



# **CNM Physical Plant Department (PPD)**

## **Design Guidelines**

FINAL DRAFT

14 May 2019

## INTRODUCTION

The purpose of the Design Guidelines is to establish and employ a set of baseline standards for the design, construction, and maintenance of physical facilities at Central New Mexico Community College (CNM). It is intended that these standards represent a holistic balance between affordable, up-front construction costs and long-term, life-cycle costs.

CNM owns, operates, and uses facilities for many years, therefore durability, maintainability, and operational efficiencies are crucial. The flexibility to adapt these facilities based on changing needs in the future is essential. To remain competitive, CNM must ensure that its capital development costs are not disproportionate or prohibitive.

The ongoing process to maintain and update the Design Guidelines is a multi-stakeholder, multi-department effort. The technical content of the Design Guidelines represents the culmination of input from many individuals and various campus entities who regularly review these standards and integrate current needs and industry practices. Procedures are in place to continuously receive input and issue revisions to the Design Guidelines as needed to ensure that it remains relevant and effective. The revision process is key component of the Design Guidelines and is dependent upon the engagement of all interested campus stakeholders.

## GENERAL

- A. The following design guidelines and construction standards for planning, design and construction at CNM shall serve as a guide to the architects and engineers engaged by the college to plan new campus buildings or the renovation of existing buildings and site work.
- B. Nothing in these standards is intended to be specific to the conditions of any particular project. It is the design professional's responsibility and liability to determine that the specific project requirements have been included within the design and the construction documents. The design professional is liable, to the extent provided by law, for all design decisions regarding any specific project and neither these standards, the review by college representatives, nor the approval of the design by the college shall constitute a waiver or disclaimer of liability of the design professional.
- C. These design guidelines and construction standards are not intended to be an exhaustive set of instructions of good practices for planning design and construction of College buildings.
- D. These design guidelines and construction standards are, however, intended to be a set of instructions to those who will be planning, designing and constructing facilities for CNM. They convey the particular needs and policies of this college with regard to development of its physical facilities.
- E. Because of the monumental scope of planning, design and construction, these design guidelines and construction standards will be continually expanded and updated to document changing needs so as to maintain their continued relevance.

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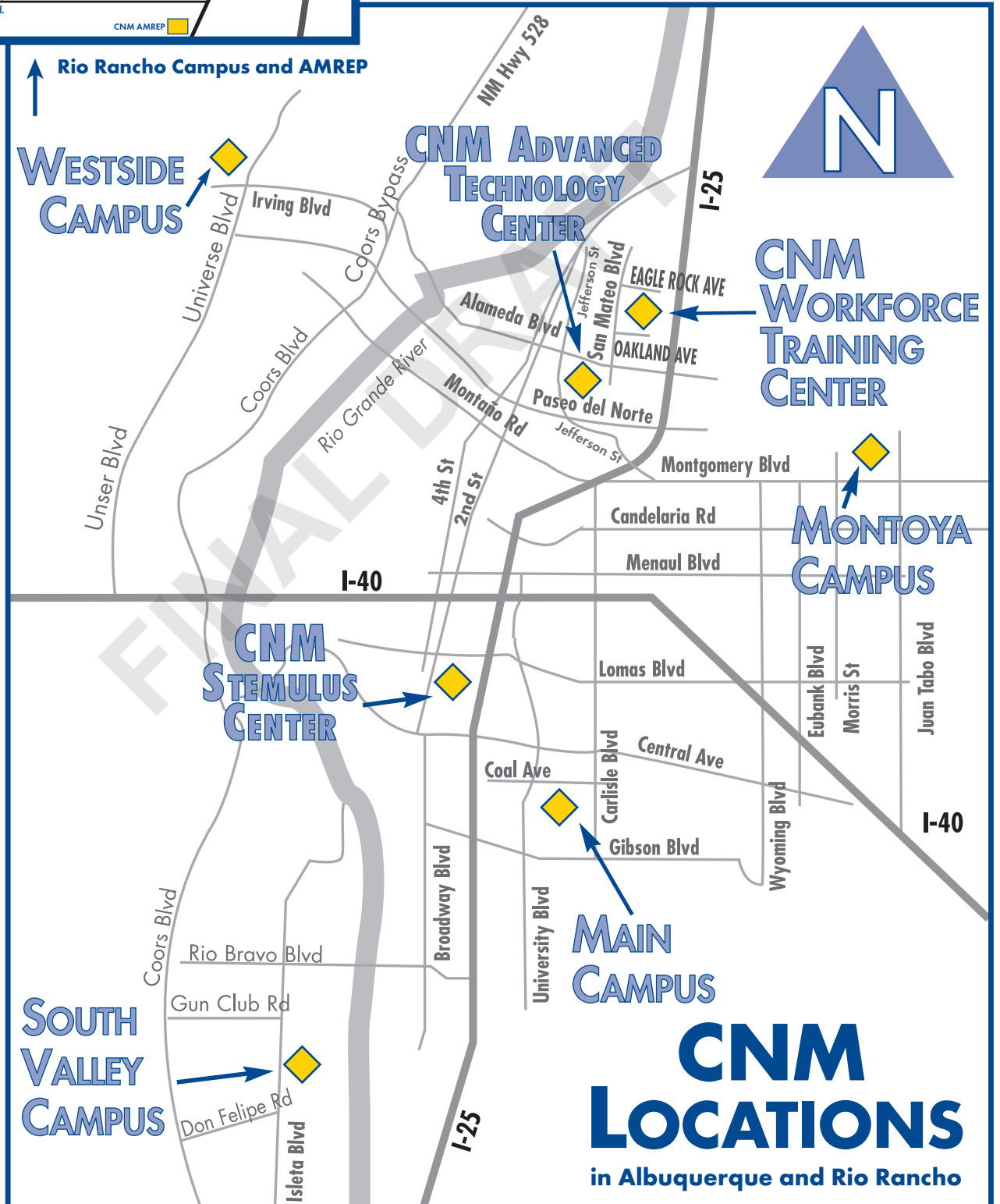
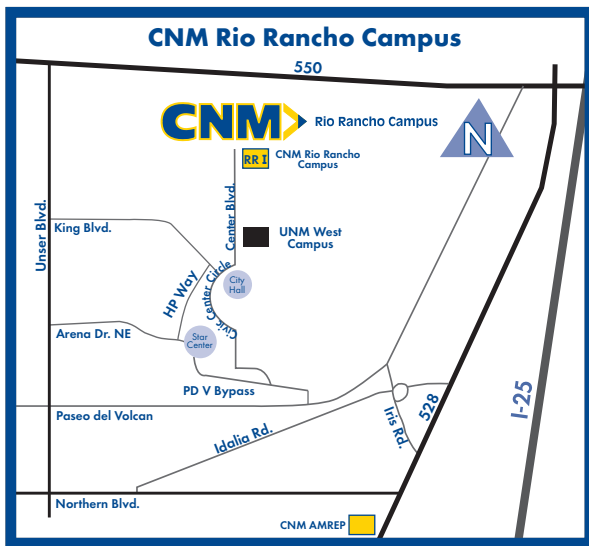
1. Div. 8 - 08 7100 Door Hardware
2. Div. 10 - CNM Campus Sign Manual - April 2019
3. Div. 10 - CNM Interior Signage - May 2019
4. Div. 22 - CNM Plumbing Standards
5. Div. 27 - Audio Visual Systems (AVS) - March 2019  
*Technology Enhanced Classroom Design Guidelines*
6. Div. 27 - CNM Information Technology Services (ITS) - December 2007  
*Communications Systems Facility and Cabling Infrastructure Design Guidelines*

FINAL DRAFT

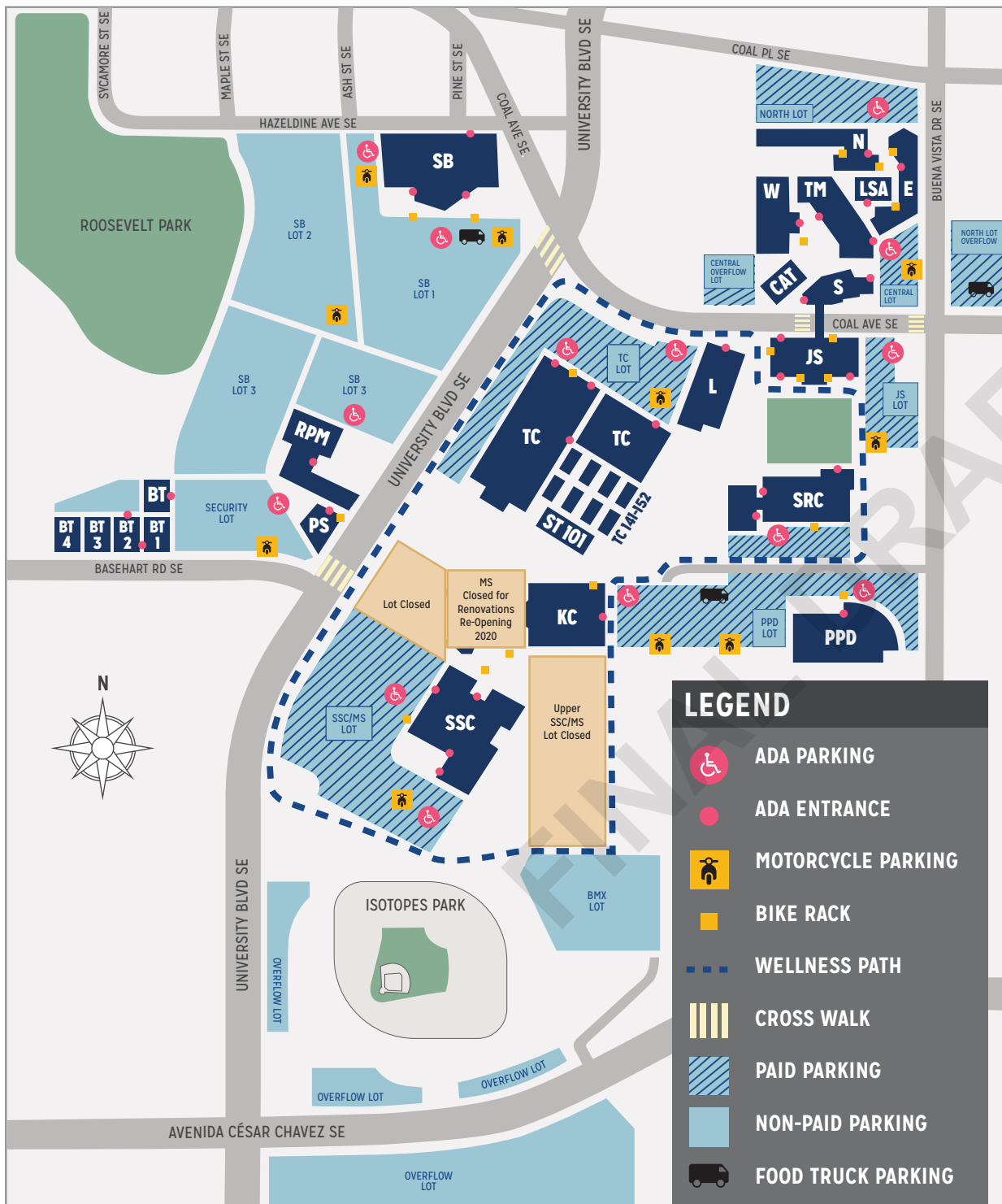


# A. CAMPUS MAPS





# MAIN CAMPUS DIRECTORY



- BT 1-4** Basehart Temporaries
- CAT** Coal Avenue Theatre
- E** East Building
- JS** JS Building
- KC** Ken Chappy Hall
- LSA** Louis E. Saavedra Administration Building
- L** Science Laboratory Building
- MS** Max Salazar Hall
- N** North Building
- PPD** Support Sevices/Physical Plant
- PS** Public Safety Building
- RPM** Robert. P Matteucci Hall
- S** South Building
- SB** Smith Brasher Hall
- SRC** Student Resource Center
- SSC** Student Services Center
- ST** South Temporary Buildings
- TC** Ted Chavez Hall
- TM** Ted F. Martinez Hall
- W** West Building

**STUDENT SERVICES ADDRESS**

900 UNIVERSITY BLVD SE  
ALBUQUERQUE, NM 87106

**EMERGENCY DISPATCH:**

(505) 224-3001

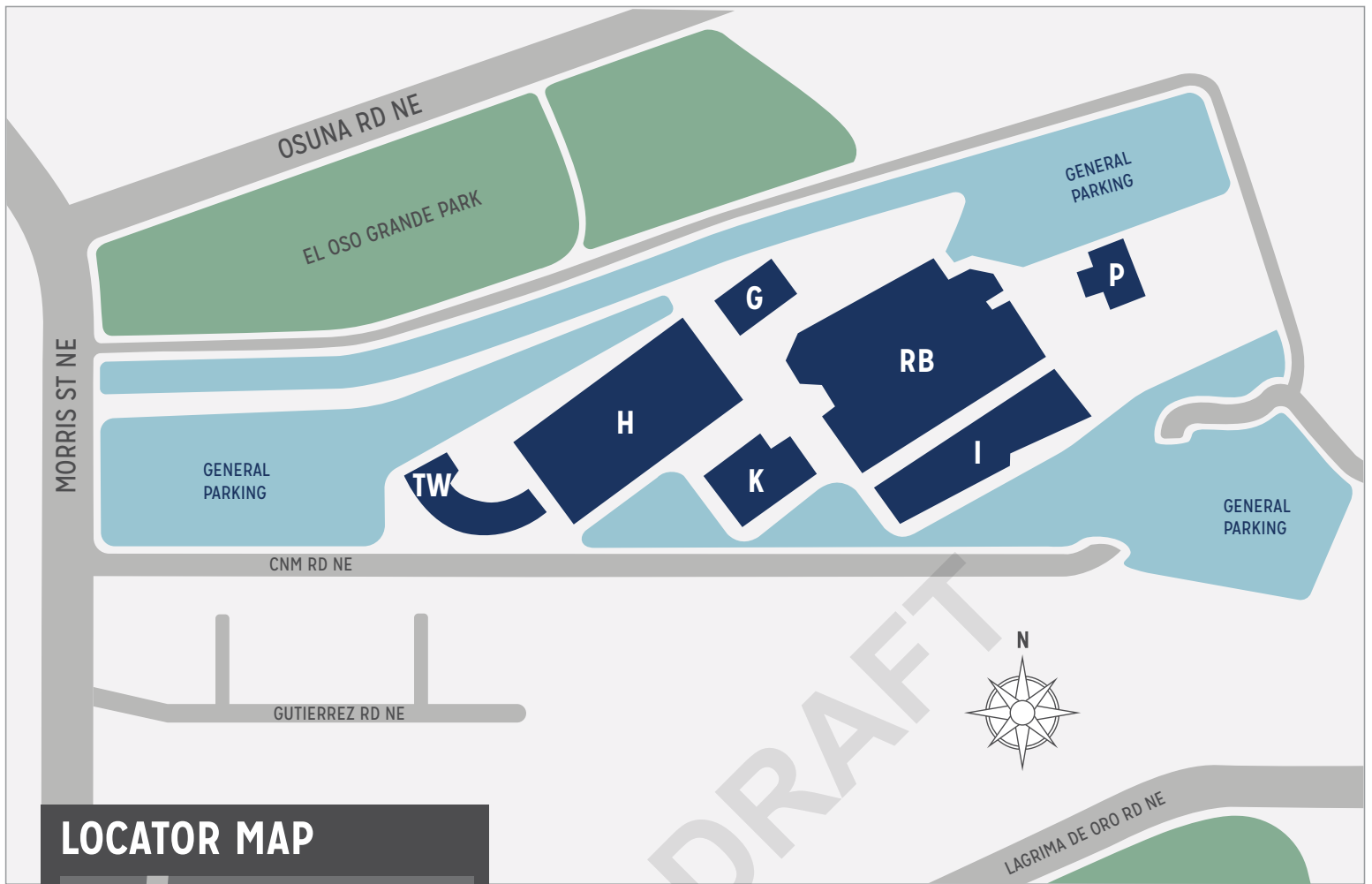
**MAILING ADDRESS**

CENTRAL NEW MEXICO COMMUNITY COLLEGE  
525 BUENA VISTA DR SE  
ALBUQUERQUE, NM 87106

**NON-EMERGENCY:**

(505) 224-3002





### LOCATOR MAP



- MONTOYA CAMPUS
- GENERAL PARKING
- ▲ NORTH

# MONTOYA CAMPUS DIRECTORY

4700 MORRIS AVE NE  
 ALBUQUERQUE, NM 87111-3704  
 (505) 224-3000

- |   |  |
|---|--|
| <p><b>G</b>    <b>G BUILDING</b><br/>       BOOKSTORE<br/>       DPC</p> <p><b>H</b>    <b>H BUILDING</b><br/>       FOOD COURT</p> <p><b>I</b>    <b>I BUILDING</b></p> <p><b>K</b>    <b>K BUILDING</b></p> | <p><b>P</b>    <b>P BUILDING</b><br/>       MAINTENANCE</p> <p><b>RB</b>    <b>RICHARD R. BARR HALL</b><br/>       CNM LIBRARY<br/>       OPEN COMPUTER LAB<br/>       TUTORING CENTER</p> <p><b>TW</b>    <b>TOM WILEY HALL</b><br/>       STUDENT SERVICES</p> |
|---|--|



Central New Mexico Community College



### LOCATOR MAP



- WESTSIDE CAMPUS
- GENERAL PARKING
- ▲ NORTH



Central New Mexico Community College

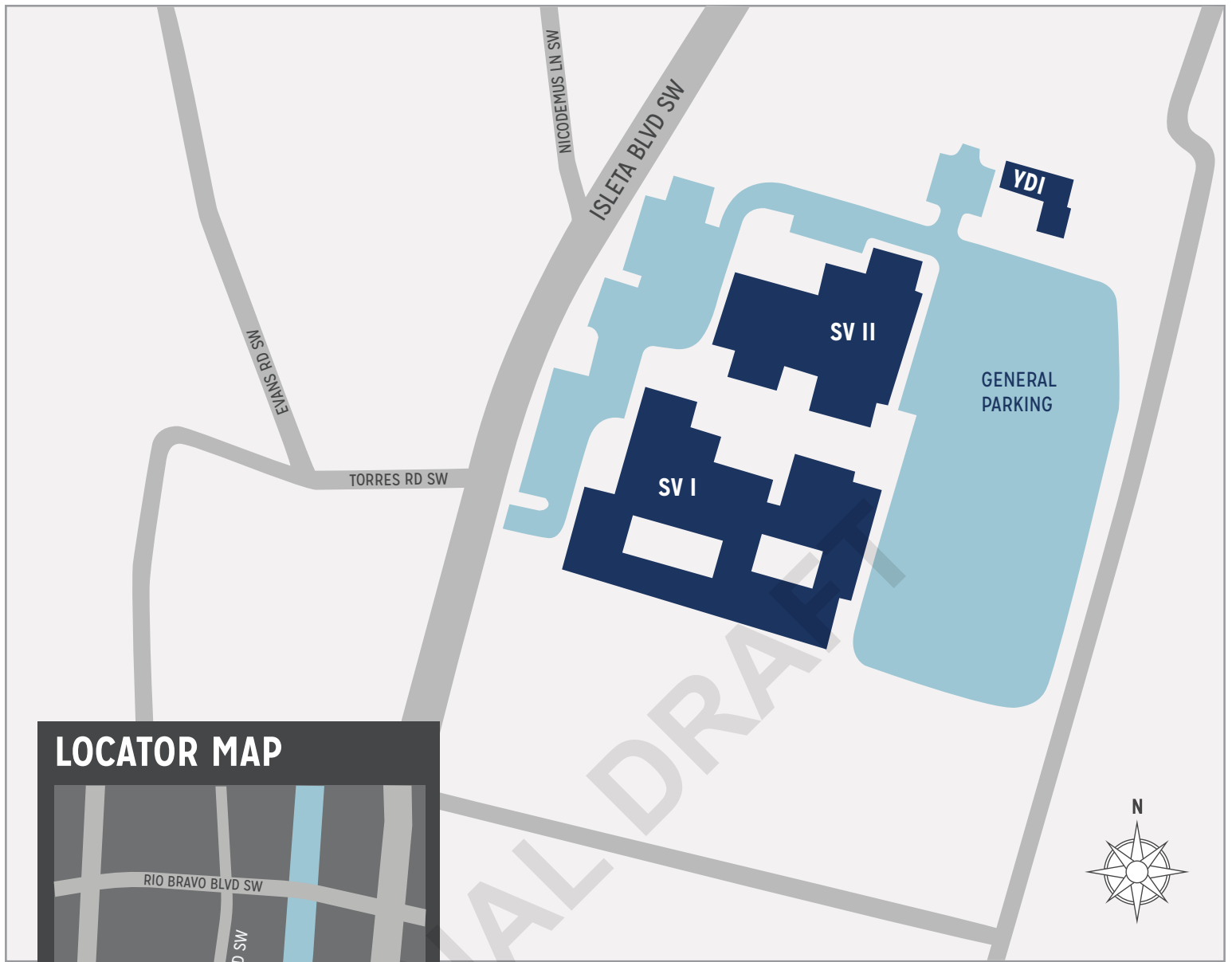
## WESTSIDE CAMPUS DIRECTORY

10549 UNIVERSE BLVD NW  
 ALBUQUERQUE, NM 87114  
 (505) 224-5301

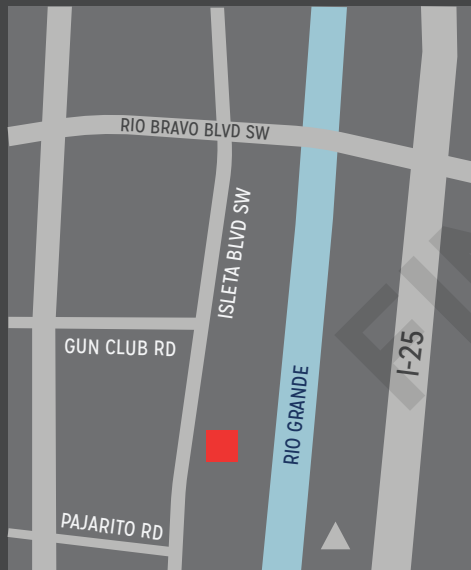
**MJG    MICHAEL J. GLENNON BUILDING**  
 CNM CONNECT, MJG 101

**WS I    WESTSIDE I BUILDING**  
 BOOKSTORE  
 LIBRARY  
 TUTORING CENTER

**WS II    WESTSIDE II BUILDING**  
 ASSESSMENT CENTER, WS II 104



### LOCATOR MAP



- SOUTH VALLEY CAMPUS
- GENERAL PARKING
- ▲ NORTH

## SOUTH VALLEY CAMPUS DIRECTORY

5816 ISLETA BLVD SW  
ALBUQUERQUE, NM 87105  
(505) 224-5000

**SV I CLASSROOMS/ADMINISTRATION**  
ROOMS 100-198

**SV II CLASSROOMS**  
ROOMS 101-112

**YDI HEADSTART: YOUTH DEVELOPMENT INC.**



Central New Mexico Community College



▲  
UNSER BLVD NE

CAMPUS BLVD NE

GENERAL PARKING

**RIO RANCHO I**

GENERAL PARKING

▼  
PASEO DEL VOLCAN NE

### LOCATOR MAP



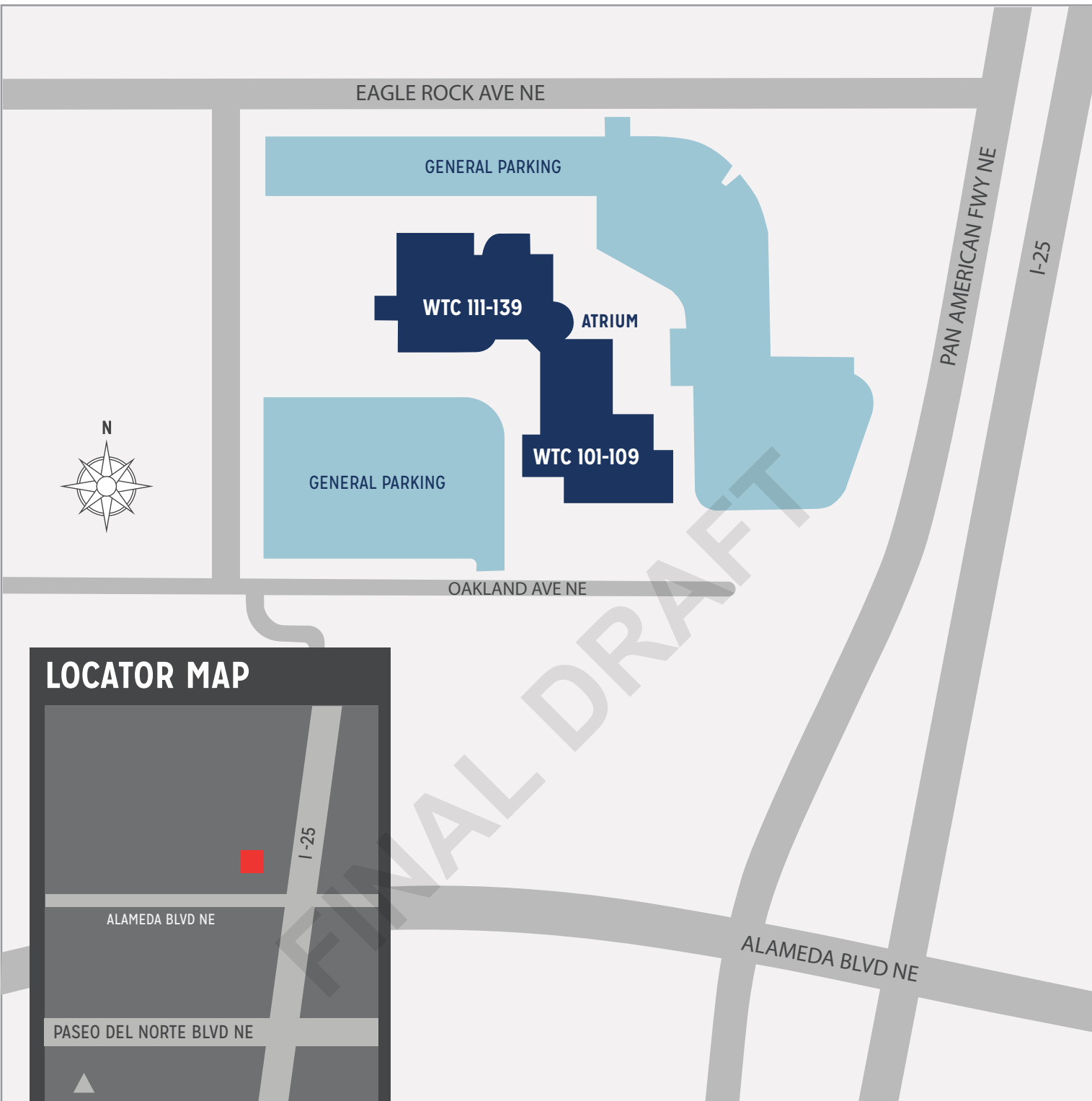
- RIO RANCHO CAMPUS
- GENERAL PARKING
- ▲ NORTH



Central New Mexico Community College

# RIO RANCHO CAMPUS DIRECTORY

2601 CAMPUS BLVD NE  
ALBUQUERQUE, NM 87144  
(505) 224-3000



### LOCATOR MAP



- WORKFORCE TRAINING CENTER
- GENERAL PARKING
- ▲ NORTH



Central New Mexico Community College

# CNM WORKFORCE TRAINING CENTER CAMPUS DIRECTORY

5600 EAGLE ROCK AVE NE  
ALBUQUERQUE, NM 87113  
(505) 224-5200



### LOCATOR MAP

The locator map shows a grid of streets. Alameda Blvd NE runs horizontally across the top. Paseo del Norte Blvd NE runs horizontally across the bottom. Jefferson St NE runs vertically through the middle. I-25 runs vertically on the right side. A red square indicates the location of the Advanced Technology Center at the intersection of Alameda Blvd NE and Jefferson St NE. A grey triangle in the bottom left corner points north.

- ADVANCED TECHNOLOGY CENTER
- GENERAL PARKING
- ▲ NORTH

**CNM**   
 Central New Mexico Community College

# ADVANCED TECHNOLOGY CENTER CAMPUS DIRECTORY

4700 ALAMEDA BLVD NE  
ALBUQUERQUE, NM 87113  
(505) 224-3000



## B. DESIGN STANDARDS



# 1 GENERAL STANDARDS

## 1.1 Standards

- 1.1.1 NMHED Standards: All CNM projects shall comply with the New Mexico Higher Education Department standards (NMHED).
- 1.1.2 IS-1420 Energy Standards and Guidelines
- 1.1.3 Postsecondary Education Facilities Inventory and Classification Manual (FICM): 2006 Edition <https://nces.ed.gov/pubs2006/ficm/> This publication to be used to calculate square footages for reporting to the State of New Mexico's Higher Education Department.

## 1.2 Sustainability

- 1.2.1 The CNM Sustainability Design Standards apply to all construction, renovation and other capital projects. CNM (Owner) is committed to sustainability in the following areas: energy consumption, air quality, soil conservation, water conservation, water quality, transportation, waste management, and human health & wellbeing. The Owner will require project teams to incorporate green building and low impact design methods with the goal of minimizing the environmental footprint of campus and to provide environments that support student and staff success. LEED Certification is necessary for projects of specified size (see 1.2.3).
- 1.2.2 CNM General Sustainability Design Guidelines
  - a. Replace inefficient, aging equipment such as air handlers, motors, and boilers (etc.) with high-energy efficient models.
  - b. Select efficient HVAC equipment and calibrate to meet CNM's Energy Standards and Guidelines (IS-1420) <https://www.cnm.edu/depts/hr/current-employees/policies-and-procedures/the-source/is-1420>.
  - c. Use natural light as a design approach to conserve energy whenever possible.
  - d. Install motion or vacancy light sensors in existing buildings and new construction so that lighting is not wasted on unused space.
  - e. Install ambient light sensors to dim lights at the brightest part of the day in appropriate spaces with Owner's approval.
  - f. Select bulbs that are rated for highest efficiency, such as LED's and compact fluorescents. Incandescent and mercury containing bulbs shall not be used. Decorative lighting shall be kept to a minimum. Decorative lighting shall address project goals for building design and shall contribute to the overall lighting plan for the project. Fixture and bulb selection must coordinate with the Owner's Facilities Maintenance standards for maintenance programs.
  - g. Utilize the latest technologies in efficiency for outdoor lighting systems that are also a 'dark sky' friendly. Replacements/retrofits will follow these same requirements as appropriate. Fixture and bulb selection must coordinate with the Owner's Facilities Maintenance standards for maintenance programs.
  - h. Consider the provision for photovoltaic panels for rooftops, adjacent grounds areas, and parking lots for the dual benefits of shaded parking spots and on-site power production.
  - i. Consider alternative transportation and community connections by locating new construction near existing alternate transportation lines; implement bicycle commuter facilities where needed; and install priority parking signage for car poolers and/or fuel efficient vehicles (coordinate with Owner's Parking and Transit Services). For CNM lots, the USGBC requires that transportation signage also indicates to which building the signage belongs.

- j. Consider the life-cycle costs of all products and reuse building and landscaping materials whenever possible.
- k. Provide recycling containers (see section 2.3 site amenities) during and after construction, especially in central areas and consolidated refuse collection/service areas at project sites. Indoors recycling containers should be paired with a trash container (side by side). Recycling bins should be designed for co-mingled recyclables and should be blue in color (see section 2.3). Applicable signage should also be installed according to current standards.
- l. Install hydration stations (bottle fillers) to reduce single-use bottle waste (see section 3.3.13).
- m. Utilize all means possible that are site appropriate to reduce potable water use outdoors through the following approaches: Selection of native and drought tolerant plants (Xeriscaping), installing Green Stormwater infrastructure (GSI), practicing Low Impact Development (LID), reducing turf and utilizing drip irrigation.
- n. Utilize all means possible to reduce indoor water use by installing water conserving fixtures and other applicable appliances/systems.
- o. Select Energy Star certified products in all areas where such ratings exist.
- p. Select Low VOC emitting materials that may also be cleaned with products found in CNM's Green Cleaning Policy.
- q. Assist the Owner with investigating and obtaining all available rebates or subsidies from any sources to make these sustainability endeavors more economically viable.

### 1.2.3 LEED Guidelines

- a. The A/E Consultant shall schedule meetings with the Owner and with all necessary sub-consultants to facilitate successful compliance with applicable green building design goals defined by the college. As well as those required by the state of New Mexico for new construction or renovation of buildings "in excess of 15,000 square feet and/or using over 50 kW peak electrical demand" (NM Executive Order 2006-001). Buildings that meet these criteria must achieve a minimum LEED™ Silver certification rating according to the current version.
- b. At minimum, current version LEED design goals require adherence to the Owner's Project Requirements (OPR), LEED prerequisites, and other LEED credits specified by the owner and project team. This compliance includes continuous evaluation and documentation throughout all phases of the project.
- c. See current version LEED guidebook for overarching performance standards and reference materials regarding baselines requirements for energy, air quality, and water consumption.
- d. See CNM standards for submeter (related software) and fixture specifications.

## 1.3 CNM Master Plan

- 1.3.1 Review the CNM Master Plan so that the project complies with the master plan principles and initiatives, including but not limited to the following:
  - a. Recommended site capacity for building area and minimum number of stories
  - b. Open space relationships
  - c. Campus circulation system (pedestrian, vehicular/service) system and related circulation
  - d. Linkage to sites beyond the university
  - e. The university's relationship with the adjacent community and designing buildings at the edge of campus to engage the community.

## 1.4 Security Considerations

- 1.4.1 Consideration should be given to the design of the exterior space around the building. There should be adequate lighting and visibility for pedestrians to accommodate their safety. Landscaping and building features should be designed such that there are no nooks or areas where someone can hide and pedestrian safety is maximized at all times. Provide appropriately located conduit to provide coverage of main entries, service entries, and main walking paths around the building.
- 1.4.2 Designated exterior entry doors shall be equipped to operate under the standardized CNM access control system with electrified devices. Strikes can be installed as necessary. Provide conduit for Owner's card readers at designated exterior entry doors. The Owner will designate which doors will receive card readers per the CNM standard. Refer to hardware standards for more information.
- 1.4.3 Provide security camera coverage on designated exterior entry doors and the interior of the opposite door. Additionally, provide security camera coverage for interior public spaces. Exact locations shall be determined in coordination with the Owner / CNM Security. Location of cameras shall address security, privacy and surveillance issues.
- 1.4.4 Determine locations of new and existing wall-mounted Emergency Phones (by Ramtel) in the project. Include at a minimum, emergency phones near all exterior entries. Coordinate with the Owner all final Emergency Phone locations.

## 1.5 Building Commissioning

- 1.5.1 Building Commissioning shall be required on all major projects. Commissioning observation and review shall be done by a third-party firm specializing in testing and commissioning of mechanical, electrical, climate control and smoke control systems. This shall be done to test and document the functionality of the systems to confirm that the performance meets the documented design intent and the owner's operational requirements. The construction contractor and their subcontractors shall provide all services, verifications and activities to support the commissioning review and observation by the third-party commissioning consultant. Systems to be tested and commissioned shall include the following as applicable to each project. Other systems may require commissioning in projects based on the specific systems applicable to each project.
  - a. Mechanical/Plumbing:
    - 1) Cooling System
    - 2) Heating System
    - 3) Air handling and Ventilation System
    - 4) Terminal Units
    - 5) Fume Hood Systems (If applicable)
    - 6) Exhaust System
    - 7) Plumbing systems (domestic hot water, sinks, toilets, specialty systems, and other plumbing systems).
    - 8) Facility Automation System/EMCS and related controls
    - 9) Building HVAC Controls/ EMCS
  - b. Electrical:
    - 1) Lighting Controls System
    - 2) Emergency Power System
    - 3) Power Distribution System
    - 4) Electromagnetic Interference and other shielding requirement compliance
    - 5) Security systems
    - 6) Data and telecommunication systems
  - c. Process:
    - 1) Lab gases and Vacuum systems
    - 2) Process chilled water systems

## 2 Site

### 2.1 Civil Site Design

2.1.1 All projects shall be above grade and shall have positive drainage away from buildings.

2.1.2 Civil design shall be addressed early in the project to address grading and drainage issues, utility coordination, traffic control, and accessibility. (i.e. limit / eliminate handrails where possible, provide positive drainage away from the building(s) at the entire perimeter and at all entries and openings.)

#### 2.1.3 Fire Lane Routes

- a. In consultation with the Owner, designate the fire lane route to the building in coordination with the existing fire lane for the campus. The Owner, the Architect, and the Civil Engineer will meet with the FD to review the proposed route. Upon preliminary approval of the proposed route by the FD, the civil engineer will complete the design documents for submittal to the FD. If the FD proposes changes to the route, the Architect must meet with CNM to discuss the changes before revising the documents.

#### 2.1.4 Public Utility Equipment and Service/Access

- a. In consultation with the Owner, designate the locations of equipment and screening methods for all equipment such as transformers, backflow devices, meters, etc. that service the building or campus. The Owner, Architect, and the Architect's sub-consultant will meet with each public utility that is providing service for the project to review the proposed design. Upon preliminary approval of the proposed route, equipment location and equipment specifications by the public utility, the sub-consultant will complete the design documents for submittal to the public utility. If the public utility proposes changes to the design, the Architect must meet with the Owner to discuss the changes before revising the documents. The Architect should try to locate this equipment so they equipment does not conflict with pedestrian and vehicular circulation and is set back from sidewalks and other open space.
- b. Do not locate this equipment in or adjacent to the main mall quad, open space or pedestrian access areas.
- c. Investigate utility availability, capacity, access and location to determine the impacts (cost, convenience, disruption) on the project and on the campus. Utilities include but are not limited to the following: Sanitary Sewer, Storm Sewer, Gas, Water (Fire and Domestic), Electricity, Emergency Power, Data, Telephone, Cable and Central Plant Services.
- d. Coordinate all applications for service, design initiation, design review, service agreements and other utility procedural items with Owner.

#### 2.1.5 Accessibility

- a. Public buildings and their related sites which are accessible to the public and/or offer employment to individuals with disabilities shall comply with all requirements of the latest adopted edition of the building code and with ADA, ADAAG, and ICC/ANSI regulations. Coordinate all access/accessibility items with other civil design issues as well as architectural, lighting, landscape and other design components.
- b. All major building entries must be accessible. In consultation with Owner determine designated accessible route from the campus main walkways, nearest staff and student parking lots, and nearest transit stop to the main entries of the building. The project must provide adequate signage that designates the accessible routes. Slopes that meet sidewalk criteria (1:20 or less) are highly preferred to accessible ramps requiring landings and handrails. If these sidewalk criteria cannot be met, the Consultant shall review alternatives with the Owner prior to proceeding with the design.



- c. Walkways, steps, ramps, and accessible routes shall be designed with slip-resistant surfaces as required by ADA, ADAAG, and ICC/ANSI regulations.

#### 2.1.6 Site Lighting

- a. Site lighting shall be restricted to that required for safety and function, and shall be shielded from adjacent properties and from the sky. Site lighting shall incorporate appropriately selected cut-off light fixtures that meet or exceed the sustainability initiatives, policies and requirements as outlined in these Design Guidelines.

### 2.2 Site Design and Improvements

2.2.1 Do not empty roof drains on to sidewalks. Where feasible, connect roof drains to storm sewer.

2.2.2 Concrete (not asphalt) shall be used for sidewalks.

2.2.3 Give consideration to special areas for alternative hardscape materials.

2.2.4 Site design shall ensure positive drainage and minimum erosion.

2.2.5 Structural sections for access roads and parking areas shall be designed in accordance with the recommendations of the geotechnical report for the project and shall be coordinated with any Uniform Standards for appropriate use designations (i.e. structural, traffic, walkway, landscaping, etc.)

2.2.6 Site design shall include appropriate consideration for on-site parking, traffic circulation, and site ingress and egress.

2.2.7 Traffic control, pavement markings, and exterior signage shall comply with the guidelines listed in the most current edition of the Manual on Uniform Traffic Control Devices (published by the U.S. Department of Transportation).

2.2.8 All parking lot sign poles to be 2" square steel tubing, 8 feet high. If there are no precast concrete bumpers, the bottom of the pole to have a 4 foot high, 6" diameter concrete base.

2.2.9 Trash receptacles, emergency generators, cooling towers and other similar equipment shall be enclosed or screened in accordance with the Owner's approved types, models, and specifications as noted in the Owner's Technical Specifications.

2.2.10 Site furnishings, guardrails and handrails shall be designed to discourage the use of skateboards and/or roller skates and in accordance with the Owner's approved types, models, and specifications as noted in the Owner's Technical Specifications.

2.2.11 Transportation requirements must be considered in each project. Major considerations in this area include:

- a. All projects must provide a means of access in compliance with accessibility and other codes to accessible parking, within the campus network of accessible campus parking. Based on code requirements and approval by the Owner, this may include site improvements for accessible parking or accessible routes to existing accessible parking.
- b. Project planning and budgeting must include provisions for parking replacement and new parking supply subject to specific conditions of the project. This may include all types and classifications of parking (i.e. student, faculty/staff, metered, accessible, etc.)
- c. All projects must consider access and provisions for public transit and alternative transit in consultation with the Owner. This may include coordination with any public transit routes on campus for vehicle and transit stop accommodation, provisions for carpools, alternative fuel vehicles, bikes, pedestrian access and other means of public or alternative transit.
- d. Parking layouts are required where existing parking is impeded or new parking added.

### 2.3 Site Amenities



- 2.3.1 Provide fixed site amenities and furnishings. Plan for site amenities and furnishings that are part of the FF&E project package. Give consideration to amenities in the vicinity. For instance, every building does not need a bike rack, but if there are none in the vicinity, we would want to consider locating them at the project site. Similar consideration will apply for trash receptacles, benches and other standard and special site amenities and furnishings.
- 2.3.2 Recycle Bins: Recycle Bins shall be provided at appropriate locations and integrated into the landscape and exterior design as appropriate. Typically, they will be located at entries/exits as a minimum, but this must be coordinated with the Owner's Project Manager and in accordance with the Owner's technical standards. They should always be paired with trash receptacles. In common central areas, educational signage must also be posted. Request signage standards from CNM project manager.
- 2.3.3 Recycling/Trash Receptacles standards
- a. Common areas recycling (hallways and communal areas): 23-gallon blue stationary, open top (Tough Guy Manufacture Model #4UAU7)
  - b. Common areas trash: 23-gallon gray, open top (Tough Guy Manufacture Model #4PGU8)
  - c. Classrooms recycling: 7 gal blue desk-side recycling, open top (Tough Guy Manufacture Model #4UAU5)
  - d. Classrooms trash: 7 gal rectangular gray, open top (Rubbermaid Manufacture Model #FG2956000GRA)
  - e. Outdoor Recycling and trash receptacles: 32 gallon standard style with steel green dome top lid Green.
  - f. Recycling Receptacle: 32 gallon standard style with steel mystic blue dome top Mystic Blue.

## 2.4 Landscape

### 2.4.1 General Information

- a. Grading, dust control, weed control, curbs, gutters, streets, off-street parking and sidewalks shall conform to local ordinances and local design and site construction standards.
- b. Maintenance requirements shall be included in the specifications of selected planting/species.

### 2.4.2 Landscaping

- a. This is a desert environment, and one of the key goals for the Owner is to be sustainable. Drought-tolerant, low water use and native plants must be considered in all landscaping designs. Consultant shall meet with the Owner during the early design phase to review acceptable plant materials.
- b. Landscaping design shall be appropriate for the type of building, the environmental setting, and the needs of the building occupants. Plant selection shall be adaptable to USDA zone 7b or Sunset zone 10 and shall be approved by Owner prior to final design.
- c. Consider connection to existing landscaping when proposing design solutions. Sitework and landscaping in projects should connect to adjacent projects and improvements in a consistent and sensible manner to maintain a coordinated campus environment.
- d. Existing trees shall be preserved where practical.
- e. Grass/turf, if used, should not be planted up to the sidewalk to prevent overspray. Grass/turf shall only be considered where it provides functional benefits (i.e. events and activity space) or connects in a reasonable manner to adjacent existing campus grass/turf. These connections to adjacent existing grass/turf shall be accomplished in the most efficient and sensible manner to accomplish project objectives and connections while limiting the use of grass/turf.

- f. Inorganic (non-living) landscaping materials should be pervious whenever possible, to prevent runoff and to encourage infiltration.
- g. Inorganic (non-living) landscaping materials should be natural or light in color to prevent absorbing solar radiation.

#### 2.4.3 Water Conservation

- a. Landscaping design shall minimize water use and maintenance.
- b. Irrigation systems shall be automatically controlled and drip irrigation shall be provided in tree and shrub areas. Irrigation controls must fully integrate with the existing CNM Irrigation system.
- c. Lawn sprinkler designs shall provide for head-to-head coverage.
- d. All systems should be set according to local regulations/restrictions regarding time-of-day watering.

### 2.5 Exterior Signage & Building Signage

- 2.5.1 See CNM Sign Manual (updated February 2019) in the appendix for specific information.
  - 1) Below are some highlights of the manual.

#### 2.5.2 Way finding concept:

- a. Projects will incorporate Owner's kiosk monuments with maps at the main building entry. Owner's kiosk monuments also need to be considered at secondary building entries and main access paths to or from the project site.
- b. Whenever possible identify alternative transportation amenities/routes on campus maps such as bicycle parking, bus stops and electric car charging stations.

#### 2.5.3 Building identification signage

- a. All main building entries shall have Owner's Building ID signs with building and program names on sign header and slats.
- b. Buildings shall have building name signage clearly visible in 12" – 18" letters at major building entries and approaches. Building names and signage shall be approved by Owner. The first letter shall be capitalized and 18" high with the rest in lower case.
- c. Building signage shall include the three-letter designation identification in all CAPS 12" – 18" letters, coordinated with building names locations, entries and building access paths/approaches.

#### 2.5.4 Building plaques:

- a. Building plaques shall be one-piece cast bronze.
- b. In certain instances, unique building plaques, donor signage or other recognition may be required. All instances of these types of signage or plaques shall be approved by Owner.

### 3 Architectural Design Standards

#### 3.1 General Information

3.1.1 Following information are general comments that should be addressed or taken into consideration on all of the Owner's buildings.

#### 3.1.2 Service Access

- a. Identify the service entry for buildings. Designate the service route from the nearest street or access to the service entry. Avoid pedestrian and vehicle conflicts. Consider campus deliveries including mail delivery, general commercial deliveries, trash pick-up, and hazardous material delivery and disposal. Design service access and service area for the largest delivery vehicle that will (regularly) service the building.
  - 1) Is a loading dock appropriate?
  - 2) Are roll-up doors required?
  - 3) Is a freight elevator required near the service entry?
- b. Provide service access in a manner that is most consistent with the campus master plan and reduces or eliminates disruptions to pedestrian access, non-service access or general campus activity. Service access should be located, designed and screened to be discrete and non-disruptive to non-service campus activity.
- c. Locate service access to provide direct access to spaces/functions within the building that require it. This may include, but not be limited, to services such as building receiving, mail, building technical services (electrical, TR, mechanical areas), freight/service-related elevators, and other building elements.

#### 3.1.3 Room Numbering

Submit room numbering plans to the Owner for approval, prior to finalizing design documents. Every room, (including corridors and building service rooms) will receive a room number. Owner will approve all room numbering plans. Construction to include the Vista signs with

Here are the guidelines:

- a. Start the room number with the building abbreviation, for example SB102 in Smith Brasher.
- b. Restrooms are to be 180s, 280s, etc.
- c. Mechanical, Electrical, Telecommunications, Custodial, Storage (only those located in common areas and corridors), are to be 190s, 290s, etc.
- d. Elevators are to be EL-1, EL-2 (if the building has more than one elevator), etc.
- e. Stairs are to be ST-1, ST-2 (if the building has more than one flight of stairs), etc.
- f. Cluster room numbers by suite, example suite 101 and any room within will continue 101a, 101b, etc.
  - 1) I's and O's are not to be used.
  - 2) Storage within a suite will follow this rule
  - 3) There can be a suite or cluster of utility rooms that would follow this rule, 191, 191a, 191b, etc. If it makes sense with the overall numbering of a suite, the conference room should be 'a'.
- g. Corridors, common areas, vestibules are 100s, 200s, etc. They can be broken up into different areas with letters, 100a, 100b, etc.
- h. Balconies will be BLC-100s, BLC 200s, etc.
- i. Cubicles should be numbered on plans. CNM Project Manager will provide numbers.

#### 3.1.4 Interior Signage - see appendix for graphics

- a. Wayfinding concepts

- i. A wayfinding conceptual plan shall be presented as part of the design development phase submittal and review. Construction document submittals must include wayfinding elements to accomplish the approved way-finding plan.
- ii. Provide interior wayfinding signage and/or graphics as required to direct people within buildings. Building maps or floor plans may be installed at key locations. Directional signs and/or directories shall be installed at strategic locations. Suspended signs are preferred over all-mounted. Signage must also be provided at key locations in the building to indicate destinations or other key building locations. Design and installation (i.e. mounting height, contrast, visibility and other factors) shall meet ADA guidelines for all signage.
- b. Room Signage: Every room shall have a wall-mounted room sign. Refer to Interior Sign Types in the appendix for graphics. Signage shall contain tactile and braille room numbers, room space identification and occupant name where applicable. Braille symbols to meet all ADA requirements. All signage shall be approved by the Owner's Project Manager who will coordinate with MCO (Marketing and Communications Office). Construction package to include the signs with tactile and braille lens, printed color paper backgrounds and clear plastic inserts with the room space identification (e.g. Classroom) or occupant name (e.g. Joe Smith).
  - i. Basis of design: Vista-system with black plastic end caps.
  - ii. Unisex restrooms shall be designated as "All Gender".
  - iii. Cubicles do not need tactile room numbers or braille. They are typically numbered in a clockwise and left-to-right pattern. (1, 2, 3, etc.)
- c. Building Directory. Provide main directory near the main entrance or entrances of the building – primarily at major public access points.
- d. Donor plaques/naming opportunities. Review requirements for providing donor plaques or donor walls in a project with the Owner's Project Manager.

### 3.1.5 Equipment

- a. All exterior mechanical and/or electrical equipment shall be screened from view. This includes rooftop equipment and ground-level equipment. The screening should be adequate to fully cover the equipment from ground level or adjacent building view. Screening shall also be reviewed and accepted by any applicable utility provider. Where appropriate ensure OSHA compliance and provide fall protection/tie-downs.

### 3.1.6 Trash Enclosures

- a. Trash enclosures shall be provided with each project unless waived by Owner. Trash enclosures should also be screened from public areas, campus view corridors and building entries. Screening shall be provided from ground level views as well as any adjacent building views. Gates should not be included for easy access, only three wall enclosures to be provided.

## 3.2 Building Services - Infrastructure

- 3.2.1 An integral part of the programming and designing the project is to plan for a well-integrated infrastructure to support not only the building but also anticipated and programmed equipment, furniture and fixtures.
- 3.2.2 Aside from typical building services and infrastructure, the following items must be addressed during initial project planning. The following items (in addition to other building services and infrastructure, including but not limited to HVAC (including controls), plumbing, electrical, specialty, and other building services and infrastructure) shall be incorporated into every project, unless directed otherwise by the Owner. As previously noted in these Guidelines, the planning for this infrastructure begins during programming. Space plan and furniture layouts during design shall consider all infrastructure requirements.
  - a. Data/phone
  - b. Wireless

- c. Emergency power – if applicable
- d. Emergency phones – if applicable
- e. Security cameras – if applicable
- f. Cell booster
- g. Access control
- h. A/V

### 3.3 Space/Room Design Guidelines

#### 3.3.1 General Requirements

- a. A/E team is to verify with Owner if central clock systems are to be included in projects, with clocks to be considered at a minimum in (and directly outside of) classrooms, laboratories, lecture halls and conference spaces. In academic spaces, clocks should be located opposite of teaching wall where applicable. Clocks may be needed in other areas, if required, including, but limited to, reception areas to suites, offices, wet labs, corridors and other areas.
  - 1) Clocks are owner provided, contractor installed
  - 2) Hard-wired (120v power, recessed receptacle approximately 65" from finished floor to center of clock face)
  - 3) Model: American Time Wireless Analog Molded Case Electric Clocks SQ56BAAD304R
  - 4) CNM M&O to provide the transmitter frequency that is dependent on the campus.
- b. Building services (power, data, etc.) acoustics, lighting, sound/vibration attenuation, electrical interference attenuation/treatment, HVAC, structural and other performance requirements/measures are to be addressed for all spaces based on operational, equipment and user requirements. This is particularly important for spaces/equipment that have uses, operations and equipment that either require special consideration in these areas to function properly, or have uses, operations and equipment that lead to issues that require special treatment to not impact other areas of the building. Considerations here may include, but are not limited to:
  - 1) Mechanical, plumbing, vacuum, compressed air and electrical equipment/services
  - 2) Laboratory and class laboratory equipment
  - 3) Audio-Visual equipment/services
  - 4) Storage systems (standard, high-density, automated retrieval and other storage systems)
  - 5) Medical, dental and other clinical or health services equipment
  - 6) Other items with special requirements such as IT equipment
- c. Wall Finish Levels and Texture
  - 1) Minimum level 3 with light spray (orange peel) texture in public spaces (no Zolatone or similar product/application)
  - 2) Maximum level 4
- d. Hazardous materials shall not be used in building exit signs or other illuminated signs.
- e. Provide code required and Owner requested fixed safety related devices per code. Consider access to these items to meet code requirements and functional access accounting for access control and locked/restricted access doors. Final location of these items are subject to Owner approval. These items are to be provided in the construction budget, and include but are not limited to:
  - 1) Fire extinguishers (semi-recessed or recessed cabinet, extinguisher type to be determined based on nature of fire risk in room/area)
  - 2) Eye washes and emergency showers with drains
  - 3) Automatic External Defibrillator (AED's) (one per every other floor per building, to be located in an easily accessible and visible public area, with building services necessary for AED function (i.e. power, data, telephone).

- f. Mock-ups of typical exterior wall materials and finishes will be required as well as for unique or high performance requirement elements of the building (i.e. exterior finishes/systems, specialized casework, a standard module of a building with performance requirements where a mock-up will reduce potential for errors in the final product.) This should be included in drawings, specifications and in the construction budget.
- g. Provide interior wall and corner protection in areas of building subject to heavy use and movement of materials, supplies, equipment, and furniture.
- h. All CNM buildings are to be designed for wireless data services. Construction budget shall include conduit, cabling and terminations for all elements of a wireless data system.
- i. In consultation with Owner, floor drains are to be provided where plumbing fixtures exists and there is a risk of flooding if a plumbing fixture malfunctions or generates high flow (i.e. eye showers, restrooms, mechanical areas with water service, areas with significant plumbing fixture counts, other conditions.)
- j. Acoustical considerations are to be reviewed and addressed in terms of overall building performance, specific room/space performance, and adjacency of room/space performance. This applies to all acoustical performance issues/requirements, including but not limited to the performance of acoustics within a room/space to support function, the isolation of acoustics from a room/ space to support function, and the relationship between rooms/spaces (horizontally and vertically) to support acoustical performance/function. Consultant, vendor and contractor shall identify the schedule, function and performance requirements of rooms/spaces, for the full range of acoustical issues (i.e. frequency, volume, performance requirements, and other requirements). Address these issues and performance standards to support the function and performance of the facility (i.e. classroom, auditoria, performance and media playback spaces functioning with the room, and not disturbing adjacent rooms, privacy of speech issues in rooms, critical acoustical isolation between adjacent rooms, and other items). Acoustics shall conform, at a minimum, to ANSI current standard for schools.
- k. Location of the mailroom (if needed) and specific requirements for number of mailboxes, as well as other spatial and mailroom arrangement requirements should be verified for each applicable project with the Owner. Many departments no longer have physical mailboxes as the USPS mail and interdepartmental CNM mail is hand delivered to the departmental administrative staff, who then distributes to each employee's desk.
- l. Mailbox numbering, key specifications and procurement shall be coordinated with the Owner to ensure campus uniformity.
- m. All mail is initially delivered to the central CNM Postal Center located on main campus in PPD. CNM staff sort by department and distribute mail to each department on main campus and each off-site campus.

#### 3.3.2 Space Requirements:

At the end of this section are individual Space/Room Design Layout/Information Sheets. These space/room sheets illustrate the layout and features of some common/typically programmed spaces (but is not fully inclusive of all potential spaces) and provide typical square footages, suggested FF&E layouts as well as detailed information on power, data and other infrastructure requirements. Spaces may require further investigation during design; particularly for spaces likely to have more specific requirements based on use, (i.e. offices and service spaces are more likely to be typical, whereas classrooms, labs and clinical spaces are more likely to require specific investigation on a project-by project basis).

The following tables shall be used as a guideline in assigning office and support spaces in design. Where applicable and efficient for building planning, consultant shall work with Owner to assign space allowances to typical building program elements that are repeated to allow flexibility/consistency with building planning modules for building systems coordination



(i.e. building structure, exterior window systems modules, etc.) Space assignments shall take into consideration future flexibility of space for potential building remodel as well. It is the goal that the minimum necessary space types be used to accomplish project space goals, accommodation of users and required FF&E in a space, and provide modular flexibility for future remodel or reimplementation of space as functions and users change. These areas shall be verified with the Owner's Project Manager during programming and design.

- a. Space Assignment Guidelines: In consultation with the Owner, a planning module is to be established for the basis of space planning. 65 net square feet is considered a good starting space planning module for administrative and office space (excludes classrooms, laboratories and other special purpose spaces)

### Administrative Offices

Type of room occupants	Private Office, Shared Office or Cubicle	Suggested Allowable Net (SF)
President	Private Office	320
Vice President	Private Office	180 - 240
Associate Vice President	Private Office	120 - 180
Executive Director	Private Office	100 - 150
Director	Private Office	100 - 140
Associate or Assistant Director	Private Office, Shared Office	100 - 130
Manager	PO, SO or Cubicle	80 - 120
Staff, Professional (full-time)	PO, SO or Cubicle	48 - 110
Staff, Professional (part-time) <sup>1</sup>	Shared Office or Cubicle	48 - 64
Staff, Administrative Support (full-time)	Shared Office or Cubicle	64 - 100
Staff, Administrative Support (part-time) <sup>1</sup>	Shared Office or Cubicle	48 - 80
Temporary Employee, Student Employee	Shared Office or Cubicle	30 - 64

<sup>1</sup> Part-time denotes the room occupant is 50% FTE or less. If the occupant is more than 50% FTE, it is recommended to follow the guidelines for a full-time room occupant.

### Academic Offices

Type of room occupants	Private Office, Shared Office or Cubicle	Suggested Allowable Net (SF)
Vice President	Private Office	180 - 240
Associate Vice President	Private Office	120 - 180
Dean	Private Office	100 - 150
Associate Dean / Department Chair	Private Office	100-125
Executive Director	Private Office	100 - 150
Director	Private Office	100 - 140
Faculty, Part Time	Shared Office or Cubicle	80 - 120
Faculty, Consulting or Visiting	Shared Office or Cubicle	80
Faculty, In Two Locations	Shared Office or Cubicle	64 - 140
Manager	PO, SO or Cubicle	80 - 120
Staff, Professional (full-time)	PO, SO or Cubicle	48 - 110
Staff, Professional (part-time) <sup>1</sup>	Shared Office or Cubicle	48 - 64
Staff, Administrative Support (full-time)	Shared Office or Cubicle	64 - 100
Staff, Administrative Support (part-time) <sup>1</sup>	Shared Office or Cubicle	48 - 80
Temporary Employee, Student Employee	Shared Office or Cubicle	30 - 64
Achievement Coach / Advisors	Private Office	100-150

<sup>1</sup> Part-time denotes the room occupant is 50% FTE or less. If the occupant is more than 50% FTE, it is recommended to follow the guidelines for a full-time room occupant.

### Support Spaces

Type of room	Type of space	Suggested Allowable Net (SF)
Custodial Closets	Closed	100 min.
Maintenance Storage Closets	Closed	200 min. (can be split into multiple spaces)
ER (Equipment Rooms)	Closed	11' x 16' min. (176 sf)
TR (Telecom Rooms)	Closed	11' x 14' min. (154 sf)
Copy / Work rooms (copy and work room functions shall be consolidated in one room)	Closed	80 min.

Spaces below largely depend on specific program intent, equipment/usage. Guidelines below are general in nature, and specific space assignments shall be verified during programming and design.

Type of room	Suggested Allowable Net (SF)
Conference Rooms	20 - 25 per person
Waiting area	8 - 15 per person
Files (lateral & standard file cabinets)	15
Classroom Minimum Size (30)	700 - 800
Computer Lab (20-25)	400 - 500
Lecture Hall (100)	2,200 – 2,500
Lecture Hall (150)	3,300 – 3,500
Wet Lab	600 nsf per bay (subject to specifics of wet lab type)

Consultant shall prepare similar space/room specification sheets as part of the programming phase, with appropriate spaces and space features per project.

#### 3.3.3 Specific Space Requirements

Below are a series of specific space requirements for projects at CNM. These requirements are not exhaustive, but are intended to highlight major points/elements and items relative to the design, performance and construction of these spaces. Specific project programming information may supplement these requirements. Additionally, spaces may exist in project programs that are not specifically addressed in these standards where supplemental

program data may provide information for these spaces. These standards are to be used in guidance for design, construction and performance of these spaces and as general information, for typical CNM requirements.

#### 3.3.4 Offices

- a. Show furniture and equipment layout on floor plans at Schematic Design Phase. At Design Development and Construction Documents Phases, provide separate floor plan for furniture and equipment. Demonstrate ADA clearances in offices with furniture shown – to scale. Coordinate mechanical service access with furniture layout.
- b. Provide natural light as much as possible
- c. Indirect lighting is preferred for artificial light
- d. Provide 3-way switching w/ occupancy sensor
- e. Floor Finish – carpet tile
- f. Base: Rubber
- g. Walls: Paint – eggshell
- h. Ceilings: Provide acoustical ceiling tile
- i. Doors: Wood stain grade doors (no-lites)
- j. Show data and power locations on special systems and furniture plans. Duplex power receptacle min. to be provided on each office wall (4 power receptacles per office min.), quad power receptacle preferable on return side of desk in place of duplex receptacle, quad data receptacle min. to be provided on desk and credenza wall locations (2 data receptacles per office min.)
- k. Signs: Provide Owner's standard room signs.
- l. Exterior Window Treatments: Fabric screen shade. Mechoshade or approved equal. Operation will typically be by hand, use electrical operated where necessary (i.e. clerestories).
- m. Corridors in office areas: double loaded corridors should terminate with natural light whenever possible. Doors should be offset across corridors (i.e. doors of spaces across a corridor should not align and should be fully offset for visual and acoustical reasons) to maximize privacy.
- n. Provide acoustical privacy through sound attenuating fiberglass batts (SAFB) in walls and acoustical ceiling tiles and surfaces. Sound attenuated walls to bottom of deck are preferred. Consideration of measures of acoustical privacy relative to building systems (i.e. HVAC provisions and other) shall be considered as well. Provisions for acoustical privacy shall have special consideration and measures at areas of high acoustical privacy, i.e. counseling rooms, HIPAA compliant spaces, spaces where matters of high privacy are discussed, etc.
- o. Access control: Hard key unless otherwise requested by Owner.

#### 3.3.5 Administrative Areas

- a. A project's design should enhance the capability of the department to properly secure their areas of responsibility. Coordinate closely through Owner's Project Manager with department and CNM security representatives before renovating an administrative area.

#### 3.3.6 Conference Rooms

- a. Show furniture and equipment layout on floor plans at Schematic Design Phase. At Design Development and Construction Documents Phases, provide separate floor plan for furniture and equipment. Demonstrate ADA clearances with furniture shown – to scale.
- b. Provide natural light as much as possible.
- c. Indirect lighting is preferred for artificial light.
- d. Provide 3-way switching w/ occupancy sensor.

- e. Floor Finish – carpet tile
- f. Base: Rubber
- g. Walls: Paint – eggshell
- h. Ceilings: Provide acoustical ceiling tile
- i. Doors: Wood stain grade doors (lites to be approved by Owner)
- j. Show data and power locations on special systems and furniture plans. Duplex power receptacle min. to be provided on each wall (four power receptacles min.), quad data receptacle min. to be provided on two wall locations min. Power and data receptacles shall be provided in floors to support equipment use and furniture layout.
- k. Signs: Provide Owner's standard room signs.
- l. Exterior Window Treatments: Fabric screen shade. Mechoshade or approved equal. Operation will typically be by hand, use electrical operated where necessary (i.e. clerestories).
- m. Provide acoustical privacy through sound attenuating fiberglass batts (SAFB) in walls and acoustical ceiling tiles and surfaces. Sound attenuated walls to bottom of deck are preferred. Consideration of measures of acoustical privacy relative to building systems (i.e. HVAC provisions and other) shall be considered as well. Provisions for acoustical privacy shall have special consideration and measures at areas of high acoustical privacy, i.e. counseling rooms, HIPAA compliant spaces, spaces where matters of high privacy are discussed, etc.
- n. Conference rooms typically have audio-visual systems in them, for visual systems/projection, audio systems, lecterns and other considerations to support classroom use. Audio-visual systems and their performance is to be coordinated with building services, acoustical, lighting and other systems.
- o. Provide key access control to all conference rooms. Coordinate with Owner where Marlok card reader is required on conference rooms, and where conference room doors require swipe-open, swipe-lock capability.
- p. Special Considerations: Consider donor signage or potential for future signage applications in design.
- q. Provide magnetic whiteboards in all conference rooms. Coordinate type and size with Owner.

### 3.3.7 Lobbies

- a. Main entries should have vestibules with built-in recessed walk-off mats.
- b. Lobby floor finishes should be durable.
- c. Carpet may be required for acoustical reasons.
- d. Lobbies should have direct access to toilet rooms that are visually screened. Wayfinding is important in lobbies.
- e. Provide building directories, wayfinding / directional signage, code required signage (exiting, accessibility and other) and other signage. Provide these items in construction budget.
- f. Stairs should be visible from the lobby.
- g. Passenger elevators should be convenient to the lobby.
- h. Elements that should be considered when designing lobbies: donor wall, seating, trash & recycling receptacles, data and power for lobby users, upgraded finishes for appearance and durability, monitors for building information, specialty lighting, reception, natural lighting, display cases, bulletin boards.
- i. Potential areas near the lobby: food service and vending areas.

- j. Exterior Window Treatments: Fabric screen shade. Mechoshade or approved equal. Operation will typically be by hand, use electrical operated where necessary (i.e. clerestories).

### 3.3.8 Classrooms (Including Class Dry Labs/Computer Labs and similar spaces)

General: Classrooms (Including Class Dry Labs/Computer Labs and similar spaces) can be unique and custom designed spaces to support the activities and teaching methods that occur within them. It is typical that these types of spaces may have unique requirements accordingly, and special needs for fixed furniture, equipment, building services, audio-visual equipment, HVAC service/tolerances/redundancy, access control, and other features. Below are some general guidelines to support the requirements of these spaces that are subject to refinement, validation and further definition based on the specific function, requirements and activities of a particular space.

- a. Floor Finish – carpet tile. In consultation with Owner, other materials may be approved. Seamless flooring may be necessary at some locations. Computer labs to have dissipative flooring material.
- b. Base: Rubber
- c. Walls: Paint – Eggshell  
Apply acoustical treatment as required to provide an effective classroom environment.
- d. Ceilings: Provide acoustical ceiling tile
- e. Doors: Wood stain grade doors (w/ lite), door size: 3'0" x 7'0" typical.
- f. Show data and power locations on special systems and furniture plans. In consultation with Owner provide hard wired power and data at all fixed classroom furniture through furniture systems. If furniture is not fixed, power and data is to be provided in both floors and walls to provide a reasonable 'grid' of power and data to support access to these services based on multiple potential furniture configurations. Fixed classroom furniture and equipment is to be provided in the construction budget unless Owner approves otherwise.
- g. Signs: Provide Owner's standard room signs.
- h. Evacuation Route: Provide an 11" x 11" space near door for exit plan. CNM's Safety Dept. will supply the plan. The plastic frame is part of the signage package.
- i. Accessibility – Ensure accessibility standards are met in classrooms, including but not limited to audio-visual systems compliance, assisted listening systems, number, location and distribution of accessible seating locations, floor walks/ ramps/stairs, handrails, and other elements of accessibility. Integrate accessibility elements into the base design so that they are functional, meet requirements, and integrate into the design so that they do not appear as supplementary to the overall design. Implement principals of universal design.
- j. Classrooms are to have audio-visual systems in them, for visual systems/ projection, audio systems, lecterns and other considerations to support classroom use. Audio-visual systems and their performance is to be coordinated with building services, acoustical, lighting, window treatments and other systems.
- k. Provide access control to all classroom doors, with 'swipe-open, swipe lock' capability. For classrooms with 2 doors, door on left when looking at classroom from corridor shall have the access control while the door on the right shall be exit only. ITS/Security to review.
- l. Exterior Window Treatments: Fabric screen shade. Mechoshade or approved equal. Operation will typically be by hand, use electrical operated where necessary (i.e. clerestories)
- m. Special Considerations: Consider donor signage or potential for future signage applications in design.

### 3.3.9 Wet Labs

General: Wet Labs are unique and have custom designed spaces to support the activities that occur within them. It is typical that wet labs will have unique requirements accordingly, and special needs for fixed furniture, equipment, building services (i.e. power, water, RO/DI water, data, gas, compressed air, vacuum and other services), shielding, vibration tolerances, EMI resistance/levels, HVAC service/ tolerances/redundancy, access control, structural requirements and other features. Below are some general guidelines to support the requirements of wet labs that are subject to refinement, validation and further definition based on the specific function, requirements and activities of a particular wet lab.

- a. Floor/Base Finish – seamless surface, chemical, static, microbial or other resistance, other as required based on program, use, equipment requirements.
- b. Walls: Paint – Semi-gloss, min. Special/upgraded finishes to address chemical, static, microbial or other resistance, shielding requirements, or other as required based on program, use, equipment requirements.
- c. Ceilings: Provide washable and chemical/stain resistant acoustical ceiling tile. Special/upgraded finishes to address chemical, static, microbial or other resistance, other as required based on program, use, equipment requirements.
- d. Doors: Wood stain grade doors (w/ lite) 36” min. width, larger as required. Special upgraded finishes and performance to address chemical, static, microbial or other resistance, shielding requirements, or other as required based on program, use, equipment requirements.
- e. Provide fixed furniture and equipment (lab benches, shelving/cabinets, carriers and other fixed systems) in labs and coordinate with building services (i.e. power, water, RO/DI water, data, gas, compressed air, vacuum and other services) to provide all required building services in a modular and regular manner (i.e. 3’ on center, 6’ on center, other).
- f. Provide all building services (HVAC, power, water, RO/DI water, data, gas, compressed air, vacuum and other services) to support space use and to support equipment to be used in space as well as maintenance access.
- g. Signs: Provide Owner’s standard room signs.
- h. Shielding – provide shielding from electrical interference (EMI, RF and other types) or to contain any radioactivity or other items/activities requiring containment in the space (e.g. shielded walls), to support the operational requirements of equipment and activities in wet labs.
- i. Vibration resistance / tolerances - Ensure vibration tolerances are met for equipment / instrumentation operation and to support research activities.
- j. Accessibility – Ensure accessibility standards are met in wet labs.
- k. Provide access control to all wet lab doors.
- l. Exterior Window Treatments: Fabric screen shade. Mechoshade or approved equal. Operation will typically be by hand, use electrical operated where necessary (i.e. clerestories)
- m. Special Considerations:
  - 1) Consider donor signage potentials and special signage for functional or warning purposes in design.
  - 2) Plan wet labs on a modular basis to work with furniture and equipment. Design with modularity to allow for future flexibility in space use, arrangement, assignment and provisions for furniture and equipment. This applies to many items in the wet lab design (structural bays, layout of bench and equipment areas, design of benches and their modularity/adjustability (layout, height, etc.) and other considerations.
  - 3) Lockable storage, in furniture and equipment and built-in casework, should be provided based on the user needs.
  - 4) Management and disposal of biohazards must be addressed, per the requirements of the operations needs of clinical facilities.



- 5) Provide analysis of and provision for any chemical storage and use provisions (fire separations/ratings, control areas, maximum allowable chemical storage, venting, etc.)
- 6) Provide for and coordinate all lab safety provisions and requirements.
- 7) Provide eyewash, emergency shower and other safety equipment in clinical areas where chemicals, fluids, pathogen carrying materials or other such items or activities warrant safety equipment and provisions. Refer to Risk Management and Safety Design Considerations in section 8 of this publication.
- 8) Safety and M&O will provide emergency shut-off requirements in labs.

3.3.10 Clinical Spaces (Including Clinical Research, Teaching, Service and other similar spaces) Clinical spaces are unique and have custom designed spaces to support the activities and research that occur within them. It is typical that clinical spaces will have unique requirements accordingly, and special needs for equipment, building services (i.e. power, water, RO/DI water, data, gas, compressed air, vacuum and other services), shielding, vibration tolerances, HVAC service/tolerances/redundancy, access control, privacy, structural requirements and other features. Below are some general guidelines to support the requirements of clinical spaces that are subject to refinement, validation and further definition based on the specific function, requirements and activities of a particular clinical space.

- a. Floor/Base Finish – seamless surface, chemical, static, microbial or other resistance, other as required based on program, use, equipment requirements.
- b. Walls: Paint – Semi-gloss, min. Special/upgraded finishes to address chemical, static, microbial or other resistance, shielding requirements, or other as required based on program, use, equipment requirements.
- c. Ceilings: Provide acoustical ceiling tile. May be required to be washable and chemical/stain resistant based on specific space program or use. Special or upgraded finishes to address chemical, static, microbial or other resistance, other as required based on program, use, equipment requirements.
- d. Doors: Wood stain grade doors (w/o lite standard) 36" min. width or larger as required. Special/upgraded finishes and performance to address chemical, static, microbial or other resistance, shielding requirements, or other as required based on program, use, equipment requirements. Lites in doors should be reviewed based on use.
- e. Provide fixed furniture and equipment (shelving/cabinets, other fixed systems) in clinical spaces and coordinate with building services (i.e. power, water, RO/DI water, data, gas, compressed air, vacuum and other services) to provide all required building services in a manner to service clinical spaces.
- f. Provide all building services (HVAC, power, water, RO/DI water, data, gas, compressed air, vacuum and other services) to support space use and to support equipment to be used in space.
- g. Signs: Provide Owner's standard room signs.
- h. Shielding – provide shielding from electrical interference (EMI, RF and other types) or to contain any radioactivity or other items/activities requiring containment in the space (i.e. shielded walls), to support the operational requirements of equipment and activities in clinical spaces.
- i. Vibration resistance and tolerances – Ensure vibration tolerances are met for equipment and instrumentation operation and to support clinical activities.
- j. Accessibility – Ensure accessibility standards are met in clinical spaces.
- k. Provide access control to overall clinic area.
- l. Exterior Window Treatments: Fabric screen shade. Mechoshade or approved equal. Operation will typically be by hand, use electrical operated where necessary (i.e. clerestories).

- m. Special Considerations:
- 1) Consider donor signage potentials and special signage for functional, safety or warning purposes in design.
  - 2) Plan clinical spaces on a modular basis to work with furniture and equipment. Design with modularity to allow for future flexibility in space use, arrangement, assignment and provisions for furniture and equipment.
  - 3) Address all HIPAA, OSHA and other requirements for the operations of clinical spaces. This may include but not be limited to privacy, acoustical performance, records security, quality of finishes (ability to clean/disinfect, non-porous/resistant to bacterial growth, and other items) and other considerations relative to specialty function/requirements for clinical spaces.
  - 4) Lockable storage, in furniture and equipment and built-in casework, should be provided based on the user needs.
  - 5) Management and disposal of biohazards must be addressed, per the requirements of the operational needs of clinical facilities.
  - 6) Provide analysis of and provision for any chemical storage and use provisions (fire separations/ratings, control areas, maximum allowable chemical storage, venting, etc.)
  - 7) Provide for and coordinate all clinical safety provisions and requirements.
  - 8) Provide eyewash, emergency shower and other safety equipment in clinical areas where chemicals, fluids, pathogen carrying materials or other such items or activities warrant safety equipment and provisions. Refer to Risk Management and Safety Design Considerations in section 8 of this publication.
  - 9) Safety and M&O to provide emergency shut-off requirements in labs, if required.

3.3.11 Audio/Visual Guidance - refer to CNM Audiovisual Service's Technology Enhanced Classroom Design Guidelines in the appendix.

These standards for audio-visual FF&E are general in nature. Specific design of audiovisual systems is to be coordinated with Owner.

- a. All infrastructure and building services are to be coordinated with audio-visual requirements. The building services required to support audio-visual systems are to be included in the design and construction packages of the project.
- b. Security issues of audio-visual equipment are to be addressed. Outside of security requirements for rooms, provisions such as keyed hardware at lecterns, A/V closets / racks, audio-visual specific security / alarm devices, and other items shall be addressed.
- c. Coordinate any front-end network, equipment or other provisions with Owner to support function of audio-visual systems.
- d. Specialized or unique classroom, teaching or laboratory environments beyond the conventional types noted below may need additional provisions to support their function.
- e. Classrooms – Large (30 – 50 person and over) and similar spaces/functions:
  - 1) Coordinate all lighting, acoustics/acoustical separation, access, building systems and other items for effective audio-visual systems function.
  - 2) Dual ceiling or rear projection room mounted projectors. Provide capability to project unique or duplicate program material, and coordination with audio and controls to be effective in either arrangement.
  - 3) Dual powered ceiling recessed projection screens, sized based on room design for image clarity and site lines. Capability to project unique or duplicate program material, and coordination with audio and controls to be effective in either arrangement.
  - 4) Ceiling mounted or desk mounted document camera, per Owner's option.
  - 5) Fixed ceiling and wall mounted speakers as appropriate for all program materials / sources.

- 6) Secured racks for head-end audio-visual equipment not contained in the lectern. Coordinate security/access provisions for closet or room based rack with Owner.
- 7) Lectern per CNM standard design to include:
  - i. Current spec rack mounted computer with 24" widescreen monitor
  - ii. DVD player
  - iii. Fixed and 2 mobile lapel microphones
  - iv. Document camera controls
  - v. Powered screen or flat panel monitor controls
  - vi. 6" minimum control panel (i.e. Creston), specified and programmed per Owner requirements
  - vii. All input and output controls and sources at lectern
  - viii. Laptop connections for audio and video
  - ix. Remote control
  - x. Room lighting controls, programmed per Owner requirements
  - xi. Other room environment controls (i.e. blinds if powered, other items) programmed per Owner requirements.
  - xii. Head-end equipment to support function in rack or A/V closet (i.e. codecs, encoders, remote control systems, processors, control headend, receivers, power conditioners, UPS, amplifiers, switches, mixers, other).
- f. Classrooms – Small (30 – 50 person and under) and similar spaces/functions:
  - 1) Coordinate all lighting, acoustics/acoustical separation, access, building systems and other items for effective audio-visual systems function.
  - 2) Single ceiling or rear projection room mounted projector minimum, dual preferred if possible. If dual is possible, provide capability to project unique or duplicate program material, and coordination with audio and controls to be effective in either arrangement.
  - 3) Single powered ceiling recessed projection screen minimum, sized based on room design for image clarity and site lines, dual preferred if possible. If dual is possible, provide capability to project unique or duplicate program material, and coordination with audio and controls to be effective in either arrangement.
  - 4) Ceiling mounted or desk mounted document camera, per Owner's option.
  - 5) Fixed ceiling and wall mounted speakers as appropriate for all program materials/sources.
  - 6) Secured racks for head-end audio-visual equipment not contained in the lectern. Coordinate security/access provisions for closet or room based rack with Owner.
  - 7) Lectern per CNM standard design to include:
    - i. Current spec rack mounted computer with 24" widescreen monitor
    - ii. DVD player
    - iii. Fixed and 2 mobile lapel microphones
    - iv. Document camera controls
    - v. Powered screen or flat panel monitor controls
    - vi. 6" minimum control panel (i.e. Creston), specified and programmed per Owner requirements
    - vii. All input and output controls and sources at lectern
    - viii. Laptop connections for audio and video
    - ix. Remote control
    - x. Room lighting controls, programmed per Owner requirements
    - xi. Other room environment controls (i.e. blinds if powered, other items) programmed per Owner requirements.
    - xii. Head-end equipment to support function in rack or A/V closet (i.e. codecs, encoders, remote control systems, processors, control headend, receivers, power conditioners, UPS, amplifiers, switches, mixers, other)
- g. Conference Rooms and similar spaces/functions:

- 1) Coordinate all lighting, acoustics/acoustical separation, access, building systems and other items for effective audio-visual systems function.
  - 2) Single ceiling or rear projection room mounted projector, or wall mounted flat panel display, sized appropriately, 50" minimum.
  - 3) Single powered ceiling recessed projection screen minimum, sized based on room design for image clarity and site lines, or wall mounted flat panel display, sized appropriately, 50" minimum.
  - 4) Fixed ceiling and wall mounted speakers as appropriate for all program materials/sources.
  - 5) Telephone line with teleconferencing telephone
  - 6) Laptop audio/video link at conference table. Conceal computer components under conference table where possible.
  - 7) Lectern per CNM standard design to include:
    - i. Current spec rack mounted computer with 24" widescreen monitor
    - ii. DVD player
    - iii. 6" minimum control panel (i.e. Creston), specified and programmed per Owner requirements, mobile
    - iv. Central input and output controls and sources at A/V source location
    - v. Powered screen or flat panel monitor controls
    - vi. Room lighting controls, programmed per Owner requirements
    - vii. Other room environment controls (i.e. blinds if powered, other items) programmed per Owner requirements.
    - viii. Laptop connections for audio and video
    - ix. Coordinate all security/access provisions for A/V cabinet/closet with Owner.
    - x. Head-end equipment to support function in cabinet mounted rack or A/V closet (i.e. codecs, encoders, remote control systems, processors, control head-end, receivers, power conditioners, UPS, amplifiers, switches, mixers, other)
  - h. Videoconference Facilities – All Room Types (Classrooms, conference rooms, other):
    - 1) Dual projection or monitors for sites and angles.
    - 2) One confidence monitor minimum (two preferred – one for distance material, one for local material) in rear, sized for effective viewing, 42" minimum.
    - 3) 2 cameras minimum, near and far
    - 4) Presenter and audience microphones to support program based needs (i.e. push to talk or other microphone systems to support videoconferencing functions.
    - 5) Head-end equipment to support video-conferencing functions.
- 3.3.12 ER and TR Closets - See ITS Manual in the appendix, manual overrides this summary. (*ER - Equipment room and TR - Telecom Room*)
- a. Provide one ER and any additional TRs as required to meet cable length requirements. The minimum space requirement for the ER is 11' x 16' and additional TRs must be at least 11' x 14', and at least 8 feet high ceilings. No false floors or ceilings.
  - b. ER and TR rooms shall be separate spaces not intended for joint use or any other purpose. Co-location of any non-data related equipment (custodial, electrical, HVAC, facility, storage) is not acceptable. Contractor, sub-contractor, and vendors shall not use the ER and TR rooms as storage within twenty-one days of Substantial Completion.
  - c. ER and TRs shall be directly accessible from a corridor or service hallway. ERs and TRs shall not be accessed through intermediary spaces (restrooms, electrical rooms, others) unless approved by Office of Information Technology and Project Manager. In some instances, ERs are preferable to be accessed through doors to the exterior or service yards. This shall be coordinated with Office of Information Technology and Project Manager.
  - d. ER and TR rooms shall have a separate HVAC thermostat and be air conditioned with a separate zone or air conditioning unit 24 hours a day, seven days a week.
  - e. Signs: Provide Owner's standard room signs.
  - f. Access control: keyed lock

### 3.3.13 Toilet Rooms

- a. Gang restrooms should not have doors for accessibility and safety. Sight lines should screen the toilet room interior from public view.
- b. Tile floors (12 x 12 is desirable, 6 x 6 is minimum size), tile walls at least to 6" above the partition height, preferably to the ceiling. Grout should be a medium to dark color. The floor and the wall grout should be the same color. The wall base should be a pre-manufactured cove base.
- c. Gypsum Board walls should be painted with washable semi-gloss paint.
- d. Provide at least one floor drain with trap guard per toilet room and slope the floor to the drain.
- e. Toilet partitions are required to be floor mounted and overhead braced. Partition material should be powder coated metal or phenolic core. Minimum stall width shall be 36" clear in new construction.
- f. Ceilings should be gypsum board painted with washable semi-gloss paint.
- g. Countertop material to be solid surfacing with integral backsplash.
- h. Integral sinks are acceptable, but trough or gang sinks are not acceptable.
- i. Moisture resistant backing is required in wet areas. (i.e. Dur-a-rock or equal).
- j. A continuous recessed light fixture at the back wall of the stalls and over the mirrored wall of the sink area is preferred, but not required.
- k. Lighting shall be carefully considered in toilet and restrooms to provide minimum required lighting levels per code and to be functional. Lighting shall also be specified and located for ease of access and maintenance.
- l. Drinking fountains (wall-mounted electric water cooler type) should be in the proximity of the toilet rooms. Provide Elkay by-level fountains with a bottle filler and filter.
- m. Provide outlet for custodial use in an inconspicuous location.
- n. Include one "Gender Neutral" restroom in each building. This restroom should be single occupant and accessible. Privacy lockset to have indicator window (vacant/in use).
- o. Privacy (Lactation) Room - Discuss the need for a privacy room in the building with the Owner's Project Manager. If one is to be included, provide the following in a comfortable, private room other than a bathroom stall or locker room:
  - 1) table and supportive chair
  - 2) easily accessible electrical outlet
  - 3) sink with adjacent counter
  - 4) dimmable lighting
  - 5) door that can be locked from the inside

### 3.3.14 Elevators

- a. Walls around elevators should be finished in hard durable surface. The surface should be cleanable, stain resistant and able to withstand impact from equipment.
- b. Equip elevators with an emergency telephone that connects directly to the Owner's Security Dispatch.
- c. Emergency telephones installed in elevators and areas of refuge telephones must be ADA accessible, including such visual signaling indicators for the hearing impaired.
- d. Doors should be stainless steel. CNM will apply Vandal Shield sacrificial film.
- e. Floors shall be rubber with a non-skid raised pattern in service or exterior elevators (i.e. garages). Flooring in all other elevators to be approved by Owner.
- f. Interior cabs shall be of metal, solid surface or other durable and high quality finishes that will discourage and hide vandalism and provide an attractive elevator cab finish.
- g. Elevator controllers and door operators shall not be proprietary.



- h. In addition to meeting all code requirements, elevator equipment rooms shall have access to allow for technicians to reasonably service equipment. Access to room shall be indirect so that it does not appear as a publicly accessible room. Co-location of any non-elevator equipment is not acceptable.
- i. Coordinate requirements for elevator equipment rooms. This may include location, access off service corridors (similar to other service spaces), proximity to elevator chase, building service requirements (power, data, telephone, HVAC/venting, other items) and other considerations.

#### 3.3.15 Custodial Closets

- a. Provide minimum one per floor with built-in shelving for janitorial supplies.
- b. The minimum requirement for any facility is 100 S.F. of custodial work space and equipment storage for every 20,000 S.F. of building space, with a 100 s.f. minimum.
- c. In addition to the above, for all buildings of 50,000 S.F. or more, a 120 S.F. storage area is required, with lights, fixtures, 120V 20 amp outlets, and switches where needed.
- d. Custodial closets shall be separate spaces not intended for joint use or any other purpose. Co-location of any non-custodial equipment (mechanical, electrical, data/telecommunications, storage, etc.) is not acceptable.
- e. Custodial closets shall be directly accessible from a corridor or service hallway. Custodial closets shall not be accessed through intermediary spaces (restrooms, electrical rooms, others) unless approved by Owner.
- f. Signs: Provide Owner's standard room signs.
- g. Access control: Key, unless otherwise requested by Owner.
- h. Provide HVAC/venting, power and other building services to address issues with any storage/venting of cleaning supplies or special considerations for custodial materials/equipment.
- i. Finishes: Walls to be painted semi-gloss gypsum board with min. 5'-0" high FRP panels on each side of the mop sink. Flooring can be sealed or painted concrete.

#### 3.3.16 Mechanical Spaces/Rooms

- a. Flooring can be sealed or painted concrete.
- b. Mechanics spaces shall be separate spaces not intended for joint use or any other purpose. Co-location of any non-mechanical equipment (custodial, electrical, data/telecommunications, facility/other storage, etc.) is not acceptable.
- c. Mechanical spaces shall be directly accessible from a corridor or service hallway. Mechanical spaces shall not be accessed through intermediary spaces (restrooms, electrical rooms, others) unless approved by the Owner. In some instances, mechanical spaces are preferable to be accessed through doors to the exterior or service yards. This shall be coordinated with the Owner.
- d. Building HVAC controls should be located in these spaces and not the electrical rooms or TR rooms. Consult with CNM's M&O for current control system information.
- e. Mechanical spaces and elements within shall be treated with sound, vibration and other attenuation measures to ensure they do not adversely impact the performance of the building and its spaces.
- f. All mechanical equipment is to be located in mechanical rooms. No mechanical equipment shall be located in rooms not specifically designated as mechanical rooms (i.e. storage areas and other areas.)
- g. Signs: Provide Owner's standard room signs.
- h. Access control: Key unless otherwise requested by Owner.
- i. Provide any standard or special building services to support mechanical room operations, conditions and other factors for performance. This may include but not be



limited to considerations for power, data, telephone, HVAC/venting and other considerations to address unique issues and performance requirements.

- j. House-keeping pads shall be provided for all equipment. When possible, conduit and piping penetrations into the mechanical space shall be made at the floor level and not the ceiling level. Floor sinks shall be located in appropriate areas and sized for full flow. Floor sinks shall be below the level of the surrounding area to allow for gravity flow.
- k. Data shall be included in all mechanical rooms for use of sub-metering.

#### 3.3.17 Electrical Spaces/Rooms

- a. Flooring can be sealed or painted concrete.
- b. Electrical spaces shall be separate spaces not intended for joint use or any other purpose. Co-location of any non-electrical equipment (custodial, mechanical, data/telecommunications, storage, etc.) is not acceptable.
- c. Electrical spaces shall be directly accessible from a corridor or service hallway. Electrical spaces shall not be accessed through intermediary spaces (restrooms, mechanical rooms, others) unless approved by the Owner. In some instances, electrical spaces are preferable to be accessed through doors to the exterior or service yards. This shall be coordinated with the Owner.
- d. Electrical spaces and elements within shall be treated with shielding, sound, vibration and other attenuation measures to ensure they do not adversely impact the performance of the building and its spaces.
- e. All electrical equipment and panels are to be located in electrical rooms. No electrical equipment shall be located in rooms not specifically designated as electrical rooms (i.e. storage areas and other areas.)
- f. TR/data rooms are separate rooms from electrical rooms/spaces and shall be addressed per the Owner's data/telecommunications standards for all aspects (i.e. building services/infrastructure, finishes, security/access control and other items).
- g. Signs: Provide Owner's standard room signs.
- h. Access control: Key unless otherwise requested by Owner for Electrical Rooms. TR rooms to have access control.
- i. Provide any standard or special building services to support electrical room operations, conditions and other factors for performance. This may include but not be limited to considerations for power, data, telephone, HVAC/venting and other considerations to address unique issues and performance requirements.
- j. Data shall be included in all electrical rooms for use of sub-metering.

#### 3.3.18 Storage Spaces/Rooms

- a. Storage spaces shall have sealed concrete. Alternate flooring material to be approved by the Owner.
- b. Walls: Paint – Eggshell
- c. Ceilings: Provide acoustical ceiling tile
- d. Doors: Wood stain grade doors (w/o lite) 36" min. width, larger as required. Consider metal doors w/o lite for specific applications.
- e. Storage spaces shall be separate spaces not intended for joint use or any other purpose. Co-location of other function in storage rooms (custodial, mechanical, data/telecommunications, storage, etc.) is not acceptable.
- f. Storage spaces shall be directly accessible from a corridor or service hallway. Storage spaces shall not be accessed through intermediary spaces (restrooms, mechanical rooms, others) unless approved by the Owner. In some instances, storage spaces are preferable to be accessed through doors to the exterior or service yards. This shall be coordinated with the Owner.

- g. Storage spaces shall be designed with module, sizing and building services in mind for potential future conversion to office space. See office requirements for additional information.
- h. Access control: Key, unless otherwise requested by Owner.
- i. Signs: Provide Owner's standard room signs.
- j. Storage rooms may have special requirements based on the contents to be stored in the room (i.e. security, temperature/humidity control, venting, etc.) Coordinate any special requirements with Owner.
- k. Provide built in storage items (i.e. casework, shelving, others) per Owner's requirements.

#### 3.3.19 Copy/Work Rooms

- a. Copy/Work Rooms shall have sealed concrete unless an alternate flooring material is approved by the Owner.
- b. Walls: Paint – Eggshell
- c. Ceilings: Provide acoustical ceiling tile
- d. Doors: Wood stain grade doors (w/o lite) 36" min. width, larger as required for equipment.
- e. Copy/Work spaces shall be separate spaces not intended for joint use or any other purpose. Co-location of other function in copy/work rooms (custodial, mechanical, data/telecommunications, etc.) is not acceptable. At times, storage functions may be accommodated in Copy/Work Rooms. If this occurs, Storage Area/Room design guidelines shall be coordinated.
- f. Copy/Work spaces shall be directly accessible from a corridor or service hallway. Copy/Work spaces shall not be accessed through intermediary spaces (i.e. offices, storage rooms, others) unless approved by the Owner.
- g. Copy/Work spaces/rooms shall be designed with module, sizing and building services in mind for potential future conversion to office space. See office requirements for additional information.
- h. Access control: Key unless otherwise requested by Owner.
- i. Signs: Provide Owner's standard room signs.
- j. Copy/Work space/rooms may have special requirements based on the activities and equipment requirements in the room (i.e. building services for equipment, venting, etc.) Coordinate any special requirements with Owner.
- k. Provide built in storage items (i.e. casework, shelving, others) per Owner's requirements.
- l. Coordinate with Owner the need for any lockable built-in items.

### 3.4 Building Materials

#### 3.4.1 General:

- a. The Owner requires to be involved in the building design and materials directly and will approve all building designs. Below is a listing of materials to guide design and construction so that consultants, contractors and vendors are well aware of Owner's preferences, minimum requirements and restrictions.
- b. All materials shall be chosen, designed and specified to address issues of constructability, appearance, durability, longevity of performance and ease/efficiency of maintenance. The character of finish options for materials (especially but not limited to exterior building materials) is to be selected based on its ability to provide a consistent and high-quality finish and selections, quality and characteristics must be coordinated with the Owner. Some examples here may include, but are not limited to:
  - 1) Concrete finishes. Concrete finishes shall be specified to address the natural qualities of concrete to provide a reasonably consistent finished surface and appearance and shall address inherent consistencies in concrete character (texture,

color and other) and natural properties of fabricating, installing and ongoing maintenance / aging of concrete. At a minimum, smooth and fine concrete textures shall not be specified, and more textured concrete finishes shall be used to hide any imperfections acceptable, based on the project specifications and the impacts of wear and aging of concrete.

- 2) Metal / metal panel finishes. Metal and metal panel finishes, colors, textures, reflectance quality, patterns, seam layouts and other characteristics shall be chosen, design and specified to address any potential or understood inconsistencies of metal and metal panel finishes. The overall composition of metals and metal panels should address any inconsistent finish issues or material quality to result in a cohesive and deliberate finish and overall composition. Issues including, but not limited to, design, fabrication and installation tolerances with metal and metal panel colors, textures, seams, reflectance quality and variance amount pieces, panels and other issues shall be carefully considered and addressed. The completed project should result in a consistent finish. Where a consistent finish cannot be achieved based on the material and its fabrication, the design shall account for inconsistencies in the material in a deliberate manner to result in an installation acceptable to the Owner.
- 3) Masonry, CMU, tile and other finishes. Masonry, CMU, tile and other similar finishes shall be thoroughly mixed on-site prior to installation where a similar masonry material (of the same finish specification) is being provided on project on continuous surfaces, and different deliveries, quarry pallets or fabrication runs of these materials are being provided. Mixing of these materials shall result in a consistent finish to continuous surfaces without any obvious differentiation of material, delivery pallet, quarry pallet, fabrication run or other inconsistencies. Similar measures and caution is to be taken with grout (and all components within, such as cement, water and other grout assembly components), coatings and other related finishes to ensure a consistent finish. Where design specifies a finish where material inconsistency (i.e. quarried material with significant variations in material appearance, or other) vendors shall work with Owner to achieve desired finish quality acceptable to Owner. Unless otherwise approved by Owner, these materials shall be installed with minimal surface projection or deviation.

#### 3.4.2 Exterior Building Materials

##### a. Preferred:

- i. Brick - Over the years, several different brick colors, patterns and sizes have been used on the TVI/CNM campus. (example: TVI Red Smooth, TVI Red Velour, Brown Velour) Most of these bricks are no longer available or would not be an exact match because of different batches and manufacturing methods.  
Some buildings were purchased from APS or the archdiocese and it is unknown what the exact brick is.  
For new construction, it is not desired to use brick as a dominant material, but it can be used as an accent for continuity on the campus, especially at Main and Montoya. The most recent use of brick is on main campus for the SRC and EC. These buildings used the Interstate face brick "Moroccan Brown" in both a modular 4x8 and emperor 4x16 size. Interstate is locally distributed by the Kinney Brick Company.
- ii. CMU block with color and finish enhancements such as honing or other, i.e. no standard gray precision block (examples: RPM, SRC)
- iii. Insulated metal panels, white (examples: SRC, EC or MS addition)
- iv. Cast-in place concrete.
- v. Factory applied coatings for high-quality appearance, durability and longevity.

- ##### b. Acceptable: Stucco, Composite Pre-cast panels, mechanically fastened stone/tile, metal standing seam roof, metal batten roof or similar.

- c. Not preferred: Adhered tile, glass block, clay/concrete roof tile, Corten steel, wood, painted or stained materials including block, fabric structures (except as a site feature), and tilt-up concrete panels.
- d. Other materials will be considered particularly where existing conditions warrant their use. Consider context with adjacent buildings/materials.
- e. Exterior masonry construction shall be sealed with an ultraviolet resistant, acrylic or siloxane based sealer.
- f. All exterior concrete, stone, CMU or other porous materials/finishes shall be covered with a sacrificial anti-graffiti coating. Coating shall go to twelve (12) feet above grade minimum on broken surfaces to a break line, reveal or joint that provides a clean break, and full height on wall surfaces with no easily identifiable break.
- g. Designs including exterior tile shall include specifications requiring appropriate special inspection of the exterior tile installation.

#### 3.4.3 Interior Building Materials

- a. Gypsum board: Specify abuse resistant gypsum board up to four feet high in all traffic areas.

#### 3.4.4 All building materials (Exterior and Interior) must have final approval from the Owner.

#### 3.4.5 Glazing

- a. Preferred: insulated clear glass
- b. Not preferred: tinted, reflective, and operable windows
- c. Exterior glazing should be shaded as appropriate. Shading needs to be designed to discourage pigeon roosting through design features or anti-pigeon roosting measures to be approved by Owner. Exterior windows with and without shading devices need to be designed so that they can be easily maintained and accessed for cleaning.

### 3.5 Hardware

#### 3.5.1 Mechanical Keys (Keys)

- a. All permanent cores, housings, and keys are to ASSA V-10 only. No substitutions will be allowed.
- b. Door locks shall have changeable cylinders. Lock cylinders/cores to be master keyed-six pin.
- c. CNM Lock shop will write key system, pin cylinders and cut keys.
- d. CNM Lock shop will supply key blanks and cylinders. Contractor to provide temporary cylinders.
- e. No full glass (Herculite) style doors and related hardware are to be used.
- f. No surface or concealed vertical rod exit devices. Provide rim exit devices with keyed removable mullions.
- g. No surface or automatic bolts are to be used on pairs of doors. Provide locksets on each door with a removable hollow metal mullion or a removable mullion.
- h. No magnetic locks are to be used.
- i. Refer to specification section 08 7100 Hardware in the Appendix for the Owner's hardware requirements.

#### 3.5.2 Electronic Access Control

- a. Designated exterior perimeter doors shall have an electric strike tied to the access control system. The Owner's Project Manager will determine with the Owner's Lock Shop and end user groups which exterior perimeter doors shall have card readers.

- b. If an entry is integral to student, faculty, staff or public access to a space or portion of the building (i.e. a set of doors in a bank of doors to a wing, classroom, etc.) they shall receive access devices.
- c. The Owner's Project Manager, working with the end user and the Technical Groups, will determine which interior doors are to receive electronic access control devices at start up and which interior doors are to receive conduit only for future electronic access control devices in compliance with room design guidelines and specific requirements.
- d. All classrooms shall have access control devices, hardware and programming to provide swipe-open, swipe-lock functionality where classrooms can have doors unlocked for set periods of time (i.e. a one-hour class) and locked after these unlocked periods of time, both based on programming and card swiping mechanisms.
- e. Define proper location of card readers (i.e. easy to swipe card free of obstructions). If a Classroom has more than one entrance, only one door should have a card reader, but both doors should be wired for a contact. The second door will be keyed according to the Master Key System, with only Security having a key.
- f. Refer to specification section 08 7100 Hardware in the Appendix for detailed requirements for the Electronic Access Control Systems.

### 3.6 Security Systems

#### 3.6.1 Emergency Phones and Intercoms

- a. The Owner's Communications Services is responsible for the purchase and installation of phones used throughout CNM. They also establish the type, model, and manufacturer requirements. Coordinate with Owner's Communications Services through the Owner's Project Manager on all communications requirements.
- b. Coordinate emergency phone locations with CNM Security Services and Owner's Telecommunications Services through the Owner's Project Manager. Emergency phones and intercoms are linked directly to the Owner's Security Services Dispatch. When activated, these devices solicit a security response.
- c. Inside the building, emergency phones may be installed in:
  - 1) designated areas of refuge
  - 2) isolated areas inside academic and administrative buildings
- d. In addition to emergency phones, other devices (such as intercoms) may be used for communicating emergencies. The locations of these items shall be coordinated with the Owner.

#### 3.6.2 Panic Buttons - Consult with CNM Security for possible locations of panic buttons. These are mounted to the underside of furniture and are part of construction because they are required to be hard wired.

#### 3.6.3 Security Cameras

- a. Unless specifically waived by Owner, projects shall have IP based fixed security cameras with full coverage of the site/exterior, appropriate for day/night lighting applications to provide acceptable resolution for viewing. Owner may require interior fixed IP cameras based on the specific requirements of the project.
- b. All security camera material shall be recorded to a DVR/NVR, per Owner's determination. Recording capability must be for 30 days minimum, and may be event based for recording.
- c. All security camera systems must tie into Owner's head-end security camera monitoring and recording system in a manner acceptable to Owner, to provide full function and seamless operations.
- d. All security camera systems and their elements must be non-proprietary or serviceable from several vendors who serve the Albuquerque area.

- e. Security cameras systems must interface and interact with the Owner's data network in a manner acceptable to the Owner, regarding performance, service, security and other considerations.
- f. All security camera systems shall include a 2-year service contract in the construction project budget for all security camera system elements (i.e. head-end elements, cameras, wiring, etc.).
- g. Security cameras head-end equipment shall be in a dedicated room, and shall not be co-located in other rooms (i.e. TR rooms, storage rooms, electrical rooms, etc.)

### 3.7 Roofing

#### 3.7.1 TPO (Thermoplastic Polyolefin) elastomeric, heat weldable sheet membrane.

- a. Thickness: 80 mil, roof protection pads: 60 mil
- b. Color: tan
- c. Warranty: Manufacturer's 20 year, no dollar limit, leak-tight, hail-resistant to cover total roof system.
- d. Acceptable manufacturers: Firestone or Carlisle

#### 3.7.2 Fall Protection

- a. All roof hatches will have protection rails. Roof ladders to have assist post.
- b. For low-slope "flat" roofs, if mechanical equipment or roof drains requiring maintenance are located within fifteen (15) feet of the roof edge, a guardrail, safety net, travel restraint or personal fall arrest system is required. It is preferred that mechanical units are not within fifteen (15) feet of roof edges. If they are, there must be a 42" high railing or parapet. Contractor to provide and install anchor posts (welded to structure) and cables as needed. Owner will provide lanyard and full body harness for maintenance personnel.
- c. The walking paths to the equipment also need to be protected by a railing if the path is within 15' from edge and there are no parapets. Provide a line (painted in safety yellow) 15' from edge if there are no parapets.
- d. If the operational point (where the employee needs to stand to work on equipment) is higher than the roof itself, additional railing and work platform will need to be provided for that piece of equipment.

#### 3.7.3 Skylights must be double domed with a diffused outer dome and of polycarbonate (not acrylic) material. They must be able to withstand 200 lbs. applied perpendicularly. At special conditions a heavy-duty grate (4x4 with 1/4" diam. wires) shall be installed on the interior. The grate will provide security and added fall protection.

### 3.8 Aluminum Storefront

#### 3.8.1 Acceptable Manufacturers: Kawneer or Tubelite.

#### 3.8.2 Materials: Extruded aluminum with clear or colored anodic finish and steel reinforcement where required.

#### 3.8.3 Framing Systems: Exterior to be thermally broken with 1" IGUs centered in frame (Kawneer VG451T or equal). Single glazed non-thermal frames to be 1/4" monolithic glazing, centered (Kawneer VG450 or equal).

#### 3.8.4 Entrance Doors: Wide stile with intermediate rail (Kawneer 500 heavy Wall Entry door or equal).

### 3.9 Toilet Compartments (metal or phenolic)

#### 3.9.1 Panels supported by pilasters anchored to floor and braced overhead with headrail.

#### 3.9.2 Metal face sheet thickness: partitions and door panels: 22 ga., pilaster panels: 20 ga.



Finish: Powder coated paint from manufacturer's standard colors

- 3.9.3 Panel thickness: partitions and door panels: 1", pilaster panels: 1 1/4"
  - 3.9.4 Toilet compartment panels: 58" high with 24" wide door
  - 3.9.5 Urinal screens: 18" wide by 42" high
  - 3.9.6 Hardware: hinges, 2 coat hooks with rubber bumper, slide latch with handle and door pull. Wheelchair accessible compartments must have pull on each side of out-swinging door and the door shall be self-closing. (ANSI 117.1 604.9.3)
- 3.10 Toilet Accessories
- 3.10.1 These items are all supplied and installed by CNM:
    - a. Waste Receptacles - *either style may be used*
      - 1) Rubbermaid - Slim Jim - Color: Gray  
23 gallon (#FG354060GRAY), 22lx11wx25h  
16 gallon (#1971258) used under countertops, 22l x 11w x 30h
      - 2) Tough Guy 23 gallon Gray, Open top Grainger/Mfr. model item #4PGU8,  
20l x 11w x 30h
    - b. Sanitary Napkin Disposal - Bobrick B-270
  - 3.10.2 These items are all supplied by CNM and installed by contractor:
    - a. Paper Towel Dispenser - TORK 87T
    - b. Bath Tissue Dispenser - TORK 56T
    - c. Soap Dispenser - symmetry 1.25 liter, #99011997
  - 3.10.3 Contractor responsible for purchasing and installing the following items:  
*All items to be mechanically anchored, with no double-sided tape.*
    - a. Glass Mirrors
      - 1) Single occupant toilets - Stainless Steel Frame - Bobrick B-290.
      - 2) Gang Restrooms - frameless mirror, adhered to the wall.  
Note: CNM Maintenance will apply Vandal Shield, a protective sacrificial film to all mirrors. This product is distributed in Albuquerque by Protective Shields.
    - b. Grab bars, Bobrick B-5806, in lengths as needed (18", 36", 42" etc.)
    - c. Mop Broom Holder and Rag hook - Bobrick B-224
    - d. Diaper changing stations - Basis of design: Koala Kare KB200, horizontal  
*Per new legislation in 2019.*
  - 3.10.4 Miscellaneous Accessories:
    - a. No electric hand dryers, no toilet seat covers, no hand sanitizer dispensers and no feminine hygiene dispensers.
    - b. Sharps containers: CNM has *some* sharps containers in designated areas, such as the Nursing school and Security department. There are no requirements for sharps containers in regular restrooms.
- 3.11 FFE - Fixtures, Furniture and Equipment
- 3.11.1 Furniture
    - a. Adaptive furniture such as height adjustable tables and chairs should be provided in the classrooms, computer labs, and general use areas (library, tutoring, etc.).

- b. Lumbar chairs should support 300 lbs. Bariatric chairs (without arms) should support 500 lbs. For more information contact the CNM Disability Resource Center.

#### 3.11.2 Projection Screens - motorized with cable tensioning

- a. Acceptable Manufacturers:  
Da-Lite Screen Co. (Tensioned Advantage Electrol) or Draper Inc. (Access Series V)
- b. Trim flange in ceiling openings to be recessed and suspended from threaded rods, aircraft cable or manufacturer approved straps.
- c. Viewing surface: Matte White, size 69" high x 110" wide unless otherwise requested, 16:10 aspect ratio with black drop material above viewing surface.

#### 3.11.3 Projection Screens - manual

- a. Acceptable Manufacturers:  
Da-Lite Screen Co. (Model C) or Draper Inc. (Luna 2)
- b. Wall or ceiling mounted with screen case. For wall mounted, provide blocking in wall.
- c. Viewing surface: Matte White, size 69" high x 110" wide unless otherwise requested, 16:10 aspect ratio with 6" of black drop material above viewing surface.

### 3.12 Furnishings

#### 3.12.1 Roller Window Shades

- a. Specify roller shades for all exterior windows.
- b. Specify standard plus black-out shades for special conditions.

#### 3.12.2 Entrance Floor Mats and Frames

- a. Recessed entrance mats consisting of aluminum frame and reversible grate type mate with reinforced tire rubber treads alternating with aluminum bars. Basis of design - Arden Architectural Specialties model G-218 Environtread II mat.
- b. Surface mounted mats. Basis of design - mats inc., walk-off mats and runners. Select series based on amount of traffic and aesthetics. Minimum 10' length and minimum width equal to door, semi-custom size.

#### 3.12.3 Residential Appliances

- a. Refrigerators, microwaves and coffee makers are supplied by Owner and to be located in specific Break Room areas only. Architect to confirm all required utilities and clearances.

## 4 MECHANICAL GENERAL DESIGN REQUIREMENTS

### 4.1 General

- 4.1.1 HVAC, plumbing, and fire sprinkler systems shall be designed to comply with the requirements of the adopted codes and regulations listed, with the most current edition of following reference standards as applicable to each specific project:
- ASHRAE Handbooks
  - ASHRAE Standards
  - International Energy Conservation Code and/or ASHRAE/IESNA Standard 90.1
  - SMACNA Duct Construction Standards
  - ASPE Data Books
  - Other codes as applicable

### 4.2 Energy Conservation

- 4.2.1 Mechanical and plumbing systems shall be designed and documented to comply with the requirements of the International Energy Conservation Code and/or ASHRAE/IESNA Standard 90.1.
- 4.2.2 In accordance with NRS 338.190, prior to the construction or renovation of any public building, a detailed life cycle cost analysis including the cost of operation and maintenance, must be completed. At the discretion of the Owner, a life-cycle cost analysis may be deleted on certain projects. The study shall identify measures for the conservation of energy (and shall consider the use of alternate non-fossil fuels when applicable). The analysis shall include comparisons of at least three different HVAC system types. The three different system types to be evaluated shall be reviewed and approved by the Owner prior to beginning the analysis. A separate narrative shall be provided outlining the building envelope insulating values (for walls, glass, roof, etc.) and specific HVAC system components (i.e. plate and frame heat exchangers, variable frequency drives, compensating type kitchen exhaust hoods, etc.) as they relate to energy conservation.
- 4.2.3 All Buildings shall comply with the minimum building sustainability design standards as defined by Owner for each project (typically a 20% reduction in both energy and water consumption beyond the values allowed by ASHRAE/IESNA Standard 90.1-2004).
- 4.2.4 Coordinate all energy conservation measures with sustainability requirements and policies.
- 4.2.5 If considering rooftop photovoltaic systems, provide an adequate number of roof hydrants (domestic cold water) for occasional washing of the solar panels. If a penthouse is present, wall hydrants are preferred. Consult with CNM M&O for hose lengths, i.e. hydrant spacing.

### 4.3 HVAC Systems and Equipment

- 4.3.1 HVAC systems and equipment shall be designed in conformance with all applicable sections of the ASHRAE Handbooks and ASHRAE Standards (e.g., ASHRAE Standards NO. 15, 55, 62, 90.1 etc.). The most current edition of all ASHRAE Handbooks and Standards shall be utilized.
- 4.3.2 Preferred base line system: VAV Air Handling systems with VAV terminal units with reheat coils, using the chilled water and heating hot water as a cooling and heating source. The Design shall be in agreement with ASHRAE 90.1-2007 and the ASHRAE AEDG for K-12 schools.
- 4.3.3 All selected systems must incorporate 100% air side economizers and water side tower free cooling through plate/frame heat exchangers.

- 4.3.4 Owner's Preferred systems. Water cooled central plants, single zone air handling systems, VAV air handling systems with terminal reheat.
  - 4.3.5 Acceptable systems: Water cooled packaged RTV's with VAV terminal units with reheat. Air cooled equipment is acceptable but not preferred and should be pre-approved by Owner. Owner reserves the right to reject any acceptable system offered in lieu of the preferred system.
  - 4.3.6 Non-acceptable systems: Multiple small RTV's and multiple water source heat pumps, maintenance intensive, and absorption chillers.
  - 4.3.7 Life cycle cost analysis shall be presented for each project including the first costs, utility costs and maintenance costs. Energy consumption should be evaluated in detail indicating all ECM's (energy conservation measures).
  - 4.3.8 All equipment and equipment rooms shall be designed to ensure adequate provisions for service, maintenance, and removal/replacement of equipment, filters, controls, etc. Special consideration shall be given to ensure proper clearances for maintenance and removal of chiller and boiler tubes, fan housings, fan shafts, and filters.
  - 4.3.9 Access to equipment for service and maintenance shall be thoroughly coordinated with Owner. Required clearance areas shall be specifically identified on the drawings (for equipment such as fan coils, variable air volume boxes, indoor air handling units, etc.). Coordinate with other disciplines to ensure that other trades (electrical, fire sprinkler, etc.) are made aware of the required clearances. Coordinate with FF&E plans.
  - 4.3.10 Rooms containing electrical equipment (transformers, switchgear, telephone, data equipment, etc.) shall be thoroughly reviewed and coordinated with the architect, the electrical engineer, and the Owner (IRS) to ensure that service clearances and cooling requirements are appropriately defined and addressed. Use building exhaust system for the electrical rooms whenever possible. Provide a dry cooler system for the cooling of the TR rooms and data rooms in winter or heating season when the central plant cooling service is down.
  - 4.3.11 Project specifications shall limit the length of the flexible ducts to a maximum of 6 feet.
- 4.4 Central Plant (Chilled Water)
- 4.4.1 Utilize only primary/secondary pumping system with VFD's on all chilled water and condenser water pumps. Variable primary pumping systems shall be used only when preapproved by Owner on specific projects.
  - 4.4.2 Locate chilled water plant equipment at ground level.
  - 4.4.3 Provide plate/frame heat exchangers with integral strainers and P/T ports and flow sensors on both sides for water-side economizer operation.
  - 4.4.4 Provide drain valves in chw and cw piping at plate heat exchanger.
  - 4.4.5 Utilize counter-flow induced draft cooling towers whenever possible/practical.
  - 4.4.6 Specify cooling tower hot and cold basins (wetted surfaces) to be all stainless steel construction.
  - 4.4.7 Provide side-stream condenser water filter and tower basin sweep system (either centrifugal filter or air/dirt separator with motorized ball valve for automatic purge).
  - 4.4.8 On projects that incorporate two chillers provide two separate cooling towers (incorporate valved equalizing line between towers and/or cell basins).
  - 4.4.9 The chiller schedule should include the following information and/or options:  
The required minimum chiller efficiency – specifically the Integrated Part Load Value (IPLV), the required refrigerant (typically R-134a), BACnet MS/TP interface for remote

communication with ddc control system, contacts for remote start/stop and for remote monitoring of alarm/failure status, capability for remote adjustment of CHWS temperature, capability to unload to 10% of maximum capacity, suction service valves and compressor sound blankets.

- 4.4.10 The compressor oil filters are to be replaced just prior to the end of the one year warranty period by the chiller manufacturer's authorized service representative.
  - 4.4.11 Water chillers shall be energy efficient with the best kw/ton rating in the corresponding categories, listed in ASRAE 90.1.
  - 4.4.12 All refrigerants shall meet ASHRAE 15 and 34 and shall be classified as A1 refrigerants.
  - 4.4.13 Refrigerant equipment rooms and chillers shall be acoustically covered, blankets, ceilings and walls such that STC-50 conditions are maintained.
  - 4.4.14 RER shall have floors and walls sealed water-tight with plenum rated materials. No fiberglass un-backed products are acceptable.
  - 4.4.15 All piping shall be suspended by acoustically isolated spring hangers.
  - 4.4.16 Floor supported or suspended equipment shall be secured with seismic snubbers and/or seismic bracing.
  - 4.4.17 Provide acoustical, vibration and other attenuation/separation in all central plant areas to meet the operations and performance requirements of the building.
- 4.5 Central Plant (Heating Water)
- 4.5.1 Select boilers/pumps for 100% to 120% of design load (two boilers at 50% to 60% capacity each). No boiler is to have an IBR > 1.99 MBH.
  - 4.5.2 Utilize high efficiency gas-fired copper fin-tube boilers (87% minimum combustion efficiency).
  - 4.5.3 Design/calculate heating water system utilizing a 180°F hws temperature.
  - 4.5.4 Select pumps for a minimum 20°F temperature difference (30°F is typically appropriate).
  - 4.5.5 Utilize primary/secondary pumping (vfd's on secondary pumps)
  - 4.5.6 Equip boilers with contacts for remote start/stop and alarm monitoring. Monitoring devices shall communicate directly with campus EMS.
  - 4.5.7 Locate heating water plant equipment at ground level.
  - 4.5.8 Provide modulating 3-way bypass valve at each boiler (to prevent condensation problems in boiler).
  - 4.5.9 The boiler schedule should include the following information and/or options: List the required minimum boiler efficiency, contacts for remote start/stop, contacts for remote monitoring of alarm/failure status, and list the desired/required pressure relief valve pressure rating.
  - 4.5.10 Boiler rooms shall have floors and walls sealed water-tight with plenum rated materials. No fiberglass un-backed products are acceptable.
  - 4.5.11 Provide acoustical, vibration and other attenuation/separation in all central plant areas to meet the operations and performance requirements of the building.
- 4.6 Air Handling Units (Variable Air Volume)
- 4.6.1 Provide Supply and Return air measuring devices.
  - 4.6.2 Provide dual low leakage opposing blade outside air dampers (one for economizer and one for minimum outside air).
  - 4.6.3 Provide backdraft damper(s) in exhaust air at each vav air handler.

- 4.6.4 Provide CO<sub>2</sub> sensor(s) at each air handling unit in mixed air plenum to modulate minimum outside air cfm. Shall be direct reading at CNM EMS.
  - 4.6.5 Select cooling coils with an entering water temperature of no less than 45°F.
  - 4.6.6 Provide humidification and direct evap. cooling where possible, when required with an RO water misting system as the preferred method.
  - 4.6.7 Direct drive fans are preferred. Direct drive fan wall systems are preferred where possible.
  - 4.6.8 List internal pipe chase as a required option in the schedule for each outdoor A.H. unit.
  - 4.6.9 Provide internal air conditioned VFD and control panel compartment(s) as may be applicable.
  - 4.6.10 System design shall result in building pressurization of between .02" and .05" w.c.
  - 4.6.11 Energy recovery systems shall be utilized and implemented as much as possible on each project. Run-around coils system and heat pipes are acceptable systems. Heat wheels shall not be utilized, due to high maintenance costs.
- 4.7 Variable Air Volume Boxes (Terminal Units)
- 4.7.1 Specify VAV boxes with maximum, minimum, and reheat cfm (100%, 20% & 50%, respectively, all adjustable).
  - 4.7.2 Designate a 36" by 36" service/access area at each VAV box (boxes no more than 18" above ceiling).
  - 4.7.3 Require electrical disconnect, control enclosure, and reheat coil connections to be located on the same side of each vav box (to allow for access from a single service/access location).
  - 4.7.4 Provide discharge air temperature sensor at each VAV box and flow cross measuring devices for each.
  - 4.7.5 Schedule/specify VAV boxes for a total air pressure drop of no more than .60" w.c. (combined pressure drop thru both damper and reheat coil) and with reheat coils selected to ensure a discharge air temperature not lower than 85°F.
  - 4.7.6 Schedule/select terminal units with maximum, minimum, and reheat cfm values of 100%, 20%, and 50% respectively.
  - 4.7.7 Schedule/select terminal units with a total air pressure drop of .60" w.c. or less (total pressure drop to include the combined air pressure drop thru both the damper and the reheat coil). Terminal units should also be selected with an inlet velocity between 1700 and 2300 fpm (2000 fpm plus or minus 15%) to ensure controllability at the minimum and reheat cfm set-points.
- 4.8 Fan Coil Units (serving data closets, server rooms, and TR rooms)
- 4.8.1 Dedicated fan-coil unit shall be utilized for all TR rooms in order to maintain the room temperatures between 72°F and 75°F. Consultant is to confirm with Owner (ITS) the room temperatures during design. TR rooms shall be properly zoned in order to provide the alternate source of cooling during the winter/heating season when the central plant cooling service is shut down. Adequate back-up shall be designed (dry cooler or DX system) for winter operation.
  - 4.8.2 Provide a discharge air temperature sensor at each fan coil unit.
- 4.9 Electrical Rooms Ventilation
- 4.9.1 Utilize exhaust system for all electrical rooms providing the adequate transfer ducts from the building R/A plenums. Provide fire dampers at all duct penetrations through fire rate walls.



#### 4.10 Air Handling Units

- 4.10.1 VFD and control panel compartment(s) need to be conditioned with supply air.
- 4.10.2 Clarify/note that air handling units are to be configured with a minimum of 6" between the heating coil and the cooling coil (to allow for installation of an averaging type temperature sensor between the coils). Provide at least one hinged access door to allow access to the space between the coils.
- 4.10.3 Provide bell mouth supply air fittings.
- 4.10.4 Provide factory-installed air vents at the top of each coil.

#### 4.11 Variable Frequency Drives

- 4.11.1 Furnish vfds with input line reactors (to limit harmonic distortion to 5% or less).
- 4.11.2 Locate all vfds inside the conditioned building envelope or in an appropriately air conditioned air handling unit compartment (conditioned compartment to be sized for vfds and temperature control panel).
- 4.11.3 Coordinate with the electrical engineer to ensure that electrical disconnects are required to be installed on the line side of each vfd (since installing a disconnect on the load side of a vfd can result in permanent damage to the vfd if the disconnect is opened with the vfd in operation).

#### 4.12 Miscellaneous

- 4.12.1 Schedule fire/smoke dampers with an air pressure drop no greater than .05" w.c.
- 4.12.2 Provide pressure/temperature test at inlets and outlets of Hydronic equipment.
- 4.12.3 Provide individual high torque actuators at all valves and dampers (no multiple control using linkage).
- 4.12.4 Provide current sensors on all fan motors and on all pump motors.
- 4.12.5 Air filter differential pressure sensors shall be analog type (to read and display actual pressure drop).

#### 4.13 Plumbing Systems and Equipment

##### 4.13.1 General

- a. The minimum number of plumbing fixtures shall be determined in accordance with International Building Code Chapter 29.
- b. Plastic piping shall not be used inside any building, except for acid waste piping, deionized water piping, or other process piping when specifically approved by Owner. In cases where plastic piping is approved to be utilized inside a building, the piping shall have a flame spread and smoke developed rating of 25/50 or less.
- c. In cases where plastic piping is utilized below a floor slab (to accommodate corrosive soil conditions or to accommodate other unusual design parameters) the requirements for bedding depth, bedding width, and bedding material shall be carefully evaluated, clearly specified, and the piping system installation shall be inspected and approved prior to covering. The transition from plastic to cast iron shall be made approximately three inches above the floor slab with flexible coupling.
- d. Wherever a plumbing pipe penetrates a concrete slab-on-grade, the pipe shall be protected with a minimum of 1/2" thick insulation (typically closed cell elastomeric type insulation). Where site water table conditions warrant, pipe sleeves & watertight seals shall be specified at each penetration of a floor slab or foundation wall.

- e. All plumbing fixtures shall be specifically designed to conserve water. Maximum water usage by specific fixture type shall be as follows:
  - 1) Water Closets - 1.28 gallons per flush
  - 2) Urinals - 0.5 gallons per flush
  - 3) Restroom lavatories - 2.2 gallons per minute (automatic shut-off at .25 gallons or less)
  - 4) Showers - 2.0 gallons per minute
- f. Water closets shall be wall-mounted type (except in remodel construction where existing wall or chase space does not allow for wall-mounted type) unless written authorization is obtained from Owner allowing floor-mounted water closets.
- g. Accessible shut-off valves shall be installed to allow for isolation of groups of plumbing fixtures (such as at restrooms, kitchens, laboratories, and at each floor of a multi-story building).
- h. A shut-off valve and pressure reducing valve with full size bypass and pressure gauges shall be installed on the domestic cold water riser in each building.
- i. Water hammer arrestors shall be provided as required to protect against noise and damage from water hammer (sizes and locations shall be in accordance with the ASPE Data Book or other recognize standard).
- j. The domestic cold water service to each building shall incorporate a reduced pressure backflow preventer to protect the water supply from backflow. The reduced pressure backflow preventer shall be located inside the building whenever possible (to maximize access for service and maintenance and to minimize the potential for freezing). Confirm required/acceptable location with the local water utility.
- k. The fire sprinkler water service to each building shall incorporate a double check detector assembly or a reduced pressure backflow preventer to protect the water supply from backflow. The selected device shall be located inside the building whenever possible at not more than 5' AFF or grade. Confirm required/acceptable location with the local water utility.
- l. When the water service configuration requires a reduced pressure backflow preventer located inside the building the design shall incorporate an adequately sized receptor and drain piping to ensure that a full discharge (from backflow preventer failure) or water will be directed to the exterior of the building. Device not to be more than 5' AFF.
- m. Provide for re-circulation of domestic hot water at a point immediately behind each bank of low-flow lavatory faucets such that no more than two feet of domestic hot water piping is un-circulated.
- n. Provide a balancing valve at each domestic hot water re-circulating branch.
- o. Provide a seismic gas shut-off valve on the gas piping just prior to entering each building. Seismic gas valve as manufactured by Pacific Seismic Products (equipped with optional Model MS remote monitoring switch to be interfaced with the direct digital control system). Gas piping immediately adjacent to the seismic gas valve shall be secured to the building utilizing a unistrut channel brace.
- p. Plumbing Equipment Schedules
  - 1) Specify on plumbing equipment schedule that motors 1 hp and larger are to be premium efficiency.
- q. Plumbing Plan Requirements
  - 1) Coordinate all utilities with the civil engineer and the civil drawings (including waste inverts).
  - 2) Clarify intended gas distribution pressure and pressure regulator requirements.
  - 3) Provide a seismic gas shutoff valve immediately outside the gas service entrance to the building. Specify method of securing the adjacent gas piping to the building, with unistrut channel bracing.

- 4) Depict and note that domestic hot water is to be re-circulated immediately behind each group of lavatories (within two feet of each faucet to ensure hot water availability within a reasonable time period at low flow faucets).
  - 5) Provide enlarged plumbing plans (or isometric diagrams) for restrooms, laboratories, central plants, and other areas with congested plumbing. Provide separate enlarged plans (or isometric diagrams) for domestic water piping and for waste and vent piping.
  - 6) Clarify provisions for draining the cooling tower (including dam for preventing rainwater from entering exterior drain box).
- r. Fire Sprinkler Requirements
- 1) Provide a separate fire riser room which is accessible from outside the building.
  - 2) Provide a separate fire sprinkler floor plan sheet to clarify/indicate the general fire sprinkler system requirements. The sheet should include as a minimum the fire riser location, a fire riser diagram, and the location of the inspector's test station (at a location that is substantially remote from the fire riser location).
  - 3) Review/coordinate fire department connection location with the local fire department and with the civil engineer.
  - 4) CNM Safety Department to review plans.
- s. Adequate fire extinguishers shall be installed to meet code compliance as part of the project.
- 4.13.2 Metering for water and gas
- a. Water Meters - Banyan series
  - b. Gas Meters - Onicon F5400 series thermal mass flow or equal that can speak BACnet, Modbus or pulse.
- 4.13.3 Seismic Bracing for Mechanical Systems
- a. All equipment, ductwork, and piping, shall be braced for the applicable seismic forces. Seismic bracing requirements shall be specifically identified on the plans.
  - b. Seismic bracing specifications shall require compliance with all applicable codes and shall require compliance with the means and methods outlined in the National Uniform Seismic Installation Guidelines (NUSIG) manual, the International Seismic Application Technology (ISAT) manual, or an approved equivalent.
- 4.13.4 Mechanical/Roofing Coordination
- a. Ductwork, piping, and conduit shall be routed below the roof on all new construction projects and to the best extent possible on all remodel projects. Any design requiring ductwork, piping, or conduit to be exposed above a roof requires written approval from the Owner.
  - b. Air handling units located above the roof shall be specified with integral disconnects, integral receptacle outlets, and integral chases designed to accept all required piping and conduit.
  - c. Mechanical design drawings shall incorporate roofing coordination details. The applicable mechanical roofing coordination details shall be reviewed with the Architect prior to incorporation into the design documents to confirm that the details are suitable for the project and to ensure conformance with the Architect's roofing system design requirements.
- 4.13.5 Ductwork Plan Requirements
- a. Identify on the plans the designated service/access area at each terminal unit, fan coil unit, and fire-smoke damper utilizing a shaded area on the floor plan.
  - b. Provide a detail clarifying that no piping, ductwork, conduit, and/or ceiling hangers are to be installed in the designated service/access area. The detail should also indicate that

terminal units and/or fan coil units are to be installed no more than 18" above the ceiling (to facilitate ladder access).

- c. Provide a detail clarifying that terminal units are to be installed with a minimum 24" length of straight duct at the inlet (10'-0" maximum length) at the same size as the inlet connection and with a minimum 48" length of lined duct at the outlet.
- d. Coordinate access to all terminal unit and/or fan coil unit locations with light fixtures shown on the electrical drawings.
- e. Review all duct and pipe routing with the architect and the structural engineer to ensure that the ductwork and piping (including fire sprinkler piping) will fit into the available space above the ceilings after allowing for electrical conduit, light fixtures, etc.
- f. Locate duct static pressure sensors for control of supply fan vfd's on the appropriate ductwork plan.
- g. Review/coordinate fire/smoke damper locations with the architect and with the exiting plan. Route ductwork to minimize the required number of fire/smoke dampers.
- h. Provide a single line duct drawing identifying the design cfm, velocity, and pressure drop (per 100 feet) in each section of medium pressure duct (upstream of terminal units).
- i. All ducts shall be designed to withstand the greatest positive or negative pressure capability of the fan(s) serving the system.
- j. All supply ducts are to be insulated, minimum R-8 UNO.

#### 4.13.6 Piping Plan Requirements

- a. Piping and/or ductwork shall not be routed in the dedicated electrical space at or above electrical switchboards, distribution boards, or motor control centers.
- b. Locate fan coil units serving data/electrical rooms outside of the data/electrical room.
- c. Require that the bottom of all air handling unit pipe chases be insulated and sealed air and water tight.
- d. Provide location of differential pressure sensors for chilled water system and heating water system secondary pump vfd control (locate differential pressure sensors on the appropriate piping plans).
- e. Specify all valves as 2-way except for 3-way valves at one air handling unit at end of longest run.
- f. Indicate required type of balancing valve at all chilled water and heating water coils. Valves to be automatic pressure-compensating type valves.
- g. Specify/note that temperature/pressure test ports are to be installed immediately at connections at each chiller, at each plate heat exchanger, and at each heating and/or cooling coil.
- h. Provide isolation valves at or near the plate heat exchanger to facilitate periodic removal of port filters for cleaning. Provide notation requiring that isolation valves be installed as close as possible to the heat exchanger (to ensure a minimal loss of treated water when heat exchanger is drained to clean port filters).
- i. Provide a drain valve with a hose connection at the low point in the piping at both the cold side and warm side of the plate heat exchanger (to facilitate drain-down for removal and cleaning of port filters).
- j. List required chilled water system and heating water system fill pressure and expansion tank charge pressure.
- k. List required chilled water system and heating water system relief valve pressures.
- l. Provide a 12" high inverted loop in the condenser water return piping at each cooling tower (to prevent overflow of tower basin when condenser water pumps are shut off).

- m. Specify/note that all heat traced piping exposed outdoors is to be insulated with closed cell polyisocyanurate insulation (ITW, or approved equal) and covered with aluminum jacketing.
- n. Provide a venturi type flow sensor in the secondary chilled water supply and in the secondary heating water supply (to allow for assessment of potential problems with variable secondary flow). This requirement can be addressed by incorporating a Flow Design Model EF Accu-Setter venturi/valve combination. A more accurate alternative for applications requiring remote assessment via the ddc control system is a magnetic flow meter (Onicon Model F-3000, or equal).

#### 4.13.7 Mechanical Load Calculations and Equipment Capacity

- a. Load calculations are to be prepared utilizing maximum occupant loads that are based on an assessment of the intended use for each space in the building (which is generally somewhat less than the occupant load determined as part of the architect's life safety or exiting analysis). Prepare and submit a written summary sheet (developed/provided by both the architect and the engineer) listing / comparing both the life safety exiting occupant load and the estimated maximum occupant load (utilized in cooling load calculations) for each space in the building.
- b. Provide a summary calculation of the continuous general exhaust cfm (from restrooms, janitor's closets, etc.) associated with the area served by each air handling unit. This information is utilized in the control sequences to clarify testing and balancing procedures for each air handling unit and is also utilized to evaluate the minimum outside air quantities required for building pressurization.
- c. Provide a summary calculation listing the total of all vav box maximum cfm values (separate total for each air handling unit) to allow for an assessment of the diversity between the total maximum air flow and the air handling unit supply fan cfm).
- d. Provide a summary calculation listing the total of all chilled water coil and all heating water coil gpm values (to allow for an assessment of the diversity between the total coil flows and the secondary pump gpm).
- e. Provide a summary/comparison sheet to list the capacity of each boiler and chiller as a percentage of the calculated building peak block heating and cooling loads.

## 5 MECHANICAL EQUIPMENT

### 5.1 General

5.1.1 All HVAC, Plumbing and Fire Sprinkler shall comply with the requirements of the most current adopted editions of the following codes, regulations, and references:

- a. International Building Code (IBC)
- b. Uniform Mechanical Code (UMC)
- c. Uniform Plumbing Code (UPC)
- d. Uniform Fire code (UFC)
- e. National Fire Codes (NFPA Standards)
- f. B31.1 Power Piping Code
- g. ASHRAE Handbooks
- h. ASHRAE Standards
- i. International Energy Conservation Code (IECC)
- j. SMACNA Duct Construction Standards
- k. National Uniform Seismic Installation Guidelines
- l. ASPE Data Books
- m. NAC Chapter 618 (Boilers and Pressure Vessels)
- n. Americans with Disabilities Act / ANSI 117.1
- o. The American National Standard for Accessible & Usable Buildings & Facilities
- p. Local codes and ordinances as may be applicable

### 5.1.2 HVAC Systems and Equipment

- a. HVAC equipment shall be rated for an elevation of 2100 feet above mean sea level.

### 5.1.3 Maintenance

- a. All equipment and equipment rooms shall be designed to ensure adequate clearances for maintenance of filters and removal of chiller and boiler tubes, fan housing, and fan shafts.

### 5.2 Electrical Requirements for Mechanical Equipment

5.2.1 All motors over ½ horsepower shall be premium efficiency type. Motors shall be open drip-proof (ODP), or totally enclosed fan cooled (TEFC), IF in high heat or high humidity locations or outside installation. Minimum motor efficiencies at full load shall be as follows:

- a. 1.0 HP 86% 50.0 HP 94.1%
- b. 5.0 HP 89.5% 100.0 HP 95.1%
- c. 10.0 HP 91%

5.2.2 Those motors that will be controlled by a frequency drive shall be inverter rated. Any motor that could possibly have a frequency drive installed at a future date shall be inverter rated.

### 5.3 Basic Materials and Methods

5.3.1 All equipment, ductwork, and piping shall be braced for the applicable seismic zone. Seismic bracing requirements shall be specifically identified in the Contract Documents (such that bracing requirements and/or methods are not merely left to the discretion of the Contractor).

### 5.4 Heating Hot Water Boilers



- 5.4.1 Hot water boilers shall be designed to provide 180 degrees F boiler water. Boilers shall be designed and constructed in accordance with ASME Boiler & Pressure Valve Code Section IV and designed for 250 degrees F and 160 psig.
- 5.4.2 Burners shall be modulating.
- 5.4.3 Modular, gas-fired boilers up to 1,900,000 BTU/h that can communicate with CNM EMS directly are non-condensing type, copper fin tube, 87% minimum thermal efficiency. Units shall be forced draft with modulating burners, and controls.
- 5.4.4 The specifications for projects including a boiler shall require that the contractor apply for and obtain all required boiler inspections and operating permits (as required by the New Mexico Construction Industries Division, Occupational Safety and Health Enforcement Section. The contractor shall obtain an installation application prior to beginning any work and shall apply for a final inspection as required to obtain the boiler operating permit). Reference NRS 455C.
- 5.4.5 All new gas burners on boilers will have an IRI (Industrial Risk Insurers) approved gas train.

## 5.5 Water Chillers

- 5.5.1 Chillers shall comply and be tested in accordance with ARI 550/590. Pressure vessels shall be in accordance with ASME B&PV Code Section VIII. Units shall be factory assembled including evaporator, condenser, compressor, lubrication system, refrigerant charge and controls/wiring. Chillers shall be UL listed.
- 5.5.2 The chiller shall have a graphic control panel with a stand-alone microprocessor to control the chiller. The display shall include the following:
  - a. Chiller liquid leaving temperature
  - b. Chiller liquid entering temperature
  - c. Condenser liquid entering temperature
  - d. Condenser liquid leaving temperature
  - e. Percent full load amps
  - f. Operating hours
  - g. Input kW
  - h. Evaporator pressure
  - i. Condenser pressure
  - j. Oil Sump Temperature
  - k. Oil pressure
- 5.5.3 Microprocessor shall be able to communicate directly with Owner's EMS.
- 5.5.4 Compressor drives shall be VFD drives.

## 5.6 Cooling Towers

- 5.6.1 Cooling towers to be designed and constructed in accordance with the Cooling Tower Institute and CTI 201.
- 5.6.2
- 5.6.3 Cooling towers to be either cross flow or counter flow design, 2-cell, induced flow type designed for outdoor use with all-around 316 stainless steel construction with PVC fill and mist eliminators. Low noise axial fan with V-belt drive. Where exposed to freezing conditions, cold water basin to have electric basin heaters.
- 5.6.4 Cooling tower basin shall be equipped with a basin cleaning system consisting of PVC piping and nozzles. A tower filtration system for the condenser water system shall be provided in a form of full-flow air/ dirt separator with automatic drain valve and manual bypass valve. Flame spread of all materials used shall be 25 or less.

- 5.6.5 The cooling tower where required, shall have an OSHA-compliant handrail around the top and/or side where access is necessary and cage ladder to all platforms. Permanent access from grade to the platform shall be provided.
- 5.7 HVAC Equipment: Spot Cooling Applications
  - 5.7.1 For high density cooling applications, such as computer/server rooms or other sensitive electronic equipment, that requires constant 24/7 cooling: the product allowed is Liebert precision air conditioning systems.
- 5.8 Heat Exchangers
  - 5.8.1 Plate and Frame Heat Exchangers
  - 5.8.2 For free cooling systems, a plate and frame heat exchanger shall be specified. Heat exchanger shall be sized for a 2 degree F approach. 304 stainless steel plates and nitrite, EPDM or BUNA N gaskets. Flanged connections to be 150# ANSI raised faced flanges. Frames shall be epoxy painted carbon steel. Frame bolting to be stainless steel with carbon steel nuts. Provide in line conical stainless steel strainer.
- 5.9 Air Handlers
  - 5.9.1 Roof top air handlers shall be built in accordance with AMCA and ARI standards and shall be factory assembled and tested. The exterior casing shall be 22 gauge steel or better with 2" thick acoustic panels. Unit shall have a C-channel steel base and 14 gauge floor plate. Unit shall have fully gasketed access doors same thickness as walls. Minimum door dimensions are 24" x 72". Finish shall be epoxy prime coat and acrylic finish. Centrifugal backward incline or air foil fans shall be steel or aluminum. Minimum bearing life to be AFBMA L - 10 200,000 hours.
  - 5.9.2 Dampers shall be air-foil opposed blade, low leakage with end spring seals.
- 5.10 Unitary Air Conditioners
  - 5.10.1 Window or wall-mounted air conditioners are not acceptable. Where space cooling is needed and the building primary system cannot be used, split DX cooling systems with a remote condenser shall be used.
- 5.11 Air Distribution Systems - Laboratory Ventilation Systems
  - 5.11.1 Ducts shall be sheet metal, per latest SMACNA standards.
  - 5.11.2 Pressure rating shall be equal to maximize positive or negative pressure of connected fans.
- 5.12 Piping Specialties
  - 5.12.1 Ball Valves shall be full-port.
  - 5.12.2 All dielectric separations shall be made with clear flow nipples. Bronze fittings are not an acceptable separation.
- 5.13 Centrifugal Pumps
  - 5.13.1 Centrifugal pumps shall be horizontal, end-suction type or horizontal in-line type. Impellers to be bronze, pump casings to be cast iron. Mechanical shaft seals shall be specified. All shaft bearings to be ball bearings with AFBMA L10 life of 100,000 hours. Suction and discharge connections to be 125# flat face flanges. Pump impeller shall be selected for best efficiency and be between 50% and 80% of the maximum impeller diameter.
  - 5.13.2 Pump speed shall be 1750 RPM, direct driven by squirrel cage, induction motor, TEFC type. Motors shall have a 1.15 service factor.

- 5.13.3 Pump accessories shall include a triple duty valve on the discharge and flexible connections on both the inlet and outlet connections. Pumps shall have a low point drain connection and high point air release connection, minimum 3/4" NPT.

#### 5.14 Water Treatment

- 5.14.1 All new water treatment chemicals shall be approved by CNM prior to its introduction to the system.
- 5.14.2 All new hydronic water pipe shall be initially cleaned before start-up of any equipment.
- 5.14.3 No untreated water shall be allowed to remain in any closed or open loop system or its related equipment after leak tests have been completed.
- 5.14.4 Specialized systems such as RO, DI, etc shall, after testing, remain in service with fluids being maintained at specified conditions.

#### 5.15 Testing, Adjusting, and Balancing

- 5.15.1 Who Performs: Testing, adjusting and balancing (TAB) shall be performed by an independent testing agency. The project shall provide an allowance for Owner to hire an independent testing agency. The test and balance agency will visit the project during the installation of the HVAC system. TAB shall be a certified AABC firm.
- 5.15.2 Witnessing: No work shall be done unless the TAB firm is accompanied by representatives of the owner's Facilities Management HVAC Shop. The TAB firm shall give the owner's Office of Planning and Construction three working days notice prior to beginning work. If the TAB firm fails to coordinate with Owner and performs work, this work shall be repeated, with CNM representation, at no cost to Owner. The contractor may have representatives accompany the TAB.
- 5.15.3 Deficiencies: Deficiencies uncovered during TAB shall be corrected at no cost to Owner.

## 6 BUILDING AUTOMATION AND CONTROL SYSTEMS

### 6.1 General

- 6.1.1 The control system shall tie into the existing Compass server. Minimum 25% spare capacity in communications capabilities shall be provided for future requirements. Points lists and control strategies for various HVAC design items will be provided by the engineer of record for approval by Owner at each phase of submittal.
- 6.1.2 Every building shall be evaluated for the use of Environmental Management and Control System (EMCS). Final decision regarding the use of EMCS shall be made by the Owner's Office of Planning & Construction.
- 6.1.3 Any Building Automation and Control System installed at CNM must be fully compatible and transparent to the existing installed Compass Enterprise server. Interface protocol connections must be evaluated and approved by owner's Energy Management and Controls Systems representatives.
- 6.1.4 The control system shall provide the option to monitor and report electrical, gas, water consumption and other energy consumable, billable usage. The ability to correctly monitor and report these consumptions shall be demonstrated to Facilities Management personnel by the Contractor. Measurements, to insure accuracy and operability, shall be by independent instruments. All data retrieved by the system shall be capable of trending and historical data collection methods.
- 6.1.5 There shall be no annual maintenance or licensing fees of any kind required to be paid by the Owner at any time during the ongoing use of the installed system and software. Licenses shall be issued and authorized as directed by Owner. Licenses shall be issued such that they can be modified by owner without the permission of the contractor and/or local system integrator. Specific license wording and format shall be provided as part of the contractor's submittals.

### 6.2 EMCS Standardization

- 6.2.1 The CNM campus uses a control system as the standard Environmental Management and Control Systems (EMCS). Owner's Facilities Management has standardized the campus EMCS, based on the equipment and technical support provided by the BACS Compass server. The CNM campus standard is to be maintained, and represents the cost effective method for campus operation, monitoring and maintenance. Buildings are monitored and controlled from a central computer station located in the Campus Services Building (CSB). All EMCS are to be monitored and controlled with an Internet TCP/IP protocol to the existing central EMCS computer station.
- 6.2.2 All projects will be provided with the most current version of software and hardware for the EMCS. Multiple systems must have full access and archiving for all program changes. The EMCS must have full capability for saving of histories data. Modernization or remodel projects will comply with this standard.
- 6.2.3 Fire/Life Safety systems will provide a single input to the EMCS system to indicate an alarm condition with the Fire/Life Safety System.

### 6.3 Sequence of Operation

- 6.3.1 Specific sequence of operation for each building shall be provided by the engineer of record in all phases of design development.
- 6.3.2 At the completion of construction, a commissioning process shall insure that all requirements of this specification and the Sequence of Operation are adhered to.

#### 6.4 Communications

- 6.4.1 Communication between the network controller and the equipment controllers shall be via Ethernet backbone. Communication between the equipment controllers and application specific controllers shall be via BACnet MS/TP network.
- 6.4.2 All third party software and hardware must seamlessly communicate with the control system.
- 6.4.3 Static TCP/IP addresses shall be obtained from the CNM IT/NOC Department through the CNM EMS Controls Shop. The project is shall provide all work, equipment, and material to connect the building to the Building Control System located currently in the Campus Services Building.

#### 6.5 Training

- 6.5.1 Upon completion of the commissioning process, the Control Contractor shall provide formal training to the Owner's Facilities Management on the operation of all control system software features, shall provide a complete explanation of the control sequence for each item of equipment, and shall provide instructions on the operation and maintenance of all control devices.
- 6.5.2 Formal training on programming and engineering will be provided for the Owner's CNM Maintenance personnel.

#### 6.6 Warranty Period Services

- 6.6.1 The Contractor shall provide full service for the temperature control system for a period of one year after the date of Substantial Completion.
- 6.6.2 The Contractor shall provide a scheduled monitoring and reporting service.

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## 7 ELECTRICAL GENERAL DESIGN REQUIREMENTS

### 7.1 General

- 7.1.1 The most current editions of the following codes, regulations, and standards shall be used in electrical systems designs:
- a. National Electric Code
  - b. National Electric Safety Code
  - c. National Fire Codes (NFPA Standards)
  - d. Uniform Building Code
  - e. Uniform Fire Code
  - f. Model Energy Code
  - g. ASHRAE 90.1-2007
  - h. Lighting Handbook published by the Illuminating Engineering Society (IES)
  - i. IEEE Recommended Practice Color Book Series published by the Institute of Electrical and Electronics Engineers
  - j. Commercial Building Telecommunications Wiring Standard, EIA/TIA 568, published by the Electronic Industry Association and the Telecommunications Industries Association
  - k. Commercial Building Standard for Telecommunications Pathways and Spaces, EIA/TIA 569, published by the Electronic Industry Association and the Telecommunications Industries Association
  - l. New Mexico State Fire Marshal's Regulations
  - m. Americans with Disabilities Act
  - n. Local codes and ordinances as may be applicable
- 7.1.2 All electrical equipment and equipment rooms shall be designed to ensure adequate provisions for service, maintenance, and removal/replacement of electrical equipment, panels, switchboards, transformers, generators, etc.
- 7.1.3 All electrical equipment, light fixtures, etc. shall be securely anchored to resist earthquake loads.
- 7.1.4 Electrical calculations are required for all aspects of the electrical systems. The minimum calculations required for each project are:
- a. Energy code Compliance calculations
  - b. Lighting calculations for all spaces (interior and exterior) in accordance with ASHRAE 90.1-2007
  - c. Feeder voltage drop calculations in accordance with ASHRAE 90.1-2007
  - d. Short circuit calculations
  - e. Service load calculations (Per NEC)
- 7.1.5 Electrical circuits should be assigned and dedicated to differing elements of the electrical system and related elements (i.e. building controls, smoke detectors, duct detectors and other items), so that important and critical building systems are not designed to share electrical circuits among unique and different systems (i.e. the building controls systems should not be on the same circuits as duct detectors). Circuiting design must accommodate discrete operations of these types of systems on independent circuits.

### 7.2 Energy Conservation

- 7.2.1 The electrical design shall take all steps economically feasible to insure the lowest energy consumption possible.



- 7.2.2 Lighting design shall exceed the requirements of IECC by 20% by utilizing energy efficient lamp and ballast combinations. Incandescent sources will not be used.
- 7.2.3 Buildings shall utilize 480/277 volt three phase distribution systems, unless otherwise approved by the Owner. Each building shall have its own service transformer.
- 7.2.4 7.2.4 Coordinate all energy conservation measures with sustainability requirements and policies.
- 7.2.5 If considering rooftop photovoltaic systems, provide two 3" conduits from main electrical room to stub-outs or penthouse on the roof.

### 7.3 Electrical Equipment

- 7.3.1 Electrical distribution equipment-switchboards, distribution boards, panel boards and dry-type transformers shall be located in interior rooms dedicated as electrical rooms. Exceptions must be approved by Owner.
- 7.3.2 The main service entrance main disconnecting means must be provided with a shunt trip operated from the main electrical room exterior.
- 7.3.3 All electrical distribution boards, motor control centers, panel boards shall have a minimum of 25% spare positions but as a minimum 6 poles.
- 7.3.4 Dry type transformers shall be Energy Star compliant. Coordinate heat generation requirements with the project mechanical engineer. Transformer coil shall be copper.
- 7.3.5 All equipment buses shall be copper.
- 7.3.6 Provide means for harmonic suppression for equipment that are likely to have significant harmonic content.
- 7.3.7 Power factor correction shall be utilized for suspected highly inductive/capacitive loads. Design to maintain a total building power factor of greater than 0.90 at all times.

### 7.4 Conduit/Raceways

- 7.4.1 All conductors are to be enclosed by conduit or other suitable means, e.g., totally enclosed cable trays, surface raceways.
- 7.4.2 Flexible conduit in lengths exceeding six feet in length are not to be used. AC or MC type cables shall not be used.
- 7.4.3 PVC conduit shall be used only below grade.
- 7.4.4 Fittings electrical metallic tubing (EMT) shall be galvanized steel, watertight, compression type. Rigid threadless and die-cast fittings are not permitted.

### 7.5 Conductors

- 7.5.1 All conductors shall be copper.
- 7.5.2 Minimum power and lighting conductor size is #12 AWG.
- 7.5.3 7.5.3 Conductors shall be sized for voltage drop in accordance with ASHRAE 90.1-2007.

### 7.6 Lighting

- 7.6.1 Special use areas or areas used for multiple purposes, which may require unusual levels of illumination, shall be reviewed with Owner and approved during the early stages of design.
- 7.6.2 Fluorescent fixtures shall be specified with high frequency electronic ballasts having a total harmonic distortion of 20% or less and a power factor of 90% or greater. Ballasts shall be program start only.

- 7.6.3 Automatic lighting shutoff shall be provided in accordance with ASHRAE 90.1-2007. Lighting controls shall be provided for all building spaces unless otherwise approved by Owner. Lighting shall be controlled by motion sensors, multi-level switching, daylight dimming or on/off control, and/or time-scheduling devices as appropriate.
- 7.6.4 Multiple lighting control override switches shall be provided throughout the building to accommodate custodians and occupants during after-hours building use. Number of switches, locations, and circuits/zones controlled shall be submitted to Owner for review, at each phase of the design process.
- 7.6.5 In-ground exterior light fixtures shall not be specified.
- 7.6.6 Specify affordable light fixtures from established companies that provide technical support and allow CNM the ability to get readily available parts.
- 7.6.7 Exit and Emergency lighting: Basis of Design - Exitronix, part of the Barron Lighting Group, shall be used for exit lights, emergency lights and combination exit and emergency lights.
  - a. VLED-U-WH-EL90-G2 Double faced LED Combination Exit sign with LED lamp heads - self testing - red letters - 90 min. operation - white 120/277V
  - b. LED- 90-G2 Emergency Light with LED lamp heads - self testing - red letters - 90 min. operation - white 120/277V
  - c. VEX-U-BP-WB-WH-EL90-G2 LED Exit sign -Thermoplastic - LED lamp heads - self testing - red letters - 90 min. operation - white 120/277V and battery backup.
- 7.6.8 In the instance where a Lighting Control System is selected, the Lighting Control System shall be Native BACnet providing a connection through the CNM LAN utilizing BACnet IP or via the Campus BACnet MS/TP Network. Providing the Read/Write capabilities through the Alerton server in the CNM SRC Facility.

## 7.7 Grounding

- 7.7.1 All circuit grounds shall be made up such that a continuous path is reliably maintained to a grounding electrode or system. The ground field (ufer, grids, plates, etc.) shall have a maximum resistance of 5 ohms.
- 7.7.2 Special consideration shall be given to grounding of sensitive office equipment (computer, servers, data circuits, etc.).

## 7.8 Telephone and Data Systems

- 7.8.1 In all new buildings, and where required as part of the project scope of work, the design shall provide for communications pathways and spaces for the elements of the communications systems including, but not limited to, multi-service communication systems, twisted-pair systems, coaxial cable systems, and optical fiber systems.
- 7.8.2 Coordinate the extent and layout of conduits, raceways, conductors, and cables with the Using Agency and allow for significant but reasonable changes in use of the spaces served.
- 7.8.3 Coordinate telephone and data systems with detailed Data/Telecommunication requirements per Tab C and Section 16741 standards.
- 7.8.4 Coordinate design and building services in IDF rooms, server rooms and other data service rooms with Owner's OIT Department through the Project Manager.
- 7.8.5 All projects are to have wireless capability. A wireless survey is to be conducted for wireless system design. Construction budget shall include all conduit and cable (power and data) necessary to support full wireless service and coverage. This may also include wireless services at site/exterior portions of the project.
- 7.8.6 Coordinate all requirements by complying with CNM standards for low voltage wiring.

- 7.8.7 Contractor shall provide test results and labeling for all data cabling (copper, fiber etc.) prior to substantial completion. Results to be submitted to the Owner in electronic format.
- 7.8.8 The hard-wired emergency phones are Ramtel RR733 one button with enclosure. Coordinate with Owner for pole specifications.

#### 7.9 Fire Alarm Systems

- 7.9.1 New buildings shall be equipped with a fire alarm system when required by the International Building Code. When a fire alarm system is required, the system shall be designed in conformance with the requirements of the International Building Code and the International Fire Code.

#### 7.10 Generator

- 7.10.1 When a standby generator is required due to elevator or other mechanical loads, an exterior mounted-weatherproof generator set will be provided. If generator will also serve exit and egress lighting, diesel shall be the fuel choice. It shall also have a sound attenuating enclosure.
- 7.10.2 Emergency generators shall be specified for a combined mechanical and electrical efficiency of 80% or greater.
- 7.10.3 Emergency generators shall be specified with the capability for recovery to 90% of the rated voltage and 90% of the rated frequency within 1 second (60 cycles).
- 7.10.4 Provide integral 75% resistive load bank.
- 7.10.5 Provide BACT analysis for any generators. Approval of generator during design, prior to ordering, fabrication and installation, must be coordinated through the Project Manager with Owner's Risk Management and Safety Department, Clark County Department of Air Quality Management and other applicable agencies.
- 7.10.6 Location of generator needs to be coordinated with outside air intakes of new project, as well as surrounding buildings. Generators must be screened from view, with appropriate access, service and operational clearances provided.
- 7.10.7 Provide emissions control equipment for regulatory requirements and do not disrupt the use of open spaces and adjacent facilities through emissions or odors from generators.

#### 7.11 Testing of Electrical Systems

- 7.11.1 Specifications shall include testing requirements (including documentation of test results) as are appropriate for the electrical systems utilized in the project. Testing and testing documentation requirements shall be in accordance with a recognized testing standard (such as those published by the International Electrical Testing Association, the Institute of Electrical and Electronics Engineers, or the James Biddle Company).

#### 7.12 Metering

- 7.12.1 Measurements: Meters shall measure voltage and amperage of all phases, KW, KVA, Power Factor, accumulated KWH, peak KW demand for a 15-minute period, and harmonics/power quality as necessary.
- 7.12.2 Locations: Meters shall be installed on each main service of a building. Sub-meters shall be installed on motor control centers serving major HVAC equipment and other major services.
- 7.12.3 Communications: Provide and install all communications and network devices necessary to fully communicate with the existing campus metering network provided by Alerton. Communications are via the Campus BACnet MS/TP Network to the Alerton software on the Alerton server in the CNM SRC Facility.

- 7.12.4 Software: All systems must be fully compatible with the Alerton system. All interfaces and protocols must be transparent to the user/owner. Any software modifications or adds must be approved by Owner and will be installed and fully tested and operational.
- 7.12.5 Meter Selection: Meters shall be selected using Veris E5 or equivalent. All meters must be compatible with and communicate with the CNM Alerton BACnet system. Final meter selection shall be approved by Owner.

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## 8 RISK MANAGEMENT AND SAFETY DESIGN CONSIDERATIONS

### 8.1 General

#### 8.1.1. Risk Management and Safety General Building Considerations

- a. Fire/Life Safety
  - 1) Sprinkler Systems (Drains)
  - 2) Fire Alarm Systems
  - 3) Fire Extinguishers (type, location, access, compliance with code)
  - 4) Smoke Detectors (type, location, access, compliance with code)
  - 5) Egress (Stairways, Exits)
  - 6) Stair Design (size, tread)
  - 7) Fire Rated Walls (compliance with code)
  - 8) Automatic External Defibrillator Locations and building services
- b. Occupational Safety
  - 1) Accessibility and access safety issues – i.e. Stairway/Ramp Handrails
  - 2) Lighting – location, quality, coverage, other factors
  - 3) Code required signage, i.e. exit signs, room occupancy signs, building evacuation signs, NFPA required signs, other factors
  - 4) Ventilation Systems (Air Handling Vis-à-vis Hoods), other factors
- c. Lab – Chemical Safety
  - 1) Hoods
    - i. General Chemistry
    - ii. Organic – Stainless steel or other solvent resistant hood
    - iii. Metals - Polypropylene or other polymer based acid resistant hood
    - iv. Radiochemistry
    - v. Iodine/No Iodine (filtration)
    - vi. Stainless Steel Hoods for Radiochemistry
    - vii. Perchloric Acid Chemistry
    - viii. Welded/smooth Stainless
    - ix. No nooks or crannies for perchloric acid to hide
    - x. Wash down system
  - 2) Eyewashes, Safety Showers, Sinks, Drains – locations, water/drain service, other considerations
  - 3) Provide code analysis for chemicals to be used/quantities, maximum use and storage of chemicals, and code requirements (fire separations/ratings, required control areas, egress, other considerations) to meet code requirements.
  - 4) Chemical storage, management and disposal and impact of building systems/elements (Biosafety cabinets (vented/non-vented), chemical collection/disposal and design/materials of sewer system, neutralization as necessary, text sample collection boxes on sewer system for chemical management verification, other considerations.)
  - 5) NFPA Diamonds
- d. Lab – Biological Safety
  - 1) Biosafety Levels (I, II, and perhaps III)
  - 2) HEPA Filtration Systems
  - 3) Biosafety Cabinets
  - 4) Eyewashes, Safety Showers, Sinks, Drains – locations, water/drain service, other considerations