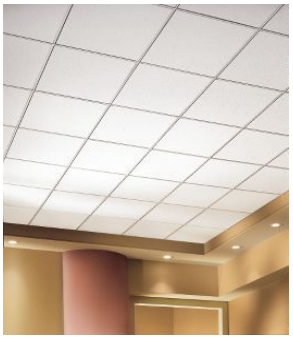
09 20 00 PLASTER AND GYPSUM BOARD

- Lightly textured finish.
- Smooth finish may be used in specific areas if approved by college.

09 30 00 TILING

- Wall tile modular to floor:
  Ceramic, 1"x1", 2"x2", 6"x6"
- Floor tile:
  Porcelain, 12"x12"
- Base:
  Porcelain to match floor tile, coved, 12" x 6"H
- Solid Surface or Stone Thresholds
- Installation:
  Floor: mortar-bed
  Walls: thin-set
- Colors and shades of selected tiles shall be of medium intensity (not so light as to easily show soiling, or so dark as to show dust and lint).
- Provide dark color grout - submit sample for review and approval by college.

09 51 00 ACOUSTICAL CEILINGS



- Acoustical Tile
  Manufacturer: Armstrong Ceilings
  Style : Ultima Beveled Tegular
  Color: White
  Size: 24 x 24
- Suspension System
  Manufacturer: Armstrong
  Grid: 9/16" Suprafine, heavy-duty suspended grid
  Color: White or factory painted Satin Silver

09 54 00 SPECIALTY CEILINGS

- As approved by college on a per project basis

09 65 00 RESILIENT FLOORING

- Vinyl Tile / Sheet Vinyl
- Linoleum / Sheet Linoleum
- Rubber Tile / Sheet Rubber
- Resilient flooring is required under fixed floor cases and cabinets

09 65 13 RESILIENT BASE AND ACCESSORIES

- Rubber base:
  - 4" High, 120' coiled material
  - Coved with toe at resilient flooring
  - Straight (toeless) at carpet
- Reducer strip:
  - Minimal profile at transitions from carpet to vinyl or other flooring
- Stair accessories:
  - Integral tread and riser
  - Stringer to match tread and riser

09 68 00 CARPET

- Manufacturer: Tandus Flooring
- Sizes: 24" X 24" Tile
  6'-0" Powerbond
- Backing: Vinyl cushion backing system with pre-applied adhesive
- Installation: Per Manufacturer's suggestions
- Colors and shades selected should be of medium intensity (not so light as to easily show soiling, or so dark as to show dust and lint). Multi-colored heathers and non-directional patterns are desirable for their soil-hiding capability. Solid color carpet should not be used.

Tandus

09 72 19 Vinyl Coated Fabric Covered Tack Surfaces

- Manufacturer: Decoustics
- Style : H.I.R. #1
- Thickness: 1"
- Edge: Square Resin Edge
- Fabric: TBD

09 91 00 PAINTING

- Materials shall be top-of-the-line products by firms with over 5 years manufacturing experience with a full product line. Prime coats and finish coats for any 1-paint system shall be the products of the same manufacturer.
- Paint products shall be low or zero VOC, low odor type, where available for the type of paint required.
- Backprime all wood installed against steel, concrete, plaster, or tile, and all wood with surfaces exposed in exterior locations.
- A single color matching walls and ceilings shall be used on all surfaces. Visible surfaces behind vents, grilles, etc., shall be painted flat black. Insides of all drawers, shelves inside cabinets, and other wood surfaces where scheduled or noted shall be given one coat of clear gloss lacquer, or clear polyurethane-base varnish.
- Handrails and railings shall be factory painted.

09 96 00 HIGH-PERFORMANCE COATINGS

- Graffiti-resistant coatings:
  - Silicone-based at concrete / CMU surfaces
  - 2-part aliphatic polyurethane clear coats at painted surfaces
- Provide marine coatings at exterior handrails and railings

Div 10 SPECIALTIES

10 11 00 VISUAL DISPLAY SURFACES

- Markerboards
  Porcelain-on-steel writing surface
  Claridge LCS-II "low gloss" with satin anodized aluminum

- Tackboards
  Natural cork
  Claridge Tackboards with satin anodized aluminum frame

10 21 13 TOILET COMPARTMENTS

- Manufacturer: Scranton
- Color: Smooth black or paisley
- Material: Solid Plastic
- Floor to Ceiling Pilaster and Urinal Screens
- Stainless steel continuous hinge
- Stainless steel continuous wall brackets

10 26 13 CORNER GUARDS

- Stainless Steel

10 28 13 TOILET ACCESSORIES

DESCRIPTION		
Waste receptacle		
B6	Combination paper towel dispenser and waste receptable Manufacturer: Bobrick Model: B-3961 Mount: Recessed Finish: Stainless steel	
Hand dryer - as approved by college		
C1	Hand dryer - surface mounted, rapid dry electric Mitsubishi Jet Towel Comac Blast, color: Grey	 
C2	Hand dryer - recess mounted, rapid dry electric Excel Dryer Xlerator with recess kit World SMARTdri with recess kit	 
Toilet seat cover dispenser		
D1	Toilet seat cover dispenser Manufacturer: Bobrick Model: B-3013 Mount: Recessed Finish: Stainless steel	
Toilet tissue dispenser		
E	Twin jumbo roll toilet tissue dispenser - surface mount Manufacturer: Bobrick Model: B-2892 Mount: Surface	
E7	Combination toilet seat cover and toilet tissue dispenser - recess mount Manufacturer: Bobrick Model: B-3474 Finish: Stainless steel *At accessible stalls only (Men)	

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10 28 13 TOILET ACCESSORIES (CONTINUED)

DESCRIPTION		
E10	Combination toilet seat cover, sanitary napkin and toilet tissue dispenser - recess mount Manufacturer: Bobrick Model: B-3574 Finish: Stainless steel *At accessible stalls only (Women)	
Soap dispenser		
F	Soap dispenser Manufacturer: Unisource Model: Foaming soap dispenser, 10380190 Mount: Wall surface mounted (vertical tank) * Owner furnished contractor installed	
Mirror		
G	Framed Mirror Mount: Surface Finish: Stainless steel	
Napkin/tampon vendor		
H1	Napkin/tampon vendor Manufacturer: Bobrick Model: B-37063 Mount: Recessed Finish: Stainless steel	
Sanitary napkin disposal		
J	Sanitary napkin disposal Manufacturer: Bobrick Model: B-270 Mount: Surface Finish: Stainless steel	

10 28 13 TOILET ACCESSORIES (CONTINUED)

DESCRIPTION		
Grab bar		
K	Horizontal grab bar Manufacturer: Bobrick Model: B-6806 series Mount: Surface Finish: Stainless steel * Provide lengths as required	
Underlavatory guards		
L	Underlavatory guard, molded vinyl covering Manufacturer: IPS Corporation Model: Soft Guard Plus * Avoid use if using specified lavatory - see Division 22	
Diaper changing station		
M	Diaper changing station Manufacturer: Bobrick Model: KB110-SSRE Mount: Recessed Finish: Stainless steel	
Utility shelf/holder		
N1	Utility shelf with mop/broom holder and rag hooks Manufacturer: Bobrick Model: B-239 Mount: Surface	
Hooks		
P	Coat hook with bumper Manufacturer: Bobrick Model: B-212 Mount: Surface *2 coat hooks per stall standard	

10 44 13 FIRE EXTINGUISHER CABINETS

- Fire Extinguisher Cabinets
  Manufacturer: Potter Roemer
  Model: "Dana" 7250-7265 series, stainless steel, with duo-vertical panel with rolled radius return, provide fire rated as required
  Mount: Recessed
  Finish: #304 stainless steel with #4 finish
  Lettering: Vertical ascending in red (-VAR)

- Valve Cabinet
  Manufacturer: Potter Roemer
  Model: "Dana" 8260-8265 series, stainless steel, with duo-vertical panel with rolled radius\ return, provide fire rated as required
  Mount: Recessed
  Finish: #304 stainless steel with #4 finish
  Lettering: Red (-RH)

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10 81 13 BIRD CONTROL DEVICES

- Dura-Spike by Bird Barrier
- All Stainless Steel
- Installation: Glue or screw base to any surface
- Location of use: Ledges, parapet caps, roof peaks, chimneys

Div 11 EQUIPMENT

11 12 00 PARKING CONTROL EQUIPMENT

- Ventek International - System VI

11 52 13 PROJECTION SCREENS

- Projection Screen
  Manufacturer: Da-Lite
  Model: Advantage Manual with CSR
  Mount: Ceiling recessed
  Operation: Manual
  Viewing surface:

- Projector Equipment Support
  Manufacturer: Peerless Industries
  Model: CMJ500-EXT lightweight adjustable suspended ceiling kit
  Color: White

Div 12 FURNISHINGS

12 24 13 ROLLER SHADES

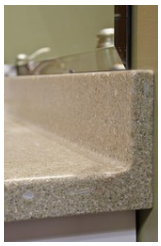
- Manual operating, double solar and room darkening blackout shades, independent operation
- Manufacturer: Mechoshades
- Shadecloth: Thermoveil 1600 medium vertical weave, 5-6% openness factor
- Blackout material: 0700 group fiberglass-coated fabric

12 30 00 CASEWORK

- See Division 6

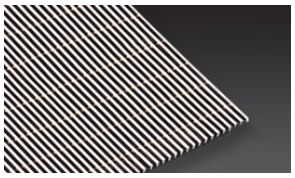
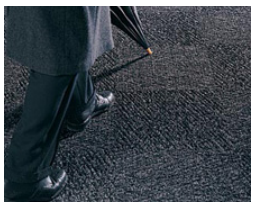
12 36 00 COUNTERTOPS

- Solid surface
- Epoxy
- Stainless steel
- Or other approved material
- Avoid use of plastic laminate for countertops
- Integral curb
- Edge: Squared self edge



12 48 13 ENTRANCE FLOOR MATS AND FRAMES

- Employ permanent entryway systems to capture dirt, particulates, etc. from high volumn building entryways

SPECIFICATIONS	
Manufacturer: Construction Specialties Pedisystems Model: Gridline G6 1-1/8" Gridline Mount: Finish: Size:	
Manufacturer: Lee's Model: FirstStep Modular Tile L8513 Size: 24" x 24" Installation: Monolithic or vertical/brick ashlar Mount: Finish:	

Div 14 CONVEYING SYSTEMS

14 20 00 ELEVATO RS

GENERAL REQUIREMENTS

- Provide hydraulic elevators for maximum rise up to 40 feet.

CONTROLS

Provide only non-proprietary microprocessor controls, diagnostic device, and tools necessary for service, troubleshooting, and adjusting the elevator. Provide wiring diagrams.

- Provide microprocessor controller, manufactured by Motion Control Engineering (MCE), or equal (no known equal), located inside a NEMA I cabinet.
- Provide battery emergency lowering device.
- Supervisory unit shall be programmable to allow for on-site modifications.
- Provide Nordic Soft Start rated at a minimum 57 percent of motor horsepower rating.

SIGNALS/FIXTURES

Provide only non-proprietary car and hall fixtures. All operating fixtures shall be Adams, Survivor Plus, or equal (no known equal).

- Car and hall buttons shall be of vandal-resistant institutional design.
- Car and hall Lanterns shall be of vandal-resistant institutional design.
- All lights shall be LED type.
- All applied cover plates shall have beveled edges.
- Fireman's Service, keyed to be Adams WD01 key or as directed by campus engineering.
- All other keyed switches, such as fan/blower, independent service, and car top inspection, shall be Adams Elevator's standard.
- Telephone: 999 minutes auto disconnect; called party must disconnect, must meet all ADA requirements.
- Car position indicator shall be 2 inches minimum, LED type, located in the transom over car door opening.
- Fixtures to be stainless steel, #4 finish, with tamper-proof fastening
- Fixtures' location and type to meet all ADA and California Disability requirements.

14 20 00 ELEVATORS (CONTINUED)

WARRANTY AND INITIAL MAINTENANCE

- Provide full maintenance service by skilled, competent employees, for 12 months following date of final acceptance.
- Include monthly preventative maintenance performed during normal working hours.
- Include repair/replacement of worn or defective parts, including below- ground cylinders, components and lubrication, cleaning, and adjusting as required for proper elevator operation.
- Include 24-hour/day, 7 days/week emergency callback service.
- Exclude only repair/replacement due to misuse, abuse, accidents, or neglect caused by persons other than Elevator Contractor's personnel.

PASSENGER ELEVATOR (TYPICAL)

- Capacity: 4000 lbs.
- Speed: 150 FPM
- Platform Size: 8 feet-0 inches wide, 6 feet-2 inches deep, 9 feet-0 inches high
- Clear Inside Platform: 7 feet-8 inches wide, 5 feet-5 inches deep, 8 feet-6 inches under ceiling.
- Door Size: 4 feet -0 inches wide, 7 feet-0 inches high, center opening with automatic close loop type door operator.
- Must accommodate stretcher 24 inches by 84 inches with 5-inch radius corners.
- Machine room must be adjacent to the elevator hoistway at lowest level.

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SERVICE ELEVATOR (TYPICAL)

- Capacity: 4500 lbs.
- Speed: 150 FPM
- Platform Size: 6 feet-0 inches wide, 8 feet-9 inches deep, 9 feet-0 inches high
- Clear Inside Platform: 5 feet-8 inches wide, 7 feet-10 inches deep, 8 feet-6 inches under ceiling.
- Door Size: 4 feet-0 inches wide, 7 feet-0 inches high, 2-speed side slide opening with automatic close loop type door operator.
- Machine room must be adjacent to the elevator hoistway at lowest level.

14 20 00 ELEVATORS (CONTINUED)

HOISTWAY EQUIPMENT

- Guide Rails: Standard steel tees (tee type rails) machined for splice plates.
- Guide rail brackets to meet seismic requirements.
- Roller Guides: 6-inch wheels, spring loaded.
- Traveling Cable: 10 percent spares
- Hoistway Doors and Frames: U.L. rated, stainless steel, #4 satin finish, sills aluminum.
- Provide all necessary safety devices per code.

HYDRAULIC EQUIPMENT

- Machine Room
- Provide belt-driven positive displacement type pump unit with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
- Motor shall be rated and capable of providing a minimum of 120 starts per hour.
- Valve shall be integral type.
- Provide oil reservoir (tank) with capacity equal to plunger displacement plus an additional 25 percent.
- Provide tank heater, oil level gauge, hydraulic silencer, and shutoff valve.
- Biodegradable oil shall be used.
- Hoistway
- For well hole, provide 30-inch minimum, steel false casing with ½ inch welded, watertight bottom.
- Provide below-grade hydraulic cylinder and piston capable of lifting elevator at capacity and speed.
- Hydraulic cylinder and all below-grade hydraulic piping shall have welding joints and installed in PVC enclosure with watertight joints.
- Provide means of detecting oil leak in PVC cylinder.
- Provide in Pit: Scavenger pump, rupture valve, shutoff valve.

CAB ENCLOSURE/FINISHES

- See Section 7 – Space Standards - Part I for Elevator Cab Finishes.
- Architect to provide finish floor type and thickness.

14 20 00 ELEVATORS (CONTINUED)

ADDITIONAL FEATURES

- The following items shall be included in all elevators:
- Exhaust 2-speed fan on cab canopy.
- Emergency light located above car-operating panel.
- Escape hatch in cab canopy.
- Janus Panachrom infrared door detection with 154 light beams or equal, (no known equal). Leading edge shall illuminate green when doors are opening and red when doors are closing.
- Phase I and II Fire Service per ASME A17.1-2004

PERMITS

- Contractor shall be responsible for obtaining and paying fee, either itself or through its subcontractors, all permits required by Labor Code Section 7301.1. Contractor shall bear all responsibility for, and assumes all risk with regards to any delay associated with the issuance of such permits.

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Div 21 FIRE SUPPRESSION

21 00 00 FIRE SUPPRESSION

- Type of system to be utilized should be determined by occupancy of the area to be protected, as determined by the C.B.C. A licensed Sprinkler Contractor should submit all documentation, including hydraulic calculations and head locations, in conjunction with submittal of plumbing drawings. All sprinkler heads, detectors and required panels and alarms should be coordinated with Architectural drawings, including reflected ceiling plans.
- Types of systems to be utilized should include but are not limited to: wet, dry, combined standpipe, pre action and clean agent.
- All underground piping should be ductile iron.

Div 22 PLUMBING

22 00 00 PLUMBING

GENERAL

- Designs shall utilize systems and products that are:
  - A. Long-life, industrial quality.
  - B. Readily-available products and components with service support available.
  - C. Maintainable arrangements with multiple units.
  - D. Readily available spare parts and materials incorporate multiple equipment elements in key systems to provide reduced capacity operation when portions are down for maintenance or failure.
- The plumbing system designer should consider using such techniques as:
  - A. Controlling hot water temperatures, water pressures, providing faucets with flow restricters.
  - B. The economic use of thermal insulation, automatic shutdown of water heating and circulating systems, use of occupancy sensor for automatic flushing, use of automatic closing faucets, and using minimum energy consuming equipment to provide maximum. Energy conservation design practices should become integrated into the building allowing it to operate more efficiently and use less energy, while meeting the needs of the user.
- The designer should study water usage periods and set to operate pumps just prior to usage periods and limit operation as much as possible. A 7-day 12-hour timer should be installed to control such pump operation especially during peak demand periods as an energy conservation measure.
- The Contractor should field verify all of the exact locations, elevations, and capabilities of proposed points of connections, including existing equipment. Any part of these systems that are deemed inadequate for the proposed project should be immediately reported to the Architect prior to bid and start of work.
- Access doors and/or panels should be coordinated with the Architect, including reflected ceiling plans, prior to installation.
- All piping installed outdoors or in corrosive environments should be prime coated and painted, or otherwise protected.

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22 00 00 PLUMBING (CONTINUED)

PLUMBING SYSTEMS

- Building site utility systems will include: Domestic hot and cold water, Sanitary Waste and Vent, and Storm Drainage. Where applicable, the following systems should be considered:
    - A. Backflow preventer, and pressure reducing valve for domestic water.
    - B. Project gas meter, and seismic shut-off valve.
    - C. Hot water return piping.
    - D. Industrial water to HVAC equipment from domestic cold water piping through backflow prevention devices.
    - E. Grease interceptors connected to fixtures and equipment as defined in C.P.C. and California Health & Safety codes.
        - Waste water from disposers, sinks, dishwashers, floor drains and floor sinks in food facilities shall drain to a grease collection system or through a grease interceptor.
    - F. Duplex sewage and sump pumps, including required alarms and interlock to building management system.
        - Commercial type duplex pump is required. Explosion proof motor is required in a mechanical/electrical equipment room.
        - Mechanical alternator, check valves, automatic float switch with rod, rod guide, copper float, and high water alarm bell should be provided on duplex pump.
        - Pumps should be of the wet-pit type complete with gas tight sump cover, vent, curb ring, grease lubricated, including alemite fittings extended to pump base plate.
        - Pumps should be heavy duty, vertical centrifugal, open non-corrosive impeller type with vertical drip-proof type motor with anti-friction grease lubricated bearings.
        - Pumps should be provided with separate circuit and circuit breaker.
        - Where pumps are installed to provide protection for mechanical/electrical equipment and/or critical equipment, in addition to high water alarm bell in the area, alarm contacts should be provided for a central monitoring system.

22 00 00 PLUMBING (CONTINUED)

- Public and Private Restrooms:

  A. All exposed metal work at fixtures should be brass with chromium plate. All faucets, fittings, supply stops for fixtures, and similar devices should be one (1) manufacturer unless otherwise required. Each fixture should contain standardized interchangeable operating units made up of separate renewable stem, seat, washer retainer, and nut. All faucets and fittings must close with the water pressure. All fixtures should be installed with supply stops/valves accessible at the fixtures.

  B. Each restroom hot and cold water supply should be provided with accessible shut off valves.

  C. Waste cleanout for maintenance should be provided per code.

  D. Each restroom should be provided with floor drain and trap primer.

  E. All fixtures should be provided with water hammer arrester.

- Sanitary sewer should gravity discharge to the existing sewer system where possible.
- Storm Drain system rainfall intensity should be per local building department. All discharge terminations should be in coordination with the Civil Engineer, ECC Facility Representative and the Architect.

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- Seismic bracing for piping and equipment should conform to Title 24. Calculations and details should be reviewed and signed by a Licensed Structural Engineer with California registration.

22 05 48 VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

	DESCRIPTION
Intertia Bases	All package based mounted rotary or reciprocating equipment shall be mounted on a concrete filled inertia base with open spring mounts with brackets and seismic snubbers to control noise, vibration and limit seismic movement. Manufacturers: Mason Ind., M.W. Sausse & Co.

22 05 53 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

	DESCRIPTION
Nameplate	All equipment shall be provided with a laminated three-layer plastic plate, 1/8" thick, with engraved black letters on light contrasting background color. Nameplates shall be engraved with the name of the equipment. The symbol designation on the drawings & specific service. Example: Domestic Water Heater WH-1, 120 degree F water, BSMT thru 3rd Floor. Provide equipment chart with number, location & purpose. Manufacturers: Brady, Seton, Kolbi
Valve Tags	Each tag shall be a minimum 18 gauge polished brass, 1 ½" diameter. Tags shall contain the service (1/4" stamped or engraved black-filled letters) and appropriate valve number (1/2" stamped or engraved black-filled number). Tag shall be securely fastened to valve. Provide valve chart with number, location and purpose. Manufacturers: Seton, Brady, Kolbi
Pipe Markers	All piping shall be clearly identified per the color and lettering: Scheme conform to ASME A13.1. Directional flow arrows shall be included in each marker. Manufacturers: Seton, Brady, Kolbi.
Plastic Underground Pipe Markers	Bright colored continuously printed plastic ribbon minimum of 6" wide by 4 mil thick. Installed 6" to 8" below finished grade. Manufacturers: Seton, Brady, Kolbi
Charts	Charts of all valves and equipment shall be furnished in duplicate with one chart mounted and framed. Manufacturers: Brady, Seton, Kolbi

22 07 00 PLUMBING INSULATION

DESCRIPTION	
Domestic and Industrial Hot Water Supply and Return	All hot water supply and return pipe shall be insulated with performed heavy density fiberglass insulation with standard factory applied all purpose jacket with double pressure sensitive adhesive self-sealing closure system. Fitting, valves and flanges, except in piping installed outdoors, shall be insulated with thermally equivalent thickness of fiberglass insulation with a PVC fitting cover. All insulated piping installed outdoors or exposed to the weather shall be covered with a polished 0.016" aluminum or 0.010" stainless steel metal jacket. Fittings other than elbows and tees shall be covered with weather resistant insulating cement to a thickness equal to the adjacent insulation. For insulated pipe, support shields shall be provided at each hanger and support. Manufacturers: John Manville, Owens-Corning, Certain Teed, Knauf
Disable use Lavatories	Hot water supply riser, fixture tailpiece, trap and trap arm to be insulated. Manufacturers: Truebro, McGuire
Domestic Hot Water Storage Tank	Hydrous calcium silicate block or molded sections with 6 ounce convas or fiberglass reinforcing cloth. Manufacturers: John Manville, Owens-Corning, Certain Teed, Knauf

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22 11 00 FACILITY WATER DISTRIBUTION

	DESCRIPTION
Domestic and Industrial Water Piping, Below grade	Copper type K, hard drawn tube with wrought copper joint fittings. Joints shall be brazed using a silver bearing copper-phosphorus alloy with a silver content not less than 14.5%. The use of flux is prohibited. Manufacturers: Cerro, Elkhart, Nibco
Domestic and Industrial Water Piping, Above grade	Hot water supply riser, fixture tailpiece, trap and trap arm to be insulated. Manufacturers: Truebro, McGuire
Unions and Flanges	Unions for piping 2" and smaller to be Class 150, bronze with soldered or brazed joints. Union 2 2" and larger, to be Class 150, slip-on cast bronze flanges with 1/16" preformed neoprene gasket. Manufacturers: Nibco, Elkhart, Johnson Bros., Ameriflex, Paragon Steel, Taco Inc.
Pressure Gauges	Bourdon tube type, 4 2" diameter, recalibrating adjustment, corrosion resistant movement. Gauges on pulsating or reciprocating equipment to be liquid filled. All gauges to be provided with shut-off cock.. Manufacturers: Trerice, Weiss, Ashcroft, U.S.Gauges
Thermometers	Vapor tension type, 4-1/2" dial, adjustable pointer, adjustable angle type, separate brass socket. Manufacturers: Ashcroft, Trerice, Weiss
Flow Control Valves	Brass or Bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, combination blow-down or back-flush drain. Manufacturers: Bell & Gossett, Armstrong, Griswold
Pressure Reducing Valves	Main supply line to be pilot-operated, globe type with stainless ssteel trim, pilot inlet strainer, shut-off valves and flow stabilizer. Manufacturers: Cla-Val, Watts
Backflow Preventers	Cross contamination shall be prevented with the use of a reduced pressure principle backflow device complete with inlet/outlet shut-off valves. Provide air gap funnel and drain. Manufacturers: Cla-Val, Febco, Watts
Water Hammer Arrestors	Copper construction, bellows or piston type. Pre-charged suitable for 35 to 100 degrees temperature range, working pressure. Provide distribution box as required. Manufacturers: PPP Inc, Sioux Chief, J.R. Smith

22 13 00 FACILITY SANITARY SEWERAGE

	DESCRIPTION
Sanitary Soil, Waste, Grease Waste and Vent Piping	Service weight, no hub cast iron soil pipe and fittings. Standard neoprene compression gasket with stainless steel shield and clamp couplings to be provided for above grade piping and heavy-duty type for below grade. All materials shall comply with CISPI 301 & 310 and ASTM A888. Manufacturers: AB & I, Charlotte, Anaco, Husky, Clamp-All
Chemical Resistant Waste and Vent Piping	Schedule 40, flame retardant polypropylene pipe and fittings with fused joints in concealed locations and mechanical joints in accessible locations. The use of type 304 or 316 stainless steel pipe with compression joint fittings is optional. Manufacturers: +GF+ Fuseal, Enfield, Orion, Blucher-Josam
Floor Drains/ Floor Sinks/ Indirect Waste Receptors	Duco cast iron body and flashing collar with adjustable nickel bronze strainer for floor drains. Floor sink shall be provided with seepage holes and acid resistant coated interior with aluminum dome bottom strainer and nickel bronze rim and grate. Indirect waste receptors shall have sump receiver, solid water dam, underdeck clamp and dome bottom drainer. See 22 40 00 for additional info. Manufacturers: J.R. Smith, Zurn, MiFAB
Back Water Valves	Cast iron body and cover, removable bronze swing valve, extension sleeve as required, bolted access cover, horizontal or vertical type, threaded or hubless ends. Manufacturers: J.R. Smith, Zurn, MiFAB
Grease Interceptors	Reinforced precast concrete tank with manways, riser extension, frame and covers extended to grade. System shall be completed with sampling box. Manufacturers: Pro-Cast Inc, Jensen Precast, Pro-Ceptor
Sand/Oil Interceptors	Reinforced precast concrete tank with manways, riser extension, frame and covers extended to grade. Manufacturers: Pro-Cast Inc, Jensen Precast
Sewage Ejectors	Ejector station to incorporate duplex column or submersible type pump with alternating controls. Sump to be fabricated fiberglass, HDPE, precast or poured in place concrete. Submersible system shall have the quick railing disconnect feature. Manufacturers: Weil Aquatronics, Paco, J.D.L. Systems

22 13 00 FACILITY SANITARY SEWERAGE (CONTINUED)

	DESCRIPTION
Cleanouts	All cleanouts except process waste to have bronze countersink rectangular slotted plugs, tapered threads, lubricated with emulsified lead paste. Flush with floor cleanout tops shall have non-skid covers secured independent of plug. Where cleanout occurs in waterproof membrane, provide flashing flange and ring. All wall cleanouts shall be located so that the bottom of the access panel or plate is above the top of the baseboard, or in the case of location inside of a cabinet, above the inside bottom of the cabinet. Floor cleanouts in finished room floors to be cast iron adjustable floor level cleanout assembly with round nickel bronze top. Floor cleanouts in unfinished floors to be cast iron adjustable floor level assembly with round double extra heavy cast iron top. Wall cleanouts in drywall or block wall to be bronze plug with test tee. Provide prime coated steel concealed hinge type access covers with removable door. Wall cleanouts in tile surfaces to be bronze plug with cover plate, screw and test tee. Cleanout in yard box to be cast iron surface level cleanout assembly with lifting device, for concrete or blacktop surface. In non-surfaced areas, set in 18" x 18" x 4" concrete support. Floor cleanout in equipment room floor to be cast iron adjustable floor cleanout assembly with round double extra heavy nickel bronze top. Floor cleanouts in terrazzo floors to be cast iron adjustable floor level cleanout assembly with square nickel bronze top, with center lifting device. Top depression to be filled with terrazzo and smoothed flush. Floor cleanouts in ceramic tile floors to be cast iron adjustable floor level cleanout assembly with square nickel bronze top. Floor cleanouts in vinyl, asphalt tile or linoleum floors to be cast iron adjustable floor level cleanout assembly with round nickel bronze top. Floor cleanouts in carpeted floors to be cast iron adjustable floor level cleanout with round nickel bronze top and carpet cleanout marker. Floor cleanout for chemical resistant waste to be durion cleanout plug and ferrule. Manufacturers: J.R. Smith, Zurn, MiFAB, Durion

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22 14 00 FACILITY STORM DRAINAGE

	DESCRIPTION
Storm & Overflow Piping	Service weight, no hub cast iron soil pipe and fittings. Standard neoprene compression gasket with stainless steel shield and clamp couplings to be provided for above grade piping and heavy-duty type for below grade. All materials shall comply with CISPI 301 & 310 and ASTM A888. Manufacturers: AB & I, Charlotte, Anaco, Husky, Clamp-All
Roof, Overflow & Area Drains	Roof, overflow and area drains shall have duco cast iron body with flashing collar and underdeck clamps, gravel stops and cast iron domes. Overflow drains to be provided with an exterior water dam. Area drains shall have duco cast iron body, standard or wide flange, flashing clamps, seepage openings, adjustable extension sleeve underdeck clamp & grate suitable for all applications. Manufacturers: J.R. Smith, Zurn, MiFAB
Sump Pumps	Sump pump station to incorporate duplex column or submersible type pump with alternating controls. Sump to be fabricated fiberglass, HDPE, precast or poured in place concrete. Submersible system shall have the quick railing disconnect feature. Manufacturers: Weil Aquatronics, Paco, J.D.L. Systems

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22 31 00 DOMESTIC WATER SOFTENERS

DESCRIPTION	
Centralized Water Softening Equipment	Provide an automatic duplex water softening system. Exchange material shall be high quality resin having an exchange capacity expressed as CaCO3 of 30,000 grains per cubic grains per cubic foot when regenerated with 15 lbs. of salt per cubic foot, and 20,000 grains per cubic foot when regenerated with 6lbs. of salt per cubic foot. Softener tanks shall have 60% or more freeboard. ASME labeled for not less than 120 psi working pressure, structural steel legs welded to tank. Operating valves on each softener shall be automatic, slow opening and closing and free of water hammer. Valving may be a single multi-port type unit or multiple hydraulically actuated diaphragm valves, controlled by a multi-port rotary pilot valve. Face Piping: Schedule 40 galvanized steel pipe with 150 lb. galvanized malleable iron I.P.S. fittings or Victaulic or equal grooved end galvanized malleable iron fittings with couplings. Provide dielectric isolators at inlet and outlet of each softener. Option: Schedule 40 PVC or CPVC Pipe & Fittings. Controls: Regeneration shall be controlled by an electronic sensor with manual override. The sensor shall initiate regeneration automatically and be interwired to permit only one softener to regenerate at a time during off peak hours. The manual override shall permit regeneration at any time of the day or night, any or every day of the week, and shall allow for push button start (override). All control mechanisms shall be enclosed in a gasketed moisture resistant casse, rated as a NEMA 4 enclosure, listed by Underwriters' Laboratories. The unit shall have provisions for individual adjustment of the backwash and rinse cycles, and provisions for manually regenerating the water softener in the event of power failure. The control valve mechanism shall prevent hard water bypass to service during regeneration. A duplex alternator shall be provided to allow only one unit to be in regeneration at a time while the other unit is in service. This system shall provide a continuous supply of soft water. Indicating lights shall be provided to show which unit is in the service position. Self-adjusting flow regulators shall control the rate off low during the backwash (to prevent resin loss), brine-rinse and fast rinse positions regardless of pressure fluctuations. Automatic controls for brine metering shall be included. Brine System: Combination salt storage and brine measuring tank with cover, sized to hold salt for at least 10 regenerations between refills. The tank shall be molded of corrosion free, rigid polyethylene or commercial grade fiberglass reinforced plastic.

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22 31 00 DOMESTIC WATER SOFTENERS (CONTINUED)

	DESCRIPTION
Centralized Water Softening Equipment (Continued)	Accessories: Inlet and outlet pressure gauges, 4-1/2" diameter, totalizing meter, sampling cock on soft water outlet and hard water inlet, and water quality test kit. Manufacturers: Culligan, Siemens, U.S. Filter
Point of Use Filters	Cellulose cellulose/glass fiber – melamine resin, 5 micron, with cartridge housing and mounting bracket. Provide inlet and outlet shut-off valves and gauges. Manufacturers: Cuno, 3M Purification Inc., Filtrene

22 33 00 ELECTRIC DOMESTIC WATER HEATERS

	DESCRIPTION
Electric Water Heaters – Tank Type	Corrosion resistant glass lining, vertical storage, thermally insulated with Non-CFC foam, lining, magnesium anode rod, heavy gauge steel tank with baked enamel finish, dielectric fittings, brass drain valve, T&P relief valve. Automatic water thermostat with adjustable temperature range from 120 to 160 degrees F, screw-in immersed elements, enclosed controls and electrical junction box. Wire double element units so elements do not operate simultaneously. Provide seismic anchoring straps, listed and approved. Manufacturers: Lochinvar, Bradford White, A.O. Smith
Electric Water Heaters – Instantaneous/ Point-of-Use	Factory-assembled and wired with microprocessor temperature control, celcon waterways and nichrome heating coils and factory set a 104 degrees F. Manufacturers: Chromite, Eemax, Rinnau

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22 34 00 FUEL-FIRED DOMESTIC WATER HEATERS

DESCRIPTION	
Commercial Gas Fired Water Heaters – Storage Type	Low NOx, glass lined welded steel with single flue passage, flue baffle and draft hood; brass dip tube, drain valve, magnesium anode, thermally insulated with Non-CFC foam and encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs, dielectric fittings, brass drain valve, T&P relief valve. Automatic water thermostat and built-in gas pressure regulator; temperature range adjustable from 120 to 180 degrees F, cast iron or stainless steel burner, safety pilot and thermocouple, and electronic ignition. Provide anchoring straps, listed and approved. Manufacturers: Bradford White, Lochinvar, A.O. Smith
Commercial Gas Fired Water Heaters – Boiler/ Storage Tank	Low NOx natural gas-fired water tube boiler, with copper finned tube heat exchanger, one inch minimum diameter, 13 gage steel boiler tubes and copper tube heat exchanger with bronze heads, steel jacket with glass fiber insulation, and tank circulating pump. Components to include, thermometer and pressure gauge. Immersion thermostats for operating and high limit protection, 100 percent safety shut-off. Electric gas valve with transformer, electronic safety pilot and pilot burner, gas pressure regulator. Manual gas shut-off, low water cut off, ASME rated temperature and pressure relief valve, coil relief valve, expansion tank, draft inverter. Storage tank to be cement lined, 120 psi ASME rated, vertical or horizontal with preformed, fiberglass board insulation. Manufacturers: Raypak, Teledyne Laars

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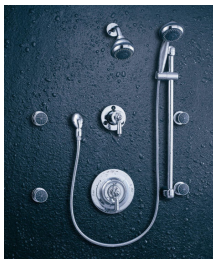
22 42 00 COMMERCIAL PLUMBING FIXTURES

This section describes the Plumbing fixtures, trim and accessories for campus buildings. The intent of this document is to provide standards and design approaches subject to review by El Camino College. Fixtures shall conform to the current commercial and code standards for cast iron and vitreous china fixtures, trim and accessories.

DESCRIPTION		
Water Closets	Water closet: Vitreous china, elongated bowl, wall hung, low flow (1.6 gallons per flush) Manufacturer: American Standard, Kohler	
	Flush valve: Conventional type or infrared sensor type hard wired to a 120-volt circuit Manufacturer: Sloan, Zurn	
	Toilet seats: Open end with self sustaining check hinges Manufacturer: Church, Beneke	
	Support carriers: To be equipped with cast iron anchor foot assemblies Manufacturer: Zurn, J.R. Smith	
Urinals	Urinal: Vitreous china, wall hung, low flow (1 gallon per flush) Manufacturers: American Standard, Kohler	
	Flush valve: Conventional type or infrared sensor type hard wired to a 120-volt circuit Manufacturer: Sloan, Zurn	
	Support carriers: Adjustable floor mounted up rights Manufacturer: Zurn, J.R. Smith	

22 40 00 COMMERCIAL PLUMBING FIXTURES (CONTINUED)

DESCRIPTION		
Lavatories	Lavatory: Vitreous china, wall hung Manufacturer: American Standard Model: Murro universal design wall-hung lavatory with vitreous china shroud/knee contact guard	 
	Faucet: Solid brass, polished chrome plated of the conventional type or infrared sensor type hard wired to a 120-volt circuit. Manufacturer: Chicago Faucet	
	Traps: 17 gauge tubing	
	Stops: Loose key angle type and supplies	
	Support carriers: Floor mounted upright, wall hangers are prohibited	
Service Sinks	Fixtures to be cast iron, wall or floor type with rim guards. Wall hung fixture shall have a 3" trap standard. Faucets to be solid brass, polished chrome plated equipped with integral vacuum breaker, 5 foot vinyl hose and pail hook. Manufacturers: Commercial Enameling Company, Kohler, Chicago, Delta	
Showers	Mixing valve to be pressure balancing type, inlet check stops, lever handle, deluxe arm and flange with low flow brass shower heads. ADA stalls to be provided with hand held shower, long reinforced vinyl hose, long, in-line vacuum breaker, vertical adjusting bar. Manufacturers: Powers, Symmons, Delta	
Hose Bibbs	Wall, standpipe or recessed, polished chrome plated, loose key with vacuum breaker. Manufacturers: Acorn, Woodford	

22 40 00 COMMERCIAL PLUMBING FIXTURES (CONTINUED)

DESCRIPTION		
Floor Drains	3"x4" finished area adjustable floor drain with square top Manufacturer: Zurn Model: FD2212-ST	

22 45 00 EMERGENCY FIXTURES

DESCRIPTION		
Emergency Fixtures	Emergency shower, emergency shower & eyewash and eyewash to be floor mounted stainless steel shower head and eyewash bowl with polished chrome plated brass piping and trim and stay open. Secure to floor or wall. Counter mounted to be all stainless steel, swing or hand held type with hose. Manufacturers: Bradley, Guardian, Haws.	

22 47 00 DRINKING FOUNTAINS

DESCRIPTION		
Drinking Fountains	"Hi-Lo" barrier free, wall mounted with access panel and in-the-wall mounting system Manufacturer: Haws Model: H1011MS Finish: Dual satin finish stainless steel	

23 00 00 HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

GENERAL

- Designs shall utilize systems and products that are:
  - A. Long-life, industrial quality.
  - B. Readily-available products and components with service support available.
  - C. Maintainable arrangements with multiple units.
  - D. Readily available spare parts and materials incorporate multiple equipment elements in key systems to provide reduced capacity operation when portions are down for maintenance or failure.
- Large Equipment Installation Sequencing: In conjunction with other design disciplines, provide the necessary scheduling, sequencing, movement and positioning of large equipment into the building during construction, including provisions for temporary removal/replacement of existing building components.
- Special and ECC-Furnished Equipment: Special types of equipment, including ECC-furnished and contractor-installed materials, shall be coordinated for correct rough-in and attachment requirements.

- Interferences: AC units, valves, fans, piping, ducts, valves, pumps, and other equipment shall be reviewed for interferences that would prevent proper installation of each system.
- AC units, valves, fans, piping, ducts, valves, pumps, and other equipment shall have adequate clearance on all sides as well as above and other interferences where space is limited.
- Accessibility: AC units, valves, fans, piping, ducts, valves, pumps, and other equipments shall be coordinated with building instruction, beams, etc., to provide adequate clearances and accessibility for maintenance. Piping and ducts shall be coordinated with other engineering disciplines.
- Penetrations: Piping/utility and duct penetrations through floors, walls, and roofs shall be coordinated and identified on the architectural and structural construction drawings.
- Equipment Protection and System Protection: Project specifications shall clearly indicate that all equipment and systems intended for a project shall be properly protected from damage, corrosion, and weather during shipment, in-transit storage, job-site storage, field/shop prep, installation, and checkout until the work is accepted by ECC. Ends of piping, valves, and fittings shall be protected from abuse and the entry of moisture. Electrical equipment controls, and insulation shall be protected against moisture and water damage.

23 00 00 HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC) (CONTINUED)

- Special Support and Anchors: All equipment including piping supports, anchors, supports-guides, and pre-insulated versions thereof, which exert force on the structure other than those forces produce by gravity, and equipment shall be designed to a factor of 1.5G and detailed on the drawings and coordinated with structural engineer and appropriate fire protection drawings.
- All equipment shall be arranged for maximum service access, while reserving space for future equipment and future uses. Ensure that all components and equipment are easily accessible for maintenance and replacement.
- Provide manufacturer's recommended space for a service access envelope around each AC unit, AHU, Pump, Boiler, Fan, Cooling Tower, Heat Exchanger and accessories for service in all dimensions.
- Install valves as needed to isolate each piece of equipment for maintenance and replacement requirements.
- Other Design Issues

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A. Mounting of air moving equipment
   - For roof-top installations, the units should be mounted on curbs, or on housekeeping pads to be coordinated with the structural engineer.
   - Curbs should be supplied or coordinated by the manufacturer/ supplier. Curbs help in waterproofing the roof opening.
   - Housekeeping pads should be minimum 4 inches high and extend 6 inches on all sides of the equipment mounting base.

B. Equipment anchoring
   - For moving equipment, vibration isolators may be required, depending on the equipment location.
   - Seismic restraints are required in all locations.
   - All suspended piping related to the mechanical system shall be isolated from the building structure.
   - Typically, vibration isolators should allow for 2 inch deflection.
   - Custom air moving equipment is generally internally isolated; in this instance external vibration isolation may not be necessary.

23 00 00 HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC) (CONTINUED)

C. Duct Air Velocities

- Duct air velocities should be limited to values that ensure that the noise from equipment and air movement is not excessive and is compliant with applicable noise criteria.
- Duct systems shall be designed with maximum velocities as follows:
  * Supply Ductwork: 1900 feet per minute for main ductwork. Pressure drop of 0.10 inch water gage per hundred feet for main ducts and 0.05 inch water gage per hundred feet for ducts downstream of VAV boxes.
  * Exhaust / Return Ductwork: 1800 feet per minute for main ductwork. Pressure drop of 0.10 inch water gage per hundred feet.
- Verify noise criteria for the spaces.
  * All occupied spaces shall meet room noise criteria (NC) of NC- 35, except for conference and meeting rooms that shall be less than NC-30.
- Provide sound attenuators if necessary.

D. Chiller systems.

- Generally the buildings within ECC are served by the Central Utility Plant (CUP). This needs to be verified in all instances. If so, a chiller system may not be required.
- Temporary chiller systems may be required during construction, along with temporary cooling towers.

E. Fans in air moving equipment

- Generally plug fans are preferred.
- A fan-wall system should be considered where possible.
  *Fan-wall systems save on space, reduce noise and allow the system to continue operating if a fan becomes inoperative for some reason (motor or drive failure).

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- Life-cycle and Maintenance Issues.

A. Coatings. Coatings extend the life of the system.

- ECC is located next to the Pacific Ocean. Due to the corrosive nature of the ocean environment, special paint and coatings are required on outdoor components - casings, coils, etc. Each guide section has the coatings described.
- Provide coatings on outdoor components of HVAC equipment such as Air Handling Units, Packaged Units, Computer Room Units, Split Systems.
- Generally, coils should have copper coils and copper fins, which will be coated.

23 00 00 HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC) (CONTINUED)

DESIGN AND CALCULATIONS

- The following information shall be used in the cooling and heating load calculations and design of this project. Where authorities having jurisdiction have applicable design limitation requirements, those design requirements shall prevail. Allowable design safety factors permissible by code shall be applied to equipment selections to ensure adequate cooling capability. (Example: Title 24 indoor and ambient design criteria may take precedence over table below per State of California Regulatory requirements).
- Outdoor Design Criteria:
    - A. Location: Torrance, Los Angeles County, California.
    - B. Climate Zone: 6.
    - C. Latitude: 33.5 North.
    - D. Longitude: 118.2 West.
    - E. Elevation: 89 feet above mean sea level.
    - F. Outdoor design dry bulb temperature (cooling): 86 degrees F.
    - G. Outdoor design wet bulb temperature: 68 degrees F.
    - H. Summer rooftop design temperature (condensers): 100 degrees F.
    - I. Outdoor design dry bulb temperature (heating): 32 degrees.
- Indoor Space Design

ROOM	SUMMER	WINTER	RH (RANGE)	PRESSURIZATION
Office space	72F	70F	(30-60)	Positive
Conference room	72F	70F	(30-60)	Positive
Rest rooms	75F	68F		Negative
Locker rooms	75F	68F		Negative
Janitorial	78F	68F		Negative
Electrical room	75F	70F	**	Positive
UPS room	68F	68F	**	Negative
Corridor	75F	70F	(30-60)	Positive
Tele/Data room	68F	68F	(30-60)	Positive
Control room	72F	68F		

** Specific manufacturer's recommendations.

- Hours of Operation
  The building operation schedule shall be verified with ECC to allow for appropriate occupancy, lighting, and office equipment loads.

23 00 00 HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC) (CONTINUED)

- Building Envelope.

  A. Insulation R-value shall not be directly used to determine the assembly R-value. The R-value shall be calculated from each assembly material, and the thermal bridging effect of assembly framing, mullions, cladding, and other through conduction paths shall be used to determine the actual R values of the construction assemblies.

- Ventilation

  A. Occupant density will be defined within the program documents for the facility, and an additional 15% shall be added to the occupant count to incorporate the high density of people associated with special situations.

  B. If data is unavailable from program documents, refer to ASHRAE Standard 62 and add 15% for occupant density.

  C. Reasonable assumptions (diversity, etc) should be used in keeping with industry standards to determine the population for purposes of calculating the ventilation air quantity. Assumptions must be documented and understood by ECC. Demand ventilation controls shall be incorporated.

  D. Space ventilation rates for the facility shall comply with the CMC, CBC, and the California Title 24. Where spaces become unoccupied, the minimum requirements shall be maintained during off-peak cooling and heating cycles based on CO2 sensors.

  E. Locker rooms and toilet room exhaust shall be no less than 12 air changes per hour.

  F. Conference rooms, and meeting rooms shall be equipped with demand ventilation controls using combination carbon dioxide sensor and thermostat.

  G. Battery Rooms shall be ventilated according to the type of batteries. Rooms with wet cell batteries shall be provided with a minimum six air changes per hour, and dry cell battery rooms shall be provided with a minimum of four air changes per hour and per the requirement of the Fire Marshall.

- Building Pressurization

  The outside air requirement shall be based on the greater of the ventilation requirement, or the positive air balance requirement as compared to the total rate of building exhaust. The building shall be kept under positive pressure via building static pressure sensors and the building supply fan variable frequency drives. The equipment rooms shall receive air from the main office air conditioning system to satisfy the ventilation requirement, and to pressurize the equipment room.

23 00 00 HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC) (CONTINUED)

- Air Filtration
  Airtight blank-off panels shall be required for irregular modular perimeter panels. Face velocity shall not exceed 550 feet per minute.

23 THERMOSTATS

NO sliders in classrooms or labs
Sliders OK in offices and division suites

23 05 48 VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

- Carefully refer to other documents to assure a complete acoustic system is achieved.
- All equipment shall be supported or suspended using vibration isolators.
- Provide calculations by Vibrex/Sausse, Mason Industries, or equal for seismic restraints including details.
- Sound attenuators shall be provided where acoustic considerations are deemed important by the architect or owner. This will typically be for multi media rooms, large lecture rooms, theaters, certain labs, or other areas as determined.
- Test and Balance Report shall include sound and vibration data assuring strict compliance with design intent.

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23 05 53 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

- Comply with ASME A13.1 Scheme for the Identification of Piping Systems
- Confirm with other sections and the owner for other schemes particular to this campus.

23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC

- Provide complete Test and Balance services for air and water systems by an AABC Certified company.

23 05 93 TESTING, ADJUSTING, AND BALANCING

- Testing Agency:

  A. Total System Balance shall be performed by an independent, non,-affiliated agency certified by the Associated Air Balance Council (AABC) which specializes in the balancing and testing, ventilating, and air conditioning systems, to balance, adjust, and test air moving and distribution systems, water systems and steam systems.

  B. Minimum of 5 years as air balance and testing agency and proof of having successfully completed at least 5 projects of similar size and scope.

  C. All work shall comply with applicable procedures and standard of a National Standards for Field Measurements and Instrumentation, Total System Balance@ by the Associated Air Balance Council (AABC).

- Test and Balance Reports

  The Test and Balance agency shall prepare and submit minimum of three (3) copies of the Test and Balance Analysis to ECC within five (5) working days of completion. This report shall contain, at a minimum:

  A. AABC Certification credential(s) for the responsible Air Balance Company Engineer of record and all certified technicians involved in the project.

  B. Project Summary and comments.

  C. Table of contents and test forms for all systems.

  D. Calibration certificates for all test equipments.

  E. Drawings:

  F. Full scale single line schematic drawings showing actual duct runs and outlet/ inlet locations.

  G. Drawings shall be in Autocad version 2002 or later format.

  H. Copy of AABC National performance guaranty

23 07 00 HVAC INSULATION

- Insulation materials shall not exceed a Flame Spread of 25 or Smoke Developed 50 ratings as tested by procedure ASTM E 84, NFPA 255, and UL 723
- All supply air and return air shall be insulated. Where there are acoustical considerations, internal duct liner may be used as duct insulation.
- Insulation shall be CertainTeed, Johns Manville, Knauf, or Owens Corning.

23 08 00 COMMISIONING OF HVAC

- Provide commissioning services in five (5) phases: pre design, design, construction, acceptance, and post acceptance in accordance with the ACG Commissioning Guideline.
- During the pre design phase, the commissioning authority will carry out the following scope of work:
  - A. Provide input for the Owner=s requirements for the mechanical system design.
  - B. Review the Design Intent Document to verify the initial design intent with the Owner and engineer.
  - C. Prepare the pre design commissioning outline.
- During the design phase the commissioning authority carries out the following scope of work:
  - A. Review the design documents (drawings and specifications) as they are prepared to ensure inclusion of material covering the contractor's responsibilities for commissioning; provide comments and suggestions for designer consideration.
  - B. Prepare the design phase commissioning plan.
- During the construction phase the commissioning authority will carry out the following scope of work:
  - A. Organize and lead the commissioning team.
  - B. Review shop drawings and equipment submittals for information affecting the commissioning process.
  - C. Update the commissioning plan to reflect equipment and controls data from the submittals, and provide commissioning schedule information that the contractor can integrate into the project schedule.
  - D. Schedule and lead commissioning meetings.
  - E. Establish and maintain a system for tracking issues needing resolution.
  - F. Review the project schedule periodically to ensure commissioning activities are properly incorporated; provide feedback to the designer as needed.
  - G. Perform on site observations during construction.
  - H. Monitor correct component and equipment installation; including controls point to point checkouts. Document observations for report.
  - I. Witness equipment and system start ups as deemed necessary. Ensure documentation of same.
  - J. Other related work.

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23 08 00 COMMISIONING OF HVAC (CONTINUED)

- During the acceptance phase the commissioning authority will carry out the following scope of work:
  - A. Verify by sample, the testing, adjusting and balancing work that has been carried out by the TAB agency.
  - B. Conduct functional performance testing of sub systems, systems and interactions between systems, leading to acceptance of the completed work. Document results of tests witnessed.
  - C. Organize and direct the training of O & M personnel.
- During the post acceptance phase the commissioning authority will carry out the following scope of work:
  - A. Conduct functional performance testing of sub systems, systems, and interactions between systems that could not be carried out prior to acceptance due to unsuitable weather conditions.
  - B. Prepare and submit a final commissioning report.
  - C. Provide follow up for quality performance during the guarantee period.

23 09 23 DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

- Automatic temperature controls field monitoring and control system using field programmable microprocessor based units with communications to Campus Building Automation and Control System.
- DDC System shall be BACNET based and web hosted allowing password protected access from the internet.
- Base system on distributed system of fully intelligent, stand alone controllers, operating in a multi tasking, multi user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.
- Provide computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.
- Provide controls for variable air volume terminals, reheat coils, unit heaters, fan coils, and package units when directly connected to control units.
- Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories to operate mechanical systems, and to perform functions specified.
- Provide installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

23 21 13 HYDRONIC PIPING

- Chilled and hot water piping shall be standard weight schedule 40 black steel pipe, ASTM A 53.
- Use welded fittings on 4@ and larger. Grooved piping may be considered.
- Copper piping will be considered for pipes under 3@. Submit request to college for each particular project.
- If a combination of steel and copper pipe is allowed, use di electric unions when connecting the two metals.

23 21 16 HYDRONIC PIPING SPECIALTIES

- Provide manual air vents at all high points of chilled and hot water piping systems.
- Provide unions at all pieces of equipment.
- Provide Pete's Plugs and isolation valves at all pieces of equipment.
- Provide dielectric unions when connecting dissimilar metals.

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23 23 00 REFRIGERANT PIPING

- Field Fabricated Pipe. Furnish copper water tube Type L, drawn temper with wrought copper or cast bronze fittings
- Pre charged Piping. Furnish copper tube Type L, annealed, with "Quick Connect" fittings matched to equipment.
- Follow manufacturer's recommendations.

23 31 00 HVAC DUCTS AND CASINGS

- All ductwork shall conform to SMACNA standards.
- Ductwork shall be galvanized steel and internally lined with acoustical insulation where shown or required for a quiet system.
- Provide turning vanes in all elbows.
- Provide manual balancing dampers at all branch run outs to individual diffusers.
- Provide leak testing of all duct systems.

23 34 00 HVAC FANS

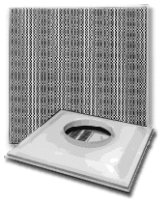
- Provide fans as required.
- In general, exhaust fans shall be roof mounted centrifugal up blast type with curb by fan manufacturer.
- Where up blast fans are not practical, single inlet centrifugal utility sets may be used.
- All fans shall be AMCA certified and by the same manufacturer.
- Fans shall be Cook, Penn, Greenheck, or approved equal.

23 36 00 AIR TERMINAL UNITS

- For most systems, provide hot water reheat VAV terminals.
- Terminal units shall be pressure independent with an overall maximum pressure airside drop of 0.75" WC.
- Hot water coils shall provide a minimum of 95 degree F. discharge air and be either one or two row as required.
- Units shall be complete with factory mounted DDC controls and sound attenuation extensions.
- Units shall be manufactured by Titus, Krueger or Anemostat

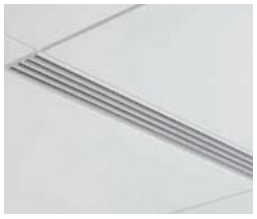
23 37 00 AIR OUTLETS AND INLETS

- In general, perforated face supply air diffusers with modular cores will be used. These are readily used in 24" x 24" acoustical tile ceilings. Smaller sizes may be used in hard type ceilings provided the correct frame is provided. Titus Model PAS or Krueger Model 1100.



- Return air grilles in acoustical ceilings will also be perforated face. The modular core is not required but a duct connection (for a ducted return air system) will be required. Titus Model PAR or Krueger Model 1190.
- Return and Exhaust air grilles in hard ceilings and walls will be single parallel blade grilles. Blades can be at either 30 or 45 degrees depending on architectural preference. Titus Model 300 or Krueger Model AFCS.

- Supply air devices for walls will be double deflection type with the front blades parallel to the long dimension.
- These may also be used in hard ceilings if so desired for architectural reasons. Titis Model 350 or Krueger Model 880.
- Where linear diffusers are desired for architectural reasons, they should come with supply air boot provided by the diffuser manufacturer where possible. Matching linear diffusers can also be used for return air. Titus ML Series or Krueger 1900 series.



- Eggcrate type grilles are acceptable in Janitor Closets and equipment rooms for exhaust.

23 40 00 HVAC AIR CLEANING DEVICES

- All air handling units shall have two sets of filters; pre filters and final filters.
- Pre filters shall be MERV 8
- Final filters shall be MERV 13.
- Air handling units shall also have UV lights as additional air cleaning device (see section 23 42 00.
- Provide temporary filters to protect equipment during construction if fans are running.
- Upon completion of the work provide college with one spare set of new filters for each application

23 42 00 ULTRA VIOLET GERMICIDAL IRRADIATION (UVGI) SYSTEM

- Provide ultraviolet disinfection for bacteria, mold and odor control inside each air handling unit.

A. UVC Emitters.

- Emitters and fixtures shall be high output, suitable for HVAC applications to minimize the number of lights affecting velocity and calculated dose of UV emission.
- Emitters shall be of the hot cathode type.
- Emitters shall be powered by Class P2, electronic type power supply, matched to the Emitter, and capable of producing a total intensity output per inch arc length of not less than 8µW/cm2 at 1meter in moving airstream of 50 F and 500 ft/min, with a line of power conversion efficiency of not less than 89%. They shall be capable of firing and properly operating each UVC Emitter at temperatures ranging from 35 F to 120 F and airflow velocities to 1,000 ft/min.
- Complete unit assembly shall be listed with UL.
- Emitter shall be constructed with hard ceramic bases to eliminate deterioration.
- Safety. Emitters shall be installed such that they cannot be accesses without the power being off. All accesses shall be labeled with caution signs in accordance with OSHA regulations for UVC devices.

- Manufacturer. Steril Aire, Lumalier, or UVDI.

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23 73 00 CENTRAL-STATION AIR-HANDLING UNITS

- Provide custom Air Handling Units as needed.
- Carefully review space requirements for AHUs.
- Units are chilled water with air side economizers, dual filters, plug or wall supply and return fans, and VFDs for controlling fan speeds.
- Units will be as manufactured by Temtrol, Alliance, Climate Craft, or Energy Labs.

23 81 03 PACKAGED ROOFTOP AIR CONDITIONING UNITS - SMALL CAPACITY

- Packaged rooftop units will only be used where chilled water is impractical and their use is pre-approved by the college.
- In general, where units are over five tons nominal capacity, chilled water Air Handling Units will be used.
- Units shall use R-134a, R-410, or other HFC refrigerant.
- Units shall include dry bulb economizer, two sets of filters (pre and final), relief fan, coils shall be copper fins on copper coils, gas fired furnaces, and curbs including vibration isolation and seismic restraints.
- Unit manufacturer shall be Trane, Carrier, York, or Lennox

23 81 23 COMPUTER-ROOM AIR-CONDITIONERS

- Where required, provide unit specifically designed for use in a computer room (BDF, IDF, etc.).
- Units shall use chilled water for cooling. If chilled water is impractical or a split system is desired as back up, provide air condensing unit by the same manufacturer as the indoor computer room air handling unit. Condensing coils shall be copper fins on copper tubes.
- Reheat may be accomplished by either hot water coil if hot water is available, or by hot gas bypass within the unit. Electric heat may be used as a last resort.
- Provide humidification if required for conditions requested by computer equipment supplier. Provide high intensity quartz lamps mounted above stainless steel evaporator pan, or self contained replaceable cylinder, microprocessor controlled electrode steam generating unit.
- Unit manufacturer shall be Liebert, Compu-Aire, or Stulz.

23 81 27 DUCTLESS SPLIT-SYSTEM AIR-CONDITIONERS

- Units may be used for small rooms requiring 24 hour air conditioning, no more than five tons total. Typical applications are small server rooms, elevator equipment rooms, remote office in a warehouse, etc.
- Refrigerant shall be R410A.
- Outdoor units shall either have copper fins on copper tube condensing coils or a coating approved by the college.
- Indoor fan coils may be wall mounted, ceiling mounted, or above ceiling fan coils depending on the application.
- Refrigerant piping shall be installed in accordance with manufacturer's recommendations.
- Thermostat must be capable of being hard wired to connect to the campus DDC system.
- Units shall be Mitsubishi, Sanyo, LG, Samsung, or Daiken.

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23 81 07 VARIABLE FREQUENCY DRIVES (VFD)

- VFDs shall be UL listed.
- VFDs shall be tested to UL 508C.
- VFDs shall be compatible with BACNET campus DDC system.
- The VFD's full load output current rating shall meet or exceed NEC Table 430-150. The VFD shall be able to provide full rated output current continuously, 110% of rated current for 60 seconds and 120% of rated torque for up to 0.5 second while starting.
- A programmable automatic energy optimization selection feature shall be provided standard in the VFD. This feature shall automatically and continuously monitor the motor's speed and load to adjust the applied voltage to maximize energy savings.
- Galvanic isolation shall be provided between the VFD's power circuitry and control circuitry to ensure operator safety and to protect connected electronic control equipment from damage caused by voltage spikes, current surges, and ground loop currents. VFDs not including either galvanic or optical isolation on both analog i/o and discrete digital i/o shall include additional isolation modules
- Protect from under voltage. The VFD shall provide full rated output with an input voltage as low as 90% of the nominal. The VFD will continue to operate with reduced output, without faulting, with an input voltage as low as 70% of the nominal voltage.
- Protect from over voltage. The VFD shall continue to operate without faulting with an input voltage as high as 130% of the nominal voltage
- VFD shall be Danfoss, ABB, or Yaskawa.

Div 25 INTEGRATED AUTOMATION

26 05 13 MEDIUM VOLTAGE CABLES

- Feeder cable for new work shall be 2/0 AWG (min) copper, type MV-90 133% insulation level, with 345 mil EPR insulation, copper tape shielding and an overall PVC or polyethylene jacket.
- Laterals between loop switches and pad-mounted transformers shall be 500MCM copper, type MV-90 similar to feeder cables.
- EPR cable shall comply with the latest editions of ICEA/NEMA S-68-516, NEMA WC-8 and AEIC CS-6.
- Cables shall be sized to carry the load as defined by demand load analysis plus at least 30 percent spare capacity for future.
- Apply fireproofing materials to new cables where exposed in manholes/pullboxes and vaults and to portions of existing cables exposed in manholes/pullboxes and vaults where splicing occurs during the work of this contract. Three phases and ground conductor of one feeder or lateral shall be fireproofed together except that cables shall be broken out and individually wrapped at splices and terminations. Apply in one layer, half-lapped except as recommended by the manufacturer. Binder tape shall be as recommended by the manufacturer.
- Where cables are spliced in manholes/pullboxes, rack cables fully across all manhole/pullbox walls, plus additional length, to continue to ductbank entrances. Install splices at locations within manholes/pullboxes to permit future replacement of splices by cutting and re-racking the affected cable along a shorter path through the manhole/pullbox. Where cables pass through manholes/pullboxes unspliced, rack along the longest route through the manhole/pullbox. Coordinate pulling operations so that all phases and the ground conductor for each feeder or lateral are grouped tightly together and rest properly on cable support arms. Where cables are spliced, cut cable lengths such that the splices will occupy a minimum of space and such that cables and splices rest properly on cable support arms.
- Medium voltage cables, splices and terminations installed in vaults shall not obstruct access for switch operation (from grade) or access for transformer and network protector removal and installation.

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26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

- Use only copper conductors, #12 AWG minimum for power wiring; #14 AWG for control circuitry.
- AC and MC cables are not permitted except as specifically noted in this section.
- A separate grounding conductor, other than the raceway, shall be included in all feeders and branch circuits.
- The use of busways shall not be permitted.
- Manufactured wiring systems are not acceptable except within modular partition systems.

26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

- Provide separate insulated conductor within each feeder and branch circuit raceway.
- Use copper-clad steel ground rods.
- Ground resistance testing shall be performed by a Contractor engaged independent testing company.
- Provide exothermic weld connections.
- Utilize the following elements for grounding:
  - Metal underground water pipe
  - Metal building frame.
  - Concrete-encased electrode.
  - Rod electrode.
  - Ground rings.
- 15 ohm maximum system ground persformance.
- Well pipes pipes shall be 8"D by 24" Long fiberglass with cast iron cover marked AGROUND@

26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

- Utilize the following mounting, anchorage and attachment components:
  - A. Poweder actuated fasteners.
  - B. Zinc-coated steel mechanical-expansions anchors.
  - C. Concrete inserts.
  - D. Clamps for attachment to structural steel elements.
  - E. Toggle bolts.
  - F. Hanger rods.
- Concrete bases: use 3000-psi, 28 day compressive-strength concrete.

26 05 33 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

- Conduit Materials:
  - Rigid steel and PVC-coated rigid steel.
  - Electrical metallic tubing (EMT).
  - Galvanized flexible steel conduit.
  - PVC schedule 40 and schedule 80.
- Conduit applications:
  - A. Underground, more than 5 feet outside foundation wall: provide PVC schedule 40 or PVC-coated rigid steel conduit.
  - B. Underground, within 5 feet from foundation wall: provide rigid steel conduit wrapped with corrosion protective electrical tape, or PVC coated rigid steel conduit.
  - C. In or under slab on grade: provide PVC schedule 80 conduit.
  - D. Outdoor locations above grade: provide galvanized rigid steel conduit. EMT may be used in areas 10' above finished grade.
  - E. In slab above grade: provide PVC schedule 80 conduit.
  - F. Wet and damp locations: provide galvanized rigid steel conduit.
  - G. Exposed dry locations: provide galvanized rigid steel conduit. EMT may be used in areas 10' above finished grade or floor.
  - H. Concealed dry locations: provide EMT.
- Provide sheet metal boxes; provide flush mounting outlet box in finished areas.
- Minimum conduit size shall be 3/4".
- Multi-outlet metal raceways in Laboratories shall be aluminum.
- Provide pull ropes in all empty conduit.

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26 05 43 UNDERGOUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

- Use concrete encased PVC conduit or concrete encased rigid steel conduit in ductbanks.
- Use minimum 12 foot radius sweeps.
- Install #4/0 bare copper ground conductor with all circuit conductors.
- Provide duct plugs in all unused ducts.
- Cable rack mounting equipment:
  - A. Heavy duty non-metallic cable rack channels.
  - B. 14-inch long arms with HDL arm locks and 3-inch saddle arms.
  - C. Use stainless steel fasteners in manholes.
  - D. Manufacturer: Underground Devices, Inc.

26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS

- Electrical Identification Materials and Devices:
- Identification for raceway and metal-clad cable.
- Identification for conductors and communication and control cable.
- Underground-line warning tape.
- Warning labels and signs.
- Instruction signs.
- Equipment identification labels.
- Miscellaneous identification products.
- Raceway and Metal-Clad Cable Identification: Adhesive labels and underground-line warning tape.
- Conductor and Cable Identification: Colored adhesive tape and brass or aluminum tags.
- Equipment Labels: engraved plastic attached with rivets or screwed on.
- Warning Signs: Baked enamel and metal backed butyrate.
- Instruction Signs: Engraved, laminated acrylic or melamine plastic.

26 05 73 OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

- Provide computer-based, fault current and overcurrent protective devices coordination study including ground fault protection and arc fault hazard analysis studies to be performed by the contractor.
- Protective devices shall be set based on the result of the protective device coordination study. Arc fault hazard analysis warning nameplates shall be printed and affixed to the electrical system equipment after the final protective relay settings have been applied and confirmed operational.
- Settings and adjustments of the relays shall be performed by an independent qualified agency familiar with this work and the agency is to be retained by the contractor.
- The person performing this work shall have a minimum of five years experience.
- Contractor shall retain a 3rd party independent consultant to perform the study indicated in this section.
- Perform study under direct supervision of Professional Engineer experienced in design of this Work and licensed at in State of California with minimum of five years experience in power system analysis.

26 22 00 LOW-VOLTAGE TRANSFORMERS

- Provide continuous copper windings.
- Ventilated enclosures.
- Insulation class: 220 degrees.
- Taps: 25KVA transformers and larger shall have two 2.5 percent full capacity taps above and two 2.5 percent full capacity taps below normal.
- Transformers shall be NEMA TP-1 compliant and meet NEMA sound criteria.
- Provide K- rated transformer or harmonic mitigating transformers for non-linear load applications.

26 24 13 SWITCHBOARDS

- The manufacturer of the switchboard assembly shall be the same as the manufacturer of circuit breakers and installed within the assembly.
- Mains shall be individually or panel mounted; branch feeder breakers shall be group mounted.
- Provide ground bussing the full length of the switchboard assembly.
- Bussing: copper with silver or tin plating of standard size.
- Connections shall be bolted, accessible from the front for ease of maintenance.
- Provide bus extensions on ends for future sections.
- Install individual circuit breaker nameplates.
- Testing shall be done by a separate contractor-engaged testing firm.
- Provide electronic metering for building main switchboard.

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26 24 16 PANELBOARDS

- The manufacturer of the panelboard assembly shall be the same as the manufacturer of circuit breakers and installed within the assembly.
- Copper bussing
- Copper ground bussing shall be installed in all panelboards.
- Circuit breakers shall be bolt-on type.
- For non-linear load applications subject to harmonics furnish 200 percent rated, plated copper, solid neutral.
- Install spare conduits out of each recessed panelboard to accessible location above ceiling or below floor. Minimum spare conduits: 5 empty 1 inch. Identify each as ASPARE@.
- Provide minimum 25 percent spare load capacity and 25 percent spare circuit breakers in panelboards.

26 24 16 PANELBOARDS (CONTINUED)

- Circuit directories shall be typed under clear plastic contained within a metal frame inside the panelboard door.
- Provide HACR type circuit breakers for air conditioning equipment.

26 24 19 MOTOR-CONTROL CENTERS

- The manufacturer of the motor control center assembly shall be the same as the manufacturer of circuit breakers and starters installed within the assembly.
- Horizintal Bus: copper bus with continuous rating. Include copper ground bus entire length of control center.
- Vertical Bus: copper.
- All indicating and pilot lights shall be LED with metal housing and easily replaceable parts.
- Control wiring shall be installed in Panduit wiring ducts. Control wiring shall be stranded copper.
- Provide engraved nameplates describing load on each cubicle.

26 27 26 WIRING DEVICES

- Receptacles: 120V, 20A
    - A. Straight blade.
    - B. GFCI: feed-thru type.
    - C. Isolated ground in IT equipment rooms.
- Snap Switches: 120/277V, 20A.
    - A. Pilot light switches.
    - B. Key-operated switches.
    - C. Momentary contact, center off switches.
- Occupancy Sensors:
    - A. Wall-Switch Sensors: Infrared type with adjustable time delay.
    - B. Long-Range Wall-Switch Sensors: Passive-infrared type with adjustable time delay.
    - C. Wide-Range Wall-Switch Sensors: Passive-infrared type with adjustable time delay.
    - D. Exterior Occupancy Sensors: Passive-infrared type with adjustable time delay.

26 27 26 WIRING DEVICES (CONTINUED)

- Wall Plates:
  - A. Material for Finished Spaces: Type 302 stainless steel, satin finish
  - B. Material for Unfinished Spaces: Galvanized steel.
  - C. Material for Damp and Wet Locations: Thermoplastic.

- Finishes:
  - A. Switches and receptacles connected to normal power system: Ivory.
  - B. Switches and receptacles connected to emergency power system: Red.
  - C. TVSS Devices: Blue.
  - D. Isolated-Ground Receptacles: Orange.

26 28 13 FUSES

- Cartridge fuses rated 600 V and less for use in switches.
- Spare-fuse cabinets. Wall-mounted steel unit with fuse pullers for each size of fuse. Quality Standard: NEMA FU 1.

- Cartridge Fuses: Nonrenewable
- Fuse Applications:
  - A. Service Entrance: Class L, fast acting.
  - B. Feeders: Class L, fast acting.
  - C. Motor Branch Circuits: Class RK1, time delay.
  - D. Other Branch Circuits: Class RK1, time delay.

26 28 16 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

- Fusible and Nonfusible Switches:
  - A. Fusible Switch, 600 A and Smaller: NEMA KS 1, Type HD.
  - B. Nonfusible Switch, 600 A and Smaller: NEMA KS 1, Type HD.
  - C. Accessories:
    - Equipment ground kit.
    - Neutral kit, where required.
    - Auxiliary contact kit.

26 51 00 INTERIOR LIGHTING

- Interior lighting fixtures (including fixtures mounted on exterior of building), lamps, and ballasts.
- Emergency lighting units.
- Exit signs.
- Lighting fixture supports.
- Retrofit kits for fluorescent lighting fixtures.
- Quality Standard for Fixtures in Hazardous Locations: FMG.
- Quality Standard for Exit Signs: UL 924.
- Warranty:
    - A. Emergency Lighting Unit Batteries: 10 years.
    - B. Emergency Fluorescent Ballasts: Seven years.
    - C. Electronic Ballasts: Five years.
    - D. Electromagnetic Ballasts: Three years.
    - E. Fluorescent Lamps: Two year(s).
- Ballasts for Linear Fluorescent Lamps:
    - A. Electronic Ballasts
    - B. Type: Instant start.
    - C. Sound Rating: A.
    - D. Total harmonic distortion rating of less than 10 percent.
    - E. Transient Voltage Protection: Category A or better.
    - F. Lamp Current Crest Factor: 1.7 or less.
    - G. BF: 0.85 or higher.
    - H. Power Factor: 0.95 or higher.
    - I. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.
- Electronic Programmed-Start Ballasts for T5 Lamps:
    - A. Lamp end-of-life detection and shutdown circuit for T5 diameter lamps.
    - B. Automatic lamp starting after lamp replacement.
    - C. Sound Rating: A.
    - D. Total Harmonic Distortion Rating: Less than 20 percent.
    - E. Transient Voltage Protection: IEEE C62.41, Category A or better.
    - F. Operating Frequency: 20 kHz or higher.
    - G. Lamp Current Crest Factor: 1.7 or less.
    - H. BF: 0.95 or higher, unless otherwise indicated.
    - I. Power Factor: 0.95 or higher.

26 26 10 INTERIOR LIGHTING (CONTINUED)

- Electromagnetic Ballasts: Energy saving, high-power factor, Class P, automatic reset thermal protection.
- Single ballasts for multiple lighting fixtures.
- Ballasts for Low-Temperature Environments:
    A. Temperatures 0 Deg F and Higher: Electronic or electromagnetic.
    B. Temperatures Minus 20 Deg F and Higher: Electromagnetic.
- Ballasts for low electromagnetic-interference environments.
- Ballasts for Dimmer-Controlled Lighting Fixtures: Electronic type.
    A. Dimming Range: 100 to 5 percent of rated lamp lumens.
    B. Ballast Input Watts: Can be reduced to 20 percent of normal.
- Ballasts for Bi-Level Controlled Lighting Fixtures: Electronic type.
    A. High-Level Operation: 100 percent of rated lamp lumens.
    B. Low-Level Operation: 30 percent of rated lamp lumens.
- Ballasts for Compact Fluorescent Lamps: Electronic.
- Ballasts for Dimmer-Controlled Lighting Fixtures:
    A. Dimming Range: 100 to 5 percent of rated lamp lumens.
    B. Ballast Input Watts: Can be reduced to 20 percent of normal.
- Emergency Fluorescent Power Units:
    A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast; having integral time delay relay; and for operating 1 fluorescent lamp(s) continuously at an output of 1100 lumens each.
    B. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more fluorescent lamps, remote mounted from lighting fixture.
- Ballasts for High-Intensity-Discharge Lamps:
    A. Electromagnetic Type for Metal-Halide Lamps: Constant-wattage autotransformer or regulating high-power-factor, low-noise type.
    B. Electronic type for metal-halide lamps.
    C. Auxiliary instant-on quartz system.
    D. Electromagnetic type for high-pressure sodium lamps with solid-state igniter/starter and instant-restrike device.

26 52 00 EMERGENCY LIGHTING

- Emergency Lighting Units: Self-contained, with sealed, maintenance-free, lead-acid battery and fully automatic, solid-state charger, wire guard, integral time-delay relay, and integral self-test.
- Fluorescent Lamps:
    A. Low-mercury lamps.
    B. T8 rapid-start, low-mercury lamps, rated 32 W maximum.
    C. Compact Fluorescent Lamps: T4 double tube, low mercury, rated 13W.
- High-Intensity-Discharge Lamps:
    A. High-pressure sodium lamps.
    B. Metal-halide lamps.
    C. Pulse-start, metal-halide lamps.
    D. Ceramic, pulse-start, metal-halide lamps.

- Manuf: Evenlite
- Model: Aperion Retracted Recessed emergency light, APR-25-NC-UP-SD
- Mount: Wall or ceiling mounted
- Finish: Textured white powder coat (field paint to blend with architecture)

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26 53 00 EXIT SIGNS

- Manuf: Lithonia
- Model: Precise LRP Series, LED Recessed
- Mount: Ceiling, wall or pendant mount as applies
- Finish: Red letters
- Directional arrows or double sided as required
- Internally lighted.
    A. LED, 100,000 hours.
    B. Battery Type Exit Signs: Sealed, maintenance-free, nickel cadmium battery with fully automatic, solid-state charger with sealed transfer relay, remote test switch.

Div 27 COMMUNICATIONS

27 00 00 COMMUNICATIONS

INTRODUCTION

The information included in this section is provided as reference for project's architects, engineers and other consultants in order to establish an initial understanding of how integrated technologies will impact architectural designs and construction for the new and renovated building projects on campus.

This document addresses minimum guidelines for the design of Technology Rooms, pathways (inter-building and intra-building), and structured cabling system.

TECHNOLOGY ROOMS

There are a number of names used to describe Technology Rooms, including;

- Telecommunications Rooms (TR), IDF Closet, Tele/Data Closet, Equipment Rooms (ER), BDF, MDF etc.
- For the purpose of this document relevant to the individual building projects, ECC has identified two classifications of Technology Rooms, the BDF and IDF. ECC reserves the use of the MDF, Main Distribution Frame and Data Center to spaces that support the entire Campus.
- Technology Rooms provide an environmentally suitable and secure space for installing cable, associated hardware, rack and wall mounted technology equipment. See Section 29.7 for specific room design criteria.

COMMUNICATIONS REQUIREMENTS IN THE TECHNOLOGY ROOMS

- Ladder Rack

  Provide Ladder Rack within the BDF AND IDFs to route cable to or from sleeves, risers, ducts, cable trays to termination fields within equipment racks or mounted on walls. This cable ladder system shall be contained within the confines rooms.

  A. Ladder Rack Materials and Applications:

  Cable ladder may be mounted horizontally or vertically on walls and over equipment cabinets and racks. Vertical ladder will be used to support riser cable from floor to ceiling as it passes between floors. The Cable Runway system shall be mounted to walls, the top of equipment rack, or hung with threaded rods for bracing and support. Refer to Local Building Codes for additional seismic bracing for code compliance.

  B. Ladder Rack Bonding and Grounding:

  The ladder rack system shall be bonded to the Telecommunications Ground Bus with 6AWG stranded copper wire.

27 00 00 COMMUNICATIONS (CONTINUED)

- Equipment Racks
  Provide a minimum of (4) equipment racks in a standard BDF and (3) equipment racks in a standard IDF.

  A. Size and Construction:
  Each rack shall consist of a modular EIA 19" mounting frame, with a minimum of 77" (44U) space for equipment in the vertical plane.
  The rack shall be manufactured from extruded aluminum / steel with a minimum load-carrying capacity of 1000 lbs. (450 kg.).
  Each rack will have both horizontal and vertical cable management. Provide side-mounted vertical cable management on both sides of each rack.
  Provide strain relief and cable management at the rear of each rack to ensure tidy routing of all feeder and horizontal cables.
  B. Power Requirements:
  Each cabinet to have a minimum of (1) mounted power strip at the rear of the cabinet with eight power sockets. The strip will connect to a UPS with a dedicated 20amp circuit. The power receptacles on the connector strip shall be NEMA 5-20R compatible. The plug shall be NEMA 5-20P compatible.
  C. Installation Requirements:
  Provide all mounting components and accessories to securely fix racks to floor and supporting walls. Provide appropriate seismic transverse and longitudinal bracing per any local codes and the current NUSIG (National Uniform Seismic Installation Guidelines), and fix each rack to the overhead ladder.
  Provide cable bend management fixtures to maintain the proper bend radius as the cables drop into the rack. Do not allow cables to be unsupported as they run from conduit or cable tray to equipment cabinets.
  D. Bonding and Grounding:
  The equipment racks shall be bonded to the Telecommunications Ground Bus with 6AWG stranded copper wire.

COMMUNICATION CABLE DISTRIBUTION INFRASTRUCTURE

The horizontal communication cable distribution infrastructure includes the pathway and support hardware which concentrates, supports and protects horizontal cable between its origination point in the IDF or BDF and the workstation outlet location. It also provides a permanent pathway that facilitates the addition or replacement of cable over time. Horizontal support hardware is further defined as continuous, (e.g. Conduit, Cable Tray) and non-continuous (e.g. J-Hooks, Bridle Rings).

27 00 00 COMMUNICATIONS (CONTINUED)

- Communication Distribution Cable Tray

  Distribution cable tray shall be installed above the accessible ceiling for the creation of main pathways for the management of high volumes of cable through corridors, and for access and egress to BDF and IDFs.

  A. Construction:

  Cable tray shall be the wire basket type manufactured of ASTM A510 high strength steel wires or equal, and comply with NEMA VE1 or the proposed IEC 61537 standards. The cable tray shall be UL (Underwriters Laboratory) listed.

  B. Dimensions:

  The cable tray shall be a minimum of 18 in. wide, with a depth of 4 in. Narrower cable tray may be used for locations with lower volumes of cable.

  C. Support Requirements:

  A trapeze-style support shall be used along the span of the cable tray. The trapeze shall be constructed of channel stock (i.e.Unistrut) and 5/8 in. threaded rod. The trapeze support elevation should allow a minimum of 12 in. between the top edge of the cable tray and the slab above. Appropriate threaded rod anchors shall be selected and approved by the Project Structural Engineer. Trapeze supports shall be placed a minimum of every 10 ft. and at cable tray intersections and terminations.

  Seismic bracing for the cable tray as required by code, shall be installed along cable tray routes. Coordination of lateral and oblique bracing locations shall be coordinated with the other disciplines whose equipment and systems share the area above the suspended ceiling.

  D. Bonding and Grounding Requirements:

  The cable tray shall be bonded to the Telecommunications Grounding Bus Bar in the IDF(s) on the same floor. All non-contiguous segments of the Cable tray shall be bonded together using 6AWG stranded copper wire, with crimp-on lugs bolted to each segment of the cable tray to ensure electrical continuity throughout the length of the cable tray system.

  E. Firestopping Requirements:

  Cable trays that penetrate fire-rated walls shall be equipped with wall penetration sleeves at each location, and have appropriate firestopping materials installed after the placement of cable has been completed.

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27 00 00 COMMUNICATIONS (CONTINUED)

- Communication Cable System Conduit

  Provide Communications cable conduit in locations where access to cable tray is unavailable or where portions of the pathway span are inaccessible (i.e. embedded in walls or inaccessible ceilings). Provide conduit for small quantities of cable where cable tray is impractical. Conduit materials may be used to house non-rated cables between end points to ensure NEC Code compliance.

  Conduits serving individual workstation outlets shall be a minimum of 1 in. The 1 in. conduits shall be connected to double-gang, deep device boxes (2-1/2 in. deep), equipped with a single-gang mud ring at the outlet location. Individual workstation conduits are to be dedicated to only one outlet box each, and shall not be "daisy chained" together.

  The following conduit type shall be utilized as described below:

  A. Rigid Galvanized Steel (RGS):

  Rigid conduit shall be used in areas exposed to the outside elements above ground and used for the containment of non-rated cable as specified in the NEC.

  RGS shall be installed using threaded couplers and fittings.

  B. Thinwall Electrical Metallic Tubing (EMT):

  EMT shall be used for installations within the confines of an environmentally-controlled building. EMT conduit is not acceptable for non-rated cable installations. EMT conduit may be used, however, to carry riser-rated cable and innerduct in vertical and horizontal cable applications. EMT conduit may be used as sleeves for wall penetrations, and for floor core riser penetrations.

  EMT conduit connectors and fittings shall be installed using "Set-Screw" type or air-tight "Compression" type fittings.

  C. Flexible Conduit ("Flex"):

  Flexible conduit shall not be used for communication cable installation when EMT conduit is available. Flex conduit may used for connections into modular furniture or similar applications. When using Flex conduit, increase the diameter of the Flex by one trade size over what the requirement would be using smooth-wall conduit.

  Flexible conduit runs may not exceed 5 feet.

27 00 00 COMMUNICATIONS (CONTINUED)

D. Plastic Conduit/Polyvinyl Chloride (PVC):
Plastic and PVC conduit shall be used for underground duct construction between buildings and vaults. PVC conduit shall not be used within buildings per NEC Code and UBC (Uniform Building Code).
The PVC conduit shall be a minimum of Schedule 40 PVC. Plastic.

- Conduit Installation Guidelines

A. Support Requirements:
Conduits shall be installed with support systems such as channel stock/threaded rod trapeze supports. Individual conduits may be supported using threaded rods with clamps. Conduits may be attached to the underside of cable trays and affixed to walls where practical. Seismic bracing shall be installed as required by local building codes, DSA, and NUSIG (National Uniform Seismic Installation Guidelines). Accommodations for lateral and oblique bracing struts must be coordinated with the other disciplines that vie for critical ceiling space.

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B. Bonding and Grounding:
Bonding of conduits to the Telecommunications Grounding System is required. At the termination of conduit runs within technology rooms, attachment of a ground wire between the Telecommunications Ground Bus to grounding rings installed on conduit box connectors should be accomplished to ensure electrical continuity of the conduit system.

C. Firestopping:
Partially filled and empty conduits that pass through fire-rated walls or through floors shall be firestopped in accordance with Local Fire Codes. Material shall be flexible firestopping putty or pillows.

- Innerduct
  Innerduct shall be installed to establish multiple pathways in a larger conduit or provide a pathway across a cable tray. Innerduct shall be used for the protection of fiber optic cabling, but copper cabling may be installed in the innerduct to prevent tangling with other cables already present. Innerduct shall be used to protect fiber optic cabling in cable trays, exposed areas in ceilings, IDFs, and BDFs.
- Communication Cable System Pull Boxes
  A pull box shall be installed in conjunction with conduit installations to provide access to cables at appropriate locations for distribution to tributary locations, and to facilitate cable installation.

27 00 00 COMMUNICATIONS (CONTINUED)

A. Materials:

For indoor use, use NEMA Type 1 pull boxes. For areas exposed to heavy moisture, chemicals or weather elements, NEMA Type 3 or 4 pull boxes shall be installed.

The pull box shall be equipped with hinged covers, or removable covers which are screwed or bolted on. The pull boxes shall have hardware for supporting and securing cabling and pulling eyes to facilitate cabling installation.

B. Placement:

A pull box shall be installed after 100 feet of conduit has been placed, and or after 180 degrees of directional change in the conduit pathway has been affected. The installation of a pull box shall not be used for directional change.

C. Support Requirements:

Pull boxes shall be attached directly to the ceiling slab, or suspended by 4-point threaded rod supports anchored to the ceiling. Pull boxes require seismic bracing to comply with Local Building Codes. Seismic bracing shall be installed as required by local building codes, DSA, and NUSIG (National Uniform Seismic Installation Guidelines). Accommodations for lateral and oblique bracing struts must be coordinated with the other disciplines that vie for critical ceiling space.

- Horizontal Cable Support Hardware (Non-Continuous)

  Horizontal Cable Support Hardware such as J-Hooks shall be used in locations where the communication cable is not supported by continuous systems such as cable trays or conduit.

  Provide J-Hooks every 48" at a minimum, attached to threaded rod or ceiling hangers to provide support for cable bundles or innerduct. The J-Hooks shall be metal stampings configured in a "J" form providing a broad cradle or saddle for supporting for of cable.

DESIGN CRITERIA FOR INTER-BUILDING COMMUNICATION DUCTBANKS AND TRANSITION STRUCTURES

Inter-building Communication Infrastructure Ductbanks shall be installed to carry communication cables between the tunnel system and buildings on Campus. The Duct shall be constructed of contiguous segments of PVC conduit. The Ductbanks shall be encased in slurry.

Transition Structures, manholes, shall be installed as required to allow technicians access to cable and splices to perform maintenance or to modify distribution configurations. The size of the Transition Structures shall be selected for installation by the number of ducts and potential cable count the structure must contain.

27 00 00 COMMUNICATIONS (CONTINUED)

The following provides general requirements for all Inter-building Communication Duct Banks and Transition Spaces as components of the overall communication cable system infrastructure.

- Inter-building Communication Ductbanks

  Inter-building Communication Ductbanks shall be designed to provide a permanent and durable pathway system which is available for the delivery of entrance cable from the campus connection point in the adjacent utility tunnel or as part of a campus Inter-building backbone system connecting several buildings to the Campus Loop.

  A. Configuration:

  There shall be minimum of (4) 4" conduits between the Campus Buildings and the Campus connection point. The Ductbanks shall be configured in arrays, with several rows stacked together such as 1 x 4, 2 x 2, 3 x 4 and shall correspond to the arrangement of duct openings in pre-cast concrete vaults and manholes where transitions occur.

  Provide (3) 1 1/4" innerduct into each 4" conduit.

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  B. Construction Materials and Methods:

  Ductbanks shall be encased in slurry.. Where Ductbanks share underground pathways with other underground infrastructure components such as water lines, gas lines, sanitary systems, it is critical that the communications infrastructure be installed with the highest level of durability.

  The duct material itself shall be Trade Size 4 (4-inch diameter), PVC Schedule 40 or equal, and suitable for contact with concrete. Conduits shall be cut square, with the cut ends reamed and deburred. Plastic bushings are to be installed over the each end of every conduit.

  Place a ¼"nylon or polyethylene pull rope in each conduit from end to end. Install conduit plugs in each empty outside plant conduit to prevent the introduction of noxious gases or water into the building.

  C. Ductbank Placement:

  Duct routing shall be coordinated with the Campus Infrastructure project, with consideration for distance between Transition Structures and difficulty of cable pulls, particularly when high-count multipair copper cables are necessary. The minimum radius for curves is 15 feet.

27 00 00 COMMUNICATIONS (CONTINUED)

Slurry-encased ductbank dimension guidelines:

Ground cover	Minimum of 24 inches
Top level of slurry	Minimum 3 inches above top duct
Slurry on outer sides of ductbank	Minimum 3 inches
Slurry between ducts	1.5 inches (above, belor and to each side)
Bottom level of slurry	Minimum 3 inches

- Ductbank Marking
  A metallic warning tape, detectable with magnetic location equipment, should be buried directly over the path of the Ductbank approximately 18" below the surface.
- Ductbank Termination At The Building
  Communication Ducts should be terminated with bell-end connectors, flush with the inner surface of the wall
- Communication Transition Structures
  Ductbank Transition Structures shall be provided allow access to cable installed within underground ductbanks. The transitions structures shall provide a location for the storage of splice cases and slack loops of cable. The transition structures shall facilitate the distribution of cable to multiple locations by providing a junction point for ducts radiating in several directions.

  A. Selection of Transition Structure Type:
  The type of structure chosen for installation shall be dependent on the number of ducts in the span. The ductbank transition structure shall be preformed concrete structures have weight-bearing cover/lid capacities that range from light pedestrian traffic to deliberate heavy vehicular traffic. The appropriate rating should be selected based on the anticipated exposure of the structure to these differing traffic types.

  B. Placement of Transition Structures:
  Structures shall be placed after 180 degrees of directional change has been affected in the ductbank route. In straight or relatively straight runs, there shall be no more than 400 feet between structures. Structures shall not be used as the apex of 90-degree change in duct direction. Sweeps and structures shall be planned such that the sweep occurs outside of the structure, allowing straight cable pulls through the structure itself.

27 00 00 COMMUNICATIONS (CONTINUED)

C. Transition Structure Accessories and Equipment:

Transition structures require the following equipment:

- A sump, or gravel drainage in the case of small hand holes
- Corrosion-resistant pulling eyes
- Cable racking
- Grounding cables installed per applicable codes or practices
- Ladders and steps
- Watertight duct plugs

DESIGN CRITERIA FOR COMMUNICATION CABLING

- Cabling System Requirements

  The communications-cabling system will be based on the following design guidelines:

  A. The cabling system will be standards compliant (EIA/TIA 568A)

  B. The cabling system will provide a high level of flexibility, capability and resilience.

  C. The cabling system shall include high performance copper and optical fiber cabling, as well as wireless systems where appropriate.

  D. Communications Outlets will be provided throughout the facility. Each outlet will support voice, data and digital media connectivity.

- Cabling System Overview

  The communications cabling system at ECC is based on a flexible design that will allow any communications connector to be used for voice or data. All communications station cable is terminated on RJ45 connectors at the faceplate and RJ45 patch panels in the IDF Closets. The voice riser cable will be extended from 110 blocks in the BDF to each IDF with one pair terminated on each port of a voice riser patch panel. This system will support add, moves and changes by simply moving a patch cord.

- Communications Outlet Configurations

  All communications outlets will support a combination of voice, data and media applications.

27 00 00 COMMUNICATIONS (CONTINUED)

The table below describes the typical outlet configurations.

Standard wall mounted outlet	Standard wall mounted outlets will be the typical outlet configuration throughout the buildings. Standard wall mounted outlets will consist of three Category 6 unshielded communications cables terminated on RJ45 connectors at the faceplate.
Wall mounted phone outlet	Wall mounted phone outlets will consist of two Category 6 unshielded communications cables terminated on RJ45 connectors at the faceplate. The faceplate will be mounted 42" above the finished floor, unless directed otherwise by the Architect.
Duplex or Quad Wall Mounted Outlet	In classrooms and other spaces requiring only one data connection per user, a duplex or quad outlet will be provided as appropriate to the seating and equipment layouts. Duplex outlets will consist of two Category 6 unshielded communications cables and Quad outlets will consist of four Category 6 unshielded communications cables terminated on RJ45 connectors at the faceplate.
Floorbox / Poke-through	In areas that need communications outlets in the floor, the typical floorbox and poke though will consist of four Category 6 unshielded communications cables terminated on RJ45 connectors in the floor devices.
Audiovisual Communications Outlets	At instruction or presentation locations, provide communications outlets dedicated to the audiovisual presentation system. If no audiovisual system exists, the AV communications outlet will still be provided at the instructor's location consisting of Six Category 6 unshielded communications cables terminated on RJ45 connectors.
Ceiling Mounted Outlet	At the video projection locations ceiling mounted outlets will consist of Three Category 6 unshielded communications cables terminated on RJ45 connectors at the faceplate mounted in the accessible ceiling tile or mounted on the surface as applicable. This supports (1) cable for the video projector and (2) cables for the wireless access point.
Wireless Access Point	Communication outlets support wireless access points will be co-located at the projector locations in all classrooms. The co-located wireless access points will use (2) of the three cables provided at that location. In other areas, wall mounted 1' above the accessible ceiling or 1' below an inaccessible ceiling. The outlets supporting the wireless access points will consist of two Category 6 unshielded communications cables terminated on RJ45 connectors at the faceplate.

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27 00 00 COMMUNICATIONS (CONTINUED)

- Communications Outlet Population in Specific Room Types

Office Single Occupancy <80sf	(2) Standard outlets (3 cables and connectors) coordinated with furniture locations. Co-locate outlets with electrical outlets.
Office Single or Double Occupancy >80sf	(3) Standard outlets located on three walls. Co-locate outlets with electrical outlets.
Division Dean's Office	(3) Standard outlets located on three walls. Co-locate outlets with electrical outlets.
Conference / Meeting Rooms	(1) Standard outlet located on each wall (1) Quad outlet located in a power / data floorbox under the conference room table or integrated into the conference room table. Co-locate outlets with electrical outlets.
Classroom / Lecture Rooms	(1) Duplex outlet on each of the three walls in the classroom (not including the front wall). (1) AV outlet at the instructors station. (1) Ceiling mounted outlet at projector location for ceiling mounted projector and wireless access point. Co-locate outlets with electrical outlets.
Computer Labs	Same as classroom plus: (1) Data drop per seat Cable shall be distributed with non-metallic Raceway with a 4' services loop at each termination point.

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- Backbone Cable (Inside Building)
  The Backbone cable will connect each IDF back to the BDF. Backbone connectivity will be supported by multipair copper cabling for voice and optical fiber cables for data.
  A. Multipair telephone riser cable will be run from 110 blocks in the BDF to rack mounted voice patch panels in the IDFs with (2) pair of riser cable terminated on RJ45 connectors.
  B. Optical fiber will be run from the BDF to each IDF consisting of (6) Singlemode and (6) high performance, 50 micron Multimode elements terminated on SC connectors rack mounted in optical fiber patch panels.
- Backbone Cable (Campus Connection)
  Optical Fiber consists of (24) Single-mode and (24) 50 micron Multi-mode elements shall enter the building from (2) separate directions of the Campus Optical Fiber Loop.
- Copper Voice Cable
  Provide 25 pair of outside grade Category 6 cable on protection blocks in the BDF.

27 00 00 COMMUNICATIONS (CONTINUED)

LABELING

Labeling shall be consistent across all projects. Please ensure that the labeling corresponds to the final room number which may be different then the Architect's number scheme on the construction documents.

- IDF Closets
  Use the room number to identify the BDF and IDF.
- Patch Panels
  All patch panels will be uniquely numbered in each closet as follows:
  A. Patch Panel A –Z
  B. Patch Panel Jack Numbers 1-48
- Workstation Outlets
  All workstation outlets will be clearly labeled as follows:

WWW	IDF closet room number
X	Patch panel number
YY, YY, YY	Patch panel jack number

Example: 202A46,47,48
IDF Room 202, Patch Panel A, Jack # 46, 47, 48

27 32 26 RING-DOWN EMERGENCY TELEPHONES

SPECIFICATIONS	
Pedestal - interactive voice communication unit Manufacturer: Code Blue 1-dual (CB 1-d) 24v AC pedestal mount Faceplate: IA4100 FP2 speakerphone with 2nd button (additional black "Info" button) Graphics text: "Police" Finish: Standard painted finish, color - blue Graphics color: Reflective white	
Wall mounted - interactive voice communication unit Manufacturer: Code Blue 2-standard (CB 2-s) 24v AC wall mount with LED area light Faceplate: IA4100 FP1 Speakerphone with single red button "Push for Help" is standard Finish: 4B Brushed stainless steel	

27 53 13 CLOCK SYSTEMS

Primex Wireless - GPS synchronized time system
12.5" Traditional clocks with -P (Calypso) dial face

Div 28 ELECTRONIC SAFETY and SECURITY

28 10 00 ACCESS CONTROL / SECURITY ALARM SYSTEM

- GE Security Hardware
- GE Sapphire Pro – latest version software

28 20 00 ELECTRONIC SURVEILLANCE

Internet Protocol video surveillance closed circuit television (IPVS/CCTV) system.

28 31 00 FIRE DETECTION AND ALARM

- Provide a fully automatic and manual, analog addressable fire alarm system.
- Campus standard fire alarm system is Notifier.
- The system shall be monitored at the Campus Police station.Connect each building system to the campus-wide fiber-optic loop.
- Alterations to existing systems shall include testing of the entire altered portion as well as a representative portion of the remaining system on completion of the work. Provide all software and programming modifications necessary to incorporate the work.
- Standard notification devices should be white in color.
- All fire alarm wiring shall be installed in conduit, factory pre-painted red.
- All work shall be in strict accordance with Division of the State Architect requirements.

Div 31 EARTHWORK

Div 50 STRUCTURAL SYSTEM DESIGN

INTRODUCTION

All projects on campus that involve engineered structural shall be designed and constructed in accordance with applicable building codes, related professional standards and publications, as well as prevailing standard of care and best practices for structural engineering services.

These guidelines are not comprehensive and should be used in conjunction with the most current applicable codes and regulations at the time for each individual development project.

DELEGATED DESIGN

The incorporation of "delegated design" duties (i.e. design duties required of the contractor and his/her structural engineering consultants) into the contract drawings or specifications is prohibited where such delegated designs include any of the basic structural design duties for the building, structure or anchorage of nonstructural components described above for the project structural engineer.

SUSTAINABLE DESIGN

All new projects shall incorporate, where practical and feasible, features that will reduce the impacts on the natural environment by maximizing the use of recycled materials, such as fly ash in concrete construction.

I. BUILDING ASSESSMENT STUDY

- A building assessment study was commissioned by El Camino Community College in 1993 and performed by Degenkolb Engineers. The study consists of the seismic evaluation of 27 buildings on campus and is intended to help guide future construction development. When working on existing buildings, designers should ascertain if an assessment was done for a particular building and should consider the recommendations of the Assessment Study as the scope of new work is developed.

II. STRUCTURAL SYSTEM SELECTION

- Limited to conventional building and other structural systems that are widely used.
- Considerations for local markets considering materials, skill sets, and cost.
- Provide higher levels of seismic performance for projects that have special considerations such as contents that far exceed the cost of the building.
- Systems should be redundant and capable of continued resistance and protection of the structure and contents after the onset of seismic induced damage.
- Structural irregularities should be avoided whenever possible.
- Lateral force resisting systems should be continuous from roof to foundation and should be evenly distributed.
- Use of discontinuous shear walls or braced frames is not acceptable.
- Use of transfer girders or other design elements that limit gravity system redundancy should be avoided.
- All buildings and structures, including non-bearing partitions, shall be of noncombustible construction. Wood-framed structures may be acceptable for small structures on a case-by-case basis with special written permission from the College.
- The use of moment frames in steel buildings and structures should generally be avoided where braced frames or other stiff and more economical structural systems can be utilized. Moment frames are inherently flexible and produce relatively large seismic drifts that can cause damage to typical wall finishes.

III. CONCRETE & MASONRY STRUCTURES

- Concrete for foundations, walls and slabs-on-grade will utilize hard rock aggregate with an unreinforced density of approximately 145 pcf, and a minimum compressive strength of 4,000 psi.
- Lightweight concrete with an unreinforced density of 110 to 115 pcf will be used for structural fill over steel deck, and shall have a minimum concrete strength of 3,000 psi.
- Reinforcing steel shall be ASTM A615 grade 60, or A706 where bars are to be welded.
- Welded wire fabric shall conform to ASTM A185.
- Concrete mix design must comply with CBC Section 1905A.2.3; Method B. Use admixtures as required to improve concrete performance. Consider mixing, placing, and curing methods to accommodate weather conditions at the time of casting concrete at site. Avoid early strength concrete that may result in cracking.
- Specify size of aggregate and slumps. Use 1-inch or 3/4 –inch minimum aggregate size, with smaller sizes only in very special cases.
- Control cracks in concrete by joints, construction joint separations, and other means.
- Avoid thin sections or projections that may crack off when forms are removed. Chamfer column corners.
- In concrete masonry walls, fill all cells except on free-standing site walls retaining no earth. Avoid bars larger than #8.
- Clearly show the minimum concrete cover required for the intended fire protection rating and protection against corrosive soils where such concern is noted in the Geotechnical Report.
- Concrete unit masonry shall be modular medium weight conforming to ASTM C90, grade N-1, hollow load-bearing.
- Portland cement shall be Type II from one source and conform to ASTM C150.
- Mortar shall conform to ASTM C270.
- Grout for reinforced masonry walls shall conform to ASTM C476 and shall provide a minimum strength of 2,000 psi.

IV. STRUCTURAL STEEL STRUCTURES

- Wide flange shapes shall be ASTM A992.
- Square or rectangular structural steel tubing shall conform to ASTM A500
- All structural bolts shall be 7/8" diameter ASTM A325-N unless noted otherwise on the drawings.
- All grout for structural steel base plates shall be cementitious nonshrink with a flowable strength of 6,000 psi minimum.
- Anchor bolts for structural steel columns shall conform to ASTM F-1554 Grade 36 or 55, unless noted otherwise.
- Galvanize all steel exposed to weather unless noted otherwise in the architectural drawings or coating specifications.

V. FOUNDATION CONSIDERATIONS

289 A geotechnical investigation and report should be commissioned for significant new projects and should be followed closely. Considering previous projects constructed on campus, conventional spread footings have been used successfully with allowable bearing pressures in the range of 2000 psf and above (use the values specified in the project Geotechnical Report). According to previous geotechnical investigations performed at the site, loose soil and fill can be found at varying depths of 2 to 5 feet or more. Building foundations should be located below the loose layer and into undisturbed native material. Additional foundation considerations are as follows:

- All excavations shall be checked by the project Geotechnical Engineer before placement of reinforcing steel and concrete to ensure a suitable sub-base has been achieved. Unsuitable foundation materials shall be treated in accordance with the geotechnical report and direction from the Geotechnical Engineer. Considering previous projects constructed on campus, over excavation of loose material up to 5 feet or more may be required.
- Slabs on Grade: Slabs on grade shall be supported on a properly prepared subgrade as specified in the Geotechnical Report. Slab on grade design shall be specific to the intended function; however, minimum slab on grade thickness shall be 5", with #4 reinforcing bars located at mid-depth of the slab and spaced at no more than 18" on center each way. Compacted aggregate base, vapor barrier, adequate reinforcing and appropriate concrete mix and curing shall be provided to help mitigate common slab on grade concerns, including settlement, cracking, curling and vapor transmission to floor adhesive materials as applicable.

V. FOUNDATION CONSIDERATIONS (CONT'D)

- Retaining walls shall be designed for the active or at-rest lateral pressures, as applicable, plus any surcharge loads and seismic soil pressures as set forth in the Geotechnical Report. Retaining walls shall be drained and backfilled with non-expansive materials to at least one-half the wall height. Additional specific requirements for retaining walls, drainage and backfill requirements shall be as set forth in the Geotechnical Report and as directed by the Project Architect and Civil Engineer.

IVI. METAL DECK

- Galvanized steel deck shall conform to ASTM A653, SS Grade 33.
- The floor deck shall be composite type, with headed studs automatically end welded to the steel beam framing. Vented deck will be used where the floor or roof finishes above seal in the water that escapes as the concrete continues to cure.
- The minimum floor deck profile shall be 3" deep by 20 gage material.
- The minimum roof deck profile shall be 1-1/2" deep and of 20 gage material – Verco HSB-36/20 gage (ER-2078P) or equal.

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VII. MECHANICAL & EPOXY ANCHORS

- Mechanical anchors – Hilti Kwik-Bolt TZ carbon steel anchors (ICC ESR-1917), Simpson Strong-Bolt (ICC ESR-1771), or equal.
- Epoxy anchors – Threaded rod conforming to ASTM A307 or better, in conjunction with the Hilti Hit RE 500-SD adhesive system (ICC ESR-2322), Simpson Set-XP (ICC ESR-2508), or equal.

VIII. METAL STUD FRAMING

- Metal framing shall be formed from corrosion-resistant steel conforming to requirements of ASTM A653, 33 ksi minimum (50 ksi minimum for jambs).
- Metal framing shall be zinc coated in conformance to requirements of ASTM A926, G60.
- Metal framing shall be manufactured in conformance with ASTM C955.
- Framing fasteners shall be minimum #10 self-tapping and self-drilling wafer-head screws unless noted otherwise on the drawings.
- Manufacturers shall be current members oVf the Steel Stud Manufacturing Association. (ICC ER 4943P).

Div 51 ACOUSTICAL and SOUND ISOLATION DESIGN

INTRODUCTION

The acoustical criteria included herein address the following acoustical aspects of the various campus projects:

Speech privacy in rooms with confidential conversations,

Freedom from distraction due to intruding sounds in rooms where such intrusions would disrupt the room's main functions,

Control of reverberation and echoes to permit adequate speech intelligibility in assembly rooms of various sizes, as well as good sound quality in performance, rehearsal and multimedia rooms.

It is recommended that the design team retain the services of a qualified acoustical consultant to assist in complying with the guidelines included herein. Such an individual should be experienced with the acoustical requirements for a wide range of higher educational facilities

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EXTERIOR SOUND ISOLATION

The façades of buildings near the campus perimeter should be designed and glazed to control the intrusion of traffic noise and other environmental noise. The design of each building's exterior envelope (e.g., walls, roof, windows, doors, etc.) should control the intruding environmental sound levels to maximum values of Leq = 35 dBA and L10 = 40 dBA during any contiguous 60-minute time period. Leq is the energy-averaged, A-weighted sound level over a contiguous 60-minute time period. L10 is the A-weighted sound level that is exceeded only 10% of time during any contiguous 60-minute time period. Rooms with extreme sensitivity to noise should not have a perimeter exposure and should be surrounded with quiet "buffer" zones, such as corridors, etc.

INTERIOR SOUND ISOLATION

Interior partitions, doors and windows should be selected to provide appropriate levels of speech privacy and freedom from distraction. Tables 1 & 2 below gives the minimum recommended Sound Transmission Class (STC) ratings for partitions that separate various room-pair adjacencies. Table 1 applies for room-pairs that are not interconnected with a door, while Table 2 applies where there is a door in the interconnecting partition. Note in Table 2 that there are many room-pair adjacencies that should not have an interconnected door. Proper detailing of the partitions is critical for maintaining their expected acoustical performance. The following guidelines will help with the specification and detailing of interior partitions selected in accordance with Tables 1 and 2.

- Pay specific attention to stud gauge and o. c. spacing when selecting partition STC ratings. Light gauge studs with 24" o. c. spacing provide higher STC ratings than heavier studs and closer stud spacings. Where heavy gauge studs are needed, use ½" thick, 25 gauge, single-leg resilient channels on one side of the partition to improve its STC rating, installed per the channel manufacturer's written instructions. 292

- Separate all room-pairs rated at STC-45 and higher with full height, slab-to-slab partitions.

- All interior partitions with insulation batts in their stud cavities should be considered "acoustical" partitions. All "acoustical" partitions should be designed and installed in complete conformance with the latest revision of ASTM E497 "Standard Practice for Installation Sound-Isolating Lightweight Partitions".

- Seal all perimeters, including the ends, head and bottom, of all "acoustical" partitions with a continuous bead of acoustical sealant. Install the sealant at both sides of the partition.

- Seal all intersections of "acoustical" partitions airtight to the building perimeter. Dog-leg partitions to intersect the perimeter at drywall or masonry, not at glass or window mullions.

- Seal all penetrations (e. g., conduits, pipes, ducts, etc.) through "acoustical" partitions with a continuous bead of acoustical sealant. Install the sealant at both sides of the partition.

- Avoid back-to-back, recessed electrical, telephone, data or other wired service outlet boxes in all "acoustical" partitions. Separate the boxes by at least 16 inches. Backwrap all recessed electrical, telephone, data, etc., boxes with box pads; in fire-rated partitions use a product similar to Manville Firetemp Putty Pads; in non-rated partitions use a product similar to Lowry's Outlet Box Pads.

- For an enclosed space that is completely surrounded by slab-to-slab partitions provide a sound-isolating, internally-lined return air "Zee-boot" located above the entry door to the space.

- Where an occupied space occurs above, below or next to an equipment room or duct shaft, select and detail the partitions, slabs and shaft-walls so that the background sound level criteria specified elsewhere in the Campus Standards Handbook are not exceeded.

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- Operable accordion partitions provide very little sound isolation. For divisible rooms needing a moderate amount of sound isolation select operable panel partitions with a laboratory STC rating not less than STC-49. Design and install the operable panel partition assembly in complete accordance with ASTM E557, "Standard Practice for Architectural Application and Installation of Operable Partitions" such that the Noise Isolation Class (NIC) rating across the assembly is not less than NIC-42.

- The door in an "acoustical" partition should have an STC rating that is within 5 points of the partition's STC rating, i.e., the door in an STC-45 partition should be rated at STC-40 or higher.

TABLE 1

Minimum partition STC rating between room-pairs without a door in the common partition

	Classroom, small group	Lecture Room	Science Lab	Lab Prep Room	Computer Lab	Private office, conference room	Open office area	Office support room	Lobby, corridor	Toilets	Storage room	Mech/Elec/Elev equipment room
Classroom, small group	50	55	50	50	50	55	50	50	45	50	50	AR
Lecture Room		55	55	55	55	55	50	50	45	50	50	AR
Science Lab			50	45	45	55	45	45	45	50	40	AR
Lab Prep Room				-	40	50	40	40	40	50	40	AR
Computer Lab					-	50	40	40	40	50	40	AR
Private office, conference room						50	50	50	50	50	45	NR
Open office area							-	40	-	50	40	AR
Office support room								-	-	50	40	AR
Lobby, corridor									40	50	-	AR
Toilet										50	45	AR
Storage room											-	AR
Mech/Elec/Elev equipment room												-

Legend:
- = Architect's Choice
NR = Not recommended
AR = As required to meet other acoustical criteria

Note: Ratings higher than STC-40 require slab-to-slab construction

TABLE 2

Minimum partition STC rating between room-pairs with a door in the common partition

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	Classroom, small group	Lecture Room	Science Lab	Lab Prep Room	Computer Lab	Private office, conference room	Open office area	Office support room	Lobby, corridor	Toilets	Storage room	Mech/Elec/Elev equipment room
Classroom, small group	NR	NR	NR	NR	NR	NR	NR	NR	40	NR	-	NR
Lecture Room		NR	NR	NR	NR	NR	NR	NR	40	NR	NR	NR
Science Lab			45	40	40	NR	NR	NR	40	NR	-	AR
Lab Prep Room				-	40	NR	NR	NR	35	NR	-	AR
Computer Lab					-	NR	-	-	40	35	-	AR
Private office, conference room						NR	35	NR	40	NR	-	NR
Open office area							-	-	-	35	-	NR
Office support room								-	-	NR	-	NR
Lobby, corridor									-	40	-	AR
Toilet										NR	35	AR
Storage room											-	-
Mech/Elec/Elev equipment room												-

Legend:
- = Architect's Choice
NR = Not recommended
AR = As required to meet other acoustical criteria

Note 1: Ratings higher than STC-40 require slab-to-slab construction
Note 2: STC rating of door to be at least "partition STC rating minus 5 points" (e.g., STC-30 or higher door in an STC-35 partition)